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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 75

TO FACILITY OPERATING LICENSE NO. DPR-67

FLORIDA POWER & LIGHT COMPANY

ST. LUCIE PLANT, UNIT NO. 1

DOCKET NO. 50-335

1.0 INTRODUCTION

By letter dated July 8, 1986, Florida Power & Light Company (FP&L) applied for an amendment to Facility Operating License No. DPR-67 of St. Lucie Unit 1 to increase the maximum fuel storage enrichment specified in Technical Specification 5.6.1. The revised limit would be changed from 3.7 weight percent to 4.0 weight percent of U-235. In support of this change, FP&L submitted Exxon Nuclear Company (ENC) report XN-NF-83-36, Revision 1, "St. Lucie Unit 1 New and Spent Fuel Storage Criticality Safety Evaluation for Natural Uranium Axial Blanket Fuel," dated Feburary 1986. This report summarizes the results of the criticality safety analyses performed for the handling and storage of new (unirradiated) and spent (irradiated) fuel at St. Lucie Unit 1, using ENC fuel with natural uranium axial blankets on both ends and a central fuel region enriched to 4.0 weight percent U-235.

2.0 EVALUATION

The St. Lucie Unit 1 spent fuel storage racks consist of square stainless steel cans having an inside dimension of 8.5 inches and a nominal wall thickness of 0.25 inches. The minimum distance between the centers of these cans is 12.53 inches. The new (unirradiated) fuel storage facility consists of a 10 x 10 fuel assembly array with the two middle rows removed and the cells spaced on 21-inch centers. The spent fuel is normally stored in pool water containing about 1720 ppm of soluble boron whereas the new fuel is normally stored in a dry (air) environment. Both of these normal storage arrangements result in extremely subcritical configurations. However, for conservatism, the spent fuel racks are calculated assuming no soluble boron in the water and the new fuel is assumed to be stored under various amounts of water moderation.

The KENO-IV Monte Carlo computer code was used to calculate the reactivities of the storage arrays. Neutron cross section data from the XSDRN 123 group library was generated for input to KENO-IV using the NITAWL and XSDRNPM codes. These models have been benchmarked by ENC against experimental data and have been found to adequately reproduce the critical values.

The spent fuel pool criticality calculations were based on no burnable poison or control rods in the fuel assemblies, unirradiated fuel with 4.0 weight percent U-235, and, as previously mentioned, no soluble boron in the water. In addition, a worst case calculation was made to ensure that the maximum K_{eff} for fuel assemblies in the spent fuel racks will be less than the NRC acceptance criterion of 0.95. For this calculation, the most adverse combination of dimensional tolerances was assumed, resulting in a worst case K_{eff} of 0.918 at the 95% confidence level.

The new fuel storage array was analyzed for varying degrees of moderation, also assuming no burnable poison or control rods and 4.0 weight percent U-235 in unirradiated fuel. For the case of full flooding, the array remains subcritical by more than 10% due to neutron isolation between assebmlies. resulting from the large amount of water between them. This meets the NRC acceptance criterion of 0.95 for the fully flooded condition. Calculations assuming uniform moderation within and between fuel assemblies in the new fuel storage array were also performed for water volume fractions ranging from 15% to 2.5%. These calculations indicate a maximum reactivity occurs for a moderator void fraction between 0.90 and 0.95 with a value of about 0.925 at the 95% confidence level. This meets the NRC acceptance criterion of 0.98 for optimum moderation conditions.

It is possible to postulate events which could lead to an increase in storage rack reactivity such as the inadvertent drop of an assembly on top of the racks. However, for such events, credit may be taken for the approximately 1720 ppm of boron in the spent pool water or for the absence of water in the new fuel racks by application of the double contingency principle of ANSI 16.1-1975. This states that one is not required to assume two unlikely, independent, concurrent events to provide for protection against a criticality accident. The reduction in K_{eff} caused by the boron or lack of water moderation more than offsets the reactivity addition caused by credible accidents.

Based on the above evaluation, the staff concludes that the spent fuel and new fuel storage racks at St. Lucie Unit 1 can accommodate any number of ENC 14 x 14 fuel assemblies of maximum enrichment no greater than 4.0 weight percent U-235.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment involves a change in the installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20. The staff has determined that the amendment involves 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 published a proposed finding that the amendment

involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, the amendment meets 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 amendment.

4.0 CONCLUSION

We have 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, and (2) such activities will be conducted in compliance with the Commission's regulations, and the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Date: December 1, 1986

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