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NLS2005003
January 5, 2005

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Response to Request for Additional Information Regarding Relief Request RI-35 Cooper Nuclear Station, NRC Docket No. 50-298, DPR-46

Reference:

1. Letter to R. Edington (Nebraska Public Power District) from U.S. Nuclear Regulatory Commission dated December 3, 2004, "Request for Additional Information On Relief Request RI-35, Repair of Reactor Pressure Vessel Control Rod Drive Nozzle-To-Cap Weld (TAC No. MC4954)."

2. Letter to U. S. Nuclear Regulatory Commission from R. Edington (Nebraska Public Power District) dated October 25, 2004, "Inservice Inspection Relief Request RI-35" (NLS2004125).

The purpose of this letter is for the Nebraska Public Power District (NPPD) to respond to the Request for Additional Information provided in Reference 1 by the Nuclear Regulatory Commission (NRC) regarding the previously submitted Relief Request of Reference 2.

Question 1 *The October 25, 2004, submittal states that the welder and welding procedures will be qualified to use the shielded metal arc welding process. However, the deposition of the Alloy 52 requires the use of the gas tungsten arc welding (GTAW) process. Is the licensee planning to use welder and welding procedures qualified to use the GTAW process? If so, explain the difference.*

Response: Shielded Metal Arc Welding will be used for a seal weld or any local repairs, if required, before applying the weld overlay. The overlay itself will be deposited using GTAW. Welding procedures and personnel qualifications will be in accordance with the applicable ASME Section XI and Section IX requirements and any additional requirements of the cited code cases.

Question 2: *Provide a diagram/sketch showing the control rod drive return nozzle-to-cap weld and the proposed weld overlay configuration.*

Response: Enclosure 1 provides a conceptual drawing of the proposed repair. The following additional information is provided per the Staff's request:

1. Cap material & dimension - SB-166, NI-CR-FE, 5.25 inches minimum Outer Diameter, 3.948 ± 0.010 inches Inner Diameter.

A047

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2. The nozzle material, wall thickness and outside diameter - SA508 Class 2, 1.353 inches Wall Thickness (excludes 0.22 inches stainless steel clad), 5.25 inches Outer Diameter.

3. The operating pressure - nominal 1005 psig, 1275 psig design

4. The operating temperature - nominal 547°F, 575°F design

Question 3: *Section (g)(2) of Code Case N-504-2 specifies that the evaluation of the repaired weld consider residual stresses produced by the weld overlay with the other applied loads on the system. The effects of water backing on the repair weld shall be considered. Section (g)(3) of Code Case N-504-2 specifies that the welds and components meet the applicable stress limits of the construction code.*

a. *What is the construction code that was used to satisfy the evaluation requirements in Sections (g)(2) and (g)(3) of the Code Case?*

b. *Provide a description of the methodology used to determine residual stresses and shrinkage effects.*

c. *Provide a list and a description of the calculations used for determining the length and thickness of the weld overlay.*

d. *Provide a table comparing the current licensing basis primary and primary-plus-secondary stresses, and the primary and primary-plus-secondary stresses at the location of the highest stress regions resulting from the installation of the weld overlay. Show that the component and the weld meet the applicable stress limits of the Cooper construction code, as required by the Code Case.*

e. *Provide the largest ASME Section III fatigue cumulative usage factor and its location in the region with and without the weld overlay, considering all applicable thermal and mechanical transients.*

Response: 3a. The Reactor Pressure Vessel was designed and constructed to ASME Section III, 1965 Edition, 1966 Addenda. The piping was designed to ANSI/ASME B31.1-1967 and installed to B31.7-1969. The Control Rod Drive (CRD) Cap was designed and installed to ASME Section III, 1974 through Winter 1975 Addenda.

3b. The end cap at Cooper is a free end, with no attached piping. Consequently, shrinkage of the weld overlay material upon cooling will have no effect on any other component, and so it is not necessary to perform a shrinkage analysis following repair application. Residual stresses at the weld overlay location have no effect on other components in the system, and, being steady state, secondary stresses do not affect Code acceptability of the repaired location.

Residual stresses would potentially affect Inter-Granular Stress Cracking Corrosion growth in a susceptible material, but the Alloy 52 weld material is not considered to be susceptible, and no credit is taken for the underlying base materials. Residual stresses, being steady state stresses, would only act as mean stresses for consideration of fatigue crack growth. Therefore, it was not necessary to separately evaluate weld residual stresses for this repair.

3c. The weld overlay reinforcement thickness was calculated using Structural Integrity (SI) proprietary software, pc-CRACK, SI calculation COOP-17Q-301: "Weld Overlay Design for CRD Return Line Nozzle Cap Weld". The methodology is consistent with ASME Section XI, IWB-3640 and Code Case N-504.

3d. The Cooper CRD end cap stress report (GE 22A5561, Rev. 0, 9/30/77) lists the maximum primary stress intensity as 5.8 ksi, compared to an allowable Sm of 23.3 ksi. This is entirely due to pressure. No other mechanical loads apply to the end cap, since it is not connected to any other mechanical components. The axial stress due to pressure is reported as 2.3 ksi. Design of the weld overlay using the methods of ASME Section XI, IWB-3640 and Appendix C consider all primary stresses in meeting the design criteria.

3e. The cumulative usage factor for the original design for the nozzle is 0.022. Since the capping of the nozzle eliminated the weight of the CRD return piping and most thermal stresses, this was considered a bounding limit for the cap. Application of the weld overlay repair will not adversely affect this value.

Should you have any questions concerning this matter, please contact Mr. Paul Fleming at (402) 825-2774.

Sincerely,

Randall K. Edington

Randall K. Edington
Vice President - Nuclear and
Chief Nuclear Officer

/wrv

Enclosure

cc: Regional Administrator w/enclosure
USNRC - Region IV

Senior Project Manager w/enclosure
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/enclosure
USNRC

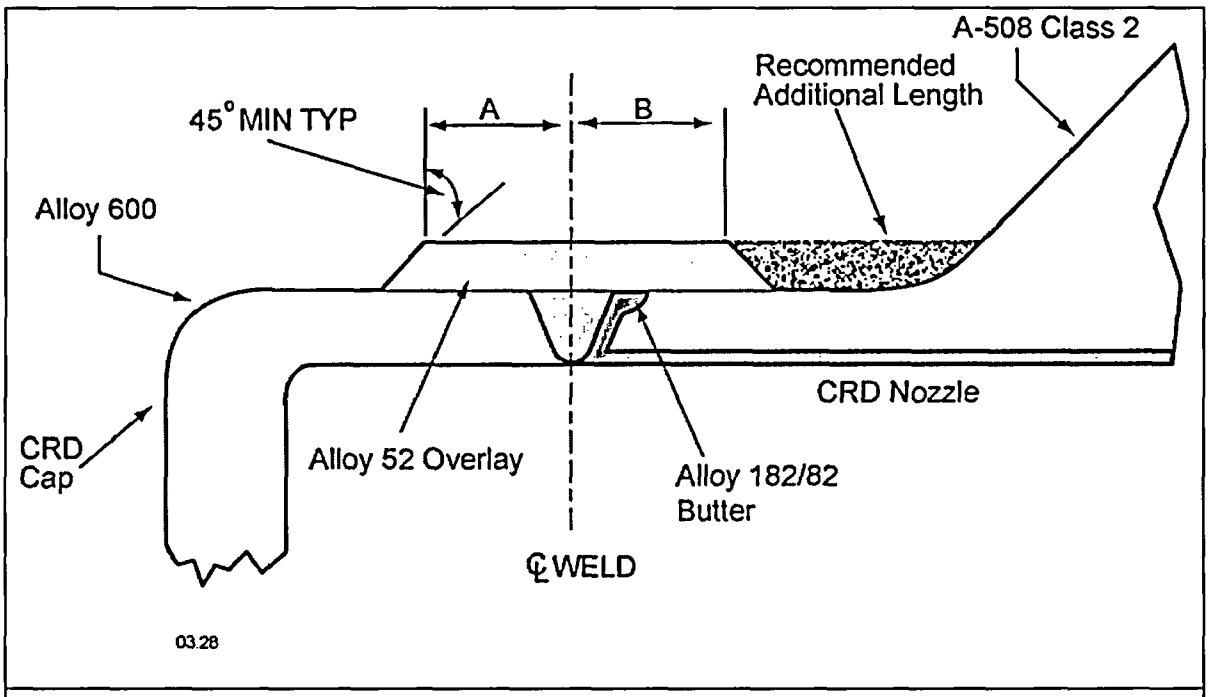
NPG Distribution w/o enclosure

Records w/enclosure

ENCLOSURE 1

Drawing of Weld Overlay Design

From Structural Integrity Report SIR-04-106



WELD NUMBER	FLAW CHARACTERIZATION	Design Dimensions			COMMENTS
		t	A	B	
CRD Hydraulic Return Cap Weld	Assumed 360° Circ. 100% throughwall flaw	0.25" see Note 4	1.0" MIN	1.0" MIN	Recommend Blend Into Nozzle

0	HLG / 9/7/04	AJG / 9/7/04	HLG / 9/7/04	
Revision	Prepared by/Date	Checked By/Date	Approved by/Date	COMMENTS

Job No: COOP-17Q File No: COOP-17Q-301	Plant/Unit: Cooper Nuclear Power Station	STRUCTURAL INTEGRITY ASSOCIATES, INC.
Drawing No: COOP-17Q-01	Title: Standard Weld Overlay Design	Sheet 1 of 2

NOTES

1. Component surface is to be examined by dye penetrant method and accepted as clean prior to overlay application.

2. In the event that the original component surface does not pass the note 1 requirements, the final deposited temper bead weld layer is to be examined by dye penetrant method and accepted as clean before proceeding with subsequent layers.

3. Weld overlay wire shall be ERNiCrFe-7 (Alloy 52).

4. The design thickness (0.25 inch) is the minimum thickness beyond the first PT clean surface. (Typo corrected by H L Dexter 1/5/05)

5. Apply as many layers as required to achieve the design overlay thickness "t".

6. Design thickness includes no allowance for surface conditioning operations to facilitate UT inspection.

7. Design length is that required for structural reinforcement; greater length may be required for effective UT inspection. This is to be determined in the field.

Job No: COOP-17Q File No: COOP-17Q-301	Plant/Unit: Cooper Nuclear Power Station	STRUCTURAL INTEGRITY ASSOCIATES, INC.	
Drawing No: COOP-17Q-01	Title: Standard Weld Overlay Design		Sheet 2 of 2

Correspondence Number: NLS2005003

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing & Regulatory Affairs Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITTED DATE OR OUTAGE
None	