UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REQUEST FOR APPROVAL TO REPAIR FLAWS IN ACCORDANCE WITH GENERIC LETTER 90-05

FOR ASME CODE CLASS 3 SERVICE WATER PIPING

VIRGINIA ELECTRIC AND POWER COMPANY

NORTH ANNA POWER STATION, UNITS 1 AND 2

DOCKET NOS. 50-338 AND 50-339

1.0 INTRODUCTION

10 CFR 50.55a(g) requires nuclear power facility piping and components to meet the applicable requirements of Section XI of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (hereafter referred to as the Code). Section XI 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. However, the implementation of required Code (weld) repairs to ASME Code Class 1, 2 or 3 systems is often impractical for nuclear licensees since the repairs normally require an isolation of the system requiring the repair, and often a shutdown of the nuclear power plant.

Alternatives to Code requirements may be used by nuclear licensees when authorized by the Director of the Office of Nuclear Reactor Regulation if the proposed alternatives to the requirements are such that they are shown to provide an acceptable level of quality and safety in lieu of the Code requirements [10 CFR 50.55a(a)(3)(i)], or if compliance with the Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety [10 CFR 50.55a(a)(3)(ii)].

A licensee may also submit requests for relief from certain Code requirements when a licensee has determined that conformance with certain Code requirements is impractical for its facility [10 CFR 50.55a(g)(5)(iii)]. Pursuant to 10 CFR 50.55a(g)(6)(i), the Commission will evaluate determinations of impracticality and may grant relief and may impose alternative requirements as it determines are authorized by law.

ENCLOSURE

Generic Letter (GL) 90-05, entitled "Guidance for Performing Temporary Non-Code Repair of ASME Code Class 1, 2 and 3 Piping," and dated June 15, 1990, provides guidance for the staff in evaluating relief requests submitted by licensees for temporary non-Code repairs of Code Class 3 piping. The staff uses the guidance in GL 90-05 as its criteria for making its safety evaluation of relief requests for temporary non-Code repairs of Code Class 3 piping.

2.0 BACKGROUND

On October 31, 1996, at the North Anna Power Station, Unit 1, Virginia Electric and Power Company (hereafter referred to as the licensee) discovered a pin hole leak in a 4-inch line of the service water system (SWS). During further inspection and evaluation of the SWS, additional pin hole leaks and locations with possible evidence of previous leakage were identified in the SWS. At the time the first leak was identified, the SWS was in an extended Action Statement, with the "B" SWS header drained for repair and restoration. Therefore, the affected portions of the operating SWS could not be isolated and repaired in accordance with the requirements of the ASME Code without requiring a unit shutdown. Upon exiting the extended action statement on November 23, 1996, repair activities for the affected welds began. Each weld was repaired per the requirements of the ASME Code by December 14, 1996. By letter dated February 3, 1997, the licensee requested pursuant to 10 CFR 50.55a(g)(6)(i) a relief from the ASME Code, Section XI replacement requirements for the period of October 31, 1996, through December 14, 1996. The licensee based its request for relief on the results of a "through-wall flaw" evaluation that was performed by the licensee in accordance with the guidelines and acceptance criteria contained in GL 90-05.

3.0 LICENSEE'S RELIEF REQUEST

3.1 Components for Which Relief is Requested

Weld #	Line #	Joint Type
FW-18W, 71	4"-WS-46-163-Q3	BW
87, 91	4"-WS-46-163-Q3	BW
89, 59	4"-WS-56-163-Q3	BW
85	4"-WS-56-163-Q3	BW
89	4"-WS-57-163-Q3	BW
58	2"-WS-60-163-Q3	BW
76	2"-WS-61-163-Q3	BW
66	2"-WS-62-163-Q3	BW
67	2"-WS-62-163-Q3	SW
91	2"-WS-65-163-Q3	BW
9W	3"-WS-74-163-Q3	BW
71	3"-WS-75-163-Q3	BW
46, 59	3"-WS-76-163-Q3	BW
73	2"-WS-450-163-Q3	SW
86	2"-WS-451-163-Q3	SW
97	2"-WS-461-163-Q3	BW
10	2"-WS-775-163-Q3	SW
20	2"-WS-945-163-Q3	SW

40	2"-WS-954-163-Q3	SW
7	2"-WS-954-163-Q3	SW
43	4"-WS-H48-163-Q3	BW

The above listed welds are ASME Code Class 3, moderate energy piping in the SWS. The piping provides cooling water from the SWS to instrument air compressors and charging pump lube oil coolers for both units and return service water back to return headers. Normal flow is 20 to 100 gpm at an operating pressure of 100 psig. The design pressure is 150 psig and design temperature is 150°F.

3.2 Section XI Edition for North Anna 1 and 2

North Anna Unit 1 - 1983 Edition of the ASME Code, Section XI including Summer 1983 Addenda.

North Anna Unit 2 - 1986 Edition of the ASME Code, Section XI.

3.3 ASME Section XI Code Requirement

The ASME Code Section XI requires that repairs or replacements of ASME Code Class components be performed in accordance with rules found in Articles IWA-4000 or IWA-7000, respectively. The intent of these rules serve to provide an acceptable means of restoring the structural integrity of a degraded Code Class system back to the original design requirements.

3.4 Content of the Relief Request

Relief is sought from performing a repair or replacement of the service water piping per the requirements of Article IWA-4000 or IWA-7000, respectively. Relief is being sought for the period of October 31, 1996, through December 14, 1996, because performing a Code repair during that period was determined to be impracticable. The licensee accomplished permanent Code repairs for all welds by the end of that period.

3.5 Basis for Relief

Request for relief has been submitted and alternatives to the Code requirements have been proposed by the licensee. The NRC staff reviewed the proposed alternatives for compliance with the provisions of 10 CFR 50.55a(a)(3)(ii). The licensee has evaluated the flaws in accordance with the guidance provided in GL 90-05. Based upon the evaluation, it was established that the discovered flaws satisfy the criteria for non-code repair as described in GL 90-05 and performing permanent repairs in accordance with the ASME Code during the period October 31, 1996, through December 14, 1996, would have constituted an undue burden (created undue hardship) upon the licensee since the repairs would have necessitated shutdown of both units since the "B" service water header was already out of service during this period for piping upgrades and taking both headers out of service would have resulted in shutdown of both the units.

3.6 Licensee's Alternative Program

During the period of October 31, 1996, through December 14, 1996, the SWS with the identified possible through-wall flaws was monitored by the licensee as follows.

1. Weekly visual monitoring of all areas with possible evidence of leakage.

2. Walkdown of the accessible portion of the SWS at least monthly.

3. Radiographic examination of all but three butt welds.

4. All butt welds were analyzed and found to be acceptable except two welds, weld 58 on line 3"-WS-74-163-Q3 and weld 9W on line 3"-WS-74-163-Q3. These two welds were declared inoperable and repaired within the limited conditions of operation as defined in the plant's Technical Specifications.

4.0 STAFF EVALUATION AND CONCLUSIONS

4.1 Operability Determination, Root Cause Analysis and Structural Integrity Evaluation

The licensee determined that several locations on the SWS have a "through-wall flaw" and all flaws were analyzed in accordance with the position stated in GL 90-05. This system was constructed in accordance with the requirements of ASME Code, Class 3. The licensee performed an operability determination of the SWS in the "as found" condition and the system was determined to be operable with the exception of two butt welds. These two welds were declared inoperable and repaired within the limited conditions of operation as defined in the plant's Technical Specifications.

Based on the radiographic testing (RT) examination data, the flaws were determined to be small voids surrounded by exfoliation, which is typical of microbiologically induced corrosion (MIC). No other type of operationally caused defects were identified by the RT. The licensee evaluated the structural integrity of the piping using the guidance of GL 90-05. Based upon the evaluation, it was determined that the integrity of the piping would be maintained and that the flawed piping satisfied the criteria of GL 90-05 except for two butt welds. These two welds were declared inoperable and repaired within the limited conditions of operation as defined in the plant's Technical Specifications.

4.2 Augmented Inspection

To assess the overall degradation of the SWS, augmented radiographic and visual examination were performed on six additional locations on lines having the same size and function. This sample group also identified welds degraded by MIC. An additional sample of five welds were examined by RT and four out of the five welds were identified as having MIC. Any indication was treated as a through-wall defect and analyzed for structural integrity in accordance with the guidance provided in GL 90-05. All augmented weld locations were found to be acceptable. In addition, 17 welds with evidence of leakage were

evaluated for structural integrity. With the exception of the welds discussed above, all welds were found to be acceptable.

4.3 Proposed Temporary Non-Code Repair and Monitoring Provisions

During the period October 31, 1996, through December 14, 1996, the licensee performed weekly visual monitoring of all areas with possible evidence of leakage and performed walkdown of the accessible portion of the SWS at least monthly. All flawed welds were Code repaired in accordance with the requirements of ASME Code Section XI by December 14, 1996.

4.4 Staff Conclusions

The staff has determined that the licensee's flaw evaluation has been consistent with the guidelines and acceptance criteria of GL 90-05. The staff therefore finds the licensee's structural integrity and operability assessments to be acceptable. The licensee repaired all flaws by December 14, 1996. During the period of October 31 through December 14, 1996, the welds were monitored by plant personnel. In addition, the licensee had evaluated the defective areas and determined that the flaws were acceptable and the SWS was determine to be operable.

Furthermore, the staff finds that performance of an immediate Code repair during the period October 31, 1996, through December 14, 1996, would have constituted an undue burden (created undue hardship) upon the licensee since the repair would have necessitated a Unit shutdown. Shutting the Unit down is not in the best interest of plant safety, given the magnitude of the flaw and the licensee's alternative program. The staff therefore concludes that authorization of the licensee's alternative program would provide an acceptable level of quality or safety, 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 have resulted if the Code requirements were imposed on the facility. Pursuant to 10 CFR 50.55a(a)(3)(ii) the alternative is authorized.