Turkey Point Units 3 and 4

LICENSE AMENDMENT REQUEST FOR EXTENDED POWER UPRATE

ATTACHMENT 7

Supplemental Environmental Report

This coversheet plus 35 pages

This Attachment 7 contains the Supplemental Environmental Report describing the impacts to the natural and human environment associated with the proposed Extended Power Uprate for the Turkey Point Nuclear Plant.

1.0 EXECUTIVE SUMMARY

This Supplemental Environmental Report contains the Florida Power & Light assessment of the environmental impacts of the proposed Turkey Point Nuclear Plant PTN 3 and 4 extended power uprate (EPU) from the current core power level of 2300 megawatts-thermal (MWt) each, to 2644 MWt each. With the EPU, the Nuclear Steam Supply System (NSSS) level (with the pump heat) will be 2652 MWt. The intent of this Supplemental Environmental Report is to provide sufficient information for the U.S. Nuclear Regulatory Commission (NRC) to evaluate the environmental impact of the EPU in accordance with the requirements of 10 CFR 51. This report is applicable to both PTN Units 3 and 4.

FPL obtained state approval of the Uprate Project under the Florida Electrical Power Plant Siting Act (PPSA), Chapter 403, Part II, Florida Statutes (F.S.). The PPSA provides a centralized review process for new electrical generating facilities in Florida that involves a balancing of the increasing demand for electrical power plants with the broad interests of the public. The Florida Public Service Commission (FPSC), which is the sole forum for the determination of need for a proposed facility, approved FPL's petition for determination of need for the EPU on January 7, 2008. On January 18, 2008, FPL submitted a Site Certification Application for the Turkey Point Unit 3 and 4 Uprate Project (SCA) (Reference 1.1) to the Florida Department of Environmental Protection (FDEP) which acts as the coordinator for the remainder of the site certification process, with input from various state, regional, and local agencies, along with interested citizens. The Secretary of the FDEP made a final positive determination by issuance of a Final Order Approving Site Certification and the Conditions of Certification-Florida Power & Light Company-Turkey Point Plant Units 3 and 4 Nuclear Power Plant/Unit 5 Combined Cycle Plant on October 29, 2008, (Reference 1.2) approving the uprate project. Included in the Conditions of Certification are requirements for additional monitoring before and after operating at EPU conditions. Issuance of the Certification demonstrates compliance with the requirements of the federal consistency provision (Section 307) of the federal Coastal Zone Management Act under Florida statutes.

The EPU project will increase the electrical output from both PTN 3 and PTN 4 without substantially changing the footprint of the existing plants. The increase in the output of the Plant will be accomplished primarily by modifications to the existing plant equipment. The only additions to support the EPU outside the power block consist of a minor expansion of the switchyard to accommodate equipment needed to deal with increased fault currents and a temporary EPU warehouse. The two units will require modifications to the turbine-generators and attendant support and control systems. All turbine modifications will incorporate state-of-the-art technology that will provide greater efficiency and result in fuel savings over the long term.

The Project will not require certification of any associated linear facilities, such as electrical transmission lines or rail lines.

The generation of low-level radioactive waste will not increase significantly over the current generation rate. There will be minimal changes in the volume of radioactive effluents (liquid and gaseous) released to the environment. Although the radioactive contents of the liquid and gaseous releases will increase slightly, they will remain bounded by the analysis in the Final Environmental Statement (FES) related to Operation of Turkey Point Plant; Florida Power and

Light Company (FPL) (Reference 1.3). All offsite radiation doses will remain small and within applicable regulatory requirements.

This Supplemental Environmental Report is intended to provide sufficient detail on both the radiological and non-radiological environmental impacts of the proposed EPU to allow the NRC to make an informed decision regarding the proposed action. It does not reassess the current environmental licensing basis or justify the environmental impacts of operating at the current licensed reactor core thermal power level of 2300 MWt each. Rather, this document demonstrates that the effects of operating under EPU conditions are bounded by the original analyses documented in the FES, the more recent Supplement 5 of the Generic Environmental Impact Statement for License Renewal: Regarding Turkey Point Plant, Units 3 and 4 (GEIS) (Reference 1.4), or by other current regulatory limits and that plant effluents will remain within levels permitted by existing regulations and the Industrial Wastewater Facility Permit (Reference 1.5) issued by the State of Florida. As a result, FPL has determined that the EPU would not significantly affect human health or the natural environment.

References

1.1 Florida Power & Light Company (FPL), 2008, Site Certification Application (SCA), Turkey Point Uprate Project, January 2008.

1.2 State of Florida Department of Environmental Protection, Final Order Approving Site Certification with Exhibit A: Conditions of Certification of Turkey Point Plant Units 3 and 4 Nuclear Power Plant/Unit 5 Combined Cycle Plant, October 29, 2008.

1.3 U.S. Atomic Energy Commission (AEC), 1972, Final Environmental Statement (FES) related to Operation of Turkey Point Plant; Florida Power and Light Company. Docket Nos. 50-250 and 50-251.

1.4 NRC, 2002, NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 5, Regarding Turkey Point Plants, Units 3 and 4 – Final Report, January 2002.

1.5 Turkey Point Industrial Wastewater Facility Permit (Permit No. FL0001562), Issued May 13, 2005 by Florida Department of Environmental Protection.

2.0 INTRODUCTION

PTN 3 and 4 are wholly-owned by Florida Power & Light (FPL). FPL, the principal subsidiary of FPL Group, Inc., is the largest electric utility in Florida. FPL serves more than 8.6 million people (approximately 4.4 million customer accounts) along the eastern seaboard and the southern and southwestern portions of Florida. FPL serves customers in all or parts of 35 Florida counties.

PTN 3 and 4 are part of the 11,000 acre Turkey Point Plant located in an unincorporated part of Miami-Dade County. Units 1, 2 and 5 are fossil-fuel fired steam-electric generating units co-located with the nuclear units. All five lie in the developed area of the Turkey Point Plant.

PTN 3 and 4 are located on the shore of Biscayne Bay approximately 25 miles south of Miami. This location is latitude 25° 26'04" North and longitude 80° 19'52" West in Sections 27, 28, 29, 31, 32, 33, and 34, Township 57 South, Range 60 East. The majority of Miami-Dade County's urban development is to the north. The city of Homestead, the closest municipality, is approximately 4.5 miles to the northwest of PTN 3 and 4.

FPL is committed to operating the Turkey Point Plant in an environmentally responsible manner. Plant activities including design, construction, maintenance, and operations are executed in a manner so as to protect the human environment and to responsibly manage natural resources. The Turkey Point Plant has operated for more than 37 years consistent with state and federal environmental regulations, while providing safe, reliable, and economical electrical power to electric ratepayers in Florida.

FPL proposes to increase the electrical generation resources to its system at PTN 3 and 4. The nuclear power units are of comparable design, each consisting of a pressurized water reactor with three steam generators that produce steam that turns a turbine to generate electricity. Each is licensed to operate at a licensed core thermal power level of 2300 MWt. After the project is complete, the licensed core thermal power of each unit will be 2644 MWt. The proposed uprate would serve the future power requirements of the State of Florida, and the region.

This environmental evaluation is provided pursuant to 10 CFR 51.41 and is intended to support the NRC environmental review of the proposed uprate. The proposed EPU would require the issuance of an operating license amendment.

10 CFR 51.41 requires that applications to the NRC be in compliance with Section 102(2) of the National Environmental Policy Act (NEPA) and consistent with the procedural provisions of NEPA (40 CFR 1500-1508).

In the 1972 FES (Reference 2.1), the AEC evaluated impacts for operation up to the maximum power level of 2300 MWt for each unit and concluded that the issuance of the full term operating license, subject to certain conditions related to monitoring and any necessary corrective actions, was the appropriate course of action under NEPA. This decision was based on the analysis presented in the FES and the weight of environmental, economic, and technical information reviewed by the AEC. It also took into consideration the environmental costs and economic benefits of operating PTN 3 and PTN 4.

In January 2002, the NRC published Supplement 5 of the Generic Environmental Impact Statement for the License Renewal of Nuclear Power Plants (Reference 2.2) that addressed the license renewals for PTN 3 and PTN 4 in which the NRC determined that the adverse

environmental impacts of license renewal (i.e., operating an additional 20 years) are not so great that preserving the option of license renewal for energy-planning decision makers would be unreasonable.

General information about the design and operational features of PTN 3 and PTN 4 that are of interest from an environmental impact standpoint is available in several documents. In addition to the FES and the GEIS discussed above, other comprehensive sources of information include the Updated Final Safety Analysis Report, prepared and maintained by FPL, and the January 2008 Site Certification Application (Reference 2.3).

References

2.1 U.S. Atomic Energy Commission (AEC), 1972, Final Environmental Statement (FES) related Operation of Turkey Point Plant; Florida Power and Light Company, Docket Nos. 50-250 and 50-251.

2.2 NRC, 2002, NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 5, Regarding Turkey Point Plants, Units 3 and 4 – Final Report, Supplement 5, January 2002.

2.3 Florida Power & Light Company (FPL), 2008, Site Certification Application (SCA), Turkey Point Uprate Project, January 2008.

3.0 PROPOSED ACTION AND NEED

The discussion below of the proposed action and need for power comes primarily from the 2008 Turkey Point Uprate Project Site Certification Application (Reference 3.1) and the Public Service Commission Order (Reference 3.3) on that application.

The Turkey Point Plant (Figures 3-1 and 3-2) is located in an unincorporated area of Miami-Dade County on an FPL-owned 11,000-acre site. It is bordered by the Atlantic Ocean to the east and is about 8 miles east of Florida City, 4.5 miles southeast of Homestead, and adjacent to the 13,000-acre Everglades Mitigation Bank (EMB), also owned by FPL. Five steam-electric generating stations are co-located at the Turkey Point Plant. Units 1, 2, and 5 are fossil-fuel fired while PTN 3 and 4 are nuclear units. PTN 3 and 4 are south of Turkey Point Units 1, 2 and 5 and comprise approximately 30 acres. See Figure 3-3 (Site Map).

3.1 Proposed Action

The proposed action is to increase the licensed reactor core power for PTN 3 and 4 from the current level of 2300 MWt to an uprated core power level of 2644. This change in core power level will require the NRC to amend the facility's operating license.

The proposed action is considered an EPU by the NRC since the modifications that are required to be made to PTN 3 and 4 are significant and the power uprate is greater than 7 percent. Refer to Licensing Report (LR) Section 1.0 for a description of the uprate related modifications. The Turkey Point Extended Uprate Project will increase the electrical output from both PTN 3 and PTN 4 without substantially changing the footprint of the existing plant. The increase in the output of the Plant will be accomplished by modifications to the existing plant equipment. In addition there will be two changes outside the power block consisting of a minor change to the switchyard to accommodate equipment needed to deal with increased fault currents and a temporary warehouse to support EPU, both of which will be on previously impacted land. There will be no significant visual alteration to the appearance of the site.

No significant environmental impacts have been identified from the Uprate Project. The uprated Plant is expected to operate within existing permit limits for PTN 3 and 4 and will avoid approximately 0.6 million tons per year of CO_2 that would be emitted from a comparable natural gas-fired plant.

PTN plans to implement the modifications necessary to support the power uprates at PTN 3 and 4 during the 2010, 2011 and 2012 refueling outages. Upon NRC approval of the EPU license amendment request and following completion of the scheduled outage periods as well as completion of power ascension and testing, PTN 3 is expected to begin operating at the EPU core rated power level of 2644 MWt in the Spring of 2012, and PTN 4 in the Fall of 2012.

3.2 Need for Action

The proposed action is intended to provide an additional supply of electric generation in the State of Florida without the need to site and construct new facilities, or to impose new sources of air or water discharges on the environment. FPL has determined that increasing the electrical output of the PTN 3 and 4 is the most cost-effective option to meet the demand for electrical energy while

enhancing fuel diversity and minimizing environmental impacts, including the avoidance of greenhouse gas emissions.

On September 17, 2007, FPL submitted a separate Petition to Determine Need for Expansion of Electrical Power Plants (Reference 3.2), including PTN 3 and 4, to the Florida Public Service Commission (FPSC) pursuant to Section 403.519, Florida Statutes (F.S.). That Petition, along with supporting documentation, addressed the manner in which the Project will meet the need for electric system reliability, integrity and adequate electricity at reasonable cost; described how the Project is the most cost-effective alternative available; and why there are no renewable energy sources and technologies or conservation measures taken by or reasonably available to FPL to mitigate the need for all or a portion of the Project.

On December 10, 2007, the FPSC held a hearing on FPL's Petition to Determine Need and approved the Petition. The FPSC approved the stipulated positions by bench decision and granted FPL's petition for a determination of need (Reference 3.3)

References

3.1 Florida Power & Light Company (FPL), 2008, Site Certification Application (SCA), Turkey Point Uprate Project, January 2008.

3.2 Florida Power & Light Company's Petition to Determine Need for Expansion of Electrical Power Plants and for Exemption from Rule 25-22.082 F.A.C. dated September 17, 2007.

3.3 Public Service Commission (PSC) Order Number PSC-08-0021-FOF-EI, dated January 7, 2008.

Figure 3-1
50-Mile Region

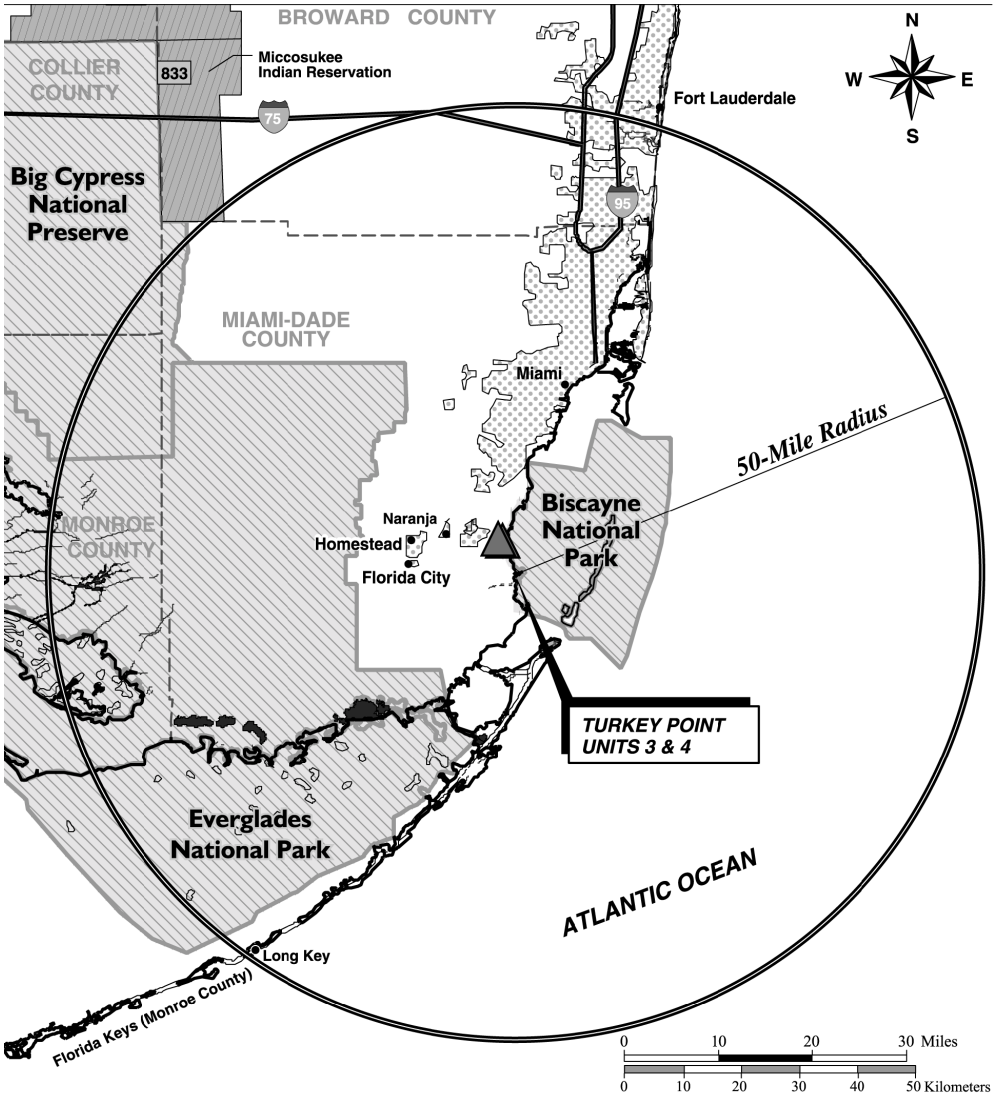


Figure 3-2
6-Mile Region

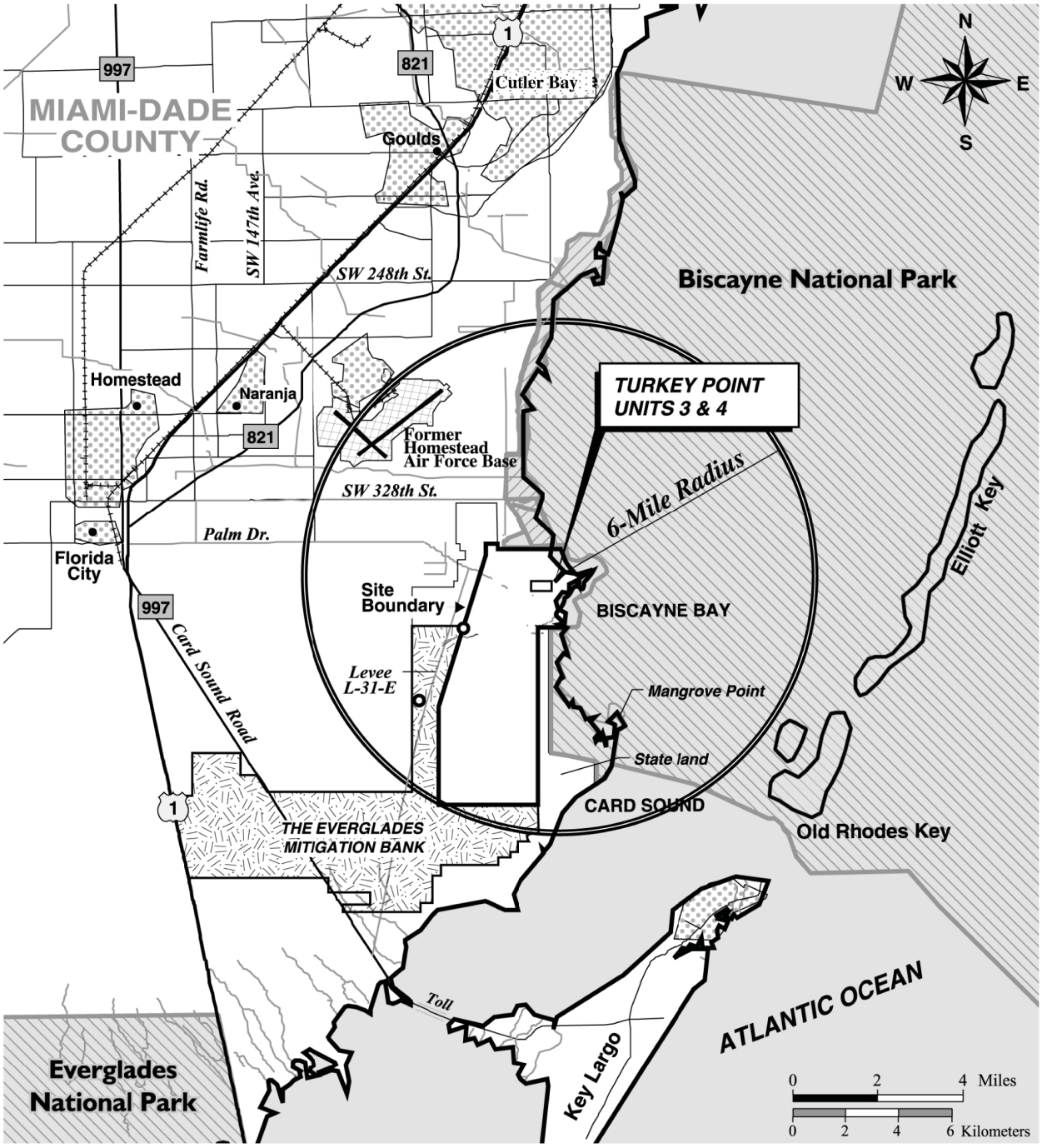
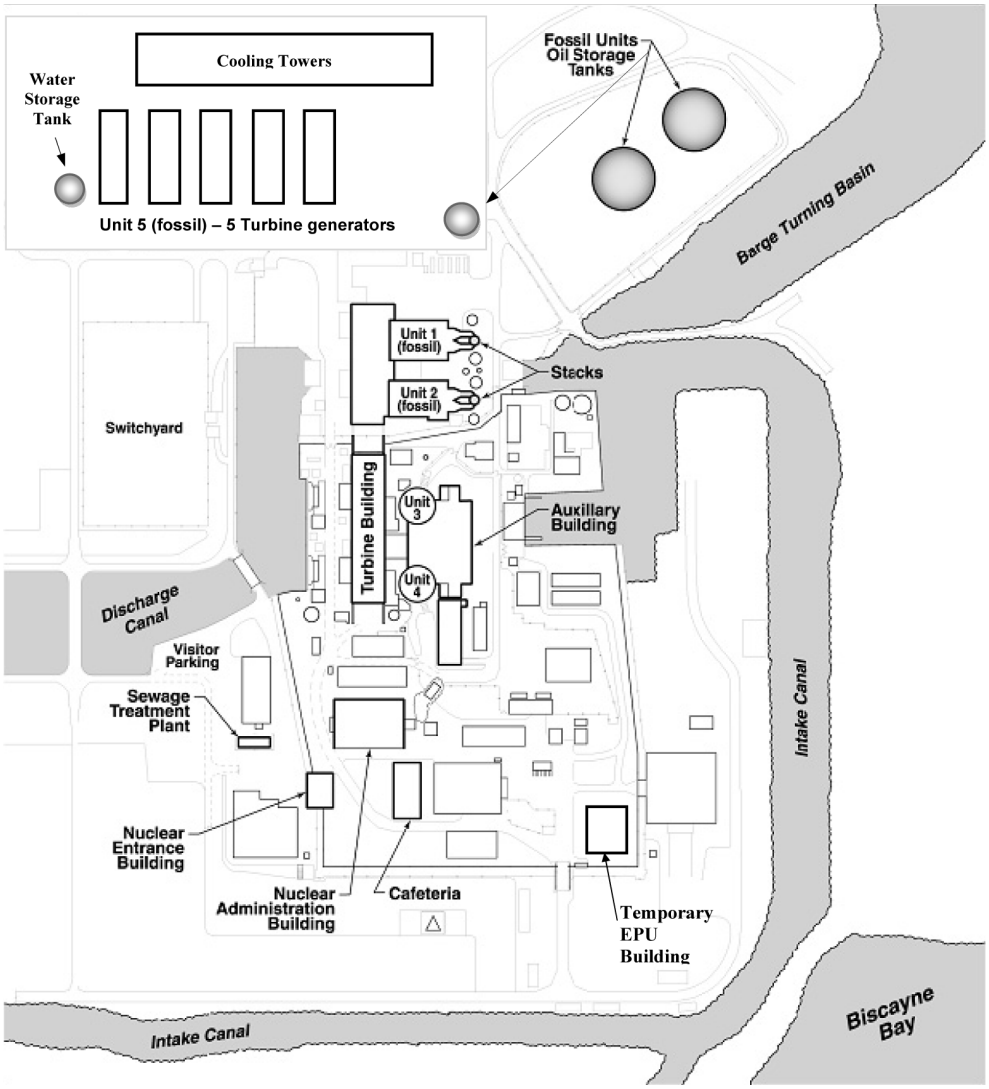


Figure 3-3
Site Map



4.0 OVERVIEW OF OPERATIONAL AND EQUIPMENT CHANGES

The uprate will result in an increase in the electrical output of each unit by increasing the licensed core rated power from 2300 MWt to 2644 MWt.

The Project consists of upgrades to each unit that will allow higher steam flow in the steam generators that will then be supplied to the turbine generator. The additional reactor energy requirements for EPU will be met by increasing the quantity of the fuel reloads. The upgrades will include modifications to the turbine-generators and attendant support and control systems. Turbine modifications will incorporate state-of-the-art technology that will provide greater efficiency in the turbines resulting in fuel savings over the long term (Reference 4.1). The details of the required modifications are described in LR Section 1.0.

The refurbishment and improvement activities will primarily occur during two outages per unit lasting about 60 days each. Construction activities associated with Unit 3 uprates are expected to begin during the Fall outage of 2010 and be completed during the Spring outage of 2012, while Unit 4 uprates are expected to begin during the Spring outage of 2011 and be completed during the Fall outage of 2012. Certain improvements will also be made while the units are operating.

Upon NRC approval of the EPU license amendment request and following completion of the scheduled outage periods, completion of power ascension and testing, PTN 3 is expected to begin operating at the EPU core rated power level of 2644 MWt in the Spring of 2012, and PTN 4 in the Fall of 2012.

References

4.1 Florida Power & Light Company (FPL), 2008, Site Certification Application (SCA), Turkey Point Uprate Project, January 2008.

5.0 SOCIOECONOMIC CONSIDERATIONS

The discussion of these socioeconomic considerations is generated primarily from the 2008 Turkey Point Uprate Project Site Certification Application (SCA) (Reference 5.1).

The Project is expected to benefit the economies of Miami-Dade County and surrounding areas.

Direct benefits from the Project include employment opportunities created by the construction and enhanced viability of continued long-term operation of PTN 3 and 4. It is expected that the majority of the construction wages paid for the project will be spent within Miami-Dade County. These wages will create additional demands for goods and services. Sales tax benefits will also accrue to the State of Florida as a result of construction of the project and to Miami-Dade County and other counties where these wages are spent that impose a county sales surtax. The purchase of goods and services to support construction of the project is anticipated to occur over a 3-year period beginning in 2010 and ending in 2012.

5.1 Current Socioeconomic Status

The operational employment of both units is about 800 people with a payroll of about $64 million which will continue after the Project is complete. No additional staff will be required once the Project is complete. The ongoing operations of the units contribute about $6 million in property taxes to Miami-Dade County. This revenue directly benefits the various County and other taxing agencies.

5.2 Extended Power Uprate Impacts to Socioeconomics

The Turkey Point Plant is designed to accommodate, on an annual basis, operational staff combined with employees associated with refueling/maintenance outages at PTN 3 and 4. Previous combined workforces have exceeded 2000 employees per day. Peak construction employment associated with the Project and outages is estimated to be 1400 construction workers per day with an average of about 1000. Population and housing impacts from construction are expected to be slight since there will be minimal immigration into the area and the amount of construction for the project is within the additional labor requirements of previous outages.

The construction phase associated with the Project will contribute both short and long-term economic benefits to the surrounding region. Construction wages will increase the demand for goods and services in the region Direct purchases of construction materials will have both direct and indirect economic benefits. Sales taxes from the purchase of equipment and material to support construction activities will increase tax revenues to the county and state governments.

The construction traffic associated with the Project was combined with the existing traffic information to develop a future conditions analysis. The analysis indicated that the transportation network located in the vicinity of the Turkey Point Plant has more than sufficient capacity to absorb the traffic impacts generated from EPU-related construction and remains within Miami-Dade County's Traffic Concurrency standards.

Among the primary direct benefits of the Project will be the increase in skilled job opportunities within the region associated with construction. There is a significant labor pool of construction

workers in the surrounding and adjacent counties. As a result, some construction workers will be drawn from these counties for the construction period. Itinerant workers that do relocate into the area will be able to use the over 200,000 available public lodging accommodations in Miami-Dade County.

Sales tax benefits will accrue to the State of Florida as a result of the construction of the Project. These taxes will be placed in the State's general fund and will be available for any use deemed appropriate by the State.

The operation of PTN 3 and 4 with approximately 800 employees represents a payroll of about $64 million annually, which will continue when the Project is complete.

The purchase of goods and services to support the construction of the Project is anticipated to occur over a 3-year period beginning in 2010 and ending in 2012. It is expected that the majority of the construction wages paid by the Project will be spent within Miami-Dade County and the surrounding region. These wages will create additional demands for goods and services. As this money is spent, it will create a multiplier effect within the area, thereby generating additional jobs and earnings. These earnings are indirect or secondary benefits of the Project, which will be enjoyed by other companies whose payrolls will also increase. Rental of construction equipment would be obtained locally when possible.

Table 5-1 indicates the recent property tax payments that PTN 3 and 4 has contributed as a percentage of the total county property taxes (Reference 5.2).

Table 5-1
Turkey Point Units 3 And 4 Contribution To
County Property Tax Revenues Since 2005

Year	Total Miami-Dade County Property Tax Revenues	Property Tax Paid to Miami-Dade County for Turkey Point Units 3 & 4	Percentage of Total Property Taxes
2005	$1,448,979,000(1)	$10,788,052	0.74
2006	$1,693,004,000(1)	$12,071,689	0.71
2007	$1,611,837,000(1)	$6,902,670	0.43
2008	$1,664,804,000(1)	$6,293,456	0.38
1. Reference 5.2			

FPL payments to engineering and consulting firms, plant equipment suppliers, and local service industries for implementation of the proposed EPU would have a positive, though temporary, impact on local and regional economies. There would also be economic benefit to both the regional and local economies as a result of the enhanced viability of the Turkey Point Plant's long-term operation brought about by the additional electrical generation. That expanded financial viability associated with PTN 3 and 4 EPU operations will help regional planners and local governments organize, plan and develop long-term sustained growth for the area.

5.3 Conclusion

Overall impacts to the economy associated with construction and operation of the Project are expected to be positive. Labor demands associated with the construction and operations of the project are not expected to create any labor shortages. Expenditures for materials and construction employment will contribute to the economy of Miami-Dade County and surrounding counties. Population and housing impacts associated with the Project will be slight due to minimal immigration into the area.

Construction activities will increase tax revenues to the county and state governments due to sales taxes from the purchase of equipment and material to support construction activities.

Since there will not be an increase in operational workforce upon completion of the Project, no changes are anticipated from the direct and indirect impacts upon the local services (e.g., schools, police). Due to the patterns of local employment, traffic patterns and daily commuting, the demographic impact from the construction of the Project is expected to be minimal. Overall, socioeconomic impacts associated with the construction and operation of the Project will be favorable to Miami-Dade County.

References

5.1 Florida Power & Light Company (FPL), 2008, Site Certification Application (SCA). Turkey Point Uprate Project, January 2008.

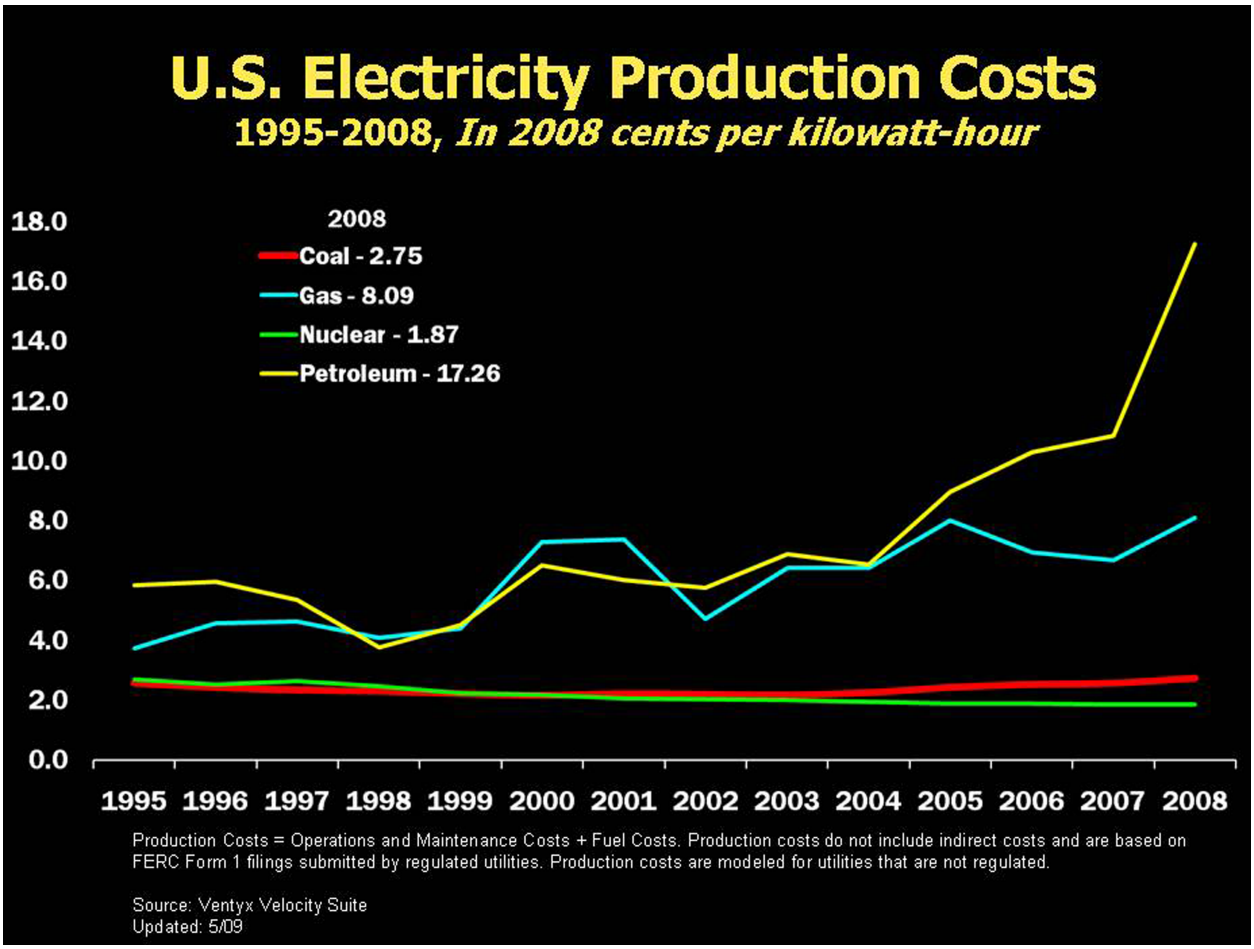
5.2 Miami-Dade County Fiscal Budget Books, FY2005 - FY2008, http://www.miamidade.gov/budget/home.asp.

6.0 COST – BENEFIT ANALYSIS

The largest direct benefit resulting from the proposed EPU to the Turkey Point Plant's current capacity is the additional supply of reliable baseload electrical power for residential and commercial customers.

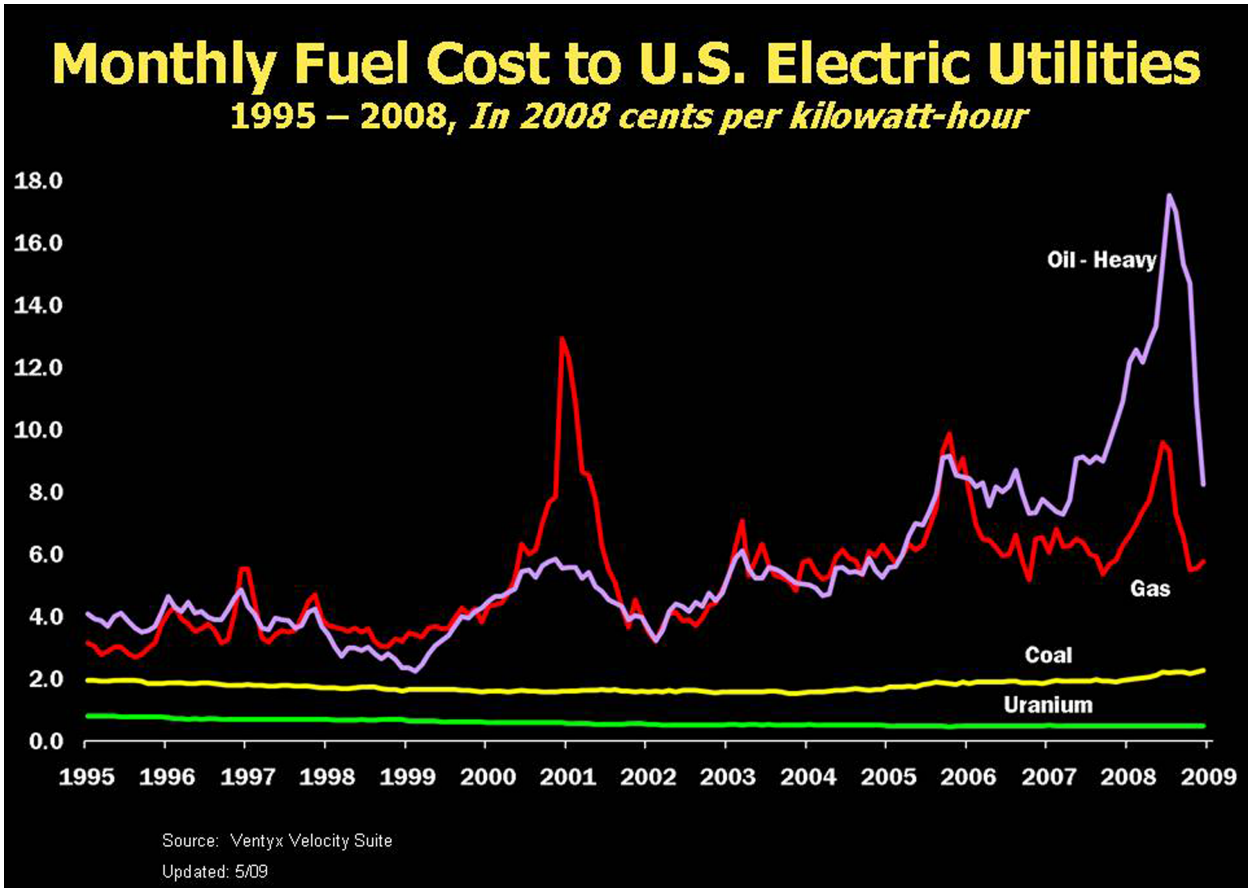
A national comparison of electric generation alternatives, updated through June of 2008, indicates that nuclear power generation production costs are lower than that of coal-fired, oil-fired, and natural gas-fired power production. Power production costs represent a combination of fuel, operations, and maintenance costs. The figures below, from the Nuclear Energy Institute, and especially Figure 6-1, show that the production cost of existing nuclear generating facilities are considerably less than that of oil or natural gas fired steam electric generation sources and even less than that of coal (Reference 6.1).

Figure 6-1



In addition, the US Nuclear industry continues to maintain and reduce the cost of nuclear fuel each year as can be seen in the graph of fuel costs associated with production of one kilowatt hour of electricity (Reference 6.2). Coal and nuclear generated electric power fuel costs are more steady and consistent and uranium costs per kilowatt-hour continue to be the lowest of the four alternatives.

Figure 6-2



A quantitative evaluation of environmental costs of alternatives would not be necessary to recognize that significant new environmental impacts would be avoided by implementing an EPU at PTN 3 and 4 compared with other new power development options to deliver additional capacity. Unlike fossil fuel plants, an EPU would not result in a significant source of nitrogen oxides, sulfur dioxide, particulates (PM10 and PM2.5), carbon dioxide, or other regulated atmospheric pollutants as a part of normal operations. Routine operation of PTN 3 and 4 at EPU conditions would not contribute to greenhouse gases or acid rain and would likely displace operation of other fossil generating plants in the region.

The radiological effects of the uranium fuel cycle are described in 10 CFR 51.51 and 51.52 and are classified as small. The PTN 3 and 4 EPU radiological effects fall within the bounds of the tables in 10 CFR 51.52. Although the proposed action would produce additional spent nuclear fuel, this increase would be accommodated by the PTN 3 and 4 existing spent fuel storage strategy.

Based upon these considerations, it is reasonable to conclude that the proposed PTN 3 and 4 EPU would provide a cost-effective utilization of an existing asset, with minimal environmental impact, making it the preferred means of securing additional baseload generating capacity to support the growing electric load in Florida.

References

6.1 NEI – Electricity production costs (1995 to 2008) access 5/21/2009 at NEI web site http://www.nei.org/resourcesandstats/documentlibrary/reliableandaffordableenergy/graphicsandcharts/uselectricityproductioncosts/

6.2 NEI - U.S. Nuclear Industry Fuel Costs (1995 to 2009) accessed at NEI on 5/21/2009 at NEI website: http://www.nei.org/resourcesandstats/documentlibrary/reliableandaffordableenergy/graphicsandcharts/monthlyfuelcosttouselectricutilities/

7.0 NON-RADIOLOGICAL ENVIRONMENTAL IMPACTS

The terrestrial and aquatic resources in the vicinity of the Turkey Point Plant, as discussed below, as well as potential for any significant adverse impacts to those resources from the proposed EPU have previously been presented in the 2008 Turkey Point Uprate Project Site Certification Application (SCA) (Reference 7.1).

7.1 Terrestrial Impacts

7.1.1 Land Use

Land use impacts, transmission line impacts, noise effects and potential impacts to terrestrial biota of the proposed uprate would be negligible. Only minor construction is planned outside of the existing facilities. This will include the construction of a temporary EPU warehouse in the southeast corner of the Turkey Point Plant site and a minor expansion of the switchyard, both on previously impacted land. Plant operation after the EPU will not require the storage of additional types of industrial chemicals, fuels, or create the need for additional storage tanks on site.

7.1.2 Historic and Archaeological Resources At and Near PTN 3 & 4

There are no known archaeological or historical sites located within the Turkey Point Plant. Construction activities will not affect any known archaeological or historical sites in the area.

No sites of historic or archaeological significance will be impacted due to the operation of the Turkey Point Plant after the EPU project is complete. No sites listed or eligible for listing in the National Register of Historic Places are on the Site. No direct or indirect impacts are anticipated from any operational aspect of the Turkey Point Plant.

7.1.3 Transmission Facilities

The Turkey Point Plant is interconnected to FPL's transmission system through a common switchyard and 230-kV (nominal) transmission lines. No changes or expansion in the transmission lines are required for the Project. The only addition to the transmission facilities consist of a minor expansion of the switchyard to accommodate equipment needed to deal with increased fault currents.

The increase in electrical power output would cause a corresponding increase in current on the transmission system, and this would result in an increased magnetic field. However, in other similar project uprates, the NRC has already reached a conclusion that the chronic effects of EMF on humans are not quantified at this time and no significant impacts to terrestrial biota have been identified (Reference 7.2).

7.1.4 Air Impacts

The EPU is expected to be implemented at the two units over the course of four refueling outages, two on each unit, in 2010, 2011 and 2012. The second EPU implementation outage is expected to be longer than the first and may exceed 100 days but it will be less than outage durations that have occurred in the past. The peak construction workforce for the EPU and the normal refueling outage work has been estimated to be about 1400 with an average outage

workforce of 1000 which is similar in size to previous outages at PTN. As a result, the air emissions related to the traveling of the workforce, truck deliveries and construction/modification activities are not expected to be any greater than that of outages that have been conducted at PTN in the past. In addition, the entrance road and most of the areas used for construction parking and laydown are paved which will minimize potential for traffic-related fugitive air emissions. Given the short-term nature of the construction activities, the normal control measures implemented during the construction period, and similar size of the construction workforce compared with that of previous outages, the EPU project will not cause incremental impacts to air quality in the vicinity of the Turkey Point plant over that of previous outages (Reference 7.1).

7.1.5 Noise

The project will not result in any noticeable increase of noise levels from PTN 3 and 4 operations. Baseline noise level data was collected during the day and night time on April 24, 2003 and during the night on January 1 and again on April 24, 2007. On April 24, 2007, all five units were operating. Data was collected at seven locations during these periods: five in the near-field and two at far-field locations located at the pre-school 1.6 miles to the northwest and at the Homestead Bay front entrance 2.0 miles north of the plant. The daytime and nighttime noise levels that excluded short-term transient noise sources, such as traffic at monitoring sites near the Turkey Point Plant boundary, were less than 50 dBA.

There are no State of Florida noise regulations applicable to the construction and operation of the proposed uprate and there is only a “nuisance” noise ordinance for Miami-Dade County.

Noise levels of 50 dBA during the nighttime, however, are generally recognized in many community ordinances as acceptable nighttime noise values for residential communities. Since the nearest residential communities are many miles farther than the noise monitoring locations, the noise levels from the Turkey Point Plant are not discernible over the normal background noise levels in these communities. The only EPU-related changes that are not within the existing buildings and structures are the temporary EPU warehouse and the slightly expanded switchyard. Neither of these are significant noise sources. The proposed uprate project would, therefore, not change the noise profile of the Plant. As a result, the noise impacts associated with the Project are expected to fully comply with the Miami-Dade County nuisance ordinance.

Construction equipment for the Project may include the use of cranes and associated devices to move and position material. However, it should be noted that these activities will be extremely intermittent and transitory and used to move equipment into the existing PTN 3 and 4 buildings and structures. Therefore, overall average noise levels at noise receptors, such as residential boundaries, and noise receptors from construction activities will be either intermittent or attenuated within the existing PTN 3 and 4 equipment, structures or buildings.

7.2 Aquatic Impacts

Due to the existing nature of the PTN 3 and 4 original construction, surrounding surface waters will not be adversely affected by the construction of the Project. Stormwater will be handled by the existing facilities. Equipment modification and retrofit activities associated with the

construction of the Project will not impact wetlands and nearby surface waters. There will be no increase in the amount of water withdrawn as a result of the project.

The Turkey Point Plant (Units 1-5) has neither an intake that withdraws from, nor an outfall that discharges into, surface waters of the U.S. or waters of the state. The cooling canal system therefore, will continue to have no impingement or entrainment effects on open water aquatic populations. Units 1 through 4 utilize a 5900 acre closed-cycle cooling canal system to remove heat from the main (turbine) condensers and other auxiliary equipment. The cooling canal system carries warm water south of the existing Plant and returns cooled water back to the condenser intake. The canal system does not directly discharge to fresh or marine surface waters but does interact with groundwater because it is unlined. Makeup water for the canal system comes from process water, rainfall, stormwater runoff, and groundwater infiltration to replace evaporative and seepage losses. Consequently, the water in the canals is hypersaline due to the effects of evaporation with salinity concentrations about twice that of Biscayne Bay or about 40 to 60 ppt depending on the season. However, an Interceptor Ditch was constructed west of and adjacent to the cooling canal system to restrict movement of saline water westward of Levee 31E, adjacent to the cooling canal system, to those amounts which would occur without the existence of the cooling canal system. This is accomplished by pumping water as necessary from the Interceptor Ditch back into the cooling canals to keep the water level or head in the Interceptor Ditch lower than in the L-31E Canal to the west. The design of the Interceptor Ditch was intended to prevent seepage, at the depth of the Interceptor Ditch, from the cooling canal system from moving landward and thereby maintaining fresh or potable water west of the Interceptor Ditch. Operation under EPU conditions will result in a slight increase in salinity in the cooling canal system but the Interceptor Ditch will continue to function effectively to prevent seepage from moving inland and, as discussed in LR Section 7.3.2 below, will not have adverse effects on the American Crocodile.

At present, each nuclear unit produces about 5.35 Billion BTU per hour of waste heat discharge to the cooling canal at full load. After the uprate that quantity will increase to about 6.10 Billion BTU per hour (Reference 7.1). The predicted temperature difference (Delta T) across the condensers will change from approximately 16.8°F to 18.8°F. The predicted maximum increase in water temperature entering the cooling canal system resulting from the project uprate is predicted to be about 2.0°F. These changes are insignificant relative to the existing seasonal changes of up to 20°F at any given location in the system.

The Conditions of Certification issued by the State of Florida in conjunction the Certification of the Project impose additional monitoring requirements before and after operating at EPU conditions that include temperature and salinity monitoring in Biscayne Bay, surface water and groundwater. The details of the monitoring plan are a part of the Fifth Supplemental Agreement between Florida Power Light and the South Florida Water Management District (Reference 7.3). The purpose of the monitoring plan is to monitor the vertical and horizontal extent of the cooling canal plume on both surface and groundwater and the ecology of the area. The cooling canal system has no intake in waters of the U.S. In summary, the uprate Project will not result in increased effects on aquatic life.

7.3 Threatened and Endangered Species

Due to the existing developed nature of PTN 3 and 4, and use of existing construction facilities (i.e., parking and laydown areas), adverse impacts to ecological habitat or resources, or threatened or endangered species are not expected to occur as a result of the construction of the Project.

7.3.1 Threatened and Endangered Terrestrial Species

Because of the lack of natural vegetative communities and the highly disturbed industrial nature of the area immediately surrounding PTN 3 and 4, no listed species of flora and fauna occur within the Site. There are a number of federally and state listed plants and animals that are associated or potentially associated with the area surrounding the developed portions of the Turkey Point Plant. A number of wetland dependent animal species (e.g., wading birds) use mangrove habitats for foraging, including the little blue heron, tricolor heron, snowy egret, and wood stork. These species are common to the area and use other similar habitats that are found throughout the surrounding region. As discussed below, the cooling canal system is also a highly productive habitat for the American crocodile which is listed as threatened by the federal government and endangered by the state.

A list of the threatened, endangered, and species of special concern known to occur in Miami-Dade County, Florida is provided in Site Certification Application, Table 2.3.6-1 (Reference 7.1).

No adverse impacts to federal- or state-listed terrestrial plants or animals are expected during facility operations due to the existing developed nature of the habitat. No long-term change in the populations of any threatened or endangered species is anticipated as a result of operation of PTN 3 and 4.

No changes in wildlife populations at the adjacent undeveloped areas are anticipated, including listed species and the Project is not anticipated to deter the continued use by wildlife of the undeveloped areas within the Turkey Point Plant boundary. Noise and lighting impacts also will not change.

7.3.2 Threatened and Endangered Aquatic Species

Since PTN 3 and 4 do not discharge to Waters of the United States but to a permitted no-discharge cooling canal system, any impacts to any Aquatic Threatened or Endangered Species in Biscayne Bay are mitigated. The cooling canal system itself, however, serves as suitable habitat for the American Crocodile, listed as threatened by the federal government and endangered by the state.

The Turkey Point cooling canal system is a permitted wastewater treatment facility (Reference 7.4). As a result, state and federal water quality standards do not apply within it. Effects of operation of the Project upon aquatic biota in the closed cooling canal system are expected to be negligible. The predicted maximum temperature increase of approximately 2°F for water entering the canal system is not anticipated to result in any adverse impacts to the listed American crocodile.

The growth rate of crocodiles varies with food availability and temperature, and digestion is only efficient within a certain range of body temperatures. Crocodiles are able to regulate body temperature through basking on the edge of canals or on berms, resting within burrows, or alternating location between cooler and warmer canals. The maximum temperature increase resulting from the project of about 2°F is unlikely to result in any significant impact to crocodiles' ability to thermoregulate.

Laboratory experiments indicate that prolonged high temperatures may be potentially stressful to hatchling crocodiles. Laboratory studies conducted by Mazzotti et. al (Reference 7.5) indicated that hatchling crocodiles showed signs of acute thermal stress (panting, pupil dilation, rapid eye blinking, jerky body movements, and attempts to climb out of aquaria) when canal temperatures exceeded 100.4°F (38°C) and water bath temperatures exceeded 104°F (40°C). Mass gain trials were also conducted and results indicated that hatchling crocodiles could not maintain mass at elevated temperatures (104.0°F/40°C). Predicted temperatures above 104°F only occur in a portion of the cooling canal system. During most months, temperatures within most of the cooling canal system are predicted to be lower. The maximum predicted temperatures occur at the inlet to the cooling canal system and decrease as water moves through the system. Crocodile nests and hatchlings typically occur in the cooler parts of the system, the southern portion of the 38 western canals and the seven eastern canals.

Berms approximately 25-30 meters wide separate the cooling canals and are used by female crocodiles for nesting. The most important requirements for crocodile nesting success are the presence of elevated, well-drained nesting substrate adjacent to relatively deep (> 1 m), intermediate salinity (10 to 20 ppt) water, protected from the effects of wind and wave action and free from human disturbance. Operation of the Project will result in a slight increase in cooling canal salinity of approximately 6 percent or 2.5 to 3.6 ppt in the canal but not in the nesting areas atop the berms. The berms contain constructed freshwater ponds which provide important freshwater refugia for hatchling crocodiles. The slight increase in cooling canal temperature and salinity will not affect the conditions within these freshwater refugia areas. No adverse impacts upon breeding success or hatchling growth are, therefore, anticipated as a result of the slight increase in cooling water temperature and salinity.

The Turkey Point cooling canal system provides ideal crocodile nesting conditions. FPL's crocodile management plan, including the creation of freshwater refugia upon berms, protection of nesting sites, prevention of human disturbance, and the availability of lower salinity canals nearby, have allowed the crocodile population within the cooling canal system to increase dramatically, with an average of 0.7 additional successful nests per year from 1978 to 1999. Additionally, the number of hatchlings has increased at a rate of 13 per year at the Turkey Point Site (Tucker et. al., 2004 as cited in Reference 7.6). Since the uprate Project will not significantly impact water temperature or salinity, no adverse impact to the thriving crocodile population within the cooling canal system is anticipated. It is also noted that in accordance with the Conditions of Certification of the Turkey Point Plant, additional monitoring of crocodiles within the cooling canal system will be conducted before and after the uprate to determine any effects due to the slight temperature and salinity changes.

References

7.1 Florida Power & Light Company (FPL), 2008, Site Certification Application (SCA), Turkey Point Uprate Project, January 2008.

7.2 NRC, 1996, NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Volume 1, (Chapter 9, Table 9-1), May 1996.

7.3 Fifth Supplemental Agreement between the South Florida Water Management District and Florida Power Light, October 16, 2009.

7.4 Florida Department of Environmental Protection Permit #FLA0001562-004-IW 1N/NR; May 13, 2005. NPDES “No Discharge” Permit.

7.5 Mazzotti, F.J. and Brandt, L.A.,1994, Procedures Manual for the Crocodile Monitoring Program at Florida Power and Light Company’s Turkey Point Power Plant Site, Homestead, Florida, University of Florida, Department of Wildlife and Range Sciences.

7.6 Tucker, W.A., Mazzotti, F.J., Zillioux, E., and Shortelle, A.B., 2004, Assessment of American Crocodile Populations of Southern Florida: Trends in Population and Reproduction Rates. Pending publication.

8.0 RADIOLOGICAL ENVIRONMENTAL IMPACTS

8.1 Radiological Waste Streams

The radioactive waste systems at PTN 3 and PTN 4 are designed to collect, process, and dispose of radioactive wastes in a controlled and safe manner. The design basis for these systems during normal operations is to limit discharges in accordance with 10 CFR 50, Appendix I. The actual performance and operation of installed equipment, as well as reporting of actual offsite releases and doses, are controlled by the requirements of the Offsite Dose Calculation Manual (ODCM). The ODCM is subject to NRC inspection and describes the methods and parameters used for calculating offsite doses resulting from radioactive gaseous and liquid effluents and ensuring compliance with NRC regulations. Adherence to these limits and objectives would continue under the proposed EPU.

Operation at the proposed EPU conditions would not result in any physical changes to the solid waste, liquid waste, or gaseous waste systems. The safety and reliability of these systems would be unaffected by the proposed EPU. Also, the proposed action would not affect the environmental monitoring of any of these waste streams or the radiological monitoring requirements of the PTN 3 and PTN 4 Radiation Protection Program. Under normal operating conditions, the proposed action would not introduce any new or different radiological release pathways and would not increase the probability of an operator error or equipment malfunction that would result in an uncontrolled radioactive release from the radioactive waste streams.

LR Section 2.5.6.1 (Gaseous Waste Management), LR Section 2.5.6.2 (Liquid Waste Management), and LR Section 2.5.6.3 (Solid Waste Management) provide a detailed evaluation of effects that the proposed EPU may have on the gaseous, liquid and solid radioactive waste systems. LR Section 2.10.1 (Occupational and Public Radiation Doses) provides an evaluation of the impact of EPU on the annual dose to the public.

The following subsections summarize the conclusions of the referenced LR Sections above, and compare the results against the impacts of the radiological waste system documented in the FES (Reference 8.1) and the GEIS (Reference 8.2). It is noted that while releases reported in the FES are per Unit, the effluent releases reported in Tables 8-1, 8-2 and 8-3 and in the GEIS, when provided, are for the site. Thus the sum of the values for activity and volume, where reported in the FES, are directly comparable to the current values reported in Tables 8-1, 8-2 and 8-3 which represent the combined operations of PTN 3 and PTN 4.

8.1.1 Solid Waste

Solid radioactive wastes include solids recovered from the reactor coolant systems, solids in contact with the liquids or gases associated with the reactor coolant process systems, and solids used in support of the reactor coolant system operation.

The largest volume of solid radioactive waste is low-level radioactive waste (LLRW) which includes bead resin, spent filters, and dry active waste (DAW) from outages and routine maintenance. DAW includes paper, plastic, wood, rubber, glass, floor sweepings, cloth, metal, and other types of waste routinely generated during maintenance and outages. Table 8-1

presents the average annual volume and activity of LLRW shipped offsite for burial or disposal at PTN 3 and 4, for the five-year period between 2003 through 2007.

Table 8-1
Average Annual Low-Level Radioactive Waste
Shipped Offsite at PTN 3 and 4
During the 2003 – 2007 Time Period

	Cubic Meters	Curies
Spent Resins, Process Filters, etc.	3.06E+00	1.13E+02
Dry Compressible Waste (DAW)	4.30E+02	1.60E+02
Irradiated Components	7.36E-01	6.76E-01
Other Wastes	9.56E+00	5.56E-03
Overall Annual Average Using Five Years (2003 – 2007) of Solid Waste Shipment Data	4.43E+02	2.73E+02
References 8.3, 8.4, 8.5, 8.6 and 8.7		

LR Section 2.5.6.3 (Solid Waste Management System) provides an evaluation of effects that the proposed EPU may have on the solid waste management system. The results of the evaluation indicate that the proposed EPU has no significant effect on the generation of solid waste volume from the primary and secondary side systems since the systems functions are not changing and the volume of inputs remain the same.

As noted in LR Section 2.10.1.2.4 (Normal Operation Radioactive Effluents and Annual Dose to the Public), the activity levels for most of the solid waste would increase proportionately to the increase in activity of long-lived radionuclides in the reactor coolant bounded by a 15.3% maximum increase based on current operation at licensed core power level of 2300 MWt and EPU operation at the analyzed core power level of 2652 MWt which includes a 0.3% margin for power uncertainty. In estimating the bounding value for activity in the solid waste following the uprate, it is conservatively assumed that the plant operates at a capacity factor of 100%. The activity contained in the waste following uprate, therefore, is estimated to be bounded by an increase of 17.7%, i.e., 15.3% divided by 0.867, the average weighted capacity factor for years 2003–2007.

The annual average activity contained in solid radioactive waste shipped at PTN 3 and 4 in Table 8-1 for the pre-EPU condition (273 Ci) is less than the activity (834 Ci) identified in Section 2.1.4.3 of the GEIS (Reference 8.2) related to the operation of PTN 3 and 4 in 1999. The annual average volume of the solid radioactive waste shipped from PTN 3 and PTN 4 as indicated in Table 8-1 for the pre-EPU condition (443 m^3) is greater than that identified in Section 2.1.4.3 of the GEIS (55 m^3). This, however, is primarily a result of the clean-up campaigns performed in anticipation of projected future changes in disposal capacity and costs as well as changes in low-level radioactive waste packaging and disposal processes since the GEIS data was collected. The FES (Reference 8.1) estimated that the solid radioactive wastes generated by the two units would be 2000 cubic feet (56.6 m^3) per reactor per year.

Section 8.2 of this Attachment addresses the impact of the EPU increase in solid waste activity on the off-site doses.

8.1.2 Liquid Waste

Liquid radioactive wastes include liquids from the reactor process systems and liquids that have become contaminated with process system liquids. Table 8-2 presents liquid releases from PTN 3 and 4 for the five-year period from 2003 through 2007. As noted in Table 8-2, approximately 4.1 million liters and 0.08 Ci of fission and activation products were released in an average year.

Table 8-2
Liquid Effluent Releases from PTN 3 and 4, 2003 – 2007

Year	Volume Released (liters)	Activity Released (Ci)	Tritium (Ci)
2003	5.16E+06	6.90E-02	1.12E+03
2004	4.21E+06	9.88E-02	1.23E+03
2005	3.91E+06	9.43E-02	5.81E+02
2006	4.40E+06	8.33E-02	9.07E+02
2007	2.96E+06	5.89E-02	1.01E+03
Annual Average	4.13E+06	8.08E-02	9.70E+02
References 8.3, 8.4, 8.5, 8.6 and 8.7			

As indicated in LR Section 2.5.6.2, (Liquid Waste Management System), the pre-EPU volume of liquid waste is expected to be representative for future operation at EPU conditions. This conclusion is based on the observation that EPU implementation would not significantly increase the inventory of liquid normally processed by the liquid waste management system since system functions are not changing and the volume inputs remain the same.

As noted in LR Section 2.10.1.2.4 (Normal Operation Radioactive Effluents and Annual Dose to the Public), the proposed EPU would result in an increase of approximately 15.3% for tritium and radionuclides with long half-lives in the equilibrium radioactivity concentration in the reactor coolant. This would, in turn, impact the concentrations of radioactive nuclides in the waste management systems. Iodines would increase by approximately 15.5%, but are a small contributor to organ doses in liquid releases.

It is concluded that the projected releases following EPU remain bounded by values provided in the FES for PTN 3 and 4. The FES for PTN 3 and 4 estimated annual releases of 1000 curies of tritium and approximately 28 curies of all other nuclides per unit. The GEIS did not report the annual releases of tritium and of other radionuclides and reported a volumetric release of 3500 m^3 for operation in 1999 of both Units.

Section 8.2 of this Attachment addresses the offsite radiation dose consequences of the EPU liquid effluent releases.

8.1.3 Gaseous Waste

Gaseous radioactive wastes are principally activation gases and noble gases resulting from process operations including continuous cleanup of the reactor coolant system, gases used for tank cover gas, and gases collected during venting. Table 8-3 presents gaseous releases from PTN 3 and 4 from 2003 through 2007.

Table 8-3
Gaseous Effluent Releases from PTN3 and 4, 2003 – 2007

Year	Noble Gases (Ci)	Particulates and Iodines ($T_{1/2}$ > 8 days) (Ci)	Tritium (Ci)
2003	1.55E+00	9.52E-06	9.69E-01
2004	1.12E+00	5.27E-06	8.71E-03
2005	2.30E-01	7.73E-10	1.29E+00
2006	1.21E+00	3.20E-04	4.70E+00
2007	1.22E+01	1.30E-04	1.82E+01
Annual Average	3.27E+00	9.29E-05	5.03E+00
References 8.3, 8.4, 8.5, 8.6 and 8.7			

The evaluation presented in LR Section 2.5.6.1 (Gaseous Waste Management Systems), indicates that implementation of the proposed EPU does not significantly increase the inventory of nonradioactive carrier gases normally processed in the gaseous waste management system, since plant system functions are not changing and the volume inputs remain the same.

As noted in LR Section 2.10.1.2.4 (Normal Operation Radioactive Effluents and Annual Dose to the Public), for all noble gases, the proposed EPU will result in a bounding maximum increase in effluent releases of 17.1%. Gaseous radionuclides with short half-lives will have increases up to a bounding value of 17.6%, whereas the increase in tritium releases is expected to be 15.3%. Iodine is expected to increase 15.4% in the RCS but 25.3% in the secondary steam due to a higher moisture carryover. Iodine contributes about 39% to the pre-EPU thyroid dose at Unit 4 and about 64% at Unit 3 with tritium being the other thyroid dose contributor.

The Iodine and particulates category, as reflected in the ODCM, includes tritium, iodine and airborne particulates. Particulates released via the turbine building from main steam leaks and air ejector exhausts are generally considered a small fraction of total particulate releases. However, an approach using very conservative assumptions was dictated for this category by the fact that the annual effluent release reports do not distinguish between the sources of particulates or iodines released. Using such conservative assumptions, secondary side moisture carryover becomes a major factor in determining the activity in the steam. A conservatively estimated 2.5 fold increase in moisture carryover is calculated as a result of the EPU. Applying the 15.3% increase in coolant activity yields a total multiplier of 2.88 for radioactive particulates released from the turbine building as a result of main steam leaks and air ejector exhaust. The higher moisture carryover results in a 25.3% increase in iodine releases. The post-EPU thyroid dose is,

therefore, projected to increase more than the increase in RCS concentrations. While it is highly unlikely that the release from steam leakage is the controlling contributor for particulates or iodines, a bounding scaling factor approach was utilized to estimate the impact of the EPU as discussed in Section 8.2.2.

The projected releases remain bounded by the FES estimated average annual releases of 3650 Ci per unit for Noble Gases and 0.8 Ci per unit for iodines and particulates. Section 2.1.4.2 of the GEIS did not report noble gas releases, iodine releases, particulate releases or tritium releases from the 1999 Annual Radioactive Effluent Release Report.

Section 8.2 addresses the offsite radiation dose consequences of the EPU gaseous effluent releases.

8.2 Radiation Levels and Offsite Doses

8.2.1 Operating and Shutdown In-Plant Levels

In-plant radiation levels and associated doses are controlled by the PTN 3 and 4 Radiation Protection Program to ensure that internal and external radiation exposures to station personnel and the general population will be as low as reasonably achievable (ALARA), as required by 10 CFR 20. FPL's policy is to maintain occupational doses at ALARA levels.

LR Section 2.10.1.2.1 (Normal Operation Radiation Levels and Shielding Adequacy) provides an analysis of the impact of the proposed EPU on radiation levels and shielding adequacy and the resulting occupational dose. The analysis considered the impact of increasing the core power level on neutron flux and gamma flux in and around the core; fission product and actinide activity inventory in the core and spent fuel; N-16 source in the reactor coolant; neutron activation source in the vicinity of the reactor core; and fission/corrosion products activity in the reactor coolant and downstream systems. The results indicate that in-plant radiation sources are anticipated to increase approximately linearly with the increase in core power level.

Shielding is used throughout PTN 3 and 4 to protect personnel against radiation from the reactor and auxiliary systems, and to limit radiation damage to operating equipment. The evaluation of the present shielding design has determined that it is adequate for the increase in radiation levels that may occur following power operation under EPU conditions since the increase is offset by:

- conservative analytical techniques typically used to establish shielding requirements,
- conservatism in the original design basis reactor coolant source terms used to establish the radiation zones, and
- Plant Technical Specification 3.4.8 which limits the reactor coolant concentrations to levels significantly below the original design basis source terms.

Therefore, no new dose reduction programs are planned and the ALARA program would continue in its current form.

8.2.2 Offsite Doses at Power Uprate Conditions

LR Section 2.10.1.2.4 (Normal Operation Radioactive Effluents and Annual Dose to the Public) provides an analysis of the impact of the proposed EPU on offsite doses using scaling

techniques based on NUREG-0017, Revision 1 methodology (NRC). This analysis conservatively projects maximum doses from normal operation under the proposed EPU conditions, taking into consideration the following:

- plant core power operating history during years 2003 through 2007,
- the reported gaseous and liquid effluent and dose data during that period,
- NUREG-0017 equations and assumptions,
- conservative methodology.

Pre-EPU dose estimates were calculated by first taking the average five-year doses during the period from 2003 through 2007 (organ and whole body) coupled with annual core power levels and normalizing the doses to those equivalent to operation at a 100% capacity factor. To predict doses under the proposed EPU conditions, the analysis then assumes that the maximum increase in radioactivity content of the liquid and gaseous releases is proportional to the percentage increase in the primary and secondary coolants over that of the pre-EPU case for various chemical/physical groups.

For Liquid Effluents, the pre-EPU offsite dose estimates are developed by averaging and adjusting the dose information for the years 2003 through 2007. Following EPU, FPL predicts that the maximum annual total body and organ doses (all pathways) from liquid effluent releases would increase approximately 15.3%. As demonstrated in Table 8-4 below, the estimated EPU total body dose due to liquid effluents is significantly below the regulatory design objectives listed in 10 CFR 50, Appendix I.

Table 8-4
Average Off-Site Dose Commitments from Liquid Effluents (PTN 3 and 4)

Type of Dose (Liquid Effluents)	Appendix I Design Objectives (2 units)	Base Case 2003 – 2007 Adjusted Doses @100% CF	Scaled Post-EPU Annual Dose	Percentage of Appendix I Design Objectives for EPU Case
Dose to total body from all pathways	6 mrem/yr	4.22E-04 mrem/yr	4.87E-04 mrem/yr	0.008%
Dose to any organ from all pathways	20 mrem/yr	Not Reported(1)	-	-

1. Not Reported value is per PTN's ODCM methodology under which compliance with the organ dose limit is assured as long as the total body dose is below its limit.

Similarly, for gaseous effluents, the pre-EPU offsite dose estimates are developed by averaging and adjusting the dose information for the years 2003 through 2007. Application of the scaling factors for various chemical/physical groups provided an estimate of the maximum dose that could be attributed to normal operation post-EPU. In the particulate and iodine category, particulates and iodines, entrained in the secondary steam, were calculated to have the highest scaling factor and were used as the bounding case. As demonstrated in Table 8-5 below, the estimated EPU dose due to gaseous effluents are significantly below the regulatory design objectives of 10 CFR 50, Appendix I.

Table 8-5
Average Off-Site Dose Commitments from Gaseous Effluents (PTN 3 and 4)

Type of Dose (Gaseous Effluents)	Appendix I Design Objectives (2 units)	Base Case 2003 – 2007 Adjusted Doses @100% CF	Scaled Post-EPU Annual Dose	Percentage of Appendix I Design Objectives for EPU Case
Gamma Dose in Air	20 mrad/yr	7.41E-05 mrem/yr	8.67E-05 mrem/yr	0.0004%
Beta Dose in Air	40 mrad/yr	1.12E-04 mrem/yr	1.31E-04 mrem/yr	0.0003%
Dose to total body of an individual	10 mrem/yr	Not Reported(1)	-	-
Dose to skin of an individual	30 mrem/yr	Not Reported [1]	-	-
Radioiodines and Particulates Released to the Atmosphere				
Dose to any organ from all pathways	30 mrem/yr	1.58E-04 mrem/yr (Thyroid)	1.91E-04 mrem/yr (Thyroid)	0.0006%

1. Not Reported values are per PTN's ODCM methodology.

The maximum average direct shine dose due to solid waste would be projected to increase by no more than 17.7% (15.3%/0.867, where 0.867 is the average capacity factor during 2003-2007) due to the activity increase in the waste. This increase would occur over time as (a) the current waste decays and its contribution decreases, (b) stored radwaste is routinely moved offsite for disposal, and (c) waste generated post EPU enters into storage.

The 40 CFR 190 whole body dose limit of 25 mrem to any member of the public includes (a) contributions from direct radiation (including skyshine) from contained radioactive sources within the facility, (b) the whole body dose from liquid release pathways, and (c) the whole body dose to an individual via airborne pathways.

For the EPU, the direct shine dose due to plant operation would increase by the increase percentage of the power level, i.e., 15.3%. As discussed above, however, the direct shine contribution due to accumulation of stored solid radwaste could increase by a bounding value of 17.7%. The direct shine dose contribution for operation of PTN 3 and 4 has been found to be negligible. A conservative bounding scaling factor of 17.7% would therefore not significantly change the estimated EPU direct shine dose at the site boundary which would remain negligible. It is noted that procedures and controls in the ODCM monitor and control this component of the off-site dose and would limit it through administrative and storage controls to ensure compliance with the 40 CFR 190 whole body dose limits.

Taking into consideration the magnitude of the estimated annual EPU doses due to gaseous and liquid effluent releases and the negligible direct shine dose contribution, it is concluded that the 40 CFR 190 whole body dose limit of 25 mrem/yr will not be exceeded by operation at EPU conditions.

References:

8.1 U.S. Atomic Energy Commission (AEC). July 1972. Final Environmental Statement related to Operation of Turkey Point Plant; Florida Power and Light Company. Docket No. 50-250 & 50-251.

8.2 NRC, 2002, NUREG-1437, Supplement 5, January 2002, Generic Environmental Impact Statement for License Renewal of Nuclear Plants Regarding Turkey Point Units 3 and 4.

8.3 Florida Power & Light Co, Turkey Point Units 3 & 4 Docket Nos. 50-250 and 50-251 “Annual Radioactive Effluent Release Report 2003,” March 29, 2004.

8.4 Florida Power & Light Co, Turkey Point Units 3 & 4 Docket Nos. 50-250 and 50-251 “Annual Radioactive Effluent Release Report 2004,” March 28, 2005.

8.5 Florida Power & Light Co, Turkey Point Units 3 & 4 Docket Nos. 50-250 and 50-251 “Annual Radioactive Effluent Release Report 2005,” March 31, 2006.

8.6 Florida Power & Light Co, Turkey Point Units 3 & 4 Docket Nos. 50-250 and 50-251 “Annual Radioactive Effluent Release Report 2006,” March 29, 2007.

8.7 Florida Power & Light Co, Turkey Point Units 3 & 4 Docket Nos. 50-250 and 50-251 “Annual Radioactive Effluent Release Report 2007,” March 20, 2008.

9.0 ENVIRONMENTAL EFFECTS OF URANIUM FUEL CYCLE ACTIVITIES AND FUEL AND RADIOACTIVE WASTE TRANSPORT

NRC regulations in 10 CFR 51.51 (Table S-3) provide the basis for evaluating the contribution of the environmental effects of the uranium fuel cycle to the environmental impacts of licensing a nuclear power plant. 10 CFR 51.52 (Table S-4) describes the environmental impacts of transporting nuclear fuel and radioactive wastes. The tables were developed in the 1970s. Since that time, most plants have increased both their uranium-235 enrichment and the fuel's burnup limits.

In 1999, in connection with the Generic Environmental Impact Statement for License Renewal of Nuclear Power Plants (Reference 9.1), NRC reviewed the effects of transporting higher enrichment and higher burnup fuel to a geologic repository. The conclusion of that evaluation was that Table S-4 applies to spent fuel enriched up to 5 percent uranium-235 with average burnup for the peak rod to current levels approved by NRC up to 62,000 MWD/MTU, provided higher burnup fuel is cooled for at least 5 years before being shipped.

Since the fuel enrichment for the EPU will not exceed 5.0 percent U-235 and the rod average discharge exposure will not exceed 62,000 MWD/MTU, the potential environmental impacts of the proposed Turkey Point power uprate will remain bounded by these conclusions and will not be significant to human health or the environment.

PTN 3 and 4 are currently licensed to use uranium-dioxide fuel that has a maximum enrichment of 4.50 percent by weight of uranium-235 as per the current Technical Specification. LR Section 2.8.6.2 (Spent Fuel Storage) addresses the request to amend the license to increase the licensed maximum enrichment to 5.0 percent uranium-235.

For PTN 3 and 4 operating under EPU conditions, the burnup limit is unchanged (the upper exposure limit is bounded by maintaining fuel within the NRC-approved vendor specific exposure limits), and the U-235 enrichment limit of 5% by weight is not exceeded. The fuel cycles for PTN 3 and PTN 4, therefore, continue to remain bounded by the impacts listed in Tables S-3 and S-4 of 10 CFR 51.

Increasing the electrical output at PTN 3 and PTN 4 is accomplished primarily by generating higher steam flow in the steam generators and supplying it to the turbine generator. The higher steam flow is achieved by increasing the reactor power level and feedwater flow to the steam generators. The additional reactor energy requirements for EPU are met by increasing the reload fuel batch size. The EPU will require some changes to fuel design.

The refueling schedule would remain the same during the implementation of the EPU. During the Spring 2012 and Fall 2012 refueling outages, approximately 45% of the existing PTN 3 and PTN 4 reactor cores, respectively will be replaced. The average fuel assembly discharge burnup would be approximately 52,000 MWD/MTU with no fuel pins exceeding the maximum fuel rod limit of 62,000 MWD/MTU. Reload design goals would maintain the PTN 3 and PTN 4 18-month fuel cycles within the limits bounded by the impacts analyzed in Tables S-3 and S-4 of 10 CFR 51. Therefore, FPL concludes that impacts to the uranium cycle and transport of nuclear fuel from the proposed action would be insignificant and not require mitigation.

References

9.1 NRC, 1999, Generic Environmental Impact Statement for License Renewal of Nuclear Plants (NUREG-1437, Vol. 1, Addendum 1), Division of Regulatory Improvement Programs, Office of Nuclear Reactor Regulation, August 1999.

10.0 EFFECTS OF DECOMMISSIONING

Environmental impacts from the activities associated with the decommissioning of any nuclear power reactor before or at the end of an initial or renewed license period are evaluated in the Generic Environmental Impact Statement for Decommissioning of Nuclear Facilities, NUREG-0586, Original and Supplement 1 (References 10.1 and 10.2). The conclusions of this report are that environmental impacts of decommissioning are generally small and that only two environmental issues would require site-specific evaluation: threatened and endangered species and environmental justice. The NRC procedures for all phases of decommissioning are described in NRC regulations (Title 10 of the Code of Federal Regulations, part 20 subpart E, and parts 50.75, 50.82, 51.23, and 51.95).

The FES for PTN 3 and 4 did not evaluate the environmental effects of decommissioning. In 1988, however, NRC published the NUREG-0586 that discusses decommissioning of nuclear power plants. Procedures for decommissioning a nuclear power plant are found in NRC regulations at 10 CFR 50.75, 50.82, 51.23, and 51.95.

The incremental environmental impacts associated with decommissioning activities resulting from continued plant operation during the renewal term are evaluated in the Generic Environmental Impact Statement for License Renewal of Nuclear Plants (GEIS), (Reference 10.3). The evaluation in the GEIS includes a determination of whether the analysis of the environmental issue could be applied to all plants and whether additional mitigation measures would be warranted. Supplement 5 to the GEIS (Reference 10.4) discusses, in Chapter 7, the effects of the later decommissioning on the local Turkey Point environment. For all the environmental issues reviewed in Supplement 5, the NRC staff concluded that impacts of license renewal would be small and mitigation would not be sufficiently beneficial to be warranted.

Prior to any decommissioning activity at PTN 3 and 4, FPL would submit a post shutdown decommissioning activities report to describe planned decommissioning activities, any environmental impacts of those activities, a schedule, and estimated costs. Implementation of an EPU does not affect FPLE's ability to maintain financial reserves for decommissioning nor does the EPU alter the decommissioning process.

The potential environmental impacts on decommissioning associated with the proposed EPU would be due to the increased neutron fluence. As a result, the amount of activated corrosion products could increase, and consequently, the post-shutdown radiation levels could increase. The increases in radiation levels as a result of operations under the proposed EPU conditions are expected to be insignificant, and would be addressed in the post-shutdown decommissioning activities report.

References

10.1 NRC (Nuclear Regulatory Commission), 1988, Final Generic Environmental Impact Statement on Decommissioning of Nuclear Facilities issued in 1988 (NUREG-0586).

10.2 NRC (Nuclear Regulatory Commission). 2002. NUREG-0586 - Generic Environmental Impact on Decommissioning of Nuclear Reactors. Supplement 1. Regarding the Decommissioning of Nuclear Power Reactors. Main Report, Appendices A through M. Final Report. November 2002.

10.3 NRC, 1996, NUREG-1437, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Volume 1, May 1996.

10.4 NRC, NUREG-1436, Generic Environmental Impact Statement for License Renewal of Nuclear Plants, Supplement 5, Regarding Turkey Point Plants, Units 3 and 4 – Final Report, January 2002.