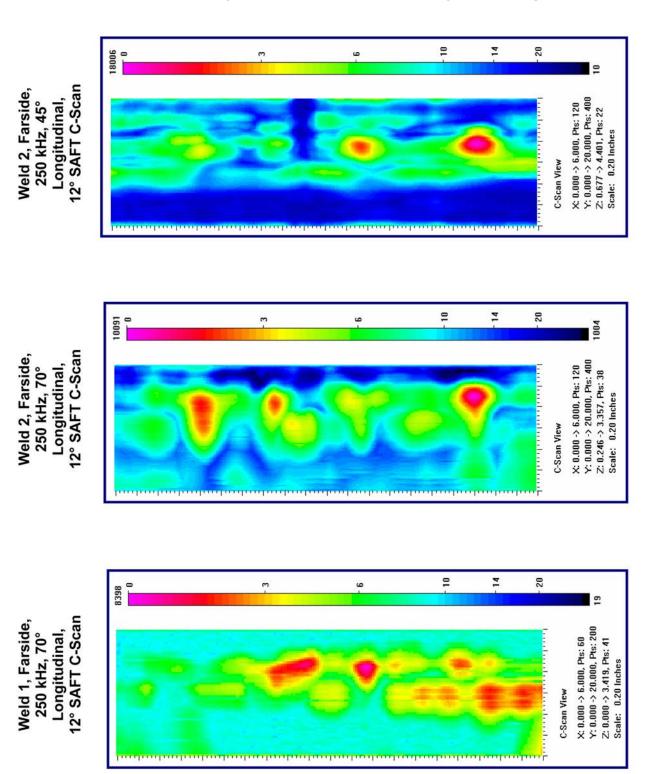
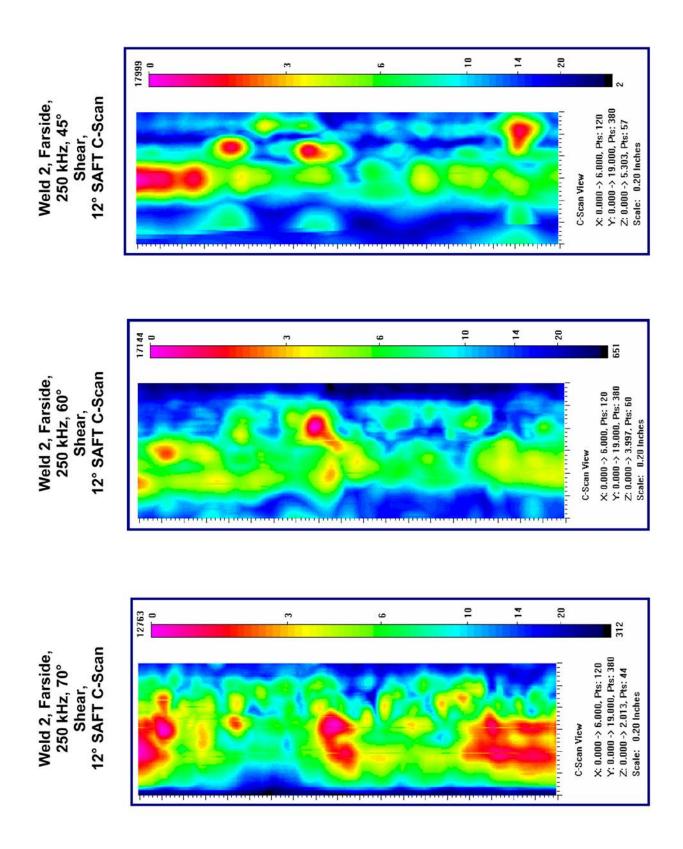
## Appendix D

Low-Frequency/SAFT Data and Analysis Images

## Appendix D

## Low-Frequency/SAFT Data and Analysis Images





12° SAFT C-Scan Weld 3, Farside, 250 kHz, 45° X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 20.000, Pts: 200 Z: 0.000 -> 6.715, Pts: 39 Longitudinal, Scale: 0.20 Inches C-Scan View 10 14 20 10068 12° SAFT C-Scan Weld 3, Farside, 250 kHz, 70° X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 20.000, Pts: 200 Z: 0.000 -> 3.419, Pts: 41 Longitudinal, Scale: 0.20 Inches C-Scan View

9

3

10

14

20

42274 10 14 20 12° SAFT C-Scan Weld 1, Farside, 400 kHz, 45° Y: 0.000 -> 19.000, Pts: 190 Longitudinal, X: 0.000 -> 6.000, Pts: 60 Z: 0.000 -> 2.684, Pts: 25 Scale: 0.20 Inches C-Scan View <del>adamban banka damban banka damban banka damban banka ba</del>-14 10 20 35194 12° SAFT C-Scan Weld 1, Farside, Longitudinal, Y: 0.000 -> 19.000, Pts: 190 400 kHz, 60° Z: 0.000 -> 2.696, Pts: 36 X: 0.000 -> 6.000, Pts: 60 Scale: 0.20 Inches C-Scan View 14 20 10 3 9 12° SAFT C-Scan Weld 1, Farside, 400 kHz, 70° Longitudinal, X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 19.000, Pts: 190 Z: 0.000 -> 2.152, Pts: 42 Scale: 0.20 Inches C-Scan View

Weld 1, Farside,
400 kHz, 60°
Shear,
12° SAFT C-Scan

12° SAFT C-Scan

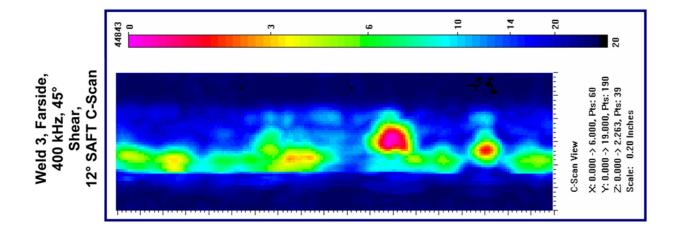
37851

C-Scan Vlew

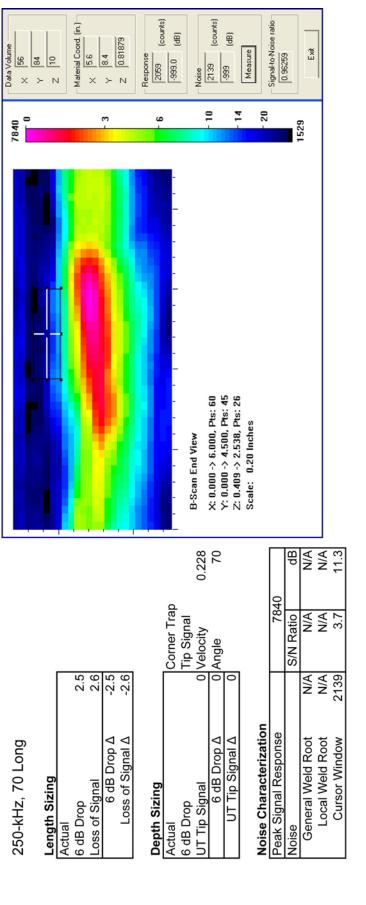
C-Sca

10 14 20 46592 12° SAFT C-Scan Weld 2, Farside, 400 kHz, 45° X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 19.000, Pts: 190 Z: 0.000 -> 2.263, Pts: 39 Scale: 0.20 Inches Shear, C-Scan View 7 20 10 50137 12° SAFT C-Scan Weld 2, Farside, 400 kHz, 60° X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 19.000, Pts: 190 Z: 0.000 -> 2.047, Pts: 50 Shear, Scale: 0.20 Inches C-Scan View 14 10 . 20 45301 12° SAFT C-Scan Weld 2, Farside, 400 kHz, 45° Longitudinal, Y: 0.000 -> 19.000, Pts: 190 Z: 0.000 -> 2.684, Pts: 25 X: 0.000 -> 6.000, Pts: 60 Scale: 0.20 Inches C-Scan View

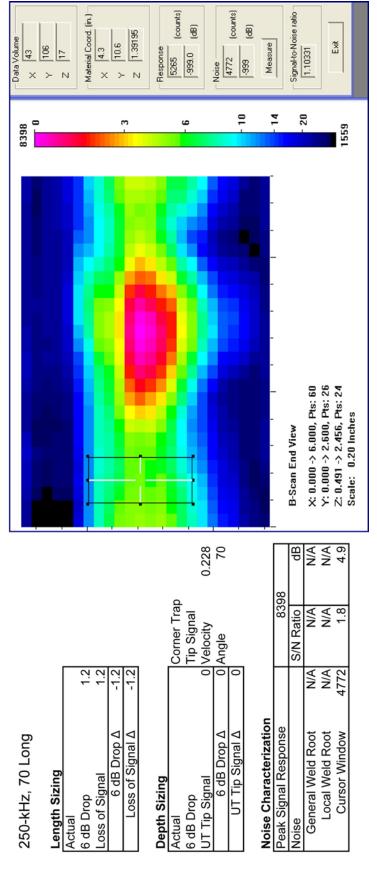
-14 20 10 39505 Weld 3, Farside, 400 kHz, 60° 12° SAFT C-Scan X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 19.000, Pts: 190 Z: 0.000 -> 2.047, Pts: 50 Shear, Scale: 0.20 Inches C-Scan View 20 10 7 57090 12° SAFT C-Scan Weld 3, Farside, Longitudinal, X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 19.000, Pts: 190 400 kHz, 45° Z: 0.000 -> 2.684, Pts: 25 Scale: 0.20 Inches C-Scan View 14 10 20 20338 12° SAFT C-Scan Weld 3, Farside, 400 kHz, 70° Longitudinal, X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 19.000, Pts: 190 Z: 0.000 -> 2.152, Pts: 42 Scale: 0.20 Inches C-Scan View



250-kHz Square Wave, Section #1, Farside, Saw Cut B, 28.4% Through Wall



250-kHz Square Wave, Section #1, Farside, Flaw B, 43% Through Wall



250-kHz Square Wave, Section #1, Farside, Saw Cut C, 7.1% Through Wall Angle

			1.3	1.5	-1.3	-1.5
250-kHz, 70 Long	Length Sizing	Actual	6 dB Drop	Loss of Signal	6 dB Drop ∆	Loss of Signal ∆

Depth Sizing         Actual         Corner Trap           6 dB Drop         Tip Signal           UT Tip Signal         0 Velocity           6 dB Drop ∆         0 Angle           UT Tip Signal ∆         0				0.228	70	
ing nal s dB Drop ∆ Fip Signal ∆		Corner Trap	Tip Signal	Velocity	Angle	
Depth Sizing Actual 6 dB Drop UT Tip Signal 6 dB Drop Δ UT Tip Signal Δ				0	0	0
	Depth Sizing	Actual	6 dB Drop	UT Tip Signal	6 dB Drop ∆	UT Tip Signal ∆

Noise Characterization			
Peak Signal Response		20	7085
Noise		S/N Ratio	ВÞ
General Weld Root	N/A	N/A	Y/N
Local Weld Root	Z/A	N/A	N/A
<b>Cursor Window</b>	4840	1.5	3.3

Data Volume  × 43  × 165  × 75	Material Coord. (in.)  × 4.3  γ 16.5  Z 1.39195	Response	Noise (counts) -999 (dB)	Measure	Signal-to-Noise ratio	Exi
7085	E	9	- 10	- 20	1867	
		ı	-			
н		н				
ш		п	-			
П		н	- - Ma	00, Pts: 60 00, Pts: 23	75, Pts: 20 iches	
Ш			B-Scan End View	X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 2.300, Pts: 23	Z: 0.737 -> 2.375, Pts: 20 Scale: 0.20 Inches	
			- B-8	χ̈́	SC:	

250-kHz Square Wave, Section #2, Farside, Saw Cut D, 18.8% Through Wall

250-kHz, 45 Shear

Length Sizing			17999	Data Volume X 110
Actual				86
6 dB Drop	1.6			Z 17
Loss of Signal	1.6			Material Coord. (in.)
6 dB Drop ∆	-1.6			× 5.5
Loss of Signal ∆	-1.6		·	÷ 4.9
			2	Z 1.57773
Depth Sizing				Response
Actual	Corner Trap			[6215 (counts)
6 dB Drop	Tip Signal		9 -	(dB) (dB)
UT Tip Signal	0 Velocity 0.125			Noise
6 dB Drop ∆	0 Angle 45			5351 (counts)
UT Tip Signal ∆	0		-	(gp) 666-
			2	Measure
Noise Characterization			14	- Signal-to-Noise ratio
Peak Signal Response	17999	B-Scan End View		1.16146
Noise	S/N Ratio dB	X: 0.000 -> 6.000, Pts: 120	- 20	
General Weld Root	N/A N/A N/A	Y: 0.000 -> 2.500, Pts: 50		Exit
Local Weld Root	A/A A/A	Scale: 0.20 Inches		
Cursor Window	5351 3.4 10.5	7	,	

Circumferential Postion
Actual
6 dB Drop
6 dB Drop Δ

250-kHz Square Wave, Section #2, Farside, Saw Cut D, 18.8% Through Wall

250-kHz, 60 Shear

-Material Coord. (in.) (counts) Signal-to-Noise ratio (counts) 9 9 0.85449 Data Volume 5.55 贫田 Measure 1.17700 Ε 2 5 Response -999.0 6859 2802 66 66  $\times$ > × > 7 10 20 11537 9 3 2231 X: 0.000 -> 6.000, Pts: 120 Y: 0.000 -> 2.200, Pts: 44 Z: 0.526 -> 2.169, Pts: 25 Scale: 0.20 Inches B-Scan End View 0.125 AN NA NA 6.0 11537 Corner Trap S/N Ratio N/A N/A 2.0 Tip Signal 0 Velocity 0 Angle N/A N/A 5802 6.0-Noise Characterization Peak Signal Response 6 dB Drop ∆ Loss of Signal A 6 dB Drop ∆ UT Tip Signal ∆ General Weld Root Local Weld Root **Cursor Window** Length Sizing 6 dB Drop UT Tip Signal oss of Signal Depth Sizing 6 dB Drop Actual Actual Noise

250-kHz Square Wave, Section #2, Farside, Saw Cut D, 18.8% Through Wall

250-kHz, 70 Shear

Signal-to-Noise ratio— (counts) Material Coord. (in.)-(counts) 9 <del>9</del> Z 0.98916 Data Volume ŒΨ Measure 3.3 3.5 -999.0 2 Response 8 22 6444 6173 86 86 × 7 20 10 10599 3 9 3347 X: 0.000 -> 6.000, Pts: 120 Y: 0.000 -> 1.850, Pts: 37 Z: 0.809 -> 1.664, Pts: 19 Scale: 0.20 Inches B-Scan End View 0.125 dB N/A N/A 7.4 10599 Corner Trap S/N Ratio N/A N/A 1.7 Tip Signal 0 Velocity 0 Angle N/A N/A 6173 Noise Characterization Peak Signal Response 6 dB Drop ∆ Loss of Signal A 6 dB Drop ∆ UT Tip Signal ∆ General Weld Root Local Weld Root **Cursor Window** Length Sizing oss of Signal Depth Sizing **UT Tip Signal** 6 dB Drop 6 dB Drop Actual Actual Noise

250-kHz Square Wave, Section #2, Farside, Saw Cut D, 18.8% Through Wall

250-kHz, 70 Long				8743	Data Volume  × 93
Length Sizing					Y 121
Actual					Z 15
6 dB Drop	2.3				
Loss of Signal	3.55				Material Coord. (in.)
6 dB Drop ∆	-2.3				×
Loss of Signal ∆	-3.55				
					Z J1.22819
Depth Sizing					Response
Actual		Corner Trap		9-	4665 [coumbs]
6 dB Drop		Tip Signal			1_
UT Tip Signal	0	0 Velocity	0.228		
6 dB Drop ∆	0	0 Angle	70		Noise
UT Tip Signal ∆	0			X: 0 000 -> 6 000 Ptc: 120	4285 (counts)
					(BP) 666-
Noise Characterization				Z: 0.655 -> 2.784, Pts: 26	Measure
Peak Signal Response		8743	3	Scale: 0.20 Inches	
Noise		S/N Ratio	dB		Signal-to-Noise ratio
General Weld Root	N/A	N/A	A/A		1.08868
Local Weld Root	N/A	A/N	A/N	1820	
Cursor Window	4285	2.0	6.2		Exit

250-kHz Square Wave, Section #2, Farside, Flaw C, 64% Through Wall

250-kHz, 45 Shear

Signal-to-Noise ratio 1.13876 (counts) Material Coord. (in.)-(counts) 9 9 Z 1.48492 Data Volume × × 5.45 Measure ξX 2.5 150 Response -999.0 7444 8477 986 7 10 20 16392 9 1574 X: 0.000 -> 6.000, Pts: 120 Y: 0.000 -> 3.200, Pts: 64 Z: 0.928 -> 3.063, Pts: 23 Scale: 0.20 Inches B-Scan End View 0.125 dB N/A N/A 6.9 16392 Corner Trap Tip Signal 0 Velocity N/A N/A 2.2 S/N Ratio 0 Angle 2.35 2.55 -2.35 N/A N/A 444 Noise Characterization Peak Signal Response UT Tip Signal A 6 dB Drop ∆ Loss of Signal A 6 dB Drop ∆ General Weld Root Local Weld Root **Cursor Window** Length Sizing 6 dB Drop UT Tip Signal oss of Signal Depth Sizing 6 dB Drop Actual Noise

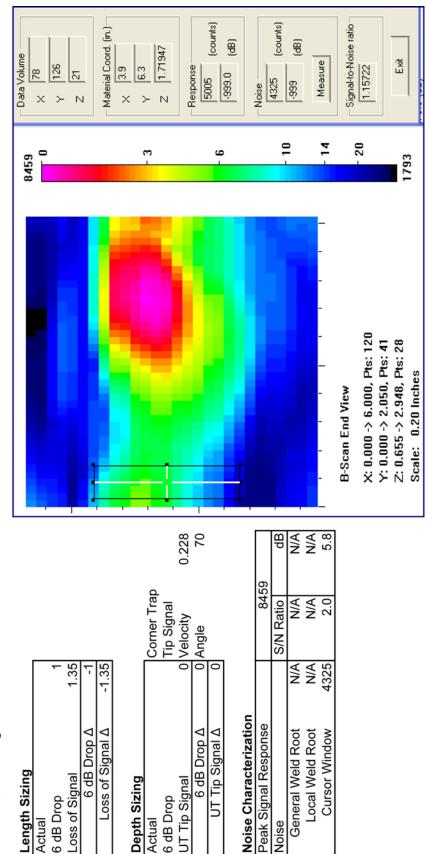
250-kHz Square Wave, Section #2, Farside, Flaw C, 64% Through Wall

250-kHz, 60 Shear

7144 Data Volume X 86	- 1 - ×	7	Material Coord. (in.)	× ×	 7 1.24007	Response	- 6 10434 (counts)	.999.0 (dB)		Noise 10	//00	- 14 (dB)	Measure	- 20	31ghar-to-Noise Iatto	3455	Exit
									B-Scan End View	X: 0 000 -> 6 000 Pts: 120	Y: 0.000 -> 3.000, Pts: 60	Z: 0.723 -> 2.169, Pts: 22	Scale: 0.20 Inches				
								0.125	9				4	dВ	N/A	N/A	5.7
						Corner Trap	Tip Signal	0 Velocity	0 Angle				17144	S/N Ratio	A/A	A/N	1.9
	1.7	2	-1.7	-2				0	0	0					N/A	N/A	8877
Length Sizing	Actual 6 dB Drop	Loss of Signal	6 dB Drop ∆	Loss of Signal ∆	Depth Sizing	Actual	6 dB Drop	UT Tip Signal	6 dB Drop ∆	UT Tip Signal ∆		Noise Characterization	Peak Signal Response	Noise	General Weld Root	Local Weld Root	Cursor Window

250-kHz Square Wave, Section #2, Farside, Flaw C, 64% Through Wall

250-kHz, 70 Long



250-kHz Square Wave, Section #2, Farside, Saw Cut E, 12% Through Wall

250-kHz, 70 Long

Signal-to-Noise ratio Material Coord. (in.)
× 5.05 1.22819 Data Volume 12.9 Measure 258 Ē -999.0 Response 4496 Noise 4128 986 10 7 - 20 9 7084 1678 X: 0.000 -> 6.000, Pts: 120 Y: 0.000 -> 3.400, Pts: 68 Z: 0.655 -> 2.538, Pts: 23 Scale: 0.20 Inches B-Scan End View 0.228 db NA NA V.4 7084 Corner Trap Tip Signal 0 Velocity 0 Angle N/A N/A 1.7 S/N Ratio 2.05 N/A N/A 4128 Noise Characterization Peak Signal Response Local Weld Root Cursor Window 6 dB Drop ∆ Loss of Signal A 6 dB Drop ∆ UT Tip Signal ∆ General Weld Root Length Sizing oss of Signal Depth Sizing UT Tip Signal 6 dB Drop 6 dB Drop Actual Noise

(counts)

9

(counts)

9

贫

250-kHz Square Wave, Section #2, Farside, Saw Cut F, 19% Through Wall Angle

- Data Volume	2 × × 103	Material Coord. (in.)—  X   5.15  Y   18.25  Z   1.11369		Response	4056 (counts)	(ap)	3600 [counts]		Measure	Signal-to-Noise ratio	1.12666		Exit
16106	0	£-			9		- 10	- 14		- 20		1128	
								B-Scan End View	X: 0.000 -> 6.000, Pts: 120	Z: 0.742 -> 2.877, Pts: 23	Scale: 0.20 Inches		
					2.0	0.125			<i>~</i>	дB	N/A	A/A	13.1
				Corner Trap	Tip Signal	U velocity 0 Angle	,		16186	S/N Ratio	A/A	A/Z	4.5
	1.35	1.85			C	0	0				N/A	N/A	3600
250-kHz, 45 Shear	Length Sizing Actual 6 dB Drop	Loss of Signal 6 dB Drop ∆ Loss of Signal ∆	Depth Sizing	Actual	6 dB Drop	OT TIP Signal 6 dB Drop ∆	UT Tip Signal ∆	Noise Characterization	Peak Signal Response	Noise	General Weld Root	Local Weld Root	Cursor Window

250-kHz Square Wave, Section #2, Farside, Saw Cut F, 19% Through Wall Angle

250-kHz, 45 Long

Material Coord. (in.)

× 4.05

γ 18.75

∠ 1.69281 Signal-to-Noise ratio 5542 (counts) (counts) (gB) <u>@</u> Data Volume EX. Measure × 2 Response -999.0 986 10 7 20 12393 9 1691 X: 0.000 -> 3.200, Pts: 120 Y: 0.000 -> 3.200, Pts: 64 Z: 1.016 -> 3.047, Pts: 12 Scale: 0.20 Inches 0.228 AN A 9.9 12393 Corner Trap S/N Ratio N/A N/A 3.1 Tip Signal 0 Velocity 0 Angle N/A N/A 3961 0. t. -1.9 Noise Characterization 6 dB Drop ∆ UT Tip Signal ∆ Peak Signal Response 6 dB Drop ∆ Loss of Signal A General Weld Root Local Weld Root **Cursor Window** Length Sizing oss of Signal Depth Sizing **UT Tip Signal** 6 dB Drop 6 dB Drop Actual Noise

250-kHz Square Wave, Section #2, Farside, Saw Cut F, 19% Through Wall Angle

Signal-to-Noise ratio 1.08903 [counts] (counts) Material Coord. (in.)-9 9 1.22819 18.6 × 3.6 Œ Data Volume Measure 372 72 Response -999.0 3694 3392 989 10 14 20 10091 9 1094 X; 0.000 -> 6.000, Pts; 120 Y: 0.000 -> 3.300, Pts; 66 Z: 0.409 -> 2.784, Pts; 29 Scale: 0.20 Inches B-Scan End View 0.228 dB N/A N/A 9.5 10091 Corner Trap Tip Signal 0 Velocity N/A N/A 3.0 S/N Ratio 0 Angle 1.65 N/A N/A 3392 2.3 -1.65 Noise Characterization Peak Signal Response 6 dB Drop ∆ 6 dB Drop ∆ Loss of Signal A UT Tip Signal ∆ General Weld Root Local Weld Root **Cursor Window** 250-kHz, 70 Long Length Sizing Loss of Signal Depth Sizing UT Tip Signal 6 dB Drop 6 dB Drop Actual Actual Noise

250-kHz Square Wave, Section #3, Farside, Saw Cut G, 18% Through Wall Angle

250-kHz, 45 Long

(counts) Signal-to-Noise ratio-1.20495 Material Coord. (in.) (counts) (B) 2.03137 Measure 9.5 Response 7296 Noise 6055 -399 10 14 20 15044 1345 X; 0.000 -> 6.000, Pts; 60 Y: 0.000 -> 4.600, Pts; 46 Z: 0.677 -> 2.878, Pts; 13 Scale: 0.20 Inches 0.228 dB N/A N/A 7.9 15044 Corner Trap S/N Ratio N/A N/A 2.5 Tip Signal 0 Velocity 0 Angle N/A N/A 6055 Noise Characterization Peak Signal Response 6 dB Drop ∆ Loss of Signal A 6 dB Drop ∆ UT Tip Signal ∆ General Weld Root Local Weld Root **Cursor Window** Length Sizing oss of Signal Depth Sizing **UT Tip Signal** 6 dB Drop 6 dB Drop Actual Actual Noise

250-kHz Square Wave, Section #3, Farside, Saw Cut G, 18% Through Wall Angle

250-kHz, 70 Long

B351 Data Volume	× 0	>-	Z 12	Material Coord. (in.)	×	-3			<u></u>	. e   5877	0.888	Noise	-10 5839	[8P] 666:	14	Medallia Managaria	Signal-to-Noise ratio	1.01338
									8	0 B-Scan End View	X: 0.000 -> 6.000, Pts: 60	Y: 0.000 -> 4.800, Pts: 48	Z: 0.409 -> 2.211, Pts: 22	Scale: U.ZU inches		ব	ব	4
							Corner Trap	ignal	ity 0.228	70				8351	S/N Ratio dB	N/A N/A	N/A N/A	
	4.3	4.4	-4.3	4.4			Com	Tip Signal	0 Velocity	0 Angle	0				/S	N/A	N/A	2839

250-kHz Square Wave, Section #3, Farside, Saw Cut H, 26% Through Wall Angle

250-kHz, 45 Long

	Material Coord (in)	Response     1870   (counts   1999.0   (dB)	Noise [2205] (counts)	Measure	Signal-to-Noise ratio 0.84807	Exit	
19646	.3	9	- 10	- 14	- 20	1381	
			B-Scan End View	X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 4.800, Pts: 48	Z. 0.877 -> 2.878, Pts: 13 Scale: 0.20 Inches		
		0.228	45		dB	A S	19.0
		Corner Trap Tip Signal 0 Velocity	O Angle O		19646 S/N Ratio	A/N	8.9
3.2	-3.2	0	00			A S	2205
Length Sizing Actual 6 dB Drop Loss of Signal	6 dB Drop ∆ Loss of Signal ∆ Denth Sizing	Actual 6 dB Drop UT Tip Signal	6 dB Drop ∆ UT Tip Signal ∆	Noise Characterization	Peak Signal Response Noise	General Weld Root	Cursor Window

250-kHz Square Wave, Section #3, Farside, Saw Cut H, 26% Through Wall Angle

250-kHz, 70 Long

Length Sizing		1			10000	Data Volume
Actual					8 0 1000	× 6
6 dB Drop	2.5	2				Y 122
Loss of Signal	2.4	4				z  12
6 dB Drop ∆	op ∆ -2.5	2				Material Coord (in )
Loss of Signal A	al ∆ -2.4	4				×
		l			-3	y 12.2
Depth Sizing						Z 0.98255
Actual		Corner Trap	Ω			Response
6 dB Drop		Tip Signal			9 -	3674 (counts)
UT Tip Signal		0 Velocity	0.228			-999.0 (dB)
6 dB Drop ∆		0 Angle	70			Noise
∆ Isignal ∆	al ∆ (	0		B-Scan End View	- 10	3665 (counts)
		ı		X 0.000 -> 6.000 -Ps: 60		(Bb) 686
Noise Characterization	zation			Y: 0.000 -> 3.900, Pts: 39	14	Measure
Peak Signal Response	onse	100	10068	Z: 0.901 → 2.620, Pts: 21	- 20	
Noise		S/N Ratio	dB	Scale: U.20 Inches		Signal-to-Noise ratio
General Weld Root	Root N/A	A/N			1604	1:000:10
Local Weld Root	Root N/A	A/N	A/A			Æ Æ
Cursor Window	dow 3665	5 2.7	8.8			

250-kHz Square Wave, Section #3, Farside, Flaw E, 48% Through Wall

250-kHz, 70 Long

- Material Coord. (in.) - × | 4 | × | 15.4 (counts) Signal-to-Noise ratio (counts) -999.0 (dB) (gp) 1.22819 EX Data Volume

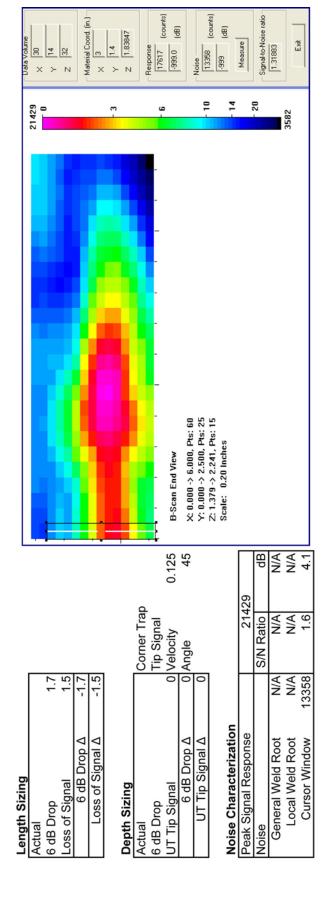
× 40

Y 154

Z 15 Measure Response 5124 986 3869 10 7 1345 6607 X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 2.700, Pts: 27 Z: 0.737 -> 1.719, Pts: 12 Scale: 0.20 Inches B-Scan End View 0.228 dB NA NA A.6 6607 Corner Trap S/N Ratio N/A N/A Tip Signal 0 Velocity 0 Angle N/A N/A 3869 -1.3 Noise Characterization 6 dB Drop ∆ UT Tip Signal ∆ Peak Signal Response 6 dB Drop ∆ Loss of Signal A Local Weld Root General Weld Root **Cursor Window** Length Sizing 6 dB Drop UT Tip Signal oss of Signal Depth Sizing 6 dB Drop Actual Actual Noise

400-kHz Spike Wave, Section #1, Farside, Saw Cut A, 7.5% Through Wall

400-kHz, 45 Shear



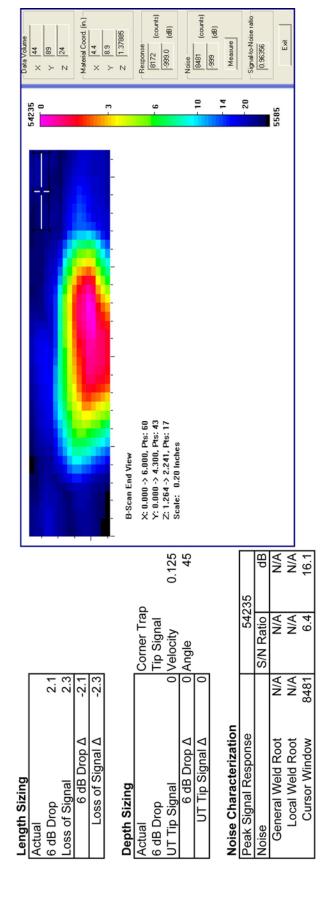
400-kHz Spike Wave, Section #1, Farside, Saw Cut A, 7.5% Through Wall

400-kHz, 45 Long

Data Volume	×	۸ /	Z 15		ē	×	۲   0.7	Z  1.57189	0	71699	-	(gp)	Noise	17787 (count	(Bb) 686:		Measure	Signal-to-Noise rati	1.21993		Exi
35514	0 0						m			٠	)			0.		- 14	- 20			3811	
												- - - - - - - -	B-Scan End View	X: 0.000 -> 6.000 Pts: 60	Y: 0.000 -> 3.000, Pts: 30	Z: 0.943 -> 2.620, Pts: 16	Scale: 0.20 Inches				
										0.228	45				4	ВВ	N/A	N/A	0.9		
								Corner Trap	Tip Signal	0 Velocity	0 Angle				35514	S/N Ratio	N/A	∀,Z	2.0		
		4.1	1.8	-1.4	-1.8					0	0	0					N/A	A/A	17787		
Length Sizing	Actual	6 dB Drop	Loss of Signal	6 dB Drop ∆	Loss of Signal ∆		Depth Sizing	Actual	6 dB Drop	UT Tip Signal	6 dB Drop ∆	UT Tip Signal ∆		Noise Characterization	Peak Signal Response	Noise	General Weld Root	Local Weld Root	Cursor Window		

400-kHz Spike Wave, Section #1, Farside, Saw Cut B, 28.4% Through Wall

400-kHz, 45 Shear



400-kHz Spike Wave, Section #1, Farside, Saw Cut B, 28.4% Through Wall

400-kHz, 45 Long

Noise | 12594 (counts) | -999 (dB) 15925 (counts) Signal-to-Noise ratio Material Coord. (in.) × 3.7 × 5.6 z 1.46710 Measure ξŒ 10 14 X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 4.300, Pts: 43 Z: 1.258 -> 2.620, Pts: 13 Scale: 0.20 Inches B-Scan End View 0.228 dB N/A N/A 10.5 42274 Corner Trap Tip Signal

O Velocity

Angle 8 N 8 A 3.4 S/N Ratio 3.1 -3.1 -3.5 N/A N/A 12594 Noise Characterization Peak Signal Response Loss of Signal ∆ 6 dB Drop ∆ 6 dB Drop ∆ UT Tip Signal ∆ General Weld Root Length Sizing oss of Signal Depth Sizing UT Tip Signal 6 dB Drop 6 dB Drop Actual Noise

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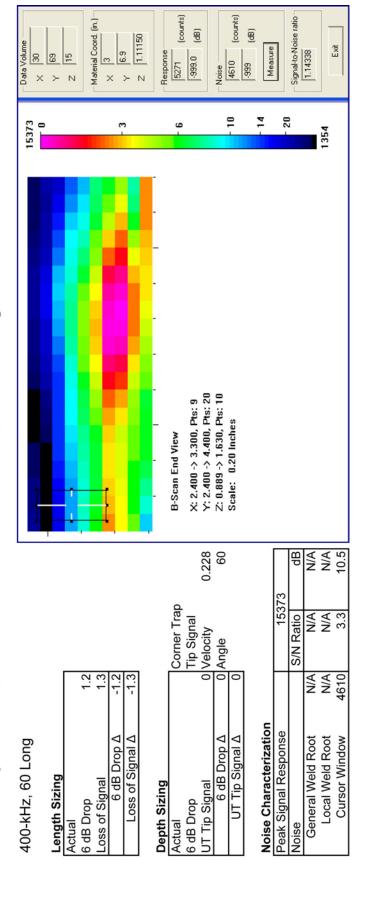
Local Weld Root

**Cursor Window** 

400-kHz Spike Wave, Section #1, Farside, Saw Cut B, 28.4% Through Wall

	Data Volume  ×   33  Y   77  Z   20	Material Coord. (in.)—  × 3.3  Y 7.7  Z 0.81380	Response	Noise 15049 (counts)	-999 (dB)	Signal-to-Noise ratio	1.15183	- <del>X</del>	
	33934	e .	9	- 10	- 14	- 20		4981	
				B-Scan End View X: 0.000 -> 6.000, Pts: 60	Y: 0.000 -> 3.100, Pts: 31 Z: 0.610 -> 2.035, Pts: 35 Scale: 0.20 Inches				
			0.428	60	2	g g	N/A	N/A	7.1
			Corner Trap Tip Signal	O Angle	33037	S/N Ratio	N/A	A/A	2.3
	1.7	-1.7					N/A	A S	15049
400-kHz, 60 Shear	Length Sizing Actual 6 dB Drop	Loss of Signal 6 dB Drop Δ Loss of Signal Δ Denth Sizing	Actual 6 dB Drop	G dB Drop ∆ 6 dB Drop ∆ UT Tip Signal ∆	Noise Characterization	Noise	General Weld Root	Local Weld Root	Cursor Window

400-kHz Spike Wave, Section #1, Farside, Saw Cut B, 28.4% Through Wall



400-kHz Spike Wave, Section #1, Farside, Saw Cut B, 28.4% Through Wall

400-kHz, 70 Long

Lengtn Sizing	Г			14606	92
Actual				0	
6 dB Drop 1.5	2				
Loss of Signal	7				1
6 dB Drop ∆ -1.5	2				Material Coord. (in.)
Loss of Signal ∆ -1.7	7			-3	9:9 × >
Depth Sizing	ĺ				z 1.01375
8	Trong Trong				Response
Actual	Corner Trap			9-	6365 (counts)
6 dB Drop	Tip Signal				-989.0 (dB)
UT Tip Signal	0 Velocity	0.228			a sion
6 dB Drop ∆ C	0 Angle	20	B-Scan End View	- 10	5674 (counts)
UT Tip Signal ∆ 0	0		X; 2,400 -> 4,700, Pts; 23		(BP) 686-
	ı		7: 2:400 -> 5:500, Pts: 31 2: 0.862 -> 2.078, Pts: 24	- 14	Measure
Noise Characterization			Scale: 0.20 Inches	- 20	] Signature
Peak Signal Response	14606	9(			1.12178
Noise	S/N Ratio	dB		2834	
General Weld Root N/A	A/N	N/A			Exit
Local Weld Root N/A	A/A	N/A			
Cursor Window 5674	2 6	82			

400-kHz Spike Wave, Section #1, Farside, Flaw B, 43% Through Wall

- Data Volume	× 24		2 18	Material Coord (in )	2.4	7 10.8	Z 1.33380		Response	13306 (counts)	-999.0 (dB)	Noise	11790 (counts)	(ab)		Measure		Signal-to-Noise ratio	1.12858	- Exit	
	24931					- 3				9 -			- 10		- 14		- 20			5543	
												-	B-Scan Fnd View		X: 0.000 -> 6.000, Pts: 60	Y: 0.000 -> 1.600, Pts: 16	Z: 1.112 -> 2.371, Pts: 17	Scale: 0.20 Inches			
									0.228	09			1	dВ	N/A	A/A	6.5				
							Corner Trap	Tip Signal	0 Velocity	0 Angle			24931	S/N Ratio	A/A	A/Z	2.1				
		0.6	0.8	9.0-	-0.8				0	0	0				N/A	Υ V	11790				
400-kHz, 60 Long	Length Sizing	Actual 6 dB Drop	Loss of Signal	6 dB Drop ∆	Loss of Signal ∆	Depth Sizing	Actual	6 dB Drop	UT Tip Signal	6 dB Drop ∆	UT Tip Signal ∆	Noise Characterization	Peak Signal Response	Noise	General Weld Root	Local Weld Root	Cursor Window				

400-kHz Spike Wave, Section #1, Farside, Flaw B, 43% Through Wall

400-kHz, 70 Long

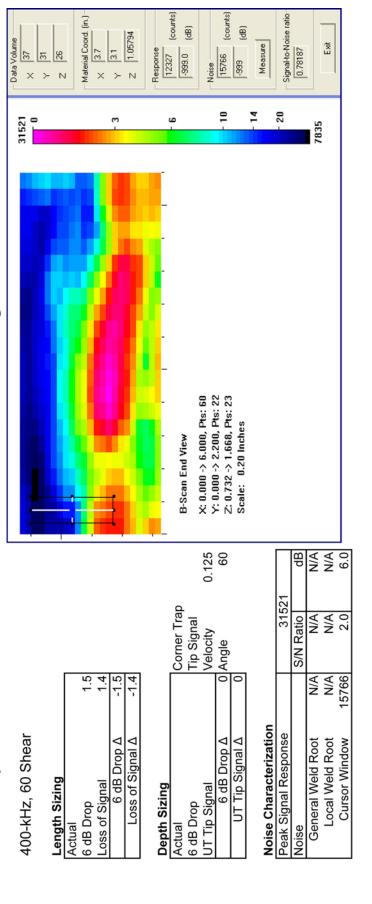
Noise 6063 (counts) Signal-to-Noise ratio Material Coord. (in.)

× 3.5 (counts) (B) 8 Z 1.26718 ĘX) 14.6 .999.0 Measure 146 Response 52 33 5923 -986 20 10 - 14 11425 9 1310 X; 3.200 -> 4.400, Pts; 12 Y; 3.200 -> 5.000, Pts; 18 Z: 1.217 -> 1.926, Pts; 14 Scale: 0.20 Inches B-Scan End View 0.228 N/A N/A 5.5 11425 Corner Trap Tip Signal 0 Velocity N N N 1.9 S/N Ratio 0 Angle N/A N/A 6063 <u>-</u> -Noise Characterization Peak Signal Response 6 dB Drop ∆ Loss of Signal A 6 dB Drop ∆ UT Tip Signal ∆ General Weld Root Local Weld Root **Cursor Window** Length Sizing 6 dB Drop UT Tip Signal Loss of Signal Depth Sizing 6 dB Drop Actual Actual Noise

400-kHz Spike Wave, Section #2, Farside, Saw Cut D, 18.8% Through Wall

AEE 90		A Material Croad (in)	x 34	-3 × 5.1	Z  1.60866		asponse lessonse	0 000			- 10   12890 (counts)	(Bb) 888-	Manage M	- 20	S	0.90372	91	
							- :: !	B-Scan End View	X: 0.000 -> 6.000, Pts: 60	Y: 0.000 -> 3.200, Pts: 32	Z: 1.034 -> Z.241, Pts: Z1 Scale: 0.20 Inches							
									0.125	45				2	дB	√N V	√ Z	
							Corner Trap	Tip Signal	0 Velocity	0 Angle				46592	S/N Ratio	A/N	A/N	•
		2.1	-2.1	-2.2				_	0	Ô	0					N/A	A/N	0000
400-kHz, 45 Shear	Length Sizing Actual	6 dB Drop	6 dB Drop ∆	Loss of Signal ∆		Deptn Sizing	Actual	6 dB Drop	UT Tip Signal	6 dB Drop ∆	UT Tip Signal ∆		Noise Characterization	Peak Signal Response	Noise	General Weld Root	Local Weld Root	

400-kHz Spike Wave, Section #2, Farside, Saw Cut D, 18.8% Through Wall



400-kHz Spike Wave, Section #2, Farside, Saw Cut D, 18.8% Through Wall

Data Volume  × 34	2 4 3	Material Coord. (in.)	Response [11649 (counts)   -399.0 (dB)	Noise 12890 (counts)	.999 (dB)	Signal-to-Noise ratio	0.90372	TX II	
46592		e	9	- 10	- 14	- 20	,	9	
			B-Scan End View	7: 0.000 -> 3.200, Pts; 32 Z: 0.003 -> 2.24, Pts; 21 Scale: 0.200 -> 0.200					
				0.125 45		2 PB	S N	A/N	11.2
			Corner Trap Tip Signal	U velocity 0 Angle 0		46592	AN	N/A	3.6
	2.1	2.2					N/A	N/A	12890
400-kHz, 45 Shear	Length Sizing Actual 6 dB Drop	Loss of Signal 6 dB Drop Δ Loss of Signal Δ	Depth Sizing Actual 6 dB Drop	01 Tip Signal 6 dB Drop ∆ UT Tip Signal ∆	Noise Characterization	Peak Signal Response	General Weld Root	Local Weld Root	Cursor Window

400-kHz Spike Wave, Section #2, Farside, Saw Cut D, 18.8% Through Wall

400-kHz, 60 Shear

Signal-to-Noise ratio-(counts) Material Coord. (in.) (counts) 9 9 Z 1.05794 ΈXΞ Data Volume Measure 3.7 -999.0 Noise 15766 3.1 Response 12327 -999 × × > 10 7 20 31521 9 7835 X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 2.200, Pts: 22 Z: 0.732 -> 1.668, Pts: 23 Scale: 0.20 Inches B-Scan End View 0.125 N/A N/A 6.0 dВ 31521 Corner Trap Tip Signal Velocity N/A N/A 2.0 S/N Ratio 0 Angle N/A N/A 15766 Noise Characterization Peak Signal Response 6 dB Drop ∆ Loss of Signal A 6 dB Drop ∆ General Weld Root Local Weld Root UT Tip Signal ∆ **Cursor Window** Length Sizing Loss of Signal Depth Sizing UT Tip Signal 6 dB Drop 6 dB Drop Actual Actual

400-kHz Spike Wave, Section #2, Farside, Flaw C, 64% Through Wall

1.9 6 dB Drop Loss of Signal 6 dB Drop ∆ Loss of Signal ∆ 400-kHz, 45 Shear Length Sizing Actual

Data Volume  × 37  × 68  2 29	Material Coord. (in.)  X   3.7  Y   6.8  Z   1.66612	_Response   15245	Noise   18635 (counts)   -999 (dB)	Medsure	0.81808		Exit	
41974	m,	9	10	- 20		4723		
		B-Scan End View	X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 2.800, Pts: 28 Z: 1.149 -> 2.241, Pts: 19 Scale: 0.20 Inches					
		0.125	45		dB	N/A	N/A	7.1
		Corner Trap Tip Signal Velocity	0 Angle	41974	S/N Ratio		N/A	
2	6.1-1.9	0	0			N/A	ΑŽ	635

			N/A
Noise Characterization	Peak Signal Response	Noise	General Weld Root

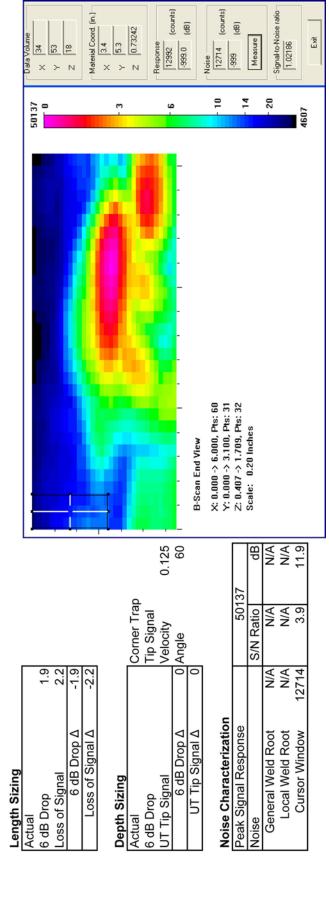
6 dB Drop ∆ UT Tip Signal ∆

6 dB Drop UT Tip Signal

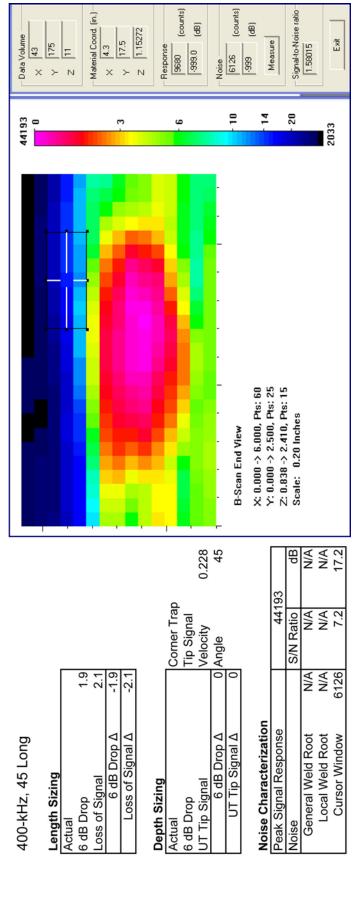
Depth Sizing Actual

400-kHz Spike Wave, Section #2, Farside, Flaw C, 64% Through Wall

400-kHz, 60 Shear



400-kHz Spike Wave, Section #2, Farside, Saw Cut F, 19% Through Wall Angle



400-kHz Spike Wave, Section #3, Farside, Saw Cut G, 18% Through Wall Angle

Signal-to-Noise ratio (counts) (counts) Material Coord. (in.)-8 9 1.26395 Data Volume Measure 贫田 3.4 2 22 Response 9443 -999.0 8083 666 Noise >-× × 10 14 20 30983 9 278 X: 2.100 -> 3.700, Pts: 16 Y: 5.800 -> 7.400, Pts: 16 Z: 0.000 -> 2.263, Pts: 39 B-Scan End View 0.125 N/A N/A 11.7 30983 Corner Trap N/A N/A 3.8 Tip Signal

O Velocity

Angle S/N Ratio 0.7 -0.7 -0.8 N/A N/A 8093 Noise Characterization Peak Signal Response 400-kHz, 45 Shear 6 dB Drop ∆ Loss of Signal A 6 dB Drop ∆ UT Tip Signal ∆ Local Weld Root **Cursor Window** General Weld Root Length Sizing oss of Signal Depth Sizing **UT Tip Signal** 6 dB Drop 6 dB Drop Actual Actual Noise

Scale: 0.20 Inches

400-kHz Spike Wave, Section #3, Farside, Saw Cut G, 18% Through Wall Angle

400-kHz, 45 Long

Signal-to-Noise ratio 10 7 20 40874 3 9 1392 X; 0.000 -> 6.000, Pts; 60 Y: 0.000 -> 3.100, Pts; 31 Z: 0.734 -> 2.620, Pts; 18 Scale: 0.20 Inches B-Scan End View 0.228 45 dB N/A N/A 12.2 40874 Corner Trap Tip Signal 0 Velocity A N 4 A 1. S/N Ratio 0 Angle 2.2 -2.2 -2.1 N/A N/A 9978 Noise Characterization 6 dB Drop ∆ UT Tip Signal ∆ Peak Signal Response 6 dB Drop ∆ Loss of Signal A Local Weld Root General Weld Root **Cursor Window** Length Sizing oss of Signal 6 dB Drop UT Tip Signal Depth Sizing 6 dB Drop Actual Noise

(counts)

Response

8

-999.0 9374

Material Coord. (in.)

8

4.1 4.8 Z 1.36231

(counts)

8266 . 669

9

Measure

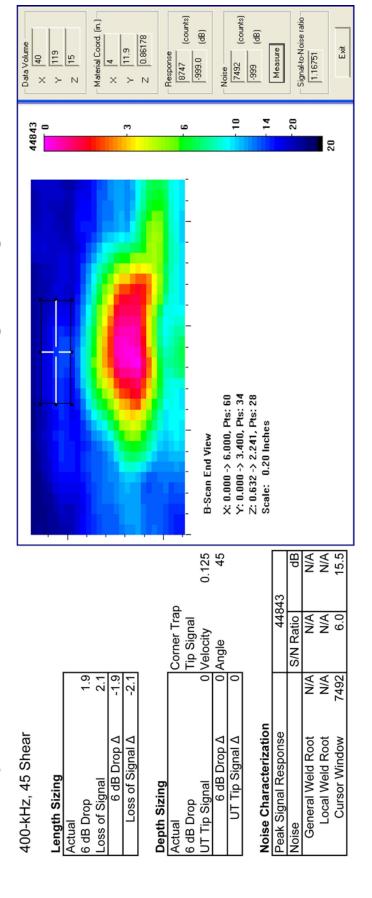
复

400-kHz Spike Wave, Section #3, Farside, Saw Cut G, 18% Through Wall Angle

400-kHz, 70 Long

	Vata volume	88	Z 20	Material Coord. [in.]	× 3.4	<u>∞</u>	2 1.01375	Response	SUB/ (counts)	(BD) 000001	Noise 4831	-999 (dB)	Measure		Signal-to-Noise ratio		Exit		
	13512					-3			٥		10		- 14	- 20		1705			
								B-Scan End View	X; 2,500 -> 4,500, Pts; 20	Y: Z.500 -> 6.400, Pts: 39 Z: 0.710 -> 1.673, Pts: 19	Scale: 0.20 Inches								
										0.228	20					dВ	N/A	Α V	8.9
								Corner Trap	Tip Signal	0 Velocity	0 Angle				13512	S/N Ratio	N/A	A/N	2.8
		2.4	2.7	-2.4	-2.7					0	0	0					N/A	Ϋ́	4831
Length Sizing	Actual	6 dB Drop	Loss of Signal	6 dB Drop ∆	Loss of Signal ∆		Depth Sizing	Actual	6 dB Drop	UT Tip Signal	6 dB Drop ∆	UT Tip Signal ∆		Noise Characterization	Peak Signal Response	Noise	General Weld Root	Local Weld Root	Cursor Window

400-kHz Spike Wave, Section #3, Farside, Saw Cut H, 26% Through Wall Angle



400-kHz Spike Wave, Section #3, Farside, Saw Cut H, 26% Through Wall Angle

400-kHz, 45 Long

Response 16817 (counts) Material Coord. (in.)
× 3.3 (counts) Signal-to-Noise ratio (B) 8 9.5 ξXΞ -999.0 1.22181 10 7 20 X: 0.000 -> 6.000, Pts: 60 Y: 0.000 -> 3.600, Pts: 36 Z: 0.838 -> 2.515, Pts: 16 Scale: 0.20 Inches B-Scan End View 0.228 dB N/A N/A 12.4 57090 Corner Trap A A 4. Tip Signal 0 Velocity S/N Ratio 0 Angle 2.3 -2.3 -2.3 N/A N/A 13764 Noise Characterization Peak Signal Response 6 dB Drop ∆ Loss of Signal A 6 dB Drop ∆ UT Tip Signal ∆ Local Weld Root **Cursor Window** General Weld Root Length Sizing oss of Signal Depth Sizing UT Tip Signal 6 dB Drop 6 dB Drop Actual Noise

400-kHz Spike Wave, Section #3, Farside, Saw Cut H, 26% Through Wall Angle

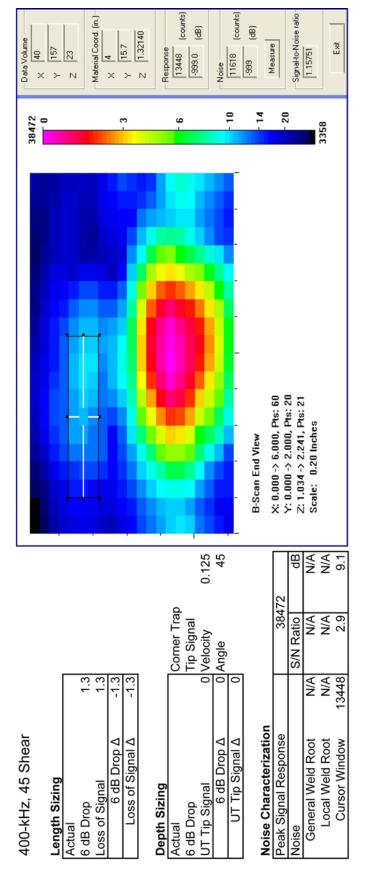
_ Data Volume	<u>8</u> ≝	- -	z  19		Material Coord. (in.)	×	7 11.5	Z 0.77311		Response	11087 [counts]	.993.0	(ap)	Noise	8547 [counts]	688	(ab)	Measure		Signal-to-Noise ratio	1.29718	,	Exit
07177	34518						-3				9 -				- 10		- 14		- 20			280	
																- - - - - - -	B-Scan End View		X: 2.000 -> 3.800, Pts: 18	Y: 10.300 -> 12.800, Pts: 25	Z: 0.000 -> 2.047, Pts: 50	ocalc: 0:50 menes	
											0.125	09				8	dВ	A/A	A/Z	12.1			
									Corner Trap	Tip Signal	0 Velocity	0 Angle				34518	S/N Ratio	N/A	A/N	4.0			
			1.2	1.3	-1.2	-1.3			Ĭ	_	0	0	0					N/A	A/A	8547			
400-kHz, 60 Shear	Length Sizing	Actual	6 dB Drop	Loss of Signal	6 dB Drop ∆	Loss of Signal ∆		Depth Sizing	Actual	6 dB Drop	UT Tip Signal	6 dB Drop ∆	UT Tip Signal ∆		Noise Characterization	Peak Signal Response	Noise	General Weld Root	Local Weld Root	Cursor Window			

400-kHz Spike Wave, Section #3, Farside, Saw Cut H, 26% Through Wall Angle

400-kHz, 70 Long

			Material Coord. (in.)		2 0.65893	0		1			1	Measure		Signal-to-Noise ratio	1.0/623	Exit		
0		П					9			10		- 14	- 20		23	2		
												B-Sran End View		X: 2.200 -> 4.100, Pts: 19 Y: 9.200 -> 13.200, Pts: 40	Z: 0.000 -> 2.152, Pts: 42	Scale: 0.20 Inches		
									0.228	20					dВ	N/A	N/A	11.9
							Corner Trap	Tip Signal	Velocity	Angle				2033	S/N Ratio	N/A	A/N	3.9
	2.1	2.5	-2.1	-2.5					0	0	0					N/A	N/A	5177
Actual	6 dB Drop	Loss of Signal	6 dB Drop ∆	Loss of Signal ∆		Depth Sizing	Actual	6 dB Drop	UT Tip Signal	6 dB Drop ∆	UT Tip Signal ∆		Noise Characterization	Peak Signal Response	Noise	General Weld Root	Local Weld Root	Cursor Window
		2.1	2.1 anal 2.5	3.1 2.1 2.5 Madeiri dB Drop Δ -2.1	2.1 3.1 6 dB Drop Δ -2.1 of Signal Δ -2.5	ynal 2.1 § dB Drop Δ -2.1 of Signal Δ -2.5	2.1 s dB Drop Δ -2.1 of Signal Δ -2.5 ing	rop 2.1 f Signal 2.5 6 dB Drop △ -2.1 oss of Signal △ -2.5 Sizing	2.1 signal 2.5 or Signal Δ -2.5 rip Signal Δ -2.5 rip Signal Δ -2.5 rip Signal	2.1	ynal 2.5 i dB Drop Δ -2.1 of Signal Δ -2.5 Ing  Corner Trap Tip Signal nal 0 Velocity 0.228 i dB Drop Δ 0.228 Tip Signal nal 0 Velocity 700 Tip Signal nal 0 Velocity 0.400 Tip Signal Notice 100 Tip Signal	10   10   10   10   10   10   10   10	2.1	10   14   14   14   14   14   14   14	1   2.1   2.5	anal         2.5           idB Drop Δ         -2.1           of Signal Δ         -2.5           ing         Corner Trap           Tip Signal Δ         0 Velocity           idB Drop Δ         0 Angle           ig Signal Δ         70           ip Signal Δ         70           ip Signal Δ         70           ig Signal Δ         70	1   2.1   2.5   3   4   4   4   4   4   4   4   4   4	10   2.1   10   10   10   10   10   10   10

400-kHz Spike Wave, Section #3, Farside, Flaw E, 48% Through Wall



400-kHz Spike Wave, Section #3, Farside, Flaw E, 48% Through Wall

400-kHz, 60 Shear

Length Sizing				29921	921	Data Volume
Actual					<b>D</b>	
6 dB Drop	0.8					2 20
Loss of Signal	1.6					
6 dB Drop ∆	-0.8					Material Coord. [in.]
Loss of Signal ∆	-1.6				-3	
;						Z 0.81380
Depth Sizing						Description
Actual		Corner Trap	•		9	13794 (compe)
6 dB Drop		Tip Signal			,	
UT Tip Signal	0	0 Velocity	0.125	B-Scan End View		
6 dB Drop ∆	0	0 Angle	09	X; 0.000 -> 6.000, Pts: 60	-10	Noise 14173 (
UT Tip Signal ∆	0					(ap) 666
				Z: 0.732 -> 1.587, Pts: 21 Scale: 0.20 Inches	-14	
Noise Characterization					- 20	DESCRIPTION
Peak Signal Response		29921	21			Signal-to-Noise ratio
Noise		S/N Ratio	dB	UBGO	_ 0	0.97325
General Weld Root	N/A	N/A	N/A	0070	00	Exit
Local Weld Root	N/A	A/N	A/N			
Cursor Window	14173	2.1	6.5			

400-kHz Spike Wave, Section #3, Farside, Flaw E, 48% Through Wall

400-kHz, 70 Long

Signal-to-Noise ratio (counts) (counts) Material Coord. (in.)-9 9 0.50687 Data Volume × 3.7 × 15.7 Measure EXT 157 Response -999.0 2561 2922 986 10 20 13912 1185 Y: 14.100 -> 16.500, Pts: 24 X: 2.100 -> 4.300, Pts: 22 Z: 0.000 -> 2.152, Pts: 42 B-Scan End View 0.228 N/A N/A 13.6 13912 Corner Trap N/A N/A 8.4 Tip Signal Velocity S/N Ratio 0 Angle N/A N/A 2922 Noise Characterization Peak Signal Response 6 dB Drop ∆ Loss of Signal A 6 dB Drop ∆ UT Tip Signal ∆ Local Weld Root General Weld Root Cursor Window Length Sizing oss of Signal Depth Sizing UT Tip Signal 6 dB Drop 6 dB Drop Noise Actual

## Appendix E Phased-Array Data and Analysis Images

## Appendix E

## **Phased-Array Data and Analysis Images**

Solid black lines represent the vertical locations and lengths of the saw cuts and flaws. The flaw positions have been horizontally offset for visibility. All stated distances are measured from the front edge of the transducers to the beginning of the weld crown; that is, "Transducer next to weld crown" means that the front edge of the transducer was next to the beginning of the weld crown.

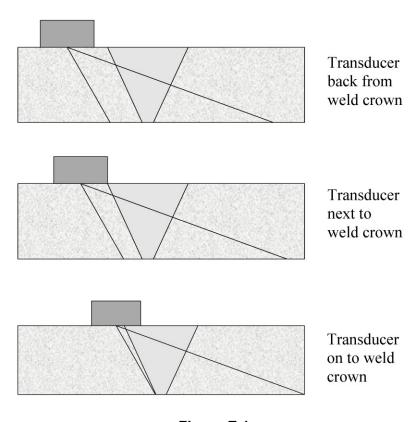


Figure E.1

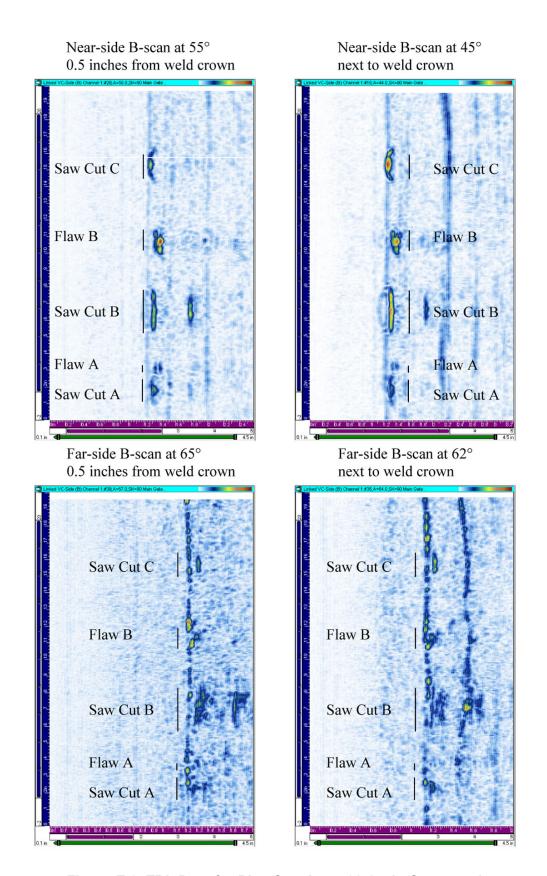
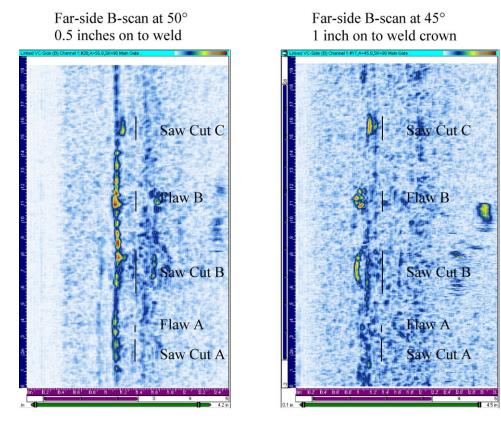


Figure E.2 TRL Data for Pipe Specimen 02-24-15 Segment 1



Far-side B-scan at 30° 1.5 inches on to weld crown

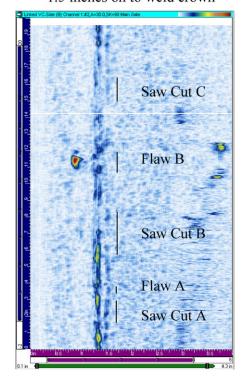


Figure E.2 TRL Data for Pipe Specimen 02-24-15 Segment 1 (continued)

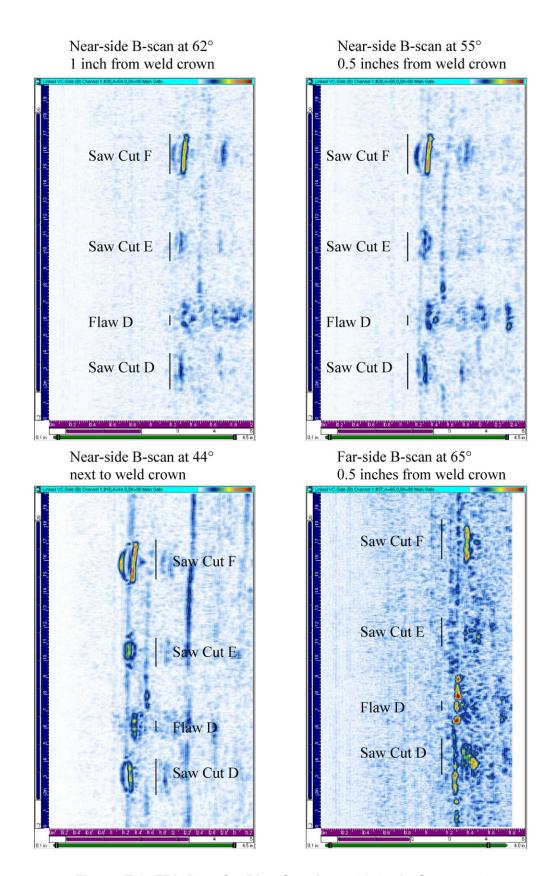


Figure E.3 TRL Data for Pipe Specimen 02-24-15 Segment 2

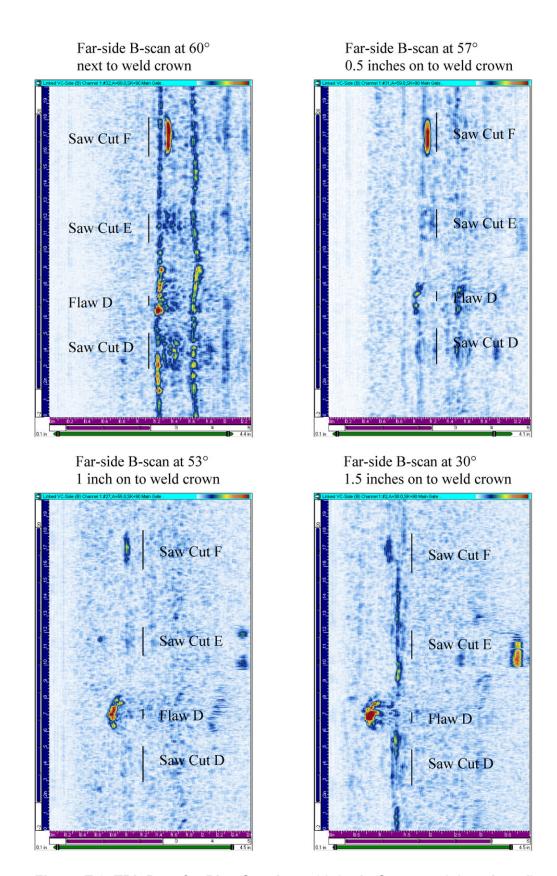


Figure E.3 TRL Data for Pipe Specimen 02-24-15 Segment 2 (continued)

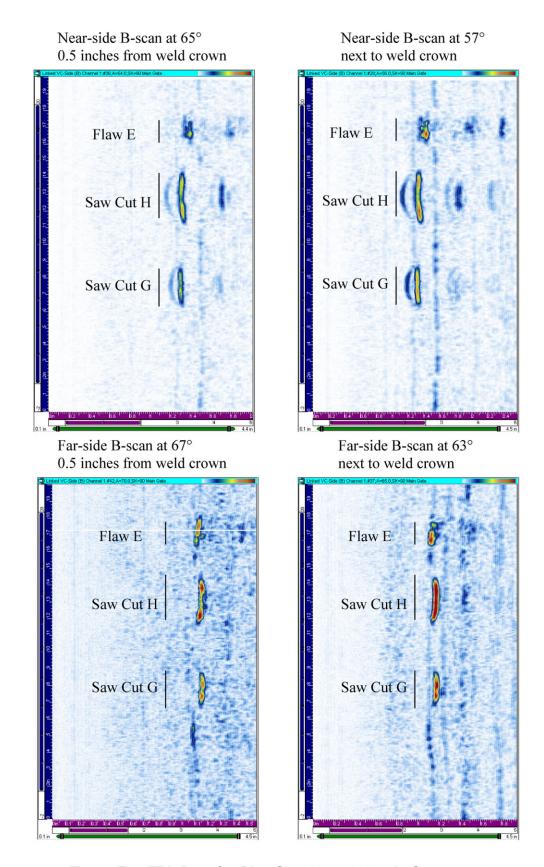
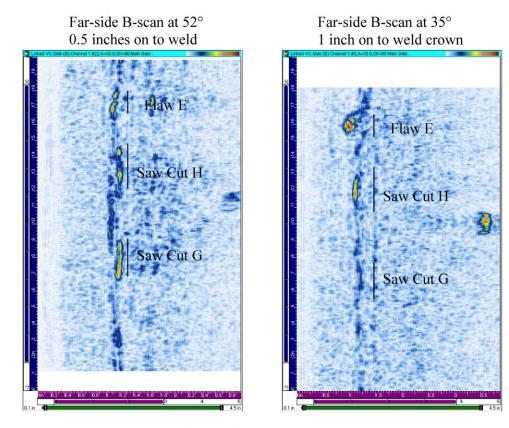


Figure E.4 TRL Data for Pipe Specimen 02-24-15 Segment 3



Far-side B-scan at 30° 1.5 inches on to weld crown

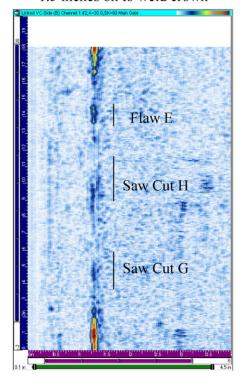


Figure E.4 TRL Data for Pipe Specimen 02-24-15 Segment 3 (continued)

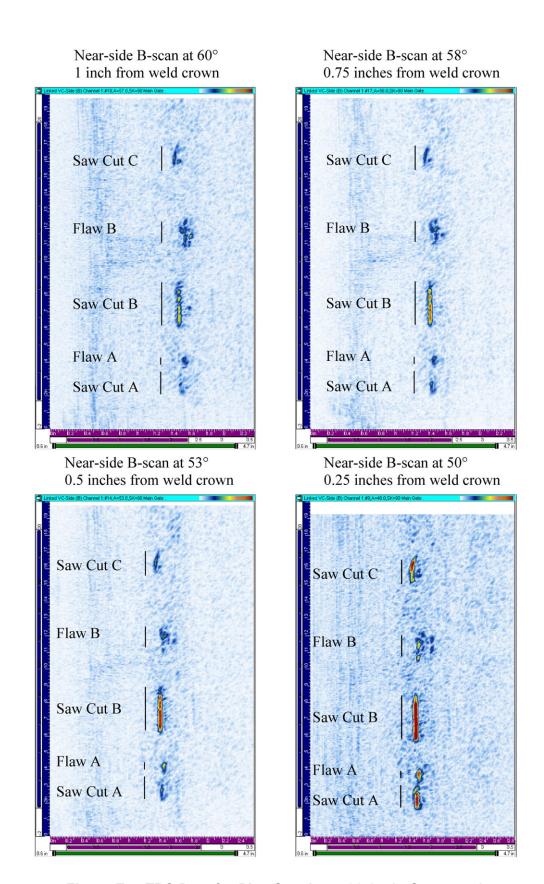


Figure E.5 TRS Data for Pipe Specimen 02-24-15 Segment 1

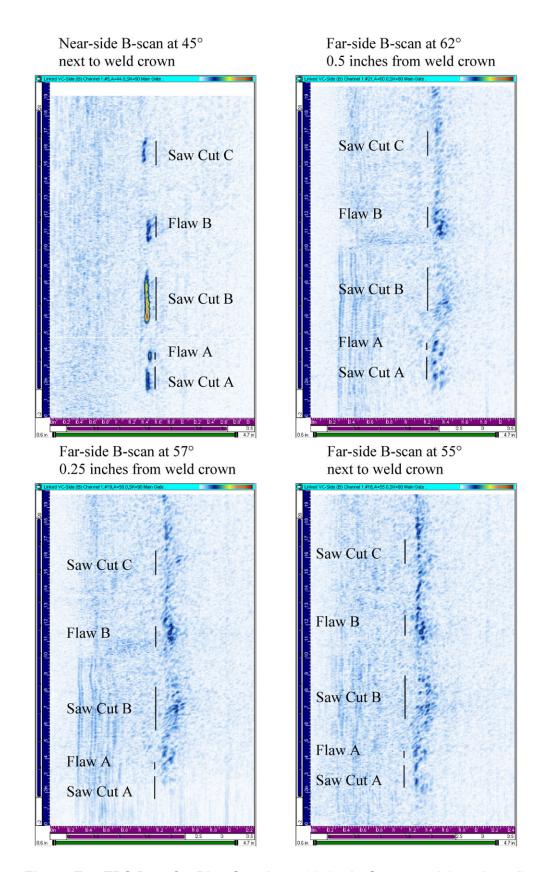


Figure E.5 TRS Data for Pipe Specimen 02-24-15 Segment 1 (continued)

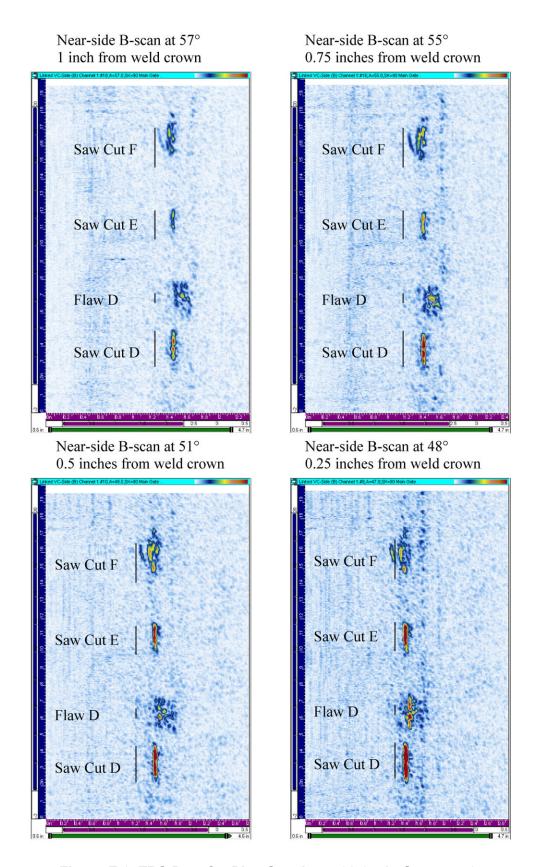


Figure E.6 TRS Data for Pipe Specimen 02-24-15 Segment 2

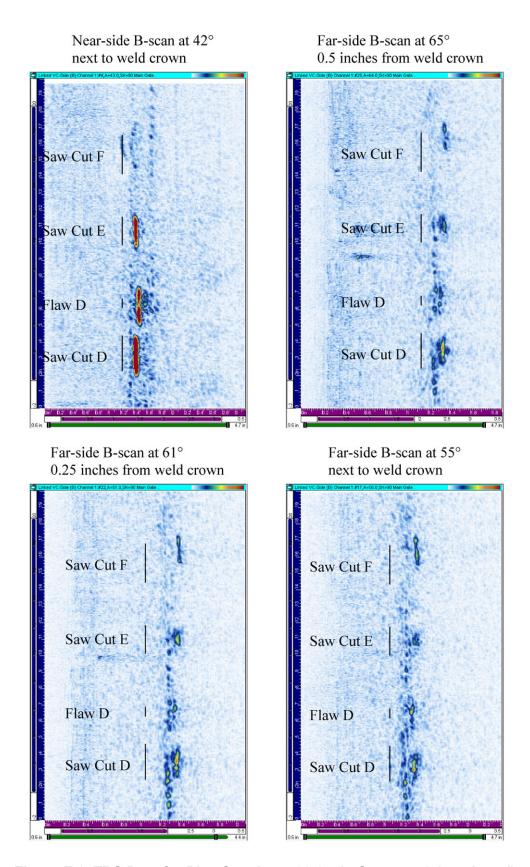


Figure E.6 TRS Data for Pipe Specimen 02-24-15 Segment 2 (continued)

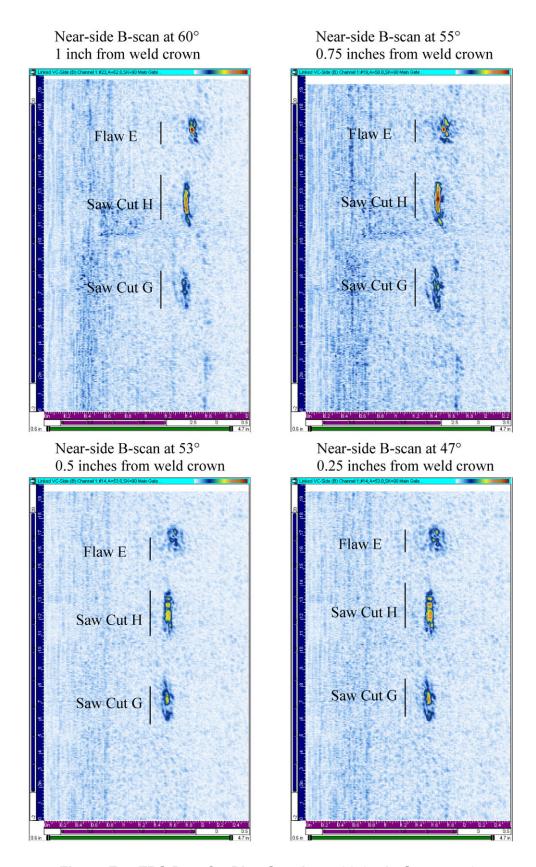


Figure E.7 TRS Data for Pipe Specimen 02-24-15 Segment 3

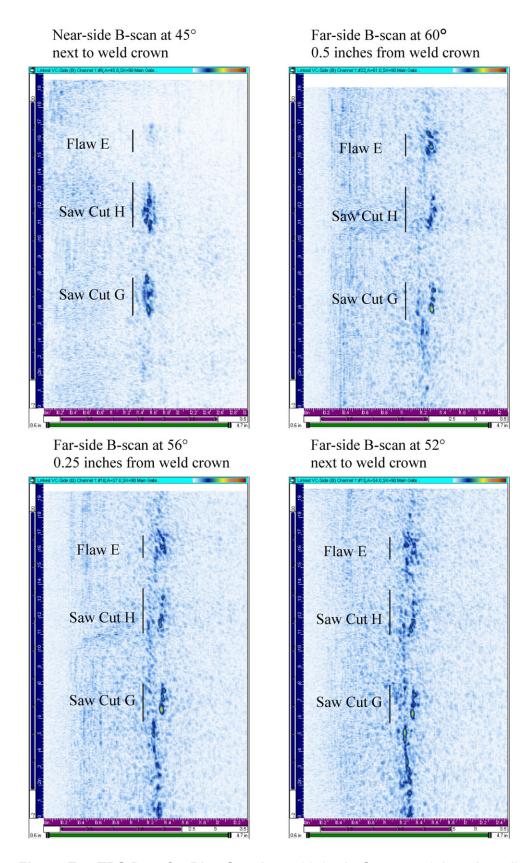


Figure E.7 TRS Data for Pipe Specimen 02-24-15 Segment 3 (continued)

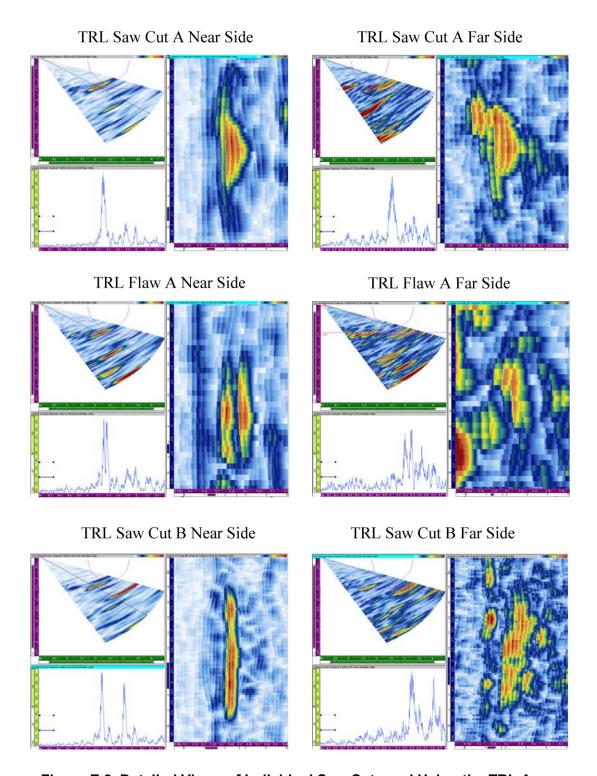


Figure E.8 Detailed Views of Individual Saw Cuts and Using the TRL Array

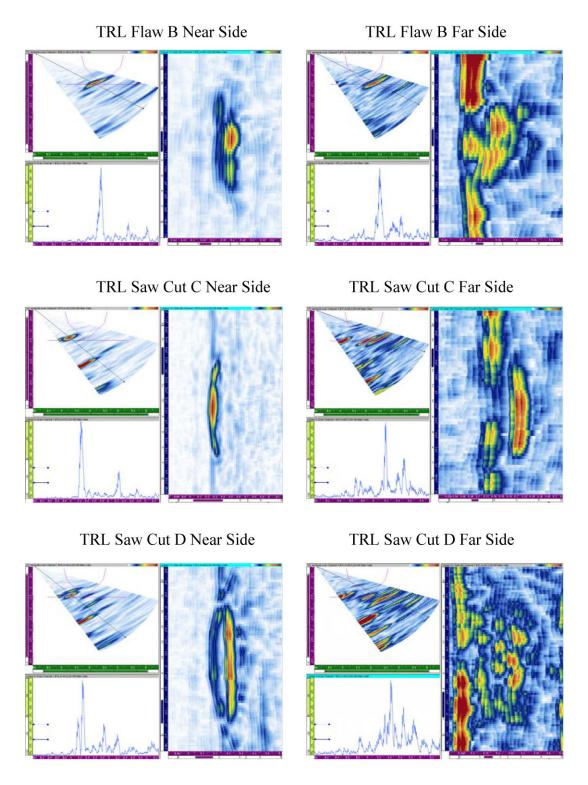


Figure E.8 Detailed Views of Individual Saw Cuts and Using the TRL Array (continued)

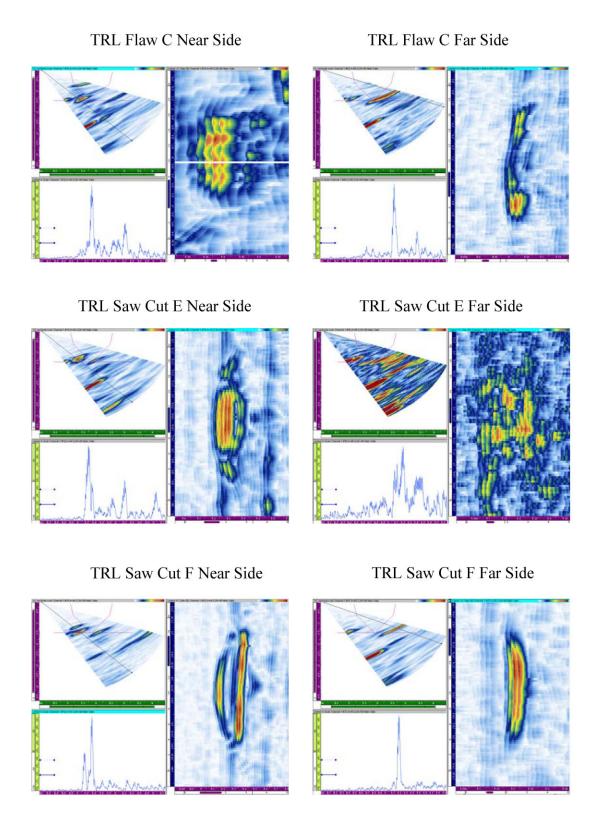


Figure E.8 Detailed Views of Individual Saw Cuts and Using the TRL Array (continued)

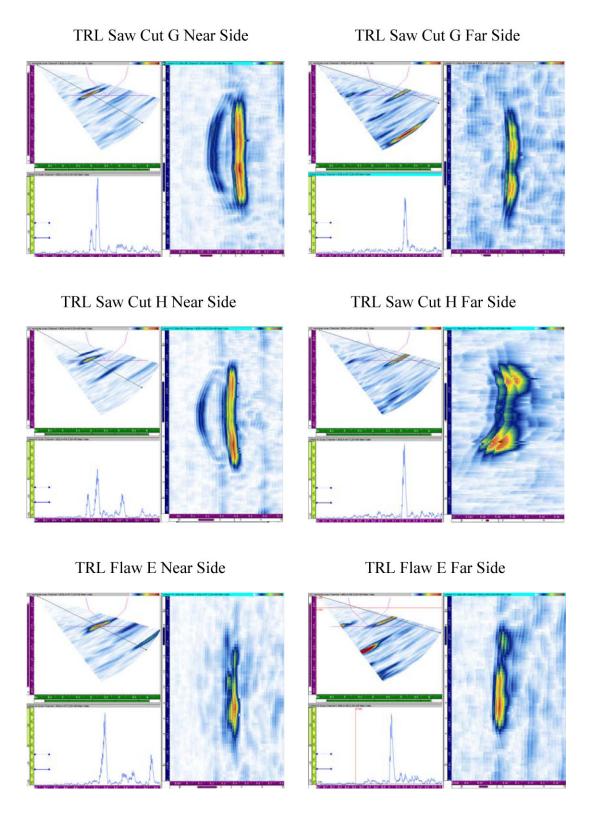


Figure E.8 Detailed Views of Individual Saw Cuts and Using the TRL Array (continued)

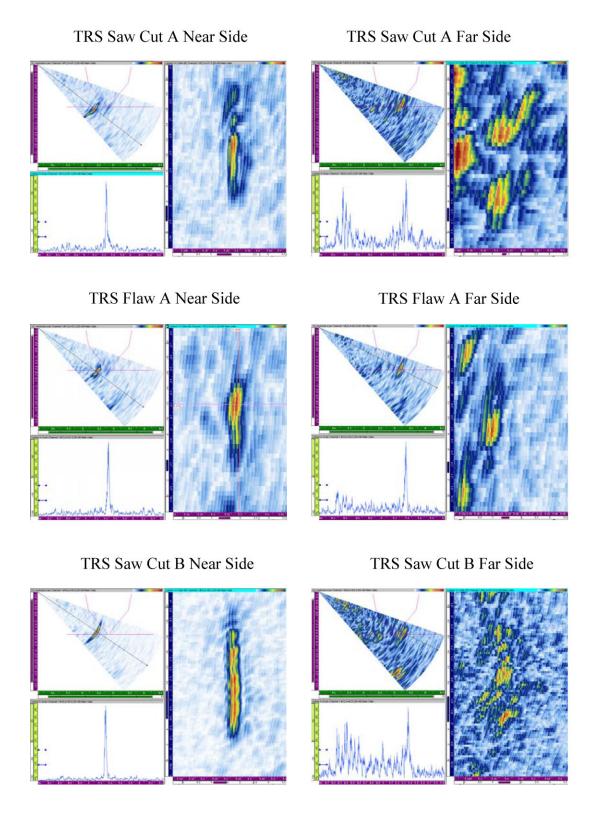


Figure E.9 Detailed Views of Individual Saw Cuts and Using the TRS Array

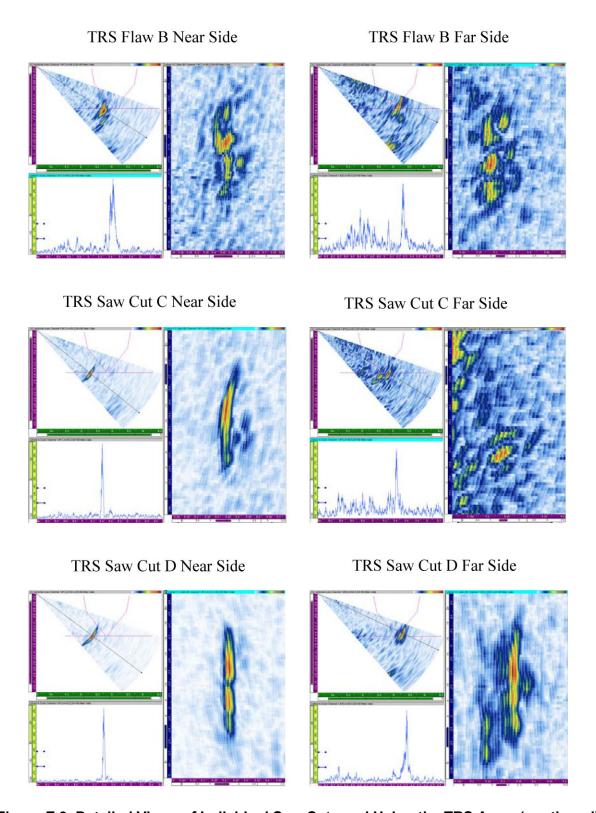


Figure E.9 Detailed Views of Individual Saw Cuts and Using the TRS Array (continued)

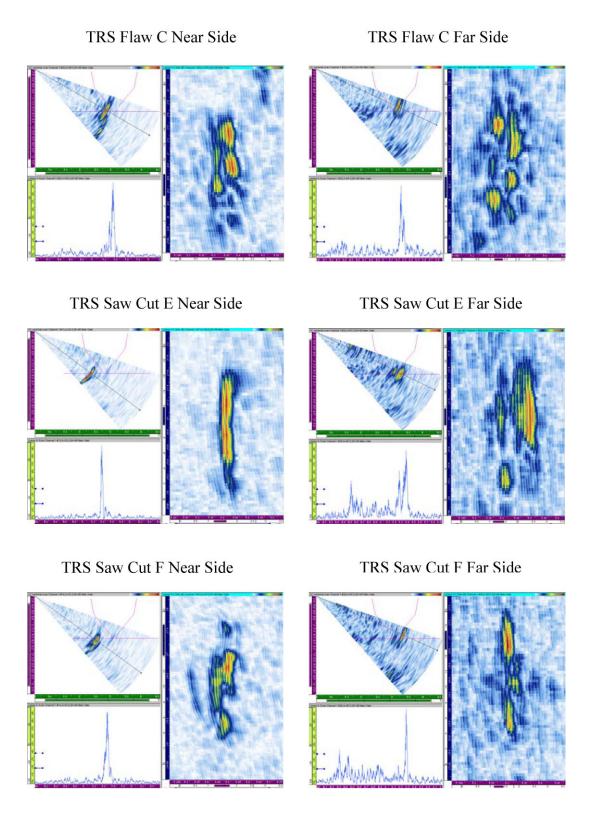


Figure E.9 Detailed Views of Individual Saw Cuts and Using the TRS Array (continued)

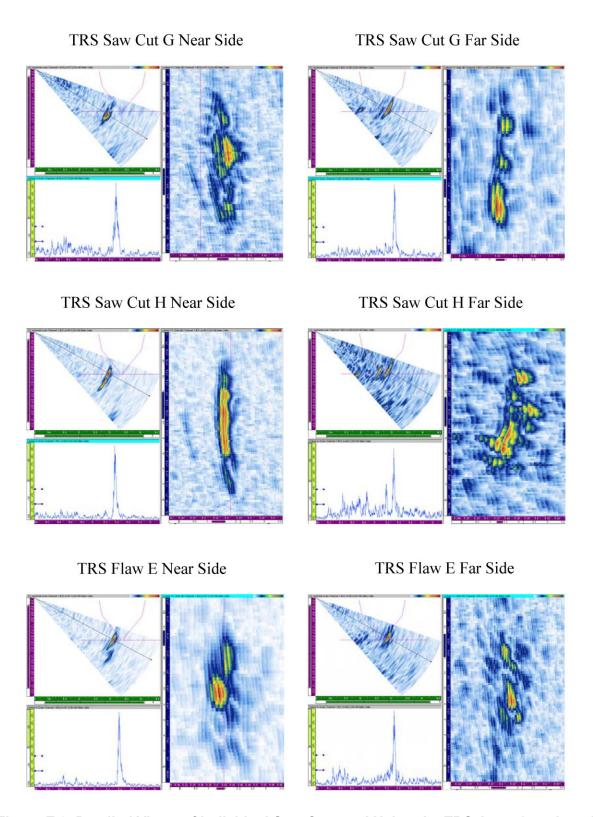


Figure E.9 Detailed Views of Individual Saw Cuts and Using the TRS Array (continued)

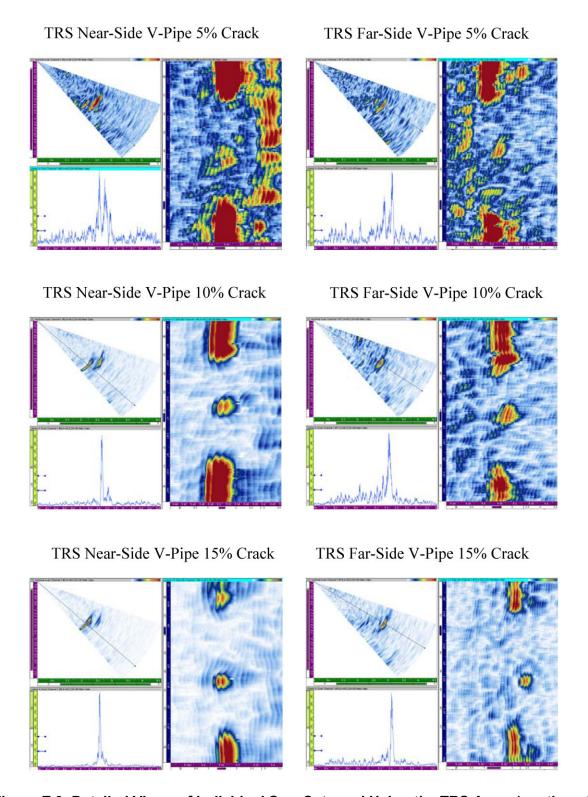


Figure E.9 Detailed Views of Individual Saw Cuts and Using the TRS Array (continued)

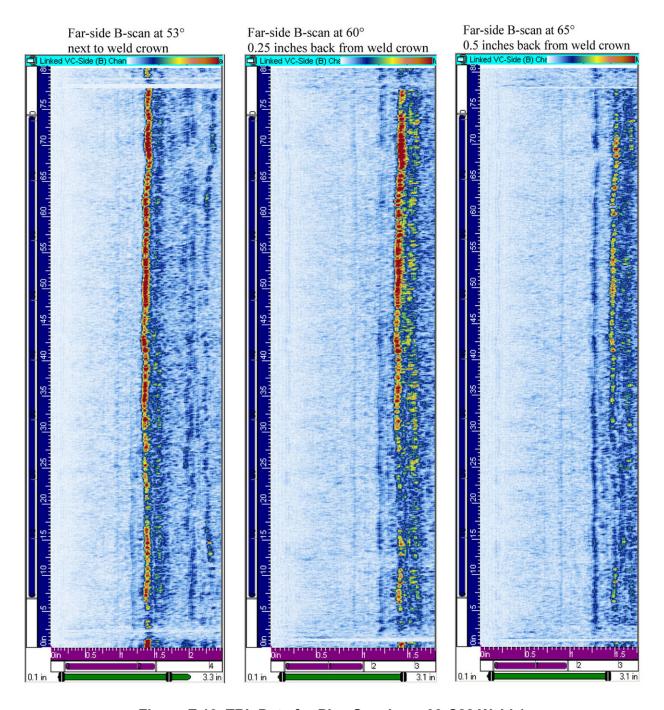


Figure E.10 TRL Data for Pipe Specimen 03-C22 Weld 1

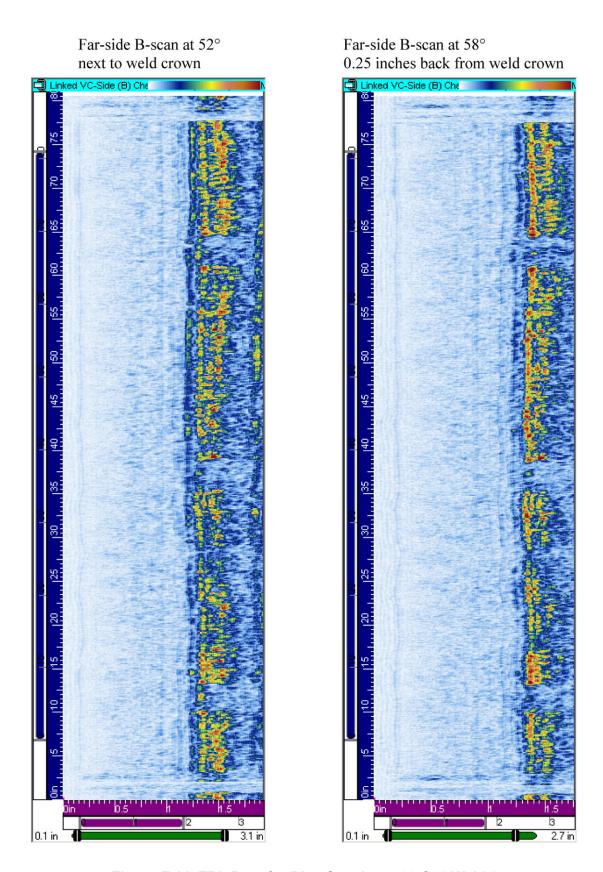


Figure E.11 TRL Data for Pipe Specimen 03-C22 Weld 2

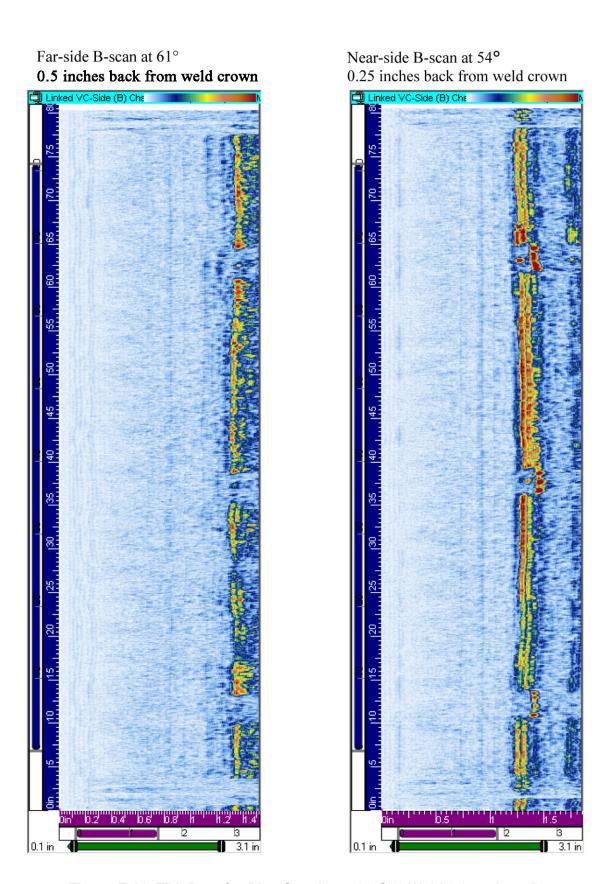


Figure E.11 TRL Data for Pipe Specimen 03-C22 Weld 2 (continued)

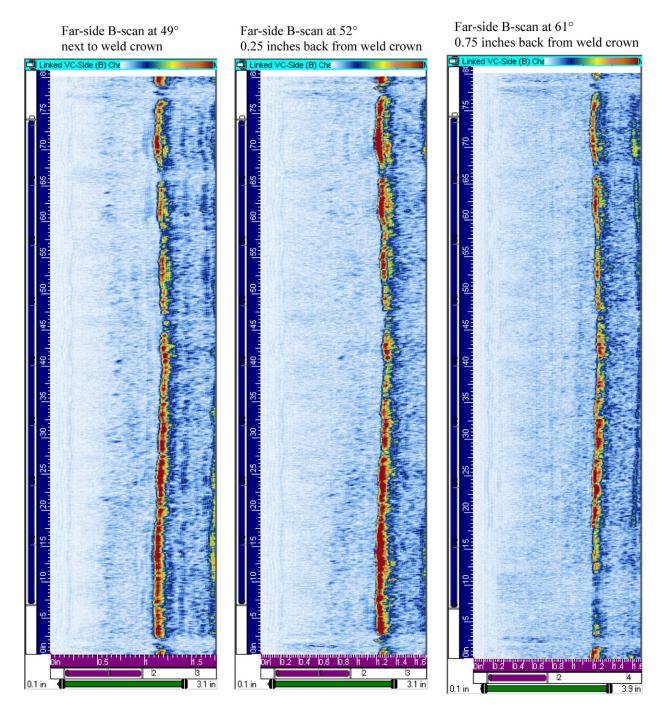


Figure E.12 TRL Data for Pipe Specimen 03-C22 Weld 3

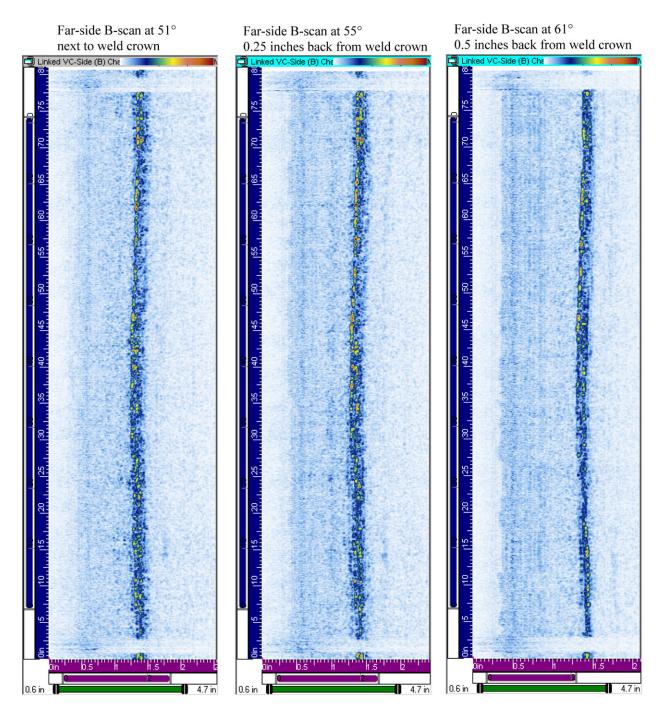


Figure E.13 TRS Data for Pipe Specimen 03-C22 Weld 1

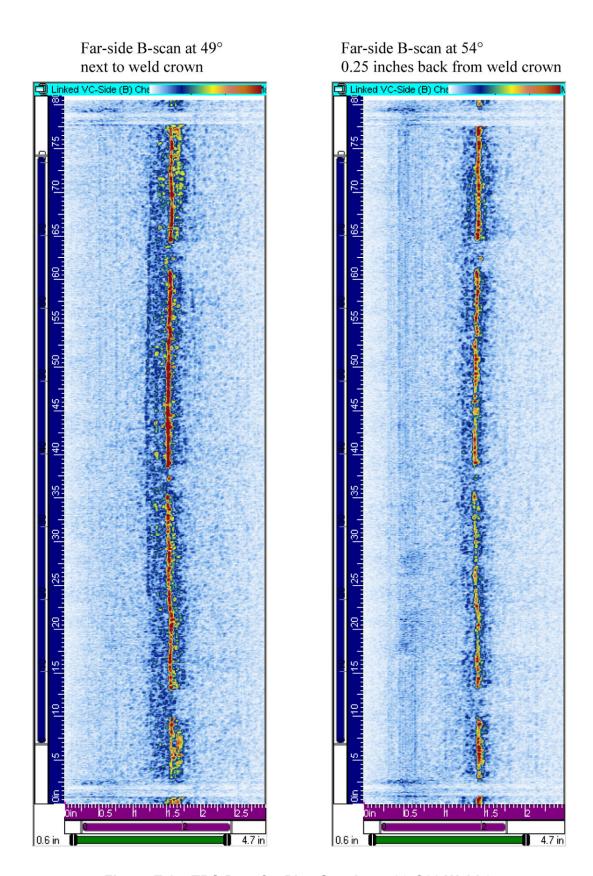


Figure E.14 TRS Data for Pipe Specimen 03-C22 Weld 2

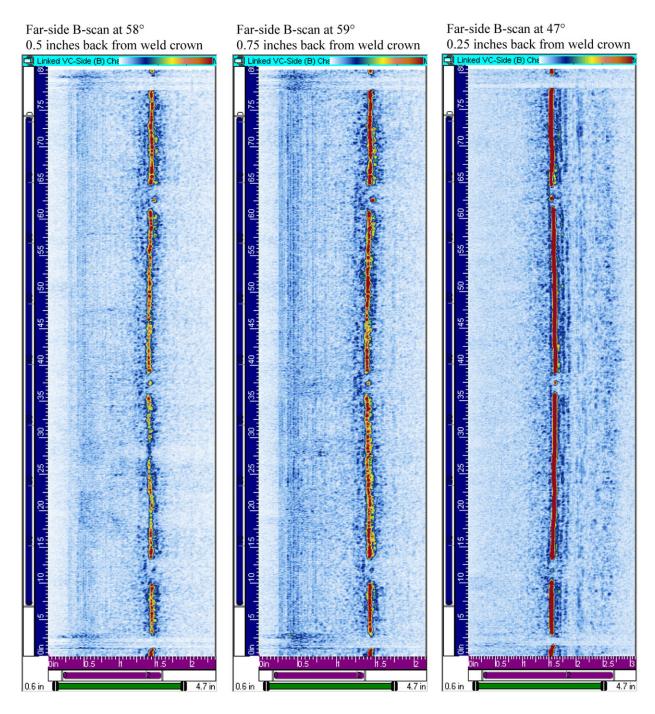


Figure E.14 TRS Data for Pipe Specimen 03-C22 Weld 2 (continued)

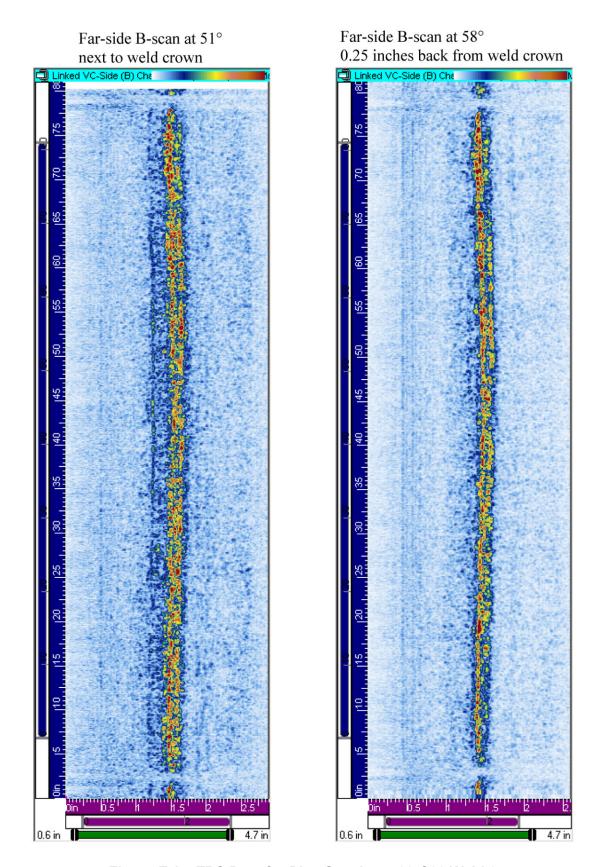


Figure E.15 TRS Data for Pipe Specimen 03-C22 Weld 3

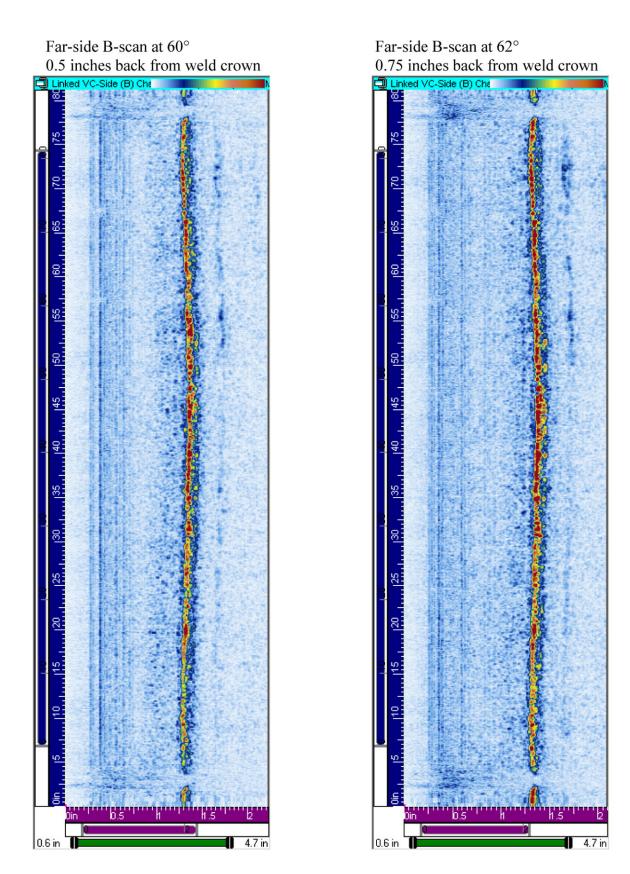


Figure E.15 TRS Data for Pipe Specimen 03-C22 Weld 3 (continued)

## Appendix F

# Conventional UT Data and Images of Piping Specimen No. 3C-022

#### **Appendix F**

## Conventional UT Data and Images of Piping Specimen No. 3C-022

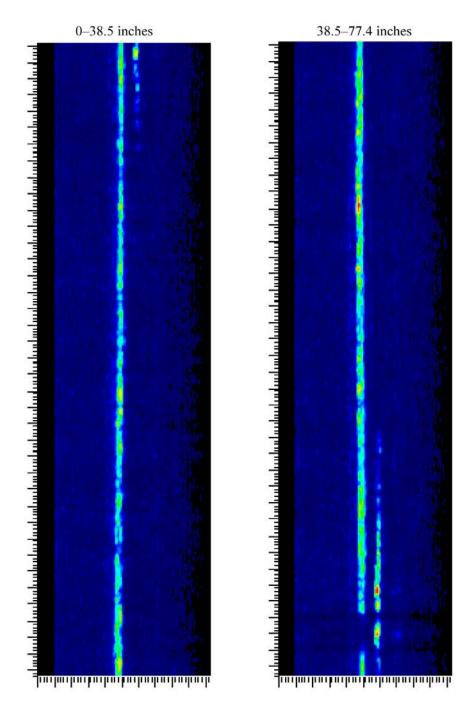


Figure F.1 C-scan Taken from the Far Side of Weld No. 1 Using 60° Shear Waves

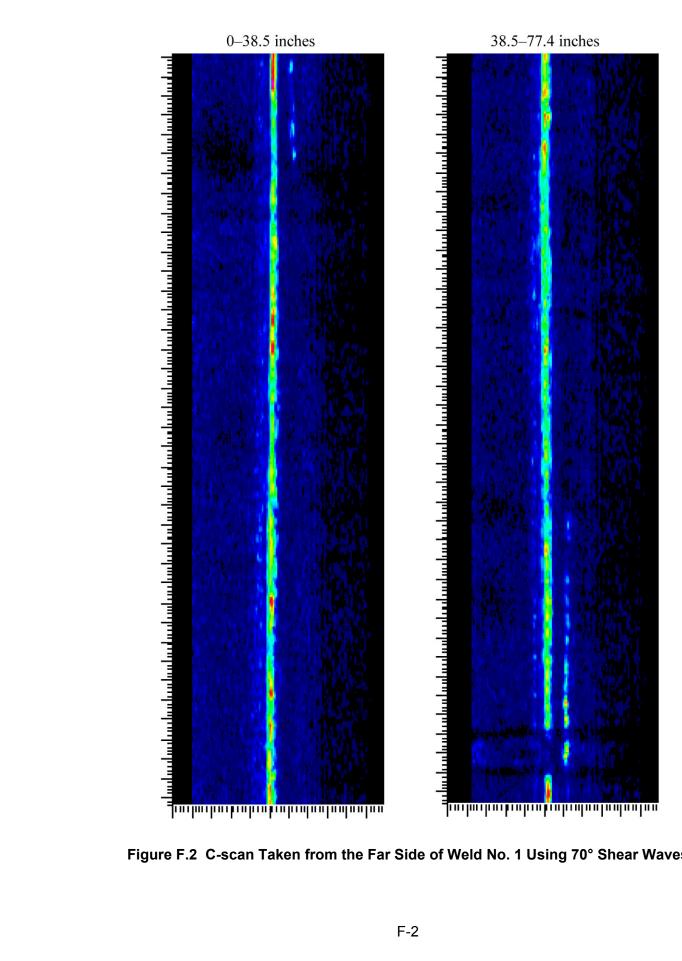


Figure F.2 C-scan Taken from the Far Side of Weld No. 1 Using 70° Shear Waves

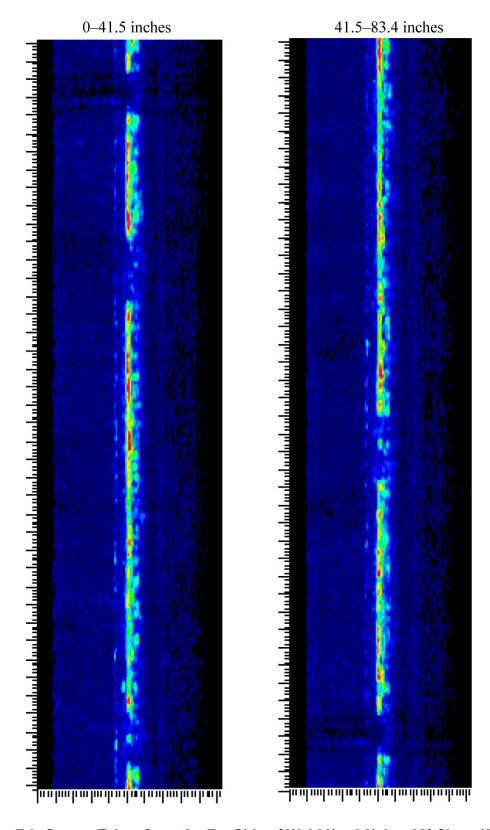


Figure F.3 C-scan Taken from the Far Side of Weld No. 2 Using 60° Shear Waves

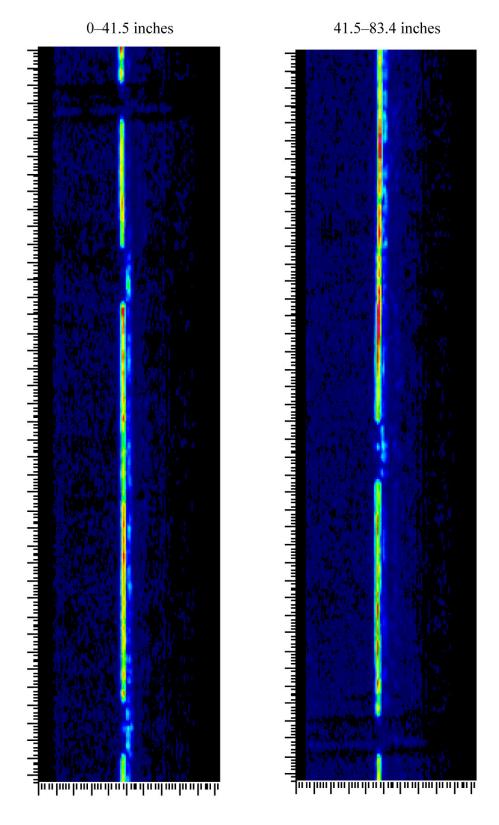


Figure F.4 C-scan Taken from the Near Side of Weld No. 2 Using 60° Shear Waves

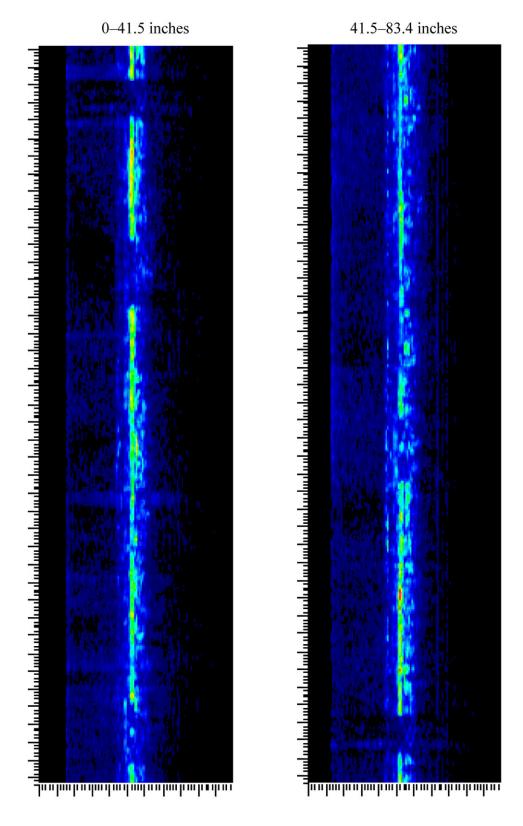


Figure F.5 C-scan Taken from the Far Side of Weld No. 2 Using 70° Shear Waves

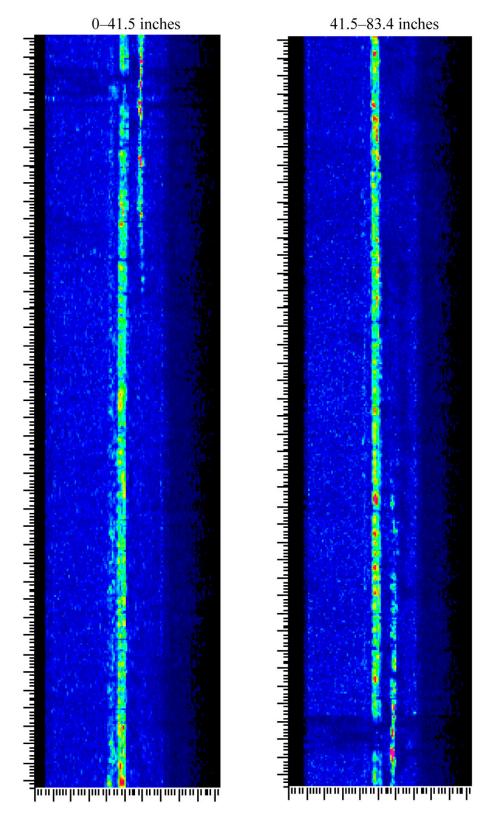


Figure F.6 C-scan Taken from the Far Side of Weld No. 3 Using 60° Shear Waves

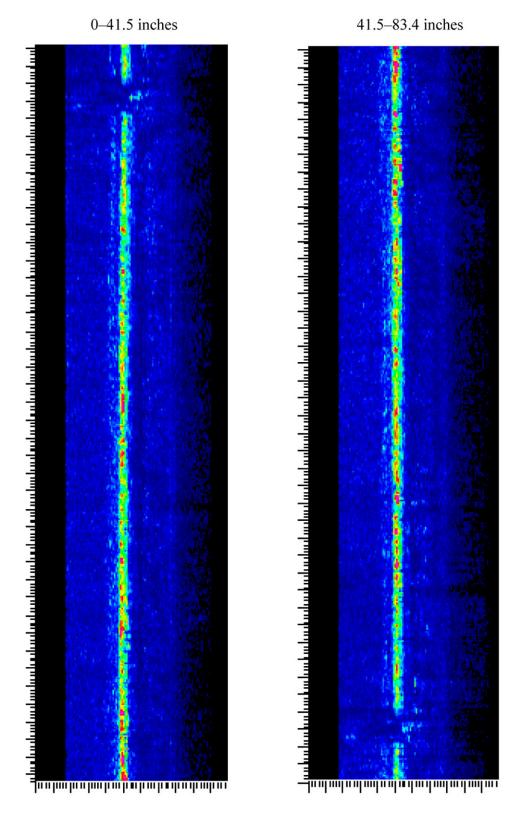


Figure F.7 C-scan Taken from the Far Side of Weld No. 3 Using 70° Shear Waves

### Appendix G

#### IGSCC Images and Detection Calls from Data on Practice Set Specimens

#### Appendix G

## IGSCC Images and Detection Calls from Data on Practice Set Specimens

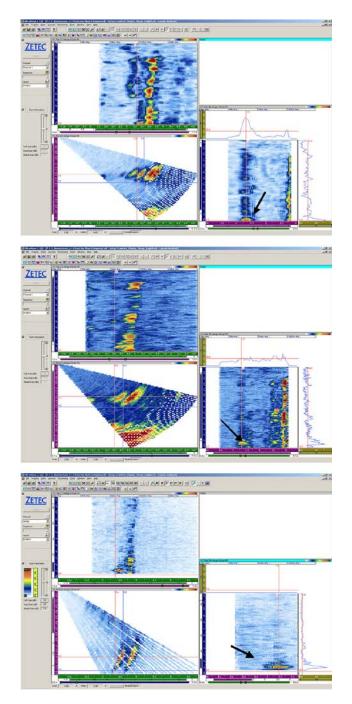


Figure G.1 P1-2 Downstream, Near Side with TRL 1.5 MHz, Mini-TRL 2 MHz, and TRS 2 MHz, Top to Bottom. Yes, Yes, Yes detected.

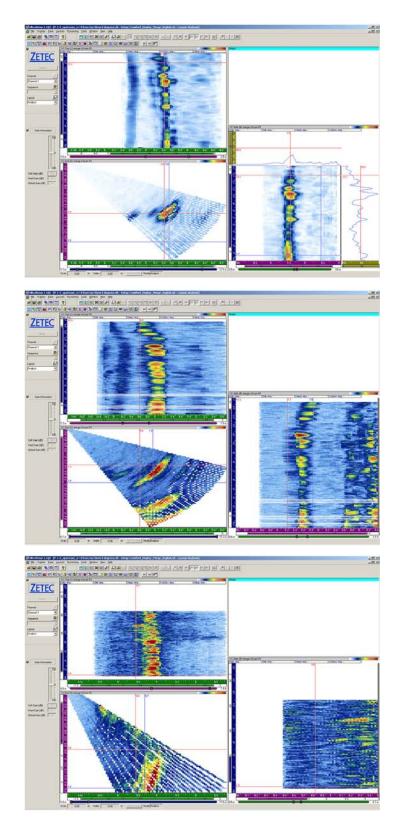


Figure G.2 P1-2 Upstream, Far Side with TRL 1.5-MHz, Mini-TRL 2-MHz, and TRS 2 MHz, Top to Bottom. No, No, No detected.

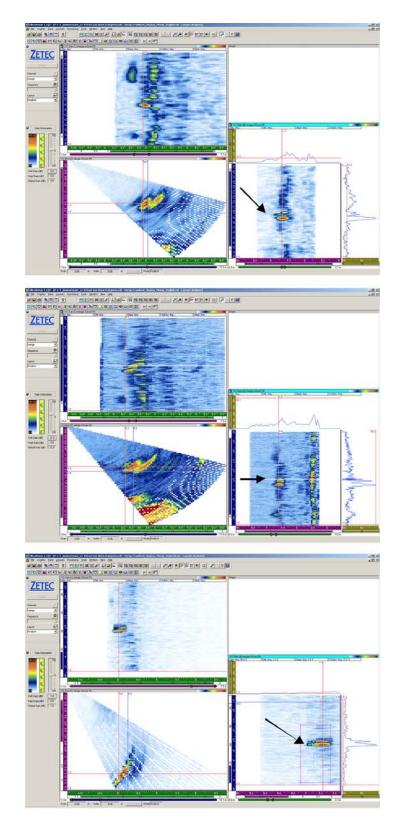


Figure G.3 P1-7 Downstream, Near Side with TRL 1.5-MHz, Mini-TRL 2-MHz, and TRS 2 MHz, Top to Bottom. Yes, Yes, Yes detected.

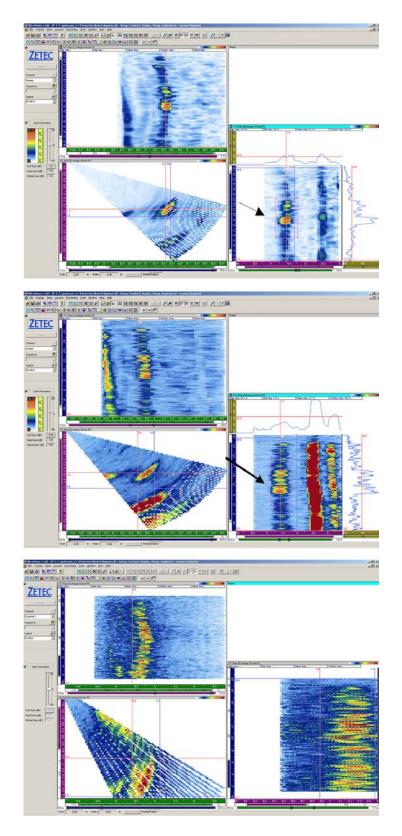


Figure G.4 P1-7 Upstream, Far Side with TRL 1.5-MHz, Mini-TRL 2-MHz, and TRS 2 MHz, Top to Bottom. Marginal, Marginal, No detected.

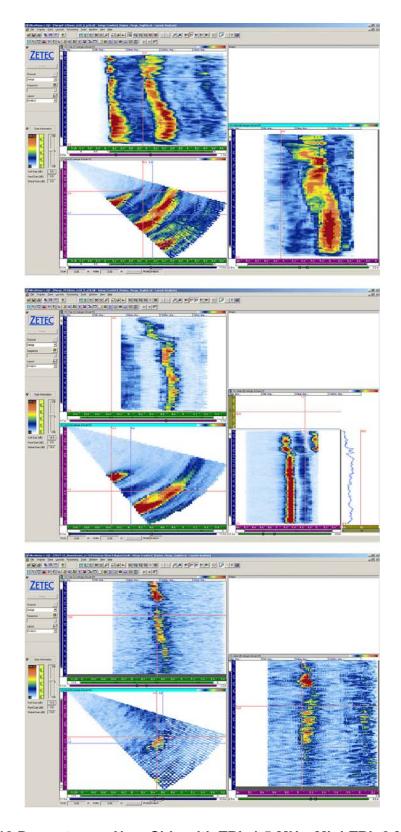


Figure G.5 P1-12 Downstream, Near Side with TRL 1.5-MHz, Mini-TRL 2-MHz, and TRS 2 MHz, Top to Bottom. No, No, No detected.

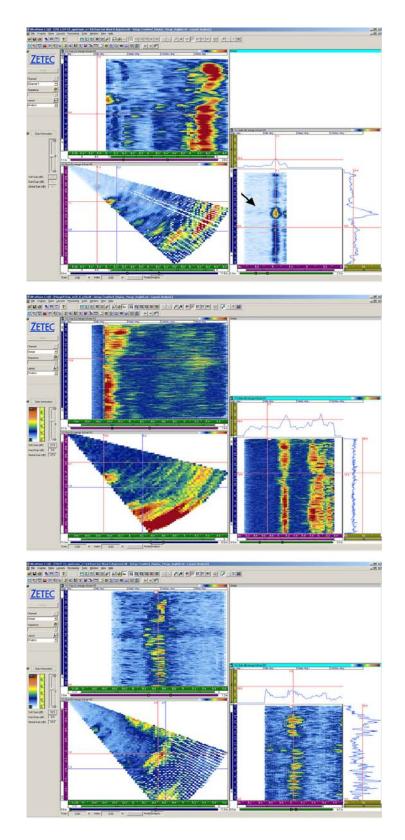


Figure G.6 P1-12 Upstream, Far Side with TRL 1.5-MHz, Mini-TRL 2-MHz, and TRS 2 MHz, Top to Bottom. Marginal, No, No detected.

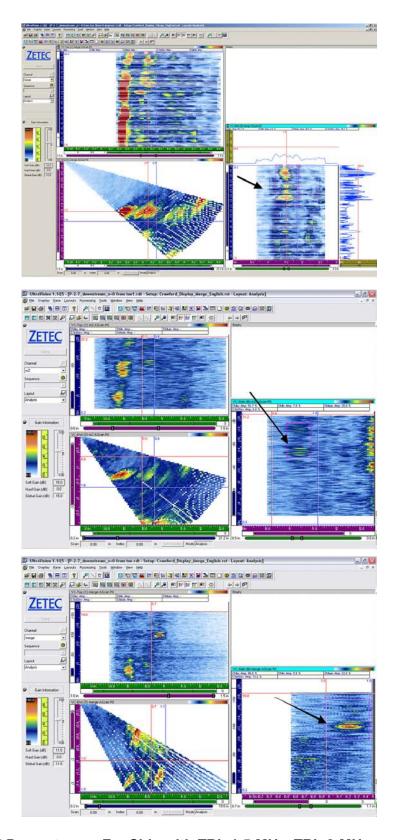


Figure G.7 P2-7 Downstream, Far Side with TRL 1.5-MHz, TRL 2-MHz, and TRS 2 MHz, Top to Bottom. Yes, Yes, Yes detected.

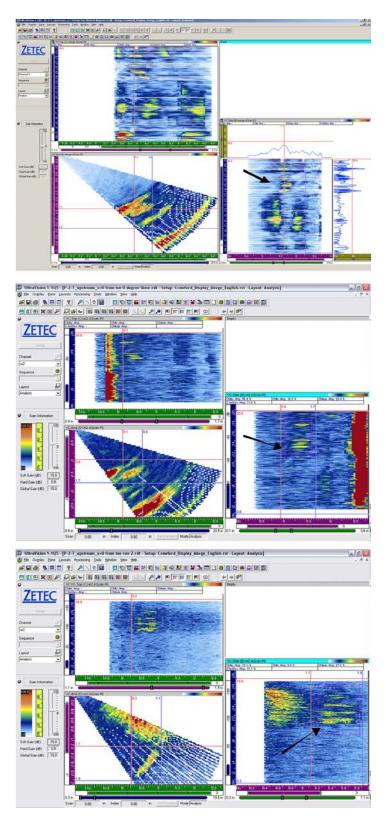


Figure G.8 P2-7 Upstream, Near Side with TRL 1.5-MHz, TRL 2-MHz, and TRS 2 MHz, Top to Bottom. Yes, Yes, Yes detected.

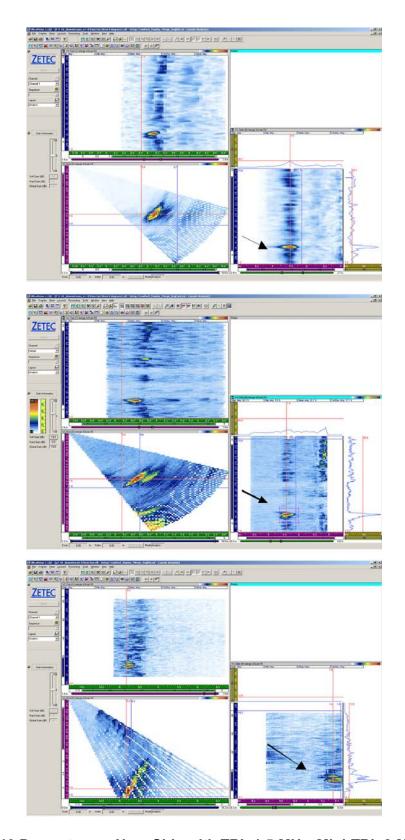


Figure G.9 P2-10 Downstream, Near Side with TRL 1.5-MHz, Mini-TRL 2-MHz, and TRS 2 MHz, Top to Bottom. Yes, Yes, Yes detected.

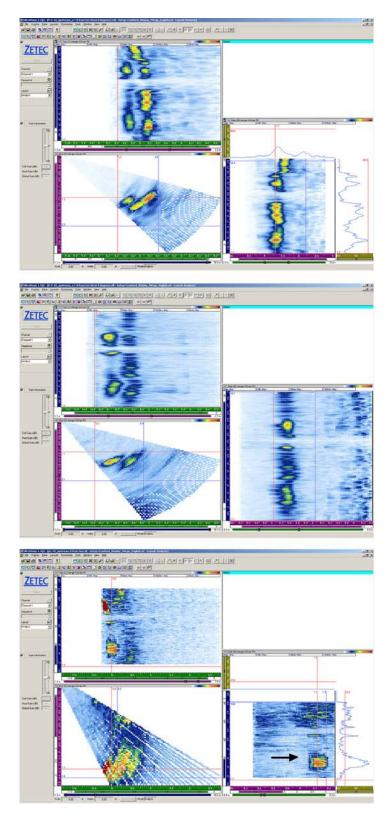


Figure G.10 P2-10 Upstream, Far Side with TRL 1.5-MHz, Mini-TRL 2-MHz, and TRS 2 MHz, Top to Bottom. No, No, Yes detected.

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An Assessment of Ultrasonic Techniques for Far-Side Examinations of Austenitic Stainless Steel Piping Welds

November 2011