MAINE YANKEE ATOMIC POWER COMPANY •

EDISON DRIVE
AUGUSTA, MAINE 04336
(207) 623-3521

September 28, 1982
MN-82-182 JHG-82-162

United States Nuclear Regulatory Commission
Washington, D. C. 20555

Attention: Office of Nuclear Reactor Regulation
Division of Licensing
Operating Reactor Branch #3
Mr. Robert A. Clark, Chief

References: (a) License No. DPR-36 (Docket No. 50-309)
(b) USNRC Letter to MYAPCo, dated July 8, 1982
(c) MYAPCo Letter to USNRC, MN-82-139, Maine Yankee Final Safety Analysis Report, dated July 7, 1982

Subject: CEA and Fuel Assembly Fretting Wear Inspections at Maine Yankee

Dear Sir:

This letter transmits Maine Yankee Atomic Power Company's response to your request for additional information, Reference (b), regarding CEA and fuel assembly fretting wear inspections at Maine Yankee.

We have herein addressed the questions raised and provided responses in conjunction with our Cycle 7 reload safety analysis report.

QUESTION 1

Fuel assembly guide tube sleeve fretting wear surveillance currently required (Ref. 1) by NRC may no longer be necessary because of favorable surveillance results obtained at Maine Yankee (e.g., Ref. 2) and other operating reactors. If future cycles of Maine Yankee will employ sleeved guide tubes in all fuel assemblies that are rodded, then NRC surveillance requirements might be relaxed if the licensee makes such a request and provides appropriate justification. (Of course, MYAPC may wish to continue use of limited numbers of unsleeved demonstration assemblies in rodded positions.) If surveillance relief is sought, the appropriate vehicle of request could be either an amendment to the Maine Yankee FSAR or a revision to the Maine Yankee Technical Specifications.

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RESPONSE:

The fuel assembly guide tube sleeves are now considered to be part of the standard Maine Yankee fuel assembly design. The FSAR, Reference (c), (Sec. 3.6.3.1) has been amended to reflect this change and includes a description of the CEA wear sleeve.

Based on previous sleeve performance, Maine Yankee requests the CEA guide tube sleeve inspection be discontinued.

QUESTION 2

If sleeved fuel assembly guide tubes are going to be used in rodded positions indefinitely (except for the possible use of a limited number of test assemblies), then in light of favorable fuel assembly guide tube sleeve wear surveillance, there might be no need to continue the fully withdrawn CEA programming (i.e., periodic repositioning of CEAs within the top 3-inch interval (4 steps) of CEA travel). If appropriately justified, we would consider a MYAPC request for a modification of the Maine Yankee Technical Specifications (i.e., page 3.10-1) to redefine the fully withdrawn CEA limit to be the original upper electrical limit. If the fully withdrawn CEA limit is to remain at the present 4-steps-in level, please continue to address the impact on safety analyses (e.g., peaking factors) in reload submittals.

RESPONSE:

Maine Yankee does not seek to modify the Technical Specifications to redefine the fully withdrawn CEA limit at this time primarily because of the workload involved in reanalysis and the timing with respect to Cycle 7 licensing. The fully withdrawn CEA limit will remain at the present 4-step-in level, and, as such, Maine Yankee will address the impact on safety analysis in the Cycle 7 reload submittal.

QUESTION 3

How are CEA cladding wear measurements at Maine Yankee performed? What is the accuracy of this method?

RESPONSE:

Wear measurements are performed using eddy current techniques and a C-E profilometry device. The eddy current method measures volume changes over the CEA finger and assumes that wear occurs over 180°. The profilmometer device measures actual wear depth and the system accuracy has been estimated by C-E at $\pm$ 0.0002 inches, diametral measurement.

QUESTION 4

What criteria are used to establish the degree of permissible CEA cladding wear? How are CEA lifetime predictions made? What is the confidence in these extrapolations? Has the CEA cladding wear rate increased after inclusion of the fuel assembly guide tube sleeves? If so, has this increased wear rate been accounted for in the predictions of minimum time to end of CEA life? If not, please provide such a reassessment.

RESPONSE:

The criteria used to establish the degree of permissible CEA cladding wear are the measured wear and the calculated strain. The strain calculations are based on hot cell test data, measured CEA finger ovality (caused by B_4C pellet swelling) and estimates derived from the known neutron fluence. The original design criteria were dependent on time-related or fluence-related performance.

CEA lifetime predictions were originally made using time and neutron fluence data. Lifetime predictions now include wear rates where known.

It is not clear that CEA wear increased when the guide tube sleeves were installed. However, it is possible that CEA wear would increase in the guide post region of C-E fuel assemblies because of the chrome plating on the installed sleeve. The wear rates from post-sleeving operation have been incorporated in predictions of minimum time to end of CEA life.

QUESTION 5

As reported in the Cycle 6 startup report (Ref. 2), the most worn CEA could reach the end of its useful lifetime in the next cycle of operation. Wear of this severity has not been reported by any other NSSS owner. Please describe the reason for the high rate of CEA wear in Maine Yankee.

RESPONSE:

Nineteen (19) of the eighty-five (85) CEA's present in the core were profiled after Cycle 5. Measured wear on the CEA fingers ranged between zero and ten mils. The predominant wear location was between fourteen and seventeen inches from the tip of the outside fingers. Most center fingers exhibited no wear. Six CEAs exhibited 6 mils or greater wear; the other CEAs showed approximately 5 mils or less. There was only one CEA at the high end of the measured range. This CEA could, but it is not necessarily expected to, require replacement at the end of the next cycle of operation.

There is not enough information available at this time to conclusively determine the reason for higher wear on this one CEA. An additional complication of the investigation is the fact that the CEA core location, fuel assembly location, and rotation have been varied from cycle to cycle.

QUESTION 6

What are the consequences of loss of CEA hermiticity? Other than during times of outage surveillance, when and how would perforated CEAs be detected? We understand that shutdown CEA banks are never subjected to worth or symmetry checks and that few of the 77 CEAs have ever been examined for fretting wear. Please comment.

RESPONSE:

Maine Yankee has not taken up the question of the consequences of CEA perforation or detectability of CEA perforation during operation in detail because we have neither experienced such performance nor do we expect to. As discussed below, our plans for the coming refueling include a comprehensive program to measure wear and use of the new information obtained to confirm our view of CEA performance.

QUESTION 7

What are the Cycle 7 outage plans for CEA wear inspections? Which CEAs will be examined (most life limited, duals, those never previously examined, those closest to outlet nozzles, all)? Please provide a description of the inspection program planned for the Cycle 7 outage.

RESPONSE:

Plans for CEA inspections during Cycle 7 outage call for eddy current examinations of all 77 CEAs which have been in service (the remaining 8 CEAs are new) and profilometry examinations of selected CEAs. The specific CEA types to be selected for profilometry examination have not been determined yet and will depend to a large extent on the results of the eddy current tests. CEAs will be selected for profilometry examination in an attempt to quantify wear rates and characteristics.

We trust this response is satisfactory. Should you have any further questions, please feel free to contact us.

Very truly yours,

MAINE YANKEE ATOMIC POWER COMPANY

John H Garrity

John H. Garrity, Senior Director
Nuclear Engineering & Licensing

JHG:pjp

cc: Mr. Ronald C. Haynes
Mr. Paul A. Swetland