

BPY-C-1001 / BPY-C-1003

3-inch Cold Leg Spray Line Loop 1A

UT Data Package Cover

Data Package No: 219-01-007



Reference ID: BPY-C-1001



AWO: 53102184602



Page #	Data Type	Exam Angle	Recordable	Limitations	Comments
1	C	0-85°			
2	C	0-85°			
3	C	0-85°			
4	C	0-85°			
5	C	0-85°			
6	E	0-85°	NRI	NONE	
7	C	0-82°			
8	C	0-82°			
9	C	0-82°			
10	C	0-82°			
11	C	0-82°			
12	E	0-82°	NRI	NONE	
13	P	0-85°	N/A	N/A	

% of Required Exam Area: 100%

Final Disposition: ACCEPTABLE 1 UP. 134
10/20/09

Previous Data Review

UT ☒ RT ☐

Dominion Review: Wack - KJ Hacker

Level: III

Review Date: 10/25/09

Legend: UT Data Type Reference

- | | | |
|---|---|------------------|
| A | = | Additional Info |
| B | = | Beam Spread |
| C | = | Calibration Data |
| E | = | Examination Data |
| L | = | Linearity |
| P | = | Coverage Plot |
| S | = | Sketch |
| T | = | Thickness |

Comments:

UT Data Package Cover

Data Package No: 219-01-038



Reference ID: BPY-C-1003



AWO: 53102184602



Page #	Data Type	Exam Angle	Recordable	Limitations	Comments
1	C	0-85°			
2	C	0-85°			
3	C	0-85°			
4	C	0-85°			
5	C	0-85°			
6	E	0-85°	NRE	NONE	
7	C	0-82°			
8	C	0-82°			
9	C	0-82°			
10	C	0-82°			
11	C	0-82°			
12	E	0-82°	NRE	NONE	
13	P	0-85°	N/A	N/A	

% of Required Exam Area: 100%

Final Disposition: ACCEPTABLE

Dominion Review: *H. Harker* *KJ Hacker*

Level:

Review Date: 10/20/09

Previous Data Review

UT ☒ A RT ☐

Legend: UT Data Type Reference

- | | | |
|---|---|------------------|
| A | = | Additional Info |
| B | = | Beam Spread |
| C | = | Calibration Data |
| E | = | Examination Data |
| L | = | Linearity |
| P | = | Coverage Plot |
| S | = | Sketch |
| T | = | Thickness |

Comments:



ULTRASONIC PHASED ARRAY WOR CALIBRATION REPORT

WOR Identification DM Weld:	BPY-C-1001	Calibration Data Sheet:	219-01-007
WOR Identification SS Weld:	BPY-C-1003	Calibration Data Sheet:	219-01-038
Plant/Unit:	Millstone / 2	Procedure No. / Rev:	ER-MP-NDE-UT-816/ Rev.0

Wedge	Comments:
Manufacturer: GEIT	See attached EPRI correspondence for Probe, Wedge and Focal Law information.
Model: 360-152-235	
Nominal Wedge Angle: 52°	
Measured Wedge Angle: 52°	
Contour Diameter: 5.50" AX OD	
Scan Direction: Axial	
Nominal Index Location: .70"	
Zero Reference: Front of Probe	

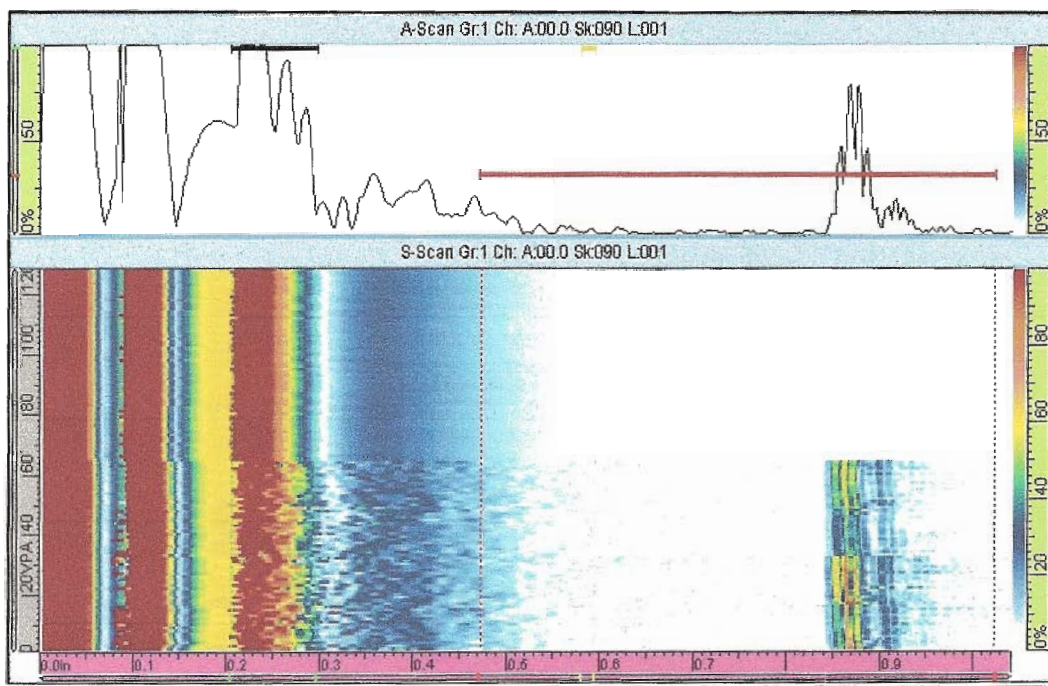
Instrument	Search Unit
Manufacturer: Zetec	Manufacturer: GEIT
Model: Omniscan 32/128 PR	Model: 115-000-631
PA Module Serial Number: Omni-Z-6034	Serial Number: 01Y28X-1/ 01Y28X-2
UT Mainframe Serial Number: Omni-Z-1062	
Software Revision: 1.4R3	
Table 2 Instrument Settings: See attached	
	Search Unit Integral Cable
	Type: See cable diagram
	Length: See cable diagram
	Connector Type #: See cable diagram

Couplant: Soundsafe	Temperature Gauge: PTC 312F
Manufacturer: Sonotech Inc.	Serial Number: 268025
Batch Number: 07220H	

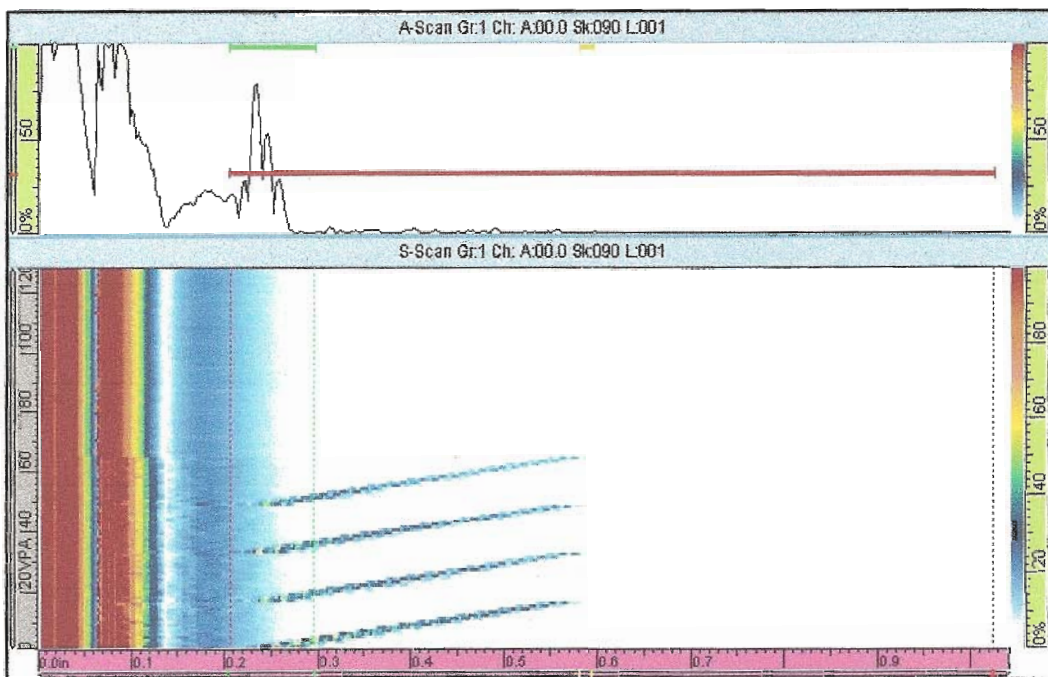
Calibration Data Files	
Focal Law:	032NJDZ2235L0085R2M1Z4_1.125MP.LAW
Angles Generated:	0° to 85°
Wave Mode:	Longitudinal
Focal Sound Path:	1.125" MP

Calibration Reflector Data					
Calibration Block(s): 6039035		9C-041(.1" SDH only)		Temperature: 80°	
Calibration Reflector	Angle	% FSH	Ref. Sensitivity	UT Response	
(70°-85°) 0.1" SDH	75°	80	43 dB	.584"	Sound Path
(25°-60°) 0.5" SDH	52°	80	24 dB	.802"	Sound Path
(0°-25°) 0.5" SDH	0°	80	37 dB	.476"	Sound Path
Channel Functional Checks	Pre Exam: Acceptable		Post Exam: Acceptable		
Number of Inactive Channels/Elements:		Transmit: 0	Receive: 0		

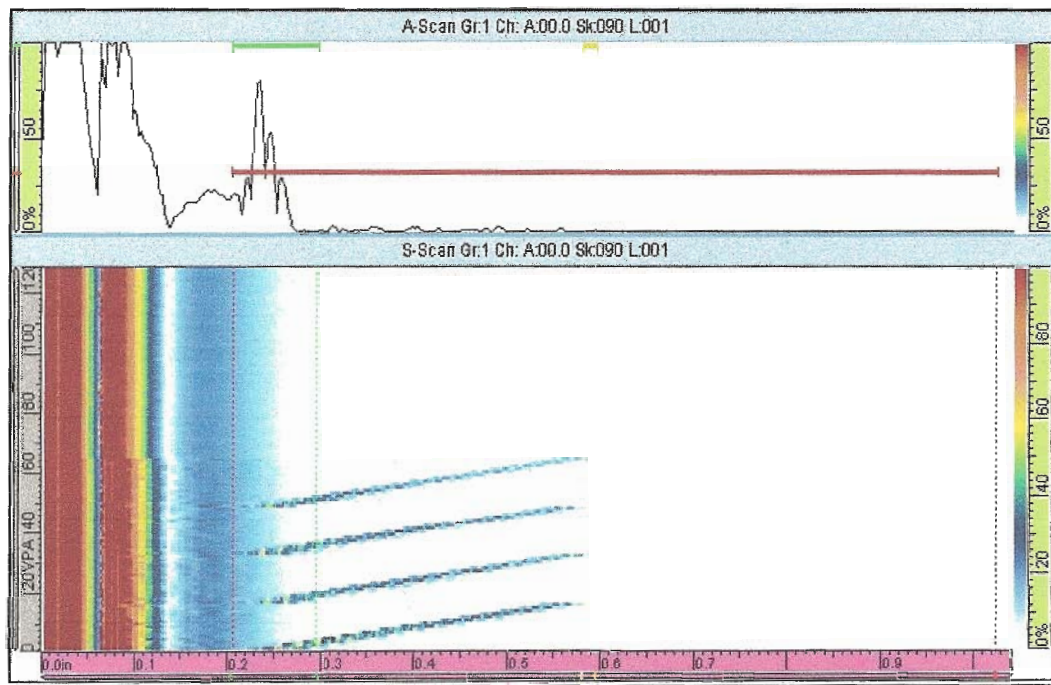
Calibration Performed	Examiner 1	Examiner 2	Level(s)	Date	Time
Initial:	Todd Blechinger	N/A	III	10/18/09	1445
Intermediate:	N/A	N/A	N/A	N/A	N/A
Final:	Todd Blechinger	N/A	III	10/18/09	1505



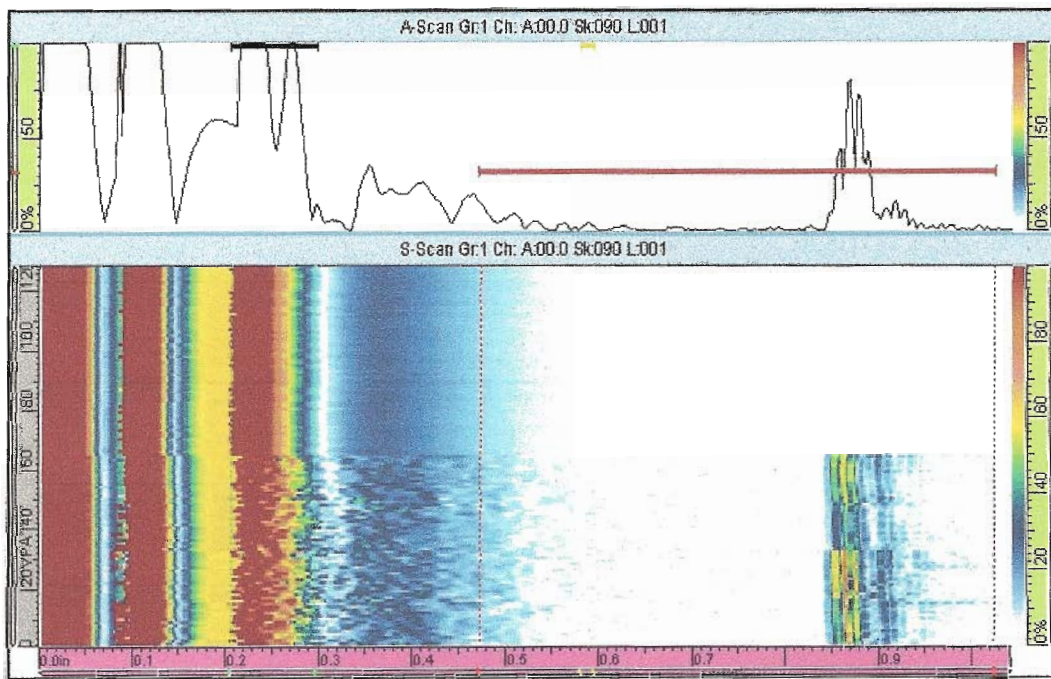
Element Check 1- Pre exam, off wedge



Element Check 2-Pre exam, on wedge



Element Check 3- Post exam, on wedge



Element Check 4-Post exam, off wedge

Phased Array Instrument Table 2 Essential Settings

Major Menu Item	Menu Item	Sub-menu Item	Setting
Reading			
	Result		
		Selector	List 1
		Field 1	A%
		Field 2	A^
		Field 3	SA
		Field 4	PA
UT			
	General		
		Gain	24 dB
		Start	0.00 in
		Range	1.896 in
		Wedge Delay	1.60 us
		Velocity	.2272 in/us
	Pulser		
		Pulser	1
		Tx/Rx Mode	PE
		Frequency	2
		Voltage	High
		PW	250ns (Auto)
		PRF	Optimum
	Receiver		
		Receiver	1
		Filter	None
		Rectifier	FW
		Video Filter	Off
		Averaging	1
		Reject	0
	Beam		
		Gain Offset	0.0 dB
		Scan Offset	-0.000 in
		Index Offset	-0.709 in
		Angle	52
		Skew	0.0°
		Beam Delay	8.52 us
	Advanced		
		dB Ref	Off
		Points Qty	452
		Scale Factor	6
		Sum Gain	22.0

Phased Array Instrument Table 2 Essential Settings (cont.)

Major Menu Item	Menu Item	Sub-menu Item	Setting
Display			
	Selection		
		Display	A-S-[C]
		C-Scan 1	Off
		Group	Current
		Projection	On
	Rulers		
		UT Unit	True Depth
		% Ruler	Linear (%)
		DAC/TCG	Off
		Gate	On
		Cursor	Off
	Color		
		Select	Amplitude
		Start (%)	0.0
		End (%)	100.0
	Properties		
		Display	A-Scan
		Source	Normal
Probe Part			
	Select		
		Select	Select Tx/Rx
		Auto Detect	Off
	Position		
		Scan Offset (in)	0
		Index Offset (in)	0
	Parts		
		Geometry	Plate
		Thickness (in)	3.0 in
PGM Probe			
	Configuration		
		Scan Type	Sectorial
		Connection P:	1
	Laws		
		Auto Program	Off
Gate Alarm			
	Gate		
		Gate Select	Gate A
		Gate A Synchro	Pulse

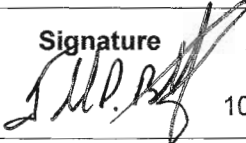
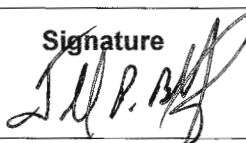
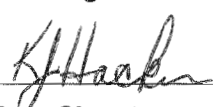
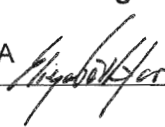


ULTRASONIC PHASED ARRAY WOR ULTRASONIC EXAMINATION RECORD

Exam Data Sheet: 219-01-007		219-01-038		Calibration Data Sheet: 219-01-007		219-01-038	
Plant: Millstone		Unit: 2		Procedure: ER-MP-NDE-UT-816/Rev. 0			
Zones DM Weld: 1-08		SS Weld: 1-23					
Date: 10/18/09		Exam Start: 1445		Exam Stop: 1505			
WOR Identification		DM Weld: BPY-C-1001		SS Weld: BPY-C-1003			
Component Configuration		DM Weld: Nozzle to Safe End		SS Weld: Safe End to Pipe			
Weld Overlay Regions: Entire overlay surface							
Examination Surface: Surface of Weld Overlay				Reviewed Previous Data: N/A			
Temperature Gauge: PTC 312F		Serial Number: 268025		Component Temp: 79°			
Percent Of Coverage Obtained: 100%				Examination Angles			
Weld Overlay Thickness:				Axial		Circumferential	
Minimum: .30"				0° to 85°		N/A	
Maximum: .60"							
Examination Sensitivity:				36 dB		N/A dB	

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(2) Axial (Upstream)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(3) Circumferential (Clockwise)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(4) Circumferential (Counterclockwise)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments: Maintained 5% to 20% average baseline noise level during examination. No suspected flaw indications were observed during examinations.

Examiner	Level	Signature	Date	LMT Review	Level	Signature	Date
Todd Blechinger	III		10/18/09	Todd Blechinger	III		10/19/09
Examiner	Level	Signature	Date	Site Review	Level	Signature	Date
N/A	N/A			Kevin Hacker	III		10/20/09
Other	Level	Signature	Date	ANII Review	Level	Signature	Date
N/A	N/A			E. York	N/A		10.20.09

ULTRASONIC PHASED ARRAY WOR CALIBRATION REPORT

WOR Identification DM Weld:	BPY-C-1001	Calibration Data Sheet:	219-01-007
WOR Identification SS Weld:	BPY-C-1003	Calibration Data Sheet:	219-01-038
Plant/Unit:	Millstone / 2	Procedure No. / Rev:	ER-MP-NDE-UT-816/ Rev.0

Wedge		Comments:
Manufacturer:	GEIT	See attached EPRI correspondence for Probe, Wedge and Focal Law information.
Model:	360-152-234	
Nominal Wedge Angle:	52°	
Measured Wedge Angle:	52°	
Contour Diameter:	5.50" CIRC OD	
Scan Direction:	Circumferential	
Nominal Index Location:	.75"	
Zero Reference:	Front of Probe	

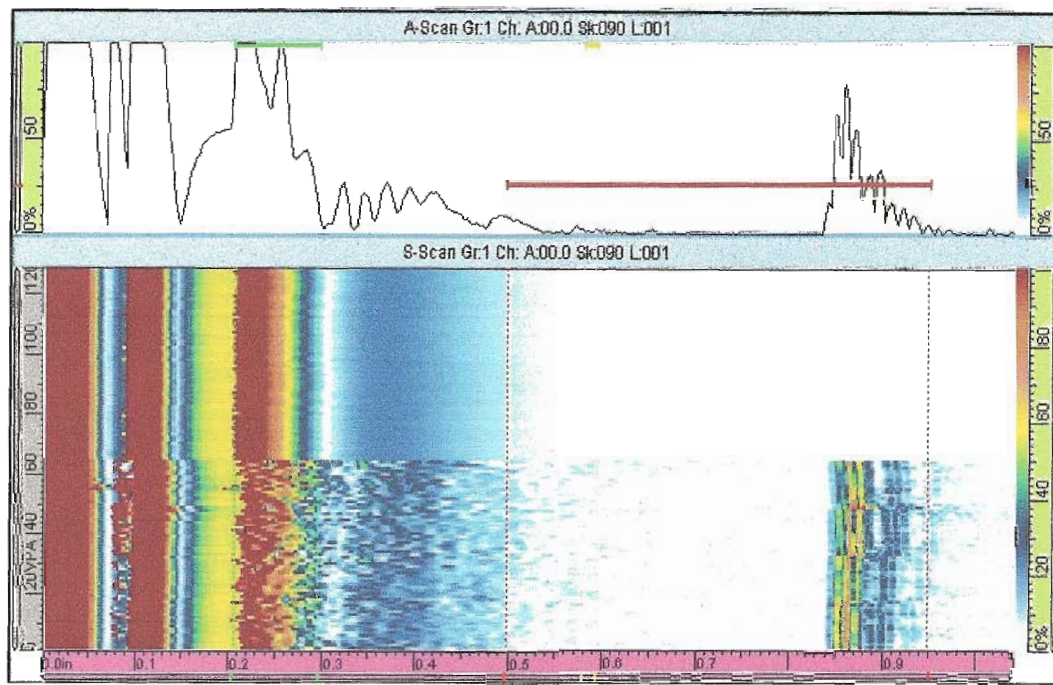
Instrument		Search Unit	
Manufacturer:	Zetec	Manufacturer:	GEIT
Model:	Omniscan 32/128 PR	Model:	115-000-631
PA Module Serial Number:	Omni-Z-6034	Serial Number:	01Y28Y-1/ 01Y28Y-2
UT Mainframe Serial Number:	Omni-Z-1062		
Software Revision:	1.4R3		
Table 2 Instrument Settings:	See attached		
		Search Unit Integral Cable	
		Type:	See cable diagram
		Length:	See cable diagram
		Connector Type #:	See cable diagram

Couplant:	Soundsafe	Temperature Gauge:	PTC 312F
Manufacturer:	Sonotech Inc.	Serial Number:	268025
Batch Number:	07220H		

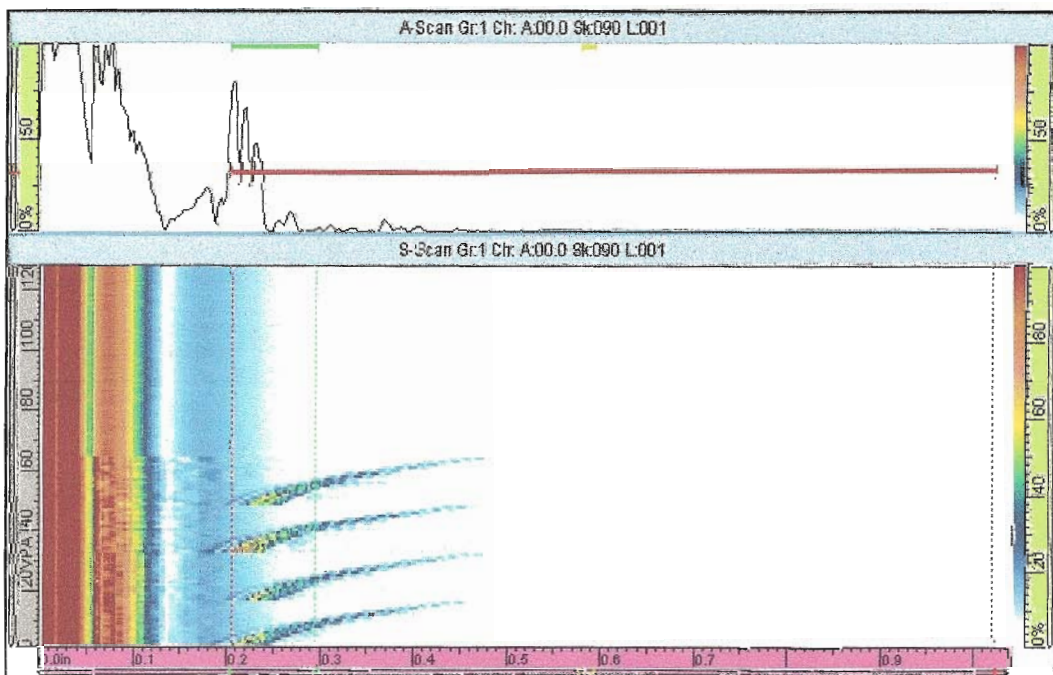
Calibration Data Files	
Focal Law:	032NJDZ2234L0082R2M1Z4_1.125MP.LAW
Angles Generated:	0° to 82°
Wave Mode:	Longitudinal
Focal Sound Path:	1.125" MP

Calibration Reflector Data					
Calibration Block(s): 6039038		MEUXE017A (.1" SDH only)		Temperature: 80°	
Calibration Reflector	Angle	% FSH	Ref. Sensitivity	UT Response	
(70°-85°) 0.1" SDH	70°	80	42 dB	.644"	Sound Path
(25°-60°) 0.5" SDH	45°	80	22 dB	.920"	Sound Path
(0°-25°) 0.5" SDH	0°	80	31 dB	.568"	Sound Path
Channel Functional Checks		Pre Exam: Acceptable	Post Exam: Acceptable		
Number of Inactive Channels/Elements:		Transmit: 0	Receive: 0		

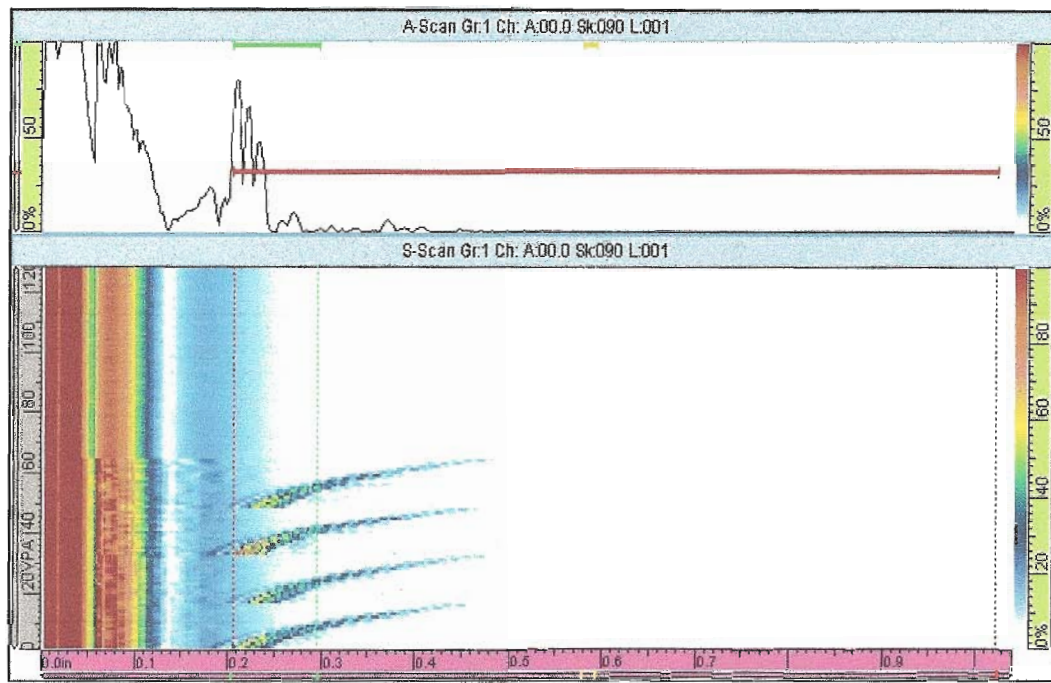
Calibration Performed	Examiner 1	Examiner 2	Level(s)	Date	Time
Initial:	Todd Blechinger	N/A	III	10/18/09	1505
Intermediate:	N/A	N/A	N/A	N/A	N/A
Final:	Todd Blechinger	N/A	III	10/18/09	1545



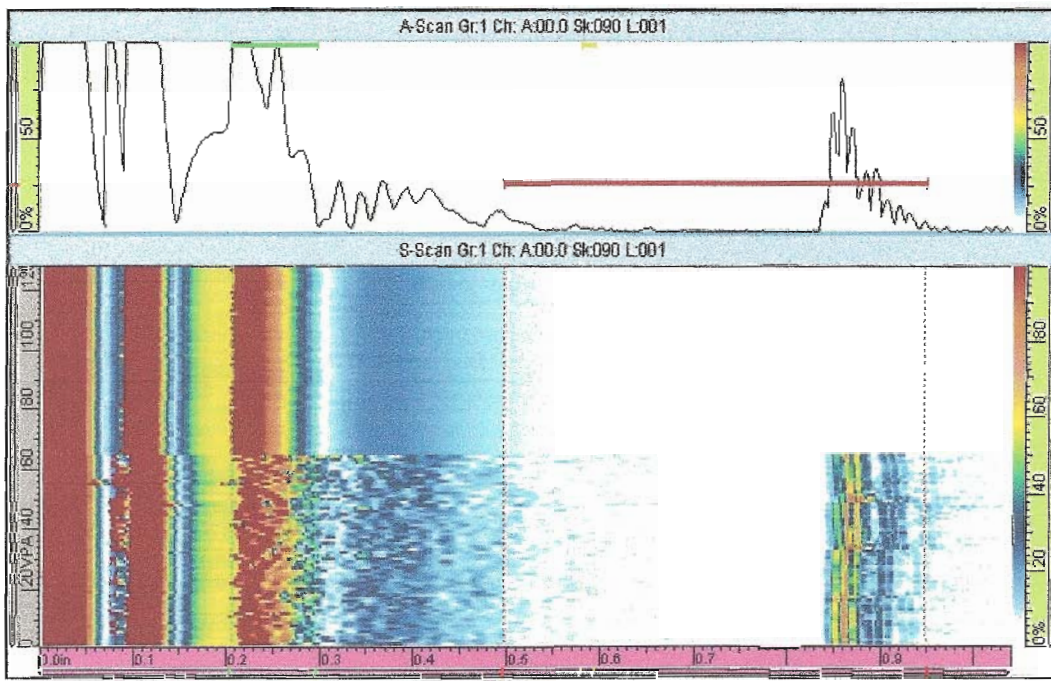
Element Check 5- Pre exam, off wedge



Element Check 6-Pre exam, on wedge



Element Check 7- Post exam, on wedge



Element Check 8-Post exam, off wedge

Phased Array Instrument Table 2 Essential Settings

Major Menu Item	Menu Item	Sub-menu Item	Setting
Reading			
	Result		
		Selector	List 1
		Field 1	A%
		Field 2	A^
		Field 3	SA
		Field 4	PA
UT			
	General		
		Gain	22 dB
		Start	0.00 in
		Range	1.452 in
		Wedge Delay	.90 us
		Velocity	.2272 in/us
	Pulser		
		Pulser	1
		Tx/Rx Mode	PE
		Frequency	2
		Voltage	High
		PW	250ns (Auto)
		PRF	Optimum
	Receiver		
		Receiver	1
		Filter	None
		Rectifier	FW
		Video Filter	Off
		Averaging	1
		Reject	0
	Beam		
		Gain Offset	0.0 dB
		Scan Offset	-0.001 in
		Index Offset	-0.722 in
		Angle	45
		Skew	0.0°
		Beam Delay	7.21 us
	Advanced		
		dB Ref	Off
		Points Qty	452
		Scale Factor	4
		Sum Gain	22.0

Phased Array Instrument Table 2 Essential Settings (cont.)

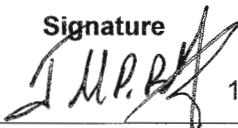
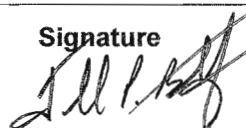
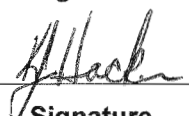
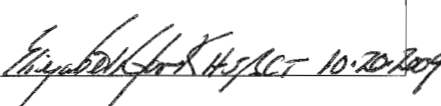
Major Menu Item	Menu Item	Sub-menu Item	Setting
Display			
	Selection		
		Display	A-S-[C]
		C-Scan 1	Off
		Group	Current
		Projection	On
	Rulers		
		UT Unit	True Depth
		% Ruler	Linear (%)
		DAC/TCG	Off
		Gate	On
		Cursor	Off
	Color		
		Select	Amplitude
		Start (%)	0.0
		End (%)	100.0
	Properties		
		Display	A-Scan
		Source	Normal
Probe Part			
	Select		
		Select	Select Tx/Rx
		Auto Detect	Off
	Position		
		Scan Offset (in)	0
		Index Offset (in)	0
	Parts		
		Geometry	Plate
		Thickness (in)	3.0 in
PGM Probe			
	Configuration		
		Scan Type	Sectorial
		Connection P:	1
	Laws		
		Auto Program	Off
Gate Alarm			
	Gate		
		Gate Select	Gate A
		Gate A Synchro	Pulse

ULTRASONIC PHASED ARRAY WOR ULTRASONIC EXAMINATION RECORD

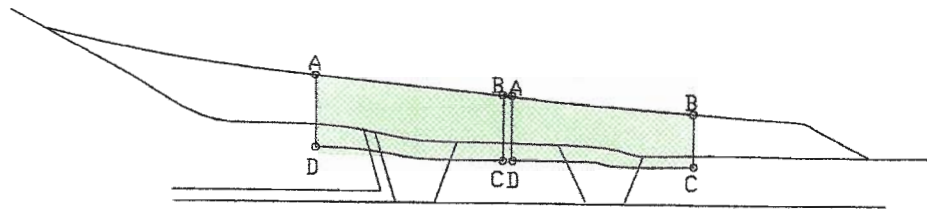
Exam Data Sheet: 219-01-007 219-01-038		Calibration Data Sheet: 219-01-007 219-01-038	
Plant: Millstone Unit: 2		Procedure: ER-MP-NDE-UT-816/Rev. 0	
Zones DM Weld: 1-08		SS Weld: 1-23	
Date: 10/18/09		Exam Start: 1505 Exam Stop: 1545	
WOR Identification DM Weld: BPY-C-1001		SS Weld: BPY-C-1003	
Component Configuration DM Weld: Nozzle to Safe End		SS Weld: Safe End to Pipe	
Weld Overlay Regions: Entire overlay surface			
Examination Surface: Surface of Weld Overlay		Reviewed Previous Data: N/A	
Temperature Gauge: PTC 312F		Serial Number: 268025 Component Temp: 79°	
Percent Of Coverage Obtained: 100%		Examination Angles	
Weld Overlay Thickness:		<u>Axial</u>	<u>Circumferential</u>
Minimum: .30"		N/A	0° to 82°
Maximum: .60"			
Examination Sensitivity:		N/A dB	34.0 dB

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(2) Axial (Upstream)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(3) Circumferential (Clockwise)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(4) Circumferential (Counterclockwise)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

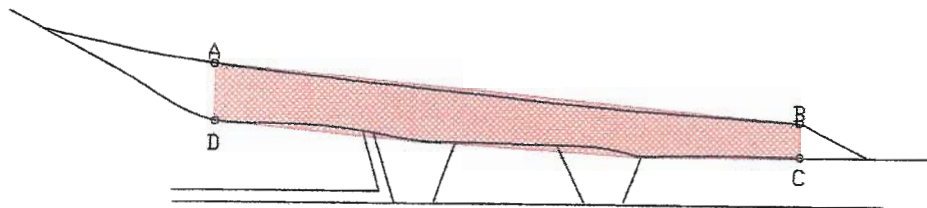
Comments: Maintained 5% to 20% average baseline noise level during examination. No suspected flaw indications were observed during examinations.

Examiner	Level	Signature	Date	LMT Review	Level	Signature	Date
Todd Blechinger	III		10/18/09	Todd Blechinger	III		10/19/09
Examiner	Level	Signature	Date	Site Review	Level	Signature	Date
N/A	N/A			Kevin Hacker	III		10/20/09
Other	Level	Signature	Date	ANII Review	Level	Signature	Date
N/A	N/A			E. York	N/A		10-20-2009

Coverage Plot



ISI Examination Volume A-B-C-D



PSI Examination Volume A-B-C-D

Scale: NOT TO SCALE

Examiner	Level	Signature	Date	LMT Review	Level	Signature	Date
Todd Blechinger	III	<i>T. Blechinger</i>	10/18/09	Todd Blechinger	III	<i>T. Blechinger</i>	10/19/09
Examiner	Level	Signature	Date	Site Review	Level	Signature	Date
N/A	N/A			Kevin Hacker	III	<i>K. Hacker</i>	10/20/09
Other	Level	Signature	Date	ANII Review	Level	Signature	Date
N/A	N/A			E. York	N/A	<i>E. York</i>	10-20-2009



September 23, 2009

Kevin Hacker
Dominion Corporate NDE Level III
Dominion Generation
Innsbrook Technical Center (M/S 3NE)
5000 Dominion Blvd
Glen Allen, VA 23060-3308

Subject: Phased Array Wedge Designs for Weld Overlay Examinations at Millstone 2 (Fall 2009)

Dear Mr. Hacker:

As requested, please find included with this letter the ultrasonic phased array wedge information for use with the EPRI Procedure for Manual Phased Array Ultrasonic Examination of Weld Overlaid Similar and Dissimilar Metal Welds (EPRI-WOL-PA-1) at Dominion's Millstone Power Station Unit 2 in the fall of 2009. These weld overlay inspections will require the use of one 2.0 MHz 2x16 ultrasonic phased array dual transducer with six wedges all manufactured by General Electric Inspection Technologies (GEIT) with the Zetec OmniScan 32-128 P/R phased array instrument (See Figure 1).

Table A indicates which GEIT wedge shall be used for each weld overlaid component while Table B contains the Zetec Advanced Phased Array Calculator 1.2R4 (ZAPAC 1.2R4) CAL file for each corresponding GEIT wedge and focal metal path distance. While these CAL files are attached to this letter, each should be loaded into ZAPAC 1.2R4 and verified with the settings contained in the EPRI report: Nondestructive Evaluation: Procedure for Manual Phased Array UT of Weld Overlays (Product ID 1015134). Figures 2 through 11 contain screen captures of the ZAPAC 1.2R4 for each CAL file. The user shall verify all of the parameters in the ZAPAC 1.2R4 for each CAL file with those found in the 1015134 EPRI report prior to generating a corresponding LAW file for field use.

It is important to note that the "O32NJDZ2232L0079R2M1Z4" and "O32NJDZ2234L0082R2M1Z4" CAL files only allow the user to generate a maximum angle range of 0° to 79° and 0° to 82° respectively instead of the 0° to 85° recommended in the procedure. These smaller angle ranges were formally demonstrated through the Performance Demonstration Initiative (PDI) Program for use with the OmniScan instruments and are acceptable for use (see EPRI-WOL-PA-1).

For your convenience, I have attached two OmniScan 32-128 P/R setup files (WOLPA1.ops - for basic setup, WOLPA1_ChannelCheck.ops - for channel/element checks) as a starting point for you to build your own setup files for the examination. You will need to verify all the parameters in the attached files prior to field use.

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1300 West W.T. Harris Boulevard, Charlotte, NC 28262-8550 USA • 704.595.2000 • Fax 704.595.2860
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September 23, 2009
Kevin Hacker
Page 2

Please note that ZAPAC 1.2R4 is a standalone program that is also embedded in the Zetec UltraVision 1.2R4 software. The ZAPAC 1.2R4 standalone and embedded programs are equivalent for LAW file generation. Please let us know if you have any comments or questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark D", with a long horizontal stroke extending to the right.

Mark Dennis
EPRI Senior Project Manager

Attachment

September 23, 2009
Kevin Hacker
Page 3

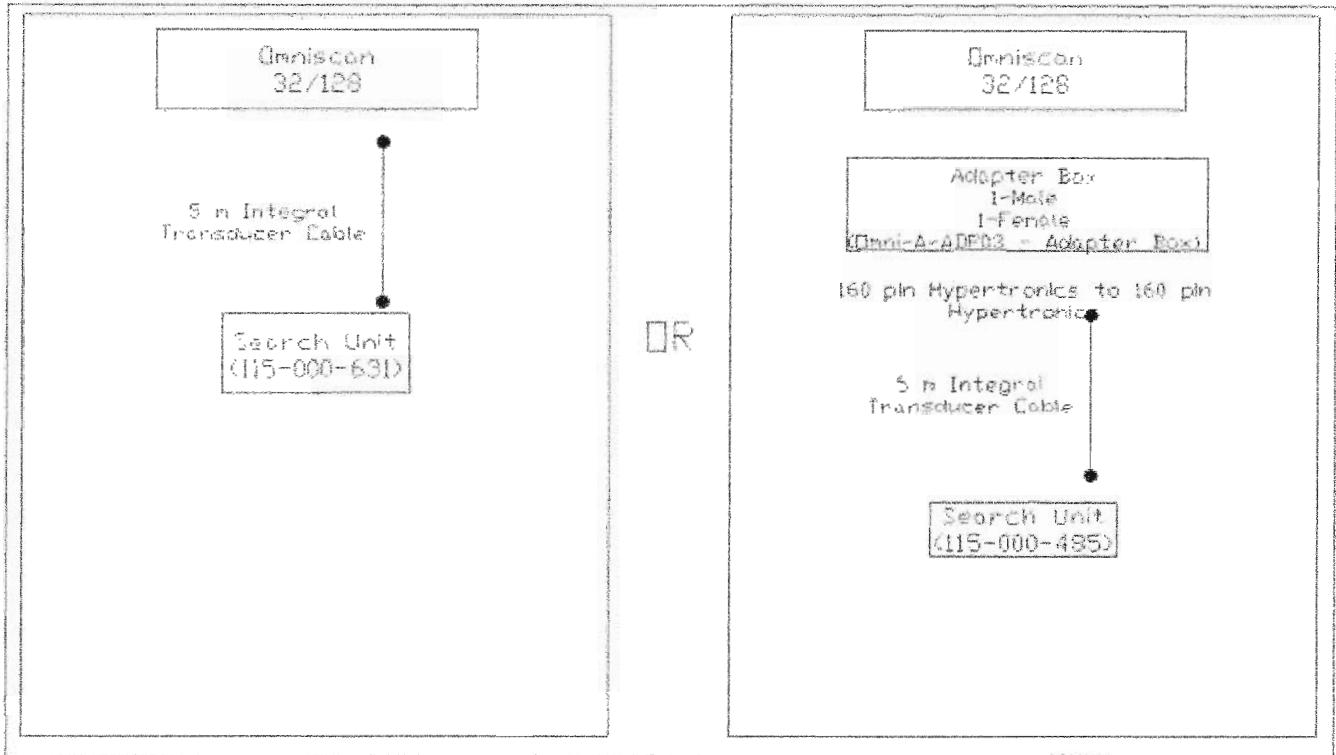


Figure 1. OmniScan 32-128 P/R Cable Diagram for EPRI-WOL-PA-1

Table A. GEIT Wedge Component Applicability

Zone	Weld Number	Location / Description	Wedge Contour Required Wedges	GEIT Axial Wedge Part #	GEIT Circ Wedge Part #
1-07	BPD-C-1017	2" Drain Line Loop 1A	4.125"	360-152-233	360-152-232
1-09	BPD-C-3000	2" Drain line Loop 1B			
1-11	BPD-C-2001	2" Drain line Loop 2A			
1-12	BCH-C-2001	2" Charging line Loop 2A			
1-08	BCH-C-1001	2" Charging Line Loop 1A	5.50"	360-152-235	360-152-234
1-08	BPY-C-1001	3" Spray line Loop 1A			
1-10	BPY-C-3000	3" Spray Line Loop 1B	16.75"	360-152-079	360-152-078
1-08	BSI-C-1001	12" Safety Injection 1A			
1-10	BSI-C-3000	12" Safety Injection 1B			
1-14	BSI-C-4000	12" Safety Injection 2B			
1-05	BPS-C-1001	12" Hot leg Surge Line Loop 1			
1-06	BSD-C-2001	12" SDC line Loop 1			
1-12	BSI-C-2001	12" Safety Injection Loop 2A			

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Table B. GEIT Wedge CAL File Applicability

GEIT Part #	Diameter (in)	Scanning Direction	Focal Metal Path (in)	CAL Filename	Weld Overlay Thickness (WOLT) Range
360-152-232	4.125	Circ.	0.5	O32NJDS2232L0085R2M1Z4	WOLT ≤ 0.20in
360-152-233	4.125	Axial	0.5	O32NJDS2233L0085R2M1Z4	WOLT ≤ 0.20in
360-152-232	4.125	Circ.	1.125	O32NJDZ2232L0079R2M1Z4	0.20in < WOLT < 0.75in
360-152-233	4.125	Axial	1.125	O32NJDZ2233L0085R2M1Z4	0.20in < WOLT < 0.75in
360-152-234	5.500	Circ.	1.125	O32NJDZ2234L0082R2M1Z4	0.20in < WOLT < 0.75in
360-152-235	5.500	Axial	1.125	O32NJDZ2235L0085R2M1Z4	0.20in < WOLT < 0.75in
360-152-078	16.750	Circ.	1.125	O32NJDZ2078L0085R2M1Z4	0.20in < WOLT < 0.75in
360-152-079	16.750	Axial	1.125	O32NJDZ2079L0085R2M1Z4	0.20in < WOLT < 0.75in
360-152-078	16.750	Circ.	1.5	O32NJDB2078L0085R2M1Z4	WOLT ≥ 0.75in
360-152-079	16.750	Axial	1.5	O32NJDB2079L0085R2M1Z4	WOLT ≥ 0.75in

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File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | **2-D Matrix array** | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation

Scan

Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point: Process angles

Focal points selection

Focusing type: Half path DDF

Interpolation: ON

	- Offset -	- Depth -
Focal plane position (in)	0.0000	0.0000
	0.0000	0.0000

	- Start -	- Stop -	- Resolution -
Emission focus position (in)	0.5000	0.5000	0.3937
Reception focus position (in)	0.5000	0.5	

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	5	30	
Secondary axis pulser	1		
Primary axis aperture	8		Single Hyperbolic
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection

Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration: 1234 5678 Type 1

Probe skew angle (deg)	0.0
Probe frequency (MHz)	2.00
Number of elements on primary axis	16
Number of elements on secondary axis	2
Primary axis pitch (in)	0.0689
Secondary axis pitch (in)	0.1575
<input checked="" type="checkbox"/> Pitch and Catch	Probe separation (in) 0.7716
<input checked="" type="checkbox"/> Symmetric	Squint angle (deg) 0.0
<input type="checkbox"/> Reverse primary axis	<input checked="" type="checkbox"/> Reverse secondary axis

Specimen: Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/us)	0.2272
Thickness (in)	0.6000
Radius (in)	2.0626

Wedge: 360-152-232

Footprint: Curvature along primary axis

Wedge angle (deg)	13.6
Roof angle (deg)	7.5
Sound velocity (in/us)	0.0921
Height at the middle of the first element (in)	0.2402
Primary axis offset of the middle of the first element (in)	0.1201
Secondary axis offset of the middle of the first element (in)	0.3532
Primary axis position of wedge reference (in)	-1.4201
Secondary axis position of wedge reference (in)	-0.7390
Distance between contact points (wedge length) (in)	1.4201
Wedge width (in)	1.4781

Load... Save As... Close Draw

Figure 2.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-232; Diameter (in) = 4.125; Scanning Direction = Circumferential; Focal Metal Path (in) = 0.5

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation

Scan

Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point Process angles

Focal points selection

Focusing type: Half path

Offset: 0.0000 Depth: 0.0000

Interpolation: ON

Emission focus position (in): 0.5000

Reception focus position (in): 0.5000

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	5	32	1
Secondary axis pulser	1		
Primary axis aperture	8		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection

Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration

1234 5678 Type 1

Probe skew angle (deg)	0.0
Probe frequency (MHz)	2.00
Number of elements on primary axis	16
Number of elements on secondary axis	2
Primary axis pitch (in)	0.0689
Secondary axis pitch (in)	0.1575
<input checked="" type="checkbox"/> Pitch and Catch	Probe separation (in) 0.7689
<input checked="" type="checkbox"/> Symmetric	Squint angle (deg) 0.0
<input type="checkbox"/> Reverse primary axis	<input checked="" type="checkbox"/> Reverse secondary axis

Specimen

Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/us): 0.2272

Thickness (in): 0.8000

Radius (in): 2.0626

Wedge

360-152-233

Footprint

Curvature along secondary axis

Wedge angle (deg)	18.3
Roof angle (deg)	11.1
Sound velocity (in/us)	0.0921
Height at the middle of the first element (in)	0.2823
Primary axis offset of the middle of the first element (in)	0.1150
Secondary axis offset of the middle of the first element (in)	0.3496
Primary axis position of wedge reference (in)	-1.4401
Secondary axis position of wedge reference (in)	-0.7325
Wedge length (in)	1.4401
Distance between contact points (wedge width) (in)	1.4651

Load... Save As... Close Draw

Figure 3.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-233; Diameter (in) = 4.125; Scanning Direction = Axial; Focal Metal Path (in) = 0.5

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	79.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point

Focal points selection

Focusing type: Half path

Focal plane position (in): 0.0000

Emission focus position (in): 1.1250

Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	32	
Secondary axis pulser	1		
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: OmniScan 32/128

Probe
115-000-485/631

Elements configuration
1234 Type 1
5678

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

☒ Pitch and Catch

Probe separation (in): 0.7716

☒ Symmetric

Squint angle (deg): 0.0

☐ Reverse primary axis

☒ Reverse secondary axis

Specimen
Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/us): 0.2272

Thickness (in): 0.8000

Radius (in): 2.0626

Wedge
360-152-232

Footprint
Curvature along primary axis

Wedge angle (deg): 13.6

Roof angle (deg): 7.5

Sound velocity (in/us): 0.0921

Height at the middle of the first element (in): 0.2402

Primary axis offset of the middle of the first element (in): 0.1201

Secondary axis offset of the middle of the first element (in): 0.3532

Primary axis position of wedge reference (in): -1.4201

Secondary axis position of wedge reference (in): -0.7390

Distance between contact points (wedge length) (in): 1.4201

Wedge width (in): 1.4781

Load... Save As... Close Draw

Figure 4.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-232; Diameter (in) = 4.125; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan

Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	0.0
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point

Focal points selection

Focusing type: Half path

Interpolation: ON

	- Offset -	- Depth -
Focal plane position (in)	0.0000	0.0000
Emission focus position (in)	1.1250	1.1250
Reception focus position (in)	1.1250	1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	32	
Secondary axis pulser	1		
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection

Type: OmniScan 32/128

Probe

115-000-485/631

Elements configuration

1234
5678 Type 1

Probe skew angle (deg)	0.0
Probe frequency (MHz)	2.00
Number of elements on primary axis	16
Number of elements on secondary axis	2
Primary axis pitch (in)	0.0689
Secondary axis pitch (in)	0.1575
<input checked="" type="checkbox"/> Pitch and Catch	Probe separation (in)
<input checked="" type="checkbox"/> Symmetric	Squint angle (deg)
<input type="checkbox"/> Reverse primary axis	<input checked="" type="checkbox"/> Reverse secondary axis

Specimen

Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/μs)	0.2272
Thickness (in)	0.8000
Radius (in)	2.0626

Wedge

360-152-233

Footprint

Curvature along secondary axis

Wedge angle (deg)	18.3
Roof angle (deg)	11.1
Sound velocity (in/μs)	0.0921
Height at the middle of the first element (in)	0.2823
Primary axis offset of the middle of the first element (in)	0.1150
Secondary axis offset of the middle of the first element (in)	0.3496
Primary axis position of wedge reference (in)	-1.4401
Secondary axis position of wedge reference (in)	-0.7325
Wedge length (in)	1.4401
Distance between contact points (wedge width) (in)	1.4651

Load... Save As... Close Draw

Figure 5.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-233; Diameter (in) = 4.125; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

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File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	82.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point: Process angles

Focal points selection

Focusing type: Half path ☐ ODF

Interpolation: ☐ TH

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.5000	0.0000

Emission focus position (in): 1.1250

Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	32	
Secondary axis pulser	1	1	
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration: 1234 Type 1
5678

Probe skew angle (deg)	0.0
Probe frequency (MHz)	2.00
Number of elements on primary axis	16
Number of elements on secondary axis	2
Primary axis pitch (in)	0.0689
Secondary axis pitch (in)	0.1575
<input checked="" type="checkbox"/> Pitch and Catch	Probe separation (in): 0.7716
<input checked="" type="checkbox"/> Symmetric	Squint angle (deg): 0.0
<input type="checkbox"/> Reverse primary axis	<input checked="" type="checkbox"/> Reverse secondary axis

Specimen: Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/μs)	0.2272
Thickness (in)	0.8000
Radius (in)	2.7501

Wedge: 360-152-234

Footprint: Curvature along primary axis

Wedge angle (deg)	14.2
Roof angle (deg)	7.5
Sound velocity (in/μs)	0.0921
Height at the middle of the first element (in)	0.2008
Primary axis offset of the middle of the first element (in)	0.1291
Secondary axis offset of the middle of the first element (in)	0.3532
Primary axis position of wedge reference (in)	-1.4301
Secondary axis position of wedge reference (in)	-0.7390
Distance between contact points (wedge length) (in)	1.4301
Wedge width (in)	1.4781

Load... Save As... Close Draw

Figure 6.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-234; Diameter (in) = 5.5; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

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File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	0.0
Secondary steering angle (deg)	0.0	0.0	0.0
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point: Process angles

Focal points selection

Focusing type: Half path

Offset: 0.0000

Depth: 0.0000

Interpolation: ON

Focal plane position (in): 0.0000

Emission focus position (in): 1.1250

Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	0	
Secondary axis pulser	1		
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: OmniScan 32/128

Probe
115-000-485/631

Elements configuration
1234 Type 1
5678

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

☒ Pitch and Catch

Probe separation (in): 0.0

☒ Symmetric

Squint angle (deg): 0.0

☐ Reverse primary axis

☒ Reverse secondary axis

Specimen
Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/μs): 0.2272

Thickness (in): 0.8000

Radius (in): 2.7501

Wedge
360-152-235

Footprint
Curvature along secondary axis

Wedge angle (deg): 18.2

Roof angle (deg): 10.2

Sound velocity (in/μs): 0.0921

Height at the middle of the first element (in): 0.2579

Primary axis offset of the middle of the first element (in): 0.1264

Secondary axis offset of the middle of the first element (in): 0.3506

Primary axis position of wedge reference (in): -1.4371

Secondary axis position of wedge reference (in): -0.7345

Wedge length (in): 1.4371

Distance between contact points (wedge width) (in): 1.4691

Load... Save As... Close Draw

Figure 7.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-235; Diameter (in) = 5.5; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

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File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point: [] Focus angle: []

Focal points selection

Focusing type: Half path

Interpolation: [] ON

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.0000	0.0000

Emission focus position (in): 1.1250

Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	1	
Secondary axis pulser	1	1	
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration: 1234 5678 Type 1

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

☒ Pitch and Catch

Probe separation (in): 0.7611

☒ Symmetric

Squint angle (deg): 0.0

☐ Reverse primary axis

☒ Reverse secondary axis

Specimen: Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/μs): 0.2272

Thickness (in): 1.5001

Radius (in): 8.3753

Wedge: 360-152-078

Footprint: Curvature along primary axis

Wedge angle (deg): 16.2

Roof angle (deg): 4.2

Sound velocity (in/μs): 0.0921

Height at the middle of the first element (in): 0.2587

Primary axis offset of the middle of the first element (in): 0.1311

Secondary axis offset of the middle of the first element (in): 0.3065

Primary axis position of wedge reference (in): -1.4141

Secondary axis position of wedge reference (in): -0.6870

Distance between contact points (wedge length) (in): 1.4141

Wedge width (in): 1.3741

Load... Save As... Close Draw

Figure 8.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-078; Diameter (in) = 16.75; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	1.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point Process angles

Focal points selection

Focusing type: Half path

Interpolation: ON

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.0010	0.0000

Emission focus position (in): 1.1250

Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	32	
Secondary axis pulser	1		
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration

1234 Type 1
5678

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

☒ Pitch and Catch

Probe separation (in): 0.0046

☒ Symmetric

Squint angle (deg): 0.0

☐ Reverse primary axis

☒ Reverse secondary axis

Specimen: Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/us): 0.2272

Thickness (in): 1.5001

Radius (in): 8.3753

Wedge: 360-152-079

Footprint: Curvature along secondary axis

Wedge angle (deg): 18.5

Roof angle (deg): 5.7

Sound velocity (in/us): 0.0921

Height at the middle of the first element (in): 0.2547

Primary axis offset of the middle of the first element (in): 0.1961

Secondary axis offset of the middle of the first element (in): 0.3048

Primary axis position of wedge reference (in): -1.4210

Secondary axis position of wedge reference (in): -0.7070

Wedge length (in): 1.4210

Distance between contact points (wedge width) (in): 1.4141

Load... Save As... Close Draw

Figure 9.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-079; Diameter (in) = 16.75; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

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File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | **2-D Matrix array** | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: **Azimuthal**

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point ... Prescan angles

Focal points selection

Focusing type: **Half path** DOF Interpolation

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.0000	0.0000

Emission focus position (in): 1.5000
Reception focus position (in): 1.5000

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	32	
Secondary axis pulser	1	1	
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: **OmniScan 32/128**

Probe
115-000-485/631

Elements configuration
1234 Type 1
5678

Probe skew angle (deg)	0.0
Probe frequency (MHz)	2.00
Number of elements on primary axis	16
Number of elements on secondary axis	2
Primary axis pitch (in)	0.0689
Secondary axis pitch (in)	0.1575
<input checked="" type="checkbox"/> Pitch and Catch	Probe separation (in): 0.7611
<input checked="" type="checkbox"/> Symmetric	Squint angle (deg): 0.0
<input type="checkbox"/> Reverse primary axis	<input checked="" type="checkbox"/> Reverse secondary axis

Specimen
Default

Specimen type: **Pipe OD**

Wave type: **Longitudinal**

Sound velocity (in/ μ s)	0.2272
Thickness (in)	1.5001
Radius (in)	8.3753

Wedge
360-152-078

Footprint
Curvature along primary axis

Wedge angle (deg)	16.2
Roof angle (deg)	4.2
Sound velocity (in/ μ s)	0.0921
Height at the middle of the first element (in)	0.2587
Primary axis offset of the middle of the first element (in)	0.1311
Secondary axis offset of the middle of the first element (in)	0.3065
Primary axis position of wedge reference (in)	-1.4141
Secondary axis position of wedge reference (in)	-0.6870
Distance between contact points (wedge length) (in)	1.4141
Wedge width (in)	1.3741

Load... Save As... Close Draw

Figure 10.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-078; Diameter (in) = 16.75; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.5

September 23, 2009
Kevin Hacker
Page 14

Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point: Process angles

Focal points selection

Focusing type: Half path

Focal plane position (in): 0.0000

Emission focus position (in): 1.5000

Reception focus position (in): 5.000

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	1	1
Secondary axis pulser	1	1	1
Primary axis aperture	16	16	1
Secondary axis aperture	2	2	1
Pulser connection	1	1	1
Receiver connection	33	33	1

Hardware selection
Type: OmniScan 32/128

Probe
115-000-485/631

Elements configuration
1234 Type 1
5678

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

Pitch and Catch: ☒ Symmetric

Probe separation (in): 1.8048

Squint angle (deg): 0.0

Reverse primary axis: ☐ Reverse secondary axis: ☒

Specimen
Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/us): 0.2272

Thickness (in): 1.5001

Radius (in): 8.3753

Wedge
360-152-079

Footprint
Curvature along secondary axis

Wedge angle (deg): 18.5

Roof angle (deg): 5.7

Sound velocity (in/us): 0.0921

Height at the middle of the first element (in): 0.2547

Primary axis offset of the middle of the first element (in): 0.1961

Secondary axis offset of the middle of the first element (in): 0.3048

Primary axis position of wedge reference (in): -1.4210

Secondary axis position of wedge reference (in): -0.7070

Wedge length (in): 1.4210

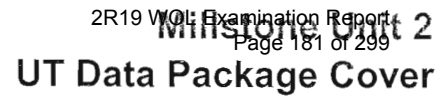
Distance between contact points (wedge width) (in): 1.4141

Load... Save As... Close Draw

Figure 11.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-079; Diameter (in) = 16.75; Scanning Direction = Axial; Focal Metal Path (in) = 1.5

BPY-C-3000 / BPY-C-3002

3-inch Cold Leg Spray Line Loop 1B



2 1 9 - 0 1 - 0 1 0

B P Y - C - 3 0 0 0

5 3 1 0 2 1 8 4 6 0 3

A = Additional Info
B = Beam Spread
C = Calibration Data
E = Examination Data
L = Linearity
P = Coverage Plot
S = Sketch
T = Thickness

Data Package No: 219-01-039



Reference ID: BPY-C-3002



AWO: 53102184603



Page #	Data Type	Exam Angle	Recordable	Limitations	Comments
1	C	0-85°	N	A	
2	C	0-85°			
3	C	0-85°			
4	C	0-85°			
5	C	0-85°			
6	E	0-85°	NRI	NONE	
7	C	0-82°	N	A	
8	C	0-82°			
9	C	0-82°			
10	C	0-82°			
11	C	0-82°			
12	E	0-82°	NRI	NONE	
13	P	0-85°	N/A	N/A	

% of Required Exam Area: 100%

Final Disposition: ACCEPTABLE *[Signature]* 10/20/09

Previous Data Review

UT ☒ N/A RT ☐

Dominion Review: *[Signature]* KJ Hacker

Level: TII

Review Date: 10/20/09

Legend: UT Data Type Reference

- A = Additional Info
- B = Beam Spread
- C = Calibration Data
- E = Examination Data
- L = Linearity
- P = Coverage Plot
- S = Sketch
- T = Thickness

Comments:

ULTRASONIC PHASED ARRAY WOR CALIBRATION REPORT

WOR Identification DM Weld:	BPY-C-3000	Calibration Data Sheet:	219-01-010
WOR Identification SS Weld:	BPY-C-3002	Calibration Data Sheet:	219-01-039
Plant/Unit:	Millstone / 2	Procedure No. / Rev:	ER-MP-NDE-UT-816/ Rev.0

Wedge		Comments:
Manufacturer:	GEIT	See attached EPRI correspondence for Probe, Wedge and Focal Law information.
Model:	360-152-235	
Nominal Wedge Angle:	52°	
Measured Wedge Angle:	52°	
Contour Diameter:	5.50" AX OD	
Scan Direction:	Axial	
Nominal Index Location:	.70"	
Zero Reference:	Front of Probe	

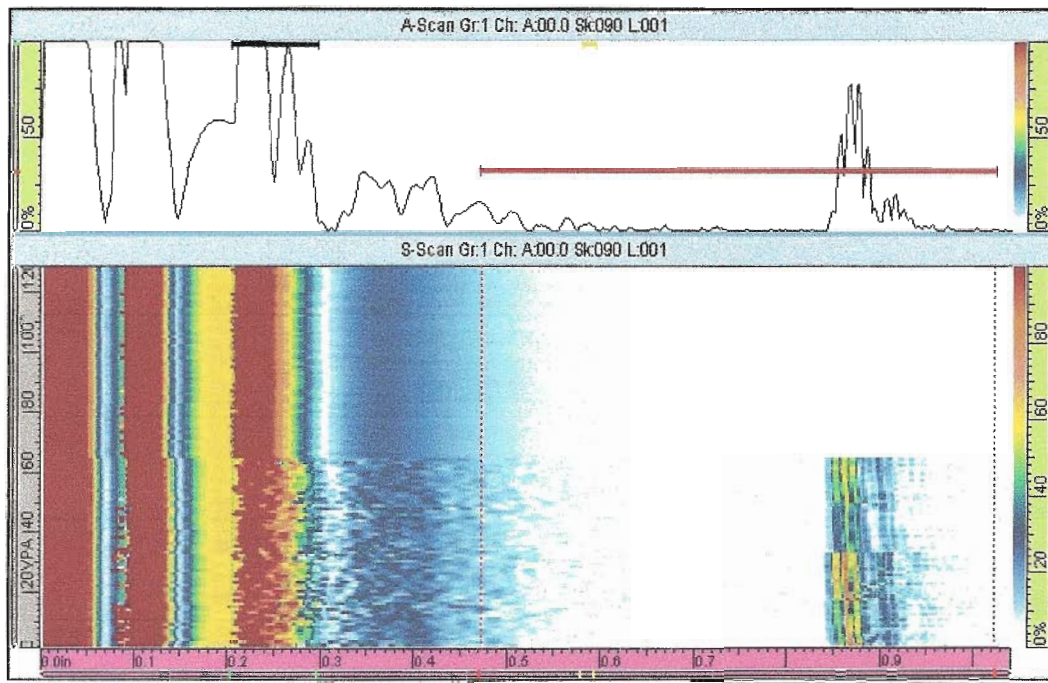
Instrument		Search Unit
Manufacturer:	Zetec	Manufacturer: GEIT
Model:	Omniscan 32/128 PR	Model: 115-000-631
PA Module Serial Number:	Omni-Z-6034	Serial Number: 01Y28X-1/ 01Y28X-2
UT Mainframe Serial Number:	Omni-Z-1062	
Software Revision:	1.4R3	
Table 2 Instrument Settings:	See attached	
		Search Unit Integral Cable
		Type: See cable diagram
		Length: See cable diagram
		Connector Type #: See cable diagram

Couplant:	Soundsafe	Temperature Gauge:	PTC 312F
Manufacturer:	Sonotech Inc.	Serial Number:	268025
Batch Number:	07220H		

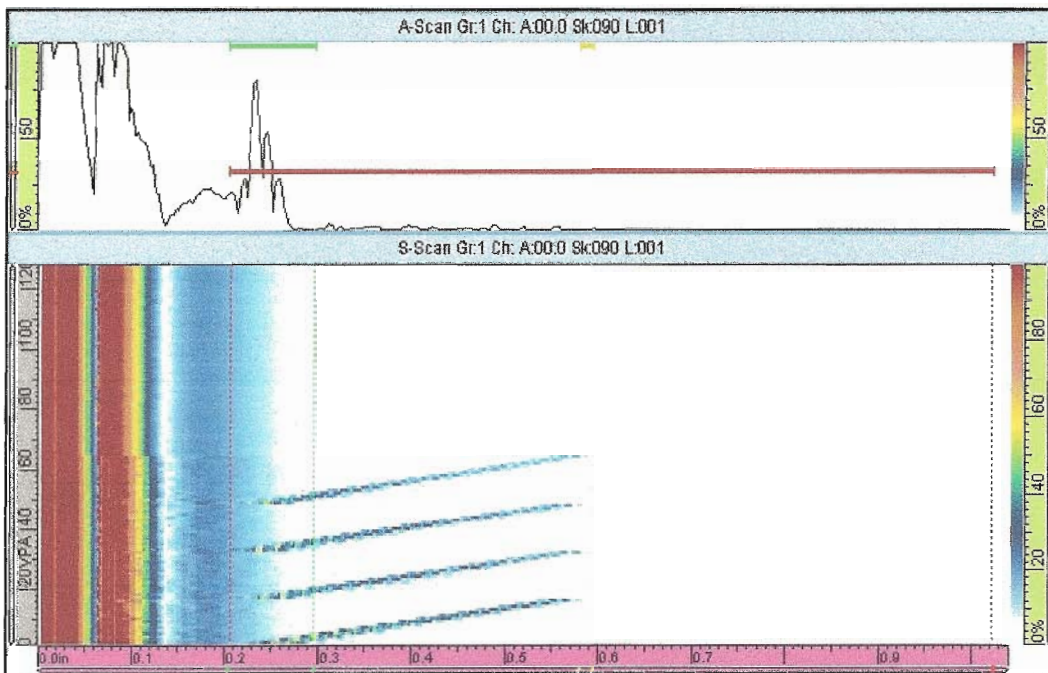
Calibration Data Files	
Focal Law:	032NJDZ2235L0085R2M1Z4_1.125MP.LAW
Angles Generated:	0° to 85°
Wave Mode:	Longitudinal
Focal Sound Path:	1.125" MP

Calibration Reflector Data					
Calibration Block(s): 6039035		9C-041(.1" SDH only)		Temperature: 80°	
Calibration Reflector	Angle	% FSH	Ref. Sensitivity	UT Response	
(70°-85°)	0.1" SDH	75°	80	43 dB	.584" Sound Path
(25°-60°)	0.5" SDH	52°	80	24 dB	.802" Sound Path
(0°-25°)	0.5" SDH	0°	80	37 dB	.476" Sound Path
Channel Functional Checks		Pre Exam: Acceptable	Post Exam: Acceptable		
Number of Inactive Channels/Elements:		Transmit: 0	Receive: 0		

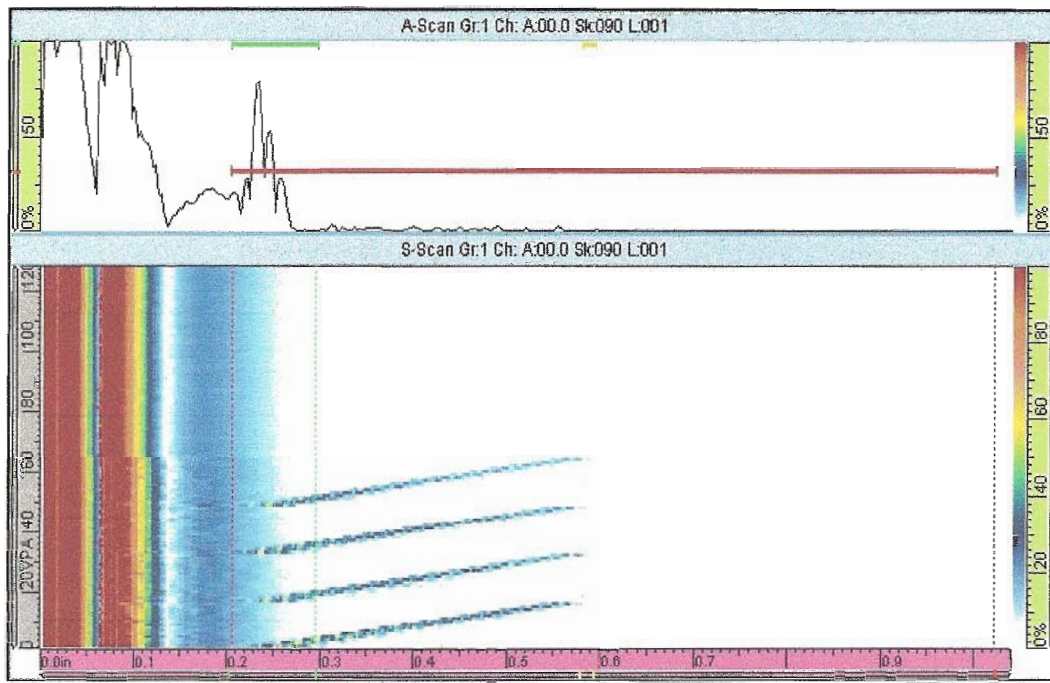
Calibration Performed	Examiner 1	Examiner 2	Level(s)	Date	Time
Initial:	Chris Van Ruler	Ryan Tolosky	II/II	10/17/09	0245
Intermediate:	N/A	N/A	N/A	N/A	N/A
Final:	Chris Van Ruler	Ryan Tolosky	II/II	10/17/09	0305



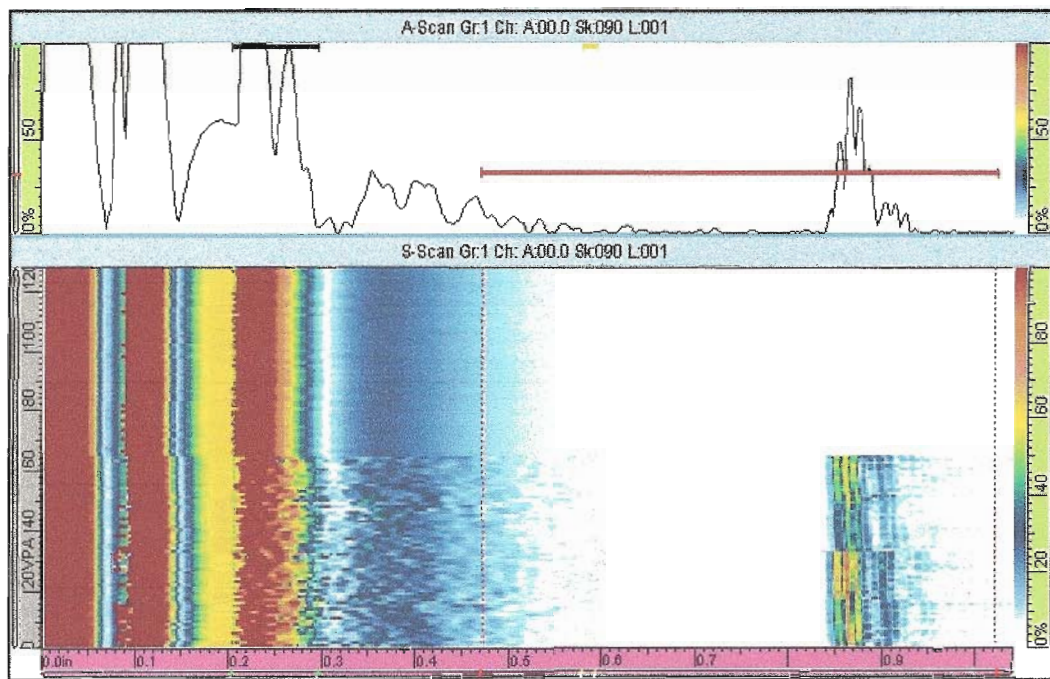
Element Check 1- Pre exam, off wedge



Element Check 2-Pre exam, on wedge



Element Check 3- Post exam, on wedge



Element Check 4-Post exam, off wedge

Phased Array Instrument Table 2 Essential Settings

Major Menu Item	Menu Item	Sub-menu Item	Setting
Reading			
	Result		
		Selector	List 1
		Field 1	A%
		Field 2	A^
		Field 3	SA
		Field 4	PA
UT			
	General		
		Gain	24 dB
		Start	0.00 in
		Range	1.896 in
		Wedge Delay	1.60 us
		Velocity	.2272 in/us
	Pulser		
		Pulser	1
		Tx/Rx Mode	PE
		Frequency	2
		Voltage	High
		PW	250ns (Auto)
		PRF	Optimum
	Receiver		
		Receiver	1
		Filter	None
		Rectifier	FW
		Video Filter	Off
		Averaging	1
		Reject	0
	Beam		
		Gain Offset	0.0 dB
		Scan Offset	-0.000 in
		Index Offset	-0.709 in
		Angle	52
		Skew	0.0°
		Beam Delay	8.52 us
	Advanced		
		dB Ref	Off
		Points Qty	452
		Scale Factor	6
		Sum Gain	22.0

Phased Array Instrument Table 2 Essential Settings (cont.)


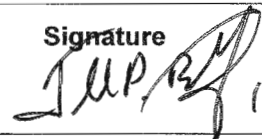

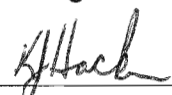

Major Menu Item	Menu Item	Sub-menu Item	Setting
Display			
	Selection		
		Display	A-S-[C]
		C-Scan 1	Off
		Group	Current
		Projection	On
	Rulers		
		UT Unit	True Depth
		% Ruler	Linear (%)
		DAC/TCG	Off
		Gate	On
		Cursor	Off
	Color		
		Select	Amplitude
		Start (%)	0.0
		End (%)	100.0
	Properties		
		Display	A-Scan
		Source	Normal
Probe Part			
	Select		
		Select	Select Tx/Rx
		Auto Detect	Off
	Position		
		Scan Offset (in)	0
		Index Offset (in)	0
	Parts		
		Geometry	Plate
		Thickness (in)	3.0 in
PGM Probe			
	Configuration		
		Scan Type	Sectorial
		Connection P:	1
	Laws		
		Auto Program	Off
Gate Alarm			
	Gate		
		Gate Select	Gate A
		Gate A Synchro	Pulse

ULTRASONIC PHASED ARRAY WOR ULTRASONIC EXAMINATION RECORD

Exam Data Sheet: 219-01-010 219-01-039		Calibration Data Sheet: 219-01-010 219-01-039	
Plant: Millstone Unit: 2		Procedure: ER-MP-NDE-UT-816/Rev. 0	
Zones DM Weld: 1-10 SS Weld: 1-22			
Date: 10/17/09		Exam Start: 0245	Exam Stop: 0330
WOR Identification DM Weld: BPY-C-3000		SS Weld: BPY-C-3002	
Component Configuration DM Weld: Nozzle to Safe End		SS Weld: Safe End to Pipe	
Weld Overlay Regions: Entire overlay surface			
Examination Surface: Surface of Weld Overlay		Reviewed Previous Data: N/A	
Temperature Gauge: PTC 312F		Serial Number: 268025	Component Temp: 80°
Percent Of Coverage Obtained: 100%		Examination Angles	
Weld Overlay Thickness:		Axial	Circumferential
Minimum: .45"		0° to 85°	N/A
Maximum: .70"			
Examination Sensitivity:		36 dB	N/A dB

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(2) Axial (Upstream)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(3) Circumferential (Clockwise)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(4) Circumferential (Counterclockwise)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments: Maintained 5% to 20% average baseline noise level during examination. No suspected flaw indications were observed during examinations.

Examiner	Level	Signature	Date	LMT Review	Level	Signature	Date
Chris Van Ruler	II		10/17/09	Todd Blechinger	III		10/19/09
Examiner	Level	Signature	Date	Site Review	Level	Signature	Date
Ryan Tolosky	II		10/17/09	Kevin Hacker	III		10/20/09
Other	Level	Signature	Date	ANII Review	Level	Signature	Date
N/A	N/A			E. York	N/A		10.20.2009

ULTRASONIC PHASED ARRAY WOR CALIBRATION REPORT

WOR Identification DM Weld:	BPY-C-3000	Calibration Data Sheet:	219-01-010
WOR Identification SS Weld:	BPY-C-3002	Calibration Data Sheet:	219-01-039
Plant/Unit:	Millstone / 2	Procedure No. / Rev:	ER-MP-NDE-UT-816/ Rev.0

Wedge		Comments:
Manufacturer:	GEIT	See attached EPRI correspondence for Probe, Wedge and Focal Law information.
Model:	360-152-234	
Nominal Wedge Angle:	52°	
Measured Wedge Angle:	52°	
Contour Diameter:	5.50" CIRC OD	
Scan Direction:	Circumferential	
Nominal Index Location:	.75"	
Zero Reference:	Front of Probe	

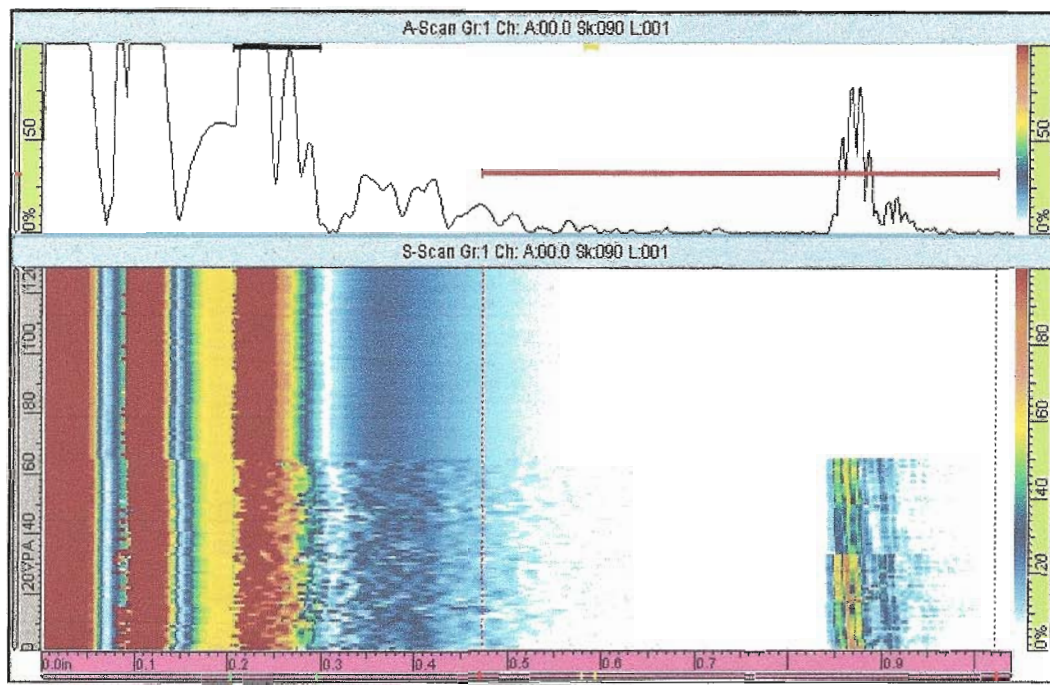
Instrument		Search Unit	
Manufacturer:	Zetec	Manufacturer:	GEIT
Model:	Omniscan 32/128 PR	Model:	115-000-631
PA Module Serial Number:	Omni-Z-6034	Serial Number:	01Y28Y-1/ 01Y28Y-2
UT Mainframe Serial Number:	Omni-Z-1062		
Software Revision:	1.4R3		
Table 2 Instrument Settings:	See attached		
		Search Unit Integral Cable	
		Type:	See cable diagram
		Length:	See cable diagram
		Connector Type #:	See cable diagram

Couplant:	Soundsafe	Temperature Gauge:	PTC 312F
Manufacturer:	Sonotech Inc.	Serial Number:	268025
Batch Number:	07220H		

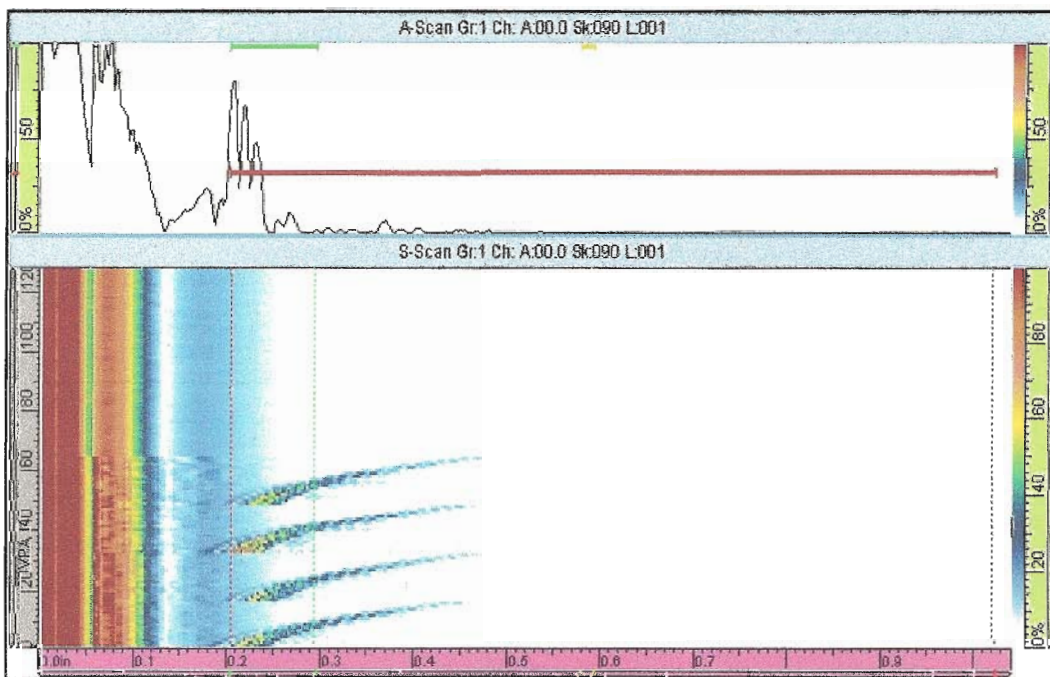
Calibration Data Files	
Focal Law:	032NJDZ2234L0082R2M1Z4_1.125MP.LAW
Angles Generated:	0° to 82°
Wave Mode:	Longitudinal
Focal Sound Path:	1.125" MP

Calibration Reflector Data					
Calibration Block(s): 6039038		MEUXE017A (.1" SDH only)		Temperature: 80°	
Calibration Reflector	Angle	% FSH	Ref. Sensitivity	UT Response	
(70°-85°)	0.1" SDH	70°	80	42 dB	.644" Sound Path
(25°-60°)	0.5" SDH	45°	80	22 dB	.920" Sound Path
(0°-25°)	0.5" SDH	0°	80	31 dB	.568" Sound Path
Channel Functional Checks		Pre Exam: Acceptable	Post Exam: Acceptable		
Number of Inactive Channels/Elements:		Transmit: 0	Receive: 0		

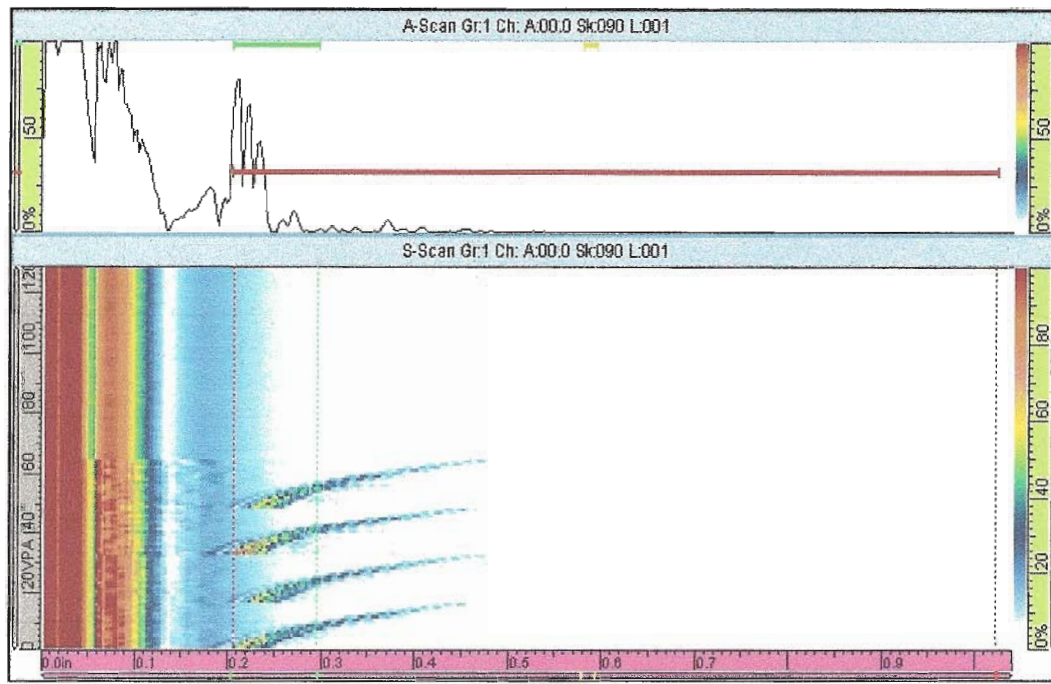
Calibration Performed	Examiner 1	Examiner 2	Level(s)	Date	Time
Initial:	Chris Van Ruler	Ryan Tolosky	II/II	10/17/09	0308
Intermediate:	N/A	N/A	N/A	N/A	N/A
Final:	Chris Van Ruler	Ryan Tolosky	II/II	10/17/09	0330



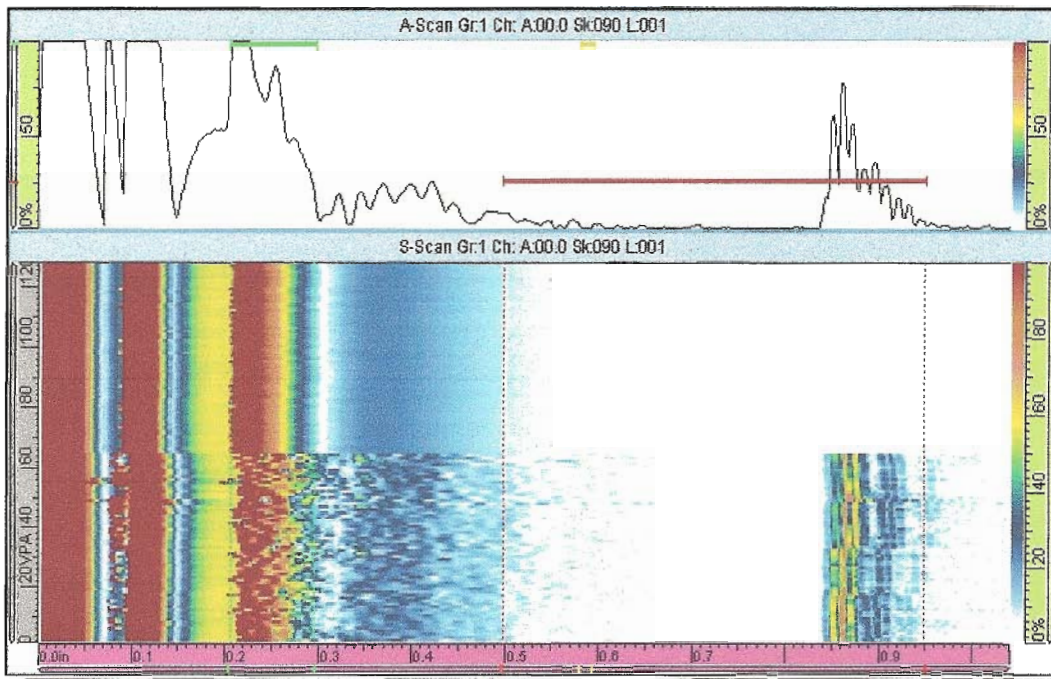
Element Check 5- Pre exam off wedge



Element Check 6-Pre exam, on wedge



Element Check 7- Post exam on wedge



Element Check 8-Post exam, off wedge

Phased Array Instrument Table 2 Essential Settings

Major Menu Item	Menu Item	Sub-menu Item	Setting
Reading			
	Result		
		Selector	List 1
		Field 1	A%
		Field 2	A^
		Field 3	SA
		Field 4	PA
UT			
	General		
		Gain	22 dB
		Start	0.00 in
		Range	1.452 in
		Wedge Delay	.90 us
		Velocity	.2272 in/us
	Pulser		
		Pulser	1
		Tx/Rx Mode	PE
		Frequency	2
		Voltage	High
		PW	250ns (Auto)
		PRF	Optimum
	Receiver		
		Receiver	1
		Filter	None
		Rectifier	FW
		Video Filter	Off
		Averaging	1
		Reject	0
	Beam		
		Gain Offset	0.0 dB
		Scan Offset	-0.001 in
		Index Offset	-0.722 in
		Angle	45
		Skew	0.0°
		Beam Delay	7.21 us
	Advanced		
		dB Ref	Off
		Points Qty	452
		Scale Factor	4
		Sum Gain	22.0

Phased Array Instrument Table 2 Essential Settings (cont.)


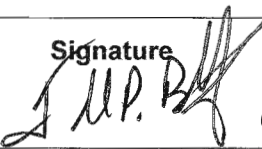

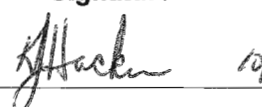
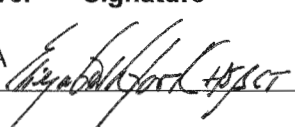
Major Menu Item	Menu Item	Sub-menu Item	Setting
Display			
	Selection		
		Display	A-S-[C]
		C-Scan 1	Off
		Group	Current
		Projection	On
	Rulers		
		UT Unit	True Depth
		% Ruler	Linear (%)
		DAC/TCG	Off
		Gate	On
		Cursor	Off
	Color		
		Select	Amplitude
		Start (%)	0.0
		End (%)	100.0
	Properties		
		Display	A-Scan
		Source	Normal
Probe Part			
	Select		
		Select	Select Tx/Rx
		Auto Detect	Off
	Position		
		Scan Offset (in)	0
		Index Offset (in)	0
	Parts		
		Geometry	Plate
		Thickness (in)	3.0 in
PGM Probe			
	Configuration		
		Scan Type	Sectorial
		Connection P:	1
	Laws		
		Auto Program	Off
Gate Alarm			
	Gate		
		Gate Select	Gate A
		Gate A Synchro	Pulse

ULTRASONIC PHASED ARRAY WOR ULTRASONIC EXAMINATION RECORD

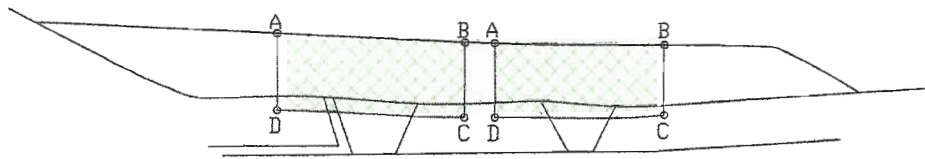
Exam Data Sheet: 219-01-010		219-01-039		Calibration Data Sheet: 219-01-010		219-01-039	
Plant: Millstone		Unit: 2		Procedure: ER-MP-NDE-UT-816/Rev. 0			
Zones DM Weld: 1-10		SS Weld: 1-22					
Date: 10/17/09		Exam Start: 0245		Exam Stop: 0330			
WOR Identification DM Weld: BPY-C-3000		SS Weld: BPY-C-3002					
Component Configuration DM Weld: Nozzle to Safe End		SS Weld: Safe End to Pipe					
Weld Overlay Regions: Entire overlay surface							
Examination Surface: Surface of Weld Overlay				Reviewed Previous Data: N/A			
Temperature Gauge: PTC 312F		Serial Number: 268025		Component Temp: 80°			
Percent Of Coverage Obtained: 100%				Examination Angles			
Weld Overlay Thickness:				<u>Axial</u>		<u>Circumferential</u>	
Minimum: .45"				N/A		0° to 82°	
Maximum: .70"							
Examination Sensitivity:				N/A dB		34.0 dB	

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(2) Axial (Upstream)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(3) Circumferential (Clockwise)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(4) Circumferential (Counterclockwise)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

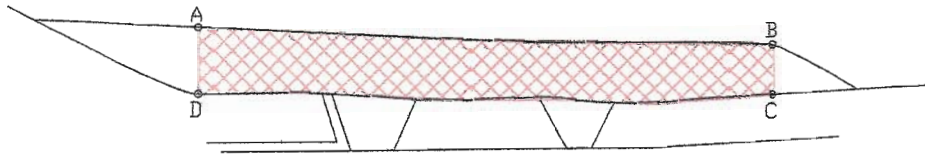
Comments: Maintained 5% to 20% average baseline noise level during examination. No suspected flaw indications were observed during examinations.

Examiner	Level	Signature	Date	LMT Review	Level	Signature	Date
Chris Van Ruler	II		10/17/09	Todd Blechinger	III		10/19/09
Examiner	Level	Signature	Date	Site Review	Level	Signature	Date
Ryan Tolosky	II		10/17/09	Kevin Hacker	III		10/20/09
Other	Level	Signature	Date	ANII Review	Level	Signature	Date
N/A	N/A			E. York	N/A		10/20/09

Coverage Plot


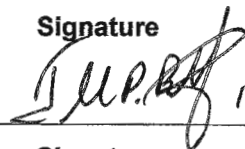

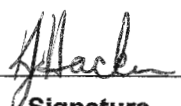
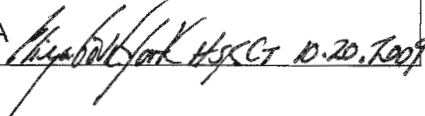


ISI Examination Volume A-B-C-D



PSI Examination Volume A-B-C-D

Scale: NOT TO SCALE

Examiner	Level	Signature	Date	LMT Review	Level	Signature	Date
Chris Van Ruler	II		10/17/09	Todd Blechinger	III		10/19/09
Examiner	Level	Signature	Date	Site Review	Level	Signature	Date
Ryan Tolosky	II		10/17/09	Kevin Hacker	III		10/20/09
Other	Level	Signature	Date	ANII Review	Level	Signature	Date
N/A	N/A			E. York	N/A		10.20.2009



September 23, 2009

Kevin Hacker
Dominion Corporate NDE Level III
Dominion Generation
Innsbrook Technical Center (M/S 3NE)
5000 Dominion Blvd
Glen Allen, VA 23060-3308

Subject: Phased Array Wedge Designs for Weld Overlay Examinations at Millstone 2 (Fall 2009)

Dear Mr. Hacker:

As requested, please find included with this letter the ultrasonic phased array wedge information for use with the EPRI Procedure for Manual Phased Array Ultrasonic Examination of Weld Overlaid Similar and Dissimilar Metal Welds (EPRI-WOL-PA-1) at Dominion's Millstone Power Station Unit 2 in the fall of 2009. These weld overlay inspections will require the use of one 2.0 MHz 2x16 ultrasonic phased array dual transducer with six wedges all manufactured by General Electric Inspection Technologies (GEIT) with the Zetec OmniScan 32-128 P/R phased array instrument (See Figure 1).

Table A indicates which GEIT wedge shall be used for each weld overlaid component while Table B contains the Zetec Advanced Phased Array Calculator 1.2R4 (ZAPAC 1.2R4) CAL file for each corresponding GEIT wedge and focal metal path distance. While these CAL files are attached to this letter, each should be loaded into ZAPAC 1.2R4 and verified with the settings contained in the EPRI report: Nondestructive Evaluation: Procedure for Manual Phased Array UT of Weld Overlays (Product ID 1015134). Figures 2 through 11 contain screen captures of the ZAPAC 1.2R4 for each CAL file. The user shall verify all of the parameters in the ZAPAC 1.2R4 for each CAL file with those found in the 1015134 EPRI report prior to generating a corresponding LAW file for field use.

It is important to note that the "O32NJDZ2232L0079R2M1Z4" and "O32NJDZ2234L0082R2M1Z4" CAL files only allow the user to generate a maximum angle range of 0° to 79° and 0° to 82° respectively instead of the 0° to 85° recommended in the procedure. These smaller angle ranges were formally demonstrated through the Performance Demonstration Initiative (PDI) Program for use with the OmniScan instruments and are acceptable for use (see EPRI-WOL-PA-1).

For your convenience, I have attached two OmniScan 32-128 P/R setup files (WOLPA1.ops - for basic setup, WOLPA1_ChannelCheck.ops - for channel/element checks) as a starting point for you to build your own setup files for the examination. You will need to verify all the parameters in the attached files prior to field use.

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Please note that ZAPAC 1.2R4 is a standalone program that is also embedded in the Zetec UltraVision 1.2R4 software. The ZAPAC 1.2R4 standalone and embedded programs are equivalent for LAW file generation. Please let us know if you have any comments or questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Mark D", with a long horizontal stroke extending to the right.

Mark Dennis
EPRI Senior Project Manager

Attachment

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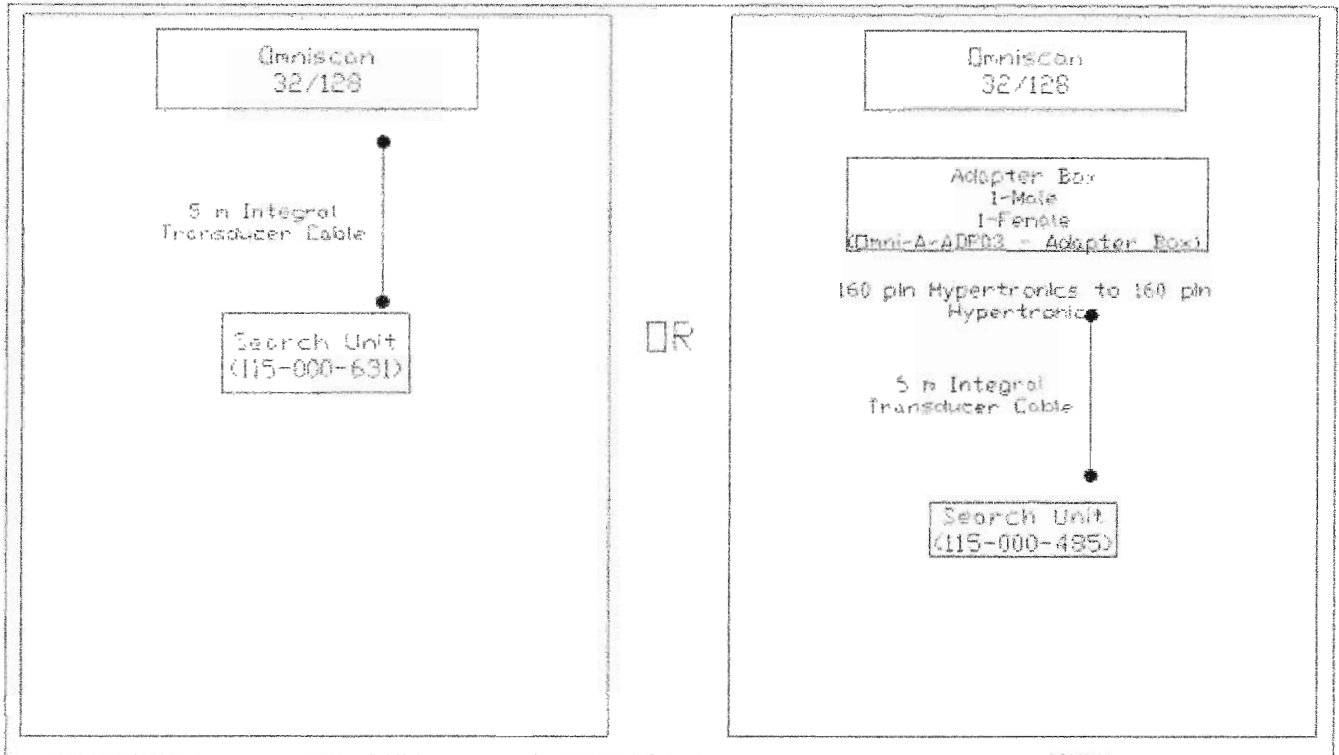


Figure 1. OmniScan 32-128 P/R Cable Diagram for EPRI-WOL-PA-1

Table A. GEIT Wedge Component Applicability

Zone	Weld Number	Location / Description	Wedge Contour Required Wedges	GEIT Axial Wedge Part #	GEIT Circ Wedge Part #
1-07	BPD-C-1017	2" Drain Line Loop 1A	4.125"	360-152-233	360-152-232
1-09	BPD-C-3000	2" Drain line Loop 1B			
1-11	BPD-C-2001	2" Drain line Loop 2A			
1-12	BCH-C-2001	2" Charging line Loop 2A			
1-08	BCH-C-1001	2" Charging Line Loop 1A	5.50"	360-152-235	360-152-234
1-08	BPY-C-1001	3" Spray line Loop 1A			
1-10	BPY-C-3000	3" Spray Line Loop 1B	16.75"	360-152-079	360-152-078
1-08	BSI-C-1001	12" Safety Injection 1A			
1-10	BSI-C-3000	12" Safety Injection 1B			
1-14	BSI-C-4000	12" Safety Injection 2B			
1-05	BPS-C-1001	12" Hot leg Surge Line Loop 1			
1-06	BSD-C-2001	12" SDC line Loop 1			
1-12	BSI-C-2001	12" Safety Injection Loop 2A			

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Table B. GEIT Wedge CAL File Applicability

GEIT Part #	Diameter (in)	Scanning Direction	Focal Metal Path (in)	CAL Filename	Weld Overlay Thickness (WOLT) Range
360-152-232	4.125	Circ.	0.5	O32NJDS2232L0085R2M1Z4	WOLT ≤ 0.20in
360-152-233	4.125	Axial	0.5	O32NJDS2233L0085R2M1Z4	WOLT ≤ 0.20in
360-152-232	4.125	Circ.	1.125	O32NJDZ2232L0079R2M1Z4	0.20in < WOLT < 0.75in
360-152-233	4.125	Axial	1.125	O32NJDZ2233L0085R2M1Z4	0.20in < WOLT < 0.75in
360-152-234	5.500	Circ.	1.125	O32NJDZ2234L0082R2M1Z4	0.20in < WOLT < 0.75in
360-152-235	5.500	Axial	1.125	O32NJDZ2235L0085R2M1Z4	0.20in < WOLT < 0.75in
360-152-078	16.750	Circ.	1.125	O32NJDZ2078L0085R2M1Z4	0.20in < WOLT < 0.75in
360-152-079	16.750	Axial	1.125	O32NJDZ2079L0085R2M1Z4	0.20in < WOLT < 0.75in
360-152-078	16.750	Circ.	1.5	O32NJDB2078L0085R2M1Z4	WOLT ≥ 0.75in
360-152-079	16.750	Axial	1.5	O32NJDB2079L0085R2M1Z4	WOLT ≥ 0.75in

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | **2-D Matrix array** | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation

Scan

Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point: Process angles

Focal points selection

Focusing type: Half path DDF

Interpolation: ON

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.0000	0.0000

Emission focus position (in): 0.5000

Reception focus position (in): 0.5000

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	5	30	1
Secondary axis pulser	1	1	1
Primary axis aperture	8	Single Hyperbolic	
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection

Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration: 1234 5678 Type 1

Probe skew angle (deg)	0.0
Probe frequency (MHz)	2.00
Number of elements on primary axis	16
Number of elements on secondary axis	2
Primary axis pitch (in)	0.0689
Secondary axis pitch (in)	0.1575
<input checked="" type="checkbox"/> Pitch and Catch	Probe separation (in): 0.7716
<input checked="" type="checkbox"/> Symmetric	Squint angle (deg): 0.0
<input type="checkbox"/> Reverse primary axis	<input checked="" type="checkbox"/> Reverse secondary axis

Specimen: Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/us)	0.2272
Thickness (in)	0.6000
Radius (in)	2.0626

Wedge: 360-152-232

Footprint: Curvature along primary axis

Wedge angle (deg)	13.6
Roof angle (deg)	7.5
Sound velocity (in/us)	0.0921
Height at the middle of the first element (in)	0.2402
Primary axis offset of the middle of the first element (in)	0.1201
Secondary axis offset of the middle of the first element (in)	0.3532
Primary axis position of wedge reference (in)	-1.4201
Secondary axis position of wedge reference (in)	-0.7390
Distance between contact points (wedge length) (in)	1.4201
Wedge width (in)	1.4781

Load... Save As... Close Draw

Figure 2.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-232; Diameter (in) = 4.125; Scanning Direction = Circumferential; Focal Metal Path (in) = 0.5

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation

Scan

Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point Process angles

Focal points selection

Focusing type: Half path

Offset: 0.0000 Depth: 0.0000

Emission focus position (in): 0.5000 Reception focus position (in): 0.5000

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	5	32	1
Secondary axis pulser	1		
Primary axis aperture	8		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection

Type: OmniScan 32/128

Probe

115-000-485/631

Elements configuration

1234 5678 Type 1

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

☒ Pitch and Catch

☒ Symmetric

☐ Reverse primary axis

Probe separation (in): 0.7689

Squint angle (deg): 0.0

☒ Reverse secondary axis

Specimen

Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/us): 0.2272

Thickness (in): 0.8000

Radius (in): 2.0626

Wedge

360-152-233

Footprint

Curvature along secondary axis

Wedge angle (deg): 18.3

Roof angle (deg): 11.1

Sound velocity (in/us): 0.0921

Height at the middle of the first element (in): 0.2823

Primary axis offset of the middle of the first element (in): 0.1150

Secondary axis offset of the middle of the first element (in): 0.3496

Primary axis position of wedge reference (in): -1.4401

Secondary axis position of wedge reference (in): -0.7325

Wedge length (in): 1.4401

Distance between contact points (wedge width) (in): 1.4651

Load... Save As... Close Draw

Figure 3.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-233; Diameter (in) = 4.125; Scanning Direction = Axial; Focal Metal Path (in) = 0.5

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	79.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point

Focal points selection

Focusing type: Half path

Interpolation: ON

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.0000	0.0000

Emission focus position (in): 1.1250

Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	32	
Secondary axis pulser	1		
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: OmniScan 32/128

Probe
115-000-485/631

Elements configuration
1234 Type 1
5678

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

☒ Pitch and Catch

Probe separation (in): 0.7716

☒ Symmetric

Squint angle (deg): 0.0

☐ Reverse primary axis

☒ Reverse secondary axis

Specimen
Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/us): 0.2272

Thickness (in): 0.8000

Radius (in): 2.0626

Wedge
360-152-232

Footprint
Curvature along primary axis

Wedge angle (deg): 13.6

Roof angle (deg): 7.5

Sound velocity (in/us): 0.0921

Height at the middle of the first element (in): 0.2402

Primary axis offset of the middle of the first element (in): 0.1201

Secondary axis offset of the middle of the first element (in): 0.3532

Primary axis position of wedge reference (in): -1.4201

Secondary axis position of wedge reference (in): -0.7390

Distance between contact points (wedge length) (in): 1.4201

Wedge width (in): 1.4781

Load... Save As... Close Draw

Figure 4.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-232; Diameter (in) = 4.125; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan

Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	0.0
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point

Focal points selection

Focusing type: Half path

Interpolation: ON

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.0000	0.0000

Emission focus position (in): 1.1250

Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	32	
Secondary axis pulser	1		
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection

Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration

1234
5678 Type 1

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

☒ Pitch and Catch

Probe separation (in): 0.1653

☒ Symmetric

Squint angle (deg): 0.0

☐ Reverse primary axis

☒ Reverse secondary axis

Specimen

Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/μs): 0.2272

Thickness (in): 0.8000

Radius (in): 2.0626

Wedge: 360-152-233

Footprint

Curvature along secondary axis

Wedge angle (deg): 18.3

Roof angle (deg): 11.1

Sound velocity (in/μs): 0.0921

Height at the middle of the first element (in): 0.2823

Primary axis offset of the middle of the first element (in): 0.1150

Secondary axis offset of the middle of the first element (in): 0.3496

Primary axis position of wedge reference (in): -1.4401

Secondary axis position of wedge reference (in): -0.7325

Wedge length (in): 1.4401

Distance between contact points (wedge width) (in): 1.4651

Load... Save As... Close Draw

Figure 5.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-233; Diameter (in) = 4.125; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	82.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point: Process angles

Focal points selection

Focusing type: Half path ☐ ODF

Interpolation: ☐ TH

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.5000	0.0000

Emission focus position (in): 1.1250

Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	32	
Secondary axis pulser	1	1	
Primary axis aperture	16		Single Hyperbolic
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration: 1234 Type 1
5678

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

☒ Pitch and Catch Probe separation (in): 0.7716

☒ Symmetric Squint angle (deg): 0.0

☐ Reverse primary axis ☒ Reverse secondary axis

Specimen: Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/μs): 0.2272

Thickness (in): 0.8000

Radius (in): 2.7501

Wedge: 360-152-234

Footprint: Curvature along primary axis

Wedge angle (deg): 14.2

Roof angle (deg): 7.5

Sound velocity (in/μs): 0.0921

Height at the middle of the first element (in): 0.2008

Primary axis offset of the middle of the first element (in): 0.1291

Secondary axis offset of the middle of the first element (in): 0.3532

Primary axis position of wedge reference (in): -1.4301

Secondary axis position of wedge reference (in): -0.7390

Distance between contact points (wedge length) (in): 1.4301

Wedge width (in): 1.4781

Load... Save As... Close Draw

Figure 6.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-234; Diameter (in) = 5.5; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	0.0
Secondary steering angle (deg)	0.0	0.0	0.0
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point: Process angles

Focal points selection

Focusing type: Half path

Offset: 0.0000, Depth: 0.0000, Interpolation: ON

Focal plane position (in): 0.0000

Emission focus position (in): 1.1250, Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	0	
Secondary axis pulser	1		
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration: 1234 5678 Type 1

Probe skew angle (deg): 0.0
Probe frequency (MHz): 2.00
Number of elements on primary axis: 16
Number of elements on secondary axis: 2
Primary axis pitch (in): 0.0689
Secondary axis pitch (in): 0.1575
☒ Pitch and Catch
☒ Symmetric
☐ Reverse primary axis
Probe separation (in): 0.0
Squint angle (deg): 0.0
☒ Reverse secondary axis

Specimen: Default

Specimen type: Pipe OD
Wave type: Longitudinal
Sound velocity (in/μs): 0.2272
Thickness (in): 0.8000
Radius (in): 2.7501

Wedge: 360-152-235

Footprint: Curvature along secondary axis

Wedge angle (deg): 18.2
Roof angle (deg): 10.2
Sound velocity (in/μs): 0.0921
Height at the middle of the first element (in): 0.2579
Primary axis offset of the middle of the first element (in): 0.1264
Secondary axis offset of the middle of the first element (in): 0.3506
Primary axis position of wedge reference (in): -1.4371
Secondary axis position of wedge reference (in): -0.7345
Wedge length (in): 1.4371
Distance between contact points (wedge width) (in): 1.4691

Load... Save As... Close Draw

Figure 7.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-235; Diameter (in) = 5.5; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point: [] Focus angle: []

Focal points selection

Focusing type: Half path

Interpolation: [] ON

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.0000	0.0000

Emission focus position (in): 1.1250

Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	1	
Secondary axis pulser	1	1	
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration: 1234 5678 Type 1

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

☒ Pitch and Catch

Probe separation (in): 0.7611

☒ Symmetric

Squint angle (deg): 0.0

☐ Reverse primary axis

☒ Reverse secondary axis

Specimen: Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/μs): 0.2272

Thickness (in): 1.5001

Radius (in): 8.3753

Wedge: 360-152-078

Footprint: Curvature along primary axis

Wedge angle (deg): 16.2

Roof angle (deg): 4.2

Sound velocity (in/μs): 0.0921

Height at the middle of the first element (in): 0.2587

Primary axis offset of the middle of the first element (in): 0.1311

Secondary axis offset of the middle of the first element (in): 0.3065

Primary axis position of wedge reference (in): -1.4141

Secondary axis position of wedge reference (in): -0.6870

Distance between contact points (wedge length) (in): 1.4141

Wedge width (in): 1.3741

Load... Save As... Close Draw

Figure 8.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-078; Diameter (in) = 16.75; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan

Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	1.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point Process angles

Focal points selection

Focusing type: Half path

Interpolation: ON

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.0010	0.0000

Emission focus position (in): 1.1250

Reception focus position (in): 1.1250

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	32	
Secondary axis pulser	1		
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection

Type: OmniScan 32/128

Probe: 115-000-485/631

Elements configuration

1234 Type 1

5678

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

☒ Pitch and Catch

Probe separation (in): 0.0046

☒ Symmetric

Squint angle (deg): 0.0

☐ Reverse primary axis

☒ Reverse secondary axis

Specimen

Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/us): 0.2272

Thickness (in): 1.5001

Radius (in): 8.3753

Wedge

360-152-079

Footprint

Curvature along secondary axis

Wedge angle (deg): 18.5

Roof angle (deg): 5.7

Sound velocity (in/us): 0.0921

Height at the middle of the first element (in): 0.2547

Primary axis offset of the middle of the first element (in): 0.1961

Secondary axis offset of the middle of the first element (in): 0.3048

Primary axis position of wedge reference (in): -1.4210

Secondary axis position of wedge reference (in): -0.7070

Wedge length (in): 1.4210

Distance between contact points (wedge width) (in): 1.4141

Load... Save As... Close Draw

Figure 9.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-079; Diameter (in) = 16.75; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

September 23, 2009
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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | **2-D Matrix array** | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: **Azimuthal**

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point ... **Prescan angles**

Focal points selection

Focusing type: **Half path** ☐ DOF ☐ Interpolation ☐ ON

Focal plane position (in)

- Offset -	- Depth -
0.0000	0.0000
0.0000	0.0000

Emission focus position (in): 1.5000
Reception focus position (in): 1.5000

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	32	
Secondary axis pulser	1	1	
Primary axis aperture	16		
Secondary axis aperture	2		
Pulser connection	1		
Receiver connection	33		

Hardware selection
Type: **OmniScan 32/128**

Probe
115-000-485/631

Elements configuration
1234 Type 1
5678

Probe skew angle (deg)	0.0
Probe frequency (MHz)	2.00
Number of elements on primary axis	16
Number of elements on secondary axis	2
Primary axis pitch (in)	0.0689
Secondary axis pitch (in)	0.1575
<input checked="" type="checkbox"/> Pitch and Catch	Probe separation (in): 0.7611
<input checked="" type="checkbox"/> Symmetric	Squint angle (deg): 0.0
<input type="checkbox"/> Reverse primary axis	<input checked="" type="checkbox"/> Reverse secondary axis

Specimen
Default

Specimen type: **Pipe OD**

Wave type: **Longitudinal**

Sound velocity (in/ μ s)	0.2272
Thickness (in)	1.5001
Radius (in)	8.3753

Wedge
360-152-078

Footprint
Curvature along primary axis

Wedge angle (deg)	16.2
Roof angle (deg)	4.2
Sound velocity (in/ μ s)	0.0921
Height at the middle of the first element (in)	0.2587
Primary axis offset of the middle of the first element (in)	0.1311
Secondary axis offset of the middle of the first element (in)	0.3065
Primary axis position of wedge reference (in)	-1.4141
Secondary axis position of wedge reference (in)	-0.6870
Distance between contact points (wedge length) (in)	1.4141
Wedge width (in)	1.3741

Load... Save As... Close Draw

Figure 10.

ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-078; Diameter (in) = 16.75; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.5

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Zetec Advanced PA Calculator 1.2R4

File View Unit Overlay ?

1-D Linear array | 1-D Circular array | 1-D Annular array | 2-D Matrix array | Tandem array | Focal Laws Display Info | Elements info | Beam Simulation |

Scan
Type: Azimuthal

Beam angles selection

	- Start -	- Stop -	- Resolution -
Primary steering angle (deg)	0.0	0.0	1.00
Secondary steering angle (deg)	0.0	0.0	1.00
Refr. angle (deg)	0.0	85.0	1.00
Beam skew angle (deg)	0.0	0.0	1.00

Select focal point: Process angles

Focal points selection

Focusing type: Half path

Focal plane position (in): 0.0000

Emission focus position (in): 1.5000

Reception focus position (in): 5.000

Elements selection

	- Start -	- Stop -	- Resolution -
Primary axis pulser	1	1	1
Secondary axis pulser	1	1	1
Primary axis aperture	16	16	1
Secondary axis aperture	2	2	1
Pulser connection	1	1	1
Receiver connection	33	33	1

Hardware selection
Type: OmniScan 32/128

Probe
115-000-485/631

Elements configuration
1234 Type 1
5678

Probe skew angle (deg): 0.0

Probe frequency (MHz): 2.00

Number of elements on primary axis: 16

Number of elements on secondary axis: 2

Primary axis pitch (in): 0.0689

Secondary axis pitch (in): 0.1575

Pitch and Catch: ☒ Symmetric

Probe separation (in): 1.8048

Squint angle (deg): 0.0

Reverse primary axis: ☐ Reverse secondary axis: ☒

Specimen
Default

Specimen type: Pipe OD

Wave type: Longitudinal

Sound velocity (in/us): 0.2272

Thickness (in): 1.5001

Radius (in): 8.3753

Wedge
360-152-079

Footprint
Curvature along secondary axis

Wedge angle (deg): 18.5

Roof angle (deg): 5.7

Sound velocity (in/us): 0.0921

Height at the middle of the first element (in): 0.2547

Primary axis offset of the middle of the first element (in): 0.1961

Secondary axis offset of the middle of the first element (in): 0.3048

Primary axis position of wedge reference (in): -1.4210

Secondary axis position of wedge reference (in): -0.7070

Wedge length (in): 1.4210

Distance between contact points (wedge width) (in): 1.4141

Load... Save As... Close Draw

Figure 11.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-079; Diameter (in) = 16.75; Scanning Direction = Axial; Focal Metal Path (in) = 1.5

BPD-C-1017 / BPD-C-1019

2-inch Cold Leg Drain Line Loop 1A

Data Package No: 219-01-005



Reference ID: BPD-C-1017



AWO: 53102184598



Page #	Data Type	Exam Angle	Recordable	Limitations	Comments
1	C	0-85°			
2	C				
3	C				
4	C				
5	C				
6	E				
7	C	0-79°			
8	C				
9	C				
10	C				
11	C				
12	E				
13	P	0-85°			

% of Required Exam Area: 100 %

Final Disposition: ACCEPTABLE

Previous Data Review

UT ☒ A RT ☐

Dominion Review: KTHacker

Level: III

Review Date: 10/26/09

Legend: UT Data Type Reference

A = Additional Info
B = Beam Spread
C = Calibration Data
E = Examination Data
L = Linearity
P = Coverage Plot
S = Sketch
T = Thickness

Comments:



Data Package No: 219-01-035



Reference ID: BPD-C-1019



AWO: 53102184598



Page #	Data Type	Exam Angle	Recordable	Limitations	Comments
1	C	0-85°			
2	C				
3	C				
4	C				
5	C				
6	E				
7	C	0-79°			
8	C				
9	C				
10	C				
11	C				
12	E				
13	P	0-85°			

% of Required Exam Area: 100%

Final Disposition: ACCEPTABLE 10/24/09

Previous Data Review

UT ☒ N/A RT ☐

Dominion Review: KJHacker JHacker

Level: III

Review Date: 10/26/09

Legend: UT Data Type Reference

A = Additional Info
B = Beam Spread
C = Calibration Data
E = Examination Data
L = Linearity
P = Coverage Plot
S = Sketch
T = Thickness

Comments:



ULTRASONIC PHASED ARRAY WOR CALIBRATION REPORT

WOR Identification DM Weld:	BPD-C-1017	Calibration Data Sheet:	219-01-005
WOR Identification SS Weld:	BPD-C-1019	Calibration Data Sheet:	219-01-035
Plant/Unit:	Millstone / 2	Procedure No. / Rev:	ER-MP-NDE-UT-816/ Rev.0

Wedge	Comments:
Manufacturer: GEIT	See attached EPRI correspondence for Probe, Wedge and Focal Law information.
Model: 360-152-233	
Nominal Wedge Angle: 52°	
Measured Wedge Angle: 52°	
Contour Diameter: 4.125" AX OD	
Scan Direction: Axial	
Nominal Index Location: .70"	
Zero Reference: Front of Probe	

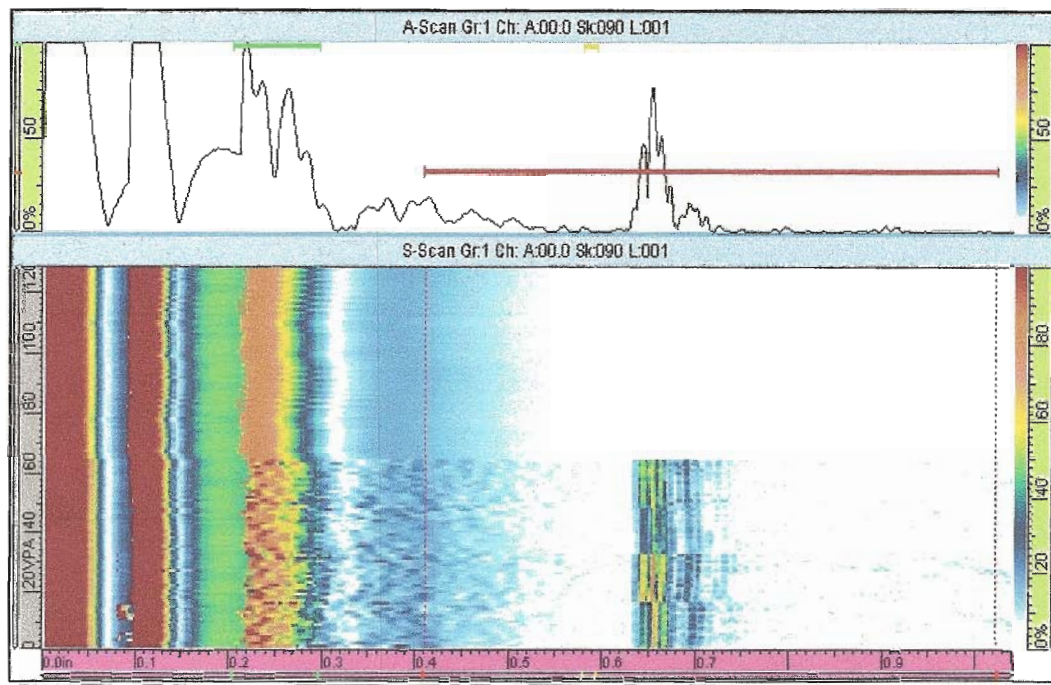
Instrument	Search Unit
Manufacturer: Zetec	Manufacturer: GEIT
Model: Omniscan 32/128 PR	Model: 115-000-631
PA Module Serial Number: Omni-Z-6034	Serial Number: 01Y28X-1/ 01Y28X-2
UT Mainframe Serial Number: Omni-Z-1062	
Software Revision: 1.4R3	
Table 2 Instrument Settings: See attached	
	Search Unit Integral Cable
	Type: See cable diagram
	Length: See cable diagram
	Connector Type #: See cable diagram

Couplant: Soundsafe	Temperature Gauge: PTC 312F
Manufacturer: Sonotech Inc.	Serial Number: 268025
Batch Number: 07220H	

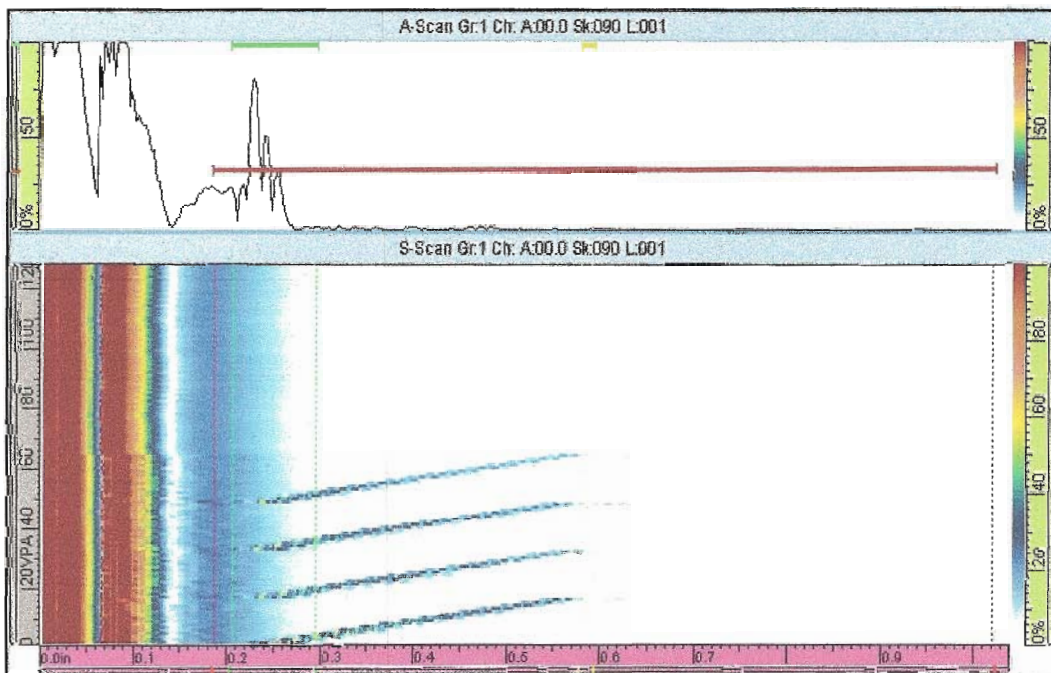
Calibration Data Files	
Focal Law:	032NJDZ2233L0085R2M1Z4_1.125MP.LAW
Angles Generated:	0° to 85°
Wave Mode:	Longitudinal
Focal Sound Path:	1.125" MP

Calibration Reflector Data					
Calibration Block(s): CB-04-171		9C-041(.1" SDH only)		Temperature: 76°	
Calibration Reflector	Angle	% FSH	Ref. Sensitivity	UT Response	
(70°-85°) 0.1" SDH	75°	80	38 dB	.603"	Sound Path
(25°-60°) 0.5" SDH	52°	80	25 dB	.816"	Sound Path
(0°-25°) 0.5" SDH	0°	80	36 dB	.491"	Sound Path
Channel Functional Checks		Pre Exam: Acceptable	Post Exam: Acceptable		
Number of Inactive Channels/Elements:		Transmit: 0	Receive: 0		

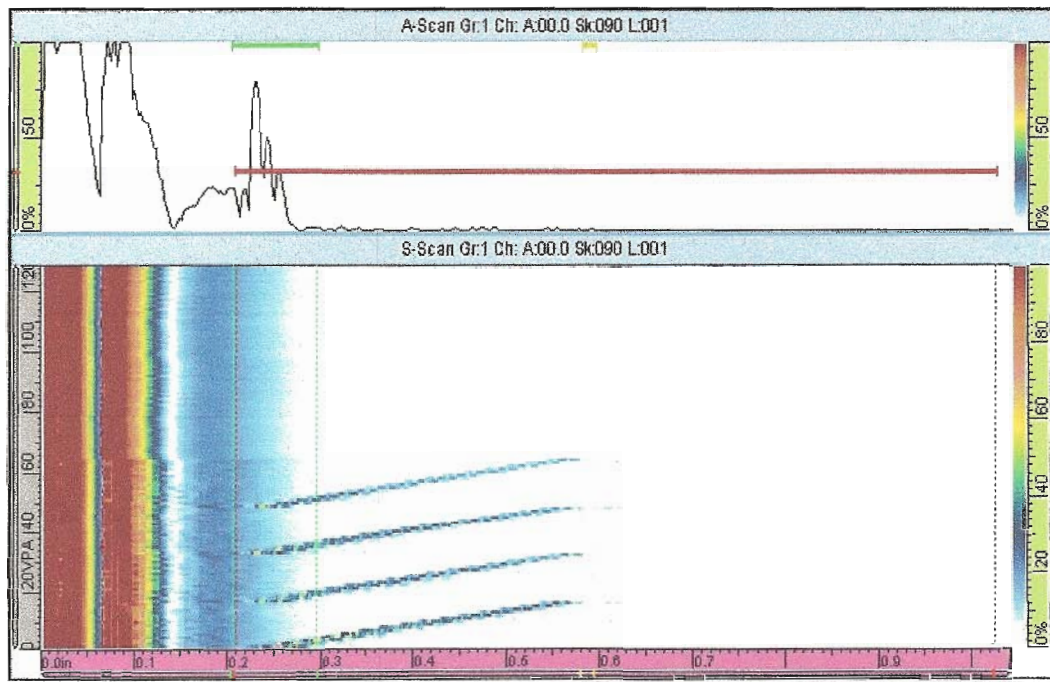
Calibration Performed	Examiner 1	Examiner 2	Level(s)	Date	Time
Initial:	Todd Blechinger	N/A	III	10/24/09	0530
Intermediate:	Todd Blechinger	N/A	III	10/24/09	0540
Final:	Todd Blechinger	N/A	III	10/24/09	0555



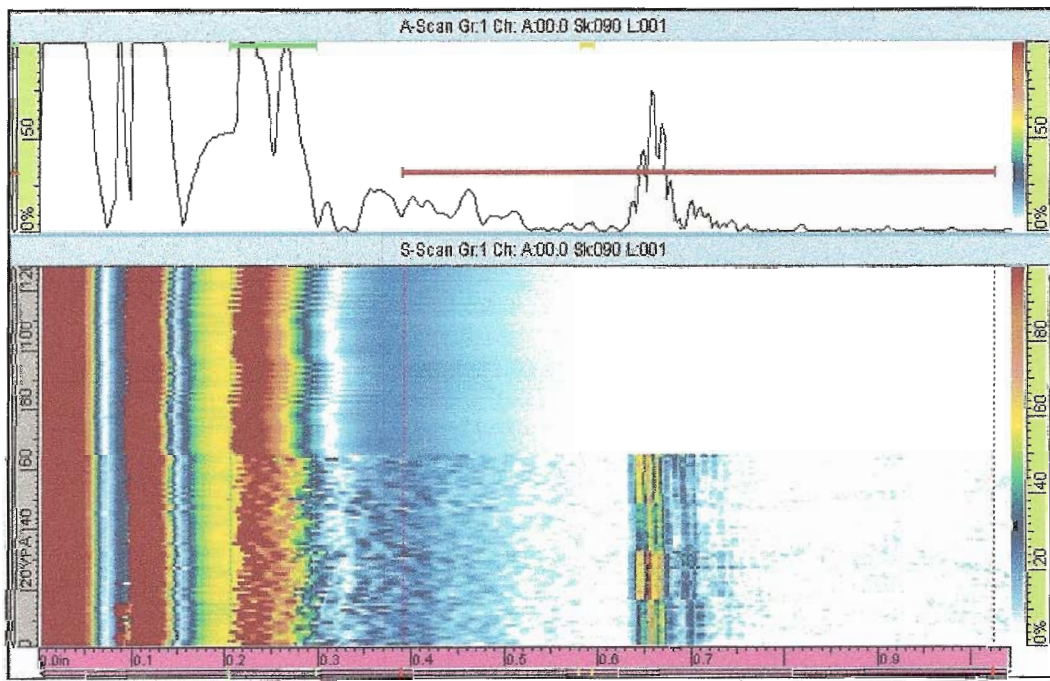
Element Check 1- Pre exam, off wedge



Element Check 2-Pre exam, on wedge



Element Check 3- Post exam, on wedge



Element Check 4- Post exam, off wedge

Phased Array Instrument Table 2 Essential Settings

Major Menu Item	Menu Item	Sub-menu Item	Setting
Reading			
	Result		
		Selector	List 1
		Field 1	A%
		Field 2	A^
		Field 3	SA
		Field 4	PA
UT			
	General		
		Gain	25 dB
		Start	0.00 in
		Range	1.896 in
		Wedge Delay	1.40 us
		Velocity	.2272 in/us
	Pulser		
		Pulser	1
		Tx/Rx Mode	PE
		Frequency	2
		Voltage	High
		PW	250ns (Auto)
		PRF	Optimum
	Receiver		
		Receiver	1
		Filter	None
		Rectifier	FW
		Video Filter	Off
		Averaging	1
		Reject	0
	Beam		
		Gain Offset	0.0 dB
		Scan Offset	-0.016 in
		Index Offset	-0.725 in
		Angle	52
		Skew	0.0°
		Beam Delay	8.43 us
	Advanced		
		dB Ref	Off
		Points Qty	452
		Scale Factor	6
		Sum Gain	22.0

Phased Array Instrument Table 2 Essential Settings (cont.)

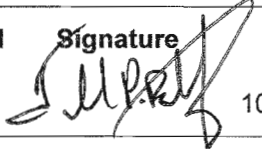
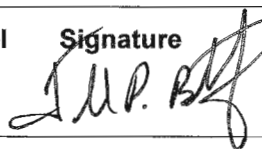

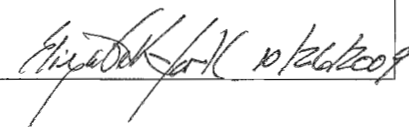
Major Menu Item	Menu Item	Sub-menu Item	Setting
Display			
	Selection		
		Display	A-S-[C]
		C-Scan 1	Off
		Group	Current
		Projection	On
	Rulers		
		UT Unit	True Depth
		% Ruler	Linear (%)
		DAC/TCG	Off
		Gate	On
		Cursor	Off
	Color		
		Select	Amplitude
		Start (%)	0.0
		End (%)	100.0
	Properties		
		Display	A-Scan
		Source	Normal
Probe Part			
	Select		
		Select	Select Tx/Rx
		Auto Detect	Off
	Position		
		Scan Offset (in)	0
		Index Offset (in)	0
	Parts		
		Geometry	Plate
		Thickness (in)	3.0 in
PGM Probe			
	Configuration		
		Scan Type	Sectorial
		Connection P:	1
	Laws		
		Auto Program	Off
Gate Alarm			
	Gate		
		Gate Select	Gate A
		Gate A Synchro	Pulse

ULTRASONIC PHASED ARRAY WOR ULTRASONIC EXAMINATION RECORD

Exam Data Sheet: 219-01-005 219-01-035		Calibration Data Sheet: 219-01-005 219-01-035	
Plant: Millstone Unit: 2		Procedure: ER-MP-NDE-UT-816/Rev. 0	
Zones DM Weld: 1-07 SS Weld: 1-32			
Date: 10/24/09		Exam Start: 0540	Exam Stop: 0555
WOR Identification DM Weld: BPD-C-1017		SS Weld: BPD-C-1019	
Component Configuration DM Weld: Nozzle to Safe End		SS Weld: Safe End to Pipe	
Weld Overlay Regions: Entire overlay surface			
Examination Surface: Surface of Weld Overlay		Reviewed Previous Data: N/A	
Temperature Gauge: PTC 312F		Serial Number: 268025	Component Temp: 78°
Percent Of Coverage Obtained: 100%		Examination Angles	
Weld Overlay Thickness:		Axial	Circumferential
Minimum: .30"		0° to 85°	N/A
Maximum: .70"			
Examination Sensitivity:		37 dB	N/A dB

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(2) Axial (Upstream)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(3) Circumferential (Clockwise)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(4) Circumferential (Counterclockwise)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments: Maintained 5% to 20% average baseline noise level during examination. No suspected flaw indications were observed during examinations.

Examiner	Level	Signature	Date	LMT Review	Level	Signature	Date
Todd Blechinger	III		10/24/09	Todd Blechinger	III		10/24/09
Examiner	Level	Signature	Date	Site Review	Level	Signature	Date
N/A	N/A			Kevin Hacker	III		10/26/09
Other	Level	Signature	Date	ANII Review	Level	Signature	Date
N/A	N/A			E. York	N/A		10/26/2009



ULTRASONIC PHASED ARRAY WOR CALIBRATION REPORT

WOR Identification DM Weld:	BPD-C-1017	Calibration Data Sheet:	219-01-005
WOR Identification SS Weld:	BPD-C-1019	Calibration Data Sheet:	219-01-035
Plant/Unit:	Millstone / 2	Procedure No. / Rev:	ER-MP-NDE-UT-816/ Rev.0

Wedge	Comments:
Manufacturer: GEIT	See attached EPRI correspondence for Probe, Wedge and Focal Law information.
Model: 360-152-232	
Nominal Wedge Angle: 52°	
Measured Wedge Angle: 52°	
Contour Diameter: 4.125" CIRC OD	
Scan Direction: Circumferential	
Nominal Index Location: .75"	
Zero Reference: Front of Probe	

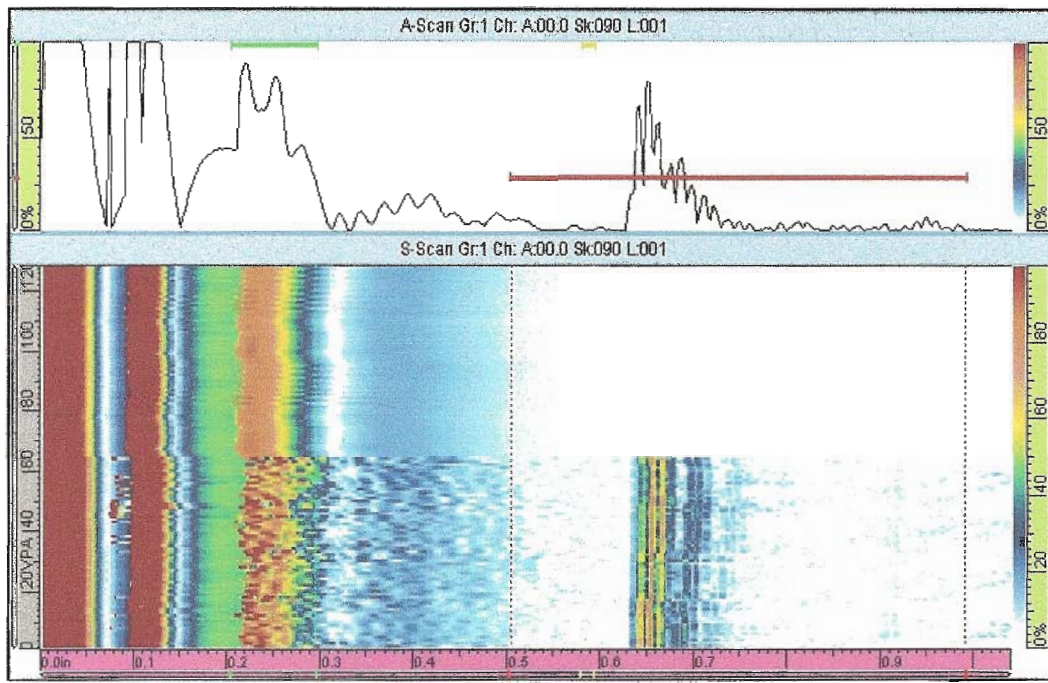
Instrument	Search Unit
Manufacturer: Zetec	Manufacturer: GEIT
Model: Omniscan 32/128 PR	Model: 115-000-631
PA Module Serial Number: Omni-Z-6034	Serial Number: 01Y28Y-1/ 01Y28Y-2
UT Mainframe Serial Number: Omni-Z-1062	
Software Revision: 1.4R3	
Table 2 Instrument Settings: See attached	
	Search Unit Integral Cable
	Type: See cable diagram
	Length: See cable diagram
	Connector Type #: See cable diagram

Couplant: Soundsafe	Temperature Gauge: PTC 312F
Manufacturer: Sonotech Inc.	Serial Number: 268025
Batch Number: 07220H	

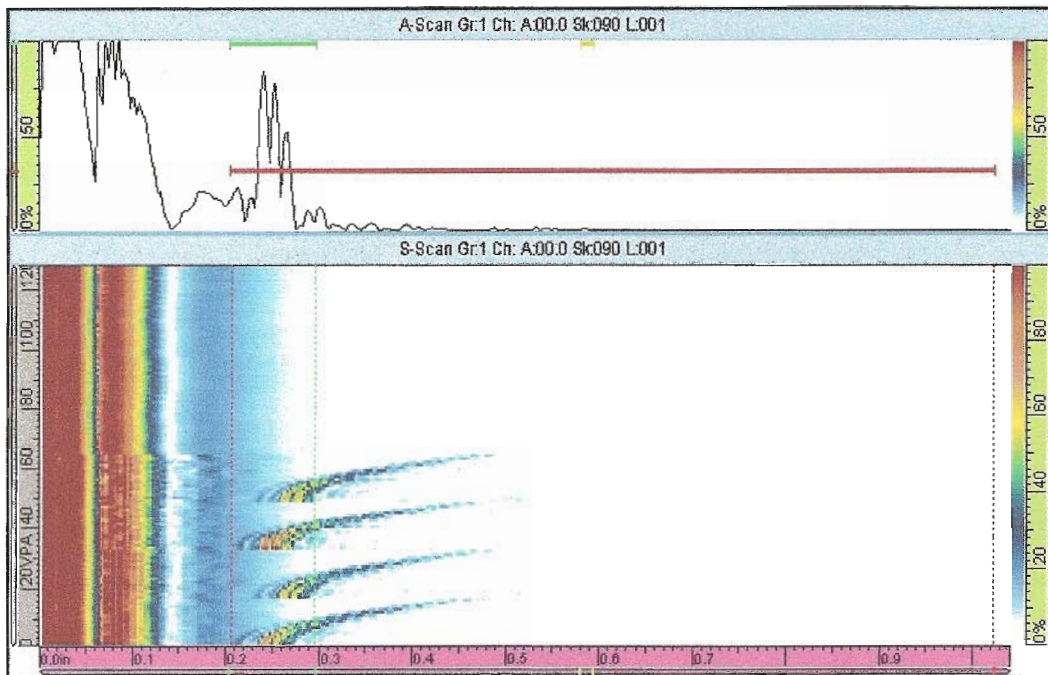
Calibration Data Files	
Focal Law:	032NJDZ2232L0079R2M1Z4_1.125MP.LAW
Angles Generated:	0° to 79°
Wave Mode:	Longitudinal
Focal Sound Path:	1.125" MP

Calibration Reflector Data					
Calibration Block(s): MEUXE017A		N/A		Temperature: 76°	
Calibration Reflector	Angle	% FSH	Ref. Sensitivity	UT Response	
(70°-85°) 0.1" SDH	70°	80	32 dB	.597"	Sound Path
(25°-60°) 0.5" SDH	45°	80	23 dB	.916"	Sound Path
(0°-25°) 0.5" SDH	0°	80	33 dB	.481"	Sound Path
Channel Functional Checks	Pre Exam: Acceptable		Post Exam: Acceptable		
Number of Inactive Channels/Elements:		Transmit: 0	Receive: 0		

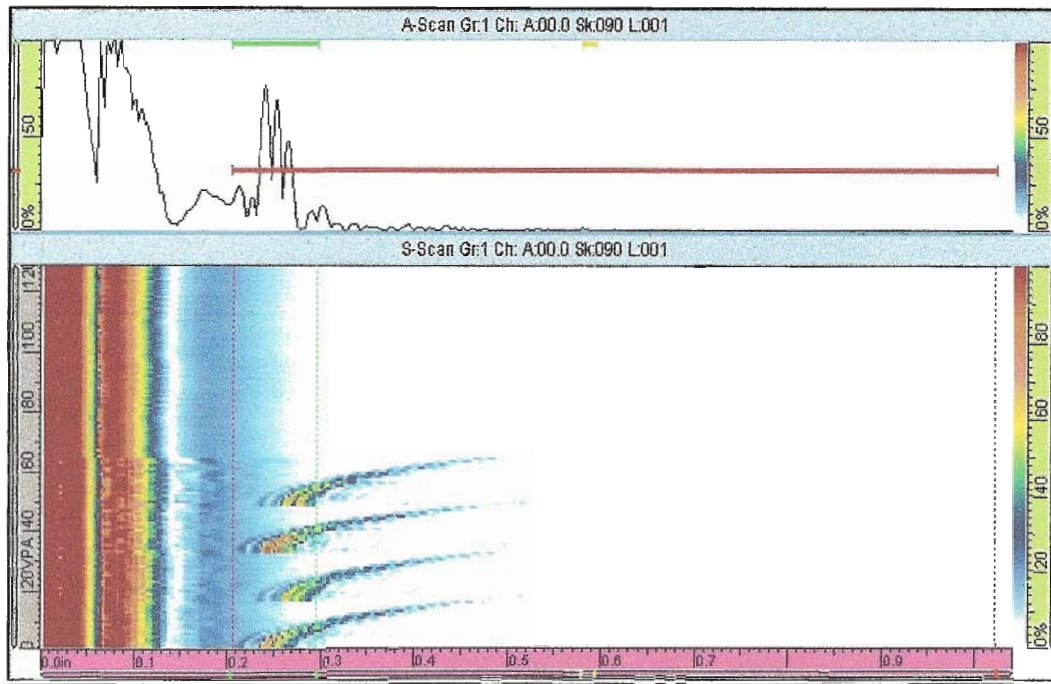
Calibration Performed	Examiner 1	Examiner 2	Level(s)	Date	Time
Initial:	Todd Blechinger	N/A	III	10/24/09	0557
Intermediate:	Todd Blechinger	N/A	III	10/24/09	0613
Final:	Todd Blechinger	N/A	III	10/24/09	0700



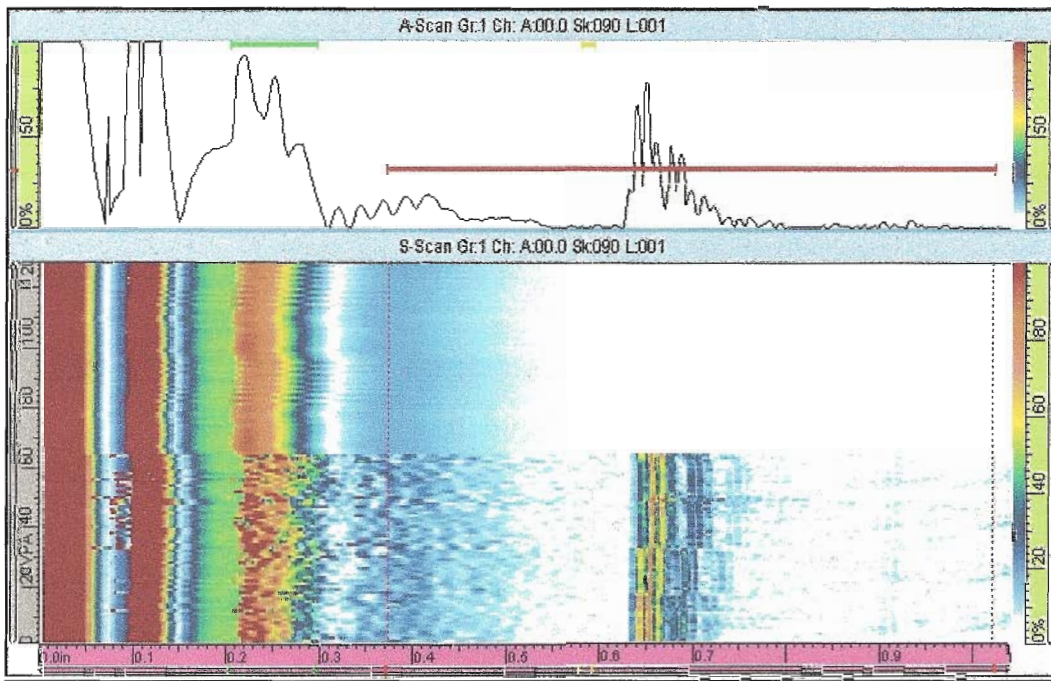
Element Check 5- Pre exam, off wedge



Element Check 6-Pre exam, on wedge



Element Check 7- Post exam on wedge



Element Check 8-Post exam, off wedge

Phased Array Instrument Table 2 Essential Settings

Major Menu Item	Menu Item	Sub-menu Item	Setting
Reading			
	Result		
		Selector	List 1
		Field 1	A%
		Field 2	A^
		Field 3	SA
		Field 4	PA
UT			
	General		
		Gain	23 dB
		Start	0.00 in
		Range	1.815 in
		Wedge Delay	1.90 us
		Velocity	.2272 in/us
	Pulser		
		Pulser	1
		Tx/Rx Mode	PE
		Frequency	2
		Voltage	High
		PW	250ns (Auto)
		PRF	Optimum
	Receiver		
		Receiver	1
		Filter	None
		Rectifier	FW
		Video Filter	Off
		Averaging	1
		Reject	0
	Beam		
		Gain Offset	0.0 dB
		Scan Offset	-0.000 in
		Index Offset	-0.704 in
		Angle	45
		Skew	0.0°
		Beam Delay	7.62 us
	Advanced		
		dB Ref	Off
		Points Qty	452
		Scale Factor	5
		Sum Gain	22.0

Phased Array Instrument Table 2 Essential Settings (cont.)

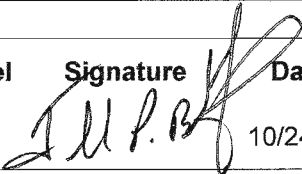
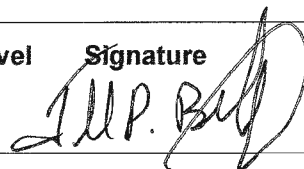
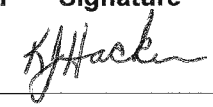
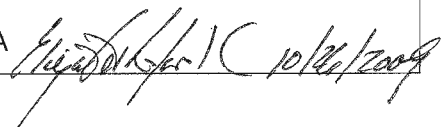
Major Menu Item	Menu Item	Sub-menu Item	Setting
Display			
	Selection		
		Display	A-S-[C]
		C-Scan 1	Off
		Group	Current
		Projection	On
	Rulers		
		UT Unit	True Depth
		% Ruler	Linear (%)
		DAC/TCG	Off
		Gate	On
		Cursor	Off
	Color		
		Select	Amplitude
		Start (%)	0.0
		End (%)	100.0
	Properties		
		Display	A-Scan
		Source	Normal
Probe Part			
	Select		
		Select	Select Tx/Rx
		Auto Detect	Off
	Position		
		Scan Offset (in)	0
		Index Offset (in)	0
	Parts		
		Geometry	Plate
		Thickness (in)	3.0 in
PGM Probe			
	Configuration		
		Scan Type	Sectorial
		Connection P:	1
	Laws		
		Auto Program	Off
Gate Alarm			
	Gate		
		Gate Select	Gate A
		Gate A Synchro	Pulse

ULTRASONIC PHASED ARRAY WOR ULTRASONIC EXAMINATION RECORD

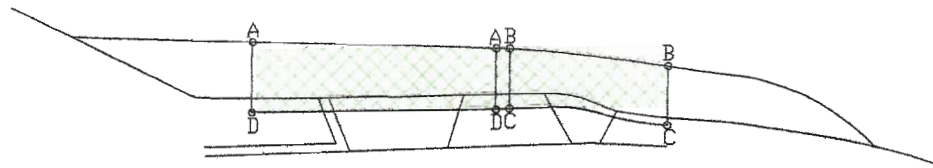
Exam Data Sheet: 219-01-005 219-01-035		Calibration Data Sheet: 219-01-005 219-01-035	
Plant: Millstone Unit: 2		Procedure: ER-MP-NDE-UT-816/Rev. 0	
Zones DM Weld: 1-07		SS Weld: 1-32	
Date: 10/24/09		Exam Start: 0557 Exam Stop: 0613	
WOR Identification DM Weld: BPD-C-1017		SS Weld: BPD-C-1019	
Component Configuration DM Weld: Nozzle to Safe End		SS Weld: Safe End to Pipe	
Weld Overlay Regions: Entire overlay surface			
Examination Surface: Surface of Weld Overlay		Reviewed Previous Data: N/A	
Temperature Gauge: PTC 312F		Serial Number: 268025 Component Temp: 80°	
Percent Of Coverage Obtained: 100%		Examination Angles	
Weld Overlay Thickness:		Axial	Circumferential
Minimum: .30"		N/A	0° to 79°
Maximum: .70"			
Examination Sensitivity:		N/A dB	35 dB

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(2) Axial (Upstream)	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
(3) Circumferential (Clockwise)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
(4) Circumferential (Counterclockwise)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

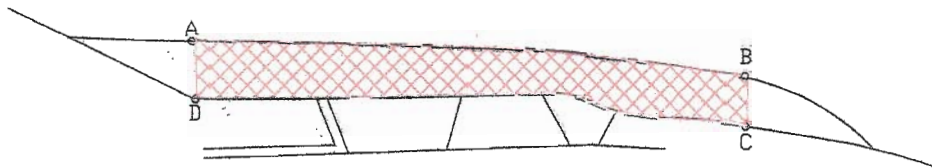
Comments: Maintained 5% to 20% average baseline noise level during examination. No suspected flaw indications were observed during examinations.

Examiner	Level	Signature	Date	LMT Review	Level	Signature	Date
Todd Blechinger	III		10/24/09	Todd Blechinger	III		10/24/09
Examiner	Level	Signature	Date	Site Review	Level	Signature	Date
N/A	N/A			Kevin Hacker	III		10/26/09
Other	Level	Signature	Date	ANII Review	Level	Signature	Date
N/A	N/A			E. York	N/A		10/26/2009

Coverage Plot



ISI Examination Volume A-B-C-D



PSI Examination Volume A-B-C-D

Scale: NOT TO SCALE

Examiner	Level	Signature	Date	LMT Review	Level	Signature	Date
Todd Blechinger	III	<i>Todd Blechinger</i>	10/24/09	Todd Blechinger	III	<i>Todd Blechinger</i>	10/24/09
Examiner	Level	Signature	Date	Site Review	Level	Signature	Date
N/A	N/A			Kevin Hacker	III	<i>K Hacker</i>	10/26/09
Other	Level	Signature	Date	ANII Review	Level	Signature	Date
N/A	N/A			E. York	N/A	<i>E. York</i>	10/26/2009