



# FIRST QUALITY SOLUTIONS

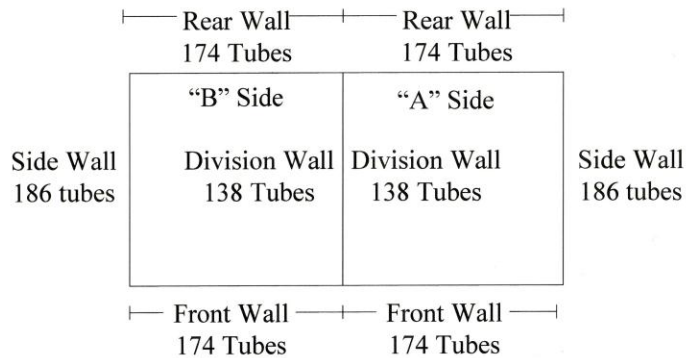
## ULTRASONIC THICKNESS EXAMINATION REPORT

Customer: Sample Waterwall Report		PO No: 123456789		Report No: Sample	
Component: Boiler Waterwalls		WO No: ABCDEFG		Loc: FQS	
Material: C/S	Prep: Blasted	Temp @ Test: 88°F	Procedure: 005	Code: N/A	
<b>Instrument:</b>					
Manufacturer: Krautkramer	Model: DMS	Serial Number: 00BF6K	Material Velocity: .2332	Range: 1.000" Gain: 62 dB	
<b>Transducer:</b>	Manufacturer: Krautkramer		Model: FH2E		
<b>Couplant:</b>	Type: Ultragel		Batch Number: N/A		
<b>Cal. Times</b>	Initial: 0715		Final: 1115		

### Summary of Inspection Performed:

First Quality Solutions was contracted to perform an ultrasonic thickness survey on the boiler waterwalls. The furnace water walls were visually inspected for general condition, and ultrasonically inspected to determine remaining wall thickness. Elevations were established from the roof (675'). Measuring down to each elevation and sandblasting a strip in which to take thickness measurements resulted in a total of 15 elevations, with the lowest being at the bottom of the lower slope (590').

The furnace is divided into two cells by a division wall; each cell was regarded as its own unit. The front and rear walls have 174 tubes, the sidewalls have 186 tubes, and the division wall has 138 tubes. A mapping of the waterwall layout can be seen below.



Visual and ultrasonic thickness inspections were made on every tube at each elevation. Listed below are the elevations where inspections were performed on each wall.

A & B Cell			
Front Wall	Division Wall	Rear Wall	Side Walls
675	675		675
667	667	651	667
660	660	650	660
654	654	649	654
648	648	646	648
641	641	641	641
635	635	635	635
628	628	628	628
622	622	622	622
615	615	615	615
608	608	608	608
601	601	601	601
596	594	596	594
593		593	590
590		590	

Examiner: FQS Inspector A	Level: II	Company: FQS	Date: 11/8/2010
Examiner: FQS Inspector B	Level: II	Company: FQS	Date: 11/8/2010

The results of the visual and ultrasonic thickness inspections can be seen as follows, and in addition, attached are visual representations of the inspection with colored maps of the test results.

**Recommendations:**

- Perform ultrasonic thickness testing at approximately the same elevations as this outage during the next scheduled maintenance outage.
- Restore all areas where walls have been bowed.
- Replace all tubes where pad welds were found from past repairs.

**Visual Inspection**



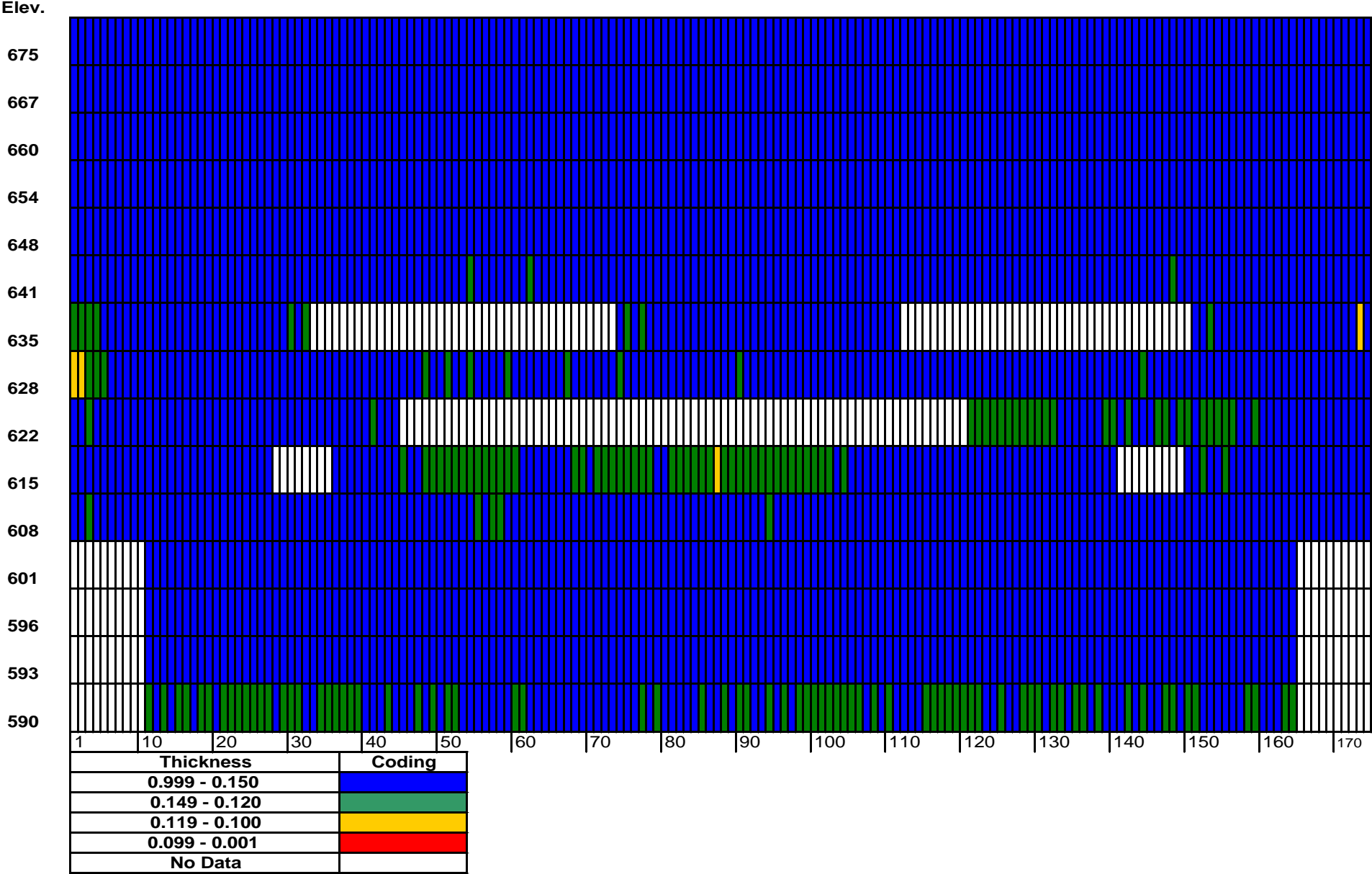
1. Elev. 675, cracking on the front wall header tube stub at the front wall header, tube # 29.



2. Elev. 675, division wall tube # 75 bent out of plain.

Sample Waterwall Report  
 Furnace Waterwall Ultrasonic Thickness Inspection  
 Nov 2010 Outage

“A” Side Front Wall



Sample Waterwall Report  
 Furnace Waterwall Ultrasonic Thickness Inspection  
 November 2010 Outage

"A" Side Front Wall

Elev.	Tube Number																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
675	0.168	0.167	0.169	0.167	0.172	0.168	0.169	0.163	0.160	0.167	0.169	0.172	0.160	0.168	0.169	0.163	0.170	0.168	0.163	0.170
667	0.177	0.168	0.177	0.171	0.173	0.172	0.171	0.166	0.165	0.170	0.177	0.178	0.166	0.171	0.170	0.170	0.170	0.171	0.168	0.170
660	0.170	0.177	0.176	0.175	0.176	0.179	0.174	0.173	0.166	0.164	0.169	0.169	0.171	0.170	0.170	0.174	0.173	0.170	0.170	0.175
654	0.176	0.168	0.174	0.175	0.176	0.176	0.178	0.170	0.176	0.171	0.175	0.172	0.170	0.167	0.170	0.176	0.176	0.179	0.170	0.176
648	0.170	0.171	0.164	0.169	0.167	0.176	0.178	0.176	0.171	0.172	0.171	0.172	0.172	0.168	0.165	0.172	0.171	0.171	0.169	0.169
641	0.166	0.161	0.167	0.160	0.161	0.157	0.159	0.158	0.161	0.157	0.158	0.157	0.156	0.159	0.164	0.165	0.161	0.166	0.160	0.164
635	0.137	0.138	0.143	0.137	0.156	0.155	0.158	0.156	0.155	0.163	0.157	0.167	0.160	0.165	0.159	0.161	0.162	0.166	0.153	0.161
628	0.107	0.110	0.129	0.143	0.138	0.157	0.169	0.158	0.163	0.161	0.168	0.159	0.161	0.160	0.162	0.161	0.162	0.168	0.170	0.163
622	0.161	0.158	0.143	0.153	0.159	0.165	0.162	0.170	0.178	0.167	0.175	0.163	0.168	0.169	0.172	0.160	0.162	0.172	0.166	0.167
615	0.172	0.169	0.158	0.162	0.176	0.167	0.175	0.168	0.162	0.165	0.169	0.167	0.166	0.171	0.170	0.169	0.160	0.163	0.169	0.171
608	0.163	0.155	0.142	0.161	0.152	0.168	0.170	0.160	0.168	0.162	0.167	0.163	0.163	0.168	0.159	0.157	0.164	0.165	0.163	0.162
601	-	-	-	-	-	-	-	-	-	-	0.208	0.200	0.193	0.195	0.193	0.190	0.191	0.190	0.187	0.184
596	-	-	-	-	-	-	-	-	-	-	0.171	0.170	0.166	0.165	0.158	0.159	0.163	0.159	0.161	0.161
593	-	-	-	-	-	-	-	-	-	-	0.166	0.167	0.166	0.163	0.166	0.164	0.160	0.169	0.169	0.170
590	-	-	-	-	-	-	-	-	-	-	0.143	0.150	0.148	0.154	0.147	0.148	0.151	0.148	0.146	0.151

Thickness	Coding
0.999 - 0.150	
0.149 - 0.120	
0.119 - 0.100	
0.099 - 0.001	
No Data	-

MAX 0.229  
 MIN 0.107  
 AVG 0.165

Sample Waterwall Report  
 Furnace Waterwall Visual Inspection  
 Nov 2010 Outage

"A" Side				
Wall				
Elev.	Front	Division	Rear	Right
675	Air leakage at front upper distribution header at the side wall and division wall, cracking on front wall tube stubs at front wall header tubes # 21	Tubes # 74,75,77and 78 bent out of plain	<b>See Section 5: Pendant Section</b>	
	25,29,35,39,49,51,57,73,85,89, 93, 95,99,101,105,109,113,115, 155 and 159	<b>Picture # 2 - Tube 75</b>		
	<b>Picture # 1 - Tube 29</b>			
		Tubes # 74,75,77and 78 bent out of plain		Pad weld on tube # 126
				Flattening on tubes #127 (0.161), 128 (0.154), 129 (0.157)
				<b>Picture # 3 - Tube # 126</b>
660	Old attachment weld left on tube # 172	Tubes # 74,75,77and 78 bent out of plain		Bowing tubes # 108,125,126 146, 147 (1/8 to 1/4 tube diam.)
				Tube #126 bulged and cracking longitudinally.

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"A" Side				
Wall				
Elev.	Front	Division	Rear	Right
654		Pad welds on tubes # 67,156	<b>See Section 5: Pendant Section</b>	
		Corrosion on tube # 67 in dog house		
		Crack weld tubes # 68,69,84,85		
		Erosion above pad weld tube #98,99,100		
		Tubes # 85 and 86 bent out of plain		
648	Pad weld on tube # 168 <b>Picture # 4</b>	Stitch weld broken at tubes # 68 & 69.		
		Tubes # 85 & 86, 115 & 116, and 121 & 122 bowed 1 tube diam.		
641	Soot blower damage,see soot blower report	Stitch welds cracked tubes # 68, 69	Erosion above weld overlay right and left sides ,also soot blower damage , see soot blower report	Pad weld on tube # 136
		Tubes #115 - 116, and 120 - 121 bowed 1 tube diameter		
	Circ. Cracking on tube #174	Tubes #2 & 3 gouged		
		Broken stitch welds at tubes #1 & 2.		
		Circ. Cracking in a 1 ft. area on tube # 1.		

