

## **Appendix D**

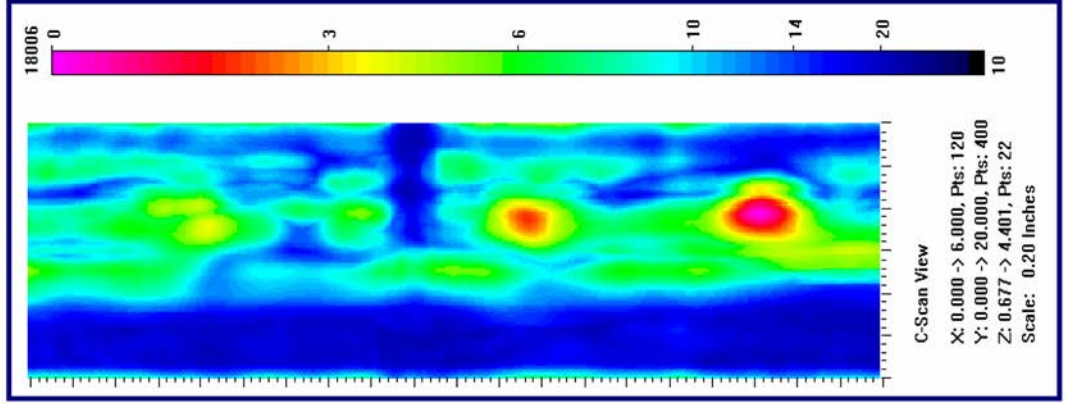
### **Low-Frequency/SAFT Data and Analysis Images**



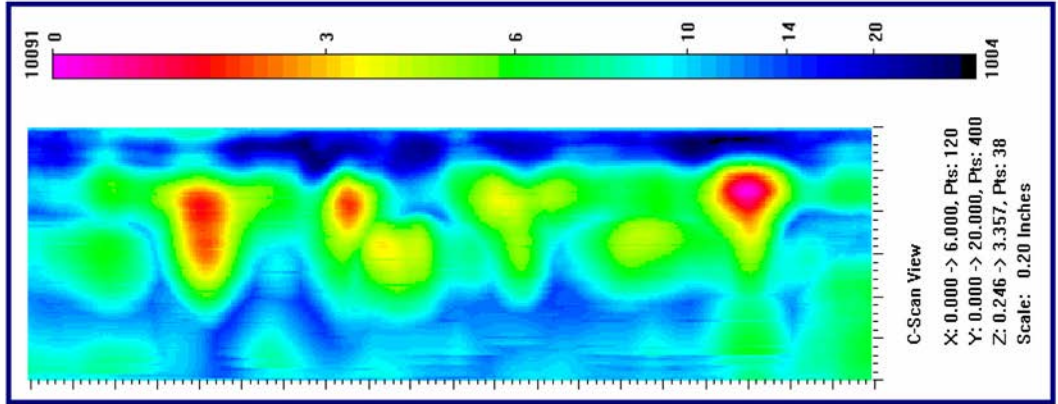
# Appendix D

## Low-Frequency/SAFT Data and Analysis Images

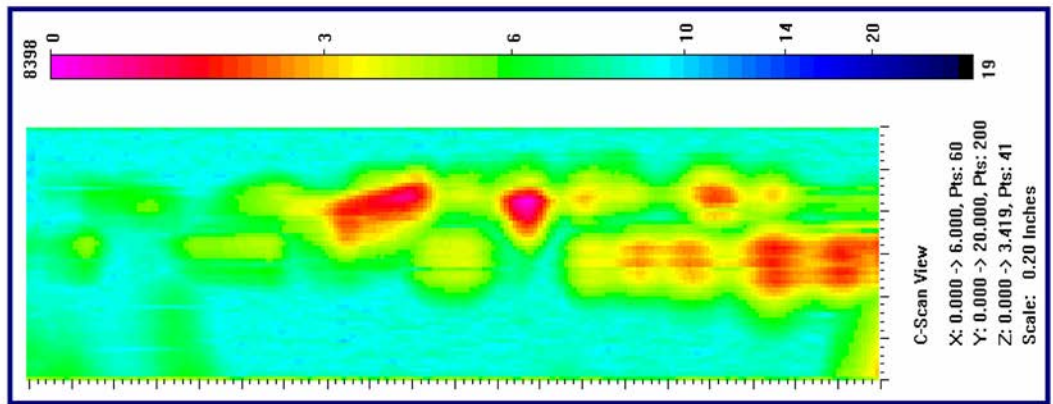
**Weld 2, Farside,  
250 kHz, 45°  
Longitudinal,  
12° SAFT C-Scan**



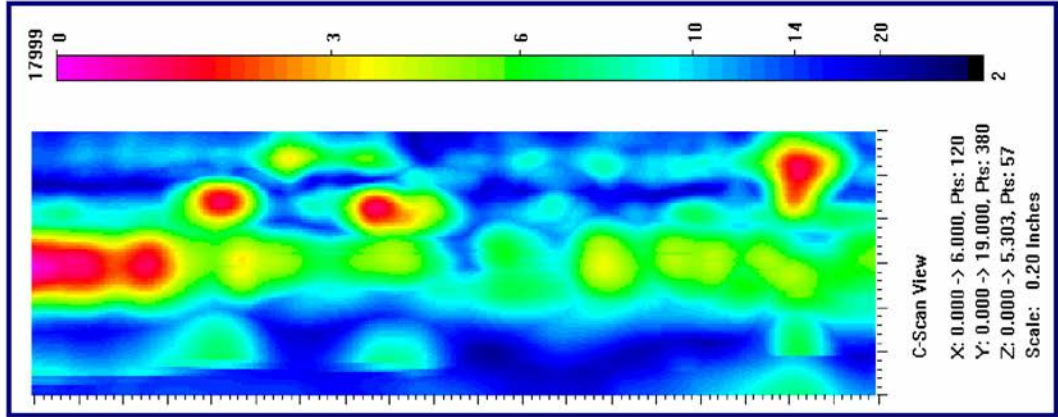
**Weld 2, Farside,  
250 kHz, 70°  
Longitudinal,  
12° SAFT C-Scan**



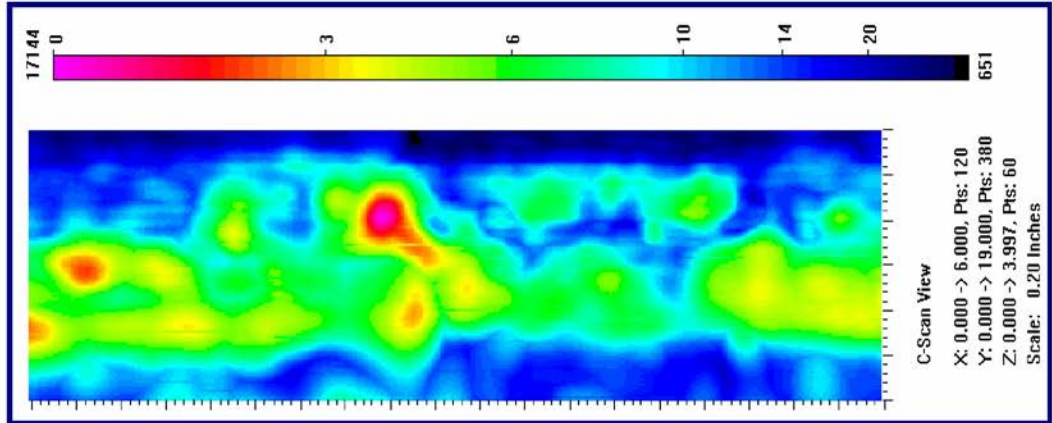
**Weld 1, Farside,  
250 kHz, 70°  
Longitudinal,  
12° SAFT C-Scan**



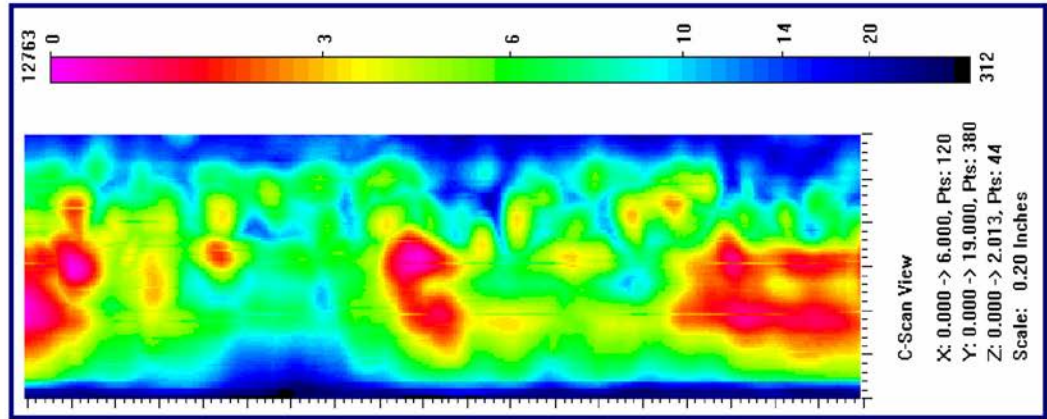
Weld 2, Farside,  
250 kHz, 45°  
Shear,  
12° SAFT C-Scan



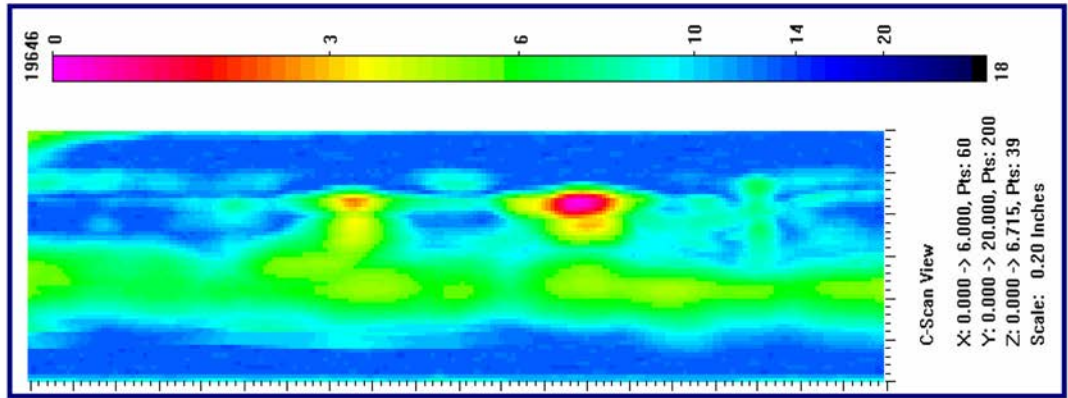
Weld 2, Farside,  
250 kHz, 60°  
Shear,  
12° SAFT C-Scan



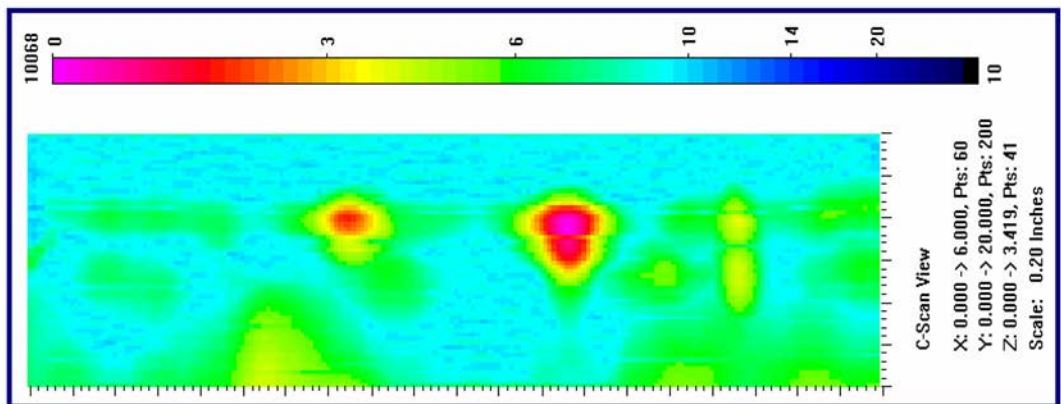
Weld 2, Farside,  
250 kHz, 70°  
Shear,  
12° SAFT C-Scan



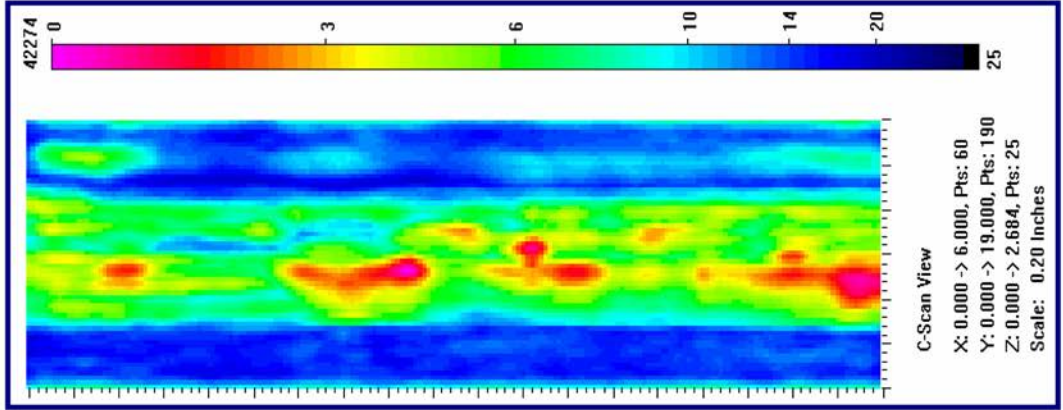
**Weld 3, Farside,  
250 kHz, 45°  
Longitudinal,  
12° SAFT C-Scan**



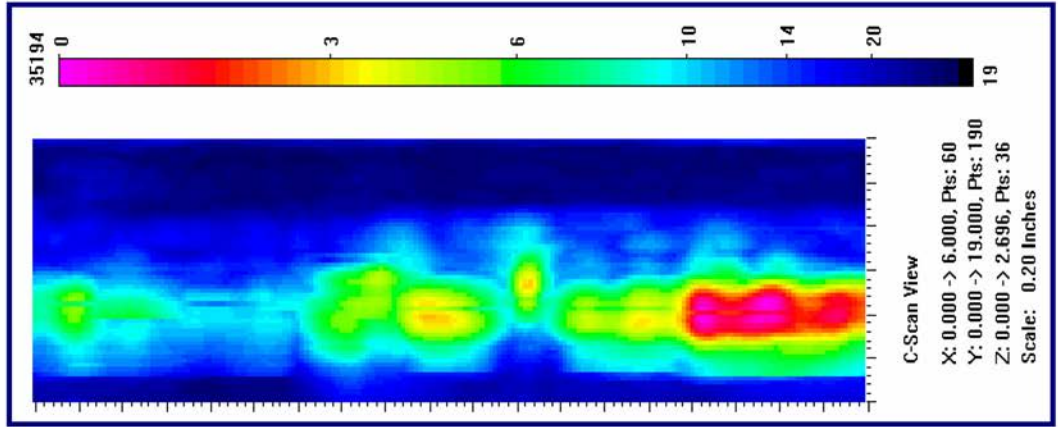
**Weld 3, Farside,  
250 kHz, 70°  
Longitudinal,  
12° SAFT C-Scan**



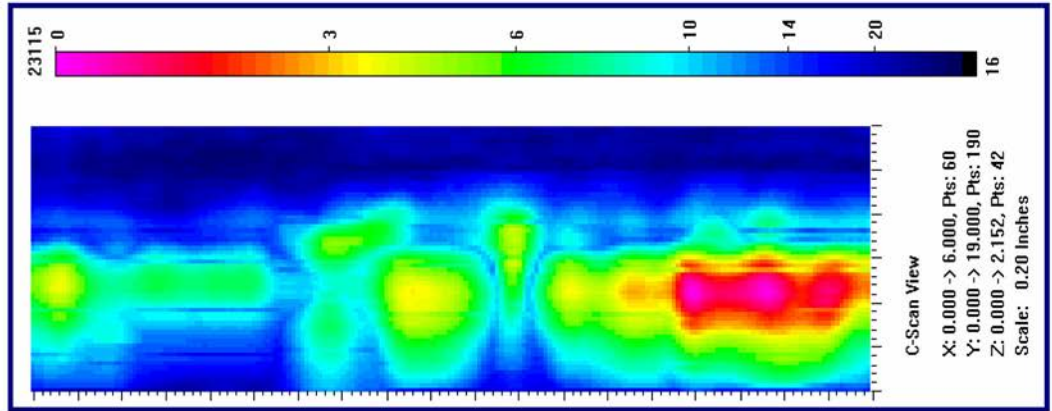
Weld 1, Farside,  
400 kHz, 45°  
Longitudinal,  
12° SAFT C-Scan



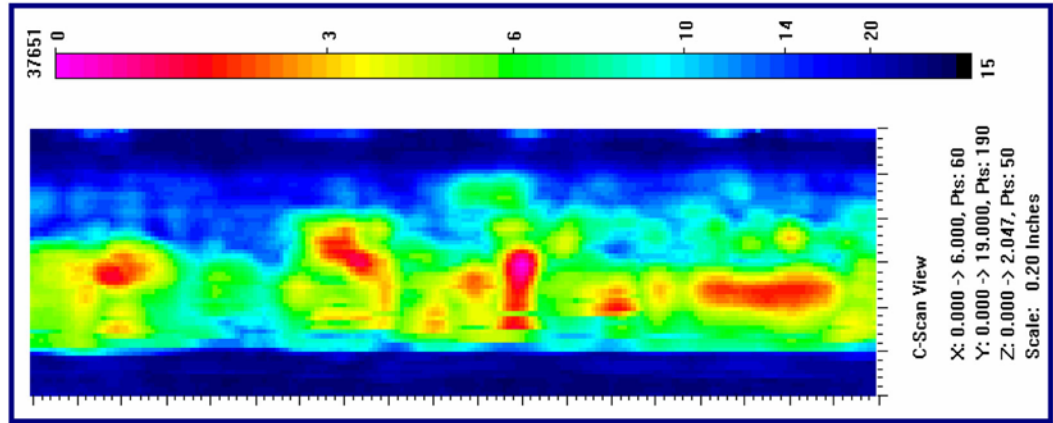
Weld 1, Farside,  
400 kHz, 60°  
Longitudinal,  
12° SAFT C-Scan



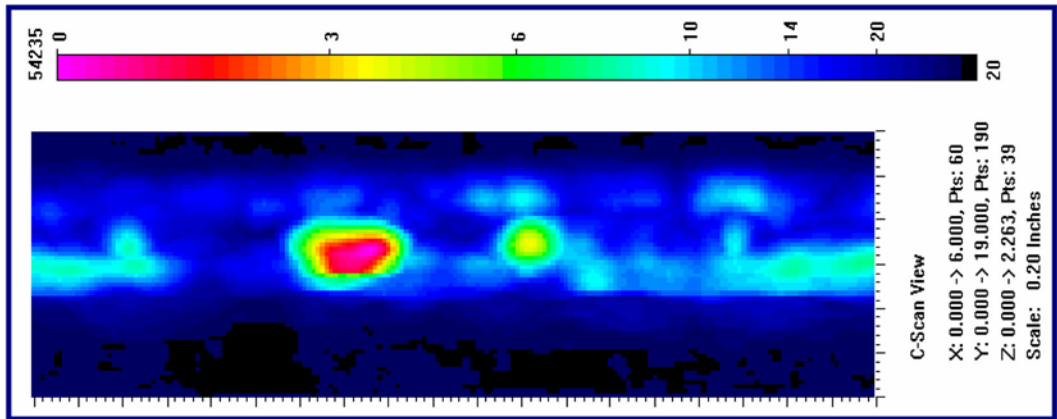
Weld 1, Farside,  
400 kHz, 70°  
Longitudinal,  
12° SAFT C-Scan



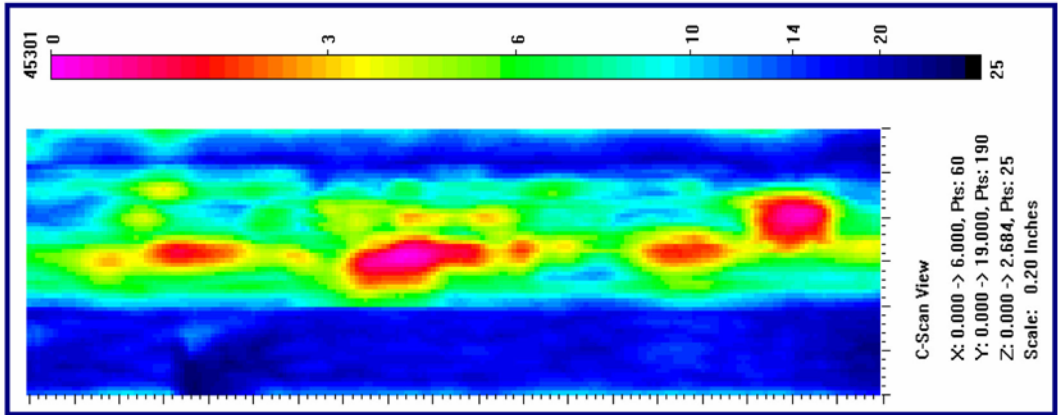
Weld 1, Farside,  
400 kHz, 60°  
Shear,  
12° SAFT C-Scan



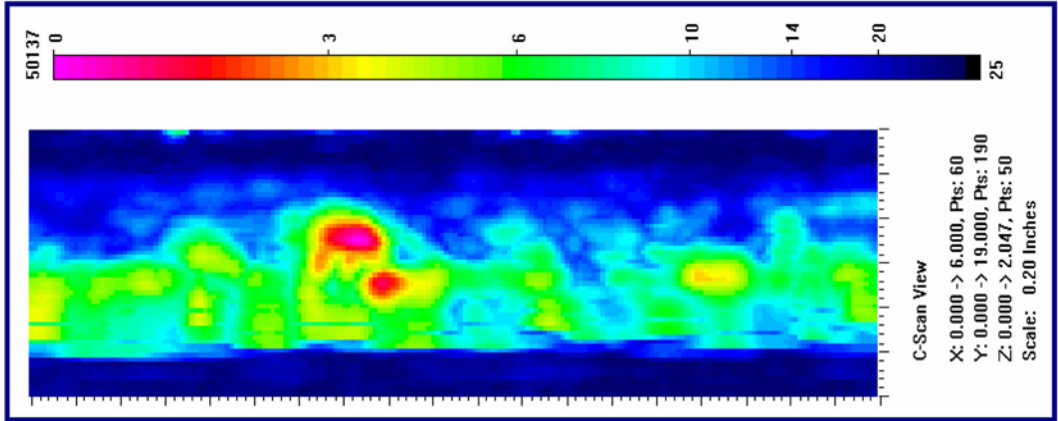
Weld 1, Farside,  
400 kHz, 45°  
Shear,  
12° SAFT C-Scan



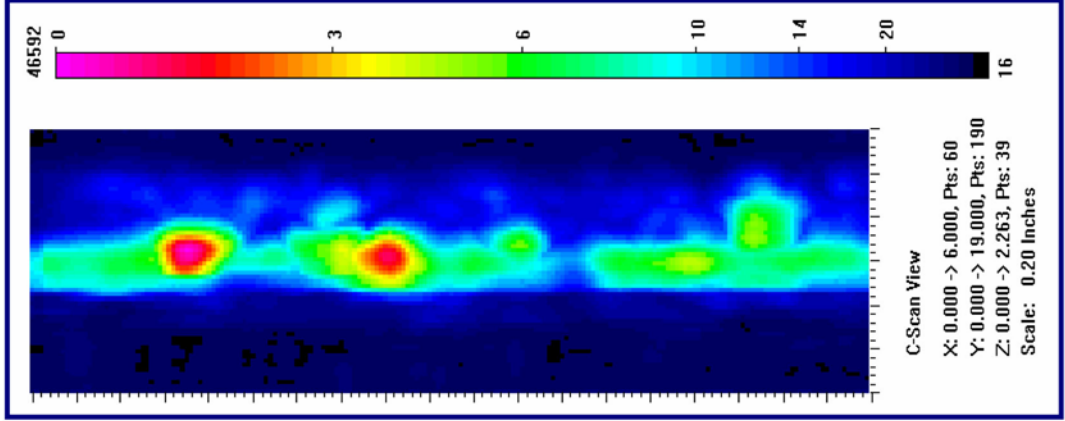
Weld 2, Farside,  
400 kHz, 45°  
Longitudinal,  
12° SAFT C-Scan



Weld 2, Farside,  
400 kHz, 60°  
Shear,  
12° SAFT C-Scan

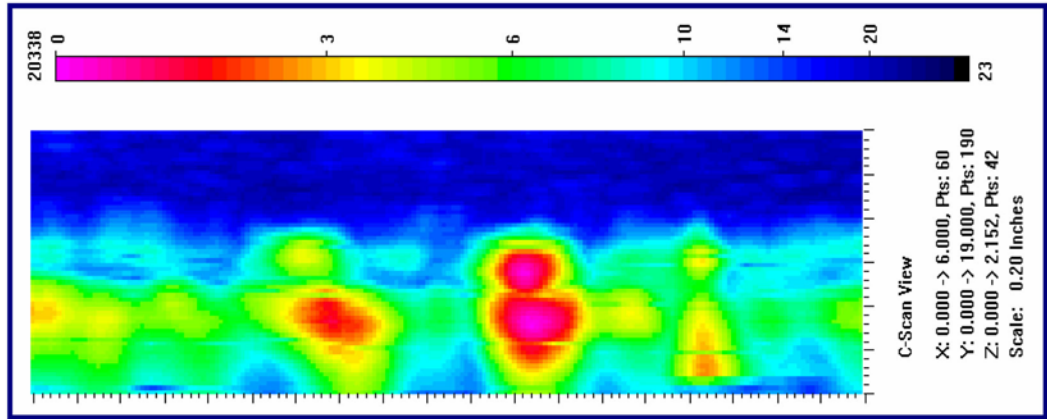


Weld 2, Farside,  
400 kHz, 45°  
Shear,  
12° SAFT C-Scan

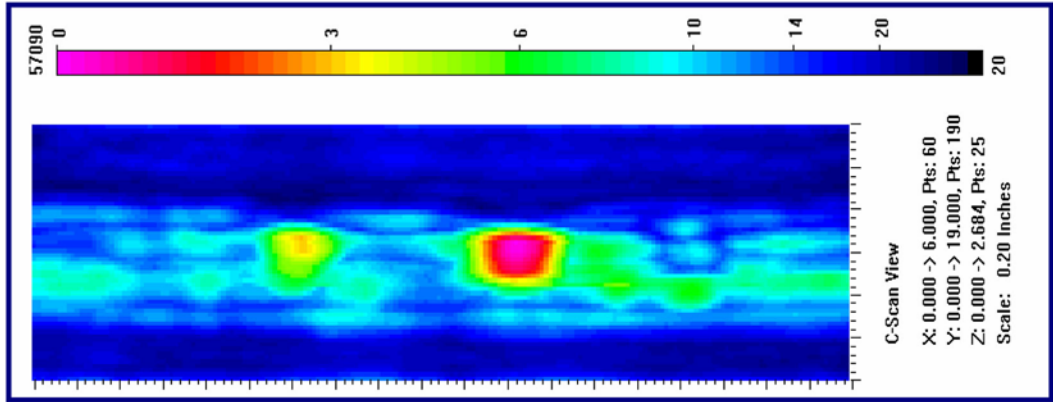




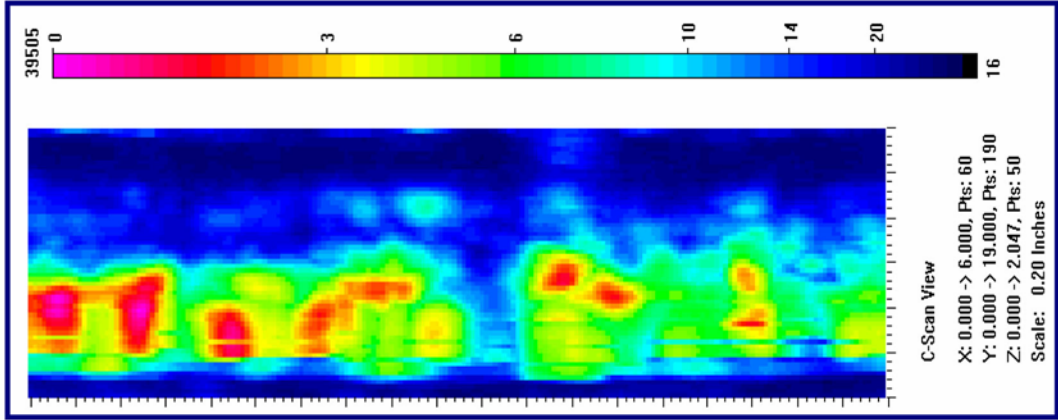
Weld 3, Farside,  
400 kHz, 70°  
Longitudinal,  
12° SAFT C-Scan



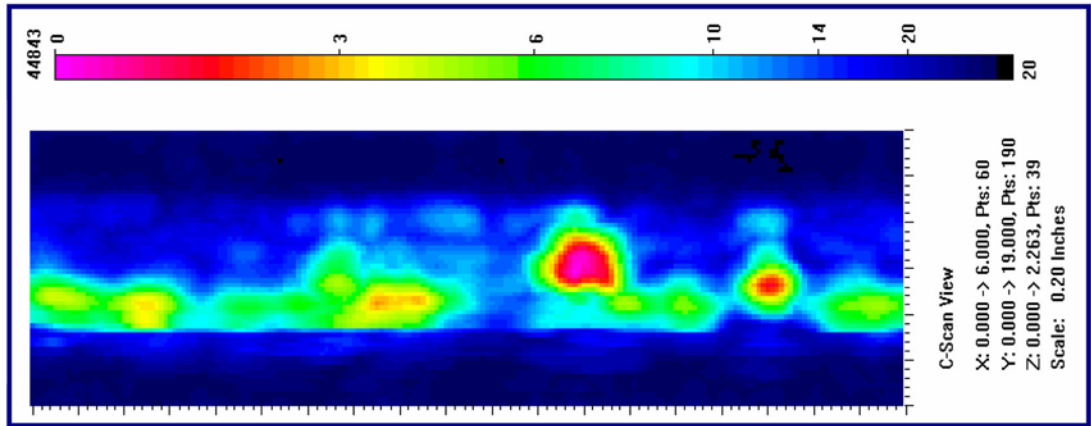
Weld 3, Farside,  
400 kHz, 45°  
Longitudinal,  
12° SAFT C-Scan



Weld 3, Farside,  
400 kHz, 60°  
Shear,  
12° SAFT C-Scan



**Weld 3, Farside,  
400 kHz, 45°  
Shear,  
12° SAFT C-Scan**



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

250-kHz, 70 Long

### Length Sizing

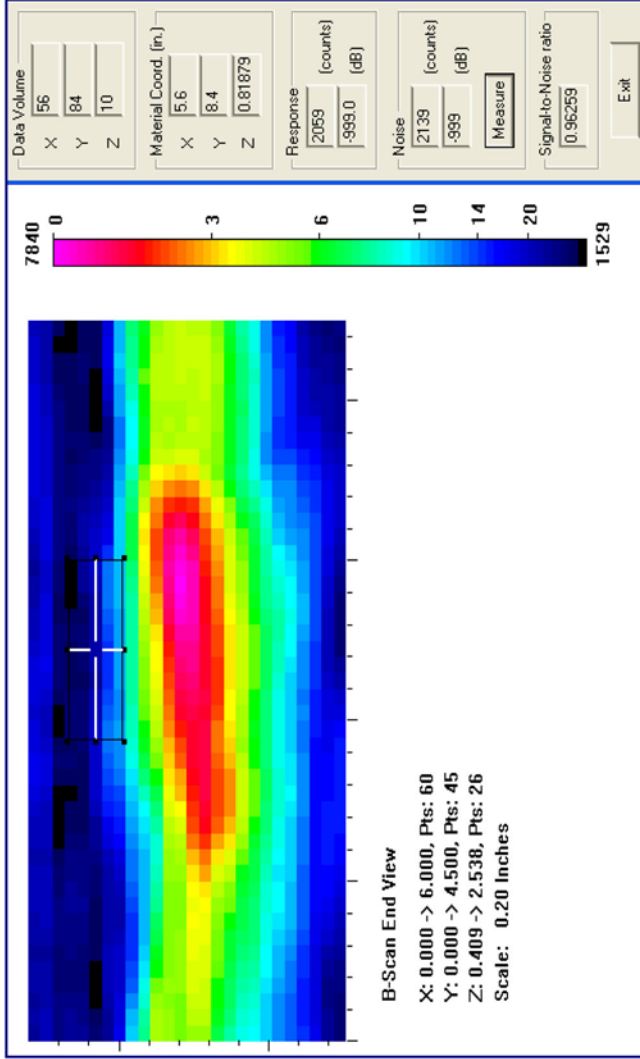
Actual	2.5
6 dB Drop	2.6
Loss of Signal	2.6
6 dB Drop $\Delta$	-2.5
Loss of Signal $\Delta$	-2.6

### Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	Velocity
UT Tip Signal $\Delta$	Angle
	0
	0.228
	70

### Noise Characterization

Peak Signal Response	7840	
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	2139	3.7
		11.3



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

250-kHz, 70 Long

### Length Sizing

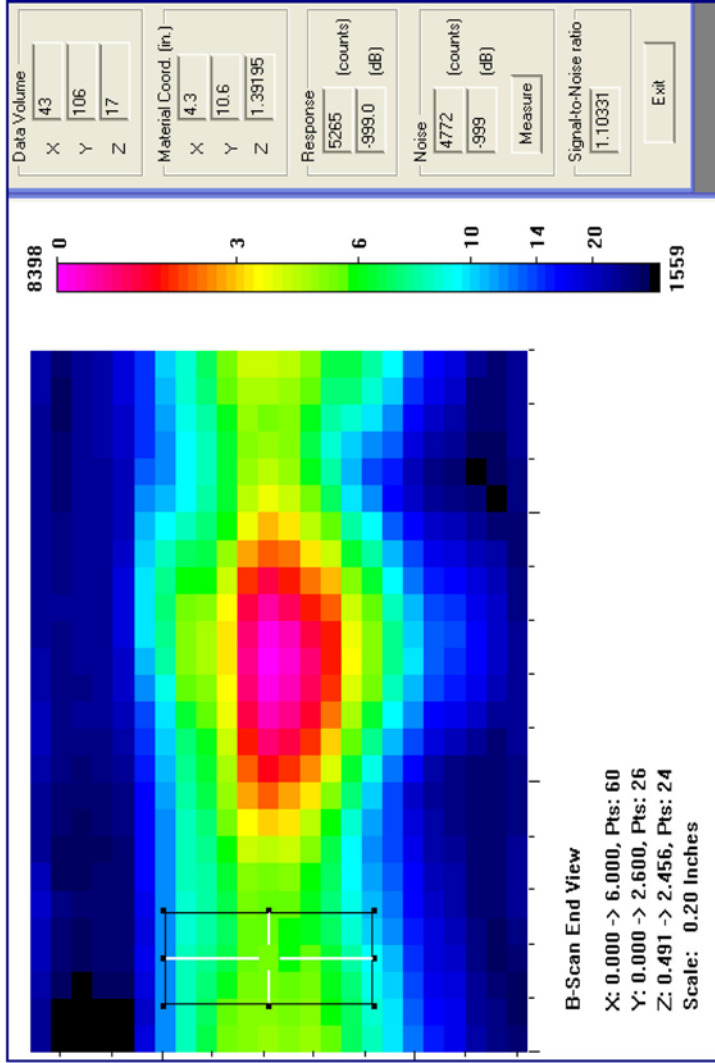
Actual	1.2
6 dB Drop	1.2
Loss of Signal	1.2
6 dB Drop $\Delta$	-1.2
Loss of Signal $\Delta$	-1.2

### Depth Sizing

Actual	Corner Trap	0.228
6 dB Drop	Tip Signal	70
UT Tip Signal	Velocity	
6 dB Drop $\Delta$	Angle	
UT Tip Signal $\Delta$	0	

### Noise Characterization

Peak Signal Response	8398
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	4772
	1.8
	4.9



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

250-kHz, 70 Long

### Length Sizing

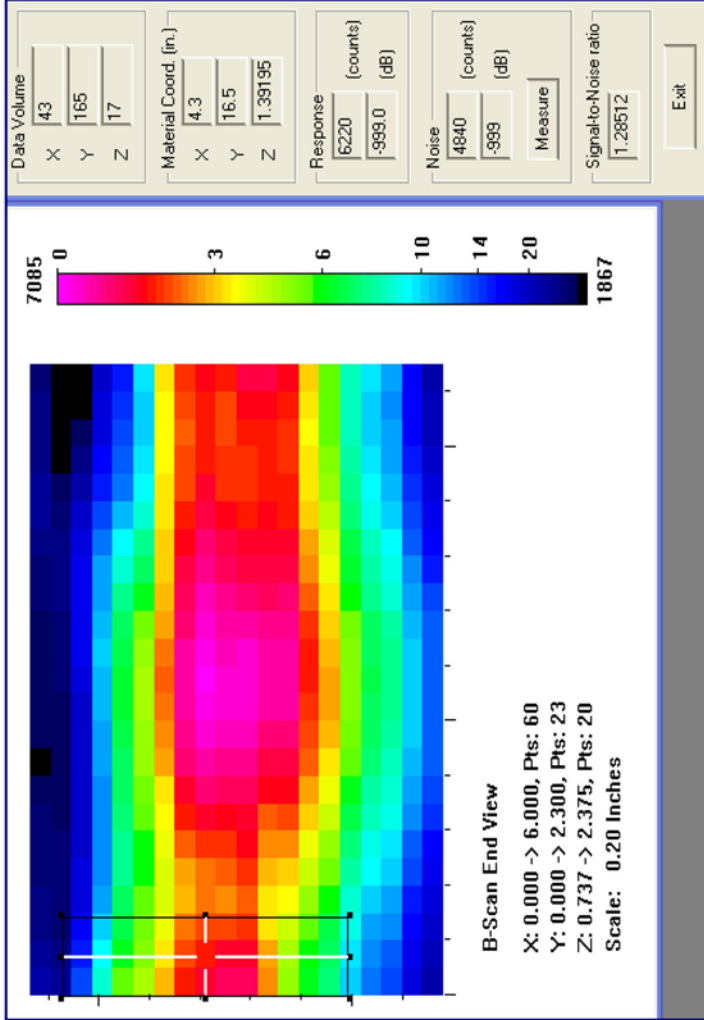
Actual	1.3
6 dB Drop	1.5
Loss of Signal	-1.3
6 dB Drop $\Delta$	-1.5
Loss of Signal $\Delta$	-1.5

### Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	Velocity 0.228
UT Tip Signal $\Delta$	Angle 70

### Noise Characterization

Peak Signal Response		7085	
Noise		S/N Ratio	dB
General Weld Root	N/A	N/A	N/A
Local Weld Root	N/A	N/A	N/A
Cursor Window	4840	1.5	3.3



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

250-kHz, 45 Shear

### Length Sizing

Actual	1.6
6 dB Drop	1.6
Loss of Signal	-1.6
6 dB Drop $\Delta$	-1.6
Loss of Signal $\Delta$	-1.6

### Depth Sizing

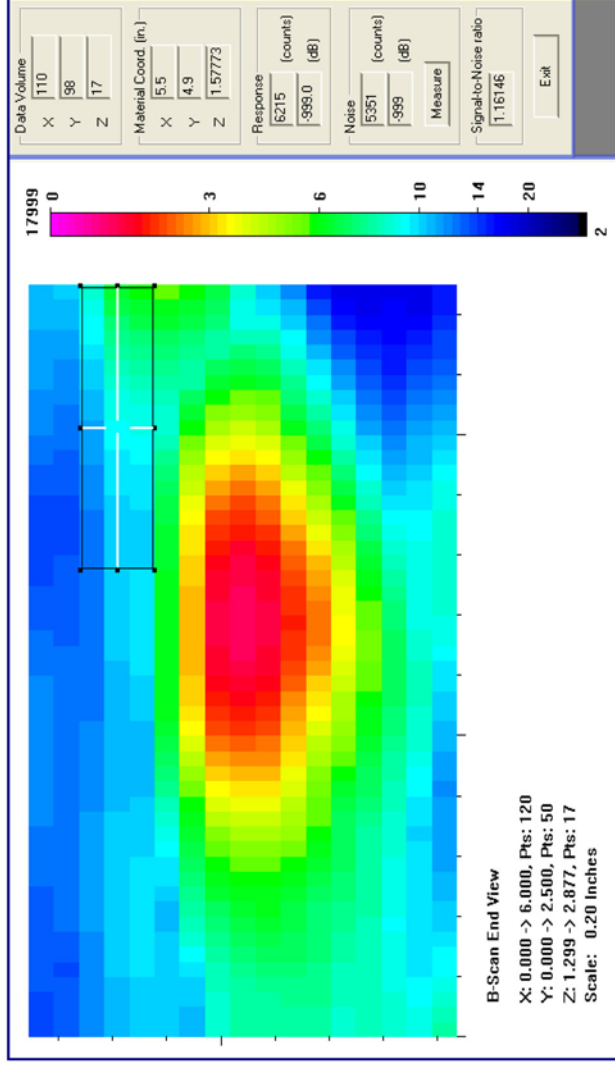
Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
Velocity	0.125
Angle	45

### Noise Characterization

Peak Signal Response	17999
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	5351
	3.4
	10.5

### Circumferential Position

Actual	
6 dB Drop	
6 dB Drop $\Delta$	0



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

250-kHz, 60 Shear

### Length Sizing

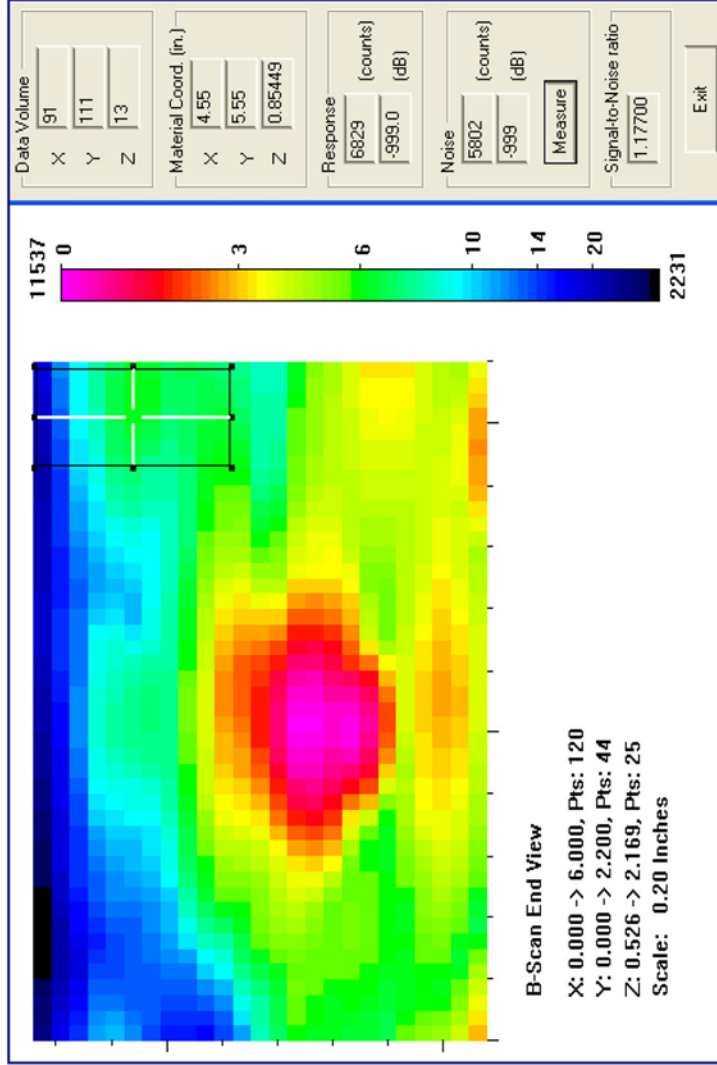
Actual	0.9
6 dB Drop	1.3
Loss of Signal	-0.9
6 dB Drop $\Delta$	-1.3
Loss of Signal $\Delta$	-1.3

### Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
	Velocity
	0.125
	Angle
	60

### Noise Characterization

Peak Signal Response		11537
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	5802	2.0
		6.0



Data Volume		
X	91	
Y	111	
Z	13	
Material Coord. (in.)		
X	4.55	
Y	5.55	
Z	0.85449	
Response		
(counts)	6829	
(dB)	-999.0	
Noise		
(counts)	5802	
(dB)	-999	
	Measure	
Signal-to-Noise ratio		
	1.17700	
Exit		

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

250-kHz, 70 Shear

### Length Sizing

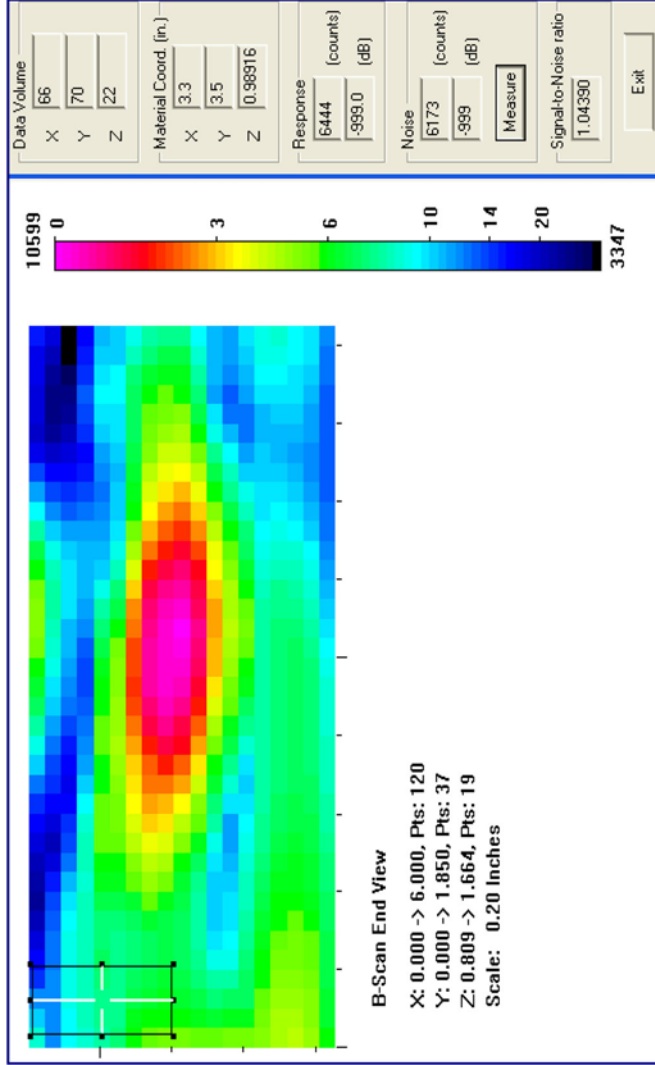
Actual	
6 dB Drop	1.3
Loss of Signal	
6 dB Drop $\Delta$	0
Loss of Signal $\Delta$	-1.3

### Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	Velocity
UT Tip Signal $\Delta$	Angle
	0
	0.125
	70

### Noise Characterization

Peak Signal Response		10599
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	6173	1.7
		4.7





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

250-kHz, 70 Long

### Length Sizing

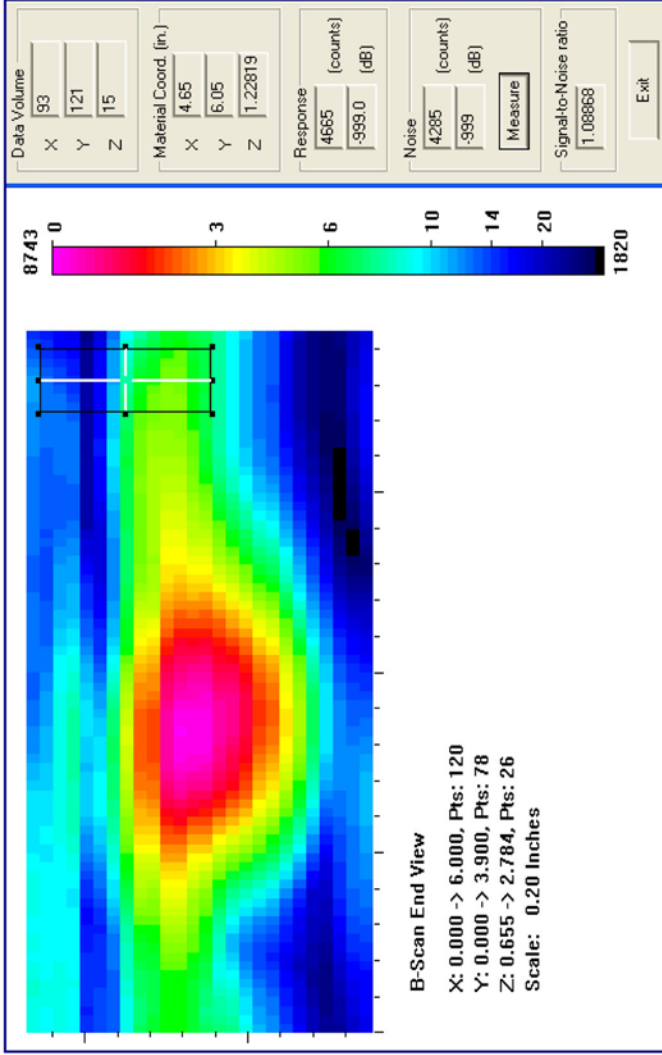
Actual	2.3
6 dB Drop	3.55
Loss of Signal	
6 dB Drop $\Delta$	-2.3
Loss of Signal $\Delta$	-3.55

### Depth Sizing

Actual	Corner Trap	
6 dB Drop	Tip Signal	
UT Tip Signal	0	Velocity 0.228
6 dB Drop $\Delta$	0	Angle 70
UT Tip Signal $\Delta$	0	

### Noise Characterization

Peak Signal Response		8743
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	4285	2.0
		6.2



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

250-kHz, 45 Shear

### Length Sizing

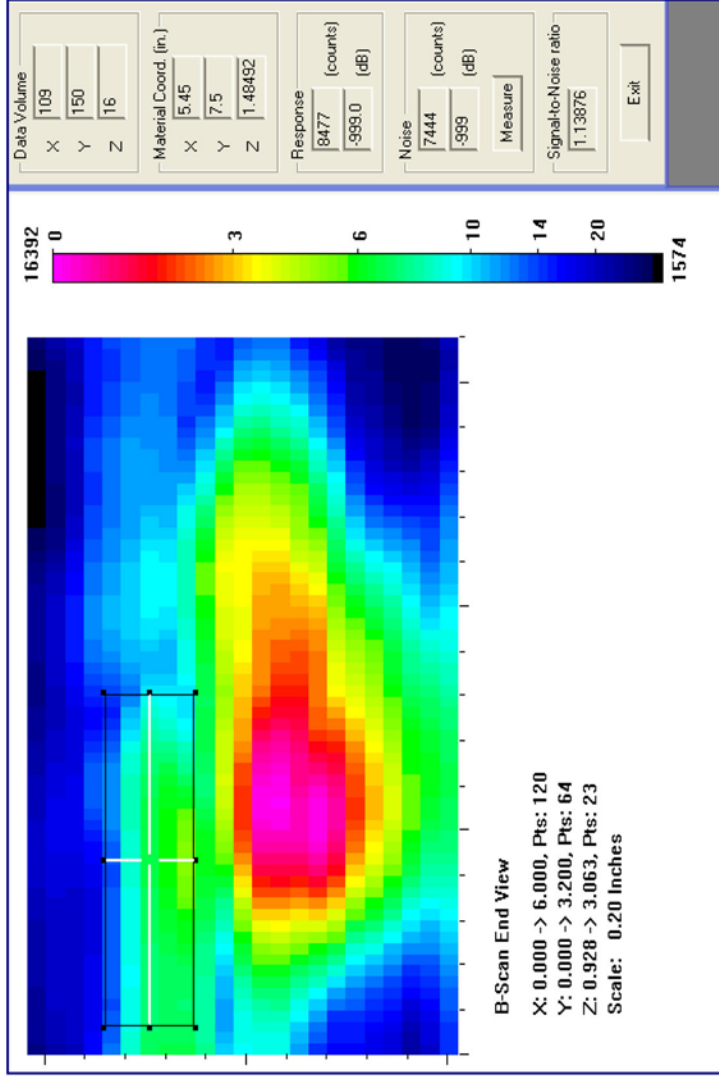
Actual	2.35
6 dB Drop	2.55
Loss of Signal	-2.35
6 dB Drop $\Delta$	-2.35
Loss of Signal $\Delta$	-2.55

### Depth Sizing

Actual	0.125	Corner Trap
6 dB Drop	45	Tip Signal
UT Tip Signal	0	Velocity
6 dB Drop $\Delta$	0	Angle
UT Tip Signal $\Delta$	0	

### Noise Characterization

Peak Signal Response		16392
Noise	S/N Ratio	
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	7444	2.2
		6.9



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

250-kHz, 60 Shear

### Length Sizing

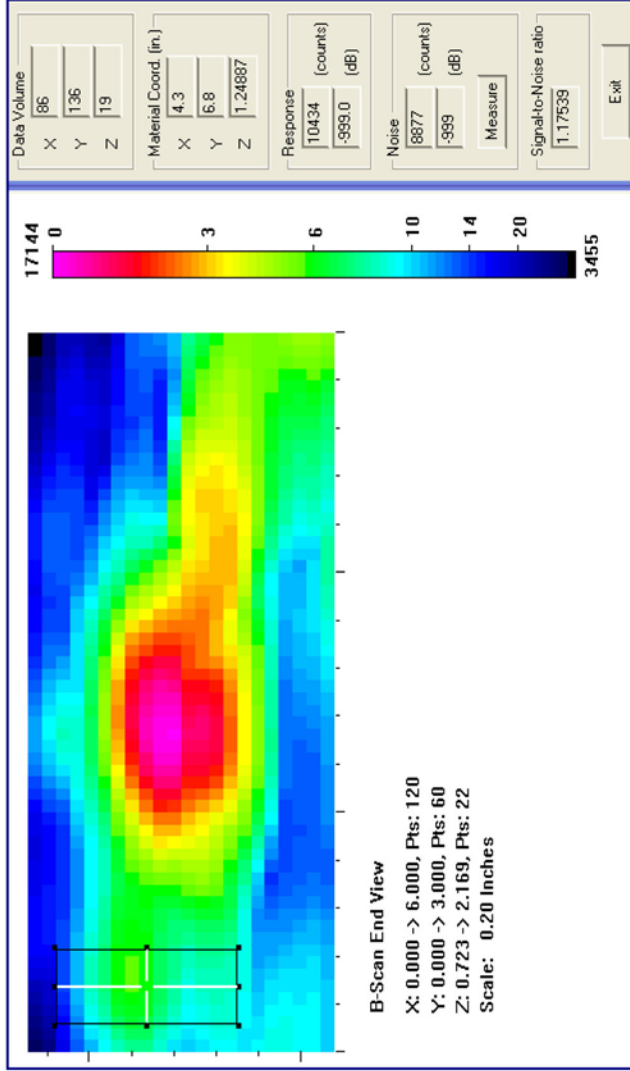
Actual	1.7
6 dB Drop	2
Loss of Signal	-1.7
6 dB Drop $\Delta$	-2
Loss of Signal $\Delta$	-2

### Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
Velocity	0.125
Angle	60

### Noise Characterization

Peak Signal Response	17144	
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	8877	1.9
		5.7



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

250-kHz, 70 Long

### Length Sizing

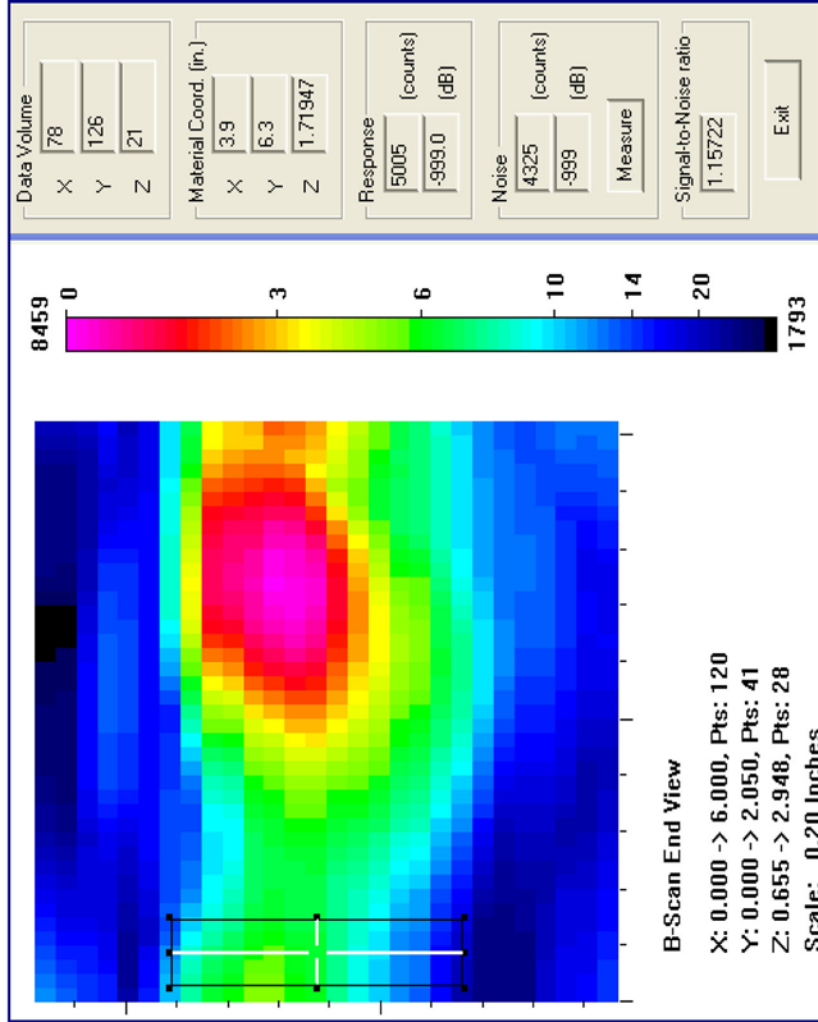
Actual	1
6 dB Drop	1.35
Loss of Signal	-1
6 dB Drop $\Delta$	-1.35
Loss of Signal $\Delta$	-1.35

### Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
Velocity	0.228
Angle	70

### Noise Characterization

Peak Signal Response	8459
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	4325
	2.0
	5.8



Data Volume	78
X	126
Y	21
Z	
Material Coord. (in.)	
X	3.9
Y	6.3
Z	1.71947
Response	5005 (counts)
	-999.0 (dB)
Noise	4325 (counts)
	-999 (dB)
	Measure
Signal-to-Noise ratio	1.15722
	Exit

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

250-kHz, 70 Long

### Length Sizing

Actual	1.8
6 dB Drop	2.05
Loss of Signal	-1.8
6 dB Drop $\Delta$	-2.05
Loss of Signal $\Delta$	-2.05

### Depth Sizing

Actual	0.228
6 dB Drop	70
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0

Corner Trap

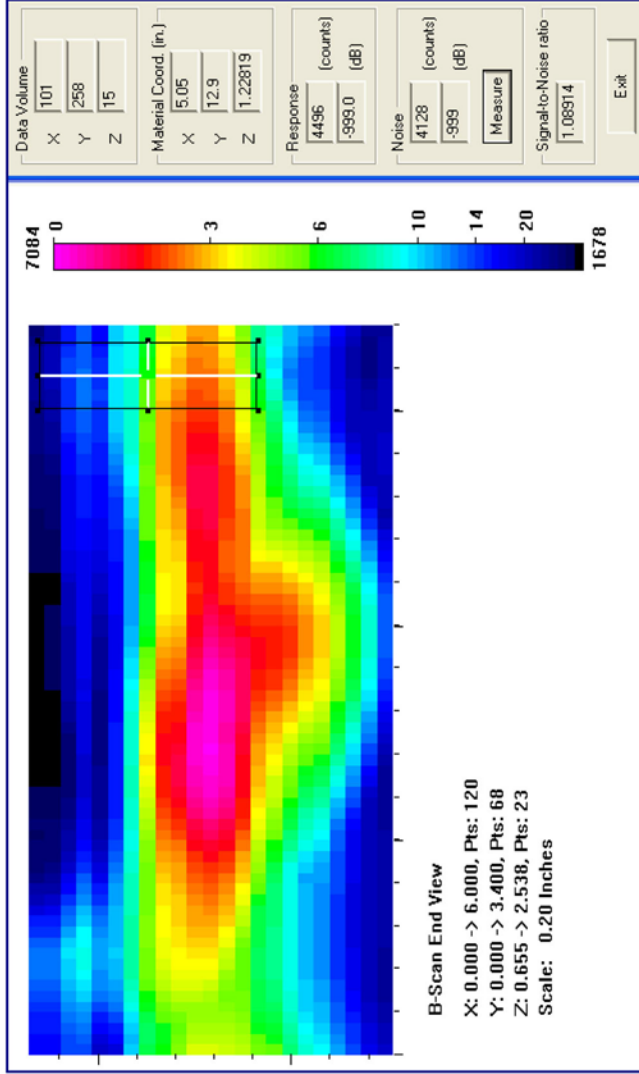
Tip Signal

Velocity

Angle

### Noise Characterization

Peak Signal Response	7084
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	4128
	1.7
	4.7



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

250-kHz, 45 Shear

### Length Sizing

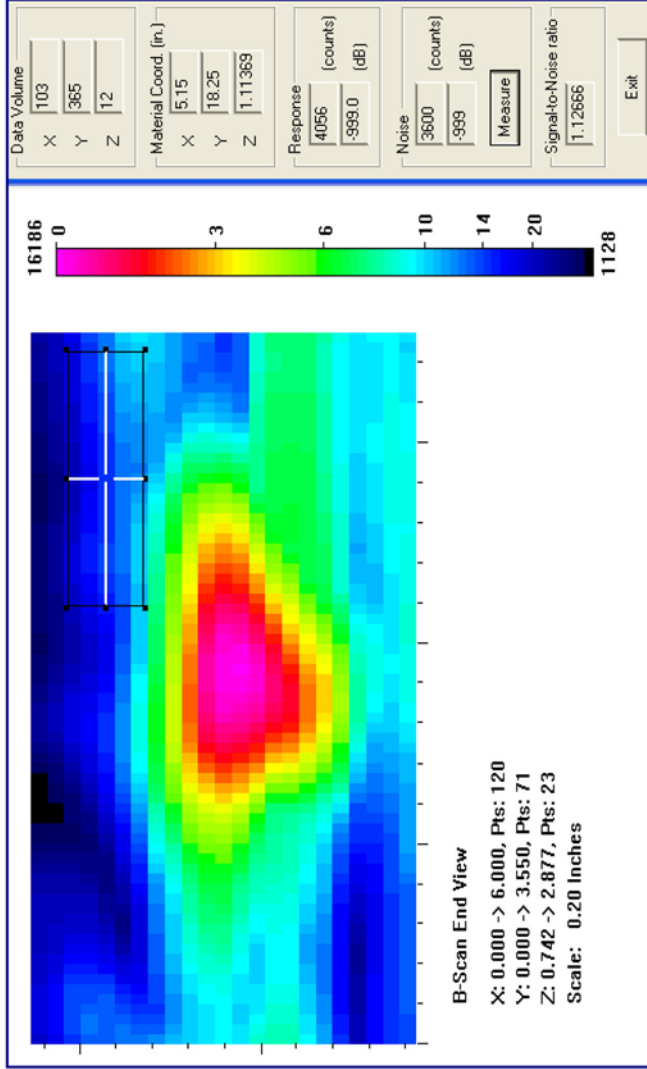
Actual	1.35
6 dB Drop	1.85
Loss of Signal	1.85
6 dB Drop $\Delta$	-1.35
Loss of Signal $\Delta$	-1.85

### Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	Velocity
UT Tip Signal $\Delta$	0
	Angle
	45

### Noise Characterization

Peak Signal Response	16186
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	3600
	4.5
	13.1



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

250-kHz, 45 Long

### Length Sizing

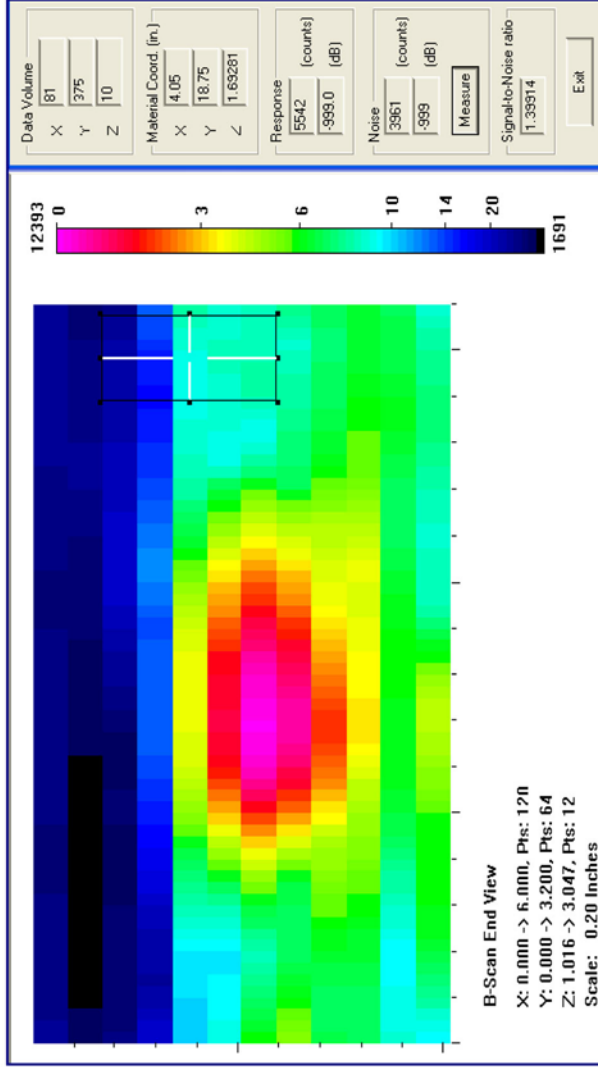
Actual	1.9
6 dB Drop	1.9
Loss of Signal	-1.9
6 dB Drop $\Delta$	-1.9
Loss of Signal $\Delta$	-1.9

### Depth Sizing

Actual	0.228	Corner Trap
6 dB Drop	45	Tip Signal
UT Tip Signal	0	Velocity
6 dB Drop $\Delta$	0	Angle
UT Tip Signal $\Delta$	0	

### Noise Characterization

Peak Signal Response	12393
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	3961
	3.1
	9.9



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

250-kHz, 70 Long

### Length Sizing

Actual	1.65
6 dB Drop	2.3
Loss of Signal	-1.65
6 dB Drop $\Delta$	-2.3
Loss of Signal $\Delta$	-2.3

### Depth Sizing

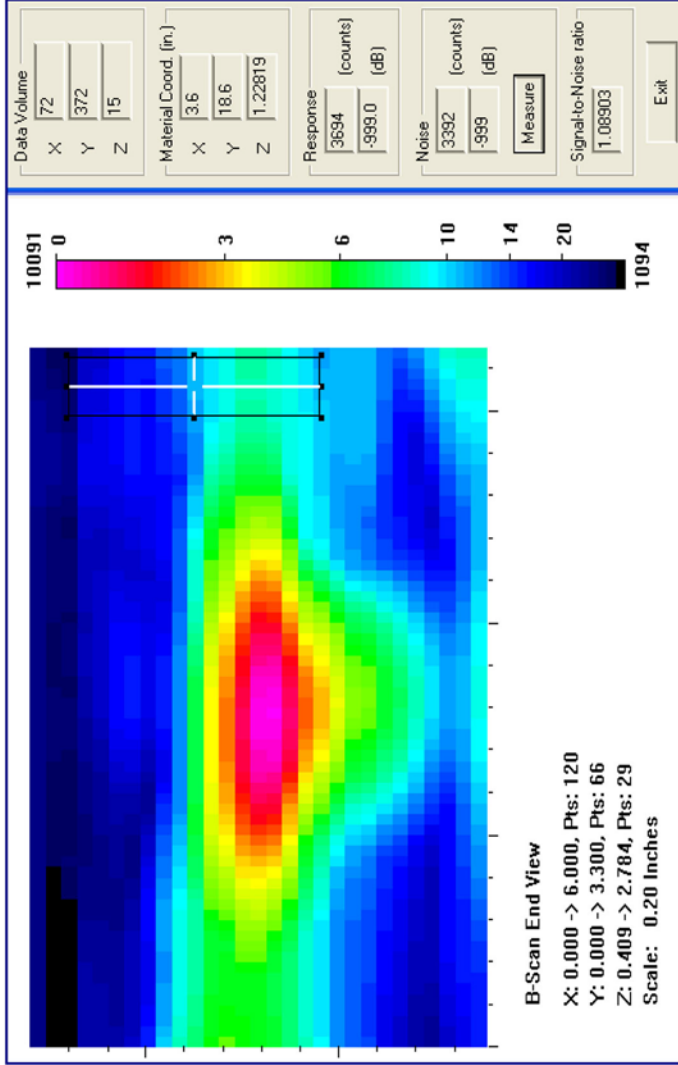
Actual	0.228
6 dB Drop	70
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0

### Corner Trap

Tip Signal	0
Velocity	0.228
Angle	70

### Noise Characterization

Peak Signal Response	10091
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	3392
	3.0
	9.5





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

250-kHz, 45 Long

### Length Sizing

Actual	3
6 dB Drop	3.1
Loss of Signal	-3
6 dB Drop $\Delta$	-3.1
Loss of Signal $\Delta$	-3.1

### Depth Sizing

Actual	0.228
6 dB Drop	45
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0

Corner Trap

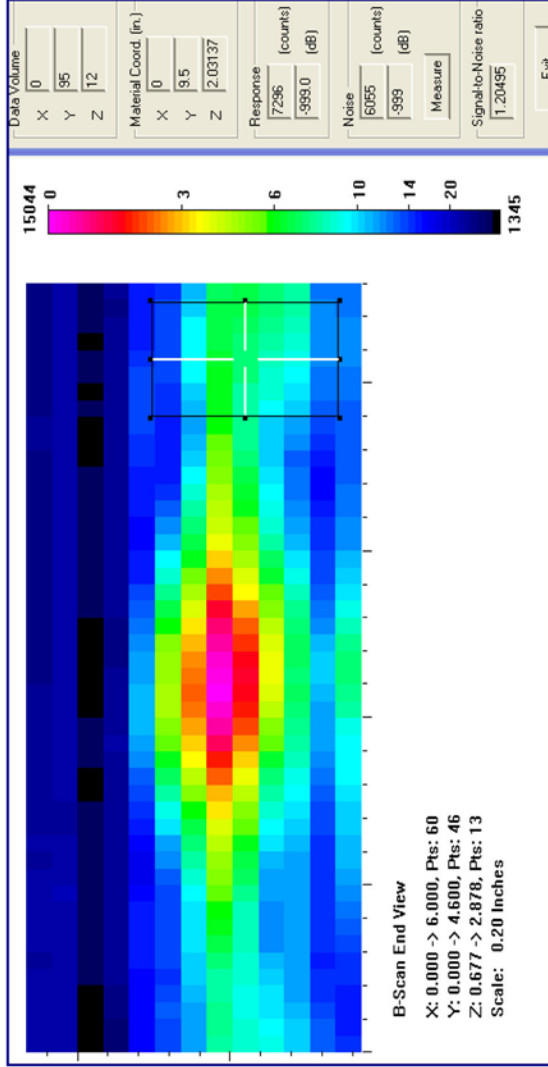
Tip Signal

Velocity

Angle

### Noise Characterization

Peak Signal Response	15044
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	6055
	2.5
	7.9



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

250-kHz, 70 Long

### Length Sizing

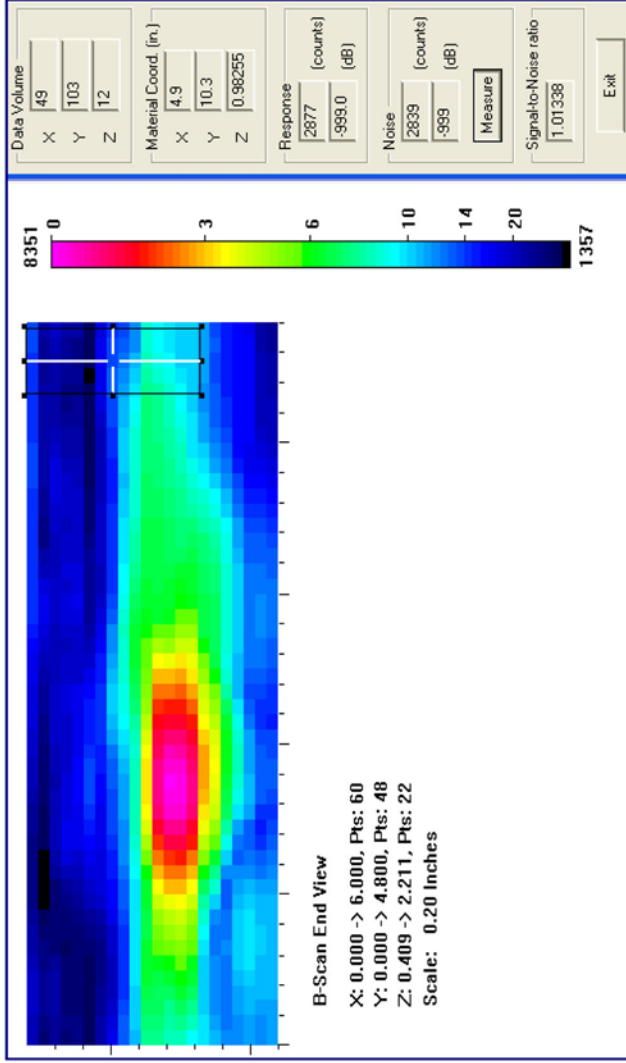
Actual	4.3
6 dB Drop	4.3
Loss of Signal	4.4
6 dB Drop $\Delta$	-4.3
Loss of Signal $\Delta$	-4.4

### Depth Sizing

Actual	0.228	Corner Trap
6 dB Drop	70	Tip Signal
UT Tip Signal	0	Velocity
6 dB Drop $\Delta$	0	Angle
UT Tip Signal $\Delta$	0	

### Noise Characterization

Peak Signal Response	8351	
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	2839	2.9
		9.4



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

250-kHz, 45 Long

### Length Sizing

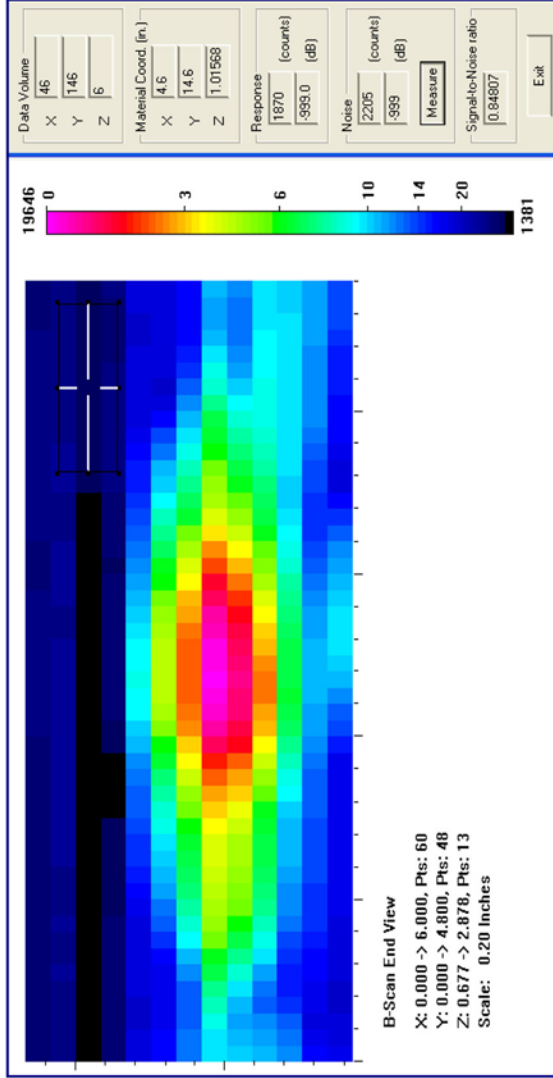
Actual	3.2
6 dB Drop	3.2
Loss of Signal	3.2
6 dB Drop $\Delta$	-3.2
Loss of Signal $\Delta$	-3.2

### Depth Sizing

Actual	0.228	45
6 dB Drop		
UT Tip Signal	0	Corner Trap
6 dB Drop $\Delta$	0	Tip Signal
UT Tip Signal $\Delta$	0	Velocity
		Angle

### Noise Characterization

Peak Signal Response		19646
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	2205	8.9
		19.0



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

250-kHz, 70 Long

### Length Sizing

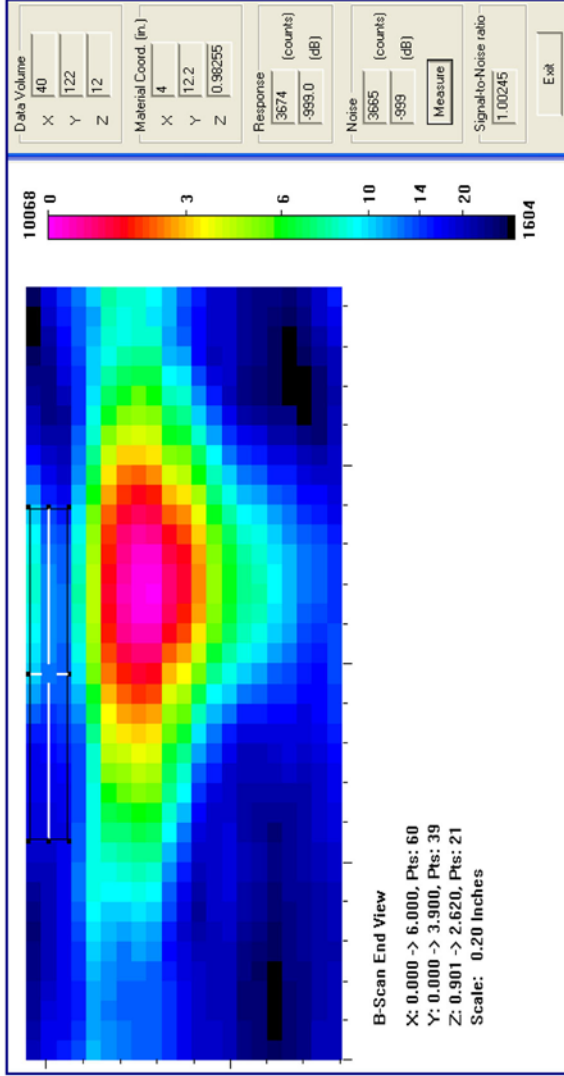
Actual	2.5
6 dB Drop	2.4
Loss of Signal	-2.5
6 dB Drop $\Delta$	-2.4
Loss of Signal $\Delta$	-2.4

### Depth Sizing

Actual	Corner Trap	0.228	70
6 dB Drop	Tip Signal		
UT Tip Signal	0	Velocity	
6 dB Drop $\Delta$	0	Angle	
UT Tip Signal $\Delta$	0		

### Noise Characterization

Peak Signal Response	10068		
Noise	S/N Ratio		dB
General Weld Root	N/A	N/A	N/A
Local Weld Root	N/A	N/A	N/A
Cursor Window	3665	2.7	8.8



Data Volume		
X	40	
Y	122	
Z	12	
Material Coord. (in.)		
X	4	
Y	122	
Z	0.98255	
Response (counts)		
	3674	
	999.0	(dB)
Noise (counts)		
	3665	
	999	(dB)
	Measure	
Signal-to-Noise ratio		
	1.00245	
Exit		

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

250-kHz, 70 Long

### Length Sizing

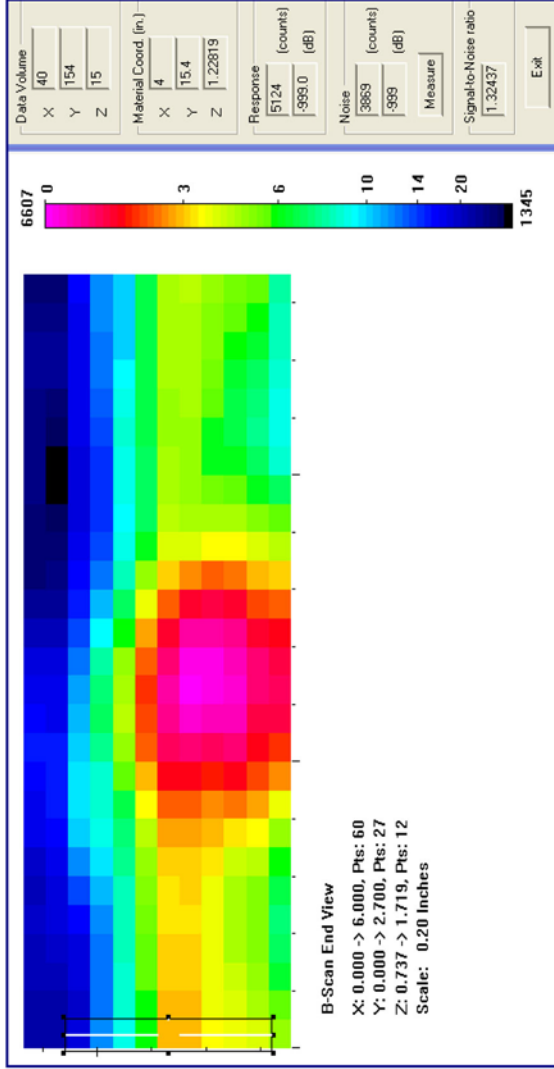
Actual	1.3
6 dB Drop	1.3
Loss of Signal	-1.3
6 dB Drop $\Delta$	-1.3
Loss of Signal $\Delta$	-1.3

### Depth Sizing

Actual	Corner Trap	0.228
6 dB Drop	Tip Signal	70
UT Tip Signal	0	Velocity
6 dB Drop $\Delta$	0	Angle
UT Tip Signal $\Delta$	0	

### Noise Characterization

Peak Signal Response	6607	
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	3869	1.7
		4.6



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

400-kHz, 45 Shear

## Length Sizing

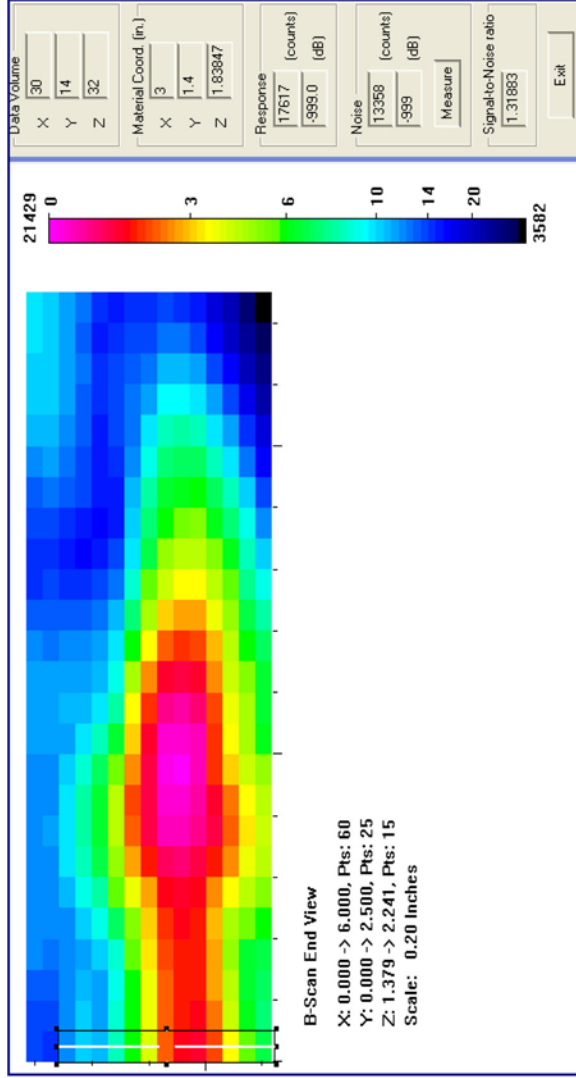
Actual	1.7
6 dB Drop	1.5
Loss of Signal	-1.7
6 dB Drop $\Delta$	-1.5
Loss of Signal $\Delta$	-1.5

## Depth Sizing

Actual	0.125	Corner Trap
6 dB Drop	45	Tip Signal
UT Tip Signal	0	Velocity
6 dB Drop $\Delta$	0	Angle
UT Tip Signal $\Delta$	0	

## Noise Characterization

Peak Signal Response	21429
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	13358
	1.6
	4.1



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

400-kHz, 45 Long

## Length Sizing

Actual	1.4
6 dB Drop	1.8
Loss of Signal	1.8
6 dB Drop $\Delta$	-1.4
Loss of Signal $\Delta$	-1.8

## Depth Sizing

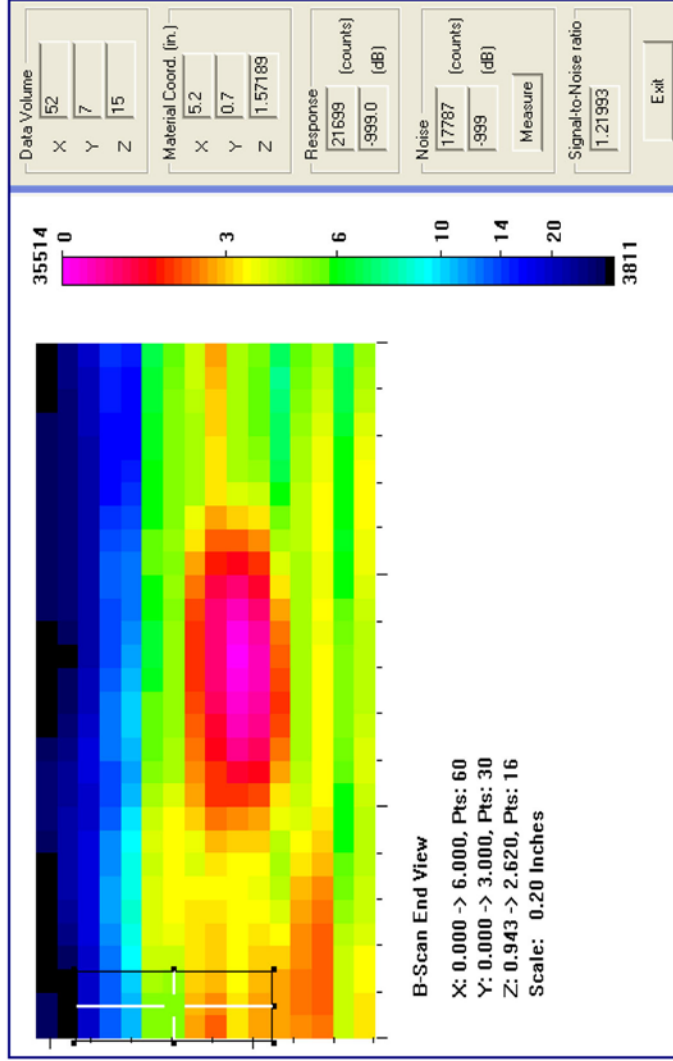
Actual	0.228
6 dB Drop	0.45
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0

## Corner Trap

Tip Signal	0
Velocity	0.228
Angle	45

## Noise Characterization

Peak Signal Response	35514
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	17787
	2.0
	6.0



Data Volume		
X	52	
Y	7	
Z	15	
Material Coord. (in.)		
X	5.2	
Y	0.7	
Z	1.57189	
Response		
	21699	(counts)
	-999.0	(dB)
Noise		
	17787	(counts)
	-999	(dB)
	Measure	
Signal-to-Noise ratio		
	1.21993	
Exit		

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

400-kHz, 45 Shear

## Length Sizing

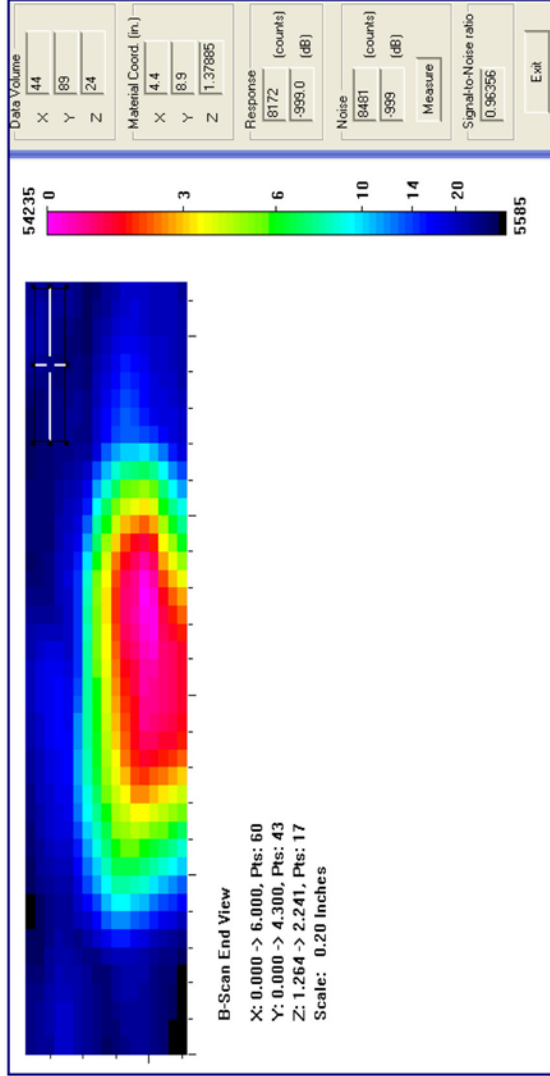
Actual	2.1
6 dB Drop	2.3
Loss of Signal	-2.1
6 dB Drop $\Delta$	-2.3
Loss of Signal $\Delta$	-2.3

## Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
Velocity	0.125
Angle	45

## Noise Characterization

Peak Signal Response	54235	
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	8481	6.4
		16.1





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

400-kHz, 45 Long

## Length Sizing

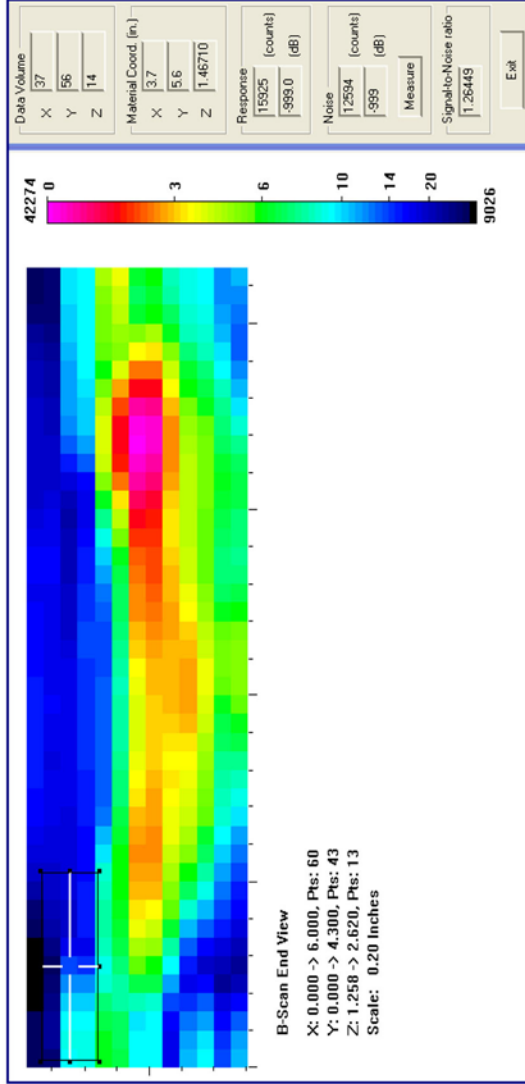
Actual	3.1
6 dB Drop	3.5
Loss of Signal	3.5
6 dB Drop $\Delta$	-3.1
Loss of Signal $\Delta$	-3.5

## Depth Sizing

Actual	0.228	Corner Trap
6 dB Drop	0	Tip Signal
UT Tip Signal	0	Velocity
6 dB Drop $\Delta$	45	Angle
UT Tip Signal $\Delta$	0	

## Noise Characterization

Peak Signal Response	42274	S/N Ratio	dB
Noise	N/A	N/A	N/A
General Weld Root	N/A	N/A	N/A
Local Weld Root	N/A	N/A	N/A
Cursor Window	12594	3.4	10.5



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

400-kHz, 60 Shear

## Length Sizing

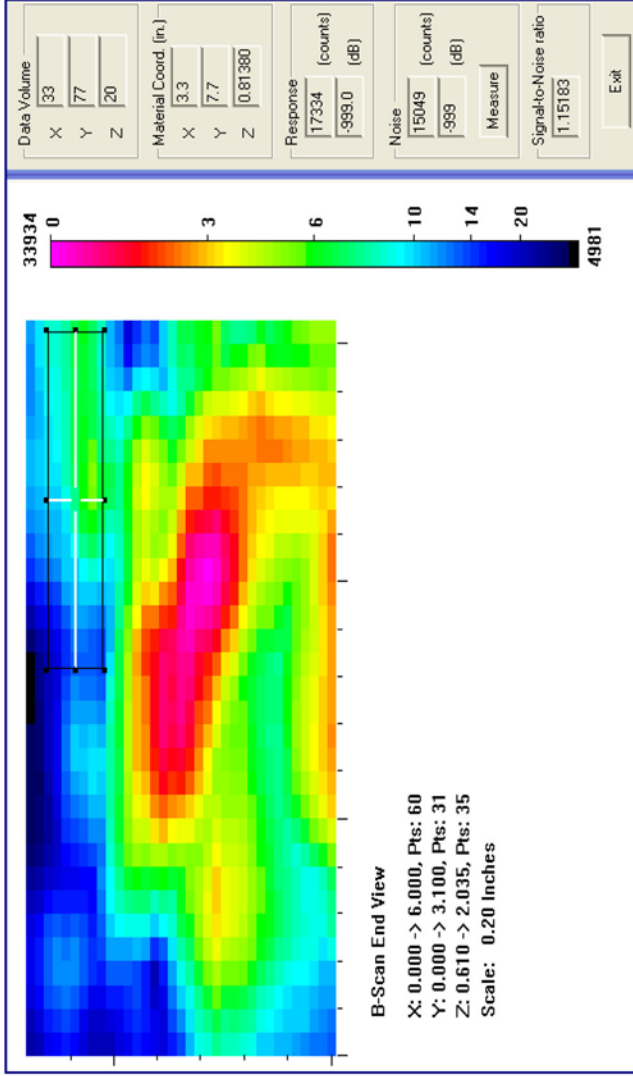
Actual	1.7
6 dB Drop	2.2
Loss of Signal	-1.7
6 dB Drop $\Delta$	-2.2
Loss of Signal $\Delta$	-2.2

## Depth Sizing

Actual	Corner Trap	0.125
6 dB Drop	Tip Signal	60
UT Tip Signal	Velocity	0
6 dB Drop $\Delta$	Angle	0
UT Tip Signal $\Delta$	UT Tip Signal $\Delta$	0

## Noise Characterization

Peak Signal Response	33934
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	15049
	2.3
	7.1



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

400-kHz, 60 Long

### Length Sizing

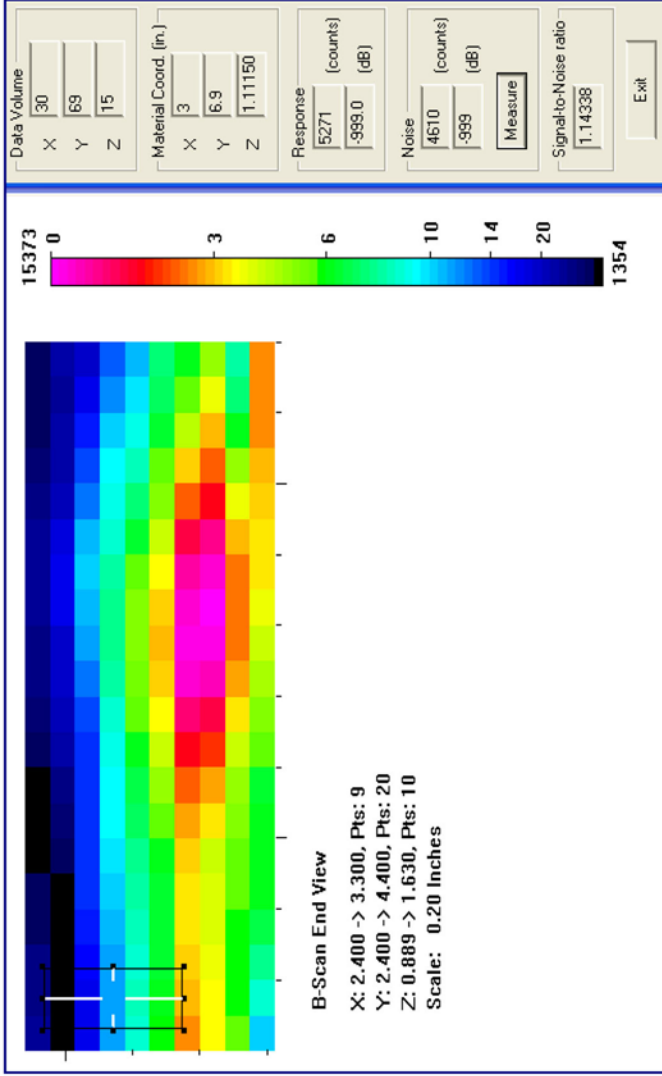
Actual	1.2
6 dB Drop	1.3
Loss of Signal	-1.2
6 dB Drop $\Delta$	-1.3
Loss of Signal $\Delta$	-1.3

### Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
	Velocity
	0.228
	Angle
	60

### Noise Characterization

Peak Signal Response	15373
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	4610
	3.3
	10.5



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

400-kHz, 70 Long

## Length Sizing

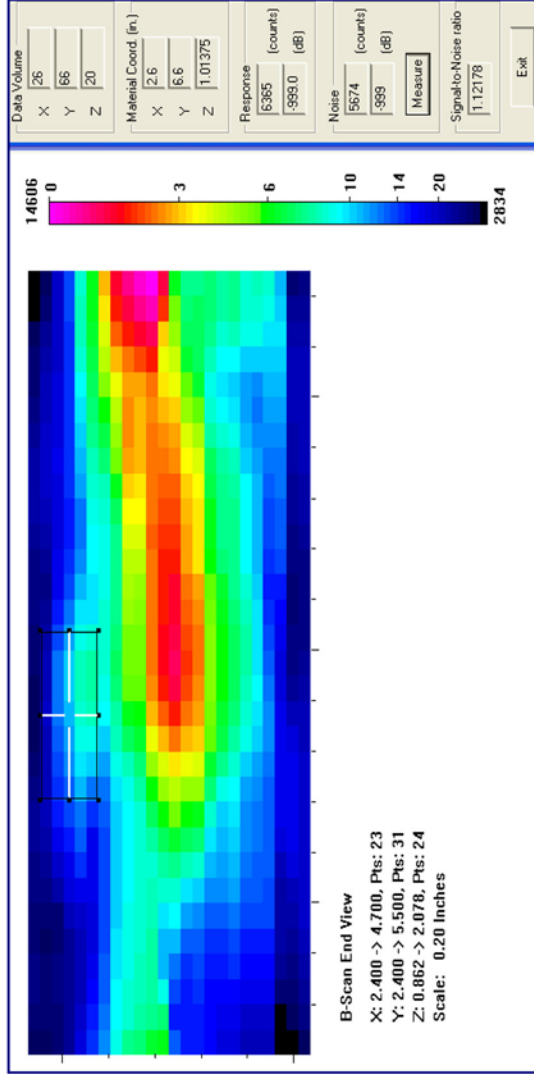
Actual	1.5
6 dB Drop	1.7
Loss of Signal	-1.5
6 dB Drop $\Delta$	-1.7
Loss of Signal $\Delta$	-1.7

## Depth Sizing

Actual	Corner Trap	0.228
6 dB Drop	Tip Signal	70
UT Tip Signal	0	Velocity
6 dB Drop $\Delta$	0	Angle
UT Tip Signal $\Delta$	0	

## Noise Characterization

Peak Signal Response	14606
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	5674
	2.6
	8.2



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

400-kHz, 60 Long

### Length Sizing

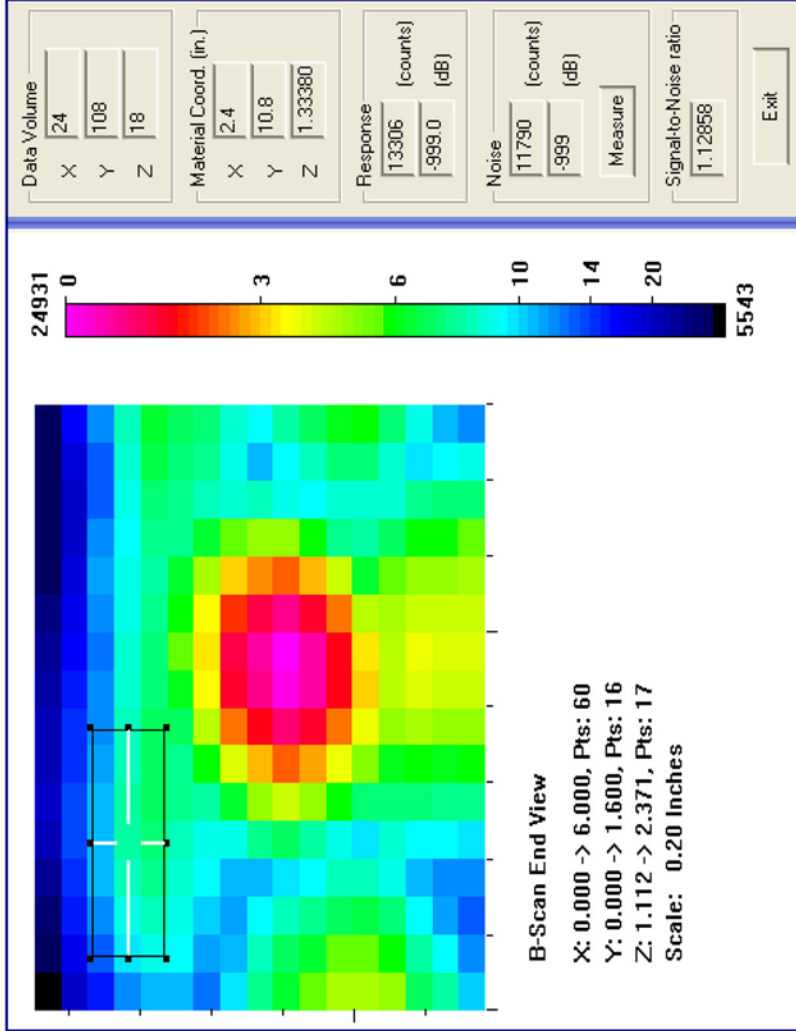
Actual	0.6
6 dB Drop	0.8
Loss of Signal	-0.6
6 dB Drop $\Delta$	-0.8
Loss of Signal $\Delta$	-0.8

### Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	Velocity
UT Tip Signal $\Delta$	0
	Angle
	60

### Noise Characterization

Peak Signal Response	24931
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	11790
	2.1
	6.5



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

400-kHz, 70 Long

### Length Sizing

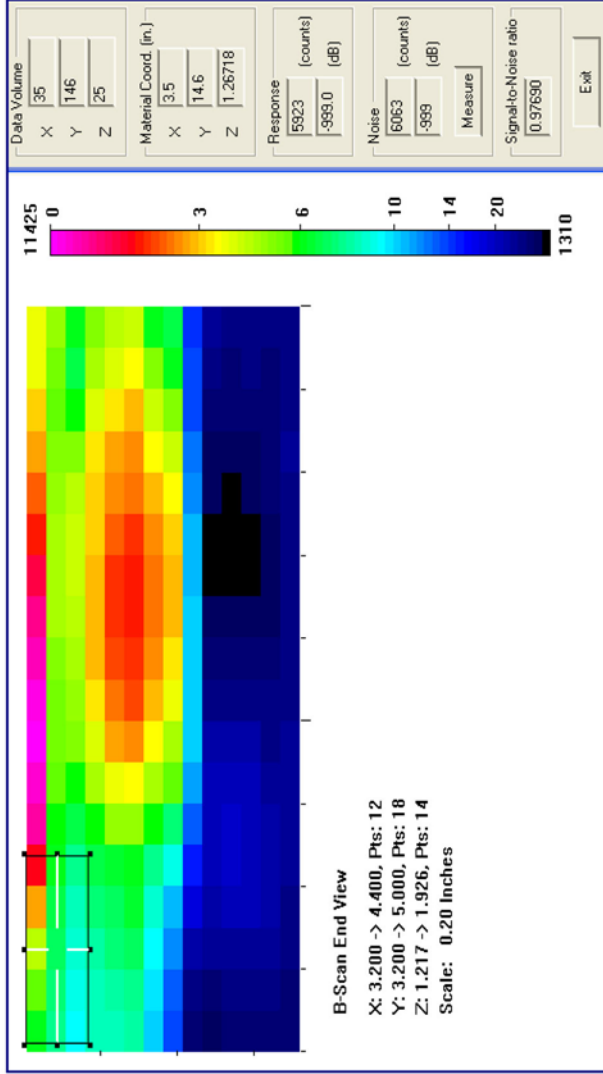
Actual	
6 dB Drop	1.1
Loss of Signal	1.1
6 dB Drop $\Delta$	-1.1
Loss of Signal $\Delta$	-1.1

### Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
	Velocity
	0.228
	Angle
	70

### Noise Characterization

Peak Signal Response		11425
Noise	S/N Ratio	
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	6063	1.9
		5.5



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

400-kHz, 45 Shear

## Length Sizing

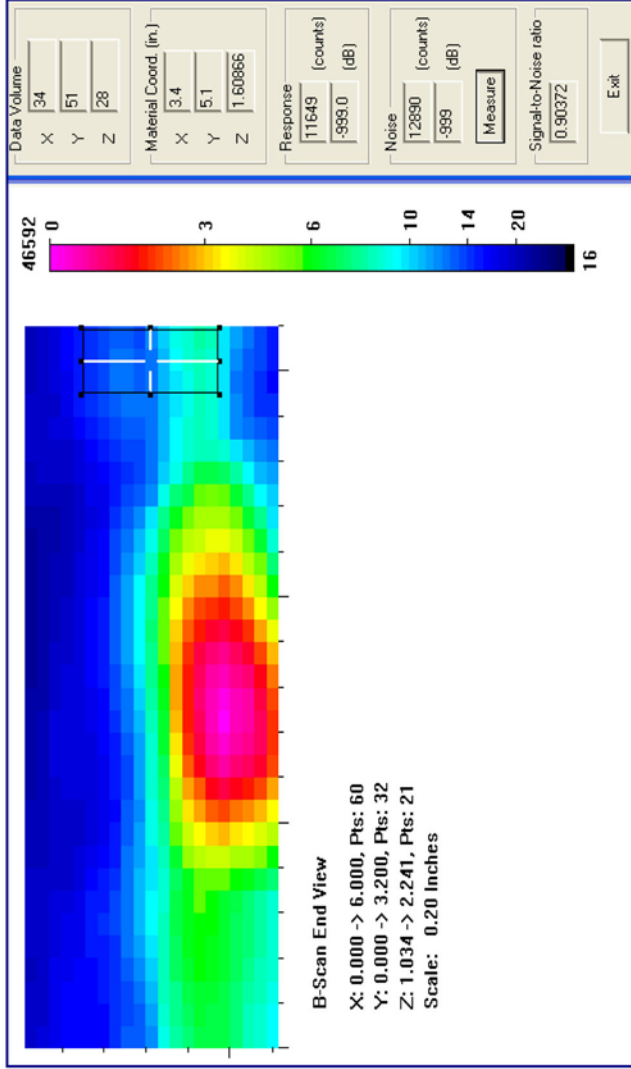
Actual	2.1
6 dB Drop	2.2
Loss of Signal	2.2
6 dB Drop $\Delta$	-2.1
Loss of Signal $\Delta$	-2.2

## Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
Velocity	0.125
Angle	45

## Noise Characterization

Peak Signal Response	46592	
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	12890	3.6
		11.2



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

400-kHz, 60 Shear

## Length Sizing

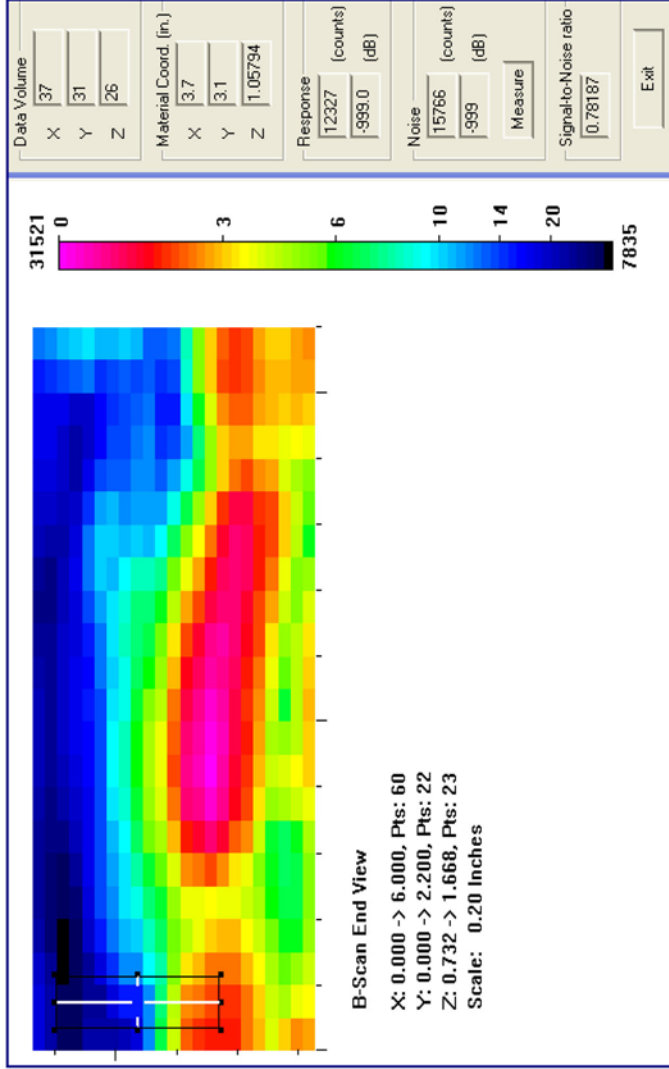
Actual	1.5
6 dB Drop	1.4
Loss of Signal	-1.5
6 dB Drop $\Delta$	-1.5
Loss of Signal $\Delta$	-1.4

## Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	Velocity
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
	Angle
	0.125
	60

## Noise Characterization

Peak Signal Response		31521
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	15766	2.0
		6.0





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

400-kHz, 45 Shear

## Length Sizing

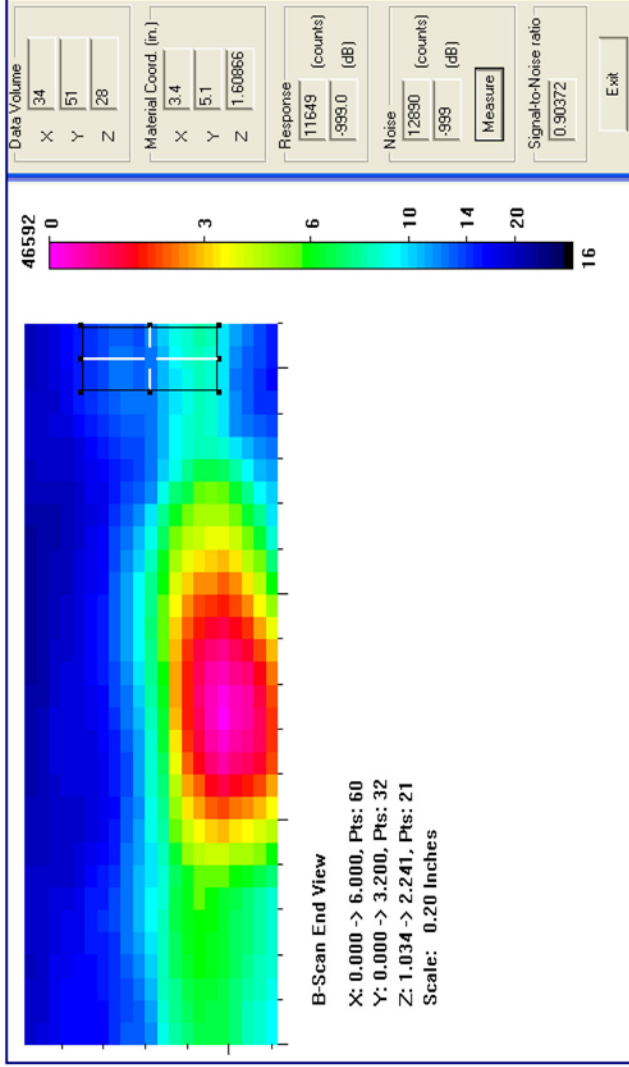
Actual	2.1
6 dB Drop	2.2
Loss of Signal	-2.1
6 dB Drop $\Delta$	-2.1
Loss of Signal $\Delta$	-2.2

## Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
Velocity	0.125
Angle	45

## Noise Characterization

Peak Signal Response	46592	
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	12890	3.6
		11.2



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

400-kHz, 60 Shear

## Length Sizing

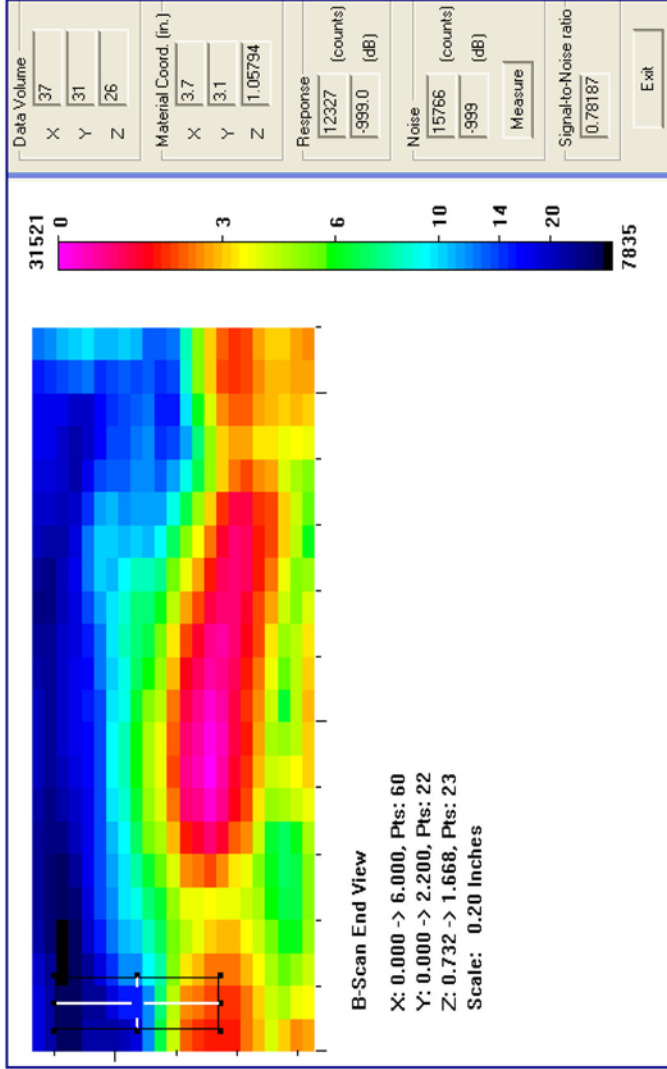
Actual	1.5
6 dB Drop	1.4
Loss of Signal	-1.5
6 dB Drop $\Delta$	-1.4
Loss of Signal $\Delta$	-1.4

## Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	Velocity
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
	Angle
	0.125
	60

## Noise Characterization

Peak Signal Response	31521
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	15766
	2.0
	6.0



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

400-kHz, 45 Shear

## Length Sizing

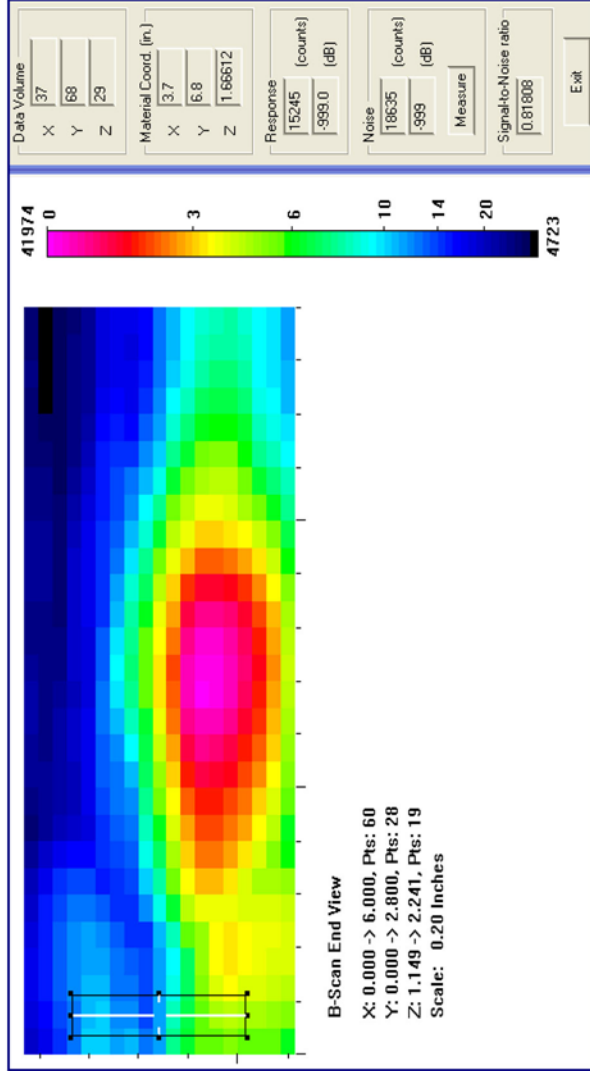
Actual	2
6 dB Drop	1.9
Loss of Signal	-2
6 dB Drop $\Delta$	-1.9
Loss of Signal $\Delta$	-1.9

## Depth Sizing

Actual	0.125	Corner Trap
6 dB Drop	45	Tip Signal
UT Tip Signal	0	Velocity
6 dB Drop $\Delta$	0	Angle
UT Tip Signal $\Delta$	0	

## Noise Characterization

Peak Signal Response	41974
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	18635
	2.3
	7.1



Data Volume	
X	37
Y	68
Z	29
Material Coord. (in.)	
X	3.7
Y	6.8
Z	1.66612
Response	
	15245 (counts)
	-999.0 (dB)
Noise	
	18635 (counts)
	-999 (dB)
	Measure
Signal-to-Noise ratio	
	0.81808
Exit	

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

400-kHz, 60 Shear

## Length Sizing

Actual	1.9
6 dB Drop	2.2
Loss of Signal	-1.9
6 dB Drop $\Delta$	-2.2
Loss of Signal $\Delta$	-2.2

## Depth Sizing

Actual	0.125	60
6 dB Drop		
UT Tip Signal	0	60
6 dB Drop $\Delta$	0	60
UT Tip Signal $\Delta$	0	60

Corner Trap

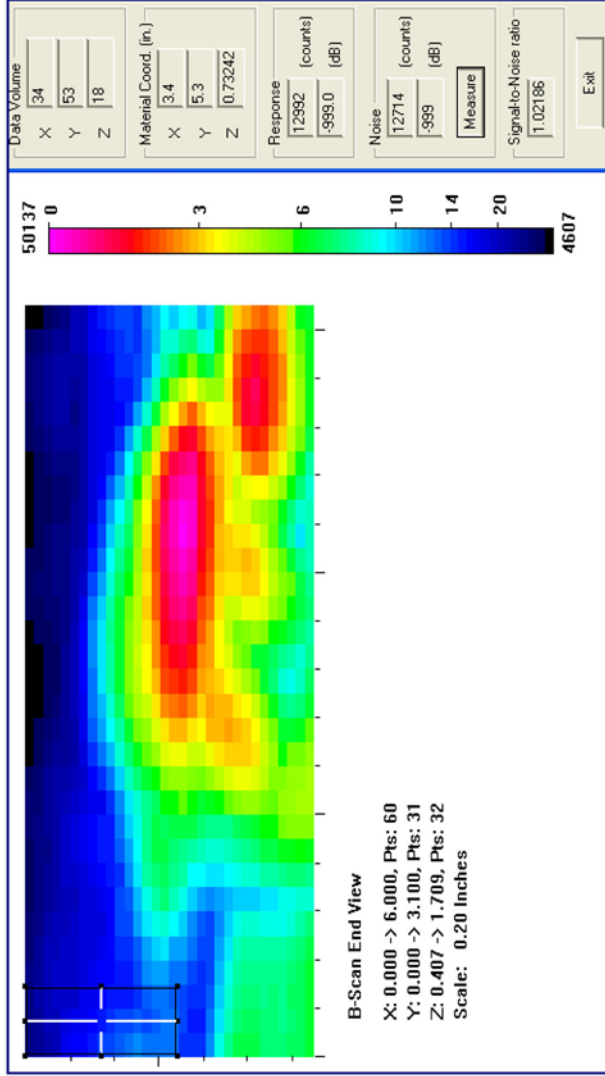
Tip Signal

Velocity

Angle

## Noise Characterization

Peak Signal Response		50137
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	12714	3.9
		11.9



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

400-kHz, 45 Long

### Length Sizing

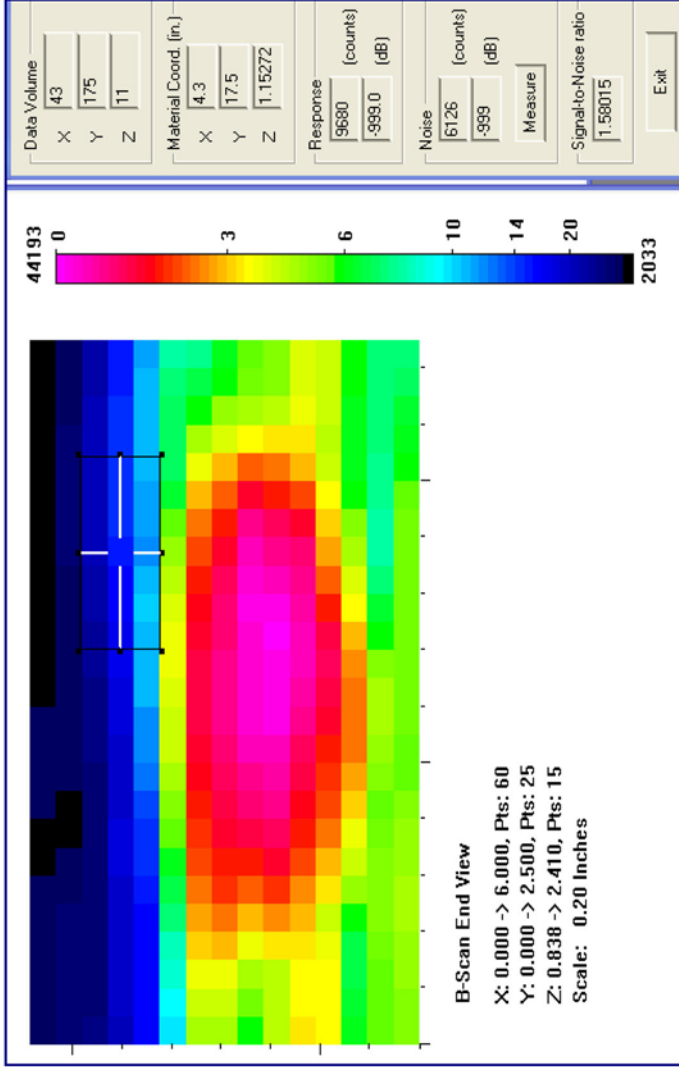
Actual	1.9
6 dB Drop	2.1
Loss of Signal	-1.9
6 dB Drop $\Delta$	-2.1
Loss of Signal $\Delta$	-2.1

### Depth Sizing

Actual	0.228	45
6 dB Drop		
UT Tip Signal	0	45
6 dB Drop $\Delta$	0	
UT Tip Signal $\Delta$	0	

### Noise Characterization

Peak Signal Response		44193
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	6126	7.2
		17.2



Data Volume		
X	43	
Y	175	
Z	11	
Material Coord. (in.)		
X	4.3	
Y	17.5	
Z	1.15272	
Response		
	9680 (counts)	
	-999.0 (dB)	
Noise		
	6126 (counts)	
	-999 (dB)	
	Measure	
Signal-to-Noise ratio		
	1.58015	
Exit		

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

400-kHz, 45 Shear

## Length Sizing

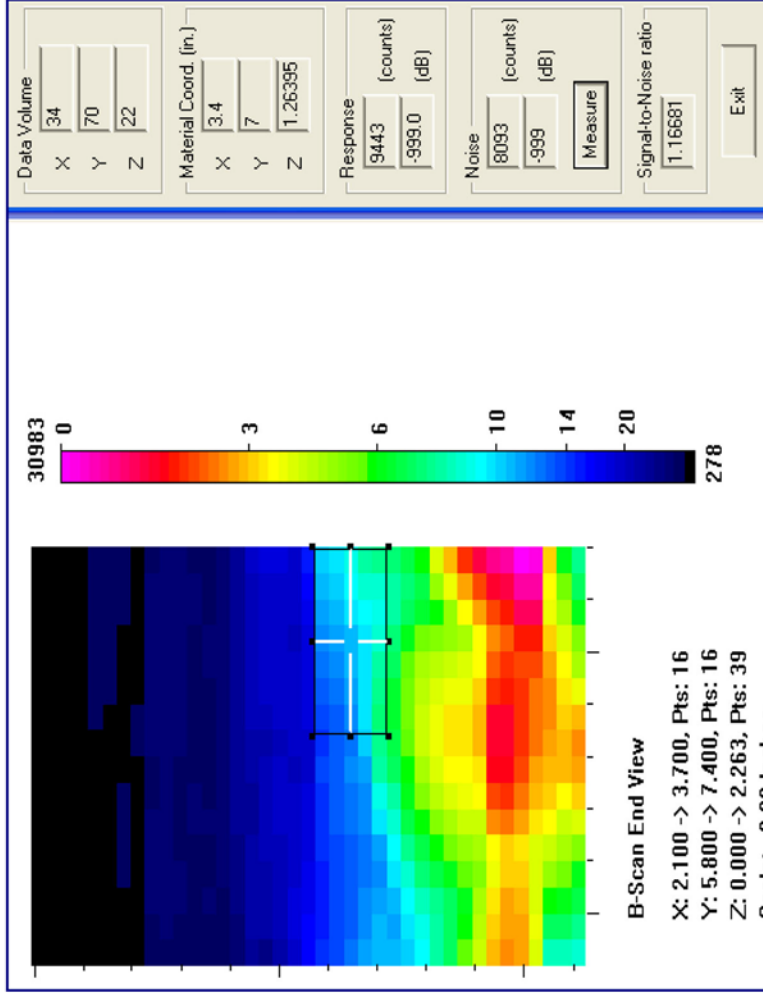
Actual	0.7
6 dB Drop	0.8
Loss of Signal	0.8
6 dB Drop $\Delta$	-0.7
Loss of Signal $\Delta$	-0.8

## Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
Velocity	0.125
Angle	45

## Noise Characterization

Peak Signal Response	30983
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	8093
	3.8
	11.7



Data Volume	
X	34
Y	70
Z	22
Material Coord. (in.)	
X	3.4
Y	7
Z	1.26395
Response	
(counts)	9443
(dB)	-999.0
Noise	
(counts)	8093
(dB)	-999
Measure	
Signal-to-Noise ratio	
1.16681	
Exit	

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

400-kHz, 45 Long

## Length Sizing

Actual	2.2
6 dB Drop	2.1
Loss of Signal	-2.2
6 dB Drop $\Delta$	-2.2
Loss of Signal $\Delta$	-2.1

## Depth Sizing

Actual	0.228
6 dB Drop	45
UT Tip Signal	0
UT Tip Signal $\Delta$	0
UT Tip Signal $\Delta$	0

Corner Trap

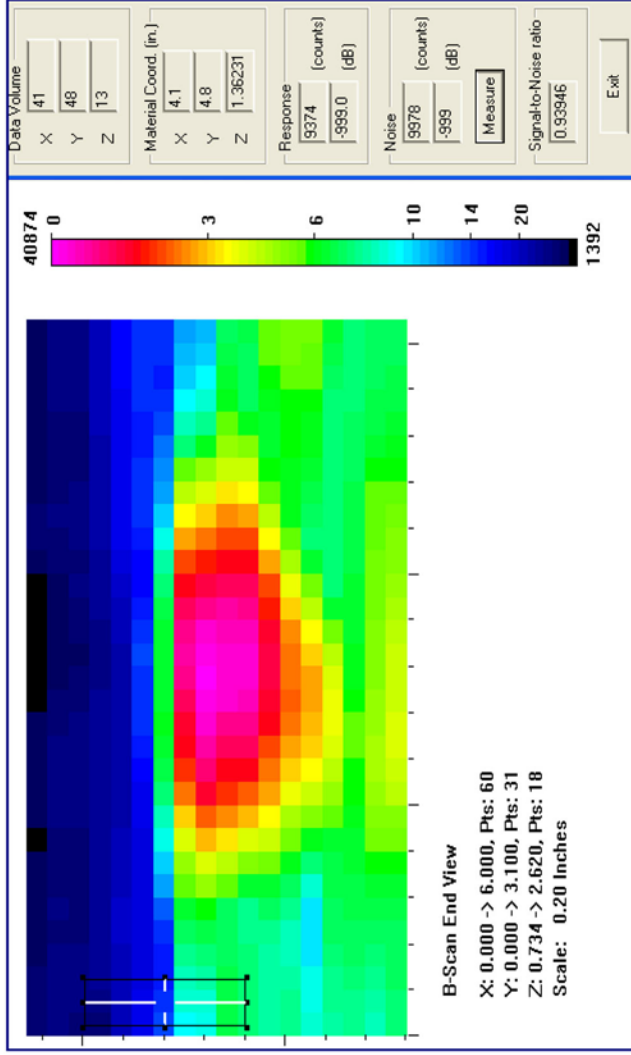
Tip Signal

Velocity

Angle

## Noise Characterization

Peak Signal Response	40874
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	9978
	4.1
	12.2



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

400-kHz, 70 Long

## Length Sizing

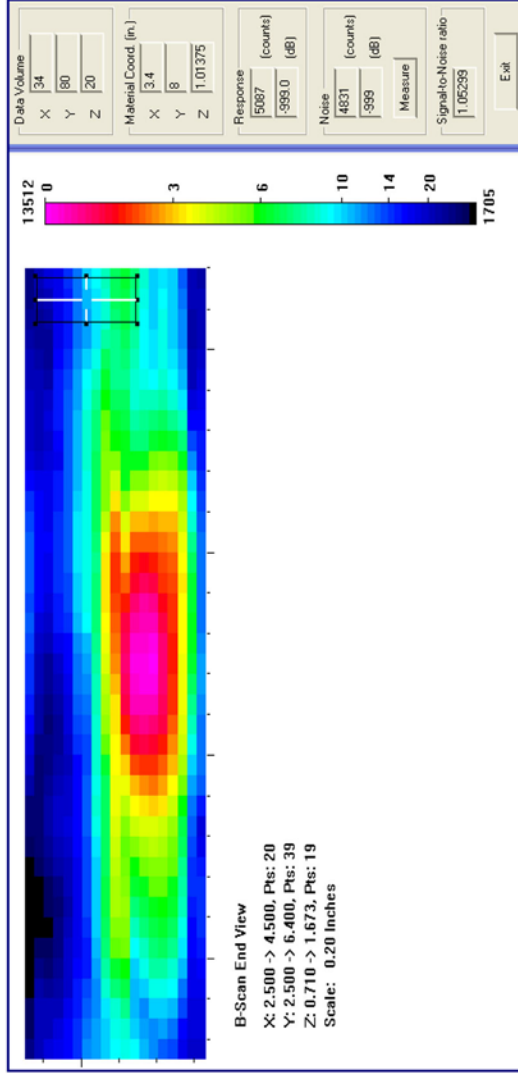
Actual	2.4
6 dB Drop	2.4
Loss of Signal	2.7
6 dB Drop $\Delta$	-2.4
Loss of Signal $\Delta$	-2.7

## Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
Velocity	0.228
Angle	70

## Noise Characterization

Peak Signal Response	13512
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	4831
	2.8
	8.9





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

400-kHz, 45 Shear

## Length Sizing

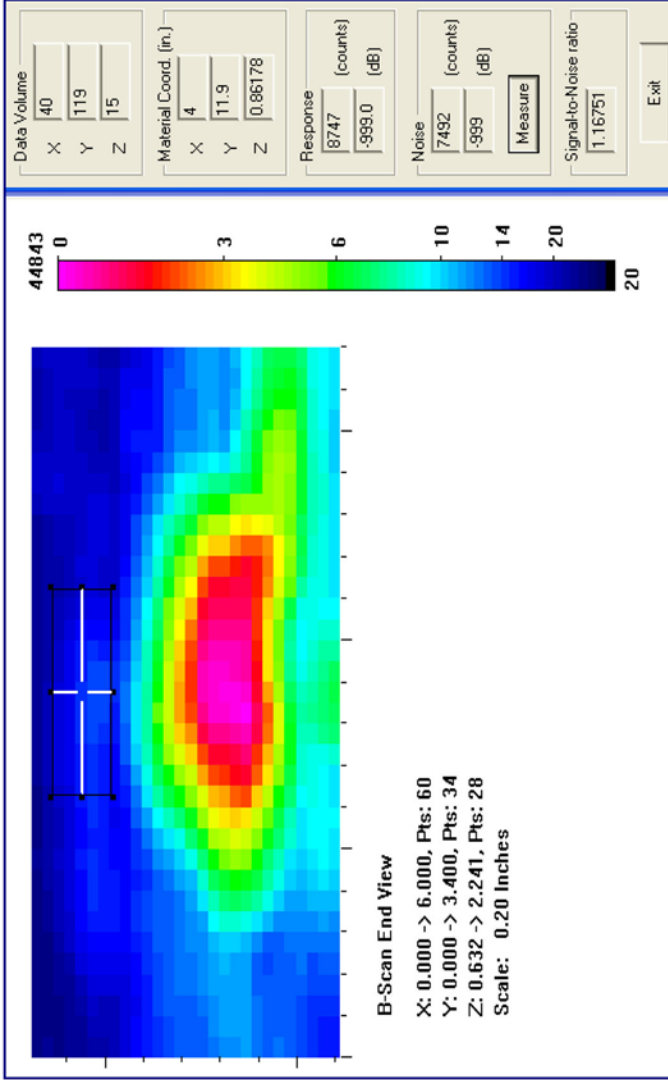
Actual	1.9
6 dB Drop	2.1
Loss of Signal	-1.9
6 dB Drop $\Delta$	-2.1
Loss of Signal $\Delta$	-2.1

## Depth Sizing

Actual	0.125	Corner Trap
6 dB Drop	45	Tip Signal
UT Tip Signal	0	Velocity
6 dB Drop $\Delta$	0	Angle
UT Tip Signal $\Delta$	0	

## Noise Characterization

Peak Signal Response	44843
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	7492
	6.0
	15.5



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

400-kHz, 45 Long

## Length Sizing

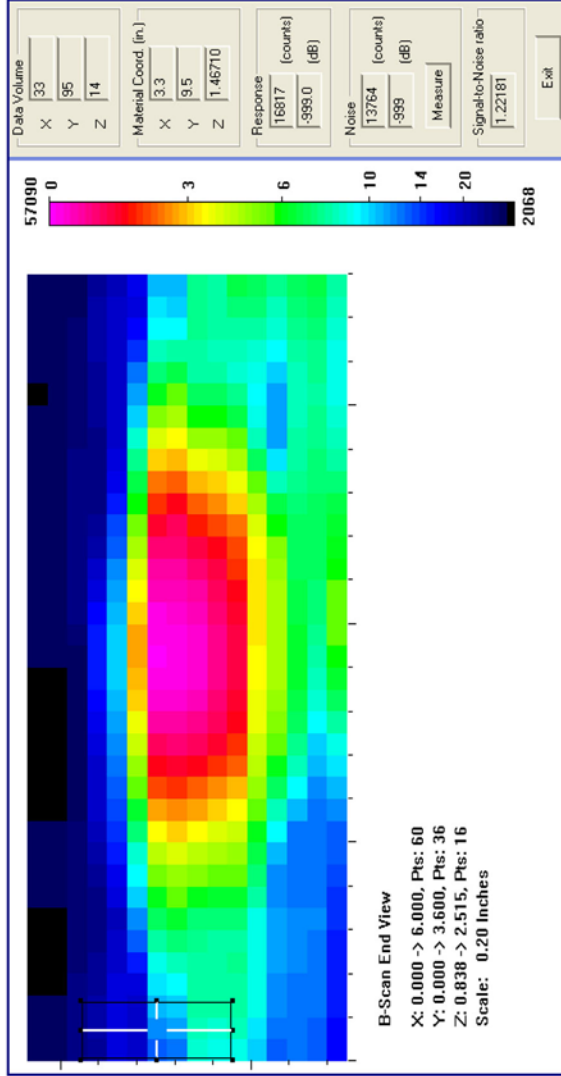
Actual	2.3
6 dB Drop	2.8
Loss of Signal	-2.3
6 dB Drop $\Delta$	-2.3
Loss of Signal $\Delta$	-2.8

## Depth Sizing

Actual	0.228
6 dB Drop	45
UT Tip Signal	0
UT Tip Signal $\Delta$	0
Corner Trap	0
Tip Signal	0
Velocity	0
Angle	0

## Noise Characterization

Peak Signal Response	57090
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	13764
	4.1
	N/A
	12.4



Data Volume		
X	33	
Y	95	
Z	14	
Material Coord (in.)		
X	3.3	
Y	9.5	
Z	1.46710	
Response		
	16817	(counts)
	-999.0	(dB)
Noise		
	13764	(counts)
	-999	(dB)
	Measure	
Signal-to-Noise ratio		
	1.22181	
Exit		

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

400-kHz, 60 Shear

## Length Sizing

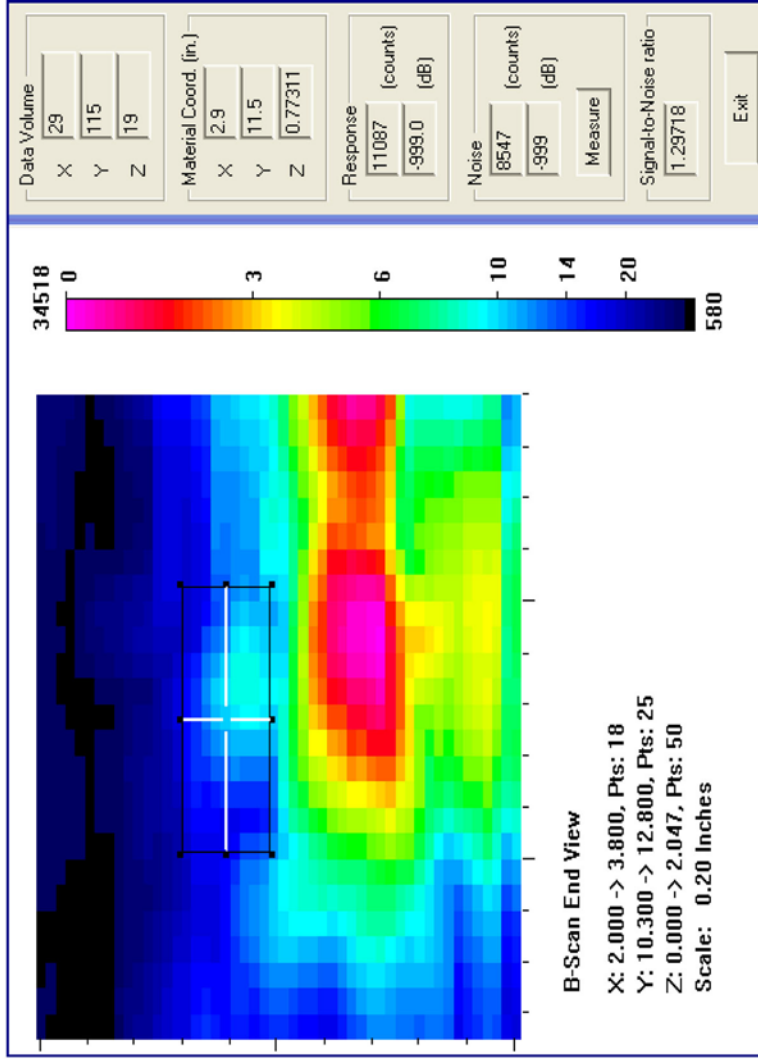
Actual	1.2
6 dB Drop	1.3
Loss of Signal	1.3
6 dB Drop $\Delta$	-1.2
Loss of Signal $\Delta$	-1.3

## Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0
	Velocity
	0.125
	Angle
	60

## Noise Characterization

Peak Signal Response		34518
Noise	S/N Ratio	dB
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	8547	4.0
		12.1



Data Volume		
X	29	
Y	115	
Z	19	
Material Coord. (in.)		
X	2.9	
Y	11.5	
Z	0.77311	
Response		
	11087	(counts)
	-999.0	(dB)
Noise		
	8547	(counts)
	-999	(dB)
	Measure	
Signal-to-Noise ratio		
	1.29718	
Exit		

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

400-kHz, 70 Long

## Length Sizing

Actual	2.1
6 dB Drop	2.5
Loss of Signal	-2.1
6 dB Drop $\Delta$	-2.5
Loss of Signal $\Delta$	-2.5

## Depth Sizing

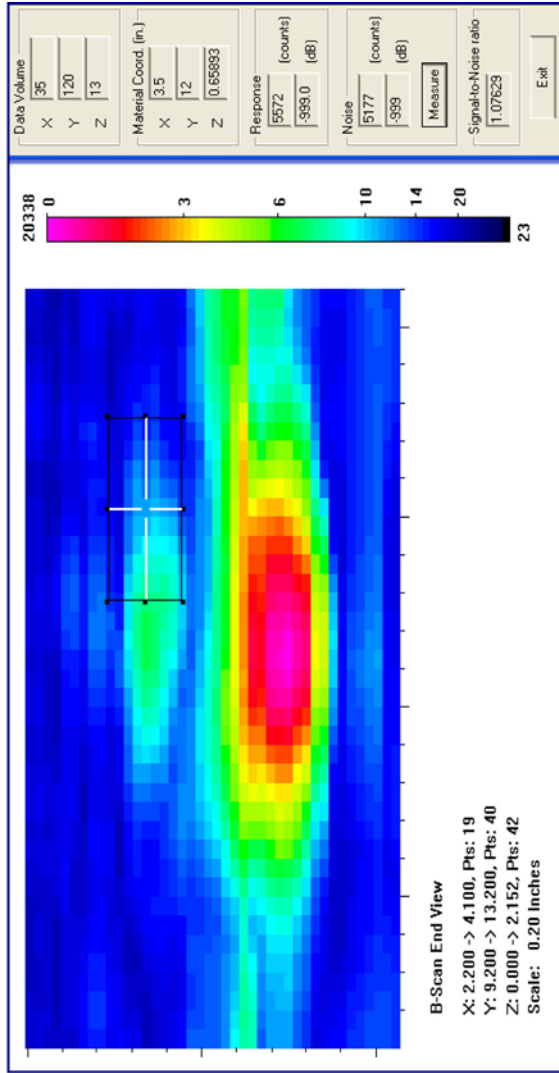
Actual	0.228
6 dB Drop	70
UT Tip Signal	0
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0

## Corner Trap

Tip Signal	0
Velocity	0
Angle	70

## Noise Characterization

Peak Signal Response	20338
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	5177
	3.9
	N/A
	N/A
	11.9



Data Volume	
X	35
Y	120
Z	13
Material Coord. (in.)	
X	3.5
Y	12
Z	0.65693
Response	
(counts)	5572
(dB)	-999.0
Noise	
(counts)	5177
(dB)	-999
Measure	
Signal-to-Noise ratio	
1.07629	
Exit	

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

400-kHz, 45 Shear

## Length Sizing

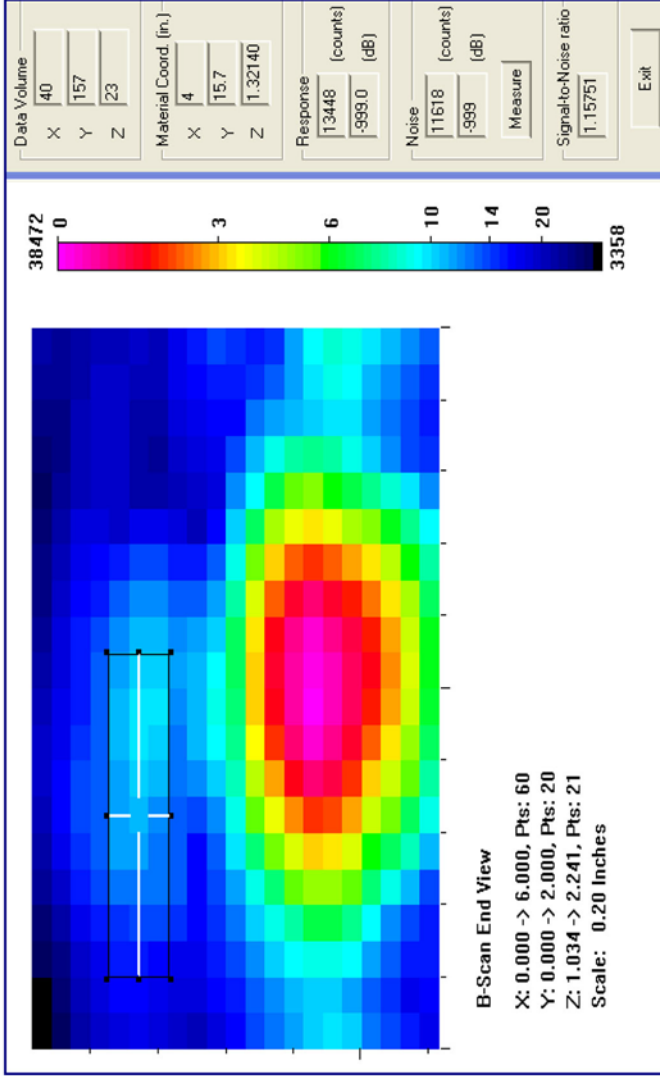
Actual	1.3
6 dB Drop	1.3
Loss of Signal	1.3
6 dB Drop Δ	-1.3
Loss of Signal Δ	-1.3

## Depth Sizing

Actual	Corner Trap
6 dB Drop	Tip Signal
UT Tip Signal	0
6 dB Drop Δ	0
UT Tip Signal Δ	0
	Velocity
	0.125
	Angle
	45

## Noise Characterization

Peak Signal Response		38472
Noise	S/N Ratio	
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	13448	2.9
		9.1



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

400-kHz, 60 Shear

## Length Sizing

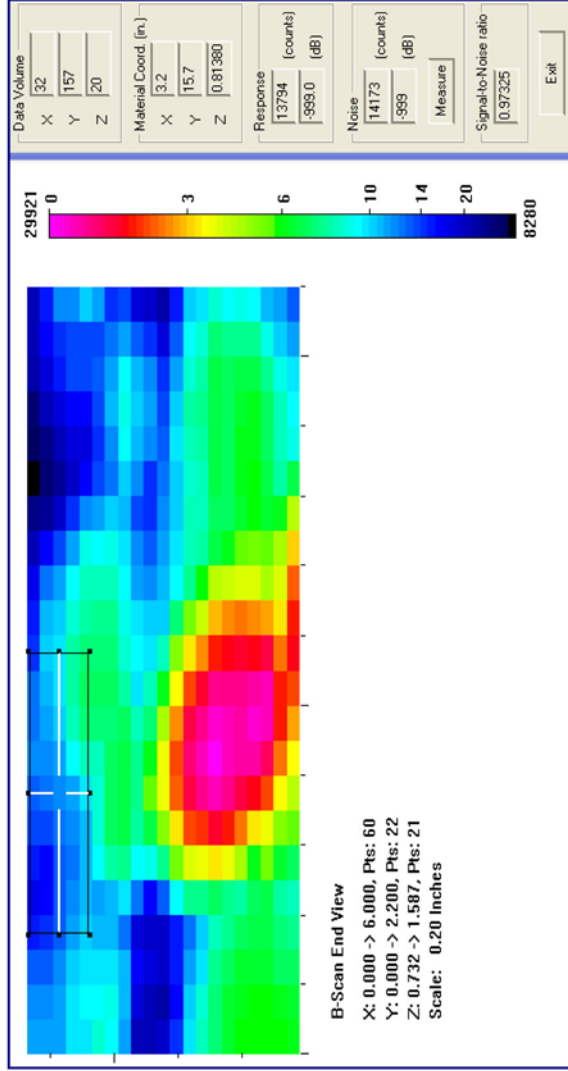
Actual	0.8
6 dB Drop	0.8
Loss of Signal	1.6
6 dB Drop $\Delta$	-0.8
Loss of Signal $\Delta$	-1.6

## Depth Sizing

Actual	Corner Trap	
6 dB Drop	Tip Signal	
UT Tip Signal	0	Velocity 0.125
6 dB Drop $\Delta$	0	Angle 60
UT Tip Signal $\Delta$	0	

## Noise Characterization

Peak Signal Response		29921
Noise	S/N Ratio	
General Weld Root	N/A	N/A
Local Weld Root	N/A	N/A
Cursor Window	14173	2.1
		6.5



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

400-kHz, 70 Long

## Length Sizing

Actual	1.1
6 dB Drop	1.3
Loss of Signal	
6 dB Drop $\Delta$	-1.1
Loss of Signal $\Delta$	-1.3

## Depth Sizing

Actual	0.228
6 dB Drop	70
UT Tip Signal	
6 dB Drop $\Delta$	0
UT Tip Signal $\Delta$	0

Corner Trap

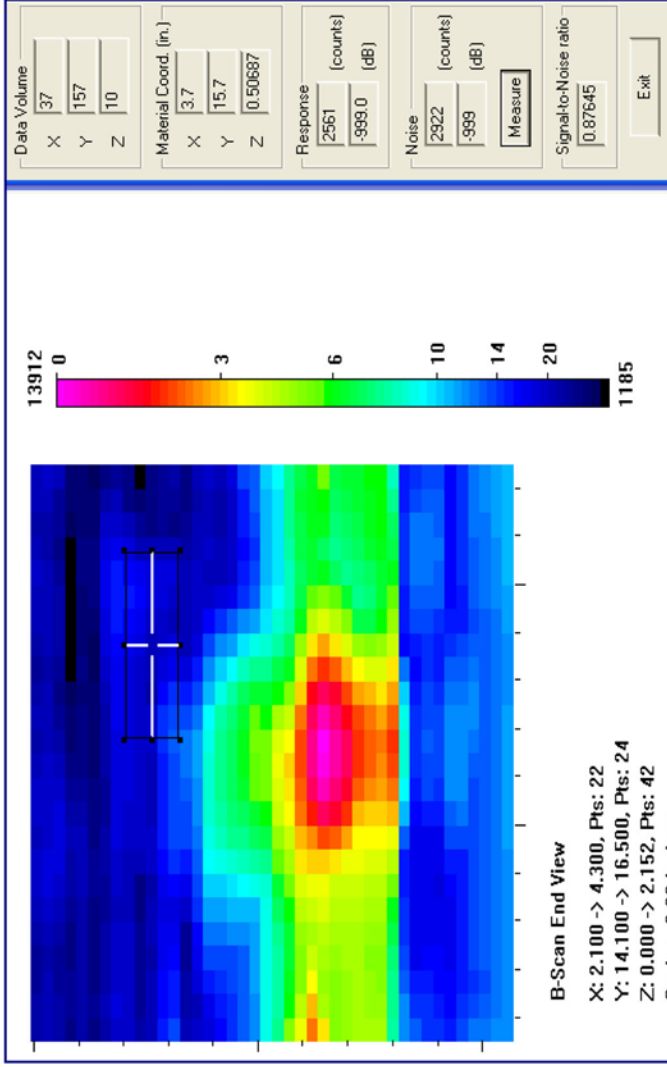
Tip Signal

Velocity

Angle

## Noise Characterization

Peak Signal Response	13912
Noise	S/N Ratio
General Weld Root	N/A
Local Weld Root	N/A
Cursor Window	2922
	4.8
	13.6



Data Volume	
X	37
Y	157
Z	10
Material Coord. (in.)	
X	3.7
Y	15.7
Z	0.50687
Response	
(counts)	2561
(dB)	-999.0
Noise	
(counts)	2922
(dB)	-999
Measure	
Signal-to-Noise ratio	
0.87645	
Exit	





## **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.

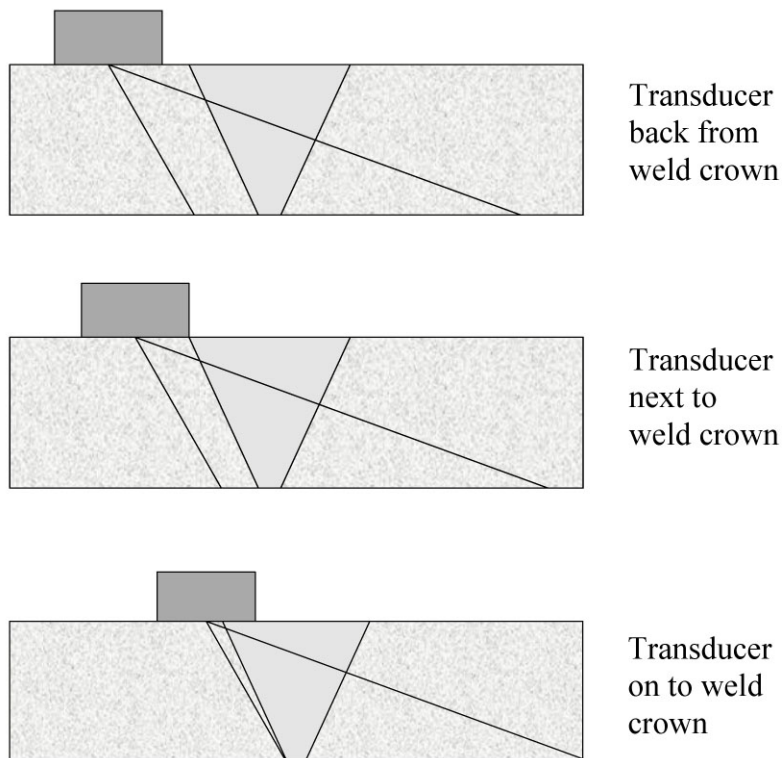
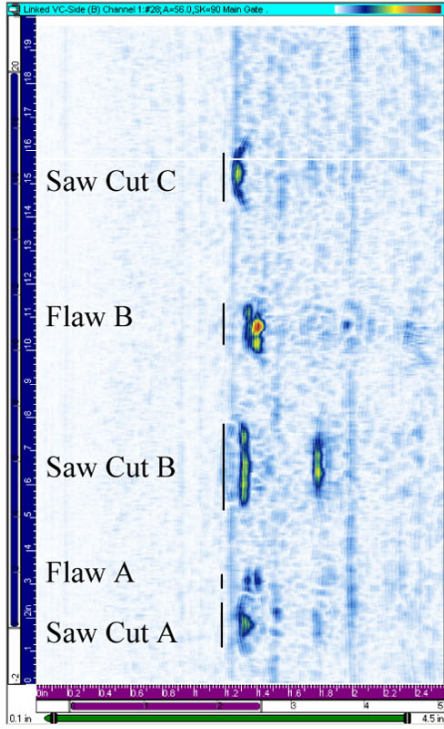
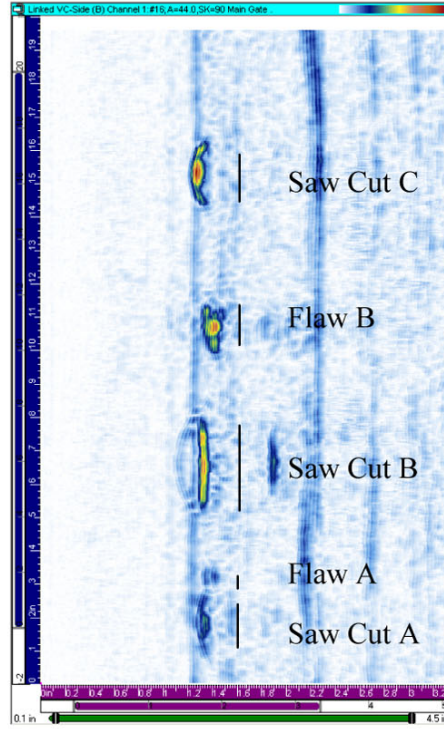


Figure E.1

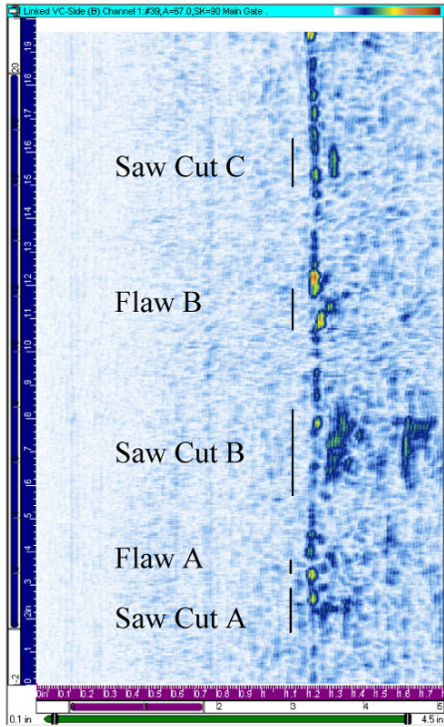
Near-side B-scan at 55°  
0.5 inches from weld crown



Near-side B-scan at 45°  
next to weld crown



Far-side B-scan at 65°  
0.5 inches from weld crown



Far-side B-scan at 62°  
next to weld crown

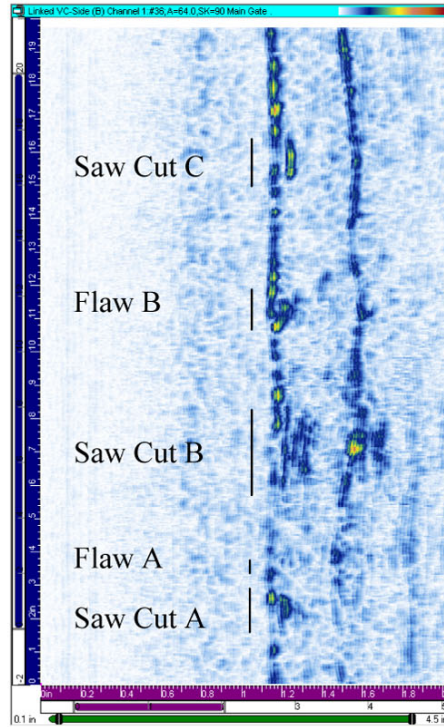
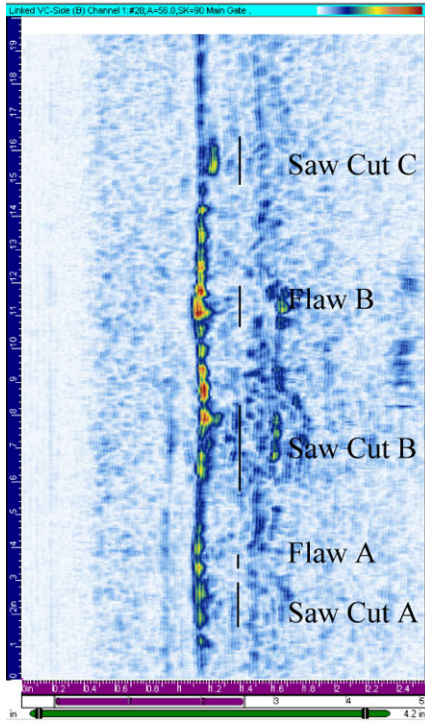
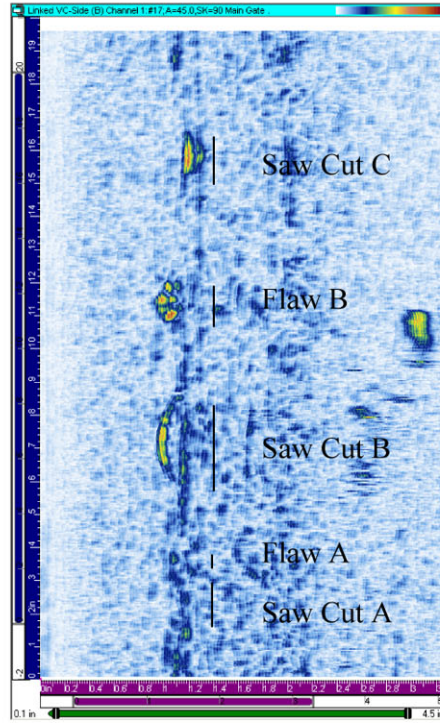


Figure E.2 TRL Data for Pipe Specimen 02-24-15 Segment 1

Far-side B-scan at 50°  
0.5 inches on to weld



Far-side B-scan at 45°  
1 inch on to weld crown



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

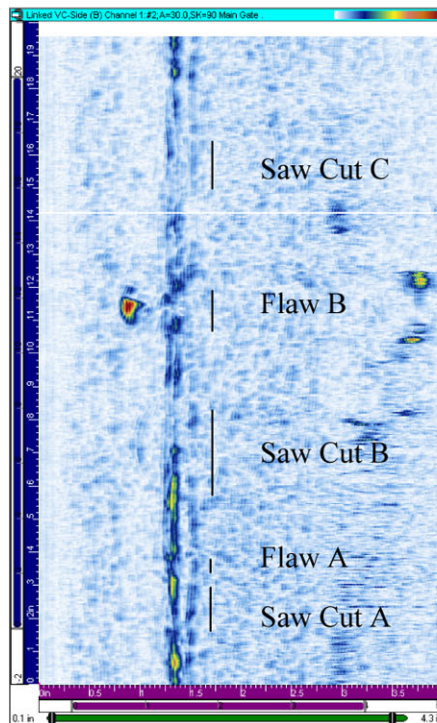
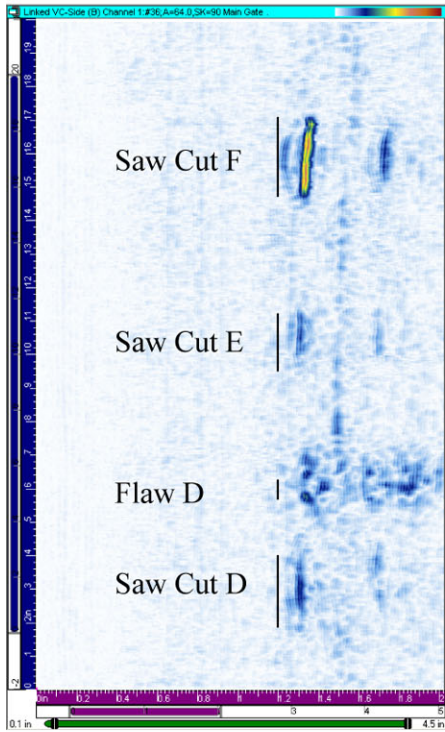
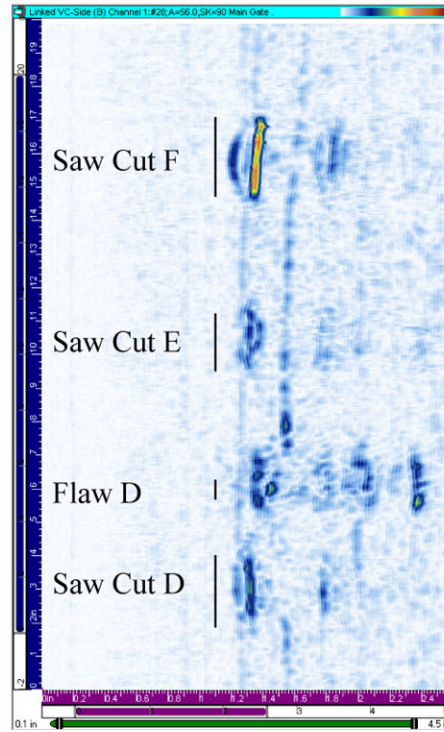


Figure E.2 TRL Data for Pipe Specimen 02-24-15 Segment 1 (continued)

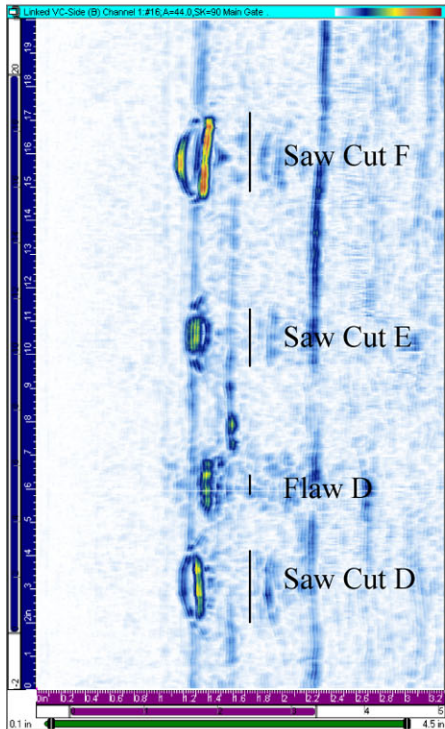
Near-side B-scan at 62°  
1 inch from weld crown



Near-side B-scan at 55°  
0.5 inches from weld crown



Near-side B-scan at 44°  
next to weld crown



Far-side B-scan at 65°  
0.5 inches from weld crown

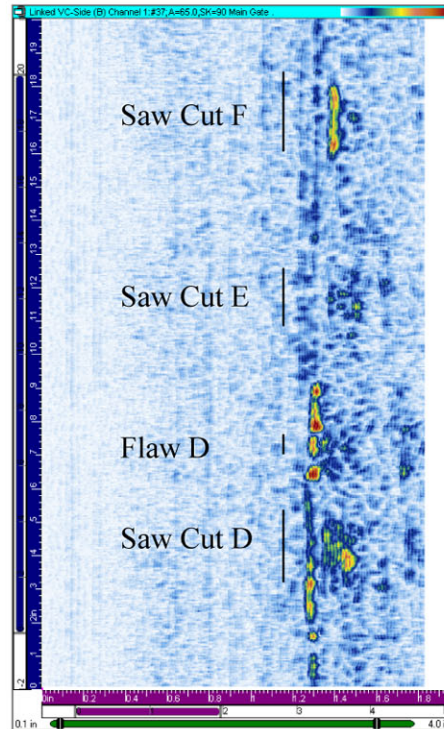
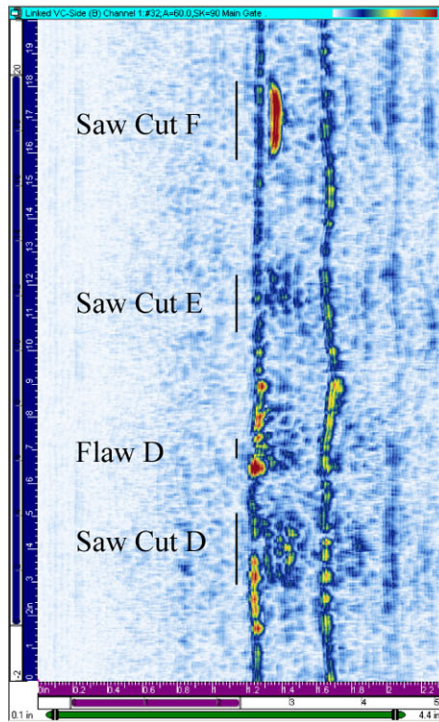
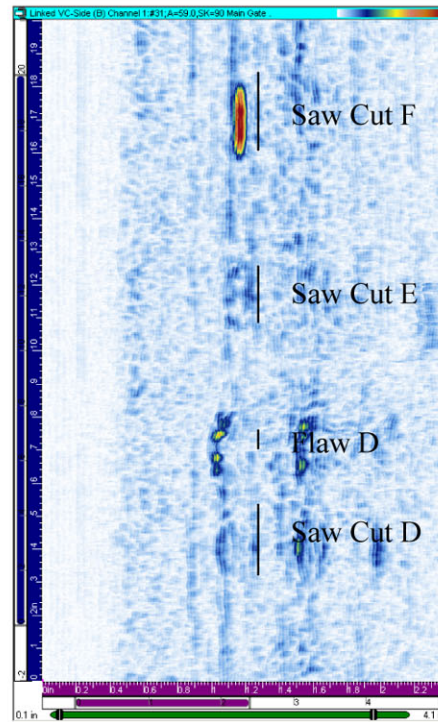


Figure E.3 TRL Data for Pipe Specimen 02-24-15 Segment 2

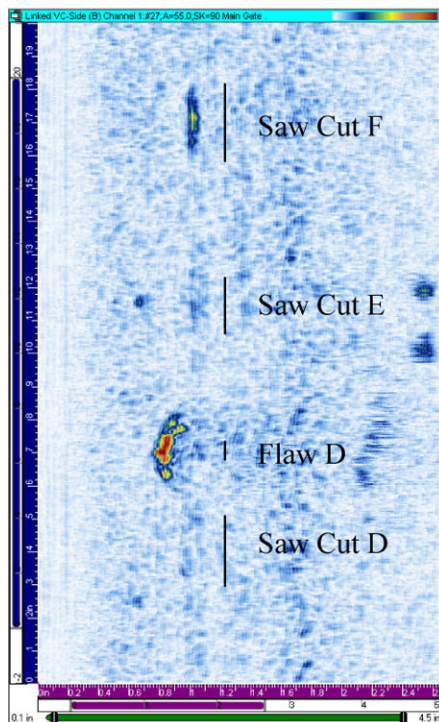
Far-side B-scan at 60°  
next to weld crown



Far-side B-scan at 57°  
0.5 inches on to weld crown



Far-side B-scan at 53°  
1 inch on to weld crown



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

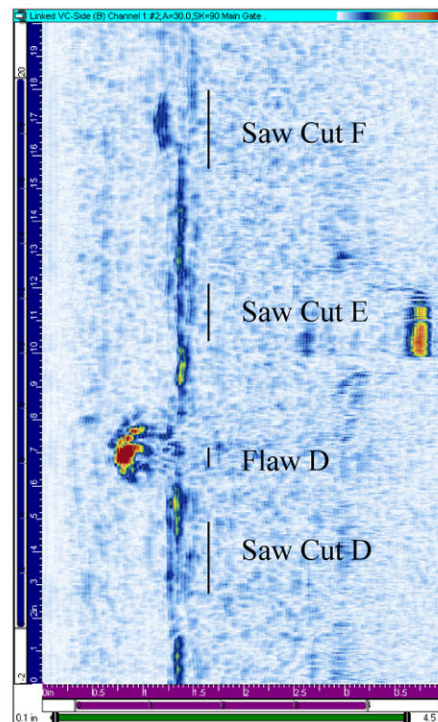
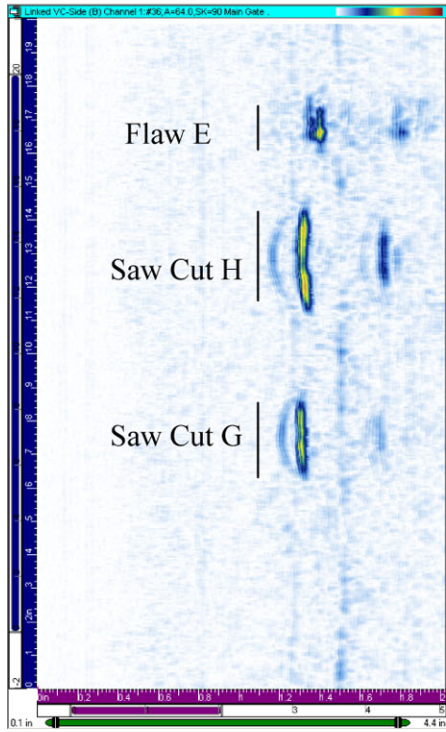
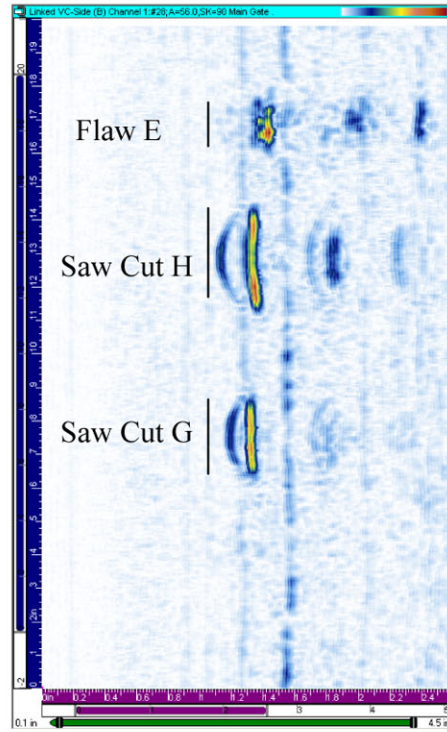


Figure E.3 TRL Data for Pipe Specimen 02-24-15 Segment 2 (continued)

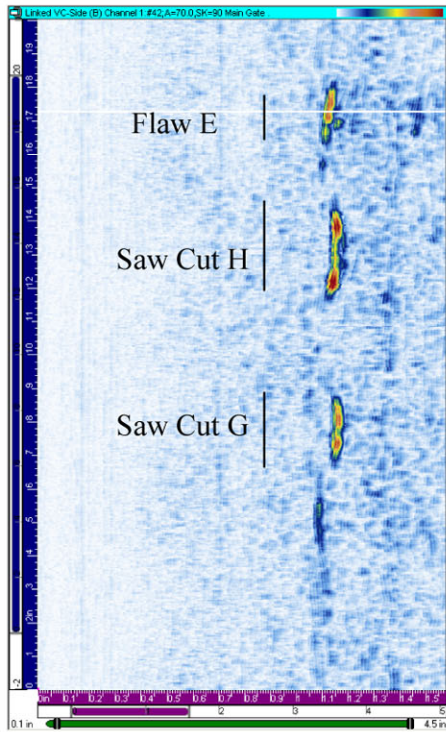
Near-side B-scan at 65°  
0.5 inches from weld crown



Near-side B-scan at 57°  
next to weld crown



Far-side B-scan at 67°  
0.5 inches from weld crown



Far-side B-scan at 63°  
next to weld crown

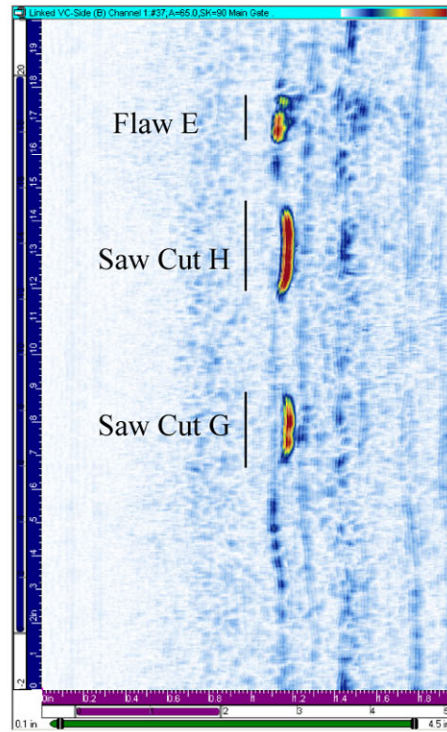
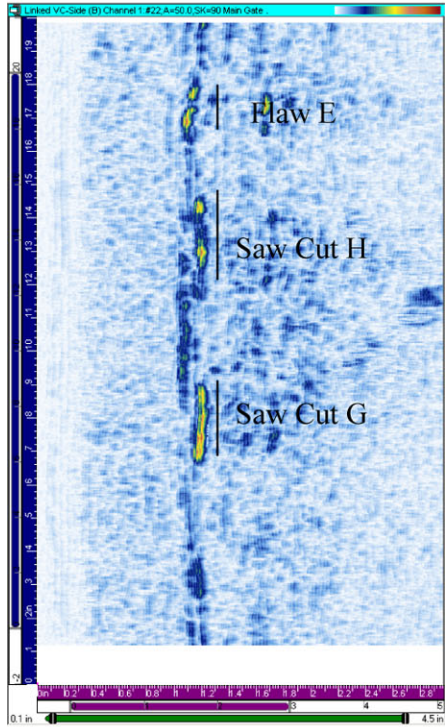


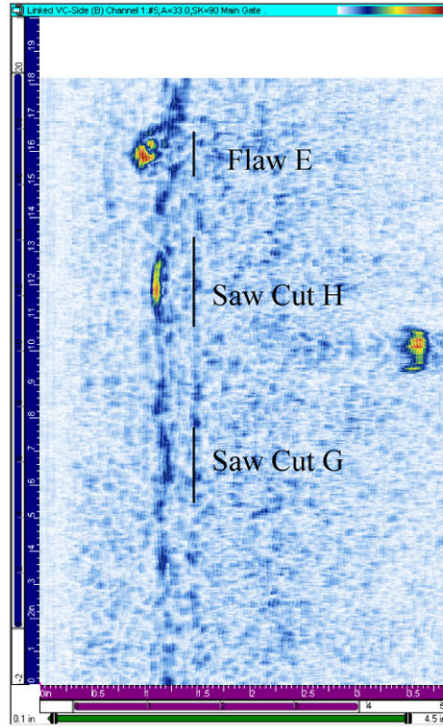
Figure E.4 TRL Data for Pipe Specimen 02-24-15 Segment 3



Far-side B-scan at 52°  
0.5 inches on to weld



Far-side B-scan at 35°  
1 inch on to weld crown



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

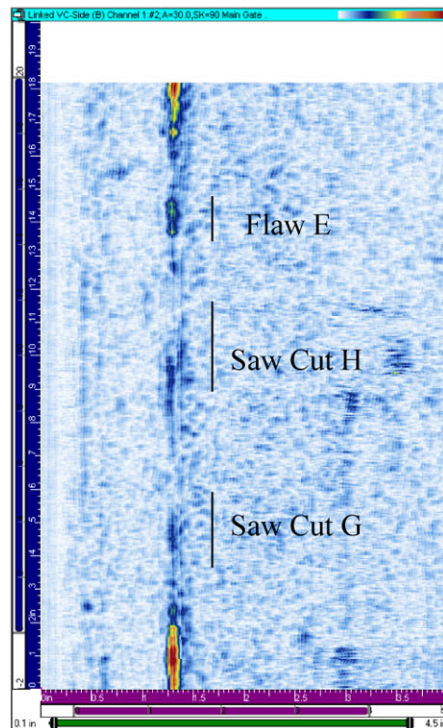
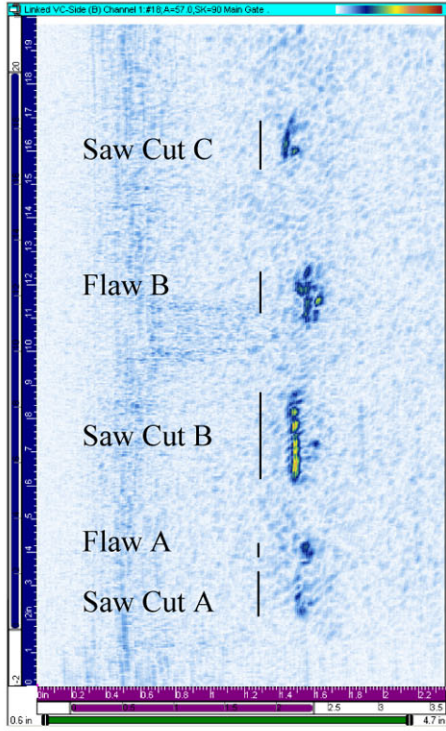
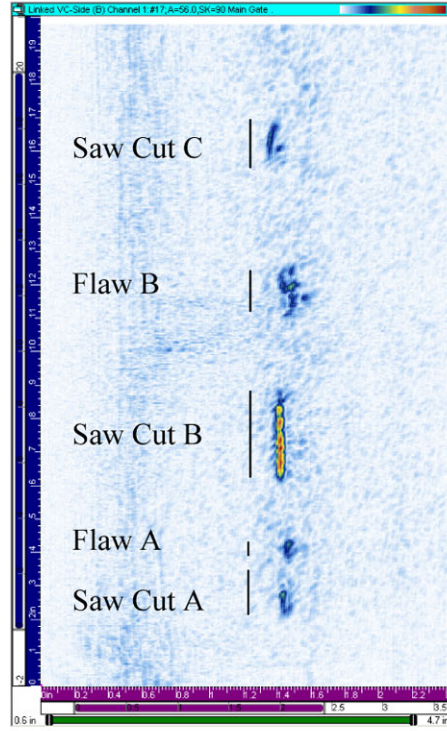


Figure E.4 TRL Data for Pipe Specimen 02-24-15 Segment 3 (continued)

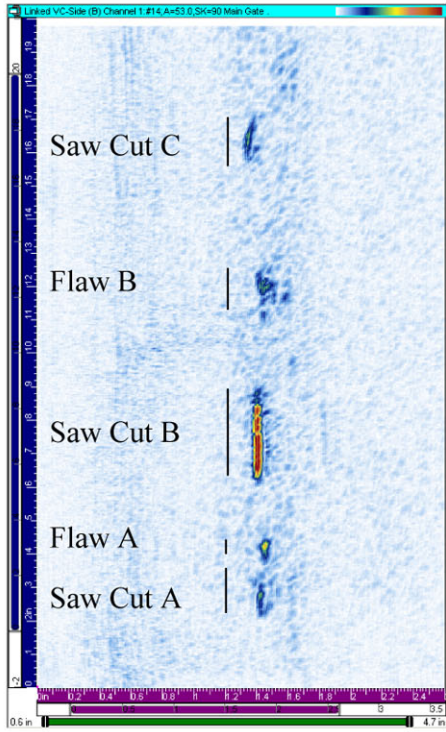
Near-side B-scan at 60°  
1 inch from weld crown



Near-side B-scan at 58°  
0.75 inches from weld crown



Near-side B-scan at 53°  
0.5 inches from weld crown



Near-side B-scan at 50°  
0.25 inches from weld crown

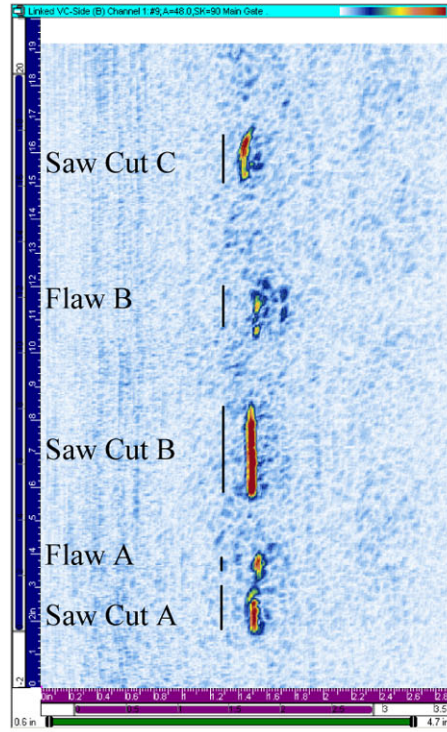
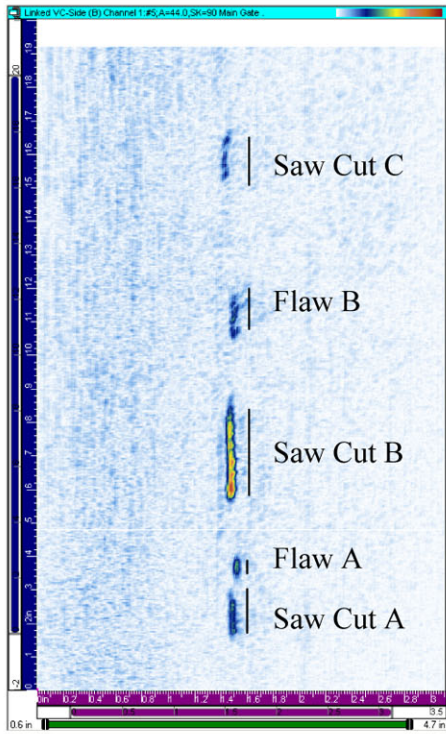
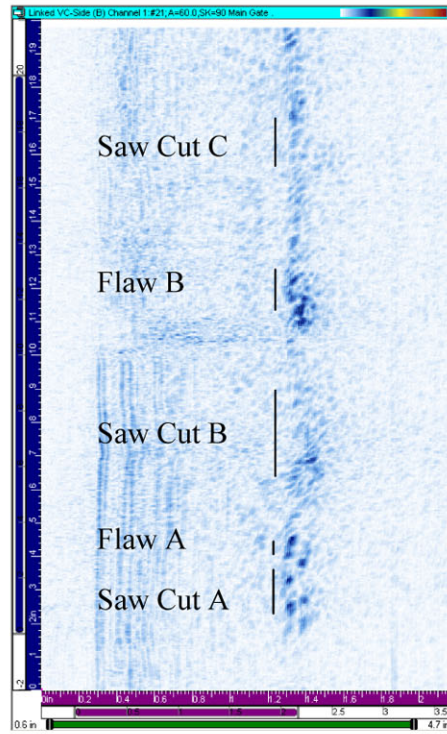


Figure E.5 TRS Data for Pipe Specimen 02-24-15 Segment 1

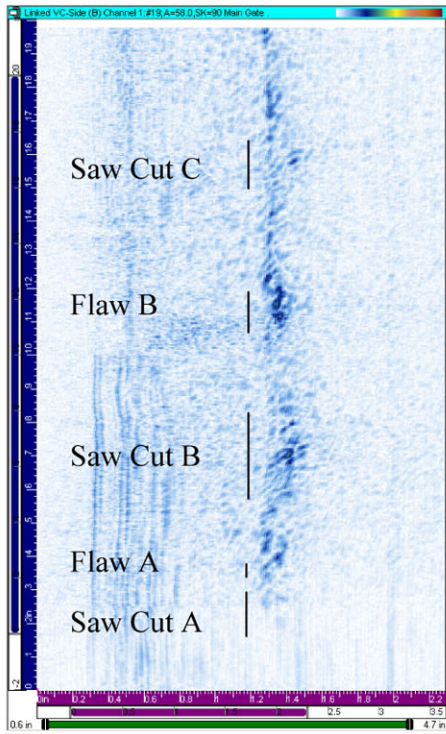
Near-side B-scan at 45°  
next to weld crown



Far-side B-scan at 62°  
0.5 inches from weld crown



Far-side B-scan at 57°  
0.25 inches from weld crown



Far-side B-scan at 55°  
next to weld crown

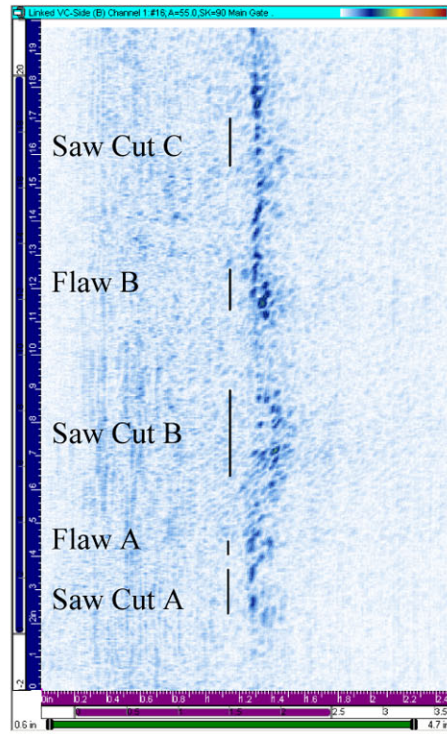
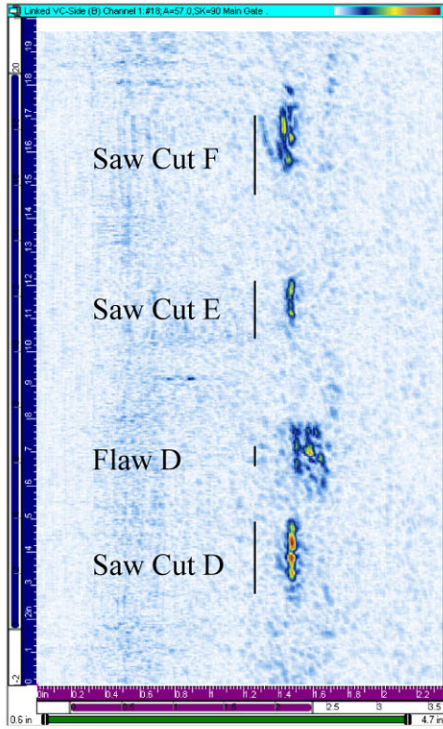
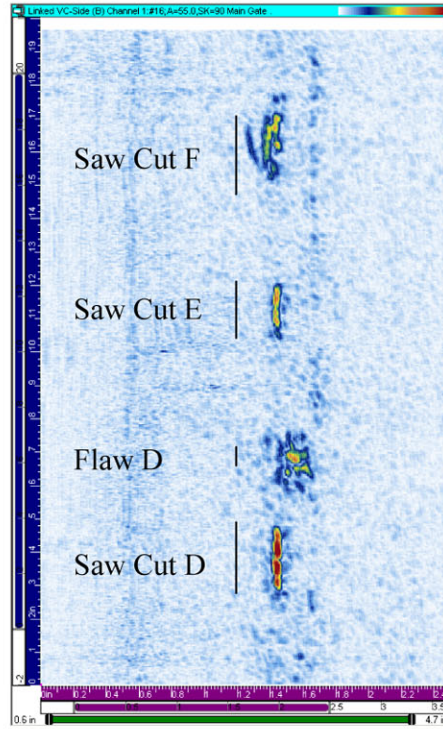


Figure E.5 TRS Data for Pipe Specimen 02-24-15 Segment 1 (continued)

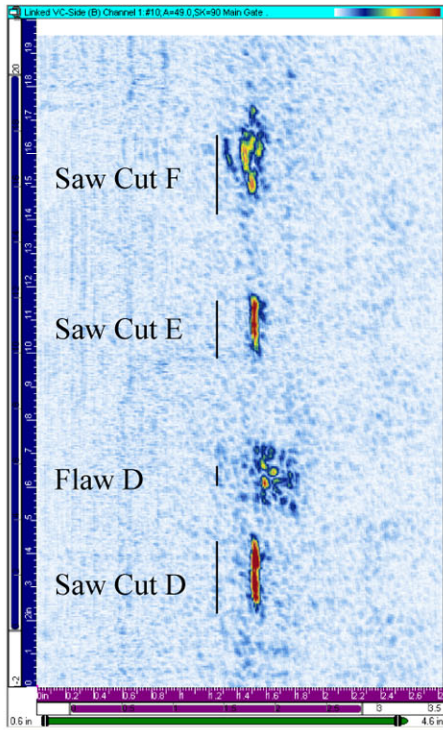
Near-side B-scan at 57°  
1 inch from weld crown



Near-side B-scan at 55°  
0.75 inches from weld crown



Near-side B-scan at 51°  
0.5 inches from weld crown



Near-side B-scan at 48°  
0.25 inches from weld crown

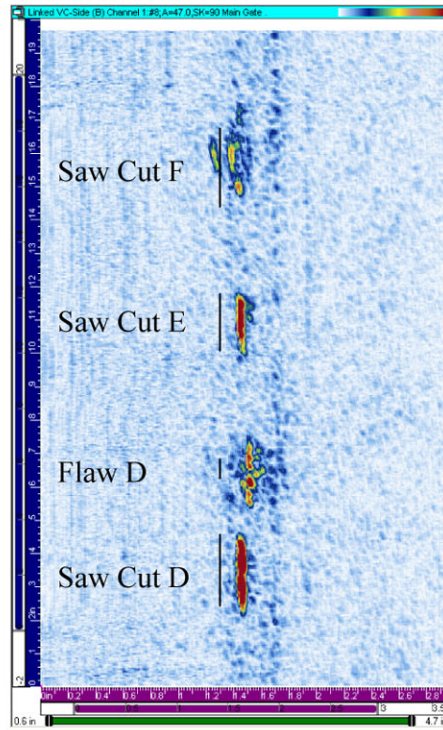
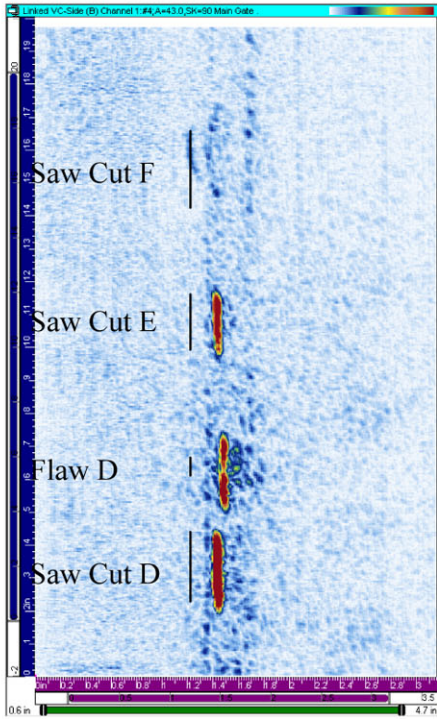
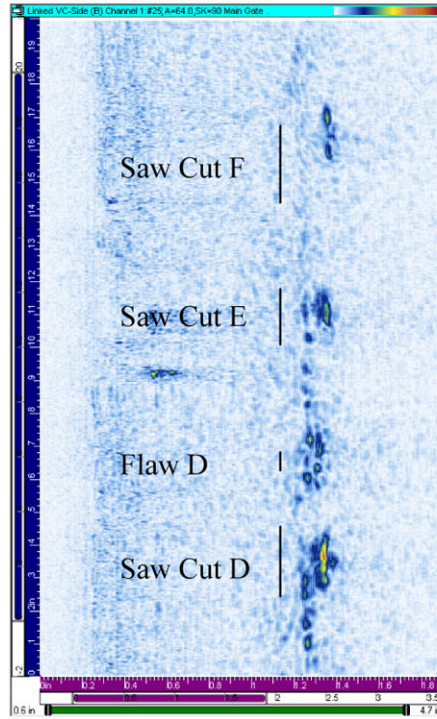


Figure E.6 TRS Data for Pipe Specimen 02-24-15 Segment 2

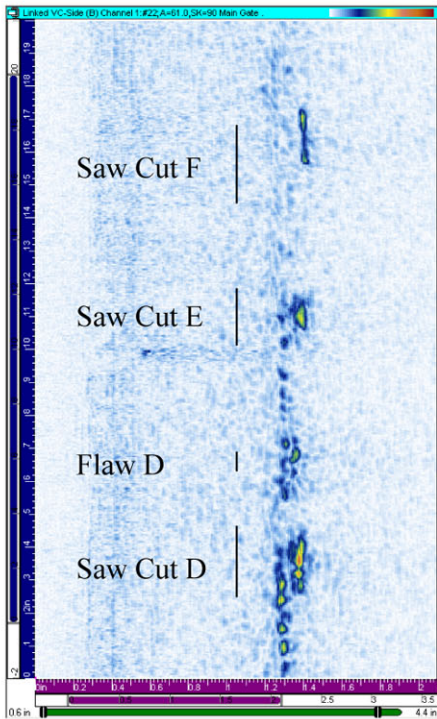
Near-side B-scan at 42°  
next to weld crown



Far-side B-scan at 65°  
0.5 inches from weld crown



Far-side B-scan at 61°  
0.25 inches from weld crown



Far-side B-scan at 55°  
next to weld crown

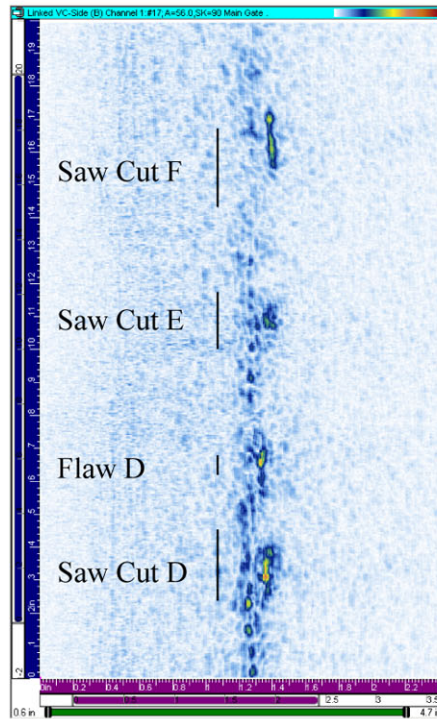
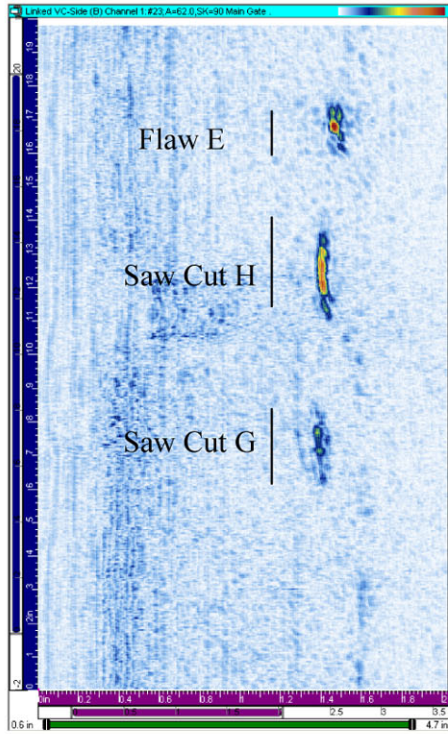
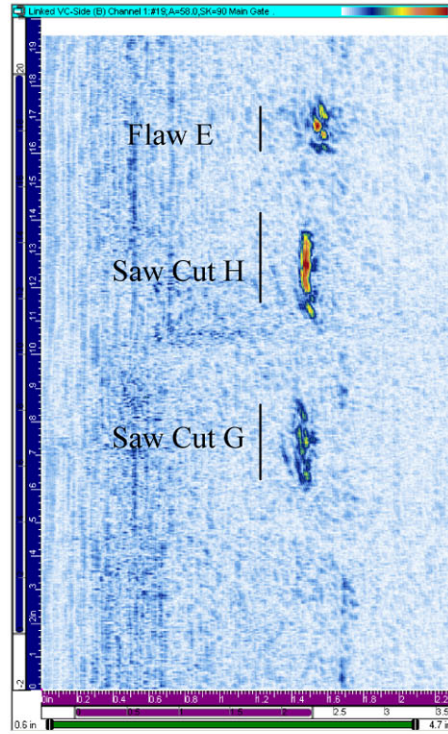


Figure E.6 TRS Data for Pipe Specimen 02-24-15 Segment 2 (continued)

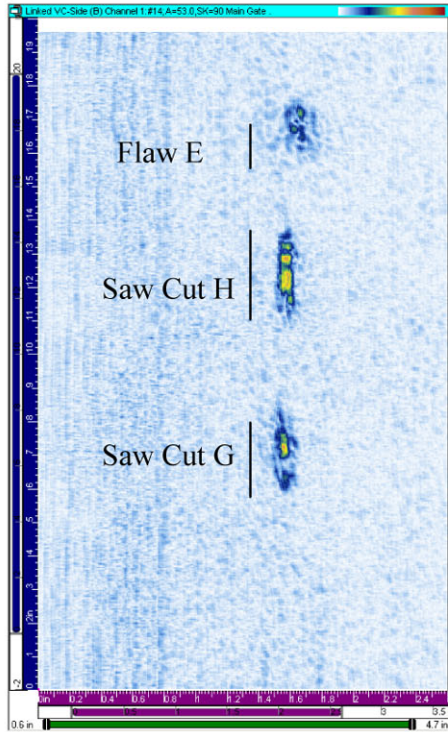
Near-side B-scan at 60°  
1 inch from weld crown



Near-side B-scan at 55°  
0.75 inches from weld crown



Near-side B-scan at 53°  
0.5 inches from weld crown



Near-side B-scan at 47°  
0.25 inches from weld crown

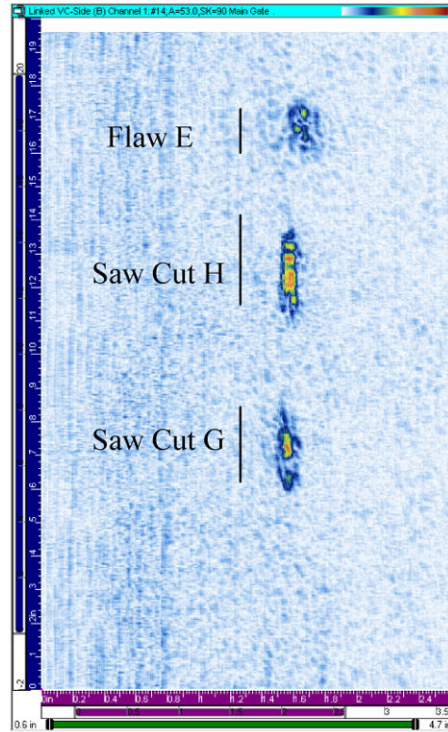
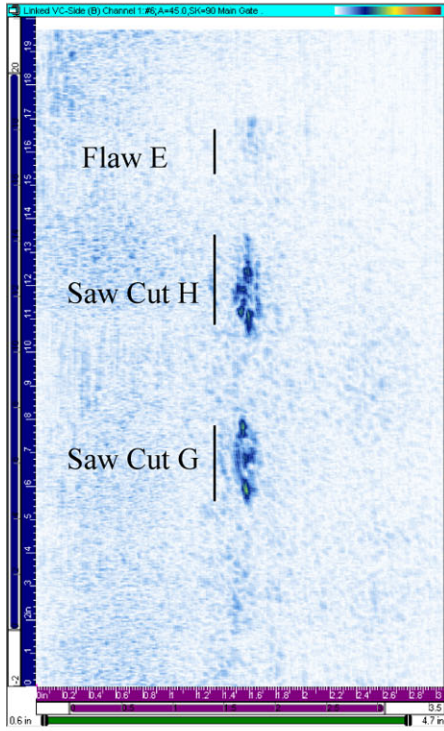
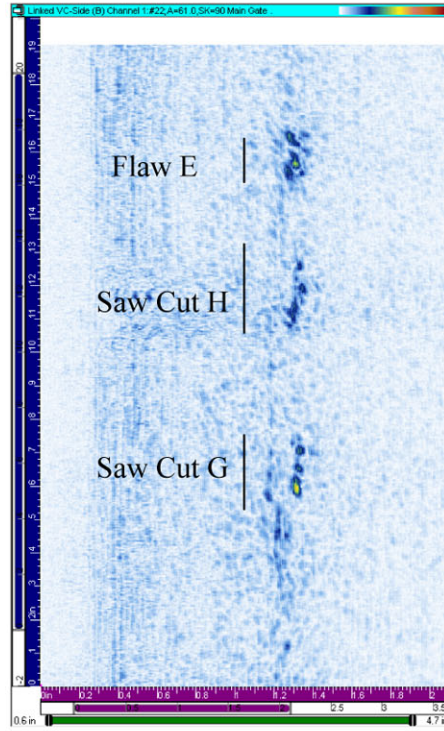


Figure E.7 TRS Data for Pipe Specimen 02-24-15 Segment 3

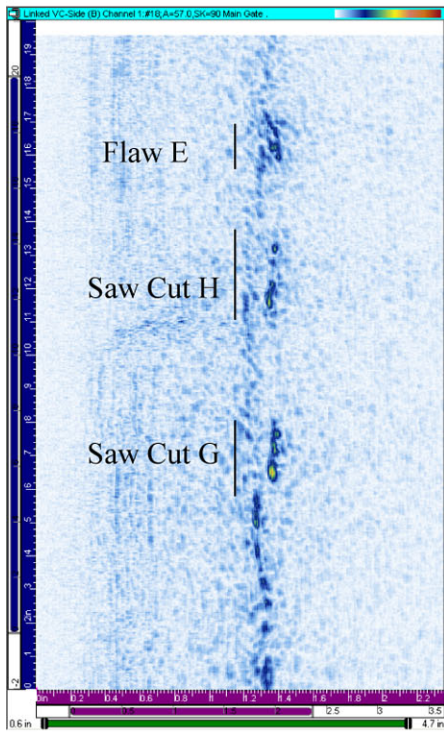
Near-side B-scan at 45°  
next to weld crown



Far-side B-scan at 60°  
0.5 inches from weld crown



Far-side B-scan at 56°  
0.25 inches from weld crown



Far-side B-scan at 52°  
next to weld crown

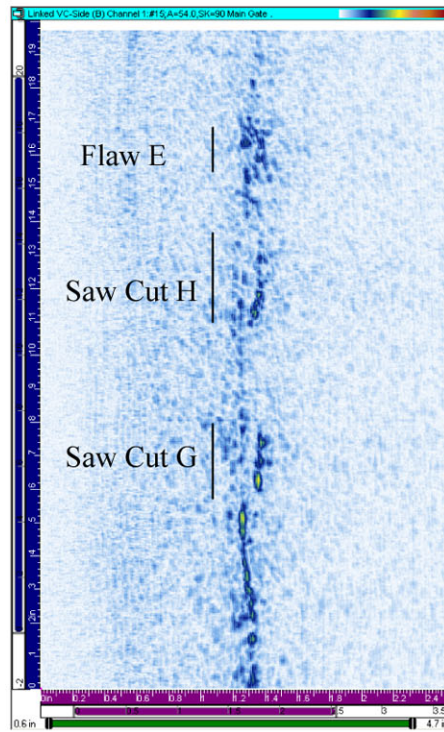
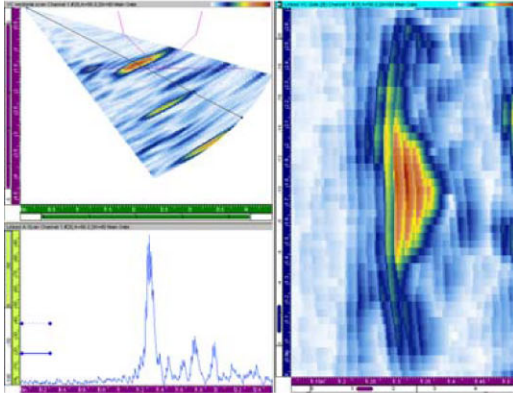
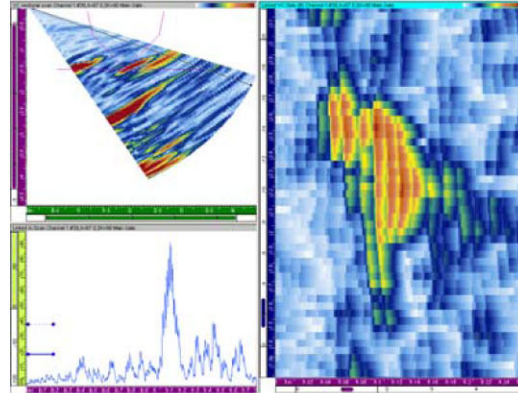


Figure E.7 TRS Data for Pipe Specimen 02-24-15 Segment 3 (continued)

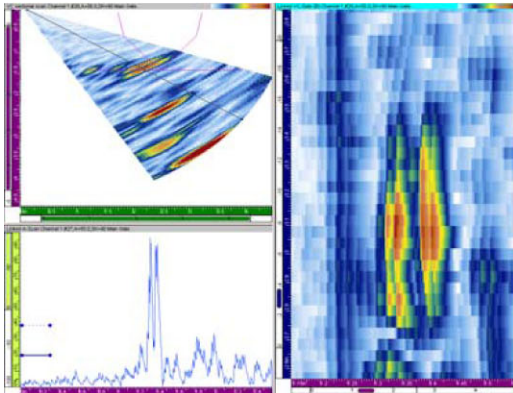
TRL Saw Cut A Near Side



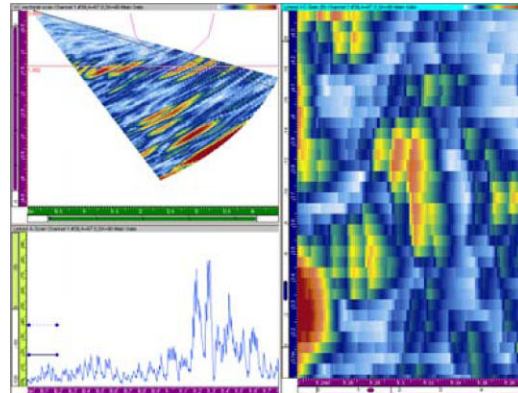
TRL Saw Cut A Far Side



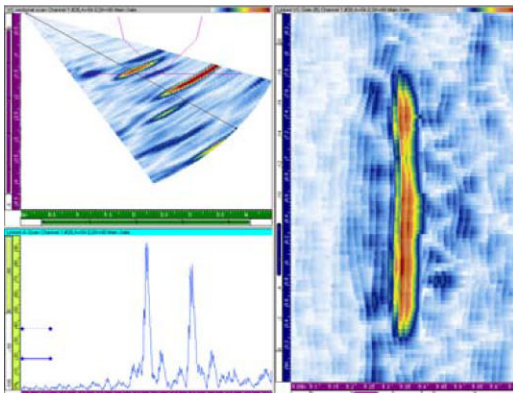
TRL Flaw A Near Side



TRL Flaw A Far Side



TRL Saw Cut B Near Side



TRL Saw Cut B Far Side

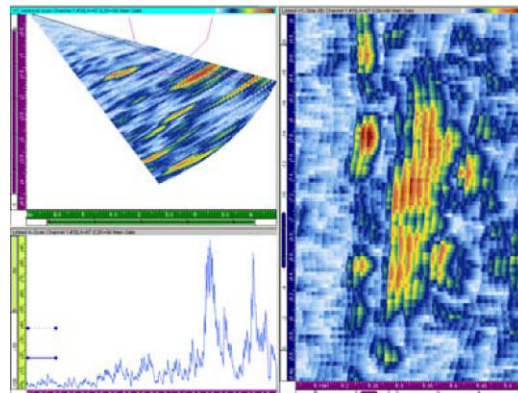
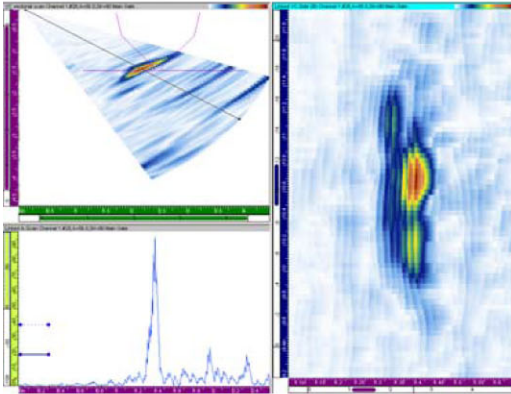


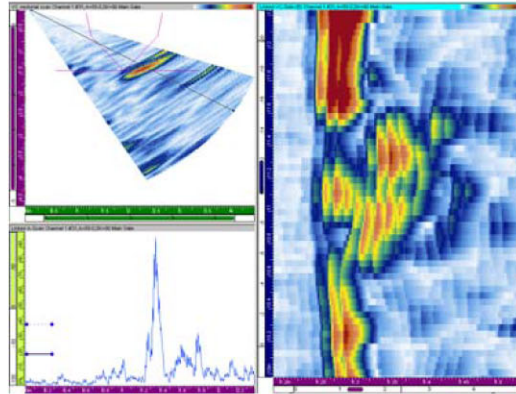
Figure E.8 Detailed Views of Individual Saw Cuts and Using the TRL Array



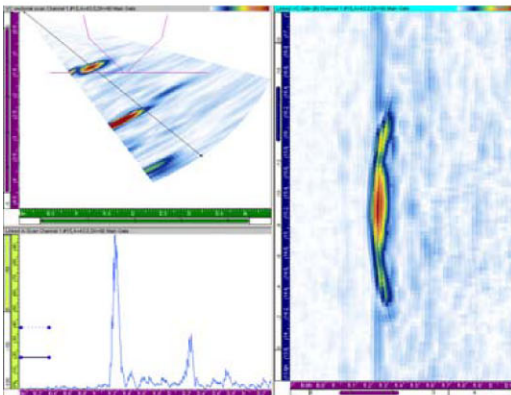
TRL Flaw B Near Side



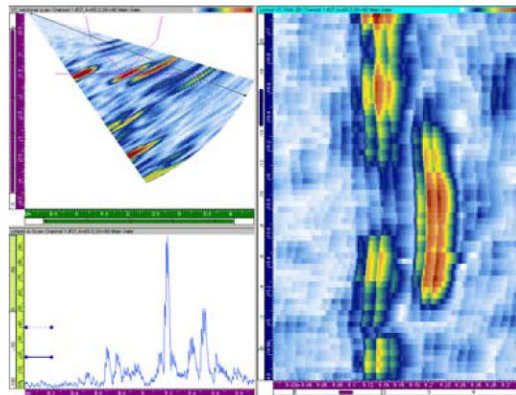
TRL Flaw B Far Side



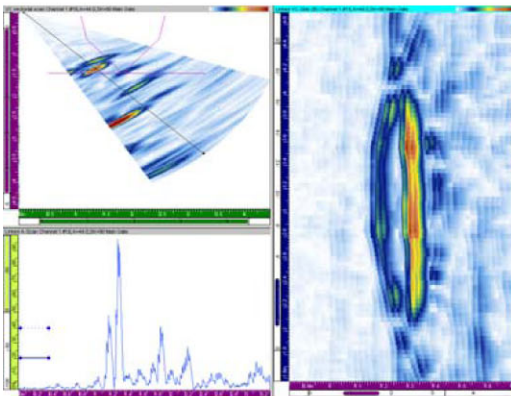
TRL Saw Cut C Near Side



TRL Saw Cut C Far Side



TRL Saw Cut D Near Side



TRL Saw Cut D Far Side

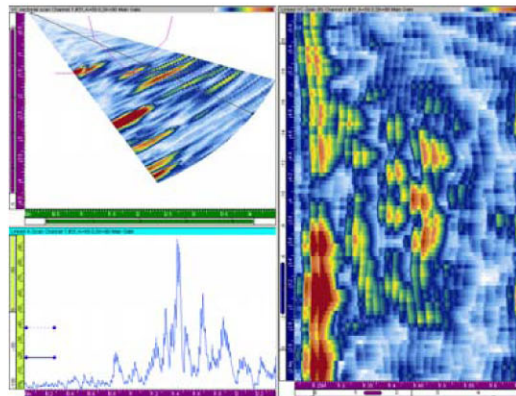
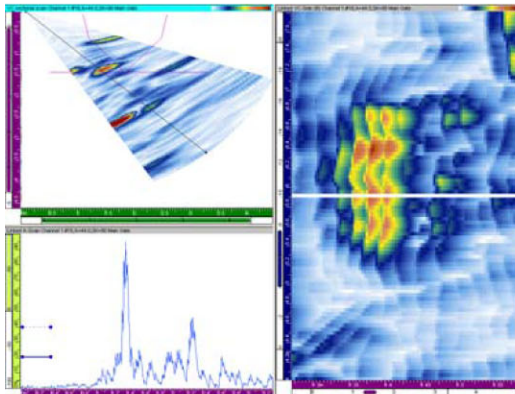
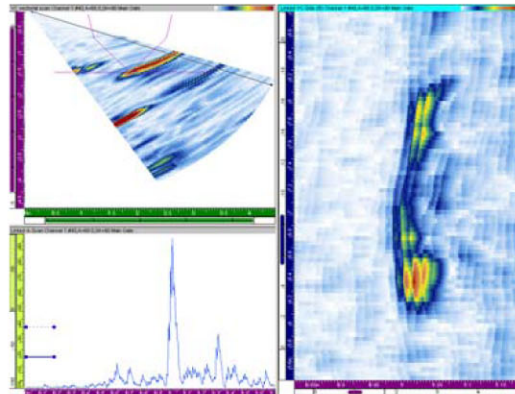


Figure E.8 Detailed Views of Individual Saw Cuts and Using the TRL Array (continued)

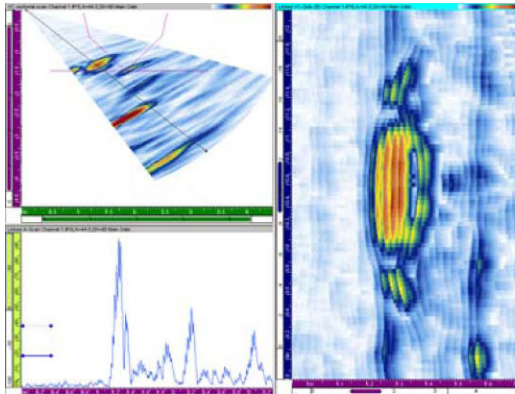
TRL Flaw C Near Side



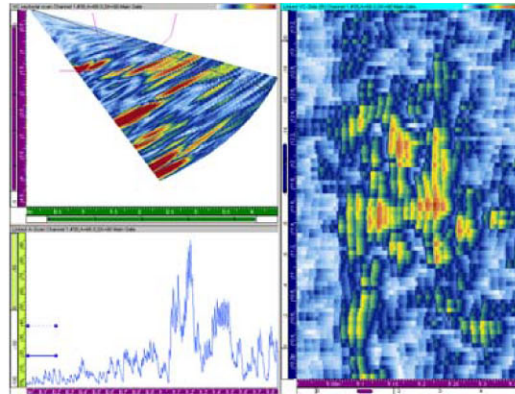
TRL Flaw C Far Side



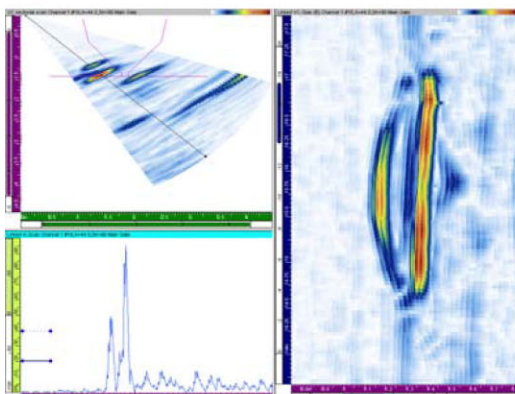
TRL Saw Cut E Near Side



TRL Saw Cut E Far Side



TRL Saw Cut F Near Side



TRL Saw Cut F Far Side

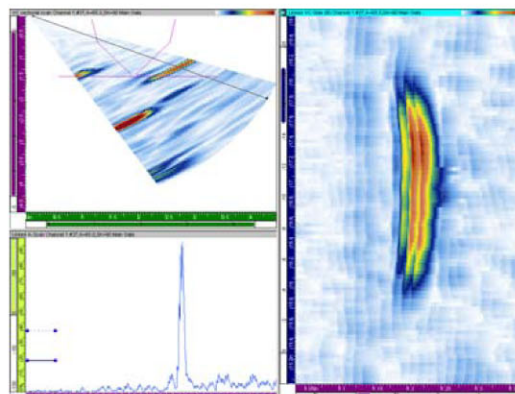
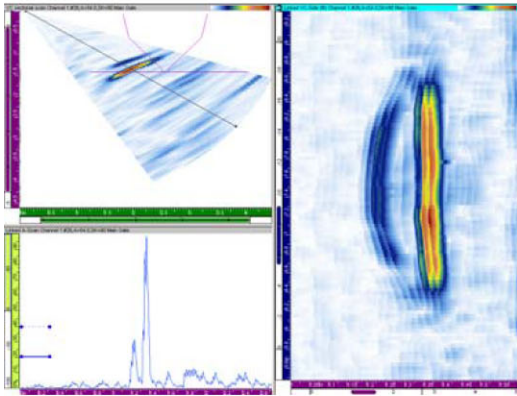
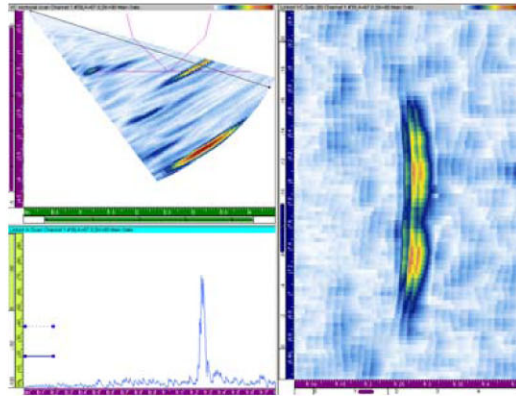


Figure E.8 Detailed Views of Individual Saw Cuts and Using the TRL Array (continued)

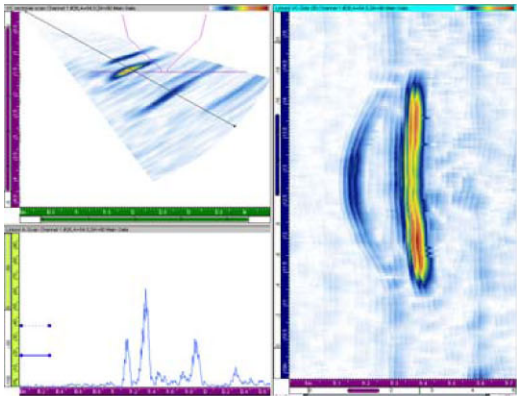
TRL Saw Cut G Near Side



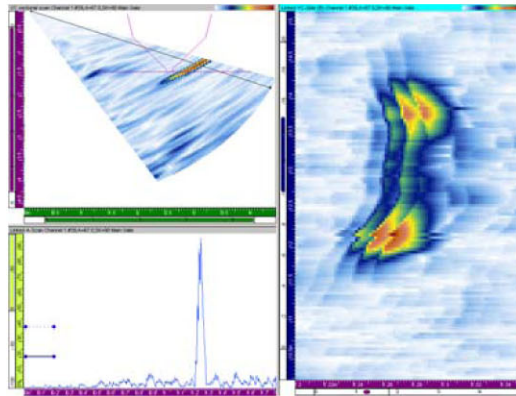
TRL Saw Cut G Far Side



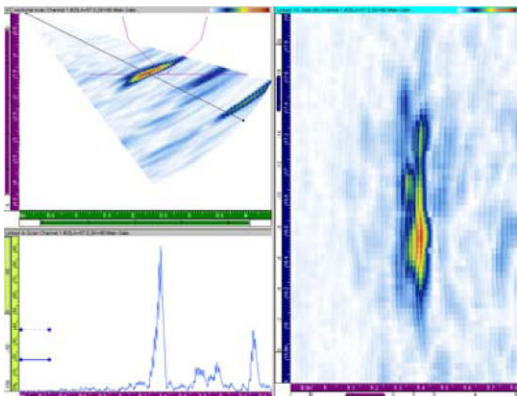
TRL Saw Cut H Near Side



TRL Saw Cut H Far Side



TRL Flaw E Near Side



TRL Flaw E Far Side

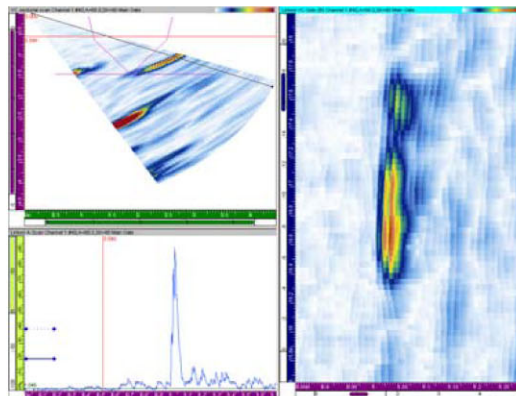
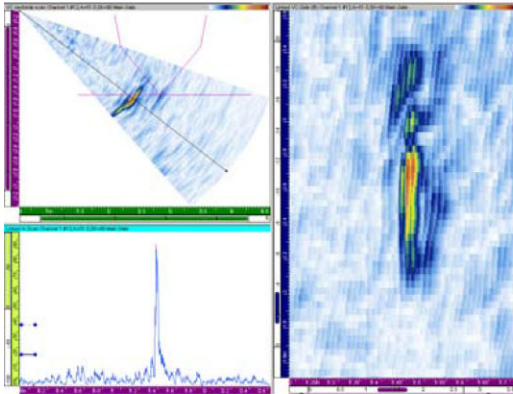
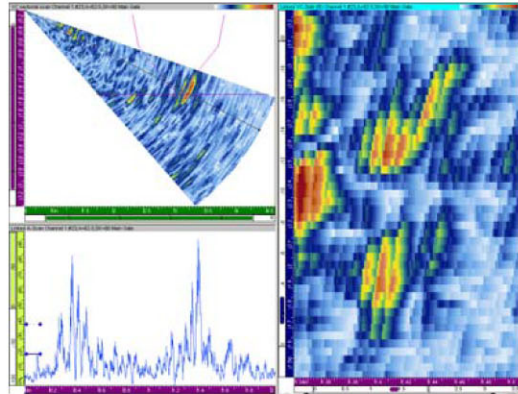


Figure E.8 Detailed Views of Individual Saw Cuts and Using the TRL Array (continued)

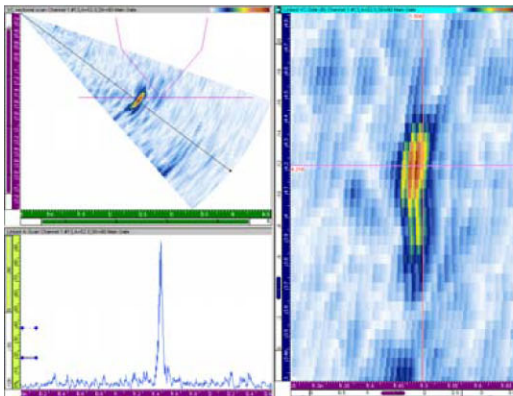
TRS Saw Cut A Near Side



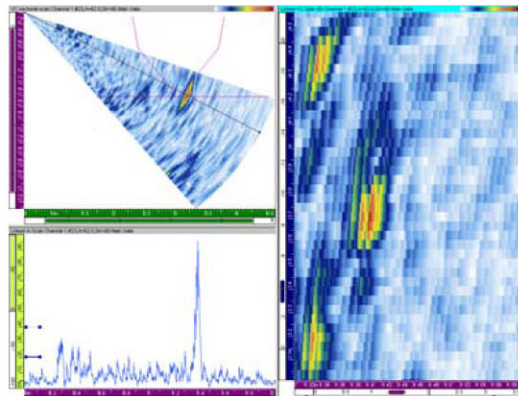
TRIS Saw Cut A Far Side



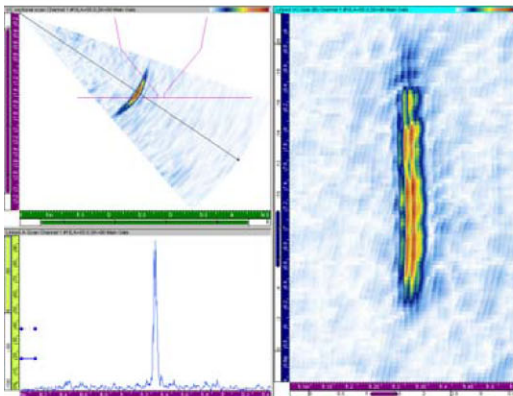
TRIS Flaw A Near Side



TRIS Flaw A Far Side



TRIS Saw Cut B Near Side



TRIS Saw Cut B Far Side

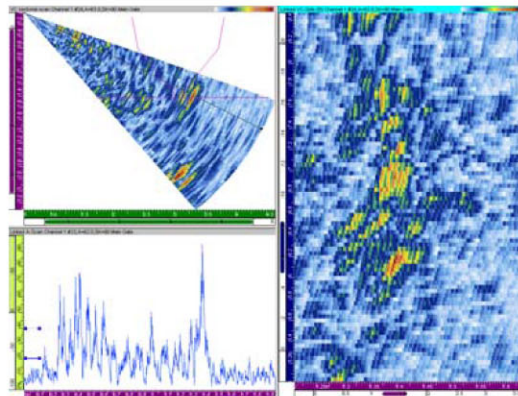
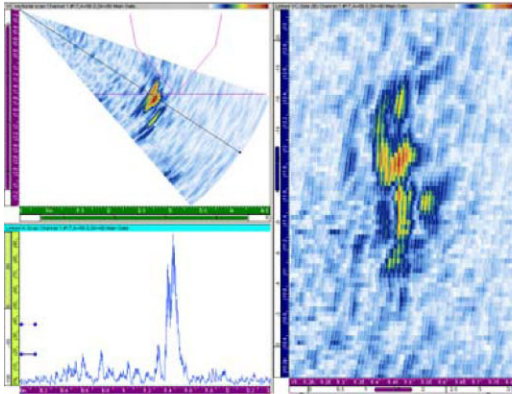
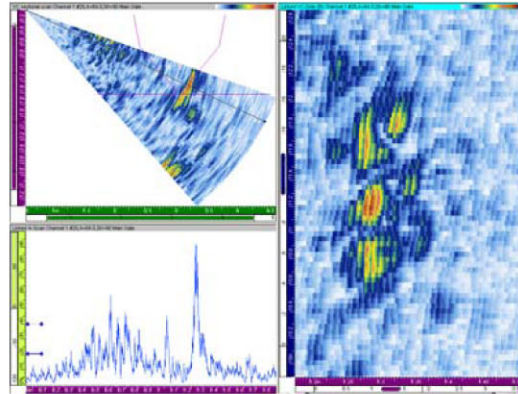


Figure E.9 Detailed Views of Individual Saw Cuts and Using the TRIS Array

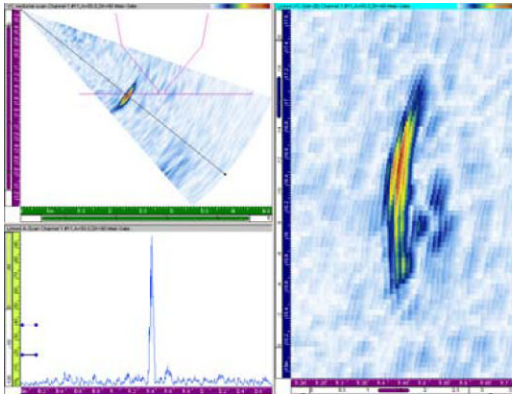
TRS Flaw B Near Side



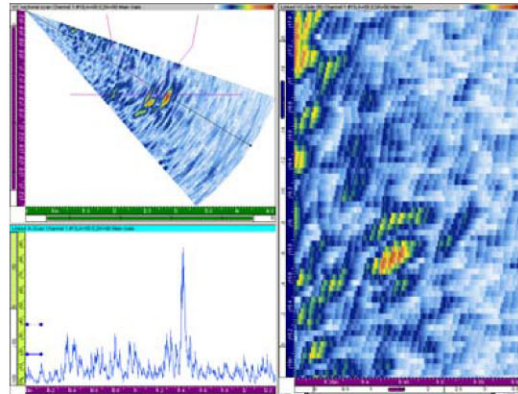
TRS Flaw B Far Side



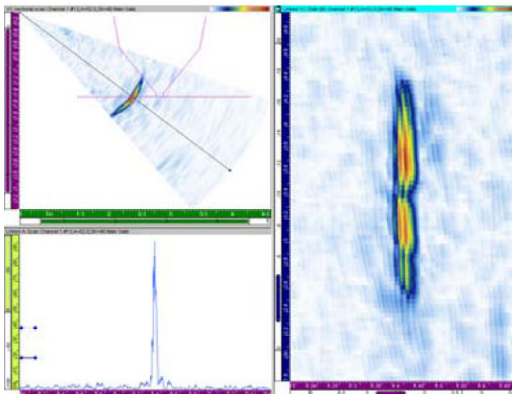
TRS Saw Cut C Near Side



TRS Saw Cut C Far Side



TRS Saw Cut D Near Side



TRS Saw Cut D Far Side

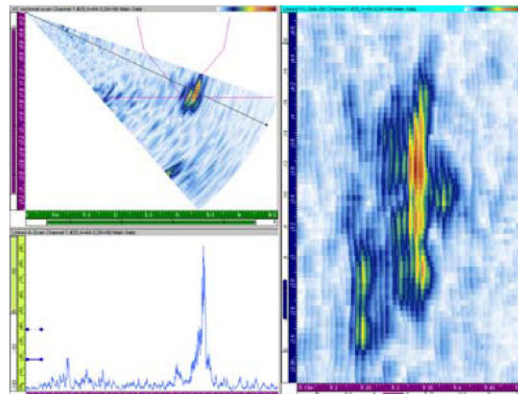
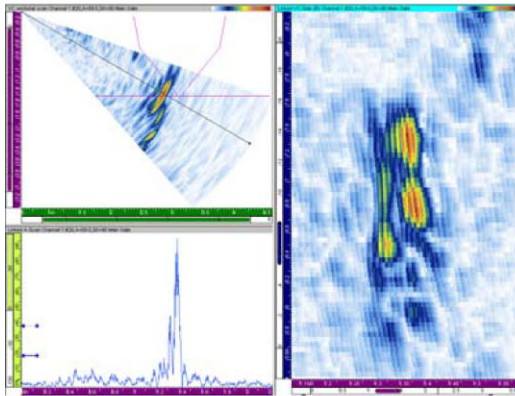
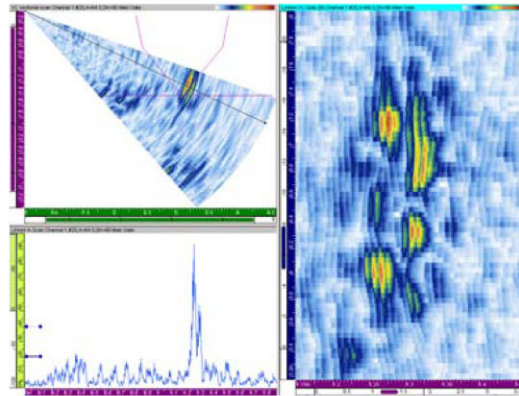


Figure E.9 Detailed Views of Individual Saw Cuts and Using the TRS Array (continued)

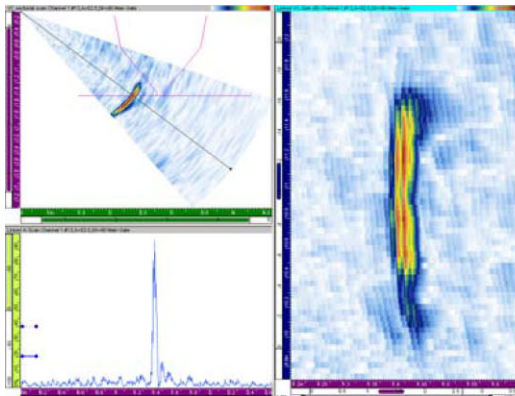
TRS Flaw C Near Side



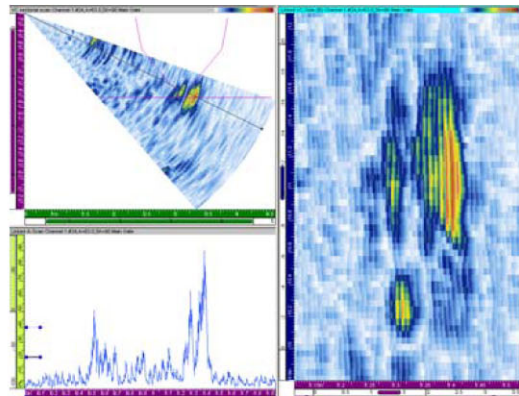
TRS Flaw C Far Side



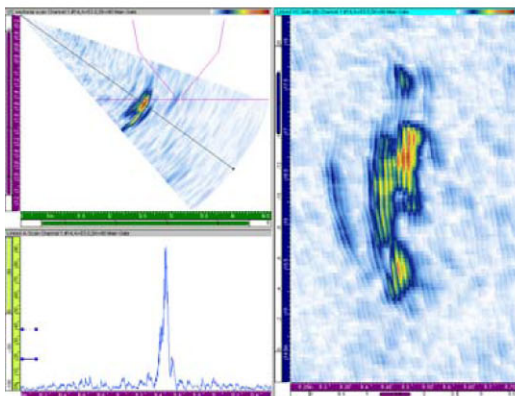
TRS Saw Cut E Near Side



TRS Saw Cut E Far Side



TRS Saw Cut F Near Side



TRS Saw Cut F Far Side

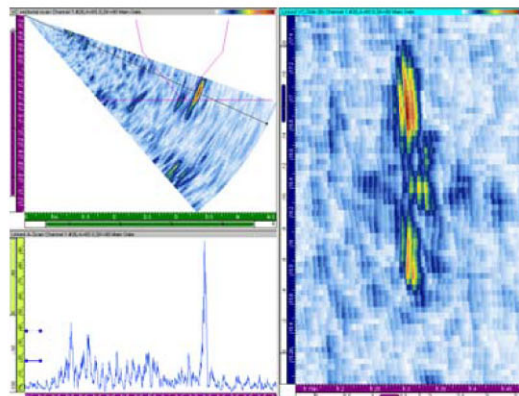
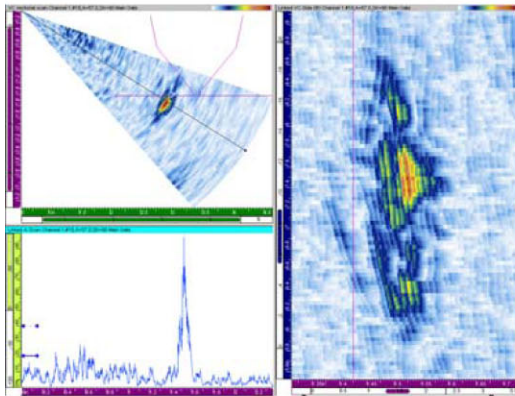
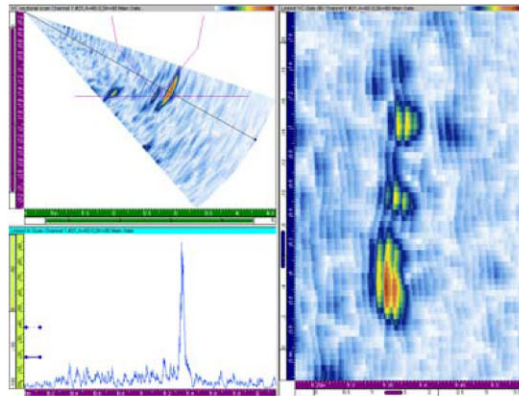


Figure E.9 Detailed Views of Individual Saw Cuts and Using the TRS Array (continued)

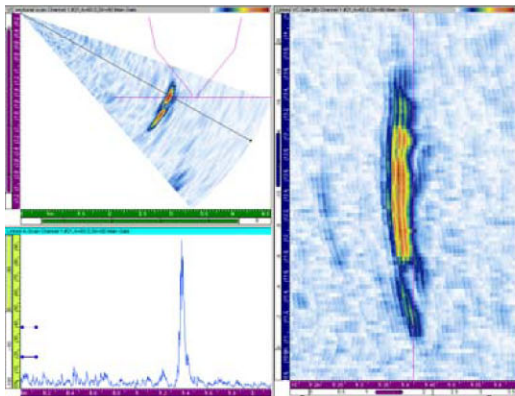
TRS Saw Cut G Near Side



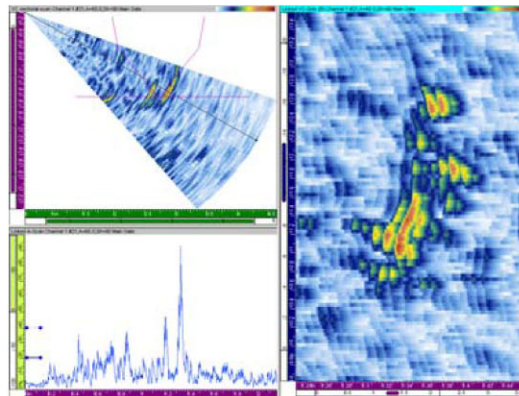
TRS Saw Cut G Far Side



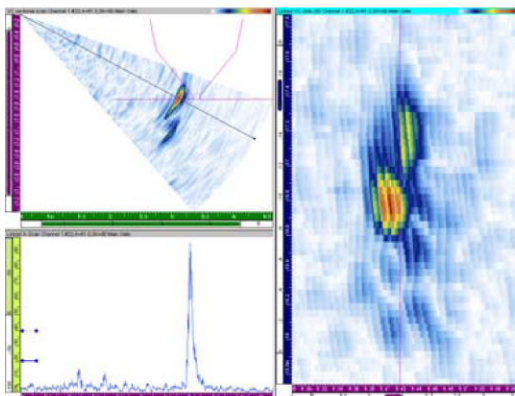
TRS Saw Cut H Near Side



TRS Saw Cut H Far Side



TRS Flaw E Near Side



TRS Flaw E Far Side

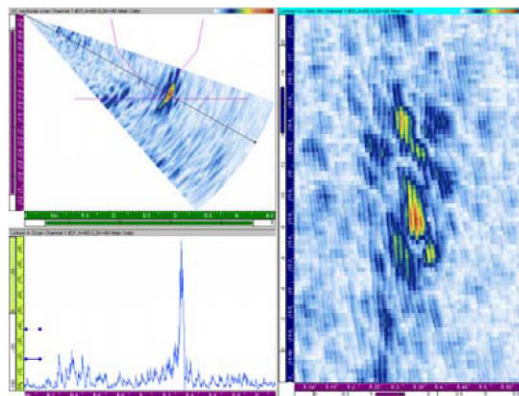
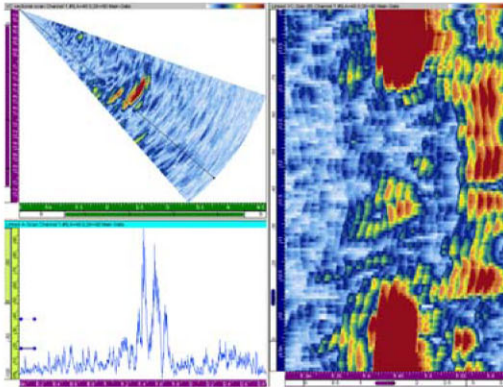
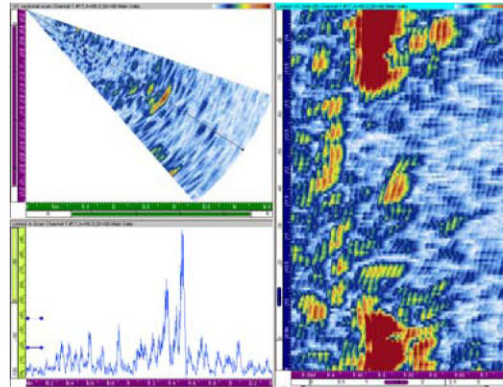


Figure E.9 Detailed Views of Individual Saw Cuts and Using the TRR Array (continued)

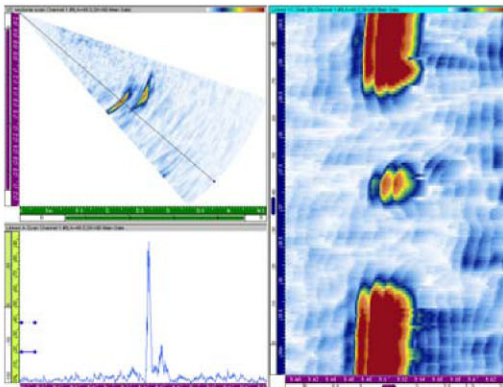
TRS Near-Side V-Pipe 5% Crack



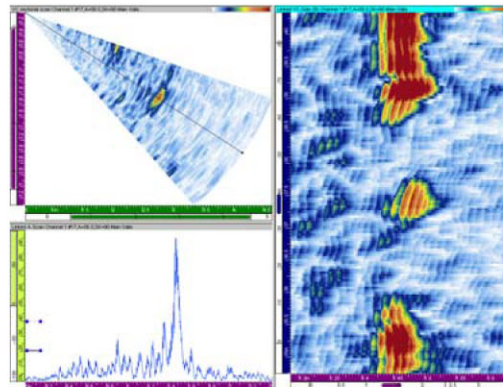
TRS Far-Side V-Pipe 5% Crack



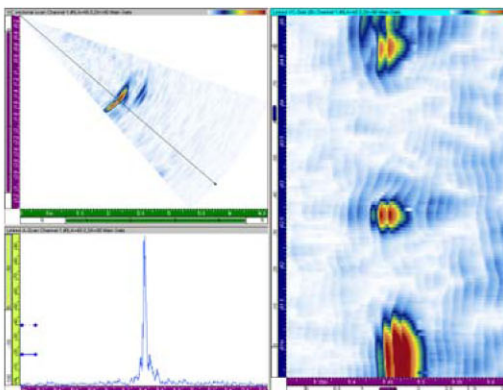
TRS Near-Side V-Pipe 10% Crack



TRS Far-Side V-Pipe 10% Crack



TRS Near-Side V-Pipe 15% Crack



TRS Far-Side V-Pipe 15% Crack

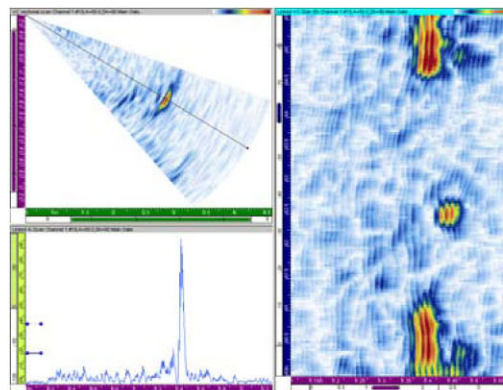


Figure E.9 Detailed Views of Individual Saw Cuts and Using the TRR Array (continued)



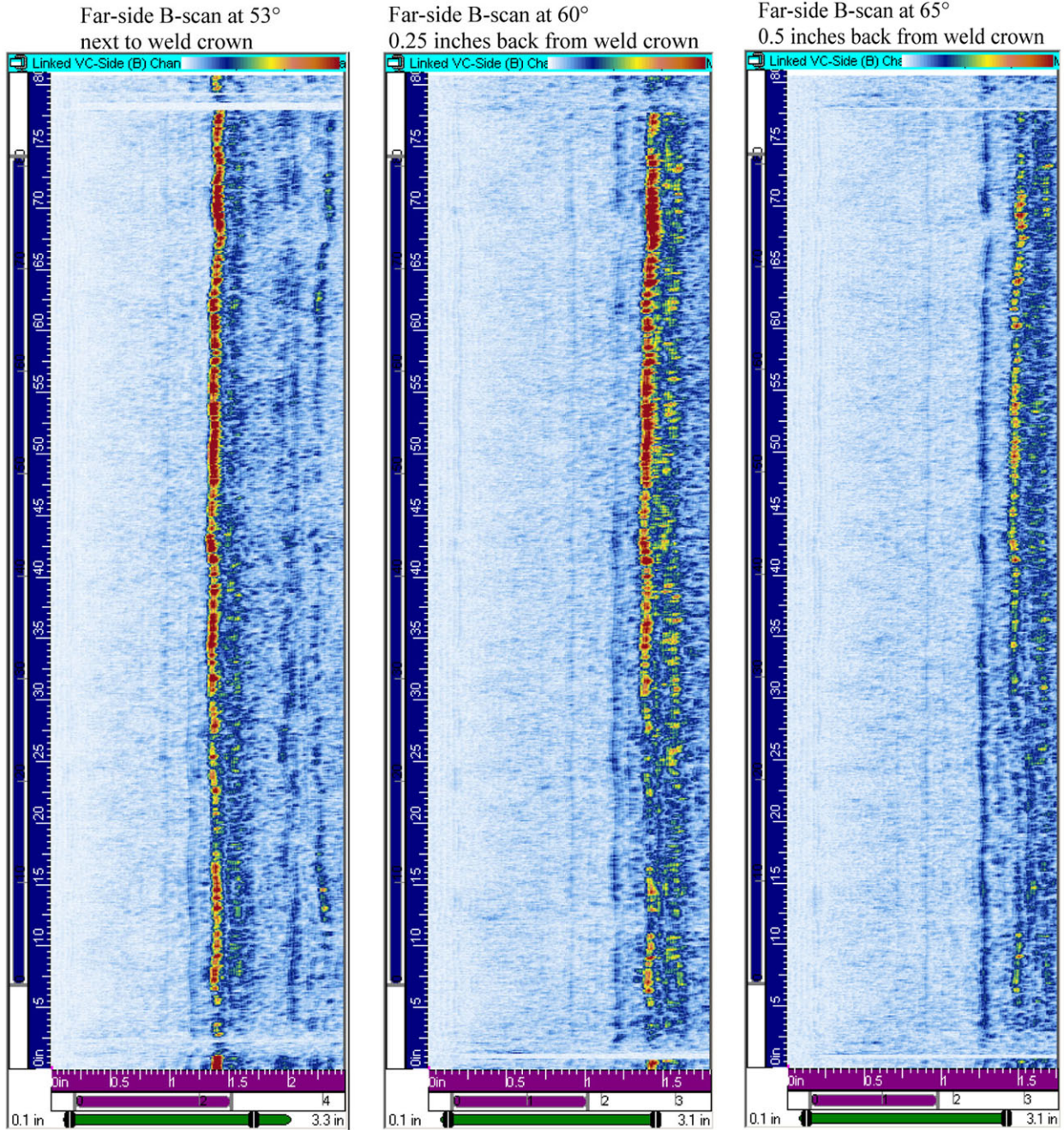
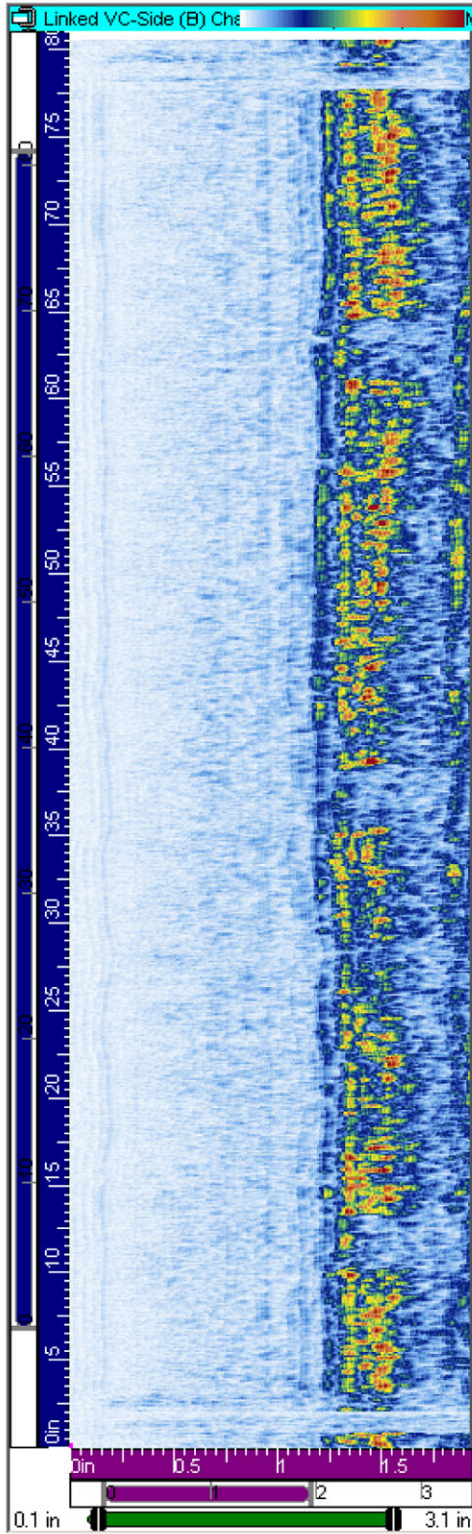


Figure E.10 TRL Data for Pipe Specimen 03-C22 Weld 1

Far-side B-scan at 52°  
next to weld crown



Far-side B-scan at 58°  
0.25 inches back from weld crown

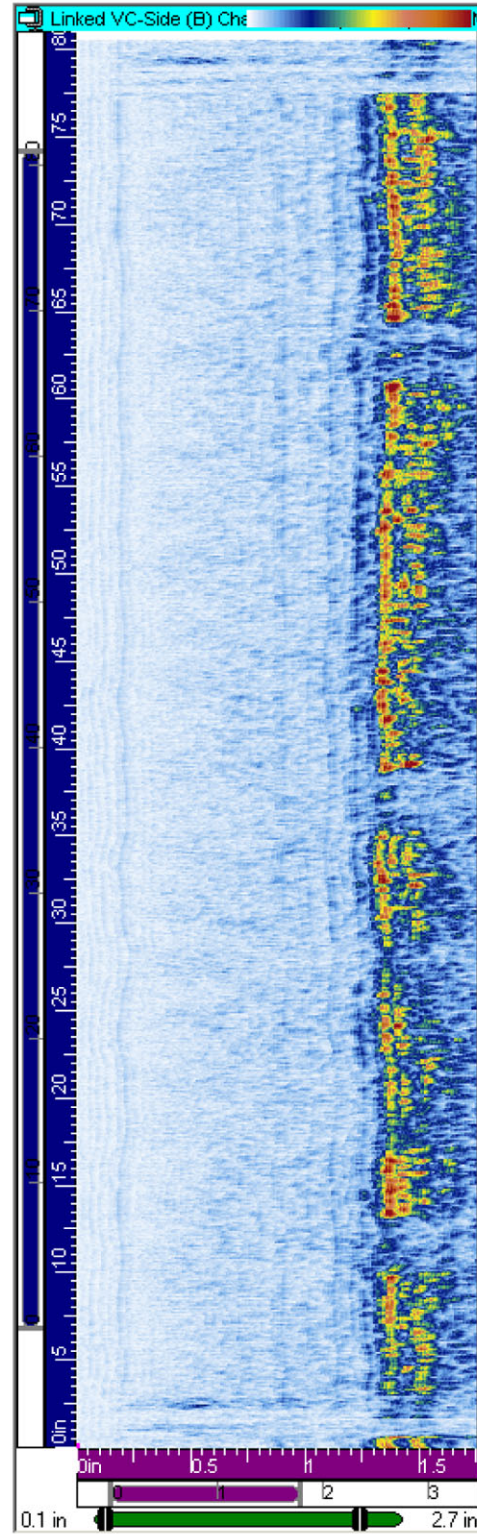
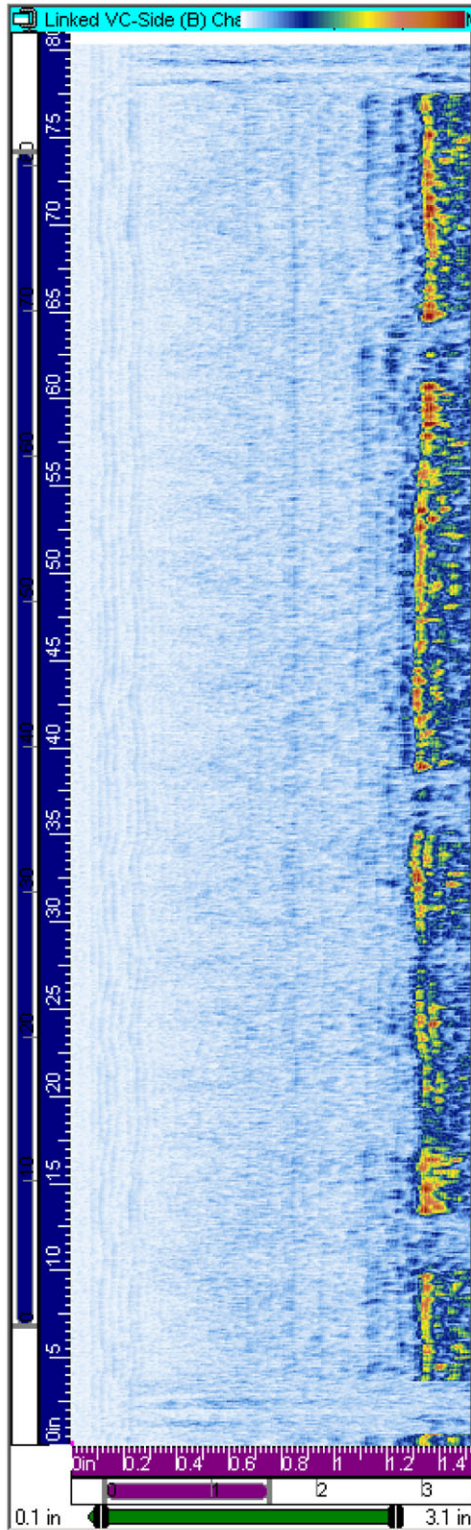


Figure E.11 TRL Data for Pipe Specimen 03-C22 Weld 2

Far-side B-scan at 61°  
0.5 inches back from weld crown



Near-side B-scan at 54°  
0.25 inches back from weld crown

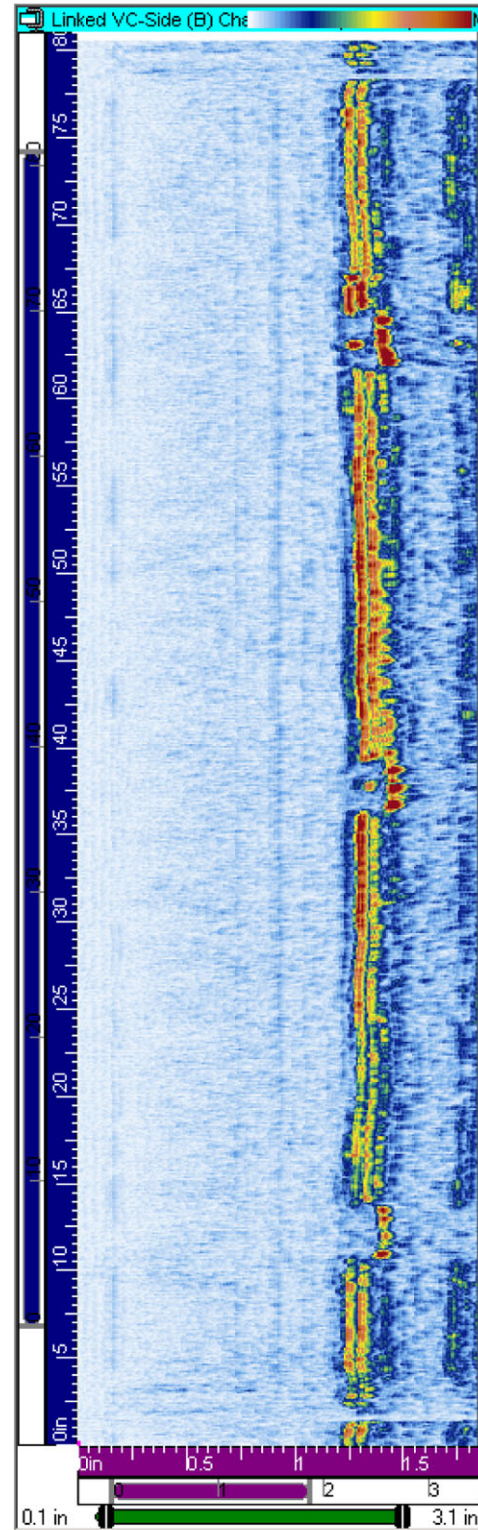
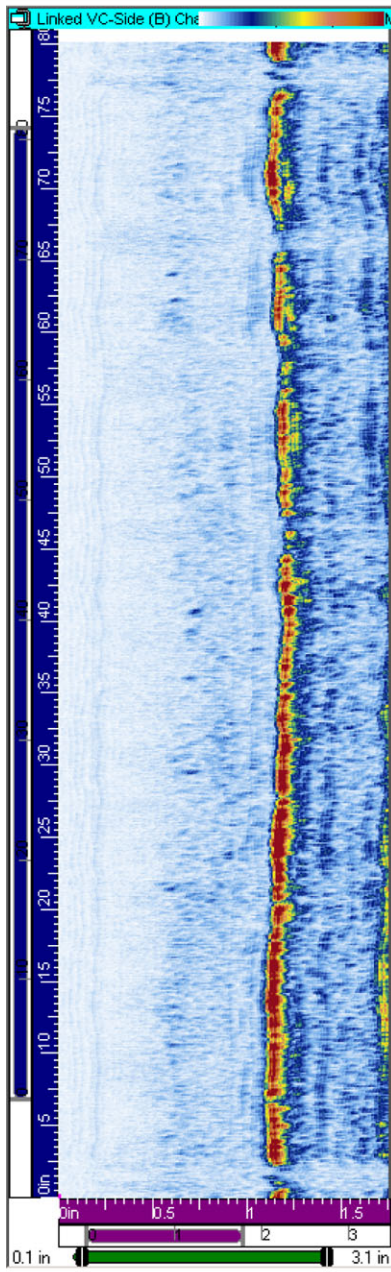
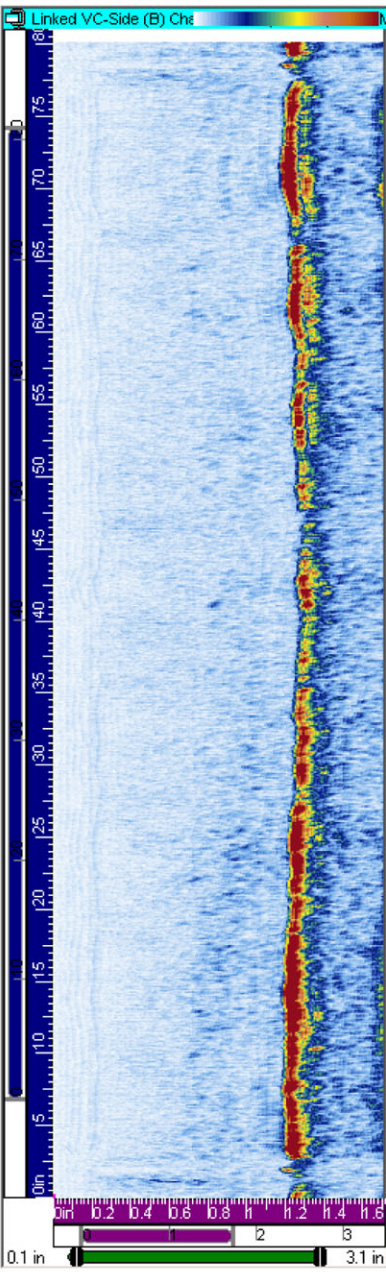


Figure E.11 TRL Data for Pipe Specimen 03-C22 Weld 2 (continued)

Far-side B-scan at 49°  
next to weld crown



Far-side B-scan at 52°  
0.25 inches back from weld crown



Far-side B-scan at 61°  
0.75 inches back from weld crown

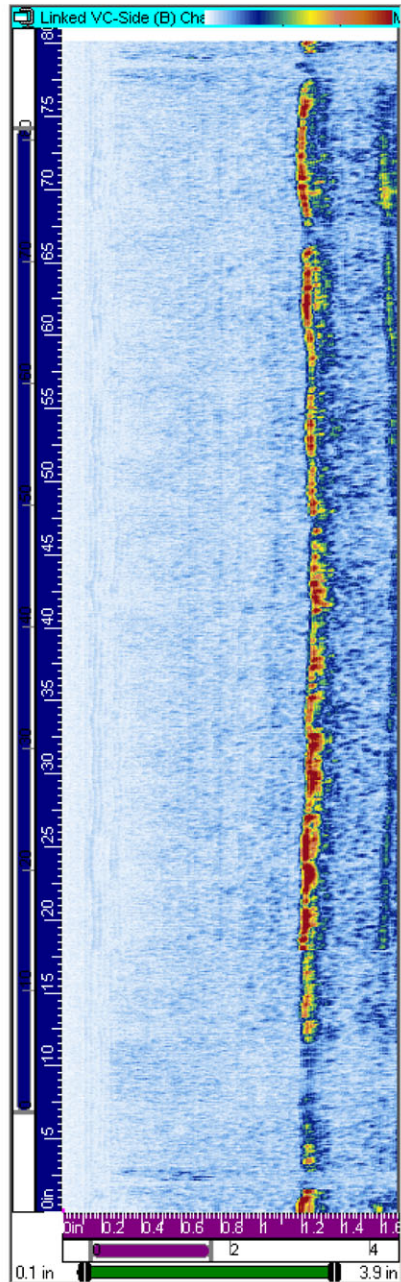


Figure E.12 TRL Data for Pipe Specimen 03-C22 Weld 3

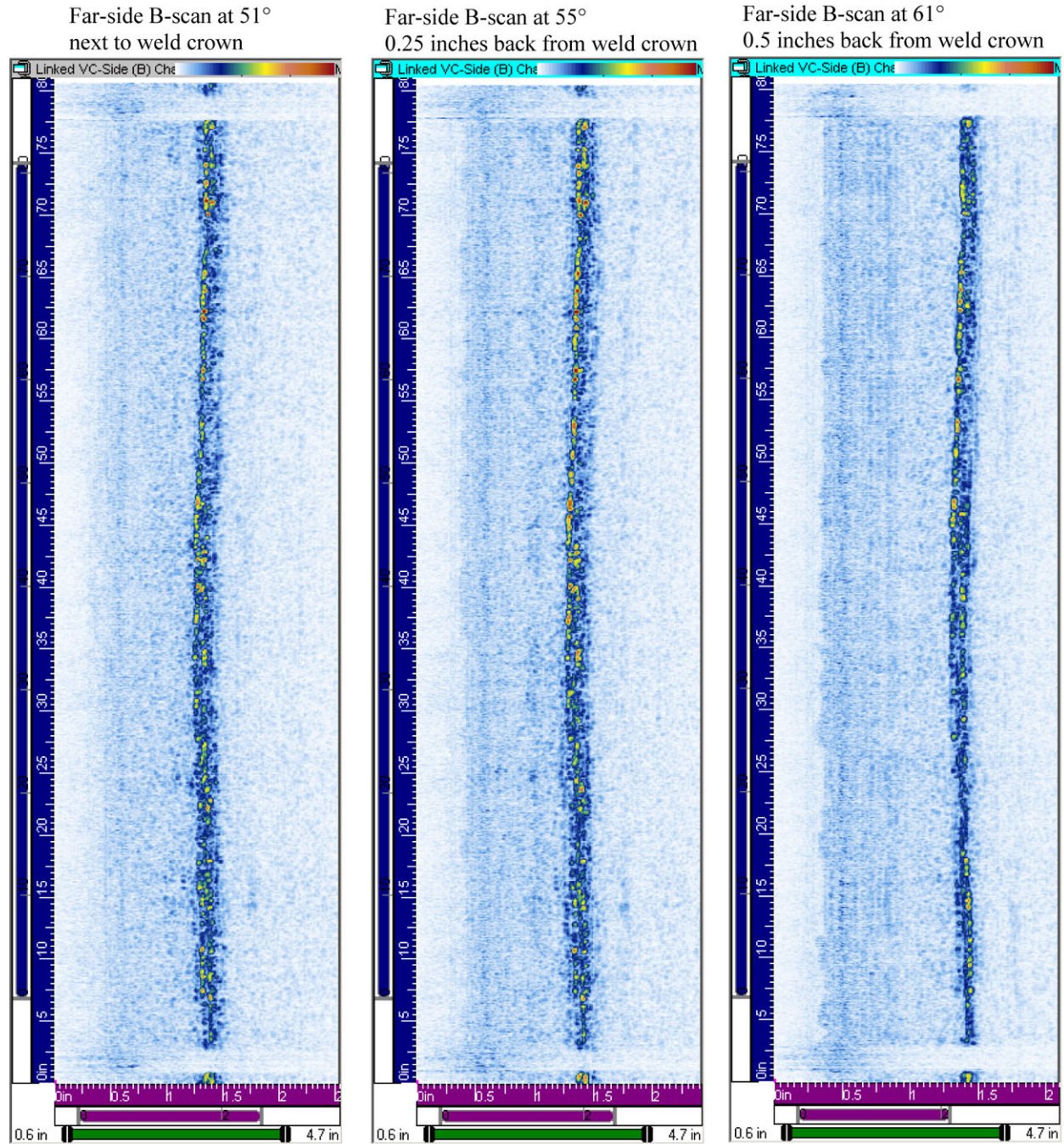
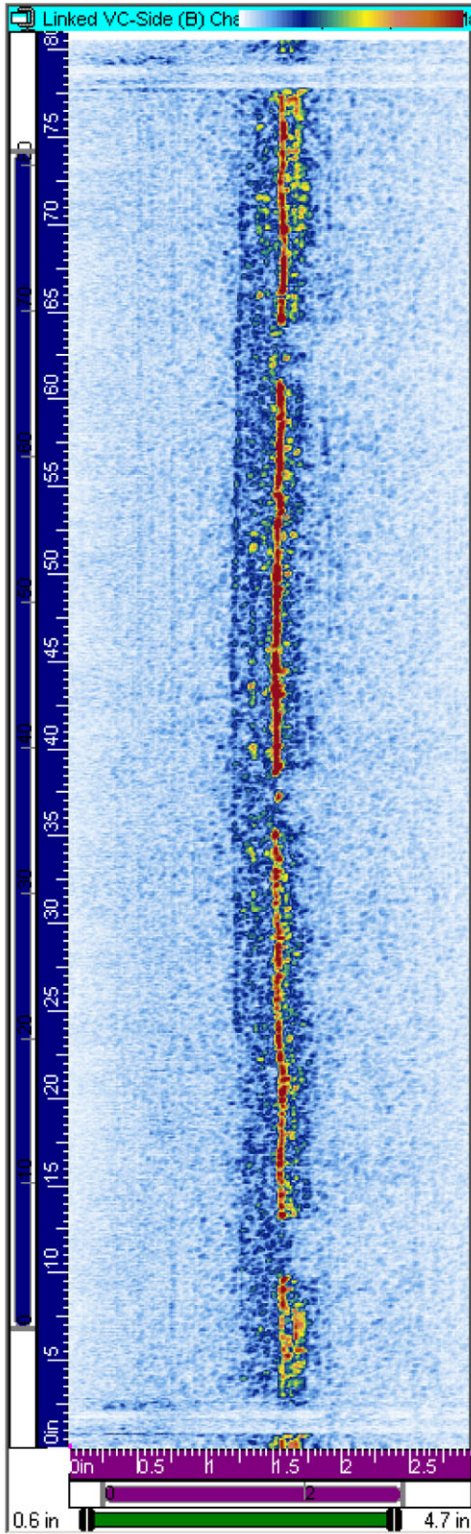


Figure E.13 TRS Data for Pipe Specimen 03-C22 Weld 1

Far-side B-scan at 49°  
next to weld crown



Far-side B-scan at 54°  
0.25 inches back from weld crown

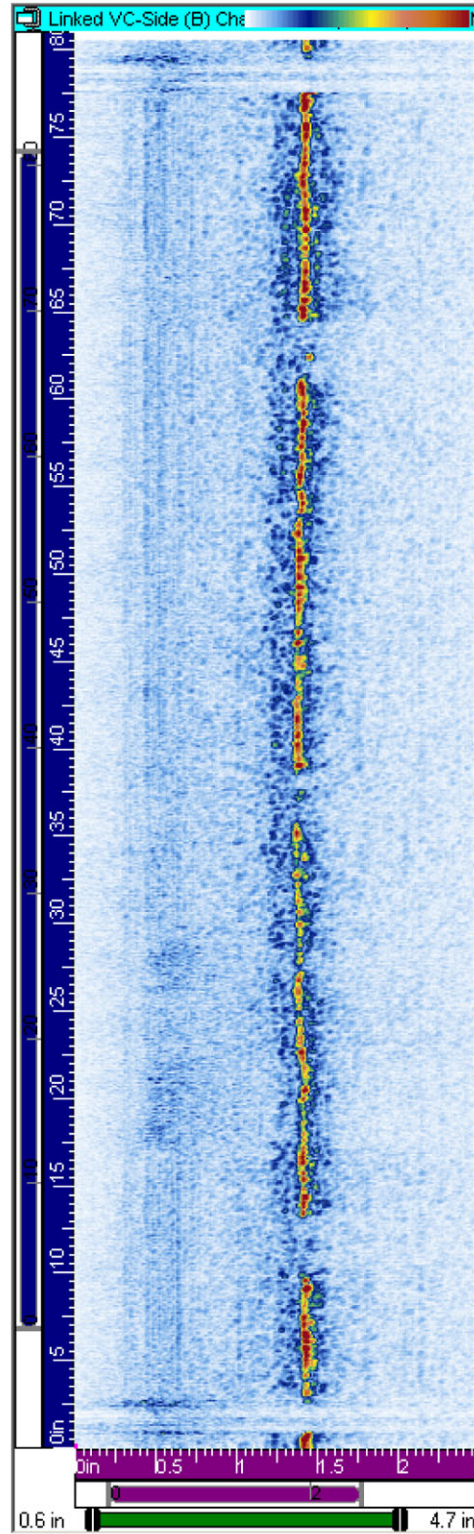
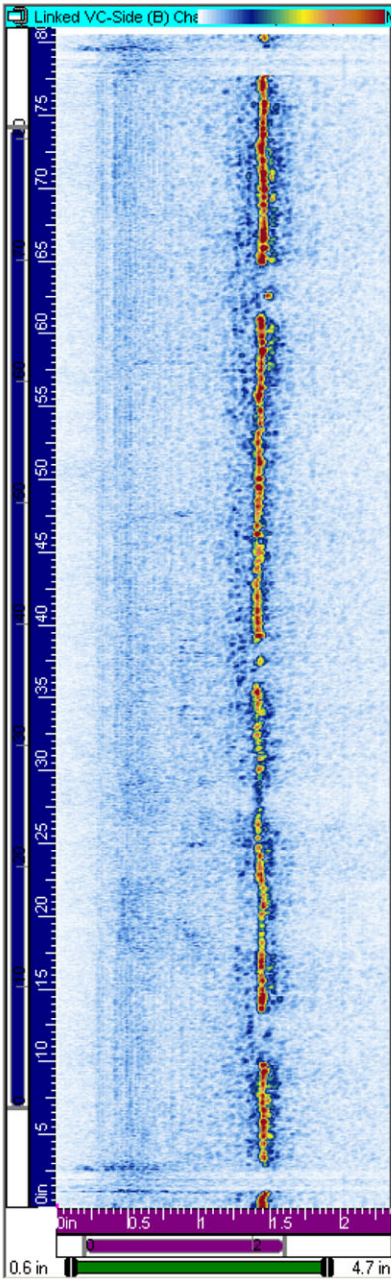
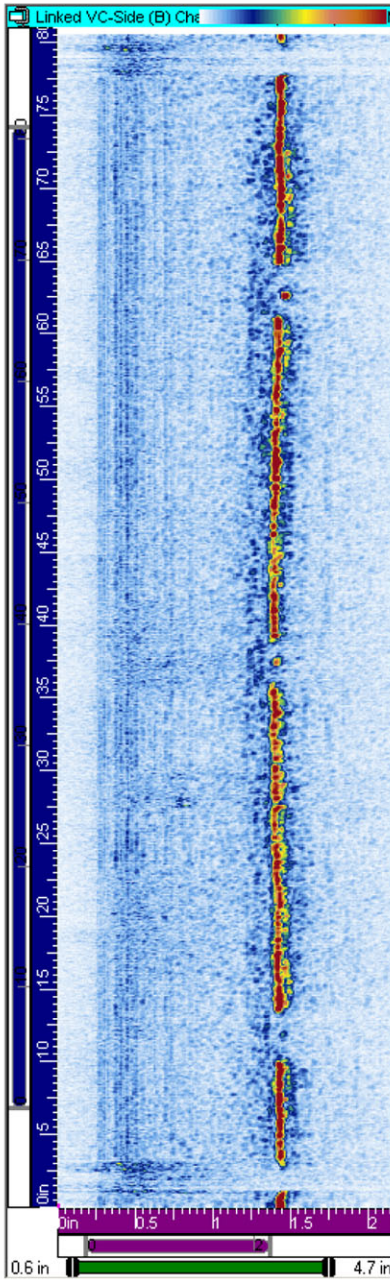


Figure E.14 TRS Data for Pipe Specimen 03-C22 Weld 2

Far-side B-scan at 58°  
0.5 inches back from weld crown



Far-side B-scan at 59°  
0.75 inches back from weld crown



Far-side B-scan at 47°  
0.25 inches back from weld crown

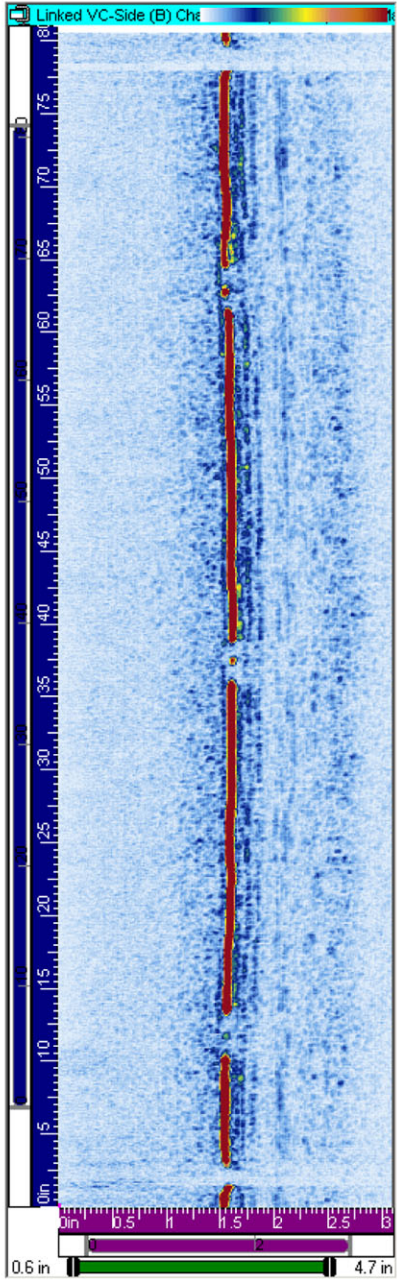
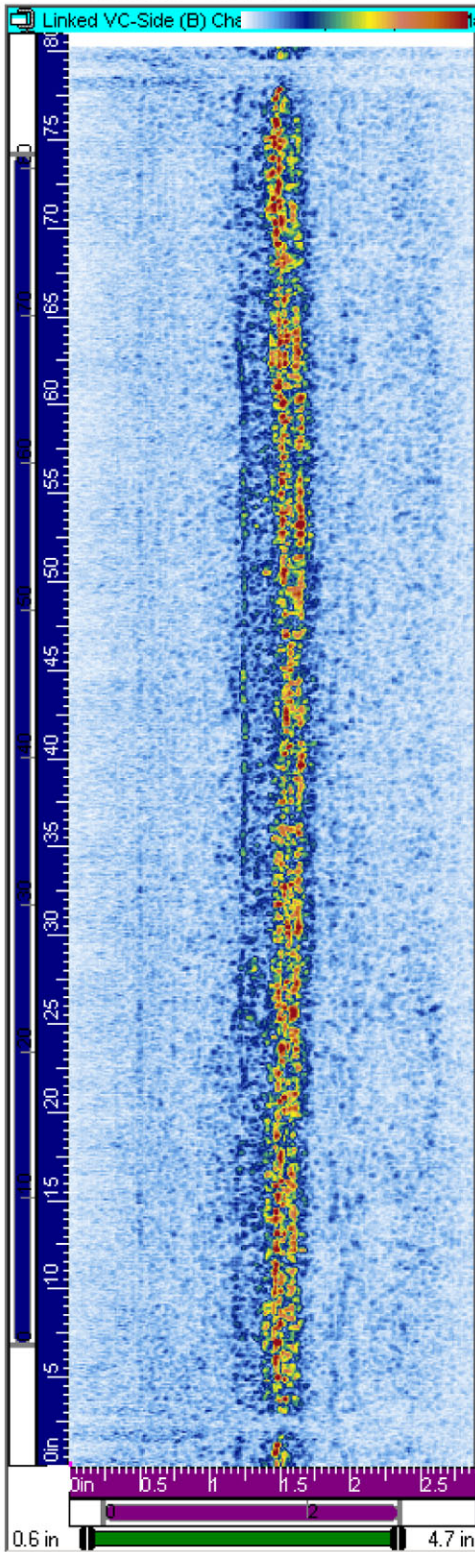


Figure E.14 TRS Data for Pipe Specimen 03-C22 Weld 2 (continued)

Far-side B-scan at 51°  
next to weld crown



Far-side B-scan at 58°  
0.25 inches back from weld crown

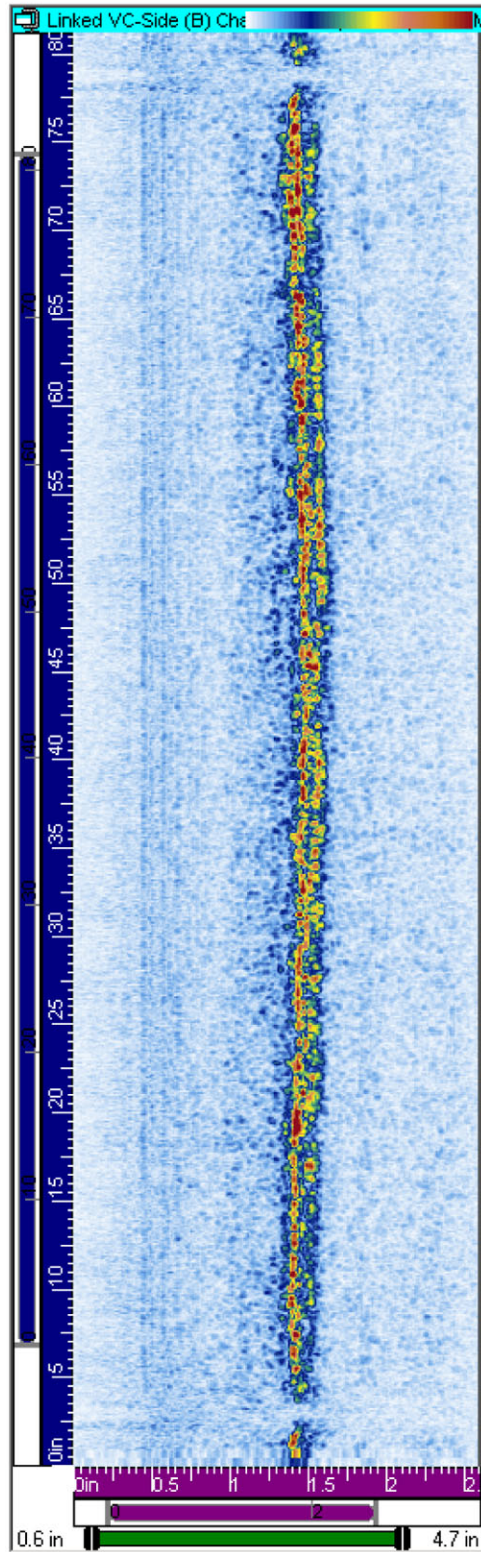
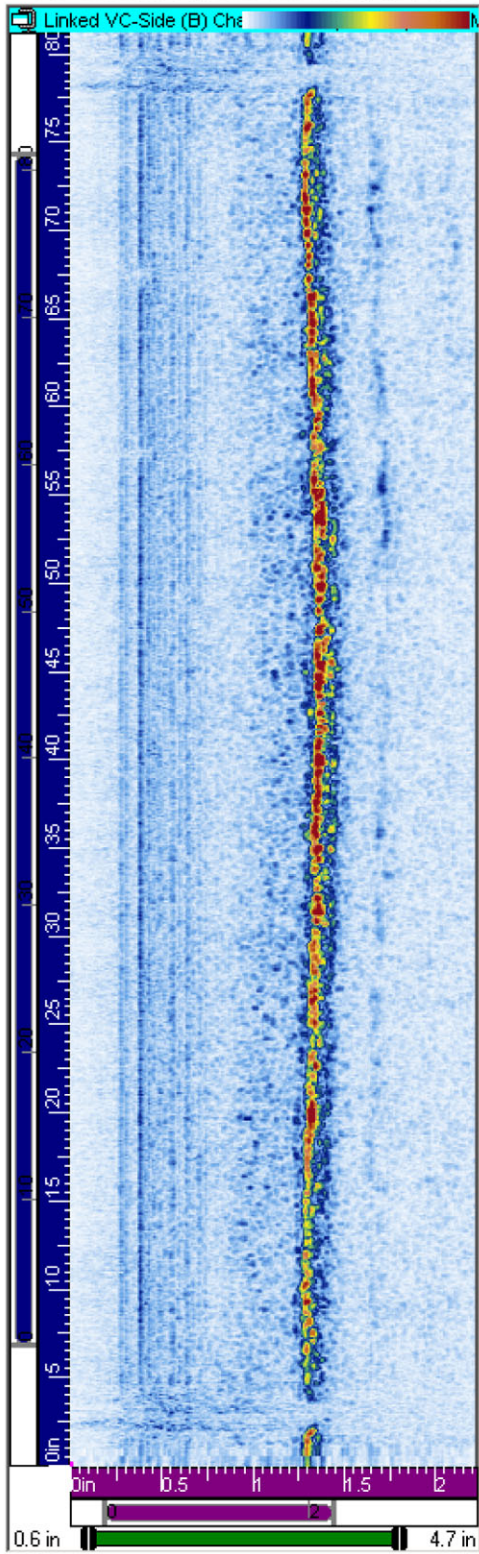


Figure E.15 TRS Data for Pipe Specimen 03-C22 Weld 3



Far-side B-scan at 60°  
0.5 inches back from weld crown



Far-side B-scan at 62°  
0.75 inches back from weld crown

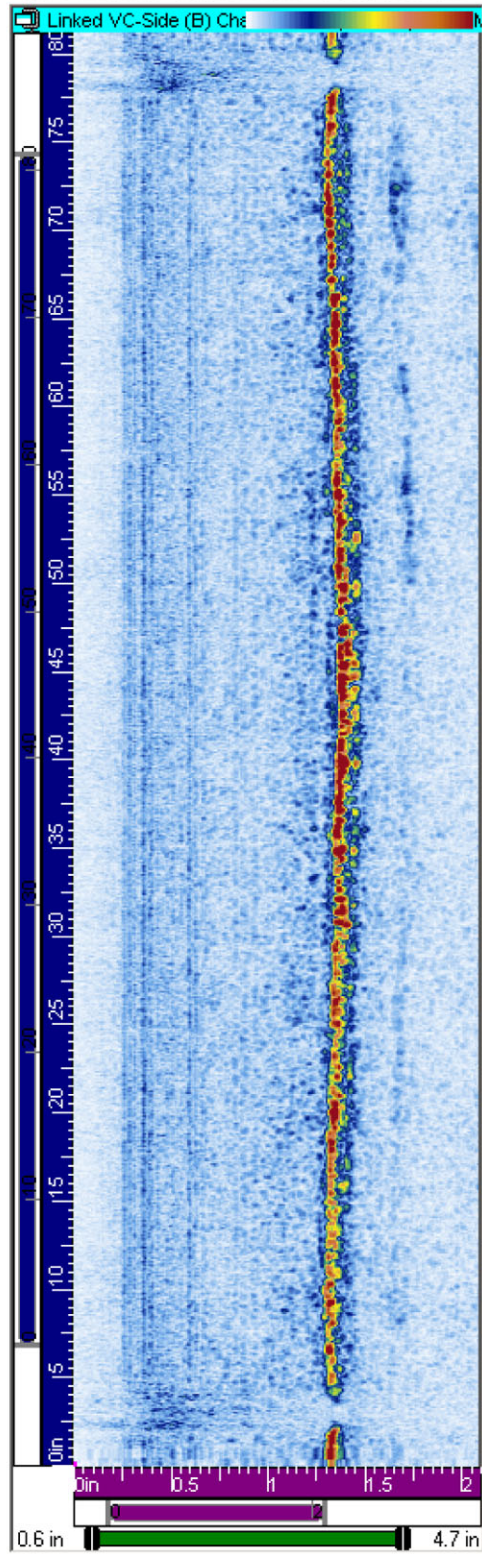


Figure E.15 TRS Data for Pipe Specimen 03-C22 Weld 3 (continued)



## **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

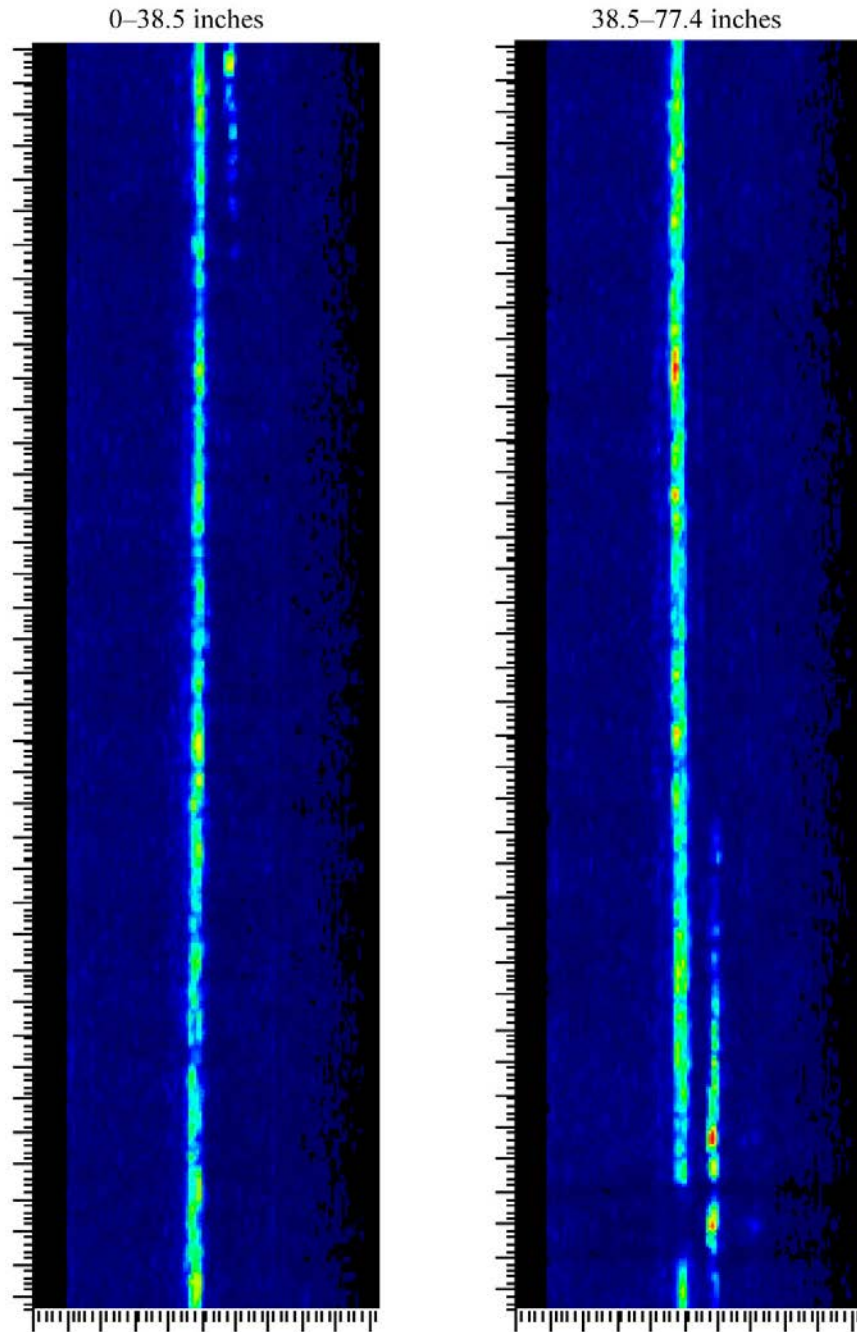


Figure F.1 C-scan Taken from the Far Side of Weld No. 1 Using 60° Shear Waves

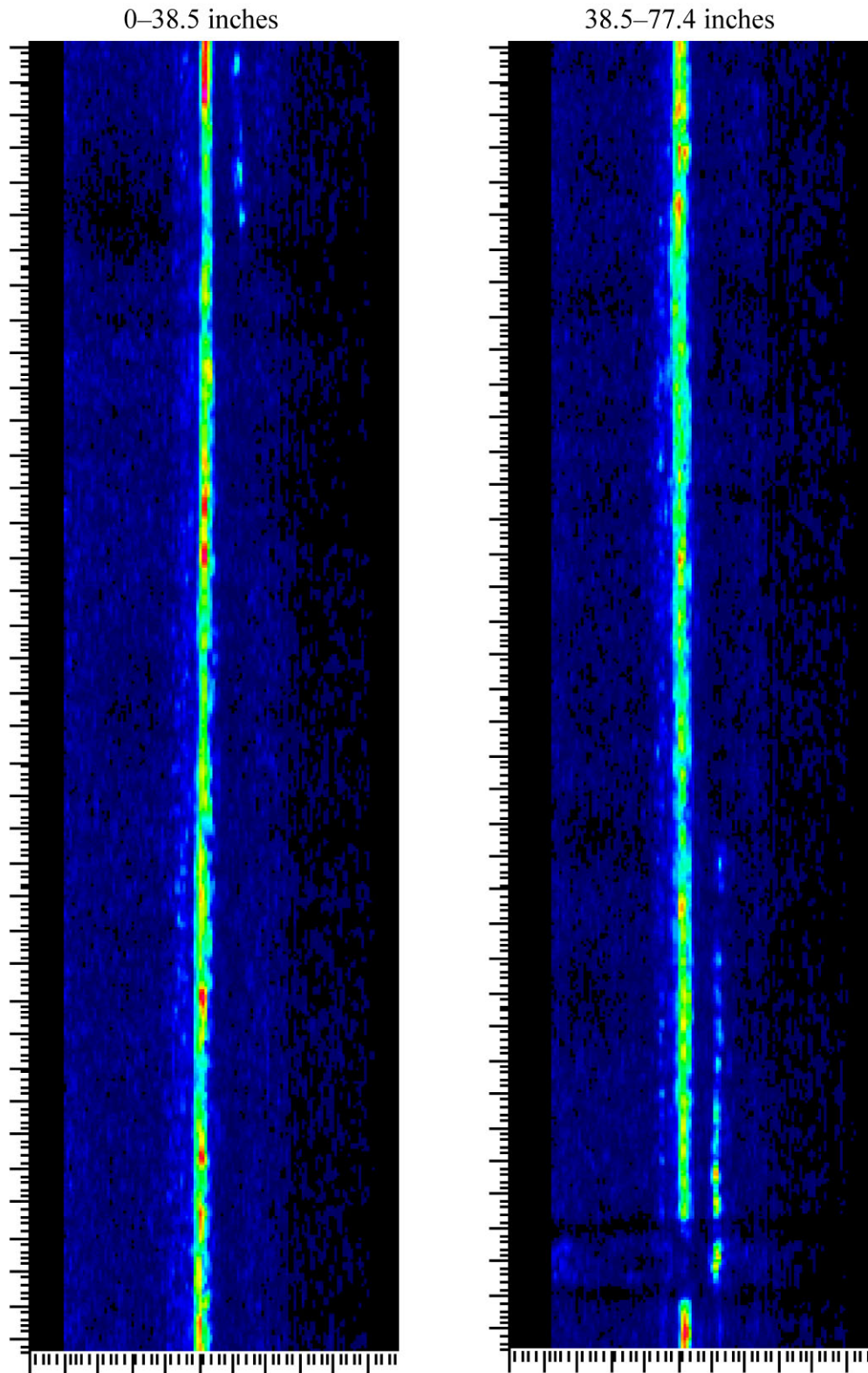


Figure F.2 C-scan Taken from the Far Side of Weld No. 1 Using 70° Shear Waves

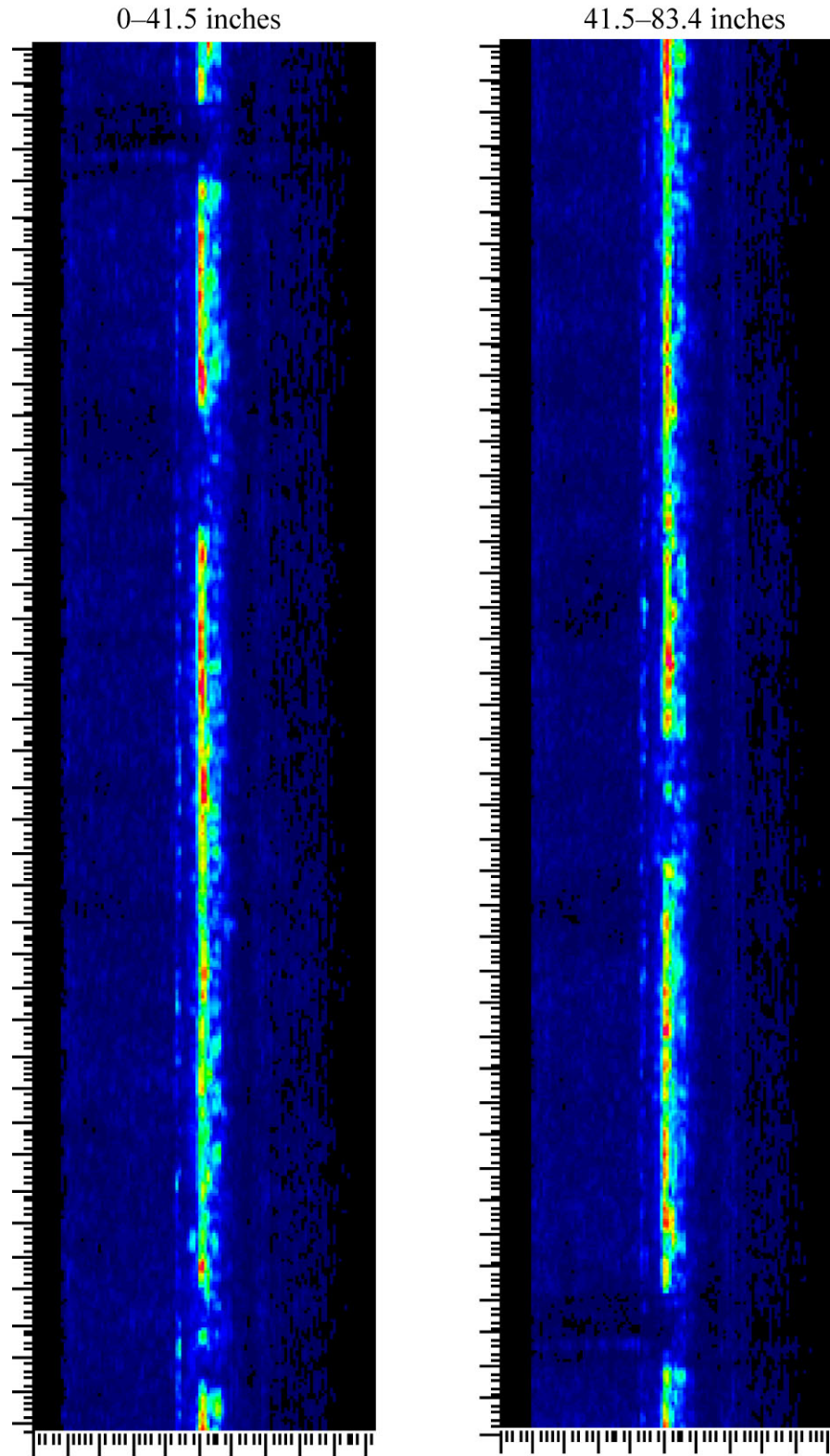


Figure F.3 C-scan Taken from the Far Side of Weld No. 2 Using 60° Shear Waves

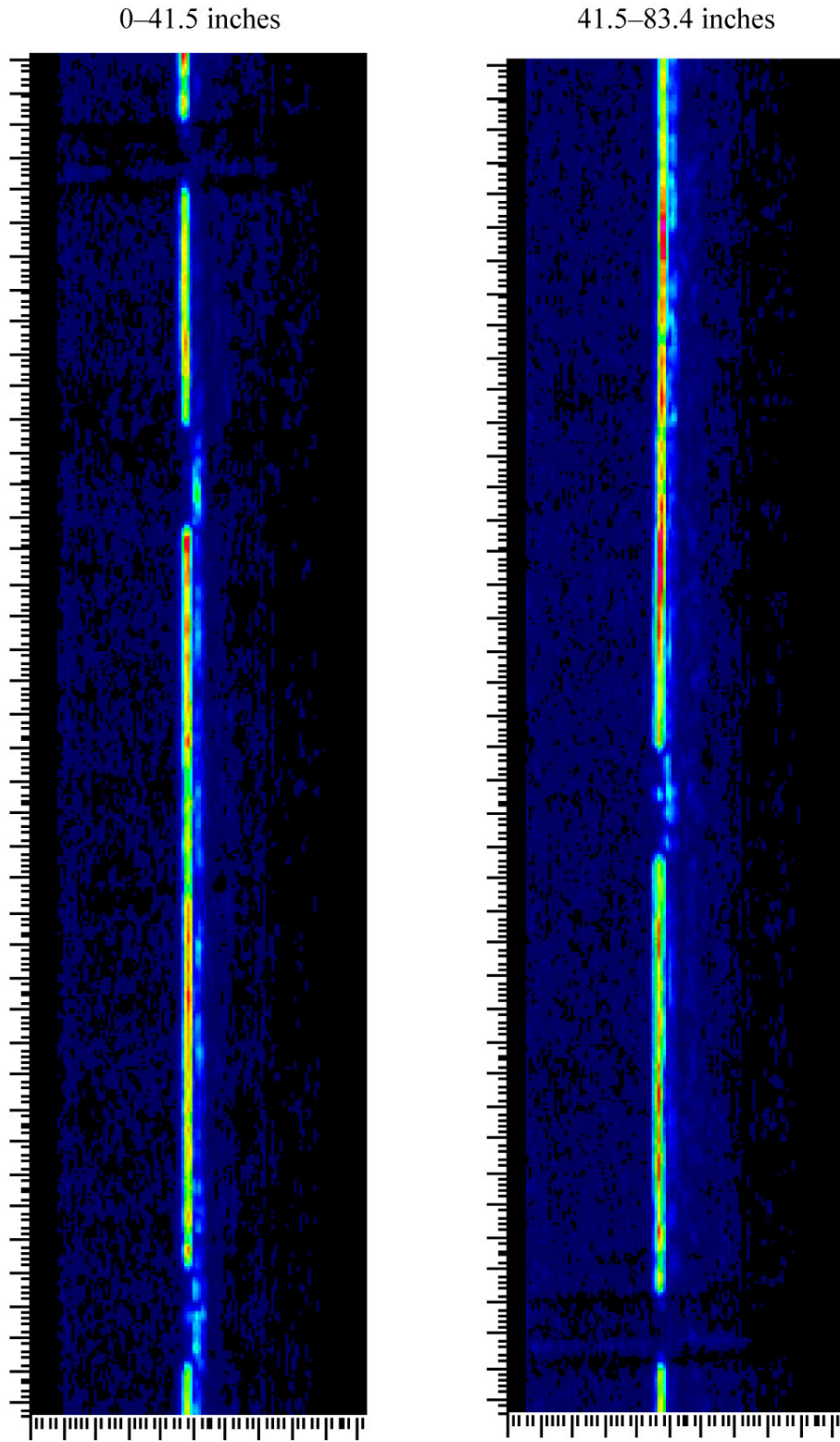


Figure F.4 C-scan Taken from the Near Side of Weld No. 2 Using 60° Shear Waves



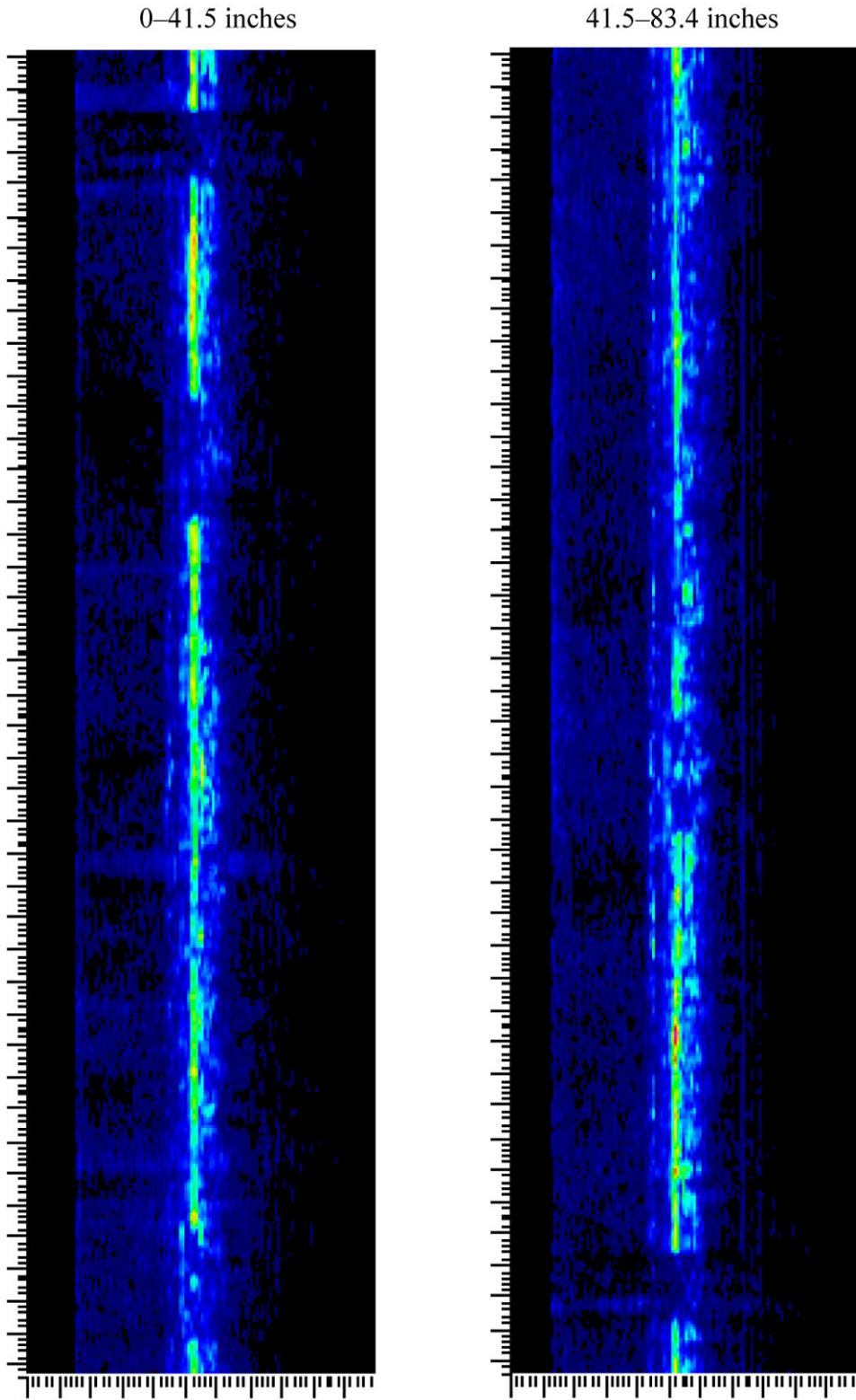


Figure F.5 C-scan Taken from the Far Side of Weld No. 2 Using 70° Shear Waves

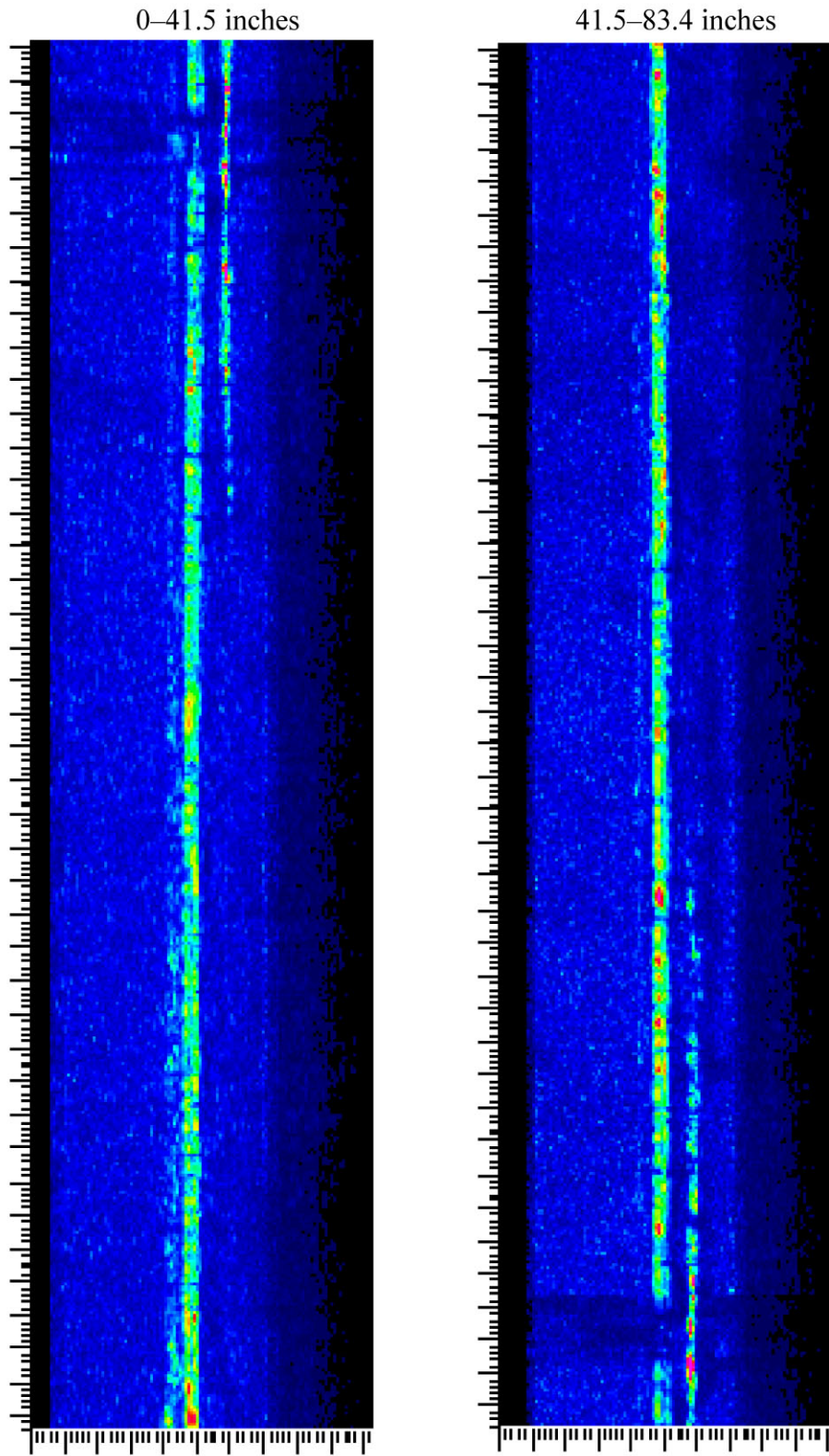
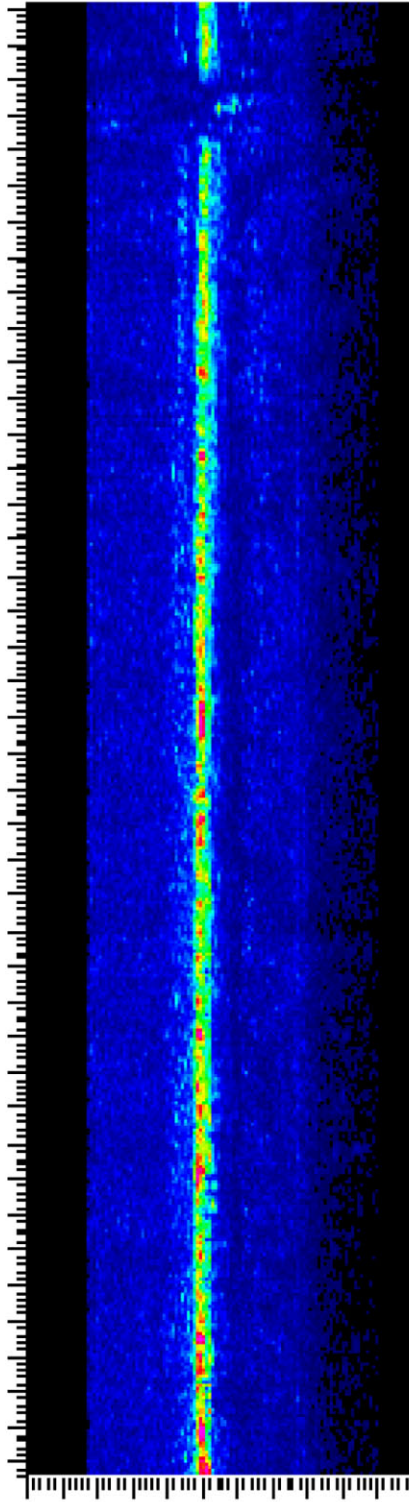


Figure F.6 C-scan Taken from the Far Side of Weld No. 3 Using 60° Shear Waves

0-41.5 inches



41.5-83.4 inches

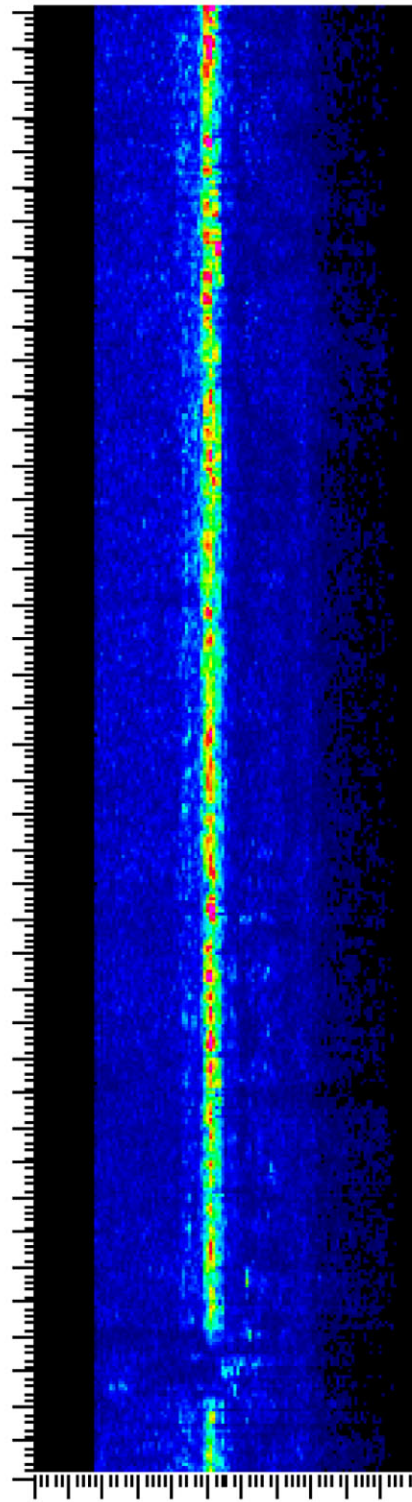


Figure F.7 C-scan Taken from the Far Side of Weld No. 3 Using 70° Shear Waves



## **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

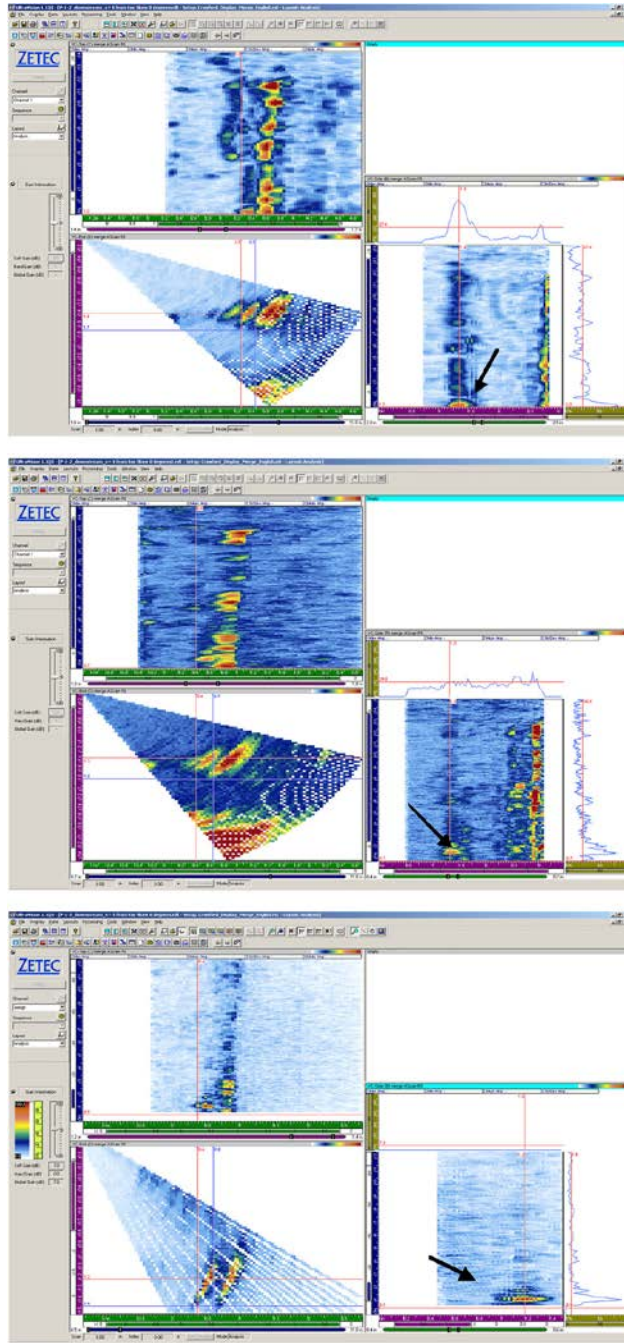
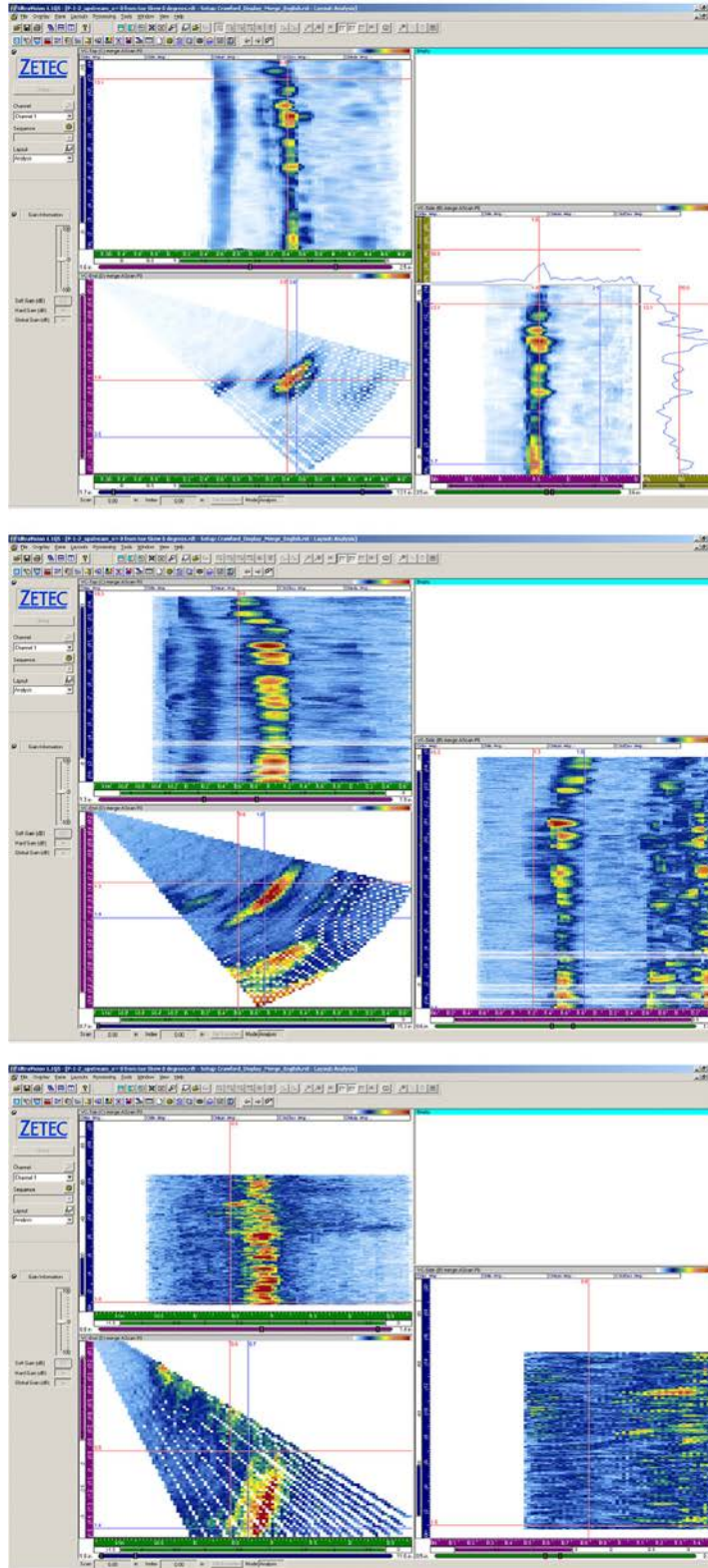


Figure G.1 P1-2 Downstream, Near Side with TRL 1.5 MHz, Mini-TRL 2 MHz, and TRS 2 MHz, Top to Bottom. Yes, Yes, Yes detected.



**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.**



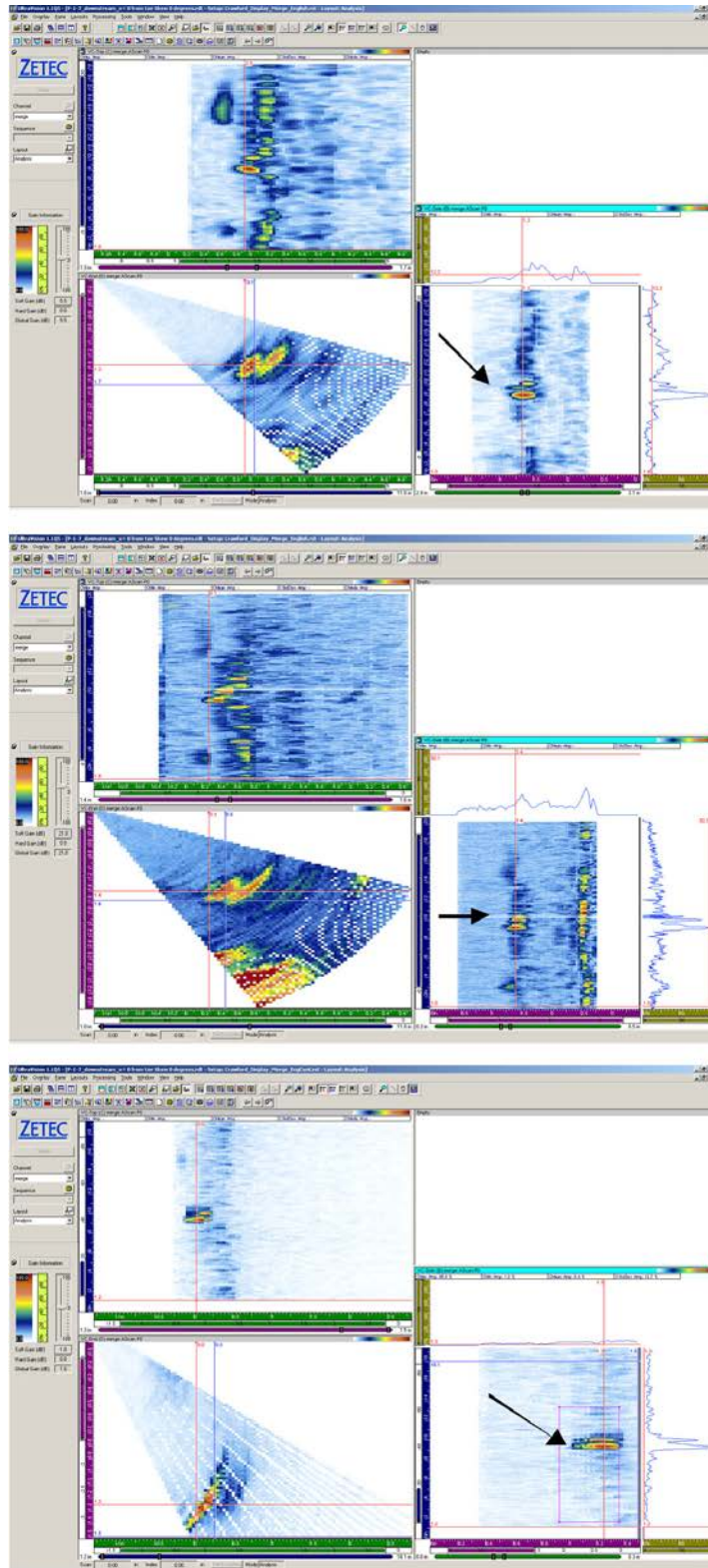
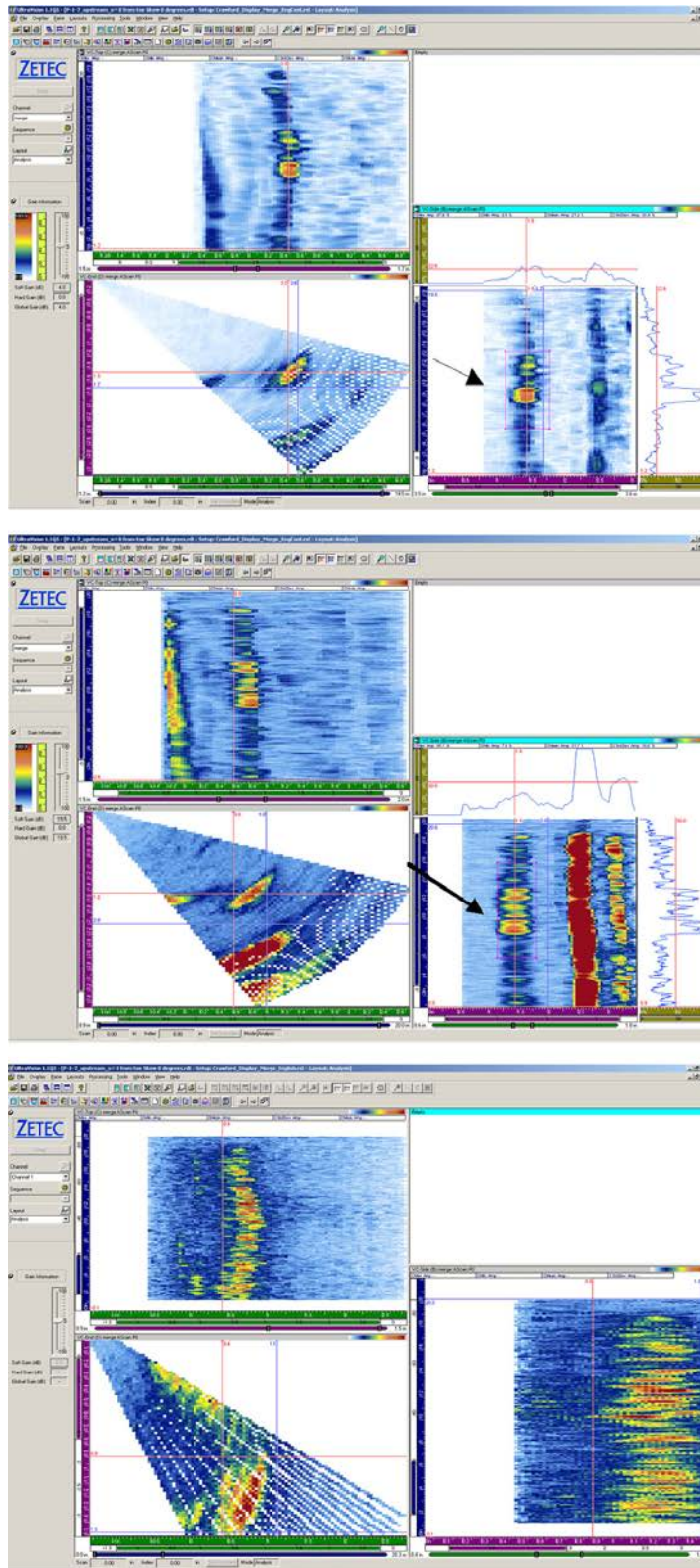


Figure G.3 P1-7 Downstream, Near Side with TRL 1.5-MHz, Mini-TRL 2-MHz, and TRS 2 MHz, Top to Bottom. Yes, Yes, Yes detected.



**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.**

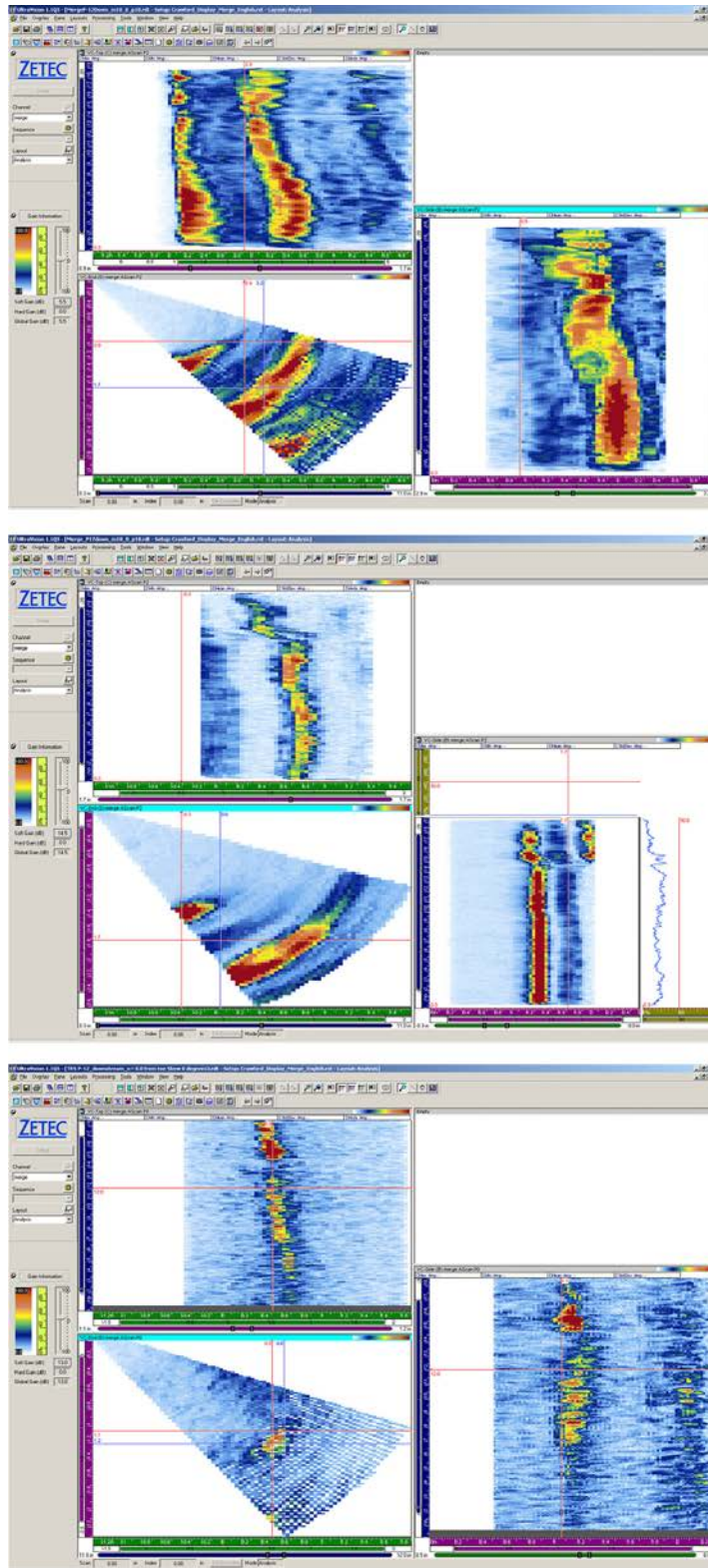
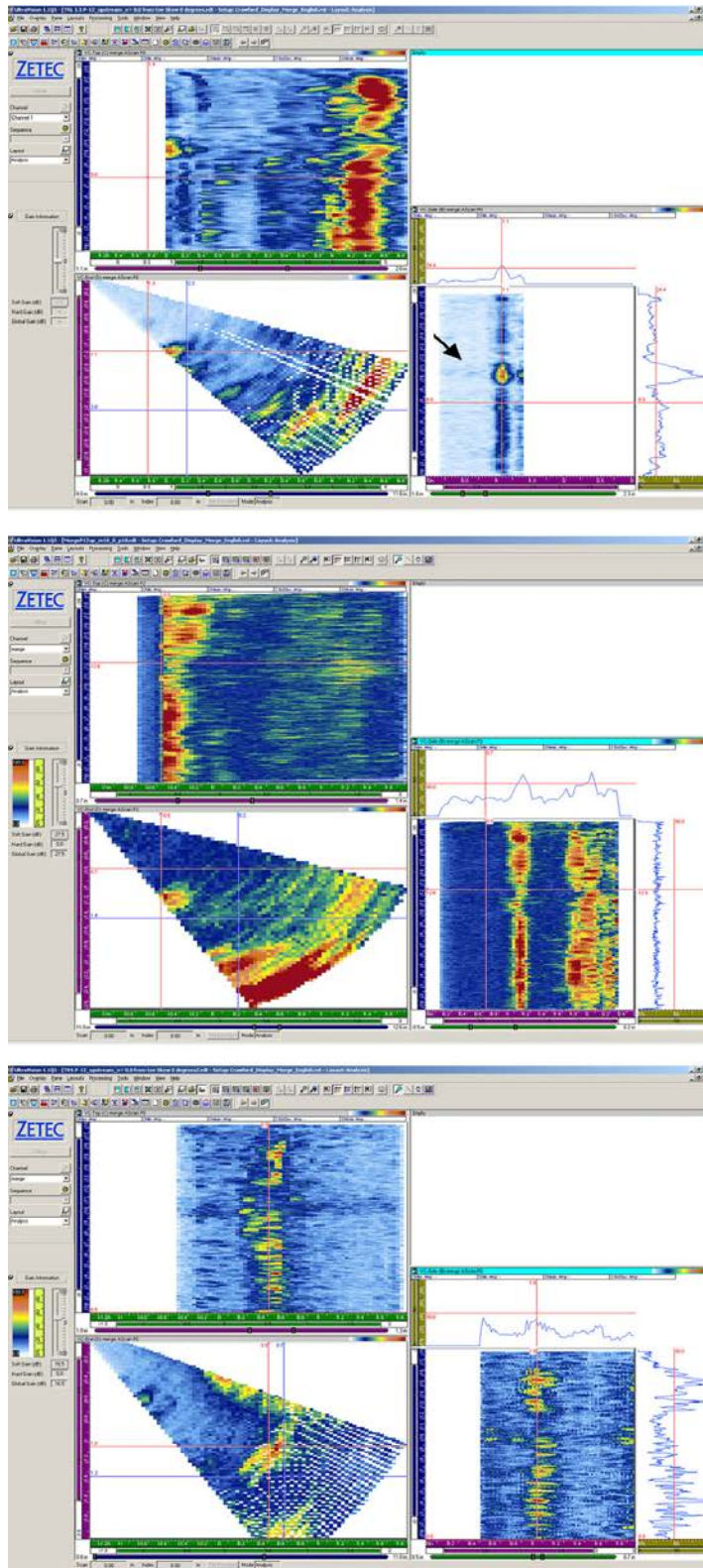


Figure G.5 P1-12 Downstream, Near Side with TRL 1.5-MHz, Mini-TRL 2-MHz, and TRS 2 MHz, Top to Bottom. No, No, No detected.



**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.**

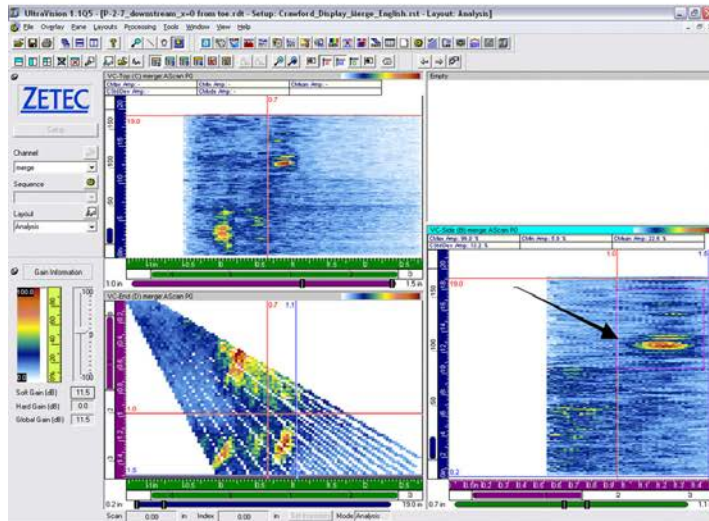
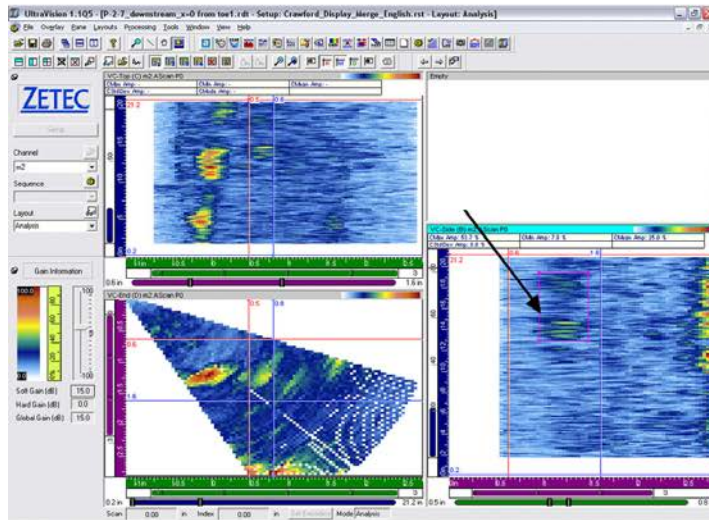
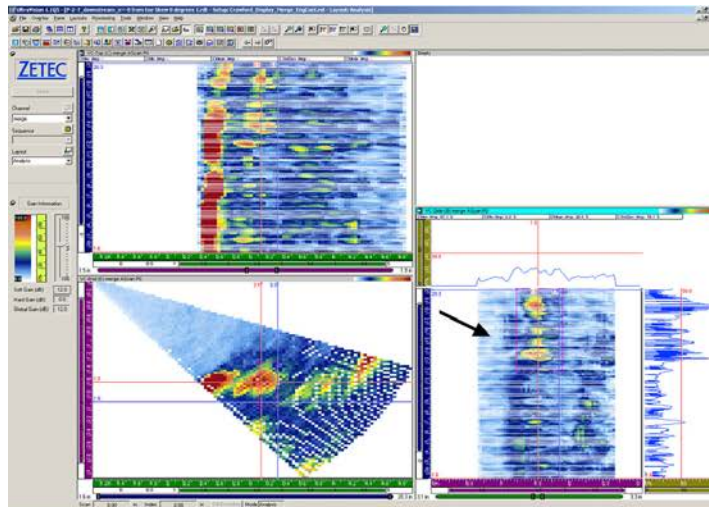


Figure G.7 P2-7 Downstream, Far Side with TRL 1.5-MHz, TRL 2-MHz, and TRS 2 MHz, Top to Bottom. Yes, Yes, Yes detected.

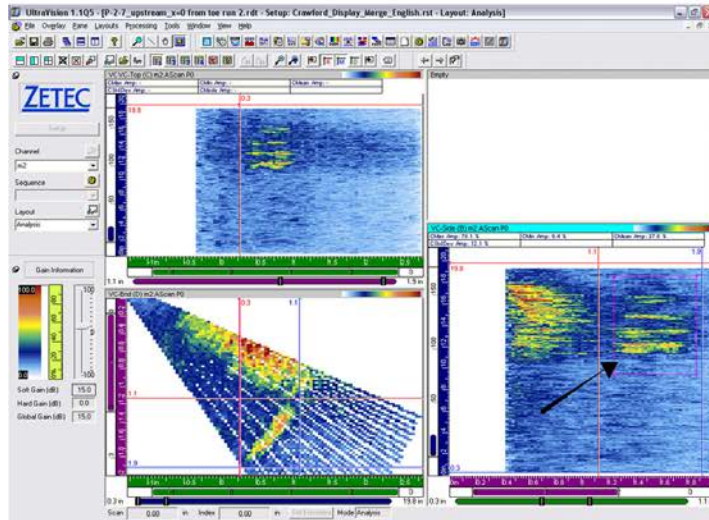
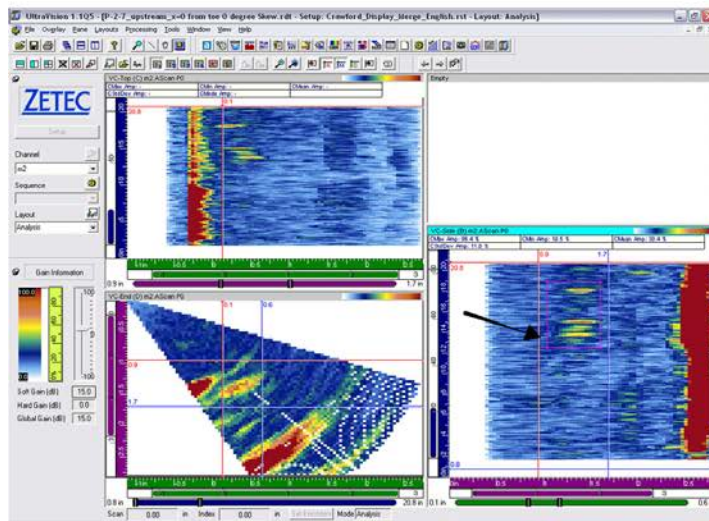
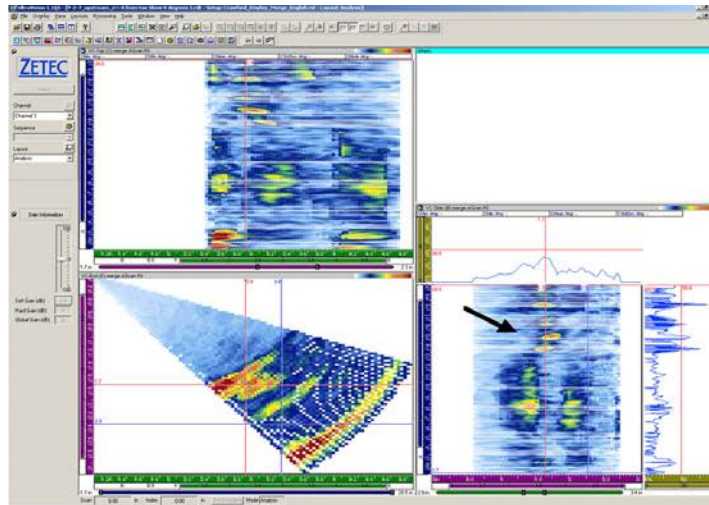
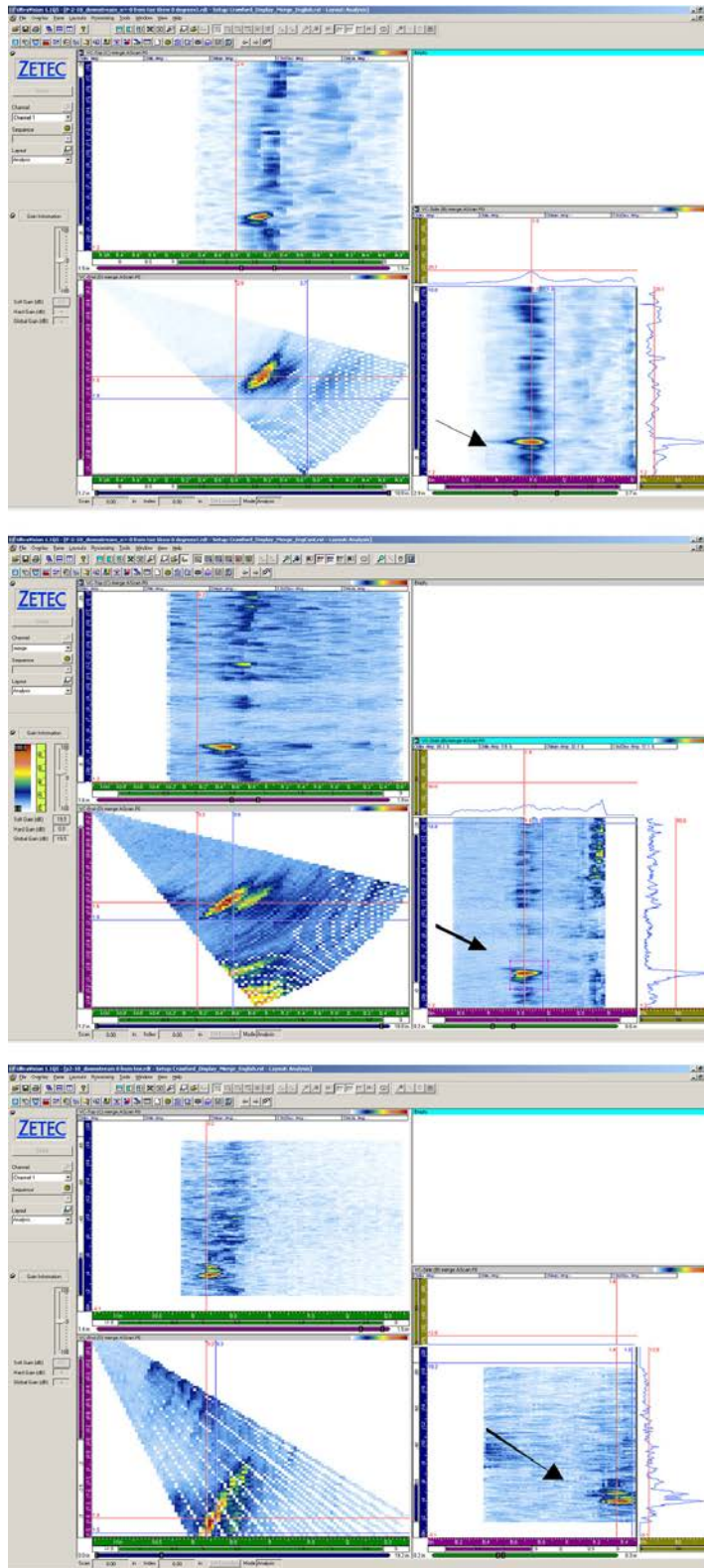


Figure G.8 P2-7 Upstream, Near Side with TRL 1.5-MHz, TRL 2-MHz, and TRS 2 MHz, Top to Bottom. Yes, Yes, Yes detected.



**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.**

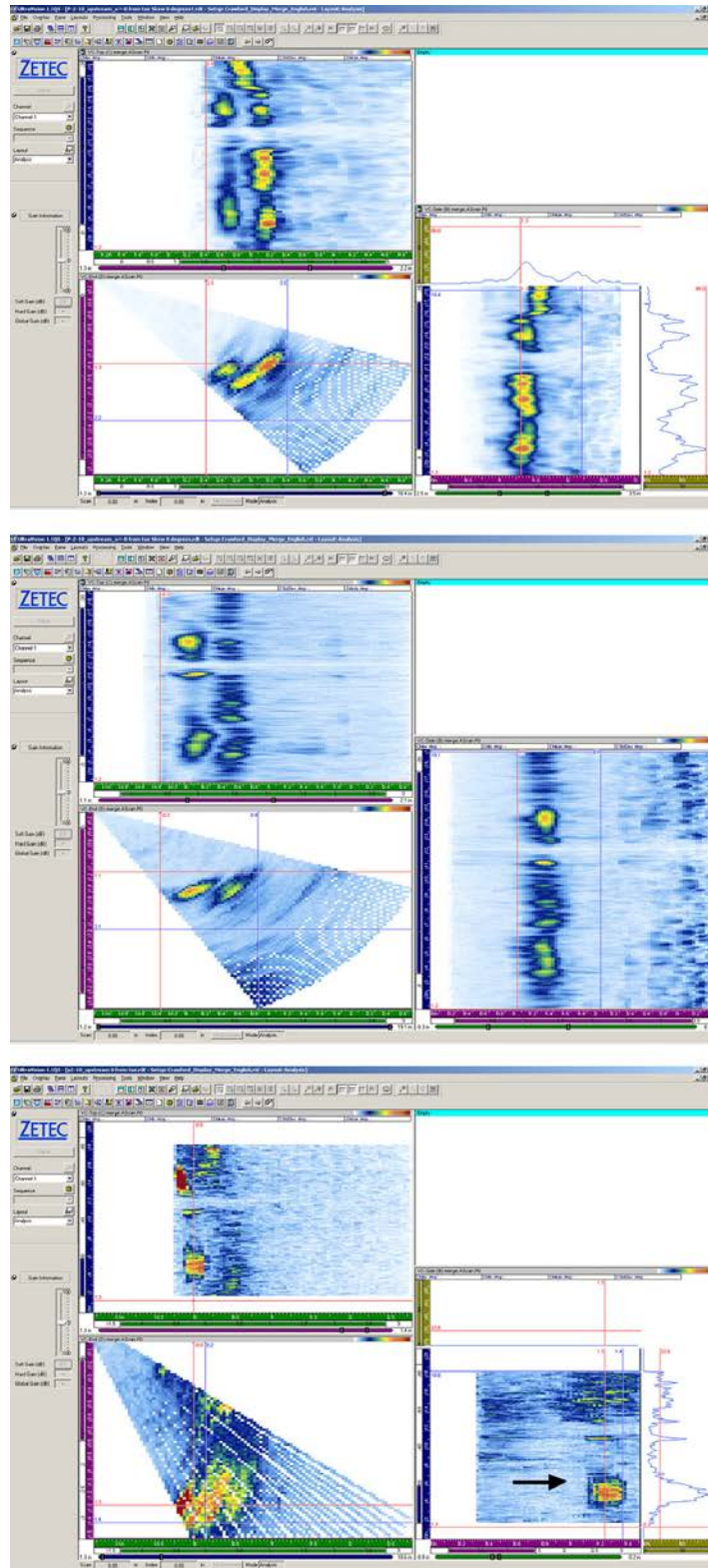


Figure G.10 P2-10 Upstream, Far Side with TRL 1.5-MHz, Mini-TRL 2-MHz, and TRS 2 MHz, Top to Bottom. No, No, Yes detected.



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