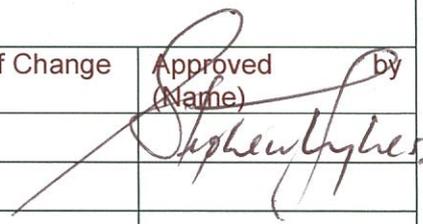




Wauchope Scraper Station

Coating Assessment Report

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1 Introduction

Direct Current Voltage Gradient (DCVG) surveys have been conducted at each scraper station along the Amadeus Gas Pipeline to give an indication of the condition of the coating at each site. However, the accuracy of these DCVG surveys at the scraper stations is uncertain due to the possibilities of CP (Cathodic Protection) shielding and interactions between different pipe sections.

To correlate the DCVG results to actual defects, 5 scraper stations and 4 MLV's and 9 anchor blocks have been selected to be excavated and to undergo coating assessment. The results of these excavations and coating assessments will help determine the expected condition of the remaining stations and MLV's, and provide key information into the decision to excavate them or not.

Wauchope is the third scraper station to be excavated and assessed. This report compares the DCVG results for Wauchope to the results of the coating assessment following excavation.

After coating assessments had been conducted, the station pipework was cleaned by abrasive blasting and recoated with Luxepoxy, a high build 2 part epoxy coating.

2 Method

In April 2012 a DCVG survey was conducted on the Wauchope scraper station. These results have been included in this report for comparison to determine if there is a correlation between the DCVG survey data and actual coating defects.

The Wauchope site has been excavated and assessed, see Appendix 1. For major defects a coating defect assessment has been conducted, completed coating defect assessment forms are in Appendix 2. Failure of a holiday detector test results in a white painted ring around that area. All sections of pipe with coating defects have been photographed, see Appendix 3 for referenced photos and the photo log. To quantify the defects and identify trends in defect activity the results are presented on a mark-up of the facility layout drawing, refer to Appendix 1.

The results of the DCVG survey and the coating defects assessments have been compared to determine if there is a correlation between the DCVG survey and actual coating defects in Section 4 Discussion.



3 Results

3.1 DCVG

There were 10 areas highlighted as having coating defects by the DCVG survey. These defects are summarised in Table 1 below. Locations of each defect are shown on the drawing in Appendix 1.

Table 1: DCVG Detected Defects

DCVG Defect Number	Section	IR
1	V07	2.5 %
2	South pig trap line	15.0 %
3	NRV southern support block	2.5 %
4	South pig trap drain line elbow	5.5 %
5	MLV	6.3 %
6	Concrete support block between V11 and V12	15.0 %
7	North of support block adjacent to MIJ	5.0 %
8	V14	2.3 %
9	Support block with 90° elbow in blowdown line	2.3 %
10	Blowdown stack	17.5 %

The Wauchope DCVG Survey drawing has been included in Appendix 1. Dig up of the areas indicated in the DCVG survey revealed the coating defects described in the following Table 2.

Table 2: Coating Damage Assessments

Defect ID#	Section	Photo Log / Notes
1	Downstream of V14.	Appendix 4, Photos 4707, 4727, 4970, 4971, 4972, 5047
2	Blowdown line downstream of 90° elbow support block.	Appendix 4, Photos 4856, 4885, 5004, 5005, 5061
3	Blowdown line upstream of 90° elbow support block.	Appendix 4, Photos 4805, 4897, 4997, 4998, 5019, 5049
4	Blowdown line.	Appendix 4, Photos 4854, 4886, 5006, 5007, 5062
5	1337mm upstream of blowdown stack.	Appendix 4, Photos 4792, 4851, 5008, 5009, 5060
6	Upstream of MIJ.	Appendix 4, Photos 0483, 4688, 4689, 4690, 4691, 4929, 4930
7	Upstream of MIJ.	Appendix 4, Photos 0483, 4688, 4689, 4690, 4691, 4931, 4932, 5043
8	Upstream of MIJ.	Appendix 4, Photos 0483, 4688, 4689, 4690, 4691, 4933, 4934, 5043
9	Blowdown line 6365mm D/S of 50mm drain line tie-in.	Appendix 4, Photos 0477, 0478, 0482, 0483, 0488, 0491, 0492, 0493, 4734, 4750, 4924, 5052

10	Blowdown line 13000mm D/S of 50mm drain line tie-in.	Appendix 4, Photos 0507, 0508, 0509, 0510, 4738, 4778, 4927, 4928, 5052
11	Blowdown line 11000-12000mm DS of 50mm drain line tie-in.	Appendix 4, Photos 0507, 4737, 4770, 4926, 5052
12	V07; 555mm D/S from valve body.	Appendix 4, Photos 0379, 4663, 4668, 4671, 4679, 4937, 4938, 4948
13	Tee U/S of V07.	Appendix 4, Photos 0391, 4658, 4659, 4940, 4941, 4942, 4944, 4959, 5036
14	Tee U/S of V07.	Appendix 4, Photos 0391, 4658, 4659, 4676, 4678, 4939, 4942, 5058
15	Tee D/S of V07; 2.6m north of tee.	Appendix 4, Photos 0401, 4965, 4966, 5058
16	Blowdown line 5970mm upstream of corner block.	Appendix 4, Photos 4716, 4894, 5028, 5029, 5048
17	Pig Receiver Line.	Appendix 4, Photos 0500, 0501, 0537, 5044
18	DN50 drain tie-in to blowdown line.	Appendix 4, Photos 0495, 0496, 0497, 0498, 0499, 5057

3.2 Coating Inspection

A significant amount of the coating found at Wauchope was in poor condition. Many areas of CTE coating were found to be blistering and the coating in places was cracked and pulling away from the pipework. Recorded coating defects have been illustrated on the Wauchope Coating Defect layout drawing in Appendix 2. Areas of coating found to fail a holiday test were circled with white paint (refer photos). Some specific examples include:

- Blistering on the southern tee upstream of V07 (photo 0391).
- Blistering to the southern tee downstream of V07 (photo 0375).
- Coating degradation at the DN50 drain line tie-in to the blowdown line (photo 0475).
- Coating degradation and blistering at the concrete support block between V11 and V12. (photo 0440).
- Blistering to coating on V14 (photo 4723, 4725, 4727).
- Blistering to the piping downstream of tee from V14 (photo 0620, 0621)
- Crack in the yellowjacket coating upstream of MIJ (photo 0483)

The following table lists coating defects that were attributed to significant metal loss on the pipe documented on-site with a Coating Damage Assessment form (see Appendix 2).

Table 3: Coating Defects Near Areas of Identified Metal Loss

ID	Section	Defect Description	Correlation to DCVG	DCVG Survey IR
6	Yellowjacket North of MIJ	Yellowjacket split into the canusa sleeve.	7	5%
7	Yellowjacket North of MIJ	Yellowjacket split into the canusa sleeve.	7	5%
8	Yellowjacket North of MIJ	Yellowjacket split into the canusa sleeve.	7	5%
13	Tee upstream of V07	CTE coating with green Protol coating	N/A	N/A
14	Tee upstream of V07	CTE coating with green Protol coating	N/A	N/A
15	North of tee downstream of V07	Blistering to CTE coating	2	15%
17	Pig receiver inlet	Scrape to tape wrap coating	N/A	N/A

3.3 Metal loss

There were 17 areas of metal loss found on the pipework at Wauchope. Of these 17 areas containing metal loss, all 7 areas had visible coating defects. The metal loss section of the coating damage assessment form was filled out for each defect – refer to Appendix 2.

Table 4: Metal Loss Reports

ID	Section	Coating Defect (Y/N)	Maximum Depth (mm)	Correlation to DCVG	DCVG Survey IR (%)
1	Downstream of V14	N	1.21	N/A	N/A
2	Blowdown line	N	0.76	N/A	N/A
3	Blowdown line	N	0.83	N/A	N/A
4	Blowdown line	N	1.06	N/A	N/A
5	Blowdown line	N	0.85	10	17.5
6	Yellowjacket north of MIJ	Y	0.33	7	5
7	Yellowjacket north of MIJ	Y	0.38	7	5
8	Yellowjacket north of MIJ	Y	0.65	7	5
9	Blowdown line	N	1.21	N/A	N/A
10	Blowdown line	N	1.37	N/A	N/A
11	Blowdown line	N	1.27	N/A	N/A
12	Downstream of V07	N	0.71	1	2.5
13	Tee upstream of V07	Y	0.60	N/A	N/A
14	Tee upstream of V07	Y	0.52	N/A	N/A
15	North of tee downstream of V07	Y	0.10	2	15
16	Blowdown line	N	0.92	N/A	N/A
17	Pig receiver inlet	Y	Negligible	N/A	N/A

The metal loss noted has been analysed in below for its possible cause. Account has been taken for the most likely cause of the metal loss considering whether there is a coating defect possibly



associated (refer photos and coating damage assessment reports of Appendix 2), evidence of rust product (photos) and physical appearance of the defect (photos).

Table 5: Metal Loss Defect Analysis

ID	Section	Coating Defect (Y/N)	Cause	Notes
1	Downstream of V14	Y	Corrosion	Refer to photo 4707 and 4970. Evidence of pitting and pattern of defects consistent with typical corrosion. No coating defect detected. Passed Jeep test.
2	Blowdown line, 7390mm upstream of blowdown stack	N	Corrosion	Refer to photos 4856, 4885, 5004 and 5005. Evidence of pitting and pattern of defects consistent with typical corrosion. No coating defect detected. Passed Jeep test.
3	Blowdown line, 2830mm upstream of corner block	N	Corrosion	Refer to photos 4805, 4897, 4998 and 5019. Evidence of pitting and pattern of defects consistent with typical corrosion. No coating defect detected. Passed Jeep test.
4	Blowdown line, 6190mm upstream of blowdown stack	N	Corrosion	Refer to photos 4854, 4886 and 5006. Evidence of pitting consistent with typical corrosion. Coating nearby failed Jeep test.
5	Blowdown line, 1337mm upstream of blowdown stack	N	Corrosion	Refer to photos 4792, 4851, 5008 and 5009. Evidence of pitting consistent with typical corrosion.
6	Yellowjacket north of MIJ, 4240mm upstream of MIJ	Y	Corrosion	Refer to photos 0483, 4688, 4689, 4690, 4691, 4929 and 4930. Evidence of pitting consistent with typical corrosion.
7	Yellowjacket north of MIJ, 4510mm upstream of MIJ	Y	Corrosion	Refer to photos 0483, 4688, 4689, 4690, 4691, 4931 and 4932. Evidence of pitting consistent with typical corrosion.
8	Yellowjacket north of MIJ, 4677mm upstream of MIJ	Y	Corrosion	Refer to photos 0483, 4688, 4689, 4690, 4691, 4933 and 4934. Evidence of pitting consistent with typical corrosion.
9	Blowdown line, 6365mm downstream of 50mm line tie-in	N	Corrosion	Refer to photos 0477, 0478, 0483, 4734. Evidence of pitting consistent with typical corrosion. No coating defect detected. Passed Jeep test.
10	Blowdown line, 13230mm downstream of 50mm line tie-in	N	Corrosion	Refer to photos 0508, 0509, 4738, 0510, 4927, 4928. Evidence of pitting consistent with typical corrosion. No coating defect detected. Passed Jeep test.

11	Blowdown line, 11075mm downstream of 50mm line tie-in	N	Corrosion	Refer to photos 0507, 4737, 4926, 4770. Evidence of pitting consistent with typical corrosion. No coating defect detected. Passed Jeep test.
12	Downstream of V07, 555mm	N	Corrosion or Mill Defect	Refer to photos 0379, 4671, 4937, 4938. Evidence of pitting, consistent with corrosion however very localised. No coating defect detected. Passed Jeep test. No corrosion product evident from photos.
13	Tee upstream of V07, 1502mm upstream of V07	Y	Corrosion	Refer to photos 0391, 4659, 4940, 4941, 4942. Evidence of pitting consistent with typical corrosion. CTE coating has been coated with Protal. Failed Jeep test.
14	Tee upstream of V07, 1502mm upstream of V07	Y	Corrosion	Refer to photos 0391, 4659, 4676, 4939, 4942 Evidence of pitting consistent with typical corrosion. CTE coating has been coated with Protal. Failed Jeep test.
15	North of tee downstream of V07	Y	Corrosion	Refer to photos 0401, 4965, 4966. Evidence of pitting consistent with typical corrosion. Blistering coating defects detected. Failed Jeep test.
16	Blowdown line, 5970mm upstream of corner block	N	Corrosion	Refer to photos 4716, 4894. Evidence of pitting consistent with typical corrosion. No coating defects detected. Passed Jeep test.
17	Pig receiver inlet	Y	Corrosion	Refer to photos 0500, 0501, 5037. Evidence of pitting consistent with typical corrosion. Damage to coating noted. Failed Jeep test.

The location and details of metal loss has been included on the Wauchope Metal Loss Results drawing in Appendix 2.

3.4 RSTRENG Analysis

RSTRENG analysis was completed over the more severe area of corrosion to the blowdown line. The pipe wall thickness in the area is 8.74mm (refer to Appendix 1) and the Coating Damage Assessment metal loss form issued from site (Appendix 2) indicates the maximum pit depth of 1.37mm, 13000mm axial length and 10mm circumferential length. The results of the RSTRENG analysis indicate that the pipeline passes for the current Maximum Allowable Operating Pressure (MAOP) of 9,650kPag (refer to Appendix 4). The AGP design factor is 0.72 which translates to a required safety factor of 1.39 and the RSTRENG results satisfy this case.



3.5 LRUT

LRUT was conducted at Wauchope scraper station on March 19, 2013. Extracts from the LRUT report are presented in Appendix 5. The diagrams in Appendix 5 shows the setup and location of the LRUT probe when undertaking the test. 12 LRUT 'shots' were conducted upon the 14inch pipe (Test Point 1 to 12; TP1, ... TP12) and 5 shots to the 10inch blowdown line pipe (Test Point 1 to 5; TP1, ... TP5) in order to examine the condition of the pipe wall within the concrete support blocks and anchor blocks.

14" Test Point 1

Test Point 1 is the forward LRUT shot at Wauchope's south concrete anchor block, looking north. An anomaly was detected within the yellowjacket region upstream of the anchorblock however no defect was discovered. The flange within the block was detected at a distance of 1.54m. Corrosion was not identified within the concrete block.

14" Test Point 2

Test Point 2 is a backward LRUT shot at Wauchope's south concrete anchor block, looking south. The flange within the block was detected at 1.70m. No anomalies were identified. Corrosion was not identified within the concrete block.

14" Test Point 3

Test Point 3 is the forward LRUT shot at Wauchope's V07 concrete support block, looking west. The body of V07 is detected at a distance of 1.66m from the LRUT device with the concrete support block in-between. As shown in Appendix 5 there are no anomalies detected within the concrete support block, a weld was correctly identified at a distance of 0.91m. Corrosion was not identified within the concrete block.

14" Test Point 4 (forward shot)

Test Point 4 is a forward and backward LRUT shot at Wauchope's V07 concrete support blocks, looking east (backward shot) and west (forward shot). The forward LRUT shot has detected a coating change into the concrete block at 1.49m, a weld at 2.38m on the other side of the concrete block, and the end cap at 2.66m. The location of these detected LRUT measurements is consistent with photo 0392. Corrosion was not identified within the concrete block.

14" Test Point 4 (backward shot)

Test Point 4 is a forward and backward LRUT shot at Wauchope's V07 concrete support blocks, looking east (backward shot) and west (forward shot). The LRUT has detected 2 significant readings identified as a valve weld at 1.24m and the valve body at 1.50m. Corrosion was not identified within the concrete block.

14" Test Point 5

Test Point 5 is the backward LRUT shot at Wauchope's NRV concrete support blocks, looking north. The LRUT has detected the vertical branch at 0.89m, downstream weld at 1.79m and the check valve



at 2.62m. Photo 4991 of Appendix 3 confirms the position and identification of these fittings and welds. Corrosion was not identified within the concrete block.

14" Test Point 6

Test Point 6 is the forward LRUT shot at Wauchope's MLV south concrete support block, looking north. The LRUT has detected 5 significant readings identified as a weld at 0.42m, a weld at 1.12m, a weld at 1.85m, coating anomaly at 2.24m and the MLV at 2.65m. Photo 0423, 0427 and 0428 of Appendix 3 confirms the position and identification of these welds and coating anomaly. The coating anomaly identified at 2.24m is 0.4m before the valve, there are visible signs on the coating at this position shown in photo 0428 where the pipe clamp has compressed the rock guard mesh to the pipe causing the reading.

14" Test Point 7

Test Point 7 is the forward LRUT shot at Wauchope's MLV north concrete support block, looking south. The LRUT has detected 8 significant anomalies identified as a weld at 0.47m and 1.03m, two vertical branched tees at 1.38m and 1.90m, a weld at 2.48m, a coating anomaly at 2.75m a weld at 3.05m and the valve at 3.61m. Photo 0450 and 0451 of Appendix 3 confirms the position and identification of these fittings and welds, and the coating anomaly could also be due to the tee into V12. Corrosion was not identified within the concrete block.

14" Test Point 8

Test Point 8 is the forward LRUT shot at Wauchope's MIJ north concrete support block, looking south. The LRUT has detected no significant anomalies between the concrete support block. The C.P cable welds and the pipe girth weld was detected at 2.59m and 2.78m respectively, and the MIJ was detected a distance of 3.16m. Photo 4700 of Appendix 3 confirms the results of the LRUT. Corrosion was not identified within the concrete block.

14" Test Point 9 (forward shot)

Test Point 9 forward is the forward LRUT shot at Wauchope's V14 concrete support blocks, looking west. The LRUT has detected 8 anomalies identified as the tee piece at 0.46m, girth weld at 0.80m, 4 anomalies; half which lie within the concrete block (1.38m, 1.63m, 1.84m and 2.29m), a girth weld at 3.56m and the end cap at 3.72m. The anomalies are identified as coating anomalies due to identified blistering and CP product build up in the area and the high symmetric LRUT readings. Corrosion was not identified within the concrete block.

14" Test Point 9 (backward shot)

Test Point 9 backward is the backward LRUT shot at Wauchope's V14 concrete support blocks, looking east. The LRUT has detected no anomalies, the valve V14 was detected at a distance of 1.18m from the LRUT device. The concrete block lies before the 1.18m range to the valve and no significant LRUT readings were identified. Corrosion was not identified within the concrete block.

**14" Test Point 10**

Test Point 10 is the forward LRUT shot at Wauchope's V14 concrete support block, looking west. The LRUT has detected no anomalies, the valve V14 was detected at a distance of 1.33m from the LRUT device. The concrete block lies before the 1.33m range to the valve and no significant LRUT readings were identified. Corrosion was not identified within the concrete block.

14" Test Point 11

Test Point 11 is the forward LRUT shot at Wauchope's north concrete anchor block, looking south (Note that the schematic drawing in Appendix 5 has incorrectly labelled TP11 and TP12). The anchor flange within the concrete anchor block begins is detected 1.68m from the sensor head as shown in the results of Appendix 5. No anomalies were detected within the range of the concrete block. Corrosion was not identified within the concrete block.

14" Test Point 12

Test Point 12 is the forward LRUT shot at Wauchope's north concrete anchor block, looking north (Note that the schematic drawing in Appendix 5 has incorrectly labelled TP11 and TP12). The concrete anchor block begins 1.3m from the sensor head as shown in the results of Appendix 5. Two coating anomalies were identified at 0.50m and 0.67m, the concrete block interface is detected at 1.16m and the flange within the block was detected at a distance of 1.60m, 440mm into the block. Corrosion was not identified within the concrete block.

10" Test Point 1

Test Point 1 is the forward LRUT shot at Wauchope's blowdown line concrete support block between V11 and V12, looking south. The concrete interface is 0.70m in front of the sensor head as shown in the results of Appendix 5. A coating anomaly was detected within the concrete support block at a distance 0.97m, 0.27m into the concrete, this was identified as a coating related anomaly by the LRUT technician. The elbow girth weld was identified by LRUT at a distance of 2.37m. Refer to photo 0448. Corrosion was not identified within the concrete block.

10" Test Point 2

Test Point 2 is the forward LRUT shot at Wauchope's blowdown line 90° elbow concrete support block, looking north. The coating interface is 0.43m, 0.62m and 0.90m in front of the sensor head where the tape wrap coating has been removed. The elbow girth weld was detected at a distance of 1.44m from the LRUT device, inside of the concrete block. No anomalies were detected within the concrete block. Corrosion was not identified within the concrete block.

10" Test Point 3

Test Point 3 is the forward LRUT shot at Wauchope's blowdown line 90° elbow concrete support block, looking east refer to photo 0530. The coating interface is 0.46m in front of the sensor head as shown in the results of Appendix 5. A coating anomaly is detected at 0.73m from the LRUT device,



before the concrete block. The elbow piece girth weld was identified within the concrete block at a distance of 1.54m. Corrosion was not identified within the concrete block.

10" Test Point 4

Test Point 4 is the forward LRUT shot at Wauchope's blowdown stack concrete support block looking west, refer to photo 0589. 2 welds were detected at 1.43m and 1.88m inside of the concrete block, these are associated with the tee internal to the concrete support block. Corrosion was not identified within the concrete block.

10" Test Point 5

Test Point 5 is the forward LRUT shot at Wauchope's blowdown stack concrete support block looking vertically down, refer to photo 0589. The coating interface was detected at 0.45m from the device, and the weld to the tee was detected at a distance of 1.54m, inside of the concrete block. Corrosion was not identified within the concrete block.

4 Discussion

Compiling the results of DCVG, coating defects noted and corrosion found at Wauchope it should be possible to determine any links between the three sets of results. A complete set of results for the DCVG, Coating Defects and Metal loss is included in the Wauchope DCVG, Coating Defects and Metal Loss layout drawing of Appendix 1.

DCVG and Coating Defects

The DCVG survey discovered CP leaks which have been referenced back to coating defects found during the dig-up as described in Table 2 and referenced photos of Appendix 1. The DCVG survey failed to find blistering on the TEE downstream of V07, blistering upstream of the south anchor block, and blistering near the support block downstream of V14. The DCVG survey identified most of the significant coating defects at Wauchope.

DCVG Defect #4, 9 and 10 were not related back to specific defects found in the coating during dig-up, and yet some were relatively high %IR readings. DCVG Defect #9 and 10 detections were around concrete support blocks however, therefore there could be a detected defect within the support block. The risk of severe corrosion within these concrete blocks is low, despite making for ideal CP shielding structures, as the block is securely sealed where the pipe enters and exits the concrete blocks. On this project LRUT surveys were used to determine whether there was a pipe wall defect within these concrete blocks, there was no detected corrosion or metal loss by the LRUT surveys.

DCVG and Metal Loss Defects

The DCVG survey identified 4 out of 17 metal loss defects found at Wauchope. All except one metal loss defects were identified as resulting from pit corrosion due to shielding. The fact that most metal loss defects were not found by DCVG is consistent with the shielding premise as shielding corrosion propagates in the absence of CP.



Coating Condition

As can be seen by the photos the pipe coating is failing in many locations leading to many detected holidays. Although corrosion has not been found to be widespread at the stage dig-up occurred, the degrading condition of the coating does indicate it is nearing the end of its effective life, and corrosion rates will accelerate as a result.

Corrosion

The corrosion that has occurred at metal loss ID #2, #3, #4, #5, #10, #11, #12 and #16 was in an area where the coating type was tape wrap on the blowdown line. The pipe was wrapped circumferentially, and corrosion occurred axially to the pipe in all above cases and the coating reported only a few defects evident in photos referenced on the drawing of Appendix 1. This indicates moisture ingress through the tape wrap defect has collected some distance away to where the corrosion subsequently occurred, shielded by the tape wrap from CP.

Metal loss ID #1 occurred underneath tape wrap with no reported coating defect and the coating passed a jeep test. This indicates moisture ingress through a tape wrap defect has collected some distance away to where the corrosion subsequently occurred, shielded by the tape wrap from CP.

Metal loss ID #12 may have resulted from a mill defect as there was no reported coating defect in the area, there was no corrosion product in the photos, and the metal loss defect was very localised.

Corrosion defects are summarised in Table 5: Metal Loss Defect Analysis above.

5 Recommendation

Corrosion has been largely mitigated at the site by the pipe coating and CP, however the blowdown line has suffered significant amounts of shielding corrosion despite the coating appearing in satisfactory condition. Corrosion rates will probably accelerate with time given the degrading condition of the coating. There is reasonable evidence of shielding particularly in the tape wrap systems. Shielding can lead to very rapid rates of pit corrosion which can ultimately result in a leak.

In the absence of shielding, the amount of general corrosion is reasonably low and the cathodic protection system is providing the secondary level of steel protection as per the design.

6 Conclusion

The DCVG survey has not been able to accurately detect all of the coating damage or metal loss at the Wauchope scraper station. The condition of the coating was generally poor and the DCVG survey indicated many CP leaks. The resolution and accuracy of the DCVG survey was shown to be a short-coming, as not all of the defects were spotted – this is probably due to the high number of defects in a relatively small area at the scraper station, therefore the gradient changes which would be an expected result of a coating defect are difficult to measure and locate given the high number.

There were several areas of metal loss on the station pipework where there had been coating degradation for example at the yellowjacket split and the tee upstream of V07. The amount of



general corrosion is low and the station cathodic protection system appears to be working as it should. However, there is evidence of shielding issues at this station.



Appendix 1 Station Layout, DCVG Survey, Coating Defects and Metal Loss Results.

DCVG IR (%)

DEFECT 1: 2.5

DEFECT 2: 15.0

DEFECT 3: 2.5

DEFECT 4: 5.5

DEFECT 5: 6.3

DEFECT 6: 15.0

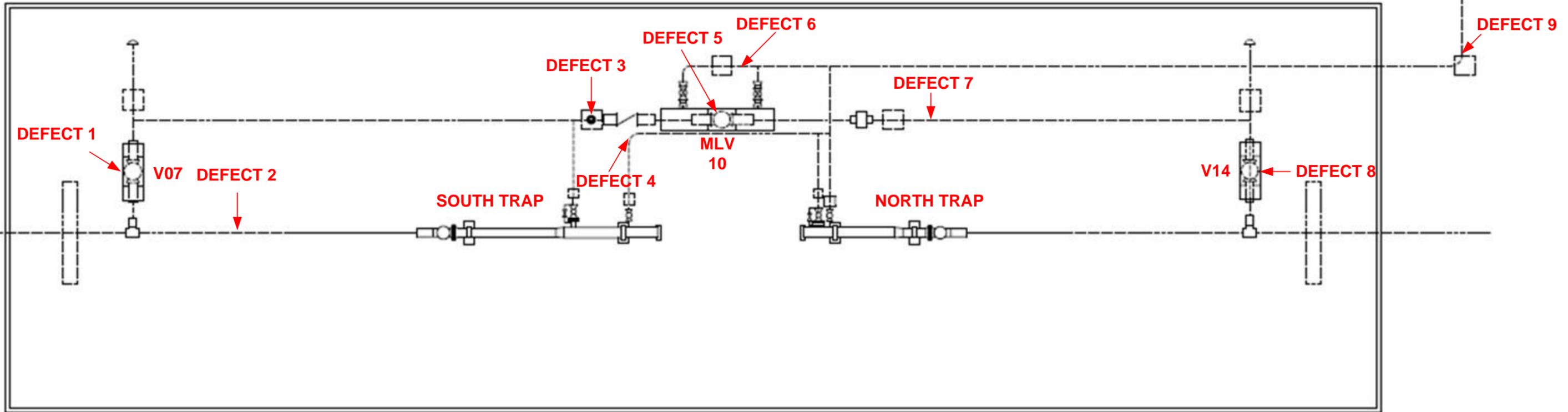
DEFECT 7: 5.0

DEFECT 8: 27.5

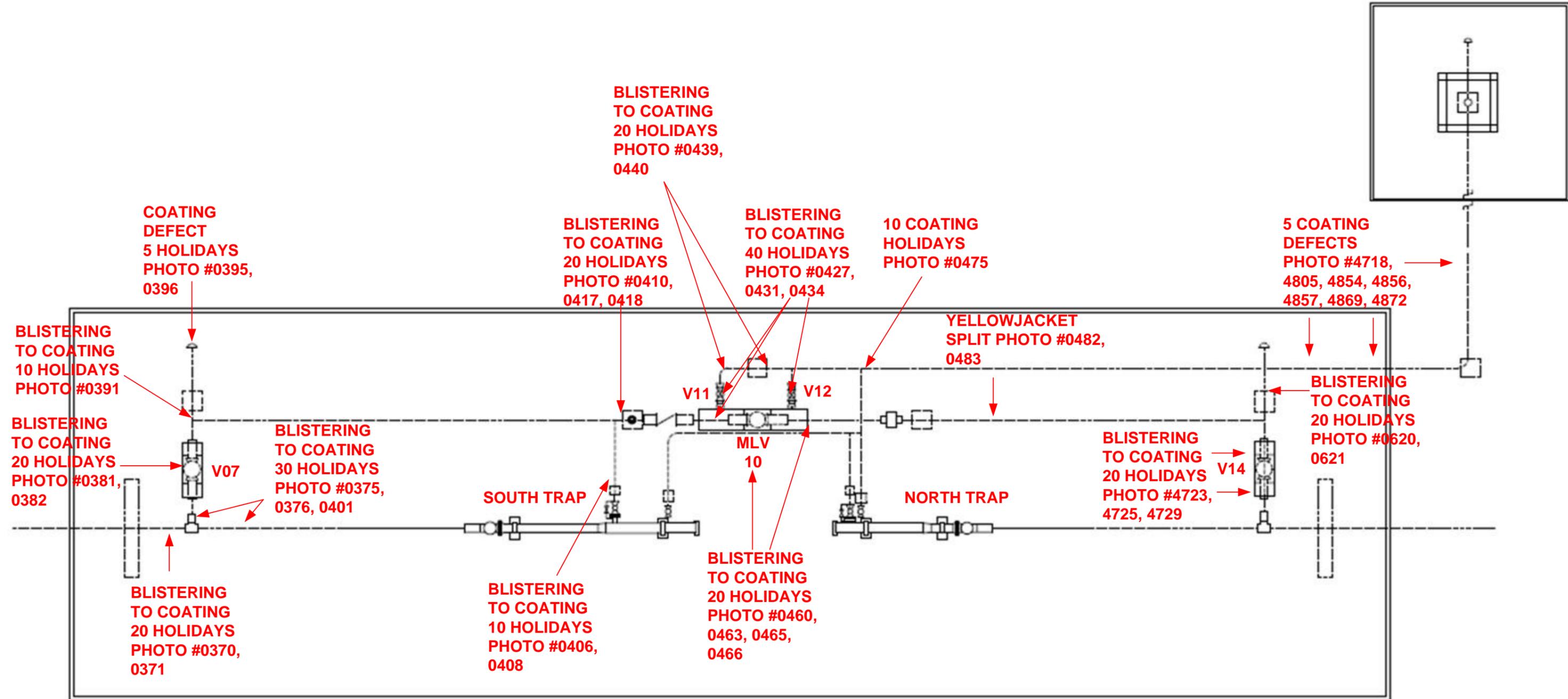
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DEFECT 10: 17.5

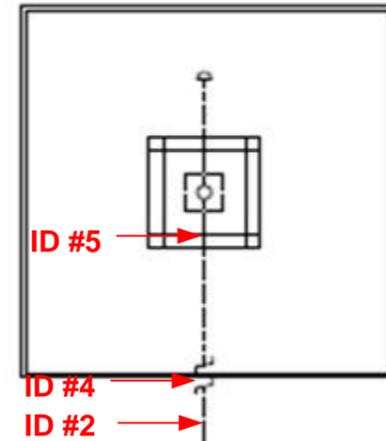
WAUCHOPE DCVG SURVEY



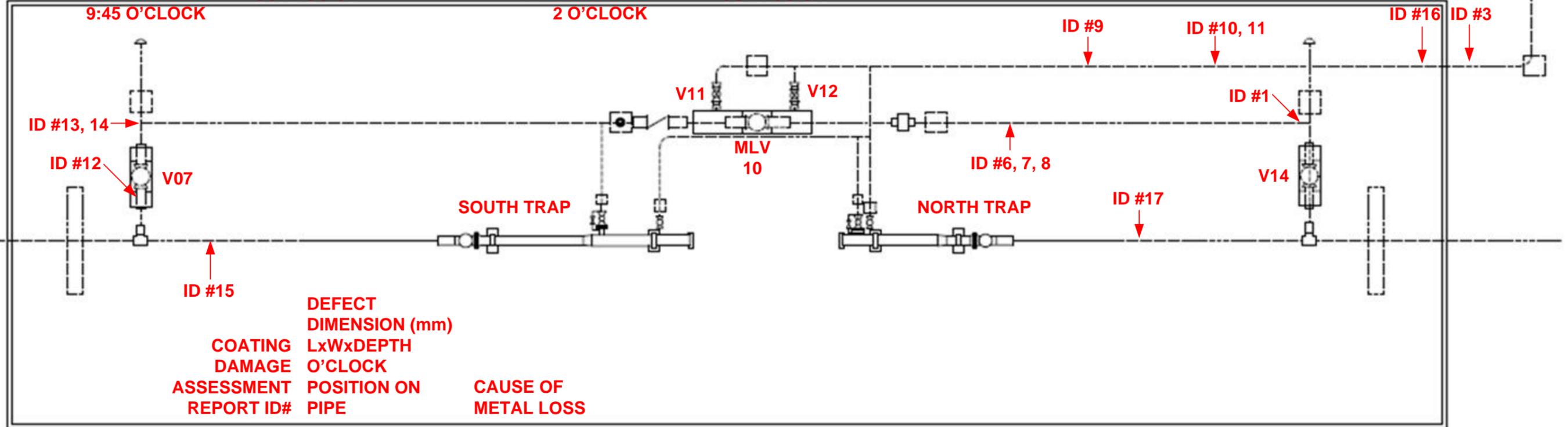
WAUCHOPE COATING DEFECT – VISUAL INSPECTION & HOLIDAY DETECTOR RESULTS



WAUCHOPE METAL LOSS RESULTS



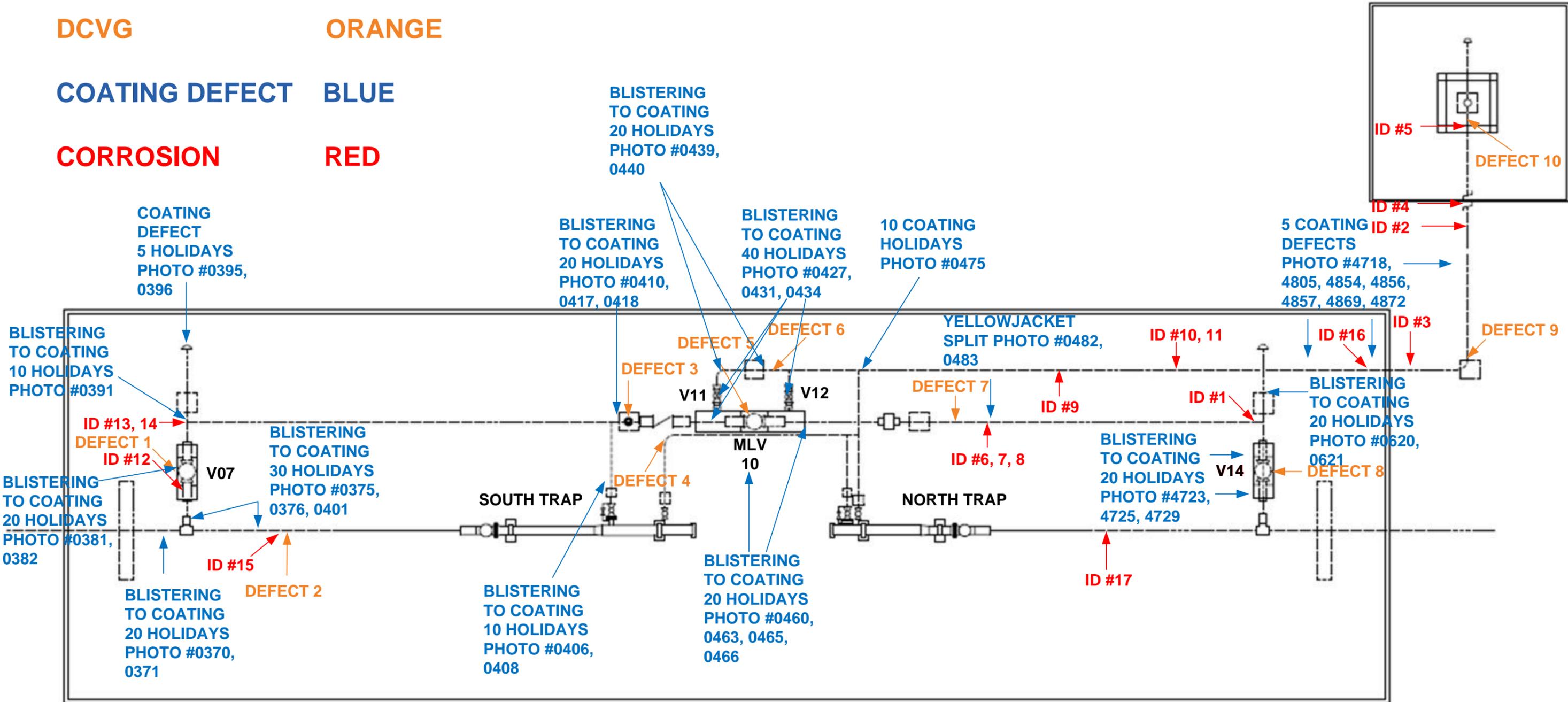
COATING DAMAGE ASSESSMENT REPORT ID#	DEFECT DIMENSION (mm) LxWxDDEPTH O'CLOCK POSITION ON PIPE	CAUSE OF METAL LOSS	COATING DAMAGE ASSESSMENT REPORT ID#	DEFECT DIMENSION (mm) LxWxDDEPTH O'CLOCK POSITION ON PIPE	CAUSE OF METAL LOSS
1	2x2x1.21 3 O'CLOCK	CORROSION	7	8x4x0.38 9:45 O'CLOCK	CORROSION
2	5x5x0.76 10:30 O'CLOCK	CORROSION	8	2x2x0.65 9:50 O'CLOCK	CORROSION
3	10x10x0.83 2:45 O'CLOCK	CORROSION	9	8x10x1.21 11 O'CLOCK	CORROSION
4	4x4x1.06 10 O'CLOCK	CORROSION	10	11x10x1.37 11:20 O'CLOCK	CORROSION
5	4x3x0.85 10 O'CLOCK	CORROSION	11	12x15x1.27 10:30 O'CLOCK	CORROSION
6	2x2x0.33 9:45 O'CLOCK	CORROSION	12	10x6x0.71 2 O'CLOCK	CORROSION



COATING DAMAGE ASSESSMENT REPORT ID#	DEFECT DIMENSION (mm) LxWxDDEPTH O'CLOCK POSITION ON PIPE	CAUSE OF METAL LOSS
13	8x8x0.60 2 O'CLOCK	CORROSION
14	4x3x0.52 12 O'CLOCK	CORROSION
15	1.2x2x0.10 4 O'CLOCK	CORROSION
16	4x4x0.92 2:45 O'CLOCK	CORROSION
17	10x15xNEG 3 O'CLOCK	CORROSION

WAUCHOPE DCVG, COATING DEFECTS & METAL LOSS RESULTS

LEGEND	COLOUR
DCVG	ORANGE
COATING DEFECT	BLUE
CORROSION	RED





Appendix 2 Coating Damage Assessment Forms

KP:
Form created by Ben Parkin Apr 09
Approved by Henry Dupal

Work Order No:

COATING DAMAGE ASSESSMENT

Location

Pipeline: _____ Excavation Date: 12/3/2013
 Section: DOWN STREAM OF V14 Digup Reason: COATING INSPECTION
 Kilometre Point: WAUCHOPE SS DCVG Measurement: N/A
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____
 Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

 Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>4707, 4727</u>
Pipe with coating removed	<u>1</u>
Pipe cleaned	<u>4970, 4971, 4972, 4974</u>
Pipe repaired	<u>5046, 5047</u>

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.3 Soil pH: 5-6
 Pipe To Soil Potential (V): 1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Is there a coating defect (Y/N)? N
 Coating Description: Any white buildup from cathodic protection (Y/N)? N
 Yellow Jacket Any evidence of termite damage (Y/N)? N
 Sleeve Any moisture inside the coating (Y/N)? N
 Wrapping Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 FBE Has the coating lifted away from the pipe (Y/N)? N
 Paint If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): _____ Coating Defect Width (mm): _____

Coating Defect Comments:
INCAP DID NOT JUMP OUT.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

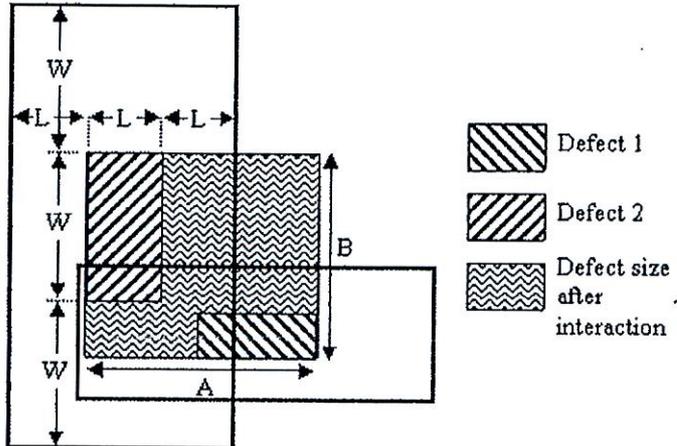


Figure 1

Maximum Depth (mm):

1.21

Wall thickness (mm):

Longitudinal dimension (A) (mm):

2

Circumferential dimension (B) (mm):

2

Clock Position (looking in direction of flow):

3

Distance from longitudinal weld (mm):

60

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

166 ON TEE

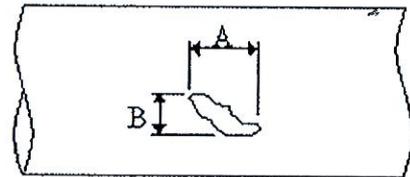


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

PIPE DOWN STREAM OF TEE CORRODED. TEE IS DOWN STREAM
OF V14
CORROSION WAS UNDER WRAP INTERFACES BETWEEN CT13 & YELLOW JACKET

Dig Up Comments:

DIGGING SOFT

Operator: Marque Duffy

Signature: [Signature]

Date: 12/4/2013

COATING DAMAGE ASSESSMENT

Location

Pipeline: _____
 Section: BLOW DOWN LINE
 Kilometre Point: WAUCHOPE SS
 Zone: _____
 Easting: _____
 Northing: _____

Excavation Date: 2/8/2013
 Digup Reason: COATING INSPECTION
 DCVG Measurement: N/A
 Defect Length from survey (m): _____
 CMMS Work Order No: 144306

Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	4856
Pipe with coating removed	4885
Pipe cleaned	5004, 5005
Pipe repaired	5063, 5061

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.5

Soil pH: 5-6

Pipe To Soil Potential (V): 1.981

Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description:

- Yellow Jacket
- Sleeve
- Wrapping
- FBE
- Paint

Is there a coating defect (Y/N)?

N

Any white buildup from cathodic protection (Y/N)?

N

Any evidence of termite damage (Y/N)?

N

Any moisture inside the coating (Y/N)?

N

Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report

N/A

Has the coating lifted away from the pipe (Y/N)?

N

If yes, how far around the pipe has it lifted (mm)? _____

Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): _____

Coating Defect Width (mm): _____

Coating Defect Comments:

COATING WAS TESTED AT 6KV AND DIDN'T TEST OUT.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

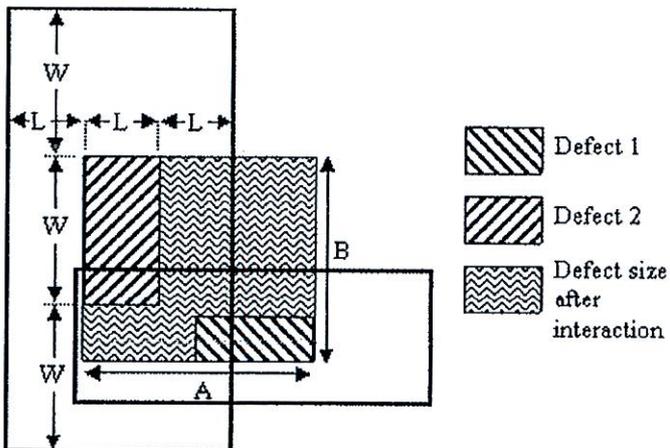


Figure 1

Maximum Depth (mm):

0.76

Wall thickness (mm):

Longitudinal dimension (A) (mm):

5

Circumferential dimension (B) (mm):

5

Clock Position (looking in direction of flow):

10:30

Distance from longitudinal weld (mm):

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

4550 D/S OF WELD

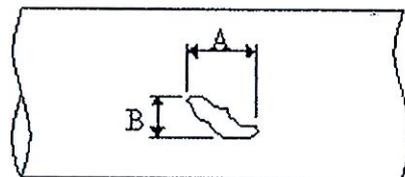


Figure 2

Repair

Length of Pipe Wrapped (mm): ENTIRE PIPE PAINTED

Other Repair Information:

CORROSION 7390 FROM BLOW DOWN GIRTH BLOCK.

Dig Up Comments:

SOFT DIGGING, NO STONE

Operator: Maqum Duff

Signature: [Signature]

Date: 12/4/2013

COATING DAMAGE ASSESSMENT

Location

Pipeline: _____ Excavation Date: 2/3/2013
 Section: BLOW DOWN LINE Digup Reason: COATING INSPECTION
 Kilometre Point: WACHOPES SS DCVG Measurement: N/A
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____

Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>4805</u>
Pipe with coating removed	<u>4897</u>
Pipe cleaned	<u>5019, 4998, 4997</u>
Pipe repaired	<u>5049</u>

Soil and CP

Soil Description (tick one or more from each column):

<input type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.6 Soil pH: 5-6

Pipe To Soil Potential (V): -1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description: _____ Is there a coating defect (Y/N)? N
 Yellow Jacket Any white buildup from cathodic protection (Y/N)? N
 Sleeve Any evidence of termite damage (Y/N)? N
 Wrapping Any moisture inside the coating (Y/N)? N
 FBE Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 Paint Has the coating lifted away from the pipe (Y/N)? N
 If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): _____ Coating Defect Width (mm): _____

Coating Defect Comments: COATING DID NOT FIND OUT

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

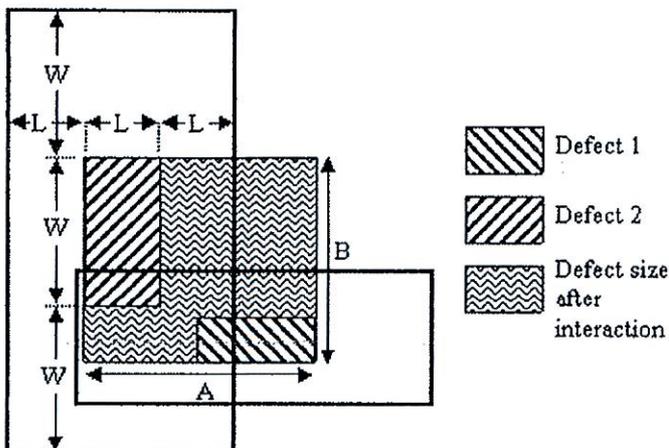


Figure 1

Maximum Depth (mm):

0.83

Wall thickness (mm):

Longitudinal dimension (A) (mm):

10

Circumferential dimension (B) (mm):

10

Clock Position (looking in direction of flow):

245

Distance from longitudinal weld (mm):

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

3100 WELD IN CORNER BLOCK.

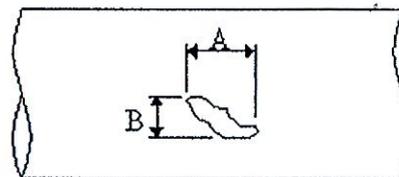


Figure 2

Repair

Length of Pipe Wrapped (mm): ENTIRE PIPE PAINTED

Other Repair Information:

CORROSION 2830 UP STREAM OF CORNER BLOCK. ON BLOW DOWN LINE.

Dig Up Comments:

SOFT DECOM, NO STONE

Operator: [Signature]

Signature: [Signature]

Date: 12/4/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 2/3/2017
 Section: BLAKE DAVEN LINE Digup Reason: COATING INSPECTION
 Kilometre Point: LAUNCH PIPE SS DCVG Measurement: N/A
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____

Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>4854</u>
Pipe with coating removed	<u>4886</u>
Pipe cleaned	<u>5006, 5007</u>
Pipe repaired	<u>5062</u>

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Soil and CP

Soil Description (tick one or more from each column):

<input type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.5 Soil pH: 4.6

Pipe To Soil Potential (V): -1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description:

Yellow Jacket

Sleeve

Wrapping

FBE

Paint

Is there a coating defect (Y/N)? N

Any white buildup from cathodic protection (Y/N)? N

Any evidence of termite damage (Y/N)? N

Any moisture inside the coating (Y/N)? N

Any stress corrosion cracking (Y/N)? N/A If yes, complete APA pipeline damage report

Has the coating lifted away from the pipe (Y/N)? N

If yes, how far around the pipe has it lifted (mm)? _____

Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): _____ Coating Defect Width (mm): _____

Coating Defect Comments:

WRAP ON PIPE DID NOT STICK OUT.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

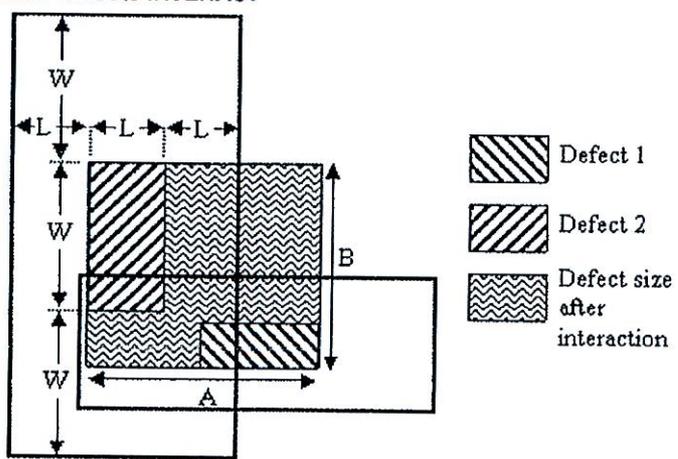


Figure 1

Maximum Depth (mm): 1.06

Wall thickness (mm): _____

Longitudinal dimension (A) (mm): 4

Circumferential dimension (B) (mm): 4

Clock Position (looking in direction of flow): 10

Distance from longitudinal weld (mm): _____

Distance from nearest girth weld (mm): 6280 IN B/D STACK BLOCKS. (TIE)
(if no girth weld has been found, do not excavate further)

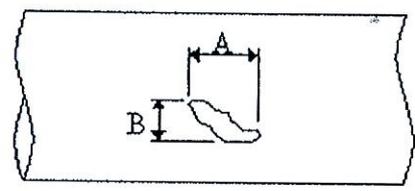


Figure 2

Repair

Length of Pipe Wrapped (mm): ENTIRE PIPE PAINTFIELD

Other Repair Information:

CORROSION 6190 FROM BLOW DOWN STACK BLOCKS.

Dig Up Comments:

Operator: [Signature]

Signature: [Signature]

Date: 12/4/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Location

Pipeline: _____ Excavation Date: 2/3/2013
 Section: LOW DOWN @ PIPE Digup Reason: COATING INSPECTION
 Kilometre Point: WAUCHOPIE SS DCVG Measurement: #10 17.5%
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____

Surrounding Description: _____
(Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>4792</u>
Pipe with coating removed	
Pipe cleaned	<u>5008, 5009, 4851</u>
Pipe repaired	<u>5060</u>

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.5 Soil pH: 5-6

Pipe To Soil Potential (V): -1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description:

- Yellow Jacket
- Sleeve
- Wrapping
- FBE
- Paint

Is there a coating defect (Y/N)? N
 Any white buildup from cathodic protection (Y/N)? N
 Any evidence of termite damage (Y/N)? N
 Any moisture inside the coating (Y/N)? N
 Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 Has the coating lifted away from the pipe (Y/N)? N
 If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): _____ Coating Defect Width (mm): _____

Coating Defect Comments:

WRAP DID NOT STICK OUT.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

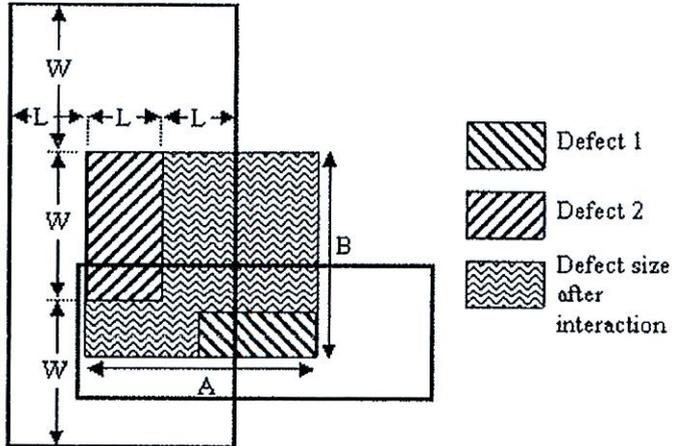


Figure 1

Maximum Depth (mm):

0.85

Wall thickness (mm):

Longitudinal dimension (A) (mm):

4

Circumferential dimension (B) (mm):

3

Clock Position (looking in direction of flow):

10

Distance from longitudinal weld (mm):

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

1410 IN B/D STACK BLOCK.

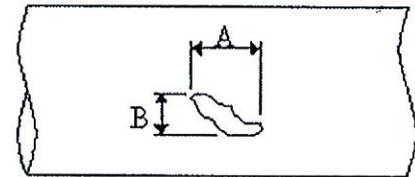


Figure 2

Repair

Length of Pipe Wrapped (mm): ENTIRE PIPE PAINTED

Other Repair Information:

CORROSION 1337 FROM BLOW DOWN STACK BLOCK.

Dig Up Comments:

SOFT DIGGING, NO STONIE.

Operator:

[Signature]

Signature:

[Signature]

Date:

12/4/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____
 Section: U/S OF M15
 Kilometre Point: WAUCHOPE SS
 Zone: _____
 Easting: _____
 Northing: _____

Excavation Date: 15/3/2013
 Digup Reason: COATING INSPECTION
 DCVG Measurement: #7 5%
 Defect Length from survey (m): _____
 CMMS Work Order No: 144306

Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>DSCN 0483</u>
Pipe with coating removed	<u>4929, 4930, 4688, 4689, 4690, 4691</u>
Pipe cleaned	<u>4929, 4930</u>
Pipe repaired	<u>5043</u>

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.3 Soil pH: 5-6

Pipe To Soil Potential (V): 1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Is there a coating defect (Y/N)? Y

Coating Description: Any white buildup from cathodic protection (Y/N)? Y

Yellow Jacket Any evidence of termite damage (Y/N)? N

Sleeve Any moisture inside the coating (Y/N)? Y

Wrapping Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A

FBE Has the coating lifted away from the pipe (Y/N)? Y

Paint If yes, how far around the pipe has it lifted (mm)? 30

Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): 2110 Coating Defect Width (mm): 10

Coating Defect Comments:
YELLOW JACKET SPLIT.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

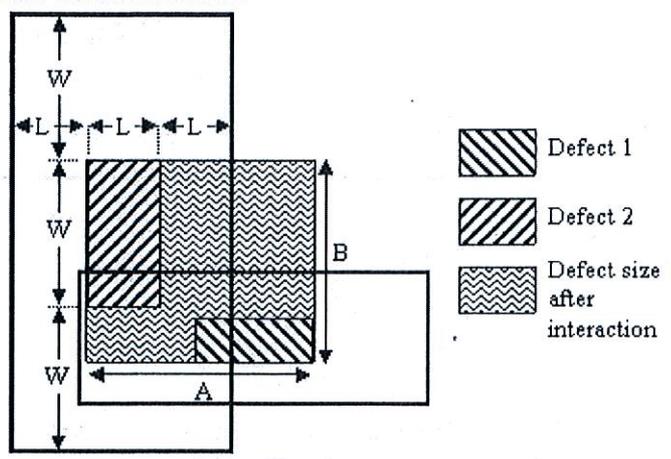


Figure 1

Maximum Depth (mm):

0.33

Wall thickness (mm):

Longitudinal dimension (A) (mm):

2

Circumferential dimension (B) (mm):

2

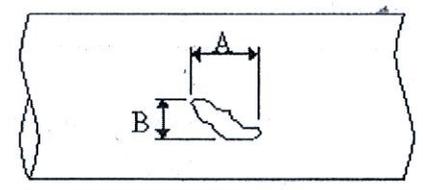


Figure 2

Clock Position (looking in direction of flow):

0945

Distance from longitudinal weld (mm):

ON WELD

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

1280 D/S OF WELD

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

CORROSION #1 4240 UP STREAM OF MID CENTRE

Dig Up Comments:

Operator: [Signature]

Signature: [Signature]

Date: 15/4/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Location

Pipeline: _____ Excavation Date: 13/3/2013
 Section: UP STREAM OF MILS Digup Reason: COATING INSPECTION
 Kilometre Point: WAUCHOPE SS DCVG Measurement: # 7 5%
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____
 Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

 Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>0483</u>
Pipe with coating removed	<u>4931, 4932, 4688, 4689, 4690, 4691</u>
Pipe cleaned	<u>4931, 4932</u>
Pipe repaired	<u>5043</u>

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.3 Soil pH: 5.6
 Pipe To Soil Potential (V): 1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Is there a coating defect (Y/N)? Y
 Coating Description: Any white buildup from cathodic protection (Y/N)? Y
 Yellow Jacket Any evidence of termite damage (Y/N)? N
 Sleeve Any moisture inside the coating (Y/N)? Y
 Wrapping Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 FBE Has the coating lifted away from the pipe (Y/N)? Y
 Paint If yes, how far around the pipe has it lifted (mm)? 30
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): 2110 Coating Defect Width (mm): 10

Coating Defect Comments:
YELLOW JACKET SPLIT.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

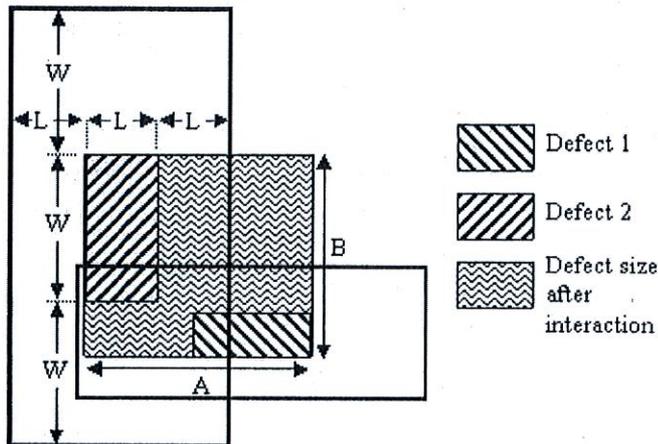


Figure 1

Maximum Depth (mm):

0-38

Wall thickness (mm):

8

Longitudinal dimension (A) (mm):

4

Circumferential dimension (B) (mm):

945

Clock Position (looking in direction of flow):

ON WELD

Distance from longitudinal weld (mm):

965 D/S OF WELD

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

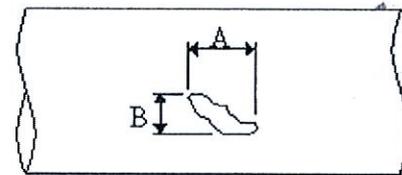


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

CORROSION # 2 IS 4510 UPSTREAM OF MJS CENTRE

Dig Up Comments:

Operator: Wayne Duff

Signature: [Signature]

Date: 15/4/2018

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 13/3/2013
 Section: UP STREAM OF M15 Digup Reason: COATING INSPECTION
 Kilometre Point: WAUCHOPE DCVG Measurement: # 7 50%
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____

Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>0483</u>
Pipe with coating removed	<u>4433, 4434, 4688, 4689, 4690, 4691</u>
Pipe cleaned	<u>4433, 4434</u>
Pipe repaired	<u>5043</u>

Soil and CP

Soil Description (tick one or more from each column):

<input type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.3 Soil pH: 5-6

Pipe To Soil Potential (V): 1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Is there a coating defect (Y/N)? Y
 Coating Description: Any white buildup from cathodic protection (Y/N)? Y
 Yellow Jacket Any evidence of termite damage (Y/N)? N
 Sleeve Any moisture inside the coating (Y/N)? Y
 Wrapping Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 FBE Has the coating lifted away from the pipe (Y/N)? Y
 Paint If yes, how far around the pipe has it lifted (mm)? 30
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): 2110 Coating Defect Width (mm): 10

Coating Defect Comments:
YELLOW JACKET SPLIT

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

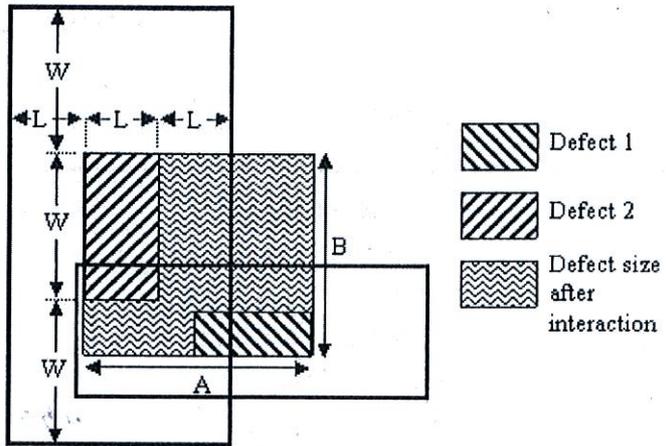


Figure 1

Maximum Depth (mm):

0.65

Wall thickness (mm):

Longitudinal dimension (A) (mm):

2

Circumferential dimension (B) (mm):

2

Clock Position (looking in direction of flow):

950

Distance from longitudinal weld (mm):

8

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

798 D/S OF WELD

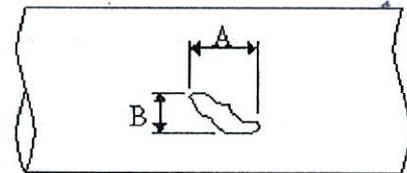


Figure 2

Repair

Length of Pipe Wrapped (mm):

Other Repair Information:

CORROSION # 3 4677 UP STREAM OF MID CENTRE

Dig Up Comments:

Operator: Wayne Daffy

Signature: [Signature]

Date: 15/4/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 12/3/2013
 Section: B/D LINE Digup Reason: COATING INSPECTION
 Kilometre Point: WAUCHOPIE SS DCVG Measurement: N/A
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____
 Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>0477, 0478, 0482, 0483, 0488, 0491, 0492, 0493</u>
Pipe with coating removed	<u>4734</u>
Pipe cleaned	<u>4924, 4750</u>
Pipe repaired	<u>5052</u>

Soil and CP

Soil Description (tick one or more from each column):

<input type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.4 Soil pH: 5-6
 Pipe To Soil Potential (V): 1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Is there a coating defect (Y/N)? N
 Coating Description: Any white buildup from cathodic protection (Y/N)? //
 Yellow Jacket Any evidence of termite damage (Y/N)? N
 Sleeve Any moisture inside the coating (Y/N)? N
 Wrapping Any stress corrosion cracking (Y/N)? N/A If yes, complete APA pipeline damage report
 FBE Has the coating lifted away from the pipe (Y/N)? N
 Paint If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): _____ Coating Defect Width (mm): _____

Coating Defect Comments:

WRAP DID NOT JUMP OUT.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

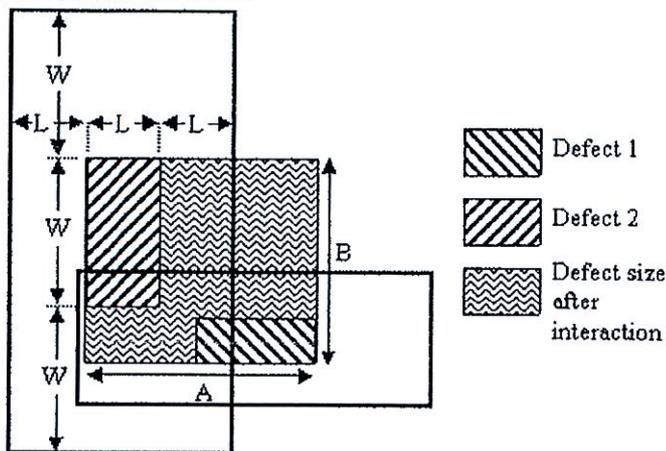


Figure 1

Maximum Depth (mm):

1.21

Wall thickness (mm):

Longitudinal dimension (A) (mm):

8

Circumferential dimension (B) (mm):

10

Clock Position (looking in direction of flow):

11

Distance from longitudinal weld (mm):

10

Distance from nearest girth weld (mm):

2625

(if no girth weld has been found, do not excavate further)

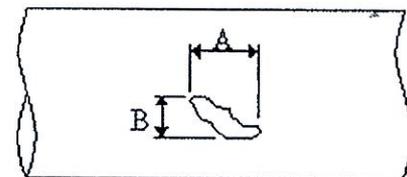


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

CORROSION 6365 D/S OF 50 MM THICK

Dig Up Comments:

Operator: Wayne Duffy

Signature: [Signature]

Date: 15/4/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____
 Section: BLOW DOWN LINE
 Kilometre Point: WAUCHOPIE SS
 Zone: _____
 Easting: _____
 Northing: _____

Excavation Date: 12/3/2013
 Digup Reason: COATING INSPECTION
 DCVG Measurement: N/A
 Defect Length from survey (m): _____
 CMMS Work Order No: 144306

Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>0508, 0509</u>
Pipe with coating removed	<u>4738, 0510</u>
Pipe cleaned	<u>4927, 4928, 4778</u>
Pipe repaired	<u>5052</u>

Soil and CP

Soil Description (tick one or more from each column):

<input type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.4 Soil pH: 5-6
 Pipe To Soil Potential (V): -1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Is there a coating defect (Y/N)? N

Coating Description: Any white buildup from cathodic protection (Y/N)? N

Yellow Jacket Any evidence of termite damage (Y/N)? N

Sleeve Any moisture inside the coating (Y/N)? H

Wrapping Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A

FBE Has the coating lifted away from the pipe (Y/N)? H

Paint If yes, how far around the pipe has it lifted (mm)? _____

Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): N/A Coating Defect Width (mm): _____

Coating Defect Comments:
WRAP DID NOT JEEP OUT AT 6,000 VOLTS.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

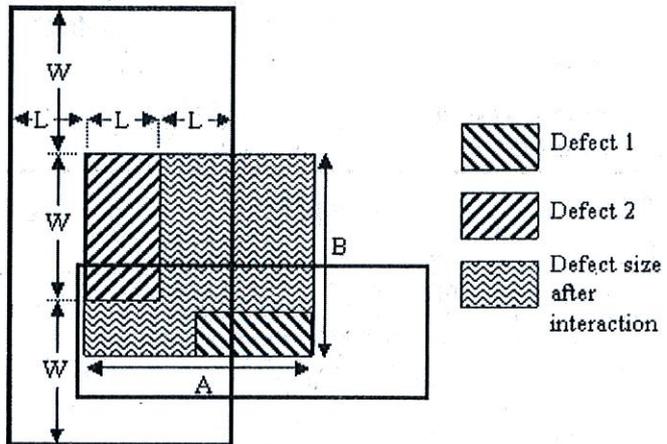


Figure 1

Maximum Depth (mm):

1.37

Wall thickness (mm):

Longitudinal dimension (A) (mm):

11

Circumferential dimension (B) (mm):

10

Clock Position (looking in direction of flow):

1120

Distance from longitudinal weld (mm):

ON WELD

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

1570 U/G OF WELD

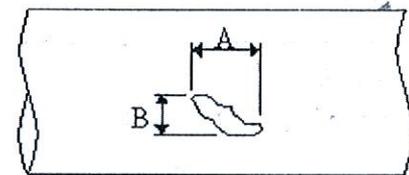


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

CORROSION ON BLOW DOWN LINE 13230 FROM 50MM TIE-IN

Dig Up Comments:

Operator: WAYNE DUFFY

Signature: [Signature]

Date: 15/4/2013

10# 11

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 12/3/2013
 Section: BLow Down Line Digup Reason: COATING INSPECTION
 Kilometre Point: WAUCHOPIE DCVG Measurement: N/A
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144 306
 Northing: _____
 Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>0507</u>
Pipe with coating removed	<u>4737</u>
Pipe cleaned	<u>4926 4770</u>
Pipe repaired	<u>5052</u>

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.4 Soil pH: 5-6
 Pipe To Soil Potential (V): 1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description: _____ Is there a coating defect (Y/N)? N
 Yellow Jacket Any white buildup from cathodic protection (Y/N)? N
 Sleeve Any evidence of termite damage (Y/N)? N
 Wrapping Any moisture inside the coating (Y/N)? N
 FBE Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 Paint Has the coating lifted away from the pipe (Y/N)? N
 If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): N/A Coating Defect Width (mm): _____

Coating Defect Comments:
WRAP DID NOT STEP OUT AT 6,000 VOLTS.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

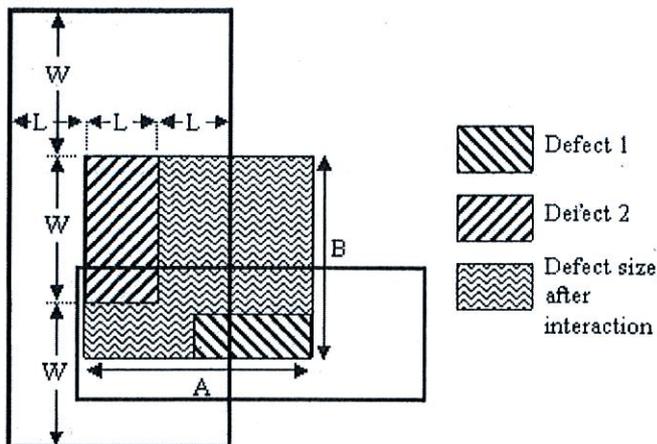


Figure 1

Maximum Depth (mm):

1.27

Wall thickness (mm):

Longitudinal dimension (A) (mm):

12

Circumferential dimension (B) (mm):

15

Clock Position (looking in direction of flow):

1030

Distance from longitudinal weld (mm):

13

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

3740 1/2 OF WELD

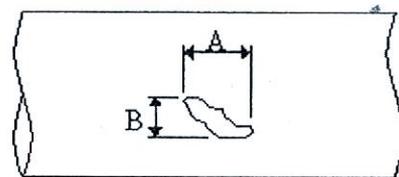


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

CORROSION 11075 DOWN STREAM OF 50MM TIE-IN

Dig Up Comments:

Operator: Wayne Duffy

Signature: [Signature]

Date: 15/4/2013

ID# 12

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 11/3/2013
 Section: D/S OF V07 Digup Reason: COATING INSPECTION
 Kilometre Point: WAUCHOPIE SS DCVG Measurement: #1 2.5
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____
 Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>4671, 4668, 4679, 4663</u>
Pipe with coating removed	<u>0378 0379</u>
Pipe cleaned	<u>4937, 4938, 4948</u>
Pipe repaired	<u>5036</u>

Soil and CP

Soil Description (tick one or more from each column):

<input type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.2 Soil pH: 5.6
 Pipe To Soil Potential (V): -1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Is there a coating defect (Y/N)? N
 Coating Description: Any white buildup from cathodic protection (Y/N)? N
 Yellow Jacket Any evidence of termite damage (Y/N)? N
 Sleeve Any moisture inside the coating (Y/N)? N
 Wrapping Any stress corrosion cracking (Y/N)? N/A If yes, complete APA pipeline damage report
 FBE Has the coating lifted away from the pipe (Y/N)? N
 Paint If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): _____ Coating Defect Width (mm): _____

Coating Defect Comments:
WRAP DID NOT JUMP OUT.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

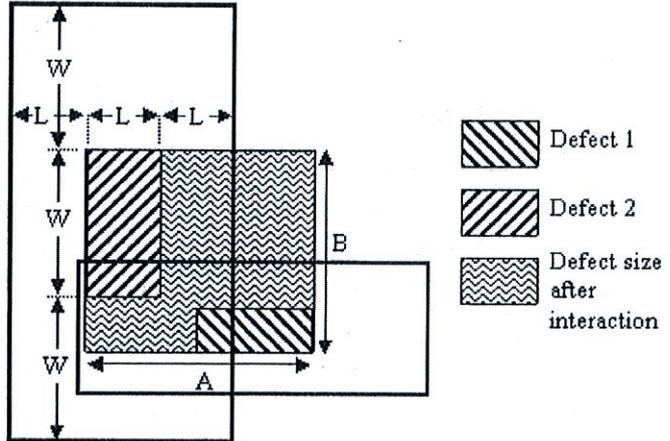


Figure 1

Maximum Depth (mm):

0.71

Wall thickness (mm):

Longitudinal dimension (A) (mm):

10

Circumferential dimension (B) (mm):

6

Clock Position (looking in direction of flow):

1400

Distance from longitudinal weld (mm):

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

410 O/S OF WELD

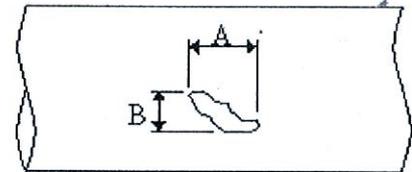


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

CORROSION 555mm O/S OF V07

Dig Up Comments:

Operator: Wayne Duff

Signature: [Signature]

Date: 15/4/2013

11D# 13

KP:
Form created by Ben Parkin Apr 09
Approved by Henry Dupal

Work Order No:

COATING DAMAGE ASSESSMENT

Location

Pipeline: _____ Excavation Date: 11/07/2013
 Section: TIE UPS OF V07 Digup Reason: COATING INSPECTION
 Kilometre Point: WAVCHOPE SS DCVG Measurement: N/A
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____

Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>4658, 4659, 0391</u>
Pipe with coating removed	
Pipe cleaned	<u>4941, 4940, 4942, 4944, 4959</u>
Pipe repaired	<u>5036</u>

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.2 Soil pH: 5-6

Pipe To Soil Potential (V): 1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description:
 Yellow Jacket
 Sleeve
 Wrapping
 FBE
 Paint

Is there a coating defect (Y/N)? Y
 Any white buildup from cathodic protection (Y/N)? N
 Any evidence of termite damage (Y/N)? N
 Any moisture inside the coating (Y/N)? N
 Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 Has the coating lifted away from the pipe (Y/N)? N
 If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): _____ Coating Defect Width (mm): _____

Coating Defect Comments:

TIE ORIGINAL COATING CTIE, THEN GREEN PAINT I THINK IS "PROTOL" WAS APPLIED TO OLD COATING. CORROSION UNDER GREEN PAINT.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

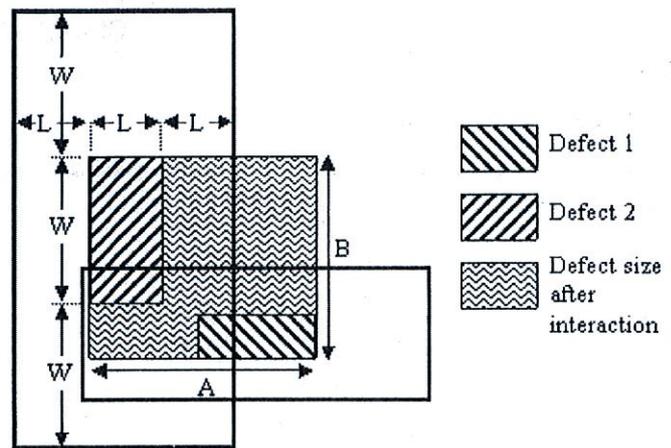


Figure 1

Maximum Depth (mm):

0.60

Wall thickness (mm):

Longitudinal dimension (A) (mm):

88

Circumferential dimension (B) (mm):

88

Clock Position (looking in direction of flow):

2 PM

Distance from longitudinal weld (mm):

ON TIE

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

60 mm

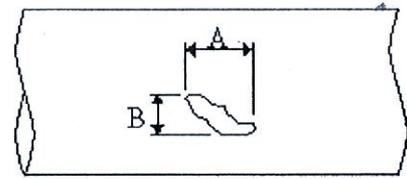


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

CORROSION ON TIE 1502 MM UPSTREAM OF V07

Dig Up Comments:

Operator: Wayne Duff

Signature: [Signature]

Date: 15/4/2013

ID# 14

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 11/3/2013
 Section: TIE U/S OF V07 Digup Reason: COATING INSPECTION
 Kilometre Point: WAUCHOPE SS DCVG Measurement: N/A
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____
 Surrounding Description: _____
 (Buildings, drains, etc) _____

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>4658, 4659, 4676, 4678, 0391</u>
Pipe with coating removed	
Pipe cleaned	<u>4939, 4942</u>
Pipe repaired	<u>5058</u>

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.2 Soil pH: 5-6
 Pipe To Soil Potential (V): 1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description:

- Yellow Jacket
- Sleeve
- Wrapping
- FBE
- Paint

Is there a coating defect (Y/N)? Y
 Any white buildup from cathodic protection (Y/N)? N
 Any evidence of termite damage (Y/N)? N
 Any moisture inside the coating (Y/N)? N
 Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 Has the coating lifted away from the pipe (Y/N)? Y
 If yes, how far around the pipe has it lifted (mm)? 380
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): 380 Coating Defect Width (mm): 580

Coating Defect Comments:

ORIGINAL COATING WAS CTIE. "PROTOL" PAINT WAS APPLIED OVER OLD COATING.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

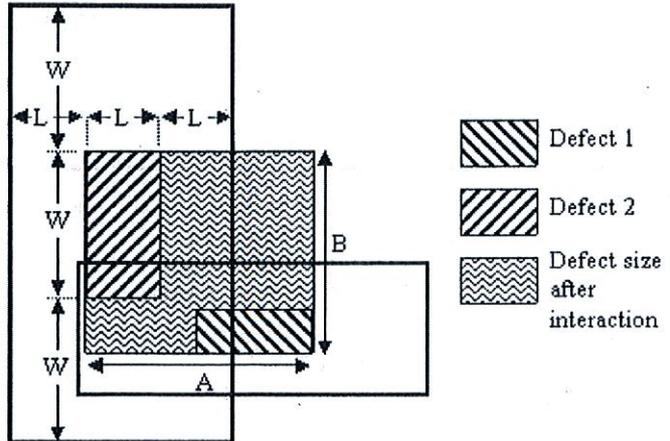


Figure 1

Maximum Depth (mm):

0.52

Wall thickness (mm):

Longitudinal dimension (A) (mm):

40

Circumferential dimension (B) (mm):

30

Clock Position (looking in direction of flow):

12

Distance from longitudinal weld (mm):

ON TIE

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

175 D/S OF WELD

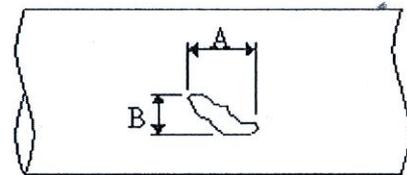


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information: 1826mm

CORROSION ON TIE, UPSTREAM OF V07

Dig Up Comments:

Operator: Wayne Duff

Signature: [Signature]

Date: 13/4/2013

COATING DAMAGE ASSESSMENT

Location

Pipeline: _____ Excavation Date: 13/3/13
 Section: ~1/2 NORTH OF TEE DOWNSTREAM OF V07, ON PRELIMINARY LINE Digup Reason: COATING INSPECTION
 Kilometre Point: _____ DCVG Measurement: 157 (DEFECT 2)
 Zone: WAUCHOPE SS Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____

Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

 Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>DSCN0401</u>
Pipe with coating removed	
Pipe cleaned	<u>4966, 4965</u>
Pipe repaired	<u>5058, 5035</u>

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input checked="" type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input checked="" type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.1-1.2m Soil pH: 5-6

Pipe To Soil Potential (V): -1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Is there a coating defect (Y/N)? Y
 Coating Description: Any white buildup from cathodic protection (Y/N)? Y
 Yellow Jacket Any evidence of termite damage (Y/N)? N
 Sleeve Any moisture inside the coating (Y/N)? Y
 Wrapping Any stress corrosion cracking (Y/N)? N/A If yes, complete APA pipeline damage report
 FBE Has the coating lifted away from the pipe (Y/N)? ~~Y~~ N
 Paint If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): 1400 Coating Defect Width (mm): 250

Coating Defect Comments:
BLISTERING AREA, LARGEST BLISTER 30mm DIAMETER.
PIG LAUNCHER WAS COATED WITH CTIE.

1D#15

KP:

Work Order No:

Page 2

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

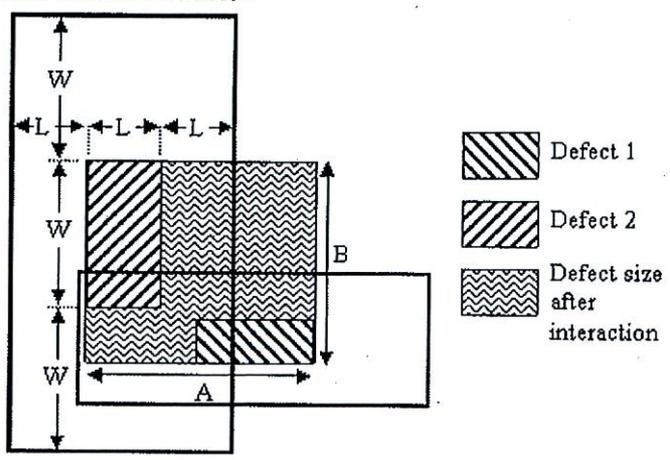


Figure 1

Maximum Depth (mm):

0.10

Wall thickness (mm):

Longitudinal dimension (A) (mm):

1.2

Circumferential dimension (B) (mm):

2.0

Clock Position (looking in direction of flow):

4

Distance from longitudinal weld (mm):

160

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

2.6

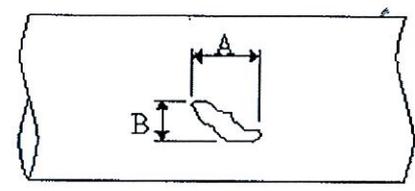


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

CORROSION ON PIG LAUNCHER 2.6M FROM BUTT WELD ON TIE TO V07

Dig Up Comments:

Operator: Wayne Duff

Signature: [Signature]

Date: 15/4/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 12/3/2013
 Section: BLow DOWN LINE Digup Reason: COATING INSPECTION
 Kilometre Point: INAUCHOPE DCVG Measurement: N/A
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144 306
 Northing: _____
 Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>4716</u>
Pipe with coating removed	<u>4894</u>
Pipe cleaned	<u>5029, 5028</u>
Pipe repaired	<u>5048</u>

Soil and CP

Soil Description (tick one or more from each column):

<input type="checkbox"/> Sand	<input type="checkbox"/> Fine	<input type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input checked="" type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1.4 Soil pH: 5-6
 Pipe To Soil Potential (V): -1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description: _____ Is there a coating defect (Y/N)? N
 Yellow Jacket Any white buildup from cathodic protection (Y/N)? N
 Sleeve Any evidence of termite damage (Y/N)? N
 Wrapping Any moisture inside the coating (Y/N)? N
 FBE Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 Paint Has the coating lifted away from the pipe (Y/N)? N
 If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): _____ Coating Defect Width (mm): _____

Coating Defect Comments:

COATING DID NOT TIEP OUT

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

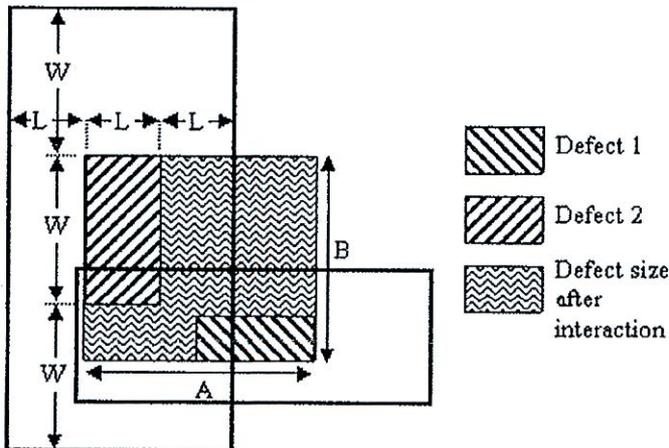


Figure 1

Maximum Depth (mm):

0.92

Wall thickness (mm):

Longitudinal dimension (A) (mm):

14

Circumferential dimension (B) (mm):

4

Clock Position (looking in direction of flow):

9.75 2.45

Distance from longitudinal weld (mm):

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

4830 O/S OF WELD

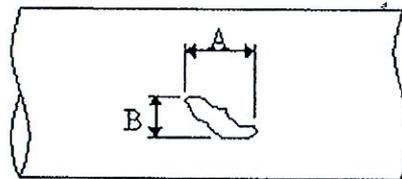


Figure 2

Repair

Length of Pipe-Wrapped (mm): _____

Other Repair Information:

CORROSION ON BLOW DOWN LINE 3970 UPSTREAM OF CONTROL BLOCK.

Dig Up Comments:

Operator: Wayne Dyff

Signature: [Signature]

Date: 16/4/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 14/3/13
 Section: PIG RECEIVED IN USE PIPE Digup Reason: COATING INSPECTION
 Kilometre Point: WAUCHOLE DCVG Measurement: #2 15%
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144306
 Northing: _____
 Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	
Pipe with coating removed	<u>4699, 0500, 0501</u>
Pipe cleaned	<u>0537</u>
Pipe repaired	<u>5044</u>

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input checked="" type="checkbox"/> Fine	<input checked="" type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam/GRAVEL	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input checked="" type="checkbox"/> Gravel	<input type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 250mm Soil pH: 5-6
 Pipe To Soil Potential (V): 1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description: _____ Is there a coating defect (Y/N)? X
 Yellow Jacket Any white buildup from cathodic protection (Y/N)? Y
 Sleeve Any evidence of termite damage (Y/N)? N
 Wrapping Any moisture inside the coating (Y/N)? Y
 FBE Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 Paint Has the coating lifted away from the pipe (Y/N)? Y
 If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): 220mm Coating Defect Width (mm): 5

Coating Defect Comments:

DEFECT LOOKS LIKE SOMETHING BLUNT HIT THE PIPE AND
SCRAPED DOWN THE SIDE OF IT WHILE IT PUSHED INTO GROUND EG: A STAKE
UPSTREAM OF BUTT WELD WHICH IS 7140 Ø/S Ø1 V01

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

N

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

Y

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

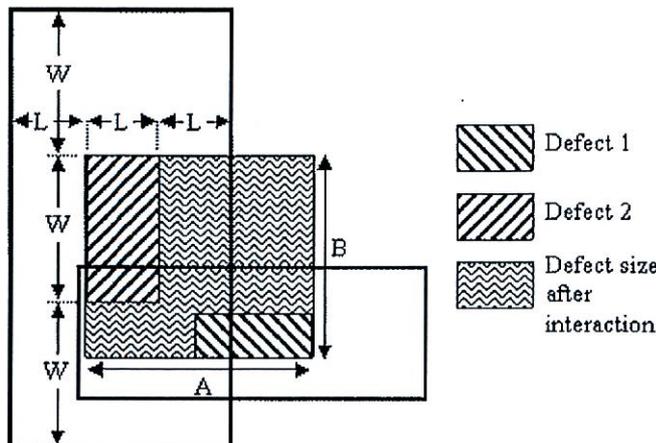


Figure 1

Maximum Depth (mm):

NEGLECTIBLE

Wall thickness (mm):

8.74

Longitudinal dimension (A) (mm):

10mm

Circumferential dimension (B) (mm):

15mm

Clock Position (looking in direction of flow):

3 O'CLOCK

Distance from longitudinal weld (mm):

Distance from nearest girth weld (mm):
(if no girth weld has been found, do not excavate further)

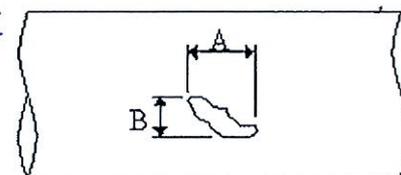


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

7005mm U/S OF PIG RELIEVER TRAP VALVE

Dig Up Comments:

Operator: _____ Signature: _____ Date: _____

KP:
Form created by Ben Parkin Apr 09
Approved by Henry Dupal

Work Order No:

COATING DAMAGE ASSESSMENT

Location

Pipeline: _____ Excavation Date: 14/3/13
 Section: DINO TEE INTO B/D LINE Digup Reason: COATING INSPECTION
 Kilometre Point: WAWCHHOPE SS DCVG Measurement: NIL
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144 306
 Northing: _____

Surrounding Description: _____
 (Buildings, drains, etc)

Photos

Has the camera date and time been set correctly?

 Please remember to take both close up (no closer than 500mm) and wide photos.

Description	Time(s) photo taken or viewfinder number
Surrounding landscape	
Site facing increasing chainage	
Site facing decreasing chainage	
Pipe with coating	<u>DSCN0495, 0496, 0497, 0498, 0499</u>
Pipe with coating removed	
Pipe cleaned	
Pipe repaired	<u>5057, 5033</u>

Soil and CP

Soil Description (tick one or more from each column):

<input checked="" type="checkbox"/> Sand	<input checked="" type="checkbox"/> Fine	<input checked="" type="checkbox"/> Dusty
<input checked="" type="checkbox"/> Loam	<input type="checkbox"/> Coarse	<input type="checkbox"/> Dry
<input type="checkbox"/> Clay	<input type="checkbox"/> Gravel	<input type="checkbox"/> Damp
<input type="checkbox"/> Black	<input type="checkbox"/> Rocky	<input type="checkbox"/> Wet
<input type="checkbox"/> Red Dirt		

Pipeline Soil Cover Depth (m): 1m Soil pH: 5.6
 Pipe To Soil Potential (V): 1.981 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description:
 Yellow Jacket
 Sleeve
 Wrapping
 FBE
 Paint

Is there a coating defect (Y/N)? Y
 Any white buildup from cathodic protection (Y/N)? Y
 Any evidence of termite damage (Y/N)? N
 Any moisture inside the coating (Y/N)? Y
 Any stress corrosion cracking (Y/N)? If yes, complete APA pipeline damage report N/A
 Has the coating lifted away from the pipe (Y/N)? ~~Y~~ N
 If yes, how far around the pipe has it lifted (mm)? _____
 Sketch of coating / corrosion damage completed (Y/N)? _____

Coating Defect Length (mm): 160mm Coating Defect Width (mm): 15mm

Coating Defect Comments:
BLOWDOWN LINE TAPE WRAP REMOVED @ TEE, CTE USED TO COAT EXPOSED AREA -
COATING DEFECT WITH CP PRODUCT @ WRAP TO CTE INTERFACE. CTE DAMAGE
APPROX 600mm UPSTREAM OF TEE TIE-IN, FILLED WITH CP PRODUCT. LIKELY
CAUSED BY EXCAVATION DAMAGE.

KP:

Work Order No:

Metal Loss

Is there any deformation of the pipe (dent, gouge or not round) (Y/N)?

 ✓

If Yes, Engineering must be contacted IMMEDIATELY.

Is there any metal loss (Y/N)?

 ✓

If there is any metal loss, complete the remaining section of this form and contact Engineering IMMEDIATELY.

The following measurements should indicate whether defects INTERACT

Interaction Rules:

1. Consider each defect as a rectangular box.
2. Draw a larger box around each defect, extending length and width as per Figure 1.
3. IF BOTH larger boxes intersect with the original defect boxes, the defects interact.
4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

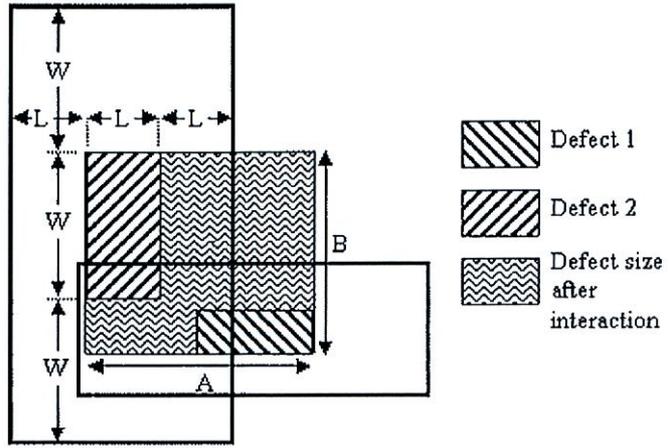


Figure 1

Maximum Depth (mm): _____

Wall thickness (mm): _____

Longitudinal dimension (A) (mm): _____

Circumferential dimension (B) (mm): _____

Clock Position (looking in direction of flow): _____

Distance from longitudinal weld (mm): _____

Distance from nearest girth weld (mm): _____
(if no girth weld has been found, do not excavate further)

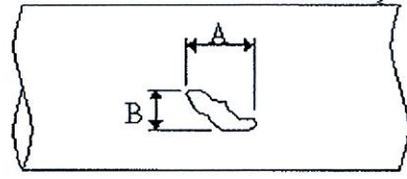


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

 PIPE WAS COATED WITH DULUX LUXAPOXY UHB

Dig Up Comments:

Operator: [Signature]

Signature: [Signature]

Date: 14/4/2013



Appendix 3 Photo Log

Photos:

0370

0371

0375

0376

0379

0381

0382

0391

0392

0395

0396

0401

0406

0408

0410

0417

0418

0427

0431

0434

0439

0440

0448

0460

0463



0465

0466

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5062



Appendix 4 RSTRENG ANALYSIS

Site: ~~Warrego~~ SS

Wauchope

Station: ~~Warrego~~ SS

Wauchope

Date: 9/07/2013

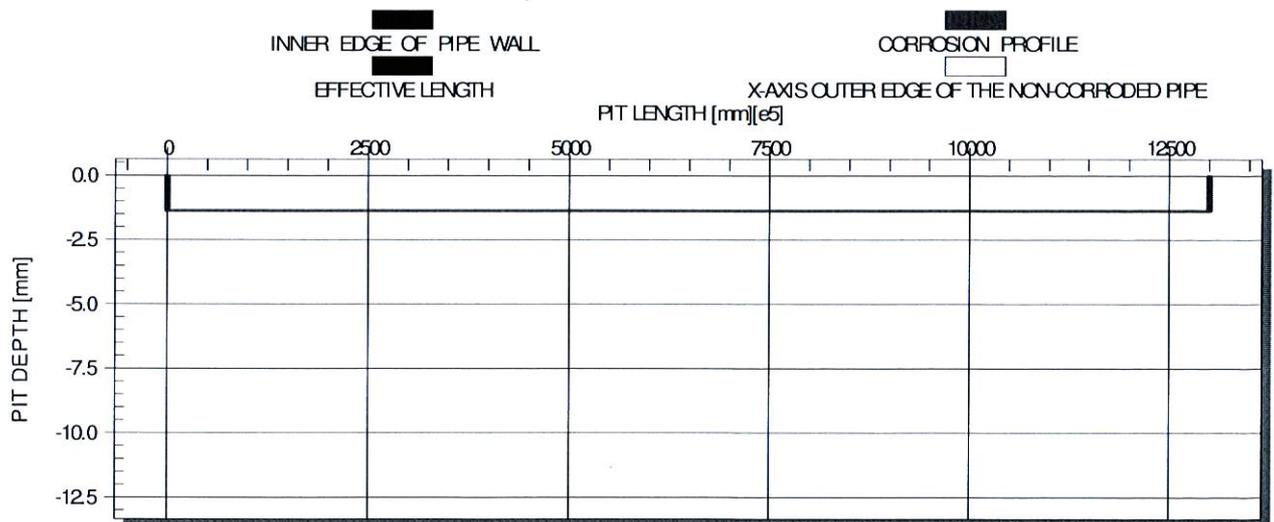
P = 2StFT/D [kPa] - Calculated Pressure 16,138.444
 Established MAOP [kPa] 9,650

Pipe Outside Diameter [mm] 273.10 Effective Length [mm] 13000.00
 Pipe Wall Thickness [mm] 12.700 Effective Area [mm]² 17811.03
 SMYS [MPa] 241 Max. Pit Depth [mm] 1.370
 Design Factor 0.72 Max. Depth/Wall Thickness 0.11
 Total Length [mm] 13002
 Effective Length: Start 1.00 End [mm] 13001.00

RESULTS OF ANALYSIS:

METHOD	Max. Safe Pressure [kPa]	Burst Pressure [kPa]	Safety Factor
RSTRENG - Effective Area	16138	25719	2.67
RSTRENG - 0.85dL	16138	26185	2.71
ASME B31 G	15837	21996	2.28

CORROSION PROFILE:



Prepared By: Ben Parkin

Approved By:

Site: ~~Warrego~~ SS

Wauchope

Station: ~~Warrego~~ SS

Wunchope

Date: 9/07/2013

CORROSION MEASUREMENT:

Nr.	Increment [mm]	Pit Depth [mm]
1.	0	0
2.	1	1.37
3.	13001	1.37
4.	13002	0

Prepared By: Ben Parkin

Approved By:



Appendix 5 LRUT



Appendix 5 LRUT

Client: APA Group (Australia) Pty Ltd
Job No.: A13A25-3

Date Completed : 21st March 2013

Location : Northern Territory, Australia
Page : 6

INSPECTION REPORTS

A comprehensive *LRUT* Inspection on the 10 and 14inch to concrete anchor block gas line at Wauchope scrapper station and Aileron MLV in Northern Territory Australia, has been conducted and the following is the summary of findings:

	Date of Insp.	Thickness measured at Head Location (mm)		LRUT Coverage Distance (m)			Anomaly categories			Inspection Findings / Comments / Remarks
		Min	Max	AG	UG	R/C	1	2	3	
Line ID: 14"Wauchope scrapper station (Forward only)										
TP 1	19.3.2013	8.8	9.0	-	1.54	-				A Horizontal flexural mode recorded above the 9% threshold. Noted at 0.67m from sensor head
Line ID: 14"Wauchope scrapper station (Forward only)										
TP 2	19.3.2013	8.8	9.0	-	1.70	-				No significant findings noted along test length during testing.
Line ID: 14"Wauchope scrapper station (Forward only)										
TP 3	19.3.2013	8.8	9.0	-	1.66	-				No significant findings noted along test length during testing.
Line ID: 14"Wauchope scrapper station (Forward only)										
TP4	19.3.2013	8.8	9.0	-	2.66	-				No significant findings noted along test length during testing.
Line ID: 14"Wauchope scrapper station (Backward only)										
TP4	19.3.2013	8.8	9.0	-	1.50	-				No significant findings noted along test length during testing.
Line ID: 14"Wauchope scrapper station (Forward only)										
TP 5	19.3.2013	8.8	9.0	-	2.62	-				No significant findings noted along test length during testing.

Legend: Underground (UG), Aboveground (AG), Road Crossing (RC), NRWT – Net Remaining Wall Thickness



Client: APA Group (Australia) Pty Ltd
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INSPECTION REPORTS – Cont'd

	Date of Insp.	Thickness measured at Head Location (mm)		LRUT Coverage Distance (m)			Anomaly categories			Inspection Findings / Comments / Remarks
		M _{in}	M _{ax}	AG	UG	R/C	1	2	3	
Line ID: 14"Wauchope scrapper station (Forward only)										
TP 6	19.3.2013	8.8	9.0	-	2.65	-				No significant findings noted along test length during testing.
Line ID: 14"Wauchope scrapper station (Forward only)										
TP 7	19.3.2013	8.8	9.0	-	3.61	-				No significant findings noted along test length during testing.
Line ID: 14"Wauchope scrapper station (Forward only)										
TP 8	19.3.2013	8.8	9.0	-	3.16	-				No significant findings noted along test length during testing.
Line ID: 14"Wauchope scrapper station (Forward only)										
TP 9	20.3.2013	8.8	9.0	-	3.72	-				Minor surface corrossions noted at 1.39 to 2.29m from sensor head, recorded above the 9% threshold.
Line ID: 14"Wauchope scrapper station (Backward only)										
TP 9	20.3.2013	8.8	9.0	-	1.18	-				No significant findings noted along test length during testing.
Line ID: 14"Wauchope scrapper station (Forward only)										
TP 10	20.3.2013	8.8	9.0	-	1.33	-				No significant findings noted along test length during testing.
Line ID: 14"Wauchope scrapper station (Forward only)										
TP 11	20.3.2013	8.8	9.0	-	1.68	-				No significant findings noted along test length during testing.

Legend: Underground (UG), Aboveground (AG), Road Crossing (RC), NRWT – Net Remaining Wall Thickness



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INSPECTION REPORTS – Cont'd

	Date of Insp.	Thickness measured at Head Location (mm)		LRUT Coverage Distance (m)			Anomaly categories			Inspection Findings / Comments / Remarks
		Min	Max	AG	UG	R/C	1	2	3	
Line ID: 14" Wauchope scrapper station (Forward only)										
TP 12	20.3.2013	8.8	9.0	-	1.74	-				No significant findings noted along test length during testing.
Line ID: 10" Wauchope Blow down line (Forward only)										
TP 1	20.3.2013	7.8	8.0	-	2.73	-				A Vertical flexural mode recorded above the 9% threshold. Noted at 0.56m from sensor head
Line ID: 10" Wauchope Blow down line (Forward only)										
TP 2	20.3.2013	7.8	8.0	-	1.44	-				No significant findings noted along test length during testing.
Line ID: 10" Wauchope Blow down line (Forward only)										
TP 3	20.3.2013	7.8	8.0	-	1.54	-				No significant findings noted along test length during testing.
Line ID: 10" Wauchope Blow down line (Forward only)										
TP 4	20.3.2013	7.8	8.0	-	3.0	-				No significant findings noted along test length during testing.
Line ID: 10" Wauchope Blow down line (Forward only)										
TP 5	20.3.2013	7.8	8.0	-	1.54	-				No significant findings noted along test length during testing.
Line ID: 14" Aileron gas line (Forward only)										
TP 1	21.3.2013	8.8	9.0	-	3.31	-				A Horizontal and Vertical flexural mode recorded above the 9% threshold. Noted at 0.48 to 0.76m from sensor head.
Line ID: 14" Aileron gas line (Forward only)										
TP 2	21.3.2013	8.8	9.0	-	3.17	-				A Vertical flexural mode recorded above the 9% threshold. Noted at 0.44 to 0.93m from sensor head.

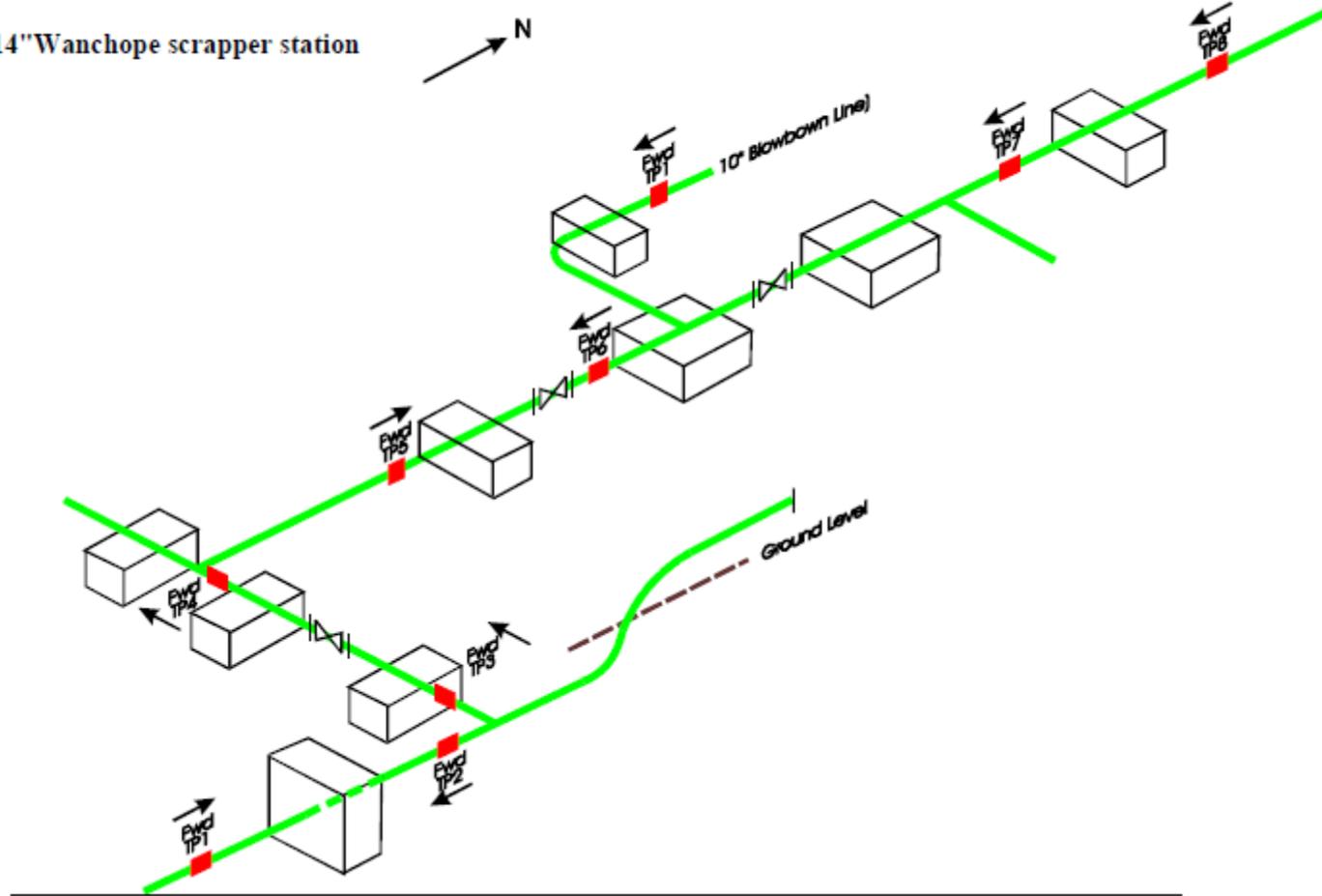
Legend: Underground (UG), Aboveground (AG), Road Crossing (RC), NRWT – Net Remaining Wall Thickness



PIPELINE SCHEMATIC DRAWINGS

Line Identification: 14" Wauchope scrapper station

Legend
■ — Head Location (TP)
>< — Valve Filling



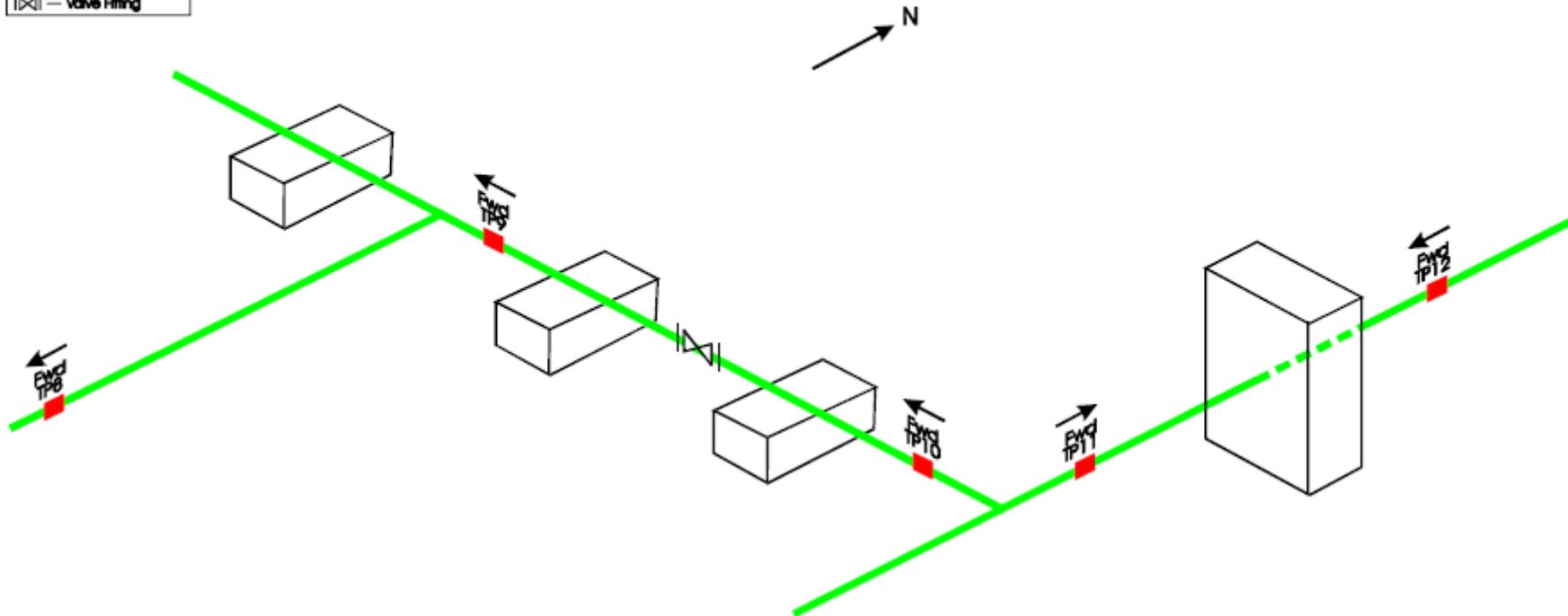


PIPELINE SCHEMATIC DRAWINGS – Cont'd

Line Identification: 14" Wauchope scraper station

Legend

- — Head Location (TP)
- ⊞ — Valve Fitting

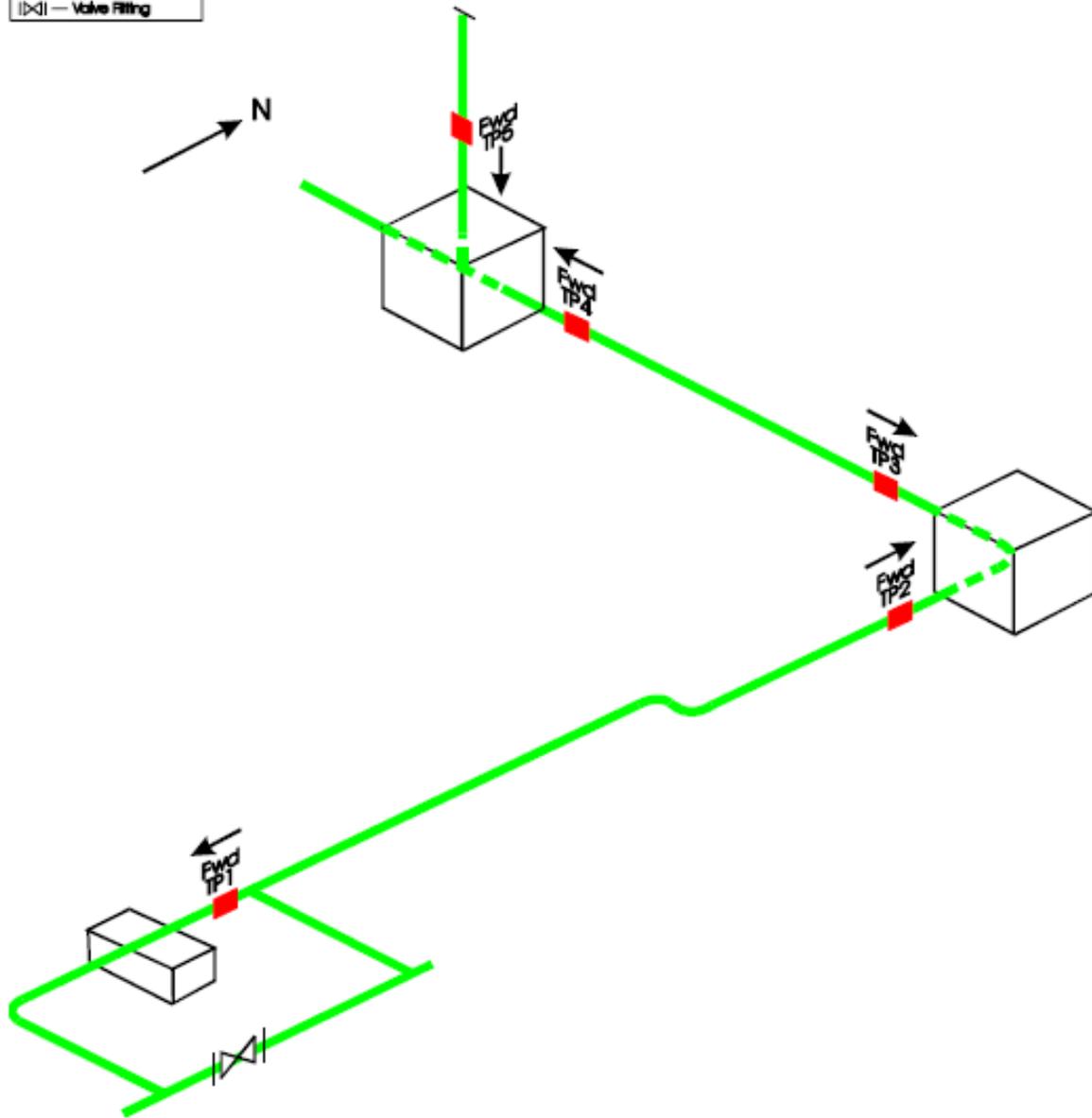




PIPELINE SCHEMATIC DRAWINGS – Cont'd

Line Identification: 10" Wauchope Blow down line

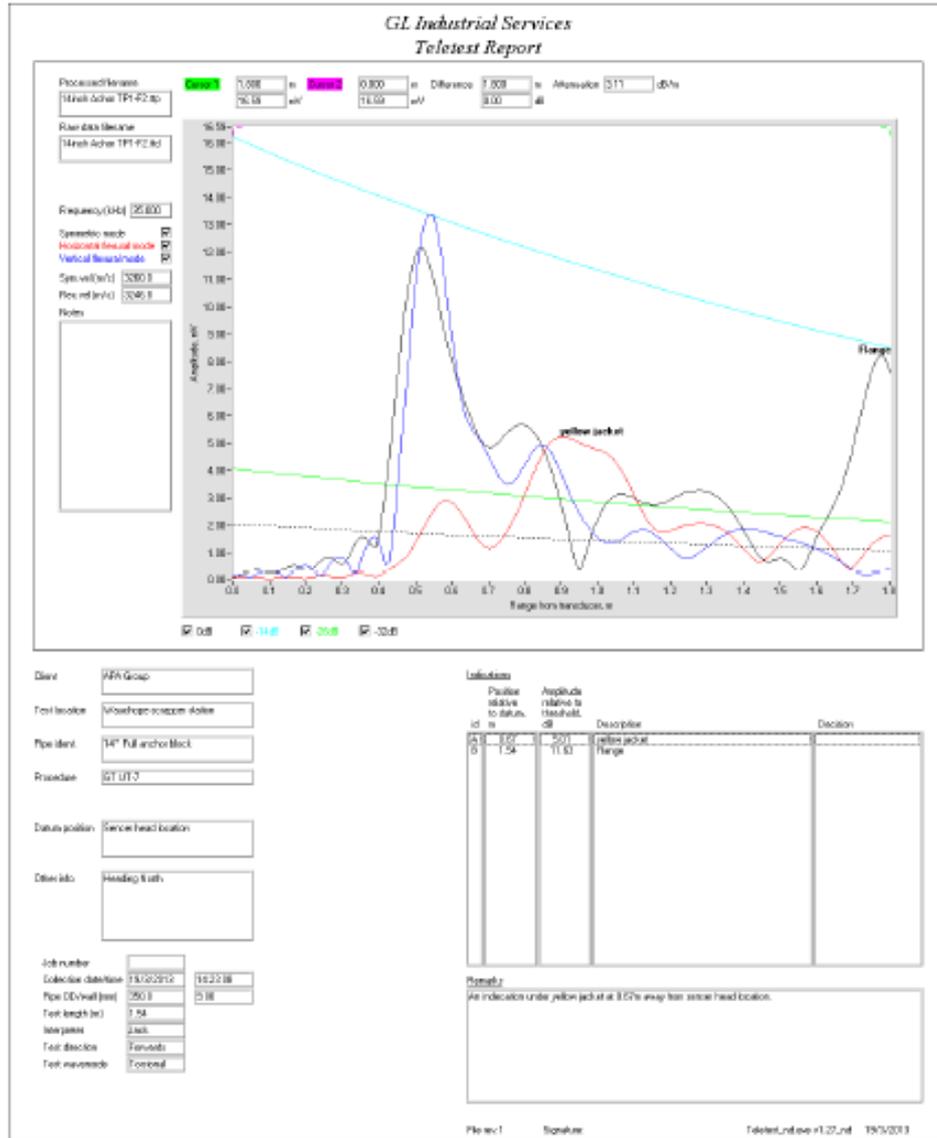
Legend
■ — Head Location (TP)
<> — Valve Fitting



LRUT A-SCAN GRAPHS

Test Point 1 : 14" Wauchope scraper station gas line

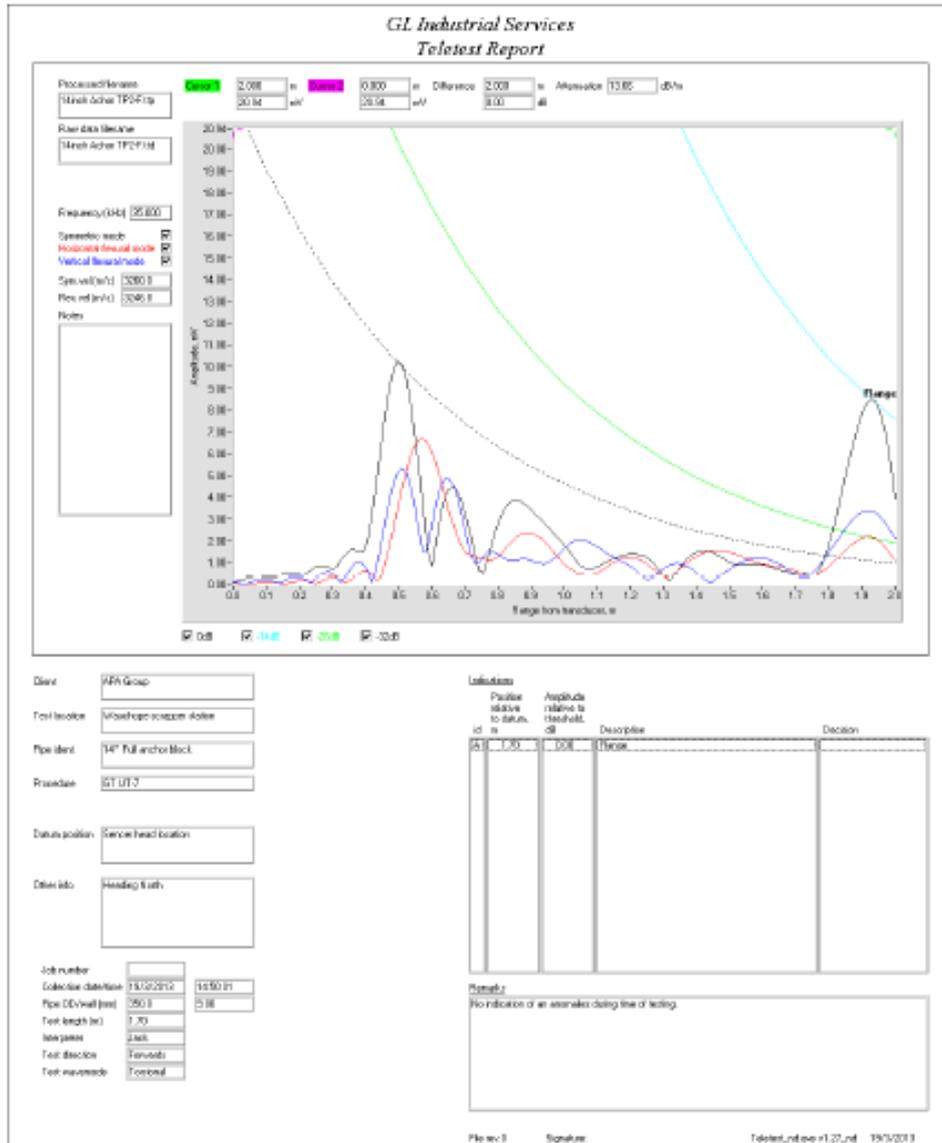
(Forward Shot Only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 2 : 14" Wauchope scraper station gas line

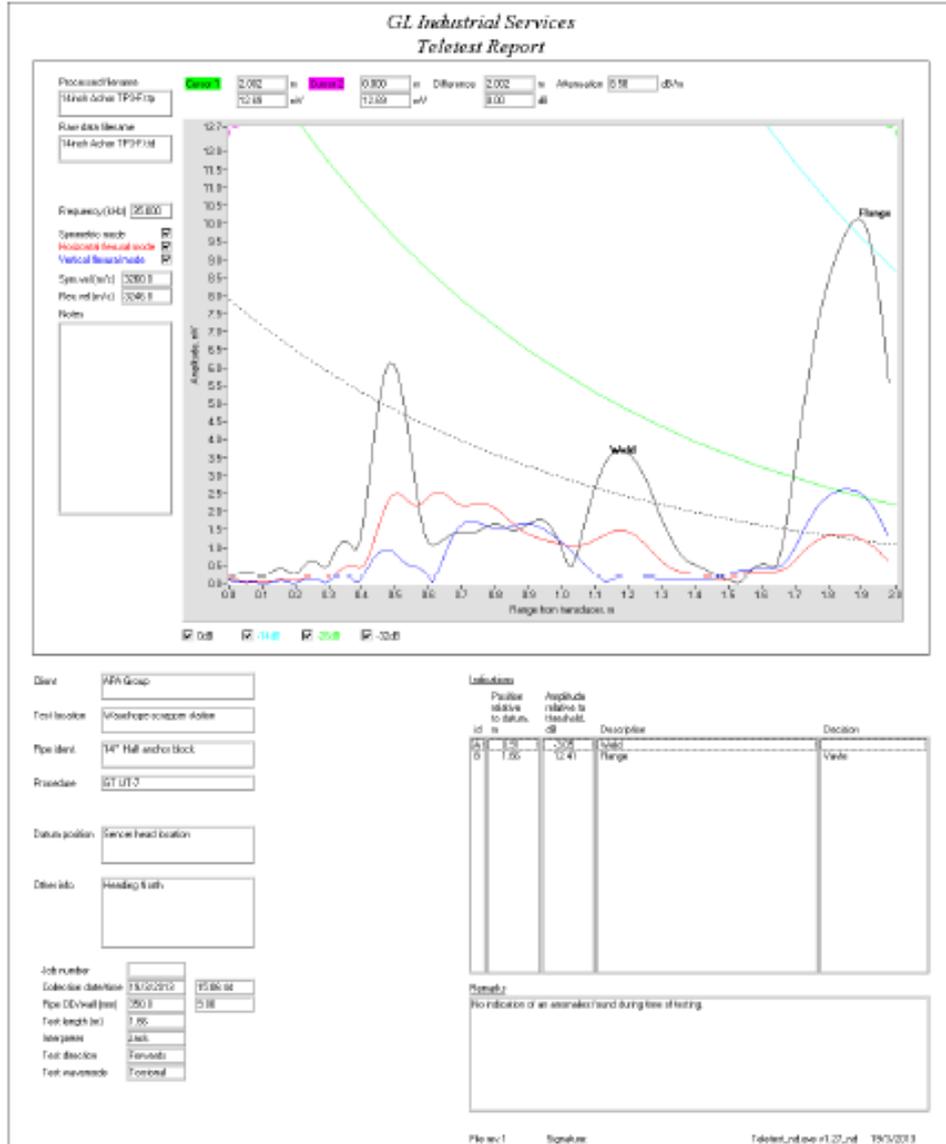
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 3 : 14" Wauchope scraper station gas line

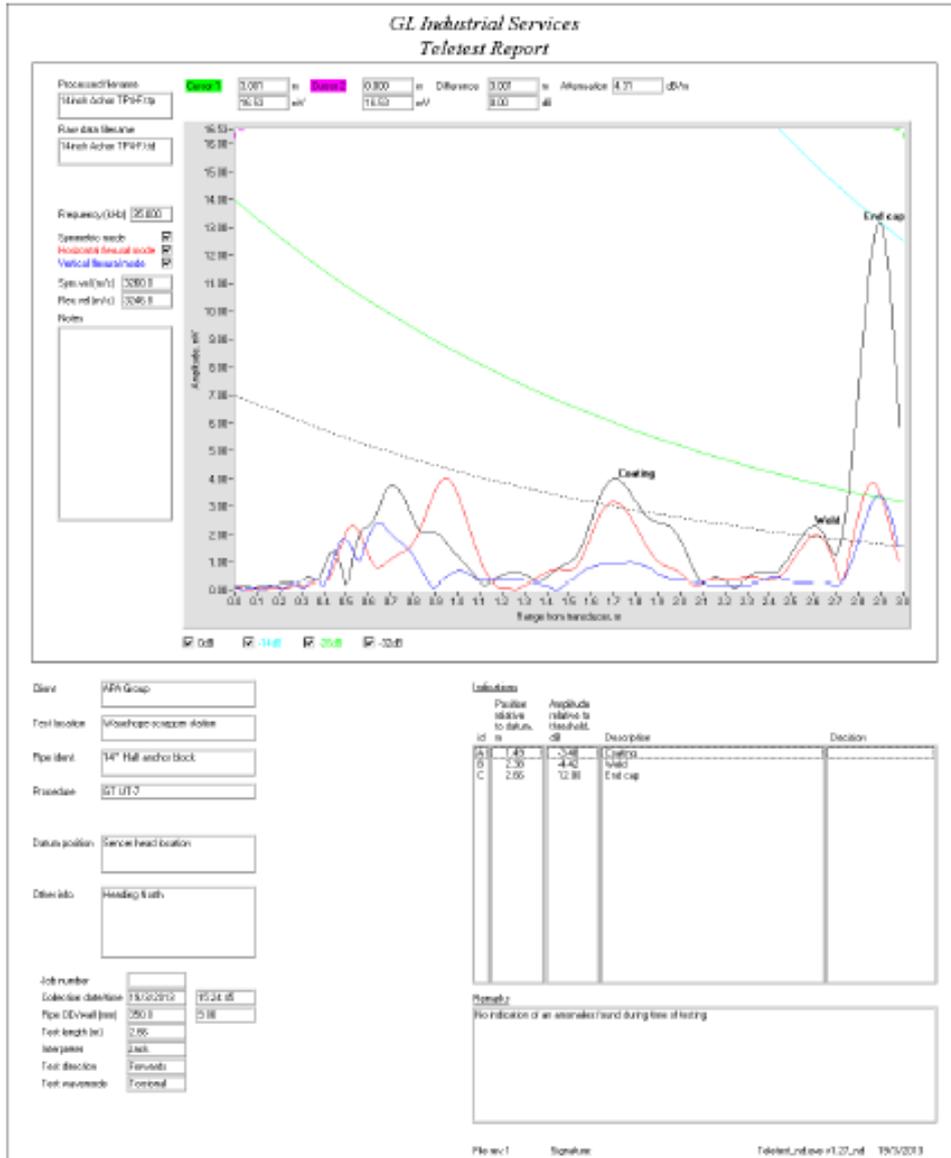
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 4 : 14" Wauchope scraper station gas line

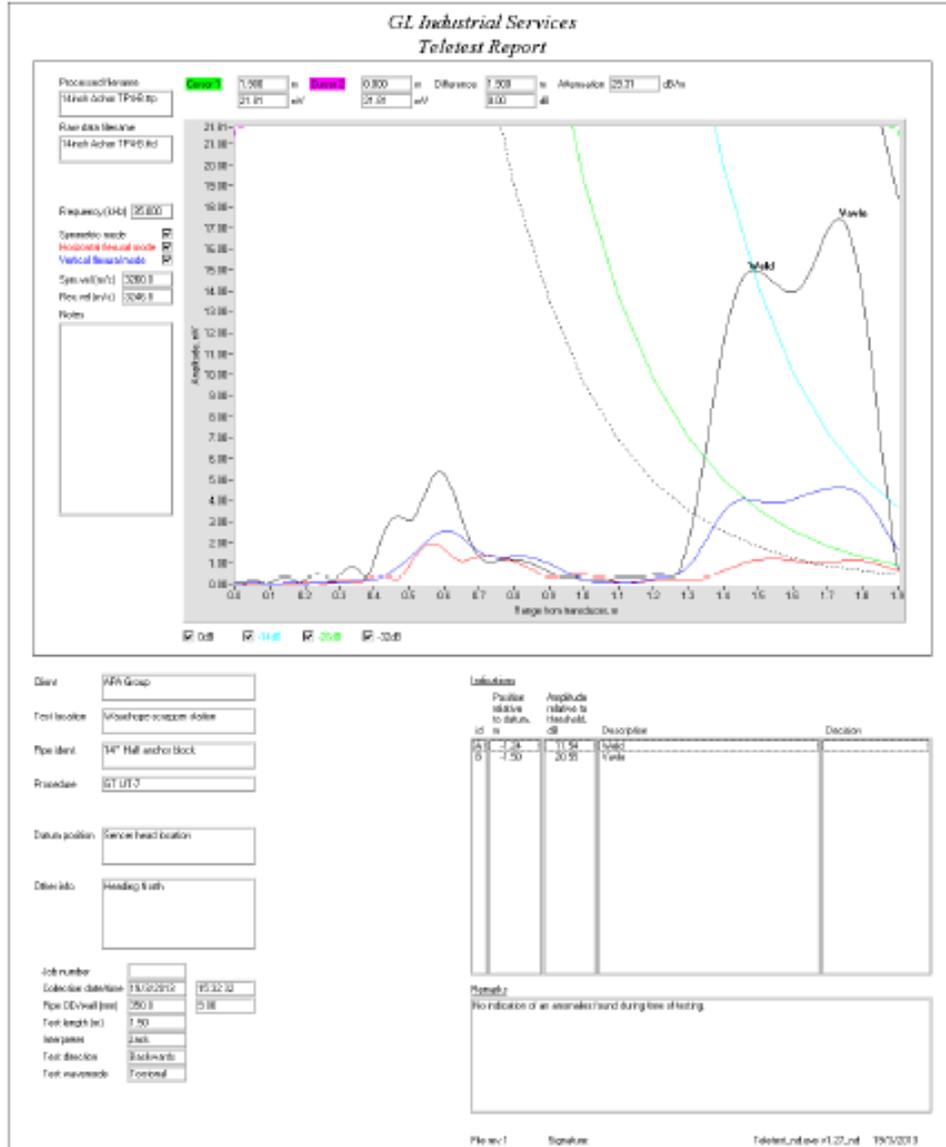
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 4 : 14" Wauchope scraper station gas line

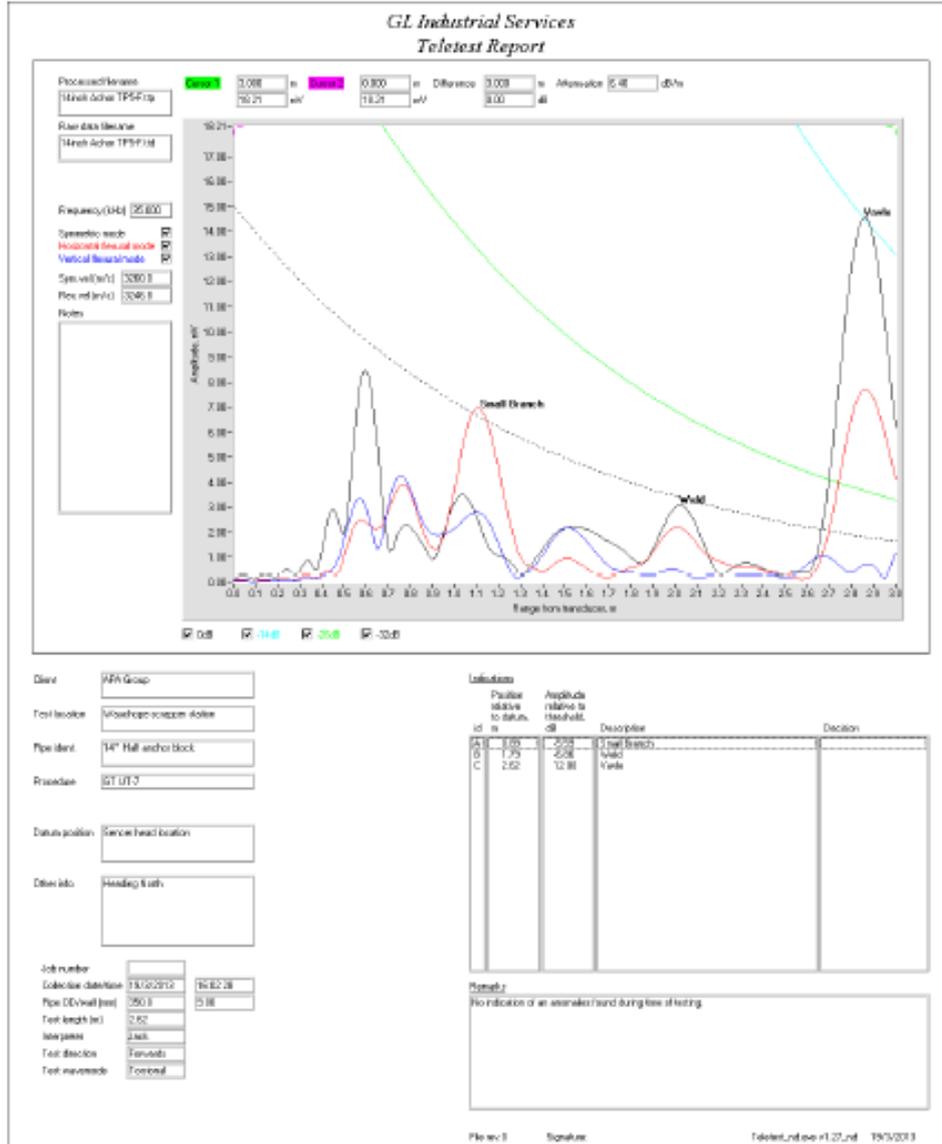
(Backward Shot Only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 5 : 14" Wauchope scraper station gas line

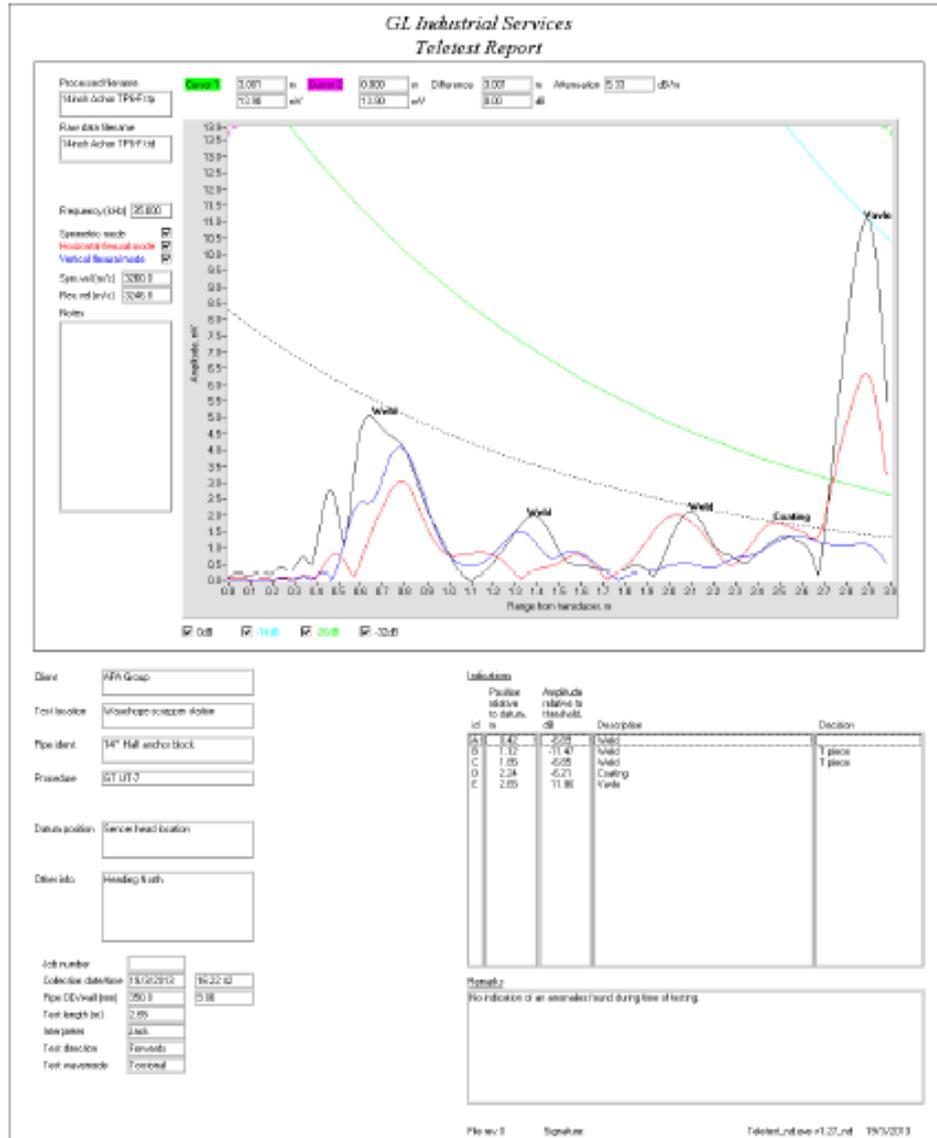
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 6 : 14" Wauchope scraper station gas line

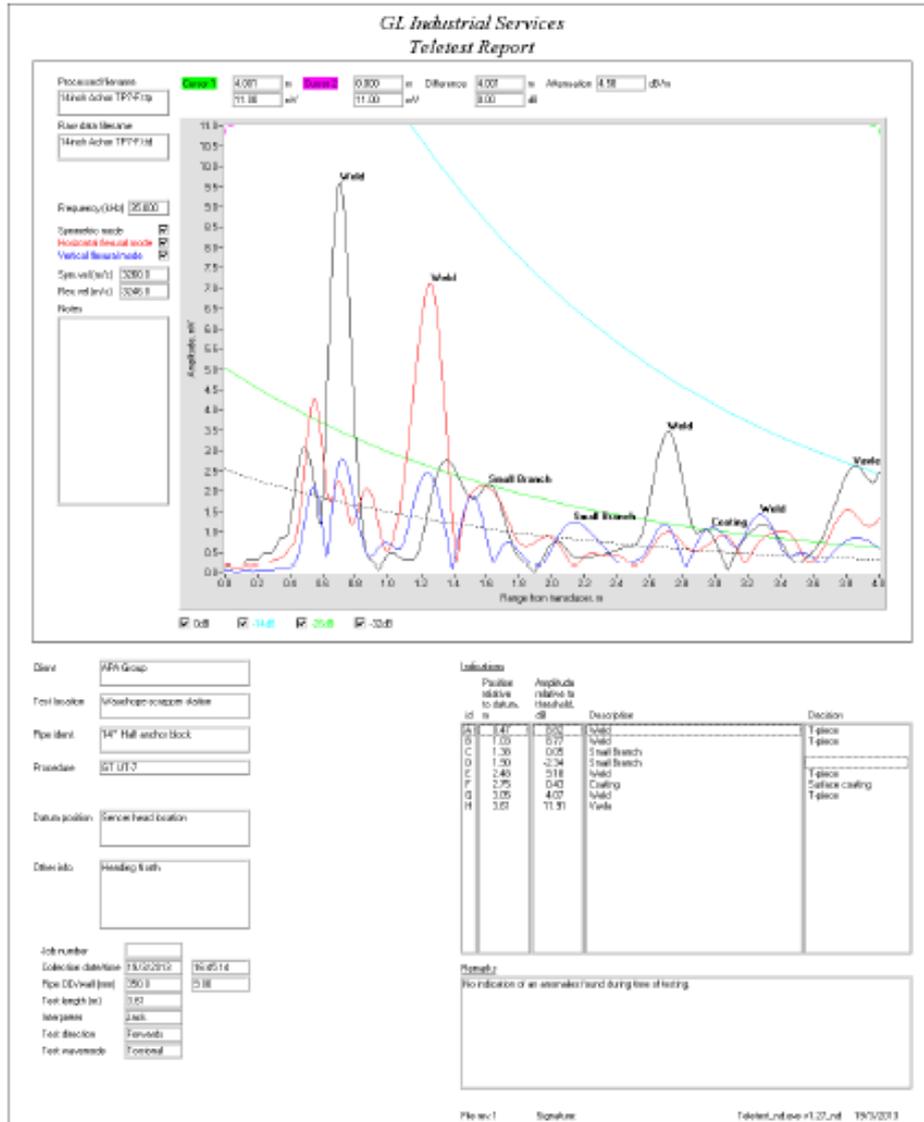
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 7 : 14" Wauchope scrapper station gas line

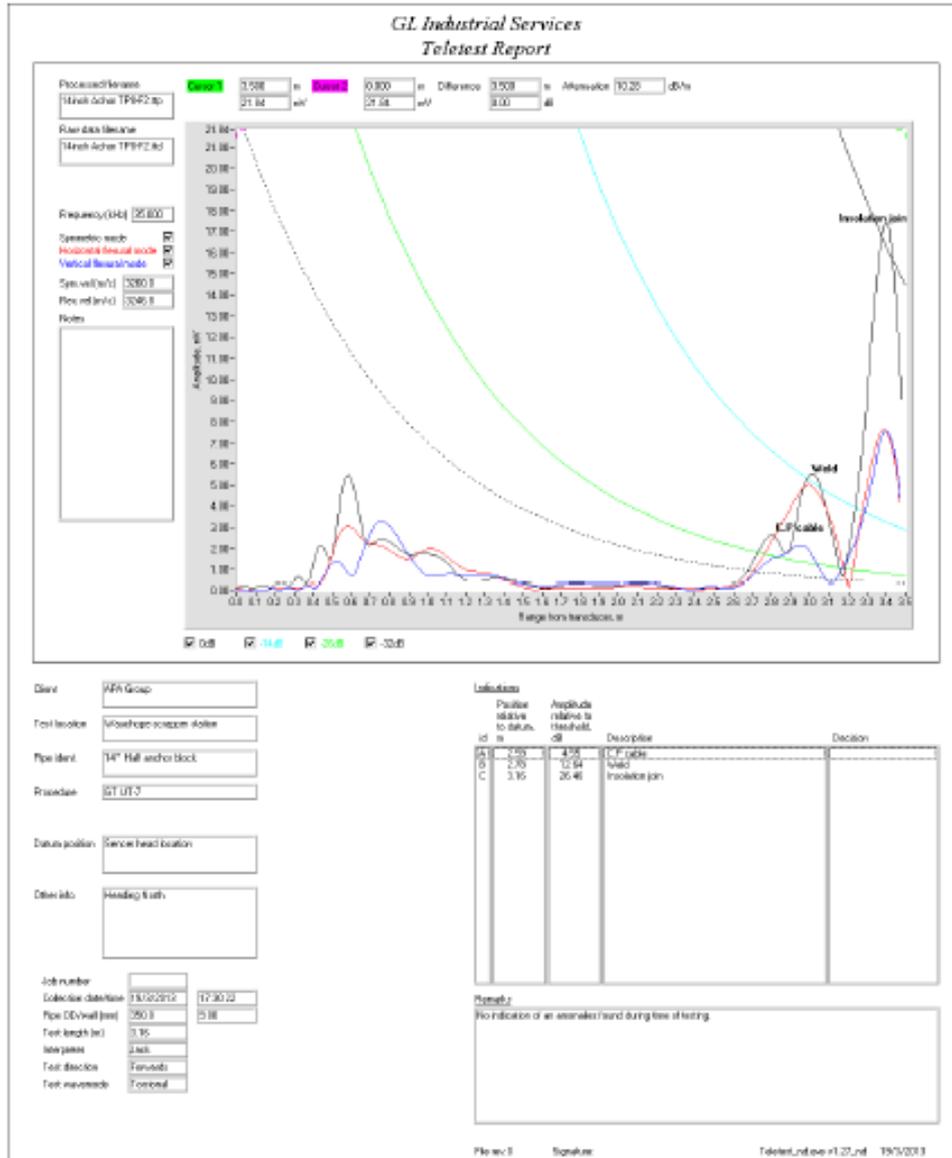
(Forward Shot Only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 8 : 14" Wauchope scraper station gas line

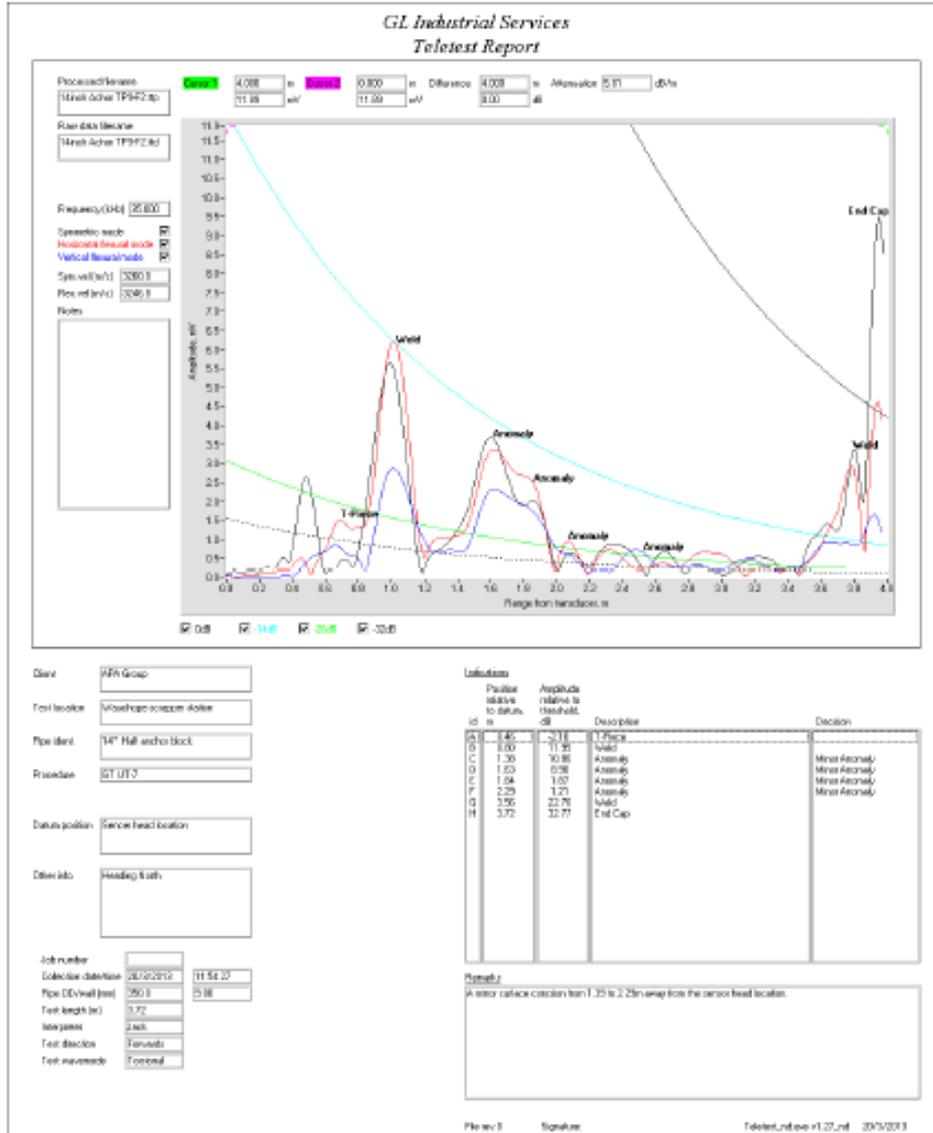
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 9 : 14" Wauchope scraper station gas line

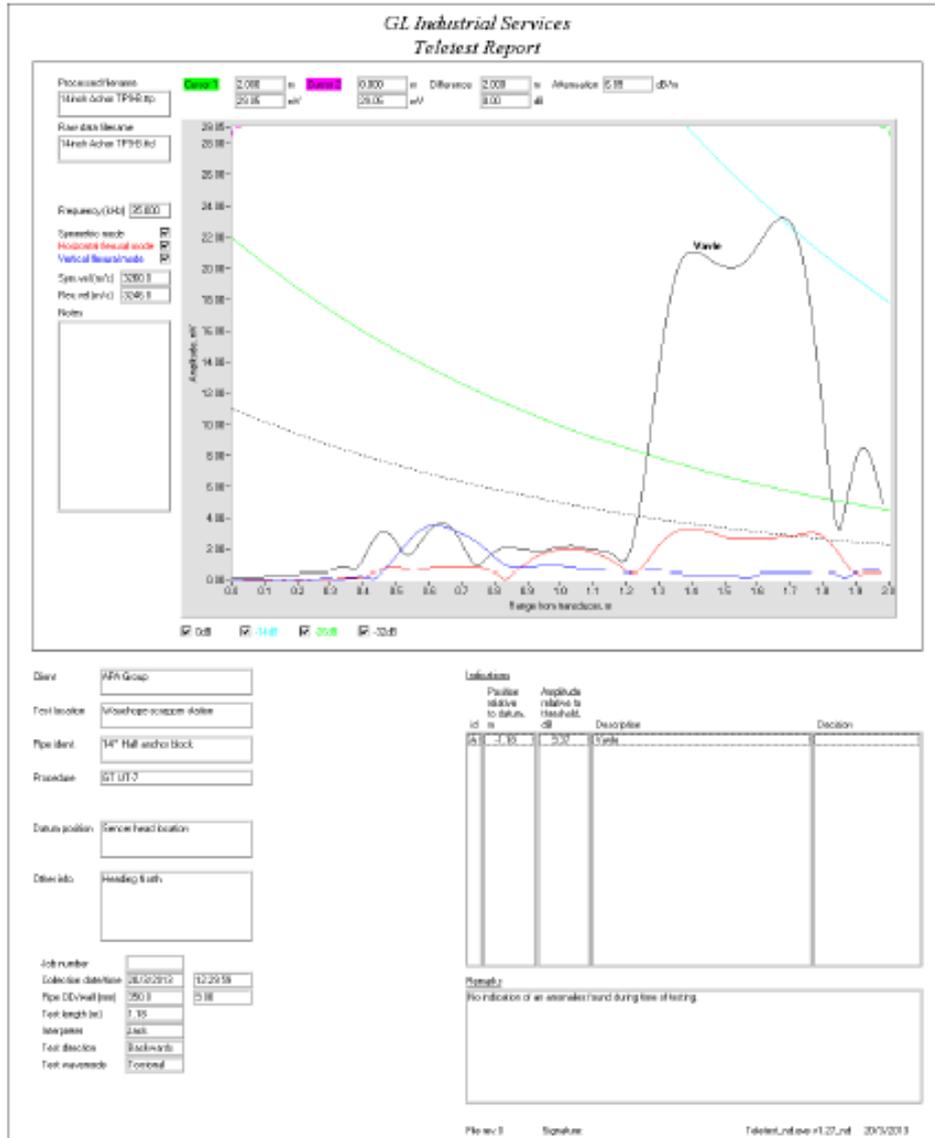
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 9 : 14" Wauchope scrapper station gas line

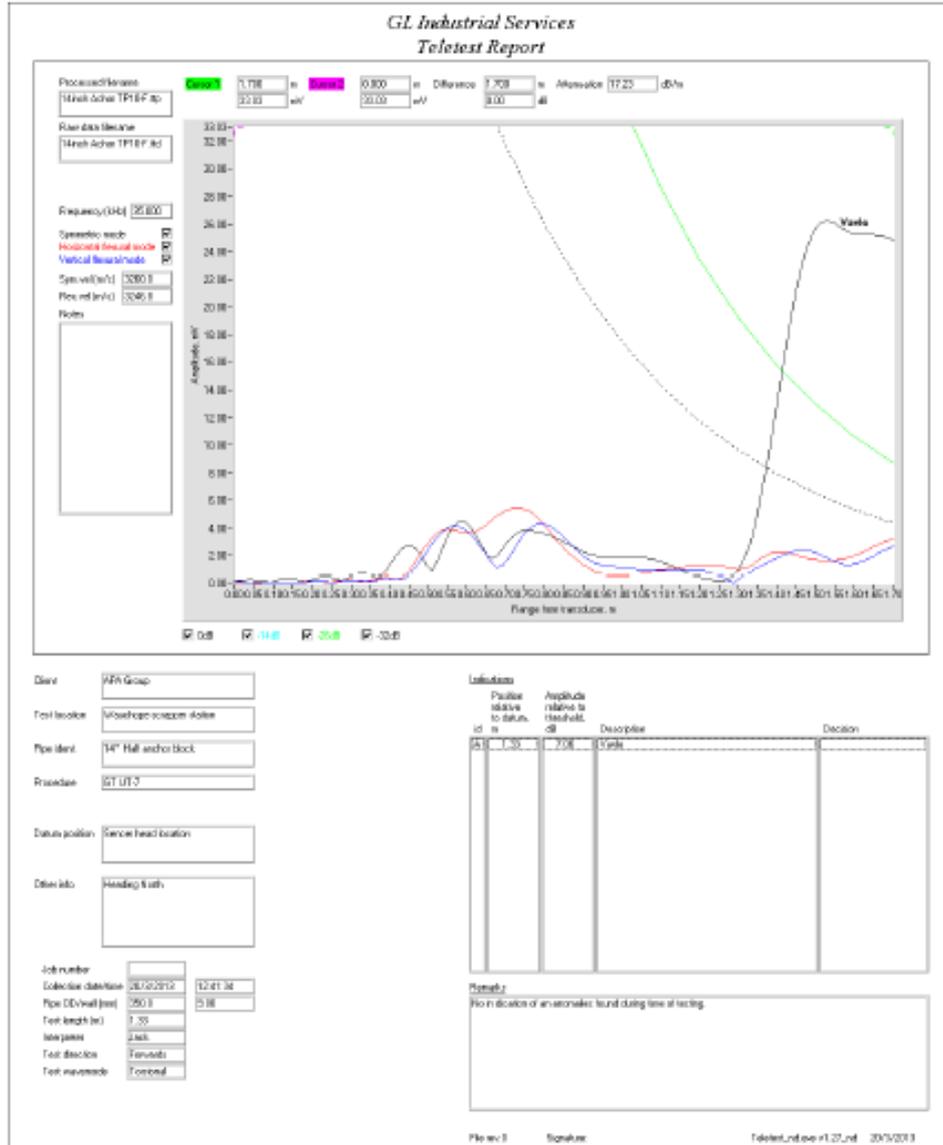
(Backward Shot only)



LRUT A-SCAN GRAPHS

Test Point 10 : 14" Wauchope scrapper station gas line

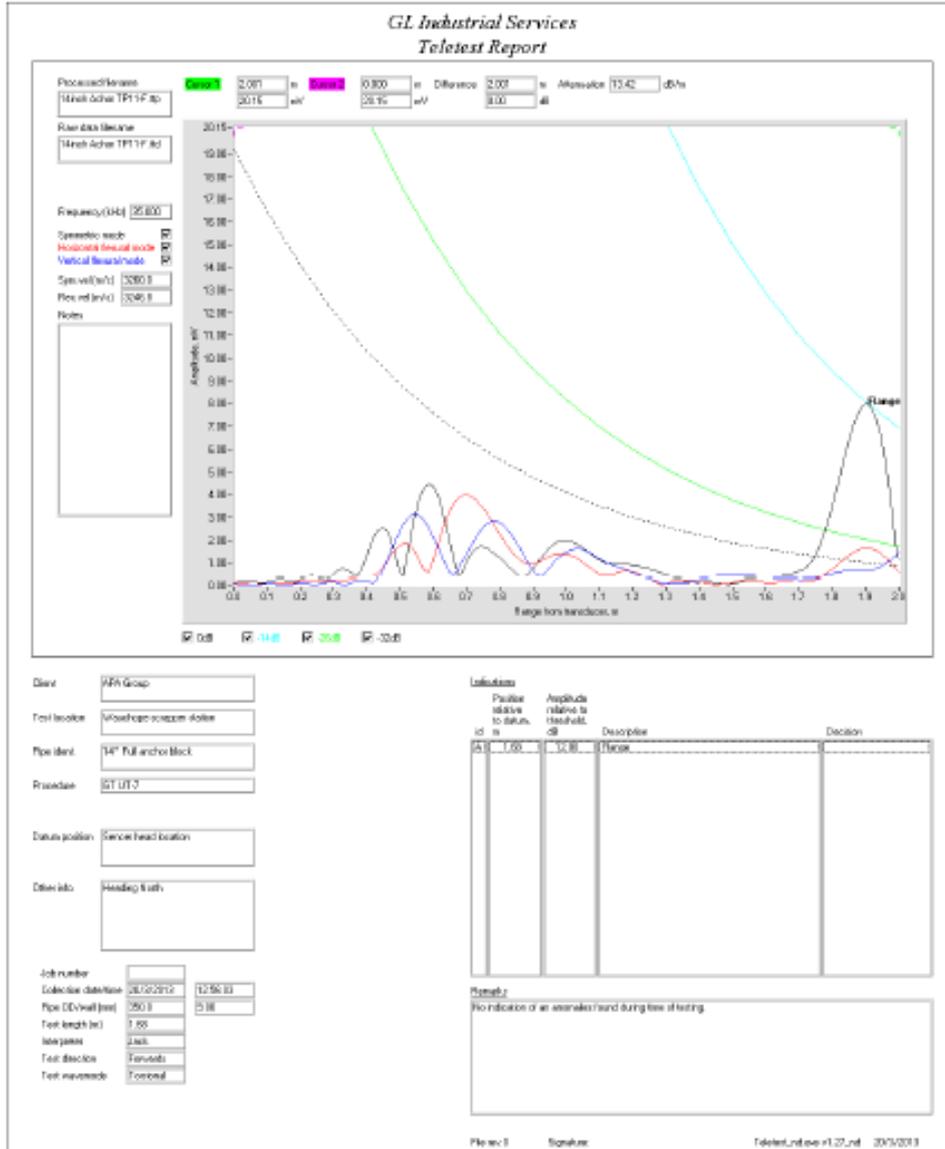
(Forward Shot Only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 11 : 14" Wauchope scrapper station gas line

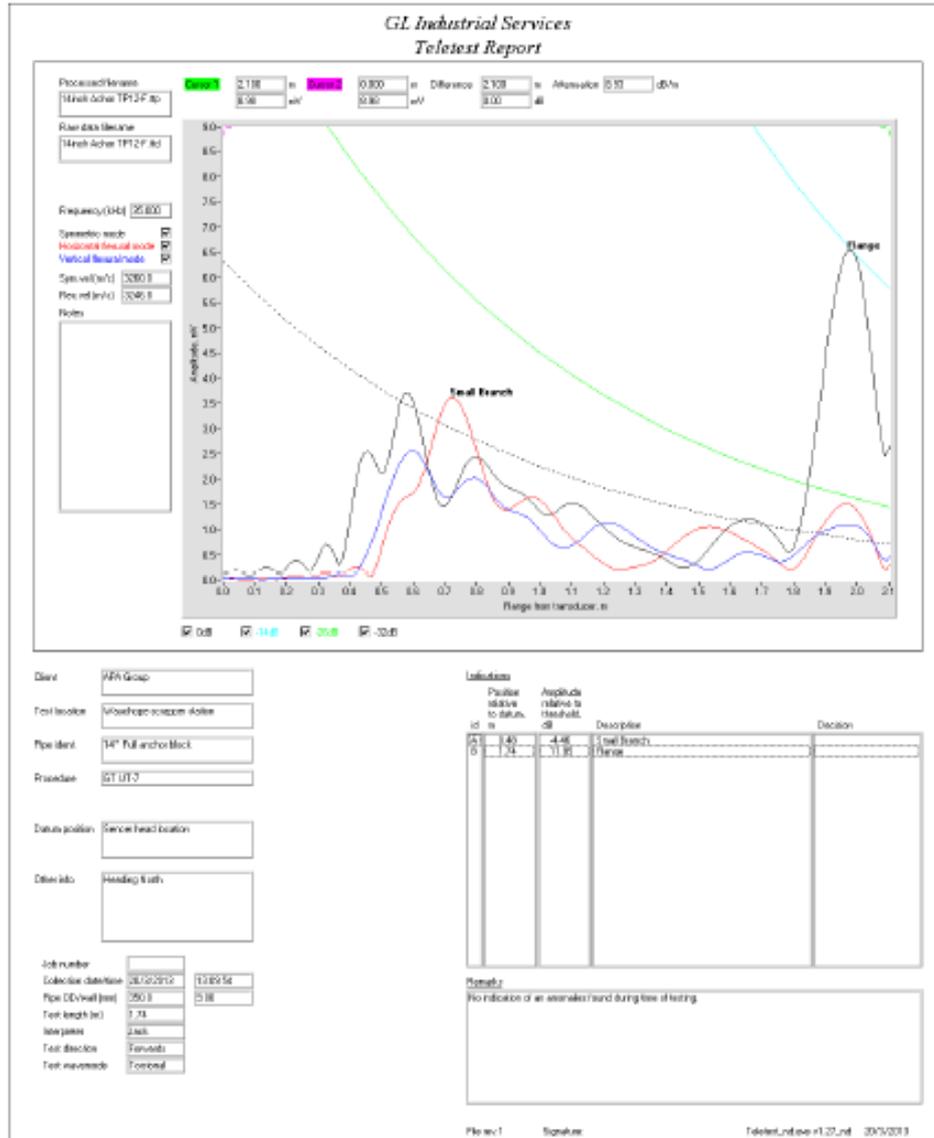
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 12 : 14" Wauchope scraper station gas line

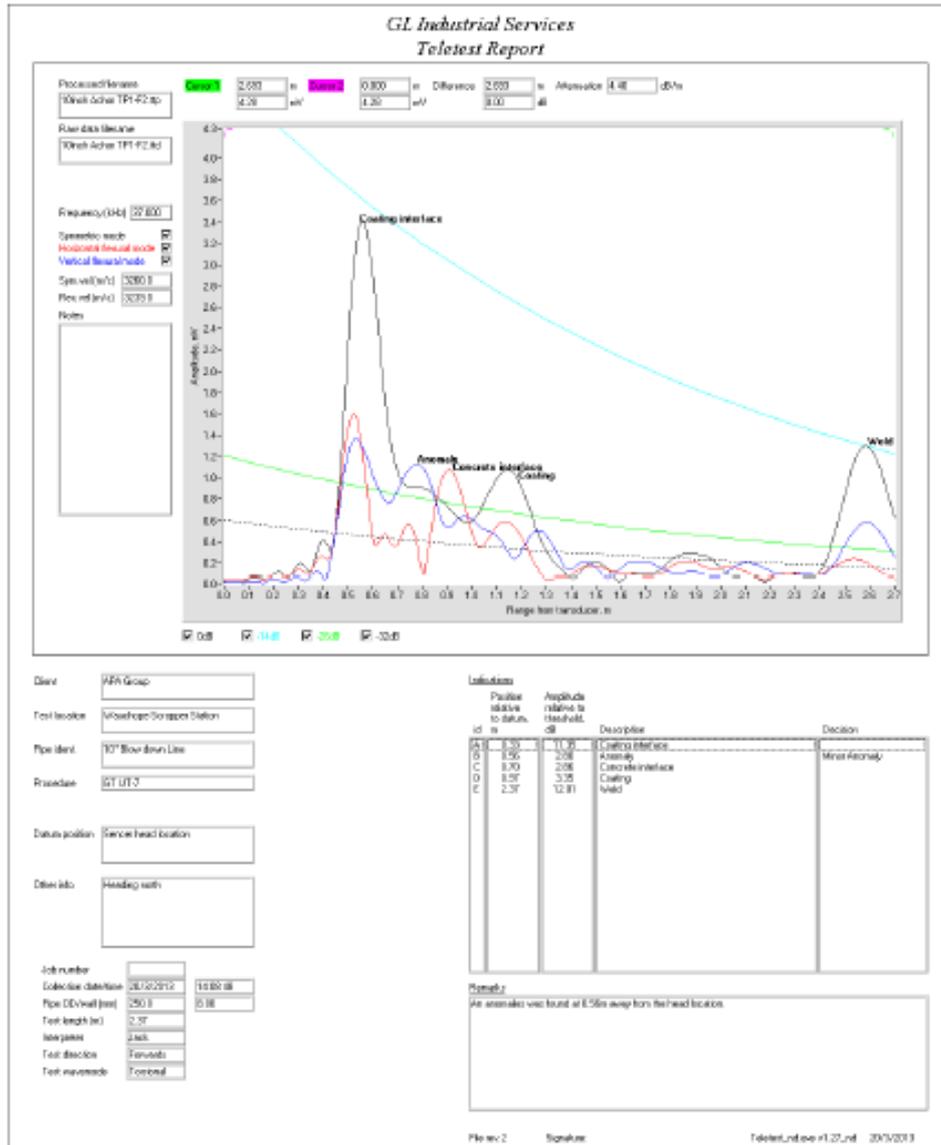
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 1 : 10" Wauchope scraper station blow down line

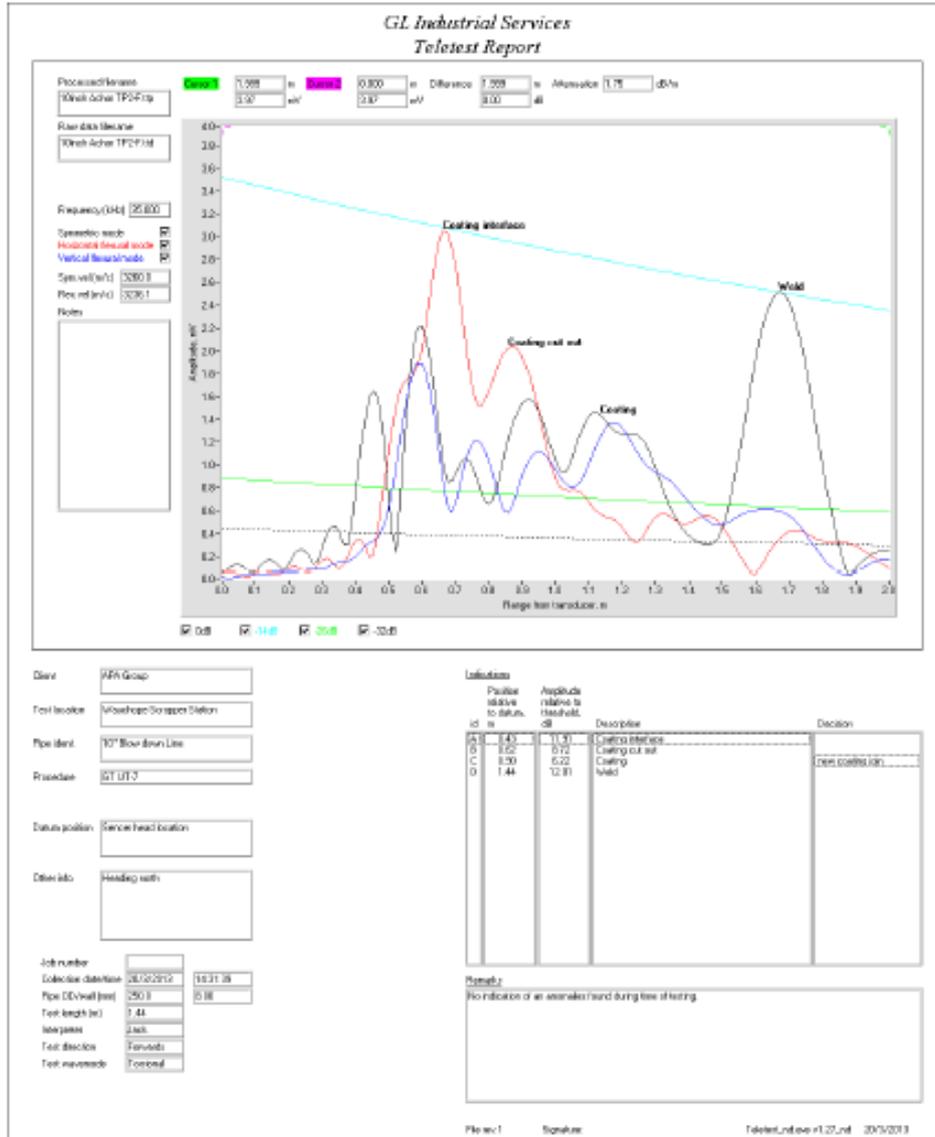
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 2 : 10" Wauchope scraper station blow down line

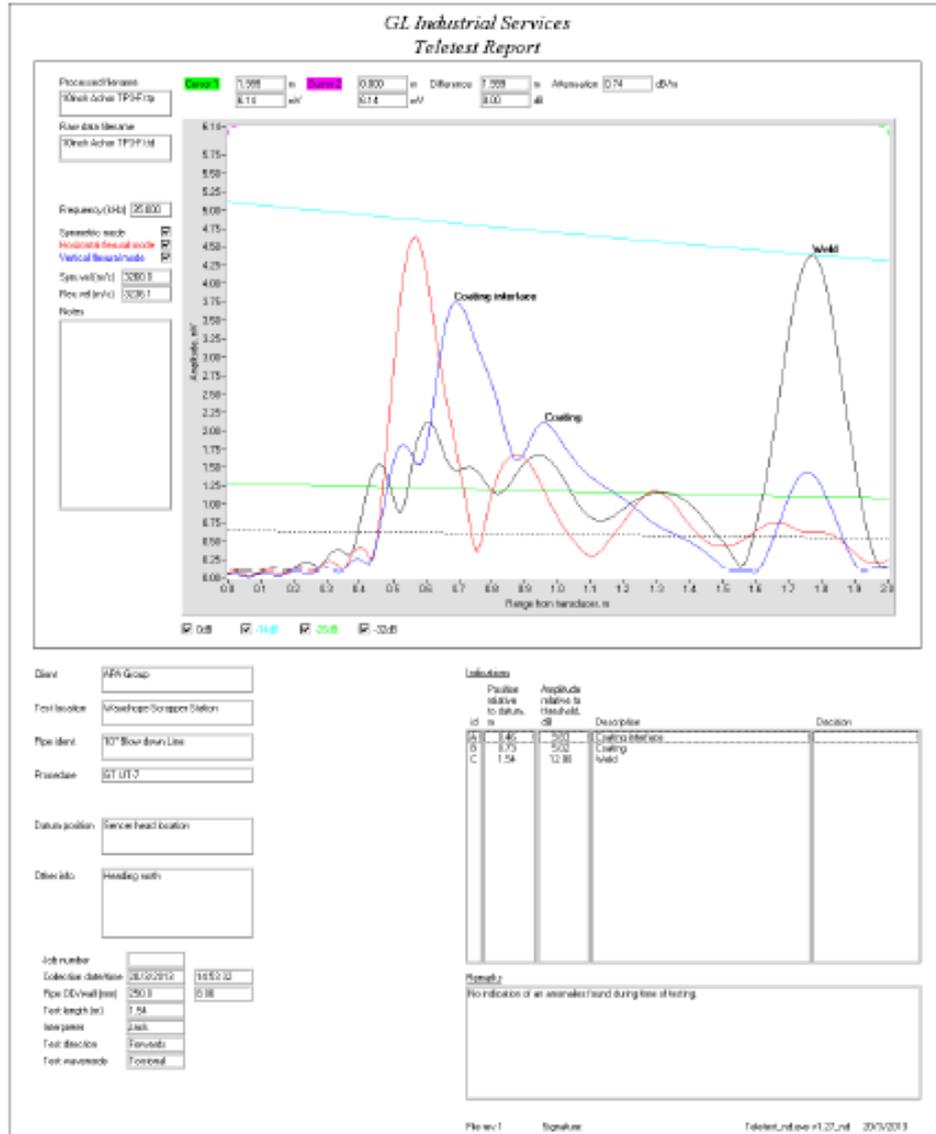
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 3 : 10" Wauchope scrapper station blow down line

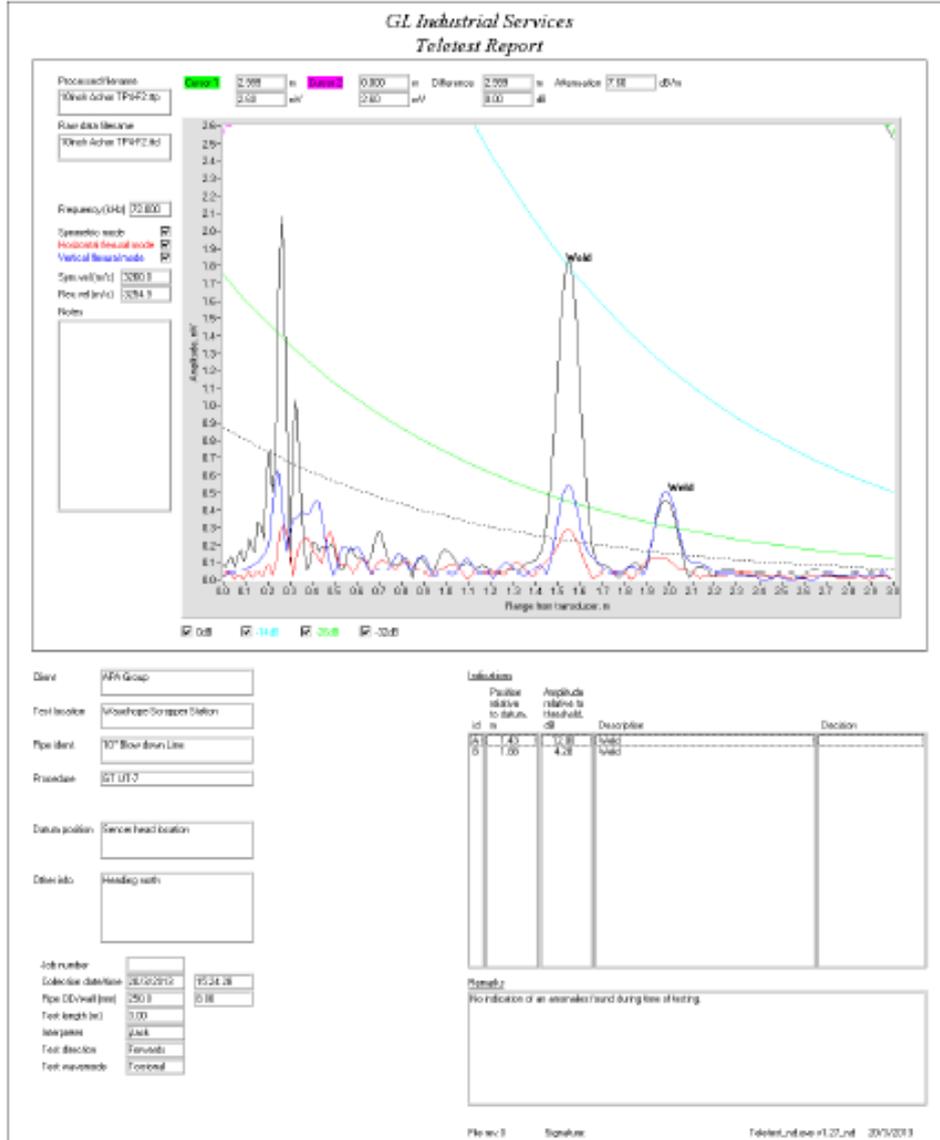
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 4 : 10" Wauchope scraper station blow down line

(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 5 : 10" Wauchope scrapper station blow down line

(Forward Shot only)

