YANKEE ATOMIC ELECTRIC COMPANY

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United States Nuclear Regulatory Commission
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References: (a) License No. DPR-3 (Docket No. 50-29)
(b) YAEC Letter to USNRC, dated July 31, 1986 (FYR 86-071)
(c) USNRC Letter to YAEC, dated December 1[illegible], 1986 (NYR 86-270)
(d) YAEC Letter to USNRC, dated January 2[illegible], 19[illegible] (FYR 87-11)
(e) USNRC Letter to YAEC, dated June 26, 1987 (NYR 87-124)

Subject: Incore Instrumentation System Technical Specifications

Dear Sir:

Pursuant to Section 50.90 of the Commission's Rules and Regulations, the Yankee Atomic Electric Company (YAEC) hereby requests the authorization to make the following changes:

Proposed Change

Reference is made to the Technical Specifications of License No. DPR-3 of the Yankee Nuclear Power Station. We propose to change the present Technical Specifications applicable for the remainder of Cycle 21 as follows:

1. Modify Specification 3.3.3.2 to allow for a change in the number of operable incore neutron detector thimbles required for operability.

2. Modify Specifications 4.2.1.2, 4.2.2.1, 4.2.2.2, and 4.2.3.2 to allow for increased uncertainty when less than 12 of the incore neutron detector thimbles are operable.

3. Modify Pages B3/4 2-2 and B3/4 2-3 to reflect the change in uncertainty to be applied to the measured peaking factor values where less than 12 of the neutron detector thimbles are operable.

Description of Change

The current Technical Specification (3.3.3.2) governing operability of the Incore Instrumentation System requires that a minimum of 12 neutron detector thimbles be operable with at least two per core quadrant whenever the system is used for core power distribution measurements. This proposed change reduces the minimum number of thimbles to nine and reduces the minimum number of thimbles per quadrant to one. In addition, the system measurement uncertainty applied to the measured power distribution parameters is increased to 8.0%. This is the appropriate uncertainty with less than 12 operable detector thimbles as determined from analysis of similar core designs and

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previously approved by the Commission. The similarity of these core designs to Cycle 21 is demonstrated in Attachment A. Exemptions to the current requirement were previously approved (References (c) and (e)) for a portion of Cycle 18 operation and for Cycle 19. This proposed change is similar to the Reference (b) and (d) submittals and would be applied only to Cycle 21 operation.

Reason for Change

At the end of Yankee Cycle 18, 13 movable detector thimbles were operable. During the Cycle 18/19 refueling outage, fixed detector strings were installed in six thimbles, increasing the total number of detector locations to 18. The performance of the fixed detectors was verified during Cycle 19 operation and licensed by the Commission for use in Cycle 20. At that time, Yankee's goal was to transition to increased use of the Fixed Detector System, with the ultimate goal of full conversion to fixed incore detectors. Plans for the Fixed Detector System have been delayed for two reasons: (1) suspected leakage in the primary seal of the fixed detectors; and (2) questions on the viability of installing detectors into the present instrumentation spire which may have a remaining useful life which is considerably shorter than the expected life of the fixed detectors. Yankee is continuing to work in these areas and is progressing towards a goal of a full Fixed Incore Detector System.

During the recent Cycle 20/21 outage, four movable incore detector thimbles were isolated, and two fixed detectors were required to be removed from service during spire repairs resulting in 12 detector thimbles available for meeting surveillance requirements. This corresponds to the minimum Technical Specification requirement for operability of that system.

Basis for Change

The proposed change allows the plant to operate with fewer detector thimbles while maintaining sufficient data collection capability to ensure that operation of the Yankee core remains within licensed limits. Increased uncertainty for fewer available thimbles provides conservative peak local power distribution parameters with very little change in the measured core power distribution. The Technical Specification modifications would be utilized only if additional failures of the neutron detector thimbles occur during Cycle 21 operation.

The Incore Instrumentation System is used to perform power distribution surveillance measurements to verify compliance with the power distribution limits of F_Q, $F_{\Delta H}$, and LHGR (kW/ft). Power distribution measurements are made approximately every 1,000 EFPH while at steady-state conditions, and also as part of power ascension startup testing. Previously, in Cycles 18 and 19, Technical Specification approval with a minimum of nine available neutron detector thimbles and one per core quadrant was granted once cycle operation was established and the core power distribution characteristics defined. This reduced number of thimbles is also sufficient for power distribution monitoring for the remainder of Cycle 21 operation, since the Cycle 21 power distribution is well characterized. The technical evaluations provided in References (b) and (d) are applicable to this proposed change.

The Yankee core is a small core which contains only 76 assemblies and employs a simple two-batch fuel management scheme. The loading pattern for Cycle 21 is similar to Cycle 20 and other previous core reloads. This results in similar core power distribution and peak local power distribution parameter values. Illustrations of this can be found in Attachment A. The assembly design and initial enrichment has changed only slightly from the previous cycles of operation. Furthermore, the consistency and accuracy of our analytical models versus measurement, shown in Attachment A for Core 20 and previous cycles, provides additional assurance of our ability to monitor the core power distribution and corresponding local peaking factors.

The ability to detect core misloading prior to core startup is not an issue for this proposed change. The possibility of core misloading has been eliminated due to core loading verification and successful results from zero power and power ascension physics testing. Verification of each assembly serial number identification has been performed for each assembly location including an independent review of the core videotaping. Acceptable measured to predicted core characteristics have also been demonstrated as part of our testing programs.

Yankee's capability to detect anomalies in the core during full power operation is maintained with this proposed change. A reduced number of available thimbles does not significantly change the ability of the Incore Instrumentation System to determine the core power distribution. In addition, sufficient alternate means which do not rely on the incore instrumentation system, are available for detection of any power distribution anomaly which might be present in the core. Given any indication of a possible anomaly, the use of incore thermocouple data, excore detector signals, and loop temperature indications are available in addition to the monthly incore flux maps.

Safety Consideration

This change is requested in order to provide flexibility in plant operation with sufficient data gathering capability to ensure operation within licensed limits. As such, this proposed change would not:

1. Involve a significant increase in the probability or consequences of an accident previously evaluated. This change increases the measurement uncertainty for a reduced complement of operable incore neutron detector thimbles. Therefore, the change cannot increase the probability or consequences of an accident, as the core will continue to be adequately monitored.

2. Create the possibility of a new or different kind of accident from any previously analyzed. This modification increases the measurement uncertainty for a reduced number of operable incore neutron detector thimbles. Therefore, it does not create the possibility of a new or different kind of accident since it does not modify plant operation or components.

3. Involve a significant reduction in a margin of safety. This modification of increasing the measurement uncertainty for a reduced

complement of operable incore neutron detector thimbles adds sufficient margin to the power distribution measurements such that this change does not impact the safety margins which currently exist. Thus, this change does not involve a significant reduction in a margin of safety.

Based on the consideration contained herein, it is concluded that there is reasonable assurance that operation of the Yankee plant, consistent with the proposed Technical Specifications, will not endanger the health and safety of the public. This proposed change has been reviewed by the Plant Operations Review Committee and the Nuclear Safety Audit and Review Committee.

Schedule of Change

These changes to the Yankee Technical Specifications will be implemented upon Commission approval. A timely review and approval of this submittal would be appreciated.

We trust that you will find this submittal satisfactory; however, should you desire additional information, please contact us.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

J. K. Thayer

J. K. Thayer
Vice President/Manager of Operations

JKT/mma/WPP42/12
Attachments
cc: USNRC Region I
USNRC Resident Inspector, YNPS

COMMONWEALTH OF MASSACHUSETTS)
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WORCESTER COUNTY)

Then personally appeared before me, J. K. Thayer, who, being duly sworn, did state that he is a Vice President/Manager of Operations of Yankee Atomic Electric Company, that he is duly authorized to execute and file the foregoing document in the name and on the behalf of Yankee Atomic Electric Company and that the statements therein are true to the best of his knowledge and belief.

H. D. Sammarco

H. D. Sammarco Notary Public
My Commission Expires November 7, 1991