INDIANA MICHIGAN POWER
A unit of American Electric Power

Indiana Michigan Power
Cook Nuclear Plant
One Cook Place
Bridgman, MI 49106
AEP.com

March 1, 2006

AEP:NRC:6055
10 CFR 50.55a

Docket No. 50-316

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Stop O-P1-17
Washington, DC 20555-0001

Donald C. Cook Nuclear Plant Unit 2
PROPOSED ALTERNATIVE TO THE
AMERICAN SOCIETY OF MECHANICAL ENGINEERS CODE, SECTION XI
REPAIR REQUIREMENTS
REQUEST FOR ADDITIONAL INFORMATION

References:
1. Letter from Daniel P. Fadel, Indiana Michigan Power Company to U. S. Nuclear Regulatory Commission Document Control Desk, "Donald C. Cook Nuclear Plant Unit 2, Proposed Alternative to the American Society of Mechanical Engineers Code, Section XI Repair Requirements," AEP:NRC:5055-13, Accession Number ML053570112, dated December 21, 2005.

2. "Cook Unit 2: Draft Request for Additional Information on Relief Request, Re: Preemptive Weld Overlay (TAC MC9305)," Accession Number ML060340609, dated February 3, 2006.

3. "Record of Conference Call, Preemptive Weld Overlay (TAC MC9305)," Accession Number ML060480031, dated February 15, 2006.

Reference 1 transmitted Indiana Michigan Power Company's (I&M's) proposed alternative to the American Society of Mechanical Engineers Code, Section XI (ASME Section XI) repair requirements. I&M proposed the use of preemptive weld overlays (PWOLs) using Code Cases N-504-2 and N-638-1 with modifications to address dissimilar metal weld concerns. During the review of the proposed alternative, the Nuclear Regulatory Commission (NRC) requested I&M to provide additional information as described in Reference 2. The request for additional information was clarified in a telephone conference between I&M and NRC personnel on February 8, 2006, Reference 3. Attachment 1 to this letter provides the information requested by the NRC, as clarified in the February 8, 2006, telephone conference. Attachment 2 provides a revised proposed alternative. The revisions to the proposed alternative, which are denoted by sidebars, include reducing the maximum requested PWOL area from 500 square inches (sq. in.) to 300 sq. in., deleting the modification to the Code Case N-638-1 requirement for a 48-hour delay at ambient temperature

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before examining the PWOL, revising the Code Case N-638-1 basis for the limited examination of the 1.5T band, and including the Susquehanna Steam Electric Station, Unit 1 as a precedent. I&M has also made editorial changes to clarify the proposed alternative and to correct the Section 3.0 text referring to the pressurizer code of construction. The editorial changes do not alter I&M's proposed alternative.

Additionally, I&M has been informed by the weld wire supplier that the designation of the weld wire to be used for the PWOL is Alloy 52MS. The material is Alloy 52M, the "S" designating the process route that converts the hot-rolled billet into finished cold-drawn wire. The material properties of the weld wire are not changed. I&M has added a note to Section 1.0 of the proposed alternative indicating the supplier's designation.

Attachment 3 to this letter provides I&M's regulatory commitment. Should you have any questions, please contact Mr. Michael K. Scarpello, Regulatory Affairs Supervisor, at (269) 466-2649.

I&M requests approval of the proposed alternative by March 15, 2006.

Sincerely

Joseph N. Jensen
Site Vice President

RV/rdw

Attachments:
1. Relief Request ISIR-20, Response to Nuclear Regulatory Commission Request for Additional Information
2. 10 CFR 50.55a Relief Request –ISIR-20, Proposed Alternative for Preemptive Weld Overlays in Accordance with 10 CFR 50.55a(a)(3)(i), Revision 1
3. Regulatory Commitment

c: R. Aben – Department of Labor and Economic Growth
J. L. Caldwell – NRC Region III
K. D. Curry – AEP Ft. Wayne
J. T. King – MPSC
MDEQ – WHMD/RPMWS
NRC Resident Inspector
P.S. Tam – NRC Washington, DC

Attachment 1 toAEP:NRC:6055

Relief Request ISIR-20
Response to Nuclear Regulatory Commission
Request for Additional Information

By letter dated December 21, 2005, Reference 1, Indiana Michigan Power Company (I&M), the licensee for Donald C. Cook Nuclear Plant (CNP) Unit 2, proposed an alternative to provisions of the American Society of Mechanical Engineers Code, Section XI, 1989 Edition. I&M proposed the application of preemptive weld overlays (PWOLs) over Alloy 82/182 dissimilar welds (DMWs) to address the susceptibility of such welds to primary water stress corrosion cracking degradation. During the review of the proposed alternative, the Nuclear Regulatory Commission (NRC) requested I&M to provide additional information regarding I&M's request as described in Reference 2. The request for additional information was clarified in a telephone conference between I&M and NRC personnel on February 8, 2006, Reference 3. The following provides I&M's response to the NRC's requests as clarified during the February 8, 2006, telephone conference.

Nuclear Regulatory Commission (NRC) Request 1. Part 1

> *Provide justification for increasing the maximum weld coverage area from the 300 square inches (sq. in.) approved for the Susquehanna Steam Electric Station to 500 sq. in.*

I&M Response:

> I&M has revised its proposed alternative, decreasing the ambient temperature temper bead weld area from 500 sq. in. to 300 sq. in. The revised proposed alternative is provided in Attachment 2.

NRC Request 1. Part 2

> *Provide the stress analyses of each component's configuration to demonstrate that the stresses resulting from the PWOLs would not hinder the components from performing their design function.*

I&M Response

> I&M will submit stress analyses summaries for the PWOLs prior to restart.

NRC Request 2

> *Provide additional justification for performing non-destructive examinations 48 hours after the completion of welding rather than 48 hours after reaching ambient temperature.*

I&M Response

I&M has revised its proposed alternative, deleting the modification to the 48-hour requirement. The revised proposed alternative is provided in Attachment 2.

NRC Request 3

Provide additional information to support the statement that it is not possible to perform a meaningful ultrasonic (UT) examination of the 1.5T band of base material because of the existing nozzle configuration. The information should discuss the achievable amount of area that will be successfully examined for each design configuration that I&M wishes to apply a PWOL. Clarify whether the UT examination will be performed to the maximum extent achievable.

I&M Response

I&M will perform UT examinations to the maximum extent practical using straight beam and angle beam techniques. The basis for the modification to Code Case N-638-1 has been revised to reflect this. The revised proposed alternative is provided in Attachment 2.

The following provides the estimated coverage that will be obtained during the UT examinations considering the nozzle configuration and weld buildup. In all scans, the configuration will cause the transducer to lose contact with the surface. The first area is at the junction of the nozzle boss with the nozzle taper. The second area where the transducer will lose contact is at the junction of the nozzle taper with the overlay weld. This area will be approximately 0.5 inches wide and extend 360 degrees around the nozzle

Spray Line Nozzle

The scans that will be performed are identified in Figure 1. It is estimated that the 0-degree scan will obtain 69 percent coverage of the area, the 25-degree circumferential scan will obtain 48 percent coverage of the area, and the supplemental 45-degree axial scan will obtain 59 percent coverage of the area.

Safety and Relief Line Nozzle

The scans that will be performed are identified in Figure 2. It is estimated that the 0-degree scan will obtain approximately 62 percent coverage of the area, the 30-degree circumferential scan will obtain 62 percent coverage of the area, and the supplemental 45-degree axial scan will obtain 53 percent coverage of the area.

Surge Line Nozzle

The scans that will be performed are identified in Figure 3. It is estimated that the 0-degree scan will obtain 85 percent coverage of the area, the 40-degree circumferential scan will obtain 75 percent coverage of the area, and the supplemental 45-degree axial scan will obtain 77 percent coverage of the area.

References: 1. Letter from Daniel P. Fadel, Indiana Michigan Power Company to U. S. Nuclear Regulatory Commission Document Control Desk, "Donald C. Cook Nuclear Plant Unit 2, Proposed Alternative to the American Society of Mechanical Engineers Code, Section XI Repair Requirements," AEP:NRC:5055-13, Accession Number ML053570112, dated December 21, 2005.

2. "Cook Unit 2: Draft Request for Additional Information on Relief Request, Re: Preemptive Weld Overlay (TAC MC9305)," Accession Number ML060340609, dated February 3, 2006.

3. "Record of Conference Call, Preemptive Weld Overlay (TAC MC9305)," Accession Number ML060480031, dated February 15, 2006.

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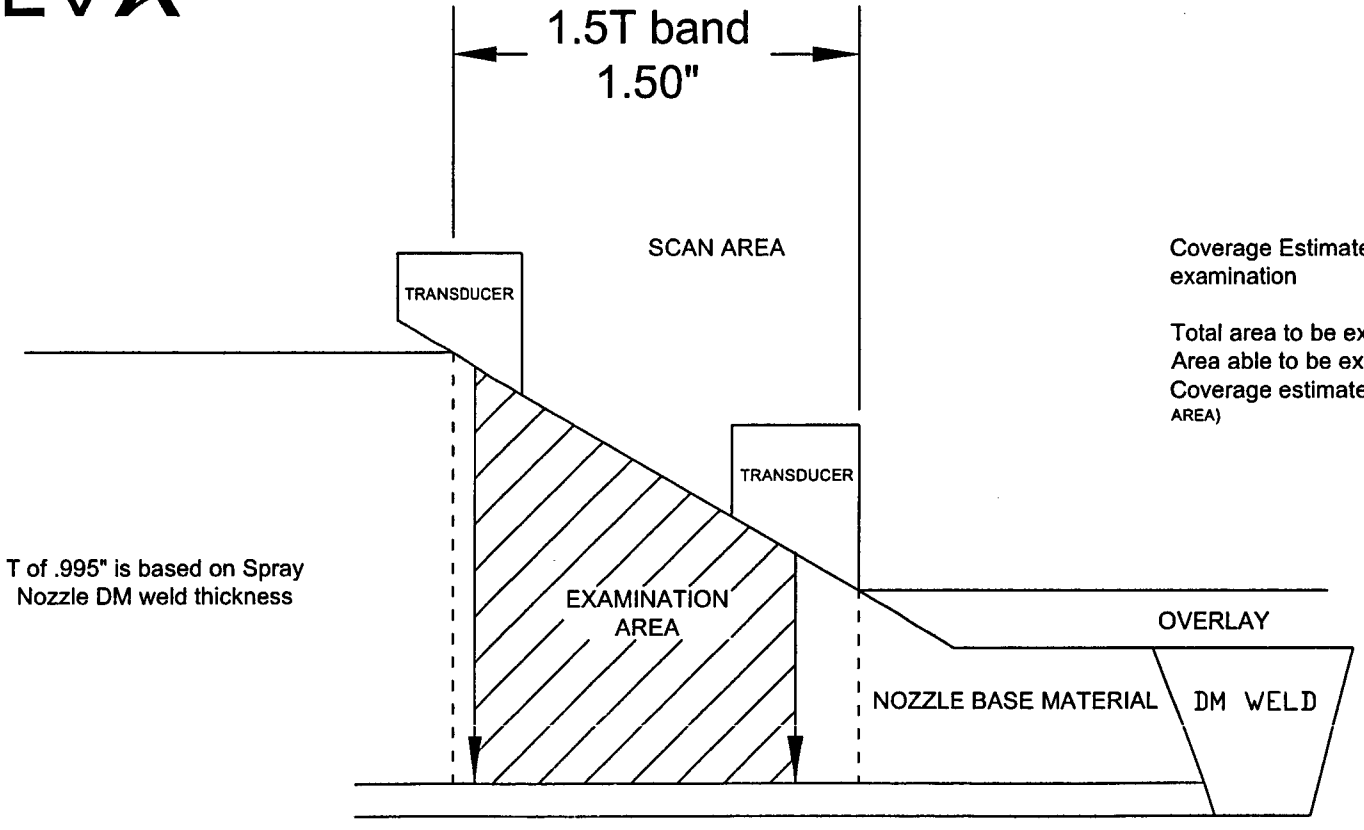
DONALD C. COOK UNIT 2
SPRAY LINE

Coverage plot for 0° transducer



Coverage Estimate for 0° examination

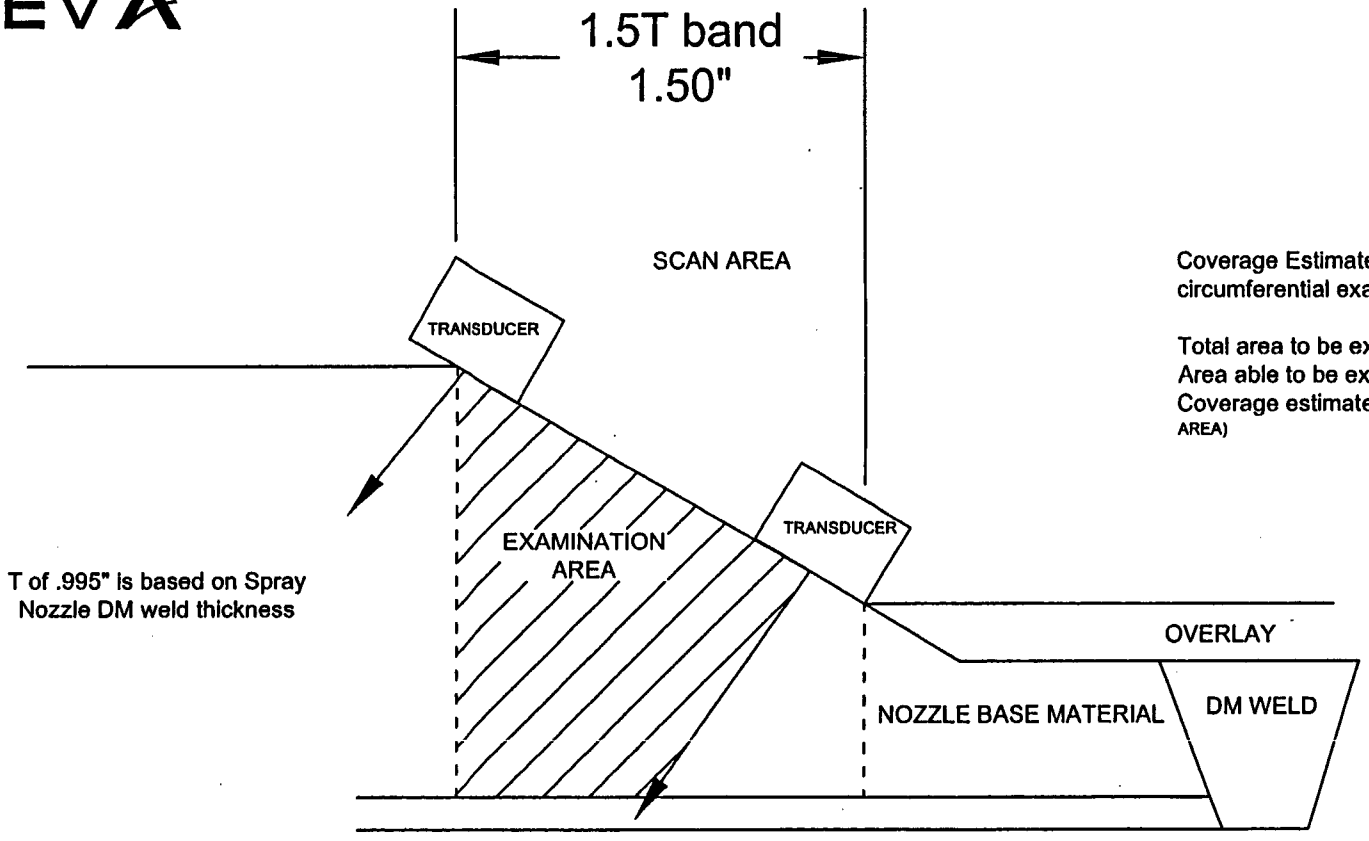
Total area to be examined = 2.85 in²
Area able to be examined = 1.98 in²
Coverage estimate = 69% (SHADED AREA)

Assumptions: 360 degree access, No obstructions
0.5" transducer size, Transducer angle compensated for taper

AREVA

DONALD C. COOK UNIT 2
SPRAY LINE

Coverage plot for Circumferential scan with 25° transducer



T of .995" is based on Spray Nozzle DM weld thickness

Coverage Estimate for 25° circumferential examination

Total area to be examined = 2.85 in²
Area able to be examined = 1.38 in²
Coverage estimate = 48% (SHADED AREA)

Assumptions: 360 degree access, No obstructions
0.5" transducer size, scans performed looking CLOCKWISE and COUNTERCLOCKWISE

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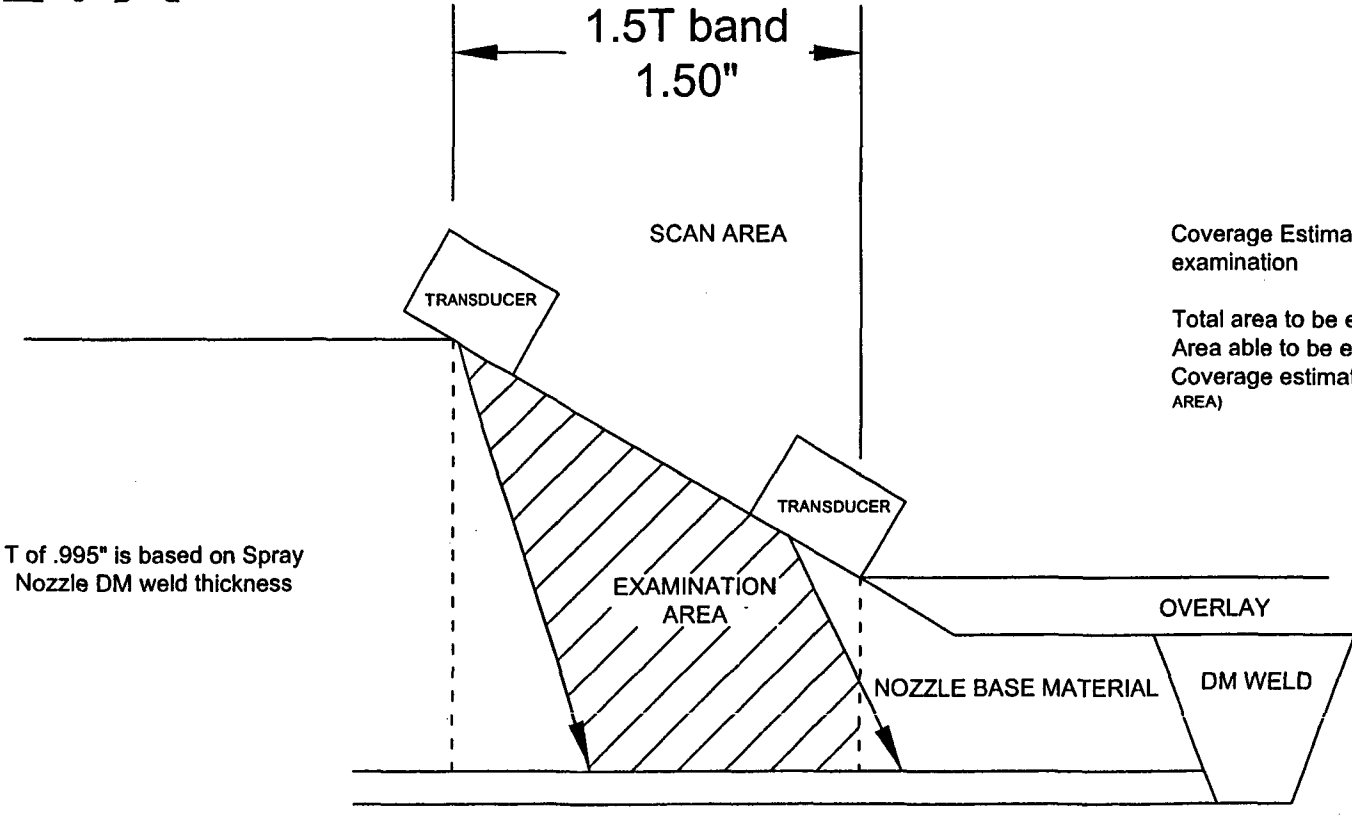
DONALD C. COOK UNIT 2
SPRAY LINE

Coverage plot for axial scan with 45° transducer looking at DM weld



Coverage Estimate for 45° axial examination

Total area to be examined = 2.85 in²
Area able to be examined = 1.7 in²
Coverage estimate = 59% (SHADED AREA)

Assumptions: 360 degree access, No obstructions
0.5" transducer size, Scan performed looking in DM weld direction

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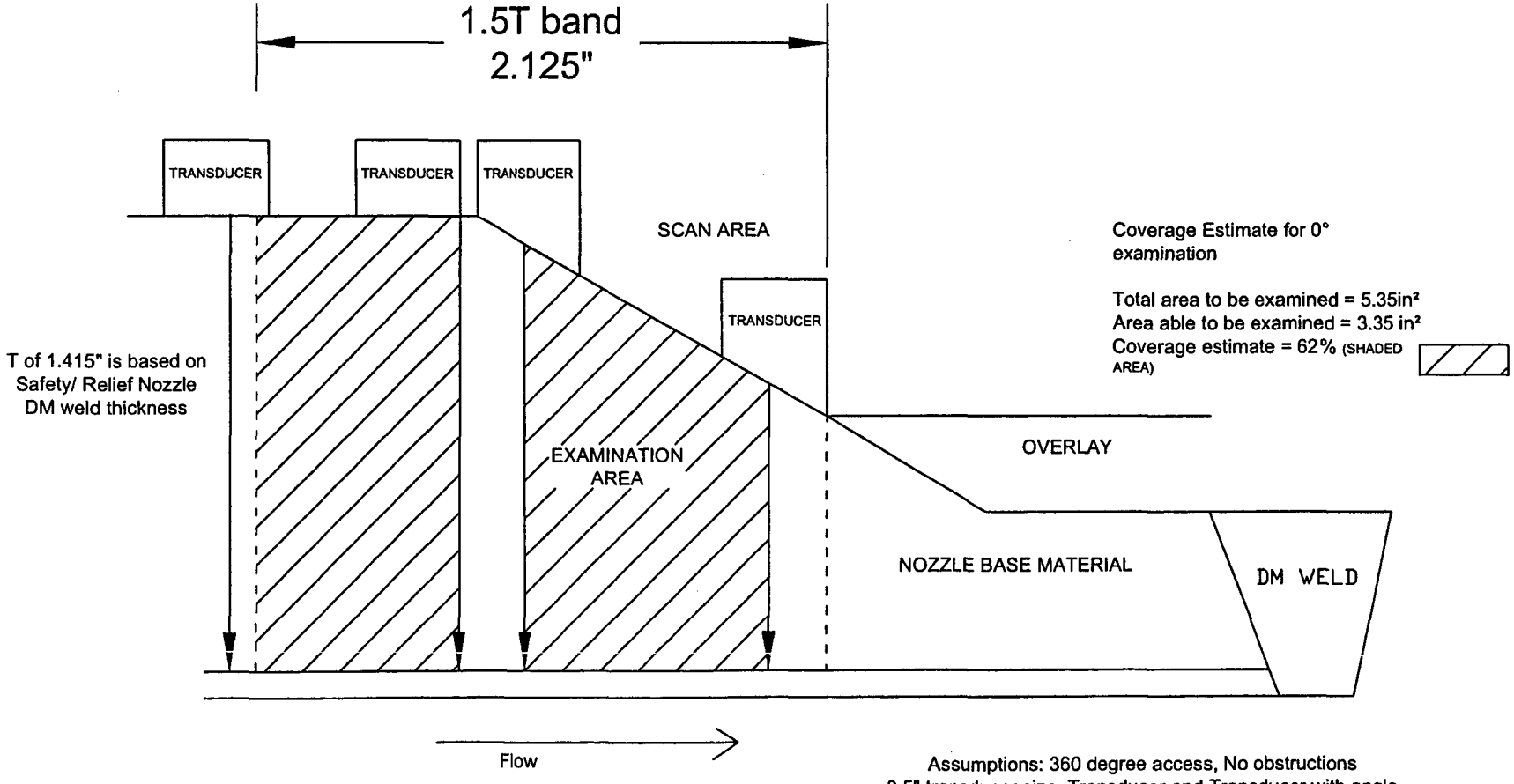
DONALD C. COOK UNIT 2
SAFETY/RELIEF
LINE

Coverage plot for 0° transducer



Assumptions: 360 degree access, No obstructions
0.5" transducer size, Transducer and Transducer with angle compensated for taper

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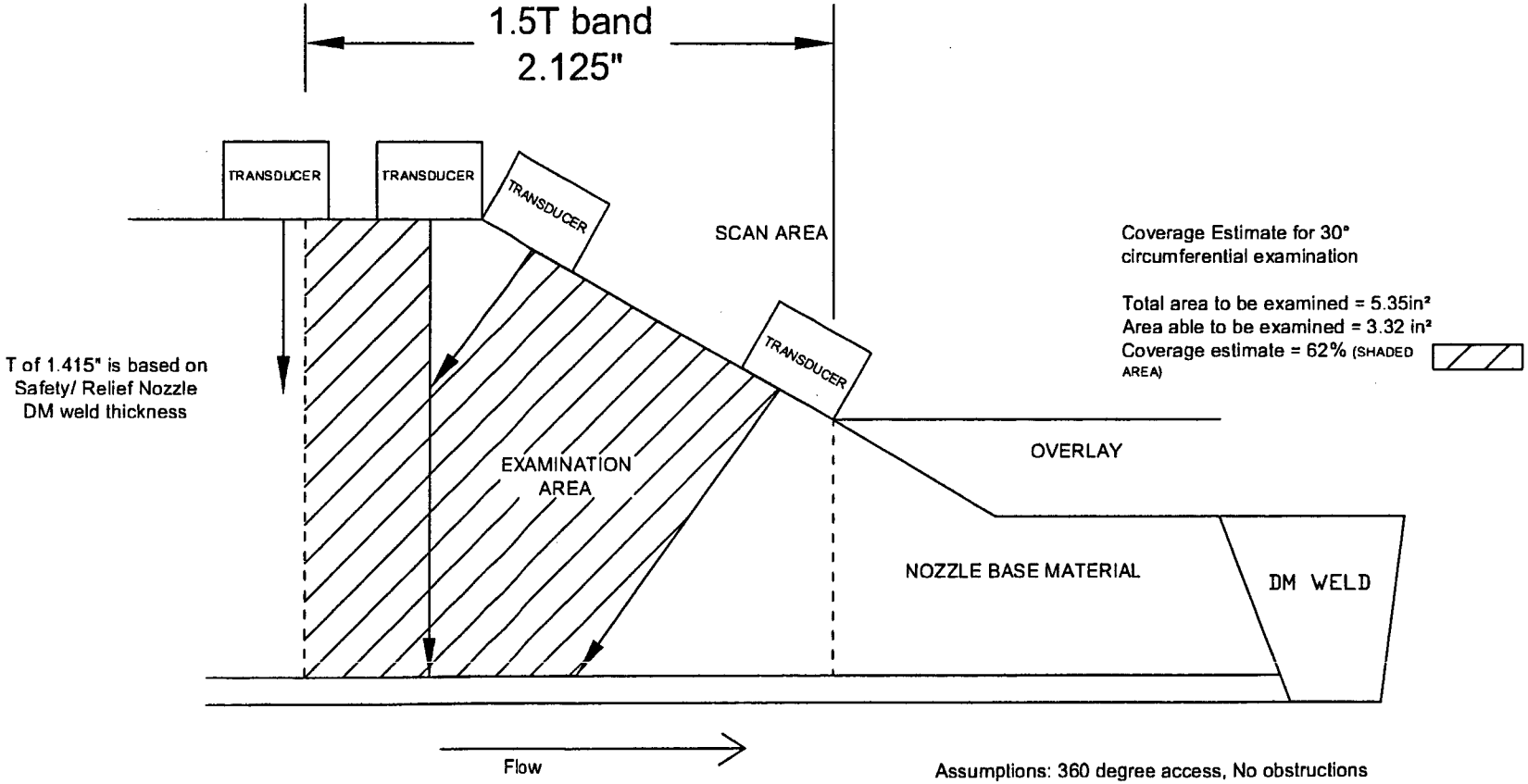
DONALD C. COOK UNIT 2
SAFETY/RELIEF
LINE

Coverage plot for Circircumferential Scans with 30° transducer



Coverage Estimate for 30° circumferential examination

Total area to be examined = 5.35in²
Area able to be examined = 3.32 in²
Coverage estimate = 62% (SHADED AREA)

Assumptions: 360 degree access, No obstructions
0.5" transducer size, scans performed looking CLOCKWISE on taper and nozzle

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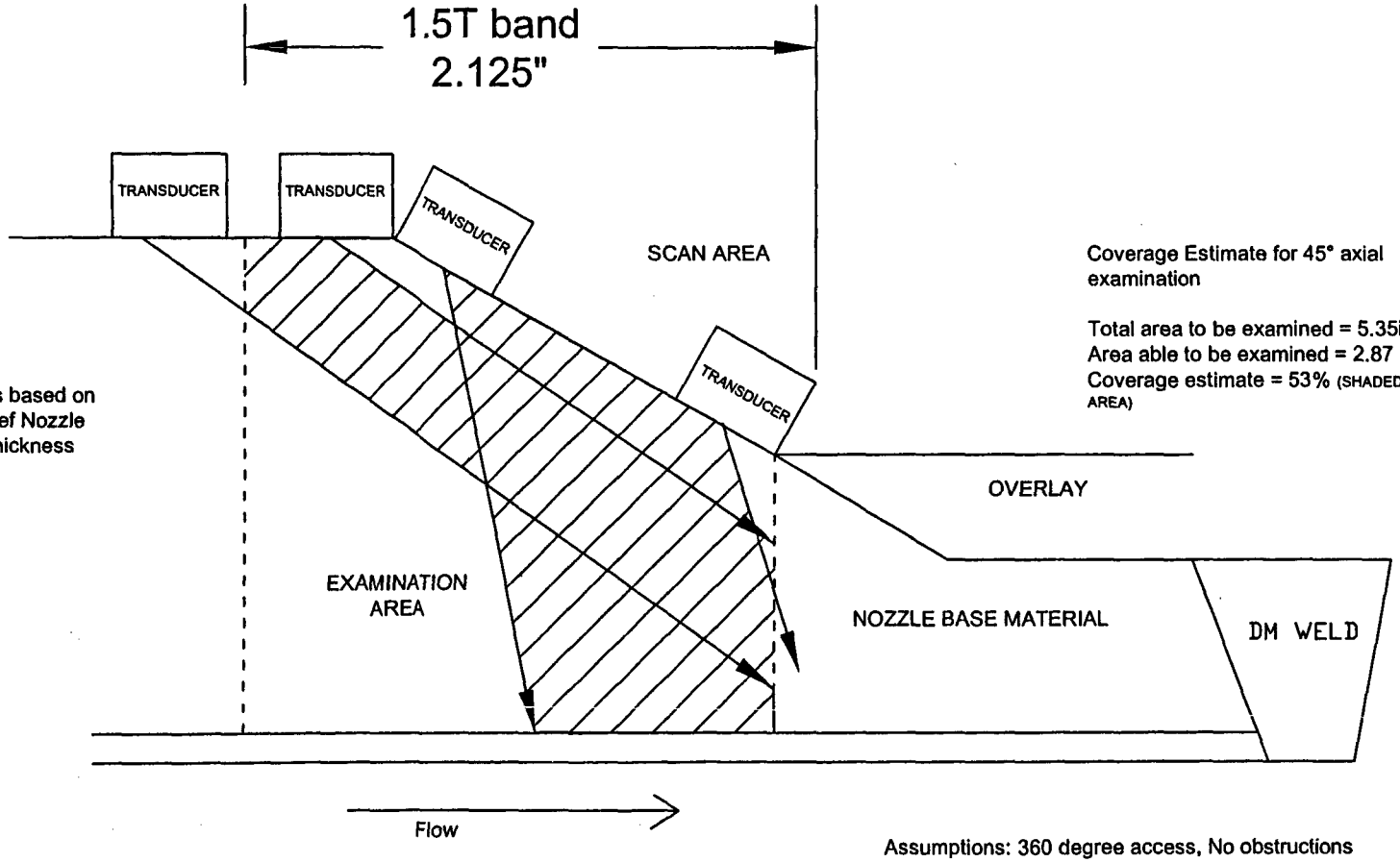
DONALD C. COOK UNIT 2 SAFETY/RELIEF LINE

Coverage plot for Axial Scans with 45° transducer looking at DM weld



T of 1.415" is based on Safety/ Relief Nozzle DM weld thickness

Coverage Estimate for 45° axial examination

Total area to be examined = 5.35in²
Area able to be examined = 2.87 in²
Coverage estimate = 53% (SHADED AREA)

Assumptions: 360 degree access, No obstructions
0.5" transducer size, scans performed looking DM weld

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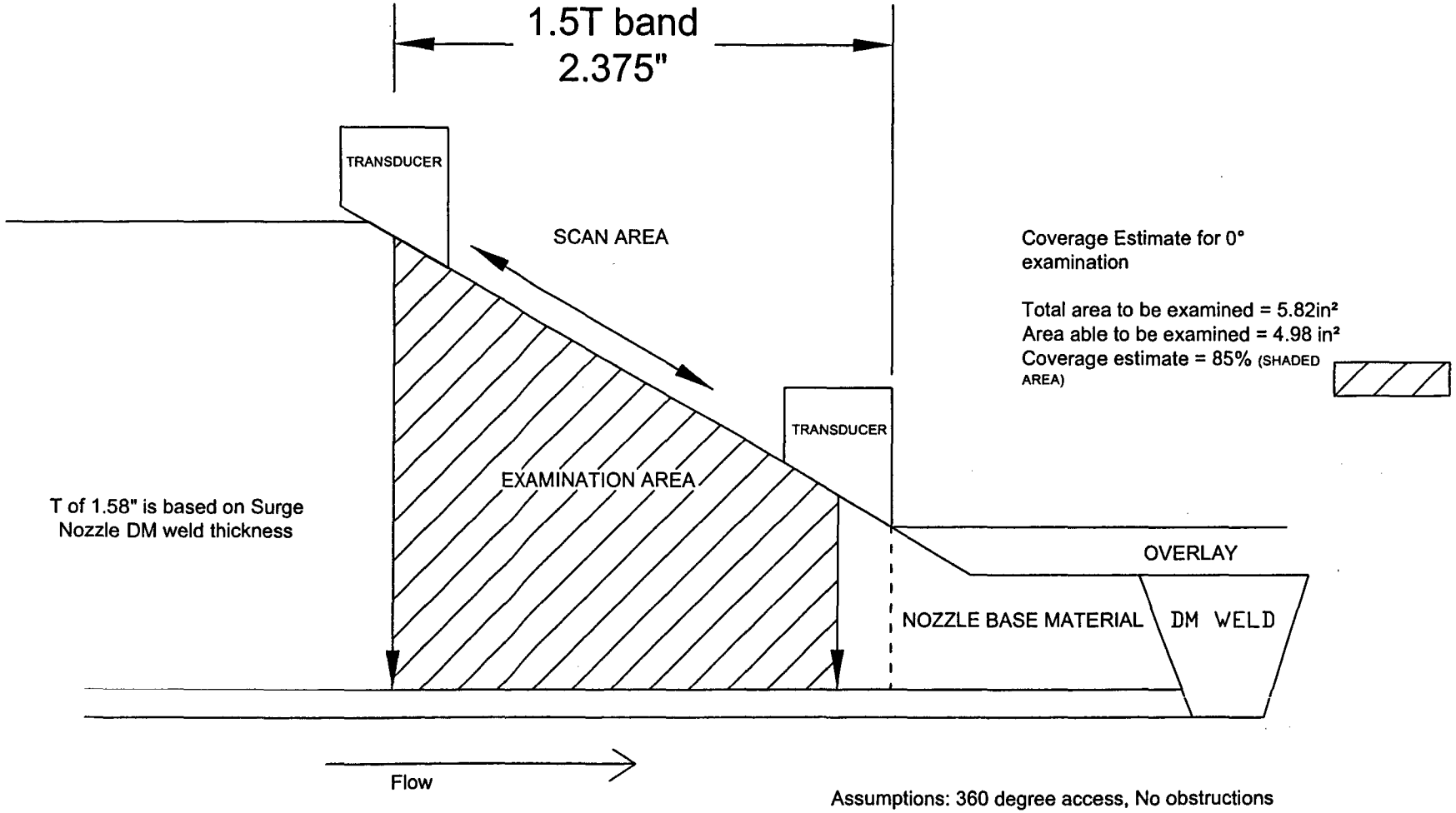
DONALD C. COOK UNIT 2
SURGE LINE

Coverage plot for 0° transducer



Coverage Estimate for 0° examination

Total area to be examined = 5.82in²
Area able to be examined = 4.98 in²
Coverage estimate = 85% (SHADED AREA)

Assumptions: 360 degree access, No obstructions
0.5" transducer size, Transducer angle compensated for taper

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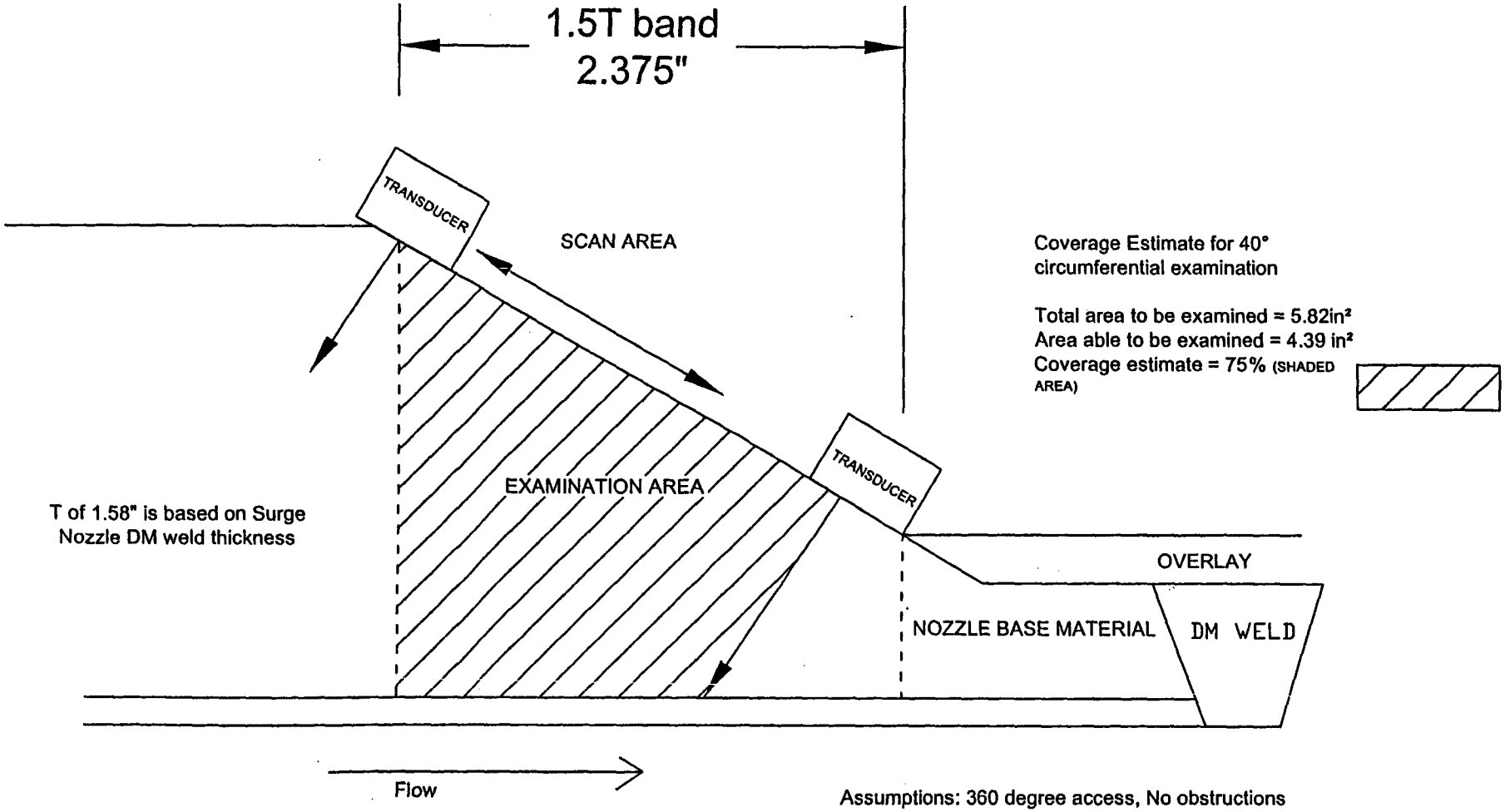
DONALD C. COOK UNIT 2
SURGE LINE

Coverage plot for Circircumferential Scans with 40° transducer



Coverage Estimate for 40° circumferential examination

Total area to be examined = 5.82in²
Area able to be examined = 4.39 in²
Coverage estimate = 75% (SHADED AREA)

Assumptions: 360 degree access, No obstructions
0.5" transducer size, scans performed looking CLOCKWISE and COUNTERCLOCKWISE

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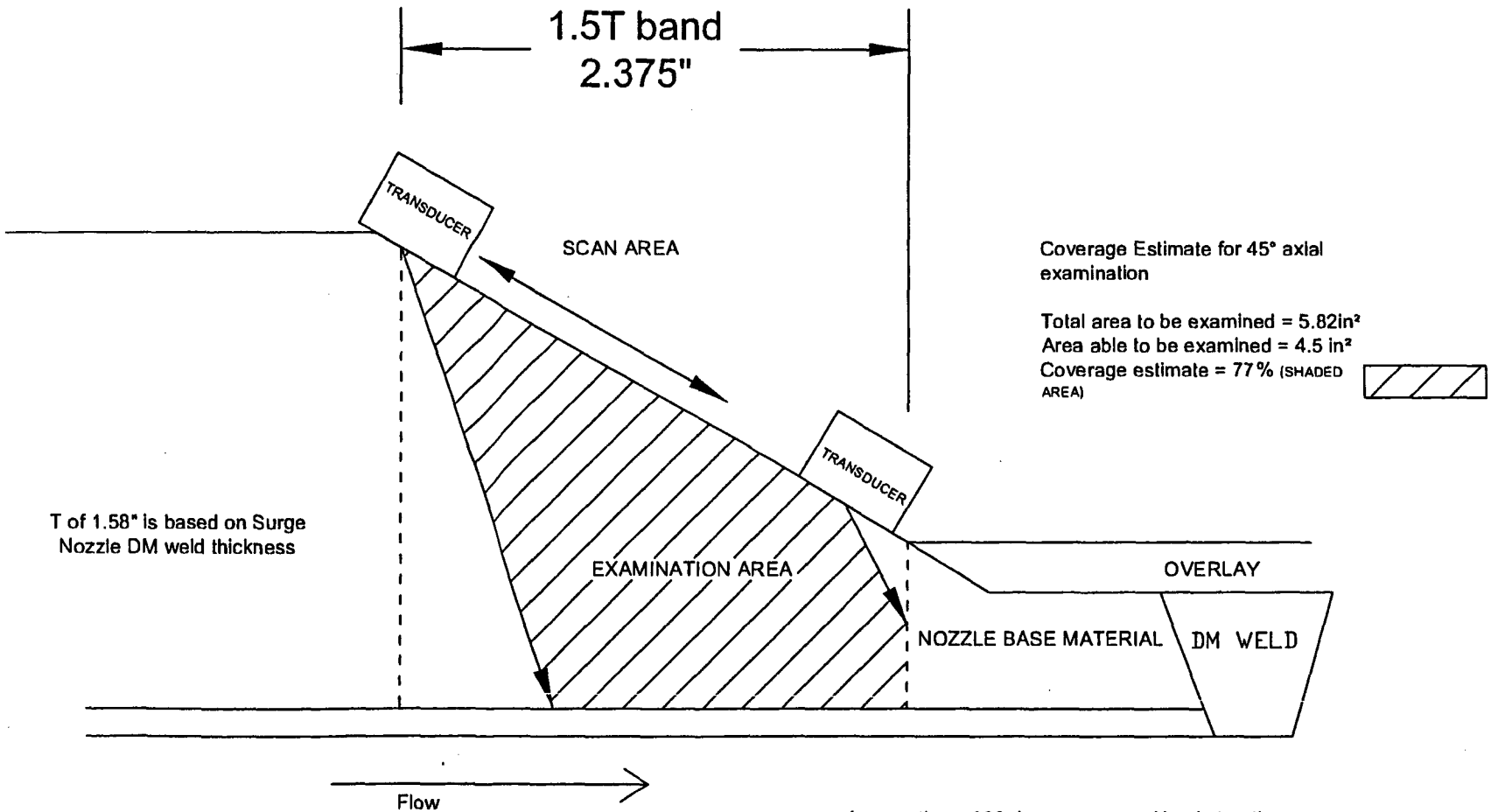
DONALD C. COOK UNIT 2
SURGE LINE

Coverage plot for axial Scans with 45° transducer looking at DM weld



Coverage Estimate for 45° axial examination

Total area to be examined = 5.82in²
Area able to be examined = 4.5 in²
Coverage estimate = 77 % (SHADED AREA)

Assumptions: 360 degree access, No obstructions
0.5" transducer size, scans performed looking at DM weld

Attachment 2 to AEP:NRC:6055

10 CFR 50.55a Relief Request –ISIR-20
Proposed Alternative for Preemptive Weld Overlays in Accordance with 10 CFR 50.55a(a)(3)(i)
Revision 1

1.0 REASON FOR THE REQUEST

Dissimilar metal welds (DMWs), consisting primarily of Alloy 82/182 weld material are frequently used in pressurized water reactor (PWR) construction to connect stainless steel pipe and safe ends to vessel nozzles, generally constructed of carbon or low alloy ferritic steel. These welds have shown a propensity for primary water stress corrosion cracking (PWSCC) degradation, especially in components subjected to higher operating temperatures, such as the pressurizer (PRZ).

With this request, Indiana Michigan Power Company (I&M) is proposing to take a proactive approach on the Donald C. Cook Nuclear Plant (CNP) Unit 2 PRZ to apply a preemptive weld overlay (PWOL) on the PRZ nozzle safe end to nozzle DMWs to mitigate the occurrence of PWSCC prior to detectable evidence of PWSCC. Structural weld overlays (WOLs) have been used for several years on both boiling water reactors and PWRs to arrest existing flaws from propagating while establishing a new structural pressure boundary. In some cases, WOLs have been used to reestablish structural integrity of the DMW containing through wall leaking flaws. The PWOLs will also facilitate ultrasonic examination of the DMWs by providing a more consistent outer surface configuration from which scanning can be performed.

The welding will be performed using a remote machine Gas Tungsten-Arc Welding (GTAW) process and using the ambient temperature temper bead method with ERNiCrFe-7 (Alloy 52 or Alloy 52M*) weld metal. Manual GTAW, using Alloy 52 or Alloy 52M, will only be permitted subsequent to the PWOLs being essentially completed. Manual GTAW may be used if local repairs of weld defects are necessary or additional weld metal is required locally to form the final PWOL contour.

As discussed herein, there is no comprehensive criterion for a licensee to apply a WOL repair to a DMW that is constructed of Alloy 82/182 weld material and is believed to be susceptible to or contain PWSCC degradation. Although the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, 1989 Edition, no Addenda, IWA-4000, is used for the CNP Unit 2 Section XI Repair/Replacement Program, it does not have the needed requirements for this type of weld overlay repair. The latest Nuclear Regulatory Commission (NRC) approved ASME Code also does not have the needed requirements for this type of overlay. Repair/replacement activities associated with weld overlays of this type are required to address the materials, welding parameters, personnel radiation exposure concerns, operational constraints, examination techniques, and procedure requirements.

*The material supplier's weld wire designation is 52MS. The "S" designates the process route that converts the hot-rolled billet into finished cold-drawn wire. The material properties are not affected.

2.0 ASME CODE COMPONENTS AFFECTED

Code Class:	Class 1
Code References:	ASME Section XI, 1989, no Addenda (Inservice Inspection Code) ASME Section III, 1965 Edition, including Addenda through Winter 1966 (Construction Code) ASME Section XI, 1995 Edition, including Addenda through 1996, Appendix VIII, Supplement 11 (Qualification Requirements) ASME Section III, 1998 Edition, including Addenda through 2000 (Repair and Inspection Code) ASME Code Case N-416-1 (Hydrostatic Testing Alternatives) ASME Code Case N-460 (Examination Coverage) ASME Code Case N-504-2 (Weld Overlay) ASME Code Case N-638-1 (Temper Bead Welding)
Examination Categories:	B-F and B-J
Item Numbers:	B5.40 and B9.11
Description:	Alternative WOLs for PRZ Spray, Safety, Relief and Surge Nozzle Safe End to Nozzle Welds (DMWs) and WOLs for the Elbow to Safe End Welds
Component Number:	2-PRZ-21 2-PRZ-22 2-PRZ-23 2-PRZ-24 2-PRZ-25 2-PRZ-26 2-RC-28-01 2-RC-25-01 2-RC-26-01 2-RC-27-01 2-RC-22-01 2-RC-21-01

3.0 GENERAL DESCRIPTION

CNP Unit 2 is in the third ten-year inservice inspection interval using the 1989 Edition of Section XI of the ASME Code. Section XI, IWA-4120, states:

> (a) "Repairs shall be performed in accordance with the Owner's Design Specification and the original Construction Code of the component or system. Later Editions and Addenda of the Construction Code or of Section III, either in their entirety or portions thereof, and Code Cases may be used. If repair welding cannot be performed in accordance with these requirements, the applicable alternative requirements of IWA-4500 and the following may be used:..."

The original construction code for the PRZ is ASME Code, Section III, 1965 Edition, Class A including Addenda through Winter 1966 for Unit 2. The 1998 Edition, ASME Code Section III, including Addenda through 2000 would require welding in accordance with NB-4622.11, "Temper Bead Weld Repair to Dissimilar Metal Welds or Buttering."

4.0 APPLICABLE CODE REQUIREMENTS FOR WHICH RELIEF IS REQUESTED

1. ASME Section XI, 1989 Edition, no Addenda, IWA-4500.

2. NRC conditionally approved Code Case N-638-1 with the condition as specified in Regulatory Guide (RG) 1.147 Revision 14.

3. NRC conditionally approved Code Case N-504-2 with the condition as specified in RG 1.147 Revision 14.

4. ASME Section XI, 1995 Edition including Addenda through 1996, Appendix VIII, Supplement 11.

5.0 PROPOSED ALTERNATIVE AND BASIS FOR USE

I&M proposes using PWOLs designed in accordance with Code Case N-504-2 (Reference 1) with the modifications proposed in Table 1. Code Case N-504-2, which the NRC finds acceptable if ASME Section XI, 2005 Addenda, Appendix Q requirements are met, allows a flaw to be reduced to an acceptable size by deposition of weld reinforcement on the outside surface of the pipe without flaw removal. The PWOLs will extend around the full circumference of the applicable DMWs as required by Code Case N-504-2. The specific thickness and length will be determined according to the guidance provided in Code Case N-504-2. The overlay will completely cover the DMWs and the adjacent stainless steel safe end to pipe welds with Alloy 52 or Alloy 52M material that is highly resistant to PWSCC. A typical PWOL configuration is shown in Figure 1.

The temper bead welding technique for the specified nozzles connecting DMWs will be implemented in accordance with ASME Code Case N-638-1 (Reference 2) with the modifications proposed in Table 2. The ultrasonic examination (UT) of the completed PWOL will be accomplished in accordance with ASME Section XI, 1995 Edition with the 1996 Addenda, Appendix VIII, Supplement 11 with the modifications described in Table 3 used to comply with the Performance Demonstration Initiative (PDI) program.

6.0 DURATION OF THE PROPOSED ALTERNATIVE

The duration of the proposed alternative is the remaining service life of the component including the period of extended operation.

7.0 PRECEDENTS

Similar relief requests have been previously approved for AmerGen Energy Company for its Three Mile Island Nuclear Station, Unit 1 (Reference 3), Constellation Energy's Calvert Cliffs Nuclear Power Plant, Unit 2 (Reference 4), CNP Unit 1 (References 5 and 6) and PPL Susqhehanna, LLC's Susqhehanna Steam Electric Station, Unit 1 (Reference 9). It is I&M's

understanding that a similar request was verbally approved for Dominion Nuclear Connecticut's Millstone Power Station Unit 3 (Reference 7). These requests were associated with welding over detected flaws outside the acceptance criteria of Section XI.

8.0 CONCLUSION

It is I&M's opinion that the application of PWOLs using the proposed modifications to ASME Code Cases N-504-2 and N-638-1 and the use of PDI provide an acceptable level of quality and safety in accordance with the requirements of 10 CFR 10.55a(3)(i).

9.0 REFERENCES

1. ASME Code Case N-504-2, "Alternative Rules for Repair of Classes 1, 2, and 3 Austenitic Stainless Steel Piping," dated March 12, 1997.

2. Code Case N-638-1, "Similar and Dissimilar Metal Welding Using Ambient Temperature Machine GTAW Temper Bead Technique," dated February 13, 2003.

3. Letter from Richard J. Laufer, NRC to Christopher M. Crane, AmerGen, "Three Mile Island Nuclear Station, Unit 1 (TMI-1) Request for Relief from Flaw, Heat Treatment, and Nondestructive Examination Requirements for the Third 10-year Inservice Inspection (ISI) Interval (TAC No. MC101)," Accession Number ML041670510, dated July 21, 2004.

4. Letter from Richard J. Laufer, NRC, to George Vanderheyden, Calvert Cliffs, "Calvert Cliffs Nuclear Power Plant, Unit No. 2 – Relief Request for Use Weld Overlay and Associated Alternative Inspection Techniques (TAC Nos. MC6219 and MC6220)," Accession Number ML051930316, dated July 20, 2005.

5. Letter from L. Raghavan, NRC, to Mano K. Nazar, I&M, "Donald C. Cook Nuclear Plant, Unit 1 (DCCNP-1) – Alternatives Regarding Repair of Weld 1-PZR-23 on Pressurizer Nozzle to Valve Inlet Line (TAC No. MC6704)," Accession Number ML053220019, dated December 1, 2005.

6. Letter from L. Raghavan, NRC, to Mano K. Nazar, I&M, "Donald C. Cook Nuclear Plant, Unit 1 – Alternative to Repair Requirements of Section XI of the American Society of Mechanical Engineers Code (TAC No. MC06751)," Accession Number ML052140463, dated June 27, 2005.

7. Letter from Leslie N. Hartz, Dominion Nuclear Connecticut, to NRC Document Control Desk, "Dominion Nuclear Connecticut, Inc., Millstone Power Station Unit 3, Second 10-year Inservice Inspection Interval, Revision 1 to Relief Request IR-2-39, Use of Weld overlay and Associated Alternative Repair Techniques," Accession Number ML052930018, dated October 19, 2005.

8. Letter from John N. Hannon, NRC, to E. E. Fitzpatrick, I&M, "D. C. Cook, Units 1 and 2, Requesting Approval of Code Case N-416-1 as an alternative to the Required Hydrostatic Pressure Test (TAC Nos. M92377 and M92345)," dated July 24, 1995.

9. Letter from Richard J. Laufer, NRC, to Bryce L. Shriver, PPL Susquehanna, "Susqhehanna Steam Electric Station, Unit 1 – Relief from American Society of Mechanical Engineers, Boiler and Pressure Vessel Code (ASME Code), Section XI, Appendix VIII, Supplement 11, Requirements and Code Cases N-504-2 and N-638 Requirements (TAC Nos. MC2450, MC2451 and MC2594)," Accession Number ML051220568, dated June 22, 2005.

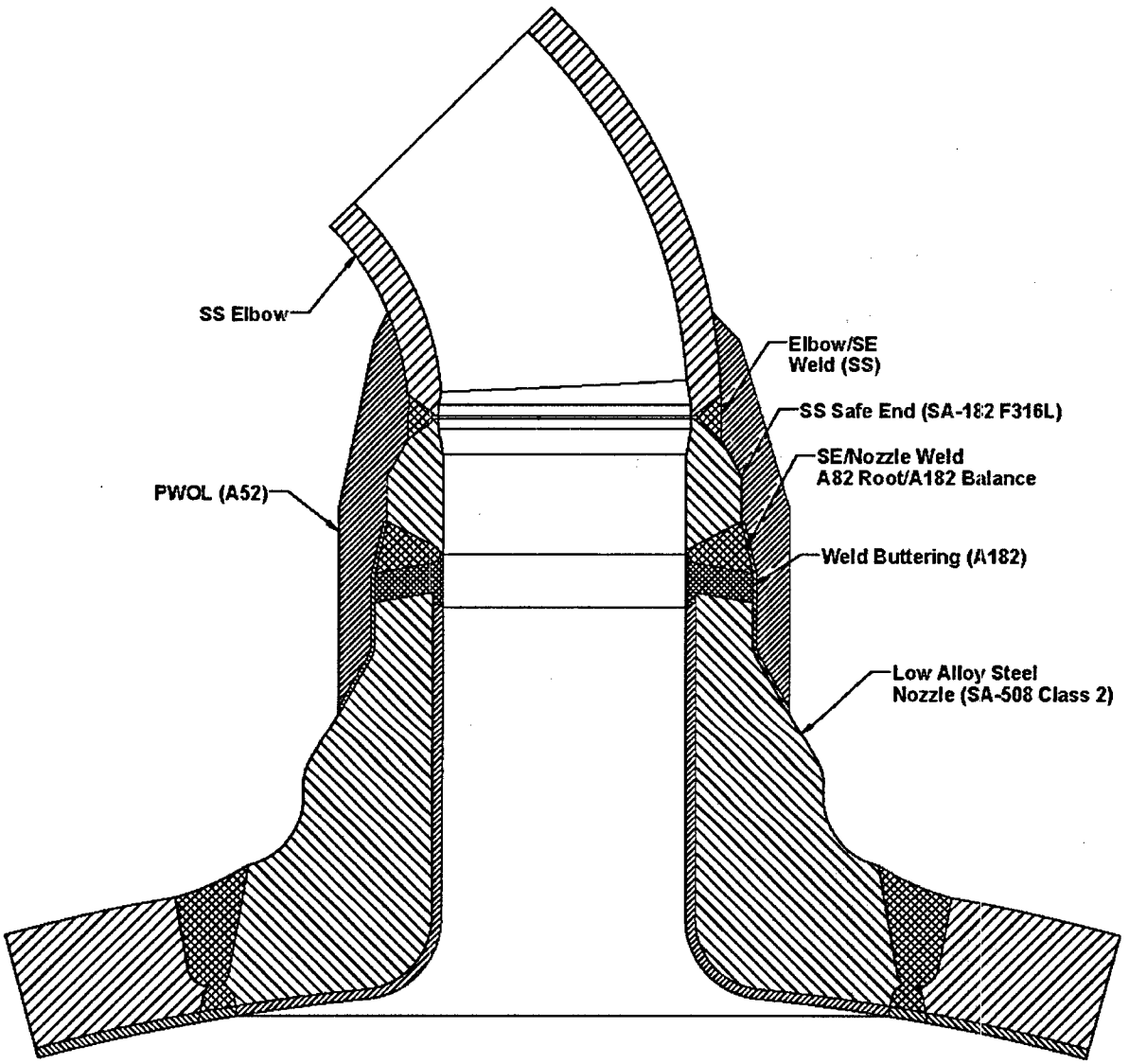


Figure 1 - Typical PWOL Configuration

TABLE 1
DESIGN/MATERIAL/NONDESTRUCTIVE EXAMINATION
Modifications to Code Case N-504-2 and ASME Section XI, Appendix Q

Code Case N-504-2 and ASME Section XI Appendix Q	Proposed Modifications
b) Reinforcement weld metal shall be low carbon (0.035% [per cent] maximum) austenitic stainless steel applied 360° around the circumference of the pipe, and shall be deposited in accordance with a qualified welding procedure specification identified in the Repair Program **[essentially same as Q-2000(a)]**.	**Modification:** Weld overlay filler metal shall be an austenitic nickel alloy (28% Cr min.) applied 360 degrees around the circumference of the item, and shall be deposited using a Welding Procedure Specification for groove welding, qualified in accordance with the Construction Code and Owner's Requirements and identified in the Repair/Replacement Plan. **Basis:** Industry operational experience has shown that PWSCC in Alloy 82/182 will blunt at the interface with stainless steel base metal, ferritic base metal, or Alloy 52/52M/152 weld metal.
(e) The weld reinforcement shall consist of a minimum of two weld layers having as-deposited delta ferrite content of at least 7.5 FN. The first layer of weld metal with delta ferrite content of at least 7.5 FN shall constitute the first layer of the weld reinforcement design thickness. Alternatively, first layers of at least 5 FN may be acceptable based on evaluation **[essentially the same as Q-2000(d) except if 0.02% carbon is used, evaluation of 5 FN acceptability not required]**.	**Modification:** There is no requirement for delta ferrite, and delta ferrite measurements will not be performed for this overlay. **Basis:** The deposited Alloy 52 or Alloy 52M is 100% austenitic and contains no delta ferrite due to the high nickel composition (approximately 60% nickel).
(h) The completed repair shall be pressure tested in accordance with IWA-5000. If the flaw penetrated the original pressure boundary prior to welding, or if any evidence of the flaw penetrating the pressure boundary is observed during the welding operation, a system hydrostatic test shall be performed in accordance with IWA-5000. If the system pressure boundary has not been penetrated, a system leakage, inservice, or functional test shall be performed in accordance with IWA-5000.	**Modification:** In lieu of hydrostatic testing, a system leakage test and an UT of the weld overlay shall be performed in accordance with the Third Interval ISI Program and ASME Code Case N-416-1. **Basis:** Code Case N-416-1 has been approved for use at the CNP as an alternative to hydrostatic testing (Reference 8).

TABLE 2
AMBIENT TEMPERATURE TEMPER BEAD WELDING
Modifications To Code Case N-638-1

Code Case N-638-1	Proposed Modifications
1.0 GENERAL REQUIREMENTS	
(a) The maximum area of an individual weld based on the finished surface shall be 100 sq. in., and the depth of the weld shall not be greater than one-half of the ferritic base metal thickness.	**Modification**: The maximum area of an individual weld based on the finished surface over the ferritic material shall be 300 sq. in. **Basis:** The PWOL will require welding on more than 100 sq. in. of surface on the surge nozzle low alloy steel base material. The PWOL will extend to the transition taper of the low alloy steel nozzle so that qualified UT of the required volume can be performed There have been a number of temper bead WOL repairs applied to safe-end to nozzle welds in the nuclear industry, and a WOL repair having a 300 sq. in. surface was recently approved for the Susquehanna Steam Electric Station (Reference 9). ASME Code Case N-432-1, which is approved for use in RG 1.147, allows temper bead welding on low alloy steel nozzles without limiting the temper bead weld surface area. The two additional conditions required by Code Case N-432-1 that are not required by Code Case N-638-1 are that temper bead welds have preheat applied and that the procedure qualification be performed on the same specification, type, grade and class of material. The elevated preheat would present a radiation exposure burden when performing the repair.
4.0 EXAMINATION	
(b) The final weld surface and the band around the area defined in para. 1.0(d) shall be examined using surface and ultrasonic	**Modification:** For the PWOLs, full UT of the 1.5T band will not be performed.

Code Case N-638-1	Proposed Modifications
methods when the completed weld has been at ambient temperature for at least 48 hours. The ultrasonic examination shall be in accordance with Appendix I.	**Basis:** For the application of the WOL repair addressed in this request, it is not possible to perform a meaningful ultrasonic examination of the required band of base material because of the existing nozzle configuration shown in Figure 1. This code case applies to any type of welding where a temper bead technique is to be employed and is not specifically written for a WOL repair. However, it is believed that for this type of repair, any major base material cracking would take place in the heat affect zone directly below the weld overlay or in the underlying Alloy 82/182 weld deposit and not in the required band of material out beyond the overlay. Therefore, it is assumed that if this cracking were to occur, it would be identified by the UT of the WOL. However, UT will be performed on the 1.5T band to the extent practical.

TABLE 3
Modifications to Appendix VIII, Supplement 11

Appendix VIII, Supplement 11	PDI Modification
1.0 SPECIMEN 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 inches or larger, the specimen set must include at least one specimen 24 inches or larger but need not include the maximum diameter. The specimen set must include at least one specimen with overlay thickness within -0.1 inches to +0.25 inches of the maximum nominal overlay thickness for which the procedure is applicable.	(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 inches or larger, the specimen set must include at least one specimen 24 inches or larger but need not include the maximum diameter. The specimen set shall include specimens with overlays not thicker than 0.1 inches more than the minimum thickness, nor thinner than 0.25 inches of the maximum nominal overlay thickness for which the examination procedure is applicable.
(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 percent through the base metal wall. Flaws may extend 100 percent 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 [intergranular stress corrosion cracking] shall be used when available.	(1) Base metal flaws. All flaws must be in or near the butt weld heat-affected zone, open to the inside surface, and extending at least 75 percent through the base metal wall. Intentional overlay fabrication flaws shall not interfere with ultrasonic detection or characterization of the base metal flaws. Specimens containing IGSCC shall be used when available. At least 70 percent 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:

Appendix VIII, Supplement 11	PDI Modification
	(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 semielliptical with a tip width of less than or equal to 0.002 inches.
(e) Detection Specimens	
(1) At least 20 percent but less than 40 percent of the flaws shall be oriented within ±20 degrees 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.	(1) At least 20 percent but less than 40 percent of the base metal flaws shall be oriented within ±20 degrees 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.
(2) Specimens shall be divided into base and over-lay grading units. Each specimen shall contain one or both types of grading units.	(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.
(a)(1) A base grading unit shall include at least 3 inches of the length of the overlaid weld. The base grading unit includes the outer 25 percent of the overlaid weld and base metal on both sides. The base grading unit shall not include the inner 75 percent of the overlaid weld and base metal overlay material, or base metal-to-overlay interface.	(a)(1) A base metal grading unit includes the overlay material and the outer 25 percent 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 inch of the adjacent base material.
(a)(2) When base metal cracking penetrates into the overlay material, the base grading unit shall include the overlay metal within 1 inch of the crack location. This portion of the overlay material shall not be used as part of any overlay	(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.

Appendix VIII, Supplement 11	PDI Modification
grading unit.	
(a)(3) When a base grading unit is designed to be unflawed, at least 1 inch 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.	(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.
(b)(l) An overlay grading unit shall include the overlay material and the base metal-to-overlay interface of at least 6 square inches The overlay grading unit shall be rectangular, with minimum dimensions of 2 inches.	(b)(l) 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.
(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 inch 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.	(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.
(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.	(b)(3) Detection sets shall be selected from Table VIII-S2-1. The minimum detection sample set is five flawed 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

Appendix VIII, Supplement 11	PDI Modification
	personnel qualification set is required.
(f) Sizing Specimen	
(1) The minimum number of flaws shall be ten. At least 30 percent of the flaws shall be overlay fabrication flaws. At least 40 percent of the flaws shall be cracks open to the inside surface.	(1) The minimum number of flaws shall be ten. At least 30 percent of the flaws shall be overlay fabrication flaws. At least 40 percent 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.
(3) Base metal cracking used for length sizing demonstrations shall be oriented circumferentially.	(3) Base metal flaws used for length sizing demonstrations shall be oriented circumferentially.
(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 inch in the through-wall direction.	(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.
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.	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. The overlay fabrication flaw test and the base metal flaw test may be performed separately.

Appendix VIII, Supplement 11	PDI Modification
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.	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 metal or overlay fabrication) that are present for each specimen.
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 percent of the base wall thickness.	(d) For flaws in base metal grading units, the candidate shall estimate the length of that part of the flaw that is in the outer 25 percent of the base metal wall thickness.
2.3 Depth Sizing Test.	
For the depth sizing test, 80 percent of the flaws shall be sized at a specific location on the surface of the specimen identified to the candidate. For the remaining flaws, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.	(a) The depth sizing test may be conducted separately or in conjunction with the detection test. (b) When the depth sizing test is conducted in conjunction with the detection test and the detected flaws do not satisfy the requirements of 1.1(f), additional specimens shall be provided to the candidate. The regions containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region. (c) For a separate depth sizing test, the regions of each specimen containing a flaw to be sized shall be identified to the candidate. The candidate shall determine the maximum depth of the flaw in each region.

Appendix VIII, Supplement 11	PDI Modification
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 satisfy the acceptance criteria of Table VIII-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.	a) Examination procedures are qualified for detection when; 1) All flaws within the scope of the procedure are detected and the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for false calls. (a) At least one successful personnel demonstration has been performed meeting the acceptance criteria defined in (b). (b) Examination equipment and personnel are qualified for detection when the results of the performance demonstration satisfy the acceptance criteria of Table VIII-S2-1 for both detection and false calls. (c) The criteria in (a), (b) shall be satisfied separately by the demonstration results for base metal grading units and for overlay fabrication grading units.
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 percent through-base-metal position.	(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 flaws is measured at the 75 percent through-base-metal position.
(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.	This requirement is omitted.

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(c) The RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 inch.	(b) The RMS error of the flaw depth measurements, as compared to the true flaw depths, is less than or equal to 0.125 inch.

Attachment 3 to AEP:NRC:6055

Regulatory Commitment

The following table identifies those actions committed to by Indiana Michigan Power Company (I&M) in this document. Any other actions discussed in this submittal represent intended or planned actions by I&M. They are described to the Nuclear Regulatory Commission (NRC) for the NRC's information and are not regulatory commitments.

Commitment	Date
I&M will submit stress analyses summaries for the preemptive weld overlays.	Prior to restart