UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 19, 200

Mr. T. F. Plunkett
President - Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: TURKEY POINT UNITS 3 AND 4 - ISSUANCE OF AMENDMENTS REGARDING BORON CREDIT IN THE SPENT FUEL POOL (TAC NOS. MA7262 AND MA7263)

Dear Mr. Plunkett:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 206 to Facility Operating License No. DPR-31 and Amendment No. 200 to Facility Operating License No. DPR-41 for the Turkey Point Plant, Units Nos. 3 and 4, respectively. The amendments consist of changes to the Technical Specifications in response to your application dated November 30, 1999, as supplemented March 8, May 15, and July 5, 2000, to allow Florida Power and Light Company the use of soluble boron credit in the spent fuel pool criticality analyses for Turkey Point Units 3 and 4. In addition, a revised criticality analysis was also presented for the fresh fuel storage racks to update the licensing bases.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

Kahtan N. Jabbour

Kahtan N. Jabbour, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-250 and 50-251

Enclosures:
1. Amendment No. 206 to DPR-31
2. Amendment No. 200 to DPR-41
3. Safety Evaluation

cc w/enclosures: See next page

Mr. T. F. Plunkett
President - Nuclear Division
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

July 19, 2000

SUBJECT: TURKEY POINT UNITS 3 AND 4 - ISSUANCE OF AMENDMENTS REGARDING BORON CREDIT IN THE SPENT FUEL POOL (TAC NOS. MA7262 AND MA7263)

Dear Mr. Plunkett:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 206 to Facility Operating License No. DPR-31 and Amendment No. 200 to Facility Operating License No. DPR-41 for the Turkey Point Plant, Units Nos. 3 and 4, respectively. The amendments consist of changes to the Technical Specifications in response to your application dated November 30,1999, as supplemented March 8, May 15, and July 5, 2000, to allow Florida Power and Light Company the use of soluble boron credit in the spent fuel pool criticality analyses for Turkey Point Units 3 and 4. In addition, a revised criticality analysis was also presented for the fresh fuel storage racks to update the licensing bases.

A copy of the Safety Evaluation is also enclosed. The Notice of Issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,
/RA/
Kahtan N. Jabbour, Senior Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 206 to DPR-31
2. Amendment No. 200 to DPR-41
3. Safety Evaluation

cc w/enclosures: See next page

Distribution:
File Center
PUBLIC(PUBLIC)
PDII-2 Reading (Hardcopy)
HBerkow (RidsNrrDlpmLpdii)
RCorreia (RidsNrrDlpmLpdii2)
BClayton (Hardcopy)
KJabbour (RidsNrrPmKJabbour)
OGC (RidsOgcRp)
GHill (2) (Hardcopy)
WBeckner (RidsNrrDripRtsb)
LKopp (RidsNrrDssaSrxb)
ACRS (RidsAcrnsAcwnMailCenter)
LWert, RII (RidsRgn2MailCenter)
Esullivan (RidsNrrDeEmcb)

DOCUMENT NAME: G:\PDII-2\Turkey Point\AMDma7262.wpd

OFFICE	PDII-2/PM	PDII-2/LA	EMCB/SC	OGC	PDII-2/SC
NAME	KJabbour	BClayton	ESullivan		RCorreia
DATE	07/7/00	07/7/00	07/7/00	07/13/00	07/15/00

OFFICIAL RECORD COPY

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

FLORIDA POWER AND LIGHT COMPANY

DOCKET NO. 50-250

TURKEY POINT PLANT UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 206
License No. DPR-31

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Florida Power and Light Company (the licensee) dated November 30,1999, as supplemented March 8, May 15, and July 5, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Facility Operating License No. DPR-31 is hereby amended to read as follows:

   B. Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 206, are hereby incorporated in the license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

a. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 19, 2000

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

FLORIDA POWER AND LIGHT COMPANY

DOCKET NO. 50-251

TURKEY POINT PLANT UNIT NO. 4

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 200
License No. DPR-41

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Florida Power and Light Company (the licensee) dated November 30, 1999, as supplemented March 8, May 15, and July 5, 2000, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act) and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 3.B of Facility Operating License No. DPR-41 is hereby amended to read as follows:

   (B) Technical Specifications and Environmental Protection Plan

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 200, are hereby incorporated in the license. The Environmental Protection Plan contained in Appendix B is hereby incorporated into the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

c. This license amendment is effective as of its date of issuance and shall be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Richard P. Correia, Chief, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: July 19, 2000

ATTACHMENT TO LICENSE AMENDMENT

AMENDMENT NO. 206 FACILITY OPERATING LICENSE NO. DPR-31

AMENDMENT NO. 200 FACILITY OPERATING LICENSE NO. DPR-41

DOCKET NOS. 50-250 AND 50-251

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain marginal lines indicating the area of change.

Remove pages	Insert pages
3/4 9-16	3/4 9-16
5-5	5-5

TABLE 3.9-1

SPENT FUEL BURNUP REQUIREMENTS FOR STORAGE IN REGION II OF THE SPENT FUEL PIT

Initial w/o	Discharge Burnup MWD/MTU
1.6	0.0
1.80	3706
2.00	7459
2.20	9724
2.40	12582
2.60	15338
2.63	15914
2.80	17994
3.00	20548
3.25	23312
3.40	25354
3.60	27605
3.88	30256
4.00	31804
4.20	33752
4.40	35599
4.50	36746

Linear interpolation between values may be used for intermediate points.

5.6 FUEL STORAGE

5.6.1 CRITICALITY

5.6.1.1 The spent fuel storage racks are designed to provide safe subcritical storage of fuel assemblies by providing sufficient center-to-center spacing or a combination of spacing and poison and shall be maintained with:

a. k_{eff} equivalent to less than 1.0 when flooded with unborated water, which includes a conservative allowance for uncertainties as described in WCAP-14416-P.

b. A k_{eff} equivalent to less than or equal to 0.95 when flooded with borated to 650 ppm water, which includes a conservative allowance for uncertainties as described in WCAP-14416-P.

c. A nominal 10.6 inch center-to-center distance for Region I and 9.0 inch center-to-center distance for Region II for two region fuel storage racks.

d. The maximum enrichment loading for fuel assemblies is 4.5 weight percent of U-235.

5.6.1.2 The racks for new fuel storage are designed to store fuel in a safe subcritical array and shall be maintained with:

a. A nominal 21 inch center-to-center spacing to assure k_{eff} equal to or less than 0.98 for optimum moderation conditions and equal to or less than 0.95 for fully flooded conditions.

b. Fuel assemblies placed in the New Fuel Storage Area shall contain no more than 4.5 weight percent of U-235.

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 206 TO FACILITY OPERATING LICENSE NO. DPR-31

AND AMENDMENT NO. 200 TO FACILITY OPERATING LICENSE NO. DPR-41

FLORIDA POWER AND LIGHT COMPANY

TURKEY POINT UNIT NOS. 3 AND 4

DOCKET NOS. 50-250 AND 50-251

1.0 INTRODUCTION

In a letter dated November 30, 1999 (Ref. 1), as supplemented March 8, May 15, and July 5, 2000 (Refs. 2-4), Florida Power and Light Company (FPL or the licensee) requested changes to the Technical Specifications (TS) for Turkey Point Units 3 and 4 to allow the use of credit for soluble boron in the spent fuel pool criticality analyses. In addition, a revised criticality analysis was also presented for the fresh fuel storage racks to update the licensing bases. These criticality analyses were performed using the methodology developed by the Westinghouse Owners Group (WOG) and described in WCAP-14416-NP-A, Rev. 1, "Westinghouse Spent Fuel Rack Criticality Analysis Methodology" (Ref. 5). The supplemental submittals of March 8, May 15, and July 5, 2000, provided clarifying information that did not change the scope of the original request or change the initial proposed no significant hazards consideration determination.

2.0 EVALUATION

2.1 Spent Fuel Storage

General Design Criterion (GDC) 62, Title 10, Code of Federal Regulations (10 CFR) for the U.S. Nuclear Regulatory Commission (NRC), requires prevention of criticality in fuel handling and storage areas outside the reactor. The Turkey Point spent fuel storage racks were analyzed using the Westinghouse methodology which had been reviewed and approved by the NRC (Ref. 5). This methodology takes partial credit for soluble boron in the fuel storage pool criticality analyses and proposes conformance with the following NRC acceptance criteria to meet GDC 62 requirements for preventing criticality outside the reactor:

1) The k_{eff} shall be less than 1.0 if fully flooded with unborated water, which includes an allowance for uncertainties at a 95% probability, 95% confidence (95/95) level as described in WCAP-14416-NP-A, Rev 1; and

2) The k_{eff} shall be less than or equal to 0.95 if fully flooded with borated water, which includes an allowance for uncertainties at a 95/95 level as described in WCAP-14416-NP-A, Rev. 1.

The analysis of the reactivity effects of fuel storage in the Turkey Point spent fuel racks was performed with the three-dimensional Monte Carlo code, KENO-Va, with neutron cross sections generated with the NITAWL-II and XSDRNPM-S codes using the 227 group ENDF/B-V cross-section data. Since the KENO-Va code package does not have burnup capability, depletion analyses and the determination of small reactivity increments due to manufacturing tolerances were made with the two-dimensional transport theory code, PHOENIX-P, which uses a 42 energy group nuclear data library from ENDF/B-V data. The analytical methods and models used in the reactivity analysis have been benchmarked against experimental data for fuel assemblies similar to those for which the Turkey Point racks are designed and have been found to adequately reproduce the critical values. The experimental data are sufficiently diverse to establish that the method bias and uncertainty will apply to rack conditions which include close proximity storage and strong neutron absorbers. The staff concludes that the analysis methods used are acceptable and capable of predicting the reactivity of the Turkey Point storage racks with a high degree of confidence.

The Turkey Point spent fuel pools are each divided in two regions. Region I is analyzed to store high reactivity (fresh or low burnup) fuel at a center-to-center spacing of 10.5 inches. Region II is analyzed to store lower reactivity (lower enrichment or higher burnup) fuel at smaller center-to-center spacing (high density) of 9.0 inches. The storage racks in both regions contain the neutron absorbing material Boraflex. However, the Boraflex panels are assumed to be degraded by shrinkage which creates gaps in the panels. In addition, a criticality analysis was also performed assuming a reduction in the boron-10 (B-10) loading and in the thickness of the Boraflex to simulate degradation by dissolution.

The Region I spent fuel storage racks were analyzed to allow storage of Westinghouse 15x15 fuel assemblies with initial nominal enrichments up to 4.5 weight percent (w/o) U-235 (with a 6-inch long natural uranium axial blanket at the top and bottom of the fuel rods). The Region 2 racks were analyzed to allow storage of Westinghouse 15x15 fuel assemblies with initial nominal enrichments up to 1.6 w/o U-235. Storage of fuel with higher initial enrichments was based on a minimum burnup requirement.

The moderator was assumed to be pure water at a temperature of 68°F and a density of 1.0 gm/cc and the array was assumed to be infinite in lateral (x and y) extent. Uncertainties due to tolerances in fuel enrichment and density, fuel pellet dishing, storage cell inner diameter, storage cell pitch, stainless steel thickness, wrapper plate thickness, assembly position, Boraflex thickness, width and length, calculational uncertainty, and methodology bias uncertainty were accounted for. These uncertainties were appropriately determined at the 95/95 probability/confidence level. A methodology bias (determined from benchmark calculations) as well as reactivity biases to account for the effect of the normal range of spent fuel pool water temperatures (50°F to 185°F) and the finite particle size of the boron bearing compound in the Boraflex panels were included. These biases and uncertainties meet the previously stated NRC requirements and are, therefore, acceptable.

Each Boraflex panel was assumed to have the following characteristics:

1. Five gaps per panel with the width of each gap being 1.5 inches, separated by 7.5 inches (center-to-center). This assumption is conservative because it assumes five gaps in every panel whereas 40% of the panels tested by Blackness testing showed no gaps.

2. The length of each Boraflex panel is assumed to shrink by approximately 4.2 inches. This is conservatively larger than the measured shrinkage of 2.0 inches.

3. A total of 8.2% of Boraflex is assumed missing and unavailable for neutron absorption. This is conservatively larger than the measured results which yielded a value of 2.1%.

4. The gaps in the analysis model are located at the same axial position in each panel, which significantly increases the neutronic coupling between cells. This is conservative with respect to the actual racks in which the gaps were found to be randomly distributed along the axial length of the Boraflex panel.

Based on our review, we find that the assumptions used in the analysis of Boraflex degradation due to shrinkage are acceptable. Additional criticality analyses with Boraflex degradation due to erosion (dissolution) are discussed below.

For the Region I racks with all cells filled with Westinghouse 15x15 fuel assemblies with nominal enrichment of 4.5 w/o U-235 and with a 6-inch natural uranium axial blanket at the top and bottom and no soluble boron in the pool water, the resulting nominal k_{eff} was found to be 0.9397. The 95/95 k_{eff} was then determined by adding the temperature and methodology biases and the statistical sum of independent tolerances and uncertainties to the nominal k_{eff} values, as described in Reference 5. This resulted in a 95/95 k_{eff} of 0.9615. Since this value is less than 1.0 and was determined at a 95/95 probability/confidence level, it meets the NRC criterion for precluding criticality with no credit for soluble boron and is, therefore, acceptable.

A similar calculation was done for the Region II racks, the only difference being that the fuel assemblies were assumed to contain a nominal U-235 enrichment of 1.60 w/o and no credit was taken for any natural or reduced enrichment axial blankets. The resulting nominal k_{eff} was 0.94785. The 95/95 k_{eff} was determined to be 0.97217, also meeting the NRC criterion for precluding criticality with no soluble boron, and is, therefore, acceptable.

Soluble boron credit is used to provide safety margin by maintaining k_{eff} less than or equal to 0.95 including 95/95 uncertainties. For Region I, the soluble boron credit calculations assumed the storage configuration was moderated by water borated to 450 ppm. As previously described, the individual tolerances and uncertainties, and the temperature and methodology biases, were added to the calculated nominal k_{eff} to obtain a 95/95 value. The resulting 95/95 k_{eff} was 0.86326 for fuel enriched to 4.50 w/o U-235 and containing natural uranium blankets. Since k_{eff} is less than 0.95 with 450 ppm of boron and uncertainties at a 95/95

probability/confidence level, the NRC acceptance criterion for precluding criticality with credit for soluble boron is satisfied. The required amount of soluble boron is well below the minimum spent fuel pool boron concentration value of 1950 ppm required by TS 3.9.14 and is, therefore, acceptable.

A similar calculation for Region II under nominal conditions with 250 ppm of soluble boron in the moderator resulted in a k_{eff} of 0.89088. The resulting 95/95 k_{eff} was 0.91663 for fuel enriched to 1.60 w/o U-235 with no axial blankets, also meeting the NRC acceptance criterion for precluding criticality with credit for soluble boron, and is, therefore, acceptable.

The concept of reactivity equivalencing due to fuel burnup was used to achieve the storage of fuel assemblies with enrichments higher than 1.60 w/o U-235 in Region II. The NRC has previously accepted the use of reactivity equivalencing predicated upon the reactivity decrease associated with fuel depletion. To determine the amount of soluble boron required to maintain $k_{eff} \leq 0.95$ for storage of fuel assemblies with maximum enrichments up to 4.5 w/o U-235, a series of reactivity calculations were performed to generate a set of enrichment versus fuel assembly discharge burnup ordered pairs which all yield an equivalent k_{eff} when stored in the Turkey Point Region II spent fuel storage racks. These are shown in TS Table 3.9-1. The values in this table represent combinations of fuel enrichment and discharge burnup which yield the same rack k_{eff} as the rack loaded with fresh (zero burnup) fuel with a maximum nominal enrichment of 1.60 w/o U-235. Uncertainties associated with burnup credit include a reactivity uncertainty of 0.01 Δk at 30,000 MWD/MTU applied linearly to the burnup credit requirement to account for calculational and depletion uncertainties and 5% on the calculated burnup to account for burnup measurement uncertainty. The NRC staff concludes that these uncertainties conservatively reflect the uncertainties associated with burnup calculations and are acceptable. The amount of additional soluble boron, above the 250 ppm value required above, that is needed to account for these uncertainties is 400 ppm. This results in a total soluble boron credit of 650 ppm for Region II. This value is well below the minimum spent fuel pool boron concentration value of 1950 ppm required by TS 3.9.14 and is, therefore, acceptable.

Although most accidents will not result in a reactivity increase, three accidents can be postulated for each storage configuration which could increase reactivity beyond the analyzed conditions. The first would be an extension in pool water temperature from the normal range (50°F to 185°F) to a range of 32°F to 240°F. The second would be a misload of an assembly into a Region II cell for which the restrictions on location, enrichment, or burnup are not satisfied. The third would be a boron dilution event which is evaluated elsewhere in this report.

Calculations have shown that, aside from the boron dilution event, the misloaded assembly accident results in the highest reactivity increase. However, for this event, the double contingency principle can be applied. This states that the assumption of two unlikely, independent, concurrent events is not required to ensure protection against a criticality accident. The reactivity increase requires an additional 450 ppm of soluble boron to maintain $k_{eff} \leq 0.95$. Therefore, the minimum amount of boron required by TS 3.9.14 (1950 ppm) is more than sufficient to cover any accident and the presence of the additional boron above the concentration required for normal conditions and reactivity equivalencing can be assumed as a

realistic initial condition since not assuming its presence would be a second unlikely event. A total of 1100 ppm of soluble boron in the spent fuel pool will maintain k_{eff} no greater than 0.95 for the worst postulated accident. A boron dilution event is evaluated elsewhere in this safety evaluation.

2.2 Boraflex Dissolution

Silica is a component of Boraflex and dissolution of silica from the Boraflex panels (accompanied by the loss of B-10) into the pool water has been found to occur at several plants until it reaches an equilibrium concentration. Although FPL does not consider the dissolution of B-10 from the Boraflex panels to be a significant degradation mechanism at Turkey Point, additional calculations were performed assuming a loss of B-10 from each Boraflex panel.

The licensee has modeled Boraflex degradation assuming changes in the panels due to gaps, shrinkage, and dissolution of boron carbide. The effect of gaps and shrinkage was directly incorporated into the model through the following assumptions: gaps and shrinkage occur in every panel, all gaps and shrinkage are at the same axial elevation, and all gaps are distributed near the axial mid-plane of the fuel. In addition to these assumptions, the model also takes into account the effect of boron carbide dissolution. The licensee evaluated the effect of this type of boraflex degradation through two scenarios: successive reduction of both areal density and panel thickness in all boraflex panels and successive reduction of areal density alone. Successive reduction for each case was analyzed until K_{eff} was slightly less than the required limit of 1.0. The limiting case for Region I assumed gaps, shrinkage, and a 55% reduction of both the B-10 areal density and the Boraflex panel thickness. The changes in this case amount to a B-10 loading decrease from 0.020 gm/cm^2 to 0.009 gm/cm^2 and a Boraflex panel thickness decrease from 0.078 inches to 0.0351 inches. This resulted in a 95/95 k_{eff} of 0.99976. For Region II, the limiting case assumed gaps, shrinkage, and a reduction of B-10 areal density of 50% (from 0.012 gm/cm^2 to 0.006 gm/cm^2) with no change in Boraflex panel thickness. This resulted in a 95/95 k_{eff} of 0.99919. Since both values are less than 1.0, the spent fuel racks will remain subcritical in unborated water when all cells are loaded with Westinghouse 15x15 fresh fuel assemblies with nominal enrichments no greater than 4.50 w/o U-235 with natural uranium axial blankets in Region 1, and with nominal enrichments no greater than 1.60 w/o U-235 in Region II, even for an assumed reduction in B-10 loading by a factor of two.

Based on the discussion presented above, the staff concludes that the assumptions built into the analyses provide reasonable assurance that the spent fuel pool will remain subcritical. Although the actual measurement of Boraflex panel degradation has yet to be performed, the analyses are conservative considering that it is unlikely that all Boraflex panels will degrade at the same rate or to the same degree as assumed. However, in reaching this conclusion, the staff is relying on the licensee's commitment to perform rack surveillance by May 2001 to confirm that these assumptions are valid. The licensee also committed to evaluate the measured results as part of the surveillance program and to determine if a change in the 5-year surveillance frequency is needed. In addition, by letter dated July 5, 2000, the licensee has committed to revise an administrative procedure requiring the next fuel storage rack surveillance to be performed by May 2001. The revised procedure will also require, within 120 days of completing the surveillance, a report to the staff containing the following information: the results of the May 2001 surveillance, a summary of the method used to project Boraflex degradation, and for each spent fuel pool region, the approximate projected date that the degradation of any Boraflex panel will exceed the assumed degradation values. This surveillance and the associated reporting requirements will be tracked by FPL as commitments. The staff finds that the licensee's commitments and actions regarding the measured results are acceptable.

2.3 Boron Dilution Event

The NRC safety evaluation report for crediting soluble boron (Ref. 5) states that potential events which could dilute the spent fuel pool soluble boron to the concentration required to maintain the 0.95 k_{eff} limit should be identified. In addition, the available time span of these dilution events should be quantified to show that sufficient time is available to enable adequate detection and suppression of any dilution event.

Deterministic plant-specific dilution event calculations were performed for Turkey Point in order to define the dilution times and volumes necessary to dilute the spent fuel pool from the minimum TS boron concentration of 1950 to a soluble boron concentration where a k_{eff} of 0.95 would be approached (650 ppm). The water volume in the pool is approximately 264,000 gallons, assuming the maximum number of allowed stored fuel assemblies (1404) and a loaded spent fuel cask are in place. In order to dilute 264,000 gallons in the spent fuel pool from the TS limit of 1950 ppm to 650 ppm, 290,000 gallons of unborated water is needed. The various initiating events considered included dilution from the chemical and volume control system (CVCS) holdup tanks, primary water makeup system, demineralized water system, component cooling water system, drain systems, fire protection system, and spent fuel pit demineralizer, as well as other events that may affect the boron concentration of the pool, such as seismic events, random pipe breaks, and loss of offsite power.

The licensee's evaluation of these sources concluded that the only credible available water sources for dilution are primary water, demineralized water, CVCS holdup tank fluid, and fire protection, and that the key system for consideration is the primary water system. The primary water makeup system for each unit consists of one primary water storage tank and two primary water pumps. Each primary water storage tank contains approximately 150,000 gallons of unborated, demineralized water. Flow rates from the primary water supply pump vary up to pump runout flow of 500 gpm. If the temporary hose connection were left unattended, it would take 10 hours to provide the 290,000 gallons required to dilute the pool from 1950 to 650 ppm. However, it would only take 8 minutes to increase the pool water level from the low to high alarm setpoints. If the high level alarm were to fail, the pool would overflow and fill the room until water would leak into the refueling canal and out of the room door leading to the building roof. A significant loss of primary water storage tank inventory would be detected by the operator via a low tank level alarm at 50%. In addition, the tank volume of 150,000 gallons is not sufficient to dilute the pool from 1950 to 650 ppm and makeup to the tank is provided administratively from the deaeration system, so the tank would not be refilled continuously without operator attention. Therefore, detection of a dilution via pool water level alarms and/or visual inspections would be expected well before the pool boron concentration could be reduced to less than the 650 ppm design basis limit.

The licensee concluded that an event which could dilute the spent fuel pool boron concentration from 1950 ppm to 650 ppm is not a credible event. The NRC staff concludes that the combination of the large volume of water required for a dilution event, TS required minimum boron concentration, monthly sampling requirement, spent fuel pool alarms, plant personnel rounds, and other administrative controls and procedures, should adequately detect a dilution event prior to k_{eff} reaching 0.95 (650 ppm). Therefore, the proposed boron dilution analysis is acceptable.

Additionally, the criticality analyses for the spent fuel pool show that k_{eff} remains less than 1.0 at a 95/95 probability/confidence level even if the pool were completely filled with unborated water. Therefore, even if the spent fuel storage pool were diluted to zero ppm, the stored fuel is expected to remain subcritical, thereby meeting the requirements of GDC 62.

2.4 Fresh Fuel Storage

The fresh fuel racks at Turkey Point were reanalyzed using the methodology given in WCAP-14416-NP-A, Rev. 1. Only the method for determining the subcriticality of the racks has changed. The maximum fuel enrichment remains at 4.5 w/o U-235.

Fresh fuel is normally stored in dry (air) conditions. However, the accidental introduction of water or other hydrogenous material into the storage area is considered as the worst-case- accident scenario. Both full-density water flooding and low-density (optimum) moderation are analyzed. The design basis for preventing criticality for fresh fuel storage is that k_{eff} for full- density flooding must be less than or equal to 0.95, and less than or equal to 0.98 for low- density moderation at the water content which gives the highest reactivity. As for the spent fuel storage analysis, the k_{eff} values incorporate all appropriate uncertainties at the 95/95 probability/confidence level.

For full density water flooding, the resulting 95/95 k_{eff} was 0.924. For low-density optimum moderation conditions, the resulting 95/95 k_{eff} was 0.8419, which occurs at a water density of approximately 0.095 gm/cc. Therefore, for both full density water moderation and low density optimum moderation conditions, the NRC reactivity criteria of 0.95 and 0.98, respectively, are met for Westinghouse 15x15 fuel assemblies with nominal enrichments up to 4.5 w/o U-235.

Therefore, the current TS for the fresh fuel storage racks remains applicable.

TS Changes

The following TS changes are proposed:

1. TS 3.9.14, Table 3.9-1 "Spent Fuel Burnup Requirements for Storage in Region II of the Spent Fuel Pit," would be replaced with a revised table which provides the burnup for a given enrichment up to 4.5 w/o U-235 that is allowed to be stored in Region II.

2. TS 5.6.1.1a would be added to allow a k_{eff} equivalent to less than 1.0 when flooded with unborated water, which includes a conservative allowance for uncertainties as described in WCAP-14416-NP-A.

3. TS 5.6.1.1b would be revised to allow a k_{eff} equivalent to less than or equal to 0.95 when flooded with water borated to 650 ppm, which includes a conservative allowance for uncertainties as described in WCAP-14416-NP-A.

The TS changes proposed as a result of the revised criticality analysis are consistent with the NRC-approved methodology given in Westinghouse topical report, WCAP-14416-NP-A, Rev. 1, (Ref. 5). Based on this consistency with the approved methodology and on the above evaluation, the staff finds these TS changes acceptable. The additional TS changes proposed are merely administrative and are acceptable.

2.5 Summary

Based on the review described above, the staff finds that the criticality aspects of the proposed Turkey Point Units 3 and 4 license amendment request are acceptable and meet the requirements of GDC 62 for the prevention of criticality in fuel storage and handling. The analysis assumed credit for soluble boron, as allowed by WCAP-14416-NP-A, Rev. 1, and degradation of the Boraflex neutron absorber panels. The criticality analysis conformed to the NRC guidance on the regulatory requirements for criticality analysis of fuel storage at light-water reactor power plants (Ref. 6).

The following storage configurations and U-235 enrichment limits for Westinghouse 15x15 fuel assemblies were determined to be acceptable.

Region 1

Assemblies with initial nominal enrichments no greater than 4.50 w/o U-235 and 6 inches of natural uranium blanket at the top and bottom can be stored in any cell location. The soluble boron credit required is 450 ppm.

Region II

Assemblies with initial nominal enrichments no greater than 1.6 w/o U-235 can be stored in any cell location. Fuel assemblies with initial nominal enrichments greater than this and up to 4.50 w/o U-235 must satisfy the minimum burnup requirements shown in TS Table 3.9-1. The soluble boron credit required is 650 ppm.

3.0 STATE CONSULTATION

Based upon a letter dated March 8, 1991, from Mary E. Clark of the State of Florida, Department of Health and Rehabilitative Services, to Deborah A. Miller, Licensing Assistant, U.S. Nuclear Regulatory Commission, the State of Florida does not desire notification of issuance of license amendments.

4.0 ENVIRONMENTAL CONSIDERATION

These amendments involve a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on such finding (65 FR 25765). Accordingly, these amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

5.0 CONCLUSION

Based on the staff evaluation in Section 2.0 above, the staff concludes that the proposed Technical Specifications changes are acceptable.

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

6.0 REFERENCES

1) R. J. Hovey, FPL, letter to U.S. Nuclear Regulatory Commission, "Turkey Point Units 3 and 4, Docket Nos. 50-250 and 50-251, Proposed License Amendments, Soluble Boron Credit for Spent Fuel Pool and Fresh Fuel Rack Criticality Analyses," L-99-176, November 30, 1999.

2) R. J. Hovey, FPL, letter to U.S. Nuclear Regulatory Commission, "Turkey Point Units 3 and 4, Docket Nos. 50-250 and 50-251, Proposed License Amendments, Soluble Boron Credit for Spent Fuel Pool and Fresh Fuel Rack Criticality Analyses, Response to Request for Additional Information," L-2000-054, March 8, 2000.

3) R. J. Hovey, FPL, letter to U.S. Nuclear Regulatory Commission, "Turkey Point Units 3 and 4, Docket Nos. 50-250 and 50-251, Proposed License Amendments, Soluble Boron Credit for Spent Fuel Pool and Fresh Fuel Rack Criticality Analyses, Documenting the FPL/NRC April 5, 2000 Telephone Conference, L-2000-109, May 15, 2000.

4) R. J. Hovey, FPL, letter to U.S. Nuclear Regulatory Commission, "Turkey Point Units 3 and 4, Docket Nos. 50-250 and 50-251, Proposed License Amendments, Soluble Boron Credit for Spent Fuel Pool and Fresh Fuel Rack Criticality Analyses, Statement of Commitments, L-2000-144, July 5, 2000.

5) W. D. Newmyer, "Westinghouse Spent Fuel Rack Criticality Analysis Methodology," Westinghouse Electric Corporation, WCAP-14416-NP-A, Rev. 1, November 1996.

6) L. Kopp, "Guidance on the Regulatory Requirements for Criticality Analysis of Fuel Storage at Light-Water Reactor Power Plants," NRC Memorandum to T. Collins, August 19, 1998.

Principal Contributors: L. Kopp, NRR
C. Lauron, NRR

Date: July 19, 2000

Mr. T. F. Plunkett
Florida Power and Light Company

TURKEY POINT PLANT

cc:
M. S. Ross, Attorney
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. Robert J. Hovey, Site
Vice President
Turkey Point Nuclear Plant
Florida Power and Light Company
9760 SW. 344th Street
Florida City, FL 33035

County Manager
Miami-Dade County
111 NW 1 Street, 29th Floor
Miami, Florida 33128

Senior Resident Inspector
Turkey Point Nuclear Plant
U.S. Nuclear Regulatory Commission
9762 SW. 344th Street
Florida City, Florida 33035

Mr. William A. Passetti, Chief
Department of Health
Bureau of Radiation Control
2020 Capital Circle, SE, Bin #C21
Tallahassee, Florida 32399-1741

Mr. Joe Myers, Director
Division of Emergency Preparedness
Department of Community Affairs
2740 Centerview Drive
Tallahassee, Florida 32399-2100

Attorney General
Department of Legal Affairs
The Capitol
Tallahassee, Florida 32304

Plant Manager
Turkey Point Nuclear Plant
Florida Power and Light Company
9760 SW. 344th Street
Florida City, FL 33035

Mr. Steve Franzone
Licensing Manager
Turkey Point Nuclear Plant
9760 SW. 344th Street
Florida City, FL 33035

Mr. John Gianfrancesco
Manager, Administrative Support
and Special Projects
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. J.A. Stall
Vice President - Nuclear Engineering
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420