Constellation

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10 CFR 50.55a

NMP1L3539

June 9, 2023

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Nine Mile Point Nuclear Station, Unit 1
Renewed Facility Operating License No. DPR-63
NRC Docket No. 50-220

Subject: 60 Day Commitment Response - Relief Request I5R-11 Concerning the Installation of a Weld Overlay on Reactor Pressure Vessel Recirculation Inlet Nozzle N2E Safe End-to-Nozzle Dissimilar Metal Weld (32-WD-208)

References:

1) Letter from D. Gudger (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "Submittal of Emergency Relief Request I5R-11 Concerning the Installation of a Weld Overlay on Reactor Pressure Vessel Recirculation Inlet Nozzle N2E Safe End-to-Nozzle Dissimilar Metal Weld (32-WD-208)," dated March 24, 2023 (ML23083B991)

2) Letter from D. Gudger (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "Submittal of Emergency Relief Request I5R-11 Concerning the Installation of a Weld Overlay on Reactor Pressure Vessel Recirculation Inlet Nozzle N2E Safe End-to-Nozzle Dissimilar Metal Weld (32-WD-208)," dated March 27, 2023 (ML23086C088)

3) Email from R. Guzman (U.S. Nuclear Regulatory Commission) to T. Loomis (Constellation Energy Generation, LLC), "Nine Mile Point Unit 1 - Request for Additional Information - Emergent Relief Request I5R-11 Weld Overlay on RPV Recirculation Nozzle N2E DM Weld (EPID L-2023-LLR-0011)," dated March 28, 2023 (ML23087A291)

4) Letter from D. Gudger (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "Submittal of Emergency Relief Request I5R-11 Concerning the Installation of a Weld Overlay on Reactor Pressure Vessel Recirculation Inlet Nozzle N2E Safe End-to-Nozzle Dissimilar Metal Weld (32-WD-208)," dated March 29, 2023 (ML23088A165)

5) Letter from D. Gudger (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "Submittal of Emergency Relief Request I5R-11 Concerning the Installation of a Weld Overlay on Reactor Pressure Vessel Recirculation Inlet Nozzle N2E Safe End-to-Nozzle Dissimilar Metal Weld (32-WD-208)," dated March 30, 2023 (ML23089A230)

6) Email from R. Guzman (U.S. Nuclear Regulatory Commission) to T. Loomis (Constellation Energy Generation, LLC), "Verbal Authorization for NMP1 Proposed Alternative Weld Overlay N2E Safe-end to nozzle DM Weld (EPID L2023-LLR-0011)," dated March 31, 2023 (ML23090A130)

7) Letter from D. Gudger (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "Proposed Alternative to Utilize Specific Provisions of Code Case N-716-3, 'Alternative Classification and Examination Requirements Section XI, Division 1'," dated March 29, 2023 (ML23088A395)

8) Email from T. Loomis (Constellation Energy Generation, LLC) to R. Guzman (U.S. Nuclear Regulatory Commission), "N-716 (Nine Mile Point Nuclear Station, Unit 1, Proposed Alternative to Utilize Specific Provisions of Code Case N-716-3) EPID L-2023-LLR-0012," dated April 3, 2023 (ML23093A178)

9) U.S. Nuclear Regulatory Commission Safety Evaluation Report, "Nine Mile Point Nuclear Station Unit No. 1 – Approval of Alternative Request I5R-13 to Utilize Specific Provisions of Code Case N-716-3 (EPID: L-2023-LLR-0012)," dated April 5, 2023 (ML23094A142)

10) Letter from D. Gudger (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "Submittal of Emergency Relief Request I5R-14 Concerning a Proposed Alternative Associated with N2E Safe End-to-Nozzle Dissimilar Metal Weld Repair with Laminar Indication," dated April 13, 2023 (ML23103A404)

11) Email from R. Guzman (U.S. Nuclear Regulatory Commission) to T. Loomis (Constellation Energy Generation, LLC), "Verbal Authorization for NMP1 Relief Request I5R-14, Proposed Alternative Associated with N2E Safe-End-to-Nozzle DM Weld Repair with a Laminar Indication (EPID L-2023-LLR-0017)," dated April 14, 2023 (ML23104A347)

In the Reference 1 letter, Constellation Energy Generation, LLC (CEG) requested emergency approval of a proposed alternative associated with the repair of the recirculation inlet nozzle N2E safe end-to-nozzle dissimilar metal (DM) weld. This repair was approved in the Reference 6 email. The remaining References 7 through 11 concern other proposed alternatives related to this repair.

In the Reference 5 letter, CEG committed to providing information within 60 days following the end of the refueling outage which occurred on April 21, 2023. Attachment 1 contains this information.

If you have any questions concerning this letter, please contact Tom Loomis at Thomas.Loomis@constellation.com.

Respectfully,

David T. Gudger

David T. Gudger
Senior Manager - Licensing & Regulatory Affairs
Constellation Energy Generation, LLC

Attachments: 1) 60 Day Commitment Response
2) Reports NMP1-PT-23-035, NMP1-PT-23-036, NMP1-PT-23-040, PT-NMP-920103-06, and PT-NMP-920103-07
3) Laminar Indication Reports
4) Summary Report
5) Examination Datasheet of 32-WD-208 (Overlaid Weld)

cc: Regional Administrator, Region I, NRC
NRC Senior Resident Inspector, NMP
Project Manager NRC, NMP
A. L. Peterson, NYSERDA

Attachment 1

60 Day Commitment Response

Commitments 1, 2, and 3:

1. A listing of indications detected in the overlaid weld.

2. A description of any repairs to the overlay material and/or base metal and the reason for the repair.

3. The disposition of all indications using the acceptance standards of ASME Code, Section XI, IWB-3514.

Response:

Attachment 5 (Examination Datasheet of 32-WD-208 (Overlaid Weld)) is the examination datasheet for 32-WD-208 which includes characterization of the flaw that was required to be overlaid.

The surface exam of the base material (prior to applying the initial sacrificial layers) identified five (5) indications (Attachment 2, Report NMP1-PT-23-035). Indication #5 was ground to an acceptable size (Attachment 2, Report NMP1-PT-23-036). The remaining four indications were sealed without excavation by a sacrificial layer as allowed by the requirements of Code Case N-740-2, paragraph 1.2(d)(1).

Two surface exams of sacrificial layer number 1 were performed. Thirteen (13) relevant indications (Attachment 2, Report NMP1-PT-23-038) were identified. Indications #5 and #12 were removed by grinding (Attachment 2, Report NMP1-PT-23-040). These indications were in the ER309L buffer layer on the stainless steel safe-end. Once these indications were removed, manual ER309L filler material was applied to reduce the risk of hot cracking prior to the second sacrificial layer of Alloy 52M being applied. The remaining Eleven (11) indications were sealed without excavation by a second sacrificial layer as allowed by the requirements of Code Case N-740-2, paragraph 1.2(d)(1).

One indication was identified in the second sacrificial layer and was removed by light grinding (Attachment 2, PT-NMP-920103-06).

The final surface exam of the weld overlay did not identify any relevant indications and the exam was acceptable (Attachment 2, PT-NMP-920103-07). During the final volumetric exam, three laminar indications were recorded (Attachment 3, Laminar Indication Reports). Two of the three indications were acceptable per IWB-3514. Proposed Alternative I5R-14 (verbally approved April 14, 2023, ML23104A347) was used to accept laminar indication #2 per ASME Section XI non-mandatory appendix Q. No repairs were conducted after the final volumetric examination.

Commitment 4:

4. A summary of the residual stress and crack growth analysis.

Response:

See Attachment 4.

Attachment 2

Reports NMP1-PT-23-035, NMP1-PT-23-036, NMP1-PT-23-038, NMP1-PT-23-040, PT-NMP-920103-06, and PT-NMP-920103-07

Liquid Penetrant Examination

Constellation

Outage No.: N/A

Site/Unit: NMP / 1 Procedure: ER-AA-335-002 Int / Per: N/A

mmary No.: N-2E Overlay Procedure Rev.: 12 Report No.: NMP1-PT-23-035

Workscope: R&R Work Order No.: C93903309-100 Page: 1 of 4

Code: 77/78 ASME Sec. III Cat./Item: N/A/N/A Location: Drywell 259'

Drawing No.: 2300376.520 Description: PT Prior to Weld Overlay

System ID: 32 Size/Length: 29.06" Dia / 93.25"

Component ID: N-2E Weld Overlay

Limitations: None

Light Meter Mfg.: N/A Serial No.: N/A Illumination: XPP-5420

Temp. Tool Mfg.: GEIT Serial No.: 49395018WS Surface Temp.: 79 °F

Lo/Wo Location: LO - Top Dead Center *Surface Condition:* Ground Light Source: Flashlight

Technique: Water Washable ☐ Solvent Removable ☑ Resolution: 0.044" Characters

	Cleaner	Penetrant Visible ☑ Fluorescent ☐	Remover	Developer
Brand	Magnaflux	Magnaflux	Magnaflux	Magnaflux
Type	SKC-S	SKL-SP2	SKC-S	SKD-S2
Batch No.	22C02C	22J07C	22C02C	19K12K
Time	Evap. 5	Dwell 10	Evap. 5	Develop 10
	Time Exam Started: 02:10		Time Exam Completed: 02:53	

Indication No.	Loc L	Loc W	Diameter	Length	Type R/L	Remarks
1	1.0" From TDC	1.37" D/S Toe	3/16"	N/A	Rounded	Acceptance Per Code Case N-740-2
2	0.75" From TDC	1.37" D/S Toe	N/A	1/4"	Linear	Acceptance Per Code Case N-740-2
3	22.50" CCW TDC	1.50" D/S TDC	1/16"	N/A	Rounded	Acceptance Per Code Case N-740-2

Comments

Performed PT Exam after grinding of Indications found under Report NMP1-PT-23-034. (5) relevant indications were recorded in accordance with Code Case N-740-2, Paragraph 1.2, Note (d). See supplemental sheets for indication photos.

Results: Accept ☐ Reject ☑ IO ☐ Reference IR 04564877

Percent of Coverage Obtained > 90%: Yes Reviewed Previous Data: N/A

Examiner	Level	Signature	Exam Date	Reviewer	Signature	Date
Sholly, Brian	III		03/26/2023	N/A		
Examiner	Level	Signature	Exam Date	Site Review	Signature	Date
N/A				Michael T. Sallay		3-26-2023
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A						

Liquid Penetrant Examination

Constellation

Outage No.: **N/A**

Site/Unit: **NMP** / **1** Procedure: **ER-AA-335-002** Int / Per: **N/A**

Summary No.: **N-2E Overlay** Procedure Rev.: **12** Report No.: **NMP1-PT-23-035**

Workscope: **R&R** Work Order No.: **C93903309-100** Page: **2** of **4**

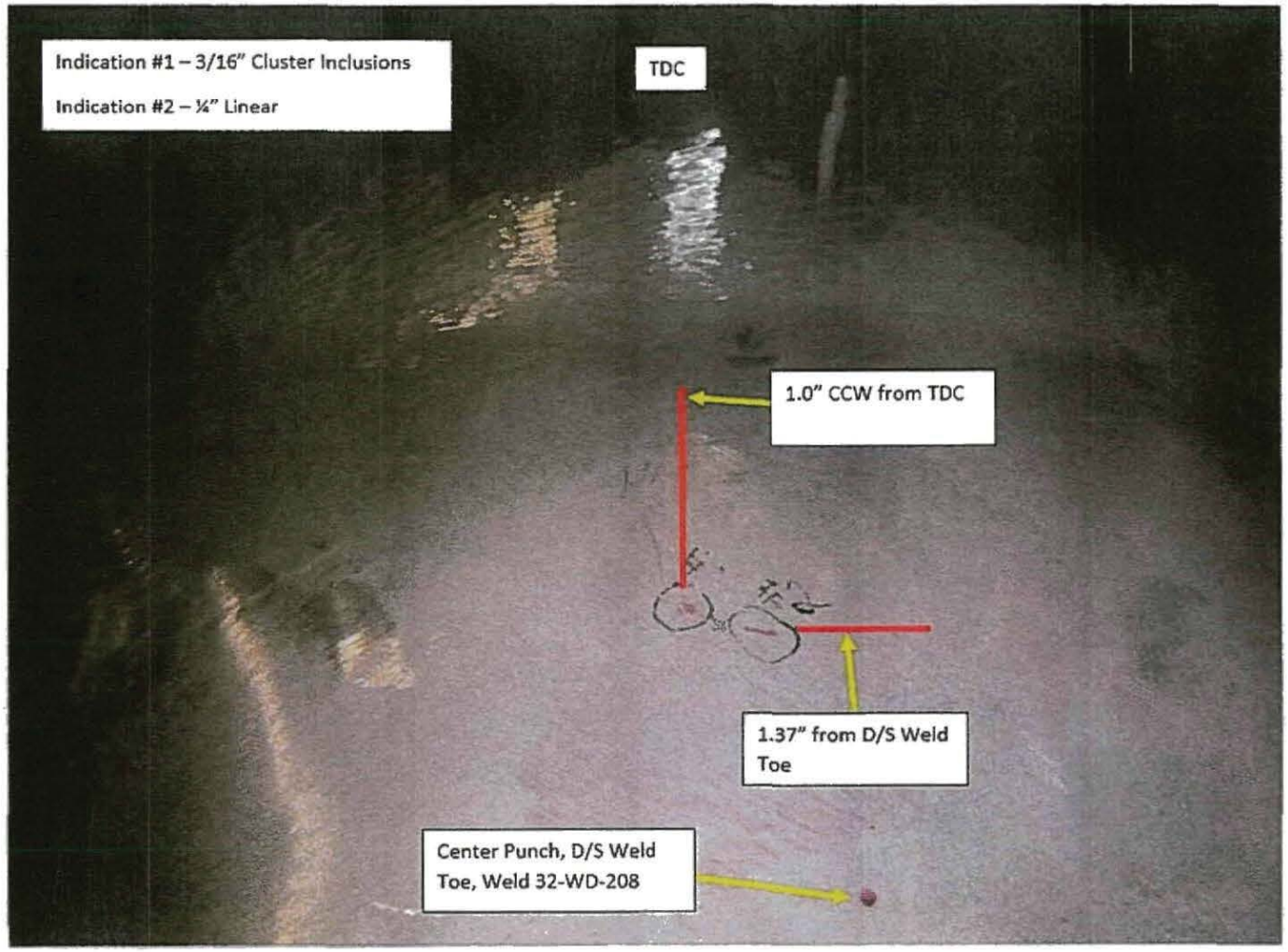
Description: **PT Prior to Weld Overlay**

Component ID: **N-2E Weld Overlay**

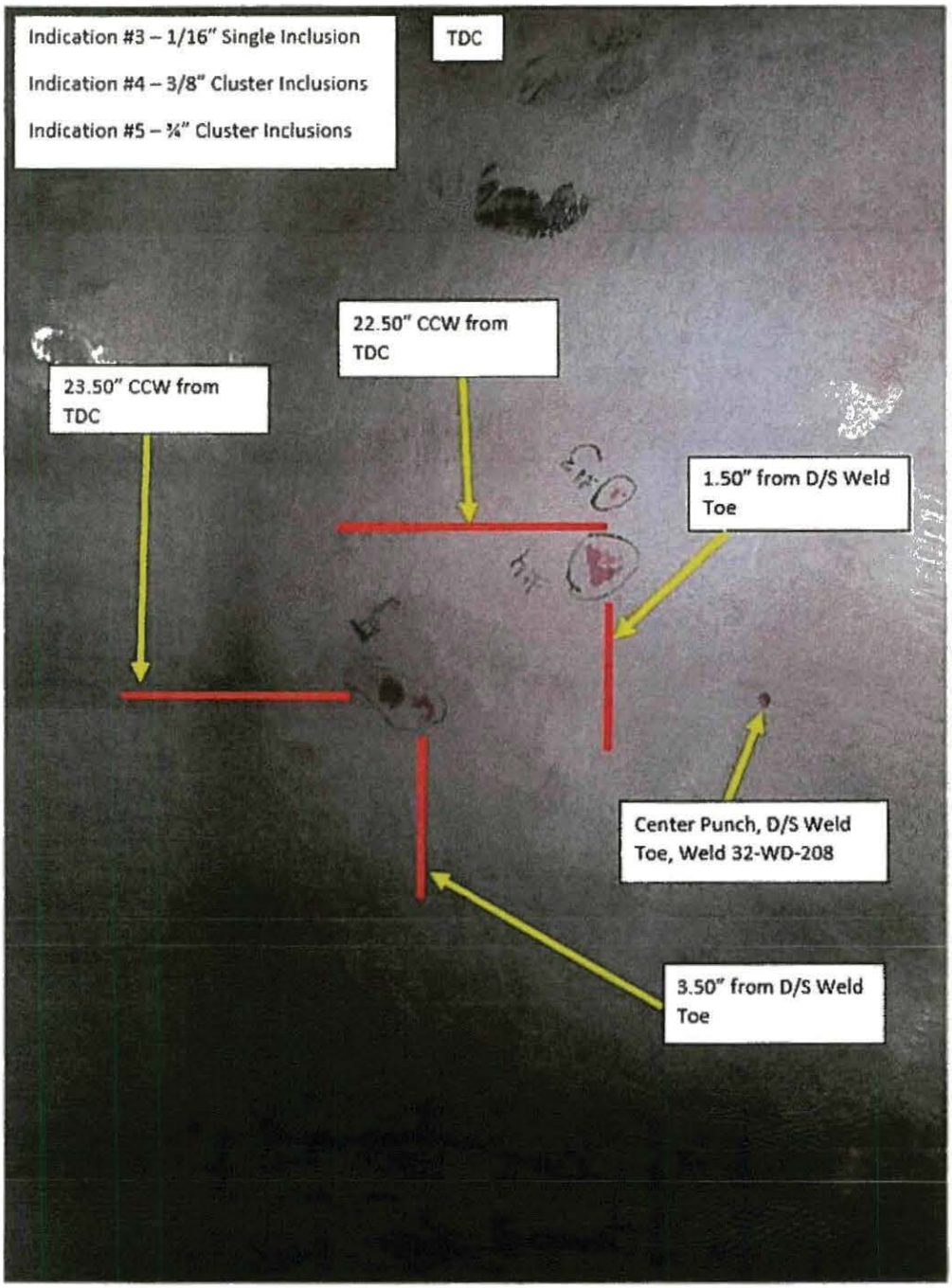
Indication No.	Loc L	Loc W	Diameter	Length	Type R/L	Remarks
4	**22.50" CCW TDC**	**1.50" D/S Toe**	**3/8"**	**N/A**	**Rounded**	**Acceptance Per Code Case N-740-2**
5	**23.50" CCW TDC**	**3.50" D/S Toe**	**3/4"**	**N/A**	**Rounded**	**Acceptance Per Code Case N-740-2**

Examiner	Level	Signature	Exam Date	Reviewer	Signature	Date
Sholly, Brian	**III**		**03/26/2023**	N/A		
Examiner	Level	Signature	Exam Date	Site Review	Signature	Date
N/A				Michael T. Sholly		3-26-2023
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A						

Sketch or Photo: O:\Outage Data\Nine Mile\N1RFO27\32-WD-208 PT PRIOR TO OVERLAY\32-WD-208 PHOTO 1 - PT AFTER GRINDING.JPG



Sketch or Photo: O:\Outage Data\Nine Mile\N1RFO27\32-WD-208 PT PRIOR TO OVERLAY\32-WD-208 PHOTO 2 - PT AFTER GRINDING.JPG



Liquid Penetrant Examination

Constellation

Outage No.: N/A

Site/Unit: NMP / 1 Procedure: ER-AA-335-002 Int / Per: N/A

Summary No.: N-2E Overlay Procedure Rev.: 12 Report No.: NMP1-PT-23-036

Workscope: R&R Work Order No.: C93903309-100 Page: 1 of 3

Code: 77/78 ASME Sec. III Cat./Item: N/A/N/A Location: Drywell 259'

Drawing No.: 2300376.520 Description: PT Prior to Weld Overlay

System ID: 32 Size/Length: 29.06" Dia / 93.25"

Component ID: N-2E Weld Overlay

Limitations: None

Light Meter Mfg.: N/A Serial No.: N/A Illumination: XPP-5420

Temp. Tool Mfg.: Fluke Serial No.: 0003082897 Surface Temp.: 77 °F

Lo/Wo Location: LO - Top Dead Center Surface Condition: Ground Light Source: Flashlight

Technique: Water Washable ☐ Solvent Removable ☑ Resolution: 0.044" Characters

	Cleaner	Penetrant (Visible ☑ / Fluorescent ☐)	Remover	Developer
Brand	Magnaflux	Magnaflux	Magnaflux	Magnaflux
Type	SKC-S	SKL-SP2	SKC-S	SKD-S2
Batch No.	22C02C	22J07C	22C02C	19K12K
Time	Evap. 5	Dwell 10	Evap. 6	Develop 10
	Time Exam Started: 1659		Time Exam Completed: 1738	

Indication No.	Loc L	Loc W	Diameter	Length	Type R/L	Remarks

Comments

Performed PT Exam after grinding and blending of Indication # 5 found under Report NMP1-PT-23-035. The relevant indication was recorded previously as unacceptable per Code Case N-740-2, however after light grinding an additional PT revealed the indications were no longer in the base material. This exam is only a supplement to PT Report NMP1-PT-23-035 and is only relevant to indication # 5 found on the report stated in this summary. This exam can not be used to accept the other rejectable indications in report NMP1-PT-23-035

Results: Accept ☑ Reject ☐ IO ☐

Percent of Coverage Obtained > 90%: Yes Reviewed Previous Data: N/A

Examiner	Level	Signature	Exam Date	Reviewer	Signature	Date
Salley, Michael	III		03/27/2023	N/A		
Examiner	Level	Signature	Exam Date	Site Review L-III	Signature	Date
N/A				Briggs, Michael J.		03/27/2023
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A				B. POWERS		3/27/23

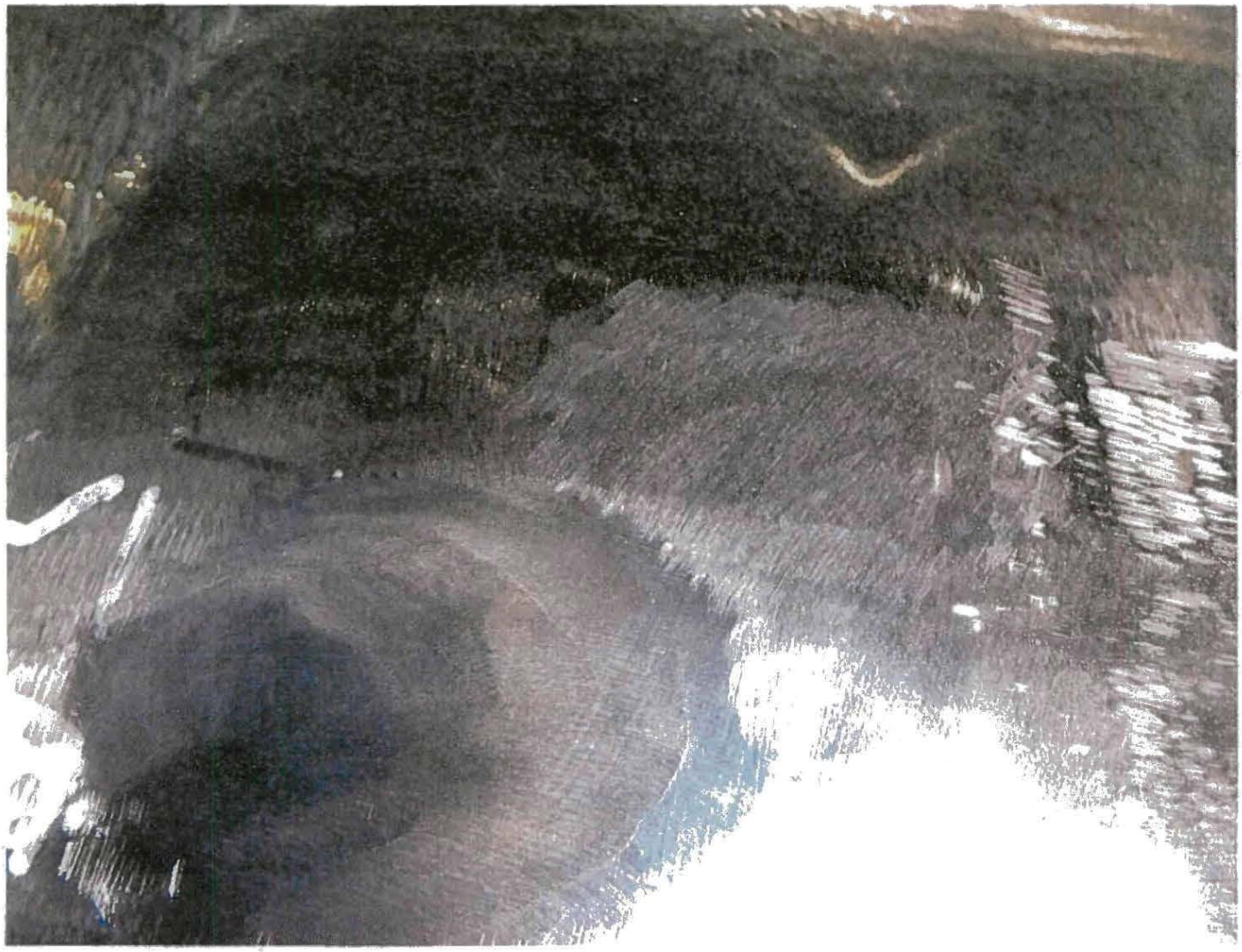
Constellation

Supplemental Report

Report No.: **NMP1-PT-23-036**

Summary No.: **N-2E Overlay** MTS MB Page: **2** of **3**

Sketch or Photo: O:\Outage Data\Nine Mile\N1RFO27\Acceptable photo of Indication number 5 after blending\Clean PT of Previous Indication Number 5.JPG



Constellation

Supplemental Report

Report No.: **NMP1-PT-23-036**

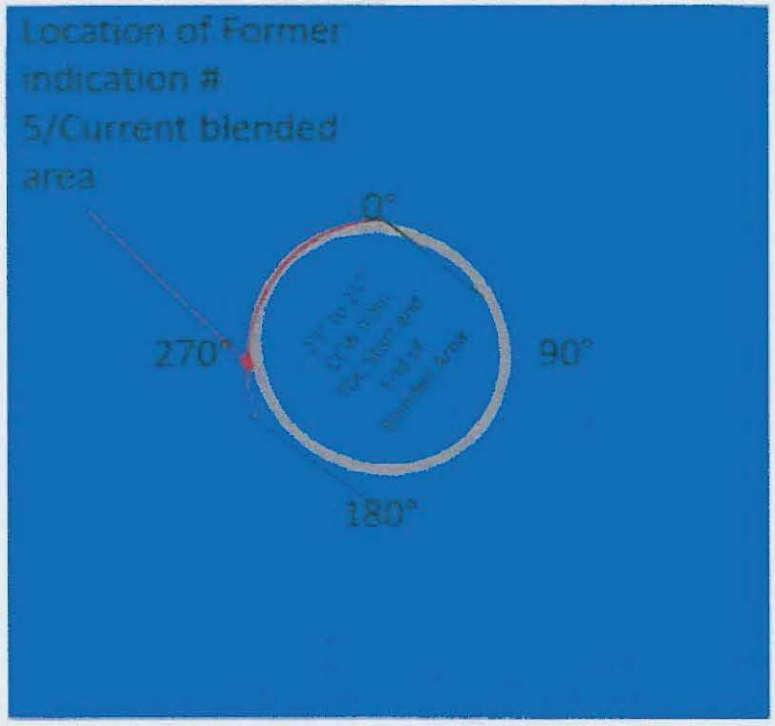
Page: **3** of **3**

Summary No.: **N-2E Overlay** MT S MB

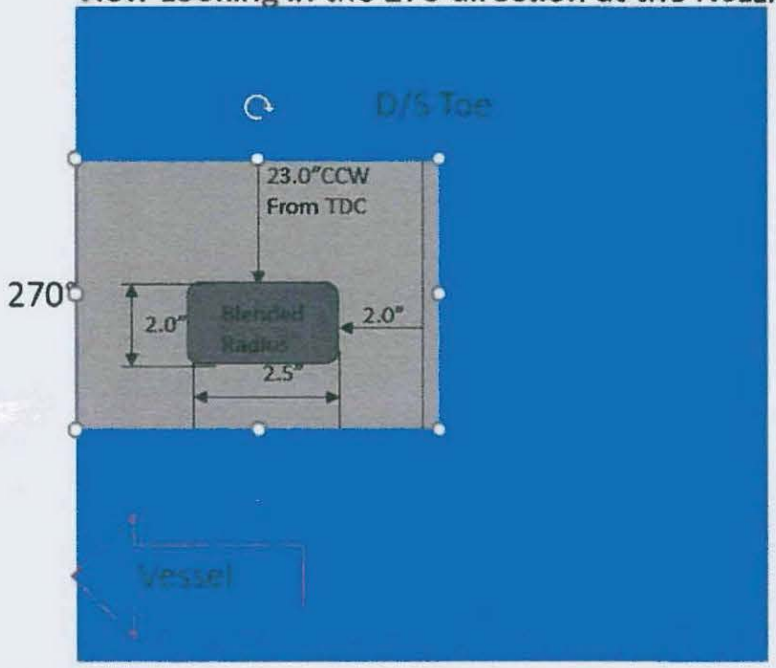
Sketch or Photo: O:\Outage Data\Nine Mile\N1RFO27\Acceptable photo of Indication number 5 after blending\Looking At Vessel inside DW.JPG

O:\Outage Data\Nine Mile\N1RFO27\Acceptable photo of Indication number 5 after blending\270 View1.JPG

View Looking AT Vessel Wall



View Looking in the 270 direction at the Nozzle



Liquid Penetrant Examination

Constellation

Outage No.: N/A

Site/Unit: NMP / 1 Procedure: ER-AA-335-002 Int / Per: N/A

Summary No.: N-2E Overlay Procedure Rev.: 12 Report No.: NMP1-PT-23-038

Workscope: BOP Work Order No.: C93903309-No Task Page: 1 of 8

Code: ASME Sec III 1992 and Later Cat./Item: N/A Location: Drywell 259'

Drawing No.: 2300376.520 Description: N-2E Weld Overlay

System ID: 32 Size/Length: 29.06" Dia / 93.25"

Component ID: N-2E Weld Overlay

Limitations: None

Light Meter Mfg.: N/A Serial No.: N/A Illumination: XPP-5420

Temp. Tool Mfg.: Fluke Serial No.: 0004486172 Surface Temp.: 89 °F

Lo/Wo Location: ** Surface Condition: Ground Light Source: Flashlight

Technique: Water Washable ☐ Solvent Removable ☑ Resolution: 0.044" Characters

	Cleaner	Penetrant (Visible ☑ / Fluorescent ☐)	Remover	Developer
Brand	Magnaflux	Magnaflux	Magnaflux	Magnaflux
Type	SKC-S	SKL-SP2	SKC-S	SKD-S2
Batch No.	18K07K	19L06K	18K07K	22H04C
Time	Evap. 5	Dwell 10	Evap. 5	Develop 10
	Time Exam Started: 1000		Time Exam Completed: 1300	

Indication No.	Loc L	Loc W	Diameter	Length	Type R/L	Remarks
1	-91.0"	9.6"	0.8	-	Rounded	
2	0"	8.0"	-	0.25	Linear	
3	-89.7"	7.4"	0.062 & 0.093	-	Rounded	Indications separated by 0.4"

Comments

Performed PT Exam after sacrificial layer. (13) relevant indications were recorded in accordance with Code Case N-740-2, Paragraph 1.2, Note (d). See supplemental sheets for indication photos.

****Lo was top dead center, Wo is the toe of the overlay on the vessel side.***

Results: Accept ☐ Reject ☑ IO ☐ Reference IR# 04665981

Percent of Coverage Obtained > 90%: Yes Reviewed Previous Data: N/A

Examiner	Level	Signature	Exam Date	Reviewer	Signature	Date
Briggs, Michael J.	III	Michael J. Briggs	03/29/2023	N/A		
Examiner	Level	Signature	Exam Date	Site Review	Signature	Date
N/A				Michael T. Salley		3/30/2023
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A				B. Powers		4/2/23

Liquid Penetrant Examination

Constellation

Outage No.: **N/A**

Site/Unit: **NMP** / **1** Procedure: **ER-AA-335-002** Int / Per: **N/A**

ımmary No.: **N-2E Overlay** Procedure Rev.: **12** Report No.: **NMP1-PT-23-038**

Workscope: **BOP** Work Order No.: **C93903309-No Task** Page: **2** of **8**

Description: **N-2E Weld Overlay**

Component ID: **N-2E Weld Overlay**

Indication No.	Loc L	Loc W	Diameter	Length	Type R/L	Remarks
4	-91.0"	6.4"	-	0.7 & 0.2	Linear	2 Linear indications
5	-17"	6.2"	-	0.25	Linear	
6	-19"	2.1"	0.3	-	Rounded	
7	-45"	6.2"	-	0.15	Linear	
8	-45.5"	6.6"	-	0.17	Linear	
9	-50.4	7.3"	-	0.3	Linear	
10	-59.5"	7.8"	-	0.25	Linear	
11	-69.3"	0"	0.4	-	Rounded	Indication is on the Toe of the weld.
12	-70.0"	9.8"	0.15	-	Rounded	
13	-87.5	6.8	0.10	-	Rounded	2 rounded inciations, both 0.1" separated my 0.35"

Examiner	Level	Signature	Exam Date	Reviewer	Signature	Date
Briggs, Michael J.	III	Michael J. Briggs	03/29/2023	N/A		
Examiner	Level	Signature	Exam Date	Site Review	Signature	Date
N/A				Michael T. Salley	Michael T. Salley	3/30/2023
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A				B. Powers	ESR	4/2/23

Summary No.: N-2E Overlay MB

Sketch or Photo: O:\Outage Data\Nine Mile\N1RFO27\32-WD-208 PT Sacrificial Layer\3-29-23 \Replacement.jpg

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Summary No.: N-2E Overlay MB

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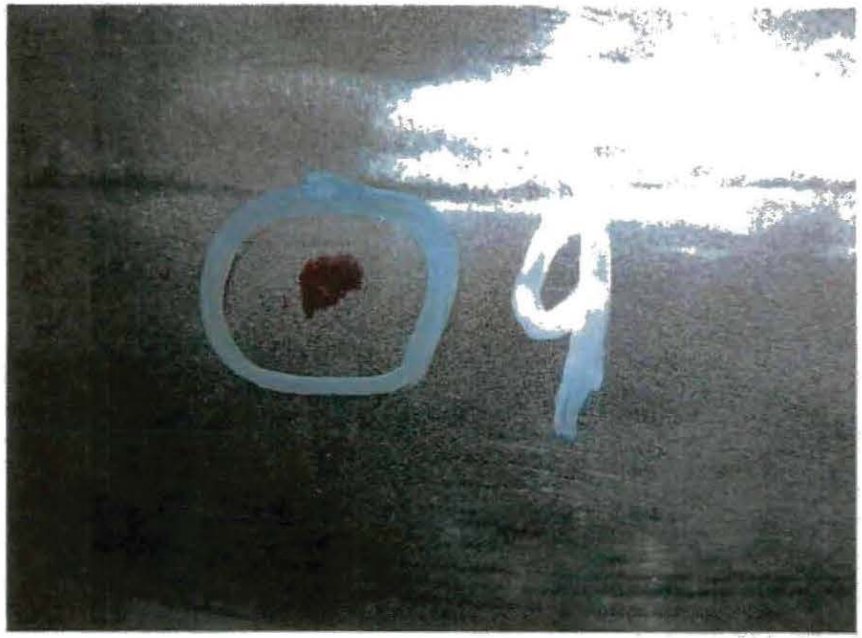

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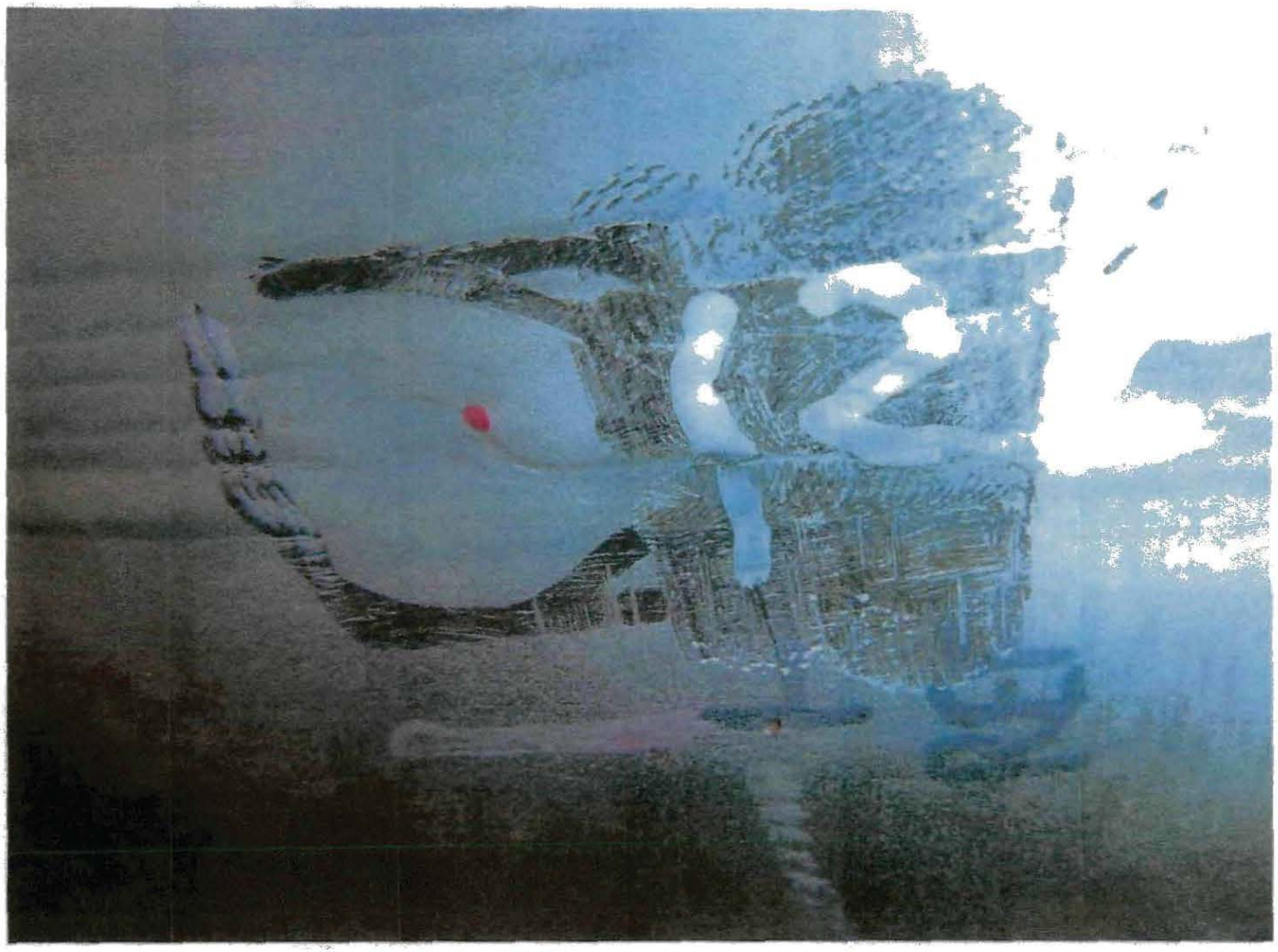

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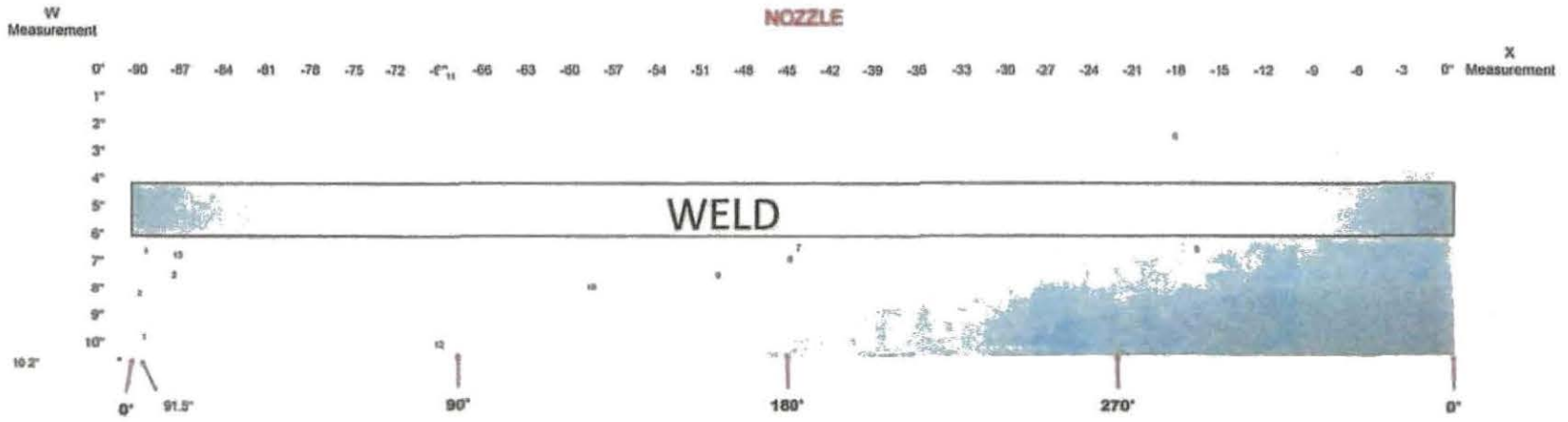


Indications No.	X Distance	W Distance	Comments
1	-91.0"	9.5"	0.8" Rounded
2	0"	8.0"	Linear - 0.25"
3	-89.7"	7.4"	2 Rounded Indications seperated by 0.4", 1/16" & 3/32"
4	-91.0"	6.4"	2 Linear Indications, 0.7" & 0.2"
5	-17"	6.2"	0.25" Linear
6	-19"	2.1"	0.3" Rounded
7	-45"	6.2"	0.15" Linear
8	-45.5"	6.6"	0.17" Linear
9	-50.4"	7.3"	0.30" Linear
10	-59.5"	7.8"	0.25" Linear
11	-69.3"	0"	0.4" Rounded on Toe
12	-70.0"	9.8"	0.15" Rounded
13	-87.5"	6.8"	2 Rounded Indications Both 0.1" Seperated by 0.35"

Liquid Penetrant Examination

Constellation

Outage No.: **N/A**

Site/Unit: **NMP** / **1** Procedure: **ER-AA-335-002** Int / Per: **N/A**

Summary No.: **N-2E Overlay** Procedure Rev.: **12** Report No.: **NMP1-PT-23-040**

Workscope: **BOP** Work Order No.: **C93903309-No Task** Page: **1** of **1**

Code: **ASME Sec III 1992 and Later** Cat./Item: **N/A** Location: **Drywell 259'**

Drawing No.: **2300376.520** Description: **N-2E Weld Overlay**

System ID: **32** Size/Length: **29.06" Dia / 93.25"**

Component ID: **N-2E Weld Overlay**

Limitations: **None**

Light Meter Mfg.: **N/A** Serial No.: **N/A** Illumination: **XPP-5420**

Temp. Tool Mfg.: **Fluke** Serial No.: **0004486172** Surface Temp.: **86** °F

Lo/Wo Location: **N/A** Surface Condition: **Ground** Light Source: **Flashlight**

Technique: Water Washable ☐ Solvent Removable ☑ Resolution: **0.044" Characters**

	Cleaner	Penetrant Visible ☑ Fluorescent ☐	Remover	Developer
Brand	**Magnaflux**	**Magnaflux**	**Magnaflux**	**Magnaflux**
Type	**SKC-S**	**SKL-SP2**	**SKC-S**	**SKD-S2**
Batch No.	**18K07K**	**19L06K**	**18K07K**	**22H04C**
Time	Evap. **5**	Dwell **10**	Evap. **5**	Develop **10**
	Time Exam Started: **1700**		Time Exam Completed: **1830**	

Indication No.	Loc L	Loc W	Diameter	Length	Type R/L	Remarks
-	-	-	-	-	**N/A**	**NRI**

Comments

Performed PT Exam of Indications #5 and #12 found under Report NMP1-PT-23-038. Indications were fully removed during the grinding process. No recordable indications were noted in accordance with Code Case N-740-2. Results SAT.

Results: Accept ☑ Reject ☐ IO ☐ **Reference IR #04665981**

Percent of Coverage Obtained > 90%: **Yes** Reviewed Previous Data: **Yes**

Examiner	Level	Signature	Exam Date	Reviewer	Signature	Date
Badore, Benjamin	**II**	Benjamin Badore	**03/29/2023**	N/A		
Examiner	Level	Signature	Exam Date	Site Review LIII	Signature	Date
N/A				M.J Briggs	Michael J. Briggs	3/31/2023
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A				B. Powers	BSP	4/2/23

☒ ☐

Report of Nondestructive Examination
Visible, Solvent-Removable Liquid Penetrant Examination

Client:	WEC for Constellation – Nine Mile Point	Project No.:	920103	Report No.:	PT-NMP-920103-06
Line/Drawing No.:	920103-SK-002, Rev. D 2300376.520, Rev. 0	Weld/Item No.:	N-2E Structural Weld Overlay	Date:	04-01-2023
Part Shape/Size:	Diameter: 29.06" Circumference: 93.25"	Material Type:	Nozzle: SA-336 Safe End: SA-182 F316	Time:	0238
NDE Procedure:	GQP-9.7, w/ PS-01 Rev. GQP-9.7: 2 PS-01: 0	Acceptance Standard:	GQP-9.7 w/ PS-01, Appendix A (ASME Code Case N-740-2, 1.2.2 (d))	Surface Finish:	Mechanically Finished
Material Thickness:	1.69"	Stage of Fabrication:	Second Sacrificial Layer	Joint Design:	Weld Overlay

TYPE II VISIBLE PENETRANT EXAMINATION, METHOD C SOLVENT REMOVABLE

Cleaner:	SKC-S	Penetrant:	SKL-SP2	Developer:	SKD-S2	Penetrant Application:	Brush
Batch No.:	22C02C	Batch No.:	19L06K	Batch No.:	22H046	Penetrant Removal:	Dry Rag, Solvent Rag, Dry Rag

Pre-Clean Dry Time:	6 Min.	Penetrant Dwell Time:	12 Min.	Post-Removal Dry Time:	6 Min.	Developing Time:	10 Min.	Type of Lighting Equipment:	Flashlight	Light Intensity:	(FC) Pre - >100 Post - >100

Part Temperature:	92° F	Thermometer No.:	PCI QTC-219	Cal. Due Date:	01-12-24	Light Meter No.:	PCI QLM-47	Cal. Due Date:	12-07-23

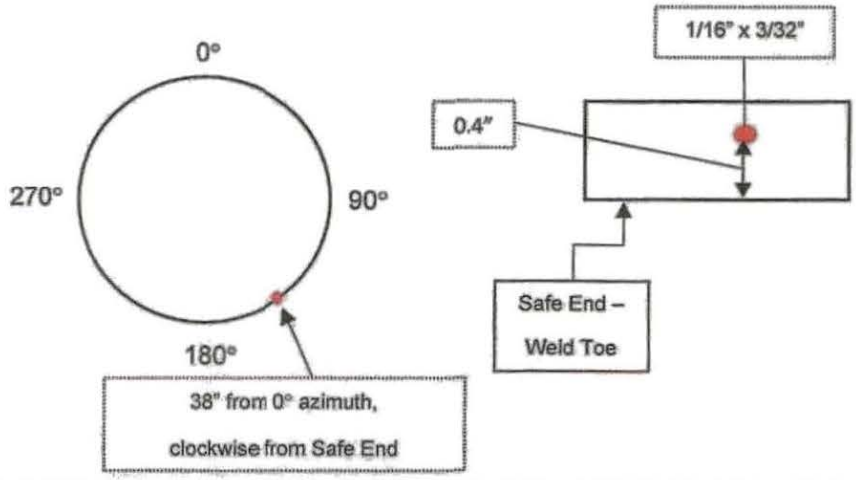
Ind. No.	Distance from Zero	Dimensions	Type	ACC	REJ
			A		
	N				

Comments:

One rejectable indication (rounded) was found upon initial examination. Surface conditioning was performed and followed by re-examination under the same conditions and parameters.
No relevant indications were present upon final examination; *see next page for photos of the weld area referenced in the sketch.*

Weld/Item is: ☒ Acceptable ☐ Rejectable

Sketch:



Examiner:	L. Rampy		Level:	II	Date:	04-01-2023	Client Reviewer:	Michael T. Sallee	Date: 4-6-2023
Reviewer:	S. Handzo		Level:	II	Date:	04-01-2023	AI/ANI/ANII:	B. Powers	Date: 4/2/23

Left: Before Surface Conditioning

Right: After Surface Conditioning

☒ ☐

Report of Nondestructive Examination
Visible, Solvent-Removable Liquid Penetrant Examination

Client:	WEC for Constellation – Nine Mile Point	Project No.:	920103	Report No.:	PT-NMP-920103-07
Line/Drawing No.:	920103-SK-002, Rev. D 2300376.520, Rev. 0	Weld/Item No.:	N-2E Structural Weld Overlay	Date:	04-12-2023
Part Shape/Size:	Diameter: 29.06" Circumference: 93.25"	Material Type:	Nozzle: SA-336 Safe End: SA-182 F316	Time:	1345
NDE Procedure:	GQP-9.7, w/ PS-01 Rev. GQP-9.7: 2 PS-01: 0	Acceptance Standard:	GQP-9.7 w/ PS-01, Appendix A 1.0 and 2.0	Surface Finish:	Mechanically Finished
Material Thickness:	1.69"	Stage of Fabrication:	Final Layer	Joint Design:	Weld Overlay

TYPE II VISIBLE PENETRANT EXAMINATION, METHOD C SOLVENT REMOVABLE

Cleaner:	SKC-S	Penetrant:	SKL-SP2	Developer:	SKD-S2	Penetrant Application:	Brush
Batch No.:	22C02C	Batch No.:	19L06K	Batch No.:	22H046	Penetrant Removal:	Dry Rag, Solvent Rag, Dry Rag

Pre-Clean Dry Time:	5 Min.	Penetrant Dwell Time:	11 Min.	Post-Removal Dry Time:	5 Min.	Developing Time:	11 Min.	Type of Lighting Equipment:	Flashlight	Light Intensity:	(FC) Pre - >100 Post - >100
Part Temperature:	94° F	Thermometer No.:	PCI QTC-220	Cal. Due Date:	01-12-24	Light Meter No.:	PCI QLM-47	Cal. Due Date:	12-07-23		

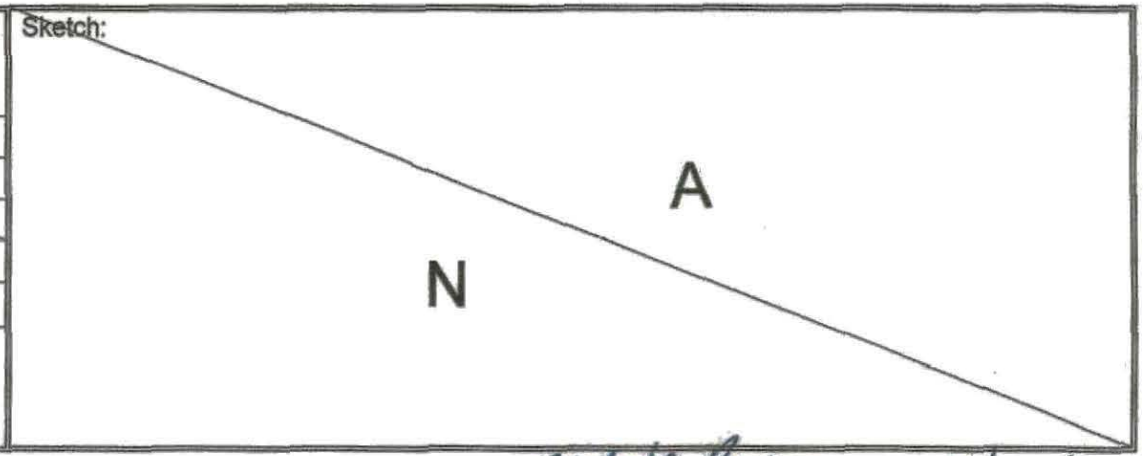
Ind. No.	Distance from Zero	Dimensions	Type	ACC	REJ
			A		
	N				

Comments:

No relevant indications were present upon final examination.

Weld/Item is: ☒ Acceptable ☐ Rejectable

Sketch:



Examiner:	Mike Felty		Level:	II	Date:	04-12-2023	Client Reviewer:	M.J Briggs II-III	Date:	4/12/2023
Reviewer:	Bill Strait		Level:	II	Date:	04-12-2023	AI/ANI/ANII:	B. Powers	Date:	4/12/23

Attachment 3

Laminar Indication Reports

Westinghouse

Summary Page

During the examination of the N2E Overlay exam, using PDI-UT-8 examiners performed a WOL Overlay acceptance exam using a 0°,Outer Diameter Creeper Wave (ODCR) and a 70° RL. There were three laminar indications found, 2 were acceptable per 3514-3. A PSI/ISI exam was also performed no recordable indications were noted.

A flaw characterization was performed on the original recordable indication which was ID connected and indicative of Stress Corrosion Cracking. This flaw is located 14" clockwise of Top Dead Center and originally had a through wall percentage of 83%. Upon application of the Leak Barrier the through wall extent is 74.1%.

Indications	L-LOCATION	W-LOCATION	OD Length	Corrected Length	Width	Depth	Results
1	95" to 3.5"	6.25"	4.5"	4.3"	0.3"	0.55"	Acceptable
2	36.5" to 49.3"	6.6"	12.8"	12.2"	0.3"	0.56"	UN-Acceptable
3	80.5" to 88"	2.7"	7.5"	7.1"	0.2"	0.51"	Acceptable

Westinghouse Overlay Ultrasonic Examination Indication Report Sheet

Site: NMP **Unit:** 1 **Sheet Number:** 23NMPU1IND1

Procedure No. : ER-AA-335-036 **Rev.:** 5 **Overlay Material Thickness:** 0.56" **Outer 25% of BM Thickness:** 0.422"

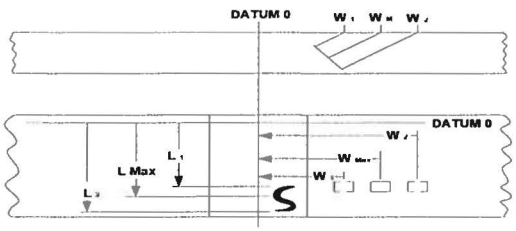
Weld No.: N2E **Datum 0 Locations:** TDC / Nozzle side of Weld Overlay

Examination : ☑ PSI ☑ ISI **Exam Volume :** ☑ Overlay Material ☑ Base Material

Exam Surface: ☐ ID ☑ OD

W Measurments - Axial Distance from Datum 0 to Search Unit exit point
MP - Metal Path
L Measurements - Circumferential Distance from Datum 0 to Search Unit Center
RBR - Remaining Back Reflection
SU Dir. - Search Unit Sound Direction

Note: Layout shown is for perpendicular (Ax) scans, For parallel (Circ) scans, L&W measurments will be reversed



Ind. No.	Max Amp % FSH @ Scan Sens.	W Max		Forward Response Tip or 100% Amp.Drop		Backward Response Tip or 100% Amp.Drop		L Max	L1 100% Amp. Drop	L2 100% Amp. Drop	RBR Amp 0 degree	SU Dir. US, DS CW, CCW	Probe used	Remarks
		W	MP	W1	MP	W2	MP							
1	46%	6.25"	0.55"	6.10"	0.55"	6.40"	0.55"	N/A	95.0"	3.5"	56%	N/A	N21A	LOB
2	52%	6.6"	0.56"	6.45	0.56"	6.75"	0.56"	N/A	36.5"	49.3"	30%	N/A	N21A	LOB
3	40%	2.7"	0.51"	2.6"	0.51"	2.8"	0.51"	N/A	80.5	88.0"	40%	N/A	N21A	LOB
4	50%	WCL	1.18"	N/A	N/A	N/A	N/A	14"	N/A	N/A	N/A	CCW	N24AC	Remaining Ligament = 0.59"

Comments : Thickness at Location of indication No. 4 is 2.28"

EXAMINER [signature] LEVEL II DATE 4/12/2023
Print Joe Serth

EXAMINER [signature] LEVEL III DATE 4/12/2023
Print Patrick Mahoney

REVIEWER Terry Sleyo LEVEL III DATE 4/13/2023

REVIEWER Michael T. Salley LEVEL III DATE 4/13/2023

Authorized Inspection Agency BRANDON POWELL DATE 4/13/23

ASME XI (2008 thru 2017) Table IWB-3514-1

Thickness: >1" to <2"

Plant / Unit: Nine Mile Point / 1 **Component:** N2E
Flaw No.: 3 **Correct Thickness Range?:** Yes

Flaw Data	Rounded Data	Field Data
Component Thickness "T":	1.70	1.69
Flaw Length "l":	6.20	6.20
Thruwall Dimension "2d":	0.10	0.10
Surface Separation "S":	0.00	0.00
0.4d:	0.02	
Is "S" < 0.4d?:	Yes	
Then Flaw is:	Surface	

Surface Flaw Analysis	
"a" = (2d+S):	0.100
a / t %:	5.9
a / l (Actual):	0.02
a / l (Max):	0.50
a / l:	0.02

Max Allow a / t % for intermediate thickness calculated by linear interpolation

Aspect Ratio a / l	Lower Bound 1.0	Upper Bound 2.0	Comp. Thick. 1.7
0.00	10.0	10.0	**10**
0.05	10.0	10.0	**10.0**
0.10	11.3	11.8	**11.7**
0.15	13.9	14.4	**14.3**
0.20	15.0	15.0	**15.0**
0.25	15.0	15.0	**15.0**
0.30	15.0	15.0	**15.0**
0.35	15.0	15.0	**15.0**
0.40	15.0	15.0	**15.0**
0.45	15.0	15.0	**15.0**
0.50	15.0	15.0	**15.0**

Surface Flaw Disposition

Intermediate flaw aspect ratios (a/l) calculated by linear interpolation

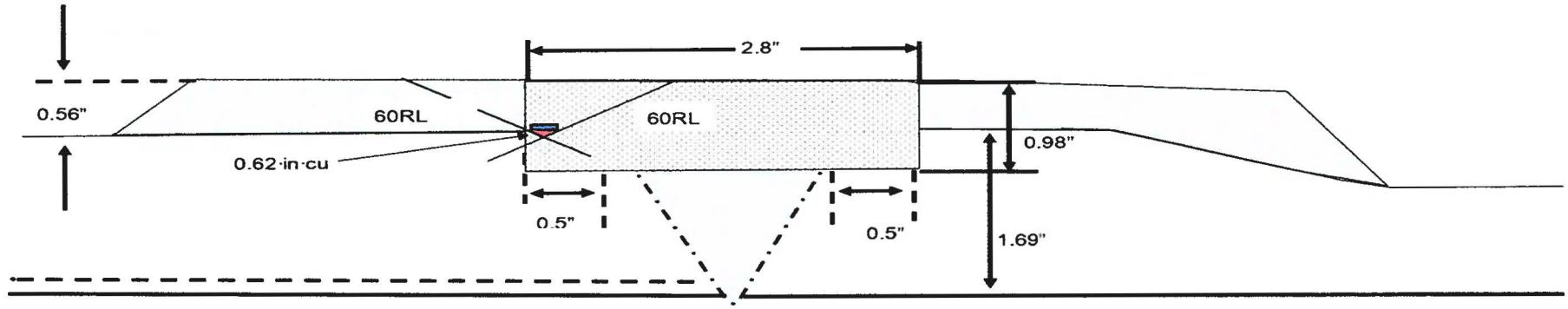
Aspect Ratio a / l	Max Allow a / t %	Flaw a / t %	Result
0.00	10.0		
0.02	**10.0**	**5.9**	Accept
0.05	10.0		

Comments:

Personnel	Name	Signature	Level	Date
Analyst:	Terry Styers	Terry Styers	III	4-12-23
Reviewer:	Michael T. Salley		III	4-13-2023
Reviewer:	BRANDON POWERS		ANII	4/13/23

N2E Weld Overlay

Indication No. 3



Nozzle

Area with no coverage and assume Planar Flaw

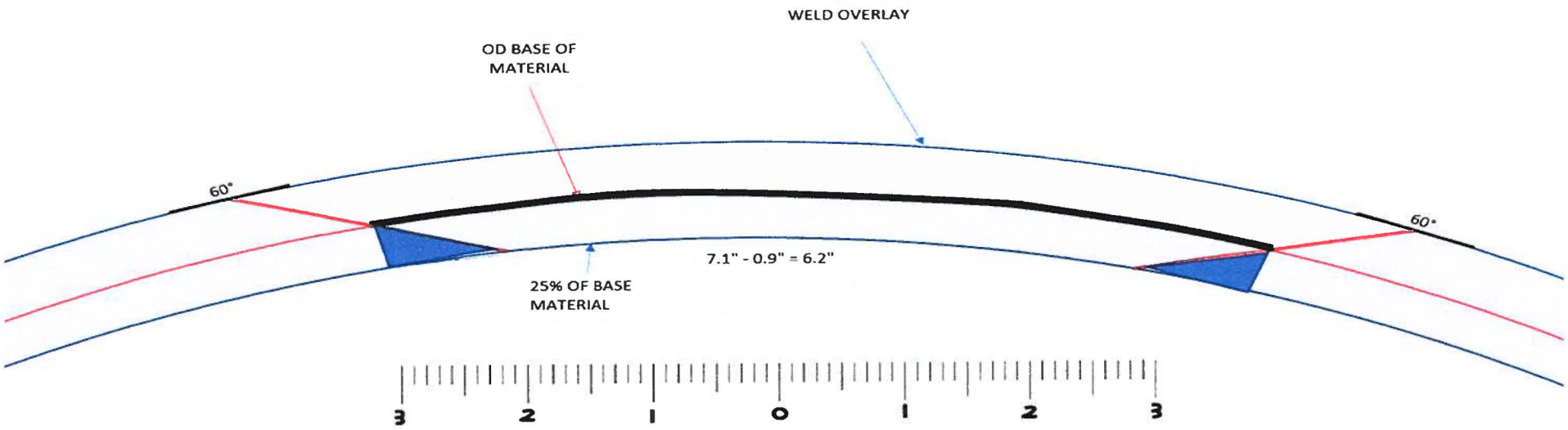
Circumference 96" on Overlay

Safe-End

Area with no coverage due to Lamination – 0.62 cu in

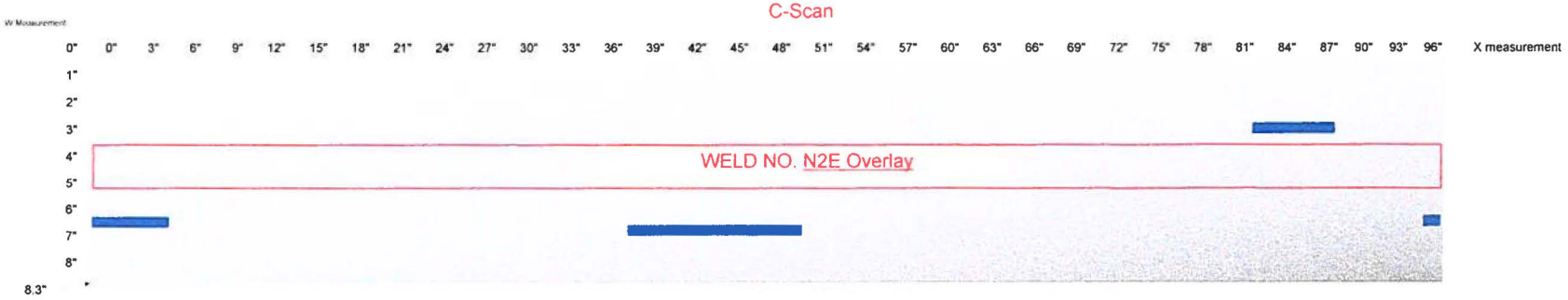
.5 * B * H * L
0.5 * 0.2 * 0.1 * 6.2
0.62 cu in cu

Examination Volume
.98 * 2.8 * 96
259 cu in
0.62/259
Coverage = 99.8%



NOZZLE N2E

C-Scan



SAFE-END

B-Scan

Indications	L- LOCATION	W-LOCATION	OD Length	Corrected Length	Width	Depth
1	95" to 3.5"	6.25"	4.5"	4.3"	0.3"	0.55"
2	36.5" to 49.3"	6.6"	12.8"	12.2"	0.3"	0.56"
3	80.5" to 88"	2.7"	7.5"	7.1"	0.2"	0.51"

FLAW INDICATION EVALUATION:
NMP N2 Nozzle

1.2 Laminar flaws in the weld overlay examination volume shall not exceed 10% of the weld surface area. [Ref. CC N-740-1 3(a)(4)(a)]:

Indication #	Measured Area (Measured Width x Measured Length) (sq in)
1	1.3
2	3.7
3	1.4
	Use combined flaw 1, 2, 3 area- worst case

Total Laminar Flaw Surface Area: 6.5 sq. in

Total Weld Overlay Surface Area:

Weld Overlay Examination Volume Surface Length = 8.20 inch **Contour:**

Number of Circumference Measurements: 1

Measured Circumferences (in): 96.00 96.00

Average Circumference of Weld Overlay Examination Volume= 96.00 inch

Total Weld Overlay Surface Area= 787 sq. inch

Total Laminar Flaw Surface Area/Total Weld Overlay Surface Area (%)= 0.1% **ACCEPTABLE** Not necessary to evaluate individual flaws

1.3 No linear dimension of a laminar flaw indication area exceeds 3.0 inches (76mm) or 10% of the nominal pipe circumference, whichever is greater. [Re

Nozzle Diameter = 30.55 inch

Nominal Pipe Circumference = 96.0 inch

Linear Dimension Criteria: ≥ 9.6 inch (3.0" or 10% of nominal pipe circumference whichever is greater)

Indication #	Corrected Length @ Indication (in)	Acceptable or Unacceptable
1	**4.3**	ACCEPTABLE
2	**12.3**	UNACCEPTABLE
3	**7.25**	ACCEPTABLE
Combined Laminar Indications		
1,2,3	**4.61**	ACCEPTABLE
1,2	**2.23**	ACCEPTABLE

Attachment 4

Summary Report

rmattson@structint.com
5215 Hellyer Avenue, Suite 210, San Jose, CA 95138 | 408-833-7325

June 6, 2023
REPORT NO. 2300434.401
REVISION: 1
PROJECT NO. 2300434.00

Quality Program: ☒ Nuclear ☐ Commercial

To: Michelle Saunders

From: Dick Mattson

Subject: Summary of the Fracture Mechanics Evaluation for the Leak Barrier Weld Overlay Repair of the Nine Mile Point, Unit 1 Recirculation Inlet Nozzle N2E Safe End-to-Nozzle Dissimilar Metal Weld (32-WD-208)

Reference: Constellation Letter No. NMP1L3519, "Submittal of Emergency Relief Request I5R-11 Concerning the Installation of a Weld Overlay on Reactor Pressure Vessel Recirculation Inlet Nozzle N2E Safe End-to-Nozzle Dissimilar Metal Weld (32-WD-208)," March 30, 2023, ADAMS Accension No. ML23089A230

This memorandum is being provided in support of Constellation's response to a commitment in the above-referenced proposed alternative:

Commitment:

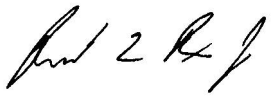
Nine Mile Point will submit to the NRC a summary demonstrating that the repaired dissimilar metal weld (DMW) for recirculation inlet nozzle N2E will perform its intended design function after weld overlay installation. This information will be submitted to the NRC within 60 days of completing Nine Mile Point, Unit 1's Refueling Outage 27.

Attachment 2 of the referenced Constellation letter states that the summary report will include residual stress results and crack growth analysis. The results will show that the as-found defect,

including growth due to stress corrosion cracking and fatigue, will not lead to a leak condition nor adversely affect the integrity of the overlaid weld over an operating period not less than one operating cycle (2 years).

Attachment A to this memorandum provides a summary to satisfy this commitment.
If you have any questions or comments regarding this summary, please contact one of the undersigned.

Prepared by:



Richard L. Bax Jr.
Associate

Verified by:

Ryan Keller
Engineering Analyst

Verified by:

Richard A. Mattson P.E.
Senior Associate

Approved by:

Richard A. Mattson P.E.
Senior Associate

Structural Integrity Associates, Inc.®
info@structint.com 1-877-4SI-POWER structint.com

Attachment A

Summary of the Fracture Mechanics Evaluation for the Leak Barrier Weld Overlay Repair of the Nine Mile Point, Unit 1 Recirculation Inlet Nozzle N2E Safe End-to-Nozzle Dissimilar Metal Weld (32-WD-208)

Structural Integrity Associates, Inc.®
info@structint.com 1-877-4SI-POWER structint.com

1.0 INTRODUCTION

Nine Mile Point, Unit 1 (NMP-1) applied a “leakage barrier” weld overlay (WOL) on dissimilar metal weld (DMW) 32-WD-208 between the reactor pressure vessel (RPV) recirculation inlet nozzle (N2E) and the safe end.

The purpose of this weld overlay is to generate leak tight integrity at the as-found flaw and to mitigate any potential future intergranular stress corrosion cracking (IGSCC) in the weld. The overlay was installed using an IGSCC resistant weld filler material; Alloy 52M [1].

This report, which satisfies one of the NMP-1 commitments of the Relief Request [2], summarizes the results of the component specific residual stress analyses and the fracture mechanics evaluations. This information is to be submitted within 60 days of completing the refueling outage.

The requirements for design of the weld overlay repair are defined in the Relief Request [2], which is based upon ASME Code Case N-740-2 [3], and ASME Code, Section XI, Nonmandatory Appendix Q [4]. The analytical basis for the design of the repair is in accordance with the requirements of ASME Code, Section XI [4], Article Q-3000(a)(5). “Leakage barrier” weld overlay repairs are acceptable long-term repairs for IGSCC flawed weldments if they meet a conservative set of design assumptions. The principal design requirements for the thickness of the WOL per Appendix Q [4] and the commitments of the Relief Request [2] are as follows:

1. Appendix Q, Q-2000(d) requires two layers minimum be deposited, which is all that is required per Q-3000(a)(5) given that there is only one identified indication, and it is axially oriented. Q-3000(a)(5) does limit the axial flaw length to 1.5” and the identified indication is 1.65” long [2, Attachment 3, Section 4.0], but relief was requested [2, Attachment 3, Section 5.1.3(b)(3)] and subsequently granted.

2. In response to RAI-5 [2, Attachment 1], the weld overlay material must be applied such that, *"At the time of mode change, the axial flaw will not exceed the 75% through wall dimension of IWB-3640."*

3. Following the repair, the surface finish of the overlay must be sufficiently smooth to allow preservice and future inservice ultrasonic examinations through the overlay material and into a portion of the original base metal. The purpose of these examinations is to demonstrate that the overlay design basis does not degrade with time due to flaw propagation.

In addition to providing structural reinforcement to the IGSCC susceptible locations with a resistant material, weld overlays have also been shown to produce beneficial residual stresses that mitigate IGSCC in the underlying DMWs. The weld overlay approach has been used to repair stress corrosion cracking in U.S. nuclear plants on hundreds of welds, and there have been no reports of subsequent crack extension after application of weld overlays. Thus, the compressive stresses caused by the weld overlay have been effective in mitigating new crack initiation and/or growth of existing cracks.

2.0 ANALYSIS SUMMARY AND RESULTS

2.1 Weld Residual Stress Analyses

Weld residual stresses for the as-built WOL for the NMP-1 RPV recirculation inlet nozzle (N2E) inboard DMW were determined by detailed elastic-plastic finite element analyses using the ANSYS software package [5]. The approach used in the analysis has been benchmarked and validated through multiple two-dimensional and three-dimensional ANSYS finite element analyses following the guidelines discussed in MRP-316 [6] and MRP-317 [7], and using the information provided in the problem statements for mock-up specimens [6, 8, 9] and experimental measurements [6].

A two-dimensional, axisymmetric finite element model was developed for the as-built weld overlay configuration. For this model, the minimum measured dimensional values were used to produce a conservative weld residual stress model (i.e., a smaller overlay produces less beneficial compressive stresses). The resulting model is shown in Figure 1.

The modeling of weld nuggets used in the analysis is illustrated in Figure 2. The model simulated an inside surface (ID) repair at the DMW location with a depth of approximately 50% of the original wall thickness. This ID weld repair is intended to meet the guidelines of the MRP-169 Safety Evaluation Report, Section 3.2.2, paragraph three [10], which states,

"The residual stress analysis assumes a highly unfavorable, pre-overlay residual stress condition which would result from an inside diameter surface weld repair during construction."

An analysis is performed to simulate the welding process of the DMW, the 50% ID weld repair of the DMW, the adjacent stainless steel weld (SSW) and the WOL welding process. The analysis consists of a thermal pass to determine the temperature response of the model to each individual weld nugget as it is added in sequence, followed by a non-linear elastic-plastic stress pass to calculate the residual stress due to the temperature cycling from the application of each nugget weld pass. Since residual stress is a function of the welding history, the stress pass for each nugget is applied to the residual stress field induced from all previously applied weld nuggets.

After completion of the weld overlay simulation, the model was then allowed to cool to a uniform steady state temperature of 70°F, and then five cycles of "shake down" with normal operating temperature and pressure were applied to stabilize the residual stress fluctuations due to stress distribution caused by normal operating loads. These "shakedown" cycles are consistent with MRP-317, Volume 1, pages 5-8, "Shakedown Evaluation" [7].

The resulting residual hoop stresses were evaluated on three paths through the DMW, and will be used in the crack growth evaluation. These path definitions are shown in Figure 3. The resulting through wall residual hoop stresses along these paths are shown in Figure 4.

2.2 ASME Code, Section XI Crack Growth Analyses

Hoop stresses for the "as-built" WOL for the NMP-1 RPV recirculation nozzle (N2E) DMW were determined from finite element analyses for a bounding set of conservative load combinations and transients using the ANSYS software package [5]. A "minimum" as-built model was used to evaluate the pressure stresses, while a "maximum" as-built model was used to evaluate the thermal transient stresses. The "minimum" and "maximum" as-built finite element models are shown in Figure 5, with the stress path locations shown in Figure 6.

The residual stress calculations were then utilized (see Figure 3 and Figure 4), along with stresses due to applied loadings and thermal transients (see Figure 6), to demonstrate that a 100% axial crack (i.e., completely through the base metal) would not grow through the WOL due to a combination of fatigue crack growth and IGSCC growth for an operating period not less than one operating cycle (2 years). In the fatigue crack growth analysis, the 60-year projected cycles for each applied transient were applied.

IGSCC is active for the evaluated 100% through wall axial flaw at the DMW. This is expected given the high tensile hoop stress in the WOL material generated as part of the WOL weld out. Figure 7 shows the through wall axial flaw K-distributions at normal operating conditions (NOC) for two a/c ratios (a/c=2 and a/c=4) (e.g., for the initial flaw depth of 1.671-inches (100% through wall), the flaw length at the inside surface (length = 2c) would be 1.671-inches long or 0.836-inch long, respectively). Note that the actual measured flaw length is 1.65-inches. A review of Figure 7 shows that IGSCC would not be present for an axial flaw smaller than ~1.275 inches through the thickness (or 76% through wall of the original base metal) for either a/c ratio. In addition, the K's at the inside surface are compressive due to the application of the WOL, which will mitigate axial growth due to IGSCC or FCG which makes it highly unlikely that the flaw would grow beyond the axial boundaries of the WOL.

The crack growth results for an initial flaw of 100% of the original base metal thickness (which bounds the as-found flaw) are shown in Table 1. At the DMW, the 100% through wall flaw grows through the susceptible Alloy 82 "bridge beads" in less than two months (~0.074 inch), primarily

due to IGSCC. The growth into the Alloy 52M WOL material slows significantly, as the Alloy 52M is an IGSCC resistant material. The flaw growth is calculated to produce a maximum flaw depth of 1.756" (a total growth of 0.085" of which 0.011" is in the Alloy 52M material), with a corresponding aspect ratio, a/t = 0.803, at the end of the two-year operating period.

It should be noted that fatigue crack growth is based on a conservative evaluation of the plant transients that used bounding thermal transients and yearly cyclic rates based on the projected 60-years of operating cycles. Thus, the fatigue crack growth results are highly conservative, but still only represent a small fraction of the total calculated crack growth.

Similarly, the assumption was made that the Alloy 52M material is also susceptible to IGSCC, though at a much slower rate than Alloy 82/182 (4x10E-9 mm/s = 5.67x10E-7 in/hr = 4.97x10E-3 in/yr [1]. This assumption generates almost all the crack growth into the Alloy 52M weld overlay material. Thus, the reported crack growth in Table 1 is considered highly conservative.

3.0 REFERENCES

1. Peter L. Andresen, et al., GE Global Research Center, "SCC of High Cr Alloys in BWR Environments," 15th International Conference on Environmental Degradation, TMS (The Minerals, Metals & Materials Society), 2011.

2. Constellation Letter No. NMP1L3519, "Submittal of Emergency Relief Request I5R-11 Concerning the Installation of a Weld Overlay on Reactor Pressure Vessel Recirculation Inlet Nozzle N2E Safe End-to-Nozzle Dissimilar Metal Weld (32-WD-208)," March 30, 2023, ADAMS Accension No. ML23089A230.

3. ASME Boiler and Pressure Vessel Code, Code Case N-740-2, "Full Structural Dissimilar Metal Weld Overlay for Repair or Mitigation of Class 1, 2 and 3 Items," Section XI, Division 1.

4. ASME Code, Section XI, 2013 Edition, Nonmandatory Appendix Q, "Weld Overlay Repairs of Classes 1, 2, and 3 Austenitic Stainless Steel Piping Weldments."

5. ANSYS Mechanical APDL (UP20170403) and Workbench (March 32, 2017) Release 18.1, SAS IP, Inc.

6. *Materials Reliability Program: Finite-Element Model Validation for Dissimilar Metal Butt-Welds (MRP-316, Revision 1): Volume 1*, EPRI, Palo Alto, CA: 2015. 3002005498.

7. *Materials Reliability Program: Welding Residual Stress Dissimilar Metal Butt-Weld Finite Element Modeling Handbook (MRP-317, Revision 1)*, EPRI, Palo Alto, CA: 2015. 3002005499.

8. U.S. NRC, “International Weld Residual Stress Round Robin Problem Statement,” Version 1.0, U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, Division of Engineering, Component Integrity Branch, December 2009.

9. U.S. NRC, “International Weld Residual Stress Round Robin Problem Statement: Phase 2b of the NRC/EPRI WRS Validation Program,” Version 3.0, U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research, Division of Engineering, Component Integrity Branch, December 2013.

10. Material Reliability Program: Technical Basis for Preemptive Weld Overlays for Alloy 82/182 Butt Welds in Pressurized Water Reactors (PWRs) (MRP-169), Revision 1-A, EPRI, Palo Alto, CA: 2010. 1021014 (includes NRC SER ML101660468).

Table 1. Crack Growth Results

Stress Path (1)	WOL Alloy 82 Bridge Bead Weld Layer			Alloy 52M Weld Overlay			Final a/t (2)
	Initial Depth, a (inch)	Final Depth, a (inch)	Time (months)	Initial Depth, a (inch)	Final Depth, a (inch)	Time (months)	
P1	1.671	1.741	2	1.744	1.756	24	0.803
P2	1.671	1.742	2	1.744	1.755	24	0.802
P3	1.671	1.744	2	1.744	1.755	24	0.802

Notes:

1. See Figure 6 for path locations.
2. a/t = depth-to-thickness ratio; t = 2.187 inch is the total thickness, including the weld overlay, refer to Figure 8.

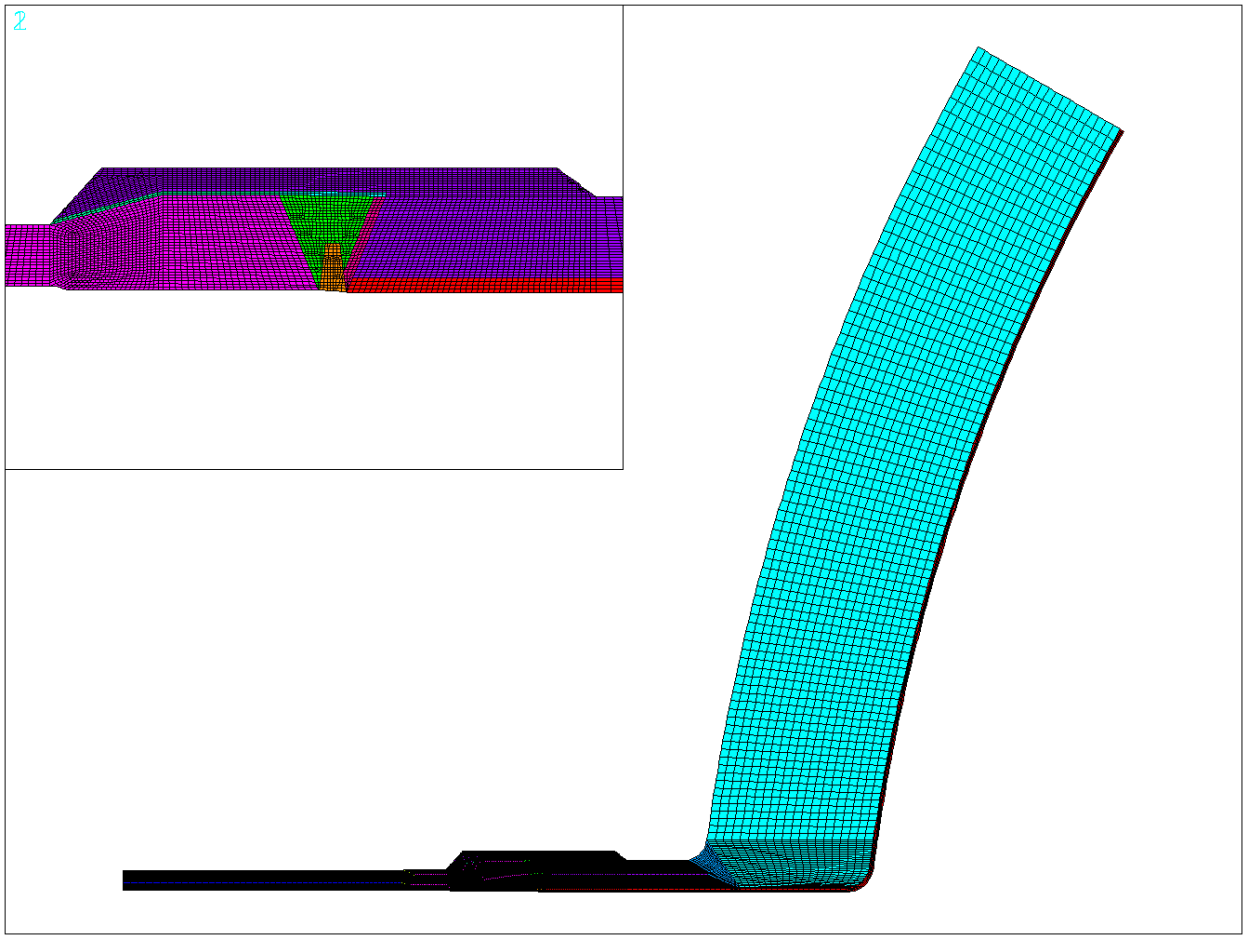


Figure 1: Finite Element Model of the As-Built "Minimum" WOL for Weld Residual Stresses

Structural Integrity Associates, Inc.®
info@structint.com 1-877-4SI-POWER structint.com

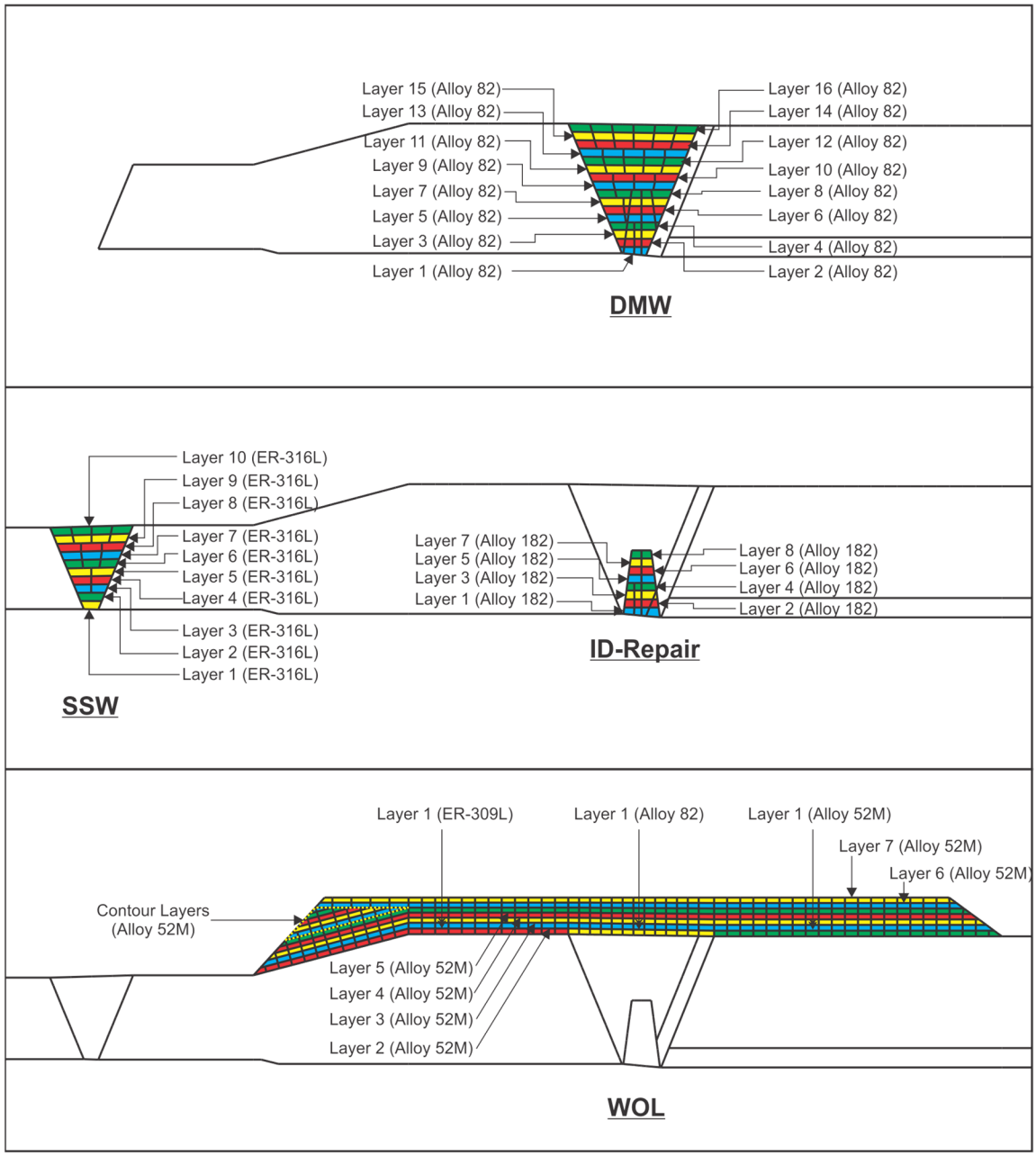


Figure 2: Finite Element Model for As-Built "Minimum" WOL Residual Stress Analysis showing Nuggets used for Welding Simulation

Figure 3: Path Locations for Through wall Stress Extractions for As-Built "Minimum" WOL Weld Residual Stress Analysis

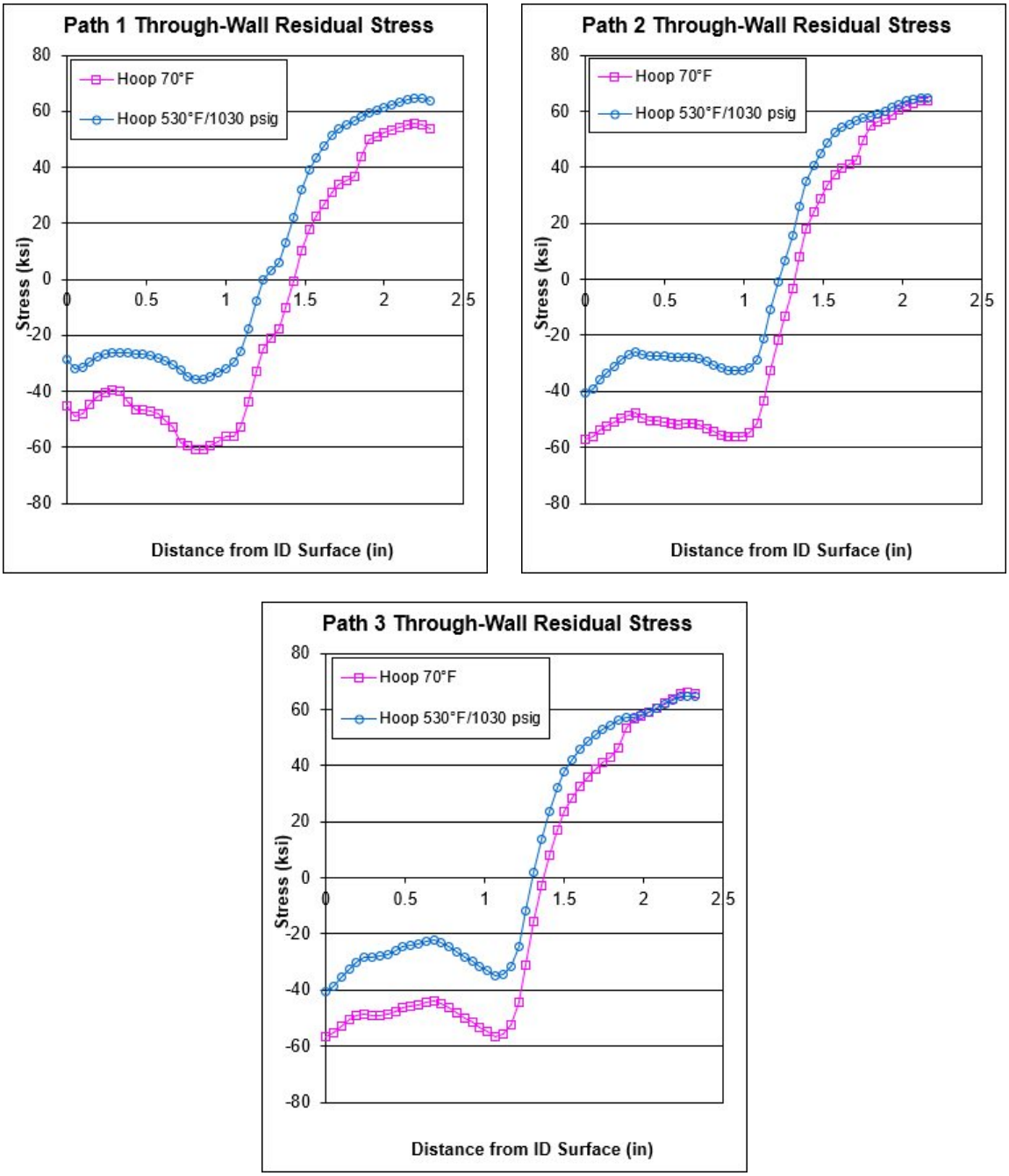
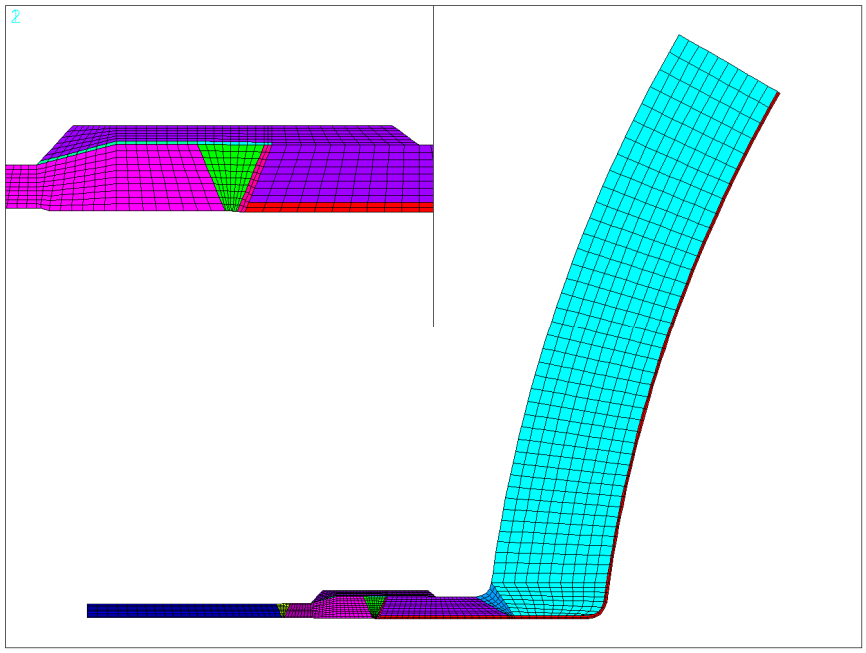
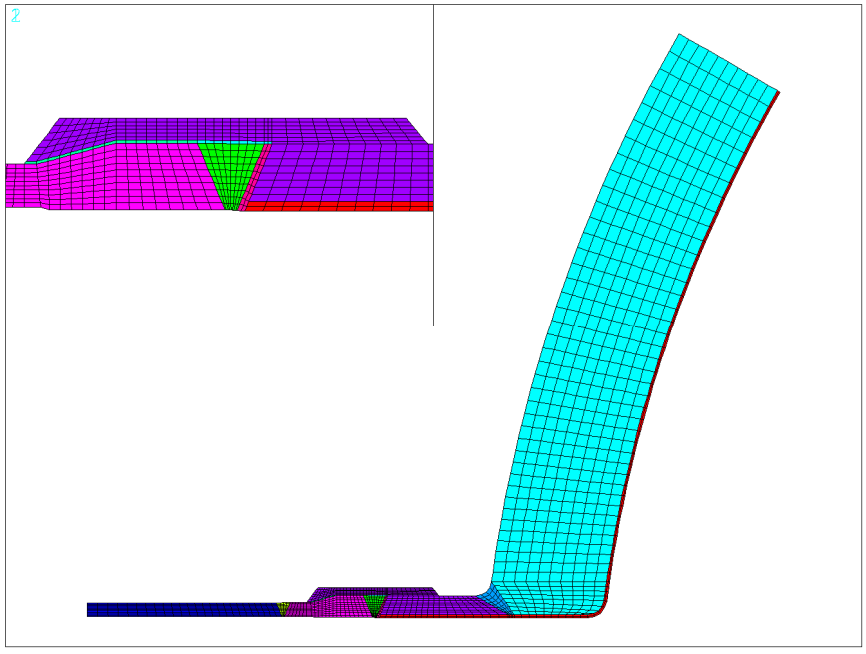


Figure 4: Weld Residual Stress Results along Stress Paths



Minimum “As-Built”



Maximum “As-Built”

Figure 5: Finite Element Model of the As-Built “Minimum” and “Maximum” WOL for Operating Stresses

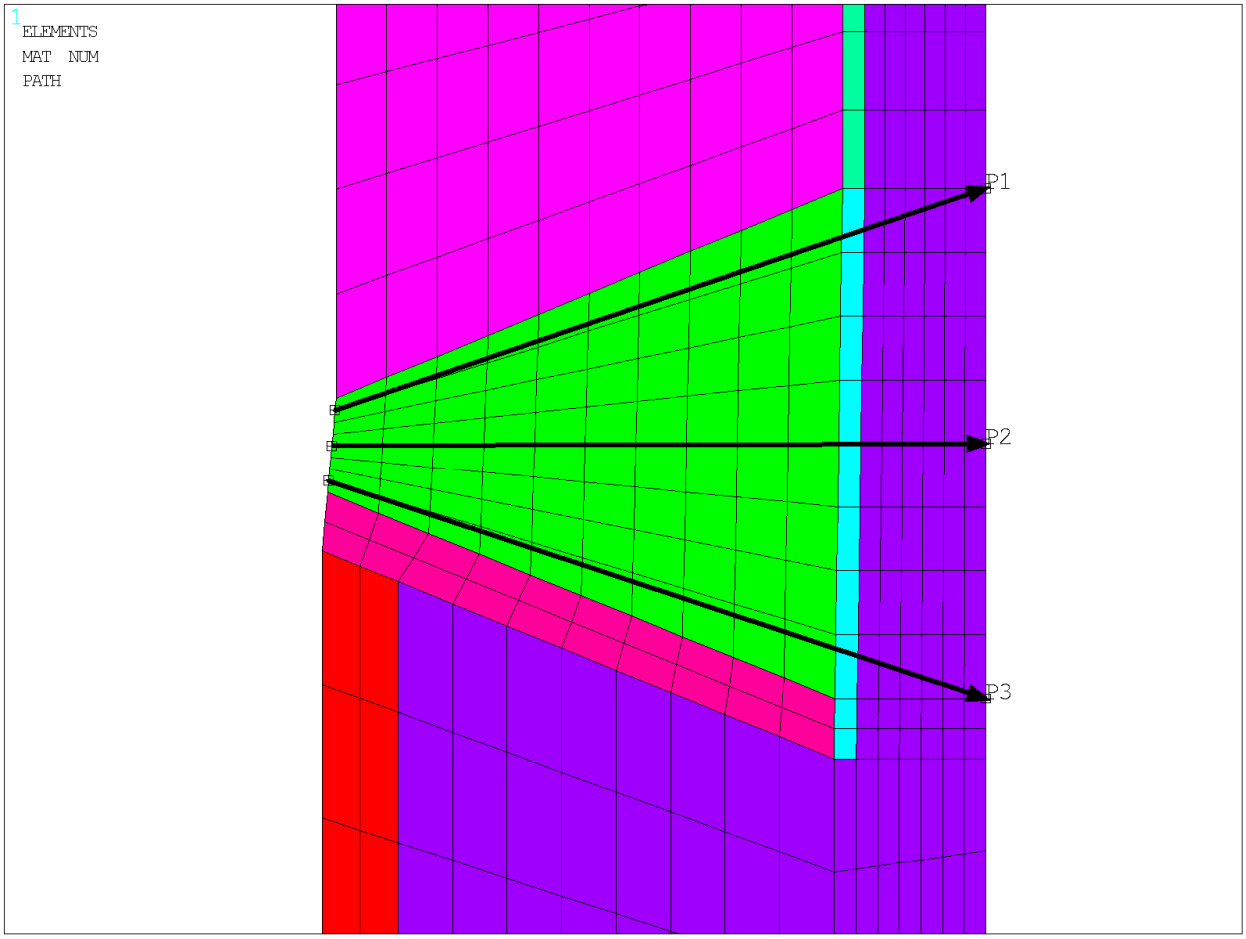


Figure 6: Path Locations for Through wall Stress Extractions for WOL Operating Stress Analyses

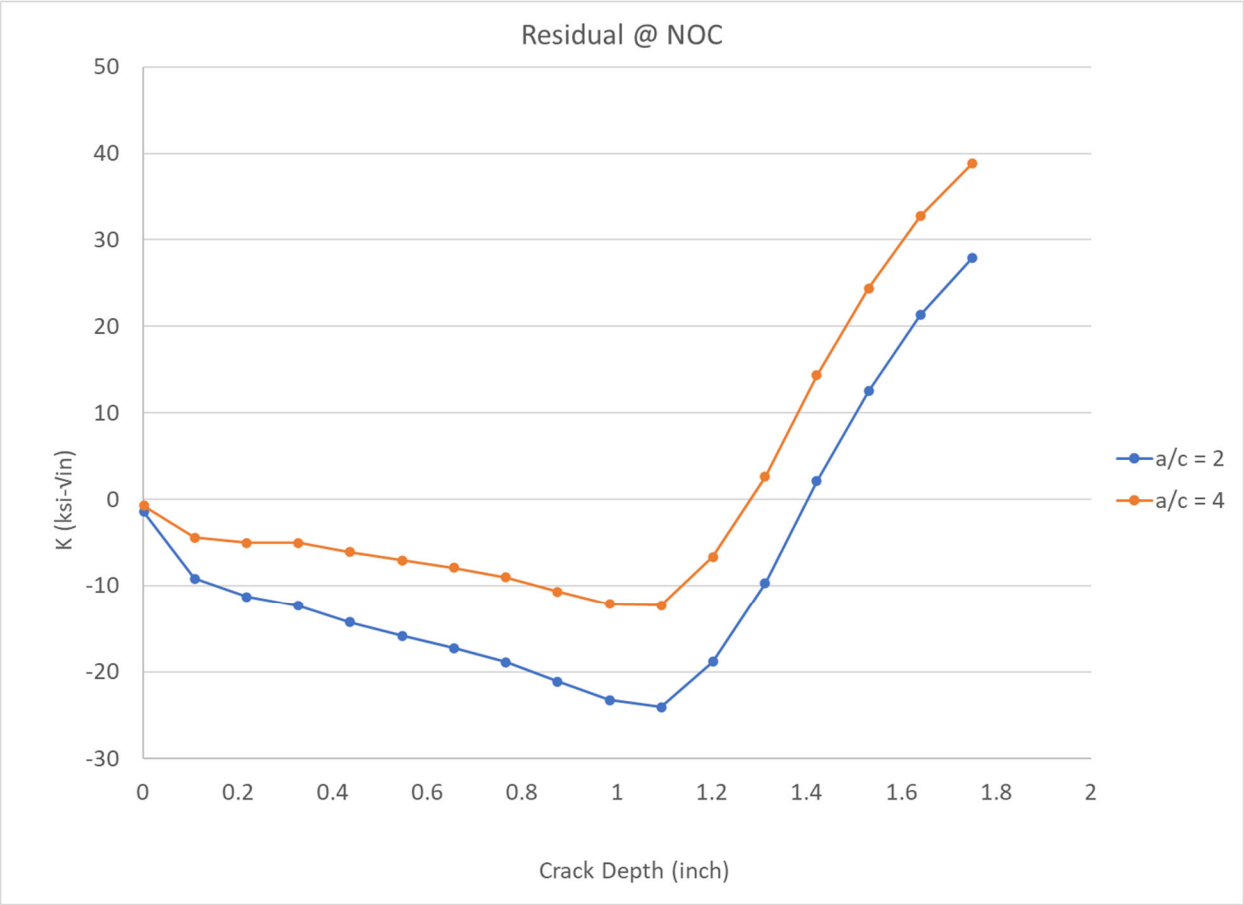


Figure 7: K Distributions for Axial Flaw at Steady State Normal Operating Conditions for Path 2

(Note: WOL interface @ 1.671")

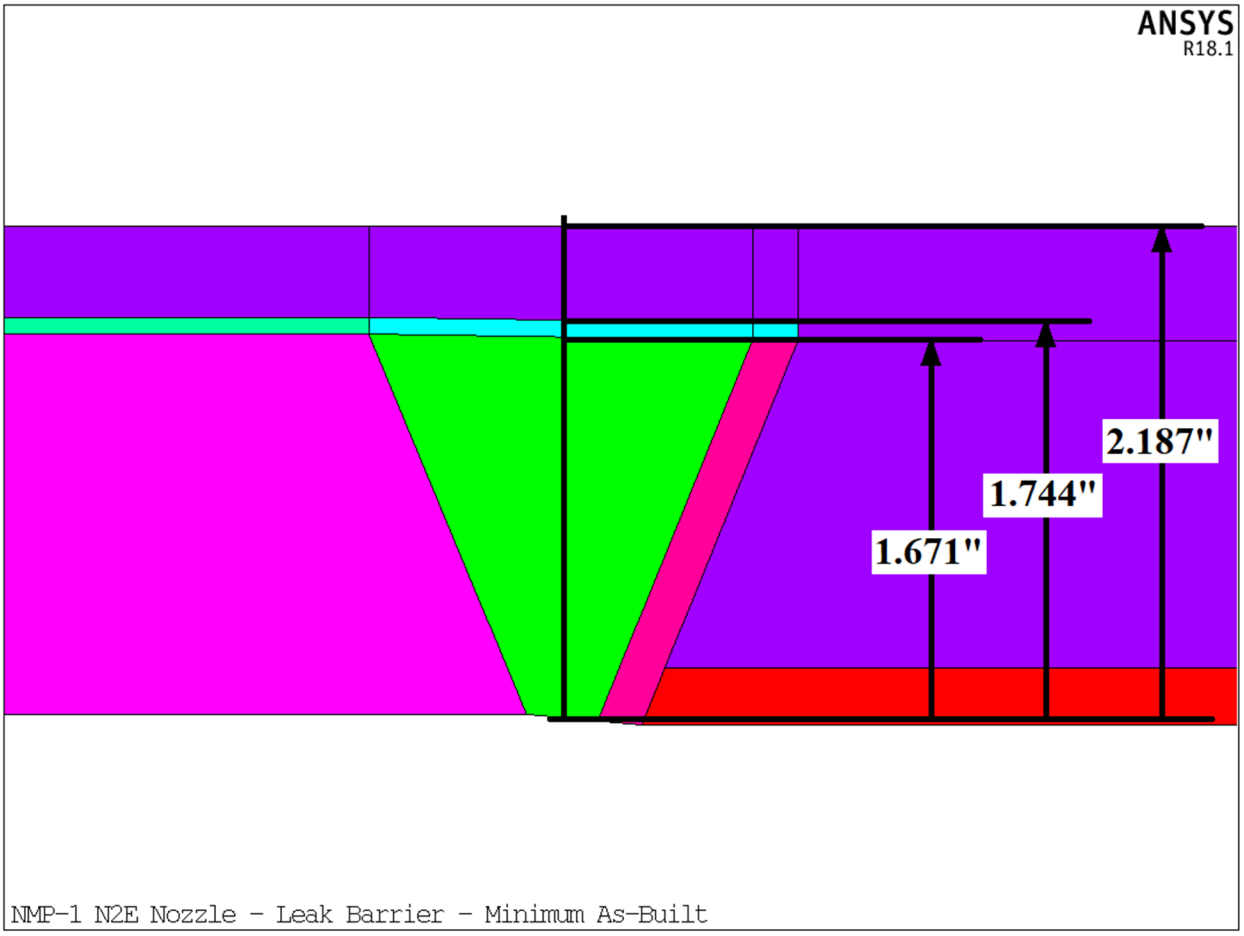


Figure 8: Dimensions used in Crack Growth Analysis

Attachment 5

Examination Datasheet of 32-WD-208 (Overlaid Weld)

Ultrasonic Examination

Constellation

Outage No.: **N1R27**

Site/Unit: **NMP** / **1** Procedure: **GEH-UT-254** Int / Per: **5 / 1**

Summary No.: **N1-ISI-209600** Procedure Rev.: **1** Report No.: **1R27-ISI-VE-019**

Workscope: **ISI** Work Order No.: **C93810476-230** Page: **1** of **1**

Code: **ASME Sect XI, 2013Ed** Cat./Item: **R-A/R1.16** Location: **Drywell 259'**

Drawing No.: **F45183C-07** Description: **N2E Nozzle-to-Safe End**

System ID: **32.0**

Component ID: **32-WD-208**

Limitations: **None**

Comments

Reference GEH Report No: N1R27-APR-07 for exam results and original signatures.

See Report: O:\Outage Data\Nine Mile\N1RFO27\ISI\Scanned Reports

Results: Accept ☑ Reject ☐ IO ☐ **N/A**

Percent of Coverage Obtained > 90%: **Yes - 100%** Reviewed Previous Data: **Yes**

Examiner	Level	Signature	Exam Date	Reviewer	Signature	Date
Rachal, Andre' M.	**III**		**03/26/2023**	**Fish, Cody A.**		**03/26/2023**
Examiner	Level	Signature	Exam Date	Site Review	Signature	Date
N/A				**Salley, Michael**		**03/28/2023**
Other	Level	Signature	Date	ANII Review	Signature	Date
N/A				**Powers, Brandon**		**03/28/2023**

HITACHI

UT EXAMINATION SUMMARY SHEET

REPORT NO.: N1R27-APR-07

SITE: Nine Mile Point
OUTAGE: N1R27

SYSTEM: Recirculation
WELD NO.: 32-WD-208 (N2E)
CONFIGURATION: Safe End to Nozzle

PROCEDURE: GEH-UT-254 **VERSION:** 1 **DRR:** N/A, N/A, N/A

PROCEDURE: N/A **VERSION:** N/A **DRR:** N/A, N/A, N/A

PROCEDURE: N/A **VERSION:** N/A **DRR:** N/A, N/A, N/A

OPERATOR: Jessie Keck **LEVEL:** II
Coltin Berg II-L
Connor Pfeiffer II
Mark Gauthier II

ANALYST: Andre' Rachal **LEVEL:** III

COMPARED TO REPORT #: ISI-VE-13-006
☒ CHANGE ☐ NO CHANGE

WELD TYPE: ☒ DM ☐ SM

WORK ORDER #: C93810476

DATA SHEET NO.(S): APD-07, N/A

CALIBRATION SHEET NO.(S): APC-43 Through APC-48

During the examination of the above referenced weld, one (1) indication associated with stress corrosion cracking was recorded by the "SP2000" Phased Array system utilizing two-dimensional phased array probes. See page two for indication location and parameters.

Examinations scanning for the detection of circumferential oriented flaws were performed utilizing a mechanical raster pattern and phased array focal laws of 30°, 45°, 60°, and 70° longitudinal waves and a 45° shear wave. These examinations were performed from both the upstream and downstream sides of the weld. Inside surface geometry, non-relevant indications, embedded reflectors, acoustic interface, and beam redirect were recorded during the circumferential flaw examinations.

Examinations scanning for the detection of axial oriented flaws were performed utilizing line scans and phased array focal laws of 22.5°, 30°, 37.5°, 45°, and 52.5° longitudinal waves. These examinations were performed in the CW and CCW beam directions from both the upstream and downstream sides of the weld skewing ±30° in 2.5° increments. A Non-Geometric Indication, Inside surface geometry, non-relevant indications, and embedded reflectors were recorded during the axial flaw examinations.

Embedded Reflectors

Multiple embedded reflectors were recorded in the axial and circumferential directions at varying lengths. The embedded reflectors did not have any ultrasonically measurable depth dimensions and were not connected to the ID. GEH-UT-254 Version 1 does not require any evaluation to be performed on these types of reflectors.See screen prints for examples of embedded reflectors.

An automated zero degree focal law was created to record thicknesses around the entire length of the weld.

Weld crown reduction was not performed prior to this examination. The current surface condition met "ground flush" procedural requirements.

Previous data, reports, and drawings were reviewed prior to this summary.

100% of the Code coverage was achieved, 100% of the Procedural coverage was achieved.

This examination meets the requirements of the current Appendix VIII program and 10CFR Part 50.55a, Industry Codes and Standards, amended requirements; and the latest final rule. The examination also meets the requirements of Nine Mile Point Risk-Informed In-service Inspection program

Andre' Rachal	III	3/26/2023	Michael Salley	3/28/2023	DOSE: 1064MR
SUMMARY BY	LEVEL	DATE	REVIEWED BY	DATE	
Cody Fish	II	3/26/2023	Brandon Powers	3/28/23	PAGE: 1 OF: 36
INDEPENDENT REVIEWER	LEVEL	DATE	ANII	DATE	

HITACHI

Planar Indication

2023 Examination Data

	Scan Direction	Orientation	Indication Location	L	Length	Remaining Ligament	Thru-Wall	Angles Used Length/Thru-wall	Acceptable/Unacceptable
IND #1	LKCC/LKCW	Axial	Safe End and Weld Material	13.95"	1.65"	.313"	1.52"	45RL / 52RL	NA

Flaw thru-wall was figured with a thickness of 1.83".
L dimensions are from TDC with flow into the nozzle

An aspect ratio was not performed for this indication based on ASME Section XI,2013 Edition, IWB-3514
(a) The acceptance standards of IWB-3514 do not apply to planar surface-connected flaws that are in contact with the reactor coolant environment during normal operation and are detected by inservice examination in the following material

HITACHI

WALL THICKNESS PROFILE SHEET

SITE: Nine Mile Point UNIT: 1

OUTAGE.: N1R27

REPORT NO.: N1R27-APR-07

SYSTEM: Recirculation

COMPONENT ID NO.: 32-WD-208 (N2E)

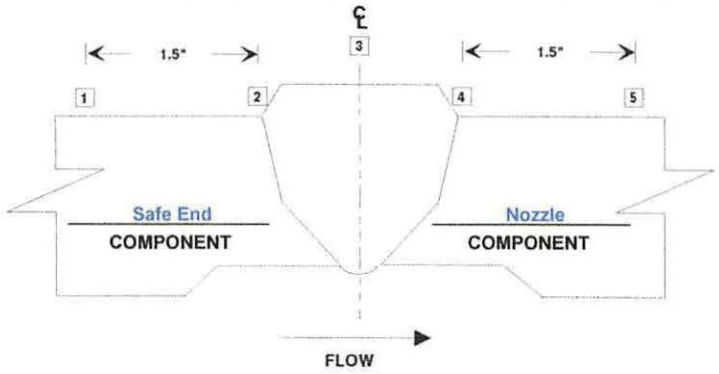
Position	0°	90°	180°	270°
1	46mm	46mm	46mm	44mm
2	47mm	47mm	47mm	44mm
3	48mm	48mm	48mm	48mm
4	46mm	46mm	47mm	43mm
5	46mm	46mm	46mm	43mm

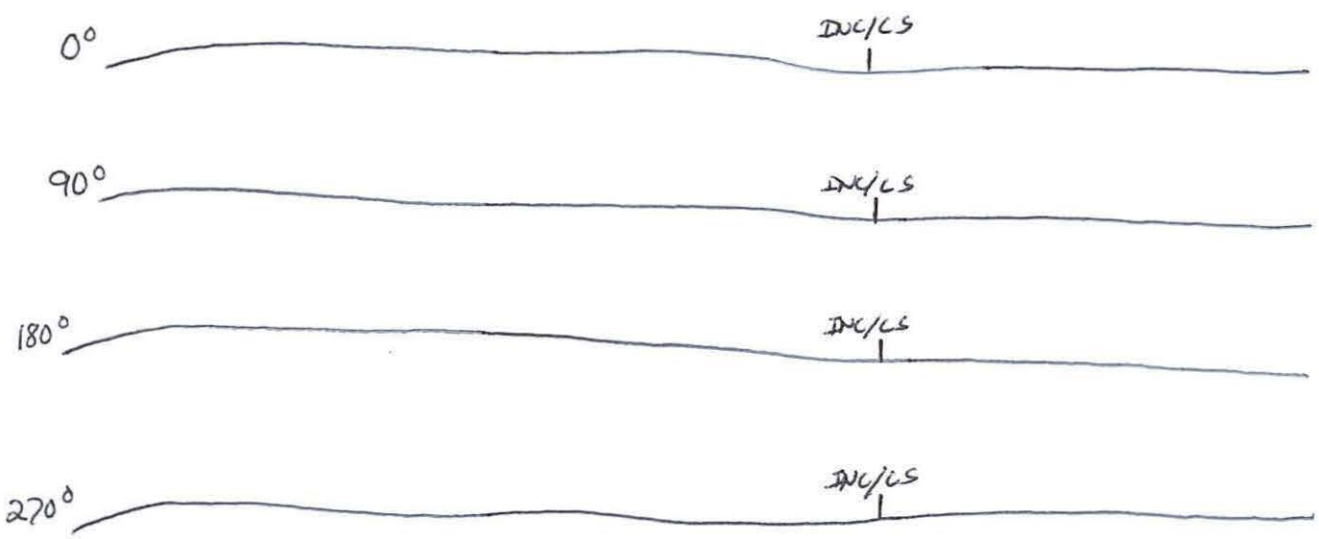
CROWN HEIGHT: Flush

CROWN WIDTH: 48mm

DIAMETER: 738mm

WELD LENGTH: 2319mm



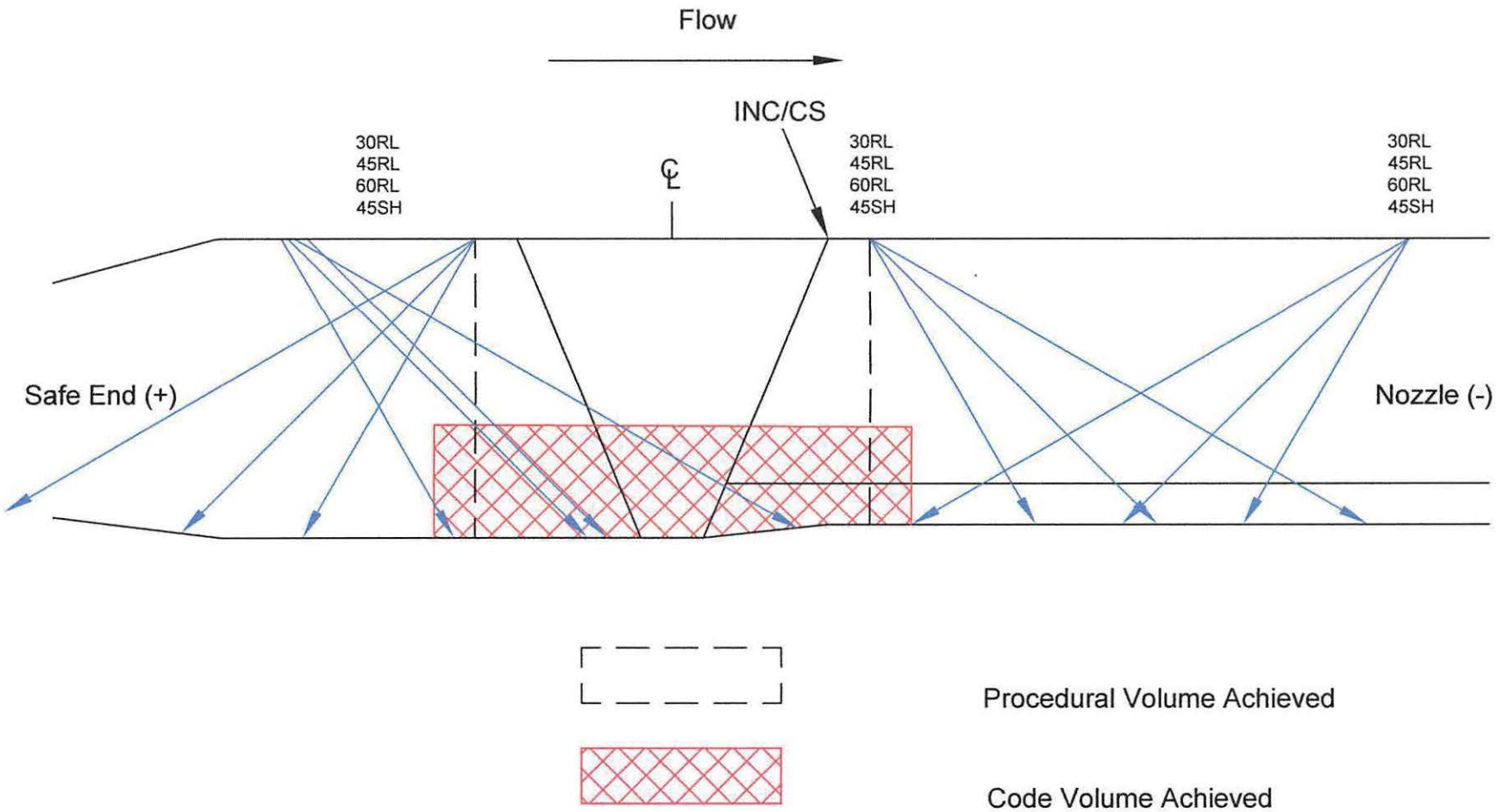


Andre' Rachal — GEH REVIEWED BY

III — LEVEL

3/26/2023 — DATE

HITACHI	COVERAGE / PLOT SHEET	SITE: Nine Mile Point UNIT: 1 OUTAGE.: N1R27	REPORT NO.: N1R27-APR-07
SYSTEM: Recirculation	COMPONENT ID NO.: 32-WD-208 (N2E)	CONFIGURATION: Safe End → Nozzle	



Andre' Rachal	III	3/26/2023		PAGE: 4 OF: 36
GEH REVIEWED BY	LEVEL	DATE		

HITACHI

Ultrasonic Data / Scan Parameter Sheet
(Automated with Phased Array)

Site:	Nine Mile	**Report No.:**	N1R27-APR-07
Unit:	1	**Data Sheet No.:**	APD-07
Outage:	N1R27	**Calibration Sheet No.:**	APC-43 Through APC-48
Procedure No.:	GEH-UT-254	**Revision / Version:**	1
		DRR:	N/A

Scan Information

Component No.: 32-WD-208 (N2E) **System:** Recirculation

	Date	Time	Operator	Level
Examination Start:	3/17/2023	0430	Mark Gauthier / Connor Pfeiffer	II / II
Examination End:	3/18/2023	1055	Jessie Keck / Colten Berg	II / II-L

Examination Surface: OD **Component Temperature:** N/A **Thermometer S/N:** N/A

Scan	File ID	Scan(mm)			Index(mm)			Gain:dB	Results	Comments
		Start	Stop	Resolution	Start	Stop	Resolution			
30RL LKDN	N2E CIRC FLAW	-31	60	0.5	0	1272	4	35	C,E,G	*,**
45RL LKDN	N2E CIRC FLAW	-31	59	0.5	0	1272	4	36	C,E	*,**
60RL LKDN	N2E CIRC FLAW	-31	58	0.5	0	1272	4	36	C	*,**
45SH LKDN	N2E CIRC FLAW	-31	56	0.5	0	1272	4	33	C,E,K	*,**
30RL LKUP	N2E CIRC FLAW	31	-127	0.5	-75	1201	4	36	C,E,G	*
45RL LKUP	N2E CIRC FLAW	31	-126	0.5	-75	1201	4	37	C,D,E	*
60RL LKUP	N2E CIRC FLAW	31	-125	0.5	-75	1201	4	37	C,D	*
45SH LKUP	N2E CIRC FLAW	31	-122	0.5	-75	1201	4	34	C,E,K	*
30RL LKDN	N2E CIRC FLAW-2	-31	60	0.5	1248	2352	4	35	C,E,G	*
45RL LKDN	N2E CIRC FLAW-2	-31	59	0.5	1248	2352	4	36	C,E,G	*
60RL LKDN	N2E CIRC FLAW-2	-31	58	0.5	1248	2352	4	36	C,G	*
45SH LKDN	N2E CIRC FLAW-2	-31	56	0.5	1248	2352	4	33	C,E,G,K	*
30RL LKUP	N2E CIRC FLAW-2	31	-127	0.5	1173	2277	4	36	C,E,G	*
45RL LKUP	N2E CIRC FLAW-2	31	-126	0.5	1173	2277	4	37	C,E,G	*
60RL LKUP	N2E CIRC FLAW-2	31	-125	0.5	1173	2277	4	37	C,G	*
45SH LKUP	N2E CIRC FLAW-2	31	-122	0.5	1173	2277	4	34	C,E,K	*
RL LKCW	N2E AS LKCW	-12	2350	1.5	-64	56	8	34	B,C,E,G	*
RL LKCC	N2E AS LKCC	14	2361	1.5	-57	63	8	35	B,C,E,G	*
RL LKCW	N2E AS LKCW-SUPP-3	186	486	0.5	-56	64	2	37	B,C,E,G	*
RL LKCC	N2E AS LKCC-SUPP-2	214	614	0.5	-56	64	2	35	B,C,E,G	*

Examination Results Legend

- A - No Recordable Indications
- B - Non-Geometric Indications
- C - Non-Relevant Indications
- D - Acoustic Interface
- E - Inside Surface Geometry
- F - Outside Surface Geometry
- G - Embedded Reflectors
- H - Root Geometry
- I - Counterbore
- J - Shear Component
- K - Beam Redirect

Setup Information

L Zero Reference:	Top Dead Center			**Positive Circ Flaw Scan/Index Direction:**	Upstream/Clockwise with Flow
W Zero Reference:	Weld Centerline			**Positive Axial Flaw Scan/Index Direction:**	Clockwise with Flow/Upstream
Track Diameter:	813 mm	**Scanner arm length:**	457 mm	**Configuration:**	Safe End to Nozzle
T&C Performed:	Thicknesses and Contours in All Four Quadrants			**Track location:**	100mm Upstream of lower edge of taper
				Scanner:	NOVA

Comments:

* Load Extension file for correct zero

** Observed repair area in approximate location of indication.

Offsets:

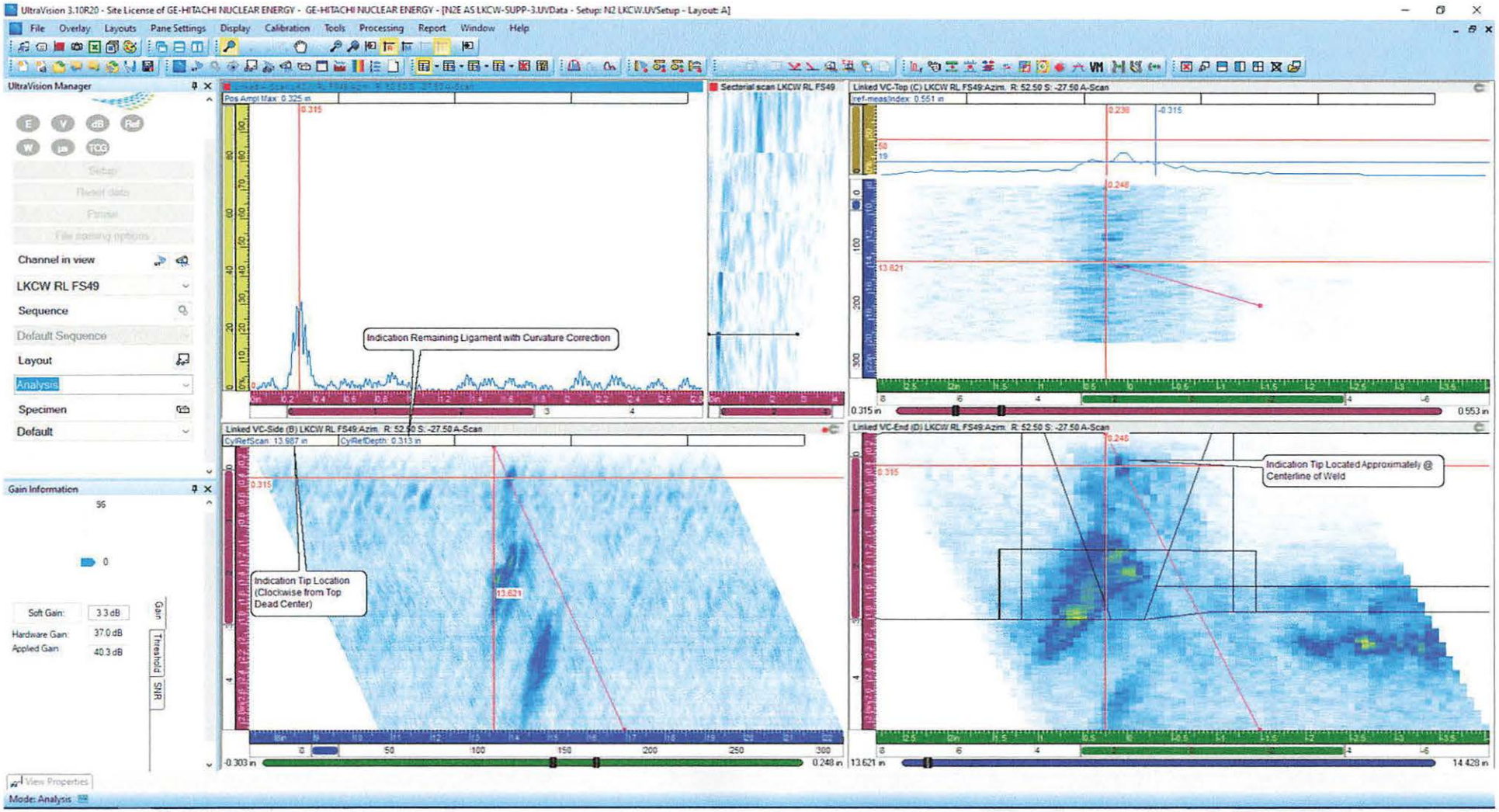
Ax Flaw

LKCW		LKCC	
RL		RL	
SCAN	INDEX	SCAN	INDEX
0 mm	0 mm	0mm	0 mm

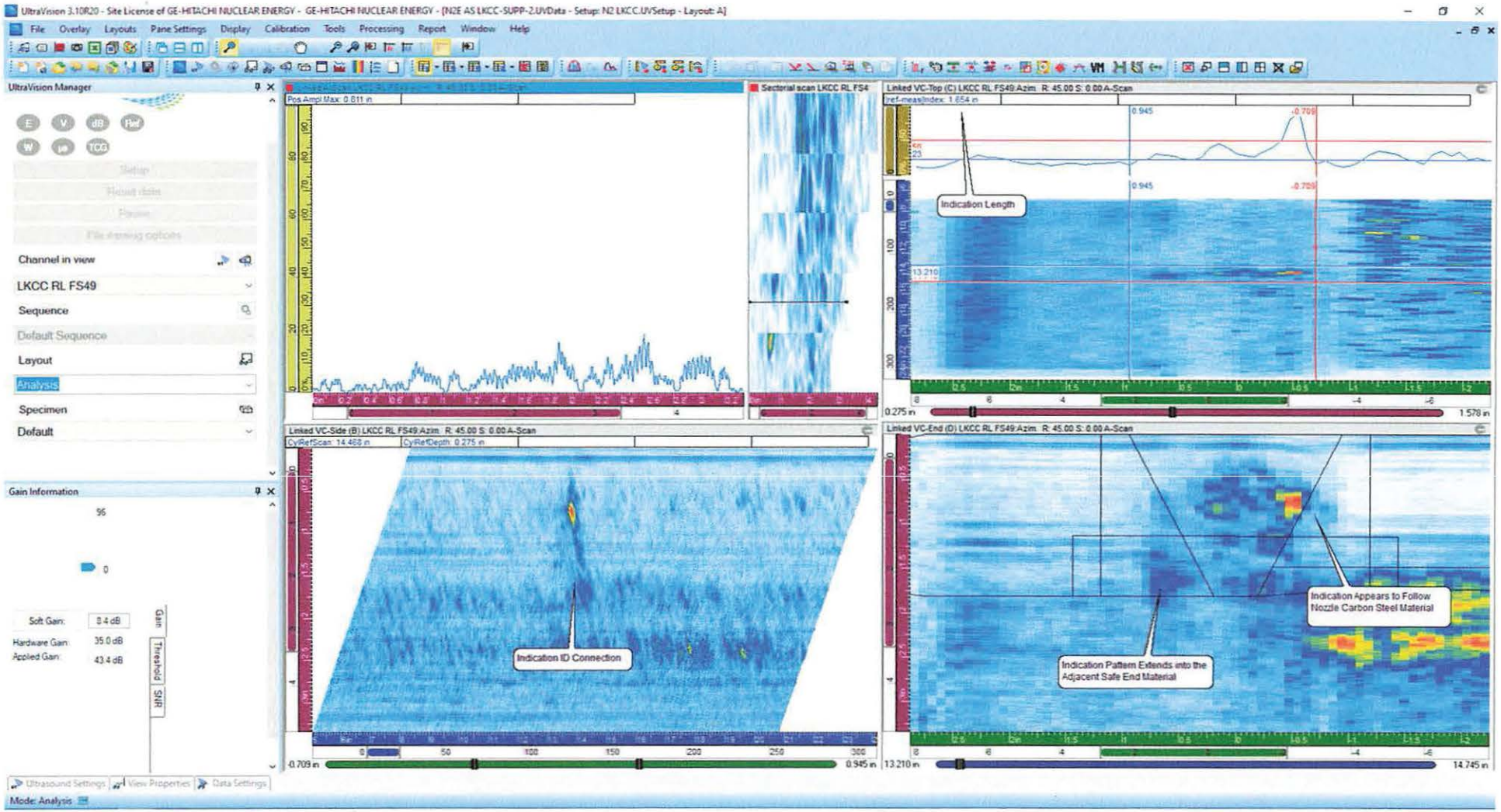
Circ Flaw

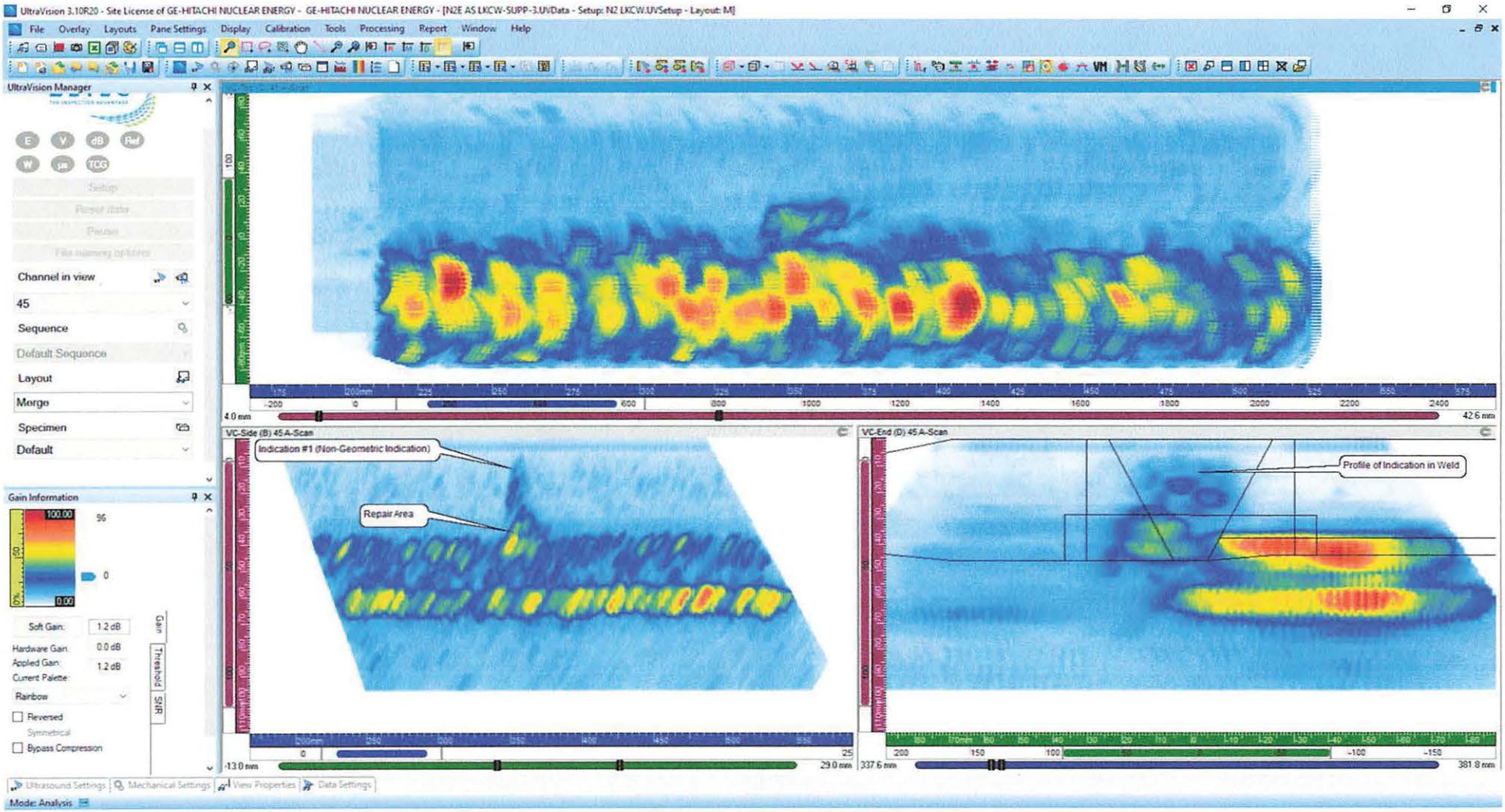
LKDN		LKUP	
0 mm	0 mm	34	-75

Andre' Rachal — Data Analyst | III — Level | 3/26/2023 — Date


Indication Remaining Ligament with Curvature Correction
Indication Tip Location (Clockwise from Top Dead Center)
Indication Tip Located Approximately @ Centerline of Weld

45°RL (Length) Indication #1 Safe End to Nozzle

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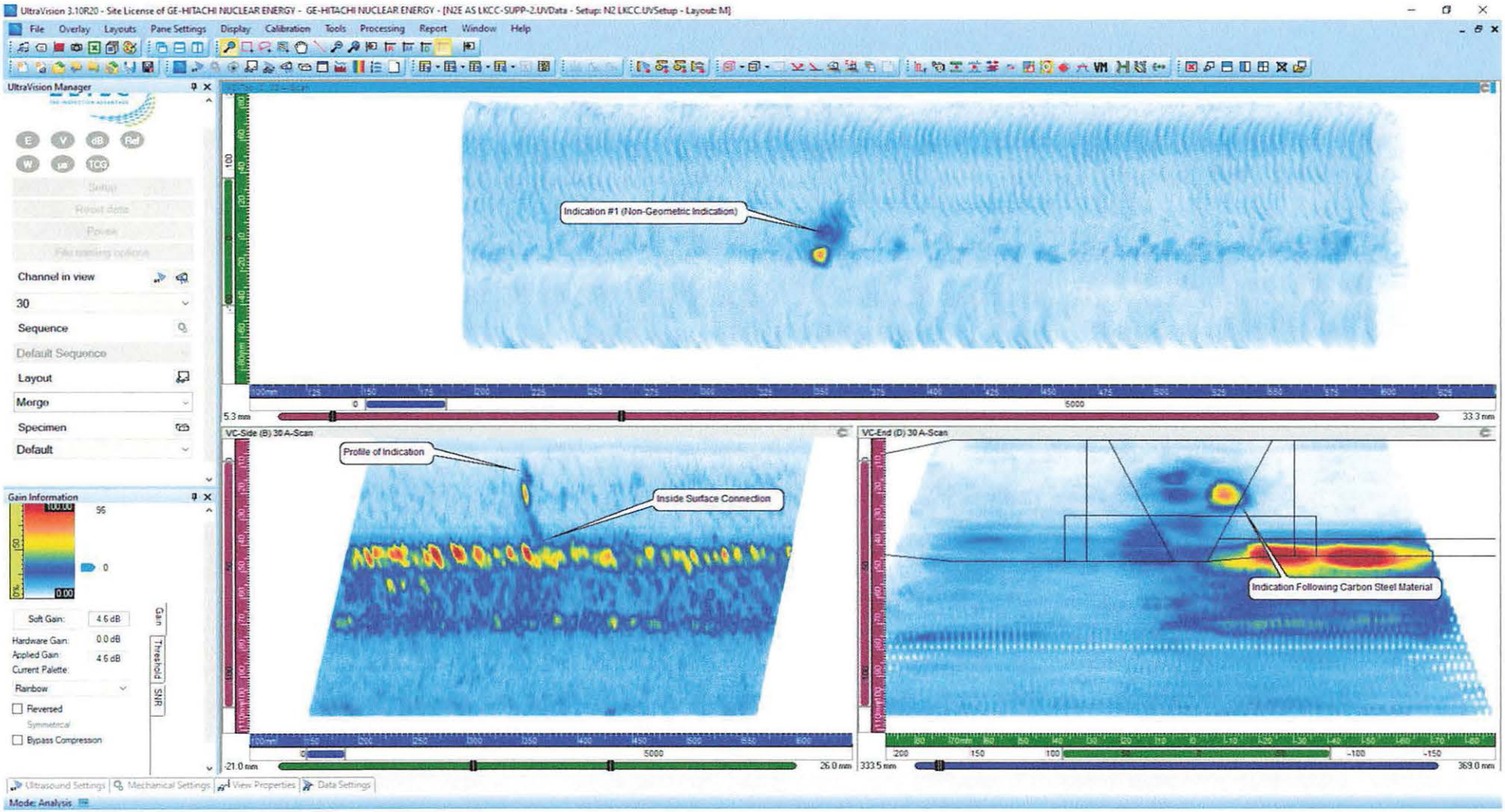
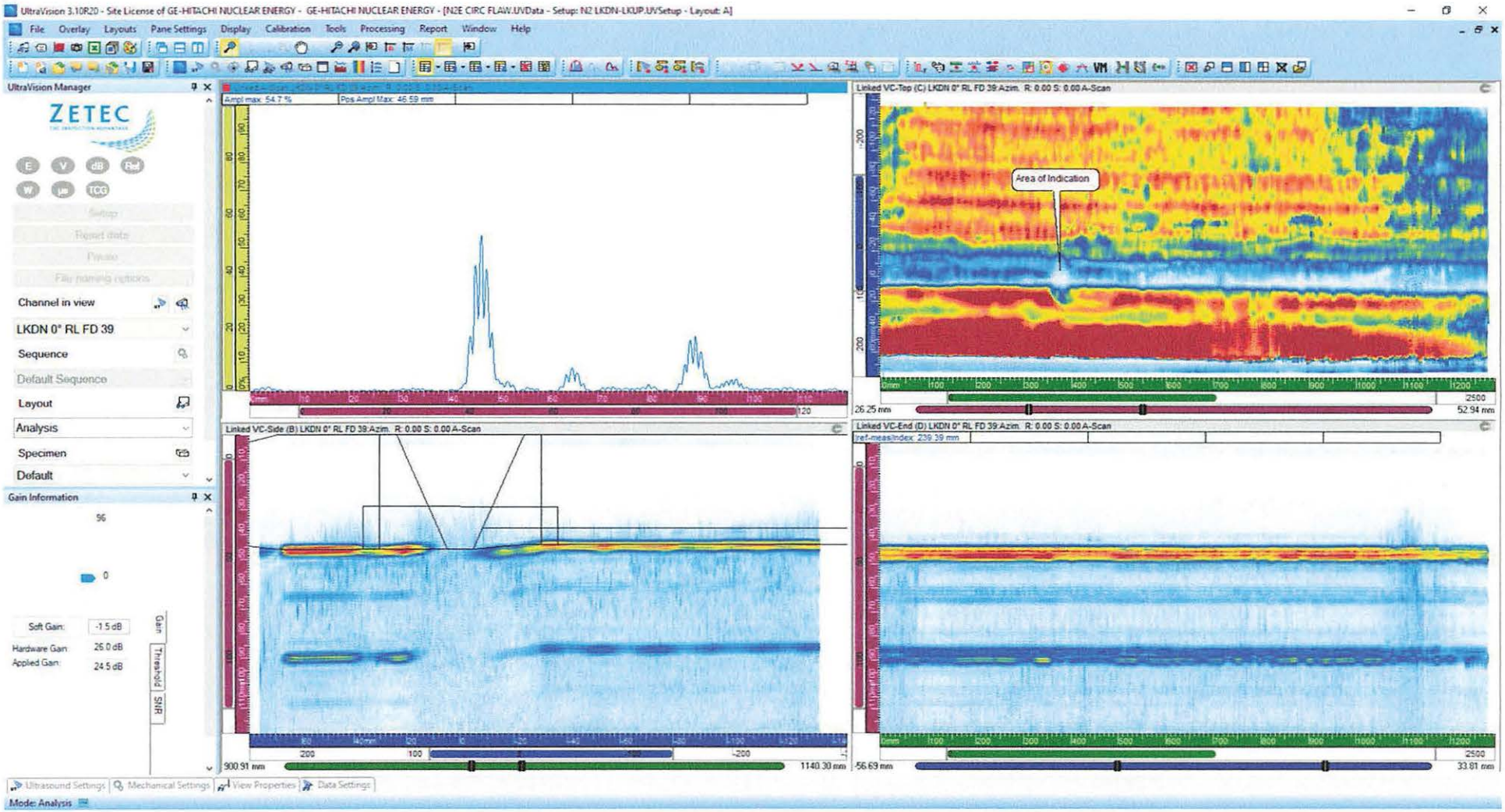
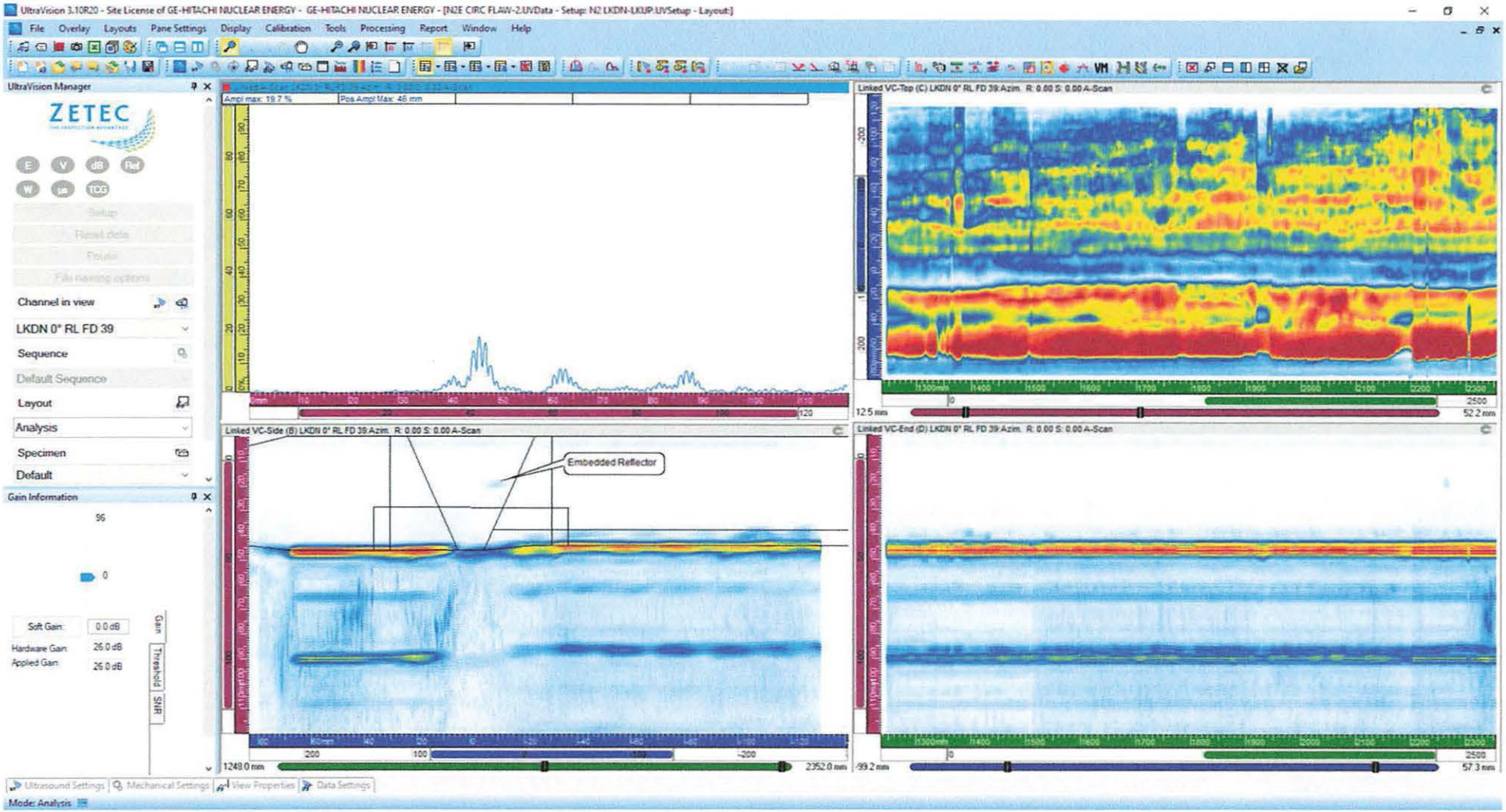
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
Channel in view
45
Sequence
Default Sequence
Layout
Merge
Specimen
Default
Gain Information
Soft Gain: 1.2 dB
Hardware Gain: 0.0 dB
Applied Gain: 1.2 dB
Current Palette:
Rainbow
Reversed
Symmetrical
Bypass Compression
VC-Side (B) 45 A-Scan
Indication #1 (Non-Geometric Indication)
Repair Area
VC-End (D) 45 A-Scan
Profile of Indication in Weld
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis

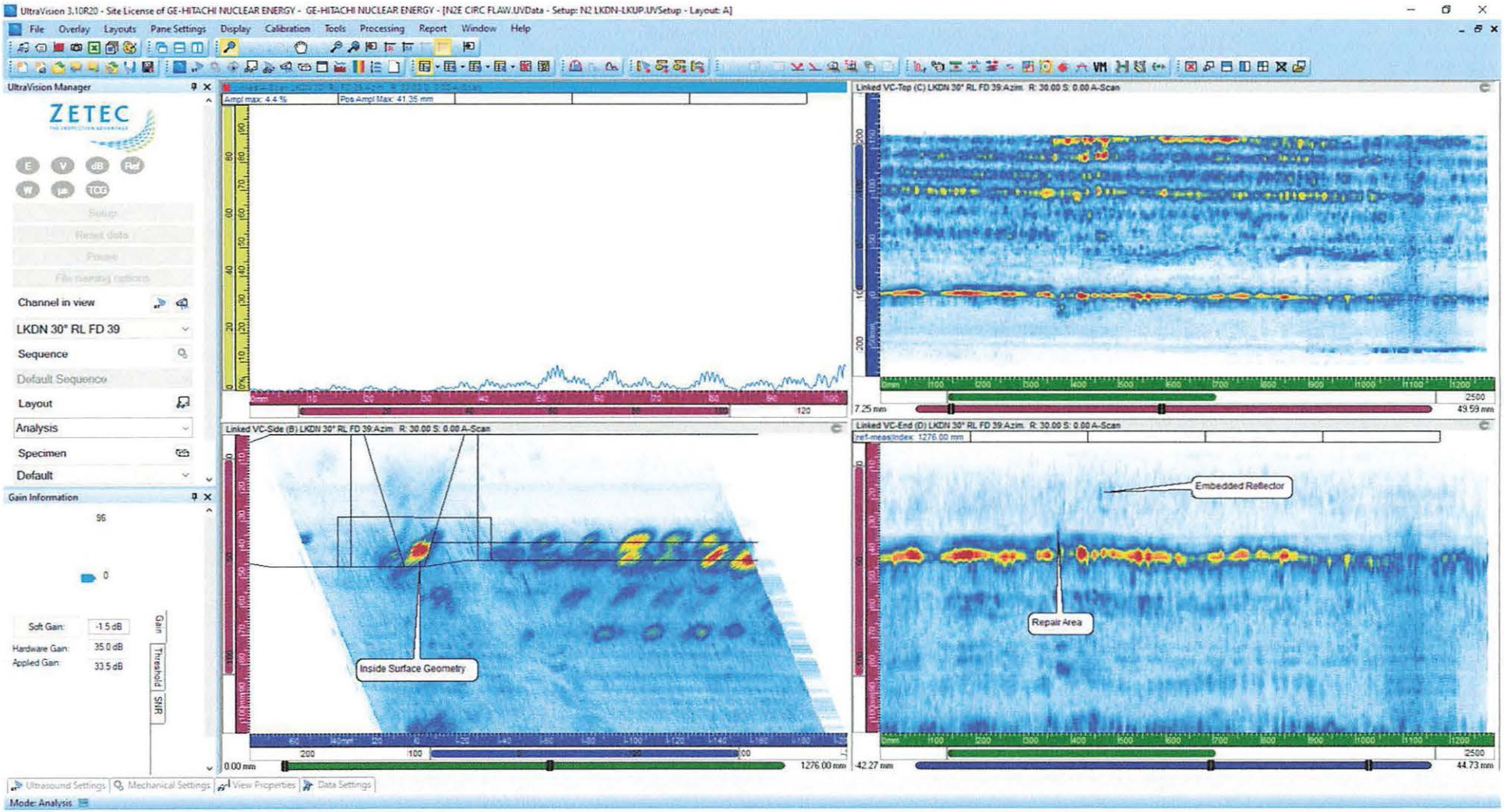

Indication #1 (Non-Geometric Indication)
Profile of Indication
Inside Surface Connection
Indication Following Carbon Steel Material
VC-Side (B) 30 A-Scan
VC-End (D) 30 A-Scan

0° L (Overview) 32-WD-208 (N2E) Safe End to Nozzle



0° L(Overview)-2 | 32-WD-208 (N2E) | Safe End to Nozzle

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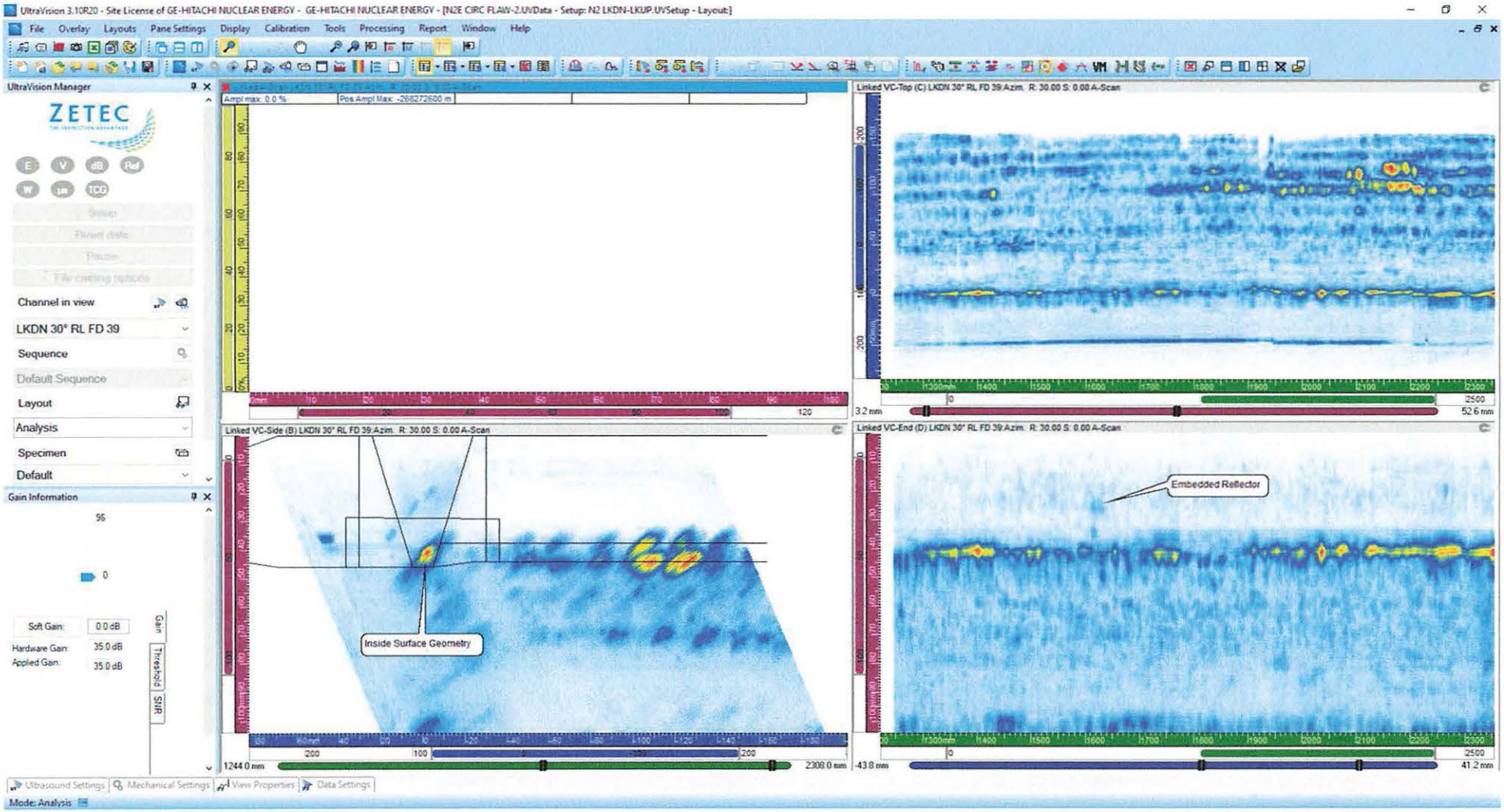
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKDN 30° RL FD 39
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: -1.5 dB
Hardware Gain: 35.0 dB
Applied Gain: 33.5 dB
Gain
Threshold
SNR
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis
Ampl max: 4.4 %
Pos Ampl Max: 41.35 mm
Linked VC-Top (C) LKDN 30° RL FD 39:Azim R: 30.00 S: 0.00 A-Scan
Linked VC-Side (B) LKDN 30° RL FD 39:Azim R: 30.00 S: 0.00 A-Scan
Inside Surface Geometry
Linked VC-End (D) LKDN 30° RL FD 39:Azim R: 30.00 S: 0.00 A-Scan
Embedded Reflector
Repair Area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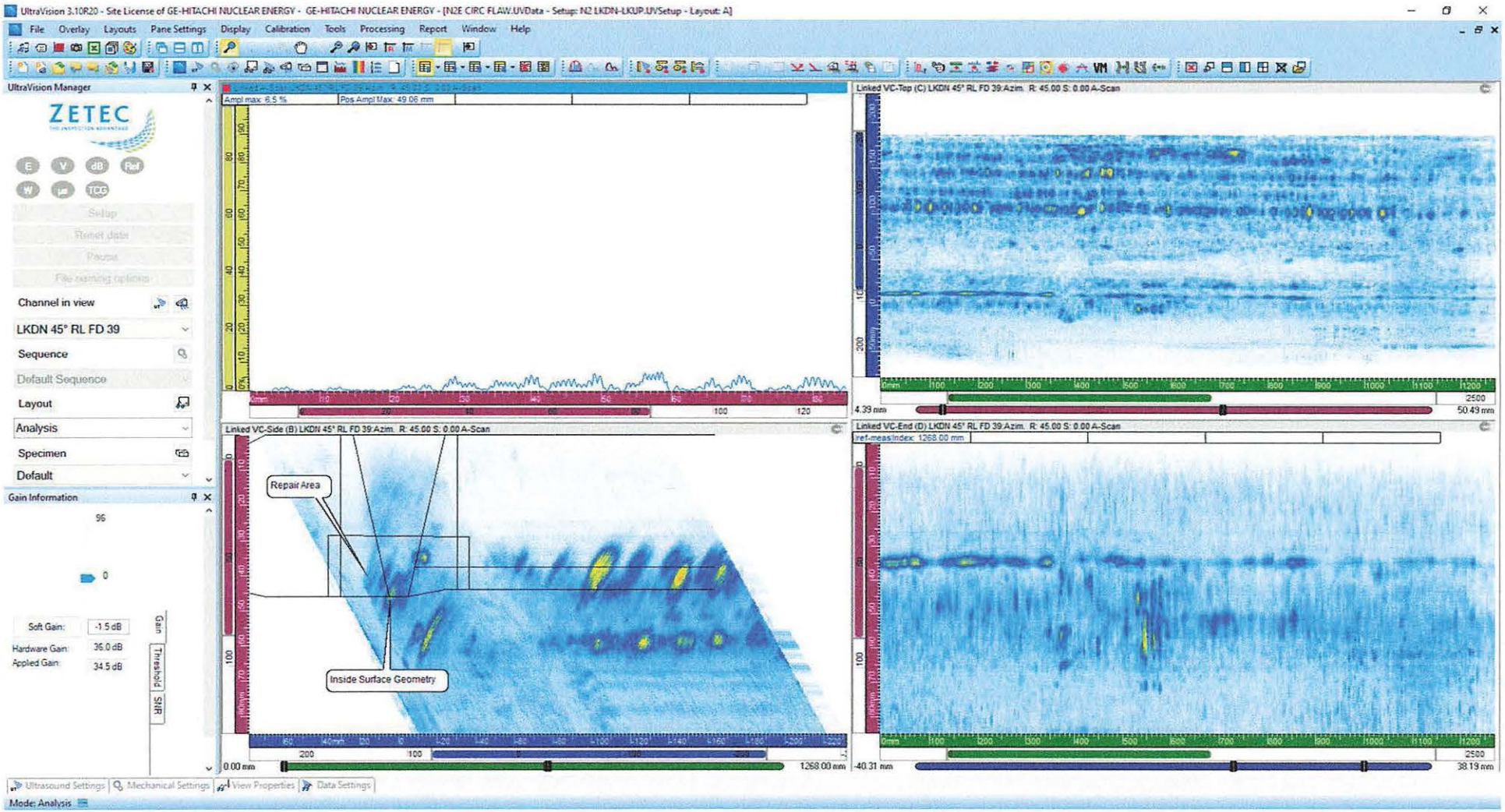
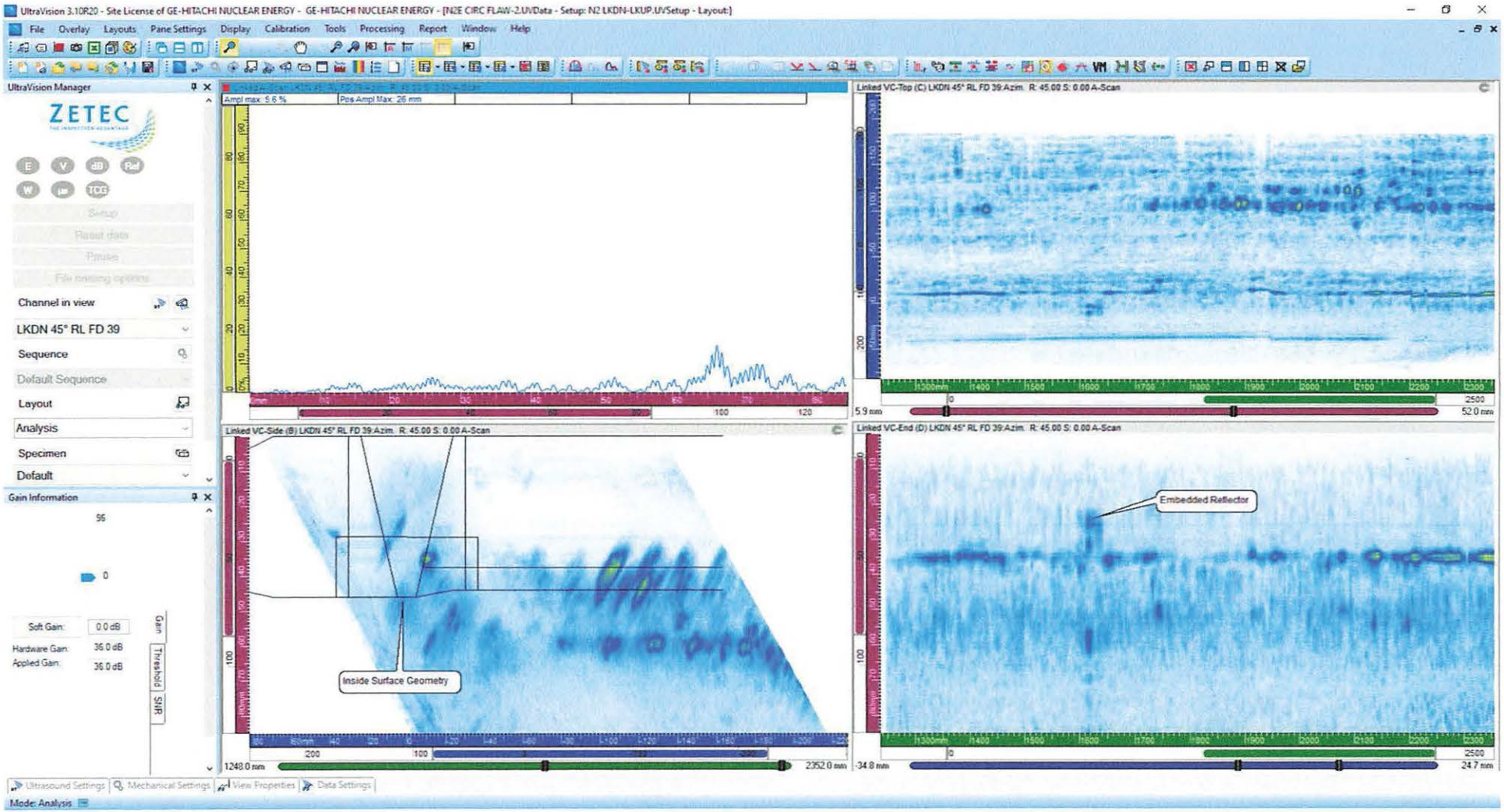
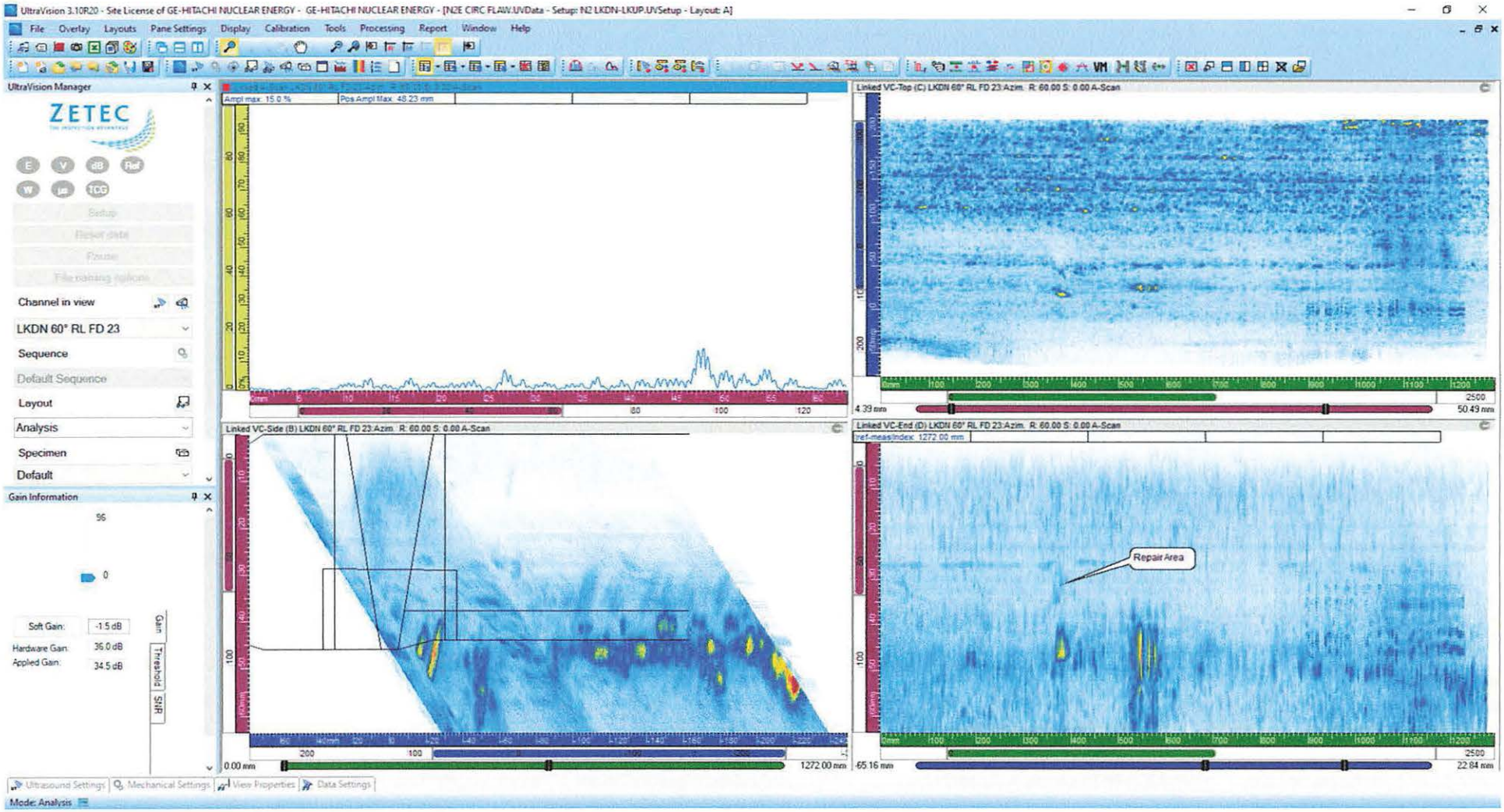
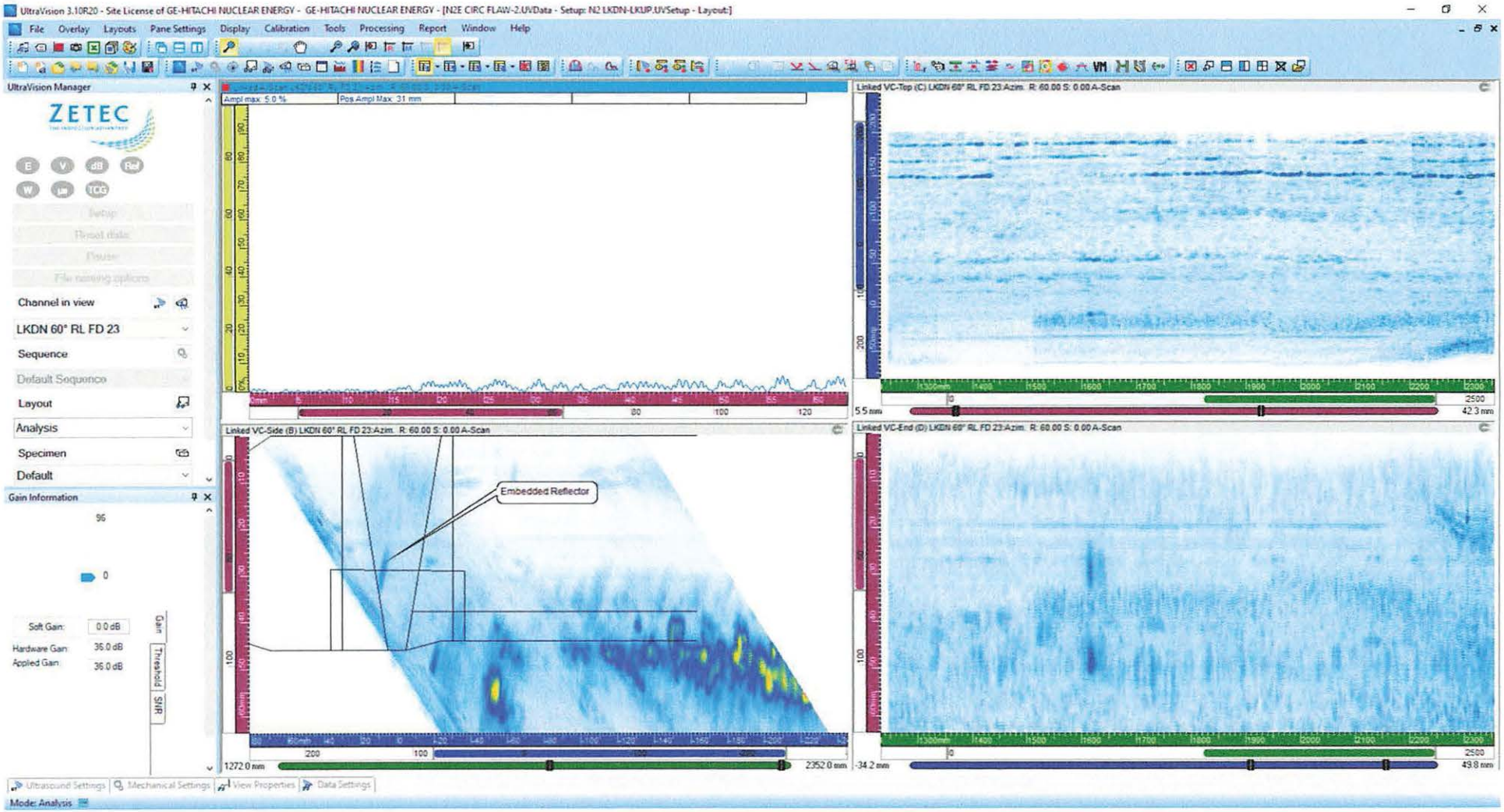
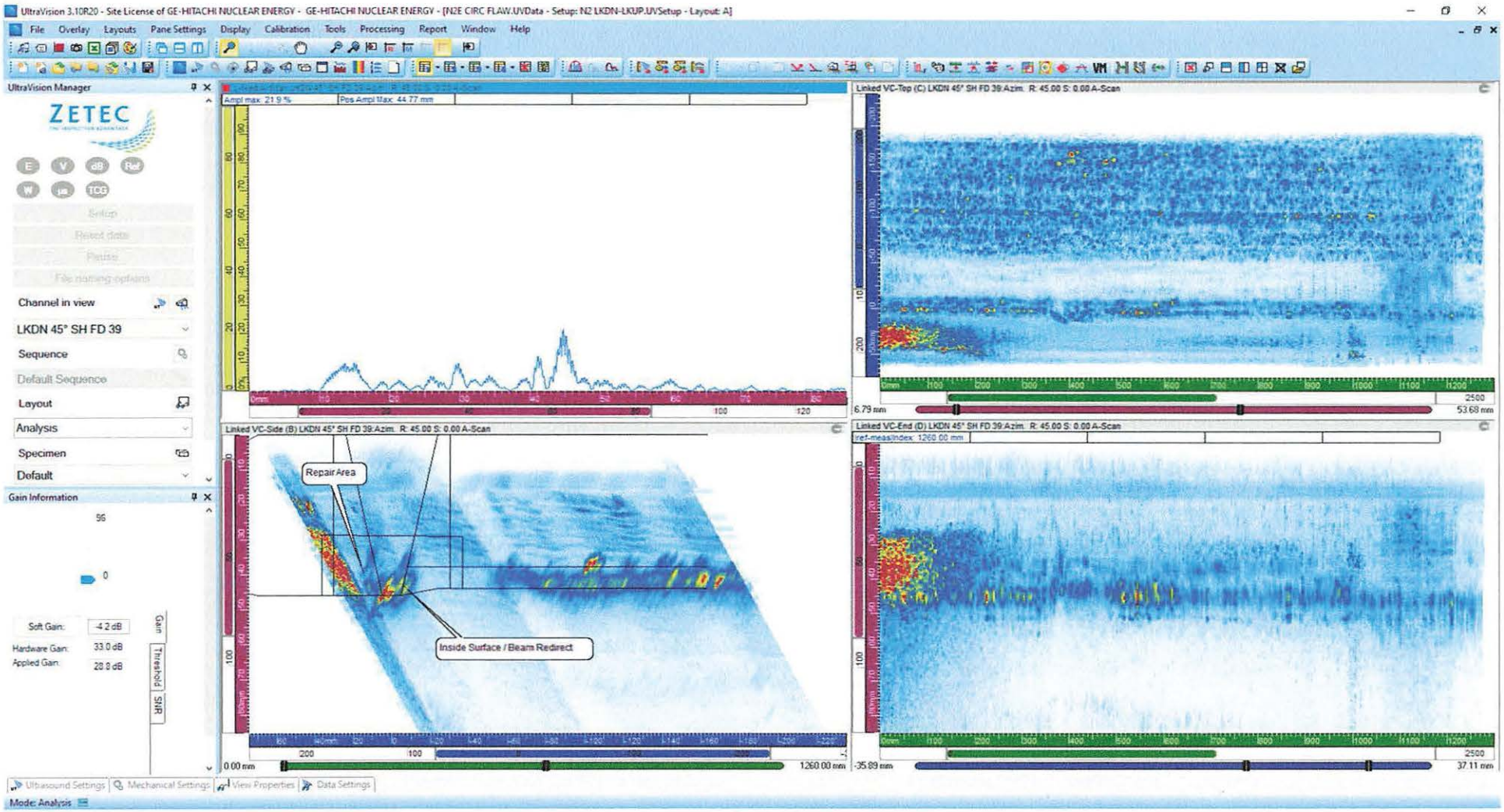
Inside Surface Geometry
Linked VC-End (D) LKDN 30° RL FD 39:Azim. R: 30.00 S: 0.00 A-Scan
Embedded Reflector

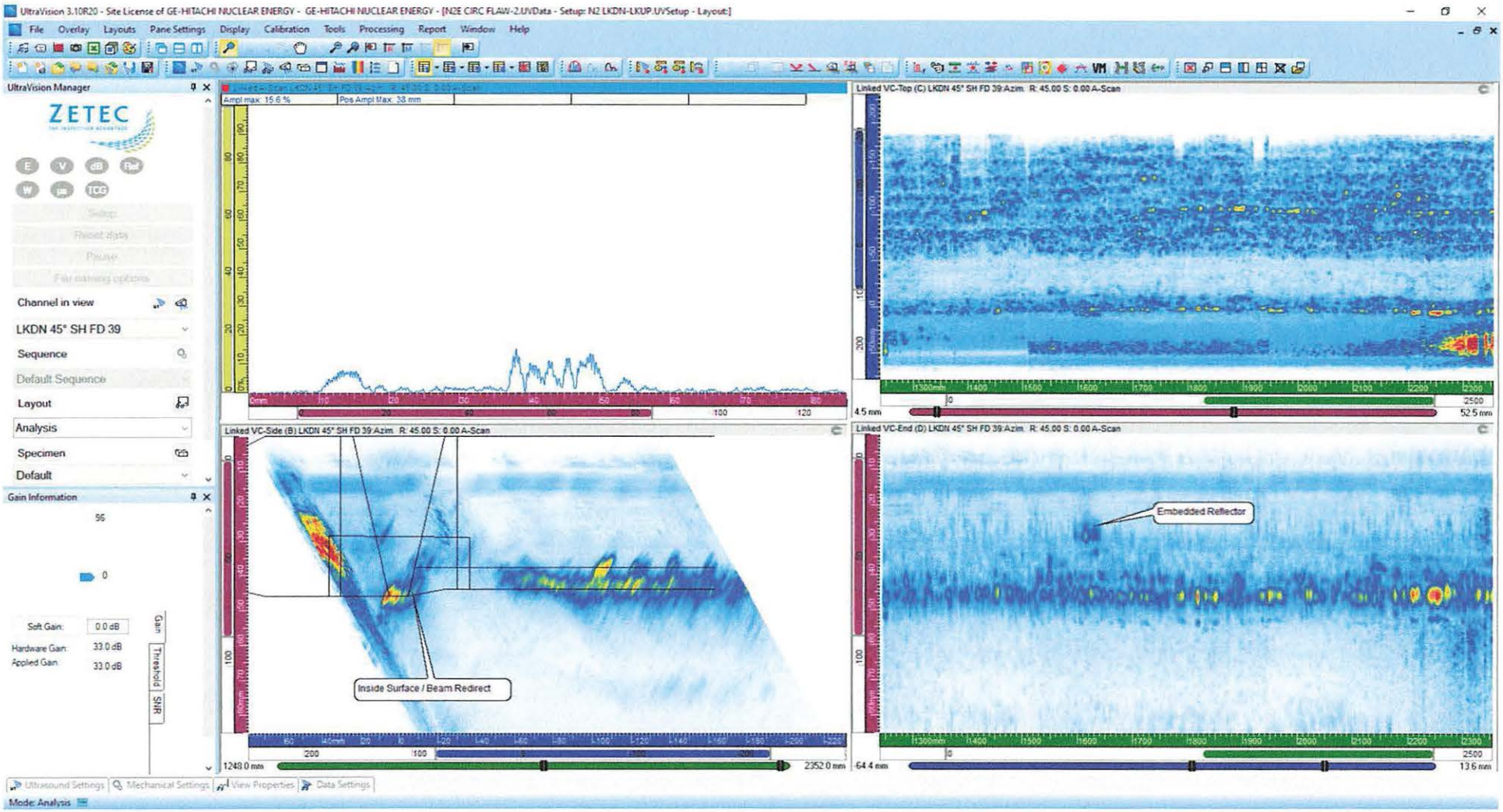

UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout: A]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKDN 45° RL FD 39
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: -1.5 dB
Hardware Gain: 36.0 dB
Applied Gain: 34.5 dB
Gain
Threshold
SNR
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis
Ampl max: 6.5 %
Pos Ampl Max: 49.06 mm
Linked VC-Top (C) LKDN 45° RL FD 39:Azim. R: 45.00 S: 0.00 A-Scan
4.39 mm
50.49 mm
Linked VC-Side (B) LKDN 45° RL FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Repair Area
Inside Surface Geometry
0.00 mm
1268.00 mm
Linked VC-End (D) LKDN 45° RL FD 39:Azim. R: 45.00 S: 0.00 A-Scan
ref-measIndex: 1268.00 mm
-40.31 mm
38.19 mm

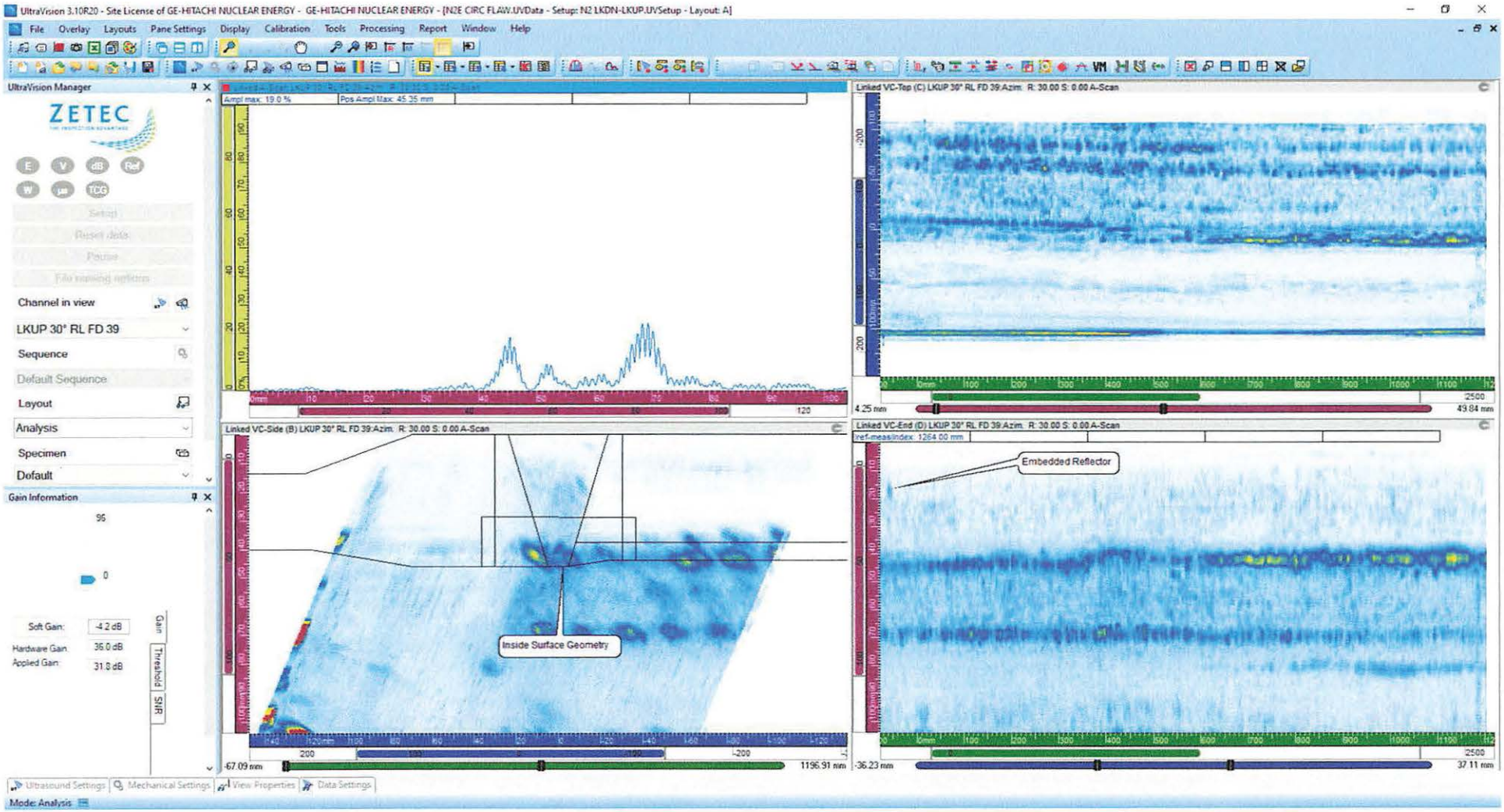

Embedded Reflector
Inside Surface Geometry

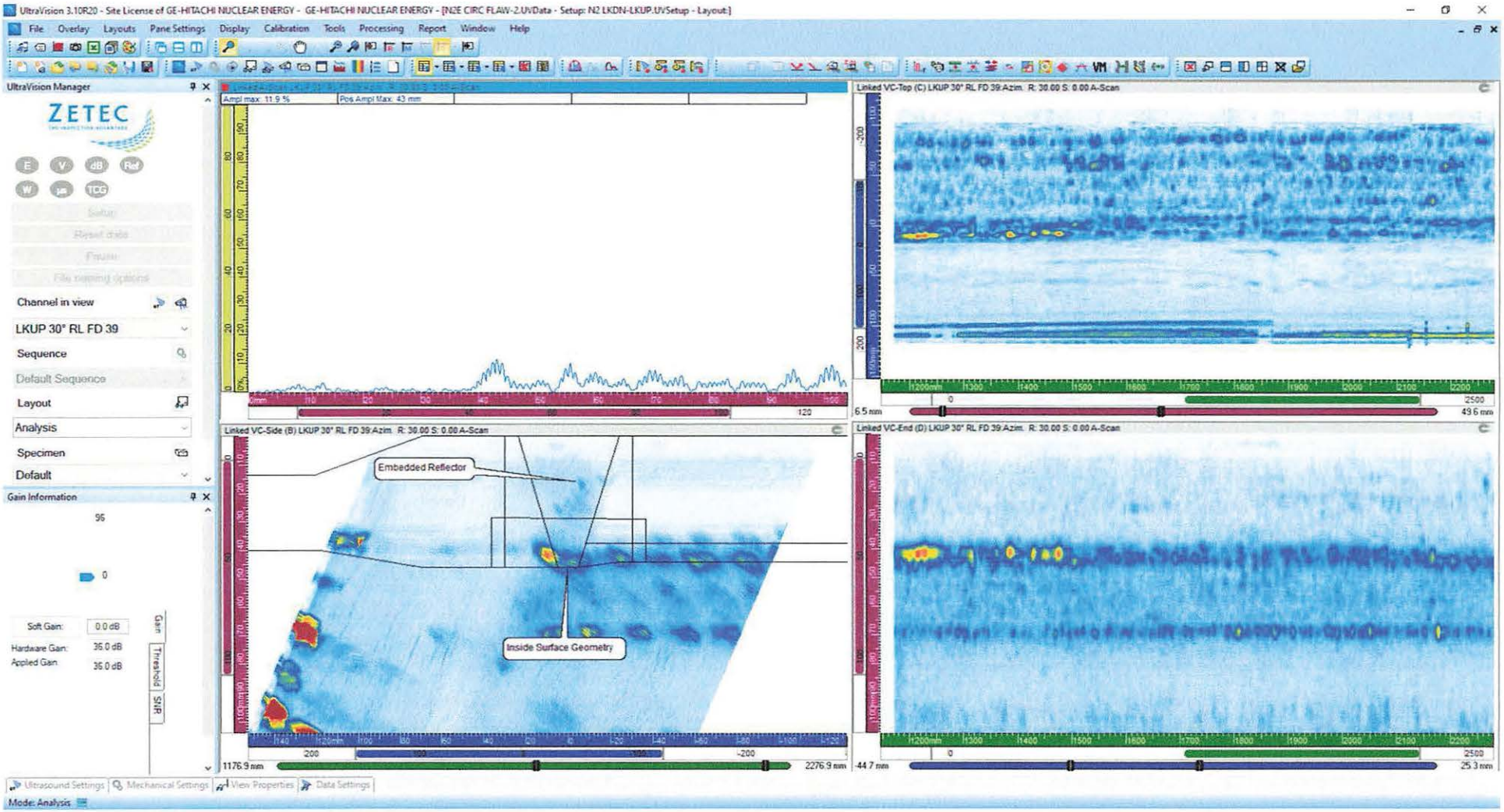

UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout: A]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKDN 60° RL FD 23
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: -1.5 dB
Hardware Gain: 36.0 dB
Applied Gain: 34.5 dB
Gain
Threshold
SNR
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis
Ampl max: 15.0 %
Pos Ampl Max: 48.23 mm
Linked VC-Top (C) LKDN 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Linked VC-Side (B) LKDN 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Linked VC-End (D) LKDN 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Repair Area

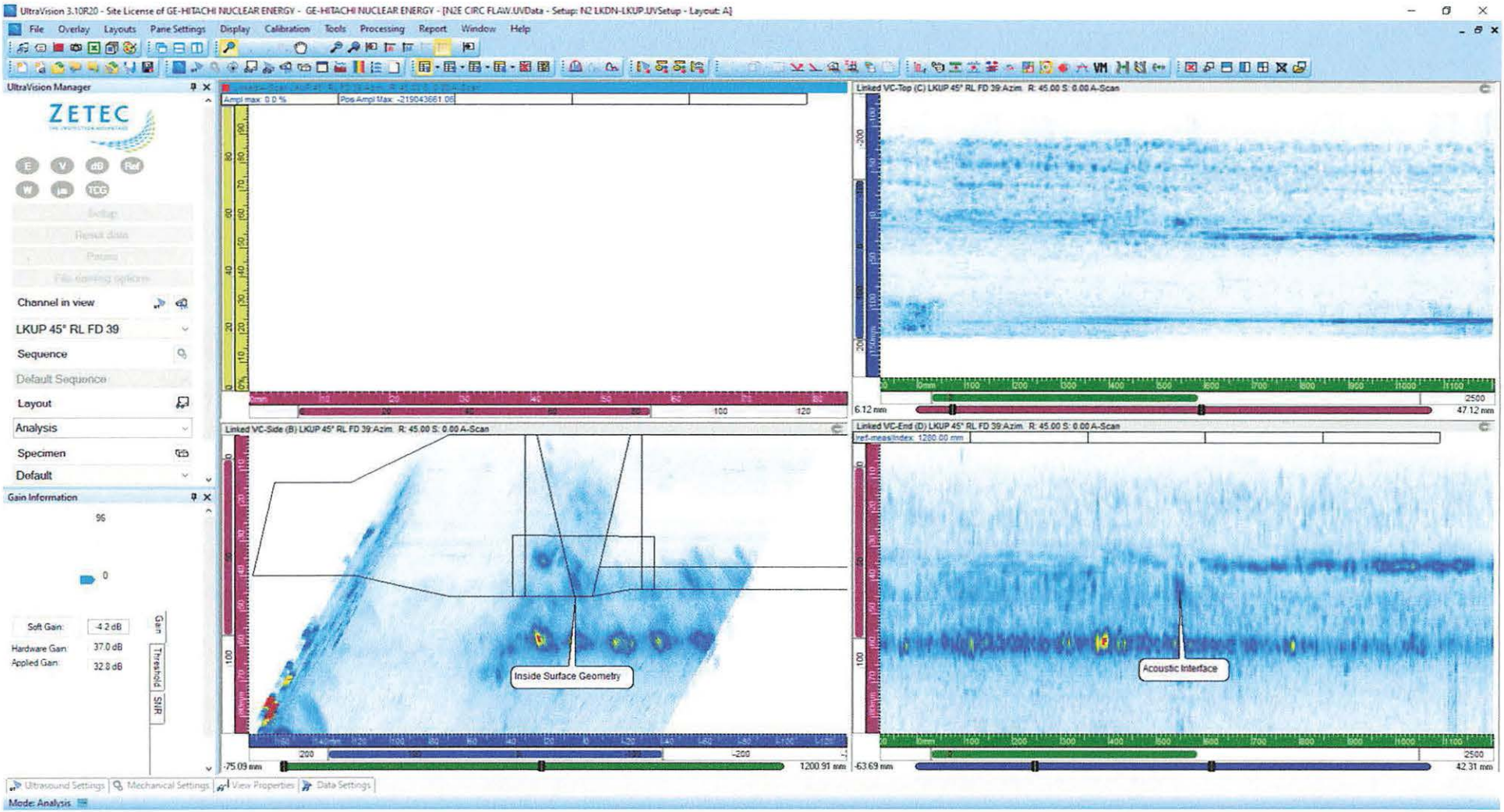

UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW-2.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout:]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKDN 60° RL FD 23
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: 0.0 dB
Hardware Gain: 36.0 dB
Applied Gain: 36.0 dB
Gain
Threshold
SNR
Ampl max: 5.0 %
Pos Ampl Max: 31 mm
Linked VC-Top (C) LKDN 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Linked VC-Side (B) LKDN 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Embedded Reflector
Linked VC-End (D) LKDN 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis

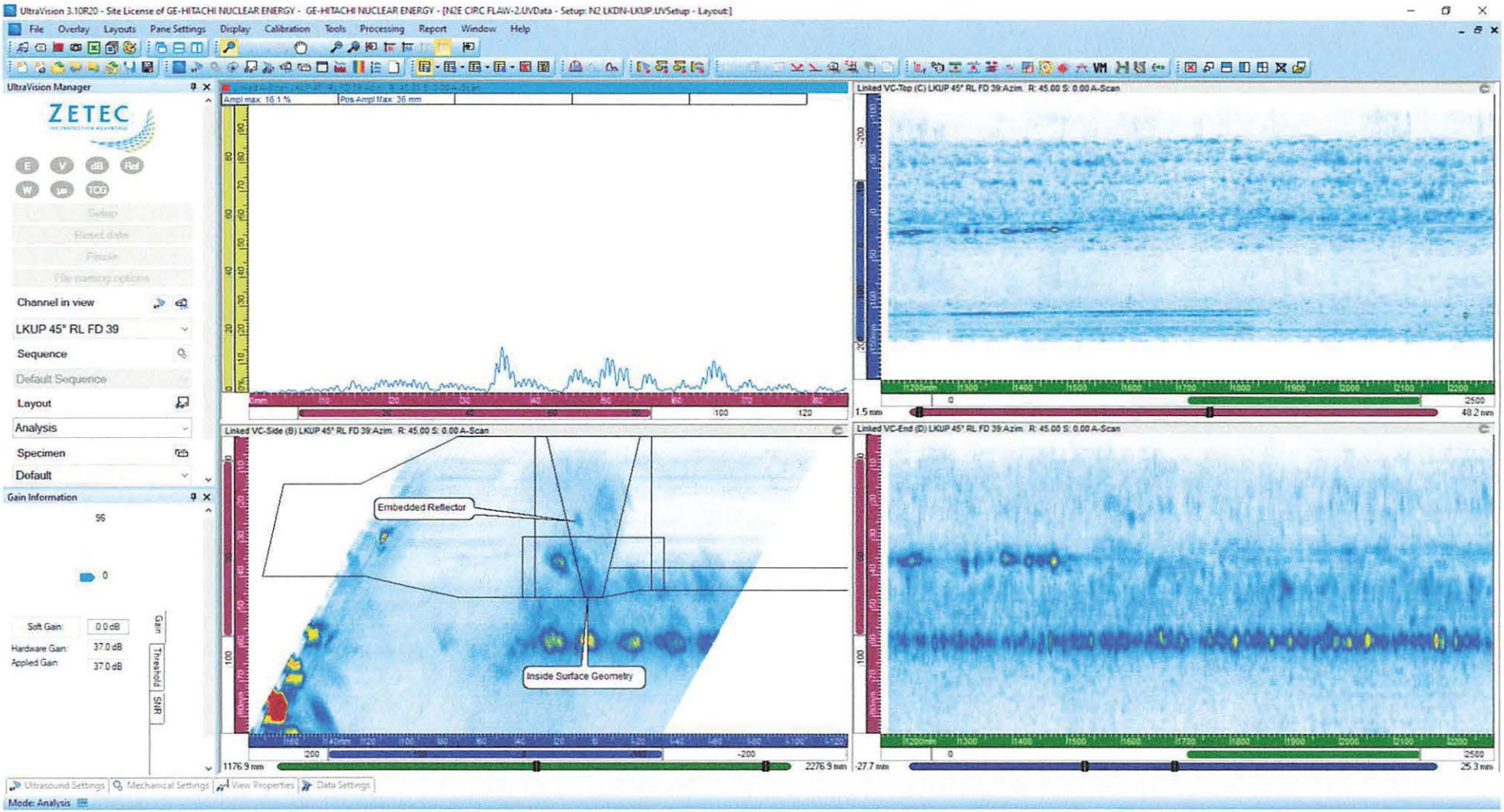

UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout: A]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKDN 45° SH FD 39
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: 4.2 dB
Hardware Gain: 33.0 dB
Applied Gain: 28.8 dB
Gain
Threshold
SNR
Ampl max: 21.9 %
Pos Ampl Max: 44.77 mm
Linked VC-Top (C) LKDN 45° SH FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Linked VC-Side (B) LKDN 45° SH FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Repair Area
Inside Surface / Beam Redirect
Linked VC-End (D) LKDN 45° SH FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis

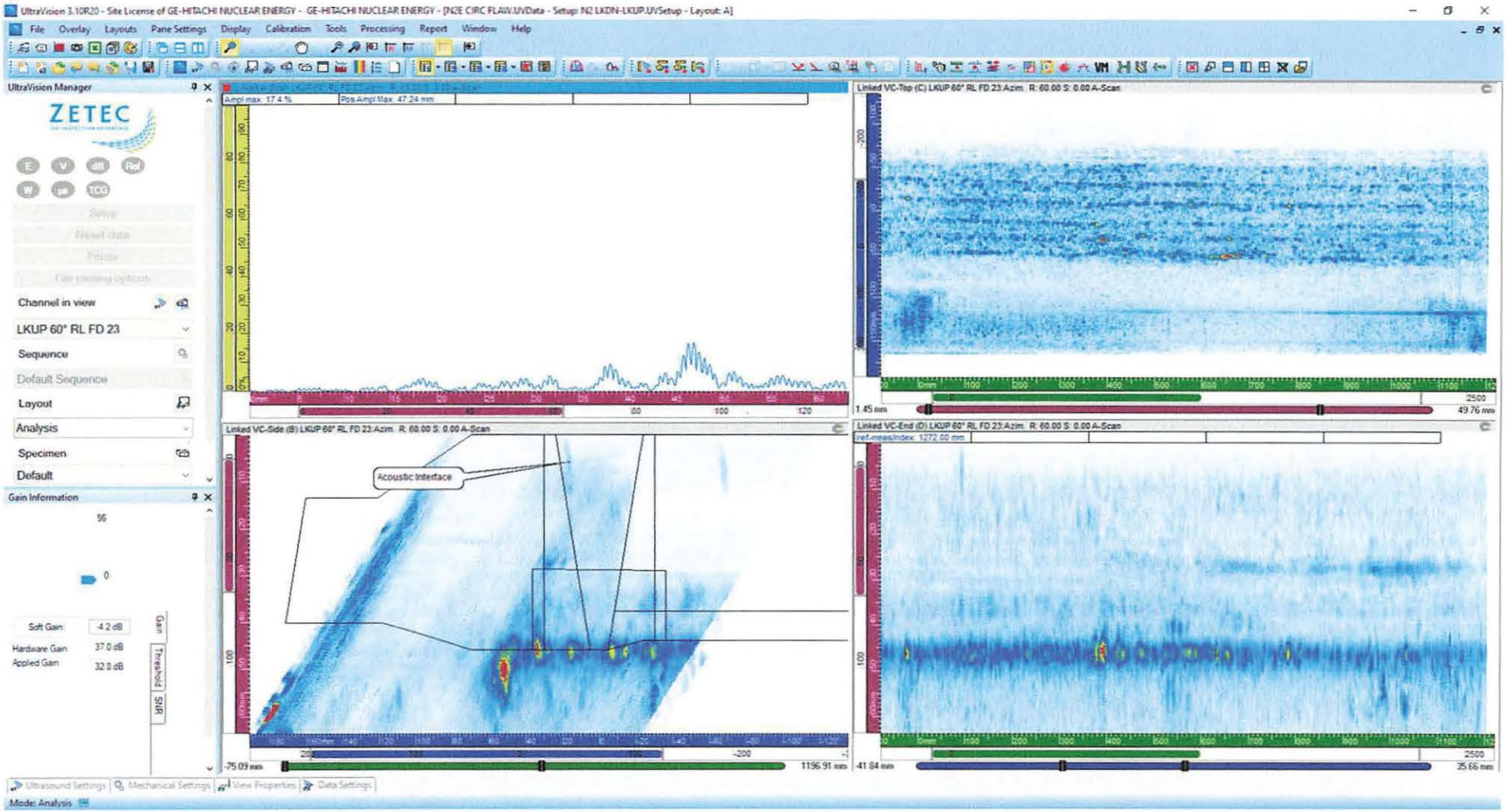

UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW-2.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout:]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKDN 45° SH FD 39
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: 0.0 dB
Hardware Gain: 33.0 dB
Applied Gain: 33.0 dB
Gain
Threshold
SNR
Ampl max: 15.6 %
Pos Ampl Max: 38 mm
Linked VC-Top (C) LKDN 45° SH FD 39:Azim R: 45.00 S: 0.00 A-Scan
Linked VC-Side (B) LKDN 45° SH FD 39:Azim R: 45.00 S: 0.00 A-Scan
Inside Surface / Beam Redirect
Linked VC-End (D) LKDN 45° SH FD 39:Azim R: 45.00 S: 0.00 A-Scan
Embedded Reflector
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis

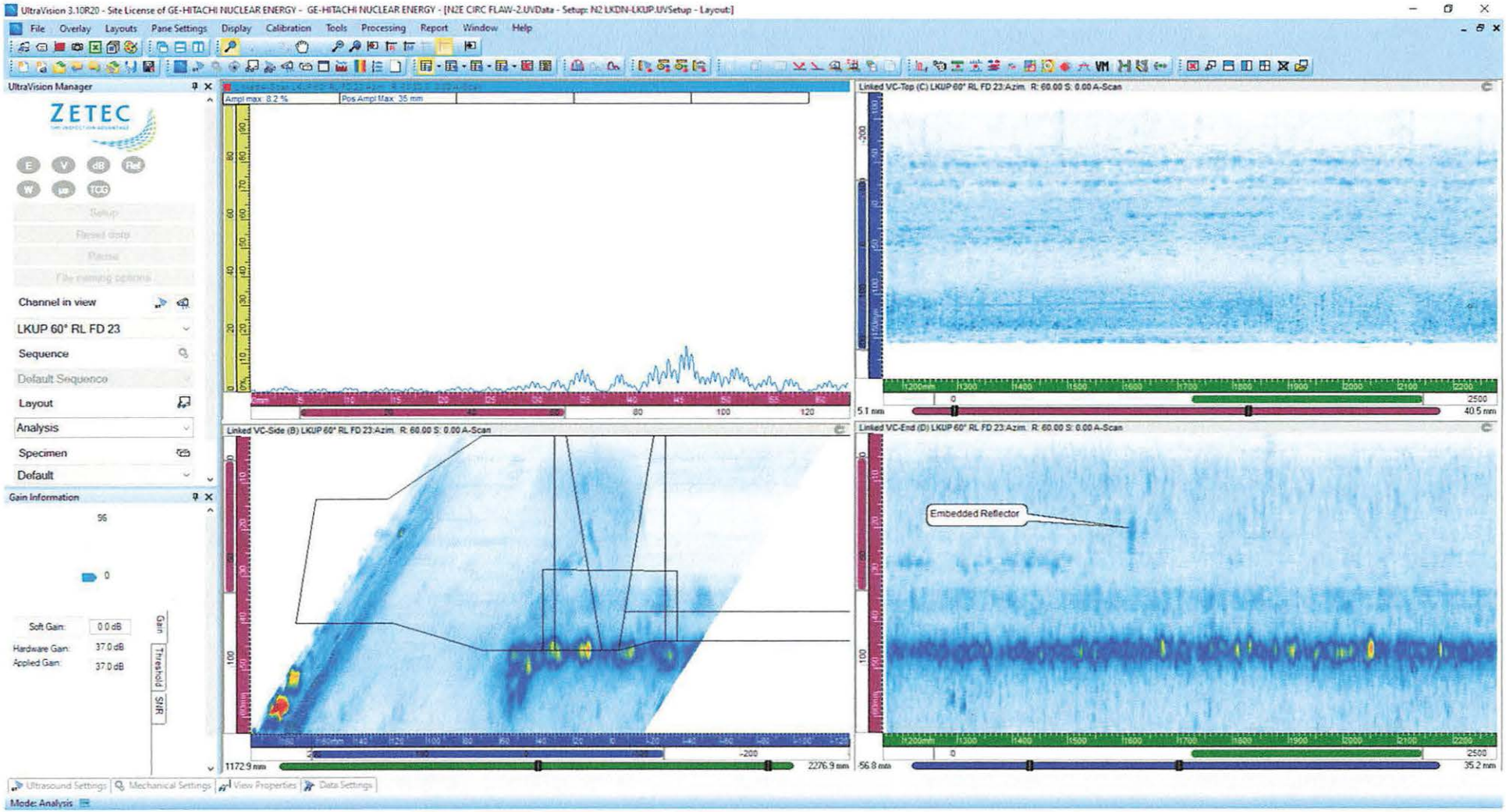

UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout: A]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKUP 30° RL FD 39
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: 4.2 dB
Hardware Gain: 36.0 dB
Applied Gain: 31.8 dB
Gain
Threshold
SNR
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis
Ampl max: 19.0 %
Pos Ampl Max: 45.35 mm
Linked VC-Top (C) LKUP 30° RL FD 39:Azim. R: 30.00 S: 0.00 A-Scan
Linked VC-Side (B) LKUP 30° RL FD 39:Azim. R: 30.00 S: 0.00 A-Scan
Inside Surface Geometry
Linked VC-End (D) LKUP 30° RL FD 39:Azim. R: 30.00 S: 0.00 A-Scan
Embedded Reflector

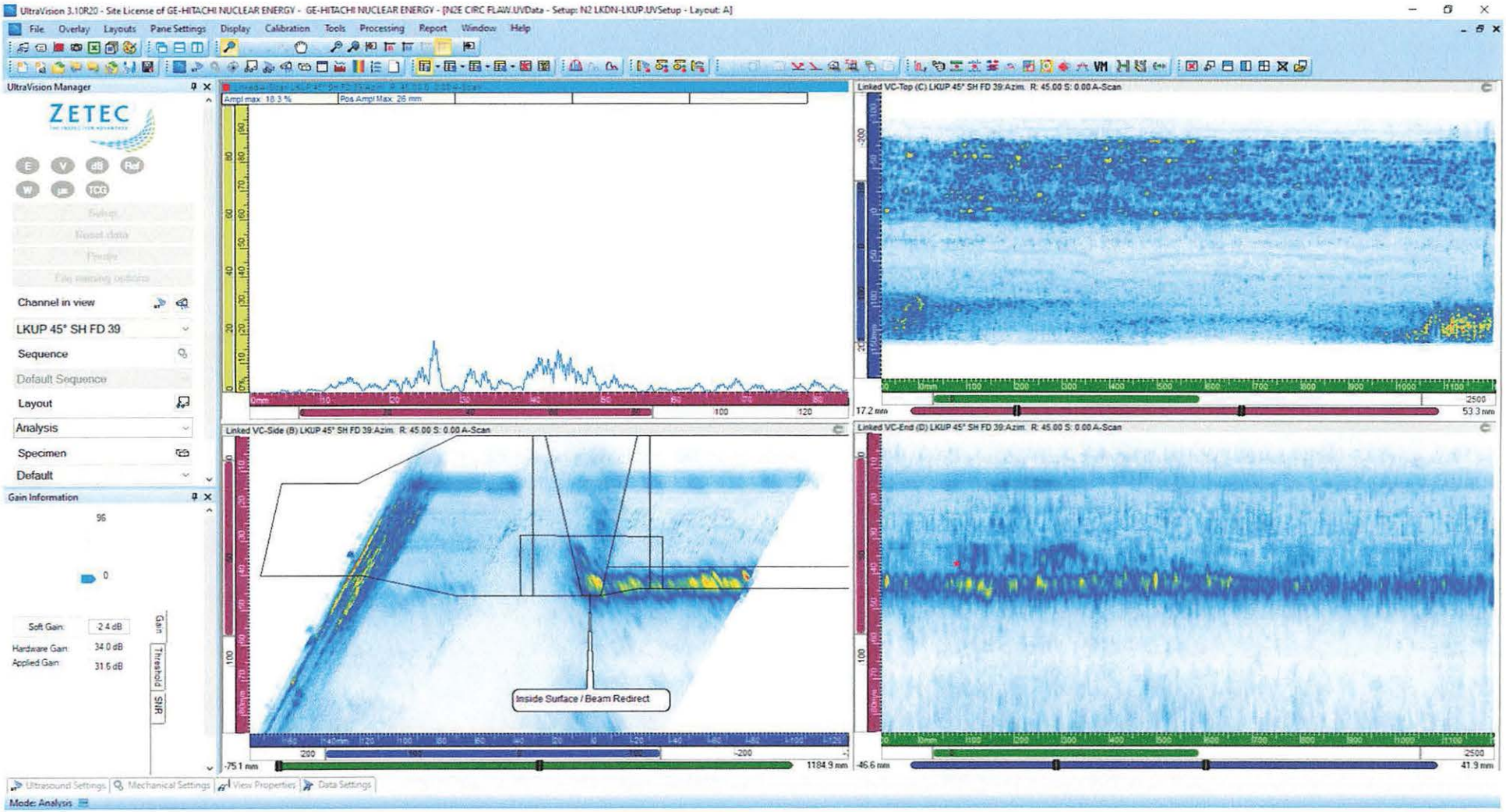

UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW-2.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout:]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKUP 30° RL FD 39
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: 0.0 dB
Hardware Gain: 36.0 dB
Applied Gain: 36.0 dB
Gain
Threshold
SNR
Ampl max: 11.9 %
Pos Ampl Max: 43 mm
Linked VC-Top (C) LKUP 30° RL FD 39:Azim. R: 30.00 S: 0.00 A-Scan
Linked VC-Side (B) LKUP 30° RL FD 39:Azim. R: 30.00 S: 0.00 A-Scan
Embedded Reflector
Inside Surface Geometry
Linked VC-End (D) LKUP 30° RL FD 39:Azim. R: 30.00 S: 0.00 A-Scan
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis

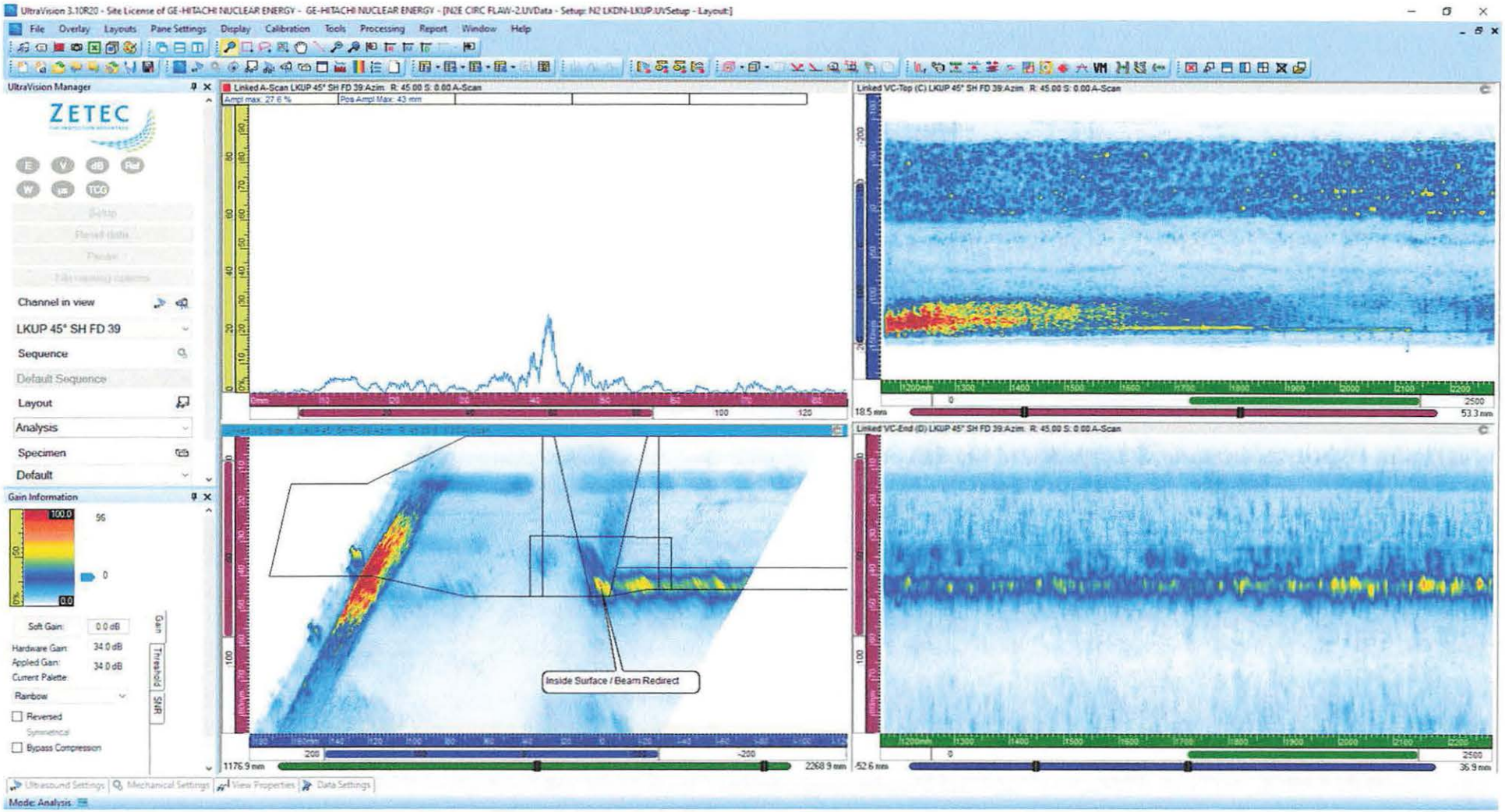

UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout: A]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKUP 45° RL FD 39
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: 4.2 dB
Hardware Gain: 37.0 dB
Applied Gain: 32.8 dB
Gain
Threshold
SNR
Linked VC-Top (C) LKUP 45° RL FD 39:Azim R: 45.00 S: 0.00 A-Scan
Linked VC-Side (B) LKUP 45° RL FD 39:Azim R: 45.00 S: 0.00 A-Scan
Inside Surface Geometry
Linked VC-End (D) LKUP 45° RL FD 39:Azim R: 45.00 S: 0.00 A-Scan
Acoustic Interface
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis

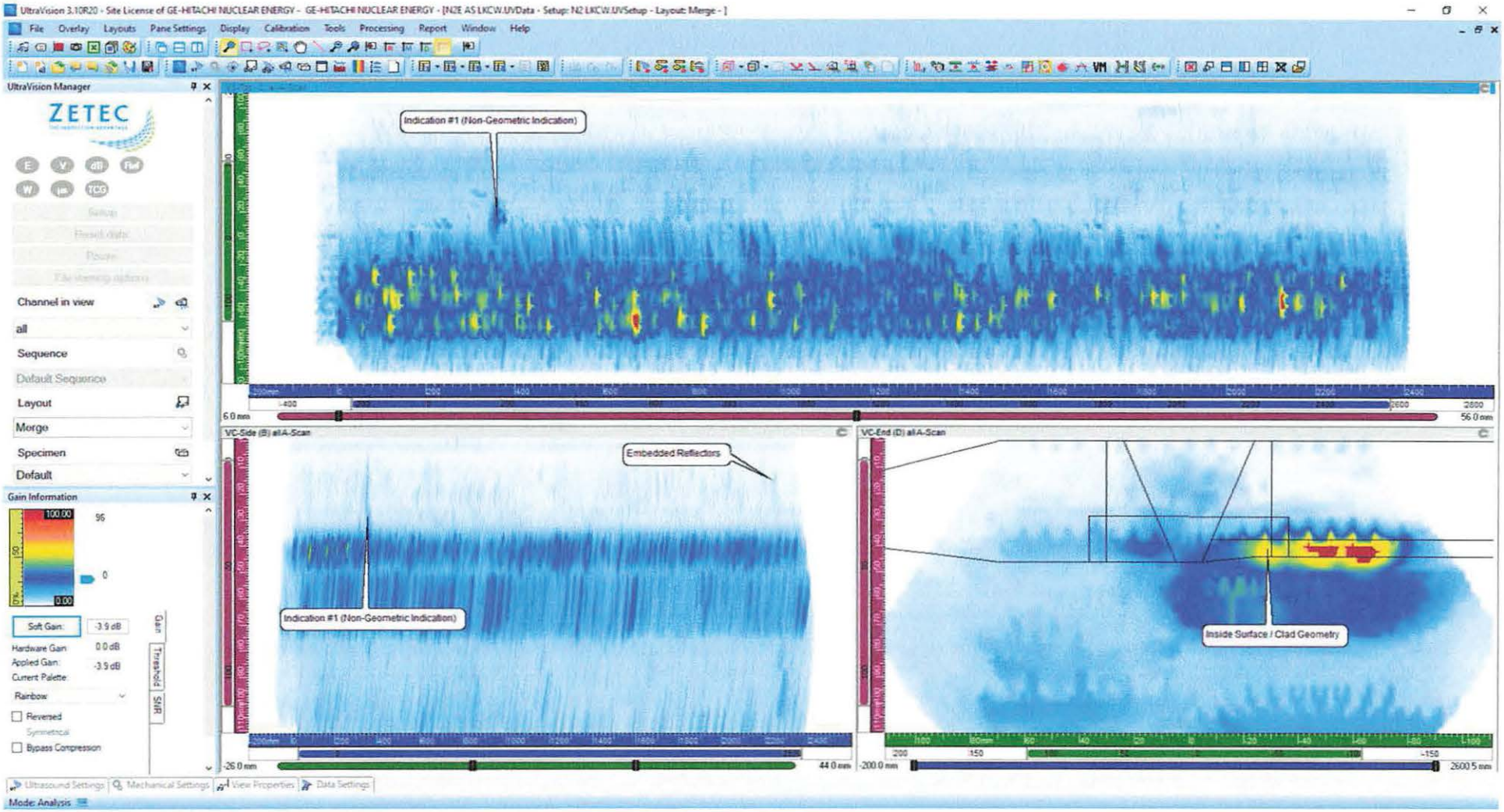

UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW-2.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout:]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKUP 45° RL FD 39
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: 0.0 dB
Hardware Gain: 37.0 dB
Applied Gain: 37.0 dB
Gain
Threshold
SNR
Ampl max: 16.1 %
Pos Ampl Max: 36 mm
Linked VC-Top (C) LKUP 45° RL FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Linked VC-Side (B) LKUP 45° RL FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Linked VC-End (D) LKUP 45° RL FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Embedded Reflector
Inside Surface Geometry
1176.9 mm
2276.9 mm
-27.7 mm
25.3 mm
1.5 mm
48.2 mm
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis

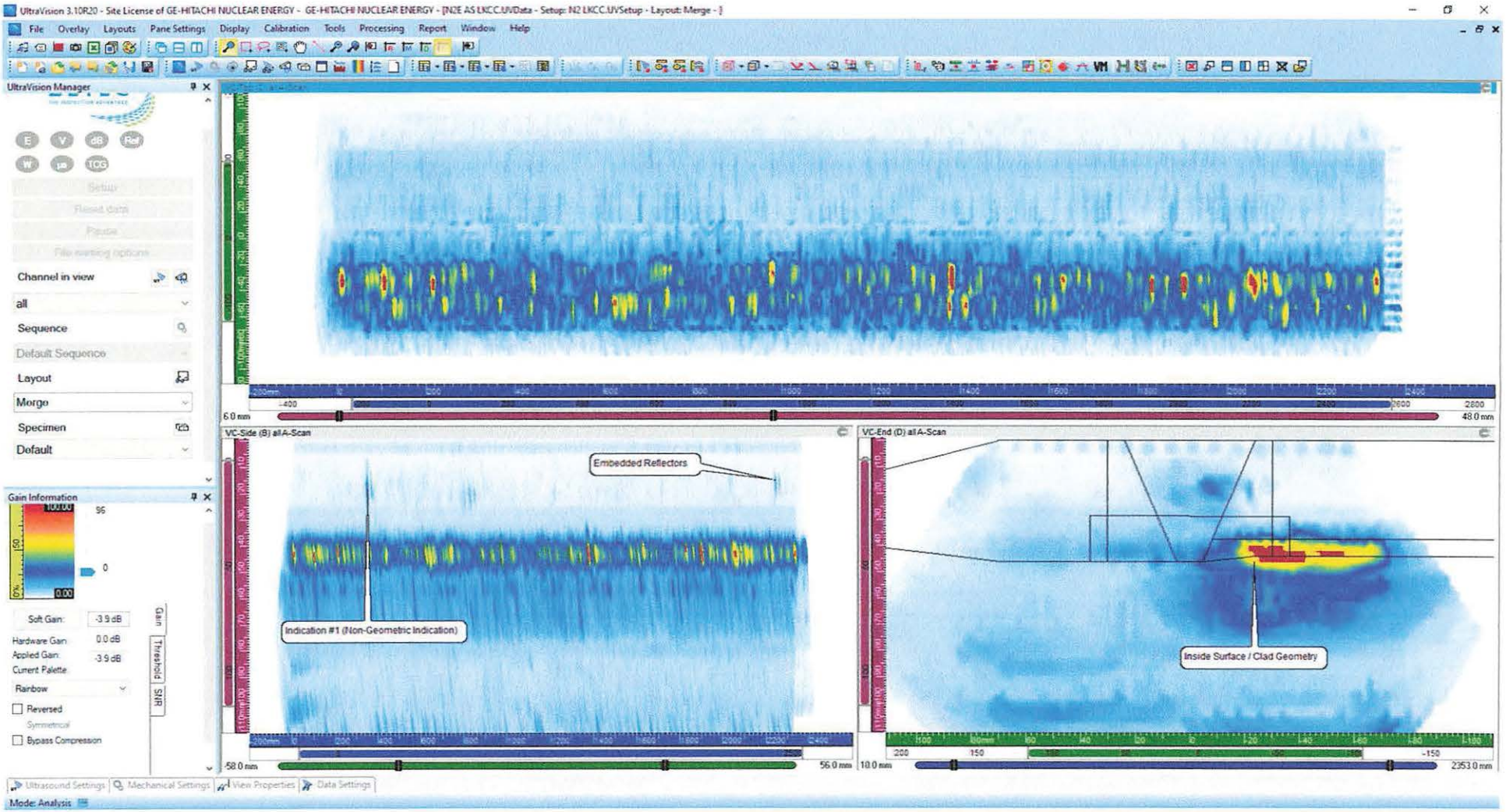

UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout: A]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKUP 60° RL FD 23
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain 4.2 dB
Hardware Gain 37.0 dB
Applied Gain 32.8 dB
Gain
Threshold
SNR
Ampl max: 17.4 %
Pos Ampl Max: 47.24 mm
Linked VC-Top (C) LKUP 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Linked VC-Side (B) LKUP 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Acoustic Interface
Linked VC-End (D) LKUP 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis


UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW-2.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout:]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKUP 60° RL FD 23
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: 0.0 dB
Hardware Gain: 37.0 dB
Applied Gain: 37.0 dB
Gain
Threshold
SNR
Ampl max: 8.2 %
Pos Ampl Max: 35 mm
Linked VC-Top (C) LKUP 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Linked VC-Side (B) LKUP 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Linked VC-End (D) LKUP 60° RL FD 23:Azim. R: 60.00 S: 0.00 A-Scan
Embedded Reflector
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis


UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout: A]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKUP 45° SH FD 39
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain 2.4 dB
Hardware Gain 34.0 dB
Applied Gain 31.6 dB
Gain
Threshold
SNR
Ampl max 18.3 %
Pos Ampl Max 26 mm
Linked VC-Top (C) LKUP 45° SH FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Linked VC-Side (B) LKUP 45° SH FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Linked VC-End (D) LKUP 45° SH FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Inside Surface / Beam Redirect
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis


UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E CIRC FLAW-2.UVData - Setup: N2 LKDN-LKUP.UVSetup - Layout:]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
ZETEC
Channel in view
LKUP 45° SH FD 39
Sequence
Default Sequence
Layout
Analysis
Specimen
Default
Gain Information
Soft Gain: 0.0 dB
Hardware Gain: 34.0 dB
Applied Gain: 34.0 dB
Current Palette:
Rainbow
Reversed
Bypass Compression
Linked A-Scan LKUP 45° SH FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Linked VC-Top (C) LKUP 45° SH FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Linked VC-End (D) LKUP 45° SH FD 39:Azim. R: 45.00 S: 0.00 A-Scan
Inside Surface / Beam Redirect
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis


Indication #1 (Non-Geometric Indication)
Embedded Reflectors
Indication #1 (Non-Geometric Indication)
Inside Surface / Clad Geometry
ZETEC
UltraVision Manager
Gain Information


UltraVision 3.10R20 - Site License of GE-HITACHI NUCLEAR ENERGY - GE-HITACHI NUCLEAR ENERGY - [N2E AS LKCC.UVData - Setup: N2 LKCC.UVSetup - Layout: Merge -]
File Overlay Layouts Pane Settings Display Calibration Tools Processing Report Window Help
UltraVision Manager
Channel in view
all
Sequence
Default Sequence
Layout
Morgo
Specimen
Default
Gain Information
Soft Gain: -3.9 dB
Hardware Gain: 0.0 dB
Applied Gain: -3.9 dB
Current Palette
Rainbow
Reversed
Symmetrical
Bypass Compression
Gain
Threshold
SNR
VC-Side (B) all A-Scan
Embedded Reflectors
Indication #1 (Non-Geometric Indication)
VC-End (D) all A-Scan
Inside Surface / Clad Geometry
Ultrasound Settings
Mechanical Settings
View Properties
Data Settings
Mode: Analysis

HITACHI

ULTRASONIC CALIBRATION DATA SHEET
(Automated with Phased Array)

SITE: Nine Mile Point UNIT: 1

OUTAGE.: N1R27

CALIBRATION SHEET NO.: APC-43

REPORT NO.: N1R27-APR-07

COMPONENT NO.: 32-WD-208 (N2E)

PROCEDURE NO.: GEH-UT-254 VERSION: 1 DRR: N/A

Instrument: Zetec / Topaz 32/128 (Manufacturer / Model) | 795170 (System Serial No.) | UltraVision 3.11R4 (Acquisition Software Version) | UltraVision 3.10R20 (Analysis Software Version)

Search Unit: Sensor Network / 00-011483 (AS) (Manufacturer / Model) | U11FG1 / U11FG2 (Serial No.) | 2x32(2.15mm x 2.4mm) (# Elements / Size) | 1.5 MHz (Freq.) MHz.

Wedge Contour: 30" (Diameter) | 22.3° (Incident Angle) | 7° (Roof Angle) | Rexolite (Material) | 2337m/s (Velocity)

Cable: 38 ga 50 Ohm Coax. (Type) | 11 m (Length) | 1 (No. of Intermediate Connectors) Couplant: Water (Type)

Calibration Standard: CAL-610-CIRC-1 (Serial No.) | SS (Material) | N/A °F (Temp.) Thermometer: N/A (Serial No.)

CALIBRATION BLOCK REFLECTOR

Orientation:	CIRC	CIRC	CIRC	CIRC
Type:	SDH	SDH	SDH	SDH
Depth: mm	41	41	20	10
Amplitude: %	82	81	80	82
Sweep: mm	41	41	21	10
Skew: °	180	180	180	180
Gain: dB	32	34	34	34
Angle Used: °	30	45	58	68

☒ Depth ☐ Metal Path

CALIBRATION VERIFICATION

	Initial Calibration	Initial Calibration Check	Verified	Verified	Verified	Verified	Final
Time	1800	1802	0300	N/A	N/A	N/A	1512
Date	3-16-23	3-16-23	3-17-23	N/A	N/A	N/A	3-17-23
Block	CAL-610-CIRC-1	CIRC/AX-24-01	CIRC/AX-24-01	N/A	N/A	N/A	CIRC/AX-24-01
Sweep (mm)	See Above	27	27	N/A	N/A	N/A	27
Amplitude % dB	See Above	50% @ 10dB	50% @ 10dB	N/A	N/A	N/A	48% @ 10dB
Operator	JK/MG	JK/MG	MG	N/A	N/A	N/A	JK

Notes

RL LKDN AS

45°RL on 1" Radius used for calibration verification and final calibration.

GENERAL

Timebase: mm Start: 0 Range: 120

Mode: ☒ Half Path

DIGITIZER

Digitizing Freq.: 100 (MHz)

Acquisition Rate: Max (Hz)

Averaging Type: None

Data Sample Size: ☐ 8 Bit ☒ 16 Bit

Synchro: Pulse

Compression: 5

PULSER/RECEIVER CONFIGURATION

Phased-array Pitch/Catch

PULSER

Pulser Element #: 1 Pulse Width: 330 (ns)

Voltage: 75 (V) Pulse Shape: N/A

RECEIVER

Receiver Element #: 33

Scale Type: Linear

Rectification: Bipolar

FILTERS

Input Filter: Band Pass 1MHz-5MHz

Smoothing: 2.0 MHz

PROBE

Velocity: m/sec 5770 Wedge Delay: µsec 2.00

Wave Type: ☒ Longitudinal ☐ Shear

Cable Element Check Sat: ☒ All Laws: Checked: ☒ Unchecked: ☐

Jesse Keck	II	3/17/2023	Andre' Rachal	III	3/26/2023	PAGE: 30 OF 36
OPERATOR	LEVEL	DATE	DATA ANALYST	LEVEL	DATE	

HITACHI

ULTRASONIC CALIBRATION DATA SHEET
(Automated with Phased Array)

SITE: Nine Mile Point UNIT: 1

OUTAGE.: N1R27

CALIBRATION SHEET NO.: APC-44

REPORT NO.: N1R27-APR-07

COMPONENT NO.: 32-WD-208 (N2E)

PROCEDURE NO.: GEH-UT-254 VERSION: 1 DRR: N/A

Instrument: Zetec / Topaz 32/128 (Manufacturer / Model) | 795170 (System Serial No.) | UltraVision 3.11R4 (Acquisition Software Version) | UltraVision 3.10R20 (Analysis Software Version)

Search Unit: Sensor Network / 00-011483 (AS) (Manufacturer / Model) | U11FG1 / U11FG2 (Serial No.) | 2x32(2.15mm x 2.4mm) (# Elements / Size) | 1.5 MHz (Freq.) MHz.

Wedge Contour: 30" (Diameter) | 22.3° (Incident Angle) | 7° (Roof Angle) | Rexolite (Material) | 2337m/s (Velocity)

Cable: 38 ga 50 Ohm Coax. (Type) | 11 m (Length) | 1 (No. of Intermediate Connectors) Couplant: Water (Type)

Calibration Standard: CAL-610-CIRC-1 (Serial No.) | SS (Material) | N/A °F (Temp.) Thermometer: N/A (Serial No.)

CALIBRATION BLOCK REFLECTOR

Orientation:	CIRC			
Type:	SDH			
Depth: mm	41			
Amplitude: %	81			
Sweep: mm	41			
Skew: °	180			
Gain: dB	30			
Angle Used: °	45			

☒ Depth ☐ Metal Path

GENERAL

Timebase: mm Start: 0 Range: 120

Mode: ☒ Half Path

DIGITIZER

Digitizing Freq.: 100 (MHz)

Acquisition Rate: Max (Hz)

Averaging Type: None

Data Sample Size: ☐ 8 Bit ☒ 16 Bit

Synchro: Pulse

Compression: 10

PULSER/RECEIVER CONFIGURATION

Phased-array Pitch/Catch

PULSER

Pulser Element #: 1 Pulse Width: 330 (ns)

Voltage: 75 (V) Pulse Shape: N/A

RECEIVER

Receiver Element #: 33

Scale Type: Linear

Rectification: Bipolar

FILTERS

Input Filter: Band Pass 1MHz-5MHz

Smoothing: 2.0 MHz

CALIBRATION VERIFICATION

	Initial Calibration	Initial Calibration Check	Verified	Verified	Verified	Verified	Final
Time	1803	1804	0300	N/A	N/A	N/A	1612
Date	3-16-23	3-16-23	3-17-23	N/A	N/A	N/A	3-17-23
Block	CAL-610-CIRC-1	CIRC/AX-24-01	CIRC/AX-24-01	N/A	N/A	N/A	CIRC/AX-24-01
Sweep (mm)	41	24	24	N/A	N/A	N/A	24
Amplitude % dB	81% @ 30dB	27% @ 10dB	30% @ 10dB	N/A	N/A	N/A	28% @ 10dB
Operator	JK/CB	JK/CB	MG	N/A	N/A	N/A	JK

Notes

SH LKDN AS

1" Radius used for calibration verification and final calibration.

PROBE

Velocity: m/sec 3150 Wedge Delay: µsec 2.00

Wave Type: ☐ Longitudinal ☒ Shear

Cable Element Check Sat: ☒ All Laws: Checked: ☒ Unchecked: ☐

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HITACHI

ULTRASONIC CALIBRATION DATA SHEET
(Automated with Phased Array)

SITE: Nine Mile Point UNIT: 1

OUTAGE.: N1R27

CALIBRATION SHEET NO.: APC-45

REPORT NO.: N1R27-APR-07

COMPONENT NO.: 32-WD-208 (N2E)

PROCEDURE NO.: GEH-UT-254 VERSION: 1 DRR: N/A

Instrument: Zetec / Topaz 32/128 (Manufacturer / Model) | 795170 (System Serial No.) | UltraVision 3.11R4 (Acquisition Software Version) | UltraVision 3.10R20 (Analysis Software Version)

Search Unit: Sensor Network / 00-011483 (AS) (Manufacturer / Model) | U11JL1 / U11JL3 (Serial No.) | 2x32(2.15mm x 2.4mm) (# Elements / Size) | 1.5 MHz (Freq.) MHz.

Wedge Contour: 30" (Diameter) | 22.3° (Incident Angle) | 7° (Roof Angle) | Rexolite (Material) | 2337m/s (Velocity)

Cable: 38 ga 50 Ohm Coax. (Type) | 11 m (Length) | 1 (No. of Intermediate Connectors) | Couplant: Water (Type)

Calibration Standard: CAL-610-CIRC-1 (Serial No.) | SS (Material) | N/A °F (Temp.) | Thermometer: N/A (Serial No.)

CALIBRATION BLOCK REFLECTOR

Orientation:	CIRC	CIRC	CIRC	CIRC
Type:	SDH	SDH	SDH	SDH
Depth: mm	41	41	20	10
Amplitude: %	82	83	80	80
Sweep: mm	41	41	20	10
Skew: °	0	0	0	0
Gain: dB	31	34	33	34
Angle Used: °	30	45	58	68

☒ Depth ☐ Metal Path

CALIBRATION VERIFICATION

	Initial Calibration	Initial Calibration Check	Verified	Verified	Verified	Verified	Final
Time	1753	1757	0305	N/A	N/A	N/A	1614
Date	3-16-23	3-16-23	3-17-23	N/A	N/A	N/A	3-17-23
Block	CAL-610-CIRC-1	CIRC/AX-24-01	CIRC/AX-24-01	N/A	N/A	N/A	CIRC/AX-24-01
Sweep (mm)	See Above	26	26	N/A	N/A	N/A	26
Amplitude % dB	See Above	50% @ 10dB	50% @ 10dB	N/A	N/A	N/A	49% @ 10dB
Operator	JK/CB	JK/CB	MG	N/A	N/A	N/A	JK

Notes

RL LKUP AS

45°RL on 1" Radius used for calibration verification and final calibration.

GENERAL

Timebase: mm Start: 0 Range: 120

Mode: ☒ Half Path

DIGITIZER

Digitizing Freq.: 100 (MHz)

Acquisition Rate: Max (Hz)

Averaging Type: None

Data Sample Size: ☐ 8 Bit ☒ 16 Bit

Synchro: Pulse

Compression: 5

PULSER/RECEIVER CONFIGURATION

Phased-array Pitch/Catch

PULSER

Pulser Element #: 65 Pulse Width: 330 (ns)

Voltage: 75 (V) Pulse Shape: N/A

RECEIVER

Receiver Element #: 97

Scale Type: Linear

Rectification: Bipolar

FILTERS

Input Filter: Band Pass 1MHz-5MHz

Smoothing: 2.0 MHz

PROBE

Velocity: m/sec 5770 Wedge Delay: µsec 2.00

Wave Type: ☒ Longitudinal ☐ Shear

Cable Element Check Sat: ☒ All Laws: Checked: ☒ Unchecked: ☐

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HITACHI

ULTRASONIC CALIBRATION DATA SHEET
(Automated with Phased Array)

SITE: Nine Mile Point UNIT: 1

OUTAGE.: N1R27

CALIBRATION SHEET NO.: APC-46

REPORT NO.: N1R27-APR-07

COMPONENT NO.: 32-WD-208 (N2E)

PROCEDURE NO.: GEH-UT-254 VERSION: 1 DRR: N/A

Instrument: Zetec / Topaz 32/128 (Manufacturer / Model) | 795170 (System Serial No.) | UltraVision 3.11R4 (Acquisition Software Version) | UltraVision 3.10R20 (Analysis Software Version)

Search Unit: Sensor Network / 00-011483 (AS) (Manufacturer / Model) | U11JL1 / U11JL3 (Serial No.) | 2x32(2.15mm x 2.4mm) (# Elements / Size) | 1.5 MHz (Freq.) MHz.

Wedge Contour: 30" (Diameter) | 22.3° (Incident Angle) | 7° (Roof Angle) | Rexolite (Material) | 2337m/s (Velocity)

Cable: 38 ga 50 Ohm Coax. (Type) | 11 m (Length) | 1 (No. of Intermediate Connectors) Couplant: Water (Type)

Calibration Standard: CAL-610-CIRC-1 (Serial No.) | SS (Material) | N/A °F (Temp.) Thermometer: N/A (Serial No.)

CALIBRATION BLOCK REFLECTOR

Orientation:	CIRC			
Type:	SDH			
Depth: mm	41			
Amplitude: %	83			
Sweep: mm	41			
Skew: °	0			
Gain: dB	29			
Angle Used: °	45			

☒ Depth ☐ Metal Path

GENERAL

Timebase: mm Start: 0 Range: 120

Mode: ☒ Half Path

DIGITIZER

Digitizing Freq.: 100 (MHz)

Acquisition Rate: Max (Hz)

Averaging Type: None

Data Sample Size: ☐ 8 Bit ☒ 16 Bit

Synchro: Pulse

Compression: 10

PULSER/RECEIVER CONFIGURATION

Phased-array Pitch/Catch

PULSER

Pulser Element #: 65 Pulse Width: 330 (ns)

Voltage: 75 (V) Pulse Shape: N/A

RECEIVER

Receiver Element #: 97

Scale Type: Linear

Rectification: Bipolar

FILTERS

Input Filter: Band Pass 1MHz-5MHz

Smoothing: 2.0 MHz

CALIBRATION VERIFICATION

	Initial Calibration	Initial Calibration Check	Verified	Verified	Verified	Verified	Final
Time	1754	1756	0305	N/A	N/A	N/A	1614
Date	3-16-23	3-16-23	3-17-23	N/A	N/A	N/A	3-17-23
Block	CAL-610-CIRC-1	CIRC/AX-24-01	CIRC/AX-24-01	N/A	N/A	N/A	CIRC/AX-24-01
Sweep (mm)	41	23	23	N/A	N/A	N/A	23
Amplitude % dB	83% @ 29dB	32% @ 10dB	33% @ 10dB	N/A	N/A	N/A	32% @ 10dB
Operator	JK/CB	JK/CB	MG	N/A	N/A	N/A	JK

Notes

SH LKUP AS

1" Radius used for calibration verification and final calibration.

PROBE

Velocity: m/sec 3150 Wedge Delay: µsec 2.00

Wave Type: ☐ Longitudinal ☒ Shear

Cable Element Check Sat: ☒ All Laws: Checked: ☒ Unchecked: ☐

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HITACHI

ULTRASONIC CALIBRATION DATA SHEET
(Automated with Phased Array)

SITE: Nine Mile Point UNIT: 1

OUTAGE.: N1R27

CALIBRATION SHEET NO.: APC-47

REPORT NO.: N1R27-APR-07

COMPONENT NO.: 32-WD-208 (N2E)

PROCEDURE NO.: GEH-UT-254 VERSION: 1 DRR: N/A

Instrument: Zetec / Topaz 32/128 (Manufacturer / Model) | 795170 (System Serial No.) | UltraVision 3.11R4 (Acquisition Software Version) | UltraVision 3.10R20 (Analysis Software Version)

Search Unit: Sensor Network / 00-011483 (AS) (Manufacturer / Model) | U11JL6 / U11JL7 (Serial No.) | 2x32(2.15mm x 2.4mm) (# Elements / Size) | 1.5 MHz (Freq.) MHz.

Wedge Contour: 30" (Diameter) | 15° (Incident Angle) | 0° (Roof Angle) | Rexolite (Material) | 2337m/s (Velocity)

Cable: 38 ga 50 Ohm Coax. (Type) | 11 m (Length) | 1 (No. of Intermediate Connectors) Couplant: Water (Type)

Calibration Standard: CAL-610-AX-1 (Serial No.) | SS (Material) | N/A °F (Temp.) Thermometer: N/A (Serial No.)

CALIBRATION BLOCK REFLECTOR

Orientation:	Ax			
Type:	SDH			
Depth: mm	41			
Amplitude: %	81			
Sweep: mm	41			
Skew: °	0			
Gain: dB	31			
Angle Used: °	37.5			

☒ Depth ☐ Metal Path

CALIBRATION VERIFICATION

	Initial Calibration	Initial Calibration Check	Verified	Verified	Verified	Verified	Final
Time	1732	1733	1629	N/A	N/A	N/A	0550
Date	3-16-23	3-16-23	3-17-23	N/A	N/A	N/A	3-18-23
Block	CAL-610-AX-1	CIRC/AX-24-01	CIRC/AX-24-01	N/A	N/A	N/A	CIRC/AX-24-01
Sweep (mm)	41	26	26	N/A	N/A	N/A	26
Amplitude % dB	81% @ 31dB	42% @ 10dB	42% @ 10dB	N/A	N/A	N/A	40% @ 10dB
Operator	JK/CB	JK/CB	JK	N/A	N/A	N/A	CP

Notes

RL LKCW AS

37.5° on 1" Radius used for calibration verification and final calibration.

GENERAL

Timebase: mm Start: 0 Range: 120

Mode: ☒ Half Path

DIGITIZER

Digitizing Freq.: 100 (MHz)

Acquisition Rate: Max (Hz)

Averaging Type: None

Data Sample Size: ☒ 8 Bit ☐ 16 Bit

Synchro: Pulse

Compression: 5

PULSER/RECEIVER CONFIGURATION

Phased-array Pitch/Catch

PULSER

Pulser Element #: 1 Pulse Width: 330 (ns)

Voltage: 75 (V) Pulse Shape: N/A

RECEIVER

Receiver Element #: 33

Scale Type: Linear

Rectification: Bipolar

FILTERS

Input Filter: Band Pass 1MHz-5MHz

Smoothing: 2.0 MHz

PROBE

Velocity: m/sec 5770 Wedge Delay: µsec 1.80

Wave Type: ☒ Longitudinal ☐ Shear

Cable Element Check Sat: ☒ All Laws: Checked: ☒ Unchecked: ☐

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HITACHI

ULTRASONIC CALIBRATION DATA SHEET
(Automated with Phased Array)

SITE: Nine Mile Point UNIT: 1

OUTAGE.: N1R27

CALIBRATION SHEET NO.: APC-48

REPORT NO.: N1R27-APR-07

COMPONENT NO.: 32-WD-208 (N2E)

PROCEDURE NO.: GEH-UT-254 VERSION: 1 DRR: N/A

Instrument: Zetec / Topaz 32/128 (Manufacturer / Model) | 795170 (System Serial No.) | UltraVision 3.11R4 (Acquisition Software Version) | UltraVision 3.10R20 (Analysis Software Version)

Search Unit: Sensor Network / 00-011483 (AS) (Manufacturer / Model) | U11CFD / U11CFE (Serial No.) | 2x32(2.15mm x 2.4mm) (# Elements / Size) | 1.5 MHz (Freq.) MHz.

Wedge Contour: 30" (Diameter) | 15° (Incident Angle) | 0° (Roof Angle) | Rexolite (Material) | 2337m/s (Velocity)

Cable: 38 ga 50 Ohm Coax. (Type) | 11 m (Length) | 1 (No. of Intermediate Connectors) | Couplant: Water (Type)

Calibration Standard: CAL-610-AX-1 (Serial No.) | SS (Material) | N/A °F (Temp.) | Thermometer: N/A (Serial No.)

CALIBRATION BLOCK REFLECTOR

Orientation:	Ax			
Type:	SDH			
Depth: mm	41			
Amplitude: %	80			
Sweep: mm	41			
Skew: °	180			
Gain: dB	32			
Angle Used: °	37.5			

☒ Depth ☐ Metal Path

GENERAL

Timebase: mm Start: 0 Range: 120

Mode: ☒ Half Path

DIGITIZER

Digitizing Freq.: 100 (MHz)

Acquisition Rate: Max (Hz)

Averaging Type: None

Data Sample Size: ☒ 8 Bit ☐ 16 Bit

Synchro: Pulse

Compression: 5

PULSER/RECEIVER CONFIGURATION

Phased-array Pitch/Catch

PULSER

Pulser Element #: 65 Pulse Width: 330 (ns)

Voltage: 75 (V) Pulse Shape: N/A

RECEIVER

Receiver Element #: 97

Scale Type: Linear

Rectification: Bipolar

FILTERS

Input Filter: Band Pass 1MHz-5MHz

Smoothing: 2.0 MHz

CALIBRATION VERIFICATION

	Initial Calibration	Initial Calibration Check	Verified	Verified	Verified	Verified	Final
Time	1735	1736	1630	N/A	N/A	N/A	0550
Date	3-16-23	3-16-23	3-17-23	N/A	N/A	N/A	3-18-23
Block	CAL-610-AX-1	CIRC/AX-24-01	CIRC/AX-24-01	N/A	N/A	N/A	CIRC/AX-24-01
Sweep (mm)	41	25	25	N/A	N/A	N/A	25
Amplitude % dB	80% @ 32dB	42% @ 10dB	42% @ 10dB	N/A	N/A	N/A	35% @ 10dB
Operator	JK/CB	JK/CB	JK	N/A	N/A	N/A	CP

Notes

RL LKCC AS

37.5° on 1" Radius used for calibration verification and final calibration.

PROBE

Velocity: m/sec 5770 Wedge Delay: µsec 1.80

Wave Type: ☒ Longitudinal ☐ Shear

Cable Element Check Sat: ☒ All Laws: Checked: ☒ Unchecked: ☐

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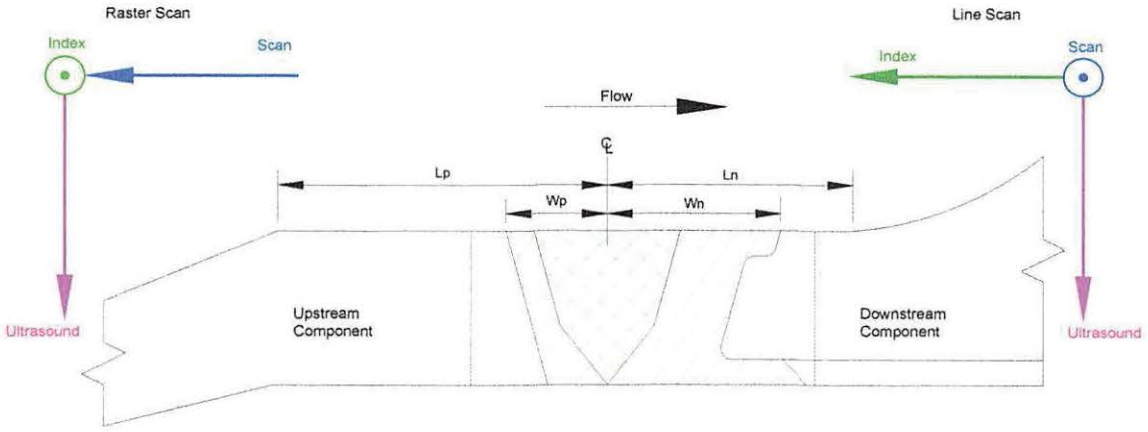
HITACHI

SCAN PLAN

32-WD-208 (N2E)



Procedure :	*GEH-UT-254 V1*	***Component Thickness t :***	*45.0* mm
Site / Unit :	*Nine Mile Unit 1*	***Component Nominal OD :***	*738.0* mm
Weld ID. :	*32-WD-208 (N2E)*	***CL to Weld Toe Upstream Side (Wp) :***	*24.0* mm
Dual Side Access :	*Yes*	***CL to Weld Toe Downstream Side (Wn) :***	*24.0* mm
Complete Pipe:	*Yes*	***Access Limitation Upstream Side (Lp) :***	*70.0* mm
		Access Limitation Downstream Side (Ln) :	*175.0* mm
		Weld Length:	*2319.0* mm

SCANNING SEQUENCES CIRCUMFERENTIAL FLAWS

Scan / Probe Skew	*Probe Type*	*MinTB* (mm)	*MaxTB* (mm)	*Scan*			*Index*			*Number of Scan Lines*	*Done ?* (OK / N/A)
				Start (mm)	*Range* (mm)	*Maximum Resolution* (mm)	*Start* (mm)	*Range* (mm)	*Maximum Resolution* (mm)		
Lkup 0° Skew	*AS*	*113*	*158*	*45*	*180*	*1.0*	*0.0*	*2344.0*	*5.0*	*N/A*	*OK*
Lkdn 180° Skew	*AS*	*113*	*158*	*-45*	*83*	*1.0*	*0.0*	*2344.0*	*5.0*	*N/A*	*OK*

Max Scan Speed 75 mm/sec

SCANNING SEQUENCES AXIAL FLAWS

Scan / Probe Skew	*Probe Type*	*MinTB* (mm)	*MaxTB* (mm)	*Scan*			*Index*			*Number of Scan Lines*	*Done ?* (OK / N/A)
				Start (mm)	*Range* (mm)	*Maximum Resolution* (mm)	*Start* (mm)	*Range* (mm)	*Resol.* (mm)		
RL Lkcw 0° Skew	*AS*	*113*	*158*	*0*	*2344*	*2.0*	*-32.0*	*64.0*	*9.1*	*8*	*OK*
RL Lkcc 180° Skew	*AS*	*113*	*158*	*0*	*2344*	*2.0*	*-32.0*	*64.0*	*9.1*	*8*	*OK*

Max Scan Speed 15 mm/sec

Encoder Counts Circ: 205

Encoder Counts Trans: 295

Data Analyst : *Andre' Rachal* ***Date :*** *3/25/2023*