

April 14, 2003

Mr. R. T. Ridenoure
Division Manager - Nuclear Operations
Omaha Public Power District
Fort Calhoun Station FC-2-4 Adm.
P.O. Box 550
Fort Calhoun, NE 68023-0550

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION - INSERVICE INSPECTION (ISI)
OF THE REACTOR PRESSURE VESSEL FOR THE THIRD TEN YEAR ISI
INTERVAL (TAC NO. MB6986)

Dear Mr. Ridenoure:

By letter dated December 20, 2002, Omaha Public Power District (OPPD), submitted for NRC staff review, Requests for Relief (RR) 1 through RR-5 for the Fort Calhoun Station, Unit 1. The requests for relief are from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI. In accordance with 10 CFR 50.55a(a)(3)(i), OPPD has proposed alternatives for certain requirements contained in ASME Sections V and XI.

The staff has reviewed OPPD's submittal and has determined that additional information is needed to complete our review. A request for additional information is enclosed. This request was discussed with Richard Jarworski of your staff on April 7, 2003, and it was agreed that a response would be provided within 60 days of receipt of this letter.

If you have any questions, please contact me at (301) 415-1445.

Sincerely,

/RA/

Alan B. Wang, Project Manager, Section 2
Project Directorate IV
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Docket No. 50-285

Enclosure: Request for Additional Information

cc w/encl: See next page

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**REQUEST FOR ADDITIONAL INFORMATION
THIRD 10-YEAR INSERVICE INSPECTION INTERVAL
REQUESTS FOR RELIEF
OMAHA PUBLIC POWER DISTRICT
FORT CALHOUN STATION, UNIT 1
DOCKET NO. 50-285**

SCOPE

By letter dated December 20, 2002, Omaha Public Power District (OPPD), submitted for NRC staff review, Requests for Relief (RR) 1 through RR-5 for the Fort Calhoun Station, Unit 1 (FCS). The requests for reliefs are from the requirements of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI. The requests for relief are for the third 10-year inservice inspection (ISI) interval, in which FCS adopted the 1989 Edition of ASME Section XI as the Code of record. In addition, in accordance with 10 CFR 50.55a, the licensee must meet the ultrasonic qualification requirements set forth in the 1995 Edition with 1996 Addenda of ASME XI, Appendix VIII.

In accordance with 10 CFR 50.55a(a)(3)(i), OPPD has proposed alternatives for certain requirements contained in ASME Sections V and XI. OPPD's proposed alternatives must provide an acceptable level of quality and safety as compared with the Code.

The staff has reviewed the information submitted by OPPD and based on this review, requires additional information to determine if the OPPD's alternatives meet the regulation.

REQUEST FOR ADDITIONAL INFORMATION

1. Please state the start and end dates for the third 10-year inspection interval at FCS.
2. Request for Relief RR-1, Examination Category B-D, Item B3.90, Pressure Retaining Nozzle Welds in Vessels, Alternative to Volumetric Weld Coverage Requirements
 - a. OPPD is proposing to reduce the examination volume currently described in Figure IWB-2500-7 to a volume that would encompass the weld and base metal one-half inch on either side of the weld. The basis for relief describes the examination volume as one-half inch base metal on either side of the weld at the widest part of the weld, for reactor pressure vessel (RPV) nozzles. Restate the proposed alternative section to agree with the examination volume description from the basis section. Provide a sketch showing the configuration [IWB-2500-7(a), (b), or(c)] and examination volume. Please list all nozzle-to-vessel welds included within the scope of this request.
 - b. OPPD has cited ASME Section V, Article 4, Paragraphs T-441.3.2.5, T-3.2.6, and T-441.3.2.7 for ultrasonic scanning requirements. However, these portions of Section V are no longer applicable to RPV nozzle-to-vessel welds. As clarified in the *Federal Register*, Volume 67, Number 187 (September 26, 2002), Section 2.3.4, *Implementation of Appendix VIII to Section XI*, licensees are required to use the ASME Section XI, 1995 Edition with 1996 Addenda of Appendix VIII.

This includes all related requirements such that ultrasonic examinations conducted in accordance with IWA-2232 will use this Edition/Addenda for components included within the scope of Appendix VIII. Appendix I of the 1995 Edition/1996 Addenda does not refer to Section V for examination of RPV nozzle-to-vessel welds, but to Appendix VIII. While this request is primarily associated with the volume described in IWB-2500-7, it is unclear whether the licensee has a complete understanding of the related requirements. Describe the coverage that will be used to interrogate the examination volume.

- c. OPPD states that the current Code requirements for base material adjacent to these welds (Code-required volume extends to one-half the vessel wall thickness) contains volumes not prone to inservice cracking and extends beyond the high residual stress regions associated with the weld. However, the licensee has not provided any data to support this contention.
 - (1) Provide a technical basis to conclude that portions of the base metal over the entire regions currently specified by Code are not susceptible to service-induced degradation.
 - (2) Provide analyses to indicate the extent and magnitude of residual stresses associated with RPV nozzle-to-vessel welds at FCS in support of the contention that all high stress regions will be encompassed within the proposed examination volume.
 - d. A significant issue is related to as-built weld configurations that may exist at FCS, the interpretation of ultrasonic signals, and assurance of volumetric coverage. Because the examination of the subject nozzles is primarily by remote, automated ultrasonic methods that are implemented from the inner clad surface of the RPV, it is unclear how the licensee will be able to precisely locate the extremities (widest sections) of the nozzle-to-vessel welds. It is unclear how repaired areas (fabrication or inservice) extending beyond the ideal weld cross-sectional area are identified, nor how these areas will be examined.
 - (1) Discuss the documentation available of the actual cross-sectional dimensions and precise locations of repaired areas for all RPV nozzle-to-vessel welds at FCS. Discuss the process for defining new examination volumes that encompass these repair weld areas.
 - (2) Describe the process for accurately determining the location of ultrasonic reflectors with respect to the proposed new examination volumes.
3. Request for Relief RR-2, Use of Alternative to Appendix VIII, Supplement 10, Qualification Requirements for Dissimilar Metal Piping Welds
- a. On page 16 of OPPD's request (enclosure showing changes between Appendix VIII, Supplement 10 and the proposed Performance Demonstration Initiative (PDI) alternative), the PDI alternative in the table in Section 2.4 under

the "Number of Flaws" does not agree with the table shown on page 9 in the basis for relief. Please clarify.

- b. On page 24 of OPPD's request (enclosure showing changes between Appendix VIII, Supplement 10 and proposed PDI alternative), Section 4.0, item (d), it is stated that "To qualify new values of essential variables, at least one personnel qualification set is required." It is unclear whether this is intended to require at least one successful personnel qualification with the new essential variables, or simply to include the number of specimens equal to one qualification set. Please clarify.
4. Request for Relief RR-3, Use of Alternative to Appendix VIII, (Proposed) Supplement 14, Combined Qualification Requirements for Piping Welds Examined from the Inner Diameter
 - a. Please indicate whether the alternative (including the comparison enclosure) provided in OPPD's request is the most current Supplement 14 version of the proposed PDI alternative.
 - b. OPPD's proposal is aimed at piping welds that are examined from the inner diameter surface using remote automated techniques. The licensee argues that to impose separate qualifications, as currently required by Supplements 2, 3 and 10, is excessive because the ultrasonic essential variables used for dissimilar metal, austenitic, and ferritic welds (when performed from the inner diameter) will be the same. Therefore, it is expected that the inner diameter applications may not be confronted with the same acoustic limitations, i.e., attenuation and beam redirection effects, as methods applied from the outside surface of these piping welds. However, situations may arise that may result in less than two-sided examinations.
 - (1) It is unclear how the qualification of far-side examinations will be implemented. Provide a discussion on the implementation of far-side examinations for the different supplements.
 - (2) It is unclear how the coverage of far-side examinations will be determined. Provide a discussion on coverage of far-side examinations for the different supplements.
5. Request for Relief RR-4, Examination Category B-F, Item B5.10, Pressure Retaining Dissimilar Metal Welds in Vessel Nozzles, Use of Code Case N-662 for RPV Nozzle-to-Safe End Welds
 - a. OPPD has requested the use of Code Case N-662 for the RPV nozzle-to-safe end welds at FCS. N-662 is actually associated with repair/replacement of items classified in accordance with risk-informed processes. There is confusion on the correct number for this Code Case, i.e., N-662 or N-663. Based on the title, "Alternative Requirements for Class 1 and Class 2 Surface Examinations," the staff believes the Code Case should be N-663. Verify the Code Case number.

- b. The proposed alternative would eliminate the outside surface examinations for piping except where outside surface attack is applicable. The Code Case presumes that the primary mechanism for outside surface degradation in all Class 1 and 2 piping is chloride-induced cracking. This is not necessarily true for all portions of piping. For instance, it may be possible for thermal fatigue to occur at certain locations, especially in high stress terminal ends of piping systems. The thermal fatigue mechanism could potentially induce cracking at inner, outer, or both surfaces of the piping. The licensee has not provided sufficient evidence to support a determination that chloride-induced stress corrosion cracking, generated from the outside surface of these piping welds, is the only outer surface initiated service-induced degradation that may be manifested in Examination Category B-F, B-J, C-F-1, and C-F-2 piping during the operating life of the plant.
- (1) The proposed alternative only addresses Examination Category B-F, Item B5.10 welds. Identify the specific welds.
 - (2) Discuss industry experience with surface cracks at Examination Category B-F, Item B5.10 welds.
- c. As for the second criteria listed in the Code Case, the staff has determined that operating history alone does not provide adequate justification to eliminate Code-required examinations because operational experience also has demonstrated that components degrade as they age. A comprehensive degradation mechanism analysis would be necessary to support an alternative to eliminate outside surface examinations for piping. Discuss the process for determining weld susceptibility for the different degradation mechanisms at the Examination Category B-F, Item B5.10 welds.
- Note: A precedent for this type of analysis has been set within the risk-informed inservice inspection (RI-ISI) initiatives which have recently been approved by the staff. During the RI-ISI process, detailed degradation mechanism assessments are required to support the failure frequency side of the risk matrix. As a result of these analyses, nondestructive examination methods, locations, and inspection frequencies, if necessary, are chosen to target specific areas for potential degradation. In doing so, many licensees have been able to show that outside diameter generated flaws would not be expected to occur at certain piping locations, thus only volumetric examinations are implemented. In order to establish this basis at FCS, a similar degradation mechanism assessment would be applicable.
- d. The staff has historically allowed licensees to perform, from the inner surface, a volumetric examination of the outside surface region in lieu of outside surface examinations, provided the capabilities of the volumetric technique to detect surface-breaking cracks is adequately demonstrated. If a review of degradation mechanisms indicate the need for surface examinations, discuss the applicability of using ultrasonic testing (UT) from the inside surface. Discuss UT demonstrations that show surface examination effectiveness.

Ft. Calhoun Station, Unit 1

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