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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

SUPPORTING AMENDMENT NO. TO PROVISIONAL OPERATING LICENSE NO. DPR-18

ROCHESTER GAS AND ELECTRIC CORPORATION

R. E. GINNA NUCLEAR POWER PLANT

DOCKET NO. 50-244

1.0 INTRODUCTION

By application dated December 14, 1979 (transmitted by letter dated December 20, 1979), the Rochester Gas and Electric Corporation (RG&E) applied for a license amendment to authorize the receipt and storage of four mixed oxide fuel assemblies in the storage racks in the R. E. Ginna spent fuel pool. By letter dated December 14, 1979 RG&E submitted proposed changes to the Security Plan, which address additional measures to be implemented to meet the present requirements of 10 CFR Part 73 for the physical protection of mixed oxide fuel assemblies.

2.0 DISCUSSION

The spent fuel storage racks at the Ginna plant are a Wachter Associates design which used square, type 304 stainless steel containers to hold the fuel assemblies in a checkerboard pattern, i.e., fuel assemblies located in every other storage lattice position with the alternate positions filled only with water. Even though the square fuel assembly and water containers are the same size, (i.e., of an outside dimension of 8.43 inches) RG&E states that it is not possible to insert a fuel assembly into a water container because the opening at the top of the water container is restricted by lead-in guides which is too small to admit a fuel assembly. The nominal thickness of the stainless steel which was used to make these square containers is 0.090 inches, so that the thickness of stainless steel between all adjacent containers is 0.180 inches. The 8.43 inches square containers are held in a close packed array. This results in a mean distance between fuel assembly centers of 11.92 inches and a fuel assembly volume fraction in the storage rack of 0.426.

In the original criticality analysis for these fuel racks RG&E assumed that the highest fissile fuel enrichment would be 3.5 weight percent U-235. This enrichment in a 14 x 14 Westinghouse fuel assembly results in a maximum fissile fuel density of 39.0 grams of U-235 per axial centimeter of fuel assembly.

In the criticality analysis for the mixed oxide fuel assemblies RG&E used the actual fuel loadings. These give an average enrich-

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ment of 3.17 percent fissile fuel of which about 0.7 percent is uranium 235, 2.35 percent is plutonium 239, and 0.11 percent is plutonium 241. These enrichments in these 14 x 14 Westinghouse fuel assemblies result in a density of 35 grams of fissile fuel per axial centimeter of fuel assembly.

Pickard, Lowe and Garrick, Inc. (PLG) of Washington, D. C., performed the nuclear analysis for RG&E. They used their version of the LEOPARD computer program to generate macroscopic cross sections for input to four energy group, diffusion theory calculations. These were made with the PDQ-7 program. The LEOPARD program is a derivative of the MUFT and SOFOCATE programs, which were developed for the Atomic Energy Commission in the late 1950's along with the PDQ diffusion theory program. RG&E's report provides the results of criticality calculations which were made with these methods. Included in these were calculations of critical experiments with PuO_2-UO_2 fuel. From these calculations an uncertainty of 0.0163 Δk was established for the PuO_2-UO_2 fuel at the 95 percent confidence level.

PLG calculated the k_{eff} of an infinite aray of mixed oxide fuel assemblies in the Ginna spent fuel pool to be 0.87. When the calculational uncertainty is added this base case k_{eff} is <0.89. PLG states that the effect of possible perturbations to this base case would be essentially the same as that previously determined for the uranium dioxide fuel.

3.0 EVALUATION

3.1 RECEIPT AND STORAGE OF MATERIAL

In the previous parametric calculations for off-design conditions for uranium dioxide fueled assemblies in these racks PLG considered the minimum thickness of stainless steel, the minimum spacing between fuel assemblies, an increase in temperature to 200°F, an increased number of mesh points in the PDQ calculation, the axial neutron leakage, and the inclusion of the inconel fuel assembly spacer grids in the calculation. PLG found that the net result of all of these effects was essentially nil. There is no reason to believe this result would be significantly different for these mixed oxide fuel assemblies. Hence, the maximum calculated k_{eff} for these mixed oxide assemblies is less than 0.89. This is the same as it was for the uranium dioxide fuel assemblies.

Based on the above, we find that all factors that could affect the neutron multiplication factors in this pool have been conservatively accounted for and that the maximum neutron multiplication factor in this pool with these mixed oxide fuel assemblies in the racks is within the R. E. Ginna Technical Specification limit and well within the Standard Technical Specification limit of 0.95.

We find that any number of the mixed oxide fuel assemblies, as described in this evaluation, are put into the Ginna spent fuel racks the k_{eff} will be less than the 0.95 limit. We, therefore, find the request to receive and store four mixed oxide fuel assemblies acceptable.

3.2 SECURITY

We have reviewed the additional security measures proposed by your letter of December 14, 1979. Based on this review we conclude that such measures, when fully implemented in conjunction with your existing Security Plan, whenever unirradiated mixed oxide fuel assemblies are stored outside the plant containment, are acceptable. The changes submitted as enclosures to your letter of December 14, 1979 are being withheld from public disclosure in accordance with Section 2.790(d)(1) of 10 CFR Part 2.

4.0 ENVIRONMENTAL CONSIDERATION

We have determined that the amendment does not authorize a change in effluent types or total amounts nor an increase in power level and will not result in any significant environmental impact. Having made this determination, we have further concluded that the amendment involves an action which is insignificant from the standpoint of environmental impact and pursuant to 10 CFR §51.5(d)(4) that an environmental impact statement or negative declaration and environmental impact appraisal need not be prepared in connection with the issuance of this amendment.

5.0 CONCLUSION

We have concluded, based on the considerations discussed above, that: (1) because the amendment does not involve a significant increase in the probability or consequences of accidents previously considered and does not involve a significant decrease in a safety margin, the amendment does not involve a significant hazards consideration, (2) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, and (3) 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.