MANITOBA CONSERVATION
PETROLEUM & ENERGY BRANCH
DEC 1 1 2000
WINNIPEG OFFICE

FLOW/BUILDUP TEST REPORT

HOME PIERSON 191/11-10-02-29W1 HZ
SPEARFISH (Datum @ 1025 mKB)
TEST DATE: JANUARY 24 - FEBRUARY 28, 2000

Prepared for:

ANDERSON EXPLORATION LTD.

Prepared by:

PETRO MANAGEMENT GROUP LTD.

MARCH 2000

#401, 100 - 4th Avenue S.W.
Calgary, Alberta, Canada T2P 3N2

Email: pmg@petromgt.com

Bus: (403) 216-5100
Fax: (403) 216-5109

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P M G Petro Management Group Ltd.

March 13, 2000

ANDERSON EXPLORATION LTD.
1600, 324 - 8th Ave. S.W.
Calgary, Alta., T2P 2Z5

Attn.: Mr. Larry Sopko

HOME PIERSON 11-10-02-29W1 HZ
SPEARFISH (DATUM @ 1025 mKB)
FLOW/BUILDUP TEST
TEST DATE: JANUARY 24 - FEBRUARY 28, 2000

As requested, a flow/buildup test analysis was performed on the subject Horizontal well. A summary of the test data and the analysis results is attached. The report marked ORIGINAL contains the test data on a diskette, if available. Three copies of the report are attached.

Should you have any questions, please feel free to contact me at (403) 216-5101.

Yours truly,
Petro Management Group Ltd.

Saad Ibrahim, P. Eng.
Principal Engineer

#401, 100 - 4th Avenue S.W.
Calgary, Alberta, Canada T2P 3N2
Email: pmg@petromgt.com
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Summary of Test Data & Results

Case Name : Horizontal Well Model

Home Pierson 11-10-02-29W1 HZ

Spearfish (Datum @ 1025 mKB)

Flow/Buildup Test

Test Date: Jan. 25 - Feb. 28, 2000

Model Parameters

Permeability in X Direction (k_x)	4.551 mD
Permeability in Y Direction (k_y)	1.026 mD
Permeability in Z Direction (k_z)	0.455 mD
Skin (s)	47.685
Total Mobility $(k/\mu)_t$	1.83 mD/mPa.s
Total Transmissivity $(kh/\mu)_t$	4.56 mDm/mPa.s
Wellbore Storage Constant Dim. (C_D)	25975.51

Effective Horizontal Well Length (L_e)	762.83 m
Reservoir Length (X_e)	1400.00 m
Reservoir Width (Y_e)	800.00 m
Reservoir Thickness (Z_e)	2.50 m
Active Well At (X_w)	700.00 m
Active Well At (Y_w)	400.00 m
Height of Horizontal Well From Base (Z_w)	1.25 m

Formation Parameters

Net Pay (h)	2.50 m
Total Porosity (ϕ_t)	16.00 %
Oil Saturation (S_o)	60.00 %
Gas Saturation (S_g)	0.00 %
Water Saturation (S_w)	40.00 %
Wellbore Radius (r_w)	0.091 m
Formation Temperature (T)	42.0 °C
Formation Compressibility (c_f)	5.802e-7 kPa^{-1}
Total Compressibility (c_t)	1.678e-6 kPa^{-1}

Fluid Properties

Oil Compressibility (c_o)	1.52772e-6 kPa^{-1}
Gas Compressibility (c_g)	3.04856e-4 kPa^{-1}
Water Compressibility (c_w)	4.53928e-7 kPa^{-1}
Oil Formation Volume Factor (B_o)	1.070
Gas Formation Volume Factor (B_g)	0.029153 m^3/m^3
Water Formation Volume Factor (B_w)	1.006
Oil Viscosity (μ_o)	3.615 mPa.s
Gas Viscosity (μ_g)	11.662 µPa.s
Water Viscosity (μ_w)	0.625 mPa.s
Solution Gas Ratio (R_s)	15 m^3/m^3
Oil Gravity (γ_o)	0.845
Gas Gravity (G)	0.650
PVT Reference Pressure (p_{PVT})	3527.71 kPa
Bubble Point Pressure (P_{bp})	3527.71 kPa

Production and Pressure

Q_tB_t	8.679 m^3/d
Final Oil Rate	1.580 m^3/d
Final Gas Rate	0.000 $10^3m^3/d$
Final Water Rate	6.950 m^3/d
Final Flowing Pressure (p_{wfo})	671.90 kPa
Final Measured Pressure	3525.77 kPa
Initial Pressure (p_i)	3527.71 kPa

Synthesis Results

Average Error	-3.05 %
Synthetic Initial Pressure (p_i)	7715.56 kPa
Extrapolated Pressure at Specified Time	3868.39 kPa
Pressure Drop Due To Skin (Δp_s)	1027.39 kPa
Flow Efficiency (FE)	0.903
Damage Ratio (DR)	1.107

Forecasts

Specified Flowing Pressure (p_{wfs})	671.90 kPa
3 - Month Constant Rate	1.174 m^3/d
6 - Month Constant Rate	0.918 m^3/d
Specified Forecast Time	12.00 month
Forecast Constant Rate @ Current Skin	0.647 m^3/d
PI / II (Total Liquids - Actual)	2.92e-3 $m^3/d/kPa$
Forecast Constant Rate @ Skin=0	0.756 m^3/d
PI / II (Total Liquids - Ideal)	4.50e-3 $m^3/d/kPa$
Forecast Constant Rate @ Skin=-4	0.774 m^3/d

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#401, 100 - 4th Avenue S.W.
Calgary, Alberta, Canada T2P 3N2

Email: pmg@petromgt.com

Bus: (403) 216-5100
Fax: (403) 216-5109

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SUMMARY

SUMMARY OF RESULTS

1. The average reservoir pressure (P_R) is 3 868 kPa.

2. The effective horizontal permeabilities to oil of the Spearfish formation in the X & Y directions are 4.6 mD and 1.0 mD, respectively.

3. The vertical horizontal is 0.5 mD.

4. The apparent skin factor of +47.7 confirms a highly damaged wellbore.

5. The IPR plot indicates a maximum theoretical stabilized oil rate (AOF) of 1.7 m^3/d.

6. Radius of investigation is approximately 492 m.

7. The effectively length of the horizontal well is 763 m (actual length is 770 m).

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TEST
ANALYSIS

DISCUSSION

1. Test Overview:

The Home Pierson 11-10-02-29W1 HZ is completed in the Spearfish formation. The mid point of the vertical pay section (Datum) is 1025 mKB. The well is equipped with a 60.3 mm tubing. The well was not fractured.

During the test, the well produced at an oil rate of 1.6 m^3/d. Subsequently, the well was shutin for a 819 hour buildup period. The bottom hole pressures were calculated from the measurement of liquid levels, obtained from the Acoustic Wellsounder equipment by Otatco Inc. The oil gravity is 36 API. Other oil physical properties were calculated using various standard correlations.

2. Data Validation:

During the test, bottom hole pressures were measured using the Acoustic Wellsounder equipment.

The primary pressure derivative (PPD) plot was constructed for the measured pressures (Figure 1) as shown in the Section "Test Data Quality". The PPD showed only minor pressure anomalies. The PPD plot should be monotonically decreasing with time for valid buildup data. Pressure data was reported in absolute at MPP.

TEST INTERPRETATION

1. Pressure Buildup Analysis:

Pressure buildup analysis was performed on the shut-in period. The reservoir parameters were provided by Anderson Exploration Ltd., as shown in the attached form "Summary of Test Data and Results". The final oil rate flow rate prior to shutting in the well was 1.6 m^3/d at a sandface flowing pressure of 672 kPa, as shown in the Strip Chart (Figure 2) in the section "Pressure Transient Analysis".

Both the Horner Plot and the pressure derivative analysis were used in the analysis, as discussed below, and results were later fine tuned using the pressure history match techniques of the test pressure data.

Wellbore storage regime was identified by the unit slope straight of the pressure derivative as shown in the Diagnostic Derivative Analysis plot (Figure 3) in the section "Pressure Transient Analysis". The flattening of the pressure derivative of the late time data confirms that the horizontal radial flow was reached.

Radial flow analysis was performed to determine the reservoir parameters using the semi-log straight line drawn through the late time pressure data, as shown in the Horner plot (Figure 4). The extrapolation of the last data points yielded a P^* of 4 780 kPa. The (P^*) was corrected for the shape, areal extent of the reservoir and the location of the well to determine the average reservoir pressure of 4 001 kPa. The results of the Horner plot and the pressure derivative are summarized below:

	Horner	Derivative
Effective Permeability, mD	4.3	4.3
Reservoir Pressure, kPa	4 001	n/a

The skin factor could not be calculated from the radial flow analysis since the early vertical radial flow regime was masked by the wellbore storage.

2. Pressure History Match:

The preliminary results from the Horner analysis were used as starting parameters for pressure history matching of the test data. The best match of the test data was obtained, using the Horizontal Well Model. The overlay of simulated analysis results on the real test data is presented in the cartesian, semi-log and log-log plots (Figures 5, 6, and 7), in the section "Pressure History Match". The parameters used to achieve the history match are as follows:

	History Match	
Reservoir Pressure, P_r	3 868	kPa
Effective Permeability in X- Direction, k_x	4.6	mD
Effective Permeability in Y- Direction, k_y	1.0	mD
Vertical Permeability	0.5	mD
Skin Factor, S	+48	
Effective Length of Horizontal Well, L_e	763	m

3. Inflow Performance Relationship (I.P.R)

The Inflow Performance Relationship (I.P.R) was constructed using the Vogel equation, as shown in Figure 9, in the Section "I.P.R". The average reservoir pressure of 3 868 kPa and the test data were used to generate the I.P.R plot, at the current skin factor of +48. The well maximum theoretical oil rate is 1.7 m^3/d.

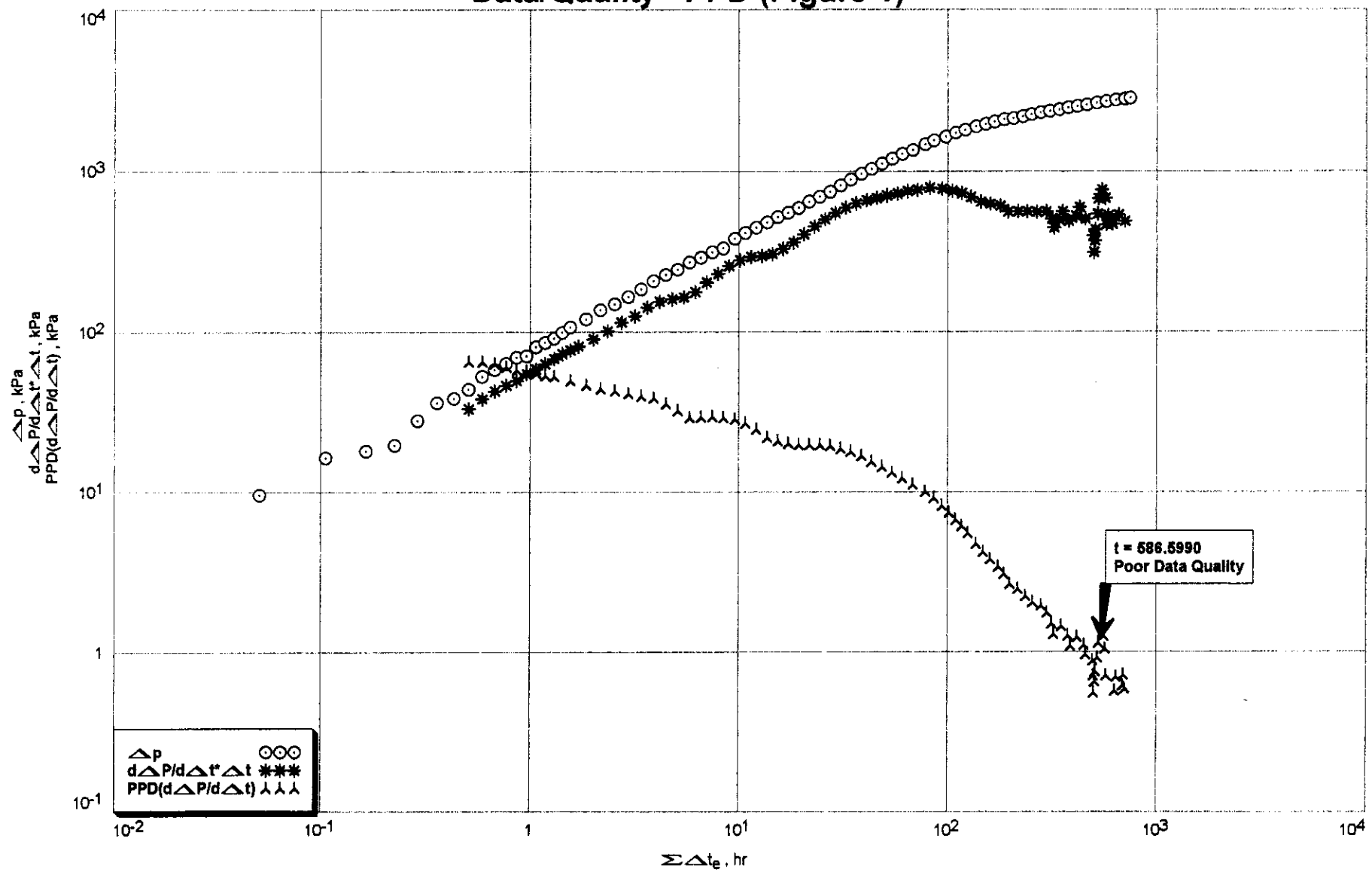
4. Production Forecast Sensitivity Analysis:

Production forecasts were generated for the well using the reservoir parameters obtained from the test history match. Sensitivity analysis was performed in attempt to maximize the oil recovery and to establish a reasonable gas production plateau. The bottom hole flowing pressure (BHFP) was used as a sensitivity parameter, and the various generated production forecasts are shown in Figure 8 in the section "Pressure History Match".

DATA
QUALITY

Home Pierson 11-10-02-29W1 HZ
Spearfish (Datum @ 1025 mKB)
Flow/Buildup Test
Test Date: Jan. 25 - Feb. 28, 2000

Data/Quality - PPD (Figure 1)



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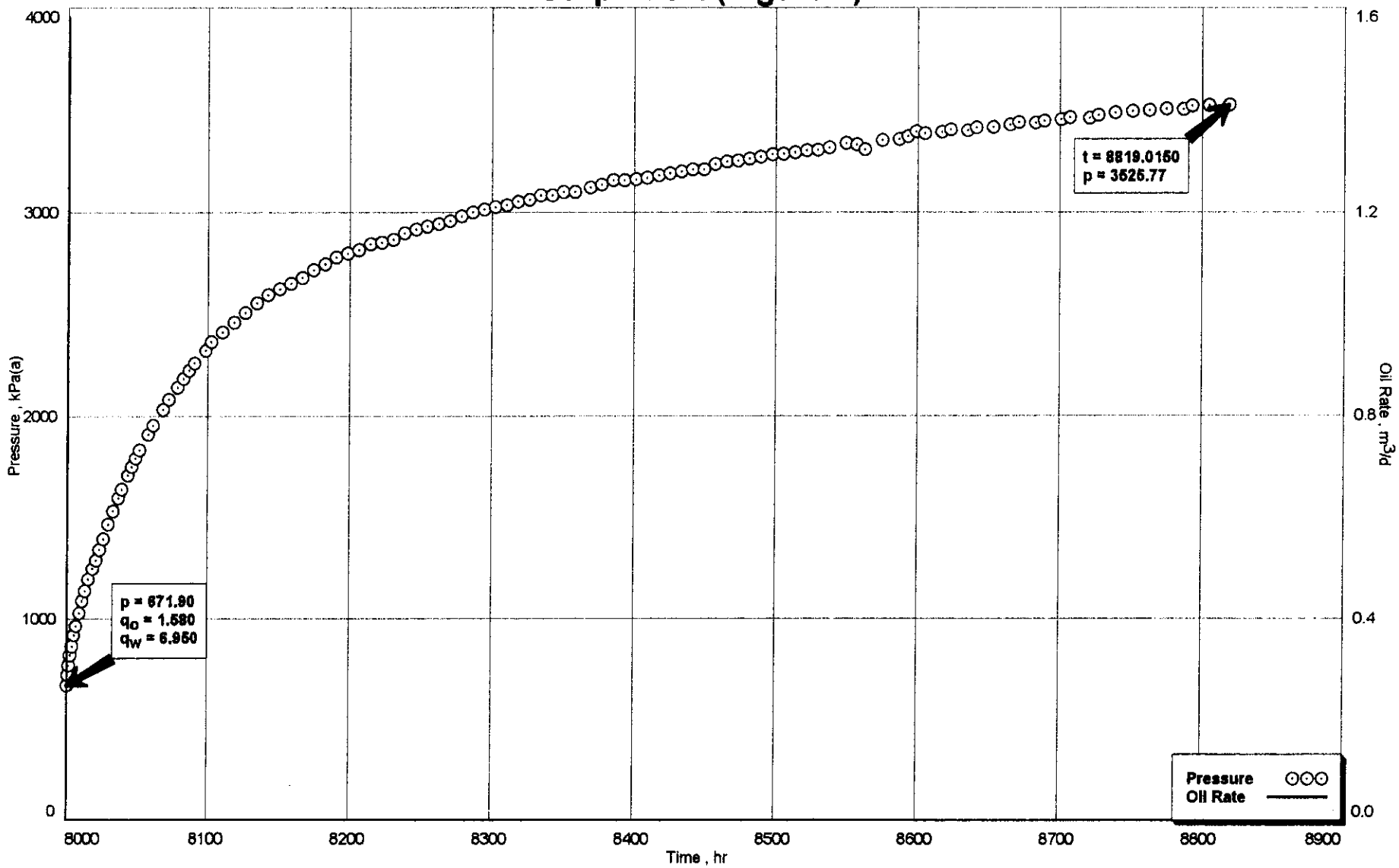
TRANSIENT ANALYSIS

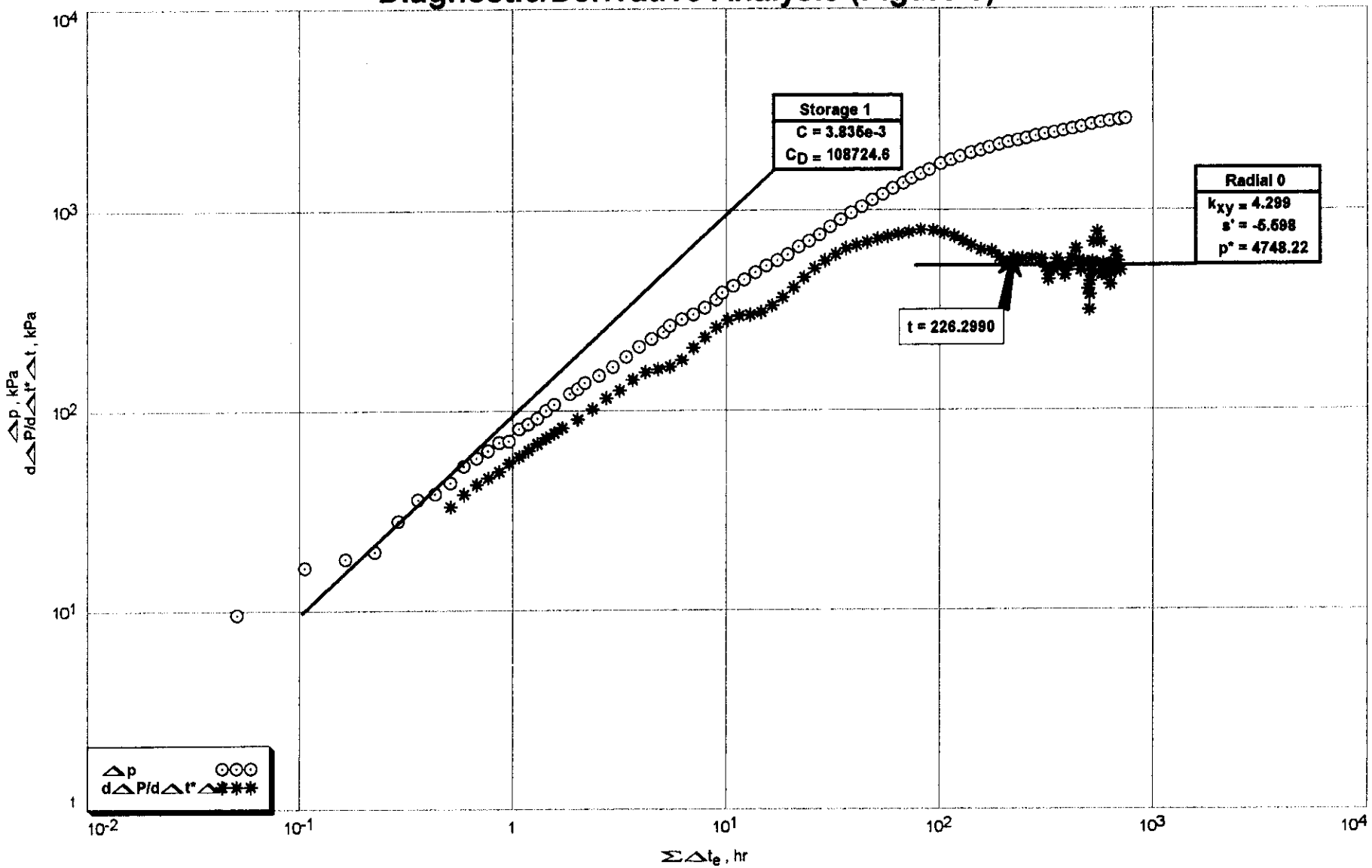
Home Pierson 11-10-02-29W1 HZ
Spearfish (Datum 1025 mKB)
Flow/Buildup Test
Test Date: Jan. 25 - Feb. 28, 2000

Strip Chart (Figure 2)



Home Pierson 11-10-02-29W1 HZ
Spearfish (Datum @ 1025 mKB)
Flow/Buildup Test
Test Date: Jan. 25 - Feb. 28, 2000

Diagnostic/Derivative Analysis (Figure 3)



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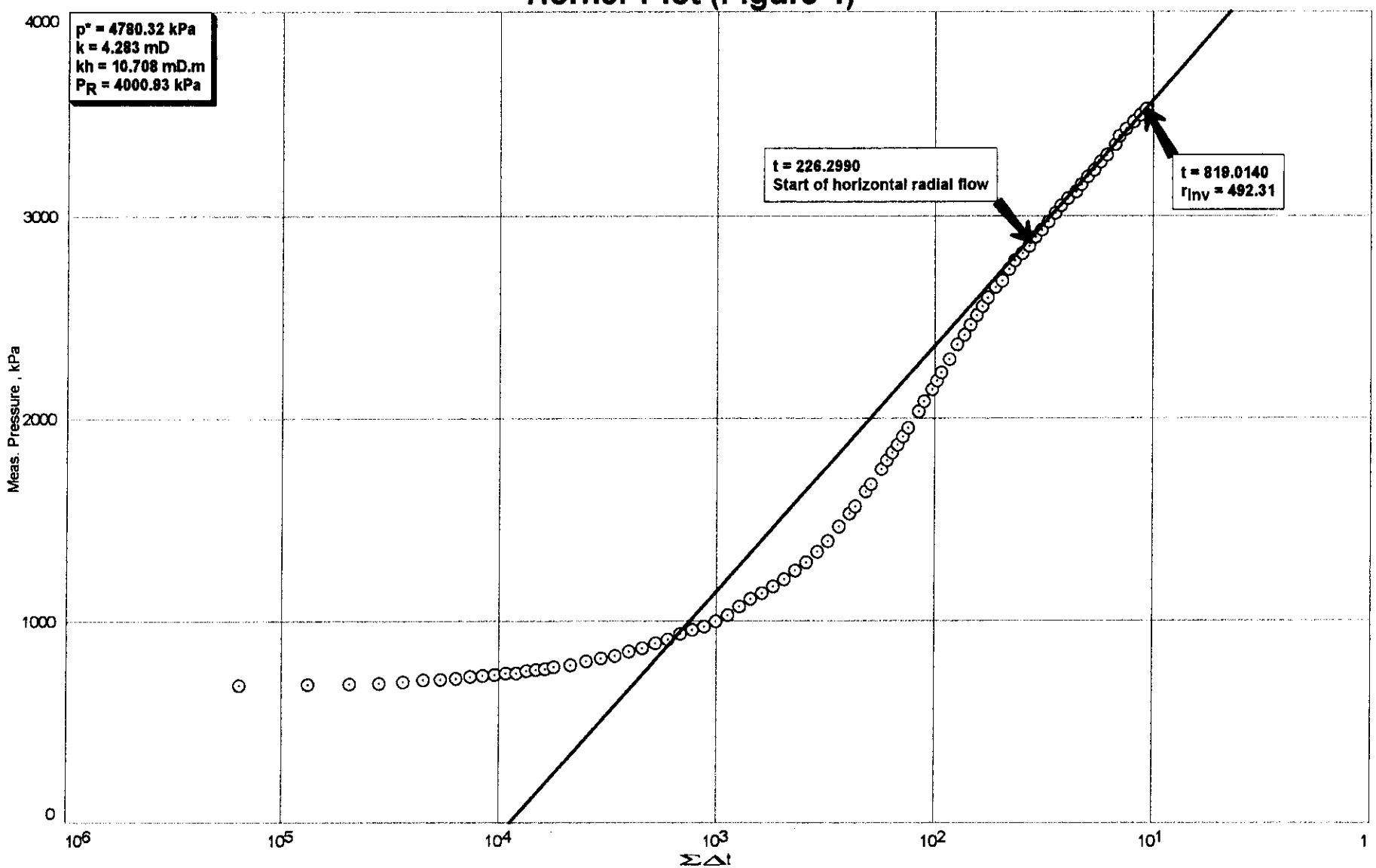
Home Pierson 11-10-02-29W1 HZ
Spearfish (Datum @ 1025 mKB)
Flow/Buildup Test
Test Date: Jan. 25 - Feb. 28, 2000

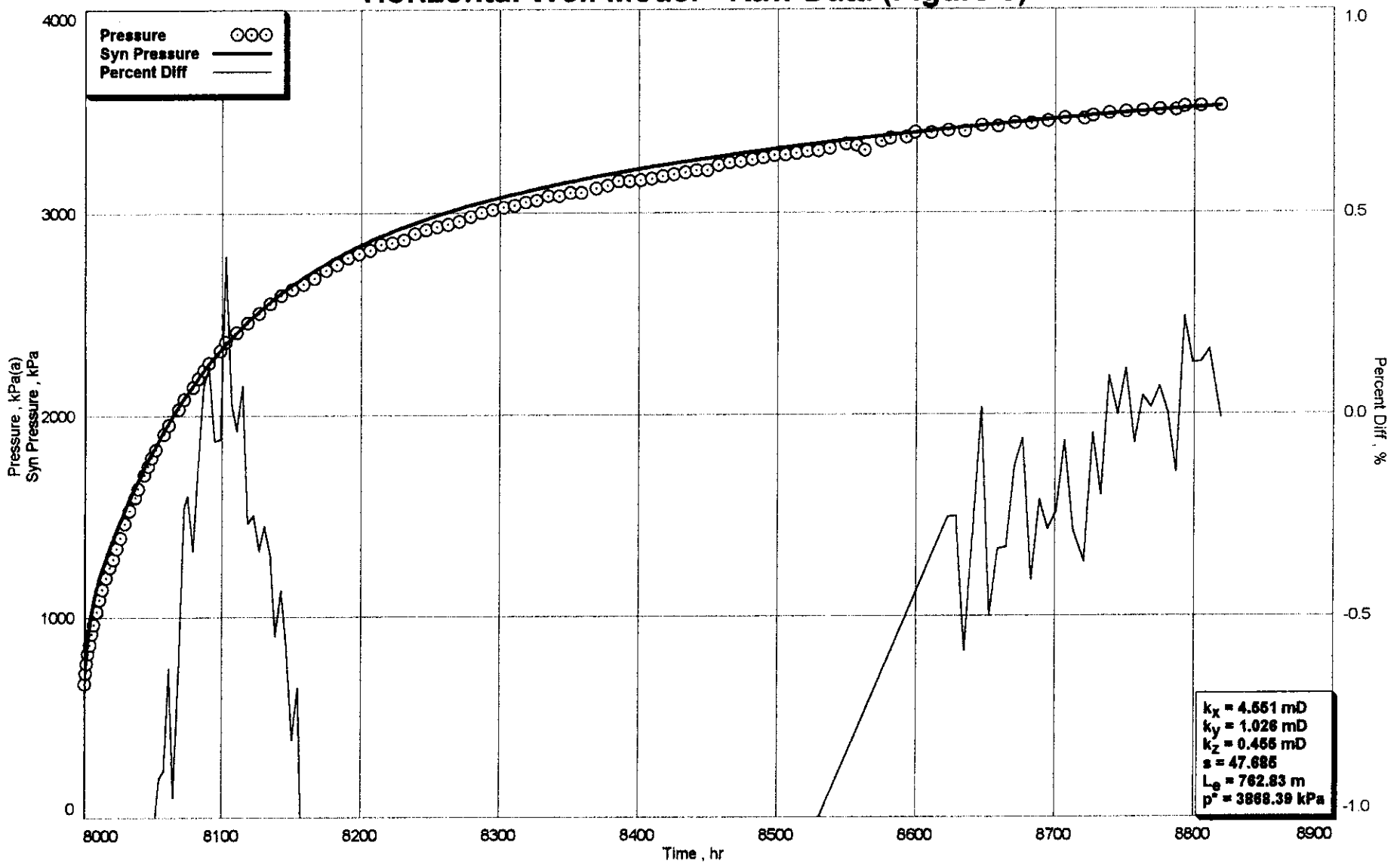
Horner Plot (Figure 4)



HISTORY
MATCH

Home Pierson 11-10-02-29W1 HZ
Spearfish (Datum @ 1025 mKB)
Flow/Buildup Test
Test Date: Jan. 25 - Feb. 28, 2000

Horizontal Well Model - Raw Data (Figure 5)



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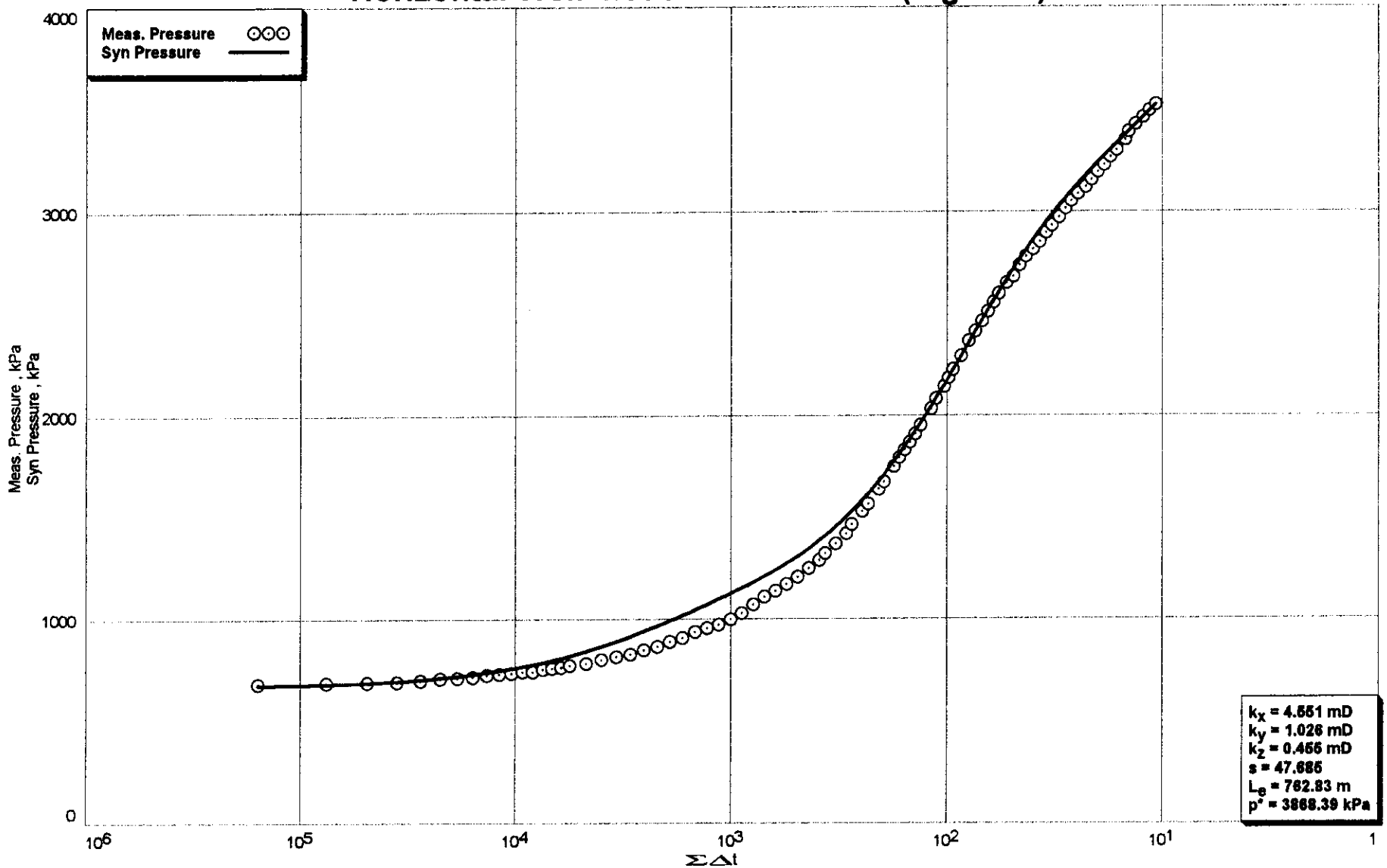
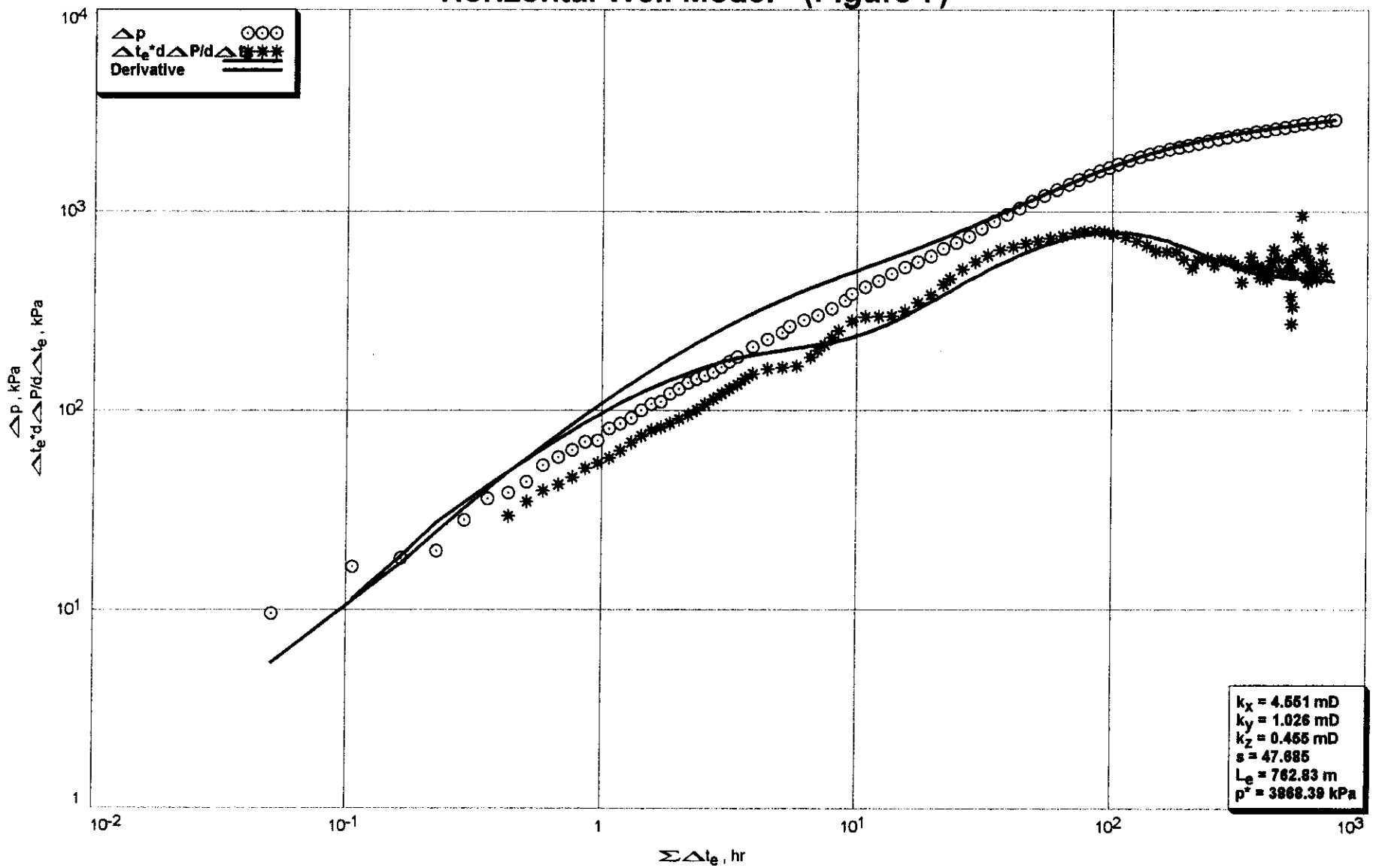
Home Pierson 11-10-02-29W1 HZ
Spearfish (Datum @ 1025 mKB)
Flow/Buildup Test
Test Date: Jan. 25 - Feb. 28, 2000

Horizontal Well Model - Horner Plot (Figure 6)



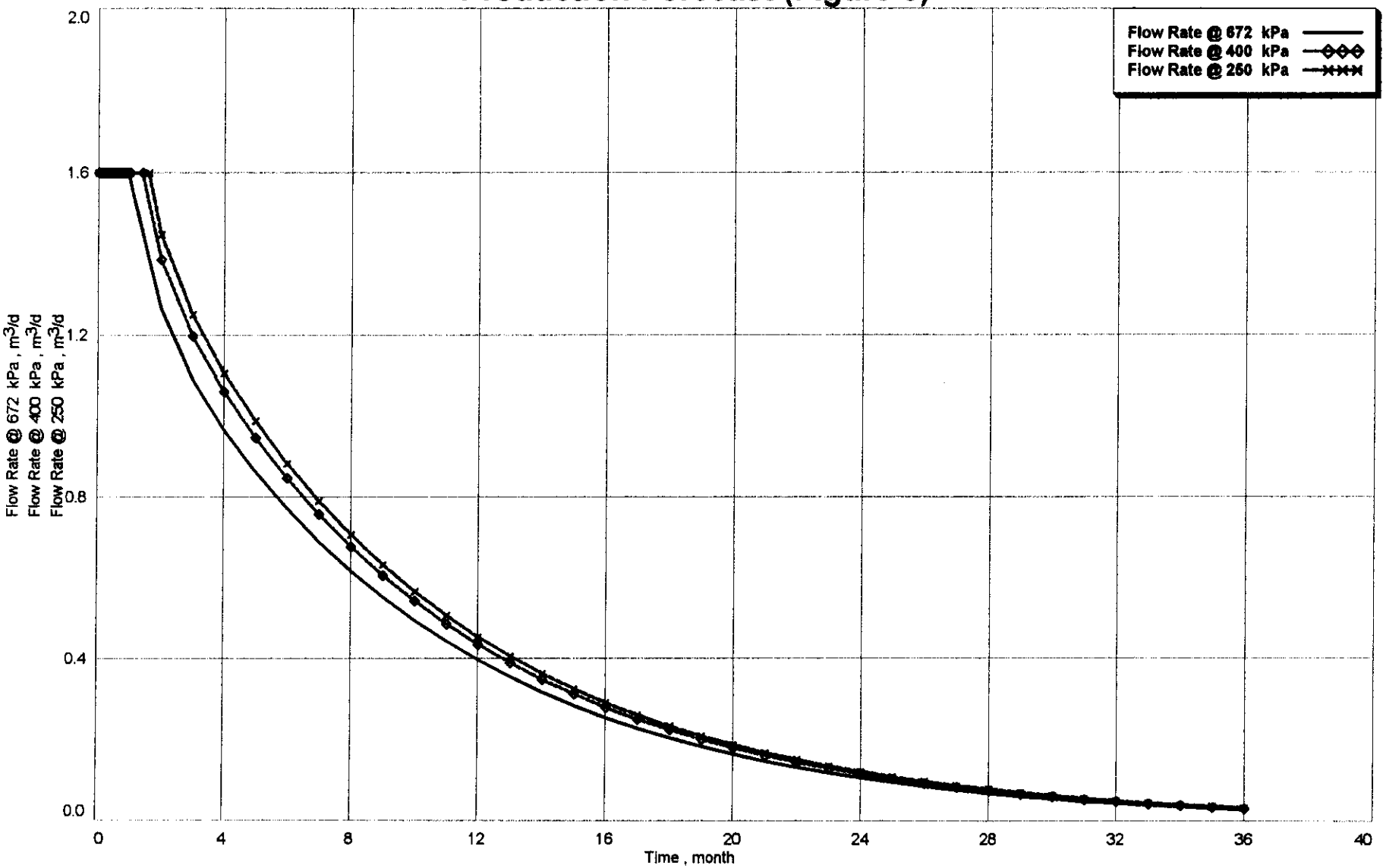
Home Pierson 11-10-02-29W1 HZ
Spearfish (Datum @ 1025 mKB)
Flow/Buildup Test
Test Date: Jan. 25 - Feb. 28, 2000

Horizontal Well Model - (Figure 7)



Home Pierson 11-10-02-29W1 HZ
Spearfish (Datum @ 1025 mKB)
Flow/Buildup Test
Test Date: Jan. 25 - Feb. 28, 2000

Production Forecast (Figure 8)



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Inflow Performance Relationship
(I.P.R.)

Home Pierson 11-10-02-29W1 HZ
Spearfish (Datum @ 1025 mKB)

Flow/Buildup Test
Test Date: Jan. 25 - Feb. 28, 2000

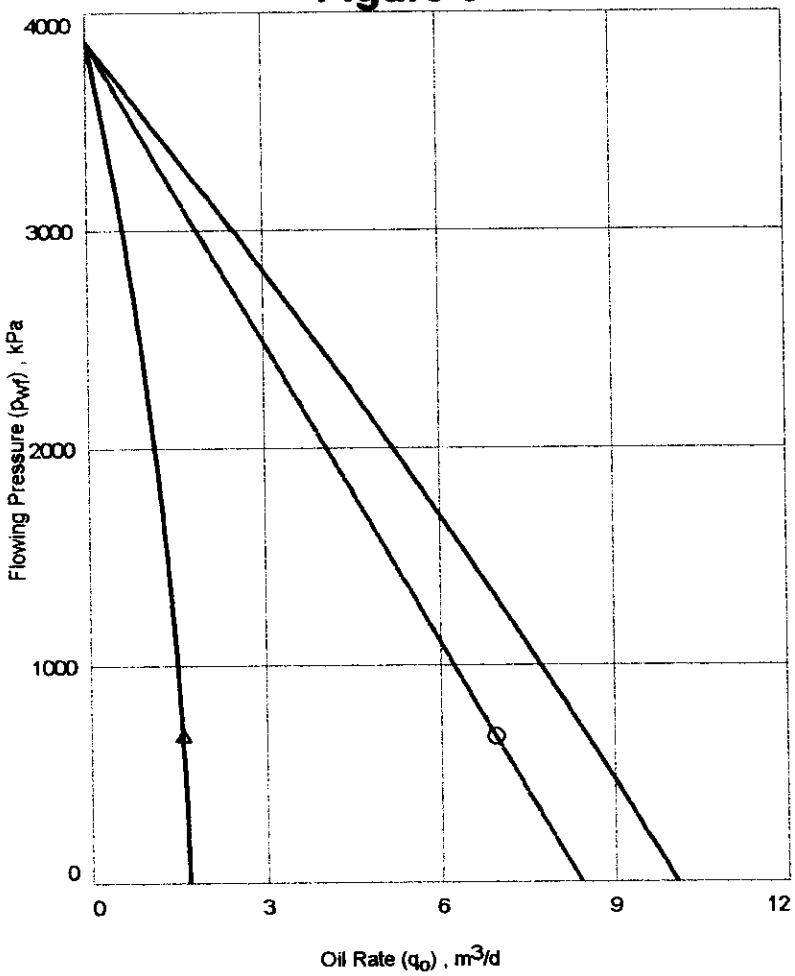
Test Data

Reservoir Pressure (p_R)	3868.00	kPa
Bubble Point Pressure (p_{bp})		kPa
Test Pressure (p_{wf})	671.00	kPa
Oil Test Rate (q_o)	1.580	m^3/d
Water Test Rate (q_w)	6.950	m^3/d

Results

Maximum Oil Rate	1.679	m^3/d
Maximum Water Rate	8.409	m^3/d
Maximum Total Rate	10.087	m^3/d

Figure 9



Flowing Pressure	Oil Rate	Water Rate	Total Rate
kPa	m^3/d	m^3/d	m^3/d
0.00	1.679	8.409	10.087
300.00	1.645	7.757	9.401
600.00	1.594	7.104	8.699
671.00*	1.580	6.950	8.530
900.00	1.528	6.452	7.980
1200.00	1.445	5.800	7.245
1500.00	1.347	5.148	6.494
1800.00	1.232	4.496	5.727
2100.00	1.101	3.843	4.944
2400.00	0.953	3.191	4.145
2700.00	0.790	2.539	3.329
3000.00	0.610	1.887	2.497
3300.00	0.415	1.235	1.650
3600.00	0.203	0.583	0.786
3868.00	0.000	0.000	0.000

Note : * Test Point
** Bubble Point
Oil IPR based on Vogel's Equation.
(Quadratic Curve Factor=0.2)

PRESSURE
DATA

OTATCO INC

ANDERSON EXPLORATION LTD.

ACOUSTIC PRESSURE SURVEY (BUILD-UP)
ANDERSON S. PIERSON HZNTL 91/11-10-02-29
191/11-10-002-29W1/0
FIELD: PIERSON
POOL: SPEAR FISH
JANUARY - FEBRUARY, 2000

DISTRIBUTION: *GORD PETERS, Calgary - 2 copies*

PREPARED BY: *ALEX OYKHMAN, C. E. T.*

DATE: *2000-02-28*

Oilfield Technology and Trading Company (A.S.E. "OI")
Head Office - 705 First Alberta Place 777 – 8th Avenue S. W. Calgary, Alberta T2P 3R5 Tel: (403) 266-0908 Fax: (403) 266-1639
Operations and Engineering - Bay 12, 700 – 58th Ave. S.E. Calgary, Alberta T2H 2E2 Tel: (403) 264-5530 Fax: (403) 269-4136

ANDERSON EXPLORATION LTD.

ACOUSTIC PRESSURE SURVEY (BUILD-UP)
ANDERSON S. PIERSON HZNTL 91/11-10-02-29
191/11-10-002-29W1/0
FIELD: PIERSON
FORMATION: SPEAR FISH
JANUARY - FEBRUARY, 2000

TEST SUMMARY:

- A Tri-Ener-Tech FL1 was installed into the casing on 2000-01-25 at 11:55 hours. The fluid level was at 99.5 (TVD) joints from surface.
- The well was shut-in on 2000-01-25 at 12:05 hours to start the build-up.
- The build-up test was concluded on 2000-02-28 at 15:05 hours.
- A bottomhole pressure of 3526 kPa (absolute) was calculated at the mid-point of the perforations after 819.0 hours of shut-in time.

PRESSURE DATA CALCULATIONS:

- The bottomhole pressures were calculated using the following information:

	Atmospheric Pressure	93.0 kPa
*	Formation Depth	1020.95 m KB
	Oil Gravity	36.00° API
	Water Gravity	1.140
	Gas Gravity	1.107
	Oil Production	1.58 m^3/d
	Water Production	5.95 m^3/d
	Bottomhole Temperature	40.0°C

* Horizontal deviated well; MPP and fluid levels at TVD.

ATTACHMENTS:
ACOUSTIC WELLSOUNDER PRESSURE SURVEY DATA
TYPECURVE PRE-PLOT
BOTTOMHOLE PRESSURE VERSUS TIME
CASING PRESSURE VERSUS TIME
FLUID LEVEL VERSUS TIME
PRESSURE FILE (ASCII FORMAT)

OTATCO INC
Acoustic Wellsounder Pressure Survey

COMPANY: ANDERSON EXPLORATION LTD.
FIELD: PIERSON
POOL NAME: SPEAR FISH

WELLNAME: ANDERSON S. PIERSON HZNTL 91/11-10-02-29
LOCATION: 191/11-10-002-29W1/0
STATUS: PUMP OIL

Tubing

TOTAL JOINTS	=	102.00	
TUBING BOTTOM	=	1020.98	mKB
AVERAGE JOINT LENGTH	=	9.96	m

Elevation

KB	=	474.10	m
CF	=	469.30	m
KB to CF	=	4.80	m

Production

OIL RATE	=	1.58	m3/d
WATER RATE	=	5.95	m3/d

Temperature

SURFACE TEMP	=	2.00	C
RESERVOIR TEMP	=	40.00	C

Fluid Properties

OIL GRAVITY(API)	=	36.00
GAS GRAVITY	=	1.107
WATER GRAVITY	=	1.140

Producing Interval

Top of Interval	=	1019.80	mKB
Bottom of Interval	=	1022.10	mKB
MID-POINT PERFS	=	1020.95	mKB

- HORIZONTAL DEVIATED WELL; FLUID LEVELS AND PERFORATED INTERVAL CORRECTED FOR DEVIATION.

Shot #	Date	Time	Test Time (hrs)	Joints to Fluid	Column Heights (m) Gas	Oil	Emul	Gradients (kPa/m) Gas	Oil	Emul	Pressures (kPag) Csg	Gas	Oil	Emul	MPP
1	00/01/25	12:05:01	0.0000	99.51	991.37	24.78	0.00	0.061	7.579	9.881	331.0	60.1	187.8	0.0	578.9
2	00/01/25	12:08:08	0.0519	99.46	990.88	24.78	0.50	0.061	7.579	10.050	335.0	60.7	187.8	5.0	588.4
3	00/01/25	12:11:25	0.1067	99.43	990.58	24.41	1.16	0.061	7.697	10.157	335.0	60.6	187.9	11.8	595.3
4	00/01/25	12:14:55	0.1650	99.43	990.58	24.24	1.33	0.061	7.746	10.212	335.0	60.6	187.8	13.6	597.0
5	00/01/25	12:18:36	0.2264	99.43	990.58	24.10	1.48	0.061	7.793	10.250	335.0	60.6	187.8	15.1	598.6
6	00/01/25	12:22:29	0.2911	99.37	989.98	24.00	2.18	0.061	7.824	10.280	336.0	60.8	187.7	22.4	606.9
7	00/01/25	12:26:36	0.3597	99.33	989.58	23.95	2.62	0.062	7.837	10.304	339.0	61.2	187.7	27.0	614.9
8	00/01/25	12:30:57	0.4322	99.33	989.58	23.71	2.86	0.062	7.917	10.288	339.0	61.2	187.7	29.4	617.3
9	00/01/25	12:35:33	0.5089	99.28	989.08	23.70	3.37	0.062	7.920	10.306	339.0	61.1	187.7	34.7	622.6
10	00/01/25	12:40:25	0.5900	99.19	988.19	23.69	4.27	0.062	7.923	10.295	339.0	61.1	187.7	44.0	631.8
11	00/01/25	12:45:33	0.6756	99.14	987.69	23.68	4.78	0.062	7.926	10.299	339.0	61.1	187.7	49.3	637.0
12	00/01/25	12:50:59	0.7661	99.09	987.19	23.67	5.29	0.062	7.930	10.304	339.0	61.0	187.7	54.5	642.2
13	00/01/25	12:56:43	0.8617	99.03	986.59	23.66	5.90	0.062	7.934	10.309	339.0	61.0	187.7	60.8	648.5
14	00/01/25	13:02:47	0.9628	99.02	986.49	23.65	6.01	0.062	7.937	10.315	339.0	61.0	187.7	62.0	649.7
15	00/01/25	13:09:12	1.0697	98.92	985.50	23.64	7.02	0.062	7.942	10.321	339.0	60.9	187.7	72.4	660.1
16	00/01/25	13:15:59	1.1828	98.91	985.40	23.62	7.13	0.062	7.946	10.332	342.0	61.4	187.7	73.7	664.8
17	00/01/25	13:23:09	1.3022	98.82	984.50	23.61	8.04	0.062	7.951	10.335	339.0	60.9	187.7	83.1	670.7
18	00/01/25	13:30:44	1.4286	98.79	984.20	23.59	8.36	0.062	7.957	10.350	343.0	61.4	187.7	86.5	678.7
19	00/01/25	13:38:44	1.5619	98.72	983.50	23.57	9.07	0.062	7.963	10.358	343.0	61.4	187.7	94.0	686.1
20	00/01/25	13:47:12	1.7031	98.69	983.20	23.55	9.39	0.062	7.969	10.370	343.0	61.4	187.7	97.4	689.5
21	00/01/25	13:56:09	1.8522	98.59	982.21	23.53	10.41	0.062	7.977	10.384	343.0	61.3	187.7	108.1	700.1
22	00/01/25	14:05:37	2.0100	98.54	981.71	23.51	10.93	0.063	7.985	10.400	344.0	61.4	187.7	113.7	706.8
23	00/01/25	14:15:36	2.1764	98.47	981.01	23.48	11.66	0.063	7.995	10.419	346.0	61.7	187.7	121.5	716.9
24	00/01/25	14:26:10	2.3525	98.42	980.51	23.45	12.19	0.063	8.005	10.439	346.0	61.6	187.7	127.2	722.6
25	00/01/25	14:37:21	2.5389	98.37	980.02	23.41	12.72	0.063	8.017	10.463	346.0	61.6	187.7	133.1	728.4
26	00/01/25	14:49:09	2.7356	98.33	979.62	23.37	13.16	0.063	8.032	10.491	347.0	61.7	187.7	138.1	734.5
27	00/01/25	15:01:38	2.9436	98.23	978.62	23.33	14.20	0.063	8.047	10.521	346.0	61.5	187.7	149.4	744.7
28	00/01/25	15:14:50	3.1636	98.18	978.12	23.27	14.76	0.063	8.067	10.548	349.0	61.9	187.7	155.7	754.3
29	00/01/25	15:28:46	3.3958	98.09	977.23	23.20	15.72	0.063	8.089	10.549	349.0	61.9	187.7	165.8	764.4
30	00/01/25	15:43:31	3.6417	98.02	976.53	23.13	16.49	0.063	8.115	10.535	349.0	61.8	187.7	173.7	772.3
31	00/01/25	15:59:06	3.9014	97.92	975.53	23.13	17.49	0.064	8.127	10.516	353.0	62.3	188.0	183.9	787.2
32	00/01/25	16:15:34	4.1758	97.83	974.64	23.13	18.38	0.064	8.128	10.516	353.0	62.3	188.0	193.3	796.6
33	00/01/25	16:32:58	4.4658	97.73	973.64	23.13	19.38	0.064	8.128	10.516	353.0	62.2	188.0	203.8	807.0
34	00/01/25	16:51:23	4.7728	97.67	973.04	23.13	19.98	0.064	8.128	10.516	354.0	62.3	188.0	210.1	814.4
35	00/01/25	17:10:50	5.0969	97.55	971.85	23.13	21.17	0.064	8.128	10.516	353.0	62.1	188.0	222.6	825.8
36	00/01/25	17:31:23	5.4394	97.43	970.65	23.13	22.37	0.065	8.128	10.516	357.0	62.6	188.0	235.2	842.8
37	00/01/25	17:53:07	5.8017	97.34	969.75	23.13	23.26	0.065	8.128	10.516	357.0	62.6	188.0	244.6	852.2
38	00/01/25	18:16:06	6.1847	97.24	968.76	23.13	24.26	0.065	8.129	10.516	357.0	62.5	188.0	255.1	862.6
39	00/01/25	18:40:23	6.5894	97.16	967.96	23.13	25.06	0.065	8.129	10.516	357.0	62.4	188.0	263.5	871.0
40	00/01/25	19:06:03	7.0172	97.08	967.16	23.13	25.86	0.065	8.129	10.516	357.0	62.4	188.0	271.9	879.3
41	00/01/25	19:33:11	7.4694	96.95	965.87	23.13	27.15	0.065	8.129	10.515	358.0	62.4	188.0	285.5	894.0
42	00/01/25	20:01:52	7.9475	96.85	964.87	23.13	28.15	0.065	8.129	10.515	358.0	62.4	188.0	296.0	904.4
43	00/01/25	20:32:11	8.4528	96.77	964.08	23.13	28.94	0.065	8.129	10.515	358.0	62.3	188.0	304.4	912.7
44	00/01/25	21:04:14	8.9869	96.58	962.18	23.13	30.84	0.065	8.130	10.515	361.0	62.6	188.0	324.3	935.9
45	00/01/25	21:38:06	9.5514	96.36	959.99	23.13	33.03	0.066	8.130	10.515	365.0	63.1	188.0	347.3	963.4
46	00/01/25	22:13:54	10.1481	96.23	958.70	23.13	34.32	0.066	8.130	10.515	365.0	63.0	188.1	360.9	976.9
47	00/01/25	22:51:45	10.7789	96.05	956.90	23.13	36.12	0.066	8.130	10.515	365.0	62.9	188.1	379.8	995.7
48	00/01/25	23:31:46	11.4458	95.87	955.11	23.13	37.91	0.066	8.131	10.515	367.0	63.0	188.1	398.6	1016.7
49	00/01/26	00:14:03	12.1506	95.78	954.21	23.13	38.81	0.066	8.131	10.515	368.0	63.1	188.1	408.0	1027.2
50	00/01/26	00:58:45	12.8956	95.62	952.62	23.13	40.40	0.066	8.131	10.515	369.0	63.2	188.1	424.8	1045.0
51	00/01/26	01:46:00	13.6831	95.44	950.83	23.13	42.19	0.066	8.131	10.515	369.0	63.0	188.1	443.7	1063.8
52	00/01/26	02:35:57	14.5156	95.31	949.53	23.13	43.49	0.066	8.131	10.515	369.0	63.0	188.1	457.3	1077.3
53	00/01/26	03:28:44	15.3953	95.08	947.24	23.13	45.78	0.067	8.132	10.515	371.0	63.1	188.1	481.4	1103.5
54	00/01/26	04:24:33	16.3256	94.99	946.34	23.13	46.68	0.067	8.132	10.515	372.0	63.2	188.1	490.8	1114.0
55	00/01/26	05:23:32	17.3086	94.77	944.15	23.13	48.87	0.067	8.132	10.515	372.0	63.0	188.1	513.8	1137.0
56	00/01/26	06:25:53	18.3478	94.62	942.66	23.13	50.36	0.067	8.132	10.514	375.0	63.3	188.1	529.5	1156.0
57	00/01/26	07:31:48	19.4464	94.44	940.86	23.13	52.16	0.067	8.133	10.514	375.0	63.2	188.1	548.4	1174.7
58	00/01/26	08:41:28	20.6075	94.23	938.77	23.13	54.25	0.067	8.133	10.514	375.0	63.1	188.1	570.4	1196.6
59	00/01/26	09:55:06	21.8347	93.95	935.98	23.13	57.04	0.068	8.133	10.514	378.0	63.3	188.1	599.7	1229.2
60	00/01/26	11:12:57	23.1322	93.77	934.19	23.13	58.83	0.068	8.134	10.514	379.0	63.3	188.1	618.6	1249.0
61	00/01/26	12:35:14	24.5036	93.51	931.60	23.13	61.42	0.068	8.134	10.514	379.0	63.2	188.2	645.8	1276.1
62	00/01/26	14:02:12	25.9531	93.30	929.51	23.13	63.51	0.068	8.134	10.514	382.0	63.4	188.2	667.8	1301.4
63	00/01/26	15:34:08	27.4853	93.06	927.11	23.13	65.90	0.068	8.135	10.514	382.0	63.3	188.2	692.9	1326.3
64	00/01/26	17:11:19	29.1050	92.67	923.23	23.13	69.79	0.069	8.135	10.514	386.0	63.6	188.2	733.7	1371.5
65	00/01/26	18:54:02	30.8169	92.42	920.74	23.13	72.28	0.069	8.136	10.513	388.0	63.7	188.2	759.9	1399.8

ANDERSON EXPLORATION LTD. 191/11-10-002-29W1/0 Continued

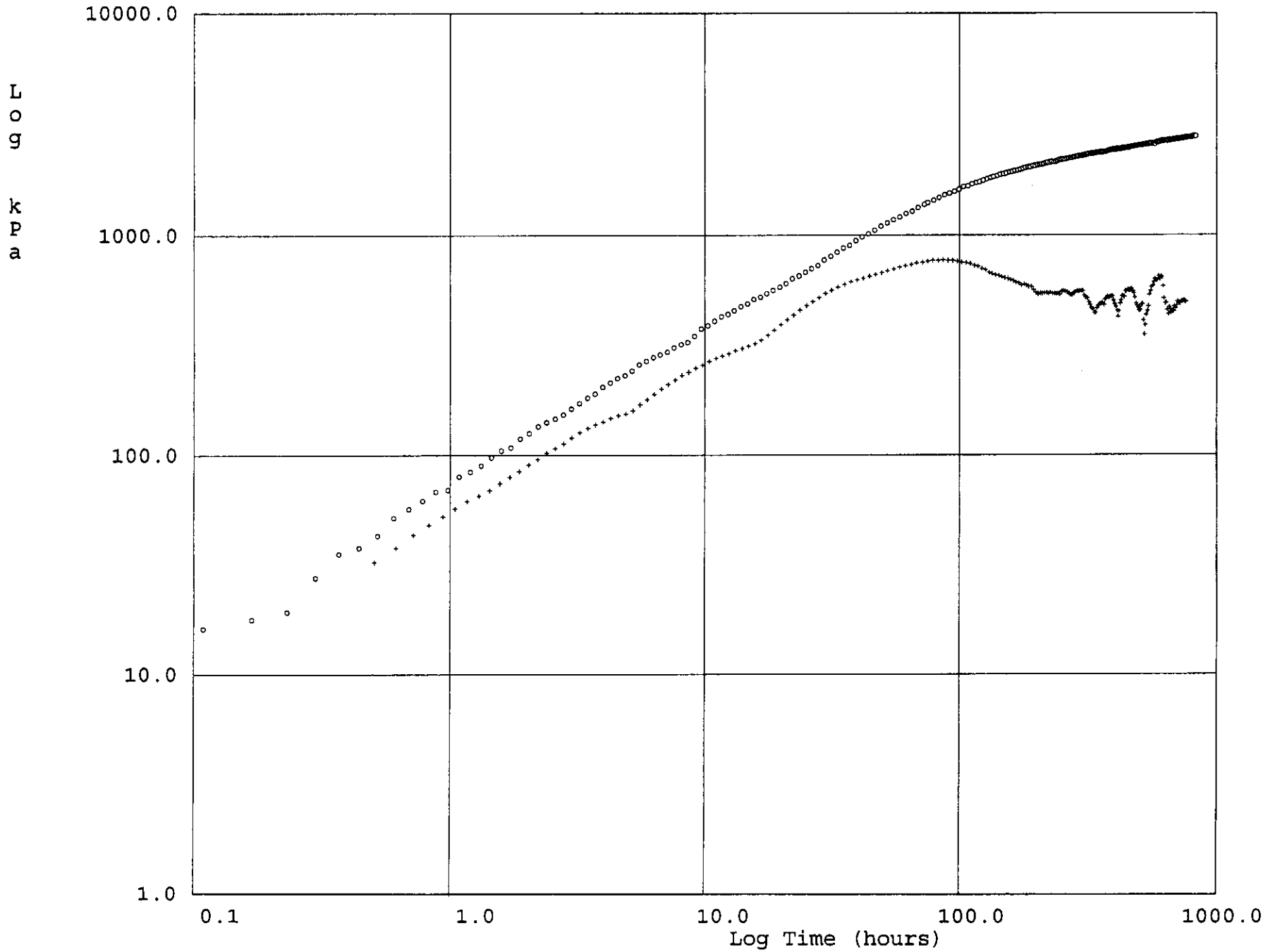
Shot #	Date	Time	Test Time (hrs)	Joints to Fluid	Column Heights (m)			Gradients (kPa/m)			Pressures (kPag)				
					Gas	Oil	Emul	Gas	Oil	Emul	Csg	Gas	Oil	Emul	MPP
66	00/01/26	20:42:37	32.6267	92.08	917.35	23.13	75.67	0.069	8.136	10.513	389.0	63.6	188.2	795.5	1436.3
67	00/01/26	22:37:23	34.5394	91.75	914.06	23.13	78.96	0.069	8.137	10.513	390.0	63.5	188.2	830.1	1471.8
68	00/01/27	00:38:42	36.5614	91.50	911.57	23.13	81.45	0.070	8.137	10.513	392.0	63.6	188.2	856.2	1500.1
69	00/01/27	02:46:57	38.6989	91.12	907.79	23.13	85.23	0.070	8.138	10.513	396.0	63.9	188.2	896.0	1544.1
70	00/01/27	05:02:30	40.9581	90.77	904.30	23.13	88.72	0.070	8.138	10.513	396.0	63.6	188.2	932.7	1580.5
71	00/01/27	07:25:47	43.3461	90.49	901.51	23.13	91.51	0.071	8.139	10.513	399.0	63.8	188.3	962.0	1613.1
72	00/01/27	09:57:14	45.8703	90.08	897.43	23.13	95.59	0.071	8.140	10.512	399.0	63.5	188.3	1004.9	1655.7
73	00/01/27	12:37:20	48.5386	89.69	893.54	23.13	99.48	0.071	8.140	10.512	402.0	63.7	188.3	1045.7	1699.7
74	00/01/27	15:26:33	51.3589	89.35	890.15	23.13	102.87	0.072	8.141	10.512	405.0	63.8	188.3	1081.3	1738.5
75	00/01/27	18:25:26	54.3403	89.02	886.87	23.13	106.15	0.072	8.141	10.512	409.0	64.1	188.3	1115.9	1777.3
76	00/01/27	21:34:31	57.4917	88.65	883.18	23.13	109.84	0.072	8.142	10.512	409.0	63.9	188.3	1154.6	1815.8
77	00/01/28	00:54:23	60.8228	88.24	879.10	23.13	113.92	0.072	8.142	10.511	410.0	63.7	188.3	1197.5	1859.6
78	00/01/28	04:25:39	64.3439	87.93	876.01	23.13	117.01	0.073	8.143	10.511	411.0	63.6	188.4	1230.0	1892.9
79	00/01/28	08:08:57	68.0656	87.51	871.82	23.13	121.20	0.073	8.144	10.511	414.0	63.7	188.4	1273.9	1940.0
80	00/01/28	12:05:01	72.0000	87.09	867.64	23.13	125.38	0.074	8.144	10.511	419.0	64.1	188.4	1317.9	1989.3
81	00/01/28	14:23:01	74.3000	86.86	865.35	23.13	127.67	0.074	8.144	10.511	419.0	63.9	188.4	1341.9	2013.2
82	00/01/28	18:23:01	78.3000	86.52	861.96	23.13	131.06	0.074	8.145	10.511	420.0	63.8	188.4	1377.5	2049.7
83	00/01/28	22:23:01	82.3000	86.12	857.97	23.13	135.04	0.074	8.146	10.510	421.0	63.6	188.4	1419.4	2092.4
84	00/01/29	02:23:01	86.3000	85.73	854.09	23.13	138.93	0.074	8.146	10.510	421.0	63.3	188.4	1460.2	2133.0
85	00/01/29	06:23:01	90.3000	85.45	851.30	23.13	141.72	0.075	8.147	10.510	427.0	63.9	188.4	1489.5	2168.8
86	00/01/29	10:23:01	94.3000	85.20	848.81	23.13	144.21	0.076	8.147	10.510	430.0	64.1	188.4	1515.6	2198.2
87	00/01/29	14:23:01	98.3000	84.91	845.92	23.13	147.10	0.076	8.147	10.510	432.0	64.1	188.5	1546.0	2230.6
88	00/01/29	18:23:01	102.3000	84.52	842.03	23.13	150.98	0.076	8.148	10.510	433.0	64.0	188.5	1586.8	2272.2
89	00/01/29	22:23:01	106.3000	84.35	840.34	23.13	152.68	0.076	8.148	10.509	436.0	64.2	188.5	1604.6	2293.3
90	00/01/30	02:23:01	110.3000	84.09	837.75	23.13	155.27	0.076	8.149	10.509	436.0	64.0	188.5	1631.8	2320.3
91	00/01/30	06:23:01	114.3000	83.81	834.96	23.13	158.06	0.077	8.149	10.509	437.0	63.9	188.5	1661.1	2350.5
92	00/01/30	10:23:01	118.3000	83.70	833.87	23.13	159.15	0.077	8.149	10.509	443.0	64.6	188.5	1672.6	2368.7
93	00/01/30	14:23:01	122.3000	83.44	831.28	23.13	161.74	0.077	8.150	10.509	442.0	64.3	188.5	1699.8	2394.6
94	00/01/30	18:23:01	126.3000	83.27	829.58	23.13	163.44	0.078	8.150	10.509	446.0	64.7	188.5	1717.5	2416.7
95	00/01/30	22:23:01	130.3000	83.04	827.29	23.13	165.73	0.078	8.150	10.509	447.0	64.6	188.5	1741.6	2441.7
96	00/01/31	02:23:01	134.3000	82.85	825.40	23.13	167.62	0.078	8.150	10.509	448.0	64.6	188.5	1761.5	2462.6
97	00/01/31	06:23:01	138.3000	82.70	823.90	23.13	169.12	0.078	8.151	10.509	449.0	64.6	188.5	1777.2	2479.3
98	00/01/31	10:23:01	142.3000	82.48	821.71	23.13	171.31	0.079	8.151	10.508	450.0	64.5	188.5	1800.2	2503.3
99	00/01/31	14:23:01	146.3000	82.34	820.32	23.13	172.70	0.079	8.151	10.508	452.0	64.7	188.5	1814.8	2520.0
100	00/01/31	18:23:01	150.3000	82.19	818.82	23.13	174.20	0.079	8.151	10.508	450.0	64.3	188.5	1830.5	2533.4
101	00/01/31	22:23:01	154.3000	82.02	817.13	23.13	175.89	0.079	8.151	10.508	454.0	64.7	188.5	1848.3	2555.5
102	00/02/01	02:23:01	158.3000	81.97	816.63	23.13	176.39	0.079	8.152	10.508	453.0	64.5	188.6	1853.5	2559.6
103	00/02/01	06:23:01	162.3000	81.80	814.94	23.13	178.08	0.079	8.152	10.508	454.0	64.5	188.6	1871.3	2578.4
104	00/02/01	10:23:01	166.3000	81.74	814.34	23.13	178.68	0.080	8.152	10.508	457.0	64.8	188.6	1877.6	2588.0
105	00/02/01	14:23:01	170.3000	81.51	812.05	23.13	180.97	0.080	8.152	10.508	459.0	64.9	188.6	1901.6	2614.1
106	00/02/01	18:23:01	174.3000	81.40	810.95	23.13	182.07	0.080	8.152	10.508	459.0	64.8	188.6	1913.1	2625.5
107	00/02/01	22:23:01	178.3000	81.26	809.56	23.13	183.46	0.081	8.152	10.508	463.0	65.2	188.6	1927.8	2644.5
108	00/02/02	02:23:01	182.3000	81.17	808.66	23.13	184.36	0.081	8.153	10.508	463.0	65.1	188.6	1937.2	2653.9
109	00/02/02	06:23:01	186.3000	81.09	807.86	23.13	185.16	0.080	8.153	10.508	462.0	64.9	188.6	1945.6	2661.1
110	00/02/02	10:23:01	190.3000	80.89	805.87	23.13	187.15	0.081	8.153	10.507	467.0	65.4	188.6	1966.5	2687.4
111	00/02/02	14:23:01	194.3000	80.83	805.27	23.13	187.75	0.081	8.153	10.507	464.0	65.0	188.6	1972.7	2690.3
112	00/02/02	18:23:01	198.3000	80.72	804.18	23.13	188.84	0.081	8.153	10.507	468.0	65.4	188.6	1984.2	2706.2
113	00/02/02	22:23:01	202.3000	80.69	803.88	23.13	189.14	0.081	8.153	10.507	465.0	65.0	188.6	1987.4	2706.0
114	00/02/03	02:23:01	206.3000	80.55	802.48	23.13	190.54	0.081	8.153	10.507	467.0	65.1	188.6	2002.0	2722.7
115	00/02/03	06:23:01	210.3000	80.49	801.89	23.13	191.13	0.081	8.154	10.507	466.0	64.9	188.6	2008.3	2727.8
116	00/02/03	10:23:01	214.3000	80.30	799.99	23.13	193.03	0.081	8.154	10.507	469.0	65.2	188.6	2028.2	2750.9
117	00/02/03	14:23:01	218.3000	80.27	799.69	23.13	193.33	0.081	8.154	10.507	469.0	65.1	188.6	2031.3	2754.0
118	00/02/03	18:23:01	222.3000	80.24	799.39	23.13	193.62	0.082	8.154	10.507	470.0	65.2	188.6	2034.4	2758.3
119	00/02/03	22:23:01	226.3000	80.07	797.70	23.13	195.32	0.082	8.154	10.507	470.0	65.1	188.6	2052.2	2775.9
120	00/02/04	02:23:01	230.3000	80.10	798.00	23.13	195.02	0.082	8.154	10.507	471.0	65.2	188.6	2049.1	2773.9
121	00/02/04	06:23:01	234.3000	80.01	797.10	23.13	195.92	0.082	8.154	10.507	471.0	65.2	188.6	2058.5	2783.3
122	00/02/04	10:23:01	238.3000	79.84	795.41	23.13	197.61	0.082	8.154	10.507	473.0	65.3	188.6	2076.3	2803.1
123	00/02/04	14:23:01	242.3000	79.73	794.31	23.13	198.71	0.082	8.155	10.507	475.0	65.4	188.6	2087.8	2816.8
124	00/02/04	18:23:01	246.3000	79.67	793.72	23.13	199.30	0.083	8.155	10.507	476.0	65.5	188.6	2094.0	2824.1
125	00/02/04	22:23:01	250.3000	79.64	793.42	23.13	199.60	0.083	8.155	10.507	477.0	65.6	188.6	2097.2	2828.4
126	00/02/05	02:23:01	254.3000	79.56	792.62	23.13	200.40	0.083	8.155	10.507	476.0	65.7	188.6	2105.5	2837.8
127	00/02/05	06:23:01	258.3000	79.47	791.72	23.13	201.30	0.083	8.155	10.507	478.0	65.6	188.6	2114.9	2847.1
128	00/02/05	10:23:01	262.3000	79.42	791.23	23.13	201.79	0.083	8.155	10.507	476.0	65.3	188.6	2120.2	2850.1
129	00/02/05	14:23:01	266.3000	79.36	790.63	23.13	202.39	0.083	8.155	10.507	479.0	65.6	188.6	2126.4	2859.7
130	00/02/05	18:23:01	270.3000	79.30	790.03	23.13	202.99	0.083	8.155	10.507	477.0	65.3	188.6	2132.7	2863.7
131	00/02/05	22:23:01	274.3000	79.19	788.93	23.13	204.09	0.083	8.155	10.506	481.0	65.7	188.6	2144.2	2879.5
132	00/02/06	02:23:01	278.3000	79.12	788.24	23.13	204.78	0.083	8.155	10.506	481.0	65.6	188.6	2151.5	2886.8
133	00/02/06	06:23:01	282.3000	79.08	787.84	23.13	205.18	0.083	8.155	10.506	482.0	65.7	188.6	2155.7	2892.1
134	00/02/06	10:23:01	286.3000	78.94	786.44	23.13	206.58	0.083	8.156	10.506	482.0	65.6	188.6	2170.3	2906.6
135	00/02/06	14:23:01	290.3000	78.91	786.14	23.13	206.87	0.083	8.156	10.506	482.0	65.6	188.6	2173.5	2909.7
136	00/02/06	18:23:01	294.3000	78.82	785.25	23.13	207.77	0.084	8.156	10.506	483.0	65.6	188.6	2182.9	2920.2
137	00/02/06	22:23:01	298.3000	78.82	785.25	23.13	207.77	0.083	8.156	10.506	481.0	65.4	188.7	2182.9	2918.0
138	00/02/07	02:23:01	302.3000	78.71	784.15	23.13	208.87	0.084	8.156	10.506	484.0	65.7	188.7	2194.4	2932.7
139	00/02/07	06:23:01	306.3000	78.65	783.55	23.13	209.46	0.084	8.156	10.506	485.0	65.7	188.7	2200.7	2940.1
140	00/02/07	10:23:01	310.3000	78.65	783.55	23.13	209.46	0.084	8.156	10.506	486.0	65.9	188.7	2200.7	2941.2
141	00/02/07	14:23:01	314.3000	78.48	781.86	23.13	211.16	0.084	8.156	10.506	486.0	65.7	188.7	2218.4	2958.8
142	00/02/07	18:23:01	318.3000	78.48	781.86	23.13	211.16	0.084	8.156	10.506	486.0	65.7	188.7	2218.4	2958.8
143	00/02/07	22:23:01	322.3000	78.37	780.76	23.13	212.25	0.084	8.156	10.506	487.0	65.7	188.7	2229.9	2971.3
144	00/02/08	02:23:01	326.3000	78.40	781.06	23.13	211.96	0.084	8.156	10.506	487.0	65.8	188.7	2226.8	2968.2
145	00/02/08	06:23:01	330.3000	78.31	780.17	23.13	212.85	0.085	8.156	10.506	490.0	66.1	188.7	2236.2	2980.9
146	00/02/08	10:23:01	334.3000	78.23	779.37	23.13	213.65	0.085	8.156	10.506	491.0	66.1	188.7	2244.6	2990.3
147	00/02/08	14:23:01	338.3000	78.23	779.37	23.13	213.65	0.085	8.156	10.506	494.0	66.5	188.7	2244.5	2993.7
148	00/02/08	18:23:01	342.3000	78.26	779.67	23.13	213.35	0.085	8.156	10.506	493.0	66.4	188.7	2241.4	2989.4
149	00/02/08	22:23:01	346.3000	78.17	778.77	23.13	214.25	0.085	8.156	10.506	492.0	66.2	188.7	2250.8	2997.7
150	00/02/09	02:23:01	350.3000	78.09	777.98	23.13	215.04	0.085	8.157	10.506	493.0	66.2	188.7	2259.2	3007.1
151	00/02/09	06:23:01	354.3000	78.14	778.47	23.13	214.55	0.085	8.156	10.506	494.0	66.4	188.7	2254.0	3003.0
152	00/02/09	10:23:01	358.3000	78.03	777.38	23.13	215.64	0.084	8.157	10.506	487.0	65.5	188.7	2265.5	3006.6
153	00/02/09	16:10:28	364.0908	78.00	777.08	23.13	215.94	0.085	8.157	10.506	491.0	65.9	188.7	2268.6	3014.2
154	00/02/09	21:12:01	369.1167	77.81	775.19	23.13	217.83	0.084	8.158	10.506	485.0	65.0	188.7	2288.5	3027.2
155	00/02/10	01:12:01	373.1167	77.81	775.19	23.13	217.83	0.085	8.157	10.506	489.0	65.5	188.7	2288.5	3031.7

ANDERSON EXPLORATION LTD. 191/11-10-002-29W1/0 Continued

Shot #	Date	Time	Test Time (hrs)	Joints to Fluid	Column Heights (m) Gas	Oil	Emul	Gradients (kPa/m) Gas	Oil	Emul	Pressures (kPag) Csg	Gas	Oil	Emul	MPP
156	00/02/10	05:12:01	377.1167	77.72	774.29	23.13	218.73	0.085	8.157	10.506	489.0	65.4	188.7	2297.9	3041.0
157	00/02/10	09:12:01	381.1167	77.69	773.99	23.13	219.03	0.087	8.157	10.505	502.0	67.0	188.7	2301.0	3058.6
158	00/02/10	13:12:01	385.1167	77.60	773.09	23.13	219.93	0.086	8.157	10.505	498.0	66.4	188.7	2310.4	3063.5
159	00/02/10	17:12:01	389.1167	77.60	773.09	23.13	219.93	0.085	8.158	10.506	492.0	65.7	188.7	2310.4	3056.8
160	00/02/10	21:12:01	393.1167	77.50	772.10	23.13	220.92	0.085	8.158	10.506	489.0	65.3	188.7	2320.9	3063.9
161	00/02/11	01:12:01	397.1167	77.55	772.60	23.13	220.42	0.085	8.158	10.506	491.0	65.5	188.7	2315.7	3060.9
162	00/02/11	05:12:01	401.1167	77.49	772.00	23.13	221.02	0.085	8.158	10.505	492.0	65.6	188.7	2321.9	3068.2
163	00/02/11	09:12:01	405.1167	77.40	771.10	23.13	221.92	0.087	8.157	10.505	502.0	66.7	188.7	2331.3	3088.7
164	00/02/11	13:12:01	409.1167	77.38	770.90	23.13	222.12	0.085	8.158	10.506	489.0	65.2	188.7	2333.5	3076.3
165	00/02/11	17:12:01	413.1167	77.32	770.30	23.13	222.72	0.085	8.158	10.505	492.0	65.5	188.7	2339.7	3085.9
166	00/02/11	21:12:01	417.1167	77.31	770.20	23.13	222.81	0.085	8.158	10.505	493.0	65.6	188.7	2340.8	3088.0
167	00/02/12	01:12:01	421.1167	77.30	770.11	23.13	222.91	0.087	8.157	10.505	503.0	66.7	188.7	2341.7	3100.2
168	00/02/12	05:12:01	425.1167	77.26	769.71	23.13	223.31	0.086	8.158	10.505	496.0	65.9	188.7	2346.0	3096.5
169	00/02/12	09:12:01	429.1167	77.19	769.01	23.13	224.01	0.087	8.158	10.505	504.0	66.8	188.7	2353.2	3112.7
170	00/02/12	13:12:01	433.1167	77.19	769.01	23.13	224.01	0.086	8.158	10.505	498.0	66.1	188.7	2353.3	3106.0
171	00/02/12	17:12:01	437.1167	77.10	768.11	23.13	224.91	0.086	8.158	10.505	499.0	66.1	188.7	2362.7	3116.5
172	00/02/12	21:12:01	441.1167	77.10	768.11	23.13	224.91	0.086	8.158	10.505	499.0	66.1	188.7	2362.7	3116.5
173	00/02/13	01:12:01	445.1167	77.05	767.61	23.13	225.40	0.086	8.158	10.505	497.0	65.8	188.7	2367.9	3119.5
174	00/02/13	05:12:01	449.1167	77.06	767.71	23.13	225.31	0.085	8.158	10.505	495.0	65.6	188.7	2366.9	3116.2
175	00/02/13	09:12:01	453.1167	76.99	767.02	23.13	226.00	0.087	8.158	10.505	504.0	66.6	188.7	2374.2	3133.5
176	00/02/13	13:12:01	457.1167	76.88	765.92	23.13	227.10	0.087	8.158	10.505	502.0	66.3	188.7	2385.7	3142.6
177	00/02/13	17:12:01	461.1167	76.82	765.32	23.13	227.70	0.087	8.158	10.505	502.0	66.2	188.7	2391.9	3148.9
178	00/02/13	21:12:01	465.1167	76.79	765.02	23.13	228.00	0.087	8.158	10.505	505.0	66.5	188.7	2395.1	3155.3
179	00/02/14	01:12:01	469.1167	76.79	765.02	23.13	228.00	0.087	8.158	10.505	505.0	66.5	188.7	2395.1	3155.3
180	00/02/14	05:12:01	473.1167	76.77	764.82	23.13	228.19	0.087	8.158	10.505	506.0	66.6	188.7	2397.2	3158.5
181	00/02/14	09:12:01	477.1167	76.70	764.13	23.13	228.89	0.087	8.158	10.505	506.0	66.6	188.7	2404.5	3165.8
182	00/02/14	13:12:01	481.1167	76.66	763.73	23.13	229.29	0.087	8.158	10.505	505.0	66.4	188.7	2408.7	3168.8
183	00/02/14	17:12:01	485.1167	76.60	763.13	23.13	229.89	0.087	8.159	10.505	505.0	66.4	188.7	2414.9	3175.0
184	00/02/14	21:12:01	489.1167	76.56	762.73	23.13	230.29	0.087	8.159	10.505	503.0	66.1	188.7	2419.1	3177.0
185	00/02/15	01:12:01	493.1167	76.56	762.73	23.13	230.29	0.087	8.159	10.505	502.0	66.0	188.7	2419.1	3175.8
186	00/02/15	05:12:01	497.1167	76.51	762.23	23.13	230.78	0.088	8.159	10.505	509.0	66.8	188.7	2424.3	3188.8
187	00/02/15	09:12:01	501.1167	76.51	762.23	23.13	230.78	0.087	8.159	10.505	506.0	66.4	188.7	2424.3	3185.5
188	00/02/15	13:12:01	505.1167	76.41	761.24	23.13	231.78	0.087	8.159	10.505	503.0	66.0	188.7	2434.8	3192.5
189	00/02/15	17:12:01	509.1167	76.41	761.24	23.13	231.78	0.087	8.159	10.505	504.0	66.1	188.7	2434.8	3193.6
190	00/02/15	21:12:01	513.1167	76.36	760.74	23.13	232.28	0.087	8.159	10.505	505.0	66.2	188.7	2440.0	3199.9
191	00/02/16	01:12:01	517.1167	76.36	760.74	23.13	232.28	0.087	8.159	10.505	506.0	66.3	188.7	2440.0	3201.0
192	00/02/16	05:12:01	521.1167	76.29	760.04	23.13	232.98	0.087	8.159	10.505	506.0	66.2	188.7	2447.3	3208.3
193	00/02/16	09:12:01	525.1167	76.29	760.04	23.13	232.98	0.088	8.159	10.505	509.0	66.6	188.7	2447.3	3211.6
194	00/02/16	13:12:01	529.1167	76.21	759.25	23.13	233.77	0.086	8.160	10.505	501.0	65.6	188.7	2455.7	3211.0
195	00/02/16	17:12:01	533.1167	76.20	759.15	23.13	233.87	0.086	8.160	10.505	501.0	65.6	188.7	2456.8	3212.1
196	00/02/16	21:12:01	537.1167	76.13	758.45	23.13	234.57	0.087	8.159	10.505	505.0	66.0	188.7	2464.1	3223.8
197	00/02/17	01:12:01	541.1167	76.13	758.45	23.13	234.57	0.086	8.160	10.505	501.0	65.5	188.7	2464.1	3219.3
198	00/02/17	09:12:01	549.1167	76.04	757.55	23.13	235.47	0.089	8.159	10.504	515.0	67.1	188.7	2473.4	3244.2
199	00/02/17	16:41:01	556.6000	75.98	756.95	23.13	236.06	0.087	8.160	10.505	504.0	65.7	188.7	2479.8	3238.2
200	00/02/17	22:41:01	562.6000	75.96	756.76	23.13	236.26	0.083	8.161	10.505	479.0	62.8	188.8	2482.0	3212.6
201	00/02/18	04:41:01	568.6000	75.90	756.16	23.13	236.86	0.083	8.162	10.505	477.0	62.5	188.8	2488.3	3216.6
202	00/02/18	10:41:01	574.6000	75.77	754.86	23.13	238.16	0.087	8.160	10.505	504.0	65.5	188.8	2501.7	3260.0
203	00/02/18	16:41:01	580.6000	75.71	754.26	23.13	238.75	0.088	8.160	10.504	511.0	66.3	188.7	2508.0	3274.0
204	00/02/18	22:41:01	586.6000	75.76	754.76	23.13	238.26	0.087	8.160	10.504	506.0	65.8	188.7	2502.8	3263.3
205	00/02/19	04:41:01	592.6000	75.68	753.97	23.13	239.05	0.088	8.160	10.504	511.0	66.3	188.7	2511.1	3277.1
206	00/02/19	10:41:01	598.6000	75.65	753.67	23.13	239.35	0.091	8.159	10.504	530.0	68.5	188.7	2514.1	3301.3
207	00/02/19	16:41:01	604.6000	75.56	752.77	23.13	240.25	0.088	8.160	10.504	513.0	66.4	188.7	2523.6	3291.8
208	00/02/19	22:41:01	610.6000	75.53	752.47	23.13	240.55	0.089	8.160	10.504	517.0	66.8	188.7	2526.7	3299.3
209	00/02/20	04:41:01	616.6000	75.50	752.17	23.13	240.85	0.088	8.160	10.504	514.0	66.5	188.7	2529.9	3299.1
210	00/02/20	10:41:01	622.6000	75.39	751.08	23.13	241.94	0.088	8.160	10.504	514.0	66.4	188.8	2541.4	3310.5
211	00/02/20	16:41:01	628.6000	75.35	750.68	23.13	242.34	0.088	8.160	10.504	514.0	66.3	188.8	2545.6	3314.7
212	00/02/20	22:41:01	634.6000	75.42	751.38	23.13	241.64	0.088	8.160	10.504	514.0	66.4	188.8	2538.3	3307.4
213	00/02/21	04:41:01	640.6000	75.33	750.48	23.13	242.54	0.089	8.160	10.504	518.0	66.8	188.8	2547.6	3321.2
214	00/02/21	10:41:01	646.6000	75.21	749.28	23.13	243.74	0.089	8.160	10.504	520.0	66.9	188.8	2560.2	3335.8
215	00/02/21	16:41:01	652.6000	75.31	750.28	23.13	242.74	0.089	8.160	10.504	517.0	66.6	188.8	2549.7	3322.1
216	00/02/21	22:41:01	658.6000	75.24	749.58	23.13	243.44	0.089	8.160	10.504	519.0	66.8	188.8	2557.1	3331.6
217	00/02/22	04:41:01	664.6000	75.18	748.98	23.13	244.03	0.089	8.161	10.504	517.0	66.5	188.8	2563.3	3335.6
218	00/02/22	10:41:01	670.6000	75.12	748.39	23.13	244.63	0.089	8.160	10.504	521.0	66.9	188.8	2569.6	3346.3
219	00/02/22	16:41:01	676.6000	75.05	747.69	23.13	245.33	0.089	8.161	10.504	520.0	66.8	188.8	2576.9	3352.4
220	00/02/22	22:41:01	682.6000	75.12	748.39	23.13	244.63	0.089	8.161	10.504	519.0	66.7	188.8	2569.6	3344.1
221	00/02/23	04:41:01	688.6000	75.03	747.49	23.13	245.53	0.089	8.161	10.504	520.0	66.7	188.8	2579.0	3354.5
222	00/02/23	10:41:01	694.6000	75.03	747.49	23.13	245.53	0.089	8.161	10.504	521.0	66.9	188.8	2579.0	3355.6
223	00/02/23	16:41:01	700.6000	74.97	746.89	23.13	246.13	0.089	8.161	10.504	520.0	66.7	188.8	2585.3	3360.7
224	00/02/23	22:41:01	706.6000	74.91	746.29	23.13	246.72	0.090	8.161	10.504	523.0	67.0	188.8	2591.5	3370.3
225	00/02/24	04:41:01	712.6000	74.94	746.59	23.13	246.43	0.090	8.161	10.504	522.0	66.9	188.8	2588.4	3366.1
226	00/02/24	12:44:28	720.6575	74.91	746.29	23.13	246.72	0.089	8.161	10.504	521.0	66.8	188.8	2591.5	3368.1
227	00/02/24	18:53:01	726.8000	74.77	744.90	23.13	248.12	0.089	8.161	10.504	521.0	66.6	188.8	2606.2	3382.6
228	00/02/25	00:53:01	732.8000	74.80	745.20	23.13	247.82	0.090	8.161	10.504	522.0	66.8	188.8	2603.0	3380.6
229	00/02/25	06:53:01	738.8000	74.70	744.20	23.13	248.82	0.090	8.161	10.504	525.0	67.0	188.8	2613.5	3394.3
230	00/02/25	12:53:01	744.8000	74.70	744.20	23.13	248.82	0.090	8.161	10.504	525.0	67.0	188.8	2613.5	3394.3
231	00/02/25	18:53:01	750.8000	74.63	743.51	23.13	249.51	0.090	8.161	10.504	525.0	67.0	188.8	2620.8	3401.5
232	00/02/26	00:53:01	756.8000	74.66	743.80	23.13	249.22	0.090	8.161	10.504	525.0	67.0	188.8	2617.7	3398.4
233	00/02/26	06:53:01	762.8000	74.59	743.11	23.13	249.91	0.090	8.161	10.504	525.0	66.9	188.8	2625.0	3405.7
234	00/02/26	12:53:01	768.8000	74.59	743.11	23.13	249.91	0.090	8.161	10.503	527.0	67.2	188.8	2625.0	3407.9
235	00/02/26	18:53:01	774.8000	74.52	742.41	23.13	250.61	0.090	8.161	10.504	525.0	66.9	188.8	2632.3	3412.9
236	00/02/27	00:53:01	780.8000	74.49	742.11	23.13	250.91	0.090	8.161	10.504	523.0	66.6	188.8	2635.4	3413.8
237	00/02/27	06:53:01	786.8000	74.51	742.31	23.13	250.71	0.090	8.161	10.504	523.0	66.6	188.8	2633.3	3411.8
238	00/02/27	12:53:01	792.8000	74.36	740.82	23.13	252.20	0.090	8.162	10.503	524.0	66.6	188.8	2649.0	3428.4
239	00/02/27	18:53:01	798.8000	74.38	741.01	23.13	252.00	0.090	8.162	10.503	525.0	66.7	188.8	2646.9	3427.4
240	00/02/28	00:53:01	804.8000	74.35	740.72	23.13	252.30	0.090	8.162	10.503	525.0	66.7	188.8	2650.1	3430.6
241	00/02/28	06:53:01	810.8000	74.31	740.32	23.13	252.70	0.090	8.162	10.503	525.0	66.7	188.8	2654.2	3434.7
242	00/02/28	15:05:55	819.0150	74.35	740.72	23.13	252.30	0.090	8.161	10.503	527.0	66.9	188.8	2650.0	3432.8

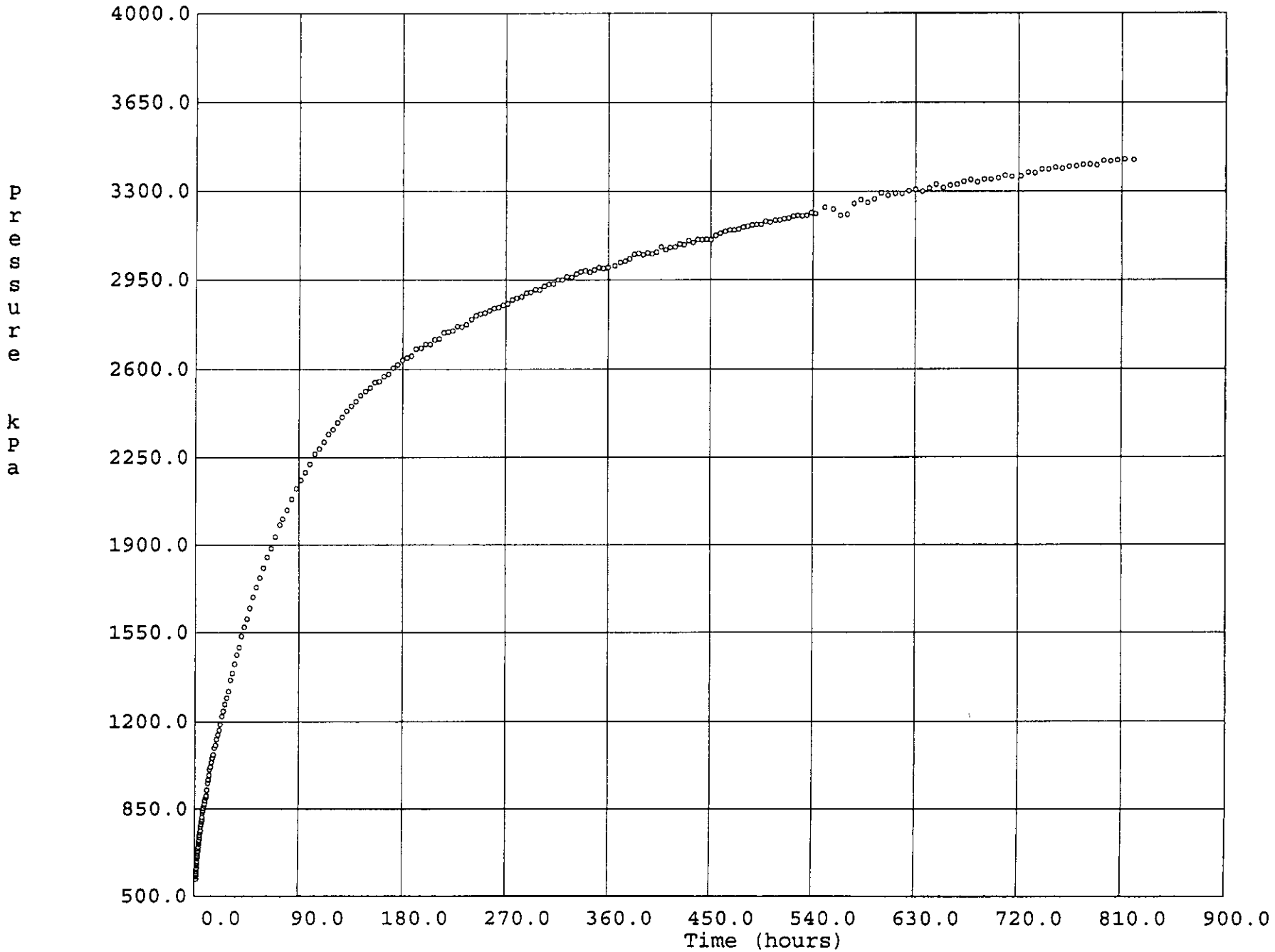
Type Curve Pre-plot (Log(Ps - Pwf) vs Log(Time))

ANDERSON EXPLORATION LTD.
191/11-10-002-29W1/0



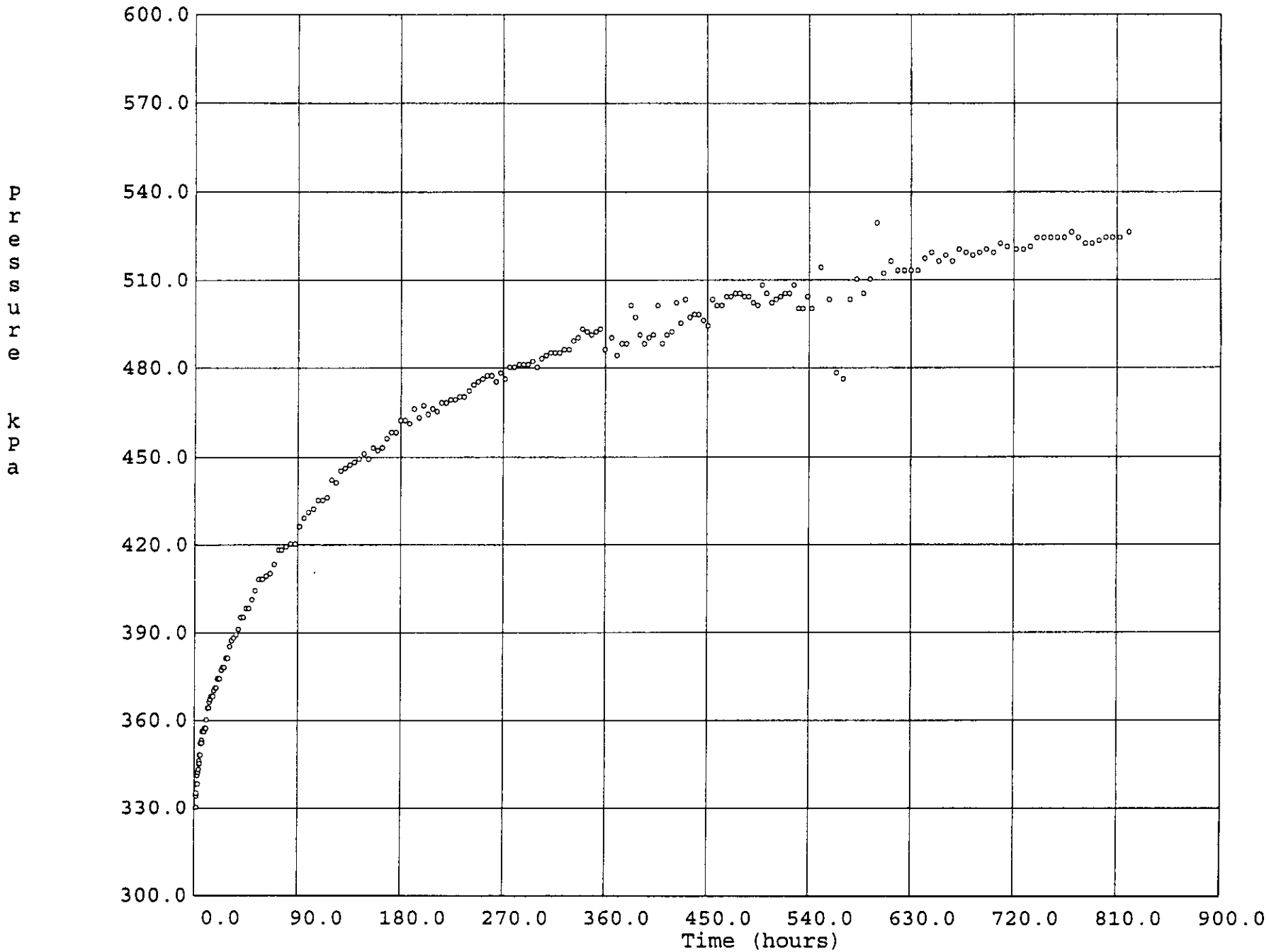
Bottom Hole Pressure vs Time

ANDERSON EXPLORATION LTD.
191/11-10-002-29W1/0



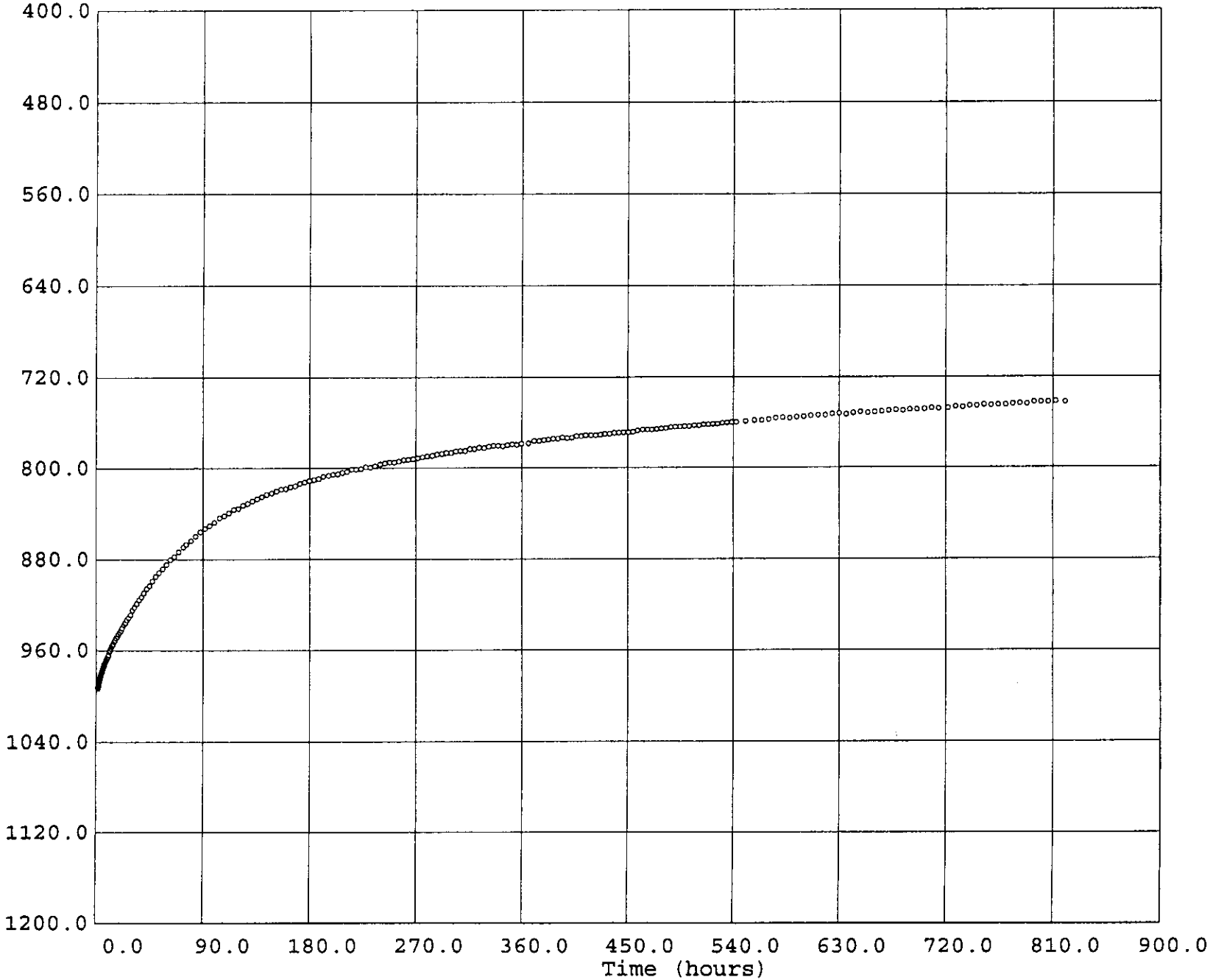
Casing Pressure vs Time

ANDERSON EXPLORATION LTD.
191/11-10-002-29W1/0



Fluid Level vs Time

ANDERSON EXPLORATION LTD.
191/11-10-002-29W1/0



APPENDIX

EQUATIONS

and

NOMENCLATURE

(METRIC UNITS)

#401, 100 - 4th Avenue S.W.
Calgary, Alberta, Canada T2P 3N2

Email: pmg@petromgt.com

Bus: (403) 216-5100
Fax: (403) 216-5109

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BASIC TIME FUNCTIONS

Flow Time

$$t$$

Shut-In Time

$$\Delta t$$

Horner Time

$$\frac{t + \Delta t}{\Delta t}$$

Superposition Time

$$t_n = \sum_{j=1}^{n} \frac{q_j - q_{j-1}}{q_n} \log(t - t_{j-1})$$

$$\Delta t_n = \sum_{j=1}^{n} \frac{q_j}{q_n} \log \frac{t_n + \Delta t - t_{j-1}}{t_n + \Delta t - t_j}$$

Equivalent Time

$$\Delta t_e = \frac{t \cdot \Delta t}{t + \Delta t}$$

Pseudo-Time

$$t_a = (\mu c)_{ref} \int_0^t \frac{dt}{\mu c}$$

$$\Delta t_a = (\mu c)_{ref} \int_0^{\Delta t} \frac{d\Delta t}{\mu c}$$

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BASIC TIME FUNCTIONS (cont'd)

Root Time	$\sqrt{t}$
	$\sqrt{\Delta t}$
Tandem Root Time	$\sqrt{t+\Delta t} - \sqrt{\Delta t}$
Quad Root Time	$\sqrt[4]{t}$
	$\sqrt[4]{\Delta t}$
Tandem Quad Root Time	$\sqrt[4]{t+\Delta t} - \sqrt[4]{\Delta t}$

Note:
1. Complex time functions like "super-linear-equivalent time" and many others are simply derived from the above.
2. Subscripts not shown above, but used for linear and bi-linear functions are 'l' and 'b', respectively.

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TYPECURVES - DIMENSIONLESS VARIABLES

$$\Delta p_D = \frac{kh\ \Delta\psi}{1295\ qT}$$

$$t_D = \frac{3.6E\text{-}3\ kt}{\phi\ (\mu c)_{ref}\ r_w^2}$$

$$\frac{t_D}{C_D} = 0.02262\ \frac{kh}{\mu_{ref}}\ \frac{t}{C}$$

$$C_D e^{2s} = \frac{0.1592\ C\ e^{2s}}{\phi c_{ref}\ hr_w^2}$$

$$t_{DA} = \frac{3.6E\text{-}3\ kt}{\phi\ (\mu c)_{ref}\ A}$$

$$t_{Dxf} = \frac{3.6E\text{-}3\ kt}{\phi\ (\mu c)_{ref}\ x_f^2}$$

$$(k_f w)_D = \frac{k_f w}{k x_f}$$

Note: t represents the time function used for the typecurve data plot.

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McKINLEY ANALYSIS

Wellbore Capacity

$$F = \left(\frac{\Delta p\ F}{qB}\right)\left(\frac{qT}{1158.7\mu\ \Delta\psi}\right)$$

Alpha

$$\alpha = \frac{F}{1}$$

Note: Alpha is the same as C

Wellbore Storage Constant
Compressible Fluid

$$C = c_{ref} V_{ws}$$

Transmissivity

$$\frac{kh}{\mu} = \left(\frac{T}{F}\right) F$$

Pressure Drop Skin

$$\Delta p_s = \left[1 - \frac{kh_{(wellbore)}}{kh_{(formation)}}\right] \Delta p_{(departure)}$$

Flow Efficiency

$$FE = \frac{p^* - p_{wf} - \Delta p_s}{p^* - p_{wf}}$$

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SEMILOG ANALYSIS

Flow Capacity

$$kh = \frac{1491\ qT}{m}$$

Permeability

$$k = \frac{1491\ qT}{mh}$$

Skin Factor

$$s' = 1.151\left[\frac{\psi_{ws} - \psi_{wfo}}{m} - \log\frac{t\Delta t}{t+\Delta t} - \log\left(\frac{k}{\phi_t\ (\mu c)_{ref}\ r_w^2}\right) + 2.09\right]$$

Pressure Drop due to Skin

$$\Delta p_s = p\ @\ (\psi_{wfo} + 0.869ms') - p_{wfo}$$

Flow Efficiency

$$FE = \frac{\bar{\psi}_R - \psi_{wfo} - 0.869\ ms'}{\bar{\psi}_R - \psi_{wfo}}$$

Damage Ratio

$$DR = \frac{1}{FE}$$

Radius of Investigation

$$r_{inv} = \sqrt{\frac{kt}{69.44\phi_t\ (\mu c)_{ref}}}$$

Time to Stabilization

$$t_s = \frac{\phi\ (\mu c)_{ref}\ A}{3.6E{-}3\ k}(t_{DA})_{pss}$$

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SEMILOG ANALYSIS (cont 'd)

Stabilized Rate

$$q_s = \frac{\psi_i - \psi_{wfo}}{\frac{1491\ T}{kh}\left(\log\left(\frac{4A}{1.781\ r_w^2 C_A}\right) + \frac{4\pi(t_{DA})_{pss}}{2.303} + \frac{2s'}{2.303}\right)}$$

MBH Average Pressure

$$\bar{\psi}_R = \psi^* - \frac{m}{2.303}(MBH\ function)$$

DIETZ Average Pressure

$$(\Delta t)_{\bar{p}_R} = \frac{\phi\ (\mu c)_{ref}\ A}{3.6E\text{-}3\ C_A k}$$

LINEAR ANALYSIS

Fracture half-length

$$x_f = \frac{137.72\ qT}{mh[\phi(\mu c)_{ref}\ k]^{1/2}}$$

Channel width

$$W = \frac{275.44\ qT}{mh[\phi(\mu c)_{ref}\ k]^{1/2}}$$

Skin Factor

$$s = \ln\frac{2\ r_w}{x_f}$$

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HORIZONTAL WELL ANALYSIS

Note: Horizontal well length in x - direction

VERTICAL RADIAL ANALYSIS

Permeability

$$\sqrt{k_y\, k_z} = \frac{1491\ qT}{mL}$$

INTERMEDIATE-LINEAR ANALYSIS

Permeability

$$k_y = \frac{1}{\phi\ (\mu c)_{rf}} \left[\frac{275.44\ qT}{Lmh}\right]^2$$

Effective Wellbore Length

$$L_e = \frac{275.44\ qT}{mh\ [\phi\ (\mu c)_{rf}\ k]^{1/2}}$$

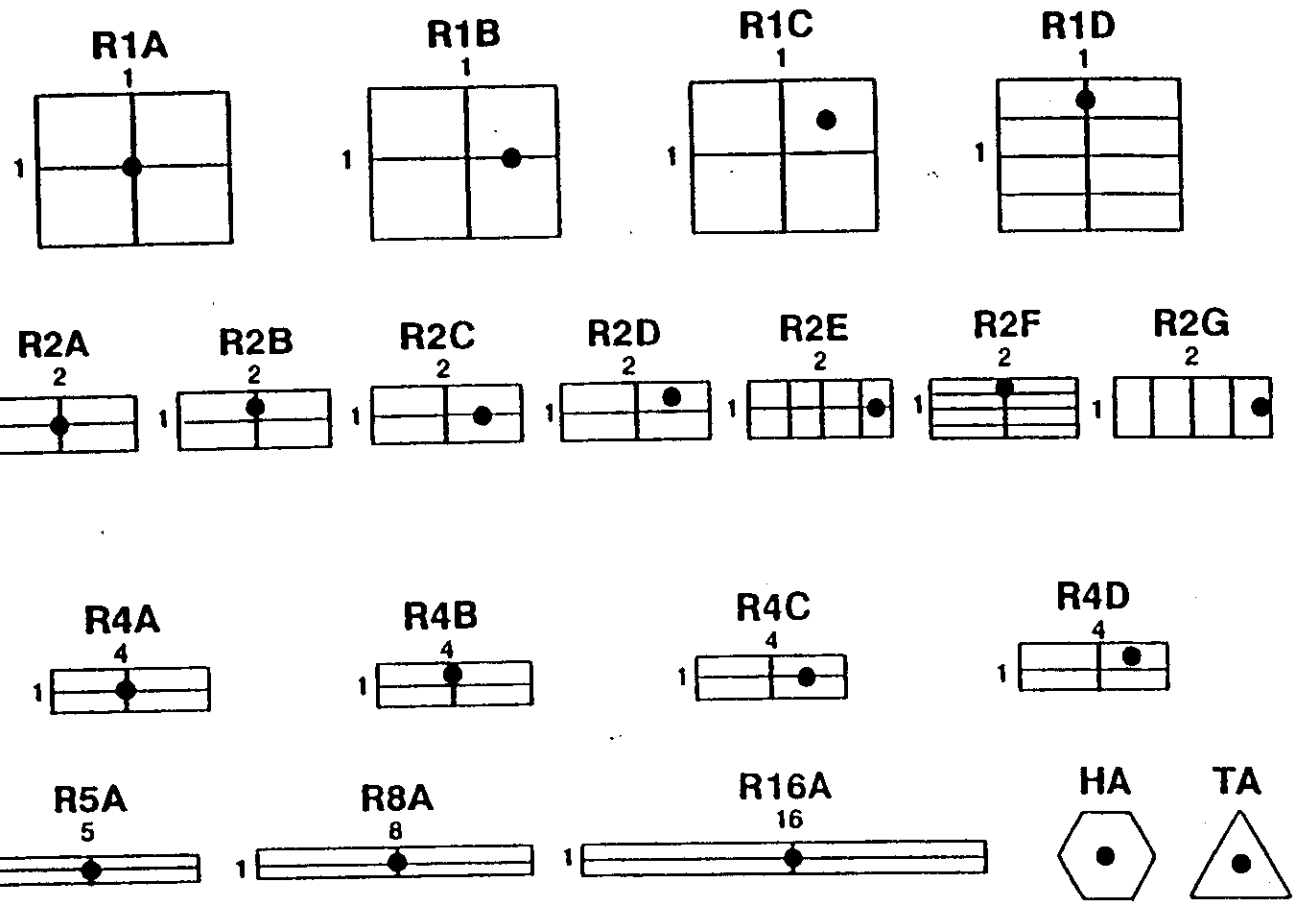
HORIZONTAL-RADIAL ANALYSIS

Permeability

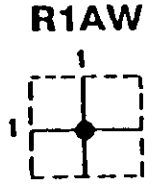
$$\sqrt{k_x\, k_y} = \frac{1491\ qT}{mh}$$

MBH AVERAGE PRESSURE CALCULATIONS
SHAPE CODES

NO FLOW OUTER BOUNDARY



CONSTANT PRESSURE OUTER BOUNDARY



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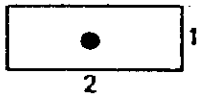
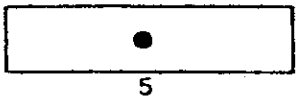
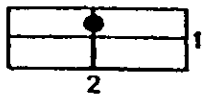
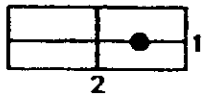
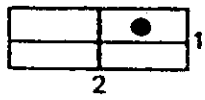
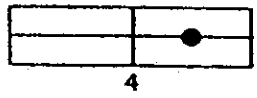
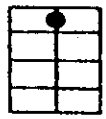
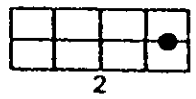
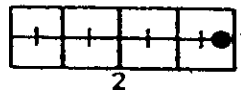
	$\ln C_A$	C_A	STABILIZED CONDITIONS FOR t_{DA} >
IN BOUNDED RESERVOIRS			
	3.45	31.6	0.1
	3.43	30.9	0.1
	3.45	31.6	0.1
	3.32	27.6	0.2
	3.30	27.1	0.2
	3.09	21.9	0.4
	3.12	22.6	0.2
	1.68	5.38	0.7
	0.86	2.36	0.7
	2.56	12.9	0.6
	1.52	4.57	0.5

	$\ln C_A$	C_A	STABILIZED CONDITIONS FOR t_{DA} >
	2.38	10.8	0.3
	1.58	4.86	1.0
	0.73	2.07	0.8
	1.00	2.72	0.8
	-1.46	0.232	2.5
	-2.16	0.115	3.0
	1.22	3.39	0.6
	1.14	3.13	0.3
	-0.50	0.607	1.0
	-2.20	0.111	1.2
	-2.32	0.098	0.9
IN WATER DRIVE RESERVOIRS			
	2.95	19.1	0.1
IN RESERVOIRS OF UNKNOWN PRODUCTION CHARACTER			
	3.22	25	0.1

PSEUDO-STEADY STATE SHAPE FACTORS FOR VARIOUS RESERVOIRS

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NOMENCLATURE

Symbol	Description	Metric (SI)	Field
a	LIT flow equation coefficient	-	-
A	drainage area	m^2	ft^2
AOF	absolute open flow potential (gas)	$10^3m^3/d$	MMcfd
b	LIT flow equation coefficient	-	-
B	formation volume factor	-	-
c	compressibility	kpa^{-1}	psi^{-1}
c_{ws}	compressibility of wellbore fluids	kpa^{-1}	psi^{-1}
C	wellbore storage/unloading constant	m^3/kPa	bbl/psi
C	simplified flow equation coefficient	-	-
C_A	shape factor	-	-
C_{aD}	apparent wellbore storage constant	-	-
C_D	dimensionless wellbore storage constant	-	-
C_{pD}	storage pressure parameter	-	-
DR	damage ratio	-	-
F	wellbore capacity (McKinley)	m^3/kPa	ft^3/psi
FE	flow efficiency	-	-
G	relative density (gas)	-	-
GOR	gas-oil ratio	m^3/m^3	ft^3/bbl
h	net pay	m	ft
k	permeability	mD	md
$k_{(x,y,z)}$	permeability in the x,y,z direction	mD	md
k_f	fracture permeability	mD	md
k_fw	fracture conductivity	mD.m	md.ft
kh	flow capacity	mD.m	md.ft
k/μ	mobility	-	-
kh/μ	transmissivity	-	-

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Symbol	Description	Metric (SI)	Field
L	length of horizontal well	m	ft
L_e	effective length of horizontal well	m	ft
m	slope of transient plots	-	-
n	simplified flow equation coefficient	-	-
p	pressure	kPa	psia
p_{bp}	bubble point pressure	kPa	psia
p_c	gas pseudo-critical pressure	kPa	psia
p_i	initial pressure	kPa	psia
p_R	average reservoir pressure	kPa	psia
p_{tf}	flowing wellhead pressure	kPa	psia
p_{ts}	shut-in wellhead pressure	kPa	psia
p_{wf}	flowing sandface pressure	kPa	psia
P_{wfo}	final flowing pressure	kPa	psia
p_{ws}	shut-in sandface pressure	kPa	psia
p^*	extrapolated pressure	kPa	psia
Δp_D	dimensionless pressure	-	-
Δp	pressure drop	kPa	psi
PI	productivity index	$m^3/d/kPa$	bbl/d/psi
q	flow rate - gas - liquid	$10^3m^3/d$ m^3/d	MMcf/d bbl/d
q_j	j^{th} flow rate	m^3/d	bbl/d
q_n	n^{th} flow rate	m^3/d	bbl/d
q_s	stabilized rate - gas - liquid	$10^3m^3/d$ m^3/d	MMcf/d bbl/d
r_e	external radius	m	ft
r_{inv}	radius of investigation	m	ft
r_w	wellbore radius	m	ft
R_s	solution gas ratio	m^3/m^3	ft^3/bbl

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Symbol	Description	Metric (SI)	Field
s	skin factor	-	-
s'	apparent skin factor	-	-
S	saturation (oil, gas, water)	-	-
t	time	hr	hr
t_D	dimensionless time	hr	hr
t_e	pseudo-time	hr	hr
t_{DA}	dimensionless time (based on drainage area)	hr	hr
t_{Dxf}	dimensionless time (based on fracture 1/2 length)	hr	hr
t_n	n^{th} flow period, or superposition time	-	-
Δt	shut-in time	hr	hr
Δt_e	shut-in pseudo-time	hr	hr
Δt_e	equivalent time	hr	hr
$(t_{DA})_{pss}$	dimensionless time at pseudo-steady state	-	-
t_s	time to stabilization	hr	hr
T	temperature	K	°R
T_c	gas pseudo-critical temperature	K	°R
V_{ws}	wellbore volume - gas - liquid	m^3 m^3	ft^3 bbl
W	channel width	m	ft
w	fracture width	m	ft
x_e	length of reservoir	m	ft
x_f	fracture half-length	m	ft
x_o	x -location of observation well	m	ft
x_w	x- location of centre of active well	m	ft
y_e	width of reservoir	m	ft
y_o	y- location of observation well	m	ft
y_w	y- location of centre of active well	m	ft
Z	gas compressibility factor	-	-
z_w	z-location of centre of active well	m	ft

Symbol	Description	Metric (SI)	Field
a	wellbore storage/unloading constant	m^3/kPa	bbl/psi
μ	viscosity - gas	$\mu Pa.s$	cp
	- liquid	mPa.s	cp
λ	inter-porosity flow coefficient	-	-
T	transmissivity (McKinley)	mD.m/mPa.s	md.ft/cp
ϕ	porosity	-	-
ψ	pseudo-pressure	$kPa^2/\mu Pa.s$	$psia^2/cp$
ω	storativity ratio	-	-

Subscripts

D	dimensionless
DA	dimensionless based on area
Dxf	dimensionless based on fracture half -length
f	formation or flowing
g	gas
i	initial
o	oil
R	reservoir
s	shut-in, skin, stabilized or storage
t	total, transient, or wellhead (tubing head)
w	water or wellbore (sandface)
ref	evaluated at reference pressure

Superscripts

-	average

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UNITS CONVERSION AND PREFIXES

METRIC (SI) UNIT	FIELD UNIT	DIVIDED BY
$10^3m^3/d$	MMcfd	2.817 399 E+01
kPa	psia	6.894 757 E+00
mD	md	9.869 233 E-01
mD.m	md.ft	3.008 142 E-01
m	ft	3.048 E-01
m^3	bbl (35 Imp gal) (42 US gal)	1.589 873 E-01
Pa.s	cp	1.0 E+03
°C	°F	(°F-32)5/9 E+00
K	°R	5/9 E+00
m^2	section (640 acres)	2.589 988 E+06
ha	section (640 acres)	2.589 988 E+02
m^3	gallon (Imp)	4.546 09 E-03
m^3	gallon (US)	3.785 412 E-03
$m^3/10^3m^3$	bbl/MMcf	5.643 052 E-03

Standard conditions: Metric (SI) 15°C, 101.325 kPa
Field 60°F, 14.65 psia

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