



## VESSEL INSPECTION REPORT

<b>CLIENT</b>	CNRL 2500, 855 - 2 Street S.W. Calgary, Ab T2P 4J8	<b>A Number</b>	A0191862
<b>CLIENT REP</b>	Carson Petersen Medicine Hat Area	<b>Equipment</b>	Free Water Knock Out
		<b>Inspec Date m/d/y</b>	09/10/2015
		<b>Facility</b>	Ralston 5-14 Battery
		<b>LSD</b>	05-14-018-10W4M

### Vessel Equipment Identification

<b>A Number</b>	A0191862	<b>Eq Number</b>		<b>Equipment</b>	Free Water Knock Out
<b>Ser Number</b>	81-7900-A	<b>Alt Jur #</b>		<b>CRN</b>	E1466.2
<b>Shell MAWP</b>	517 kPa	<b>Shell MAWT</b>	93 C	<b>Shell MDMT</b>	
<b>Tube MAWP</b>		<b>Tube MAWT</b>		<b>Tube MDMT</b>	
<b>Shell Thick</b>	12.7 mm	<b>Shell Material</b>	SA-516-70	<b>Year Built</b>	1981
<b>Head Thick</b>	28.57 / 15.87 mm	<b>Head Material</b>	SA-516-70	<b>Cor Allow</b>	3.18 mm
<b>Radiography</b>	FULL / PART	<b>Heat Treat</b>	No	<b>Diameter</b>	
<b>CODE</b>	UW 11A 5B	<b>Manufacturer</b>	Maloney Steel Ltd		

### Magnetic Particle Equipment

<b>Tool:</b>	AC Hand Yoke	<b>Model:</b>	Y-1	<b>Indicator</b>	Black on White	<b>Calibration:</b>	10 lb lift
<b>Power Source:</b>	115 Volt	<b>Ser No:</b>	1074			<b>Cal Due:</b>	03/11/2016

### Ultrasonic Equipment (0 degree)

<b>Instrument</b>	Krautkramer DMS 2	<b>Ser No</b>	01BV9X	<b>Cal Due</b>	01/14/2016
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### Probe Details

Model	Ser No	Angle	Freq	Dia	Cal Block 1	Cal Block 2
Gener FH2E-D	15E01NZH	0	7.5 MHz	0.380 "	12.5 mm 5 step, Ser No 2624 12	25 mm 4 step wedge, Ser No 12-2378

### Observations

Two blisters found on the ID of the cold side of the tube. Both blisters are in the same location as the firetube flange.

Large blister appears to be stretched so that the top of the blister has UT thickness of 11 mm, the nominal of the tube is 13.0 mm. Thickness of the blister gradually increases to 13.0 mm as probe is moved away from top center of blister.

Small blister top has UT low of 12.6 mm, steel appears to be only slightly stretched.

MT examination showed no cracks on the small blister.

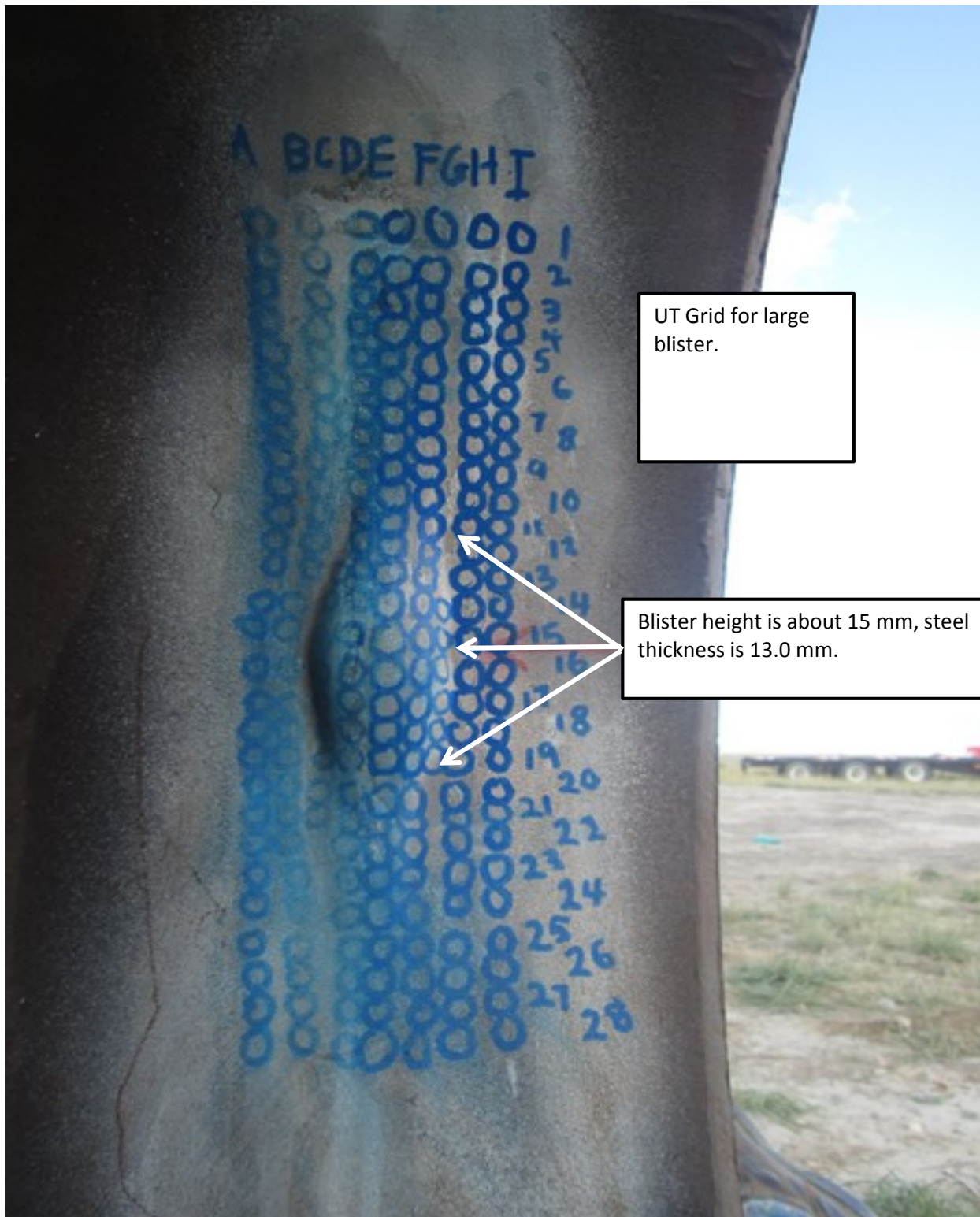
MT examination showed 1.5 mm crack on the large blister.

### Inspector Information

<b>Inspector</b>	Dale Toews	<b>PESL Reg Number</b>	000036
<b>Signature</b>		<b>API 510 Number</b>	23064
		<b>CGSB Lev 2 UT, MT Reg Number</b>	10498



Tube area adjacent to blister is consistent at 12.6 mm, no laminations were detected.



UT Grid for large blister.

Blister height is about 15 mm, steel thickness is 13.0 mm.



UT Measurements for large blister.

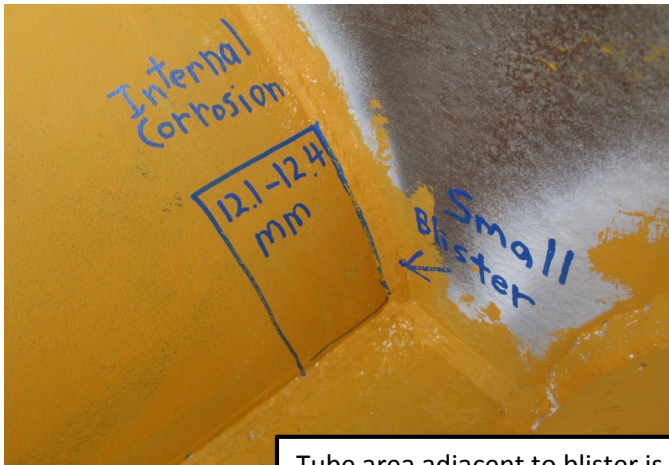
	A	B	C	D	E	F	G	H	I
1	12.75	nr		nr	12.9	12.9		nr	12.9
2	13.52	nr		11	13	13		nr	12.9
3	12.72	nr		nr	13	12.9		12.7	12.9
4	12.47	nr		11.9	13	13		nr	13
5	12.72	nr		12.4	13	13		13.2	13
6	12.59	12.7		11.9	13.1	13		nr	13
7	nr	nr		12.5	13.2	13		13.2	13.1
8	17.4	11.4		13.7	13.2	13		13.4	13.1
9	17.6	nr		13.3	13.2	13		13.3	13.1
10	nr	nr		12.7	13.2	13		13.3	13
11	nr	nr		13.1	13.1	12.8		nr	13
12	nr	nr		12.6	13	12.3		nr	12.9
13	nr	nr	11.7	12.3	12.5	11.5		nr	13
14	12.8	nr	10.1	12.1	11.9	11.6	9.6	nr	12.9
15	12.8	11.1	10.2	11.7	11.3	11.4	7.3	nr	13
16	12.8	13.6	10.3	11.5	11.1	11.2	9.3	13.7	13.1
17	12.8	13.2	10.6	11.8	11.4	11.5	9	nr	13.1
18	12.8	13.2	10.4	12	11.9	11.6	10.1	nr	13.1
19	12.7	13.2	nr	12.5	12.5	11.7	nr	nr	13.1
20	12.9	13.2	nr	12.1	13.1	12.7		nr	13.2
21	12.8	13.3	nr	13.1	13.2	12.8		nr	13
22	12.6	13.2		13	13.2	12.9		nr	13
23	10.9 *	11.0 *		13	13.1	13.3		nr	13.1
24	12.8	13.3		13	13.1	13.3		nr	11.0 *
25	12.9	13.3		13	13.1	13.2		13.1	13
26	12.9	13.2		13	13	13.2		13.1	13
27	12.8	13.2		13	13	13.2		13.1	13
28	12.9	13.1		13	13.1	13.2		13.2	12.9

\* = Inclusion  
nr = No Reading

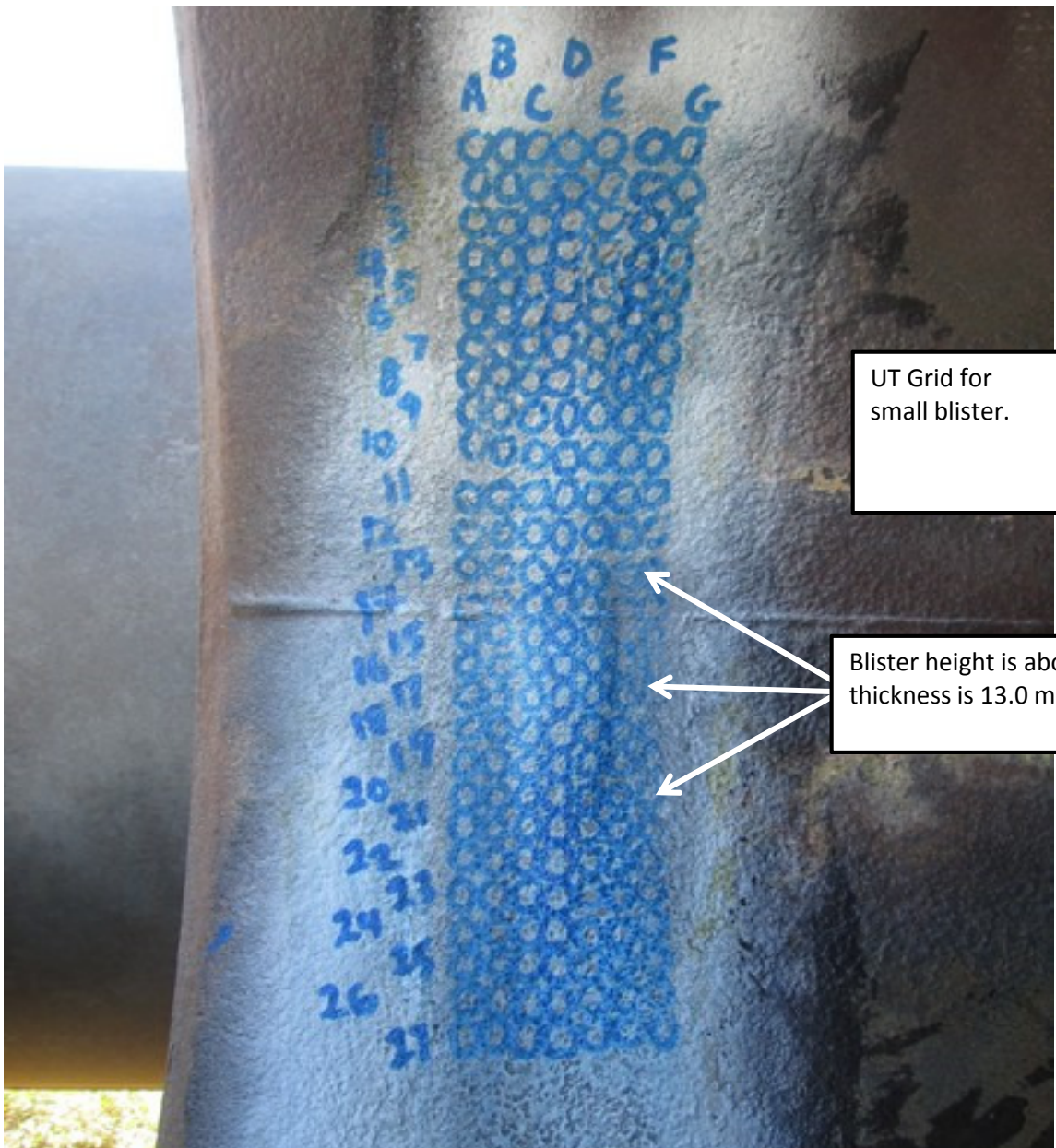
Some "nr" entries or readings higher than 13.0 mm represent UT opposite the tube to tubesheet weld.



<b>A No</b> A0191862	<b>Eq No</b>	<b>Ser No</b> 81-7900-A	<b>Equip</b> Free Water Knock Out
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Tube area adjacent to blister is consistent at 12.6 mm, no laminations were detected.



UT Grid for small blister.

Blister height is about 4 mm, steel thickness is 13.0 mm.



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UT Measurements for small blister.

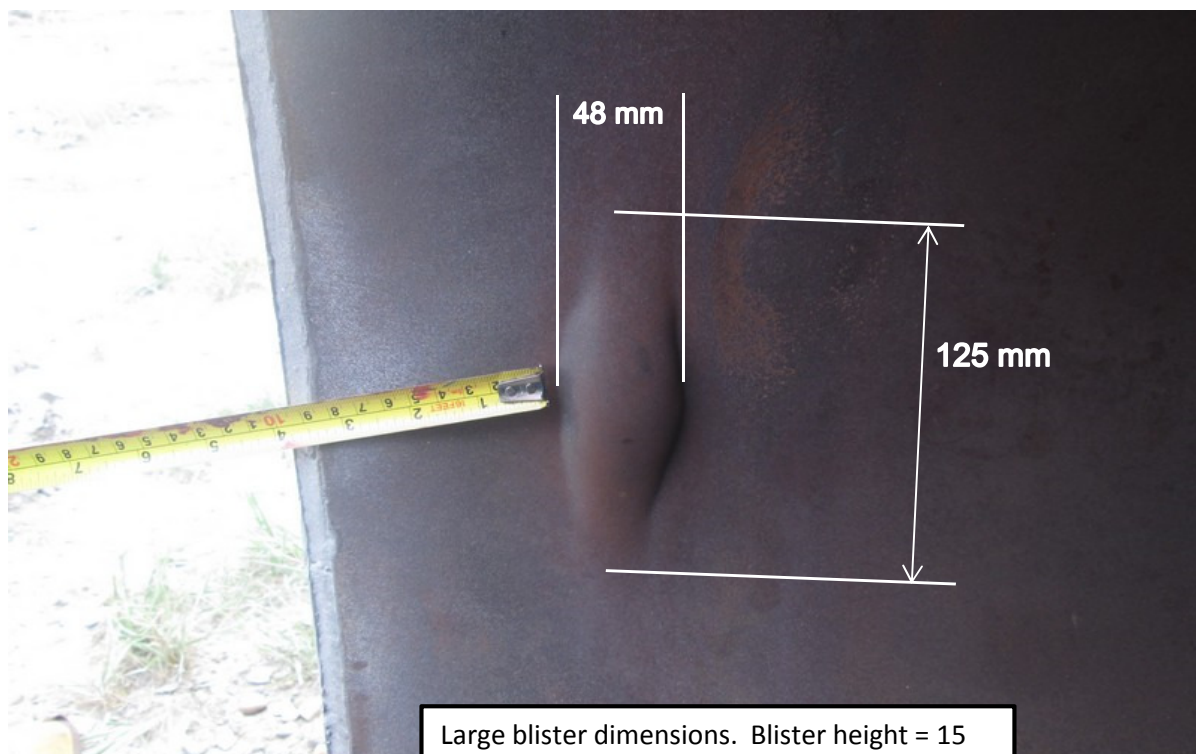
0	A	B	C	D	E	F	G		
1	13.2	nr	13.3	13.3	13.3	nr	nr		
2	13.2	nr	13	13.3	11.5 *	nr	nr		
3	11.6	nr	13.2	13	13.7	nr	13.5		
4	13.3	nr	13.1	13.2	nr	nr	nr		
5	13.4	nr	13.4	13.1	nr	13.4	nr		
6	13.3	nr	13.5	13	13.7	13.2	13.7		
7	13.2	nr	13.3	13.1	13.8	nr	nr		
8	13.1	12.3	13.1	13.1	13.4	13.4	14.2		
9	12.9	13.2	13.3	13	13.2	nr	14.2		
10	13	nr	13	13	13.2	13.6	13.2		
11	13	nr	13.1	13	13	13.3	13.3		
12	13.2	nr	12.9	12.8	13.1	13.7	nr		
13	13.1	13.6	12.7	12.9	13.2	13.4	nr		
14	Weld	Weld	Weld	Weld	Weld	Weld	Weld		
15	14.9	nr	13.4	13.4	14.6	nr	14.4		
16	13.3	nr	12.6	12.7	12.7	15.4	13.8		
17	13.1	12.7	12.6	12.8	12.7	15.7	nr		
18	13.4	nr	12.7	13.1	12.7	14.5	nr		
19	13	13.7	12.8	12.9	12.8	nr	nr		
20	13.4	13.8	12.8	13.2	12.9	13.5	nr		
21	13.2	14.5	13	13.2	13.1	13.6	nr		
22	13.5	12.6	13.3	13.3	13.4	13.9	nr		
23	13.2	nr	13.1	13.3	13.1	14.6	nr		
24	13.2	13.3	13.1	13.5	13.2	13.6	nr		
25	13.6	13.4	13.2	13.3	13.4	13.3	nr		
26	nr	12.2	13.2	13.4	13.4	13.6	nr		
27	nr	nr	13.2	13.2	13.5	13.8	13.1		
0	0	0	0	0	0	0	0		

\* = Inclusion  
nr = No Reading

The smaller blister had some surface roughness due to some general corrosion, entered as "nr"  
Some "nr" entries or readings higher than 13.0 mm represent UT opposite the tube to tubesheet weld.



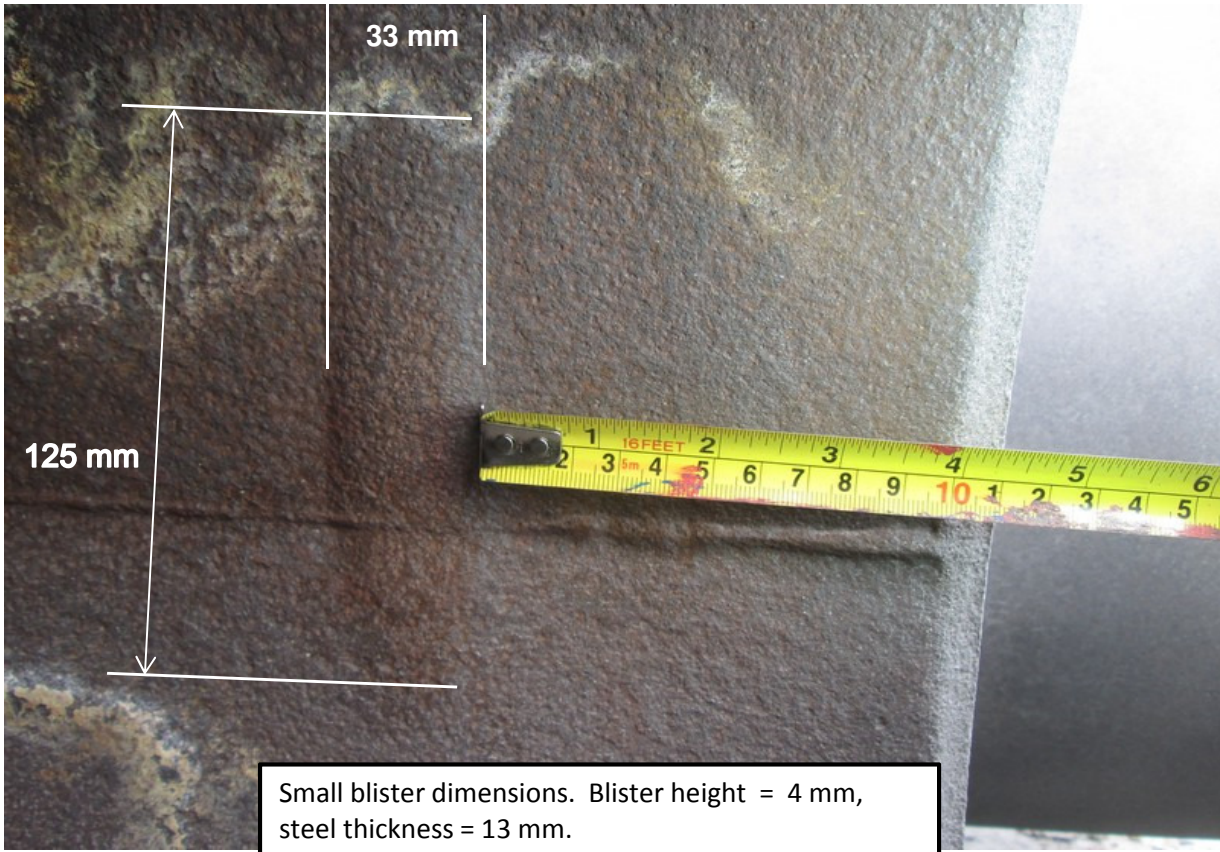
Large blister: 1.5 mm long crack indication.



Large blister dimensions. Blister height = 15 mm, steel thickness = 13 mm.



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Small blister dimensions. Blister height = 4 mm, steel thickness = 13 mm.



Blisters are in the same position as the firetube flange. (4.25 inch from end of tube).