NORTHEAST UTILITIES
THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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April 10, 1990

Docket No. 50-336
B13475
Re: 10CFR50.90

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Gentlemen:

Millstone Nuclear Power Station, Unit No. 2
Proposed Change to Technical Specifications
Fuel Enrichment Limits

Pursuant to 10CFR50.90, Northeast Nuclear Energy Company (NNECO) hereby proposes to amend its Operating License No. DPR-65 by incorporating the changes identified in Attachment 1 into the Technical Specifications of Millstone Unit No. 2.

Specifically, the proposed changes to Technical Specification 5.6.1(a) will 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 will allow 4.5 weight percent U-235 to be the maximum fuel enrichment in the reactor core. Millstone Unit No. 3 submitted a similar license amendment request on January 24, 1989,(1) resulting in issuance of License Amendment No. 37 on June 28, 1989.(2)

Discussion

Technical Specification 5.6.1(a) currently limits the maximum fuel enrichment which may be stored in the new fuel racks to 3.7 weight percent U-235. This limit is not high enough to support the longer cycle lengths planned for Millstone Unit No. 2. The reload fuel for Cycle 11, for example, is currently planned to have a maximum enrichment of approximately 4.12 percent. In order to allow higher enrichments, an analysis was performed by Advanced Nuclear Fuels Corporation (ANF).(3) This analysis is summarized in the referenced document and provided as Attachment 2. It shows that adequate margin to

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(1) E. J. Mroczka letter to U.S. Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 3, Proposed Revision to Technical Specifications," dated January 24, 1989.

(2) D. H. Jaffe letter to E. J. Mroczka, "Millstone Unit No. 3--Issuance of Amendment (TAC No. 71942)," dated June 28, 1989.

(3) "Final Report--Criticality Safety Analysis, Millstone 2 New Fuel Storage Vault and Transfer Carriage with 5.0 Percent Enriched 14 X 14 Fuel Assemblies," ANF-88-028, dated February 1988.

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criticality can be maintained with enrichments up to 5.0 weight percent U-235 stored in the new fuel storage racks.

The attached analysis was performed for fuel assemblies of the Millstone Unit No. 2 design with a 5.0 weight percent enrichment. The analysis included:

- Variable moderator density sensitivity studies
- Removal of fuel rods in assemblies
- Bundle spacing sensitivity studies

In all cases, the calculated K_{eff} remains less than 0.95. The proposed 4.5 weight percent enrichment limit is therefore shown to be acceptable.

Technical Specification 5.3.1 also currently limits the maximum fuel enrichment in the reactor core to 3.7 weight percent U-235. It is proposed to change the limit of this specification to 4.5 weight percent. This is the current enrichment limit for assemblies in the spent fuel pool. The acceptability of the specific enrichments used in the reload fuel are verified on a cycle-specific basis.

The analysis, as performed by ANF, would allow enrichments up to 5.0 weight percent to be loaded into the new fuel storage vaults. However, they could not be used in the core because of the more restrictive enrichment limits in the reactor and the spent fuel pool. The more limiting 4.5 weight percent value is being used to ensure consistency between the spent fuel pool, the reactor core, and the new fuel storage racks.

SIGNIFICANT HAZARDS CONSIDERATION

NNECO has reviewed the proposed changes in accordance with 10CFR50.92 and has concluded that they do not involve a significant hazards consideration in that these changes would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated.

   The criticality analysis for the new fuel vault was performed in the referenced document assuming a fuel enrichment of 5.0 weight percent. The analysis included:

   - Variable moderator density sensitivity studies
   - Removal of fuel rods in assemblies
   - Bundle spacing sensitivity studies

   In all cases, the calculated K_{eff} remains less than 0.95. The proposed 4.5 weight percent enrichment is bounded by the 5.0 weight percent enrichment analyzed, and is therefore shown to be acceptable.

The use of the higher enrichments in the core could result in a change to many other core parameters; for example, peaking factors or moderator temperature coefficients. However, all of these related changes have other Technical Specification requirements which are assumed in the plant's safety analysis. The acceptability of the enrichment change with the other requirements is verified on a reload specific basis. Therefore, a change in the maximum enrichment limit will not impact any safety analyses because the important inputs to these analyses are protected by other Technical Specifications.

The attached report also discusses the safety analysis impact of two closely spaced fuel assemblies of 5.0 weight percent enrichment in unborated water. The results show that the acceptance criteria could be violated if two assemblies were brought closer together than a 4-inch edge-to-edge spacing. The spacing of bundles normally loaded in the transfer carriage is greater than 4 inches. However, if an in-transit bundle were brought closer than 4 inches to a bundle in the carriage, then 500 parts per million (ppm) of boron is required to assure that K_{eff} limit is met. This is not a concern for the following reasons:

a. The 5.0 weight percent enrichment discussed in the attached report exceeds the 4.5 weight percent limit allowed in the spent fuel pool. Therefore, the analyzed case is over-conservative.

b. The only reason that two relatively fresh assemblies would be brought near the transfer canal would be to load them in the core. 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 500 ppm concentration required to assure that the criticality limits are met.

A higher enrichment fuel assembly could also have a higher discharge burnup than an assembly with a lower initial enrichment. This could result in a higher discharge radioactive isotope concentration than a lower initial enrichment assembly. The fuel-handling accidents (both in the core and in the spent fuel pool) have consequences that are limited by relatively short-lived isotopes. The concentration of these isotopes is a function of core power and is not affected by the higher potential discharge burnups. Therefore, the consequences of fuel-handling accidents are not affected by the change.

Since this change only affects the enrichment limits on fuel in the new fuel vault and in the core and does not affect any safety systems, there can be no change in the probability of failure of these systems.

The change itself is to the Technical Specifications only. It does not affect any hardware. Therefore, the change does not affect the probability of any accident previously identified.

2. Create the possibility of a new or different kind of accident.

   As discussed above, the only safety issue significantly affected by the change is the criticality analysis for the new fuel vault. Since it has been shown that K_{eff} remains below 0.95, no new or different accidents are created. Further, there are no failure modes associated with the change, and the change does not affect any hardware. Therefore, the change does not create the possibility of a new or different kind of accident.

3. Involve a significant reduction in a margin of safety.

   Since the analyses have shown that increasing the allowable percent enrichment will not increase K_{eff} above the 0.95 limit, it is concluded that this change has no impact on the margin of safety as defined in the basis for any Technical Specification. The use of higher enrichments in the core could result in a change to many other core parameters. However, all of these related changes have other Technical Specification requirements which are assumed in the plant's safety analysis. The acceptability of the enrichment change with the other requirements is verified on a reload specific basis.

The Commission has provided guidance concerning the application of standards in 10CFR50.92 by providing certain examples (51FR7751, March 6, 1986) of amendments that are considered not likely to involve a significant hazards consideration. The changes proposed herein most closely resemble Example (vi), a change which either may result in some increase to the probability or consequences of a previously analyzed accident or may reduce in some way a safety margin, but where the results of the change are clearly within all acceptable criteria in the Standard Review Plan; e.g., a change resulting from the application of a small refinement of a previously used calculational model or design method.

The NRC has reviewed the anticipated widespread use of extended burnup fuel in commercial light water reactors and has concluded (February 29, 1988, 53FR6041) that there are no significant adverse radiological or nonradiological impacts associated with the use of extended burnup fuel and that this use will not significantly affect the quality of the human environment. Moreover, the NRC has endorsed the recently issued NUREG/CR5009, "Assessment of the use of Extended Burn-up Fuel in Light Water Reactors," which concludes a finding of no significant impact for fuel up to 5 weight percent U-235 and burnup up to 60 Gwd/MTU.

Based upon the above and the information in this submittal, there are no significant radiological or nonradiological impacts associated with the proposed changes, and the proposed changes will not have a significant effect on the quality of the human environment.

The Millstone Unit No. 2 Nuclear Review Board has reviewed and approved the attached proposed revision and has concurred with the above determinations.

NNECO respectfully requests that this License Amendment Change be issued on or before July 1, 1990, to allow the receipt of new fuel with maximum enrichments of approximately 4.12 weight percent prior to Millstone Unit No. 2's refueling scheduled for September 1990. NNECO requests this license amendment be effective as of the date of its issuance, to be implemented within 30 days of issuance.

In accordance with 10CFR50.91(b), we are providing the State of Connecticut with a copy of this proposed amendment application.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

E. J. Mroczka
Senior Vice President

cc: T. T. Martin, Region I Administrator
G. S. Vissing, NRC Project Manager, Millstone Unit No. 2
W. J. Raymond, Senior Resident Inspector, Millstone Unit Nos. 1, 2, and 3

Mr. Kevin McCarthy, Director
Radiation Control Unit
Department of Environmental Protection
Hartford, CT 06116

STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me, E. J. Mroczka, who being duly sworn, did state that he is Senior Vice President of Northeast Nuclear Energy Company, a Licensee herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Licensee herein, and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Notary Public

My Commission Expires March 31, 1993