March 31, 2003

Mr. J. A. Stall
Senior Vice President, Nuclear and
Chief Nuclear Officer
Florida Power and Light Company
P.O. Box 14000
Juno Beach, Florida 33408-0420

SUBJECT: SAINT LUCIE PLANT, UNIT 1 - REQUEST FOR ADDITIONAL INFORMATION REGARDING THE PROPOSED SPENT FUEL POOL SOLUBLE BORON CREDIT AMENDMENT (TAC NO. MB6864)

Dear Mr. Stall:

By letter dated November 25, 2002, Florida Power and Light Company submitted a request to amend Facility Operating License DPR-67 for Saint Lucie Unit 1. The proposed amendment would eliminate the need to credit Boraflex™ neutron absorbing material for reactivity control in the Unit 1 spent fuel pool and credit a combination of soluble boron and fuel position within the storage racks to maintain reactivity within the effective neutron multiplication factor limits of Title 10 of the *Code of Federal Regulation*, Section 50.68.

The U.S. Nuclear Regulatory Commission staff has reviewed your submittal and finds that a response to the enclosed request for additional information (RAI) is needed before we can complete the review. This request was discussed with your staff on March 17, 2003, and Mr. Ken Frehater agreed that a response would be provided within 45 days of issuance.

If you have any questions, please feel free to contact Eva Brown at (301) 415-2315.

Sincerely,

/***RA***/

Brendan T. Moroney, Project Manager, Section 2
Project Directorate II
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-335

Enclosure: RAI

cc w/encl: See next page

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Mr. J. A. Stall
Florida Power and Light Company

ST. LUCIE PLANT

cc:
Senior Resident Inspector
St. Lucie Plant
U.S. Nuclear Regulatory Commission
P.O. Box 6090
Jensen Beach, Florida 34957

Craig Fugate, Director
Division of Emergency Preparedness
Department of Community Affairs
2740 Centerview Drive
Tallahassee, Florida 32399-2100

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

Mr. Douglas Anderson
County Administrator
St. Lucie County
2300 Virginia Avenue
Fort Pierce, Florida 34982

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

Mr. Donald E. Jernigan, Site Vice President
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. R. E. Rose
Plant General Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. Kelly Korth
Licensing Manager
St. Lucie Nuclear Plant
6351 South Ocean Drive
Jensen Beach, Florida 34957

Mr. William Jefferson
Vice President, Nuclear Operations Support
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. Rajiv S. Kundalkar
Vice President - Nuclear Engineering
Florida Power & Light Company
P.O. Box 14000
Juno Beach, FL 33408-0420

Mr. J. Kammel
Radiological Emergency
Planning Administrator
Department of Public Safety
6000 SE. Tower Drive
Stuart, Florida 34997

REQUEST FOR ADDITIONAL INFORMATION

SPENT FUEL POOL SOLUBLE BORON CREDIT AMENDMENT

SAINT LUCIE PLANT, UNIT 1

DOCKET NO. 50-335

1. The licensee's submittal described the methodology used to calculate the maximum effective multiplication factor (k_{eff}). The Nuclear Regulatory Commission (NRC) staff has outlined two acceptable methodologies to perform spent fuel pool criticality analyses in a letter entitled "Guidance on the Regulatory Requirements for Criticality Analysis of Fuel Storage at Light-Water Reactor Power Plants," from L. Kopp to T. Collins dated August 19, 1998. The two methodologies are (1) a worst-case combination with mechanical and material conditions set to maximize k_{eff}, or (2) a sensitivity study of the reactivity effects of the tolerance variations.

   Identify which methodology was employed to calculate the maximum k_{eff}.

2. The licensee calculated maximum effective multiplication factors by statistically combining all of the tolerances and uncertainties.

   a. Provide the equations used to perform the maximum k_{eff} calculations and a detailed quantitative example demonstrating how the reactivity effects of each tolerance and uncertainty were calculated. The licensee's example should clearly and numerically demonstrate the methodology used to calculate the reactivity associated with each uncertainty or tolerance.

   b. Calculate the values presented in one of the reference cases of the amendment as an example. The licensee should include a detailed description of the statistical methods employed and the values used in the calculation of any statistical uncertainties.

3. The licensee currently has an additional amendment request (L-2002-187), dated October 23, 2002, under review with the NRC, requesting storage of fresh and spent fuel assemblies in a new rack located within the Unit 1 cask pit. The submittal specifies this rack to be designated as a Region 1 rack capable of storing fresh fuel with initial enrichment up to 4.5 weight percent.

   Review the worst case reactivity conditions that could result from this interface and either provide a detailed technical discussion of why this condition is bounded by current analyses or submit detailed calculations which demonstrate that the requirements of Title 10 of the *Code of Federal Regulation* Section 50.68 will be satisfied.

4. In addition to the proposed configurations within storage racks, the licensee has identified special fuel loading rules based on the various potential interfaces within the spent fuel pool. Examples of these interfaces include assemblies in adjacent racks,

fresh and spent fuel assemblies within the same rack, and assemblies in a rack adjacent to a wall.

Describe, in greater detail, the decision making criteria (i.e., methodology) used to determine the acceptability of interfaces.

5. The licensee described a limitation of the Monte Carlo N-Particle Transport Code (MCNP) calculations which prevented modeling some fission product nuclides in the criticality analyses. A process was described in the submittal to calculate an equivalent amount of boron which provides nearly the same reactivity in MCNP as the CASMO4 result. The licensee stated that this should compensate for the inability to model these nuclides.

   Provide detailed technical information demonstrating that this alternate methodology is conservative or provides bounded results.

6. In Tables 4.1.1 and 4.1.2, as well as Figures 4.6.1 through 4.6.6, of Enclosure 1, the licensee provided data for the minimum burnup as a function of enrichment. The data was presented without any variance in the calculated dependent values.

   Provide information describing the methodology used to calculate the data points. Demonstrate that the data presented represents the most bounding or limiting condition.

7. The licensee has placed considerable emphasis on credit for burnup of the spent fuel for storage in the Region 2 racks.

   Provide detailed information describing the methods that will be in place, either administratively or experimentally, to independently confirm the fuel burnup before it is placed in the storage racks.

8. Xenon-135 is a fission product poison which decays shortly after the reactor is shut down, resulting in an increase in the reactivity of the spent fuel.

   Describe whether the analyses performed assumes the xenon-135 has decayed away completely and the assemblies are at the maximum reactivity.

9. The submittal credits cooling time to reduce the minimum burnup required to meet the reactivity requirements.

   Provide information describing what specifically is credited for the reduced reactivity and how it is modeled. Describe any conservatism used in the calculation.

10. The licensee stated that the spent fuel pool contains Vessel Flux Reduction assemblies, which contain depleted uranium at an axially constant initial enrichment of about 0.3 percent. The licensee proposed that it was acceptable to place these in any location in the racks designated for a fuel assembly.

Will storage of these assemblies be permitted in cells required to be vacant (i.e., adjacent to fresh fuel assemblies)? Specify in greater detail the permissible storage locations for the Vessel Flux Reduction assemblies. Additionally, if the licensee intends to permit storage of these assemblies in empty cells adjacent to fresh fuel assemblies, provide a detailed quantitative analysis demonstrating the acceptability.

11. The licensee performed an analysis of the effect of boron-10 depletion in the control element assemblies (CEA) to demonstrate the acceptability of their assumptions.

    Describe the controls or verification process which will be used to ensure that the CEAs which will be used in the spent fuel pool for reactivity control have not been depleted to levels greater that those assumed in the analysis.

12. The licensee modeled empty cells adjacent to fresh fuel assemblies as having a water density of 25 percent of the normal water density. This modeling would allow the licensee to store nonactinide material in these cells as long as it does not occupy more than 75 percent of the cell volume.

    Describe the controls that will be put in place to assure this limit is not violated.

13. The licensee currently has an additional amendment request (L-2002-187), dated October 23, 2002, under review with the NRC, requesting storage of fresh and spent fuel assemblies in a new rack located within the Unit 1 cask pit. The criticality analyses for that amendment request identify the worst possible moderation condition as a spent fuel pool temperature of 50 degrees Fahrenheit (°F) (10 degrees Celsius (°C)); whereas, this amendment request assumes an optimum moderator density will occur at 39.2 °F (4°C) when negative moderator temperature coefficient conditions exist in the spent fuel pool.

    Justify the discrepancy in the licensing basis proposed for the Unit 1 spent fuel pool.