January 19, 2001

Mr. R. G. Lizotte
Master Process Owner - Assessment
c/o Mr. David A. Smith
Northeast Nuclear Energy Company
P. O. Box 128
Waterford, CT 06385-0128

SUBJECT: SAFETY EVALUATION FOR RELIEF REQUEST ASSOCIATED WITH ASME CODE REPAIR REQUIREMENTS FOR ASME CLASS 3 SERVICE WATER SYSTEM PIPING, MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2 (TAC NO. MA9975)

Dear Mr. Lizotte:

By letter dated September 14, 2000, as supplemented on November 8, 2000, you submitted a request for relief from the American Society of Mechanical Engineers (ASME) Code Section XI requirements. Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g)(6)(i), you requested relief to make interim repairs on a through-wall pinhole leak located in the service water system discharge piping supply line to a 480 volt vital switchgear room cooler.

We have evaluated your request and determined that compliance with code requirements is impractical, and your analytical methods and results meet the intent of Generic Letter (GL) 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping." The staff has determined that granting of relief where Code requirements are impractical is authorized by law and will not endanger life or property, or the common defense and security and is otherwise in the public interest giving due consideration to the burden upon the licensee that would result if the requirements were imposed on the facility. Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), relief is granted through the next refueling outage, scheduled for March 2002.

The U.S. Nuclear Regulatory Commission (NRC) staff's evaluation and conclusions are contained in the Enclosure. Contact the NRC Project Manager, Jacob Zimmerman at (301) 415-2426 if you have any questions. This completes the staff's effort on TAC No. MA9775.

Sincerely,

/RA/ Victor Nerses for

James W. Clifford, Chief, Section 2
Project Directorate I
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-336

Enclosure: Safety Evaluation

cc w/encl: See next page

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Docket No. 50-336
Enclosure: Safety Evaluation
cc w/encl: See next page
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

ASSOCIATED WITH REQUEST FOR RELIEF FROM ASME CODE REPAIR REQUIREMENTS

FOR CLASS 3 SERVICE WATER SYSTEM PIPING

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

NORTHEAST NUCLEAR ENERGY COMPANY

DOCKET NUMBER 50-336

1.0 INTRODUCTION

By letter dated September 14, 2000, and supplemented by letter dated November 8, 2000, Northeast Nuclear Energy Company (the licensee) requested relief from the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (the Code), Section XI requirements regarding repair to a leak in a Class 3, moderate energy pipe at Millstone Unit 2. The leak was detected in a 2-inch nominal pipe size service water (SW) system supply to the vital switchgear cooling coil X-181B. The SW system has a design temperature of 100 °F and pressure of 100 psig. The pipe material is B466 Copper-Nickel, and the nominal wall thickness of the pipe is 0.156 inch.

An ultrasonic test (UT) examination at the leak location revealed that the flaw is a through-wall pin hole about 0.25 inch surrounded by a degraded area approximately 2.0 inches in diameter and 0.1 inch in thickness. The licensee attributed the leak to erosion/corrosion types of failure which resulted from localized eddies in the flow stream.

Although the flaw can be isolated, a plant shutdown would be required to perform the permanent repair through welding in the Vital Switchgear Room, where welding is not allowed in this room in Modes 1 through 4. Therefore, the licensee considered the on-line repair of the SW piping not practical.

Based upon the above, the licensee submitted a relief request in accordance with the provisions of Generic Letter (GL) 90-05, "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2, and 3 Piping." The licensee requested relief until a Code repair can be performed during the next refueling outage scheduled to begin in March 2002.

2.0 DISCUSSION AND EVALUATION

Title 10 of the *Code of Federal Regulations* (10 CFR), Section 50.55a(g), requires nuclear power facility piping and components to meet the applicable requirements of Section XI of the Code.

This section of the Code specifies Code-acceptable repair methods for flaws that exceed Code acceptance limits in piping that is in service. A Code repair is required to restore the structural integrity of flawed Code piping, independent of the operational mode of the plant when the flaw is detected. Those repairs not in compliance with Section XI of the Code are non-Code repairs.

In some circumstances the required Code repair may be impractical unless the facility is shut down. In such cases, the Commission may evaluate determinations of impracticality and may grant relief and impose alternative requirements pursuant to 10 CFR 50.55a(g)(6)(i). GL 90-05 provides guidance to the staff for evaluating relief requests submitted by licensees for temporary non-Code repairs to Code Class 3 piping.

On November 7, 1991, the Commission issued GL 91-18, "Information to Licensees Regarding NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability." This generic letter and the NRC Inspection Manual Part 9900 provided detailed discussions of specific operability determinations, one of which was operational leakage. In this regard, Section 6.15 of Part 9900 states the following:

> Upon discovery of leakage from a Class 1, 2, or 3 component pressure wall (i.e., pipe wall, valve body, pump casing, etc.) the licensee should declare the component inoperable. The only exception is Class 3 moderate energy piping as discussed in Generic Letter 90-05. For Class 3 moderate energy piping, the licensee may treat the system containing the through-wall flaw(s), evaluated and found to meet the acceptance criteria in Generic Letter 90-05, as operable until relief is obtained from the NRC.

The licensee has evaluated the flaw in accordance with GL 90-05. The licensee has used the "through-wall flaw" approach of the GL for the pin hole area of the SW pipe. The flaw is assumed to be 0.5 inches long, and the pipe wall is assumed conservatively to be 0.09 inch based on the UT data. The licensee calculated the applied stress intensity factor due to the combination of deadweight, pressure, thermal expansion, and seismic loading to be 8.7 ksi$\sqrt{in}$. The licensee estimated the fracture toughness to be 67.5 ksi$\sqrt{in}$., which was derived empirically from the allowable 135 ksi$\sqrt{in}$. suggested in GL 90-05 for stainless steel, reduced by the ratio of yield stress of copper-nickel versus stainless steel. Since the applied stress intensity factor is less than the fracture toughness (with a safety factor of 7.75), the licensee concluded that the structural integrity of the SW system is adequate for continued operation of the unit until the next refueling outage scheduled to begin in March 2002.

The staff reviewed the licensee's evaluation, and, except for the fracture toughness assumed for the piping material, confirmed that the evaluation conformed to the guidance of GL 90-05. Due to the lack of fracture toughness data for copper-nickel alloys in the literature, the staff cannot accept the licensee's empirical approach in estimating the fracture toughness value for the alloy. However, since copper-nickel alloys are very unlikely to be more brittle than ferritic steel, the staff considers it conservative to assume that the fracture toughness for the copper-nickel alloy is 35 ksi$\sqrt{in}$., which is suggested in GL 90-05 for ferritic steel. Using this conservatively assumed fracture toughness, the safety factor becomes 4.02, which still satisfies the guidance of GL 90-05. Hence, the staff agrees with the licensee's conclusion that the structural integrity of the SW system is adequate for continued operation of the Unit until the next refueling outage, scheduled for March 2002.

The licensee installed a rubber patch over the hole using clamps to stop the leakage from the SW pipe pin hole for housekeeping purposes. In accordance with the guidance in GL 90-05 the licensee:

- analyzed the issues of flooding, water spraying on other equipment, and loss of flow and found them to be insignificant to the operation of the SW system;
- performed an augmented UT inspection on five locations of SW piping having similar characteristics to the flawed line (this inspection did not reveal any other degraded areas); and
- proposed to perform periodic augmented UT inspections every 3 months.

Further, GL 90-05 recommends a walkdown frequency for leak monitoring at least every week. In their September 14, 2000, letter, the licensee stated that the operations personnel walkdown frequency for leak monitoring is at least twice per 12-hour shift.

3.0 CONCLUSION

The staff has reviewed the licensee's request for relief and finds that the licensee's analytical methods and results meet the guidance of GL 90-05, except for the fracture toughness assumed for the piping material. The staff performed a confirmatory calculation using a fracture toughness for the copper-nickel alloy of 35 ksi$\sqrt{in.}$, which is suggested in GL 90-05 for ferritic steel. Using this conservatively assumed fracture toughness, the safety factor becomes 4.02, and satisfies the guidance of GL 90-05. However, the staff agrees with the licensee's conclusion that the SW system is adequate for continued operation of the Unit until the next refueling outage, scheduled for March 2002.

Further, the staff finds that performing a Code repair on the leaking SW system piping while the Unit is operating is impractical. The staff concludes that the granting of relief where Code requirements are impractical and imposing alternative requirements is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest, giving due consideration to the burden upon the licensee and facility that could result if the Code requirements were imposed on the facility. Pursuant to 10 CFR 50.55a(g)(6)(i) and consistent with the guidance in GL 90-05, relief is granted through the next refueling outage scheduled to start in March 2002.

Principal Contributor: S. Sheng

Date: January 19, 2001