

August 26, 2003

Mr. Michael A. Krupa, Director
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SUBJECT: ARKANSAS NUCLEAR ONE, UNIT 1 (ANO-1); GRAND GULF NUCLEAR STATION (GGNS); RIVER BEND STATION (RBS); AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 (W3) - REQUEST TO USE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME) BOILER AND PRESSURE VESSEL CODE (CODE) CASE N-663 (TAC NOS. MB6880, MB6881, MB6879, MB6882)

Dear Mr. Krupa:

By letter dated December 6, 2002, as supplemented by letter dated March 14, 2003, you submitted a relief request from the inspection requirements of the ASME Code, Section XI, 1992 Edition, for piping welds of Categories B-F, B-J, C-F-1, and C-F-2. Specifically, you proposed to conduct inspections for these welds using ASME Code Case N-663, "Alternative Requirements for Class 1 and 2 Surface Examinations," for the subject plants.

The staff has completed its review and concludes that you have demonstrated that the proposed alternative to the Code requirements provides an acceptable level of quality and safety, as discussed in the enclosed Safety Evaluation. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the staff authorizes the relief request for the third 10-year inservice inspection (ISI) interval for ANO-1 for Class 2 piping welds only, and for the second 10-year ISI interval for RBS, GGNS, and W3 for Class 1 piping welds (nominal pipe size 4 and larger) and all Class 2 piping welds, unless during those intervals Code Case N-663 is published in a future version of Regulatory Guide (RG) 1.147, "Inservice Inspection Code Case Acceptability--ASME Section XI, Division 1." At that time, if you intend to continue implementing this Code Case, you must follow all provisions of Code Case N-663 with limitations or conditions specified in RG 1.147, if any.

Sincerely,

/RA/

Robert A. Gramm, Chief, Section 1
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket Nos. 50-313, 50-416, 50-458, 50-382

Enclosure: Safety Evaluation

cc w/Enclosure: See next page

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August 2003

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST FROM IWA-2500 AND IWC-2500 REQUIREMENTS

AND THE USE OF CODE CASE N-663

ARKANSAS NUCLEAR ONE, UNIT 1 (ANO-1); GRAND GULF NUCLEAR STATION (GGNS);

RIVER BEND STATION (RBS); AND WATERFORD STEAM ELECTRIC STATION, UNIT 3 (W3)

DOCKET NUMBERS 50-313, 50-416, 50-458, and 50-382

1.0 INTRODUCTION

The inservice inspection (ISI) of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (Code) Class 1, Class 2, and Class 3 components is to be performed in accordance with Section XI of the ASME Code, "Rules for Inservice Inspection of Nuclear Power Plant Components," and applicable edition and addenda as required by Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.55a(g), except where specific relief has been granted by the U.S. Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.55a(g)(6)(i). As stated in 10 CFR 50.55a(a)(3), alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if the licensee demonstrates that: (i) the proposed alternatives would provide an acceptable level of quality and safety, or (ii) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in ASME Code, Section XI, to the extent practical within the limitations of design, geometry, and materials of construction of the components. The regulations require that inservice examination of components and system pressure tests conducted during the first 10-year interval and subsequent intervals comply with the requirements in the latest edition and addenda of Section XI of the ASME Code, incorporated by reference in 10 CFR 50.55a(b), twelve months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

By letter dated December 6, 2002, as supplemented by letter dated March 14, 2003, Entergy Operations, Inc., the licensee, submitted a relief request for ANO-1, GGNS, RBS, and W3 from the inspection requirements of ASME Code, Section XI, for piping welds of Categories B-F, B-J, C-F-1, and C-F-2. Category B-F is for pressure retaining dissimilar metal welds in vessel nozzles, B-J is for pressure retaining welds in piping, C-F-1 is for pressure retaining welds in austenitic stainless steel or high alloy piping, and C-F-2 is for pressure retaining welds in carbon or low alloy steel piping. Instead, the licensee proposes, pursuant to 10 CFR 50.55a(a)(3)(i), to conduct inspections for these welds using ASME Code Case N-663, "Alternative Requirements for Class 1 and 2 Surface Examinations."

The applicable inspection interval for ANO-1 is its third 10-year ISI interval, and the applicable inspection intervals for GGNS, RBS, and W3 are their respective second 10-year ISI intervals. The Construction Codes are ASME Section III 1965 Edition, 1967 Addenda for ANO-1; 1974 Edition, 1975 Addenda for GGNS; 1971 Edition, 1973 Addenda for RBS; and 1971 Edition, 1971 Addenda for W3. The applicable ISI Codes and Editions for all plants are the 1992 Edition of Section XI of the ASME Code with portions of the 1993 Addenda.

2.0 EVALUATION

This relief request applies to Class 1 piping welds (nominal pipe size (NPS) 4 and larger) and all Class 2 piping welds, except for ANO-1. For ANO-1, this relief request only applies to Class 2 piping welds.

2.1 Code Requirements for which Relief is Requested

IWB-2500 and IWC-2500 require components be examined and pressure tested as specified in Tables IWB-2500-1 and IWC-2500-1. These tables require inspection of a sampling of piping welds using volumetric, surface, or both examinations and inspection during pressure testing using visual such as VT-2.

2.2 Licensee's Proposed Alternative

In lieu of the surface examination requirements of Table IWB-2500-1 for examination categories B-F (NPS 4 and larger) and B-J (NPS 4 and larger) and Table IWC-2500-1 for examination categories C-F-1 and C-F-2, the licensee proposed to use Code Case N-663 in its entirety for Class 1 piping welds (NPS 4 and larger) and all Class 2 piping welds, except for ANO-1. For ANO-1, this relief request only applies to Class 2 piping welds.

2.3 Basis for Use of Proposed Alternative (as stated by the licensee)

"The ASME Section XI Task Group on ISI Optimization, Report No. 92-01-01, "Evaluation of Inservice Inspection Requirements for Class 1, Category B-J Pressure Retaining Welds in Piping," dated July 1995, concluded (with 50 units responding with a total of 9333 welds inspected) only 2 welds (0.02%) were found to have flaws detected by Section XI surface examinations. These flaws were determined to be fabrication-induced.

In parallel with the above, several risk-informed Code cases have been developed for use on piping welds (e.g., ASME Code Cases N-560, N-577, and N-578). One of the methods for risk-informing piping examinations is via use of EPRI [Electric Power Research Institute] TR-112657, Rev[ision] B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure (NRC SER [Safety Evaluation Report] dated 10/28/99)." Table 4-1, "Summary of Degradation-Specific Inspection Requirements and Examination Methods," of the EPRI report lists the required degradation mechanisms to be evaluated in Class 1, 2, and 3 piping. It also identifies the risk-informed examination method required for each of these degradation mechanisms. The only degradation mechanism that requires a surface examination is O.D. [outside diameter] chloride cracking. These two initiatives led ASME to investigate the value of surface examinations.

Code Case N-663 incorporates lessons learned from the risk-informed initiatives and industry examination experience into Section XI by requiring that an evaluation be conducted to identify locations, if any, where a surface examination would be of benefit from a generic piping degradation perspective. The results of this evaluation identify where O.D. degradation is most likely to occur by reviewing plant-specific programs and practices, and operating experience. If the potential for degradation is identified, Code Case N-663 defines examination techniques, volumes, and frequencies. As such, implementing Code Case N-663 will identify appropriate locations for surface examination, if any, and eliminate unnecessary examinations."

2.4 Staff Evaluation

The proposed use of Code Case N-663 by the licensee to replace the ASME Code Section XI required surface examinations for piping welds of Categories B-F, B-J, C-F-1, and C-F-2 is consistent with the approved underlying EPRI and Westinghouse methodologies on risk-informed ISI contained in TR-112657, Revision B-A, and WCAP-14572, Revision 1-NP-A, "Westinghouse Owners Group Application of Risk-Informed Methods to Piping Inservice Inspection Topical Report." Although the two topical reports use different approaches, both have reached their objectives of identifying the risk-important areas of the piping systems and defining the appropriate examination methods, examination volumes, procedures, and evaluation standards necessary to address the degradation mechanisms of concern and the ones most likely to occur at each location to be inspected.

In regard to the current issue of surface examinations for piping welds of Categories B-F, B-J, C-F-1, and C-F-2, all plant-specific risk-informed ISI programs are in accordance with the topical reports' conclusion that the only degradation mechanism that requires a surface examination is O.D. chloride cracking, and consequently, surface examination will be considered only when O.D. chloride cracking is identified to be the degradation mechanism affecting the structural integrity of the subject piping welds.

Code Case N-663 provides that "...in lieu of the surface examination requirements for piping welds of Examination Category B-F (NPS 4 and larger), B-J (NPS 4 and larger), C-F-1, and C-F-2, surface examinations may be limited to areas identified by the Owner as susceptible to outside surface attack." The susceptibility criteria are listed in Table 1 of Code Case N-663 for two types of degradation mechanisms: 1) external (O.D.) chloride stress corrosion cracking and 2) other outside surface initiated mechanisms. The staff determined that the surface inspection requirements of Code Case N-663 are acceptable because the inspection requirements defined in the Code Case are equivalent to the corresponding inspection requirements approved by the NRC and adopted by using risk-informed ISI programs. Further, the Code Case requires that licensees conduct a plant-specific service history review to identify other mechanisms susceptible to outside surface attack, and to include plant-specific processes and programs that minimize chlorides and other contaminants. Hence, the alternative provides reasonable assurance that the proposed inspections will not lead to degraded piping performance when compared to the existing performance levels.

3.0 CONCLUSION

Based upon review of the information provided by the licensee in support of its request for relief, the staff concludes that use of Code Case N-663 for Class 1 and 2 surface examinations, in lieu of the IWB-2500 and IWC-2500 requirements, would provide an acceptable level of quality and safety. This conclusion is based on the fact that inspection requirements defined in Code Case N-663 are equivalent to the

inspection requirements adopted by plants employing risk-informed ISI programs, and because the licensee will be required to conduct a plant-specific service history review to identify mechanisms that will cause outside surface attack upon subject plant components. Therefore, pursuant to 10 CFR 50.55a(a)(3)(i), the licensee's proposed use of Code Case N-663 is authorized for the third 10-year ISI interval for ANO-1 for Class 2 piping welds only, and for the second 10-year ISI interval for GGNS, RBS, and W3 for Class 1 piping welds (NPS 4 and larger) and all Class 2 piping welds, on the basis that the request provides an acceptable level of quality and safety, unless during those intervals Code Case N-663 is published in a future version of Regulatory Guide (RG) 1.147. At that time, if the licensee intends to continue implementing this Code Case, the licensee must follow all provisions of Code Case N-663 with limitations or conditions specified in RG 1.147, if any.

Principal Contributor: S. Sheng

Date: August 26, 2003