

UNITED STATES OF AMERICA
 NUCLEAR REGULATORY COMMISSION

In the Matter of)
 MAINE YANKEE ATOMIC POWER COMPANY) Docket No. 50-309
 (Maine Yankee Atomic Power Station))

TERMINATION OF ORDER TO SHOW CAUSE

I.

The Maine Yankee Atomic Power Company (the licensee) is the holder of Facility Operating License No. DPR-36 which authorizes operation of the Maine Yankee Atomic Power Station (the facility) at power levels up to 2630 megawatts thermal (rated power). The facility, which is located at the licensee's site in Lincoln County, Maine, is a pressurized water reactor used for the commercial generation of electricity.

II.

Because certain safety related piping systems at the facility had been designed and analyzed with a computer code which incorrectly summed earthquake loads algebraically, the potential existed for compromising the basic defense in depth provided by redundant safety systems in the event of an earthquake. This compromising resulted from the possibility that an earthquake of the type that the plant must be designed for, could, cause a pipe rupture as well as degrade emergency cooling systems designed to mitigate such an accident. Therefore, by Order of the Director of Nuclear Reactor Regulation (the Director) for the Nuclear Regulatory Commission (NRC), dated March 13, 1979 (44 FR 16506, March 19, 1979), the licensee was ordered to show cause:

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- (1) Why the licensee should not reanalyze the facility piping systems for seismic loads on all potentially affected safety systems using an appropriate piping analysis computer code which does not combine loads algebraically;
- (2) Why the licensee should not make any modifications to the facility piping systems indicated by such reanalysis to be necessary; and
- (3) Why facility operation should not be suspended pending such reanalysis and completion of any required modifications.

In view of the importance to safety of this matter, the Order was made immediately effective and the facility was required to be placed in the cold shutdown condition and remain in that mode until further Order of the Commission.

III.

The facility is currently in the cold shutdown condition. Pursuant to the March 13, 1979 Order, the licensee filed a written answer to the Order by letter dated April 2, 1979. In this response the licensee stated that it has reanalyzed all potentially affected safety systems for seismic loads using an appropriate method which does not sum loads algebraically and these reanalyses indicate that two piping restraints needed to be modified to account for base plate flexibility. These modifications have been completed. Technical

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support for these conclusions was provided in the "Interim Report by Stone & Webster, April 1, 1979", "Containment Spray Piping Analysis of Pipe Supports H-51 and H-53, April 2, 1979", and the licensee's submittals dated April 3, 12, 13, 19, 27 and May 2, 4, 5, 15 and 18, 1979. Based on the above, the licensee concludes there is no basis for continued suspension of facility operation as contemplated by the Order, and proposes:

- (1) That the Director modify or rescind so much of his Order of March 13, 1979, as requires the continued shutdown of the facility.
- (2) That the Director grant to the licensee such other and further relief as is proper in the circumstances.

The NRC staff has reviewed the licensee's submittals. This review included an evaluation of the codes which compute pipe stresses resulting from the facility's response to an earthquake. The means by which piping responses are combined in the codes that are currently a basis for the facility design are summarized below:

NUPIPE-SW

This code combines intramodal* responses by the square root of the sum of the squares (SRSS) and combines intermodal* responses by SRSS or absolute sum for closely spaced modes.

*Modes are defined as dynamic piping deflections at a given frequency. Intramodal responses are the components of force, moment and deflection within a mode. Intermodal responses are the components of force, moment and deflection for all modes.

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PSTRESS/SHOCK 3

In this code the intramodal responses are calculated by adding the absolute value of the responses due to the vertical earthquake component to the root-mean-square of the responses due to the two horizontal earthquake components. The intermodal components are calculated by the root-mean-square method.

PSTRESS/SHOCK 1

One of four versions of this code was reviewed. In this version the largest modal response is added (absolute sum) to the root-mean-square value of all other modal responses. Intramodal responses due to multi-directional earthquake excitation were not calculated since the code only produced responses parallel to a given earthquake component excitation.

Because this code is not equivalent to current practice, the NRC staff requested that the licensee demonstrate the conservatism of pipe stress as determined by this code. This was done by reanalysis of certain piping systems using currently acceptable methods.

STRU DL-SHAKE

This code combines intramodal responses by absolute sum and the intermodal responses by SRSS.

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The NRC staff has determined that an algebraic summation of responses was not incorporated into any of the above listed codes. The NRC staff has further concluded that these codes provide an acceptable basis for the facility piping design.

Modifications of two piping supports (H-51, H-53) for the containment spray system were determined to be necessary as a result of the re-analysis. The modifications consisted of welding two stiffeners to each support base plate to reduce the base plate flexibility. The modifications were completed in accordance with the Yankee Operational Quality Assurance Program (YOQAD-1A) and are acceptable.

Based on the NRC staff's Safety Evaluation dated May 24, 1979, the staff finds that, in accordance with the Order of March 13, 1979, the licensee has reanalyzed all potentially affected safety systems using an appropriate piping analysis which does not combine loads algebraically and has made those modifications to the facility piping systems indicated by such reanalysis to be necessary.

The licensee's answer to the Order did not request a hearing. The New Hampshire Legislative Utility Consumers' Council petitioned on April 2, 1979, to be permitted to intervene in any proceeding which might arise from the Show Cause Order, but did not request a hearing. No other person requested a hearing.

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IV.

Accordingly, pursuant to the Atomic Energy Act of 1954, as amended, and the Commission's Rules and Regulations in 10 CFR Parts 2 and 50, IT IS DETERMINED THAT: The public health, interest or safety does not require the continued shutdown of the facility, AND IT IS HEREBY ORDERED THAT:

Effective this date the Order to Show Cause of March 13, 1979, and the proceeding thereon are terminated.

FOR THE NUCLEAR REGULATORY COMMISSION



Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Dated at Bethesda, Maryland
this 24th day of May 1979.

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