NORTHEAST UTILITIES

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August 27, 1980

Docket No. 50-336
B10060

Director of Nuclear Reactor Regulation
Attn: Mr. R. A. Clark, Chief
Operating Reactors Branch #3
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

References: (1) W. G. Counsil letter to V. Stello, Jr., dated July 23, 1980.
(2) R. A. Wiesemann letter to H. R. Denton, dated February 29, 1980.
(3) R. A. Wiesemann letter to D. G. Eisenhut, dated July 27, 1976.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 2
Additional Information Concerning the Cycle 4 Reload Fuel

Northeast Nuclear Energy Company (NNECO) advised the NRC Staff of an apparent design deficiency in the reload fuel assemblies supplied to NNECO for Millstone Unit No. 2 in Reference (1).

Subsequent conversations with the Staff, which included a meeting at the Westinghouse fuel fabrication facility in Columbia, SC with Mr. D. Powers of the NRC Staff, identified additional information which the Staff required concerning the design modification to the Millstone Unit No. 2 Cycle 4 fuel assemblies and the quality assurance program in effect during the design of the Cycle 4 reload fuel.

In response to these verbal requests, NNECO provides Attachment 1.

We trust you find the attached information responsive to your request.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

W. G. Counsil
Senior Vice President

By:

W. F. Fee
Executive Vice President

Attachment

Docket No. 50-336

Attachment 1

Millstone Nuclear Power Station, Unit No. 2

Guide Thimble End Plug Modification

August, 1980

Background

The Model C Fuel Assembly design was developed by Westinghouse over a period of years beginning in 1971 and culminating in production of 72 fuel assemblies this past Spring of 1980. Fuel of this design is intended for use in Combustion Engineering reactors. The 72 assemblies presently produced will comprise the third reload region (4th fuel cycle) for Millstone Unit No. 2.

Although the Westinghouse Model C fuel design was subjected to design control and verification processes, a dimensional discrepancy was recently discovered in the design. A calculational error had been made in sizing the vertical dimension between the top of the thimble tube end plug and the seating surface of the control rod. The error in question involved a misinterpretation of wording by Westinghouse of a single piece of interface data supplied by NNECO. A "maximum" control rod penetration dimension was requested. Westinghouse inadvertently assumed the value supplied was for the bounding envelope condition. A subsequent review of calculations by the designer disclosed the error and the corrective action was taken.

The revised calculations indicated there could be inadequate clearance for a fully-inserted control rod during a scram at operating temperature. Although highly improbable, a worst stackup of tolerances indicated a potential interference of .412 inches between the thimble tube end plug and the control rod. Although approximate analyses indicated that the fuel assembly could safely sustain such loading, the loads were not distributed as intended by design and should be avoided. Therefore, some modification was necessary prior to use of these assemblies in the Millstone Unit No. 2 reactor.

Corrective Actions

A number of alternative design modifcations were proposed to eliminate the interference condition. A thorough review of these various design modifications involving significant Westinghouse/NNECO interfacing and consultation was perfc ned to evaluate the acceptability of each of the proposed fixes. After reviewing the advantages and disadvantages of each alternative, a decision was made to utilize a guide tube end plug boring modification.

The guide thimble end plug boring is a machining operation. The machining is accomplished by driving a 60^{o} included angle countersink tool a sufficient depth in to the end plug to allow an additional control rod insertion distance of .625 inches (additional margin was added to allow clearance between the CEA and the guide thimble end plug).

Specially prepared tooling and fixturing were developed for this operation to ensure (a) extremely high dimensional accuracy and (b) removal of all chips and burrs from the assembly during the machining operation.

The operation has been successfully implemented at the Westinghouse Columbia Plant.

A structural analysis of the modified region of the guide tube to end plug illustrates that the weld joint integrity satisfies the structural design criteria specified in Section 3.2.1.1 of the Millstone Unit No. 2 FSAR.

In addition to the stress re-analysis, uni-axial pull tests were performed on eight (8) qualification program specimens to demonstrate that the originally specified guide tube to thimble end plug joint strength of 7,000 lbs. was satisfied.

All qualification samples met the joint strength criterion.

With respect to the calculational error, the review conducted to date by Westinghouse does not suggest a breakdown in the Westinghouse NFD internal QA Procedure by Westinghouse or any inadequacy in these procedures. Standard Westinghouse design policies and procedures have been utilized throughout the fuel assembly design process to insure design integrity. Interface dimensions essential to mechanical compatibility including assembly envelope, control rod clearances, and internals surfaces were reviewed to confirm the adequacy of the design.

A more detailed and comprehensive review of the circumstances resulting in this problem is planned to determine what, if any, specific corrective actions need be taken to avert similar problems in the future.

The results of corrective actions taken and evaluations/investigations performed to date confirm the following:

1. The calculational error which resulted in the modification is a singular type occurrence.

2. The guide tube end plug modification is a permanent fix which does not require special core loading schemes nor impact subsequent refueling operations.