



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
SUPPORTING AMENDMENT NO. 6 FOR FACILITY LICENSE NO. R-95
RHODE ISLAND AND PROVIDENCE PLANTATIONS ATOMIC ENERGY COMMISSION
RHODE ISLAND NUCLEAR SCIENCE CENTER REACTOR
DOCKET NO. 50-193

Introduction

By letter dated May 26, 1978, the Rhode Island and Providence Plantations Atomic Energy Commission (the licensee) requested an amendment to Facility License No. R-95 that would remove the existing weight (3.72 Kg) limitation of U-235 fuel permitted in a reactor core. The Technical Specifications and the reactor design permit the insertion of a maximum of 35 fuel elements into the core.

Discussion

The licensee's request will not change the limit of the total number of fuel elements (35) or the maximum amount of excess reactivity (not greater than 4.7% $\Delta k/k$) in any core. The existing Specifications further restrict the nominal amount of fuel to 0.124 Kg of U-235 per fuel element. The existing 3.72 Kg Technical Specification limit has limited the core load to 32 elements which in many cases is well below the excess reactivity limit (approximately 2% vs 4.7% $\Delta k/k$) because partially spent fuel together with fresh fuel normally make up a core reload.

The licensee normally operates the facility eight hours per day which entails overriding xenon during reactor startups. A hardship exists in that the reactor operates at reduced power during the first few hours of operation. This is the result of the xenon poisoning which has not decayed away and the limited amount of excess reactivity caused by the existing fuel limitation of the Technical Specifications.

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This proposed change will permit higher burn up of fuel elements in the core, allowing periods between refueling to increase and making the facility more efficient. Presently the fuel elements have an average burn up of less than 12% (about 14 gms) because of the low amount of U-235 fuel in each element (124 gms nominal). A two percent increase in burnup which is possible under the proposed change will allow continued use of a core by several months.

Evaluation

An increase in the total core amount of fuel equivalence to 35 fuel elements, containing initially .124 Kg of U-235 (nominal) will reduce the consequence of postulated accidents and therefore, increase the safety margin for the reactor. The reduction in the consequences of postulated accidents is due to reductions in core power density, fuel element heat flux, peak-to-average flux ratio and maximum fuel temperature. These reductions will occur because reactor power level, which is unchanged, is being generated by a larger number of fuel elements. Furthermore, regardless of the increase in the fuel amount, the licensee is still required not to exceed the excess reactivity limitation (4.7% $\Delta k/k$) nor change the minimum shutdown margin. Such limitations serve as an upper limit on the amount of fuel that can be placed in any core.

In our evaluation dated May 21, 1973, we concluded that operation with a graphite reflected core containing 35 fuel elements will not adversely affect the safety of operating the reactor. A 35 fuel element core could contain more than 3.72 Kg of fuel and the 3.72 Kg specification limitation was not a consideration in arriving at our earlier conclusion.

The proposed change will allow a prolonged usage of a core loading, thus increasing the periods between refueling. Radiation exposure to operating personnel will decrease because core refueling will occur less frequently.

We have concluded that the proposed amendment does not reduce but improves, the level of safety of the facility in areas of power density, heat flux and fuel temperature; therefore, the proposed change to the Technical Specification is acceptable.

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.

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.

Dated: October 2, 1978