

Innovative Energies Technology Program

Round 5

East Bodo Associative Polymer Flood Pilot

Upper Mannville (Lloyd) A Pool

2012 Annual Report

Pengrowth Corporation

July 2013

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REPORT ABSTRACT

An Associated Polymer Flood pilot is being conducted at the East Bodo Upper Mannville “A” pool sandstone heavy oil reservoir. The pilot pattern consists of three vertical injectors and six vertical producers.

Polymer Injection in this section began in March 2011. Associative polymer DPRG 2169 with fresh water was injected. By Dec 2012, approximately 32,950 m³ of water had been injected in the reservoir corresponding to a HCPV of approximately 6 %. Polymer Injection concentrations have been held stable at 1750 ppm with injection fluid viscosities ranging from 30 to 80 cp. Polymer injection and production response monitoring continues through the end of the report period.

Overall, pilot performance data indicates poor results in 2012. Production rates in 2011 had increased from 14 m³/d initially when the injection started and peaked at 18.5 m³/d in October 2011. Water cut increased initially from 70 to 78% but then declined to 64%. Polymer breakthrough was achieved within three months of injection.

In 2012, the production rates dropped from the peak rate of 18.5 m³/d to as low as 10.46 m³/d in September 2012. The rates then increased slightly and stabilized at approximately 11 m³/d, lower than the type curve developed for this pilot.

By the end of the year 2012, the pilot area had produced 10,000 m³ (62,898 STB) of oil corresponding to a recovery factor of 1.8%. This is using an Original Oil in Place (OOIP) of 3,383,141 STB as reported in the IETP application.

One well, 104/10-12-37-01W4/0 was shut in in May 2012 due to water channeling. A gel block treatment was performed in 2011 to treat this channel but it broke through in March 2012 and was eventually shut down in May 2012.

SUMMARY

TEAM MEMBERS

Current Team Members:

- **Larry Stewart**, P.Geol – General Manager Western Canada Unconventional
- **Gord Robinson**, P.Eng. – Exploitation and Production Engineering Manager
- **Brent Grebinski**, P.Eng. – Exploitation and Production Engineering Team Lead
- **Marie Hong**, P.Geoph., P.Geol. Senior Geophysicist
- **Phil Handcock**, P.Geol. Senior Geologist
- **Dennis Reschny** – Operations Foreman
- **Imad Brohi** – Reservoir Engineer
- **Doug Howes** – Production Engineer

Former Team Members

- **Darcy Ries**, P.Eng. – Chief Reservoir Engineer
- **Darlene Loeffel**, P.Eng. – Senior Production Engineer
- **Diane Shirra**, P.Eng. MBA – Manager, Exploitation Engineering
- **Anh Nguyen**, P.Eng. - Senior Exploitation Engineer
- **Jason Dagenais**, P.Eng Senior Exploitation Engineer
- **Tim Veenstra**, P.Eng. – Consultant, Exploitation Engineering
- **Kurt Chase**, CET – Senior Geologist
- **Darlene Loeffel**, P.Eng. – Senior Production Engineer
- **Nicole Filewich**, P.Eng. – Facility Project Engineer
- **Matt Blaschuk**, P.Eng. – Production Engineer
- **Andrew Seto**, P.Eng. – Manager, Reservoir Studies
- **Suzy Chen**, P.Eng. – Senior Reservoir Engineer
- **Jeff Butlin**, – Reservoir Modeller

- **Dr. Fred Wassmuth, –** Senior Research Chemist (AITF)
- **Kurt Chase, P.Geol –** Senior Geologist
- **Dennis Reschny, –** Operations Foreman
- **Matt Nelson, P.Eng.** Exploitation Engineer
- **David Kidger, P.Eng. –** Facility Project Engineer

ACTIVITY SUMMARY

Following is a summary of key activities associated with the Associated Polymer pilot in East Bodo Upper Mannville “A” Pool.

Q1 2012

Mar: Workovers
104/10-12-037-01W4: Upsize Pump

Q2 2012

April – June: Workovers
102/16-12-037-01W4: Downsize Pump
100/08-12-037-01W4: Replace/Upsize Pump

Q3 2012

Jul – Sept: Workovers
102/08-12-037-01W4: Repair hole in tubing, worn pump

Q4 2012

Oct – Dec: Workovers
103/16-12-037-01W4: Repair broken rods
102/16-12-037-01W4: Repair broken rods
102/15-12-037-01W4: Repair broken rods

PRODUCTION SUMMARY

Production summary for the pilot area is given in Table 1. Detailed production history for individual wells is given in Appendix A. There is some electricity consumed which is also given in the same appendix.

Date	Monthly Oil	Monthly Gas	Monthly Water	Monthly Injection	Cum Oil	Cum Gas	Cum Water	Cum Injection
	m3	e3m3	m3	m3	m3	e3m3	m3	m3
Jan-10	38.40	0.00	11.90	0.00	22.67	3348.21	3.19	31.22
Feb-10	111.60	0.00	209.30	0.00	22.78	3348.21	3.40	31.22
Mar-10	231.40	0.00	330.10	452.00	23.02	3348.21	3.73	31.67
Apr-10	293.40	0.00	637.90	1240.00	23.31	3348.21	4.37	32.91
May-10	312.20	0.00	551.50	1884.00	23.62	3348.21	4.92	34.80
Jun-10	281.40	0.00	1197.10	2990.00	23.90	3348.21	6.12	37.79
Jul-10	301.70	0.00	1257.40	2769.00	24.20	3348.21	7.38	40.56
Aug-10	237.10	0.00	1013.20	1913.00	24.44	3348.21	8.39	42.47
Sep-10	275.20	0.00	1264.70	2609.00	24.72	3348.21	9.65	45.08
Oct-10	287.00	0.00	1067.50	2260.00	25.00	3348.21	10.72	47.34
Nov-10	323.30	0.00	990.80	2365.00	25.33	3348.21	11.71	49.70
Dec-10	407.60	0.00	1100.20	2738.00	25.73	3348.21	12.81	52.44
Jan-11	404.20	0.00	1011.70	2806.00	26.14	3348.21	13.82	55.25
Feb-11	382.40	0.00	899.50	1894.00	26.52	3348.21	14.72	57.14
Mar-11	440.20	0.00	1028.40	1910.00	26.96	3348.21	15.75	59.05
Apr-11	455.00	0.00	1242.30	1841.00	27.42	3348.21	16.99	60.89
May-11	465.90	0.00	1691.10	1878.00	27.88	3348.21	18.68	62.77
Jun-11	387.90	0.50	1355.80	1690.00	28.27	3348.71	20.04	64.46
Jul-11	511.60	1.70	1806.10	1623.00	28.78	3350.41	21.85	66.08
Aug-11	564.00	2.40	1544.10	1293.00	29.35	3352.81	23.39	67.38
Sep-11	524.80	2.40	1159.30	1317.00	29.87	3355.21	24.55	68.69
Oct-11	573.40	1.40	1072.30	1465.00	30.44	3356.61	25.62	70.16
Nov-11	538.90	2.10	889.80	1249.00	30.98	3358.71	26.51	71.41
Dec-11	559.20	2.50	997.40	1133.00	31.54	3361.21	27.51	72.54
Jan-12	577.70	3.10	1007.60	971.00	32.12	3364.31	28.52	73.51
Feb-12	529.30	2.60	896.40	1513.00	32.65	3366.91	29.41	75.02
Mar-12	498.90	0.80	1555.20	2297.00	33.15	3367.71	30.97	77.32
Apr-12	461.20	0.80	1018.70	1395.00	33.61	3368.51	31.99	78.72
May-12	463.90	0.60	884.40	1179.00	34.07	3369.11	32.87	79.89
Jun-12	396.00	0.50	550.50	1309.00	34.47	3369.61	33.42	81.20
Jul-12	390.20	0.90	568.50	1426.00	34.86	3370.51	33.99	82.63
Aug-12	348.80	0.80	545.50	1210.00	35.21	3371.31	34.54	83.84
Sep-12	313.90	0.50	512.50	1046.00	35.52	3371.81	35.05	84.89

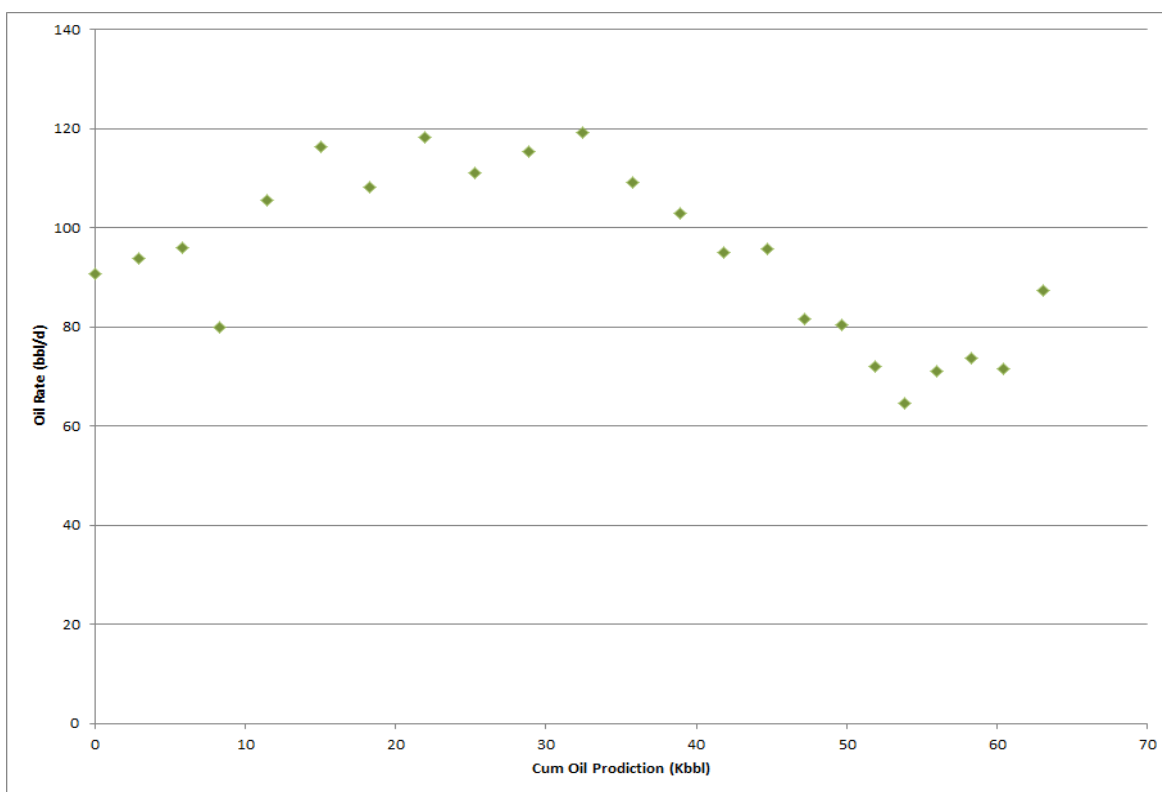
Date	Monthly Oil	Monthly Gas	Monthly Water	Monthly Injection	Cum Oil	Cum Gas	Cum Water	Cum Injection
	m3	e3m3	m3	m3	m3	e3m3	m3	m3
Oct-12	344.20	0.50	538.40	1225.00	35.87	3372.31	35.59	86.11
Nov-12	358.00	0.90	895.60	2147.50	36.22	3373.21	36.48	88.26
Dec-12	347.10	0.70	870.00	1832.00	36.57	3373.91	37.35	90.09
Jan-13	423.38	0.79	1563.91	1760.50	36.99	3374.70	38.92	91.85

Table 1 – Monthly Production Volumes

Further to this, the pilot area is injecting fresh water being produced from the well 1F1/9-12-37-1W4. This well's production is given in Appendix A.

The polymer skid and injection pumps in the pilot area are run by electricity. The electricity is bought from Fortis, Alberta. Detailed electricity consumption is also given in Appendix A. Production well pumps are run by gas which is used from one of Pengrowth's properties. The gas consumption for running the pumps is also given in Appendix A.

The plot showing estimated pilot production is also given in Appendix A. The estimated production is higher than what has been observed from the pilot. A plot of oil rate vs. cumulative production is given in Figure 1. The plot shows peak rate of 120 STB/D (18.5 m3/d) in October 2011 and production decline since then.

**Figure 1 – Oil Rate (STB/D) vs. Cum Production (STB)**

RESERVES SUMMARY

The reserves plot is given in Figure 2.1 and 2.2. The reserves were adjusted based on the performance of the pilot flood in 2011. Based on this, the total ultimate recoverable oil from the pilot area is 49,740 m³ (312,855 STB).

The reserve estimate presented at project approval is given in Appendix B. The forecast shows peak rate of 280 STB/D achieved after approximately 18 months of production and then the decline. The total ultimate recoverable volume was 642,797 STB which corresponded to approximately 19% recovery factor from the OOIP of 3383141 STB.

The adjusted model shows ultimate recoverable reserves of 312,855 STB, which corresponds to a recovery factor of 9.3 %. This was much lower than the initial reserves reported in the application.

The flood performance shows rates dropping in 2012 and it is therefore performing much lower than the adjusted reserves. Unless the flood starts performance improves, eventual recovery will be much lower than the predicted.

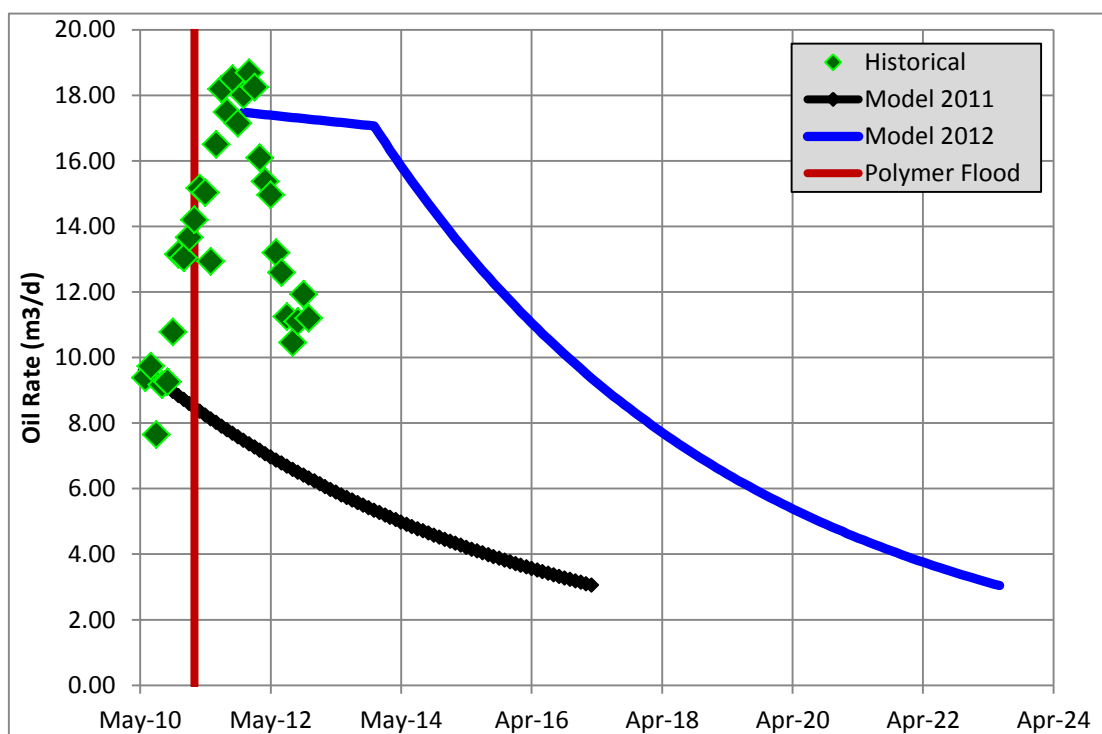


Figure 2 – Forecasted Oil Rates with baseline

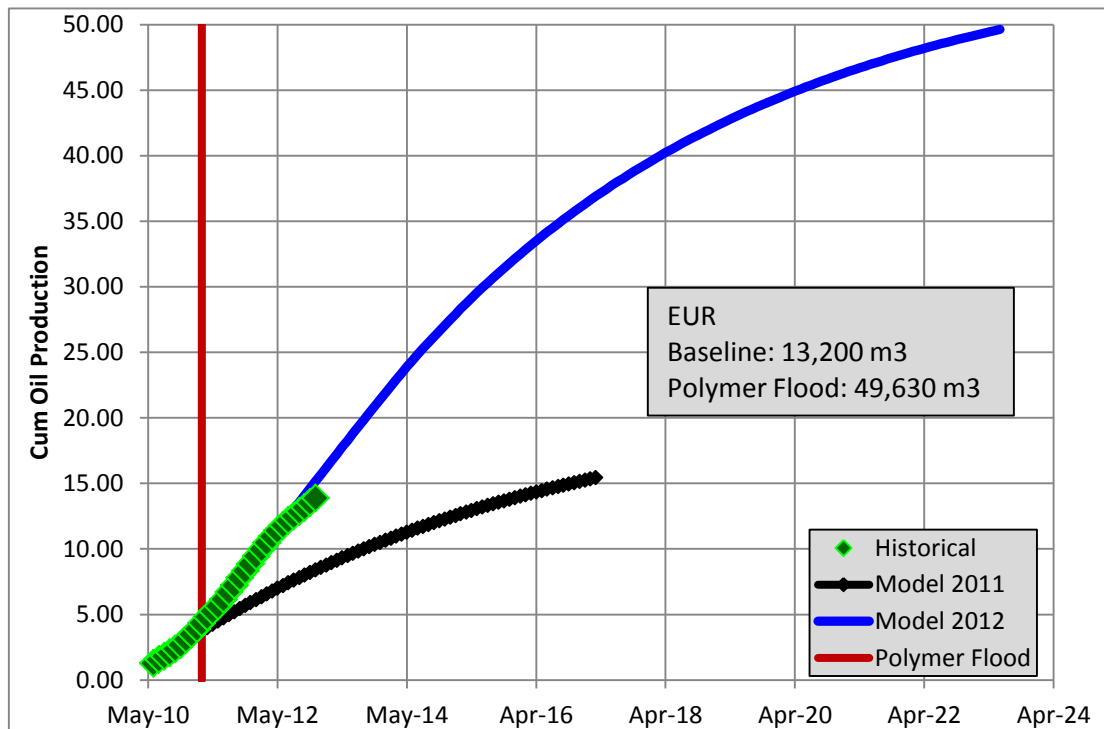


Figure 3 –Forecasted Cumulative Production (Reserves) with baseline

WELL INFORMATION

WELL LAYOUT MAP

Well layout map is given in Figure 4 along with the log cross sections of the three patterns.

DRILLING, COMPLETIONS AND WORK-OVER OPERATIONS SUMMARY

No new wells were drilled in the pilot area in the year 2012.

Most of the operations done in the pilot area were related to pump failures and replacement. A detail of all the pump changes and replacement is given in Activity Summary in Section 2.2.

WELL OPERATION

Most of the well operations conducted during the pilot period in 2012 were with pumps in production wells. For the entire operation history, please refer to Section 2.2.

WELL LIST AND STATUS

Following is the list of wells and their status:

Pattern 100/10-12-037/01W4/0

100/10-12-037/01W4/0	Injecting polymer solution
103/10-12-037/01W4/0	Producing with a Progressive Cavity Pump (PCP)
104/10-12-037/01W4/0	Shut in due to water channeling/breakthrough

Pattern 102/10-12-037/01W4/0

102/10-12-037/01W4/0	Injecting polymer solution
102/15-12-037/01W4/0	Producing with a Progressive Cavity Pump (PCP)
100/09-12-037/01W4/0	Producing with a Progressive Cavity Pump (PCP)

Pattern 100/16-12-037-01W4/0

100/16-12-037/01W4/0	Injecting polymer solution
102/16-12-037/01W4/0	Producing with a Progressive Cavity Pump (PCP)
103/16-12-037/01W4/0	Producing with a Progressive Cavity Pump (PCP)

WELLBORE SCHEMATICS

See Appendix C for wellbore schematics.

SPACING AND PATTERN

The pilot is located in a total area of 100 acres within the East Bodo Upper Mannville (Lloyd) A Pool (Figure 5). The pool spans in the township of 037-01W4, and it is a sandstone reservoir of Cretaceous age, located at a depth of approximately 800 m.

The flood pattern is producer-injector-producer line drive – with well spacing of approximately 200 m.

The pattern is centered around three injectors: 100/10-12-037-01W4/0, 102/10-12-037-01W4/0 and 100/16-12-037-01W4/0 and includes a total of six producing wells, three on each side. Historically, this pattern has been on production since 1970's, with the well 100/10-12-037-01W4/0. First water injection in this pattern started in January 2004 with the well 100/16-12-037-01W4/0. Remaining wells in this pattern were drilled in 2010 and the pattern was on waterflood from March 2010 to March 2011.

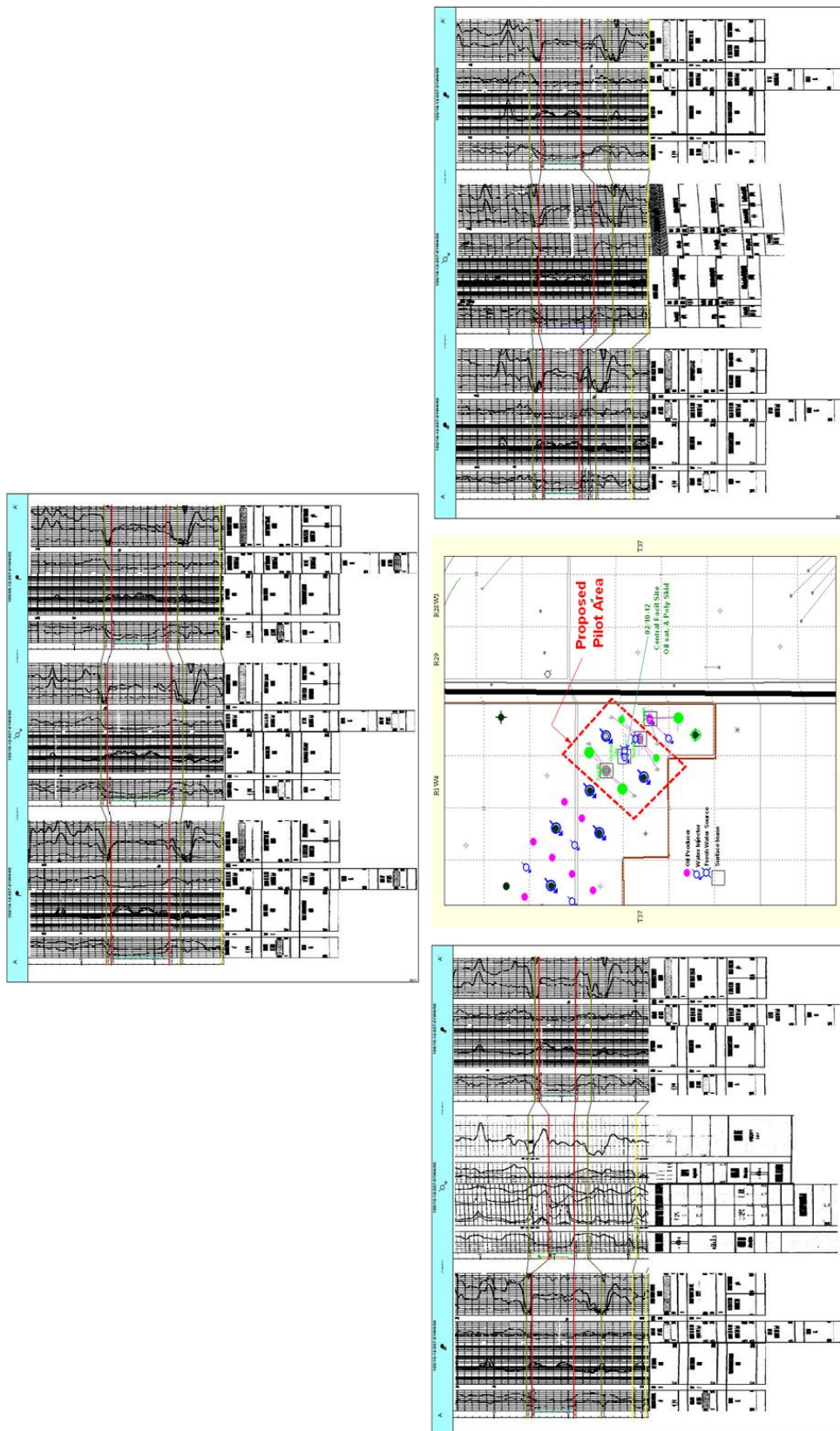


Figure 4 – Well Layout Map

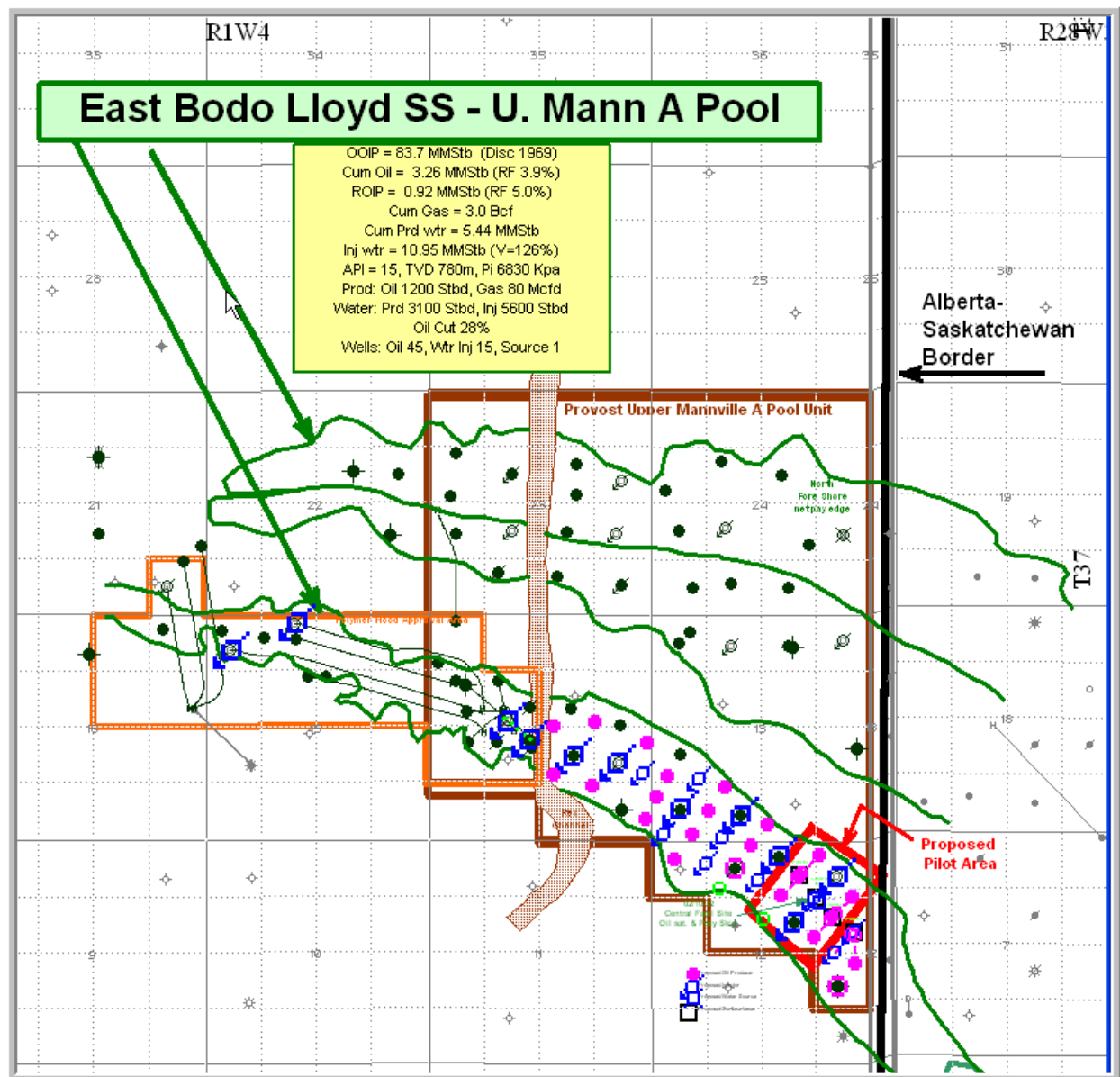


Figure 5 – Map of East Bodo with pilot boundaries highlighted

PRODUCTION PERFORMANCE

INJECTION AND PRODUCTION HISTORY

As mentioned in the presentation on Feb 04, 2010, there are three injectors and six producers in the proposed pilot area. The injectors are:

- 100/10-12-037-01W4/0
- 102/10-12-037-01W4/0
- 100/16-12-037-01W4/0

The producing wells in this pilot area are:

- 103/10-12-037-01W4/0
- 102/15-12-037-01W4/0
- 102/16-12-037-01W4/0
- 104/10-12-037-01W4/0
- 100/09-12-037-01W4/0
- 103/16-12-037-01W4/0

Based on the injector/producer well configuration, the following flood scheme patterns have been defined.

- 100/10-12-037-01W4/0
 - 103/10-12-037-01W4/0
 - 104/10-12-037-01W4/0 (also getting influence from Injector 103/08-12-037-01W4/0)
- 102/10-12-037-01W4/0
 - 102/15-12-037-01W4/0
 - 100/09-12-037-01W4/0 (also getting influence from injector 102/09-12-12-037-01W4/0 outside the proposed area)
- 100/16-12-037-01W4/0
 - 102/16-12-037-01W4/0
 - 103/16-12-037-01W4/0 (also getting influence from injector 102/09-12-12-037-01W4/0 outside the proposed area)

These patterns and their individual responses are given below.

Pattern 100/10-12-037-01W4/0

Water injection in pattern 100/10-12-037-01W4/0 started in May 2010 and it was changed to polymer injection in March 2011. The production performance in this pattern shows an increase in water cut in February 2010 (prior to the start of waterflood in this pattern) which was possibly due to water injection from the well 100/16-12-037-01W4/0. The producer 103/10-12-037-01W4/0 had been put on production in the same month and it started production at a high water cut of 80 – 90 %. Polymer

Injection on this well started in March 2011. At the onset of the polymer flood, the oil rate was 4.4 m³/d with a water cut of 75%. The oil rate has increased and the water cut decreased due to polymer flooding in the pattern. Oil rates increased to 7.6 m³/d in Jan 2012 with water cut stable at 55 %. Water breakthrough was observed in Well 104/10-12-037-01W4 after which it was shut in in May 2012. Oil production dropped from this pattern due to this and has been stable around 3 m³/d.

Injection in this pattern has varied from 10 – 15 m³/d based on the maintenance of Voidage Replacement Ratio (VRR). Injection was increased to keep the VRR high to impact the flood performance and observe response in the production wells. So far, the pattern does not show any significant response to the flood.

The pattern production plot is given in Figure 6.

Injector 100/10-12-037-01W4/0

Injector 100/10-12-037-01W4/0 was a producer until Jan 2010 and was converted to water injector in May 2010. The well had produced 22,360 m³ of oil from 1973 to 2010. The well was initially a water injector from May 2010 to March 2011 after which it was put on polymer solution injection. The well has been injecting at 10-20 m³/d at a wellhead injection pressure of ~ 4,000 kPa. By end of 2012, this cumulative injection achieved in this well was 22,940 m³ (water + polymer).

The injector performance plot is given in Figure 7.

Producer 103/10-12-037-01W4/0

This well was drilled and put on production in February 2010. The well started off at rates approximately 1 m³/d and stayed consistent until polymer injection started. Note that this means that water injection did not have a significant effect on the production in this well. This well has responded well to polymer flood. Polymer injection was started in March 2011 and the well showed increase in oil rates from 1 m³/d to 4 m³/d and drop in water cut from 75% to 30%. In 2012, the production from this well declined slightly to 2.8 m³/d with water cuts decreasing to ~ 20%.

The well performance is given in Figure 8.

Producer 104/10-12-037-01W4/0

This well lies to the S.E. of the injector 100/10-12-037-01W4/0 and was put on production in March 2010. Initial production rates were low (less than 1 m³/d) and increasing water cut was noticed almost immediately. However, oil production rates continued to increase showing effective waterflood sweep and peak rates were observed in July 2011 after the polymer flood was initiated. A gel conformance treatment was performed for water shut-off last year to reduce water channeling after which the water cut dropped. Water cuts increased sharply again in March 2012 indicating breakthrough of injection water. This well was shut in in May 2012 to avoid water channeling.

The well performance is given in Figure 9.

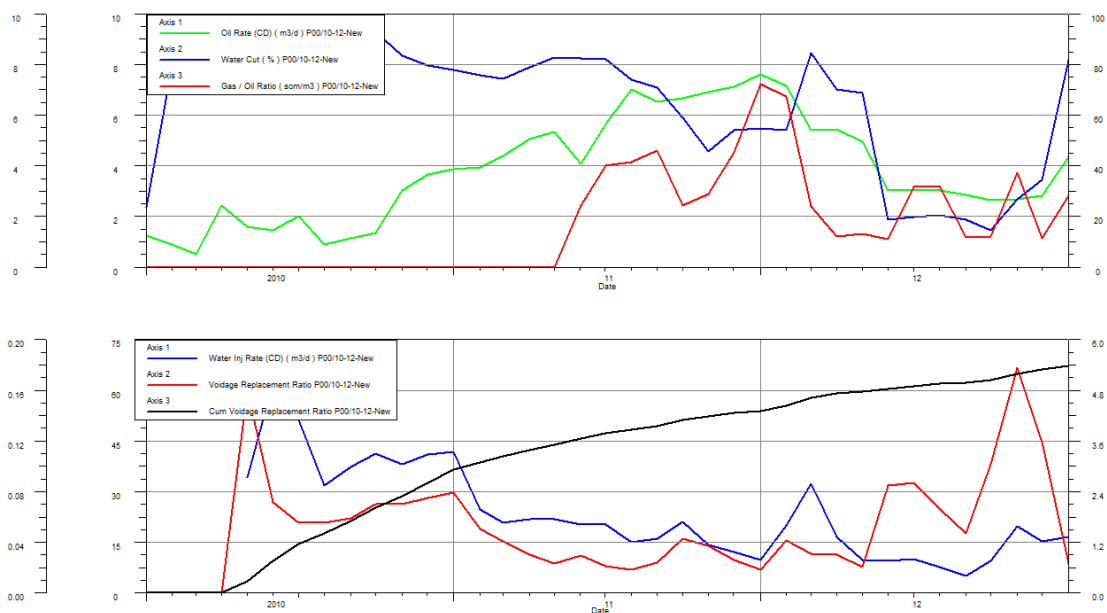


Figure 6– Pattern 100/10-12 Production and Injection Plots.

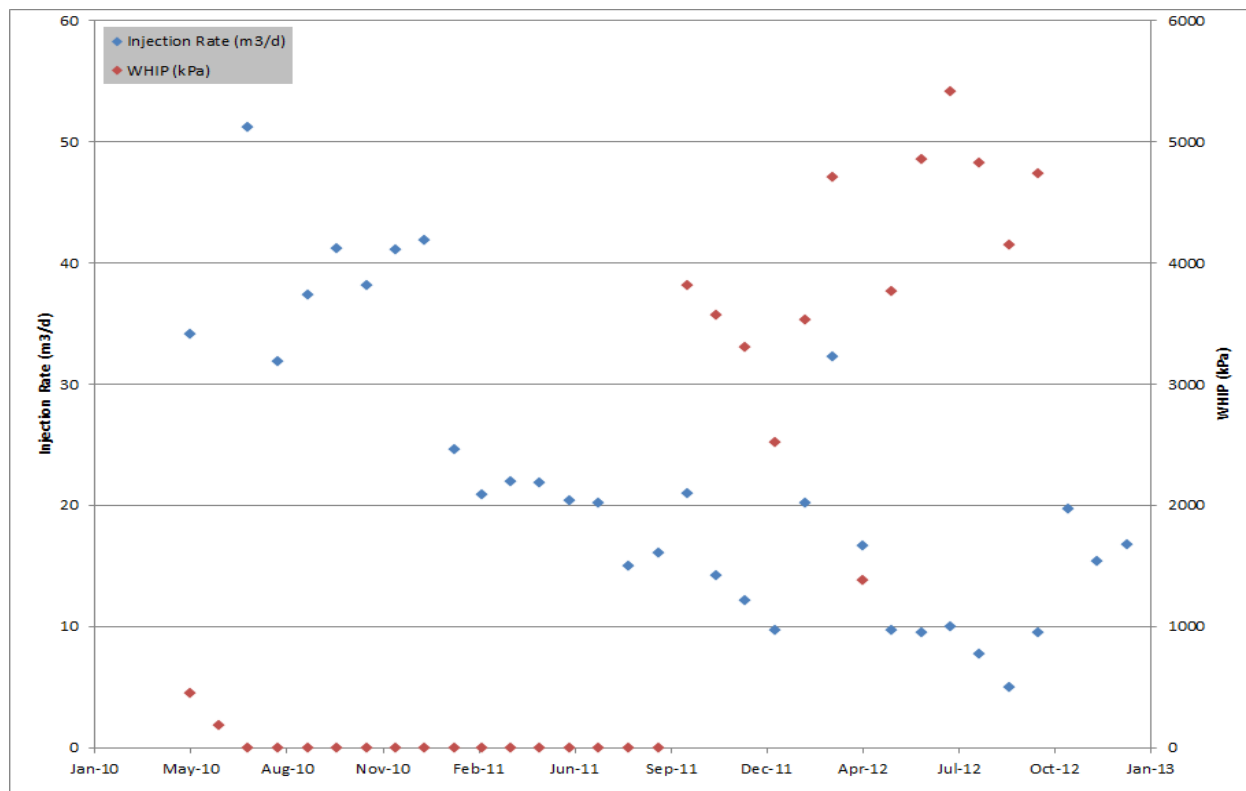


Figure 7 – Injector 100/10-12-037-01W4/0 Performance

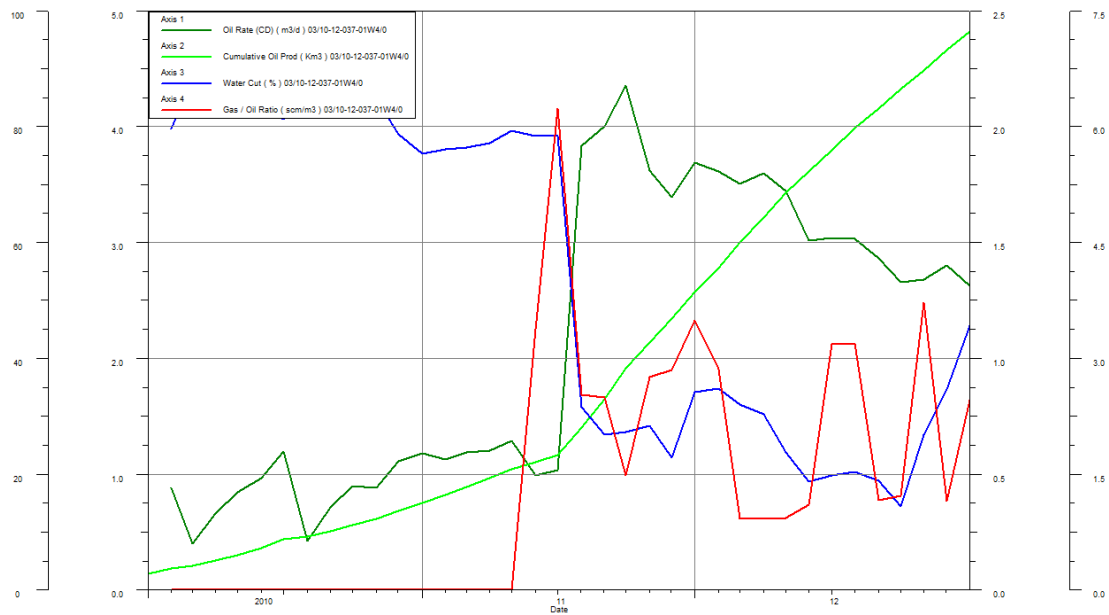


Figure 8 – Producer 103/10-12-037-01W4/0 Performance

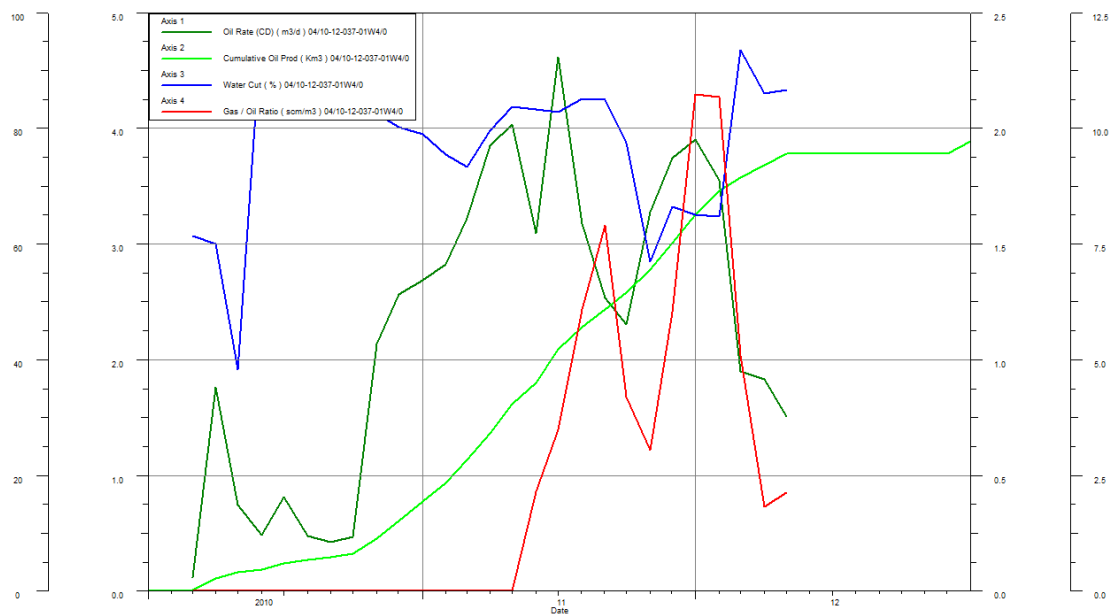


Figure 9 – Producer 104/10-12 Performance

Pattern 102/10-12-037-01W4/0

This pattern was put on production/water injection in March 2010 and converted to polymer injection in March 2011. The pattern has one injector and two producers. Oil production rate stayed stable in 2011 at or over 6 m³/d with water cut at 55-60%. In 2012, oil production rates dropped and then increased slightly to end the year at 5 m³/d with a water cut of 60%.

Voidage Replacement Ratio (VRR) was maintained at 1.0 in 2012.

Pattern Performance Plots are given in Figure 10.

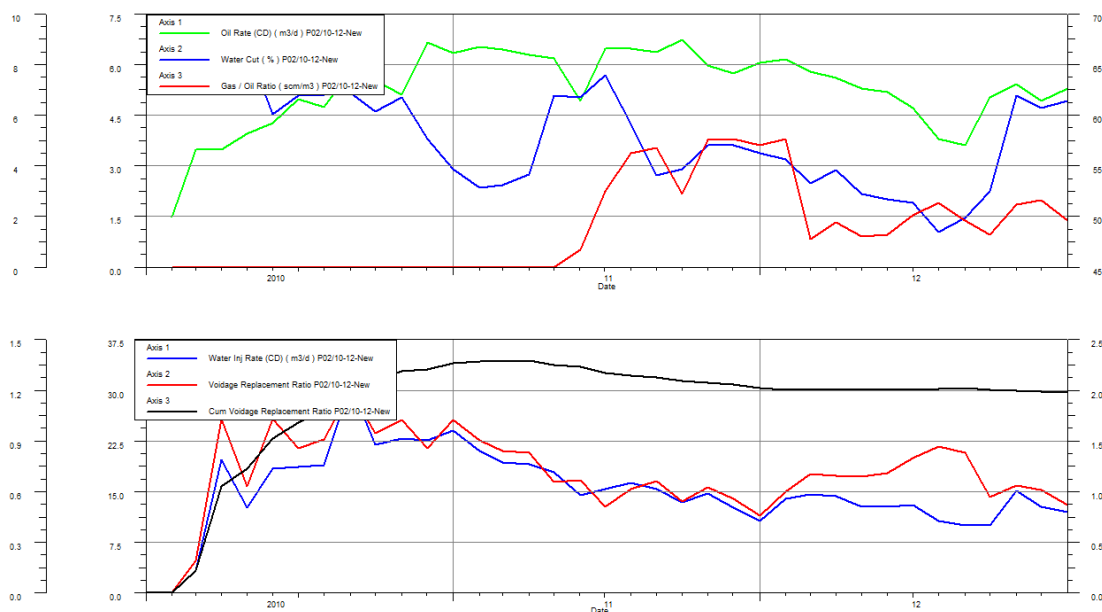


Figure 10 – Pattern 102/10-12 Performance

Injector 102/10-12 -037-01W4/0

Injector 102/10-12 was drilled as an injector and commenced water injection from March 2010. The well was converted into a polymer injector in March 2011. The well has injected at ~ 15 m³/d at a wellhead injection pressure of higher than 8,000 kPa. The well injection performance is given in Figure 11.

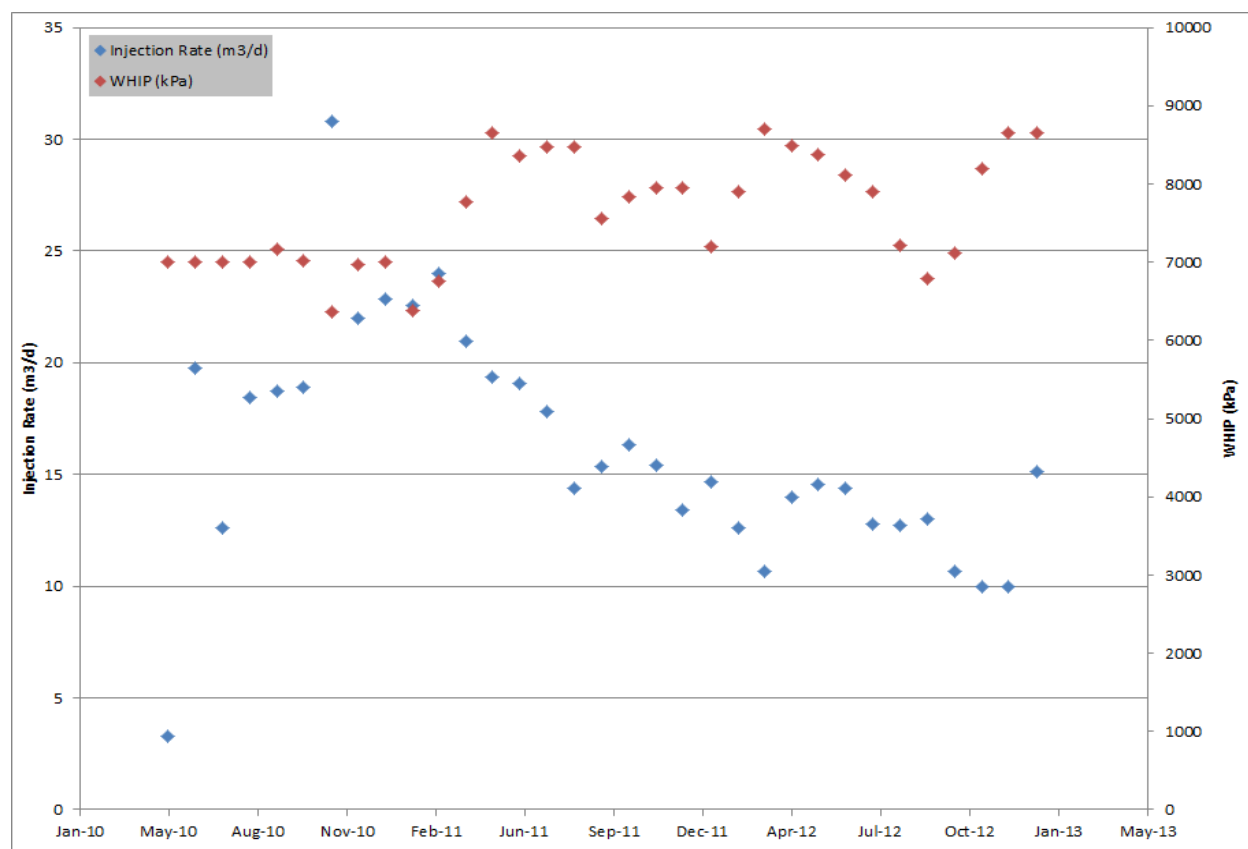


Figure 11 – Injector 102/10-12-037-01W4/0

Producer 102/15-12-037-01W4/0

The producer 102/15-12-037-01W4/0 has been on production since February 2010. Production increased from initial oil rates of 1.5 m3/d to over 4 m3/d in response to waterflood. Production held stable after the injection of polymer. In 2012, production dropped slightly from this well but then increased again to end the year at oil rates of 3 m3/d and water cut of 65%. Production plots are given in Figure 12.

Producer 100/09-12-037-01W4/0

Well 100/09-12-037-01W4/0 started production in March 2010. This well is shared between two patterns, one being out of the IETP project area. The well has shown some positive response to waterflood and polymer flood. Oil production rates kept increasing from initial rates of 1 m3/d to 2 m3/d at the time the polymer flood started. Since March 2011, oil production rates had increased by 0.5 m3/d and water cut has decreased from 55 to 35 %.

In 2012, production shows slight decline of oil rates to just under 2 m3/d and water cut increased to 50%. Production plots are given in Figure 13.

Pattern 100/16-12-037-01W4/0

Pattern 100/16-12-037-01W4/0 has one injector and two producing wells, 102/16-12-037-01W4/0 and 103/16-12-037-01W4/0. The other well 103/16-12-037-01W4/0 which is towards the southeast of the injector is also being supported by injector 102/09-12-037-01W4/0 which is outside the pattern boundaries.

The well 100/16-12-037-01W4/0 has been the oldest injector in the area with injection from January 2004. The pattern started production at 4-5 m³/d but the production dropped and water cut increased shortly showing signs of water breakthrough. After the start of polymer flood in 2011, oil production rates increased to over 5 m³/d in the last quarter of 2011 but then the oil production dropped in 2012 and the oil production rates in the last months of 2012 was just under 4 m³/d. Water cuts have also increased to over 80 %.

Injection rates are maintained to a VRR of 1 – 1.2. The following plots show the complete pattern injection and production performance.

Pattern performance is given in Figure 14.

Injector 100/16-12-037-01W4/0

Injector 100/16-12-037-01W4/0 was drilled as an injector and started injection in January 2004. Injection rates have varied and it injected between 10 – 20 m³/d. Until Dec 2012, it had injected a total of 50,600 m³ of water. The well was put on polymer skid in March 2011 and has been injecting 20 – 30 m³/d at a wellhead injection pressure of 5 – 6,000 kPa.

The injection performance plot is given in Figure 15.

Producer 102/16-12-037-01W4/0

This producer has not shown a significant impact of polymer flood. Production has been decreasing from 2.25 – 1. m³/d with water cut to 60% and then dropped to 50 %. The well performance plots are given below. Production performance is given in Figure 16.

Producer 103/16-12-037-01W4/0

103/16-12-037-01W4/0 showed an increase in oil rates from 1 m³/d in March 2011 to 3.7 m³ in Dec 2011 and the water cut dropped from 92% to 80%. However, the production trend showed a decline in 2012 with oil rates dropping to 2.5 m³/d and water cut increasing to 88 %. Production performance is given in Figure 17.

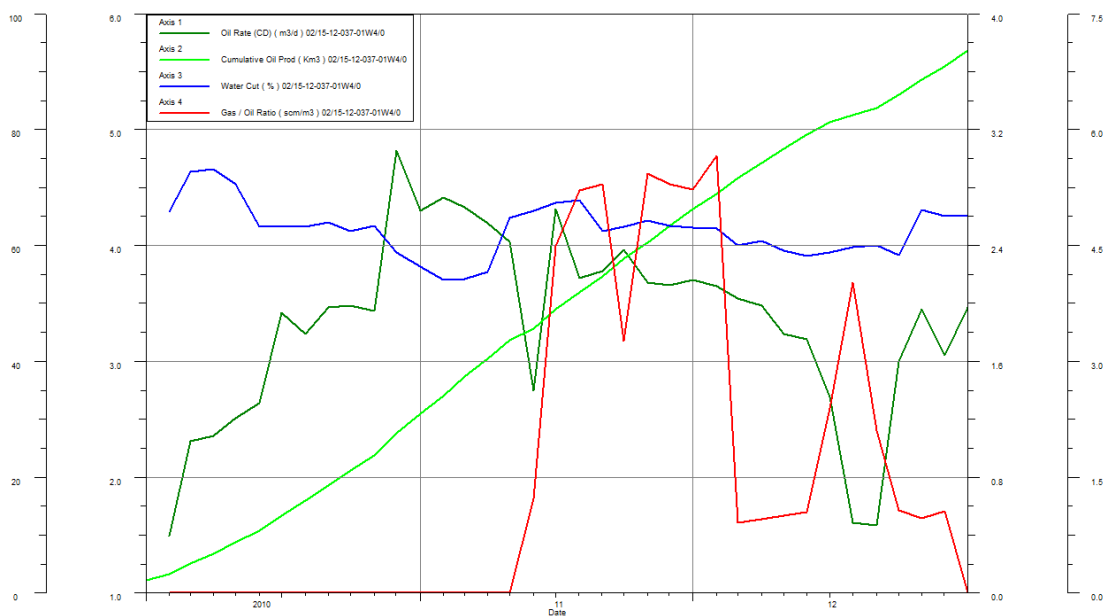


Figure 12 – Producer 102/15-12-037-01W4/0

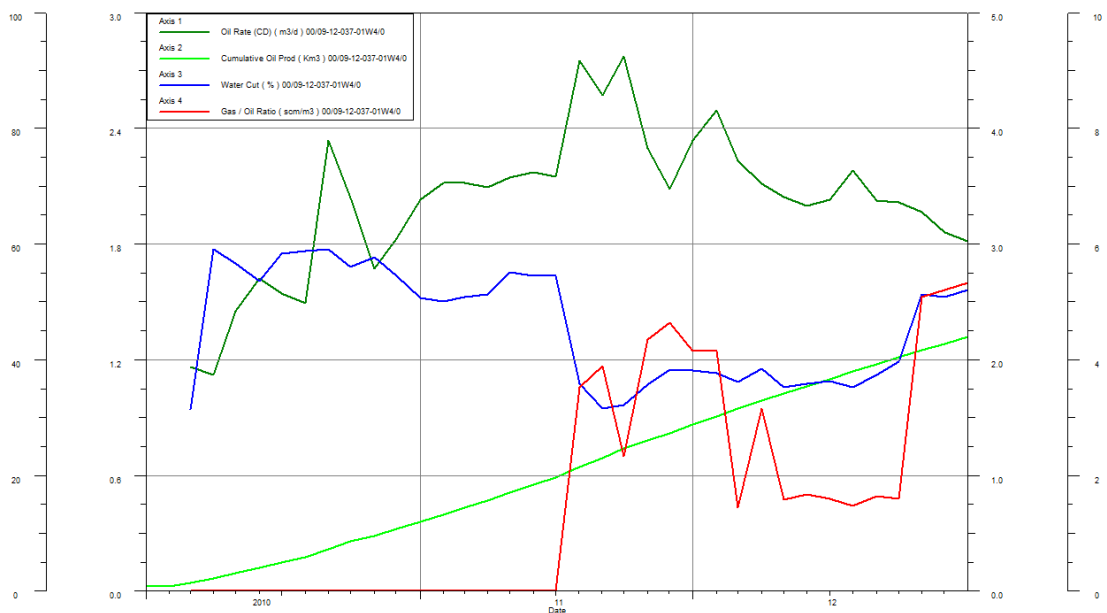


Figure 13 – Producer 100/09-12-037-01W4/0

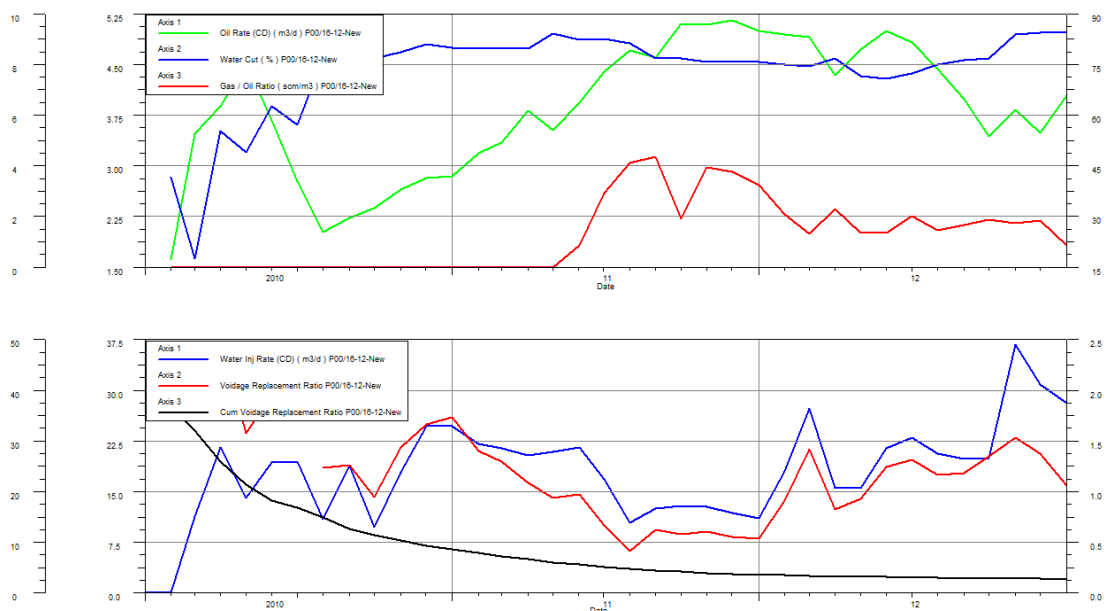


Figure 14 – Pattern 100/16-12-037-01W4/0 Performance

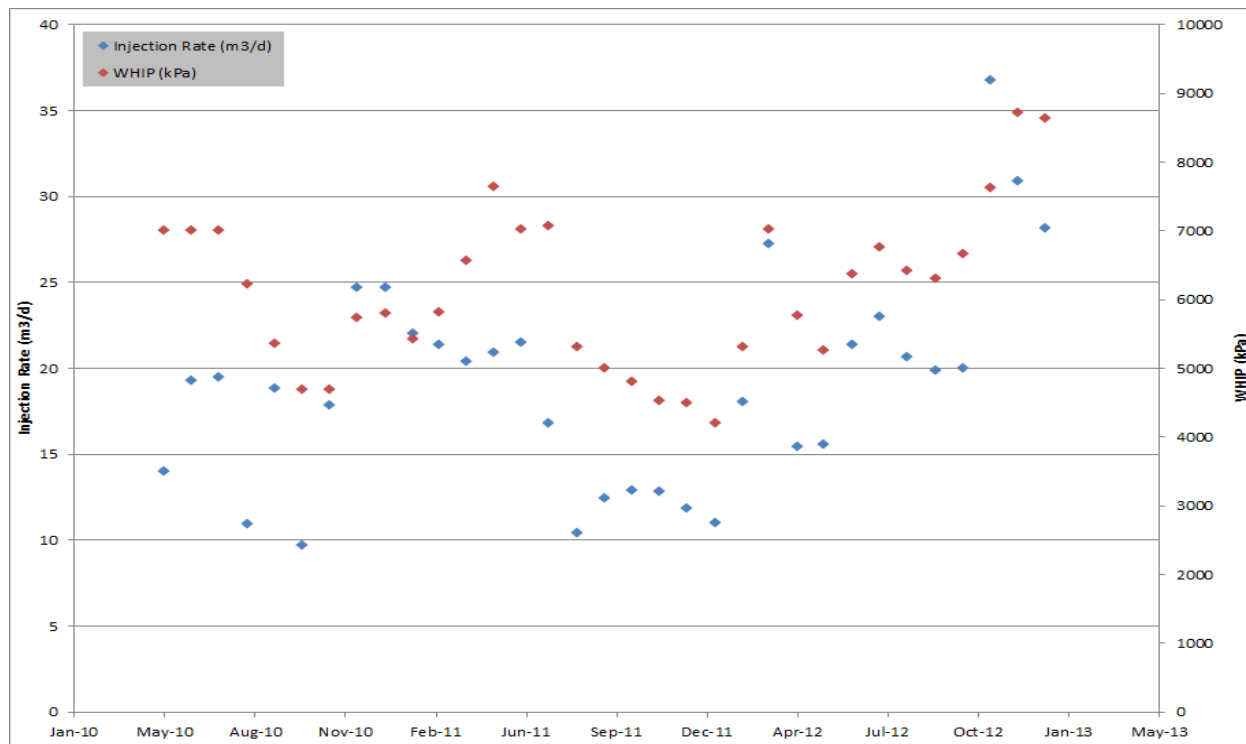


Figure 15 – Injector 100/16-12-037-01W4/0 Performance

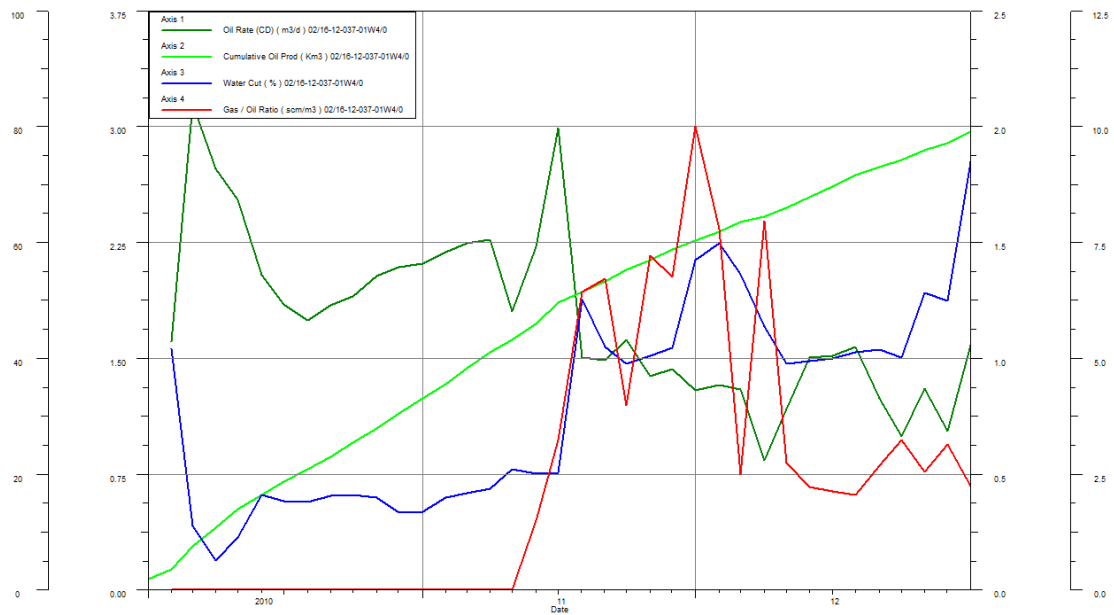


Figure 16 – Producer 102/16-12-037-01W4/0 Performance

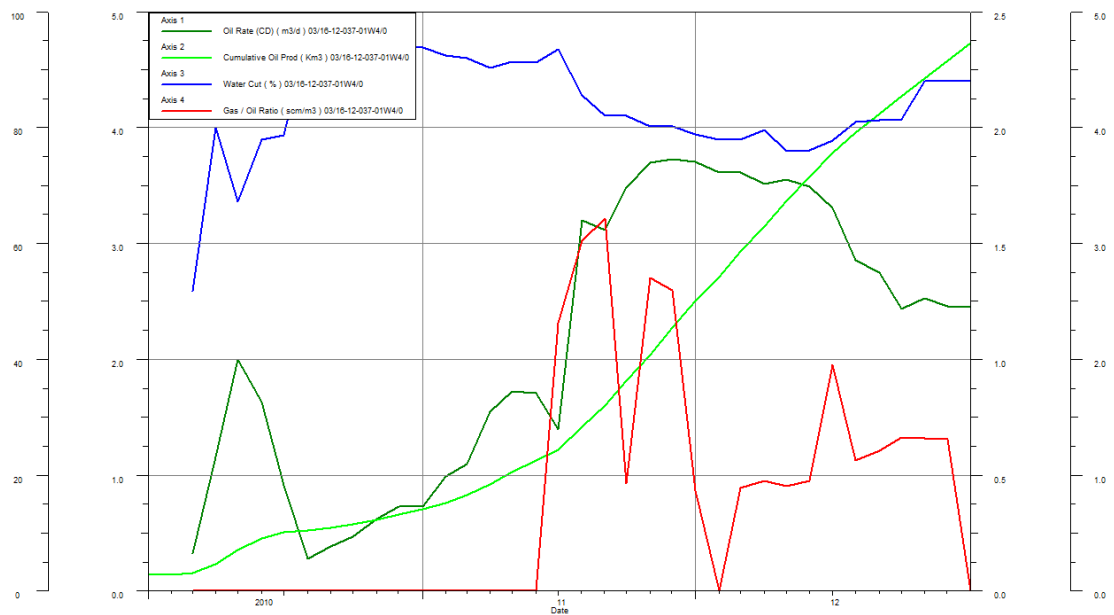


Figure 17 – Producer 103/16-12-037-01W4/0

COMPOSITION OF PRODUCED / INJECTED FLUIDS

Detailed composition of production and injection fluids was not tested. However, the produced oil, gas and water fluid analysis along with injected fresh water analysis and polymer information is given in Appendix D.

COMPARISON OF PREDICTED VS. ACTUAL WELL / PILOT PERFORMANCE

Comparison of the predicted vs. actual pilot performance is given in Table 2. The actual production is lower than what was initially forecasted for this area. Oil production rates increased initially and then dropped in 2012, to much lower than the rates which were reported in the application.

Date	Actual								Predicted		
	Daily Oil	Daily Gas	Daily Water	Daily Injection	Cumulative Oil	Cumulative Gas	Cumulative Water	Cumulative Injection	Daily Oil	Daily Gas	Daily Water
	STB	SCF	STB	STB	MSTB	MSTB	MSCF	MSTB	STB	SCF	STB
Mar-11	89.32	0.00	208.66	387.53	2.72	0.00	6.36	11.82	79.00	3972.00	-
Apr-11	95.42	0.00	260.46	385.99	5.63	0.00	14.31	23.40	89.00	4459.00	-
May-11	94.54	0.00	343.12	381.04	8.52	0.00	24.77	33.69	100.00	5007.00	-
Jun-11	81.33	0.59	284.26	354.33	11.00	0.02	33.44	42.22	112.00	5621.00	-
Jul-11	103.78	1.94	366.45	329.30	14.16	0.08	44.62	53.21	126.00	6323.00	-
Aug-11	114.41	2.73	313.29	262.35	17.65	0.16	54.18	62.61	140.00	7005.00	-
Sep-11	110.01	2.83	243.06	276.12	21.01	0.25	61.59	69.90	149.00	4469.00	-
Oct-11	116.36	1.59	217.57	297.24	24.56	0.30	68.22	76.43	162.00	4861.00	-
Nov-11	112.96	2.47	186.56	261.87	27.85	0.37	73.91	82.03	171.00	5122.00	-
Dec-11	113.47	2.85	202.37	229.88	31.30	0.46	80.09	88.10	180.00	4501.00	-
Jan-12	117.24	3.53	204.44	197.01	34.89	0.57	86.32	94.23	189.00	4735.00	-
Feb-12	114.79	3.17	194.42	328.16	38.39	0.66	92.25	100.07	199.00	4980.00	-
Mar-12	101.20	0.91	315.55	466.06	41.48	0.69	101.88	109.53	210.00	5248.00	-
Apr-12	96.67	0.94	213.58	292.48	44.42	0.72	108.39	115.94	221.00	5529.00	-
May-12	94.10	0.68	179.44	239.22	47.29	0.74	113.86	121.32	233.00	5826.00	-
Jun-12	83.03	0.59	115.42	274.45	49.83	0.76	117.38	124.79	246.00	6138.00	-
Jul-12	79.19	1.03	115.35	289.33	52.24	0.79	120.90	128.25	259.00	6473.00	-
Aug-12	70.76	0.91	110.68	245.51	54.40	0.82	124.28	131.57	273.00	6821.00	-
Sep-12	65.79	0.59	107.45	219.31	56.41	0.83	127.55	134.79	261.00	6534.00	-
Oct-12	69.82	0.57	109.24	248.55	58.54	0.85	130.89	138.07	272.00	6803.00	-
Nov-12	75.04	1.06	187.77	450.25	60.82	0.88	136.61	143.70	267.00	6670.00	-
Dec-12	70.45	0.80	176.52	371.71	62.97	0.91	142.00	149.00	235.00	5861.00	-

Table 2 – Comparison of the Predicted vs. Actual Pilot Performance

The flood response showed initial increase in oil production rates but then the production rates dropped. Injection has been increased in the pilot to that of the maximum allowable wellhead injection pressure and the VRR's have been maintained but the response remains poor.

PRESSURE DATA

For pressure data for injection wells, please refer to 4.1 where individual well injection rates and pressure have been presented.

Flowing pressure data for producing wells was acquired using fluid shots on a monthly basis. The following wells and their fluid shots were acquired.

00/09-12-037-01W4/0	Monthly bottomhole fluid shots
02/15-12-037-01W4/0	Monthly bottomhole fluid shots
02/16-12-037-01W4/0	Monthly bottomhole fluid shots
03/10-12-037-01W4/0	Monthly bottomhole fluid shots
03/16-12-037-01W4/0	Monthly bottomhole fluid shots
04/10-12-037-01W4/0	Monthly bottomhole fluid shots

Pressure data calculated from these fluid shots is given in Figures 18 through 23.

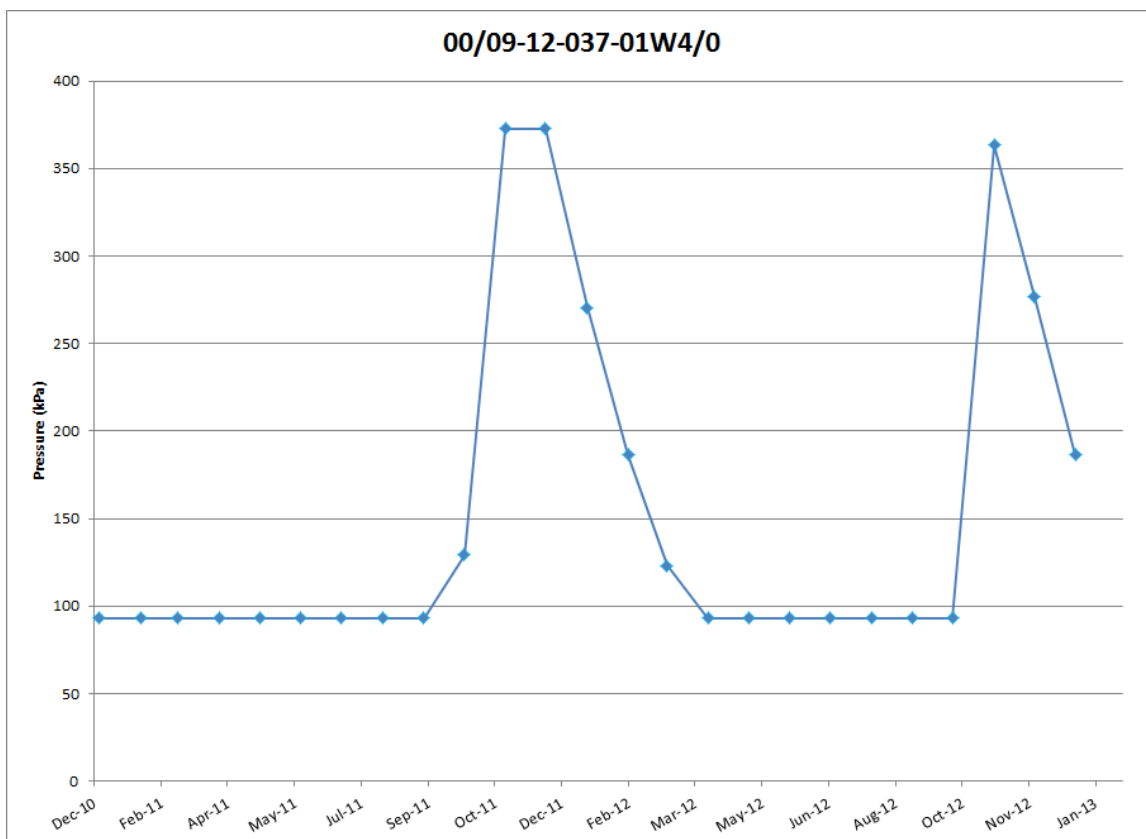


Figure 18 – 100/09-12-37-1W4/0 Bottomhole Flowing Pressure

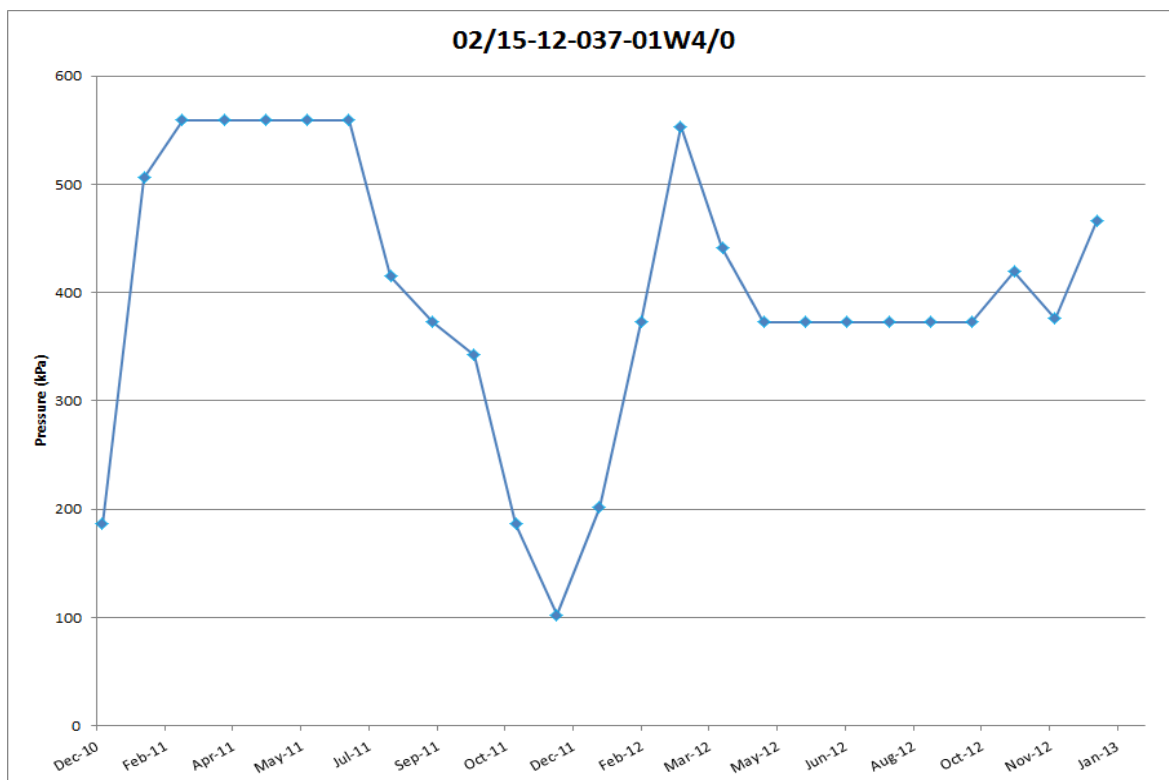


Figure 19 – 102/15-12-37-1W4/0 Bottomhole Flowing Pressure

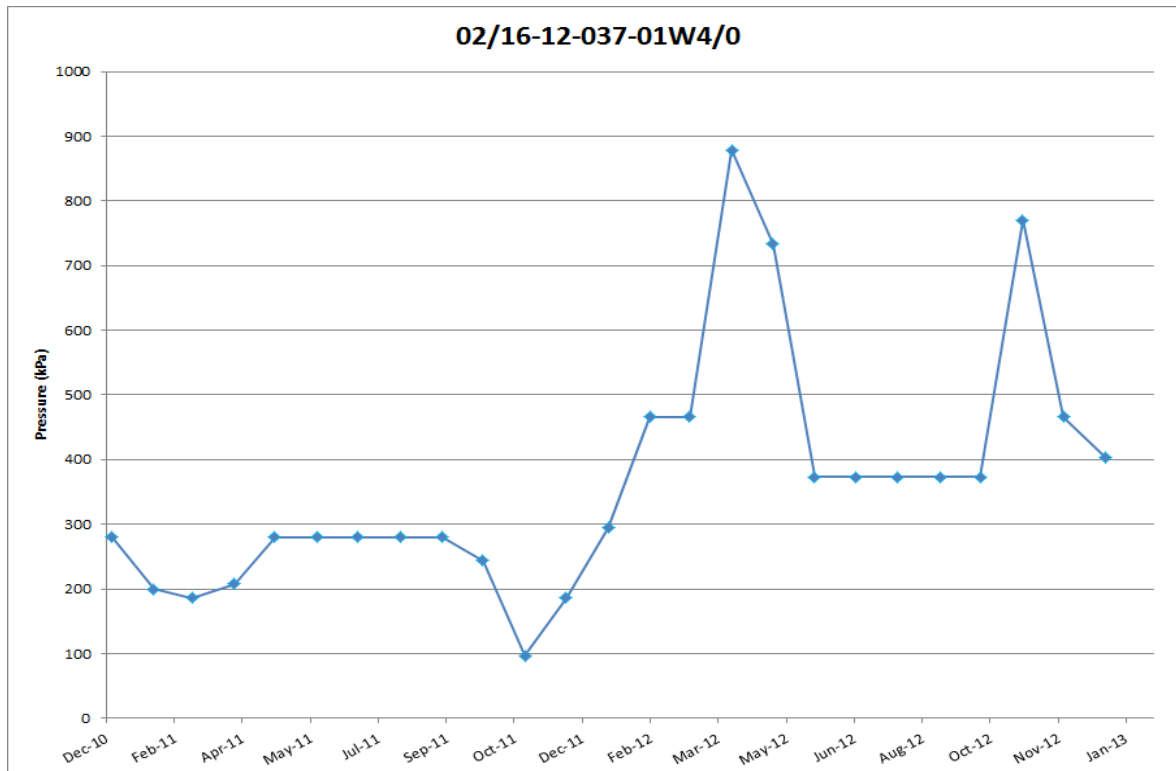


Figure 20 – 102/16-12-37-1W4/0 Bottomhole Flowing Pressure

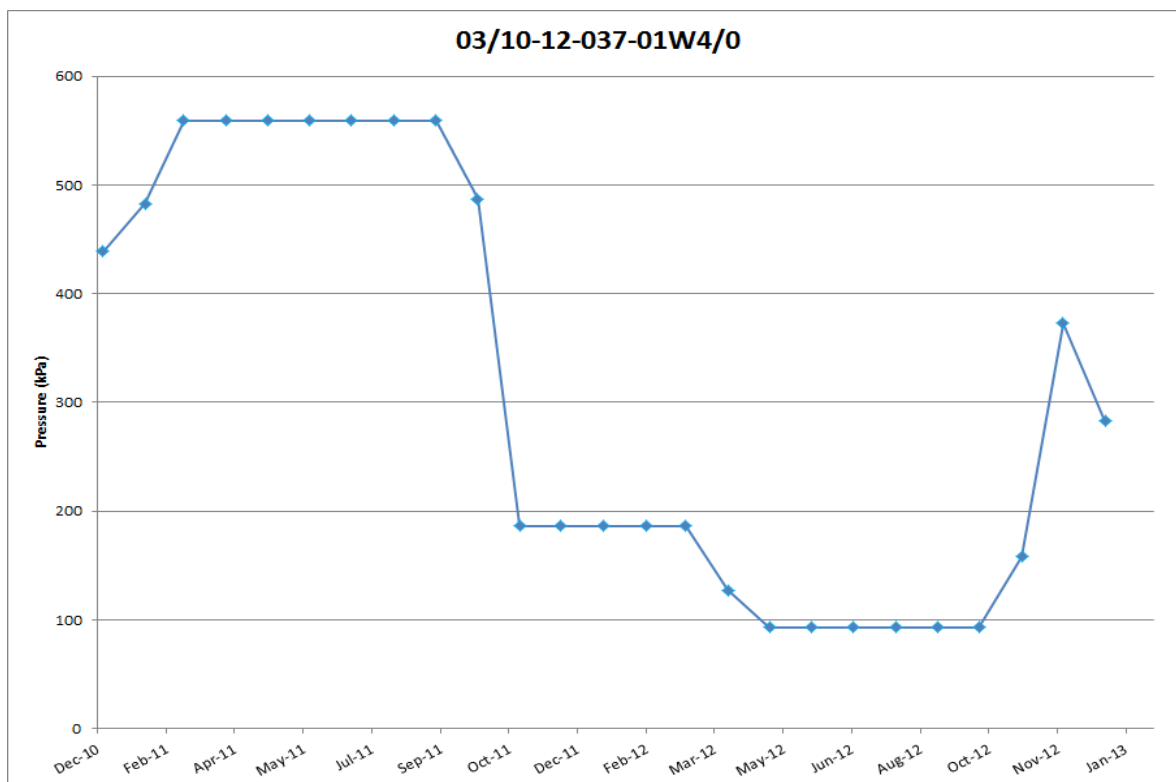


Figure 21 – 103/10-12-37-1W4/0 Bottomhole Flowing Pressure

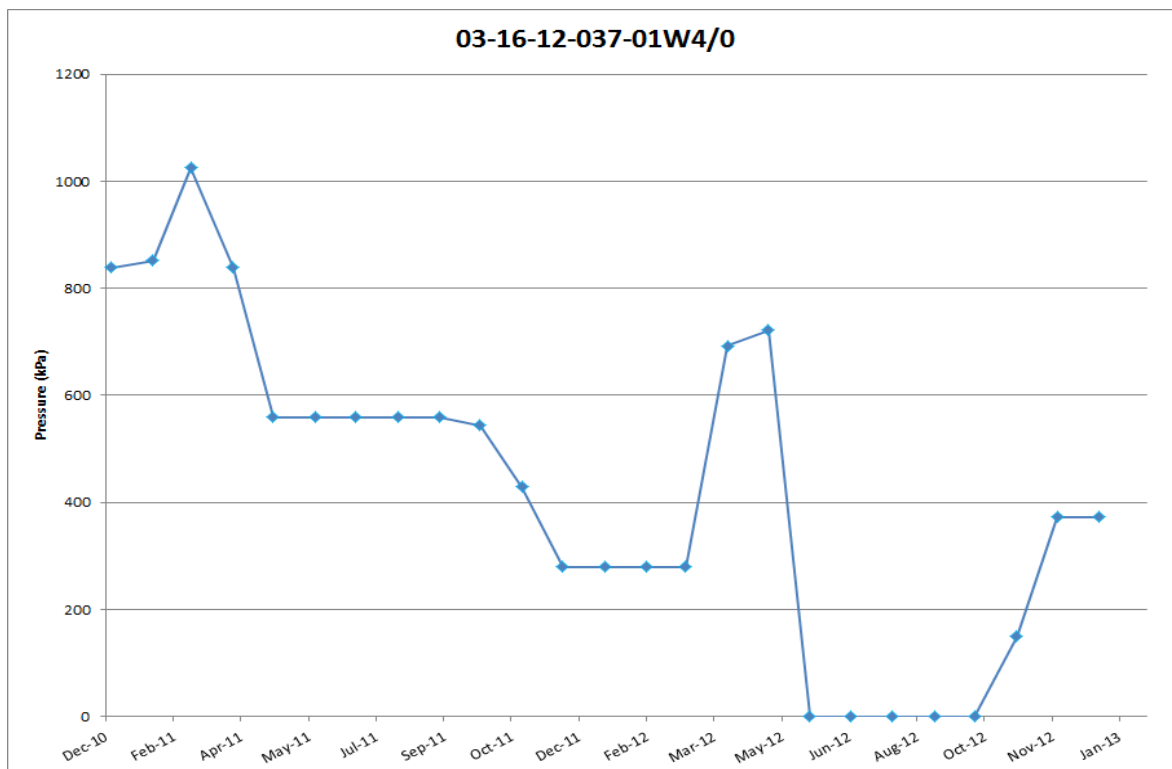


Figure 22 – 103/16-12-37-1W4/0 Bottomhole Flowing Pressure

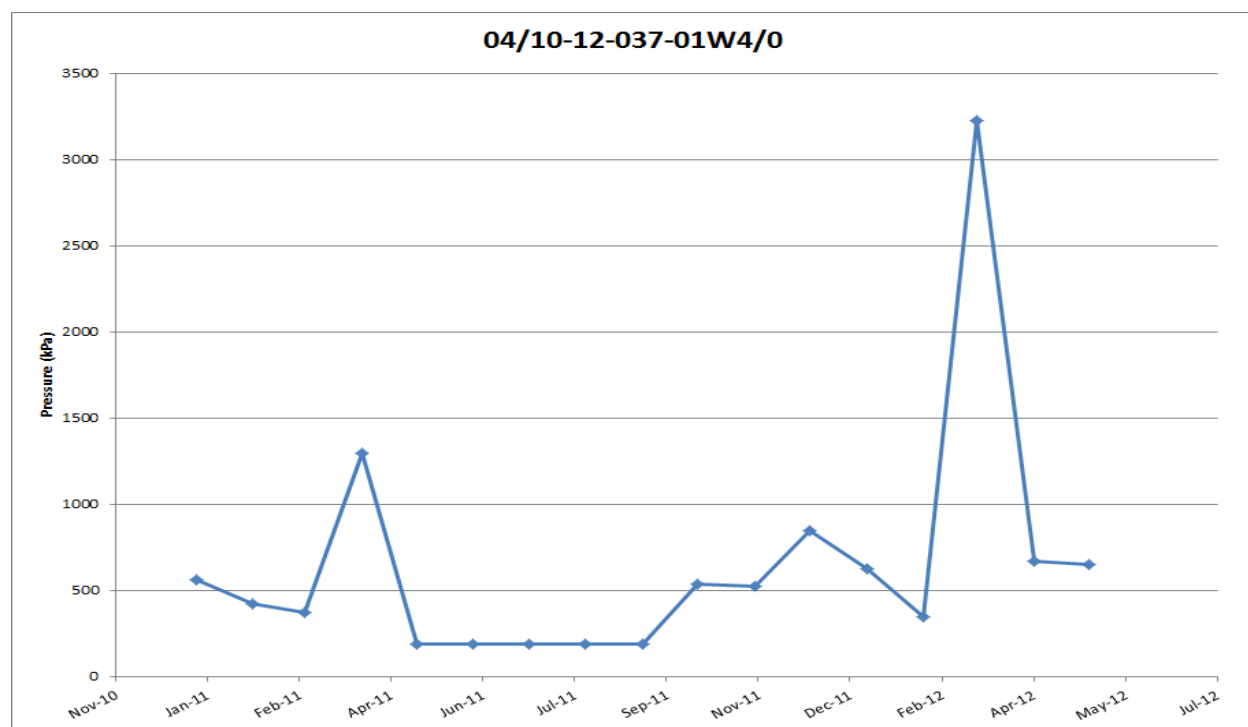


Figure 23 – 104/10-12-37-1W4/0 Bottomhole Flowing Pressure

Pressures were acquired for two wells in the pilot area in 2012. These are given in Table 3 below with the initial pressures acquired earlier.

UWI	Pre-2012			2012		
	Date	MPP (mKB)	Pressure (kPaa)	Date	MPP (mKB)	Pressure (kPaa)
100/09-12-037-01W4/00	6-Mar-10	788	7095	-	-	-
100/10-12-037-01W4/00	1-Dec-72	780.9	5705	-	-	-
100/10-12-037-01W4/00	7-May-74	780.9	5409	-	-	-
100/10-12-037-01W4/00	28-Apr-08	780.9	616	-	-	-
100/16-12-037-01W4/00	3-Feb-10	788	9731	-	-	-
102/09-12-037-01W4/00	3-Mar-10	783.5	2319	-	-	-
102/10-12-037-01W4/00	30-Jan-10	790.8	8068	-	-	-
102/15-12-037-01W4/00	11-Feb-10	787.9	7244	-	-	-
102/16/12-037-01W4/00	11-Feb-10	786.3	8597	7-Nov-12	786.3	3437.9
103/10-12-037-01W4/00	11-Feb-10	787.3	5652	-	-	-
103/16-12-037-01W4/00	5-Mar-10	787.3	6954	-	-	-
104/10-12-037-01W4/00	5-Mar-10	789.3	6893	3-Oct-12	789.3	11746.4

Table 3 – Shut In Pressures

PILOT DATA

ACTIVITIES CONDUCTED (GEOLOGY, GEOPHYSICS, LABORATORY STUDIES, SIMULATIONS, PRESSURE AND TEMPERATURE, ETC.)

POLYMER BREAKTHROUGH TESTS

Polymer breakthrough tests were acquired in 2011 after the start of the pilot. The wells and the dates of the breakthrough are given in Figure 24. No such tests were planned in 2012. Pengrowth is not measuring the concentration of polymer in produced water.

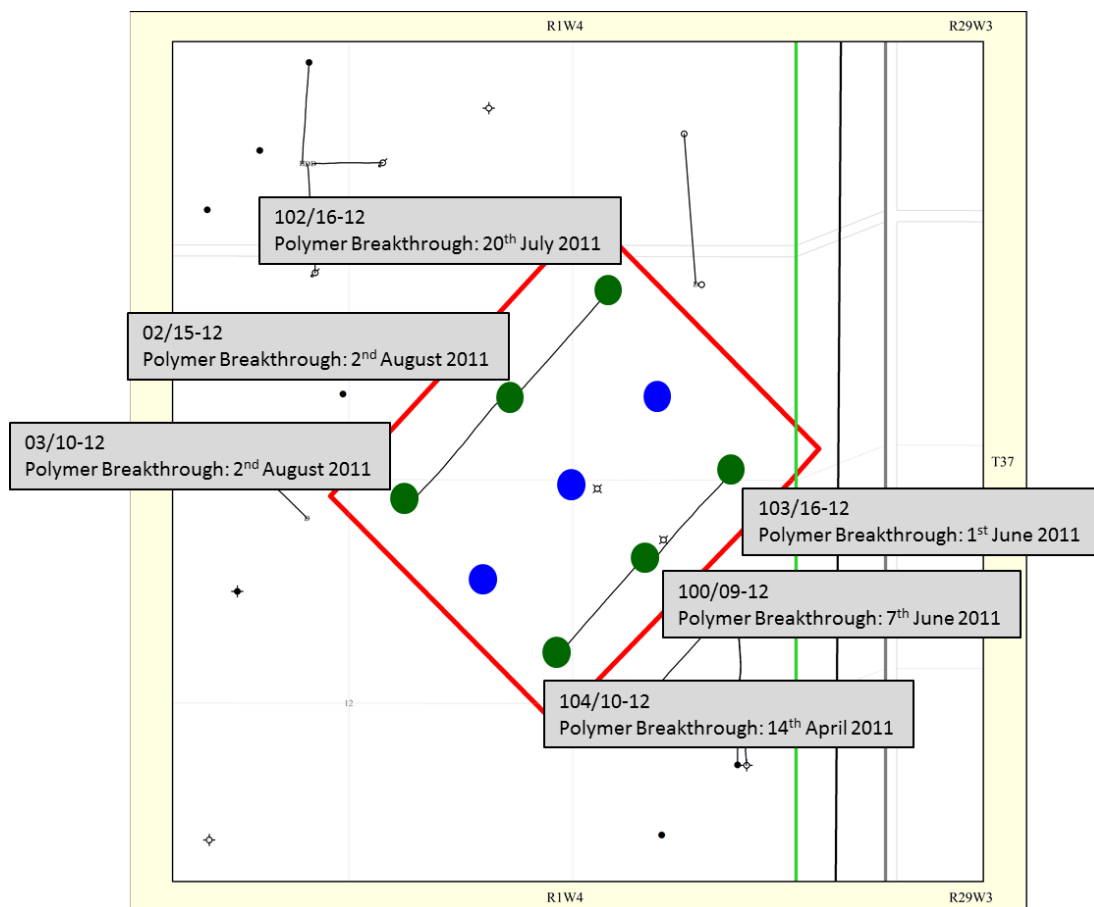


Figure 24 – Positive Results on Clay Tests

EARLIER TESTS/ACTIVITIES

Most of the work in the pilot area was done in 2010 – 2011 for the planning and execution of the pilot and are discussed in detail in the annual report for year 2011. These activities are listed below.

1. Polymer Breakthrough Tests
2. Tracer Tests
3. Associated Polymer with Produced Water Trial
4. Associative Polymer Lab Study
5. Water Conformance Treatment

INTERPRETATION OF PILOT DATA

Production response was observed to some degree in all the wells in the pilot area but the oil production has decreased in 2012. Differences in polymer breakthrough between the wells indicate that the reservoir is heterogeneous and sweep efficiency varies between the wells. Overall, the response has not been as promising as it was expected.

A discussion on the performance of each of the pattern wells follows.

Producer 100/09-12-37-1W4/0 was drilled in 2010. The well started off at initial oil production rates of 0.5 m³/d but the rates improved with response to the water flood. The wells oil rates peaked at 2.8 m³/d and water cut dropped from 55% to 35% in October 2011 in response to the polymer flooding. In 2012, oil rates dropped slightly and water cut increased. By the end of 2012, oil production rate was 1.9 m³/d and the water cut was 50%.

Producer 102/15-12-37-1W4/0 is a new well drilled in 2010. Well production increased from 1.5 m³/d to 4.8 m³/d in December 2011, in response to waterflooding. After polymer injection began in March 2011, the oil production continued to decline with water cut also decreasing. In the last quarter of 2012, oil production rates increased slightly to 3 m³/d and water cut also increased to 65%.

Producer 102/16-12-37-1W4/0 has not shown strong response to the polymer flood pattern. Oil production rates have dropped from 2.2 m³/d to 1 m³/d and water cut have increased from 15% to 50%. Although well performance does not indicate strong response to polymer flooding, polymer breakthrough was achieved in the well on 20th July 2011.

Producer 103/10-12-37-1W4/0 has shown the one of the strongest response to polymer flooding. Oil Production rates increased from 0.9 m³/d to 1.2 m³/d and water cut decreased from 88% to 76% in response to water flooding. After polymer injection, the oil rates have increased from 1.2 m³/d and peaked at 4 m³/d and water cut decreased from 76% to 25% in September 2011. Since then, the oil production rate has been decreasing slowly with water cut being stable. Polymer breakthrough in this well was achieved in 2nd August 2011. Last production for the year 2012 was oil rates of 2.8 m³/d and water cut of 35%.

Producer 103/16-12-37-1W4/0 has also shown good response to polymer flooding. Increase in oil rates were observed from 1.1 m³/d to 3.7 m³/d and water cut has decreased from 92% to 78%. Polymer breakthrough was observed in 1st June 2011. In 2012, the oil production decreased slowly to 2.5 m³/d and water cut increased to 2.5 m³/d.

Producer 104/10-12-37-1W4/0 showed good response to water flooding with oil rates increasing from 0.4 m³/d to 1.6 m³/d. After polymer injection began, oil production rates peaked at 4.6 m³/d in July 2011. This well showed possible channeling of water as oil production rates decreased in the end of 2011. A water conformance treatment was performed after which the oil production rates increased to 2 m³/d and water cut decreased to 65%. However, injection broke through again in March 2012 when water cut increased to over 90% and oil production dropped. This well was shut in in May 2012 and pressure measured on this well late in 2012 indicated over 11 MPa.

Injector 100/10-12-37-1W4/0 had an average water injection rate of 40 m³/d at a tubing pressure of 0 kPa WHIP. In 2012, the average water injection has been stable at 10-20 m³/d in 2012. Wellhead Injection Pressure has increased in 2012 to 8900 kPa which is the maximum injection pressure in the field. Hall plot for the injector is given in Figure 28.

Injector 100/16-12-37-1W4/0 has been on injection since 2004. Until March 2011 when polymer injection began in this well, the well had injected a cumulative volume of 38,400 m³. The well has injected at approximately 10 -20 m³/d at a WHIP of approximately 5000-6000 kPa but in the last quarter of 2012, the injection was increased to almost 30 m³/d at an injection pressure of 8700 kPa. The Hall Plot for this injector is given in Figure 29.

Injector 102/10-12-37-1W4/0 shows average injection rates of 10 - 15 m³/d at an average WHIP of 8,000 – 9,000 kPa. The hall plot shows a slight change of slope post polymer injection which is expected due to higher injection viscosity but there is no indication of skin or injection damage on the well.

Overall, the pilot has shown a poor response to the polymer injection in East Bodo Upper Mannville “A” pool in 2011. Oil production rates increased initially from 10 m³/d to over 18 m³/d and water cut decreased from 70% to 62%. Oil production rates peaked in Jan 2012, but since then the oil production rates have been decreasing slowly with water cut rising. One well, 104/10-12-037-01W4/0 was shut down in May 2012 due to water breakthrough. By the end of the year production had stabilized at 11 m³/d and water cut had increased to 71.5 %.

Figure 31 shows the entire pilot performance.

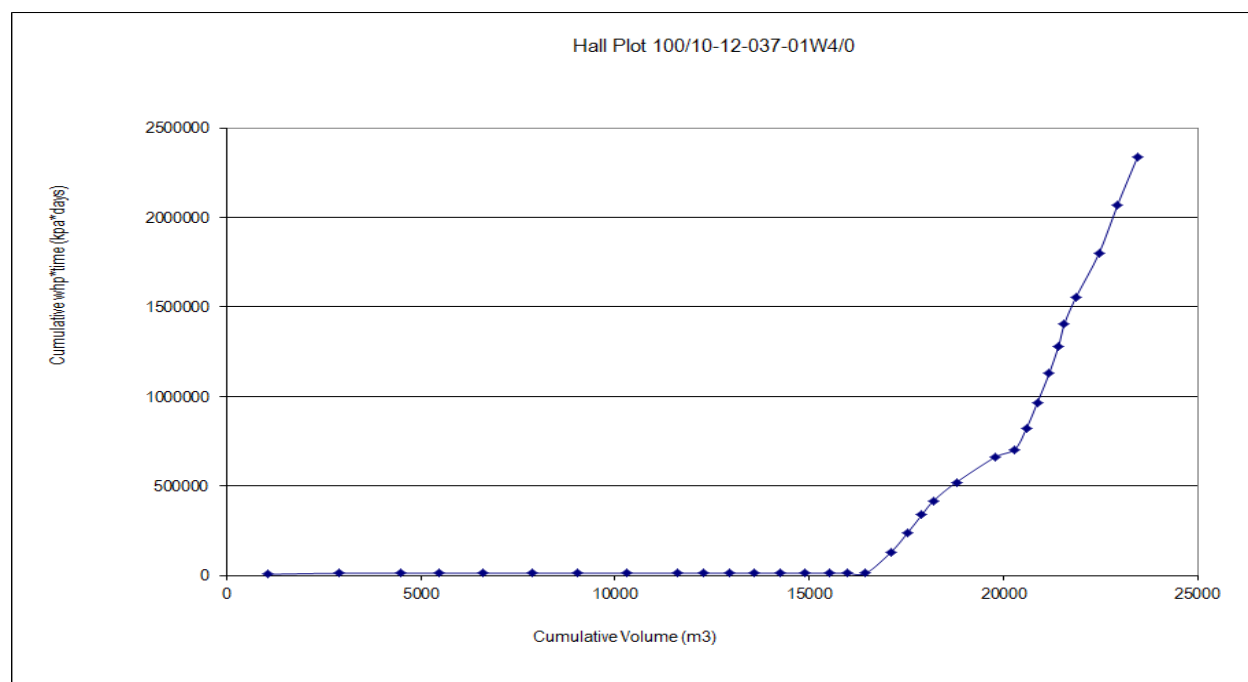


Figure 28 – 100/10-12-37-1W4/0 Hall Plot

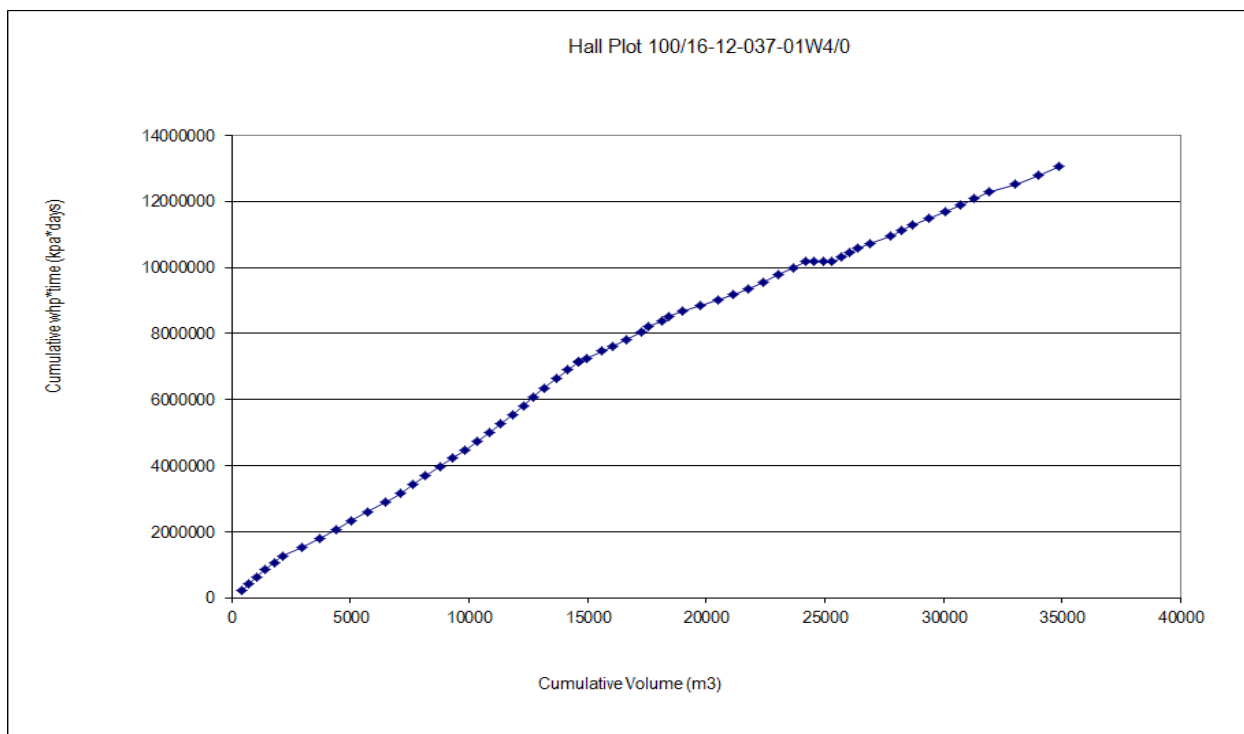


Figure 29 – 100/16-12-37-1W4/0 Hall Plot

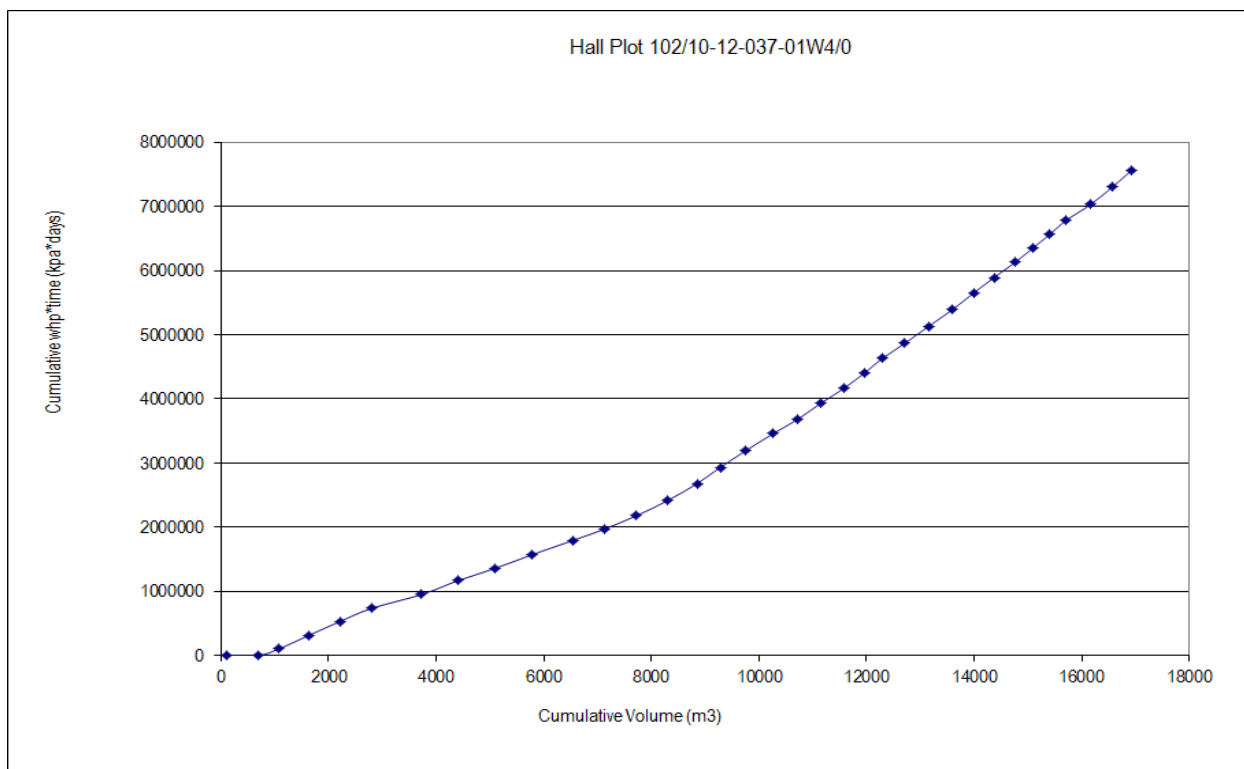


Figure 30 – 102/10-12-37-1W4/0 Hall Plot

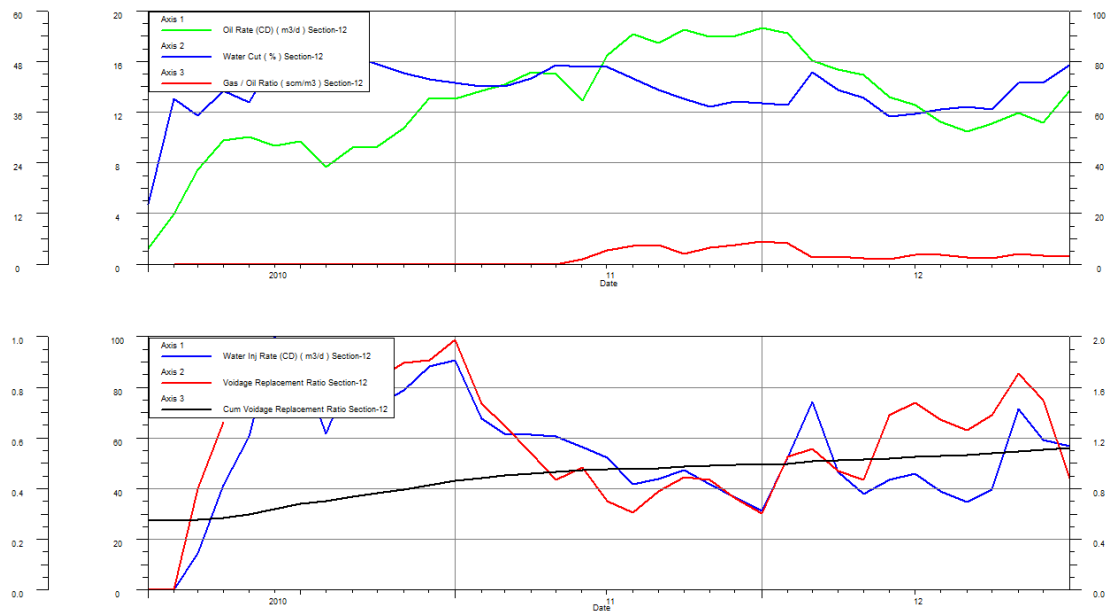


Figure 31 – East Bodo Upper Mannville “A” Pool Associative Polymer Pilot Performance

PILOT ECONOMICS

SALES VOLUMES OF NATURAL GAS AND BY PRODUCTS

Natural gas from East Bodo is being used as an energy source for running production well pumps.

REVENUE

Please refer to Appendix E.

CAPITAL COSTS

Table 7 shows the expenditures since the inception of the project.

	IETP (\$M)	2010 (\$M)	2011 (\$M)	2012 (\$M)	Total (\$M)
Polymer Skid & Polymer Purchase	3,481.2	-	3,481.2	-	3481.2
Drilling	3,860.9	3,860.9	-	-	3,860.9
Completion	2,623.4	2,623.4	-	-	2,623.4
Pipeline & Surface Pipeline	2,178.1	2,178.1	-	-	2,178.1
Lab Testing / Core Work	150.0	-	150.0	-	150.0
Conformance Treatment	-	-	113.5	-	113.5
Downhole Work	-	294.7	204.0	247.4	746.1
Totals	12,293.6	8,957.1	3,948.7	247.4	13,153.2

Table 7 – Capital Expenditures to data

DIRECT AND INDIRECT OPERATING COSTS

Please refer to Appendix E.

CROWN ROYALTIES, APPLICABLE FREEHOLD ROYALTIES AND TAXES

Please refer to Appendix E.

CASH FLOW

Please refer to Appendix E.

CUMULATIVE PROJECT COST AND NET REVENUE

Please refer to Appendix E.

EXPLANATION OF MATERIAL DEVIATIONS

The only major deviation in the cost is for the down-hole work that was done on the wells to repair completion/broken pumps (\$ 746.1M) and conformance treatment in 2011 (\$ 113.5 M).

FACILITIES

MAJOR CAPITAL ITEMS INCURRED

There were no capital items incurred in the pilot area in 2012.

CAPACITY LIMITATION, OPERATIONAL ISSUES AND EQUIPMENT INTEGRITY

POLYMER INJECTION SKID

The polymer injection skid has a capacity of 450 m³/d polymer & water injection mixture. This is more than sufficient capacity for the polymer pilot area. No modifications were required once the skid was operational. The integrity and reliability of the polymer injection skid has been satisfactory over the review period.

POLYMER MIXTURE

The polymer mixture consists of a dry polymer powder that arrives onsite in 750kg bags. The bags are hoisted over a hopper system that measures and feeds the dry polymer thru a slicer to provide more surface area. Once sliced, it is put through the wetting unit and results in the Mother Solution. This high concentration polymer is then added to a baffled tank where more water is added for mixing and hydration time. Once fully hydrated, the polymer is diluted to the injection ppm and pumped to the injectors.

PROCESS FLOW AND SITE DIAGRAMS

Please refer to Appendix F.

EQUIPMENT, CONNECTED PIPELINES, GATHERING AND COMPRESSION FACILITIES

Please refer to Appendix F.

ENVIRONMENTAL/REGULATORY COMPLIANCE

SUMMARY OF PROJECT REGULATORY REQUIREMENTS & COMPLIANCE

REGULATORY COMPLIANCE

The East Bodo Pilot is governed under ERCB EOR approval number 10529I. The pilot is operating with 100% compliance to the requirements of this approval. Highlights of these requirements include:

ERCB EOR Approval is given in Appendix G. Highlights of the ERCB EOR Approval 10529I are :

- Monitor produced water to determine polymer breakthrough.
- Complete 2 part annual reporting process (annual presentation to ERCB and data submission)

The East Bodo Pilot required utilization of the Ribstone Creek fresh water source and this water is governed by Government of Alberta Environment Water Acts. The source water well 9-12-37-1W4 is licensed to divert water under the Province of Alberta Water Act - License No. 00267180-00-00. The pilot is operating within 100% compliance to the requirements of this approval. Highlights of these requirements include:

- The License is given in Appendix G. Highlights of the license are:
- Maximum rate of Diversion = 450 m³/d
- Maximum Annual Diversion = 164250 m³
- Production well and Observation well are both equipped with measuring devices
- Submission of Conservation Plan
- Submission of Annual Monitoring Report

Pengrowth is in full compliance with the above mentioned requirements.

ENVIRONMENTAL PROCEDURES

Emergency Response Procedures

If a spill should occur Pengrowth would implement the Corporate Emergency Response Plan (ERP), if required. These operating procedures (OP) are discussed below.

Environmental Procedures

Pengrowth is committed to minimizing environmental impacts and fully complying with provincial and federal legislation and other requirements within the jurisdictions operated. This commitment is demonstrated through involvement at all levels of the Environmental Management System (EMS). The EMS contains Pengrowth's Environmental Policy and six Operating Practices (OP). These Ops outline Pengrowth's expectation of employees and contractors and ensure compliance with applicable legislation. The six Ops are listed as follows with a brief explanation.

Environmental Incident Reporting

This OP outlines the process followed to identify reporting requirements (Internal vs. regulatory office notification) for environmental incidents. All releases or environmental incidents are reported to the Field Environmental Coordinator to assist with determining the reporting requirements.

Spill Prevention and Clean-up

This OP outlines Pengrowth's expectation and standard for preventing releases to the environment. If a release should occur this practice guides in the clean-up and control of the release event. Depending on the severity of the release, this practice is used in conjunction with the ERP.

General Housekeeping

This OP outlines Pengrowth's expectation to keep worksites clean and free of hazards or pollution.

Surface Water Run-Off Management

This OP outlines Pengrowth's expectation to minimize pollution or damage caused by surface water from rainfall or snow melt. Within this practice the regulatory release limits are outlined.

Production Waste Management

This OP provides guidance in minimizing, effectively managing & properly disposing of wastes generated from production operations. All waste generated by Pengrowth is the responsibility of Pengrowth and is handled according to provincial and federal regulations.

Vegetation Management

This OP outlines Pengrowth's expectation to effectively manage vegetation and minimize problem or noxious weeds. Within this practice various control methods and a restricted pesticide list are identified.

APPENDIX A

Section 12 Production Data

Date	Monthly Oil	Monthly Gas	Monthly Water	Monthly Injection	Cum Oil	Cum Gas	Cum Water	Cum Injection	Energy Consumption	Gas Consumption	Monthly Fresh Water Prod
	m3	e3m3	m3	m3	e3m3	e3m3	e3m3	e3m3	KWH	e3m3	m3
3/1/2011	440.2	0	1028.4	1910	4.33	0	12.57	1.91	16557.75	60.19	1668
4/1/2011	455	0	1242.3	1841	4.78	0	13.81	3.751	29202.08	60.19	2471
5/1/2011	465.9	0	1691.1	1878	5.25	0	15.5	5.629	30136.23	60.19	2116
6/1/2011	387.9	0.5	1355.8	1690	5.64	0.5	16.86	7.319	27840.18	60.19	2007
7/1/2011	511.6	1.7	1806.1	1623	6.15	2.2	18.67	8.942	23921.4	60.19	1860
8/1/2011	564	2.4	1544.1	1293	6.71	4.6	20.21	10.235	26470.63	60.19	1399
9/1/2011	524.8	2.4	1159.3	1317	7.24	7	21.37	11.552	21062.76	60.19	689
10/1/2011	573.4	1.4	1072.3	1465	7.81	8.4	22.44	13.017	23213.93	60.19	1371
11/1/2011	538.9	2.1	889.8	1249	8.35	10.5	23.33	14.266	24466.55	60.19	1376
12/1/2011	559.2	2.5	997.4	1133	8.91	13	24.33	15.399	32153.38	60.19	1165
1/1/2012	577.7	3.1	1007.6	971	9.49	16.1	25.34	16.37	34606	89.9	1102
2/1/2012	529.3	2.6	896.4	1513	10.01	18.7	26.23	17.883	35517	86.6	1744
3/1/2012	498.9	0.8	1555.2	2297	10.51	19.5	27.79	20.18	37562	111	2629
4/1/2012	461.2	0.8	1018.7	1395	10.97	20.3	28.81	21.575	27986	91.9	1808
5/1/2012	463.9	0.6	884.4	1179	11.44	20.9	29.69	22.754	24324	92.1	1217
6/1/2012	396	0.5	550.5	1309	11.83	21.4	30.24	24.063	24049	82.5	1593
7/1/2012	390.2	0.9	568.5	1426	12.23	22.3	30.81	25.489	23826	44.9	1524
8/1/2012	348.8	0.8	545.5	1210	12.57	23.1	31.36	26.699	23438	36.1	1422
9/1/2012	313.9	0.5	512.5	1046	12.89	23.6	31.87	27.745	22487	37.2	1281
10/1/2012	344.2	0.5	538.4	1225	13.23	24.1	32.41	28.97	28313	40.5	1540
11/1/2012	358	0.9	895.6	2147.5	13.59	25	33.3	31.1175	32051	44	2937
12/1/2012	347.1	0.7	870	1832	13.94	25.7	34.17	32.9495	36811	42.8	3826

100/09-12-037-01W4/01

Date	Monthly Oil	Monthly Gas	Monthly Water	Cum Oil	Cum Gas	Cum Water
	m3	e3m3	m3	e3m3	e3m3	e3m3
3/1/2011	65.70	0.00	67.90	0.69	0.00	0.82
4/1/2011	62.90	0.00	66.40	0.75	0.00	0.89
5/1/2011	66.50	0.00	81.50	0.81	0.00	0.97
6/1/2011	65.20	0.00	78.20	0.88	0.00	1.05
7/1/2011	66.70	0.00	80.10	0.95	0.00	1.13
8/1/2011	85.30	0.30	47.80	1.03	0.30	1.18
9/1/2011	77.20	0.30	35.50	1.11	0.60	1.21
10/1/2011	86.00	0.20	40.70	1.20	0.80	1.25
11/1/2011	68.90	0.30	38.30	1.26	1.10	1.29
12/1/2011	64.70	0.30	40.20	1.33	1.40	1.33
1/1/2012	72.40	0.30	44.50	1.40	1.70	1.38
2/1/2012	72.30	0.30	43.70	1.47	2.00	1.42
3/1/2012	69.20	0.10	39.30	1.54	2.10	1.46
4/1/2012	63.40	0.20	39.50	1.61	2.30	1.50
5/1/2012	63.40	0.10	34.60	1.67	2.40	1.53
6/1/2012	60.00	0.10	33.60	1.73	2.50	1.57
7/1/2012	62.90	0.10	35.80	1.79	2.60	1.60
8/1/2012	67.60	0.10	36.80	1.86	2.70	1.64
9/1/2012	60.80	0.10	36.20	1.92	2.80	1.68
10/1/2012	62.50	0.10	41.00	1.98	2.90	1.72
11/1/2012	59.00	0.30	62.10	2.04	3.20	1.78
12/1/2012	57.60	0.30	59.70	2.10	3.50	1.84
1/1/2013	56.23	0.30	60.92	2.16	3.80	1.90

102/15-12-037-01W4/0

Date	Monthly Oil	Monthly Gas	Monthly Water	Cum Oil	Cum Gas	Cum Water
	m3	e3m3	m3	e3m3	e3m3	e3m3
3/1/2011	134.30	0.00	158.50	1.49	0.00	2.56
4/1/2011	125.70	0.00	156.30	1.62	0.00	2.72
5/1/2011	125.10	0.00	230.60	1.74	0.00	2.95
6/1/2011	82.30	0.10	160.10	1.83	0.10	3.11
7/1/2011	133.70	0.60	275.20	1.96	0.70	3.38
8/1/2011	115.20	0.60	242.30	2.08	1.30	3.63
9/1/2011	113.40	0.60	189.20	2.19	1.90	3.81
10/1/2011	122.80	0.40	210.90	2.31	2.30	4.03
11/1/2011	110.40	0.60	199.50	2.42	2.90	4.22
12/1/2011	113.30	0.60	196.30	2.53	3.50	4.42
1/1/2012	114.90	0.60	196.70	2.65	4.10	4.62
2/1/2012	105.90	0.60	179.40	2.76	4.70	4.80
3/1/2012	109.90	0.10	164.90	2.87	4.80	4.96
4/1/2012	104.50	0.10	162.50	2.97	4.90	5.12
5/1/2012	100.30	0.10	144.60	3.07	5.00	5.27
6/1/2012	95.60	0.10	132.70	3.17	5.10	5.40
7/1/2012	83.50	0.20	118.90	3.25	5.30	5.52
8/1/2012	49.80	0.20	73.70	3.30	5.50	5.59
9/1/2012	47.60	0.10	71.60	3.35	5.60	5.67
10/1/2012	93.00	0.10	130.60	3.44	5.70	5.80
11/1/2012	103.60	0.10	202.60	3.54	5.80	6.00
12/1/2012	94.60	0.10	175.70	3.64	5.90	6.18
1/1/2013	107.33	0.00	199.33	3.75	5.90	6.37

102/16-12-037-01W4/0

Date	Monthly Oil	Monthly Gas	Monthly Water	Cum Oil	Cum Gas	Cum Water
	m3	e3m3	m3	e3m3	e3m3	e3m3
3/1/2011	69.60	0.00	13.90	0.91	0.00	0.17
4/1/2011	68.10	0.00	14.40	0.98	0.00	0.18
5/1/2011	55.90	0.00	14.70	1.04	0.00	0.20
6/1/2011	66.60	0.10	16.70	1.10	0.10	0.21
7/1/2011	92.70	0.30	23.50	1.20	0.40	0.24
8/1/2011	46.70	0.30	47.00	1.24	0.70	0.28
9/1/2011	44.60	0.30	32.20	1.29	1.00	0.32
10/1/2011	50.20	0.20	32.10	1.34	1.20	0.35
11/1/2011	41.60	0.30	28.30	1.38	1.50	0.38
12/1/2011	44.40	0.30	31.90	1.42	1.80	0.41
1/1/2012	40.00	0.40	52.80	1.46	2.20	0.46
2/1/2012	38.50	0.30	57.30	1.50	2.50	0.52
3/1/2012	40.20	0.10	48.30	1.54	2.60	0.57
4/1/2012	25.10	0.20	21.00	1.57	2.80	0.59
5/1/2012	36.40	0.10	23.30	1.60	2.90	0.61
6/1/2012	45.10	0.10	29.50	1.65	3.00	0.64
7/1/2012	47.00	0.10	31.40	1.70	3.10	0.67
8/1/2012	48.80	0.10	33.90	1.74	3.20	0.71
9/1/2012	37.20	0.10	26.40	1.78	3.30	0.73
10/1/2012	30.90	0.10	20.70	1.81	3.40	0.75
11/1/2012	39.10	0.10	41.20	1.85	3.50	0.79
12/1/2012	31.90	0.10	31.80	1.88	3.60	0.83
1/1/2013	49.13	0.11	139.74	1.93	3.71	0.97

103/10-12-037-01W4/0

Date	Monthly Oil	Monthly Gas	Monthly Water	Cum Oil	Cum Gas	Cum Water
	m3	e3m3	m3	e3m3	e3m3	e3m3
3/1/2011	36.90	0.00	119.00	0.38	0.00	1.82
4/1/2011	36.20	0.00	122.30	0.41	0.00	1.94
5/1/2011	40.00	0.00	153.60	0.45	0.00	2.09
6/1/2011	29.60	0.10	107.40	0.48	0.10	2.20
7/1/2011	32.10	0.20	116.60	0.52	0.30	2.32
8/1/2011	118.90	0.30	55.00	0.63	0.60	2.37
9/1/2011	120.20	0.30	43.90	0.75	0.90	2.41
10/1/2011	135.00	0.20	50.80	0.89	1.10	2.47
11/1/2011	108.60	0.30	43.00	1.00	1.40	2.51
12/1/2011	105.20	0.30	31.20	1.10	1.70	2.54
1/1/2012	114.40	0.40	59.50	1.22	2.10	2.60
2/1/2012	104.80	0.30	55.90	1.32	2.40	2.65
3/1/2012	108.60	0.10	51.30	1.43	2.50	2.71
4/1/2012	107.90	0.10	47.00	1.54	2.60	2.75
5/1/2012	106.80	0.10	33.30	1.65	2.70	2.79
6/1/2012	90.50	0.10	20.90	1.74	2.80	2.81
7/1/2012	94.30	0.30	23.30	1.83	3.10	2.83
8/1/2012	94.10	0.30	24.20	1.92	3.40	2.85
9/1/2012	85.80	0.10	20.00	2.01	3.50	2.87
10/1/2012	82.30	0.10	13.90	2.09	3.60	2.89
11/1/2012	80.50	0.30	29.40	2.17	3.90	2.92
12/1/2012	86.90	0.10	45.90	2.26	4.00	2.96
1/1/2013	81.46	0.20	68.35	2.34	4.20	3.03

103/16-12-037-01W4/0

Date	Monthly Oil	Monthly Gas	Monthly Water	Cum Oil	Cum Gas	Cum Water
	m3	e3m3	m3	e3m3	e3m3	e3m3
3/1/2011	33.90	0.00	393.70	0.34	0.00	3.07
4/1/2011	46.50	0.00	432.50	0.39	0.00	3.50
5/1/2011	53.40	0.00	564.50	0.44	0.00	4.07
6/1/2011	51.30	0.00	530.00	0.50	0.00	4.60
7/1/2011	43.30	0.10	618.10	0.54	0.10	5.22
8/1/2011	99.30	0.30	586.80	0.64	0.40	5.80
9/1/2011	93.40	0.30	427.90	0.73	0.70	6.23
10/1/2011	108.00	0.10	491.50	0.84	0.80	6.72
11/1/2011	111.00	0.30	450.70	0.95	1.10	7.17
12/1/2011	115.50	0.30	468.60	1.07	1.40	7.64
1/1/2012	114.90	0.10	428.00	1.18	1.50	8.07
2/1/2012	104.70	0.00	370.20	1.29	1.50	8.44
3/1/2012	112.00	0.10	394.70	1.40	1.60	8.83
4/1/2012	105.30	0.10	410.90	1.50	1.70	9.25
5/1/2012	110.10	0.10	346.10	1.61	1.80	9.59
6/1/2012	104.80	0.10	333.80	1.72	1.90	9.93
7/1/2012	102.50	0.20	359.10	1.82	2.10	10.28
8/1/2012	88.50	0.10	376.90	1.91	2.20	10.66
9/1/2012	82.50	0.10	358.30	1.99	2.30	11.02
10/1/2012	75.50	0.10	332.20	2.07	2.40	11.35
11/1/2012	75.80	0.10	560.30	2.14	2.50	11.91
12/1/2012	76.10	0.10	556.90	2.22	2.60	12.47
1/1/2013	75.96	0.00	557.00	2.29	2.60	13.03

104/10-12-037-01W4/0

Date	Monthly Oil	Monthly Gas	Monthly Water	Cum Oil	Cum Gas	Cum Water
	m3	e3m3	m3	e3m3	e3m3	e3m3
3/1/2011	99.80	0.00	275.40	0.57	0.00	4.30
4/1/2011	115.60	0.00	450.40	0.68	0.00	4.76
5/1/2011	125.00	0.00	646.20	0.81	0.00	5.40
6/1/2011	92.90	0.20	463.40	0.90	0.20	5.86
7/1/2011	143.10	0.50	692.60	1.04	0.70	6.56
8/1/2011	98.60	0.60	565.20	1.14	1.30	7.12
9/1/2011	76.00	0.60	430.60	1.22	1.90	7.55
10/1/2011	71.40	0.30	246.30	1.29	2.20	7.80
11/1/2011	98.40	0.30	130.00	1.39	2.50	7.93
12/1/2011	116.10	0.70	229.20	1.50	3.20	8.16
1/1/2012	121.10	1.30	226.10	1.63	4.50	8.38
2/1/2012	103.10	1.10	189.90	1.73	5.60	8.57
3/1/2012	59.00	0.30	856.70	1.79	5.90	9.43
4/1/2012	55.00	0.10	337.80	1.84	6.00	9.77
5/1/2012	46.90	0.10	302.50	1.89	6.10	10.07
6/1/2012	0.00	0.00	0.00	1.89	6.10	10.07
7/1/2012	0.00	0.00	0.00	1.89	6.10	10.07
8/1/2012	0.00	0.00	0.00	1.89	6.10	10.07
9/1/2012	0.00	0.00	0.00	1.89	6.10	10.07
10/1/2012	0.00	0.00	0.00	1.89	6.10	10.07
11/1/2012	0.00	0.00	0.00	1.89	6.10	10.07
12/1/2012	0.00	0.00	0.00	1.89	6.10	10.07
1/1/2013	53.27	0.18	538.57	1.94	6.28	10.61

FUTURE OPERATING PLAN

PROJECT SCHEDULE

Currently, Pengrowth is evaluating the flood performance. The flood in Section 12 has not performed as well as it was initially expected. The polymer flood performance in Section 15 and waterflood performance in the East Bodo field was promising but the flood performance in Section 12 has shown peak rates which are too low to be economical.

A polymer flood on commercial scale was implemented in East Bodo Upper Mannville “A” Pool. This pool consists of two bars, North and South respectively. Injectors in the South bar were converted to polymer flood in April 2012 and the injectors in the North bar were converted to polymer flood in August 2012. A central skid has been put in place for the commercial scale operation and is supplying the polymer mixture to the injection wells. The commercial scale operation is using produced water with associative polymer DPRG 2234.

OPERATIONAL CHANGES

Pengrowth is not planning any operational changes in the pilot area at the moment. Pengrowth will continue to monitor the flood response and maintain VRR's.

OPTIMIZATION STRATEGIES

Well optimization consists of monitoring fluid levels and adjusting pump parameters to produce at the maximum possible rate. Pengrowth field staff will continue to monitor the fluid levels and pump speeds will be adjusted based on any increase in fluid levels. Pump sizes will be changed as required.

Injection rates are maintained to keep the VRR between 1 – 1.2 to avoid water channeling. Injection pressure is monitored to observe any response of polymer flood.

An annual pressure survey is planned in 2013 to observe changes in reservoir pressure in different parts of the pool in response to polymer flood.

SALVAGE UPDATE

Inasmuch as the pilot injectors and producers will continue operation after conclusion of the pilot, salvage opportunities are limited to polymer injection facilities. The following items will occur at the end of polymer injection pilot:

- Polymer skid will be decommissioned and removed to a new location
- Water source wells will be suspended
- Injectors will be tied to central skid which is currently in operation

INTERPRETATIONS AND CONCLUSIONS

OVERALL PILOT PERFORMANCE

The associative polymer flood pilot in East Bodo Upper Mannville “A” pool is in its third year now. The injection in the pilot area has been stable and increase in oil rates and decreasing water cut have been observed but not as promising as it was expected. The pilot continues and Pengrowth will continue to monitor the pilot performance and evaluate.

LESSONS LEARNED

Based on the field trial conducted for the associative polymer with produced water, one important lesson learned is that water quality is a prime factor in the polymer flood operation. Water properties will have a significant effect in the viscosity of the final injection solution.

DIFFICULTIES ENCOUNTERED

Some of the producing wells are deviated and have caused significant production operation issues. These are long directional wells with dog-legs. These dog-legs cause significant issues to the tubing and rod ware. Bottom-hole equipment was re-designed to work with the complex directional wellbore environment. Another difficulty encountered not in the pilot area but the commercial flood is handling the produced water quality which is important for proper polymer mixing.

TECHNICAL AND ECONOMIC VIABILITY

Technical viability for polymer injection in East Bodo has been established. Both produced water and fresh water with associative polymer have been used at for injection at East Bodo.

Based on the production response, the project does not seem to be economically feasible. Production rates have dropped below the adjusted type curve and injection is being maintained at the maximum possible wellhead injection pressure. Based on the current production rates, the cost of polymer in injection fluid is uneconomical.

OVERALL EFFECT ON RECOVERY

Currently, the polymer flood has recovered just over 10,000 m³ which corresponds to a recovery factor of 1.8 %. Target recoveries for the pilot area (based on results so far) are 9.3% but based on the performance so far it may not be achievable.

COMMERCIAL FIELD APPLICATION

East Bodo Upper Mannville “A” pool is in commercial phase of Polymer Flooding. All the injectors have been converted into polymer injection. A central skid has been installed for polymer mixing and injection to these wells.

Associative polymer solution with produced water is being injected in the commercial development of the project.

APPENDIX B

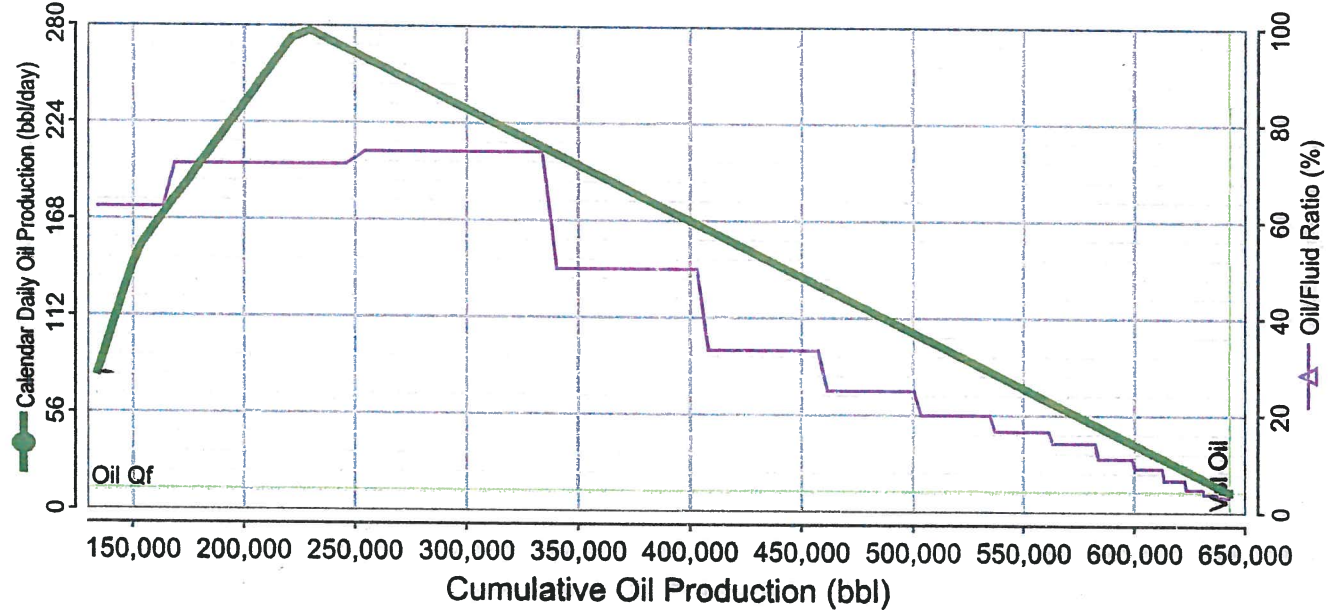
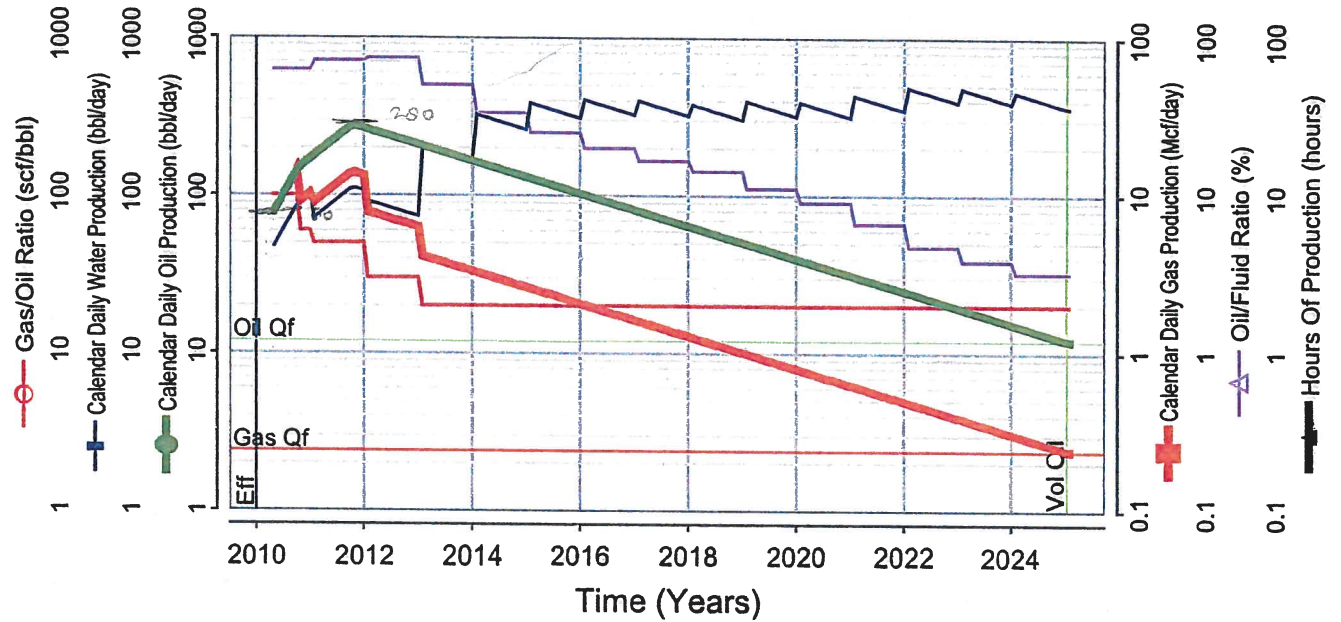
Pengrowth Corporation
GLJ July 1, 2009 Forecast
CHART - PRODUCTION AND FORECAST

Effective January 01, 2010

Page 1 of 1

Operator: Pengrowth
 Province: Alberta
 Field:
 Pool:
 Unit:
 Status:

Bodo East Polymer Pilot
 East Bodo Polymer Pilot group
 PDP

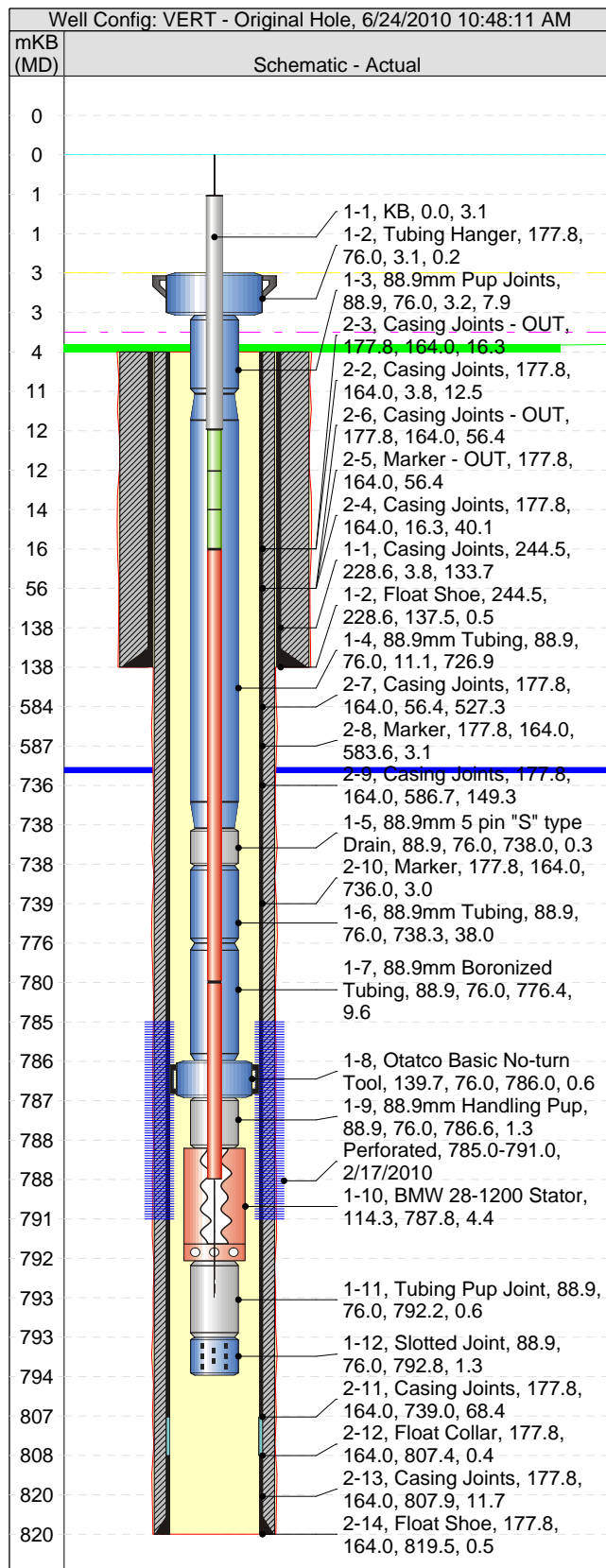


Cum Oil (bbl)	0	Cum Gas (Mcf)	0	Cum Water (bbl)	0	Cum Cond (bbl)	0
Forecast Start	04/01/2010	Calculation Type	Volumetric	Est. Cum Prod (bbl)	134,267	Decline Exponent	0.000
Forecast End	01/16/2025	OVIP (bbl)	3,383,141	Remaining (bbl)	508,530	Initial Decline (%/yr)	-300.0
Initial Rate (bbl/day)	75.0	Recovery Factor	0.190	Surface Loss	0.5	Reserve Life Index	9.86
Final Rate (bbl/day)	12.0	Ult. Recoverable (bbl)	642,797	Total Sales (Mcf)	7,885	Reserve Half Life (yrs)	1.93

APPENDIX C

Well Name: PENGROWTH 9C PROVOST 9-12-37-1

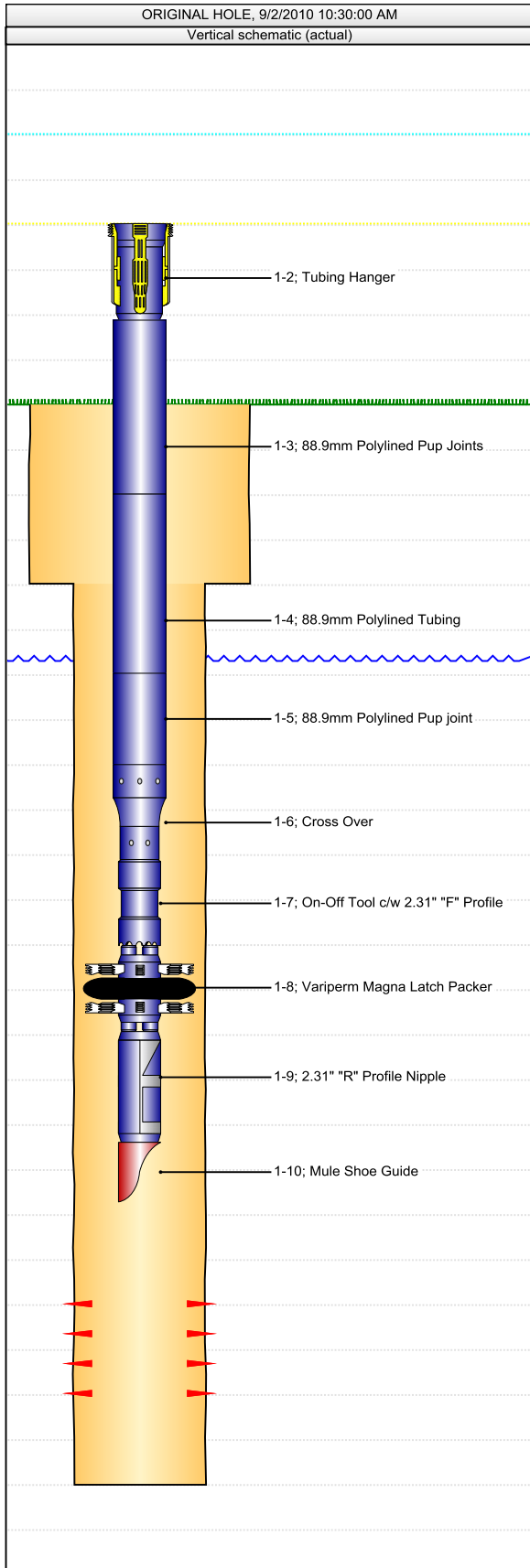
Btm Hole UWI 100/09-12-037-01W4/0	Surface Legal Location 09-12-037-01 W4M	License No. 0415633	Well Configuration Type VERT	Field Name Provost	State/Province Alberta
KB Elevation (m) 686.87	Ground Elevation (m) 683.07	KB-CF (m) 3.50	KB - THF (m) 3.09	Total Depth (mKB) 820.00	Spud Date 7/2/2010
			Rig Release Date 9/2/2010		



PBTDS							
Date			Depth (mKB)				
Casing Strings							
Casing Description	OD (mm)	Wt (kg/m)	Grade	Set Depth (mKB)			
Surface	244.5	48.068	H-40	138.00			
Production	177.8	29.763	J-55	820.00			
Cement Stages							
Description	Type	Top (mKB)	Btm (mKB)	Stroke (m)	Recip Rate (spm)	Cmnt Rtn (m³)	
Production Casing Cement	casing	3.80	820.00	3.00	3	3.00	
Surface Casing Cement	casing	3.80	138.00			4.00	
Perforations							
Zone		Top (mKB)	Btm (mKB)	Current Status			
Lloydminster, Original Hole		785.00	791.00				
Tubing Strings							
Tubing - Production set at 794.15mKB on 2/18/2010 17:00							
Tubing Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)			
Tubing - Production	88.9	13.840	J-55	794.15			
Comment							
Item No.	Jts	Item Description	OD (mm)	ID (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1	1	KB			3.09	0.00	3.09
1-2	1	Tubing Hanger	177.8	76.0	0.15	3.09	3.24
1-3	3	88.9mm Pup Joints	88.9	76.0	7.88	3.24	11.12
1-4	76	88.9mm Tubing	88.9	76.0	726.91	11.12	738.03
1-5	1	88.9mm 5 pin "S" type Drain	88.9	76.0	0.29	738.03	738.32
1-6	4	88.9mm Tubing	88.9	76.0	38.04	738.32	776.36
1-7	1	88.9mm Boronized Tubing	88.9	76.0	9.63	776.36	785.99
1-8	1	Otatco Basic No-turn Tool	139.7	76.0	0.56	785.99	786.55
1-9	1	88.9mm Handling Pup	88.9	76.0	1.27	786.55	787.82
1-10	1	BMW 28-1200 Stator	114.3		4.40	787.82	792.22
1-11	1	Tubing Pup Joint	88.9	76.0	0.59	792.22	792.81
1-12	1	Slotted Joint	88.9	76.0	1.34	792.81	794.15
Rods							
Rod String on 3/7/2010 12:30							
Rod Description			OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)	
Rod String			25.4	4.316	D	792.50	
Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)	
1-1	1	Polished Rod	31.7	10.97	0.52	11.49	
1-2	1	25.4mm Pony Rod	25.4	0.45	11.49	11.94	
1-3	1	25.4mm Pony Rod	25.4	1.86	11.94	13.80	
1-4	1	25.4mm Pony Rod	25.4	2.48	13.80	16.28	
1-5	100	25.4mm Gr D75 Sucker Rods	25.4	764.00	16.28	780.28	
1-6	1	25.4mm "EL" Rod	25.4	7.62	780.28	787.90	
1-7	1	PCP Rotor		4.60	787.90	792.50	

Well Name: PENGROWTH PROVO 10-12-37-1
Report # 2.0, Report Date: 9/2/2010

Btm Hole UWI 00/10-12-037-01W4/0	Surface Legal Location 00/10-12-037-01W4/0	Field Name Provost	License # 0044007	State/Province Alberta	Well Configuration Type
KB Elevation (m) 677.90	KB - Tubing Head Flange (m) 2.90	Spud Date 11/25/1972 00:00	Rig Release Date	PBTD (All) (mKB) ORIGINAL HOLE - 0.00	Total Depth All (TVD) (mKB)



Primary Job Type Workover		Secondary Job Type Pressure Build-up/Survey		DDS Sub. #	Grs Comp Intvl
Objective Run pressure recorders in well for pressure build.					
Contractor				Rig Number Lonkar Services	
AFE # 11878-9800-302	AFE+Supp Amt (Cost)	Daily Field Est Total (Cost) 2,917.50	Cum Field Est To Date (Cost) 4,175.00		
Daily Readings					
Daily Man Hours (hr)	Weather Sunny	T (°C) 22	Road Condition Good	Drill Pipe Pr... 0	P Cas (kPa) 0
Rig Time (hr)					
Daily Contacts					
Job Contact		Title		Phone Number	
Terry Gramlich		Consultant		306-753-7730	
Chuck Doetzel				306-753-7777	
Time Log					
Start Time	End Time	Dur (hr)	Code	Activity	Com
09:30	09:45	0.25	SMT G	Safety Meeting	Hold safety meeting and issue work permit.
09:45	09:45	0.00	WL WK	Wireline	Rig up Lonkar. Pick up drop spool and pull pressure recorders. Rig out Lonkar.
Report Fluids Summary					
Fluid	To well (m³)	From well (m³)	To lease (m³)	From lease (m³)	
Safety Checks					
Time	Des	Type	Com		
Logs					
Time	Type	Top (mKB)	Btm (mKB)	Cased?	
Perforations					
Time	Zone	Top (mKB)	Btm (mKB)	Current Status	
Stimulations & Treatments					
Time	Zone	Type	Delivery Mode	Stim/Treat Company	
Stg #	Stage Type	Top (mKB)	Btm (mKB)	Vol Clean Pump (m³)	
Tubing Run					
Run Time	Tubing Description	Set Depth (mKB)	String Max Nomina... Wt (kg/m)	String Grade	
Tubing Pulled					
Pull Time	Tubing Description	Set Depth (mKB)	String Max Nomina... Wt (kg/m)	String Grade	
Other in Hole Run (Bridge Plugs, etc)					
Run Time	Des	OD (mm)	Top (mKB)	Btm (mKB)	
Other in Hole Pulled (Bridge Plugs, etc)					
Pull Time	Des	Top (mKB)	Btm (mKB)	OD (mm)	
10:00	Pressure Sensor	777.00	778.00	38.1	
Cement					
Start Time	Des	Type	String	Cement Comp	

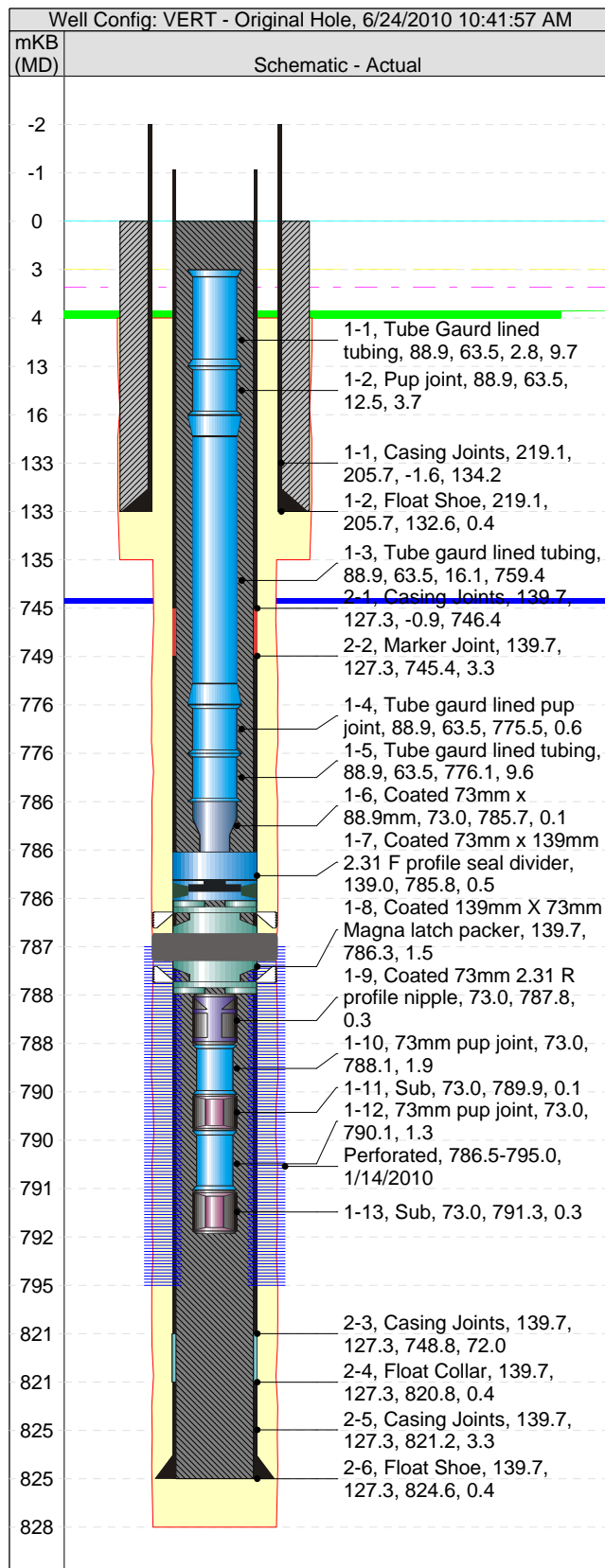
PENGROWTH PROVO 16-12-37-1

Downhole Summary

License #:	289498	Date Prepared:	October 11, 2006	By:	Josh McEwen
GL Elevation	682.7 m	Status:	Water, Inj		
KB Elevation	686.6 m				
KB-CF	3.75 m				
PBTD	805.78 mKB				
TD	818 mKB				
Surface Location	100/16-12-037-01W4/00				
Bottom Hole Location	100/16-12-037-01W4/00				
Surface Casing	10 jts 244.5 mm – 48.06 kg/m – H-40 – ST&C Landed at 137 mKB Cemented w/12 Tonnes TSC + 3% CaCl ₂ 4 m ³ Good Returns				
Intermediate Casing	10 jts 177.8 mm – 29.76 kg/m – J-55 – ST&C (131.04 m) 50 jts 177.8 mm – 25.3 kg/m – H-40 – ST&C (664.21 m) 2 jts 177.8 mm – 29.76 kg/m – J-55 – ST&C (23.54 m) Landed at 818 mKB Cemented w/20 Tonnes T-Mix TS + 0.5% CaCl ₂ + 0.4% CFL-2 4.5 m ³ Good Returns				
Perforations	785 – 791 mKB – October 20, 2003 127 mm ERHSC Gun w/30 g BH charges, 26 SPM				
Stimulation History					
WellHead					
Tubing String	1 x 73 mm x 0.12 m wireline re-entry tool 1 x 73 mm x 1.88 m Pup 1 x 73 mm x 177.8 mm Double Grip Packer c/w 50,000 Pull Shear Release 1 x 73 mm on-off tool c/w 58.7 XN Profile slick joint & 57 No-Go 1 x 73 mm x 88.9 mm X-over 1 x 88.9 mm x 1.88 m TK99 Pup 79 x 88.9 mm TK99 TBG jts 1 x 88.9 mm x 3.07 m Pup 1 x 88.9 mm x 1.86 m Pup 1 x 88.9 mm x 9.53 TBG jt Bottom of Tubing landed at 782.95 mKB				
Rod String					
Bottom Hole Tools	Center of Packer at 780.57 mKB				

Well Name: PENGROWTH 10D PROVOST 10-12-37-1

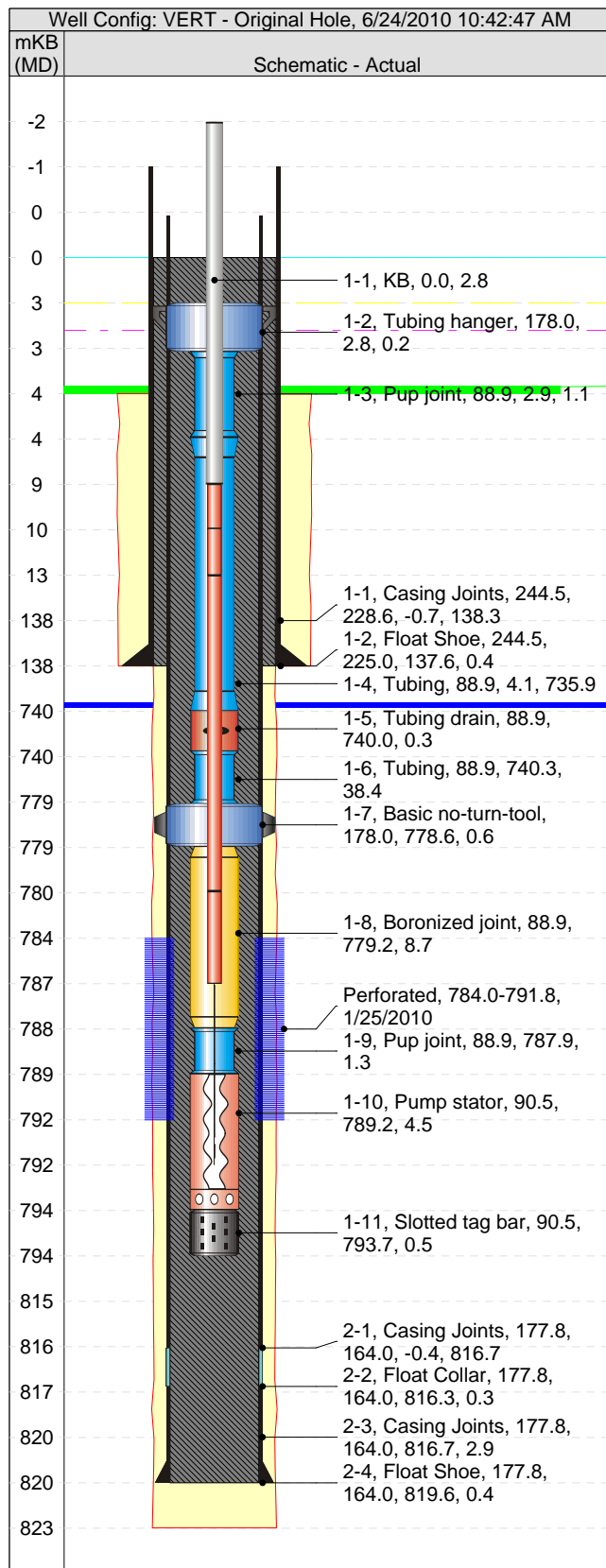
Btm Hole UWI 102/10-12-037-01W4/00	Surface Legal Location 10-12-037-01 W4M	License No. 0415626	Well Configuration Type VERT	Field Name Provost	State/Province Alberta
KB Elevation (m) 688.72	Ground Elevation (m) 685.22	KB-CF (m) 3.05	KB - THF (m) 2.80	Total Depth (mKB) 828.00	Spud Date 1/9/2010
			Rig Release Date 1/11/2010		



PBTDS		Date	Depth (mKB)				
Casing Strings							
Casing Description		OD (mm)	Wt (kg/m)	Grade	Set Depth (mKB)		
Surface		219.1	35.716	J-55	133.00		
Production		139.7	20.834	J-55	825.00		
Cement Stages							
Description	Type	Top (mKB)	Btm (mKB)	Stroke (m)	Recip Rate (spm)	Cmnt Rtrn (m³)	
Surface	casing	0.00	133.00	1.00		3.00	
Production Casing Cement		0.00	825.00	2.00		2.00	
Perforations							
Zone		Top (mKB)	Btm (mKB)	Current Status			
		786.50	795.00	(786.5 - 795)			
Tubing Strings							
88.9mm Tube Gaurd new lined tubing set at 791.58mKB on 1/14/2010 11:00							
Tubing Description		OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)		
88.9mm Tube Gaurd new lined tubing		88.9	13.840	J55	791.58		
Comment							
Item No.	Jts	Item Description	OD (mm)	ID (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1	1	Tube Gaurd lined tubing	88.9	63.5	9.66	2.80	12.46
1-2	2	Pup joint	88.9	63.5	3.67	12.46	16.13
1-3	79	Tube gaurd lined tubing	88.9	63.5	759.36	16.13	775.49
1-4	1	Tube gaurd lined pup joint	88.9	63.5	0.62	775.49	776.11
1-5	1	Tube gaurd lined tubing	88.9	63.5	9.57	776.11	785.68
1-6	1	Coated 73mm x 88.9mm	73.0		0.14	785.68	785.82
1-7	1	Coated 73mm x 139mm 2.31 F profile seal divider	139.0		0.49	785.82	786.31
1-8	1	Coated 139mm X 73mm Magna latch packer	139.7		1.45	786.31	787.76
1-9	1	Coated 73mm 2.31 R profile nipple	73.0		0.29	787.76	788.05
1-10	1	73mm pup joint	73.0		1.86	788.05	789.91
1-11	1	Sub	73.0		0.15	789.91	790.06
1-12	1	73mm pup joint	73.0		1.25	790.06	791.31
1-13	1	Sub	73.0		0.27	791.31	791.58

Well Name: PENGROWTH 15A PROVOST 15-12-37-1

Btm Hole UWI 102/15-12-037-01W4/0	Surface Legal Location 15-12-037-01 W4M	License No. 0415629	Well Configuration Type VERT	Field Name Provost	State/Province Alberta
KB Elevation (m) 686.00	Ground Elevation (m) 682.50	KB-CF (m) 2.86	KB - THF (m) 2.79	Total Depth (mKB) 822.48	Spud Date 1/16/2010
					Rig Release Date 1/18/2010



Date	Depth (mKB)
1/25/2010	815.00

Casing Strings

Casing Description	OD (mm)	Wt (kg/m)	Grade	Set Depth (mKB)
Surface	244.5	48.068	H-40	138.00
Production	177.8	29.763	J-55	820.00

Cement Stages

Description	Type	Top (mKB)	Btm (mKB)	Stroke (m)	Recip Rate (spm)	Cmnt Rtn (m³)
Production Casing Cement		0.00	820.00	1.00		4.00
Surface Casing Cement		0.00	138.00	1.20		3.00

Perforations

Zone	Top (mKB)	Btm (mKB)	Current Status
Lloydminster, Original Hole	784.00	791.80	(784 - 791)

Tubing Strings

88.9mm tubing set at 794.22mKB on 1/27/2010 08:00

Tubing Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
88.9mm tubing	88.9	13.840	J55	794.22

Comment

Item No.	Jts	Item Description	OD (mm)	ID (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1	1	KB			2.79	0.00	2.79
1-2	1	Tubing hanger	178.0		0.15	2.79	2.94
1-3	1	Pup joint	88.9		1.13	2.94	4.07
1-4	77	Tubing	88.9		735.90	4.07	739.97
1-5	1	Tubing drain	88.9		0.29	739.97	740.26
1-6	4	Tubing	88.9		38.36	740.26	778.62
1-7	1	Basic no-turn-tool	178.0		0.56	778.62	779.18
1-8	1	Boronized joint	88.9		8.71	779.18	787.89
1-9	1	Pup joint	88.9		1.28	787.89	789.17
1-10	1	Pump stator	90.5		4.50	789.17	793.67
1-11	1	Slotted tag bar	90.5		0.55	793.67	794.22

Rods

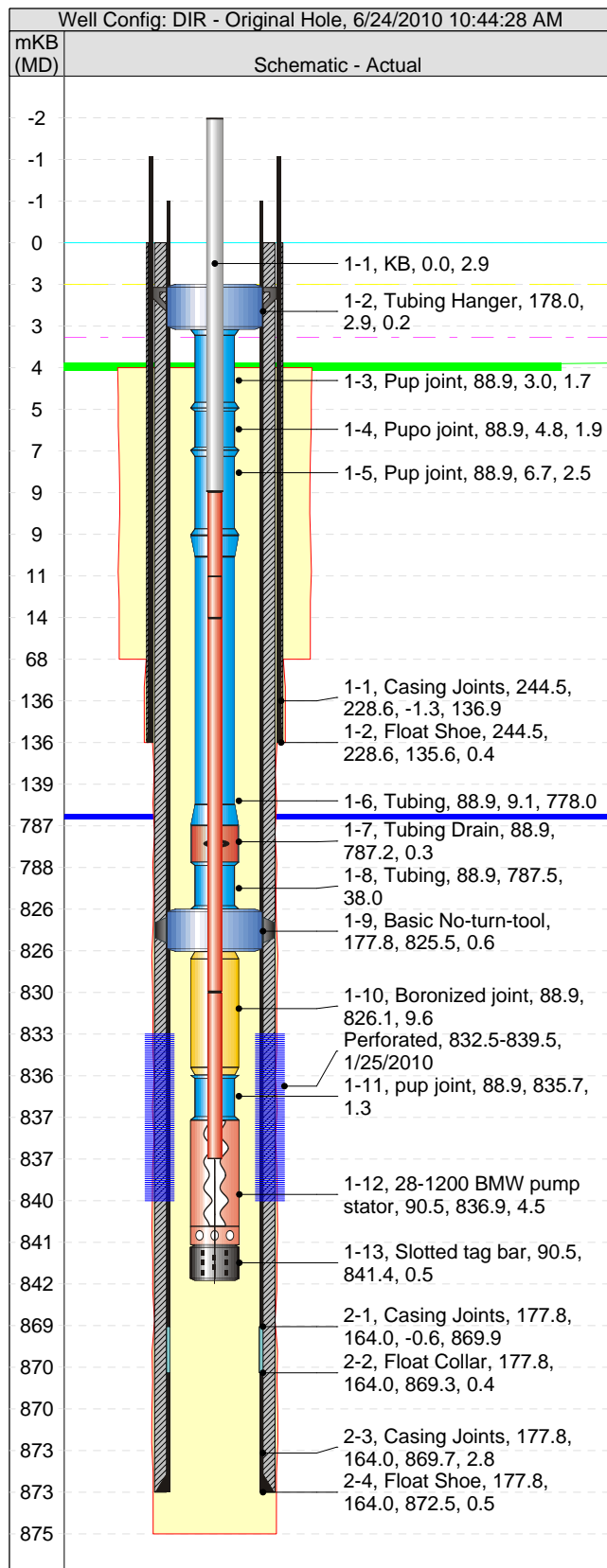
Rod on 2/13/2010 11:00

Rod Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
Rod	25.4	4.316	D	792.00

Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1	1	Polished Rod	31.7	10.97	-1.89	9.08
1-2	1	Pony Rod	25.4	0.60	9.08	9.68
1-3	1	Sucker Rod	25.4	3.10	9.68	12.78
1-4	100	Sucker Rod	25.4	767.00	12.78	779.78
1-5	1	Sucker Rod	25.4	7.62	779.78	787.40
1-6	1	PCP Rotor		4.60	787.40	792.00

Well Name: PENGROWTH 16C PROVOST 16-12-37-1

Btm Hole UWI 102/16-12-037-01W4/0	Surface Legal Location 15-12-037-01 W4M	License No. 0415630	Well Configuration Type DIR	Field Name Provost	State/Province Alberta
KB Elevation (m) 686.00	Ground Elevation (m) 682.41	KB-CF (m) 3.14	KB - THF (m) 2.89	Total Depth (mKB) 875.00	Spud Date 12/1/2010
					Rig Release Date 1/15/2010



PBTDs	
Date	Depth (mKB)
1/25/2010	870.00

Casing Strings				
Casing Description	OD (mm)	Wt (kg/m)	Grade	Set Depth (mKB)
Surface	244.5	48.068	H-40	136.00
Production	177.8	29.763	J-55	873.00

Cement Stages						
Description	Type	Top (mKB)	Btm (mKB)	Stroke (m)	Recip Rate (spm)	Cmnt Rtn (m³)
Production	casing	0.00	873.00	2.00		4.00
Surface	casing	0.00	136.00	1.00		3.00

Perforations			
Zone	Top (mKB)	Btm (mKB)	Current Status
Lloydminster, Original Hole	832.50	839.50	

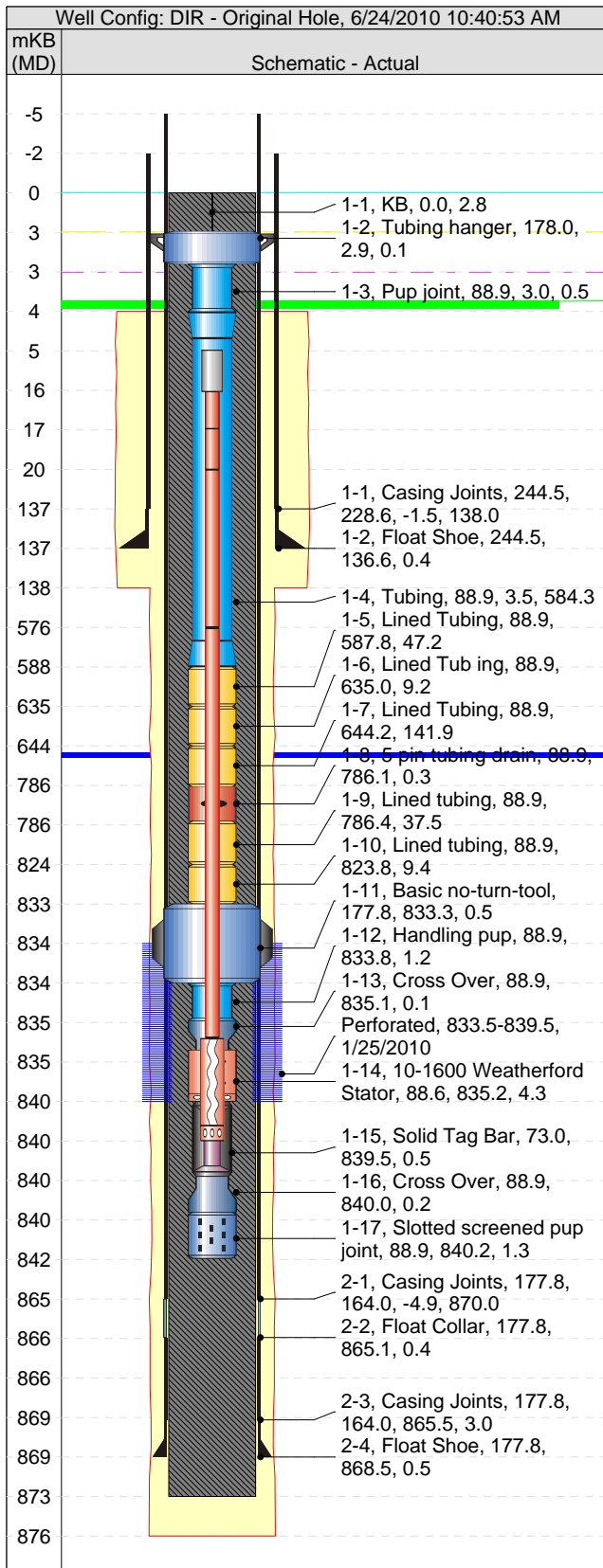
Tubing Strings				
88.9mm tubing set at 841.95mKB on 1/26/2010 12:00				
Tubing Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
88.9mm tubing	88.9	13.840	J.55	841.95
Comment				

Item No.	Jts	Item Description	OD (mm)	ID (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1	1	KB			2.89	0.00	2.89
1-2	1	Tubing Hanger	178.0		0.15	2.89	3.04
1-3	1	Pup joint	88.9		1.72	3.04	4.76
1-4	1	Pupo joint	88.9		1.90	4.76	6.66
1-5	1	Pup joint	88.9		2.48	6.66	9.14
1-6	81	Tubing	88.9		778.03	9.14	787.17
1-7	1	Tubing Drain	88.9		0.29	787.17	787.46
1-8	4	Tubing	88.9		38.02	787.46	825.48
1-9	1	Basic No-turn-tool	177.8		0.57	825.48	826.05
1-10	1	Boronized joint	88.9		9.60	826.05	835.65
1-11	1	pup joint	88.9		1.28	835.65	836.93
1-12	1	28-1200 BMW pump stator	90.5		4.51	836.93	841.44
1-13	1	Slotted tag bar	90.5		0.51	841.44	841.95

Rods						
Rod string on 2/13/2010 16:00						
Rod Description			OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
Rod string			25.4	4.316	D	842.00
Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1	1	Polished Rod	31.7	10.97	-2.01	8.96
1-2	1	Pony Rod	25.4	2.38	8.96	11.34
1-3	1	Pony Rod	25.4	3.10	11.34	14.44
1-4	107	Sucker Rods	25.4	815.34	14.44	829.78
1-5	1	Sucker Rod	25.4	7.62	829.78	837.40
1-6	1	PCP Rotor		4.60	837.40	842.00

Well Name: PENGROWTH 10C PROVOST 10-12-37-1

Btm Hole UWI 103/10-12-037-01W4/0	Surface Legal Location 15-12-037-01 W4M	License No. 0415628	Well Configuration Type DIR	Field Name Provost	State/Province Alberta
KB Elevation (m) 686.00	Ground Elevation (m) 682.54	KB-CF (m) 3.01	KB - THF (m) 2.85	Total Depth (mKB) 876.00	Spud Date 1/18/2010
			Rig Release Date 1/21/2010		



Date	Depth (mKB)
1/25/2010	866.00

Casing Strings

Casing Description	OD (mm)	Wt (kg/m)	Grade	Set Depth (mKB)
Surface	244.5	48.068	H-40	137.00
Production	177.8	29.763	J-55	869.00

Cement Stages

Description	Type	Top (mKB)	Btm (mKB)	Stroke (m)	Recip Rate (spm)	Cmnt Rtn (m³)
Surface Casing Cement		0.00	137.00	1.00		3.00
Production Casing Cement		0.00	873.00	2.00		4.50

Perforations

Zone	Top (mKB)	Btm (mKB)	Current Status
Lloydminster, Original Hole	833.50	839.50	

Tubing Strings

88.9mm tubing set at 841.46mKB on 3/25/2010 10:30

Tubing Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
88.9mm tubing	88.9	13.840	J55	841.46

Comment

Item No.	Jts	Item Description	OD (mm)	ID (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1	1	KB			2.85	0.00	2.85
1-2	1	Tubing hanger	178.0		0.13	2.85	2.98
1-3	1	Pup joint	88.9		0.54	2.98	3.52
1-4	61	Tubing	88.9		584.26	3.52	587.78
1-5	5	Lined Tubing	88.9		47.22	587.78	635.00
1-6	1	Lined Tub ing	88.9		9.24	635.00	644.24
1-7	15	Lined Tubing	88.9		141.87	644.24	786.11
1-8	1	5 pin tubing drain	88.9		0.26	786.11	786.37
1-9	4	Lined tubing	88.9		37.45	786.37	823.82
1-10	1	Lined tubing	88.9		9.44	823.82	833.26
1-11	1	Basic no-turn-tool	177.8		0.55	833.26	833.81
1-12	1	Handling pup	88.9		1.24	833.81	835.05
1-13	1	Cross Over	88.9		0.12	835.05	835.17
1-14	1	10-1600 Weatherford Stator	88.6		4.31	835.17	839.48
1-15	1	Solid Tag Bar	73.0		0.48	839.48	839.96
1-16	1	Cross Over	88.9		0.20	839.96	840.16
1-17	1	Slotted screened pup joint	88.9		1.30	840.16	841.46

Rods

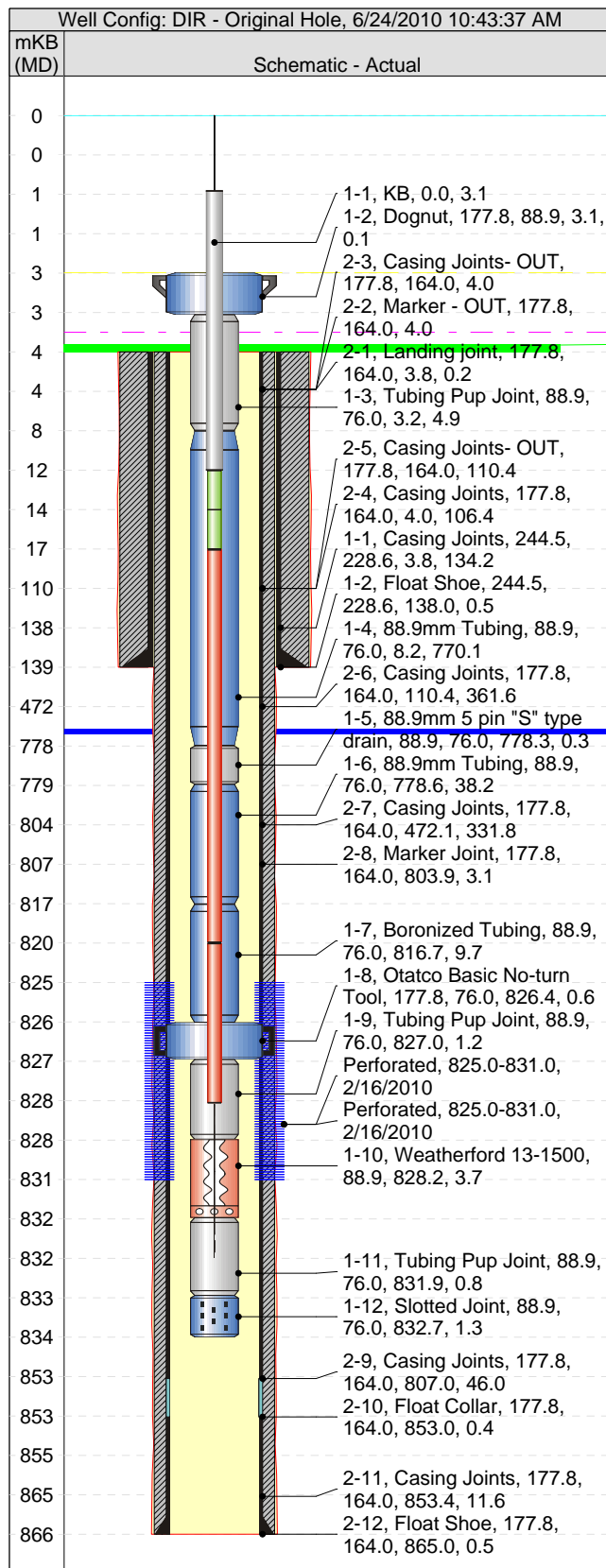
Rod on 3/25/2010 13:30

Rod Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
Rod	25.4	4.316	D	839.60

Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1	1	Polished Rod	38.1	10.97	5.17	16.14
1-2	1	pony rod	25.4	1.22	16.14	17.36
1-3	1	pony rod	25.4	2.44	17.36	19.80
1-4	73	Sucker Rod	25.4	556.26	19.80	576.06
1-5	34	Sucker Rod 1" with 7/8" pins	25.4	259.08	576.06	835.14
1-6	1	PCP Rotor Weatherford 10-1600	43.0	4.46	835.14	839.60

Well Name: PENGROWTH 16A PROVOST 16-12-37-1

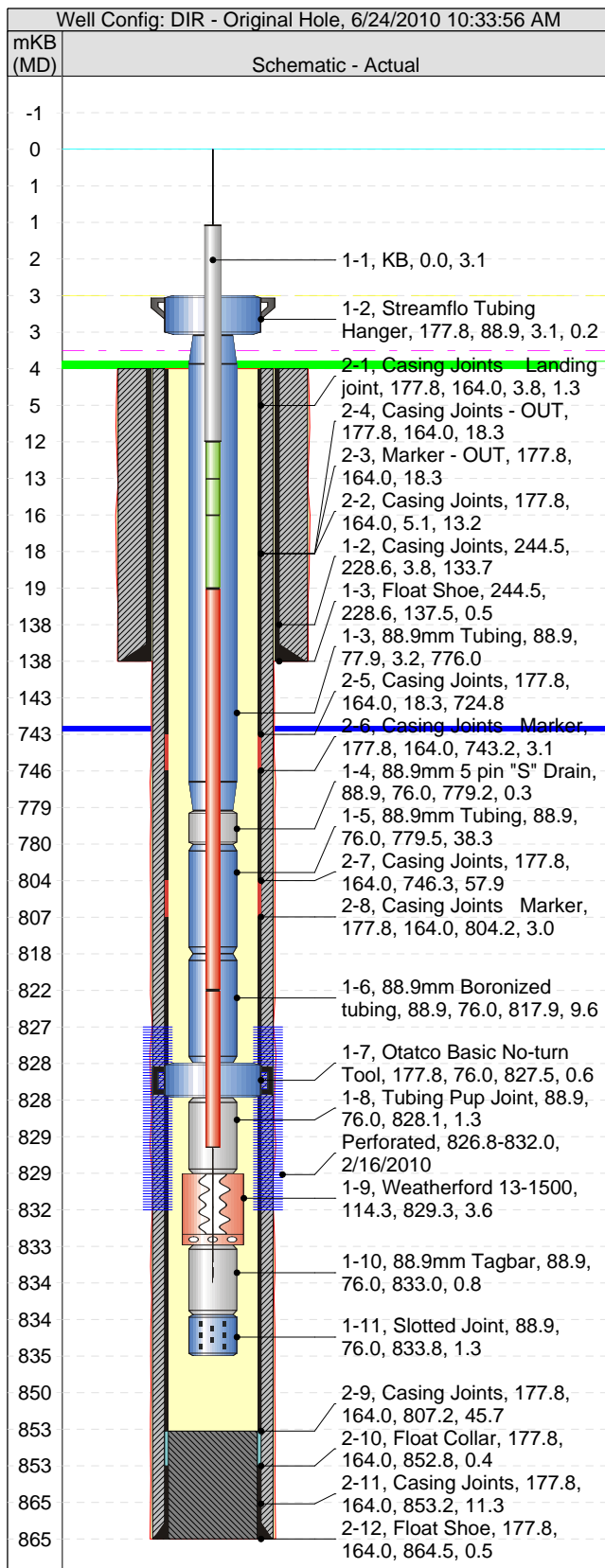
Btm Hole UWI 103/16-12-037-01W4/0	Surface Legal Location 09-12-037-01 W4M	License No. 0415632	Well Configuration Type DIR	Field Name Provost	State/Province Alberta
KB Elevation (m) 686.82	Ground Elevation (m) 683.02	KB-CF (m) 3.50	KB - THF (m) 3.09	Total Depth (mKB) 865.50	Spud Date 2/4/2010
					Rig Release Date 2/6/2010



PBTDS							
Date				Depth (mKB)			
2/16/2010				855.10			
Casing Strings							
Casing Description		OD (mm)	Wt (kg/m)	Grade	Set Depth (mKB)		
Surface		244.5	48.068	H-40	138.50		
Production		177.8	29.763	J-55	865.50		
Cement Stages							
Description	Type	Top (mKB)	Btm (mKB)	Stroke (m)	Recip Rate (spm)	Cmnt Rtrn (m³)	
Production Casing Cement	casing	3.80	865.50	3.00	3	3.00	
Surface Casing Cement	casing	3.80	138.50			4.00	
Perforations							
Zone			Top (mKB)	Btm (mKB)	Current Status		
			825.00	831.00			
Lloydminster, Original Hole			825.00	831.00			
Tubing Strings							
Production String set at 833.99mKB on 3/28/2010 12:00							
Tubing Description		OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)		
Production String		88.9	13.840	J-55	833.99		
Comment							
Item No.	Jts	Item Description	OD (mm)	ID (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1	1	KB			3.09	0.00	3.09
1-2	1	Dognut	177.8	88.9	0.14	3.09	3.23
1-3	2	Tubing Pup Joint	88.9	76.0	4.94	3.23	8.17
1-4	80	88.9mm Tubing	88.9	76.0	770.13	8.17	778.30
1-5	1	88.9mm 5 pin "S" type drain	88.9	76.0	0.29	778.30	778.59
1-6	4	88.9mm Tubing	88.9	76.0	38.15	778.59	816.74
1-7	1	Boronized Tubing	88.9	76.0	9.67	816.74	826.41
1-8	1	Otatco Basic No-turn Tool	177.8	76.0	0.56	826.41	826.97
1-9	1	Tubing Pup Joint	88.9	76.0	1.22	826.97	828.19
1-10	1	Weatherford 13-1500	88.9		3.68	828.19	831.87
1-11	1	Tubing Pup Joint	88.9	76.0	0.79	831.87	832.66
1-12	1	Slotted Joint	88.9	76.0	1.33	832.66	833.99
Rods							
Rod String on 3/28/2010 14:00							
Rod Description			OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)	
Rod String			25.4	4.316	D	832.00	
Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)	
1-1	1	Polished Rod	31.7	10.97	0.56	11.53	
1-2		Pony Rod	25.4	2.48	11.53	14.01	
1-3		Pony Rod	25.4	3.10	14.01	17.11	
1-4		Sucker Rod	25.4	803.00	17.11	820.11	
1-5	1	Sucker Rod	25.4	7.62	820.11	827.73	
1-6	1	Weatherford 13-1500 XXXLP Rotor		4.27	827.73	832.00	

Well Name: PENGROWTH 10A PROVOST 10-12-37-1

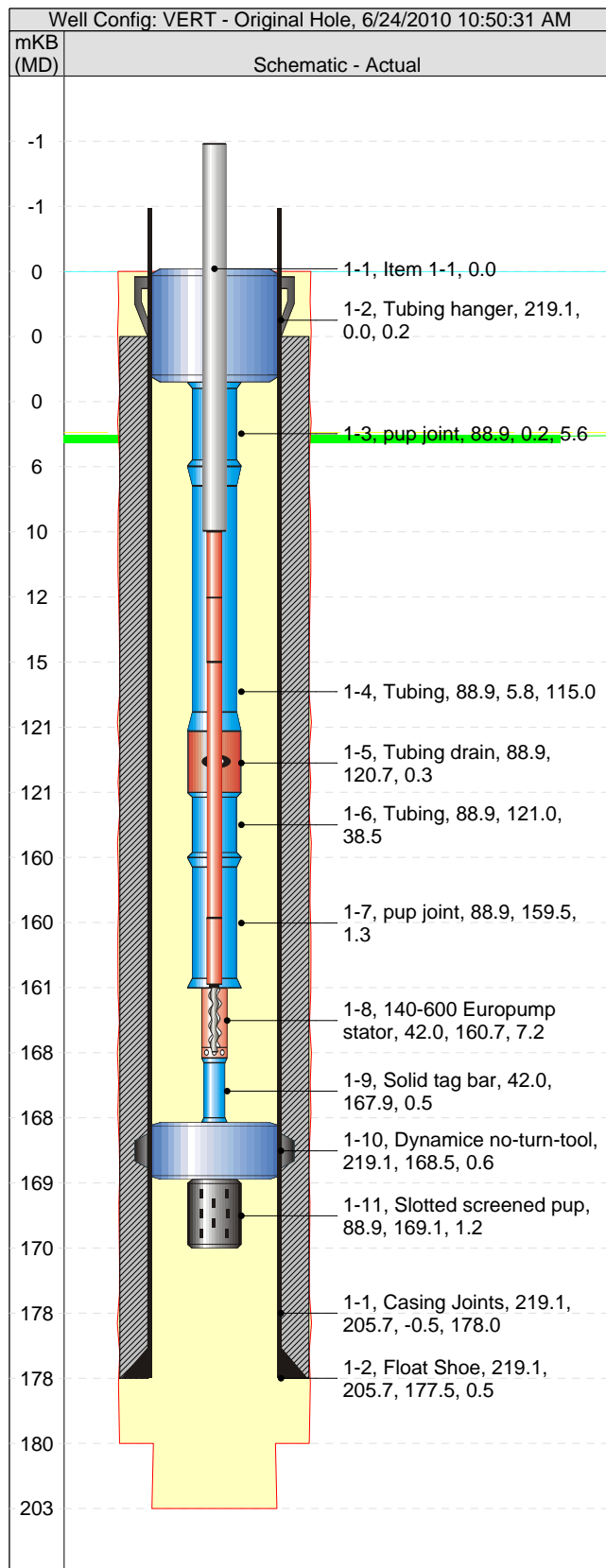
Btm Hole UWI 104/10-12-037-01W4/0	Surface Legal Location 09-12-037-01 W4M	License No. 0415631	Well Configuration Type DIR	Field Name Provost	State/Province Alberta
KB Elevation (m) 686.90	Ground Elevation (m) 683.10	KB-CF (m) 3.50	KB - THF (m) 3.09	Total Depth (mKB) 865.00	Spud Date 10/2/2010
					Rig Release Date 12/2/2010



PBTDS							
Date			Depth (mKB)				
2/12/2010			852.82				
Casing Strings							
Casing Description		OD (mm)	Wt (kg/m)	Grade	Set Depth (mKB)		
Surface		244.5	48.068	H-40	138.00		
Production		177.8	29.763	J-55	865.00		
Cement Stages							
Description	Type	Top (mKB)	Btm (mKB)	Stroke (m)	Recip Rate (spm)	Cmnt Rtrn (m³)	
Surface	casing	3.80	138.00			3.00	
Production	casing	3.80	865.00	3.00	3	3.00	
Perforations							
Zone			Top (mKB)	Btm (mKB)	Current Status		
Lloydminster, Original Hole			826.80	832.00			
Tubing Strings							
Tubing - Production set at 835.09mKB on 3/29/2010 13:00							
Tubing Description		OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)		
Tubing - Production		88.9	11.459	J-55	835.09		
Comment							
Item No.	Jts	Item Description	OD (mm)	ID (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1	1	KB			3.09	0.00	3.09
1-2	1	Streamflo Tubing Hanger	177.8	88.9	0.15	3.09	3.24
1-3	81	88.9mm Tubing	88.9	77.9	775.99	3.24	779.23
1-4	1	88.9mm 5 pin "S" Drain	88.9	76.0	0.29	779.23	779.52
1-5	4	88.9mm Tubing	88.9	76.0	38.33	779.52	817.85
1-6	1	88.9mm Boronized tubing	88.9	76.0	9.64	817.85	827.49
1-7	1	Otatco Basic No-turn Tool	177.8	76.0	0.57	827.49	828.06
1-8	1	Tubing Pup Joint	88.9	76.0	1.27	828.06	829.33
1-9	1	Weatherford 13-1500	114.3		3.63	829.33	832.96
1-10	1	88.9mm Tagbar	88.9	76.0	0.80	832.96	833.76
1-11	1	Slotted Joint	88.9	76.0	1.33	833.76	835.09
Rods							
Rod string on 3/29/2010 14:30							
Rod Description			OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)	
Rod string			25.4	4.316	D	833.50	
Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)	
1-1		Polished Rod	31.7	10.97	1.22	12.19	
1-2		Pony Rod	25.4	1.24	12.19	13.43	
1-3		Pony Rod	25.4	2.48	13.43	15.91	
1-4		Pony Rod	25.4	3.10	15.91	19.01	
1-5	106	Sucker Rod	25.4	802.60	19.01	821.61	
1-6	1	25.4mm "EL" Rod	25.4	7.62	821.61	829.23	
1-7	1	Weatherford 13-1500 XXXLP Rotor		4.27	829.23	833.50	

Well Name: PENGROWTH WWC3 PROVOST 9-12-37-1

Btm Hole UWI 1F1/09-12-037-01W4/0	Surface Legal Location 09-12-037-01 W4M	License No. 0415673	Well Configuration Type VERT	Field Name Provost	State/Province Alberta
KB Elevation (m) 689.87	Ground Elevation (m) 686.10	KB-CF (m)	KB - THF (m) 2.86	Total Depth (mKB) 203.00	Spud Date 1/26/2010
					Rig Release Date 1/20/2010



PBTDS						
Date			Depth (mKB)			
Casing Strings						
Casing Description	OD (mm)	Wt (kg/m)	Grade	Set Depth (mKB)		
Surface	219.1	35.716	J-55	178.00		
Cement Stages						
Description	Type	Top (mKB)	Btm (mKB)	Stroke (m)	Recip Rate (spm)	Cmnt Rtn (m³)
Surface Casing Cement	casing	0.10	178.00	1.50	3	3.00
Tubing Strings						
Stator set at 170.25mKB on 1/2/2010 08:00						
Tubing Description	OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)		
Stator	88.9	13.840	J55	170.25		
Comment						
Item No.	Jts	Item Description	OD (mm)	ID (mm)	Len (m)	Top (mKB)
1-1	1				0.00	-0.02
1-2	1	Tubing hanger	219.1		0.19	-0.02
1-3	2	pup joint	88.9		5.58	0.17
1-4	12	Tubing	88.9		114.97	5.75
1-5	1	Tubing drain	88.9		0.29	120.72
1-6	4	Tubing	88.9		38.46	121.01
1-7	1	pup joint	88.9		1.27	159.47
1-8	1	140-600 Europump stator	42.0		7.20	160.74
1-9	1	Solid tag bar	42.0		0.51	167.94
1-10	1	Dynamice no-turn-tool	219.1		0.61	168.45
1-11	1	Slotted screened pup	88.9		1.19	169.06
Rods						
Rotor on 2/1/2010 15:00						
Rod Description			OD (mm)	Wt (kg/m)	String Grade	Set Depth (mKB)
Rotor			25.4	4.316	D	167.87
Item No.	Jts	Item Description	OD (mm)	Len (m)	Top (mKB)	Btm (mKB)
1-1		Polished Rod	38.1	10.97	-1.18	9.79
1-2		Sucker Rod	25.4	2.44	9.79	12.23
1-3		Sucker Rod	25.4	3.05	12.23	15.28
1-4		Sucker Rod	25.4	144.78	15.28	160.06
1-5		Sucker Rod	25.4	0.61	160.06	160.67
1-6		PCP Rotor	16.0	7.20	160.67	167.87

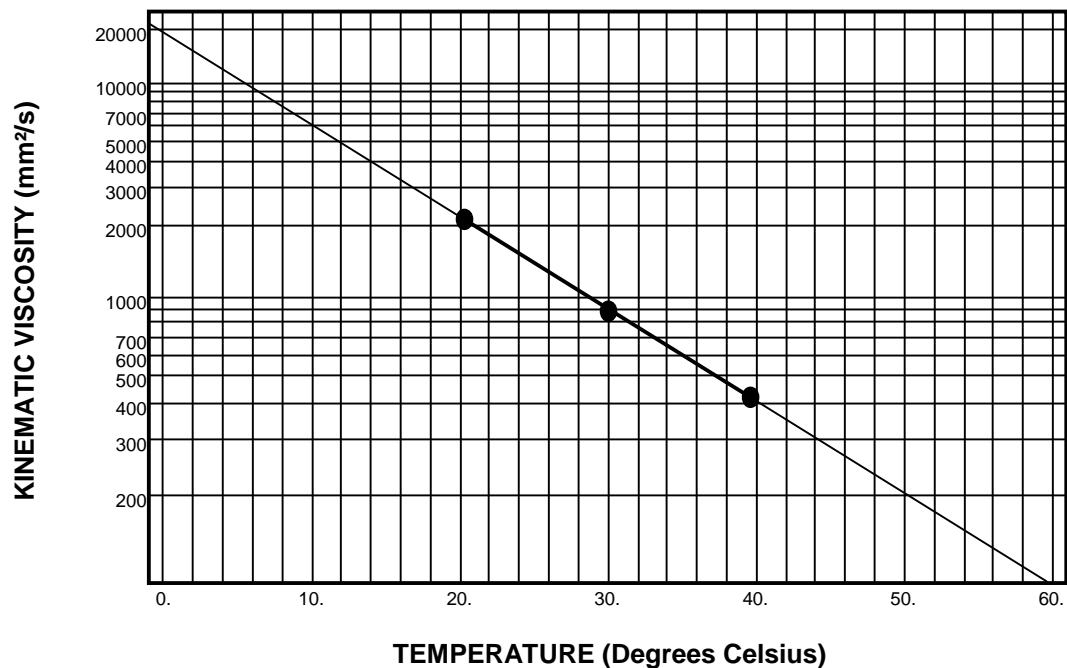
APPENDIX D

OIL ANALYSIS



Company Name: Pengrowth Corporation
Well Name: Pengrowth 10D Provost 10-12-37-1
Location: 102/10-12-037-01W4/00
Sampled From: Wellhead Tubing
Sampling Date: 2010 01 15

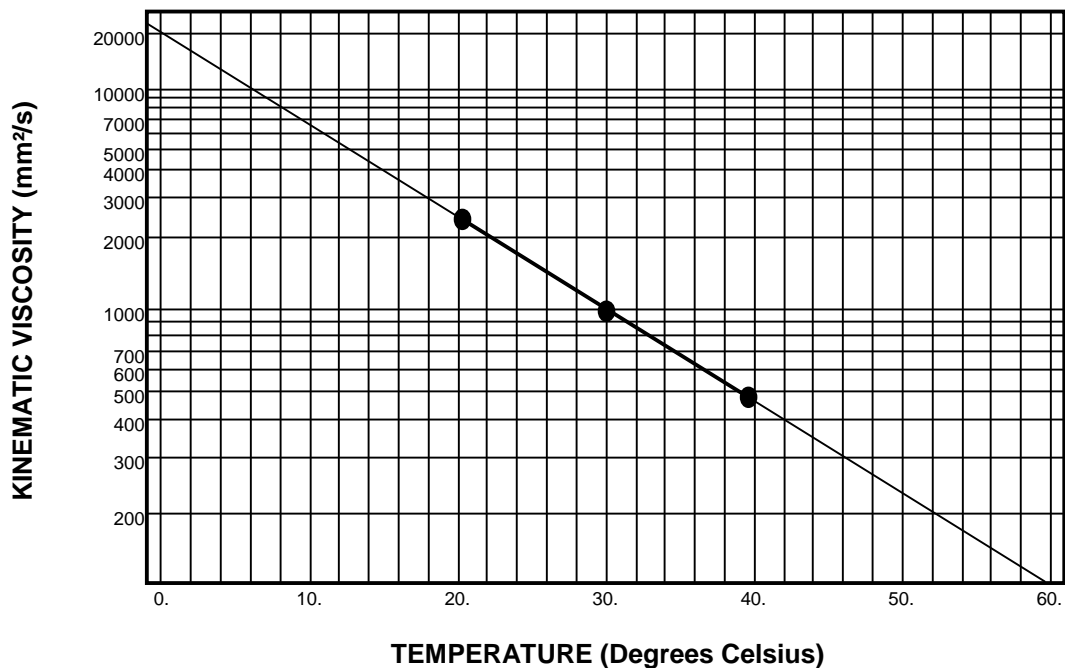
VISCOSITY - TEMPERATURE CHART





Company Name: Pengrowth Corporation
Well Name: Pengrowth 16C Provo 16-12-37-1
Location: 102/16-12-037-01W4/00
Sampled From: Wellhead at 15-12
Sampling Date: 2010 08 22

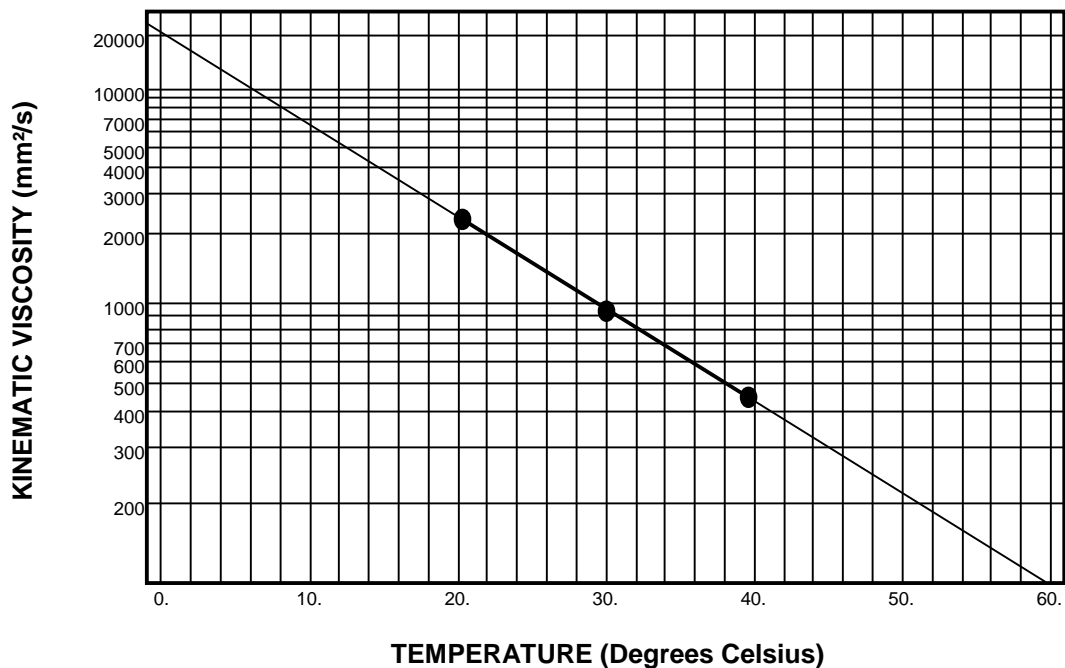
VISCOSITY - TEMPERATURE CHART





Company Name: Pengrowth Corporation
Well Name: Pengrowth 10C Provo 10-12-37-1
Location: 103/10-12-037-01W4/00
Sampled From: Wellhead at 15-12
Sampling Date: 2010 08 22

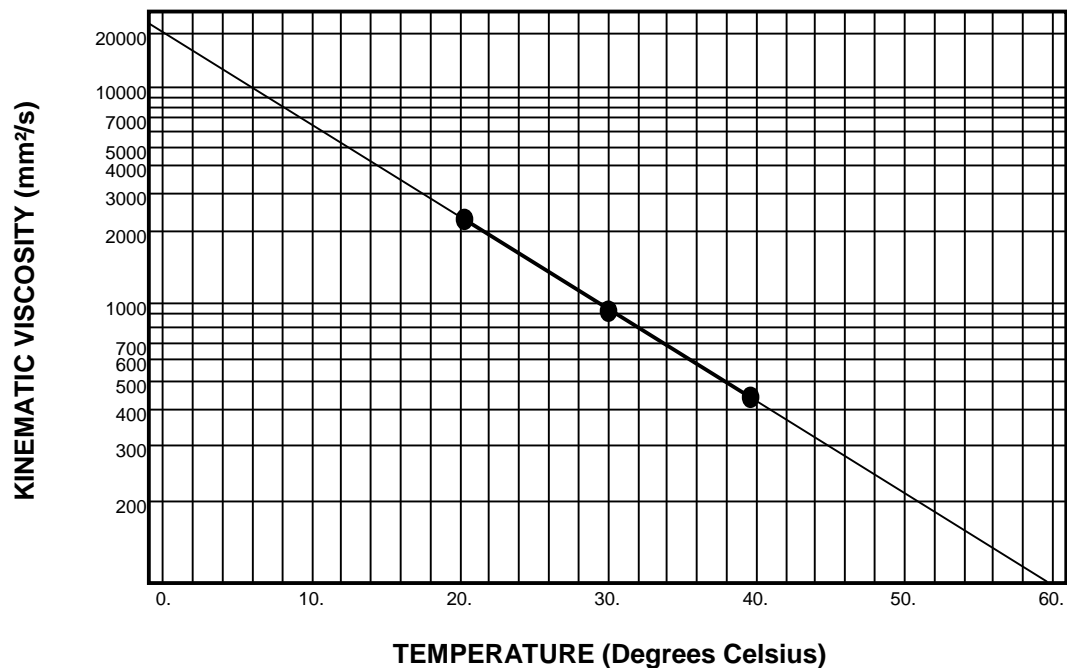
VISCOSITY - TEMPERATURE CHART





Company Name: Pengrowth Corporation
Well Name: Pengrowth 16A Provo 16-12-37-1
Location: 103/16-12-037-01W4/00
Sampled From: Wellhead at 9-12
Sampling Date: 2010 08 22

VISCOSITY - TEMPERATURE CHART





WATER ANALYSIS

498 - 1

CONTAINER IDENTITY

METER ID

WELL LICENSE NUMBER

52136-2010-0781

LABORATORY FILE NUMBER

Pengrowth Corporation

OPERATOR

1

PAGE

09-14-037-01W4

LOCATION (UWI)

Pengrowth Provost 9-14 Battery

WELL NAME

KB ELEV (m)

GR ELEV (m)

Provost

FIELD OR AREA

POOL OR ZONE

Pengrowth

SAMPLER

TEST TYPE AND NO.

TEST RECOVERY

Injection Water

POINT OF SAMPLE

SAMPLE POINT ID

PUMPING

FLOWING

GAS LIFT

SWAB

WATER

m³/d

OIL

m³/d

GAS

m³/d

TEST INTERVAL or PERFS (meters)

SEPARATOR

RESERVOIR

OTHER

@ °C

CONTAINER
WHEN SAMPLED

@ °C

CONTAINER
WHEN RECEIVED

SEPARATOR

OTHER

Pressures, kPa (gauge)

Temperatures, °C

2010 06 17

DATE SAMPLED (Y/M/D)

2010 06 18

DATE RECEIVED (Y/M/D)

2010 06 18

DATE ANALYZED (Y/M/D)

ML

ANALYST

AMT. AND TYPE CUSHION

@ °C

MUD RESISTIVITY

CATIONS

ION	mg/L	mg Fraction	meq/L
Na			
K			
Ca			
Mg			
Ba			
Sr			
Fe			
Mn			

ANIONS

ION	mg/L	mg Fraction	meq/L
Cl			
Br			
I			
HCO ₃			
SO ₄			
CO ₃			
OH			
H ₂ S			

Total Dissolved Solids

(mg/L)

Not Requested

By Evaporation @ 110 °C

Not Requested

By Evaporation @ 180 °C

0

Calculated

@ 15.6 °C

Specific Gravity

@ °C

Refractive Index (n_D)

@ 25.0 °C

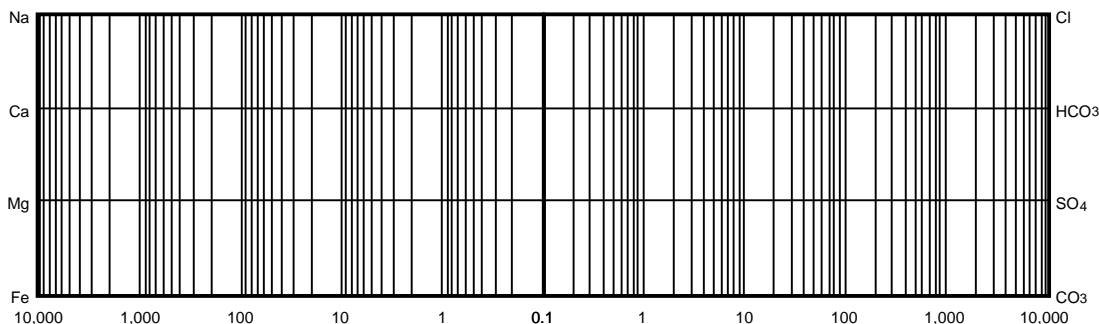
pH

@ 25 °C

Resistivity (Ohm-Meters)

LOGARITHMIC PATTERNS OF DISSOLVED IONS

meq/L



REMARKS: Oil & Grease Content (mg/L) = 25.9

Report Transmission Cover Page

Bill To: Hydrogeological Consultants	Project:	Lot ID: 725668
Report To: Hydrogeological Consultants	ID: 09-990	Control Number: Z-624763
17740 - 118 Avenue	Name: License a Groundwater Supply	Date Received: Feb 9, 2010
Edmonton, AB, Canada	Location: 10-12-37-1 W4M	Date Reported: Feb 17, 2010
T5S 2W3	LSD: 9-12-37-1 W4M	Report Number: 1296244
Attn: Tara Parker	P.O.: 13529	
Sampled By:	Acct code:	
Company: Mow Tech Ltd.		

Contact & Affiliation	Address	Delivery Commitments
Tara Parker HCL	17740 - 118 Avenue Edmonton, Alberta T5S 2W3 Phone: (780) 702-6242 Fax: (780) 484-9413 Email: tara@hcl.ca	On [Lot Verification] send (COA) by Email - Multiple Reports On [Report Approval] send (COC, Test Report) by Email - Multiple Reports On [Report Approval] send (Test Report) by Email - Multiple Reports On [Report Approval] send (Test Report, COC) by Email - Multiple Reports On [Report Approval] send (Test Report) by Email - Multiple Reports
Sonja Boyko HCL	17740 - 118 Avenue Edmonton, Alberta T5S 2W3 Phone: (780) 702-6221 Fax: (780) 484-9413 Email: sonja@hcl.ca	On [Lot Approval and Final Test Report Approval] send (Invoice) by Email - Multiple Reports

Notes To Clients:

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Sample Custody

Bill To: Hydrogeological Consultants	Project:	Lot ID: 725668
Report To: Hydrogeological Consultants	ID: 09-990	Control Number: Z-624763
17740 - 118 Avenue	Name: License a Groundwater Supply	Date Received: Feb 9, 2010
Edmonton, AB, Canada	Location: 10-12-37-1 W4M	Date Reported: Feb 17, 2010
T5S 2W3	LSD: 9-12-37-1 W4M	Report Number: 1296244
Attn: Tara Parker	P.O.: 13529	
Sampled By:	Acct code:	
Company: Mow Tech Ltd.		

Sample Disposal Date: March 13, 2010

All samples will be stored until this date unless other instructions are received. Please indicate other requirements below and return this form to the address or fax number on the top of this page.

☐ Extend Sample Storage Until _____ (MM/DD/YY)

The following charges apply to extended sample storage:

Storage for an additional 30 days	\$ 2.50 per sample
Storage for an additional 60 days	\$ 5.00 per sample
Storage for an additional 90 days	\$ 7.50 per sample

☐ Return Sample, collect, to the address below via:

☐ Greyhound

☐ DHL

☐ Purolator

☐ Other (specify) _____

Name _____

Company _____

Address _____

Phone _____

Fax _____

Signature _____

Analytical Report

Bill To: Hydrogeological Consultants
Report To: Hydrogeological Consultants
17740 - 118 Avenue
Edmonton, AB, Canada
T5S 2W3
Attn: Tara Parker
Sampled By:
Company: Mow Tech Ltd.

Project:
ID: 09-990
Name: License a Groundwater Supply
Location: 10-12-37-1 W4M
LSD: 9-12-37-1 W4M
P.O.: 13529
Acct code:

Lot ID: **725668**
Control Number: Z-624763
Date Received: Feb 9, 2010
Date Reported: Feb 17, 2010
Report Number: 1296244

Reference Number 725668-1
Sample Date Feb 03, 2010
Sample Time 13:53
Sample Location
Sample Description M40211.430104 (09-
12 WSW)
Matrix Water

Analyte		Units	Results	Results	Results	Nominal Detection Limit
Physical and Aggregate Properties						
Colour	Apparent, Potable	Colour units	12			5
Turbidity		NTU	1.2			0.1
Routine Water						
pH			8.26			
Temperature of observed		°C	21.3			
pH						
Electrical Conductivity		µS/cm at 25 C	6160			1
Calcium	Extractable	mg/L	22			0.2
Magnesium	Extractable	mg/L	5.8			0.2
Sodium	Extractable	mg/L	1360			0.4
Potassium	Extractable	mg/L	5			0.4
Iron	Extractable	mg/L	0.21			0.01
Manganese	Extractable	mg/L	<0.02			0.005
Chloride	Dissolved	mg/L	2010			0.4
Fluoride		mg/L	<0.5			0.05
Nitrate - N		mg/L	<0.1			0.01
Nitrite - N		mg/L	<0.05			0.005
Nitrate and Nitrite - N		mg/L	<0.1			0.01
Sulfate (SO ₄)		mg/L	<4			0.9
Hydroxide		mg/L	<5			5
Carbonate		mg/L	<6			6
Bicarbonate		mg/L	371			5
P-Alkalinity	as CaCO ₃	mg/L	<5			5
T-Alkalinity	as CaCO ₃	mg/L	304			5
Total Dissolved Solids		mg/L	3590			1
Hardness	as CaCO ₃	mg/L	79			
Ionic Balance		%	97			

Analytical Report

Bill To: Hydrogeological Consultants
Report To: Hydrogeological Consultants
17740 - 118 Avenue
Edmonton, AB, Canada
T5S 2W3
Attn: Tara Parker
Sampled By:
Company: Mow Tech Ltd.

Project:
ID: 09-990
Name: License a Groundwater Supply
Location: 10-12-37-1 W4M
LSD: 9-12-37-1 W4M
P.O.: 13529
Acct code:

Lot ID: **725668**
Control Number: Z-624763
Date Received: Feb 9, 2010
Date Reported: Feb 17, 2010
Report Number: 1296244

Reference Number 725668-2
Sample Date Feb 03, 2010
Sample Time 13:53
Sample Location
Sample Description M40211.430104 (09-
12 WSW)
Matrix Gases

Analyte	Units	Results	Results	Results	Nominal Detection Limit
Gas Analysis - Not Air Corrected					
Helium	Not air corrected	Mole %	<0.01		0.01
Helium	Not air corrected	ppm	<100		100
Hydrogen	Not air corrected	Mole %	<0.01		0.01
Hydrogen	Not air corrected	ppm	<100		100
Carbon Dioxide	Not air corrected	Mole %	0.07		0.01
Carbon Dioxide	Not air corrected	ppm	742.00		100
Oxygen	Not air corrected	Mole %	1.34		0.01
Oxygen	Not air corrected	ppm	13410		100
Nitrogen	Not air corrected	Mole %	7.02		0.01
Nitrogen	Not air corrected	ppm	70200		100
Methane	Not air corrected	Mole %	91.55		0.01
Methane	Not air corrected	ppm	915500		100
Ethane	Not air corrected	Mole %	0.01		0.01
Ethane	Not air corrected	ppm	121		100
Propane	Not air corrected	Mole %	<0.01		0.01
Propane	Not air corrected	ppm	<100		100
Iso-Butane	Not air corrected	Mole %	<0.01		0.01
Iso-Butane	Not air corrected	ppm	<100		100
n-Butane	Not air corrected	Mole %	<0.01		0.01
n-Butane	Not air corrected	ppm	<100		100
Iso-Pentane	Not air corrected	Mole %	<0.01		0.01
Iso-Pentane	Not air corrected	ppm	<100		100
n-Pentane	Not air corrected	Mole %	<0.01		0.01
n-Pentane	Not air corrected	ppm	<100		100
Hexanes	Not air corrected	Mole %	<0.01		0.01
Hexanes	Not air corrected	ppm	<100		100
Heptanes	Not air corrected	Mole %	<0.01		0.01
Heptanes	Not air corrected	ppm	<100		100
Octanes	Not air corrected	Mole %	<0.01		0.01
Octanes	Not air corrected	ppm	<100		100
Nonanes	Not air corrected	Mole %	<0.01		0.01
Nonanes	Not air corrected	ppm	<100		100
Decanes +	Not air corrected	Mole %	<0.01		0.01
Hydrogen Sulfide	As Received	ppm	<0.1		0.1

Analytical Report

Bill To: Hydrogeological Consultants
Report To: Hydrogeological Consultants
17740 - 118 Avenue
Edmonton, AB, Canada
T5S 2W3
Attn: Tara Parker
Sampled By:
Company: Mow Tech Ltd.

Project:
ID: 09-990
Name: License a Groundwater Supply
Location: 10-12-37-1 W4M
LSD: 9-12-37-1 W4M
P.O.: 13529
Acct code:

Lot ID: **725668**
Control Number: Z-624763
Date Received: Feb 9, 2010
Date Reported: Feb 17, 2010
Report Number: 1296244

Approved by:



Darren Crichton, BSc, PChem
Operations Chemist

Analytical Report

Bill To: Hydrogeological Consultants	Project:	Lot ID: 725668
Report To: Hydrogeological Consultants	ID: 09-990	Control Number: Z-624763
17740 - 118 Avenue	Name: License a Groundwater Supply	Date Received: Feb 9, 2010
Edmonton, AB, Canada	Location: 10-12-37-1 W4M	Date Reported: Feb 17, 2010
T5S 2W3	LSD: 9-12-37-1 W4M	Report Number: 1296244
Attn: Tara Parker	P.O.: 13529	
Sampled By:	Acct code:	
Company: Mow Tech Ltd.		

Reference Number	725668-1
Sample Date	February 03, 2010
Sample Time	13:53
Sample Location	
Sample Description	M40211.430104 (09-12 WSW)
Sample Matrix	Water

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Physical and Aggregate Properties						
Colour	Apparent, Potable	Colour units	12	5	15	Below AO
Turbidity		NTU	1.2	0.1	0.1	Above OG
Routine Water						
pH			8.26		6.5 - 8.5	Within AO
Temperature of observed		°C	21.3			
pH						
Electrical Conductivity		µS/cm at 25 C	6160	1		
Calcium	Extractable	mg/L	22	0.2		
Magnesium	Extractable	mg/L	5.8	0.2		
Sodium	Extractable	mg/L	1360	0.4	200	Above AO
Potassium	Extractable	mg/L	5	0.4		
Iron	Extractable	mg/L	0.21	0.01	0.3	Below AO
Manganese	Extractable	mg/L	<0.02	0.005	0.05	Below AO
Chloride	Dissolved	mg/L	2010	0.4	250	Above AO
Fluoride		mg/L	<0.5	0.05	1.5	Below MAC
Nitrate - N		mg/L	<0.1	0.01	10	Below MAC
Nitrite - N		mg/L	<0.05	0.005	1	Below MAC
Nitrate and Nitrite - N		mg/L	<0.1	0.01	10	Below MAC
Sulfate (SO4)		mg/L	<4	0.9	500	Below AO
Hydroxide		mg/L	<5	5		
Carbonate		mg/L	<6	6		
Bicarbonate		mg/L	371	5		
P-Alkalinity	as CaCO3	mg/L	<5	5		
T-Alkalinity	as CaCO3	mg/L	304	5		
Total Dissolved Solids		mg/L	3590	1		
Hardness	as CaCO3	mg/L	79			
Ionic Balance		%	97			

Analytical Report

Bill To: Hydrogeological Consultants	Project:	Lot ID: 725668
Report To: Hydrogeological Consultants	ID: 09-990	Control Number: Z-624763
17740 - 118 Avenue	Name: License a Groundwater Supply	Date Received: Feb 9, 2010
Edmonton, AB, Canada	Location: 10-12-37-1 W4M	Date Reported: Feb 17, 2010
T5S 2W3	LSD: 9-12-37-1 W4M	Report Number: 1296244
Attn: Tara Parker	P.O.: 13529	
Sampled By:	Acct code:	
Company: Mow Tech Ltd.		

Reference Number	725668-2
Sample Date	February 03, 2010
Sample Time	13:53
Sample Location	
Sample Description	M40211.430104 (09-12 WSW)
Sample Matrix	Gases

Analyte		Units	Result	Nominal Detection Limit	Guideline Limit	Guideline Comments
Gas Analysis - Not Air Corrected						
Helium	Not air corrected	Mole %	<0.01	0.01		
Helium	Not air corrected	ppm	<100	100		
Hydrogen	Not air corrected	Mole %	<0.01	0.01		
Hydrogen	Not air corrected	ppm	<100	100		
Carbon Dioxide	Not air corrected	Mole %	0.07	0.01		
Carbon Dioxide	Not air corrected	ppm	742.00	100		
Oxygen	Not air corrected	Mole %	1.34	0.01		
Oxygen	Not air corrected	ppm	13410	100		
Nitrogen	Not air corrected	Mole %	7.02	0.01		
Nitrogen	Not air corrected	ppm	70200	100		
Methane	Not air corrected	Mole %	91.55	0.01		
Methane	Not air corrected	ppm	915500	100		
Ethane	Not air corrected	Mole %	0.01	0.01		
Ethane	Not air corrected	ppm	121	100		
Propane	Not air corrected	Mole %	<0.01	0.01		
Propane	Not air corrected	ppm	<100	100		
Iso-Butane	Not air corrected	Mole %	<0.01	0.01		
Iso-Butane	Not air corrected	ppm	<100	100		
n-Butane	Not air corrected	Mole %	<0.01	0.01		
n-Butane	Not air corrected	ppm	<100	100		
Iso-Pentane	Not air corrected	Mole %	<0.01	0.01		
Iso-Pentane	Not air corrected	ppm	<100	100		
n-Pentane	Not air corrected	Mole %	<0.01	0.01		
n-Pentane	Not air corrected	ppm	<100	100		
Hexanes	Not air corrected	Mole %	<0.01	0.01		
Hexanes	Not air corrected	ppm	<100	100		
Heptanes	Not air corrected	Mole %	<0.01	0.01		
Heptanes	Not air corrected	ppm	<100	100		
Octanes	Not air corrected	Mole %	<0.01	0.01		
Octanes	Not air corrected	ppm	<100	100		
Nonanes	Not air corrected	Mole %	<0.01	0.01		
Nonanes	Not air corrected	ppm	<100	100		
Decanes +	Not air corrected	Mole %	<0.01	0.01		
Hydrogen Sulfide	As Received	ppm	<0.1	0.1		

Analytical Report

Bill To: Hydrogeological Consultants
Report To: Hydrogeological Consultants
17740 - 118 Avenue
Edmonton, AB, Canada
T5S 2W3
Attn: Tara Parker
Sampled By:
Company: Mow Tech Ltd.

Project:
ID: 09-990
Name: License a Groundwater Supply
Location: 10-12-37-1 W4M
LSD: 9-12-37-1 W4M
P.O.: 13529
Acct code:

Lot ID: **725668**
Control Number: Z-624763
Date Received: Feb 9, 2010
Date Reported: Feb 17, 2010
Report Number: 1296244

Approved by:



Darren Crichton, BSc, PChem
Operations Chemist

Methodology and Notes

Bill To: Hydrogeological Consultants	Project:	Lot ID: 725668
Report To: Hydrogeological Consultants	ID: 09-990	Control Number: Z-624763
17740 - 118 Avenue	Name: License a Groundwater Supply	Date Received: Feb 9, 2010
Edmonton, AB, Canada	Location: 10-12-37-1 W4M	Date Reported: Feb 17, 2010
T5S 2W3	LSD: 9-12-37-1 W4M	Report Number: 1296244
Attn: Tara Parker	P.O.: 13529	
Sampled By:	Acct code:	
Company: Mow Tech Ltd.		

Method of Analysis

Method Name	Reference	Method	Date Analysis Started	Location
Alkalinity, pH, and EC in water	APHA	* Alkalinity - Titration Method, 2320 B	10-Feb-10	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* Conductivity, 2510	10-Feb-10	Exova Edmonton
Alkalinity, pH, and EC in water	APHA	* pH - Electrometric Method, 4500-H+ B	10-Feb-10	Exova Edmonton
Anions (Routine) by Ion Chromatography	APHA	* Ion Chromatography with Chemical Suppression of Eluent Cond., 4110 B	10-Feb-10	Exova Edmonton
Approval-Edmonton	APHA	Checking Correctness of Analyses, 1030 E	10-Feb-10	Exova Edmonton
Chloride in Water	APHA	* Automated Ferricyanide Method, 4500-Cl- E	10-Feb-10	Exova Edmonton
Colour (Apparent) in water	APHA	* Visual Comparison Method, 2120 B	10-Feb-10	Exova Edmonton
Metals Trace (Extractable) in water	APHA	Hardness by Calculation, 2340 B	10-Feb-10	Exova Edmonton
Metals Trace (Extractable) in water	APHA	* Inductively Coupled Plasma (ICP) Method, 3120 B	10-Feb-10	Exova Edmonton
Natural Gas - C7/10 Composition	GPA	* Analysis for Natural Gas and Similar Gaseous Mixtures by Gas Chromatography, GPA 2261-00	11-Feb-10	Exova Edmonton
Total Reduced Sulfur Analysis of Natural Gas	ASTM	* Standard Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence, D 5504-08	16-Feb-10	Exova Edmonton
Turbidity in Water	APHA	* Turbidity - Nephelometric Method, 2130 B	10-Feb-10	Exova Edmonton

* Reference Method Modified

References

APHA	Standard Methods for the Examination of Water and Wastewater
ASTM	Annual Book of ASTM Standards
GPA	Gas Processors Association

Guidelines

Guideline Description	Health Canada GCDWQ
Guideline Source	Guidelines for Canadian Drinking Water Quality, Health Canada, May 2008
Guideline Comments	MAC = Maximum Acceptable Concentration AO = Aesthetic Objective OG = Operational Guideline for Water Treatment Plants Refer to Health Canada GCDWQ for complete guidelines and additional drinking water information at www.hc-sc.gc.ca

Methodology and Notes

Bill To:	Hydrogeological Consultants	Project:		Lot ID:	725668
Report To:	Hydrogeological Consultants	ID:	09-990	Control Number:	Z-624763
	17740 - 118 Avenue	Name:	License a Groundwater Supply	Date Received:	Feb 9, 2010
	Edmonton, AB, Canada	Location:	10-12-37-1 W4M	Date Reported:	Feb 17, 2010
	T5S 2W3	LSD:	9-12-37-1 W4M	Report Number:	1296244
Attn:	Tara Parker	P.O.:	13529		
Sampled By:		Acct code:			
Company:	Mow Tech Ltd.				

Comments:

The comparison of test results to guideline limits is provided for information purposes only. This is not to be taken as a statement of conformance / nonconformance to any guideline, regulation or limit. The data user is responsible for all conclusions drawn with respect to the data and is advised to consult official regulatory references when evaluating compliance.

Please direct any inquiries regarding this report to our Client Services group.

Results relate only to samples as submitted.

The test report shall not be reproduced except in full, without the written approval of the laboratory.

SNF, Incorporated
P.O. Box 250 . Riceboro, GA 31323 . (912) 884-3366

PENGROWTH CORPORATION
Attention: Regulatory Affairs Department
2100,222 THIRD AVENUE SW
ATTN: KEN BAIJOO

10/21/2011

CALGARY, AB T2P 0

Dear Sir or Madam:

Please find enclosed the Material Safety Data Sheet(s) in 16 points, complying with the OSHA standard, for the product(s) listed below. Please give a copy of each Material Safety Data Sheet to your Occupational Physician and to any third-party to whom the product(s) may be retroceded.

Sincerely,

Ruben Westin

Product Name

SUPERPUSHER C 319



Material Safety Data Sheet

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY

Product name : **Superpusher C 319**

Company : SNF Inc.
1 Chemical Plant Road
Riceboro, GA 31323
United States

Telephone : 912-884-3366
Telefax : 912-880-2330
E-mail : info@snfhc.com

Emergency telephone number : 800-424-9300 CHEMTREC (CCN 20412), Outside U.S. 703-527-3887

Product Use : Processing aid for industrial applications.

2. HAZARDS IDENTIFICATION

Appearance and Odor

Form : Granular solid
Color : White
Odor : None

Emergency Overview :

Aqueous solutions or powders that become wet render surfaces extremely slippery.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Identification : Anionic water-soluble polymer.

Regulated Components

None.

4. FIRST AID MEASURES

Inhalation : No hazards which require special first aid measures.

Skin contact : Wash with water and soap as a precaution. In case of persistent skin irritation, consult a physician.

Eye contact : Rinse thoroughly with plenty of water, also under the eyelids. In case of persistent eye irritation, consult a physician.

Ingestion : The product is not considered toxic based on studies on laboratory animals.

5. FIRE-FIGHTING MEASURES

Unsuitable extinguishing media : None.

Suitable extinguishing media : Foam. Dry powder. Water. Water spray. Carbon dioxide (CO₂).

Precautions : Aqueous solutions or powders that become wet render surfaces extremely slippery.

Special protective equipment for firefighters : No special protective equipment required.

Flash point : Not applicable.

Autoignition temperature (°C): Not applicable.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions : No special precautions required.

Environmental precautions : As with all chemical products, do not flush into surface water.

Methods for cleaning up : Do not flush with water Clean up promptly by sweeping or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

7. HANDLING AND STORAGE

Handling

Safe handling advice : Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Wash hands before breaks and at the end of workday.

Storage

Keep in a cool, dry place (0 - 35 °C).

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Occupational Exposure Limits

No exposure limits noted for ingredient(s).

Engineering measures

Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

Personal protective equipment

Respiratory protection : Dust safety masks are recommended where concentration of total dust is more than 10 mg/m³.

Hand protection : Rubber gloves.

Eye protection : Safety glasses with side-shields. Do not wear contact lenses where this product is used.

Skin and body protection : Chemical resistant apron or protective suit if splashing or repeated contact with solution is likely.

Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

9. PHYSICAL AND CHEMICAL PROPERTIES

Form : Granular solid

Color : White

Odor : None

Melting point/range : Not applicable

Flash point : Not applicable

Autoignition temperature (°C): Not applicable

Approx. bulk density : 0.80

Water solubility : Completely miscible

LogPow : ~0

10. STABILITY AND REACTIVITY

Stability : Hazardous polymerisation does not occur. Stable.

Materials to avoid : Oxidizing agents may cause exothermic reactions.

Hazardous decomposition products : Thermal decomposition may produce. Nitrogen oxides (NO_x). Carbon oxides (CO_x).

11. TOXICOLOGICAL INFORMATION

Acute toxicity

Oral : LD50/oral/rat > 5000 mg/kg.

Skin : The results of testing on rabbits showed this material to be non-toxic even at high dose levels.

Inhalation : The product is not expected to be toxic by inhalation.

Irritation

Skin : The results of testing on rabbits showed this material to be non-irritating to the skin.

Eyes : Testing conducted according to the Draize technique showed the material produces no corneal or iridial effects and only slight transitory conjunctival effects similar to those which all granular materials have on conjunctivae.

Sensitization :

The results of testing on guinea pigs showed this material to be non-sensitizing.

Chronic toxicity :

A two-year feeding study on rats did not reveal adverse health effects. A one-year feeding study on dogs did not reveal adverse health effects.

12. ECOLOGICAL INFORMATION

Aquatic toxicity

Toxicity to fish : LC50/96 hours > 100 mg/l, (OECD 203), (Based on results obtained from tests on analogous products.).

Toxicity to daphnia : LC50/Daphnia m./48 hours > 100 mg/l, (OECD 202), (Based on results obtained from tests on analogous products.).

Toxicity to algae : IC50/Scenedesmus subspicatus/72 hours > 100 mg/l. (OECD 201), (Based on results obtained from tests on analogous products.).

Environmental fate

Persistence and degradability : Not readily biodegradable.

Hydrolysis : Does not hydrolyse.

LogPow : ~0

Bioaccumulation : Does not bioaccumulate.

13. DISPOSAL CONSIDERATIONS

Disposal : Dispose of in accordance with local, state and federal regulations.

Container : Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local, state and federal regulations.

14. TRANSPORT INFORMATION

DOT

Not classified as dangerous in the meaning of DOT regulations.

IMDG/IMO

Not classified as dangerous in the meaning of IMO/IMDG regulations.

ICAO/IATA

Not classified as dangerous in the meaning of ICAO/IATA regulations.

15. REGULATORY INFORMATION

US SARA Reporting Requirements:

SARA (Section 311/312) hazard class: Not concerned.

California Proposition 65 Information :

The following statement is made in order to comply with the California Safe Drinking Water and Toxic Enforcement Act of 1986. This product contains the following substance (s) known to the State of California to cause cancer : Acrylamide

International Inventories

USA (TSCA): All components of this product are either listed on the inventory or are exempt from listing.

Canada (DSL) : All components of this product are either listed on the inventory or are exempt from listing.

European Union (REACH) : All components of this product have been registered or pre-registered with the European Chemicals Agency or are exempt from registration.

Australia (AICS) : All components of this product are either listed on the inventory or are exempt from listing.

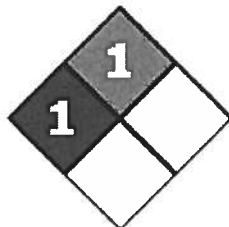
Japan (ENCS) : All components of this product are either listed on the inventory or are exempt from listing.

Korea (ECL) : All components of this product are either listed on the inventory or are exempt from listing.

Philippines (PICCS) : All components of this product are either listed on the inventory or are exempt from listing.

16. OTHER INFORMATION

NFPA and HMIS Ratings :



NFPA :

Health :	1
Flammability :	1
Instability :	0

HMIS :

Health :	1
Flammability :	1
Physical Hazard :	0

This MSDS was prepared in accordance with the following :

ISO 11014-1: Material Safety Data Sheet for Chemical Products
ANSI Z400.1-2004; Material Safety Data Sheets - Preparation

Contact : Regulatory Affairs Manager

The data in this Material Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.
This information is based upon technical information believed to be reliable. It is subject to revision as additional knowledge and experience is gained

APPENDIX E

East Bodo Sec 12 Polymer Pilot

(000's unless otherwise stated)

	6.3	6.1	6.2	6.5	6.7	6.4	6.4	6.6	6.7		
	Capital Expenditures	Sales Volume (m3)	Sales Revenue	Total Royalties	Net Revenue	Operating Expenses (Direct)	Operating Expenses (Indirect)	Annual Cash Flow	Cumulative Project Costs	Total Project Income (Loss)	Cumulative Project Income (Loss)
2010	8,957.1		0.0	0.0	0.0	0.0	0.0	0.0	8,957.1	-8,957.1	-8,957.1
2011	3,948.7	837.5	361.6	84.0	277.6	140.6	0.0	137.0	13,046.4	-3,811.7	-12,768.8
2012	385.6	2,522.3	1,060.6	187.0	873.6	160.6	0.0	713.1	13,592.6	327.4	-12,441.4
TOTAL	13,291.4	3,359.8	1,422.2	271.0	1,151.2	301.2	0.0	850.1	13,592.6	-12,441.4	-12,441.4

11878 - PROVOST UPPER MANNVILLE 'A' POOL UNIT (NET)

REVENUE	12/Oct (AV)	12/Nov (AV)	12/Dec (AV)	Total
7710 703 - HEAVY OIL SALES	\$1,724,901.80	\$1,424,154.00	\$868,390.00	\$20,652,640.80

7711 703 - HEAVY OIL VOLUMES (IMPERIAL)	22,933.84	21,169.32	20,086.94	311,954.14
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7711 703 - HEAVY OIL PRICE (\$/BBL)	\$75.21	\$67.27	\$43.23	\$66.20
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EAST BODO SECTION 12 POLYMER PILOT	12/Oct (AV)	12/Nov (AV)	12/Dec (AV)	Total
INCREMENTAL OIL PRODUCTION (m3/d)	4.60	5.52	4.88	6.91
7711 703 - HEAVY OIL VOLUMES (IMPERIAL)	898.05	1,042.82	952.55	15,916.03
7710 703 - HEAVY OIL SALES	\$67,543.88	\$70,155.15	\$41,180.10	\$1,060,630.81

11878 - PROVOST UPPER MANNVILLE 'A' POOL UNIT (NET)

ROYALTIES	12/Oct (AV)	12/Nov (AV)	12/Dec (AV)	Total
7730 700 - OIL CROWN ROYALTIES	\$81,832.00	\$88,531.00	\$57,870.00	\$1,606,904.00
7740 700 - OIL FREEHOLD ROYALTY (PRODUCTION)	\$153,957.00	\$123,587.00	\$74,415.28	\$1,865,434.28
7750 700 - OIL OVERRIDING ROYALTY (RESOURCE)	\$4,846.00	\$3,983.00	\$2,565.75	\$58,673.75
Total	\$240,635.00	\$216,101.00	\$134,851.03	\$3,531,012.03

ROYALTY RATE - CROWN	4.74%	6.22%	6.66%	7.78%
ROYALTY RATE - FREEHOLD	8.93%	8.68%	8.57%	9.03%
ROYALTY RATE - OVERRIDING	0.28%	0.28%	0.30%	0.28%
ROYALTY RATE - COMBINED	13.95%	15.17%	15.53%	17.10%

EAST BODO SECTION 12 POLYMER PILOT	12/Oct (AV)	12/Nov (AV)	12/Dec (AV)	Total
CROWN ROYALITES	\$3,204.39	\$4,361.12	\$2,744.27	\$87,654.35
FREEHOLD ROYALTIES	\$6,028.66	\$6,088.01	\$3,528.86	\$96,319.25
OVERRIDING ROYALTIES	\$189.76	\$196.21	\$121.67	\$3,015.18
COMBINED ROYALTIES	\$9,422.81	\$10,645.34	\$6,394.80	\$186,988.78

8637 - PROVOST NE 12-037-01W4 POLYMER SKID (NET)

DIRECT OPERATING EXPENSES	12/Oct (AV)	12/Nov (AV)	12/Dec (AV)	Total
LABOUR	\$7,905.88	\$9,034.26	\$8,230.45	\$102,986.95
LEASES, TAXES & FEES	\$0.00	\$0.00	\$0.00	\$225.00
GENERAL MAINTENANCE	\$5,040.67	\$1,050.00	\$542.50	\$13,896.18
SAFETY & ENVIRONMENT	\$0.00	\$0.00	\$6,720.97	\$10,487.47
COMMUNICATIONS	\$0.00	\$0.00	\$0.00	\$1,453.39
FREIGHT	\$1,950.00	\$110.00	\$110.00	\$6,940.00
PROPERTY TAX	\$24,583.84	\$0.00	\$0.00	\$24,583.84
TOTAL EXPENSES	\$39,480.39	\$10,194.26	\$15,603.92	\$160,572.83

Jul 9, 2013

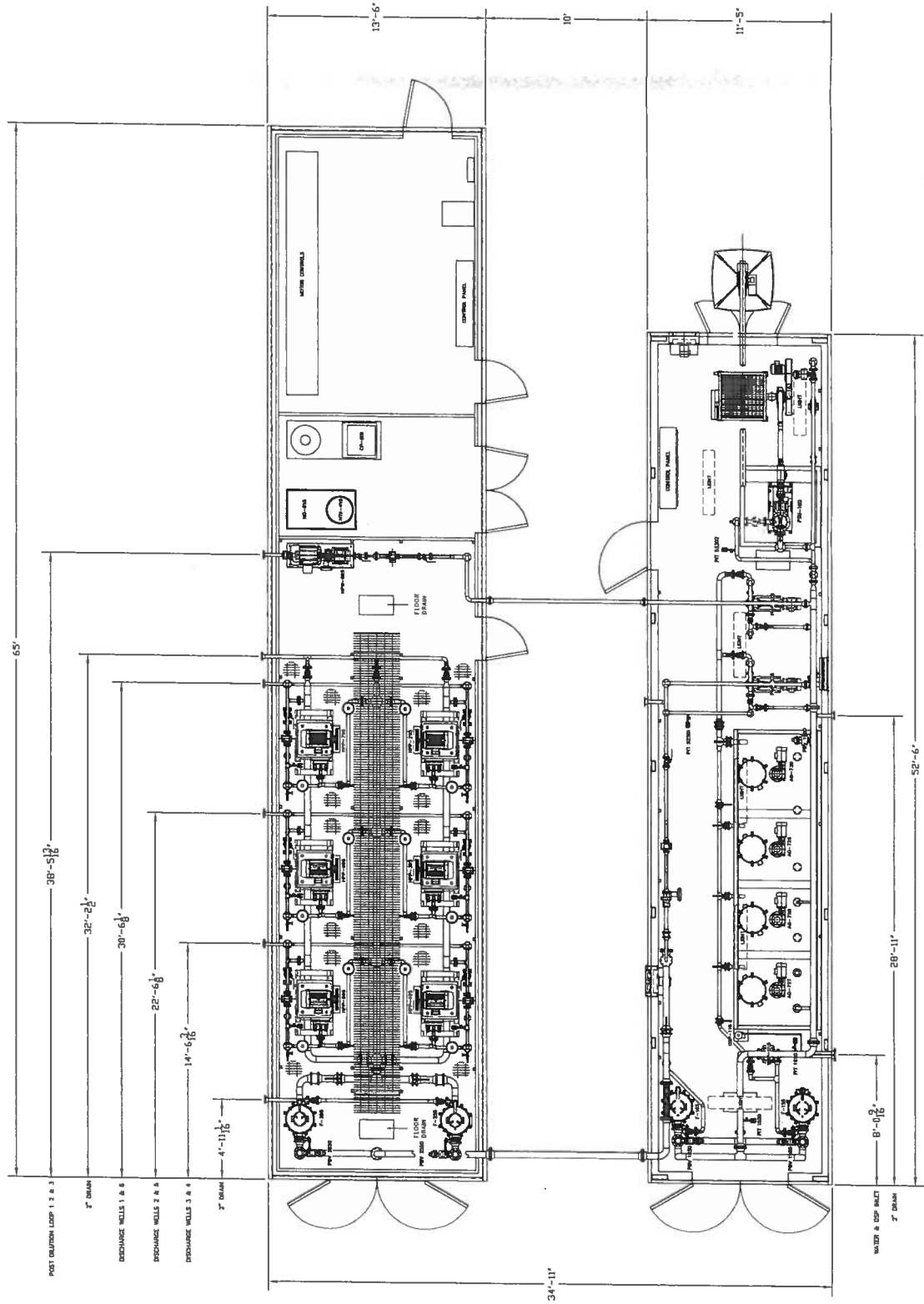
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EAST BODO SECTION 12 POLYMER PILOT	12/Oct (AV)	12/Nov (AV)	12/Dec (AV)	Total
REVENUE	\$67,543.88	\$70,155.15	\$41,180.10	\$1,060,630.81
ROYALTIES	(\$9,422.81)	(\$10,645.34)	(\$6,394.80)	(\$186,988.78)
DIRECT OPERATING EXPENSES	(\$39,480.39)	(\$10,194.26)	(\$15,603.92)	(\$160,572.83)
CASH FLOW	\$18,640.68	\$49,315.56	\$19,181.38	\$713,069.20

APPENDIX F

NOTES:

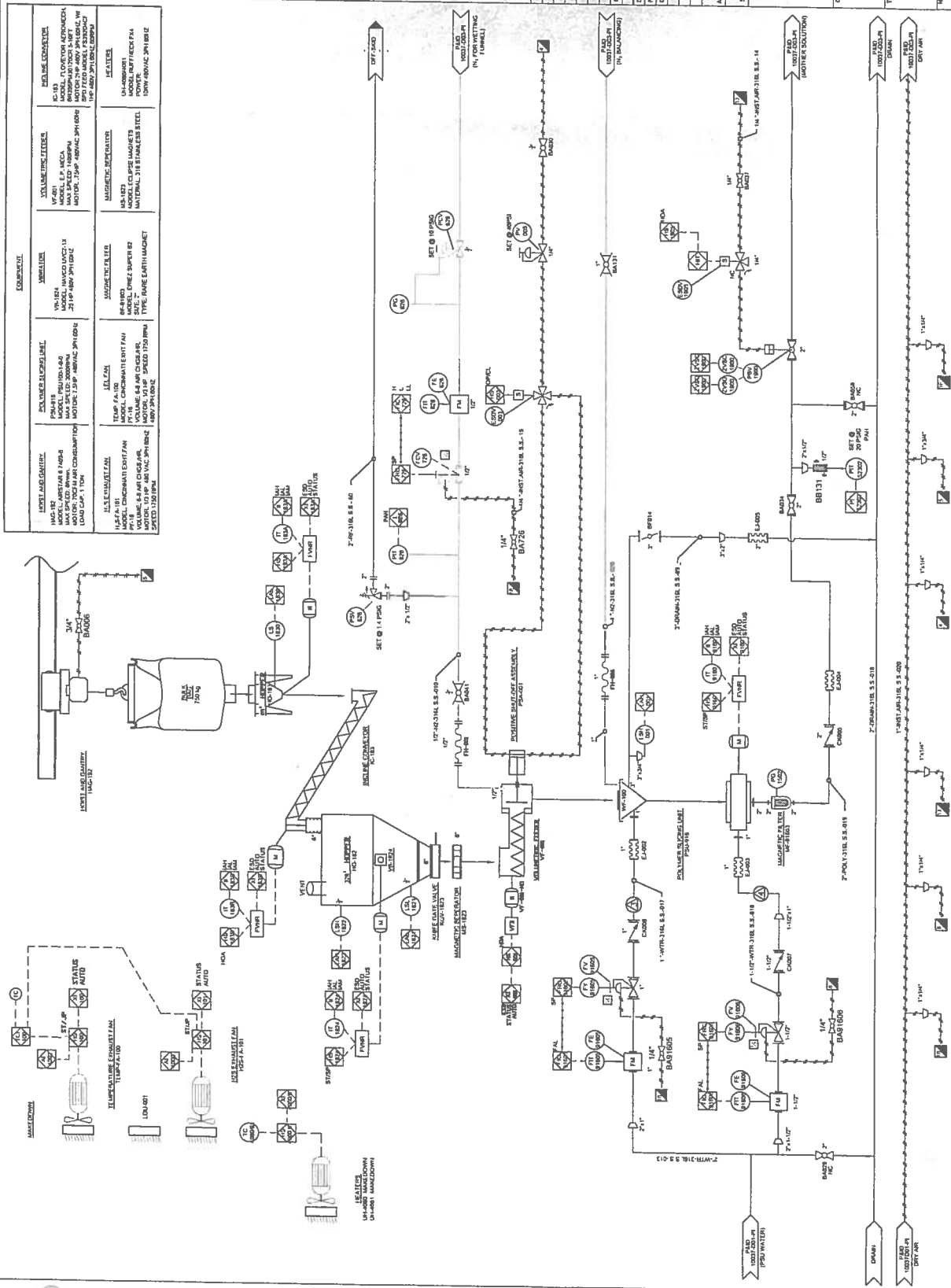
- 1) - BUILDING EXTERIOR PLAN.
PANEL: WHITE
TRIM: TAN
- 2) - ICE RAKES AND DOOR CANOPIES REQUIRED
ON BUILDING EXTERIOR.
(CANOPIES TO BE INSTALLED AT SITE.)



PLAN VIEW - POLYMER SYSTEM

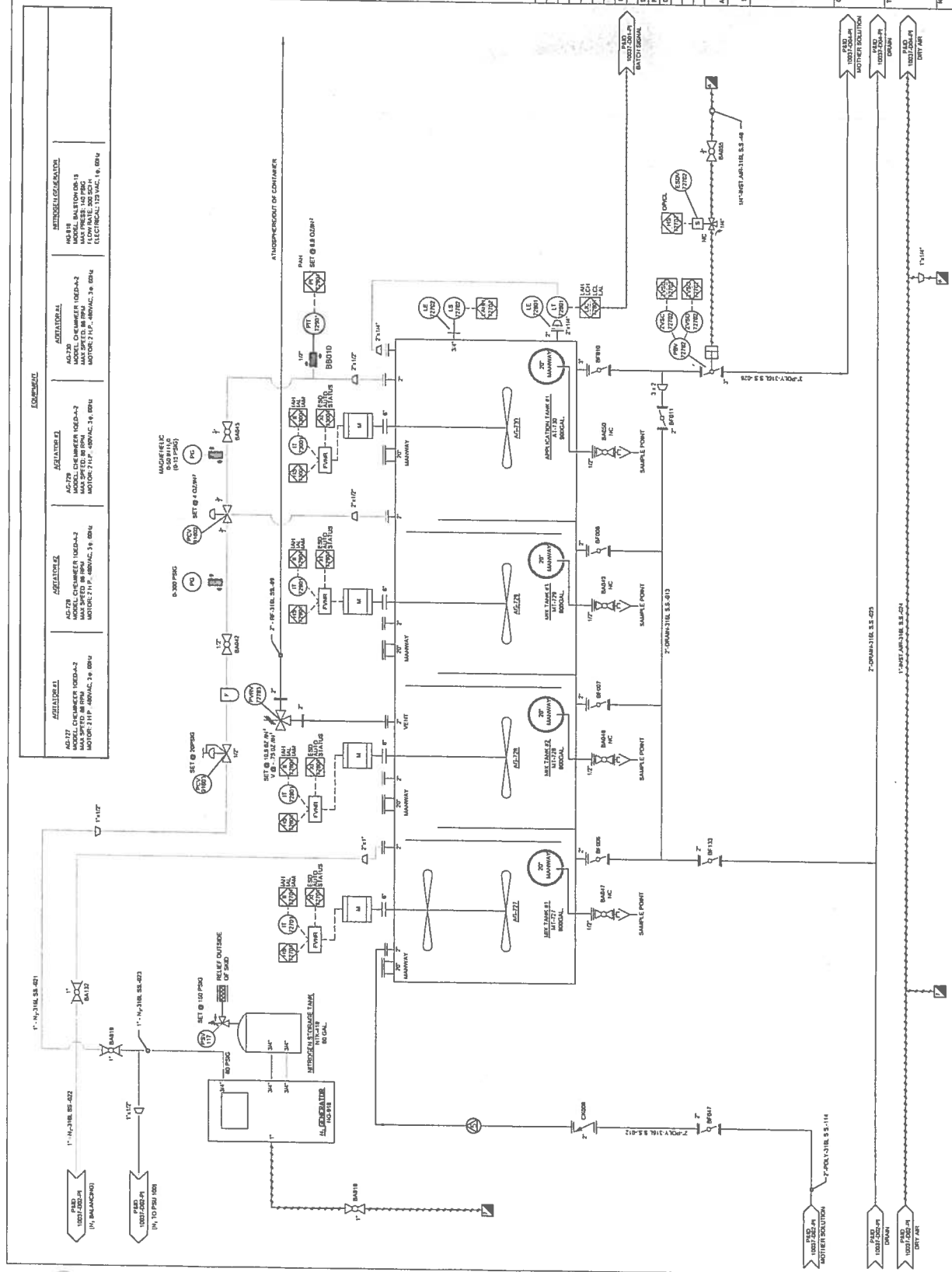
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- 1) - REFER TO PENEGROWTH PPMWG SPEC AT ASME 150 FOR LOW PRESSURE COMPOSITE SERVICE
- 2) - REFER TO PENEGROWTH PPMWG SPEC AT ASME 600 FOR HIGH PRESSURE COMPOSITE SERVICE

[illegible][illegible]

DO NOT SCALE THIS TAG USE DIMENSIONS ONLY	DO NOT SCALE THIS TAG USE DIMENSIONS ONLY	DO NOT SCALE THIS TAG USE DIMENSIONS ONLY
SCALE	HTS	
		
P.O. BOX 220 RICEBORO, GEORGIA 31352 VOICE 478 884 8796 FAX 478 884 8797 C.MAIL FLOQUIP@COMPANET.NC.COM		

10037	PENGROWTH CORPORATION		
	EAST 8000 POLYMER INJECTION FACILITY		
10037-D02-PI		REGISTRATION	4



NOTES:

- 1) -. REFER TO PONGOWITH PIPING SPEC AT ASME 150 FOR LOW PRESSURE CORROSION SERVICE.
- 2) -. REFER TO PONGOWITH PIPING SPEC AT ASME 600 FOR HIGH PRESSURE CORROSION SERVICE.

4	WY/PA	AS BULK	DEF	100
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6	WY/PA	PACKED FOR CHARGES	400	100
7	WY/PA	PACKED FOR CHARGES	50	100
8	WY/PA	PACKED FOR CHARGES	50	100
9	WY/PA	FOR BULK-UPS	50	100
10	WY/PA	FOR BULK-UPS	50	100
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100	WY/PA	FOR BULK-UPS	50	100

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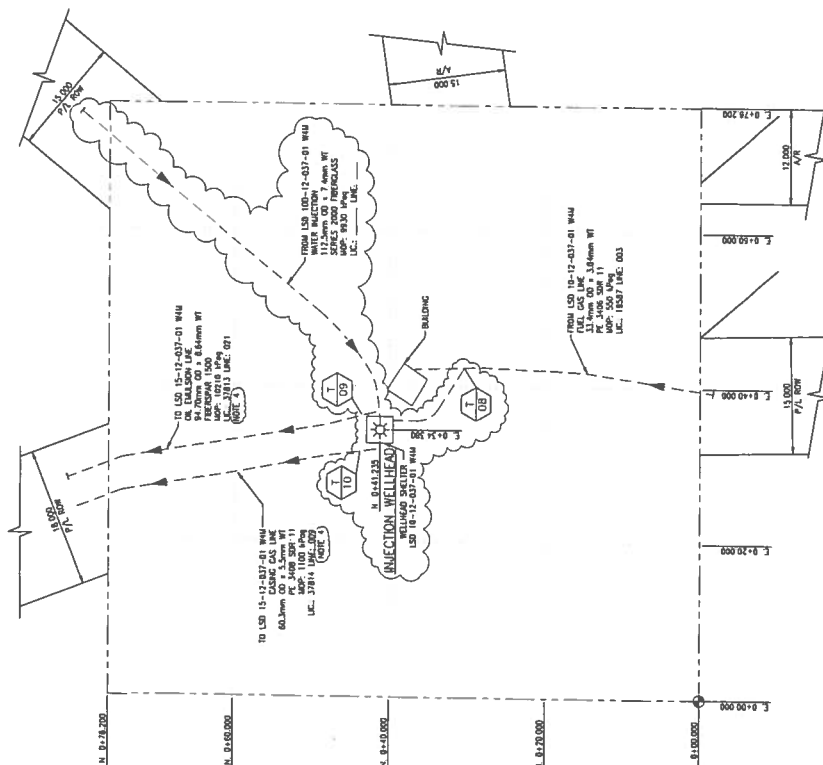
P.O. BOX 3720
RACEBORO, GEORGIA 31323
VOICE - 912.884.8726
FAX - 912.884.4216
EMAIL: FLOORSPC@UNF1FC.COM

10037
GROWTH CORPORATION

EAST BODD POLYMER
INJECTION FACILITY

NUMBER	10037-003-PI	REVISION	4
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NOTES:

1. ENGINEER'S SIGN APPLIES TO CLOUDED NEW CONSTRUCTION ONLY.
2. ALL DIMENSIONS AND COORDINATES ARE IN METRES UNLESS NOTED OTHERWISE.
3. ON LAYSE U/G PIPING TO HAVE 2000mm UHMAN COVER.
4. PIPELINE TO BE DISCONNECTED FROM WELLHEAD AND TAKEN OUT OF SERVICE.

NO	DATE	BY	INITIALS	REVISIONS
0	10 02 01			ISSUED FOR CONSTRUCTION (GHS PROJECT 1702 00)
A	10 01 15			ISSUED FOR BID (GHS PROJECT 1702 00)
B	09 12 14			ISSUED FOR APPROVAL (GHS PROJECT 1702 00)

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REVISION

FOR CONSTRUCTION
FOR BID (GAS)
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PENGROWTH CORPORATION

EAST 8000	SCALE	1/300	SHEET
00/10-12-37-01 WSM	CONTRACTOR DRAWING NUMBER	REV	
WATER INJECTION PLOT PLAN	CONTRACTOR NAME	GRB Engineering Ltd	083-B0E-010-116 01

WRK - Working

[illegible]

WORK - Working

APPENDIX G

MADE at the City of Calgary, in the
Province of Alberta, on

12th day of December 2011.



ENERGY RESOURCES CONSERVATION BOARD

The Energy Resources Conservation Board, pursuant to the Oil and Gas Conservation Act, chapter O-6 of the Revised Statutes of Alberta, 2000, orders as follows:

- 1) The scheme of Pengrowth Energy Corporation for enhanced recovery of oil by polymer and water injection in that part of the **Provost Upper Mannville A Pool** outlined in Appendix A of the approval, as described in

- | | |
|-----------------------------|-----------------------------|
| a) Application No. 1444822, | g) Proceeding No. 1683899, |
| b) Application No. 1473021, | h) Application No. 1685673, |
| c) Application No. 1599385, | i) Application No. 1698445, |
| d) Application No. 1617539, | j) Application No. 1708942, |
| e) Application No. 1638343, | k) Proceeding No. 1710322, |
| f) Application No. 1659088, | |

is approved, subject to the terms and conditions herein contained.

- 2) Polymer and/or water may be injected into the subject pool through the well(s) with the following unique identifier(s):

- a) Previously approved injection wells:

Class II

02/09-12-037-01W4/0
03/09-12-037-01W4/0
00/10-12-037-01W4/0
02/10-12-037-01W4/0
00/14-12-037-01W4/2
00/16-12-037-01W4/0
00/14-13-037-01W4/0
00/16-13-037-01W4/0
00/08-14-037-01W4/0
00/11-14-037-01W4/0

Class II

03/13-15-037-01W4/0
03/14-15-037-01W4/0
02/01-21-037-01W4/0
00/01-23-037-01W4/3
00/03-23-037-01W4/2
00/06-23-037-01W4/0
00/08-23-037-01W4/0
00/09-23-037-01W4/0
00/11-23-037-01W4/2
00/06-24-037-01W4/0

- b) Previously approved injection wells:

Class II

02/13-12-037-01W4/0
04/14-12-037-01W4/0
03/02-13-037-01W4/0
03/03-13-037-01W4/0

Class II

04/03-13-037-01W4/0
02/04-13-037-01W4/0
03/08-23-037-01W4/0<rescinded¹>
04/08-23-037-01W4/0<rescinded¹>

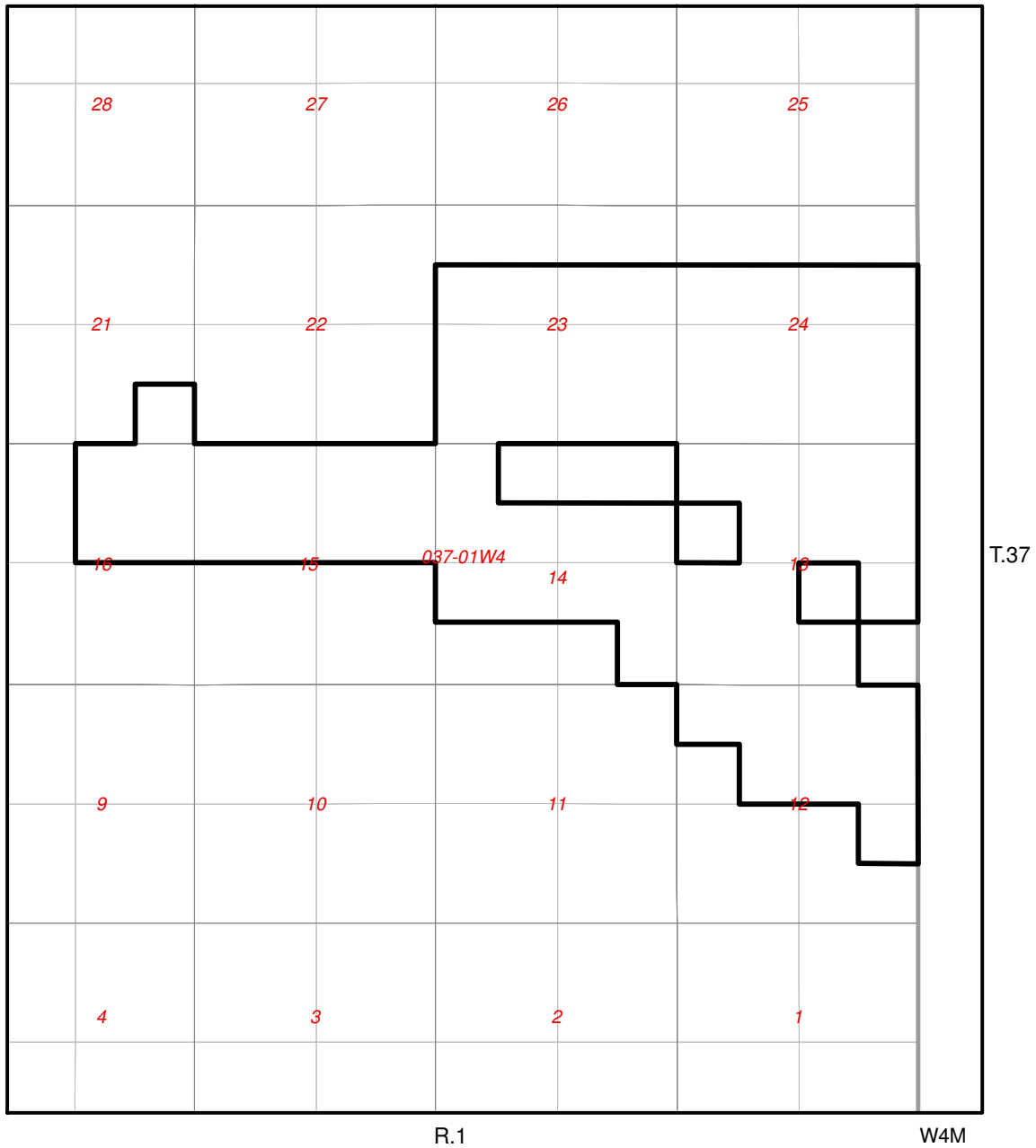
Injection shall commence in the well(s) referred to in clause 2, subclause b by January 25, 2012.

The class of injection fluid is described in *Directive 051*.

- 3) The injection of polymer and/or water may commence in the well(s) referred to in clause 2 once the ERCB has confirmed in writing that *Directive 051* requirements have been met.
- 4) The polymer and/or water injected to that part of the subject pool outlined in Appendix A
 - a) must maintain a voidage replacement ratio of 1.0 on the basis of cumulative production and injection volumes following the commencement of production, and
 - b) shall target a voidage replacement ratio of 1.0 on a monthly basis.
 - c) A re-pressurization period may commence where the voidage replacement ratio, on a monthly basis, shall be between 1.0 and 1.2 until such time as the voidage replacement ratio of 1.0, on the basis of cumulative production and injection volumes following the commencement of production, is reached. The conditions in clause 4, subclauses a and b will not apply during this period.
- 5) The approval holder shall initiate and continue a monitoring program which includes the sampling of produced water to determine polymer breakthrough.
- 6) (1) The approval holder shall file with, and make presentations to the ERCB on the progress of the scheme, on an annual basis with the first presentation to occur before March 31, 2011.

(2) The annual performance presentations must include the following information:
 - a) the results of any measurements, observations, tests, or laboratory investigations which are pertinent to the determination of the success of the scheme,
 - b) a discussion of the scheme's performance, including the production performance at each well, the injection performance, and related statements regarding the success and significance of the operations conducted on the wells, and
 - c) verification that all conditions of the approval have been met and if not, detail the specific non-compliance events and the action plan to restore compliance.
- 7) Approval No. 10529I rescinds Approval No. 10529H.

END OF DOCUMENT



**PROVOST UPPER MANNVILLE A POOL
APPENDIX A TO APPROVAL NO. 10529I**

Area(s) of Change

////// Added

\\\\\\\\ Deleted

Licence No. 00235775-00-00 (November 25, 2008)



**LICENCE TO DIVERT WATER
PROVINCE OF ALBERTA
WATER ACT, R.S.A. 2000, c.W-3, as amended**

LICENCE NO.: 00235775-00-00

FILE NO.: 21222

PRIORITY NO.: 2007-05-04-002

EFFECTIVE DATE: 2008 11 25

EXPIRY DATE: 2013 11 24


SOURCE OF WATER: Aquifer accessed by Water Well ID No. 0180376 (identified in Report No. 21222-R005 as WSW No. 3) in the NE 21-037-01-W4

LICENSEE: Pengrowth Corporation

Pursuant to the *Water Act*, R.S.A. 2000, c.W-3, as amended, a licence is issued to the Licensee to:

operate a works and to divert up to 63875.0 cubic metres of water annually from the source of water for the purpose of Industrial (Oilfield Injection)

subject to the attached terms and conditions.



Designated Director under the Act
David Helmer, P.Eng., M.Sc.

Date Signed:

2008 11 25
(Y/M/D)

200502-03

Licence No. 00235775-00-00
File No. 21222
Page 1 of 6

DEFINITIONS

- 1.0 All definitions from the Act and the Regulations apply except where expressly defined in this licence.
- 1.1 In all parts of this licence:
- (a) "Act" means the Water Act, RSA 2000, c. W-3, as amended;
 - (b) "Application" means the written submissions to the Director in respect of application number 001-00235775 and any subsequent applications for amendments of Licence No. 00235775-00-00;
 - (c) "Aquifer" means the underground water-bearing formation that is capable of yielding water, that is accessed by the works authorized by this licence;
 - (d) "Director" means an employee of the Government of Alberta designated as a Director under the Act;
 - (e) "Monitoring well" means the well used to monitor the water levels associated with the diversion of water authorized by this licence;
 - (f) "Production well" means any well used to divert water for the purpose of this licence;
 - (g) "Regulations" means the regulations, as amended, enacted under the authority of the Act.
 - (h) "Water Use Reporting System" means the secure internet website provided by Alberta Environment at <http://www.environment.alberta.ca/1286.html> for submitting measuring and monitoring results electronically to the Director.

GENERAL

- 2.0 The Licensee shall immediately report to the Director by telephone any contravention of the terms and conditions of this licence at 1-780-422-4505.
- 2.1 The terms and conditions of this licence are severable. If any term or condition of this licence is held invalid, the application of such term or condition to other circumstances and the remainder of this licence shall not be affected thereby.
- 2.2 The Licensee shall not deposit or cause to be deposited any substance in, on or around the source of water that has or may have the potential to adversely affect the source of water.
- 2.3 The licensee shall comply with the terms and conditions of the "Water Use Reporting System User Consent".

Licence No. 00235775-00-00
File No. 21222
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DIVERSION OF WATER

3.0 This licence is appurtenant to the production well as described in the following:

REPORT NO.	REPORT NAME
21222-R005	Licensing a "Deemed Licence" Groundwater Supply East Bodo 10-21-037-01 W4M Prepared for Pengrowth Heavy Oil Partnership Prepared by Hydrogeological Consultants Ltd. May 4, 2007

- 3.1 The Licensee shall divert water only for the purpose specified in this licence.
- 3.2 The Licensee shall divert water only from the source of water specified in this licence.
- 3.3 The works used to divert the water authorized by this licence shall include, at a minimum, the production well referred to in Report 21222-R005 dated May 4, 2007 submitted with the application.
- 3.4 The Licensee shall not exceed any of the limits specified in Table 3-1.
- 3.5 The Licensee shall not position the pump intake in the production well at a depth greater than the maximum pump intake depth specified in Table 3-1.

TABLE 3-1

WELL NUMBER	LEGAL LAND DESCRIPTION for WELL LOCATION	PRODUCTION INTERVAL (metres below grade)	MAXIMUM PUMP INTAKE DEPTH (metres below grade)	LIMITS	
				MAXIMUM RATE OF DIVERSION (cubic metres per day)	MAXIMUM ANNUAL DIVERSION (cubic metres)
Well ID 0180376 (WSW No. 3)	NE 21-037-01-W4	177.7-187.8	177.7	248.0	63875.0

- 3.6 Prior to diverting any water from the source of water, the Licensee shall equip the production well with a meter, which cumulatively measures the quantity of all water diverted during the term of this licence.
- 3.7 The Licensee shall maintain each measuring device referred to in 3.6 at all times.

Licence No. 00235775-00-00
File No. 21222
Page 3 of 6

3.8 The Licensee shall

- (a) establish a monitoring well within 150 meters of the production well which intersects the corresponding aquifer as identified in Report No. 21222-R005 and
- (b) the Licensee shall maintain the well identified as the monitoring well.

CONSERVATION PLAN

4.0 The licence shall prepare and execute a Conservation and Productivity Plan on or before November 1, 2009.

4.1 The Conservation and Productivity Plan shall include at a minimum all of the following:

- (a) a comparison of the amount of water used to the amount of productivity;
- (b) a continuing economic assessment of alternative sources and reduction of non-saline water use as required in the *Water Conservation and Allocation Guideline for Oilfield Injection (2006), Alberta Environment*; and
- (c) an impact assessment of any future water use reduction or any alternative technologies implemented for the purpose of enhanced oil recovery.

4.2 The licensee shall prepare and conduct an educational program related to water conservation in the oilfield recovery process to:

- (a) company employees and
- (b) the general public.

4.3 The educational program must be executed at a minimum of one time during the term of this licence.

4.4 The Licensee shall prepare a summary of the implemented Conservation and Productivity Plan and the results.

4.5 The Licensee shall submit the report prepared in 4.4 to the Director on or before November 1, 2012.

MONITORING AND REPORTING

5.0 Unless otherwise authorized in writing by the Director, the Licensee shall

- (a) measure the water levels in the monitoring well on a monthly basis;
- (b) record the water level in the monitoring well in 5.0(a) on a monthly basis.

5.1 Unless otherwise authorized in writing by the Director, the Licensee shall

- (a) measure the water level in the production well (Well ID 0180376) identified in the report No. 21222-R005 as WSW No. 3 on a monthly basis;

Licence No. 00235775-00-00
File No. 21222
Page 4 of 6

(b) record the water level in the production well in 5.1(a) on a monthly basis

5.2 Unless otherwise authorized in writing by the Director, the Licensee shall:

(a) monitor the total number of cubic metres of water diverted; and

(b) record the total number of cubic metres of water diverted;
from the production well on a monthly basis.

5.3 The Licensee shall ensure that the:

(a) collection;

(b) preservation;

(c) storage;

(d) handling; and

(e) analysis

of any sample required to be taken by this licence shall be conducted in accordance with the following, unless otherwise authorized in writing by the Director:

(i) the *Standard Methods for the Examination of Water and Wastewater*, published jointly by the American Public Health Association, American Water Works Association, and the Water Environment Federation, 1998, as amended.

5.4 The Licensee shall:

(a) obtain a representative sample of water being diverted from the production well and

(b) analyze the water collected in 5.4(a) for the following parameters:

(i) Total Dissolved Solids, Hardness, Alkalinity, pH, Calcium, Magnesium, Sodium, Potassium, Carbonate (CO_3), Bicarbonate (HCO_3), Sulphate (SO_4), Chloride, Nitrate, and Iron; and

(ii) any other parameter required by the Director;

on an annual basis unless otherwise specified in writing by the Director.

5.5 The Licensee shall record and retain the results of 5.4(b) for a minimum of 5 years after being collected:

Licence No. 00235775-00-00

File No. 21222

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- 5.6 The Licensee shall report to the Director the results of the recording in 5.0, 5.1 and 5.2 (b) using the "Water Use Reporting System" and any other information required in writing by the Director.
- 5.7 The Licensee shall submit the report required in 5.6 on or before the end of the month following the month in which the information is based upon was collected.
- 5.8 The Annual Water Use Report shall include, at a minimum, the following information collected during the previous calendar year:
- (a) the total annual number of cubic metres of water diverted from the production well;
 - (b) the results obtained pursuant to 5.0, 5.1, and 5.2; and
 - (c) any other information required in writing by the Director.

COMPLAINT INVESTIGATION

- 6.0 The Licensee shall:
- (a) investigate all written complaints accepted by the Director relating to allegations of surface water and groundwater interference as a result of the operation of the production well;
 - (b) provide a written report to the Director, within a time specified in writing by the Director, detailing the results of the investigation relating to the complaint accepted by the Director in 6.0(b) including:
 - (i) recommendations to remediate and/or mitigate the impact(s) such as:
 - A. lowering the intake of the pump to compensate for a drop in water level,
 - B. re-drilling the water well to an increased depth so as to allow the pump to be installed at a lower depth,
 - C. drilling a new well, or
 - D. providing an alternate water supply; and
 - (ii) any other information required by the Director.
- 6.1 The Licensee shall satisfy the Director that the report submitted pursuant to 5.0 has identified remedial and/or mitigative measures relating to the alleged interference.

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File No. 21222
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RECLAMATION

- 7.0 The Licensee shall reclaim all abandoned wells or other holes related to the water diversion in accordance with the Act and the Regulations.
- 7.1 The Licensee shall submit a reclamation report to the Director documenting the actions taken under 7.0 within 90 days after the reclamation is complete.



Designated Director under the Act
David Helmer, P. Eng., M.Sc.

Date Signed:

2008 11 25
(Y/M/D)