

August 23, 2006

Mr. Randall K. Edington
Vice President-Nuclear and CNO
Nebraska Public Power District
P.O. Box 98
Brownville, NE 68321

SUBJECT: COOPER NUCLEAR STATION RE: FOURTH 10-YEAR INTERVAL
INSERVICE INSPECTION REQUEST FOR RELIEF RI-37 (TAC NO. MD0323)

Dear Mr. Edington:

By letter dated February 24, 2006, Nebraska Public Power District (the licensee) submitted Relief Request RI-37, which involved the use of American Society of Mechanical Engineers (ASME) Code Case N-686, "Alternative Requirements for Visual Examinations, VT-1, VT-2, and VT-3" at the Cooper Nuclear Station. The approval of Code Case N-686 was requested because the NRC has not yet endorsed Code Case N-686 for generic use in its Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1."

Based on the enclosed safety evaluation, Relief Request RI-37 is authorized pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(a)(3)(ii), on the basis that compliance with the specified requirements would cause hardship or unusual difficulty without a compensating increase in the level of quality and safety and, therefore, the use of Code Case N-686 is authorized for use at the Cooper Nuclear Station for the fourth 10-year inservice inspection interval or until Code Case N-686, "Alternative Requirements for Visual Examinations, VT-1, VT-2, and VT-3," is approved for general use by reference in Regulatory Guide (RG) 1.147. After that time, if the licensee intends to continue use of the code case, it must follow the conditions, if any, specified in the RG.

Sincerely,
/RA/

David Terao, Chief
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-298

Enclosure: Safety Evaluation

cc w/encl: See next page

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION
RELATED TO THE INSERVICE INSPECTION PROGRAM
REQUEST FOR RELIEF NO. RI-37
COOPER NUCLEAR STATION
NEBRASKA PUBLIC POWER DISTRICT
DOCKET NO. 50-298

1.0 INTRODUCTION

By letter dated February 24, 2006, Nebraska Public Power District (NPPD, the licensee) requested pursuant to paragraph 50.55a(a)(3)(ii) of Title 10 of the *Code of Federal Regulations* (10 CFR) an approval of Relief Request RI-37 which involved the use of American Society for Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Case N-686, "Alternative Requirements for Visual Examinations, VT-1, VT-2, and VT-3" at Cooper Nuclear Station (CNS). The approval of Code Case N-686 was requested because the Nuclear Regulatory Commission (NRC) has not yet endorsed Code Case N-686 for generic use in Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability, ASME Section XI, Division 1." ASME Code, Section XI, 2001 Edition, 2003 Addenda is the inservice inspection (ISI) code of record for the CNS fourth 10-year ISI Interval which commenced on March 1, 2006.

2.0 REGULATORY EVALUATION

Paragraph 50.55a(g) of 10 CFR specifies that ISI of nuclear power plant components shall be performed in accordance with the requirements of the ASME Code, Section XI, except where specific written relief has been granted by the Commission pursuant to 10 CFR 50.55a(g)(6)(i). Paragraph 50.55a(a)(3) of 10 CFR states that alternatives to the requirements of paragraph (g) may be used, when authorized by the NRC, if (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. Paragraph 50.55a(g)(5)(iii) of 10 CFR states that if the licensee has determined that conformance with certain code requirements is impractical for its facility, the licensee shall notify the Commission and submit, as specified in Section 50.4, to support the determinations.

The information provided by the licensee in support of the request has been evaluated by the NRC staff and the bases for disposition are documented in Section 4.0 below.

3.0 BACKGROUND

3.1 Licensee's Evaluation

3.1.1 Components for which Relief is Requested

Various Components involving Code Classes 1, 2, and 3

Examination Categories: B-G-1, B-G-2, B-L-2, B-M-2, B-N-1, B-N-2, B-P, C-B, C-H, D-A, D-B, F-A

Item Numbers: B6.10, B6.50, B6.130, B6.140, B6.160, B6.170, B6.190, B6.200, B6.220, B6.230, B7.10, B7.40, B7.50, B7.60, B7.70, B12.20, B12.50, B13.10, B13.20, B13.30, B13.40, B15.10, C2.33, C7.10, D1.10, D1.20, D1.30, D1.40, D2.10, F1.10, F1.20, F1.30, F1.40

3.1.2 Code Requirements from which Relief is Requested

ASME Code Section XI, 2001 Edition, 2003 Addenda, paragraphs IWA-2210 through IWA-2213 and Table IWA-2210-1 (as modified by Erratum of December 2003)

IWA-2210, "Visual Examinations," states that visual examinations shall be conducted in accordance with Section V, Article 9, Table IWA-2210-1, and the following:

- (a) A written procedure and report of examination results is required.
- (b) For procedure demonstration, a test chart containing text with some lower case characters without an ascender or descender (e.g., a, c, e, o) meeting Table IWA-2210-1 is required. Measurements of the test chart shall be made once before initial use with an optical comparator (10X or greater) or other suitable instrument to verify that the height of a representative lower case character without an ascender or descender, for the selected type size, meets the requirements of Table IWA-2210-1.
- (c) Remote examination may be substituted for direct examination. The remote examination procedure shall be demonstrated to resolve the selected test chart characters.
- (d) Alternatives to the direct visual examination distance requirements of Section V may be used as specified in Table IWA-2210-1.
- (e) It is not necessary to measure illumination levels on each examination surface when the same portable light source or similar installed lighting equipment is demonstrated to provide the illumination specified in Table IWA-2210-1 at the maximum examination distance.
- (f) The adequacy of the illumination levels from battery powered portable lights shall be checked before and after each examination or series of examinations, not to exceed 4 hr [sic] between checks. In lieu of using a

light meter, these checks may be made by verifying that the illumination is adequate (i.e., no discernable degradation in the visual examination resolution of the procedure demonstration test chart characters).

IWA-2211, "VT-1 Examination," states:

VT-1 examinations are conducted to detect discontinuities and imperfections on the surfaces of components, including such conditions as cracks, wear, corrosion, or erosion.

IWA-2212, "VT-2 Examination," states:

(a) VT-2 examinations are conducted to detect evidence of leakage from pressure retaining components, with or without leakage collection systems, as required during the conduct of system pressure test.

(b) VT-2 examinations shall be conducted in accordance with IWA-5000. For direct examination, the Table IWA-2210-1 maximum examination distance shall apply to the distance from the eye to the surfaces being examined.

IWA-2213, "VT-3 Examination," states:

VT-3 examinations are conducted to determine the general mechanical and structural condition of components and their supports by verifying parameters such as clearances, settings, and physical displacements; and to detect discontinuities and imperfections, such as loss of integrity at bolted or welded connections, loose or missing parts, debris, corrosion, wear, or erosion. VT-3 includes examinations for conditions that could affect operability or functional adequacy of snubbers and constant load and spring-type supports.

Table IWA-2210-1:

Visual Examination	Minimum Illumination, ¹ fc	Maximum Direct Examination Distance, ft (mm)	Maximum Procedure Demonstration Lower Case Character Height, in. (mm)
VT-1	50	2 (609.6)	0.044 (1.1)
VT-2	15	6 (1829)	0.158 (4)
VT-3	50	4 (1219)	0.105 (2.7)

NOTE:

- (1) Resolution of the specified characters can be used in lieu of illumination measurement to verify illumination adequacy.

3.1.3 Licensee's Reason for Request

The 1989 Edition of ASME Code, Section XI, which was the applicable ASME Code for the CNS third 10-year interval, did not specify distance and illumination requirements for VT examinations. ASME Code Case N-686 was incorporated into ASME Section XI, 2001 Edition, 2003 Addenda (Sections IWA-2210 through 2213, including Table IWA 2211-1). In December 2003, an Erratum was issued which restored the Code back to the 2002 Addenda version, which specifies distance and illumination requirements. Subsequently, Code Case N-686 was incorporated into the 2004 Edition 2005 Addenda of ASME Code, Section XI. However, the applicable code edition and addenda for CNS is ASME Code, Section XI, 2001 Edition, 2003 Addenda, which specifies distance and illustration requirements because of changes made as a result of the Erratum of December 2003.

At CNS, in order to meet the distance requirements and to gain access to areas to complete VT-2 and VT-3 visual examinations in accordance with IWA-2210 through IWA-2213 and Table IWA-2210-1, remote visual equipment would have to be used, or scaffolding would have to be erected and removed, increasing radiation exposure to plant personnel. Therefore, meeting the Code requirement would cause a hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii) relief is requested to use ASME Code Case N-686, "Alternate Requirements for Visual Examinations, VT-1, VT-2, and VT-3, Section XI, Division 1." Code Case N-686 was approved by ASME on February 14, 2003, to provide alternative examination requirements to those stated in ASME Code, Section XI, IWA-2210 through IWA-2213 and Table IWA-2210-1, when performing VT-1, VT-2, and VT-3 visual examinations.

3.1.4 Proposed Alternative and Basis for Use

CNS is proposing to use the provisions in Code Case N-686, without exception, in lieu of IWA-2210 through IWA-2213 and Table IWA-2210-1 when performing VT-1, VT-2, and VT-3 visual examinations.

Table 1 of Code Case N-686:

Visual Examination	Minimum Illumination fc [Note (1)]	Maximum Direct Examination Distance, ft (mm)	Maximum Height, in. (mm) for Procedure Demonstration Characters [Note (2)]
VT-1	50	2 (600)	0.044 (1.0)
VT-3	50	N/A	0.105 (3.0)

NOTES:

- (1) Resolution of the specified characters can be used in lieu of illumination measurement to verify illumination adequacy.
- (2) For procedure demonstration, a test chart or card containing text with some lower case characters, without an ascender or descender (e.g., a, c, e, o), that meet the specified

height requirements is required. Measurement of the test chart or card shall be made once before its initial use with an optical comparator (10X or greater) or other suitable instrument to verify that the height of the lower case characters without an ascender or descender meets the specified requirements.

The licensee's basis for use is described below:

There is no significant difference in VT-1 requirements that are included in ASME Code, Section XI, and those stated in ASME Code Case N-686. The only difference in the VT-1 examination is that the metric system for distance has been rounded off (slightly different numbers) in Code Case N-686.

The visual VT-2 examination performed during the Class 1 system leakage test is typically performed after a refueling outage when the unit is at reactor pressure and temperature. Table IWA-2210-1 requires the examiner to be within 6 feet of the surfaces being examined or use remote examination equipment that provides demonstrated equivalent resolution. For an examiner to be within 6 feet of the surfaces being examined would require the erection of scaffolding to perform a system pressure test because the piping runs for certain systems may be 20 to 30 feet above the floor. The plant personnel required to erect and take down the scaffolding or the additional plant personnel required to perform remote examinations (for example, personnel to install or hold a light source if the examiner used binoculars) would receive unnecessary radiation exposure. However, ASME Code Case N-686 allows the examiner to conduct VT-2 examinations to detect evidence of leakage from pressure retaining components without a distance limitation and prescribes examinations in accordance with IWA-5000.

Table IWA-2210-1 also requires a minimum illumination level of 15 footcandles for a VT-2 examination. In order to meet this illumination level, temporary light may have to be provided which, again, involves more plant personnel and causes additional radiation exposure. Experience has shown, however, that there are other effective techniques and tools for locating leakage. For example, when water is illuminated with a flashlight it has a "mirror effect" or shiny reflective area, allowing leaks to be located from distance greater than 6 feet. Therefore, a VT-2 examination using a flashlight provides a level of quality equivalent to performing the examination with general illumination of 15 footcandles.

A VT-3 examination is conducted to determine the general mechanical and structural condition of a component or a component support. Table IWA-2210-1 requires the examiner to be within four feet of the surfaces being examined or use remote examination equipment that provides demonstrated equivalent resolution. Again, the piping runs for certain systems may be 20 to 30 feet above the floor. This would require the erection of scaffolding to perform a visual examination of a component support. In addition, as discussed above, the use of remote examination equipment involves more plant personnel.

The industry has over 30 years of experience performing visual examinations to the less prescriptive requirements for proximity and illumination, and examiners are fully qualified in accordance with IWA-2300, "Qualifications of Nondestructive Examination Personnel."

Experience, training, and qualifications of visual examiners provide reasonable assurance that they will apply the appropriate illumination and distance requirements required to perform quality examinations.

The specific requirements of IWA-2210 through IWA-2213 and Table IWA-2210-1 will cause a hardship or unusual difficulty without a compensating increase in the level of quality and safety because of ALARA considerations. Thirty years of industry experience performing system pressure tests demonstrates that an equivalent level of quality and safety can be achieved by performing VT-2 examinations at distances well in excess of 6 feet and VT-3 examinations at distances well in excess of 4 feet. These time-proven methods for conducting visual examinations will continue to provide reasonable assurance of structural integrity while preventing plant personnel from receiving excessive radiation exposure.

Therefore, pursuant to 10 CFR 50.55a(a)(3)(ii), NPPD requests authorization to use ASME Code Case N-686 in lieu of ASME Code IWA-2210 through IWA-2213 and Table IWA-2210-1 requirements.

4.0 TECHNICAL EVALUATION

The licensee stated that the 1989 Edition of ASME Section XI, was the applicable ASME Code of record for the CNS third 10-year interval. The 1989 Edition of ASME Code, Section XI, did not specify distance or illumination requirements for VT examinations. The 1989 Edition of the ASME Code has been approved by the NRC staff. The applicable code edition and addenda for the CNS fourth 10-year ISI is ASME Code, Section XI, 2001 Edition, 2003 Addenda, which includes the Erratum provisions. The 2001 Edition, 2003 Addenda specifies distance and illumination requirements for VT examinations. The 2001 Edition of the ASME Code has also been approved by the NRC staff.

The licensee also stated that in order to meet the distance requirements and to gain access to areas to complete VT-2 and VT-3 visual examinations required by ASME Code, Section XI, paragraphs IWA-2210 through IWA-2213 and Table IWA-2210-1, remote visual equipment would have to be used or scaffolding would need to be erected and removed to perform the VT examinations. Erecting and removal of scaffolding would cause additional radiation exposure to plant personnel.

The NRC staff reviewed the licensee's request to use ASME Code Case N-686 in lieu of the requirements of ASME Code, Section XI, paragraphs IWA-2210 through IWA-2213 and Table IWA-2210-1 and finds it acceptable. The staff has determined that the minimum illumination level and maximum direct examination distance need not be specified in order to perform effective VT-2 examinations. A VT-2 examination is conducted to detect evidence of leakage, and such leakage can be detected effectively beyond the Code-specified minimum distance. Leakage can also be detected well under the Code-specified minimum illumination level. Even if the general illumination level in the general building area of interest is below the minimum specified illumination level, supplemental spot lighting, if necessary, can be utilized.

For a VT-3 examination, Code Case N-686 eliminates the maximum direct examination distance requirement. A VT-3 examination is performed to determine the general mechanical and structural condition of components and their supports, such as physical displacement,

general deformation, corrosion, and missing or loose parts. Experience has shown that such conditions and degradation can be detected effectively at distances greater than the Code-required maximum distance criteria.

5.0 CONCLUSION

The NRC staff concludes that compliance with the specified requirements would cause hardship or unusual difficulty without a compensating increase in the level of quality and safety, and that the licensee has proposed an acceptable alternative to the requirements of ASME Code Section XI, 2001 Edition, 2003 Addenda, paragraphs IWA-2210 through IWA-2213 and Table IWA-2210-1. Therefore, the use of Code Case N-686 is authorized for use at the CNS for the fourth 10-year inservice inspection interval or until Code Case N-686, "Alternative Requirements for Visual Examinations, VT-1, VT-2, and VT-3," is approved for general use by reference in Regulatory Guide 1.147. After that time, if the licensee intends to continue use of the code case, it must follow the conditions, if any, specified in the regulatory guide.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved in Relief Request RI-37 remain applicable, including third party review by the Authorized Nuclear Inservice Inspector.

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Date: August 23, 2006

Cooper Nuclear Station

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