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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. 72 TO FACILITY OPERATING LICENSE NO. DPR-72

FLORIDA POWER CORPORATION, ET AL.

CRYSTAL RIVER UNIT NO. 3 NUCLEAR GENERATING PLANT

DOCKET NO. 50-302

INTRODUCTION

By letter dated February 24, 1984, the Florida Power Corporation (the licensee) made application to increase the permitted enrichment for fuel to be stored in the high denisty racks in pool "A" at the Crystal River Unit 3 facility. The original analyses for these racks had been performed under the assumption of 3.3 weight percent U-235 enrichment fuel assemblies. The present application would increase that value to 3.5 percent. The analysis for the fuel racks in pool "B" had originally been done for 3.5 weight percent U-235 enrichment fuel assemblies. In support of the application, the licensee submitted a report, "Criticality Safety Analysis of the Crystal River Spent Fuel Storage Rack", SS-152, prepared by Southern Science.

EVALUATION

The calculation was performed with the KENO-IV code with cross-section preparation by the AMPX code package. This is the most widely used calculation method and has been extensively verified against critical experiments. In particular, Southern Science has performed such verification. We conclude that the calculation method used is acceptable.

A nominal design case was calculated and the uncertainties to be applied to the nominal value of k-effective were investigated. The uncertainties were obtained by using diffusion theory to obtain the effect of small changes in the parameters of the nominal calculation. This is a common industry practice and is acceptable.

The uncertainties treated included those due to variations in boron loading in the absorber plates, absorber plate width variations, storage cell lattice pitch, stainless steel thickness, and fuel enrichment and density. The effect of these variations when combined at the 95/95 level is less than 0.01 in k-effective change. In addition, an uncertainty in the verification analysis and a statistical uncertainty in the nominal calculation (due to the use of the Monte-Carlo method) were added to the mechanical uncertainties to obtain a total uncertainty of 0.011 in the k-effective value. Adding this value to the nominal value results in a k-effective value of 0.946 including all uncertainties. This meets our acceptance criterion of 0.95 for this quantity and is acceptable.

The effect of eccentric positioning of fuel assemblies in the racks and loss of pool cooling with consequent increase in pool temperature has been analyzed. Both these abnormal conditions lead to a reduction in pool reactivity. The effect of dropping an assembly on top of the racks or beside the racks has been analyzed. In neither case can the assembly be closer than 6 inches to another assembly. An infinite array of assemblies having 6-inch face-to-face separation (without intervening poison) has a k_{eff} less than the nominal value for the racks. We conclude that credible accident configurations will not lead to reduction in pool margin to criticality.

On the basis of our review, which is described above, we conclude that fuel of the B&W 15x15 design having enrichment no greater than 3.5 weight percent U-235 may be safely stored in the high density racks in pool "A" at the Crystal River Unit 3 facility. We further conclude that the revised Technical Specifications 5.3.1 and 5.6.1 are acceptable.

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. We have 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 issued a proposed finding that this amendment involves no significant hazards consideration and there has been no public comment on such finding. Accordingly, this 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 this amendment.

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

Dated: November 8, 1984

Principal Contributors:
W. Brooks, H. Silver