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

Gentlemen:

Millstone Nuclear Power Station, Unit No. 2
Cycle 5 Reload Fuel

Recently, members of our respective Staffs discussed the results of on-site fuel inspections for Cycle 5 reload fuel at Millstone Unit No. 2. As a follow up to that conversation, Northeast Nuclear Energy Company (NNECO) provides the following information concerning the on-site inspections of the Cycle 5 reload fuel.

As part of the new fuel receipt inspection program at Millstone Unit No. 2, fresh fuel assemblies undergo various checks to ensure compatability with existing components within the reactor vessel and core. One such inspection is the fuel assembly envelope check. The apparatus utilized for this inspection includes a two-hole upper gauge block which seats on the top nozzle assembly of the fuel bundle. The on-site inspection of the Cycle 5 fuel indicated that some of the assemblies would not accept the upper gauge block (UGB) of the envelope checking apparatus in the orientation as specified by procedure. All assemblies had the envelope check performed in one of the four possible orientations. In addition to performing an envelope check, the fit up of this apparatus is influenced by top nozzle squareness and the relative alignment of the top nozzle posts to each other.

Two distinct conditions could cause the aforementioned condition.

1. One design requirement for the as-built assembly is an overall length check on all four sides of each assembly. For a given assembly, a small variation can result in the top nozzle not being parallel with respect to bottom nozzle. Consequently the UGB may not seat on the assembly in the specified orientation. The UGB will seat for other fuel orientations because all four length ("L") dimensions did not vary enough to preclude the UGB from seating in all possible orientations.

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2. The spacing and perpendicularity requirements for the top nozzle posts are such that there will be no interference between these posts and the upper core plate. The UGB is built to tolerances much tighter than the upper core plate so that minor deviations in spacing or perpendicularity could cause the UGB not to seat. Due to the tighter tolerances involved, failure of the UGB to accept the top nozzle posts is not necessarily indicative of fuel assembly/core plate interference.

Either of the two conditions discussed above or their combination could be the cause of the UGB/top nozzle alignment problem. Each of these conditions was evaluated and their impact determined as discussed below.

An evaluation was performed to determine the impact of the "L" dimension deviation on the assembly and any potential mechanical interface problems. The results of this evaluation demonstrated that these assemblies can be used in the Millstone Unit No. 2 core without compromising any aspects of safety or engineering design requirements.

The UGB is much more restrictive than the core plate and is not meant to be an absolute go, no-go criterion for nozzle compatibility with the core plate. It was designed to perform a good envelope check. Therefore, the orientation of the fuel assembly is not crucial when performing the envelope check.

The fuel supplier designed and built a five-hole gauge which can be used to verify top nozzle compatibility with the core plate. Design calculations demonstrate that the as-built gauge will insure adequate clearance in all directions. Therefore, all assemblies which accept the five-hole gauge are suitable for use in the Millstone Unit No. 2 core. All assemblies to be used this cycle have passed the five-hole gauge clearance test.

There were four assemblies out of seventy two which would not pass the five-hole gauge; thus there was identified a potential for a slight mechanical interference fit between the upper core plate and the top nozzle. Since this condition was judged to be undesirable, the top nozzle posts of these assemblies were reworked at the vendor's facility so that they now all pass the five hole-gauge test.

The fuel supplier is presently reviewing their fabrication procedures so that the "L" dimension variations will be minimized in the future. In addition, the five-hole guage as described above will be a design requirement for subsequent reload fuel.

As noted above, there are no safety implications due to the variations in the assembly "L" dimension. All assemblies are acceptable for use since the five-hole gauge ensures that there will be adequate clearance between the nozzle posts and the upper core plate. All envelope checks have been completed satisfactorily.

In addition to the fuel assembly envelope check, NNECO performs a control element assembly (CEA) free path and end clearance check.

The on-site inspection of the Cycle 5 reload fuel indicated that most of the assemblies failed to meet the control rod to guide tube end clearance check due to a reduction on the clearance at the extreme bottom of the guide tubes. It should be noted that this condition does not mean that the CEA will meet interference during a trip, but rather indicates that measurements of the available clearance should be taken. Measurements were taken on every guide tube and it has been demonstrated that there is adequate clearance for CEA operation in all instances for the worst case conditions. Details of this condition are described below.

During the fabrication process, the bottom spacer grid sleeves are mechanically fastened to the guide tube end plugs. A small circumferential constriction of the guide tube/end plug resulted during the "swaging" process which caused the guide tube measurements to indicate a loss of clearance. An evaluation of the mechanical integrity of the affected fuel assemblies demonstrated that no detrimental effects resulted from this condition.

The fuel vendor has taken steps to prevent recurrence of the present condition. The lower end plug of the guide tube has been redesigned in order to provide additional clearance over and above the present design margin. In addition, this new design along with the applicable fabrication processes will preclude any future deformation in the guide tube/end plug assembly.

NNECO has determined that the actions described above represent an acceptable resolution to the conditions identified during the fuel receipt inspections at Millstone Unit No. 2. It has been determined that use of the Cycle 5 reload fuel does not present any safety concern.

We trust you find this information responsive to the Staff's concerns.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

W. G. Counsil

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Senior Vice President