

July 27th, 2010



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Pembina Pipeline Corporation
PO Box 447
SWAN HILLS AB T0G 2C0

ATTENTION: Mr. Peter Koropczak

Dear Sir:

RE: 2010 CATHODIC PROTECTION SURVEY REPORT
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES

Enclosed, please find the 2010 annual cathodic protection survey report for the subject facilities. We trust the contents are adequate for your purposes. The survey for the above mentioned facilities was initially completed during May 2010.

Adequate protection levels were noted throughout the facilities. Recommendations for maintaining/improving protection levels on the facilities are provided in this report.

Our invoice covering the field survey was submitted previously. Our invoice for the preparation of this report will follow. Should any questions, comments or concerns arise regarding this report or the work completed, please contact the undersigned at (780) 447-4566, Ext. 223.

Sincerely,

CORRPRO CANADA, INC.

A handwritten signature in black ink, appearing to be "B. Bilawey", written over a horizontal line.

(FOR) Barry A. Bilawey, R.E.T.
Project Manager

BAB/kdp

Encl.: Surveillance Form
Report (1 hard copy & e-mail transfer)

x.c.: Ms. Deb Billey (E-mail transfer of report & Excel data)
Mr. Frank Fiorini, Corrpro Canada, Inc. (E-mail transfer)

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**PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
CATHODIC PROTECTION SURVEILLANCE FORM**

DATE: _____ READ BY: _____

Rectifier Location	Rectifier & Groundbed Data	Status	Setting	Volts	Amps	Target Amperage
Athabasca Block Valve @ 14-35-61-06 W5M	RTS CSAYSA 30-12 S/N: C-87289	As Found	C ____ F ____			8.5 – 9.5 Total
		As Left	C ____ F ____			
Goose River @ 07-13-66-15 W5M	RTS CAYSC 30-12 BB022 S/N: C-98750	As Found	C ____ F ____			1.0 – 2.0 Total
		As Left	C ____ F ____			
Judy Creek Pump Stn. NE-34-63-10 W5M	GoodAll JSAWSC 30-28 S/N: 70C2025	As Found	C ____ F ____			25.0 – 28.0 Total
		As Left	C ____ F ____			
Judy Creek Meter Site #3 SE-25-64-11 W5M	RTS CAYSC 30-12 BBKOZZ S/N: C-98751	As Found	C ____ F ____			6.0 – 6.5 Total
		As Left	C ____ F ____			
Swan Hills Pump Stn. #1 12-19-66-09 W5M	GoodAll CSAWSE 60-22 S/N: C-061136	As Found	C ____ F ____			18.0 – 22.0 Total
		As Left	C ____ F ____			
Swan Hills Pump Stn. #2 12-19-66-09 W5M	RTS CSAYSA 30-12 S/N: C85224	As Found	C ____ F ____			9.0 – 12.0 Total
		As Left	C ____ F ____			
Sarah Lake Junction 02-13-65-11 W5M	GoodAll JSAWSA 30-12Z S/N: 70C1396	As Found	C ____ F ____			9.0 – 10.0 Total
		As Left	C ____ F ____			
Deer Mountain 04-07-09-08 W5M	RTS VAYSA 20-5 S/N: C84418	As Found	C ____ F ____			1.5 – 2.0 Total
		As Left	C ____ F ____			

**PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
CATHODIC PROTECTION SURVEILLANCE FORM
PAGE 2**

Rectifier Location	Rectifier & Groundbed Data	Status	Setting	Volts	Amps	Target Amperage
Apache House Mountain 04-09-70-10 W5M	Corrpower VAYSA 40-8 S/N: C-022204	As Found	C ____ F ____			3.5 – 4.5 Total
		As Left	C ____ F ____			
Pengrowth 02-09-63-11 W5M	Foreign System GoodAll AN12R3AN S/N: 64C6456	As Found	C ____ F ____			4.0 Total
		As Left	C ____ F ____			
ARC Resources 10-17-68-10 W5M	Corrpower CSAYSD 30-16BB	As Found	C ____ F ____			4.0 – 5.0 Total CCT#2
		As Left	C ____ F ____			

REMARKS:

SUGGESTED INSTRUCTIONS:

1. Record rectifier data during the first part of each month.
2. Note 'As Found' rectifier readings and show 'As Left' readings if adjustments are required to achieve target output.
3. Please include any comments in the space provided under 'Remarks'.
4. Indicate if any flowline or facility construction has occurred.
5. Note when additional blank data sheets are required _____.
6. Should you require any information, please call us at (780) 447-4565.
7. Send one copy of the completed data sheet to:

Corrpro Canada, Inc.
10848 – 214th Street NW
EDMONTON AB T5S 2A7

or

Fax to: (780) 447-3215

or

E-Mail: surveillance.edmonton@corrpro.ca

July/10



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**PEMBINA PIPELINE CORPORATION
CATHODIC PROTECTION SURVEY REPORT
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
2010**

CORRPRO CANADA, INC.

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SUMMARY

The 2010 annual cathodic protection survey includes the following pipelines and facilities:

- Crude oil gathering system in the Swan Hills area
- Crude oil transmission lines to the Highridge pump station
- The Natural Gas Liquids (NGL) pipeline system in the Swan Hills area
- The NGL pipelines between Swan Hills, Slave Lake and the Highridge pump station
- The NGL Northern Expansion line from Judy Creek to Goose River
- The NGL Mitsue line

In general, structure-to-soil potential measurements obtained indicate adequate levels of cathodic protection on the crude oil and NGL gathering and transmission facilities. Protection levels are lower in the vicinity of some electrical shorts. Repair requirements are given in the recommendations section below.

The following pipelines were not protected:

- The Enermark 10-36-64-14 W5M to PrimeWest 04-02-65-13 W5M
- The abandoned lease line between Mobil Amurex and the Mobil Amurex/Deer Mountain cross over
- Apache 04-02-65-13 W5M (Virginia Hills) tie-in lateral

Corrpro Canada, Inc. has been advised that protection of the above lines is not required, so no recommendations are given with regards to these lines.

The Swan Hills Pump Station #2 cathodic protection system was left operating normally, but the anode bed is at the end of its theoretical life and consideration should be given for replacement. All other cathodic protection systems were left operating normally.

All minor repairs and upgrades that could be performed during the survey were completed. Several test stations have been destroyed and should be replaced to allow protection levels to be monitored. Replacing the destroyed test stations will require excavation of the pipeline so that new test lead wires can be installed. A list of destroyed test stations is given in the "Recommendations" section of this report.

High levels of protection were being maintained on the Mitsue NGL line; however, induced AC levels are approaching maximum safe limits. Additional study is recommended to determine the most effective means of reducing AC levels.

The survey was performed in May/June and the report was written. Most of the data was misplaced/stolen and not recovered. The facilities were resurveyed in July at no cost to Pembina Pipelines. The information contained in the report body for the rectifiers, reflect the comments found for the initial survey.

RECOMMENDATIONS

It is recommended that Pembina Pipeline Corporation address the following items to ensure continued operation of the cathodic protection systems. For each recommendation, a priority number and a cost estimate is provided (if the work is suited to the type that Corrpro Canada, Inc. performs). The priority numbers are defined as follows:

<u>Priority Number</u>	<u>Time for Repair</u>
#1	Top priority. Requires immediate attention
#2	Requires attention within 1 month
#3	Requires attention within 3 months
#4	Requires attention within 6 months
#5	Requires attention within 12+ months

All Areas	Priority	Cost (\$)
1. Read the rectifiers on a monthly basis and ensure they are adjusted to their target currents. The readings should be sent to Corrpro Canada, Inc. for review, analysis and record keeping. The target outputs are given in the updated copies (12) of the surveillance form sent with this report.	3	By Pembina
2. As per previous years, arrange to have the 2011 survey completed on all pipeline systems.	5	\$28,000 (including minor repairs).

Crude Oil System	Priority	Cost (\$)
Sarah Lake Junction to Virginia Hills Terminal: The Iteration 06-32-64-12 W5M tie-in requires a replacement 2” 600lb RF flange isolation kit at the location flagged orange and tagged.	2	By Pembina
Swan Hills Terminal: Confirm that protection is not required on the “Station #1” piping or the V-121 check valve.	3	By Pembina
Swan Hills Terminal to Deer Mountain: The ARC 10-17-68-10 W5M sender requires the installation of a 2” insulating union on the pig drain line, then adjustment of the ARC rectifier.	3	By Pembina and Corrpro.
Swan Hills Terminal: The south 10” (09-24) sending trap requires the isolation kit to be moved to the field side of the B110 MOV.	3	By Pembina
Judy Creek Terminal: Replace ammeter in rectifier.	3	\$500 - \$1000 (when in area)
Swan Hills Pump Station #2: Replace combination voltmeter/ammeter in rectifier.	3	\$500 - \$1000 (when in area)
Pengrowth Judy Creek Field Gate: 6” Pembina tie-in requires a 4” 600lb RF flange isolation kit at the location flagged orange and tagged.	4	By Pembina
Highridge to Judy Creek, Mile 74.1 ‘B’ line casing short: The casing should be cleared of any collected fluid and filled with inhibitor. If blowing out fluid does not clear the short, the casing will need to be daylighted and the short repaired.	4	\$2,500 - \$5,000 to clear collected fluid.
Highridge to Judy Creek, Air Marker J-2 ‘B’ line casing short: The casing should be cleared of any collected fluid and filled with inhibitor. If blowing out fluid does not clear the short, the casing will need to be daylighted and the short repaired.	4	\$2,500 - \$5,000 to clear collected fluid.
Judy Creek to Judy Creek Fieldgate/Whitcourt Junction Hwy #32 Crude line casing short: The casing should be cleared of any collected fluid and filled with inhibitor. If blowing out fluid does not clear the short, the casing will need to be daylighted and the short repaired.	4	\$2,500 - \$5,000 to clear collected fluid.

Crude Oil System	Priority	Cost (\$)
Swan Hills Pump Station #2: Replace anode bed before failure. Alternatively, monitor rectifier current output to determine when a new groundbed is required.	5	\$25,000.00 - \$30,000.00(Replacement anode bed)
Swan Hills Terminal to Celtic (Home 12): Inspect the culvert at the BE-30 valve to determine where the pipe is contacting the culvert. Cut away culvert or install rubber padding to clear electrical short between culvert and pipe.	4	By Pembina
Judy Creek Pump Station: Inspect the culvert at the G-220 valve (near south fence) to determine where the pipe is contacting the culvert. Cut away culvert or install rubber padding to clear electrical short between culvert and pipe.	5	By Pembina

NGL System	Priority	Cost (\$)
Swan Hills NGL Terminal and Judy Creek Meter Sites #1 and #2: Cathodic protection status and effectiveness should be re-checked and any necessary repairs made immediately, once piping changes are complete.	2	\$2,000 - \$4,000 for re-checks.
Swan Hills to Mitsue line: Have an engineering study conducted to determine alternatives for reducing induced voltages on the pipeline, if not included in the new Nipisi Pipeline Project.	3	\$22,000.00-\$28,000.00
Highridge to Judy Creek Mile 48.9 “A” line casing short: The casing should be cleared of any collected fluid and filled with inhibitor. If blowing out fluid does not clear the short, the casing will need to be daylighted and the short repaired.	4	\$2,500 - \$5,000 to clear collected fluid.
Have test stations installed or repaired at the following locations: Highridge Mile 28.8 to Mile 96.9: “C” line requires five test stations at various locations. Swan Hills Terminal to Mituse: -23+170.5; Power pole 174; Test station could not be located -27+739.5; Power pole 193/194; Test station could not be located	4	\$8,000.00 - \$12,000.00 per test station (where vehicle accessible)

DISCUSSION

Status of Cathodic Equipment

Rectifiers and Groundbeds

The majority of the rectifiers were found to be operating at target current output.

Adjustments and repairs were completed at the following rectifiers:

- Swan Hills #1: The rectifier was found operating slightly below the target current. The rectifier was adjusted up one fine tap setting and was left with an output of 19.01 amperes at 36.4 volts.
- Sarah Lake Junction: The rectifier was found operating slightly below the target current, but was left operating at an output of 8.60 amperes at 6.81 volts, due to the next setting being much too high.

Problems exist at the following rectifiers:

- Judy Creek Pump Station: For the re-survey, the system was operating below the target current requirements and the output was increased two settings and left operating at 9.72 volts and 25.1 amperes. The meter is indicating an output 9.56% higher than actual and should have a new meter installed.

- Swan Hills Pump Station #2: The meter is indicating an output 31.7% lower than actual and should have a new meter installed.

Remaining anode life expectancies for all systems are given in Table 1 below. The life expectancies were calculated based on the information given in Appendix 1 and the present current output.

Location	Remaining Anode Life (Years)
Highridge PS	8
Athabasca block Valve	7
Judy Creek PS	21
Swan Hills 1	22
Swan Hills 2	0
Sarah Lake Junction	>40
Deer Mountain	12
House Mountain	19
Pengrowth 02-09-63-11	Unknown
ARC Resources 10-17-68-10	>15
Judy Creek Meer Site #3	>40
Goose River	>40

Table 1: Anode Life Expectancy

Note that the Swan Hills #2 anode bed has reached the end of its theoretical life. To ensure continuous operation of the cathodic protection system, consideration should be given to installing a replacement anode bed at Swan Hills #2. Alternatively, the output of the system should be closely monitored to determine exactly when replacement is required.

Life expectancy for the Pengrowth 02-09 anodes could not be calculated since the anode details are unknown. Circuit resistance data suggests that the Pengrowth 02-09 anodes were replaced in 2003, so they are expected to be operational for at least 10 more years.

The ARC Resources 10-17-68-10 anodes have been replaced, and the system is operating normally. All other anode beds are expected to remain operational for at least six more years.

Bonds

A large number of bonds exist between Pembina and other pipeline operators. These bonds are being used to supplement protection levels on the Pembina facilities and to provide protection against interference. All required bonds were left in good operating condition.

Test Stations

Several test stations were found to be damaged. Where possible, repairs were made during the survey. Repairs included extending lead wires and replacing missing or damaged heads and posts. Test stations were not repaired if the lead wires were missing or broken below grade. Test stations that require repair are listed in the “Recommendations” section of this report. Note that repairing these test stations will require excavating the pipeline(s) so that new wires can be connected to the pipeline(s).

There are large distances (up to 15.0 miles) where potentials cannot be obtained on the NGL 'C' line between the Highridge Pump Station and Freeman River. It is recommended that additional test leads be installed at five or more locations. The additional test leads should be installed at the same locations as the test stations on the 'A' and 'B' lines.

The test station at WPT 150 on the crude line between the Sarah Lake Meter Site and Whitecourt Junction had been removed with a section of line that had been repaired. The test station was replaced during the survey.

Pipe-to-Soil Meters

Permanent pipe-to-soil potential meters exist at many of the facilities in the Swan Hills district. These meters were intended to allow operations personnel to monitor cathodic protection levels on the pipelines. Over the years, these meters have deteriorated or have been damaged. At this time, the majority of the meters are either inoperable or inaccurate and should not be relied upon as a means of monitoring pipeline protection levels.

Annual surveys of the pipelines, in conjunction with monthly rectifier maintenance checks, are considered to be an effective means of ensuring adequate protection. If monthly monitoring of potentials is desired, a major upgrading program will be required.

Status of Electrical Insulation and Continuity

Culverts

The culverts at the G220 valve Judy Creek pump station, HI-30 at the Lario/Cyries (now Iteration) mainline tie-in and BE-30 at Celtic (Home 12) are shorted to the piping. These shorts cause an unnecessary drain on the cathodic protection system and could shield the piping inside the culvert from protection. The culverts should be inspected to determine the point of contact between the culvert and the piping. If possible, each culvert should be cut away from the piping, or the rubber matting should be placed between the culvert and the pipe.

Casings

The casing at Mile 56.8 on the 'B' line and Mile 115 on the 'A' line are electrically shorted to the carrier pipelines, but they were filled with an inert inhibitor in 1999 to mitigate corrosion in the annular space. Potential shifts were noted at both casings and this is not of a concern, due to the annulus space being filled with the inhibitor.

Some casings were found to be partially shorted to the pipelines and the annular space between the casing and carrier pipe should be blown out, pressure tested and if pressure maintained, filled with inhibitor to prevent corrosion in the annular space at the following locations:

<u>Location</u>	<u>Line</u>	<u>Potential (On/Off)</u>
Mile 48.9	A	-1090/-1000
Mile 74.1	B	-1080/-850
Air Marker J	B	-1200/-1100
Hwy #32 Crossing	B	-950/-890

Stations and Block Valves

The initial cathodic protection design required insulating kits to be installed at the stations and block valve sites to isolate these facilities and protect only the pipelines. In many cases, the insulating kits were not effective in isolating the facilities from the pipelines due to electrical shorts through the electrical grounding systems. In spite of the numerous ‘shorts’, adequate levels of protection were maintained on the pipelines. Consequently, maintaining effective isolation at the stations is only recommended where pipeline protection levels are low.

Effective isolation does not exist at the Iteration 06-32-64-12 tie-in. In order to increase protection levels on the pipeline, it is recommended that the 2” 600lb RF insulating kit be replaced at the tie-in riser. The location of the required insulators was flagged for easy identification.

At the ARC 10-17-68-10 W5M location, a 2” insulating union is required on the pig drain line, to isolate from the foreign battery.

At the Swan Hills Terminal, the insulating kit needs to be relocated to the field side of B110 BOV at the south 10” (09-24) sending trap.

At the Pengrowth Judy Creek Field Gate, a 4” 600lb insulating kit is required at the 6” tie-in, as flagged.

The Devon 02-07 line at the Swan Hills NGL terminal was found to be isolated from the cathodic protection system due to re-piping work in progress. The line is now blinded underground, with a bond cable brought to surface that was re-connected to the cathodic protection system. Adequate levels of protection were achieved.

Station piping changes are underway at the Swan Hills NGL site and at the Judy Creek Meter Sites #1 and #2. A re-check of the status and effectiveness of the cathodic protection systems should be made as soon as possible once the piping changes are complete.

Status of Electrical Interference

Bonds to foreign operators are being used to control interference effects. A list of bonds is given in Appendix 6. No significant uncontrolled interference effects were observed during the 2010 survey.

Induced AC

AC electrical potentials were measured on the various lines where they are in proximity to overhead power lines. In most areas, induced AC potentials were found to be less than 2 volts AC and are not of concern at this time; however, AC potentials greater than 10 VAC were observed on the Swan Hills to Mitsue pipeline between Mile posts 30 and 50. All measured potentials were less than 15 VAC, which is considered to be the 'safe' limit, but potentials can vary depending on loading of the power lines. Consequently, safety hazards could exist at pipeline appurtenances (valves, risers, test stations, and etc) during periods of high electrical demand. In addition, induced AC voltages can lead to external pipeline corrosion, even if otherwise adequate levels of protection are being maintained. To ensure worker safety and to prevent the possibility of AC corrosion, it is recommended that a study be conducted to determine the most effective means of reducing AC voltages on the Swan Hills to Mitsue pipeline. This may be done in conjunction with the Nipisi Pipeline project.

Status of Cathodic Protection

As outlined in Appendix 8, the criteria to indicate adequate cathodic protection is the achievement of an instant ‘OFF’ potential of -850 millivolts when referenced to a copper-copper sulphate half-cell in contact with the soil electrolyte. Since all of the rectifiers in the system could not be simultaneously interrupted, a minimum -900 millivolts potential criterion is used here to allow for possible ‘IR Drop errors’.

Structure-to-soil potential data given in Appendices 3, 4 and 5 show that adequate levels of cathodic protection are being applied to the vast majority of pipelines and structures. Areas not receiving adequate protection are discussed below:

Crude Oil System

Judy Creek Pump Station

Adequate levels of protection are being achieved throughout the station. In addition, an attempt was made to clean out the monitoring tubes under the tanks with a snake in order to facilitate a tank profile survey, but the tubes were found to be solidly blocked. Additional cathodic protection equipment would be required to ensure full protection to these tanks.

Protection levels are below the minimum criterion at the Iteration 06-32-64-12 tie-in due to a lack of isolation. Insulation requirements are given in the “Recommendations” section of this report.

The PrimeWest 04-02-65-13 to Enermark 10-36-64-14 pipeline is disconnected from the cathodic protection systems and unprotected. Corrpro Canada, Inc. has been advised that this piping has been abandoned and therefore repairs are not required.

High levels of protection are indicated throughout the majority of the Swan Hills terminal, but no protection is being achieved at the “Station #1” piping of the V-21 check valve. Pembina should confirm that this piping has been abandoned.

There are two sections of line where cathodic protection is supplied by foreign parties. The Apache Belloy loop line was again found protected with current supplied by foreign rectifiers. The line is assumed to be bonded into the Apache Canada system at an unknown location. In 1993, the line was found isolated and a continuity bond was installed above grade at the Apache Belloy loop tie-in crossover valve. This year, as in previous years, the original bond or any associated above ground piping could not be located. Either an agreement should be put in place for Apache Canada to protect this line, or further investigation should be undertaken to determine how the line is electrically isolated from the Pembina rectifiers.

The pipeline between Mobil Amurex and the Mobil Amurex/Deer Mountain crossover is unprotected. Corrpro Canada, Inc. has been

advised that this “leased” line is abandoned and protection is not required.

If protection is required, a bond could be installed between a protected line approximately 100m away in the right-of-way, and the underground portion of the cut-off Amurex line.

Natural Gas Liquids System

The vast majority of the NGL system is receiving adequate levels of protection.

Areas not receiving adequate protection are as follows:

- The Apache 04-02 tie-in on the Sarah Lake to Virginia Hills section is disconnected and unprotected. Corrpro Canada, Inc. has been advised that this section of line is abandoned, so repairs are not required.
- The Devon 02-07 line was found discontinuous with the cathodic protection system due to piping changes underway at the Swan Hills NGL terminal. A bond cable runs to the Swan Hills end of the line, which is now cut off underground, was spliced to the cathodic protection system during the 2010 survey by Pembina crews to restore continuity and protection. A permanent junction box/bond panel should be installed once the piping changes are complete.

Interrupted potentials were obtained on all station piping. Some station piping is isolated or being provided protection from foreign rectifiers. All of the stations that appear to be protected by analyzing the ‘ON’ potentials are as follows:

Freeman River Pump Station	By Pembina
Judy Creek Fieldgate	By Pengrowth
Judy Creek Block Valve Site	By Pembina
Sarah Lake Junction	By Pembina
Virginia Hills Meter Site	By PrimeWest

The Home 13 lateral is discontinuous due to the section of pipeline that has been replaced with an above grade plastic line. The bond to the ARC Resources (Home 13) rectifier is designed to provide protection to the upstream pipeline, however protection is presently being provided instead through a short between ARC and Pembina at the Pembina 2" trap drain line. The Deer Mountain and House Mountain rectifiers are protecting the downstream line. The abandoned section of line is not being protected by Pembina.

APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010

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House Mountain	8
Pengrowth 02-09 Water Plant (Foreign)	9
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Goose River Block Valve	12

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
EDMONTON SWAN HILLS DISTRICT
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



CODE: CATH 0022
LOCATION: HIGHRIDGE PUMP STATION MILE 48.8
 (16-21-58-01 W5M)
MANUFACTURER: GOODALL
MODEL: JA 30-28-CZ
SERIAL NUMBER: 69C1633
A.C. INPUT: 230V/6.2A
D.C. OUTPUT: 30V/28A
TARGET OUTPUT: 26.0 - 28.0 AMPERES
GROUND BED DATA: 9 TAD CANISTER ANODES; 1993
 15 TA-2 ANODES SEMI-DEEP, 3 ANODES/HOLE; 1998

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>TOTAL AMPS</u>	<u>CCT #1 AMPS</u>	<u>C/R</u>	<u>REMARKS</u>
Sep 14/05	AF	C2F4	18.00	24.00	23.50	0.75	2005 Survey
	ACT/AL	C2F4	18.20	23.80	23.40	0.76	
Sep 29/05	AF/AL	C2F4	18.10	23.80	23.40	0.76	G/B B2 repairs
Dec 20/06	AF	C3F1	20.00	30.00	--	0.67	2006 Survey
	ACT	C3F1	19.60	30.00	--	0.65	
Oct 18/07	AF	CCF1	--	--	--	--	2007 Survey; Off scale
	AA	CBF5	19.00	25.00	25.00	0.76	
	AM/AL	CBF5	20.30	26.20	24.80	0.77	
Sep 21/08	AF	CBF5	18.00	26.00	--	0.69	2008 Survey
	AM/AS/AL	CBF5	19.10	28.09	--	0.68	
May 26/09	AF	CBF5	18.00	27.25	--	0.66	2009 Survey
	AM/AL	CBF5	18.76	27.01	--	0.69	
July 5/10	AF	CBF5	18.00	28.00	--	0.64	2010 Survey
	AM/AS	CBF5	18.62	27.80	--	0.67	
<u>Groundbed Data (Amperes)</u>							2009 Survey
South	1	1.90	North Center				North center B2; South #1 found disc; Spliced and reconnected
	2	2.86			1	1.22	
	3	1.62			2	2.10	
South Center			North		3	1.46	
	1	1.61			1	1.55	
	2	1.16			2	2.16	
Center	3	1.90			3	1.35	
	1	1.28					
	2	2.32					
	3	1.82					

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



LOCATION: ATHABASCA NORTH BLOCK VALVE SITE
(14-35-61-06 W5M)
MANUFACTURER: RTS **GPS LOCATION:** 24.32557°N
MODEL: CSAYSA 30-12 **114.7905°W**
SERIAL NUMBER: C-87289
A.C. INPUT: 115V/5.3A
D.C. OUTPUT: 30V/12A
TARGET OUTPUT: 8.5 - 9.5 AMPS
GROUND BED DATA: 7 TAD CANISTER ANODES CONVENTIONAL - HORIZONTAL
INSTALLED JUNE 1987

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>AMPS</u>	<u>C/R</u>	<u>REMARKS</u>
Sep 27/04	AF	CCF1	16.00	9.20	1.74	2004 Survey
	ACT/AL	CCF1	16.20	9.40	1.72	
Sep 16/05	AF	CCF1	15.50	9.00	1.72	2005 Survey
	ACT/AL	CCF1	15.90	9.20	1.73	
Oct 6/06	AF	CCF1	16.00	8.70	1.84	2006 Survey
	ACT/AL	CCF1	16.60	8.60	1.93	
Oct 18/07	AF	CCF1	17.00	8.50	2.00	2007 Survey
	AM/AL	CCF1	17.30	8.42	2.05	
Oct 29/08	AF	CCF1	16.75	8.50	1.97	2008 Survey
	AM/AL	CCF1	17.15	8.61	1.99	
May 28/09	AF	CCF1	17.25	7.00	2.46	2009 Survey
	AA	CCF2	18.50	8.50	2.18	
	AM/AL	CCF2	18.93	8.40	2.25	
July 5/10	AF	CCF2	18.00	8.00	2.25	2010 Survey
	AM/AL	CCF2	18.61	8.52	2.18	

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



LOCATION: JUDY CREEK PUMP STATION
(NE 34-63-10 W5M)
MANUFACTURER: GOODALL
MODEL: JSAWSC 30-28 **GPS LOCATION:** 45.50020°N
SERIAL NUMBER: 70C2025 **115.4196°W**
A.C. INPUT: 230V/6.2A
D.C. OUTPUT: 30V/28A
TARGET OUTPUT: 25.0 - 28.0 AMPS
GROUND BED DATA: 14 DURICHLOR CD-51/26 - GCI 2" x 60"
CONVENTIONAL - HORIZONTAL - DISTRIBUTED
INSTALLED 1982/1999

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>AMPS</u>	<u>C/R</u>	<u>REMARKS</u>
Sep 10/02	AF	C2F1	9.00	23.00	0.39	
	AM/AL	C2F1	9.45	22.86	0.41	
Sep 10/03	AF	C2F1	9.00	22.50	0.40	
	AM/AL	C2F1	9.60	21.10	0.45	
Sep 27/04	AF	C2F1	6.00	13.00	0.46	2004 Survey
	AM	C2F1	6.16	12.90	0.48	
	AA/AL	C2F4	9.05	20.96	0.43	
Oct 5/05	AF	C2F4	8.00	19.50	0.41	2005 Survey
	ACT	C2F4	8.60	18.50	0.46	2.7A = Tank anodes
	AS/AL	C2F5	9.60	23.00	0.42	
Oct 3/06	AF	C2F5	9.00	22.00	0.41	2006 Survey
	ACT/AL	C2F5	9.50	22.00	0.43	3.8A = Tank anodes
Oct 14/07	AF	C2F5	8.75	22.00	0.40	2007 Survey
	AM/AL	C2F5	9.40	21.20	0.44	3.4A = Tank anodes
Oct 29/08	AF	CBF5	9.25	23.30	0.40	2008 Survey
	AM/AL	CBF5	9.78	20.72	0.47	
May 29/09	AF	CBF5	9.00	25.00	0.36	2009 Survey
	AM/AS	CBF5	9.62	20.40	0.47	Adjusted Meter
July 5/10	AF	CBF5	6.00	23.00	0.26	2010 Survey; Meter max adjustment
	AM	CBF5	7.10	19.60	0.36	3.6A = Tank anodes
	AA	CCF2	9.00	27.50	0.33	
	AM/AS	CCF2	9.72	25.10	0.39	

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



LOCATION: SWAN HILLS PUMP STATIONS #1
(12-19-66-09 W5M)
MANUFACTURER: GOODALL **GPS LOCATION:** 54.72889°N
MODEL: CSAWSE 60-22 **115.3606°W**
SERIAL NUMBER: C - 061136
A.C. INPUT: 115/230 V - 17.4/8.72
D.C. OUTPUT: 60V/22A
TARGET OUTPUT: 18.0 - 22.0 AMPERES
GROUND BED DATA: 12TA - 2 CAST IRON ANODES CONVENTIONAL HORIZONTAL - INSTALLED 2006
6TA - 2 CAST IRON ANODES CONVENTIONAL HORIZONTAL - INSTALLED 2006

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>TOTAL AMPS</u>	<u>#1 AMPS</u>	<u>#2 AMPS</u>	<u>C/R</u>	<u>REMARKS</u>
Sep 27/04	AF	C2F5	22.50	15.00			1.50	2004 Survey
	ACT/AL	C2F5	26.00	15.00			1.73	
	TERMINAL	--	--	8.80			--	
	MOBIL AMUREX	--	--	4.20			--	
	MITSUE	--	--	2.00			--	
	BOND	--	--	0.00			--	
	DEER MOUNTAIN	--	--	0.00			--	
Oct 3/05	AF	C2F5	30.00	0.00			--	2005 Survey; Positive cable break Cable repaired
	ACT	C2F5	34.50	0.00			--	
	AE	C2F5	22.00	15.80			1.39	
	ACT/AL	C2F5	25.00	15.80			1.58	
Oct 2/06	AF	CCF2	31.00	19.40	11.00	8.40	1.60	2006 Survey
	ACT/AL	CCF2	31.20	19.20	10.80	8.40	1.63	
Oct 10/07	AF	CCF2	30.00	18.50	10.00	9.00	1.62	2007 Survey
	AM/AL	CCF2	31.50	18.50	9.80	8.70	1.70	
Oct 22/08	AF	CCF2	31.00	18.50	10.00	9.00	1.68	2008 Survey
	AM/AL	CCF2	31.36	18.77	9.51	9.26	1.67	
May 28/09	AF	CCF2	32.00	17.00	9.50	7.50	1.88	2009 Survey
	AM	CCF2	32.48	16.65	9.40	6.80	1.95	
	AA	CCF3	35.00	18.50	10.50	8.50	1.89	
	AM/AS	CCF3	35.63	18.36	10.23	8.23	1.94	
July 5/10	AF	CCF4	34.00	22.00	10.00	9.50	1.55	2010 Survey
	AM/AS	CCF4	34.53	21.64	9.98	9.71	1.60	

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



LOCATION: SWAN HILLS PUMP STATIONS #2
(12-19-66-09 W5M)

MANUFACTURER: RTS **GPS LOCATION:** 54.72796°N
MODEL: CSAYSA 30-12 **115.3626°W**
SERIAL NUMBER: C85224
A.C. INPUT: 115V/5.3A
D.C. OUTPUT: 30V/12A
TARGET OUTPUT: 9.0 - 12.0 AMPS
GROUND BED DATA: 8 DURIRON TA-CD CAST IRON ANODES CONVENTIONAL
HORIZONTAL; INSTALLED 1985

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>AMPS</u>	<u>C/R</u>	<u>REMARKS</u>
Oct 2/06	AF	CCF1	16.00	9.50	1.68	2006 Survey
	ACT/AL	CCF1	15.70	11.30	1.39	Loose meter connection
	Sarah Lake	--	--	2.20	--	repaired
	Home 1	--	--	7.00	--	
	Home 2-6	--	--	2.80	--	
Oct 10/07	AF	CCF1	1.80	0.00	--	2007 Survey; Fuse blown
	AE	CCF1	15.50	11.50	1.35	Replaced fuse
	AM/AL	CCF1	15.42	12.60	1.22	
	Sarah Lake	--	--	1.60	--	Rheo @ 24%
	Home 1	--	--	2.10	--	Rheo @ 78%
	Home 2-6	--	--	2.80	--	Rheo @ 51%
Oct 22/08	AF	CCF1	16.00	11.20	1.43	2008 Survey
	AM/AL	CCF1	16.13	11.32	1.42	
	Sarah Lake	--	--	2.02	--	Rheo @ 24%
	Home 1	--	--	6.80	--	Rheo @ 78%
	Home 2-6	--	--	2.80	--	Rheo @ 52%
May 28/09	AF	CCF1	16.87	9.60	1.76	2009 Survey
	AM/AS	CCF1	16.13	10.76	1.50	
	Sarah Lake	--	--	2.14	--	Rheo @ 24%
	Home 1	--	--	6.45	--	Rheo @ 78%
	Home 2-6	--	--	2.26	--	Rheo @ 52%
July 5/10	AF	CCF1	15.00	7.00	2.14	2010 Survey
	AM/AS	CCF1	15.92	10.25	1.55	
	Sarah Lake	--	--	1.88	--	Rheo @ 24%
	Home 1	--	--	5.65	--	Rheo @ 78%
	Home 2-6	--	--	2.72	--	Rheo @ 52%

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



LOCATION: SARAH LAKE JUNCTION
(02-13-65-11 W5M)
MANUFACTURER: GOODALL **GPS LOCATION:**
MODEL: JSAWSA 30-12 Z **54.61797°N**
SERIAL NUMBER: 70C1396 **115.5204°W**
A.C. INPUT: 115V/5.3A
D.C. OUTPUT: 30V/12A
TARGET OUTPUT: 9.0 - 10.0 AMPS
GROUND BED DATA: 16 - HSCI ANODES SEMI-DEEP; 4 ANODES/HOLE; 2008

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>TOTAL AMPS</u>	<u>CCT #1 AMPS</u>	<u>C/R</u>	<u>REMARKS</u>
Sep 10/02	AF	C2F2	8.00	8.80	8.50	0.91	
	AM/AL	C2F2	8.95	9.05	8.90	0.99	
Sep 10/03	AF	C2F2	8.50	8.40	8.40	1.01	
	AM/AL	C2F2	12.54	9.10	8.95	1.38	
Sep 27/04	AF	C2F2	8.50	8.20	--	1.04	2004 Survey
	AM	C2F2	12.62	8.29	--	1.52	
	AA/AL	C2F3	14.10	9.60	--	1.47	Adjusted to target
Oct 6/05	AF/AL	C2F3	9.00	9.30	--	0.97	2005 Survey
	ACT	C2F3	14.90	9.40	--	1.59	
Oct 5/06	AF	C2F3	10.00	7.80	--	1.28	2006 Survey
	ACT	C2F3	15.50	7.50	7.30	2.07	
	AS/AL	C2F5	19.30	10.50	10.20	1.84	
Oct 13/07	AF	C2F5	15.00	10.00	10.00	1.50	2007 Survey
	AM/AL	C2F5	16.30	10.70	10.30	1.52	
Oct 25/08	AF	C2F4	12.50	9.00	9.00	1.39	2008 Survey
	AM/AL	C2F4	13.20	9.34	9.02	1.41	
May 31/09	AF	CAF4	7.20	9.50	9.20	0.76	2009 Survey
	AM/AS	CAF4	7.12	9.63	8.98	0.74	
July 7/10	AF	CBF4	7.00	9.50	8.50	0.74	2010 Survey
	AM/AS	CBF4	6.88	9.48	8.79	0.73	

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



LOCATION: DEER MOUNTAIN
(04-07-69-08 W5M)

MANUFACTURER: RTS **GPS LOCATION:** 54.95381°N
MODEL: VAYSA 20-5 115.2213°W
SERIAL NUMBER: C84418
A.C. INPUT: 115V/1.54A
D.C. OUTPUT: 20V/5A
TARGET OUTPUT: 1.5 - 2.0 AMPS
GROUND BED DATA: 4 TA-D CONVENTIONAL HORIZONTAL ANODES
INSTALLED 1984

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>AMPS</u>	<u>C/R</u>	<u>REMARKS</u>
Sep 9/03	AF	30%	4.50	3.40	1.32	
	AM/AL	30%	4.65	3.45	1.35	
Sep 28/04	AF	28%	4.80	3.20	1.50	2004 Survey
	ACT/AL	28%	6.10	3.30	1.85	
Oct 4/05	AF	25%	4.00	2.10	1.90	2005 Survey
	ACT	25%	5.80	2.20	2.64	
	AS/AL	20%	4.80	1.50	3.20	
May 5/05	AF	25%	4.00	3.00	1.33	Neg connection repaired HM lateral commissioning
	AA/AL	18%	3.00	1.00	3.00	
Oct 2/06	AF	24%	4.50	2.20	2.05	2006 Survey
	ACT	24%	5.70	2.10	2.71	
	AS/AL	20%	4.70	1.60	2.94	
Oct 10/07	AF	18%	4.00	0.75	5.33	2007 Survey
	AM	18%	3.80	0.60	6.33	
	AA	20%	4.70	1.50	3.13	
Oct 22/08	AF	20%	--	--	--	2008 Survey; Fuse blown; Replaced
	AE	20%	4.00	1.20	3.33	
	AA/AM/AL	22%	5.10	2.00	2.55	
May 30/09	AF	22%	5.00	2.10	2.38	2009 Survey
	AM/AS	22%	4.82	2.30	2.10	
July 6/10	AF	24%	5.00	2.40	2.08	2010 Survey
	AA	20%	4.80	2.00	2.40	
	AM/AS	20%	4.69	2.01	2.33	

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



LOCATION: HOUSE MOUNTAIN
(04-09-70-10 W5M)
MANUFACTURER: CORRPOWER **GPS LOCATION:** 55.03999°N
MODEL: VAYSA 40-8 115.4370°W
SERIAL NUMBER: C-022204
A.C. INPUT: 115V/4.36A
D.C. OUTPUT: 40V/8A
TARGET OUTPUT: 3.5 - 4.5 AMPS
GROUND BED DATA: 4 HSCCI ANODES IN ONE SEMI-DEEP WELL; INSTALLED 2002

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>AMPS</u>	<u>C/R</u>	<u>REMARKS</u>
Sep 17/02	AF	19%	5.50	5.40	1.02	New rectifier and anodes installed in 2002
	AM/AL	19%	5.89	5.20	1.13	
Sep 9/03	AF	19%	5.50	5.40	1.02	
	AM/AL	19%	5.74	5.25	1.09	
Sep 28/04	AF	19%	6.00	5.60	1.07	2004 Survey
	ACT/AL	19%	5.80	5.40	1.07	
May 5/05	AF	22%	7.20	5.30	1.36	
	AA/AL	17%	5.90	4.00	1.48	
Oct 4/05	AF	17%	5.20	3.80	1.37	2005 Survey
	ACT/AL	17%	5.10	3.70	1.38	
Oct 2/06	AF	7%	3.50	0.40	8.75	2006 Survey
	ACT	7%	2.90	0.40	7.25	
	AS/AL	17%	6.00	3.60	1.67	
Oct 10/07	AF	17%	5.80	3.60	1.61	2007 Survey
	AM/AL	17%	5.87	3.68	1.60	
Oct 22/08	AF	17%	5.50	3.60	1.53	2008 Survey
	AM/AL	17%	5.72	3.71	1.54	
May 30/09	AF	17%	5.00	3.40	--	2009 Survey
	AM	17%	5.21	3.23	1.61	
	AA/AS	19%	6.00	4.00	1.50	
July 6/10	AF	18%	6.00	4.20	1.43	2010 Survey
	AM/AS	18%	6.14	4.31	1.42	

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



LOCATION: PENGROWTH 02-09 WATER PLANT (FOREIGN)
(02-09-63-11 W5M)
MANUFACTURER: GOODALL **GPS LOCATION:** 54.43071°N
MODEL: AN 12R 3AN 115.5975°W
SERIAL NUMBER: 64C6456
A.C. INPUT: 115V/6.8A
D.C. OUTPUT: 36V/12A
TARGET OUTPUT: 4.0 AMPS FEDERATED
GROUND BED DATA: UNKNOWN
INSTALLED: UNKNOWN

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>AMPS</u>	<u>C/R</u>	<u>Pembina AMPS</u>	<u>REMARKS</u>
Sep 10/02	AF	Hi 100%	50.00	3.20	15.63	1.20-80%	
	AM	Hi 100%	56.55	3.21	17.62	1.27-80%	
	AA/AL	Hi 100%	56.55	3.21	17.62	1.87-100%	
Sep 12/03	AF	Hi 100%	50.00	0.50	100.00	0.20-100%	
	AM	Hi 100%	53.65	0.62	86.53	0.32-100%	
Oct 27/03	AE	Hi 64%	8.20	4.80	1.71	2.80A - PPL	
	AA/AL	Hi 48%	6.80	4.00	1.70		
Sep 28/04	AF	Hi	8.00	7.60	1.05	3.2A-PPL	2004 Survey
	AM	Hi	8.52	6.60	1.29	3.2A-PPL	I/F @ 2.5A
	AA/AL	Hi	8.52	6.60	1.29	4.0A-PPL	Target changed to 4.0A
Oct 7/05	AF/AL	Hi	11.00	8.80	1.25	4.0A-PPL	2005 Survey
Oct 7/06	AF	Hi 50%	9.20	7.00	1.31	4.0A-PPL	2006 Survey
	ACT/AL	Hi 50%	9.00	6.90	1.30	4.0A-PPL	
Oct 17/07	AF/AL	--	--	--	--	--	2007 Survey; OFF
Oct 22/08	AF/AL	--	--	--	--	--	2008 Survey; Locked
Jun 3/09	AF/AL	Hi	10.00	6.56	1.52	4.29A PPL	2009 Survey
July 7/10	AF/AS	Hi	10.12	6.30	1.61	4.72A PPL	2010 Survey; PPL rheo @ 100%

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



LOCATION: ARC RESOURCES (HOME 13) (FOREIGN)
 (10-17-68-10 W5M) **GPS LOCATION:** 54.88939°N
MANUFACTURER: CORRPWER 115.4848°W
MODEL: CSAYSD 30-16 BB
SERIAL NUMBER: C-061317
A.C. INPUT: 460VAC/1.7AAC
D.C. OUTPUT: 30V/16A
TARGET OUTPUT: 4.0 - 5.0 AMPS FEDERATED
GROUND BED DATA: UNKNOWN **A.C. TO D.C. STACK EFFICIENCY:** 52% (OVERALL)
INSTALLED: UNKNOWN 55% (STACK)

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>Total AMPS</u>	<u>#1 ARC AMPS</u>	<u>#2 Pembina AMPS</u>	<u>#3 ARC AMPS</u>	<u>#2</u>	<u>#3</u>	<u>C/R</u>	<u>REMARKS</u>
Jul 18/01	AF	CBF1	15.00	12.80	9.00	3.60	0.20	--	--	1.17	
	AM/AL	CBF1	16.10	12.80	8.84	3.64	0.32	100%	100%	1.26	
Sep 13/02	AF	CBF1	16.00	14.00	9.65	4.00	--	--	--	1.14	
	AM/AL	CBF1	17.45	13.60	9.60	3.80	0.20	100%	100%	1.28	
Sep 12/03	AF	CCF2	17.00	12.00	7.40	4.40	0.20	100%	100%	1.42	Meter
	AM/AL	CCF2	18.03	12.05	7.55	4.00	0.30	100%	100%	1.50	calibrated
Sep 28/04	AF	CCF2	18.00	11.00	7.20	4.20	--	100%	100%	1.64	2004 Survey
	AM	CCF2	18.52	10.72	6.88	3.89	0.10	100%	100%	1.73	Adjusted to
	AA/AL	CCF3	19.95	12.05	7.70	4.05	0.30			1.66	target
Oct 4/05	AF	CDF2	27.00	12.40	8.20	4.60	--	100%	100%	2.18	2005 Survey
	ACT/AL	CDF2	27.60	12.00	7.60	4.20	0.20			2.30	
Oct 4/06	AF	CDF2	30.00	6.20	3.60	2.60	--			4.84	2006 Survey
	ACT/AL	CDF2	30.10	5.90	3.30	2.60	0.00			5.10	
Oct 11/07	AF	CEF1	32.00	8.00	6.50	2.00	--	100%	100%	4.00	2007 Survey
	AM/AL	CEF1	32.30	7.80	6.50	1.30	--			4.14	
Oct 22/08	AF	CEF1	33.00	0.16	--	--	--			206.25	2008 Survey Notified ops
May 30/09	AF/AL	CEF1	32.00	2.50	1.50	0.50	0.50			12.80	2009 Survey
July 6/10	AF/AL	CEF1	32.00	1.89	1.60	0.27	0.01			16.93	2010 Survey

APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT NORTHERN EXPANSION PIPELINE
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010



LOCATION: JUDY CREEK METER SITE #3 @ SE 25-64-11 W5M
MANUFACTURER: RTS
MODEL: CAYSC 30-12 BBKOZZ **GPS LOCATION:** 54.5629°N
SERIAL NUMBER: C-98751 **115.5144°W**
A.C. INPUT: 208 VOLTS - 2.5 AMPERES - 1 PHASE
D.C. OUTPUT: 30 VOLTS - 12 AMPERES
TARGET OUTPUT: 6.0 - 6.5 AMPERES
GROUND BED DATA: 12 ONLY 51mm x 1524mm SiFeCr ALLOY ANODES INSTALLED w/ 4 ANODES
 PER HOLE IN 3 SEMI-DEEP G/B's; SEPTEMBER 1998

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>TOTAL AMPS</u>	Snipe Lake		<u>IOL Lat. Neg #3 AMPS</u>	<u>C/R</u>	<u>REMARKS</u>
					M/L Neg #1 AMPS	Stn Neg #2 AMPS			
Sep 16/03	AF	CAF5	4.50	4.80	--	2.20	--	0.94	
	AM/AL	CAF5	4.85	4.93	2.70	2.22	0.10	0.98	
Sep 28/04	AF	CAF5	4.50	5.00	3.00	2.00	--	0.90	2004 Survey
	AM/AL	CAF5	4.75	4.92	2.70	2.12	0.10	0.97	
Oct 5/05	AF	CAF5	4.90	--	3.00	1.50	--	--	New sealed meter switch req'd
	ACT/AL	CAF5	4.90	4.80	3.20	1.50	0.10	1.02	
Oct 25/05	AF	CAF5	4.80	4.80	3.20	1.50	--	1.00	2005 Survey
	AM/AL	CAF5	4.90	4.77	3.27	1.53	--	1.03	
Oct 5/06	AF	CAF5	5.00	4.80	3.20	1.60	--	1.04	2006 Survey
	ACT	CAF5	4.90	4.70	3.30	1.40	--	1.04	
	AS/AL	CBF1	6.00	6.80	4.70	1.90	--	0.88	
Oct 14/07	AF	CBF1	6.00	7.00	4.50	2.00	--	0.86	2007 Survey
	AM/AL	CBF1	5.87	6.84	4.53	1.91	--	0.86	
Oct 23/08	AF	CBF1	6.50	5.40	--	--	--	1.20	2008 Survey; Meter needle sticks
	AM/AS	CBF1	6.12	6.58	4.62	1.96	--	0.93	
May 31/09	AF	CBF1	6.00	6.50	4.50	2.00	--	0.92	2009 Survey
	AM/AS	CBF1	5.81	6.47	4.56	1.92	--	0.90	
July 5/10	AF	CBF1	6.00	6.40	4.50	2.00	--	0.94	2010 Survey
	AM/AS	CBF1	5.90	6.74	4.60	2.14	--	0.88	

**APPENDIX 1
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT NORTHERN EXPANSION PIPELINE
CUMULATIVE RECTIFIER AND GROUND BED DATA
2010**



LOCATION: GOOSE RIVER @ 07-13-66-15 W5M
MANUFACTURER: RTS
MODEL: CAYSC 30-12 BKOZZ **GPS LOCATION:** 54.69784°N
SERIAL NUMBER: C-98750 **116.1314°W**
A.C. INPUT: 230 VOLTS - 2.5 AMPERES - 1 PHASE
D.C. OUTPUT: 30 VOLTS - 12 AMPERES
TARGET OUTPUT: 1.0 - 2.0 AMPERES
GROUND BED DATA: 12 ONLY 51mm x 1524mm SiFeCr ALLOY ANODES INSTALLED
w/ 4 ANODES PER HOLE IN 3 SEMI-DEEP G/B'S; JAN. /99

<u>DATE</u>	<u>STATUS</u>	<u>TAP</u>	<u>VOLTS</u>	<u>AMPS</u>	<u>C/R</u>	<u>REMARKS</u>
Sep 18/03	AF	CAF3	3.00	1.20	2.50	
	AM/AL	CAF3	3.35	1.22	2.75	
Sep 29/04	AF	CAF3	3.00	1.20	2.50	2004 Survey
	AL	CAF3	3.25	1.24	2.62	
Oct 25/05	AF	CAF3	3.00	1.20	2.50	2005 Survey
	AM	CAF3	3.18	1.08	2.94	
	AL	CAF3	3.25	1.24	2.62	
Dec 20/06	AF	CAF3	3.20	1.20	2.67	2006 Survey
	ACT/AL	CAF3	3.30	3.30	1.00	
Oct 15/07	AF	CAF3	3.00	1.20	2.50	2007 Survey
	AM/AL	CAF3	3.10	1.10	2.82	
Oct 24/08	AF	CAF3	3.00	1.20	2.50	2008 Survey
	AM/AL	CAF3	3.15	1.15	2.74	
May 31/09	AF	CAF3	3.00	1.00	3.00	2009 Survey
	AM/AS	CAF3	3.09	1.12	2.76	
July 7/10	AF	CAF3	3.00	1.20	2.50	2010 Survey
	AM/AS	CAF3	3.12	1.50	2.08	

APPENDIX 2
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
STRUCTURE-TO-SOIL POTENTIAL DATA
CRUDE OIL SYSTEM
2010

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APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>			POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
			Structure		Other			
			<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
<u>Highridge Mile 48.8 to Judy Creek Pump Station</u>								
Mile 48.9 Road Crossing	Stud	B	1860	1020	610	610	285	TWP Rd 584 Vent casing
Mile 49.9 Road Crossing	Red	B	1520	1000	--	--	286	Range Rd. 14
Mile 51.5 Road Crossing	Red	B	1340	1010	580	580	287	Sec 654 Vent casing
Mile 52.9 Road Crossing	Black	B	1210 1120	1110 1000	-- 1290	-- 1120	288	Range Rd 20 Bond to 'A' I = 1320mA ON/710mA OFF to B Bond disconnected
Mile 54.4 Road Crossing	Black	B	1240	1030	510	510	289	Twp. Rd. 592 Vent casing
Mile 56.8 Road Crossing	Black	B	1270	1040	1120	1050	290	Range Road 23 Vent casing filled 1999; Shorted

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION			POTENTIAL (-mV)				Waypoint	REMARKS
			Structure		Other			
			ON	OFF	ON	OFF		
Mile 58.0 Road Crossing	#2 Black	B	1260	1010	--	--	291	Range Road 24
Mile 59.0 Road Crossing	#2 Black	B	1240	1020	620	620	292	Range Road 25 Vent casing
Mile 59.6 Road Crossing	Black	B	1250	1050	600	600	293	Twp Road 594 Vent casing
Mile 63.6 #18 Road Crossing	Black	B	1270	1070	660	660	309	Vent casing
Mile 63.8	V-86	B	1200	980	760	760	308	Other = Culvert
Mile 65.0	Black	B	1210	980	560	560	294	Casing; North of Barrhead; RR 34
Mile 67.5 Road Crossing		B	1240	1050	--	--	307	Range Road 40

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



<u>LOCATION</u>			POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
			Structure		Other			
			<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Mile 69.9 Road Crossing	Black	B	1340	1126	--	--	306	Range Road 42
Mile 70.9 Road Crossing	Black	B	1290	1060	580	580	305	West of Bloomsbury; TWP Rd 604 Vent casing
Mile 71.2 Road Crossing	#2 Blue		1260	1010	--	--	304	Range Road 43; Replaced mini fink head Common TP w/NGL Dead lead
	#3 White		--	--	--	--		
Mile 72.1 Road Crossing	Black	B	1440	1070	610	610	303	Range Road 43A Vent casing
Mile 74.1 Hwy 33 Road Crossing	Black	B	1510	1120	1080	850	302	Vent casing; Shorted
Mile 76.6 Camp Creek Pump Stn.	Upstream B		1560	1060	--	--	301	1.8 VAC Station piping removed Station piping removed
	16"		--	--	--	--		
	Downstream B		1560	1060	--	--		
	16"		--	--	--	--		

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION			POTENTIAL (-mV)				Waypoint	REMARKS
			Structure		Other			
			ON	OFF	ON	OFF		
Indicating Meter								
	Upstream B		1400	1100	1100	--		Other = Zinc reference Actual/AL -Calibrated
			1550	1080	1060	--		
Mile 78.1 Road Crossing								Range Road 52
	Wire	B	1490	1060	--	--	300	
Mile 80.2 Road Crossing								
	Black	B	1490	1050	--	--	299	
Mile 83								Range Road 60A Casing
	Black	B	1570	1090	580	580	297	
Mile 83.7 Athabasca S. Block Valves								296
	V-93	B	1540	1080	1060	960	Culvert	
	V-96	B	1560	1090	1010	900	Culvert	
Mile 84.0								Removed
	V-91	B	--	--	--	--		
Mile 84.7 Highway 33 Crossing								
	Abandoned A		--	--	620	620	Casing	
	Abandoned B		--	--	640	640	Casing	

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Mile 85.1 Athabasca North Block Valves					124	0.9 VAC
	10" Upstream A	1980	1150	--	--	
	16" Upstream B	2000	1150	--	--	
	16" Upstream C	2180	1210	--	--	
	10" Downstream A	1940	1140	--	--	
	16" Downstream B	1930	1150	--	--	
	16" Downstream C	2090	1200	--	--	
Mile 86.6 Hwy 33 Crossing					123	
	Black Wire B	1520	1180	620	620	
Mile 90.1 Hwy 33 Road Crossing					121	
	Black B Foreign TP	--	--	710 1260	710 1260	Casing gone
Mile 92.0					120	
	White #3 B	1480	1110	--	--	2¾ poles north of AM 91.8
Mile 94.0 TCPL Crossing					119	
	Top Left B	1420	1120	1410	1410	Bottom Right
	Top Right B	--	--	--	--	Bottom Left Approx. 450m SW of hwy

APPENDIX 2
 PEMBINA PIPELINE CORPORATION
 CRUDE OIL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Mile 96.4					116	01-16-63-07 W5M
Freeman River						
Pump Station						
V-104	1280	1140	1110	1020		Culvert; 0.8 VAC
V-111 B	1240	1120	1210	1140		Culvert
V-110 B	1300	1200	1200	1180		Culvert
Blind Flange	1280	1140	--	--		

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
<u>Mile 96.4 to Judy Creek Pump Station</u>							
River Crossing R06						117	
East Side	White B	1290	1100		--		Access from cutline, 100m from river; yellow mini Fink
	Other Wires	1280	1100				
Valve V-122	B	1350	1110	--	--	186	
West Side							
Road Crossing	B	1310	1100	1200	1100	186	Air Marker J-2, across beaver dam Vent casing
TCPL I/F Bond Panel						187	100m west to TEG
	Pembina	1380	1140	--	--		
	TCPL	--	--	1510	1480		I = 1.7A ON/0.6A OFF @ 80%
TCPL I/F Bond Panel							Bond temporarily removed
	#8 PPL	1200	1040	--	--		Current lead
	#12 PPL	1200	1040	--	--		Crude line
	#10 TCPL	--	--	1560	1560		TCPL
	#12 PPL	1200	1040	--	--		NLG line
Test Station @ I/F Bond							
	Black	1290	1100	--	--		NGL 'C' line
	White	--	--	1290	1100		Current lead
	White	--	--	1290	1100		From bond panel

APPENDIX 2
 PEMBINA PIPELINE CORPORATION
 CRUDE OIL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Test Station @ TCPL Row						
Black	--	--	1510	1510		
White	--	--	1510	1510		
White	--	--	1510	1510		
Test Station @ 12-29-63-09					188	
Road Crossing	1360	1150	690	690		Other = Casing vent

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
<u>Judy Creek Pump Station</u>							
<u>Control Valve</u>							
	Outlet North	1260	1040				
	Inlet South	1220	1020				
<u>Meter Runs</u>							
East	Inlet	1290	1040				
	Outlet	1220	1020				
	Prover	1240	1040	1240	1040		Prover header
Center	Inlet	1260	1060				
	Outlet	1180	1020				
	Prover	1100	1020				
West	Inlet	1260	1060				
	Outlet	1170	1020				
	Prover	1110	1030				
Valve @ South Fence	G-221	1420	1140				
	G-220	1410	1140	1410	1140		Culvert; Shorted

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION			POTENTIAL (-mV)				Waypoint	REMARKS
			Structure		Other			
			ON	OFF	ON	OFF		
Suction								
Header	Inlet		1080	1010	1070	1010	Other = 3" stub	
Unit 1	Suction		1100	1020	--	--		
	Discharge		1120	1020	--	--		
Unit 2	Suction		1090	1010	--	--		
	Discharge		1070	1010	--	--		
Unit 3	Suction		1090	1010	--	--		
	Discharge		1090	990	--	--		
Unit 4	Suction		1070	990	--	--		
	Discharge		1100	1000	--	--	#4 Discharge	
	Outlet		1020	990	--	--		
Sump			1060	1000	--	--	All 4 riser continuous to outlet	
20"	Suction							
	Header	Discharge	1180	1020	--	--		
20"	Suction							
	Header	Inlet	1210	1030	--	--		
Tee			1180	1030	--	--		
Booster	Discharge		1110	1000	--	--		
Suction	North Unit 3		1140	1010	--	--		
	Center Unit 2		1120	1010	--	--		
	South Unit 1		1200	1000	--	--		

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
Check Valve		1240	1080	620	620		Culvert
Tank Crossover		1300	1090	--	--		
12" Stub		1320	1070				
Tank 116							Not in service
	East	1360	1020	--	--		
	West	1290	1000	--	--		
	North	1240	1040	--	--		
	South	1350	1020	--	--		
	V-135	1240	990	--	--		
	V-148	1250	1000	--	--		
Tank 116 - Monitoring Tubes							
North	5'	--	--				
	10'	--	--				
	15'	--	--				Blocked
South	5'	--	--				
	10'	--	--				Blocked
	15'	--	--				Blocked
Southwest	5'	--	--				
	10'	--	--				Blocked
	15'	--	--				Blocked
Buried Reference	Red	1090	720	--	--		Other = Ref to tank
Buried Reference		1100	720	50	10		Other = Ref to tank

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>		POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
		Structure		Other			
		<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Tank 118 - Monitoring Tubes							
North	5'	--	--				Tank 12% full
	10'	--	--				
South	5'	--	--				Blocked
	10'	--	--				
East	5'	--	--				Removed
	8'	--	--				
	15'	--	--				
South TP	Buried Ref	Red	0	0	--	--	Other = Ref to tank; Lead broken U/G
	Buried Ref		0	0	--	--	Other = Ref to tank; Lead broken U/G
Crossover							
	V-141 North		1130	940	--	--	
	V-141 South		1130	930	--	--	
Tank 118 (SW Tank)							
	East		1080	870	--	--	
	South		1190	920	--	--	
	North		1140	910	--	--	
	West		1210	1000	--	--	
	V-142		1220	1010	--	--	
	V-134		1220	1010	--	--	

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
Tank 117 (North Tank)							
	East	1860	1080	--	--		Tank 14% full
	West	1280	1010	--	--		
	North	1260	1010	--	--		
	South	1410	1060	--	--		
	V-137	1930	1050	--	--		
	V-136	1760	1030	--	--		
East TP	Buried Stealth CuC0 ₄	--	--	1860	1080		Other = Ref to tank
West TP	Buried Stealth CuC04	--	--	1240	920		Broken leads
8" Sonic Meter							Meter removed
	North	1240	1040	--	--		
	South	1210	1030	--	--		
Receiver							
	S. Bend	1440	1060	--	--		Pigtrap; No kits Culvert
	Outlet G-222	1460	1050	920	900		
	V-193 GX-50 West	1470	1060				
	GX-50 East	1470	1060				
Sender							
	@ Kit	1430	1140	1430	1140		Pigtrap; Kit short; Install strap
	S-Bend	1400	1130				

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
<u>Batch Valves</u>							
Intake East V-2921		1410	1080				
Outlet West V-2919		1420	1100				
Outlet South V-2916		1360	1080				
Outlet North V-2920		1360	1070				
Center V-2918		1360	1060				
<u>Meter Runs</u>							
South End	6"x 2	1080	1060				Other = 3; Disconnected 3 lines
East to West	6"x 3	1080	1020				All lines continuous
	6"x 3	1070	1010				No kits
	6"x 3	1100	1040				Common cell
	3" x 3	1100	1040				
	6"x 2	1060	1010				
	6"x 2	1090	1020				
	6"x 2	1130	1000				
	6"x 2	1130	1010	1130	1010		Other = 3; Disconnected 3 lines

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure ON	Structure OFF	Other ON	Other OFF		
<u>Judy Creek Pump Station to Judy Creek Fieldgate/Whitecourt Junction</u>						
Judy Creek Pump Station					185	
Old Bond	1270	1100	--	--		S.W. corner
New Bond	1270	1100	1270	1100		NGL #3 Green
#3 Black	--	--	--	--		I ON = +50mA ON/-820mA OFF; 8 to 7, 5 to 7
Road x-ing	1250	1090	710	710	183	Vent casing; Mini Fink
Omen Tie-in	1240	1090	680	680		Other = Culvert
GC-30						
Hwy. 32 Crossing	1340	1110	950	890	181	Vent casing; Partial short
Test Station 13-32-63-10					180	Main road south of 01-06-64-10 to F/G NW T/S
Top	1360	1130	--	--		Orange; mini Fink
	--	--	1320	1320		Blue SE T.S.
	--	--	1290	1290		Black
Test Station 02-06-64-10					178	East of road
Red	1380	1160	680	680		White, over N. line
						Yellow Fink

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>Structure</u>		<u>Other</u>			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Test Station East of F.G.					177	68m south of signs
16" Black	--	--	--	--		Wht, over E line; Could not locate; WPT not correct
	--	--	--	--		White-Pengrowth over W. line
8" Leased Line	--	--	--	--		Black
Test Station South of F.G.					176	
Red	1320	1240	910	910		Blue Pengrowth
						Over E. line, Under 1st
						overhead 12" line.
Pengrowth					175	
Judy Creek F.G.						Pengrowth rect N/R; Locked
Pump Inlets	--	--	1260	1250		
GA-9B Pump #1	1260	1250	1260	1250		Pengrowth
GA-9A Pump #2	1260	1250	1260	1250		Pengrowth
GA-8 Pump #3	1260	1250	1260	1250		Pengrowth
GA-9A Pump #2	1240	1230				Pengrowth G/B's approx 100' from line
6" M/L Tie-in	1240	1230	1240	1230		6" new tie-in req's 4" 600lb RF kit
Test Station 75m South of					170	
Whitcourt Junction						TP gone
Red Fink						#1 Black 4" NGL
16" Crude #7 White	--	--	--	--		#2 Black 4" NGL
10" Crude #9 White	--	--	--	--		#3 Black 6" NGL
	--	--	--	--		#4 Black 6" NGL

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Test Station South of Whitecourt Junction					171	20m South of fence; After repair
16" Crude #7	1380	1120	1380	1120		Orange Fink
16" Crude #8	1380	1120	1380	1120		#1 4" NGL
	--	--	1380	1120		#2 4" NGL
	--	--	1380	1120		#3 6" NGL
						#4 6" NGL
						All leads bonded
Whitecourt Junction @ 08-12-64-11						
16" B Line	1340	1150	--	--		
G-110	1280	1170	510	510		Other = Culvert
G-111	1210	1140	--	--		
16" B S-Bend	1300	1140	--	--		
Sump Tank	--	--	1300	1140		
Indicating Meter						
As Found	1400	1200	--	--		Sump
	--	--	1100	1100		Zinc
Actual	1360	1180	--	--		Sump lead
	--	--	1070	1070		Zinc
	--	--	--	--		

APPENDIX 2
 PEMBINA PIPELINE CORPORATION
 CRUDE OIL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	Structure <u>ON</u>	Structure <u>OFF</u>	Other <u>ON</u>	Other <u>OFF</u>		
<u>Pengrowth 13-36 (Mobil 36) to Whitecourt Junction</u>					155	EMC Rect. @ N/R; Locked
Battery @ 13-36-61-12 W5M						Location re-piped; All pumps A/G piping
Pump #1	--	--	--	--		Pumps
Pump #2	--	--	--	--		Pumps
Pump #3	--	--	--	--		Pumps
Pump #4	--	--	--	--		Pumps
Spare	--	--	--	--		
Spare	--	--	--	--		
Meter Run South	--	--	--	--		
North	--	--	--	--		
Pop Valve			1110	1110		
Booster Pumps						
Northwest			--	--		
Northeast			--	--		
South			--	--		
Pig Launcher						I/F TP removed
Inlet			1130	1130		PPL to EMC; Pig barrel
	--	--	--	--		
Outlet S. Bend	1100	1080				

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
Indicating Meter	Read	--	--	--	--		EMC; Removed
		--	--	--	--		Zinc
	Actual	--	--	--	--		EMC
		--	--	--	--		Zinc
Road x-ing Test Station							
Tower Road x-ing						154	
06-01-62-12							
	East Post Black	1280	1280	1290	1290		White
	West Post Black	1280	1280	1270	1270		White
	South Post Top Red	1300	1300	1290	1290		Bottom Red
Sun Carson 01-13 Tie-in							
	Test Station White	--	--	--	--		No access
Tower Road Test Post						157	TP gone
	White	--	--	--	--		
	Black	--	--	--	--		
Test Station						159	
03-32-62-11		1460	1450	--	--		SS of road
CCS Tie-in	1B-30 Valve	1500	1490	580	580	WP158	Other = Culvert
	Trap Outlet	1520	1500	400	400		Other = Pigtrap

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
03-32-62-11	S-Bend	1590	1580	--	--		
CCS Sender	S-Bend	1410	1370	1070	1070	160	Other = Plant
04-05-63-11	Inlet	1420	1390	1070	1070		I = 830mA to Pembina
	Inlet (I/F Disc)	1590	1550	980	980		
CCS Pump	Outlet	--	--	1080	1080		
	Inlet	--	--	1090	1090		
CCS/Mobil 02-36 Junction						161	
	Test Station White	1390	1350	--	--		Line bonded
	Black #2	--	--	1310	1280		I = 185mA
Road X-ing @ Pengrowth 02-09-63-11	Blue	1710	1710	1480	1480	163	T.P. south of road White - Pengrowth Test post north of road
	Blue	--	--	--	--		Red - Pengrowth; I/F disconnected
		1410	1400	1420	1400		
Rectifier @ Pengrowth 02-09 Test Station	Red	2630	2490	2960	2820	162	Blue; I = 4.72A; Rheo @ 100%

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Road X-ing Imperial Tower Aerial Marker C3 Stud	1590	1580	--	--	164	
Pengrowth 12-26-63-11 Lease Road White	1510	1420	--	--	165	South side, Blk @ sign; Other = Broken? Access from Red Penn corner
Pengrowth 14-26-63-11 White	1480	1300	--	--	166	Pengrowth ON; Locked N/R
	--	--	--	--		
Road X-ing Pengrowth 04-36 Lease Road White	1360	1290	--	--	167	Red - South
Stud	1360	1290	--	--		North
Road x-ing Red Penn Corner Top	--	--	--	--	168	Red mini Fink; Lead broken
Red	1350	1220	1120	1120		Bottom; Yellow Fink
Whitcourt Junction @ 08-12-64-11 I-220 S-Bend	1370	1180	1370	1180	169	Pig Barrel

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure ON	Structure OFF	Other ON	Other OFF		
<u>Sarah Lake Meter Site to Whitecourt Junction</u>						
Sarah Lake Meter Site					038	
F30 10"	--	--	--	--		
Virginia Hills x-over						
10" North	1900	1320	--	--		North
10" South	1880	1320	--	--		
	--	--	--	--		South
Road X-ing 10-12-65-11					139	North of road
Red Mini Fink						
Black 8"	--	--	--	--		Black Foreign rect @ N/R, Blk = Dead lead
White 8"	2110	1400	--	--		Foreign OFF
Penn West X-ing 10-12-65-11					140	South of road
Orange Finks						
#2, #5 Red 8"	1750	1390	--	--		#3,#6 Black Foreign
#2, #5 Red	--	--	1430	1430		
#2, #5 White 10"	1730	1390	--	--		#3,#6 White Foreign
#2, #5 White	--	--	1430	1430		
#2, #5 Red 8"	--	--	--	--		Foreign OFF
#2, #5 Red	--	--	--	--		
#2, #5 White 10"	--	--	--	--		Foreign OFF
#2, #5 White	--	--	--	--		

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure ON	Structure OFF	Other ON	Other OFF		
Road Crossing 12-31-64-10						
2 Orange Finks					147	
	#2 Black 8"	1330	1140	--	--	West Fink
	#3 White 10"	1330	1140	--	--	
	#2 Black 8"	1360	1150	--	--	East Fink
	#3 White 10"	1360	1150	--	--	
Pengrowth Gas Plant Road						Could not locate
North of Road					149	
	TS Black 10" - Top	--	--	1420	1420	White IORL JCCL
	TS Black - Bottom	1560	1380	--	--	
South of Road					150	
	Test Station Bottom	--	--	1560	1560	
	Test Station Bottom 10"	1520	1400	--	--	
West T/S	#5 White 8"	--	--	--	--	#5 Black NGL downstream
	#5 White	--	--	--	--	New TP's req'd
Center T/S	#5 White 10"	--	--	--	--	#5 Black 4" transfer
	#5 White	--	--	--	--	
East T/S	#5 White 10"	--	--	--	--	
	#5 White	--	--	--	--	
Whitecourt Junction @ 08-12-64-11					169	Road approaching from north no longer exists
H-220	S-Bend 8"	1370	1180	--	--	Virginia Hills
		--	--	1370	1180	Pigtrap
E-220	S-Bend 10"	1310	1140	--	--	Sarah Lake
		--	--	1380	1210	Pigtrap

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
<u>Sarah Lake Junction to Sarah Lake Sender</u>						037	Line sold
Pig Receiver	6"	--	--	--	--		Removed
Black Fink TP @ S.L. Fence							
	Black			1490	1250		I = 8mA Connected
	White			1490	1250		
<u>Sarah Lake Junction to Swan Hills Terminal</u>							
Road x-ing N/S Road						042	
West Side	Black	1500	1230				Green (Little Fink Yellow)
East Side	Red	1500	1230	480	480		White (Little Fink Yellow)
Suspended BP Canada 5 Line							Green - ATCO
Road x-ing N/S Road						043	
West Side	Black	1470	1250	640	640		Suspended BP Canada 5 Line; Left
East Side	Right	1460	1250	1410	1410		
Old BP Canada 9 Tie-in						046	
Test Station	#2 White	1560	1240	--	--		NGL ?
	#3 White	1560	1240	--	--		Idle 10"
	#5 Black	1560	1240	--	--		Crude?; All lines bonded
Penn West Tie-In @ 03-19-65-10							
	10" North	1420	1200			044	
	10" South	1410	1200				
	Inlet			1160	1160		#3 to #5

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>	
	<u>Structure</u> <u>ON</u>	<u>OFF</u>	<u>Other</u> <u>ON</u>	<u>OFF</u>			
Pop Valve	--	--	--	--		One sleeve removed; All piping A/G at pumps	
Pump North	--	--	--	--			
Pump Center	--	--	--	--			
Pump South	--	--	--	--			
Pump Inlet	--	--	--	--			
North of BP Canada 9							
White	--	--	--	--	047	Black, orange mini Fink	
Test Station's North of BP Canada 9							
10" Idle Line	#3 Black	1580	1210	1180	1180	048	#5 White - Big Fink - Blue
		1570	1210				#2 Black - NGL
	White	1570	1210	1210	1210	049	Red - Little Fink - Yellow
	Red	1570	1210	1210	1210	049	Black - Little Fink - Yellow
	#3 Blue	1580	1220	--	--	050	#2 White - Big Fink - Blue
	#2 Black	1580	1220	310	310	051	#4 White - Blue Fink ; Dead lead
		--	--				#3 Red
	#2 White	1510	1190	1200	1200	052	#3 Blue - Red Fink
	#2 Black	1490	1190	1310	1310	052	#3 White - Red Fink
		--	--	1200	1200		#4 Blue
Test Station at Old V-1 Tie-in				1230	1230	053	
	White & Black	1430	1210	--	--		
	White	1430	1210	--	--		

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Test Station North Side E/W Road						16-19-65-10 intersection
Black	1250	1250	1250	1250	054	White - Old Pan Am V-1
Disconnected	1080	1080	1310	1310		Bonded to BP Canada; I = 17mA
Test Stations North Side						East of 14-20-65-10
E/W Road West Test					055	East of V-1
Station	1620	1390	1390	1390		White
Gulf 8 Site	--	--	--	--		Site reclaimed
Gulf 8 NGL Block						
Valve Site	#2	1620	1340	--	057	Red Fink
	#3	1620	1340	--		
Hwy. #32 Crossing		--	--	580	060	Casing Vent
Hwy. #33 Crossing						
South Side						Post should be replaced and leads lengthened;
South Test Station					061	Will require hydro-vac
	#2	1650	1260	--		10" Crude
	#3	1650	1260	--		Idle 6" BP Canada 7/Pan Am
	#5	1650	1260	--		10" Crude
	#6	1650	1260	--		Idle 6" BP Canada 7/Pan Am
						#5 - #6 Bonded
						I = 710mA ON/61mA OFF; #5 to #6
South Side of Highway						
North Test Station						
	Black (R)	1610	1180	--	062	
	Red (L)	--	--	680		Casing
				650		Vent

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>Structure</u> <u>ON</u>	<u>OFF</u>	<u>Other</u> <u>ON</u>	<u>OFF</u>		
<u>Sarah Lake Junction to Virginia Hills Terminal</u>						
Sarah Lake Junction @ 02-13-65-11						
Blind Flange Inside Fence						
6" VH Valve	1690	1290	--	--	036	
Valve EX-50	1710	1300	--	--	038	
Valve E200	1710	1300	--	--		
Lario Tie-in @ 06-16-65-12 W5M						
Receiver HK-20 Outlet	--	--	--	--		Removed - Operating License #5702-1
Receiver Inlet S-Bend	--	--	--	--		
Valve	--	--	--	--		Discontinued; License #5702-2
Daylight Energy						
10-20-65-12 W5M						
Launcher Outlet S-Bend	--	--	--	--		Removed - Operating License #5702-1
Launcher Inlet HK-11	--	--	--	--		Barrel
Pump Discharge	--	--	--	--		Pump
Pump Suction	--	--	--	--		
Indicating Meter						
As Found	--	--	--	--		Removed
	--	--	--	--		Barrel
	--	--	--	--		Zinc
Actual	--	--	--	--		Barrel
	--	--	--	--		Zinc

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>Structure</u>		<u>Other</u>			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Lario Oil & Gas 05-16-65-12 W5M	--	--	--	--		No access - "Discontinued"; License #5702-2
Anderson Road x-ing Test Point Black	1380	1180	--	--	233	
Lario/Cyries - Mainline Tie-in HI-30 Valve	1110	1080	1020	920	235	Culvert Water; Valve under water @ intersection; Shorted
Iteration Tie-in Receiver Outlet HJ-20	1080	1060	600	600	235	0.7 VAC Other = Trap @ Intersection
Receiver Inlet S-Bend	1070	1050	--	--		
NGL X-ing Test Station #2 Black	1120	1100	1420	1420	235	#6 Black - NGL
Lario Tie-in Receiver Outlet HI-20	1050	1040	590	590	235	@ Intersection Other = Trap
Receiver Inlet S-Bend	1040	1030	--	--		
Pipeline X-ing North of Iteration					237	
Viking Red	1010	1000	--	--		Yellow
	--	--	--	--		Black
	--	--	--	--		Blue

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS	
	Structure		Other				
	ON	OFF	ON	OFF			
Iteration							
06-32-64-12					237		
Launcher Outlet	S-Bend	680	680	--	--	Replace flagged 2" 600lb RF kit	
Launcher Inlet		700	700	700	700		
Pump		700	700	700	700		
Pump Inlet		--	--	710	710		
Pipeline X-ing							
South of 11-08							
	Black	1090	1070	1020	1020	234	White; 8m south of pig sender
Lario 11-08-65-12							
Launcher Outlet	S-Bend	1170	1090	--	--	234	Lario ON
Launcher Inlet	HI-10	1170	1090	410	410		Trap
Pump Discharge		1140	1100	1080	1080		Pump
Pump Suction		--	--	820	820		
Pipeline X-ing							
West of Bredal							@ Intersection
Viking Tie-in	Black	1180	1150	1050	1050	235	White
Cyries							
04-07-65-12 W5M							
Launcher Outlet		--	--	--	--		Removed; Discontinued; License #952-6

APPENDIX 2
 PEMBINA PIPELINE CORPORATION
 CRUDE OIL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Apache Crossing 12-01-65-13 W5M						
Top	--	--	--	--		Removed
Bottom	--	--	--	--		
Daylight Energy Tie-in (Dome 02-11)						
Receiver Outlet HE-20	--	--	--	--		Removed
NGL X-ing Test Station 06-02-65-13 W5M						
#2	1320	1310	1310	1300	238	#3 NGL line
Ravenwood Tie-in (Cego 04-12)						
Valve	--	--	--	--		Removed
S-Bend	--	--	--	--		
Outlet	--	--	--	--		
Ravenwood 04-12-65-13 (Cego 04-12)						
Launcher Outlet						
S-Bend	--	--	--	--		Removed; Operating License #5693-1

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
Launcher Inlet		--	--	--	--		Removed
Pump	Discharge	--	--	--	--		
	Suction	--	--	--	--		
Old 10-11 Tie-in							
Launcher Outlet	S-Bend	1440	1440	--	--	241	To 10-11-65-13 W5M
Launcher Inlet		1450	1450	1450	1450		Pig Barrel; No kits
Receiver Inlet	S-Bend	1450	1450	1450	1450		
Receiver Outlet	HD-20	1420	1420	1420	1420		Pig Barrel; No kit
8" Riser - Blinded		--	--	820	820		
Pipeline Crossing							30m North
	White	1410	1410			240	PPL
	Blue			1410	1410		Apache
Daylight Energy 02-11-66-13 W5M							
Launcher	S-Bend	--	--	--	--		Removed; Operating License #4142-1
Pipeline X-ing		--	--	--	--		Black; Could not locate
North of Substation		--	--	--	--		Red
at Virginia Hills		--	--	--	--		White
Field Gate		--	--	--	--		Blue
		--	--	--	--		Green
Pipeline x-ing at MCC							Apache deep well off; 10m North PPL
	White	--	--	--	--		Blue - Apache ON
	White	--	--	--	--		Blue - Apache OFF

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Virginia Hills Field Gate					242	Site piping protected by Apache
Launcher Outlet S-Bend H-111	2120	2120	2100	2100		Other = Trap; Kit shorted
Launcher Inlet H-110	2100	2090	2100	2100		
Pump Discharge #1	2040	2040	2010	2010		Pump Suction
Pump Discharge #2	--	--	--	--		Pump Suction; Shared with pump 1
Pump Discharge #3	--	--	--	--		Pump 3 removed
04-02						
Tie-in Valve - Meekwap HC-30	1250	1250	1270	1270		Penn West rectifier; N/R locked
Meter Run						
Outlet - South	1330	1330	--	--		
Inlet - North	1340	1340	--	--		
Indicating Meter						
As Found	1500	1500	1050	1050		Zinc
Actual	1650	1650	1000	1000		Zinc
B-2 Pedestal						
Red	--	--	--	--		Leads disconnected U/G
White	--	--	--	--		
Current Drain						I = 0

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
<u>PrimeWest Terminal to Enermark</u>						
PrimeWest Terminal						
04-02-65-13					243	
	S-Bend	1250	1250	1270	1270	Trap
	Intake	1270	1270	--	--	
	Pump Discharge	1240	1240	--	--	Foreign rectifier; N/R locked
	Inlet	1250	1250	--	--	
Enermark 10-36					244	
S-Bend		710	710	--	--	
Outlet	HB-30	710	710	680	680	Trap; Lines to be abdn; Left as per Peter K.
Test Station					245	
#5 - #6	White	510	510	760	760	#2 - #3 Black
	White	510	510	760	760	
Enermark 10-36-64-14 W5M						
	HB-11 S-Bend	620	620	410	410	Pig Barrel; Operating License #5175-2
	Inlet	--	--	400	400	
Pump	Outlet	--	--	560	560	Pump removed
	Inlet	--	--	1180	1180	Lines left unprotected as per Peter K.; Lines to abandoned

APPENDIX 2
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CRUDE OIL SYSTEM
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2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	Structure		Other			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
<u>Swan Hills Terminal</u>						
Tank 113						North
North	2410	1070	--	--		
West	2300	1040	--	--		
South	2190	1050	--	--		
East	2230	1150	--	--		
V-130	2760	1150				I = 230mA
8" South	2150	1040	--	--		
Permacells - CuCuSO ₄						
Center	2370	120	+420	+400		1 notch; Other = Ref to tank
Middle	2910	200	+130	+100		
Edge	3000	710	+270	+270		4 notches
North Header 16"						
North	2070	1150				
South	1990	1150				
10" Blind Flange	1870	1090				
V-21 Check Valve	680	680	490	490		Other = Culvert

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Station #1						
Meter Spool East	--	--	--	--		Disc.
Meter Spool West	740	710	--	--		Disc.
Discharge Pop Valve	950	900	--	--		Disc.
4" Stub	1140	1020	--	--		Disc.
'A' Line Sonic Meter						
South	--	--	--	--		
North V-179	--	--	--	--		Removed
West	1290	1080	--	--		
Station #2						
Suction						
V-23	1090	1010	700	700		
V-133	1120	1010	--	--		
V-114	1120	1010	--	--		
V-19	1120	1010	--	--		To Tank #113
V-177	1080	990	--	--		
10" (Disconnected)	--	--	640	640		Blinded; Isolated
V-178 (Disconnected)	1140	1010	640	640		
3-4" Risers						
East	--	--	580	510		Blinded; Isolated
Center	--	--	510	510		Blinded; Isolated
West	--	--	480	520		Blinded; Isolated

APPENDIX 2
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CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
Mobil Amurex Sonic Meter							
	East	--	--	--	--		
	V-138 West	--	--	320	640		Isolated & abandoned
Valve V-118							
	East			--	--		
	West	--	--	--	--		
Meter #1							
	East	1020	900				
	West	1040	910				
Meter #2							
	East	1030	910				
	West	1040	910				
Meter #3							
	East	1020	900				
	West	1050	910				
Station Fence							
	North of Gate			--	--		
	West of G/B			--	--		
Truck loading (2 Lines)		1120	1040				
North 8" Deer Mountain							
	Line	1670	1110				
	Station			1750	1100		
	Trap			1700	1100		

APPENDIX 2
 PEMBINA PIPELINE CORPORATION
 CRUDE OIL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
10" 02-23							
	Line	1680	1120				
	Station			1490	1100		
	Trap			1530	1100		
8" Home 1							
	Line	1280	1060				Common cell; Kits ok
	Station			1310	1050		
	Trap			1300	1060		
South 10" Sending Trap (09-24)							
	Line	1140	950				
	Station			1140	950		
	Trap			1140	950		Short through MOV Teck @ B110; Move kit to upstream side.

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		Structure		Other			
		ON	OFF	ON	OFF		
<u>Swan Hills Terminal to Home 1</u>							
Test Point At Terminal Fence							
	#5, #6 White	1860	1210	1900	1210	065	#2, #3 White; NGL
N-1/NGL Crossing							
N-1 Road #6 White		1760	1080	1840	1160	069	#2, #3 Black NGL
BP Canada Pipeline Crossing							
#2, #5 Red		1600	1130	1310	1310	070	#3, #6 Black BP Canada Orange post
N-1 Truck Battery							
	S-Bend	1560	1120	--	--	072	0.9 VAC Isolated
	Pigtrap	--	--	180	180		
	Intake	1550	1120	--	--		
D1-2	Pump Discharge	1440	1100	--	--		Pump
D1-1	Pump Suction	1380	1100	--	--		Pump, Victaulic's
Storage Tank							
	South	1180	1040	--	--		
	East	1210	1050	--	--		
	North	1220	1060	1220	1060		Line from T.T.
	West	1190	1040	--	--		

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure ON	Structure OFF	Other ON	Other OFF		
Truck Loading						
	East	1320	1100	--	--	
	West	1320	1100	--	--	
	U/G Tank	1380	1120			
N-1 Receiver						
	S-Bend	1580	1160	--	--	073
	Discharge	1520	1140	--	--	
	Trap	1530	1140			
	4" Stub (Red)	1480	1150			
	M/L Tie-In	1460	1150	620	620	Other = Culvert
Sinclair ABC Tie-in						079
	Valve DF-30	1510	1000	610	610	Home 04-35 Road
	Black	--	--	1180	1200	Other = Culvert Broken lead; White
Pan-Am A-1 Tie-in 05-34 rec.						081
	Valve DE-30	--	--	710	710	Culvert
Receiver Outlet DE-20		1240	1050	600	600	Pigtrap
Receiver Inlet		1190	1050	--	--	
Test Station Black		1190	1050	--	--	2 cables bonded 6m; No shift on TP south of DE-20 inlet
A-1 Route Change						
Test Station						082
	#2 Black	1420	1160	--	--	New A-1 Line
	#3 White	--	--	680	680	Old A-1 Line abandoned

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS	
	Structure		Other				
	ON	OFF	ON	OFF			
New A-1 Crossing					082		
Test Station	#2 Black	1450	1180	1140	1140	Penn West; #3 White	
Pembina Crossing						NGL	
Test Station Old A-1	#6 White - Crude	1720	1220	1720	1220	#2, #3 Black - NGL	
05-34 Sender							
	S. Bend DE-10	1240	1080	1040	1080	086	I/F shift; Trap; 0.5 VAC
	Inlet To Trap	--	--	1050	1060		Trap U/G piping
	Pump Outlet	--	--	1040	1040		I/F shift
	Inlet	--	--	1040	1040		Firewall
Pan-Am 05-34 Tie-in		--	--	--	--		Removed
Home 7 Tie-in							
	Check Valve	1220	1060	460	460	107	150m West; Other = Culvert
Home Oil Crossing							
	Black TR	1460	1150	1330	1330	100	White BR On road to home 02-08

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION			POTENTIAL (-mV)				Waypoint	REMARKS
			Structure		Other			
			ON	OFF	ON	OFF		
Home 9 Tie-in Test Station	White		1310	1110	680	680	099	Red Fink; West on ROW from BA Edith TP
BA Edith Tie-in Test Station	White		1330	1120	--	--	097	East of Home 12-08 @ Corner
	Black		1330	1120	--	--		
Home 9 Road Crossing	Check Valve		1290	1100	610	610	098	Other = Culvert; On road to 02-08
North Side of River Pipeline Crossing							102	TP's on aband river xing; R-14 sign #2 Black; Blue Finks in from
Pipeline Crossing							101	Green Fink 10m from R-14 sign
Home 1 Test Station	Valve	D-111			520	520	103	Abandoned pipelines D111/D110 continuous
	Valve	D-110			450	450		Barrel
Esso Crossing Test Station	Blue TL		1240	1060	1250	1050	104	Continuity location White TR

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Pipeline Crossing						
Test Station						Abandoned portion
	Black		520	520	104	
	White		600	600		Red mini Fink
Pipeline Crossing						Abandoned
Test Station					105	Black; Top
						Black; Bottom
						White; Top
						White; Bottom
<u>Home 1 @ 11-18-67-10 W5M</u>						
8" S-Bend					106	
8" @ Kit						
Indicating Meter						
	As Found/As Left					Home; Broken meter inoperable
						Zinc
	Actual					Home
						Zinc

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure ON	Structure OFF	Other ON	Other OFF		
<u>Swan Hills Terminal to Mobil Amurex</u>						
Swan Hills Terminal						
C-220 S. Bend	1680	1120				
Station	1490	1100	1530	1100		Pigtrap
Hwy 32 Road Crossing						
Black	1410	1100	690	690	022	White Casing
Test Station (13-06-67-09)						On hill; S. of road
Black Fink	1380	1080	--	--	023	
Lease Road 02-18-67-09					024	West; A/G bond installed
Red Fink	1360	1050	--	--		I = 370mA ON/20mA OFF
Yellow Fink	1360	1050	--	--		Blue leads dead
Road Crossing East of						
Sat. 12-18 Black Fink						
Black	1310	1050	1040	1040	025	White - Anderson
	--	--	1030	1030		Red
Pigtrap - S-Bend	610	610	--	--	027	Leased line; Cut off above & below ground
30m North of CX-50 - Outlet	--	--	--	--		
Line @ Culverts	1260	1040				
Mobil Amurex Deer Mountain						100m North of road
Crossover CX-50	1260	1050	610	610	026	Other = Culvert; Full of water
						Dug out & cut-off U/G

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS	
	Structure ON	Structure OFF	Other ON	Other OFF			
Mobil Scony Road Crossing North of East Side Sat. 12-18	Black	--	--	--	--	028	TP over Mobil Amurex line; Dead leads
West Side North Line	Black #2, #3	640	640	1110	1110	028	Leased line White #5, #6; Other = Penn West Blue Fink
Lease Road 02-24-67-10 Road Crossing South Line	Top Black	1380	1110	1060	1060	111	White - Bottom
North Line	Leased Black	--	--	1080	1080	111	Wht; TP destroyed by mower; PPL leads lost; Foreign leads in grass
Samson Road Crossing	Black	1350	1090	1100	1100	WP110	White
North	Black	--	--	1120	1120	110	Leased line White; Black dead lead
Samson 02-36Tie-in	Valve CB-30	1290	1090	810	750	109	Other = Culvert

APPENDIX 2
 PEMBINA PIPELINE CORPORATION
 CRUDE OIL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



LOCATION			POTENTIAL (-mV)				Waypoint	REMARKS
			Structure		Other			
			ON	OFF	ON	OFF		
Penn West (Mobil Amurex) @ 02-23-67-10 W5M S. Bend							300	
	Outlet	C-110	1280	1140	--	--		@ N/R V, N/R A; Locked
	Inlet		1210	1060	1100	1040		Pigtrap; No kit on drain
Pump 1	Discharge		1310	1140	1110	1080		
Pump 2	Discharge		1280	1100	1100	1070		
Pump 3	Discharge		1210	1110	1140	1100		Disconnected
Pump 4	Discharge		1220	1130	1090	1070		
12" Meter	Run		1180	1090	1120	1100		
Pop Valve			1280	1140	1110	1090		
Pump Inlet			--	--	1100	1080		

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>Structure</u> <u>ON</u>	<u>OFF</u>	<u>Other</u> <u>ON</u>	<u>OFF</u>		
Swan Hills Terminal to Celtic (Home 12)						
Tie-in North of Terminal Valve BE-30 on Deer Mountain Line Culvert	1740	1140	1210	1080		F/G liner installed 2006 Culvert shorted
Test Point @ BE 30						Leads bonded
Green #5 & #8	1820	1160			136	Deer Mountain
White #6 & #4	1820	1160				Mitsue
Black #2 & #3	1820	1160				Amurex
North of Swan Hills Terminal Home 12					137	
Inlet BE-20/21	1360	1110				
Receiver Outlet	1380	1080				Meter I = 0.0A ON
Trap			680	680		ACT I = 240mA; New kits
Celtic Exploration 03-32-66-09 W5M Sender S. Bend	1440	1160	--	--	135	Celtic rectifier @ 15.0V/15.0A
BE-10 Inlet	1440	1160	1440	1160		Pig Barrel

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Celtic Exploration (Home 12)						
Pump Discharge BE-2	1290	1070	--	--		
Inlet	--	--	1290	1290		
Indicating Meter						
As Found	1500	1200	1150	1050		Barrel
	--	--	1100	1100		Zinc
Actual/As Left	1310	1090	1310	1090		
	--	--	1090	1090		
Current Control Test Station						Celtic rectifier AF/AL ON
Black	1260	1050	--	--		
White	--	--	1300	1280		I = 420mA ON/90mA OFF

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION			POTENTIAL (-mV)				Waypoint	REMARKS
			Structure		Other			
			ON	OFF	ON	OFF		
<u>Swan Hills Terminal to Deer Mountain</u>								
Swan Hills Terminal Receiver	S. Bend Station	BM-220	1670	1110	1750	1100		Pigtrap Station
Test Station (13-06-67-09)			1380	1080	--	--	023	
Lease Road 02-18-67-09 Road Crossing	Red Fink		1360	1050	--	--	024	A/G bond present
	Yellow Fink		1360	1050	--	--		I = 370mA ON/20mA OFF;(+) to red fink west line
								#3 Blue; leads dead
Road Crossing East of Sat. 12-18 Test Station	Black #2, #3		1310	1050	1040	1040	025	#5 White Anderson; Common cell
			--	--	1030	1030		#6 Red - Anderson
Anderson Amurex Deer Mountain Crossover	BX-50		1260	1040	610	610	026	100m North of road
	Pigtrap & Riser 50m N		610	610	--	--		Culvert - full of water; Anderson Amurex Line
								Line disconnected and dug out

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Penn West Road Crossing 15-19-67-09 #2 Red	1220	1050	700	700	029	#3 Black
Penn West Tie-in 15-30-67-09 Valve BD-30	1230	1040	670	670	030	Culvert
Penn West Receiver						F/G liner; P/L bonded AF/AL
Outlet	1190	1020	--	--		Pigtrap
Ground Entry	1180	1010	--	--		
U/G Tank	1170	1010	--	--		
Penn West @ 10-23-67-10 S. Bend					032	F/G liner; P/L bonded
Outlet	1060	990	--	--		
Inlet	1060	990	1280	1250		
Inlet	--	--	--	--		
Pump 1 Discharge	--	--	--	--		Pump
	1050	990	--	--		I/F Bond RH@94%; I = 25mA ON/0mA Off
Indicating Meter						
As Found	1100	1000	900	900		P.W.
	--	--	1050	1050		Zinc
Actual	1120	1020	840	840		P.W.
	--	--	1060	1060		Zinc

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Home 13 Tie-in Valve BC-30 10-08-68-09	1310	1250	660	660	031	Other = Culvert
Home 13 Receiver						
S. Bend	1300	1210	--	--		
Outlet BC-20	1340	1220	480	480		Other = Pigtrap
Test Station East Side of Decalta Road	--	--	--	--		Black/White leads Abandoned; A/G flowline
Block Valve South of 04-14-68-10	1380	1290	--	--	133	Plastic A/G line 150m west of road to 03-21-68-10
Yellow Fink @ 04-04	740	740	410	410		Blue
Block Valve 02-15-68-10	1460	1390	--	--	130	
Kewanee 'D' Tie-In						
#2 Black	--	--	--	--	129	Removed 2003
#3 White	--	--	--	--		
Road Crossing East Side						South of 04-21-68-10
Red Fink	1520	1450	--	--	131	

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>Structure</u> <u>ON</u>	<u>OFF</u>	<u>Other</u> <u>ON</u>	<u>OFF</u>		
Test Station 30m East of Old Home 13 Tie-in						
Red	1490	1460	1490	1460	132	Black; 0.3 VAC I = 15mA ON
Red	1500	1480	1310	1300		Red to Black
Old Home 13 Tie-in						Bond disconnected
Valve	1490	1470	910	870	128	South of 04-21-68-10 Barrel - full of water Probe required for reading
Road Crossing East of ARC Resources (Home 13) Orange Fink						
#2 Black	1430	1420	--	--	127	
#3 White	1430	1420	--	--		
4x4 TP						
Green TL	1390	1380	--	--	126	Green
Green TR	1390	1380	--	--		Green
Green BL	--	--	1300	1290		White
Green BR	--	--	1310	1290		Red
ARC Resources 10-17-68-10 Sender Ground Entry	1410	1400	--	--	125	
Inlet	1390	1380	--	--		Pigtrap shorted to ARC through 2" drain line
Pump Discharge	1280	1290	1280	1270		Other = Pump
Meter Run Inlet	1240	1200	--	--		
Suction Valve Outlet	1220	1210	--	--		

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Moosehorn Junction 07-20-68-9 W5M					310	
6" House Mountain	1430	1210				
6" Deer Mountain	1480	1240				
8" Group	1420	1230				
U/G Tank Riser Pipe	1420	1230				U/G tank non-metallic
Test Station West Side of Swan River 01-33-68-09 W5M						
White	--	--	--	--		Could not locate
Arcan Tie-in 09-34-68-09 W5M						
Valve BB-30	1510	1190	--	--	034	
Block Valve B-100	1540	1220	720	720		Other = Culvert
U/G Tank	1210	1080	700	700		
Arcan Receiver Outlet	1600	1260	610	610		Pigtrap; Line = AL
S. Bend Inlet	1580	1250		--		
Arcan Resources 10-19-68-08 W5M						Arcan @ 0V/0A; OFF; @ PPL pumps
S. Bend Outlet BB-10	1540	1140	--	--	033	
Inlet	--	--	1110	1110		Pig Barrel
Pump Outlet	--	--	1090	1090		I/F Bond 0mA ON/0mA OFF Rheostat open CCT

**APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure		Other			
	ON	OFF	ON	OFF		
Arcan Indicating Meter						Meter defective
As Found	--	--	--	--		Trap
	--	--	--	--		New zinc req'd
Actual	--	--	--	--		Trap; Wire discontinuous
As Left	--	--	--	--		
	--	--	--	--		Zinc
12-01-69-09 Test Station						
Top New	1720	1240	--	--	020	I = 310mA ON
Bottom Old	1720	1240	--	--		
08-01-69-09 Test Station						
Red, Black	1930	1300	--	--	021	@ Road crossing
Pengrowth Corp Deer Mountain						
04-07-69-08 W5M						
6" Sending Trap						
6" Ground Entry	2090	1190	--	--		
Across Kit	2130	1210	2130	1210		
U/G Tank			600	600		Non-metallic
Pump Discharge	1290	1210	1290	1210	035	Pump; Sleeve removed from kit
P/S Indicating Meter						
As Found						
#1	2150	1100				
#2			1150	1150		
Zinc			1050	1050		

APPENDIX 2
 PEMBINA PIPELINE CORPORATION
 CRUDE OIL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



<u>LOCATION</u>		POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
		Structure		Other			
		<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Actual/As Left							
	#1	2210	1210				
	#2			1210	1180		
	Zinc			1040	1040		

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	Structure ON	Structure OFF	Other ON	Other OFF		
<u>Moosehorn Junction to House Mountain</u>						
6" TP @ 10-29-68-09 W5M	1460	1280			311	
6" TP @ 15-31-68-09 W5M	1490	1280			312	Repaired lead
6" TP @ 04-19-69-09 W5M	1520	1300			131	
6" TP @ 03-35-69-10 W5M	--	--				No TP @ 03-35
ARC Tie-In @ 03-35-69-10 W5M					322	
4" 10-28	1690	1340				
Mainline	1700	1340				
U/G Sump	1660	1310				
4" TP @ NW 26-69-10 W5M	--	--				West side of creek; Not located Might be flooded, beaver dam
4" TP @ 16-28-69-10 W5M					005	
Black	1510	1490				Apache
White			1120	1120		
ARC @ 10-28-69-10 W5M						
4" Pipeline	1490	1210			006	
Station (ARC)			1180	1180		
Ground Entry	1490	1200				

APPENDIX 2
PEMBINA PIPELINE CORPORATION
CRUDE OIL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>Structure</u> <u>ON</u>	<u>OFF</u>	<u>Other</u> <u>ON</u>	<u>OFF</u>		
P/S Indicating Meter						
As Found						
#1	1500	1200				
#2			1150	1150		
Zinc			1100	1100		
Actual/As Left						
#1	14960	1150				
#2			1210	1210		
Zinc			1090	1090		
6" TP @ 04-02-70-10 W5M Black	1510	1490	1240	1240	009	Red = Apache; I = 0mA; Resistance bond disc
TP @01-03-70-10	2190	1430			323	Apache line former PPL; Leave bond disc.
6" Block Valve @ 01-03-70-10 W5M	2230	1410			008	
6" TP @ 03-09-70-10 W5M	2010	1380				
Apache House Mountain						
04-09-70-10 W5M						
6" Sending Trap					295	
Ground Entry	2100	1320				
B2 I/F Pedestal					001	
6" Pipeline	2230	1360				I = 3.7A ON/1.4A OFF
Station			1430	1310		
6" Pipeline	2080	1300				Bond disconnected
Station			1490	1320		
Pump Discharge			1410	1390		

**APPENDIX 3
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
STRUCTURE-TO-SOIL POTENTIAL DATA
NGL SYSTEM
2010**

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APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		LINE ON	OFF	OTHER ON	OFF		
Highridge Mile 48.8 to Mile 96.6							
Mile 48.9	A	1760	1080	1090 1110	1000 1010	285	Twp 584; Casing vent south North vent
Mile 49.9 Road Crossing Black	A	1530	1050	--	--	286	Range Road 14
Mile 51.5 Road Crossing	A	1410	1040	600	600	287	Sec. Rd. 654 Vent Casing
Mile 52.9 Red	A	1210	1110	1290	1120	288	Range Road 20 Bond to 'B' line; I=1320mA ON/710mA OFF to B Other = Bond disconnected
Mile 54.4 Road Crossing Black	A	1200	1000	560	560	289	TWP. Road 592 Vent Casing
Mile 56.8 Road Crossing Black	A	1210	1050	740	740	290	Range Road 23 Vent Casing

**APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



LOCATION			POTENTIAL (-mV)				Waypoint	REMARKS
			LINE		OTHER			
			ON	OFF	ON	OFF		
Mile 59.0	#4 Black	A	1220	1000	640	640	292	Range Road 25 Vent Casing
Mile 59.6								
Road Crossing	Black	A	1210	1030	630	630	293	TWP. Road 594 Vent Casing
Mile 63.6								
Hwy #18 Road Crossing	Black	A	1250	1070	620	620	309	Vent Casing
		C	1200	1060	600	600		Vent Casing
Barrhead Block Valve								
Mile 63.8								
V-3370							308	
	South	A	1220	960	--	--		0.4 VAC
	North	A	1210	960	--	--		
			--	--	1220	960		
V-2125								
	South	C	1180	950	--	--		
	North	C	1180	950	--	--		
Road Crossing								
	Black	C	1180	960	620	620	308	Vent Casing

APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>			POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
			LINE <u>ON</u>	<u>OFF</u>	OTHER <u>ON</u>	<u>OFF</u>		
Mile 65.0	Black	A	1240	970	590	590	294	North of Barrhead; RR 34 Vent Casing
Mile 67.5								Range Road 40
Road Crossing		A	1280	1070	--	--	307	
Mile 69.9								Range Road 42
Road Crossing	Black	A	1350	1080	--	--	306	
Mile 70.9								TWP Road 604
Road Crossing	Black	A	1280	1050	600	600	305	West of Bloomsbury Vent Casing
Mile 71.2								Range Road 43
Road Crossing	#1 Black	A	1260	1010	--	--	304	Common TP w/Crude
Mile 72.1								Range Road 43A
	Black	A	1460	1080	620	620	303	Vent Casing
Mile 74.1								
Highway 33 Road Crossing	Black	A	1480	1130	630	630	302	Vent Casing
		C	1450	1100	680	680		Vent Casing

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NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



			POTENTIAL (-mV)				Waypoint	REMARKS
			LINE		OTHER			
LOCATION			ON	OFF	ON	OFF		
Mile 78.1								Range Road 52
Road Crossing								
Black	A		1510	1050	--	--	300	
Mile 80.2								
Road Crossing								
Black	A		1420	1020	--	--	299	
Mile 82.7								Sec Hwy #763
Black	C		1510	1040	600	600	298	Vent Casing
Mile 83.0								Range Road 60A
Black	A		1560	1090	560	560	297	Vent Casing
Mile 83.7								
Athabasca South								
Block Valve V-2130								
South	C		1550	1090	--	--	296	
North	C		1530	1090	--	--		
3365								
South	A		1570	1110	--	--		
North	A		1580	1110	--	--		
			--	--	1550	1100		Building

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NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION			POTENTIAL (-mV)				Waypoint	REMARKS
			LINE		OTHER			
			ON	OFF	ON	OFF		
Mile 85.1								
Athabasca North								
3360								
	South	A	1940	1140	--	--	124	Concrete Pile - South
	North	A	1980	1150	--	--		Concrete Pile - South
	South	C	2090	1200	--	--		
	North	C	2180	1210	--	--		
Mile 86.6								
Highway Road Crossing								
	Black	A	--	--	610	610	123	Vent Casing
	Black	C	1560	1180	680	680		Vent Casing
Mile 88.6								
Road Crossing								
	Black	C	1610	1170	--	--	122	West side
Mile 90.1								
Highway 33 Road Crossing								
	Black	A	1570	1140	700	700	121	Vent Casing
		C	--	--	--	--		TP gone
Mile 92.0								
	#2 Black	A	1480	1100	--	--	120	

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STRUCTURE-TO-SOIL POTENTIAL DATA
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<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>	<u>OTHER</u>	<u>ON</u>	<u>OFF</u>		
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Mile 94.0						
TCPL Crossing						
White A	1310	1080	1420	1420	119	Black TCPL
Mile 96.6						
Freeman River Pump Stn.						
10" C3+ to Swan Hills from Edmonton						01-16-63-07 W4M
V-3350	1240	1140	--	--		S. Bend south
V-3352	1250	1140	--	--		
V-3350	1240	1140	--	--		S. Bend north
V-3351	1300	1200	--	--		
16" NGL to Judy Creek						
V-8030	1250	1120	--	--		S. Bend north
V-8023	1220	1110	--	--		
V-8007	1230	1130	--	--		
V-8013	1200	1110	--	--		
16" NGL from Edmonton						
V-8009	1190	1040	--	--		S. Bend south
V-8011	1210	1060	--	--		
V-8000	1210	1060	--	--		4" downstream V-8000
V-8000	1210	1050	--	--		6" downstream V-8000
V-8010	1120	1010	--	--		8" upstream V-8010
V-8000	1130	1020	1130	1020		Stn. Continuity check
V-8020	1190	1040	--	--		

APPENDIX 3
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NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE ON	LINE OFF	OTHER ON	OTHER OFF		
North Meter Run						
V-3016	1220	1070	--	--		East
V-3016	1160	1020	--	--		West
South Meter Run						
V-3013	1200	1050	--	--		East
V-3004	1150	1040	--	--		West
Station Shut Off						
V-8008	1190	1060	--	--		16" from Edmonton
Flare Stack	1220	1100	--	--		A/G
Flare Header						
V-8034 2"	1180	1060	--	--		
2"	1180	1060	--	--		
Unit 1 Pump						
V-8001	1110	1030	--	--		East/West riser 8"
V-8025	1140	1050	--	--		
V-8022	1080	1010	--	--		
Check Valve	1080	1010	--	--		East/West riser 8"
Unit 2 Pump						
V-8002	1080	990	--	--		East/West riser 8"
V-8026	1030	970	--	--		
V-8024	1120	1020	--	--		

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<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
Unit 3 Pump						
8" Blind	1310	1190	--	--		East
8" Blind	1310	1190	--	--		West
6" Blind	1280	1140	--	--		East
6" Blind	1280	1140	--	--		West
Test Station						
Red Fink						
1 A C3+	1380	1150	--	--		Crude Crude
2 A C3+	1380	1150	--	--		
3 B	1380	1150	--	--		
4 B	1380	1150	--	--		
5 C C2	1380	1150	--	--		
6 C C2+	1380	1150	--	--		
Test Station						
Orange Fink - Repaired Red						
White	1350	1120	--	--		
Black	1350	1120	--	--		
Indicating Meter						
As Found/As Left						
1	800	--	--	--		
2	1050	--	--	--		
3	1000	--	--	--		
4	750	--	--	--		
Zinc	1000	--	--	--		

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 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	LINE		OTHER			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Indicating Meter						
Actual						
1	--	--	--	--		
2	960	900	--	--		
3	--	--	--	--		
4	900	890	--	--		
Zinc	920	920	--	--		

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NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>	<u>OTHER</u>				
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
<u>"C" NGL Mile 96.6 to Judy Creek Pump Station</u>						
Outside Fence						
V-8032	1310	1140	--	--		
River Crossing R06						
East Side Black	1340	1120	--	--	118	Access from cutline 100m from river; Yellow mini Fink
White	1340	1100	--	--		
East Side (West TP) Black	1420	1130				
TCPL I/F Bond Panel						100m west to TEG
Pembina	1380	1140	--	--	187	GPS 54.47786°N, 115.2355°W
TCPL	--	--	1510	1480		I = 17mA ON/91mA OFF @ 80%
TCPL I/F Bond Panel						Bond temporarily removed
#8 PPL	1200	1040	--	--		Current lead
#12 PPL	1200	1040	--	--		Crude line
#10 TCPL	--	--	1560	1560		TCPL
#12 PPL	1200	1040	--	--		NGL line
Test Station @ I/F Bond						
Black	1290	1100	--	--		NGL 'C' line
White	--	--	1290	1100		Current lead
White	--	--	1290	1100		From bond panel

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 PEMBINA PIPELINE CORPORATION
 NGL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE		OTHER			
	ON	OFF	ON	OFF		
Test Station @ TCPL ROW						
Black	--	--	1510	1510		
White	--	--	1510	1510		
White	--	--	1510	1510		
Mile 114.5						
Judy Creek Pump Station						
V-2140						
East	1380	1060	--	--	232	
West	1410	1070	--	--		
Valve 2900	1320	1050	1310	1050		Shorted via electrical
Pile			1320	1060		Kit present; Shorted

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STRUCTURE-TO-SOIL POTENTIAL DATA
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LOCATION	POTENTIAL (-mV)						Waypoint	REMARKS
	LINE		OTHER		ON	OFF		
			ON	OFF	ON	OFF		
<u>"C" NGL Mile 96.6 to Swan Hills Terminal</u>								
Mile 102.2								150 meters north of MD
of South Side River								Big Lakes sign
Black	A		1320	1130	--	--	115	
Mile 103.0								
Trapper Lee's Cabin								
Blue	A		1380	1130	--	--	114	
Mile 111.8								
#2 White	A		1340	1120	--	--	113	Blue fink
#3 Black	A		1340	1130	--	--		
Mile 115.0								
Highway 33 Crossing								
Black	A		1360	1150	970	900	112	S Vent casing filled 1999; Shorted
Red	A		1360	1150	--	--		14km South of Swan Hills
					950	900		N Vent leaning
Mile 122 (Approx.)								Leads bonded
#5 Black	A		1410	1180	--	--	064	10" NGL 'A' C3+
#6 Black	A		1410	1180	--	--		10" NGL 'A' C3+
#2 White			1410	1180	--	--		6" NGL C3+
#3 Black			1410	1180	--	--		8" NGL SL

APPENDIX 3
 PEMBINA PIPELINE CORPORATION
 NGL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	LINE		OTHER			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Mile 122.5						
Swan Hills Terminal						
S-Bend	1290	1030	--	--		
3340 Outlet	--	--	1270	1020		

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STRUCTURE-TO-SOIL POTENTIAL DATA
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<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
<u>Judy Creek Terminal to Whitecourt Junction</u>						
Judy Creek Pump Station						
Nuclear Densitometer Site						
West	1310	1040			184	West fence (outside)
East	1280	1050				Piles shorted via electrical ground
Support			1140	1060		
Judy Creek Pump Station						
Bond to Crude						
#2 Green	1270	1100	1270	1100	185	#3 Black - Crude I = +50mA ON/-820mA OFF; #8 to #7
Hwy #32 Road Crossing						
Black	1640	1320	580	580	182	Vent Casing; T.P. Black mini Fink
13-05-64-10 Lease						
White #4	1630	1330	--	--	179	East T.S. TCPL Style
Black #2	--	--	1360	1360		
White	1650	--	--	--		West T.S.
Black	--	--	1410	1410		Black mini Fink
02-07-64-10 Lease Road						
Black	--	--	610	610	174	Foreign
White	--	--	610	610		Lead dead

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 STRUCTURE-TO-SOIL POTENTIAL DATA
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<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	LINE		OTHER			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Whitecourt Junction @ 08-12-64-11						
16" Mainline South	1300	1140	--	--		
6" to JCFG	1340	1150	--	--		

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STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
<u>Sarah Lake Junction to Whitecourt Junction</u>						
Sarah Lake Junction 02-13-65-11						
South	1740	1320	--	--	036	
To Meter Run	1740	1320	--	--		
Meter Run East	1740	1320	--	--		
Meter Run West	1740	1320	--	--		
Penn West Crossing 10-12-65-11						
Orange Fink						
#2, #5 White 10"	1730	1390	1430	1430	140	#3, #6 White Foreign
	--	--	--	--		Foreign OFF
Road Crossing 12-31-64-10						
#3 Black, #2 White	1390	1190	--	--	146	Orange fink
Pengrowth Gas Plant Road						
13xJCCL Mitsue Tie-in	--	--	--	--	151	6" IORL NGL; N/R; Locked
Judy Creek						
Junction Site #1						
16" C2+ System						
V-2147 16" North S-Bend	1420	1230	--	--		Station being re-piped
	--	--	--	--		Neg bond re-attached to 16" riser w/thermo
V-3996	--	--	--	--		
V-3995	--	--	--	--		
V-	--	--	--	--		South end of meter run; Contact through gravel

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LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE		OTHER			
	ON	OFF	ON	OFF		
6" IOR Riser			1520	1330		West of site
Test Stations						T.P. Bonded; Removed; Station piping removed
East	#5 Black	--	--	--	--	Upstream
	#5 Black	--	--	--	--	Downstream
	#5 Black	--	--	--	--	4" M/L
West	#5 Black	--	--	--	--	Downstream
	#5 Black	--	--	--	--	4" Transfer
	#5 White	--	--	--	--	8" Crude
	#5 White	--	--	--	--	10" Crude
Judy Creek						
Junction Site #2						
	16" South S-Bend	1730	1340	1660	1280	Station being re-piped
	6" Site #3	1680	1310	--	--	Northern Expansion
		--	--	--	--	North pile
		--	--	--	--	South pile
P/L Crossing 16-12-64-11						North of Whitecourt JCN
	#1 Black	1420	1190	1310	1310	172 TCPL Style, North of Road
						#3 White 1st lease road
						north of Whitecourt Junction;
						27m north of signs
Whitecourt Junction						
	16" Mainline North	1340	1150	--	--	169

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LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE ON	OFF	OTHER ON	OFF		
Judy Creek Plant Block Valve to Pengrowth Judy Creek Condensate Plant						
Judy Creek Plant Back Road						
Imperial Crossing						East of Road; Red Fink
4" ML #7, #10 Black	1460	1240	1320	1320	199	#2 White - Imperial
4" Transfer #9, #11 Black	--	--	1320	1320		#3 White - Imperial
	1460	1240	1380	1380		#4 White - Imperial
Imperial Crossing						West of Road
4" ML #9 Black	1400	1200	1120	1120	198	#2 White - Imperial
4" Transfer #7 Black	1400	1200	1310	1310		#3 White - Imperial
#8 2 - Black	1400	1200	1290	1290		#4 White, Imperial
TCPL Crossing						
4" ML #1, #2 White	1340	1160	1460	1460	197	#5 Black - TCPL
4" Transfer #3, #4 White	1340	1160	1460	1460		#6 Black - TCPL
Pipeline Crossing						
#1 - #2 White	1360	1160	1440	1440	196	#5 Black - TCPL
#3 - #4 White	1360	1160	1440	1440		#6 Black - TCPL
Gulf Crossing	--	--	--	--	195	#5 White
Pipeline Crossing						
TL Black	1300	1110	1310	1310	194	BL White
TR Black	1300	1110	1310	1310		BR White

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 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



			POTENTIAL (-mV)				Waypoint	REMARKS
			LINE		OTHER			
LOCATION			ON	OFF	ON	OFF		
Imperial Crossing								
4" ML #1, #2	Black		1320	1130	1160	1160	193	#5 White - Imperial
4" Transfer #3, #4	Black		1320	1130	1170	1170		#6 White - Imperial
Pipeline Crossing								
#1, #2	White		--	--	--	--	192	Orange Fink; ROW too wet #5 White
#3	White		--	--	--	--		#6 White
#4	White		--	--	--	--		#7 White
			--	--	--	--		#8 White; 90m south of station fences
Pipeline TP Foreign								
Blue					--	--	191	Orange Fink
White					--	--		
Pipeline Crossing								
4" ML TL	Black		--	--	--	--	190	BL White
4" Transfer TR	Black		--	--	--	--		BR White
Pengrowth Gas Plant Meter Site								
4" ML								
V-4003 S-Bend			1240	1080	1320	1320	189	Station
4" Transfer								
V-4030 S-Bend			1150	1020	1210	1210		Station

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LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		LINE		OTHER			
		ON	OFF	ON	OFF		
Indicating Meter							
AF	Left 4" Transfer	1200	1100	1050	--		Zinc
	Right 4" M/L	1090	1100	--	--		
ACT/AL	Left 4" Transfer	1230	1120	1090	--		Zinc
	Right 4" M/L	1060	1060	--	--		
Station Piping							
	V-4009	1220	1220	--	--		
	V-4011	1220	1220	--	--		
	V-4010	1220	1220	--	--		
	V-4012	1220	1220	--	--		
	V-4025	1160	1160	--	--		
	V-4006	1160	1160	--	--		
	V-4020	1160	1160	--	--		
	V-4021	1160	1160	--	--		
	V-4027N	1160	1160	--	--		
	V-4029	1210	1210	--	--		
	V-4028	1210	1210	--	--		
	V-4027S	1210	1210	--	--		
	Prover West	1120	1120	--	--		
Station Piping							
	Prover East	1120	1120	--	--		
	Inlet West	1250	1250	--	--		PPL
		1250	1250	--	--		Pengrowth
	Inlet East	1260	1260	--	--		PPL
		1260	1260	--	--		Pengrowth
	Flare Stack	--	--	1300	1300		

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<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	LINE		OTHER			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Gulf Meter Run						
Gulf Inlet	--	--	--	--		
North Outlet	--	--	1320	1320		
Prover North	--	--	1320	1320		
Prover South	--	--	1320	1320		
South Inlet	--	--	1320	1320		

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<u>LOCATION</u>		POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
		<u>LINE</u>		<u>OTHER</u>			
		<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
<u>Whitecourt Junction to Judy Creek Field Gate</u>							
Whitecourt Junction @ 08-12-64-11							
16" Mainline	North	1340	1150	--	--	169	
	South	1300	1140	--	--		
6" to JCFG 2989	South	1370	1180	--	--		Disconnected & bonded
Test Station South of Whitecourt Junction							
4" Transfer	#1	1380	1120	--	--	171	Orange Fink; All leads in TP bonded; #10 Wire
4" Transfer	#2	1380	1120	--	--		#8 Wire
6" to JCFG	#3	1380	1120	--	--		#8 Wire
6" to JCFG	#4	1380	1120	--	--		#10 Wire
16" Crude	#7	1380	1120	--	--		#8 Wire
16" Crude	#8	1380	1120	--	--		#10
							#4, #7 Bonded
Test Station S. of Whitecourt Junction							
4" NGL	#1 Black #10	--	--	--	--	170	Red Fink; N/R Test post gone
4" NGL	#2 Black #8	--	--	--	--		#10 Black
6" NGL	#3 Black #10	--	--	--	--		#8 Black
6" NGL	#4 Black #8	--	--	--	--		10" Black
16" Crude #7				--	--		#10 White
16" Crude #9				--	--		#10 White

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NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE ON	OFF	OTHER ON	OFF		
Judy Creek FG Meter Site 14-06-64-10						
4" V-3035	S-Bend	1210	1090	--	--	173
6" V-3000	S-Bend	1240	1110	--	--	
4" Continuity Check		1260	1140	1140	1140	Station
6" Continuity Check		1260	1140	790	790	Pigtrap
Indicating Meter						
As Found	P/L	1100	1100	1100	1100	Zinc
	M/L	1100	1100	--	--	Defective
Actual	P/L	--	--	1200	1200	Zinc; PPL lead discontinuous
	M/L	1250	1150	--	--	
Station Piping						
West Meter Run						
	North			1140	1140	
	South			1110	1110	
Middle Meter Run						
	North			1060	1060	Check valve to flare
	South			1140	1140	Isolated
East Meter Run						
	North			1120	1120	Disconnected
	South			510	510	Disconnected & isolated
	South 4" Stub			700	700	Disconnected & isolated
	Middle 4" Stub			1140	1140	
	North 4" Stub			1080	1080	
	Prover North			1090	1090	
	Prover South			1120	1120	
	4" Stub (Near Gate)			1090	1090	

APPENDIX 3
 PEMBINA PIPELINE CORPORATION
 NGL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
<u>Sarah Lake to Virginia Hills</u>						
Sarah Lake Junction 02-13-65-11						
6" S-Bend	1700	1290	--	--	036	Valve 4507
To Meter Run	1680	1280	1680	1290		Valve 4501
Meter Run						
West			1740	1320		
East			1740	1320		
6" Crude Riser			1730	1310		
16" Riser @ Kit	--	--	--	--		Removed
Pipeline Crossing						0 +168.4-West of S.L.J.
#2 - #3 Black	1710	1310	1710	1310	039	#5 - #6 White 12" Pembina
Pipeline Crossing						0 +179.3-West of S.L.J.
#2 - #3 Black	1680	1280	1700	1280	039	#5 - #6 White 8" Pembina
Pipeline Crossing						0 + 195.7
#2 - #3 Black	--	--	--	--	040	#5,#6 White Penn West; N/R TP gone
Pipeline Crossing						0 +909.4-West of S.L.J.; N/R could not access;
#2 - #3 Black	--	--	--	--	041	Across swamp; #5 - #6 White 3" Penn West

APPENDIX 3
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2010



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>	<u>OTHER</u>	<u>ON</u>	<u>OFF</u>		
Pipeline Crossing #2 - #3 Black	--	--	--	--	141	1 + 335.2 - 200m N of road #4 - #5 - #6 Penn West 3"
Pipeline Crossing #2 - #3 Black	--	--	--	--	141	1+349.9 - 200m N of road #5 6" Gulf #6 4" Gulf
Pipeline Crossing (09-11-65-11) #2 - #3 Black	1580	1330	1620	1620	142	1+633.9 #5 - #6 White 4" Gulf
Pipeline Crossing (09-11-65-11) #2 - #3 Black	1600	1330	910	910	143	Lease rd 313-1+750.2 #5 - #6 White 8"
Pipeline Crossing (S of 12-11-65-11) #2 - #3 Black	1550	1300	--	--	144	2+741.1 #5 - #6 White 3" Gulf
Pipeline Crossing (S or 12-11-65-11) #2 - #3 Black	1580	1330	--	--	144	2 + 757.1 #5 White 6" Gulf #6 White 4" Gulf
Pipeline Crossing #2 - #3 Black	--	--	--	--	145	3 + 528.1 Red mini Fink; Not located #5, #6 White 3" Gulf; Overgrown

N/R; Access
along ROW
blocked by
excavation
of other lines.

**APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
Anderson Road Crossing #2 - #3 Black	1380	1180	610	610	233	#5 - #6 White Anderson
Cyries Crude Crossing #6	1150	1120	1160	1150	235	18 + 269.1 #2 Pembina Crude
Anderson Pipeline Crossing #2 - #3 Black	1180	1150	1050	1050	235	18 + 286.1 #5 - #6 White
Cyries Pipeline Crossing #2 - #3 Black	--	--	--	--	236	20 + 230.1 #5 - #6 White
Apache Crossing #2 - #3 Black	--	--	--	--		22 + 849.1; Not located #5 - #6 White 75m down Apache R/W to plant
Daylight Energy 2 - 11 Crude Crossing #3	1310	1300	1320	1310	238	23 + 325 #2 Pembina Crude; N/R
Test Station #2	--	--	--	--	239	#3; 23 + 786; Not located
Enermark Crude Crossing #2 - #3 Black	510	510	760	760	245	24 + 284.0 #5 - #6 White

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 PEMBINA PIPELINE CORPORATION
 NGL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		LINE		OTHER			
		ON	OFF	ON	OFF		
Virginia Hills (Apache 04-02)							
Meter Site							
	S-Bend	550	550	1320	1320	246	Station; Abnd lines & bonds disc. Left disc. As per Peter K.; Lines to be abnd; Pigtrap
		--	--	--	--		
		--	--	--	--		
Meter Run	North	--	--	--	--		
	South	--	--	--	--		
Station Inlet							
	3"	--	--	--	--		Station piping disconnected
	2"	--	--	--	--		
	2"	--	--	--	--		

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PEMBINA PIPELINE CORPORATION
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2010



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
<u>Virginia Hills to Apache Belloy</u>						
Virginia Hills Terminal					242	
Pig Receive S-Bend	1710	1710	1610	1610		Bond removed
Outlet HA-20	1640	1640	1620	1620		Pigtrap disc. from mainline; shorted kit in bypass
Blind Flange	1680	1680	--	--		
4" Loop Pig Receiver						Isolated
S-Bend	2090	2090	1910	1910		
Outlet AA-21	1810	1810	1920	1920		Pigtrap; Bond across kit = 15mA
Blind Flange	1800	1800	--	--		
Red Fink						
South of Receiver						
#2,3 Black	--	--	--	--		N/R inside excavation
#6 Red/#3 Black	--	--	--	--		30m south of receiver
						Bonded by others; Bond
#2,3 Black	--	--	--	--		I = 0mA
#6 Red/#3 Black	--	--	--	--		Disconnected
Old Virginia Hills Road Crossing					254	
4"Loop Line Blue	1240	1240	1210	1210		Yellow Shell
	1390	1390	--	--		Red Shell

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 PEMBINA PIPELINE CORPORATION
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 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



LOCATION		POTENTIAL (-mV)				Waypoint	REMARKS
		LINE		OTHER			
		ON	OFF	ON	OFF		
Simpson Lumber Road Crossing - Loop Line						253	C202 TP S side of road; Test head destroyed; Face plate only; Unable to dig out; Tree grown around post; Top Right
Bottom	Right	--	--	--	--		Top Left
		1460	1460	--	--		Bottom Left
		--	--	--	--		Shell
Pipeline Crossing - Loop Line 06-22-64-13						252	S side of road
	TL	--	--	--	--		Broken leads U/G
	TR	--	--	--	--		
	ML	--	--	--	--		
	MR	--	--	--	--		
	BL	--	--	--	--		
	BR	1090	1090	--	--		
				--	--		Vent - Vent loose
Apache "D" Battery 04-22						251	
Apache Belloy Loop Tie-in							
Cross Over Valve HA-50		510	510	600	600		Culvert
S-Bend		900	900	520	520		Pigtrap

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<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>		<u>OTHER</u>			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
South Side of Road					250	N/R; No TP
#1	--	--	--	--		
#2	--	--	--	--		
#3	--	--	--	--		
#4	--	--	--	--		
#5	--	--	--	--		
#6	--	--	--	--		
TCPL Crossing						East of Hope Creek; Walked ROW 500m from
22+726	--	--	--	--		road; No TP found; Road on TCPL row
22+703	--	--	--	--		
22+679 East	--	--	--	--		#1,#3 Black
	--	--	--	--		#2,#4 White
22+683 West	--	--	--	--		#2,#4 White;
						#1, #3 Black
Hope Creek Gas Plant						
10-17-64-13 W5M						
S-Bend	1020	1020	--	--	247	
Inlet	1010	1010	--	--		
Pump Outlet	1030	1030	--	--		
Receiver	1040	1040	--	--	248	No kits in place
S-Bend	1040	1040	--	--		One sleeve pulled
Outlet	--	--	1010	1010		
Tie-in Valve	1030	1030	810	810		Other = Culvert

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 STRUCTURE-TO-SOIL POTENTIAL DATA
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LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE		OTHER			
	ON	OFF	ON	OFF		
Apache Belloy 10-31-63-13					249	
Pig Launcher HA-10 S-Bend	990	990	990	990		Pigtrap I = 11mA Other = Pig drain 2"
Inlet	920	920	900	900		
Pump Outlet	930	930	--	--		
Inlet	1000	1000	--	--		

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2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE ON	LINE OFF	OTHER ON	OTHER OFF		
<u>Sarah Lake to Swan Hills Terminal</u>						
Sarah Lake Junction 02-13-65-11						
4499 North 16" Line	--	--	--	--	036	Removed
4500 Station	--	--	--	--		
						9.423
TCPL Crossing Bottom (2)	1540	1240	1510	1510	045	Top (2) TCPL
Old Gulf 9 Tie-in						
Test Station						100m Southwest of pump
#2 White	1560	1240	--	--	046	NGL?
#3 White	1560	1240	--	--		Idle 10"
#5 Black	1560	1240	--	--		Crude ?; All lines bonded
Test Station						
North of Gulf 9						Common to crude
#2 Long Black	1570	1210	1180	1180	048	#5 White
#3 Black 10" Idle	1580	1210	--	--		
Test Station						
West of N/S Road						
Black	1430	1210	--	--	053	
White	1430	1210	--	--		

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PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE ON	OFF	OTHER ON	OFF		
Test Station North Side of E/W Road Black	1620	1380	1390	1390	055	East of V-1 White
Test Station West Side of N/S Road by Gulf 8 #6 Black	1590	1380	1370	1370	056	#2 Red 8" IOL #3 White 8" Gulf
	--	--	510	510		
Gulf 8 Trap Site Block Valves @ 05-28-65-10 8" North	1630	1350	--	--	057	Sleeves removed
16" South	1610	1350	--	--		
Flare	--	--	1680	1350		
TP North Fence	1620	1340	--	--		
Main Gulf Road 01-33-65-10 #2 Black	1600	1300	--	--	058	8" NGL S.L.
#3 White	1640	1290	--	--		6" NGL C3+
Golf Course Road 02-03-66-10 #2 Black	1820	1310	--	--	059	8" NGL S.L.
#3 White	1910	1290	--	--		6" NGL C3+

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STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
Highway 32 Crossing						
#2 Black	--	--	--	--	060	8" NGL S.L.
#3 White	--	--	580	580		6" NGL C3+; Vent
Highway 33 Crossing						
North Side						
#2 Black	1600	1170	--	--	062	8" NGL S.L.
#3 White	1610	1180	--	--		6" NGL C3+
						Bonded; I = 180mA ON/20mA OFF; #3 to #2
South of Swan Hills Terminal						300m South of Flare Stack;
						Leads bonded
#2 White	1790	1190	--	--	064	6" NGL C3+
#3 Black	1790	1190	--	--		8" NGL S.L.
#5 Black	1790	1190	--	--		10" NGL 'A' C3+
#6 Black	1790	1190	--	--		10" NGL 'A' C3+

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2010



<u>LOCATION</u>		POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
		<u>LINE</u>	<u>OTHER</u>				
		<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
<u>Swan Hills Terminal</u>							
6" NGL							
	Line	1480	1080				
	Station			1320	1060		
	Pigtrap			1320	1060		
10" NGL							
	Line	1350	1060				
	Station			1350	1060		No kit @ pigtrap; Stamp illegible
8" NGL (02-06)							
	Inlet	--	--				Cut off U/G & bonded
	Outlet	--	--				
	Station			--	--		
6" NGL (Mitsue)							
	Line	1520	1070				
	Station			1480	1050		
	Trap			1480	1050		
Pump							
	Inlet			1320	1040		
	Outlet			1380	1040		
Meter							
	East End			1220	1030		
	2" Header			1360	1060		

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2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE ON	OFF	OTHER ON	OFF		
<u>Swan Hills Terminal to Devon 02-06</u>						
Swan Hills Terminal						
V-2163 S-Bend S	--	--	--	--		S-Bend north; Cut off U/G & bonded
Continuity Check	--	--	--	--		
Station			--	--		
Test Point Outside Terminal Fence						
#2, #3 Black	1900	1210	1860	1210	065	#5, #6 white; Crude
BP Canada Pipeline Crossing						223 + 906.55
#2, #3 Black	2120	1230	1310	1330	066	#6 White - BP Canada
Pembina Pipeline Crossing						224 + 398.563
Red Fink #2 Black	2040	1200	560	560	067	#3 White - Pembina Crude Home 1 Aband; Unprotected
Devon Pipeline Crossing						224 + 451.133
Orange Fink						
#2, #3 Black	2080	1220	1260	1270	068	#6 White - Devon H ₂ O
Devon Pipeline Crossing						224 + 987.983
(SW ¼-25-66-10)						#6 White 4" Pembina
N-1 Road #2, #3 Black	1840	1160	1760	1180	069	Crude - N-1 Line
						225 + 033.049; Blue Fink
#1 Black	1880	1120	1230	1240	071	#2 White - 2" Devon;

**APPENDIX 3
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<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
Devon Pipeline Crossing	--	--	1230	1240		#3 Black - 4" Devon
(SW ¼-25-66-10)	--	--	--	--		Line 4
West Side of	--	--	--	--		#5 Black - 4" Devon; Dead lead
N-1 Road	--	--	--	--		Line 3
	--	--	--	--		#6 Red - 4" Devon
BP Canada Pipeline Crossing						
#2 Red, #3 White	1880	1190	1360	1380	074	#5, #6 Black
White	1880	1190				
Pipeline Crossing						
(SE ¼-26-66-10)						
#3, #6 Black	1280	1200	1180	1180	076	#2 White
Highway 33 Crossing						
East Side #3, #4 White	1710	1190	710	710	077	#1, #2 White Casing
Highway 33 Crossing						
West Side #1, #2	1690	1170	720	720	078	#3, #4 White Casing
Home Pipeline						
Crossing #2, #3 Black	1620	1180	1180	1200	079	Home 04-35 Sat lease road #6 White - 3" Devon

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LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE ON	OFF	OTHER ON	OFF		
Home Pipeline Crossing N.E. of Well 02-34 #3, #4 Black	--	--	--	--	080	N/R ROW too swampy #2 White - 4" Devon
Pembina Pipeline Crossing North of A-1 #2, #3 Black	1720	1220	1720	1220	083	East of Road #6 White - Pembina - Crude Line bonded; I = 160mA
Devon Pipeline Crossing North of A-1 #2, #3 Black	1740	1200	1120	1120	084	West of Road #5, #6 White - 3" Devon
Devon Pipeline Crossing Lead Road #2, #3 Black	1790	1180	1100	1100	085	S.W. of New 05-34 #6 White - 3" Devon
Devon Pipeline Crossing - Old Home 7 Road - Orange Fink #1, #2 Black	1730	1150	620	620	087	#3 White - 8" Devon #4 White - 8" Devon
	--	--	620	620		

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LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE ON	OFF	OTHER ON	OFF		
Devon Crossing						
Old Home 7 Road						
Red Fink #2 Black	--	--	--	--	087	Broken Lead
	--	--	960	860		#4 White 8" Devon Line1
	--	--	--	--		#5 White; Broken
	--	--	--	--		#6 White; Broken
#3 Black	--	--	--	--		Broken Leads
	--	--	--	--		#7 White 7" Devon Line4
	--	--	--	--		#8 White 4" Devon Line5
	--	--	--	--		#9 White 3" Devon Line6
Goose Tower Road - Orange Fink						
Pengrowth Pipeline						25m down R.O.W.
#2, #3 Black	1360	1070	1110	1110	088	#6 White - 12" Pengrowth
Devon Pipeline Crossing						
110m East of A-4 Corner						
Top Black	1340	1040	1040	1040	089	C202 T.S. Bottom White
Devon Pipeline Crossing						
East Side of A-4 Corner @ 02-32-66-10					090	Post #2 (East)
#2, #3 Black	1260	1020	1080	1080		#4 White - Devon
	--	--	--	--		#5 White - Devon
	--	--	--	--		#6 White - Devon
	--	--	1040	1040		#7 White - 4" Devon
	--	--	--	--		#9 White - 6" Pengrowth

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<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>	<u>OTHER</u>	<u>ON</u>	<u>OFF</u>		
Devon Pipeline Crossing						
East side of A-4 Corner @ 02-32-66-10						Post #1 (West)
#2 Black	--	--	--	--	090	Broken Lead
	--	--	1050	1050		#4 White - 3" Devon
#3 Black	1270	1020	1070	1070		#5 White - 3" Devon
	--	--	580	580		#6 White - 3" Devon
	--	--	1060	1060		#7 White - 3" Devon
	--	--	510	510		#9 White - 3" Devon
Test Station						
West Side of A-4 Corner @ 02-32-66-10						
#2, #3 Black	1250	1000	1030	1030	090	
Goose Tower Road Crossing						
Pipeline Crossing						
Red Fink	--	--	1180	1180	091	#4 White - 16"
Pengrowth Pipeline Crossing						
Orange Fink	--	--	1290	1290	091	#4 White - 3" Pengrowth
Pengrowth Pipeline Crossing						
Red Fink #1 Black	1680	1240	1280	1280	091	#4 White - 12" Pengrowth
Pengrowth Pipeline Crossing						
Orange Fink	--	--	1110	1110	091	#4 White - 20" Pengrowth

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<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>	<u>OTHER</u>	<u>ON</u>	<u>OFF</u>		
ATCO Pipeline Crossing Red Fink 04-31-66-10 W5						
#4 Black	--	--	--	--	092	#2 - 4" ATCO
	--	--	1020	1020		#3 White - 4" ATCO
Devon Pipeline Crossing Red Fink 04-31-66-10 W5						
#2, #3 Black	1380	1100	1040	1040	092	#4 White - 10" Devon
	--	--	--	--		#5 White - 3" Devon; Broken
	--	--	--	--		#6 Black - 6" Devon; Broken
Pipeline Crossing Southwest of 02-06-67-10 Plant						Red Fink
#2, #3 Black	1430	1120	1090	1090	093	#5 White
Pipeline Crossing Southwest of 02-06 Plant						Red Fink
#2, #3 Black	1460	1130	--	--	094	17m West
						#5 White - ATCO; Dead lead
Pipeline Crossing South of 02-06 Plant						
#10, #11 White	1450	1100	1080	1080	095	#5, #6 Black 8" Devon
	--	--	1130	1130		#2, #3 Red 10" Devon
						White; No shift

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<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>		<u>OTHER</u>			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Devon 02-06-67-10 W5M						
V-5001 S-Bend	1320	1020	--	--	096	Rheo @ 9%
V-5000	1340	1020	860	870		I = 560mA ON/50mA OFF to Pembina
V-5003	--	--	870	870		
V-5014	--	--	800	800		
V-5015	--	--	800	800		
Prover East	--	--	690	690		Rheo @ 100% = 5mV increase on stn; 100mV
West	--	--	690	690		decrease in line; Left @ 9%
V-5017	--	--	710	710		
Devon Tie-in						
Pembina NGL	940	940	--	--		
Devon NGL	--	--	990	990		
Pembina Flare	--	--	--	--		
Devon Flare	--	--	--	--		
Indicating Meter						
As Found	1300	1100	1000	1000		Station
	--	--	1100	1100		Zinc
Actual	1360	1040	900	900		Station
	--	--	1080	1080		Zinc

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<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>		<u>OTHER</u>			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Swan Hills Terminal to Judy Creek Site 1 (C3+)						
South of Swan Hills Terminal						300m south of flare stack Leads bonded
#2 White	1790	1190	--	--	064	6" NGL C3+
#3 Black	1790	1190	--	--		8" NGL S.L.
#5 Black	1790	1190	--	--		10" NGL 'A' C3+
#6 Black	1790	1190	--	--		10" NGL 'A' C3+
Hwy 33 Crossing						
#2 Black	1620	1170	--	--		8" NGL S.L.
#3 White	1610	1180	--	--		6" NGL C3+; Bond I = 180mA ON/20mA OFF
Hwy 32 Crossing						
#2 Black	--	--	--	--	060	8" NGL S.L.
#3 White	--	--	580	580		6" NGL C3+; Vent
Golf Course Road						
#2 Black	1820	1310	--	--	059	8" NGL S.L.
#3 White	1910	1290	--	--		6" NGL C3+
Main Gulf Road						
#2 Black	1600	1300	--	--	058	8" NGL S.L.
#3 White	1640	1290	--	--		6" NGL C3+

APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE		OTHER			
	ON	OFF	ON	OFF		
Road Crossing 01-07-65-10 #2, #3 Black	--	--	--	--		Not located S. of Gulf 9; Orange Fink
SSHU Well 222 Lease Road 04-32-64-10 #2, #3 Black	2370	1810	--	--	148	Red Fink; Locked Gulf rectifier OFF; N/R
Judy Creek Junction Site #1					153	
16" Inlet	1420	1230	--	--		Station being re-piped
4" West	--	--	--	--		Pile
Meter Run V-3323	--	--	--	--		
V-3324	--	--	--	--		
V-3328	--	--	--	--		
V-	--	--	--	--		6" Esso tie-in
6" South	--	--	--	--		
IOR Riser West of Site			1520	1330		

APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Judy Creek Junction Site #3						
<u>@ 01-25-64-11 W5M</u>						
					200	
16" Taylor Lateral	1680	1210	--	--		GPS 54.56307°N, 115.5148°W
Station	1590	1220	--	--		Kit bypassed by electrical
IOL Pipelines Tie-in Riser						
6" to Station	1710	1190	--	--		
10" to IOL Station	1710	1190	--	--		
Meter South						
6" Intake - from IOL	--	--	1610	1120		
6" Intake	1480	1180	--	--		
6" Intake	1440	1200	--	--		
4"	1320	1120	--	--		
6" Discharge	1420	1220	--	--		
6" Discharge	1400	1140	--	--		
6" Discharge	1350	1110	--	--		
Meter North						
10" Intake	1380	1230	--	--		
10" Intake	1360	1230	--	--		
10" Intake	1360	1160	--	--		
4" Bypass	1310	1170	--	--		
4" Bypass	1330	1170	--	--		
4" Bypass	1350	1120	--	--		

APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



LOCATION	POTENTIAL (-mV)				Waypoint	REMARKS
	LINE ON	OFF	OTHER ON	OFF		
Meter North						
8" Discharge	1290	1120	--	--		
8" Discharge	1260	1110	--	--		
8" Discharge	1290	1120	--	--		
8" Intake	1310	1140	--	--		
10" to JCPS Tie-in	1320	1120	--	--		
2" Buy Back	1320	1120	--	--		
Judy Creek Mainline Tie-in						
16" to Whitecourt Jct	1730	1340	--	--		
10" from Site #3	--	--	--	--		Being re-piped
Flare Drain Tank						
2" Line - Blank	1460	1210	--	--		
2" Line - Blank	1460	1210	--	--		
1" Line	1380	1150	--	--		
Tank - Manway	1400	1160	--	--		
3" Line	1400	1160	--	--		
2" Line - Blank	1410	1160	--	--		
Flare 2" from Station	1360	1110	--	--		
TCPL TP S of Flare	1370	1120	1580	1580		
IOL Facilities						
6" NGL	--	--	--	--		Gate locked
10" NGL	--	--	--	--		
2" Flare	--	--	--	--		

APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
<u>Swan Hills Terminal to Mitsue</u>						
Swan Hills Terminal V-6010 S-Bend	1502	1070	1480	1050		Station
Pipeline Crossing West of Swan Hills Terminal #2, #3	1580	1120	1580	1120		#4, #6; Home 1; Continuity bonded
Road Crossing South of Home 12 #2, #3	1610	1190	--	--	321	3 + 820.50
Test Station #2	--	--	--	--		6 + 820; N/R VAC No TP at this location
Test Station South of Waste Plant #2, #3	1720	1210	--	--	268	@ Old Road 10 + 670.50; Replaced zap fink 0.3 VAC; East of R-15
Test Station At Power Line Junction #2, #5	1710	1220	--	--	267	13 + 920.50

APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
Test Station South of Windy Lake Road #5, #6	1480	1060	--	--	266	2½ poles; Before Powerline 150 16 + 745.50
Test Station At Windy Lake Road #2, #5	1560	1160	--	--	320	17 + 695.50 South Side of road; 5.1 VAC
Test Station at Road #2, #5	1620	1150	--	--	265	M20 19+853.5, just S. of AM South side of road
Air Marker 20						
Test Station #2, #5	--	--	--	--		Power Pole 174; 23+170.5 Midpoint; N/R; N/R VAC; Possibly destroyed by ROW grooming; ½ way between 174 & 175
Air Marker 25						
Test Station Crosses to East of Power Line #5, #6	--	--	--	--	264	26 + 446.50 just past creek pole 188 N/R VAC; No landing area

**APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>		<u>OTHER</u>			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Test Station #2, #5	--	--	--	--	263	27 + 739.50 pole 193/194 N/R VAC; TP destroyed; Leads lost
Air Marker R-23						
Test Station #5, #6	1620	1180	--	--	262	30 + 020.50 @ AM30 sign 12.8 VAC; Green Fink
Air Marker 40						
Test Station #5, #6	1510	1160	--	--	319	40 + 70 @ corner
Air Marker R-24						
Test Station #5, #6	--	--	--	--		40 + 325 N/R VAC; Could not locate over P/L
Test Station #5, #6	1420	1130	--	--	261	47 + 90; Pole 269 11.4 VAC
Air Marker R-25						
Test Station #5, #6	1320	1090	--	--	260	47 + 607; Pole 271 9.8 VAC

APPENDIX 3
 PEMBINA PIPELINE CORPORATION
 NGL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>		<u>OTHER</u>			
	<u>ON</u>	<u>OFF</u>	<u>ON</u>	<u>OFF</u>		
Test Station #5, #6	--	--	--	--		51 + 562; 2½ south of 290; N/R VAC; Midpoint; Lost in swamp
Air Marker 55						
Test Station #5, #6	--	--	--	--		57 + 257 12.7 VAC; Pipeline moves away; N/R no landing area
Test Station #5, #6	1440	1230	--	--	259	58 + 472 13.5 VAC; Pipeline returns
Air Marker 60						
Test Station #5, #6	1310	1140	--	--	318	60 + 218 8.1 VAC; Pipeline moves away
Air Marker R-26						
Test Station #5, #6	--	--	--	--	317	61 + 807 N/R VAC; Pipeline returns; N/R; no landing area
Air Marker 65						

**APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
Air Marker 70 Test Station Crosses to West of Power Line #5, #6	1320	1190	--	--	316	71 + 055.5 9.6 VAC; Repaired TP
Test Station #2, #3 Black	1280	1120	--	--	315	76 + 445.5 5.5 VAC South of least (reclaimed)
Pipeline Crossing 1st Road South of Block Valve #5, #6 White	1290	1200	1310	1310	314	77 + 988.701 #2 - #3 Black Chevron; 6.1 VAC
Highway 2 Block Valve West of Chevron 10-10-72-05 South	1270	1220	--	--	204	AC service lines draped over fence; Not live Valve removed; 3.9 VAC Lines bonded through spool
North	1280	1230	--	--		
Chevron 10-10-72-05 Flowline	--	--	--	--		North - Blinded
Flowline	--	--	--	--		
Casing	--	--	--	--		

APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
Test Station South of Highway 2 TCPL Crossing #2, #3 Black	1290	1200	1420	1420	205	80 + 280.7 #5, #6 White - TCPL
BP Canada Crossing #5, #6 Black	1360	1250	1310	1310	206	80 + 395.4 #2 #3 White - BP Canada Oil
Pipeline Crossing North of Highway 2 #5, #6 White	1300	1260	1240	1220	207	81 + 546.4 #2, #3 Black; 50m north of Hwy 2
Interference Bond East of Chevron						81 + 624.10 Amoco; Not connected NE of test station; I = 30mA @ bond panel
12-14-72-05 W5M Black	1250	1230	--	--	208	White - Chevron
	--	--	1250	1230		
Indicating Meter	1300	1250	1100	1100		White - Zinc As Found
	1290	1260	--	--		Actual/As Left

**APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
Pipeline Crossing 02-23-72-05						82 + 520A
South Post						
#5, #6 White	1380	1380	1490	1490	209	#2, #3 Black - Chevron
North Post						
#5, #6 White	1380	1380	1490	1490	209	#2, #3 Black - Chevron
Pipeline Crossing South 09-23-72-05						83 + 700A
#5, #6 White	1300	1280	1320	1320	211	#2, #3 Black - Chevron 30m from edge of Hwy
North 09-23-72-05						
#5, #6 White	1310	1290	1290	1290	210	Foreign leads
Pipeline Crossing 4 #5, #6 Black	1280	1220	710	710	212	85 + 316.8 #2, #3 White 100m east of MP 46
Pipeline Crossing 150m West of Tracks						86 + 433.900
#2, #3 Black	1250	1220	1240	1240	213	#5, #6 White
R.R. Crossing (West Side)						86+573.7
#2, #3 White	1240	1210	--	--	214	#5, #6 Black - Casing
	--	--	720	720		Vent

APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	LINE <u>ON</u>	LINE <u>OFF</u>	OTHER <u>ON</u>	OTHER <u>OFF</u>		
Test Point						
Orange Fink/Black Post						
#2 Red	--	--	--	--	215	N/R
#3 White	--	--	--	--		
#5 Green	--	--	--	--		
Test Point						
Orange Fink/White Post						
#2/#3 White	1280	1250	--	--	216	
#5/#6 Black	--	--	1090	1090		Test head broken
Test Point						
Orange Fink/White Post						
#2/#3 White	--	--	--	--	217	
#5/#6 Black	1250	1240	--	--		
	--	--	1160	1160		
Test Point						
Orange Fink/White Post						
#2/#3 White	1260	1240	--	--	218	
#5 Black	--	--	1270	1250		
#6 Black	--	--	1310	1310		
#7 Black	--	--	1310	1310		
#9/#10 Black	--	--	1270	1250		

APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>	<u>OTHER</u>	<u>ON</u>	<u>OFF</u>		
Test Post						
Red Fink/White Post						
#2/#3 White	1240	1210	--	--	219	
#5/#6 Black	--	--	1210	1210		
North of Chevron Plant						
Red Fink						20m West of I/F bond
Black Post #2, #3 Black	1260	1230	1240	1240	220	#5, #6 White - 6" Group
Yellow Fink						
White Post #2, #3 Black	1260	1240	1110	1100		#5, #6 White - 3"
Yellow Fink						
White Post #2, #3 Black	1260	1240	1180	1180		#5, #6 White
Orange Cap						
Interference Bond						53m West of next red fink
White	1240	1200	--	--	221	I = 20mA ON
Black Wire	--	--	1300	1300		Bond connected
White Wire	1210	1140	--	--		Disc.
Black Wire	--	--	1310	1310		
Indicating Meter						
As Found	1250	1250	1050	1050		Zinc
Actual	1270	1230	1000	1000		Zinc

APPENDIX 3
PEMBINA PIPELINE CORPORATION
NGL SYSTEM
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>POTENTIAL (-mV)</u>				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u>	<u>OTHER</u>	<u>ON</u>	<u>OFF</u>		
Pipeline Crossing						
Red Fink						
White Post #2 White	1210	1180	1070	1070	222	#4 Black
#3 White	1210	1180	1050	1050		#1 Black
	--	--	1280	1280		#5 Black
	--	--	1280	1280		#7 Black
	--	--	--	--		#8 Black
	--	--	--	--		#9 Black
	--	--	--	--		#10 Black
	--	--	--	--		#11 Black
Pipeline Crossing						
Red Fink #2 White	1220	1200	1310	1310	223	
White Post #3 White	1200	1200	1300	1300		#5 Black
Pipeline Crossing						
Red Fink						
White Post #2, #3 White	1230	1200	1270	1270	224	#5 Black RPL
Pipeline Crossing						
Red Fink						
White Post #3 White	1270	1260	610	610	224	#2, #5 Black
#6 White	1270	1260	610	610		Line unknown
Pipeline Crossing						
Red Fink						
White Post #2, #3 Black	1230	1210	1290	1290	225	#5, #6 White

APPENDIX 3
 PEMBINA PIPELINE CORPORATION
 NGL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	<u>LINE</u> <u>ON</u>	<u>OFF</u>	<u>OTHER</u> <u>ON</u>	<u>OFF</u>		
Pipeline Crossing Yellow Fink White Post #2, #3 Black	1240	1200	1270	1270	225	#5, #6 White - 3" Chevron
Pipeline Crossing Orange Fink White Post #5, #6 White	1260	1240	510	510	226	#3 Black
	--	--	510	510		#2 Black
Pipeline Crossing Red Fink White Post #2, #3 White	1240	1240	1250	1250	227	#4 Black
	1240	1200	1240	1240		#5 Black
	1250	1220	600	600		#6 Black
Black	1240	1220	1290	1290		#7 White
Black	1240	1220	1290	1290		#8 White
	1260	1260	1040	1040		#9 Black
Pipeline Crossing Red Fink White Post #2, #3 White	1240	1210	1330	1330	228	#5, #6 Black
Pipeline Crossing Red United #2, #5 Black	1240	1210	1260	1260	229	#3
			1250	1250		#6 White

APPENDIX 3
 PEMBINA PIPELINE CORPORATION
 NGL SYSTEM
 STRUCTURE-TO-SOIL POTENTIAL DATA
 2010



<u>LOCATION</u>	POTENTIAL (-mV)				<u>Waypoint</u>	<u>REMARKS</u>
	LINE <u>ON</u>	<u>OFF</u>	OTHER <u>ON</u>	<u>OFF</u>		
Pipeline Crossing Red Fink White Post #2, #3 White	1230	1200	1270	1270	230	#5, #6 Black
Interference Bond Panel White Wire	1300	1260	--	--	231	AF/AL
Black Wire	--	--	1140	1040		Rheo @ 100%
Black Wire Stub	--	--	600	600		Current = 12mA ON/12mA OFF
Indicating Meter As Found	--	--	--	--		Zinc; No meter
Actual/As Left	--	--	--	--		Zinc
Mitsue - Nipisi Meter Site 15-30-72-04 W5M Mitsue Receiver						
V-7000 S. Bend	--	--	--	--		Station removed
Outlet North	--	--	--	--		Piping cut off U/G
East	--	--	--	--		



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APPENDIX 4
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
STRUCTURE-TO-SOIL POTENTIAL DATA
NORTHERN EXPANSION PIPELINE
2010

**APPENDIX 4
PEMBINA PIPELINE CORPORATION
NORTHERN EXPANSION PIPELINE
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



<u>LOCATION</u>	<u>GPS Co-ordinates</u>		<u>Chainages (KM)</u>	<u>POTENTIAL (-mV)</u>				<u>REMARKS</u>
	<u>Latitude</u>	<u>Longitude</u>		<u>Structure ON</u>	<u>OFF</u>	<u>Other ON</u>	<u>OFF</u>	
08-25-64-11 W5M Judy Creek Meter Stn #3 Snipe Lake Pigtrap	54.56447°N	115.5205°W	277.65	1680 1590	1210 1220			Pembina Pembina; No kit @ trap
SE 25-64-11 W5M T.P. #99 Black (2) White (2) Valve Chamber	54.56521°N	115.5224°W	277.61	1480	1140			
						1310	1310	Foreign - East side of N/S road
				--	--			Confined space entry
						1300	1300	Foreign - Culvert
SE 25-64-11 W5M T.P. #98 Black (2) White (2)	54.56524°N	115.5225°W	277.61	1500	1150			Pembina - East side of N/S road; Foreign
						1320	1320	
SE 25-64-11 W5M T.P. #97 Black (2) White (2)	54.56527°N	115.5226°W	277.60	1490	1130			Pembina - East side of N/S road
						1380	1380	Foreign
SE 25-64-11 W5M T.P. #96 Black (2) White (2)	54.56533°N	115.5228°W	277.58	1450	1150			Pembina - West side of N/S road
						1310	1310	Foreign

APPENDIX 4
PEMBINA PIPELINE CORPORATION
NORTHERN EXPANSION PIPELINE
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>GPS Co-ordinates</u>		<u>Chainages (KM)</u>	<u>POTENTIAL (-mV)</u>				<u>REMARKS</u>
	<u>Latitude</u>	<u>Longitude</u>		<u>Structure ON</u>	<u>OFF</u>	<u>Other ON</u>	<u>OFF</u>	
SE 25-64-11 W5M T.P. #95 Black (2) White (2)	54.56538°N	115.5229°W	277.58	1560	1310	1140	1140	Pembina 8m from TP 97 Foreign
SE 25-64-11 W5M T.P. #94 Black (2) White (2)	54.56541°N	115.5230°W	277.57	1540	1290	1290	1290	Pembina 10m from TP 97 Foreign
SE 25-64-11 W5M T.P. #93 Black White	54.56558°N	115.5236°W	277.56	1510	1310	1280	1280	
SE 25-64-11 W5M T.P. #92 Black (2) White (2)	54.56560°N	115.5237°W	277.56	1490	1270	1330	1330	Pembina 53m from TP 97 Foreign
SE 25-64-11 W5M T.P. #91 Black (2) White (2)	54.56567°N	115.5240°W	277.53	1500	1270	1190	1190	Pembina 80m from TP 97 Foreign
SE 25-64-11 W5M T.P. #90 Black (2) White (2)	54.5657°N	115.5241°W	277.52	1490	1270	1410	1410	WP 284 Pembina 85m from TP 97 Foreign

APPENDIX 4
PEMBINA PIPELINE CORPORATION
NORTHERN EXPANSION PIPELINE
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>GPS Co-ordinates</u>		<u>Chainages</u> <u>(KM)</u>	<u>POTENTIAL (-mV)</u>				<u>REMARKS</u>
	<u>Latitude</u>	<u>Longitude</u>		<u>Structure</u> <u>ON</u>	<u>OFF</u>	<u>Other</u> <u>ON</u>	<u>OFF</u>	
SE 25-64-11 W5M T.P. #89 Black (2) White (2)	54.56572°N	115.5242°W	277.51	1490	1290		1440 1440	WP 284 Pembina Foreign
SE 25-64-11 W5M T.P. #88 Black (2) White (2)	54.56578°N	115.5244°W	277.49	1570	1330		1180 1180	WP 284 Pembina Foreign
NE 25-64-11 W5M T.P. #87 Black White	54.56808°N	115.5248°W	277.47	--	--		-- --	Could not locate Pembina - South of Pengrowth plant (Orange Fink); Destroyed Foreign
NW 25-64-11 W5M T.P. #86			276.40	--	--			Could not locate
12-25-64-11 W5M T.P. #85 Black (2)	54.57032°N	115.5370°W	276.30	1480	1310			WP 282 Pembina - West side of N/S road
SE 28-64-11 W5M T.P. #84 Black (2)	54.56495°N	115.5912°W	272.91	1570	1330			WP 282; Replaced zap guard fink head West of power line

APPENDIX 4
PEMBINA PIPELINE CORPORATION
NORTHERN EXPANSION PIPELINE
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>GPS Co-ordinates</u>		<u>Chainages</u> <u>(KM)</u>	<u>POTENTIAL (-mV)</u>				<u>REMARKS</u>
	<u>Latitude</u>	<u>Longitude</u>		<u>Structure</u> <u>ON</u>	<u>OFF</u>	<u>Other</u> <u>ON</u>	<u>OFF</u>	
SW 28-64-11 W5M T.P. #83 Black (2) White (2)	54.56387°N	115.6084°W	271.81	1590	1320		1330 1330	WP 281
SW 28-64-11 W5M T.P. #82 Black (2) White (2)	54.5642°N	115.6180°W	271.07	1550	1330		1180 1180	WP 280
SW 31-64-11 W6M T.P. #80 Black (2) White (2)	54.56637°N	115.6262°W	268.15	--	--	--	--	Could not locate
SW 34-64-12 W5M T.P. #79 Black (2)	54.57485°N	115.6581°W	268.50	1500	1280			WP 279 FA 53
SW 04-65-12 W5M T.P. #78 Black (2)	54.59014°N	115.7522°W	260.45	1480	1280			WP 278 Pembina - South side of W/E road
NW 12-65-13 W6M T.P. #77 Black (2)	54.61475°N	115.8372°W	254.72	--	--			Pembina - West side of N/S road
10-10-65-13 W5M T.P. #76 Black (2)	54.61539°N	115.8626°W	252.10	--	--			Pembina - West side of N/S road; Could not locate

APPENDIX 4
PEMBINA PIPELINE CORPORATION
NORTHERN EXPANSION PIPELINE
STRUCTURE-TO-SOIL POTENTIAL DATA
2010



<u>LOCATION</u>	<u>GPS Co-ordinates</u>		<u>Chainages (KM)</u>	<u>POTENTIAL (-mV)</u>				<u>REMARKS</u>
	<u>Latitude</u>	<u>Longitude</u>		<u>Structure ON</u>	<u>OFF</u>	<u>Other ON</u>	<u>OFF</u>	
NE 20-65-13 W5M T.P. #75 Black (2)	54.63399°N	115.9114°W	247.79	--	--			Could not locate Pembina - South side of W/E road; FA 49
SW 30-65-13 W5M T.P. #74	54.65086°N	115.9502°W	245.36	1460	1300			WP 277 8.3 VAC
NE 34-65-14 W5M T.P. #73 Black (2)	54.67253°N	116.0179°W	240.55	--	--			WP 276 Pembina; 0VAC
NE 04-66-14 W5M T.P. #72 Black (2)	54.68424°N	116.0546°W	237.81	--	--			WP 275 Pembina - North side ; One lead broken of road; 0 VAC
NE 07-66-14 W5M T.P. #71 Black (2)	54.69784°N	116.0985°W	234.55	--	--			WP 274 Pembina - North side of road; 0 VAC
07-13-66-15 W5M Goose River BV (MLV 14) East West Tower	54.71056°N	116.1314°W	232.05					WP 270 Rectifier location Pembina 0.3 VAC
				1480	1210			
				1490	1180			
				1310	1190			

**APPENDIX 4
PEMBINA PIPELINE CORPORATION
NORTHERN EXPANSION PIPELINE
STRUCTURE-TO-SOIL POTENTIAL DATA
2010**



<u>LOCATION</u>	<u>GPS Co-ordinates</u>		<u>Chainages (KM)</u>	<u>POTENTIAL (-mV)</u>				<u>REMARKS</u>
	<u>Latitude</u>	<u>Longitude</u>		<u>Structure ON</u>	<u>OFF</u>	<u>Other ON</u>	<u>OFF</u>	
NW 13-66-15 W5M T.P. #70 Black (2)	54.71601°N	116.1441°W	230.92	1450	1240			WP 271 Pembina - East side of N/S road
SW 23-66-15 W5M T.P. #69	54.72601°N	116.1707°W	228.94	1410	1220			WP 272 FA 45
SE 28-66-15 W5M T.P. #68	54.74071°N	116.2078°W	226.28	1420	1230			WP 273
SE 32-66-15 W5M T.P. #67	54.75296°N	116.2388°W	223.56	--	--			TP gone; Leads lost in tall grass FA 44
NW 06-67-15 W5M T.P. #66	54.77262°N	116.2881°W	219.71	--	--			N/R; Could not locate



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APPENDIX 5
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
GPS WAYPOINTS
2010

APPENDIX 5
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
GPS WAYPOINTS
2010



<u>LOCATION DESCRIPTION</u>	<u>GPS CO-ORDINATES (WGS 84)</u>	<u>COMMENTS</u>
1	N55.04019 W115.47307	
2	N54.95512 W115.56149	
3	N54.93267 W115.58809	
4	N55.04118 W115.46215	
5	N55.00733 W115.45207	
6	N55.00414 W115.45972	
7	N55.02624 W115.42115	
8	N55.02785 W115.42566	
9	N55.02708 W115.42356	
10	N55.00734 W115.45126	
12	N55.01073 W115.34647	
13	N55.01070 W115.34650	
14	N55.00781 W115.33350	
15	N55.00773 W115.33314	
16	N55.00750 W115.33216	
17	N55.01205 W115.35235	
18	N54.97707 W115.24165	
19	N54.95383 W115.22132	
20	N54.94621 W115.24331	
21	N54.94334 W115.22483	
22	N54.76085 W115.36300	
23	N54.77738 W115.36280	
24	N54.79611 W115.36271	
25	N54.80218 W115.36160	
26	N54.80291 W115.36097	
27	N54.80323 W115.36095	
28	N54.80541 W115.37044	
29	N54.81949 W115.35817	
30	N54.83369 W115.35789	
31	N54.86162 W115.35624	
32	N54.84534 W115.33199	
33	N54.90404 W115.20481	
34	N54.93369 W115.27904	
35	N54.95346 W115.22032	
36	N54.61810 W115.52016	
37	N54.61832 W115.52010	
38	N54.61773 W115.52310	
39	N54.61794 W115.52310	
40	N54.61795 W115.52355	
41	N54.61716 W115.53380	
42	N54.62898 W115.51234	
43	N54.63098 W115.51239	
44	N54.63366 W115.50167	

APPENDIX 5
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
GPS WAYPOINTS
2010



<u>LOCATION DESCRIPTION</u>	<u>GPS CO-ORDINATES (WGS 84)</u>	<u>COMMENTS</u>
45	N54.63301 W115.50455	
46	N54.63353 W115.50366	
47	N54.63395 W115.50289	
48	N54.63422 W115.50234	
49	N54.63473 W115.50146	
50	N54.63491 W115.50086	
51	N54.63534 W115.49955	
52	N54.63544 W115.49928	
53	N54.63826 W115.49052	
54	N54.64185 W115.49099	
55	N54.64168 W115.47985	
56	N54.65238 W115.46058	
57	N54.65294 W115.45905	
58	N54.66347 W115.43777	
59	N54.67849 W115.42429	
60	N54.68742 W115.40533	
61	N54.70956 W115.37179	
62	N54.71012 W115.37144	
63	N54.71059 W115.37107	
64	N54.72440 W115.36361	
65	N54.72893 W115.36385	
66	N54.73078 W115.36821	
67	N54.73328 W115.37451	
68	N54.73366 W115.37482	
69	N54.73709 W115.38071	
70	N54.73729 W115.38069	
71	N54.73718 W115.38131	
72	N54.74073 W115.38068	
73	N54.73508 W115.38132	
74	N54.73735 W115.38849	
75	N54.73897 W115.39244	
76	N54.74091 W115.39687	
77	N54.74283 W115.40072	
78	N54.74315 W115.40140	
79	N54.74707 W115.40863	
80	N54.75039 W115.42088	
81	N54.75597 W115.42409	
82	N54.75340 W115.42810	
83	N54.75168 W115.43075	
84	N54.75185 W115.43159	
85	N54.75289 W115.43513	
86	N54.75468 W115.43464	
87	N54.75312 W115.43995	

APPENDIX 5
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
GPS WAYPOINTS
2010



<u>LOCATION DESCRIPTION</u>	<u>GPS CO-ORDINATES (WGS 84)</u>	<u>COMMENTS</u>
88	N54.75181 W115.45572	
89	N54.75134 W115.47095	
90	N54.75116 W115.47256	
91	N54.75155 W115.48600	
92	N54.75138 W115.51054	
93	N54.76465 W115.51041	
94	N54.76470 W115.51017	
95	N54.76469 W115.50542	
96	N54.76548 W115.50504	
97	N54.78568 W115.49496	
98	N54.79054 W115.50596	
99	N54.78399 W115.48917	
100	N54.78203 W115.48548	
101	N54.80112 W115.51644	
102	N54.80107 W115.51639	
103	N54.80249 W115.51692	
104	N54.80262 W115.51692	
105	N54.80269 W115.51738	
106	N54.80275 W115.51789	
107	N54.76562 W115.44487	
108	N54.80978 W115.41146	
109	N54.80895 W115.40216	
110	N54.80931 W115.39649	
111	N54.80824 W115.38506	
112	N54.63449 W115.24808	
113	N54.61076 W115.21563	
114	N54.52177 W115.09414	
115	N54.50260 W115.06415	
116	N54.44568 W114.98509	
117	N54.44346 W115.00292	
118	N54.44359 W115.00304	
119	N54.41766 W114.94453	
120	N54.39699 W114.91186	
121	N54.38028 W114.87608	
122	N54.36905 W114.85165	
123	N54.34441 W114.81985	
124	N54.32551 W114.79044	
125	N54.88938 W115.48482	
126	N54.88932 W115.48428	
127	N54.88940 W115.48424	
128	N54.89494 W115.47499	
129	N54.89233 W115.46665	
130	N54.88160 W115.43617	

APPENDIX 5
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
GPS WAYPOINTS
2010



<u>LOCATION DESCRIPTION</u>	<u>GPS CO-ORDINATES (WGS 84)</u>	<u>COMMENTS</u>
131	N54.77714 W115.36285	
132	N54.89493 W115.47432	
133	N54.87903 W115.42578	
134	N54.87900 W115.42522	
135	N54.75186 W115.32824	
136	N54.73055 W115.36322	
137	N54.73053 W115.35545	
138	N54.60597 W115.49239	
139	N54.61246 W115.52083	
140	N54.61189 W115.52036	
141	N54.61425 W115.53836	
142	N54.61240 W115.54133	
143	N54.61179 W115.54277	
144	N54.61135 W115.55971	
145	N54.61116 W115.57018	
146	N54.58387 W115.51177	
147	N54.58380 W115.51310	
148	N54.57690 W115.51230	
150	N54.56875 W115.51368	
151	N54.56795 W115.51223	
152	N54.56741 W115.51387	
153	N54.56348 W115.51354	
154	N54.33241 W115.66969	
155	N54.32586 W115.67583	
156	N54.40089 W115.65839	
157	N54.39223 W115.62554	
158	N54.40165 W115.61863	
159	N54.40085 W115.61928	
160	N54.41628 W115.63644	
161	N54.40609 W115.63584	
162	N54.43063 W115.59754	
163	N54.43038 W115.59710	
164	N54.46270 W115.57283	
165	N54.48157 W115.55906	
166	N54.48476 W115.55617	
167	N54.49082 W115.55150	
168	N54.50430 W115.54091	
169	N54.52267 W115.51405	
170	N54.52126 W115.51381	
171	N54.52241 W115.51346	
172	N54.52728 W115.51370	
173	N54.51466 W115.50522	
174	N54.51665 W115.49752	

APPENDIX 5
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
GPS WAYPOINTS
2010



<u>LOCATION DESCRIPTION</u>	<u>GPS CO-ORDINATES (WGS 84)</u>	<u>COMMENTS</u>
175	N54.51187 W115.50517	
176	N54.51137 W115.50472	
177	N54.50995 W115.50263	
178	N54.50414 W115.49584	
179	N54.51409 W115.48544	
180	N54.50100 W115.48838	
181	N54.50070 W115.47288	
182	N54.50800 W115.45685	
183	N54.49918 W115.42946	
184	N54.50000 W115.42288	
185	N54.49878 W115.42227	
186	N54.47599 W115.22495	
187	N54.47730 W115.23241	
188	N54.48336 W115.33243	
189	N54.56800 W115.52217	
190	N54.56790 W115.52298	
191	N54.56759 W115.52324	
192	N54.56717 W115.52363	
193	N54.56603 W115.52398	
194	N54.56601 W115.52380	
195	N54.56592 W115.52363	
196	N54.56588 W115.52347	
197	N54.56585 W115.52341	
198	N54.56563 W115.52283	
199	N54.56551 W115.52243	
200	N54.56319 W115.51448	
201	N54.70978 W115.41207	
202	N54.71074 W115.44488	
203	N54.71046 W115.44469	
204	N55.22367 W114.67850	
205	N55.23129 W114.67934	
206	N55.23177 W114.67919	
207	N55.23339 W114.67670	
208	N55.23825 W114.66299	
209	N55.24375 W114.65439	
210	N55.25396 W114.65057	
211	N55.25388 W114.65033	
212	N55.26356 W114.63408	
213	N55.26666 W114.61758	
214	N55.26687 W114.61576	
215	N55.26791 W114.61272	
216	N55.26806 W114.61267	
217	N55.26816 W114.61265	

APPENDIX 5
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
GPS WAYPOINTS
2010



<u>LOCATION DESCRIPTION</u>	<u>GPS CO-ORDINATES (WGS 84)</u>	<u>COMMENTS</u>
218	N55.26827 W114.61266	
219	N55.26828 W114.61264	
220	N55.26902 W114.60928	
221	N55.26896 W114.60902	
222	N55.26891 W114.60826	
223	N55.26891 W114.60825	
224	N55.26891 W114.60799	
225	N55.26890 W114.60728	
226	N55.26891 W114.60664	
227	N55.26891 W114.60657	
228	N55.26890 W114.60644	
229	N55.26890 W114.60573	
230	N55.26891 W114.60576	
231	N55.26872 W114.60363	
232	N54.49853 W115.41826	
233	N54.60493 W115.76071	
234	N54.61055 W115.78162	
235	N54.60216 W115.78214	
236	N54.59862 W115.81189	
237	N54.57797 W115.78303	
238	N54.59492 W115.85734	
239	N54.59493 W115.85746	
240	N54.59224 W115.85794	
241	N54.59223 W115.85845	
242	N54.59042 W115.85774	
243	N54.59057 W115.86494	
244	N54.59080 W115.86486	
245	N54.59081 W115.86544	
246	N54.59046 W115.86543	
247	N54.53814 W115.92225	
248	N54.53691 W115.91125	
249	N54.49574 W115.94759	
250	N54.54698 W115.89229	
251	N54.54763 W115.89186	
252	N54.55149 W115.88628	
253	N54.56772 W115.84993	
254	N54.58264 W115.85291	
255	N55.15081 W114.66044	
256	N55.15080 W114.66045	
257	N55.15079 W114.66045	
258	N55.06534 W114.73504	
259	N55.05165 W114.74799	
260	N54.97506 W114.84657	

APPENDIX 5
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
GPS WAYPOINTS
2010



<u>LOCATION DESCRIPTION</u>	<u>GPS CO-ORDINATES (WGS 84)</u>	<u>COMMENTS</u>
261	N54.97161 W114.85166	
262	N54.84739 W115.00261	
263	N54.83409 W115.01869	
264	N54.82468 W115.03020	
265	N54.78118 W115.09887	
266	N54.75980 W115.12944	
267	N54.74028 W115.15730	
268	N54.73481 W115.20519	
269	N54.73419 W115.31214	
270	N54.71056 W116.13140	
271	N54.71587 W116.14485	
272	N54.72591 W116.17088	
273	N54.74045 W116.20755	
274	N54.69787 W116.09906	
275	N54.68411 W116.05450	
276	N54.67229 W116.01770	
277	N54.65081 W115.95010	
278	N54.59014 W115.75220	
279	N54.57484 W115.65829	
280	N54.56620 W115.62626	
281	N54.56374 W115.60837	
282	N54.56489 W115.59189	
283	N54.57026 W115.53630	
284	N54.56528 W115.52289	
285	N54.03586 W114.08296	
286	N54.04749 W114.10111	
287	N54.06492 W114.12829	
288	N54.07846 W114.15174	
289	N54.09405 W114.18068	
290	N54.11695 W114.22673	
291	N54.11818 W114.25180	
292	N54.11933 W114.27680	
293	N54.12315 W114.28926	
294	N54.16400 W114.40176	
295	N55.03992 W115.47301	
296	N54.31498 W114.77113	
297	N54.31023 W114.75570	
298	N54.30690 W114.75180	
299	N54.28549 W114.70136	
300	N54.27590 W114.65183	
301	N54.26822 W114.62510	
302	N54.24425 W114.57712	
303	N54.22257 W114.54279	

APPENDIX 5
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
GPS WAYPOINTS
2010



<u>LOCATION DESCRIPTION</u>	<u>GPS CO-ORDINATES (WGS 84)</u>	<u>COMMENTS</u>
304	N54.21451 W114.52677	
305	N54.21034 W114.51976	
306	N54.20280 W114.50186	
307	N54.18374 W114.45178	
308	N54.15435 W114.37661	
309	N54.15214 W114.37240	
310	N54.90039 W115.33564	
311	N54.91752 W115.33139	
312	N54.93766 W115.35903	
313	N54.98243 W115.37247	
314	N55.21111 W114.67460	
315	N55.19820 W114.67218	
316	N55.15093 W114.66094	
317	N55.07718 W114.72625	
318	N55.04335 W114.75570	
319	N54.92139 W114.91350	
320	N54.76637 W115.12007	
322	N55.01171 W115.41769	
323	N55.02709 W115.42476	
324	N54.89404 W115.47210	
325	N54.56847 W115.51373	
326	N54.63405 W115.91162	
327	N54.59858 W115.81240	



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APPENDIX 6
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
BOND CURRENT SUMMARY
2010

**APPENDIX 6
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
FOREIGN BOND SURVEY
2010**



Crude System

			Current (mA)		
Line	Location	Waypoint	On	OFF	Remarks
Highridge to Judy Creek					
	Mile 52.9	288	1320	710	See NGL system
Judy Creek PS to Fieldgate/Whitcourt Jct					
	Judy Ck Pump Stn SW Corner (NGL)	185	50	-820	
Pengrowth 13-36-61-12 to Whitcourt Junction					
	04-05-63-11CCS Sender	160	830		
	CCS/Mobil 2-3C Junction	161	185		
	Pengrowth 02-09-63-11	162	4720		Rectifier site
Sarah Lake to Swan Hills					
	16-19-65-10 Intersection	54	17		BP Canada
	Hwy 33 Crossing	61	710	61	
Swan Hills to Celtic					
	Home 12 Bond cable	137	240		
	Celtic IFTP	135	420	90	
Swan Hills to Deer Mountain					
	Lease Road 02-18-67-09	24	370	20	To west line
	Penn West @ 10-23-67-10 Pump 1	32	25		IF bond
	Old Home 13 Tie-in	132	15		
	12-01-69-09 Test Station	20	310		
Moosehorn Junction to House Mountain					
	04-02-70-10 TP	9	--		Disconnected
	Apache 04-09-70-10	1	3700	1400	

NGL System

			Current (mA)		
Line	Location	Waypoint	On	OFF	
Highridge to Mile 96.6					
	Mile 52.9	288	1320	710	see crude system
"C" NGL Mile 96.6 to Judy Creek Pump Station					
	Mile 96.6 TCPL I/F Bond Panel	187	1700	600	
Judy Creek Terminal to Whitcourt Junction					
	Judy Creek Pump Station	185	50	-820	NGL Bond to crude
Virginia Hills to Apache Belloy					
	Virginia Hills Terminal Outlet AA-21	242	15		
	10-31-63-13, HA-10 S-Bend	249	11		
Sarah Lake to Swan Hills Terminal					
	Highway 32 Crossing	62	180	20	8" to 6"
Swan Hills Terminal to Devon 02-06					
	Crossing North of A-1	83	160		NGL to Crude
	Devon 02-06-67-10	96	432	23	Devon to Pembina
Swan Hills Terminal to Judy Creek Site 1 (C3+)					
	Hwy 33 Crossing		180	20	6" NGL to 8"NGL

APPENDIX 6
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT
FOREIGN BOND SURVEY
2010



NGL System (continued)

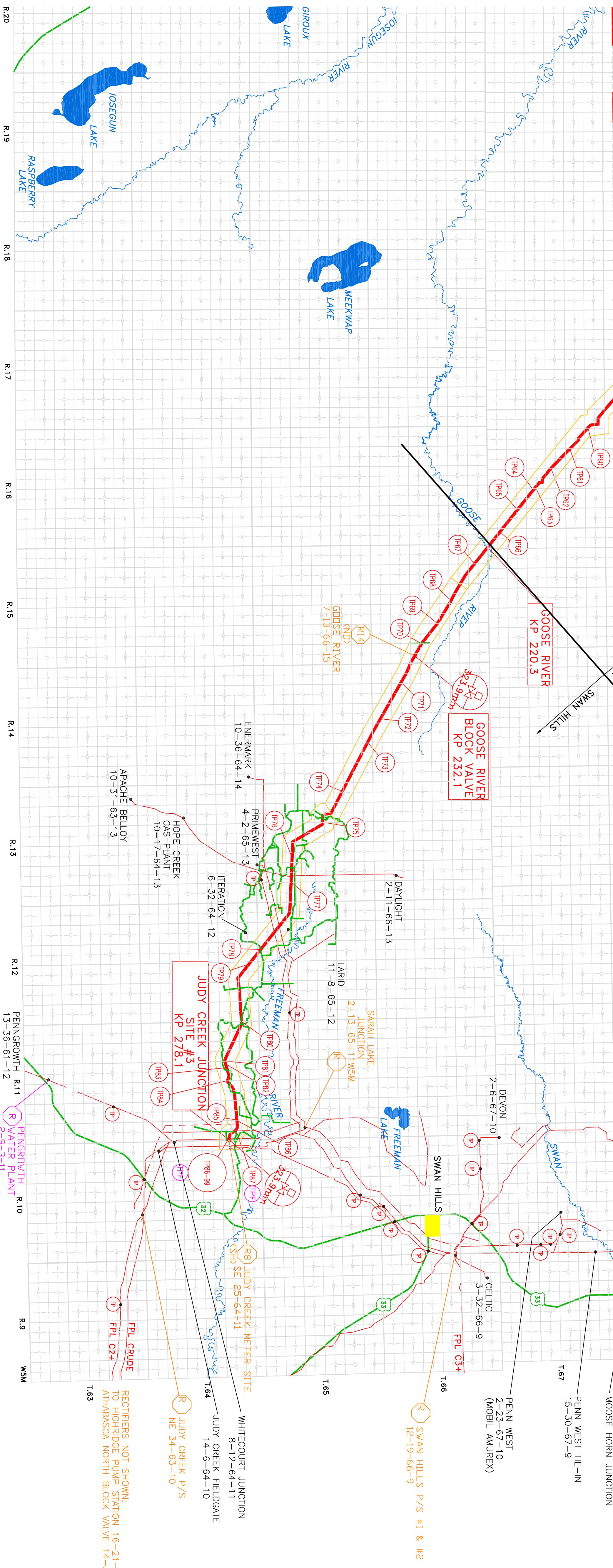
Line	Location	Waypoint	Current (mA)		
			On	OFF	
Swan Hills Terminal to Mitsue					
	81+624.10		30		
	West of Chevron 12-14-72-05 W5M	221	20		
	North of Chevron 12-14-72-05 W5M	231	12	12	



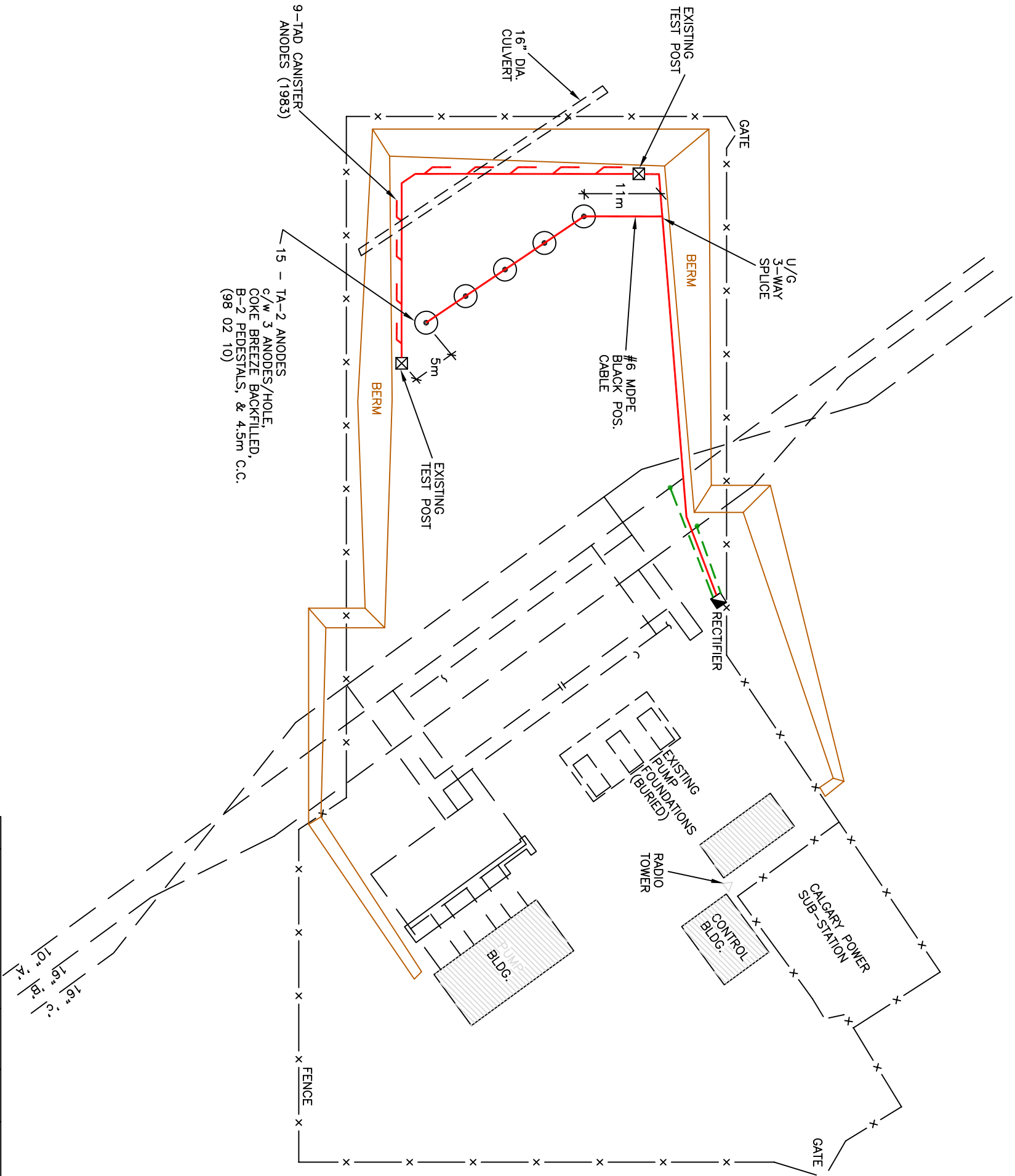
An Insituform® Company

APPENDIX 7
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
DRAWINGS
2010

#D-40217	-	House Mountain Lateral System Map
#D-30976C	-	Snipe Lake to Judy Creek System Map
#D-40930	-	Swan Hills Terminal 2006 Cathodic Protection System Additions
#D-5384	-	Swan Hills Terminal 1985 Cathodic Protection System Additions
#B-15209	-	Highridge Cathodic Protection System
#C-16675	-	Judy Creek Pump Station CP System
#B-18250	-	Apache House Mountain CP System
#D-30623P	-	Goose River Station CP System
#D-30621P	-	Judy Creek #3 Station CP System
#B-30624P	-	Typical Semi-Deepwell Groundbed Details



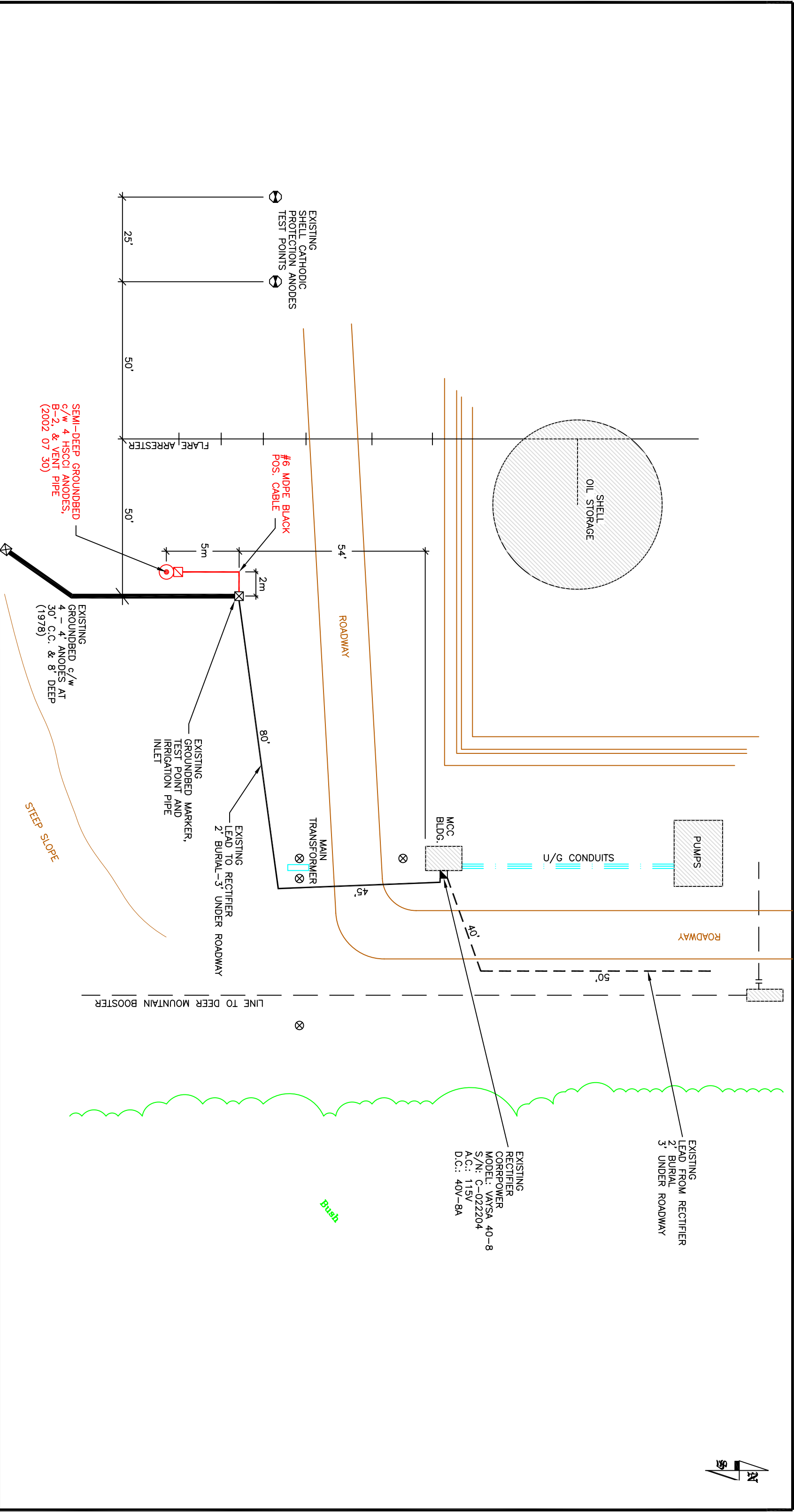
- | LEGEND | |
|--------|--|
| (P)10d | CORRPRO TEST POST |
| (T)P | FOREIGN TEST POST |
| (R) | RECIFIER LOCATION
(SWAN HILLS) |
| (S)H | RECIFIER LOCATION
(NORTHERN DISTRICT) |
| (R) | RECIFIER LOCATION
(NORTHERN DISTRICT) |
| (ND) | FOREIGN RECIFIER LOCATION |
| (P) | FOREIGN RECIFIER LOCATION |



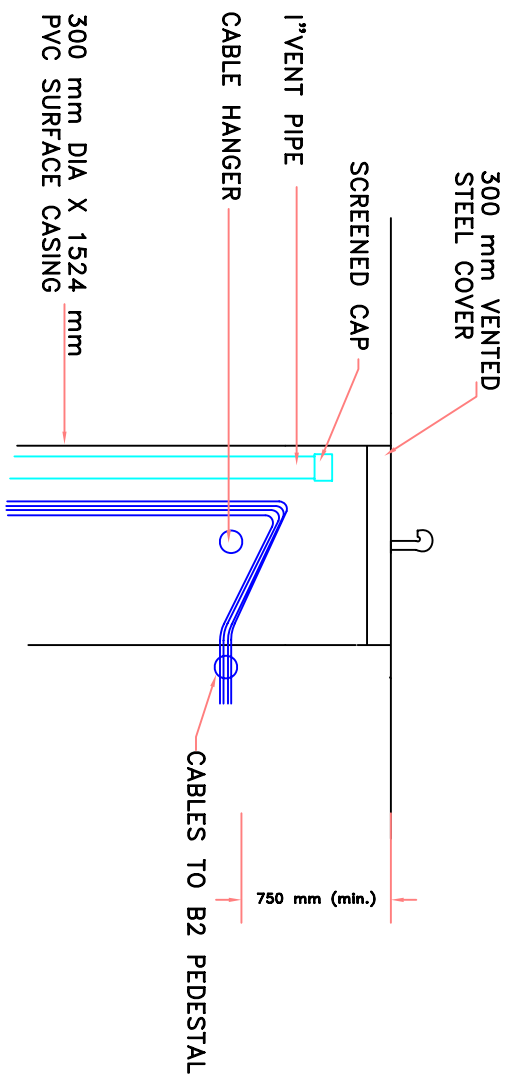
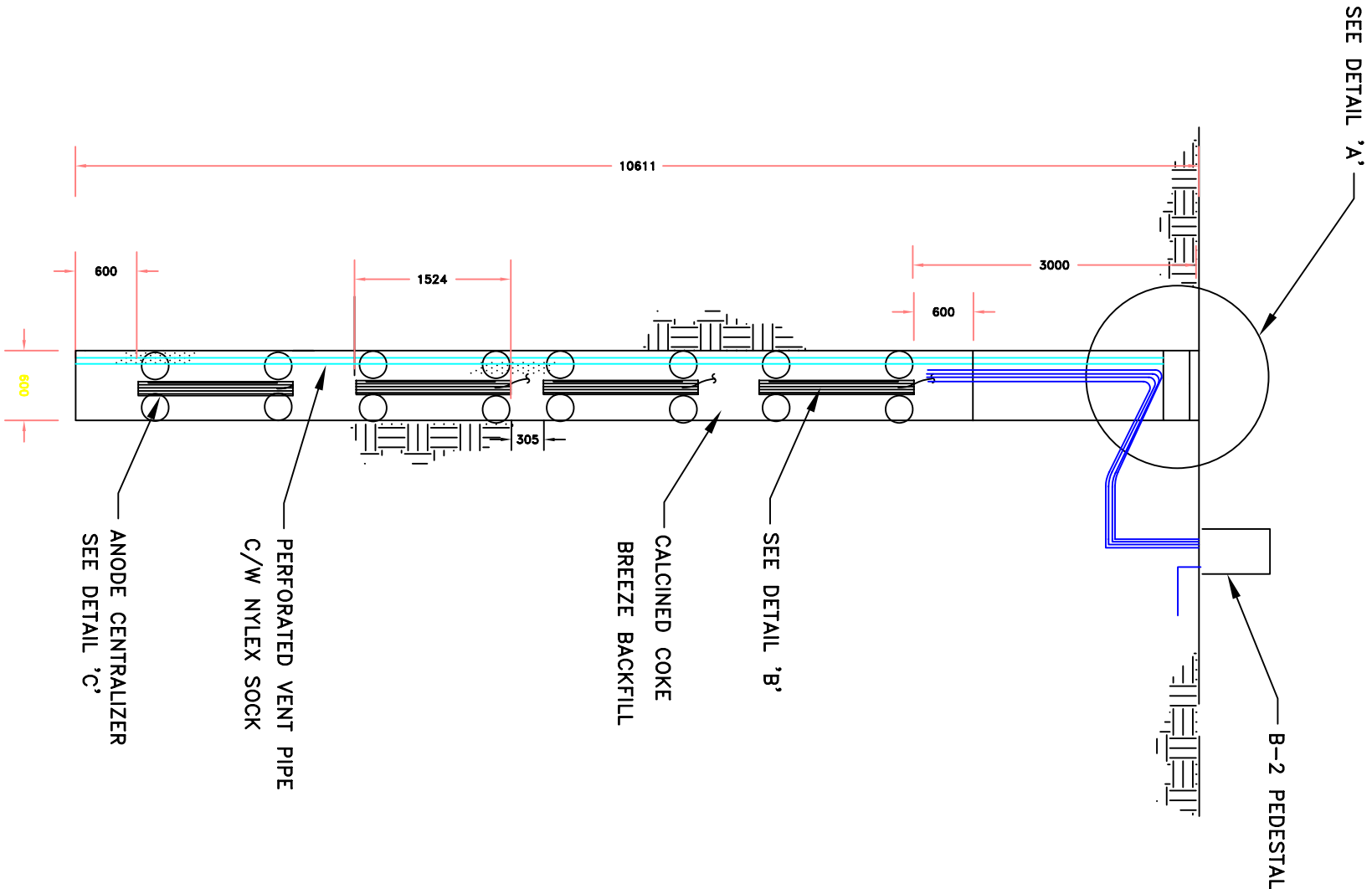
REF.	REVISION	DATE	BY
1	Fedtrcd To Pembina	03 03 05	DGP

DISK#4
FR. F.P.L.L. DWG. No. D-0487-4034

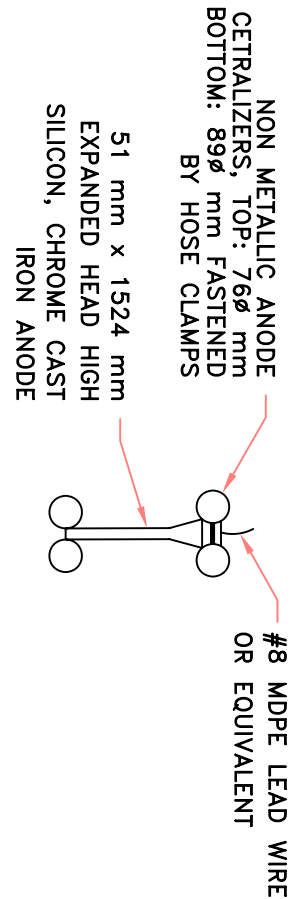
CUSTOMER		DWG. BY	
PEMBINA PIPELINE CORPORATION		D. G. P.	
LOCATION		DSGN. BY	
HIGHRIDGE PUMP STATION			
16-21-58-1W5M		CHK. BY	
AS BUILT CATHODIC PROTECTION SYSTEM		B.A.B.	
SCALE	DATE	DWG. NO.	
1"=50'	98 03 16	B-15209	



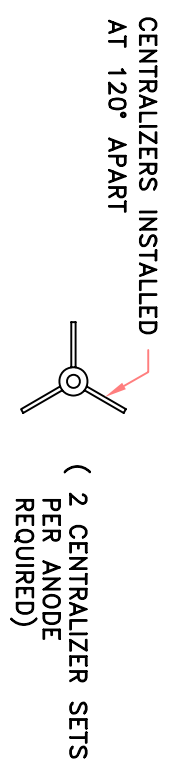
LEGEND				DISK #3	REF.	REVISION	DATE	BY	CUSTOMER			DWG. BY
<input checked="" type="checkbox"/> RECTIFIER		ANODES (HORIZONTAL)		SWAMP/WET AREA						PEMBINA PIPELINE CORPORATION	D. G. P.	
<input checked="" type="checkbox"/> THERMOELECTRIC GENERATOR		SEMI-DEEP G/B (VERTICAL)		BULLET TANK				DSGN. BY				
<input checked="" type="checkbox"/> GROUND BED TEST STATION		WEEPING TILE		POSITIVE CABLE				B. A. B.				
<input checked="" type="checkbox"/> B-2 SPLUTTER PEDESTAL		SOIL RESISTIVITY (ohm/cm)(5'/10'/15' DEPTH)		NEGATIVE CABLE				CHK. BY				
<input type="checkbox"/> ELECTRICAL PANEL		TREE/FOREST AREA		FLOWLINE				B. A. B.				
<input type="checkbox"/> CATHODIC PROTECTION WARNING SIGN		OIL WELL		POWER CABLE					AS BUILT CATHODIC PROTECTION SYSTEM			
<input type="checkbox"/> POWER POLE		GAS WELL		2 CONDUCTOR #8 TECK CABLE					SCALE	DATE	DWG. NO.	
<input type="checkbox"/> INTERFERENCE TEST POST		INJECTION WELL		FLARE STACK					1"=30'	2002 08 12	B-18250	



DETAIL 'A'
ANODE BED CAP
N.T.S.



DETAIL 'B'
ANODE DETAIL
N.T.S.



DETAIL 'C'
ANODE CENTRALIZER
N.T.S.

4 ANODE SEMI-DEEPWELL GROUND BED

										<div><div>CORPORA®</div><div>PEMBINA PIPELINE CORPORATION</div></div>									
										CLIENT:									
										PROJECT:									
										NORTH EXPANSION PIPELINE TYPICAL SEMI-DEEPWELL GROUND BED DETAILS									
										DRAWN: A.L.S.									
										DATE: 98 03 16									
										CHECKED: R.D.W.									
										SCALE: N.T.S.									
										APPROVED:									
										DWG. NO. B-30624P									
										REV:									

APPENDIX 8
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
PROJECT DETAILS
2009

LOCATION: Crude Oil Pipeline system and Natural Gas Liquid Pipelines in Townships 58 to 72 and Ranges 01 to 15 W5M

PROJECT DATES:

Field:	May/July 2010
Office:	July 2010

PERSONNEL:

Field:	Jude Donahue
Office:	Barry A. Bilawey, R.E.T. Jude Donahue

PURPOSE:

The purpose of the work carried out on behalf of Pembina Pipeline Corporation was:

- To inspect each rectifier and groundbed system and adjust or repair as required.
- To measure pipe-to-soil potentials at all accessible points so that the level of protection can be determined.
- To check insulation and continuity status, make repairs if possible and note where repairs are still required.
- To determine if interference is occurring on any foreign lines and correct or report if found necessary.

APPENDIX 8
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
PROJECT DETAILS
2010 - PAGE 2

DATA INTERPRETATION

The accepted criterion indicative of the achievement of cathodic protection on a buried coated steel structure, in accordance with OCC-1-2005 and NACE Standard SP0169-2007, is a minimum measured structure-to-soil potential of -850 millivolts referenced to a copper-copper sulphate electrode. In order to eliminate IR (voltage) drop errors in the measurements caused by the movement of the current through the soil resistance, the potentials must be recorded the instant that all cathodic current to the structure is stopped. When correction is not made for the IR drop error, the potentials appear more negative and may not be representative of the true structure potential. Ideally, all applied current should be stopped simultaneously; however, multiple rectifier systems can make this technique impractical and in these instances, the rectifier having the most effect on the structure under test is interrupted to yield an indication of the degree of polarization achieved.

The assessment of cathodic protection effectiveness is based on the interpretation of the potentials gathered at points of access to the protected structure. Normal survey techniques require, as a minimum, the gathering of potentials at the extremities of a system as it is assumed that the lowest potential will exist at the furthest point from the current source and all intermediate locations will exhibit equal or higher potentials. This procedure permits the general status of cathodic protection to be assessed on any structure based on a minimum number of gathered potentials, but it does not provide the actual status of cathodic protection at all points. In reality, the gathered potentials are only valid at the point of measurement.

As the facilities incorporate multiple cathodic protection systems, true 'OFF' potentials were not obtained at every location. It should also be noted the potentials recorded are only indicative of the level of cathodic protection at the test location. Assumptions are made that the extremity of the system will have the lowest potential in the majority of the cases. On long sections of line where no test facilities exist, the potential at the midpoint may drop below protected levels and then increase once again.

APPENDIX 8
PEMBINA PIPELINE CORPORATION
SWAN HILLS DISTRICT CRUDE OIL & NGL PIPELINES
PROJECT DETAILS
2010 - PAGE 3

Situations such as high coating conductivity at some locations, due to coating damage or deterioration, may result in low potentials and no protection on the structure. Electrical interference from other direct current sources and electrical shielding of the protected structure may contribute to corrosion of the structure if the problem is not identified and corrected. Items such as these may not be discovered in a normal survey because of limited access to the structure. Even when structure access is good and the potentials exceed the cathodic protection criterion, corrosion may still be occurring if a disbonded coating is present.

Survey techniques exist to permit a thorough assessment of the cathodic protection status at all points on a structure. As these techniques are time consuming and costly, they are only recommended when it is believed that a possible problem exists.

REGULATORY REQUIREMENTS

In order to comply with the Alberta Pipeline Act and associated Directives 066 and 055 as well as the CSA Z662, pipeline systems in Alberta must be cathodically protected and surveyed annually for compliance to criteria listed in OCC-1-2005 (Canadian Gas Association). Furthermore, all sources of impressed current (i.e., rectifiers, thermoelectric generators, etc.) must be monitored at a frequency of once every 2 months, with longer or shorter intervals being appropriate. As well, all devices whose failure would jeopardize structure protection shall be monitored once every 2 months but not exceeding 10 weeks.