BPY-C-1001 / BPY-C-1003

3-inch Cold Leg Spray Line Loop 1A

Dominion

Millstone Unit 2

UT Data Package Cover

Data Package No: 219-01-007

2 1 9 - 0 1 - 0 0 7

Reference ID: BPY-C-1001

B P Y - C - 1 0 0 1

AWO: 53102184602

5 3 1 0 2 1 8 4 6 0 2

Page #	Data Type	Exam Angle	Recordable	Limitations	Comments
1	C	0-85°			
2	C	0-85°	N		
3	C	0-85°		A	
4	C	0-85°			
5	C	0-85°			
6	E	0-85°	NRI	NONE	
7	C	0-82°			
8	C	0-82°	N		
9	C	0-82°		A	
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 10/20/09

Dominion Review: KJ Hacker

Level: III

Review Date: 10/20/09

Previous Data Review

UT ☒ N/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:

Dominion

Millstone Unit 2

UT Data Package Cover

Data Package No: 219-01-038

219-01-038

Reference ID: BPY-C-1003

BPY-C-1003

AWO: 53102184602

53102184602

Page #	Data Type	Exam Angle	Recordable	Limitations	Comments
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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 10/20/09

Dominion Review: KJHacker KJHackes

Level: III

Review Date: 10/20/09

Previous Data Review

UT ☑ N/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	
Manufacturer:	GEIT
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

Comments:
See attached EPRI correspondence for Probe, Wedge and Focal Law information.

Instrument	
Manufacturer:	Zetec
Model:	Omniscan 32/128 PR
PA Module Serial Number:	Omni-Z-6034
UT Mainframe Serial Number:	Omni-Z-1062
Software Revision:	1.4R3
Table 2 Instrument Settings:	See attached

Search Unit	
Manufacturer:	GEIT
Model:	115-000-631
Serial Number:	01Y28X-1/ 01Y28X-2

Search Unit Integral Cable	
Type:	See cable diagram
Length:	See cable diagram
Connector Type #:	See cable diagram

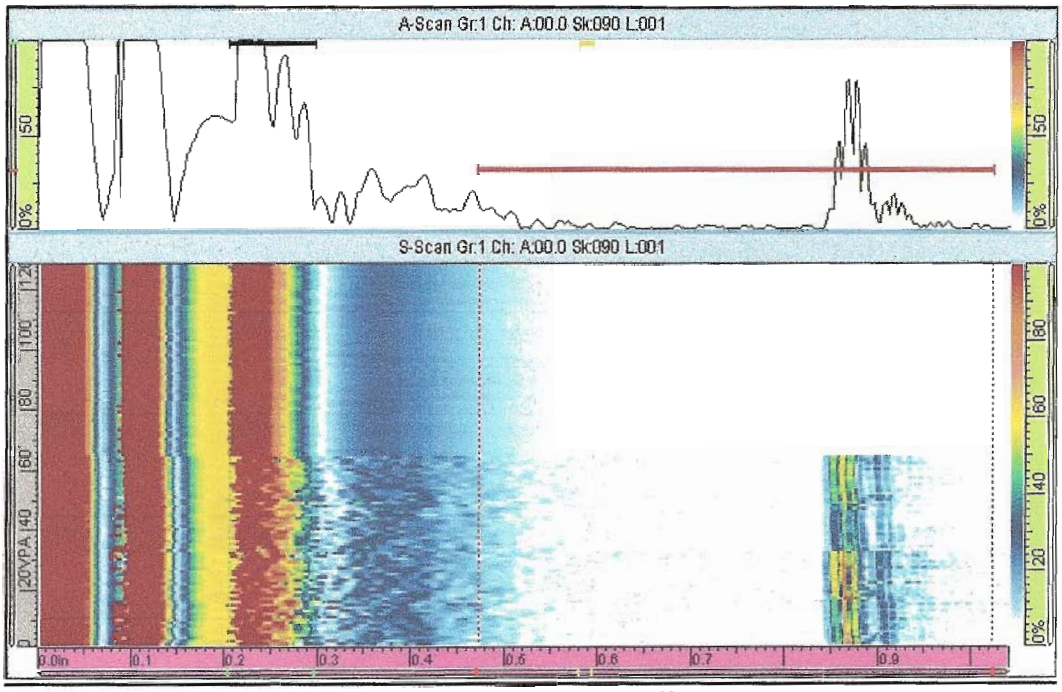
Couplant:	Soundsafe	**Temperature Gauge:**	PTC 312F
Manufacturer:	Sonotech Inc.	**Serial Number:**	268025
Batch Number:	07220H		

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



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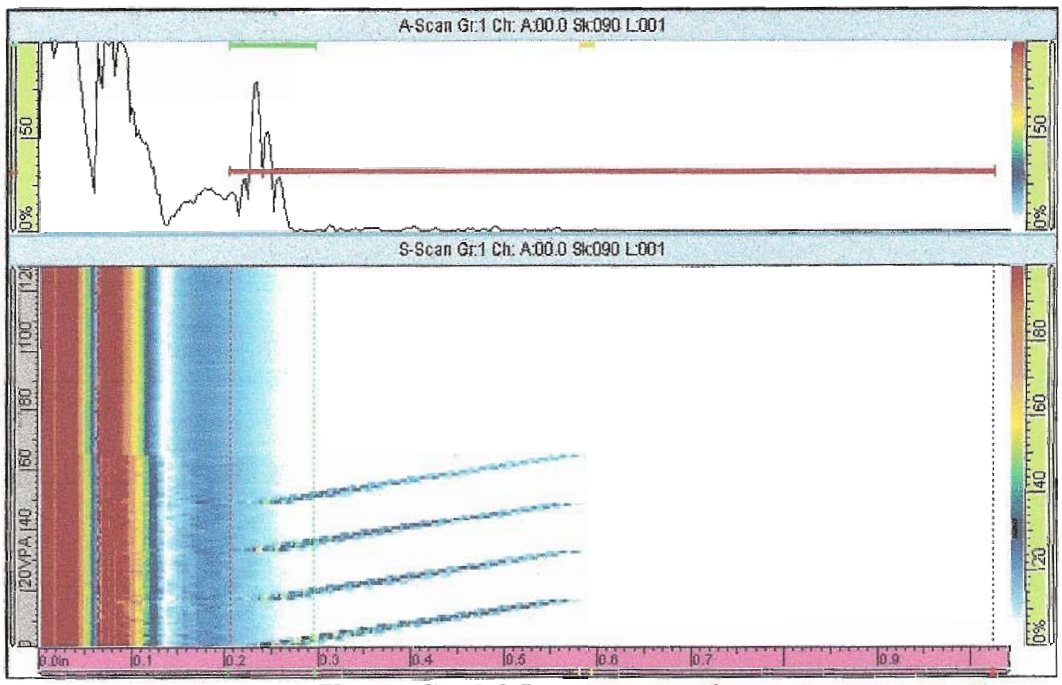

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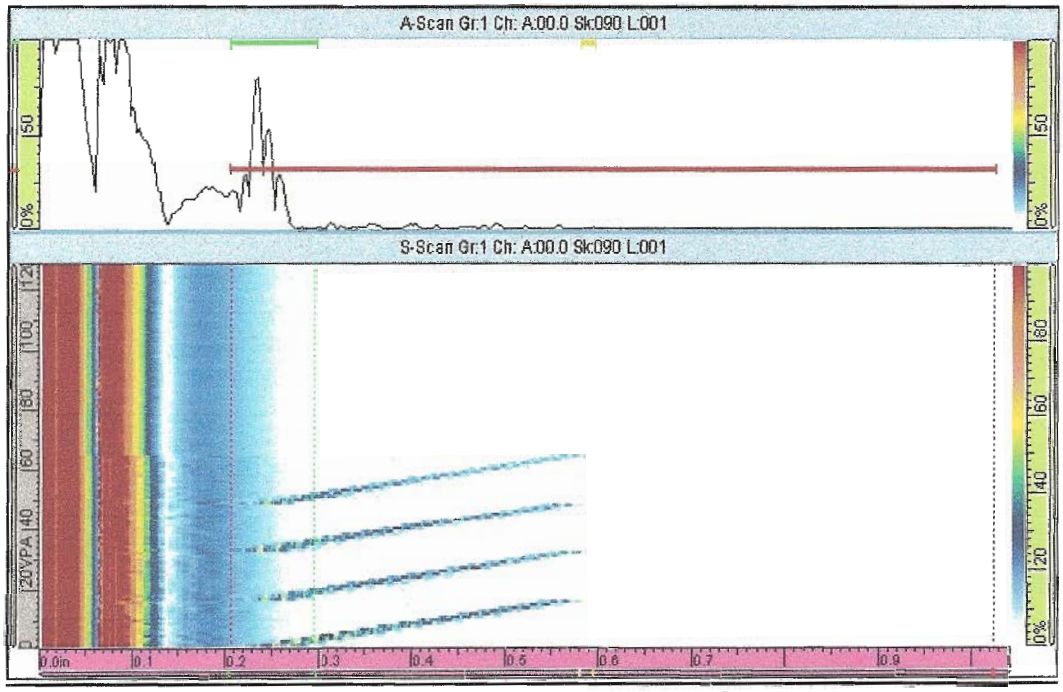

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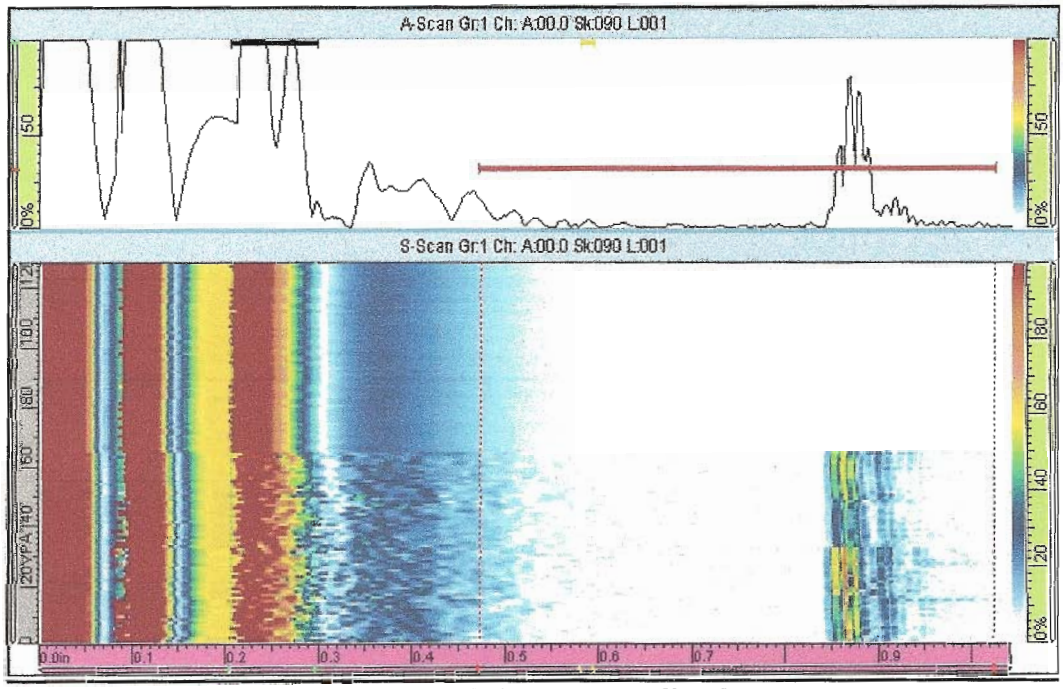


Element Check 4-Post exam, off wedge

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

Dominion

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: **Minimum:** .30" **Maximum:** .60"		**Axial** 0° to 85°	**Circumferential** N/A
	Examination Sensitivity:	36 dB	N/A dB

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	☒	☐	☐
(2) Axial (Upstream)	☒	☐	☐
(3) Circumferential (Clockwise)	☐	☐	☒
(4) Circumferential (Counterclockwise)	☐	☐	☒

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	
Manufacturer:	GEIT
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

Comments:
See attached EPRI correspondence for Probe, Wedge and Focal Law information.

Instrument	
Manufacturer:	Zetec
Model:	Omniscan 32/128 PR
PA Module Serial Number:	Omni-Z-6034
UT Mainframe Serial Number:	Omni-Z-1062
Software Revision:	1.4R3
Table 2 Instrument Settings:	See attached

Search Unit	
Manufacturer:	GEIT
Model:	115-000-631
Serial Number:	01Y28Y-1/ 01Y28Y-2

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

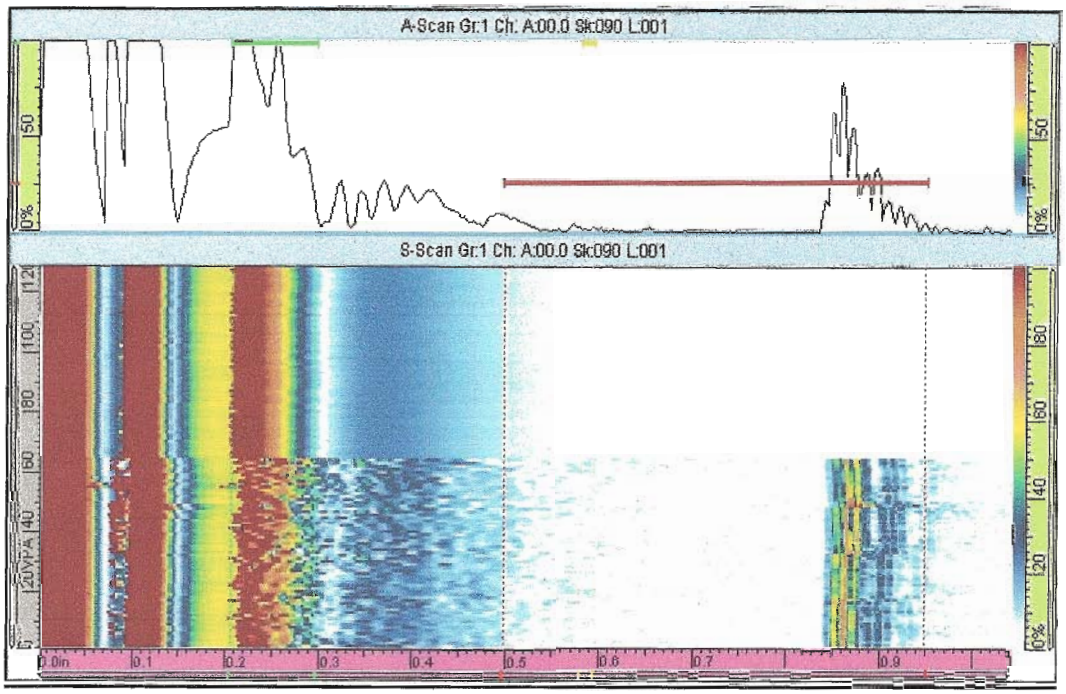
Calibration Block(s): 6039038 MEUXE017A (.1" SDH only) **Temperature:** 80°

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

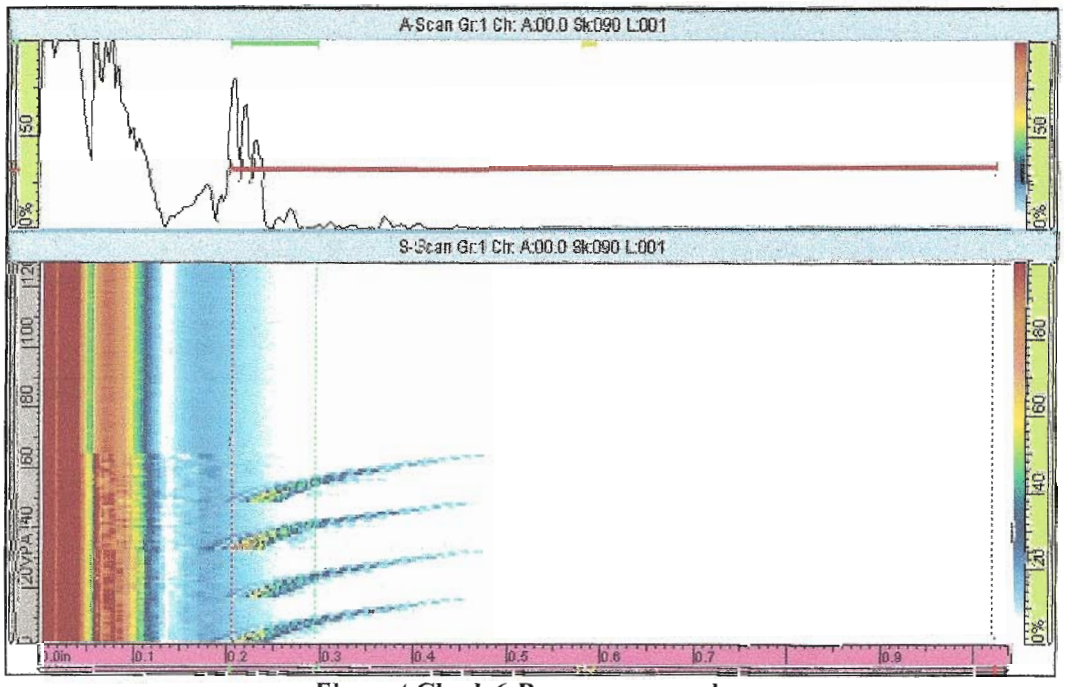
Channel Functional Checks **Pre Exam:** Acceptable **Post Exam:** Acceptable

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



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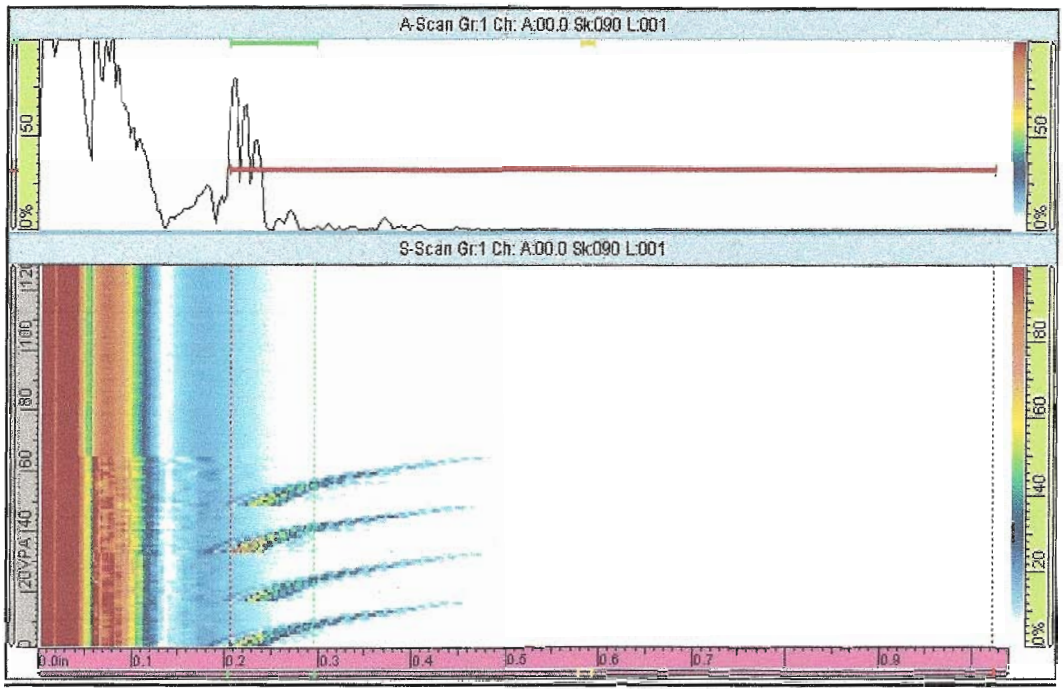

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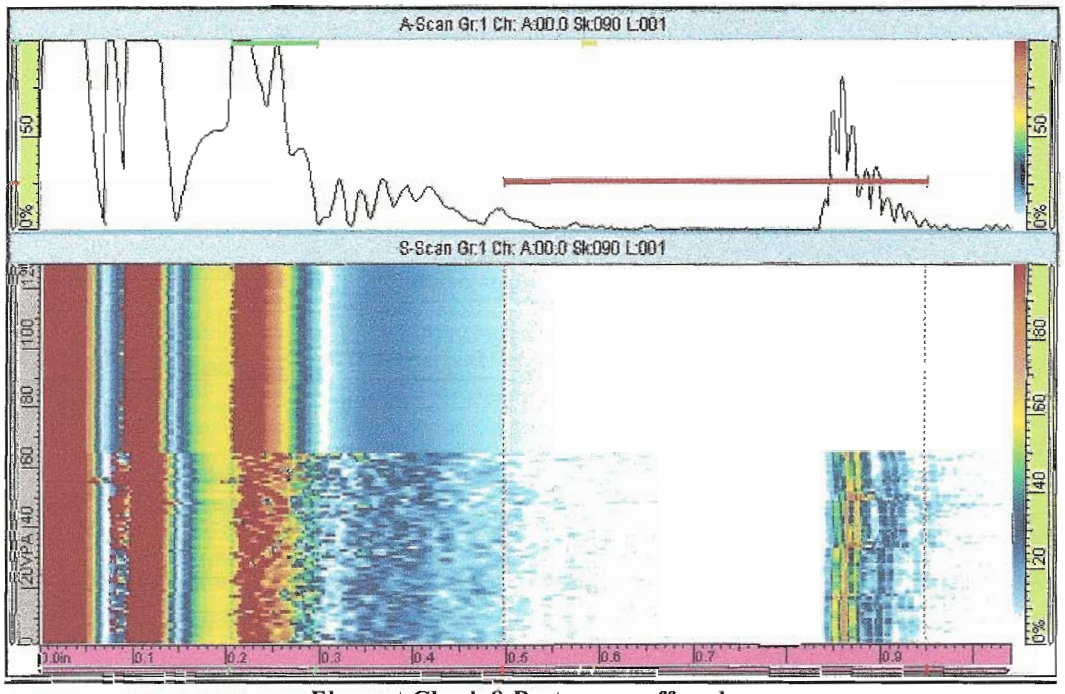


Element Check 8-Post exam, off wedge

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

Dominion

ULTRASONIC PHASED ARRAY WOR ULTRASONIC EXAMINATION RECORD

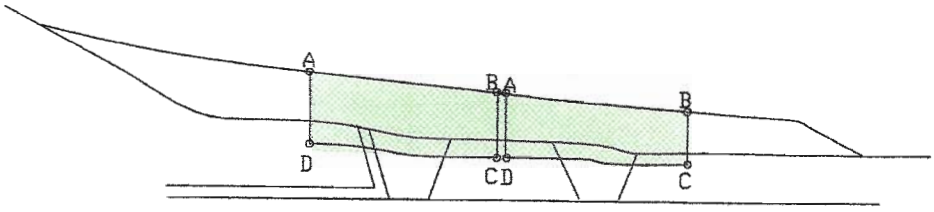
Exam Data Sheet: 219-01-007 219-01-038		**Calibration Data Sheet:** 219-01-007 219-01-038	
Plant: Millstone	**Unit:** 2	**Procedure:** ER-MP-NDE-UT-816/Rev. 0	
Zones DM Weld: 1-08	**SS Weld:** 1-23		
Date: 10/18/09	**Exam Start:** 1505	**Exam Stop:** 1545	
WOR Identification	**DM Weld:** BPY-C-1001	**SS 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: **Minimum:** .30" **Maximum:** .60"		**Axial** N/A	**Circumferential** 0° to 82°
	Examination Sensitivity:	N/A dB	34.0 dB

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	☐	☐	☒
(2) Axial (Upstream)	☐	☐	☒
(3) Circumferential (Clockwise)	☒	☐	☐
(4) Circumferential (Counterclockwise)	☒	☐	☐

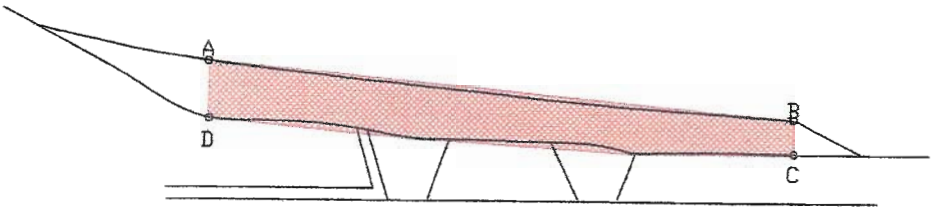
Comments: Maintained 5% to 20% average baseline noise level during examination. No suspected flaw indications were observed during examinations.

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		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

ELECTRIC POWER RESEARCH INSTITUTE

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.

CHARLOTTE OFFICE
1300 West W.T. Harris Boulevard, Charlotte, NC 28262-8550 USA • 704.595.2000 • Fax 704.595.2860
Customer Service 800.313.3774 • www.epri.com

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,

Mark Dennis
EPRI Senior Project Manager

Attachment

September 23, 2009
Kevin Hacker
Page 3

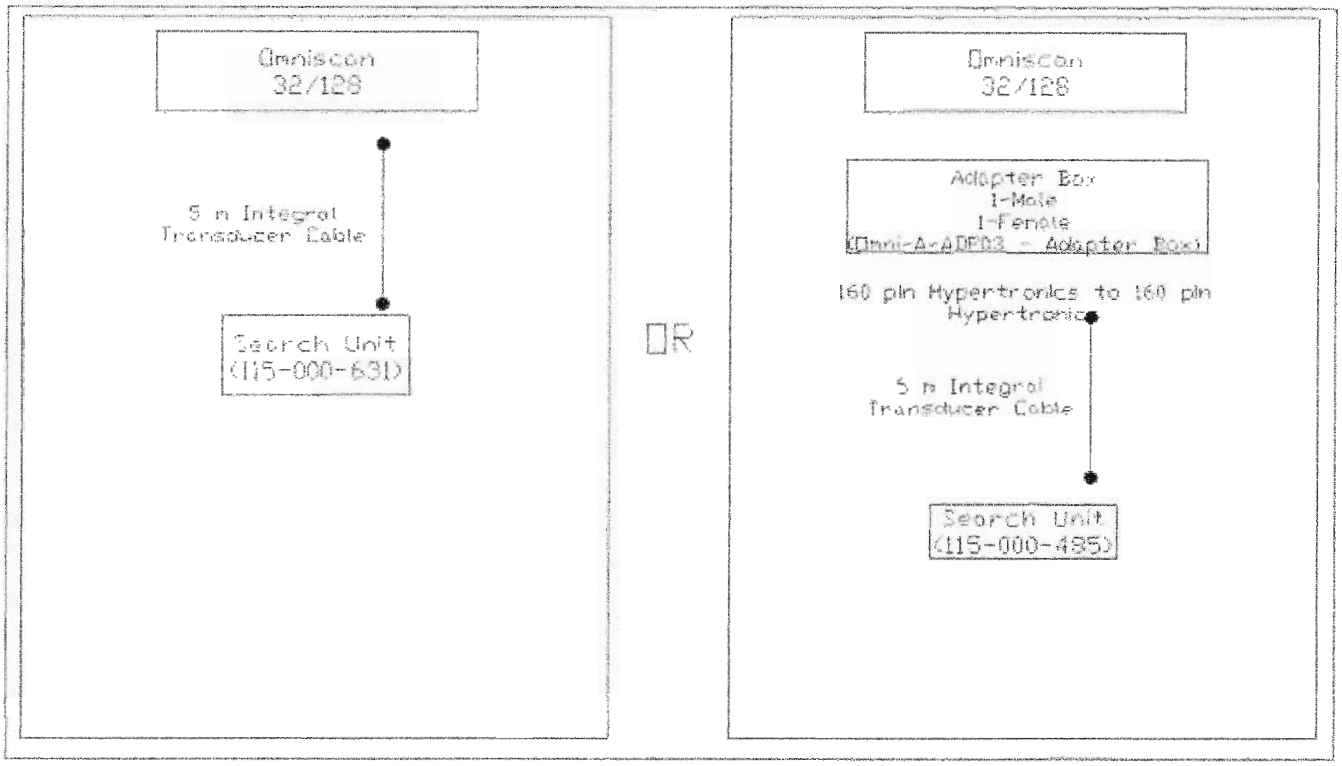


Figure 1. OmniScan 32-128 P/R Cable Diagram for EPRI-WOL-PA-1

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			
1-08	BPY-C-1001	3" Spray line Loop 1A	5.50"	360-152-235	360-152-234
1-10	BPY-C-3000	3" Spray Line Loop 1B			
1-08	BSI-C-1001	12" Safety Injection 1A	16.75"	360-152-079	360-152-078
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			

September 23, 2009
Kevin Hacker
Page 4

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

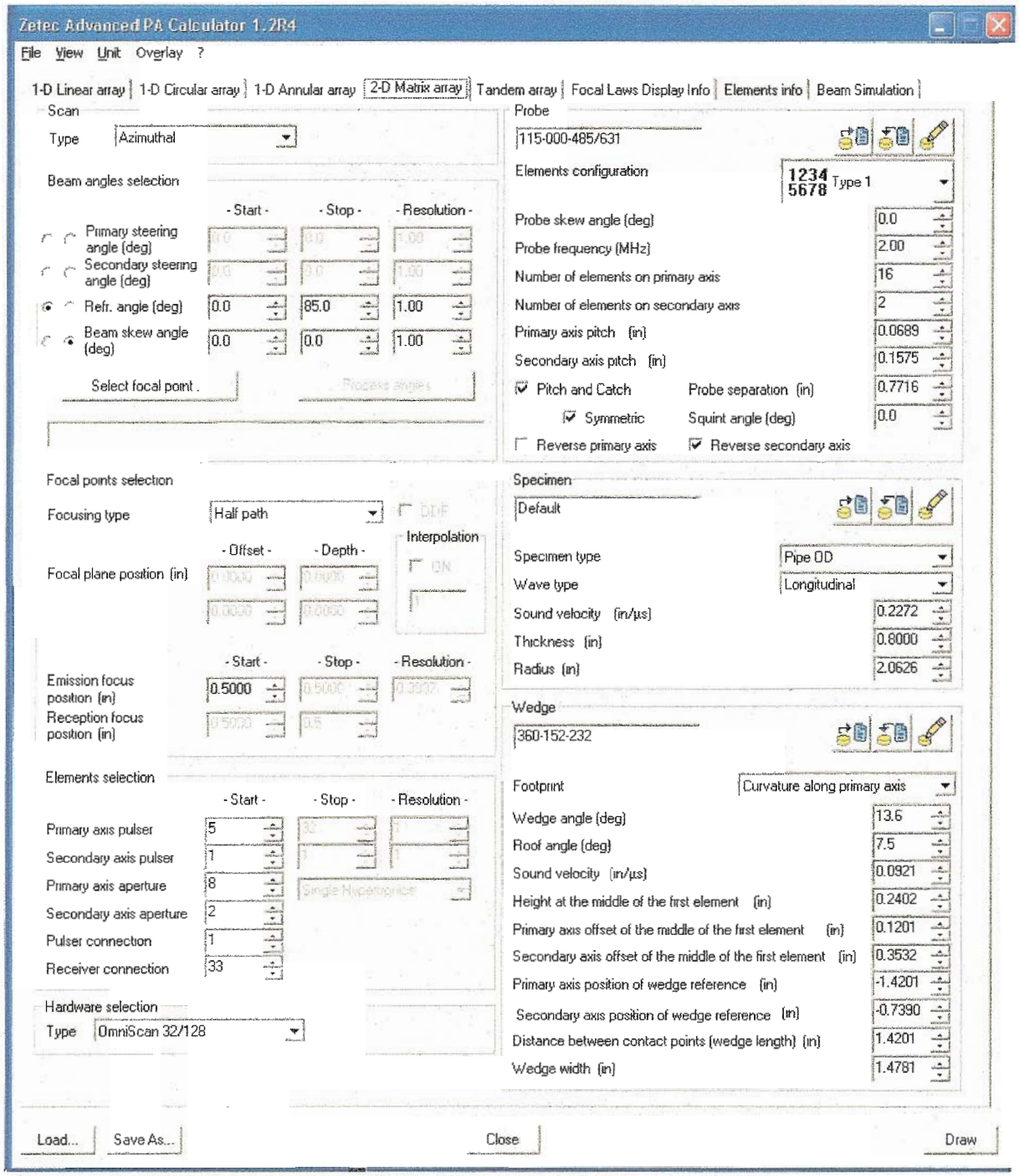


Figure 2.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-232; Diameter (in) = 4.125; Scanning Direction = Circumferential; Focal Metal Path (in) = 0.5

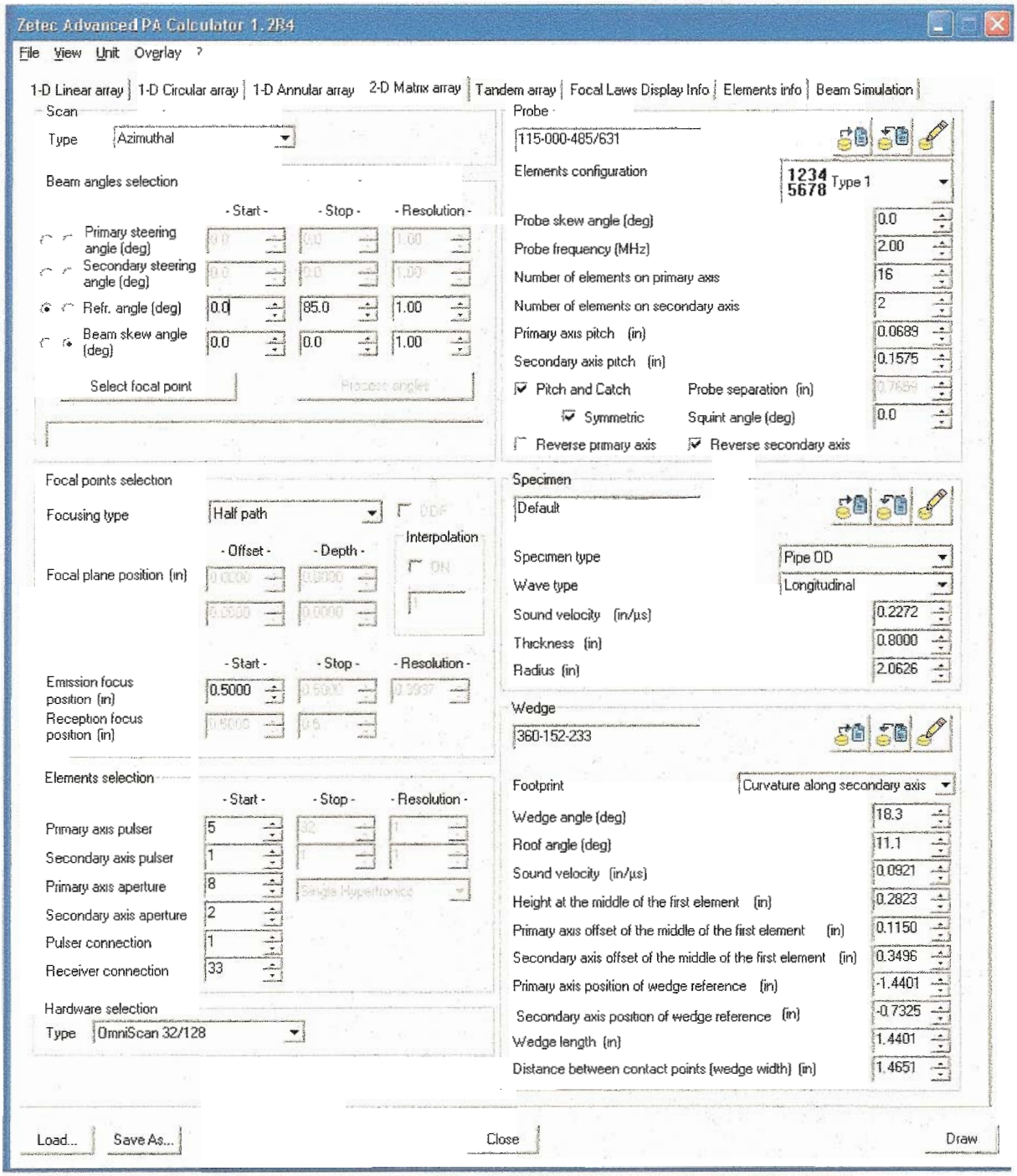


Figure 3.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-233; Diameter (in) = 4.125; Scanning Direction = Axial; Focal Metal Path (in) = 0.5

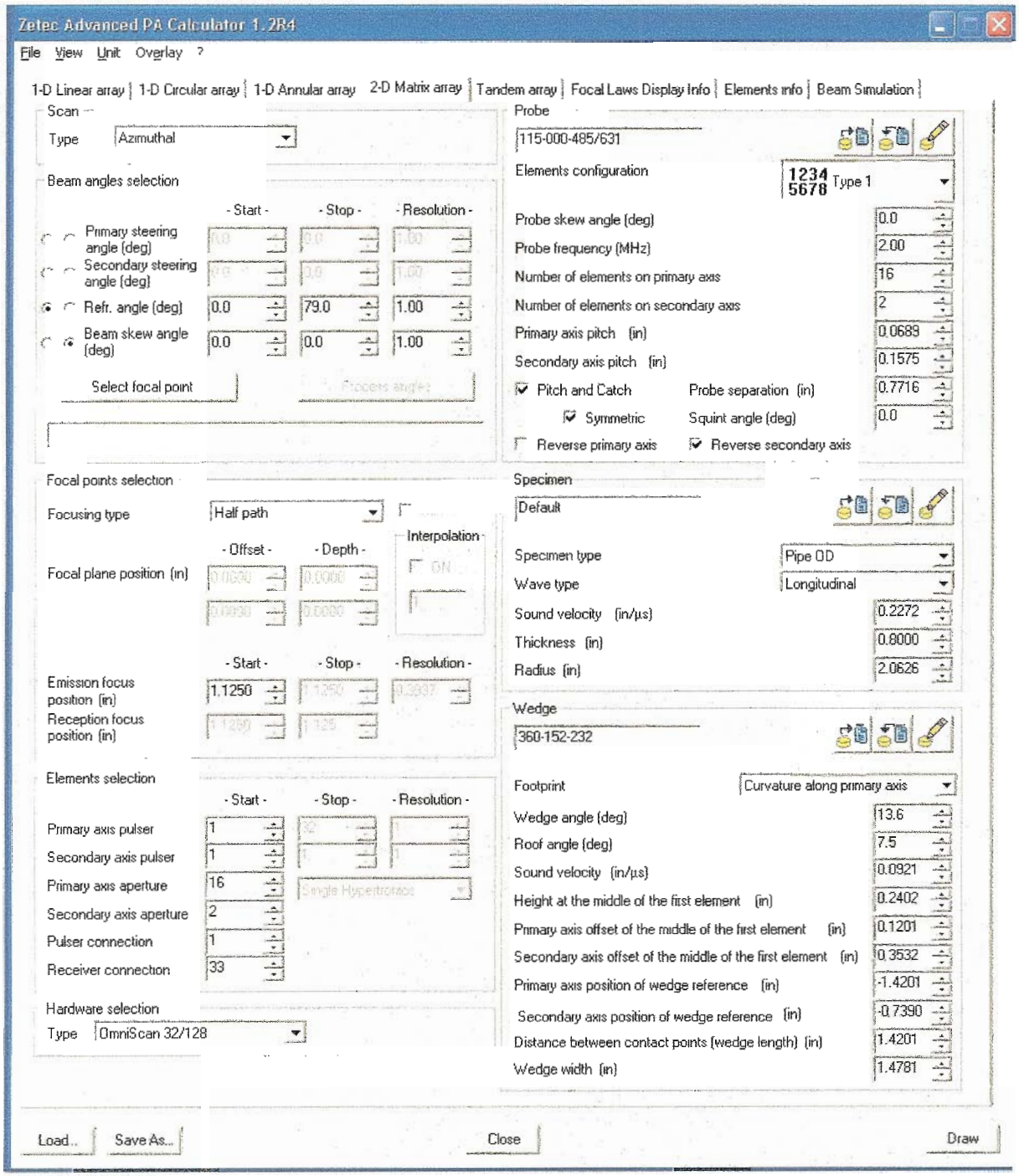


Figure 4.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-232; Diameter (in) = 4.125; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

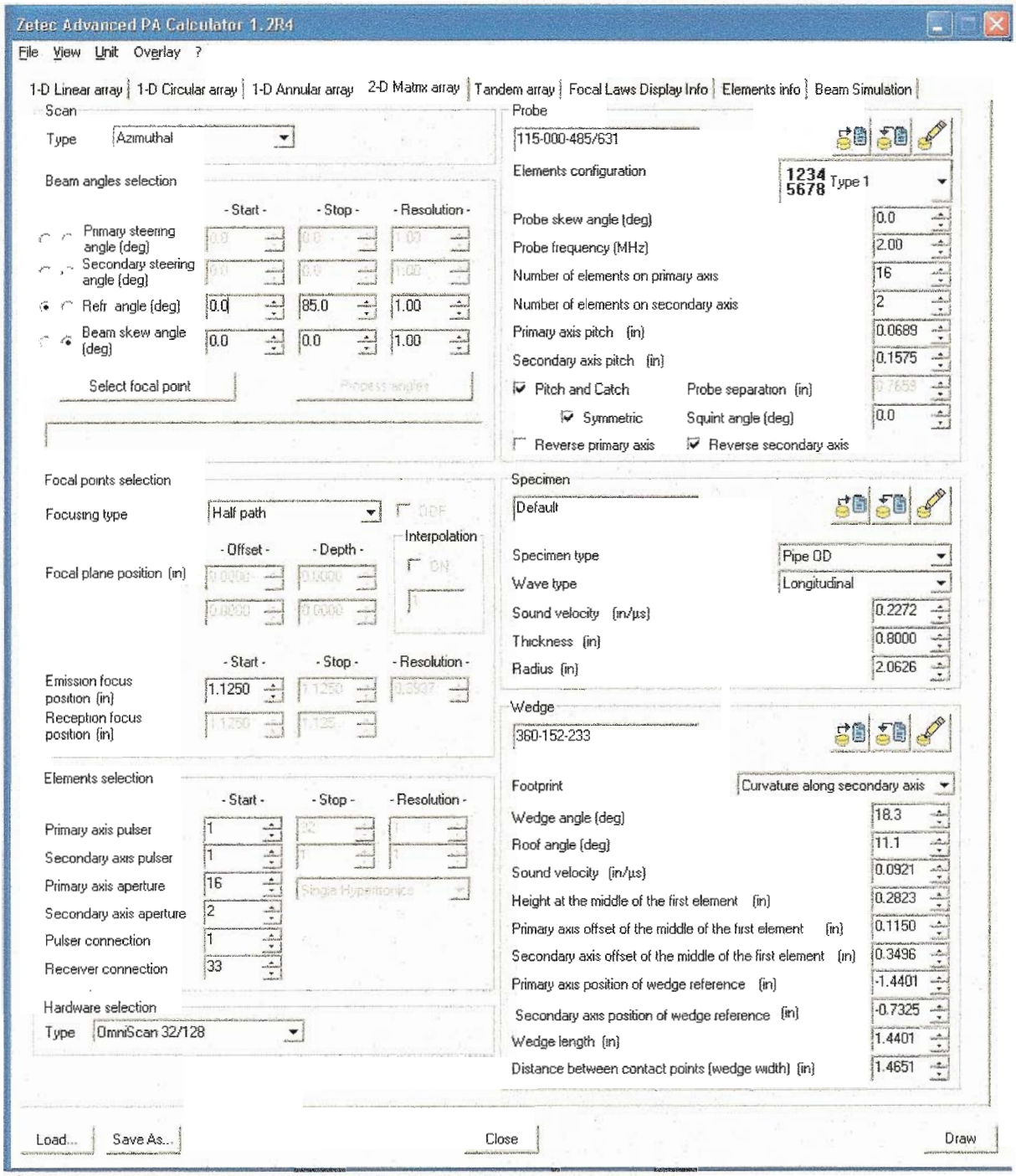


Figure 5.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-233; Diameter (in) = 4.125; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

September 23, 2009
Kevin Hacker
Page 9

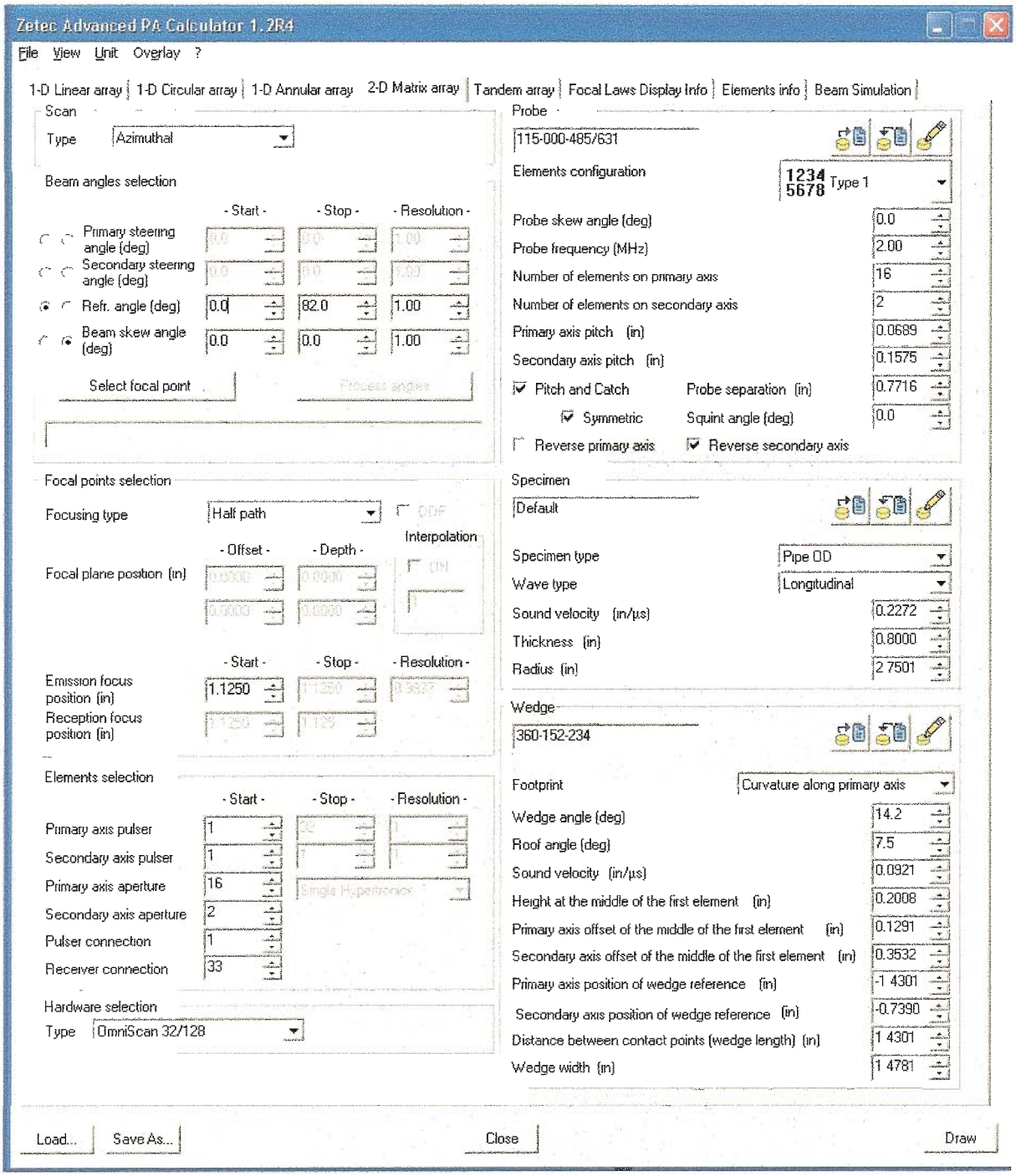


Figure 6.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-234; Diameter (in) = 5.5; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

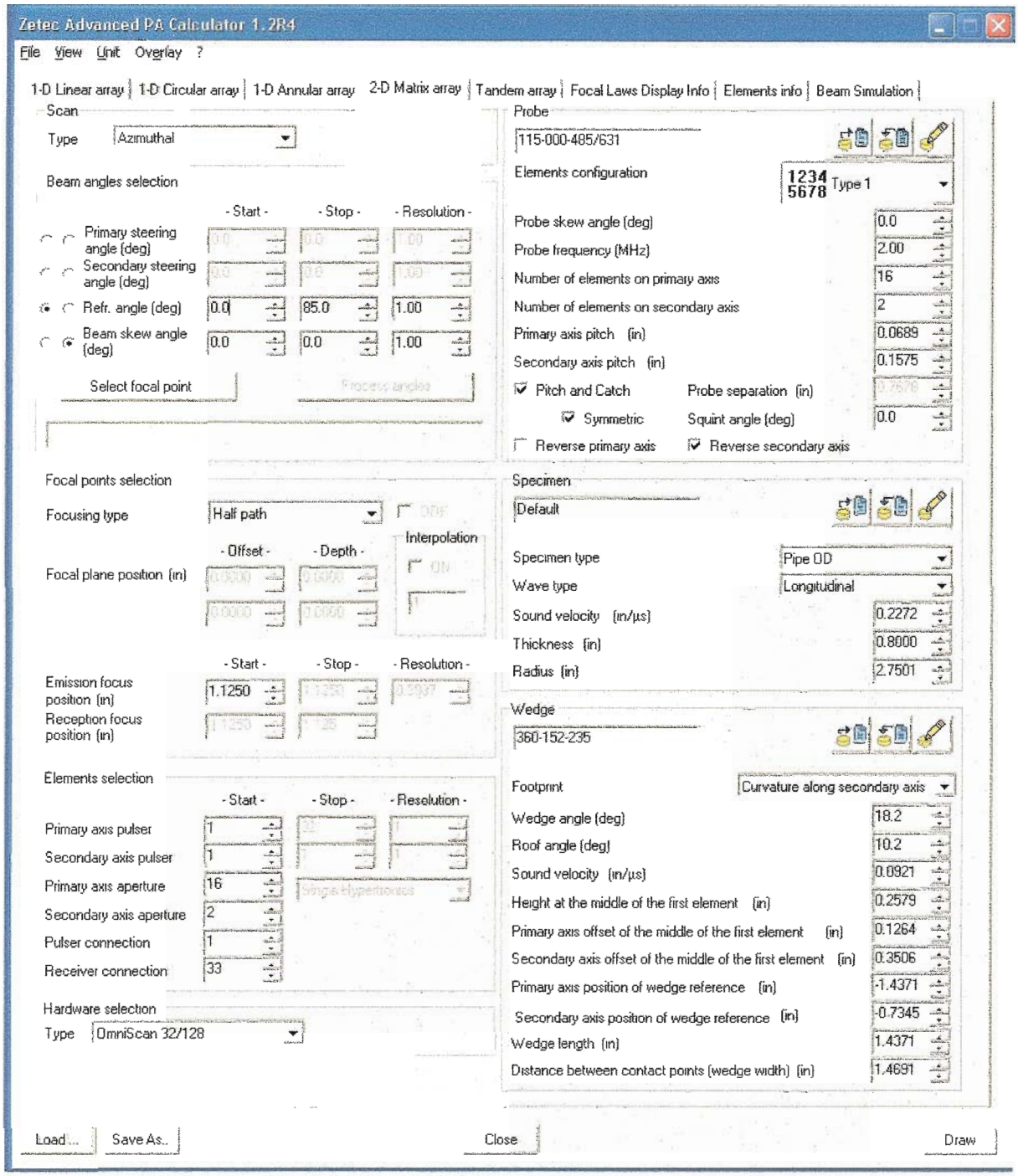


Figure 7.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-235; Diameter (in) = 5.5; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

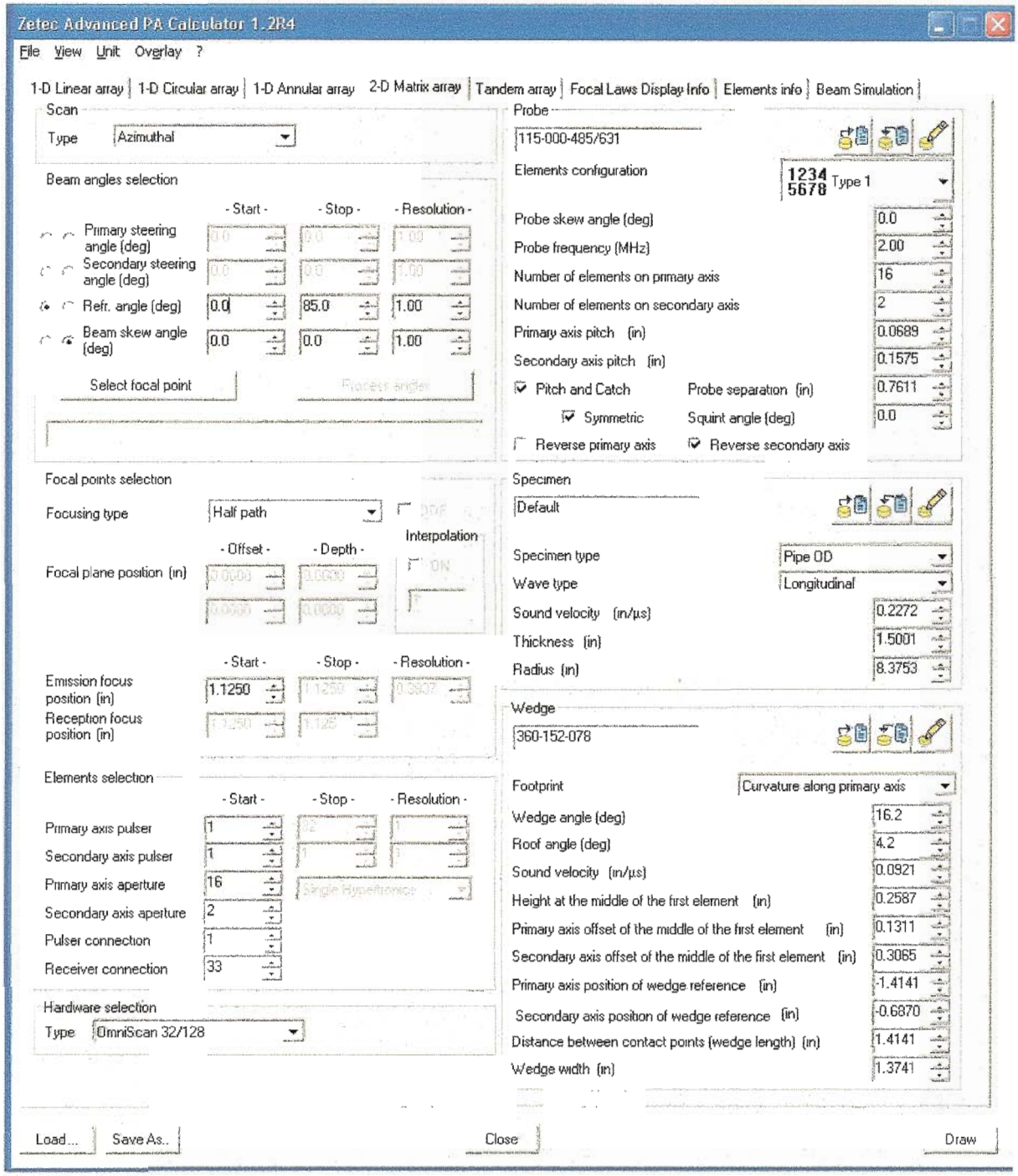


Figure 8.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-078; Diameter (in) = 16.75; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

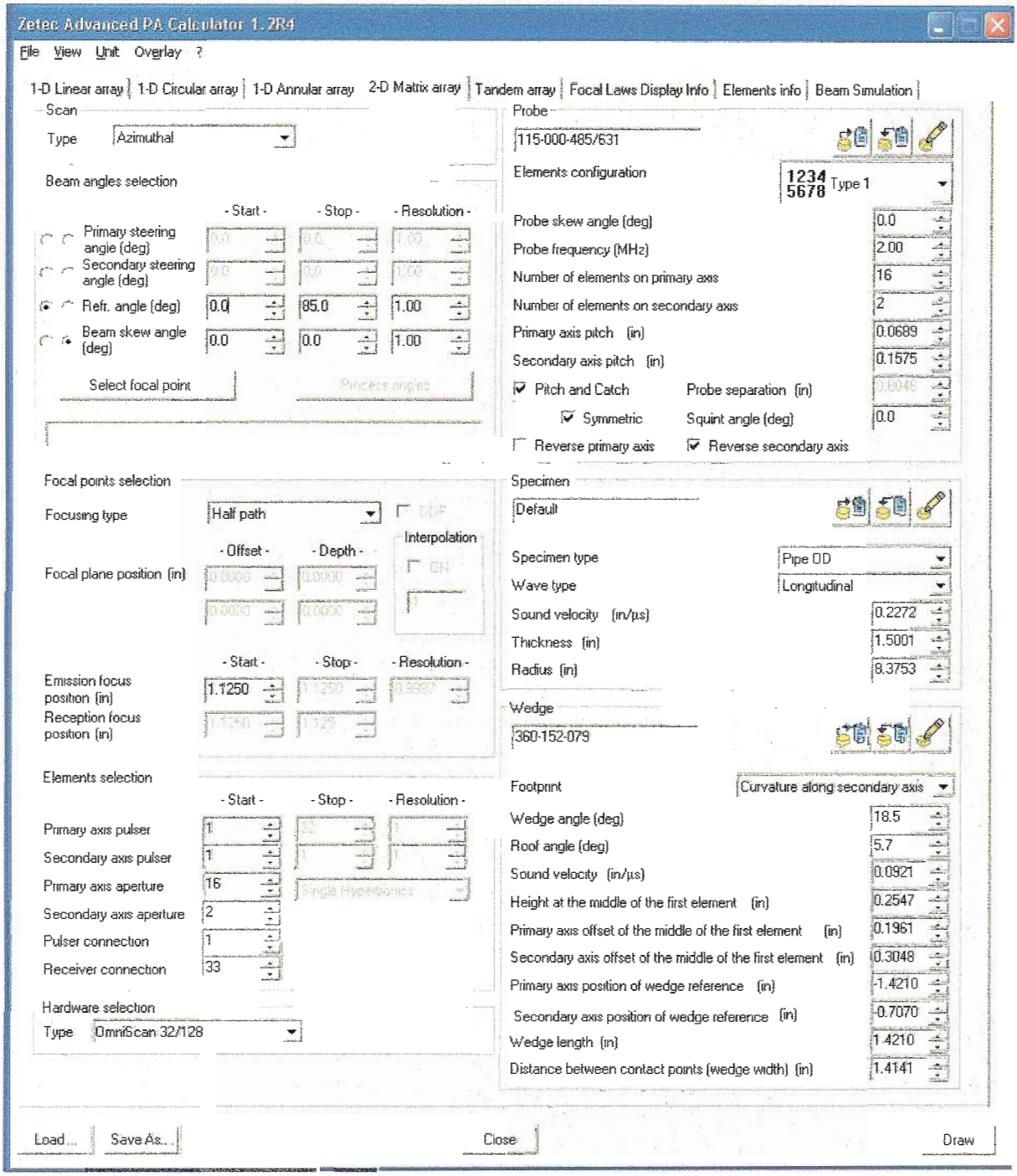


Figure 9.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-079; Diameter (in) = 16.75; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

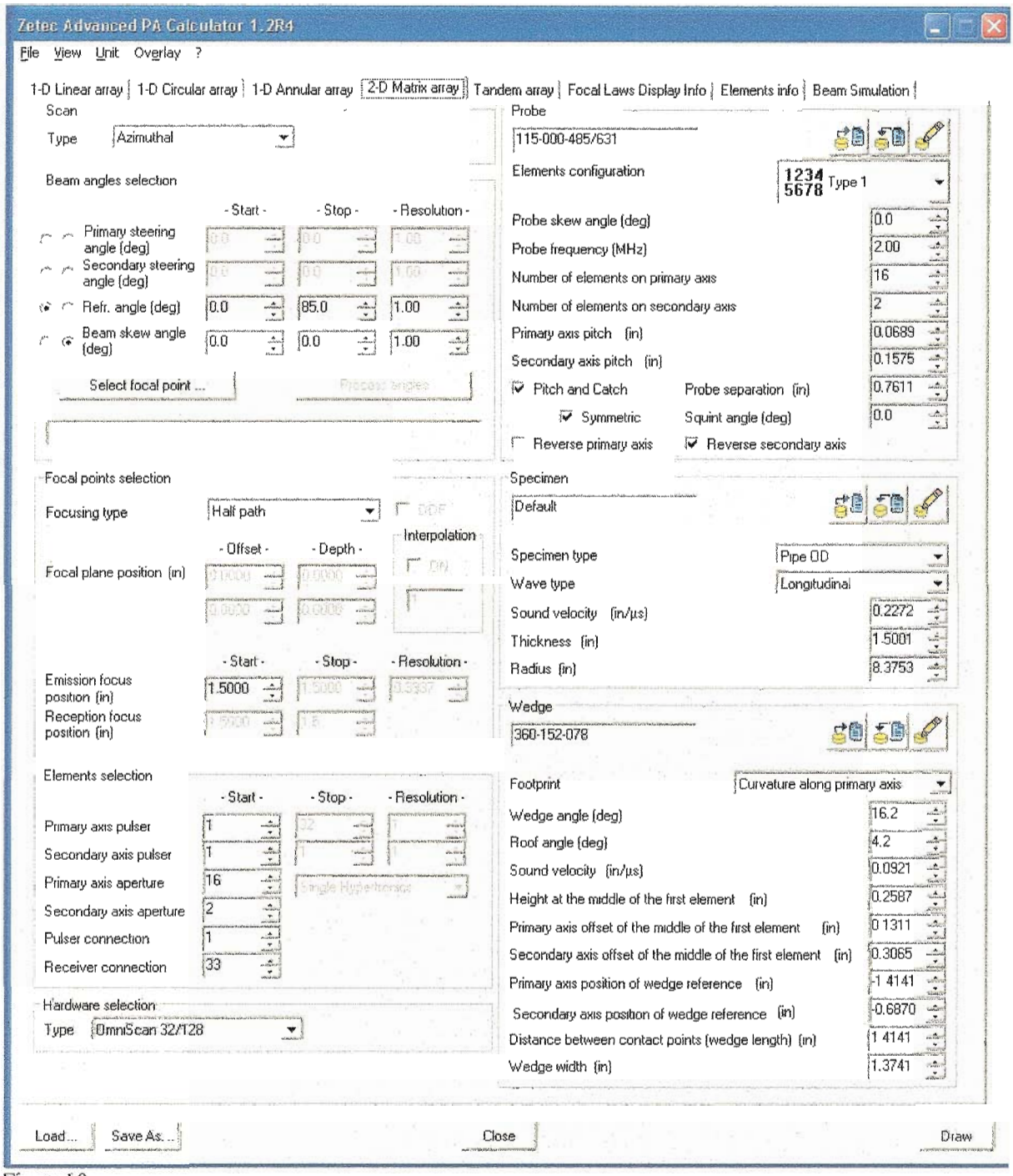


Figure 10.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-078; Diameter (in) = 16.75; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.5

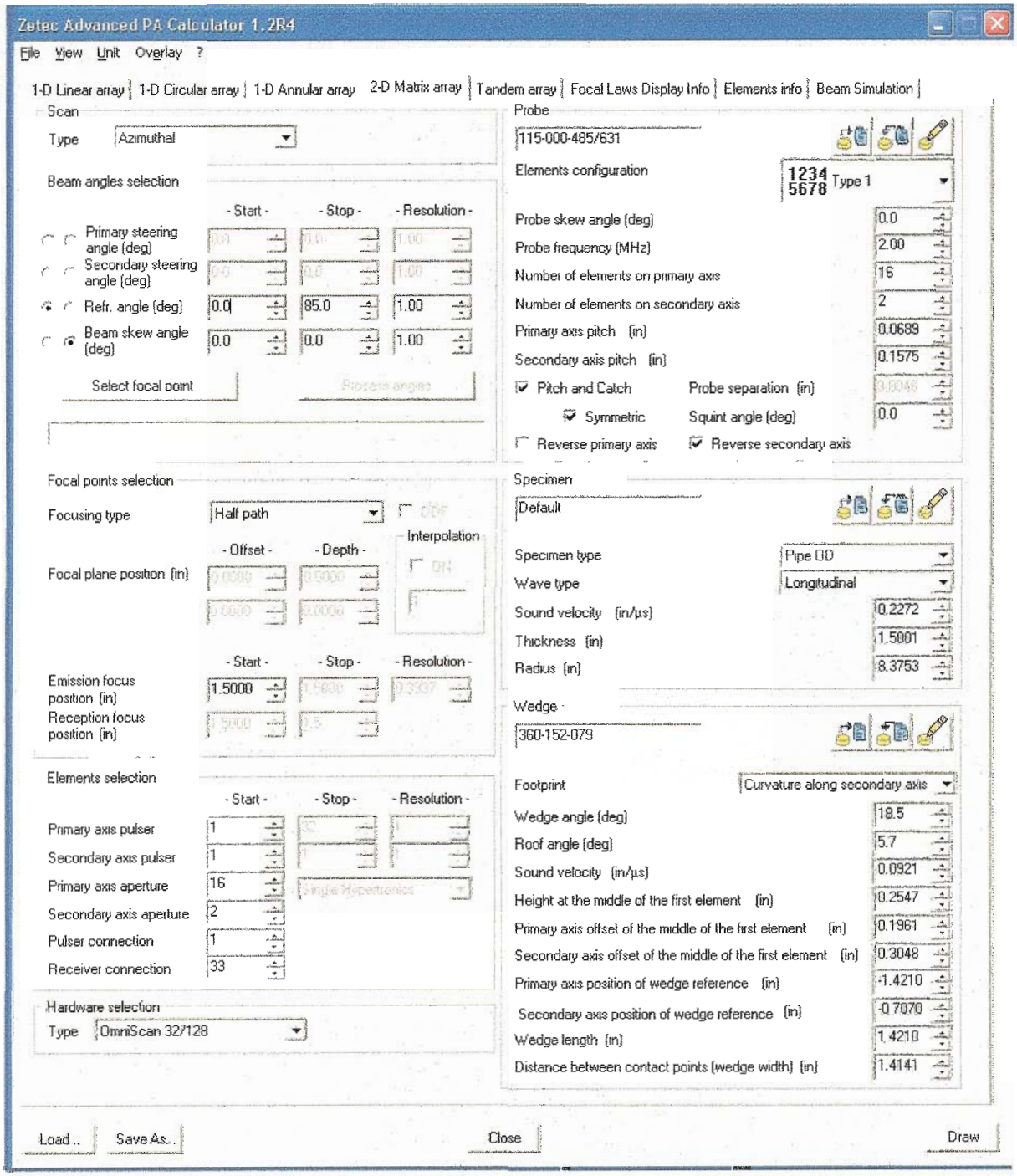


Figure 11.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-079; Diameter (in) = 16.75; Scanning Direction = Axial; Focal Metal Path (in) = 1.5

BPY-C-3000 / BPY-C-3002

3-inch Cold Leg Spray Line Loop 1B

Dominion

Millstone Unit 2

UT Data Package Cover

Data Package No: 219-01-010

2 1 9 - 0 1 - 0 1 0

Reference ID: BPY-C-3000

B P Y - C - 3 0 0 0

AWO: 53102184603

5 3 1 0 2 1 8 4 6 0 3

Page #	Data Type	Exam Angle	Recordable	Limitations	Comments
1	C	0-85°			
2	C	0-85°			
3	C	0-85°	N		
4	C	0-85°		A	
5	C	0-85°			
6	E	0-85°	NRI	NONE	
7	C	0-82°			
8	C	0-82°			
9	C	0-82°	N		
10	C	0-82°		A	
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 10/20/09

Dominion Review: KJHacker

Level: III

Review Date: 10/20/09

Previous Data Review

UT ☐ N/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:

Dominion

Millstone Unit 2

UT Data Package Cover

Data Package No: 219-01-039

219-01-039

Reference ID: BPY-C-3002

BPY-C-3002

AWO: 53102184603

53102184603

Page #	Data Type	Exam Angle	Recordable	Limitations	Comments
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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 10/20/09

Dominion Review: KJHacker

Level: III

Review Date: 10/20/09

Previous Data Review

UT ☑ N/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-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	
Manufacturer:	GEIT
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

Comments:
See attached EPRI correspondence for Probe, Wedge and Focal Law information.

Instrument	
Manufacturer:	Zetec
Model:	Omniscan 32/128 PR
PA Module Serial Number:	Omni-Z-6034
UT Mainframe Serial Number:	Omni-Z-1062
Software Revision:	1.4R3
Table 2 Instrument Settings:	See attached

Search Unit	
Manufacturer:	GEIT
Model:	115-000-631
Serial Number:	01Y28X-1/ 01Y28X-2

Search Unit Integral Cable	
Type:	See cable diagram
Length:	See cable diagram
Connector Type #:	See cable diagram

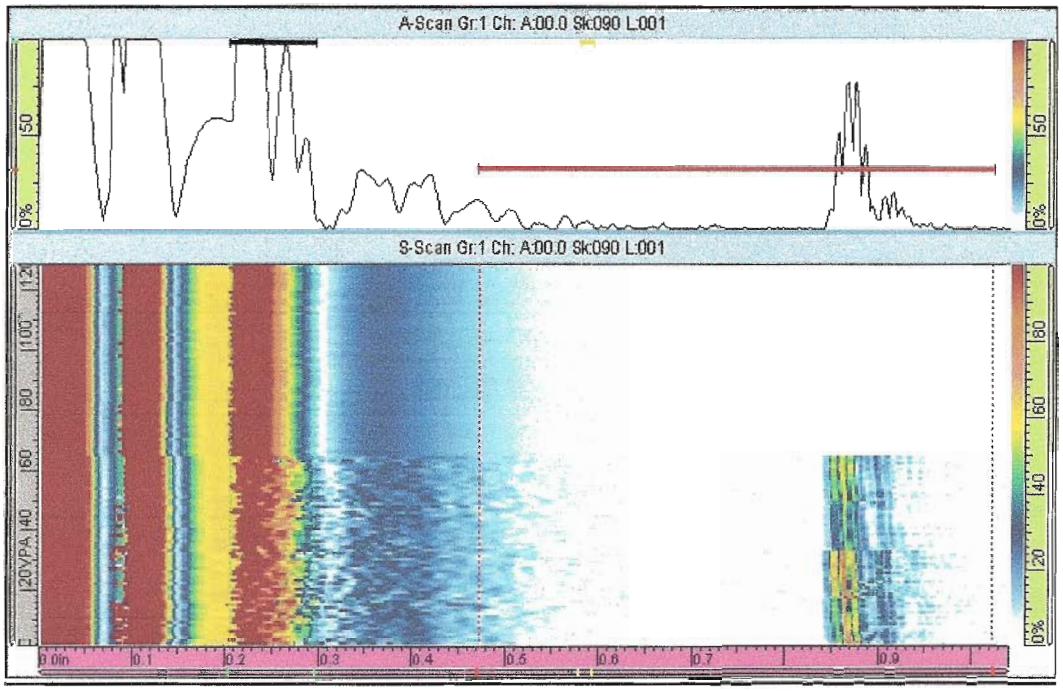
Couplant:	Soundsafe	**Temperature Gauge:**	PTC 312F
Manufacturer:	Sonotech Inc.	**Serial Number:**	268025
Batch Number:	07220H		

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

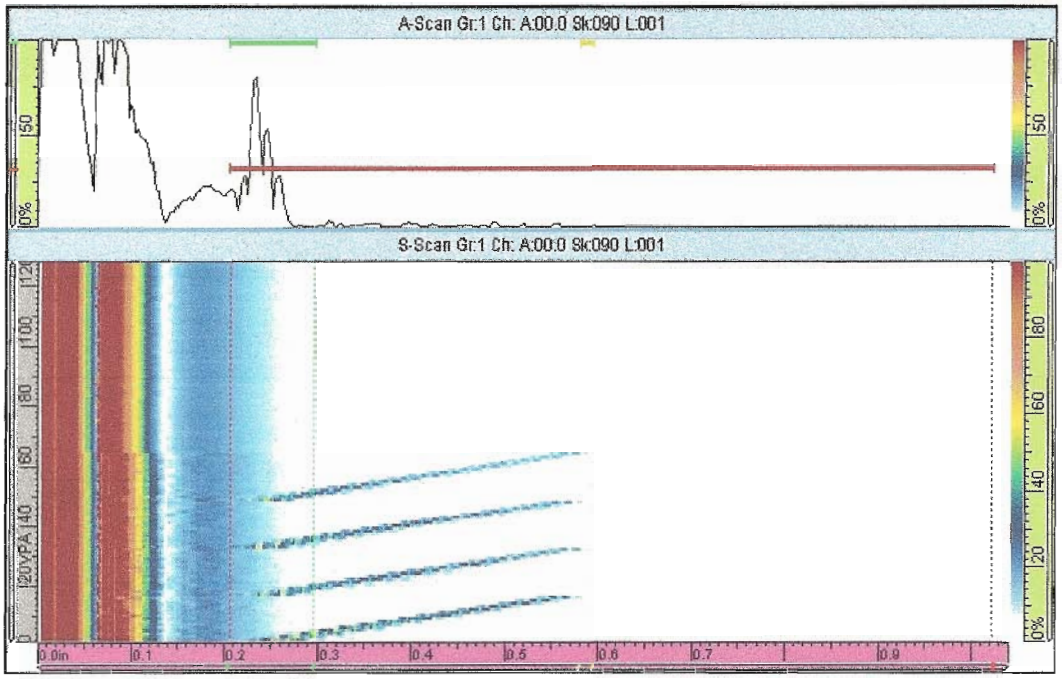
Calibration Reflector Data

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		

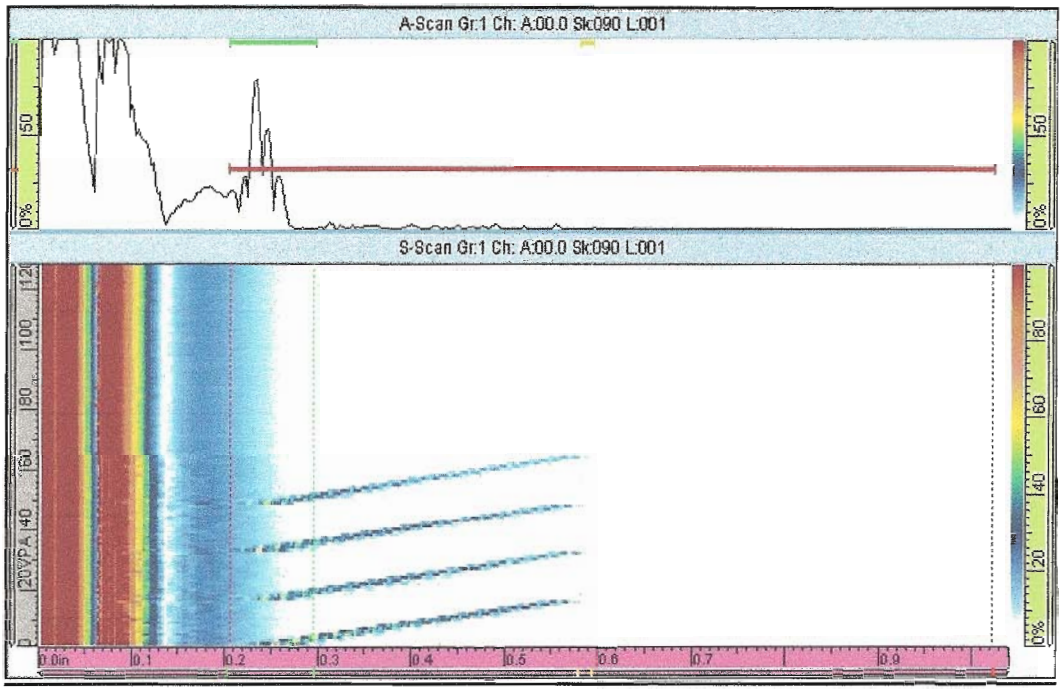
Calibration Performed	**Examiner 1**	**Examiner 2**	**Level(s)**	**Date**	**Time**
Initial:	Chris Van Ruler	Ryan Tolosky	II/II	10/17/09	0245
Intermediate:	N/A	N/A	N/A	N/A	N/A
Final:	Chris Van Ruler	Ryan Tolosky	II/II	10/17/09	0305



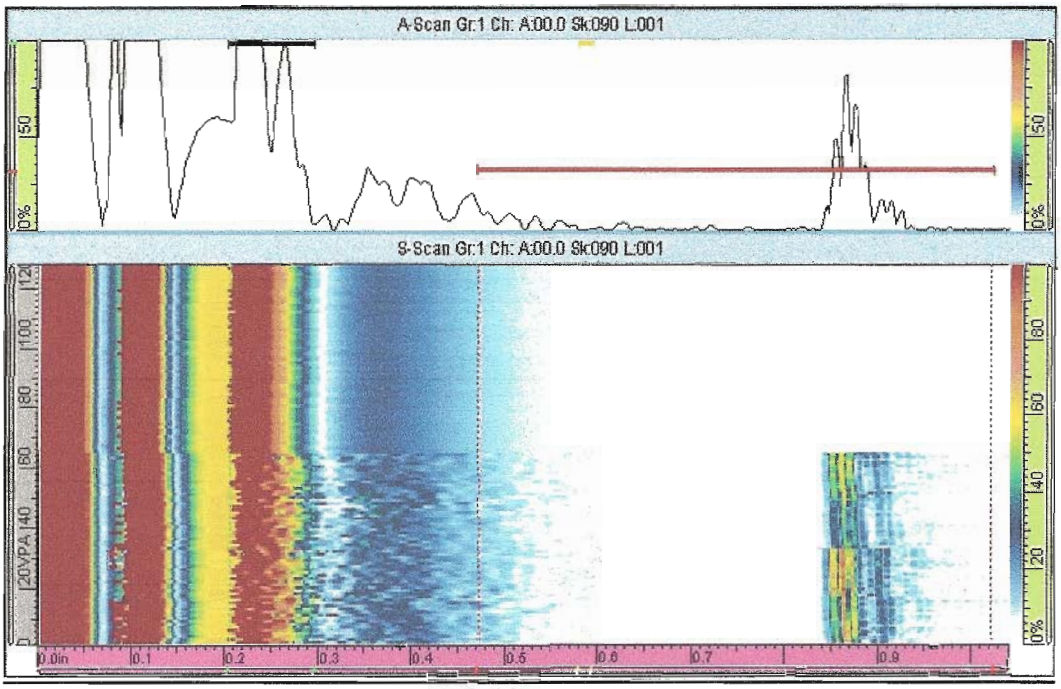
Element Check 1- Pre exam, off wedge



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

Dominion

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: **Minimum:** .45" **Maximum:** .70"	**Axial** 0° to 85°	**Circumferential** N/A	
Examination Sensitivity:	36 dB	N/A dB	

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	☒	☐	☐
(2) Axial (Upstream)	☒	☐	☐
(3) Circumferential (Clockwise)	☐	☐	☒
(4) Circumferential (Counterclockwise)	☐	☐	☒

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

Dominion

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	
Manufacturer:	GEIT
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

Comments:
See attached EPRI correspondence for Probe, Wedge and Focal Law information.

Instrument	
Manufacturer:	Zetec
Model:	Omniscan 32/128 PR
PA Module Serial Number:	Omni-Z-6034
UT Mainframe Serial Number:	Omni-Z-1062
Software Revision:	1.4R3
Table 2 Instrument Settings:	See attached

Search Unit	
Manufacturer:	GEIT
Model:	115-000-631
Serial Number:	01Y28Y-1/ 01Y28Y-2

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

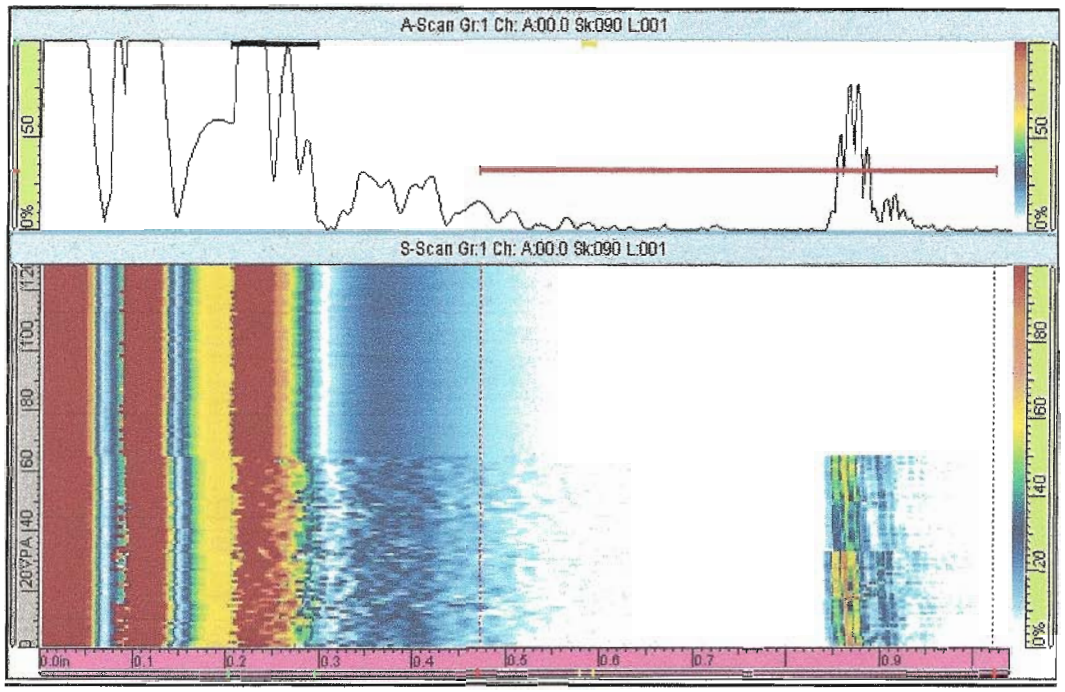
Calibration Block(s): 6039038 MEUXE017A (.1" SDH only) **Temperature:** 80°

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

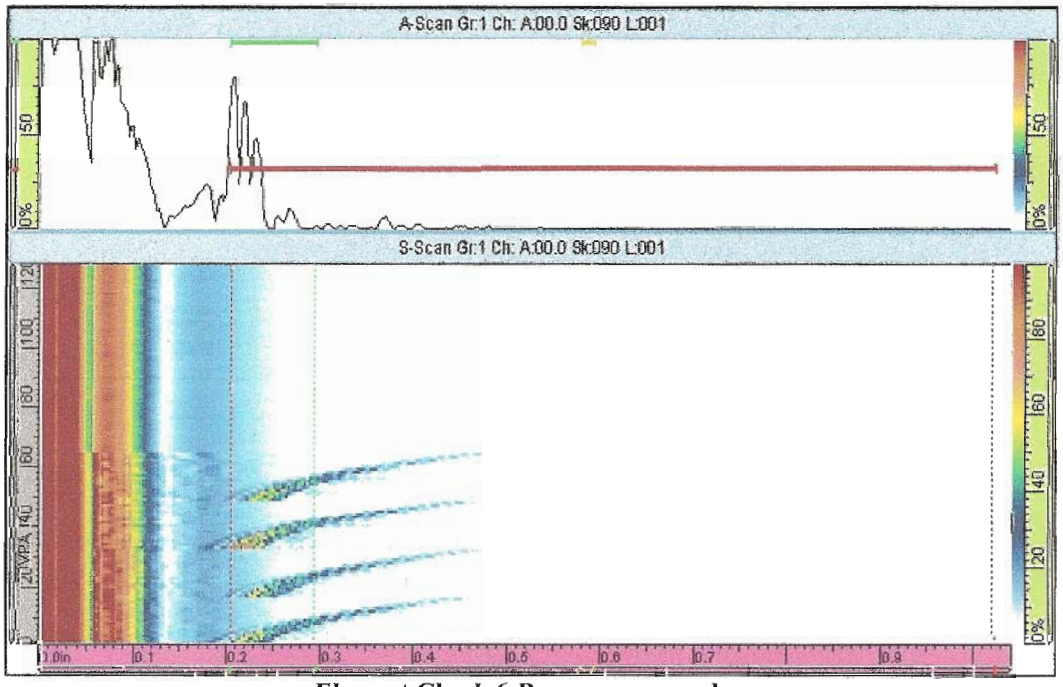
Channel Functional Checks **Pre Exam:** Acceptable **Post Exam:** Acceptable

Number of Inactive Channels/Elements: **Transmit:** 0 **Receive:** 0

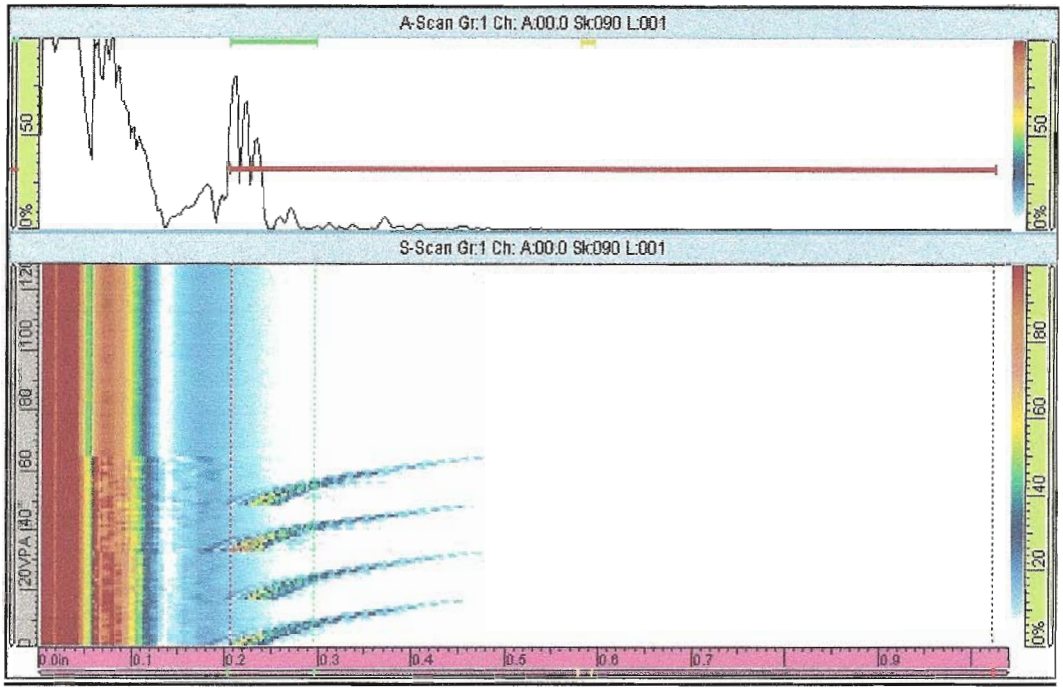
Calibration Performed	**Examiner 1**	**Examiner 2**	**Level(s)**	**Date**	**Time**
Initial:	Chris Van Ruler	Ryan Tolosky	II/II	10/17/09	0308
Intermediate:	N/A	N/A	N/A	N/A	N/A
Final:	Chris Van Ruler	Ryan Tolosky	II/II	10/17/09	0330



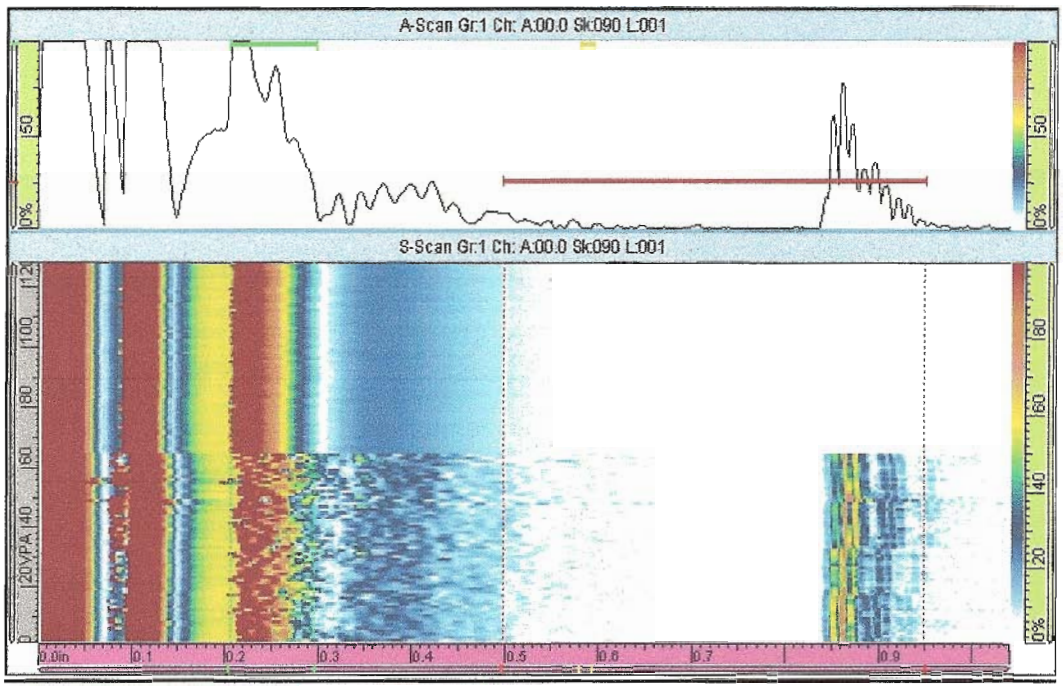
Element Check 5- Pre exam off wedge



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

Dominion

ULTRASONIC PHASED ARRAY WOR ULTRASONIC EXAMINATION RECORD

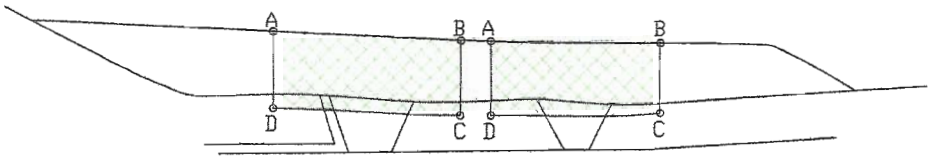
Exam Data Sheet: 219-01-010 219-01-039		**Calibration Data Sheet:** 219-01-010 219-01-039	
Plant: Millstone	**Unit:** 2	**Procedure:** ER-MP-NDE-UT-816/Rev. 0	
Zones DM Weld: 1-10	**SS Weld:** 1-22		
Date: 10/17/09	**Exam Start:** 0245	**Exam Stop:** 0330	
WOR Identification DM Weld: BPY-C-3000	**SS 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: **Minimum:** .45" **Maximum:** .70"		**Axial** N/A	**Circumferential** 0° to 82°
	Examination Sensitivity:	N/A dB	34.0 dB

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	☐	☐	☒
(2) Axial (Upstream)	☐	☐	☒
(3) Circumferential (Clockwise)	☒	☐	☐
(4) Circumferential (Counterclockwise)	☒	☐	☐

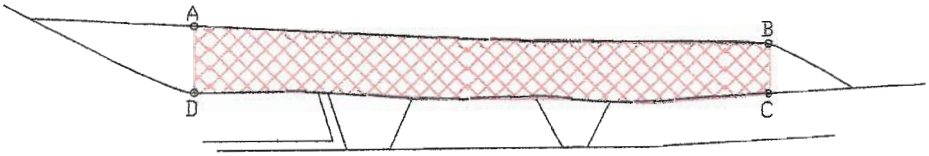
Comments: Maintained 5% to 20% average baseline noise level during examination. No suspected flaw indications were observed during examinations.

Examiner	Level	Signature	Date	LMT Review	Level	Signature	Date
Chris Van Ruler	II		10/17/09	Todd Blechinger	III		10/18/09
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

ELECTRIC POWER RESEARCH INSTITUTE

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.

CHARLOTTE OFFICE
1300 West W.T. Harris Boulevard, Charlotte, NC 28262-8550 USA • 704.595.2000 • Fax 704.595.2860
Customer Service 800.313.3774 • www.epri.com

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,

Mark Dennis
EPRI Senior Project Manager

Attachment

September 23, 2009
Kevin Hacker
Page 3

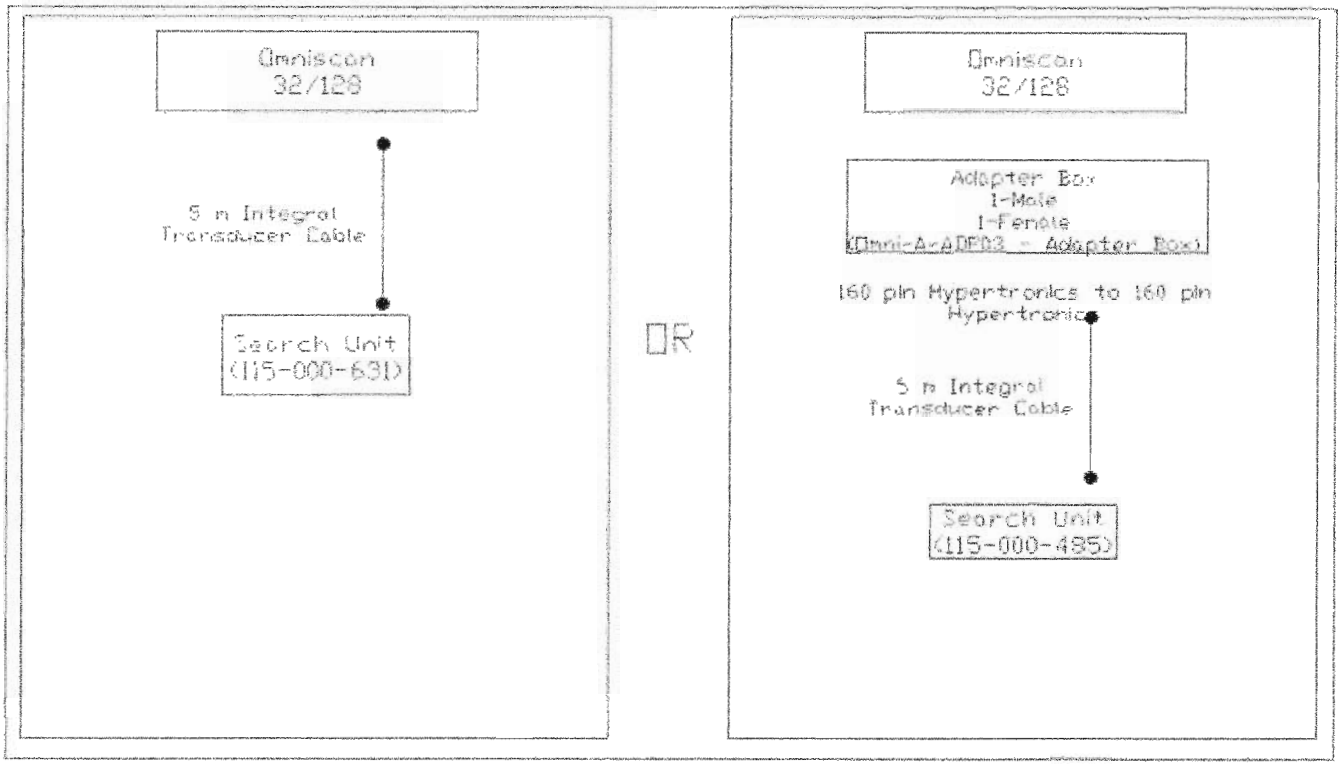


Figure 1. OmniScan 32-128 P/R Cable Diagram for EPRI-WOL-PA-1

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			
1-08	BPY-C-1001	3" Spray line Loop 1A	5.50"	360-152-235	360-152-234
1-10	BPY-C-3000	3" Spray Line Loop 1B			
1-08	BSI-C-1001	12" Safety Injection 1A	16.75"	360-152-079	360-152-078
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			

September 23, 2009
Kevin Hacker
Page 4

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

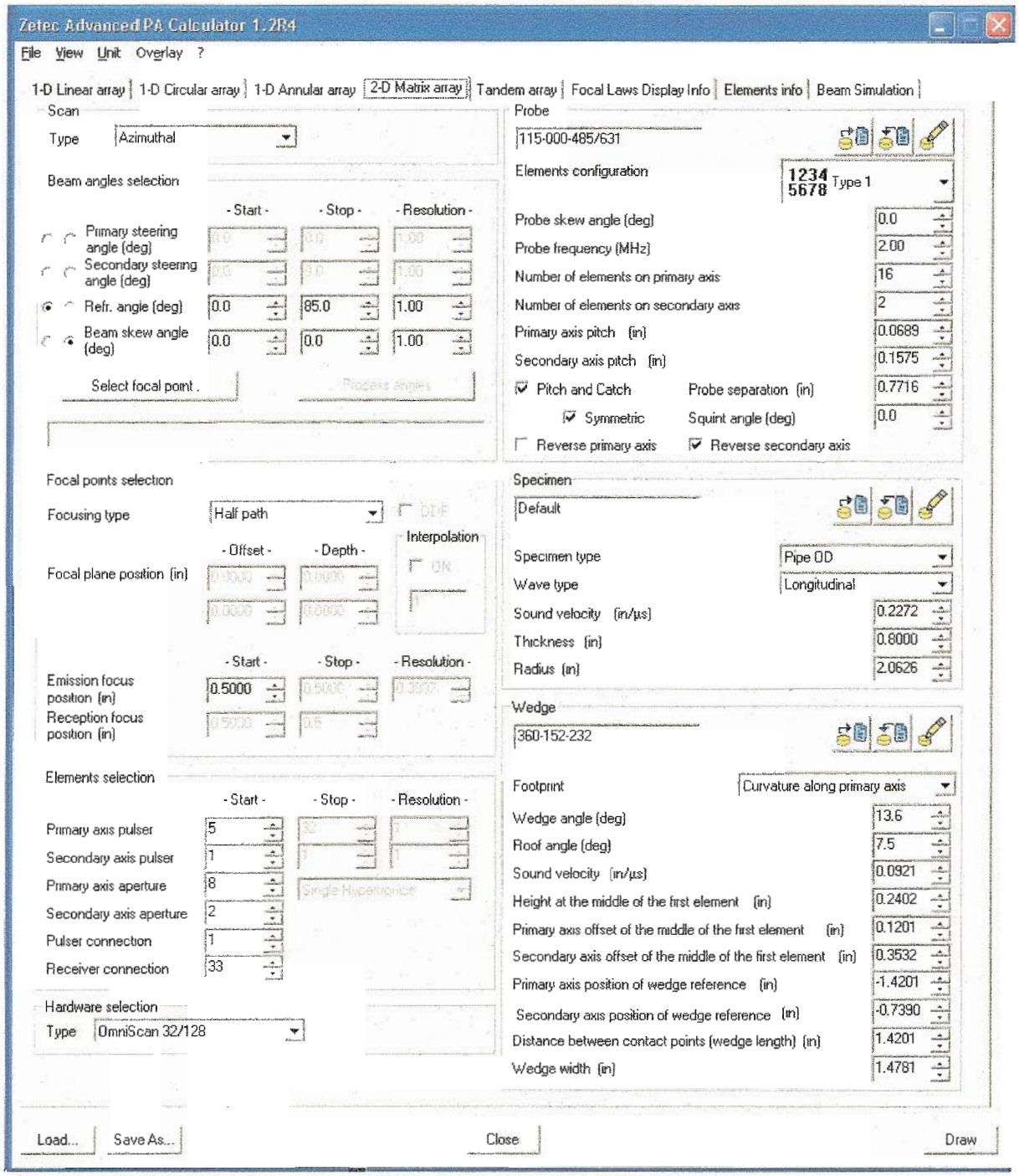


Figure 2.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-232; Diameter (in) = 4.125; Scanning Direction = Circumferential; Focal Metal Path (in) = 0.5

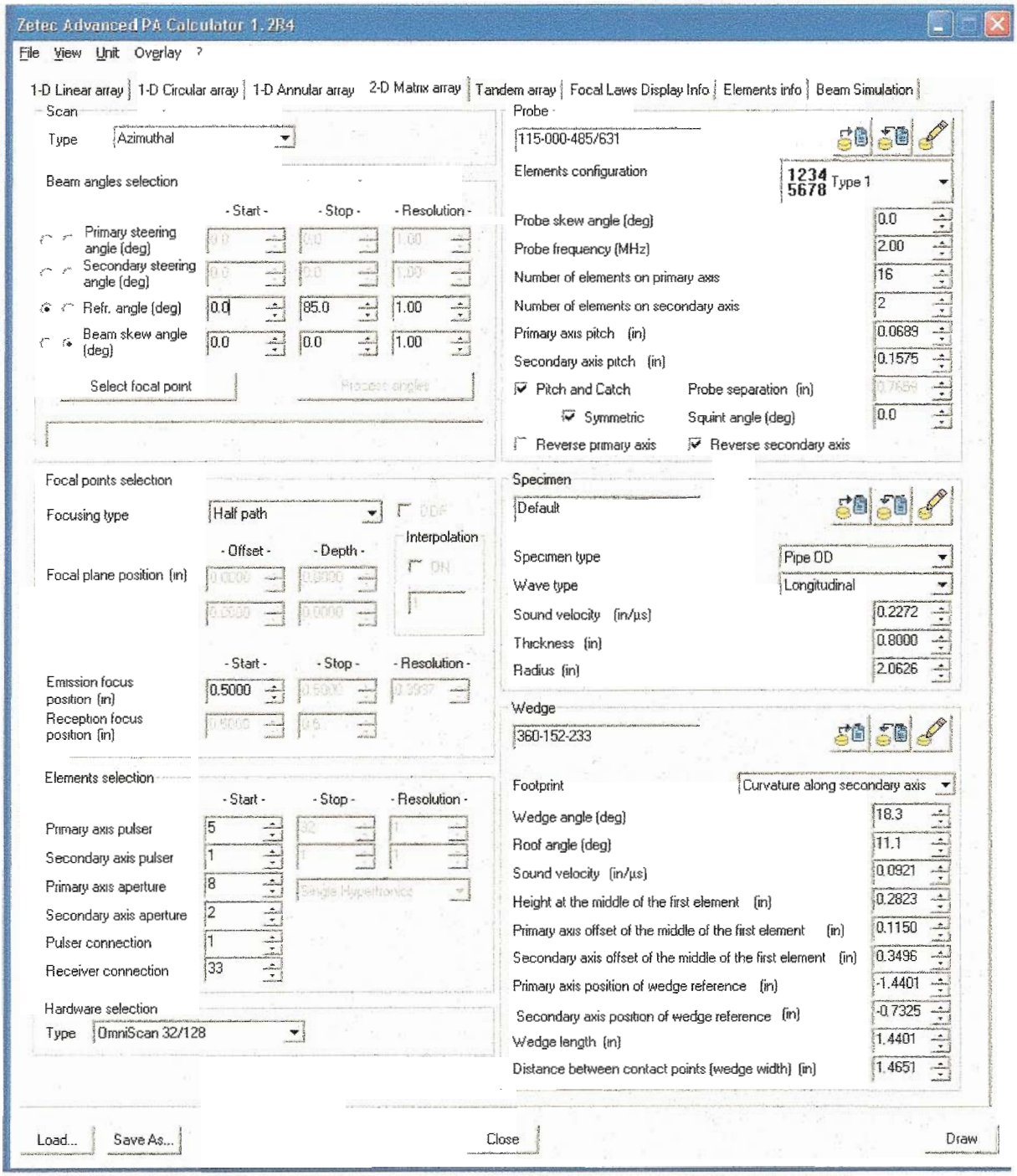


Figure 3.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-233; Diameter (in) = 4.125; Scanning Direction = Axial; Focal Metal Path (in) = 0.5

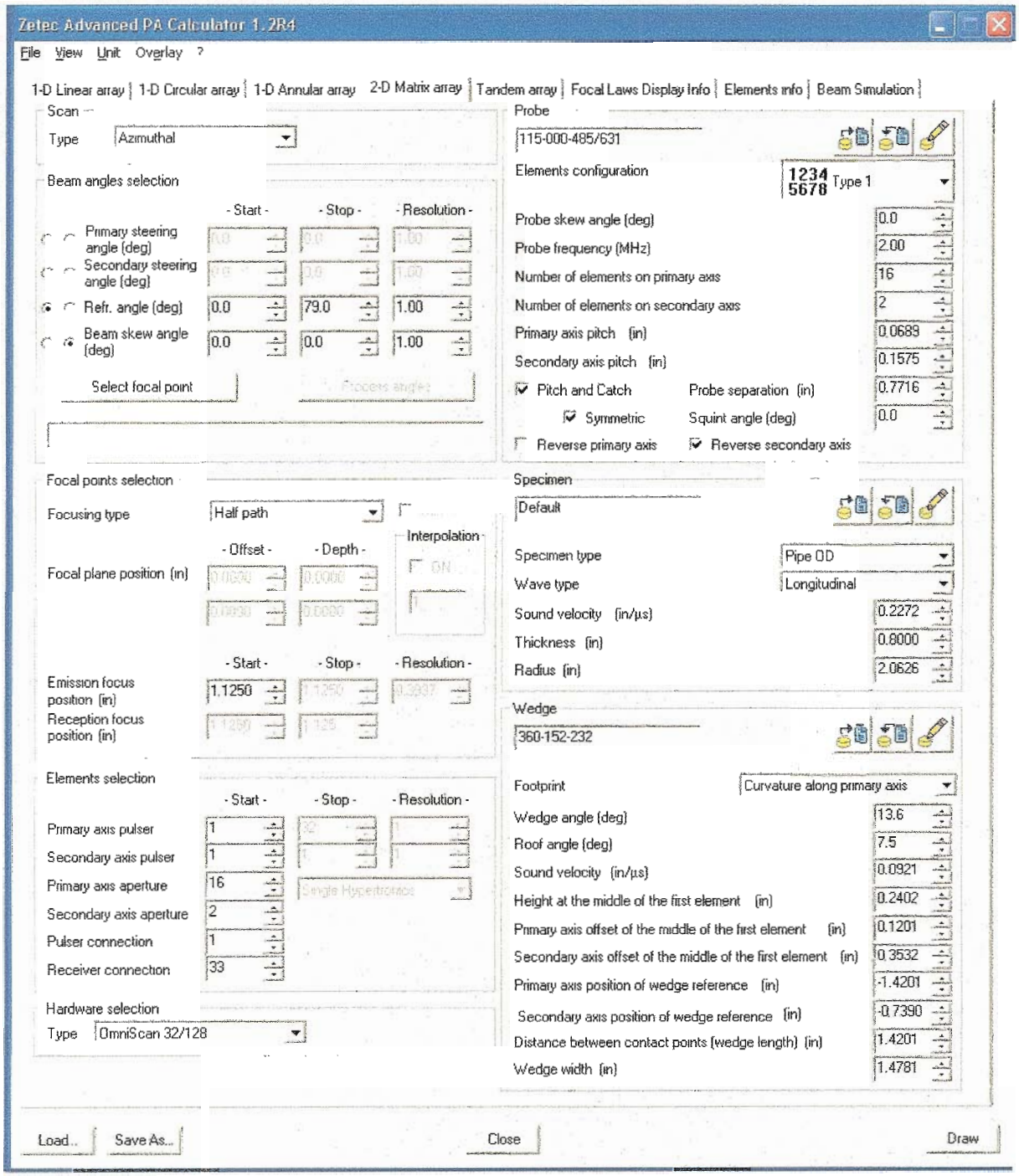


Figure 4.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-232; Diameter (in) = 4.125; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

September 23, 2009
Kevin Hacker
Page 8

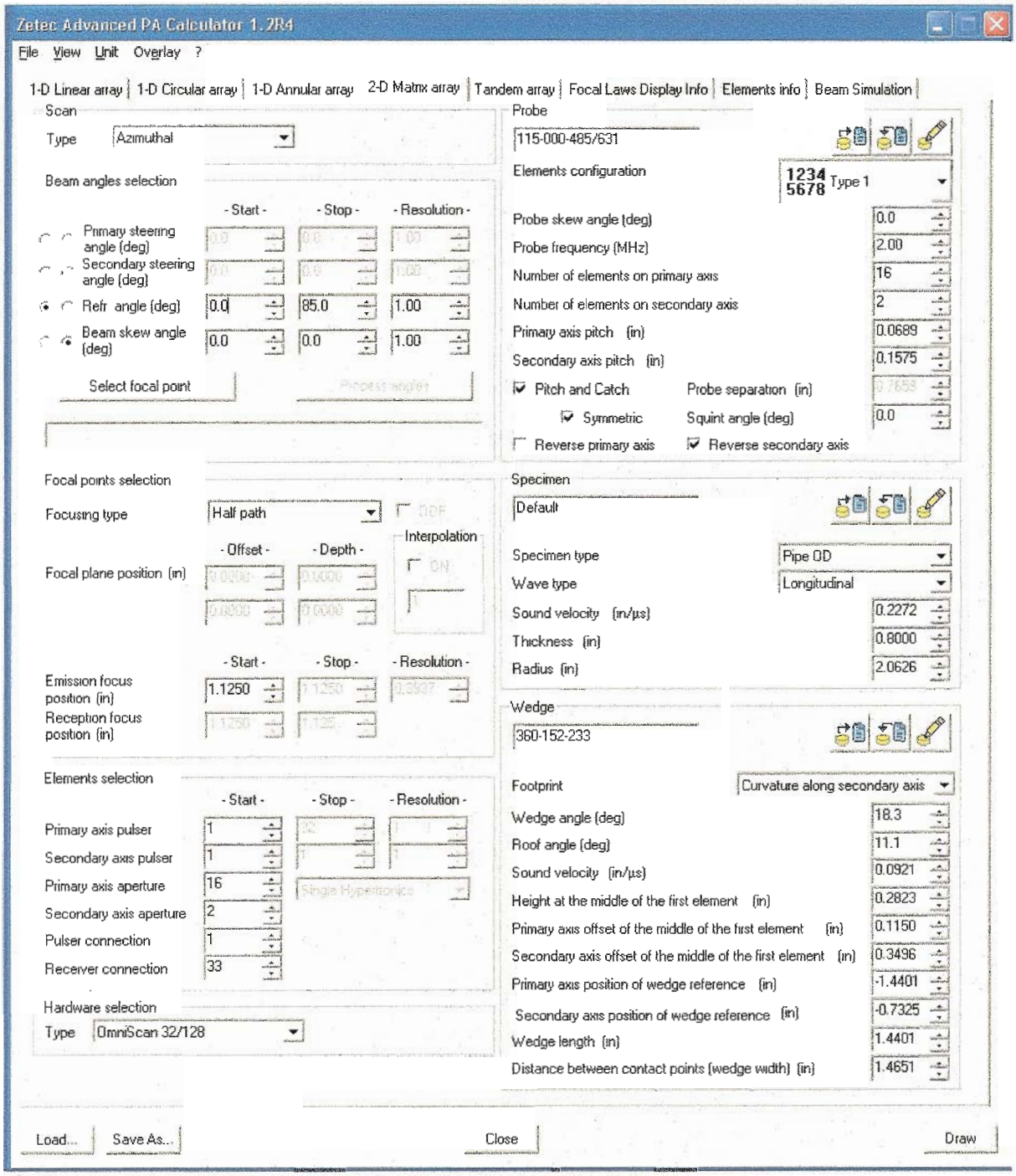


Figure 5.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-233; Diameter (in) = 4.125; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

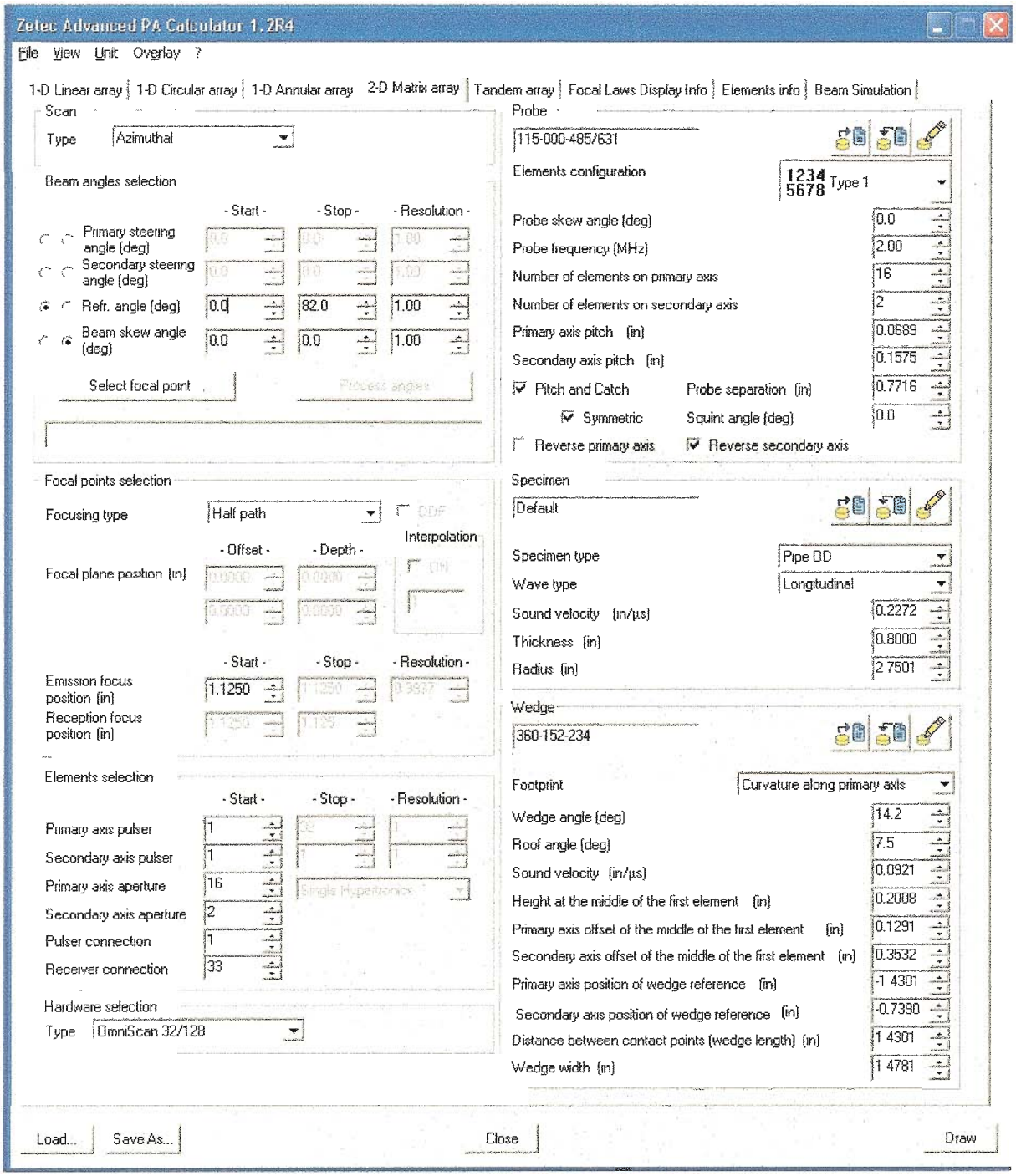


Figure 6.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-234; Diameter (in) = 5.5; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

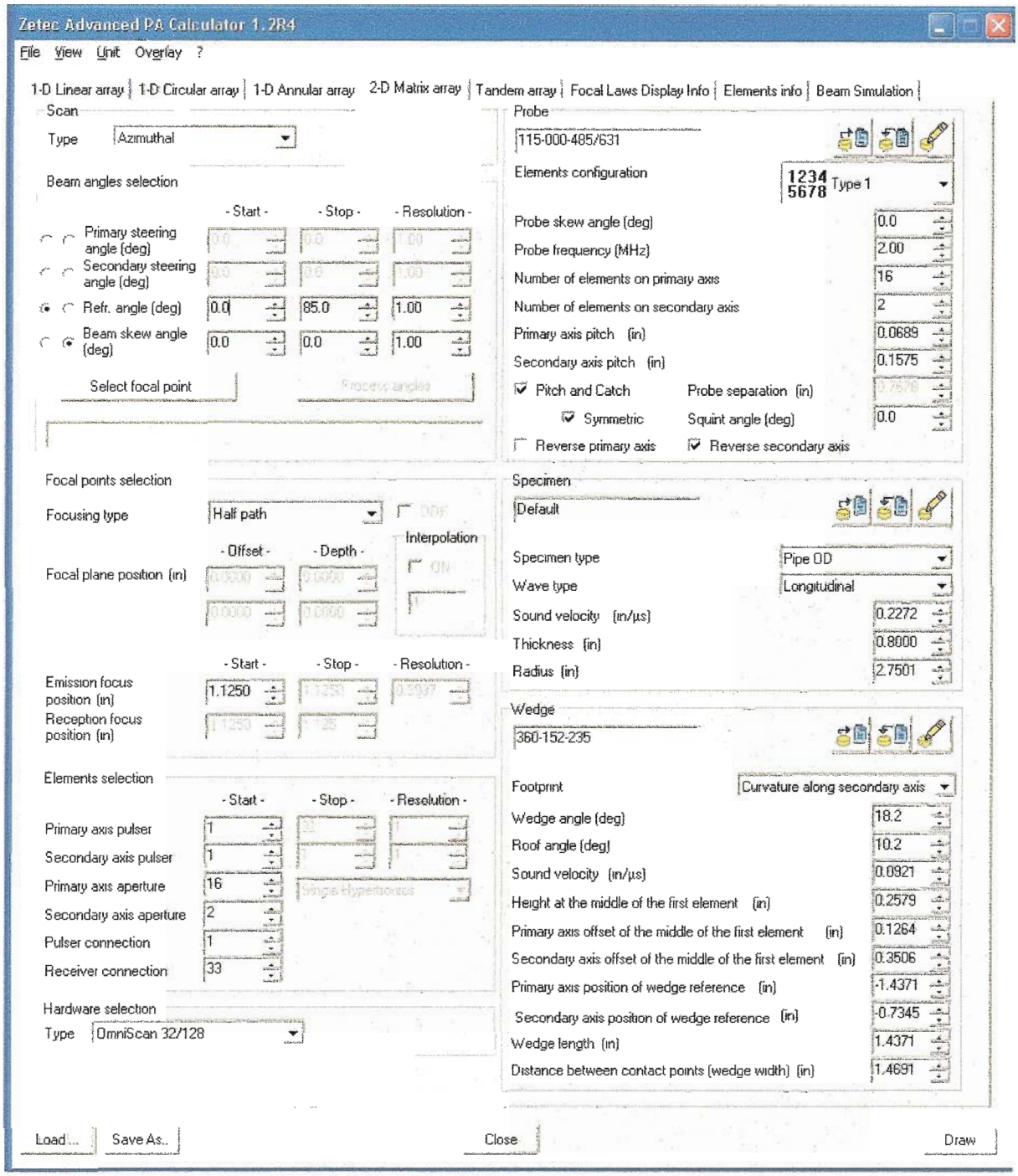


Figure 7.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-235; Diameter (in) = 5.5; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

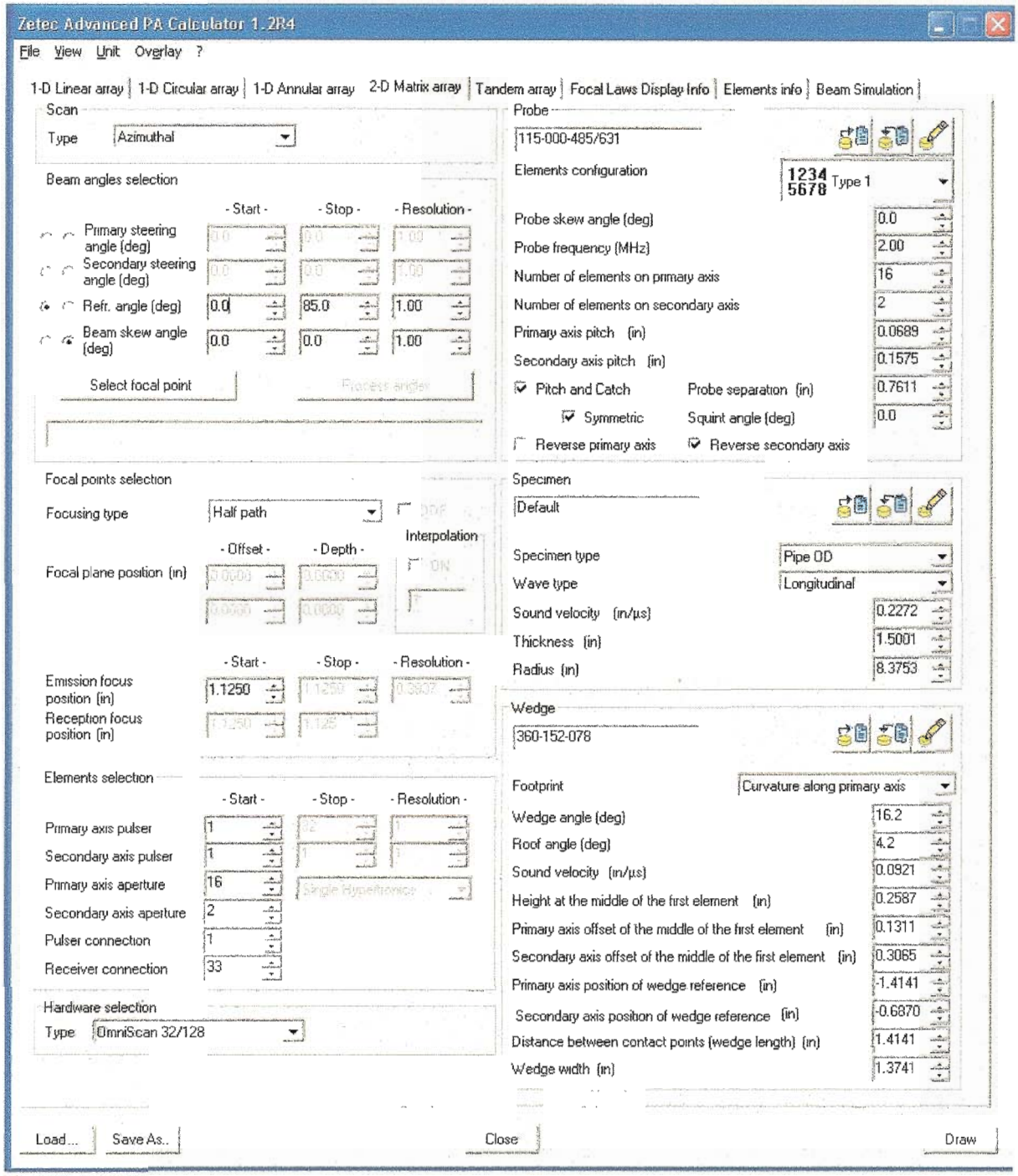


Figure 8.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-078; Diameter (in) = 16.75; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.125

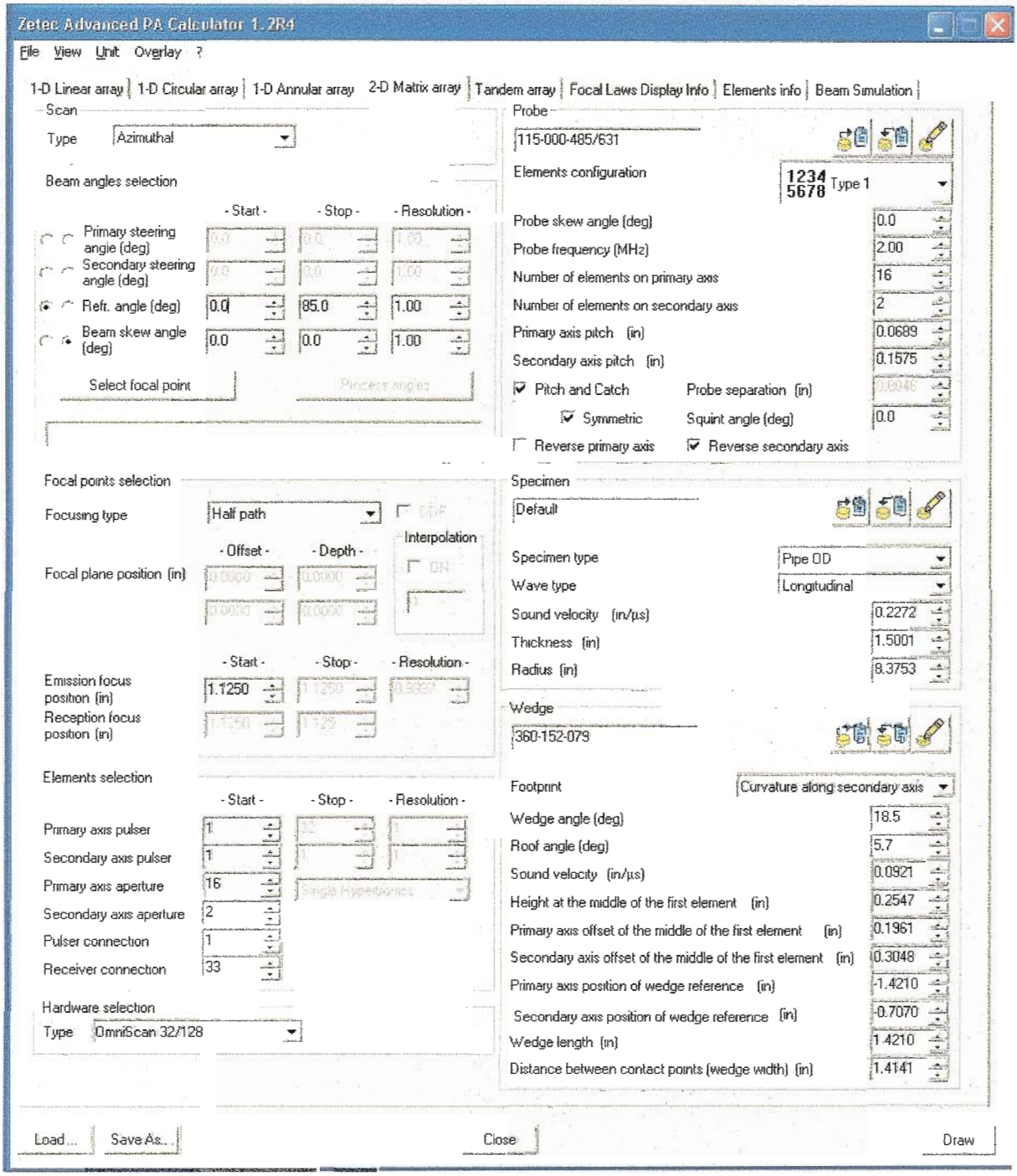


Figure 9.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-079; Diameter (in) = 16.75; Scanning Direction = Axial; Focal Metal Path (in) = 1.125

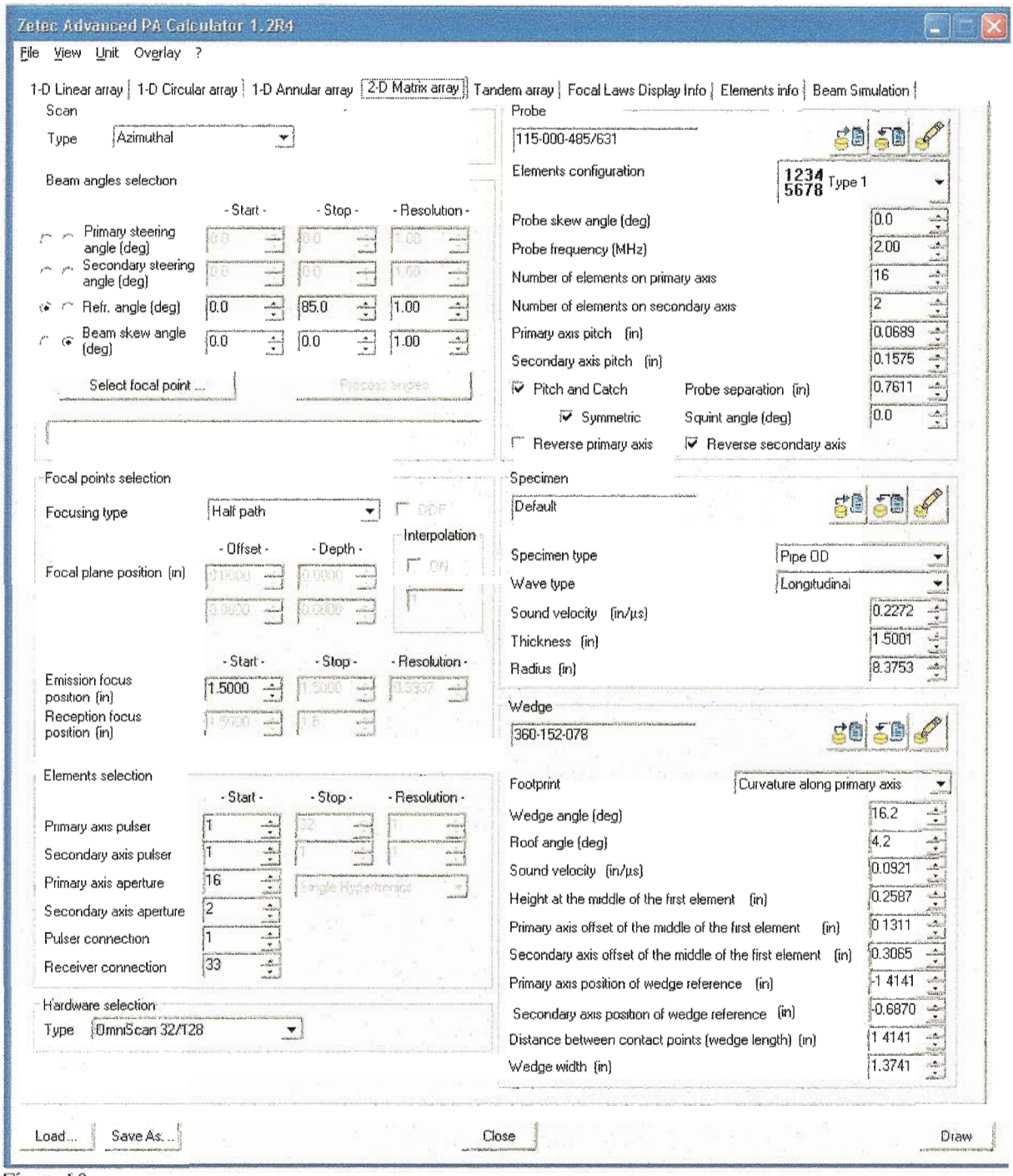


Figure 10.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-078; Diameter (in) = 16.75; Scanning Direction = Circumferential; Focal Metal Path (in) = 1.5

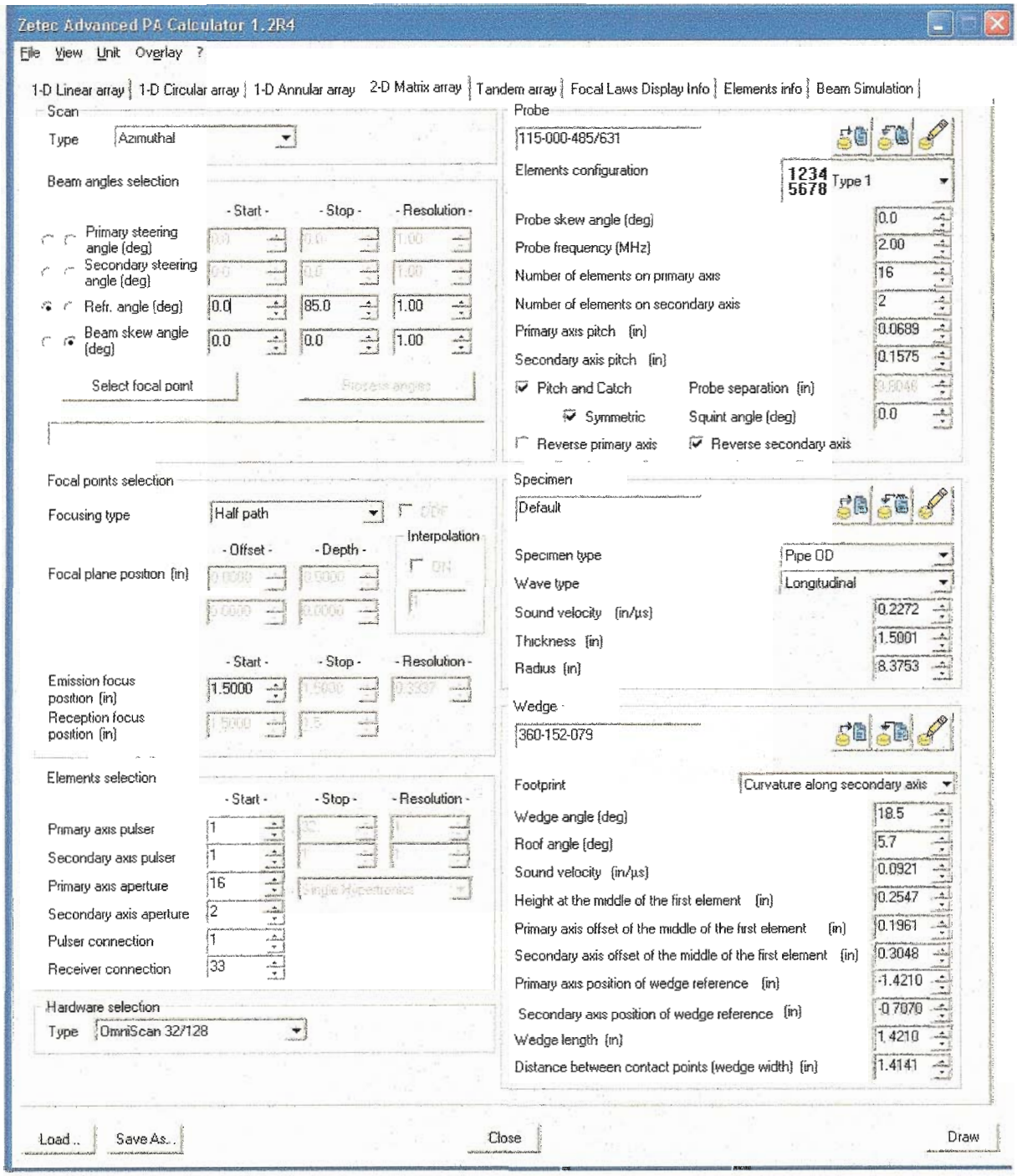


Figure 11.
ZAPAC Input for GEIT Array Part #115-000-485 or 115-000-631; GEIT Wedge Part #360-152-079; Diameter (in) = 16.75; Scanning Direction = Axial; Focal Metal Path (in) = 1.5

BPD-C-1017 / BPD-C-1019

2-inch Cold Leg Drain Line Loop 1A

Dominion

Millstone Unit 2
UT Data Package Cover

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		N		
4	C			A	
5	C				
6	E		NRI	NONE	
7	C	0-79°			
8	C				
9	C		N		
10	C			A	
11	C				
12	E		NRI	NONE	
13	P	0-85°	N/A	N/A	

% of Required Exam Area: 100 %

Final Disposition: ACCEPTABLE 10/24/09

Dominion Review: KJHackes

Level: III

Review Date: 10/26/09

Previous Data Review

UT ☒ N/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:

Dominion

Millstone Unit 2

UT Data Package Cover

Data Package No: 219-01-035

2 1 9 - 0 1 - 0 3 5

Reference ID: BPD-C-1019

B P D - C - 1 0 1 9

AWO: 53102184598

5 3 1 0 2 1 8 4 5 9 8

Page #	Data Type	Exam Angle	Recordable	Limitations	Comments
1	C	0-85°			
2	C		N		
3	C			A	
4	C				
5	C				
6	E		NRI	NONE	
7	C	0-79°			
8	C				
9	C		N		
10	C			A	
11	C				
12	E		NRI	NONE	
13	P	0-85°	N/A	N/A	

% of Required Exam Area: 100%

Previous Data Review

UT ☒ N/A RT ☐

Final Disposition: ACCEPTABLE 10/24/09

Dominion Review: KJHacker KJHacker

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	

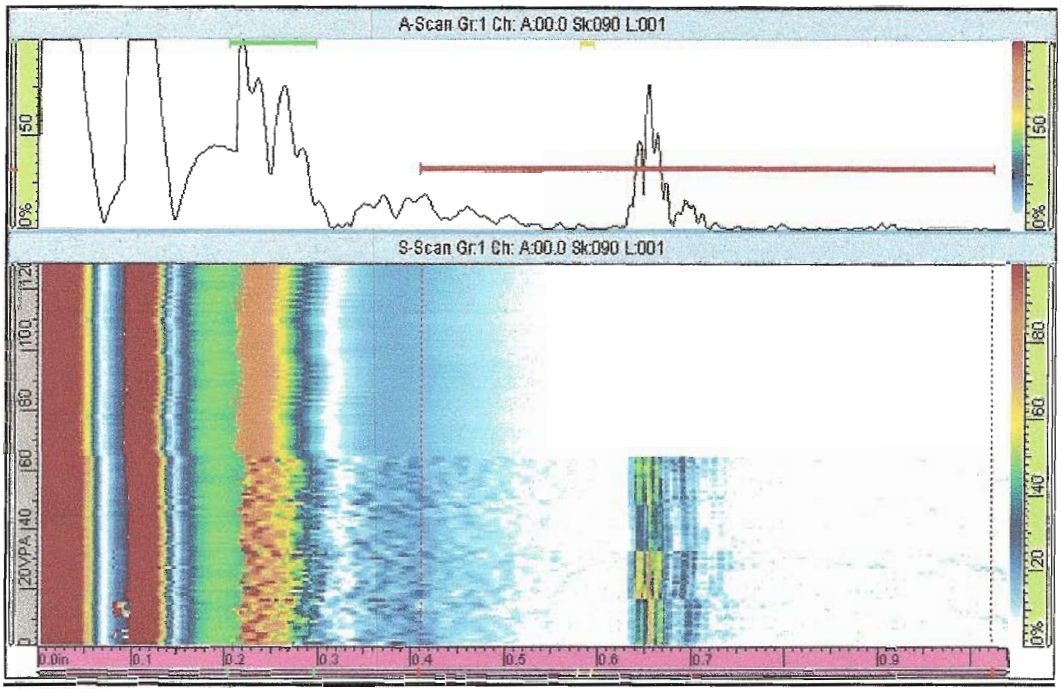
Instrument		**Search Unit**	
Manufacturer:	Zetec	**Manufacturer:**	GEIT
Model:	Omniscan 32/128 PR	**Model:**	115-000-631
PA Module Serial Number:	Omni-Z-6034	**Serial Number:**	01Y28X-1/ 01Y28X-2
UT Mainframe Serial Number:	Omni-Z-1062		
Software Revision:	1.4R3		
Table 2 Instrument Settings:	See attached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

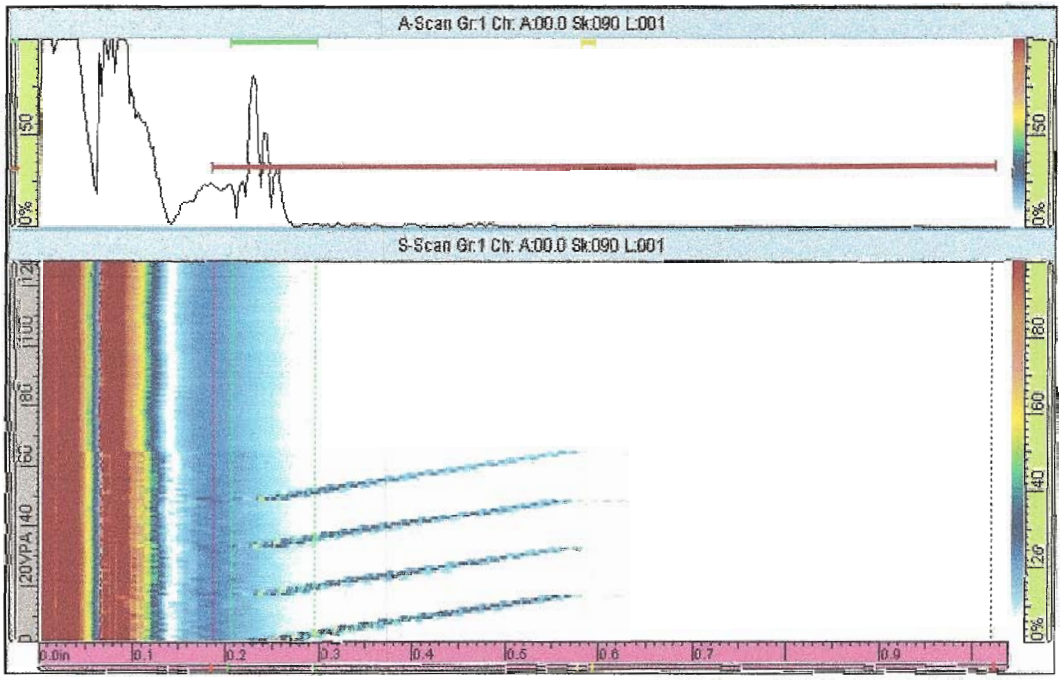
Calibration Data Files	
Focal Law:	032NJDZ2233L0085R2M1Z4_1.125MP.LAW
Angles Generated:	0° to 85°
Wave Mode:	Longitudinal
Focal Sound Path:	1.125" MP

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		

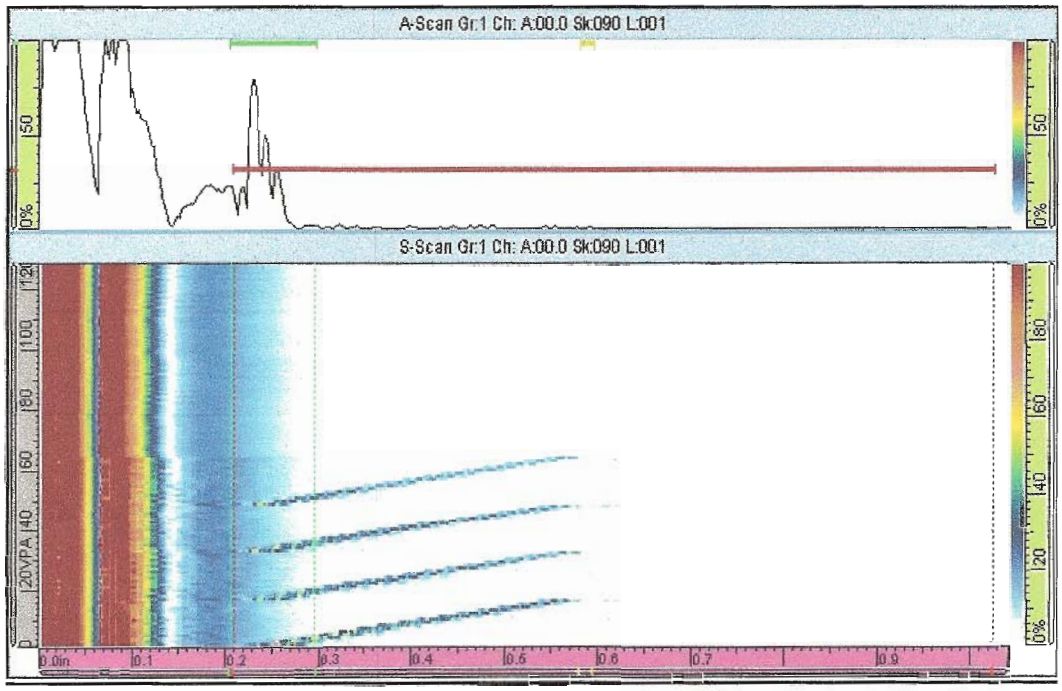
Calibration Performed	**Examiner 1**	**Examiner 2**	**Level(s)**	**Date**	**Time**
Initial:	Todd Blechinger	N/A	III	10/24/09	0530
Intermediate:	Todd Blechinger	N/A	III	10/24/09	0540
Final:	Todd Blechinger	N/A	III	10/24/09	0555



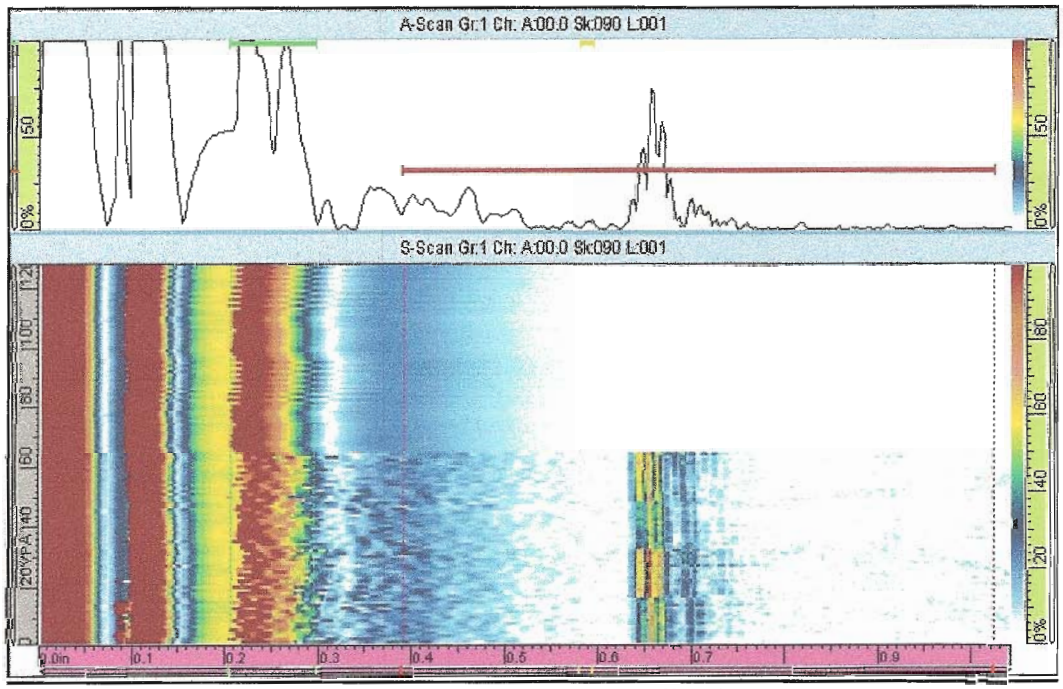
Element Check 1- Pre exam, off wedge



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

Dominion

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: **Minimum:** .30" **Maximum:** .70"		**Axial** 0° to 85°	**Circumferential** N/A
	Examination Sensitivity:	37 dB	N/A dB

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	☒	☐	☐
(2) Axial (Upstream)	☒	☐	☐
(3) Circumferential (Clockwise)	☐	☐	☒
(4) Circumferential (Counterclockwise)	☐	☐	☒

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	
Manufacturer:	GEIT
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

Comments:
See attached EPRI correspondence for Probe, Wedge and Focal Law information.

Instrument	
Manufacturer:	Zetec
Model:	Omniscan 32/128 PR
PA Module Serial Number:	Omni-Z-6034
UT Mainframe Serial Number:	Omni-Z-1062
Software Revision:	1.4R3
Table 2 Instrument Settings:	See attached

Search Unit	
Manufacturer:	GEIT
Model:	115-000-631
Serial Number:	01Y28Y-1/ 01Y28Y-2

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

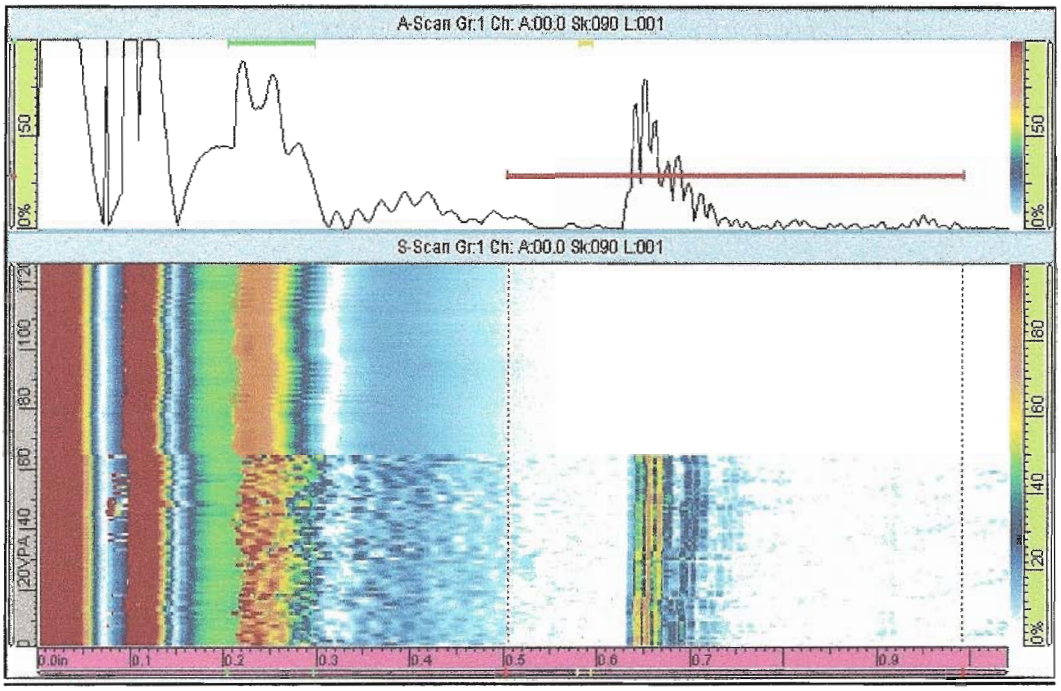
Calibration Block(s): MEUXE017A N/A **Temperature:** 76°

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

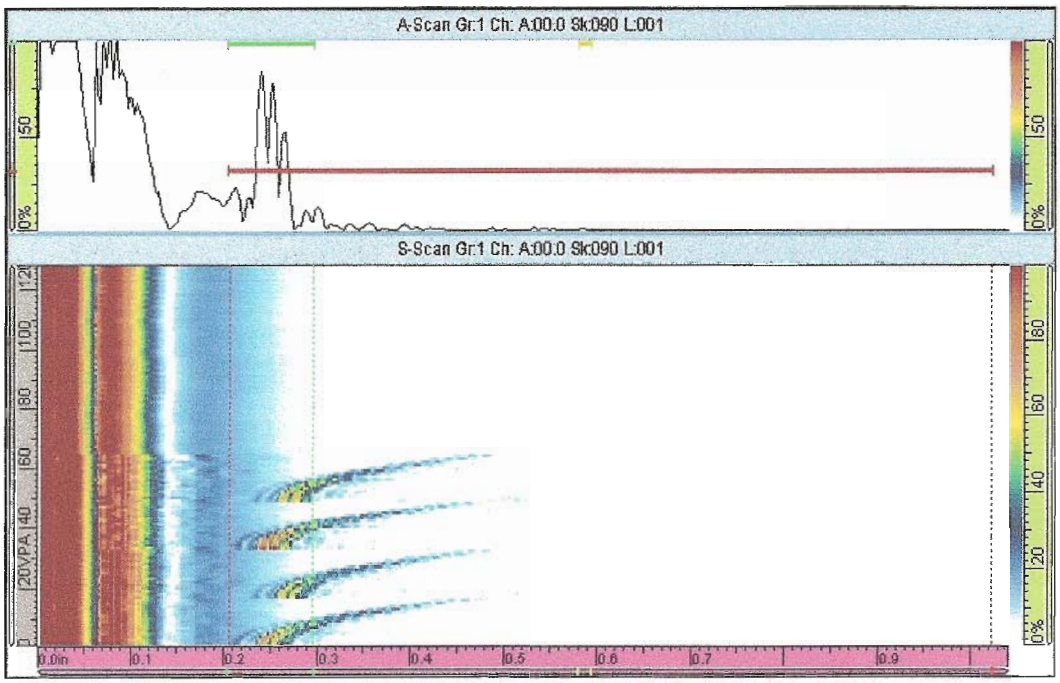
Channel Functional Checks **Pre Exam:** Acceptable **Post Exam:** Acceptable

Number of Inactive Channels/Elements: **Transmit:** 0 **Receive:** 0

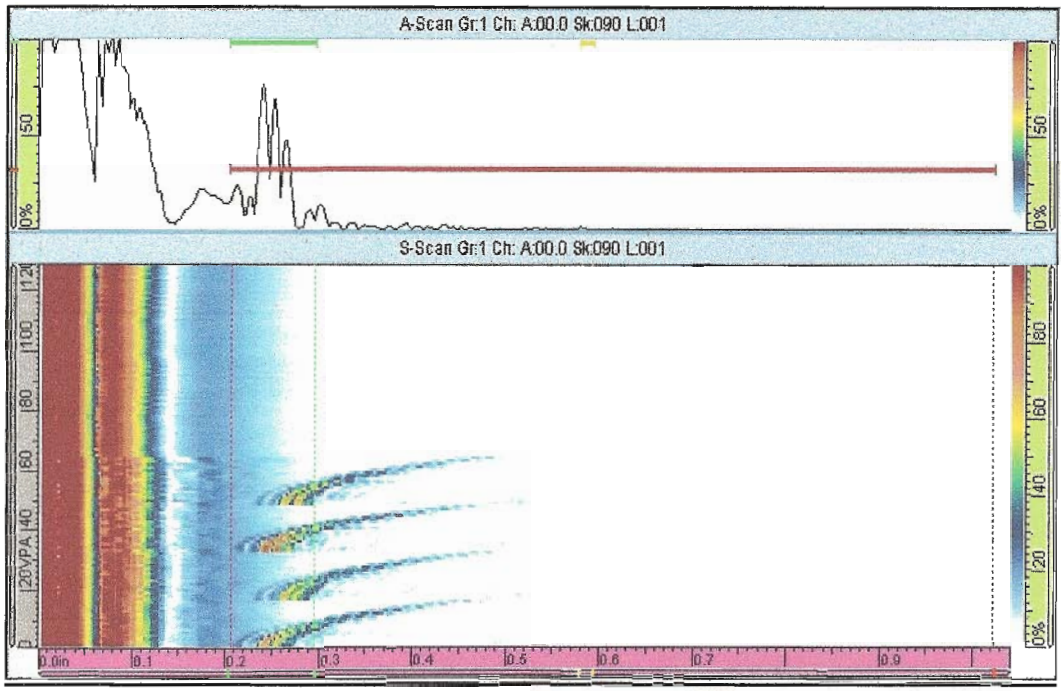
Calibration Performed	**Examiner 1**	**Examiner 2**	**Level(s)**	**Date**	**Time**
Initial:	Todd Blechinger	N/A	III	10/24/09	0557
Intermediate:	Todd Blechinger	N/A	III	10/24/09	0613
Final:	Todd Blechinger	N/A	III	10/24/09	0700



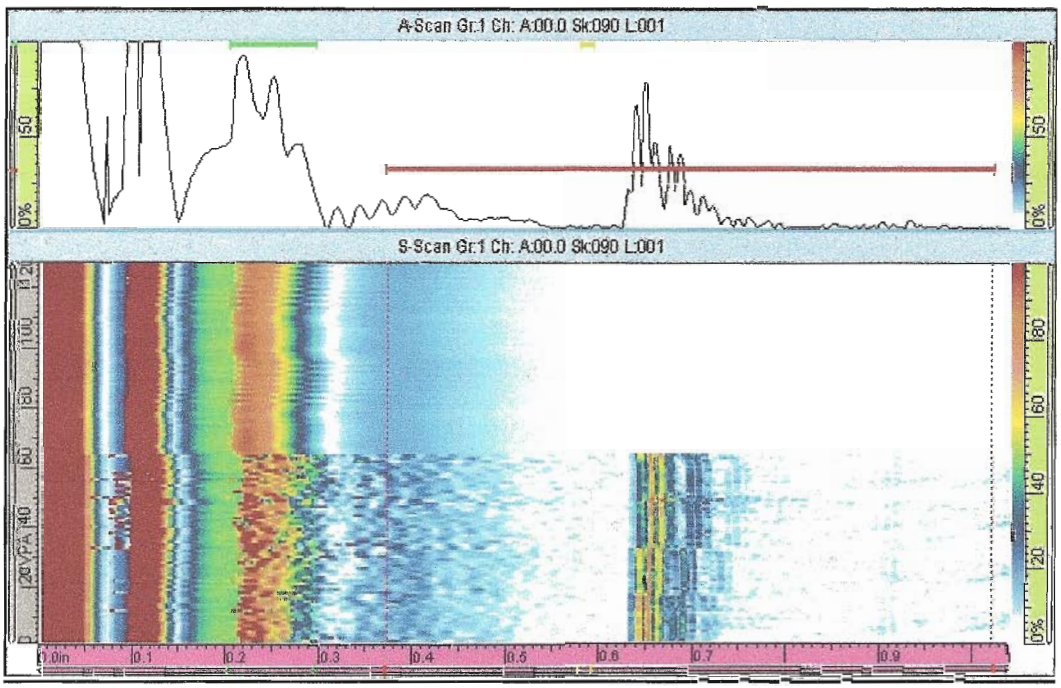
Element Check 5- Pre exam, off wedge



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

Dominion

ULTRASONIC PHASED ARRAY WOR ULTRASONIC EXAMINATION RECORD

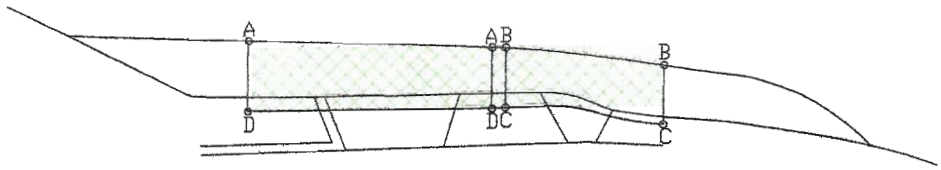
Exam Data Sheet: 219-01-005 219-01-035		**Calibration Data Sheet:** 219-01-005 219-01-035	
Plant: Millstone	**Unit:** 2	**Procedure:** ER-MP-NDE-UT-816/Rev. 0	
Zones DM Weld: 1-07	**SS Weld:** 1-32		
Date: 10/24/09	**Exam Start:** 0557	**Exam Stop:** 0613	
WOR Identification DM Weld: BPD-C-1017	**SS 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: **Minimum:** .30" **Maximum:** .70"		**Axial** N/A	**Circumferential** 0° to 79°
	Examination Sensitivity:	N/A dB	35 dB

Examination Scans Performed	Yes	No	N/A
(1) Axial (Downstream)	☐	☐	☒
(2) Axial (Upstream)	☐	☐	☒
(3) Circumferential (Clockwise)	☒	☐	☐
(4) Circumferential (Counterclockwise)	☒	☐	☐

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	T M P. B	10/24/09	Todd Blechinger	III	T M P. B	10/24/09
Examiner	**Level**	**Signature**	**Date**	**Site Review**	**Level**	**Signature**	**Date**
N/A	N/A			Kevin Hacker	III	K Hacker	10/26/09
Other	**Level**	**Signature**	**Date**	**ANII Review**	**Level**	**Signature**	**Date**
N/A	N/A			E. York	N/A	Elizabeth York	10/26/2009

Coverage Plot



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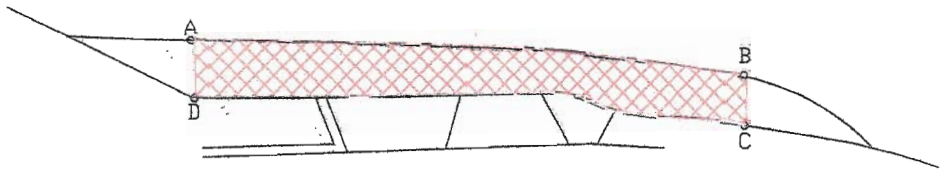

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Scale: NOT TO SCALE

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