



MAINE YANKEE ATOMIC POWER COMPANY •

ENGINEERING OFFICE

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WMY 79-68

July 5, 1979

United States Nuclear Regulatory Commission
Office of Inspection and Enforcement
Region I
King of Prussia, Pennsylvania

Attention: Mr. Boyce H. Grier, Director

References: (a) License No. DPR-36 (Docket No. 50-309)
(b) USNRC Letter to MYAPC dated March 8, 1979.
I & E Bulletin 79-02
(c) USNRC Letter to MYAPC dated June 21, 1979
I & E Bulletin 79-02, Revision 1

Dear Sir:

Subject: Response to I&E Bulletin No. 79-02, Revision 1

Upon receipt of the subject I&E Bulletin a three part effort was begun by Maine Yankee to address your concerns:

- a. A program is underway to develop a generic base plate flexibility computer analysis.
- b. Plans to re-analyze base plate stresses and anchor bolt applied loads were initiated.
- c. A program for inspection of a sample population of drilled-in anchor bolts at Maine Yankee was initiated.

The following explanation of our actions are presented in the same sequence as your bulletin:

1. Since base plate flexibility was not considered in the Maine Yankee design we have undertaken a program to develop a finite element computer program which accounts for flexibility in the existing base plates. This program will produce anchor bolt plate stresses and deflections which result from applied loads, shears, moments and the effect of the stiffness of the base plate and attached structure.

The analytical model used in this analysis employs a finite

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element, three dimensional mesh assuming linear elastic steel to model the base plate. Tension only, one dimensional axial, non-linear elements are used to represent the bolts; and compression only, non-linear axial elements are used to model the concrete behind the base plate.

All Seismic Category I Piping at Maine Yankee will be reanalyzed with new response spectra inputs to modern computer codes as part of our commitment resulting from the March 13, 1979 order to show cause relative to seismic piping. Pipe hanger loads resulting from these analyses will be used as inputs to the base plate reanalysis effort. Meanwhile existing support and drawing compatibility are being verified in preparation for the re-analysis program.

2. Original design loads for seismic piping support anchor bolts at Maine Yankee were predicated on the recommendations of the anchor bolt manufacturer. These values are supported by the manufacturers' test program. Properly installed drilled-in anchor bolts used at Maine Yankee develop the ultimate loads originally published. The factor of safety recommended by the manufacturers of all drilled-in anchor bolts in use at Maine Yankee is four. In other words the ultimate load, verified by the manufacturers test program, is four times the design load. If testing justifies a change in the ultimate load our design load will change by the four to one factor of safety but the factor itself is an arbitrary value equally applicable to all equipment. We, therefore, see no way to justify the use of two factors of safety for one type of equipment. We will, for these reasons, continue to use the manufacturers recommended factor of safety of four for all drilled-in anchor bolts.

The ultimate capacity of the bolts will include the effects of shear and tension interaction, proper edge distance and spacing.

3. To prevent the application of high cyclic loading on drilled-in anchor bolts at Maine Yankee our test program is designed to verify that a pre-tension equal to the bolt design load exists in each anchor bolt. Manufacturers test data indicates that this installation procedure develops the full tension and shear

capability and assures little to no cycling of anchor bolt loads.

4. Sufficient QC documentation does not exist at Maine Yankee to assure correct installation. A testing program has been initiated to accomplish this. This program provides for testing a randomly selected sample of drilled-in anchor bolts. Testing consists of first verifying that the number, size (diameter), type, location and length (embedment depth) of the bolts meet the drawing requirements. The bolts are then torqued to an equivalent tensile value equal to the bolt design load. The relationship of torque to tension is being verified by on site testing. A test is also made at this time to assure that anchor bolt shells and leveling nuts are not in contact with the back side of the base plate. The testing program has shown thus far no failures of any anchor bolts. Furthermore, since anchor bolts are used for deadweight anchors as well as seismic restraints, and have not shown a history of failures even though they have been under constant load since their installation; we feel that initial correct installation has been amply demonstrated. In the event a review of the applied loads (from the results of the re-analysis) indicates any value in excess of the design load for any bolt, a design adjustment and modifications to the structure will be made to rectify any inadequacies.

A large majority of the 2 ½ inch diameter and smaller pipes at Maine Yankee were analyzed by the chart method which has been shown to be very conservative. Visual inspection of the supports for these pipes will be conducted. If no failures or incorrect installation of the drilled-in anchor bolts for these pipes is noted by this method, no further action will be undertaken. Any failure to meet our inspection requirements will require the inclusion of these piping supports into our sampling and testing program. They would then be required to meet the requirements of that program.

5. Anchor bolt testing at Maine Yankee is complete. No failed or improperly installed anchor bolts have been found. In conclusion we believe that Maine Yankee has demonstrated a total adequacy in the design and installation of seismic piping restraints and their anchor bolts. Recent test results revealed no failures of dead load supports, due in part to the known conservatism in design demonstrated in the piping stress analysis review this past spring. Our continuing analytical program will verify this adequacy.

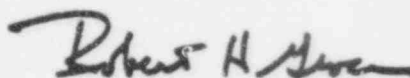
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We feel certain the above answers your concerns on this subject, however, if you require further information, please contact us at your convenience.

Sincerely,

MAINE YANKEE ATOMIC POWER COMPANY



Robert H. Groce
Licensing Engineer

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