

NORTHEAST UTILITIES



THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 665-5000

September 30, 1993

Docket No. 50-336
B14633

Re: NRC Bulletin 88-11

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Gentlemen:

Millstone Nuclear Power Station, Unit No. 2
Response to NRC Staff Request for Additional Information on
"Pressurizer Surge Line Thermal Stratification Evaluation"

On December 20, 1988,⁽¹⁾ the NRC Staff issued Bulletin No. 88-11, "Pressurizer Surge Line Thermal Stratification." The Bulletin directed licensees to perform inspections and analyses to determine if pressurizer surge line (PSL) are subject to previously unanalyzed stresses from thermal stratification and thermal striping which may reduce the life of the surge line, and to take appropriate measures.

By letter dated February 28, 1989,⁽²⁾ Northeast Nuclear Energy Company (NNECO) responded to NRC Bulletin 88-11 on behalf of Millstone Unit No. 2. The response indicated the program in place to address the above issues, its schedule, and justification for that schedule. Also, NRC Bulletin 88-11 encouraged licensees to collectively address the noted concerns. Millstone Unit No. 2 was considered in the Combustion Engineering Owners' Group (CEOG) engineering analyses to evaluate pressurizer surge line thermal stratification in response to NRC Bulletin 88-11.

- (1) Nuclear Regulatory Commission Bulletin No. 88-11: "Pressurizer Surge Line Thermal Stratification," dated December 20, 1988.
- (2) E. J. Mroczka letter to the U.S. Nuclear Regulatory Commission, "NRC Bulletin No. 88-11 Pressurizer Surge Line Thermal Stratification," dated February 28, 1989.

The CEOG, by reports CEN-387-P, Revision 0 and 1, "Pressurizer Surge Line Flow Stratification Evaluation,"⁽³⁾ performed an analysis to demonstrate integrity of the pressurizer surge lines in view of the occurrence of thermal stratification during the 40-year service life. The NRC Staff and its consultant reviewed the CEOG Report CEN-387-P and concluded that the CEOG analysis adequately demonstrated that the bounding surge lines and nozzles meet the ASME Code and fatigue requirements for the 40-year design life of the facility considering the phenomenon of thermal stratification and thermal striping. The results of the NRC Staff safety evaluation on the above issue were transmitted to NNECO by letter dated July 6, 1993.⁽⁴⁾

In addition, as part of the NRC Staff safety evaluation, Millstone Unit No. 2 was requested to provide additional information verifying the applicability of the CEOG bounding analysis in CEN-387-P, Revision 1. Also, we were requested to include a confirmation that all actions required by NRC Bulletin 88-11, including the updating of the plant-specific stress and fatigue analyses required by Action 1.d, have been completed. This letter serves to provide the NRC Staff with the necessary information on these issues. Each of these issues is addressed as follows:

I. Verification of CEOG Bounding Analysis

NNECO has evaluated the CEOG bounding analysis in CEN-387-P, Revision 1, for applicability to Millstone Unit No. 2. This verification was based on the following criteria:

A. Verification of Loads

The loads used in the CEOG bounding analysis are equal to or greater than the loads reported in the applicable Combustion Engineering (CE) Specifications for Millstone Unit No. 2. This has been demonstrated for Millstone Unit No. 2 by a Northeast Utilities

(3) Combustion Engineering Owners Group Report CEN-387-P, Revision 1, "Pressurizer Surge Line Flow Stratification Evaluation," dated December 1991.

(4) U.S. Nuclear Regulatory Commission letter to J. F. Opeka regarding Safety Evaluation for Combustion Engineering Owners Group Report CEN-387-P, Revision 1, "Pressurizer Surge Line Thermal Stratification Evaluation," (Bulletin 88-11), dated July 6, 1993.

Service Company (NUSCO) calculation⁽⁵⁾. Therefore, the loads used in the CEOG analysis are considered to be bounding for Millstone Unit No. 2.

B. Verification of Temperature Differential

The CE analysis assumed the temperature differential between the reactor coolant system hot leg and the pressurizer was less than 340°F. The heatup and cooldown log from August 1993, supports the conservatism in the CE assumptions. The largest temperature differential noted during this period was 250°F.

C. Verification of Support Deflections

The ability of the PSL supports to accommodate the thermal stratification deflections was reported in CEOG Report CEN-NPSD 546-P, Revision 1, "Pressurizer Surge Line Flow Stratification Evaluation."⁽⁶⁾ Subsequently, NNECO has performed an internal evaluation which has verified the ability of the PSL supports to accommodate thermal stratification deflections.

D. Surge Line Piping Check

The only piping connected to the surge line is the 0.75" diameter sample system piping. The small diameter and relatively thick walls of piping of this size tend to promote thermal conduction around the circumference of the pipe. Therefore, the susceptibility of the pipe to thermal stratification is reduced. In addition, this small piping tends to be flexible and therefore more tolerant of temperature gradients than larger lines. For these reasons, the sample system line connected to the surge line is not considered to be susceptible to stratified flow. Because of its relative flexibility, it is capable of accommodating the deflection due to thermal stratification without exceeding the corresponding codes stress allowable.

Conclusion

Based on a review of the CEOG bounding analysis, NNECO has determined that CEN-387-P, Revision 1, is applicable to Millstone Unit No. 2.

-
- (5) Northeast Utilities Service Company Calculation MP2-LOE-380-EM, Revision 0, "MP2: Pressurizer Surge Line Analysis Considering Thermal Stratification," dated September 17, 1993.
- (6) Combustion Engineering Owners Group Report CEN-NPSD 546-P, Revision 1, "Pressurizer Surge Line Flow Stratification Evaluation," dated December 1991.

II. Completion of Actions Identified by NRC Bulletin 88-11

NNECO has reviewed the actions of NRC Bulletin 88-11 to confirm that all actions have been completed. A listing of these actions along with confirmation of completion is as follows:

A. Action 1.a, Visual Inspection

A visual inspection of the PSL was performed on February 8, 1989, as detailed in the February 28, 1989, submittal. No indications of discernible distress or structural damage were observed.

B. Action 1.b, Surge Line Code Compliance

The CEOG bounding generic analyses showed that all ASME requirements were met and that shakedown was demonstrated. In addition, a fatigue life in excess of 40 years was demonstrated.

C. Action 1.c, Bounding Analysis Review

Action 1.c is required if the plant-specific or generic bounding analysis did not meet the requirements of Action 1.b. However, action 1.b was effectively demonstrated. Therefore, action 1.c is not applicable.

D. Action 1.d, Update Plant Stress and Fatigue Reports

The plant-specific stress and fatigue reports were updated by NNECO for Millstone Unit No. 2 in the NUSCO calculation cited in footnote 5, at the bottom of page 2.

E. Action 2, Applicants for PWR Operating Licenses

Action 2 is directed to all applicants for PWR Operating Licenses. Millstone Unit No. 2 has an operating license therefore, this action is not applicable.

F. Action 3, Documentation of Program

As requested by Action 3, records have been generated to document the development and implementation of the program requested by Action 1 above. The Millstone Unit No. 2 plant-specific stress and fatigue analyses have been updated to reflect the program requested by Action 1 in the previously cited NUSCO calculation. In addition, these records are maintained in accordance with 10 CFR Part 50, Appendix B and plant procedures.

U.S. Nuclear Regulatory Commission
B14633/Page 5
September 30, 1993

Conclusion

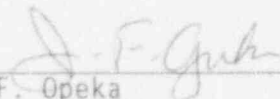
In response to the NRC Staff safety evaluation on PSL thermal stratification, NNECO hereby confirms that all actions required by NRC Bulletin 88-11 have been completed.

A response due date of September 10, 1993, was requested in the NRC Staff safety evaluation on PSL Flow Stratification. However, this schedule was verbally discussed with the NRC Staff and a revised response submittal of September 30, 1993, was found mutually agreeable.

If you should have any further question please contact us.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY



J. F. Opeka
Executive Vice President

cc: T. T. Martin, Region I Administrator
G. S. Vissing, NRC Project Manager, Millstone Unit No. 2
P. D. Swetland, Senior Resident Inspector, Millstone Unit
Nos. 1, 2, and 3