

PRODUCTIVITY AND BUILDUP TEST REPORT

On Well

WASKADA UNIT No. 3

102/13-31-001-25W1/00

Lower Amaranth: 1038.0 – 1672.3 mKB

Test Date: July 11 – 21, 2011

Prepared for:

PENN WEST ENERGY TRUST

Prepared by:

FEKETE ASSOCIATES INC.

September 23, 2011

PENN WEST ENERGY TRUST
Suite 200, 207 – 9th Ave. S.W.
Calgary, Alberta
T2P 1K3

ATTENTION: TREVOR THOMPSON

Re: Productivity & Buildup Test Report
WASKADA UNIT No. 3 102/13-31-001-25W1/00
Amaranth: 1038.0 – 1672.3 mKB
Test Date: July 11 – 21, 2011

An acoustic well sounder buildup test was conducted on the subject well to establish the current reservoir pressure, flow characteristics and productivity of the Amaranth formation. The test data have been analyzed and the results are presented in this report.

The raw data, analysis, report PDF, and PAS files are included in the CD attached to the original copy of this report.

If you should have any further questions or concerns, please do not hesitate to contact the undersigned or Reza Ali at 403.213-4200.

Sincerely,

FEKETE ASSOCIATES INC.

Gordon Severin
Well Test & Production Data Analyst

GS/fb

Frank Brunner, R.E.T.
Senior Technical Advisor,
Well Testing

REPORT DISTRIBUTION

Two (2) Copies of the Report to:

PENN WEST ENERGY TRUST
Calgary, Alberta

Attention: TREVOR THOMPSON

Summary of Results

WASKADA UNIT No. 3 102/13-31-001-25W1/00
Lower Amaranth: 1038.0 – 1672.3 mKB
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TEST RESULTS

PRESSURE SUMMARY		Metric		Field	
Final Calculated Buildup Pressure (2011/07/21)	(p)	1904	kPaa	276	psia
Final Calculated Flowing Sandface Pressure (2011/07/11)	(p _{wfo})	968	kPaa	140	psia

PRODUCTION AND DELIVERABILITY					
Final Oil Rate (2011/07/11)	(q _o)	2.5	m ³ /d	15.7	bbl/d
Final Gas Rate (2011/07/11)	(q _g)	689	m ³ /d	24	Mcf/d
Final Water Rate (2011/07/11)	(q _w)	16.6	m ³ /d	104	bbl/d
Cumulative Oil Production (to 2011/07/11)		1345	m ³	8459	bbl
Maximum Oil Rate (based on final oil rate)	(q _{omax})	2.8	m ³ /d	17.6	bbl/d

RESERVOIR CHARACTERISTICS– Hz Multi-frac Model w/Boundaries		Field		Metric	
Average Reservoir Pressure (History Match)	(p_R)	3765	kPaa	546	psia
Horizontal Permeability	(k _{xy})	0.04	mD	0.04	md
Permeability in X Direction	(k _x)	0.01	mD	0.01	md
Permeability in Y Direction	(k _y)	0.15	mD	0.15	md
Net Vertical Pay	(h)	18.9	m	62.0	ft
Effective Horizontal Wellbore Length (provided)	(L _e)	634	m	2081	ft
Effective Fracture Half Length	(x _{fy})	25	m	82	ft
Fracture Conductivity	(F _{CD})	24		24	
Reservoir Length (assumed)	(X _e)	1600	m	5249	ft
Reservoir Width (assumed)	(Y _e)	400	m	1312	ft
Location of Well From X Axis (assumed)	(X _w)	800	m	2625	ft
Location of Well From Y Axis (assumed)	(Y _w)	200	m	656	ft

Discussion/ Conclusions

WASKADA UNIT No. 3 102/13-31-001-25W1/00
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Test Date: July 11 - 21, 2011

BACKGROUND AND TEST OVERVIEW

The WASKADA UNIT No.3 well was drilled vertically to a depth of 626 mKB before starting to build angle. Drilling continued at a high angle until the Amaranth formation was penetrated, and then, the lateral section of the wellbore was drilled out to a TD of 1708 mKB MD (901 mKB TVD). Production casing (139.7 mm) was then landed at TD and cemented in place.

Completion operations commenced on September 16, 2010, when a Mongoose frac tool assembly was RIH on the end of 73 mm coiled tubing. The packer BHA was set at 1673.8 mKB, and on the following day, the toe was perforated (abrasive cut) over the interval of 1672.0 – 1672.3 mKB MD. The interval was subsequently hydraulically frac'd (placing 5 tonnes of sand into the formation) and this procedure was repeated 15 times along the length of the horizontal wellbore over the additional gross interval of 1038.0 – 1640.3 mKB (exact details of the stimulation operation were not provided).

Following the 16 stage hydraulic fracture treatment, a "WR" plug was RIH on the end of coiled tubing and set at 390 mKB and services were released. The well remained suspended until September 26, at which time, the "WR" plug was retrieved and an N₂ assisted coiled tubing cleanout was conducted to the PBTD of 1694 mKB MD.

On September 30, 73 mm production tubing was RIH and landed at 920.2 mKB MD. The pump and rods were then installed and the well was placed on continuous pump (no rate data provided).

The well was shut-in on October 9, when the pump and rods were POOH. Shortly thereafter, a new pump and rod assembly was installed, tested and primed. Commercial oil and gas production commenced October 13, 2010. Oil production peaked in December, 2010, at 12.7 m³/d and fell to a daily average of 2.6 m³/d by July 2011.

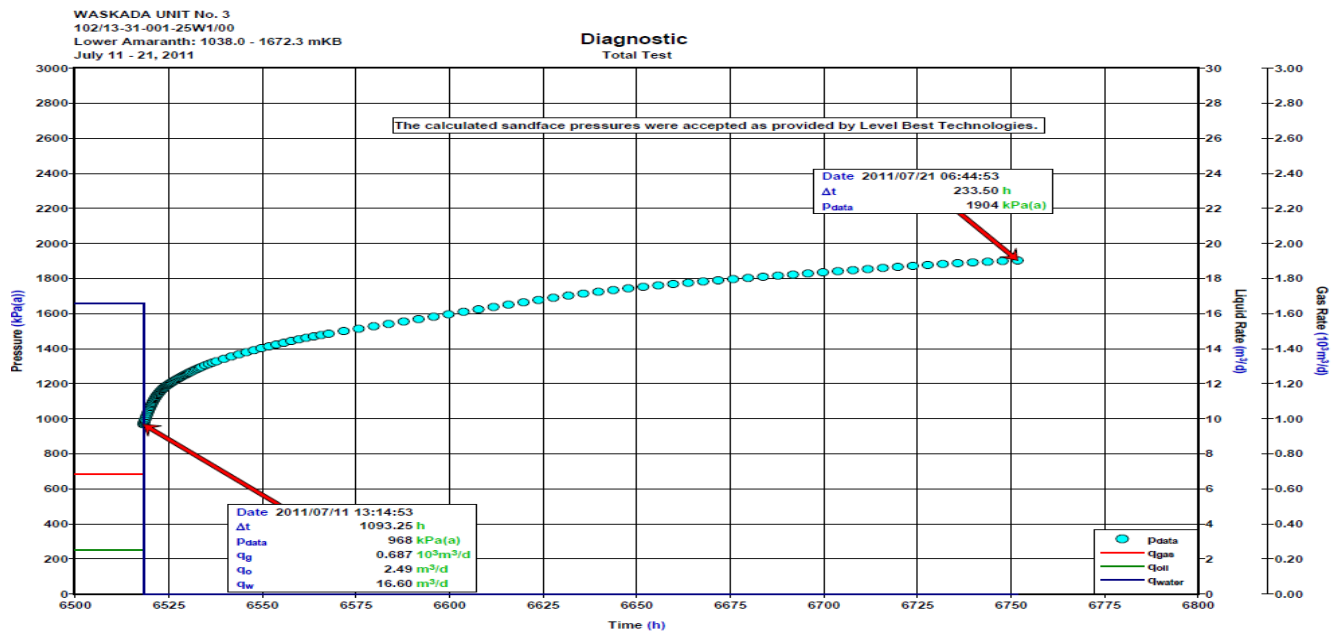
WASKADA UNIT No. 3 102/13-31-001-25W1/00
Lower Amaranth: 1038.0 – 1672.3 mKB
Test Date: July 11 - 21, 2011

BACKGROUND AND TEST OVERVIEW (cont'd)

On July 11, 2011, an automated acoustic well sounder, c/w surface pressure recorder, was connected to the annulus and a fluid depression test was initiated. The well was then shut-in at a final oil rate of 2.5 m³/d, a gas rate of 0.7 10³m³/d, and a water rate of 16.6 m³/d. The subsequent automated samplings of fluid level and corresponding casing pressure were collected until July 21 (Δt = 234 hrs), when the AWS equipment was rigged out. The pressure calculations to MPP (900.5 mKB TVD), were conducted by the AWS service provider and have been accepted as presented.

During the October 13, 2010 to July 11, 2011 production period, a total of 1345 m³ of oil, 73.7 10³m³ of gas, and 4042 m³ of water were produced.

The plot below displays the calculated bottomhole pressures measured during the test and the oil, gas and water rates reported just prior to shut-in on July 11.

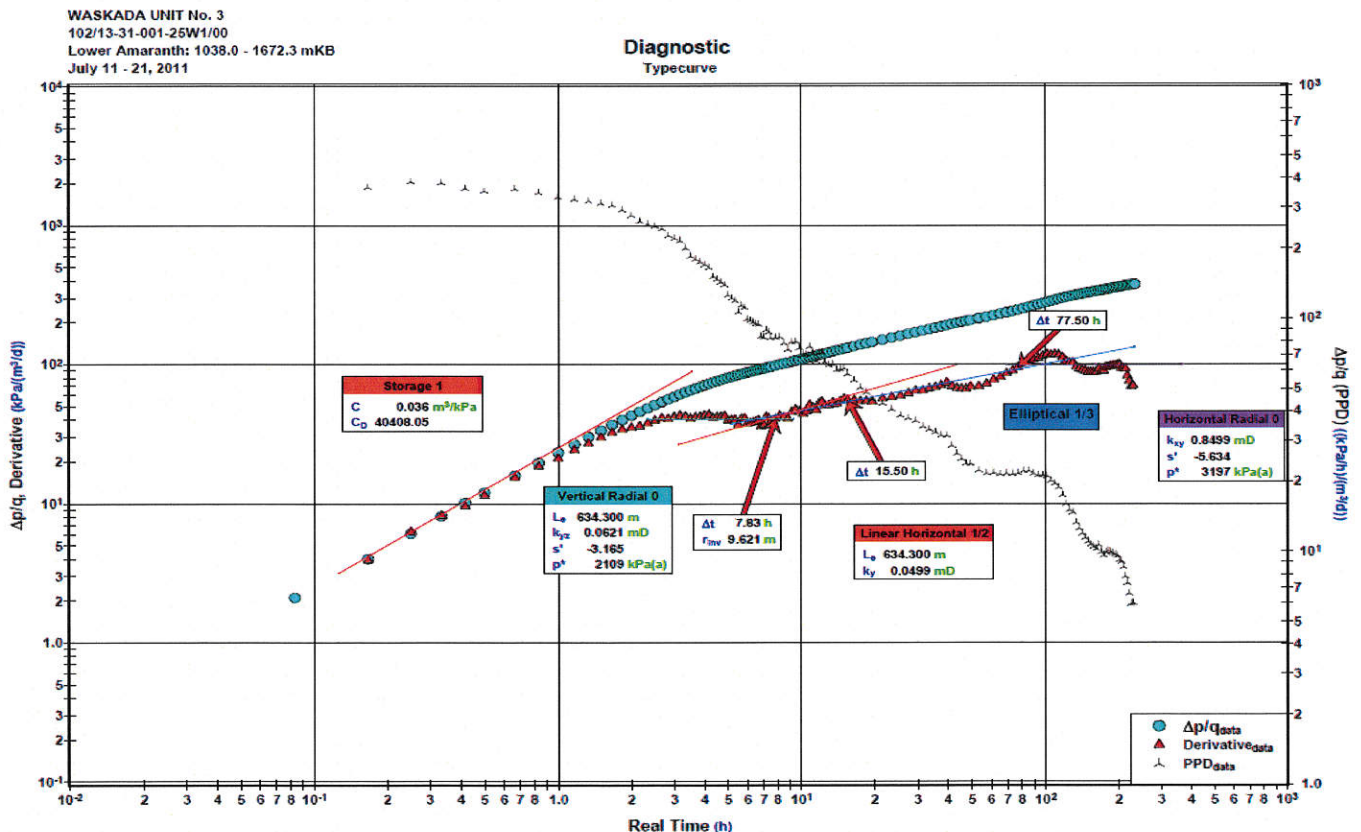


The properties of the oil have been taken from the PVT data supplied by Penn West. A saturation pressure (P_b) of 4326 kPa(a) is reported and the solution gas/oil ratio is estimated to be 43.3 m³/m³.

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DIAGNOSTIC ANALYSIS

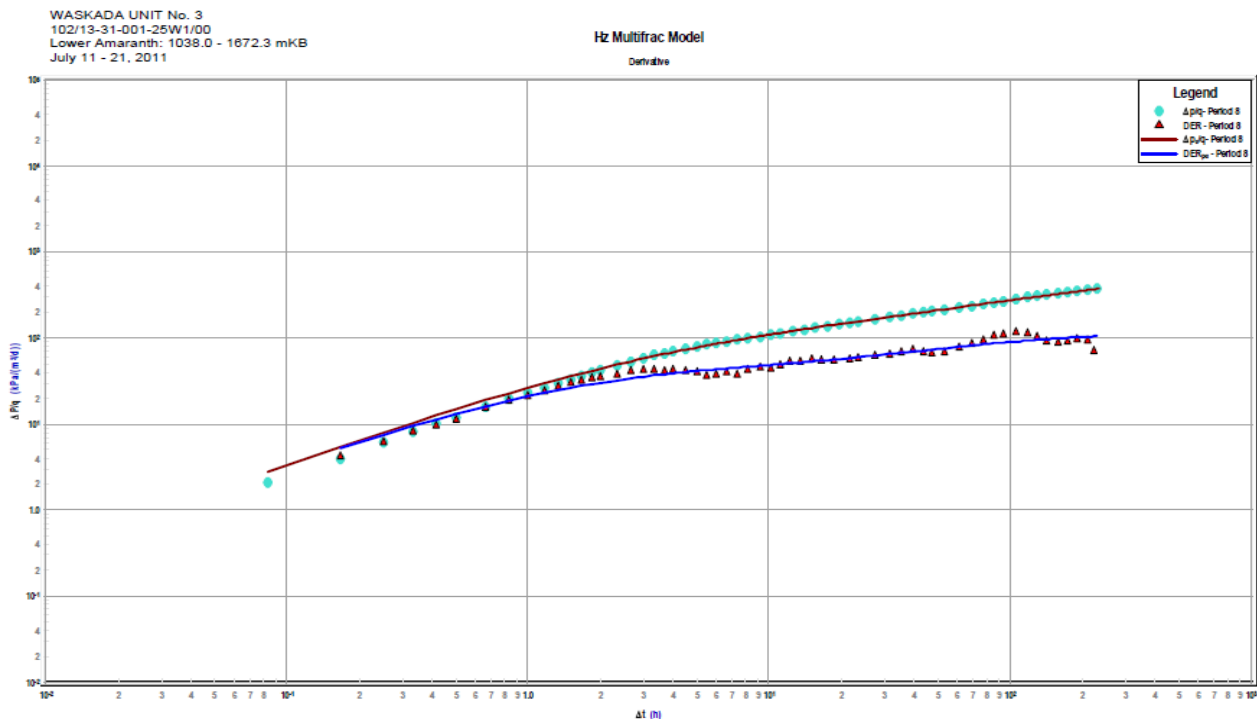
To determine the reservoir flow characteristics affecting the pressure behavior, a type-curve and pressure derivative plot of the buildup was generated. Although multiple fractures likely impact the flow pattern, conventional horizontal well methodology is initially applied to the buildup trends to provide preliminary permeability and skin estimates to commence subsequent history matching. Therefore, any values shown on the following plot should be viewed as qualitative. Wellbore storage and vertical radial flow appear to be developed within about 8 hours of shut-in. After vertical radial flow dissipates, the derivative exhibits a $\frac{1}{2}$ slope trend (indicating linear horizontal flow) to about 16 hours of shut-in. The derivative then transitions to an apparent $\frac{1}{3}$ slope until about 78 hours of shut-in, indicating elliptical flow (transitional flow regime between linear horizontal and horizontal radial flow). Thereafter, the derivative changes trend and follows what could be interpreted as a zero slope (indicating horizontal radial flow) to the end of the test.



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CONCLUSIONS

- History matching was undertaken utilizing the **Horizontal Multi-stage Frac Model**. Assuming an effective horizontal wellbore length of 634 m, a reasonable match to the observed pressure data was achieved with a horizontal permeability (k_{xy}) of 0.04 mD. The corresponding effective fracture half-length was calculated to be 25 m. The drainage area could not be determined from the test, and a $\frac{1}{4}$ section drainage area (1600 x 400 meters) is assumed. The following plot displays the match obtained with the typecurve and pressure derivative.

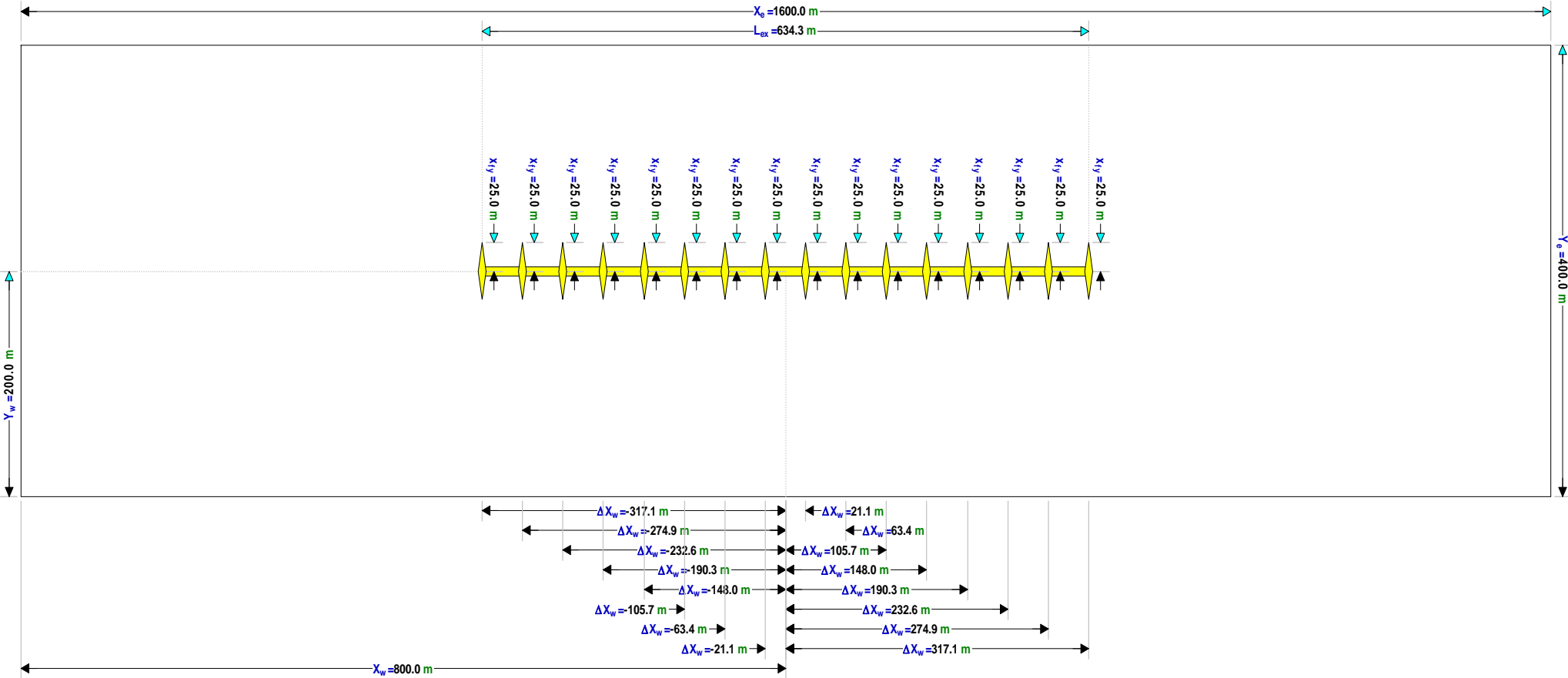


- The final calculated buildup pressure on July 21, 2011 (after 234 hrs of shut-in) was 1904 kPaa. Assuming a $\frac{1}{4}$ section drainage area (1600 x 400 meters), the model calculates a current reservoir pressure of 3765 kPaa.
- Based on the final producing conditions on July 11, 2011 ($q = 2.5 \text{ m}^3/\text{d}$ @ $p_{wf} = 968 \text{ kPaa}$) and a reservoir pressure of 3765 kPaa, an inflow performance relationship curve was generated, and indicates a maximum oil rate (assuming the sandface flowing pressure could be lowered to zero) of $2.8 \text{ m}^3/\text{d}$. Therefore, the well is producing at its current maximum potential.

Models

WASKADA UNIT No. 3
102/13-31-001-25W1/00
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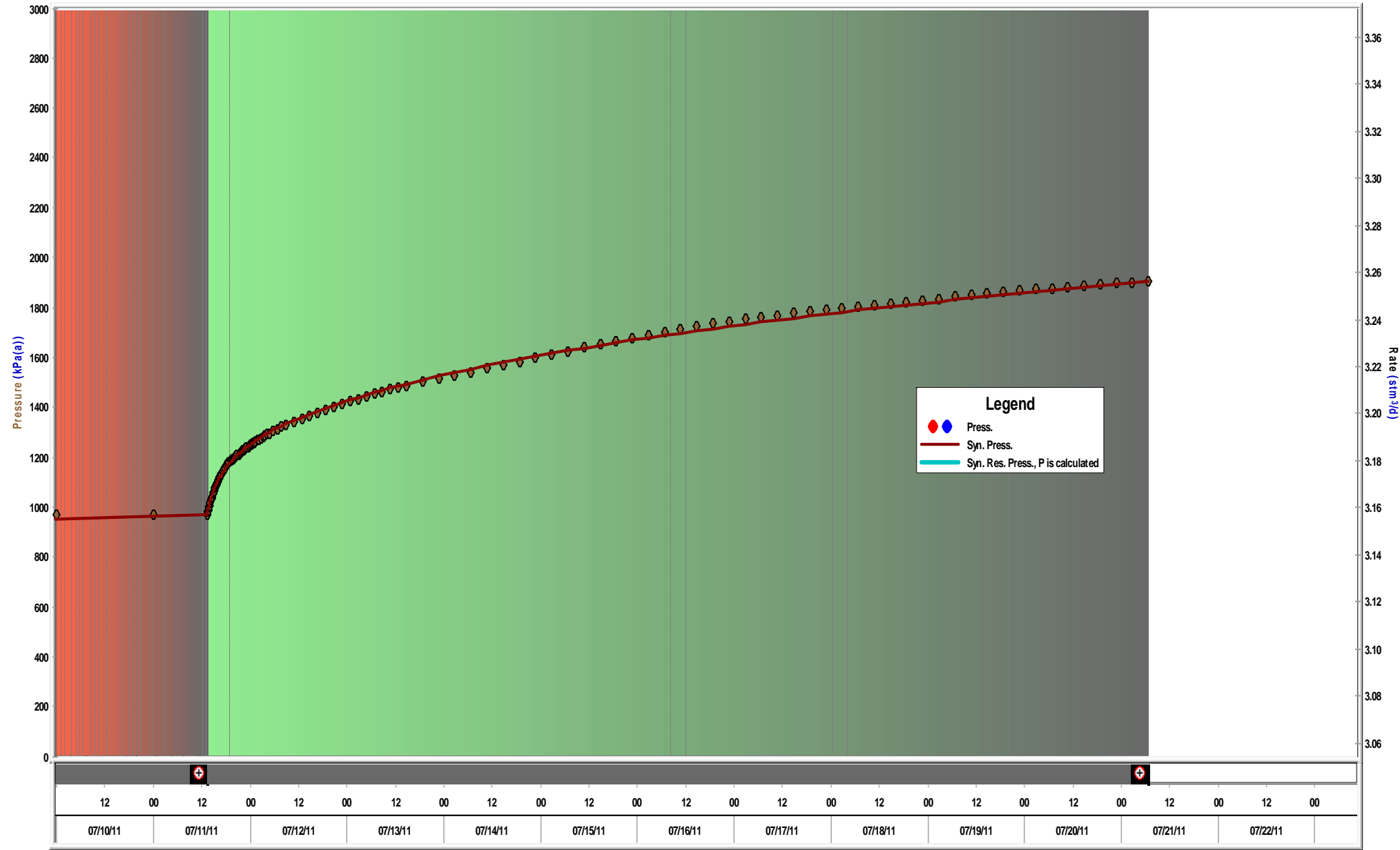
Hz Multifrac Model
Schematic



WASKADA UNIT No. 3
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Hz Multifrac Model

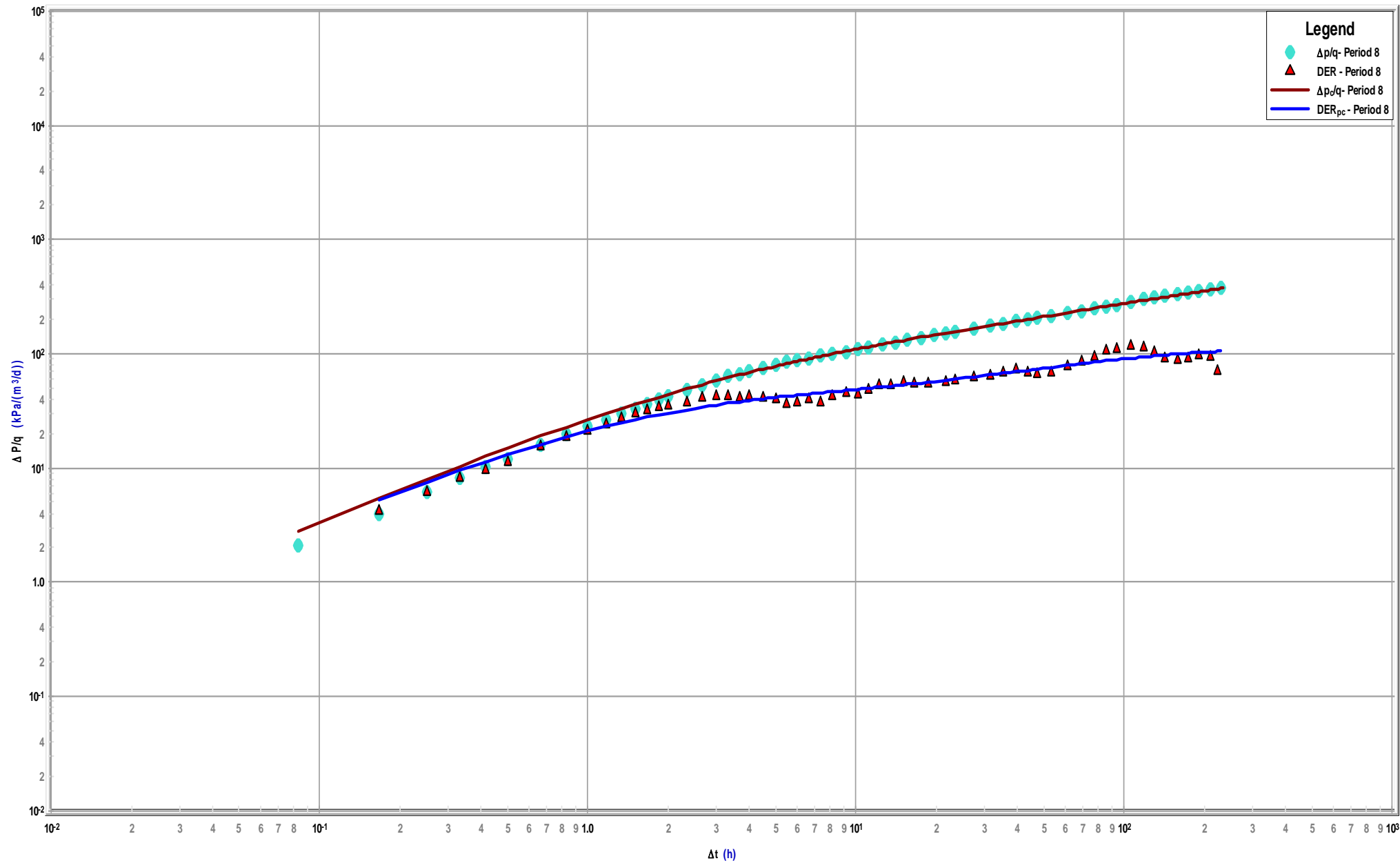
Welltest History



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Hz Multifrac Model

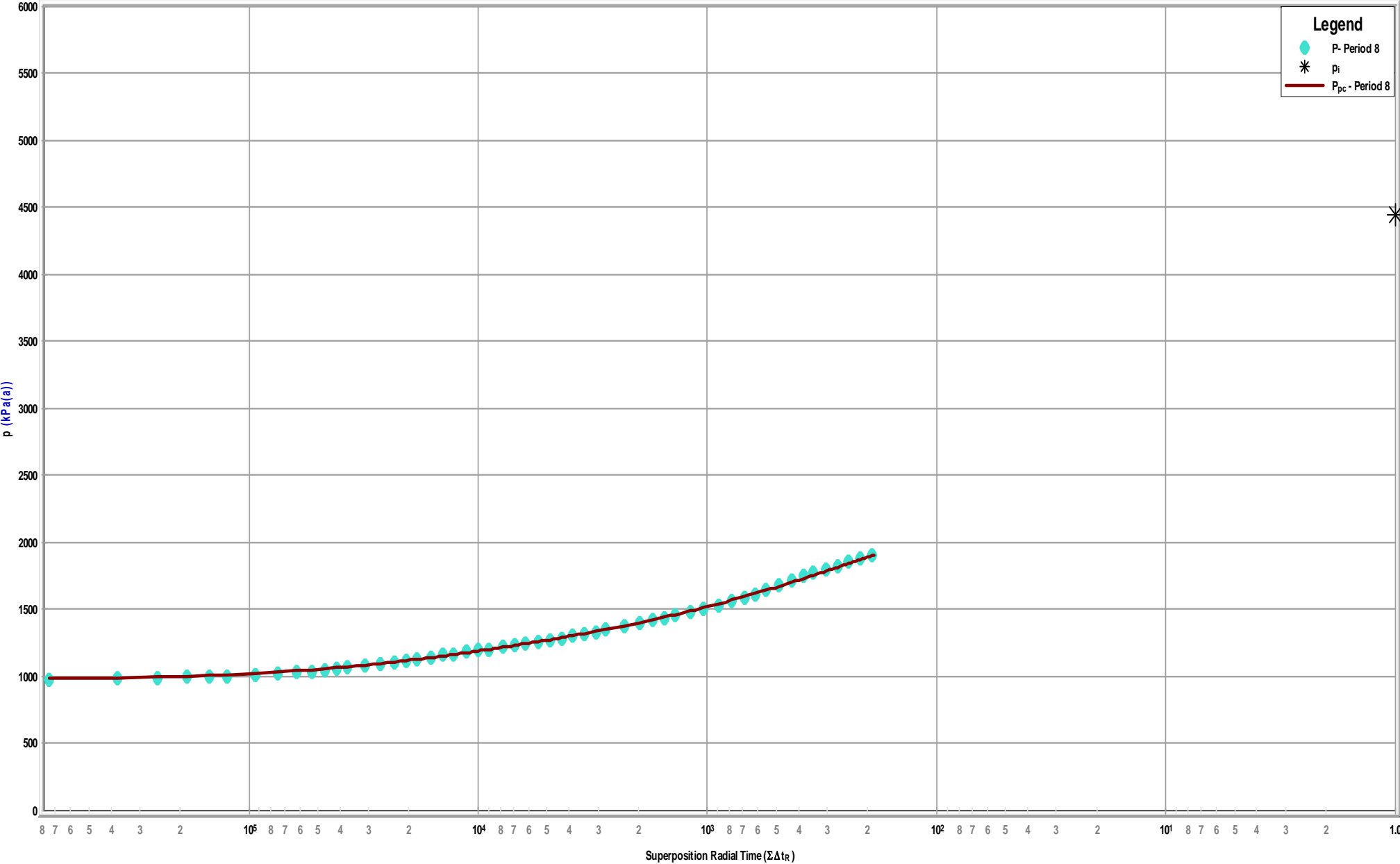
Derivative



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Hz Multifrac Model

Radial Build-Up



Oil Model - Horizontal Multifrac Model

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Model Results

Permeability x-direction (k_x)	0.0089 mD	Reservoir Length (X_e)	1600.0 m
Permeability y-direction (k_y)	0.1470 mD	Reservoir Width (Y_e)	400.0 m
Horizontal to Vertical Permeability Ratio (k_h / k_v)	1.000	Well Location in X-direction (X_w)	800.0 m
Number of Fractures (#Fracs)	16	Well Location in Y-direction (Y_w)	200.0 m
Fracture Half Length (x_{fy})	25.0 m	Effective Wellbore Length (L_e)	634.300 m
Dimensionless Fracture Conductivity (F_{CD})	24.000		

Reservoir Parameters

Reservoir Temperature (T_R)	45.0 °C	Net Pay (h)	18.9 m
Dimensionless Storage 1 (C_{D1})	7800.0	Total Porosity (ϕ_t)	13.00 %
Dimensionless Storage 2 (C_{D2})	7500.0	Wellbore Radius (r_w)	0.091 m
Dimensionless Storage Parameter (C_{pD})	0.050	Drainage Area (A_D)	64.0 ha
		Gas Saturation (S_g)	0.00 %
		Oil Saturation (S_o)	50.00 %
		Water Saturation (S_w)	50.00 %
		Formation Compressibility (c_f)	6.3246e-07 1/kPa
		Total Compressibility (c_t)	1.4104e-06 1/kPa
		Gas Compressibility (c_g)	2.4545e-04 1/kPa
		Water Compressibility (c_w)	4.5083e-07 1/kPa
		Oil Compressibility (c_o)	1.1051e-06 1/kPa

Fluid Properties

Reservoir Temperature (T_{resv})	45.0 °C
Reservoir Pressure (p_{resv})	4600 kPa(a)
Oil Gravity (γ_o)	37.2 °API
Bubble Point Pressure (p_{bp})	4326 kPa(a)
Oil Formation Volume Factor (B_o)	1.122
Oil Viscosity (μ_o)	1.5352 mPa.s
Oil Compressibility (c_o)	1.0674e-06 1/kPa
Solution Gas Ratio (R_s)	43.30 m ³ /m ³
Oil Correlation	Vasquez and Beggs
Oil Viscosity Correlation	Beggs & Robinson
Total Cumulative Production Oil (Cum _{oil})	1.345 10 ³ m ³
Total Cumulative Production Water (Cum _{water})	3.995 10 ³ m ³

I.P.R.

Liquid IPR

Inflow Performance Relationship

WASKADA UNIT No. 3
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Test Data

Bubble Point Pressure (p_{bp}) 4326 kPa(a)
Reservoir Pressure (p_R) 3765 kPa(a)
Test Pressure (p_{wf}) 968 kPa(a)
Oil Test Rate (q_o) 2.5 m³/d
Water Test Rate (q_w) 16.6 m³/d

Results

Maximum Oil Rate ($q_{o(max)}$) 2.8 m³/d
Maximum Total Rate ($q_{t(max)}$) 25.1 m³/d
Maximum Water Rate ($q_{w(max)}$) 22.3 m³/d

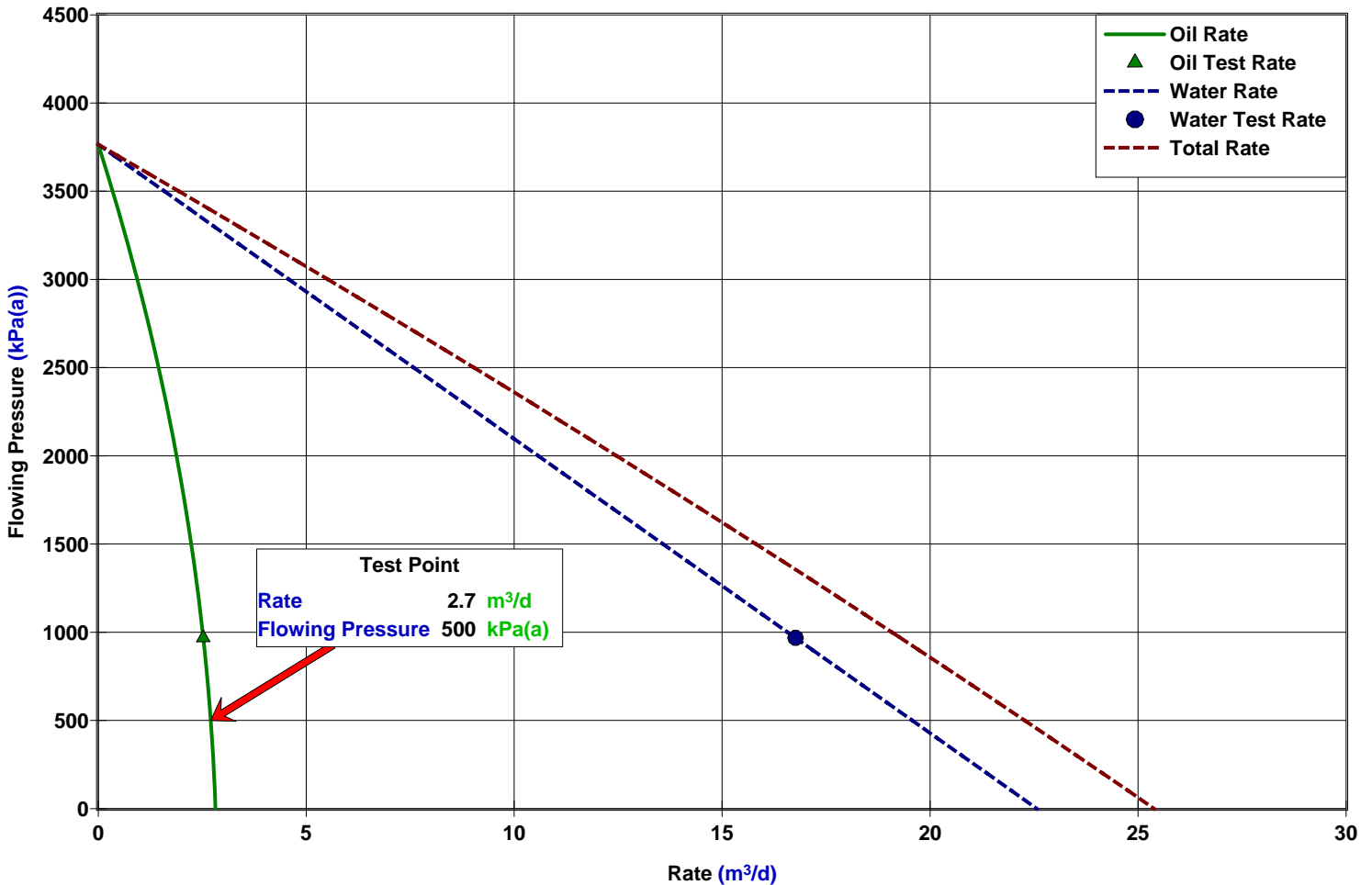
Note * Test Point

** Bubble Point

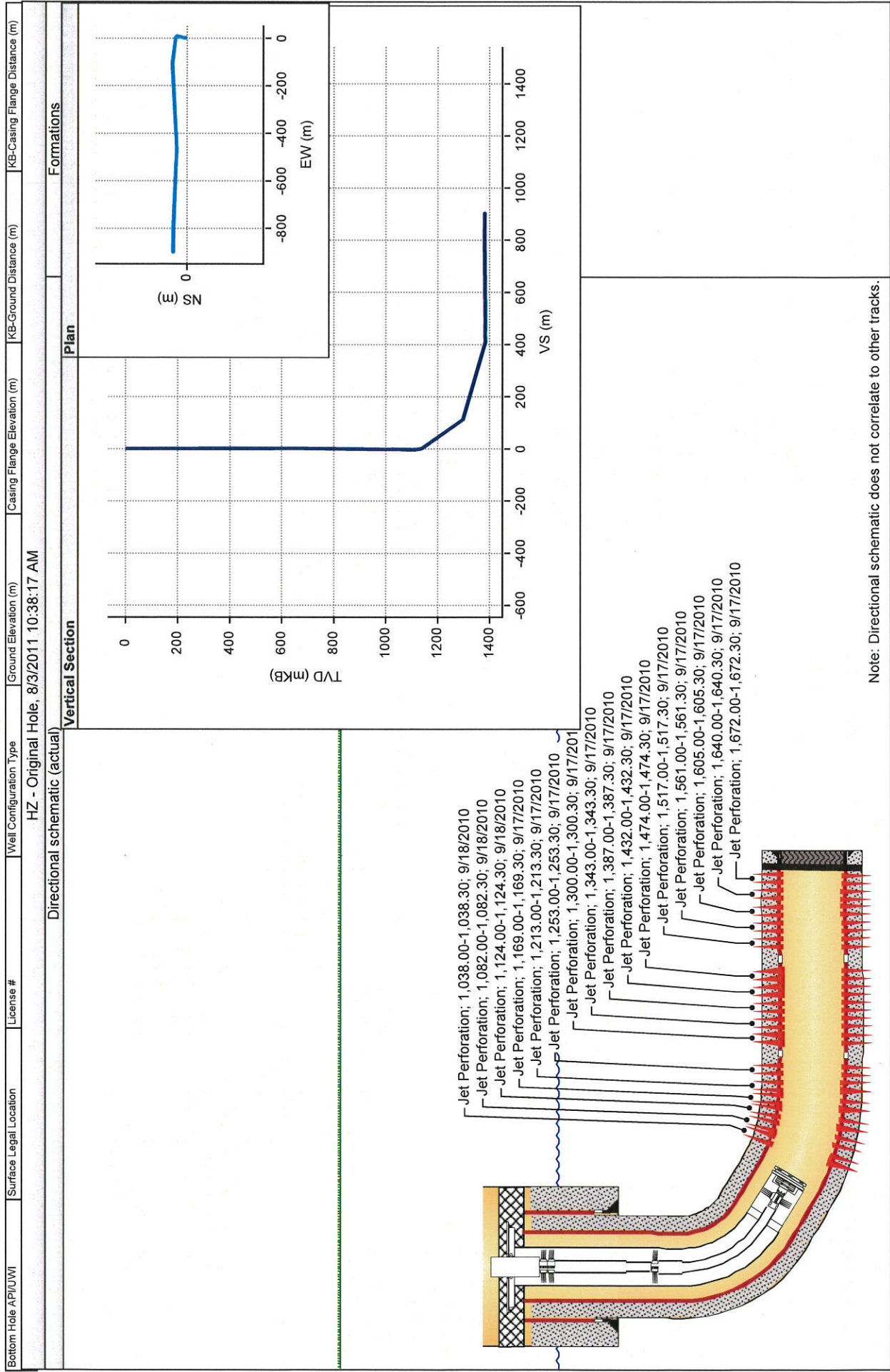
Oil IPR based on Vogel's Equation
(Quadratic Curve Factor = 0.2)

Flowing Pressure	Oil Rate	Water Rate	Total Rate
kPa(a)	m ³ /d	m ³ /d	m ³ /d
0	2.8	22.3	25.1
300	2.7	20.6	23.3
600	2.6	18.8	21.4
900	2.5	17.0	19.5
968*	2.5	16.6	19.1
1200	2.4	15.2	17.6
1500	2.2	13.4	15.7
1800	2.0	11.7	13.7
2100	1.8	9.9	11.7
2400	1.5	8.1	9.6
2700	1.2	6.3	7.6
3000	0.9	4.5	5.5
3300	0.6	2.8	3.3
3600	0.2	1.0	1.2
3765	0.0	0.0	0.0

IPR

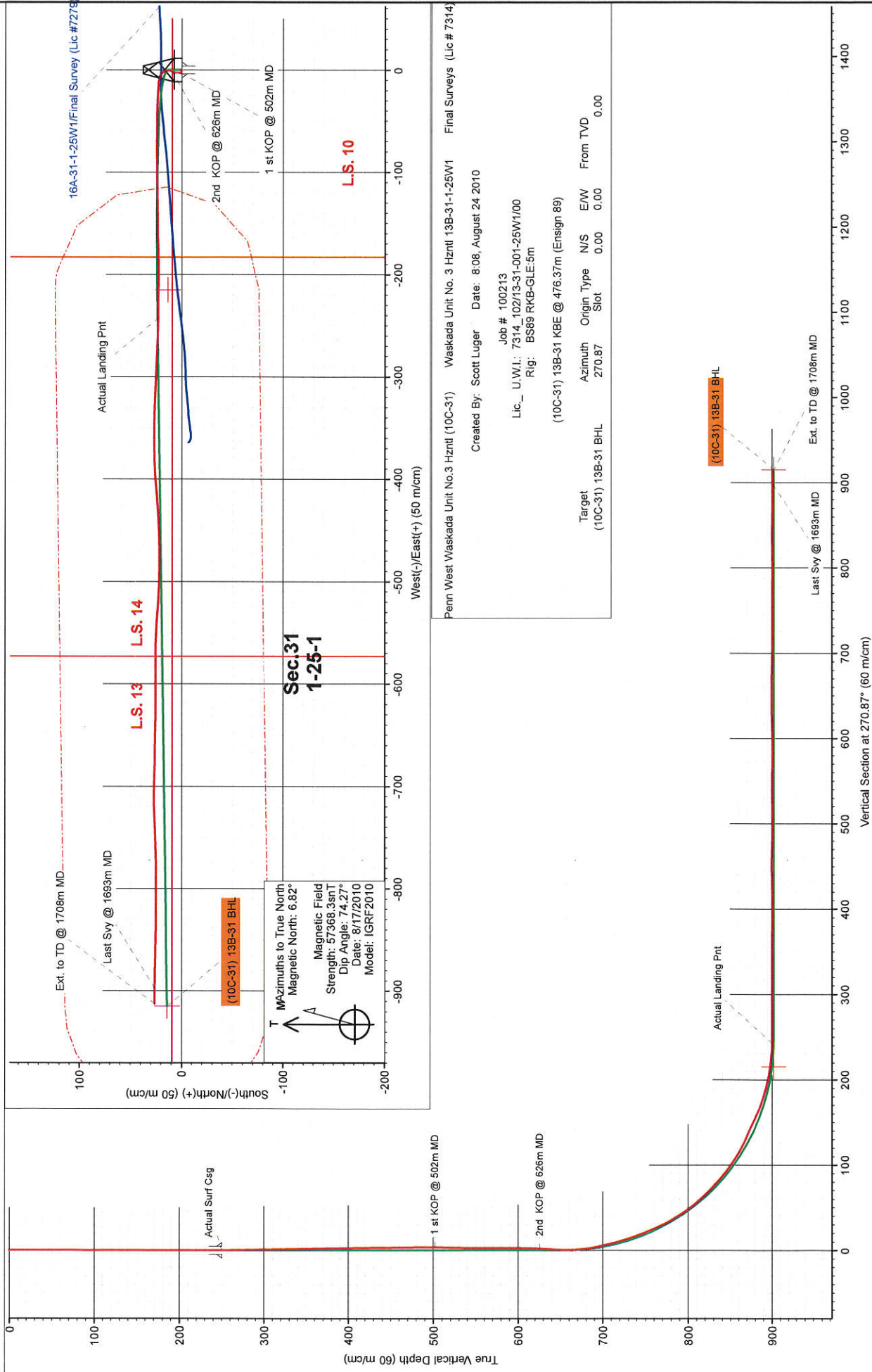


Wellbore





Project: Waskada
Site: Penn West Waskada Unit No.3 Hzntrl (10C-31)
Well: Waskada Unit No. 3 Hzntrl 13B-31-1-25W1
Wellbore: HZ
UWI : 102/13-31-001-25W1/00
Final Surveys (Lic # 7314)



Cathedral Energy Services

Survey Report

Company:	Penn West Petroleum Ltd.	Local Co-ordinate Reference:	Well Waskada Unit No. 3 Hzntrl 13B-31-1-25W1
Project:	Waskada	TVD Reference:	(10C-31) 13B-31 KBE @ 476.37m (Ensign 89)
Site:	Penn West Waskada Unit No.3 Hzntrl (10C-31)	MD Reference:	(10C-31) 13B-31 KBE @ 476.37m (Ensign 89)
Well:	Waskada Unit No. 3 Hzntrl 13B-31-1-25W1	North Reference:	True
Wellbore:	Hz	Survey Calculation Method:	Minimum Curvature
Design:	Final Surveys (Lic # 7314)	Database:	EDM R5000 CATHEDRAL Multi Users

Project	Waskada		
Map System:	Universal Transverse Mercator	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Zone 14N (102 W to 96 W)		

Site	Penn West Waskada Unit No.3 Hzntrl (10C-31)		
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Site Position:		Northing:	5,438,411.44 m	Latitude:	49° 5' 3.64 N
From:	Map	Easting:	367,767.44 m	Longitude:	100° 48' 39.52 W
Position Uncertainty:	0.00 m	Slot Radius:	0.00 mm	Grid Convergence:	-1.37 °

Well	Waskada Unit No. 3 Hzntrl 13B-31-1-25W1				
Well Position	+N/-S	0.00 m	Northing:	5,438,411.44 m	Latitude: 49° 5' 3.64 N
	+E/-W	0.00 m	Easting:	367,767.44 m	Longitude: 100° 48' 39.52 W
Position Uncertainty		0.00 m	Wellhead Elevation:	476.37 m	Ground Level: 471.37 m

Wellbore	Hz				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/17/2010	6.82	74.27	57,368

Design	Final Surveys (Lic # 7314)				
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Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(m)	(m)	(m)	(°)	
	0.00	0.00	0.00	270.87	

Survey Program	Date 8/24/2010				
From (m)	To (m)	Survey (Wellbore)	Tool Name	Description	
250.00	1,708.00	Final Surveys (Hz)	MWD		

Measured Depth (m)	Inc. (°)	Az. (°)	Vertical Depth (m)	Sub Sea Depth (m)	+N/-S (m)	+E/-W (m)	Vertical Section (m)	Closure Distance (m)	Closure Azimuth (°)	Dogleg Rate (°/30m)	Formations / Comments
0.00	0.00	0.00	0.00	476.37	0.00	0.00	0.00	0.00	0.00	0.00	
250.00	0.00	0.00	250.00	226.37	0.00	0.00	0.00	0.00	0.00	0.00	Actual Surf Csg
270.00	1.10	256.00	270.00	206.37	-0.05	-0.19	0.19	0.19	256.00	1.65	
413.20	1.00	305.40	413.18	63.19	0.34	-2.54	2.54	2.56	277.74	0.18	
489.60	0.20	276.80	489.57	-13.20	0.75	-3.21	3.23	3.30	283.08	0.33	
499.10	0.20	308.60	499.07	-22.70	0.76	-3.24	3.26	3.33	283.17	0.35	
502.00	0.29	30.01	501.97	-25.60	0.77	-3.24	3.26	3.33	283.33	3.38	1 st KOP @ 502m MD
508.70	1.00	57.20	508.67	-32.30	0.82	-3.19	3.20	3.29	284.35	3.38	
518.20	2.70	31.00	518.17	-41.80	1.05	-3.00	3.02	3.18	289.31	5.86	
527.70	4.70	18.10	527.65	-51.28	1.61	-2.77	2.79	3.20	300.26	6.80	

Cathedral Energy Services

Survey Report

Company:	Penn West Petroleum Ltd.	Local Co-ordinate Reference:	Well Waskada Unit No. 3 Hzntrl 13B-31-1-25W1
Project:	Waskada	TVD Reference:	(10C-31) 13B-31 KBE @ 476.37m (Ensign 89)
Site:	Penn West Waskada Unit No.3 Hzntrl (10C-31)	MD Reference:	(10C-31) 13B-31 KBE @ 476.37m (Ensign 89)
Well:	Waskada Unit No. 3 Hzntrl 13B-31-1-25W1	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Final Surveys (Lic # 7314)	Database:	EDM R5000 CATHEDRAL Multi Users

Survey

Measured Depth (m)	Inc. (°)	Az. (°)	Vertical Depth (m)	Sub Sea Depth (m)	+N/-S (m)	+E/-W (m)	Vertical Section (m)	Closure Distance (m)	Closure Azimuth (°)	Dogleg Rate (°/30m)	Formations / Comments
537.30	4.70	16.00	537.21	-60.84	2.37	-2.53	2.57	3.47	313.02	0.54	
546.80	5.20	2.70	546.68	-70.31	3.17	-2.41	2.45	3.98	322.78	3.94	
556.40	5.10	357.00	556.24	-79.87	4.03	-2.41	2.47	4.70	329.13	1.63	
566.00	4.60	359.00	565.81	-89.44	4.84	-2.44	2.51	5.42	333.27	1.65	
575.50	4.10	359.00	575.28	-98.91	5.56	-2.45	2.53	6.08	336.22	1.58	
585.00	3.80	3.90	584.76	-108.39	6.22	-2.44	2.53	6.68	338.60	1.43	
594.60	4.00	9.30	594.33	-117.96	6.86	-2.36	2.46	7.26	341.03	1.31	
604.10	4.00	8.60	603.81	-127.44	7.52	-2.26	2.37	7.85	343.29	0.15	
613.70	4.80	22.60	613.38	-137.01	8.22	-2.05	2.18	8.47	345.98	4.17	
623.20	5.10	29.90	622.85	-146.48	8.95	-1.69	1.82	9.11	349.32	2.20	
626.00	5.22	29.93	625.64	-149.27	9.17	-1.56	1.70	9.30	350.33	1.29	2nd KOP @ 626m MD
632.80	5.50	30.00	632.41	-156.04	9.72	-1.25	1.39	9.80	352.70	1.24	
642.30	7.10	24.90	641.85	-165.48	10.65	-0.77	0.93	10.68	355.86	5.35	
651.90	9.40	10.60	651.35	-174.98	11.96	-0.38	0.56	11.96	358.19	9.58	
661.40	10.50	358.70	660.71	-184.34	13.59	-0.25	0.46	13.59	358.93	7.35	
671.00	11.40	341.90	670.14	-193.77	15.36	-0.57	0.80	15.37	357.88	10.32	
680.50	12.30	326.80	679.44	-203.07	17.10	-1.41	1.67	17.16	355.27	10.16	
690.10	13.40	313.60	688.80	-212.43	18.73	-2.78	3.06	18.93	351.55	9.77	
699.60	14.40	302.70	698.02	-221.65	20.12	-4.57	4.88	20.64	347.20	8.84	
709.20	15.30	291.80	707.30	-230.93	21.24	-6.75	7.07	22.29	342.36	9.16	
718.70	16.10	281.30	716.45	-240.08	21.96	-9.21	9.54	23.81	337.25	9.31	
728.30	18.00	277.40	725.63	-249.26	22.41	-11.99	12.32	25.42	331.86	6.93	
737.80	19.80	275.10	734.61	-258.24	22.75	-15.04	15.39	27.27	326.52	6.15	
747.40	20.90	273.30	743.61	-267.24	22.99	-18.37	18.72	29.43	321.37	3.95	
756.90	21.80	271.70	752.46	-276.09	23.14	-21.83	22.18	31.81	316.67	3.39	
766.50	24.00	272.40	761.31	-284.94	23.27	-25.56	25.91	34.57	312.32	6.93	
776.00	26.30	272.30	769.90	-293.53	23.44	-29.59	29.95	37.75	308.38	7.26	
785.60	28.70	272.40	778.42	-302.05	23.62	-34.02	34.38	41.42	304.77	7.50	
795.10	31.40	271.00	786.64	-310.27	23.76	-38.78	39.13	45.48	301.50	8.81	
804.60	34.10	270.80	794.63	-318.26	23.84	-43.92	44.27	49.97	298.50	8.53	
814.20	36.80	270.50	802.45	-326.08	23.90	-49.48	49.84	54.95	295.78	8.45	
823.70	39.80	270.30	809.90	-333.53	23.94	-55.37	55.73	60.33	293.38	9.48	
833.30	42.70	270.10	817.12	-340.75	23.97	-61.70	62.06	66.19	291.23	9.07	
842.80	45.70	270.70	823.93	-347.56	24.01	-68.32	68.68	72.42	289.36	9.57	
852.40	47.50	270.30	830.53	-354.16	24.07	-75.30	75.65	79.05	287.73	5.70	
862.30	49.00	269.20	837.12	-360.75	24.04	-82.68	83.04	86.11	286.21	5.18	
871.60	50.60	269.10	843.12	-366.75	23.93	-89.78	90.14	92.92	284.93	5.17	
880.80	53.20	269.30	848.80	-372.43	23.83	-97.02	97.37	99.91	283.80	8.49	
889.90	55.30	269.70	854.11	-377.74	23.77	-104.41	104.75	107.08	282.83	7.01	
898.80	57.60	269.60	859.03	-382.66	23.72	-111.82	112.17	114.31	281.98	7.76	
908.10	61.30	269.70	863.76	-387.39	23.68	-119.83	120.18	122.15	281.18	11.94	
917.50	65.20	269.30	867.99	-391.62	23.60	-128.22	128.57	130.38	280.43	12.50	

Cathedral Energy Services

Survey Report

Company:	Penn West Petroleum Ltd.	Local Co-ordinate Reference:	Well Waskada Unit No. 3 Hzntrl 13B-31-1-25W1
Project:	Waskada	TVD Reference:	(10C-31) 13B-31 KBE @ 476.37m (Ensign 89)
Site:	Penn West Waskada Unit No.3 Hzntrl (10C-31)	MD Reference:	(10C-31) 13B-31 KBE @ 476.37m (Ensign 89)
Well:	Waskada Unit No. 3 Hzntrl 13B-31-1-25W1	North Reference:	True
Wellbore:	H2	Survey Calculation Method:	Minimum Curvature
Design:	Final Surveys (Lic # 7314)	Database:	EDM R5000 CATHEDRAL Multi Users

Survey											
Measured Depth (m)	Inc. (°)	Az. (°)	Vertical Depth (m)	Sub Sea Depth (m)	+N/-S (m)	+E/-W (m)	Vertical Section (m)	Closure Distance (m)	Closure Azimuth (°)	Dogleg Rate (°/30m)	Formations / Comments
926.40	66.30	269.00	871.64	-395.27	23.48	-136.34	136.68	138.34	279.77	3.82	
935.50	65.90	269.30	875.33	-398.96	23.36	-144.66	144.99	146.53	279.17	1.60	
944.80	65.30	269.60	879.17	-402.80	23.28	-153.12	153.46	154.88	278.64	2.13	
954.20	65.00	268.70	883.12	-406.75	23.15	-161.65	161.98	163.30	278.15	2.78	
963.50	68.20	268.20	886.82	-410.45	22.92	-170.18	170.51	171.72	277.67	10.43	
972.80	71.90	268.20	889.99	-413.62	22.64	-178.92	179.24	180.35	277.21	11.94	
982.10	74.80	268.70	892.65	-416.28	22.40	-187.83	188.14	189.16	276.80	9.48	
991.20	77.70	270.10	894.82	-418.45	22.31	-196.66	196.98	197.92	276.47	10.56	
1,000.60	80.10	270.70	896.63	-420.26	22.38	-205.89	206.20	207.10	276.20	7.89	
1,009.90	81.60	271.40	898.11	-421.74	22.54	-215.07	215.38	216.24	275.98	5.33	
1,018.90	83.60	271.10	899.26	-422.89	22.74	-223.99	224.31	225.14	275.80	6.74	
1,028.30	87.40	269.90	900.00	-423.63	22.82	-233.36	233.68	234.47	275.59	12.71	
1,037.50	89.40	270.90	900.26	-423.89	22.88	-242.55	242.87	243.63	275.39	7.29	Actual Landing Pnt
1,046.40	89.40	271.70	900.35	-423.98	23.09	-251.45	251.77	252.51	275.25	2.70	
1,055.90	90.20	271.50	900.38	-424.01	23.35	-260.95	261.27	261.99	275.11	2.60	
1,065.10	90.40	271.40	900.34	-423.97	23.58	-270.14	270.47	271.17	274.99	0.73	
1,074.20	90.40	272.80	900.27	-423.90	23.92	-279.24	279.57	280.26	274.90	4.62	
1,083.50	89.90	272.40	900.25	-423.88	24.34	-288.53	288.86	289.55	274.82	2.07	
1,092.80	90.10	272.90	900.25	-423.88	24.77	-297.82	298.16	298.85	274.75	1.74	
1,102.20	89.70	272.00	900.27	-423.90	25.17	-307.21	307.55	308.24	274.68	3.14	
1,111.10	89.70	272.50	900.31	-423.94	25.52	-316.10	316.45	317.13	274.62	1.69	
1,120.20	89.60	272.70	900.37	-424.00	25.93	-325.19	325.55	326.22	274.56	0.74	
1,129.50	90.20	271.70	900.38	-424.01	26.29	-334.48	334.84	335.52	274.49	3.76	
1,138.90	90.30	270.80	900.34	-423.97	26.50	-343.88	344.24	344.90	274.41	2.89	
1,148.10	89.10	270.80	900.39	-424.02	26.62	-353.08	353.44	354.08	274.31	3.91	
1,157.30	88.80	270.30	900.56	-424.19	26.71	-362.28	362.64	363.26	274.22	1.90	
1,166.60	90.00	268.70	900.66	-424.29	26.63	-371.58	371.94	372.53	274.10	6.45	
1,176.00	90.30	268.10	900.63	-424.26	26.37	-380.97	381.33	381.89	273.96	2.14	
1,185.30	89.80	267.10	900.62	-424.25	25.98	-390.27	390.61	391.13	273.81	3.61	
1,194.50	89.70	266.60	900.66	-424.29	25.47	-399.45	399.79	400.26	273.65	1.66	
1,203.90	89.70	264.80	900.71	-424.34	24.77	-408.82	409.15	409.57	273.47	5.74	
1,213.30	90.40	265.00	900.71	-424.34	23.93	-418.19	418.50	418.87	273.28	2.32	
1,222.40	92.20	266.40	900.50	-424.13	23.25	-427.26	427.56	427.89	273.11	7.52	
1,231.80	92.50	266.30	900.11	-423.74	22.65	-436.63	436.92	437.22	272.97	1.01	
1,241.10	90.80	268.50	899.85	-423.48	22.23	-445.92	446.20	446.47	272.85	8.97	
1,250.20	89.30	267.70	899.84	-423.47	21.93	-455.01	455.29	455.54	272.76	5.60	
1,259.60	88.90	267.80	899.99	-423.62	21.56	-464.40	464.68	464.90	272.66	1.32	
1,269.00	89.00	269.30	900.16	-423.79	21.32	-473.80	474.07	474.28	272.58	4.80	
1,278.30	89.30	270.80	900.30	-423.93	21.33	-483.10	483.37	483.57	272.53	4.93	
1,287.60	89.20	271.20	900.42	-424.05	21.49	-492.40	492.66	492.86	272.50	1.33	
1,297.00	89.20	271.80	900.55	-424.18	21.74	-501.79	502.06	502.26	272.48	1.91	
1,306.20	90.70	273.50	900.56	-424.19	22.17	-510.98	511.26	511.46	272.48	7.39	

Cathedral Energy Services

Survey Report

Company:	Penn West Petroleum Ltd.	Local Co-ordinate Reference:	Well Waskada Unit No. 3 Hzntrl 13B-31-1-25W1
Project:	Waskada	TVD Reference:	(10C-31) 13B-31 KBE @ 476.37m (Ensign 89)
Site:	Penn West Waskada Unit No.3 Hzntrl (10C-31)	MD Reference:	(10C-31) 13B-31 KBE @ 476.37m (Ensign 89)
Well:	Waskada Unit No. 3 Hzntrl 13B-31-1-25W1	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Final Surveys (Lic # 7314)	Database:	EDM R5000 CATHEDRAL Multi Users

Survey											
Measured Depth (m)	Inc. (°)	Az. (°)	Vertical Depth (m)	Sub Sea Depth (m)	+N/-S (m)	+E/-W (m)	Vertical Section (m)	Closure Distance (m)	Closure Azimuth (°)	Dogleg Rate (°/30m)	Formations / Comments
1,315.50	91.10	273.70	900.41	-424.04	22.75	-520.26	520.55	520.76	272.50	1.44	
1,324.80	91.00	274.40	900.24	-423.87	23.41	-529.54	529.83	530.05	272.53	2.28	
1,334.10	90.30	273.70	900.13	-423.76	24.06	-538.81	539.12	539.35	272.56	3.19	
1,343.50	89.00	272.90	900.19	-423.82	24.60	-548.20	548.51	548.75	272.57	4.87	
1,352.90	88.30	271.70	900.41	-424.04	24.98	-557.59	557.90	558.15	272.57	4.43	
1,361.80	87.60	269.90	900.73	-424.36	25.11	-566.48	566.79	567.03	272.54	6.51	
1,371.10	89.20	270.30	900.99	-424.62	25.12	-575.78	576.09	576.32	272.50	5.32	
1,380.40	90.60	270.30	901.01	-424.64	25.17	-585.07	585.39	585.62	272.46	4.52	
1,389.60	92.40	270.80	900.77	-424.40	25.26	-594.27	594.59	594.81	272.43	6.09	
1,398.90	92.20	269.40	900.39	-424.02	25.27	-603.56	603.88	604.09	272.40	4.56	
1,408.20	91.50	269.60	900.09	-423.72	25.19	-612.86	613.17	613.38	272.35	2.35	
1,417.60	90.50	269.70	899.93	-423.56	25.14	-622.26	622.57	622.76	272.31	3.21	
1,426.90	90.20	270.50	899.87	-423.50	25.15	-631.56	631.86	632.06	272.28	2.76	
1,436.30	90.40	271.40	899.82	-423.45	25.31	-640.95	641.26	641.45	272.26	2.94	
1,445.40	90.30	272.20	899.77	-423.40	25.59	-650.05	650.36	650.55	272.25	2.66	
1,454.80	89.60	270.30	899.78	-423.41	25.80	-659.45	659.76	659.95	272.24	6.46	
1,465.00	89.20	270.50	899.88	-423.51	25.87	-669.65	669.96	670.15	272.21	1.32	
1,474.50	89.30	271.30	900.01	-423.64	26.02	-679.14	679.46	679.64	272.19	2.55	
1,484.00	89.30	271.80	900.12	-423.75	26.28	-688.64	688.96	689.14	272.19	1.58	
1,493.60	88.60	271.30	900.30	-423.93	26.54	-698.23	698.56	698.74	272.18	2.69	
1,503.10	89.50	270.80	900.46	-424.09	26.71	-707.73	708.05	708.24	272.16	3.25	
1,512.70	89.40	269.30	900.55	-424.18	26.72	-717.33	717.65	717.83	272.13	4.70	
1,522.20	89.70	267.10	900.62	-424.25	26.42	-726.82	727.14	727.31	272.08	7.01	
1,531.80	89.60	267.60	900.68	-424.31	25.98	-736.41	736.72	736.87	272.02	1.59	
1,541.30	90.00	267.40	900.72	-424.35	25.56	-745.91	746.21	746.34	271.96	1.41	
1,550.80	90.20	267.90	900.70	-424.33	25.17	-755.40	755.69	755.82	271.91	1.70	
1,560.40	90.00	269.30	900.68	-424.31	24.94	-764.99	765.28	765.40	271.87	4.42	
1,569.90	89.40	268.60	900.73	-424.36	24.76	-774.49	774.78	774.89	271.83	2.91	
1,579.50	89.30	269.90	900.84	-424.47	24.64	-784.09	784.37	784.48	271.80	4.07	
1,589.00	90.60	269.60	900.85	-424.48	24.60	-793.59	793.87	793.97	271.78	4.21	
1,598.60	90.90	270.10	900.72	-424.35	24.57	-803.19	803.47	803.57	271.75	1.82	
1,608.10	90.70	270.80	900.59	-424.22	24.65	-812.69	812.97	813.06	271.74	2.30	
1,617.60	90.20	270.60	900.52	-424.15	24.76	-822.19	822.47	822.56	271.73	1.70	
1,627.20	89.90	270.00	900.51	-424.14	24.81	-831.79	832.07	832.16	271.71	2.10	
1,636.70	89.80	270.90	900.53	-424.16	24.89	-841.29	841.57	841.65	271.69	2.86	
1,646.30	89.30	270.40	900.61	-424.24	25.00	-850.89	851.17	851.25	271.68	2.21	
1,655.80	89.10	271.20	900.74	-424.37	25.13	-860.38	860.67	860.75	271.67	2.60	
1,665.30	89.20	272.10	900.88	-424.51	25.40	-869.88	870.16	870.25	271.67	2.86	
1,674.90	89.80	270.80	900.97	-424.60	25.64	-879.47	879.76	879.85	271.67	4.47	
1,684.40	90.00	270.40	900.98	-424.61	25.74	-888.97	889.26	889.35	271.66	1.41	
1,693.00	89.80	270.50	901.00	-424.63	25.81	-897.57	897.86	897.95	271.65	0.78	Last Svy @ 1693m MD

Cathedral Energy Services

Survey Report

Company:	Penn West Petroleum Ltd.	Local Co-ordinate Reference:	Well Waskada Unit No. 3 Hzntl 13B-31-1-25W1
Project:	Waskada	TVD Reference:	(10C-31) 13B-31 KBE @ 476.37m (Ensign 89)
Site:	Penn West Waskada Unit No.3 Hzntl (10C-31)	MD Reference:	(10C-31) 13B-31 KBE @ 476.37m (Ensign 89)
Well:	Waskada Unit No. 3 Hzntl 13B-31-1-25W1	North Reference:	True
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	Final Surveys (Lic # 7314)	Database:	EDM R5000 CATHEDRAL Multi Users

Survey											
Measured Depth (m)	Inc. (°)	Az. (°)	Vertical Depth (m)	Sub Sea Depth (m)	+N/-S (m)	+E/-W (m)	Vertical Section (m)	Closure Distance (m)	Closure Azimuth (°)	Dogleg Rate (°/30m)	Formations / Comments
1,708.00	89.80	270.50	901.05	-424.68	25.94	-912.57	912.86	912.94	271.63	0.00	Ext. to TD @ 1708m MD

Targets										
Target Name	- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (m)	+N/-S (m)	+E/-W (m)	Northing (m)	Easting (m)	Latitude	Longitude
(10C-31) 13B-31 BHL	-	0.00	0.00	902.37	13.86	-914.99	5,438,447.15	366,853.04	49° 5' 4.09 N	100° 49' 24.62 W
- actual wellpath misses target center by 12.39m at 1708.00m MD (901.05 TVD, 25.94 N, -912.57 E)										
- Point										
(10C-31) 13B-31 Lanc	-	0.00	0.00	902.37	13.20	-214.99	5,438,429.77	367,552.83	49° 5' 4.07 N	100° 48' 50.12 W
- actual wellpath misses target center by 10.27m at 1010.17m MD (898.14 TVD, 22.55 N, -215.33 E)										
- Point										

Casing Points					
Measured Depth (m)	Vertical Depth (m)	Name	Casing Diameter (mm)	Hole Diameter (mm)	
250.00	250.00	Actual Surf Csg			

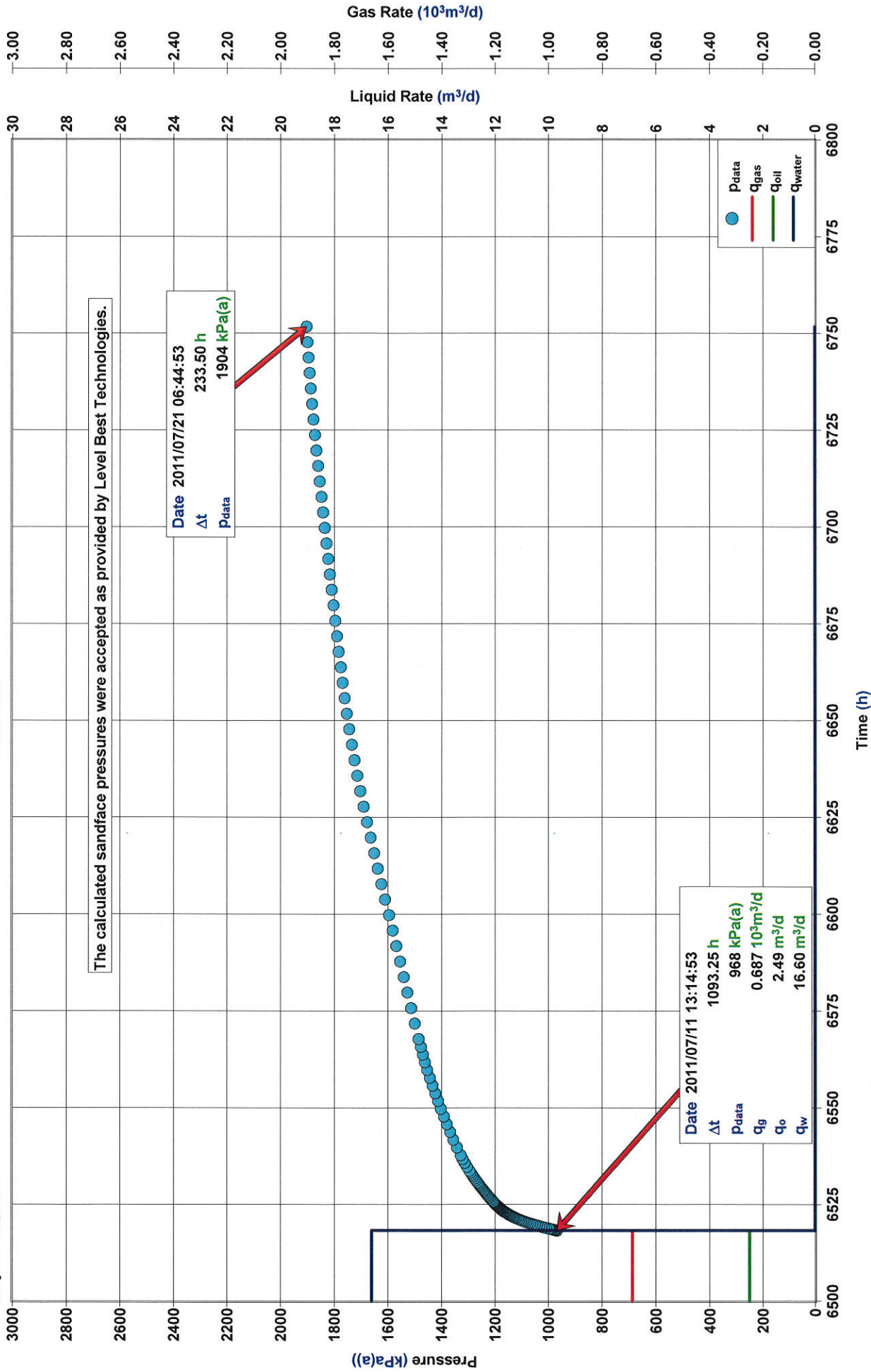
Design Annotations					
Measured Depth (m)	Vertical Depth (m)	Local Coordinates		Comment	
		+N/-S (m)	+E/-W (m)		
502.00	501.97	0.77	-3.24	1 st KOP @ 502m MD	
626.00	625.64	9.17	-1.56	2nd KOP @ 626m MD	
1,037.50	900.26	22.88	-242.55	Actual Landing Pnt	
1,693.00	901.00	25.81	-897.57	Last Svy @ 1693m MD	
1,708.00	901.05	25.94	-912.57	Ext. to TD @ 1708m MD	

Checked By: _____ Approved By: _____ Date: _____

Diagnostics

WASKADA UNIT No. 3
102/13-31-001-25W1/00
Lower Amaranth: 1038.0 - 1672.3 mKB
July 11 - 21, 2011

Diagnostic Total Test



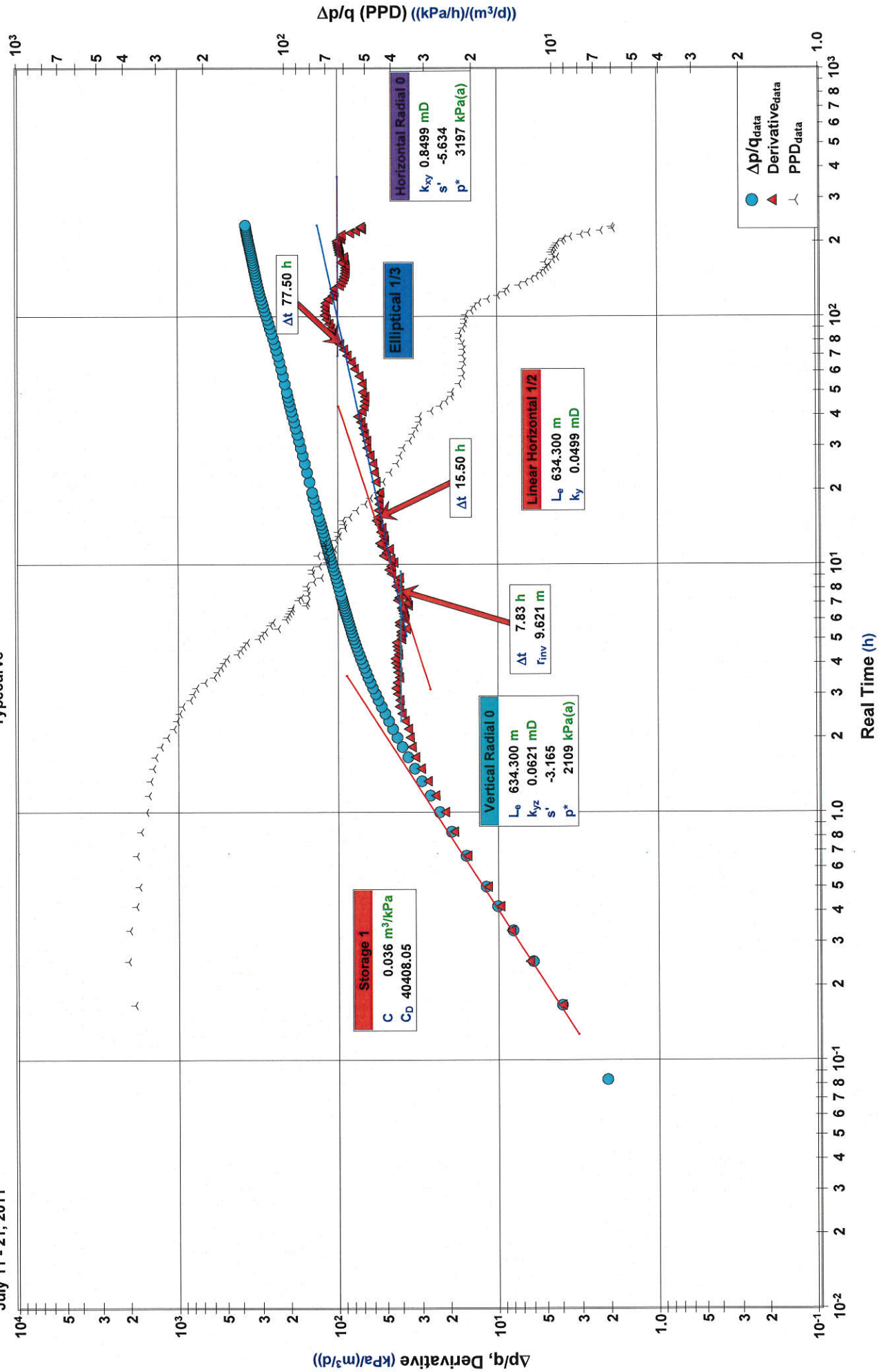
WASKADA UNIT No. 3

102/13-31-001-25W1/00

Lower Amaranth: 1038.0 - 1672.3 mKB

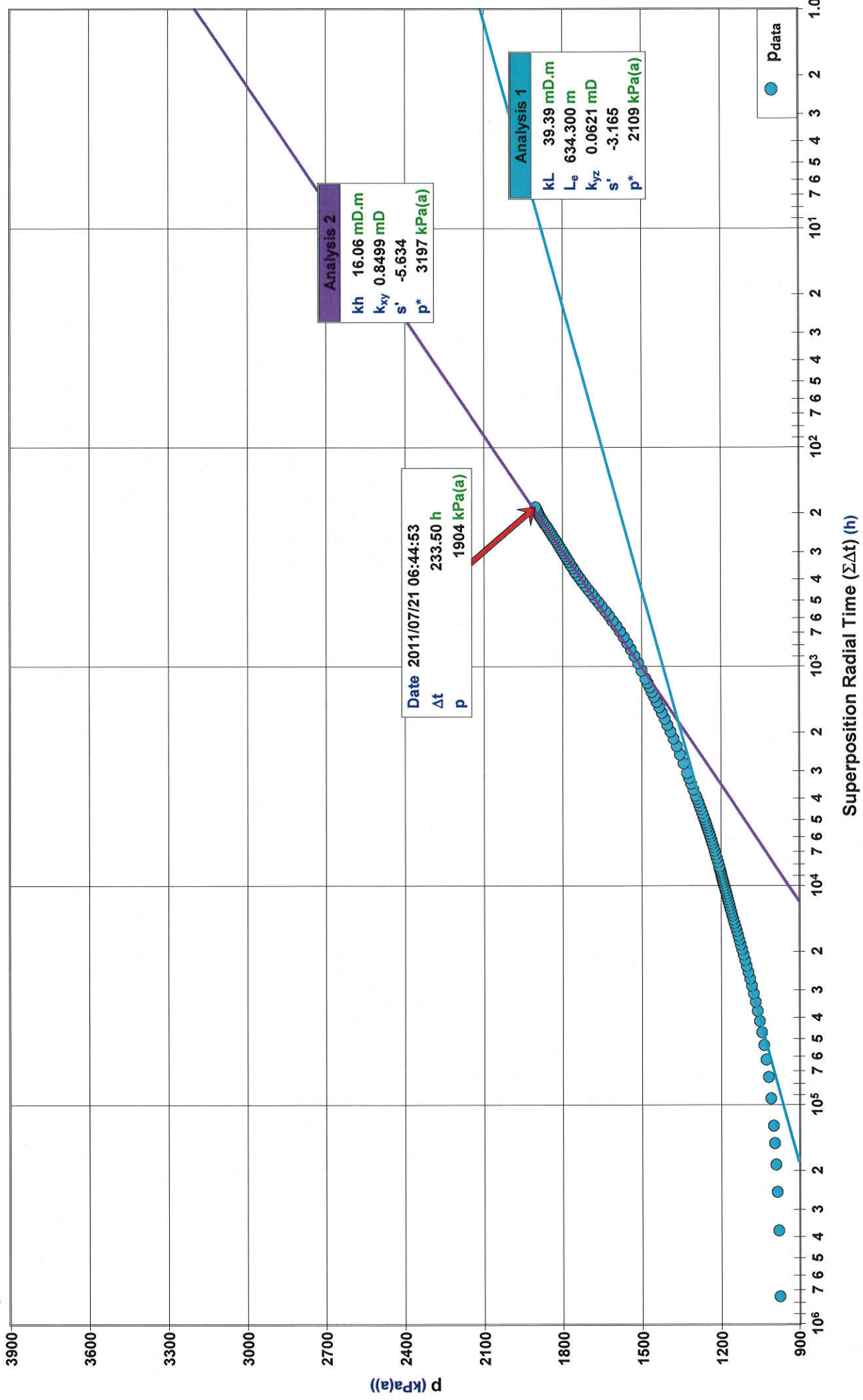
July 11 - 21, 2011

Diagnostic Typecurve



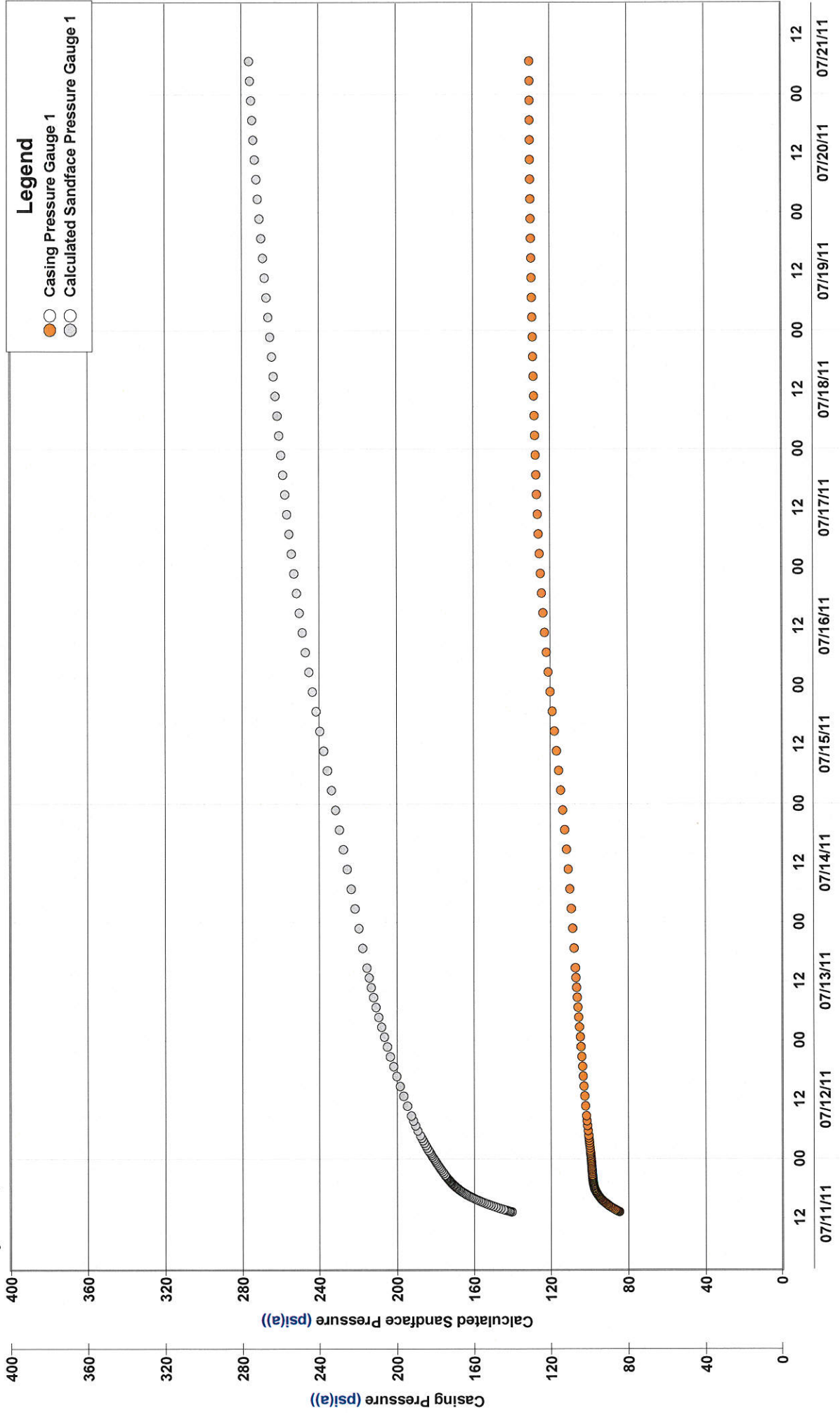
WASKADA UNIT No. 3
 102/13-31-001-25W1/00
 Lower Amaranth: 1038.0 - 1672.3 mKB
 July 11 - 21, 2011

Diagnostic Radial



WASKADA UNIT No. 3
 102/13-31-001-25W1/00
 Lower Amaranth: 1038.0 - 1672.3 mKB
 July 11 - 21, 2011

Gauge 1



WASKADA UNIT No. 3
102/13-31-001-25W1/00
Lower Amaranth: 1038.0 - 1672.3 mKB
July 11 - 21, 2011

Pressure/Production Summary

Item	Date Clock Time	Time	Cumulative Time	Tubing Pressure	Casing Pressure	Calculated Sandface Pressure	Gas Rate	Oil Rate	Water Rate
	YYYY/MM/DD HH:mm:ss h		h	psi(a)	psi(a)	psi(a)	MMscfd	bbl/d	bbl/d
1	0/10/12 23:00	0.0000	0.0000				0.000	0.0	0.0
2	0/10/13 00:00	1.0000	1.0000					5.3	261.4
3	0/10/14 00:00	25.0000	25.0000					7.5	232.6
4	0/10/15 00:00	49.0000	49.0000				0.000	55.3	130.6
5	0/10/16 00:00	73.0000	73.0000				0.010	61.0	157.4
6	0/10/17 00:00	97.0000	97.0000				0.010	0.0	0.0
7	0/10/18 00:00	121.0000	121.0000				0.000		
8	0/10/25 00:00	289.0000	289.0000					0.0	0.0
9	0/10/26 00:00	313.0000	313.0000				0.000	39.1	105.6
10	0/10/27 00:00	337.0000	337.0000				0.010	57.8	188.6
11	0/10/28 00:00	361.0000	361.0000					57.3	183.9
12	0/10/29 00:00	385.0000	385.0000					57.7	164.8
13	0/10/30 00:00	409.0000	409.0000					57.9	154.4
14	0/10/31 00:00	433.0000	433.0000					55.9	173.5
15	0/11/01 00:00	457.0000	457.0000					52.3	191.6
16	0/11/02 00:00	481.0000	481.0000					56.5	165.2
17	0/11/03 00:00	505.0000	505.0000					55.8	116.8
18	0/11/04 00:00	529.0000	529.0000					53.4	110.0
19	0/11/05 00:00	553.0000	553.0000					55.2	114.6
20	0/11/06 00:00	577.0000	577.0000				0.010	55.4	116.5
21	0/11/07 00:00	601.0000	601.0000				0.000	55.4	111.2
22	0/11/08 00:00	625.0000	625.0000				0.020	51.5	128.7
23	0/11/09 00:00	649.0000	649.0000				0.010	53.3	112.7
24	0/11/10 00:00	673.0000	673.0000					53.7	76.6
25	0/11/11 00:00	697.0000	697.0000					53.9	107.3
26	0/11/12 00:00	721.0000	721.0000					53.0	126.8
27	0/11/13 00:00	745.0000	745.0000					55.3	108.2
28	0/11/14 00:00	769.0000	769.0000					53.5	95.7
29	0/11/15 00:00	793.0000	793.0000					56.4	112.6
30	0/11/16 00:00	817.0000	817.0000					57.3	108.8
31	0/11/17 00:00	841.0000	841.0000					54.6	60.1
32	0/11/18 00:00	865.0000	865.0000					54.0	93.8
33	0/11/19 00:00	889.0000	889.0000					58.3	103.7
34	0/11/20 00:00	913.0000	913.0000					55.6	93.6
35	0/11/21 00:00	937.0000	937.0000					53.9	77.2
36	0/11/22 00:00	961.0000	961.0000					55.9	85.3
37	0/11/23 00:00	985.0000	985.0000					55.5	108.8
38	0/11/24 00:00	1009.0000	1009.0000					59.5	97.0
39	0/11/25 00:00	1033.0000	1033.0000					54.9	117.9
40	0/11/26 00:00	1057.0000	1057.0000					56.9	115.5
41	0/11/27 00:00	1081.0000	1081.0000					55.5	110.1
42	0/11/28 00:00	1105.0000	1105.0000					54.9	109.5
43	0/11/29 00:00	1129.0000	1129.0000					62.6	99.4
44	0/11/30 00:00	1153.0000	1153.0000					69.0	112.5
45	0/12/01 00:00	1177.0000	1177.0000					80.1	121.2
46	0/12/02 00:00	1201.0000	1201.0000					53.0	92.5
47	0/12/03 00:00	1225.0000	1225.0000					65.9	87.3
48	0/12/04 00:00	1249.0000	1249.0000				0.010	65.2	98.7
49	0/12/05 00:00	1273.0000	1273.0000				0.000	68.4	111.2
50	0/12/06 00:00	1297.0000	1297.0000				0.010	62.1	94.4
51	0/12/07 00:00	1321.0000	1321.0000					64.6	110.1
52	0/12/08 00:00	1345.0000	1345.0000					62.3	106.3
53	0/12/09 00:00	1369.0000	1369.0000					51.6	69.1
54	0/12/10 00:00	1393.0000	1393.0000					66.7	65.2
55	0/12/11 00:00	1417.0000	1417.0000					56.5	85.8
56	0/12/12 00:00	1441.0000	1441.0000					60.3	74.5
57	0/12/13 00:00	1465.0000	1465.0000					53.0	111.2
58	0/12/14 00:00	1489.0000	1489.0000					53.1	111.4
59	0/12/15 00:00	1513.0000	1513.0000					65.2	105.9
60	0/12/16 00:00	1537.0000	1537.0000					58.4	108.1
61	0/12/17 00:00	1561.0000	1561.0000					53.3	108.2
62	0/12/18 00:00	1585.0000	1585.0000					66.8	118.4
63	0/12/19 00:00	1609.0000	1609.0000					51.1	112.8
64	0/12/20 00:00	1633.0000	1633.0000					60.5	113.4
65	0/12/21 00:00	1657.0000	1657.0000					69.0	102.7
66	0/12/22 00:00	1681.0000	1681.0000					57.0	115.7
67	0/12/23 00:00	1705.0000	1705.0000					52.2	124.4
68	0/12/24 00:00	1729.0000	1729.0000					53.3	110.1
69	0/12/25 00:00	1753.0000	1753.0000					60.5	116.8
70	0/12/26 00:00	1777.0000	1777.0000					54.9	108.8
71	0/12/27 00:00	1801.0000	1801.0000					50.0	113.6
72	0/12/28 00:00	1825.0000	1825.0000					57.3	113.5
73	0/12/29 00:00	1849.0000	1849.0000					56.0	95.5
74	0/12/30 00:00	1873.0000	1873.0000				0.010	45.6	106.3
75	0/12/31 00:00	1897.0000	1897.0000				0.020	64.0	110.9
76	1/01/01 00:00	1921.0000	1921.0000				0.020	58.8	107.4

Pressure/Production Summary

Item	Date Clock Time	Time	Cumulative Time	Tubing Pressure	Casing Pressure	Calculated Sandface Pressure	Gas Rate	Oil Rate	Water Rate
	YYYY/MM/DD HH:mm:ss h		h	psi(a)	psi(a)	psi(a)	MMscfd	bbl/d	bbl/d
77	1/01/02 00:00	1945.0000	1945.0000				0.010	43.0	104.7
78	1/01/03 00:00	1969.0000	1969.0000				0.020	50.3	119.9
79	1/01/04 00:00	1993.0000	1993.0000				0.020	54.0	93.6
80	1/01/05 00:00	2017.0000	2017.0000				0.010	59.5	63.2
81	1/01/06 00:00	2041.0000	2041.0000					56.7	110.0
82	1/01/07 00:00	2065.0000	2065.0000					68.1	115.0
83	1/01/08 00:00	2089.0000	2089.0000					66.4	92.5
84	1/01/09 00:00	2113.0000	2113.0000					61.7	103.9
85	1/01/10 00:00	2137.0000	2137.0000					72.7	92.3
86	1/01/11 00:00	2161.0000	2161.0000					79.8	96.2
87	1/01/12 00:00	2185.0000	2185.0000					71.0	130.8
88	1/01/13 00:00	2209.0000	2209.0000					66.1	97.9
89	1/01/14 00:00	2233.0000	2233.0000					60.3	117.7
90	1/01/15 00:00	2257.0000	2257.0000				0.010	32.5	90.1
91	1/01/16 00:00	2281.0000	2281.0000				0.000	53.1	81.6
92	1/01/17 00:00	2305.0000	2305.0000					47.6	101.8
93	1/01/18 00:00	2329.0000	2329.0000					30.5	66.5
94	1/01/19 00:00	2353.0000	2353.0000					40.3	94.0
95	1/01/20 00:00	2377.0000	2377.0000					36.7	89.4
96	1/01/21 00:00	2401.0000	2401.0000					53.4	93.5
97	1/01/22 00:00	2425.0000	2425.0000				0.000	27.9	89.1
98	1/01/23 00:00	2449.0000	2449.0000				0.010	26.1	73.3
99	1/01/24 00:00	2473.0000	2473.0000					25.0	81.8
100	1/01/25 00:00	2497.0000	2497.0000					29.6	87.6
101	1/01/26 00:00	2521.0000	2521.0000					19.8	81.7
102	1/01/27 00:00	2545.0000	2545.0000					21.2	75.2
103	1/01/28 00:00	2569.0000	2569.0000					19.2	71.5
104	1/01/29 00:00	2593.0000	2593.0000					27.9	63.8
105	1/01/30 00:00	2617.0000	2617.0000					25.6	74.6
106	1/01/31 00:00	2641.0000	2641.0000					23.9	76.2
107	1/02/01 00:00	2665.0000	2665.0000					23.1	72.0
108	1/02/02 00:00	2689.0000	2689.0000					22.1	54.7
109	1/02/03 00:00	2713.0000	2713.0000				0.010	0.0	0.0
110	1/02/04 00:00	2737.0000	2737.0000				0.000		
111	1/02/08 00:00	2833.0000	2833.0000					0.0	0.0
112	1/02/09 00:00	2857.0000	2857.0000				0.000	11.1	45.4
113	1/02/10 00:00	2881.0000	2881.0000				0.010	22.3	77.9
114	1/02/11 00:00	2905.0000	2905.0000					18.9	97.3
115	1/02/12 00:00	2929.0000	2929.0000					21.3	97.6
116	1/02/13 00:00	2953.0000	2953.0000					20.9	88.1
117	1/02/14 00:00	2977.0000	2977.0000					20.7	90.9
118	1/02/15 00:00	3001.0000	3001.0000					21.6	95.9
119	1/02/16 00:00	3025.0000	3025.0000					28.6	105.8
120	1/02/17 00:00	3049.0000	3049.0000					27.8	112.8
121	1/02/18 00:00	3073.0000	3073.0000					29.9	119.2
122	1/02/19 00:00	3097.0000	3097.0000					26.6	104.3
123	1/02/20 00:00	3121.0000	3121.0000					27.2	120.1
124	1/02/21 00:00	3145.0000	3145.0000					27.5	119.8
125	1/02/22 00:00	3169.0000	3169.0000					27.2	155.8
126	1/02/23 00:00	3193.0000	3193.0000					27.2	147.6
127	1/02/24 00:00	3217.0000	3217.0000					26.6	111.3
128	1/02/25 00:00	3241.0000	3241.0000					26.2	130.4
129	1/02/26 00:00	3265.0000	3265.0000					26.0	176.9
130	1/02/27 00:00	3289.0000	3289.0000					25.8	153.1
131	1/02/28 00:00	3313.0000	3313.0000					26.2	124.2
132	1/03/01 00:00	3337.0000	3337.0000					28.6	109.3
133	1/03/02 00:00	3361.0000	3361.0000					25.5	109.3
134	1/03/03 00:00	3385.0000	3385.0000					26.9	120.8
135	1/03/04 00:00	3409.0000	3409.0000					25.1	95.2
136	1/03/05 00:00	3433.0000	3433.0000					25.3	114.1
137	1/03/06 00:00	3457.0000	3457.0000					27.2	115.9
138	1/03/07 00:00	3481.0000	3481.0000					25.1	104.2
139	1/03/08 00:00	3505.0000	3505.0000					24.7	90.5
140	1/03/09 00:00	3529.0000	3529.0000					20.5	85.4
141	1/03/10 00:00	3553.0000	3553.0000					23.6	108.0
142	1/03/11 00:00	3577.0000	3577.0000					24.7	121.8
143	1/03/12 00:00	3601.0000	3601.0000					24.6	88.6
144	1/03/13 00:00	3625.0000	3625.0000					25.7	113.9
145	1/03/14 00:00	3649.0000	3649.0000				0.010	25.2	104.0
146	1/03/15 00:00	3673.0000	3673.0000				0.007	30.8	53.5
147	1/03/16 00:00	3697.0000	3697.0000				0.003	9.1	35.4
148	1/03/17 00:00	3721.0000	3721.0000				0.004	9.0	53.5
149	1/03/18 00:00	3745.0000	3745.0000				0.008	28.3	106.4
150	1/03/19 00:00	3769.0000	3769.0000				0.010	27.5	108.4
151	1/03/20 00:00	3793.0000	3793.0000				0.011	29.9	121.3
152	1/03/21 00:00	3817.0000	3817.0000				0.010	24.2	110.7

Pressure/Production Summary

Item	Date Clock Time	Time	Cumulative Time	Tubing Pressure	Casing Pressure	Calculated Sandface Pressure	Gas Rate	Oil Rate	Water Rate
	YYYY/MM/DD HH:mm:ss	h	h	psi(a)	psi(a)	psi(a)	MMscfd	bbbl/d	bbbl/d
153	1/03/22 00:00	3841.0000	3841.0000				0.004	7.7	31.6
154	1/03/23 00:00	3865.0000	3865.0000				0.010	28.7	105.9
155	1/03/24 00:00	3889.0000	3889.0000				0.006	16.8	53.3
156	1/03/25 00:00	3913.0000	3913.0000				0.004	11.8	35.2
157	1/03/26 00:00	3937.0000	3937.0000				0.005	15.7	66.7
158	1/03/27 00:00	3961.0000	3961.0000				0.007	23.5	100.4
159	1/03/28 00:00	3985.0000	3985.0000				0.009	20.2	102.9
160	1/03/29 00:00	4009.0000	4009.0000				0.008	26.2	119.7
161	1/03/30 00:00	4033.0000	4033.0000				0.008	30.1	94.1
162	1/03/31 00:00	4057.0000	4057.0000				0.002	25.5	114.8
163	1/04/01 00:00	4081.0000	4081.0000				0.010	30.5	103.7
164	1/04/02 00:00	4105.0000	4105.0000				0.010	23.6	102.2
165	1/04/03 00:00	4129.0000	4129.0000				0.010	27.8	126.7
166	1/04/04 00:00	4153.0000	4153.0000				0.010	30.4	93.1
167	1/04/05 00:00	4177.0000	4177.0000				0.010	26.5	115.0
168	1/04/06 00:00	4201.0000	4201.0000				0.014	34.0	107.3
169	1/04/07 00:00	4225.0000	4225.0000				0.014	35.4	36.7
170	1/04/08 00:00	4249.0000	4249.0000				0.013	29.1	86.2
171	1/04/09 00:00	4273.0000	4273.0000				0.011	27.6	114.0
172	1/04/10 00:00	4297.0000	4297.0000				0.008	29.1	114.9
173	1/04/11 00:00	4321.0000	4321.0000				0.010	24.7	101.6
174	1/04/12 00:00	4345.0000	4345.0000				0.006	23.0	100.4
175	1/04/13 00:00	4369.0000	4369.0000				0.009	27.1	97.0
176	1/04/14 00:00	4393.0000	4393.0000				0.010	24.5	101.1
177	1/04/15 00:00	4417.0000	4417.0000				0.000	0.0	0.0
178	1/05/27 00:00	5425.0000	5425.0000				0.000	0.0	0.0
179	1/05/28 00:00	5449.0000	5449.0000				0.008	1.1	344.8
180	1/05/29 00:00	5473.0000	5473.0000				0.008	57.0	332.2
181	1/05/30 00:00	5497.0000	5497.0000				0.011	71.2	287.4
182	1/05/31 00:00	5521.0000	5521.0000				0.011	69.0	248.5
183	1/06/01 00:00	5545.0000	5545.0000				0.011	68.1	281.8
184	1/06/02 00:00	5569.0000	5569.0000				0.011	69.1	254.6
185	1/06/03 00:00	5593.0000	5593.0000				0.012	68.3	268.0
186	1/06/04 00:00	5617.0000	5617.0000				0.012	68.4	301.8
187	1/06/05 00:00	5641.0000	5641.0000				0.012	63.4	256.2
188	1/06/06 00:00	5665.0000	5665.0000				0.012	66.0	241.9
189	1/06/07 00:00	5689.0000	5689.0000				0.027	28.4	161.5
190	1/06/08 00:00	5713.0000	5713.0000				0.028	31.9	159.8
191	1/06/09 00:00	5737.0000	5737.0000				0.027	29.2	155.8
192	1/06/10 00:00	5761.0000	5761.0000				0.028	28.8	172.2
193	1/06/11 00:00	5785.0000	5785.0000				0.029	30.2	174.1
194	1/06/12 00:00	5809.0000	5809.0000				0.026	30.9	174.1
195	1/06/13 00:00	5833.0000	5833.0000				0.026	31.8	193.0
196	1/06/14 00:00	5857.0000	5857.0000				0.025	31.6	158.1
197	1/06/15 00:00	5881.0000	5881.0000				0.024	30.6	167.1
198	1/06/16 00:00	5905.0000	5905.0000				0.024	30.3	140.0
199	1/06/17 00:00	5929.0000	5929.0000				0.024	27.9	153.5
200	1/06/18 00:00	5953.0000	5953.0000				0.025	28.2	168.8
201	1/06/19 00:00	5977.0000	5977.0000				0.027	22.8	190.0
202	1/06/20 00:00	6001.0000	6001.0000				0.028	31.4	156.1
203	1/06/21 00:00	6025.0000	6025.0000				0.026	30.1	153.2
204	1/06/22 00:00	6049.0000	6049.0000				0.030	30.8	174.8
205	1/06/23 00:00	6073.0000	6073.0000				0.028	30.7	160.2
206	1/06/24 00:00	6097.0000	6097.0000				0.028	31.1	164.5
207	1/06/25 00:00	6121.0000	6121.0000				0.028	31.9	159.0
208	1/06/26 00:00	6145.0000	6145.0000				0.028	17.1	98.2
209	1/06/27 00:00	6169.0000	6169.0000				0.028	17.9	99.9
210	1/06/28 00:00	6193.0000	6193.0000				0.027	16.6	98.5
211	1/06/29 00:00	6217.0000	6217.0000				0.027	16.4	85.4
212	1/06/30 00:00	6241.0000	6241.0000				0.026	16.9	97.5
213	1/07/01 00:00	6265.0000	6265.0000				0.027	17.7	97.9
214	1/07/02 00:00	6289.0000	6289.0000				0.027	17.4	105.6
215	1/07/03 00:00	6313.0000	6313.0000				0.026	16.4	99.5
216	1/07/04 00:00	6337.0000	6337.0000				0.025	16.6	100.1
217	1/07/05 00:00	6361.0000	6361.0000				0.027	16.4	108.1
218	1/07/06 00:00	6385.0000	6385.0000				0.027	16.4	100.5
219	1/07/07 00:00	6409.0000	6409.0000				0.027	16.9	99.2
220	1/07/08 00:00	6433.0000	6433.0000				0.025	16.7	94.8
221	1/07/09 00:00	6457.0000	6457.0000				0.025	16.4	101.1
222	1/07/10 00:00	6481.0000	6481.0000				0.024	15.4	82.7
223	1/07/11 00:00	6505.0000	6505.0000				0.024	15.7	104.4
224	1/07/11 13:14	6518.2481	6518.2481		84.59	140.45	0.024	15.7	104.4
225	1/07/11 13:19	6518.3314	6518.3314		85.01	141.21	0.000	0.0	0.0
226	1/07/11 13:24	6518.4147	6518.4147		85.42	141.89			
227	1/07/11 13:29	6518.4981	6518.4981		85.82	142.64			
228	1/07/11 13:34	6518.5814	6518.5814		86.20	143.37			

Pressure/Production Summary

Item	Date Clock Time	Time	Cumulative Time	Tubing Pressure	Casing Pressure	Calculated Sandface Pressure	Gas Rate	Oil Rate	Water Rate
	YYYY/MM/DD HH:mm:ss h		h	psi(a)	psi(a)	psi(a)	MMscfd	bbl/d	bbl/d
229	1/07/11 13:39	6518.6647	6518.6647		86.59	144.10			
230	1/07/11 13:44	6518.7481	6518.7481		86.96	144.75			
231	1/07/11 13:54	6518.9147	6518.9147		87.68	146.17			
232	1/07/11 14:04	6519.0814	6519.0814		88.37	147.51			
233	1/07/11 14:14	6519.2481	6519.2481		89.05	148.83			
234	1/07/11 14:24	6519.4147	6519.4147		89.68	150.04			
235	1/07/11 14:34	6519.5814	6519.5814		90.30	151.31			
236	1/07/11 14:44	6519.7481	6519.7481		90.89	152.49			
237	1/07/11 14:54	6519.9147	6519.9147		91.44	153.70			
238	1/07/11 15:04	6520.0814	6520.0814		91.97	154.83			
239	1/07/11 15:14	6520.2481	6520.2481		92.48	155.94			
240	1/07/11 15:24	6520.4147	6520.4147		92.96	156.95			
241	1/07/11 15:34	6520.5814	6520.5814		93.41	157.93			
242	1/07/11 15:44	6520.7481	6520.7481		93.84	158.90			
243	1/07/11 15:54	6520.9147	6520.9147		94.24	159.84			
244	1/07/11 16:04	6521.0814	6521.0814		94.62	160.75			
245	1/07/11 16:14	6521.2481	6521.2481		94.98	161.57			
246	1/07/11 16:24	6521.4147	6521.4147		95.31	162.44			
247	1/07/11 16:34	6521.5814	6521.5814		95.61	163.22			
248	1/07/11 16:44	6521.7481	6521.7481		95.90	163.97			
249	1/07/11 16:54	6521.9147	6521.9147		96.17	164.63			
250	1/07/11 17:04	6522.0814	6522.0814		96.42	165.34			
251	1/07/11 17:14	6522.2481	6522.2481		96.64	165.97			
252	1/07/11 17:24	6522.4147	6522.4147		96.85	166.65			
253	1/07/11 17:34	6522.5814	6522.5814		97.05	167.23			
254	1/07/11 17:44	6522.7481	6522.7481		97.22	167.80			
255	1/07/11 17:54	6522.9147	6522.9147		97.39	168.36			
256	1/07/11 18:04	6523.0814	6523.0814		97.53	168.90			
257	1/07/11 18:14	6523.2481	6523.2481		97.66	169.42			
258	1/07/11 18:24	6523.4147	6523.4147		97.78	169.86			
259	1/07/11 18:34	6523.5814	6523.5814		97.89	170.36			
260	1/07/11 18:44	6523.7481	6523.7481		97.98	170.77			
261	1/07/11 18:54	6523.9147	6523.9147		98.07	171.17			
262	1/07/11 19:04	6524.0814	6524.0814		98.14	171.64			
263	1/07/11 19:14	6524.2481	6524.2481		98.21	172.02			
264	1/07/11 19:24	6524.4147	6524.4147		98.27	172.40			
265	1/07/11 19:34	6524.5814	6524.5814		98.33	172.77			
266	1/07/11 19:44	6524.7481	6524.7481		98.37	173.14			
267	1/07/11 19:54	6524.9147	6524.9147		98.42	173.50			
268	1/07/11 20:04	6525.0814	6525.0814		98.46	173.86			
269	1/07/11 20:14	6525.2481	6525.2481		98.50	174.14			
270	1/07/11 20:24	6525.4147	6525.4147		98.53	174.50			
271	1/07/11 20:34	6525.5814	6525.5814		98.57	174.85			
272	1/07/11 20:44	6525.7481	6525.7481		98.60	175.13			
273	1/07/11 21:04	6526.0814	6526.0814		98.67	175.76			
274	1/07/11 21:24	6526.4147	6526.4147		98.74	176.40			
275	1/07/11 21:44	6526.7481	6526.7481		98.81	177.04			
276	1/07/11 22:04	6527.0814	6527.0814		98.89	177.60			
277	1/07/11 22:24	6527.4147	6527.4147		98.96	178.16			
278	1/07/11 22:44	6527.7481	6527.7481		99.03	178.81			
279	1/07/11 23:04	6528.0814	6528.0814		99.11	179.38			
280	1/07/11 23:24	6528.4147	6528.4147		99.19	179.96			
281	1/07/11 23:44	6528.7481	6528.7481		99.27	180.45			
282	1/07/12 00:04	6529.0814	6529.0814		99.34	181.03			
283	1/07/12 00:24	6529.4147	6529.4147		99.42	181.61			
284	1/07/12 00:44	6529.7481	6529.7481		99.50	182.11			
285	1/07/12 01:04	6530.0814	6530.0814		99.58	182.61			
286	1/07/12 01:24	6530.4147	6530.4147		99.66	183.20			
287	1/07/12 01:44	6530.7481	6530.7481		99.74	183.71			
288	1/07/12 02:14	6531.2481	6531.2481		99.87	184.43			
289	1/07/12 02:44	6531.7481	6531.7481		99.99	185.16			
290	1/07/12 03:14	6532.2481	6532.2481		100.12	185.89			
291	1/07/12 03:44	6532.7481	6532.7481		100.25	186.54			
292	1/07/12 04:14	6533.2481	6533.2481		100.39	187.28			
293	1/07/12 04:44	6533.7481	6533.7481		100.52	187.94			
294	1/07/12 05:44	6534.7481	6534.7481		100.80	189.27			
295	1/07/12 06:44	6535.7481	6535.7481		101.07	190.43			
296	1/07/12 07:44	6536.7481	6536.7481		101.34	191.59			
297	1/07/12 08:44	6537.7481	6537.7481		101.59	192.65			
298	1/07/12 10:44	6539.7481	6539.7481		102.05	194.64			
299	1/07/12 12:44	6541.7481	6541.7481		102.49	196.61			
300	1/07/12 14:44	6543.7481	6543.7481		102.89	198.38			
301	1/07/12 16:44	6545.7481	6545.7481		103.28	200.14			
302	1/07/12 18:44	6547.7481	6547.7481		103.66	201.81			
303	1/07/12 20:44	6549.7481	6549.7481		104.04	203.48			
304	1/07/12 22:44	6551.7481	6551.7481		104.41	204.97			

Pressure/Production Summary

Item	Date Clock Time	Time	Cumulative Time	Tubing Pressure	Casing Pressure	Calculated Sandface Pressure	Gas Rate	Oil Rate	Water Rate
	YYYY/MM/DD HH:mm:ss h		h	psi(a)	psi(a)	psi(a)	MMscfd	bbl/d	bbl/d
305	1/07/13 00:44	6553.7481	6553.7481		104.78	206.55			
306	1/07/13 02:44	6555.7481	6555.7481		105.15	207.96			
307	1/07/13 04:44	6557.7481	6557.7481		105.52	209.45			
308	1/07/13 06:44	6559.7481	6559.7481		105.88	210.85			
309	1/07/13 08:44	6561.7481	6561.7481		106.24	212.07			
310	1/07/13 10:44	6563.7481	6563.7481		106.58	213.27			
311	1/07/13 12:44	6565.7481	6565.7481		106.91	214.37			
312	1/07/13 14:44	6567.7481	6567.7481		107.24	215.46			
313	1/07/13 18:44	6571.7481	6571.7481		107.88	217.64			
314	1/07/13 22:44	6575.7481	6575.7481		108.53	219.56			
315	1/07/14 02:44	6579.7481	6579.7481		109.22	221.62			
316	1/07/14 06:44	6583.7481	6583.7481		109.97	223.57			
317	1/07/14 10:44	6587.7481	6587.7481		110.77	225.57			
318	1/07/14 14:44	6591.7481	6591.7481		111.64	227.55			
319	1/07/14 18:44	6595.7481	6595.7481		112.58	229.52			
320	1/07/14 22:44	6599.7481	6599.7481		113.56	231.53			
321	1/07/15 02:44	6603.7481	6603.7481		114.59	233.60			
322	1/07/15 06:44	6607.7481	6607.7481		115.65	235.62			
323	1/07/15 10:44	6611.7481	6611.7481		116.74	237.57			
324	1/07/15 14:44	6615.7481	6615.7481		117.84	239.53			
325	1/07/15 18:44	6619.7481	6619.7481		118.92	241.48			
326	1/07/15 22:44	6623.7481	6623.7481		119.98	243.40			
327	1/07/16 02:44	6627.7481	6627.7481		120.99	245.18			
328	1/07/16 06:44	6631.7481	6631.7481		121.94	247.00			
329	1/07/16 10:44	6635.7481	6635.7481		122.82	248.64			
330	1/07/16 14:44	6639.7481	6639.7481		123.62	250.21			
331	1/07/16 18:44	6643.7481	6643.7481		124.35	251.58			
332	1/07/16 22:44	6647.7481	6647.7481		124.99	252.98			
333	1/07/17 02:44	6651.7481	6651.7481		125.55	254.29			
334	1/07/17 06:44	6655.7481	6655.7481		126.04	255.42			
335	1/07/17 10:44	6659.7481	6659.7481		126.47	256.60			
336	1/07/17 14:44	6663.7481	6663.7481		126.86	257.62			
337	1/07/17 18:44	6667.7481	6667.7481		127.20	258.70			
338	1/07/17 22:44	6671.7481	6671.7481		127.51	259.65			
339	1/07/18 02:44	6675.7481	6675.7481		127.79	260.67			
340	1/07/18 06:44	6679.7481	6679.7481		128.06	261.57			
341	1/07/18 10:44	6683.7481	6683.7481		128.30	262.56			
342	1/07/18 14:44	6687.7481	6687.7481		128.54	263.53			
343	1/07/18 18:44	6691.7481	6691.7481		128.75	264.39			
344	1/07/18 22:44	6695.7481	6695.7481		128.95	265.33			
345	1/07/19 02:44	6699.7481	6699.7481		129.14	266.26			
346	1/07/19 06:44	6703.7481	6703.7481		129.31	267.18			
347	1/07/19 10:44	6707.7481	6707.7481		129.47	268.09			
348	1/07/19 14:44	6711.7481	6711.7481		129.62	268.99			
349	1/07/19 18:44	6715.7481	6715.7481		129.76	269.87			
350	1/07/19 22:44	6719.7481	6719.7481		129.88	270.75			
351	1/07/20 02:44	6723.7481	6723.7481		129.99	271.61			
352	1/07/20 06:44	6727.7481	6727.7481		130.09	272.36			
353	1/07/20 10:44	6731.7481	6731.7481		130.17	273.20			
354	1/07/20 14:44	6735.7481	6735.7481		130.24	273.90			
355	1/07/20 18:44	6739.7481	6739.7481		130.28	274.49			
356	1/07/20 22:44	6743.7481	6743.7481		130.30	275.05			
357	1/07/21 02:44	6747.7481	6747.7481		130.33	275.62			
358	1/07/21 06:44	6751.7481	6751.7481		130.37	276.09			

Reservoir Information

Simmi Saharan

Subject:

FW: Data for Buildups

Attachments:

Penn West Waskada 3-3 Reservoir Fluid Study.pdf; 103-13-24-001-26W1 Directional Survey.pdf; 102-13-31-001-25W1 Directional Survey.pdf; 103-13-24-001-26W1 Production.xlsx; 102-13-31-001-25W1 Production.xlsx; 102-13-31-001-25W1 Frac Program.pdf; 103-13-24-001-26W1 Frac Program.pdf; 103-13-24-001-26W1 Wellbore Schematic.pdf; 102-13-31-001-25W1 Wellbore Schematic.pdf; 102-13-31-001-25W1 Completion Reports.pdf; 102-13-31-001-26W1 Drilling Reports.pdf; 103-13-24-001-26W1 Drilling Reports.pdf; 103-13-24-001-26W1 Completion Reports.pdf

From: Trevor Thompson [<mailto:Trevor.Thompson@pennwest.com>]

Sent: August-04-11 2:30 PM

To: Reza Ali

Subject: Data for Buildups

Reza,

Attached is the data for those buildups. All of the data should be there.

102/13-31-1-25W1

Net Pay: 18.9m

Porosity: 13%

Sw: 50%

103/13-24-1-26W1

Net Pay: 30.0m

Porosity: 13%

Sw: 50%

Trevor

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Reservoir Fluid Study
For

Penn West Exploration

Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00

Sampled: February 23, 2011

Laboratory File Number: 52134-2011-0649 (Calgary)
Sampling File Number: 52138-2011-1039 (Esterwan)
Date: April 27, 2011

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April 27, 2011

Penn West Exploration

200, 207 9th Ave S.W.

Calgary, AB

T2P 1K3

Attention: Andrew Seto

Subject: Reservoir Fluid Study

Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00

Laboratory File Number: 52134-2011-0649 (Calgary)

Sampling File Number 52138-2011-1039 (Estevan)

Separator fluid samples were collected from the subject location by representatives of Core Laboratories Canada Ltd. on February 23rd, 2011. The samples were then submitted to our Calgary laboratory for use in a reservoir fluid study.

The enclosed report contains a brief description of the laboratory tests and procedures that were followed in the lab, the laboratory results in tabular and graphical formats, the compositional data, and concluding remarks.

The reservoir fluid was recombined to a saturation pressure of 4 220 kPag at the reservoir temperature of 45.0 °C. 1.5 litres of reservoir fluid was recombined for this study and upcoming miscibility projects.

Core Laboratories is committed to customer satisfaction and welcomes your feedback. You can e-mail the General Manager with your comments at pscanada.feedback@corelab.com.

Yours truly,

CORE LABORATORIES CANADA LTD.

Dale McIiesh

PVT Data Evaluator

/DMc

enclosure

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52134-2011-0649

SUMMARY OF PVT DATA

Reported Reservoir Conditions

Reservoir Pressure	7 398	kPa(g)
Reservoir Temperature	45.0	°C

Pressure-Volume Relations

Saturation Pressure	4 233	kPa(g)
Avg. Single-Phase Compressibility	9.71	E-7 v/v/kPa (34 474 to 4 233 kPa(g))
Thermal Exp. @ 34 474 kPa(g)	1.02398	V at 45.0 °C / V at 15.0 °C

Differential Vaporization Data (at 4 233 kPa(g) and 45.0 °C)

Solution Gas/Oil Ratio	43.3	m ³ / m ³ of residual oil at 15.0 °C
Relative Oil Volume	1.151	m ³ / m ³ of residual oil at 15.0 °C
Density of Reservoir Fluid	788.5	kg/m ³

Reservoir Fluid Viscosity

1.53 mPa·s at 4 233 kPa(g) and 45.0 °C
--

Separator Test Results

Separator Conditions		Formation Volume Factor (A)	Total Solution Gas/Oil Ratio (B)	Tank Oil Gravity (°API at 15.6 °C)
kPa(g)	°C			
1 103	2.0	1.122	37.9	37.2

(A) Cubic metres of saturated oil per cubic metre of stock tank oil at 15.0 °C.

(B) Total standard cubic metres of gas per cubic metre of stock tank oil at 15.0 °C.

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PROJECT OBJECTIVE & SCOPE

The objective of the reservoir fluid study is to determine the PVT properties of the reservoir fluid from the **Penn West Waskada Unit No. 5 Hz 3-3-2-26W1** well.

The scope of the study entails the compositional analysis of the separator oil and gas, physical recombination of the separator gas and liquid samples to produce a recombined reservoir fluid, pressure-volume relations of the recombined reservoir fluid, differential vaporization test on the recombined fluid, reservoir fluid viscosity measurements, separator test of the recombined reservoir fluid and the compositional analysis of the recombined reservoir fluid. A routine oil analysis is included in the compositional data section of this report.

ANALYTICAL SUMMARY

Sample Analysis and Verification

A. Separator Gases

Gas analyses are performed on the HP 6890 gas chromatograph. Three columns are employed in this technology. One column is used to detect inert components such as helium, hydrogen, nitrogen and oxygen. The second column detects lighter hydrocarbon components to propane, carbon dioxide and hydrogen sulphide. The third column detects heavier C3+ hydrocarbons. Argon is used as a carrier gas in the first column and helium in the second and third. The extended gas analysis to decanes plus is performed with the use of the HP 6890 gas chromatograph. Its technique is described below in the reservoir fluid analysis section.

The gas samples are heated to temperatures considerably above sampling temperature to ensure complete homogeneity including the revaporization of any possible condensables. Finally, the heated gas samples are injected into the chromatographs for analysis.

The separator gas compositions can be found on page **16** of this report.

B. Separator Liquids

Initially, the room temperature saturation pressures of the separator liquid samples are determined, as a means of a quality check, by incremental additions of an inert hydraulic fluid. Separator liquids are analyzed by high temperature flash. In this process, an aliquot of separator liquid is flashed to atmospheric pressure at a controlled rate and elevated temperature. The evolved gas is collected, quantified and analyzed. The residual liquid is also quantified and analyzed. The separator liquid composition is arrived at by mathematically recombining the individual flashed gas and residual liquid compositions.

The separator liquid composition is included on pages **17 & 18** of this report.

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Analytical Summary...continued

C. K-Value Analysis

The final sample verification step is the generation of a K-value plot from the compositional analysis of the separator gas and liquid samples. This step confirms equilibrium was established between the gas and liquid in the separator at the time of sampling and that the samples were collected properly. Refer to page **19** for the illustration.

D. Reservoir Fluid Composition

The composition of the recombined reservoir fluid, as per the separator oils, is also determined by high temperature flash. The resulting composition is detailed on pages **20 & 21** of this report.

Laboratory Physical Recombination

A. Sample Preparation

Prior to recombination, a number of sample preparation steps are necessary. First, the separator gas must be condensed into an evacuated, high-pressure cylinder. This is accomplished by immersing the high-pressure cylinder in liquid nitrogen. The high-pressure cylinder is attached to the source cylinder and the contents of the source cylinder are transferred by pressure drop to the high-pressure cylinder. The source cylinder is heated to a temperature considerably above sampling temperature to ensure single-phase transfer. Once the condensing process is completed, the vapour contents in the high-pressure cylinder are brought to room temperature and stabilized at a reference pressure.

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Analytical Summary...continued

B. Physical Recombination

The physical recombination was performed as follows. An evacuated, high-pressure, windowed cell was heated to the reported reservoir temperature of **45.00 °C**. A measured aliquot of pressured separator liquid was injected into the cell. A measured aliquot of pressured separator gas was then added to the cell. The contents of the cell were put into single phase by increasing the pressure, through hydraulic fluid injection, and vigorous agitation. The saturation pressure of this initial mixture was then visually determined and found to be less than the target saturation pressure of **4 220 kPa(g)**. A second aliquot of separator gas was added and the resulting fluid's saturation pressure visually determined. This pressure was found to be approximately **4 220 kPa(g)**. The contents of the cell were once again put into single phase by increasing the pressure, through hydraulic fluid injection, and vigorous agitation. This recombined reservoir fluid was then monophasically transferred from the cell to a high-pressure, stainless steel, storage cylinder.

PVT Experiments

A. Pressure-Volume Relations Test

A measured aliquot of the reservoir fluid is transferred, under pressure, to a high-pressure, windowed cell and stabilized at a working pressure significantly above the bubblepoint pressure. The cell is then heated to the reported reservoir temperature of **45.00 °C** and again stabilized at the working pressure. The cell pressure is lowered by withdrawing the inert hydraulic fluid. Reservoir fluid volumes in the cell are determined at several pressure increments both above and below the saturation pressure. The saturation pressure (bubblepoint) itself is confirmed by visual observation through the cell window and is repeated twice.

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Analytical Summary...continued

The results of this test are reported in the form of a ratio of reservoir fluid volume at any pressure to the reservoir fluid volume at saturation conditions (relative volume or V/V_{sat}). The relative volume data is then used to calculate single-phase oil compressibilities and densities.

The data from this test is tabulated on pages **10, 11** and illustrated on page **25** of this report.

B. Differential Vaporization

At the completion of the pressure-volume relations test, the reservoir fluid is put into single phase and stabilized at the working pressure and reservoir temperature. The pressure in the cell is then lowered, through hydraulic fluid withdrawal, to a predetermined pressure below the saturation pressure. The gas and oil phase portions of the system are allowed to separate and establish equilibrium. Once equilibrium is reached, the liberated gas is removed, at constant pressure, quantified and its relative density to air measured. The volume of oil remaining in the cell is also determined. The pressure is reduced again and the procedure repeated until the final pressure (atmospheric) is reached.

The stepwise pressure reduction allows for the examination of two-phase properties as a function of pressure depletion during primary production. Specifically, the liberated gas relative density, gas deviation (Z) factor, gas formation volume factor, solution gas-oil ratio, oil formation volume factor and oil phase density are determined at each pressure stage.

The data generated from the differential vaporization test is tabulated on pages **12 & 13** and illustrated on pages **26 to 30** of this report.

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Analytical Summary...continued

C. Reservoir Fluid Viscosity

An aliquot of the recombined reservoir fluid is transferred, in single phase, to a piston-style viscometer that is preheated to the reservoir temperature. Inside the viscometer chamber a low mass piston is magnetically forced back and forth in the sample fluid. The time required for the piston to move a fixed distance is then very accurately related to the fluid viscosity and displayed directly as viscosity in centipoise (cP). A number of calibrated pistons of various sizes are available to cover a wide range of viscosities. The measurement is started at a pressure above the reservoir pressure and is lowered through a relief valve to the next required pressure level. For pressures below the saturation pressure, the sample is stabilized at the selected pressure in an external cell by removing the liberated gas from oil phase in such a way as to allow only the stabilized oil to fill the measuring chamber.

The viscosity of the liberated gas at each pressure level below the saturation pressure is calculated, based on a correlation by Lee, Eakin & Gonzalez, using the liberated gas properties determined in the differential vaporization test.

The viscosity data is tabulated on page 14 and illustrated on pages 30 & 31 of this report.

D. Separator Test

A measured aliquot of the reservoir fluid is transferred to a scale separator and flashed at separator conditions equal to those that prevailed in the field at the time of sampling. Specifically, flash to 1 103 kPa(g) and 2 °C and then to atmospheric pressure and 15.0 °C. At each stage, the liberated gas is removed and quantified after equilibrium has been reached. The volume of oil remaining at each stage is also determined. This data is presented in the form of solution gas-oil ratios (total and individual stage), formation volume factor, stock tank oil gravity

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Analytical Summary...continued

and liberated gas relative densities. The total gas-oil ratio and the formation volume factor from this test are adjusted, as documented in the Data Adjustment section of this report, using data from the pressure-volume relations test and the differential vaporization test.

The results from the separator test can be found on page **15** of this report.

General

A. Illustrations

Where applicable, analytical expressions best representing the PVT data reported and the corresponding statistical summaries have been provided. Refer to pages **25 to 31** of this report.

B. Data Adjustment

The total solution gas-oil ratio and the formation volume factor from the multi-stage separator test have been adjusted such that this data can be used directly in volumetric and material balance calculations. Complete documentation is provided on pages **32 to 34**. The adjusted data is tabulated on page **35** and is illustrated on pages **36 and 37** of this report.

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CONCLUSIONS & OBSERVATIONS

Based on the information received from **Penn West Exploration**, the data contained in this report and the observations made during the course of this study, the following can be concluded.

1. The reservoir fluid was recombined to a saturation pressure of **4 233** kPa(g) at the reported reservoir temperature of **45.00** °C. The reservoir fluid yielded a GOR of 11.7 m³/m³ sep at a pressure of 1 103 kPa(g) and 2 °C, and it yielded a total GOR of 37.9 m³/m³.
2. The physically recombined reservoir fluid exhibited the behaviour of a medium gravity oil system (37.2 °API).
3. The adjusted data should be used in volumetric and material balance calculations.

Core Laboratories can recommend and perform additional tests to further define or characterize the reservoir.

TABULAR DATA

Penn West Exploration
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VOLUMETRIC DATA
(at 45.0 °C)

Saturation Pressure (Psat)	4 233 kPa(g)
Density at Psat	788.5 kg/m ³
Thermal Exp. @ 34 474 kPa(g)	1.02398 V at 45.0 °C / V at 15.0 °C

AVERAGE SINGLE-PHASE COMPRESSIBILITIES

Pressure Range kPa(g)			Single-Phase Compressibility v/v/kPa
34 474	to	27 579	8.69 E -7
27 579	to	20 684	9.15 E -7
20 684	to	13 790	9.81 E -7
13 790	to	4 233	11.35 E -7

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PRESSURE-VOLUME RELATIONS
(at 45.0 °C)

Pressure kPa(g)	Relative Volume (A)	Y-Function (B)	Density kg/m³
34 474	0.9706		812.4
27 579	0.9765		807.5
20 684	0.9826		802.5
13 790	0.9893		797.1
10 342	0.9929		794.2
r»7 398	0.9961		791.6
5 516	0.9984		789.8
b»4 233	1.0000		788.5
4 226	1.0005	3.240	
4 192	1.0030	3.222	
4 144	1.0066	3.197	
4 089	1.0109	3.169	
3 978	1.0201	3.113	
3 765	1.0404	3.004	
3 427	1.0808	2.831	
3 061	1.1402	2.644	
2 703	1.2218	2.461	
2 358	1.3337	2.285	
2 048	1.4783	2.127	
1 744	1.6840	1.972	
1 551	1.8665	1.873	

(A) Relative Volume: V/V_{sat} or volume at indicated pressure per volume at saturation pressure.

(B) Where: $Y\text{-Function} = \frac{(P_{sat} - P)}{(P_{abs}) * (V/V_{sat} - 1)}$

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
52134-2011-0649

DIFFERENTIAL VAPORIZATION

(at 45.0 °C)

Oil Properties

Pressure kPa(g)	Oil Density kg/m ³	Relative Oil Volume Bod (A)	Relative Total Volume Btd (B)	Solution Gas/Oil Ratio Rsd (C)	Liberated Gas/Oil Ratio Rld
b»4 233	788.5	1.1514	1.1514	43.3	0.0
3 806	789.3	1.1480	1.1940	41.6	1.7
3 103	790.9	1.1417	1.3007	38.5	4.8
2 413	792.9	1.1342	1.4873	35.0	8.3
1 724	795.6	1.1247	1.8643	30.8	12.5
1 062	799.2	1.1120	2.7726	25.5	17.8
717	801.9	1.1025	3.9583	21.9	21.4
0	821.2	1.0268		0.0	43.3

Gravity of Residual Oil = 36.2 °API at 15.6 °C
Density of Residual Oil = 843.2 kg/m³ at 15.0 °C

(A) Cubic metre of oil at indicated pressure and temperature per cubic metre of residual oil at 15.0 °C.

(B) Cubic metres of oil plus liberated gas at indicated pressure and temperature per cubic metre of residual oil at 15.0 °C.

(C) Cubic metres of gas at 101.325 kPa(a) and 15.0 °C per cubic metre of residual oil at 15.0 °C.

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
52134-2011-0649

DIFFERENTIAL VAPORIZATION

(at 45.0 °C)

Gas Properties

Pressure kPa(g)	Incremental Gas Relative Density (A)	Cumulative Gas Relative Density (A)	Incremental Deviation Factor Z	Gas Formation Volume Factor Bg (B)	Gas Expansion Factor 1/Bg (C)
b»4 233					
3 806	0.825	0.825	0.944	0.02704	36.98
3 103	0.831	0.829	0.950	0.03316	30.16
2 413	0.848	0.837	0.955	0.04251	23.52
1 724	0.883	0.853	0.962	0.05899	16.95
1 062	0.947	0.881	0.970	0.09333	10.72
717	1.003	0.901	0.976	0.13336	7.50
0	1.524	1.216			

(A) Air = 1.000

(B) Cubic metres of gas at indicated pressure and temperature per cubic metre at 101.325 kPa(a) and 15.0 °C.

(C) Cubic metres of gas at 101.325 kPa(a) and 15.0 °C per cubic metre at indicated pressure and temperature.

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
52134-2011-0649

RESERVOIR FLUID VISCOSITY

(at 45 °C)

Pressure kPa(g)	Oil Viscosity mPa·s	Gas Viscosity * mPa·s	Oil/Gas Viscosity Ratio
34 474	2.19		
27 579	2.04		
20 684	1.89		
13 790	1.74		
10 342	1.66		
r»7 398	1.60		
5 516	1.56		
b»4 233	1.53		
3 806	1.52	0.0118	129
3 103	1.54	0.0115	134
2 413	1.60	0.0113	142
1 724	1.72	0.0109	157
1 062	1.91	0.0105	182
717	2.07	0.0102	202
0	3.01		

* Gas Viscosity data calculated from correlation of Lee A.L., Gonzalez M.H., and Eakin B.E., "The Viscosity of Natural Gases", Journal of Petroleum Technology, August, 1966, pp. 997-1000.

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
52134-2011-0649

SEPARATOR TEST OF RESERVOIR FLUID

Flash Conditions		Gas/Oil Ratio (m ³ /m ³) (A)	Gas/Oil Ratio (m ³ /STm ³) (B)	Stock Tank Oil Gravity at 15.6 °C (°API)	Formation Volume Factor Bofb (C)	Separator Volume Factor (D)	Specific Gravity of Flashed Gas (Air=1.000)	Oil Phase Density (kg/m ³)
kPa(g)	°C							
4 233	45.0							786.2
1 103	2.0	11.7	12.4			1.055	0.824	826.3
0	15.0	25.5	25.5	37.2	1.122	1.000	1.255	838.2
Rsfb = 37.9								

- (A) Cubic metres of gas at 101.325 kPa(a) and 15.0 °C per cubic metre of oil at indicated pressure and temperature.
(B) Cubic metres of gas at 101.325 kPa(a) and 15.0 °C per cubic metre of stock tank oil at 15.0 °C.
(C) Cubic metres of saturated oil at 4 233 kPa(g) and 45.0 °C per cubic metre of stock tank oil at 15.0 °C.
(D) Cubic metres of oil at indicated pressure and temperature per cubic metre of stock tank oil at 15.0 °C.

COMPOSITIONAL DATA



EXTENDED GAS ANALYSIS

K0000076 - 1

CONTAINER IDENTITY

7234

WELL LICENSE NUMBER

52134-2011-0649

LABORATORY FILE NUMBER

Penn West Exploration

METER ID

16

OPERATOR

PAGE

102/03-03-002-26W1/00

LOCATION (UWI)

Penn West Waskada Unit No.5 Hz 3-3-2-26

WELL NAME

KB ELEV (m)

GR ELEV (m)

Waskada

FIELD OR AREA

Lower Amaranth

POOL OR ZONE

Core Lab - Estevan

SAMPLER

TEST TYPE AND NO.

TEST RECOVERY

Test Separator Meter Run at 7-3

POINT OF SAMPLE		SAMPLE POINT ID	
PUMPING	FLOWING	GAS LIFT	SWAB
WATER	m ³ /d	OIL	m ³ /d
		GAS	m ³ /d

TEST INTERVAL or PERFS (meters)

1103	1100 @ 9 °C	1100 @ 22 °C	2.0
SEPARATOR	CONTAINER WHEN SAMPLED	CONTAINER WHEN RECEIVED	SEPARATOR
RESERVOIR			OTHER
OTHER			

10:00 Hrs

Pressures, kPa (gauge)

Temperatures, °C

2011 02 23

2011 02 28

2011 03 02

TUN

@ °C

DATE SAMPLED (Y/M/D)

DATE RECEIVED (Y/M/D)

DATE ANALYZED (Y/M/D)

ANALYST

AMT. AND TYPE CUSHION

MUD RESISTIVITY

COMPONENT	MOLE FRACTION AIR FREE AS RECEIVED	MOLE FRACTION AIR FREE ACID GAS FREE	mL/m ³ AIR FREE AS RECEIVED
H ₂	0.0001	0.0001	
He	0.0003	0.0003	
N ₂	0.1243	0.1255	
CO ₂	0.0092	0.0000	
H ₂ S	0.0006	0.0000	
C ₁	0.6762	0.6830	
C ₂	0.1225	0.1237	435.3
C ₃	0.0501	0.0506	184.1
iC ₄	0.0042	0.0042	18.3
C ₄	0.0087	0.0088	36.6
iC ₅	0.0013	0.0013	6.3
C ₅	0.0013	0.0013	6.3
C ₆	0.0007	0.0007	3.7
C ₇₊	0.0005	0.0005	2.8
Total	1.0000	1.0000	693.4

CALCULATED GROSS HEATING VALUE MJ/m ³ @ 15°C & 101.325 kPa (abs.)		CALCULATED VAPOR PRESSURE kPa (abs.) @ 40 °C	
40.61	40.99	101.5	
MOISTURE FREE	MOISTURE & ACID GAS FREE	PENTANES PLUS	
CALCULATED TOTAL SAMPLE PROPERTIES (AIR=1) @ 15°C & 101.325 kPa			
MOISTURE FREE AS SAMPLED			
0.918	0.749	21.7	
DENSITY	RELATIVE DENSITY	RELATIVE MOLECULAR MASS	
CALCULATED PSEUDOCRITICAL PROPERTIES			
AS SAMPLED		ACID GAS FREE	
4476.1	210.8	4446.5	209.8
kPa (abs)	K	kPa (abs)	K
pPc	pTc	pPc	pTc
C ₇₊ PROPERTIES @ 15°C & 101.325 kPa		MOLE FRACTION	LOCATION
723.8	96.6	0.0005900	Field
DENSITY	MOLECULAR WEIGHT		Gastec
HYDROGEN SULPHIDE			

REMARKS:

H2S determined in the field by Gastec = 590ppm

NOTE: THE GROSS HEATING VALUE HAS BEEN CALCULATED IN ACCORDANCE TO
AGA REPORT #5 AND ALL PROPERTIES HAVE BEEN CALCULATED UTILIZING
PHYSICAL CONSTANTS AND BOILING POINT GROUPING.



HYDROCARBON LIQUID ANALYSIS

V0007711 - 2		7234	52134-2011-0649
CONTAINER IDENTITY	METER ID	WELL LICENSE NUMBER	LABORATORY FILE NUMBER
Penn West Exploration		17	
OPERATOR		PAGE	
102/03-03-002-26W1/00	Penn West Waskada Unit No.5 Hz 3-3-2-26		
LOCATION (UWI)	WELL NAME		
Waskada	Lower Amaranth	Core Lab - Estevan	
FIELD OR AREA	POOL OR ZONE	SAMPLER	
TEST TYPE AND NO.		TEST RECOVERY	
Test Separator Sight Glass at 7-3			
POINT OF SAMPLE		SAMPLE POINT ID	
PUMPING		FLOWING	
GAS LIFT		SWAB	
WATER	m ³ /d	OIL	m ³ /d
GAS		m ³ /d	
TEST INTERVAL or PERFS (meters)			
1103	1100 @ 9 °C		
SEPARATOR	RESERVOIR	OTHER	@ °C
CONTAINER WHEN SAMPLED		CONTAINER WHEN RECEIVED	
10:30 Hrs		2.0	
Pressures, kPa (gauge)		Temperatures, °C	
2011 02 23	2011 02 28	2011 03 18	DH
DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST
AMT. AND TYPE CUSHION		@ °C	
MUD RESISTIVITY			

COMPONENT	MOLE FRACTION	MASS FRACTION	LIQUID VOLUME FRACTION	mL/m ³
N ₂	0.0020	0.0004	0.0004	2.9
CO ₂	0.0015	0.0004	0.0004	3.4
H ₂ S	0.0000	0.0000	0.0000	0.0
C ₁	0.0427	0.0044	0.0118	96.6
C ₂	0.0540	0.0104	0.0234	191.9
C ₃	0.0851	0.0241	0.0381	312.7
iC ₄	0.0165	0.0062	0.0088	72.0
C ₄	0.0573	0.0214	0.0294	241.1
iC ₅	0.0242	0.0112	0.0144	118.1
C ₅	0.0340	0.0157	0.0201	164.5
C ₆₊	0.6827	0.9058	0.8532	6,995.1
Total	1.0000	1.0000	1.0000	8,198.3

OBSERVED PROPERTIES OF C ₆₊ RESIDUE (15/15°C)		
853.6 kg/m ³	0.8543	34.3
DENSITY	RELATIVE DENSITY	API @ 15.5 °C
207		
RELATIVE MOLECULAR MASS		
CALCULATED PROPERTIES OF TOTAL SAMPLE (15/15°C)		
804.0 kg/m ³	0.8047	44.5
DENSITY	RELATIVE DENSITY	API @ 15.5 °C
155.85		
RELATIVE MOLECULAR MASS		
GAS EQUIVALENT		
0.1220 10 ³ m ³ Gas/m ³ Liquid (E ² m ³ /m ³)		

REMARKS: Refer to page 18 for the extended analysis of hexanes plus.

NOTE: All Properties have been calculated utilizing physical constants.



HYDROCARBON LIQUID ANALYSIS

Operator: Penn West Exploration

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Well: Penn West Waskada Unit No.5 Hz 3-3-2-26

File: 52134-2011-0649-2-V0007711

Sample Point: Test Separator Sight Glass at 7-3

Date: 2011 03 18

Analysis of C₆₊ Fraction

Boiling Point: Range (° C)	Component	Carbon Number	Mole Fraction	Mass Fraction	Liq. Vol. Fraction
36.1- 68.9	Hexanes	C ₆	0.0432	0.0222	0.0263
68.9- 98.3	Heptanes	C ₇	0.0446	0.0266	0.0304
98.3-125.6	Octanes	C ₈	0.0591	0.0402	0.0447
125.6-150.6	Nonanes	C ₉	0.0430	0.0329	0.0357
150.6-173.9	Decanes	C ₁₀	0.0452	0.0383	0.0410
173.9-196.1	Undecanes	C ₁₁	0.0391	0.0342	0.0340
196.1-215.0	Dodecanes	C ₁₂	0.0313	0.0301	0.0295
215.0-235.0	Tridecanes	C ₁₃	0.0308	0.0322	0.0311
235.0-252.2	Tetradecanes	C ₁₄	0.0238	0.0269	0.0257
252.2-270.6	Pentadecanes	C ₁₅	0.0238	0.0293	0.0276
270.6-287.8	Hexadecanes	C ₁₆	0.0182	0.0240	0.0224
287.8-302.8	Heptadecanes	C ₁₇	0.0160	0.0226	0.0209
302.8-317.2	Octadecanes	C ₁₈	0.0152	0.0226	0.0209
317.2-330.0	Nonadecanes	C ₁₉	0.0146	0.0229	0.0210
330.0-344.4	Eicosanes	C ₂₀	0.0115	0.0189	0.0172
344.4-357.2	Heneicosanes	C ₂₁	0.0095	0.0165	0.0149
357.2-369.4	Docosanes	C ₂₂	0.0094	0.0170	0.0153
369.4-380.0	Tricosanes	C ₂₃	0.0083	0.0157	0.0140
380.0-391.1	Tetracosanes	C ₂₄	0.0077	0.0152	0.0136
391.1-401.7	Pentacosanes	C ₂₅	0.0071	0.0146	0.0130
401.7-412.2	Hexacosanes	C ₂₆	0.0062	0.0132	0.0118
412.2-422.2	Heptacosanes	C ₂₇	0.0059	0.0131	0.0115
422.2-431.7	Octacosanes	C ₂₈	0.0051	0.0117	0.0102
431.7-441.1	Nonacosanes	C ₂₉	0.0048	0.0117	0.0102
441.1 PLUS	Triacotanes Plus	C ₃₀₊	0.0871	0.3125	0.2716
80.0	Benzene	C ₆ H ₆	0.0029	0.0014	0.0012
110.6	Toluene	C ₇ H ₈	0.0100	0.0055	0.0049
136.1-138.9	Ethylbenzene, p + m-Xylene	C ₈ H ₁₀	0.0152	0.0096	0.0087
144.4	o-Xylene	C ₈ H ₁₀	0.0034	0.0022	0.0019
168.9	1,2,4 Trimethylbenzene	C ₉ H ₁₂	0.0048	0.0034	0.0031
48.9	Cyclopentane	C ₅ H ₁₀	0.0039	0.0016	0.0017
72.2	Methylcyclopentane	C ₆ H ₁₂	0.0103	0.0052	0.0054
81.1	Cyclohexane	C ₆ H ₁₂	0.0110	0.0055	0.0055
101.1	Methylcyclohexane	C ₇ H ₁₄	0.0107	0.0063	0.0063
	TOTAL		0.6827	0.9058	0.8532
Mole Fraction of C7+					0.6356
Mass Fraction of C7+					0.8820
Liquid Volume Fraction of C7+					0.8252
Calculated Relative Molecular Mass of C7+					216
Calculated Relative Density of C7+					0.8608
Calculated Density of C7+ (kg/m3)					860.0



K-VALUE ANALYSIS

Operator: Penn West Exploration

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Well: Penn West Waskada Unit No.5 Hz 3-3-2-26

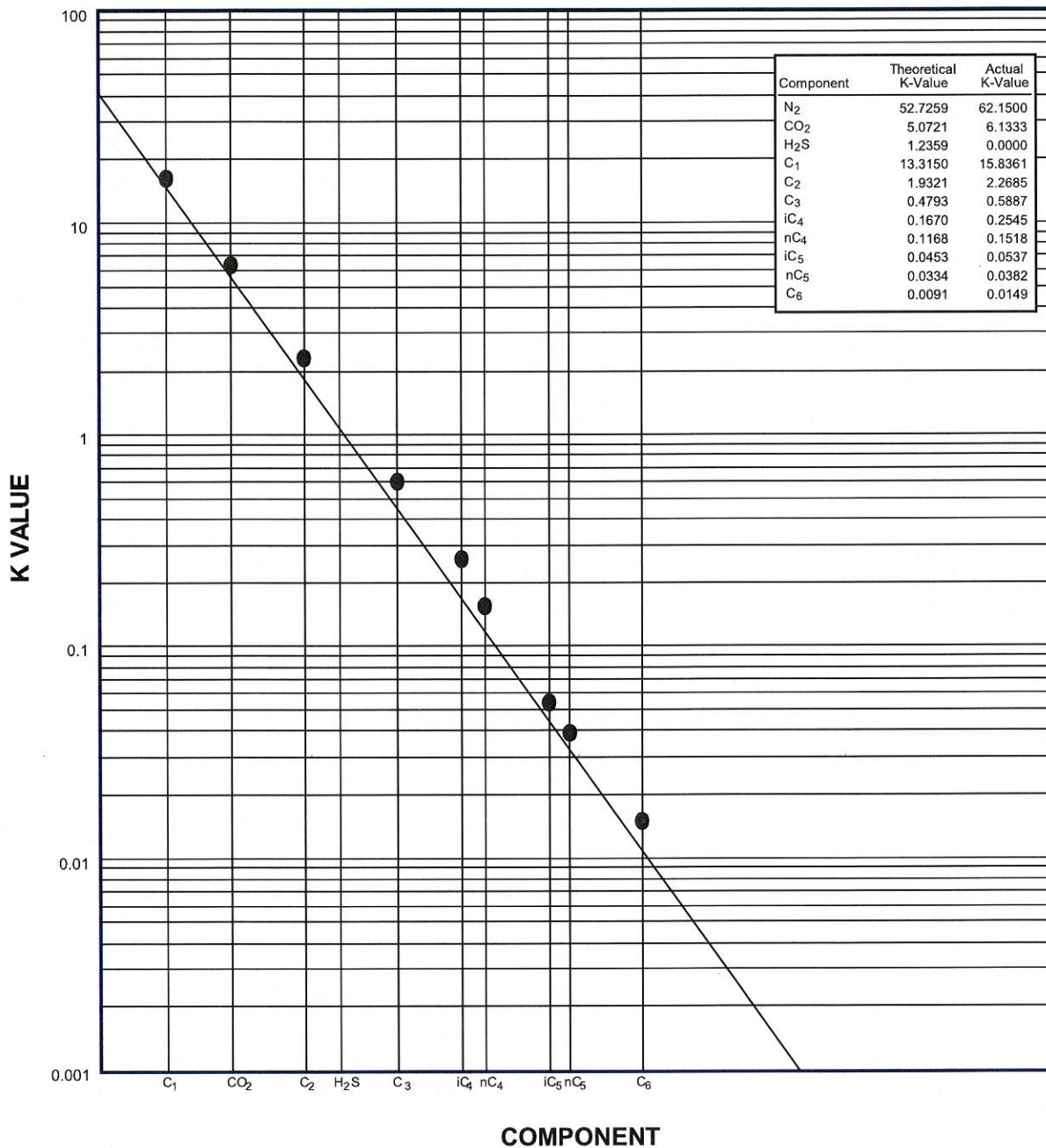
File: 52134-2011-0649

Sample Point: Test Separator Meter Run at 7-

Date: 2011 02 23

Pressure: 1103 kPa Temperature: 2.0 °C

● Actual K-Value
 \ Theoretical K-Value





HYDROCARBON LIQUID ANALYSIS

B0001079 - 6	7234	52134-2011-0649	
CONTAINER IDENTITY	METER ID	WELL LICENSE NUMBER	LABORATORY FILE NUMBER
Penn West Exploration		20	
OPERATOR		PAGE	
102/03-03-002-26W1/00	Penn West Waskada Unit No.5 Hz 3-3-2-26		
LOCATION (UWI)	WELL NAME	KB ELEV (m)	GR ELEV (m)
Waskada			
FIELD OR AREA	POOL OR ZONE	SAMPLER	
TEST TYPE AND NO.		TEST RECOVERY	
Recombined Reservoir Fluid			
POINT OF SAMPLE		SAMPLE POINT ID	
PUMPING _____ FLOWING _____ GAS LIFT _____ SWAB _____ WATER _____ m ³ /d OIL _____ m ³ /d GAS _____ m ³ /d			
TEST INTERVAL or PERFS (meters)			
1103	1100 @ 9 °C	2.0	
SEPARATOR	CONTAINER WHEN SAMPLED	SEPARATOR	OTHER
Pressures, kPa (gauge)		Temperatures, °C	
10:30 Hrs			
2011 02 23	2011 02 28	2011 04 13	RWS
DATE SAMPLED (Y/M/D)	DATE RECEIVED (Y/M/D)	DATE ANALYZED (Y/M/D)	ANALYST
		AMT. AND TYPE CUSHION	MUD RESISTIVITY

COMPONENT	MOLE FRACTION	MASS FRACTION	LIQUID VOLUME FRACTION	mL/m ³
N ₂	0.0116	0.0023	0.0022	17.0
CO ₂	0.0022	0.0007	0.0006	5.0
H ₂ S	0.0001	0.0000	0.0000	0.2
C ₁	0.0998	0.0111	0.0293	225.7
C ₂	0.0623	0.0130	0.0288	221.4
C ₃	0.0832	0.0255	0.0398	305.7
iC ₄	0.0156	0.0063	0.0089	68.1
C ₄	0.0540	0.0218	0.0295	227.2
iC ₅	0.0217	0.0109	0.0138	105.9
C ₅	0.0308	0.0155	0.0194	149.0
C ₆₊	0.6187	0.8929	0.8277	6,365.0
Total	1.0000	1.0000	1.0000	7,690.2

OBSERVED PROPERTIES OF C ₆₊ RESIDUE (15/15°C)		
853.3 kg/m ³	0.8541	34.3
DENSITY	RELATIVE DENSITY	API @ 15.5 °C
208		
RELATIVE MOLECULAR MASS		
CALCULATED PROPERTIES OF TOTAL SAMPLE (15/15°C)		
790.9 kg/m ³	0.7916	47.4
DENSITY	RELATIVE DENSITY	API @ 15.5 °C
143.82		
RELATIVE MOLECULAR MASS		
GAS EQUIVALENT		
0.1300 10 ³ m ³ Gas/m ³ Liquid (E ³ m ³ /m ³)		

REMARKS: Refer to page 21 for the extended analysis of hexanes plus.



HYDROCARBON LIQUID ANALYSIS

Operator: Penn West Exploration
 Well: Penn West Waskada Unit No.5 Hz 3-3-2-26
 Sample Point: Recombined Reservoir Fluid

Page: 21
 File: 52134-2011-0649-6-B0001079
 Date: 2011 04 13

Analysis of C₆₊ Fraction

Boiling Point: Range (° C)	Component	Carbon Number	Mole Fraction	Mass Fraction	Liq. Vol. Fraction
36.1- 68.9	Hexanes	C ₆	0.0410	0.0241	0.0279
68.9- 98.3	Heptanes	C ₇	0.0434	0.0297	0.0332
98.3-125.6	Octanes	C ₈	0.0492	0.0384	0.0417
125.6-150.6	Nonanes	C ₉	0.0396	0.0347	0.0369
150.6-173.9	Decanes	C ₁₀	0.0393	0.0382	0.0400
173.9-196.1	Undecanes	C ₁₁	0.0361	0.0363	0.0353
196.1-215.0	Dodecanes	C ₁₂	0.0293	0.0322	0.0309
215.0-235.0	Tridecanes	C ₁₃	0.0288	0.0344	0.0325
235.0-252.2	Tetradecanes	C ₁₄	0.0221	0.0288	0.0268
252.2-270.6	Pentadecanes	C ₁₅	0.0223	0.0313	0.0290
270.6-287.8	Hexadecanes	C ₁₆	0.0170	0.0258	0.0236
287.8-302.8	Heptadecanes	C ₁₇	0.0150	0.0243	0.0220
302.8-317.2	Octadecanes	C ₁₈	0.0140	0.0240	0.0216
317.2-330.0	Nonadecanes	C ₁₉	0.0138	0.0248	0.0222
330.0-344.4	Eicosanes	C ₂₀	0.0103	0.0193	0.0172
344.4-357.2	Heneicosanes	C ₂₁	0.0092	0.0184	0.0162
357.2-369.4	Docosanes	C ₂₂	0.0088	0.0183	0.0161
369.4-380.0	Tricosanes	C ₂₃	0.0077	0.0167	0.0146
380.0-391.1	Tetracosanes	C ₂₄	0.0073	0.0165	0.0144
391.1-401.7	Pentacosanes	C ₂₅	0.0064	0.0151	0.0130
401.7-412.2	Hexacosanes	C ₂₆	0.0058	0.0142	0.0123
412.2-422.2	Heptacosanes	C ₂₇	0.0053	0.0137	0.0117
422.2-431.7	Octacosanes	C ₂₈	0.0047	0.0125	0.0107
431.7-441.1	Nonacosanes	C ₂₉	0.0045	0.0124	0.0106
441.1 PLUS	Triacotanes Plus	C ₃₀₊	0.0635	0.2614	0.2224
80.0	Benzene	C ₆ H ₆	0.0030	0.0016	0.0014
110.6	Toluene	C ₇ H ₈	0.0088	0.0055	0.0049
136.1-138.9	Ethylbenzene, p + m-Xylene	C ₈ H ₁₀	0.0111	0.0080	0.0071
144.4	o-Xylene	C ₈ H ₁₀	0.0031	0.0022	0.0020
168.9	1,2,4 Trimethylbenzene	C ₉ H ₁₂	0.0060	0.0049	0.0043
48.9	Cyclopentane	C ₅ H ₁₀	0.0039	0.0019	0.0019
72.2	Methylcyclopentane	C ₆ H ₁₂	0.0121	0.0070	0.0071
81.1	Cyclohexane	C ₆ H ₁₂	0.0131	0.0075	0.0074
101.1	Methylcyclohexane	C ₇ H ₁₄	0.0132	0.0088	0.0088
	TOTAL		0.6187	0.8929	0.8277
Mole Fraction of C7+					0.5738
Mass Fraction of C7+					0.8669
Liquid Volume Fraction of C7+					0.7979
Calculated Relative Molecular Mass of C7+					217
Calculated Relative Density of C7+					0.8611
Calculated Density of C7+ (kg/m3)					860.4

REMARKS:



Company Name: Penn West Exploration

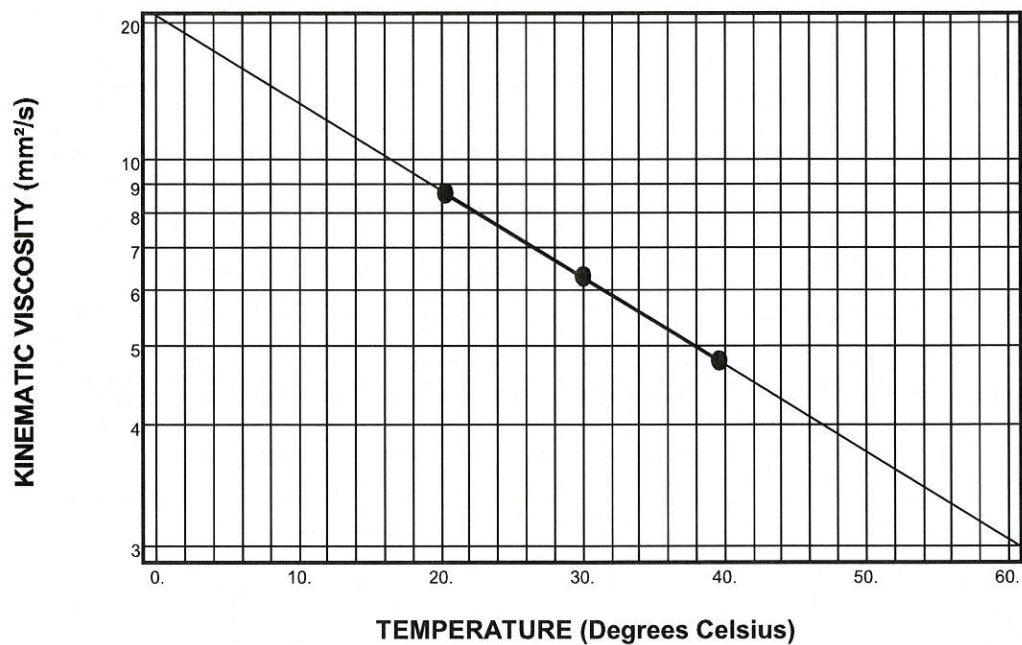
Well Name: Penn West Waskada Unit No.5 Hz 3-3-2-26

Location: 102/03-03-002-26W1/00

Sampled From: Test Separator Sight Glass at 7-3

Sampling Date: 2011 02 23

VISCOSITY - TEMPERATURE CHART



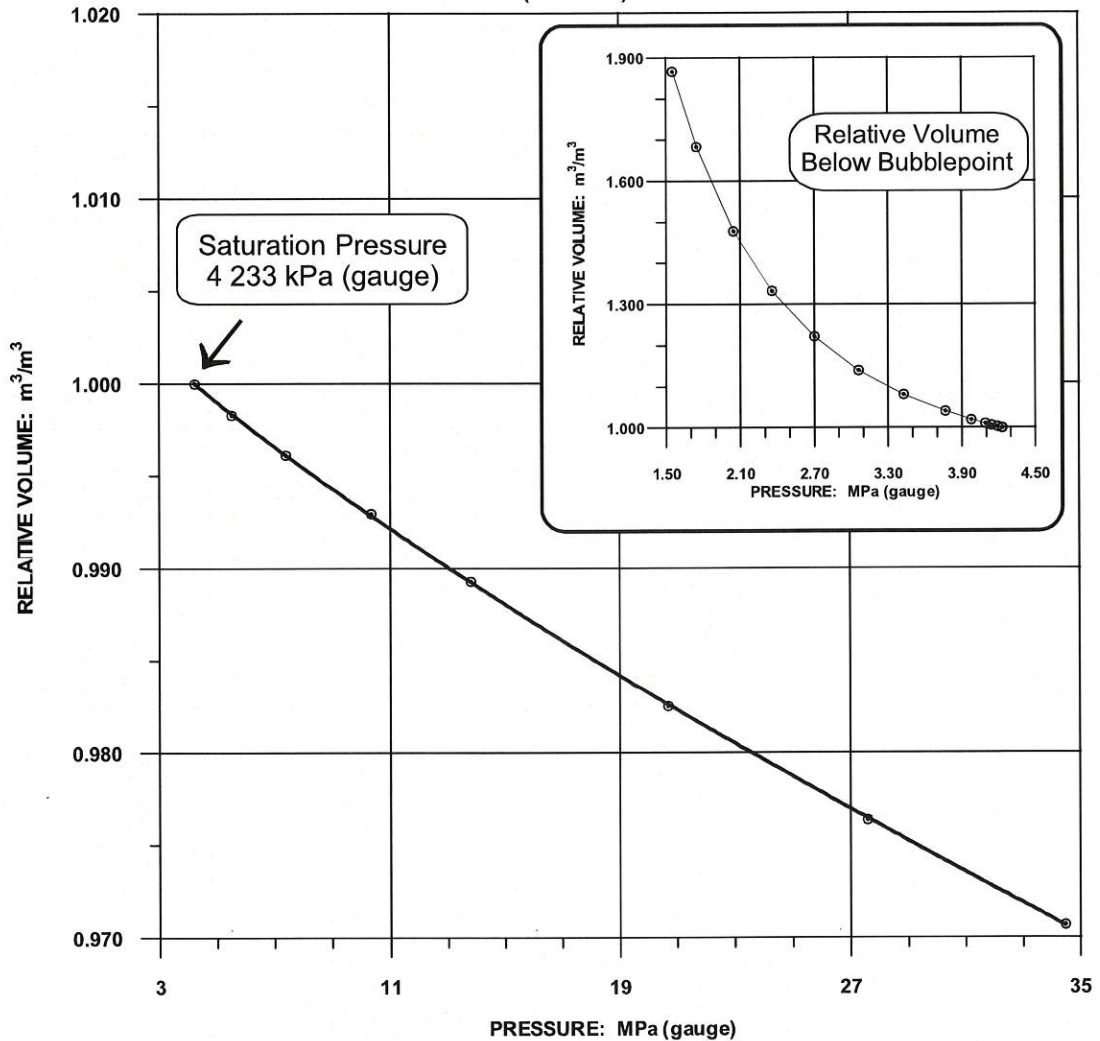
REMARKS: Water Content check for PVT Study.

ILLUSTRATIONS

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
52134-2011-0649

RELATIVE VOLUME (V/Vs)

(at 45.0 °C)



Analytical Expression (above bubblepoint)

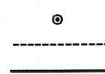
$$1.0067E00 + 1.8688E-03 * (Xd)^{0.500} - 8.5888E-03 * (Xd)^{0.750}$$

where; Xd is defined as (P / Psat)

Statistical Summary

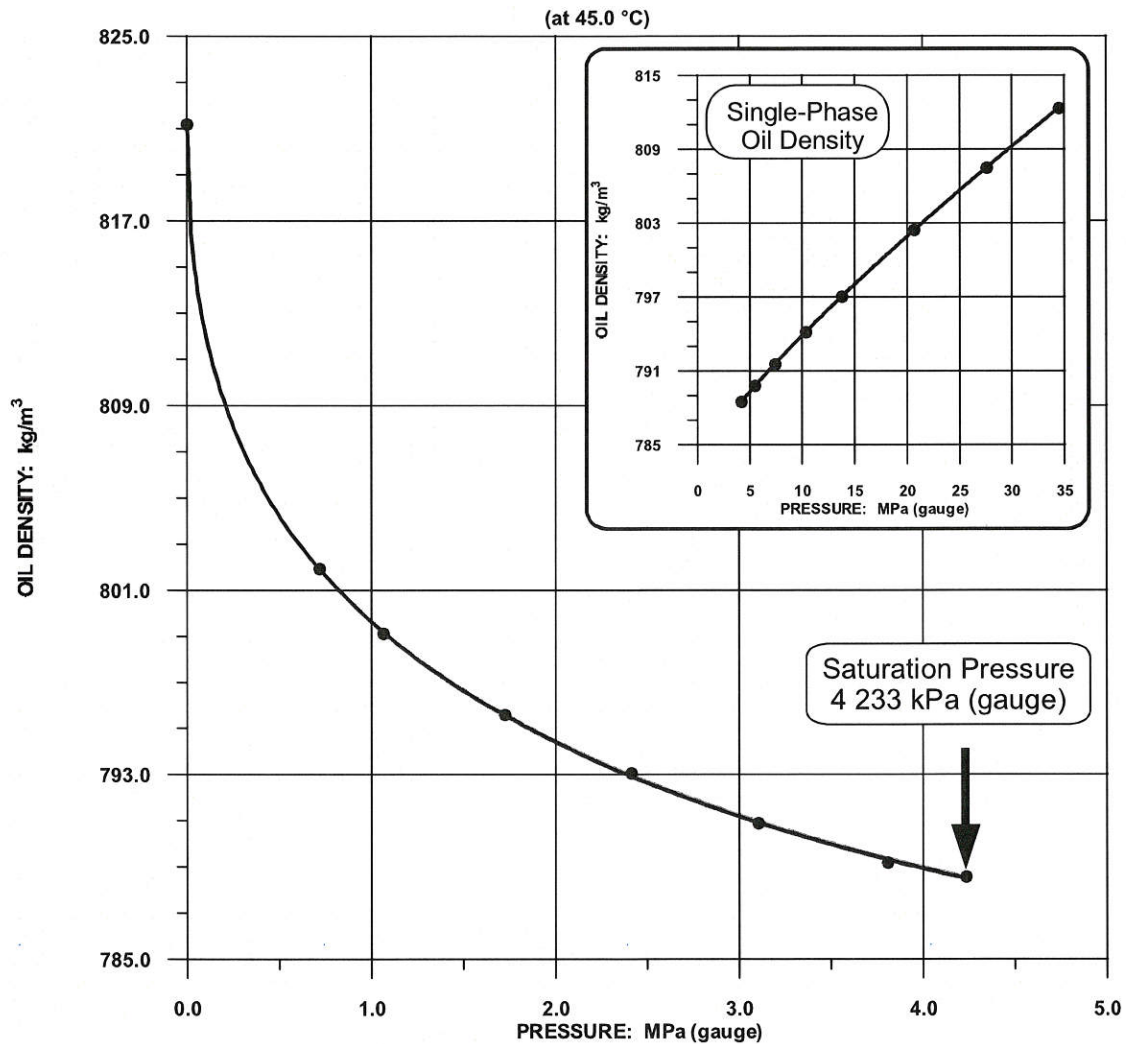
r squared: 0.999961
 Confidence Interval (+/-): 0.00008
 Confidence: 99 %

Legend



Laboratory Data
 Confidence Limits
 Analytical Expression

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
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OIL DENSITY



Analytical Expression (below bubblepoint)

$$8.2119\text{E}+02 - 1.2256\text{E}+02 * (X_d)^{0.501} + 8.9878\text{E}+01 * (X_d)^{0.598}$$

where; Xd is defined as (P / Psat)

Statistical Summary

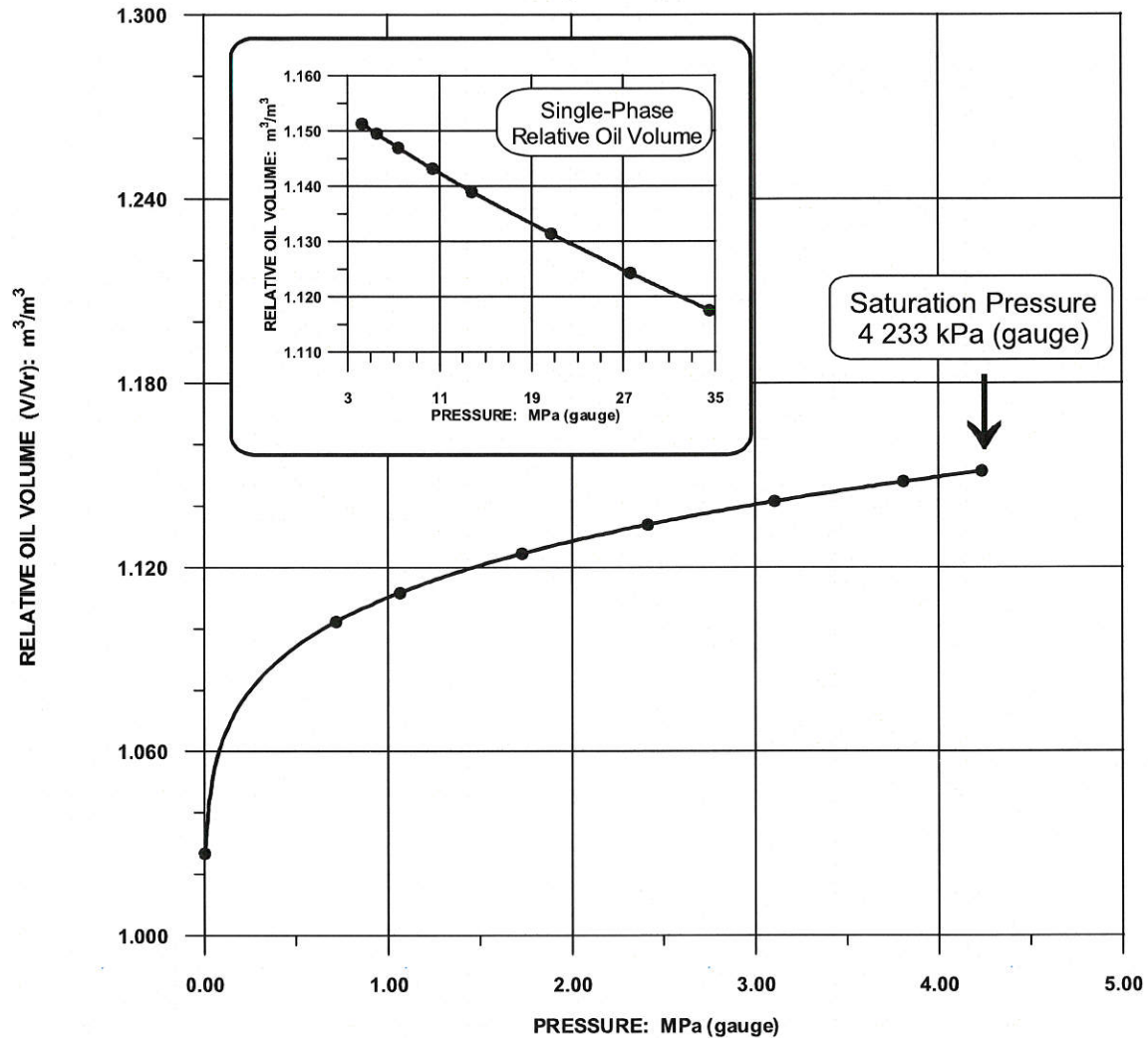
r squared: 0.999941
 Confidence Interval (+/-): 0.102
 Confidence: 99 %

Legend

● Laboratory Data
 ----- Confidence Limits
 ————— Analytical Expression

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
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RELATIVE OIL VOLUME (V/Vr)
 (at 45.0 °C)



Analytical Expression (below bubblepoint)

$$1.0268E00 + 5.0801E-02 * P^{0.170} - 6.1207E-02 * P^{0.040}$$

where; P is defined as pressure, kPa(g)

Statistical Summary

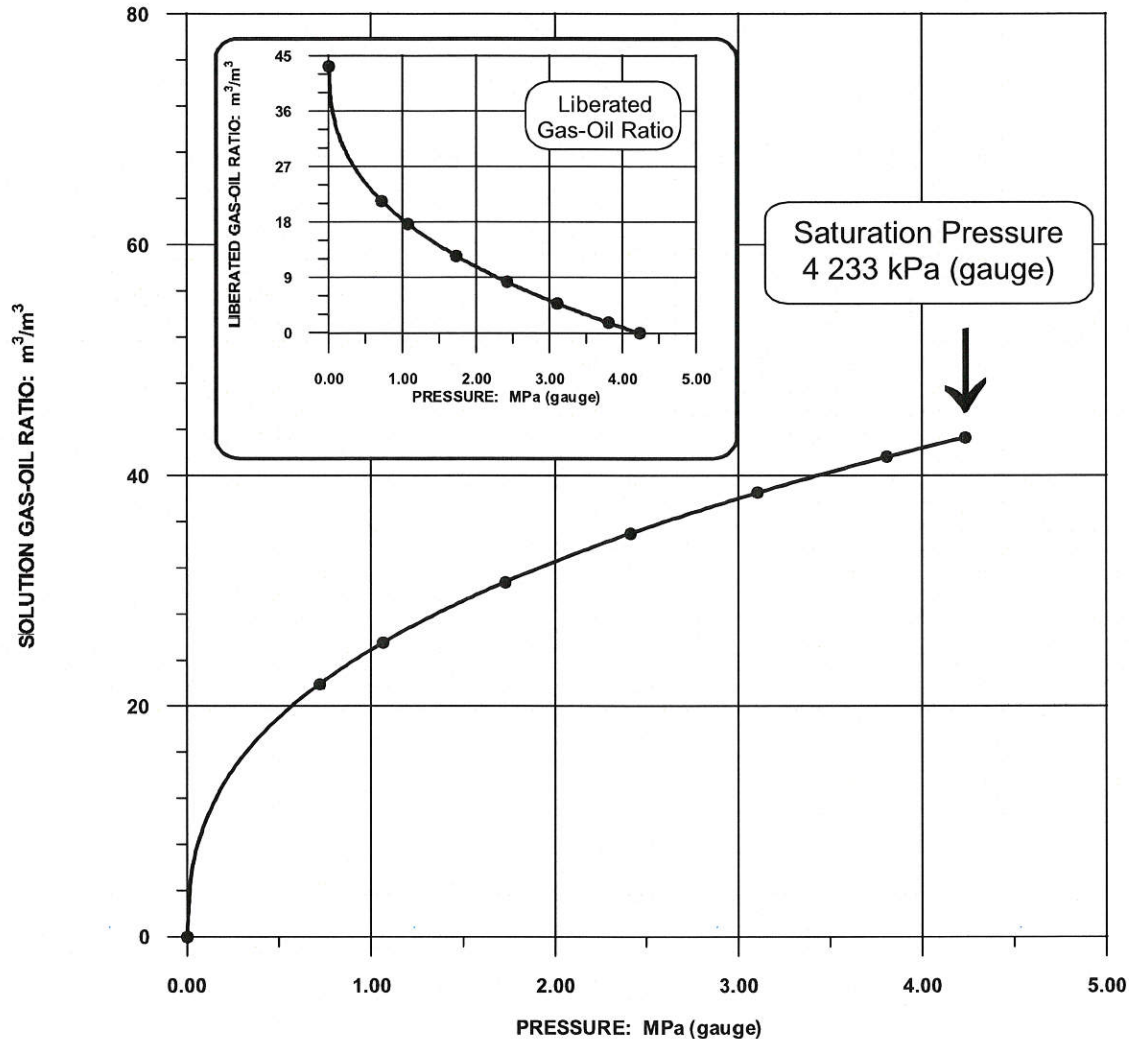
r squared: 0.999999
 Confidence Interval (+/-): 0.00004
 Confidence: 99 %

Legend

● Laboratory Data
 --- Confidence Limits
 — Analytical Expression

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
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GAS-OIL RATIOS
(at 45.0 °C)



Analytical Expression (Solution GOR - below bubblepoint)

$$2.1648E00 * P^{0.449} - 6.6560E-01 * P^{0.514}$$

where; P is defined as pressure, kPa(g)

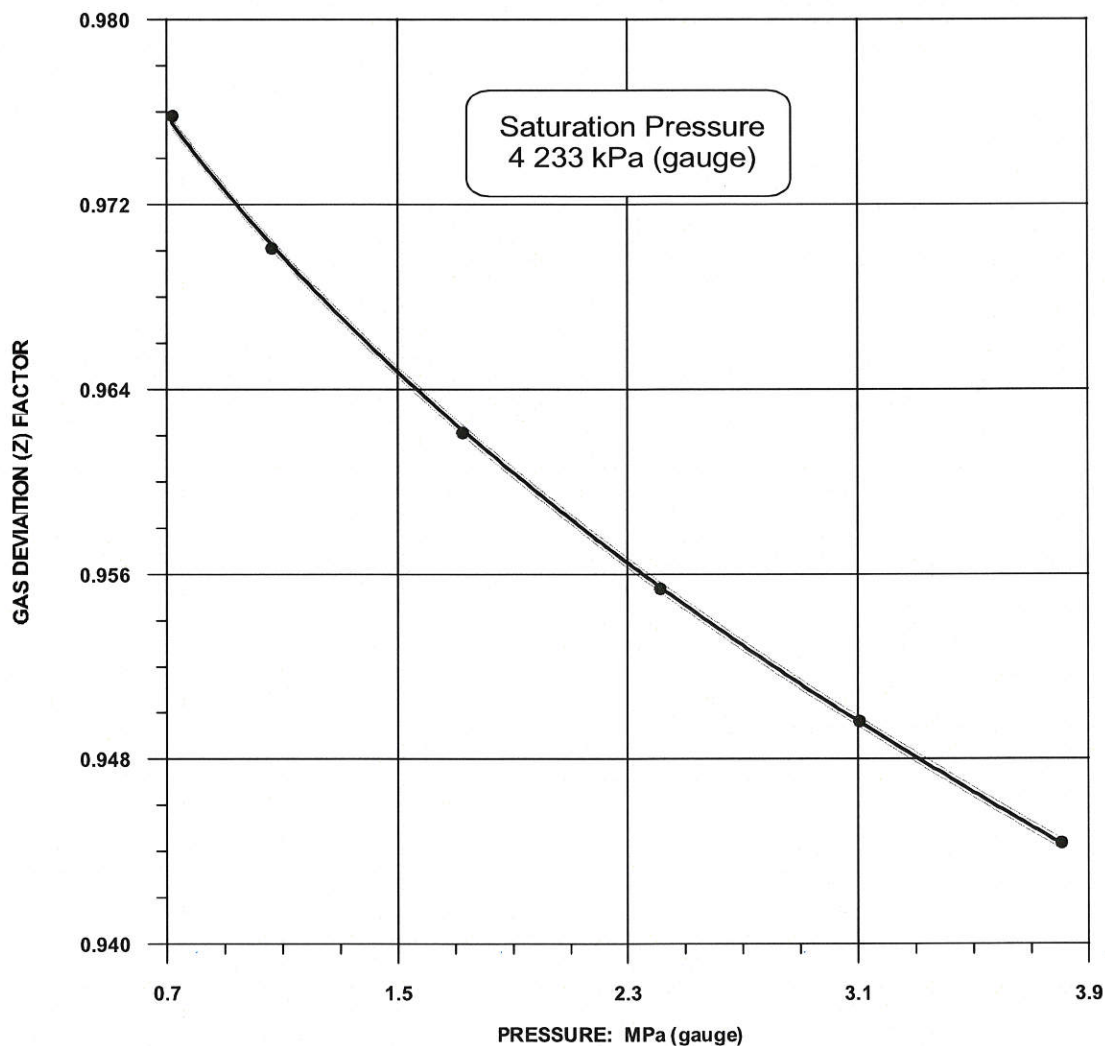
Statistical Summary

r squared: 0.999999
Confidence Interval (+/-): 0.02
Confidence: 99 %

Legend

● Laboratory Data
--- Confidence Limits
— Analytical Expression

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
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GAS DEVIATION (Z) FACTOR
 (at 45.0 °C)



Analytical Expression

$$1.0000E00 - 6.0161E-02 * (X_d)^{0.500} + 1.4751E-03 * (X_d)^{1.000}$$

where; X_d is defined as (P / P_{sat})

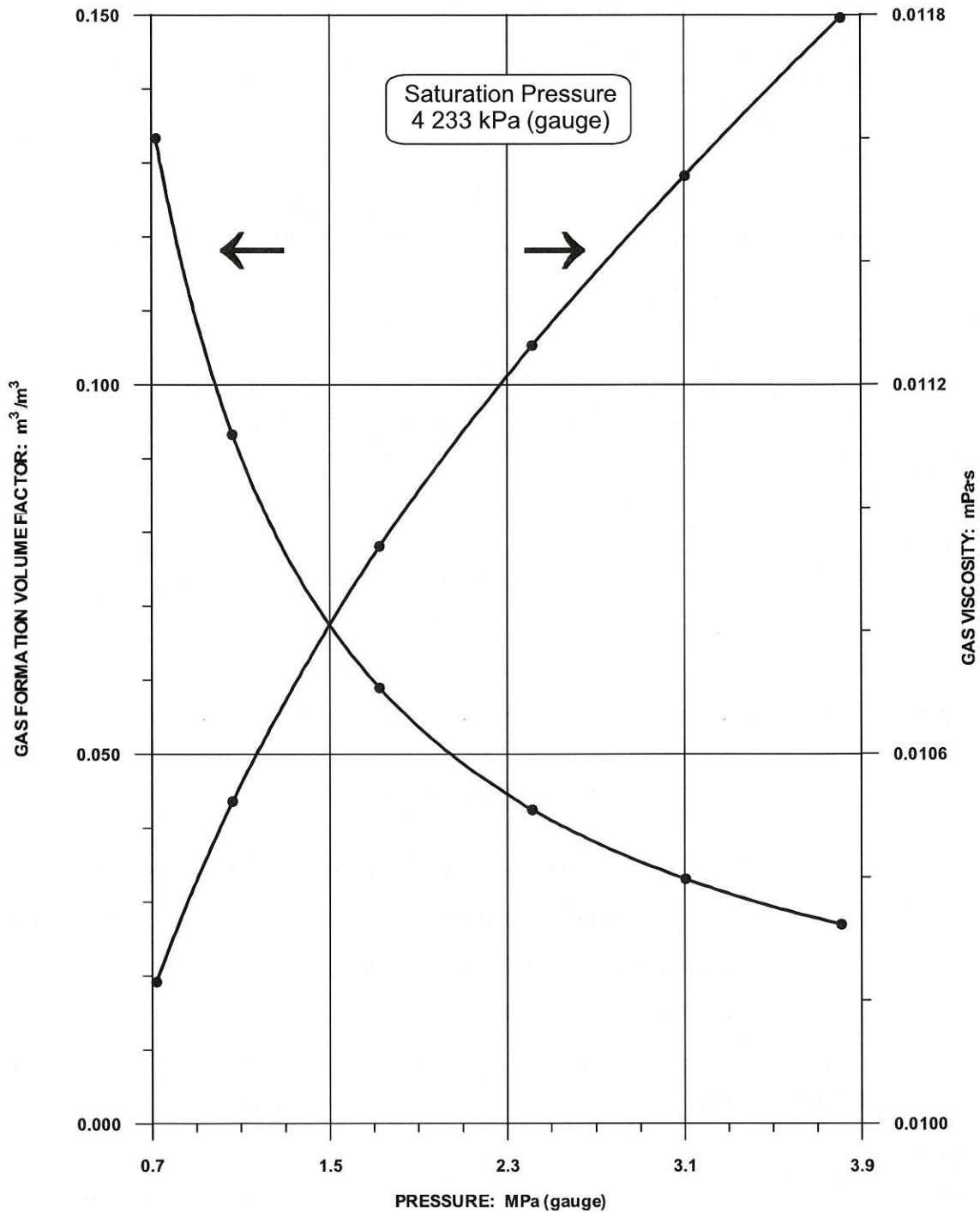
Statistical Summary

r squared: 0.999930
 Confidence Interval (+/-): 0.0002
 Confidence: 99 %

Legend

● Laboratory Data
 --- Confidence Limits
 — Analytical Expression

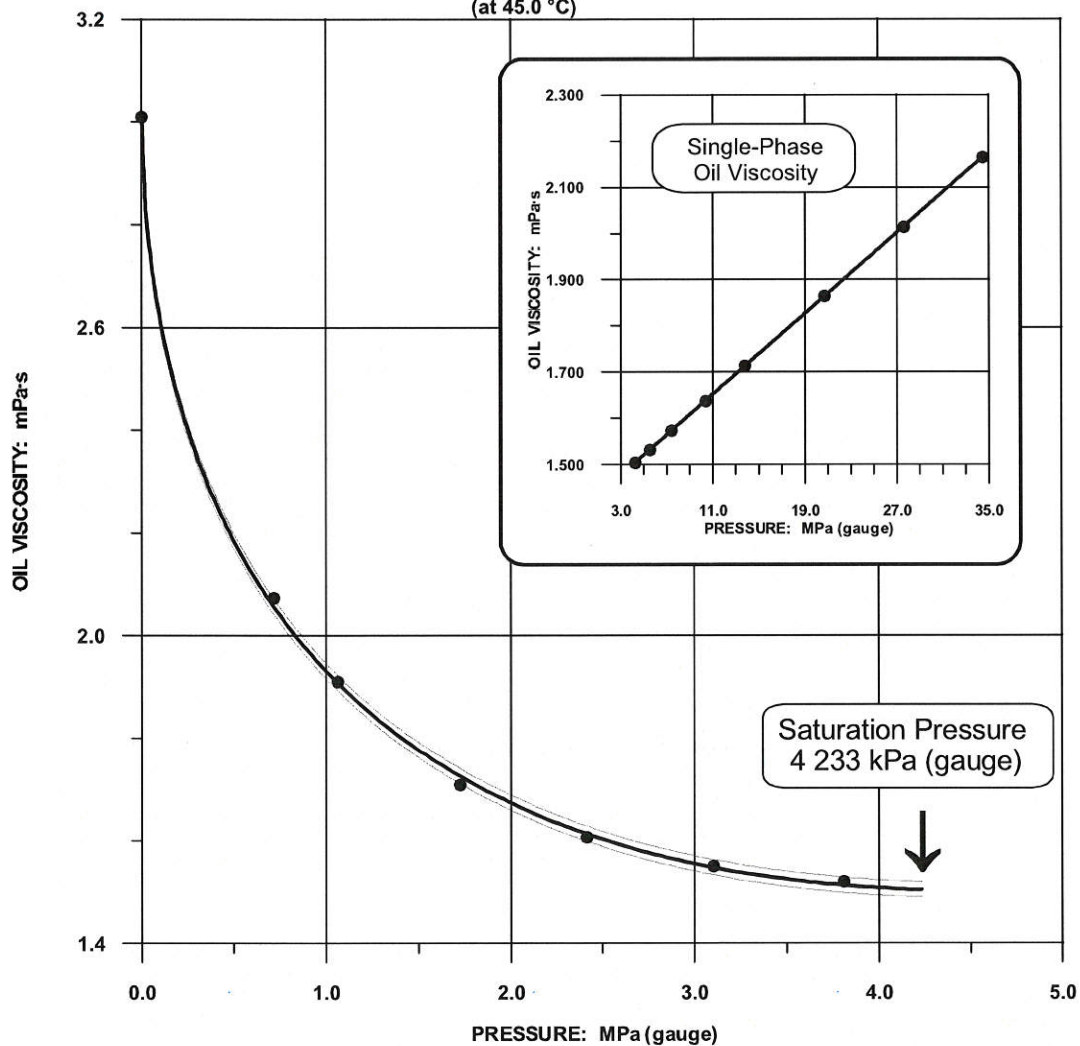
GAS FORMATION VOLUME FACTOR & GAS VISCOSITY
(at 45.0 °C)



Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
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OIL VISCOSITY

(at 45.0 °C)



Analytical Expression (below bubblepoint)

$$3.0105E00 + 1.6175E00 * (X_d)^{1.107} - 3.1001E00 * (X_d)^{0.550}$$

where; X_d is defined as (P / P_{sat})

Statistical Summary

r squared: 0.999901
 Confidence Interval (+/-): 0.0073
 Confidence: 99 %

Legend

● Laboratory Data
 ----- Confidence Limits
 ————— Analytical Expression

DATA ADJUSTMENT

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
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INTRODUCTION TO DATA ADJUSTMENT

Reservoir fluids, while being produced, simultaneously undergo two different thermodynamic processes. One is the flash separation process, which occurs in surface separation facilities, and the second is insitu reservoir fluid expansion ultimately resulting in differential equilibrium separation of gas and oil in the reservoir during reservoir pressure decline.

Flash separation data are referenced to reservoir fluid volumes at saturation pressure (bubblepoint). The data are useable only at the specific instant when the reservoir pressure is equal to the saturation pressure as determined in the PVT study.

It is therefore necessary to adjust flash separation data to account for the insitu changes in reservoir fluid properties that will occur during primary pressure depletion. Both the flash solution gas-oil ratio data (R_s) and the flash formation volume factor data (B_o) require adjustment for pressures above and below the saturation pressure.

A. Solution Gas-Oil Ratio (R_s)

Pressure above P_s : No correction is required, as no gas will escape from solution at pressures above the saturation pressure. Therefore, R_s is equal to flash R_s at all pressures in excess of P_s .

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Pressures below Ps: Due to insitu differential equilibrium separation of gas and oil, flash separator data must be corrected as follows:

$$R_s = R_{sfb} - (R_{sdb} - R_{sd}) * (B_{ofb} / B_{odb})$$

where: **R_s** = Adjusted solution gas-oil ratio

R_{sfb} = Total gas-oil ratio from flash at saturation pressure

R_{sdb} = Gas-oil ratio from differential liberation at saturation pressure

R_{sd} = Gas-oil ratio from differential liberation at pressure less than saturation pressure

B_{ofb} = Formation volume factor from flash at saturation pressure

B_{odb} = Relative oil volume from differential liberation at saturation pressure

This correction must be made for all D.V. gas-oil ratio data points below saturation pressure.

B. Formation Volume Factor (Bo)

Pressure above Ps: Because flash formation volume factors are referenced to a volume at saturation pressure, Bo at pressures above saturation pressure must be corrected to account for oil compressibility. The adjustment is:

$$B_o = B_{ofb} * V/V_{sat}$$

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where; **Bo** = Adjusted flash formation volume factor for pressures above saturation pressure

Bofb = Formation volume factor from flash at saturation pressure
V/Vsat = Relative volume from pressure volume relations at pressure above saturation pressure

Pressure below Ps: Because insitu oil shrinkage occurs due to differential gas liberation at pressures below the saturation pressure (P_s), flash formation volume factors which are referenced to a volume at saturation pressure must be corrected to reflect insitu reservoir fluid shrinkage. The adjustment is as follows:

$$\mathbf{Bo} = \mathbf{Bod} * \mathbf{Bofb} / \mathbf{Bodb}$$

where: **Bo** = Adjusted flash formation volume factor for pressures below saturation pressure

Bod = Relative oil volume from differential liberation at pressure below saturation pressure

Bofb = Formation volume factor from flash at saturation pressure

Bodb = Relative oil volume from differential liberation at saturation pressure

This adjustment must be made for all D.V. relative oil volumes below saturation pressure.

The above adjustments have been made on your behalf and are reported on the following pages.

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Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
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DIFFERENTIAL VAPORIZATION
ADJUSTED TO SEPARATOR CONDITIONS*

Pressure kPa(g)	Solution Gas/Oil Ratio Rs (A)	Formation Volume Factor Bo (B)	Gas Formation Volume Factor (C)	Oil Density kg/m³	Oil/Gas Viscosity Ratio
34 474	37.9	1.089		812.4	
27 579	37.9	1.096		807.5	
20 684	37.9	1.103		802.5	
13 790	37.9	1.110		797.1	
10 342	37.9	1.114		794.2	
r» 7 398	37.9	1.118		791.6	
5 516	37.9	1.120		789.8	
b» 4 233	37.9	1.122		788.5	
3 806	36.3	1.119	0.02704	789.3	129
3 103	33.2	1.113	0.03316	790.9	134
2 413	29.8	1.105	0.04251	792.9	142
1 724	25.7	1.096	0.05899	795.6	157
1 062	20.6	1.084	0.09333	799.2	182
717	17.0	1.074	0.13336	801.9	202

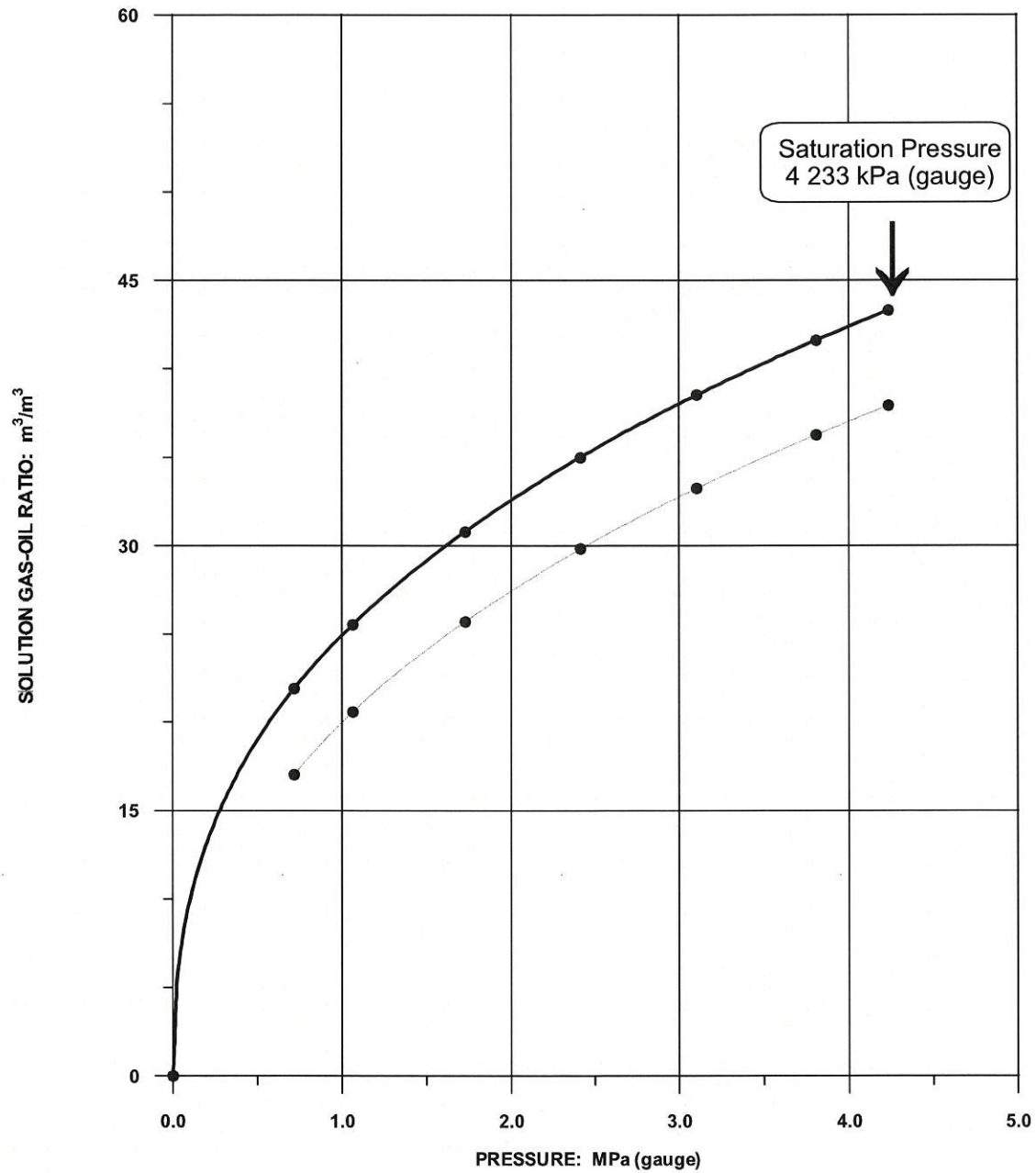
*Separator Conditions	
First Stage Stock Tank	1 103 kPa(g) at 2.0 °C 0 kPa(g) at 15.0 °C

(A) Cubic metres of gas at 101.325 kPa(a) and 15.0 °C per cubic metre of stock tank oil at 15.0 °C.

(B) Cubic metre of oil at indicated pressure and temperature per cubic metre of stock tank oil at 15.0 °C.

(C) Cubic metres of gas at indicated pressure and temperature per cubic metre at 101.325 kPa(a) and 15.0 °C.

ADJUSTED SOLUTION GAS-OIL RATIOS

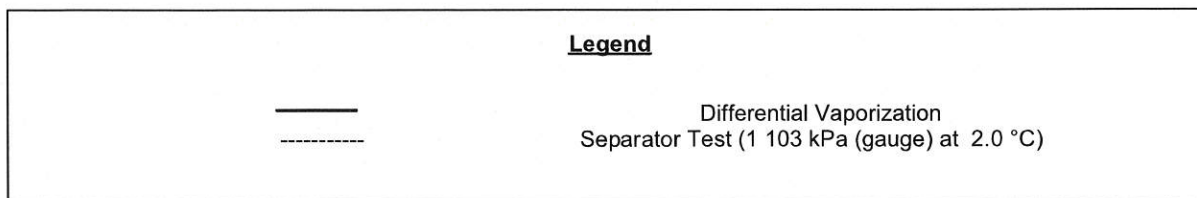
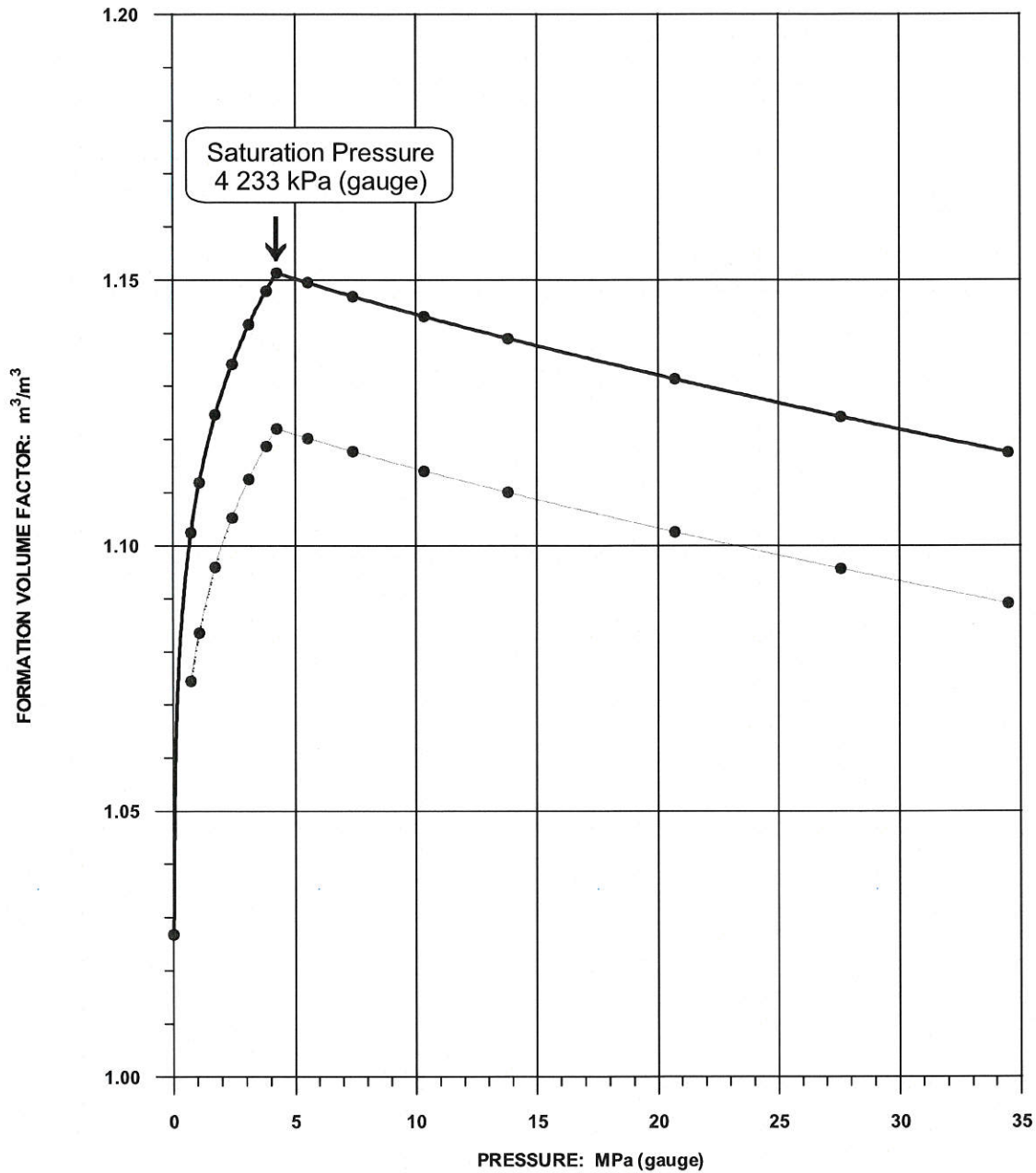


Legend



Differential Vaporization
Separator Test (1 103 kPa (gauge) at 2.0 °C)

ADJUSTED FORMATION VOLUME FACTORS



APPENDIX

Penn West Exploration
Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00
52134-2011-0649

SEPARATOR TEST OF RESERVOIR FLUID

Flash Conditions		Gas/Oil Ratio (m³/m³) (A)	Gas/Oil Ratio (m³/STm³) (B)	Stock Tank Oil Gravity at 15.6 °C (°API)	Formation Volume Factor Bofb (C)	Separator Volume Factor (D)	Specific Gravity of Flashed Gas (Air=1.000)	Oil Phase Density (kg/m³)
kPa(g)	°C							
4 233	45.0							786.7
0	15.0	55.8	55.8	34.2	1.186	1.000	1.342	853.5
			Rsfb =	55.8				

(A) Cubic metres of gas at 101.325 kPa(a) and 15.0 °C per cubic metre of oil at indicated pressure and temperature.

(B) Cubic metres of gas at 101.325 kPa(a) and 15.0 °C per cubic metre of stock tank oil at 15.0 °C.

(C) Cubic metres of saturated oil at 4 233 kPa(g) and 45.0 °C per cubic metre of stock tank oil at 15.0 °C.

(D) Cubic metres of oil at indicated pressure and temperature per cubic metre of stock tank oil at 15.0 °C.

Penn West Exploration

Penn West Waskada Unit No.5 Hz 102/03-03-002-26W1/00

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Report prepared by

Report approved by

**Dale McIlesh
PVT Data Evaluator**

**Dawson Milbury
PVT Specialist**

Test Data

well_location	production_date	Oil (bbl/d)	Gas (mmscf/d)	Water (bbl/d)	hours_on_production
102133100125W100	13/10/2010 0:00	5.35	0	261.43	17
102133100125W100	14/10/2010 0:00	7.55	0	232.62	24
102133100125W100	15/10/2010 0:00	55.29	0.01	130.59	24
102133100125W100	16/10/2010 0:00	61.02	0.01	157.45	24
102133100125W100	17/10/2010 0:00	0	0	0	0
102133100125W100	18/10/2010 0:00	0	0	0	0
102133100125W100	19/10/2010 0:00	0	0	0	0
102133100125W100	20/10/2010 0:00	0	0	0	0
102133100125W100	21/10/2010 0:00	0	0	0	0
102133100125W100	22/10/2010 0:00	0	0	0	0
102133100125W100	23/10/2010 0:00	0	0	0	0
102133100125W100	24/10/2010 0:00	0	0	0	0
102133100125W100	25/10/2010 0:00	0	0	0	0
102133100125W100	26/10/2010 0:00	39.06	0.01	105.55	18
102133100125W100	27/10/2010 0:00	57.75	0.01	188.59	24
102133100125W100	28/10/2010 0:00	57.31	0.01	183.87	24
102133100125W100	29/10/2010 0:00	57.68	0.01	164.81	24
102133100125W100	30/10/2010 0:00	57.87	0.01	154.43	24
102133100125W100	31/10/2010 0:00	55.86	0.01	173.49	24
102133100125W100	01/11/2010 0:00	52.27	0.01	191.55	24
102133100125W100	02/11/2010 0:00	56.49	0.01	165.19	24
102133100125W100	03/11/2010 0:00	55.8	0.01	116.75	24
102133100125W100	04/11/2010 0:00	53.41	0.01	109.96	24
102133100125W100	05/11/2010 0:00	55.17	0.01	114.55	24
102133100125W100	06/11/2010 0:00	55.42	0	116.5	24
102133100125W100	07/11/2010 0:00	55.42	0.02	111.15	24
102133100125W100	08/11/2010 0:00	51.46	0.01	128.7	24
102133100125W100	09/11/2010 0:00	53.34	0.01	112.73	24
102133100125W100	10/11/2010 0:00	53.72	0.01	76.56	24
102133100125W100	11/11/2010 0:00	53.91	0.01	107.32	24
102133100125W100	12/11/2010 0:00	52.97	0.01	126.75	24
102133100125W100	13/11/2010 0:00	55.29	0.01	108.2	24
102133100125W100	14/11/2010 0:00	53.47	0.01	95.74	24
102133100125W100	15/11/2010 0:00	56.36	0.01	112.6	24
102133100125W100	16/11/2010 0:00	57.31	0.01	108.76	24
102133100125W100	17/11/2010 0:00	54.6	0.01	60.07	24
102133100125W100	18/11/2010 0:00	53.97	0.01	93.85	24
102133100125W100	19/11/2010 0:00	58.25	0.01	103.67	24
102133100125W100	20/11/2010 0:00	55.61	0.01	93.6	24
102133100125W100	21/11/2010 0:00	53.85	0.01	77.18	24
102133100125W100	22/11/2010 0:00	55.86	0.01	85.3	24
102133100125W100	23/11/2010 0:00	55.55	0.01	108.76	24
102133100125W100	24/11/2010 0:00	59.51	0.01	97	24
102133100125W100	25/11/2010 0:00	54.92	0.01	117.88	24

well_location	production_date	Oil (bbl/d)	Gas (mmscf/d)	Water (bbl/d)	hours_on_p roduction
102133100125W100	26/11/2010 0:00	56.93	0.01	115.49	24
102133100125W100	27/11/2010 0:00	55.55	0.01	110.08	24
102133100125W100	28/11/2010 0:00	54.92	0.01	109.52	24
102133100125W100	29/11/2010 0:00	62.59	0.01	99.39	24
102133100125W100	30/11/2010 0:00	69.01	0.01	112.54	24
102133100125W100	01/12/2010 0:00	80.14	0.01	121.16	24
102133100125W100	02/12/2010 0:00	52.97	0.01	92.47	24
102133100125W100	03/12/2010 0:00	65.86	0.01	87.25	24
102133100125W100	04/12/2010 0:00	65.23	0	98.7	24
102133100125W100	05/12/2010 0:00	68.38	0.01	111.22	24
102133100125W100	06/12/2010 0:00	62.15	0.01	94.42	24
102133100125W100	07/12/2010 0:00	64.6	0.01	110.08	24
102133100125W100	08/12/2010 0:00	62.28	0.01	106.31	24
102133100125W100	09/12/2010 0:00	51.65	0.01	69.07	24
102133100125W100	10/12/2010 0:00	66.68	0.01	65.17	24
102133100125W100	11/12/2010 0:00	56.49	0.01	85.8	24
102133100125W100	12/12/2010 0:00	60.26	0.01	74.54	24
102133100125W100	13/12/2010 0:00	53.03	0.01	111.15	24
102133100125W100	14/12/2010 0:00	53.15	0.01	111.4	24
102133100125W100	15/12/2010 0:00	65.17	0.01	105.93	24
102133100125W100	16/12/2010 0:00	58.38	0.01	108.13	24
102133100125W100	17/12/2010 0:00	53.28	0.01	108.2	24
102133100125W100	18/12/2010 0:00	66.81	0.01	118.39	24
102133100125W100	19/12/2010 0:00	51.08	0.01	112.85	24
102133100125W100	20/12/2010 0:00	60.51	0.01	113.42	24
102133100125W100	21/12/2010 0:00	69.01	0.01	102.66	24
102133100125W100	22/12/2010 0:00	56.99	0.01	115.68	24
102133100125W100	23/12/2010 0:00	52.21	0.01	124.36	24
102133100125W100	24/12/2010 0:00	53.34	0.01	110.08	24
102133100125W100	25/12/2010 0:00	60.45	0.01	116.81	24
102133100125W100	26/12/2010 0:00	54.85	0.01	108.83	24
102133100125W100	27/12/2010 0:00	49.95	0.01	113.61	24
102133100125W100	28/12/2010 0:00	57.31	0.01	113.48	24
102133100125W100	29/12/2010 0:00	55.99	0.01	95.55	24
102133100125W100	30/12/2010 0:00	45.61	0.02	106.31	24
102133100125W100	31/12/2010 0:00	63.97	0.02	110.9	24
102133100125W100	01/01/2011 0:00	58.82	0.01	107.44	24
102133100125W100	02/01/2011 0:00	43.03	0.02	104.74	24
102133100125W100	03/01/2011 0:00	50.32	0.02	119.9	24
102133100125W100	04/01/2011 0:00	54.04	0.01	93.6	24
102133100125W100	05/01/2011 0:00	59.45	0.01	63.22	24
102133100125W100	06/01/2011 0:00	56.74	0.01	109.96	24
102133100125W100	07/01/2011 0:00	68.13	0.01	114.99	24
102133100125W100	08/01/2011 0:00	66.36	0.01	92.47	24

well_location	production_date	Oil (bbl/d)	Gas (mmscf/d)	Water (bbl/d)	hours_on_production
102133100125W100	09/01/2011 0:00	61.71	0.01	103.86	24
102133100125W100	10/01/2011 0:00	72.66	0.01	92.34	24
102133100125W100	11/01/2011 0:00	79.83	0.01	96.18	24
102133100125W100	12/01/2011 0:00	70.96	0.01	130.78	24
102133100125W100	13/01/2011 0:00	66.11	0.01	97.94	24
102133100125W100	14/01/2011 0:00	60.26	0.01	117.7	24
102133100125W100	15/01/2011 0:00	32.46	0	90.08	24
102133100125W100	16/01/2011 0:00	53.15	0	81.59	24
102133100125W100	17/01/2011 0:00	47.56	0	101.84	24
102133100125W100	18/01/2011 0:00	30.51	0	66.49	18
102133100125W100	19/01/2011 0:00	40.26	0	94.04	24
102133100125W100	20/01/2011 0:00	36.67	0	89.39	24
102133100125W100	21/01/2011 0:00	53.41	0	93.54	24
102133100125W100	22/01/2011 0:00	27.87	0.01	89.07	24
102133100125W100	23/01/2011 0:00	26.11	0.01	73.28	24
102133100125W100	24/01/2011 0:00	24.97	0.01	81.84	24
102133100125W100	25/01/2011 0:00	29.57	0.01	87.63	24
102133100125W100	26/01/2011 0:00	19.75	0.01	81.71	24
102133100125W100	27/01/2011 0:00	21.2	0.01	75.17	24
102133100125W100	28/01/2011 0:00	19.19	0.01	71.46	18
102133100125W100	29/01/2011 0:00	27.87	0.01	63.79	24
102133100125W100	30/01/2011 0:00	25.6	0.01	74.61	24
102133100125W100	31/01/2011 0:00	23.9	0.01	76.24	24
102133100125W100	01/02/2011 0:00	23.15	0.01	72.03	24
102133100125W100	02/02/2011 0:00	22.14	0.01	54.73	24
102133100125W100	03/02/2011 0:00	0	0	0	0
102133100125W100	04/02/2011 0:00	0	0	0	0
102133100125W100	05/02/2011 0:00	0	0	0	0
102133100125W100	06/02/2011 0:00	0	0	0	0
102133100125W100	07/02/2011 0:00	0	0	0	0
102133100125W100	08/02/2011 0:00	0	0	0	0
102133100125W100	09/02/2011 0:00	11.13	0.01	45.35	15
102133100125W100	10/02/2011 0:00	22.27	0.01	77.94	24
102133100125W100	11/02/2011 0:00	18.87	0.01	97.31	24
102133100125W100	12/02/2011 0:00	21.32	0.01	97.57	24
102133100125W100	13/02/2011 0:00	20.88	0.01	88.07	24
102133100125W100	14/02/2011 0:00	20.7	0.01	90.9	24
102133100125W100	15/02/2011 0:00	21.64	0.01	95.87	24
102133100125W100	16/02/2011 0:00	28.56	0.01	105.81	24
102133100125W100	17/02/2011 0:00	27.8	0.01	112.79	24
102133100125W100	18/02/2011 0:00	29.88	0.01	119.2	24
102133100125W100	19/02/2011 0:00	26.61	0.01	104.3	24
102133100125W100	20/02/2011 0:00	27.24	0.01	120.09	24
102133100125W100	21/02/2011 0:00	27.49	0.01	119.77	24

well_location	production_date	Oil (bbl/d)	Gas (mmscf/d)	Water (bbl/d)	hours_on_p roduction
102133100125W100	22/02/2011 0:00	27.17	0.01	155.82	24
102133100125W100	23/02/2011 0:00	27.17	0.01	147.58	24
102133100125W100	24/02/2011 0:00	26.55	0.01	111.34	24
102133100125W100	25/02/2011 0:00	26.17	0.01	130.4	24
102133100125W100	26/02/2011 0:00	25.98	0.01	176.95	24
102133100125W100	27/02/2011 0:00	25.79	0.01	153.05	24
102133100125W100	28/02/2011 0:00	26.23	0.01	124.17	24
102133100125W100	01/03/2011 0:00	28.56	0.01	109.27	24
102133100125W100	02/03/2011 0:00	25.54	0.01	109.33	24
102133100125W100	03/03/2011 0:00	26.86	0.01	120.84	24
102133100125W100	04/03/2011 0:00	25.1	0.01	95.24	24
102133100125W100	05/03/2011 0:00	25.29	0.01	114.05	24
102133100125W100	06/03/2011 0:00	27.17	0.01	115.93	24
102133100125W100	07/03/2011 0:00	25.1	0.01	104.23	24
102133100125W100	08/03/2011 0:00	24.66	0.01	90.52	24
102133100125W100	09/03/2011 0:00	20.51	0.01	85.36	20
102133100125W100	10/03/2011 0:00	23.59	0.01	108.01	24
102133100125W100	11/03/2011 0:00	24.72	0.01	121.78	24
102133100125W100	12/03/2011 0:00	24.6	0.01	88.57	24
102133100125W100	13/03/2011 0:00	25.73	0.01	113.92	24
102133100125W100	14/03/2011 0:00	25.16	0.01	104.04	24
102133100125W100	15/03/2011 0:00	26.29	0.01	99.45	24
102133100125W100	15/03/2011 0:00	30.76	6.71	53.47	24
102133100125W100	16/03/2011 0:00	9.06	2.83	35.42	8
102133100125W100	17/03/2011 0:00	9	3.53	53.47	10
102133100125W100	18/03/2011 0:00	28.31	8.48	106.37	24
102133100125W100	19/03/2011 0:00	27.49	9.89	108.39	24
102133100125W100	20/03/2011 0:00	29.88	10.59	121.28	24
102133100125W100	21/03/2011 0:00	24.22	9.53	110.65	24
102133100125W100	22/03/2011 0:00	7.67	3.53	31.58	8
102133100125W100	23/03/2011 0:00	28.68	10.24	105.93	24
102133100125W100	24/03/2011 0:00	16.8	6.36	53.34	15
102133100125W100	25/03/2011 0:00	11.76	3.53	35.23	11
102133100125W100	26/03/2011 0:00	15.66	5.3	66.74	15
102133100125W100	27/03/2011 0:00	23.46	6.71	100.4	24
102133100125W100	28/03/2011 0:00	20.19	9.18	102.91	24
102133100125W100	29/03/2011 0:00	26.17	7.77	119.65	24
102133100125W100	30/03/2011 0:00	30.07	8.12	94.11	24
102133100125W100	31/03/2011 0:00	25.48	2.12	114.8	24
102133100125W100	01/04/2011 0:00	30.51	9.53	103.73	24
102133100125W100	02/04/2011 0:00	23.59	9.53	102.22	24
102133100125W100	03/04/2011 0:00	27.8	10.24	126.69	24
102133100125W100	04/04/2011 0:00	30.38	9.53	93.1	24
102133100125W100	05/04/2011 0:00	26.48	9.89	114.99	24

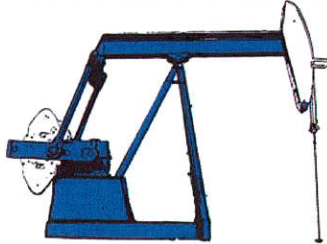
well_location	production_date	Oil (bbl/d)	Gas (mmscf/d)	Water (bbl/d)	hours_on_production
102133100125W100	06/04/2011 0:00	34.03	14.48	107.25	24
102133100125W100	07/04/2011 0:00	35.35	13.77	36.67	24
102133100125W100	08/04/2011 0:00	29.13	13.07	86.18	24
102133100125W100	09/04/2011 0:00	27.55	11.3	113.98	24
102133100125W100	10/04/2011 0:00	29.06	8.48	114.86	24
102133100125W100	11/04/2011 0:00	24.72	9.53	101.59	24
102133100125W100	12/04/2011 0:00	22.96	5.65	100.4	24
102133100125W100	13/04/2011 0:00	27.11	8.83	97	24
102133100125W100	14/04/2011 0:00	24.53	9.53	101.09	24
102133100125W100	15/04/2011 0:00	0	0	0	0
102133100125W100	16/04/2011 0:00	0	0	0	0
102133100125W100	17/04/2011 0:00	0	0	0	0
102133100125W100	18/04/2011 0:00	0	0	0	0
102133100125W100	19/04/2011 0:00	0	0	0	0
102133100125W100	20/04/2011 0:00	0	0	0	0
102133100125W100	21/04/2011 0:00	0	0	0	0
102133100125W100	22/04/2011 0:00	0	0	0	0
102133100125W100	23/04/2011 0:00	0	0	0	0
102133100125W100	24/04/2011 0:00	0	0	0	0
102133100125W100	25/04/2011 0:00	0	0	0	0
102133100125W100	26/04/2011 0:00	0	0	0	0
102133100125W100	27/04/2011 0:00	0	0	0	0
102133100125W100	28/04/2011 0:00	0	0	0	0
102133100125W100	29/04/2011 0:00	0	0	0	0
102133100125W100	30/04/2011 0:00	0	0	0	0
102133100125W100	01/05/2011 0:00	0	0	0	0
102133100125W100	02/05/2011 0:00	0	0	0	0
102133100125W100	03/05/2011 0:00	0	0	0	0
102133100125W100	04/05/2011 0:00	0	0	0	0
102133100125W100	05/05/2011 0:00	0	0	0	0
102133100125W100	06/05/2011 0:00	0	0	0	0
102133100125W100	07/05/2011 0:00	0	0	0	0
102133100125W100	08/05/2011 0:00	0	0	0	0
102133100125W100	09/05/2011 0:00	0	0	0	0
102133100125W100	10/05/2011 0:00	0	0	0	0
102133100125W100	11/05/2011 0:00	0	0	0	0
102133100125W100	12/05/2011 0:00	0	0	0	0
102133100125W100	13/05/2011 0:00	0	0	0	0
102133100125W100	14/05/2011 0:00	0	0	0	0
102133100125W100	15/05/2011 0:00	0	0	0	0
102133100125W100	16/05/2011 0:00	0	0	0	0
102133100125W100	17/05/2011 0:00	0	0	0	0
102133100125W100	18/05/2011 0:00	0	0	0	0
102133100125W100	19/05/2011 0:00	0	0	0	0

well_location	production_date	Oil (bbl/d)	Gas (mmscf/d)	Water (bbl/d)	hours_on_production
102133100125W100	20/05/2011 0:00	0	0	0	0
102133100125W100	21/05/2011 0:00	0	0	0	0
102133100125W100	22/05/2011 0:00	0	0	0	0
102133100125W100	23/05/2011 0:00	0	0	0	0
102133100125W100	24/05/2011 0:00	0	0	0	0
102133100125W100	25/05/2011 0:00	0	0	0	0
102133100125W100	26/05/2011 0:00	0	0	0	0
102133100125W100	27/05/2011 0:00	0	0	0	0
102133100125W100	28/05/2011 0:00	1.13	7.77	344.78	24
102133100125W100	29/05/2011 0:00	57.05	8.12	332.2	24
102133100125W100	30/05/2011 0:00	71.15	11.3	287.35	24
102133100125W100	31/05/2011 0:00	69.01	11.3	248.54	24
102133100125W100	01/06/2011 0:00	68.13	10.95	281.75	24
102133100125W100	02/06/2011 0:00	69.13	10.95	254.58	24
102133100125W100	03/06/2011 0:00	68.25	12.36	267.98	24
102133100125W100	04/06/2011 0:00	68.38	11.65	301.82	24
102133100125W100	05/06/2011 0:00	63.41	12.01	256.21	24
102133100125W100	06/06/2011 0:00	65.99	12.01	241.87	24
102133100125W100	07/06/2011 0:00	28.37	26.84	161.54	24
102133100125W100	08/06/2011 0:00	31.89	27.55	159.78	24
102133100125W100	09/06/2011 0:00	29.19	26.84	155.75	24
102133100125W100	10/06/2011 0:00	28.75	28.25	172.17	24
102133100125W100	11/06/2011 0:00	30.19	28.96	174.06	24
102133100125W100	12/06/2011 0:00	30.95	26.13	174.12	24
102133100125W100	13/06/2011 0:00	31.83	26.49	192.99	24
102133100125W100	14/06/2011 0:00	31.64	25.43	158.08	24
102133100125W100	15/06/2011 0:00	30.57	24.01	167.14	24
102133100125W100	16/06/2011 0:00	30.26	23.66	140.03	24
102133100125W100	17/06/2011 0:00	27.93	24.37	153.49	24
102133100125W100	18/06/2011 0:00	28.18	25.43	168.84	24
102133100125W100	19/06/2011 0:00	22.83	27.19	190.04	24
102133100125W100	20/06/2011 0:00	31.45	27.55	156.13	24
102133100125W100	21/06/2011 0:00	30.07	25.78	153.17	24
102133100125W100	22/06/2011 0:00	30.76	30.02	174.75	24
102133100125W100	23/06/2011 0:00	30.7	28.25	160.16	24
102133100125W100	24/06/2011 0:00	31.08	27.55	164.5	24
102133100125W100	25/06/2011 0:00	31.89	28.25	158.96	24
102133100125W100	26/06/2011 0:00	17.05	27.9	98.19	24
102133100125W100	27/06/2011 0:00	17.87	28.25	99.89	24
102133100125W100	28/06/2011 0:00	16.61	26.84	98.45	24
102133100125W100	29/06/2011 0:00	16.42	26.84	85.42	24
102133100125W100	30/06/2011 0:00	16.92	26.49	97.5	24
102133100125W100	01/07/2011 0:00	17.68	26.84	97.94	24
102133100125W100	02/07/2011 0:00	17.42	27.19	105.62	24

well_location	production_date	Oil (bbl/d)	Gas (mmscf/d)	Water (bbl/d)	hours_on_p roduction
102133100125W100	03/07/2011 0:00	16.36	25.78	99.45	24
102133100125W100	04/07/2011 0:00	16.61	24.72	100.14	24
102133100125W100	05/07/2011 0:00	16.42	27.19	108.07	24
102133100125W100	06/07/2011 0:00	16.36	26.84	100.52	24
102133100125W100	07/07/2011 0:00	16.92	27.19	99.2	24
102133100125W100	08/07/2011 0:00	16.73	25.07	94.8	24
102133100125W100	09/07/2011 0:00	16.36	25.43	101.09	24
102133100125W100	10/07/2011 0:00	15.35	23.66	82.66	21
102133100125W100	11/07/2011 0:00	15.66	24.37	104.42	24
102133100125W100	12/07/2011 0:00	0	0	0	0
102133100125W100	13/07/2011 0:00	0	0	0	0
102133100125W100	14/07/2011 0:00	0	0	0	0
102133100125W100	15/07/2011 0:00	0	0	0	0
102133100125W100	16/07/2011 0:00	0	0	0	0
102133100125W100	17/07/2011 0:00	0	0	0	0
102133100125W100	18/07/2011 0:00	0	0	0	0
102133100125W100	19/07/2011 0:00	0	0	0	0
102133100125W100	20/07/2011 0:00	0	0	0	0
102133100125W100	21/07/2011 0:00	0	0	0	0
102133100125W100	22/07/2011 0:00	0	0	0	0
102133100125W100	23/07/2011 0:00	0	0	0	0
102133100125W100	24/07/2011 0:00	0	0	0	0
102133100125W100	25/07/2011 0:00	0	0	0	0
102133100125W100	26/07/2011 0:00	12.52	20.13	73.03	20
102133100125W100	27/07/2011 0:00	16.67	26.49	90.58	24
102133100125W100	28/07/2011 0:00	17.8	26.49	93.98	24
102133100125W100	29/07/2011 0:00	15.98	27.55	83.22	24
102133100125W100	30/07/2011 0:00	10.82	16.24	59	15
102133100125W100	31/07/2011 0:00	17.17	25.78	90.58	24
102133100125W100	01/08/2011 0:00	16.48	22.6	92.91	24
102133100125W100	02/08/2011 0:00	15.22	0	93.41	24

**ACOUSTIC PRESSURE SURVEY
BUILD-UP TEST**

LEVEL BEST



TECHNOLOGIES LTD.

WASKADA UNIT NO. 3 HZNTL 13-31-1-25

102/13-31-001-25W1/0

Surface Location: 100/10-31-001-25W1/0 (HZTL)

License: 007314

Field: WASKADA MB

Formation: AMRANTH

Pool: LOWER AMARANTH A

JULY 2011

DATA COLLECTION SERVICES

Prepared by: Sean Chakowski, C.E.T. (NR-Tec Ltd.)

Date: 2011-Jul-25

**Prepared for: BRAD CALDWELL
PENN WEST PETROLEUM**

NR-Tec Ltd.

P.O. Box 36028 Lakeview RPO, Calgary, Alberta, Canada T3E 7C6

Tel: (403) 283-1416 Fax: (403) 206-7783

<http://www.nr-tec.com>

PENN WEST PETROLEUM

ACOUSTIC PRESSURE SURVEY (BUILD-UP)

WASKADA UNIT NO. 3 HZNTL 13-31-1-25

102/13-31-001-25W1/0

WASKADA MB

POOL: LOWER AMARANTH A

2011-JUL-11 TO 2011-JUL-21

TEST SUMMARY:

- An acoustic well sounder instrument was installed into the casing on 2011-07-11 at 13:14 hours. The fluid level was at 94.2 joints.
- The well was shut-in on 2011-07-11 at 13:14 hours to start the build-up.
- The build-up test was concluded on 2011-07-21 at 06:44 hours.
- A final bottomhole pressure of 1,904 kPa (absolute) was calculated at the mid-point of the producing interval after 9.7 days of shut-in.
- The rate of change in pressure during the last 8.0 hours of shut-in is 0.90 kPa/hr.

PRESSURE DATA CALCULATIONS:

- The bottomhole pressures were calculated using the following information:

Atmospheric Pressure	93.0 kPa
Formation Depth	900.48 m KB (TVD) / 1,355.15 m KB
Oil Gravity	37.79 °API
Water Gravity	1.067
Gas Gravity	0.750
Oil Production	2.76 m ³ /d
Water Production	14.39 m ³ /d
Gas Production	0.60 E ³ m ³ /d
Bottomhole Temperature	50.00 °C

ATTACHMENTS:

ACOUSTIC WELLSOUNDER PRESSURE SURVEY DATA

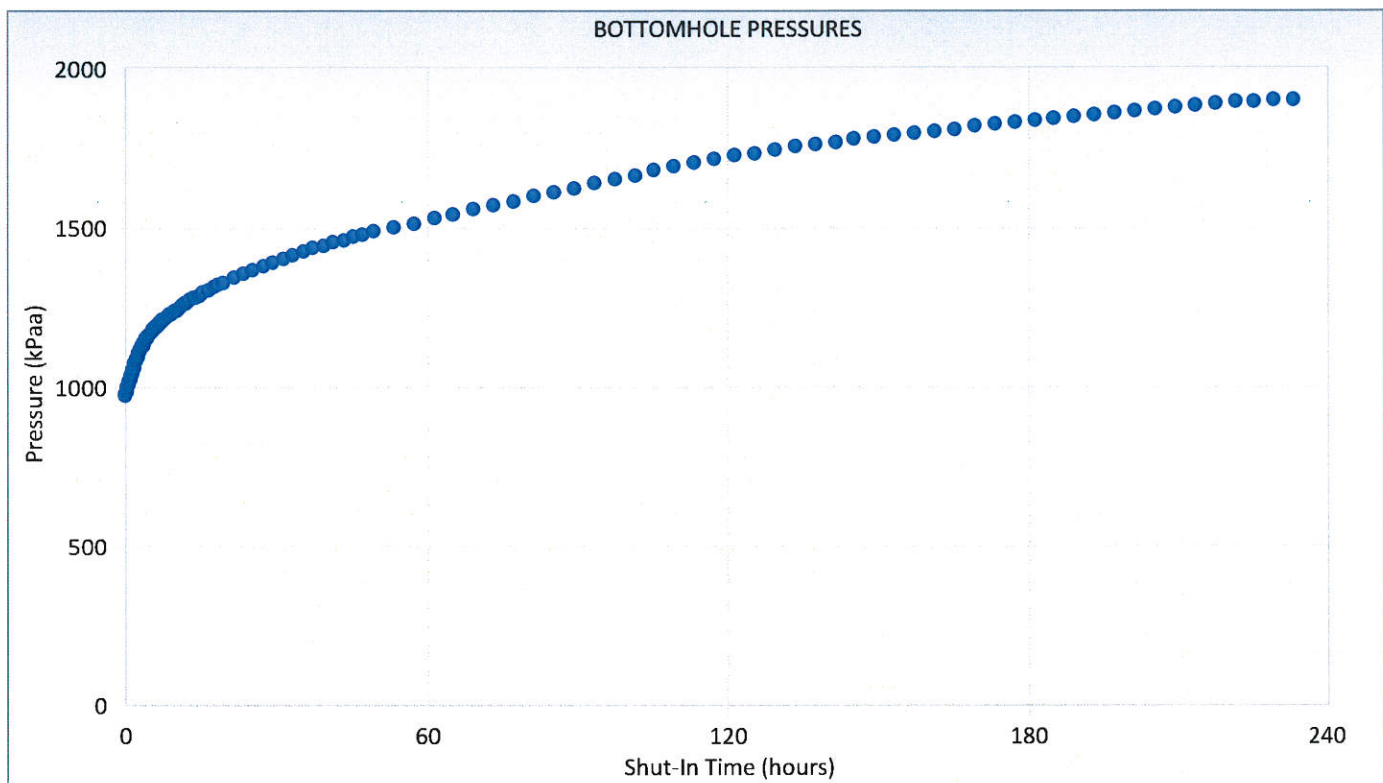
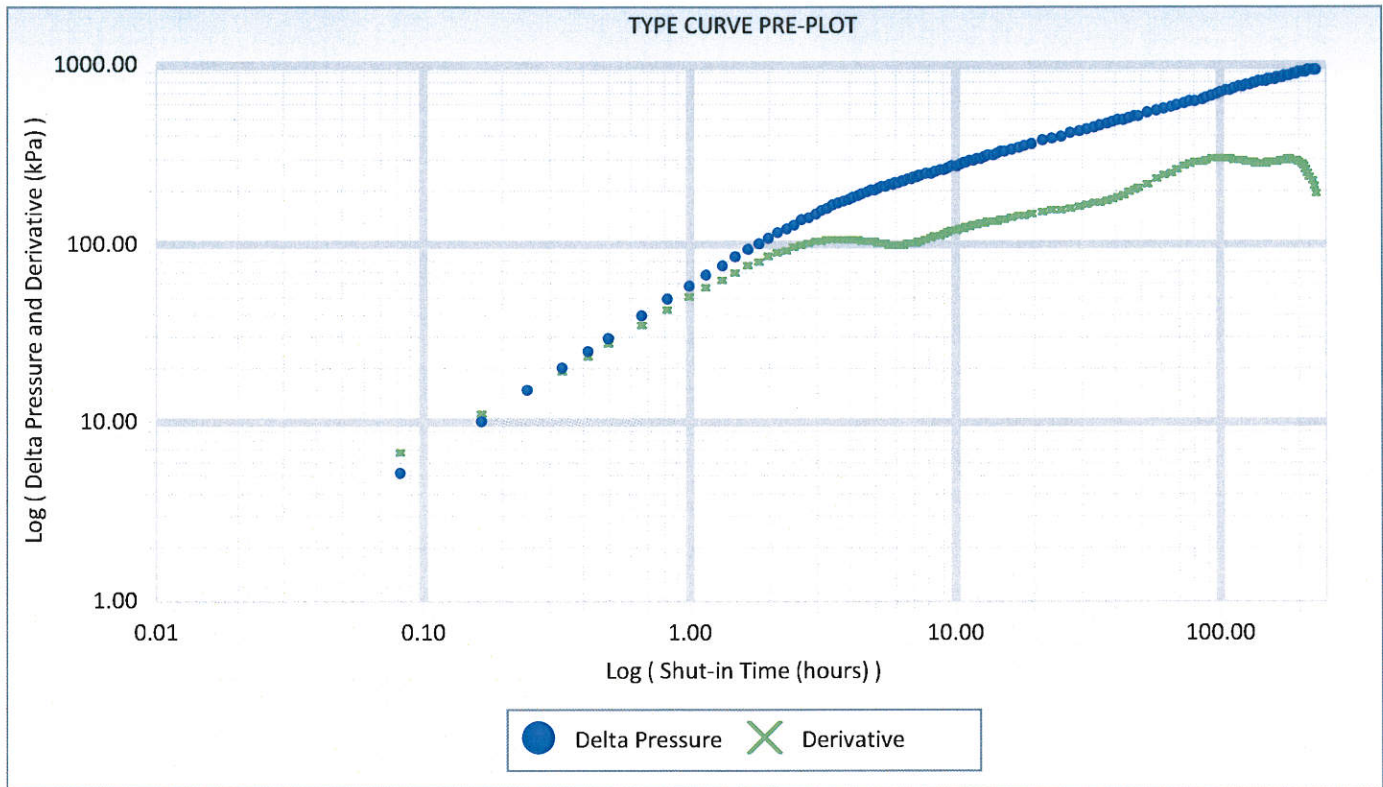
TYPE CURVE PRE-PLOT

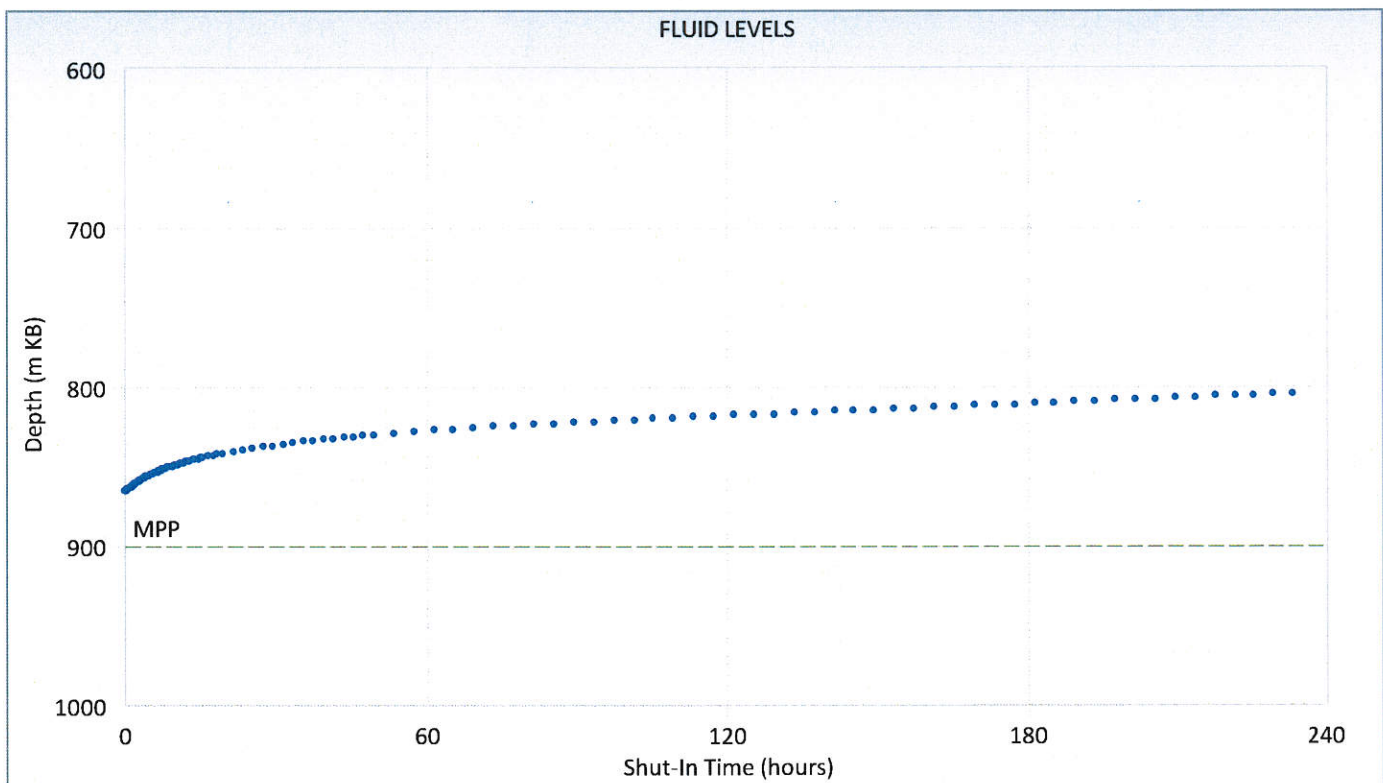
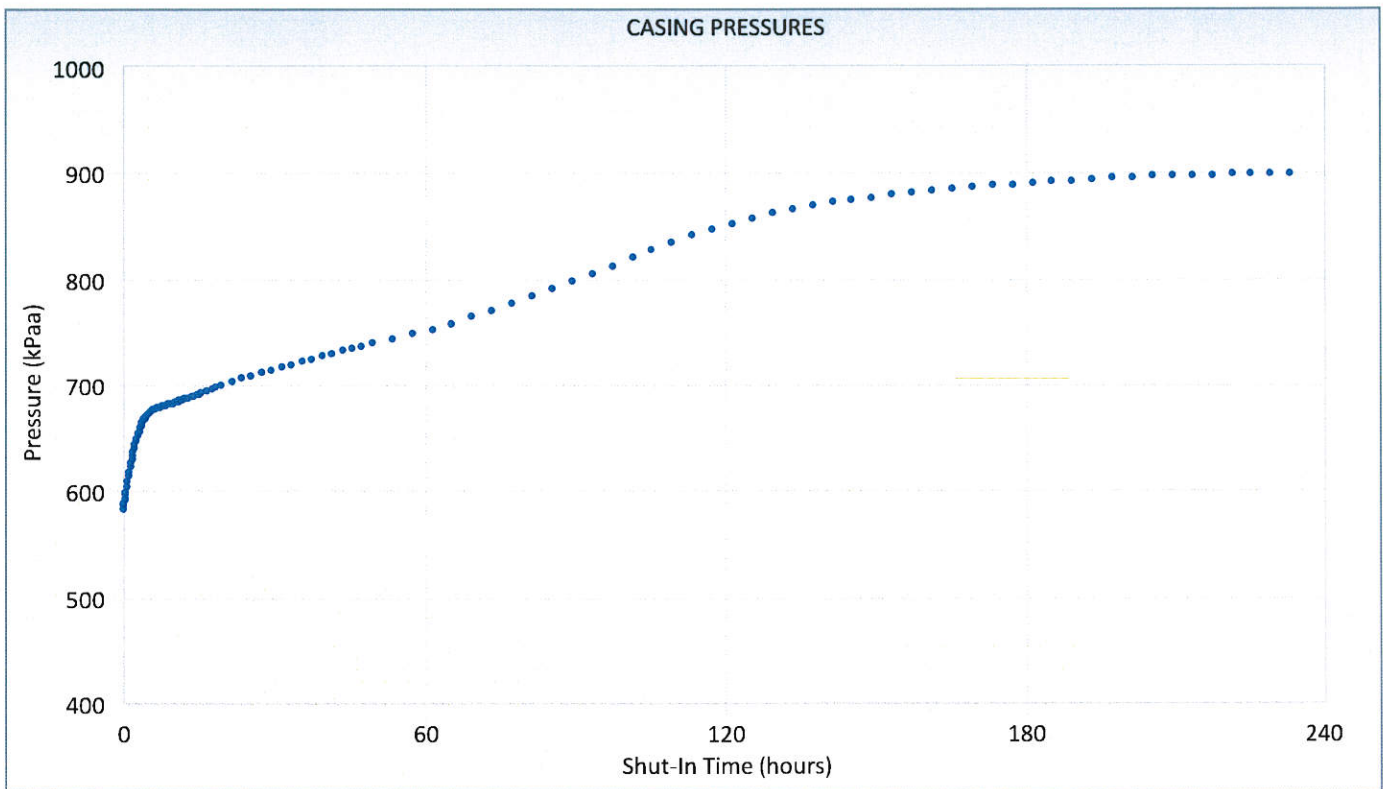
BOTTOMHOLE PRESSURE VERSUS TIME

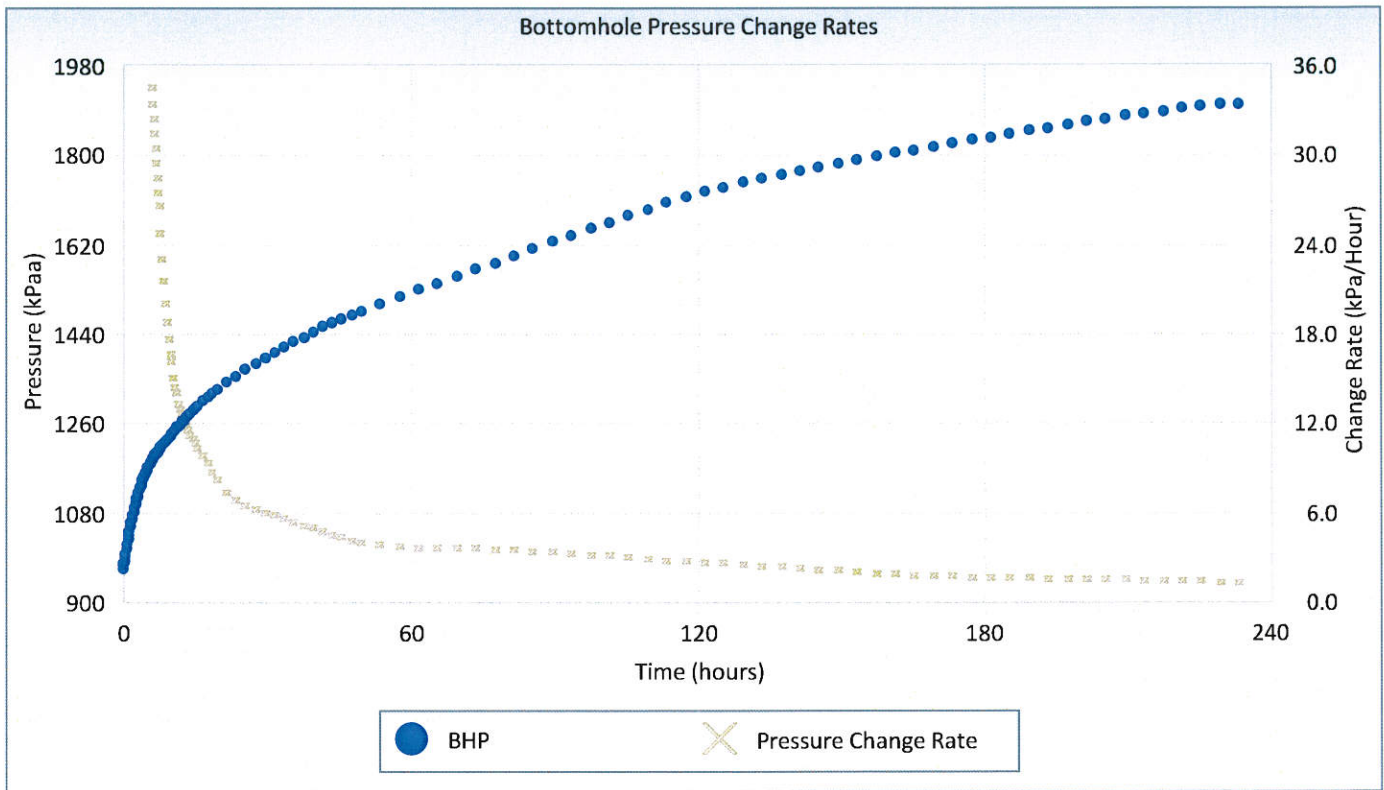
CASING PRESSURE VERSUS TIME

FLUID LEVEL VERSUS TIME









ACOUSTIC WELLSOUNDER PRESSURE SURVEY

COMPANY: PENN WEST PETROLEUM	POOL: LOWER AMARANTH A	U.W.I.: 102/13-31-001-25W1/0
FIELD: WASKADA MB	WELL STATUS: OIL	WELL NAME: WASKADA UNIT NO. 3 HZNTL 13-31-1-25
SHUT-IN: 2011-Jul-11 @ 13:14:53	LICENSE: 007314	SURFACE LCN.: 100/10-31-001-25W1/0 (HZTL)

ELEVATIONS:	FLUID PROPERTIES:	TEMPERATURES:
Kelly Bushing (KB): 476.20 m	Gas Gravity: 0.750	Surface: 2.50 °C
Ground Level (GL): 471.40 m	Oil Gravity: 37.790 °API	Reservoir: 50.00 °C
KB to GL: 4.80 m	Water Gravity: 1.067	

PRODUCTION RATES:	PRODUCING INTERVAL:
Gas: 0.60 E ³ m ³ /d	Top: 900.27 m KB (TVD)
Oil: 2.76 m ³ /d	1,038.00 m KB (MD)
Water: 14.39 m ³ /d	Bottom: 900.96 m KB (TVD)
	1,672.30 m KB (MD)
	Mid-Point: 900.48 m KB (TVD)
	1,355.15 m KB (MD)

NOTES:

All calculated depths have been corrected to True Vertical Depth.

NO.	TEST		JOINTS		SURFACE PRESSURE (kPaa)	GAS COLUMN			OIL COLUMN			EMULSION COLUMN			PRESSURE @ MPP
	TIME (hours)	DATE	TIME	TO LIQUID		HEIGHT (m)	GRADIENT (kPa/m)	PRESSURE (kPa)	HEIGHT (m)	GRADIENT (kPa/m)	PRESSURE (kPa)	HEIGHT (m)	GRADIENT (kPa/m)	PRESSURE (kPa)	
1	0.000	2011-Jul-11	13:14:53	94.19	583.3	860.8	0.053	45.8	3.5	7.904	27.9	31.4	9.929	311.5	968.3
2	0.083	2011-Jul-11	13:19:53	94.14	586.1	860.6	0.053	46.0	3.5	7.904	28.0	31.6	9.929	313.4	973.6
3	0.167	2011-Jul-11	13:24:53	94.10	588.9	860.4	0.054	46.2	3.6	7.904	28.2	31.7	9.929	315.0	978.3
4	0.250	2011-Jul-11	13:29:53	94.05	591.7	860.2	0.054	46.4	3.6	7.904	28.3	31.9	9.929	317.0	983.4
5	0.333	2011-Jul-11	13:34:53	94.00	594.4	859.9	0.054	46.6	3.6	7.904	28.5	32.1	9.929	319.0	988.5
6	0.417	2011-Jul-11	13:39:53	93.95	597.0	859.7	0.054	46.8	3.6	7.904	28.7	32.3	9.929	321.0	993.5
7	0.500	2011-Jul-11	13:44:53	93.91	599.5	859.5	0.055	47.0	3.7	7.904	28.9	32.5	9.929	322.6	998.0
8	0.667	2011-Jul-11	13:54:53	93.81	604.5	859.1	0.055	47.4	3.7	7.904	29.3	32.9	9.929	326.6	1007.8
9	0.833	2011-Jul-11	14:04:53	93.72	609.3	858.7	0.056	47.8	3.8	7.903	29.6	33.3	9.929	330.3	1017.0
10	1.000	2011-Jul-11	14:14:53	93.63	614.0	858.2	0.056	48.1	3.8	7.903	30.0	33.6	9.929	334.1	1026.1
11	1.167	2011-Jul-11	14:24:53	93.55	618.3	857.9	0.056	48.4	3.8	7.903	30.3	34.0	9.929	337.4	1034.5
12	1.333	2011-Jul-11	14:34:53	93.46	622.6	857.4	0.057	48.7	3.9	7.903	30.7	34.4	9.929	341.2	1043.3
13	1.500	2011-Jul-11	14:44:53	93.38	626.6	857.0	0.057	49.1	3.9	7.903	31.0	34.7	9.929	344.7	1051.4
14	1.667	2011-Jul-11	14:54:53	93.29	630.4	856.6	0.058	49.3	4.0	7.903	31.3	35.1	9.929	348.6	1059.7
15	1.833	2011-Jul-11	15:04:53	93.21	634.1	856.2	0.058	49.6	4.0	7.903	31.7	35.5	9.929	352.1	1067.5
16	2.000	2011-Jul-11	15:14:53	93.13	637.6	855.8	0.058	49.9	4.0	7.903	32.0	35.8	9.929	355.7	1075.1
17	2.167	2011-Jul-11	15:24:53	93.06	640.9	855.5	0.059	50.1	4.1	7.903	32.2	36.1	9.929	358.8	1082.1
18	2.333	2011-Jul-11	15:34:53	92.99	644.1	855.1	0.059	50.3	4.1	7.903	32.5	36.5	9.929	362.0	1088.9
19	2.500	2011-Jul-11	15:44:53	92.92	647.0	854.8	0.059	50.6	4.1	7.903	32.8	36.8	9.929	365.2	1095.5
20	2.667	2011-Jul-11	15:54:53	92.85	649.8	854.4	0.059	50.8	4.2	7.903	33.0	37.1	9.929	368.5	1102.0
21	2.833	2011-Jul-11	16:04:53	92.78	652.4	854.0	0.060	50.9	4.2	7.903	33.3	37.4	9.929	371.7	1108.3
22	3.000	2011-Jul-11	16:14:53	92.72	654.8	853.7	0.060	51.1	4.2	7.903	33.5	37.7	9.929	374.5	1114.0
23	3.167	2011-Jul-11	16:24:53	92.65	657.1	853.4	0.060	51.3	4.3	7.903	33.7	38.1	9.929	377.9	1120.0
24	3.333	2011-Jul-11	16:34:53	92.59	659.2	853.0	0.060	51.4	4.3	7.903	33.9	38.3	9.929	380.7	1125.3
25	3.500	2011-Jul-11	16:44:53	92.53	661.2	852.7	0.060	51.6	4.3	7.903	34.1	38.6	9.929	383.6	1130.5
26	3.667	2011-Jul-11	16:54:53	92.48	663.1	852.5	0.061	51.7	4.3	7.903	34.3	38.9	9.929	386.0	1135.1
27	3.833	2011-Jul-11	17:04:53	92.42	664.8	852.1	0.061	51.8	4.4	7.903	34.5	39.2	9.929	388.9	1140.0
28	4.000	2011-Jul-11	17:14:53	92.37	666.3	851.9	0.061	51.9	4.4	7.903	34.6	39.4	9.929	391.4	1144.3



NO.	TEST	DATE	TIME	JOINTS TO LIQUID	SURFACE PRESSURE (kPaa)	GAS COLUMN			OIL COLUMN			EMULSION COLUMN			PRESSURE @ MPP
	TIME (hours)					HEIGHT (m)	GRADIENT (kPa/m)	PRESSURE (kPa)	HEIGHT (m)	GRADIENT (kPa/m)	PRESSURE (kPa)	HEIGHT (m)	GRADIENT (kPa/m)	PRESSURE (kPa)	
29	4.167	2011-Jul-11	17:24:53	92.31	667.8	851.6	0.061	52.0	4.4	7.903	34.8	39.7	9.929	394.3	1149.0
30	4.333	2011-Jul-11	17:34:53	92.26	669.1	851.3	0.061	52.1	4.4	7.903	35.0	40.0	9.929	396.8	1153.0
31	4.500	2011-Jul-11	17:44:53	92.21	670.3	851.0	0.061	52.2	4.4	7.903	35.1	40.2	9.929	399.3	1156.9
32	4.667	2011-Jul-11	17:54:53	92.16	671.5	850.8	0.061	52.3	4.5	7.903	35.2	40.5	9.929	401.8	1160.8
33	4.833	2011-Jul-11	18:04:53	92.11	672.5	850.5	0.062	52.3	4.5	7.903	35.4	40.7	9.929	404.3	1164.5
34	5.000	2011-Jul-11	18:14:53	92.06	673.4	850.2	0.062	52.4	4.5	7.903	35.5	41.0	9.929	406.9	1168.1
35	5.167	2011-Jul-11	18:24:53	92.02	674.2	850.0	0.062	52.4	4.5	7.903	35.6	41.2	9.929	408.9	1171.1
36	5.333	2011-Jul-11	18:34:53	91.97	674.9	849.7	0.062	52.5	4.5	7.903	35.7	41.4	9.929	411.5	1174.6
37	5.500	2011-Jul-11	18:44:53	91.93	675.6	849.5	0.062	52.5	4.5	7.903	35.8	41.6	9.929	413.5	1177.4
38	5.667	2011-Jul-11	18:54:53	91.89	676.2	849.3	0.062	52.6	4.5	7.903	35.9	41.9	9.929	415.6	1180.2
39	5.833	2011-Jul-11	19:04:53	91.84	676.7	849.0	0.062	52.6	4.6	7.903	36.0	42.1	9.929	418.2	1183.4
40	6.000	2011-Jul-11	19:14:53	91.80	677.1	848.8	0.062	52.6	4.6	7.903	36.1	42.3	9.929	420.2	1186.1
41	6.167	2011-Jul-11	19:24:53	91.76	677.5	848.6	0.062	52.6	4.6	7.903	36.2	42.5	9.929	422.3	1188.7
42	6.333	2011-Jul-11	19:34:53	91.72	677.9	848.4	0.062	52.6	4.6	7.903	36.3	42.7	9.929	424.4	1191.2
43	6.500	2011-Jul-11	19:44:53	91.68	678.3	848.1	0.062	52.7	4.6	7.903	36.4	43.0	9.930	426.5	1193.8
44	6.667	2011-Jul-11	19:54:53	91.64	678.6	847.9	0.062	52.7	4.6	7.903	36.5	43.2	9.930	428.6	1196.3
45	6.833	2011-Jul-11	20:04:53	91.60	678.8	847.7	0.062	52.7	4.6	7.904	36.5	43.4	9.930	430.7	1198.7
46	7.000	2011-Jul-11	20:14:53	91.57	679.1	847.5	0.062	52.7	4.6	7.904	36.6	43.5	9.930	432.2	1200.7
47	7.167	2011-Jul-11	20:24:53	91.53	679.4	847.3	0.062	52.7	4.6	7.904	36.7	43.7	9.930	434.4	1203.1
48	7.333	2011-Jul-11	20:34:53	91.49	679.6	847.1	0.062	52.7	4.7	7.904	36.8	44.0	9.930	436.5	1205.6
49	7.500	2011-Jul-11	20:44:53	91.46	679.8	846.9	0.062	52.7	4.7	7.904	36.8	44.1	9.930	438.1	1207.5
50	7.667	2011-Jul-11	20:54:53	91.42	680.0	846.7	0.062	52.7	4.7	7.904	36.9	44.2	9.930	439.7	1209.4
51	7.833	2011-Jul-11	21:04:53	91.39	680.3	846.5	0.062	52.7	4.7	7.904	37.0	44.5	9.930	441.8	1211.8
52	8.000	2011-Jul-11	21:14:53	91.32	680.8	846.1	0.062	52.7	4.7	7.904	37.1	44.9	9.930	445.5	1216.2
53	8.167	2011-Jul-11	21:24:53	91.25	681.3	845.7	0.062	52.8	4.7	7.904	37.3	45.2	9.930	449.3	1220.6
54	8.333	2011-Jul-11	21:34:53	91.19	681.8	845.4	0.062	52.8	4.7	7.904	37.4	45.6	9.930	453.2	1224.5
55	8.500	2011-Jul-11	21:44:53	91.13	682.3	845.0	0.062	52.8	4.7	7.904	37.5	45.9	9.930	457.8	1228.4
56	8.667	2011-Jul-11	21:54:53	91.06	682.8	844.6	0.063	52.8	4.8	7.904	37.7	46.3	9.930	462.6	1232.9
57	8.833	2011-Jul-11	22:04:53	91.00	683.3	844.3	0.063	52.8	4.8	7.905	37.8	46.6	9.930	467.8	1238.8
58	9.000	2011-Jul-11	22:14:53	90.94	683.9	843.9	0.063	52.9	4.8	7.905	37.9	46.9	9.930	473.1	1244.2
59	9.167	2011-Jul-11	22:24:53	90.89	684.4	843.7	0.063	52.9	4.8	7.905	38.0	47.2	9.930	478.8	1249.6
60	9.333	2011-Jul-11	22:34:53	90.83	685.0	843.3	0.063	52.9	4.8	7.905	38.1	47.5	9.930	484.1	1254.1
61	9.500	2011-Jul-11	22:44:53	90.77	685.5	843.0	0.063	52.9	4.8	7.905	38.3	47.9	9.930	489.9	1259.5
62	9.667	2011-Jul-11	22:54:53	90.72	686.0	842.7	0.063	53.0	4.9	7.905	38.4	48.2	9.930	495.6	1264.9
63	9.833	2011-Jul-11	23:04:53	90.67	686.6	842.4	0.063	53.0	4.9	7.905	38.5	48.4	9.930	498.2	1267.5
64	10.000	2011-Jul-11	23:14:53	90.61	687.2	842.0	0.063	53.0	4.9	7.905	38.6	48.8	9.930	503.9	1272.9
65	10.167	2011-Jul-11	23:24:53	90.56	687.7	841.7	0.063	53.0	4.9	7.905	38.7	49.1	9.930	509.6	1278.3
66	10.333	2011-Jul-11	23:34:53	90.49	688.6	841.3	0.063	53.1	4.9	7.905	38.9	49.5	9.930	515.3	1283.7
67	10.500	2011-Jul-11	23:44:53	90.42	689.4	840.9	0.063	53.1	4.9	7.906	39.1	49.8	9.930	521.0	1289.1
68	10.667	2011-Jul-11	23:54:53	90.35	690.3	840.5	0.063	53.2	5.0	7.906	39.2	50.2	9.930	526.7	1294.5
69	10.833	2011-Jul-11	00:04:53	90.29	691.2	840.1	0.063	53.2	5.0	7.906	39.4	50.6	9.930	532.4	1300.0
70	11.000	2011-Jul-11	00:14:53	90.22	692.2	839.7	0.063	53.3	5.0	7.906	39.6	51.0	9.930	538.1	1305.4
71	11.167	2011-Jul-11	00:24:53	90.16	693.1	839.3	0.064	53.3	5.0	7.906	39.7	51.3	9.930	543.8	1310.8
72	11.333	2011-Jul-11	00:34:53	90.10	694.0	838.9	0.064	53.4	5.1	7.906	40.0	52.0	9.930	549.5	1316.2
73	11.500	2011-Jul-11	00:44:53	90.04	695.0	838.6	0.064	53.4	5.1	7.906	40.2	52.6	9.930	555.2	1321.6
74	11.667	2011-Jul-11	00:54:53	89.94	696.9	838.0	0.064	53.5	5.1	7.906	40.5	53.2	9.930	560.9	1327.0
75	11.833	2011-Jul-11	01:04:53	89.84	698.7	837.4	0.064	53.6	5.1	7.906	40.7	53.7	9.930	566.6	1332.4
76	12.000	2011-Jul-11	01:14:53	89.75	700.4	836.8	0.064	53.7	5.1	7.906	40.9	54.2	9.930	572.3	1337.8
77	12.167	2011-Jul-11	01:24:53	89.68	702.1	836.2	0.064	53.8	5.2	7.907	41.0	54.7	9.930	578.0	1343.2
78	12.333	2011-Jul-11	01:34:53	89.61	703.6	835.8	0.065	53.9	5.2	7.907	41.3	55.2	9.930	583.7	1348.6
79	12.500	2011-Jul-11	01:44:53	89.41	706.7	834.7	0.065	54.1	5.2	7.907	41.5	55.7	9.930	589.4	1354.0
80	12.667	2011-Jul-11	01:54:53	89.26	709.4	833.8	0.065	54.2	5.3	7.907	41.8	56.2	9.930	595.1	1359.4
81	12.833	2011-Jul-11	02:04:53	89.11	712.1	832.8	0.065	54.4	5.3	7.907	42.0	56.7	9.931	600.8	1364.8
82	13.000	2011-Jul-11	02:14:53	88.97	714.7	831.9	0.066	54.6	5.3	7.907	42.2	57.2	9.931	606.5	1370.2
83	13.167	2011-Jul-11	02:24:53	88.83	717.3	831.1	0.066	54.7	5.3	7.908	42.5	57.7	9.931	612.2	1375.6
84	13.333	2011-Jul-11	02:34:53	88.71	719.9	830.3	0.066	54.9	5.4	7.908	42.8	58.2	9.931	617.9	1381.0
85	13.500	2011-Jul-11	02:44:53	88.58	722.5	829.5	0.066	55.0	5.4	7.908	43.0	58.7	9.931	623.6	1386.4
86	13.667	2011-Jul-11	02:54:53	88.47	725.0	828.8	0.067	55.2	5.4	7.908	43.2	59.2	9.931	629.3	1391.8
87	13.833	2011-Jul-11	03:04:53	88.35	727.5	828.0	0.067	55.3	5.4	7.908	43.5	59.7	9.931	635.0	1397.2
88	14.000	2011-Jul-11	03:14:53	88.24	730.0	827.3	0.067	55.4	5.4	7.908	43.8	60.2	9.931	640.7	1402.6



NO.	TEST	DATE	TIME	JOINTS TO LIQUID	SURFACE PRESSURE (kPa)	GAS COLUMN			OIL COLUMN			EMULSION COLUMN			PRESSURE @ MPP
	TIME (hours)					HEIGHT (m)	GRADIENT (kPa/m)	PRESSURE (kPa)	HEIGHT (m)	GRADIENT (kPa/m)	PRESSURE (kPa)	HEIGHT (m)	GRADIENT (kPa/m)	PRESSURE (kPa)	
86	43.500	2011-Jul-13	08:44:53	88.15	732.5	826.7	0.067	55.6	5.4	7.908	43.0	63.5	9.931	631.0	1462.2
87	45.500	2011-Jul-13	10:44:53	88.06	734.9	826.1	0.067	55.8	5.5	7.909	43.2	64.1	9.931	636.7	1470.4
88	47.500	2011-Jul-13	12:44:53	87.98	737.1	825.6	0.068	55.9	5.5	7.909	43.3	64.6	9.931	641.7	1478.0
89	49.500	2011-Jul-13	14:44:53	87.90	739.4	825.1	0.068	56.0	5.5	7.909	43.4	65.1	9.931	646.8	1485.5
90	53.500	2011-Jul-13	18:44:53	87.74	743.8	824.0	0.068	56.3	5.5	7.909	43.6	66.1	9.931	656.9	1500.6
91	57.500	2011-Jul-13	22:44:53	87.61	748.3	823.2	0.069	56.6	5.5	7.909	43.8	67.0	9.931	665.2	1513.8
92	61.500	2011-Jul-14	02:44:53	87.47	753.0	822.2	0.069	56.9	5.6	7.909	44.0	67.9	9.931	674.1	1528.0
93	65.500	2011-Jul-14	06:44:53	87.35	758.3	821.4	0.070	57.3	5.6	7.909	44.1	68.7	9.931	681.8	1541.5
94	69.500	2011-Jul-14	10:44:53	87.23	763.8	820.6	0.070	57.6	5.6	7.909	44.3	69.4	9.931	689.5	1555.2
95	73.500	2011-Jul-14	14:44:53	87.12	769.7	819.9	0.071	58.0	5.6	7.909	44.5	70.1	9.931	696.6	1568.9
96	77.500	2011-Jul-14	18:44:53	87.02	776.2	819.2	0.071	58.5	5.6	7.909	44.6	70.8	9.931	703.1	1582.5
97	81.500	2011-Jul-14	22:44:53	86.92	783.0	818.6	0.072	59.0	5.7	7.909	44.8	71.5	9.931	709.6	1596.4
98	85.500	2011-Jul-15	02:44:53	86.82	790.1	817.9	0.073	59.5	5.7	7.908	44.9	72.1	9.931	716.2	1610.6
99	89.500	2011-Jul-15	06:44:53	86.73	797.4	817.3	0.073	60.0	5.7	7.908	45.1	72.7	9.931	722.0	1624.6
100	93.500	2011-Jul-15	10:44:53	86.65	804.9	816.7	0.074	60.6	5.7	7.908	45.2	73.2	9.931	727.3	1638.0
101	97.500	2011-Jul-15	14:44:53	86.57	812.5	816.2	0.075	61.1	5.7	7.908	45.4	73.8	9.931	732.5	1651.5
102	101.500	2011-Jul-15	18:44:53	86.49	819.9	815.6	0.076	61.6	5.8	7.908	45.6	74.3	9.931	737.8	1665.0
103	105.500	2011-Jul-15	22:44:53	86.41	827.2	815.1	0.076	62.2	5.8	7.907	45.7	74.8	9.931	743.1	1678.2
104	109.500	2011-Jul-16	02:44:53	86.34	834.2	814.6	0.077	62.7	5.8	7.907	45.9	75.3	9.931	747.8	1690.5
105	113.500	2011-Jul-16	06:44:53	86.26	840.7	814.0	0.078	63.1	5.8	7.907	46.1	75.8	9.931	753.1	1703.0
106	117.500	2011-Jul-16	10:44:53	86.19	846.8	813.5	0.078	63.6	5.8	7.907	46.2	76.3	9.931	757.7	1714.3
107	121.500	2011-Jul-16	14:44:53	86.12	852.4	813.0	0.079	64.0	5.9	7.907	46.4	76.8	9.931	762.4	1725.1
108	125.500	2011-Jul-16	18:44:53	86.06	857.3	812.6	0.079	64.3	5.9	7.907	46.5	77.2	9.931	766.4	1734.6
109	129.500	2011-Jul-16	22:44:53	85.99	861.8	812.1	0.080	64.6	5.9	7.906	46.7	77.7	9.931	771.1	1744.2
110	133.500	2011-Jul-17	02:44:53	85.92	865.6	811.6	0.080	64.9	5.9	7.906	46.9	78.1	9.931	775.9	1753.2
111	137.500	2011-Jul-17	06:44:53	85.86	869.0	811.2	0.080	65.1	5.9	7.906	47.0	78.5	9.931	779.9	1761.1
112	141.500	2011-Jul-17	10:44:53	85.79	872.0	810.7	0.081	65.3	6.0	7.906	47.2	79.0	9.931	784.7	1769.2
113	145.500	2011-Jul-17	14:44:53	85.73	874.7	810.3	0.081	65.5	6.0	7.906	47.3	79.4	9.931	788.8	1776.2
114	149.500	2011-Jul-17	18:44:53	85.66	877.0	809.8	0.081	65.6	6.0	7.906	47.5	79.9	9.931	793.6	1783.7
115	153.500	2011-Jul-17	22:44:53	85.60	879.1	809.3	0.081	65.7	6.0	7.906	47.6	80.3	9.931	797.7	1790.2
116	157.500	2011-Jul-18	02:44:53	85.53	881.1	808.8	0.081	65.9	6.0	7.907	47.8	80.8	9.931	802.5	1797.3
117	161.500	2011-Jul-18	06:44:53	85.47	882.9	808.4	0.082	66.0	6.1	7.907	47.9	81.2	9.931	806.7	1803.5
118	165.500	2011-Jul-18	10:44:53	85.40	884.6	807.9	0.082	66.1	6.1	7.907	48.1	81.7	9.931	811.5	1810.3
119	169.500	2011-Jul-18	14:44:53	85.33	886.2	807.4	0.082	66.1	6.1	7.907	48.2	82.2	9.931	816.4	1817.0
120	173.500	2011-Jul-18	18:44:53	85.27	887.7	806.9	0.082	66.2	6.1	7.907	48.4	82.6	9.931	820.6	1822.9
121	177.500	2011-Jul-18	22:44:53	85.20	889.1	806.4	0.082	66.3	6.1	7.907	48.5	83.1	9.931	825.5	1829.4
122	181.500	2011-Jul-19	02:44:53	85.13	890.4	805.9	0.082	66.3	6.2	7.907	48.7	83.6	9.931	830.4	1835.8
123	185.500	2011-Jul-19	06:44:53	85.06	891.6	805.4	0.082	66.4	6.2	7.907	48.8	84.1	9.931	835.4	1842.1
124	189.500	2011-Jul-19	10:44:53	84.99	892.7	804.9	0.083	66.4	6.2	7.907	49.0	84.6	9.931	840.3	1848.4
125	193.500	2011-Jul-19	14:44:53	84.92	893.7	804.4	0.083	66.5	6.2	7.907	49.1	85.1	9.931	845.3	1854.6
126	197.500	2011-Jul-19	18:44:53	84.85	894.6	803.8	0.083	66.5	6.2	7.908	49.3	85.6	9.931	850.3	1860.7
127	201.500	2011-Jul-19	22:44:53	84.78	895.5	803.3	0.083	66.5	6.3	7.908	49.4	86.1	9.931	855.3	1866.7
128	205.500	2011-Jul-20	02:44:53	84.71	896.3	802.8	0.083	66.5	6.3	7.908	49.6	86.6	9.931	860.3	1872.7
129	209.500	2011-Jul-20	06:44:53	84.65	897.0	802.3	0.083	66.6	6.3	7.908	49.7	87.1	9.931	864.6	1877.9
130	213.500	2011-Jul-20	10:44:53	84.58	897.5	801.8	0.083	66.6	6.3	7.908	49.9	87.6	9.931	869.7	1883.6
131	217.500	2011-Jul-20	14:44:53	84.52	897.9	801.4	0.083	66.6	6.3	7.908	50.0	88.0	9.931	874.0	1888.5
132	221.500	2011-Jul-20	18:44:53	84.47	898.2	801.0	0.083	66.6	6.3	7.908	50.1	88.4	9.931	877.7	1892.5
133	225.500	2011-Jul-20	22:44:53	84.42	898.4	800.6	0.083	66.5	6.3	7.909	50.2	88.7	9.931	881.3	1896.4
134	229.500	2011-Jul-21	02:44:53	84.37	898.6	800.2	0.083	66.5	6.4	7.909	50.3	89.1	9.931	884.9	1900.4
135	233.500	2011-Jul-21	06:44:53	84.33	898.8	799.9	0.083	66.5	6.4	7.909	50.4	89.4	9.931	887.9	1903.6