UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR THE USE OF ALTERNATE MATERIALS

FOR NON-ASME CODE REPLACEMENT

NORTHEAST NUCLEAR ENERGY COMPANY

MILLSTONE NUCLEAR POWER STATION, UNIT 3

DOCKET NO. 50-423

1.0 INTRODUCTION

By letter dated May 1, 1992, Northeast Nuclear Energy Company, the licensee requested relief from the ASME Code Section XI, Article IWA 7000 requirements for the replacement of a leaking expansion joint with a non-ASME Code, alternate material. The leaking expansion joint 3SWP*EJ6C is located in an 8-inch service water line at the outlet nozzle of the "A" Emergency Diesel Generator (EDG) jacket water cooler for Millstone Unit No. 3.

The expansion joint (bellows) is fabricated from monel. The cause for failure is attributed to crevice corrosion and/or microbiological initiated corrosion (MIC) that resulted in pits through the monel bellows. This is a plausible failure cause since the line conveys seawater and may experience low flow or no flow for significant time periods.

The licensee proposes to temporarily replace the leaking expansion joint with a reinforced rubber joint until a permanent replacement incorporating Code acceptable material (Inconel 625 bellows) is procured.

Relief from the Code requirements was requested under the provisions of Generic Letter 90-05, "GUIDANCE FOR PERFORMING TEMPORARY NON-CODE REPAIR OF ASME CODE CLASS 1, 2, AND 3 PIPING." Since the component in question is not addressed within the bounds of Generic Letter 90-05, relief was not considered under those guidelines. However, the staff finds the licensee's analysis, based largely on considerations and methods contained within the Generic Letter, to be adequate and consistent with good engineering practice and acceptable for consideration under the provisions of 10 CFR 50.55a(a)(3).

2.0 DISCUSSION

Corrosion by seawater is an ongoing and significant cause of service water system problems throughout the industry. Frequently, the problem is rooted in the selection of materials made at the time of the original design and construction of the systems. The staff recognizes that the ASME Code does not adequately address corrosion engineering principles in the design of power

plants. Code materials are frequently not optimum or even apropriate choices from the corrosion resistance standpoint. The staff recognizes these limitations and is aware of numerous alternative materials possessing superior seawater corrosion resistance combined with other desirable engineering properties. Because these materials are not included in the appropriate section(s) of the ASME Code, their use in safety related systems require prior NRC review and approval pursuant to 10 CFR 50.55a(a)(3).

The licensee has proposed, as a temporary replacement, a reinforced rubber expansion joint. The joint is constructed of polyester and steel reinforced chlorobutyl rubber. Burst pressure is four times design pressure. Design pressure of the rubber joint is 150 psig versus 100 psig design pressure for the monel joint. Design temperature of the rubber joint is 250 degrees F, compared to 95 degrees F design and operating temperature for the monel joint.

Seawater has no adverse effects on chlorobutyl rubber. In the absence of aggressive chemical agents, aging of the rubber occurs primarily as a result of time and temperature. The effects from aging reduces the rubber's elasticity along with the gradual formation of a network of cracks. Failure is expected to be by leakage through the crack network. The reinforcing steel and polyester strands inhibit burst failures.

Seismic analysis of the service water system (performed by the licensee), incorporating the lower stiffness of the rubber joint (as compared to the monel joint) shows adequate system response.

The staff concludes that the engineering assessment and related industry experience gives reasonable assurance of the structural adequacy of the rubber joint to maintain pressure boundary integrity.

3.0 CONCLUSION

The staff has determined that the design parameters and system interactions will be satisfied by the proposed temporary substitution of a rubber expansion joint in place of the existing monel expansion joint. This substitution will not endanger the public health and safety. Pursuant to 10 CFR 50.55a(a)(3), the staff finds the use of a rubber expansion joint between the service water outlet nozzle from the "A" EDG jacket water cooler to the system piping at Millstone Unit No. 3 an acceptable alternative to the ASME Code allowed joint. Use of the rubber expansion joint shall be limited to a time period equal to the lesser of: (1) the Manufacturer's minimum stated service life of 5 years, or (2) the time remaining in the current Unit 3, Code Section XI, 10 year ISI interval. After the shorter of these two intervals, the licensee shall replace the rubber expansion joint with a Code acceptable joint, or, apply to the NRC for approval for the installation of a new reinforced rubber expansion joint. Use of such a joint would be limited to the appropriate time period.

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Date: June 9, 1989