FPL

MAY 1 5 2000

L-2000-109
10 CFR 50.36
10 CFR 50.90

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington D. C. 20555-0001

Re: 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

By letter L-99-176, dated November 30, 1999, Florida Power and Light Company (FPL) submitted a proposed license amendments request "Soluble Boron Credit for Spent Fuel Pool and Fresh Fuel Rack Criticality Analyses." By letter dated January 31, 2000, the NRC staff requested additional information regarding the proposed license amendments request. FPL responded by letter L-2000-054, "Response to Request for Additional Information" dated March 8, 2000. Subsequently, the NRC staff and FPL had a telephone conference on April 5, 2000, to discuss conservatism embedded in the criticality analyses submitted in FPL letter L-99-176.

The purpose of this letter is to document, in Attachment 1, the information FPL provided to the NRC during the April 5, 2000, telephone conference. Furthermore, this letter provides, in Attachment 2, the revised mark-up of Technical Specification 5.6.1.1, which incorporates the additional wording "as described in WCAP-14416-P," as stated in FPL letter L-2000-054, dated March 8, 2000.

FPL has determined that the additional information provided herein does not change the conclusions reached in the original no significant hazards consideration determination provided in FPL letter L-99-176.

In accordance with 10 CFR 50.91 (b) (1), a copy of this letter is being forwarded to the State Designee for the State of Florida.

Should there be any questions on this request, please contact us.

Very truly yours,

R. J. Hovey
Vice President
Turkey Point Plant

SM
Attachments
cc: Regional Administrator, Region II, USNRC
Senior Resident Inspector, USNRC, Turkey Point
Florida Department of Health

A001

STATE OF FLORIDA)
) ss.
COUNTY OF MIAMI-DADE)

R. J. Hovey being first duly sworn, deposes and says:

That he is Vice President, Turkey Point Plant, of Florida Power and 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.

R. J. Hovey

STATE OF FLORIDA

COUNTY OF MIAMI-DADE

Subscribed and sworn to before me this

15th day of May, 2000,

by R. J. Hovey is personally known to me.

Cheryl A. Stevenson
Name of Notary Public - State of Florida

CHERYL A. STEVENSON
MY COMMISSION # CC 564017
EXPIRES: June 19, 2000
Bonded Thru Notary Public Underwriters

(Print, type or stamp Commissioned Name of Notary Public)

ATTACHMENT 1

FPL/NRC Telephone Conference Discussion
April 5, 2000

During the April 5, 2000, Telephone Conference FPL and NRC Staff discussed the following issues:

- Basis of conservatism assumed in FPL letter L-99-176 submittal, Reference1
- Relevant industry information on Boraflex degradation for comparable storage racks
- Boraflex Surveillance Program.
- General information regarding spent fuel storage rack vintage, irradiation history, and susceptibility to erosion.

DISCUSSION DETAILS

Basis of Conservatism and Relevant Industry Information for Boraflex Degradation

Boraflex degradation has been modeled in the analyses as changes in the as-built design configuration of the Boraflex panels due to gaps, shrinkage, and dissolution of Boron Carbide. The analyses submitted in Reference 1 are conservative because they assume:

1. A conservative distribution of gaps and gap sizes as compared to specific Turkey Point Boraflex degradation measurements.
2. A conservative value of B^{10} areal density modeled as compared to available industry data for similar racks.
3. The inclusion of the effect of mechanical design tolerances, calculation biases and uncertainties in the final results such that there is a 95% probability and 95% confidence that the design limits for K_{eff} will not be exceeded.

The effect of gaps and shrinkage was directly incorporated into the storage rack model to determine the soluble boron credit. The characteristics and distribution of the gaps and shrinkage as described in Reference 1 were selected such that the number of gaps per panel, the size of gaps and shrinkage, and their axial position conservatively represent the observed results of the past four Boraflex surveillances at Turkey Point. These assumptions, taken in combination, become even more conservative, because their inclusion into the model was done in a very conservative manner so as to bound additional degradation. This was accomplished by further assuming that:

1. Gaps and shrinkage occurred in every panel.
2. All gaps and shrinkage are at the same axial elevation.
3. All gaps were distributed near the axial mid-plane of the fuel.

When compared to a criticality analysis (Reference 2), which assumes no degradation to the Boraflex panels, the above conservative assumptions translate into a reactivity penalty of at least 0.01776 Δk in the presence of soluble boron, and 0.02356 Δk with no soluble boron. If the gaps and shrinkage were represented in the criticality analysis in a random manner, as they have been observed, the associated reactivity penalty would have been considerably less. Representing gaps and shrinkage as provided in Reference 1 assures a high degree of conservatism in the result.

In addition to the conservative modeling of gaps and shrinkage, the effect of B_4C dissolution, which represents another Boraflex degradation mechanism was also considered in the criticality analyses in Reference 1. This was accomplished by removing an additional amount of B^{10} above and beyond that which was already removed to account for gaps and shrinkage. FPL evaluated the following cases since the exact physical mechanism of B_4C removal is not known:

1. Both the areal density and the panel thickness in all Boraflex panels were successively reduced, and
2. The areal density alone was successively reduced.

Successive reductions for both cases continued until K_{eff} was slightly less than the required limit of 1.0. This process assures that the value obtained for K_{eff} is the most conservative.

The most limiting case obtained for Region I assumed gaps, shrinkage, and a reduction of both the B^{10} areal density and the Boraflex panel thickness by 55%. Similarly for Region II, a reduction of B^{10} areal density by 50% with no change in Boraflex panel thickness proved to be the most limiting case.

Recent industry information available for spent fuel storage racks similar to Turkey Point's does not show B^{10} dissolution in every panel to the extent that it was conservatively assumed in Reference 1. In terms of reactivity penalty, FPL's conservative assumption on B^{10} areal density alone corresponds to 0.03826 Δk for Region I and 0.02702 Δk for Region II. The reactivity penalty due to B^{10} areal density in combination with the reactivity penalty due to gaps and shrinkage indicates a high level of conservatism because they are based on assumptions which bound both measurements specific to Turkey Point and available industry data comparable to Turkey Point storage racks. This provides FPL the confidence that the assumptions included in Reference 1, regarding B^{10} dissolution, are indeed conservative.

The conservative assumptions, discussed above, regarding gaps and shrinkage when combined with the conservative assumptions regarding B^{10} dissolution, provide assurance that these assumptions bound the physical configuration of Turkey Point's storage racks. In addition, in discussions with other utilities with similar rack designs, FPL found out that the assumptions included in the criticality analyses are conservative with respect to the measured gaps and areal density results.

Boraflex Surveillance program

The design bases assumed in our current Technical Specifications regarding the storage of spent fuel are verified by a periodic surveillance of the Boraflex panels. The design bases assumed in Reference 1 would be verified by periodic surveillance of the Boraflex panels. In the remote event that the surveillance demonstrates that the results are outside the design bases, then appropriate actions would be taken as required under Federal Regulations.

FPL intends to perform the next storage rack surveillance by Spring 2001 and is in the process of contracting the services needed to measure the extent of gaps, shrinkage, and B^{10} areal density present in the Boraflex panels. Currently, the surveillance frequency is once every five years in either spent fuel pool. FPL intends to evaluate the measured results as part of the surveillance program and determine if a change in surveillance frequency is necessary.

General Information

Turkey Point Re-racking and Boraflex Irradiation History

Two different non high-density storage racks were in use prior to the installation of our present high-density storage racks for Turkey Point Units 3 and 4. The present racks were manufactured by Westinghouse and have been in service approximately 15 years. They are of similar vintage to other Westinghouse spent fuel storage racks. The accumulated gamma dose in the most highly irradiated Boraflex panels, based on 18 month operating cycles and 30 day refueling outages, is estimated to be 3×10^{10} Rads for Region I and 4×10^{10} Rads for Region II. These estimates were obtained from the generic dose information in Reference 3 at 15 years biased to the dose calculated in Reference 4 and assuming a fuel assembly burnup of 50 GWD/MTU.

Boraflex Susceptibility to Erosion

The Boraflex panel is shielded from the direct flow of water by a stainless steel wrapper plate that is tack welded to the main body of the storage cell at intervals of approximately every 6 inches in the vertical direction and approximately every 3 inches across the top and bottom end of the wrapper plate. The total design flow area available for the free ingress and egress of water is limited to less than 1 $in.^2$ which includes an observation port that was incorporated only in the Region II wrapper plates. The Blackness Testing surveillance results thus far have not shown any location preference (including the observation port) for the formation of gaps in the panels.

The silica concentrations provided in Reference 1 are based on chemistry samples usually taken once per month. In some instances more than one sample was available in a given month and the result was recorded as an average in Reference 1. The chemistry test measures only soluble silica. The silica concentration in the pool water is considered to be near equilibrium since the purification system has a low turnover rate, a low propensity to remove soluble silica, and no special measures are taken to reduce its concentration. The overall changes in the concentration including its variability are small and slow with respect to time. This provides FPL additional confidence that there is no massive dissolution of B_4C from the Boraflex panel. Additionally, in discussions with other utilities, FPL found out that the silica levels in the Turkey Point Spent Fuel Pools are comparable to others in the industry.

References

1. R.J. Hovey (FPL) to USNRC, "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. Westinghouse report CAB-99-214-Rev.1, Criticality for Fresh and Spent Fuel Storage for Turkey Point Units 3 and 4 (Full Boraflex).

3. "Updated Radiation Analysis Results for Higher Burnup Fuel and Consolidated Fuel," E. P. Lippencot, Addendum A of SPE-88-312, April 13, 1989.

4. FPL Calculation: NF-QAR-219, "PTN-3 Spent Fuel Rack Boraflex Gamma Dose," Approved February 1990.

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ATTACHMENT 2

TS 5.6.1.1 Markup

as described in WCAP-14416-P

Add

5.6 FUEL STORAGE

5.6.1 CRITICALITY

a. Keff equivalent to less than 1.0 when flooded with unborated water, which includes a conservative allowance for uncertainties

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:

Delete

b ~~a~~. A k_{eff} equivalent to less than or equal to 0.95 when flooded with ~~unborated~~ water borated to 650 ppm, which includes a conservative allowance ~~in region 1 of 0.97% Δk/k and in region 2 of 1.96% Δk/k~~ for uncertainties as described in WCAP-14416-P ~~for two-region fuel storage racks.~~ (delete) Add

c. ~~b~~. A nominal 10.6 inch center-to center distance for Region ~~1~~ I and 9.0 inch center-to-center distance for Region ~~2~~ II for two region fuel storage racks.

d. ~~c~~. 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.