

# Tanami Road Scraper Station

## Coating Assessment Report

### Document No. BGS-RP-A-0011 Rev 0A

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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.

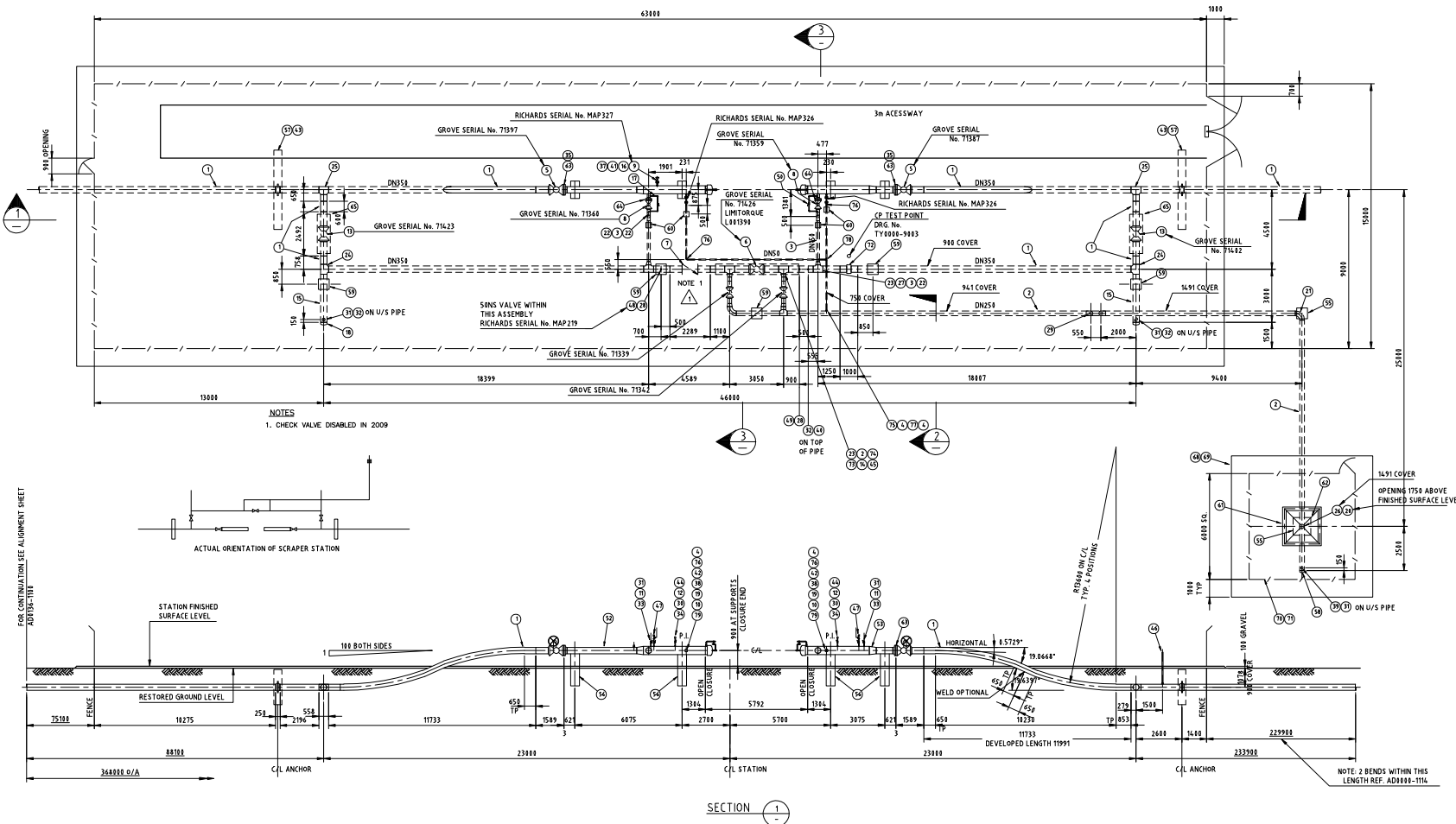
In the absence of shielding, the amount of general corrosion is reasonably low and the cathodic protection system is providing the secondary level of steel protection as per the design.

## 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				
ITEM	QTY	DESCRIPTION	CODE NO.	
* INDICATES MATERIAL TO BE SUPPLIED BY PRINCIPAL				
1	*	385m		
2	*	Pipe 350 NS 8.74 WT API 5LX-40	C0006	
3	*	Pipe 250 NS XS ASTM A106 Gr B	C0042	
4	*	Pipe 150 NS XS ASTM A106 Gr B	C0044	
5	*	Pipe 50 NS XS ASTM A106 Gr B	C0047	
6	*	2 VALVE BALL 350 NS 4000 FR RF/W/ FULL BORE C/W PUMP 700 LONG & WITH GEAR OPERATOR	C0166	
7	*	1 VALVE BALL 150 NS 4000 W/ FULL BORE 2492 O/A LENGTH C/W PUMPS & WITH GAS HYDRAULIC OPERATOR MOUNTED ON EXTENSION 2100 ABOVE C/L OF VALVE	C0154	
8	*	1 VALVE CHECK 350 NS 4000 W/ 8.74 WT SWING C/W PUMPS 700 LONG - DISABLED (2009)	C0401	
9	*	2 VALVE BALL 150 NS 4000 W/ XS/FE RF C/W GEAR OPERATOR	C0180	
10	*	2 VALVE BALL 80 NS 6000 FR RF	C0212	
11	*	2 VALVE BALL 50 NS 6000 FR RF	C0210	
12	*	2 VALVE BALL 25 NS 6000 SW/NT	C0243	
13	*	2 VALVE GAUGE 150 NS 4000 SCR NPT C/W BLEED M/F MOUNTED ON PUMPS & WITH GEAR OPERATOR LENGTH ON EXTENSION 2100 ABOVE C/L OF VALVE	C0160	
14	*	0.4m		
15	*	5.5m		
16	*	2 FLANGE BLIND 80 NS 4000 FR ASTM A105	C0544	
17	*	1 PPE ASSY. DRG. No. AD0000-4154		
18	*	2 CAP 350 NS XS M55 SP-2 WPHY-52	C0657	
19	*	2 FLANGE 350 NS 4000 FR XS ASTM A105	C0541	
20	*	1 CLOSURE 250 NS 4000 W/ XS ASTM A105 VERT C/W DAVIT	C0445	
21	*	2 ELBOW 90 DEG. L 150 NS XS ASTM A234 WPB	C0728	
22	*	4 ELBOW 90 DEG. L 80 NS XS ASTM A234 WPB	C0730	
23	*	4 TEE REG. 350x250 NS XS M55 SP-2 WPHY-52	C0647	
24	*	2 TEE EQ. 150x75 NS XS M55 SP-2 WPHY-52	C0642	
25	*	2 TEE BARBED 350 NS DRG. No. AD0000-4182		
26	*	2 TEE EQUAL 250 NS XS ASTM A234 WPB	C0753	
27	*	2 REDUCER CON. 350x50 NS XS ASTM A234 WPB	C0816	
28	*	2 WOL. 45x-350x50 NS XS ASTM 105	C0771	
29	*	2 ELBOW 45 DEG. 250 NS XS ASTM A234 WPB	C0736	
30	*	2 COUPLING IS NS 30000 NPT ASTM A105		
31	*	5 PLUG HEX. 10. 25 NS SCR NPT ASTM A105		
32	*	3 TOL. 900-300x25 NS 30000 NPT ASTM 105		
33	*	2 PPE NIPPLE 15 NS 1600 NS PRE ASTM A106 Gr B		
34	*	2 PPE NIPPLE 15 NS 7.5 SCH 160 P/TEE ASTM A106 Gr B		
35	40	STUD BOLT 1/2"x1 UNF x 235 LG. ASTM A193 B7 C/W 2 NUTS ASTM A194-2		
36	24	STUD BOLT 7/8" UNF x 170 LG. ASTM A193 B7 C/W 2 NUTS ASTM A194-2		
37	32	STUD BOLT 3/4" UNF x 125 LG. ASTM A193 B7 C/W 2 NUTS ASTM A194-2		
38	32	STUD BOLT 5/8" UNF x 110 LG. ASTM A193 B7 C/W 2 NUTS ASTM A194-2		
39	*	1 TOL. 250-150x25 NS 30000 NPT ASTM 105		
40	*	1 THERMOWELL 25 NS WITH PLUG	C3078	
41	*	4 GASKET 80 NS 4000 C/L THK. METAFLEX SG		
42	*	2 GASKET 50 NS 4000 C/L THK. METAFLEX SG		
43	*	2 GASKET 150 NS 4000 NS NS DR0000-4181	C0994	
44	*	2 PLUG HEX. 10. 15 NS SCR NPT ASTM A105		
45	*	1 TEE REG. 250x200 XS ASTM A234 WPB	C0786	
46	*	1 PIG SIG. EXTENDED 180 (350 NS)	C1029	
47	*	2 PPE ASSY. DRG. No. AD0000-4174		
48	*	1 PPE ASSY. DRG. No. AD0000-4102		
49	*	1 PPE ASSY. DRG. No. AD0000-4109		
50	*	1 PPE ASSY. DRG. No. AD0000-4157		
51	*	4 PPE CLAMP. DRG. No. AD0000-4110		
52	*	1 TRAP RECEIVER 350 NS DRG. No. AD0000-4122		
53	*	1 TRAP LAUNCHER 350 NS DRG. No. AD0000-4121		
54	*	1 FOUNDATION ITEM 1 DRG. No. AD0000-1003		
55	*	2 FOUNDATION ITEM 2 DRG. No. AD0000-1003		
56	*	4 FOUNDATION ITEM 2 DRG. No. AD0000-1001		
57	*	2 ANCHOR BLOCK ITEM 3 DRG. No. AD0000-1001		
58	*	1 CAP 250 NS XS ASTM A234 WPB	C0744	
59	*	5 FOUNDATION ITEM 5 DRG. No. AD0000-1001		
60	*	4 FOUNDATION ITEM 6 DRG. No. AD0000-1001		
61	*	1 FOUNDATION ITEM 3 DRG. No. AD0000-1003		
62	*	1 PPE BRACE DRG. No. AD0000-4111		
63	*	2 SETS INSULATING TRK 350 NS 4000 FR	C1010	
64	*	2 SETS INSULATING TRK 150 NS 4000 FR	C1014	
65	*	2 FOUNDATION ITEM 1 DRG. No. AD0000-1001		
66	1SET	FENCE RAIL-LESS TYPE 2.2m HIGH INCL. 45 DEG. OVERHANG 15m. O/H LENGTH COMPRISING 4 CORNER, 4 GATE & 4.7 INTERM. POSTS. STRUTS AS READ. DOUBLE GATE 3.6m OPENING WITH DROP BOLTS & LOCK. MAIN GATE WITH LOCK, CHAIN WIRE MESH & BARB WIRES, GALV. CYCLOPE OR EQUIV.		

AMADEUS BASIN TO DARWIN PIPELINE

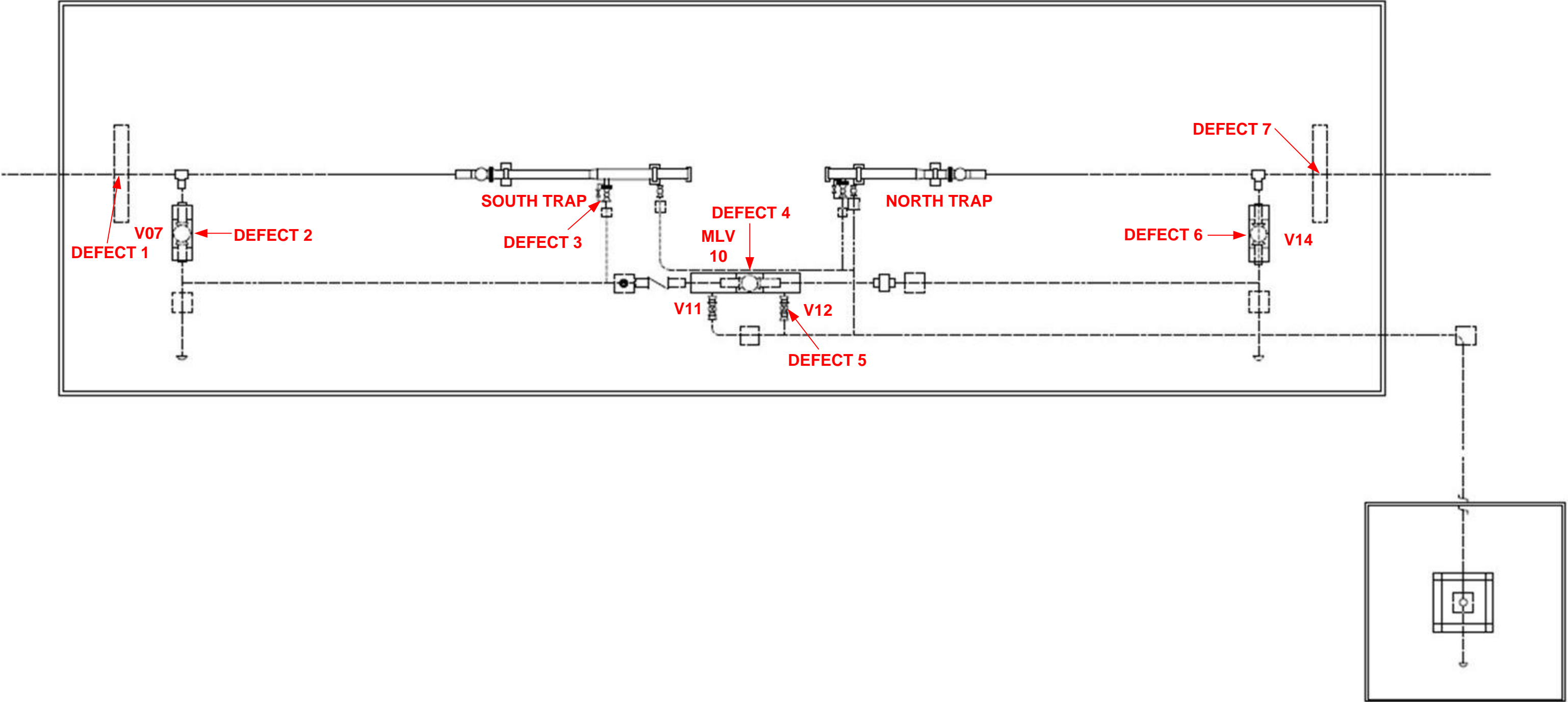
SCRAPER STATION 350 NS

ARRANGEMENT - TANAMI ROAD

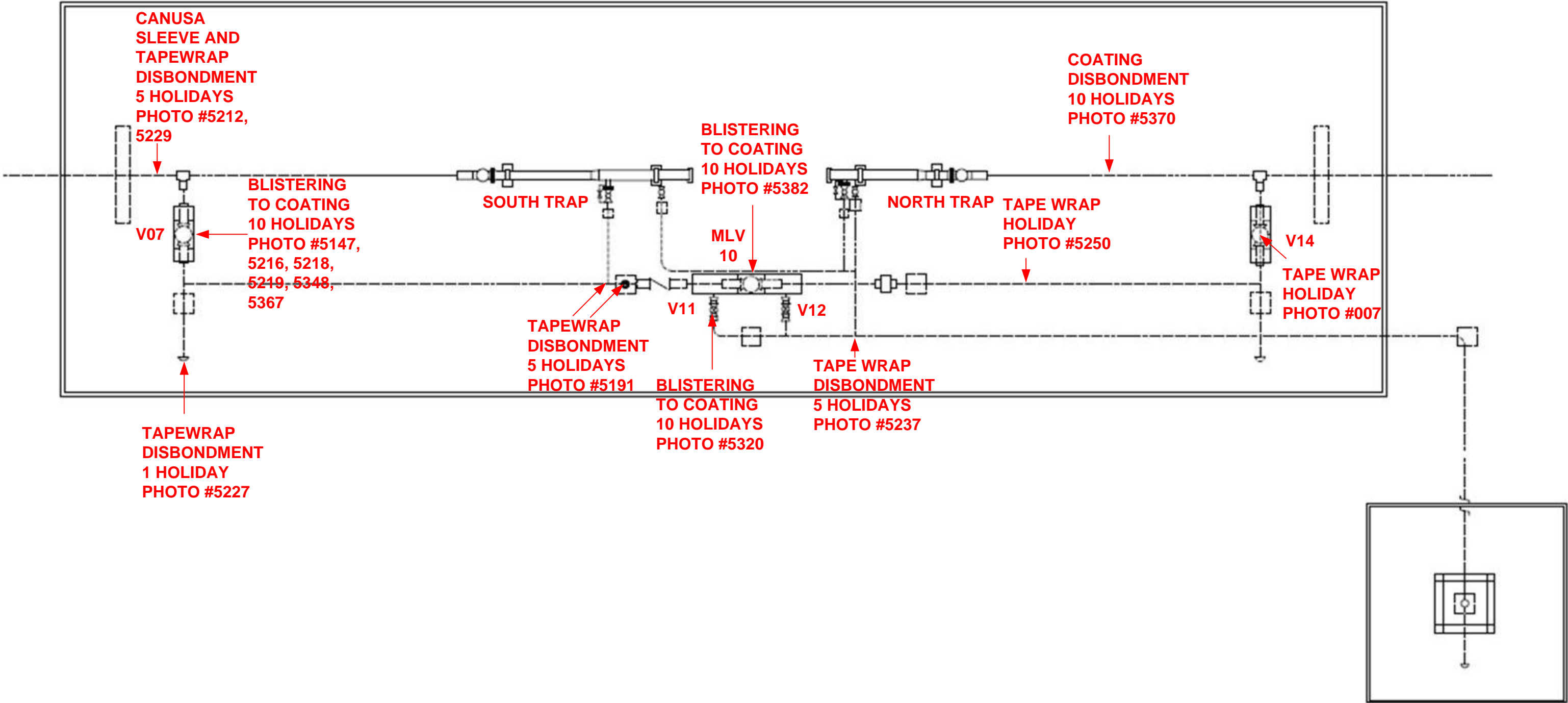
DRAWING NUMBER	SHEET	
AD0161-6004	A1	

# 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



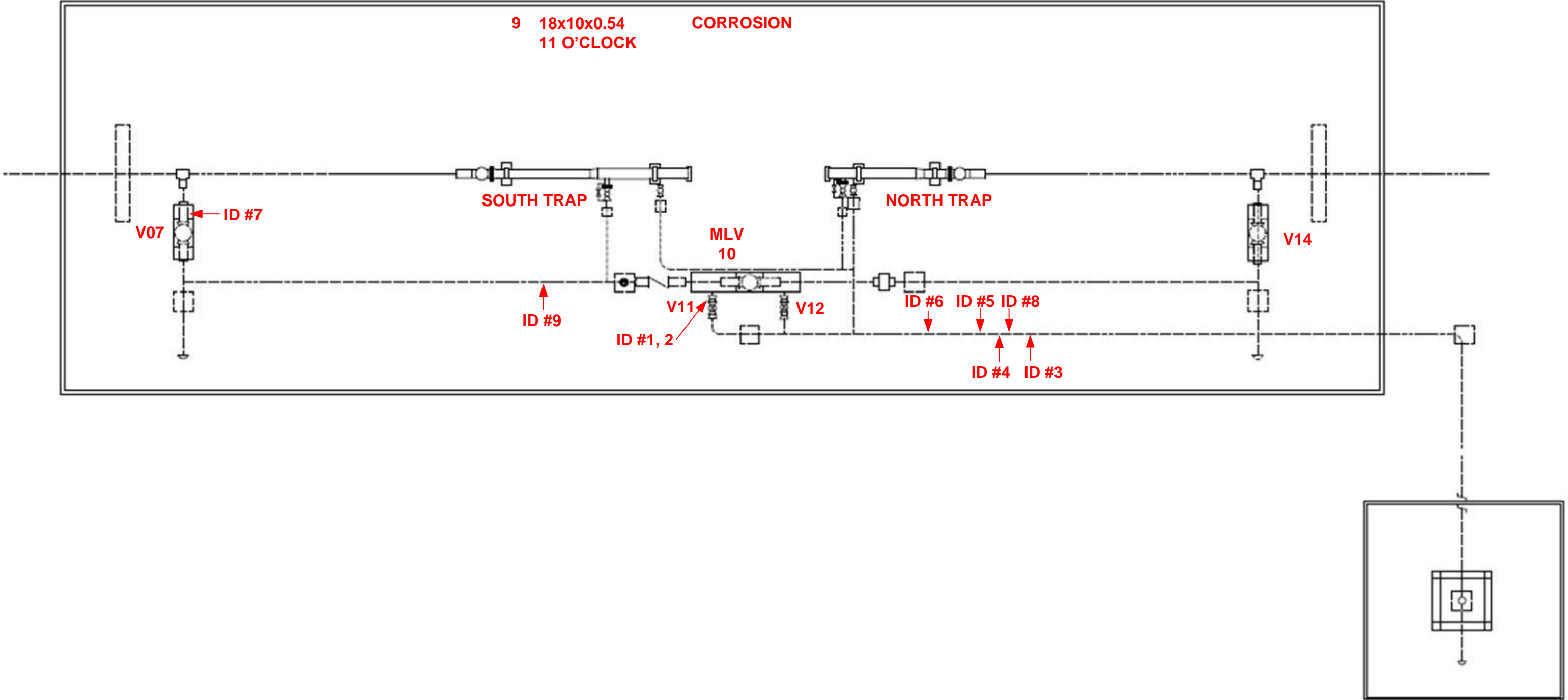
**TANAMI RD COATING DEFECT – VISUAL  
INSPECTION & HOLIDAY DETECTOR RESULTS**



TANAMI RD METAL LOSS RESULTS

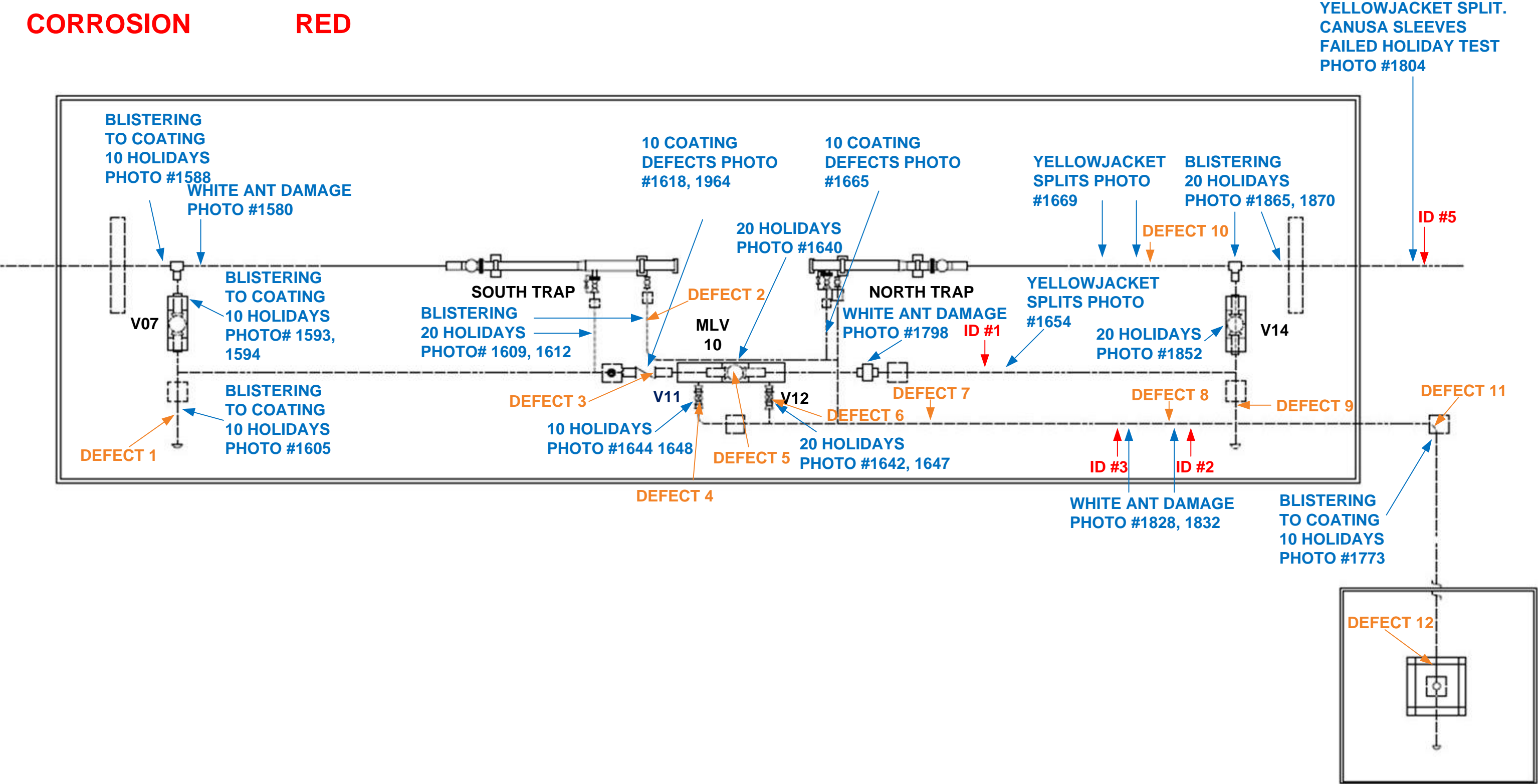
COATING DAMAGE ASSESSMENT REPORT ID#	DEFECT DIMENSION (mm) LxWxDPTH O'CLOCK POSITION ON PIPE	CAUSE OF METAL LOSS	COATING DAMAGE ASSESSMENT REPORT ID#	DEFECT DIMENSION (mm) LxWxDPTH O'CLOCK POSITION ON PIPE	CAUSE OF METAL LOSS
1	7x5x0.72 1:30 O'CLOCK	CORROSION	5	5x6x1.30 9:30 O'CLOCK	CORROSION
2	10x8x1.08 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:

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.

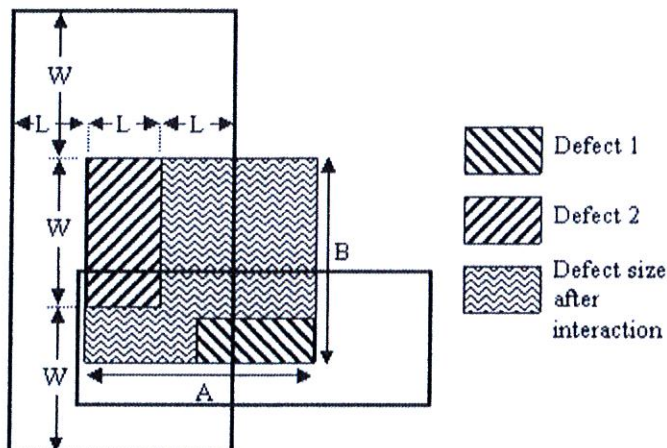


Figure 1

Maximum Depth (mm):

0.72

Wall thickness (mm):

Longitudinal dimension (A) (mm):

7

Circumferential dimension (B) (mm):

5

Clock Position (looking in direction of flow):

1:30

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

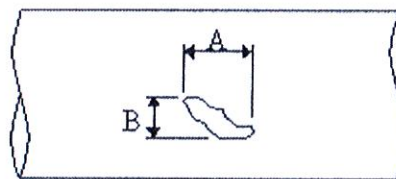


Figure 2

**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 Duffy

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:

Kilometre Point:

Zone:

Easting:

Northing:

Surrounding Description:

(Buildings, drains, etc)

Excavation Date:

Digup Reason:

DCVG Measurement:

Defect Length from survey (m):

CMMS Work Order No:

18/4/2013  
COATING INSPECTION  
NIL  
144308

## 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	5204, 5130
Pipe with coating removed	
Pipe cleaned	5624, 5625
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)?

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

Any evidence of termite damage (Y/N)?

Any moisture inside the coating (Y/N)?

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

Has the coating lifted away from the pipe (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):

Coating Defect Width (mm):

Coating Defect Comments:

COATING APPEARED IN GOOD CONDITION

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.

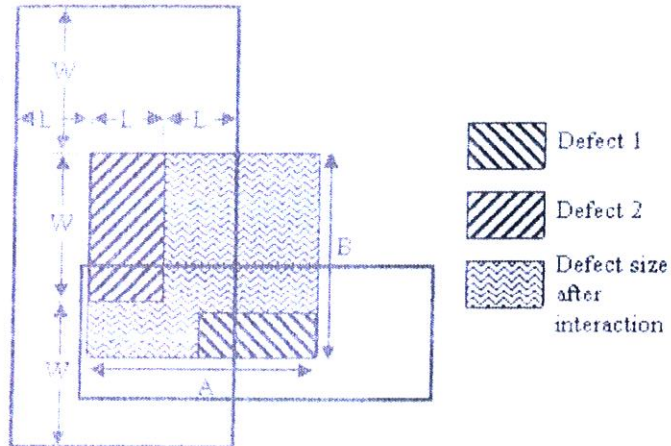


Figure 1

Maximum Depth (mm):

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

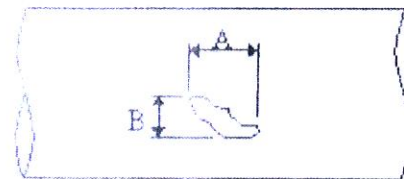


Figure 2

**Repair**

Length of Pipe Wrapped (mm):

Other Repair Information:

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

Dig Up Comments:

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: 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 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:

- ☐ 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 APPEARED TO BE IN GOOD CONDITION AND DID NOT JUMP OUT.

KP:

Work Order No:

Page 2

### 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)?

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.

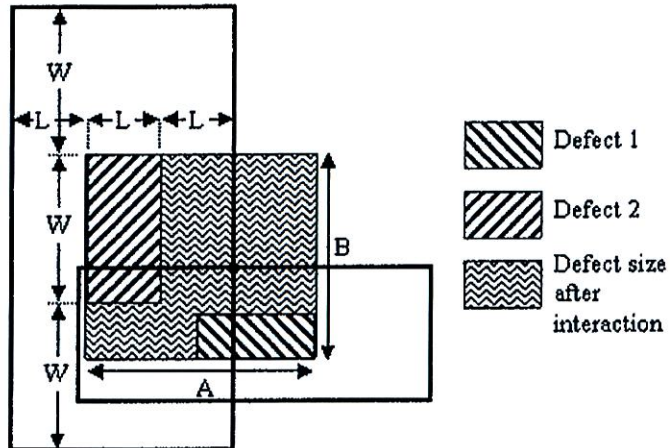


Figure 1

Maximum Depth (mm):

1-37

Wall thickness (mm):

7

Longitudinal dimension (A) (mm):

9

Circumferential dimension (B) (mm):

3:30

Clock Position (looking in direction of flow):

240

Distance from longitudinal weld (mm):

4540

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

4540

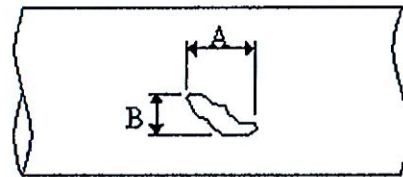


Figure 2

### Repair

Length of Pipe Wrapped (mm):

Other Repair Information:

ENTIRE BLow DOWN LINE PAINTED WITH DULUX LUXAPRAX VHB

Dig Up Comments:

SOIL SOFT LOAM AND DAMP, NO STONES.

Operator:

Wayne Doff

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	<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**

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 APPEARED TO BE IN GOOD CONDITION AND DID NOT JET OUT

KP:

Work Order No:

Page 2

### 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.

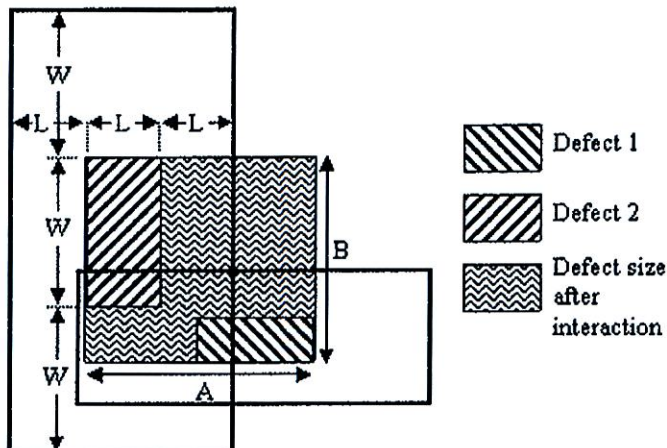


Figure 1

Maximum Depth (mm):

1-11

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

5220

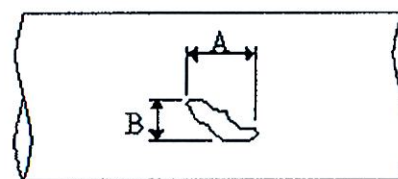


Figure 2

### 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: \_\_\_\_\_  
 Section: BLOW DOWN LINE  
 Kilometre Point: TANAMI SS  
 Zone: \_\_\_\_\_  
 Easting: \_\_\_\_\_  
 Northing: \_\_\_\_\_

Excavation Date: 23/4/2013  
 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	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**

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 APPEARED TO BE IN GOOD CONDITION AND DID NOT  
ZIPPER OUT.

KP:

Work Order No:

Page 2

**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)?

YIf 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.

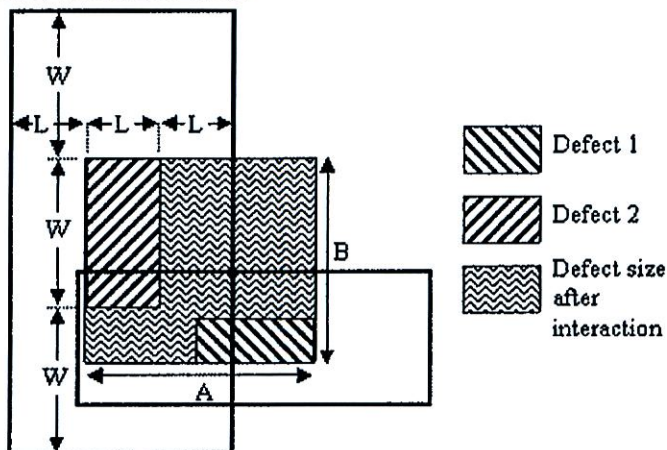


Figure 1

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):

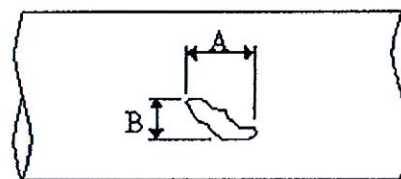
125Distance from nearest girth weld (mm):  
(if no girth weld has been found, do not excavate further)2545

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:

Wynne 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:

Section:

Digup Reason:

Kilometre Point:

DCVG Measurement:

Zone:

Defect Length from survey (m):

Easting:

CMMS Work Order No:

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	5271
Pipe with coating removed	5331
Pipe cleaned	5763, 5764
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**

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 APPEARED TO BE IN GOOD CONDITION AND DID NOT JET

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.

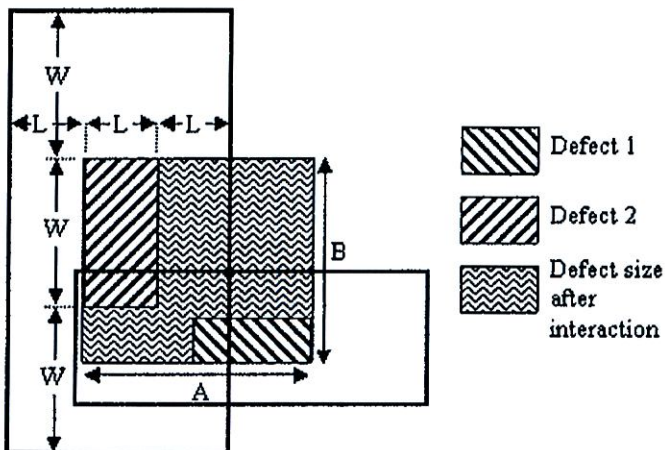


Figure 1

Maximum Depth (mm):

1-67

Wall thickness (mm):

7

Longitudinal dimension (A) (mm):

9

Circumferential dimension (B) (mm):

9:30

Clock Position (looking in direction of flow):

Distance from longitudinal weld (mm):

140

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

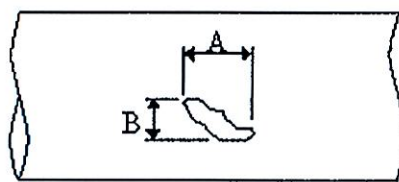
1960

Figure 2

**Repair**

Length of Pipe Wrapped (mm): \_\_\_\_\_

Other Repair Information:

ENTIRE BLOW DOWN LINE PAINTED WITH DULUX LEXAPOLY 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: 19/4/2013  
 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>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): 0.9Soil pH: 5-6Pipe 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)? YAny white buildup from cathodic protection (Y/N)? YAny evidence of termite damage (Y/N)? NAny moisture inside the coating (Y/N)? NAny stress corrosion cracking (Y/N)? N/A If yes, complete APA pipeline damage reportHas the coating lifted away from the pipe (Y/N)? YIf yes, how far around the pipe has it lifted (mm)? 400

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

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

Coating Defect Comments:

ORIGINAL PAINT HAD LIFTED AWAY FROM PIPE.



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)?

YIf 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.

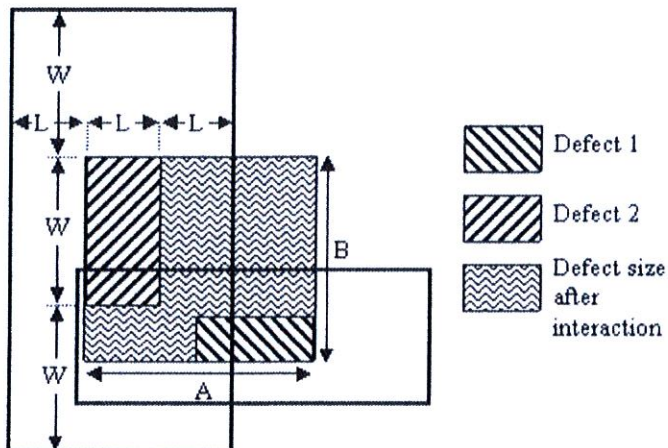


Figure 1

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)

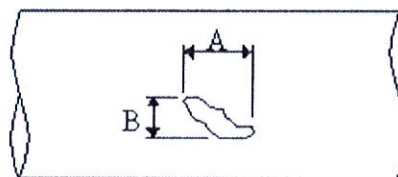


Figure 2

**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	<u>5265, 5267</u>
Pipe with coating removed	<u>5333</u>
Pipe cleaned	<u>5771, 5772</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: 5-6Pipe 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)? NAny white buildup from cathodic protection (Y/N)? NAny evidence of termite damage (Y/N)? NAny moisture inside the coating (Y/N)? NAny stress corrosion cracking (Y/N)? N/A If yes, complete APA pipeline damage reportHas 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:

WARP APPEARED TO BE IN GOOD CONDITION AND DID NOT JELLY OUT.



KP:

Work Order No:

Page 2

**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.

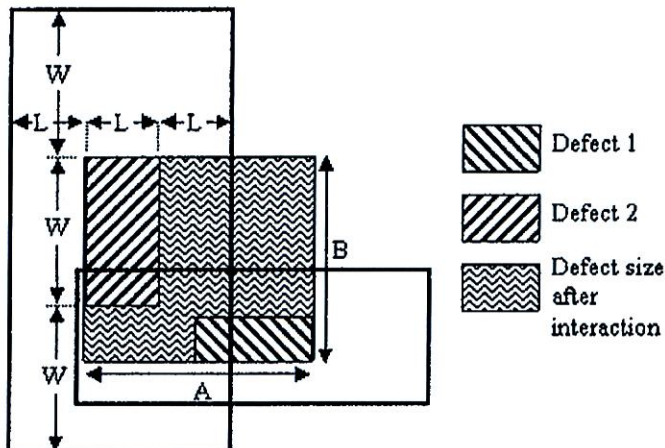


Figure 1

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.

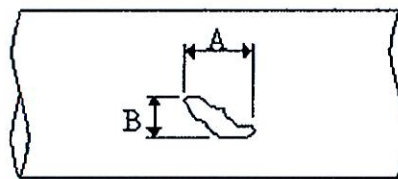


Figure 2

**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

Page 1

## 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: 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>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:

- ☐ 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)? 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 BUTT WELD. SLIGHT CORROSION AT 11 O'CLOCK POSITION



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.

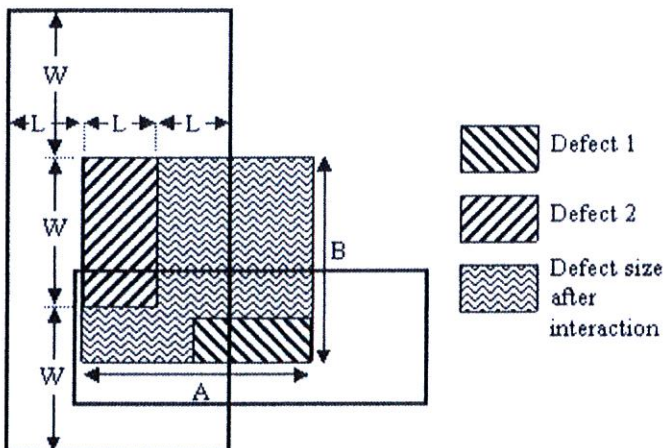


Figure 1

Maximum Depth (mm):

0.54

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

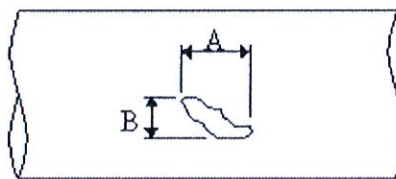


Figure 2

**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:

Off

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

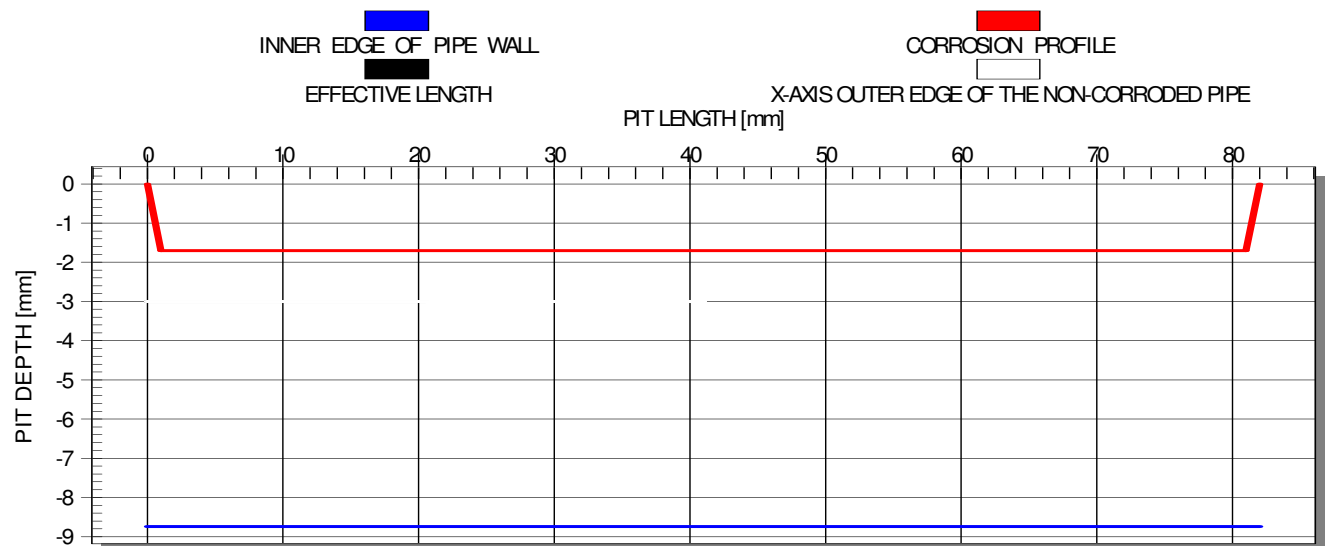
$P = 2StFT/D$  [kPa] - Calculated Pressure 14,617.138  
Established MAOP [kPa] 9,650

Pipe Outside Diameter [mm]	355.60	Effective Length [mm]	82.00
Pipe Wall Thickness [mm]	8.740	Effective Area [mm] <sup>2</sup>	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



Station: Tanami Road V07

Date: 11/07/2013

**CORROSION MEASUREMENT:**

Nr.      Increment [mm]    Pit Depth [mm]

1.	0	0
2.	1	1.7
3.	81	1.7
4.	82	0

Prepared By: Ben Parkin

Approved By:





Site: Tanami Road V07 X52

Station: Tanami Road V07 X52

Date: 11/07/2013

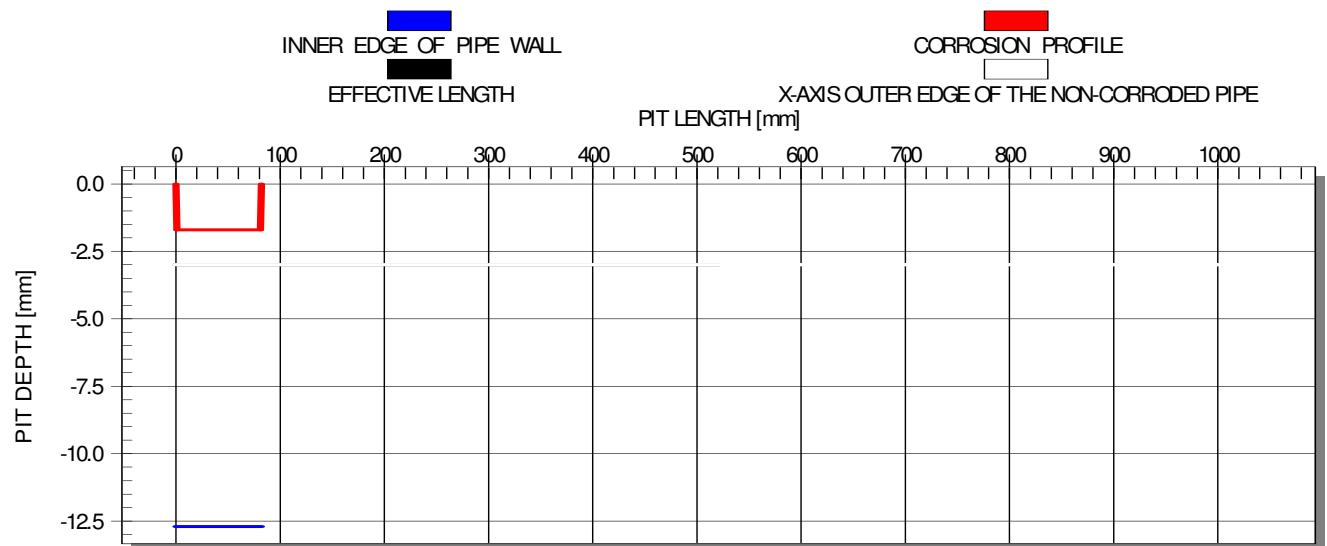
$P = 2StFT/D$  [kPa] - Calculated Pressure 18,411.433  
Established MAOP [kPa] 9,650

Pipe Outside Diameter [mm]	355.60	Effective Length [mm]	82.00
Pipe Wall Thickness [mm]	12.700	Effective Area [mm] <sup>2</sup>	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



Station: Tanami Road V07 X52

Date: 11/07/2013

**CORROSION MEASUREMENT:**

Nr.      Increment [mm]    Pit Depth [mm]

1.	0	0
2.	1	1.7
3.	81	1.7
4.	82	0

Prepared By: Ben Parkin

Approved By:







## 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 scrapper 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 scrapper 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 scrapper 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 scrapper station (Backward only)										
TP4	16.5.2013	8.8	9.0	-	1.27	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scrapper station (Forward only)										
TP4	16.5.2013	8.8	9.0	-	3.90	-				No significant findings noted along test length during testing.
Line ID: 14" Tanami Rd scrapper 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

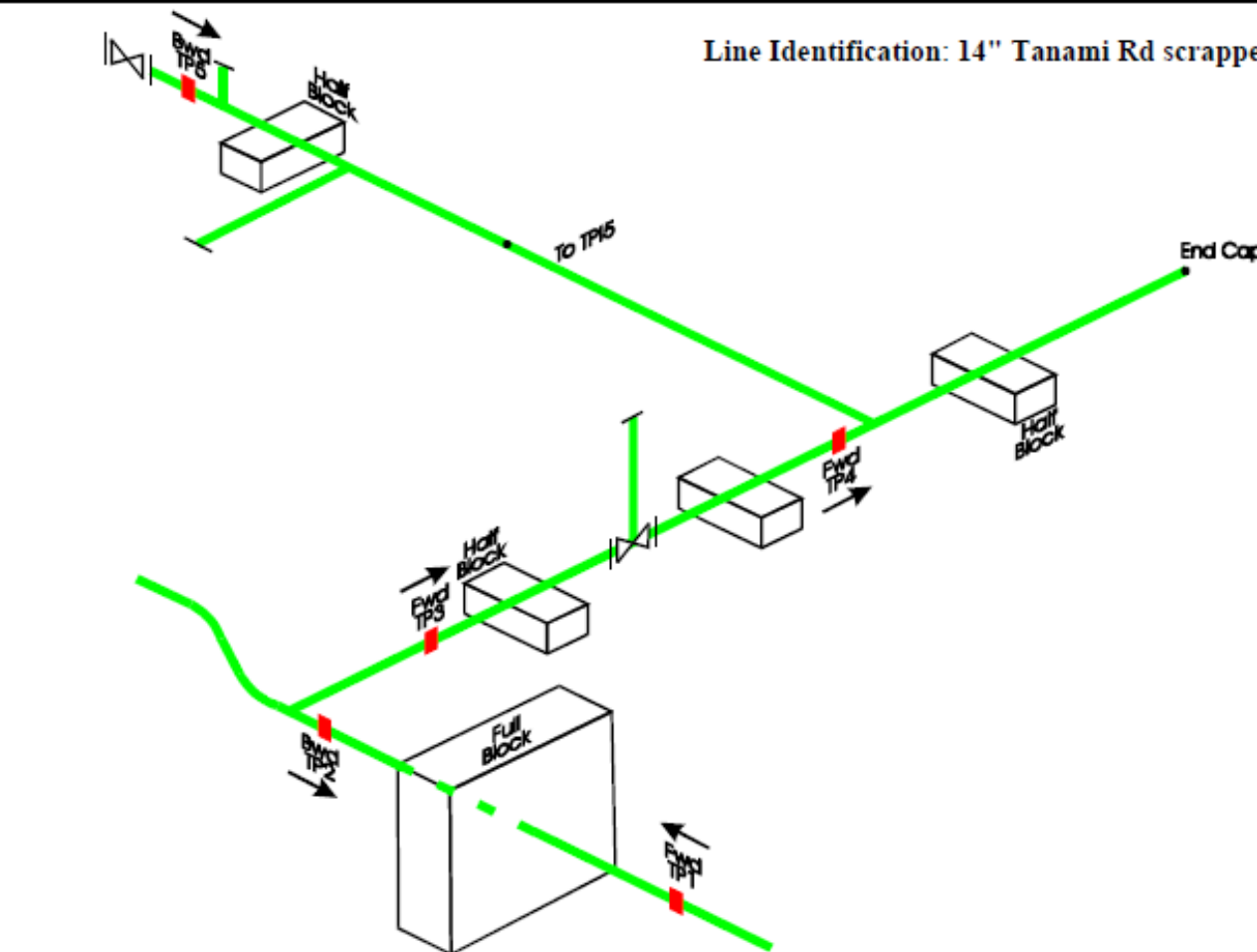
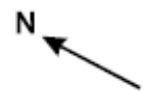
INSPECTION REPORTS – Cont'd

	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 scrapper 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 scrapper 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 scrapper 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 scrapper 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 scrapper 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 scrapper 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

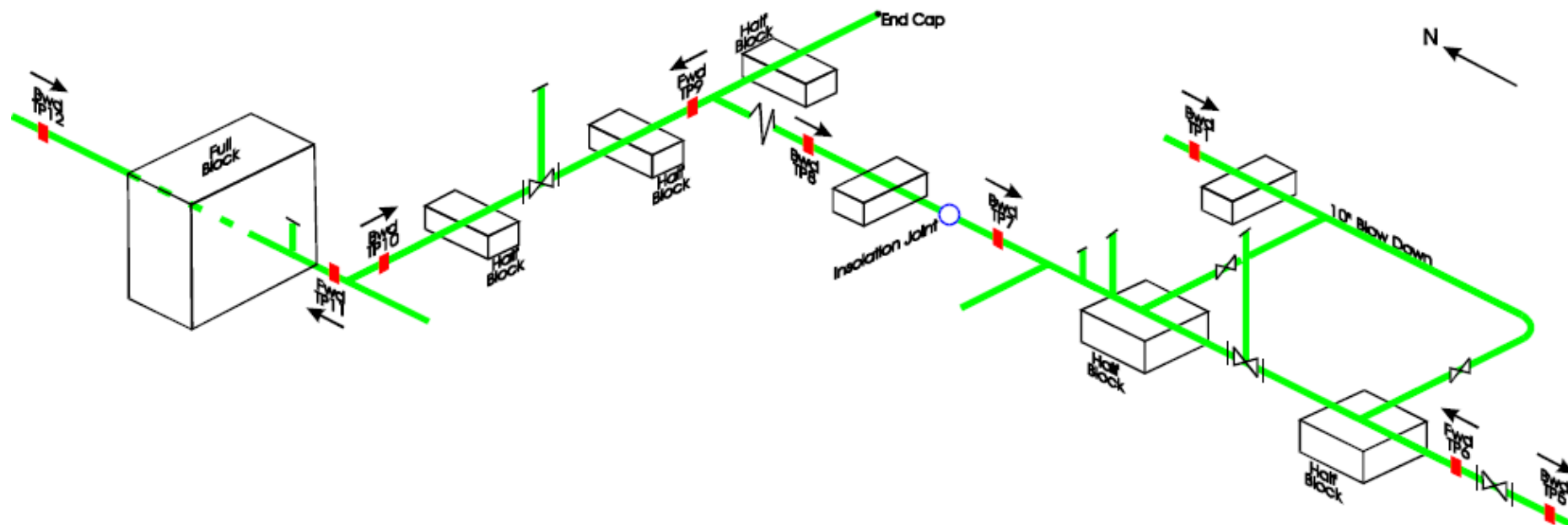
Line Identification: 14" Tanami Rd scraper station (TP1 to TP5)





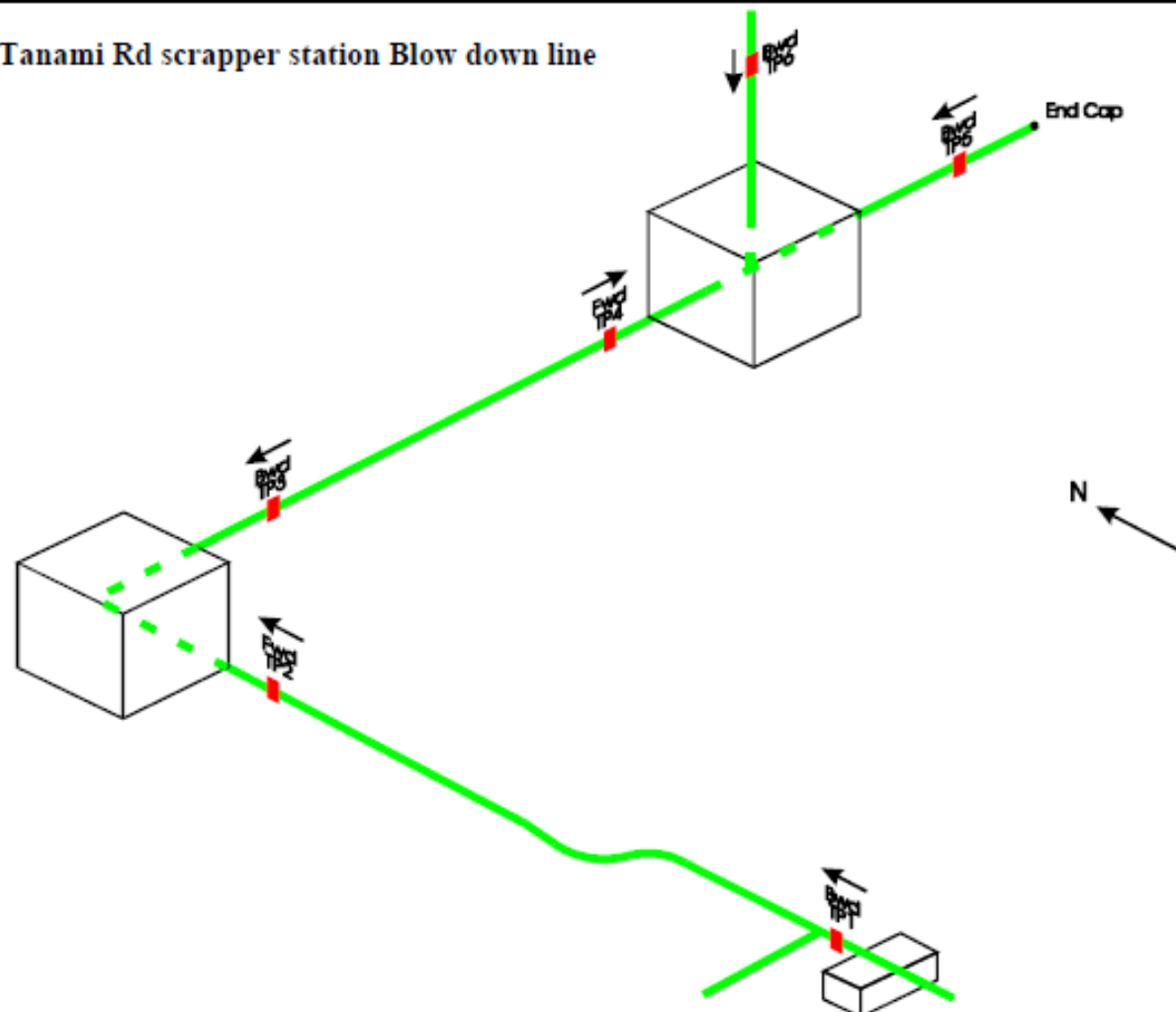
PIPELINE SCHEMATIC DRAWINGS – Cont'd

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



## PIPELINE SCHEMATIC DRAWINGS – Cont'd

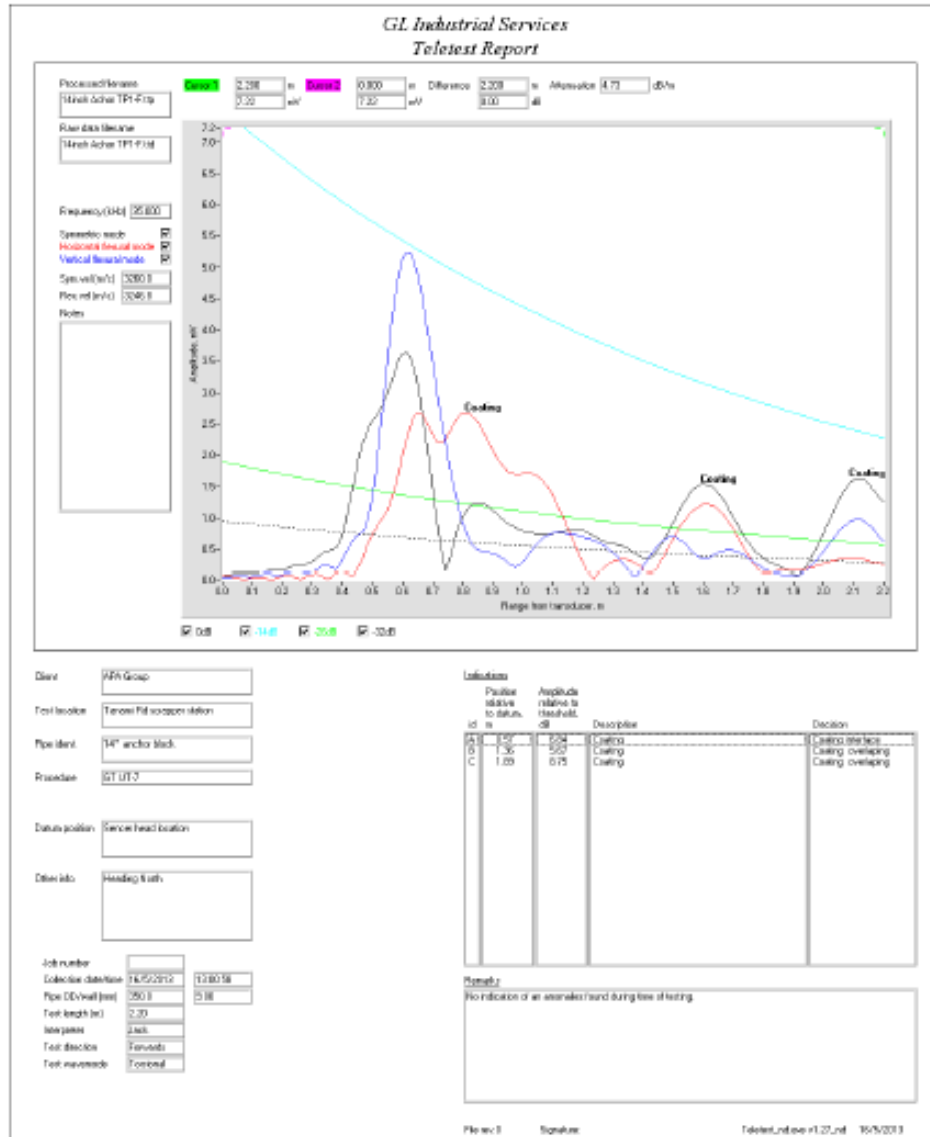
**Line Identification: 10" Tanami Rd scraper station Blow down line**



## LRUT A-SCAN GRAPHS

Test Point 1 : 14" Tanami Rd scraper station

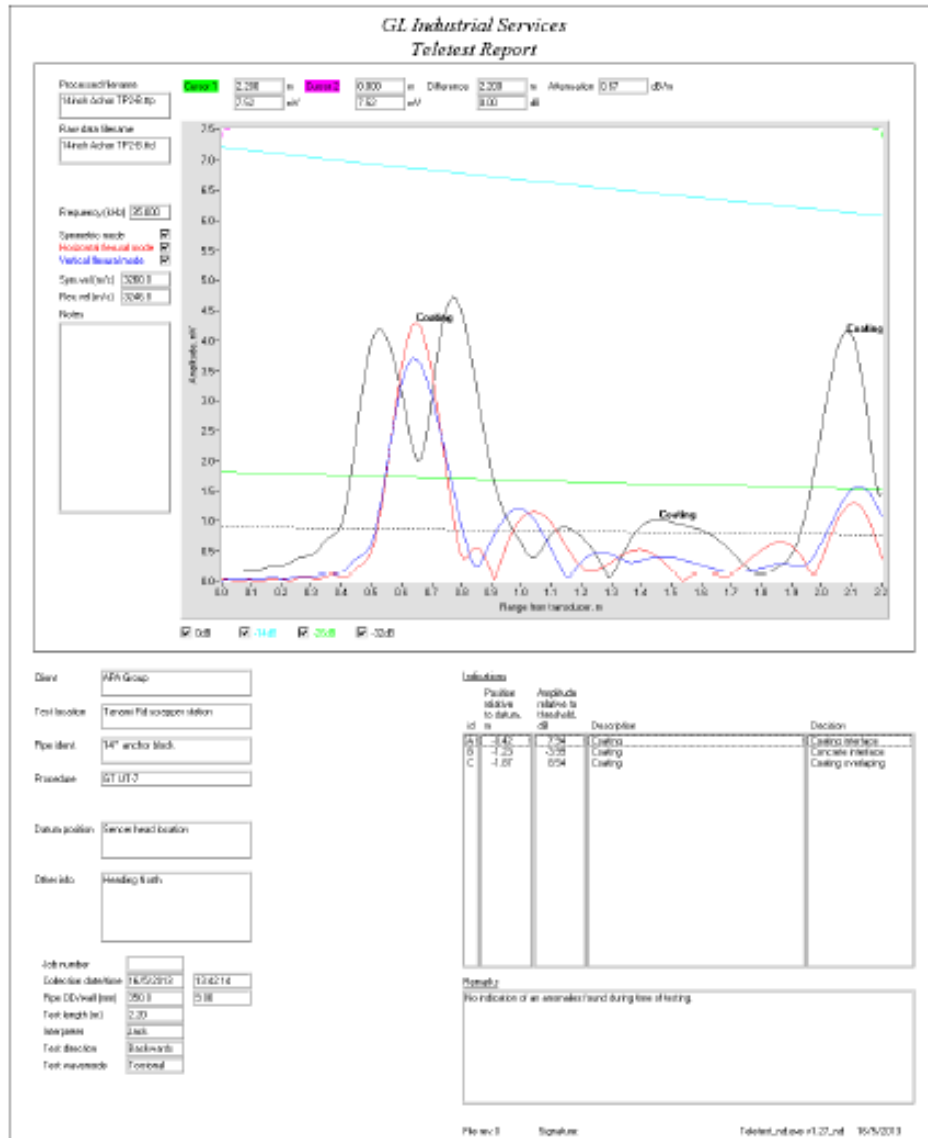
(Forward Shot Only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 2 : 14" Tanami Rd scraper station

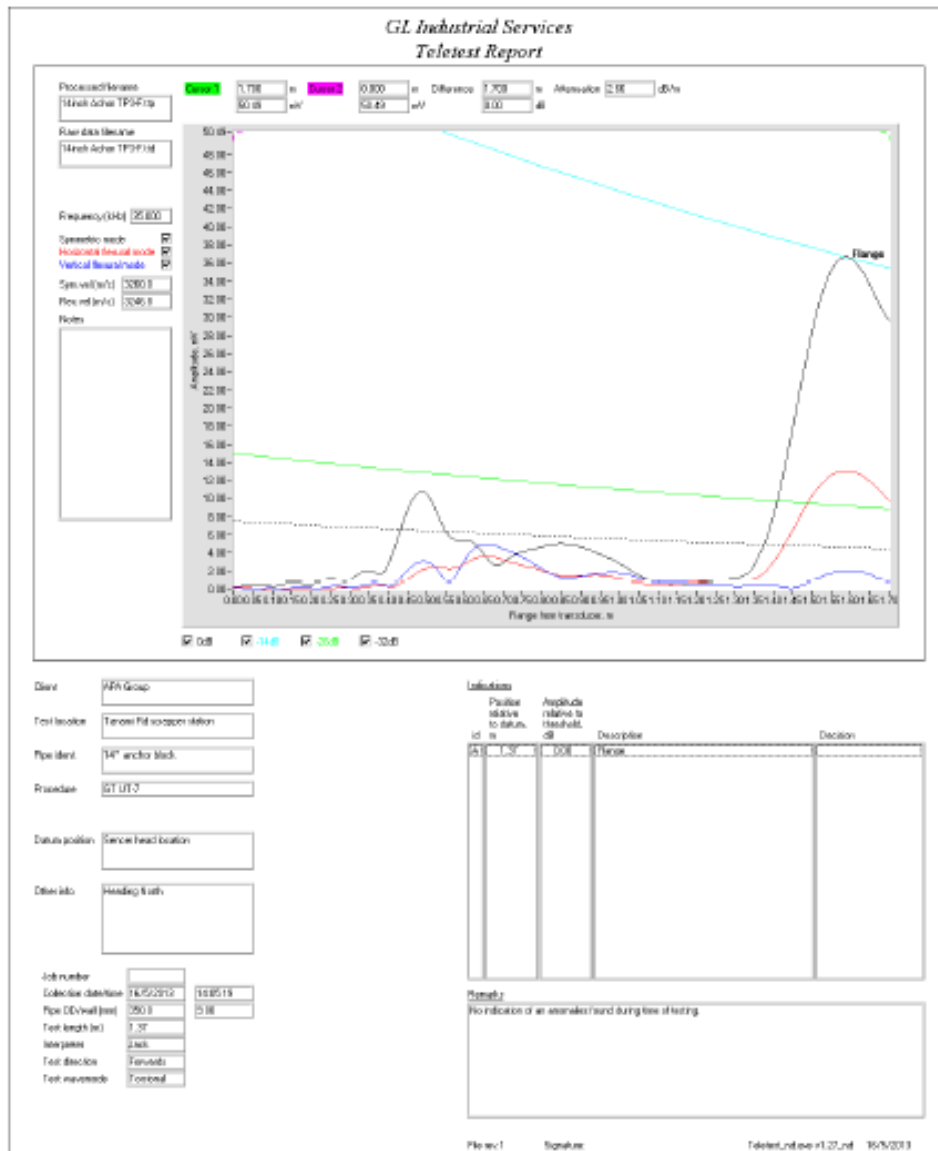
(Backward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 3 : 14" Tanami Rd scraper station

(Forward Shot only)

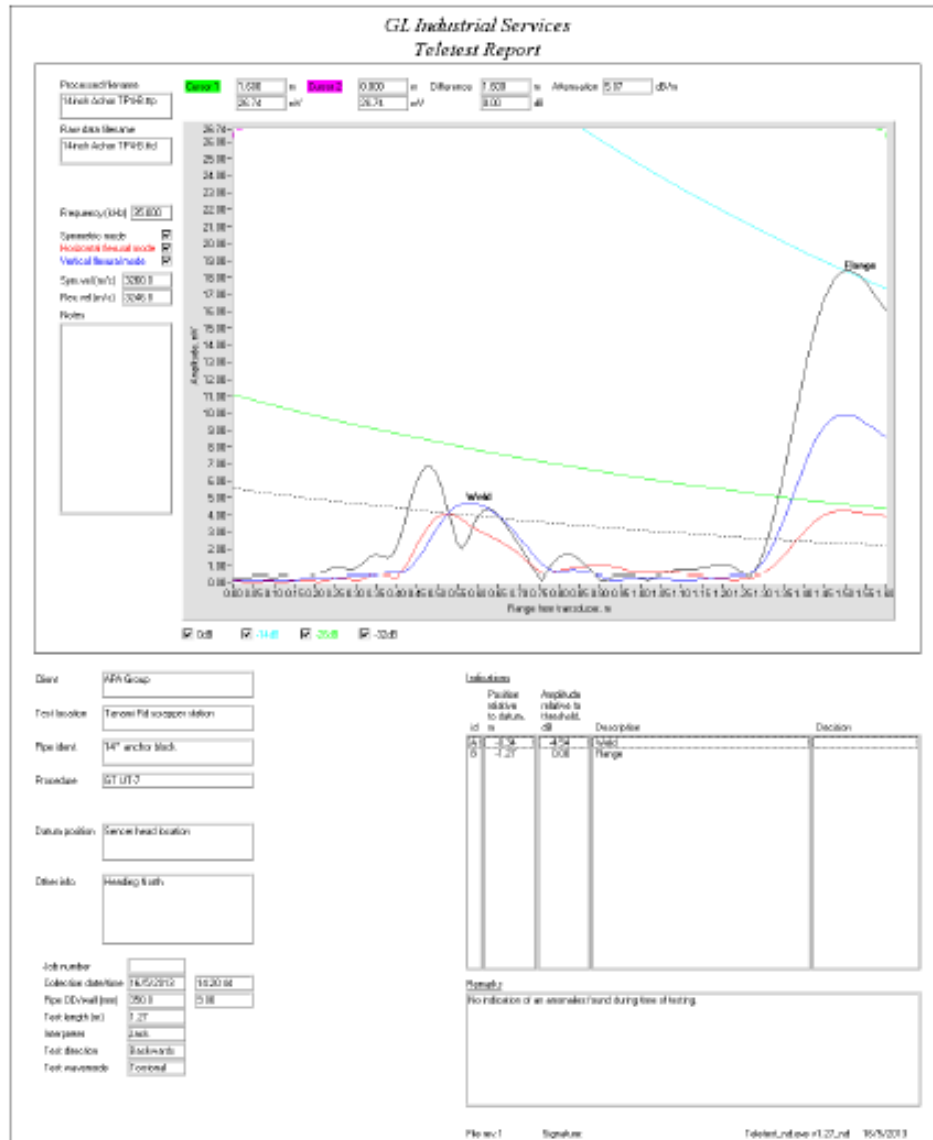




LRUT A-SCAN GRAPHS - Cont'd

Test Point 4 : 14" Tanami Rd scraper station

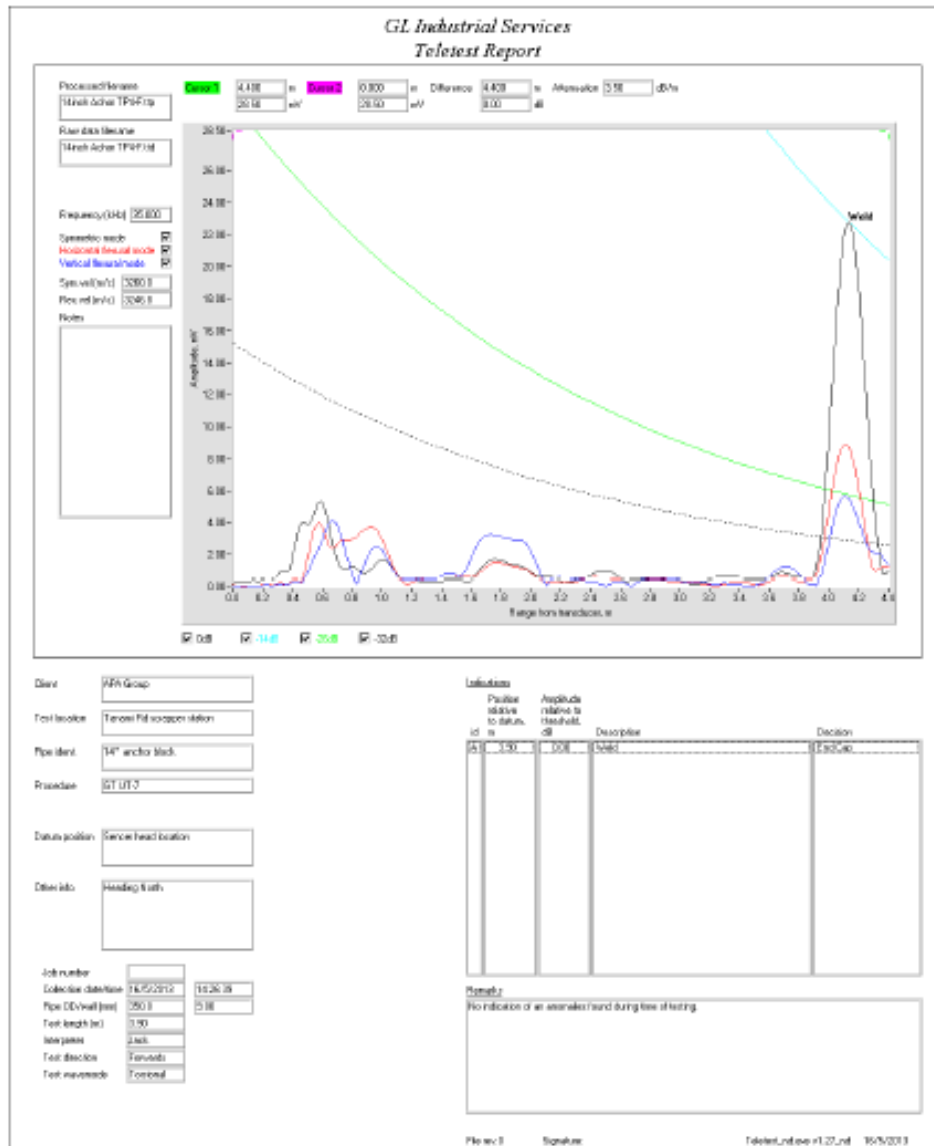
(Backward Shot only)



## LRUT A-SCAN GRAPHS

Test Point 4 : 14" Tanami Rd scraper station

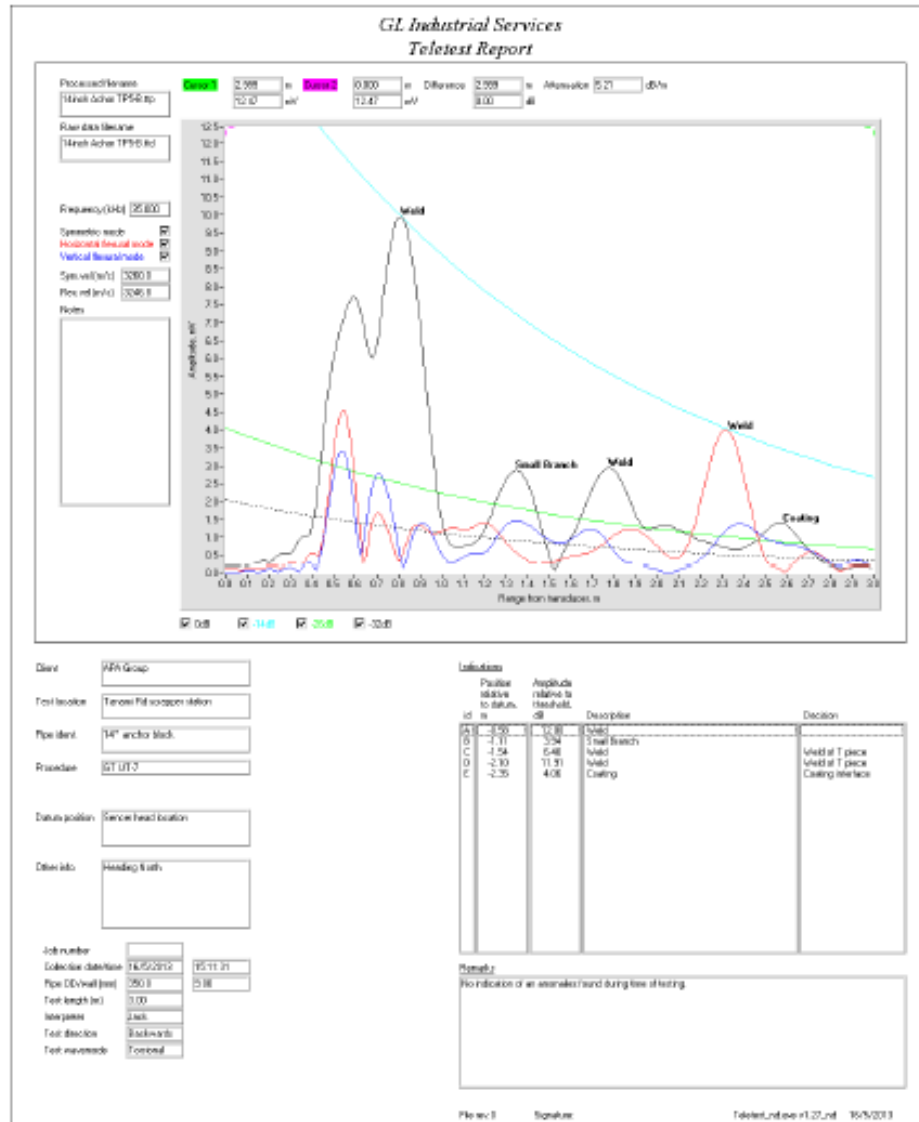
(Forward Shot Only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 5 : 14" Tanami Rd scraper station

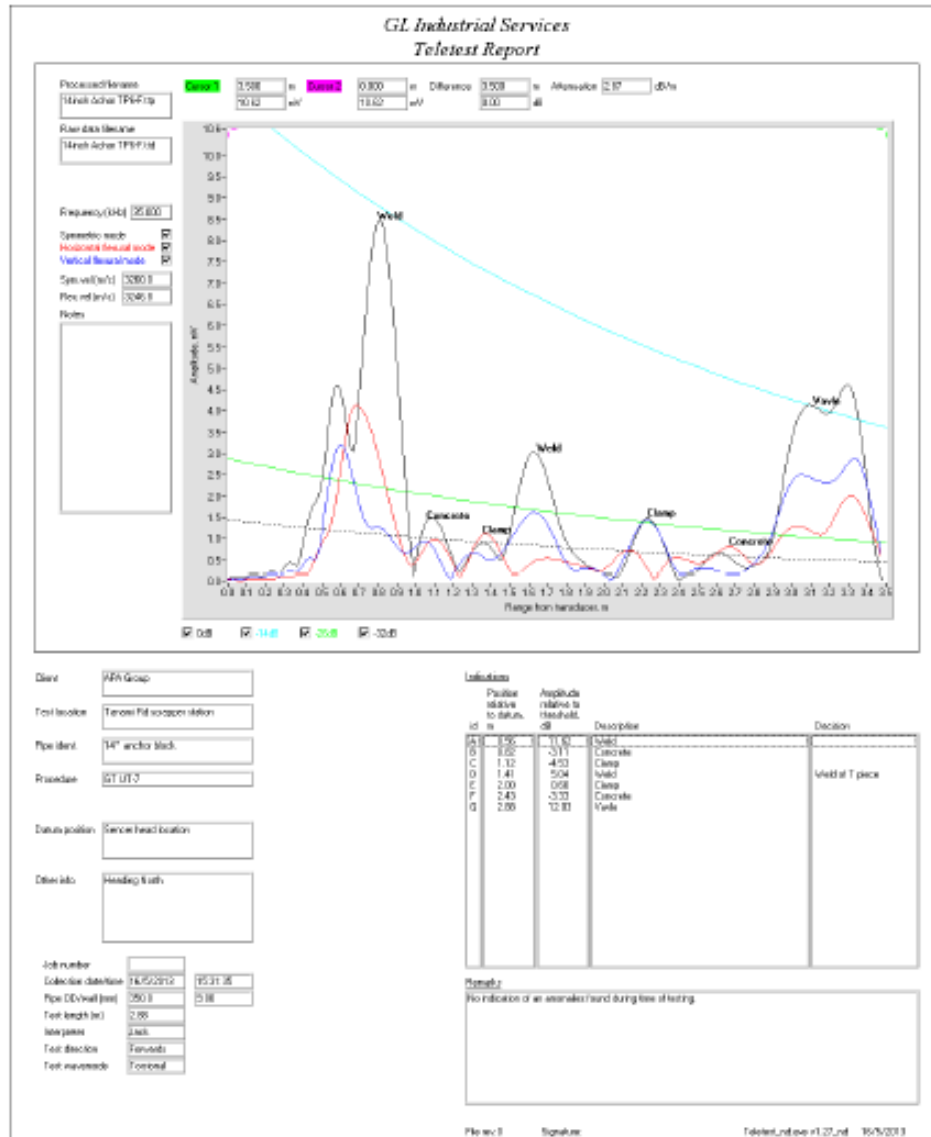
(Backward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 6 : 14" Tanami Rd scraper station

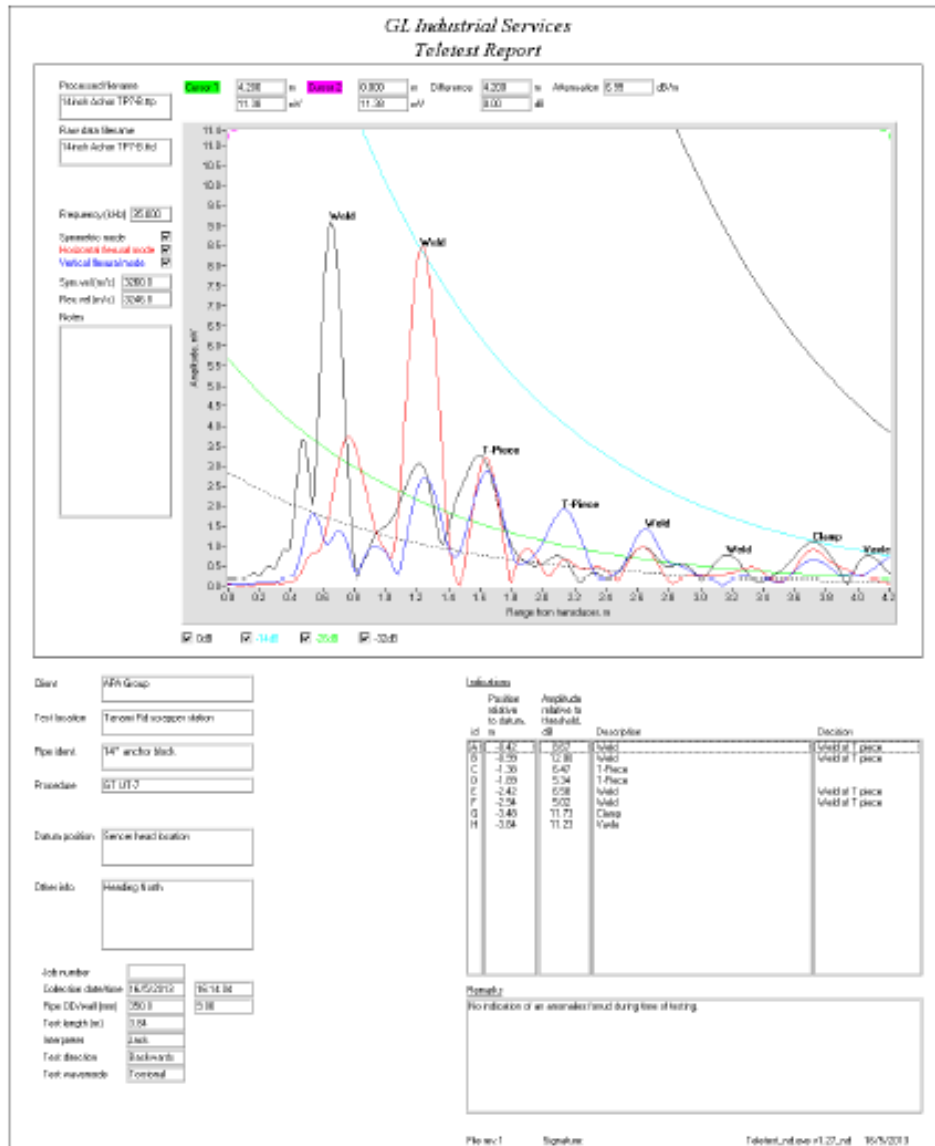
(Forward Shot only)



## LRUT A-SCAN GRAPHS

Test Point 7 : 14" Tanami Rd scraper station

(Backward Shot Only)

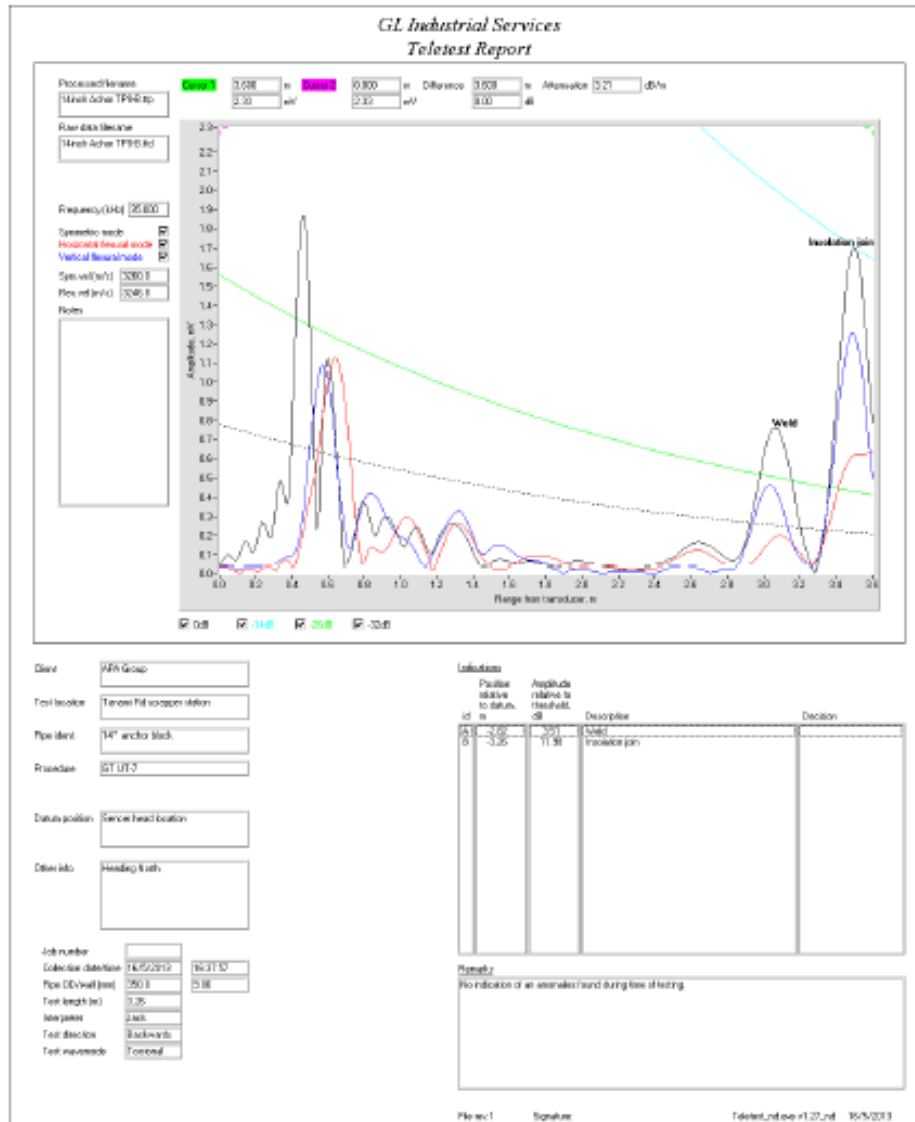




LRUT A-SCAN GRAPHS - Cont'd

Test Point 8 : 14" Tanami Rd scraper station

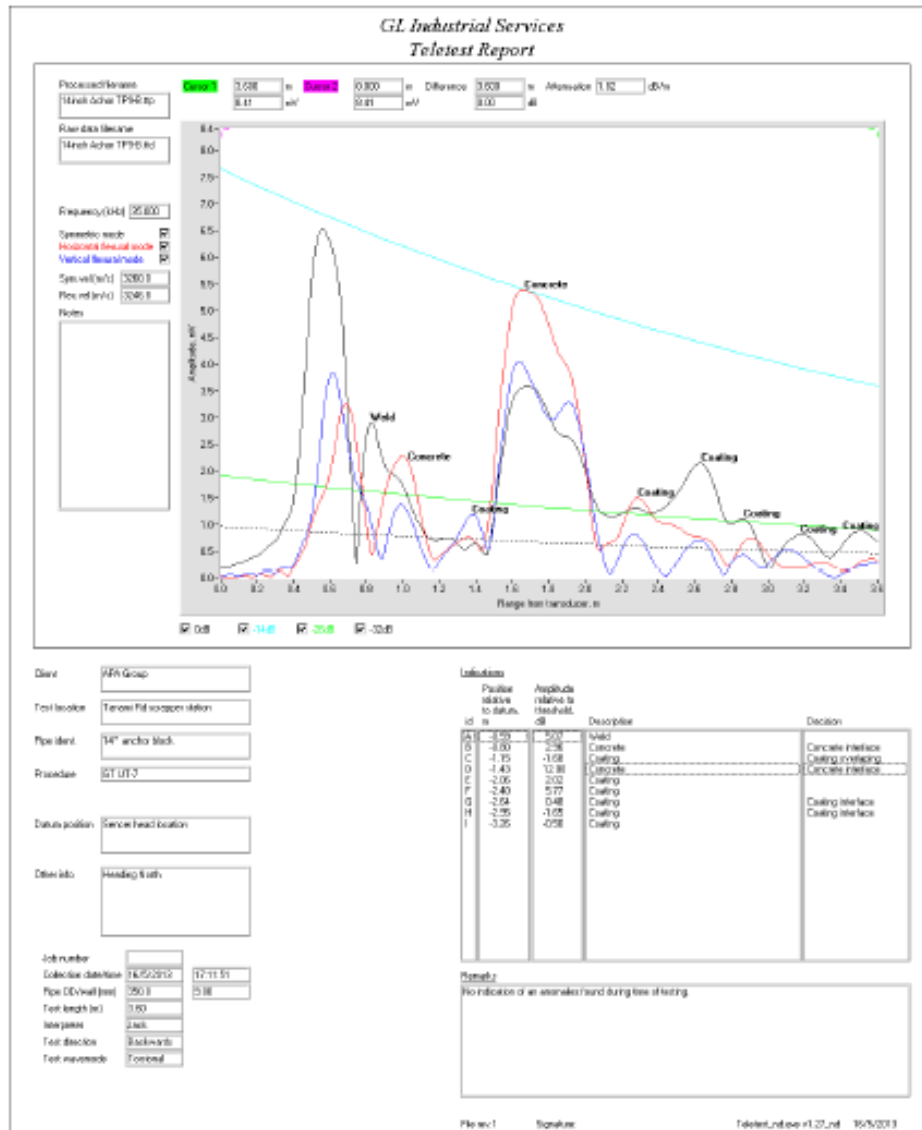
(Backward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

Test Point 9 : 14" Tanami Rd scraper station

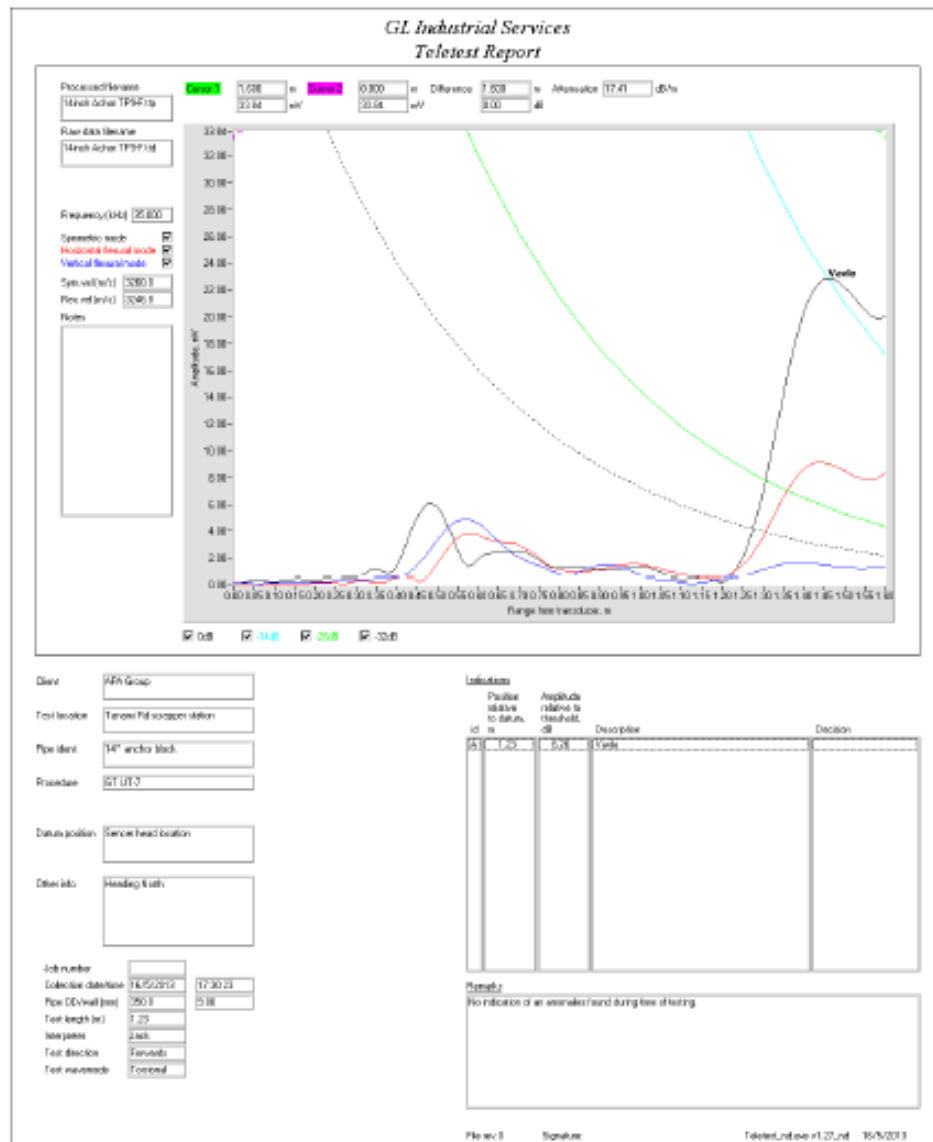
(Backward Shot only)



### LRUT A-SCAN GRAPHS - Cont'd

**Test Point 9 : 14" Tanami Rd scrapper station**

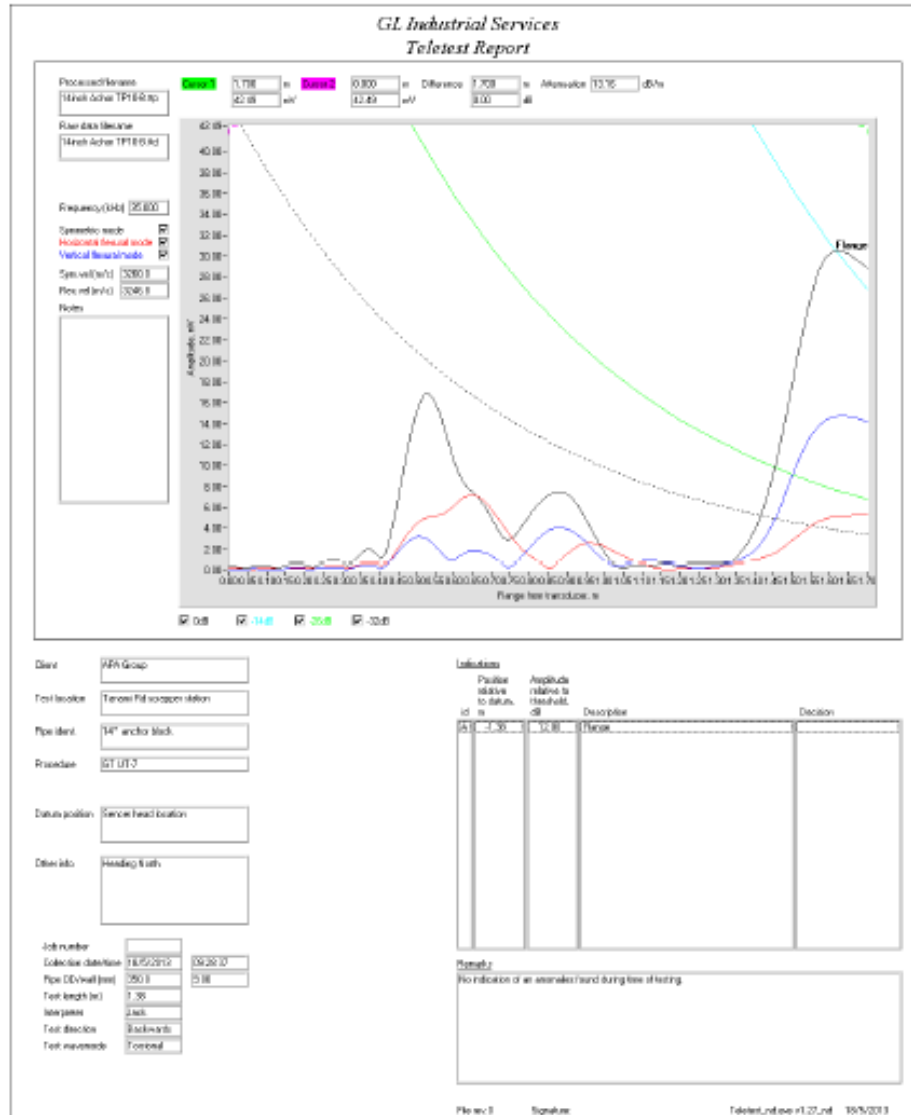
(Forward Shot only)



## LRUT A-SCAN GRAPHS

Test Point 10 : 14" Tanami Rd scraper station

(Backward Shot Only)

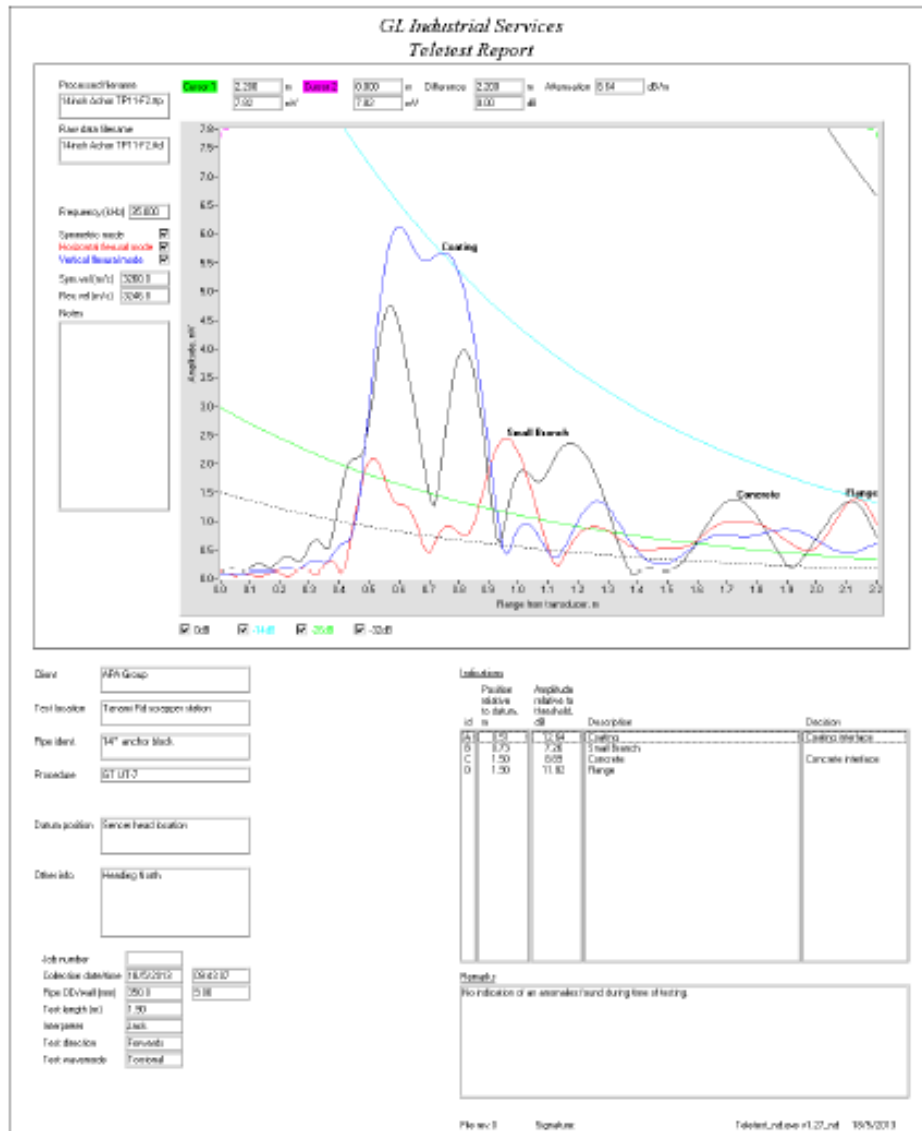




LRUT A-SCAN GRAPHS - Cont'd

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

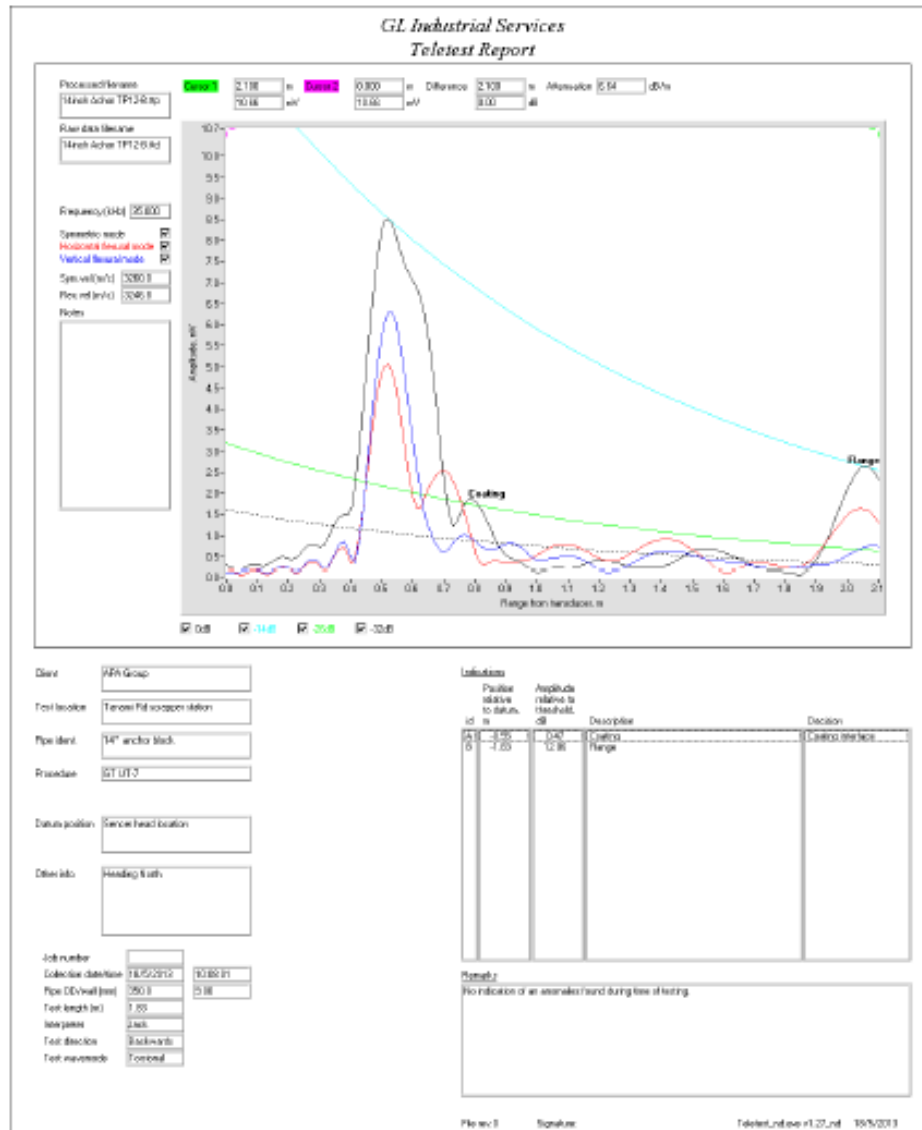
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

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

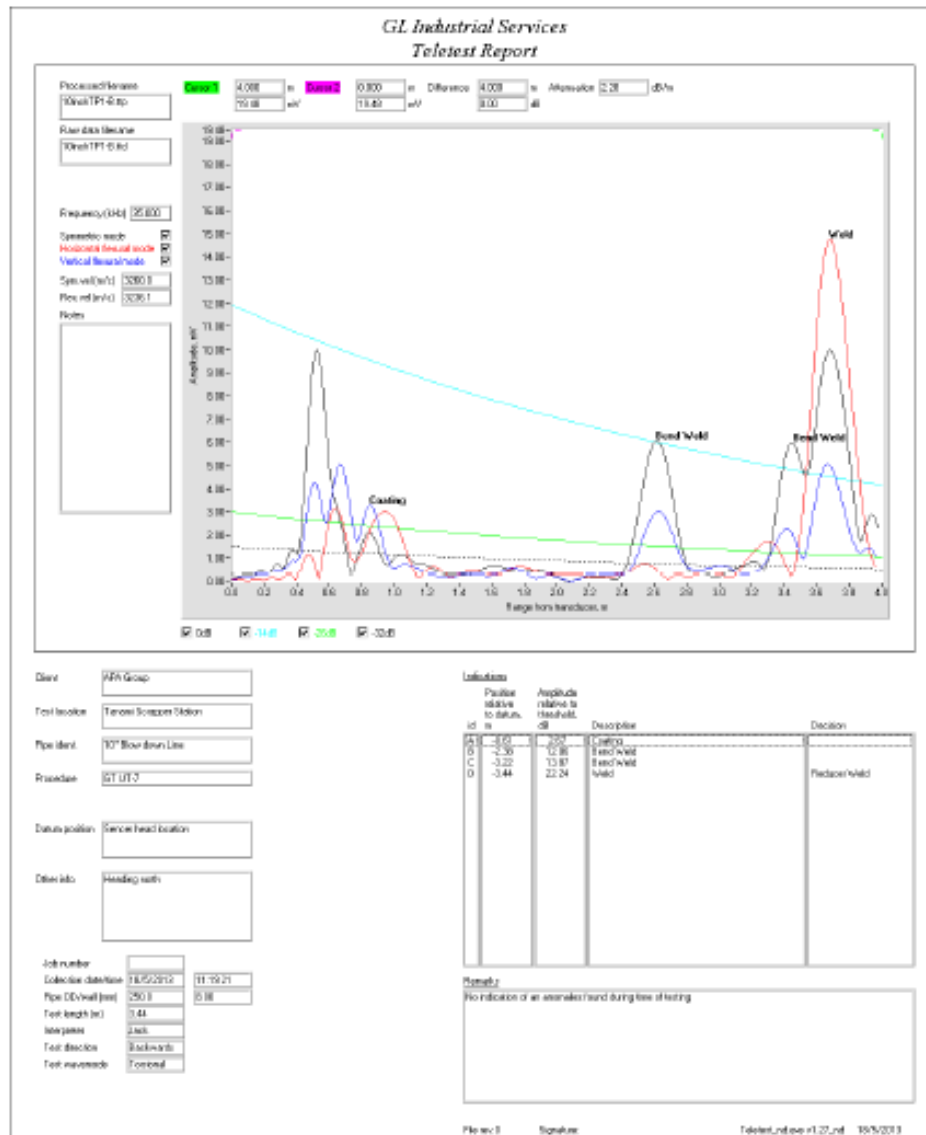
(Backward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

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

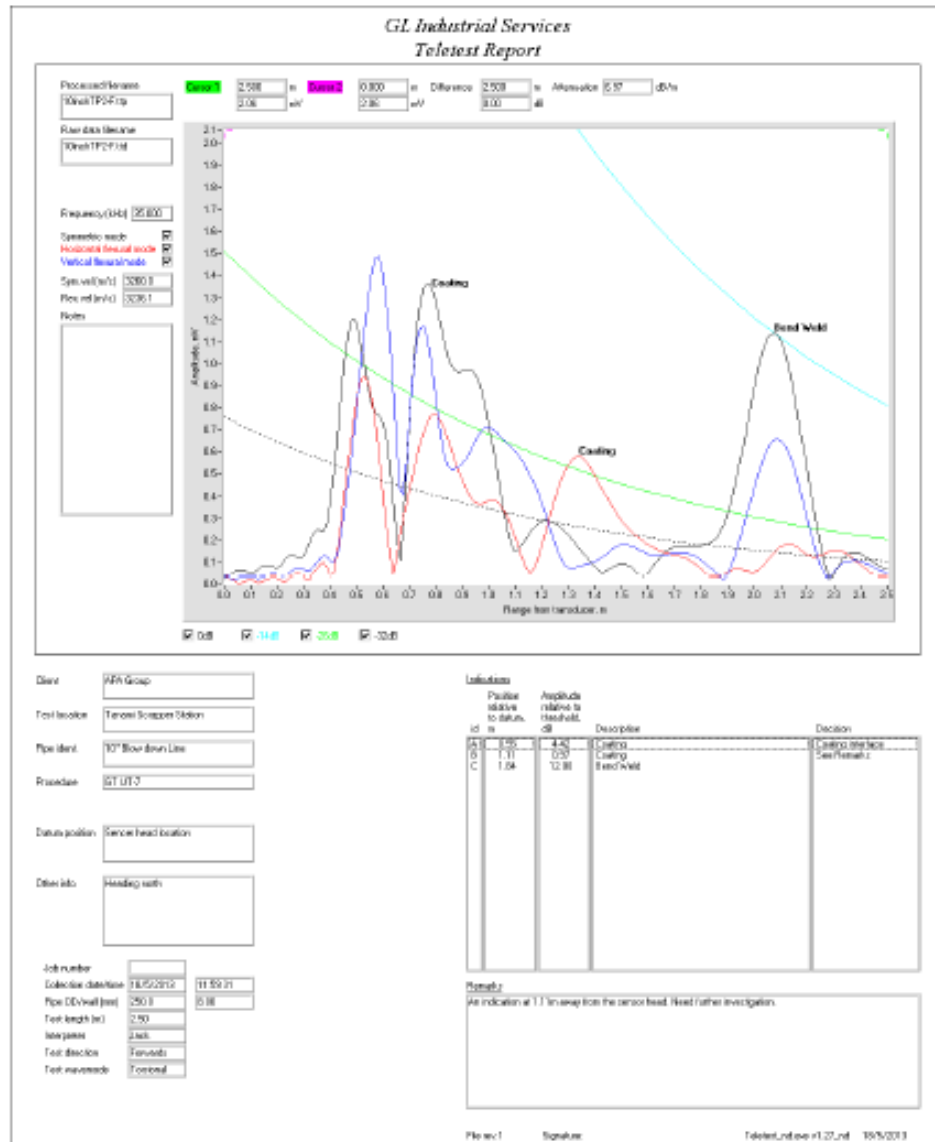
(Backward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

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

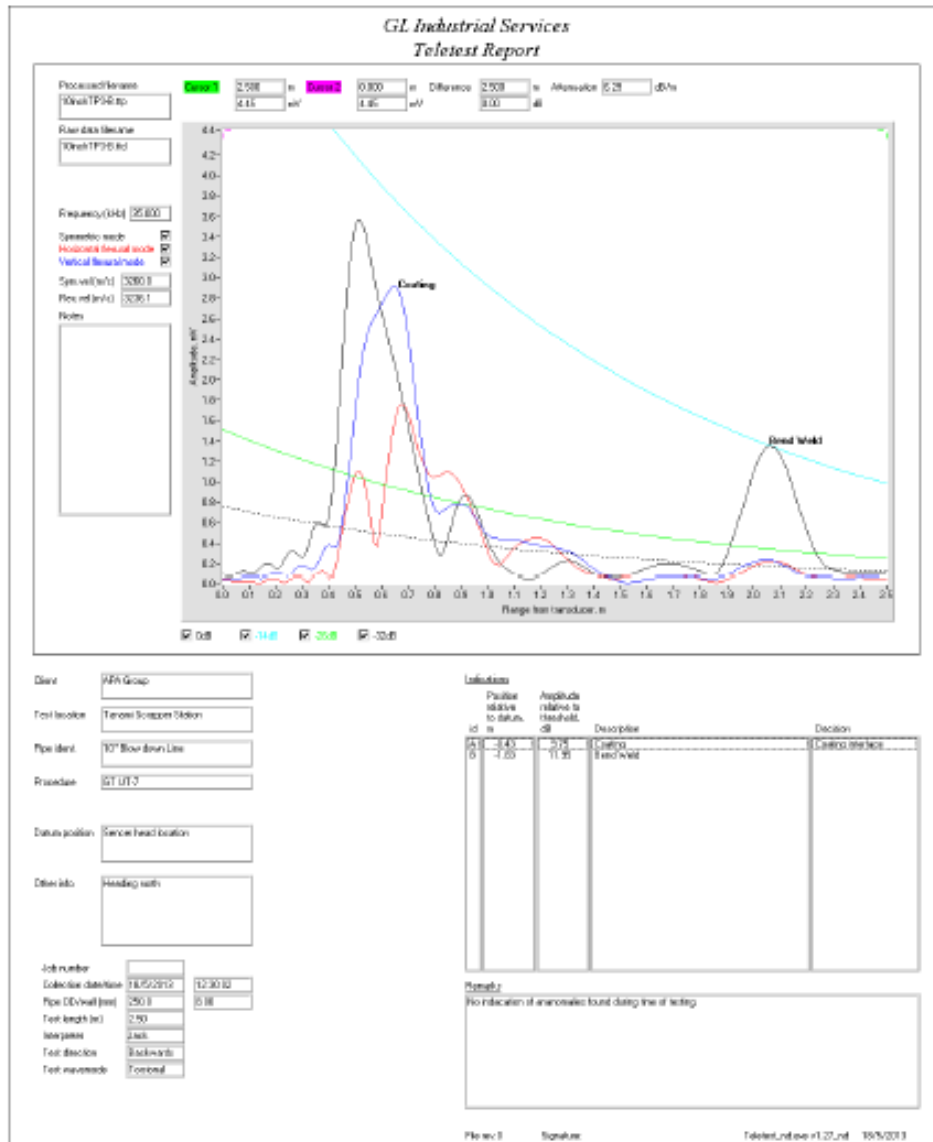
(Forward Shot only)



### LRUT A-SCAN GRAPHS - Cont'd

**Test Point 3 : 10" Tanami Rd scrapper station blow down line**

(Backward Shot only)

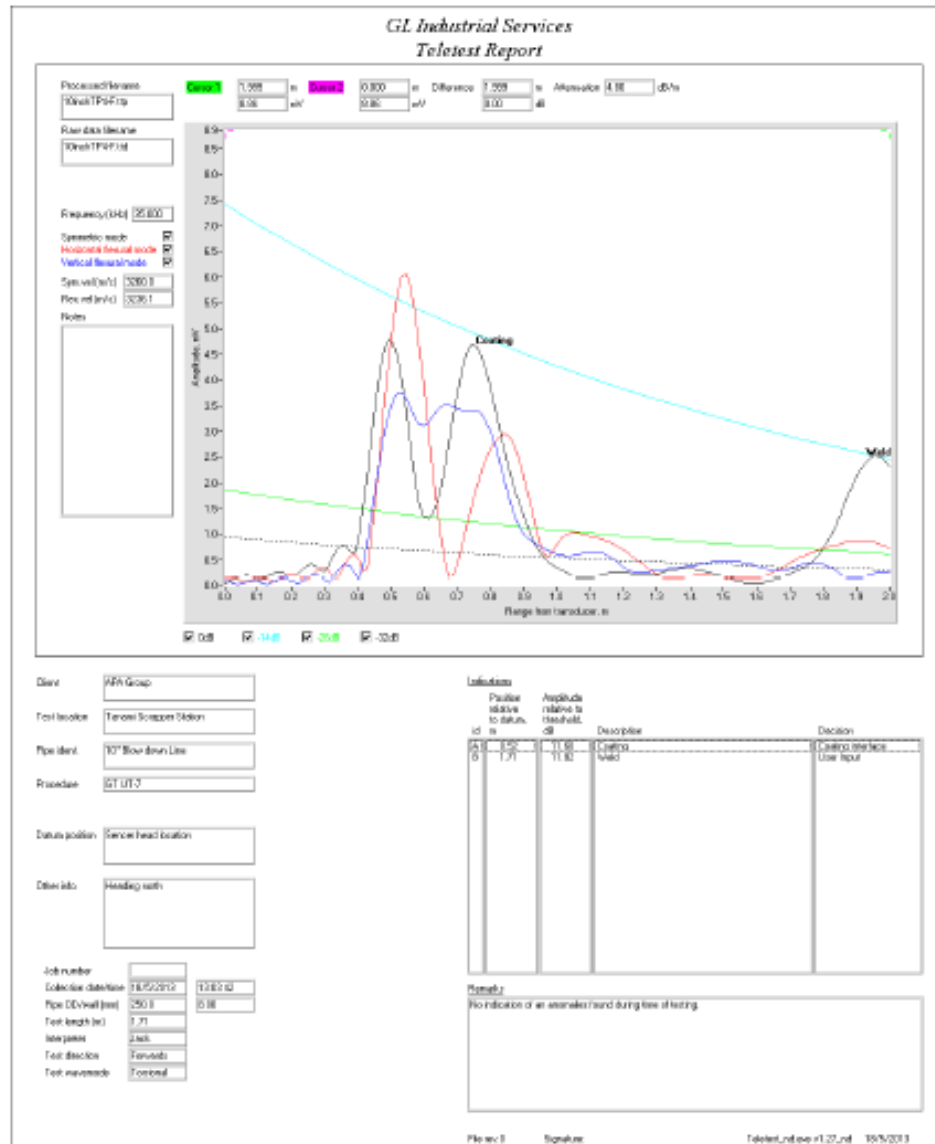




LRUT A-SCAN GRAPHS - Cont'd

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

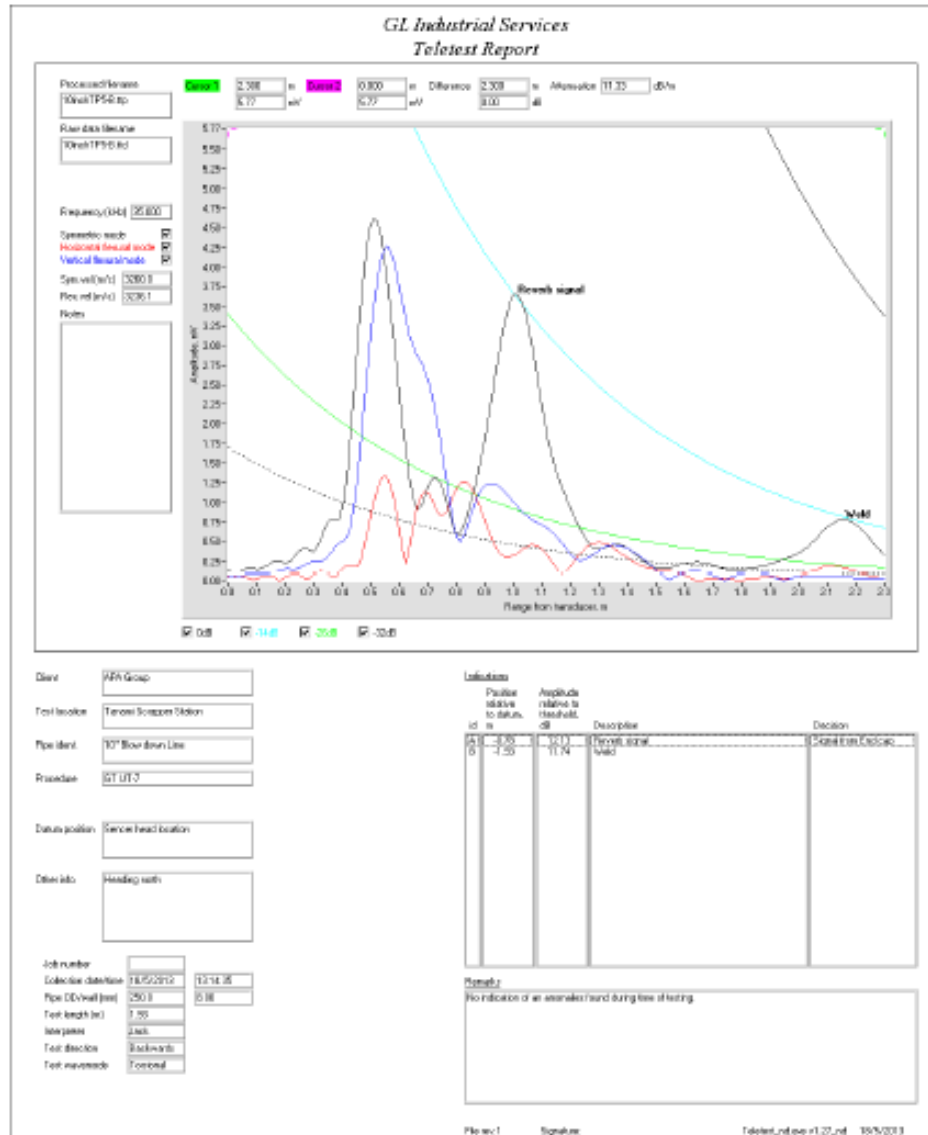
(Forward Shot only)



LRUT A-SCAN GRAPHS - Cont'd

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

(Backward Shot only)



### LRUT A-SCAN GRAPHS - Cont'd

**Test Point 6 : 10" Tanami Rd scrapper station blow down line**

(Backward Shot only)

