Nebraska Public Power District
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10 CFR 50.55a

NLS2010013
February 5, 2010

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

Subject: 10 CFR 50.55a Request Number RI-36, Revision 0
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dear Sir or Madam:

The purpose of this letter is to request that the Nuclear Regulatory Commission (NRC) grant Nebraska Public Power District (NPPD) relief from certain inservice inspection (ISI) code requirements for Cooper Nuclear Station (CNS) pursuant to 10 CFR 50.55a.

10 CFR 50.55a Request Number RI-36, Revision 0 is applicable to the fourth ten-year ISI interval, which began March 1, 2006. NPPD requests NRC approval of the attached request by February 8, 2011, which represents a standard twelve-month review period following the submittal. Approval of this request is needed to support weld repair work, if needed, for Refueling Outage 26.

This request is very similar to RI-35, Revision 1, approved by the NRC in the Safety Evaluation provided August 15, 2008 for Refueling Outage 24.

RI-36, Revision 0 is contained in the attachment to this letter.

If you have any questions concerning this matter, please contact David Van Der Kamp, Licensing Manager, at (402) 825-2904.

Sincerely,

Brian J. O'Grady
Site Vice President

/dm

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A047
NRR

Attachment

cc: Regional Administrator w/ attachment
USNRC - Region IV

Cooper Project Manager w/ attachment
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/ attachment
USNRC - CNS

NPG Distribution w/ attachment

CNS Records w/ attachment

10CFR 50.55a Request Number RI-36, Revision 0
Alternative Weld Overlay Repairs for Dissimilar Metal Welds Joining Nozzle to Control Rod Drive End Cap

Cooper Nuclear Station
Docket No. 50-298, DPR-46

Proposed Alternative
in Accordance to 10CFR50.55a(a)(3)(i)

--Alternative Provides Acceptable Level of Quality and Safety--

Applicable Code Components Affected

Code Class:	1
Examination Categories:	B-F
Item Number:	B5.10
Component Numbers:	RCA-BF-1, 5 inch Control Rod Drive Return Cap to Nozzle N9 Weld

Applicable Code Edition and Addenda

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

Applicable Code Requirement

IWA-4421(a) and IWA-4611.1(a) require removal of the detected flaw.

IWA-4610(a) requires that the area to be welded shall be pre-heated to 300°F minimum for gas tungsten arc welding (GTAW).

IWA-4610(a) also requires the use of thermocouples to monitor process temperatures.

IWA-4631(b) specifies the surface of the completed weld on the ferritic steel shall not exceed 100 square inches.

IWA-4633.2(c) specifies the first three layers of the weld shall be deposited with heat inputs within ±10% of that used in the procedure qualification test. Subsequent layers shall be deposited using heat input equal to or less than that used for layers beyond the third in the procedure qualification.

IWA-4633.2(c) also specifies that at least one layer of weld reinforcement shall be deposited and then this reinforcement shall be removed, to be substantially flush with the surface surrounding the weld.

Appendix VIII provides requirements for performance demonstration for ultrasonic examination systems. Supplement 11 provides qualification requirements for full structural overlaid wrought austenitic piping welds.

Reason for Request

Pursuant to 10 CFR 50.55a, "Codes and Standards," Paragraph (a)(3), relief is requested from the requirements of ASME Code Section XI requirements. The request is based upon restoring the structural integrity of the nozzle to control rod drive end cap weld joint by applying a full structural weld overlay over the weld joint using technically sound welding practices and non-destructive examination (NDE), while limiting repair personnel exposure to the maximum extent practical. Currently, there exist no generically accepted Code approved criteria for a licensee to apply a full structural weld overlay to dissimilar metal welds involving nickel alloys such as Alloy 600, 82 and 182 at ambient temperature.

The following cited ASME Section XI articles identify the actions that would be required if a repair is performed in accordance with the Code without exception:

IWA-4421(a) and IWA-4611.1(a) require removal of the detected flaw. The repair cavity would extend through-wall since outer diameter (OD) removal would be required. Internal diameter (ID) removal of the indication and subsequent weld repair would be impractical due to the need to drain the vessel to perform the repair, and the resultant radiation levels would present unacceptable exposure burden.

IWA-4610(a) requires that the area to be welded shall be pre-heated to 300°F minimum for GTAW. Since the nozzle will remain full of water, establishing the 300°F minimum pre-heat temperature cannot be achieved.

IWA-4610(a) also requires the use of thermocouples to monitor process temperature. Due to the personnel exposure associated with the installation and removal of the thermocouples, the nozzle configuration, and because the nozzle will be full of water, a contact pyrometer will be used, in lieu of thermocouples, to provide equivalent temperature monitoring capabilities.

IWA-4631(b) specifies the surface of the completed weld on the ferritic steel shall not exceed 100 square inches. Restoring the structural integrity with the weld overlay of the end cap-to-nozzle weld may require welding on more than 100 square inches of surface on the low alloy steel base material.

IWA-4633.2(c) specifies the first three layers of the weld shall be deposited with heat inputs within ±10% of that used in the procedure qualification test. Subsequent layers shall be deposited using heat input equal to or less than that used for layers beyond the third in the procedure qualification. Code Case N-638-1 (Reference 3) allows for layers beyond the third to exceed the heat input, provided it is in accordance with the procedure qualification records (PQRs).

IWA-4633.2(c) also specifies that at least one layer of weld reinforcement shall be deposited and then this reinforcement shall be removed, to be substantially flush with the surface surrounding the weld. The weld reinforcement will not be removed flush to the surface.

Appendix VIII provides requirements for performance demonstration for ultrasonic examination systems. Supplement 11 provides qualification requirements for full structural overlaid wrought austenitic piping welds. Appendix VIII, Supplement 11 cannot be implemented as written for ultrasonic examination of structural weld overlay repair.

Code Case N-504-3

- Code Case N-504-3 was prepared specifically to apply a weld overlay to austenitic stainless steel material. An alternative was required to implement the N-504-3 weld overlay methodology due to the specific materials and configuration of the existing nickel-based alloy weld and buttering (Alloy 82 and Alloy 182) and Alloy 600 cap.

- Code Case N-504-3, Requirement (b), requires that the weld overlay shall be low carbon (0.035 percent maximum) austenitic stainless steel. An alternative was required since a nickel-based filler (Alloy 52M) has been selected to be used.

- Code Case N-504-3, Requirement (e), requires that the first two layers of the weld overlay shall have a ferrite content of at least 7.5 FN (Ferrite Number). Cooper Nuclear Station (CNS) does not intend to perform these measurements for this type of overlay on the basis that the nickel-based alloy filler is a fully austenitic material.

- Code Case N-504-3, Requirement (h), specifies that a system hydrostatic test shall be performed in accordance with ASME Section XI, IWA-5000 if the flaw penetrates the original pressure boundary. In the event a flaw becomes through-wall, leak testing in accordance with IWA-5000 will be performed.

Code Case N-638-1

- Code Case N-638-1, paragraph 1.0(a), specifies that the maximum weld area on the finished low alloy steel surface shall be 100 square inches. Restoring the structural integrity of the nozzle to end cap weld will require application of the weld overlay on more than 100 square inches of surface on the low alloy steel base material.

- Code Case N-638-1, paragraph 4.0(b), specifies that the final weld surface and the band around the area (to a width of 1.5 times the thickness of the weld (1.5T) or 5 inches, whichever is less) shall be examined using surface and ultrasonic test (UT) methods, when the completed weld has been at ambient temperature for at least 48 hours. The UT shall be in accordance with ASME Section XI, Appendix I. Full UT examination of the 1.5T band will not be performed.

- Code Case N-638-1, paragraph 4.0(c), specifies that the area from which weld-attached thermocouples have been removed shall be ground and examined using a surface examination method. Thermocouples will not be used. Instead, calibrated pyrometers will be utilized to monitor preheat and interpass temperatures.

Proposed Alternative and Basis for Use

The component for which a full structural weld overlay repair may be needed is identified in the following Table 1. The overlay would entirely replace the original pressure boundary of the dissimilar metal welds identified in Table 1.

Table 1

Component ID	Component Description	Material 1	Material 2	Maximum Surface Area of Weld Overlay (Ferritic side, in^2)
RCA-BF-1	5 inch Control Rod Drive Return Cap to Nozzle N9 Weld	Nozzle: A-508 Class 2	SB-166	260

The full structural weld overlay will be designed consistent with the requirements of the following:

1. NUREG-0313, Revision 2 (Reference 4; implemented by Nuclear Regulatory Commission (NRC) Generic Letter 88-01, Reference 5).

2. Code Case N-504-3 (Reference 2), "Alternative Rules for Repair of Classes 1, 2, and 3 Austenitic Stainless Steel Piping, Section XI, Division 1." Regulatory Guide 1.147, Revision 15 requires the following condition to be met when using Code Case N-504-3:

   "The provisions of Section XI, Non-Mandatory Appendix Q, "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments", must also be met."

   CNS will meet the associated requirements contained in Non-mandatory Appendix Q, 2007 Edition (Reference 7).

3. Code Case N-638-1, "Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique, Section XI, Division 1," (Reference 3), listed in Regulatory Guide 1.147, Revision 15, requires the following condition to be met when using Code Case N-638-1:

   "UT volumetric examinations shall be performed with personnel and procedures qualified for the repaired volume and qualified by demonstration using representative samples which

contain construction type flaws. The acceptance criteria of NB-5330 in the 1998 Edition through 2000 Addenda of Section III apply to all flaws identified in the repair volume."

CNS will implement this limitation.

4. IWB-3640, ASME Section XI 2001, Edition including Addenda through 2003 with Appendix C.

The use of an overlay filler material that provides excellent resistance to stress corrosion cracking (SCC) creates an effective barrier to flaw extension. Also, temper bead welding techniques produce excellent toughness and ductility in the weld heat-affected zone (HAZ) of low alloy steel materials and, in this case, results in compressive residual stresses on the inside surface that help to inhibit further SCC of the original weldment. The design of the overlay for the nozzle to end cap weldment uses methods that are standard in the industry. There are no new or different approaches in this overlay design which would be considered either a first-of-a-kind or inconsistent with previous approaches.

The overlay will be designed as a full structural weld overlay in accordance with Code Case N-504-3. The temper bead welding technique that will be implemented in accordance with Code Case N-638-1 will produce a tough, ductile, corrosion-resistant overlay.

Welder Qualification and Welding Procedures-Use of Alloy 52M

All welders and welding operators will be qualified in accordance with ASME Section IX and any special requirements of ASME XI or applicable code cases. Qualified personnel under the vendor's welding program will perform the weld overlay repair.

A weld procedure specification utilizing machine GTAW (with cold wire feed) for welding SFA-5.14, ERNiCrFe-7A, UNS N06054, F-No. 43 (commercially known as Alloy 52M) will be used. This alloy has nominally 30% chromium, which is significantly greater than Alloy 82 (which nominally contains 20% chromium), and has been accepted by the NRC in NUREG-0313, Revision 2, as a resistant material against intergranular stress corrosion cracking (IGSCC) in the boiling water reactor (BWR).

If repairs to the overlay are required, manual GTAW for welding SFA-5.14, ERNiCrFe-7A, UNS N06054, F-No. 43 (commercially known as Alloy 52M) will be used. In the unlikely event of a through-wall defect, UNS W86152, F No. 43 manual shield metal arc weld rod (commercially known as Alloy 152) will be used to seal any defect if it is greater than 0.125 inch from the P-3 nozzle material before beginning the structural weld overlay using GTAW.

Welding Wire and Electrodes

A consumable nickel based welding wire, highly resistant to SCC, is selected as the weld overlay material. This material, Alloy 52M, contains a nominal 30 wt% Cr level that imparts excellent resistance to SCC. Where localized repairs are required, Alloy 52M will also be used.

Weld Overlay Design

The weld overlay will extend around the full circumference of the end cap to nozzle weldment location in accordance with NUREG-0313, Revision 2, Code Case N-504-3 and Generic Letter 88-01. The overlay length will extend across the projected flaw intersection with the outer surface beyond the extreme axial boundaries of the flaw. The design thickness and length will be determined in accordance with the guidance provided in Code Case N-504-3 (paragraph f(1)) and ASME Section XI, paragraph IWB-3640, 2001 Edition including Addenda through 2003, and Appendix C for the evaluation methodology for flawed pipe. The overlay will completely cover the area of the flaw and other Alloy 182 or susceptible austenitic stainless steel material with the highly resistant Alloy 52M weld filler material. The overlay length conforms to the guidance of Code Case N-504-3, paragraph f(1), which satisfies the stress and load transfer requirements. A sketch of the weld overlay repair to the nozzle to control rod drive cap weld is presented in Figure 1 at the end of this request.

In order to apply the necessary weld overlay geometry, it will be necessary to weld on the low alloy steel nozzle base material. A temper bead welding approach will be used for this purpose following the guidance of ASME Section XI Code Case N-638-1, "Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique." This Code Case provides for fabricating machine GTAW temper bead weld repairs to P-No. 3 Group No. 3 nozzle base material at ambient temperature. The temper bead approach was selected because temper bead welding is an acceptable alternative to the requirement for post-weld heat treatment (PWHT) of the HAZ in welds on low alloy steel material. Also, the temper bead welding technique produces excellent toughness and ductility as demonstrated by welding procedure qualification in the HAZ of welds on low alloy steel materials, and, in this case, results in compressive residual stresses on the inside surface, which assists in inhibiting SCC. This approach provides a comprehensive weld overlay repair and increases the volume under the overlay that can be examined.

Pressure Testing

The completed repair shall be given a system leakage test in accordance with the CNS Section XI Repair/Replacement Program and in accordance with ASME Section XI, IWB-5220, 2001 Edition, 2003 Addenda. In the event an unexpected through-wall defect is identified, either before or during the repair, the hydrostatic pressure test requirements defined in Code Case N-504-3 will not be used since the requirements for the 2001 Edition, 2003 Addenda will be met for this repair activity.

Pre-heat and PWHT Requirements

Pre-heat and PWHT are typically required for welding on low alloy steel material. ASME Section III specifies PWHT on P-No. 3, Group No. 3, base materials unless temper bead welding is performed under limited restrictions (area and depth limits). ASME Section XI, 2001 Edition including Addenda through 2003, IWA-4610(a) specifies 300°F minimum pre-heat be used for temper bead welding. PWHT cannot be performed and the pre-heat requirements would

necessitate draining the reactor pressure vessel (RPV) and a portion of the recirculation system piping. This would result in unacceptable radiation exposure of personnel. Therefore, consistent with As Low As Reasonably Achievable practices and prudent utilization of outage personnel, the RPV will not be drained for this activity. The nozzle and connected cap will be full of water.

Basis for the Alternatives

IWA-4421(a) and IWA-4611.1(a) require removal of the detected flaw. The repair cavity would extend through wall since OD removal would be required. The ID is inaccessible due to the thermal sleeve. Therefore, the flaw will not be removed. Structural weld overlays covering flaws are permitted by Code Case N-504-3 provided the necessary weld overlay geometry is used.

IWA-4610(a) requires that the area to be welded shall be pre-heated to 300°F minimum for GTAW. Since the nozzle will remain full of water, establishing the 300°F minimum pre-heat temperature cannot be achieved. Code Case N-638-1, paragraph 1.0(b), provides for machine GTAW temper bead weld repairs to P-No. 3, Group No. 3, nozzle base material at ambient temperature. The ambient temperature temper bead approach was selected because temper bead welding supplants the requirement for PWHT of the HAZ in welds on low alloy steel material. Also, the temper bead welding technique produces excellent toughness and ductility in the HAZ of welds on low alloy steel materials, as demonstrated by welding procedure qualification. Welding procedure qualifications have been successfully performed using Alloy 52M welds on P-No. 3, Group No.3, base material using the ambient temperature temper bead technique.

IWA-4610(a) also requires the use of thermocouples to monitor process temperatures. Due to the personnel exposure associated with the installation and removal of the thermocouples from the nozzle configuration, and because the water in the associated line will not be drained, thermocouples will not be used to verify that pre-heat and interpass temperature limits are met. In lieu of thermocouples, a contact pyrometer will be used to verify pre-heat temperature and interpass temperature compliance with the welding procedure surveillance (WPS) requirements. The use of a contact pyrometer provides equivalent temperature monitoring capabilities.

IWA-4631(b) specifies the surface of the completed weld on the ferritic steel shall not exceed 100 square inches. Restoring the structural integrity with the weld overlay of the control rod drive end cap to nozzle weld will require welding on more than 100 square inches of surface on the low alloy steel base material. The NRC has accepted the increase on surface area up to 500 square inches for Millstone Power Station Unit 3 by letter from Harold K. Chernoff to David A. Christian dated May 3, 2007 (Reference 8).

In addition, if the 100 square inch surface limit were maintained, the length of weld overlay extension on the nozzle base material would be severely limited on the nozzle side of the joint. This distance could be justified as sufficient to provide load redistribution from the weld overlay back into the nozzle without violating ASME III stress limits for primary local and bending stresses and secondary and peak stresses for some of the joints. However, this length would not permit a complete UT of the outer 25% of the nozzle thickness as specified by Code Case N-

504-3 for this nozzle to end cap configuration. The overlay may extend to the transition taper of the low alloy steel nozzle if this is necessary to provide adequate structural reinforcement and allow necessary NDE personnel access so that qualified UT of the required volume can be performed.

Code Case N-432-1 (Reference 1) allows temper bead welding on low alloy steel nozzles without limiting the temper bead weld surface area. The two additional conditions required by N-432-1, that are not required by Code Case N-638-1, are that temper bead welds have pre-heat applied and that the procedure qualification be performed on the same specification, type, grade, and class of material. As previously discussed, elevated pre-heat necessitates draining of the RPV. This would result in unacceptable radiation exposure to personnel.

IWA-4633.2(c) specifies that the first three layers of the weld shall be deposited with heat inputs within ±10% of that used in the procedure qualification test. Subsequent layers shall be deposited using heat input equal to or less than that used for layers beyond the third in the procedure qualification. Code Case N-638-1 allows for layers beyond the third to exceed the heat input provided it is in accordance with the PQRs.

IWA-4633.2(c) also specifies that at least one layer of weld reinforcement shall be deposited and then this reinforcement shall be removed, to be substantially flush with the surface surrounding the weld. The weld overlay is austenitic and thus, there is no need to remove the final layer. Also, overlays, by definition, cannot be substantially flush with the surrounding surface. Overlays are permitted per Code Case N-504-3. The toe of the weld on the low alloy steel nozzle shoulder will be indexed between layers such that proper HAZ tempering will result.

Code Case N-638-1 is approved (with one limitation) for generic use in Regulatory Guide (RG) 1.147, Revision 15 and was developed for both similar and dissimilar metal welding using ambient temperature machine GTAW temper bead technique. The welding methodology of Code Case N-638-1 will be followed for the overlay, whenever welding within the 0.125-inch minimum distance from the low alloy steel nozzle base material.

Code Case N-504-3 is approved (with one limitation) for generic use in RG 1.147, Revision 15 and was developed for welding on and using austenitic stainless steel material. An alternate application for nickel-based and low alloy steel materials is proposed due to the specific configuration of this weldment. The weld overlay proposed is austenitic material having a mechanical behavior similar to austenitic stainless steel. It is also compatible with the existing weld and base materials.

The methodology of Code Case N-504-3 is to be followed, with the following exception.

Alternative to Code Case N-504-3, Requirement (b)

Code Case N-504-3, Requirement (b), requires the weld overlay shall be low carbon (0.035% maximum) austenitic stainless steel. A consumable welding wire highly resistant to SCC was selected for the overlay material. This material, designated as UNS N06054, FN 43, is a nickel

based alloy weld filler material, commonly referred to as Alloy 52M, and will be deposited using the machine GTAW process with cold wire feed. Alloy 52M contains about 30 wt% chromium, which imparts excellent corrosion resistance to the material. By comparison, Alloy 82 is identified as a SCC-resistant material in NUREG-0313, Revision 2, and contains nominally 20 wt% chromium, while Alloy 182 has a nominal chromium content of 15 wt%. With its significantly higher chromium content than Alloy 82, Alloy 52M provides an even higher level of resistance to SCC consistent with the requirements of the Code Case. Therefore, this alternative provides an acceptable level of quality and safety.

Alternative to Code Case N-504-3, Requirement (e)

Code Case N-504-3, Requirement (e), requires the first two layers of the weld overlay to have a ferrite content of at least 7.5 FN. The composition of nickel-based Alloy 52M is such that delta ferrite does not form during welding, because Alloy 52M welds are 100% austenitic and contain no delta ferrite due to the high nickel composition (approximately 60 wt% nickel).

Consequently, delta ferrite measurements will not be performed for this overlay. Therefore, this alternative provides an acceptable level of quality and safety.

Alternative to Code Case N-504-3, Requirement (h)

Code Case N-504-3, Requirement (h), specifies that a system hydrostatic test shall be performed in accordance with IWA-5000 if the flaw penetrates the pressure boundary. Leak testing in accordance with ASME Section XI (2001 Edition with the 2003 Addenda), IWA-5000 and IWB-2500-1, Category B-P, will be performed. Therefore, this alternative provides an acceptable level of quality and safety.

Alternative to Code Case N-638-1 Paragraph 1.0(a)

Code Case N-638-1, paragraph 1.0(a), specifies that the maximum weld area on the finished surface shall be 100 square inches. Restoring the structural integrity with the weld overlay of the nozzle to end-cap weld will require welding on more than 100 square inches of surface on the low alloy steel base material. The weld overlays could, if needed, cover up to 260 square inches. The maximum surface area is a conservative estimate. The actual surface area is expected to be less, depending on the location of a detected flaw. The NRC has accepted the increase on surface area to 500 square inches for Millstone Power Station Unit 3 (Reference 8).

Code Case N-432-1, "Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temper Bead Technique, Section XI, Division 1," allows temper bead welding on low alloy steel nozzles, without limiting the temper bead weld surface area. The two additional conditions required by N-432-1 that are not required by Code Case N-638-1 are (1) that temper bead welds have preheat applied, and (2) that the procedure qualification be performed on the same specification, type, grade, and class of material. Elevated preheat necessitates draining of the reactor pressure vessel. By removing the water in the nozzle area, and (in vessel) inlet riser,

a large amount of shielding is removed. The radiation dose rates at the weld overlay location would increase, thereby significantly increasing personnel dose.

The ASME Code committees have recognized that the 100 square inches restriction on the surface area is unnecessarily limiting and Code Case N-638-3 has been issued to increase the surface area limit to 500 square inches. The code case attempts to combine the features of Code Cases N-432 and N-638 into a single code case. The supporting analysis for the code case is documented in Electric Power Research Institute (EPRI) Technical Report 1008454, "Expansion of Temper Bead Repair: Proposed Code Case," which concluded that the residual stresses are not detrimentally changed by increasing the surface area of the repair. The technical basis that justifies exceeding 100 square inches of surface area for repair welds is found in EPRI Technical Report 1003616, "Additional Evaluations to Expand Repair Limits for Pressure Vessels and Nozzles," (Reference 6). This technical report describes an ANSYS Finite Element Analysis conducted on the Nine Mile Point Unit 2 feedwater nozzle weld overlay repair. The analysis consisted of modeling the welding processes for both thermal and mechanical aspects. Two overlays were modeled: one was 100 square inches, the other was extended to blend into the nozzle radius to achieve greater than the 100 square inches surface area repair currently permitted by the ASME Code requirements. Comparison of the residual stresses of the two overlays showed that the effect of extending the overlay to the nozzle radius minimally impacted the residual stress profile and, in some cases, slightly increased the beneficial compressive stresses on the nozzle inner diameter.

Alternative to Code Case N-638-1 Paragraph 4.0(b)

Code Case N-638-1, Paragraph 4.0(b), specifies that the final weld surface and band area [1.5T width or 5 inches, whichever is less, per paragraph1.0 (d)] shall be examined using surface and ultrasonic methods when the completed weld has been at ambient temperature for at least 48 hours. Code Case N-638-1 requires that the final post-weld examinations be performed after completion of welding. The alternative is to begin the 48 hour hold period following the completion of the third temper bead weld layer on the ferritic base metal. The 48-hour hold period is invoked specifically to permit delayed hydrogen cracking to occur prior to the final NDE. Extensive industry experience has identified no evidence of delayed hydrogen cracking in nuclear applications involving ambient temperature temper bead welding. Absence of cracking is attributed to use of the GTAW machine welding process, and to the extensive process and quality controls present in nuclear welding applications. Revising the start time for the 48-hour period reduces adverse cost and scheduling impacts, while retaining effective assurance that delayed hydrogen cracking has not occurred.

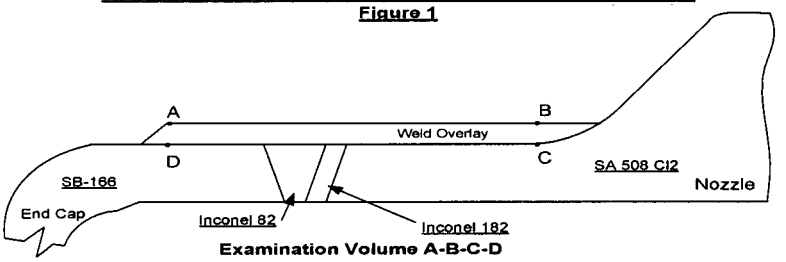
The UT shall be in accordance with ASME Section XI, Appendix I. Surface exams will be performed. IWA-4634 requires UT of the area to be welded only. Any laminar flaws in the weld overlay will be evaluated in accordance with ASME Section XI, Non-mandatory Appendix Q, Paragraph Q-4100 (2007 Edition), except, as allowed by IWB-3132.3 (2001 Ed., 2003 Add.), any flaws that exceed the acceptance standards of Table IWB-3510-1 (2001 Ed., 2003 Add.) are acceptable for continued service, without repair, if an analytical evaluation, performed in accordance with IWB-3600 (2001 Ed., 2003 Add.), meets the acceptance criteria of IWB-3600.

Full UT of the 1.5T band will not be performed. Full ultrasonic examination of the 1.5T band will not be possible due to geometric interferences. The ultrasonic examination may not extend up to the very edge of the overlay. The weld overlay will extend into the blend radius of the nozzle beyond the length required by Code Case N-504-3 for structural reinforcement. This extension into the blend radius eliminates a stress riser on the nozzle and may provide additional surface area for ultrasonic examination of the defect area in the original weld. UT examination on the nozzle beyond the overlay will not provide any information regarding the area of the defect that required repair. Additionally, such UT would likely be unsatisfactory when applied to the nozzle blend radius, where the toe of the weld overlay resides. The UT return signal would be difficult to obtain and to interpret. Figures 1 and 2 identify the extent of coverage expected for scans in the circumferential and axial directions. The full weld overlay surface will be scanned. See Table 2 for the examination summary.

Because this is a surface application of a temperbead welding process (specifically performed to minimize heat input into the ferritic steel nozzle), there is minimal impact to the volume of the ferritic shell nozzle material in the area surrounding the weld overlay. Also, no additional useful information can be gained by a volumetric examination of the area beyond the physical boundaries of the weld overlay. The weld and heat affected zone beneath the weld overlay will be volumetrically examined after welding to ensure that sound weld metal has been deposited and that the process did not introduce flaws into the base material. Surface examinations of the weld overlay surface will be performed (See Figure 3 for the examination area). This is sufficient to verify that defects were not introduced in either the ferritic steel nozzle or Alloy 600 (SB-166) end cap due to welding.

Later editions of Section Xl, as well as Code Case N-638-2, have deleted the requirement for the 1.5T examination band for both ultrasonic examination and surface examination. This is consistent with the less restrictive requirements for ultrasonic examination of the ferritic nozzle because hydrogen cracking away from the temper bead weld is not considered a concern. The NDE requirements in these documents apply to any type of welding where a temperbead technique is to be employed (which includes weld repairs of excavated flaws) and is not specifically written for weld overlay. For the weld overlay type of repair, any ferritic steel base material cracking would occur in the HAZ directly below or adjacent to the weld overlay and not in the 1.5T examination band of ferritic material beyond the edges of the weld overlay. If this type of cracking occurs it will be detected by the NDE of the weld overlay and adjacent ferritic steel surfaces as described in the relief request and non-mandatory Appendix Q. Therefore, this alternative provides an acceptable level of quality and safety.

Weld Overlay Required Ultrasonic (UT) Examination Coverage
Figure 1

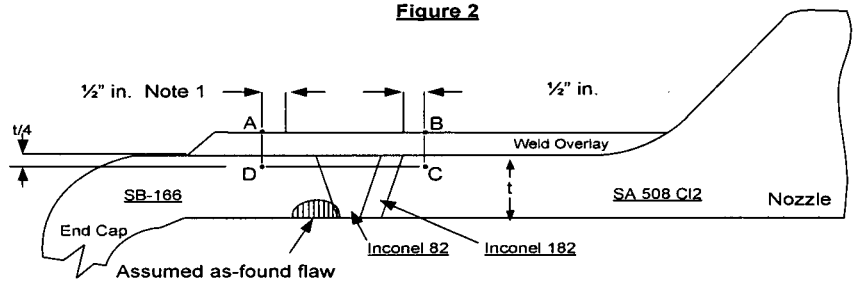


Examination Volume A-B-C-D

Note:
(1) The UT Axial scan coverage of the Weld Overlay material will only be limited in the taper areas by transducer wedge element size and taper transitions, both of which are outside the Code Required Examination Volume. UT scans will be performed in opposing upstream and downstream directions.

(2) The UT Circumferential scan coverage of the Weld Overlay material is expected to be limited at each edge of the overlay by approximately 0.5" as determined by the dimension of the transducer wedge element and taper transitions. UT scans will be performed in opposing clockwise and counter-clockwise directions.

Weld Required (PSI/ISI) Ultrasonic Examination Coverage
Figure 2

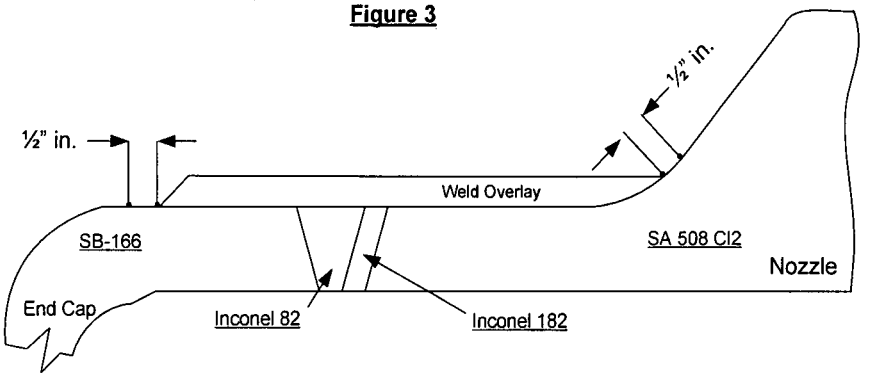


Examination Volume A-B-C-D

Note:
(1) For axial or circumferential flaws, the extent of the examination volume shall extend at least ½ in. beyond the as found flaw and at least ½ in. beyond the toes of the original piping weldment, including weld end butter, where applied.

(2) The Ultrasonic Axial and Circumferential scans will achieve 100% of the Code Required Volume.

Weld Overlay (PSI) Liquid Penetrant Examination Coverage
Figure 3



The weld overlay and adjacent base material for ½ inch from each side of the overlay shall be examined using the Liquid penetrant method.

Alternative to Code Case N-638-1 paragraph 4.0(c)

Code Case N-638-1, paragraph 4.0(c), specifies that the area from which weld-attached thermocouples have been removed shall be ground and examined using a surface examination method. Due to the personnel exposure associated with the installation and removal of the thermocouples, the nozzle configuration, and because the nozzle will be full of water, thermocouples will not be used to verify that the pre-heat and interpass temperature limits are met. In lieu of thermocouples, a contact pyrometer will be used to verify pre-heat temperature and interpass temperature compliance with the WPS requirements. Therefore, this alternative provides an acceptable level of quality and safety.

The use of overlay filler material that provides excellent resistance to SCC develops an effective barrier to flaw extension. Also, temper bead welding techniques produce excellent toughness and ductility in the weld HAZ low alloy steel materials, and in this case, results in compressive residual stresses on the inside surface that help to inhibit further SCC. The design of the overlay for the control rod drive end cap to nozzle weldment uses methods that are standard in the industry. There are no new or different approaches in this overlay design which would be considered either first-of-a-kind or inconsistent with previous approaches. The overlay will be designed as a full structural overlay in accordance with Code Case N-504-3, except as noted above. The temper bead welding technique that will be implemented in accordance with Code Case N-638-1 will produce a tough, ductile, corrosion-resistant overlay. Therefore, this alternative provides an acceptable level of quality and safety.

Appendix VIII, Supplement 11

Appendix VIII provides requirements for performance demonstration for ultrasonic examination systems. Supplement 11 provides qualification requirements for full structural overlaid wrought

austenitic piping welds. Appendix VIII, Supplement 11, cannot be implemented as written for ultrasonic examination of structural weld overlay repair. Table 3 includes a discussion of the Performance Demonstration Initiative (PDI) Program alternatives and their bases with respect to Appendix VIII, Supplement 11 requirements. Therefore, this alternative provides an acceptable level of quality and safety.

Examination Requirements

NUREG-0313, Revision 2, and Code Case N-504-3, specify UT using methods and personnel qualified in accordance with ASME Section XI, Appendix I. The UT techniques to be used for the final post-weld examination have been qualified through the EPRI NDE Center, which satisfies the requirements of ASME Section XI, Appendix I. Furthermore, NUREG-0313 states that the UT is to be performed in accordance with the requirements of the applicable Edition and Addenda of ASME Section XI. ASME Section XI, 2001 Edition including Addenda through 2003, is the Code of Record for the current Cooper Inservice Inspection Interval. Therefore, the acceptance criteria that will be used for the UT will be IWB-3130, "In-service Volumetric and Surface Examinations," and ASME Section XI (2007 Edition) Non-mandatory Appendix Q, "Weld Overlay Repair of Class 1, 2, and 3 Austenitic Stainless Steel Piping Weldments," as clarified under Exceptions to Code Case N-638-1, paragraph 4.0(b).

Although the provisions of Code Case N-638-1, (paragraph 4.0(b)), require that the final post-weld examinations be performed after completion of welding, an alternative to that provision is proposed, and the 48 hour hold will begin following the completion of the third temper bead weld layer on the ferritic base metal. The 48-hour hold period is invoked specifically to permit delayed hydrogen cracking to occur prior to the final NDE. Extensive industry experience has identified no evidence of delayed hydrogen cracking in nuclear applications involving ambient temperature temper bead welding. Absence of cracking is attributed to use of the GTAW machine welding process, and to the extensive process and quality controls present in nuclear welding applications. Revising the start time for the 48-hour period reduces adverse cost and scheduling impacts, while retaining effective assurance that delayed hydrogen cracking has not occurred. Table 2 summarizes the examination requirements:

Table 2: Summary of Examination Requirements

Exam Description	Method	Technique	Reference
As found flaw detection	UT	PDI Qualified Implementing ASME Section XI, Appendix VIII, Supplement 10	IWB-3514.4
Pre-weld UT Thickness	UT	0°	N-504-3
Surface Prior to welding	PT	Color Contrast (Visible) Penetrant	IWA-4611.1(a) N504-3(c) N-638-1, 4.0(a)
Final Weld Overlay	PT	Color Contrast (Visible) Penetrant	IWA-4634

Exam Description	Method	Technique	Reference
Surface			N-504-3(j) N-638-1, 4.0(b)
Final Weld Overlay for Thickness	UT	0°	IWA-4634 N-504-3(j) N-638-1, 4.0(b)
Final Weld Overlay and outer 25% of the underlying wall thickness volumetric Pre-service	UT	PDI Qualified Implementing ASME Section XI, Appendix VIII Supplement 11 as allowed by this request. (Reference PDI generic Procedure PDI-UT-8).	IWA-4634 IWB-3514.4 N-504-3(j) N-638-1, 4.0(b) Appendix Q (2007 Edition)

PDI Program vs. Supplement 11

Relief is requested to allow closer spacing of flaws provided they did not interfere with detection or discrimination. The existing specimens used to date for qualification to the Tri-party (NRC/Boiling Water Reactor Owners Group/EPRI) agreement have a flaw population density greater than allowed by the current Code requirements. These samples have been used successfully for all previous qualifications under the Tri-party agreement program. To facilitate their use and provide continuity from the Tri-party agreement program to Supplement 11, the PDI Program has merged the Tri-party test specimens into their weld overlay program.

Duration of Proposed Alternative

CNS is currently in its Fourth ten-year ISI interval, which began March 1, 2006. This interval will end concurrent with the expiration of Cooper Operating License on January 18, 2014. Consequently, the requested relief is for the remainder of the current operating license.

Precedents

This request is consistent with RI-35, Revision 1, approved by the NRC for CNS for the current 4th Interval, however limited to only RE24 (Fall 2008). (Adams Accession #ML080370464, TAC #MD8025)

A relief request for Millstone Unit 3 was approved by the NRC in a letter dated May 3, 2007 (Reference 8), including approval of 500 square inch surface area provision on the low alloy steel nozzle (ADAMS Accession No. ML071210024, TAC #MD3379).

Regarding the use of PDI in lieu of Supplement 11 requirements, the NRC has approved requests for several utilities to allow the use of the PDI Program for implementation of Appendix VIII, Supplement 11, requirements for the examination of piping welds with overlays.

The proposed repair activity is consistent with requests previously approved by the NRC to apply overlay repairs at other boiling water reactors, including Duane Arnold (Reference 9), Nine Mile

Point Unit 2 (Reference 10), Susquehanna (Reference 11), Pilgrim (Reference 12) and Hope Creek (Reference 13).

References

1. ASME Case N-432-1, "Repair Welding Using Automatic or Machine Gas Tungsten-Arc Welding (GTAW) Temper Bead Technique, Section XI, Division 1."

2. ASME Case N-504-3, "Alternative Rules for Repair of Classes 1, 2, and 3 Austenitic Stainless Steel Piping, Section XI, Division 1."

3. ASME Code Case N-638-1, "Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique, Section XI, Division 1."

4. NUREG-0313 Revision 2, Date Published: January 1988.

5. NRC Generic Letter 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping," January 25, 1988, and Supplement 1, February 4, 1992.

6. EPRI Technical Report 1003616, "Additional Evaluations to Expand Repair Limits for Pressure Vessels and Nozzles," March 2004.

7. ASME Section XI, Nonmandatory Appendix Q, "Weld Overlay Repair of Classes 1, 2, and 3 Austenitic Stainless Steel Piping Weldments," 2007.

8. Letter from Harold K. Chernoff, NRC, to David A. Christian, Dominion Nuclear, dated May 3, 2007, for the Millstone Power Station Unit 3 (ADAMS Accession No. ML071210024).

9. Letter from L. Raghavan, NRC, to Gary Van Middlesworth, Duane Arnold Energy Center, dated June 12, 2007 (ADAMS Accession No. ML071110007).

10. Letter from Marsha Gamberoni, NRC, to John H. Mueller, Niagara Mohawk Power Corporation, dated March 30, 2000, for Nine Mile Point Station Unit No. 2.

11. Letter from Richard J. Laufer, NRC, to Bryce L. Shriver, PPL Susquehanna, LLC, dated June 22, 2005, for Susquehanna Station (ADAMS Accession No. ML051220568).

12. Letter from John P. Boska, NRC, to Michael Kansler, Entergy Nuclear Operations, Inc., dated April 2, 2007, for Pilgrim Nuclear Power Station, (ADAMS Accession No. ML070590479).

13. Letter from Darrell J. Roberts, NRC, to William Levis, PSEG Nuclear, dated August 29, 2005, for Hope Creek Generating Station (ADAMS Accession No. ML051520177).

Supplement 11 Qualification Requirements for Full Structural Overlaid Wrought Austenitic Piping Welds	**PDI Program: The Proposed Alternative to Supplement 11 Requirements**
1.0 SPECIMEN REQUIREMENTS	
1.1 General. The specimen set shall conform to the following requirements.	
(b) The specimen set shall consist of at least three specimens having different nominal pipe diameters and overlay thicknesses. They shall include the minimum and maximum nominal pipe diameters for which the examination procedure is applicable. Pipe diameters within a range of 0.9 to 1.5 times a nominal diameter shall be considered equivalent. If the procedure is applicable to pipe diameters of 24 in. or larger, the specimen set must include at least one specimen 24 in. or larger but need not include the maximum diameter. The specimen set must include at least one specimen with overlay thickness within -0.1 in. to +0.25 in. of the maximum nominal overlay thickness for which the procedure is applicable.	**Alternative:** (b) The specimen set shall include specimens with overlays not thicker than 0.1 inch more than the minimum thickness, nor thinner than 0.25 inch of the maximum nominal overlay thickness for which the examination procedure is applicable. **Basis:** *To avoid confusion, the overlay thickness tolerance contained in the last sentence was reworded and the phrase "and the remainder shall be alternative flaws" was added to the next to last sentence in paragraph 1.1 (d)(1).*
(d) Flaw Conditions	
(1) Base metal flaws. All flaws must be cracks in or near the butt weld heat-affected zone, open to the inside surface, and extending at least 75% through the base metal wall. Flaws may extend 100% through the base metal and into the overlay material; in this case, intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the cracking. Specimens containing IGSCC shall be used when available.	**Alternative:** (1) ... must be in or... intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the base metal flaws. Specimens containing intergranular stress corrosion cracking shall be used when available. At least 70% of the flaws in the detection and sizing tests shall be cracks and the remainder shall be alternative flaws. Alternative flaw mechanisms, if used, shall provide crack-like reflective characteristics and shall be limited by the following: (a) The use of alternative flaws shall be limited to when the implantation of cracks produces spurious reflectors that are uncharacteristic of actual flaws. (b) Flaws shall be semi elliptical with a tip width of less than or equal to 0.002 inches. **Basis:** *This paragraph requires that all base metal flaws be cracks. Implanting a crack*

Supplement 11-Qualification Requirements for Full Structural Overlaid Wrought Austenitic Piping Welds	PDI Program: The Proposed Alternative to Supplement 11 Requirements
	requires excavation of the base material on at least one side of the flaw. While this may be satisfactory for ferritic materials, it does not produce a useable axial flaw in austenitic materials because the sound beam, which normally passes only through base material, must now travel through weld material on at least one side, producing an unrealistic flaw response. To resolve this issue, the PDI program revised this paragraph to allow use of alternative flaw mechanisms under controlled conditions. For example, alternative flaws shall be limited to when implantation of cracks precludes obtaining an effective ultrasonic response, flaws shall be semi elliptical with a tip width of less than or equal to 0.002 inches, and at least 70% of the flaws in the detection and sizing test shall be cracks and the remainder shall be alternative flaws. To avoid confusion, the overlay thickness tolerance contained in paragraph 1.1(b) ***last*** *sentence, was reworded and the phrase "and the remainder shall be alternative flaws" was added to the next to last sentence. Paragraph 1.1(d)(1) includes the statement that intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the base metal flaws.*

(e) Detection Specimens	
(1) At least 20% but less than 40% of the flaws shall be oriented within ±20 deg. of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access. The rules of IWA-3300 shall be used to determine whether closely spaced flaws should be treated as single or multiple flaws.	**Alternative:** (1) At least 20% but less than 40% of the base metal flaws shall be oriented within +/-20° of the pipe axial direction. The remainder shall be oriented circumferentially. Flaws shall not be open to any surface to which the candidate has physical or visual access. **Basis:** *The requirement for axially oriented overlay fabrication flaws was excluded from the PDI Program as an improbable scenario. Weld overlays are typically applied using automated GTAW techniques with the filler metal applied in a circumferential direction. Because resultant fabrication induced discontinuities would also be expected to have major dimensions oriented in the circumferential direction axial overlay fabrication flaws are unrealistic. The requirement for using IWA-3300 for proximity flaw evaluation was excluded; instead indication will be sized based on their individual merits.*
(2) Specimens shall be divided into base and over-lay grading units. Each specimen shall contain one or both types of grading units.	**Alternative:** (2) Specimens shall be divided into base metal and overlay fabrication grading units. Each specimen shall contain one or both types of grading units. Flaws shall not interfere with ultrasonic detection or characterization of other flaws. **Basis:** Inclusion of "metal" and "fabrication" provides clarification. Flaw identification is improved by ensuring flaws are not masked by other flaws.
(a)(1) A base grading unit shall include at least 3 in. of the length of the overlaid weld. The base grading unit includes the outer 25% of the overlaid weld and base metal on both sides. The base grading unit shall not include the inner 75% of the overlaid weld and base metal overlay material, or base metal-to-overlay interface.	**Alternative:** (a)(1) A base metal grading unit includes the overlay material and the outer 25% of the original overlaid weld. The base metal grading unit shall extend circumferentially for at least 1 inch and shall start at the weld centerline and be wide enough in the axial direction to encompass one half of the original weld crown and a minimum of 0.50" of the adjacent base material. **Basis:** *The phrase "and base metal on both sides," was inadvertently included in the*

	description of a base metal grading unit. The PDI program intentionally excludes this requirement because some of the qualification samples include flaws on both sides of the weld. To avoid confusion several instances of the term "cracks" or "cracking" were changed to the term "flaws" because of the use of alternative Flaw mechanisms. Modified to require that a base metal grading unit include at least 1inch of the length of the overlaid weld, rather than 3 inches.
(a)(2) When base metal cracking penetrates into the overlay material, the base grading unit shall include the overlay metal within 1 in. of the crack location. This portion of the overlay material shall not be used as part of any overlay grading unit.	**Alternative:** (a)(2) When base metal flaws penetrate into the overlay material, the base metal grading unit shall not be used as part of any overlay fabrication grading unit. **Basis:** *Substituted terms provide clarification and are consistent with 1d(1) above. The PDI program adjusts for this conservative change for excluding this type grading unit.*
(a)(3) When a base grading unit is designed to be unflawed, at least 1 in. of unflawed overlaid weld and base metal shall exist on either side of the base grading unit. The segment of weld length used in one base grading unit shall not be used in another base grading unit. Base grading units need not be uniformly spaced around the specimen.	**Alternative:** (a)(3) Sufficient unflawed overlaid weld and base metal shall exist on all sides of the grading unit to preclude interfering reflections from adjacent flaws. **Basis:** *Modified to require sufficient unflawed overlaid weld and base metal to exist on all sides of the grading unit to preclude interfering reflections from adjacent flaws, rather than the 1 inch requirement.*
(b)(l) An overlay grading unit shall include the overlay material and the base metal-to-overlay interface of at least 6 sq. in. The overlay grading unit shall be rectangular, with minimum dimensions of 2 in.	**Alternative:** (b)(1) An overlay fabrication grading unit shall include the overlay material and the base metal-to-overlay interface for a length of at least 1 inch. **Basis:** *The PDI program reduces the base metal-to-overlay interface to at least 1 inch (in lieu of a minimum of 2 inches) and eliminates the minimum rectangular dimension. This criterion is necessary to allow use of existing examination specimens that were fabricated in order to meet NRC Generic Letter 88-01. This criterion may be more challenging than the ASME Code because of the variability associated with the shape of the grading unit.*

(b)(2) An overlay grading unit designed to be unflawed shall be surrounded by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 in. around its entire perimeter. The specific area used in one overlay grading unit shall not be used in another overlay grading unit. Overlay grading units need not be spaced uniformly about the specimen.	**Alternative:** (b)(2) Overlay fabrication grading units designed to be unflawed shall be separated by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 inch at both ends. Sufficient unflawed overlaid weld and base metal shall exist on both sides of the overlay fabrication grading unit to preclude interfering reflections from adjacent flaws. The specific area used in one overlay fabrication grading unit shall not be used in another overlay fabrication grading unit. Overlay fabrication grading units need not be spaced uniformly about the specimen. **Basis:** *Paragraph 1.1(e)(2)(b)(2) states that overlay fabrication grading units designed to be unflawed shall be separated by unflawed overlay material and unflawed base metal-to-overlay interface for at least 1 inch at both ends, rather than around its entire perimeter.*
(b)(3) Detection sets shall be selected from Table VIII-S2-1. The minimum detection sample set is five flawed base grading units, ten unflawed base grading units, five flawed overlay grading units, and ten unflawed overlay grading units. For each type of grading unit, the set shall contain at least twice as many unflawed as flawed grading units.	**Alternative:**...base metal grading units, ten unflawed base metal grading units, five flawed overlay fabrication grading units, and ten unflawed overlay fabrication grading units. For each type of grading unit, the set shall contain at least twice as many unflawed as flawed grading units. For initial procedure qualification, detection sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required. **Basis:** *Clarified the guidance for initial procedure qualifications versus qualifying new values of essential variables.*
(f) Sizing Specimen	
(1) The minimum number of flaws shall be ten. At least 30% of the flaws shall be overlay fabrication flaws. At least 40% of the flaws shall be cracks open to the inside surface.	**Alternative:** (1) The...least 40% of the flaws shall be open to the inside surface. Sizing sets shall contain a distribution of flaw dimensions to assess sizing capabilities. For initial procedure qualification, sizing sets shall include the equivalent of three personnel qualification sets. To qualify new values of essential variables, at least one personnel qualification set is required.

	Basis: *Clarified the guidance for initial procedure qualifications versus qualifying new values of essential variables and is consistent with 1d(1) above.*
(3) Base metal cracking used for length sizing demonstrations shall be oriented circumferentially.	**Alternative:** (3) Base metal flaws used...circumferentially. **Basis:** *Clarified wording to be consistent with 1d(1) above.*
(4) Depth sizing specimen sets shall include at least two distinct locations where cracking in the base metal extends into the overlay material by at least 0.1 in. in the through-wall direction.	**Alternative:** (4) Depth sizing specimen sets shall include at least two distinct locations where a base metal flaw extends into the overlay material by at least 0.1 inch in the through-wall direction. **Basis:** *Clarified wording to be consistent with 1d(1) above.*
2.0 CONDUCT OF PERFORMANCE DEMONSTRATION	
The specimen inside surface and identification shall be concealed from the candidate. All examinations shall be completed prior to grading the results and presenting the results to the candidate. Divulgence of particular specimen results or candidate viewing of unmasked specimens after the performance demonstration is prohibited.	**Alternative:** The specimen ...prohibited. The overlay fabrication flaw test and the base metal flaw test may be performed separately. **Basis:** *Clarified wording to describe process.*
2.1 Detection Test.	
Flawed and unflawed grading units shall be randomly mixed. Although the boundaries of specific grading units shall not be revealed to the candidate, the candidate shall be made aware of the type or types of grading units (base or overlay) that are present for each specimen.	**Alternative:** Flawed...(base metal or overlay fabrication)...each specimen. **Basis:** *Clarified wording similar to 1(e)2 above.*
2.2 Length Sizing Test	
(d) For flaws in base grading units, the candidate shall estimate the length of that part of the flaw that is in the outer 25% of the base wall thickness.	**Alternative:** (d) For . . . base metal grading . . . base metal wall thickness. **Basis:** *Clarified wording for consistency.*
2.3 Depth Sizing Test.	
3.0 ACCEPTANCE CRITERIA	
3.1 Detection Acceptance Criteria	
Examination procedures, equipment, and personnel are qualified for detection when the results of the performance demonstration	**Alternative:** Examination procedures are qualified for detection when: a. All flaws within the scope of the procedure

satisfy the acceptance criteria of Table Vlll-S2-1 for both detection and false calls. The criteria shall be satisfied separately by the demonstration results for base grading units and for overlay grading units.	are detected and the results of the performance demonstration satisfy the acceptance criteria of Table VIIIS2-1 for false calls. b. At least one successful personnel demonstration has been performed meeting the acceptance criteria defined in (c). c. Examination equipment and personnel are qualified for detection when the results of the performance demonstration satisfy the acceptance criteria of Table Vlll-S2-1 for both detection and false calls. d. The criteria in (b) and (c) shall be satisfied separately by the demonstration results for base metal grading units and for overlay fabrication grading units. **Basis:** *Clarified wording to better describe the difference between procedure qualification and equipment and personnel qualifications.*
3.2 Sizing Acceptance Criteria	
(a) The RMS error of the flaw length measurements, as compared to the true flaw lengths, is less than or equal to 0.75 inch. The length of base metal cracking is measured at the 75% through-base-metal position.	**Alternative:** (a) The...base metal flaws is...position. **Basis:** *Clarified wording to be consistent with 1d(1) above.*
(b) All extensions of base metal cracking into the overlay material by at least 0.1 inch are reported as being intrusions into the overlay material.	**Alternative:** This requirement is omitted. ***Basis:*** *The requirement for reporting all extensions of cracking into the overlay is omitted from the PDI Program because it is redundant to the RMS calculations performed in paragraph 3.2(c) and its presence adds confusion and ambiguity to depth sizing as required by paragraph 3.2(c). This also makes the weld overlay program consistent with the supplement 2 depth sizing criteria.*

ATTACHMENT 3 LIST OF REGULATORY COMMITMENTS©[4]

Correspondence Number: NLS2010013

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 Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITMENT NUMBER	COMMITTED DATE OR OUTAGE
None	N/A	N/A