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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 146

TO FACILITY OPERATING LICENSE NO. DPR-65

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

DOCKET NO. 50-336

1.0 INTRODUCTION

By application for license amendment dated April 10, 1990, Northeast Nuclear Energy Company (the licensee) requested changes to the Technical Specifications (TS) for Millstone Nuclear Power Station, Unit 2. The proposed change would revise Technical Specification 5.6.1(a) to allow enrichments up to 4.5 weight percent U-235 to be stored in the new fuel storage racks and Technical Specification 5.3.1 to allow 4.5 weight percent U-235 to be the maximum fuel enrichment in the reactor core. Plant operation using the higher enrichment fuel would be demonstrated to be acceptable by a cycle-specific reload safety evaluation performed prior to each fuel loading.

2.0 EVALUATION

The new fuel storage racks at Millstone 2 consist of eight 2x4 modules and three 1x4 modules of storage cells. These 76 storage locations are designed to store fresh fuel assemblies on a 20.5 inch center-to-center spacing in a dry (air) environment. However, for conservatism, the fuel rack reactivity is calculated assuming water moderation.

The Millstone 2 fresh fuel racks are currently limited to using fuel assemblies of the Millstone 2 design containing a 14x14 array of fuel rods enriched to no greater than 3.7 w/o U-235. The new analysis, performed by Advanced Nuclear Fuels Corporation (ANF), evaluated the loading of fuel of enrichments up to 5.0 w/o into the new fuel storage racks.

The analysis uses the SCALE system of computer codes for reactivity calculations and neutron cross section generation. These codes and cross sections have been benchmarked against experimental data and were found to adequately reproduce the critical values. The staff concludes that these methods and models are acceptable.

The design basis for preventing criticality in fresh fuel storage racks is that the effective multiplication factor, k-eff, of the fuel assembly array when fully flooded by unborated water shall be no greater than 0.95, including all appropriate uncertainties. In addition, if the peak reactivity occurs at a partially flooded optimum moderation condition, the k-eff must be no greater than 0.98, including all uncertainties. The ANF analysis indicated that the peak reactivity occurs at fully flooded conditions, yielding a reactivity of 0.9121 and, thereby meeting the NRC acceptance criteria. The ANF analysis assumed a U-235 enrichment of 5.0 w/o for the fuel assemblies in the new fuel storage racks. However, because of the more restrictive enrichment limit of 4.5 w/o in the reactor and spent fuel pool, the limiting value of 4.5 w/o is being requested for the new fuel storage racks to ensure consistency.

In addition to the assumption of water moderation in the normally dry new fuel storage racks, it is possible to postulate other events which could lead to an increase in reactivity. For example, the analysis shows that the 0.95 acceptance criteria could be violated if an in-transit assembly of 5.0 w/o U-235 enrichment were brought closer than 4 inches to another 5.0 w/o assembly under the assumption of full moderation by unborated water. However, the only reason that two fresh fuel assemblies would be brought this close together would be to load them into the core through the transfer canal. Under these conditions, the transfer canal would have to be maintained at or above the refueling boron concentration as given in Technical Specification 3.9.1. This is well in excess of the minimum boron concentration required to assure that the 0.95 acceptance limit is met.

Based on the above evaluation, the staff concludes that the Millstone 2 fresh fuel racks can accommodate new fuel, similar in physical design to the initial core loading, with a maximum enrichment of 4.5 w/o U-235. Technical Specification 5.6.1 may be revised to reflect this higher acceptable enrichment. Technical Specification 5.3.1 may also be revised to reflect the acceptance of reload fuel of enrichment as great as 4.5 w/o U-235. However, actual plant operation using the higher enriched fuel will be demonstrated to be acceptable by a cycle specific reload safety evaluation performed prior to each fuel loading.

3.0 ENVIRONMENTAL CONSIDERATION

The 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. 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 staff 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 (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Dated: June 13, 1990

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