PENGROWTH

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Via E-Mail and Courier

File No. 03-056

June 30, 2011

Geoff Pearson, Sr. Project Analyst
Innovative Energy Technologies Program
Research and Technology Branch
9th Floor, North Petroleum Plaza
9945-108th Street
Edmonton, AB
T5K 2G6

Dear Mr. Pearson

Re: IETP Project No. 03-053/Judy Creek Quaternary Acid Gas Injection for EOR and Sequestration

Attached, please find the final report for the captioned project detailing pilot operations and results to December 31st, 2010.

If there are any questions, please do not hesitate to contact the undersigned at (403) 806-3262.

Thank you,

Ray Pollock, P. Eng.
Team Lead, Engineering, Swan Hills
Pengrowth Energy Corporation

MINES AND MINERALS ACT
INNOVATIVE ENERGY TECHNOLOGIES REGULATION
STATUTORY DECLARATION

Definitions

In this Statutory Declaration,

(a) "Allocable Costs" means allocable costs as defined in the Regulation;

(b) "Approval" means Approval No. 03 - 056 granted pursuant to the Regulation;

(c) "Operator" has the same meaning as in the Approval;

(d) "Project" has the same meaning as in the Approval;

(e) "Regulation" means the *Innovative Energy Technologies Regulation* (AR 250/2004);

(f) "Period of Time" means from January 1, 2010 to December 31, 2010.

Declaration

I, James E Causgrove,

of the City/Town/Village of Calgary in the Province of Alberta,

DO SOLEMNLY DECLARE THAT:

1. I am an authorized signing officer of the Operator.

2. The Project commenced in accordance with the commencement provision of the Approval.

3. In respect to the Period of Time,

   (a) Allocable Costs have not been applied for and established in relation to

      (i) equipment or facilities located outside of the Province of Alberta;

      (ii) the cost of borrowed money that has been or will be deducted from income under section 21 of the *Income Tax Act* (Canada);

      (iii) an amount deducted as a capital cost allowance or as amortization of eligible capital property under the *Income Tax Act* (Canada) or the *Income Tax Regulations* under that Act;

      (iv) any item or service obtained from a person who is connected to the Operator or any owner of the Project, pursuant to the definition of a connected person under section 6 of the Regulation;

MINES AND MINERALS ACT
INNOVATIVE ENERGY TECHNOLOGIES REGULATION
STATUTORY DECLARATION

(v) materials or capital items that have not been used in the Project; and

(b) all government grants and benefits provided in relation to the Project, including, without limitation, amounts provided under other royalty regulations administered by the Alberta Department of Energy, have been disclosed to the Alberta Department of Energy.

AND I MAKE THIS SOLEMN DECLARATION CONSCIENTIOUSLY BELIEVING IT TO BE TRUE AND KNOWING THAT IT IS OF THE SAME FORCE AND EFFECT AS IF MADE UNDER OATH.

DECLARED before me at City/Town/Village of)
Calgary)
in the Province of Alberta,)
this 30th day of June, 2011)
Month Year

A Commissioner for Oaths or Notary Public
in and for the Province of Alberta
Hugo S. A. Potts
Being a Barrister and Solicitor

Signature of Declarant

Jim Causgrove, P. Eng.
V.P. Production & Operations
Title/Position

Innovative Energy Technologies Program

Intellectual Property Agreement Reporting Form (Section 4)

	Name	Type	Owner	Description	Operator Use (Legal Terms and Conditions)	Licensee Use (Legal Terms and Conditions)	Developer	Statutory Protection
	(name of the specific Technology)	*(Background Technology, New Technology or Commercial Technology)*	*(name of the owner of the Technology i.e. the name of the Operator if the Operator is the owner or the name of the licensor of the Operator is a licensee)*	*(description of the Technology)*	*(i.e. if the Operator is a licensee, or is restricted in the use of the Technology, any legal terms or conditions which may restrict the Operator's use of the Technology)*	*(i.e. if a third party licensee wishes to retain a license to that Technology, set out the significant terms and conditions of that license)*	*(name of the person who developed the Technology)*	*(if known, indicate whether Statutory Protection will be sought for the Technology i.e. patenting)*
1.	Quaternary Acid Gas Miscible EOR	New Technology	Pengrowth Energy Corporation	Enhanced oil recovery using CO2 and H@S as a miscible agent as a followup to a tertiary recovery process (namely Hydrocarbon Miscible Solvent)	No known restrictions	N?A	Pengrowth Energy Corporation	Not known at this time
2.								
3.								
4.								
5.								

THIS FORM IS INTENDED ONLY AS A GUIDE AND ANY ADDITIONAL INFORMATION REQUIRED TO COMPLY WITH SECTION 4 OF THE AGREEMENT MAY BE ATTACHED IN A SEPARATE FORM AND DOCUMENT

Innovative Energy Technologies Program: 03-056
Quaternary Acid Gas Injection at Judy Creek BHL "A" Pool

2010 Final Report

Pengrowth Corporation
June, 2011

Innovative Energy Technologies Program: 03-056
Quaternary Acid Gas Injection at Judy Creek BHL "A" Pool
2010 Final Report

1.0 Report Abstract

A quaternary CO_2 EOR pilot is being conducted at the Judy Creek Beaverhill Lake "A" Pool, a middle Devonian age carbonate reservoir. The pilot pattern has previously undergone waterflood and hydrocarbon miscible flooding.

CO_2 injection in WAG mode began in February 2007. Acid gas injectant consists of waste CO_2 with a small percentage of H_2S from the Judy Creek Gas Plant, supplementing a pure CO_2 stream which is purchased and trucked. In April 2009, injection of CO_2 concluded at 26.2% HCPV. Water injection and production response monitoring continues through the end of the report period.

This report outlines production and operational data for the period ending December 31, 2010.

Overall pilot performance to date indicates encouraging results for incremental recovery of oil, hydrocarbon solvent and CO_2 breakthrough. CO_2 reproduction has been cyclic, lagging CO_2 injection, and peak reproduction periods which were somewhat predictable resulted in some operational downtime.

2.0 Summary

2.1 Team Members

Current Team Members

- Ray Pollock – Team Lead, Engineering
- Craig Johnson – Operations Superintendent
- Ken Suchan – Operations Foreman
- Al Myles – Well Servicing Coordinator
- Bruce Malcolm – Senior Royalty Coordinator
- Glenn Malcolm – Manager, Geophysics
- Darcy Ries – Manager, Reservoir Technology
- Michael Boutette – Consulting Engineer

Former Team Members

- Mario Struik – Facilities Engineer
- Randy Sutherland – Construction Supervisor
- Rob Moriyama – Director, Exploitation Engineering
- Andrew Seto – Manager, Reservoir Studies

Norm Schultheis - Geologist
Ashok Singhal – Consulting Research Engineer
Rohan Balkaran – Facilities Engineer
David Fowler – Geophysicist
Colin Muir – Exploitation Engineer

2.2 Activity Summary

Following is a summary of key activities associated with the Judy Creek acid gas injection pilot.

Q2 2006	10-02-064-11W5 producer acid fracture stimulation Injector 07-02-064-11W5 injection string upgrade
Q3 2006	Producer 02-02-064-11W5 flowline replacement Construct & install acid gas pipeline from 04-23-064-11W5 to injector 07-02-064-11W5 Wellhead upgrades at pilot producers
Q4 2006	Construction & installation of surface facilities at injector 07-02-064-11W5 Dec - Acquire baseline 3D seismic survey of pilot area
Q1 2007	Jan - ERCB D51 & D65 Approval Jan - Static pressure surveys Jan - Fluid sampling initiated Feb - Commence CO_2 injection (Purchased CO_2 only) Mar - CO_2 injection profile log
Q2 2007	Apr - Water injection profile log Apr - Supplement injection stream with acid gas Apr - Water tracer injection May - 02-02-064-11 ESP repair; install downhole pressure probes; Saturation (RST) log May - 06-02-064-11 ESP repair; install downhole pressure probes
Q4 2007	Nov - Water injection profile log Dec - 02-02-064-11W5 ESP repair & static pressure survey
Q1 2008	Mar - 07-02-064-11W5 Injection fall off test
Q2 2008	May - 06-02-064-11W5 ESP repair May - Static pressure surveys June – Alter target WAG ratios & injection schedule
Q3 2008	Sept – Static pressure surveys Nov – Judy Creek Gas Plant completes “jefftreat” upgrades
Q1 2009	Feb – Acquire 3D seismic survey of pilot area (4D)

Q2 2009	Apr – Manage CO_2 breakthrough
	Apr – Static pressure surveys
	Apr – Terminate CO_2 injection
Q3 2009	Aug – Injection profile
Q4 2009	Oct – Static pressure surveys
	Dec – Adjust water injection target
Q2 2010	Mar – Static pressure survey
Q2 2011	Apr – Static pressure survey

2.3 / 2.4 Production & Reserves Summary

Table 1 below outlines the injection and production results relative to the forecast provided with the project approval. Table 2 shows the ultimate reserves expectation of the pilot relative to the original project approval.

Table 1: 2010 Monthly and Calendar Year Production and Injection Data

	CURRENT DATA					IETP APPROVAL FORECAST			
	CO2 Inject. e3m3	Oil w/o 10-02 frac m3	Oil w/ 10-02 frac m3	Hydrocarbon Gas (Raw) e3m3	Acid Gas Prod. e3m3	CO2 Inject. E3m3	Oil m3	Hydrocarbon Gas (Raw) e3m3	Acid Gas Prod. e3m3
2010 Monthly Data – Actual									
Jan-10	0	220	281	62	177	0	125	97	310
Feb-10	0	192	235	45	150	0	113	97	280
Mar-10	0	232	319	36	156	0	125	97	310
Apr-10	0	263	297	49	139	0	121	97	300
May-10	0	259	322	82	143	0	125	97	310
Jun-10	0	187	252	89	137	0	121	97	300
Jul-10	0	161	226	79	126	0	125	97	310
Aug-10	0	144	198	68	110	0	125	97	310
Sep-10	0	151	198	56	93	0	121	97	300
Oct-10	0	154	198	49	85	0	125	97	310
Nov-10	0	169	208	39	72	0	121	97	300
Dec-10	0	159	196	33	66	0	125	97	310
Calendar Year Data (Actual & Forecast)									
2006	0	0	749	0	0	0	0	0	0
2007	12,253	722	2,111	1,639	416	13,385	0	0	0
2008	16,007	3,073	4,221	2,406	2,736	13,385	2,848	580	1,825
2009	6,172	3,509	4,861	1,351	3,837	0	3,197	1,160	3,650
2010	0	2,188	2,929	686	1,456	0	1,478	1,160	3,650
2011	0	1,010	1,428	112	382	0	1,128	580	1,825
2012	0	374	493	6	92	0	550	0	0
2013	0	0	0	0	0	0	336	0	0
TOTAL	**34,431**	**10,876**	**16,791**	**6,200**	**8,918**	**26,770**	**9,538**	**3,481**	**10,951**

Table 2: FORECAST RESERVES @ YE 2010									
	Oil (w/o frac) [e^3m^3]	Oil (w/ frac) [e^3m^3]	Sales Gas [e^6m^3]	Ethane [e^3m^3]	Propane [e^3m^3]	Butane [e^3m^3]	C5+ [e^3m^3]	MOE 6:1 (w/ frac)	BOE 6:1 (w/ frac)
Current	10.9	16.8	3.0	5.5	1.2	0.8	0.3	**25.1**	**172.2**
Approval	10.0	10.0	0.9	0.9	0.7	0.4	0.2	**12.4**	**82.5**

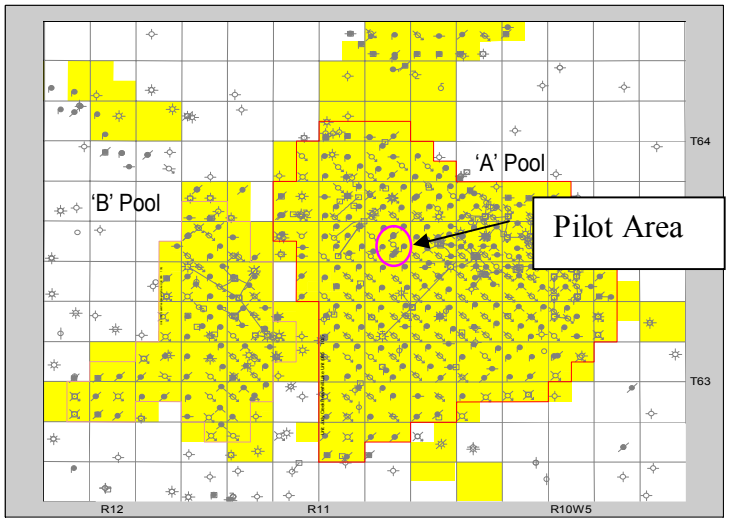
3.0 Well Information

3.1 Well Layout & Pattern Description

The pilot is located in an existing 80 acre pattern located within the Judy Creek Beaverhill Lake (BHL) "A" Pool (Figure 1). The pool spans portions of four townships in Central Alberta from 63-10W5 to 64-11W5, and is a carbonate reservoir of middle Devonian age, located at a depth of approximately 2400 m.

The pattern area is small relative to other "A" Pool patterns. The smaller pattern was selected to allow a higher percentage of the pattern pore volume to be flooded with a given volume of injectant and to provide timely pattern response.

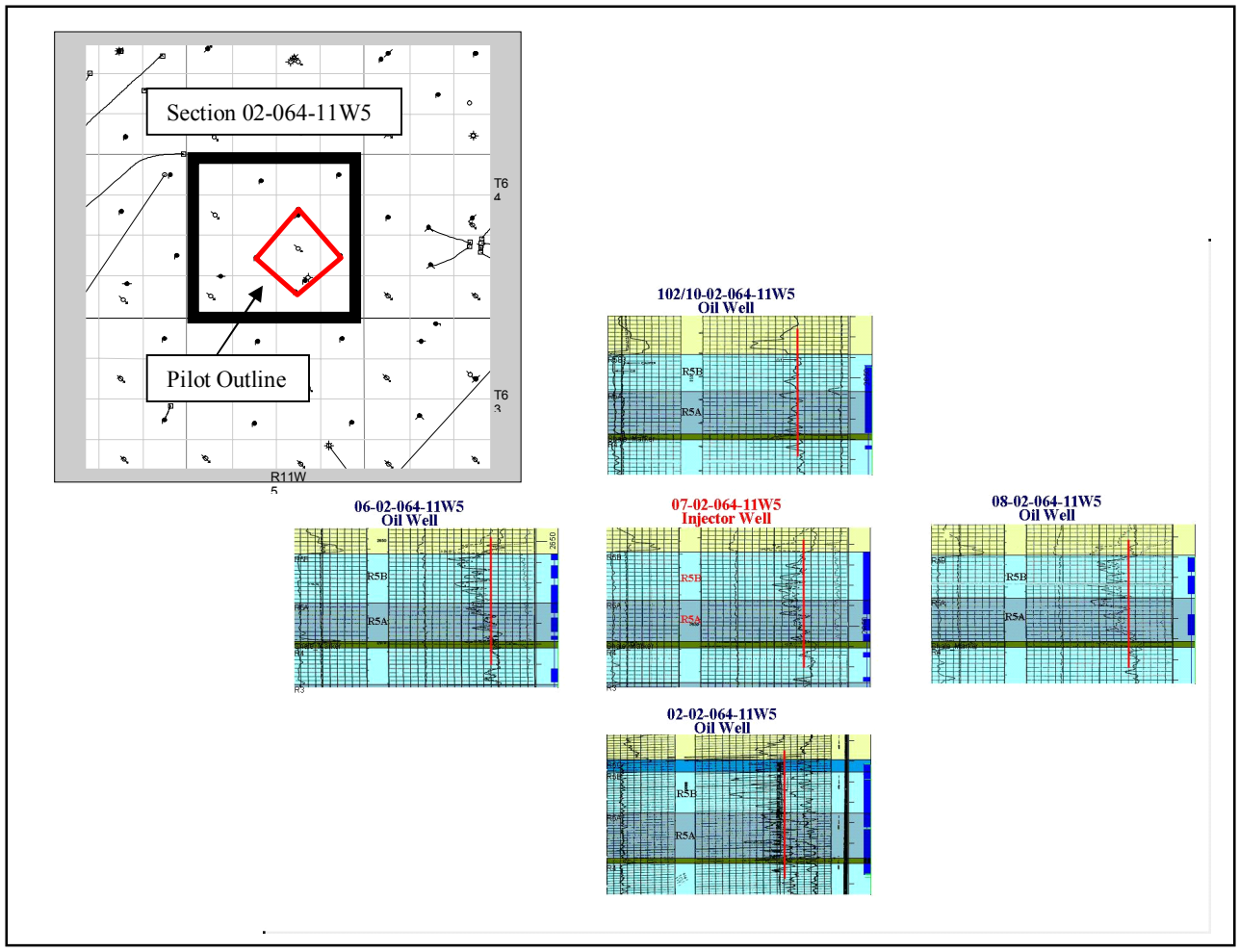
Figure 1: Judy Creek BHL "A" Pool



The pattern is centered on injector 07-02-064-11W5 (abbreviated 07-02), and includes four vertical oil producers. The pattern has historically undergone both waterflood and hydrocarbon miscible flood operations. Miscible operations were conducted between February 2002 and August 2003.

The montage shown in Figure 2 shows the pattern well layout within section 02-064-11W5. Also included is the open hole logs associated with each pattern well.

Figure 2: CO_2 Pilot Well Layout



3.2 2010 Drilling, Completion and Workover Operations

April 2009: 06-02-064-11W5 electrical submersible pump (ESP) repair after 12 month run life. Failure analysis found the cause to be a result of frequent startups and shutdowns. 06-02 was shut-in frequently during high CO_2 cycling periods due to CO_2 handling capacity at the Judy Creek Gas Conservation Plant. CO_2 corrosion was not observed during the replacement of this pump.

August 2010: The ESP in 02-02 was pulled and repaired after more than a 2 1/2 year run life.

3.3 Well Operation

Well service factor has been satisfactory over the review period, with downtime events occurring mainly due to routine maintenance and pressure data acquisition. Producers were shut in to control CO_2 production in the early part of 2009. This is discussed in later sections.

3.4 Well List and Status

Following is a listing of each of the pattern wells, and their function and status.

Well	Status and Function
00/07-02-064-11W5/0 (Abbreviated 07-02)	Operating water & acid gas injector
00/02-02-064-11W5/0 (Abbreviated 02-02)	Operating oil producer (ESP)
00/06-02-064-11W5/0 (Abbreviated 06-02)	Operating oil producer (ESP)
00/08-02-064-11W5/0 (Abbreviated 08-02)	Operating oil producer (ESP)
02/10-02-064-11W5/0 (Abbreviated 10-02)	Operating oil producer (rod pump)

3.5 Wellbore schematics

See Appendix I for wellbore schematics.

3.6 Spacing and Pattern

Discussed in section 3.1

4.0 Production performance

4.1 Injection & Production history

The daily injection & production history for each pattern well are shown in detail in Figures 3a to 3d . Appendix II contains the monthly & daily plots & monthly tabular data associated with each producer.

Figure 3a: 02-02-064-11W5 production and 07-02-064-11W5 Injection

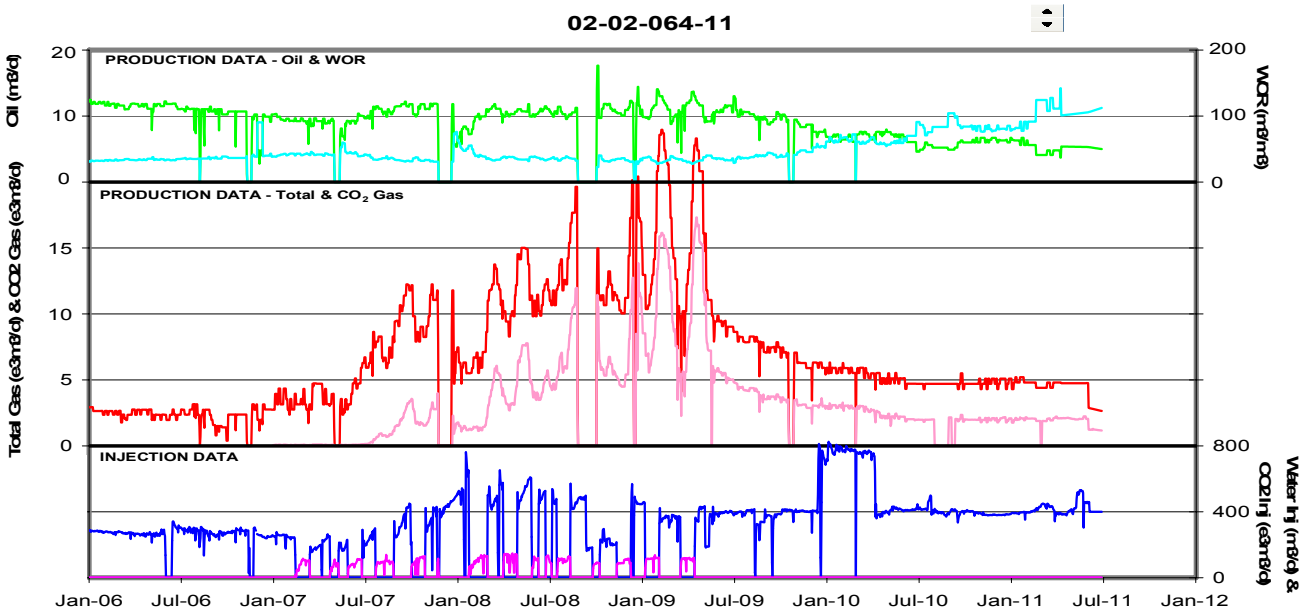


Figure 3b: 06-02-064-11W5 production and 07-02-064-11W5 Injection

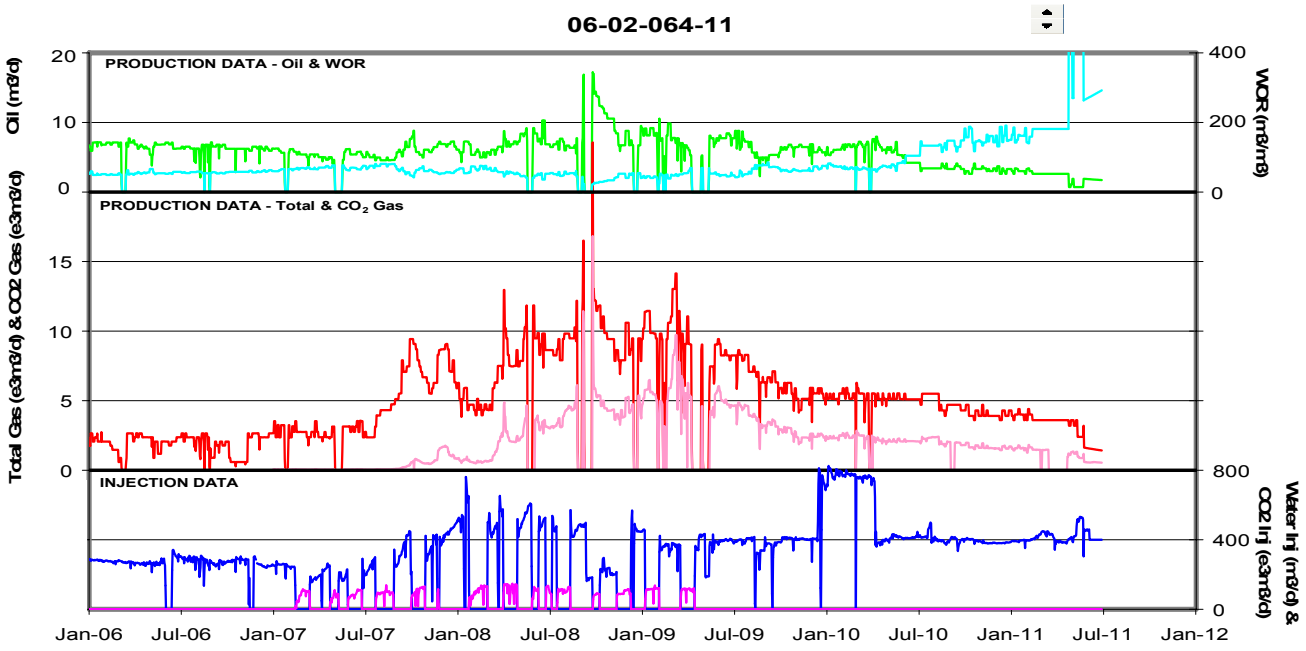


Figure 3c: 08-02-064-11W5 production and 07-02-064-11W5 Injection

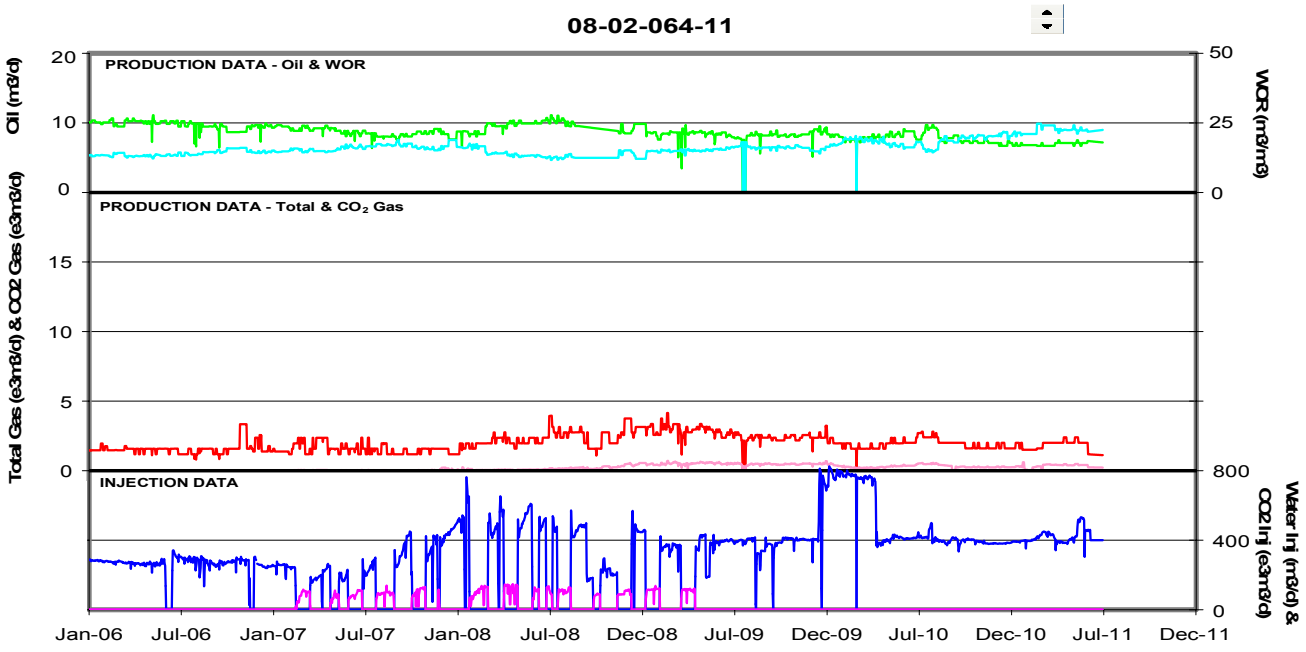
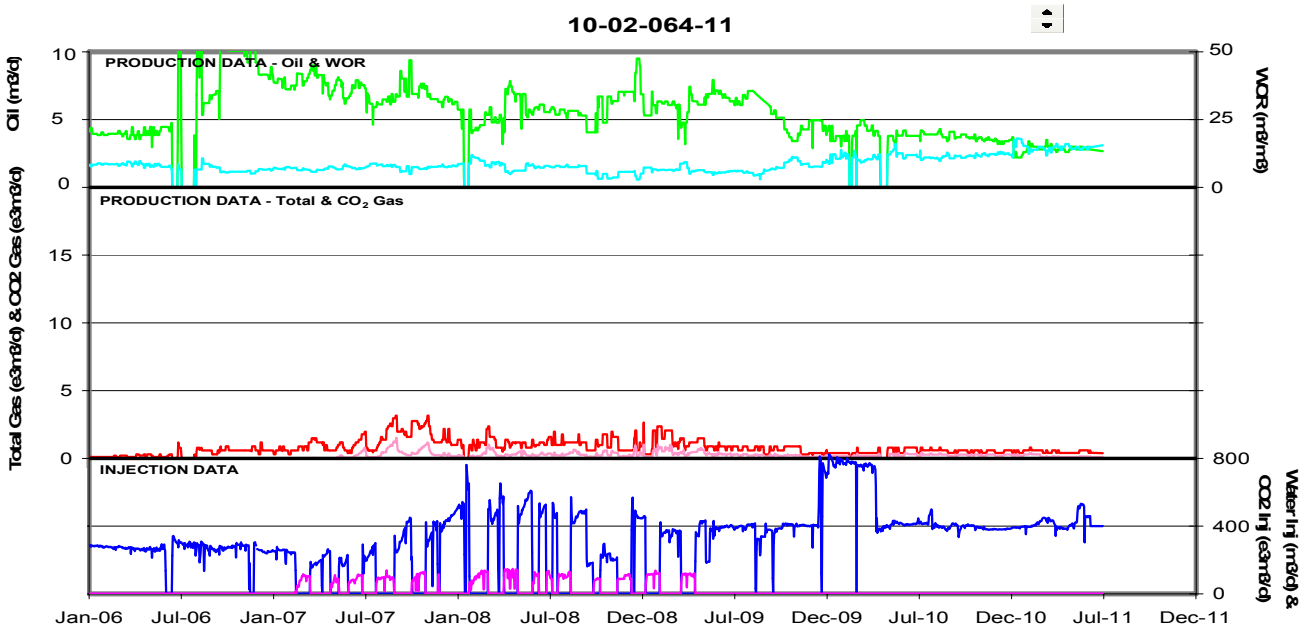


Figure 3d: 10-02-064-11W5 production and 07-02-064-11W5 Injection



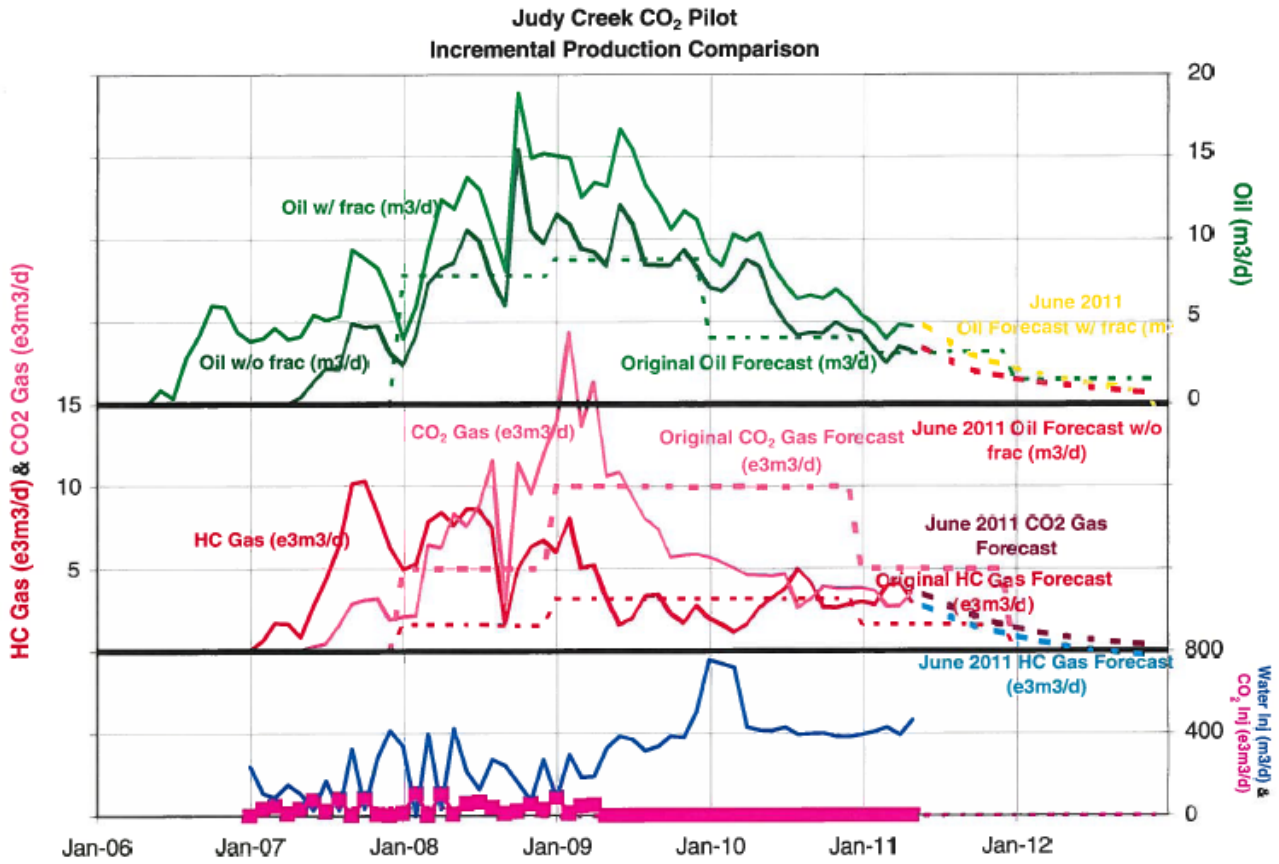
4.2 Composition of produced / injected fluids

Please reference Appendix II for composition tabular data.

4.3 Predicted vs. Actual Performance

Figure 4 provides a graphical comparison between actual pilot performance and the IETP Approval forecasts. The data is also provided in tabular form in Appendix III.

Figure 4: Pattern Production and Injection vs. Approval Forecast



Discussion

Injection

Initial CO_2 injection rates at 07-02 were lower than expected based on rates observed under hydrocarbon miscible flood. Over several months an increase in the injection rates of both water and CO_2 was

observed. This is believed to be in part the result of increasing reservoir permeability caused by dissolution of reservoir rock from injected CO_2. In the latter portions of 2008, CO_2 injection rate was reduced to manage peak CO_2 production rates. CO_2 injection was terminated in April 2009 due to increased difficulties in handling CO_2 production at the Judy Creek Gas Conservation Plant. Water target rates were set to 400m^3/d to maintain voidage. The injection target was increased to 800m^3/d in Dec 2009 to the end of March 2010. The rate was then returned to 400 m^3/d of water in April 2010. The increased injection resulted in a positive response with a gain of approximately 3 m3/d of oil after two months of increased injection. The oil rate dropped and the oil decline returned to the historical trend after the injection was returned to 400 m^3/d of water.

Production

In general, initial production response in terms of oil, hydrocarbon gas and CO_2 reproduction was seen earlier than had been predicted. The higher productivity producers 02-02 and 06-02 showed some response within the first six months of injection, compared to the predicted response time of 18 months. Significant response began between 12 and 18 months. After 18 months of injection, peak oil and gas response to injection began to correlate strongly with injection events in a cyclic nature, with the magnitude of the peaks also increasing. Since terminating CO_2 injection gas production declined sharply, while oil production has been declining gradually.

Producer 10-02 experienced minor gas cycling after the first injection cycle. This was a direct result of an acid fracture stimulation which had been performed to improve communication with the 07-02 injector. In previous hydrocarbon miscible flood operations, 10-02 saw no response to solvent injection at 07-02. The acid fracture treatment improved oil production at this producer significantly. For the sake of clarity certain of the reported oil recovery values included in this report will show incremental oil production with and without the incremental oil associated with this workover. This is done so as not to combine impacts of the workover with direct CO_2 flood impacts (although a portion of this production can be attributed to the flood).

The magnitude of the peak acid gas reproduction rates began to impact gas plant operations in August 2008. This resulted in modification to the injection cycles and modifications to gas plant facilities. These will be discussed further in a later section.

Current estimates of the cumulative recovery of hydrocarbon gas are higher than in the original forecast. This is the result of additional oil recovery (associated solution gas) from the 10-02 fracture stimulation, and a higher volume of residual solvent within the pattern boundaries than was estimated in the original forecast. The average hydrocarbon gas production rate for 2010 is similar to the forecasted rate but the trend in 2011 appears to be higher than predicted.

4.4 Pressure Data

The following pressure data was collected from the Judy Creek CO_2 pilot:

- Static reservoir pressure
- Producer 02-02-064-11W5: flowing pressure data
- Producer 06-02-064-11W5: flowing pressure data
- Injector 07-02-064-11W5: tubing wellhead pressure

4.4.1 - Static Reservoir Pressure

To ensure miscibility of the acid gas solvent with the Judy Creek oil, reservoir pressure is maintained above 23.0 MPa. To monitor static reservoir pressure, pressure measurements are taken at two of the pattern producers annually. The static pressure measurements acquired for pilot producers are shown in Table 3 below. Note that 06-02 builds to 23.0MPa in ~7 days, while 02-02 takes ~21 days. The last pressure survey on the 06-02 well was conducted over an extended shut-in period in order to obtain a reservoir pressure above the hydrocarbon minimum miscible pressure of 26.2MPa due to a nearby pattern actively injecting hydrocarbon solvent.

Table 3: Static Reservoir Pressure Data

Well	Shut-in Date	Survey Date	Shut in Days	Datum Pressure (MPa)
06-02-064-11	24-Jan-07	31-Jan-07	7	24.0
02-02-064-11	24-Nov-07	03-Dec-07	9	22.3
02-02-064-11	24-Nov-07	17-Dec-07	23	23.5
06-02-064-11	19-May-08	25-May-08	6	25.0
02-02-064-11	26-Aug-08	04-Sep-08	9	22.8
02-02-064-11	26-Aug-08	18-Sep-08	23	24.4
06-02-064-11	9-Apr-09	16-Apr-09	7	24.7
02-02-064-11	18-Oct-09	28-Oct-09	10	23.8
06-02-064-11	26-Mar-10	31-Mar-10	5	26.7
06-02-064-11	14-Mar-11	19-Apr-11	35	26.5

4.4.2 – Producer 02-02 & 06-02-064-11 Bottomhole Flowing Pressure

Producers 02-02 & 06-02 were equipped with downhole pressure sensors in conjunction with ESP replacements in May 2007. Both wells maintain a bottomhole flowing pressure (P_{wf}) of ~15 MPa. Periodic increases in P_{wf} are typically associated with downtime or gas cycling. (Figure 5a & 5b). The pressure sensor at 06-02 quit transmitting in Nov 2008, but was repaired during the ESP replacement in April 2009 and then failed again in November 2009. The sensor did not provide any useful data during 2010. The sensor in 06-02 was repaired and began data acquisition in May 2011.

The pressure sensor at 02-02 failed in August 2009 and was repaired during the pump replacement in August 2010. In May 2011 the sensor in the 02-02 well has failed again.

Figure 5a: 02-02-064-11 Flowing Bottomhole Pressure

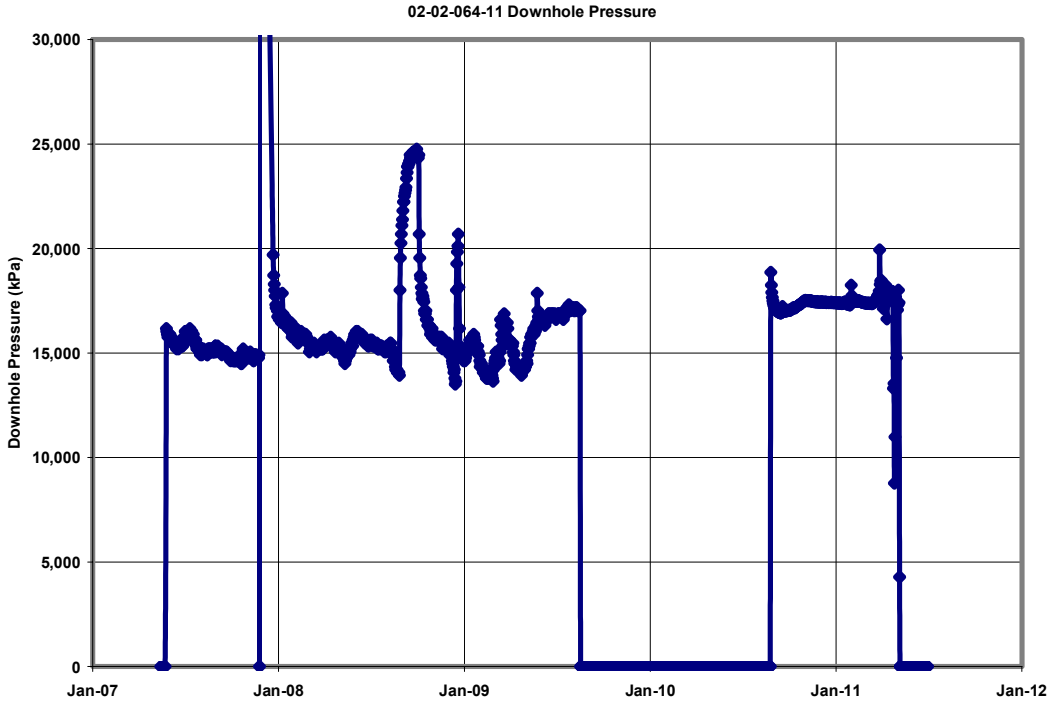
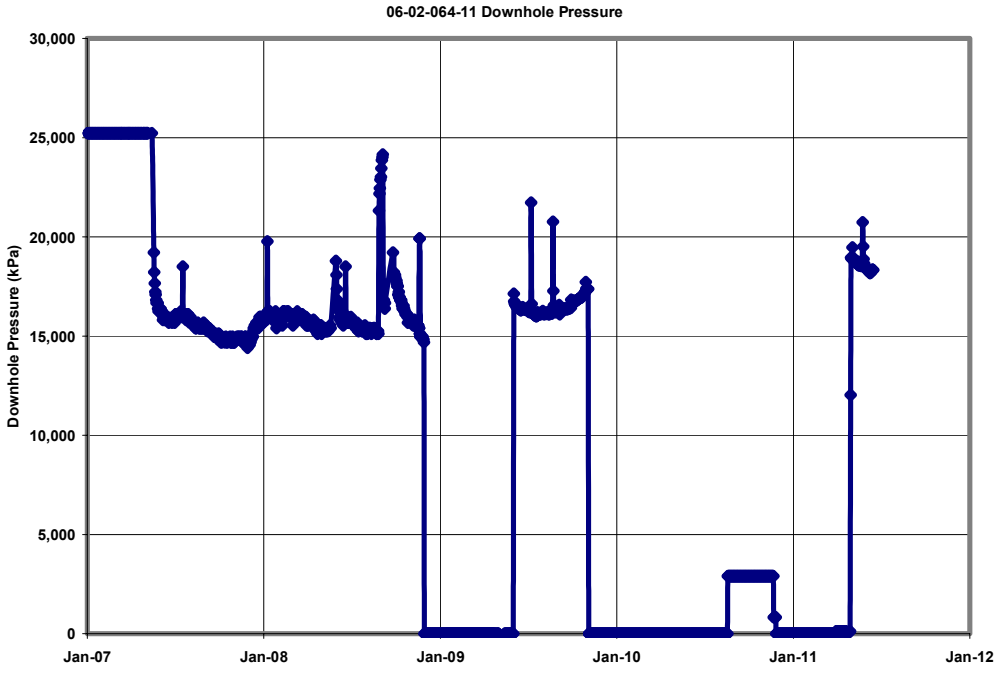


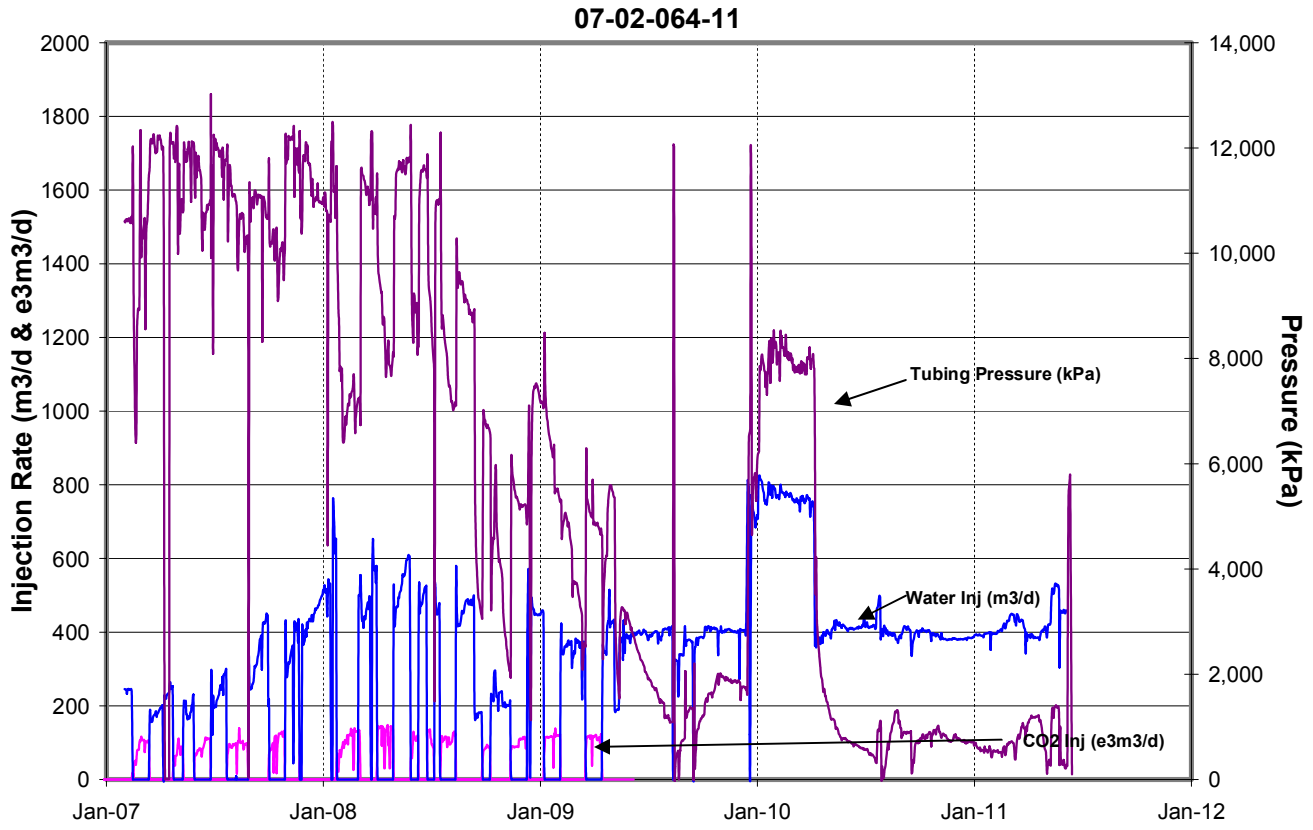
Figure 5b: 06-02-064-11 Flowing Bottomhole Pressure



4.4.3 - Injector 07-02-064-11 Tubing Wellhead Pressure

Tubing pressure data is collected at injector 07-02. Figure 6 displays this tubing pressure data with water and CO_2 injection rate data. Water injection rates began to increase in Q3 2007. A choke was installed in Q3 2008 to manage voidage replacement VRR and WAG ratio. Water injection target was set to 400m^3/d, which resulted in wellhead pressure to continue to decline to 1000 kPa. The target was increased to 800m^3/d from Dec 2009 to Apr 2010 which increased the wellhead injection pressure to 8,000 kPa. The injection rate was returned to 400 m3/d of water (to maintain a voidage replacement ratio of 1) in April 2010 and the wellhead injection pressure returned to the previous level of approximately 1,000 kPa.

Figure 6: 07-02 Injection Pressure Data and Injection Rates



5.0 Pilot Data

5.1 Other Data (geology, geophysical, lab studies, simulation, PVT, other)

5.1.1 Pilot Performance History Match Using Streamline-based Model

To supplement existing forecasts, based on compositional simulation results and analog analysis, a screening level streamline based model was employed to generate forecasts of ultimate oil and CO_2 recovery from the pilot. The software was developed by Texaco Exploration and Production Technology Department in the mid-1990s. It is a relatively fast and simple screening tool and can be used to simulate waterflood and various modes of CO_2 flooding (e.g. WAG, Immiscible).

Based on the early history match of pilot performance, the model forecasted an ultimate incremental oil recovery of 2.3% OOIP and recovery of 25% of the injected CO_2 (CO_2 bank size: 30% HCPV). Prior to terminating CO_2 injection, this coincided with our previous forecasts (2.5-3.0% OOIP recovery). However, oil rates have not declined as severely as predicted with the current incremental oil recovery factor exceeding 3.1% and forecasted to be as high as 3.5% OOIP. The project has recovered 27% of the CO2 injected and is forecasted to recover up to 30% by the end of 2012. See Figures 7a and b for a comparison of the model history match and forecast.

Figure 7a: Model History Match & Forecast: Oil Recovery

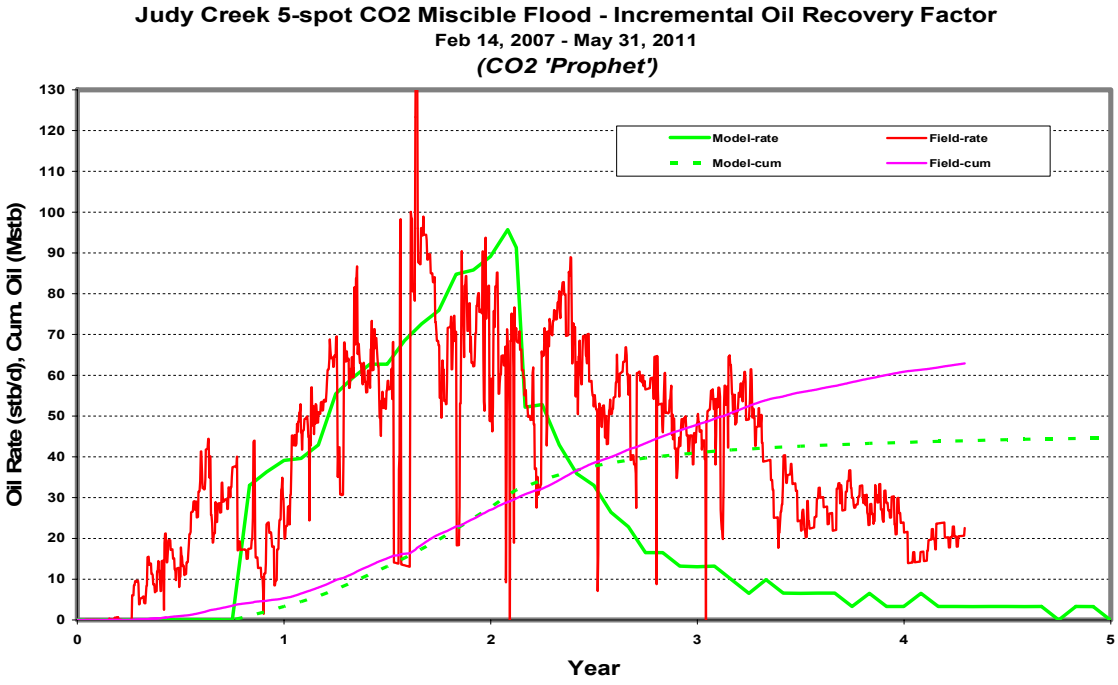
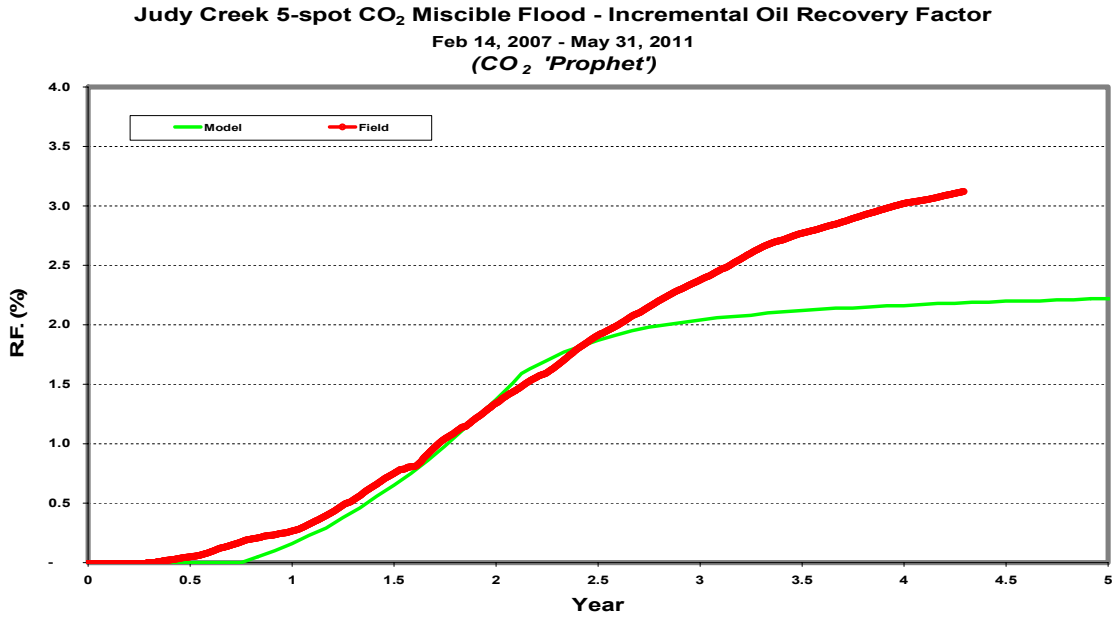


Figure 7b: Model Forecast and History Match: Oil Recovery Factor



5.1.2 - Isolation Testing

In Q4 2007 an increase in the water injection rate at the 07-02 injector was noted. Likely causes of this increase were:

a) Loss of isolation between the target R5 zones and lower zones. The lower zones in the wellbore had been shut off with a bridge plug in preparation for the pilot, and/or
b) Reservoir permeability increase due to CO_2 injection, yielding carbonic acid.

An injection profile log & temperature log were run in November 2007 and an injection fall off test was performed in March 2008 in an attempt to confirm isolation.

Given the short interval between the R5 perforations and the top of the bridge plug (0.3 m), the injection/temperature log was inconclusive, since the lowermost portion of the interval could not be logged. However, since the injection profile was essentially the same as the original profile run in April 2007, it was rationalized that permeability was increasing and isolation was intact.

The fall off test indicated that either the well had fractured (unlikely since injection is below fracture pressure), that permeability had increased or that isolation was lost to the lower zones.

It was concluded that an increase in reservoir permeability was being observed. This conclusion was supported given:

- Sustained reservoir pressure (static & flowing), and
- Consistent voidage replacement, calculated assuming full injection into the R5
- Similar response at the Swan Hills Unit 1 CO_2 pilot
- Ongoing miscible response to all pattern producers

An additional injection profile log was performed in Aug 2009 to help validate this conclusion. Profiles were measured at 2 injection rates (400 & 1000m^3/d). Both spinner surveys indicate that at least 88-92% of injectant is entering the target R5 perforations. The static flow check was once again inconclusive at the bridge plug, due to the potential for fill & potential offdepth measurement (~0.1m). After consulting with Weatherford we concluded that the bridge plug was holding.

After discussions with service companies, a temperature log was determined to more accurately show isolation of the bridge plug rather than a spinner survey. A logging program was devised to confirm depth (Run 1 GR-CCL) and then a temperature log (Run 2 Temp-GR-CCL), with the temperature logging tool on the bottom of the stack. During the initial run in Dec 2009, it was determined that fill was on top of the bridge plug and that future logs would continue to be inconclusive unless the fill was remove. Considerations were given to cleanout the fill, but due to the low ID of the XN-Nipple our well servicing department advised that it would be a low chance of success to cleanout to the bridge plug.

Due to the reasons mentioned above, we maintain our original conclusions that injectivity is increasing due to enhanced permeability.

The injection profiles, interpretations and proposed temperature log program for 2009 are provided in appendix IV.

5.1.3 - Water Tracer Analysis

A non-radioactive tracer was injected with the water phase after the first CO_2 injection cycle in 2007. Water samples have been taken quarterly through 2007, monthly in 2008 and quarterly in 2009. The tracer study was undertaken to determine if CO_2 injection was sweeping in markedly different pathways than the water injection. Since CO_2 acts as its own tracer, only the water phase was traced. To date results have shown water tracer arriving at all pattern producers. Below are the early conclusions that were reached with the Alberta Research Council.

- Tracer returns helped quantify distribution of the injected water towards the four producers.
- Water tracer returns indicate the strongest communication between the injector 07-02 and 06-02, whereas returns of oil, CO_2 and ethane suggest strongest communication between the injector and well 02-02, with somewhat less direct communication with well 06-02.
- There is thus some persuasive evidence that injected water and CO_2 travel towards the four producing wells via different paths and that WAG is only partially effective.
- There exist relatively high quality permeability ‘streaks’ between the injector and well 08-02 but their aerial extents are much smaller than those between the injector and wells 02-02 and 06-02.
- Flow towards well 10-02 was dominated by the hydraulic fracture. It possibly extends in the NW direction towards well 16-02.

- Flow of water tracer and CO_2 via hydraulic fracture around well 10-02 is episodic, suggesting it may be opening and closing depending upon pressure gradients.

Data collection and analysis is ongoing. The results from the tracer surveys to date are supplied in Appendix V.

5.1.4 - Corrosion Monitoring

Operational and equipment issues resulted in delays in the implementation of the corrosion monitoring and mitigation program and some loss of collected data.

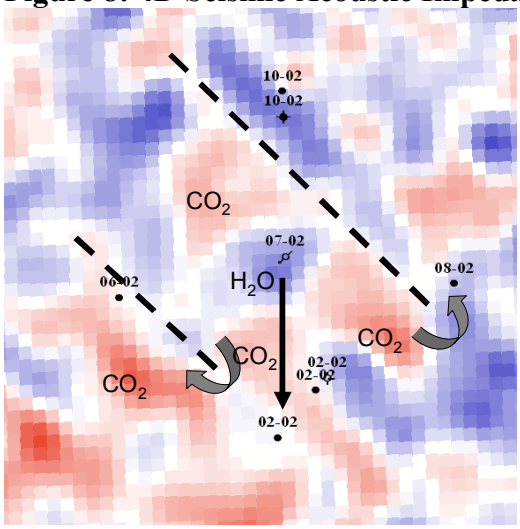
Corrosion inhibitor batch treatments were started after CO_2 breakthrough occurred. Corrosion rate data collected prior to the startup of the pilot was supplemented with manual readings after pilot operation was underway.

The test separator at 8-2-64-11 satellite and the inlet vessel S19 at the Judy Creek Production Complex were both internally inspected in mid 2010. Both are internally coated vessels and each required sandblasting and re-coating. There was no clear evidence of CO2 corrosion at either vessel. No repairs to any steel components were required.

5.1.4 – 4D Seismic

A baseline 3D seismic was obtained in Dec 2006 prior to commencing CO_2 injection. In Feb 2009 a second set of 3D seismic was shot to observe any changes in pathways & saturations. Both surveys were acquired with identical field parameters and processed with the same processing flow. The acquisition parameters had the source lines and receiver lines at intervals of 420 m and the source points and receiver stations at intervals of 60 m. The 30 m by 30 m bin size was chosen as it is the bin size used on our previous 3Ds in the area. The source was 2 kg of dynamite buried at 15 m depth. With the small size of the survey the whole survey was live for all shots and it was shot with frozen ground conditions for both surveys. Figure 8 illustrates the change in acoustic impedance.

Figure 8: 4D Seismic Acoustic Impedance (2009 minus 2006)



A negative change in acoustic impedance (Blue) indicates water swept pathways, while a positive change in acoustic impedance (Red) indicates CO_2 swept pathways. The dashed lines represent baffles in the reservoir that channel the CO_2 along preferred pathways. This interpretation of pathways is consistent with; production history to 02-02 & 06-02, geology to 08-02 & 10-02 and pattern tracer response. Understanding this reservoir heterogeneity is important in understanding not only the pilot performance but how this could affect a commercial CO_2 flood. While this 4D technology assists in interpreting pilot response, it is not likely viable for a long term commercial application. The seismic response to CO_2 is similar to its response to gas; most of the change is manifested with the first 10-20% saturation. Further increases in CO_2 saturation have little effect on the seismic response. Research shows that electrical methods are better at mapping these increased saturations.

5.2 Interpretation of pilot data

Production response is being seen to some degree at all pattern producers. Early comparisons between CO_2 response and water tracer response might suggest a variation in sweep between CO_2 and water, but a final conclusion awaits additional data collection and analysis.

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

Producer 10-02 was acid fracture stimulated in June 2006. 10-02 was the first well to respond to 07-02, as it cycled minor amounts of gas during the first few CO_2 injection cycles. Typically this would not be an encouraging response, however, since 10-02 is a low rate producing well that did not respond to historical hydrocarbon miscible floods (HCMF) the results can be viewed as encouraging. Further, such an acid treatment on a larger spacing pattern might yield more muted or delayed response. Cyclic gas response has reduced over the duration of the pilot. This acid fracture stimulation has identified opportunities to optimize future miscible patterns.

Producer 02-02 oil and gas response began in Q2 2007. The response sequence was as expected with an oil response followed by hydrocarbon gas (methane & ethane). CO_2 response did not begin until Q3 2007. 02-02 has maintained a steady oil production of ~10m^3/d, which is a modest increment from the base decline. Significant CO_2 breakthrough in August 2008 resulted in 02-02 and 06-02 being shut-in until late September 2008 (see sections 9 & 10 for operation details). The reproduction of injected acid gas at 02-02 is cyclic and highly correlated with 07-02 injection. This has been shown to make the gas response predictable and to some extent controllable by managing CO_2 injection rates and WAG ratio. Since completing CO_2 injection, 02-02 oil production has steadily been declining.

Producer 06-02 gas response began in July 2007 and oil response in Sept 2007. Gas response was primarily methane and ethane until April 2008. As noted above, 06-02 had significant CO_2 breakthrough in August 2008 and was shut-in until late Sept 2008. 06-02 cyclic response is offset in time from 02-02 response, which allows for additional flexibility in managing CO_2 breakthrough response. 06-02 continued to be shut-in periodically to handle peak CO_2 production in early 2009. 06-02 production has declined steadily since completing CO_2 injection.

As producer 08-02 did not respond to miscible injection at 07-02, predicted response under acid gas injection was likewise fairly small. 08-02 began subtle oil and gas response in Feb 2008. 08-02 had about a 2 m^3/d oil increment and <1e^3m^3/d increment of methane & ethane. CO_2 recycling has also been

limited to <1e^{3}m^3/d. The results are encouraging that CO_2 has contacted new reservoir. 08-02 will be considered for acid fracture stimulation after monitoring of production is complete.

07-02 injectivity was initially lower than anticipated but began to increase in Q3 2007. This resulted in modifying WAG ratio targets and CO_2 injection schedule. A water injection choke was installed in June 2008 to manage voidage and WAG ratios. The injection schedule was modified in June 2008 to lower WAG ratios, with shorter injection cycles. This potentially resulted in CO_2 breakthrough in August 2008. The injection cycles were modified again while the Judy Creek Gas Plant completed work on the acid gas handling facilities. 07-02 remained choked at 400m^3/d to manage voidage replacement. The rate was increased to 800m^3/d in December 2009 and reduced back to 400 m^3/d in March 2010 to observe any production changes. The increased injection resulted in a positive response with a gain of approximately 3 m3/d of oil after two months of increased injection. The oil rate dropped and the oil decline returned to the historical trend after the injection was returned to 400 m^3/d of water. The increased water injection rate to 800m^3/d from Dec 2009 to Apr 2010 increased the wellhead injection pressure to 8,000 kPa. When the injection rate was returned to 400 m3/d of water (to manage voidage replacement) the wellhead injection pressure returned to the previous level of approximately 1,000 kPa.

6.0 Pilot Economics

6.1 Sales volumes of natural gas and by-products.

See Appendix VI

6.2 Revenue.

See Appendix VI

6.3 Capital costs **(include a listing of items with installed cost greater than $10,000)**

Table 5 shows the expenditures since the inception of the project. 2009 capital was primarily expended on CO_2 purchases, skid rental, sampling & 3D seismic.

Table 5: Capital Expenditures to date

	IETP ($M)	2006 ($M)	2007 ($M)	2008 ($M)	2009 ($M)	2010 ($M)	TOTAL ($M)
Pipeline & Surface Piping	2,931.7	2,430.0	357.8	0.0	0.0	0.0	2,787.8
Downhole Work	975.0	890.8	53.1	6.1	0.0	0.0	950.0
Other	45.5	0.0	22.7	0.0	0.0	0.0	22.7
Sampling	284.2	0.0	70.0	105.0	105.0	105.0	385.0
CO2 Purchases & Skid Rental	4,118.1	0.0	2,369.6	2,655.2	1,339.6	140.0	6,504.3
3D Seismic (3 surveys)	1,160.0	353.3	25.7	0.0	247.5	5.6	632.1
07-02 Isolation Testing	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTALS	9514.5	3,674.1	2,898.8	2,766.3	1,692.1	250.7	**11,281.9**

6.4 Direct and indirect operating costs by category (e.g. fuel, injectant costs, electricity).

See Appendix VI

6.5 Crown royalties, applicable freehold royalties, and taxes.

See Appendix VI

6.6 Cash flow.

See Appendix VI

6.7 Cumulative project costs and net revenue.

See Appendix VI

6.8 Explanation of material deviations from budgeted costs

As per the table in section 6.3, the major deviations from budgeted costs are: Sampling, CO_2 purchases & skid rental and 3D seismic. The sampling & CO_2 purchases increased due to the change in scope of the project to inject CO_2 to 30% HCPV instead of the original 20% HCPV (50% increase). The 3D seismic cost was reduced with only 2 surveys shot, while up to three were provided for in the plan.

7.0 Facilities

7.1 Major capital items incurred in 2010

As noted in section 6.3, key capital expenses in 2010 were associated with skid rental & sampling ($750.7 M).

7.2 Capacity limitation, operational issues & equipment integrity

Acid Gas System

The acid gas portion of the injectant is sourced from the Judy Creek Gas Conservation Plant, and includes CO_2 and H_2S removed from produced gas streams prior to sale.

Acid gas is removed from the produced gas stream using an amine based "Jefftreat" system. The design capacity of the Jefftreat System is 90 e^3m^3/d of CO_2 removal, based on an assumed inlet flow rate of 2000 e^3m^3/d with a maximum CO_2 composition of 4.63 mole%. The system has performed as predicted.

The integrity and reliability of the acid gas compressor has been satisfactory over the review period. Minor operational issues have been experienced with the lubricating and cooling systems.

Praxair CO_2 Skid

The Praxair CO_2 skid has a 400 tonne bullet and pump at 02-02-064-11. CO_2 is pumped to the 07-02-064-11 injection site. During the initial injection cycles, the CO_2 injection rate was lower than expected. New plungers were installed in the pump to optimize the equipment. As the injectivity began to increase over time, the plungers were again modified. Although after 12 months the pump was still undersized for the potential injectivity, the pump capacity was set at ~$110e^3m^3$/d. This would delay the rate of peak CO_2 breakthrough and the attendant operational issues, which ultimately occurred in August 2008. The integrity and reliability of the acid gas compressor was satisfactory over the final period. The CO_2 skid was removed in the first quarter of 2010.

7.3 Process flow and site diagram

See appendix VII for process flow diagrams.

8.0 Environmental/Regulatory/Compliance

8.1 Summary of project regulatory requirements & compliance

8.1.1 - Regulatory Compliance

The Judy Creek Pilot is governed under ERCB EOR approval number 10269. The pilot is operating with 100% compliance to the requirements of this approval. Highlights of these requirements include:

ERCB EOR Approval 10269 Highlights (see appendix VIII)

- Miscible injectant fluid at least 0.970 mole fraction H_2S & CO_2 and not greater than 7% H_2S
- Inject at least 15% HCPV
- Maintain reservoir pressure above 23.0 MPa & complete two pressure surveys per year
- Monitor molar composition of injection & production gas
- Complete 2 part annual reporting process (annual presentation to ERCB and data submission)

8.1.2 - Environmental Procedures

Emergency Response Procedures
If a release should occur Pengrowth would implement the First Hour Response and the Emergency Response Plan (ERP), if required.

The First Hour Response manual outlines initial critical facts and procedures when dealing with an emergency. Pengrowth, regulatory and service company contacts are listed to assist in the initial stages of an emergency. This document is used in conjunction with the ERP.

The ERP outlines the details of responding to various emergency situations.

Environmental Procedures
Pengrowth demonstrates its commitment to environmental principles through involvement at all levels of the Environmental Management System (EMS). The EMS contains Pengrowth's Environmental Policy & 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

9.0 Future Operating Plan

9.1 Project Schedule Update

CO2 Quaternary Pilot Milestones

October 2005:	Approval-in-principle for the quaternary flood concept
January 2006:	Laboratory testing and Compositional Simulation initiated
March 2006:	Management approval for Pilot: $8.5 million
April 2006:	Laboratory and simulation work completed
May 2006:	Application filed with EUB for scheme approval
December 2006:	Baseline 3-D seismic data obtained
January 2007:	Well re-completion, facility upgrade, pipeline construction completed
January 2007:	ERCB Scheme approval is granted
February 2007:	First CO2 injection
April 2007:	Acid gas injection begins in the WAG mode
August 2008 **(April 2009)**:	Acid gas injection completed and straight water injection resumes
August 2008 **(February 2009)**:	Follow-up 3-D seismic survey
August 2009 **(December 2010)**:	Monitoring and Evaluation of the Pilot completed

Milestones pushed out from 2008-2009 to 2009-2010 due to increased target banksize.

9.2 Changes in pilot operation & optimization strategies

Water Injection Rate
As mentioned in section 5.1, with the increasing water injection rate, a surface choke was installed at the 07-02-064-11W5 injector to control water injection rates and thereby maintain voidage replacement and WAG ratio.

ESP Failures
02-02 & 06-02-064-11W5 failed in May 2007. Both wells had older vintage equipment and were expected to fail during the CO_2 pilot. 02-02 failed again in December 2007 and 06-02 in May 2008. Failure analysis indicated that both failures resulted from a manufacturer error and not from operation in the CO_2 pilot. There were similar failures in other parts of Judy Creek and other Pengrowth operated properties. 06-02 failed in May 2009. There were no signs of corrosion and the pump condition was similar to units from non-CO_2 portions of the field. The ESP in 02-02 was pulled and repaired in August 2010 after more then a 2 1/2 year run life.

Acid Gas Handling (injection changes, shut-in production)
Acid gas handling issues were anticipated when the target total injection volume was increased above 20% HCPV. The original acid gas handling system was designed to accommodate peak rates associated with a 20% HCPV injection target. Modifications to the acid gas handling systems were executed to handle the incremental CO_2.

In August 2008 the Judy Creek Gas Plant began experiencing acid gas handling problems as 02-02 & 06-02 began to breakthrough CO_2 gas. Both wells were shut-in and CO_2 injection was deferred while the upgrades to the acid gas handling system (Jeff treat) were undertaken. The water injection rate into the pilot was reduced to prevent an escalating WAG ratio and pressure buildup. In late September 2008, both wells were re-started and CO_2 injection resumed. To manage the peak CO_2 reproduction, the CO_2 injection cycle time was reduced from 28 to 14 days and the CO_2 injection rate was reduced.

In November 2008, the JCGP completed work on the Jeff treat system. The JCGP was able to handle the additional acid gas, but struggled during peak periods of gas production at 02-02 & 06-02. During December 2008 & April 2009, 06-02 was shut in during peak CO_2 production periods at 02-02.

9.3 Salvage Update

Inasmuch as the pattern injector and producers will continue operation after the conclusion of the pilot, salvage opportunities are limited to the CO_2 injection facilities (CO_2 bullet and pipeline).

Pengrowth purged all acid gas & CO_2 lines upon completion of injection to reduce any environmental impact in the event of a flowline failure. All lines remain in place for future acid gas injection.

10. Interpretations and Conclusions

10.1 Overall Pilot Performance

Lessons learned & difficulties encountered

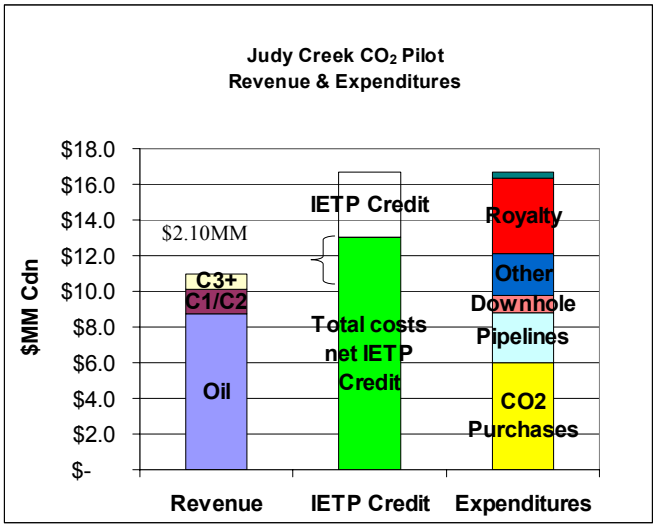
Increasing injectivity over time is thought to be at least partly the result of increasing reservoir permeability through dissolution of reservoir rock from CO_2 & water injection (carbonic acid). This resulted in installing a choke during water injection to manage VRR and WAG ratio, and multiple diagnostics to assess downhole isolation. Constraints on diagnostics existed based on the selection of isolation techniques (isolation with bridge plug) and downhole equipment, most notably the permanent packer. While alternate techniques may have increased flexibility for diagnostics, they would have also increased the risk of loss of isolation, in the case of a zonal isolation using only cementing and costs.

As expected, acid gas handling limitations were experienced when the injection target was increased above 20% HCPV. Modifications to the amine system and installing larger coolers helped to improve removal of acid gas, but some disruptions to pilot and gas plant operation were still experienced.

Technical & Economic Viability

The Judy Creek CO_2 pilot can be deemed technically successful as it has resulted in incremental oil production & hydrocarbon solvent (methane & ethane) from all pattern producers. As well, the ability to handle and inject a waste acid gas stream combined with purchased CO_2 has been demonstrated. As expected, due to the high cost of infrastructure and CO_2 purchases, the pilot will not generate positive economics, but will guide the design and forecasts for commercial scale development. See figure 9 for a breakdown of revenue & expenditures for the CO_2 Pilot.

Figure 9: Revenue & Expenditures for Judy Creek CO_2 Pilot



Overall Effect on Oil & Gas Recovery

The expected oil recovery from the pilot is ~3.4% OOIP (10,876 m^3). In addition 40 to 45% of previously injected hydrocarbon solvent will be recovered. Target recoveries were originally estimated at an incremental oil recovery 3.0% OOIP and 40% of previously injected hydrocarbon solvent.

Assessment of Commercial Field Application and Discussion of Reasons

Data is being used to update both simulation and analytical models for other reservoir types within Judy Creek such that full field commercial production forecasts can be updated. Operational data is also being used to advance engineering work in facility design.

Pengrowth is also working with, and sharing pilot results with, other Swan Hills Area operators to assess joint venture facilities and common CO_2 supply, to optimize capital investment in any future commercial development.

The economics of a commercial scale CO_2 scheme at Judy Creek continue to be updated, and the range of possible outcomes remains wide. Key drivers for the project remain CO_2 delivered costs, oil recovery, oil price, and the EOR royalty relief program. Alternative EOR royalty relief concepts to the current program have been investigated. Multiple development scenarios have now been formulated that account for: Reservoir quality (impacts on oil and solvent recovery), banksize, development pace, joint facilities, and joint CO_2 supply.

Energy and Material Balance Information for the Final Project Report

The following energy sources and produced materials for the period 2007 to 2010 were used or produced during this IETP project.

Type	amount	source	
Gross Balances:			
Electricity (MWh):	13,702	From Grid	
Steam:	None		
In-Situ Combustion:	None		
Process air:	None		
Fresh Water:	None		
Produced Materials			
Water (m3):	449,703		
Oil (m3):	14,122	41° API	
Diluents (m3):	None		
Sales Oil (m3):	14,122	41° API	no diluents used
Sand (m3):	None		
Gas (m3):	6,082,000		
Gas (GJ):	243,966		

The following table shows the electricity usage by site by year

Table: Electricity consumed (from grid):

Site	07-02	02-02	06-02	08-02	10-02	CO2 Skid	CO2 Booster	Acid Gas Plant	Total
	MWHrs	MWHrs	MWHrs	MWHrs	MWHrs	MWHrs	MWHrs	MWHrs	MWHrs
Year									
2007	20.0	1401.0	984.4	573.6	317.1	113.6	22.7	141.9	**5581.3**
2008	26.6	1424.0	970.3	573.0	222.1	128.1	25.6	160.1	**5537.8**
2009	22.1	1434.1	974.2	555.0	247.4	45.1	9.0	56.4	**5352.3**
2010	24.6	1327.1	1108.4	568.7	225.9	0.0	0.0	0.0	**5264.8**
Total	**93.4**	**5586.3**	**4037.3**	**2270.3**	**1012.5**	**286.7**	**57.3**	**358.4**	**13702.1**

PENGROWTH CORPORATION

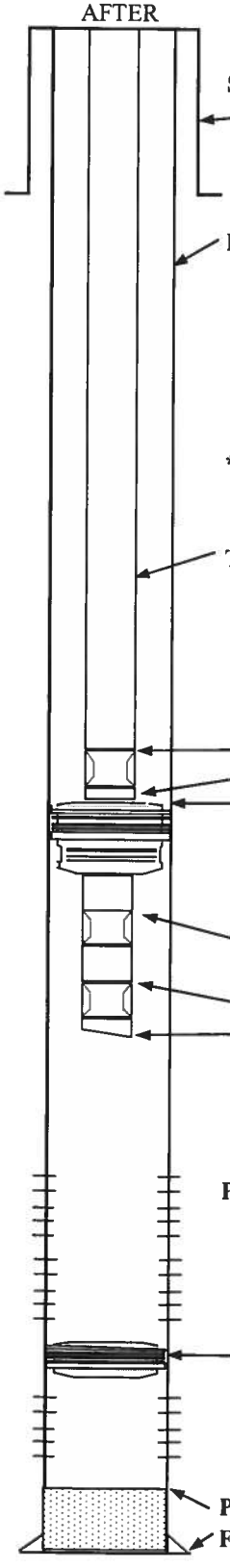
APPENDIX I
WELLBORE SCHEMATICS

INNOVATIVE ENERGY TECHNOLOGIES PROGRAM
2010 FINAL REPORT

JUDY CREEK PATTERN 102 CO_2 PILOT

AFTER

ACTUAL DOWNHOLE SCHEMATIC



SURFACE CASING

219 mm J-55, 35.7 kg/m to **390.0 mKB**

Well Name 07-02-64-11w5

Date 09/08/14

PRODUCTION CASING

139.7 mm 25.3 kg/m L-80 to **2706.29 m**

K.B. Elevation:	**1077.90 m**
K.B. to Dognut:	**4.46 m**
K.B. to C.F.:	**5.10 m**
K.B. to Ground:	**5.50 m**

***Note:** Tubing Hanger, 17-4PH S.S. Box by Pin Down "MMS"

Tubing

1 - 73.0 mm TK-99, MMS Tubing Joint
1 - 73.0 mm TK-99, MMS Pup Joints
270 - 73.0 mm TK-99, MMS Tubing Joints

73.0 mm TK-99, MMS Pup Joint
73.0 mm Otis "X" Nipple c/w 47.63 mm Profile at **2593.90 mKB** {Duplex 2205 S.S.}
68.3 mm Tryton "Latched" Seal Assy. **Incoloy 925.**
139.7 mm Tryton "TL" Sealbore Packer
c/w 68.3 mm Seal Assy, **Incoloy 925** material
Top of Packer at **2594.6 mKB**
60.3 mm Vam, FJL Pup Joint
60.3 mm Otis "X" Nipple c/w 47.63 mm Profile at **2597.16 mKB**
60.3 mm Vam, FJL Pup Joint
60.3 mm Otis "XN" Nipple c/w 47.63 mm Profile 45.49 mm NoGoat **2599.22 mKB**
60.3 mm Pump-Out / Re-entry Guide, Bottom at **2599.65 mKB**
***Note:** Above Sealbore Packer and Tail Pipe built from **Incoloy 925**

Perforations:

2632.0 - 2647.0
2648.3 - 2651.0
2652.0 - 2653.7

139.7 mm Drillable Permanent Bridgeplug at **2655.0 mKB Center Element**
2656.5 - 2657.5
2662.4 - 2663.4
2668.7 - 2674.2
2678.5 - 2681.2

P.B.D. 2729.6 mKB
F.T.D. 2743.2 mKB

AFTER

PENGROWYH JUDY CREEK

SURFACE CASING
273 mm, 60.27 kg/m
to 187.45 mKB

Location: 02-02-64-11W5
Date: 07-12-20

PRODUCTION CASING
139.7 mm K-55/N-80 23.1/25.3 kg/m
to 2685.28 mKB

K.B. Elevation:	**1057.66 m**
K.B. to C.F.:	**3.76 m**
K.B. to T.F.:	**2.90 m**
Licence:	**19329**

Tubing
1 - 73.0 mm Tbg Joint
4 - 73.0 mm Tbg Nipples (.18, .18, .18 & .23m)
260 - 73.0 mm Tbg Joints
1 - 73 mm Tryton "TXA" S.S.D. SR222 Coated c/w 174-PH Inner Sleeve
1 - 73.0 mm Pup Joint {TK-2}
1 - 73 mm "WJ" 2.25", 17-4PH Nipple

***Note:** 7.5 cable guards on **Cable #101669412** {8200ft}

73 mm Tryton "TXA" S.S.D. SR222 Coated c/w 174-PH Inner Sleeve at **2490.97mKB**
73mm EUE, J-55 Pup c/w TK-2 Interinal Coating
73 mm "WJ" 2.25", 17-4PH Nipple at **2494.39mKB**

Centrilift, Discharge, 2 7/8" EUE, 8RD	0.16 m
Centrilift,400PM, P22, 100 Stage Pump, s/n# 1035021	4.43 m
Centrilift,400PM, P22, 111 Stage Pump, s/n# 1035026	4.89 m
Centrilift, 400GSR M M/C, Gas Separator Intake, s/n#10434167	0.79 m
Centrilift, FSBB3 FER SSCV SB FER PFSA, Seal, s/n#10410576/10411508	3.42 m
Centrilift, FMF, 185 H.P., 2340V/53A, Motor, s/n#10308517	9.81 m
Centrilift, 400 series, Centaur 0-5,000 psi, PHD, SN#10434151	0.85 m
Motor Bottom at **2519.00 mKB**	**Total** **24.35 m**

Perforations:
2615.8 - 2642.6
2649.0 - 2655.5
2658.5 - 2661.5

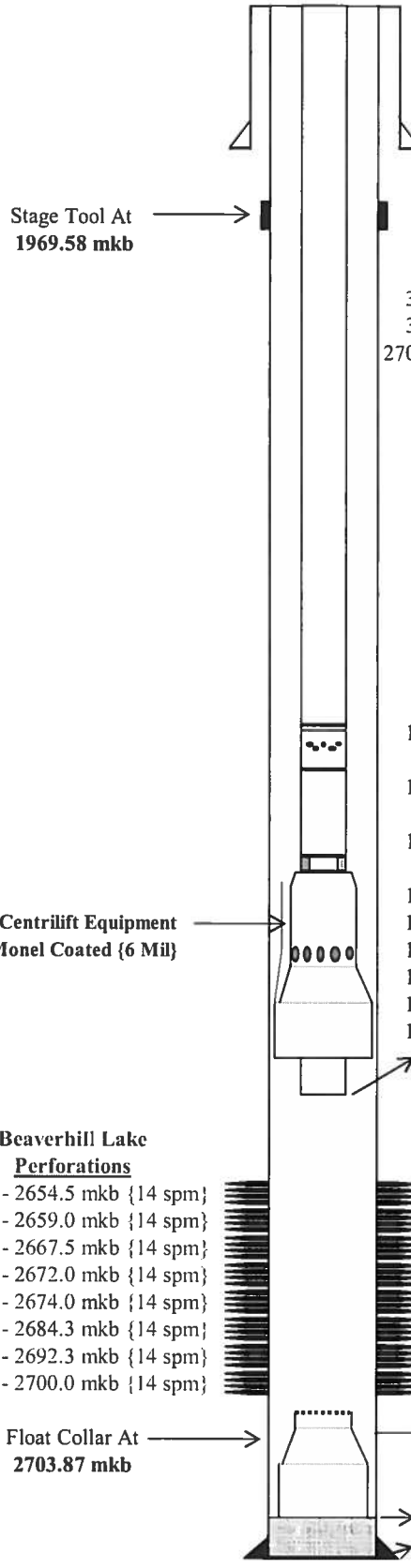
***Note: Complete** Unit Monel Coated

Wireline tagged bottom at 2660.1 mKB 07-05-13, SLICKLINE DEPTH 2659.7mKB
07-12-11

P.B.D. 2667.7 mKB
F.T.D. 2685.3 mKB

PENGROWTH - JUDY CREEK

Location	06-02-64-11w5
License #	238805
Date	May 13, 2009
KB Elev:	1097.12 m
KB-CF:	5.22 m
KB-TH:	4.66 m



SURFACE CASING
244.5 mm, 53.6 kg/m "Soo-55" To **408.0 mkb.**
PRODUCTION CASING
177.8 mm, 34.2 kg/m, L-80 To **2078.37 mkb.**
177.8 mm, 38.7 kg/m, L-80 To **2719.0 mkb.**

Stage Tool At **1969.58 mkb**

TUBING
3 - 73mm EUE , 9.67 kg/m, J-55 Pup Joint., 2.47m, 3.04m & 2.91m (pin x pin)
3 73mm EUE, J-55 Tubing Nipples {0.28m, 0.20m, 0.23m}.
270 - 73mm EUE, 9.67 kg/m, J-55 Tubing Joints.

CABLE
*Note: Cable #101884860 {8400'}. #4 CELF.
***Note: Green Seal II Pipe Thread Compound Used.**
*Note: All Equipment Monel Coated {6 MIL}.
***Note: NO Cable Guards On Equipment {none in Centrilift stock}**
7 - Monel Bands To Top Of MLE Splice.

1 - 73mm EUE "XA" Sliding Sleeve w/ 58.75mm "Otis X" Profile At **2596.54 mkb.**

1 - 73mm x 1.83m EUE, 9.67 kg/m, J-55 Pup Joint {TK-2 Internal} - New.

1 - 73mm EUE "WJ" Nipple w/ 57.15mm Bore {Impreglon SR222} At **2599.32 mkb.**

All Centrilift Equipment Is Monel Coated {6 Mil}

1 - Centrilift 73mm EUE B.O.D. At **2599.58 mkb.**	0.16 m
1 - Centrilift 538 Series 538PM P23, 81 - Stage Pump	3.03 m
1 - Centrilift 513 Series GSB3 FER SSCV VB Seal.	0.99 m
1 - Centrilift 513 Series GSB3 SSCV FER FSA LT Seal.	3.04 m
1 - Centrilift 562 Series KMHG 152 hp, 2350v / 40a Motor.	4.67 m
1 - Centrilift 450 Series Centinel 0-5000 PHD.	0.79 m
PHD Bottom At **2613.08 mkb.**	12.68 m

Beaverhill Lake Perforations

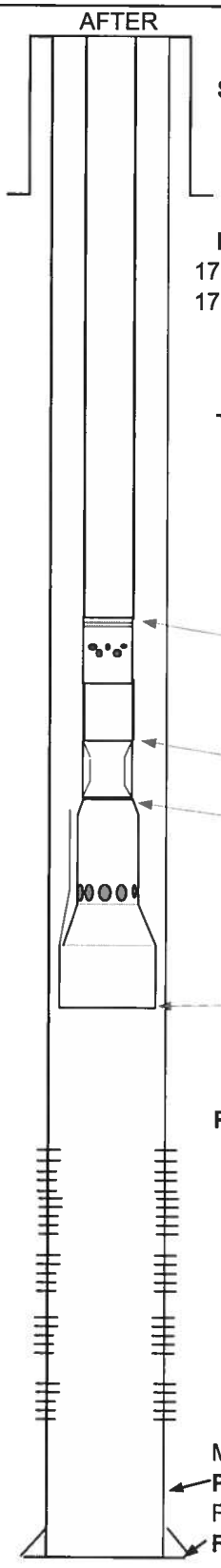
2653.0 - 2654.5 mkb {14 spm}	R5B
2655.8 - 2659.0 mkb {14 spm}	R5B
2660.5 - 2667.5 mkb {14 spm}	R5B
2668.5 - 2672.0 mkb {14 spm}	R5A
2673.0 - 2674.0 mkb {14 spm}	R5A
2681.0 - 2684.3 mkb {14 spm}	R4
2691.0 - 2692.3 mkb {14 spm}	R3
2698.2 - 2700.0 mkb {14 spm}	R2

Marker Casing Joint At 2644.1 mkb - 2648.2 mkb

Float Collar At **2703.87 mkb**

Top Of Fish At +/- **2702.81 mkb.**
Centrilift Esp Assembly. Parted At 513 Series Rotary Gas Separator Intake.
Total Fish Length - 8.79m.

PBD At **2711.6 mkb**
FTD At **2719.0 mkb**



DOWNHOLE SCHEMATIC

SURFACE CASING
244.5 mm, K-55, 53.6 kg/m at **228.63 mKB**

Well Name 08-02-64-11 W5
Date 09/08/14

PRODUCTION CASING
177.8 mm, 34.23 kg/m, MN-80 to **1973.73 m**
177.8 mm, 38.69 kg/m, L-80 to **2683.0 m**

K.B. Elevation;	**1057.88** M
K.B. to C.F.;	**5.50** M
K.B. to T.H.;	**4.92** M

TUBING
3 - 73.0 mm Pup Joints
1- 73 MM Nipple.
257 - 73.0 mm Tubing Joints

1 - 73.0 mm Otis "XA" S.S.D. c/w 2.313" Profile at **2534.62 mKB**

1 - 73.0 mm {New} Pup Joint

1 - 73.0 mm "WJ" Nipple c/w 2.25" I.D., at **2537.9 mKB**
No "WJ" Valve

1 - Centrilift 232 Stage, FC-925, FPMT-N-BOD		6.45 m
1 - Centrilift GSFC3 FER BAR Seal		1.51 m
1 - Centrilift GSFB3 LT FER VB SSCV		1.51 m
1 - Centrilift FRSX/GSX Adaptor {400 Intake, 513 Seal}		0.03 m
1 - Centrilift FRSX FER BAR Intake		0.8 m
1 - Centrilift KME1 65 H.P., 1250V/30A Motor		2.52 m
Motor bottom at **2550.19 mKB**	**Total**	**12.82 m**

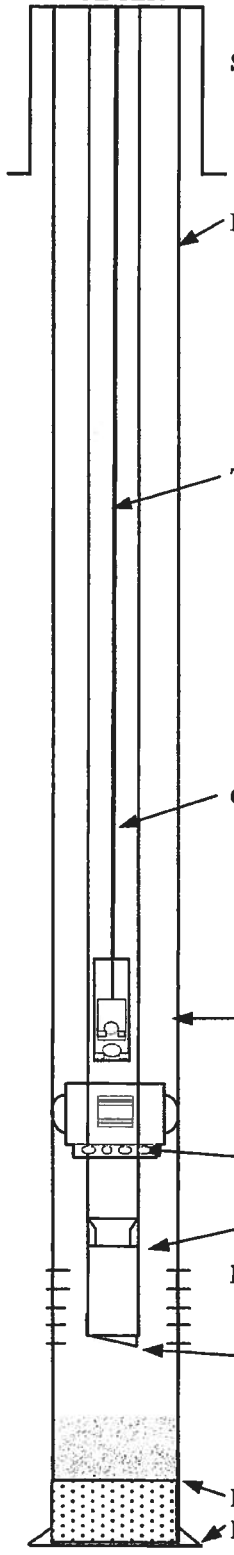
PERFORATIONS:

2610.0 - 2613.5	{UR5B}
2614.5 - 2619.0	{LR5B}
2624.0 - 2629.0	{R5A}
2645.0 - 2646.5	{R3}
2650.0 - 2656.0	{R2}

Marker Joint at 2580.17 mKB
P.B.D. 2663.0 mKB
Float Collar at **2668.56 m**
F.T.D. 2683.0 mKB

AFTER

ACTUAL DOWNHOLE SCHEMATIC



SURFACE CASING
244.5 mm IK-55, 53.6 kg/m
to **181.83 mKB**

Well Name 10-02-064-11w5
Date 10-04-30

PRODUCTION CASING
177.8mm , 38.69 kg/m, L-80, set @ 2700.0 mkb

K.B. Elevation:	**1089.43** m
K.B. to C.F.:	**4.6** m
K.B. to T.H.:	**4.05** m
Ground:	m

Split "FMC Tubing Hanger
Tubing 1 - 73.0 mm 3.05m pup jt
276 - 73.0 mm 8 RD, EUE, 9.67 kg/m "ERW" Tubing Joints
***Note:** Tubing in 5,000 daN Tension

POLISH ROD, 38.1m x 9.1 m. (used)

Corod String# SM73-150-84-4933M Reconditioned April 23 / 2010
- 7, 182 m
- 6, 269 m
- 5, 268 m
- 4, 296 m-new
- 3, 1371 m - new

Bottomhole Pump # SWCA-090019-25-150-RHBA-20-6-4 Insert Anchor
PUMP SET DEPTH: 2400 MKB
SUSPECT HOLES IN TUBING AT, 2504 MKB, 2570 MKB **AND AT** 2627 MKB

177.8mm Guiberson "TM" Tubing Anchor At **2620.08** MKB, 35,000# Shear
2 - jts 73.0 mm EUE tubing

73.0mm Pacific Combination PSN C/W 2.28" Bore at **2640.16** mkb
Perforations:
2647.0 - 2687.0 mkb

Tubing bottom at **2688.5 mkb mKB**

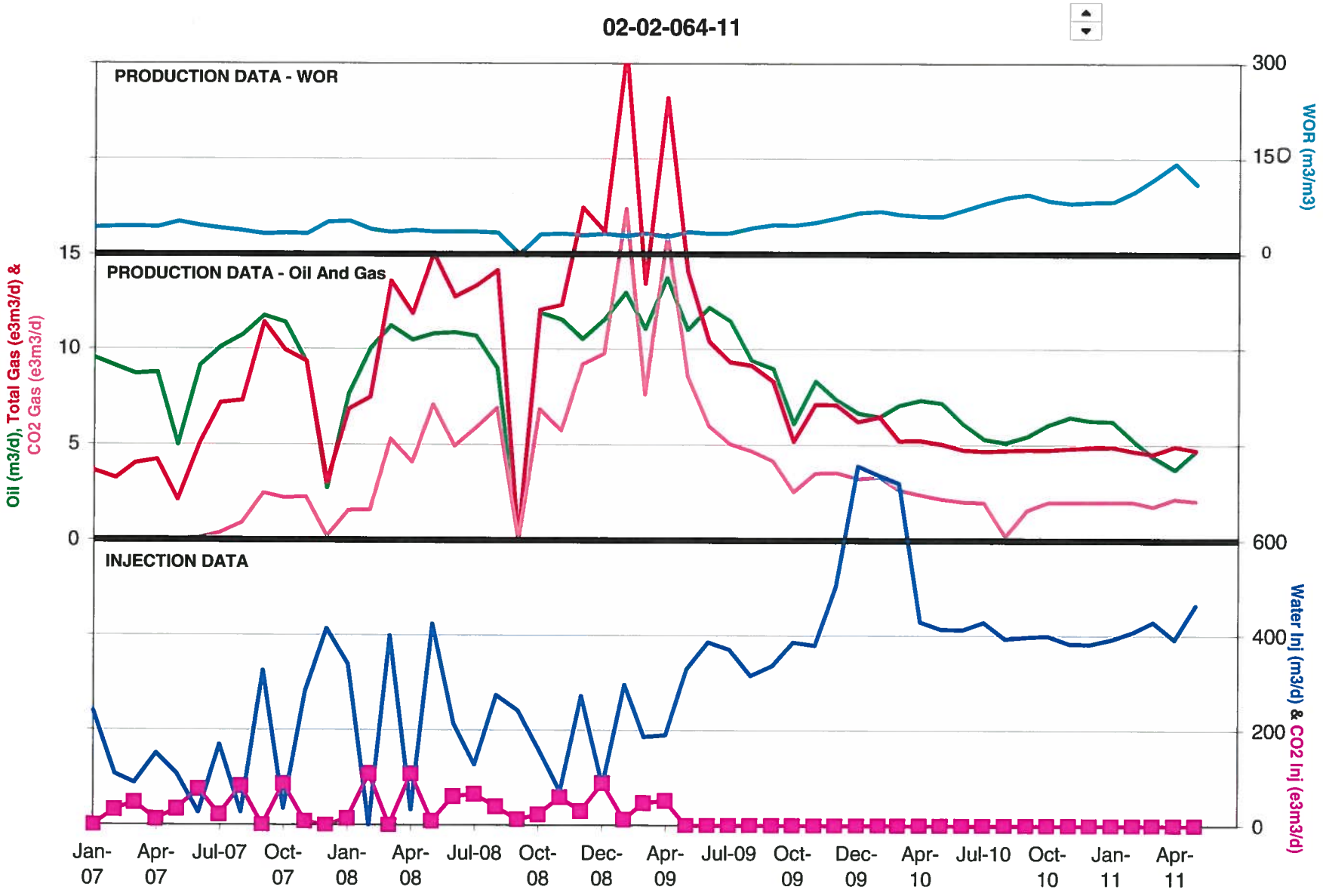
P.B.D.
F.T.D.

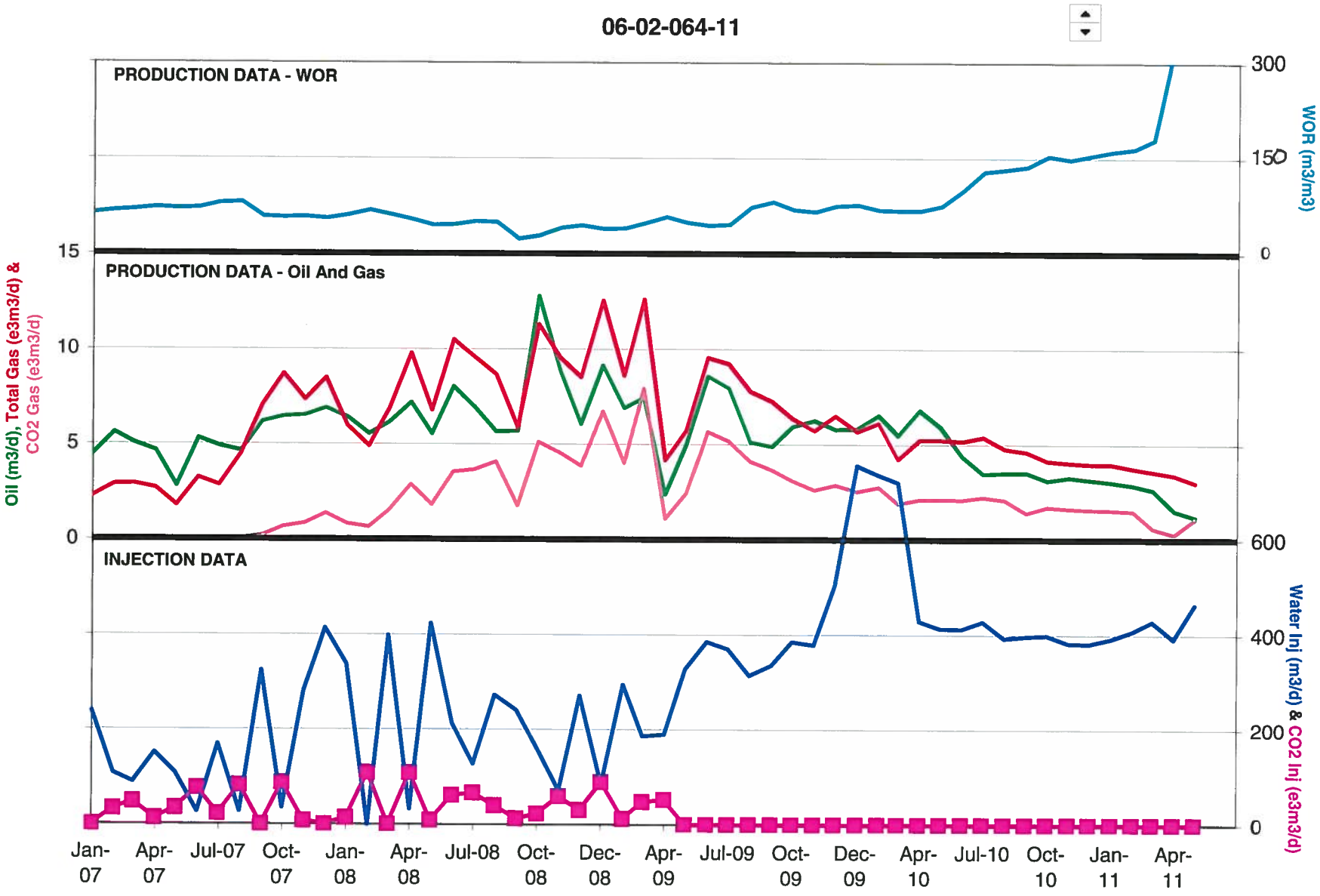
PENGROWTH CORPORATION

APPENDIX II
PRODUCTION DATA

INNOVATIVE ENERGY TECHNOLOGIES PROGRAM
2010 FINAL REPORT

JUDY CREEK PATTERN 102 CO_2 PILOT


02-02-064-11
PRODUCTION DATA - WOR
PRODUCTION DATA - Oil And Gas
INJECTION DATA
Oil (m3/d), Total Gas (e3m3/d) &
CO2 Gas (e3m3/d)
WOR (m3/m3)
Water Inj (m3/d) & CO2 Inj (e3m3/d)
300
150
0
15
10
5
0
600
400
200
0
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Dec-08
Apr-09
Jul-09
Oct-09
Dec-09
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11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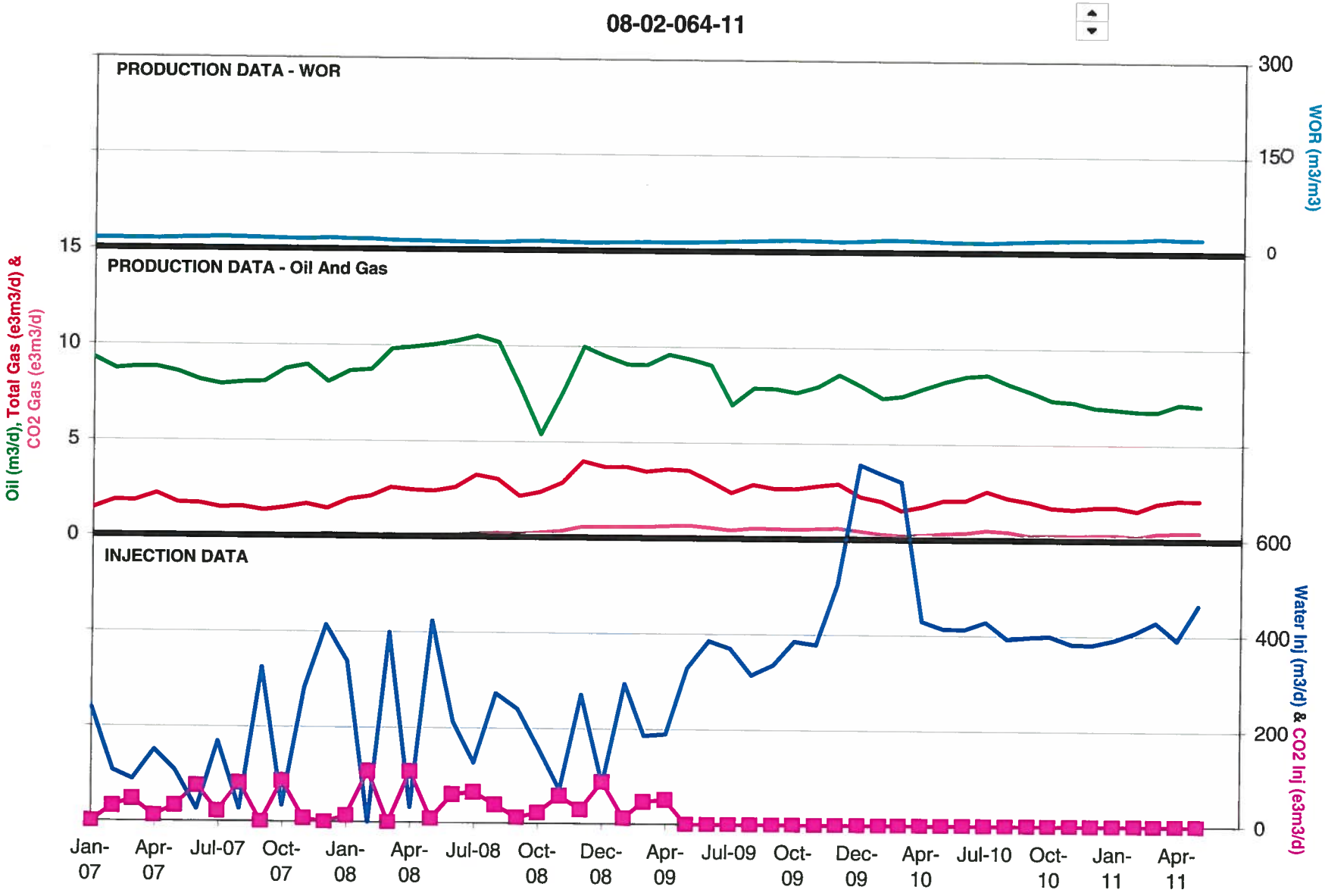
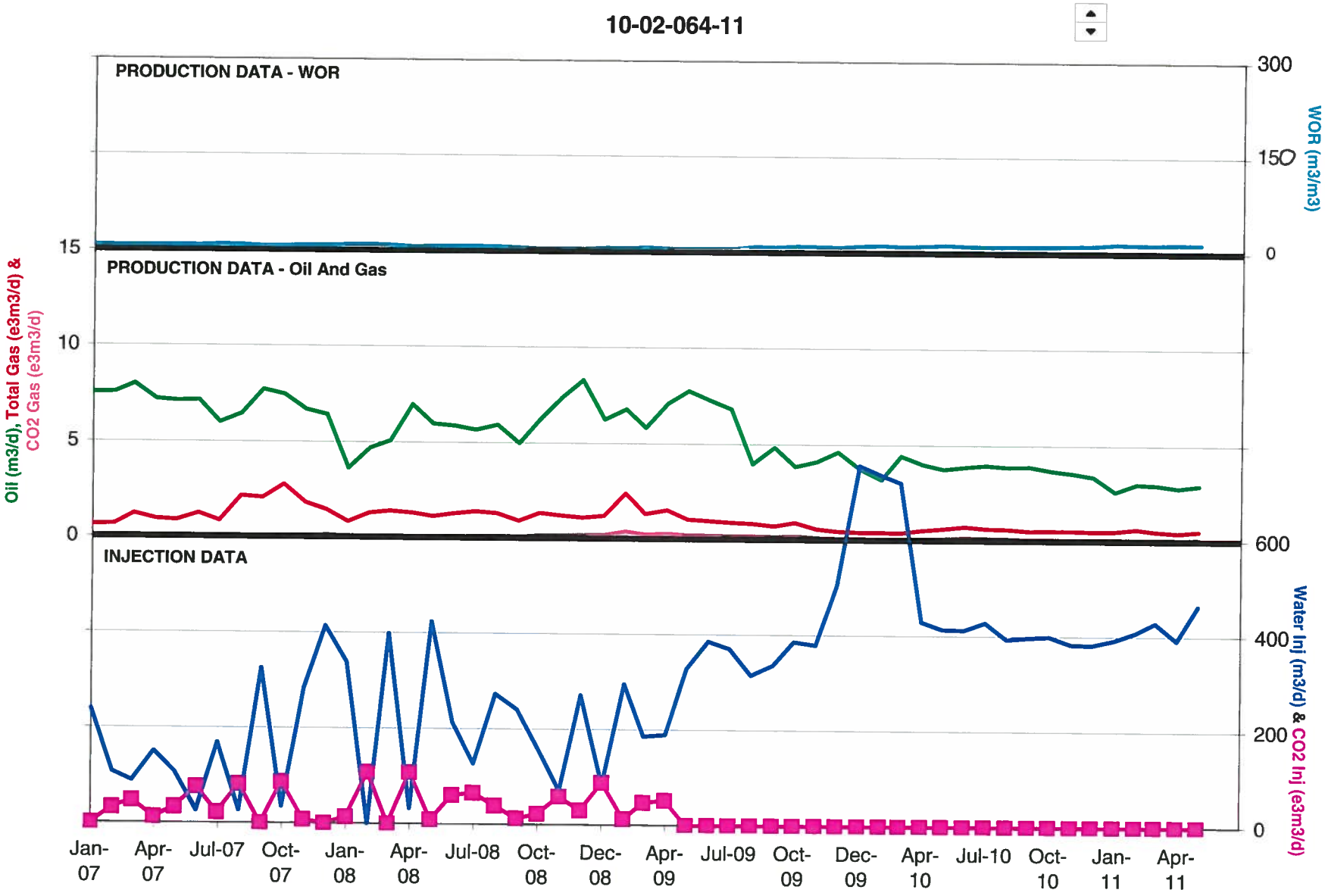
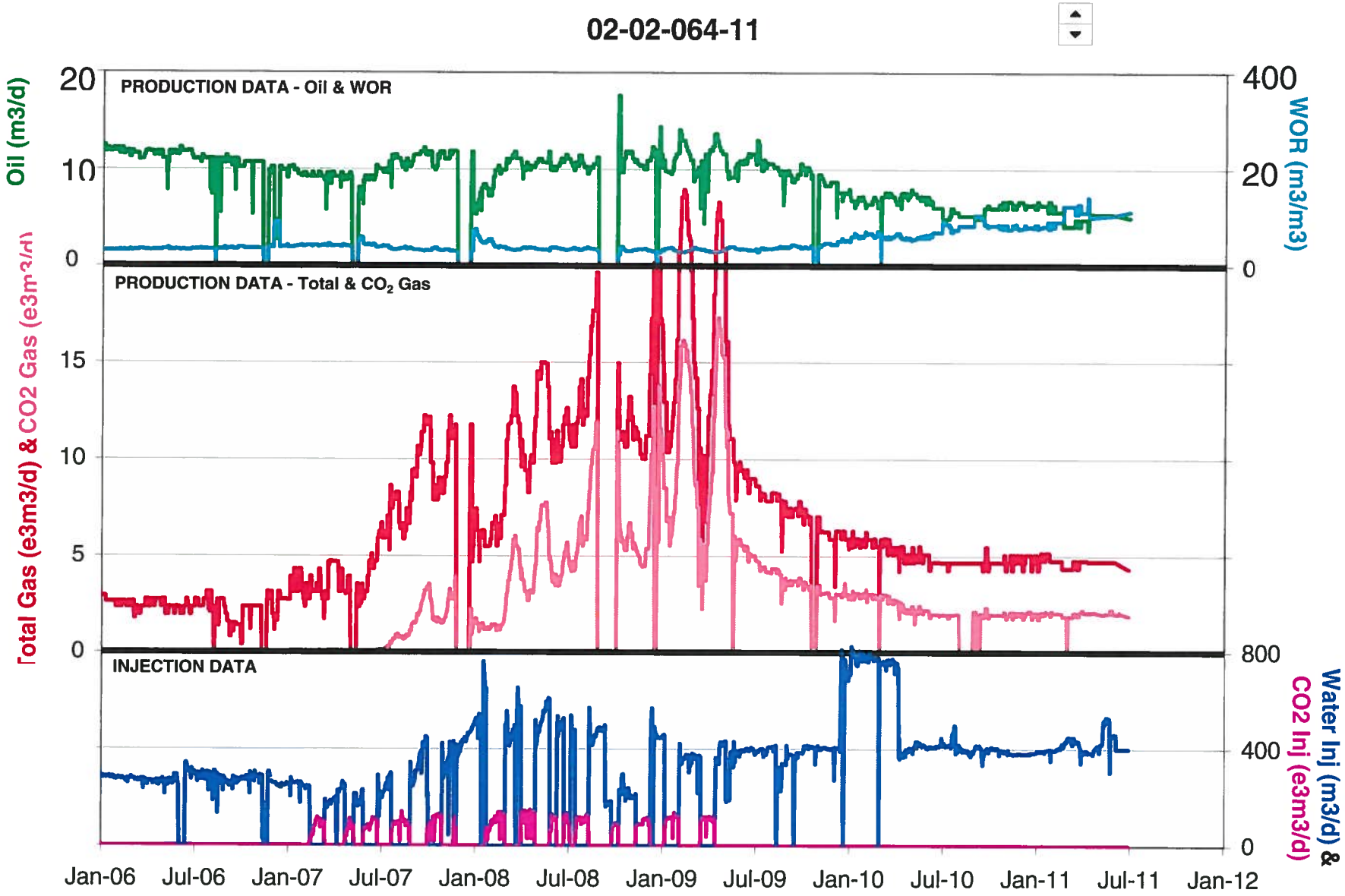
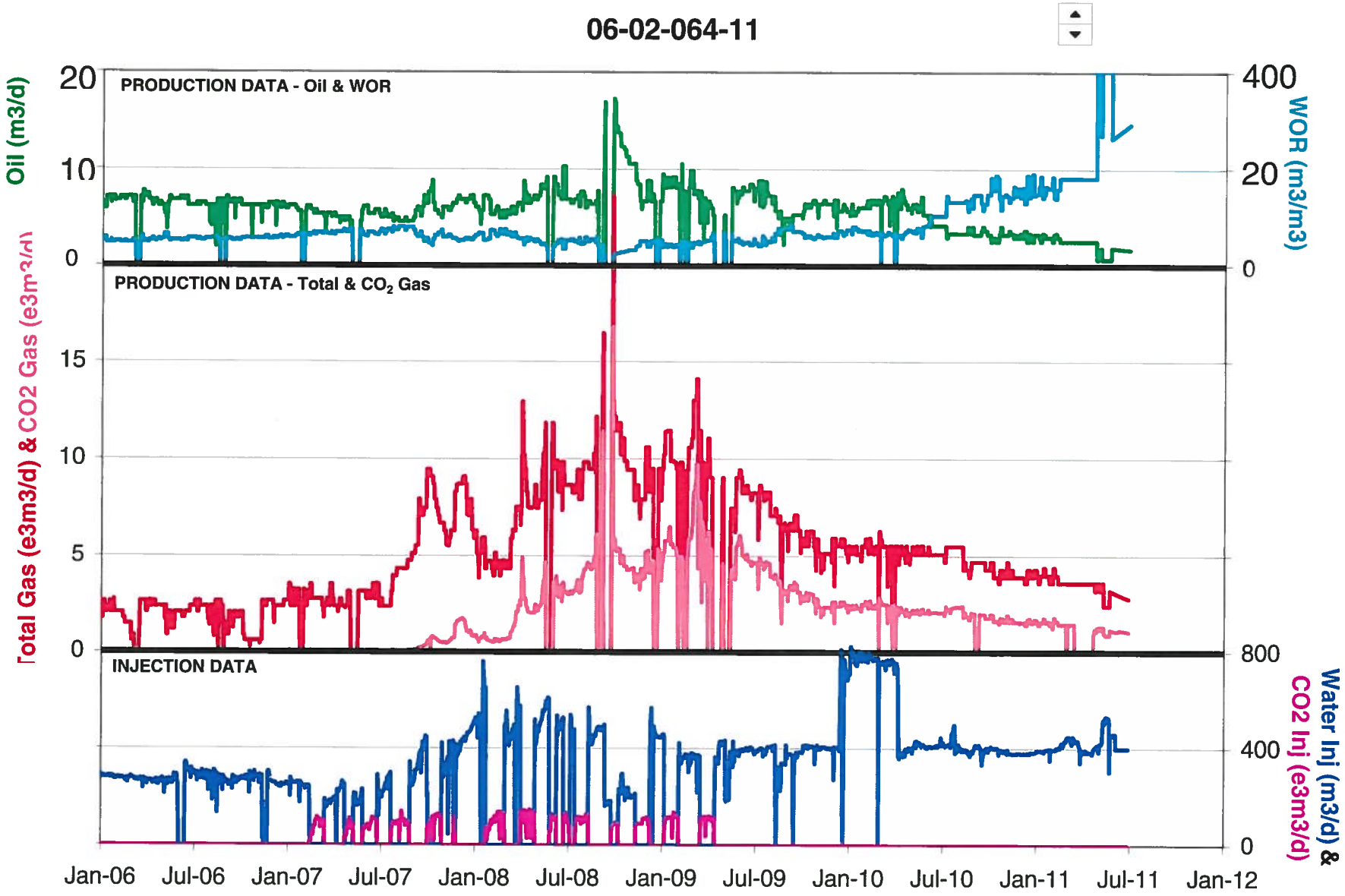
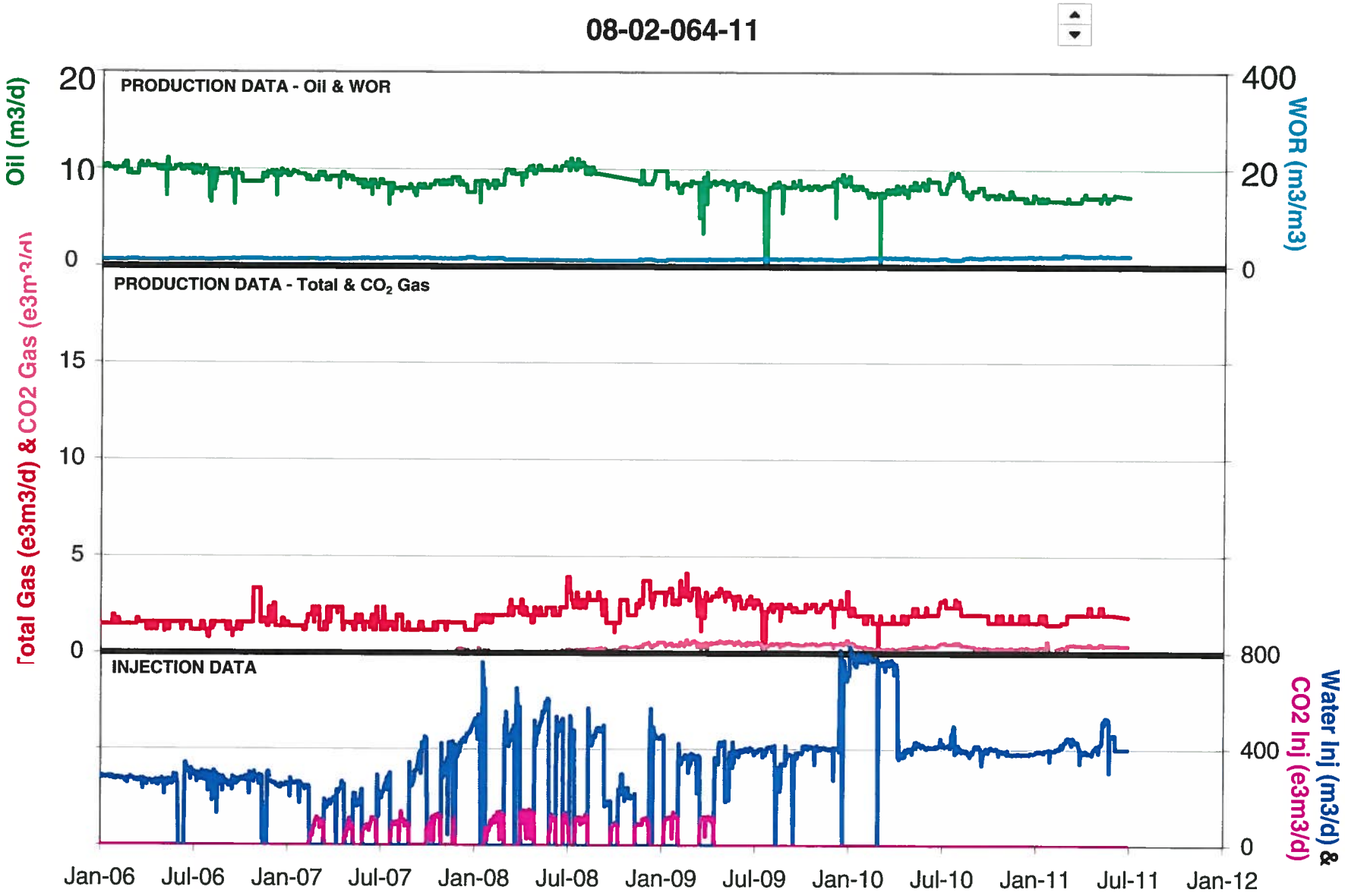
PRODUCTION DATA - WOR
WOR (m3/m3)
300
150
0
15
PRODUCTION DATA - Oil And Gas
Oil (m3/d), Total Gas (e3m3/d) &
CO2 Gas (e3m3/d)
10
5
0
600
INJECTION DATA
400
200
0
Water Inj (m3/d) & CO2 Inj (e3m3/d)
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Dec-08
Apr-09
Jul-09
Oct-09
Dec-09
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11

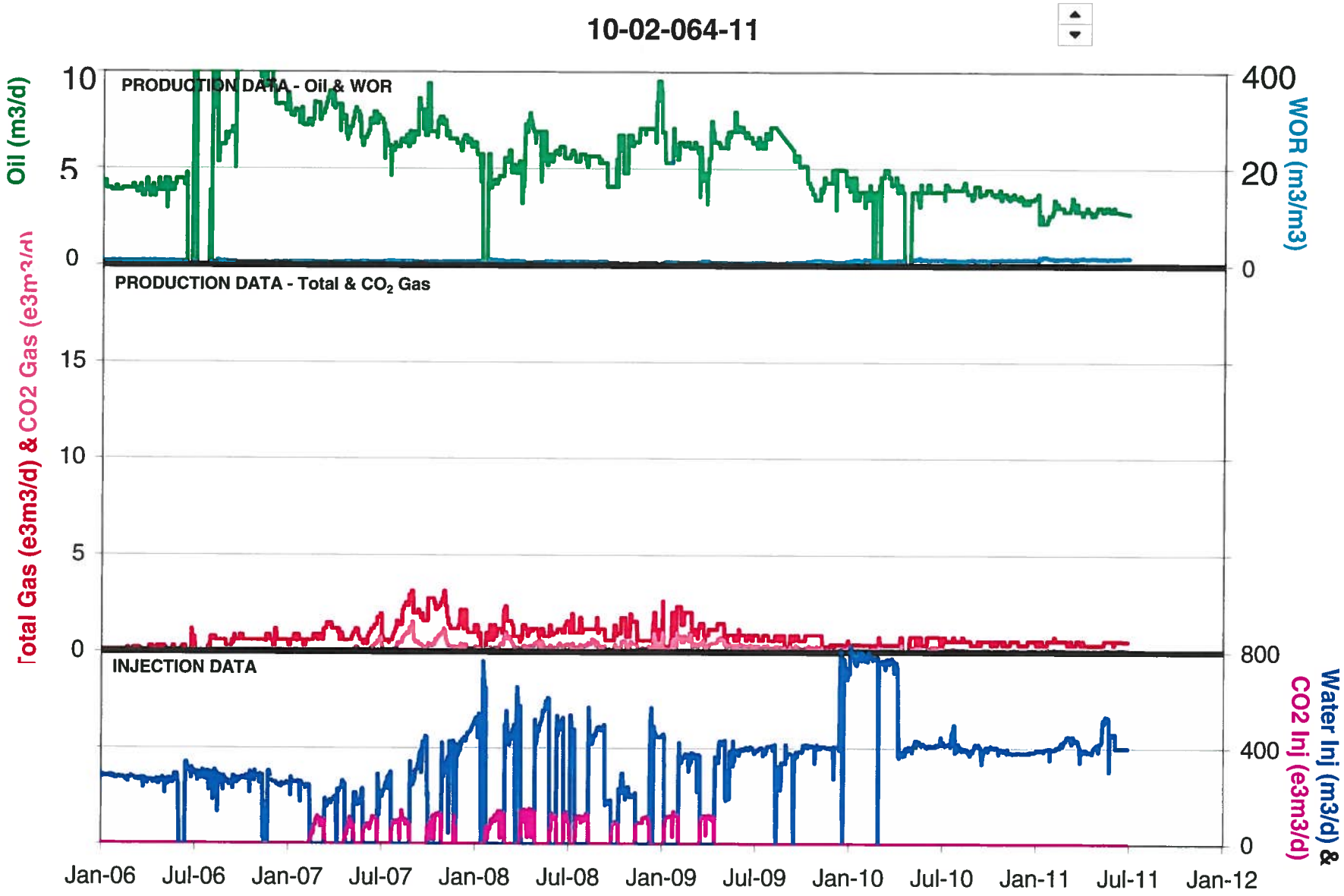

08-02-064-11
PRODUCTION DATA - WOR
PRODUCTION DATA - Oil And Gas
INJECTION DATA
Oil (m3/d), Total Gas (e3m3/d) &
CO2 Gas (e3m3/d)
WOR (m3/m3)
Water Inj (m3/d) & CO2 Inj (e3m3/d)
300
150
0
15
10
5
0
600
400
200
0
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Dec-08
Apr-09
Jul-09
Oct-09
Dec-09
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11


10-02-064-11
PRODUCTION DATA - WOR
PRODUCTION DATA - Oil And Gas
INJECTION DATA
Oil (m3/d), Total Gas (e3m3/d) &
CO2 Gas (e3m3/d)
WOR (m3/m3)
Water Inj (m3/d) & CO2 Inj (e3m3/d)
300
150
0
15
10
5
0
600
400
200
0
Jan-07
Apr-07
Jul-07
Oct-07
Jan-08
Apr-08
Jul-08
Oct-08
Dec-08
Apr-09
Jul-09
Oct-09
Dec-09
Apr-10
Jul-10
Oct-10
Jan-11
Apr-11


02-02-064-11
PRODUCTION DATA - Oil & WOR
PRODUCTION DATA - Total & CO_2 Gas
INJECTION DATA
Oil (m3/d)
Total Gas (e3m3/d) & CO2 Gas (e3m3/d)
WOR (m3/m3)
Water Inj (m3/d) & CO2 Inj (e3m3/d)
20
10
0
15
5
400
800
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12


06-02-064-11
PRODUCTION DATA - Oil & WOR
PRODUCTION DATA - Total & CO_2 Gas
INJECTION DATA
Oil (m3/d)
Total Gas (e3m3/d) & CO2 Gas (e3m3/d)
WOR (m3/m3)
Water Inj (m3/d) & CO2 Inj (e3m3/d)
20
10
0
15
5
400
800
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12


08-02-064-11
PRODUCTION DATA - Oil & WOR
Oil (m3/d)
WOR (m3/m3)
20
10
0
400
20
0
PRODUCTION DATA - Total & CO_2 Gas
Total Gas (e3m3/d) & CO2 Gas (e3m3/d)
15
10
5
0
INJECTION DATA
800
400
0
Water Inj (m3/d) & CO2 Inj (e3m3/d)
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12


10-02-064-11
PRODUCTION DATA - Oil & WOR
PRODUCTION DATA - Total & CO_2 Gas
INJECTION DATA
Oil (m3/d)
Total Gas (e3m3/d) & CO2 Gas (e3m3/d)
WOR (m3/m3)
Water Inj (m3/d) & CO2 Inj (e3m3/d)
10
5
0
15
10
5
0
400
20
0
800
400
0
Jan-06
Jul-06
Jan-07
Jul-07
Jan-08
Jul-08
Jan-09
Jul-09
Jan-10
Jul-10
Jan-11
Jul-11
Jan-12

07-02-064-11

	Water Inj	CO2 Inj	Water Inj	CO2 Inj	Cal. Day CO2 Inj	Prod. Day CO2 Inj	Injection Gas Composition											
	days	days	m3/d	e3m3	e3m3/d	e3m3/d	N2	CO2	H2S	C1	C2	C3	IC4	NC4	IC5	NC5	C6	C7+	OTHER
1/1/2007	31	0	238.4	0.0	0.0	0.0	-	-	-	-	-	-	-						-
2/1/2007	13	15	107.6	904.6	32.3	60.3	0.00%	99.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%
3/1/2007	16	15	88.5	1471.8	47.5	98.1	0.00%	99.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%
4/1/2007	23	7	150.9	375.5	12.5	53.6	0.00%	98.79%	0.98%	0.03%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.18%
5/1/2007	18	13	107.2	1050.8	33.9	80.8	0.00%	98.08%	1.68%	0.06%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.17%
6/1/2007	5	25	26.5	2277.1	75.9	91.1	0.00%	98.88%	0.80%	0.03%	0.00%	0.01%	0.00%	0.01%	0.01%	0.01%	0.02%	0.07%	0.16%
7/1/2007	23	8	169.1	685.0	22.1	85.6	0.00%	99.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%
8/1/2007	4	27	27.0	2542.2	82.0	94.2	0.00%	98.25%	1.53%	0.03%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.16%
9/1/2007	30	0	324.9	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10/1/2007	3	28	35.0	2701.8	87.2	96.5	0.00%	98.44%	1.31%	0.04%	0.04%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.17%
11/1/2007	26	4	282.3	244.5	8.1	61.1	0.00%	98.25%	1.55%	0.03%	0.02%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%
12/1/2007	31	0	413.4	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1/1/2008	23	8	337.9	437.6	14.1	54.7	0.00%	98.53%	1.26%	0.02%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.15%
2/1/2008	0	29	0.0	3146.4	108.5	108.5	0.00%	98.61%	1.20%	0.02%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.16%
3/1/2008	31	0	398.3	0.0	0.0	0.0	0.00%	98.83%	0.97%	0.02%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.16%
4/1/2008	2	28	32.5	3253.3	108.4	116.2	0.00%	98.53%	1.19%	0.10%	0.02%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.15%
5/1/2008	27	4	423.6	275.0	8.9	68.8	0.00%	99.80%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%
6/1/2008	13	17	213.2	1815.9	60.5	106.8	0.00%	98.74%	1.06%	0.03%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.15%
7/1/2008	10	21	127.0	2047.5	66.0	97.5	0.00%	98.31%	1.47%	0.03%	0.03%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%
8/1/2008	20	11	272.6	1228.7	39.6	111.7	0.00%	98.65%	1.03%	0.03%	0.08%	0.01%	0.01%	0.00%	0.02%	0.02%	0.01%	0.00%	0.14%
9/1/2008	25	5	240.6	381.6	12.7	76.3	0.00%	98.76%	0.97%	0.03%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.03%	0.16%
10/1/2008	23	8	160.2	711.5	23.0	88.9	0.00%	97.96%	1.70%	0.07%	0.11%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.14%
11/1/2008	11	19	71.1	1772.8	59.1	93.3	0.00%	98.17%	1.50%	0.06%	0.09%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.14%
12/1/2008	22	9	271.3	936.3	30.2	104.0	0.00%	98.03%	1.61%	0.05%	0.15%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%
1/1/2009	7	24	83.9	2766.1	89.2	115.3	0.00%	98.68%	1.13%	0.03%	0.01%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%
2/1/2009	24	4	295.1	360.3	12.9	90.1	0.00%	98.44%	1.28%	0.05%	0.05%	0.01%	0.02%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%
3/1/2009	17	14	186.4	1479.8	47.7	105.7	0.00%	98.56%	1.19%	0.03%	0.06%	0.01%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.14%
4/1/2009	16	14	189.9	1565.4	52.2	111.8	0.00%	98.12%	1.45%	0.19%	0.10%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.13%
5/1/2009	31	0	328.4	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
6/1/2009	30	0	385.7	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
7/1/2009	31	0	370.5	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
8/1/2009	31	0	315.0	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
9/1/2009	30	0	336.1	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10/1/2009	31	0	385.8	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
11/1/2009	30	0	378.9	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
12/1/2009	31	0	504.1	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
1/1/2010	31	0	755.6	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2/1/2010	28	0	735.8	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
3/1/2010	31	0	719.7	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
4/1/2010	30	0	429	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
5/1/2010	31	0	413.6	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
6/1/2010	30	0	412.4	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
7/1/2010	31	0	428.0	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
8/1/2010	31	0	393.1	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
9/1/2010	30	0	397.1	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
10/1/2010	31	0	399.3	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
11/1/2010	30	0	383.1	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
12/1/2010	31	0	382.3	0.0	0.0	0.0	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

02-02-064-11

	Oil	Total Fluid	Gas	CO2	Produced Gas Composition											
	m3/d	m3/d	e3m3/d	e3m3/d	N2	CO2	C1	C2	C3	NC4	IC4	NC5	C5	C6	C7	H2S
1/1/2007	9.53	406.68	3.61	0.077	2.74%	2.13%	56.08%	24.91%	7.47%	2.85%	1.04%	0.83%	0.71%	1.16%	0.00%	0.08%
2/1/2007	9.08	399.46	3.22	0.069	2.74%	2.13%	56.08%	24.91%	7.47%	2.85%	1.04%	0.83%	0.71%	1.16%	0.00%	0.08%
3/1/2007	8.7	387.1	4.01	0.085	2.74%	2.13%	56.08%	24.91%	7.47%	2.85%	1.04%	0.83%	0.71%	1.16%	0.00%	0.08%
4/1/2007	8.78	382.72	4.2	0.089	2.74%	2.13%	56.08%	24.91%	7.47%	2.85%	1.04%	0.83%	0.71%	1.16%	0.00%	0.08%
5/1/2007	5	259.99	2.1	0.047	2.79%	2.22%	56.51%	24.04%	7.32%	2.87%	1.03%	0.89%	0.75%	1.49%	0.00%	0.08%
6/1/2007	9.13	414.08	5.06	0.099	2.61%	1.95%	54.18%	27.82%	6.41%	2.61%	0.91%	0.90%	0.74%	1.81%	0.00%	0.07%
7/1/2007	10.09	416.12	7.18	0.374	2.19%	5.21%	48.72%	33.11%	4.94%	2.03%	0.70%	0.77%	0.64%	1.65%	0.00%	0.06%
8/1/2007	10.71	401.99	7.31	0.901	1.99%	12.32%	44.64%	30.85%	4.63%	1.90%	0.65%	0.73%	0.59%	1.63%	0.00%	0.07%
9/1/2007	11.74	381.19	11.41	2.445	1.73%	21.43%	38.81%	28.91%	3.88%	1.61%	0.54%	0.64%	0.51%	0.64%	0.95%	0.10%
10/1/2007	11.39	390.03	9.95	2.191	1.79%	22.02%	39.93%	26.38%	4.27%	1.77%	0.59%	0.68%	0.56%	0.61%	1.05%	0.13%
11/1/2007	9.3	306.04	9.36	2.245	1.53%	23.99%	35.03%	24.16%	3.67%	1.53%	0.51%	0.60%	0.47%	0.54%	0.95%	0.15%
12/1/2007	2.73	139.4	3.04	0.196	0.59%	6.44%	12.39%	6.41%	1.51%	0.59%	0.21%	0.20%	0.16%	0.15%	0.24%	0.06%
1/1/2008	7.66	404.84	6.85	1.556	1.85%	22.72%	40.49%	23.79%	4.90%	2.06%	0.69%	0.76%	0.62%	0.64%	1.03%	0.22%
2/1/2008	10.03	400.56	7.49	1.578	1.82%	21.07%	41.46%	24.52%	4.86%	2.03%	0.69%	0.75%	0.61%	0.65%	1.05%	0.23%
3/1/2008	11.21	394.68	13.59	5.288	1.27%	38.91%	30.64%	20.70%	3.42%	1.45%	0.48%	0.58%	0.45%	0.53%	0.97%	0.35%
4/1/2008	10.46	402.48	11.88	4.068	1.40%	34.24%	33.59%	21.69%	3.76%	1.60%	0.53%	0.63%	0.50%	0.57%	1.02%	0.35%
5/1/2008	10.79	388.95	15.07	7.108	1.15%	47.16%	26.53%	18.27%	2.46%	1.26%	0.41%	0.51%	0.40%	0.48%	0.93%	0.44%
6/1/2008	10.85	389.77	12.76	4.918	1.27%	38.55%	30.56%	20.74%	3.63%	1.49%	0.50%	0.59%	0.48%	0.54%	0.98%	0.41%
7/1/2008	10.67	382.5	13.33	5.870	1.17%	44.03%	27.93%	18.56%	3.35%	1.40%	0.46%	0.56%	0.45%	0.52%	0.96%	0.45%
8/1/2008	8.99	310.05	14.17	6.917	1.15%	48.81%	26.27%	15.85%	3.26%	1.32%	0.45%	0.50%	0.41%	0.44%	0.82%	0.46%
9/1/2008	0	0	0	0.000	0.20%	2.55%	4.17%	2.00%	0.54%	0.21%	0.07%	0.06%	0.05%	0.04%	0.03%	0.02%
10/1/2008	11.9	379.55	12.07	6.850	0.84%	56.76%	21.08%	14.24%	2.73%	1.18%	0.39%	0.47%	0.37%	0.43%	0.79%	0.60%
11/1/2008	11.54	386.49	12.33	5.742	1.03%	46.57%	26.29%	17.80%	3.41%	1.43%	0.47%	0.56%	0.44%	0.51%	0.95%	0.48%
12/1/2008	10.51	321.52	17.45	9.202	0.97%	52.73%	23.73%	14.50%	3.20%	1.34%	0.45%	0.52%	0.41%	0.47%	0.84%	0.54%
1/1/2009	11.54	378.71	16.20	9.775	0.70%	60.35%	19.10%	12.88%	2.46%	1.11%	0.36%	0.46%	0.36%	0.44%	0.88%	0.65%
2/1/2009	12.96	386.33	25.62	17.395	0.58%	67.90%	15.99%	11.04%	0.73%	0.94%	0.30%	0.40%	0.31%	0.40%	0.84%	0.74%
3/1/2009	11.06	373.05	13.44	7.640	0.71%	56.84%	21.05%	14.37%	2.42%	1.19%	0.39%	0.48%	0.38%	0.46%	0.91%	0.63%
4/1/2009	13.75	394.29	23.19	16.058	0.37%	69.26%	14.54%	9.95%	1.93%	0.88%	0.28%	0.37%	0.29%	0.37%	0.83%	0.75%
5/1/2009	11.00	394.30	14.10	8.596	0.43%	60.95%	15.63%	10.23%	2.13%	0.97%	0.31%	0.41%	0.32%	0.39%	0.83%	0.70%
6/1/2009	12.18	404.76	10.41	5.998	0.53%	57.60%	20.68%	13.25%	2.89%	1.29%	0.42%	0.52%	0.42%	0.49%	0.96%	0.72%
7/1/2009	11.46	392.78	9.34	5.045	0.64%	54.04%	22.77%	13.99%	3.14%	1.41%	0.46%	0.56%	0.48%	0.52%	1.02%	0.71%
8/1/2009	9.40	396.58	9.16	4.673	1.37%	51.01%	24.51%	14.29%	3.29%	1.47%	0.48%	0.58%	0.51%	0.54%	1.06%	0.64%
9/1/2009	8.98	420.79	8.33	4.150	1.12%	49.82%	25.44%	14.44%	3.43%	1.53%	0.50%	0.61%	0.51%	0.56%	1.09%	0.62%
10/1/2009	6.11	283.71	5.16	2.543	1.05%	49.25%	25.79%	14.55%	3.51%	1.57%	0.51%	0.62%	0.51%	0.57%	1.12%	0.59%
11/1/2009	8.33	422.66	7.11	3.504	1.22%	49.27%	26.30%	14.00%	3.52%	1.59%	0.52%	0.62%	0.51%	0.57%	1.10%	0.59%
12/1/2009	7.36	427.01	7.09	3.540	1.33%	49.91%	26.94%	13.38%	3.01%	1.66%	0.54%	0.66%	0.53%	0.60%	1.11%	0.54%
1/1/2010	6.66	439.46	6.23	3.225	1.28%	51.80%	25.11%	12.96%	3.28%	1.50%	0.49%	0.61%	0.50%	0.57%	1.15%	0.55%
2/1/2010	6.46	442.26	6.48	3.306	1.25%	51.06%	25.80%	13.02%	3.31%	1.49%	0.49%	0.60%	0.49%	0.56%	1.12%	0.56%
3/1/2010	7.07	447.28	5.20	2.634	1.23%	50.63%	25.87%	13.14%	3.37%	1.52%	0.50%	0.60%	0.51%	0.56%	1.15%	0.55%
4/1/2010	7.33	444.19	5.22	2.390	1.27%	45.79%	26.08%	13.11%	3.38%	1.50%	0.50%	0.57%	0.47%	0.55%	1.06%	0.52%
5/1/2010	7.18	433.92	5.04	2.168	1.38%	43.03%	27.85%	13.64%	3.61%	1.56%	0.53%	0.58%	0.50%	0.55%	1.07%	0.51%
6/1/2010	6.10	429.69	4.74	2.0256	1.49%	42.69%	27.92%	13.69%	3.56%	1.59%	0.53%	0.58%	0.49%	0.56%	1.08%	0.48%
7/1/2010	5.30	429.29	4.68	1.97688	1.55%	42.26%	28.12%	13.38%	3.63%	1.60%	0.53%	0.60%	0.56%	0.58%	1.19%	0.51%
8/1/2010	5.11	459.72	4.72	0.20983	0.43%	4.45%	11.57%	9.12%	0.90%	0.38%	0.13%	0.14%	0.12%	0.13%	0.24%	0.06%
9/1/2010	5.45	517.82	4.75	1.58877	1.18%	33.45%	21.33%	9.35%	2.76%	1.24%	0.41%	0.47%	0.43%	0.45%	0.93%	0.41%
10/1/2010	6.06	514.59	4.74	1.9992	1.61%	42.17%	28.59%	12.61%	3.68%	1.65%	0.54%	0.62%	0.56%	0.60%	1.24%	0.51%
11/1/2010	6.45	520.71	4.82	1.99689	1.65%	41.44%	28.96%	12.88%	3.74%	1.66%	0.55%	0.62%	0.53%	0.60%	1.22%	0.49%
12/1/2010	6.27	517.60	4.86	2.01164	1.44%	41.35%	28.95%	13.08%	3.73%	1.67%	0.56%	0.62%	0.53%	0.61%	1.21%	0.48%

06-02-064-11

	Oil	Total Fluid	Gas	CO2	Produced Gas Composition											
	m3/d	m3/d	e3m3/d	e3m3/d	N2	CO2	C1	C2	C3	NC4	C4	NC5	IC5	C6	C7	H2S
1/1/2007	4.47	291.03	2.28	0.050	2.61%	2.20%	54.08%	28.22%	7.38%	2.74%	1.03%	0.60%	0.58%	0.47%	0.00%	0.09%
2/1/2007	5.58	382.37	2.89	0.064	2.61%	2.20%	54.08%	28.22%	7.38%	2.74%	1.03%	0.60%	0.58%	0.47%	0.00%	0.09%
3/1/2007	5.05	355.61	2.92	0.064	2.61%	2.20%	54.08%	28.22%	7.38%	2.74%	1.03%	0.60%	0.58%	0.47%	0.00%	0.09%
4/1/2007	4.65	344.54	2.69	0.059	2.61%	2.20%	54.08%	28.22%	7.38%	2.74%	1.03%	0.60%	0.58%	0.47%	0.00%	0.09%
5/1/2007	2.79	201.53	1.79	0.027	1.95%	1.53%	51.99%	34.16%	5.97%	1.93%	0.73%	0.51%	0.45%	0.74%	0.00%	0.04%
6/1/2007	5.29	386.91	3.25	0.068	2.32%	2.09%	52.92%	30.85%	5.52%	2.34%	0.80%	0.82%	0.68%	1.59%	0.00%	0.08%
7/1/2007	4.89	395.14	2.86	0.059	2.34%	2.05%	53.40%	30.21%	5.60%	2.39%	0.82%	0.85%	0.71%	1.56%	0.00%	0.07%
8/1/2007	4.64	380.41	4.5	0.074	2.42%	1.65%	52.41%	33.30%	4.63%	1.96%	0.66%	0.75%	0.60%	1.57%	0.00%	0.06%
9/1/2007	6.16	367.02	7.07	0.214	2.30%	3.03%	50.05%	35.02%	4.20%	1.79%	0.59%	0.70%	0.56%	0.70%	0.89%	0.07%
10/1/2007	6.43	375.36	8.71	0.664	1.99%	7.62%	44.80%	33.75%	3.64%	1.53%	0.50%	0.62%	0.49%	0.56%	0.97%	0.07%
11/1/2007	6.5	384.82	7.35	0.842	1.97%	11.45%	44.78%	32.46%	4.02%	1.70%	0.56%	0.66%	0.53%	0.59%	0.97%	0.09%
12/1/2007	6.88	388.27	8.48	1.377	1.96%	16.23%	43.11%	29.38%	4.24%	1.71%	0.58%	0.62%	0.51%	0.51%	0.83%	0.12%
1/1/2008	6.38	393.61	5.94	0.815	2.00%	13.71%	44.50%	29.65%	4.42%	1.87%	0.62%	0.72%	0.58%	0.62%	1.01%	0.13%
2/1/2008	5.51	382.72	4.91	0.655	1.99%	13.34%	44.80%	29.12%	4.62%	2.01%	0.67%	0.75%	0.61%	0.64%	1.01%	0.15%
3/1/2008	6.12	382.13	6.85	1.536	1.73%	22.42%	39.34%	26.94%	4.01%	1.75%	0.58%	0.68%	0.54%	0.59%	0.97%	0.20%
4/1/2008	7.17	395.25	9.79	2.890	1.89%	29.52%	36.47%	24.05%	3.23%	1.62%	0.48%	0.55%	0.74%	0.55%	0.93%	0.44%
5/1/2008	5.51	255.46	6.78	1.826	1.11%	26.93%	25.50%	18.44%	1.63%	1.11%	0.36%	0.44%	0.35%	0.41%	0.74%	0.24%
6/1/2008	8.01	377.57	10.5	3.558	1.20%	33.89%	29.18%	21.17%	3.27%	1.37%	0.45%	0.54%	0.43%	0.48%	0.82%	0.32%
7/1/2008	6.93	358.99	9.57	3.676	1.26%	38.41%	30.40%	21.56%	3.37%	1.46%	0.48%	0.58%	0.46%	0.51%	0.88%	0.37%
8/1/2008	5.64	286.04	8.68	4.101	1.07%	47.25%	25.85%	18.49%	2.85%	1.24%	0.40%	0.51%	0.40%	0.46%	0.84%	0.46%
9/1/2008	5.67	144.06	5.87	1.773	0.37%	30.21%	9.37%	7.05%	1.05%	0.48%	0.16%	0.19%	0.15%	0.18%	0.33%	0.31%
10/1/2008	12.77	385.3	11.29	5.121	1.06%	45.36%	26.50%	19.23%	3.17%	1.34%	0.44%	0.53%	0.42%	0.47%	0.82%	0.45%
11/1/2008	8.85	371.99	9.55	4.569	1.05%	47.84%	25.85%	17.45%	3.00%	1.31%	0.43%	0.54%	0.42%	0.50%	0.89%	0.49%
12/1/2008	6.03	276.18	8.54	3.885	0.91%	45.49%	22.55%	14.59%	2.60%	1.12%	0.36%	0.46%	0.36%	0.43%	0.80%	0.46%
1/1/2009	9.14	370.03	12.54	6.712	0.87%	53.52%	23.31%	15.63%	2.30%	1.17%	0.38%	0.48%	0.38%	0.46%	0.86%	0.53%
2/1/2009	6.90	284.38	8.62	4.029	0.79%	46.73%	21.03%	14.14%	2.51%	1.11%	0.36%	0.44%	0.35%	0.41%	0.74%	0.45%
3/1/2009	7.44	365.41	12.61	7.927	1.10%	62.86%	16.93%	11.56%	1.64%	1.21%	0.36%	0.66%	0.49%	0.81%	1.58%	0.64%
4/1/2009	2.36	139.12	4.19	1.109	0.59%	26.45%	16.33%	8.92%	1.94%	0.70%	0.25%	0.24%	0.20%	0.19%	0.34%	0.26%
5/1/2009	4.97	250.78	5.71	2.436	0.53%	42.64%	15.80%	10.05%	1.86%	0.87%	0.28%	0.36%	0.28%	0.33%	0.61%	0.43%
6/1/2009	8.59	395.72	9.57	5.652	0.54%	59.08%	20.31%	13.12%	2.48%	1.14%	0.37%	0.47%	0.37%	0.44%	0.84%	0.60%
7/1/2009	7.95	377.66	9.23	5.175	0.62%	56.08%	22.06%	13.83%	2.65%	1.24%	0.40%	0.51%	0.42%	0.48%	0.93%	0.56%
8/1/2009	5.12	380.42	7.79	4.123	1.09%	52.94%	24.07%	14.24%	2.79%	1.28%	0.41%	0.52%	0.44%	0.49%	0.97%	0.53%
9/1/2009	4.89	404.81	7.26	3.675	1.16%	50.62%	25.78%	14.41%	2.96%	1.37%	0.44%	0.56%	0.46%	0.51%	0.98%	0.53%
10/1/2009	5.92	418.95	6.35	3.093	1.21%	48.70%	26.76%	14.69%	3.21%	1.50%	0.48%	0.60%	0.49%	0.55%	1.03%	0.53%
11/1/2009	6.23	420.57	5.71	2.611	1.33%	45.71%	28.42%	15.51%	3.42%	1.59%	0.51%	0.63%	0.51%	0.57%	1.04%	0.54%
12/1/2009	5.77	441.45	6.48	2.886	1.48%	44.50%	29.79%	16.07%	2.89%	1.54%	0.50%	0.62%	0.49%	0.56%	1.05%	0.55%
1/1/2010	5.81	453.66	5.66	2.539	1.47%	44.85%	29.07%	15.61%	3.38%	1.55%	0.50%	0.61%	0.50%	0.55%	1.05%	0.61%
2/1/2010	6.52	458.35	6.11	2.761	1.35%	45.21%	28.91%	15.67%	3.29%	1.50%	0.49%	0.60%	0.48%	0.55%	1.04%	0.68%
3/1/2010	5.46	379.74	4.25	1.911	1.33%	44.98%	28.96%	15.85%	3.32%	1.50%	0.49%	0.59%	0.49%	0.54%	1.05%	0.71%
4/1/2010	6.7736	471.56	5.25	2.126	1.28%	40.51%	27.23%	15.35%	3.02%	1.35%	0.44%	0.51%	0.42%	0.42%	0.93%	0.64%
5/1/2010	5.8974	453.04	5.25	2.119	1.41%	40.34%	28.88%	16.24%	3.18%	1.43%	0.47%	0.55%	0.45%	0.45%	0.98%	0.60%
6/1/2010	4.3723	442.54	5.17	2.10655	1.54%	40.76%	29.23%	15.92%	3.02%	1.37%	0.44%	0.53%	0.43%	0.43%	0.97%	0.58%
7/1/2010	3.4676	452.17	5.39	2.246	1.48%	41.68%	28.13%	15.17%	3.06%	1.44%	0.46%	0.57%	0.51%	0.51%	1.10%	0.60%
8/1/2010	3.5168	471.38	4.80	2.090	1.45%	43.59%	27.57%	13.86%	2.89%	1.41%	0.44%	0.57%	0.52%	0.52%	1.15%	0.62%
9/1/2010	3.5303	488.69	4.62	1.431	1.10%	30.97%	20.97%	10.58%	2.12%	0.99%	0.31%	0.40%	0.36%	0.36%	0.85%	0.44%
10/1/2010	3.1129	482.98	4.16	1.742	1.54%	41.85%	29.02%	14.33%	2.85%	1.35%	0.43%	0.56%	0.48%	0.48%	1.17%	0.57%
11/1/2010	3.267	488.50	4.05	1.653	1.62%	40.78%	29.83%	14.52%	2.88%	1.35%	0.43%	0.55%	0.45%	0.45%	1.14%	0.53%
12/1/2010	3.15	491.01	4.00	1.604	1.57%	40.10%	30.33%	14.81%	2.83%	1.35%	0.43%	0.55%	0.45%	0.45%	1.14%	0.51%

08-02-064-11

	Oil	Total Fluid	Gas	CO2	Produced Gas Composition											
	m3/d	m3/d	e3m3/d	e3m3/d	N2	CO2	C1	C2	C3	NC4	IC4	NC5	IC5	C6	C7	H2S
1/1/2007	9.3	150.08	1.42	0.031	2.77%	2.18%	59.23%	19.81%	9.25%	2.97%	1.15%	0.75%	0.66%	1.19%	0.00%	0.04%
2/1/2007	8.74	146.29	1.83	0.040	2.77%	2.18%	59.23%	19.81%	9.25%	2.97%	1.15%	0.75%	0.66%	1.19%	0.00%	0.04%
3/1/2007	8.83	145.1	1.81	0.039	2.77%	2.18%	59.23%	19.81%	9.25%	2.97%	1.15%	0.75%	0.66%	1.19%	0.00%	0.04%
4/1/2007	8.83	142.52	2.18	0.048	2.77%	2.18%	59.23%	19.81%	9.25%	2.97%	1.15%	0.75%	0.66%	1.19%	0.00%	0.04%
5/1/2007	8.59	150.09	1.71	0.038	2.85%	2.21%	59.20%	19.87%	9.08%	2.96%	1.13%	0.77%	0.68%	1.19%	0.00%	0.05%
6/1/2007	8.17	149.09	1.68	0.037	2.86%	2.20%	59.04%	19.76%	9.20%	3.03%	1.15%	0.79%	0.70%	1.20%	0.00%	0.06%
7/1/2007	7.95	152.3	1.47	0.032	2.87%	2.16%	59.53%	19.70%	8.99%	2.95%	1.14%	0.78%	0.70%	1.13%	0.00%	0.06%
8/1/2007	8.06	148.07	1.51	0.033	2.96%	2.17%	59.67%	20.34%	8.52%	2.72%	1.05%	0.73%	0.64%	1.14%	0.00%	0.06%
9/1/2007	8.09	145.03	1.34	0.030	3.01%	2.22%	59.53%	20.23%	8.56%	2.75%	1.05%	0.73%	0.64%	0.51%	0.66%	0.06%
10/1/2007	8.77	148.45	1.48	0.034	2.88%	2.29%	57.21%	20.12%	8.03%	2.57%	0.98%	0.68%	0.60%	0.49%	0.65%	0.06%
11/1/2007	8.98	150.15	1.67	0.053	2.81%	3.16%	57.76%	22.02%	8.00%	2.56%	0.97%	0.68%	0.60%	0.49%	0.66%	0.06%
12/1/2007	8.09	148.36	1.44	0.109	2.77%	7.55%	54.18%	23.67%	6.32%	2.06%	0.77%	0.61%	0.52%	10.09%	0.72%	0.08%
1/1/2008	8.66	148.11	1.92	0.101	2.96%	5.26%	55.63%	23.41%	6.88%	2.27%	0.85%	0.65%	0.56%	0.50%	0.73%	0.08%
2/1/2008	8.75	147.97	2.08	0.049	3.12%	2.38%	58.93%	21.31%	7.91%	2.60%	0.98%	0.70%	0.62%	0.50%	0.65%	0.06%
3/1/2008	9.81	146.94	2.54	0.065	2.86%	2.57%	57.54%	22.46%	8.15%	2.67%	1.01%	0.71%	0.63%	0.50%	0.64%	0.06%
4/1/2008	9.93	146.39	2.42	0.070	2.73%	2.90%	56.61%	23.68%	7.65%	2.61%	0.97%	0.72%	0.63%	0.52%	0.69%	0.07%
5/1/2008	10.05	142.85	2.37	0.083	2.79%	3.49%	56.05%	23.40%	7.75%	2.71%	1.02%	0.72%	0.64%	0.50%	0.64%	0.07%
6/1/2008	10.25	140.74	2.57	0.098	2.62%	3.83%	55.11%	23.76%	8.18%	2.67%	1.01%	0.72%	0.63%	0.50%	0.64%	0.07%
7/1/2008	10.51	139.51	3.22	0.161	2.54%	5.01%	53.82%	24.47%	7.86%	2.61%	0.98%	0.71%	0.62%	0.49%	0.64%	0.07%
8/1/2008	10.2	135.38	3.01	0.211	2.40%	7.01%	51.80%	24.86%	7.66%	2.57%	0.96%	0.70%	0.62%	0.49%	0.63%	0.08%
9/1/2008	7.85	118.06	2.13	0.172	2.23%	8.07%	50.22%	24.41%	8.36%	2.82%	1.05%	0.76%	0.67%	0.51%	0.62%	0.09%
10/1/2008	5.4	86.44	2.35	0.244	2.25%	10.37%	50.24%	23.67%	7.50%	2.42%	0.91%	0.66%	0.58%	0.47%	0.60%	0.11%
11/1/2008	7.63	113.74	2.84	0.350	2.20%	12.33%	48.75%	23.19%	7.34%	2.53%	0.94%	0.71%	0.62%	0.50%	0.66%	0.10%
12/1/2008	9.99	135.55	3.98	0.582	2.02%	14.61%	46.31%	23.22%	7.49%	2.59%	0.96%	0.72%	0.63%	0.51%	0.64%	0.11%
1/1/2009	9.50	134.15	3.69	0.580	2.43%	15.72%	45.74%	22.92%	7.06%	2.50%	0.92%	0.71%	0.62%	0.51%	0.65%	0.11%
2/1/2009	9.09	133.81	3.70	0.588	2.10%	15.89%	46.17%	22.57%	7.02%	2.55%	0.93%	0.74%	0.64%	0.53%	0.66%	0.11%
3/1/2009	9.07	137.82	3.46	0.584	2.51%	16.86%	44.27%	21.86%	6.69%	2.62%	0.93%	0.91%	0.75%	0.87%	1.44%	0.13%
4/1/2009	9.61	141.12	3.59	0.643	1.92%	17.90%	45.13%	22.07%	6.73%	2.51%	0.91%	0.73%	0.63%	0.52%	0.70%	0.13%
5/1/2009	9.38	142.54	3.53	0.675	2.47%	19.13%	44.42%	21.16%	6.54%	2.42%	0.87%	0.70%	0.61%	0.50%	0.66%	0.14%
6/1/2009	9.07	144.08	2.97	0.568	2.73%	19.13%	44.55%	21.07%	6.54%	2.38%	0.87%	0.69%	0.60%	0.49%	0.66%	0.16%
7/1/2009	7.01	119.09	2.37	0.432	3.00%	18.24%	45.17%	20.87%	6.68%	2.44%	0.89%	0.70%	0.61%	0.49%	0.66%	0.14%
8/1/2009	7.89	140.93	2.81	0.547	4.37%	19.47%	43.19%	20.45%	6.51%	2.40%	0.87%	0.69%	0.60%	0.49%	0.67%	0.14%
9/1/2009	7.87	148.64	2.60	0.522	2.33%	20.06%	44.62%	20.31%	6.63%	2.43%	0.88%	0.69%	0.61%	0.50%	0.68%	0.15%
10/1/2009	7.66	147.91	2.60	0.513	2.42%	19.75%	44.68%	20.43%	6.64%	2.44%	0.88%	0.70%	0.62%	0.50%	0.69%	0.15%
11/1/2009	7.99	147.28	2.76	0.545	2.59%	19.76%	44.65%	20.16%	6.70%	2.47%	0.89%	0.71%	0.62%	0.51%	0.69%	0.15%
12/1/2009	8.62	149.70	2.87	0.583	2.61%	20.31%	45.31%	20.78%	5.54%	2.40%	0.87%	0.68%	0.60%	0.49%	0.68%	0.16%
1/1/2010	8.04	149.22	2.21	0.428	2.71%	19.35%	46.97%	20.33%	4.67%	2.43%	0.90%	0.68%	0.60%	0.49%	0.70%	0.18%
2/1/2010	7.39	151.53	1.97	0.277	2.85%	14.09%	49.77%	19.91%	7.09%	2.45%	0.91%	0.67%	0.60%	0.48%	0.68%	0.17%
3/1/2010	7.51	152.87	1.52	0.195	2.81%	12.85%	50.51%	20.17%	7.32%	2.52%	0.94%	0.69%	0.61%	0.49%	0.69%	0.18%
4/1/2010	7.923	153.34	1.72	0.233	2.66%	13.53%	46.84%	19.58%	7.00%	2.44%	0.90%	0.64%	0.57%	0.48%	0.66%	0.17%
5/1/2010	8.2835	148.97	2.03	0.321	2.56%	15.76%	45.49%	19.47%	6.65%	2.32%	0.86%	0.62%	0.54%	0.46%	0.65%	0.18%
6/1/2010	8.556	150.25	2.04	0.365591	2.53%	17.94%	44.16%	19.39%	6.31%	2.21%	0.82%	0.59%	0.52%	0.44%	0.64%	0.18%
7/1/2010	8.6345	147.58	2.51	0.495	2.55%	19.70%	42.24%	18.76%	6.21%	2.30%	0.83%	0.65%	0.57%	0.50%	0.71%	0.20%
8/1/2010	8.1532	149.85	2.16	0.420	2.52%	19.46%	42.35%	18.33%	6.42%	2.41%	0.87%	0.68%	0.60%	0.52%	0.75%	0.21%
9/1/2010	7.7641	153.23	1.97	0.219	2.15%	11.13%	35.15%	14.07%	5.38%	1.99%	0.72%	0.55%	0.48%	0.42%	0.58%	0.14%
10/1/2010	7.3265	152.52	1.69	0.253	2.71%	15.02%	45.23%	18.31%	7.09%	2.63%	0.96%	0.73%	0.64%	0.55%	0.77%	0.20%
11/1/2010	7.2373	152.63	1.61	0.238	2.77%	14.78%	45.65%	18.20%	7.11%	2.62%	0.95%	0.72%	0.63%	0.54%	0.74%	0.20%
12/1/2010	6.9548	150.66	1.72	0.262	3.56%	15.26%	44.50%	18.35%	6.94%	2.56%	0.93%	0.71%	0.62%	0.54%	0.73%	0.20%

10-02-064-11

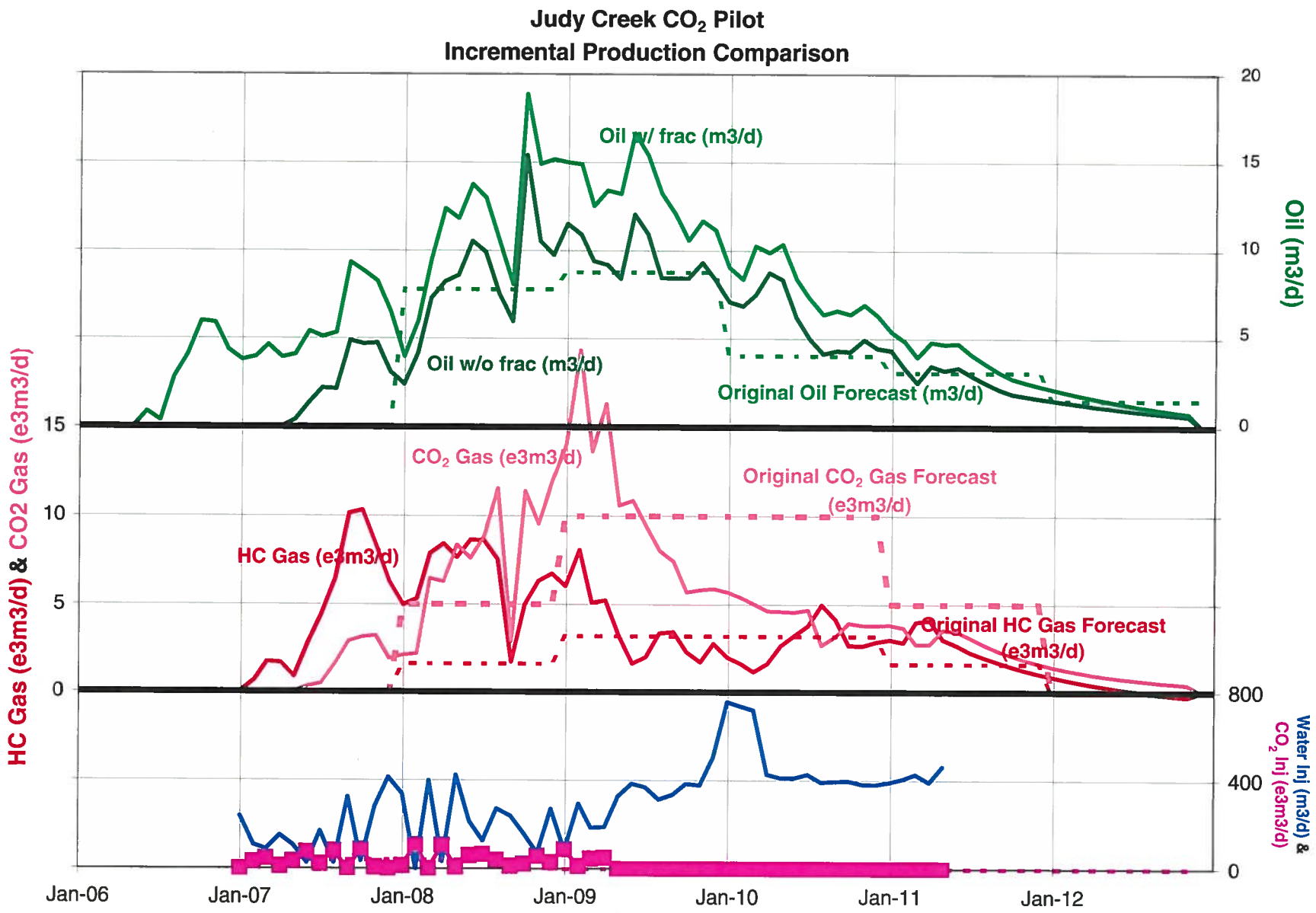
	Oil	Total Fluid	Gas	CO2	Produced Gas Composition											
	m3/d	m3/d	e3m3/d	e3m3/d	N2	CO2	C1	C2	C3	NC4	IC4	NC5	IC5	C6	C7	H2S
1/1/2007	7.54	61.83	0.61	0.013	2.77%	2.18%	59.23%	19.81%	9.25%	2.97%	1.15%	0.75%	0.66%	1.19%	0.00%	0.04%
2/1/2007	7.56	60.11	0.64	0.014	2.77%	2.18%	59.23%	19.81%	9.25%	2.97%	1.15%	0.75%	0.66%	1.19%	0.00%	0.04%
3/1/2007	7.99	59.2	1.2	0.026	2.77%	2.18%	59.23%	19.81%	9.25%	2.97%	1.15%	0.75%	0.66%	1.19%	0.00%	0.04%
4/1/2007	7.19	58.36	0.92	0.020	2.77%	2.18%	59.23%	19.81%	9.25%	2.97%	1.15%	0.75%	0.66%	1.19%	0.00%	0.04%
5/1/2007	7.11	60.45	0.85	0.019	2.85%	2.21%	59.20%	19.87%	9.08%	2.96%	1.13%	0.77%	0.68%	1.19%	0.00%	0.05%
6/1/2007	7.14	60.56	1.22	0.027	2.86%	2.20%	59.04%	19.76%	9.20%	3.03%	1.15%	0.79%	0.70%	1.20%	0.00%	0.06%
7/1/2007	5.99	59.61	0.83	0.018	2.87%	2.16%	59.53%	19.70%	8.99%	2.95%	1.14%	0.78%	0.70%	1.13%	0.00%	0.06%
8/1/2007	6.45	59.36	2.14	0.046	2.96%	2.17%	59.67%	20.34%	8.52%	2.72%	1.05%	0.73%	0.64%	1.14%	0.00%	0.06%
9/1/2007	7.72	55.79	2.05	0.046	3.01%	2.22%	59.53%	20.23%	8.56%	2.75%	1.05%	0.73%	0.64%	0.51%	0.66%	0.06%
10/1/2007	7.46	58.95	2.76	0.063	2.88%	2.29%	57.21%	20.12%	8.03%	2.57%	0.98%	0.68%	0.60%	0.49%	0.65%	0.06%
11/1/2007	6.68	57.49	1.79	0.057	2.81%	3.16%	57.76%	22.02%	8.00%	2.56%	0.97%	0.68%	0.60%	0.49%	0.66%	0.06%
12/1/2007	6.41	55.51	1.43	0.108	2.77%	7.55%	54.18%	23.67%	6.32%	2.06%	0.77%	0.61%	0.52%	10.09%	0.72%	0.08%
1/1/2008	3.61	36.3	0.81	0.043	2.96%	5.26%	55.63%	23.41%	6.88%	2.27%	0.85%	0.65%	0.56%	0.50%	0.73%	0.08%
2/1/2008	4.69	50.21	1.27	0.030	3.12%	2.38%	58.93%	21.31%	7.91%	2.60%	0.98%	0.70%	0.62%	0.50%	0.65%	0.06%
3/1/2008	5.07	48.61	1.38	0.035	2.86%	2.57%	57.54%	22.46%	8.15%	2.67%	1.01%	0.71%	0.63%	0.50%	0.64%	0.06%
4/1/2008	6.96	48.74	1.28	0.037	2.73%	2.90%	56.61%	23.68%	7.65%	2.61%	0.97%	0.72%	0.63%	0.52%	0.69%	0.07%
5/1/2008	5.96	49.45	1.11	0.039	2.79%	3.49%	56.05%	23.40%	7.75%	2.71%	1.02%	0.72%	0.64%	0.50%	0.64%	0.07%
6/1/2008	5.86	49.46	1.26	0.048	2.62%	3.83%	55.11%	23.76%	8.18%	2.67%	1.01%	0.72%	0.63%	0.50%	0.64%	0.07%
7/1/2008	5.65	48.7	1.37	0.069	2.54%	5.01%	53.82%	24.47%	7.86%	2.61%	0.98%	0.71%	0.62%	0.49%	0.64%	0.07%
8/1/2008	5.92	48.39	1.29	0.090	2.40%	7.01%	51.80%	24.86%	7.66%	2.57%	0.96%	0.70%	0.62%	0.49%	0.63%	0.08%
9/1/2008	4.97	34.42	0.9	0.073	2.23%	8.07%	50.22%	24.41%	8.36%	2.82%	1.05%	0.76%	0.67%	0.51%	0.62%	0.09%
10/1/2008	6.22	29.34	1.31	0.136	2.25%	10.37%	50.24%	23.67%	7.50%	2.42%	0.91%	0.66%	0.58%	0.47%	0.60%	0.11%
11/1/2008	7.37	41.03	1.18	0.146	2.20%	12.33%	48.75%	23.19%	7.34%	2.53%	0.94%	0.71%	0.62%	0.50%	0.66%	0.10%
12/1/2008	8.29	44.58	1.08	0.158	2.02%	14.61%	46.31%	23.22%	7.49%	2.59%	0.96%	0.72%	0.63%	0.51%	0.64%	0.11%
1/1/2009	6.23	44.96	1.18	0.186	2.43%	15.72%	45.74%	22.92%	7.06%	2.50%	0.92%	0.71%	0.62%	0.51%	0.65%	0.11%
2/1/2009	6.78	46.98	2.36	0.376	2.10%	15.89%	46.17%	22.57%	7.02%	2.55%	0.93%	0.74%	0.64%	0.53%	0.66%	0.11%
3/1/2009	5.81	47.25	1.30	0.219	2.51%	16.86%	44.27%	21.86%	6.69%	2.62%	0.93%	0.91%	0.75%	0.87%	1.44%	0.13%
4/1/2009	7.08	46.14	1.50	0.269	1.92%	17.90%	45.13%	22.07%	6.73%	2.51%	0.91%	0.73%	0.63%	0.52%	0.70%	0.13%
5/1/2009	7.75	46.87	1.03	0.196	2.47%	19.13%	44.42%	21.16%	6.54%	2.42%	0.87%	0.70%	0.61%	0.50%	0.66%	0.14%
6/1/2009	7.26	46.25	0.94	0.180	2.73%	19.13%	44.55%	21.07%	6.54%	2.38%	0.87%	0.69%	0.60%	0.49%	0.66%	0.16%
7/1/2009	6.82	44.31	0.86	0.158	3.00%	18.24%	45.17%	20.87%	6.68%	2.44%	0.89%	0.70%	0.61%	0.49%	0.66%	0.14%
8/1/2009	3.96	40.83	0.81	0.158	4.37%	19.47%	43.19%	20.45%	6.51%	2.40%	0.87%	0.69%	0.60%	0.49%	0.67%	0.14%
9/1/2009	4.83	45.22	0.69	0.138	2.33%	20.06%	44.62%	20.31%	6.63%	2.43%	0.88%	0.69%	0.61%	0.50%	0.68%	0.15%
10/1/2009	3.83	43.70	0.88	0.175	2.42%	19.75%	44.68%	20.43%	6.64%	2.44%	0.88%	0.70%	0.62%	0.50%	0.69%	0.15%
11/1/2009	4.09	42.95	0.55	0.109	2.59%	19.76%	44.65%	20.16%	6.70%	2.47%	0.89%	0.71%	0.62%	0.51%	0.69%	0.15%
12/1/2009	4.60	44.71	0.44	0.088	2.61%	20.31%	45.31%	20.78%	5.54%	2.40%	0.87%	0.68%	0.60%	0.49%	0.68%	0.16%
1/1/2010	3.73	44.86	0.39	0.076	2.71%	19.35%	46.97%	20.33%	4.67%	2.43%	0.90%	0.68%	0.60%	0.49%	0.70%	0.18%
2/1/2010	3.15	40.44	0.38	0.054	2.85%	14.09%	49.77%	19.91%	7.09%	2.45%	0.91%	0.67%	0.60%	0.48%	0.68%	0.17%
3/1/2010	4.41	49.63	0.37	0.048	2.81%	12.85%	50.51%	20.17%	7.32%	2.52%	0.94%	0.69%	0.61%	0.49%	0.69%	0.18%
4/1/2010	3.98	49.38	0.51	0.070	2.66%	13.53%	46.84%	19.58%	7.00%	2.44%	0.90%	0.64%	0.57%	0.48%	0.66%	0.17%
5/1/2010	3.73	51.67	0.60	0.094	2.56%	15.76%	45.49%	19.47%	6.65%	2.32%	0.86%	0.62%	0.54%	0.46%	0.65%	0.18%
6/1/2010	3.85	48.78	0.72	0.129	2.53%	17.94%	44.16%	19.39%	6.31%	2.21%	0.82%	0.59%	0.52%	0.44%	0.64%	0.18%
7/1/2010	3.95	46.82	0.61	0.120	2.55%	19.70%	42.24%	18.76%	6.21%	2.30%	0.83%	0.65%	0.57%	0.50%	0.71%	0.20%
8/1/2010	3.85	46.30	0.59	0.114	2.52%	19.46%	42.35%	18.33%	6.42%	2.41%	0.87%	0.68%	0.60%	0.52%	0.75%	0.21%
9/1/2010	3.88	46.89	0.51	0.056	2.15%	11.13%	35.15%	14.07%	5.38%	1.99%	0.72%	0.55%	0.48%	0.42%	0.58%	0.14%
10/1/2010	3.67	46.15	0.52	0.077	2.71%	15.02%	45.23%	18.31%	7.09%	2.63%	0.96%	0.73%	0.64%	0.55%	0.77%	0.20%
11/1/2010	3.53	46.14	0.51	0.076	2.77%	14.78%	45.65%	18.20%	7.11%	2.62%	0.95%	0.72%	0.63%	0.54%	0.74%	0.20%
12/1/2010	3.36	45.40	0.49	0.075	3.56%	15.26%	44.50%	18.35%	6.94%	2.56%	0.93%	0.71%	0.62%	0.54%	0.73%	0.20%

PENGROWTH CORPORATION

APPENDIX III
COMPARISON DATA

INNOVATIVE ENERGY TECHNOLOGIES PROGRAM
2010 FINAL REPORT

JUDY CREEK PATTERN 102 CO_2 PILOT


Judy Creek CO_2 Pilot
Incremental Production Comparison
Oil w/ frac (m3/d)
Oil w/o frac (m3/d)
Original Oil Forecast (m3/d)
CO_2 Gas (e3m3/d)
Original CO_2 Gas Forecast (e3m3/d)
HC Gas (e3m3/d)
Original HC Gas Forecast (e3m3/d)
HC Gas (e3m3/d) & CO2 Gas (e3m3/d)
Oil (m3/d)
Water Inj (m3/d) & CO_2 Inj (e3m3/d)
Jan-06
Jan-07
Jan-08
Jan-09
Jan-10
Jan-11
Jan-12
15
10
5
0
20
15
10
5
0
800
400
0

Judy Creek CO2 Pilot - INCREMENTAL PRODUCTION

Year	CO2 Inj e3m3/d	Oil w/ frac m3/d	Oil w/o Frac m3/d	C1 e3m3/d	C2 m3/d	C3 m3/d	C4 m3/d	C5+ m3/d	CO2 Prod e3m3/d	Other e3m3/d
1/1/2006	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/1/2006	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/1/2006	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/1/2006	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/1/2006	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/1/2006	0.0	0.9	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/1/2006	0.0	0.4	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/1/2006	0.0	2.8	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/1/2006	0.0	4.2	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/1/2006	0.0	6.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/1/2006	0.0	5.9	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/1/2006	0.0	4.4	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/1/2007	0.0	3.8	0.0	0.02	0.02	0.00	0.00	0.00	0.01	0.00
2/1/2007	32.3	4.0	0.0	0.34	0.30	0.02	0.01	0.00	0.00	0.00
3/1/2007	47.5	4.6	0.0	0.86	0.76	0.05	0.02	0.01	0.04	0.00
4/1/2007	12.5	4.0	0.0	0.84	0.74	0.05	0.02	0.01	0.03	0.00
5/1/2007	33.9	4.1	0.4	0.43	0.38	0.03	0.01	0.00	0.03	0.00
6/1/2007	75.9	5.4	1.4	1.40	1.23	0.08	0.03	0.01	0.31	0.00
7/1/2007	22.1	5.1	2.2	2.21	1.95	0.13	0.04	0.01	0.48	0.00
8/1/2007	82.0	5.3	2.2	3.24	2.84	0.19	0.06	0.02	1.59	0.00
9/1/2007	0.0	9.4	4.9	5.10	4.48	0.30	0.10	0.03	2.89	0.00
10/1/2007	87.2	8.8	4.7	5.19	4.56	0.30	0.10	0.03	3.12	0.00
11/1/2007	8.1	8.2	4.8	4.19	3.69	0.25	0.08	0.03	3.20	0.00
12/1/2007	0.0	6.5	3.1	3.16	2.78	0.18	0.06	0.02	1.92	0.00
1/1/2008	14.1	4.0	2.4	2.50	2.19	0.15	0.05	0.02	2.11	0.00
2/1/2008	108.5	6.0	4.2	2.67	2.34	0.16	0.05	0.02	2.19	0.00
3/1/2008	0.0	9.5	7.3	3.96	3.48	0.23	0.08	0.03	6.46	0.00
4/1/2008	108.4	12.4	8.2	4.23	3.72	0.25	0.08	0.03	6.30	0.00
5/1/2008	8.9	11.8	8.6	3.85	3.38	0.23	0.08	0.02	8.35	0.00
6/1/2008	60.5	13.8	10.6	4.34	3.82	0.25	0.09	0.03	7.61	0.00
7/1/2008	66.0	13.0	9.9	4.33	3.80	0.25	0.09	0.03	8.86	0.00
8/1/2008	39.6	10.6	7.5	3.79	3.33	0.22	0.07	0.02	11.56	0.00
9/1/2008	12.7	8.1	6.0	0.86	0.75	0.05	0.02	0.01	2.88	0.00
10/1/2008	23.0	18.9	15.4	2.50	2.20	0.15	0.05	0.02	11.41	0.00
11/1/2008	59.1	14.9	10.5	3.18	2.79	0.19	0.06	0.02	9.55	0.00
12/1/2008	30.2	15.2	9.8	3.39	2.98	0.20	0.07	0.02	11.97	0.00
1/1/2009	89.2	15.0	11.5	3.04	2.67	0.18	0.06	0.02	13.99	0.00
2/1/2009	12.9	14.9	10.9	4.06	3.57	0.24	0.08	0.03	19.38	0.00
3/1/2009	47.7	12.5	9.4	2.56	2.25	0.15	0.05	0.02	13.66	0.00
4/1/2009	52.2	13.4	9.2	2.62	2.30	0.15	0.05	0.02	16.34	0.00
5/1/2009	0.0	13.2	8.4	1.62	1.42	0.09	0.03	0.01	10.60	0.00
6/1/2009	0.0	16.7	12.1	0.82	0.72	0.05	0.02	0.01	10.87	0.00
7/1/2009	0.0	15.4	11.0	1.00	0.88	0.06	0.02	0.01	9.43	0.00
8/1/2009	0.0	13.2	8.5	1.68	1.48	0.10	0.03	0.01	8.04	0.00
9/1/2009	0.0	12.1	8.4	1.72	1.51	0.10	0.03	0.01	7.43	0.00
10/1/2009	0.0	10.6	8.4	1.16	1.02	0.07	0.02	0.01	5.69	0.00
11/1/2009	0.0	11.7	9.3	0.86	0.75	0.05	0.02	0.01	5.82	0.00
12/1/2009	0.0	11.2	8.3	1.39	1.22	0.08	0.03	0.01	5.89	0.00

Judy Creek CO2 Pilot - INCREMENTAL PRODUCTION

Year	CO2 Inj e3m3/d	Oil w/ frac m3/d	Oil w/o Frac m3/d	C1 e3m3/d	C2 m3/d	C3 m3/d	C4 m3/d	C5+ m3/d	CO2 Prod e3m3/d	Other e3m3/d
1/1/2010	0.0	9.1	7.1	1.00	0.88	0.06	0.02	0.01	5.70	0.00
2/1/2010	0.0	8.4	6.9	0.81	0.71	0.05	0.02	0.01	5.37	0.00
3/1/2010	0.0	10.3	7.5	0.58	0.51	0.03	0.01	0.00	5.04	0.00
4/1/2010	0.0	9.9	8.8	0.82	0.72	0.05	0.02	0.01	4.63	0.00
5/1/2010	0.0	10.4	8.4	1.33	1.17	0.08	0.03	0.01	4.61	0.00
6/1/2010	0.0	8.4	6.2	1.62	1.43	0.09	0.03	0.01	4.56	0.00
7/1/2010	0.0	7.3	5.0	1.90	1.67	0.11	0.04	0.01	4.70	0.00
8/1/2010	0.0	6.4	4.2	2.50	2.20	0.15	0.05	0.02	2.66	0.00
9/1/2010	0.0	6.6	4.3	2.09	1.84	0.12	0.04	0.01	3.16	0.00
10/1/2010	0.0	6.4	4.3	1.34	1.18	0.08	0.03	0.01	3.93	0.00
11/1/2010	0.0	6.9	5.0	1.33	1.17	0.08	0.03	0.01	3.82	0.00
12/1/2010	0.0	6.3	4.5	1.44	1.26	0.08	0.03	0.01	3.81	0.00
1/1/2011	0.0	5.4	4.4	1.50	1.32	0.09	0.03	0.01	3.83	0.00
2/1/2011	0.0	4.9	3.3	1.42	1.25	0.08	0.03	0.01	3.67	0.00
3/1/2011	0.0	4.0	2.5	2.00	1.76	0.12	0.04	0.01	2.74	0.00
4/1/2011	0.0	4.8	3.5	2.06	1.81	0.12	0.04	0.01	2.74	0.00
5/1/2011	0.0	4.7	3.2	1.51	1.32	0.09	0.03	0.01	3.55	0.00
6/1/2011	0.0	4.7	3.4	1.34	1.18	0.08	0.03	0.01	3.47	0.00
7/1/2011	0.0	4.1	2.9	1.15	1.01	0.07	0.02	0.01	3.10	0.00
8/1/2011	0.0	3.6	2.5	1.00	0.88	0.06	0.02	0.01	2.72	0.00
9/1/2011	0.0	3.1	2.2	0.86	0.76	0.05	0.02	0.01	2.38	0.00
10/1/2011	0.0	2.8	1.9	0.74	0.65	0.04	0.01	0.00	2.10	0.00
11/1/2011	0.0	2.5	1.8	0.63	0.55	0.04	0.01	0.00	1.85	0.00
12/1/2011	0.0	2.3	1.6	0.53	0.47	0.03	0.01	0.00	1.64	0.00
1/1/2012	0.0	2.1	1.5	0.44	0.39	0.03	0.01	0.00	1.45	0.00
2/1/2012	0.0	2.0	1.4	0.36	0.31	0.02	0.01	0.00	1.28	0.00
3/1/2012	0.0	1.8	1.3	0.28	0.25	0.02	0.01	0.00	1.14	0.00
4/1/2012	0.0	1.7	1.2	0.21	0.19	0.01	0.00	0.00	1.01	0.00
5/1/2012	0.0	1.5	1.1	0.15	0.13	0.01	0.00	0.00	0.90	0.00
6/1/2012	0.0	1.4	1.0	0.09	0.08	0.01	0.00	0.00	0.79	0.00
7/1/2012	0.0	1.2	1.0	0.04	0.03	0.00	0.00	0.00	0.71	0.00
8/1/2012	0.0	1.1	0.9	-0.01	-0.01	0.00	0.00	0.00	0.62	0.00
9/1/2012	0.0	1.0	0.8	-0.06	-0.05	0.00	0.00	0.00	0.55	0.00
10/1/2012	0.0	0.9	0.7	-0.10	-0.09	-0.01	0.00	0.00	0.49	0.00
11/1/2012	0.0	0.8	0.7	-0.13	-0.12	-0.01	0.00	0.00	0.42	0.00
12/1/2012	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/1/2013	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00

IETP APPLICATION - INCREMENTAL PRODUCTOIN

Year	CO2 Inj e3m3/d	Oil m3/d	C1 e3m3/d	C2 m3/d	C3 m3/d	C4 m3/d	C5+ m3/d	CO2 Prod e3m3/d	Other e3m3/d
1/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/1/2006	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/1/2007	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/1/2007	40.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
2/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
3/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
4/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
5/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
6/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
7/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
8/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
9/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
10/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
11/1/2008	40.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
12/1/2008	0.0	7.8	0.71	0.71	0.58	0.35	0.13	5.00	0.07
1/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
2/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
3/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
4/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
5/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
6/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
7/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
8/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
9/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
10/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
11/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08
12/1/2009	0.0	8.8	0.79	0.80	0.65	0.39	0.15	10.00	0.08

IETP APPLICATION - INCREMENTAL PRODUCTOIN

Year	CO2 Inj e3m3/d	Oil m3/d	C1 e3m3/d	C2 m3/d	C3 m3/d	C4 m3/d	C5+ m3/d	CO2 Prod e3m3/d	Other e3m3/d
1/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
2/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
3/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
4/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
5/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
6/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
7/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
8/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
9/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
10/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
11/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
12/1/2010	0.0	4.0	0.37	0.37	0.30	0.18	0.07	10.00	0.04
1/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
2/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
3/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
4/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
5/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
6/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
7/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
8/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
9/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
10/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
11/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
12/1/2011	0.0	3.1	0.28	0.28	0.23	0.14	0.05	5.00	0.03
1/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
2/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
3/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
4/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
5/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
6/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
7/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
8/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
9/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
10/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
11/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
12/1/2012	0.0	1.5	0.14	0.14	0.11	0.07	0.03	0.00	0.01
1/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
2/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
3/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
4/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
5/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
6/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
7/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
8/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
9/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
10/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
11/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01
12/1/2013	0.0	0.9	0.08	0.08	0.07	0.04	0.02	0.00	0.01

JUDY CREEK CO2 PILOT minus IETP APPLICATION

Year	CO2 Inj e3m3/d	Oil w/ frac m3/d	Oil w/o Frac m3/d	C1 e3m3/d	C2 m3/d	C3 m3/d	C4 m3/d	C5+ m3/d	CO2 Prod e3m3/d	Other e3m3/d
1/1/2006	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2/1/2006	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3/1/2006	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4/1/2006	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5/1/2006	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6/1/2006	0.0	0.9	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7/1/2006	0.0	0.4	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
8/1/2006	0.0	2.8	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9/1/2006	0.0	4.2	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10/1/2006	0.0	6.0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
11/1/2006	0.0	5.9	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12/1/2006	0.0	4.4	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1/1/2007	0.0	3.8	0.0	0.02	0.02	0.00	0.00	0.00	0.01	0.00
2/1/2007	-7.7	4.0	0.0	0.34	0.30	0.02	0.01	0.00	0.00	0.00
3/1/2007	7.5	4.6	0.0	0.86	0.76	0.05	0.02	0.01	0.04	0.00
4/1/2007	-27.5	4.0	0.0	0.84	0.74	0.05	0.02	0.01	0.03	0.00
5/1/2007	-6.1	4.1	0.4	0.43	0.38	0.03	0.01	0.00	0.03	0.00
6/1/2007	35.9	5.4	1.4	1.40	1.23	0.08	0.03	0.01	0.31	0.00
7/1/2007	-17.9	5.1	2.2	2.21	1.95	0.13	0.04	0.01	0.48	0.00
8/1/2007	42.0	5.3	2.2	3.24	2.84	0.19	0.06	0.02	1.59	0.00
9/1/2007	-40.0	9.4	4.9	5.10	4.48	0.30	0.10	0.03	2.89	0.00
10/1/2007	47.2	8.8	4.7	5.19	4.56	0.30	0.10	0.03	3.12	0.00
11/1/2007	-31.9	8.2	4.8	4.19	3.69	0.25	0.08	0.03	3.20	0.00
12/1/2007	-40.0	6.5	3.1	3.16	2.78	0.18	0.06	0.02	1.92	0.00
1/1/2008	-25.9	-3.8	-5.4	1.79	1.48	-0.44	-0.30	-0.12	-2.89	-0.07
2/1/2008	68.5	-1.8	-3.6	1.96	1.63	-0.43	-0.30	-0.12	-2.81	-0.07
3/1/2008	-40.0	1.7	-0.5	3.25	2.76	-0.35	-0.27	-0.11	1.46	-0.07
4/1/2008	68.4	4.6	0.4	3.52	3.01	-0.34	-0.27	-0.10	1.30	-0.07
5/1/2008	-31.1	4.0	0.8	3.14	2.67	-0.36	-0.27	-0.11	3.35	-0.07
6/1/2008	20.5	6.0	2.7	3.64	3.11	-0.33	-0.26	-0.10	2.61	-0.07
7/1/2008	26.0	5.2	2.1	3.62	3.09	-0.33	-0.26	-0.10	3.86	-0.07
8/1/2008	-0.4	2.8	-0.3	3.08	2.62	-0.36	-0.27	-0.11	6.56	-0.07
9/1/2008	-27.3	0.3	-1.8	0.15	0.04	-0.53	-0.33	-0.13	-2.12	-0.07
10/1/2008	-17.0	11.1	7.6	1.80	1.49	-0.44	-0.30	-0.12	6.41	-0.07
11/1/2008	19.1	7.1	2.7	2.47	2.08	-0.40	-0.29	-0.11	4.55	-0.07
12/1/2008	30.2	7.4	2.0	2.68	2.26	-0.39	-0.28	-0.11	6.97	-0.07
1/1/2009	89.2	6.3	2.8	2.25	1.87	-0.48	-0.33	-0.13	3.99	-0.08
2/1/2009	12.9	6.2	2.2	3.27	2.77	-0.42	-0.31	-0.12	9.38	-0.08
3/1/2009	47.7	3.8	0.7	1.76	1.45	-0.51	-0.34	-0.13	3.66	-0.08
4/1/2009	52.2	4.7	0.4	1.83	1.50	-0.50	-0.34	-0.13	6.34	-0.08
5/1/2009	0.0	4.5	-0.4	0.83	0.62	-0.56	-0.36	-0.14	0.60	-0.08
6/1/2009	0.0	7.9	3.3	0.02	-0.08	-0.61	-0.38	-0.14	0.87	-0.08
7/1/2009	0.0	6.6	2.2	0.21	0.08	-0.60	-0.37	-0.14	-0.57	-0.08
8/1/2009	0.0	4.5	-0.3	0.89	0.68	-0.56	-0.36	-0.14	-1.96	-0.08
9/1/2009	0.0	3.3	-0.3	0.93	0.71	-0.55	-0.36	-0.14	-2.57	-0.08
10/1/2009	0.0	1.8	-0.3	0.36	0.22	-0.59	-0.37	-0.14	-4.31	-0.08
11/1/2009	0.0	2.9	0.6	0.06	-0.05	-0.60	-0.38	-0.14	-4.18	-0.08
12/1/2009	0.0	2.4	-0.4	0.60	0.42	-0.57	-0.36	-0.14	-4.11	-0.08

JUDY CREEK CO2 PILOT minus IETP APPLICATION

Year	CO2 Inj e3m3/d	Oil w/ frac m3/d	Oil w/o Frac m3/d	C1 e3m3/d	C2 m3/d	C3 m3/d	C4 m3/d	C5+ m3/d	CO2 Prod e3m3/d	Other e3m3/d
1/1/2010	0.0	5.0	3.0	0.63	0.51	-0.24	-0.16	-0.06	-4.30	-0.04
2/1/2010	0.0	4.3	2.8	0.44	0.34	-0.26	-0.17	-0.06	-4.63	-0.04
3/1/2010	0.0	6.2	3.4	0.21	0.14	-0.27	-0.17	-0.06	-4.96	-0.04
4/1/2010	0.0	5.9	4.7	0.45	0.35	-0.25	-0.17	-0.06	-5.37	-0.04
5/1/2010	0.0	6.3	4.3	0.96	0.80	-0.22	-0.16	-0.06	-5.39	-0.04
6/1/2010	0.0	4.4	2.2	1.25	1.06	-0.21	-0.15	-0.06	-5.44	-0.04
7/1/2010	0.0	3.2	1.0	1.53	1.30	-0.19	-0.14	-0.06	-5.30	-0.04
8/1/2010	0.0	2.3	0.1	2.14	1.83	-0.16	-0.13	-0.05	-7.34	-0.04
9/1/2010	0.0	2.6	0.3	1.72	1.47	-0.18	-0.14	-0.06	-6.84	-0.04
10/1/2010	0.0	2.3	0.3	0.97	0.81	-0.22	-0.15	-0.06	-6.07	-0.04
11/1/2010	0.0	2.9	0.9	0.96	0.80	-0.23	-0.16	-0.06	-6.18	-0.04
12/1/2010	0.0	2.3	0.4	1.07	0.89	-0.22	-0.15	-0.06	-6.19	-0.04
1/1/2011	0.0	2.3	1.3	1.22	1.04	-0.14	-0.11	-0.04	-1.17	-0.03
2/1/2011	0.0	1.8	0.2	1.14	0.97	-0.15	-0.11	-0.04	-1.33	-0.03
3/1/2011	0.0	0.9	-0.6	1.72	1.48	-0.11	-0.10	-0.04	-2.26	-0.03
4/1/2011	0.0	1.7	0.4	1.78	1.53	-0.11	-0.10	-0.04	-2.26	-0.03
5/1/2011	0.0	1.6	0.1	1.23	1.04	-0.14	-0.11	-0.04	-1.45	-0.03
6/1/2011	0.0	1.6	0.3	1.06	0.90	-0.15	-0.11	-0.04	-1.53	-0.03
7/1/2011	0.0	1.0	-0.2	0.87	0.73	-0.16	-0.12	-0.05	-1.90	-0.03
8/1/2011	0.0	0.5	-0.6	0.72	0.59	-0.17	-0.12	-0.05	-2.28	-0.03
9/1/2011	0.0	0.0	-0.9	0.58	0.48	-0.18	-0.12	-0.05	-2.62	-0.03
10/1/2011	0.0	-0.3	-1.2	0.46	0.37	-0.19	-0.12	-0.05	-2.90	-0.03
11/1/2011	0.0	-0.5	-1.3	0.35	0.27	-0.19	-0.13	-0.05	-3.15	-0.03
12/1/2011	0.0	-0.7	-1.4	0.25	0.18	-0.20	-0.13	-0.05	-3.36	-0.03
1/1/2012	0.0	0.6	0.0	0.30	0.25	-0.09	-0.06	-0.02	1.45	-0.01
2/1/2012	0.0	0.5	-0.1	0.22	0.18	-0.09	-0.06	-0.02	1.28	-0.01
3/1/2012	0.0	0.3	-0.2	0.14	0.11	-0.10	-0.06	-0.02	1.14	-0.01
4/1/2012	0.0	0.1	-0.3	0.08	0.05	-0.10	-0.06	-0.02	1.01	-0.01
5/1/2012	0.0	0.0	-0.4	0.01	-0.01	-0.10	-0.06	-0.02	0.90	-0.01
6/1/2012	0.0	-0.1	-0.5	-0.05	-0.06	-0.11	-0.07	-0.02	0.79	-0.01
7/1/2012	0.0	-0.3	-0.5	-0.10	-0.11	-0.11	-0.07	-0.03	0.71	-0.01
8/1/2012	0.0	-0.4	-0.6	-0.15	-0.15	-0.11	-0.07	-0.03	0.62	-0.01
9/1/2012	0.0	-0.5	-0.7	-0.19	-0.19	-0.12	-0.07	-0.03	0.55	-0.01
10/1/2012	0.0	-0.6	-0.8	-0.24	-0.22	-0.12	-0.07	-0.03	0.49	-0.01
11/1/2012	0.0	-0.7	-0.8	-0.27	-0.25	-0.12	-0.07	-0.03	0.42	-0.01
12/1/2012	0.0	-1.5	-1.5	-0.14	-0.14	-0.11	-0.07	-0.03	0.00	-0.01
1/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
2/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
3/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
4/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
5/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
6/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
7/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
8/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
9/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
10/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
11/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01
12/1/2013	0.0	-0.9	-0.9	-0.08	-0.08	-0.07	-0.04	-0.02	0.00	-0.01

PENGROWTH CORPORATION

APPENDIX IV
INJECTION PROFILE DATA

INNOVATIVE ENERGY TECHNOLOGIES PROGRAM
2010 FINAL REPORT

JUDY CREEK PATTERN 102 CO_2 PILOT

Judy Creek - 07-02-064-11W5
CO2 Pilot Pattern Injection Profiles

CO2 PROFILE - MARCH 12TH, 2007

	Zones		Injection %
R5B	2632	2633	4.78
R5B	2633	2634	3.64
R5B	2634	2635	4.85
R5B	2635	2636	7.49
R5B	2636	2637	4.13
R5B	2637	2638	3.25
R5B	2638	2639	3.51
R5B	2639	2640	4.23
R5B	2640	2641	3.73
R5B	2641	2642	2.81
R5B	2642	2643	1.7
R5A	2643	2644	2.5
R5A	2644	2645	1.84
R5A	2645	2646	1.51
R5A	2646	2647	0.22
R5A	2648.3	2649.3	5.39
R5A	2649.3	2650.3	1.86
R5A	2650.3	2651	12.56
R5A	2652	2653	24.25
R5A	2653	2653.7	5.73

R5B	44.12%
R5A	55.86%

WATER PROFILE - APRIL 9TH, 2007

	Zones (m)		Injection (%)
R5B	2632	2633	1.99
R5B	2633	2634	4.31
R5B	2634	2635	3.03
R5B	2635	2636	5.05
R5B	2636	2637	0.7
R5B	2637	2638	2.01
R5B	2638	2639	6.02
R5B	2639	2640	5.5
R5B	2640	2641	6.89
R5B	2641	2642	2.98
R5B	2642	2643	6.86
R5A	2643	2644	5.68
R5A	2644	2645	1.5
R5A	2645	2646	0.47
R5A	2646	2647	3.87
R5A	2648.3	2649.3	0.98
R5A	2649.3	2650.3	6.91
R5A	2650.3	2651	4.79
R5A	2652	2653	23.6
R5A	2653	2653.7	6.86

R5B	45.34%
R5A	54.66%

WATER PROFILE - NOVEMBER 13TH, 2007

	Zones (m)		Injection (%)
R5B	2632	2633	1.46
R5B	2633	2634	1.53
R5B	2634	2635	1.54
R5B	2635	2636	3.95
R5B	2636	2637	12.13
R5B	2637	2638	5.1
R5B	2638	2639	5.11
R5B	2639	2640	5.13
R5B	2640	2641	5.11
R5B	2641	2642	5.12
R5B	2642	2643	5.28
R5A	2643	2644	3.3
R5A	2644	2645	4.11
R5A	2645	2646	1.29
R5A	2646	2647	2.29
R5A	2648.3	2649.3	4.43
R5A	2649.3	2650.3	3.64
R5A	2650.3	2651	3.05
R5A	2652	Below	26.43

R5B	51.46%
R5A	22.11%
BELOW?	26.43%

WATER PROFILE - **1000m3/d** - AUGUST 14TH, 2009

	Zones (m)		Injection (%)
R5B	2632	2633	9.72
R5B	2633	2634	0.81
R5B	2634	2635	4.27
R5B	2635	2636	0
R5B	2636	2637	0
R5B	2637	2638	0
R5B	2638	2639	10.95
R5B	2639	2640	10.49
R5B	2640	2641	4.74
R5B	2641	2642	9.64
R5B	2642	2643	7.58
R5A	2643	2644	3.08
R5A	2644	2645	7.22
R5A	2645	2646	5.81
R5A	2646	2647	4.52
R5A	2648.2	2649.3	5.24
R5A	2649.3	2650.3	2.86
R5A	2650.3	2651	0.29
R5A	2652	2652.9	12.77

R5B	58.20%
R5A	29.02%
BELOW?	12.77%

WATER PROFILE - **400m3/d** - AUGUST 14TH, 2009

	Zones (m)		Injection (%)
R5B	2632	2633	21.09
R5B	2633	2634	0.7
R5B	2634	2635	1.23
R5B	2635	2636	0
R5B	2636	2637	0
R5B	2637	2638	0
R5B	2638	2639	10.18
R5B	2639	2640	17.04
R5B	2640	2641	9.82
R5B	2641	2642	0.42
R5B	2642	2643	1.63
R5A	2643	2644	3.66
R5A	2644	2645	11.25
R5A	2645	2646	0.82
R5A	2646	2647	3.68
R5A	2648.2	2649.3	3.48
R5A	2649.3	2650.3	5.22
R5A	2650.3	2651	1.15
R5A	2652	2652.9	8.61

R5B	62.11%
R5A	29.26%
BELOW?	8.61%

** "below" indicates below lowest logged interval and not necessarily below R5A **

07-02-064-1 INJECTION PROFILE SUMMARY

	10/01 (w)	02/02 (s)	03/07 (co2)	04/07 (w)	11/07 (w)	08/09 (w)	08/09 (w)
R5B	64.7%	44.0%	44.1%	45.3%	51.5%	58.2%	62.1%
R5A	27.0%	43.0%	55.9%	54.7%	48.5%	41.8%	37.9%
R2-R4	7.5%	8.0%	0.0%	0.0%	0.0%	0.0%	0.0%

WATER PROFILE - OCTOBER 29TH, 2001

R5B	64.7%
R5A	27.0%
R2-R4	7.5%
TOTAL	99.1%

SOLVENT PROFILE - FEBRUARY 26, 2002

R5B	44.0%
R5A	43.0%
R2-R4	8.0%
TOTAL	95.0% *

NOT SURE WHERE THE REMAINING 5% WENT

Weatherford®

Production Logging Services

Injection Profile – 430 m3/Day & 1000 m3/Day

Company:	PENGROWTH CORPORATION
Field:	JUDY CREEK
Well:	PENGROWTH JUDY CREEK 7-2-64-11W5
Survey Date:	August 14, 2009
Service Company:	Weatherford Canada Partnership
Interpretation Date:	August 17, 2009
Prepared By:	MUNIR/ASIF KARDAR

Weatherford Canada Partnership • 1600, 333 – 5th Avenue SW • Calgary • Alberta • T2P 3B6 • Canada
Telephone : 403.693.7800

Weatherford®

Production Logging Services

Injection Profile – 430 m3/day

Company:	PENGROWTH CORPORATION
Field:	JUDY CREEK
Well:	PENGROWTH JUDY CREEK 7-2-64-11W5
Survey Date:	August 14, 2009
Service Company:	Weatherford Canada Partnership
Interpretation Date:	August 17, 2009
Prepared By:	MUNIR/ASIF KARDAR

Weatherford Canada Partnership • 1600, 333 – 5th Avenue SW • Calgary • Alberta • T2P 3B6 • Canada
Telephone : 403 693-7500

Purpose of Survey.

To profile water injection into the perforated intervals.

General Interpretation Comments.

Log correlated to Weatherford Injection Profile date November 13, 2007.
Well was shut in 48 hours prior to logging the base temperature.
Well was a CO2 injector and changed to water injector approximately a month ago.
Well on vacuum when not on injection.
First reported injection rate was 380 -430 m3/day at 1200 KPa.
Second reported injection rate was 1000 m3/day at 6000 Kpa.
Existing perforations:
2632.0 – 2647.0, 2648.3 – 2651 & 2652.0 – 2653.7 mKB.

Base temperature log displays a stable gradient from the top logged depth of 2400 m down to the top of perforations with minor anomalies due to lithology and tubing bottom. A cold storage is present over the perforated zones and extends down to the bottom log interval at 2653.0 mKB.

Injecting temperature passes run during injection indicates that some fluid is moving down below the bottom log interval at 2653.5 mKB.

Four shut in temperature passes display a stable gradient from the top logged interval of 2400.0 m down to the top of perforations with minor anomalies due to lithology and tubing bottom. There is no indication of up hole migration of fluid above the packer or perforations. A cold storage is present over the logged perforation intervals.

Flow meter data analysis indicate that 81.54% of the injected fluid is being injected into the top set of perforated interval, 9.85% is taken by the second perforated zone, and the rest of 8.61% is injected into bottom perforation.

Flow meter static check was done by placing the tool at 2654.0mKB, whereas the spinner was positioned at 2653.7mKB. No spinner movement is seen at this depth.

Injection rates for each zone are summerized on the following pages.

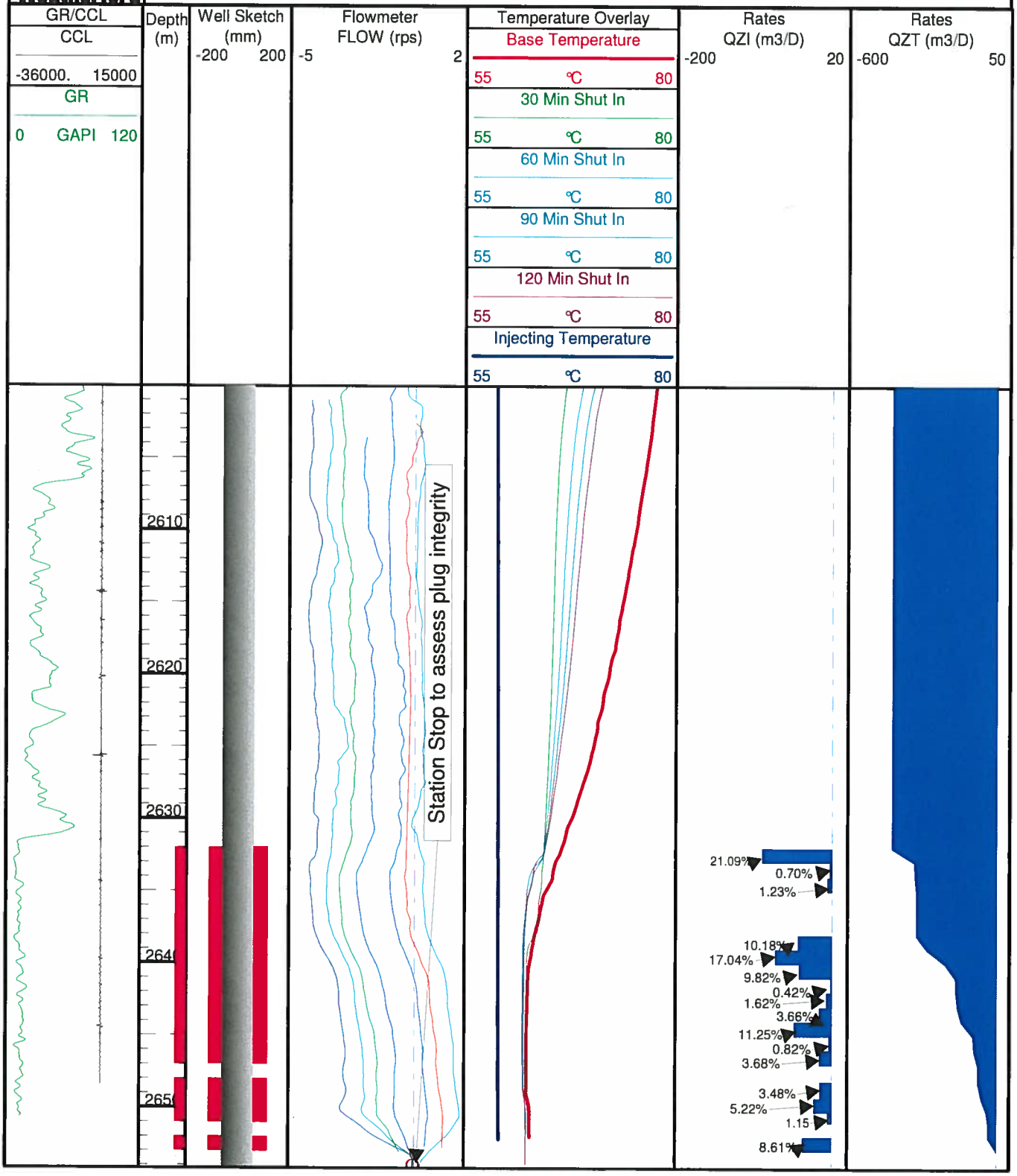
Weatherford

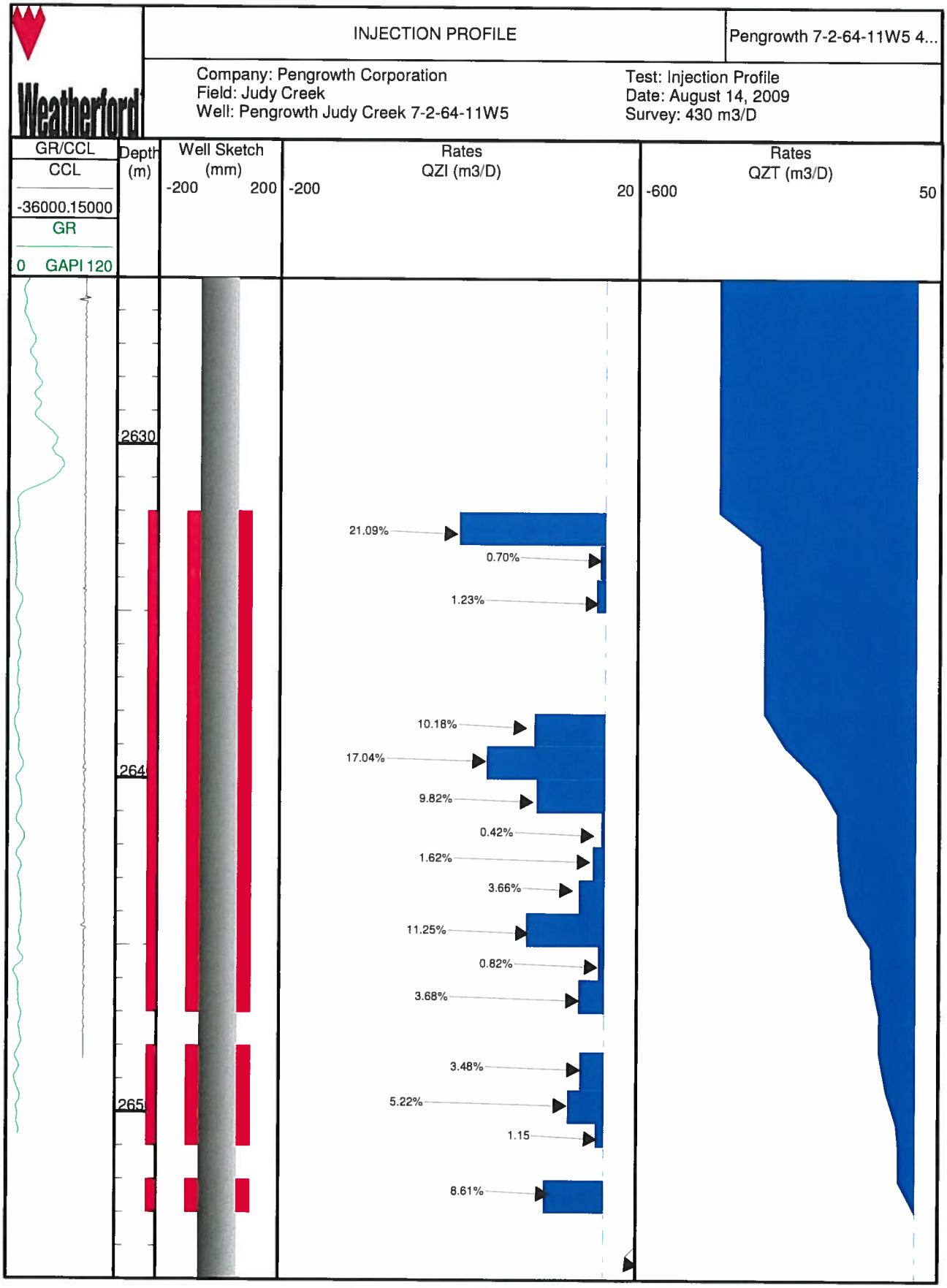
INJECTION PROFILE

Pengrowth 7-2-64-11W5 430 rates...

Company: Pengrowth Corporation
Field: Judy Creek
Well: Pengrowth Judy Creek 7-2-64-11W5

Test: Injection Profile
Date: August 14, 2009
Survey: 430 m3/D




Weatherford
INJECTION PROFILE
Pengrowth 7-2-64-11W5 4...
Company: Pengrowth Corporation
Field: Judy Creek
Well: Pengrowth Judy Creek 7-2-64-11W5
Test: Injection Profile
Date: August 14, 2009
Survey: 430 m3/D
GR/CCL
CCL
-36000.15000
GR
0 GAPI 120
Depth (m)
Well Sketch (mm)
-200 200
Rates QZI (m3/D)
-200 20
Rates QZT (m3/D)
-600 50
2630
21.09%
0.70%
1.23%
10.18%
17.04%
9.82%
0.42%
1.62%
3.66%
11.25%
0.82%
3.68%
3.48%
5.22%
1.15
8.61%

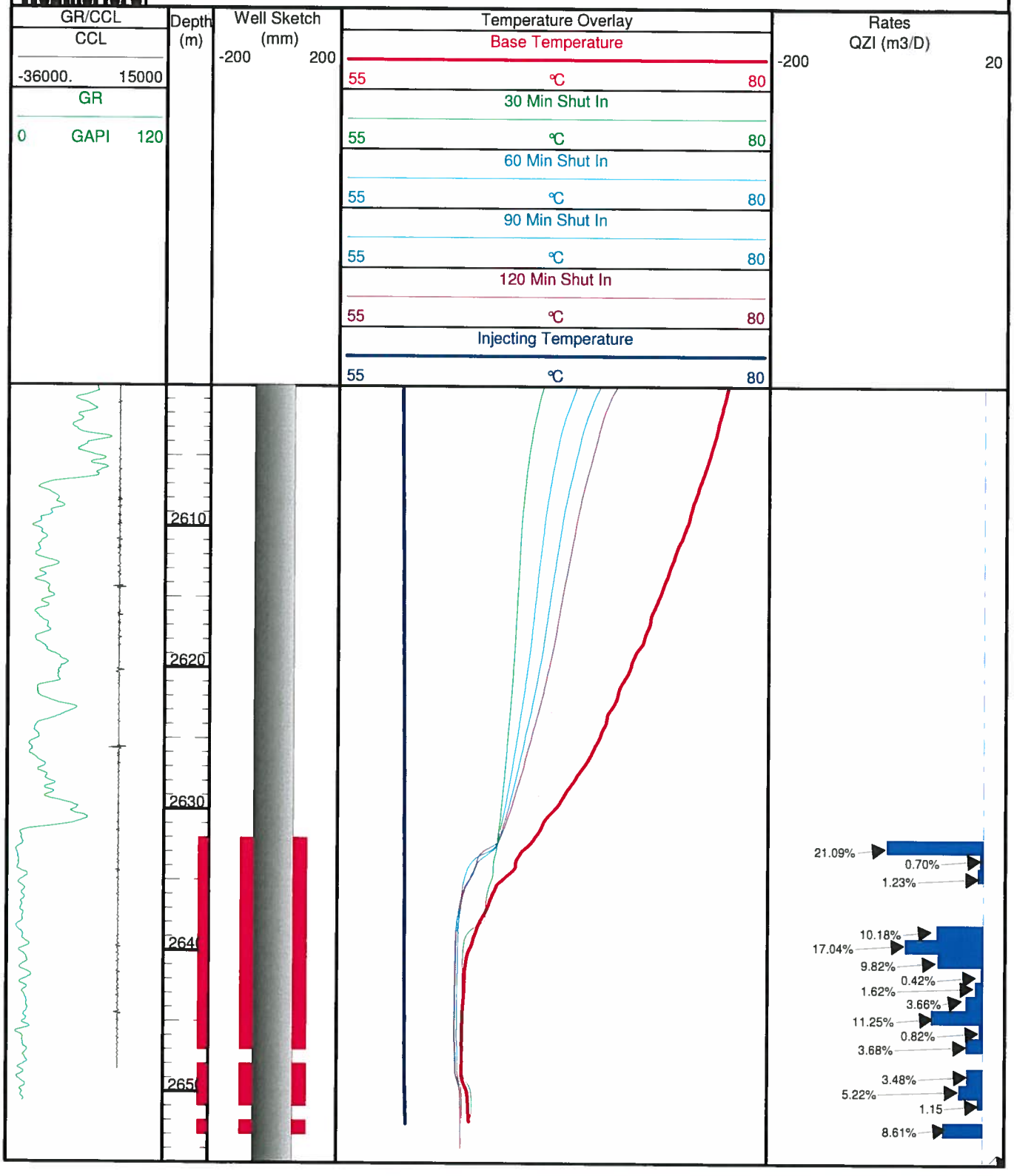
Weatherford

INJECTION PROFILE

Pengrowth 7-2-64-11W5 430 rates...

Company: Pengrowth Corporation
Field: Judy Creek
Well: Pengrowth Judy Creek 7-2-64-11W5

Test: Injection Profile
Date: August 14, 2009
Survey: 430 m3/D



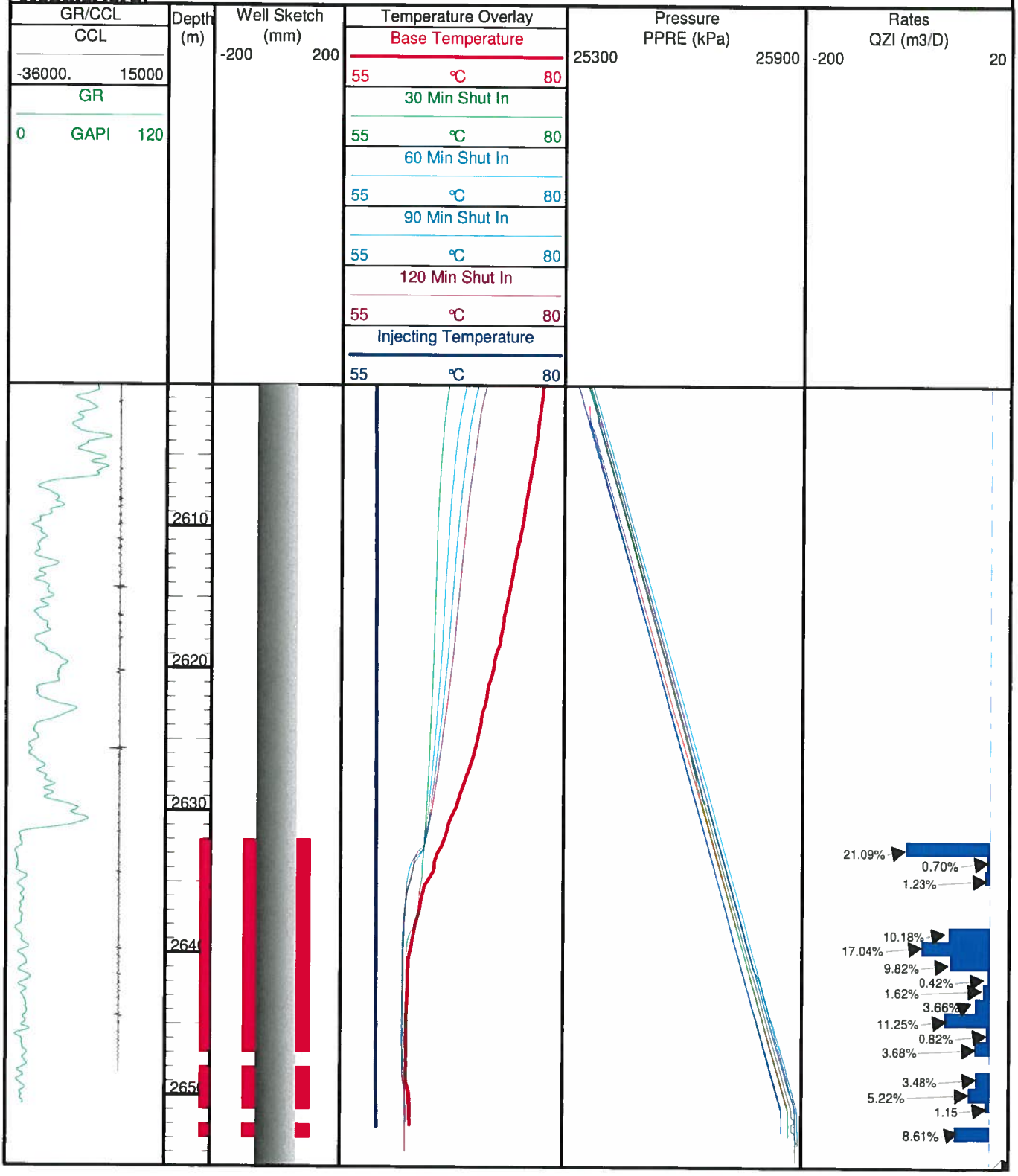
Weatherford

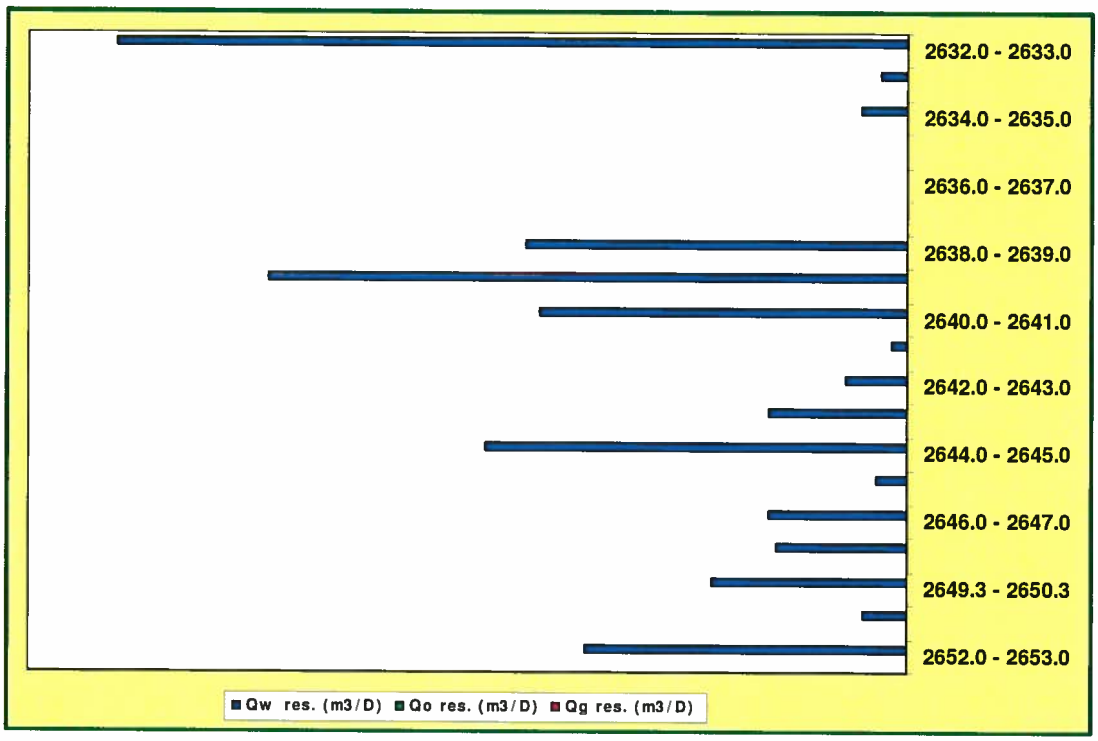
INJECTION PROFILE

Pengrowth 7-2-64-11W5 430 rates...

Company: Pengrowth Corporation
Field: Judy Creek
Well: Pengrowth Judy Creek 7-2-64-11W5

Test: Injection Profile
Date: August 14, 2009
Survey: 430 m3/D





Computed Downhole Rates

Water total contribution SC: -423.845 m3/D
Oil total contribution SC: 0 m3/D
Gas total contribution SC: 0 Mm3/D

Recorded (Actual) Rates

Water	-380 to -430 m3/D
Oil	0 m3/D
Gas	0 Mm3/D

Zonal Contributions.

Contributions by Phase (Downhole)

Zones (m)	Qw res. (m3/D)	Qo res. (m3/D)	Qg res. (m3/D)
2632.0 - 2633.0	-90.00	N/A	N/A
2633.0 - 2634.0	-3.00	N/A	N/A
2634.0 - 2635.0	-5.23	N/A	N/A
2635.0 - 2636.0	0.00	N/A	N/A
2636.0 - 2637.0	0.00	N/A	N/A
2637.0 - 2638.0	0.00	N/A	N/A
2638.0 - 2639.0	-43.42	N/A	N/A
2639.0 - 2640.0	-72.74	N/A	N/A
2640.0 - 2641.0	-41.93	N/A	N/A
2641.0 - 2642.0	-1.81	N/A	N/A
2642.0 - 2643.0	-6.96	N/A	N/A
2643.0 - 2644.0	-15.62	N/A	N/A
2644.0 - 2645.0	-48.01	N/A	N/A
2645.0 - 2646.0	-3.51	N/A	N/A
2646.0 - 2647.0	-15.71	N/A	N/A
2648.2 - 2649.3	-14.86	N/A	N/A
2649.3 - 2650.3	-22.29	N/A	N/A
2650.3 - 2651.0	-4.92	N/A	N/A
2652.0 & below	-36.74	N/A	N/A

Percentage Total Production (Downhole)

Zones (m)	Qt res. (m3/D)	Injection % (%)
2632.0 - 2633.0	-90.00	21.09
2633.0 - 2634.0	-3.00	0.70
2634.0 - 2635.0	-5.23	1.23
2635.0 - 2636.0	0.00	0.00
2636.0 - 2637.0	0.00	0.00
2637.0 - 2638.0	0.00	0.00
2638.0 - 2639.0	-43.42	10.18
2639.0 - 2640.0	-72.74	17.04
2640.0 - 2641.0	-41.93	9.82
2641.0 - 2642.0	-1.81	0.42
2642.0 - 2643.0	-6.96	1.63
2643.0 - 2644.0	-15.62	3.66
2644.0 - 2645.0	-48.01	11.25
2645.0 - 2646.0	-3.51	0.82
2646.0 - 2647.0	-15.71	3.68
2648.2 - 2649.3	-14.86	3.48
2649.3 - 2650.3	-22.29	5.22
2650.3 - 2651.0	-4.92	1.15
2652.0 & below	-36.74	8.61

Survey Summary

Survey Name: 430 m3/D

Tools Summary

String OD	42.8625 mm
Capacitance	None (Calib. Type)
100% Water	N/A
100% HC	N/A
Density	None
Spinner blade OD	101.6 mm

Interpretation Summary

Interpretation Name: Interpretation # 1

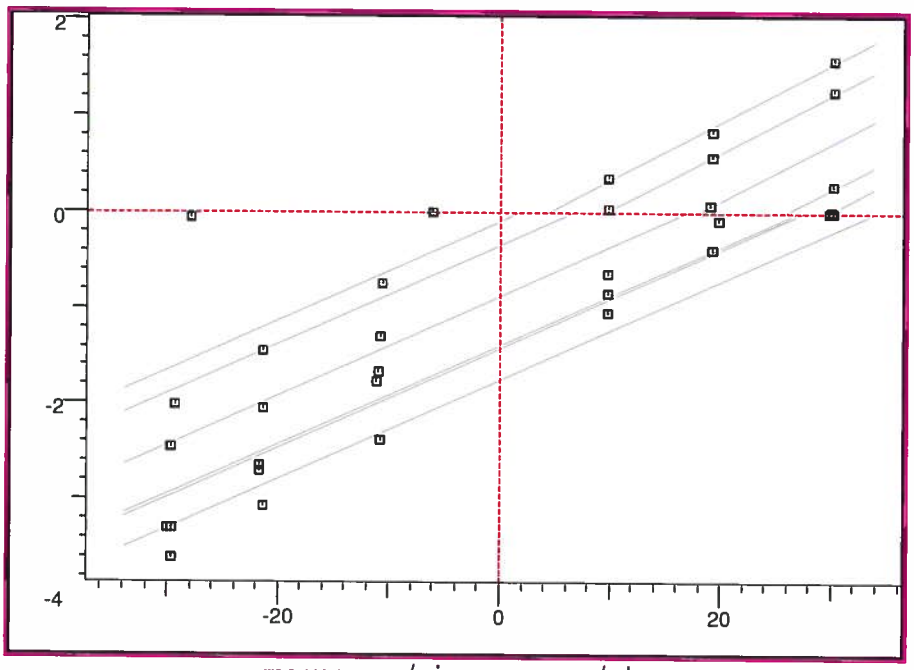
Density offset	N/A
Capacitance offset	N/A
Flow type	Single-phase
Flow model	
Flow model L-G	
Flow model W-O	
Vpcf multipler	1
Vslip multipler	N/A
Vslip mult.W-O	N/A

Fluid Parameters Summary

Fluid Type: Water

Gas:	(NO)
Specific gravity	N/A
N2 %	N/A
CO2 %	N/A
H2S %	N/A
Z factor	
µg	
Oil:	(NO)
Gravity	N/A
GOR	N/A
WOR	
Rs, Pb	
Bo	
Co	
µo	
Condensate:	(NO)
Tank GOR	N/A
Tank gas gravity	N/A
Separator GOR	N/A
Separator gas gravity	N/A
Separator P	N/A
Separator T	N/A
Dew point P	N/A
Dew point T	N/A
Liq. Gravity	N/A
N2 %	N/A
CO2 %	N/A
H2S %	N/A
Water:	( )
Salinity, ppm	30000
Rsw	Katz
Cw	Dodson and Standing
µw	Van-Wingen+Frick

Spinner Calibration Summary



rps versus m/minrps versus m/min

Threshold (+) 0 m/minThreshold (-) 0 m/min

Calib. Zone (m)	Slope (+)	Slope (-)	Int (+) (m/min)	Int (-) (m/min)	Int. Diff. (m/min)
2600.8 - 2625.6	0.061	0.052	29.591	26.824	2.766
2628.6 - 2630.3	0.061	0.052	17.784	27.411	-9.627
2634.0 - 2635.4	0.061	0.052	25.709	33.748	-8.039
2639.9 - 2642.3	0.061	0.052	9.495	16.833	-7.338
2647.2 - 2647.7	0.061	0.052	4.398	6.550	-2.152
2653.6 - 2654.1	N/A	0.052	N/A	1.787	0.000

Weatherford®

Production Logging Services

Injection Profile – 1000 m3/Day

Company:	PENGROWTH CORPORATION
Field:	JUDY CREEK
Well:	PENGROWTH JUDY CREEK 7-2-64-11W5
Survey Date:	August 14, 2009
Service Company:	Weatherford Canada Partnership
Interpretation Date:	August 17, 2009
Prepared By:	MUNIR/ASIF KARDAR

Weatherford Canada Partnership • 1600, 333 – 5th Avenue SW • Calgary • Alberta • T2P 3B6 • Canada
Telephone : 403 693-7500

Purpose of Survey.

To profile water injection into the perforated intervals.

General Interpretation Comments.

Log correlated to Weatherford Injection Profile date November 13, 2007.
Well was shut in 48 hours prior to logging the base temperature.
Well was a CO2 injector and changed to water injector approximately a month ago.
Well on vacuum when not on injection.
First reported injection rate was 380 -430 m3/day at 1200 KPa.
Second reported injection rate was 1000 m3/day at 6000 Kpa.
Existing perforations:
2632.0 – 2647.0, 2648.3 – 2651 & 2652.0 – 2653.7 mKB.

Base temperature log displays a stable gradient from the top logged depth of 2400 m down to the top of perforations with minor anomalies due to lithology and tubing bottom. A cold storage is present over the perforated zones and extends down to the bottom log interval at 2653.0 mKB.

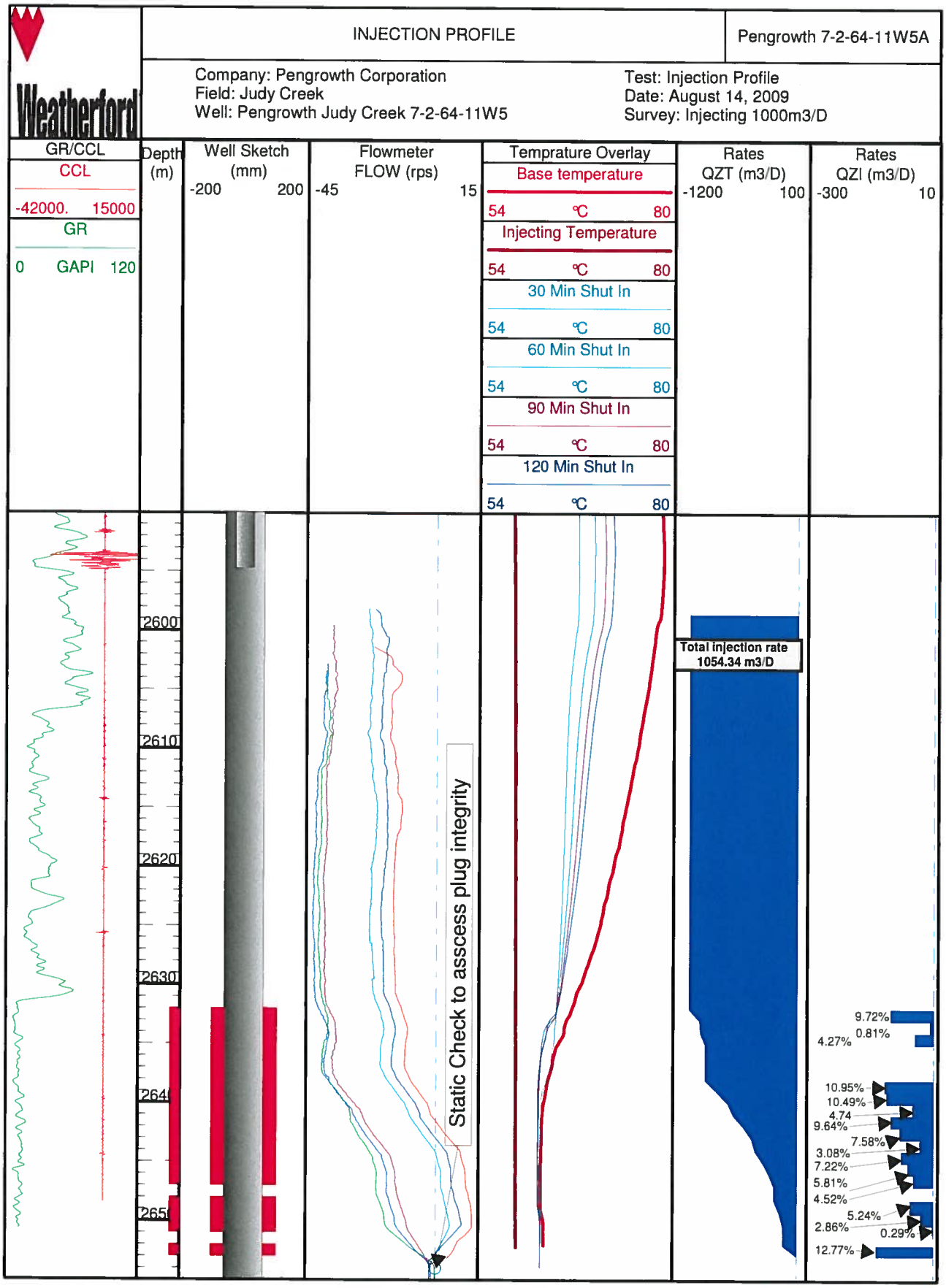
Injecting pass run during injection indicates that some fluid is moving down below the bottom log interval at 2653.5 mKB.

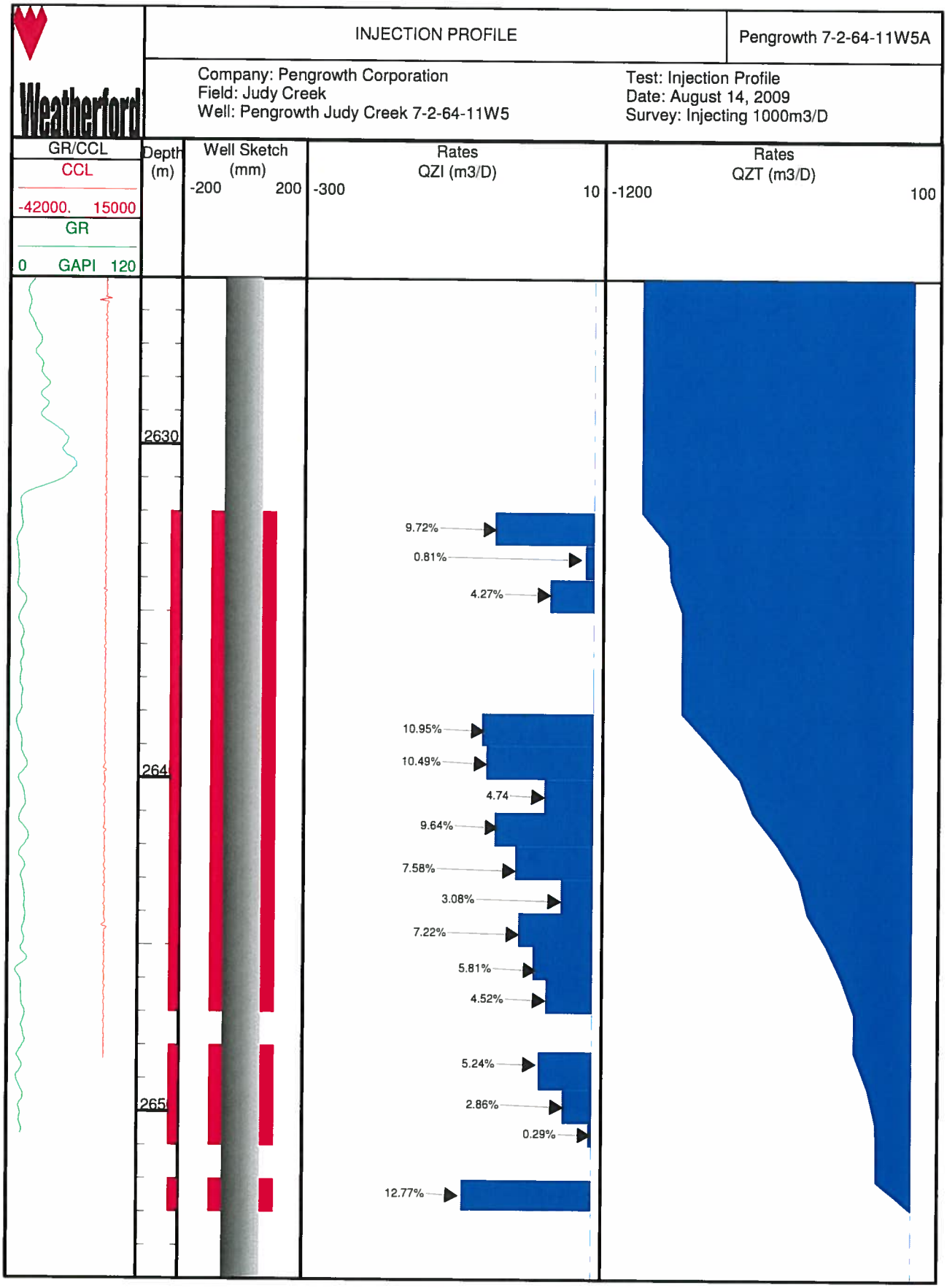
Four shut in temperature passes display a stable gradient from the top logged interval of 2400.0 m down to the top of perforations with minor anomalies due to lithology and tubing bottom. There is no indication of up hole migration of fluid above the packer or perforations. A cold storage is present over the logged perforation intervals.

Flow meter data analysis indicate that 77.28% of the injected fluid is being injected into the top set of perforated interval, 10.05% is taken by the second perforated zone, and the rest of 12.77% is injected into bottom perforation.

Flow meter static check was done by placing the tool at 2654.0mKB, whereas the spinner was positioned at 2653.7mKB. No spinner movement is seen at this depth.

Injection rates for each zone are summerized on the following pages.


Weatherford
INJECTION PROFILE
Pengrowth 7-2-64-11W5A
Company: Pengrowth Corporation
Field: Judy Creek
Well: Pengrowth Judy Creek 7-2-64-11W5
Test: Injection Profile
Date: August 14, 2009
Survey: Injecting 1000m3/D
GR/CCL
CCL
-42000. 15000
GR
0 GAPI 120
Depth (m)
Well Sketch (mm)
-200 200
Flowmeter FLOW (rps)
-45 15
Temprature Overlay
Base temperature
54 ℃ 80
Injecting Temperature
54 ℃ 80
30 Min Shut In
54 ℃ 80
60 Min Shut In
54 ℃ 80
90 Min Shut In
54 ℃ 80
120 Min Shut In
54 ℃ 80
Rates QZT (m3/D)
-1200 100
Rates QZI (m3/D)
-300 10
2600
2610
2620
2630
2640
2650
Static Check to asscess plug integrity
Total injection rate 1054.34 m3/D
9.72%
0.81%
4.27%
10.95%
10.49%
4.74
9.64%
7.58%
3.08%
7.22%
5.81%
4.52%
5.24%
2.86%
0.29%
12.77%


Weatherford
INJECTION PROFILE
Pengrowth 7-2-64-11W5A
Company: Pengrowth Corporation
Field: Judy Creek
Well: Pengrowth Judy Creek 7-2-64-11W5
Test: Injection Profile
Date: August 14, 2009
Survey: Injecting 1000m3/D
GR/CCL
CCL
-42000. 15000
GR
0 GAPI 120
Depth (m)
Well Sketch (mm)
-200 200
Rates QZI (m3/D)
-300 10
Rates QZT (m3/D)
-1200 100
2630
264
265
9.72%
0.81%
4.27%
10.95%
10.49%
4.74
9.64%
7.58%
3.08%
7.22%
5.81%
4.52%
5.24%
2.86%
0.29%
12.77%

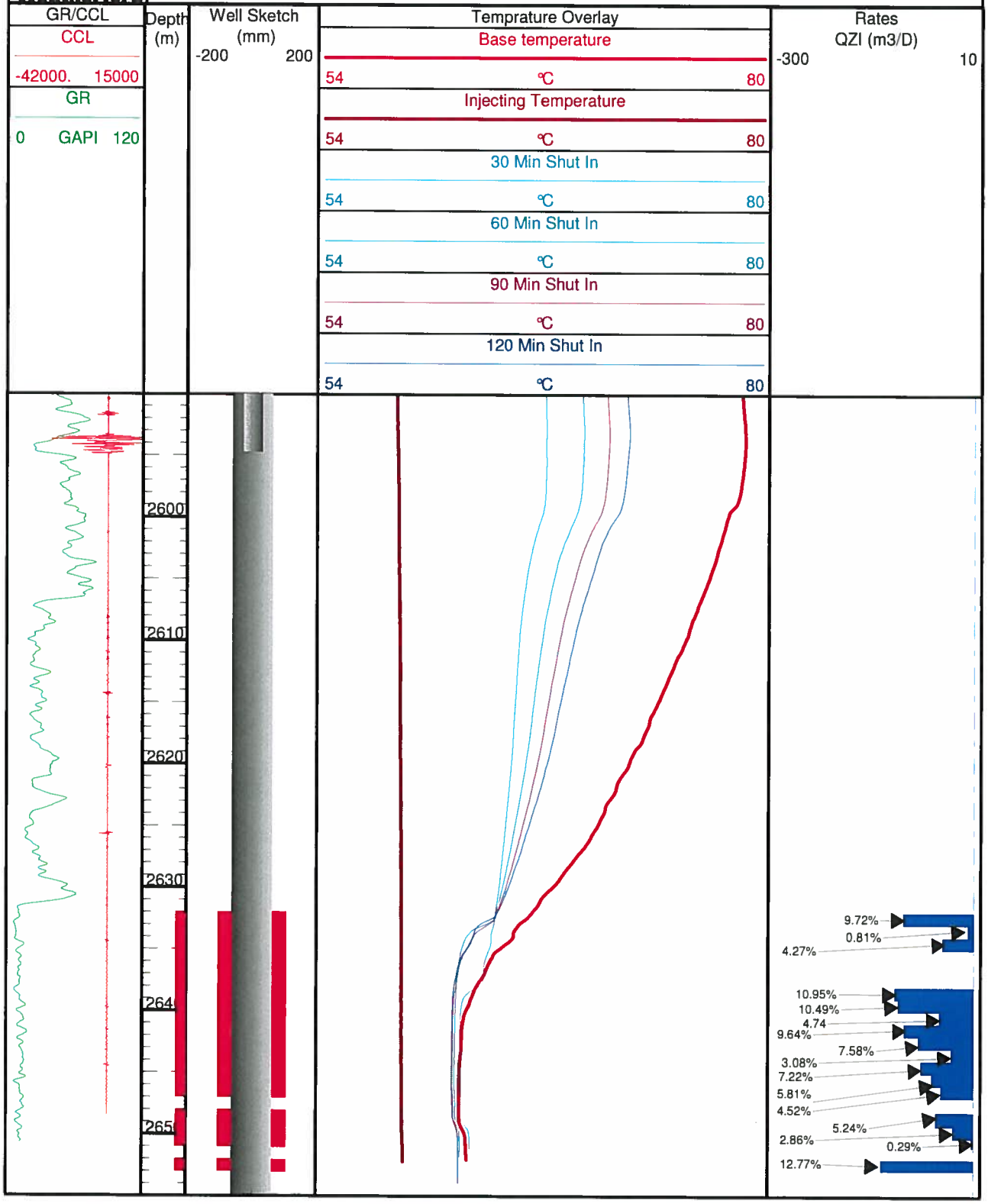
Weatherford

INJECTION PROFILE

Pengrowth 7-2-64-11W5A

Company: Pengrowth Corporation
Field: Judy Creek
Well: Pengrowth Judy Creek 7-2-64-11W5

Test: Injection Profile
Date: August 14, 2009
Survey: Injecting 1000m3/D



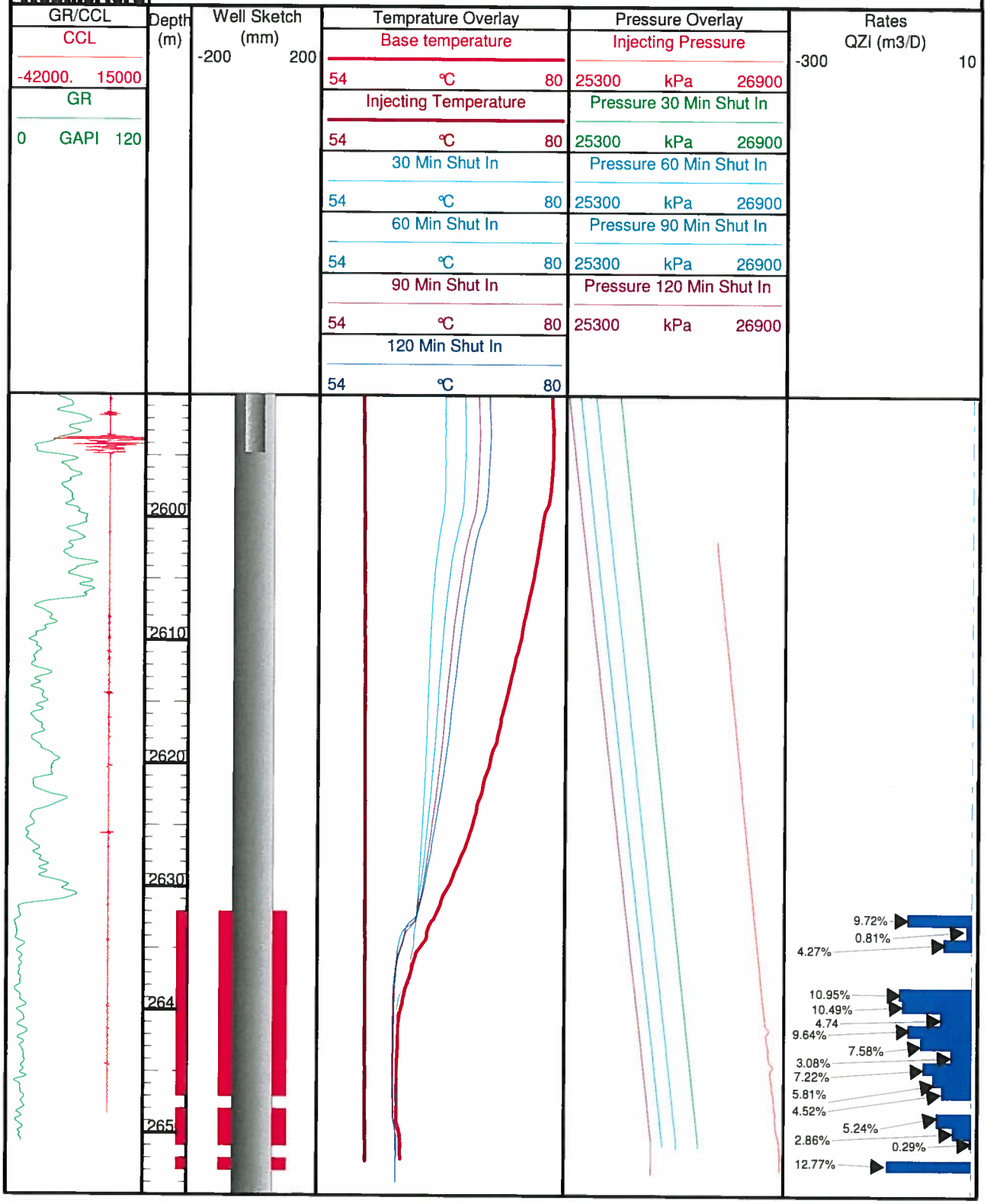
Weatherford

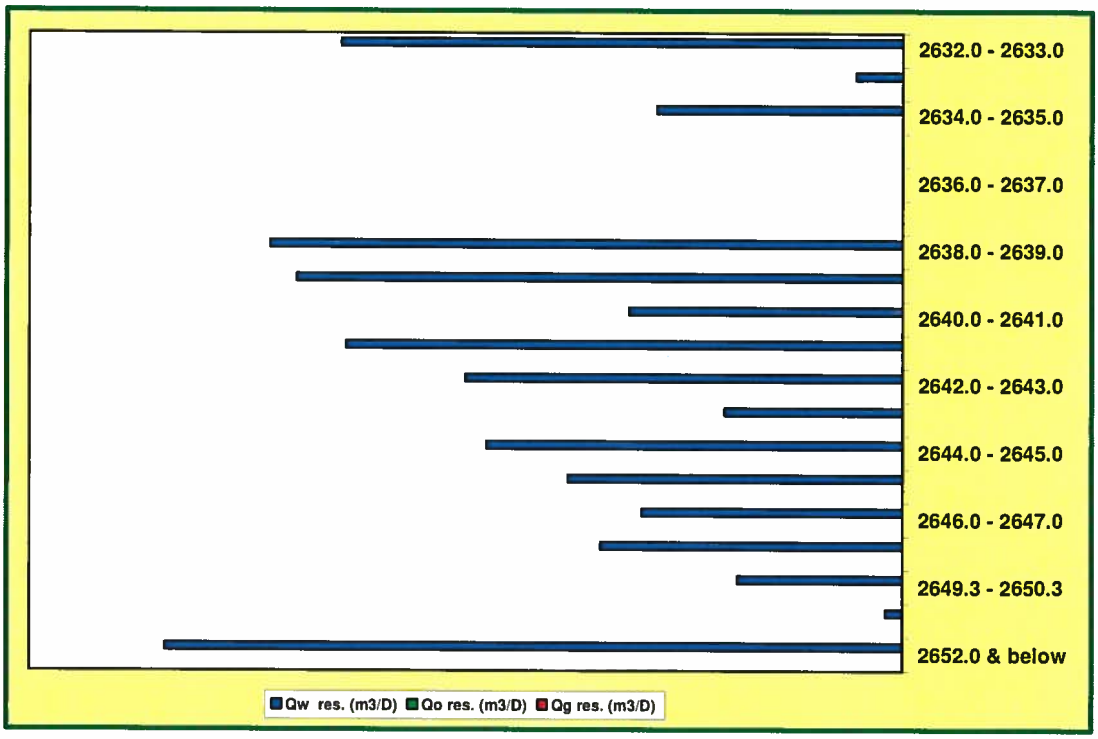
INJECTION PROFILE

Pengrowth 7-2-64-11W5A

Company: Pengrowth Corporation
Field: Judy Creek
Well: Pengrowth Judy Creek 7-2-64-11W5

Test: Injection Profile
Date: August 14, 2009
Survey: Injecting 1000m3/D





Computed Downhole Rates

Water total contribution SC: -1052.34 m3/D
Oil total contribution SC: 0 m3/D
Gas total contribution SC: 0 Mm3/D

Recorded (Actual) Rates

Water	-1000 m3/D
Oil	0 m3/D
Gas	0 Mm3/D

Zonal Contributions.

Contributions by Phase (Downhole)

Zones (m)	Qw res. (m3/D)	Qo res. (m3/D)	Qg res. (m3/D)
2632.0 - 2633.0	-102.81	N/A	N/A
2633.0 - 2634.0	-8.55	N/A	N/A
2634.0 - 2635.0	-45.10	N/A	N/A
2635.0 - 2636.0	0.00	N/A	N/A
2636.0 - 2637.0	0.00	N/A	N/A
2637.0 - 2638.0	-0.00	N/A	N/A
2638.0 - 2639.0	-115.81	N/A	N/A
2639.0 - 2640.0	-110.97	N/A	N/A
2640.0 - 2641.0	-50.12	N/A	N/A
2641.0 - 2642.0	-101.93	N/A	N/A
2642.0 - 2643.0	-80.16	N/A	N/A
2643.0 - 2644.0	-32.58	N/A	N/A
2644.0 - 2645.0	-76.31	N/A	N/A
2645.0 - 2646.0	-61.45	N/A	N/A
2646.0 - 2647.0	-47.83	N/A	N/A
2648.2 - 2649.3	-55.42	N/A	N/A
2649.3 - 2650.3	-30.20	N/A	N/A
2650.3 - 2651.0	-3.11	N/A	N/A
2652.0 & below	-135.08	N/A	N/A

Percentage Total Production (Downhole)

Zones (m)	Qt res. (m3/D)	Injection % (%)
2632.0 - 2633.0	-102.81	9.72
2633.0 - 2634.0	-8.55	0.81
2634.0 - 2635.0	-45.10	4.27
2635.0 - 2636.0	0.00	0.00
2636.0 - 2637.0	0.00	0.00
2637.0 - 2638.0	-0.00	0.00
2638.0 - 2639.0	-115.81	10.95
2639.0 - 2640.0	-110.97	10.49
2640.0 - 2641.0	-50.12	4.74
2641.0 - 2642.0	-101.93	9.64
2642.0 - 2643.0	-80.16	7.58
2643.0 - 2644.0	-32.58	3.08
2644.0 - 2645.0	-76.31	7.22
2645.0 - 2646.0	-61.45	5.81
2646.0 - 2647.0	-47.83	4.52
2648.2 - 2649.3	-55.42	5.24
2649.3 - 2650.3	-30.20	2.86
2650.3 - 2651.0	-3.11	0.29
2652.0 - & below	-135.08	12.77

Survey Summary

Survey Name: Injecting 1000m3/D

Tools Summary

String OD	42.8625 mm
Capacitance	None (Calib. Type)
100% Water	N/A
100% HC	N/A
Density	None
Spinner blade OD	101.6 mm

Interpretation Summary

Interpretation Name: Interpretation #2

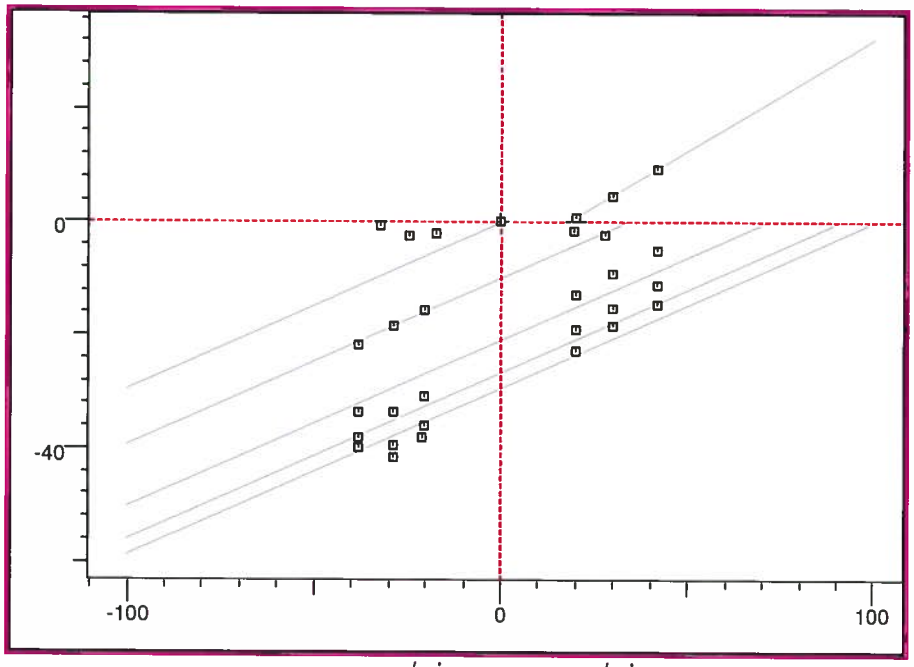
Density offset	N/A
Capacitance offset	N/A
Flow type	Single-phase
Flow model	
Flow model L-G	
Flow model W-O	
Vpcf multipler	1
Vslip multipler	N/A
Vslip mult.W-O	N/A

Fluid Parameters Summary

Fluid Type: Water

Gas:	(NO)
Specific gravity	N/A
N2 %	N/A
CO2 %	N/A
H2S %	N/A
Z factor	
µg	
Oil:	(NO)
Gravity	N/A
GOR	N/A
WOR	
Rs, Pb	
Bo	
Co	
µo	
Condensate:	(NO)
Tank GOR	N/A
Tank gas gravity	N/A
Separator GOR	N/A
Separator gas gravity	N/A
Separator P	N/A
Separator T	N/A
Dew point P	N/A
Dew point T	N/A
Liq. Gravity	N/A
N2 %	N/A
CO2 %	N/A
H2S %	N/A
Water:	( )
Salinity, ppm	30000
Rsw	Katz
Cw	Dodson and Standing
µw	Van-Wingen+Frick

Spinner Calibration Summary



rps versus m/minrps versus m/min

Threshold (+) 0 m/min Threshold (-) 0 m/min

Calib. Zone (m)	Slope (+)	Slope (-)	Int (+) (m/min)	Int (-) (m/min)	Int. Diff. (m/min)
2604.7 - 2625.7	N/A	0.293	N/A	100.063	0.000
2632.2 - 2633.5	N/A	0.293	N/A	90.902	0.000
2638.6 - 2640.2	N/A	0.293	N/A	71.744	0.000
2644.3 - 2645.6	0.394	0.293	17.938	34.104	-16.166
2653.4 - 2654.7	N/A	0.293	N/A	0.441	0.000

Weatherford
Specialty Division

JOB REPORT

Client:	**PENGROWTH CORPORATION**		
Well:	100/07-02-064-11W5/00	**Date:**	August 14, 2009
Field:	JUDY CREEK		
Log Type:	INJECTION PROFILE	**Consultant:**	Andy Doucette
SO# :	10201205	**Specialty Engineer:**	Corinne Coghlan

Time:	ORGANIZED EVENTS	.las File	Logged Interval (mKB)
07:30	Arrive at Judy Creek bone yard and wait for Pengrowth representative Andy Doucette.	-	-
07:45	Andy leads Weatherford Wireline to location.	-	-
08:00	Arrive on location and MIRU wireline unit.	-	-
08:15	Safety meeting.	-	-
08:30	Continue rig up.	-	-
10:00	Assemble PLT string vertically and function test.	-	-
10:15	RIH.		
11:00	Base Temp DN. Well SI 48 hrs. P_{WH} = 0 Kpa.	INJ01A	2400-2655
11:24	Correlation strip /X-Flow check 15 m/min UP.	INJ02A	2655-2595
11:52	X-Flow check 20 m/min DN.	INJ03A	2595-2655
11:56	X-Flow check 25 m/min UP.	-	-
12:07	Well on injection. Wait for stabilization.	-	-
	INJECTING PASSES P_{WH} = 1200 KPa, Reported Q = 380 - 430 m^3/day. No choke.	-	-
13:51	Injecting Pass 10 DN.	INJ06A	2595-2655
14:01	Injecting Pass 10 UP.	INJ07A	2655-2595
14:09	Injecting Pass 20 DN.	INJ08A	2595-2655
14:13	Injecting Pass 20 UP.	INJ09A	2655-2595
14:17	Injecting Pass 30 DN.	INJ10A	2595-2655
14:20	Injecting Pass 30 UP.	INJ11A	2655-2595
14:24	Injecting Pass 40 DN.	INJ12A	2595-2655
14:28	Injecting Pass 40 UP.	INJ13A	2655-2595
14:35	Injecting Temp 10 DN.	INJ14A	2400-2655
15:09	STATION STOP @ 2654 mKB to assess plug integrity.	INJ15	2654

Weatherford
Specialty Division

15:20	**INJECTION RATE CHANGE; P_{WH} = 6000 KPa, Reported Q = 1000 m^3/day.**	-	-
16:02	Injecting Pass 10 DN.	INJ16A	2595-2655
16:08	Injecting Pass 10 UP - Winchman stops accidentally, pass not presented.	INJ17A	2655-2595
16:17	Injecting Pass 20 DN.	INJ18A	2595-2655
16:21	Injecting Pass 20 UP.	INJ19A	2655-2595
16:26	Injecting Pass 30 DN.	INJ20A	2595-2655
16:30	Injecting Pass 30 UP.	INJ21A	2655-2595
16:33	Injecting Pass 40 DN.	INJ22A	2595-2655
16:37	Injecting Pass 40 UP.	INJ23A	2655-2595
16:44	STATION STOP @ 2654 mKB to assess plug integrity.	INJ24	2654
16:51	Injection Pass 10 UP.	INJ25A	2655-2595
17:10	**Well Shut-In and on immediate vaccum. Shut-In Passes.**		
17:13	30 MIN SI.	INJ26A	2400-2655
17:50	60 MIN SI.	INJ27A	2400-2655
18:23	90 MIN SI.	INJ28A	2400-2655
18:59	120 MIN SI.	INJ29A	2400-2655
20:00	Surface toolstring and rig out.	-	-
21:00	Leave location.	-	-

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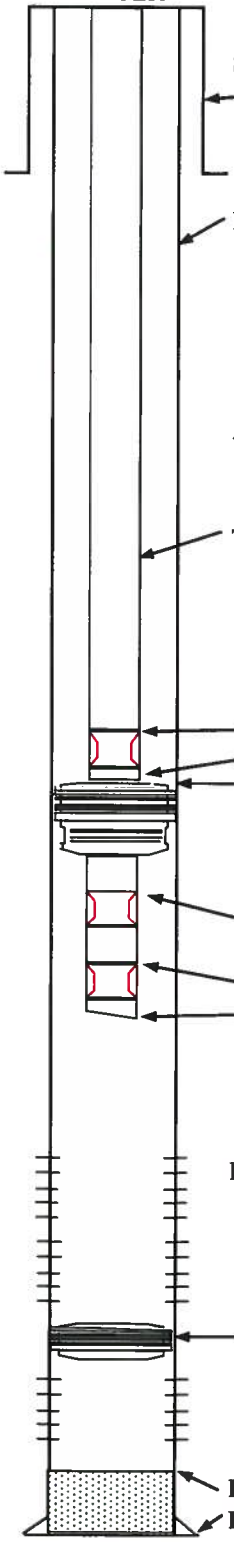
Specialty Division

AFTER



ACTUAL DOWNHOLE SCHEMATIC

SURFACE CASING
219 mm J-55, 35.7 kg/m
to **390.0 mKB**

Well Name 07-02-64-11w5
Date 09/08/17

PRODUCTION CASING
139.7 mm 25.3 kg/m L-80 to **2706.29 m**

K.B. Elevation:	**1077.90 m**
K.B. to Dognut:	**4.46 m**
K.B. to C.F.:	**5.10 m**
K.B. to Ground:	**5.50 m**

***Note:** Tubing Hanger, 17-4PH S.S. Box by Pin Down "MMS"

Tubing
1 - 73.0 mm TK-99, MMS Tubing Joint
1 - 73.0 mm TK-99, MMS Pup Joints
270 - 73.0 mm TK-99, MMS Tubing Joints

73.0 mm TK-99, MMS Pup Joint
73.0 mm Otis "X" Nipple c/w 47.63 mm Profile at **2593.90 mKB** {Duplex 2205 S.S.}
68.3 mm Tryton "Latched" Seal Assy. **Incoloy 925**.
139.7 mm Tryton "TL" Sealbore Packer
c/w 68.3 mm Seal Assy, **Incoloy 925** material
Top of Packer at **2594.6 mKB**
60.3 mm Vam, FJL Pup Joint
60.3 mm Otis "X" Nipple c/w 47.63 mm Profile at **2597.16 mKB**
60.3 mm Vam, FJL Pup Joint
60.3 mm Otis "XN" Nipple c/w 47.63 mm Profile 45.49 mm NoGoat **2599.22 mKB**
60.3 mm Pump-Out / Re-entry Guide, Bottom at **2599.65 mKB**
***Note:** Above Sealbore Packer and Tail Pipe built from **Incoloy 925**

Perforations:
2632.0 - 2647.0
2648.3 - 2651.0
2652.0 - 2653.7

139.7 mm Drillable Permanent Bridgeplug at **2655.0 mKB Center Element**
2656.5 - 2657.5
2662.4 - 2663.4
2668.7 - 2674.2
2678.5 - 2681.2

P.B.D. 2729.6 mKB
F.T.D. 2743.2 mKB

PROVINCE ALBERTA
FIELD JUDY CREEK
WELL PENGROWTH JUDY CREEK
7-2-64-11
COMPANY PENGROWTH CORPORATION

INJECTION PROFILE

COMPANY PENGROWTH CORPORATION

WELL PENGROWTH JUDY CREEK 7-2-64-11

FIELD JUDY CREEK

PROVINCE ALBERTA

LSD 07 Sec. 02 Twp. 064 Rge. 11
Perm. Datum Ground Level Elev.1072.40
Log measured from K.B. , 5.50 m above
Permanent Datum.

Other Services:

UWI 100/07-02-064-11W5/00
Licence 255847

ELEV.K.B.1077.90
G.L.1072.40

		Shot Density	No. of Shots	Perf. Interval From	Perf. Interval To
Date	AUGUST 14,2009				
Service Order	10201205				
Run No.	ONE				
BHT	80 °C				
Depth-Driller	2743.2				
Depth-Logger	2653.7				
Btm.Log Inter.	2653.5				
Top Log Inter.	2400.0	Gun Type			
Fluid in Hole	PRODUCED WATER	Gun Size			
Fluid Level	SURFACE/INJECTING	Tubing/Casing Record			
Bit Size (mm)	N/A	Size mm	Wt. Kg/m	From	To
Unit #	14170	219.1	35.7	SURFACE	390.0 m
Location	EDM SPECIALTY	139.7	25.3	SURFACE	2706.3 m
Recorded By	CORINNE COGHLAN	73.0		SURFACE	2594.7 m
Witnessed By	ANDY DOUCETTE				

Other Services

Service	Type	Size	Depth
Bridge Plug			
Produc. Packer			
Cement Retainer			
Cement			
Tubing Bottom 2594.7	Junk Basket Type		
Seating Nipple	Gauge Ring Size		

All interpretations of log data are opinions based on inferences from electrical or other measurements. We do not guarantee the accuracy or correctness of any interpretation or recommendation and we shall not be liable or responsible for any loss, cost, damages or expenses incurred or sustained by anyone resulting from any interpretation or recommendation made by any of our employees or agents.

REMARKS Rig: WFT PICKER 15012 Service Order # 10201205

WELL WAS A CO2 INJECTOR AND CHANGED TO WATER INJECTION APPROXIMATELY A MONTH AGO.
WELL SHUT-IN APPROXIMATELY 48 HOURS PRIOR TO LOGGING BASE TEMPERATURE PASS.
WELL ON VACCUM WHEN NOT ON INJECTION.
FIRST REPORTED INJECTION RATE = 380 - 430 m^3/day @ 1200 KPa.
SECOND REPORTED INJECTION RATE = 1000 m^3/day @ 6000 KPa.
STATION STOPS COMPLETED TO ASSESS PLUG INTEGRITY.
LOG CORRELTAED TO A WEATHERFORD INJECTION PROFILE DATED NOVEMBER 13, 2009.

EQUIPMENT DATA

Run No.	Tool Type	Tool No.	Other
ONE	TELEMETRY/CCL	CTLA133	RAN 4 X HD SINKER BAR ABOVE.
	CENTRALIZER	CENRW127	BIDIRECTIONAL BOWSPRING CENTRALIZER.
	GAMMA RAY	GRTW149	GAMMA RAY
	QUARTZ PRESSURE	QPGD122	QUARTZDYNE PRESSURE
	TEMPERATURE	CFTAA118	TEMPERATURE PROBE
	FLOWMETER	FBAB114	FULLBORE FLOWMETER (IMPELLER DIAMETER = 101.6 mm)

CS400 08/14/09 09:11:58 Ver. 80214133R Service: coalbedmethane Job 10201205

** DEPTH TRACK GRAPHICS ** 80214133R

( ) Exit ( ) Add Graphic ( ) Add Multiple Graphics ( ) Save/Restore

---

edit	Image	Bottom Depth	Top Depth	Color	Offset
( )	Existing Perforations	2647.00	2632.00	black	depthtrack
( )	Existing Perforations	2651.00	2648.30	black	depthtrack
( )	Existing Perforations	2653.70	2652.00	black	depthtrack

REMARKS

REPORTED Q = 380 - 430 m^3/day.

DEPTH SCALE: **1:240** VERSION: **80214133R**

INJECTING FLOWMETERS

10201205 FMS1

FINISH DEPTH: **2590.0** Meters DIRECTION: **UP** DATE: **08/14/2009** TIME: **15:02** MODE: **TRACE PLAYBACK**

LINE SPEED #3 DOWN

-50.0 Meter/Min 50.0

LINE SPEED #2 DOWN

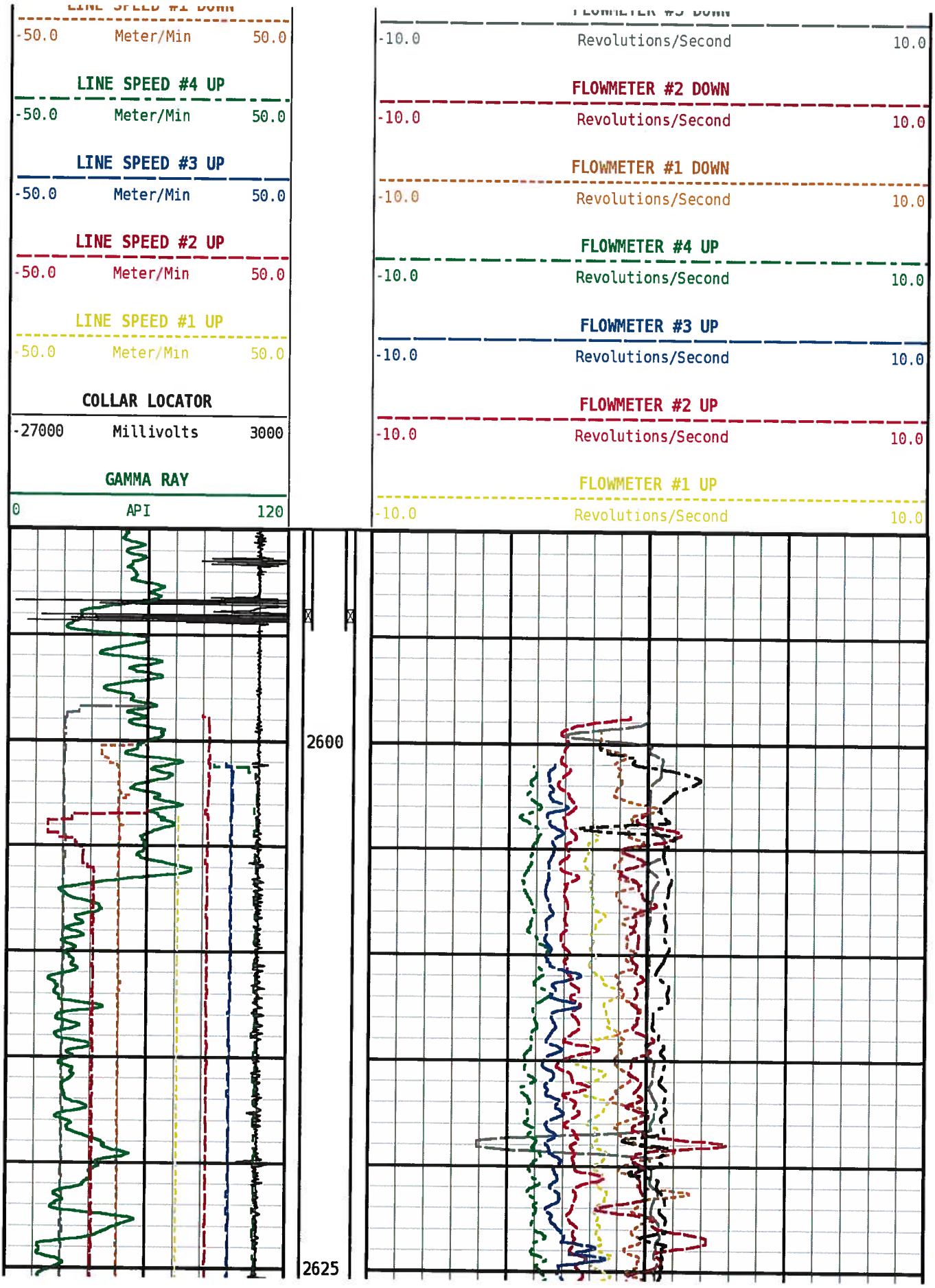
-50.0 Meter/Min 50.0

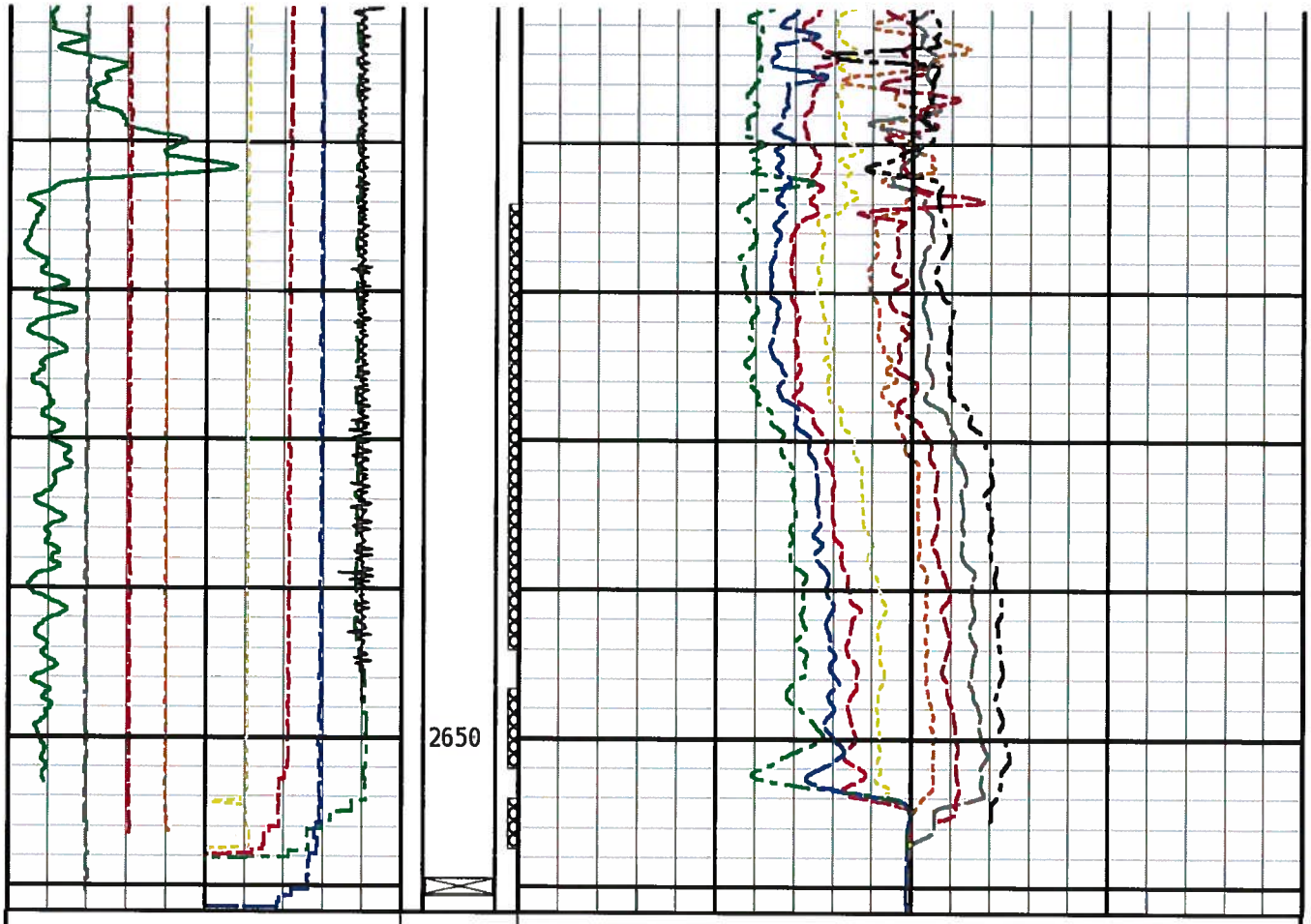
LINE SPEED #1 DOWN

FLOWMETER #4 DOWN

-10.0 Revolutions/Second 10.0

FLOWMETER #3 DOWN


LINE SPEED #1 DOWN
-50.0
Meter/Min
50.0
LINE SPEED #4 UP
-50.0
Meter/Min
50.0
LINE SPEED #3 UP
-50.0
Meter/Min
50.0
LINE SPEED #2 UP
-50.0
Meter/Min
50.0
LINE SPEED #1 UP
-50.0
Meter/Min
50.0
COLLAR LOCATOR
-27000
Millivolts
3000
GAMMA RAY
0
API
120
FLOWMETER #3 DOWN
-10.0
Revolutions/Second
10.0
FLOWMETER #2 DOWN
-10.0
Revolutions/Second
10.0
FLOWMETER #1 DOWN
-10.0
Revolutions/Second
10.0
FLOWMETER #4 UP
-10.0
Revolutions/Second
10.0
FLOWMETER #3 UP
-10.0
Revolutions/Second
10.0
FLOWMETER #2 UP
-10.0
Revolutions/Second
10.0
FLOWMETER #1 UP
-10.0
Revolutions/Second
10.0
2600
2625



GAMMA RAY		
0	API	120
COLLAR LOCATOR		
-27000	Millivolts	3000
LINE SPEED #1 UP		
-50.0	Meter/Min	50.0
LINE SPEED #2 UP		
-50.0	Meter/Min	50.0
LINE SPEED #3 UP		
-50.0	Meter/Min	50.0
LINE SPEED #4 UP		
-50.0	Meter/Min	50.0
LINE SPEED #1 DOWN		
-50.0	Meter/Min	50.0
LINE SPEED #2 DOWN		
-50.0	Meter/Min	50.0

FLOWMETER #1 UP		
-10.0	Revolutions/Second	10.0
FLOWMETER #2 UP		
-10.0	Revolutions/Second	10.0
FLOWMETER #3 UP		
-10.0	Revolutions/Second	10.0
FLOWMETER #4 UP		
-10.0	Revolutions/Second	10.0
FLOWMETER #1 DOWN		
-10.0	Revolutions/Second	10.0
FLOWMETER #2 DOWN		
-10.0	Revolutions/Second	10.0
FLOWMETER #3 DOWN		
-10.0	Revolutions/Second	10.0
FLOWMETER #4 DOWN		
-10.0	Revolutions/Second	10.0

LINE SPEED #3 DOWN

-50.0 Meter/Min 50.0

START DEPTH: **2655.9** DIRECTION: **UP** DATE: **08/14/2009** TIME: **15:02** MODE: **TRACE PLAYBACK**

10201205 FMS1

INJECTING FLOWMETERS

DEPTH SCALE: **1:240** VERSION: **80214133R**

REMARKS

STATION STOP TO ASSESS PLUG INTEGRITY.
Q = 380 m^3/day.

DEPTH SCALE: **1:240** VERSION: **80214133R**

STATION STOP @ 2654m

10201205 INJ15

FINISH DEPTH: **2652.1** Meters DIRECTION: **TIME** DATE: **08/14/2009** TIME: **15:14** MODE: **TRACE PLAYBACK**

QUARTZ PRESSURE

24000 Kilopascals 28000

COLLAR LOCATOR

-27000 Millivolts 3000

TEMPERATURE

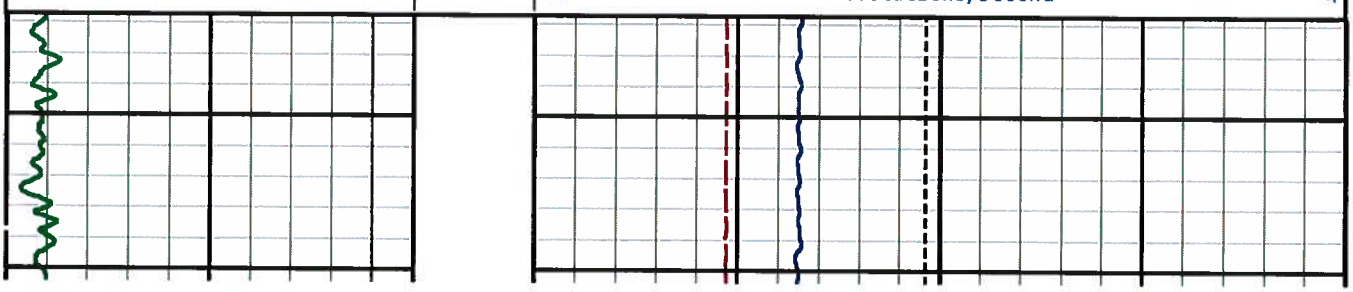
58 DegreesCentigrade 62

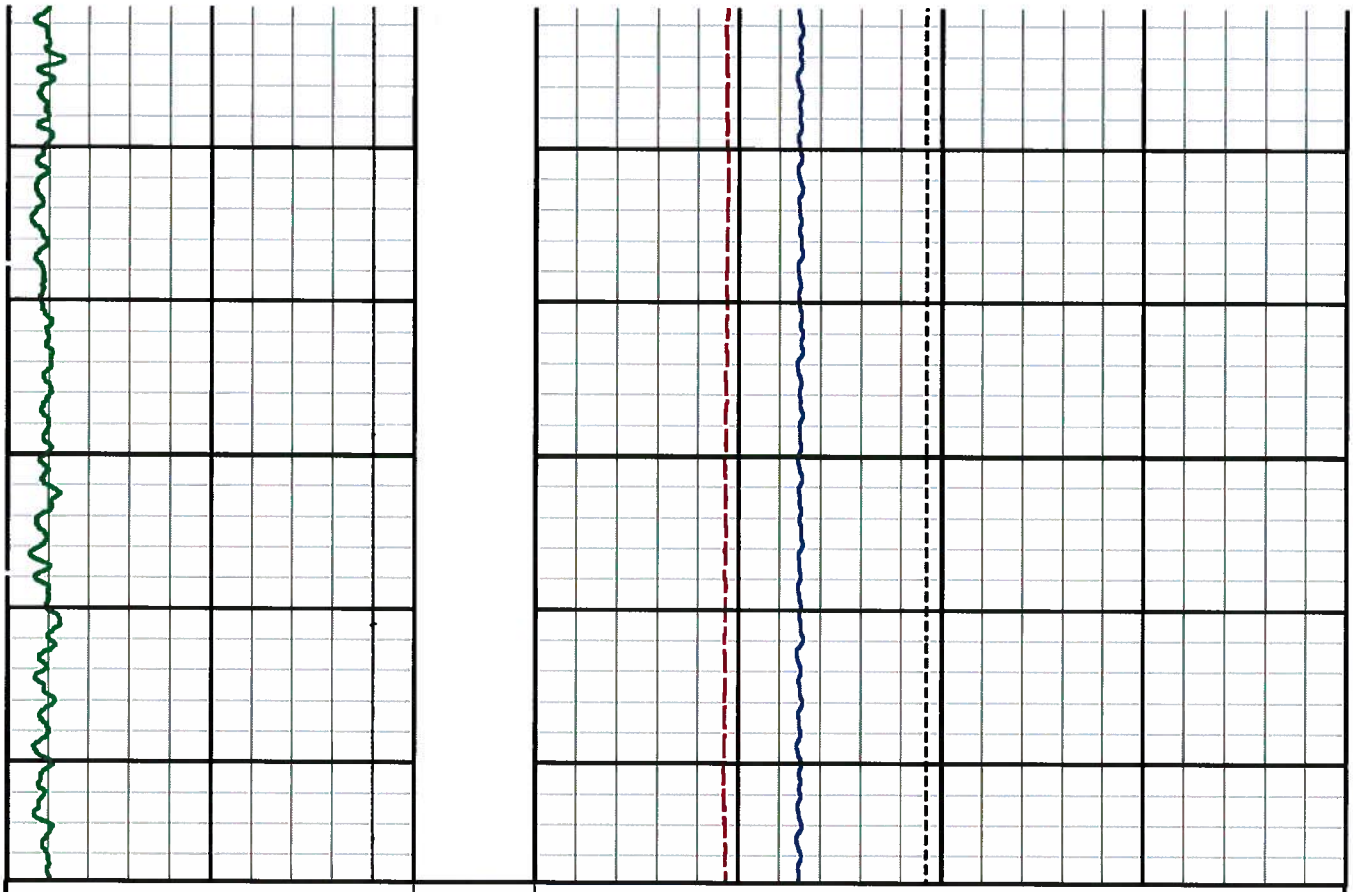
GAMMA RAY

0 API 120

FLOWMETER

-2 Revolutions/Second 4





GAMMA RAY		
0	API	120

COLLAR LOCATOR		
-27000	Millivolts	3000

FLOWMETER		
-2	Revolutions/Second	4

TEMPERATURE		
58	DegreesCentigrade	62

QUARTZ PRESSURE		
24000	Kilopascals	28000

START DEPTH: **2652.1** DIRECTION: **TIME** DATE: **08/14/2009** TIME: **15:10** MODE: **TRACE PLAYBACK**

10201205 INJ15

STATION STOP @ 2654m

DEPTH SCALE: **1:240** VERSION: **80214133R**

REMARKS

REPORTED Q = 1000 m^3/day.

DEPTH SCALE: **1:240** VERSION: **80214133R**

INJECTING FLOWMETERS

10201205 FMS2

FINISH DEPTH: **2590.0** Meters DIRECTION: **UP** DATE: **08/14/2009** TIME: **18:51** MODE: **TRACE PLAYBACK**

LINE SPEED #4 DOWN
-50.0 Meter/Min 50.0

LINE SPEED #3 DOWN
-50.0 Meter/Min 50.0

LINE SPEED #2 DOWN
-50.0 Meter/Min 50.0

LINE SPEED #1 DOWN
-50.0 Meter/Min 50.0

LINE SPEED #4 UP
-50.0 Meter/Min 50.0

LINE SPEED #3 UP
-50.0 Meter/Min 50.0

LINE SPEED #2 UP
-50.0 Meter/Min 50.0

LINE SPEED #1 UP
-50.0 Meter/Min 50.0

COLLAR LOCATOR
-27000 Millivolts 3000

GAMMA RAY
0 API 120

FLOWMETER #4 DOWN
-10.0 Revolutions/Second 5.0

FLOWMETER #3 DOWN
-10.0 Revolutions/Second 5.0

FLOWMETER #2 DOWN
-10.0 Revolutions/Second 5.0

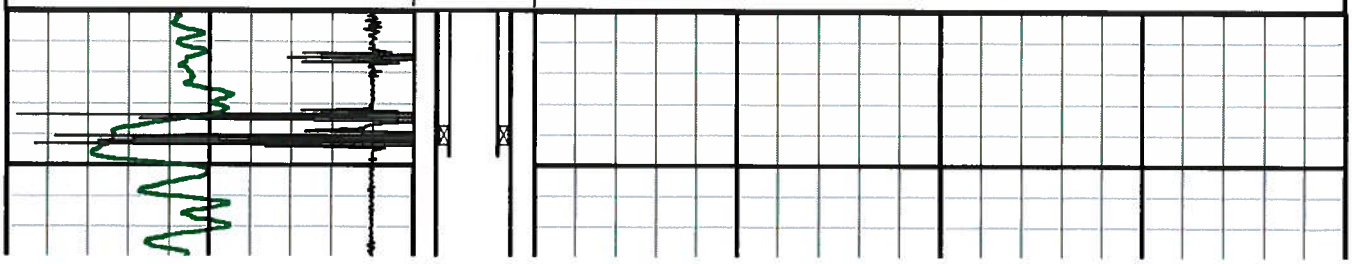
FLOWMETER #1 DOWN
-10.0 Revolutions/Second 5.0

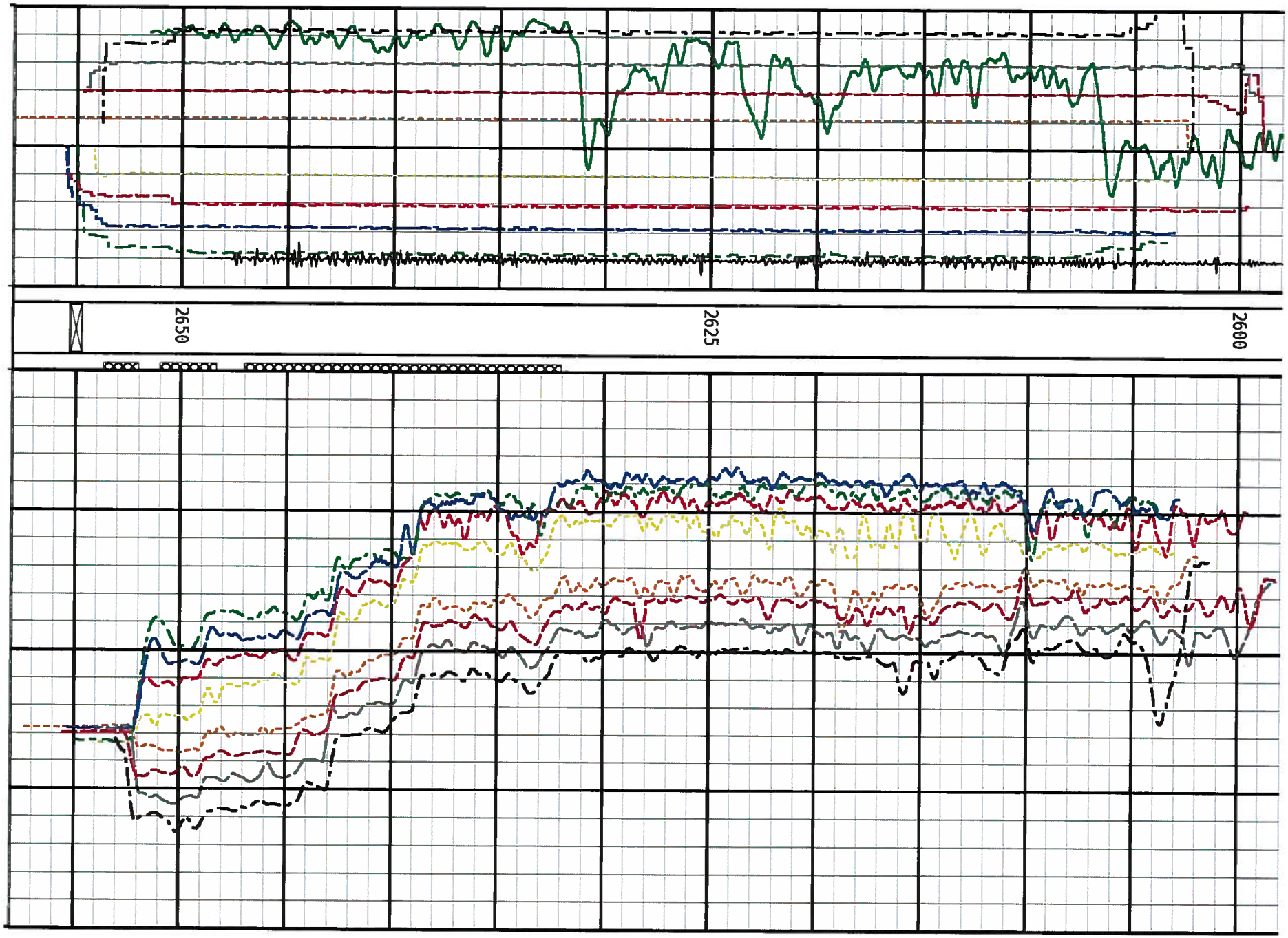
FLOWMETER #4 UP
-10.0 Revolutions/Second 5.0

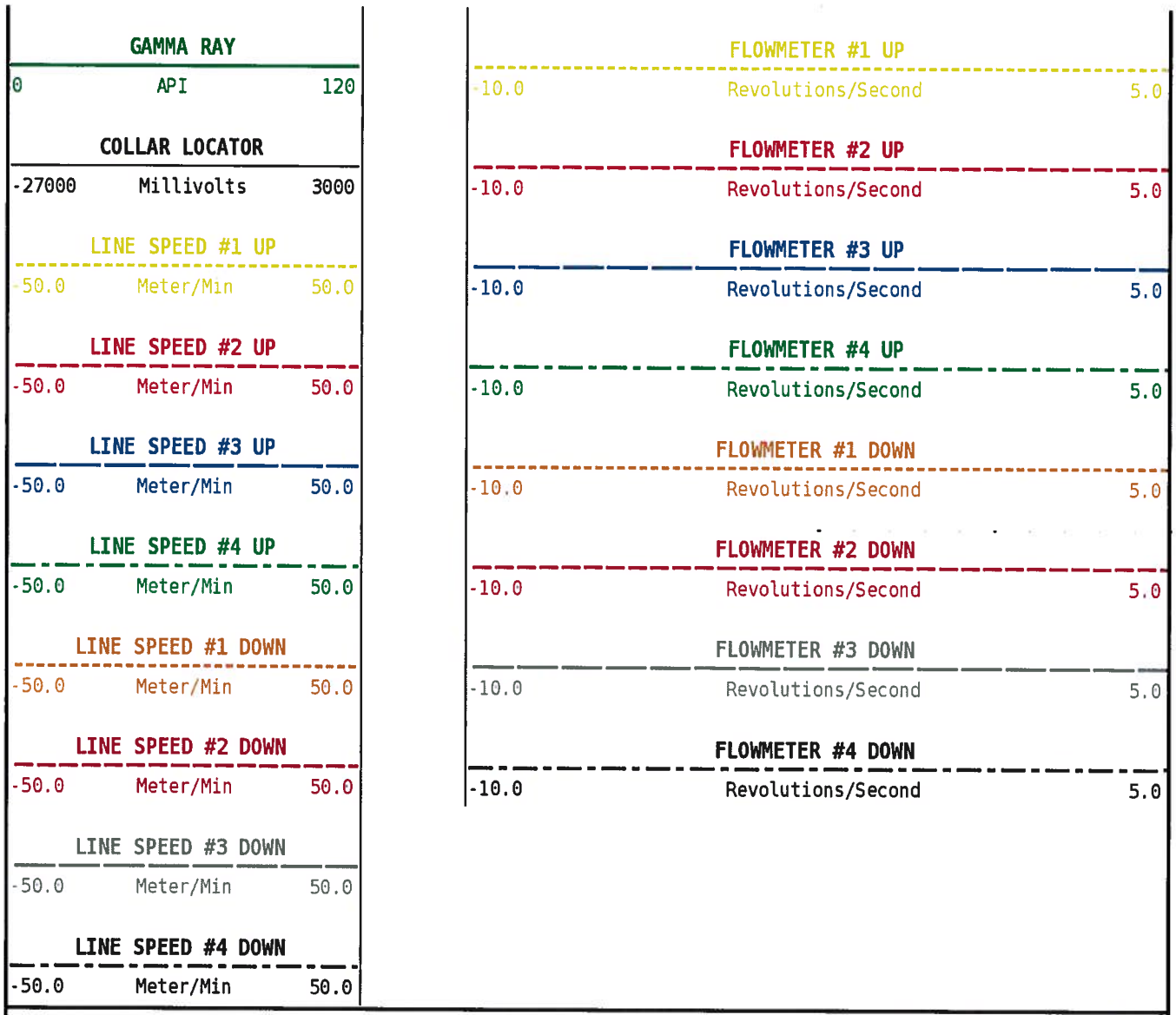
FLOWMETER #3 UP
-10.0 Revolutions/Second 5.0

FLOWMETER #2 UP
-10.0 Revolutions/Second 5.0

FLOWMETER #1 UP
-10.0 Revolutions/Second 5.0




2650
2625
2600



START DEPTH: **2658.0** DIRECTION: **UP** DATE: **08/14/2009** TIME: **18:51** MODE: **TRACE PLAYBACK**

10201205 FMS2

INJECTING FLOWMETERS

DEPTH SCALE: **1:240** VERSION: **80214133R**

REMARKS

STATION STOP TO ASSESS PLUG INTEGRITY.

Q = 1017 m^3/day.

DEPTH SCALE: **1:240**

VERSION: **80214133R**

STATION STOP @ 2654m

10201205 INJ24

FINISH DEPTH: **2650.7** Meters DIRECTION: **TIME** DATE: **08/14/2009** TIME: **16:51** MODE: **TRACE PLAYBACK**

QUARTZ PRESSURE

24000.0 Kilopascals 28000.0

TEMPERATURE

60.0 DegreesCentigrade 65.0

FLOWMETER

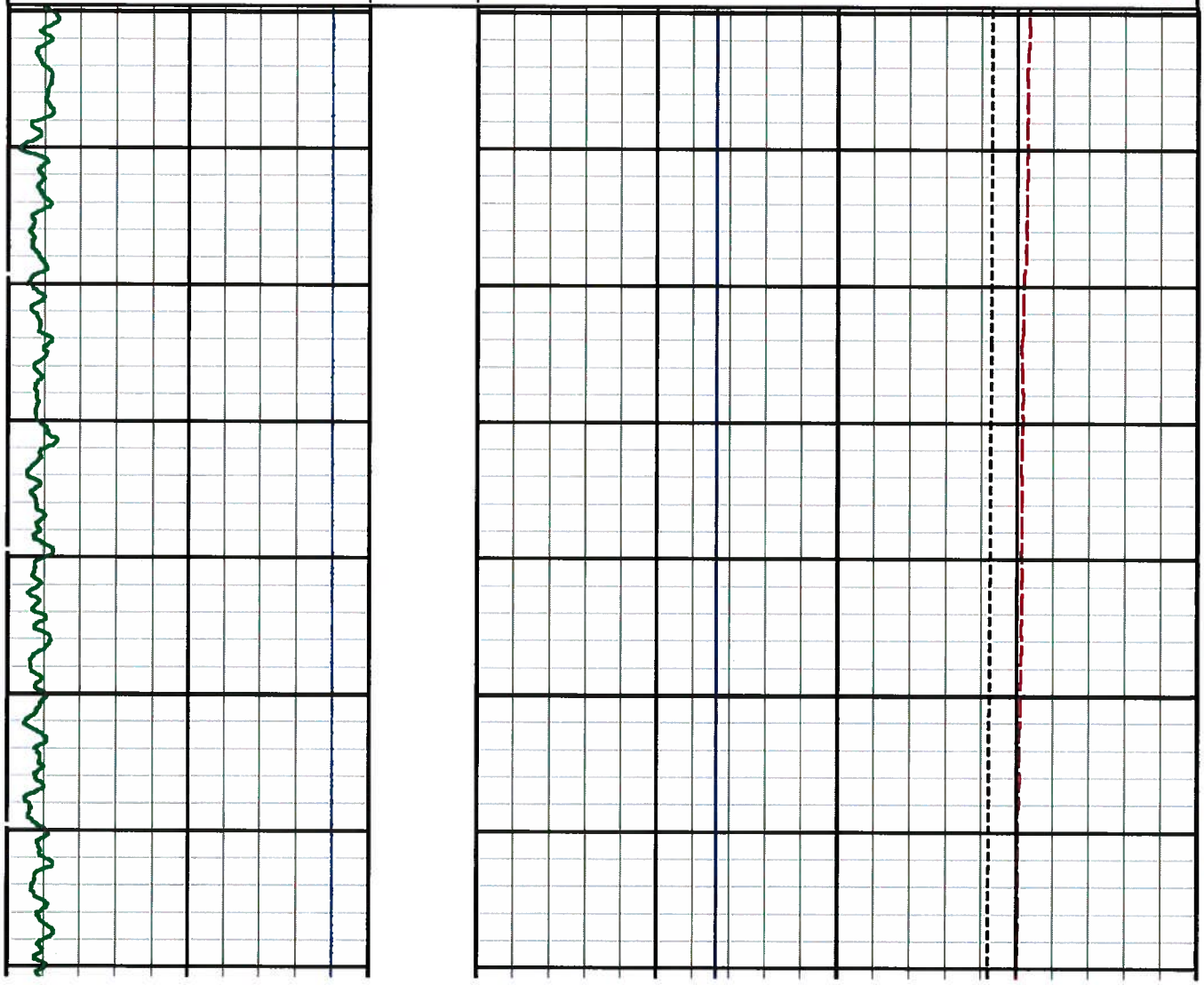
-2.0 Revolutions/Second 4.0

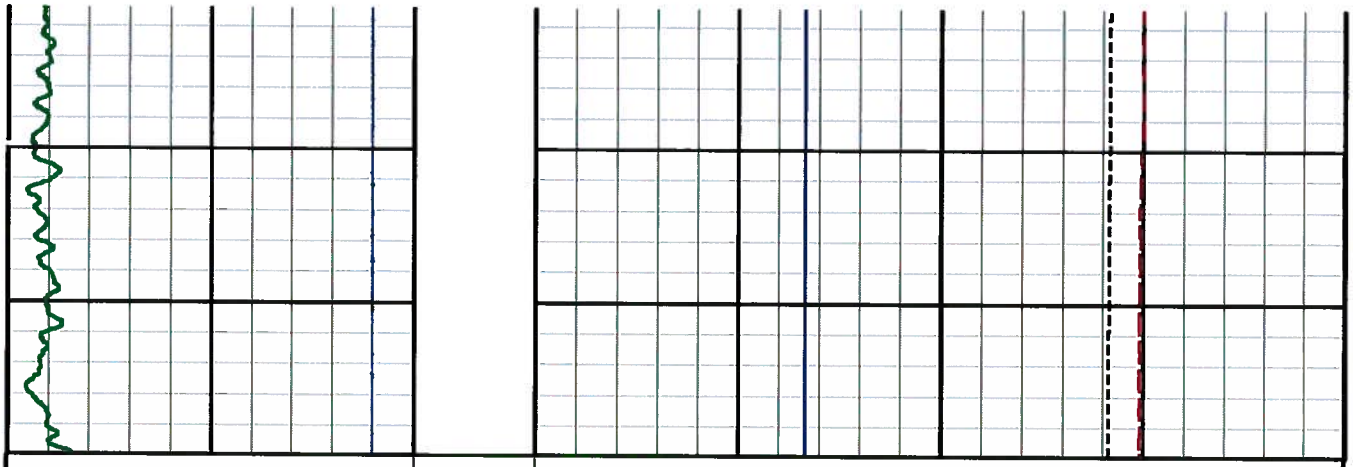
COLLAR LOCATOR

-27000 Millivolts 3000

GAMMA RAY

0 API 120





GAMMA RAY		
0	API	120

COLLAR LOCATOR		
-27000	Millivolts	3000

FLOWMETER		
-2.0	Revolutions/Second	4.0

TEMPERATURE		
60.0	DegreesCentigrade	65.0

QUARTZ PRESSURE		
24000.0	Kilopascals	28000.0

START DEPTH: **2650.7** DIRECTION: **TIME** DATE: **08/14/2009** TIME: **16:46** MODE: **TRACE PLAYBACK**

10201205 INJ24

STATION STOP @ 2654m

DEPTH SCALE: **1:240** VERSION: **80214133R**

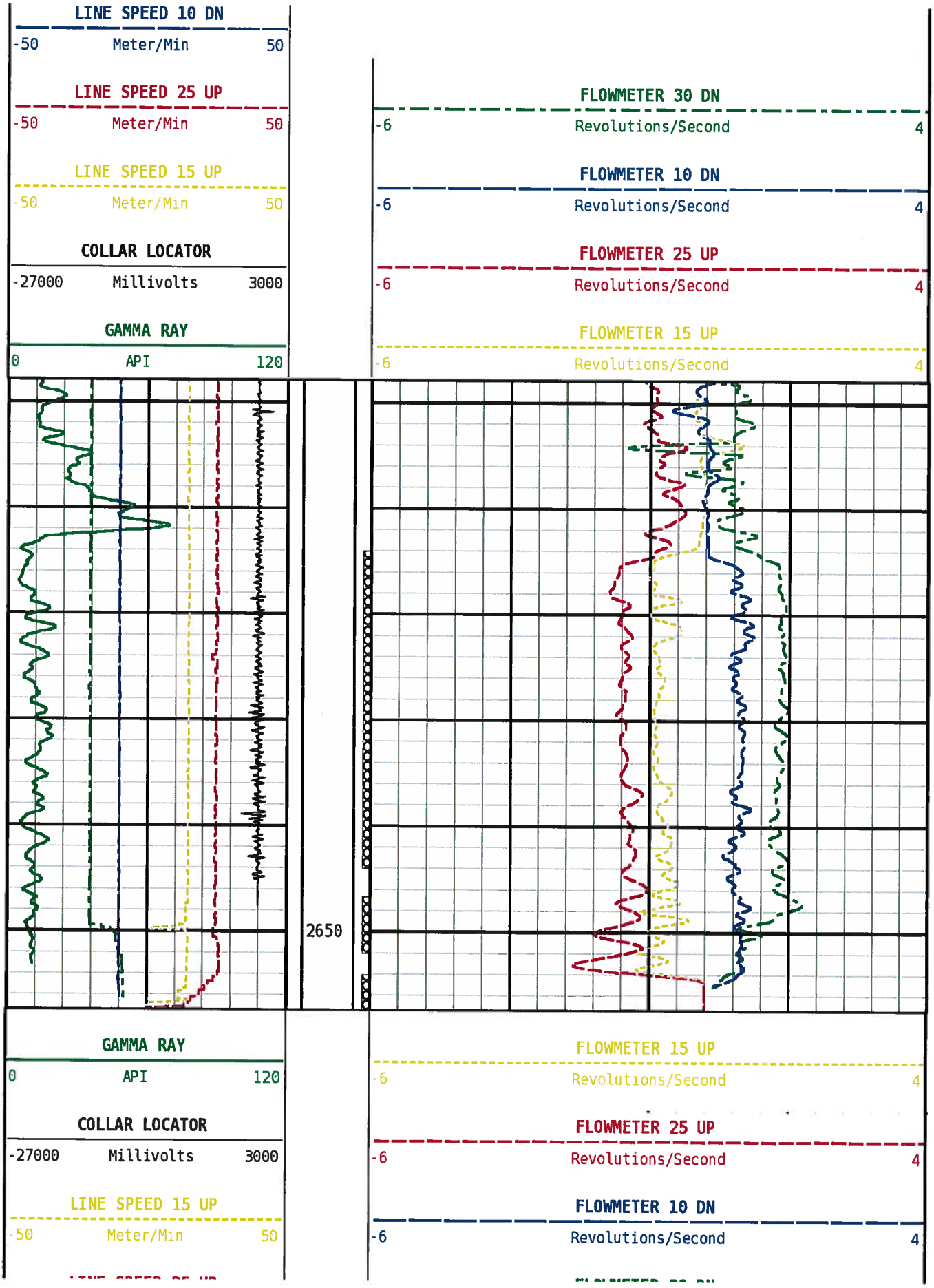
DEPTH SCALE: **1:240** VERSION: **80214133R**

XFLOW CHECK

10201205 XFLOW

FINISH DEPTH: **2624.0** Meters DIRECTION: **UP** DATE: **08/14/2009** TIME: **16:15** MODE: **TRACE PLAYBACK**

LINE SPEED 30 DN		
-50	Meter/Min	50


LINE SPEED 10 DN
-50
Meter/Min
50
LINE SPEED 25 UP
-50
Meter/Min
50
LINE SPEED 15 UP
-50
Meter/Min
50
COLLAR LOCATOR
-27000
Millivolts
3000
GAMMA RAY
0
API
120
FLOWMETER 30 DN
-6
Revolutions/Second
4
FLOWMETER 10 DN
-6
Revolutions/Second
4
FLOWMETER 25 UP
-6
Revolutions/Second
4
FLOWMETER 15 UP
-6
Revolutions/Second
4
2650
GAMMA RAY
0
API
120
COLLAR LOCATOR
-27000
Millivolts
3000
LINE SPEED 15 UP
-50
Meter/Min
50
FLOWMETER 15 UP
-6
Revolutions/Second
4
FLOWMETER 25 UP
-6
Revolutions/Second
4
FLOWMETER 10 DN
-6
Revolutions/Second
4

LINE SPEED 25 UP		
-50	Meter/Min	50

LINE SPEED 10 DN		
-50	Meter/Min	50

LINE SPEED 30 DN		
-50	Meter/Min	50

FLOWMETER 30 DN		
-6	Revolutions/Second	4

START DEPTH: **2653.7** DIRECTION: **UP** DATE: **08/14/2009** TIME: **16:15** MODE: **TRACE PLAYBACK**

10201205 XFLOW

XFLOW CHECK

DEPTH SCALE: **1:240** VERSION: **80214133R**

DEPTH SCALE: **1:240** VERSION: **80214133R**

MERGED TEMPERATURES

10201205 TMPS

FINISH DEPTH: **2398.0** Meters DIRECTION: **UP** DATE: **08/14/2009** TIME: **19:41** MODE: **TRACE PLAYBACK**

COLLAR LOCATOR		
-27000	Millivolts	3000

GAMMA RAY

120 MIN SI TEMP		
55	DegreesCentigrade	85

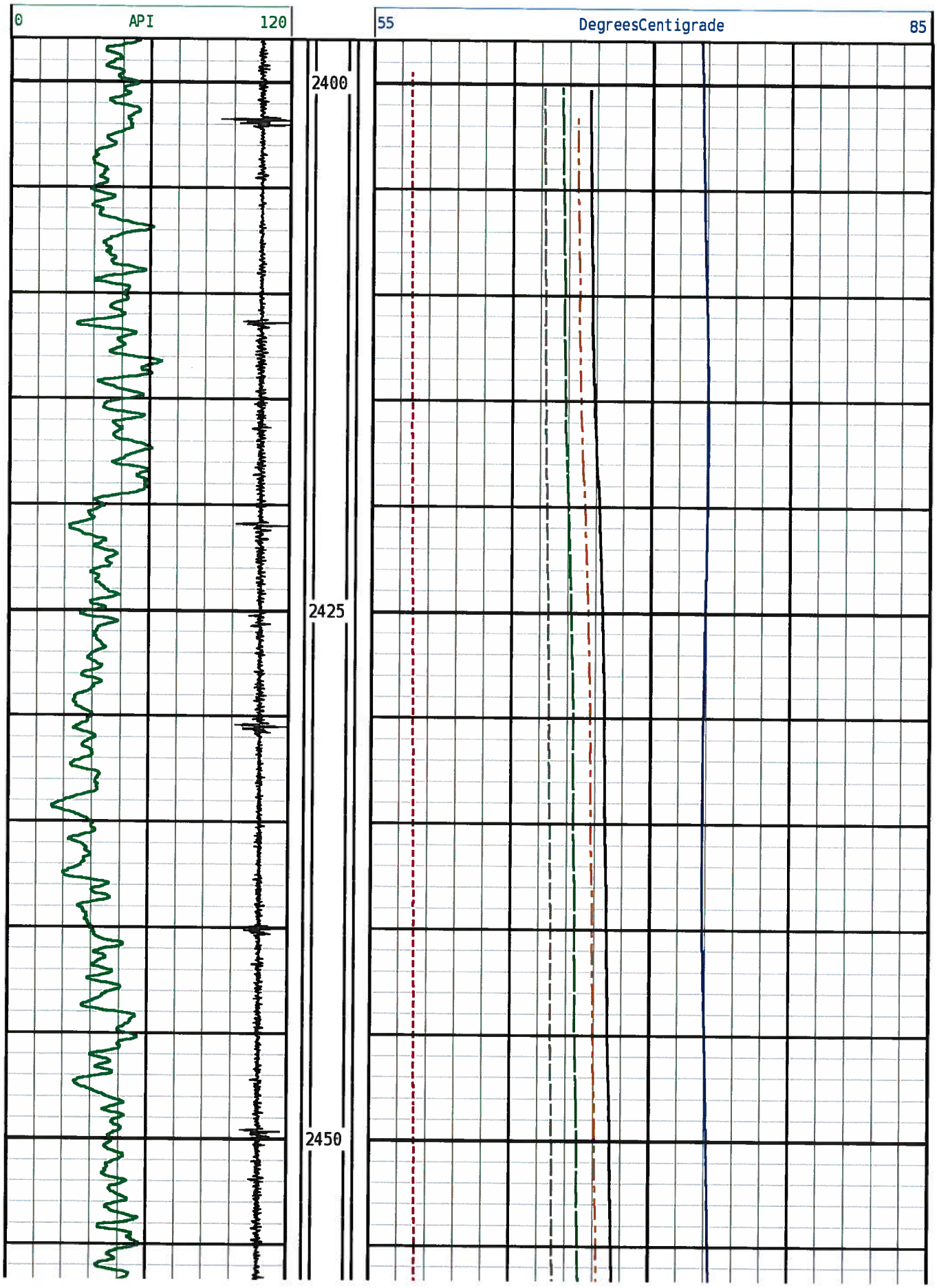
90 MIN SI TEMP		
55	DegreesCentigrade	85

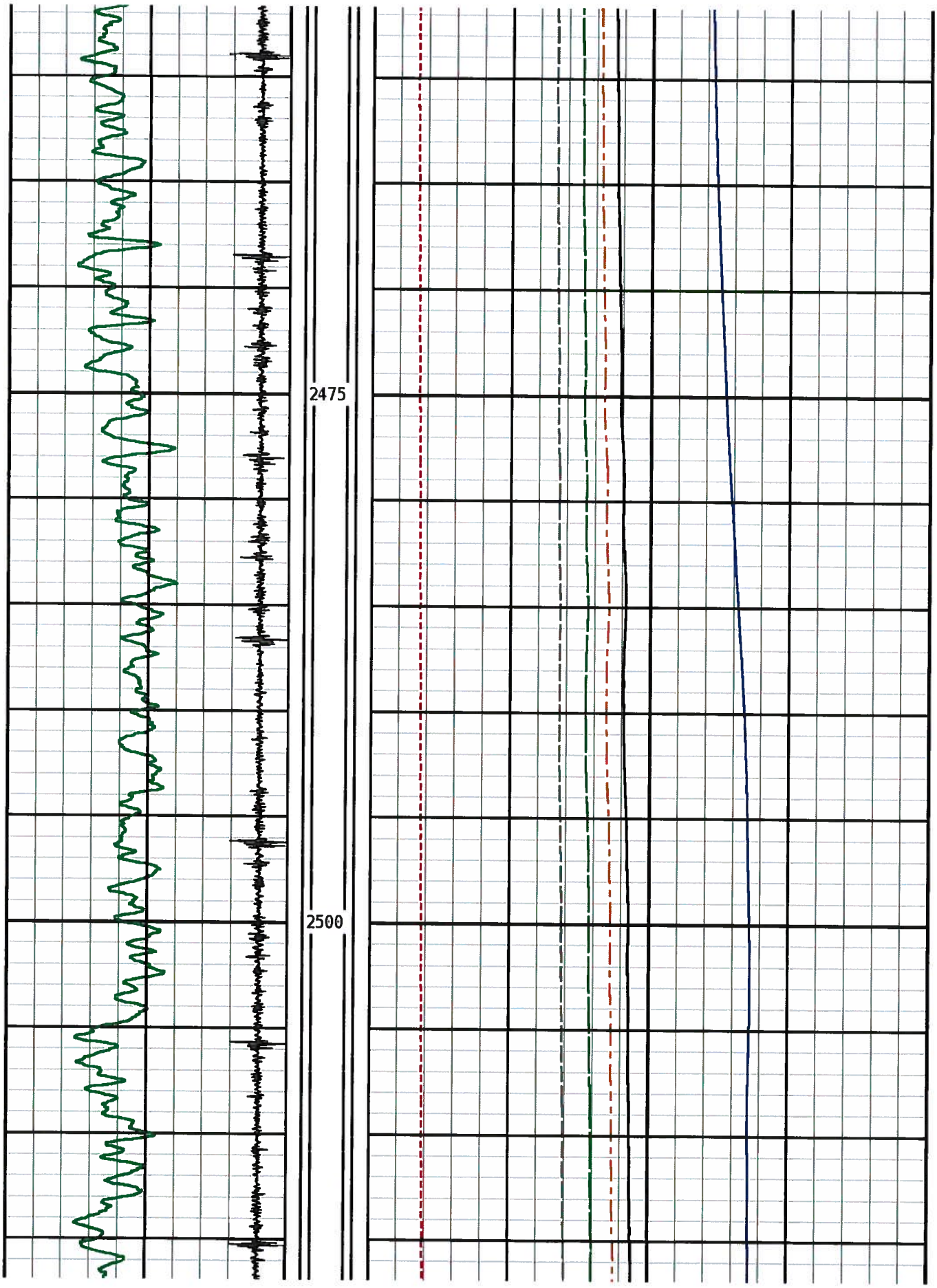
60 MIN SI TEMP		
55	DegreesCentigrade	85

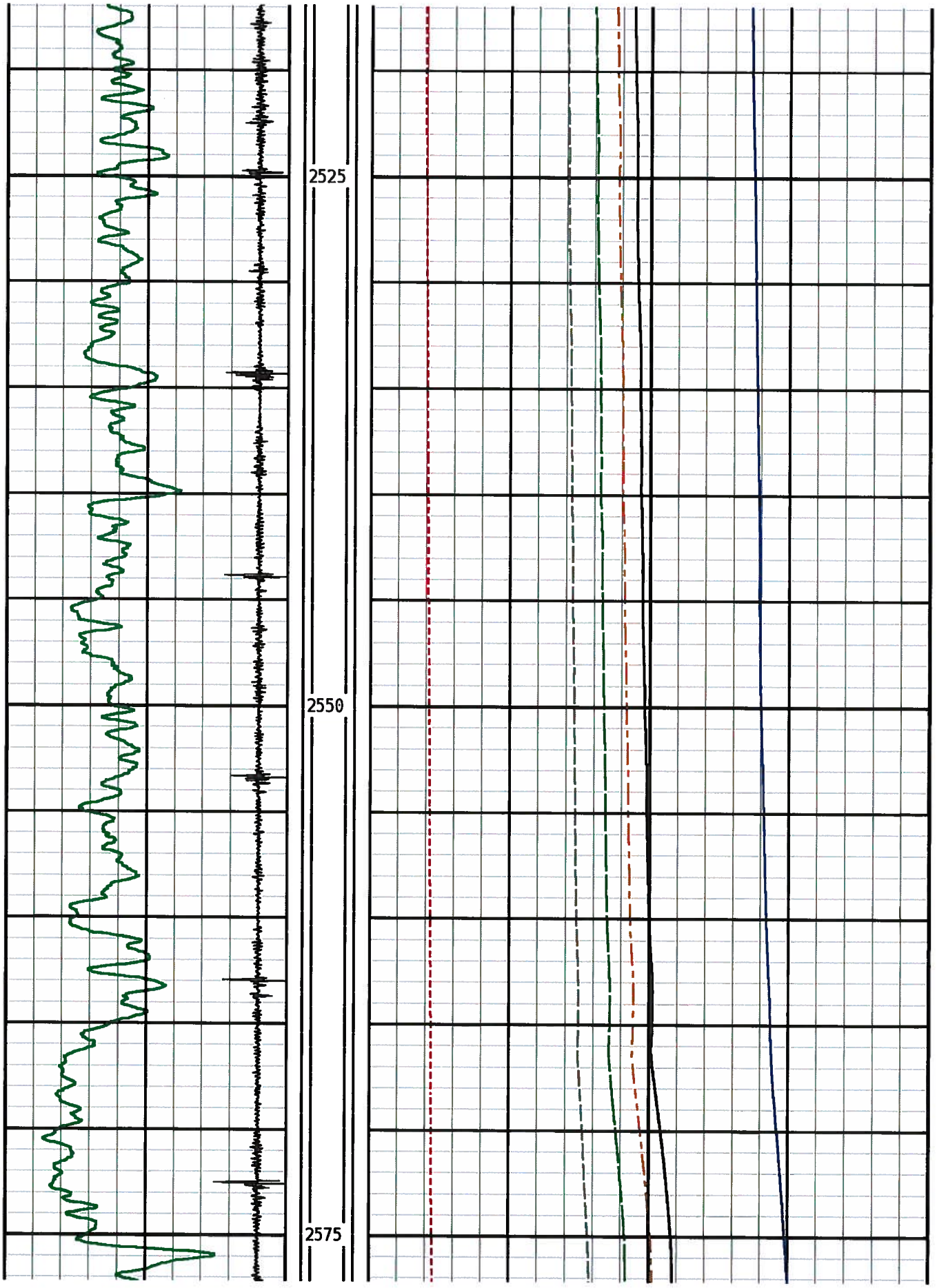
30 MIN SI TEMP		
55	DegreesCentigrade	85

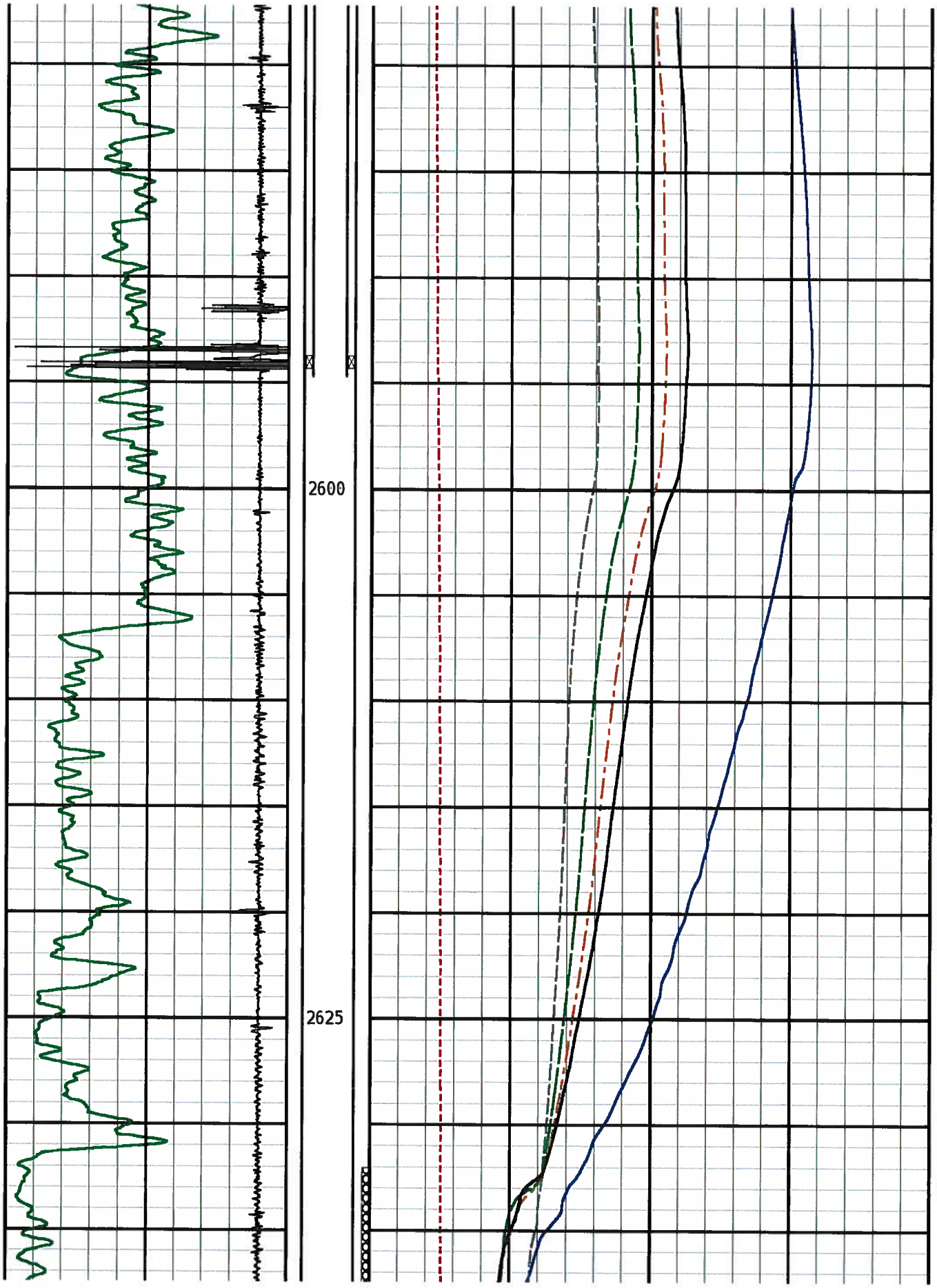
INJECTING TEMP		
55	DegreesCentigrade	85

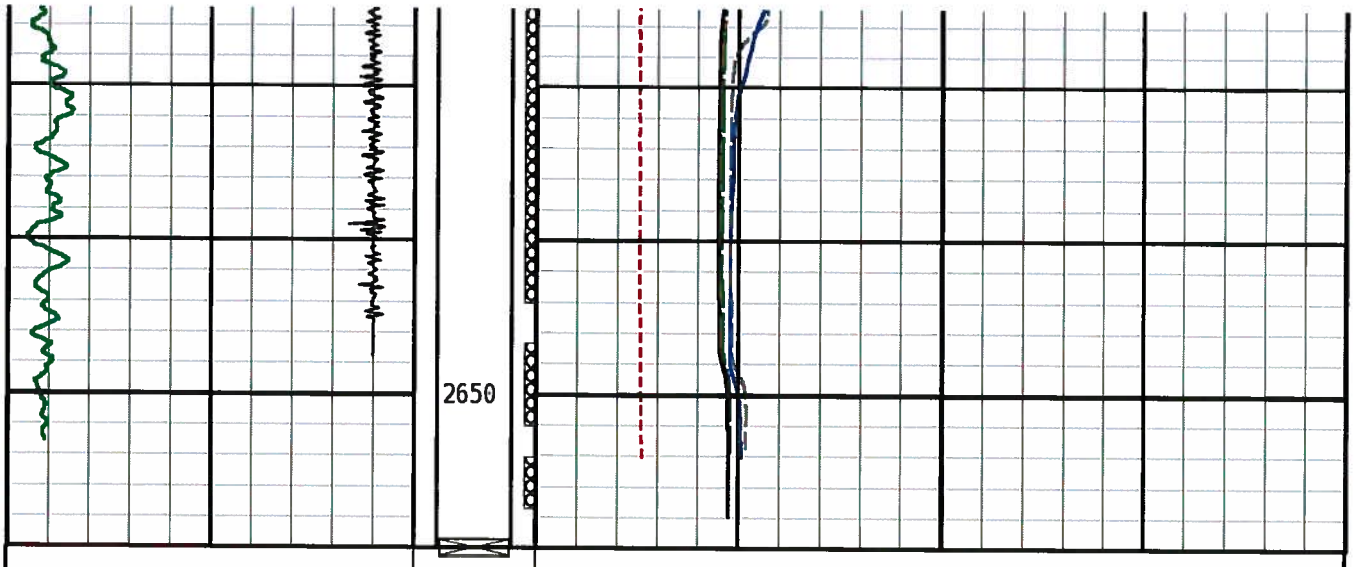
BASE TEMPERATURE


0
API
120
55
DegreesCentigrade
85
2400
2425
2450


2475
2500


2525
2550
2575


2600
2625



GAMMA RAY		
0	API	120

COLLAR LOCATOR		
-27000	Millivolts	3000

BASE TEMPERATURE		
55	DegreesCentigrade	85

INJECTING TEMP		
55	DegreesCentigrade	85

30 MIN SI TEMP		
55	DegreesCentigrade	85

60 MIN SI TEMP		
55	DegreesCentigrade	85

90 MIN SI TEMP		
55	DegreesCentigrade	85

120 MIN SI TEMP		
55	DegreesCentigrade	85

START DEPTH: **2655.0** DIRECTION: **UP** DATE: **08/14/2009** TIME: **19:41** MODE: **TRACE PLAYBACK**

10201205 TMPS

MERGED TEMPERATURES

DEPTH SCALE: **1:240** VERSION: **80214133R**

DEPTH SCALE: **1:240** VERSION: **80214133R**

MERGED PRESSURES

10201205 QP

FINISH DEPTH: **2395.0** Meters DIRECTION: **UP** DATE: **08/14/2009** TIME: **20:04** MODE: **TRACE PLAYBACK**

120 MIN SI PRESSURE

22000 Kilopascals 28000

90 MIN SI PRESSURE

22000 Kilopascals 28000

60 MIN SI PRESSURE

22000 Kilopascals 28000

30 MIN SI PRESSURE

22000 Kilopascals 28000

INJECTING PRESSURE

22000 Kilopascals 28000

BASE PRESSURE

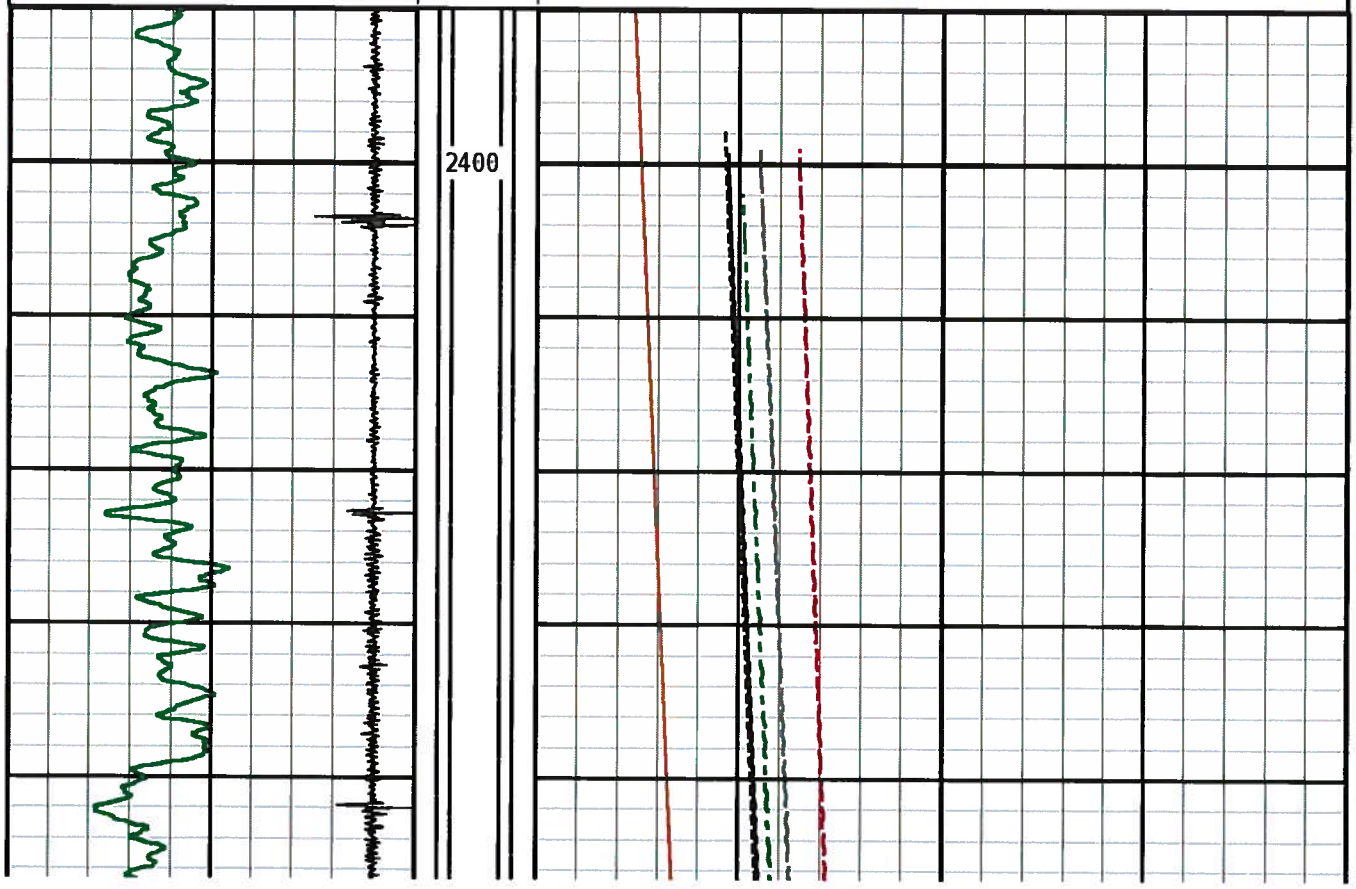
22000 Kilopascals 28000

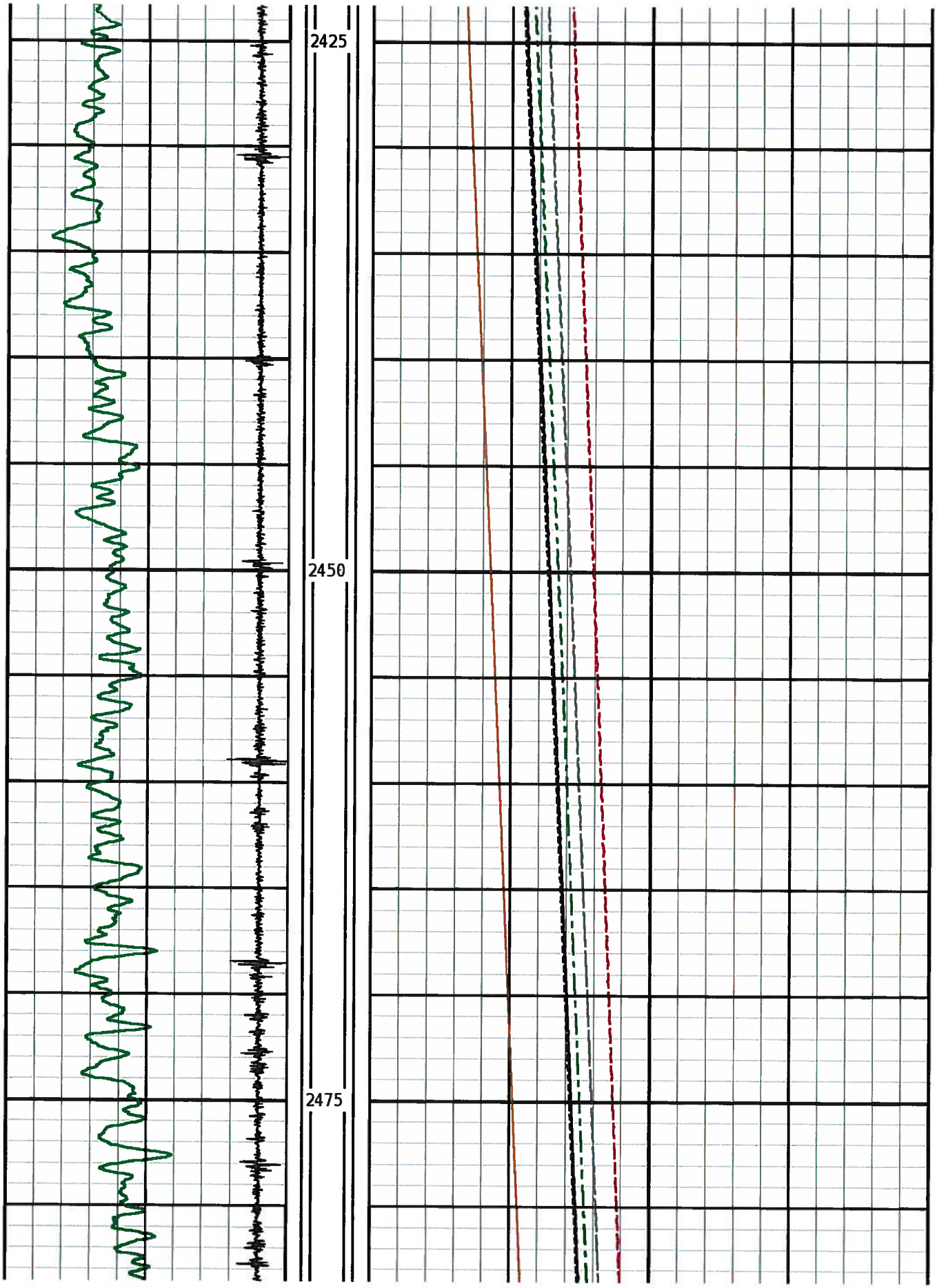
COLLAR LOCATOR

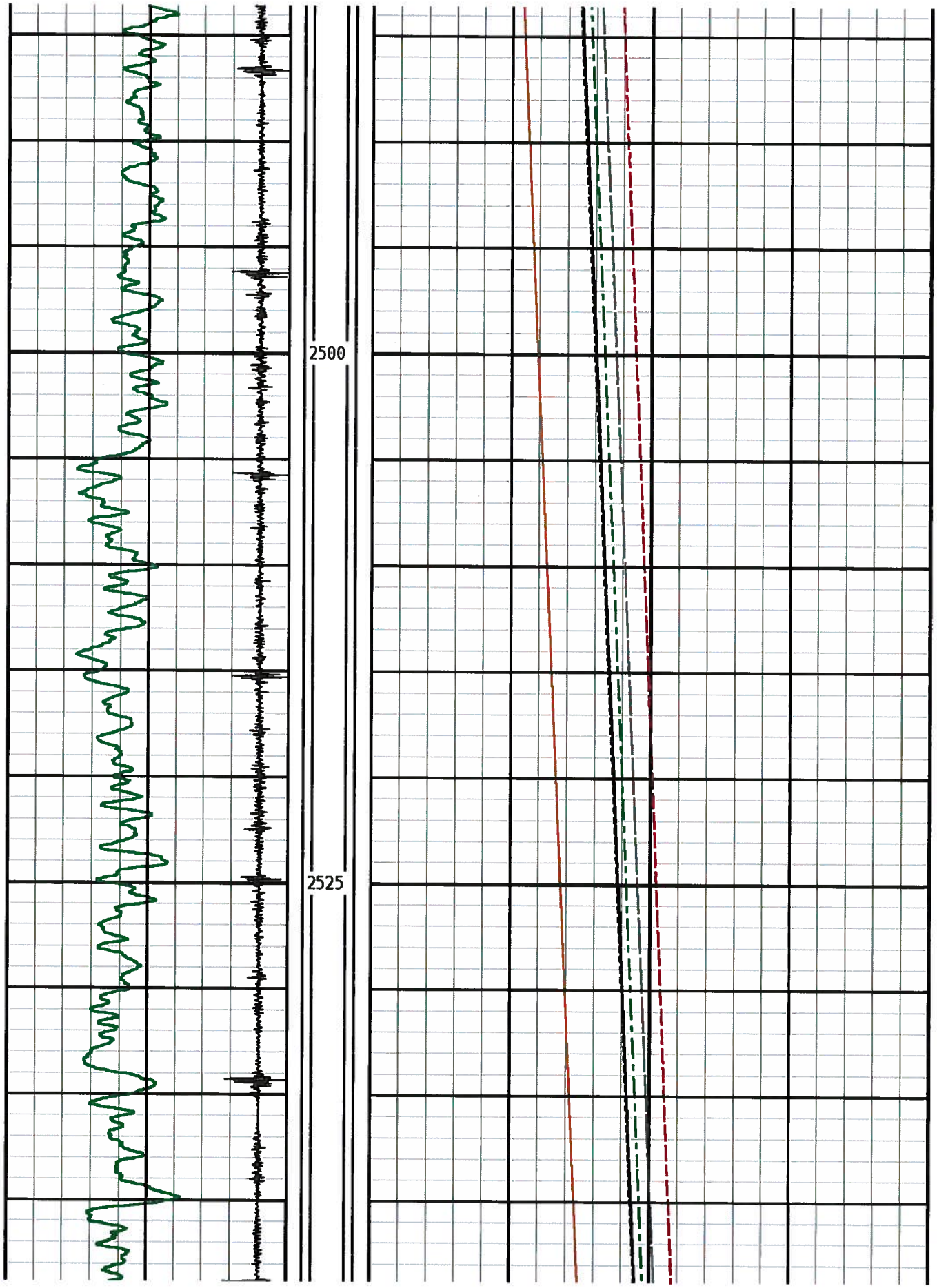
-27000 Millivolts 3000

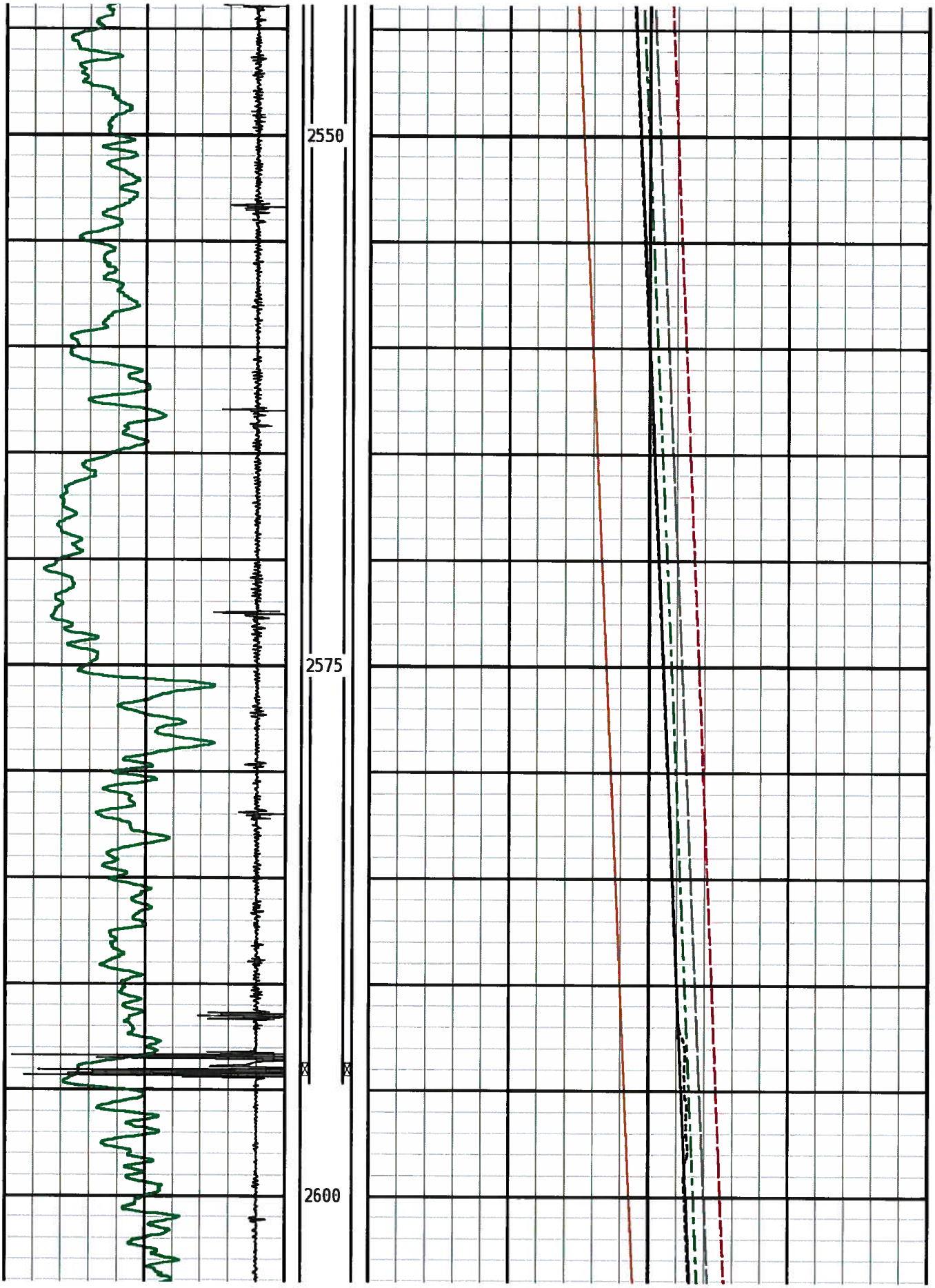
GAMMA RAY

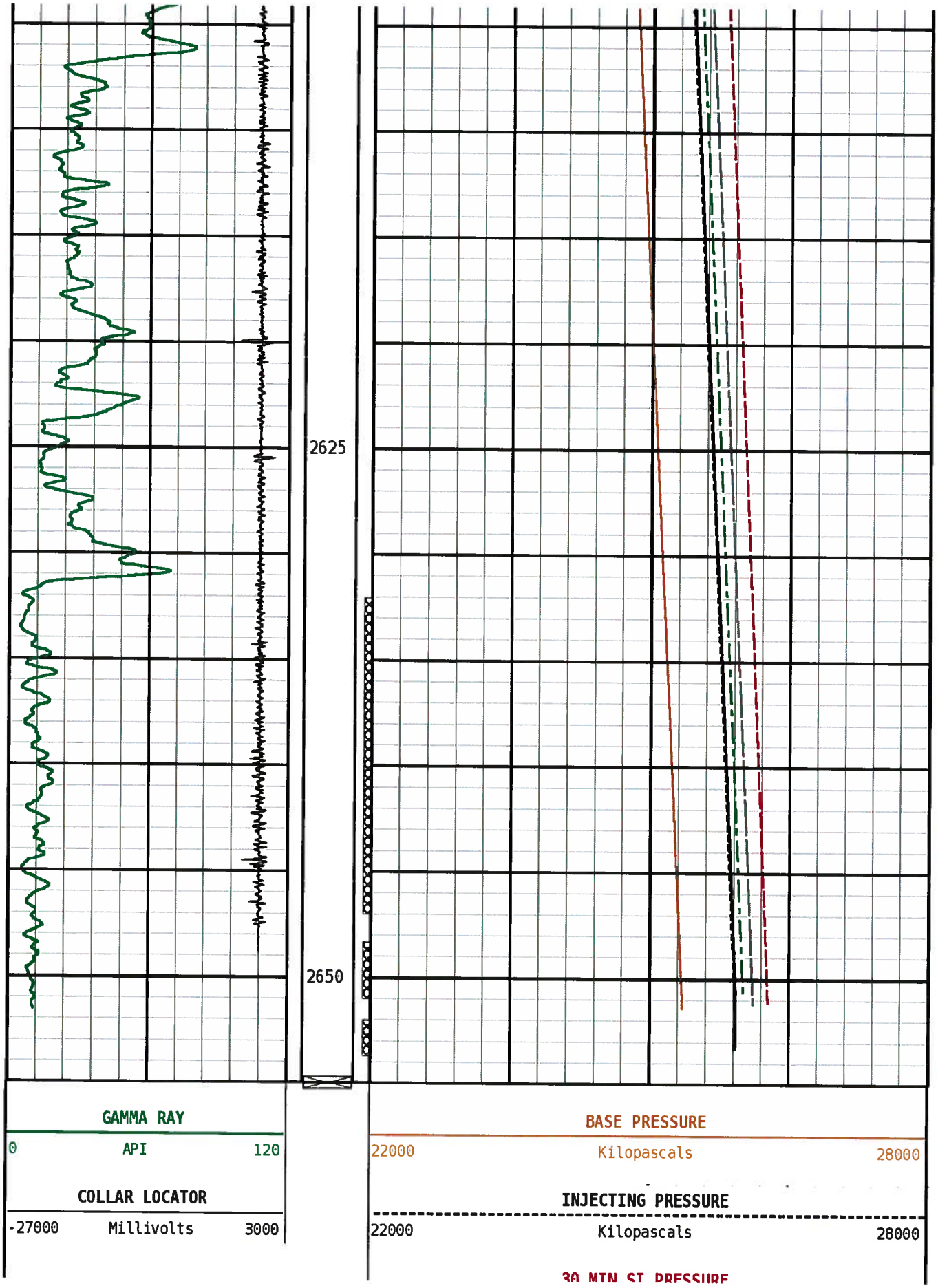
0 API 120




2425
2450
2475


2500
2525


2550
2575
2600


2625
2650
GAMMA RAY
0
API
120
COLLAR LOCATOR
-27000
Millivolts
3000
BASE PRESSURE
22000
Kilopascals
28000
INJECTING PRESSURE
22000
Kilopascals
28000
3A MTN ST PRESSURE

22000	Kilopascals	28000
	60 MIN SI PRESSURE	
22000	Kilopascals	28000
	90 MIN SI PRESSURE	
22000	Kilopascals	28000
	120 MIN SI PRESSURE	
22000	Kilopascals	28000

START DEPTH: **2655.0** DIRECTION: **UP** DATE: **08/14/2009** TIME: **20:03** MODE: **TRACE PLAYBACK**

10201205 QP

MERGED PRESSURES

DEPTH SCALE: **1:240** VERSION: **80214133R**

Cased Hole Cablehead

Weight	1.0 kg
Length	0.30 m
Max. Diameter	36.51 mm

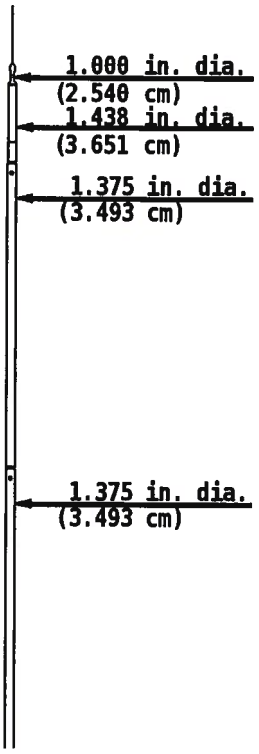
Total Stack Weight 113.62 kg in air
Total Stack Length 12.6 m

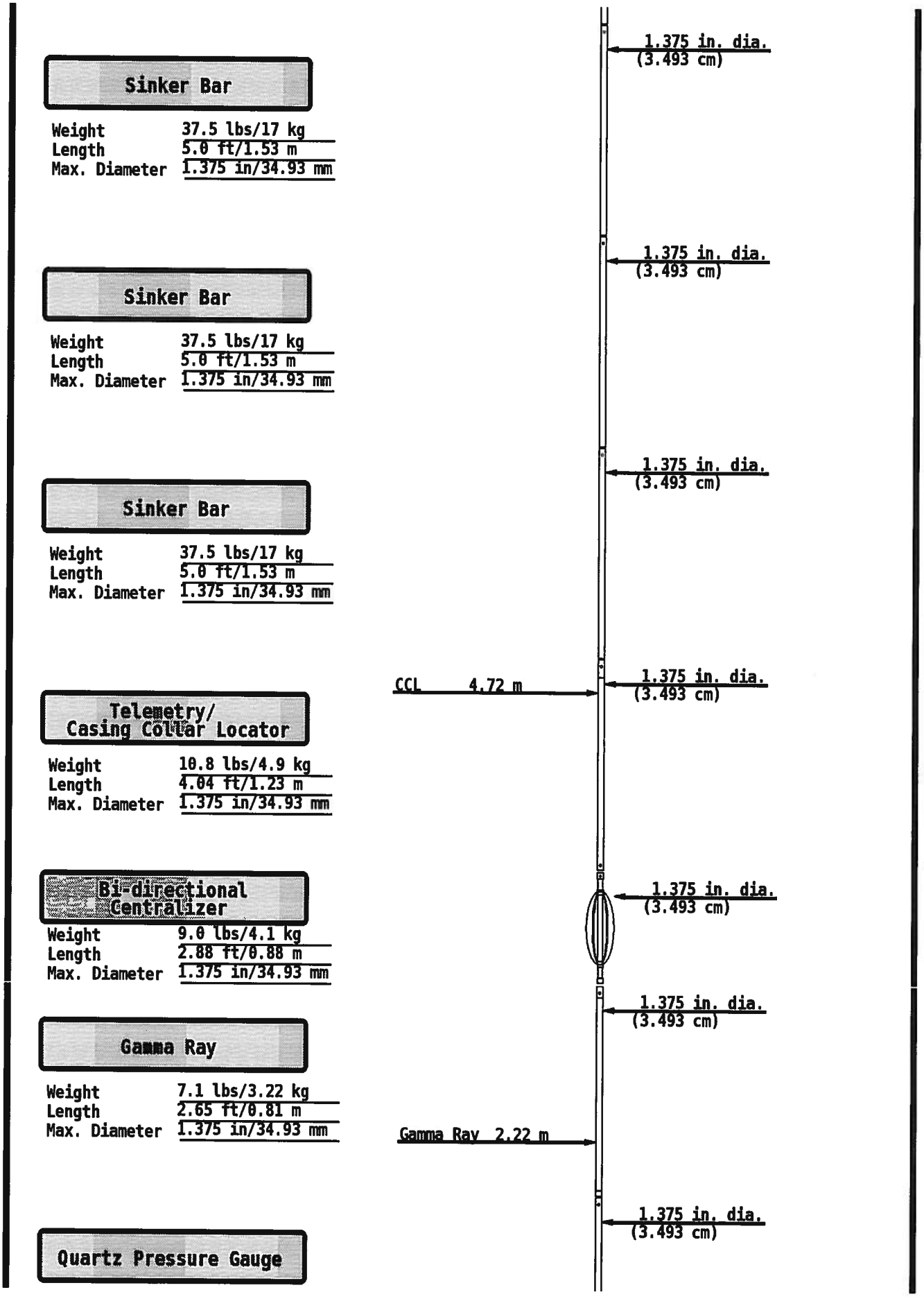
Sinker Bar

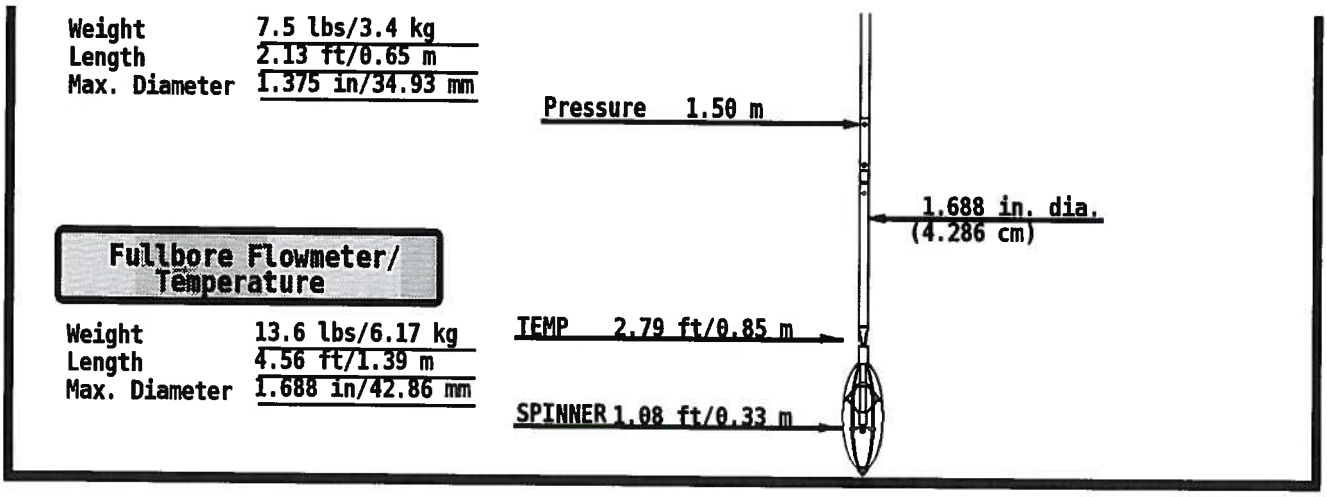
Weight	37.5 lbs/17 kg
Length	5.0 ft/1.53 m
Max. Diameter	1.375 in/34.93 mm

Sinker Bar

Weight	37.5 lbs/17 kg
Length	5.0 ft/1.53 m
Max. Diameter	1.375 in/34.93 mm




Sinker Bar
Weight 37.5 lbs/17 kg
Length 5.0 ft/1.53 m
Max. Diameter 1.375 in/34.93 mm
Sinker Bar
Weight 37.5 lbs/17 kg
Length 5.0 ft/1.53 m
Max. Diameter 1.375 in/34.93 mm
Sinker Bar
Weight 37.5 lbs/17 kg
Length 5.0 ft/1.53 m
Max. Diameter 1.375 in/34.93 mm
Telemetry/
Casing Collar Locator
Weight 10.8 lbs/4.9 kg
Length 4.04 ft/1.23 m
Max. Diameter 1.375 in/34.93 mm
Bi-directional
Centralizer
Weight 9.0 lbs/4.1 kg
Length 2.88 ft/0.88 m
Max. Diameter 1.375 in/34.93 mm
Gamma Ray
Weight 7.1 lbs/3.22 kg
Length 2.65 ft/0.81 m
Max. Diameter 1.375 in/34.93 mm
Quartz Pressure Gauge
1.375 in. dia.
(3.493 cm)
1.375 in. dia.
(3.493 cm)
1.375 in. dia.
(3.493 cm)
CCL 4.72 m
1.375 in. dia.
(3.493 cm)
1.375 in. dia.
(3.493 cm)
1.375 in. dia.
(3.493 cm)
Gamma Ray 2.22 m
1.375 in. dia.
(3.493 cm)



COMPANY PENGROWTH CORPORATION

WELL PENGROWTH JUDY CREEK 7-2-64-11

FIELD JUDY CREEK PROVINCE ALBERTA

Weatherford®

Pollock, Ray

From: Pollock, Ray
Sent: Wednesday, December 23, 2009 10:59 AM
To: Pollock, Ray; Myles, Al
Cc: Johnson, Craig; Suchan, Ken; Muir, Colin; Oleksow, Joe; McLean, Corey; Pettigrew, Rod; Witherly, Evan; Moriyama, Rob; Steele, Randy
Subject: RE: 07-02-064-11 Temperature & Water Profile Log
Attachments: 07-02 Schem.xls

Hi all,

Al attempted to run these logs yesterday. During the first run (GR/CCL) to determine PBTD, they hit fill at 2652.69mKB, which is ~1m above the base of perfs (2653.7mKB) and ~2m above the top of the BP. Needless to say, we are unable to get below the bottom set of perfs to confirm isolation (however, the bridge is holding lots of fill...so that might be all the evidence we need).

So we will have to continue this conversation again in the New Year to determine if we want to put a rig on this well to do some isolation diagnostics.

A schematic is attached for your reference. Let me know if you have any questions.

Thanks

Ray

From: Pollock, Ray
Sent: Tuesday, December 15, 2009 3:33 PM
To: Myles, Al
Cc: Johnson, Craig; Suchan, Ken; Muir, Colin; Oleksow, Joe; McLean, Corey; Pettigrew, Rod; Witherly, Evan; JC Field Ops; Moriyama, Rob; Steele, Randy; Pollock, Ray
Subject: 07-02-064-11 Temperature & Water Profile Log

Al,

As discussed, please arrange to have the following wireline work done at 07-02-064-11. The attached program from Weatherford has most of the details. Note that the logging runs have been reduced from 3 to 2.
Run 1 - GR/CCL
Run 2 - Flow/Temp/GR/CCL

As per Al's note, this work is scheduled for Dec 22nd, so please shut-in 07-02 the morning of Sunday Dec 20th.

We are doing this work to:

- confirm isolation of the well
- see if the injection profile has changed due to the higher rates/low Pwh

We have changed the configuration of the logging tools in an attempt to get lower into the wellbore and to confirm PBTD.

GammaRay / CCL:

- Run this tool / log string as low as possible to tag the BP & confirm PBTD.

Temperature Logging:

- The well must be **shut in for 48 hours** to allow the wellbore temperature to return to near geothermal.
- With the well shut-in, run a baseline temperature log (logged down) and a baseline gamma ray (logged up) from approximately 200m above the Beaverhill Lake to PBTD
- Inject produced water (from supply line) at normal injection pressure
- Subsequently, with well shut in conduct 4 temperature runs (logging down) at a minimum of 1/2 hour intervals to assist in identifying storage areas.

Water Injection Profile Logging:

- Please have the interpretation completed at 1m intervals.
- Please have the logging company get the spinner as close as possible to PBTD so we can establish if there is any flow going below the retainer.
- Please run spinner log(s) at maximum rate conditions. Operations should have already increased injection rate at 07-02.

Pstatic reservoir = ~24 MPa.

07-02-064-11
Rate & Wellhead pressure are unknown as the rate was increased on Dec 14th or 15th to maximum - please check FDC prior to shut-in
AFE: 2007DT0951 - 9300.331

If you have any questions or require any further information please contact me.

Ray Pollock, P. Eng.
Exploitation Engineer
Pengrowth Corporation
Ph: (403) 806-3262
Fax: (403) 234-6753
ray.pollock@pengrowth.com

PENGROWTH CORPORATION

APPENDIX V
WATER TRACER ANALYSIS

INNOVATIVE ENERGY TECHNOLOGIES PROGRAM
2010 FINAL REPORT

JUDY CREEK PATTERN 102 CO_2 PILOT

Pengrowth: Judy Creek Field
Sample Analysis Results

Report date 11-Jun-10

Injection well	Injection date	IWT	Amount, L	Color code
07-02-64-11-W5M	28-Mar-07	IWT-1200	20	

N.D. indicates that tracer was not detected

<50 indicates that tracer was detected qualitatively

Monitoring well	Sample Date	Days since Injection	Tracer Concentration (ppt)	Comments
02-02-64-11-W5M	11-Apr-07	14	N.D.	
	11-May-07	44	N.D.	
	11-Jul-07	105	N.D.	
	14-Sep-07	170	<50	
	11-Nov-07	228	197	
	9-Jan-08	287	200	
	13-Feb-08	322	650	
	12-Mar-08	350	470	
	11-Apr-08	380	690	
	11-May-08	410	950	
	11-Jun-08	441	840	
	10-Jul-08	470	730	
	10-Aug-08	501	810	
	11-Oct-08	563	890	
	12-Nov-08	595	630	
	18-Jan-09	662	660	
	12-Feb-09	687	522	
	12-May-09	776	390	
	14-Jul-09	839	433	
	11-Oct-09	928	540	
	12-Jan-10	1021	300	
	11-Feb-10	1051	410	
	11-May-10	1140	297	Latest data
6-1-64-11-W5M	29-Aug-08	520	N.D.	
	11-Oct-08	563	N.D.	
	18-Jan-09	662	N.D.	
	11-Feb-10	1051	480	Latest data
06-02-64-11-W5M	11-Apr-07	14	N.D.	
	11-May-07	44	N.D.	
	11-Jul-07	105	N.D.	
	14-Sep-07	170	N.D.	
	11-Nov-07	228	N.D.	
	9-Jan-08	287	N.D.	
	13-Feb-08	322	760	
	12-Mar-08	350	850	
	11-Apr-08	380	1010	
	11-May-08	410	1790	
	11-Jun-08	441	1660	
	10-Jul-08	470	1510	
	10-Aug-08	501	1240	
	11-Oct-08	563	1230	
	12-Nov-08	595	863	
	18-Jan-09	662	620	
	12-Feb-09	687	563	
	14-May-09	778	310	
	14-Jul-09	839	389	
	11-Oct-09	928	430	
	12-Jan-10	1021	310	
	11-May-10	1140	260	Latest data

08-02-64-11-W5M	11-May-07	44	N.D.	
	11-Jul-07	105	N.D.	
	14-Sep-07	170	N.D.	
	9-Jan-08	287	900	
	13-Feb-08	322	<50	
	12-Mar-08	350	N.D.	
	11-Apr-08	380	<50	
	11-May-08	410	180	
	11-Jun-08	441	380	
	10-Jul-08	470	560	
	10-Aug-08	501	730	
	11-Oct-08	563	1030	
	18-Jan-09	662	910	
	12-May-09	776	470	
	11-Oct-09	928	1120	
	12-Jan-10	1021	870	
	11-Feb-10	1051	1610	
	11-May-10	1140	1381	Latest data

10-02-64-11-W5M	11-Apr-07	14	70	
	11-May-07	44	7728	
	11-Jun-07	75	2840	
	11-Jul-07	105	3960	
	14-Sep-07	170	<50	
	9-Jan-08	287	N.D.	
	13-Feb-08	322	670	
	11-May-08	410	1220	
	11-Jun-08	441	1390	
	10-Aug-08	501	1630	
	11-Oct-08	563	1920	
	18-Jan-09	662	N.D.	not enough water
	12-Jan-10	1021	910	

12-01-64-11-W5M	29-Aug-08	520	N.D.	
	11-Oct-08	563	N.D.	
	18-Jan-09	662	N.D.	

14-02-64-11-W5M	11-Nov-07	228	N.D.	
	29-Aug-08	520	N.D.	
	11-Oct-08	563	N.D.	
	18-Jan-09	662	N.D.	

14-35-63-11-W5M	11-May-08	410	N.D.	
	29-Aug-08	520	N.D.	
	11-Oct-08	563	N.D.	
	18-Jan-09	662	N.D.	

16-02-64-11-W5M	11-Nov-07	228	600	
	29-Aug-08	520	N.D.	
	11-Oct-08	563	N.D.	
	18-Jan-09	662	N.D.	

16-35-63-11-W5M	11-May-08	410	N.D.	
	29-Aug-08	520	N.D.	
	11-Oct-08	563	N.D.	
	18-Jan-09	662	N.D.	

02-02-64-11-W5M

1. Most consistant presence of tracer. A single tracer wave.
2. One of two lowest maximum concentrations, suggesting this is a more homogenous area of the reservoir.
3. The lower concentration also suggests the permeability in this area is lower than high concentration wells.
4. Slight increase in tracer concentration on the last sample collection date, possibly suggesting a second tracer wave

06-02-64-11-W5M

1. Consistant tracer presence.
2. Higher concentration of tracer, suggesting a more significant pathway.
3. Last sample has a slight increase in tracer concentration, possibly suggesting a second tracer wave is starting to

10-02-64-11-W5M

1. Significantly highest tracer concentration.
2. Earliest date of tracer showing up.
3. Above two suggest more heterogeneity in this area, as awell as a higher permeability streak between the injector

4. A second tracer wave collaborates the greater heterogeneity in this area.

08-02-64-11-W5M

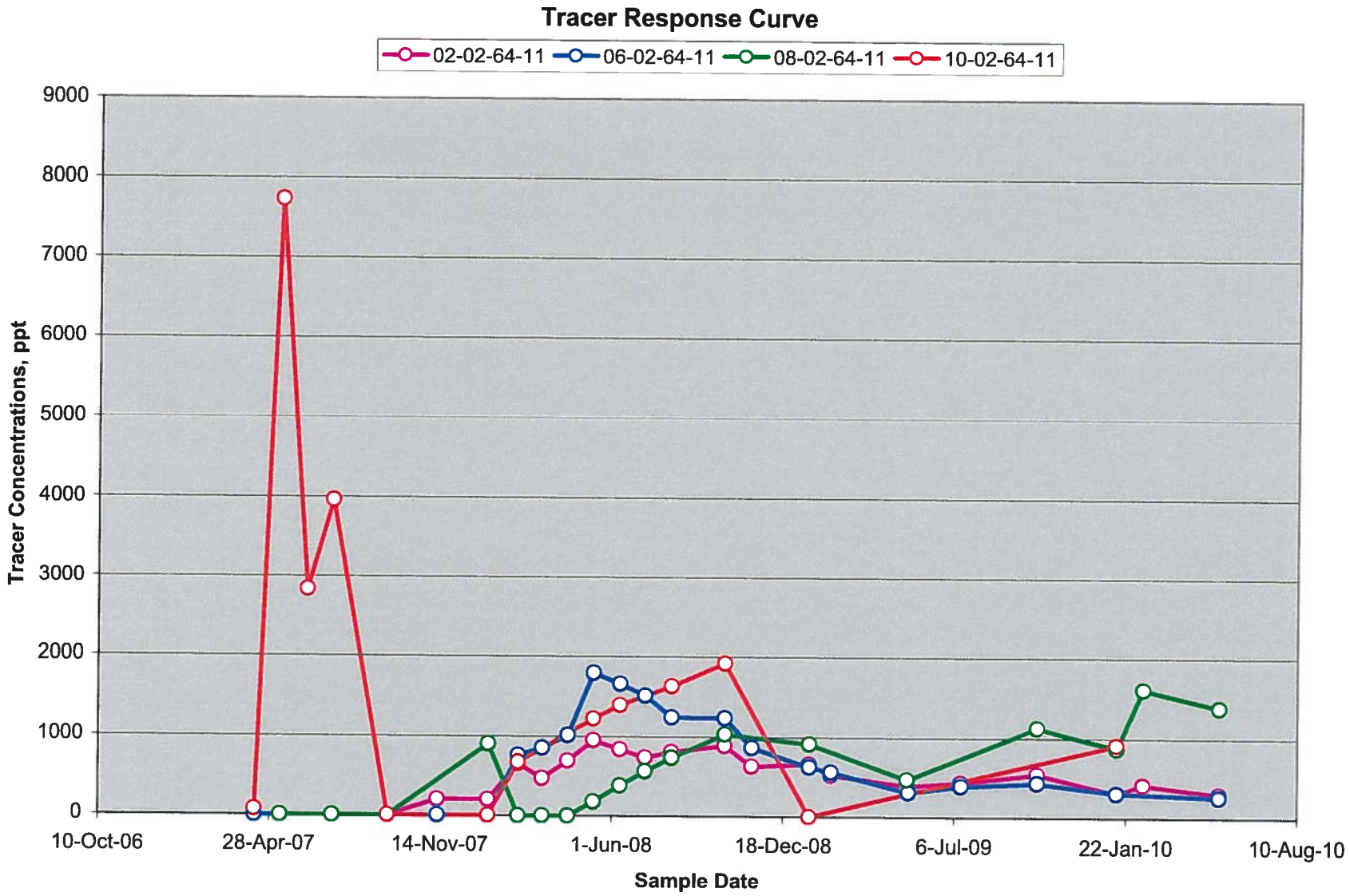
1. Somewhat similar to 10-02 in that tracer showed up here the second fastest, and there was two elution curves.
2. Second elution curve suggests the second pathway has a lower permeability, but has a larger portion of the

16-02-64-11-W5M

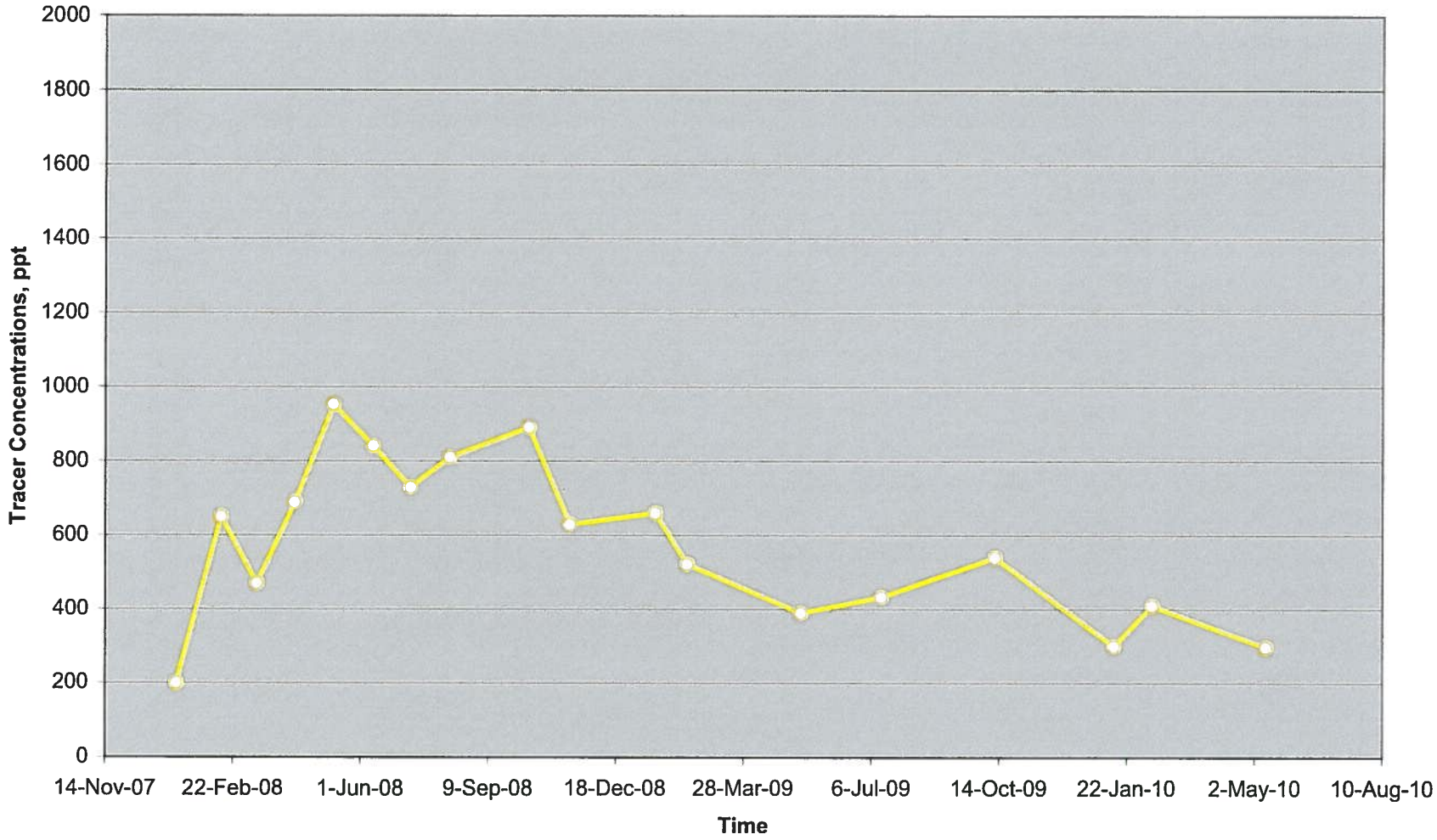
1. Tracer showed up at this production well quicker and at a higher concentration than at 02-02 and 06-02 producers
2. The moderate single date tracer presence, suggests a thin, high permeability streak in the NE direction. This

Summary

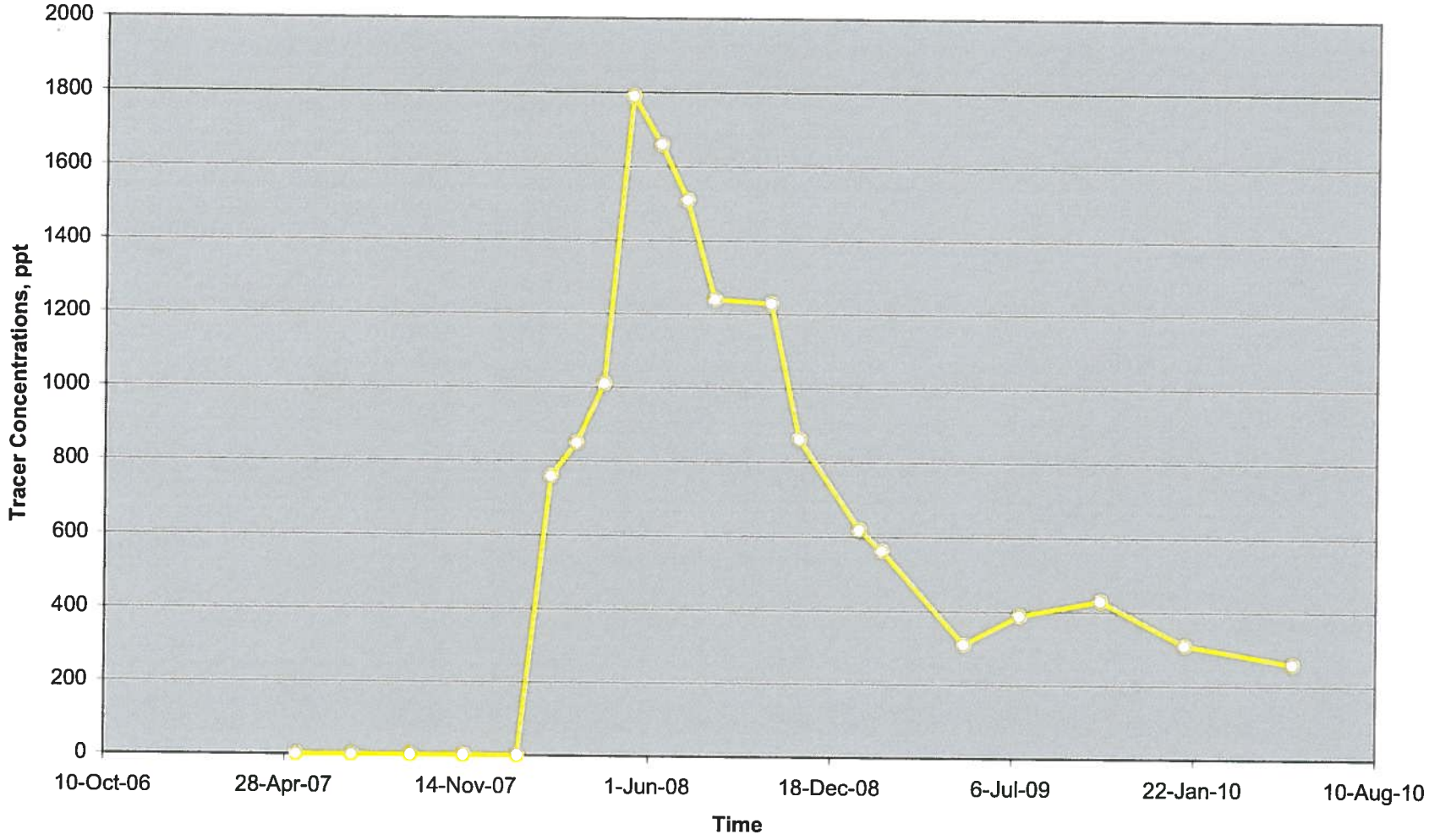
1. There appears to be more homogeneity in a SW direction, and greater heterogeneity in a NE direction.


Tracer Response Curve
02-02-64-11
06-02-64-11
08-02-64-11
10-02-64-11
Tracer Concentrations, ppt
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
10-Oct-06
28-Apr-07
14-Nov-07
1-Jun-08
18-Dec-08
6-Jul-09
22-Jan-10
10-Aug-10
Sample Date

Elution Curve: 02-02-64-11
from 07-02-64-11-W5M: IWT-1200



Elution Curve: 06-02-64-11
from 07-02-64-11-W5M: IWT-1200



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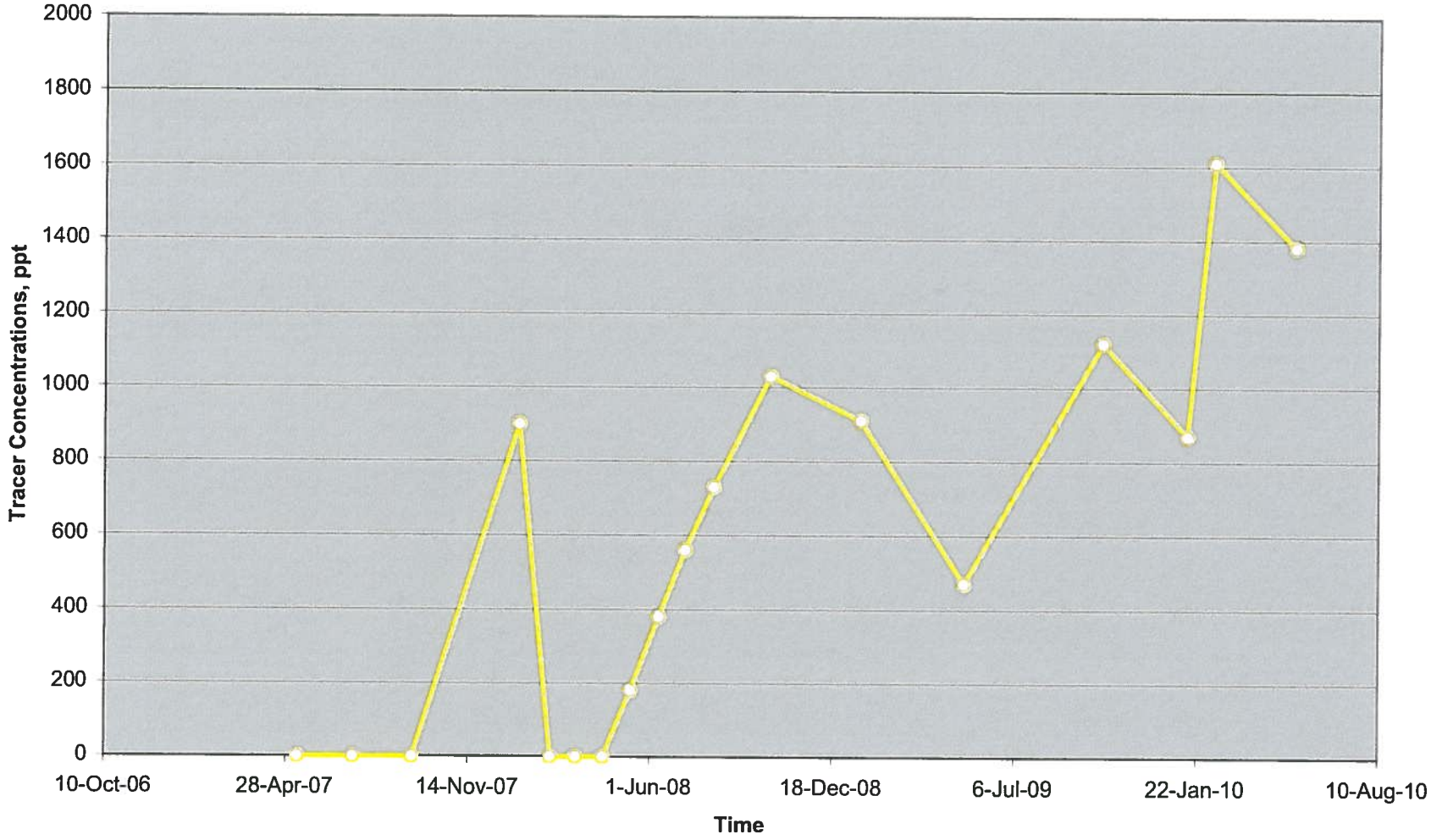
from 07-02-64-11-W5M: IWT-1200



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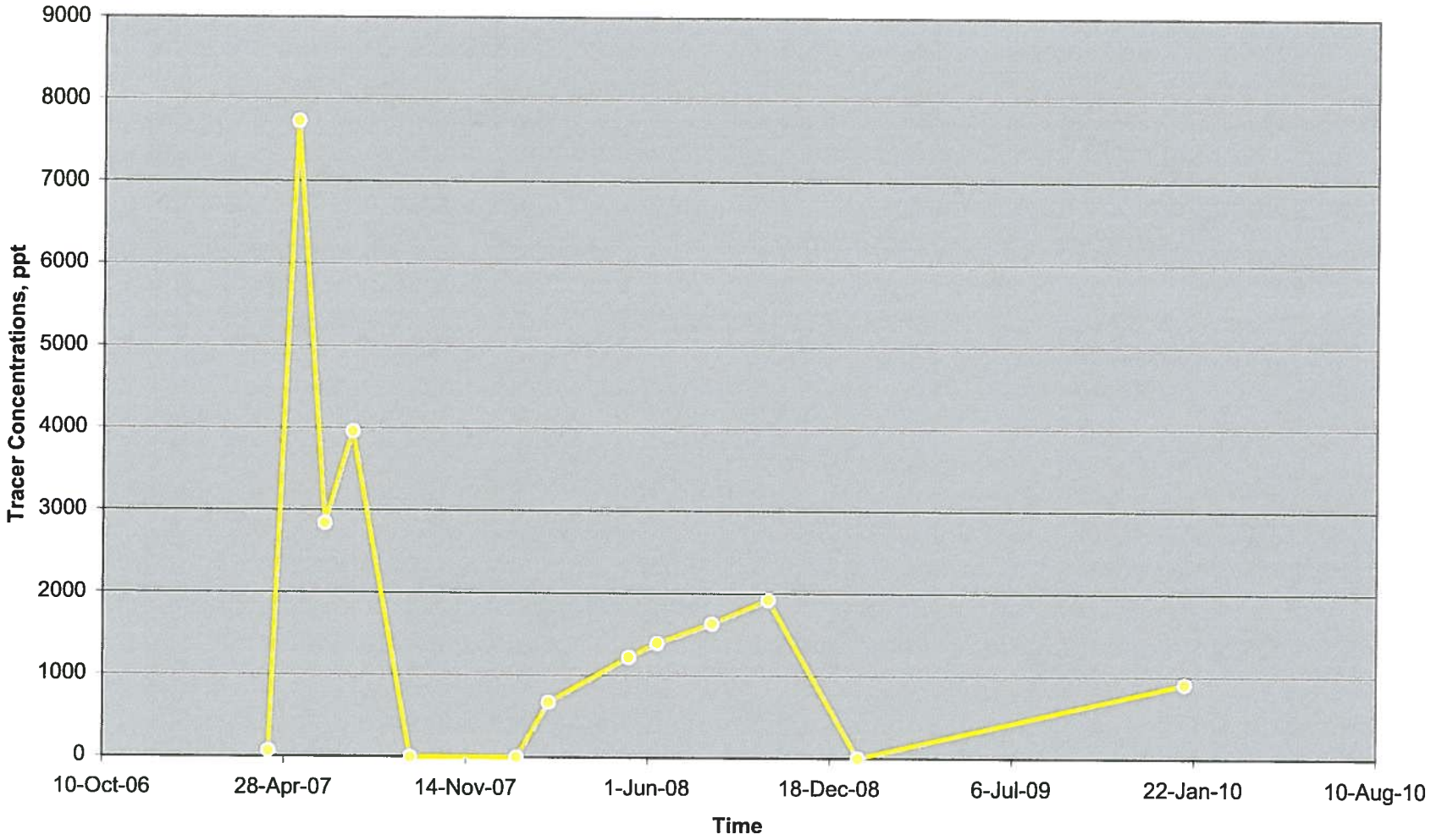
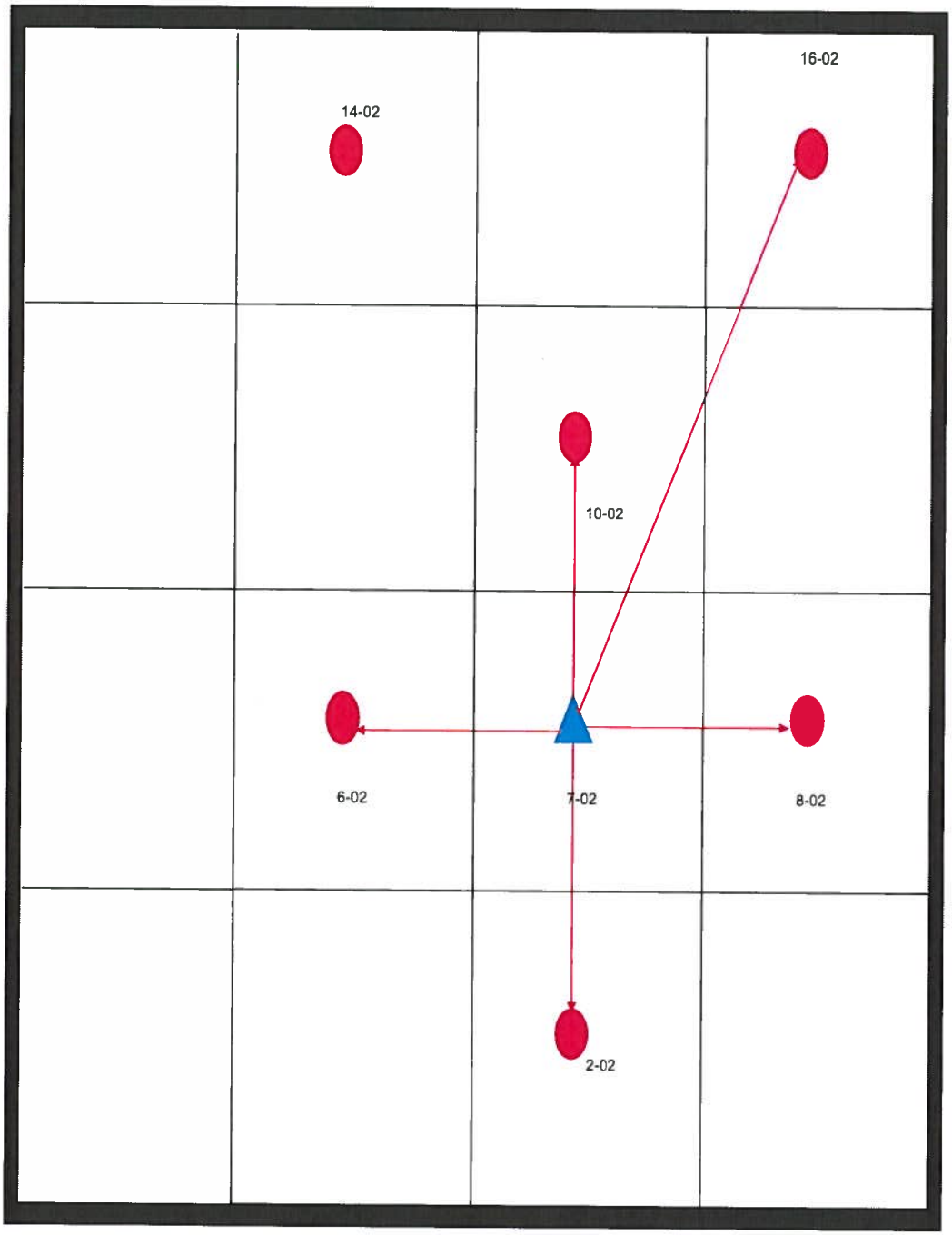



16-02
14-02
10-02
6-02
7-02
8-02
2-02

PENGROWTH CORPORATION

APPENDIX VI
ECONOMICS

INNOVATIVE ENERGY TECHNOLOGIES PROGRAM
2010 FINAL REPORT

JUDY CREEK PATTERN 102 CO_2 PILOT

Table 1: PRODUCTION SUMMARY

Project clasified as conventional oil, natural gas, or oilsands?	conventional oil
Oil Density (Kg/m^3), if applicable:	41 API
Production Start Date (MM/YYYY):	01/2006
Production End Date (MM/YYYY):	01/2015

	# of Wells			Production Volumes									
	# of Producing Oil Wells	# of Producing Gas Wells	# of Injection Wells	Oil [MSTB]	Raw Gas [MMSCF]	Sales Gas [MMSCF]	Ethane [MSTB]	Propane [MSTB]	Butane [MSTB]	Condensate [MSTB]	Sulpher [MLt]	Other	BOE (6:1)
2006	4.0	0.0	1.0	4.7	0.0	0.2	-0.6	0.2	0.2	0.1	0.0	0.0	4.6
2007	4.0	0.0	1.0	13.3	57.7	27.0	10.8	1.4	0.8	0.3	0.0	0.0	31.2
2008	4.0	0.0	1.0	26.5	84.6	39.9	15.0	2.4	1.5	0.6	0.0	0.0	52.7
2009	4.0	0.0	1.0	30.6	48.1	23.4	6.6	2.0	1.4	0.5	0.0	0.0	45.1
2010	4.0	0.0	1.0	18.4	24.2	11.9	3.0	1.2	0.8	0.3	0.0	0.0	25.6
2011	4.0	0.0	1.0	9.0	4.0	2.2	-0.2	0.5	0.3	0.1	0.0	0.0	10.0
2012	4.0	0.0	1.0	3.0	0.2	0.2	-0.3	0.1	0.1	0.0	0.0	0.0	3.0
2013	4.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tot.	4.0	0.0	1.0	105.5	218.7	104.8	34.3	7.8	5.1	2.0	0.0	0.0	172.2

* Remaining years to be summed up.

Notes:

- *M $* stands for thousand dollars

Table 2: COST SUMMARY

	Capital Cost									Operating Cost							
										Direct				Indirect			
	Pipelines [M $]	Downhole [M $]	Sampling [M $]	Skid Rental [M $]	Other [M $]	3D Seismic [M $]	Isolation Testing [M $]	CO2 Purchases [M $]	TOTAL CAPITAL	Fuel Cost [M $]	Man Power [M $]	WAG [M $]	TOTAL Direct	Item #1	Item #2	TOTAL Indirect	Total Operating Costs
2006	2,230.4	950.0	0.0	0.0	0.0	353.3	0.0	0.0	3,533.7	-	0.0	0.0	0.0	-	-	-	0.0
2007	557.6	0.0	70.0	143.0	22.5	25.7	0.0	2,226.6	3,045.4	-	11.0	33.0	44.0	-	-	-	44.0
2008	0.0	0.0	105.0	156.0	0.0	0.0	0.0	2,499.2	2,760.2	-	12.0	36.0	48.0	-	-	-	48.0
2009	0.0	0.0	105.0	52.0	0.0	247.5	0.0	1,287.6	1,692.1	-	4.0	12.0	16.0	-	-	-	16.0
2010	0.0	0.0	105.0	140.0	0.0	5.6	0.0	0.0	250.6	-	0.0	0.0	0.0	-	-	-	0.0
2011	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	-	0.0
2012	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	-	0.0
2013	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	0.0	0.0	0.0	-	-	-	0.0
Tot.	2,788.0	950.0	385.0	491.0	22.5	632.1	0.0	6,013.3	11,281.9	-	27.0	81.0	108.0	-	-	-	108.0

TOTAL COSTS [M $]
3,533.7
3,089.4
2,808.2
1,708.1
250.6
0.0
0.0
0.0
11,389.9

* Remaining years to be summed up.

Notes:

- *M $* stands for thousand dollars
- Direct costs include such items as: operating labor, fuel, water, electricity, well service & maintenace, etc.
- Indirect costs such as overhead, insurance, property taxes that are directly attributable to the innovation technology.

Table 3: ROYALTY SUMMARY

Crown Land %:	100%
Vintage (Old, New, or Thrid Tier), if applicable - Provide Base Case Royalty Regime (e.g. Hz. Reentry Royalty	Old/New 2006-2008. NRF 2009-2013

	Royalty Rate							Royalty Due						
	Oil royalty rate [%]	Gas royalty rate [%]	Ethane royalty rate [%]	Propane royalty rate [%]	Butane royalty rate [%]	Condensate royalty rate [%]	**AVERAGE ROYALTY RATE [%]**	Oil royalty due [M$]	Gas royalty due [M$]	Ethane royalty due [M$]	Propane royalty due [M$]	Butane royalty due [M$]	Condensate royalty due [M$]	**TOTAL ROYALTY DUE [M $]**
2006	22.2%	33.0%	33.0%	30.0%	30.0%	42.0%	31.7%	125.7	0.3	-4.1	2.6	2.7	2.1	129.3
2007	23.0%	33.0%	33.0%	30.0%	30.0%	42.0%	31.8%	364.3	67.7	73.4	19.7	15.0	11.6	551.6
2008	23.8%	33.0%	33.0%	30.0%	30.0%	42.0%	32.0%	1,011.5	118.7	121.3	36.8	29.5	29.6	1,347.4
2009	27.4%	10.9%	10.9%	30.0%	30.0%	42.0%	25.2%	857.0	22.9	19.7	16.8	14.8	15.3	946.4
2010	29.7%	5.3%	5.3%	30.0%	30.0%	40.0%	23.4%	598.7	3.2	2.3	20.9	15.7	10.7	651.6
2011	30.2%	5.0%	5.0%	30.0%	30.0%	40.0%	23.4%	396.1	0.4	-0.1	8.7	7.9	5.8	418.7
2012	25.7%	5.0%	5.0%	30.0%	30.0%	40.0%	22.6%	146.4	0.0	-0.2	2.6	2.4	1.7	152.9
2013	20.5%	5.0%	5.0%	30.0%	30.0%	40.0%	21.7%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tot.	25.3%	16.3%	16.3%	30.0%	30.0%	41.0%	26.5%	3,499.6	213.3	212.2	108.0	88.0	76.8	4,198.0

* Remaining years to be summed up.

Notes:

- *M $* stands for thousand dollars

Actual prices 2006-2010. April 2010 GLJ Forecast

Table 4: CASH FLOW SUMMARY

	Revenue									Costs							Taxes		
	Oil Revenue [M $]	Sales Gas Revenue [M $]	Ethane Revenue [M $]	Propane Revenue [M $]	Butane Revenue [M $]	Condensate Revenue [M $]	Sulpher Revenue [M $]	Other Revenue [M $]	Total Revenue [M $]	Total Capital [M $]	Total Operating [M $]	Total CO2 Purchases [M $]	Total Royalties [M $]	Total ORR [M $]	Total Costs [M $]	BEFORE TAX CASH FLOW [M $]	Blended Taxes [M $]	Total Taxes	AFTER TAX CASH FLOW [M $]
2006	344	1	-12	9	4	5	0	0	350	3,534	0	0	129	9	3,672	-3,321	-99	-99	-3,222
2007	1,020	202	219	66	18	27	0	0	1,551	819	44	2,227	552	39	3,680	-2,129	15	15	-2,143
2008	2,747	354	362	123	98	69	0	0	3,754	261	48	2,499	1,347	94	4,250	-496	440	440	-936
2009	1,993	95	74	56	49	38	0	0	2,304	404	16	1,288	946	58	2,712	-408	167	167	-575
2010	1,434	48	33	70	52	27	0	0	1,664	251	0	0	652	42	944	720	104	104	616
2011	891	8	-3	29	26	14	0	0	966	0	0	0	419	24	443	523	17	17	505
2012	299	1	-4	9	8	4	0	0	317	0	0	0	153	8	161	156	-47	-47	203
2013	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	-64	-64	64
Tot.	8,728	709	669	360	256	185	0	0	10,907	5,269	108	6,013	4,198	274	15,862	-4,955	534	534	-5,488

* Remaining years to be summed up.

Notes:

- *M $* stands for thousand dollars

Actual prices 2006-2010. April 2010 GLJ Forecast

Table 5: ECONOMIC INDICATORS

	Before Tax & Royalty	Before Tax	After Tax & Royalty
1) Rate of Return [%]	N/A	N/A	N/A
2) Payout [months]	NO PAYOUT	NO PAYOUT	NO PAYOUT
3) Project NPV			
NPV_5 [M $]	-1,513	-5,796	-6,220
NPV_{10} [M $]	-2,362	-6,716	-7,191
NPV_{12} [M $]	-2,712	-7,098	-7,590
NPV_{15} [M $]	-3,250	-7,689	-8,200
4) NPV of Crown royalty			
NPV_5 [M $]		3,984	3,984
NPV_{10} [M $]		4,049	4,049
NPV_{12} [M $]		4,078	4,078
NPV_{15} [M $]		4,126	4,126

Notes:
- *M $* stands for thousand dollars

Actual prices 2006-2010. April 2010 GLJ Forecast

Table 6: PRICE DECK

	Edmonton Light sweet As spent C$/bbl	AECO Spot As Spent C$/mmBTU	Spec Ethane As Spent C$/bbl	Propane As Spent C$/bbl	Butane As Spent C$/bbl	C5+ As Spent C$/bbl
2006	73.08	7.61	18.24	42.15	55.73	76.75
2007	76.85	7.20	22.20	45.93	59.09	80.97
2008	103.48	8.57	22.20	50.98	66.15	117.82
2009	65.18	4.22	14.32	27.35	35.88	70.06
2010	77.87	4.17	16.61	59.89	65.91	84.27
2011	99.19	4.01	17.52	63.67	78.83	107.81
2012	101.02	4.74	15.72	63.64	77.79	104.05
2013	100.51	5.31	17.66	63.32	77.39	102.52

Actual prices 2006-2010. April 2010 GLJ Forecast

PENGROWTH CORPORATION

APPENDIX VII
PROCESS FLOW DIAGRAMS

INNOVATIVE ENERGY TECHNOLOGIES PROGRAM
2010 FINAL REPORT

JUDY CREEK PATTERN 102 CO_2 PILOT

INLET SEPARATOR
SIZE: 12'-0" ø x 80'-0" S/S
WITH 8'-0" I.D. BOOT

INLET COOLER
HEAT DUTY: 9 MMBTU/HR

COALESCER
SIZE: 3'-0" ø x 10'-0" S/S

MDEA CONTACTOR
SIZE: 9'-0" ø & 10'-0" ø x 57'-0" S/S

LEAN/RICH EXCHANGER
HEAT DUTY: 51 MMBTU/HR

LEAN MDEA COOLER
HEAT DUTY: 107.5 MMBTU/HR

PARTICULATE/CARBON FILTER
SIZE: 6'-0" ø x 15'-6" S/S

SALES GAS TURBO-COMPRESSOR (EXISTING)
CAPACITY: 21.3 MMSCFD @ 550 PSIG DISCHARGE

MDEA REGENERATION TOWER
SIZE: 12'-0" ø x 74'-0" S/S

MDEA REBOILER
HEAT DUTY: 140 MMBTU/HR

MDEA CHARGE PUMP
CAPACITY: 2200 GPM

MDEA REFLUX AERIAL COOLER
HEAT DUTY: 30 MMBTU/HR

MDEA REFLUX ACUMMULATOR
SIZE: 5'-0" ø x 15'-0" S/S

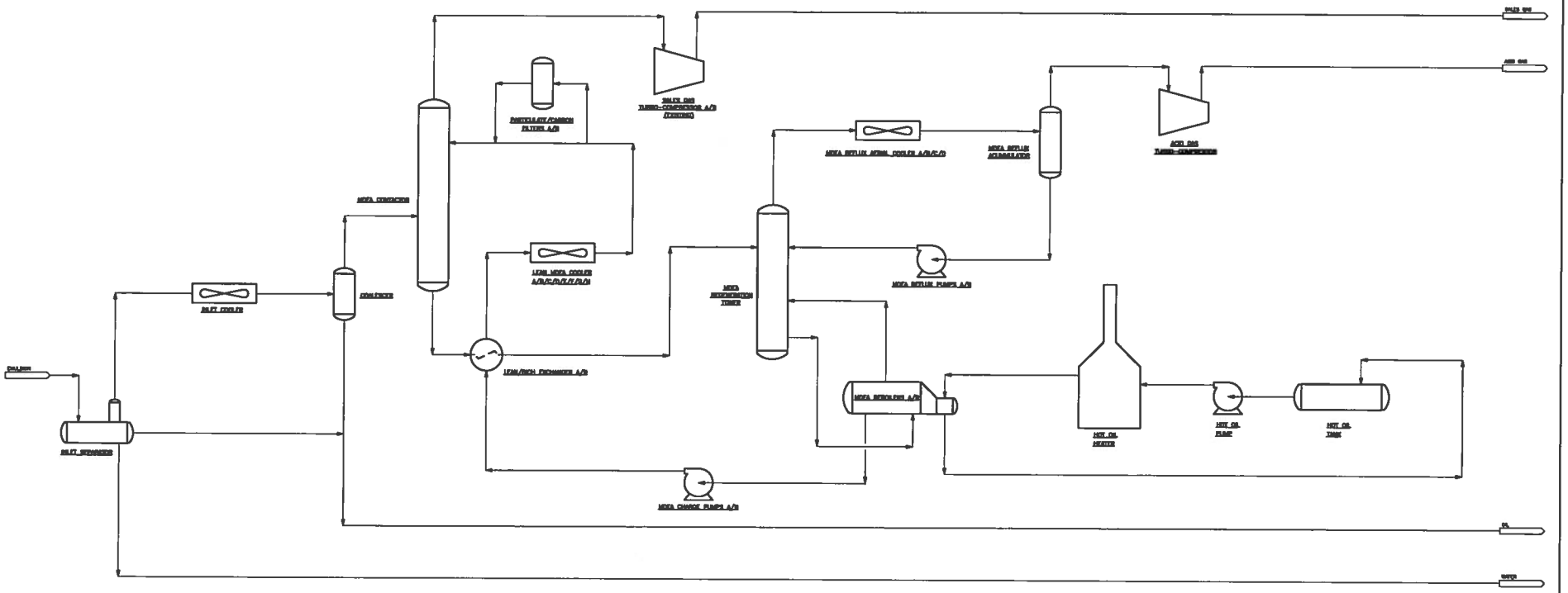
ACID GAS TURBO-COMPRESSOR
CAPACITY: 21 MMSCFD @ 2000 PSIG DISCHARGE

MDEA REFLUX PUMP
CAPACITY: 55 GPM

HOT OIL HEATER
153 mm BTU/HR

HOT OIL TANK
SIZE: 12' O.D. x 40' L

HOT OIL PUMP
4000 U.S. GPM @ 75 psi



NOTES	REFERENCE DRAWINGS	REV.	DATE	BY	DESCRIPTION	CHK'D	APP'D	CLIENT	ENGINEERING & PERMIT STAMPS
		A	09.08.14	CA	ISSUED FOR CLIENTS REVIEW (MRC JOB #09120)				

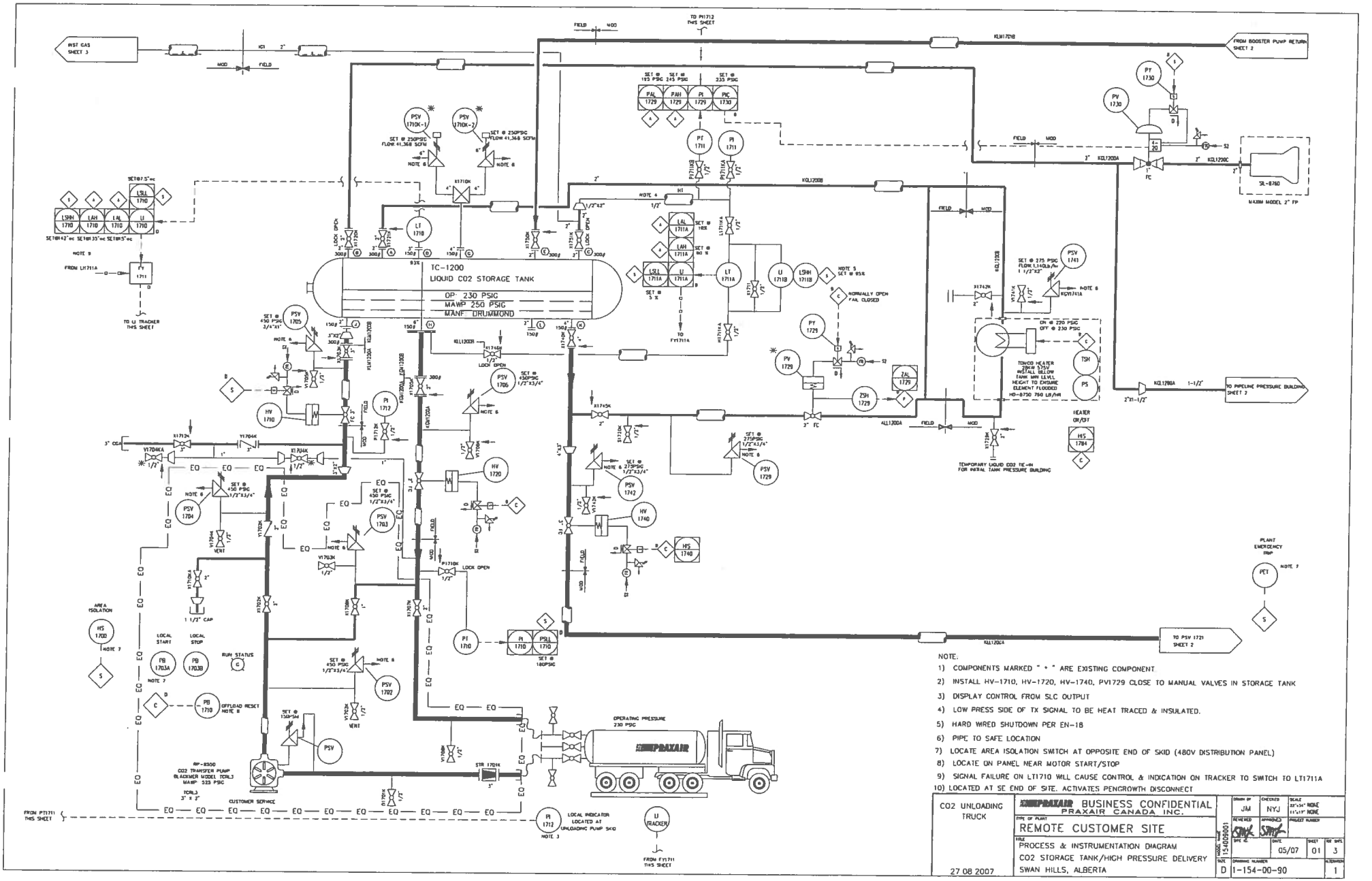
	BY	DATE
DRAWN:	JE	07.01.16
CHECKED:		
DESIGN:		
APPROVED:		
CLIENT:		
CADNAME:	A1-06810-PFD-003_A	

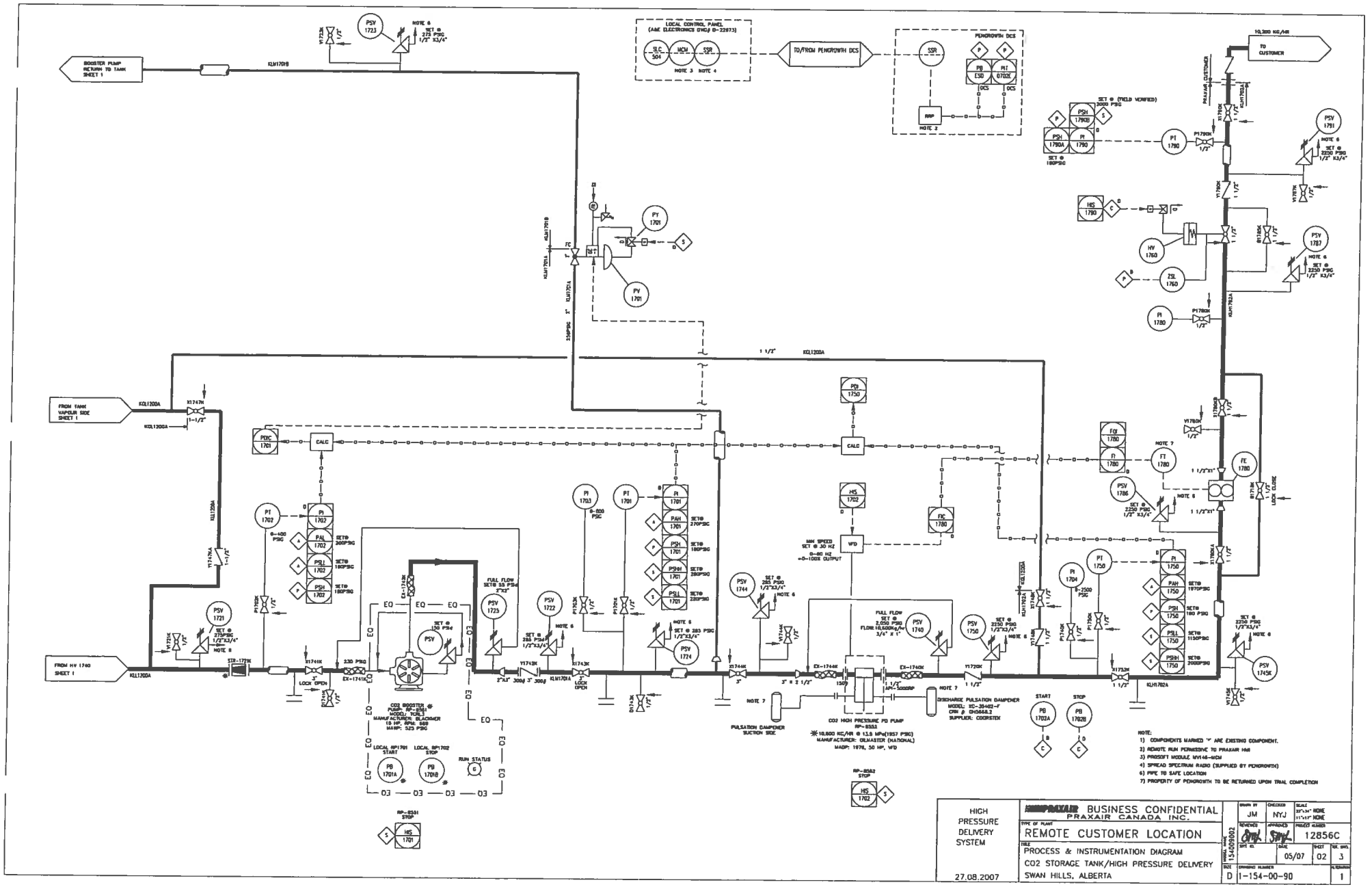
PENGROWTH CORPORATION

MILLENIA
Resource Consulting

JUDY CREEK CO2 INJECTION
LSD 6-64-10 W5M
AMINE PROCESSING/HOT OIL
PROCESS FLOW DIAGRAM

SCALE/PLOT SCALE	DRAWING NAME	REV.
N.T.S.	A1-06810-PFD-003	A


TC-1200
LIQUID CO2 STORAGE TANK
OP: 230 PSIG
MAWP 250 PSIG
MANF DRUMMOND
TO PI1712 THIS SHEET
FROM BOOSTER PUMP RETURN SHEET 2
TO PSV 1721 SHEET 2
TO PIPELINE PRESSURE BUILDING SHEET 2
FROM INST GAS SHEET 3
FROM PI1711 THIS SHEET
TO LI TRACKER THIS SHEET
TO PI1711A
TO FY1711 THIS SHEET
PLANT EMERGENCY TRIP
AREA ISOLATION
LOCAL START
LOCAL STOP
RUN STATUS
OFFLOAD RESET
RP-9350
CO2 TRANSFER PUMP
BLACKMER MODEL TCRL3
MAWP 525 PSIG
CUSTOMER SERVICE
OPERATING PRESSURE 230 PSIG
PRAXAIR
LOCAL INDICATOR LOCATED AT UNLOADING PUMP SKID
U TRACKER
TEMPORARY LIQUID CO2 TIE-IN FOR INITIAL TANK PRESSURE BUILDING
HEATER ON/OFF
TEMCO HEATER 20kW 575V INSTALL BELOW TANK MIN LEVEL HEIGHT TO ENSURE ELEMENT FLOODED HO-8750 750 LB/HR
SR-8760
MAXIM MODEL 2" FP
NOTE:
1) COMPONENTS MARKED " * " ARE EXISTING COMPONENT
2) INSTALL HV-1710, HV-1720, HV-1740, PV1729 CLOSE TO MANUAL VALVES IN STORAGE TANK
3) DISPLAY CONTROL FROM SLC OUTPUT
4) LOW PRESS SIDE OF TX SIGNAL TO BE HEAT TRACED & INSULATED.
5) HARD WIRED SHUTDOWN PER EN-18
6) PIPE TO SAFE LOCATION
7) LOCATE AREA ISOLATION SWITCH AT OPPOSITE END OF SKID (480V DISTRIBUTION PANEL)
8) LOCATE ON PANEL NEAR MOTOR START/STOP
9) SIGNAL FAILURE ON LT1710 WILL CAUSE CONTROL & INDICATION ON TRACKER TO SWITCH TO LT1711A
10) LOCATED AT SE END OF SITE. ACTIVATES PENGROWTH DISCONNECT
CO2 UNLOADING TRUCK
27.08.2007
PRAXAIR BUSINESS CONFIDENTIAL
PRAXAIR CANADA, INC.
TYPE OF PLANT
REMOTE CUSTOMER SITE
TITLE
PROCESS & INSTRUMENTATION DIAGRAM
CO2 STORAGE TANK/HIGH PRESSURE DELIVERY
SWAN HILLS, ALBERTA
DRAWN BY JM
CHECKED NYJ
SCALE 22"x34" NONE 11"x17" NONE
REVIEWED
APPROVED
PROJECT NUMBER
DATE 05/07
SHEET 01
REV SHTS 3
SIZE D
DRAWING NUMBER 1-154-00-90
REVISION 1



HIGH PRESSURE DELIVERY SYSTEM	PRAXAIR CANADA INC. BUSINESS CONFIDENTIAL	DRAWN BY: JM	CHECKED: NYJ
27.08.2007	TYPE OF PLANT: REMOTE CUSTOMER LOCATION	REVISED:	APPROVED:
	TITLE: PROCESS & INSTRUMENTATION DIAGRAM CO2 STORAGE TANK/HIGH PRESSURE DELIVERY SWAN HILLS, ALBERTA	DATE: 05/07	PROJECT NUMBER: 12856C
		SHEET: 02	NO. SHTS: 3
	SIZE: D	DRAWING NUMBER: 1-154-00-90	REVISION: 1

SCALE: 20"x36" NONE; 11"x17" NONE

154009902

PENGROWTH CORPORATION

APPENDIX VIII
ERCB EOR APPROVAL 10269

INNOVATIVE ENERGY TECHNOLOGIES PROGRAM
2010 FINAL REPORT

JUDY CREEK PATTERN 102 CO_2 PILOT

EUB Alberta Energy and Utilities Board

Calgary Office 640 – 5 Avenue SW Calgary, Alberta Canada T2P 3G4 Tel 403 297-8311 Fax 403 297-7336

January 19, 2007

Ray Pollock
Pengrowth Corporation
2900, 240 - 4 Avenue SW
Calgary AB T2P 4H4

Dear Mr. Pollock:

JUDY CREEK BEAVERHILL LAKE A POOL
ENHANCED OIL RECOVERY (EOR)
APPLICATION NO. 1463712
APPROVAL NO. 10269E

The Alberta Energy and Utilities Board (EUB) has considered your application dated May 31, 2006 and supporting submissions dated September 12 and November 2, 2006, requesting an amendment to Approval No. 10269. Your application has been granted and Approval No. 10269E is enclosed for this purpose.

Pengrowth is advised that the operations in the carbon dioxide flood area must be annually reported and presented along with the current hydrocarbon miscible flood operations as per the *EUB's IL 96-2: Progress Report Requirements for Miscible Flood Schemes*. Annual reports and presentations should provide separate coverage for each of the carbon dioxide flood area and the hydrocarbon solvent flood area for clarity.

Pengrowth is reminded that all other required EUB approvals and requirements for the carbon dioxide flood operations must be applied for and met in the normal manner. All requirements and provisions of *Directive 056: Energy Development Applications and Schedules* regarding the potential increase in the H_2S concentration in the produced gas must be adhered to.

The EUB recommends that resources applications be submitted through the Electronic Application Submission (EAS) system. Access to EAS for resources applications is available on the Digital Data Submission (DDS) page on the EUB's Web site (www.eub.ca). To setup a DDS account, contact the EUB DDS Administrator at (403) 297-5802 or by email at EUB.DDSAdministrator@eub.gov.ab.ca.

Questions on this matter should be directed to Steve Thomas at 297-6950.

Yours truly,

Tom Byrnes, P.Eng.
Staff Reservoir Engineering Specialist
Resources Applications

TB/am
Enclosure

EUB Alberta Energy and Utilities Board

ENHANCED OIL RECOVERY
Approval No. 10269E

MADE at the City of Calgary, in the Province of Alberta, on 19th day of January 2007.	ALBERTA ENERGY AND UTILITIES BOARD

The Alberta Energy and Utilities 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 Corporation (hereinafter called "the Operator") for enhanced recovery of oil by miscible displacement using hydrocarbon solvent, chase gas, carbon dioxide[1] and water injection in that part of the **Judy Creek Beaverhill Lake A Pool** as outlined on Appendix A of the approval, as described in

a) Application No. 1088305,
b) Application No. 1094123,
c) Application No. 1243118,
d) Application No. 1247874,
e) Application No. 1246844,
f) Application No. 1268927,
g) Application No. 1268929,
h) Application No. 1274163,
i) Application No. 1275022,
j) Application No. 1275025,
k) Application No. 1284185,
l) Application No. 1289469,
m) Application No. 1292918,
n) Application No. 1296768,
o) Application No. 1296323,
p) Application No. 1303547,
q) Application No. 1303794,
r) Application No. 1307710,
s) Application No. 1307725,
t) Application No. 1311173,
u) Application No. 1315278,
v) Application No. 1322961,
w) Application No. 1328170,
x) Application No. 1332924,
y) Application No. 1331892,
z) Application No. 1336975,
aa) Application No. 1336981,
bb) Application No. 1337023,
cc) Application No. 1342553,
dd) Application No. 1344016,
ee) Application No. 1347069,
ff) Application No. 1354570,
gg) Application No. 1377596,
hh) Application No. 1377772,
ii) Application No. 1382738,
jj) Application No. 1379687,
kk) Application No. 1390535,
ll) Application No. 1393834,
mm) Application No. 1428296,
nn) Application No. 1443242,
oo) Application No. 1455268,
pp) Application No. 1468870,
qq) Application No. 1463712,

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

PART 1
WATER FLOOD AND HYDROCARBON SOLVENT FLOOD AREA

2) For the purpose of this approval, "solvent" means a suitable mixture of hydrocarbons ranging from methane to pentanes plus, but consisting largely of methane, ethane and propane,

[1]Application No. 1463712

wherein the ethane plus content of the solvent shall be of sufficient quantity to obtain first-contact miscibility with reservoir oil as determined by the procedure outlined on the attached Appendix B.

3) In accordance with the scheme, the injection of solvent, chase gas and water shall proceed into the subject pool in accordance with the following schedule of commencement dates for the wells with the following unique identifiers. Fluids to be injected, having commenced in accordance with the schedule may continue. The pattern numbers given below correspond to those identified by the operator.

Well Location	Operator's Pattern No.	Commence Injection Date Water	Solvent/Gas & Water
00/10-19-063-10W5/0	58	-	terminal waterflood
00/04-28-063-10W5/0	10	currently injecting	-
00/11-28-063-10W5/2	116	-	currently injecting
00/12-28-063-10W5/0	87	-	terminal waterflood
02/12-28-063-10W5/2	22A	-	terminal waterflood
00/04-29-063-10W5/0	122	-	currently injecting
02/10-29-063-10W5/0	70	-	terminal waterflood
00/12-29-063-10W5/0	69	-	terminal waterflood
00/02-30-063-10W5/0	75	-	terminal waterflood
00/04-30-063-10W5/0	12	-	terminal waterflood
00/10-30-063-10W5/0	59	-	terminal waterflood
00/12-30-063-10W5/0	72	-	terminal waterflood
00/02-31-063-10W5/0	67	-	terminal waterflood
00/04-31-063-10W5/0	20	-	terminal waterflood
00/12-31-063-10W5/0	27	-	terminal waterflood
00/16-31-063-10W5/0	79	-	terminal waterflood
00/02-32-063-10W5/0	68	-	terminal waterflood
00/10-32-063-10W5/0	24	-	terminal waterflood
00/14-32-063-10W5/0	25	-	terminal waterflood
00/04-33-063-10W5/0	22	-	terminal waterflood
00/07-33-063-10W5/3	80A	-	terminal waterflood
00/11-33-063-10W5/3	110	-	terminal waterflood
00/13-33-063-10W5/2	39A	-	terminal waterflood
00/15-33-063-10W5/2	64A	-	terminal waterflood
00/12-14-063-11W5/0	89	-	terminal waterflood
00/10-15-063-11W5/0	1	-	terminal waterflood
00/10-22-063-11W5/0	111	currently injecting	-
00/04-23-063-11W5/0	4	-	terminal waterflood
00/10-23-063-11W5/0	14	-	terminal waterflood
00/12-23-063-11W5/0	90	-	terminal waterflood
00/04-24-063-11W5/0	5	-	terminal waterflood
00/10-24-063-11W5/0	57	-	terminal waterflood
00/12-24-063-11W5/0	76	-	terminal waterflood
00/02-25-063-11W5/0	74	-	terminal waterflood
00/04-25-063-11W5/0	13	-	terminal waterflood

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02/10-25-063-11W5/0	19	-	terminal waterflood
00/12-25-063-11W5/0	91	-	terminal waterflood
00/02-26-063-11W5/0	73	-	terminal waterflood
00/04-26-063-11W5/0	15	-	terminal waterflood
00/10-26-063-11W5/0	18	-	terminal waterflood
00/12-26-063-11W5/0	106	-	currently injecting
00/02-27-063-11W5/0	114	-	currently injecting
00/10-27-063-11W5/0	62	-	terminal waterflood
00/02-34-063-11W5/0	117	-	currently injecting
00/04-34-063-11W5/0	63	currently injecting	-
00/10-34-063-11W5/0	31	-	terminal waterflood
00/02-35-063-11W5/0	83	-	terminal waterflood
00/04-35-063-11W5/0	7	-	terminal waterflood
00/10-35-063-11W5/0	32	-	terminal waterflood
00/12-35-063-11W5/0	93	-	terminal waterflood
00/02-36-063-11W5/0	71	-	terminal waterflood
00/04-36-063-11W5/0	29	-	terminal waterflood
02/10-36-063-11W5/0	28	-	terminal waterflood
00/12-36-063-11W5/0	86	-	terminal waterflood
S0/02-04-064-10W5/2	92	-	terminal waterflood
00/12-04-064-10W5/0	84	-	terminal waterflood
00/02-05-064-10W5/0	38	-	terminal waterflood
00/04-05-064-10W5/0	37	-	terminal waterflood
00/07-05-064-10W5/0	96	-	terminal waterflood
00/11-05-064-10W5/2	115	-	currently injecting
00/12-05-064-10W5/0	78	-	terminal waterflood
00/15-05-064-10W5/2	41A	-	terminal waterflood
00/02-06-064-10W5/0	36	-	terminal waterflood
00/04-06-064-10W5/0	35	-	terminal waterflood
02/12-06-064-10W5/0	66	-	terminal waterflood
00/15-06-064-10W5/2	42A	-	terminal waterflood
00/01-07-064-10W5/2	112	-	currently injecting
00/03-07-064-10W5/3	109	-	terminal waterflood
00/10-07-064-10W5/0	65	-	terminal waterflood
00/02-08-064-10W5/0	88	-	terminal waterflood
00/04-08-064-10W5/0	52	-	terminal waterflood
00/05-08-064-10W5/0	52A	-	terminal waterflood
00/02-01-064-11W5/0	34	-	terminal waterflood
00/04-01-064-11W5/0	33	-	terminal waterflood
02/10-01-064-11W5/0	43	-	terminal waterflood
00/04-02-064-11W5/0	45	-	terminal waterflood
<rescinded[1]>00/07-02-064-11W5/0	102	-	terminal waterflood
00/12-02-064-11W5/0	97	-	terminal waterflood
00/02-03-064-11W5/0	94	-	terminal waterflood
00/04-03-064-11W5/0	47	currently injecting	2007
00/11-03-064-11W5/0	100	-	terminal waterflood
00/02-09-064-11W5/0	48	currently injecting	-

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00/03-10-064-11W5/0	118	-	currently injecting
00/14-10-064-11W5/0	119	currently injecting	2006
00/02-11-064-11W5/0	98	-	terminal waterflood
00/04-11-064-11W5/0	49	-	terminal waterflood
02/10-11-064-11W5/0	101	currently injecting	-
02/12-11-064-11W5/0	103	-	terminal waterflood
02/04-12-064-11W5/0	104	currently injecting	-
00/07-12-064-11W5/0	121	2006	-
00/09-12-064-11W5/0	120	2006	-
00/14-12-064-11W5/0	105	currently injecting	-
00/06-13-064-11W5/0	108	currently injecting	-
00/04-14-064-11W5/0	54	-	currently injecting
00/08-14-064-11W5/0	53	currently injecting	-
00/12-14-064-11W5/0	113	currently injecting	-
00/06-15-064-11W5/0	107	currently injecting	-
00/10-16-064-11W5/0	132	currently injecting	-

4) Fluid injection may commence in the well(s) referred to in clause 3 once the EUB has confirmed in writing that Directive 51 requirements have been met.

5) (1) Injection through the wells referred to in clause 3

a) must maintain a voidage replacement ratio of 1.0 on the basis of cumulative production and injection volumes following the commencement of injection on a pattern basis, and

b) shall target a voidage replacement ratio of 1.0 on a monthly basis on a pattern basis.

(2) Patterns subject to active solvent injection shall be operated in such a manner as to minimize solvent migration outside of that pattern.

6) (1) A minimum operating pressure (MOP) of 26 200 kilopascals (gauge) shall be maintained in that part of the subject pool referred to in clause 1 in all patterns undergoing any active hydrocarbon[1] miscible flood displacement process, while a MOP of 15 800 kilopascals (gauge) shall be maintained in all patterns outside any active miscible flood areas.

(2) A hydrocarbon[1] miscible flood pattern is deemed to be on terminal waterflood and shall be governed by a reduced MOP of 15 800 kilopascals (gauge) after completion of a minimum solvent injection of 15 per cent of the pattern's floodable continuous hydrocarbon pore volume (FCHCPV) and following 12 months of water injection post solvent.

(3) Production shall not be taken from any producing wells in patterns subject to active hydrocarbon[1] solvent injection wherein the reservoir pressure is less than 26 200 kilopascals (gauge) and in patterns outside active miscible areas wherein the reservoir pressure is less than 15 800 kilopascals (gauge).

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(4) Any representative pressure survey must include pressure measurement at producing wells along the boundary between active miscible flood patterns and the adjacent water flood patterns.

7) The cumulative volume of solvent to be injected during the life of the scheme shall be not less than 19.4 million reservoir cubic metres as described in Application No. 920333. The cumulative injected solvent shall be distributed such that each pattern receives a volume of solvent not less than 15 per cent of the pattern's "floodable continuous hydrocarbon pore volume" (FCHCPV), as described in the Operator's letter dated November 2, 1992 and entitled "Detailed Explanation of Floodable Continuous Hydrocarbon Pore Volume".

8) Alternate volumes of solvent and water shall be injected in accordance with the scheme, in the wells referred to in clause 3, in such volumes that the water-alternating-gas (WAG) ratio will vary from pattern to pattern depending upon the capability of the injector, with the WAG generally increasing with time as detailed in Applications No. 910457 and 1051297.

9) (1) The Operator shall monitor the vertical distribution of injected fluids by an injection profile survey to be run at least once for each type of fluid injected, in each of the wells referred to in clause 3.

(2) If an injection well is reworked, an injection profile shall immediately be taken.

(3) The 00/04-14-064-11W5/0 well is exempt from any further injection profile surveys.

10) The Operator shall implement, or continue with, a program for the subject pool to determine:

a) the average molar composition of the solvent and chase gas injected each month,

b) when solvent breakthrough occurs by monitoring each well's producing gas-oil ratio,

c) the average molar composition of the solvent and chase gas produced each month, by continuously monitoring the produced gas stream.

11) (1) The Operator shall be subject to the two-part reporting process as outlined in the Board's Informational Letter IL 96-2 entitled: "Progress Report Requirements for Miscible Flood Schemes".

(2) Any solvent migration outside of active patterns shall be reported in the annual performance presentation, in accordance with IL 96-2, and shall include a discussion of completed or planned remedial measures to reduce/minimize solvent migration.

Part 2
CARBON DIOXIDE FLOOD AREA[1]

12) For the purposes of this approval "miscible fluid" means a mixture that contains:

a) at least 0.970 mole fraction of H_2S and CO_2, with the remainder composed of other natural gas components, and

b) an H_2S content not more than 0.07 mole fraction at any time.

13) In accordance with the scheme, the injection of miscible fluid and water shall proceed into the subject pool as described in the following schedule of commencement dates and minimum miscible fluid injection volumes, corresponding to a minimum hydrocarbon pore volume (HCPV) of 15 per cent for the target zones in the pattern, for the wells listed. Fluids to be injected, having commenced in accordance with the schedule, may continue. The pattern numbers below correspond to those identified by the Operator.

Well Location	Operator's Pattern No.	Minimum Miscible Fluid Injection Volume (10^6 standard m^3)	Commence Injection Date Miscible Fluid and Water
00/07-02-064-11W5/0	102	20	within three months of the date of this approval

14) The injection of miscible fluid and water may commence in the well(s) referred to in clause 13 once the EUB has confirmed in writing that Directive 51 requirements have been met.

15) Water and miscible fluid injection through the wells referred to in clause 13

a) must maintain a voidage replacement ratio of 1.0 on the basis of cumulative production and injection volumes following the commencement of injection on a pattern basis, and

b) shall target a voidage replacement ratio of 1.0 on a monthly basis on a pattern basis.

16) (1) A minimum operating pressure (MOP) of 23 000 kilopascals (gauge) shall be maintained in that part of the subject pool referred to in clause 1 in all patterns undergoing any active carbon dioxide miscible flood displacement process, while a MOP of 15 800 kilopascals (gauge) shall be maintained in all patterns outside any active miscible flood areas.

(2) A carbon dioxide miscible flood pattern is deemed to be on terminal waterflood and shall be governed by a reduced MOP of 15 800 kilopascals (gauge) after completion of the minimum miscible fluid injection volume specified in clause 13 and following 12 months of water injection post miscible fluid injection.

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(3) Production shall not be taken from any producing wells in patterns subject to active carbon dioxide injection wherein the reservoir pressure is less than 23 000 kilopascals (gauge) and in patterns outside active miscible areas wherein the reservoir pressure is less than 15 800 kilopascals (gauge).

17) (1) The Operator shall monitor the vertical distribution of injected fluids by an injection profile survey to be run at least once for each type of fluid injected, in each of the wells referred to in clause 13.

(2) If an injection well is reworked, an injection profile shall immediately be taken.

18) Upon commencement of miscible fluid injection, the Operator shall implement, or continue with, a monitoring program for the patterns under active miscible fluid injection to determine:

a) the average molar composition of the miscible gas injected each month,

b) when miscible fluid breakthrough occurs by monitoring each pattern well's producing gas-oil ratio and fluid compositions on a monthly basis, and

c) the average reservoir pressure in the pattern by annual pressure surveys on at least two pattern producers.

19) In addition to the two-part reporting process outlined in the EUB's Information Letter (IL) 96-2: Progress Report Requirements for Miscible Flood Schemes, the Operator shall report in each progress report submitted for the scheme

a) the volume of incremental oil recovery due to miscible fluid injection,

b) the volume of hydrocarbon solvent (ethane and methane) recovered due to miscible fluid injection, and

c) when breakthrough has occurred, the volume of injected miscible fluid remaining in the reservoir, at reservoir and standard conditions, based on the difference between the volume of miscible fluid injected and the volume produced back to surface.

20) Approval No. 10269E rescinds Approval No. 10269D.

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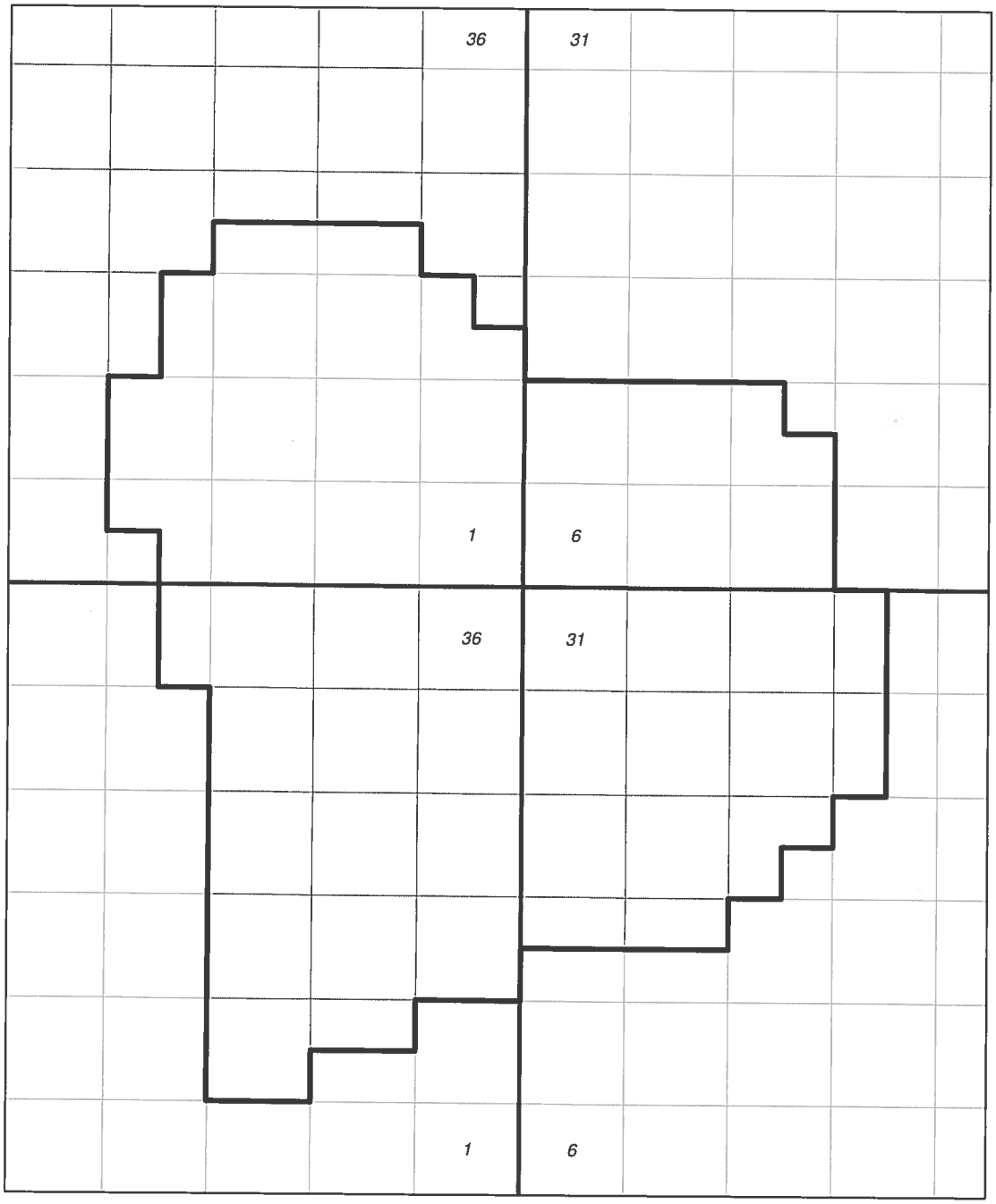
R.11 R.10W.5M



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JUDY CREEK BEAVERHILL LAKE A POOL
APPENDIX A TO APPROVAL NO. 10269E

Scheme Approvals Areas of Change

Added

Deleted

APPENDIX B TO APPROVAL NO. 10269

IN THE JUDY CREEK FIELD

The ethane plus content of the solvent shall be a sufficient quantity to obtain first-contact miscibility with the reservoir oil as determined by the following relationship:

$$\sum \frac{x_i}{M_{ei}} \geq \frac{1}{2.009}$$

where x_i is the mole fraction of component i in the solvent and M_{ei} is the miscible-equivalence values for each component as shown in the following table:

	M_{ei}
C_1	∞
C_2	1.00
C_3	0.66
C_4	0.54
C_5	0.49
C_6	0.43
N_2	∞
CO_2	2.20