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HARRIS,K.N. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
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SUBJECT: Application for amends to Licenses DPR-31 & DPR-41 to extend date of expiration so that forty yr term begins w/date of issuance of licenses rather than date of issuance of CPs.

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FPL

P.O. Box 14000, Juno Beach, FL 33408-0420

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L-92-31
10 CFR 50.90
10 CFR 50.91
10 CFR 50.92

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Proposed License Amendments
Operating License Expiration Date

In accordance with 10 CFR 50.90, Florida Power & Light Company (FPL) submits herewith a request to amend Operating Licenses DPR-31 and DPR-41 for Turkey Point Units 3 and 4, respectively.

These amendments will extend the date of expiration of the Turkey Point Units 3 and 4 operating licenses so that the forty year term of each unit begins with the date of issuance of the operating license for that unit rather than the date of issuance of that unit's construction permit. The proposed amendments would change the expiration date of Operating License DPR-31 for Turkey Point Unit 3 from April 27, 2007, to July 19, 2012, and the expiration date of Operating License DPR-41 for Turkey Point Unit 4 from April 27, 2007, to April 10, 2013. These proposed expiration dates are 40 years from the dates of issuance of the operating licenses (i.e., July 19, 1972, for Turkey Point Unit 3 and April 10, 1973, for Turkey Point Unit 4).

The proposed changes are included in Enclosure 1. A Safety and Environmental Analysis in support of the proposed license amendments addressing the nuclear safety and environmental aspects of the proposed changes is included in Enclosure 2. In accordance with 10 CFR 50.92, Enclosure 3 is FPL's Determination of No Significant Hazards Consideration for the proposed extensions to the operating license terms.

These proposed license amendments have been reviewed by the Turkey Point Plant Nuclear Safety Committee and the FPL Company Nuclear Review Board.

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A copy of these proposed license amendments is being forwarded to the state designee for the State of Florida in accordance with 10 CFR 50.91 (b) (1).

Should you have any questions about this submittal, please contact us.

Very truly yours,

K.N. Harris
Senior Vice President - Nuclear Division
Nuclear Operations

Enclosures

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point Plant
Jacob Daniel Nash, Florida Department of Health and Rehabilitative Services

STATE OF FLORIDA)
) ss.
COUNTY OF PALM BEACH)

K.N. Harris being first duly sworn, deposes and says:

That he is Senior Vice President, Nuclear Operations for the Nuclear Division of Florida Power & Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information and belief, and that he is authorized to execute the document on behalf of said Licensee.

K.N. Harris
K.N. Harris

Subscribed and sworn to before me this
25th day of February, 1992.

Karen E. Gutowski

KAREN E. GUTOWSKI
Name of Notary Public

NOTARY PUBLIC, in and for the County of
Palm Beach, State of Florida

NOTARY PUBLIC STATE OF FLORIDA
MY COMMISSION EXP JULY 30,1994
BONDED THRU GENERAL INS. UND.

My Commission expires
Commission No. CC020162

K.N. Harris is personally known to me.

Enclosure 1

Proposed Changes to

Turkey Point Units 3 and 4

Operating Licenses

DPR-31 and DPR-41

a. The Plan shall be followed by the licensee from and after the effective date of this amendment.

b. Changes to dates for completion of items identified in Schedule B do not require a licensee amendment. Dates specified in Schedule A shall be changed only in accordance with applicable NRC procedures.

2. This license condition shall be effective until December 31, 1991, subject to renewal upon application by the licensee.

L. The license shall fully implement and maintain in effect all provisions of the Commission-approved physical security, guard training and qualification, and safeguards contingency plans including amendments made pursuant to provision of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The plans, which contain Safeguards Information protected under 10 CFR 73.21, are entitled: "Turkey Point Plant, Units 3 and 4 Security Plan," with revisions submitted through April 13, 1988; "Turkey Point Plant, Units 3 and 4, Training and Qualification Plan," with revisions submitted through December 18, 1986; and "Turkey Point Plant, Units 3 and 4 Safeguards Contingency Plan," with revisions submitted through July 15, 1985. Changes made in accordance with 10 CFR 73.55 shall be implemented in accordance with the schedule set forth therein.

4. FPL shall proceed with implementation of the recommendations set forth in paragraphs 7b and c of the "Summary and Conclusions" section of the "Final Environmental Statement Related to Operation of Turkey Point, Florida Power and Light Company, Docket Nos. 50-250 and 50-251," issued July 1972 by the AEC Directorate of Licensing. No later than thirty (30) days from the date of issuance of this license, FPL shall submit to the AEC, for review and approval, its plan for the implementation of such recommendations.

5. This license is effective as of the date of issuance, and shall expire at midnight April 27, 2007

July 19, 2012

L. The license shall fully implement and maintain in effect all provisions of the Commission-approved physical security, guard training and qualification, and safeguards contingency plans including amendments made pursuant to provision of the Miscellaneous Amendments and Search Requirements revisions to 10 CFR 73.55 (51 FR 27817 and 27822) and to the authority of 10 CFR 50.90 and 10 CFR 50.54(p). The plans, which contain Safeguards Information protected under 10 CFR 73.21, are entitled: "Turkey Point Plant, Units 3 and 4 Security Plan," with revisions submitted through April 13, 1988; "Turkey Point Plant, Units 3 and 4, Training and Qualification Plan," with revisions submitted through December 18, 1986; and "Turkey Point Plant, Units 3 and 4 Safeguards Contingency Plan," with revisions submitted through July 15, 1985. Changes made in accordance with 10 CFR 73.55 shall be implemented in accordance with the schedule set forth therein.

4. This license is effective as of the date of issuance, and shall expire at midnight April 27, 2007.

April 10, 2013.

Enclosure 2

Safety and Environmental Analysis

Table of Contents

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Safety and Environmental Analysis

I. Introduction

A. Background

The Atomic Energy Act of 1954, as amended, specifies in Section 103 c. that a utilization facility operating license shall be issued for a specified period of time, not to exceed forty years. This requirement has been codified in Title 10 Code of Federal Regulations §50.51 (10 CFR 50.51).

Prior to 1982, the Nuclear Regulatory Commission (NRC) granted operating licenses to nuclear power reactors with the date of expiration of the operating license linked to the date of issuance of the construction permit. This practice was changed in response to a request by Commonwealth Edison Company for the NRC to issue the operating licenses for La Salle Units 1 and 2 for a full operating term of forty years starting on the date of issuance of the operating licenses. This request was approved and La Salle Unit 1 received an operating license effective for forty years from the 1982 date of the operating license issuance. In an August 16, 1982, memorandum from the Executive Director for Operations (EDO) to the NRC Commissioners, the EDO informed the Commission of the staff's new operating license issuance policy; he also informed the Commissioners that, in the future, the NRC staff would issue operating licenses for the term requested by the applicant, but in no case to exceed forty years from the date of issuance of the operating license.

Subsequently, other operating license applicants requested forty year operating licenses from the date of issuance of the license. These applicants included Florida Power & Light Company (FPL) for St. Lucie Unit 2, which received a forty year operating license for that unit on April 6, 1983.

The NRC's practice of granting forty year operating licenses from the date of issuance of the license has also been extended to plants which received their original operating licenses prior to the staff's change in policy. Baltimore Gas & Electric Company proposed license amendments to change the operating license expiration dates for both Calvert Cliffs Units 1 and 2. The NRC approved these proposals and amended both units' licenses in 1985. FPL proposed a similar amendment for St. Lucie Unit 1 on February 28, 1986. This proposed amendment was approved by the NRC on July 8, 1987, as Amendment No. 82 which extended the operating license expiration date for that unit from July 1, 2010, to March 1, 2016.

Turkey Point Units 3 and 4 were issued operating licenses prior to the change in staff policy discussed above and, as a result, their operating licenses currently expire forty years from the

date of issuance of their construction permits. These proposed license amendments are intended to "recapture" the balance of the forty years of operation.

B. Need for License Extension

The construction permits for both Turkey Point Units 3 and 4 were issued on April 27, 1967. Following completion of construction activities, the NRC issued operating licenses for Turkey Point Unit 3 on July 19, 1972, and for Turkey Point Unit 4 on April 10, 1973. The operating license for each unit was issued for a term of forty years, commencing with the date of issuance of the construction permit. As a result, the operating licenses for both units currently expire on April 27, 2007. These proposed amendments are intended to change the operating license expiration date for Turkey Point Unit 3 to July 19, 2012, and for Turkey Point Unit 4 to April 10, 2013.

The granting of these proposed amendments will permit the continued operation of Turkey Point Unit 3 for approximately an additional five and one-quarter years and for Turkey Point Unit 4 for approximately an additional six years. As demonstrated later in this analysis, these proposed amendments will permit FPL to defer the construction of additional generating capacity resulting in a considerable cost benefit.

C. Description of Analysis

Two requirements were identified in the NRC's guidance policy for operating reactors to recapture the operating years lost in the period between construction permit issuance and operating license issuance (NRC memorandum from Hugh L. Thompson, Jr. to Harold R. Denton, dated April 20, 1985). These requirements are that (1) there is no significant impact on the unit's final safety analysis report (FSAR); and (2) all environmental effects and impacts have been evaluated as having been addressed in the unit's Final Environmental Statement (FES).

In issuing operating licenses to Turkey Point Units 3 and 4, the NRC had reviewed and determined that these two requirements were met for the approximately 34 years of operating life. Issues associated with operating license terms of forty years were considered in the original design as defined in the Turkey Point Units 3 and 4 Updated Final Safety Analysis Report (UFSAR) and/or are the subject of ongoing programs.

This analysis contains three principal areas of review. The first analysis area (Section II) is an assessment of the safety impact of the proposed license amendments. That section summarizes the analysis, conclusions, and bases for the

conclusions, that the systems, structures and components can safely remain in service for the additional operating years afforded by these proposed license amendments.

The second analysis area (Section III) involves the environmental impact associated with the additional years of operation of the units. That analysis includes an assessment of the onsite and offsite radiation exposures, waste production, fuel cycle effects, and non-radiological environmental effects. This section also reaches a conclusion with respect to the overall environmental impact of the proposed license amendments.

The third analysis area (Section IV) deals with the cost effectiveness of the proposed license amendments.

The summary to this report addresses the findings and determinations required to be made under 10 CFR 50.92 and 10 CFR 51. The Turkey Point radiation protection (As Low As Reasonably Achievable (ALARA)) program is summarized in the attachment to this enclosure.

II. Safety Analysis

A. Introduction

This area of the review demonstrates that the public health and safety will not be adversely affected by these amendments to the operating licenses.

B. Electrical Equipment

The safety-related electrical equipment at Turkey Point Units 3 and 4 has been analyzed with respect to the requirements of 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants," as discussed in the Turkey Point Units 3 and 4 Updated Final Safety Analysis Report (UFSAR), Appendix 8A, "Environmental Qualification." The aging analyses performed by FPL have identified the qualified lifetimes for these components. The duration of these qualified lifetimes are incorporated into plant equipment maintenance and replacement practices to ensure that all safety-related electrical equipment remains qualified and available to perform its intended safety-related function in its most severe normal operating environment and design basis conditions throughout the forty year lifetime of the unit. This is evidenced by equipment qualification analysis assumptions discussed in the Turkey Point Units 3 and 4 UFSAR, Appendix 8A, "Environmental Qualification," which takes into consideration the environmental effects of 40 years of service plus a design basis accident in determining equipment qualification as defined in 10 CFR 50.49.

The continuing environmental qualification program, in conjunction with each unit's Technical Specification Surveillance Requirements, assures that the safety-related electrical equipment will perform its design basis function regardless of the unit's age.

C. Mechanical Equipment

The Reactor Coolant System (RCS) design bases and General Design Criteria (GDC) applicable to the RCS are discussed in the Turkey Point Units 3 and 4 UFSAR, Section 4, "Reactor Coolant System." All components in the RCS are designed to withstand the effects of cyclic loads due to reactor system temperature and pressure changes. To establish the service life of the RCS components as required by the American Society of Mechanical Engineers (ASME) Code (Section III), Boiler and Pressure Vessel Code for Class "A" Vessels, the unit operating conditions have been established for the 40 year design life. These operating conditions include the cyclic application of pressure loadings and thermal transients.

Table 4.1-8, Design Thermal and Loading Cycles, lists the number of thermal and loading cycles estimated for equipment design purposes for the 40 years of operation.

All pressure-containing components of the RCS were designed, fabricated, inspected, and tested in conformance with the applicable codes listed in UFSAR Table 4.1-9. The RCS is classified as Class I for seismic design. RCS valves, fittings, and piping were designed, fabricated, inspected, and tested in conformance with the Code requirements also listed in UFSAR Table 4.1-9. Safety-related mechanical equipment is inspected and tested in accordance with the ASME Inservice Testing (IST) and Inservice Inspection (ISI) requirements of Section XI of the ASME Boiler and Pressure Vessel Code. Inservice inspection of ASME Code Class 1, 2, and 3 components is performed in accordance with Section XI of the ASME Boiler and Pressure Vessel Code and applicable Addenda as required by 10 CFR 50.55a(g), except where specific written relief has been granted by the NRC pursuant to 10 CFR 50.55a(g)(6)(i).

Inservice inspection of the steam generator tubes ensures that the structural integrity of that portion of the RCS is maintained. The steam generator tube inservice inspection program is conducted in accordance with the requirements of the Technical Specifications.

FPL compliance with the requirements of the IST and ISI programs, in conjunction with the Technical Specification Surveillance Requirements for mechanical components, assure the continued operability of the safety-related mechanical equipment regardless of the age of the plant.

D. Structures

The design and construction codes, and the construction structural materials used in the construction of the Class I structures at Turkey Point Plant are discussed in UFSAR Chapter 5.

The areas of the Auxiliary Building housing Class I systems have been designed and constructed to Class I requirements. The Control Building is a reinforced concrete structure, designed to Class I requirements similar to the Class I areas of the Auxiliary Building. The Control Building houses the following:

1. Reactor Control Rod Drive Equipment
2. Cable Spreading Room and Battery Room
3. Control Room

The facility's intake cooling water pumps are Class I components and are supported by the Intake Structure which is also designed

to Class I requirements. The units' emergency diesel generators and the switchgear equipment are located in separate reinforced concrete enclosures. These structures are also designed to Class I requirements. The Spent Fuel Storage Facilities house the spent fuel assemblies and cooling equipment. It is a reinforced concrete structure designed to Class I requirements.

The units' structures were designed and constructed considering a forty year operating lifetime and incorporate features to facilitate inspections. Industrial experience with such structures establishes that a service life well in excess of forty years can be anticipated.

The right vertical cylinder containments with post-tensioned reinforced concrete, pre-stressing tendons, reinforced and post-tensioned concrete hemispherical domed roofs, and substantial base slabs at Turkey Point Units 3 and 4 have been analyzed considering a forty year service life while accounting for all loads they will, or may, encounter. The design and analysis of the Turkey Point Units 3 and 4 containments are documented in UFSAR Chapter 5.1. Testing of the containments is conducted in accordance with the 10 CFR 50 Appendix J, "Primary Reactor Containment Leakage Testing For Water-Cooled Power Reactors." Additionally, the Turkey Point Units 3 and 4 Technical Specification Surveillance Requirements assure the continued operability of the reactor containments throughout the extended period of operation.

E. Reactor Vessel

The design of the reactor pressure vessels and their internals considered the effects of forty years of operation at full power with a plant capacity factor of 80% (i.e., 32 effective full power years (EFPY)).

The reference temperature for pressurized thermal shock (RT_{PTS}) values were calculated in accordance with the requirements of 10 CFR 50.61, "Fracture toughness requirements for protection against pressurized thermal shock events," and were found to be below the 10 CFR 50.61 screening criteria. The results of this analysis were submitted by FPL to the NRC by letter L-92-27 dated February 13, 1992. Table 7 presents the projected values for RT_{PTS} for both Turkey Point Units 3 and 4 at the current operating license expiration date and at the end of the recapture period. This table demonstrates that the expected neutron fluences at Turkey Point Units 3 and 4 and resultant RT_{PTS} will not result in either unit exceeding the RT_{PTS} screening criteria during the operating license recapture period through 32 EFPY.

Turkey Point Units 3 and 4 have an integrated surveillance program which meets the requirements of credible surveillance

programs described in Regulatory Guide 1.99, Revision 2. Surveillance capsules placed inside the reactor vessel provide a means to monitor the cumulative effects of power operation. The surveillance capsule withdrawal schedules for Turkey Point Units 3 and 4 are currently included in each unit's Technical Specifications. The surveillance capsule withdrawal schedules were developed using the guidance of the American Society of Testing and Materials (ASTM) E185 and are in compliance with 10 CFR 50 Appendix H, "Reactor Vessel Material Surveillance Program Requirements." Additionally, pressure-temperature, heatup, and cooldown curves, as well as low temperature overpressure protection (LTOP) limits for the reactor coolant systems and the reactor pressure vessels are specified in the Technical Specifications and are in compliance with 10 CFR 50 Appendix G, "Fracture Toughness Requirements." Pressure-temperature, heatup, and cooldown curves, and LTOP limits will be updated, if required, in accordance with the requirements of 10 CFR 50 Appendix G throughout plant lifetime, including the recapture period. These activities will ensure that pressure-temperature limitations associated with reactor pressure vessel embrittlement will remain in compliance with 10 CFR 50 Appendix G during the recapture period.

Three surveillance capsules have been removed from Turkey Point Unit 3 and two surveillance capsule have been removed from Turkey Point Unit 4. These capsules have been evaluated to determine the degree of irradiation-induced embrittlement of the reactor pressure vessel welds (which are the most limiting reactor vessel material). Turkey Point Units 3 and 4 are predicted to drop below the 50 ft-lb Charpy upper shelf energy (USE) limit in 10 CFR 50 Appendix G prior to the end of the current full-term operating lives. In accordance with 10 CFR 50, Appendix G, FPL has, for Turkey Point Units 3 and 4:

* Performed, in 1991, a volumetric inspection of 100% of the reactor vessel critical beltline welds ;

* Developed supplemental data, through the Babcock & Wilcox Owners Group (B&WOG) and is currently irradiating additional material; and

* Submitted an analysis to the NRC (FPL letter L-92-02, dated February 4, 1992) which demonstrates adequate margin against brittle fracture.

FPL is a member of the B&WOG, which has initiated fracture mechanics studies of the low USE issue for all B&W fabricated reactor pressure vessels with high-copper, Linde 80 ASA weld metals. The purpose of the studies is to demonstrate adequate margin against brittle fracture for low USE materials. The Turkey Point Units 3 and 4 analysis is documented in the November 1991 BAW-2118P report, Low Upper-Shelf Toughness Fracture

Analysis of Reactor Vessels of Turkey Point Units 3 and 4 for Load Level A & B Conditions. This analysis uses the elastic-plastic fracture mechanics methodology and acceptance criteria developed by the ASME Section XI Working Group on Flaw Evaluation. The results of the analysis for the Turkey Point vessels are evaluated against the acceptance criteria for low upper-shelf fracture toughness analysis, developed by ASME Boiler and Pressure Vessel Code Section XI. The elastic-plastic fracture mechanics evaluation performed shows that the crack driving force applied is significantly lower than the material toughness at a crack extension of 0.1 inch, as specified by ASME Section XI. Also, the analysis results demonstrate that when the crack driving force is equal to the material toughness, crack growth is stable, as required by ASME Section XI. Additional loading margin exists since the Turkey Point vessels were fabricated using only circumferential welds in the beltline. The analysis clearly shows that the material has excellent toughness and, although the upper-shelf energy of the Turkey Point vessels may drop below 50 ft-lbs, there will be adequate margin of safety against fracture through at least 40 years of operation.

F. Safety Upgrades and Other Issues

When the NRC issued the initial operating licenses to Turkey Point Units 3 and 4 under 10 CFR 50.57, it concluded that the units had been completed and would be operated in accordance with their operating license applications, the rules and regulations of the NRC and the provisions of the Atomic Energy Act. At that time, the NRC also made a comprehensive determination that the design, construction, and proposed operation of the units satisfied the NRC's requirements and provided reasonable assurance of adequate protection to the public health and safety and common defense and security.

The NRC determined that an acceptable level of safety existed and that the common defense and security was provided at the time of initial licensing. The basis for that determination does not remain fixed for the term of the operating license. The licensing basis evolves throughout the terms of the operating licenses because of the continuing regulatory activities of the NRC as well as the activities of FPL. The NRC's regulatory process provides ongoing assurance that the licensing bases of nuclear power plants provide an acceptable level of safety. This process includes research, inspections, audits, investigations, evaluations of operating experience, and regulatory actions to resolve identified issues. The NRC's activities result in changes to the licensing bases through the promulgation of new or revised regulations, acceptance of licensee commitments for modifications to plant designs and procedures, and the issuance of orders or confirmatory action letters.

Subsequent to the issuance of the operating licenses for Turkey Point Units 3 and 4, new regulations and other licensing issues have continued to emerge. Examples of such new regulations are:

* 10 CFR 50 Appendix R, "Fire Protection Program For Nuclear Power Facilities Operating Prior to January 1, 1979";

* 10 CFR 50.62, "Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants"; and

* 10 CFR 50.63, "Loss of all alternating current power."

Additionally, various NRC Generic Letters requiring responses, NRC Bulletins, and other NRC correspondence are addressed to FPL with respect to Turkey Point Units 3 and 4. As these regulations, and generic and plant-specific issues have arisen, modifications have been made to the physical plant, plant programs, and plant procedures. The ongoing program of safety review, regulatory oversight and plant improvement has resulted in a continued, or increased, level of plant safety relative to the original plant licensing basis.

G. Summary of Safety Analysis

The basis for requesting the "recapture" of the interim period between issuance of the construction permits until issuance of the operating licenses is that the plants were designed and constructed assuming a forty year service life, as discussed above. Nonetheless, it is anticipated that certain components will age during the plants' lifetimes and require refurbishment or repair. Design features have been incorporated which provide the opportunity to test, inspect, and perform preventive and corrective maintenance on plant systems, structures and components. Maintenance and surveillance practices have been implemented in accordance with industry codes, regulatory requirements, and the Technical Specifications to provide assurance that any unexpected degradation in plant equipment will be identified and corrected.

Aging analyses have been performed for safety-related electrical equipment within the scope of 10 CFR 50.49, "Environmental Qualification of electric equipment important to safety for nuclear power plants" which identify the qualified lifetimes of this equipment. These lifetimes have been incorporated into the plants' environmental qualification programs to ensure that required safety-related electrical equipment remains qualified, operable, and available to perform its safety function regardless of the age of the plant. Mechanical equipment is routinely tested in accordance with industry codes and standards and the

Technical Specification Surveillance Requirements to ensure its continued operability. In the event of significant wear, mechanical components are refurbished or replaced, thereby ensuring the continued availability of that equipment.

Based on the above, FPL concludes that the extension of the operating licenses of Turkey Point Units 3 and 4 to allow a forty year service life is consistent with the safety analysis in that issues associated with plant aging during the forty year service life have been previously addressed and that emerging safety issues for the extended period will be considered in the ongoing programs of safety review, regulatory oversight, and plant improvements.

III. Environmental Analysis

A. Introduction

This area of the review discusses the impact of the proposed amendments on the environment. The onsite and offsite radiological and non-radiological environmental effects are assessed.

Environmental issues associated with the issuance of an operating license for both Turkey Point Units 3 and 4 were originally evaluated in the "Final Environmental Statement related to the Operation of the Turkey Point Plant" (U.S. Atomic Energy Commission, July 1972). That document has been reviewed relative to the conclusions reached; the effects of extending the operating licenses to forty years of operation are discussed below.

B. Offsite Radiation Exposure

Offsite radiation exposures from postulated accidents are assessed and documented in the Turkey Point Units 3 and 4 UFSAR. This section of the analysis addresses the operational experience to date and the postulated effect of the proposed additional reactor-years of operation on these offsite radiation exposures.

1. Normal Operation Exposure

The offsite radiation exposure from various pathways to the maximally exposed individual member of the general public has been computed for each unit. The first step in the offsite dose calculation is the determination of the estimated annual release of each isotope. The releases are then used as a source term for the calculation of the dose of exposed individuals offsite. The analyses show that both units are designed and operated to assure that the objective is met of maintaining exposures within the limitations of 10 CFR 50 Appendix I, "Numerical Guides For Design Objectives And Limiting Conditions For Operation To Meet The Criterion 'As Low As Reasonably Achievable' For Radioactive Material In Light-Water-Cooled Nuclear Power Reactor Effluents."

Section V.D. of the Final Environmental Statement projected doses resulting from radioactive materials released to the environment from routine operations of the two reactors. Title 10 CFR Part 50, Appendix I, which provides guidelines for meeting as low as reasonably achievable (ALARA) doses from the reactors, is incorporated in the Turkey Point Units 3 and 4 Technical Specifications and Off-Site Dose Calculation Manual (ODCM).

The results of operating experience in effluents, off-site dose calculation results, and the radiological environmental monitor-

ing program demonstrate the minute radiological impact upon the general public from the operation of the two reactors. These matters are discussed below.

a. Radioactive Materials Released in Liquid Effluents

The liquid effluents from the plant are discharged into a closed cooling canal system. Other than subsurface aquifer transport to the east to Biscayne Bay and Card Sound, radioactive materials are confined to this system.

The FES described doses to an adult scout leader from shoreline activities, swimming, and consuming biota grown in the canal. The total body dose from these pathways was estimated to be about 0.65 mRem/yr.

In actuality, the FES-assumed activities did not occur; for a short while there was day camping. The canal system has, for many years, been closed to the general public. For comparative purposes, however, dose from shore-line deposits is calculated to demonstrate meeting ALARA guidelines. The total body dose from both units for this assumed pathway, averaged for the years 1985 to 1990, was 0.01 mRem/yr. This average dose, per reactor, is about 0.16% of the ALARA objective. Table 1 compares the calculated liquid pathway doses from the years 1985 to 1990 to the ALARA objective.

The FES also estimated doses to members of the general public from aquatic activities in Biscayne Bay and Card Sound. The Turkey Point Units 3 and 4 Radiological Environmental Monitoring Program has not identified nuclides attributable to plant operation in the waters and the biota accessible to the general public in the vicinity of Turkey Point Plant other than trace amounts of tritium. The trace amounts of tritium detected in the water, averaging about 200 pCi/l, (well below the amount required to be detected), are occasionally seen in stagnant canals adjacent to the cooling canal system.

b. Radioactive Materials Released to the Atmosphere

Gaseous wastes from routine operations are collected, compressed, and stored in tanks at the plant. This hold-up allows for the decay of short half-lived radionuclides prior to release through high efficiency particulate absolute (HEPA) filters to remove particulate material.

The FES described airborne pathway doses to the adult scout leader and to a continuously occupied farm 3.5 miles northwest of the plant. The scout camp and the residence no longer exist. The 1991 annual land use census has not identified a residence within the scope of the survey.

Additionally, there are very few gardens in the area located within 5 miles of the plant; most of the land in this area is either swamp or tree farms. The nearest dairy animal remains greater than 20 miles from the plant site.

Because there are no members of the general public residing within close proximity of the plant, (as determined by the 1991 annual land use census), compliance to the ALARA guidelines is demonstrated by comparing the airborne release to the air dose limits for noble gases at the site boundary and an assumed person living at the reference farm location (i.e., 3.5 miles northwest of the plant) for radioiodines 131 and 133, tritium, and particulates with half-lives greater than 8 days for the inhalation, ingestion, and ground plane pathways. The average doses for the years 1985 to 1990 are less than 1% of the air dose limit and less than 3% of the organ dose limit. See Table 1 for a comparison of these doses for years 1985 to 1990 to the ALARA objective.

The FES also estimated doses to members of the general public at distances further away. The Radiological Environmental Monitoring Program has not identified radionuclides attributable to plant operation in air sampling or food stuffs grown within 25 miles of the plant, and direct exposure monitoring has not detected an increase in ground level external exposure.

c. Conclusion

Turkey Point Units 3 and 4 have consistently been operated well within the requirements of 10 CFR 50 Appendix I for all types of releases as documented in the Turkey Point Units 3 and 4 Semi-Annual Radioactive Effluent Release Reports. Table 1 presents a summary of the offsite dose projections as reported in the current Semi-Annual Radioactive Effluent Release Reports. This table compares offsite doses computed using the Turkey Point Units 3 and 4 ODCM for recent operating history as compared to the 10 CFR 50 Appendix I design objectives. Note that the design objectives and limiting conditions for operation conforming to the guidelines of 10 CFR 50 Appendix I are deemed by the NRC as a conclusive showing of compliance with the ALARA requirements of 10 CFR 50.34a, "Design objectives for equipment to control releases of radioactive materials in effluents-nuclear power reactors", and 10 CFR 50.36a, "Technical specifications on effluents from nuclear power reactors". As demonstrated in Table 1, Turkey Point Units 3 and 4 are in full compliance with the ALARA requirements of these regulations.

The Turkey Point Units 3 and 4 Radiological Effluent Technical Specifications (RETS) are also in compliance with

the goal of maintaining radiation exposure ALARA. The operation of Turkey Point Units 3 and 4 in accordance with the RETS assures the protection of the health and safety of the public. Therefore, the offsite radiological environmental impact of the continued operation of Turkey Point Units 3 and 4 is minimized through compliance with the RETS.

It is anticipated that Turkey Point Units 3 and 4 will remain well below the 10 CFR 50 Appendix I guidelines during the period of extended operation to a full 40 year operating term.

2. Accident Exposure

The proposed amendments to the operating licenses will have no effect on the potential for the release of radioactivity in an accident. The offsite doses presented in the UFSAR analyses remain bounding for the exposure postulated under accident conditions. The Exclusion Area Boundary and the Low Population Zone for Turkey Point Units 3 and 4 remain the same as those defined in the FSAR at the time of licensing both units. No changes to either unit which would affect either the Exclusion Area Boundary or the Low Population Zone are anticipated during the period of extended operation.

One factor that is variable over time with respect to the overall risk to the general public of the extended operating period of Turkey Point Units 3 and 4 is the population within 50 miles of the plant. The predicted doses to the population are based upon the forecasted population increases presented in the FES. Updated population estimates for the area surrounding Turkey Point Units 3 and 4 were compared to the population estimates in the FES. Population projections in the FES projected the growth anticipated in the vicinity of Turkey Point Units 3 and 4 for the period from 1966 to 1986. Those figures are compared to current projections in Table 2. That table shows that the FES generally overestimated the population growth in the vicinity of Turkey Point Units 3 and 4. Although, the 1990 United States (US) Government Census figures for the population located within 40 - 50 miles from the plant show an increase when compared to the 1986 FES projections, the 1990 figures for the total population located within 50 miles from the plant is less than the 1986 FES projections.

Based on the 1990 US Government Census population update performed for FPL, the nearest population centers to Turkey Point Units 3 and 4 are the cities of Florida City/Homestead and greater Miami, all lying to the west and north beyond the 5 mile radius from the units. As shown on Table 2, the 1990 US Government Census population update shows there are no residents living within 5 miles of Turkey Point Units 3 and 4. The 5 year population projections show about a 4% increase in residents in

the 10 mile Emergency Planning Zone (EPZ) with Florida City and Homestead showing the greatest increase projections. The change in the nearest population center to Turkey Point Units 3 and 4 will be Homestead developing to a point approximately 5 miles from the units. No new population centers are projected at this time and FPL knows of no projected developments planned within 5 miles of the units.

The lower than projected population growth rates experienced in the vicinity of Turkey Point Units 3 and 4 support the conclusions reached in the FES concerning population exposure in the event of an accident at either Turkey Point Unit 3 or 4.

C. Onsite Radiation Exposure

Onsite radiation exposure involves the exposure of plant workers to nuclear radiation. These amendments to the Turkey Point Units 3 and 4 operating licenses will not result in an increase in the day-to-day radiation exposures encountered by plant workers since the in-plant radiation levels will not change significantly over the operating lifetime of the units.

1. ALARA

FPL has developed and implemented comprehensive ALARA programs at its nuclear power plants. The Turkey Point Units 3 and 4 ALARA program is described in the attachment to this analysis.

2. Dose Assessment

Yearly exposure data for Turkey Point Units 3 and 4 for the years 1983 to 1990 were reviewed to determine the man-rem exposures attributable to routine operations and refueling outages. Tables 3, 4, and 5 present historical dose information as measured by direct reading dosimeters (DRDs) from 1983-1990. This data has been summarized from the Turkey Point Unit 3 and 4 annual man-rem reports.

Table 3 lists the man-rem for each of the six work functions. The information in this table is used for estimating the projected annual doses for the extended years of operation.

Table 4 gives the dose for each job function. Seventy-six percent of the exposure is received by maintenance personnel. The percentages listed in this table are not expected to change significantly during the extended years of operation.

Table 5 gives the dose for each employee type. Contract personnel will still be expected to receive a proportionally higher

dose than station personnel in future years. The normal operations exposure is determined as the difference between the site annual total and outage totals.

An estimate for the additional years of operation beyond the current operating licenses expiration dates with respect to projected radiation exposure was made. An estimate of dose from decommissioning and extensive decontamination was not attempted. Table 6 gives the total estimated annual doses for the extended years of operation. The assumptions used in calculating the dose are:

- Refueling outage dates estimated after December 3, 1998, are based on an outage schedule approximately 16 months apart and 63 days in length as estimated in the approved operating schedule of April 30, 1991. There are only two years between the years 2006 and 2013 in which two refueling outages will occur on the site in the same year. It is estimated that two refueling outages will occur in the years 2006 and 2009; only one refueling outage per year is expected in the period of additional operation other than the years 2006 and 2009. No other outages associated with significant occupational exposure are anticipated. The additional outages will not result in exposures outside the limits of 10 CFR 20, "Standards For Protection Against Radiation." Furthermore, outage-related exposure is minimized by the ALARA program discussed in the attachment to this analysis.

- Exposure estimates are based on historical data from 1983 to 1990 (Table 3). The values used for reactor operations and surveillance, inservice inspection, waste processing and refueling are based on average values for the years 1983 to 1990. The value used for the routine maintenance is the 1990 value rather than the 1983 to 1990 average. This value is expected to be more representative for the future years. The value used for special maintenance is the 1989 value since no major special maintenance jobs are projected in the future that will result in large cumulative dose as in previous years (e.g., steam generator replacement). Major modifications were completed in 1991 including the removal of the resistance temperature detector (RTD) bypass system. Exposure estimates for each work function were adjusted by a thermoluminescent detector/direct reading dosimeter (TLD/DRD) ratio of 0.85 and an estimated reduction of 15% due to future ALARA initiatives and improvements. The predictions are treated as an upper value. It is expected that new technologies for dose reduction will be in use including enhanced chemistry control and evolving decontamination practices.

Values for each work function are calculated below.

Reactor Operations and Surveillance	= 139 x 0.85 x 0.85	= 100 man-rem
Routine Maintenance	= 232 x 0.85 x 0.85	= 168 man-rem
Inservice Inspection	= 105 x 0.85 x 0.85	= 76 man-rem
Special Maintenance	= 163 x 0.85 x 0.85	= 118 man-rem
Waste Processing	= 19 x 0.85 x 0.85	= 14 man-rem
Refueling	= 112 x 0.85 x 0.85	= 81 man-rem
	TOTAL	557 man rem*

* For years in which two refueling outages are scheduled, an additional 157 man-rem is assumed for a total of 714 man-rem. This additional exposure is comprised of refueling and ISI activities.

As indicated above, the average occupational exposure for the period of 1983 to 1990 is 14 man-rem from rad-waste processing, handling, and shipping. The annual dose from rad-waste activities should not increase significantly during the extended years of operation. Due to increased awareness of, and efforts in, volume waste minimization, the annual dose should be lower than the eight year average on which the 14 man-rem estimate is based.

3. Radioactive Inventories

While radioactive isotope inventories in certain plant components would be expected to increase as the units age, the Turkey Point Units 3 and 4 source term has been declining due to several ALARA initiatives which have taken place recently. Source term reduction techniques are continually being reviewed for applicability and implementation at Turkey Point Plant. Some of the most significant source term reduction efforts to date have been: ...

- Operation of the units under a coordinated lithium boron (Li-B) program over the last two cycles. The downward trend of the radiation dose rate around the Reactor Coolant System (RCS) loop piping offers some evidence of the effectiveness of the program.
- Installation of fine filtration (scheduled for mid-1992).

- Removal of the RTD bypass system. Average dose rate inside the biowall has decreased by a factor of 2 following the removal of system piping and components.

- Improvements in fuel design have effectively eliminated significant fuel failures.

Other source term improvements will be done as both technology improves and they become economically beneficial. Areas FPL will be investigating for application at Turkey Point Plant are cobalt-free materials for valves, system decontamination, and application of robotics to repetitive tasks.

While experience has indicated that radioactive isotope inventories in certain plant components increase as the units age and results in increased radiation dose rates in the vicinity of these components, radiation exposures inside the plants are carefully controlled under the Turkey Point Units 3 and 4 ALARA program (see Attachment). As radioactive material builds up in a component, the ALARA program provides for the use of added shielding, engineering controls, and/or a reduction in work times to control worker exposure. Measures such as changing demineralizer beds on reaching radioactivity limits and the use of decontamination techniques are also used to minimize worker exposure.

The continued management commitment to the ALARA program, including implementing exposure reduction technologies as they become feasible, should continue to reduce exposures in future years including the proposed license extension for a forty year operating term.

4. Radioactive Waste Production

Continued operation of Turkey Point Units 3 and 4 beyond their current operating license expiration dates will result in the generation of additional radioactive wastes. Three types of waste are generated: gaseous, liquid, and solid. Each of these types of waste is discussed below with respect to their impact on waste treatment.

a. Gaseous Waste Releases

The gaseous radwaste treatment systems are designed to assure that the airborne release of such waste is maintained ALARA during normal plant operation. The RETS ensure that the equipment required to maintain the offsite doses ALARA will be operable and will be operated as required to maintain the releases ALARA. Table 1 presents recent Turkey Point Units 3 and 4 gaseous radwaste release experience.

b. Liquid Waste Releases

The liquid waste treatment systems at Turkey Point Units 3 and 4 are designed to meet the ALARA goals. These systems are also subject to the RETS for assurance of operability. Table 1 presents recent Turkey Point Units 3 and 4 liquid waste release experience.

c. Solid Waste Shipment

Operation of Turkey Point Units 3 and 4 beyond the current operating license termination dates will result in additional volumes of solid Low Level Radioactive Waste (LLRW) that will have to be shipped for disposal. However, the annual volume of LLRW is not expected to be increased over current levels. A comparison of recent LLRW disposal volume history with the volumes discussed in the FES is provided below. The basis for the recent history data is the annual average LLRW volume disposed of for the last 3 calendar years of operation, 1988 to 1990.

Turkey Point Units 3 and 4
Radioactive Waste Shipments

Basis	Cubic Feet
Turkey Point Units 3 and 4 Final Environmental Statement Projected Annual LLRW Disposal Volume	2250 - 4500
Recent History LLRW Disposal Volume Three Year Average 1988 to 1990	7956
Industry PWR Experience Three Year Median Value for LLRW Disposal Volume 1988 to 1990	9744

Based on this comparison, the current annual volume of LLRW is approximately 77% higher than the annual volume of LLRW projected by the FES. However, as also shown above, Turkey Point's LLRW disposal volume is well below the median value for similar two unit pressurized water reactor (PWR) sites.

Solid LLRW is disposed of at an off-site licensed low-level radioactive waste disposal facility. LLRW is packaged for transportation and disposal in strict compliance with Federal and State regulations which assure a high degree of safety and a minimum risk to the public. Over the years, significant improve-

ments have been made in the way that LLRW is handled and disposed. LLRW is now classified and packaged for disposal based upon increasing the level of protection to the public. As a result, Turkey Point Plant has modified some of its LLRW management processes from those discussed in the FES. For example, Turkey Point Units 3 and 4 currently make extensive use of demineralization and filtration for LLRW processing and volume reduction. The resulting resin and filter waste is packaged and dewatered in high integrity containers (HICs) which are designed to retain the LLRW for at least 300 years. Evaporator concentrates are no longer produced as a final waste form. In addition, Turkey Point Units 3 and 4 have improved the packaging efficiency by employing larger box or van type containers in lieu of 55 gallon drums.

Currently, the largest component of Turkey Point's LLRW volume is relatively low activity miscellaneous contaminated trash. Turkey Point Plant also uses both volume minimization techniques and other volume reduction processes to minimize the volume of LLRW for final disposal. Some of the LLRW is shipped to radwaste processors for further volume reduction using decontamination, compaction and/or incineration.

The state of Florida is a party state to the Southeast Interstate Low-Level Radioactive Waste Management Compact (Southeast Compact). Under provisions of the Southeast Compact, Turkey Point Units 3 and 4 will have access, during the period of extension, to a regional LLRW disposal facility in North Carolina. This facility is currently expected to begin operation in 1996.

Using the current volume projections from above, it is estimated that the Turkey Point Plant will produce approximately 45,000 cubic feet of additional LLRW for disposal during the approximately 11.25 reactor-years of operation. This additional volume will be a small fraction of the volume of LLRW which will be produced by the facility during the current authorized operating period. In addition to this small increase in volume, LLRW is managed, transported, and disposed of under strict regulations designed to protect public health and safety. Based upon the above analyses, it can be concluded that there will be no significant impact from the additional volume of LLRW that will be produced during the extended period of operation of Turkey Point Units 3 and 4.

5. Nuclear Fuel Cycle

The proposed period of continued operation for Turkey Point Units 3 and 4 will add approximately 5 additional fuel reload cycles to the operation of each unit. Table S-3 of 10 CFR 51.52 is based on an analysis for a 1000 megawatt (electric) (MWe) light water reactor operating for one initial core and 29 reload cycles. The

electrical rating of Turkey Point Units 3 and 4 is 666 MWe (net) and, with the proposed recaptured operating term, each unit is currently projected to complete 25 reload cycles. The fuel fabrication requirements for Turkey Point Units 3 and 4 are lower than those assumed in the basis for Table S-3; therefore, the assumptions comprising the basis for Table S-3 are unaffected by the proposed recaptured operating term for both units.

The impact of 18 months versus 12 month cycles on the values in Table S-3 were investigated by the Atomic Industrial Forum (AIF) as a part of a study on impact of higher burnup fuel on Table S-3. The study, completed for the National Environmental Studies Project of AIF, concluded that the current values in that table, and the generic analysis of environmental dose commitments of the nuclear fuel cycle done by the NRC staff, apply up to fuel burnups of 60,000 megawatt-days per metric ton of Uranium (MWD/M-TU) (The Environmental Consequences of Higher Fuel Burnup, AIF/NESP-032, Atomic Industrial Forum, Inc., June 1985). While this study primarily concerned high burnup fuel, one of the primary assumptions used was 18 months fuel cycles. That assumption was made because the longer operating cycles are more typical of current practice than 12 months cycles. Thus, the AIF study confirms that the values in Table S-3 are applicable to both high burnup fuel and 18 months cycles.

The Final Environmental Statement (FES) for Turkey Point Units 3 and 4 assumed 760 MWe output from each unit operating an annual reload cycles with each reload containing approximately 41 fresh fuel assemblies. The average burnup of discharged fuel assumed in the FES was 25,000 MWD/MTU. Currently, Turkey Point Units 3 and 4 operate with an electrical output of 666 MWe and employ 18 month fuel cycles. Between 48 and 56 fresh assemblies are loaded each cycle. By December 1991, Turkey Point Unit 3 had completed 11 fuel cycles and Turkey Point Unit 4 had completed 12 fuel cycles. Annualized, the number of Turkey Point fuel assemblies required for reload will be less under an 18 month cycle and higher burnup operating scheme than was assumed in the FES for annual cycles. Although the current average fuel assembly burnup is greater that the 25,000 MWD/MTU assumed in the FES, the effect on spent fuel shipping is offset by the longer decay time required by Technical Specifications prior to shipment (120 days versus the 90 days assumed in the FES).

a. Onsite Spent Fuel Storage

The combined storage capacity of the two spent fuel pools at Turkey Point Units 3 and 4 is 2808 fuel cells. Based upon current projections, this capacity will accommodate spent fuel discharges throughout the recaptured operating period for Turkey Point Units 3 and 4.

FPL has a contract with the Department of Energy for the removal from the plant site and the disposal of spent fuel. The contract provides for the services to commence in 1998. In the event that spent fuel removal is delayed and additional storage is required on site, additional spent fuel storage can be accomplished by on-site storage in casks or other means. Federal Regulations provide the capability to licensees for the onsite use of storage casks.

b. Environmental Effects of Transportation of Fuel and Waste

Title 10 CFR 51.52, "Environmental effects of transportation of fuel and waste - Table S-4", addresses certain requirements regarding the transportation of fuel and radioactive wastes to and from the site. As discussed in 10 CFR 51.52, environmental reports prepared for construction permits for light-water-cooled reactors submitted after February 4, 1975, are required to contain a statement concerning transportation of fuel and radioactive wastes to and from the reactor. FPL submitted its application for construction permits for Turkey Point Units 3 and 4 in March 1966. The staff's Final Environmental Statement related to the operation of Turkey Point Units 3 and 4 was issued in July 1972. The following information is provided concerning 10 CFR 51.52.

1) The current reactor core thermal power for Turkey Point Units 3 and 4 is 2200 megawatts per unit.

2) The nuclear fuel used at Turkey Point Units 3 and 4 is in the form of sintered uranium dioxide pellets enclosed in zircaloy rods. The current maximum enrichment in Uranium-235 for the Turkey Point Units 3 and 4 fuel assemblies is 4.50 weight percent.

3) The current average level of irradiation of the Turkey Point Units 3 and 4 fuel assemblies is less than 46,000 megawatt-days per metric ton of Uranium (MWD/MTU). The cooling period after it is removed from the reactor prior to transportation will be at least 120 days.

Although the average burnup level of the Turkey Point Units 3 and 4 fuel assemblies exceeds the value of 33,000 MWD/MTU of 10 CFR 51.52(a)(3), the additional cooling period before shipment reduces the significance of the higher average burnup. In addition, the impact of higher fuel burnup on the values in 10 CFR 51.52, Table S-4, has been investigated by the Atomic Industrial Forum (AIF). A study done for the National Environmental Studies Project of AIF concluded that "the current values in Tables S-3 and S-4, and the generic

analyses of environmental dose commitments of the fuel cycle performed by the NRC staff, are applicable to fuel burnups up to 60,000 MWD/MT" (The Environmental Consequences of Higher Fuel Burnup, AIF/NESP-032, Atomic Industrial Forum, Inc., June 1985).

4) With the exception of irradiated fuel all radioactive waste shipped from Turkey Point Units 3 and 4 is packaged in accordance with NRC and Department of Transportation (DOT) regulations.

5) Unirradiated fuel is shipped to Turkey Point Units 3 and 4 by truck. The irradiated fuel assemblies will be shipped from Turkey Point Units 3 and 4 either by truck, rail or barge.

6) The transportation of radioactive material is regulated by the Department of Transportation and the U.S. Nuclear Regulatory Commission. The regulations provide protection of the public and transport workers from radiation. This protection is achieved by a combination of standards and requirements applicable to packaging, limitations on the contents of packages and radiation levels from packages, and procedures to limit the exposure of persons under normal and accident conditions.

   Primary reliance for safety in transport of radioactive material is placed on the packaging. The packaging must meet regulatory standards (10 CFR 71, and 49 CFR 173 and 178) established according to the type and form of material for containment, shielding, nuclear criticality safety, and heat dissipation. The standards provide that the packaging shall prevent the loss or dispersal of the radioactive contents, retain shielding efficiency, assure nuclear criticality safety, and provide adequate heat dissipation under normal conditions of transport and under specified accident damage test conditions. The contents of packages not designed to withstand accidents are limited, thereby limiting the risk from releases which could occur in an accident. The contents of the package also must be limited so that the standards for external radiation levels, temperature, pressure, and containment are met.

In addition, Table S-4 of 10 CFR 51.52 is based on an analysis for a 1000 megawatt electric (Mwe) light water reactor. The electrical rating of Turkey Point Units 3 and 4 is 666 Mwe each. Since fuel requirements are lower for smaller plants, the environmental impact of the nuclear fuel cycle for both Turkey Point Units 3 and 4 is less than the impact of a 1000 Mwe plant.

Based on the above, FPL concludes that the environmental impacts attributable to transportation of fuel and waste to and from

Turkey Point Units 3 and 4, with respect to normal conditions of transport and possible accident in transport, is in accordance with the impacts set forth in Table S-4 of 10 CFR 51.52. These environmental costs will not be altered by the extended period of operation.

D. Non-Radiological Effects

The U.S. Atomic Energy Commission's (AEC) "Final Environmental Assessment related to operation of Turkey Point Plant" (FES), dated July 1972, assessed the non-radiological impacts of plant operation as a function of plant design features, relative loss of renewable resources, and relative loss or degradation of available habitat. Environmental impacts associated with forty year operating licenses were originally evaluated in the FES. The FES concluded that, after weighing the environmental, economic, technical, and other benefits against environmental costs and considering available alternatives, and subject to certain conditions, from the standpoint of environmental effects, the issuance of operating licenses for Turkey Point Units 3 and 4 was an acceptable action. These assessments, and the assumptions on which they were based, have been proven correct throughout the operating terms to date of both units.

The operating licenses for Turkey Point Units 3 and 4 were issued with certain conditions and Environmental Technical Specifications, as dictated by the FES. The operating licenses provided that programs, as described in the FES, be undertaken to determine the effects of plant operation on the aquatic and terrestrial environment. Monitoring programs were initiated and reports were submitted to the NRC for eight years. In 1983, FPL requested deletion of water quality limits and water quality, terrestrial, biological, and physical monitoring programs. Operating License Amendments 93 and 100, for Turkey Point Unit 3, and Amendments 87 and 94, for Turkey Point Unit 4, were issued by the NRC pertaining to the non-radiological water quality-related requirements and environmental monitoring programs. A non-radiological environmental monitoring report continues to be submitted annually to the NRC on the following topics:

* Listing of any special environmental studies related to the facility not required by the Technical Specifications.

* Records of any violations of the environmental Technical Specifications.

* Reports concerning unusual or important events impacting the environment.

In addition, protection of the environment is assured by compliance with permits issued by federal, state, and local agencies.

Thus, the environmental concerns discussed in the FES have either been resolved or continue to be monitored under appropriate agency authority. Protection of the environment will, therefore, be maintained throughout the full term operating life of both Turkey Point Units 3 and 4.

E. Summary of Environmental Analysis

FPL has reviewed the radiological and non-radiological environmental impacts of the proposed license amendments and has determined :

* There will be no significant onsite or offsite radiation exposures as a result of the proposed license amendments. The increase in plant radioactivity inventory will not have a significant effect on either onsite or offsite radiation exposures.

* The effects of radioactive wastes during the lengthened operating term are not significant.

* The effects of the extra fuel cycles during the lengthened operating term are not significant.

* No significant non-radiological environmental effects are likely to be encountered.

Based on these analyses, FPL has concluded that there are no significant radiological or non-radiological impacts associated with the proposed license amendments. The issuance by the NRC of the proposed license amendments will have no significant impact on the quality of the human environment and an environmental impact statement should not be prepared for this action.

IV. Alternatives to Licensed Term Recapture

FPL has investigated the alternatives to these proposed license amendments. The investigation has confirmed that the extension to the operating licenses to permit a full forty year term of operation for both Turkey Point Units 3 and 4 is clearly to the financial benefit of FPL and its electric power customers.

A. Need for Power

FPL analysis of load growth indicates that the peak demand for central station generated electricity will likely be growing through the beginning of the twenty-first century. Estimates of the peak demand are indicated below.

Forecast of FPL Peak Demand Growth, 1992 - 2009 (December 1991 Projection)		
Year	Most Likely Peak (Megawatts)	High Peak (Megawatts)
1992	14180	15155
1993	14387	15424
1994	14694	15715
1995	15118	16154
1996	15390	16441
1997	15694	16802
1998	16019	17109
1999	16282	17427
2000	16700	17834
2001	17061	18268
2002	17406	18551
2003	17761	19047
2004	18160	19518
2005	18448	19876
2006	18946	20446
2007	19352	20904
2008	19773	21331
2009	20240	21854

These data predict that the FPL system peak electrical load will increase during the remainder of the twentieth century and into the twenty-first century. From the current dates of expiration of the Turkey Point Units 3 and 4 operating licenses and into the requested period of recovered operating life, it can be seen from the above table that the FPL electrical system can expect a continuing increase in the forecasted peak load. FPL electrical distribution system peak load forecasts are not currently available for the years 2010 to 2013 but are not expected to result in a change in trend from greater system demand. Therefore, the retirement of any generating capacity will necessitate the construction of a similarly sized unit to provide the required electrical generation with its associated environmental impacts.

B. Cost-Benefit of Recapture

The addition of approximately 11.25 reactor-years of operation for both Turkey Point Units 3 and 4 is expected to result in substantial cost benefit to FPL and its customers.

1. Methodology

The methodology FPL used in determining the economic benefits are summarized below.

The evaluation assumed 5 additional years of operation per reactor. FPL determined the projected economic benefits using a discounted cash flow approach associated with recapturing the additional years of operation. A revenue requirements analysis was also conducted. The scenarios examined in this evaluation assume that realistic generation and economic targets, as established by FPL's Nuclear Division, are achieved for Turkey Point Units 3 and 4.

For the base case , which assumed no license recapture, as well as the 5 year recapture cases, FPL assumed that both Turkey Point Units 3 and 4 will be replaced with the equivalent of 1.5 Integrated Gasified Combined Cycle (IGCC) units after operating license expiration. The IGCCs were assumed to have a residual value in the year 2032 equivalent to the undepreciated book value.

A "fuel penalty" was assigned to each analyzed case, where appropriate, to reflect differences between projected capacity factors for the nuclear units (74% in the "most likely" case) and the IGCCs (87%). The resultant differences in output were priced at FPL's projected average marginal energy cost. The difference between the base and the extended term cases was determined and discounted to 1991 using FPL after tax weighted cost of capital. All accruals (e.g., depreciation, decommissioning, etc.) were adjusted to reflect a near term decision on license recapture.

With respect to depreciation rates, Plant in Service and projected additions were amortized to achieve straight line recovery over the remaining life of the units.

2. Results

The conclusions stated in the evaluation are largely predicated on the assumptions made for the key elements. Capital and O&M (Operations and Maintenance), in combination with fuel costs, are the main determinants of the outcome of the evaluation. While there would be a continuing capital expenditure program during the additional years of operation, these capital expenditures are less (in present value terms) than those associated with the replacement IGCCs. This translates into lower present value capital (non-operating) cash flows and lower present value capital revenue requirements. Additionally, the annual O&M costs for the nuclear units are roughly equivalent to those for the IGCCs. Fuel costs are significantly lower for the nuclear units than for the IGCCs even when accounting for the fuel penalty.

As a result, the additional reactor-years of operation gained by the proposed license recapture are expected to result in a net cost savings of $156 million (1991 present value) when compared to FPL's future generation alternative.

V. Summary and Conclusions

FPL has evaluated the proposed license amendments pursuant to the criteria of 10 CFR 50.92. FPL has determined that these amendments do not involve a significant hazards consideration. The bases for this conclusion is included in Enclosure 3.

FPL has evaluated the proposed license amendments against the criteria presented in 10 CFR 51 and has concluded that an environmental impact statement should not be required. The data presented in the Environmental Analysis portion of this enclosure are used as the bases for this conclusion. FPL has concluded that there are no significant radiological or non-radiological impacts associated with the proposed license amendments and that the proposed license amendments will not have a significant effect on the quality of the human environment.

Table 1
Turkey Point Units 3 and 4 Actual Offsite Dose Projections
Versus 10 CFR 50 Appendix I Design Objectives for the Years 1985 through 1990

Turkey Point Unit 3

Dose Category	Appendix I Objective	Calculated Doses, Mrem/year					
		1985	1986	1987	1988	1989	1990
Liquid-Total Body[1]	3 Mrem/year	0.0041	0.0033	0.0157	0.0081	0.0019	0.0014
Gaseous-Gamma to Air	10 mRad/year	0.0088	0.018	0.019	0.0087	0.011	0.0048
Gaseous-Beta to Air	20 mRad/year	0.026	0.054	0.020	0.025	0.033	0.014
Airborne Iodine and Particulate-Organ[2]	15 Mrem/year	0.121	1.69	1.30	0.066	0.0049	0.075

Turkey Point Unit 4

Dose Category	Appendix I Objective	Calculated Doses, Mrem/year					
		1985	1986	1987	1988	1989	1990
Liquid-Total Body[1]	3 Mrem/year	0.0041	0.0033	0.0157	0.0081	0.0019	0.0014
Gaseous-Gamma to Air	10 Mrad/year	0.012	0.051	0.0053	0.014	0.011	0.0043
Gaseous-Beta to Air	20 Mrad/year	0.034	0.015	0.015	0.027	0.033	0.012
Airborne Iodine and Particulate-Organ[2]	15 Mrem/year	0.119	0.211	0.217	0.068	0.0048	0.030

Notes: (1) The two units have a shared liquid rad-waste release system; releases and doses prorated 50/50 between the units.
(2) Thyroid dose via assumed pathways to assumed receptor.

Table 2
Resident Population Projections for Turkey Point Units 3 and 4

July 1972 Final Environmental Statement							
Year	0-5 mi	5-10 mi	10-20 mi	20-30 mi	30-40 mi	40-50 mi	Total
1966	0	42,000	190,000	590,000	390,000	170,000	1,382,000
1976	0	88,000	460,000	720,000	570,000	280,000	2,118,000
1986	0	170,000	710,000	950,000	720,000	400,000	2,950,000
Population Estimate Determined with 1990 Census Data							
	0-5 mi	5-10 mi	10-20 mi	20-30 mi	30-40 mi	40-50 mi	Total
1990*	0	105,679	391,827	902,461	707,175	506,393	2,613,535
1995 estimate**	0	110,037	434,929	1,001,732	784,963	562,097	2,893,758
2000	0	123,552	457,188	1,052,786	827,329	597,954	3,058,809
2005	0	131,766	487,285	1,122,932	880,342	631,393	3,253,718
2010	0	139,617	516,459	1,189,978	929,218	657,706	3,432,978
2013	0	144,638	535,044	1,232,779	960,277	674,291	3,547,029

* Based on 1990 U.S. Census.
** Based on general trends in Homestead and Florida City between 1980 and 1990, and the growth rate calculated for the 10-mile area as well as the average growth rate for the counties within 50 miles as determined from 1980 and 1990 Census information for the 10- to 50-mile area.

Table 3

Man-Rem by Work Function (by DRD)*

Work Function	1983	1984	1985	1986	1987	1988	1989	1990	Average
Reactor Operations and Surveillance	337	258	109	90	96	21	35	169	139
Routine Maintenance	375	286	363	457	482	506	320	232	378
In-Service Inspection	143	75	118	171	92	104	35	99	105
Special Maintenance	2215**	750	725	366	853	207	163	225	688
Waste Processing	29	31	23	18	17	11	7	14	19
Refueling	216	90	165	85	108	41	45	142	112
Total	3315	1490	1503	1187	1648	890	605	881	1441

Notes:
* Thermoluminescent dosimeter (TLD) values are typically 85% of the DRD values listed.
** Steam generator replacement

Table 4

Man-Rem by Job Function (by DRD)*

Job Function	1983	1984	1985	1986	1987	1988	1989	1990	Average	% of Average
Maintenance	2746	1175	1123	842	1195	639	421	633	1097	76
Operations	59	61	49	24	40	28	42	37	42	3
Health Physics	252	140	188	208	211	124	70	103	162	11
Supervisor	105	61	52	41	92	39	33	52	59	4
Engineering	153	53	91	72	110	60	39	57	79	6
Total	3315	1490	1503	1187	1648	890	605	881	1439	-

* Thermoluminescent dosimeter (TLD) values are typically 85% of the DRD values listed.

Table 5

Man-Rem by Employment (by DRD)*

Employment	1983	1984	1985	1986	1987	1988	1989	1990	Average	% of Average
Station	615	402	432	257	419	253	209	300	361	20
Utility	80	48	92	32	42	6	4	7	39	2
Contract and Others	2620	1040	979	898	1187	631	392	574	1387	78
Total	3315	1490	1503	1187	1648	890	605	881	1787	-

* Thermoluminescent dosimeter (TLD) values are typically 85% of the DRD values listed.

Table 6

Projected Refueling Outages and Related Projected Radiation Exposure

Year	Total Man-Rem*	Number of Refueling Outages at the Site
2006	714	2
2007	557	1
2008	557	1
2009	714	2
2010	557	1
2011	557	1
2012	557	1
2013	557	1
Total	4770	-

* Based on thermoluminescent dosimeter results.

Table 7
Current and Projected RT_{PTS} (°F)

Turkey Point Unit 3

Date	Fluence (x 10^{19}) neutrons/cm^2 (E> 1 MeV)	Intermediate Shell	Lower Shell	Girth Weld
August 24, 1992	1.501	115	121	266
April 27, 2007	2.342	120	127	287
July 19, 2012	2.641	121	128	293

Turkey Point Unit 4

Date	Fluence (x 10^{19}) neutrons/cm^2 (E> 1 MeV)	Intermediate Shell	Lower Shell	Girth Weld
October 15, 1991	1.366	121	112	262
April 27, 2007	2.210	125	117	285
April 10, 2013	2.533	126	118	291

Attachment

ALARA Program Description

FPL COMMITMENT TO ALARA

FPL is committed to ensure that radiation exposure to personnel is kept as low as reasonably achievable (ALARA) both collectively and individually. ALARA means that anytime personnel exposure can be effectively reduced without excessive cost, it should be done. This includes total person-rem exposure for the facility as well as individual exposure. This requires a general awareness by all personnel that they should make every reasonable effort to avoid any exposure that is not necessary to accomplish their work assignment. Examples of ALARA techniques that are evaluated include adequate training of personnel working in the radiation controlled area (RCA), preplanning of job activities, installation of shielding, and design review of new facilities or plant modifications. The present emphasis on ALARA is the result of changes in regulations and issuance of regulatory guides that are intended to promote a more formal, documented approach to the ALARA concept.

Radiation protection is the responsibility of all personnel working in a nuclear plant; therefore, each individual is responsible to ensure that his exposure, as well as all other personnel exposure, is maintained ALARA.

FPL has established an ALARA program which contains the following elements:

- A firm commitment and support to the Health Physics Program by the plant and company management to ensure that doses are maintained ALARA. This is accomplished effectively through the ALARA Review Board composed of members from the Management team which ensures that the site operates, maintains, and modifies the plant to reduce personnel exposures.

- Procedures which delineate management and worker responsibilities dealing with radiation protection related policies and describe details of the program.

- The establishment of personnel administrative dose guidelines which are lower than the regulatory limits set by the NRC.

- A radiation exposure goal setting program which establishes challenging and meaningful goals for:
  - Collective radiation exposure (man-rem) per year, per outage and for major jobs.
  - Maximum external radiation dose received by an individual in a year.
  - Man-rem per department and specific job.

- A comprehensive job review process which provides ALARA reviews before, during and at the conclusion of the job. This ensures that ALARA techniques are considered and applied if practical and prudent.

- A dynamic plant modification review process of site facilities procedures and equipment for radiological impact which reviews:
  - Work location - consideration of radiological environment during installation, operations and maintenance.
  - Indirect effects - consideration of any change to previously installed modifications to reduce exposure.
  - Material selection - consideration of highly reliable, low maintenance material components with low cobalt content.

- An aggressive source term reduction program through the use of controlled chemistry, improved filtration and use of alternative cobalt free materials when available and economically feasible for use.

ALARA EXECUTIVE ORGANIZATION

The Senior Vice President, Nuclear Operations, Nuclear Division, has the responsibility to ensure implementation of FPL's ALARA program and to evaluate periodically the effectiveness of the program.

The Plant Manager has the responsibility to implement the overall plant ALARA program ensuring the effectiveness of this program and that sufficient resources are available within the plant for support of program implementation.

The Nuclear Division Health Physicist provides basic guidelines for the implementation of ALARA concepts, implementation of the corporate policy, and maintaining abreast of the effectiveness of the ALARA program, goals, and objectiveness.

The Plant Heath Physics Supervisor has the responsibility to develop, maintain, and supervise the health physics program at the plant. He is also responsible for periodically evaluating the effectiveness of the program and keeping the Plant Manager abreast of its effectiveness, goals, and objectives.

The Health Physics ALARA Supervisor has, as his primary responsibilities, the coordination, implementation, and monitoring of the health physics program in accordance with established health physics procedures.

The Training Supervisor is responsible for ensuring that an effective training program is maintained stressing the importance of ALARA in personnel's daily activities.

Each department supervisor and contract project leader has the overall responsibility to ensure that every individual under his supervision adheres to the established ALARA programs and the effective implementation of this program. This is performed by routine review of person-rem accumulated, saved, and trending, and the preplanning of job activities. The Engineering department is responsible for incorporating ALARA concepts in design modifications and new facilities.

OPERATIONAL GUIDELINES

Turkey Point Plant Health Physics procedures describe four levels of required ALARA review associated with the issuance of a Radiation Work Permit (see below for conditions requiring a Radiation Work Permit). The required levels of review are associated with the magnitude of the existing or potential radiological conditions associated with the job. The review may be a job site review which includes as a minimum, review and approval by Health Physics shift supervision, review by the Health Physics Supervisor, review by corporate Health Physics, or a presentation by the site Health Physics Department supervisor to the ALARA Review Board (i.e., plant management). Additionally, some activities require a post-job ALARA review to determine the effectiveness of the exposure control techniques used.

A plant ALARA Review Board periodically evaluates the effectiveness of the plant's ALARA program. The appropriate board personnel normally meet on a quarterly basis and/or after each major outage.

RADIATION WORK PERMITS

The primary purpose of a Radiation Work Permit (RWP) is to provide Health Physics with a vehicle whereby it can evaluate and plan jobs in order to ensure proper radiological controls are in place and in order to maintain radiation exposure ALARA. The FPL RWP philosophy is based on the precept that control of radiation and contamination is accomplished primarily by training, Health Physics job surveillance, pre-job planning, post-job evaluation, and special instructions. An RWP normally describes the radiological conditions of a job, the protective clothing required, monitoring to be performed, and any other special instructions.

RWP REQUIREMENTS

A job-specific RWP is required for the following conditions:

1. Entry into high radiation areas, airborne radioactivity areas, areas contaminated to levels in excess of 10,000 dpm/100 cm^2 loose surface contamination, or in any area posted as "RWP REQUIRED FOR ENTRY".

2. Entry into the reactor containment anytime during and subsequent to initial reactor startup.

3. Maintenance or inspection of equipment contaminated in excess of 100,000 dpm/100cm^2.

4. Work assignments involving changes (withdrawing, uncovering, opening, valving, disassembling, moving, etc.) that have the following potential as the work progresses:

   a. Exposure of a major portion of the body to a radiation dose in excess of 100 millirem in any one hour.

   b. Increasing surface contamination levels to exceed 10,000 dpm/100 cm^2.

   c. Increasing airborne radioactivity concentration exceeding 25% of those listed or referred to in 10 CFR 20 Appendix B, Table 1, Column 1.

MAINTAINING ALARA IN THE FUTURE

FPL will remain committed to the ALARA process in the future. FPL's program will continue to evolve and improve as new technology becomes available and economically viable.

Continuing efforts in Data Base Management have the potential to reduce exposure by identifying which jobs in a major evolution result in the most exposure. This identification may serve to target additional exposure control efforts. Subsequent exposure would then be tracked to determine the effectiveness of changes made.

Enclosure 3

Determination of No Significant Hazards

The standards used to arrive at a determination that a request for a license amendment involves no significant hazards considerations are included in the Nuclear Regulatory Commission's regulation, 10 CFR 50.92, which states that no significant hazards considerations are involved if the operation of the facility in accordance with the proposed amendment would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. Each of these three standards is discussed below for the Operating License Expiration Date proposed license amendments.

(1) Operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed license amendments do not involve a change in the probability or consequences of accidents previously evaluated since no physical changes to the plants, their operation, nor their procedures are involved. The proposed changes merely involve the administrative activity of revising both units' operating license expiration dates.

Turkey Point Units 3 and 4 were designed and constructed assuming forty years of operation. The analyses contained in the Updated Final Safety Analysis Report (UFSAR) for Turkey Point Units 3 and 4 are also predicated upon operation up to forty years. Surveillance and maintenance practices that are implemented in accordance with the American Society of Mechanical Engineers (ASME) Code and the Turkey Point Units 3 and 4 Technical Specifications provide assurance that any degradation in plant equipment will be identified and corrected.

The design of the reactor vessels and their internals considered the effects of forty years of operation at full power at a capacity factor of 80% (i.e., 32 effective full power years). Analyses have indicated that expected cumulative neutron fluences will not be a limiting consideration. Calculations, based on a forty year operating life, were made in accordance with 10 CFR 50.61, "Fracture toughness requirements for protection against pressurized thermal shock events", and found to be below the screening criteria.

The results of this analysis were submitted by FPL to the NRC by letter L-92-27 dated February 13, 1992, demonstrate that the expected neutron fluences at Turkey Point Units 3 and 4 and resultant RT_{PTS} will not result in either unit exceeding the RT_{PTS} screening criteria during the operating license recapture period through 32 EFPY. The Turkey Point Units 3 and 4 analysis documented in the November 1991 BAW-2118P report, Low Upper-Shelf Toughness Fracture Analysis of Reactor Vessels of Turkey Point Units 3 and 4 for Load Level A & B Conditions., and submitted by FPL to the NRC by letter L-92-02 dated February 4, 1992, addresses the requirements of 10 CFR 50, Appendix G, "Fracture Toughness Requirements." The analysis clearly shows that the vessel material has excellent toughness and, although the upper-shelf energy of the Turkey Point vessels may drop below 50 ft-lbs, there will be adequate margin of safety against fracture through at least 40 years of operation. In addition to these calculations, surveillance capsules placed inside the reactor vessels provide a means of monitoring the cumulative effects of power operation.

Aging analyses have been performed for all safety-related electrical equipment in accordance with the requirements of 10 CFR 50.49, "Environmental qualification of electric equipment important to safety for nuclear power plants", identifying qualified lifetimes for this equipment. These lifetimes are incorporated into equipment maintenance and replacement practices to ensure that all safety-related electrical equipment remains qualified and available to perform its safety function throughout a forty year life-time.

Additionally, analysis of operating experience at other facilities is routinely conducted by FPL. This analysis, coupled with regulatory feedback, provides added assurance that emerging concerns are addressed in a timely manner consistent with significance of the issue.

Based on the forty year design of the plant, coupled with the ongoing surveillance of plant systems, structures, and components, FPL has concluded that operation of Turkey Points 3 and 4 for the additional years representing the time period between issuance of each unit's construction permit to issuance of its operating license will not involve an increase in the probability or consequences of an accident previously evaluated.

(2) Operation of the facility in accordance with the proposed amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed license amendments do not create the possibility of a new or different kind of accident from any accident previously evaluated since no physical changes to the plants, their operation, nor their procedures are involved. The proposed changes merely involve the administrative activity of revising both units operating license expiration dates.

Based on the forty year design of the plant, coupled with the ongoing surveillance of plant systems, structures, and components, FPL has concluded that operation of Turkey Point Units 3 and 4 for the additional years representing the time period between issuance of each unit's construction permit to issuance of its operating license will not create the possibility of a new or different kind of accident from any accident previously evaluated.

(3) Operation of the facility in accordance with the proposed amendment would not involve a significant reduction in a margin of safety.

The proposed license amendments do not involve physical changes to the plants, their operation, or their procedures. The proposed changes merely involve the administrative activity of revising both units' operating license expiration dates.

Since Turkey Point Units 3 and 4 were designed and constructed assuming a operating term of at least forty years, the proposed changes to the expiration terms of the operating licenses will not affect, nor impact, the analyses, Technical Specifications, or operation of either unit. Since the design, operation, maintenance, and surveillance of the units will continue to be conducted in accordance with the UFSAR, operating licenses, Federal Regulations, and facility Technical Specifications, no reduction in margin of safety is involved in implementation of the proposed license amendments.

Based on the forty year design of the plant, coupled with the ongoing surveillance of plant systems, structures, and components, FPL has concluded that operation of Turkey Points 3 and 4 for the additional years representing the time period between issuance of each unit's construction permit to issuance of its operating license will not result in a reduction of any margin of safety.

Based on the above, it has been determined that the proposed amendments do not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety; therefore, it is concluded that these license amendments do not involve a significant hazards consideration.