



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATIONS

RELATED TO AMENDMENT NO. 121

TO PROVISIONAL OPERATING LICENSE NO DPR-16

GPU NUCLEAR CORPORATION AND
JERSEY CENTRAL POWER & LIGHT COMPANY

OYSTER CREEK NUCLEAR GENERATING STATION

DOCKET NO. 50-219

1.0 INTRODUCTION

By letter dated January 29, 1988, as supplemented in a letter date March 16, 1988 GPU Nuclear Corporation (GPUN or the licensee) requested an Amendment to the Provisional Operating License No. DPR-16 for the Oyster Creek Nuclear Generating Station (Oyster Creek). The proposed amendment would revise Technical Specification 5.3.1 to permit an increase in the maximum enrichment of fuel assemblies stored in the Spent Fuel Storage Pool at Oyster Creek. The information submitted by letter dated March 16, 1988 referenced the report "Criticality Safety Analyses Oyster Creek High Density Storage Racks With Increased Enrichment Fuel" prepared by Southern Science dated May 1987. The supplemental information provided in the letter dated March 16, 1988 did not change the scope of the staff's notice for opportunity for hearing. The staff has reviewed the application and prepared the following evaluation.

2. EVALUATION

Currently, the Oyster Creek spent fuel pool is licensed to store fuel assemblies having U-235 enrichment of up to 3.01 weight percent. No credit was taken in the analysis for the presence of burnable poison, (gadolinium) in the fuel. But most reload fuel assemblies do contain such poison which reduces the k-effective value by several percent when compared to assemblies of the same enrichment without burnable poison. However, since the gadolinium is burned out as the fuel is exposed, the reactivity will increase with fuel exposure. Acting against this tendency is the fact that the U-235 is also burned out as the fuel is exposed. The result is that the pool k-effective value first rises with fuel exposure and then begins to decrease. Staff criteria require that the k-effective value of the pool be calculated for fuel having an exposure which yields the maximum value.

The licensee has re-evaluated the criticality aspects of the Oyster Creek spent fuel pool, including the effect of burnable poison. Fuel assemblies having uniform enrichment up to 3.8 weight percent U-235 and containing 3

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weight percent gadolinia (Gd_2O_3) in seven fuel rods in each assembly were analyzed. For each enrichment, the assemblies were burned to the point of maximum reactivity. The maximum pool k_{eff} occurred for the 3.8 weight percent enrichment and was 0.908 with a 95% probability at a 95% confidence level. Since the reactivity of fuel is smaller for both smaller and larger burnups, such fuel assemblies may be stored at any point in their life.

A series of calculations was also performed for the pool k_{eff} value as a function of burnup and initial enrichment under the assumption of no burnable poison (gadolinia) in the fuel. From these calculations a curve of required burnup as a function of initial enrichment was constructed which ensures that the pool k_{eff} value will be less than 0.95 with a 95% probability at a 95% confidence level.

The analyses described above were performed with the CASMO-2E code which has been extensively qualified for such analyses in particular by the performers of the present calculation. In addition, for the present analyses, the CASMO-2E code was compared to the AMPX-KENO code with the 27-group SCALE cross-section library for the 3.19% enrichment case with zero burnup and no gadolinium. The two calculations agreed to within the statistical uncertainty in the KENO calculation. The staff concludes that acceptable analysis methods have been used for the analyses.

The uncertainties due to mechanical and manufacturing tolerances were assumed to be the same as those for the previous analysis. Since the KENO code was also used for that analysis, we find the assumption to be acceptable. Additional uncertainties due to the assumption of burnup were derived for the present analyses. Conservative assumptions made include the use of pool temperature yielding the largest k -effective value and the use of uniform enrichment in the fuel assemblies.

Based on the discussion presented above, we conclude that fuel assemblies having enrichments (in their highest enrichment segments) of up to 3.8 weight percent U-235 may be stored in the Oyster Creek spent fuel pool, provided that:

- (1) at least 7 fuel rods contain at least 3 weight percent gadolinia (Gd_2O_3), or
- (2) the discharge burnup lies within the "acceptable burnup domain" of Figure 2 of the licensee's submittal of January 29, 1988.

Technical Specification 5.3.1 has been altered to remove the 3.01 percent limit on assembly enrichment and replace it with a requirement to maintain a k -effective value less than 0.95. In response to our request, the licensee in a letter dated March 16, 1988 referenced the report "Criticality Safety Analyses Oyster Creek High Deposits Storage Racks With Increased Enrichment Fuel" prepared by Southern Science dated May 1987 in the bases of Technical Specification 5.3.1. We find this acceptable.

3.0 ENVIRONMENTAL CONSIDERATION

This amendment changes a requirement with respect to 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 issued a proposed finding that this 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 this amendment.

4.0 CONCLUSION

The staff has 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 nor to the health and safety of the public.

Dated: April 11, 1988

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