



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELIEF FROM CERTAIN REQUIREMENTS OF SECTION XI OF THE ASME CODE

OMAHA PUBLIC POWER DISTRICT

FORT CALHOUN STATION

DOCKET NO. 50-285

1.0 INTRODUCTION

The Technical Specification for the Fort Calhoun Station requires that inservice examination of ASME Code Class 1, 2, and 3 components shall be performed in accordance with Section XI of the ASME Code as required by 10 CFR 50.55(g)(4) except where specific written relief has been granted by the Commission. Some plants were designed in conformance to early editions of this Code Section, consequently certain requirements of later editions and addenda of Section XI are impractical to perform because of the plant's design, component geometry, and material of construction. Paragraph 10 CFR 50.55a(g)(6)(i) authorizes the Commission to grant relief from those requirements upon making the necessary findings.

In a letter dated June 10, 1986, the Omaha Public Power District (OPPD), the licensee, identified specific ASME Code requirements that OPPD determined to be impractical to perform at the Fort Calhoun Station and requested relief from these requirements. The staff completed the evaluation in a letter dated November 10, 1986. The licensee submitted additional information related to this issue in a letter dated August 12, 1987. The objective of this Safety Evaluation is to review the supplemental information.

2.0 STAFF EVALUATION

2.1 Description and Function of the Piping System

The licensee submitted inspection isometric drawings that identify the inaccessible welds, materials of construction, nominal diameter and nominal wall thickness or pipe schedule. The subject welds are in the main steam and feedwater system outside of containment in Room 81 of the Fort Calhoun facility. A total of 35 welds (8 circumferential welds and 19 branch connection welds) in the main steam system and 8 circumferential welds in the feedwater system are inaccessible for inservice inspection.

2.2 ASME Code Requirement

Table IWC-2500-1, Examination Category C-F requires (1) a volumetric and surface examination of ASME Code Class 2 circumferential pressure

retaining welds in piping greater than 1/2 inch nominal wall thickness and (2) a surface examination of pipe branch connections (1980 Edition including Addenda through Winter 1980).

Paragraph IWC-2430 requires additional examinations when flaw indications are detected that exceed the acceptance standards of Article IWC-3000.

2.3 Licensee's Request

The licensee requests Commission approval to exclude the inaccessible welds from the Inservice Inspection Program.

2.4 Licensee's Bases for Relief

2.4.1 Protective Measures

The protective enclosures in Room 81 were designed to contain the steam or fluid from a large break to the extent that severe impingement of jets on safety-related equipment or structures cannot occur. The protective enclosures consist of a series of longitudinal flat steel bars placed around the outside of the pipe insulation and held in position by a series of independent loops of wire rope. At the main steam safety valves, the spacing of the wire rope is increased to clear the valve nozzles and their reinforcing plates. At these locations the longitudinal enclosure bars are thickened and reinforced with stiffener plates. The wire rope size is increased and the spacing immediately adjacent to the nozzles is decreased to compensate for the increased spacing between wire rope loops in this area. In order to maintain the configuration of the bars following pipe rupture, the individual bars are tightly fastened to the wire rope by means of wire rope clips. Each bar is fastened by clips at a spacing of approximately one foot. The protective enclosures around the feedwater lines are similar to those for the main steam line although the loads involved are far smaller.

The design criteria for the main steam and feedwater piping protective enclosures is in Attachment C to Appendix M of the updated Safety Analysis Report. These documents reflect the results of the "Fort Calhoun Unit 1 Pipe Rupture Analysis of Feedwater and Main Steam Out-side of Containment" by Nuclear Services Corporation (Campbell, California) done in 1973, and on file in the OPPD Nuclear QA/Records Management System. Basically, the conclusion of this report is that the design of the protective enclosures is sufficient to assure the mitigation of a main steam line rupture or feedwater rupture in Room 81 so that all vital control capabilities will be maintained. Updated Safety Analysis Report Section 14.12, "Main Steam Line Break" assures us that the radiological consequences of a main steam line break, concurrent with steam generator tube rupture will not exceed the exposure limits of 10 CFR Part 100.

2.4.2 Examination Requirements

2.4.2.1 Main Feedwater 16" Circumferential Pipe Welds

The subject pipe is constructed from schedule 80 carbon steel with a nominal wall thickness of 0.844 inches. During scheduled examinations a number of recordable surface indications were detected that resulted in an expansion of the examination program to include 100% of the weld locations as required by paragraph IWC-2430. All accessible welds in the 16 inch feedwater system were examined in 1985. All of the weld locations with recordable surface indications were repaired per ASME and subsequently passed reexamination. The surface indications that were found appeared to be confined to the surface scale of the pipe and did not degrade the pressure retaining function. Two of the welds in the feedwater system, weld #7 on Figure B-7 and #11 on Figure B-8 were examined; however, these welds are located slightly inside of the bio-shield penetrations for the feedwater lines and only a limited examination of the welds were performed (approximately 40% of the total weld length). The interference caused by their physical location does not prevent a 100% one-sided ultrasonic examination. Because 100% of the weld volume can be covered with the UT examination, OPPD will, therefore, continue the surface examination to the extent possible, and do 100% of the required volumetric examination as scheduled in the normal ISI Program. The other six welds are totally covered by the protective enclosures. The feedwater welds are monitored by the required IWA-5000 system leakage test.

2.4.2.2 Main Steam 28" Circumferential Pipe Welds

The eight welds identified in the licensee's June 10, 1986 are inaccessible because of the cable wrapping. No examinations are scheduled for these locations throughout the 10-year interval; therefore, relief is not necessary. This group of welds was included to inform the staff that these welds are not available for inservice inspection.

2.4.2.3 Main Steam Branch Connections, 2½ and 6" Lines

Nineteen branch connections are covered by cable wrapping. Two of these locations were scheduled for examination in 1985. At least one more location is required to be examined during the 10-year interval. The licensee has determined that these Code requirements are impractical to perform.

There are no locations of similar material, configuration, diameter, wall thickness and operating conditions at Fort Calhoun that are not covered by cable wrapping. The above system are pressure test every 40 months in accordance to paragraph IWC-5221 and a system hydrotest performed every 10-years in accordance with paragraph IWC-5222.

3.0 EVALUATION AND CONCLUSION

The staff completed the review of the licensee's letters dated June 10, 1986 and August 12, 1987 based on the provisions of 10 CFR 50.55a(g)(6)(i). The staff determined that the protective enclosures make inservice inspection impractical to the extent required by ASME Section XI.

3.1 Main Feedwater 16" Circumferential Pipe Welds

A partial examination can be performed on two (2) of the eight (8) welds subject to examination. The 1980 Edition including Addenda through Winter 1980 of ASME Section XI requires a volumetric and surface examination of piping greater than 1/2 inch thickness in order to detect a flaw in the lower 1/3 of the weld by volumetric examination techniques and the outside surface of the weld by surface examination techniques. Since welds #7 and #11 are fabricated from carbon steel material, the staff agrees with the licensee that an ultrasonic examination of 100% of the weld volume and the limited surface examination performed during the 1985 outage should have detected any significant flaw, if there is one.

When the sample is expanded to include 100% of the weld locations, as required by paragraph IWC-2430, some welds may be difficult or impossible to examine. The staff evaluates the type of flaws detected versus the measures required to perform the examinations. The staff determined that removal of the protective enclosures to continue the examination of additional welds based on the detection of surface scale is not warranted. The licensee has examined all accessible welds and did not find a condition that resulted in degradation of the pressure retaining function of the pipe. The staff finds that relief may be granted as requested by the licensee to eliminate the examinations in the feedwater system welds as a result of this event.

The staff concludes that the design of protective enclosures to mitigate the effects of a pipe break and the system pressure tests provides an acceptable level of quality and safety.

3.2 Main Steam 28" Circumferential Pipe Welds

Since no examinations are scheduled for these locations throughout the interval, relief is not necessary. In the event that the identified welds are required to be examined based on IWC-2430, the staff will consider each event on a case-by-case basis.

3.3 Main Steam Branch Connections, 2 1/2" and 6" Lines

Only a few of the nineteen inaccessible branch connection welds are actually subject to examination. ASME Section XI requires an examination of a representative sample of welds in order to detect unanticipated generic service-induced degradation in a piping system. The regulation and the ASME Code have provisions for the substitution of an alternative program that is demonstrated to be equivalent or superior to the specified requirement. The staff considers an Inservice Inspection Program that maintains the size of the examination sample to be equivalent.

The staff concludes that relief being granted from the required inservice inspection of the welds made inaccessible by the protective enclosures on the condition that: the licensee selects for inservice inspection at least an equivalent number of accessible welds that are of similar materials, configuration, nominal diameter, nominal wall thickness, and operating conditions. The licensee has the option of performing an examination of larger diameter branch connections, with the corresponding or lower pipe schedule, in the main steam system to meet the condition described above.

In addition, the staff concludes, with the above condition, the relief being granted is authorized by law, will not endanger life or property, or the common defense and security, and is otherwise in the public interest.

Dated: April 7, 1988

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