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

November 15, 2012

Mr. Brian J. O'Grady
Vice President-Nuclear and CNO
Nebraska Public Power District
72676 648A Avenue
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION - RELIEF REQUEST NO. RI-06, REVISION 1 FOR THE FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL REGARDING WELD EXAMINATIONS (TAC NO. ME7599)

Dear Mr. O'Grady:

By letter dated November 14, 2011, as supplemented by letter dated February 29, 2012, Nebraska Public Power District (the licensee), submitted Revision 1 of Request No. RI-06 to the U.S. Nuclear Regulatory Commission (NRC) for review and approval. Request RI-06, Revision 1, is applicable to the fourth 10-year inservice inspection (ISI) interval at the Cooper Nuclear Station (Cooper). Request RI-06, Revision 1, requested relief from the examination requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for several ASME Code Class 1 components at Cooper. Request RI-06, Revision 1, supersedes Revision 0 of Request RI-06, which was submitted by letter dated October 5, 2009 (ADAMS Accession No. ML092810349), and approved in a safety evaluation dated April 26, 2010 (ADAMS Accession No. ML100970687). Request RI-06, Revision 1, requested relief for several additional components that were not addressed in RI-06, Revision 0.

Specifically, pursuant to paragraph 50.55a(g)(5)(iii) of Title 10 of the *Code of Federal Regulations* (10 CFR), the licensee requested to use the proposed alternative in Request RI-06, Revision 1, on the basis that compliance with the code requirements is impractical for Cooper.

The NRC staff has reviewed the licensee's submittal, as supplemented. Pursuant to 10 CFR 50.55a(g)(6)(i), the staff's approval of RI-06, Revision 0, remains in effect for the fourth 10-year interval ISI program at Cooper, and the granting of relief for the subject reactor vessel (RV) longitudinal shell welds based on the review of RI-06, Revision 1, is not required. Relief is also not required for the subject RV lower head meridional and circumferential welds because the licensee has satisfied the ASME Code, Section XI examination requirements. The NRC staff has determined that continuing approval of RI-06, Revision 0, 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 that could result if the requirements were imposed.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved in this relief request remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

The detailed results of the NRC staff review are provided in the enclosed safety evaluation. If you have any questions concerning this matter, please contact Ms. L. Wilkins of my staff at (301) 415-1377 or via e-mail at Lynnea.Wilkins@nrc.gov.

Sincerely,

CFlyon for

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosure:
As stated

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

FOURTH 10-YEAR INSERVICE INSPECTION INTERVAL

REQUEST FOR RELIEF NO. RI-06, REVISION 1

NEBRASKA PUBLIC POWER DISTRICT

COOPER NUCLEAR STATION

DOCKET NO. 50-298

1.0 INTRODUCTION

By letter dated November 14, 2011, as supplemented by letter dated February 29, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML11322A036 and ML12066A098, respectively), Nebraska Public Power District (the licensee), submitted Revision 1 of Request No. RI-06 to the U.S. Nuclear Regulatory Commission (NRC) for review and approval. Request RI-06, Revision 1, is applicable to the fourth 10-year inservice inspection (ISI) interval at the Cooper Nuclear Station (Cooper). Request RI-06, Revision 1, requested relief from the examination requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, for several ASME Code Class 1 components at Cooper. Request RI-06, Revision 1, supersedes Revision 0 of Request RI-06, which was submitted by letter dated October 5, 2009 (ADAMS Accession No. ML092810349), and approved in a safety evaluation (SE) dated April 26, 2010 (ADAMS Accession No. ML100970687). Request RI-06, Revision 1, requested relief for several additional components that were not addressed in RI-06, Revision 0.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, Section 50.55a(g)(5)(iii), the licensee requested to use the proposed alternative in Request RI-06, Revision 1, on the basis that compliance with the code requirements is impractical for Cooper.

2.0 REGULATORY EVALUATION

Pursuant to 10 CFR 50.55a(g)(4), ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in the 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, which was incorporated by reference in 10 CFR 50.55a(b) 12 months prior to the start of the 120-month interval, subject to the limitations and modifications listed therein.

The regulations in 10 CFR 50.55a(g)(5)(iii) state that if licensees determine that conformance with certain ASME Code requirements is impractical, the licensee shall notify the Commission and submit information in support of the determination. Determination of impracticality in accordance with this section must be based on the demonstrated limitations experienced when attempting to comply with the ASME Code requirements during the inservice inspection interval for which the request is being submitted. Requests for relief made in accordance with this section must be submitted to the NRC no later than 12 months after the expiration of the initial 120-month inspection interval or subsequent 120-month inspection interval for which relief is sought.

The regulations in 10 CFR 50.55a(g)(6)(i) state that the Commission will evaluate determinations under paragraph (g)(5) of this section that Code requirements are impractical. The Commission may grant such relief and may impose such alternative requirements as it determines 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 that could result if the requirements were imposed on the facility.

The licensee has requested relief from ASME Code, Section XI ,requirements pursuant to 10 CFR 50.55a(g)(5)(iii). The licensee's request for relief is applicable to the fourth 10-year interval ISI program at Cooper. The applicable Code of record for the fourth 10-year interval ISI program at Cooper is the 2001 Edition of the ASME Code, Section XI, with 2003 Addenda. The fourth 10-year interval ISI program at Cooper began on March 1, 2006, and is scheduled to end in April 2016.

3.0 TECHNICAL EVALUATION

3.1 Applicable ASME Code Components Affected

Request RI-06, Revision 1, addresses the following ASME Code, Section XI, Examination Category B-A components (the subject components) for the fourth 10-year interval ISI program at Cooper. The following examination category and item numbers are from Table IWB-2500-1 of the 2001 Edition of the ASME Code, Section XI, with 2003 Addenda.

ASME Code Class	ASME Code Examination Category	ASME Code Item Number	Component Description	Component Numbers
1	B-A	B1.12	Reactor Vessel (RV) Longitudinal Shell Welds	VLA-BA-2, VLA-BA-3, VLB-BA-1, VLB-BA-3, VLC-BB-1
1	B-A	B1.21	RV Lower Head Circumferential Weld	Weld HMD-BB-1
1	B-A	B1.22	RV Lower Head Meridional Welds	HMB-BB-1, HMB-BB-2, HMB-BB-3, HMB-BB-4, HMB-BB-5, and HMB-BB-6

The ASME Code, Section XI, Table IWB-2500-1, Examination Category B-A requires a volumetric examination of the RV longitudinal shell welds (Item No. B1.12) along 100 percent of the weld length and a volumetric examination of the RV lower head meridional and circumferential welds along the accessible lengths of the welds.

It should be noted that the licensee's fourth 10-year ISI interval request, RI-06, Revision 0, which was submitted by letter dated October 5, 2009, previously requested the same relief for the RV longitudinal shell welds listed above. Request RI-06, Revision 0, was granted pursuant to 10 CFR 50.55a(g)(6)(i) for the fourth 10-year interval ISI program at Cooper in an SE dated April 26, 2010.

3.2 Applicable Code Edition and Addenda (as stated by the licensee)

American Society of Mechanical Engineers (ASME) Code Section XI, 2001 Edition, 2003 Addenda.

3.3 ASME Code Requirements for which Relief is Requested (as stated by the licensee)

Table IWB-2500-1, Category B-A, Item B 1.12, requires a volumetric examination of the longitudinal reactor vessel welds.

Table IWB-2500-1, Category B-A, Item B1.21 and B1.22 require a volumetric examination of accessible lengths of all lower head circumferential and meridian welds.

3.4 Reason for Request (as stated by the licensee)

In order to perform the code-required examinations, the biological shield and reactor vessel support skirt would require design modifications to allow access for examination from the outside diameter.

3.5 Proposed Alternative and Basis for Use

With regard to the lower head meridional and circumferential welds, the licensee stated that the control rod drive and instrument penetrations inside the RV support skirt prevent access to most of the bottom head for performing these weld examinations. The licensee stated that lower head circumferential weld HMD-BB-1 is located entirely inside the RV support skirt and is therefore inaccessible for examination. The licensee also stated that most of the lengths of the bottom head meridional welds, welds HMB-BB-1, HMB-BB-2, HMB-BB-3, HMB-BB-4, HMB-BB-5, and HMB-BB-6, are located inside the RV support skirt and are inaccessible for examination. This limits the available scan length to only 2.25 inches for each meridional weld, which is the length of these welds outside the RV support skirt. In the licensee's letter dated February 29, 2012, Figure RI-06-1 illustrates the access limitation for the meridional welds. According to the licensee, the accessible portions of the meridional welds were examined during refueling outage (RFO) 26 at their intersections with lower head circumferential weld HMC-BB-1. The licensee stated that lower head circumferential weld HMC-BB-1 is located

entirely outside the RV support skirt, and therefore received volumetric examination coverage along 100 percent of its accessible length.

In its letter dated November 29, 2012, with regard to the RV longitudinal shell welds, the licensee stated that:

> Access to the reactor vessel shell welds from the exterior is limited. Below the top of the biological shield, most of the reactor vessel is insulated with permanent reflective insulation and surrounded by a concrete biological shield. Penetrations through the biological shield provide limited access to some welds. The annular space between the inside diameter of the insulation and the outside diameter of the reactor vessel is a nominal two (2) inches. There is no working space to remove the insulation panels from the vessel, which precludes both direct and remote examination of the outside surface.

The licensee also stated that automated ultrasonic testing (UT) examination of the RV shell welds from the RV interior was performed and supplemented by manual examinations to obtain additional volumetric coverage. The volumetric examination coverages achieved by the licensee for the RV longitudinal shell welds were provided in Table RI-06-1 of Request RI-06, Revision 1.

The licensee also discussed the results of an analysis completed for an application to exempt the RV circumferential welds from examination based on the criteria of Boiling-Water Reactor (BWR) Vessel and Internals Project (BWRVIP)-05, "Boiling Water Reactor Vessel and Internals Project, BWR RPV Shell Weld Inspection Recommendations." The licensee's analysis calculated the increase in RV longitudinal shell weld failure probability due to an average reduction in inspection coverage from 90 percent to 55 percent. The licensee's analysis concluded that the failure probability was virtually the same for both cases. Specifically, the decreased coverage resulted in a 6.67×10^{-9} increase in the probability of a failure event per operating year, which is negligible compared to the longitudinal weld failure probability based on 90 percent examination coverage.

According to the licensee, the above limited scope weld examinations resulted in no recordable indications.

3.6 NRC Staff Technical Evaluation

Pursuant to 10 CFR 50.55a(g)(5)(iii), the licensee submitted Request RI-06, Revision 1, requesting relief from the examination requirements of the ASME Code, Section XI for the subject Class 1 RV longitudinal shell welds and RV lower head welds at Cooper. Inservice examination requirements for Class 1 welded components are specified in Table IWB-2500-1 of the ASME Code, Section XI. Table IWB-2500-1, Examination Category B-A, Item No. B1.12 requires a volumetric examination of the RV longitudinal shell welds, with essentially 100 percent coverage of the volume specified in Figure IWB-2500-3, along the total length of the welds. Table IWB-2500-1, Examination Category B-A, Item Nos. B1.21 and B1.22 require a volumetric examination of the RV lower head meridional and circumferential welds, with

essentially 100 percent coverage of the volume specified in Figure IWB-2500-3, along the accessible length of the welds.

3.6.1 ASME Code, Section XI, Table IWB-2500-1, Examination Category B-A, Item Nos. B1.21 and B1.22 – RV Lower Head Meridional and Circumferential Welds

As discussed above, the ASME Code, Section XI, Table IWB-2500-1, Examination Category B-A, Item Nos. B1.21 and B1.22, require a volumetric examination of the RV lower head meridional and circumferential welds along the accessible length of the welds. The licensee's examinations of the RV lower head meridional welds (welds HMB-BB-1, HMB-BB-2, HMB-BB-3, HMB-BB-4, HMB-BB-5, and HMB-BB-6) covered the lengths of the welds outside the RV support skirt. This is 8.9 percent of the total weld length of the meridional welds, which is the total accessible length of the welds. Access to the lower head meridional welds inside the RV support skirt is not possible. Lower head circumferential weld HMC-BB-1 received full coverage along 100 percent of its length due to its location outside the RV support skirt. However, lower head circumferential weld HMD-BB-1 received no examination coverage due to its inaccessible location inside the RV support skirt. The NRC staff determined that, based on its review of the information and drawings provided by the licensee, the examination coverage obtained for the subject lower head welds was the maximum achievable coverage because access to these welds for examination inside of the RV support skirt is not possible due to the presence of the lower head control rod drive and instrument penetrations. No recordable indications were observed during these examinations.

The NRC staff found that the licensee's volumetric examinations of all portions of the RV lower head meridional and circumferential welds outside the RV support skirt have met the ASME Code, Section XI, IWB-2500, Examination Category B-A, Item No. B1.22, requirements for the fourth 10-year interval ISI program because the subject examinations covered 100 percent of the accessible length of these welds, as required by the ASME Code, Section XI. The staff concludes that, based on its review of the information and drawings provided by the licensee, the portions of the RV lower head meridional and circumferential welds inside the RV support skirt are inaccessible for volumetric examination due to the presence of the lower head control rod drive and instrument penetrations and, therefore, do not require examination under the ASME Code, Section XI. The ASME Code Committees recognize the limitations of examining these welds and specifically stated in this particular ASME Code requirement to examine the "accessible length" of the welds. The licensee noted in its relief that it did examine the subject welds to the extent practical and that there were no recordable indications detected. Therefore, the licensee met the ASME Code requirements for these welds and does not require relief.

3.6.2 ASME Code, Section XI, Table IWB-25-000-1, Examination Category B-A, Item No. B1.12 – RV Longitudinal Shell Welds

The NRC staff previously granted relief for the limited scope volumetric examinations of the subject RV longitudinal shell welds (Welds VLA-BA-2, VLA-BA-3, VLB-BA-1, VLB-BA-3, VLC-BB-1) through its approval of Request RI-06, Revision 0, in an SE dated April 26, 2010.

The licensee provided a discussion of the access limitations that prevented 100 percent volumetric examination coverage of the subject RV longitudinal shell welds. Specifically,

manual ultrasonic scans of the shell welds from the outer diameter of the RV were restricted due to physical constraints imposed by the biological shield and RV insulation supports. Automated ultrasonic scans from the inner surface of the RV were restricted due to constraints imposed by various RV internal components. The NRC staff noted that the licensee's discussion of these access limitations is identical to the discussion provided in Revision 0 of Request RI-06.

The NRC staff also noted that, for the subject RV longitudinal shell welds, the limited scope examinations described in Revision 0 and Revision 1 of Request RI-06 both refer to the same ISI performed during RFO 24. Specifically, the percentage volumetric examination coverages achieved by the licensee for these RV longitudinal shell welds, as shown in Table RI-06-1 of RI-06, Revision 1, are identical to the examination coverages specified in Request RI-06, Revision 0.

The NRC staff determined that the licensee's basis for relief and limited scope alternative examinations for the subject RV longitudinal shell welds, as described in RI-06, Revision 1, are identical to those described in RI-06, Revision 0, and in fact, both revisions of RI-06 refer to the same set of limited scope longitudinal shell weld examinations. Furthermore, both Revision 0 and Revision 1 of Request RI-06 are applicable to the fourth 10-year ISI interval program at Cooper, and the ASME Code, Section XI, Table IWB-2500-1 longitudinal shell weld inservice examination requirements are therefore the same for the two revisions of Request RI-06. Therefore, the staff concludes that its basis for granting relief for the subject RV longitudinal shell welds remains unchanged from that discussed in its SE dated April 26, 2010, for Request RI-06, Revision 0; therefore, a separate evaluation is not required based on the above summary. Accordingly, the staff concludes that relief for the subject RV longitudinal shell welds continues to remain in effect pursuant to 10 CFR 50.55a(g)(6)(i) for the duration of the fourth 10-year ISI interval at Cooper.

Based on the above considerations, the NRC staff determined that the ASME Code, Section XI, requirement to perform volumetric examinations of the subject RV longitudinal shell welds, with essentially 100 percent coverage, is impractical for Cooper. The staff determined that the licensee's limited volumetric examinations provide reasonable assurance of continued structural integrity for RV longitudinal shell welds VLA-BA-2, VLA-BA-3, VLB-BA-1, VLB-BA-3, and VLC-BB-1. As discussed above, the staff determined that relief is not required for RV lower head meridional welds HMB-BB-1, HMB-BB-2, HMB-BB3, HMB-BB-4, HMB-BB-5, and HMB-BB-6 and lower head circumferential weld HMD-BB-1 because the licensee fully examined all accessible potions of these welds, as required by the ASME Code, Section XI.

4.0 CONCLUSION

Based on the above, including the evaluation documented in the SE dated April 26, 2010, for Request RI-06, Revision 0, the NRC staff concludes that the applicable ASME Code, Section XI, examination requirements are impractical for the subject Class 1 RV longitudinal shell welds at Cooper. Furthermore, the staff concludes that the licensee's alternative examinations provide reasonable assurance of structural integrity for the subject components.

Therefore, pursuant to 10 CFR 50.55a(g)(6)(i), the NRC staff's approval of Request RI-06, Revision 0, remains in effect for the fourth 10-year interval ISI program at Cooper, and the granting of relief for the subject RV longitudinal shell welds based on the review of Request RI-06, Revision 1, is not required. Relief is also not required for the subject RV lower head meridional and circumferential welds because the licensee has satisfied the ASME Code, Section XI, examination requirements. The NRC staff has determined that continuing approval of Request RI-06, Revision 0, 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 that could result if the requirements were imposed.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved in the subject request for relief remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: C. Sydnor

Date: November 15, 2012

The detailed results of the NRC staff review are provided in the enclosed safety evaluation. If you have any questions concerning this matter, please contact Ms. L. Wilkins of my staff at (301) 415-1377 or via e-mail at Lynnea.Wilkins@nrc.gov.

Sincerely,

/RA by CF.Lyon for/

Michael T. Markley, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-298

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