

Tanami Road Scraper Station

Coating Assessment Report

Document No. BGS-RP-A-0011 Rev 0A				
File Path: \\falcon\exword\2012\12109\Engineering\APA Project Folders - 130513\23.3_BGS_Below Ground Station Pipework Recoating\20. Coating Defect Analysis\Tanami Rd\BGS-RP-A-0011 Tanami Rd coating assessment Rev 0A.docx				
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Version control	Date	Version	Nature of Change	Approved by (Name)
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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 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 10 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.

Tanami Rd is the fifth scraper station to be excavated and assessed. This report compares the DCVG results for Tanami Rd 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 Tanami Rd 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 Tanami Rd 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 7 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	South anchor block	24.0 %
2	V07	9.0 %
3	South trap kicker valve V04	4.2 %
4	MLV	6.8 %
5	V12	7.1 %
6	V14	2.4 %
7	North anchor block	9.4 %

The Tanami Rd 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	Upstream of V11	Appendix 4, Photos 5204, 5645, 5646.
2	Upstream of V11	Appendix 4, Photos 5130, 5204, 5624, 5625
3	Blowdown Line	Appendix 4, Photos 5275, 5302, 5712, 5713, 5862
4	Blowdown Line	Appendix 4, Photos 5274, 5334, 5767, 5768, 5862
5	Blowdown Line	Appendix 4, Photos 5266, 5332, 5765, 5766, 5862
6	Blowdown Line	Appendix 4, Photos 5271, 5331, 5763, 5764, 5862
7	V07	Appendix 4, Photos 5147, 5183, 5188, 5647, 5851
8	Blowdown Line	Appendix 4, Photo 5267, 5333, 5771, 5772, 5862
9	NRV	Appendix 4, Photo 5234, 5152, 5664, 5665, 5871

3.2 Coating Inspection

Some areas of coating found at Tanami Rd were found in poor condition. 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 Tanami Rd 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:

- Tapewrap disbondment upstream of V07 (refer photo 5212, 5229).
- Coating disbondment of V07 (refer photo 5147 and 5183).
- Tapewrap disbondment to the south future compressor tie-in line (refer photo 5227).
- Tapewrap disbondment around south kicker line and pressure transmitter riser (refer photo 5191).
- Jeeped coating defects to V11 (refer photo 5320).
- Blistering coating defects to MLV (refer photo 5382).

- Tape wrap disbondment to drain line tie-in (refer photo 5237).
- Tape wrap holiday upstream of MIJ (refer photo 5250).
- Tape wrap disbondment to north pig trap riser (refer photo 5370).

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
7	V07	Original paint lifted away from pipe.	2	9.0%

3.3 Metal loss

There were 9 areas of metal loss found on the pipework at Tanami Rd. Of these 9 areas containing metal loss only all 1 area had a visible coating defect. The metal loss section of the coating damage assessment form was filled out for each defect – refer to 0.

Table 4: Metal Loss Reports

ID	Section	Coating Defect (Y/N)	Maximum Depth (mm)	Correlation to DCVG	DCVG Survey IR
1	Upstream of V11	N	0.72	N/A	N/A
2	Upstream of V11	N	1.08	N/A	N/A
3	Blowdown Line	N	1.37	N/A	N/A
4	Blowdown Line	N	1.11	N/A	N/A
5	Blowdown Line	N	1.30	N/A	N/A
6	Blowdown Line	N	1.67	N/A	N/A
7	V07	Y	1.70	2	9.0%
8	Blowdown Line	N	1.23	N/A	N/A
9	NRV	N	0.54	N/A	N/A

The metal loss noted has been analysed in Table 5 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	Upstream of V11	N	Corrosion	Refer to photo 5204, 5645, 5646. Visual examination of coating condition showed no defect. Pit appearance seems consistent with pit corrosion due to shielding.
2	Upstream of V11	N	Corrosion	Refer to photos 5204, 5645. Visual examination of coating condition showed no defect. Evidence of pitting and pattern of defects consistent with typical corrosion.
3	Blowdown Line	N	Corrosion	Refer to photos 5275, 5302, 5712, 5713. Visual examination of coating condition showed no defect. Evidence of pitting and pattern of defects consistent with typical corrosion.
4	Blowdown Line	N	Corrosion	Refer to photos 5274, 5334, 5768. Visual examination of coating condition showed no defect. Evidence of pitting consistent with typical corrosion.
5	Blowdown Line	N	Corrosion	Refer to photos 5266, 5332, 5766. Visual examination of coating condition showed no defect. Evidence of pitting consistent with typical corrosion.
6	Blowdown Line	N	Corrosion	Refer to photos 5271, 5331, 5763. Visual examination of coating condition showed no defect. Evidence of pitting consistent with typical corrosion.
7	V07	Y	Corrosion	Refer to photo 5147, 5183, 5647. Visual examination of coating condition showed coating had lifted away from the pipe. Pit appearance seems consistent with pit corrosion due to shielding.
8	Blowdown Line	N	Corrosion	Refer to photos 5267, 5333, 5771. Visual examination of coating condition showed no defect. Evidence of pitting consistent with typical corrosion.
9	NRV	N	Corrosion	Refer to photo 5152, 5234, 5664, 5665. Corrosion underneath canusa sleeve. Pit appearance seems consistent with pit corrosion due to shielding.



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

3.4 RSTRENG Analysis

RSTRENG analysis was completed over the more severe area of corrosion to the ends of V07. The pipe wall thickness in the area is 8.74mm W.T X60 or 12.7mm W.T X52 steel (refer to Appendix 1) and the Coating Damage Assessment metal loss form issued from site (Appendix 2) indicates the maximum pit depth of 1.70mm, 80mm axial length and 15mm 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 for both steel grades.

3.5 LRUT

LRUT was conducted at Tanami Rd scraper station from May 16-18, 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 6 shots to the 10inch blowdown line pipe (Test Point 1 to 6; TP1, ... TP6) 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 Tanami Rd's south concrete anchor block, looking north. Three coating related anomalies were detected by LRUT. There are no results which indicate metal loss on the pipe. Corrosion was not identified within the concrete block.

14" Test Point 2

Test Point 2 is a backward LRUT shot at Tanami Rd's south concrete anchor block, looking south. Three coating related anomalies were detected by LRUT. There are no results which indicate metal loss on the pipe. Corrosion was not identified within the concrete block.

14" Test Point 3

Test Point 3 is the forward LRUT shot at Tanami Rd's V07 concrete support block, looking east. The body of V07 is 1.37m 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. Corrosion was not identified within the concrete block.

14" Test Point 4 (Backward)

Test Point 4 is the backward LRUT shot at Tanami Rd's V07 concrete support blocks, looking west. The LRUT has detected 1 significant anomaly identified as a weld at 0.34m and the valve body at 1.27m. The weld detected at 0.34 is the valve girth weld correctly identified, refer to photo 5652. Corrosion was not identified within the concrete block.

**14" Test Point 4 (Forward)**

Test Point 4 is the forward LRUT shot at Tanami Rd's V07 concrete support blocks, looking east. The LRUT has detected 1 significant anomaly identified as a weld at 3.90m from the end cap weld. Corrosion was not identified within the concrete block.

14" Test Point 5

Test Point 5 is the backward LRUT shot at Tanami Rd's NRV concrete support blocks, looking south. The LRUT has detected 45 significant anomalies identified as a weld at 0.58m, a vertical branched tee at 1.11m, a weld at 1.54m and the horizontal kicker line tee at 2.10m. Photo 5380 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 Tanami Rd's MLV south concrete support block, looking north. The LRUT has detected 7 significant anomalies identified as a weld at 0.5m, the concrete interface at 0.83m, a pipe clamp at 1.22m, a weld at 1.41m, a clamp at 2.00m, the other edge of the concrete block at 2.43m and the valve body at 2.88m. Photo 5381 of Appendix 3 confirms the position and identification of these clamp fittings and welds. Corrosion was not identified within the concrete block.

14" Test Point 7

Test Point 7 is the backward LRUT shot at Tanami Rd's MLV north concrete support block, looking south. The LRUT has detected 8 significant anomalies identified as tee welds at 0.42m and 0.99m, two vertical branched tees at 1.38m and 1.89m, tee welds at 2.42m and 2.94m, a pipe clamp at 3.48m and the valve body at 3.84m. Photo 5382 of Appendix 3 confirms the position and identification of these fittings and welds.

The bill of materials on Appendix 1 drawing AD0161-6004 Rev. 1 identifies the tees as DN350 schedule 80 which has 560mm weld-to-weld length according to pipe charts. This confirms the weld to weld dimensions of the tee girth welds above.

Corrosion was not identified within the concrete block.

14" Test Point 8

Test Point 8 is the backward LRUT shot at Tanami Rd's MIJ north concrete support block, looking south. The LRUT has detected the weld at 2.82m and the MIJ which was detected at 3.26m. Photo 5292 of Appendix 3 confirms the detected distance between the weld and the MIJ. Corrosion was not identified within the concrete block.

14" Test Point 9 (backward)



Test Point 9 is the forward LRUT shot at Tanami Rd's V14 concrete support blocks, looking east. The LRUT has detected 9 significant anomalies identified as a weld and 8 coating interface related anomalies. The first LRUT result is identified as due to a weld at 0.59m, refer to photo 022 and the schematic drawing of Appendix 5. The following 8 anomalies have been identified as coating related by the LRUT technician at 0.80m, 1.15m, 1.43m, 2.06m, 2.40m, 2.64m, 2.95m and 3.26m. Corrosion was not identified within the concrete block.

14" Test Point 9 (forward)

Test Point 9 is the forward LRUT shot at Tanami Rd's V14 concrete support blocks, looking west. The LRUT has no significant anomalies, only the valve body at 1.23m (refer to photo 007). Corrosion was not identified within the concrete block.

14" Test Point 10

Test Point 10 is the forward LRUT shot at Tanami Rd's V14 concrete support block, looking east. As shown in Appendix 5 there are no significant anomalies detected within the concrete support block between the start of the concrete block at 0.8m and the valve body identified at a distance of 1.38m. Corrosion was not identified within the concrete block.

14" Test Point 11

Test Point 11 is the forward LRUT shot at Tanami Rd's north concrete anchor block, looking north. The concrete anchor block begins 1.50m from the sensor head as shown in the results of Appendix 5, and the pig-sig tee is 0.73m from the sensor head. The pig-sig tee is identified by LRUT at a distance of 0.73m, a coating transition (to yellow jacket, refer photo 007) is identified at 0.51m, the concrete block interface is detected at 1.50m and the flange within the block was detected at a distance of 1.90m, 400mm into the block. Corrosion was not identified within the concrete block.

14" Test Point 12

Test Point 12 is the backward LRUT shot at Tanami Rd's north concrete anchor block, looking south. A coating anomaly was identified at 0.55m, and the flange within the block was detected at a distance of 1.83m. Corrosion was not identified within the concrete block.

10" Test Point 1

Test Point 1 is the backward LRUT shot at Tanami Rd's blowdown line concrete support block between V11 and V12, looking south. A coating anomaly was detected at 0.61m from the device. The elbow piece weld was identified downstream the concrete block at a distance of 2.38m. Corrosion was not identified within the concrete block.

10" Test Point 2

Test Point 2 is the forward LRUT shot at Tanami Rd's blowdown line 90° elbow concrete support block, looking north. Two anomalies were identified as coating related at 0.55m and 1.11m as coating related. The anomaly located at 1.11m was not identified in the coating reports as metal loss



related. The girth weld to the 90° elbow was located at 1.84m which is inside of the concrete block. Corrosion was not identified within the concrete block.

10" Test Point 3

Test Point 3 is the backward LRUT shot at Tanami Rd's blowdown line 90° elbow concrete support block, looking west. The coating interface is 0.43m in front of the sensor head as shown in the results of Appendix 5. The elbow piece girth weld was identified within the concrete block at a distance of 1.83m which is inside of the block. Corrosion was not identified within the concrete block.

10" Test Point 4

Test Point 4 is the forward LRUT shot at Tanami Rd's blowdown stack concrete support block, looking east. The concrete interface is 0.52m in front of the sensor head as shown in the results of Appendix 5. The tee piece girth weld was identified within the concrete block at a distance of 1.71m, inside of the block. Corrosion was not identified within the concrete block.

10" Test Point 5

Test Point 5 is the backward LRUT shot at Tanami Rd's blowdown stack concrete support block, looking west. A reverberated signal is detected 0.78m in front of the sensor head as shown in the results of Appendix 5. The tee piece girth weld was identified within the concrete block at a distance of 1.93m, inside of the block. Corrosion was not identified within the concrete block.

10" Test Point 6

Test Point 6 is the backward LRUT shot at Tanami Rd's blowdown stack concrete support block, looking vertically down. The concrete interface is 0.50m in front of the sensor head as shown in the results of Appendix 5. Two more coating anomalies were identified at 0.79m and 1.05m before a weld at 1.70m and the tee inside the concrete detected at 2.05m. These results are confirmed by photo 040, refer to Appendix 3. Corrosion was not identified within the concrete block.

4 Discussion

Compiling the results of DCVG, coating defects noted and corrosion found at TANAMI Rd it should be possible to determine and links between the three sets of results. A complete set of results for the DCVG, Coating Defects and Metal loss is included in the TANAMI Rd 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. However, DCVG failed to find coating disbondment near the tee downstream of V07, disbondment of coating at the dead-ended tee upstream of V07, disbondment of the coating near the north trap kicker line tee,



disbondment of the coating around the blowdown line pig trap drain tie-in, and coating disbondment on the north trap riser.

DCVG Defect #1, 3 and 7 were not related back to specific defects found in the coating during dig-up, and yet were relatively high %IR readings. DCVG Defect #1 and 7 detections were around concrete anchor blocks however, therefore there could be a detected defect within the anchor 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 and there was no reported cases of corrosion by LRUT.

DCVG and Metal Loss Defects

The DCVG survey identified 1 out of 9 metal loss defects found at Tanami Rd. All metal loss defects found were identified as resulting from pit corrosion due to shielding. The fact that all except for metal loss defect ID #7 and were not found by DCVG is consistent with the shielding premise.

Coating Condition

As can be seen by the photos the pipe coating is failing in many locations leading to many detected holidays, however the coating is in better condition than the majority of other sites surveyed due to high amounts of tape wrap. Corrosion was found in several locations and just as for Wauchope the blowdown line had significant corrosion. 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 #1, 2, 3, 4, 5, 6 and 8 was in an area where the coating type was tape wrap. The pipe was wrapped circumferentially whilst corrosion occurred axially in cases #3, 4, 5, 6 and 8. Corrosion occurred in-line with the tape wrap winding to the pipe for cases #1 and 2. This indicates moisture ingress through the tape wrap defect has collected some distance away from where the defect is located, and corrosion subsequently occurred, shielded by the tape wrap (or canusa sleeve) from CP.

Metal loss ID #9 occurred underneath a canusa sleeve over a girth weld. The corrosion seen is typical of that seen underneath canusa sleeves; pitting corrosion spanning the area of pipe disbanded from the sleeve. The corrosion mechanism is shielding type, with the canusa sleeve acting as the CP shield.

Metal loss ID #7 is most likely to be due to localised pit corrosion resulting from shielding underneath the disbonded coating. Shielding normally results in a very uniform corrosion rate during periods when the local environment is corrosive and cathodic protection currents cannot reach the site to prevent the corrosion.



5 Recommendation

It is evident that corrosion has been largely mitigated at the site by the pipe coating and CP as many areas with coating defects did not present with corrosion, and as a result corrosion has been fairly minor. Corrosion rates will probably accelerate with time given the degrading condition of the coating. There is reasonable evidence of shielding in the tape 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.

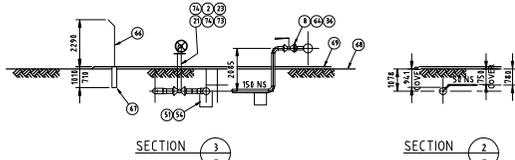
6 Conclusion

The DCVG survey has not been able to accurately detect all of the coating damage or metal loss at the Tanami Rd 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.

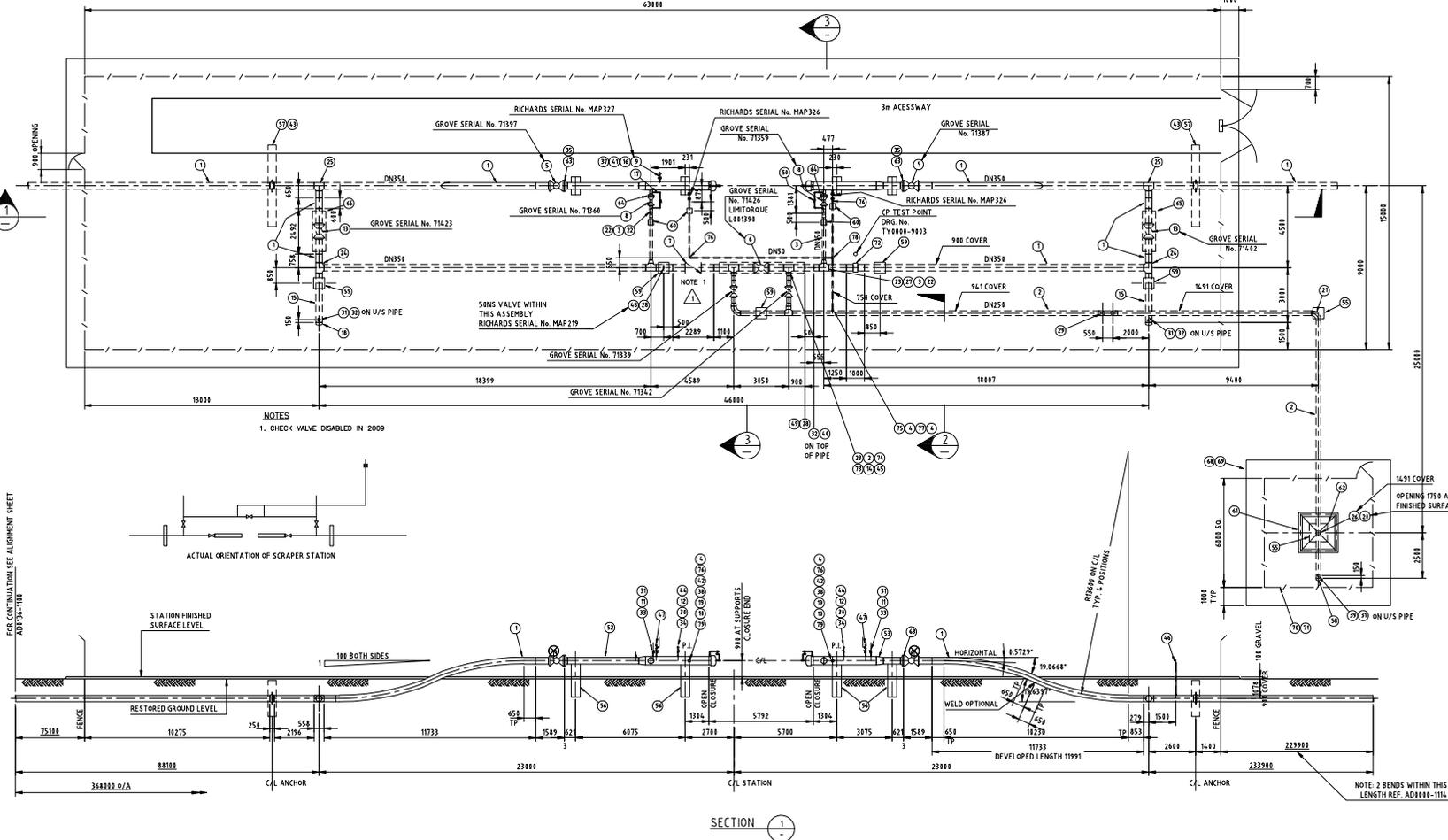
There were several areas of metal loss on the station pipework where there had been coating degradation. The amount of general corrosion is low and the station cathodic protection system appears to be working as it should. However, there is evidence of shielding issues at this station.



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



BILL OF MATERIAL				BILL OF MATERIAL				BILL OF MATERIAL			
ITEM	QTY	DESCRIPTION	CODE No.	ITEM	QTY	DESCRIPTION	CODE No.	ITEM	QTY	DESCRIPTION	CODE No.
72	1	INSULATING JOINT 350 NS 600H RF	C904	67	1 SET	FENCE FOUNDATIONS COMPRISING 8 - 250 DIA x 100 DEEP CORNER/GATE POST FOOTINGS. 4.7 - 200 DIA x 700 DEEP INTERM. POST FOOTINGS & ONE 300 x 200 x 200 DEEP GATE PAD WITH 2 HOLES FOR DROP BOLTS - 20 MPa MASS CONCRETE		1	*	INDICATES MATERIAL TO BE SUPPLIED BY PRINCIPAL	
73	2	VALVE BALL 200 NS 600H WE XS C/W 300 LONG PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2000 ABOVE C/L OF VALVE	C0163	68	978m ²	POLYTHENE SHEET 0.1mm THK. (COVERAGE AREA GIVEN)		1	*	PIPE 350 NS 8.74 WT API 5LX-60	C0096
74	3	REDUCER CON. 250x200 NS XS ASTM A234 WPB	C0815	69	98.0m ²	GRAVEL GRADED. (COMPACTED VOLUME GIVEN)		2	*	PIPE 250 NS XS ASTM A106 Gr B	C0062
75	1	WOL 250-200x50NS XS ASTM 105	C0772	70	1 SET	FENCE 2 RAIL TYPE 2.27m HIGH INCL 4.5 DEG OVERHANG 2.4m O'ALL LENGTH COMPRISING 5 CORNER/GATE & 5 INTERM POSTS. MAN GATE 0.9m OPENING WITH LOCK, CHAINWIRE MESH, BARB WIRES, GALV. CYCLONE OR EQUIV.		3	*	PIPE 150 NS XS ASTM A106 Gr B	C0064
76	5	ELBOW 90 DEG. LR 50 NS XS ASTM A234 WPB	C0733	71	1 SET	FENCE FOUNDATIONS COMPRISING 5 - 250 DIA x 100 DEEP CORNER/GATE POST FOOTINGS. 5 - 200 DIA x 700 DEEP INTERM POST FOOTINGS. 20 MPa MASS CONCRETE		4	*	PIPE 50 NS XS ASTM A106 Gr B	C0067
77	1	ELBOW 45 DEG. 50 NS XS ASTM A234 WPB	C0761					5	*	VALVE BALL 350 NS 600H FE REF. FULL BORE C/W PUP 700 LONG & WITH GEAR OPERATOR	C0154
78	1	TEE EQUAL 50 NS XS ASTM A234 WPB	C0754					6	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0401
79	2 SETS	INSULATING KIT 50 NS 600H RF	C0817					7	*	VALVE CHECK 350 NS 600H WE 8.74 WT SWING C/W PUPS 700 LONG - DISABLED (2009)	C0180
80								8	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								9	*	VALVE BALL 50 NS 600H FE FR	C0213
								10	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								11	*	VALVE BALL 25 NS 600H SW/FF	C0247
								12	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								13	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								14	*	VALVE BALL 50 NS 600H FE FR	C0213
								15	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								16	*	VALVE BALL 25 NS 600H SW/FF	C0247
								17	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								18	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								19	*	VALVE BALL 50 NS 600H FE FR	C0213
								20	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								21	*	VALVE BALL 25 NS 600H SW/FF	C0247
								22	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								23	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								24	*	VALVE BALL 50 NS 600H FE FR	C0213
								25	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								26	*	VALVE BALL 25 NS 600H SW/FF	C0247
								27	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								28	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								29	*	VALVE BALL 50 NS 600H FE FR	C0213
								30	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								31	*	VALVE BALL 25 NS 600H SW/FF	C0247
								32	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								33	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								34	*	VALVE BALL 50 NS 600H FE FR	C0213
								35	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								36	*	VALVE BALL 25 NS 600H SW/FF	C0247
								37	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								38	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								39	*	VALVE BALL 50 NS 600H FE FR	C0213
								40	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								41	*	VALVE BALL 25 NS 600H SW/FF	C0247
								42	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								43	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								44	*	VALVE BALL 50 NS 600H FE FR	C0213
								45	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								46	*	VALVE BALL 25 NS 600H SW/FF	C0247
								47	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								48	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								49	*	VALVE BALL 50 NS 600H FE FR	C0213
								50	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								51	*	VALVE BALL 25 NS 600H SW/FF	C0247
								52	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								53	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								54	*	VALVE BALL 50 NS 600H FE FR	C0213
								55	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								56	*	VALVE BALL 25 NS 600H SW/FF	C0247
								57	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								58	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								59	*	VALVE BALL 50 NS 600H FE FR	C0213
								60	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								61	*	VALVE BALL 25 NS 600H SW/FF	C0247
								62	*	VALVE BALL 350 NS 600H FE FULL BORE 2492 O/A LENGTH C/W PUPS & WITH GEAR OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160
								63	*	VALVE BALL 150 NS 600H WE XS/FE/FF C/W GEAR OPERATOR	C0212
								64	*	VALVE BALL 50 NS 600H FE FR	C0213
								65	*	VALVE BALL 25 NS 600H SW/NPT	C0249
								66	*	VALVE BALL 25 NS 600H SW/FF	C0247



NOTES
1. CHECK VALVE DISABLED IN 2009

ACTUAL ORIENTATION OF SCRAPER STATION

STATION FINISHED SURFACE LEVEL

SECTION 1

ORIGINAL DRAWING BY WILLIAMS BROS. CMPS ENGINEERS. SYDNEY NSW.
(ORIGINAL CONFIDENTIALITY NOTE)
 INFORMATION CONTAINED HEREIN IS CONFIDENTIAL AND/OR PROPRIETARY INFORMATION OF WILLIAMS BROS. CMPS ENGINEERS AND SHALL REMAIN THE PROPERTY OF WILLIAMS BROS. CMPS ENGINEERS AND SHALL BE HELD CONFIDENTIAL AND SHALL NOT BE USED FOR ANY PURPOSE OR PURPOSES OTHER THAN THOSE FOR WHICH THEY HAVE BEEN SUPPLIED OR PREPARED.

DWG. No.	REFERENCE DRAWINGS
AD061-7001	P&I DIAGRAM

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
1	CHECK VALVE DISABLED																			
2	NEW DRAWING NUMBER. REF. PREVIOUS DRG WP0154-6004 REV 3																			

PROJ. ENGINEER	DATE	DRAWN	DATE	CHECKED	DATE	PROJ. MANAGER	DATE	CLIENT	DATE
BP	17.02.10	ML	21.05.10	HD					
DCH	12.06.08	BP		HD					

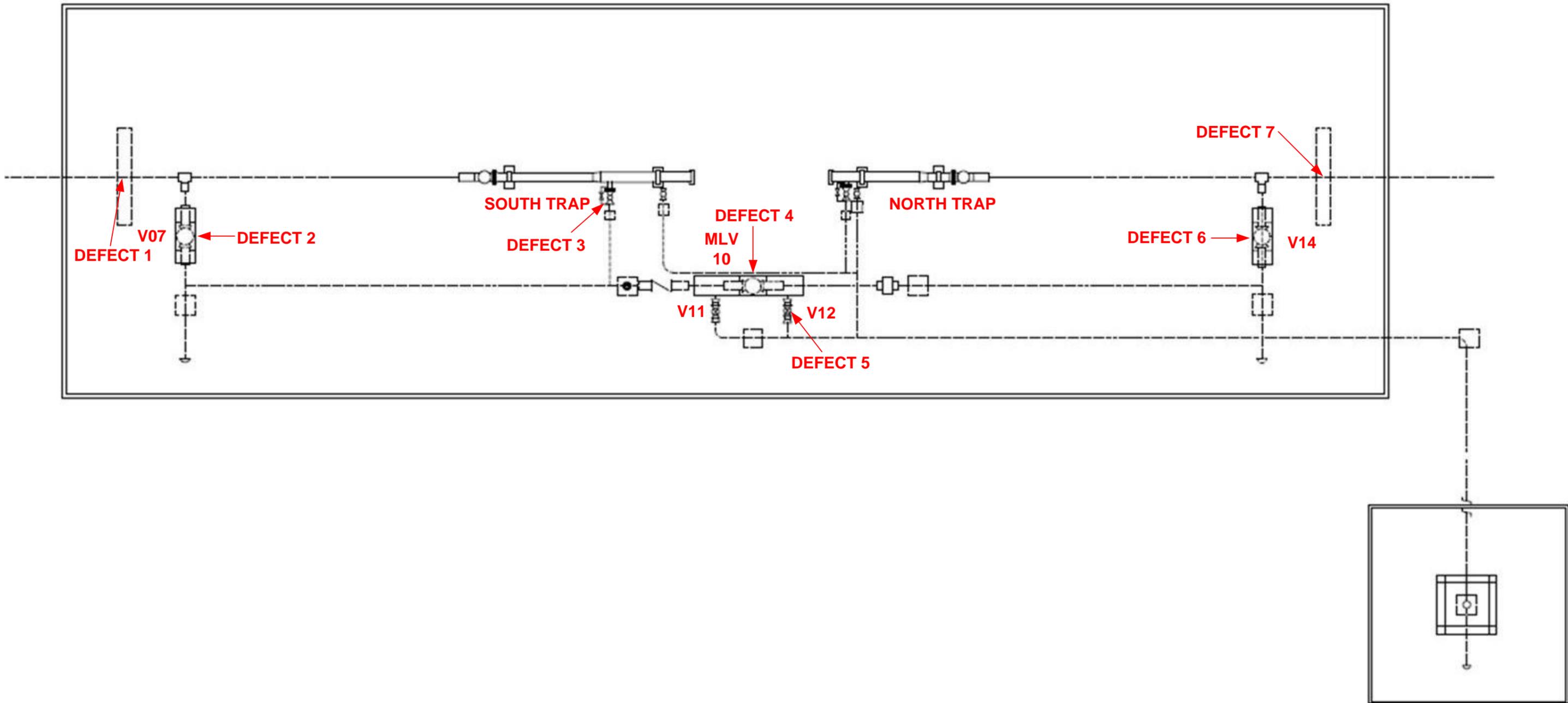


CLIENT
 AMADEUS BASIN TO DARWIN PIPELINE
 SCRAPER STATION 350 NS
 ARRANGEMENT - TANAMI ROAD

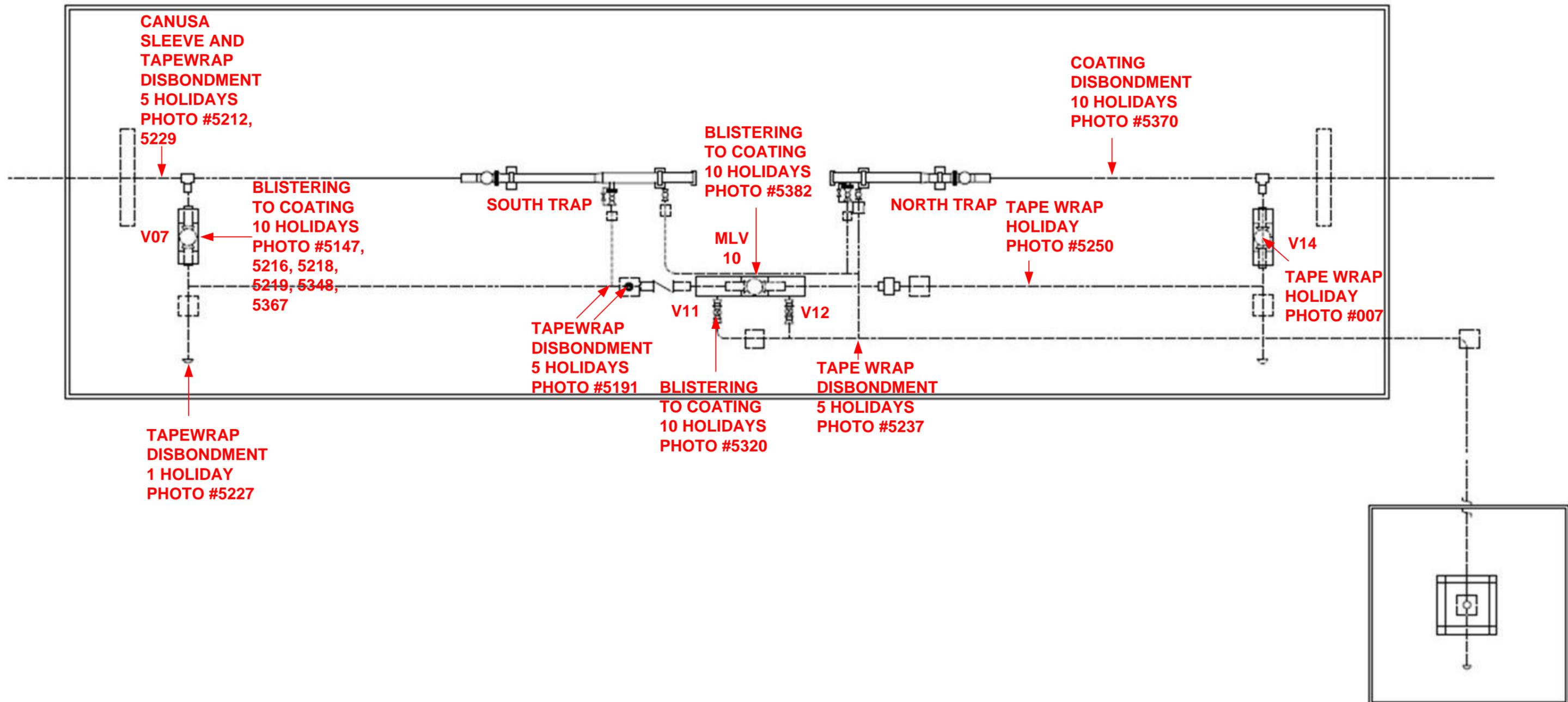
DRAWING NUMBER	SHEET	REVISION
AD0161-6004	A1	1

TANAMI RD DCVG SURVEY

DCVG	IR (%)
DEFECT 1:	24.0
DEFECT 2:	9.0
DEFECT 3:	4.2
DEFECT 4:	6.8
DEFECT 5:	7.1
DEFECT 6:	2.3
DEFECT 7:	9.4

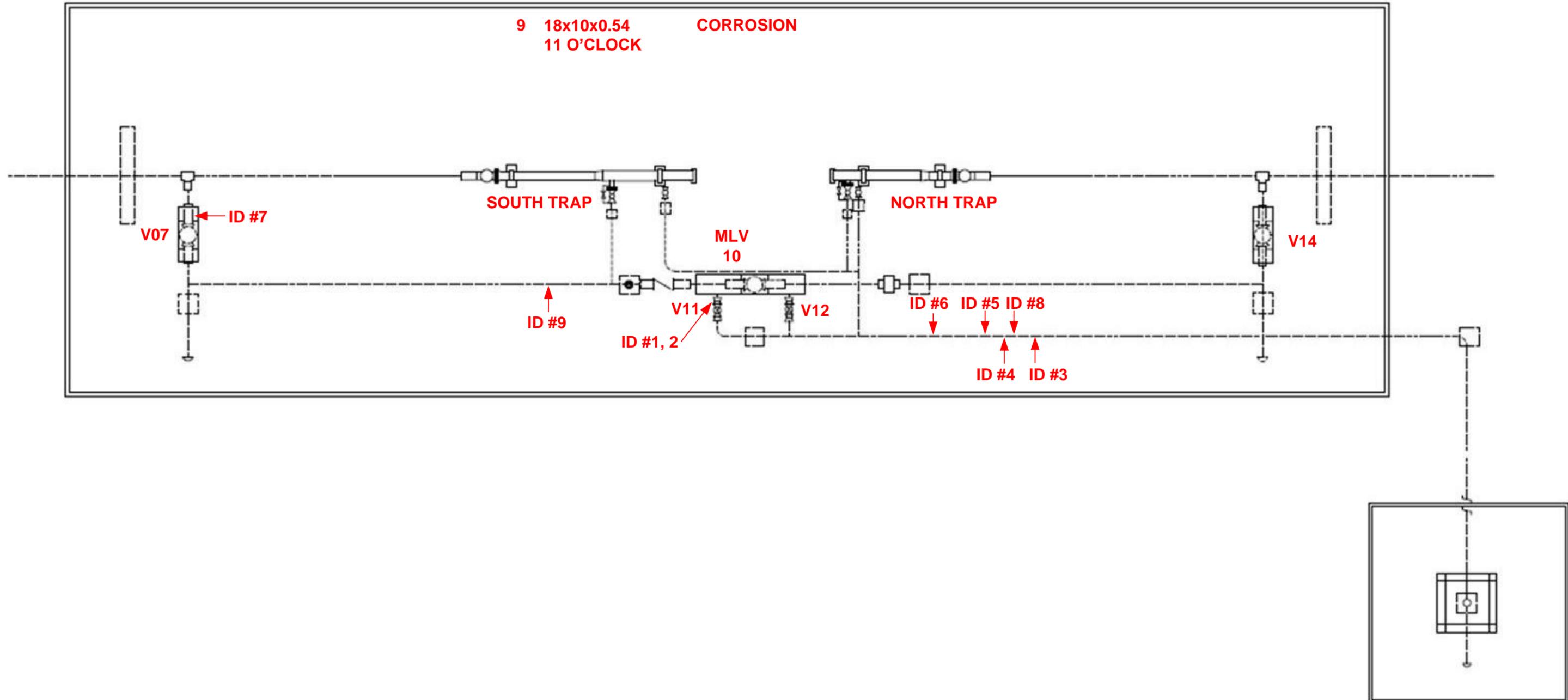


TANAMI RD COATING DEFECT – VISUAL INSPECTION & HOLIDAY DETECTOR RESULTS



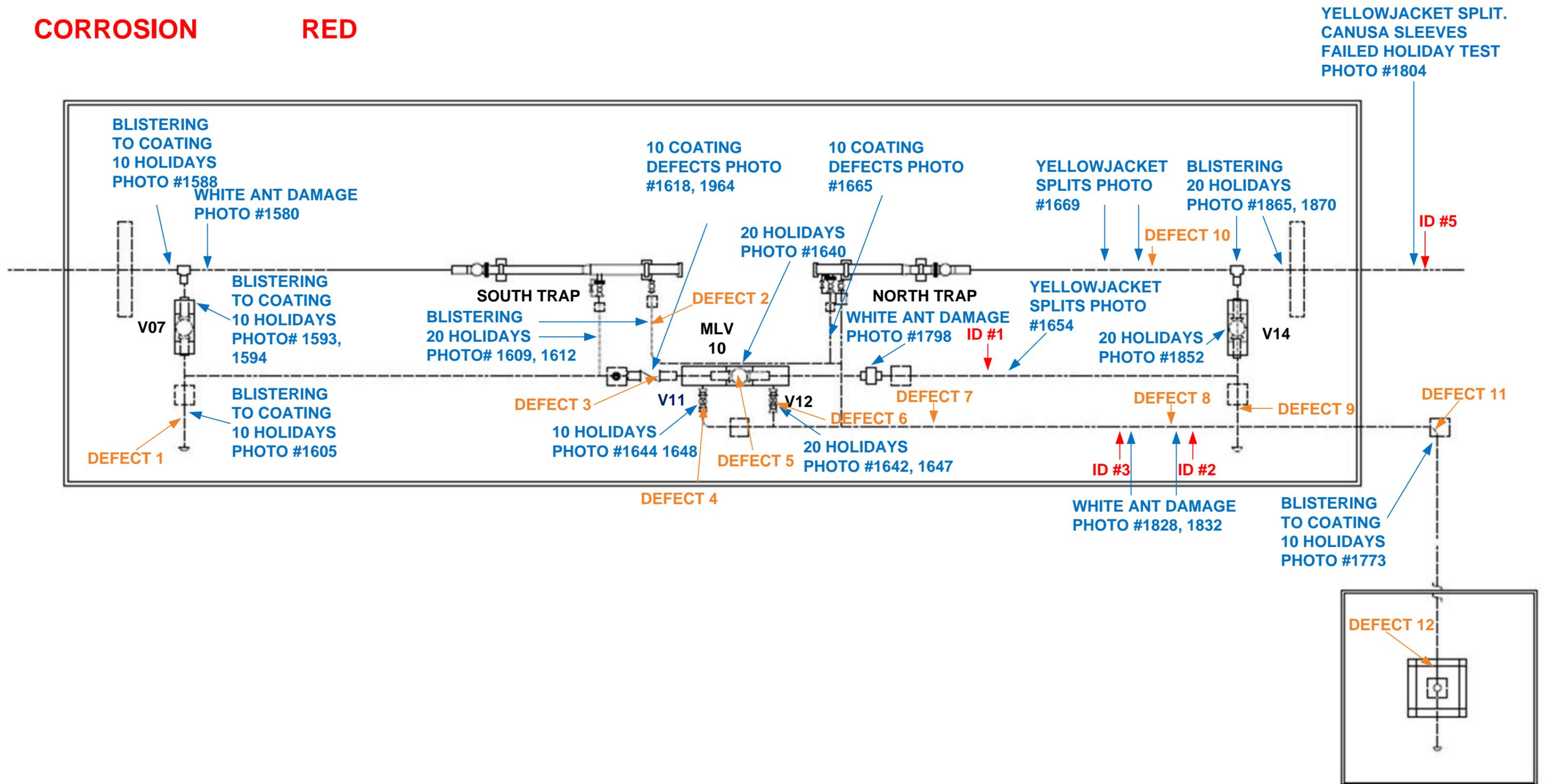
TANAMI RD METAL LOSS RESULTS

COATING DAMAGE ASSESSMENT REPORT ID#	DEFECT DIMENSION (mm) LxWxDPTH O'CLOCK POSITION ON PIPE	CAUSE OF METAL LOSS	COATING DAMAGE ASSESSMENT REPORT ID#	DEFECT DIMENSION (mm) LxWxDPTH O'CLOCK POSITION ON PIPE	CAUSE OF METAL LOSS
1	7x5x0.72 1:30 O'CLOCK	CORROSION	5	5x6x1.30 9:30 O'CLOCK	CORROSION
2	10x8x1.08 9 O'CLOCK	CORROSION	6	7x9x1.67 9:30 O'CLOCK	CORROSION
3	7x9x1.37 3:30 O'CLOCK	CORROSION	7	26x15x1.70 1:15 O'CLOCK	CORROSION
4	6x6x1.11 10:30 O'CLOCK	CORROSION	8	7x11x1.23 9:10 O'CLOCK	CORROSION
			9	18x10x0.54 11 O'CLOCK	CORROSION



WARREGO DCVG, COATING DEFECTS & METAL LOSS

LEGEND	COLOUR
DCVG	ORANGE
COATING DEFECT	BLUE
CORROSION	RED





Appendix 2 Coating Damage Assessment Forms

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____
 Section: V11
 Kilometre Point: TANAMI SS
 Zone: _____
 Easting: _____
 Northing: _____

Excavation Date: 18/4/2013
 Digup Reason: COATING INSPECTION
 DCVG Measurement: NIL
 Defect Length from survey (m): _____
 CMMS Work Order No: 144308

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>5204</u>
Pipe with coating removed	
Pipe cleaned	<u>5645, 5646</u>
Pipe repaired	

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): 0.90

Soil pH: 5-6

Pipe To Soil Potential (V): -1.957

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:

COATING APPEARED TO BE IN GOOD CONDITION.

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.

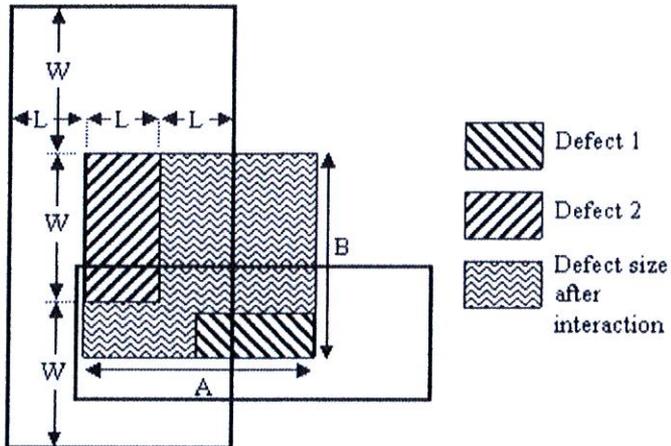


Figure 1

Maximum Depth (mm):

0.72

Wall thickness (mm):

7

Longitudinal dimension (A) (mm):

5

Circumferential dimension (B) (mm):

1:30

Clock Position (looking in direction of flow):

Distance from longitudinal weld (mm):

COULD NOT FIND

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

35

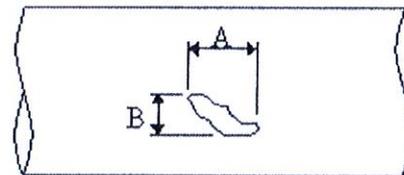


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

CORROSION IN POP PIECE BETWEEN TIE D/S OF MLV AND VII
ALL PIPE WORK PAINTED WITH DULUX LUXAPOXY UHB.

Dig Up Comments:

SOIL SOFT & DAMP

Operator: Wayne Duffly

Signature: [Signature]

Date: 27/5/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____
 Section: NEAR V11
 Kilometre Point: TANAMI SS
 Zone: _____
 Easting: _____
 Northing: _____

Excavation Date: 18/4/2013
 Digup Reason: COATING INSPECTION
 DCVG Measurement: NIL
 Defect Length from survey (m): _____
 CMMS Work Order No: 144308

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>5204, 5130</u>
Pipe with coating removed	
Pipe cleaned	<u>5624, 5625,</u>
Pipe repaired	

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): 0.90 Soil pH: 5-6
 Pipe To Soil Potential (V): -1.957 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:

COATING APPEARED IN GOOD CONDITION

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.

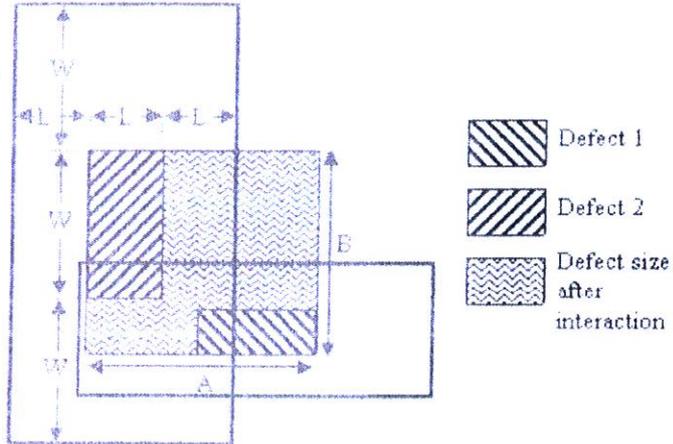


Figure 1

Maximum Depth (mm):

1.08

Wall thickness (mm):

Longitudinal dimension (A) (mm):

10

Circumferential dimension (B) (mm):

8

Clock Position (looking in direction of flow)

9:0

Distance from longitudinal weld (mm):

COULD NOT FIND

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

74

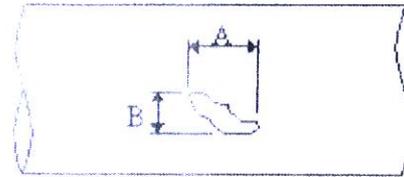


Figure 2

Repair

Length of Pipe Wrapped (mm):

Other Repair Information:

CORROSION IN RUP PIECE BETWEEN TIE DOWN STREAM OF MLV AND VII.
ALL PIPE WORK PAINTED WITH DULUX LUXAPOXY UHA.

Dig Up Comments:

Operator: Wayne Duffy

Signature:

Date: 27/5/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupat

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 23/4/2013
 Section: BLOW DOWN LINE Digup Reason: INSPECT COATING
 Kilometre Point: TANAMI SS DCVG Measurement: NIL
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144308
 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>5275</u>
Pipe with coating removed	<u>5302</u>
Pipe cleaned	<u>5713, 5712</u>
Pipe repaired	<u>5862</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): 1.0 Soil pH: 5-6

Pipe To Soil Potential (V): -1.957 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description:

<input type="checkbox"/> Yellow Jacket	Is there a coating defect (Y/N)?	<u>N</u>
<input type="checkbox"/> Sleeve	Any white buildup from cathodic protection (Y/N)?	<u>N</u>
<input checked="" type="checkbox"/> Wrapping	Any evidence of termite damage (Y/N)?	<u>N</u>
<input type="checkbox"/> FBE	Any moisture inside the coating (Y/N)?	<u>N</u>
<input type="checkbox"/> Paint	Any stress corrosion cracking (Y/N)? <small>If yes, complete APA pipeline damage report</small>	<u>N/A</u>
	Has the coating lifted away from the pipe (Y/N)?	<u>N</u>
	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 APPEARED TO BE IN GOOD CONDITION AND 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.

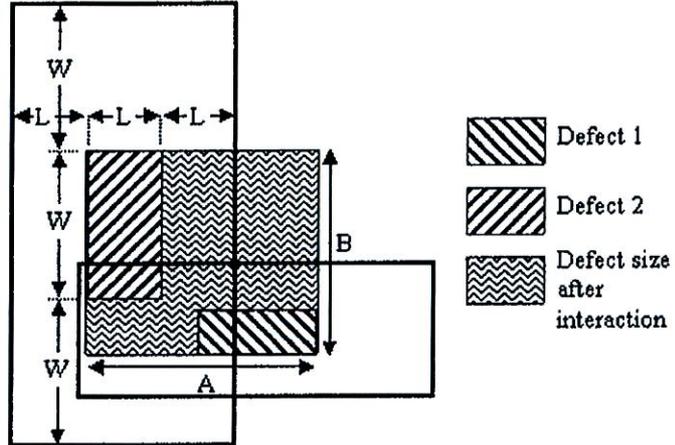


Figure 1

Maximum Depth (mm):

1-37

Wall thickness (mm):

Longitudinal dimension (A) (mm):

7

Circumferential dimension (B) (mm):

9

Clock Position (looking in direction of flow):

3:30

Distance from longitudinal weld (mm):

240

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

4540

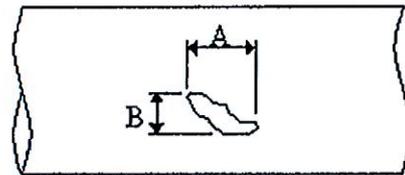


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

ENTIRE BLow DOWN LINE PAINTED WITH DULUX LUXAPORX UHB

Dig Up Comments:

SOIL SOFT LOAM AND DAMP, NO STONES.

Operator:

Wayne Duff

Signature:

[Signature]

Date:

1/6/2013

COATING DAMAGE ASSESSMENT

Location

Pipeline: _____ Excavation Date: 23/4/2013
 Section: BLOW DOWN LINE Digup Reason: COATING INSPECTION
 Kilometre Point: TANAMI SS DCVG Measurement: NIL
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144308
 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>5274</u>
Pipe with coating removed	<u>5334</u>
Pipe cleaned	<u>5768, 5767.</u>
Pipe repaired	<u>5862.</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): 1.0 Soil pH: 5.6
 Pipe To Soil Potential (V): -1.957 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 APPEARED TO BE IN GOOD CONDITION AND DID NOT JUMP OUT

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.
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4. The dimensions reported on this form are the dimensions of the defect after interaction - dimensions A and B as shown in Figure 1.

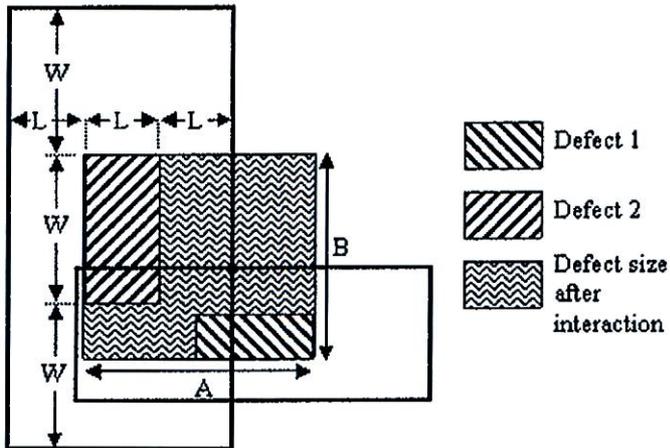


Figure 1

Maximum Depth (mm):

 1-11

Wall thickness (mm):

Longitudinal dimension (A) (mm):

 6#

Circumferential dimension (B) (mm):

 6

Clock Position (looking in direction of flow):

 10:30

Distance from longitudinal weld (mm):

 195

Distance from nearest girth weld (mm):

 5220

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

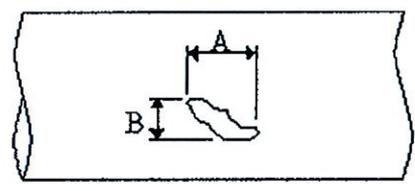


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

 ENTIRE BLow DOWN LINE PAINTED WITH DULUX LUXAPOXY UHB

Dig Up Comments:

 SOIL WAS SOFT AND DAMP

Operator: Wayne Duffy

Signature: [Signature]

Date: 1/6/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 23/4/2013
 Section: BLOW DOWN LINE Digup Reason: COATING INSPECTION
 Kilometre Point: TANAMI SS DCVG Measurement: NIL
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144308
 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	5266
Pipe with coating removed	5332
Pipe cleaned	5766 5765
Pipe repaired	5862

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): 1.0 Soil pH: 5-6

Pipe To Soil Potential (V): -1.957 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 APPEARED TO BE IN GOOD CONDITION AND 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.

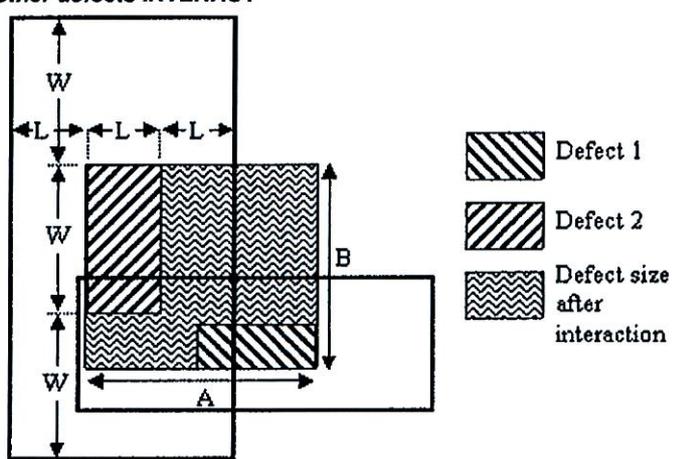


Figure 1

Maximum Depth (mm):

1-30

Wall thickness (mm):

Longitudinal dimension (A) (mm):

5

Circumferential dimension (B) (mm):

6

Clock Position (looking in direction of flow):

9:30

Distance from longitudinal weld (mm):

125

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

2545

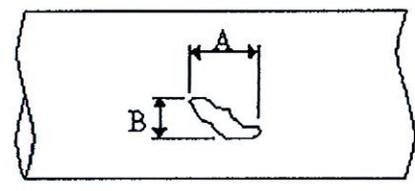


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

ENTIRE BLAD DOWN LINE PAINTED WITH DULUX LUXAPOXY UHB

Dig Up Comments:

SOIL WAS SOFT AND DAMP

Operator: Wesley Duff

Signature: [Signature]

Date: 1/6/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 23/4/2013
 Section: BLOW DOWN LINE Digup Reason: COATING INSPECTION
 Kilometre Point: TANAMI SS DCVG Measurement: NIL
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144 309
 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>5271</u>
Pipe with coating removed	<u>5331</u>
Pipe cleaned	<u>5763, 5764</u>
Pipe repaired	<u>5862</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): 1.0 Soil pH: 5.6
 Pipe To Soil Potential (V): -1.957 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 APPEARED TO BE IN GOOD CONDITION AND DID NOT JIBE?

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.

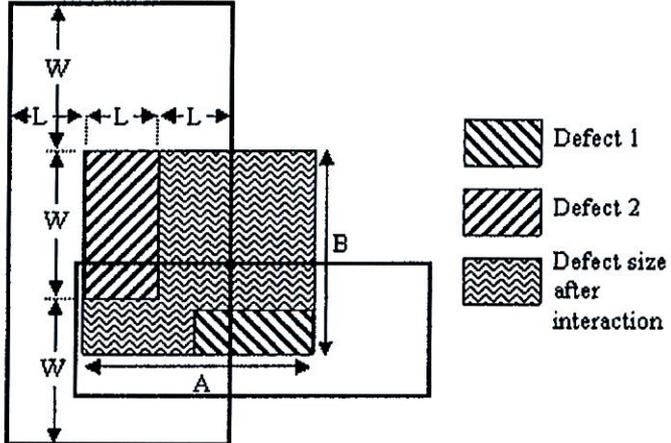


Figure 1

Maximum Depth (mm):

1-67

Wall thickness (mm):

Longitudinal dimension (A) (mm):

7

Circumferential dimension (B) (mm):

9

Clock Position (looking in direction of flow):

9:30

Distance from longitudinal weld (mm):

140

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

1960

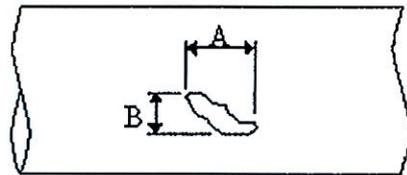


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

ENTIRE BLOW DOWN LINE PAINTED WITH DULUX LEXA POLY UHB

Dig Up Comments:

SOIL WAS SOFT AND DAMP

Operator: Wayne Duff

Signature: [Signature]

Date: 1/6/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____
 Section: V07
 Kilometre Point: TANAMI SS
 Zone: _____
 Easting: _____
 Northing: _____

Excavation Date: 19/11/2013
 Digup Reason: COATING INSPECTION
 DCVG Measurement: NIL
 Defect Length from survey (m): _____
 CMMS Work Order No: 144308

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>5147</u>
Pipe with coating removed	<u>5183, 5188</u>
Pipe cleaned	<u>5647</u>
Pipe repaired	<u>5851</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): 0.9 Soil pH: 5-6

Pipe To Soil Potential (V): -1.957 Soil Resistivity (Ohms): _____ Pin Spacing 1.5m

Coating

Coating Description:	Is there a coating defect (Y/N)?	<u>Y</u>
<input type="checkbox"/> Yellow Jacket	Any white buildup from cathodic protection (Y/N)?	<u>Y</u>
<input type="checkbox"/> Sleeve	Any evidence of termite damage (Y/N)?	<u>N</u>
<input type="checkbox"/> Wrapping	Any moisture inside the coating (Y/N)?	<u>N</u>
<input checked="" type="checkbox"/> FBE	Any stress corrosion cracking (Y/N)? <small>If yes, complete APA pipeline damage report</small>	<u>N/A</u>
<input type="checkbox"/> Paint	Has the coating lifted away from the pipe (Y/N)?	<u>Y</u>
	If yes, how far around the pipe has it lifted (mm)?	<u>400</u>
	Sketch of coating / corrosion damage completed (Y/N)?	

Coating Defect Length (mm): 900 Coating Defect Width (mm): 400

Coating Defect Comments:

ORIGINAL PAINT HAD LIFTED AWAY FROM PIPE.

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.

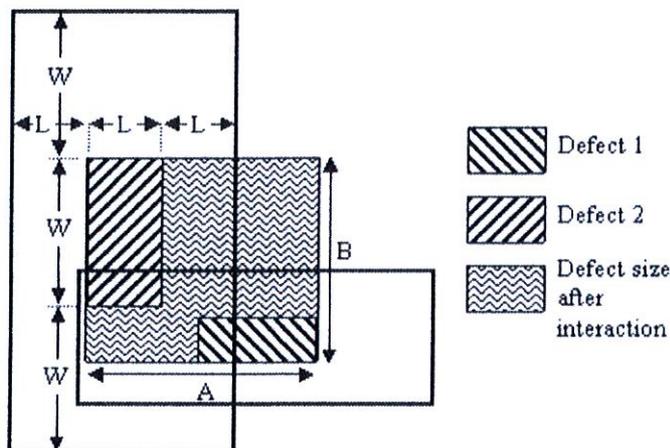


Figure 1

Maximum Depth (mm):

1-70

Wall thickness (mm):

Longitudinal dimension (A) (mm):

26

Circumferential dimension (B) (mm):

15

Clock Position (looking in direction of flow):

1:15

Distance from longitudinal weld (mm):

NA

Distance from nearest girth weld (mm):

470

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

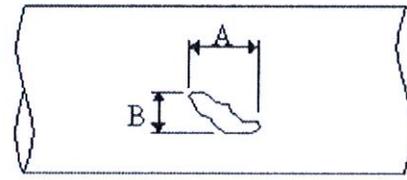


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

ENTIRE SECTION WAS PAINTED WITH DULUX LUXA POXY UHB.

Dig Up Comments:

SOIL WAS SOFT & DAMP.

Operator: Wayne Duffy

Signature: [Signature]

Date: 27/5/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Page 1

Location

Pipeline: _____ Excavation Date: 23/4/2013
 Section: BLOW DOWN LINE Digup Reason: COATING INSPECTION
 Kilometre Point: TANAMI SS DCVG Measurement: NIL
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144308
 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	5265 , 5267
Pipe with coating removed	5333
Pipe cleaned	5771, 5772
Pipe repaired	5862

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): 1.0 Soil pH: 5-6
 Pipe To Soil Potential (V): -1.957 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 APPEARED TO BE IN GOOD CONDITION AND DID NOT JELLY OUT.

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.

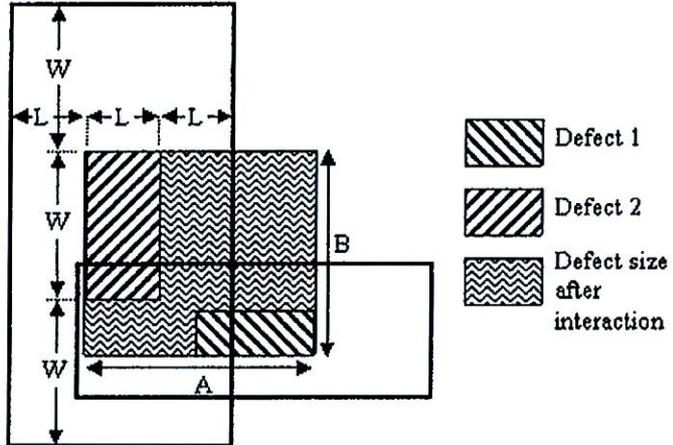


Figure 1

Maximum Depth (mm):

 1.23

Wall thickness (mm):

Longitudinal dimension (A) (mm):

 7

Circumferential dimension (B) (mm):

 11

Clock Position (looking in direction of flow):

 9:10

Distance from longitudinal weld (mm):

 105

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

 4235

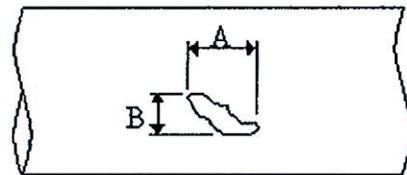


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

 ENTIRE BLOW DOWN LINE WAS PAINTED WITH LUXAPOXY UHB.

Dig Up Comments:

 SOIL WAS SOFT AND DAMP.

Operator:

 Wayne Duff

Signature:

 [Signature]

Date:

 4/6/2013

KP:

Work Order No:

Form created by Ben Parkin Apr 09
Approved by Henry Dupal

COATING DAMAGE ASSESSMENT

Location

Pipeline: _____ Excavation Date: 20/4/2013
 Section: D/S OF CHECK VALVE Digup Reason: COATING INSPECTION
 Kilometre Point: TANAMI SCRAPIER DCVG Measurement: NIL
 Zone: _____ Defect Length from survey (m): _____
 Easting: _____ CMMS Work Order No: 144309
 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>5234, 5152</u>
Pipe with coating removed	
Pipe cleaned	<u>5664, 5665</u>
Pipe repaired	<u>5871</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 checked="" 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): 950 Soil pH: 5-6
 Pipe To Soil Potential (V): -1.957 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)? N/A
 Sketch of coating / corrosion damage completed (Y/N)? N

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

Coating Defect Comments:

REMOVED CANUSA SLEEVE WHICH WAS OVER BUT W/CD. SLIGHT CORROSION AT 11 O'CLOCK POSITION

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.

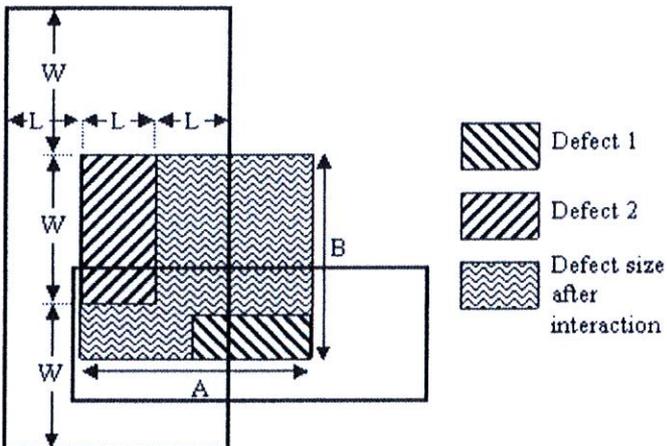


Figure 1

Maximum Depth (mm):

0.54

Wall thickness (mm):

Longitudinal dimension (A) (mm):

18

Circumferential dimension (B) (mm):

10

Clock Position (looking in direction of flow):

11:00'clock.

Distance from longitudinal weld (mm):

530

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

65

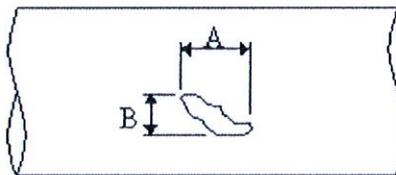


Figure 2

Repair

Length of Pipe Wrapped (mm): _____

Other Repair Information:

CORROSION 8080 MM DOWN STREAM OF CHECK VALVE.

Dig Up Comments:

SOIL SOFT & DAMP

Operator:

Wayne Off

Signature:

[Signature]

Date:

15/6/2013



Appendix 3 Photo Log

Photos:

007

022

5130

5147

5152

5183

5188

5191

5204

5212

5216

5218

5219

5227

5229

5234

5237

5250

5266

5267

5271

5274

5275

5292

5302



5320

5331

5332

5333

5334

5348

5367

5370

5380

5381

5382

5624

5625

5645

5646

5647

5652

5664

5665

5712

5713

5763

5764

5765

5766

5767

5768



5771

5772

5851

5862

5871



Appendix 4 RSTRENG ANALYSIS

Site: Tanami Road V07

Station: Tanami Road V07

Date: 11/07/2013

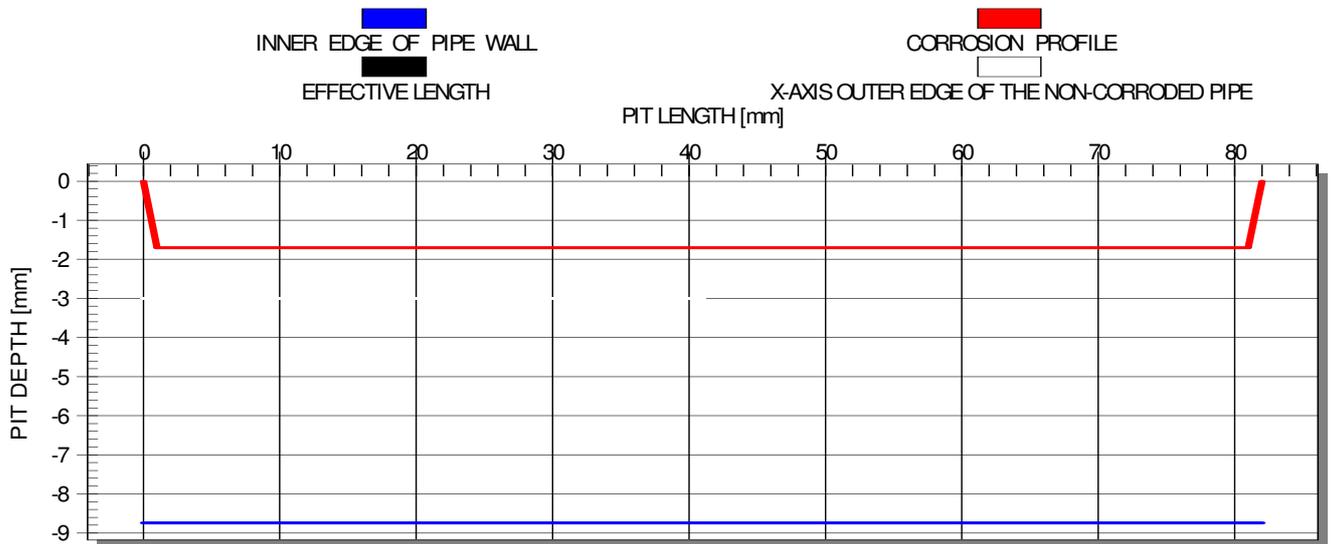
P = 2StFT/D [kPa] - Calculated Pressure 14,617.138
Established MAOP [kPa] 9,650

Pipe Outside Diameter [mm] 355.60 Effective Length [mm] 82.00
Pipe Wall Thickness [mm] 8.740 Effective Area [mm]² 137.71
SMYS [MPa] 413 Max. Pit Depth [mm] 1.7
Design Factor 0.72 Max.Depth/Wall Thickness 0.19
Total Length [mm] 82
Effective Length: Start [mm] 0.00 End [mm] 82.00

RESULTS OF ANALYSIS:

METHOD	Max.Safe Pressure [kPa]	Burst Pressure [kPa]	Safety Factor
RSTRENG - Effective Area	14617	21887	2.27
RSTRENG - 0.85dL	14617	22169	2.3
ASME B31 G	14617	21091	2.19

CORROSION PROFILE:



Prepared By: Ben Parkin

Approved By:

Site: Tanami Road V07

CORROSION MEASUREMENT:

Nr.	Increment [mm]	Pit Depth [mm]
1.	0	0
2.	1	1.7
3.	81	1.7
4.	82	0

Site: Tanami Road V07 X52

Station: Tanami Road V07 X52

Date: 11/07/2013

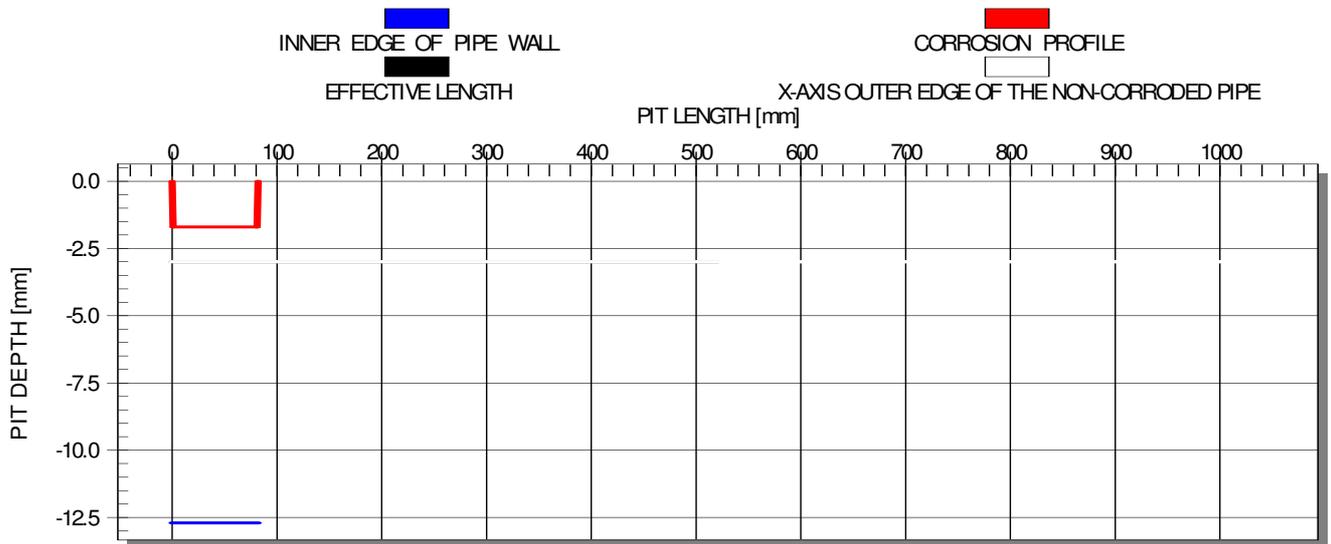
P = $2StFT/D$ [kPa] - Calculated Pressure 18,411.433
Established MAOP [kPa] 9,650

Pipe Outside Diameter [mm] 355.60 Effective Length [mm] 82.00
Pipe Wall Thickness [mm] 12.700 Effective Area [mm]² 137.71
SMYS [MPa] 358 Max. Pit Depth [mm] 1.700
Design Factor 0.72 Max.Depth/Wall Thickness 0.13
Total Length [mm] 82
Effective Length: Start 0.00 End [mm] 82.00

RESULTS OF ANALYSIS:

METHOD	Max. Safe Pressure [kPa]	Burst Pressure [kPa]	Safety Factor
RSTRENG - Effective Area	18411	29250	3.03
RSTRENG - 0.85dL	18411	29440	3.05
ASME B31 G	18411	27262	2.83

CORROSION PROFILE:



Prepared By: Ben Parkin

Approved By:

Site: Tanami Road V07 X52

CORROSION MEASUREMENT:

Nr.	Increment [mm]	Pit Depth [mm]
1.	0	0
2.	1	1.7
3.	81	1.7
4.	82	0



Appendix 5 LRUT

INSPECTION REPORTS

A comprehensive *LRUT* inspection on the 10 and 14inch to concrete anchor block gas line at Tanami Rd scraper station and Palm Valley Interconnect 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" Tanami Rd scraper station (Forward only)										
TP 1	16.5.2013	8.8	9.0	-	2.20	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scraper station (Backward only)										
TP 2	16.5.2013	8.8	9.0	-	2.20	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scraper station (Forward only)										
TP 3	16.5.2013	8.8	9.0	-	1.37	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scraper station (Backward only)										
TP 4	16.5.2013	8.8	9.0	-	1.27	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scraper station (Forward only)										
TP 4	16.5.2013	8.8	9.0	-	3.90	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scraper station (Forward only)										
TP 5	16.5.2013	8.8	9.0	-	3.00	-				No significant findings noted along test length during testing.

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



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" Tanami Rd scrapper station (Forward only)										
TP 6	16.5.2013	8.8	9.0	-	2.88	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scrapper station (Backward only)										
TP 7	16.5.2013	8.8	9.0	-	4.20	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scrapper station (Backward only)										
TP 8	16.5.2013	8.8	9.0	-	3.26	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scrapper station (Backward only)										
TP 9	16.5.2013	8.8	9.0	-	3.60	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scrapper station (Forward only)										
TP 9	16.5.2013	8.8	9.0	-	1.23	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scrapper station (Backward only)										
TP 10	18.5.2013	8.8	9.0	-	1.38	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scrapper station (Forward only)										
TP 11	18.5.2013	8.8	9.0	-	1.90	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scrapper station (Backward only)										
TP 12	18.5.2013	8.8	9.0	-	1.83	-				No significant findings noted along test length during testing.

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



INSPECTION REPORTS – Cont'd

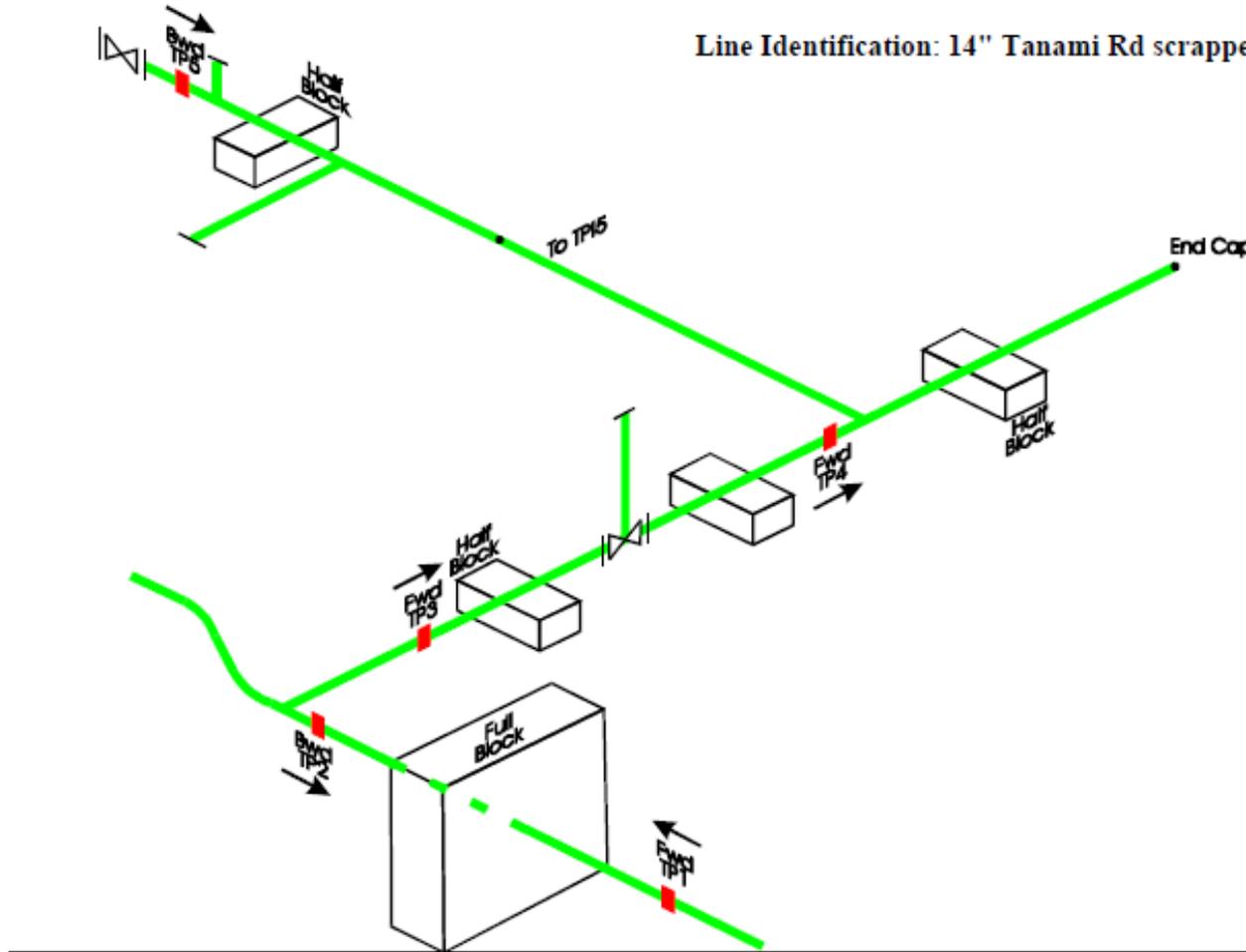
	Date of Insp.	Thickness measured at Head Location (mm)		LRUT Coverage Distance (m)			Anomaly categories			Inspection Findings / Comments / Remarks
		Min	Max	AG	UG	R/C	1	2	3	
Line ID: 10" Tanami Rd scraper station Blow down line (Backward only)										
TP 1	18.5.2013	7.8	8.0	-	4.00	-				No significant findings noted along test length during testing.
Line ID: 10" Tanami Rd scraper station Blow down line (Forward only)										
TP 2	18.5.2013	7.8	8.0	-	2.5	-				A Horizontal flexural mode recorded above the 9% threshold. Noted at 1.11m away from sensor head.
Line ID: 10" Tanami Rd scraper station Blow down line (Backward only)										
TP 3	18.5.2013	7.8	8.0	-	2.5	-				No significant findings noted along test length during testing.
Line ID: 10" Tanami Rd scraper station Blow down line (Forward only)										
TP 4	18.5.2013	7.8	8.0	-	1.71	-				No significant findings noted along test length during testing.
Line ID: 10" Tanami Rd scraper station Blow down line (Backward only)										
TP 5	18.5.2013	7.8	8.0	-	1.93	-				No significant findings noted along test length during testing.
Line ID: 10" Tanami Rd scraper station Blow down line (Backward only)										
TP 6	18.5.2013	8.8	9.0	-	2.05	-				No significant findings noted along test length during testing.
Line ID: 14" Palm Valley Interconnect gas line (Forward only)										
TP 1	17.5.2013	8.8	9.0	-	2.04	-				No significant findings noted along test length during testing.
Line ID: 14" Palm Valley Interconnect gas line (Forward only)										
TP 2	17.5.2013	8.8	9.0	-	1.49	-				No significant findings noted along test length during testing.

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



PIPELINE SCHEMATIC DRAWINGS

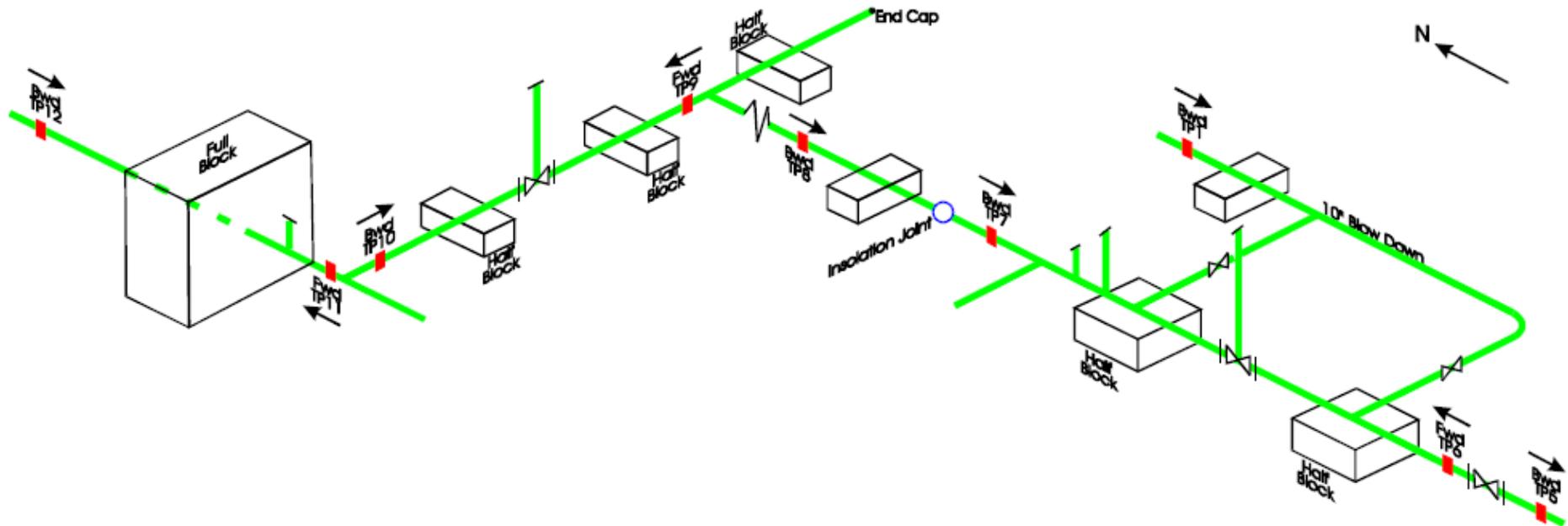
Line Identification: 14" Tanami Rd scraper station (TP1 to TP5)





PIPELINE SCHEMATIC DRAWINGS – Cont'd

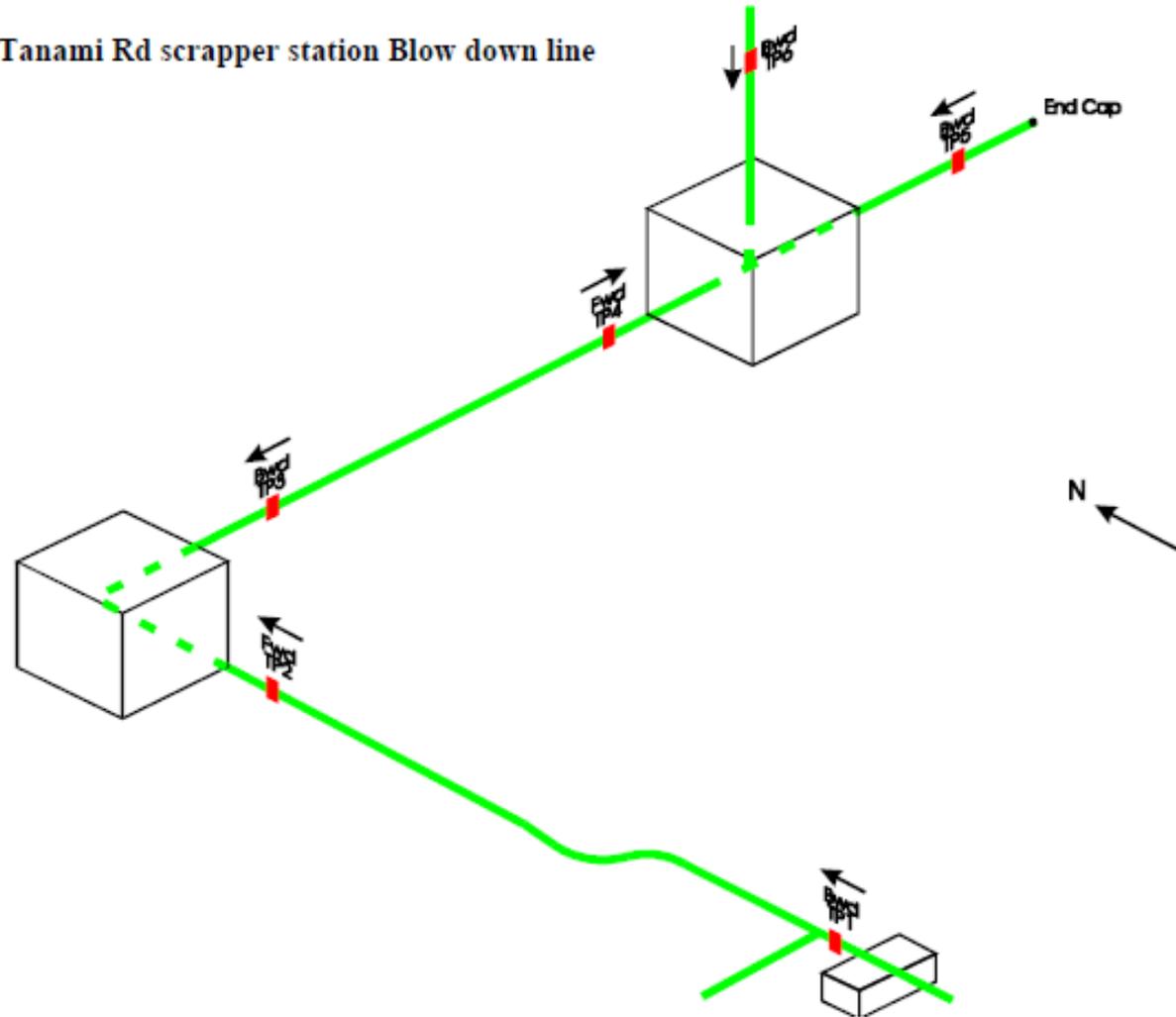
Line Identification: 14" Tanami Rd scraper station (TP5 to TP12)





PIPELINE SCHEMATIC DRAWINGS – Cont'd

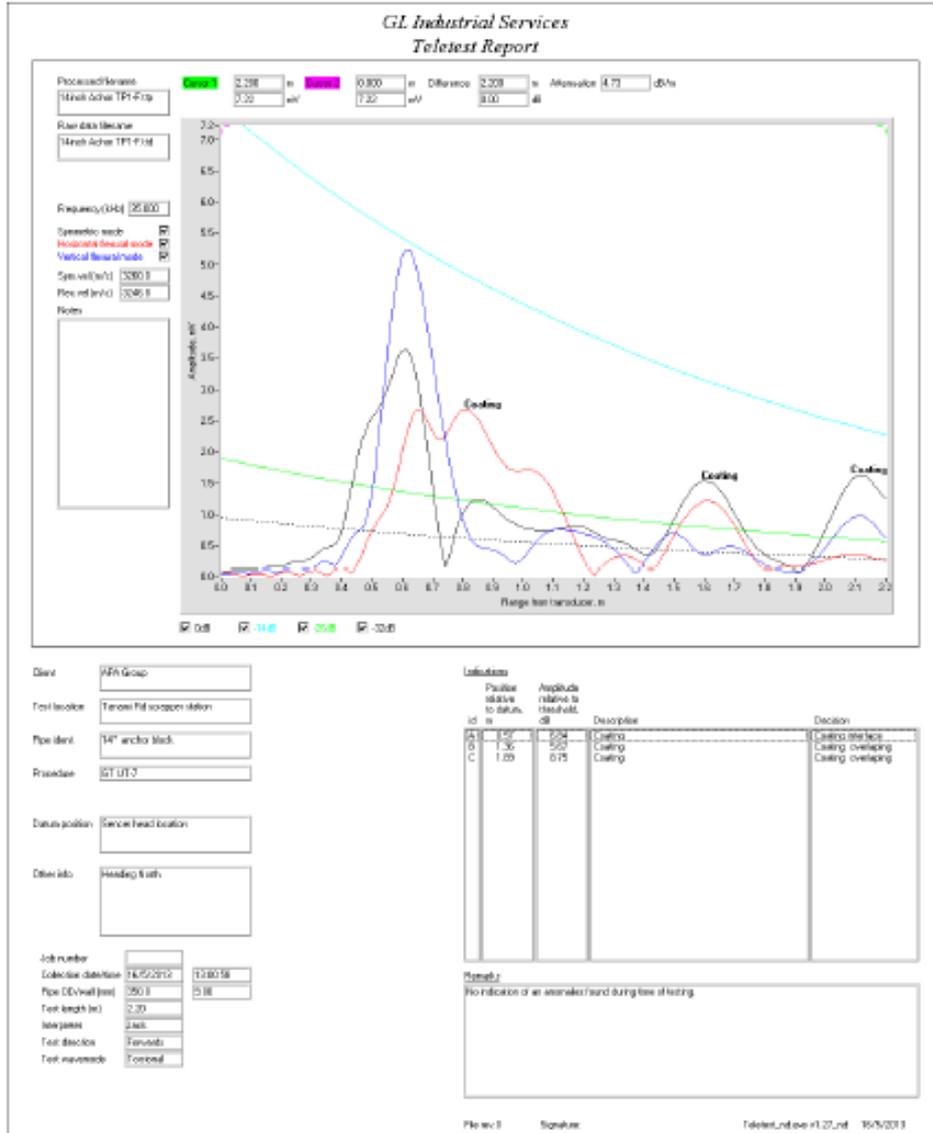
Line Identification: 10" Tanami Rd scraper station Blow down line



LRUT A-SCAN GRAPHS

Test Point 1 : 14" Tanami Rd scraper station

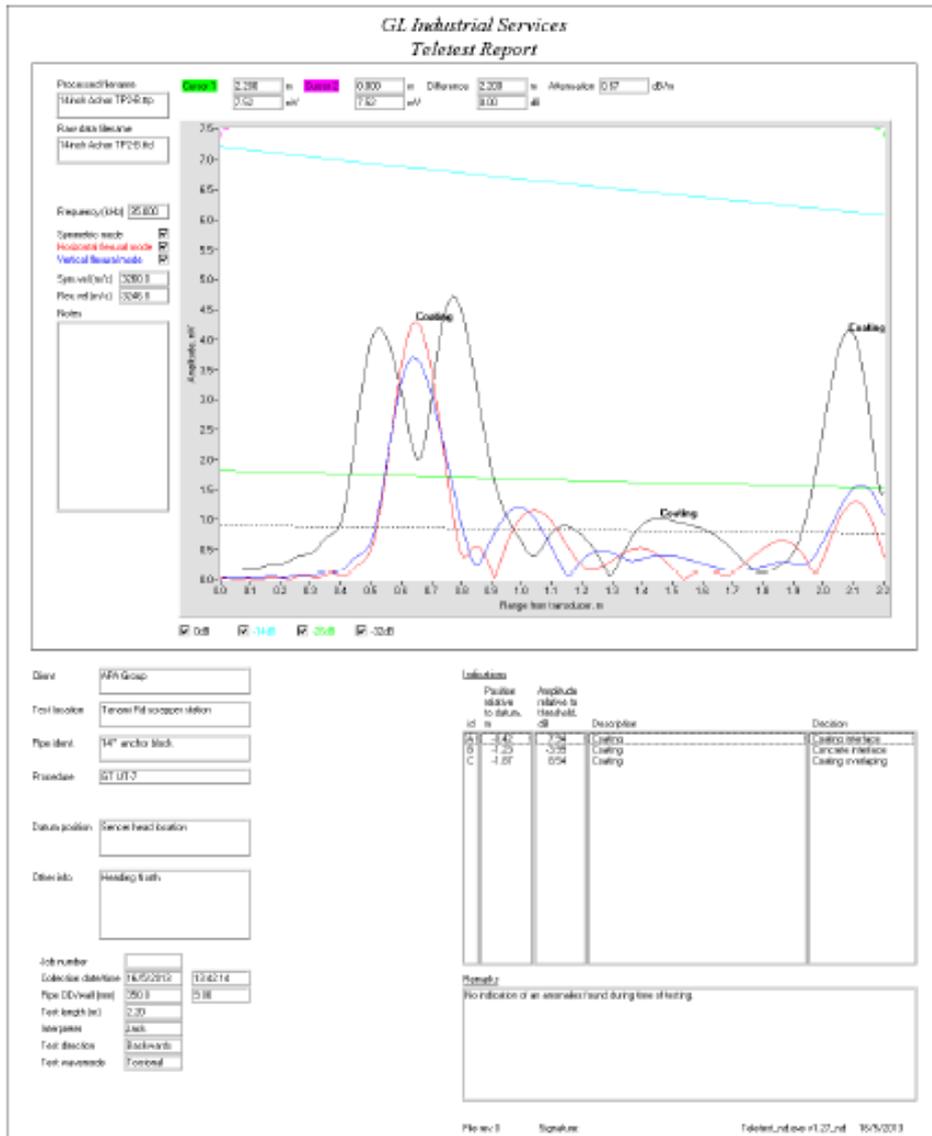
(Forward Shot Only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 2 : 14" Tanami Rd scraper station

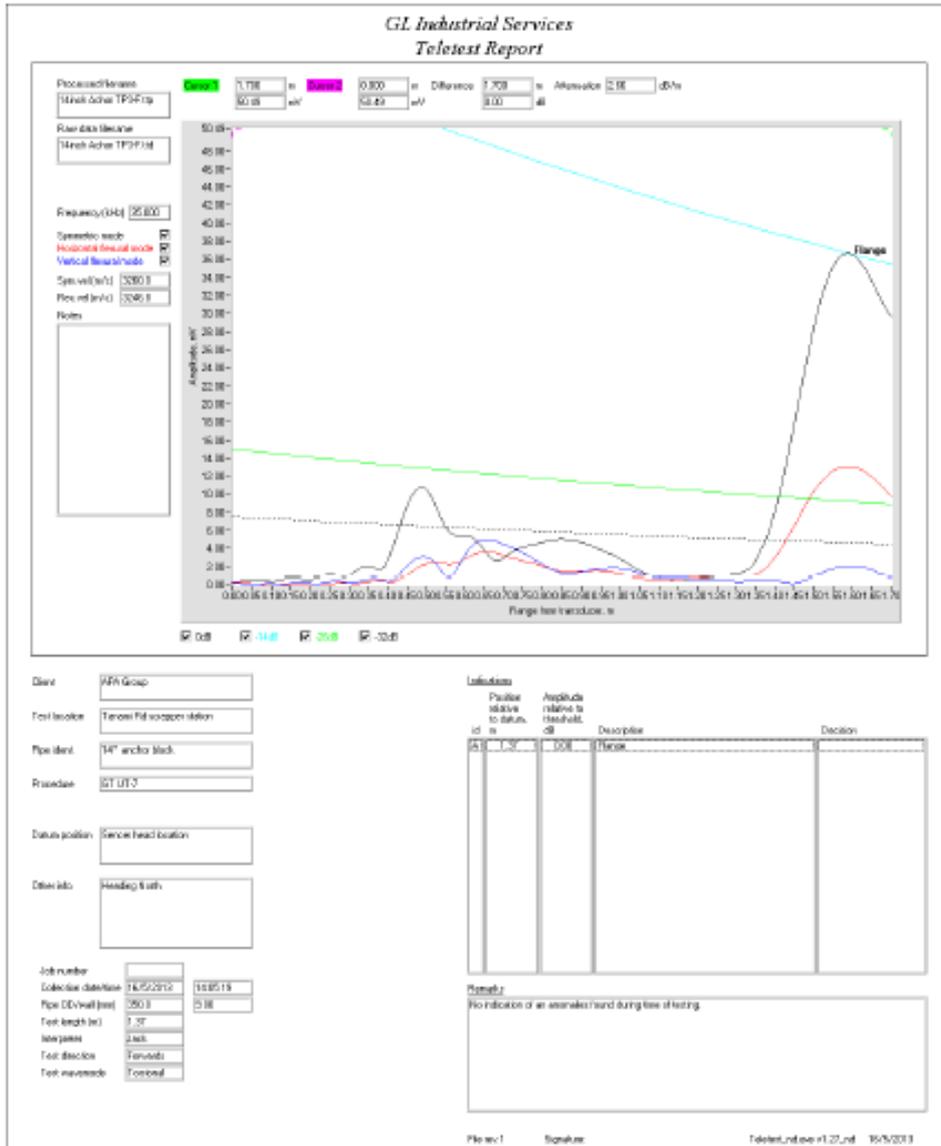
(Backward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 3 : 14" Tanami Rd scraper station

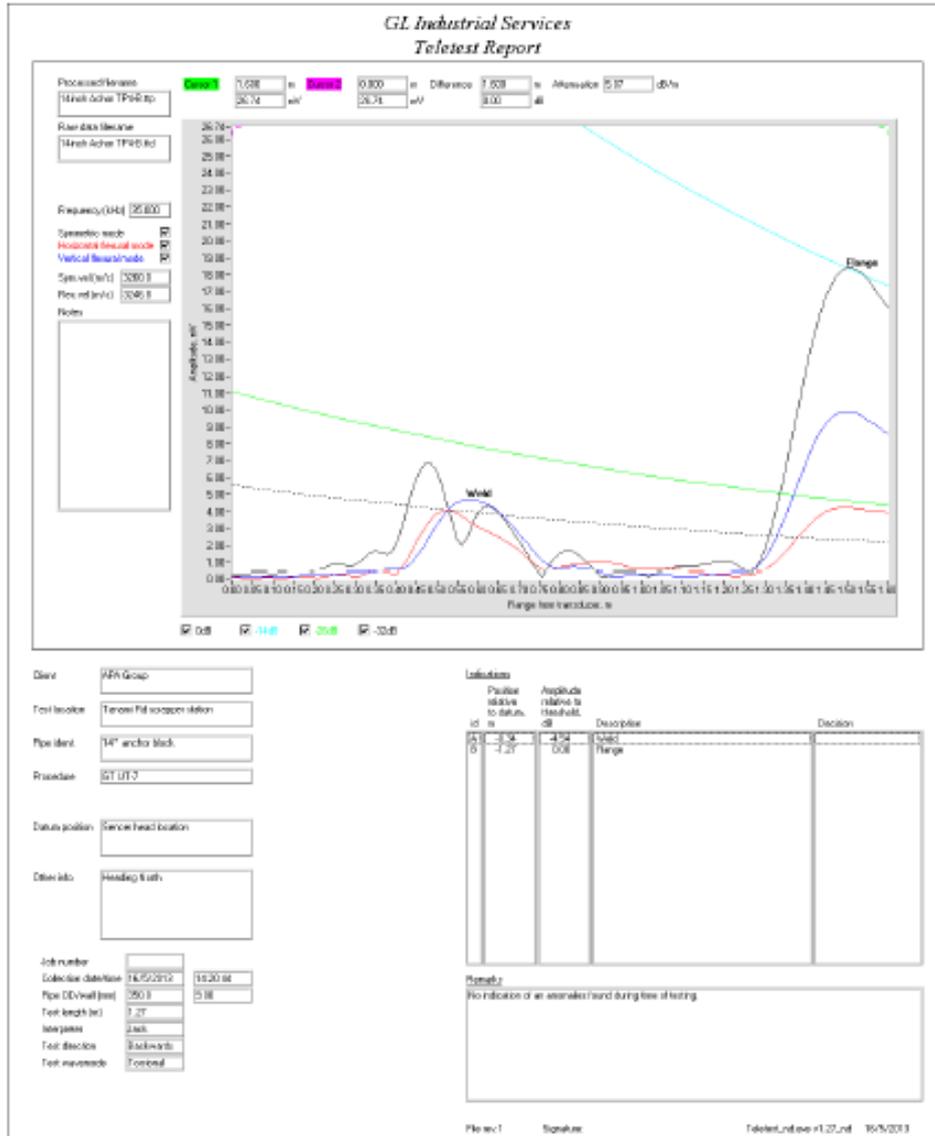
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 4 : 14" Tanami Rd scraper station

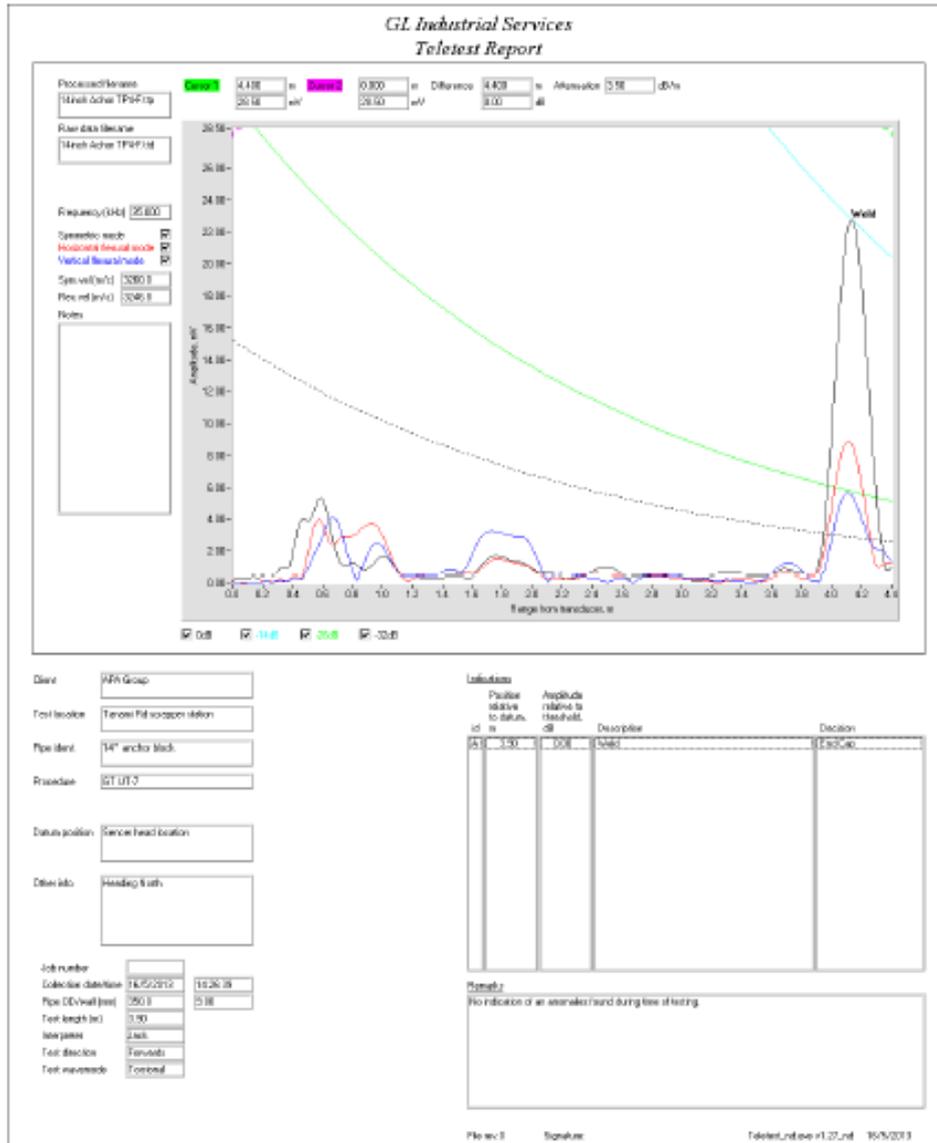
(Backward Shot only)



LRUT A-SCAN GRAPHS

Test Point 4 : 14" Tanami Rd scraper station

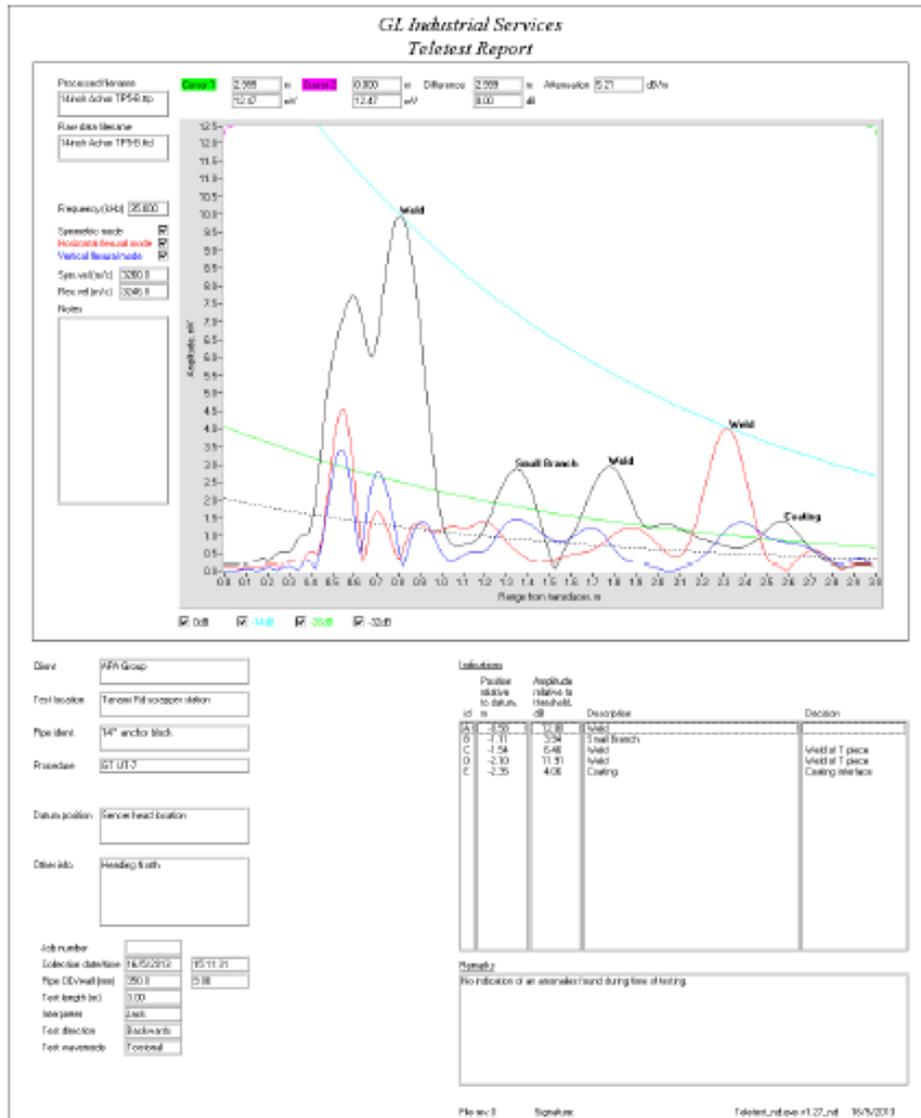
(Forward Shot Only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 5 : 14" Tanami Rd scraper station

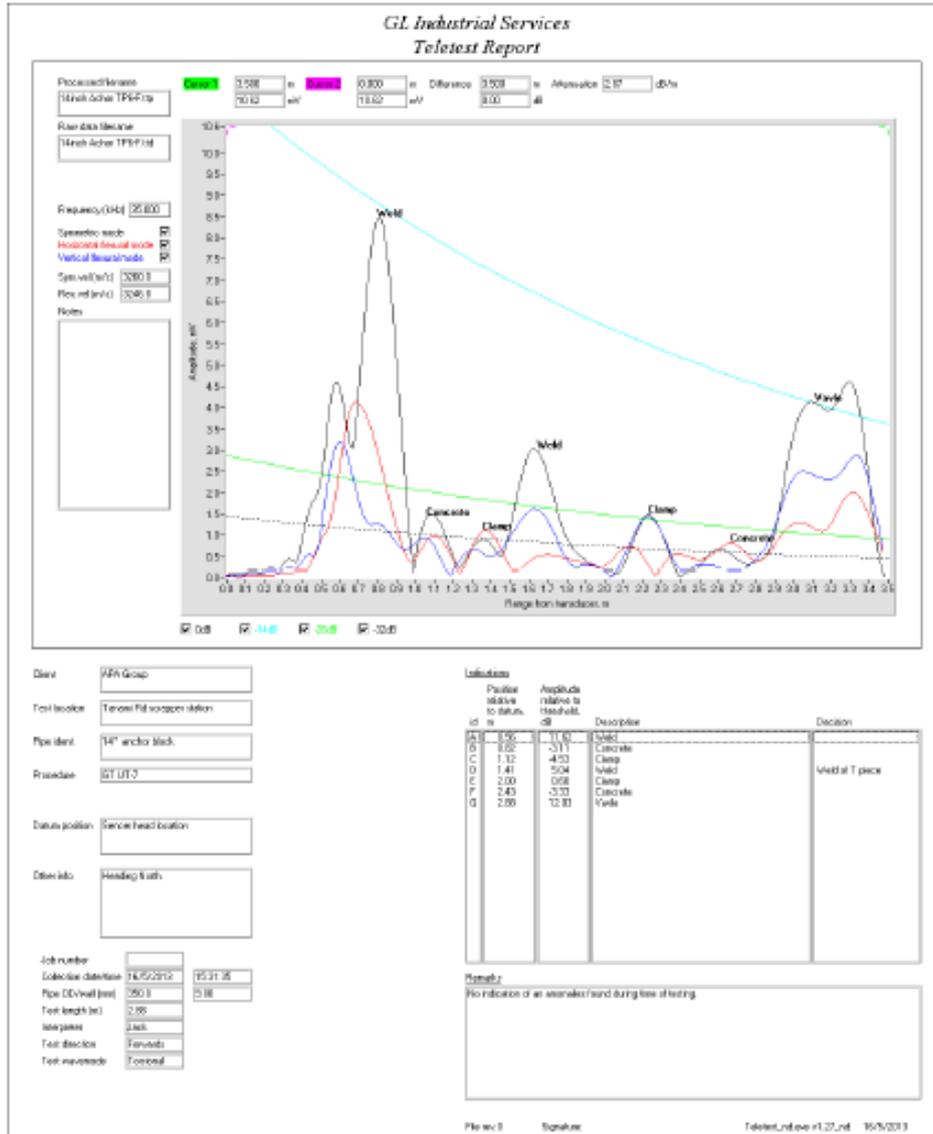
(Backward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 6 : 14" Tanami Rd scraper station

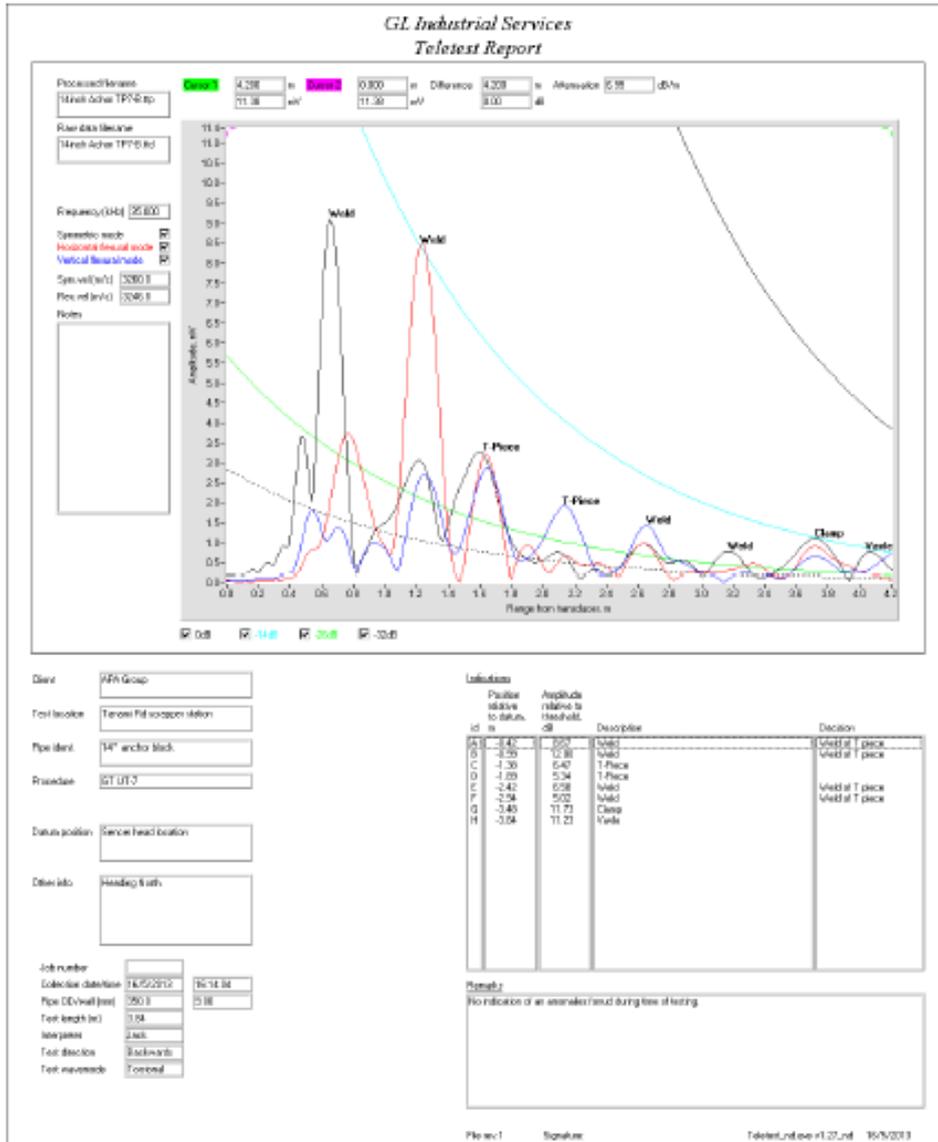
(Forward Shot only)



LRUT A-SCAN GRAPHS

Test Point 7 : 14" Tanami Rd scraper station

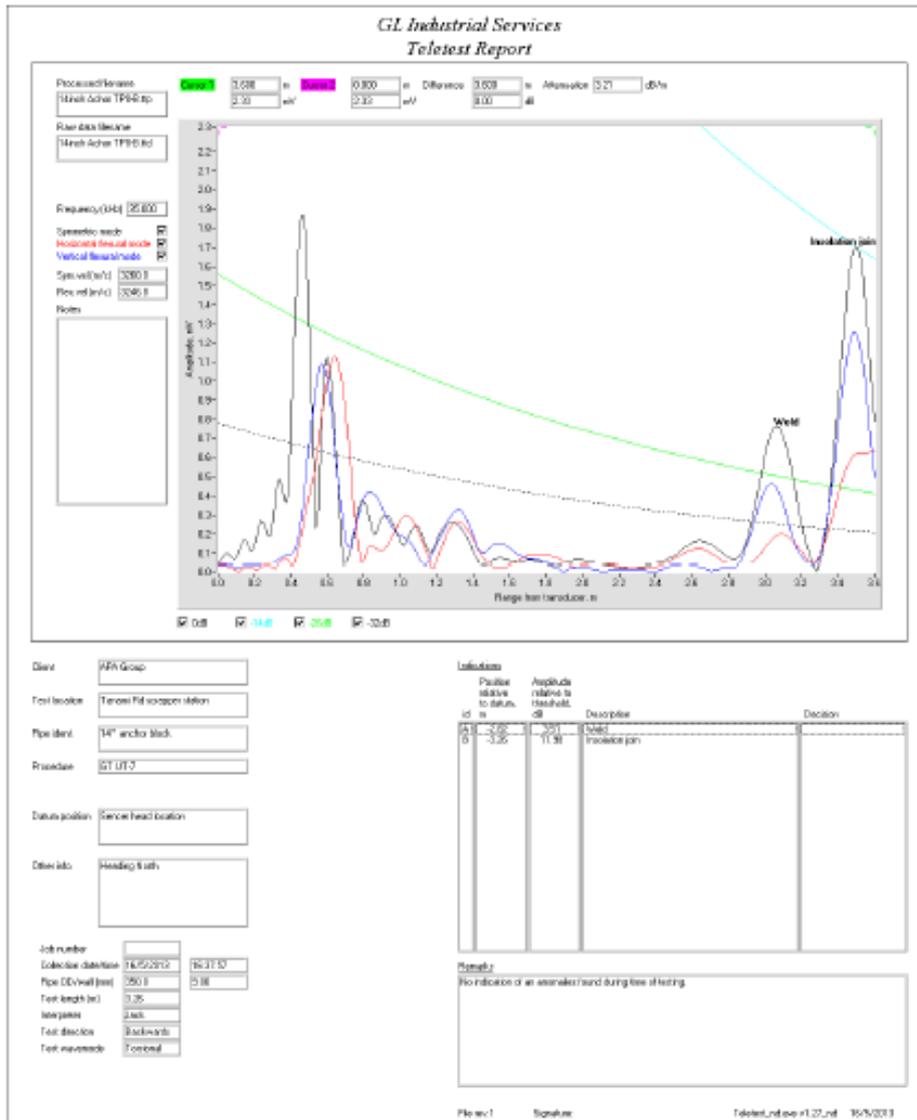
(Backward Shot Only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 8 : 14" Tanami Rd scraper station

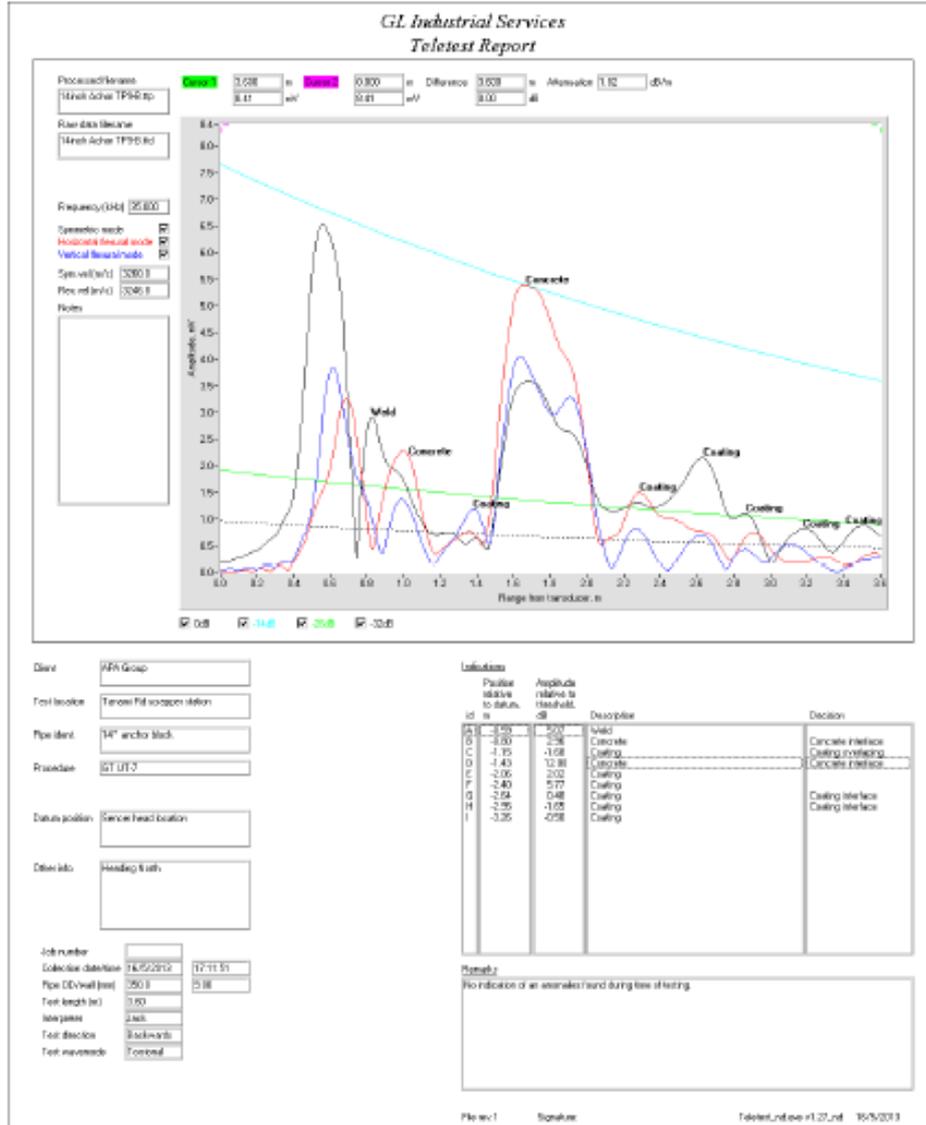
(Backward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 9 : 14" Tanami Rd scraper station

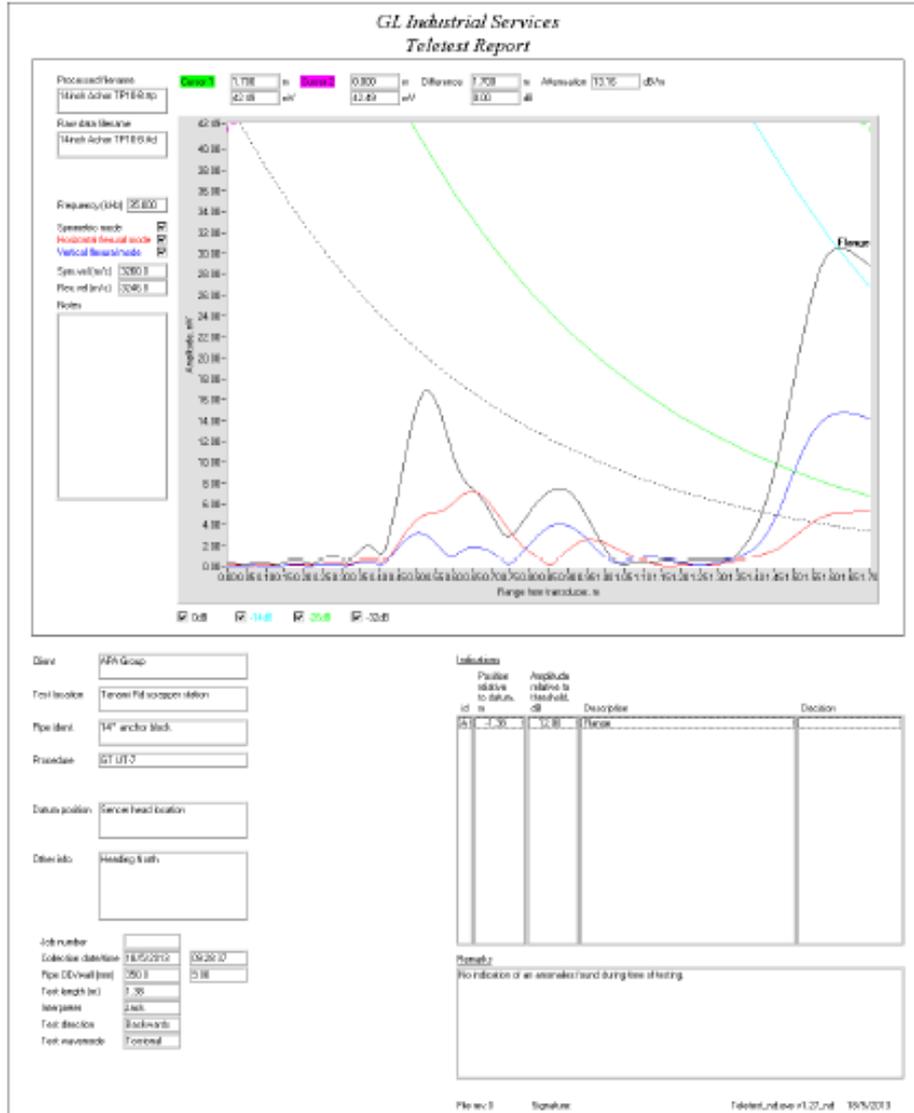
(Backward Shot only)



LRUT A-SCAN GRAPHS

Test Point 10 : 14" Tanami Rd scraper station

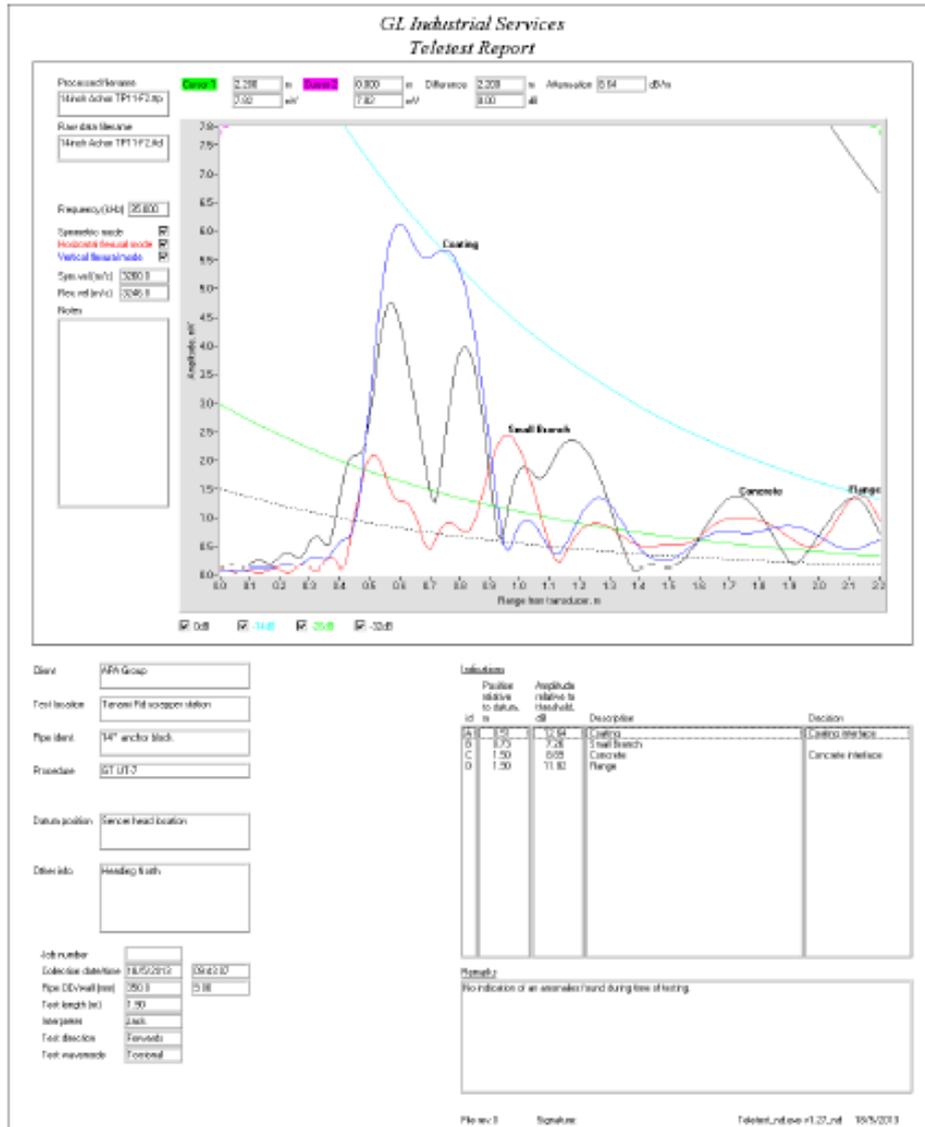
(Backward Shot Only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 11 : 14" Tanami Rd Scraper station Gas line

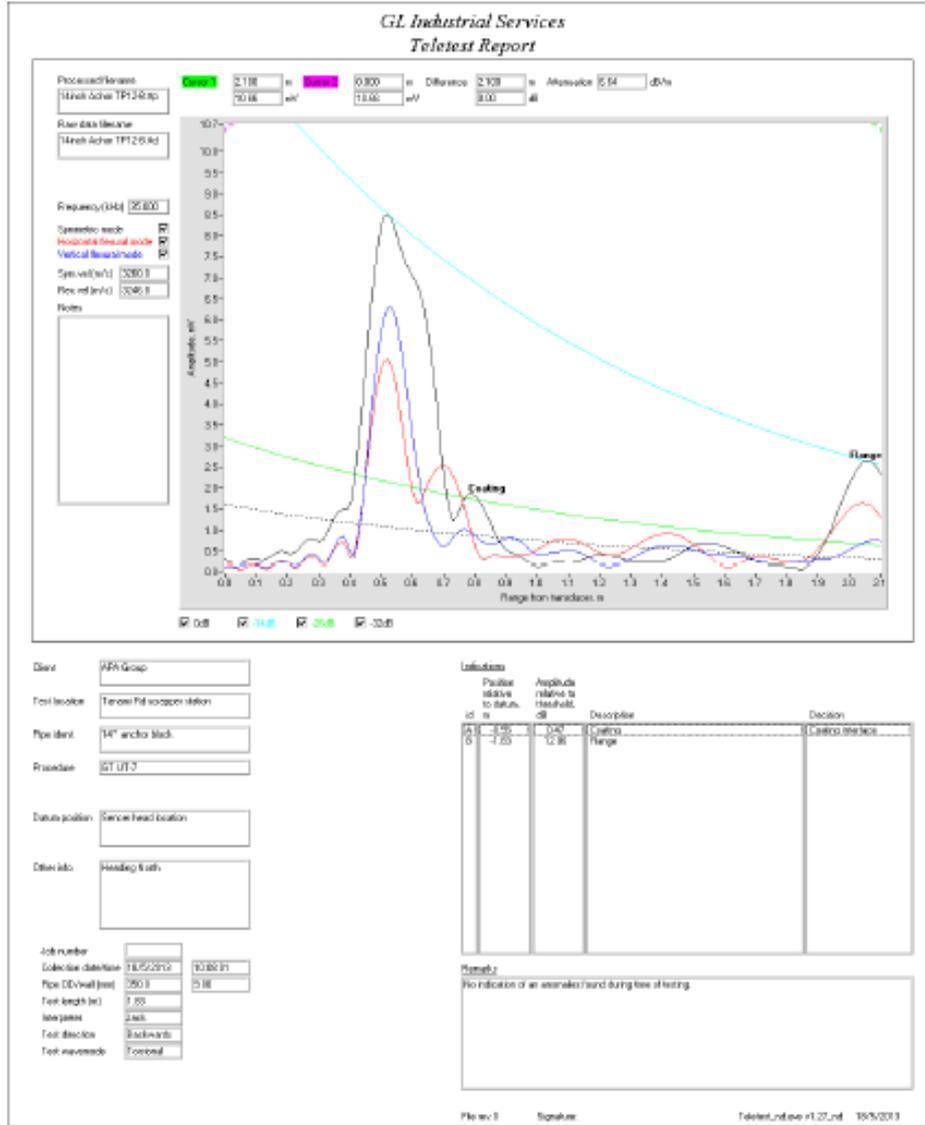
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 12 : 14" Tanami Rd Scraper station Gas line

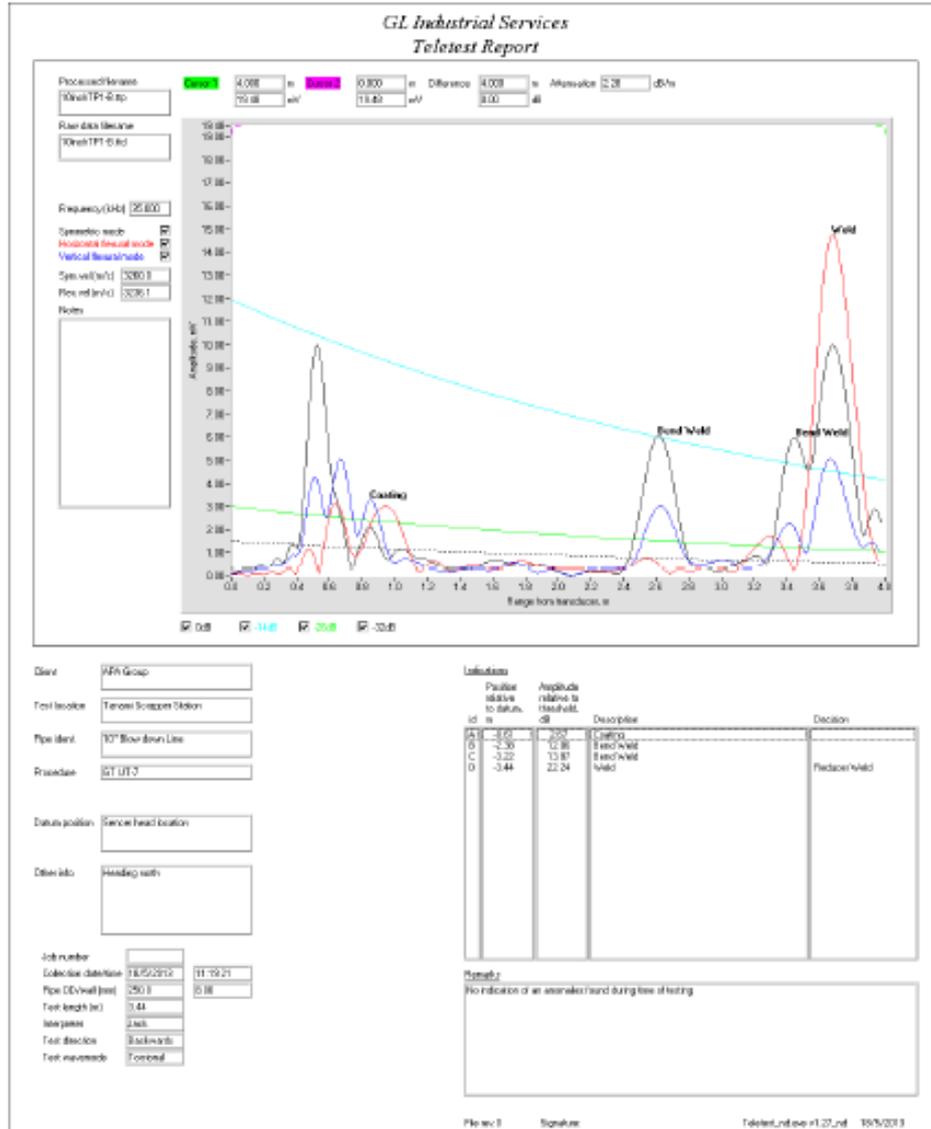
(Backward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 1 : 10" Tanami Rd scraper station blow down line

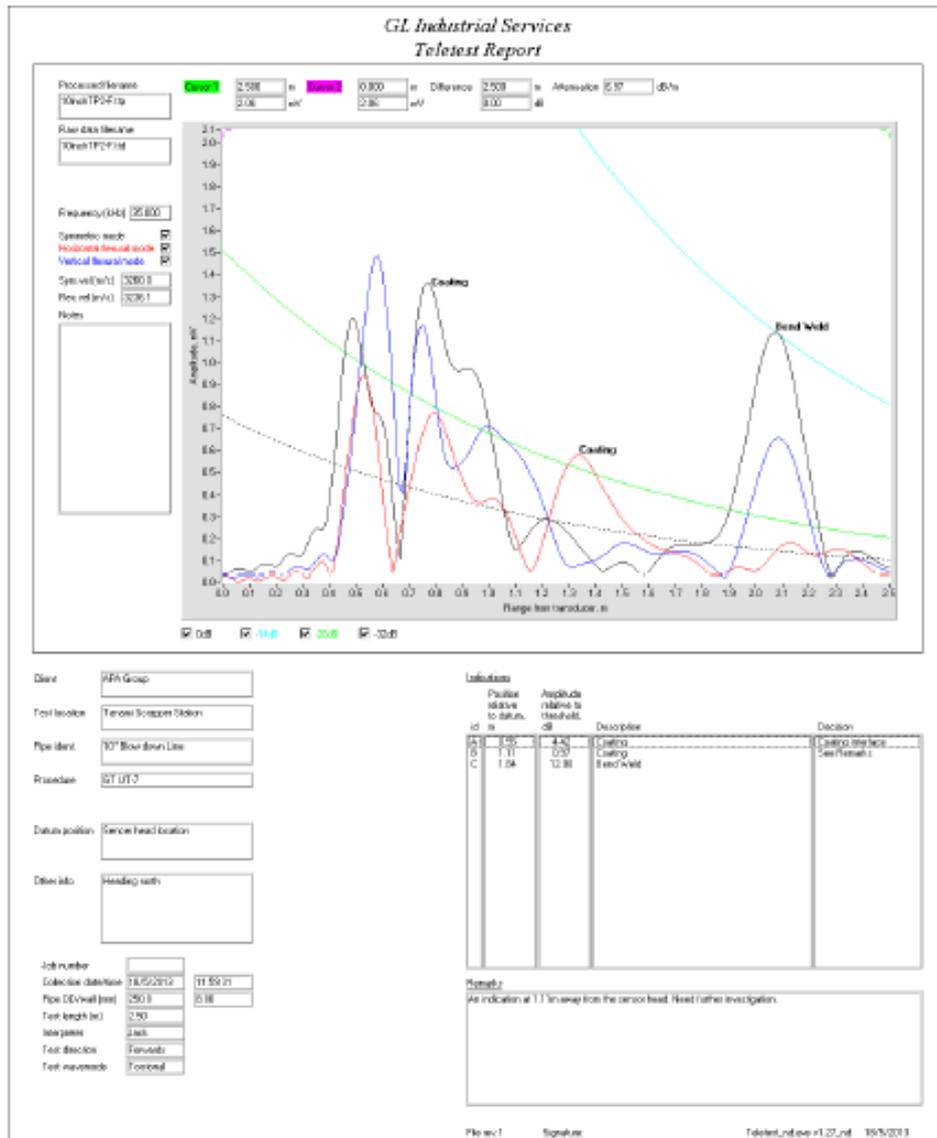
(Backward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 2 : 10" Tanami Rd scraper station blow down line

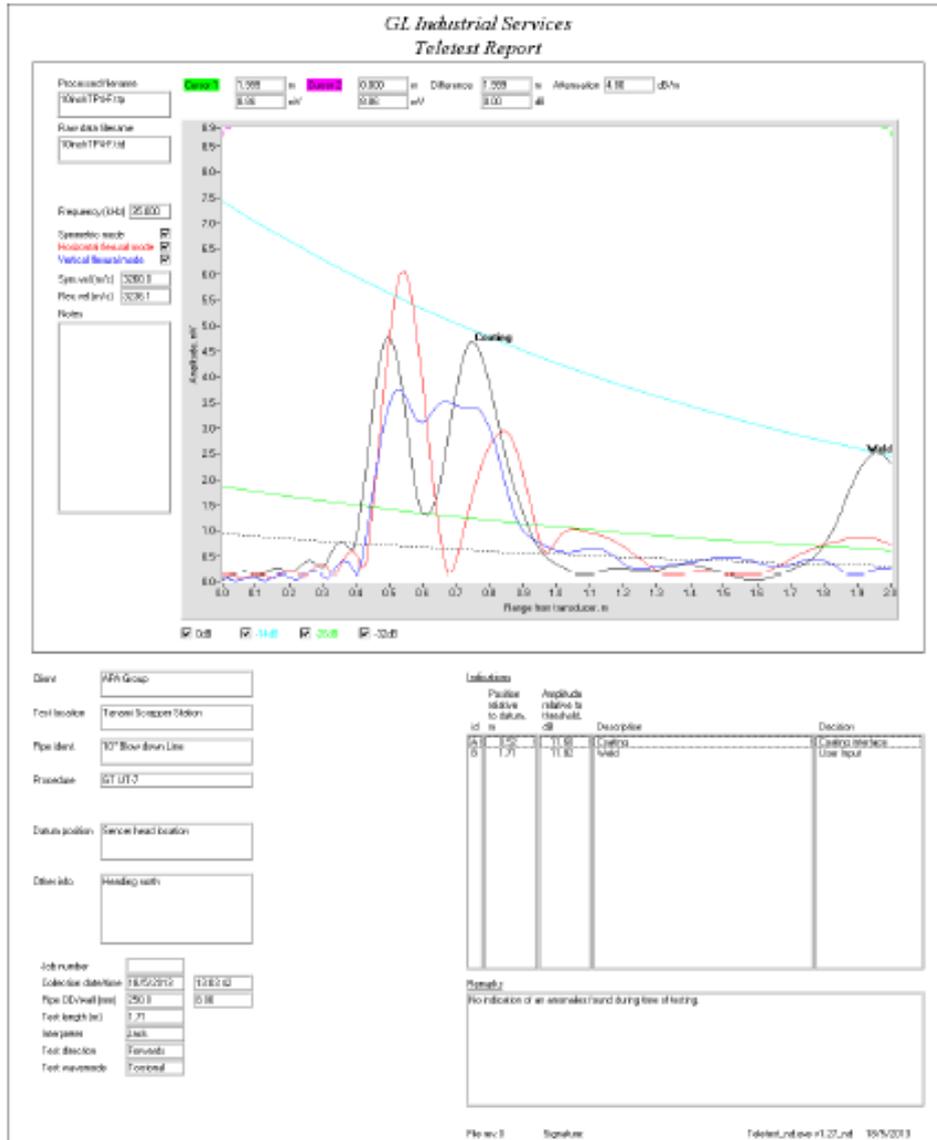
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 4 : 10" Tanami Rd scraper station blow down line

(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 5 : 10" Tanami Rd scraper station blow down line

(Backward Shot only)

