October 13, 2000

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

SUBJECT: CORRECTION TO THE SAFETY EVALUATION THAT SUPPORTS AMENDMENTS NOS. 206 AND 200 FOR TURKEY POINT PLANT, UNITS 3 AND 4

Dear Mr. Plunkett:

On July 19, 2000, the Nuclear Regulatory Commission issued Amendment Nos. 206 and 200 for Turkey Point Plant, Units 3 and 4. The amendments consisted of changes to the Plant Technical Specifications (TS) to allow the use of soluble boron credit in the spent fuel pool criticality analyses. These amendments were issued under TAC Nos. MA7262 and MA7263 in response to Florida Power and Light Company's submittal of November 30, 1999, as supplemented March 8, May 15, and July 5, 2000. Your staff informed us of inconsistencies in the information included on Pages 2 and 3 of the safety evaluation (SE) that supports the amendments.

We have reviewed these inconsistencies and the corrected pages are included as an enclosure to this letter. The two lines containing the corrections to the numerical values have been identified by lines in the margin. This letter with its enclosure should be attached to the subject SE to document the resolution of these inconsistencies.

The thoroughness of your staff in identifying these inconsistencies is appreciated. In this case, none of the inconsistencies identified by your staff resulted in a change to our conclusion in the subject SE that supports amendment Nos. 206 and 200 for Turkey Point Units 3 and 4, respectively. If you or your staff have any questions concerning this matter, please call me at (301) 415-1496.

Sincerely,

/RA/

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

Enclosure: Revised SE pages

cc w/enclosures: See next page

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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 1 is analyzed to store high reactivity (fresh or low burnup) fuel at a center-to-center spacing of 10.6 inches. Region 2 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 1 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 1 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 2. 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 2 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 1, 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 0.90391 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

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