

April 26, 2001

10 CFR Part 50  
Section 50.55a

U S Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

**PRAIRIE ISLAND NUCLEAR GENERATING PLANT**  
Docket Nos. 50-282 License Nos. DPR-42  
50-306 DPR-60

**#12 Steam Generator Weld Indication Evaluation**

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During the Unit 1 refueling outage in January-March 2001, Refueling Outage 20, ultrasonic examinations of steam generator #12 were performed in accordance with ASME Boiler and Pressure Vessel Code Section XI. The third ten-year interval plan for Prairie Island Unit 1 was written to conform to the 1989 edition of ASME Section XI.

During the examinations, two indications ( 45 degree scan and 60 degree scan) were identified in the Transition to Shell Cone weld (W-F) region for steam generator #12, Code Section XI, Category C1.10 (see attached cover sheet to examination report #2001U012). Both indications (flaws 1 and 4) exceeded the allowable flaw size when evaluated against the standards provided in ASME Section XI, IWC-3500. Accordingly, we performed analytical evaluations of these flaws per ASME Section XI, IWC-3610. Both flaw indications were found acceptable per these analyses.

These indications are scheduled for follow-up examinations as required according to IWC-2420 (b) for identified flaws.

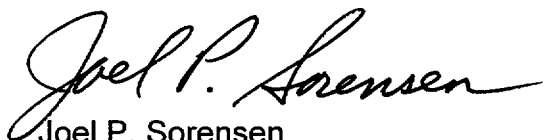
Attached for your review are the results of these evaluations. The procedure used for these evaluations is contained in WCAP-14166 , which we submitted for review in January 1995.

A047

USNRC  
April 26, 2001  
Page 2

NUCLEAR MANAGEMENT COMPANY, LLC

In this letter we have made no new Nuclear Regulatory Commission commitments. Please contact Jack Leveille (651-388-1121, Ext. 4142) if you have any questions related to this letter.



Joel P. Sorensen  
Site Vice President  
Prairie Island Nuclear Generating Plant

c: Regional Administrator - Region III, NRC  
Senior Resident Inspector, NRC  
NRR Project Manager, NRC  
J E Silberg

Attachment: Ultrasonic Examination Report #2001U012 (16 pages).



# UT Vessel Examination

Report No.: 2001U012Page: 1 of 8  
*0544*Site/Unit: NSP / PI1Procedure: ISI-UT-3Summary No.: 301072Procedure Revision/FC: 9 /Examination For: ISIWork Order No.: 0010296Applicable Code: 1989ISO Drawing No.: ISI-43BLocation: ContainmentDescription: TRANSITION - SHELLSystem ID: SGComponent ID: W-FSize/Length: 2.0" / 553.0" Thickness/Diameter: 3.9" / 176.0"Limitations: 4 Welded Pads 10.5" L x 7.0" HStart Time: 09:23 Finish Time: 18:33Examination Surface: Inside ☐ Outside ☒Surface Condition: BuffedLo Location: Feedwater NozzleWo Location: Centerline of WeldCouplant: Sonotrace 40Batch No.: #00143Temp. Tool Mfg.: TelatempSerial No.: NSP 162Surface Temp.: 80 °FCal. Sheet No.: 2001CA031, 2001CA032, 2001CA033

Angle Used

0	45	45T	60	60T	
46.8	52.7	52.7	66.2	66.2	

Scanning dB

Indication(s): Yes ☒ No ☐Scan Coverage: Upstream ☒ Downstream ☒ CW ☒ CCW ☒

Comments:

NoneResults: NAD ☐ IND ☒ GEO ☐Percent Of Coverage Obtained > 90%: YesReviewed Previous Data: Yes

Examiner	Level	Signature	Date	Reviewer	Signature	Date
Gahan, Timothy	II	<i>Timothy Gahan</i>	1/31/2001	Halling, David A.	<i>David A. Halling</i>	2/7/01
Examiner	Level	Signature	Date	Site Review	Signature	Date
Potter, Michael E.	II	<i>Michael E. Potter</i>	1/31/2001	Clay, Sean P.	<i>Sean P. Clay</i>	2/7/01
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A	N/A			Clow, Ron	<i>Ron Clow</i>	2/19/01



## Supplemental Report

Report No.: 2001U012

Page: 2 of 816

Summary No.: 301072

Examiner: Gahan, Timothy

Level: II

Reviewer: Halling, David A.

Date: 2/7/01

Examiner: Potter, Michael E.

Level: II

Site Review: Clay, Sean P.

Date: 2/7/01

Other: N/A

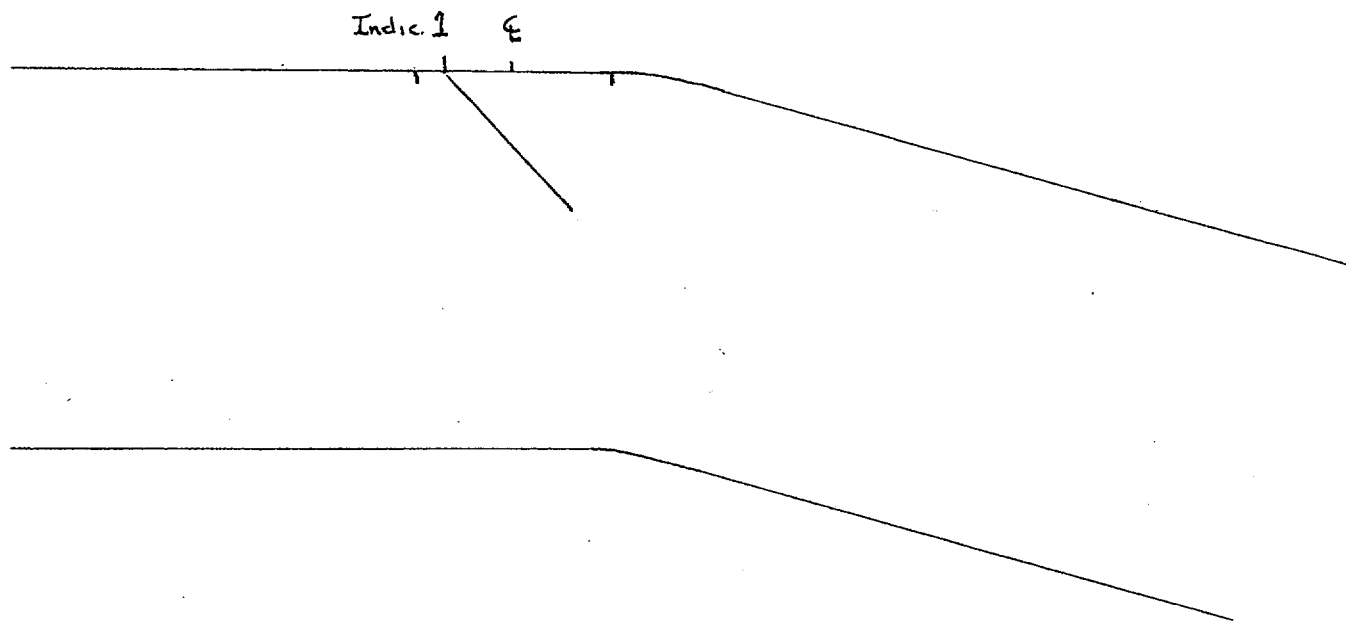
Level: N/A

ANII Review: Clow, Ron

Date: 2/19/01

Comments: Scale 2:1

Sketch or Photo: G:\IDDEAL50\PI1RFO2001\UT - Supplemental\2001U012-1.bmp





## Supplemental Report

Report No.: 2001U012

Page: 3 of 816

Summary No.: 301072

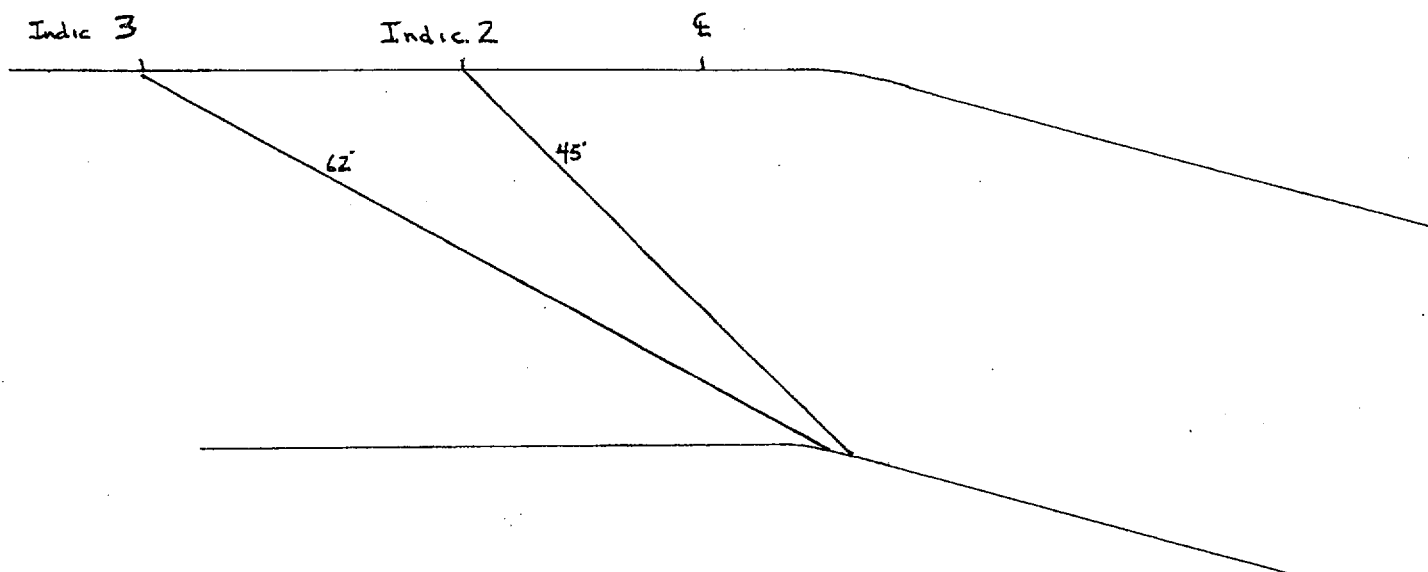
Examiner: Gahan, Timothy Level: II Reviewer: Halling, David A. Date: 2/1/01

Examiner: Potter, Michael E. Level: II Site Review: Clay, Sean P. Date: 2/7/01

Other: N/A Level: N/A ANII Review: Clow, Ron Date: 2/19/01

Comments: ID Geometry indicative of welded pad.  
Scale 2:1

Sketch or Photo: G:\IDDEAL50\PI1RFO2001\UT - Supplemental\2001U012-2.bmp





## Supplemental Report

Report No.: 2001U012

Page: 4 of 8/6  
*over*

Summary No.: 301072

Examiner: Gahan, Timothy

Level: II

Reviewer: Halling, David A.

Date: 2/7/01

Examiner: Potter, Michael E.

Level: II

Site Review: Clay, Sean P.

Date: 2/7/01

Other: N/A

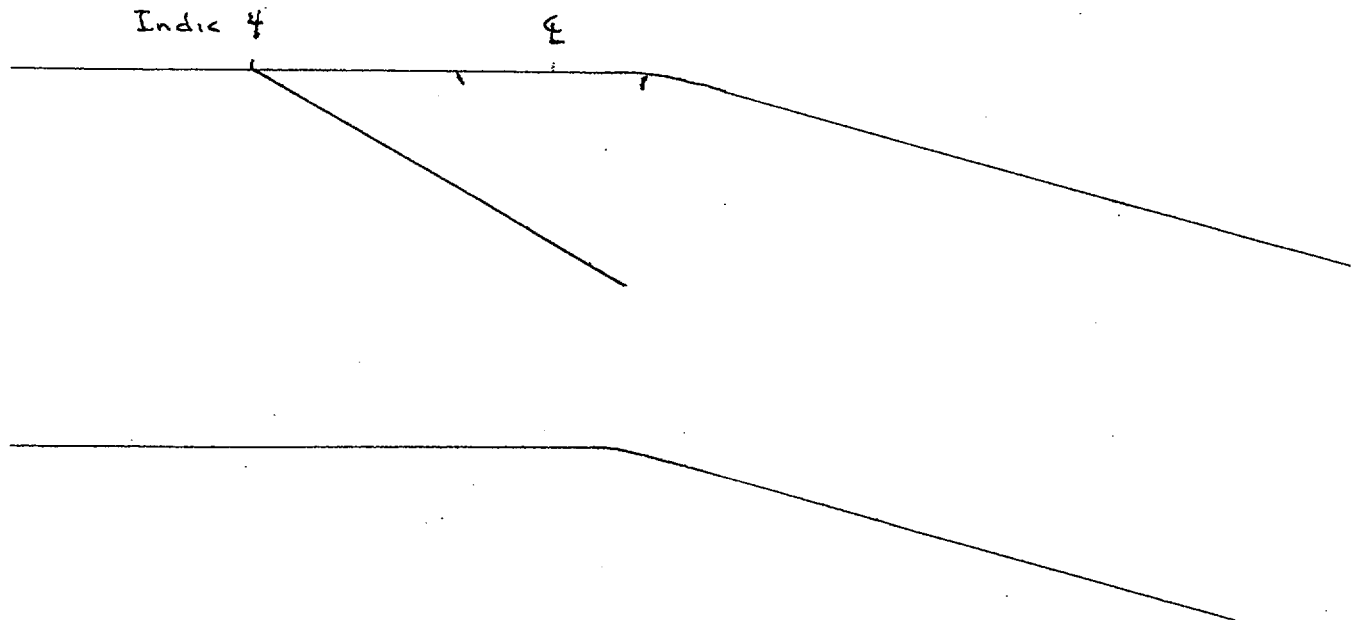
Level: N/A

ANII Review: Clow, Ron

Date: 2/19/01

Comments: **Scale 2:1**

Sketch or Photo: G:\IDDEAL50\PI1RFO2001\UT - Supplemental\2001U012-3.bmp





# Ultrasonic Indication Report

Report No.: 2001U012

Page: 5 of 816

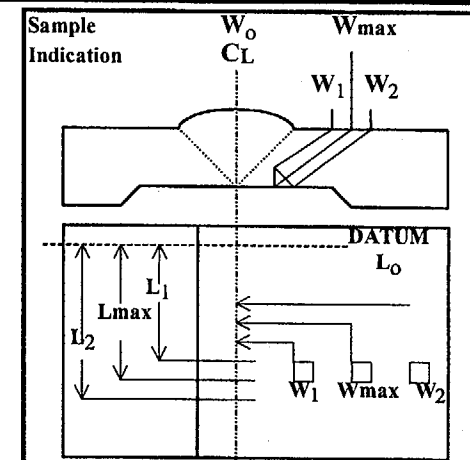
Site/Unit: NSP / PI1  
Summary No.: 301072  
Examination For: ISI

Procedure: ISI-UT-3  
Procedure Revision/FC: 9 /  
Work Order No.: 0010296

Search Unit Angle: 45 &amp; 60 °

Wo Location: Centerline of Weld

Lo Location: Feedwater Nozzle

☐ Piping Welds☒ Ferritic Vessels  $\geq 2''T$ ☐ Other

MP	Metal Path	Wmax	Distance From Wo To S.U. At Maximum Response
RBR	Remaining Back Reflection	W1	Distance From Wo At 20% Of Max (Forward)
L	Distance From Datum	W2	Distance From Wo At 20% Of Max (Forward)

Scan #	Indication No.	% Of DAC	W Max		Forward 20% Of Max		Backward 20% Of Max		L1 20% Of Max	L Max	L2 20% Of Max	RBR Amp.	Remarks
			W	MP	W1	MP	W2	MP					
2	1	55%	0.75	1.96	0.65	1.84	0.90	2.23	9.25	9.50	10.25		45 Degree - Indication < recordable from other side.
2	2	38%	3.50	5.66					39.0	40.0	40.5		45 Degree - ID Geometry < recordable scans 1,3 and 4.
2	3	100%	7.00	8.25					39.0	40.0	40.5		60 Degree - ID Geometry.
2	4	22%	2.90	4.46	2.00	3.725	3.40	5.03	383.45	384.00	384.40		60 Degree - Indication < recordable from other side.

Examiner	Level II	Signature	Date	Reviewer	Signature	Date
Gahan, Timothy		<i>Timothy Gahan</i>	1/31/2001	Halling, David A.	<i>David A. Halling</i>	2/7/01
Examiner	Level II	Signature	Date	Site Review	Signature	Date
Potter, Michael E.		<i>Michael E. Potter</i>	1/31/2001	Clay, Sean P.	<i>Sean P. Clay</i>	2/7/01
Other	Level N/A	Signature	Date	ANII Review	Signature	Date
N/A				Clow, Ron	<i>Ron Clow</i>	2/19/01



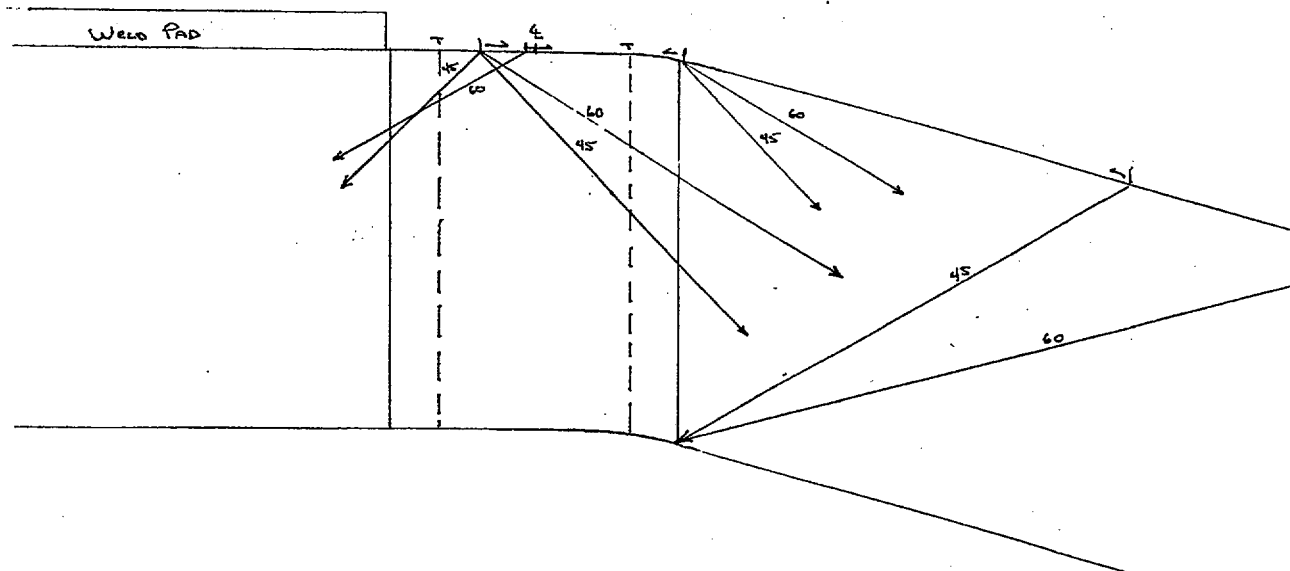
# Limitation Record

Report No.: **2001U012**Site/Unit: **NSP / PI1**Procedure: **ISI-UT-3**Page: **6** of **816**Summary No.: **301072**Procedure Revision/FC: **9 /**Examination For: **ISI**Work Order No.: **0010296**

Description of Limitation:

**Weld Pad. Scale 2:1**

Sketch of Limitation: G:\IDDEAL50\PI1RFO2001\UT - Supplemental\2001U012-4.bmp



Limitations removal requirements:

**None**Radiation field: **15 mR/hr**

Examiner	Level	II	Signature	Date	Reviewer	Signature	Date
Gahan, Timothy			<i>Timothy Gahan</i>	1/31/2001	Halling, David A.	<i>D. A. Halling</i>	2/7/01
Examiner	Level	II	Signature	Date	Site Review	Signature	Date
Potter, Michael E.			<i>Michael E. Potter</i>	1/31/2001	Clay, Sean P.	<i>Sean P. Clay</i>	2/7/01
Other	Level	N/A	Signature	Date	ANII Review	Signature	Date
N/A					Clow, Ron	<i>Ron Clow</i>	2/19/01



# Determination of Percent Coverage for UT Examinations - Vessels

Report No.: 2001U012  
Site/Unit: NSP / PI1 Procedure: ISI-UT-3 Page: 7 of 8/6  
Summary No.: 301072 Procedure Revision/FC: 9 /  
Examination For: ISI Work Order No.: 0010296

## 0 deg Planar

Scan 100.000 % Length X 100.000 % volume of length / 100 = 100.000 % total for 0 deg

## 45 deg

Scan 1 100.000 % Length X 99.700 % volume of length / 100 = 99.700 % total for Scan 1

Scan 2 100.000 % Length X 94.000 % volume of length / 100 = 94.000 % total for Scan 2

Scan 3 100.000 % Length X 100.000 % volume of length / 100 = 100.000 % total for Scan 3

Scan 4 100.000 % Length X 100.000 % volume of length / 100 = 100.000 % total for Scan 4

Add totals and divide by # scans = 98.425 % total for 45 deg

## Other deg 62

Scan 1 100.000 % Length X 93.300 % volume of length / 100 = 93.300 % total for Scan 1

Scan 2 100.000 % Length X 99.500 % volume of length / 100 = 99.500 % total for Scan 2

Scan 3 100.000 % Length X 100.000 % volume of length / 100 = 100.000 % total for Scan 3

Scan 4 100.000 % Length X 100.000 % volume of length / 100 = 100.000 % total for Scan 4

Add totals and divide by # scans = 98.200 % total for 62 deg

## Percent complete coverage

Add totals for each angle and scan required and divide by # of angles to determine;

98.875 % Total for complete exam

## **Note:**

Supplemental coverage may be achieved by use of other angles / methods. When used, the coverage for volume not obtained with angles as noted above shall be calculated and added to the total to provide the percent total for the complete examination.

Site Field Supervisor: [Signature] LV III

Date: 2/3/01

Page 0 of 10  
Page 8 of 16

**Flaw Sizing Calculations Using Metal Path for Vessel Welds > 2"**  
For surface and subsurface single planar flaws oriented in plane normal to pressure retaining surface

**ASME SECT XI 1989 W/ NO ADDENDA SPC INITIAL TO VERIFY**

ISI Report # 2001U012  
Flaw # 1

Evaluation Performed By: S. Clay Date: 02/03/01  
Reviewed By: Jerry P. Wm Date: 2-4-01

**Length**

Length of the flaw "l" is determined by finding the difference between L1 and L2 for perpendicular scans, W1 and W2 for parallel scans.

L and W values are from page 5 of the UT report.

$l = 10.25 \text{ (L2)} - 9.25 \text{ (L1)} = 1.0$  inches.

**Thickness**

Thickness of the component at the location of the flaw, using UT or nom wall (circle one).

This value is from page 1 of the UT report.

"t" = 3.9 inches

**Calibration**

The measured angle in the calibration block was 44.5 degrees

**Calculations using metal path**

From page 5 of the UT report, Scan # 2

The flaw exhibited 20% DAC at 1.84 and 2.23 inches MP. Max amplitude is 1.96 inches MP with the transducer exit point at .75 inches (W) from the centerline of the weld and 9.5 inches (L) from the 0" reference. (Use of 20% DAC vs. 50% max amp for indications > 100% DAC is conservative.)

- 1) Determine the upper depth of the flaw from the exam surface.  
1.84 (metal path at 20% upper) \* COS of the measured angle .7133 = 1.31 inches depth.
- 2) Determine the lower depth of the flaw from the exam surface.  
2.23 (metal path at 20% lower) \* COS of the measured angle .7133 = 1.59 inches depth.
- 3) Determine the depth of the flaw from the exam surface at the maximum amplitude point.  
1.96 (metal path at maximum amplitude point) \* COS of the measured angle .7133 = 1.40 inches depth.
- 4) Determine the distance from the center line of the weld to the maximum amplitude point of the flaw.  
1.96 (metal path at maximum amplitude point) squared = 3.84 (a<sup>2</sup>)  
1.40 (depth at maximum amplitude point) squared = 1.96 (b<sup>2</sup>)  
 $\sqrt{a^2 - b^2} = 1.37$  inches of surface distance to the flaw from the transducer exit point.  
.75 (Wmax) - 1.37 (surf dist) = -.62 inches to the centerline of the weld.
- 5) Determine S by picking the smaller of the following;  
S = 1.31 (result of 1) = distance between exam surface and the upper flaw tip  
    >> OR <<  
S = 3.9 (part "t") - 1.59 (result of 2) = 2.31 distance between the side opposite exam surface and the lower flaw tip
- 6) Determine 2d in though wall thickness.  
1.59 (from step 2) - 1.31 (from step 1) = .28 inches.

**Determination of surface or subsurface**

$0.4d = (2d / 2) * 0.4 = .056$

Compare to S (from step 5)

If S is less than 0.4d, the flaw is **surface**.  $a = 2d + S = \text{N/A}$  inches.

If S is greater than or equal to 0.4a the flaw is **sub-surface**.  $a = 2a / 2 = .14$  inches.

$l = 1.0$  (for  $a/l > 0.5$ ,  $l = 2a$ )

$t = 3.9$  (part thickness)

$a = .15$  (surf or sub surf, circle one)

$S = 1.3$



# ISI Flaw Sizing Worksheet

Report No.: 2001U012

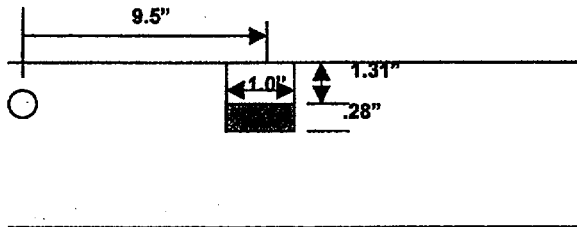
Site/Unit: NSP / PI1  
Summary No.: 301072  
Examination For: ISI

Procedure: ISI-UT-3  
Procedure Revision/FC: 9 /  
Work Order No.: 0010296

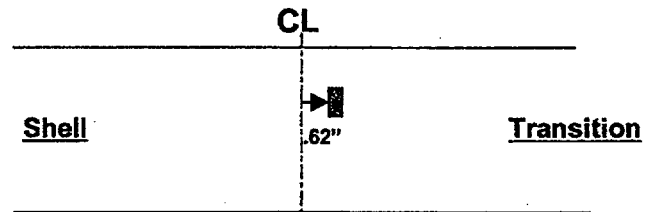
Page: 89 of 816

- 1) Flaw Number 1 3) ISI Interval 3rd Interval ☒ OK Reviewer JPW  
2) Item Number C1.10 4) Code Edition & Addenda 89 no addenda ☒ OK Reviewer JPW  
5) Method UT ☒ OK Reviewer JPW  
6) Flaw Sketch (See Below)

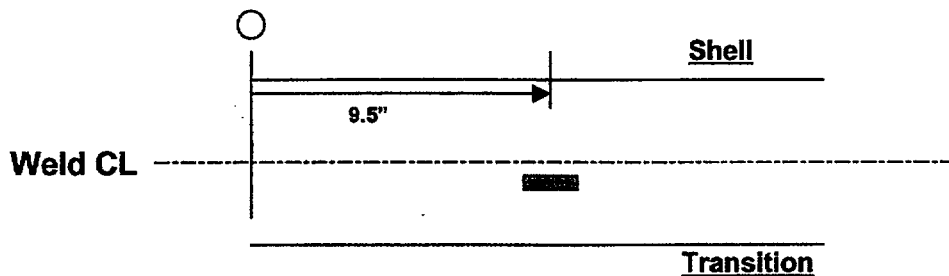
Flaw View G:\IDDEAL50\PI1RFO2001\UT - Supplemental\2001U012-6.bmp



Side View



End View



Top View

- 7) Calculations
- ☒
- OK Reviewer
- JPW

Show determination of Surface or Subsurface  
See attached Calculation Sheet.

Show determination of type of "a" to use  
See attached Calculation Sheet.

- 8) ISI-FE-1 Paragraph 7.0 - "Rounding-off Method" was used ☒ Yes Preparer SPC ☒ OK Reviewer JPW  
9) Code Flaw Dimensions ☒ OK Reviewer JPW  
"l" = 1.0 "a" = .15 "t nominal" = N/A "t measured" = 3.9 "s" = 1.3 "w" = N/A  
10) Flaw Type ☒ OK Reviewer JPW Subsurface Planar (UT/RT)  
11) Flaw Characterization Figure ☒ OK Reviewer JPW IWA-3320-1  
12) Flaw Characterization Figure Number Flaw 1  
13) Was IWA-3300 Flaw Characterization followed? ☒ Yes ☐ No If no, why?

N/A

- 14) The correct Code Edition and Addenda was available and used.
- ☒
- Yes Preparer
- SPC
- ☒
- OK Reviewer
- JPW

15) Prepared by and date Sean P. Clay 2/3/2001

The results are correct and the methodology used is in accordance with applicable codes, standards, specifications and procedures.

16) Review by and date Jerry P. Wren 2-4-01

The review assures that the results are correct and the methodology used is in accordance with applicable codes, standards, specifications and procedures.



# ISI Flaw Disposition Worksheet

Report No.: 2001 U012  
~~2001 U012~~ KJA  
 Page: 10 of 16

Site/Unit: 1 P11 Procedure: ISI-UT-3  
 Summary No.: 301072 Procedure Revision/FC: 9 1  
 Examination For: ISI Work Order No.: 0010296

1) Flaw Number 41 3) ISI Interval 3rd. ☒ OK Reviewer KJK  
 2) Item Number C1.10 4) Code Edition & Addenda 1989 no Addenda. ☒ OK Reviewer KJK  
 5) Acceptance Standard IWC-3510 ☒ OK Reviewer KJK  
 6) Calculations (See Below) ☒ OK Reviewer KJK

From table IWC-3510-1

$$Y = \frac{S}{a} = \frac{1.3}{.15} = 8.67$$

Therefore  $Y > 1.0$  Hence  $Y = 1.0$

$$\text{Aspect ratio} = a/l = \frac{.15}{1.0} = .15$$

From Table IWC-3510-1 aspect = .15

$$t = 2.5" \quad a/t\% = 4.9\%$$

$$t = 4.0" \quad a/t\% = 2.9\%$$

$$\text{Actual } t_{\text{nominal}} = 3.9" \quad L = 1.0$$

$$a = .15$$

$$S = 1.3$$

$$@ t_{\text{nom}} = 3.9$$

$$a/t\%_{\text{allow}} @ 3.9" = 4.9 + \frac{(2.9 - 4.9)}{(4.0 - 2.5)} (3.9 - 2.5)$$

$$a/t\%_{\text{allow}} @ 3.9" = 3.03\%$$

$$a/t\%_{\text{measured}} = \frac{.15}{3.9} \times 100 = 3.85\%$$

7) Results ☒ OK Reviewer KJK

$a/l = .15$  Code allowable  $a/t\% = 3.03\%$  Calculated  $a/t\% = 3.85\%$  Laminar flaw surface area:  $(0.75 | w) = NA$

8) Table used for analysis ☒ OK Reviewer KJK IWC-3510-1

9) Was linear interpolation used? ☒ Yes ☐ No If no, why?

10) Was IWA-3200 Significant Digits For Limiting Values followed? ☒ Yes ☐ No If no, why?

11) The correct Code Edition and Addenda was available and used. ☒ Yes Preparer OSW ☒ OK Reviewer KJK

12) Statement of acceptability or rejectability with basis. ☒ OK Reviewer KJK ☒ Accept ☐ Reject

☐ (a/t) Code allowable > (a/t) calculated

☒ OEM flaw evaluation handbook (see attached analysis) (Flaw #1 acceptable by WCAP 14166, IWB-3600).

☒ (a/t) Code allowable < (a/t) calculated

13) Prepared by and date

Daniel Whitford 2-4-2001

The results are correct and the methodology used is in accordance with applicable codes, standards, specifications and procedures.

14) Engineering review by and date

Karen LeBlond 2-5-01

This review assures that the results are correct and the methodology used is in accordance with applicable codes, standards, specifications and procedures.

15) Approved by and date

Thonia Vith 2-5-01

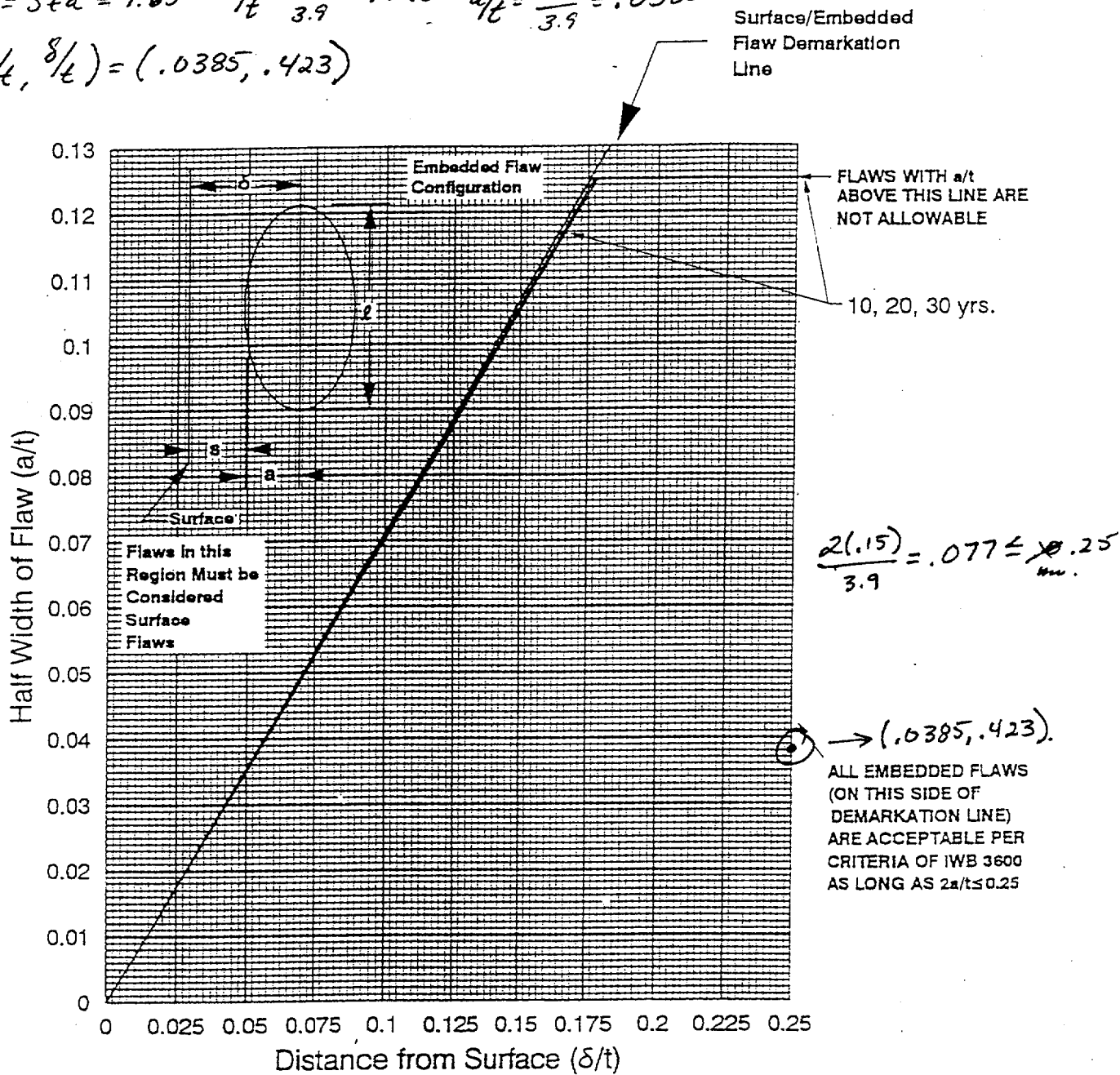
This approval assures that all involved with this flaw sizing and flaw disposition were aware of the necessity that the results and the methodology are correct and in accordance with applicable codes, standards, specifications and procedures.

Upper-Shell to Cone.

$a = .15$   $L = 1.0$   $t = 3.9$   $S = 1.5$

$S = S + a = 1.65$   $\delta/t = \frac{1.65}{3.9} = .423$   $a/t = \frac{.15}{3.9} = .0385$

$(a/t, \delta/t) = (.0385, .423)$



Flaw #1 is acceptable by IWB 3600.

Figure A-6.4 Flaw Evaluation Chart for the Upper Shell-Cone Weld for Prairie Island Units 1 and 2

$\frac{X}{X}$  Inside Surface  $\frac{X}{X}$  Surface Flaw  $\frac{X}{X}$  Longitudinal Flaw  
 $\frac{X}{X}$  Outside Surface  $\frac{X}{X}$  Embedded Flaw  $\frac{X}{X}$  Circumferential Flaw

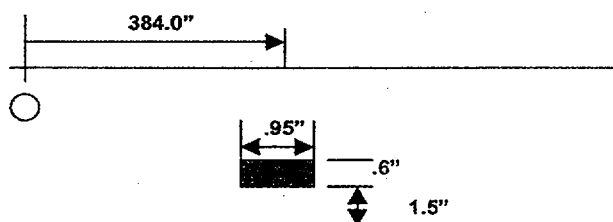
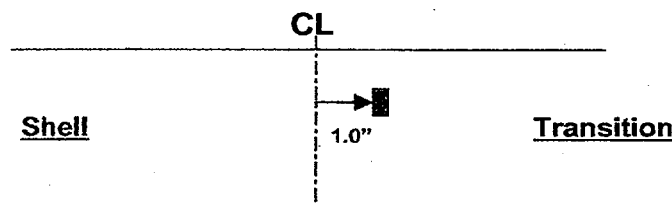
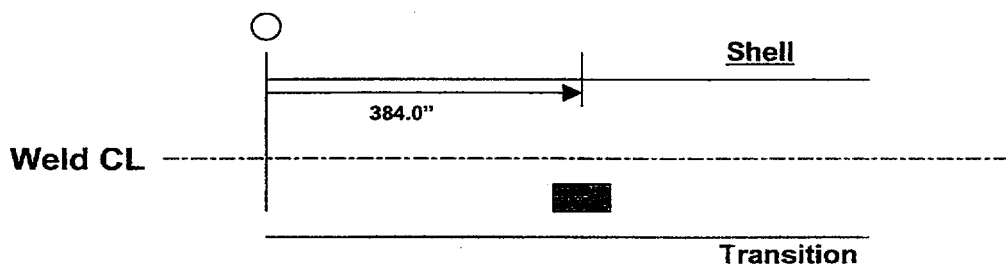


# ISI Flaw Sizing Worksheet

Report No.: 2001U012Site/Unit: NSP / PI1  
Summary No.: 301072  
Examination For: ISIProcedure: ISI-UT-3  
Procedure Revision/FC: 9 /  
Work Order No.: 0010296Page: 8/2 of 8/6

1) Flaw Number	<u>4</u>	3) ISI Interval	<u>3rd Interval</u>	OK Reviewer	<u>JPW</u>
2) Item Number	<u>C1.10</u>	4) Code Edition & Addenda	<u>89 no addenda</u>	OK Reviewer	<u>JPW</u>
		5) Method	<u>UT</u>		
		6) Flaw Sketch (See Below)		OK Reviewer	<u>JPW</u>

Flaw View G:\IDEAL50\PI1RFO2001\UT - Supplemental\2001U012-5.bmp

Side ViewEnd ViewTop View7) Calculations ☒ OK Reviewer JPWShow determination of Surface or Subsurface  
See attached Calculation Sheet.Show determination of type of "a" to use  
See attached Calculation Sheet.8) ISI-FE-1 Paragraph 7.0 - "Rounding-off Method" was used ☒ Yes Preparer SPC ☒ OK Reviewer JPW  
9) Code Flaw Dimensions ☒ OK Reviewer JPW  
"l" = 1.0 "a" = .30 "t nominal" = N/A "t measured" = 3.9 "s" = 1.3 "w" = N/A10) Flaw Type ☒ OK Reviewer JPW Subsurface Planar (UT/RT)11) Flaw Characterization Figure ☒ OK Reviewer JPW IWA-3320-112) Flaw Characterization Figure Number Flaw 113) Was IWA-3300 Flaw Characterization followed? ☒ Yes ☐ No If no, why?N/A14) The correct Code Edition and Addenda was available and used. ☒ Yes Preparer SPC ☒ OK Reviewer JPW15) Prepared by and date  
Sean P. Clay 2/3/2001

The results are correct and the methodology used is in accordance with applicable codes, standards, specifications and procedures.

16) Review by and date  
Jerry P. Wren 2-4-01

The review assures that the results are correct and the methodology used is in accordance with applicable codes, standards, specifications and procedures.

Page 13 of 16

**Flaw Sizing Calculations Using Metal Path for Vessel Welds > 2"**  
For surface and subsurface single planar flaws oriented in plane normal to pressure retaining surface

**ASME SECT XI 1989 W/ NO ADDENDA SPC INITIAL TO VERIFY**

ISI Report # 2001U012  
Flaw # 4

Evaluation Performed By: S. Clay Date: 02/03/01  
Reviewed By: [Signature] Date: 2-4-01

**Length**

Length of the flaw "l" is determined by finding the difference between L1 and L2 for perpendicular scans, W1 and W2 for parallel scans.

L and W values are from page 5 of the UT report.

$l = \underline{384.4} \text{ (L2)} - \underline{383.45} \text{ (L1)} = \underline{.95} \text{ inches.}$

**Thickness**

Thickness of the component at the location of the flaw, using UT or nom wall (circle one).

This value is from page 1 of the UT report.

"t" = 3.9 inches

**Calibration**

The measured angle in the calibration block was 62 degrees

**Calculations using metal path**

From page 5 of the UT report, Scan # 2

The flaw exhibited 20% DAC at 3.725 and 5.03 inches MP. Max amplitude is 4.46 inches MP with the transducer exit point at 2.9 inches (W) from the centerline of the weld and 384 inches (L) from the 0" reference. (Use of 20% DAC vs. 50% max amp for indications > 100% DAC is conservative.)

- 1) Determine the upper depth of the flaw from the exam surface.  
 $\underline{3.725} \text{ (metal path at 20\% upper)} * \cos \text{ of the measured angle } \underline{.4695} = \underline{1.75} \text{ inches depth.}$
- 2) Determine the lower depth of the flaw from the exam surface.  
 $\underline{5.03} \text{ (metal path at 20\% lower)} * \cos \text{ of the measured angle } \underline{.4695} = \underline{2.36} \text{ inches depth.}$
- 3) Determine the depth of the flaw from the exam surface at the maximum amplitude point.  
 $\underline{4.46} \text{ (metal path at maximum amplitude point)} * \cos \text{ of the measured angle } \underline{.4695} = \underline{2.1} \text{ inches depth.}$
- 4) Determine the distance from the center line of the weld to the maximum amplitude point of the flaw.  
 $\underline{4.46} \text{ (metal path at maximum amplitude point)} \text{ squared} = \underline{19.89} \text{ (a}^2\text{)}$   
 $\underline{2.1} \text{ (depth at maximum amplitude point)} \text{ squared} = \underline{4.41} \text{ (b}^2\text{)}$   
 $\sqrt{a^2 - b^2} = \underline{3.93} \text{ inches of surface distance to the flaw from the transducer exit point.}$   
 $\underline{2.9} \text{ (Wmax)} - \underline{3.93} \text{ (surf dist)} = \underline{-1.03} \text{ inches to the centerline of the weld.}$
- 5) Determine S by picking the smaller of the following;  
 $S = \underline{1.75} \text{ (result of 1) = distance between exam surface and the upper flaw tip}$   
**>> OR <<**  
 $S = \underline{3.9} \text{ (part "t")} - \underline{2.36} \text{ (result of 2) = } \underline{1.54} \text{ distance between the side opposite exam surface and the lower flaw tip}$
- 6) Determine 2d in though wall thickness.  
 $\underline{2.36} \text{ (from step 2)} - \underline{1.75} \text{ (from step 1) = } \underline{.61} \text{ inches.}$

**Determination of surface or subsurface**

$0.4d = (2d / 2) * 0.4 = \underline{.122}$

Compare to S (from step 5)

If S is less than 0.4d, the flaw is **surface**.  $a = 2d + S = \underline{N/A}$  inches.

If S is greater than or equal to 0.4a the flaw is **sub-surface**.  $a = 2a / 2 = \underline{.30}$  inches.

$l = \underline{1.0}$  (for  $a/l > 0.5$ ,  $l = 2a$ )

$t = \underline{3.9}$  (part thickness)

$a = \underline{.30}$  (surf or sub surf, circle one)

$S = \underline{1.5}$



# ISI Flaw Disposition Worksheet

Report No.: 20010012

Site/Unit: / PI1

Procedure: ISI-UT-3

Page: 14 of 16

Summary No.: 301072

Procedure Revision/FC: 9 1

Examination For: ISI

Work Order No.: 0010296

- |                             |   |                        |
|-----------------------------|---|------------------------|
| 1) Flaw Number <u>#4</u>    | 3) ISI Interval <u>3rd</u>                        | OK Reviewer <u>KSL</u> |
| 2) Item Number <u>C1.10</u> | 4) Code Edition & Addenda <u>1989 NW Addendum</u> | OK Reviewer <u>KSL</u> |
|                             | 5) Acceptance Standard <u>IWC-3510</u>            | OK Reviewer <u>KSL</u> |
|                             | 6) Calculations (See Below)                       | OK Reviewer <u></u>    |

From ASME table IWC-3510-1

$$Y = S/a = \frac{1.5}{.30} = 5.0$$

Therefore  $Y > 1.0$  ∴  $Y = 1.0$

$$\text{aspect ratio} = a/l = \frac{.30}{1.0} = .30$$

$$L = 0.5" \quad a/l\% = 13.54 = 13.5\%$$

$$L = 2.5" \quad a/l\% = 7.84 = 7.8\%$$

$$L = 4.0" \quad a/l\% = 4.44 = 4.4\%$$

$$\text{Actual nominal} = 3.9" \quad L = 1.0$$

$$\text{Sub Surface} \quad a = .30$$

$$S = 1.5$$

$$@ L_{\text{nominal}} = 3.9" \quad \frac{a}{l}\%_{\text{allow}} = \frac{7.8 + (4.4 - 7.8)}{(4.0 - 2.5)} \times 3.9$$

$$a/l\%_{\text{allow}} @ 3.9" = 7.8 + \frac{(4.4 - 7.8)(3.9 - 2.5)}{4.0 - 2.5}$$

$$a/l\%_{\text{allow}} @ 3.9" = 4.63\%$$

$$a/l\%_{\text{m}} = \frac{.30}{3.9} \times 100 = 7.69\%$$

7) Results ☒ OK Reviewer KSL

$a/l = .30$  Code allowable  $a/l\% = 4.63\%$  Calculated  $a/l\% = 7.69\%$  Laminar flaw surface area:  $(0.75 | w) = \text{N/A}$

8) Table used for analysis ☒ OK Reviewer KSL IWC-3510-1

9) Was linear interpolation used? ☒ Yes ☐ No If no, why?

10) Was IWA-3200 Significant Digits For Limiting Values followed? ☒ Yes ☐ No If no, why?

11) The correct Code Edition and Addenda was available and used. ☒ Yes Preparer OSW ☒ OK Reviewer KSL

12) Statement of acceptability or rejectability with basis. ☒ OK Reviewer KSL ☒ Accept ☐ Reject

☐ (a/t) Code allowable > (a/t) calculated

☒ OEM flaw evaluation handbook (see attached analysis) (Flaw #4 acceptable by WCAP 14166, IWB-3600)

☒ (a/t) Code allowable < (a/t) calculated

13) Prepared by and date

Daniel Whitaker 2-4-2001

The results are correct and the methodology used is in accordance with applicable codes, standards, specifications and procedures.

14) Engineering review by and date

Daniel Whitaker 2-5-2001

This review assures that the results are correct and the methodology used is in accordance with applicable codes, standards, specifications and procedures.

15) Approved by and date

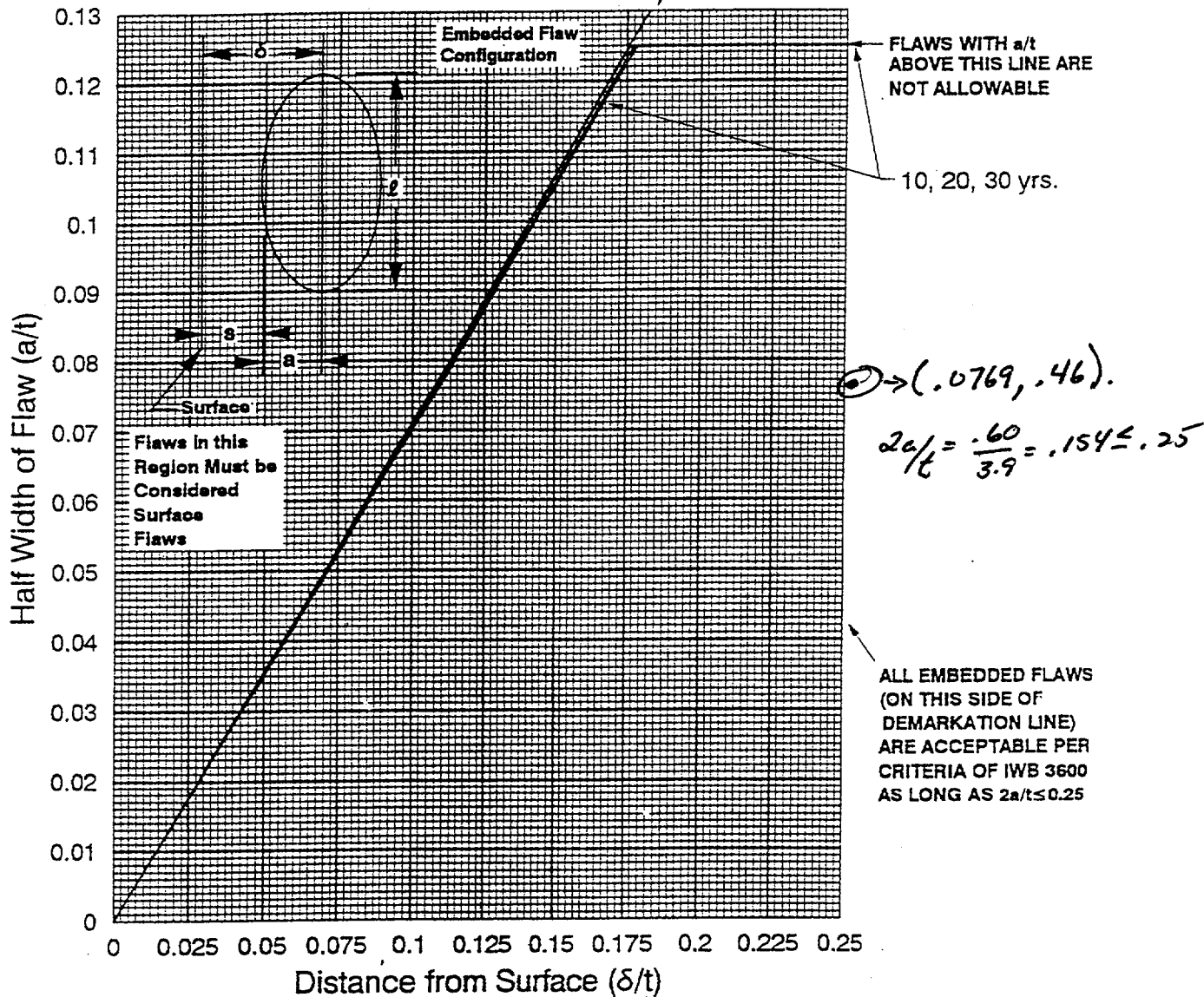
Monica Vil 2/5/01

This approval assures that all involved with this flaw sizing and flaw disposition were aware of the necessity that the results and the methodology are correct and in accordance with applicable codes, standards, specifications and procedures.

$a = .30" \quad l = 1.0" \quad t = 3.9" \quad S = 1.5$

$\delta = S + a = 1.8 \quad \delta/t = \frac{1.8}{3.9} = .46 \quad a/t = \frac{.30}{3.9} = .0769$

$(a/t, \delta/t) = (.0769, .46)$



Flaw #4 is acceptable by IWB 3600.

Figure A-6.4 Flaw Evaluation Chart for the Upper Shell-Cone Weld for Prairie Island Units 1 and 2

$\frac{X}{X}$	Inside Surface	$\frac{X}{X}$	Surface Flaw	$\frac{X}{X}$	Longitudinal Flaw
$\frac{X}{X}$	Outside Surface	$\frac{X}{X}$	Embedded Flaw	$\frac{X}{X}$	Circumferential Flaw

# ENGINEERING ISI 3<sup>RD</sup> INTEVAL DISCREPANCY DISPOSITION

## UNIT 1 – 2001

**Report Number:** 2001U012

**Item Description:** 12 SG transition to shell weld

**Discrepancy:** Two sub surface indications detected by Ultrasonic Testing.

**Disposition:** These indications are determined to be acceptable as is per WCAP 14166, IWB-3600. The associated flaw dispositions are attached to Report Number 2001U012.

Disposition: Use As Is

Prepared By: Paul Blaylock

Date: 02/20/01

Reviewed By: Paul Hajovy

Date: 02/20/01