

V. perelre.

COPESERPET S.A.

Compañía Peruana de Servicios Petroleros

Buildup Pressure Test

DATA
INCREASING TIME
DAYS VPG

Well LO16-23 Lobitos Offshore

April 10th, 1998

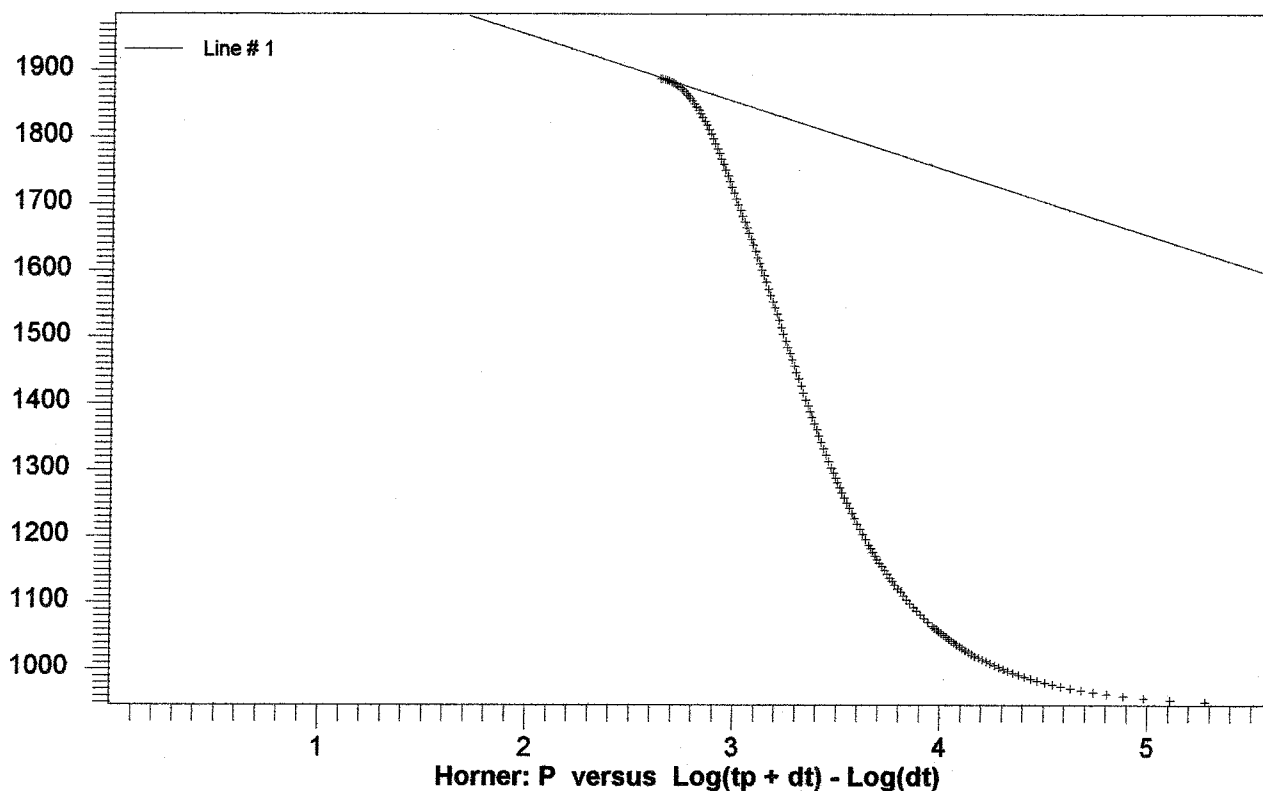


Flexible

LO16-23

Company PETRO-TECH
Field LOBITOS
Well LO16-23

Test SHORT-PBU
Date APRIL 10, 1998
Gauge MEMORY



Flow Period # 2
Rate 0 STB/day
Rate Change 200 STB/day
P at dt=0 942.34 psia
Pi 2135.53 psia

Flexible line # 1
P vs Log(dt), BU
Slope -100.304
Intercept 2150.18
kh 427 md.ft
k 14.2 md
Skin factor 4.9

$0.2837 = 0.1 \text{ SKIN}$

FEED	8600' MD (7008' VI)
DOWN	8920' MD (7284' VI) = 1885' MD
MPP	9167' MD (7485' VI) = 1940' MD

$MPP (LW BS. SA/INA) = 7485' MD (9167' MD)$

$FG \approx \frac{2150}{7485} = 0.287 \text{ psi/ft}$

$P^* \approx 2150$

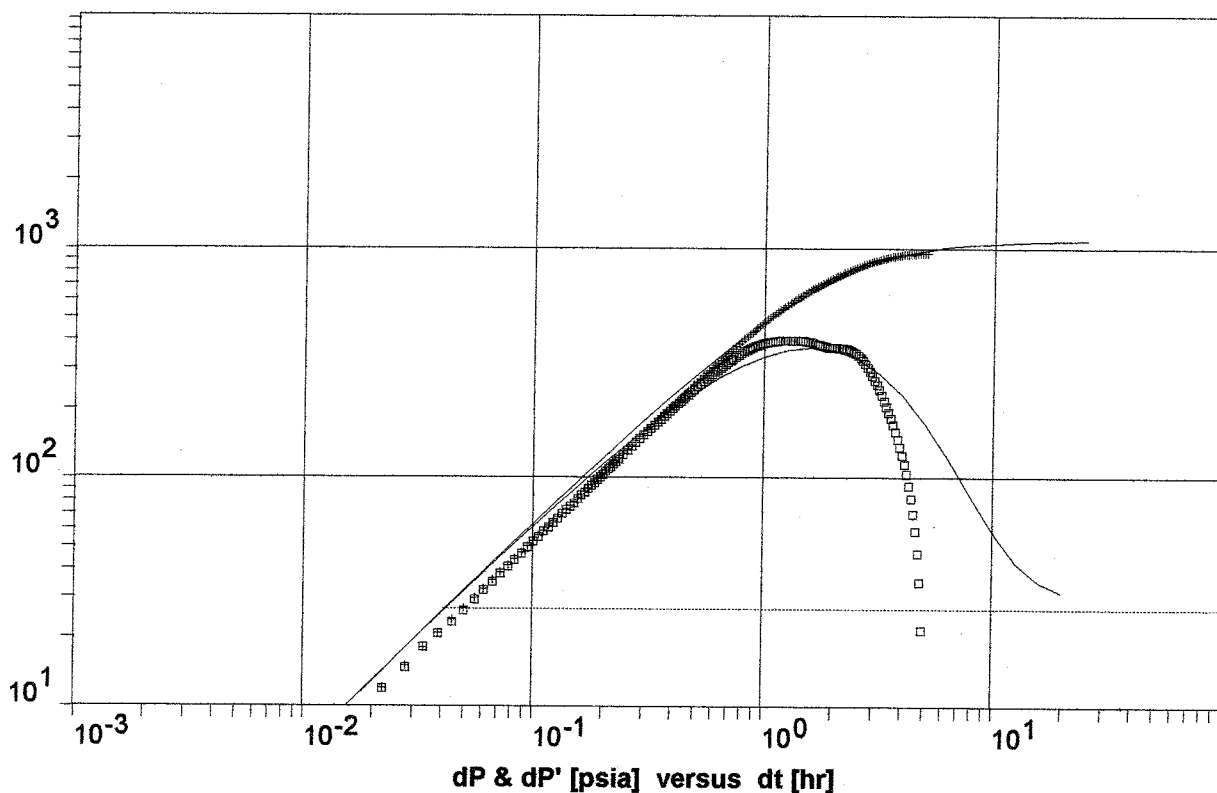


Log-Log

LO16-23

Company PETRO-TECH
Field LOBITOS
Well LO16-23

Test SHORT-PBU
Date APRIL 10, 1998
Gauge MEMORY



Flow Period # 2
Rate 0 STB/day
Rate Change 200 STB/day
P at dt=0 942.34 psia
Smoothing 0.1
Pi 2135.53 psia

Time Match 12.2 (hr)-1
Pressure Match 0.019 (psia)-1

RESERVOIR Homogeneous
BOUNDARY Infinite
WELL Storage & Skin
Storage C 0.016 STB/psi
Skin factor 13.5
Delta P Skin 709.234 psia

kh 708 md.ft
k 23.6 md
Mobility k/mu 22.2
Investig. R 134 ft

**Main Results****LO16-23**

Company PETRO-TECH
Field LOBITOS
Well LO16-23
Test SHORT-PBU
Date APRIL 10. 1998
Gauge MEMORY
Depth 8929

Formation interval LW. BS.SALINA
Perforated interval 9444-8890

TEST TYPE Standard**FLUID TYPE** Oil

Porosity Phi (%) 8.84
Well Radius rw 0.229 ft
Pay Zone h 30 ft

Volume Factor B 1.23719
Total Compr. ct 5.96365E-5 psi-1
Viscosity 1.06441 cp

Flow Period # 2
Rate 0 STB/day
Rate Change 200 STB/day
P at dt=0 942.34 psia
Pi 2135.53 psia

Time Match 12.2 (hr)-1
Pressure Match 0.019 (psia)-1

RESERVOIR Homogeneous
BOUNDARY Infinite
WELL Storage & Skin
Storage C 0.016 STB/psi
Skin factor 13.5
Delta P Skin 709.234 psia

kh 708 md.ft
k 23.6 md
Mobility k/mu 22.2

CPSP 058-98

Talara, April 12th 1998

ENG° JOHN W. MEYERS
Production Engineering Manager
PETRO-TECH PERUANA S.A.

Dear Mr:

Attached you will find the report of the BUILDUP PRESSURE test carried out in well LO16-23 (Upper Basal Salina: 8968'-8890') Lobitos Offshore.

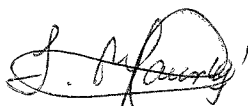
The purpose of this test is to determine Bottom hole Static Pressure, P*, k, s and fluid levels at static conditions.

Data used in this report was obtained using your Memory Gauge model EMS-725F-15 with range of 5000 psi and 250°F s/n 87013, which is available for you to have a good service.

If you have any question please contact us.

Thanks for your kind attention

Yours sincerely



Luis Fernando Manrique Carrillo
COPESERPET S.A.

w.c.
Eng° Ricardo Corman
Well File

CHF = 50'

FIELD REPORT

APRIL, 10th 1998

* Well Status: Producing and Closed for 12 hr test
* Np = 41170 STB, Qo = 200 STB/D,

04:30 Rig up
05:35 BOP installed
07:35 Memory gauge s/n 87013 activated
Amerada 2025 psi x 12 hr
07:50 Well closed for testing
07:57 RIH gauges
08:11 Memory gauge at 8929' for 10.5 hr.
Taking Static Buildup pressure record.
WHP = 340 psig
09:00 WHP = 560 psig
10:00 WHP = 840 psig
12:00 WHP = 1200 psig
14:00 WHP = 1300 psig
16:00 WHP = 1400 psig
18:00 WHP = 1480 psig
18:45 WHP = 1500 psig

POOH Memory gauge with 4 min steps as:

8929'	8200'	6500'	3000'
8800'	8000'	6000'	2000'
8600'	7500'	5000'	1000'
8400'	7000'	4000'	0'

20:02 Memory gauge on surface inside lubricator
WHP = 1560 psig
20:30 Well in production
20:36 Memory gauge deactivated
20:40 Amerada deactivated
21:00 Rig down

$t_p = 89 \text{ days} < 2136 \text{ hrs}$

Low: Bs. Salina

$H = 30'$

$\phi = 8.84$

$S_{gw} = 38.5\%$

5/16

18" @ 562'

13 3/8 @ 2547'

9 5/8 @ 6322'

Oil level @ 8600'

Gauges @ 8929'

8890'
Upper Basal Salina
8968'

9392'
Lower Basal Salina
9444'

FC @ 9683'

FS @ 9770'

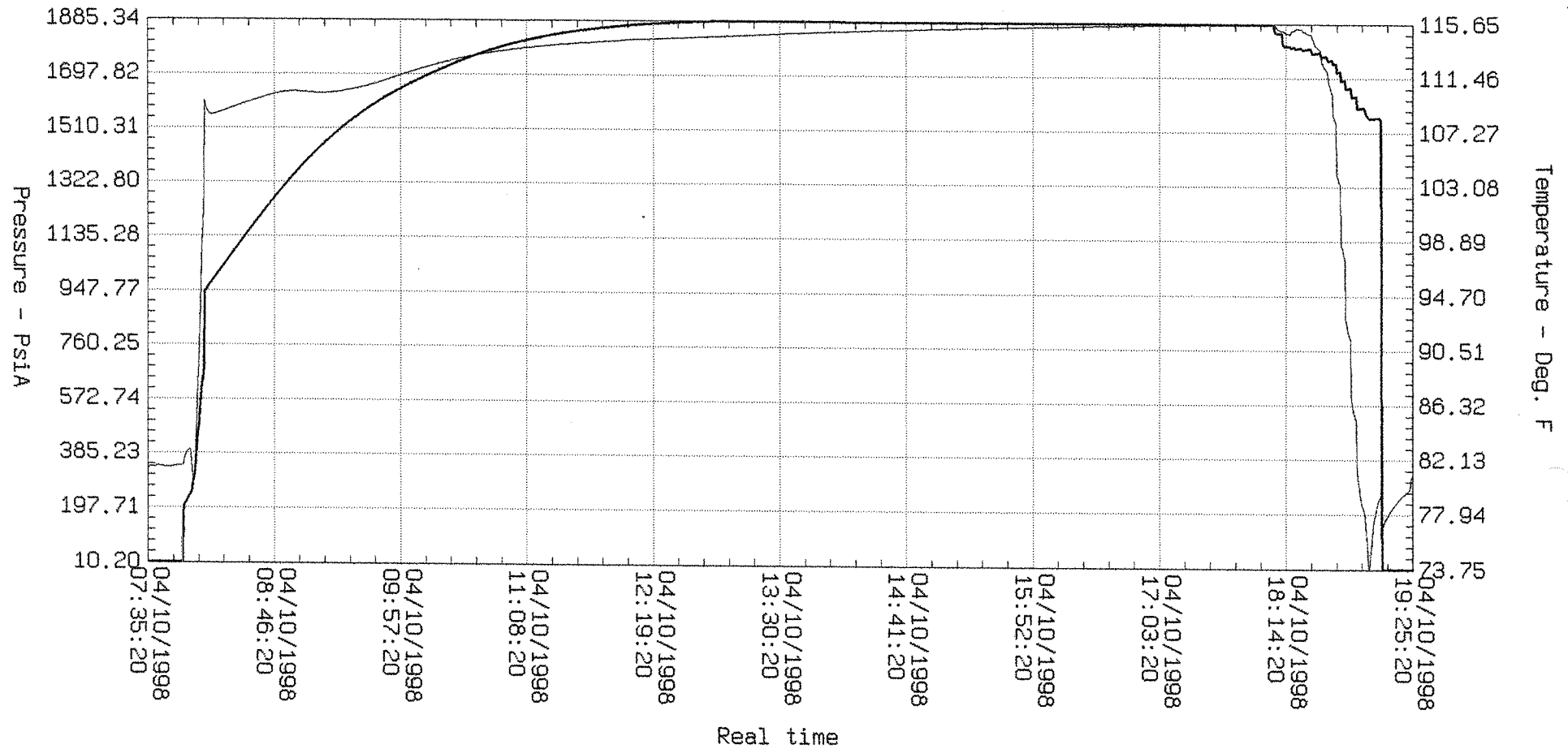
TD = 10043'

LOGGED PRESSURE / TEMPERATURE DATA

File name: BL01623

Company : COPESERPET S.A.
 Client : PETRO-TECH PERUANA S.A.
 Gauge number : 87013
 Well name : L016-23
 Well number : L016-23
 Test number :
 Field name : LOBITOS

Test operator: LUIS MANRIQUE
 Comments :



Starting date: 04/10/1998
 time: 07:35:00

Summary of Results

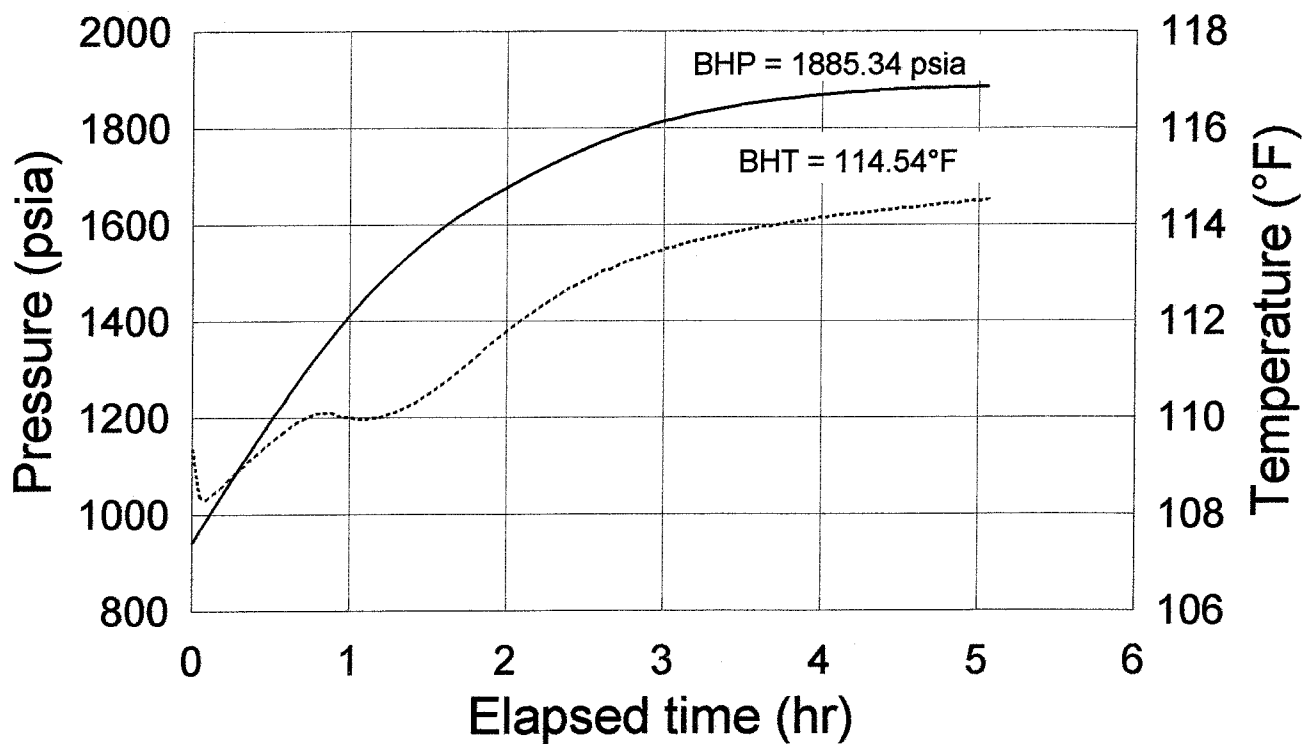
Date of Test	April, the 10th 1998
Formation	Upper Basal Salina (8968'-8890')
Depth of Gauges	8929 ft MD 7 284 ft VD
Well Head Pressure	
Before RIH Memory	340 psig (manometer)
After POOH Memory	1560 psig (manometer)
Bottom Hole Static Pressure	1882.81 psia
Bottom Hole Temperature	114.54 °F
Pressure at MPP	1882.81 psia
Static Gradient at MPP	0.2585 psi/ft
Gauge gradient	0.2585 psi/ft
Oil level	8600 ft MD 7008 ft VD
Wet Gas gradient	0.0349 psi/ft
Oil gradient	0.2737 psi/ft
Oiltramp	Mud

Gauges at 8929' at Static Condition

Date	Time	Elapsed time (hr)	Pressure (psia)	Temperature (°F)
04/10/98	08:07:00	0.0000	942.34	109.36
04/10/98	08:09:40	0.0444	965.82	108.39
04/10/98	08:12:20	0.0889	988.70	108.31
04/10/98	08:15:00	0.1333	1 011.44	108.44
04/10/98	08:17:40	0.1778	1 034.06	108.55
04/10/98	08:20:20	0.2222	1 056.64	108.70
04/10/98	08:23:00	0.2667	1 079.13	108.84
04/10/98	08:25:40	0.3111	1 101.48	108.96
04/10/98	08:28:20	0.3556	1 123.68	109.10
04/10/98	08:31:00	0.4000	1 145.63	109.22
04/10/98	08:33:40	0.4444	1 167.40	109.34
04/10/98	08:36:00	0.4833	1 186.26	109.45
04/10/98	08:38:40	0.5278	1 207.56	109.57
04/10/98	08:41:20	0.5722	1 228.60	109.69
04/10/98	08:44:00	0.6167	1 249.36	109.79
04/10/98	08:46:40	0.6611	1 269.78	109.90
04/10/98	08:49:20	0.7056	1 289.91	109.98
04/10/98	08:52:00	0.7500	1 309.65	110.04
04/10/98	08:54:40	0.7944	1 329.08	110.09
04/10/98	08:57:20	0.8389	1 348.07	110.11
04/10/98	09:00:00	0.8833	1 366.62	110.11
04/10/98	09:02:40	0.9278	1 384.73	110.05
04/10/98	09:05:20	0.9722	1 402.31	110.02
04/10/98	09:08:00	1.0167	1 419.26	110.00
04/10/98	09:10:40	1.0611	1 435.64	109.98
04/10/98	09:13:20	1.1056	1 451.48	109.98
04/10/98	09:16:00	1.1500	1 466.79	110.00
04/10/98	09:18:40	1.1944	1 481.58	110.02
04/10/98	09:21:20	1.2389	1 495.90	110.07
04/10/98	09:24:00	1.2833	1 509.68	110.11
04/10/98	09:26:40	1.3278	1 522.97	110.18
04/10/98	09:29:20	1.3722	1 535.81	110.24
04/10/98	09:32:00	1.4167	1 548.22	110.31
04/10/98	09:34:40	1.4611	1 560.21	110.40
04/10/98	09:37:00	1.5000	1 570.42	110.49
04/10/98	09:39:40	1.5444	1 581.78	110.59
04/10/98	09:42:20	1.5889	1 592.80	110.69
04/10/98	09:45:00	1.6333	1 603.48	110.80
04/10/98	09:47:40	1.6778	1 613.83	110.92
04/10/98	09:50:20	1.7222	1 623.61	111.04
04/10/98	09:53:00	1.7667	1 632.82	111.16
04/10/98	09:55:40	1.8111	1 641.84	111.28
04/10/98	09:58:20	1.8556	1 650.65	111.42
04/10/98	10:01:00	1.9000	1 659.21	111.54
04/10/98	10:03:40	1.9444	1 667.58	111.66
04/10/98	10:06:20	1.9889	1 675.77	111.77
04/10/98	10:09:00	2.0333	1 683.74	111.89
04/10/98	10:11:40	2.0778	1 691.55	111.99
04/10/98	10:14:20	2.1222	1 699.20	112.10
04/10/98	10:17:00	2.1667	1 706.68	112.20
04/10/98	10:19:40	2.2111	1 714.04	112.30
04/10/98	10:22:20	2.2556	1 721.20	112.39
04/10/98	10:25:00	2.3000	1 728.28	112.48
04/10/98	10:27:40	2.3444	1 735.15	112.58
04/10/98	10:30:20	2.3889	1 741.88	112.67
04/10/98	10:33:00	2.4333	1 748.41	112.74
04/10/98	10:35:40	2.4778	1 754.80	112.82

04/10/98	10:38:20	2.5222	1 760.97	112.89
04/10/98	10:41:00	2.5667	1 767.02	112.95
04/10/98	10:43:40	2.6111	1 772.79	113.05
04/10/98	10:46:20	2.6556	1 778.25	113.08
04/10/98	10:49:00	2.7000	1 783.50	113.15
04/10/98	10:51:40	2.7444	1 788.60	113.21
04/10/98	10:54:20	2.7889	1 793.56	113.26
04/10/98	10:57:00	2.8333	1 798.34	113.31
04/10/98	10:59:40	2.8778	1 802.93	113.36
04/10/98	11:02:20	2.9222	1 807.34	113.41
04/10/98	11:05:00	2.9667	1 811.57	113.45
04/10/98	11:07:40	3.0111	1 815.38	113.50
04/10/98	11:10:20	3.0556	1 819.08	113.53
04/10/98	11:13:00	3.1000	1 822.66	113.59
04/10/98	11:15:40	3.1444	1 826.09	113.62
04/10/98	11:18:20	3.1889	1 829.42	113.66
04/10/98	11:21:00	3.2333	1 832.58	113.69
04/10/98	11:23:40	3.2778	1 835.62	113.73
04/10/98	11:26:20	3.3222	1 838.51	113.76
04/10/98	11:29:00	3.3667	1 841.26	113.78
04/10/98	11:31:40	3.4111	1 843.90	113.83
04/10/98	11:34:20	3.4556	1 846.44	113.85
04/10/98	11:36:40	3.4944	1 848.53	113.88
04/10/98	11:39:20	3.5389	1 850.84	113.90
04/10/98	11:42:00	3.5833	1 853.03	113.93
04/10/98	11:44:40	3.6278	1 855.13	113.97
04/10/98	11:47:20	3.6722	1 857.06	113.97
04/10/98	11:50:00	3.7167	1 858.97	114.00
04/10/98	11:52:40	3.7611	1 860.81	114.02
04/10/98	11:55:20	3.8056	1 862.57	114.05
04/10/98	11:58:00	3.8500	1 864.26	114.07
04/10/98	12:00:40	3.8944	1 865.89	114.09
04/10/98	12:03:20	3.9389	1 867.37	114.12
04/10/98	12:06:00	3.9833	1 868.80	114.16
04/10/98	12:08:40	4.0278	1 870.16	114.16
04/10/98	12:11:20	4.0722	1 871.46	114.18
04/10/98	12:14:00	4.1167	1 872.68	114.21
04/10/98	12:16:40	4.1611	1 873.79	114.21
04/10/98	12:19:20	4.2056	1 874.87	114.23
04/10/98	12:22:00	4.2500	1 875.88	114.24
04/10/98	12:24:40	4.2944	1 876.85	114.26
04/10/98	12:27:20	4.3389	1 877.75	114.28
04/10/98	12:30:00	4.3833	1 878.61	114.30
04/10/98	12:32:40	4.4278	1 879.43	114.31
04/10/98	12:35:20	4.4722	1 880.20	114.33
04/10/98	12:38:00	4.5167	1 880.91	114.35
04/10/98	12:40:40	4.5611	1 881.54	114.35
04/10/98	12:43:20	4.6056	1 882.14	114.37
04/10/98	12:46:00	4.6500	1 882.68	114.38
04/10/98	12:48:40	4.6944	1 883.15	114.40
04/10/98	12:51:20	4.7389	1 883.57	114.42
04/10/98	12:54:00	4.7833	1 883.95	114.44
04/10/98	12:56:40	4.8278	1 884.28	114.44
04/10/98	12:59:20	4.8722	1 884.58	114.45
04/10/98	13:02:00	4.9167	1 884.85	114.49
04/10/98	13:04:40	4.9611	1 885.06	114.50
04/10/98	13:07:20	5.0056	1 885.22	114.50
04/10/98	13:10:00	5.0500	1 885.30	114.52
04/10/98	13:10:20	5.0556	1 885.31	114.52
04/10/98	13:10:40	5.0611	1 885.34	114.54

Gauges at 8929' at Static Condition



— P T

Horner Method

Data:

Porosity	0.14
Oil Production Rate (Qo)	200 STB/D
Cummulative Production (Np)	41170 STB
Production time (tp)	2160 hr
Formation Volume factor (Bo)	1.2 STB/bbl
Oil viscosity (uo)	1.1 cp
Total compresibility (ct)	0.0000256 psi ⁻¹
Wellbore radius (rw)	0.354 ft
Net thickness (h)	60 ft

Elapsed time (hr)	Horner time	Pressure (psia)
0.0000		942.34
0.0444	48 605.86	965.82
0.0889	24 300.70	988.70
0.1333	16 201.41	1 011.44
0.1778	12 150.85	1 034.06
0.2222	9 721.10	1 056.64
0.2667	8 100.90	1 079.13
0.3111	6 943.88	1 101.48
0.3556	6 075.92	1 123.68
0.4000	5 401.00	1 145.63
0.4444	4 861.05	1 167.40
0.4833	4 470.00	1 186.26
0.5278	4 093.61	1 207.56
0.5722	3 775.77	1 228.60
0.6167	3 503.68	1 249.36
0.6611	3 268.23	1 269.78
0.7056	3 062.40	1 289.91
0.7500	2 881.00	1 309.65
0.7944	2 719.90	1 329.08
0.8389	2 575.83	1 348.07
0.8833	2 446.29	1 366.62
0.9278	2 329.14	1 384.73
0.9722	2 222.72	1 402.31
1.0167	2 125.58	1 419.26
1.0611	2 036.60	1 435.64
1.1056	1 954.76	1 451.48
1.1500	1 879.26	1 466.79
1.1944	1 809.38	1 481.58
1.2389	1 744.50	1 495.90
1.2833	1 684.12	1 509.68
1.3278	1 627.78	1 522.97
1.3722	1 575.09	1 535.81
1.4167	1 525.70	1 548.22
1.4611	1 479.33	1 560.21
1.5000	1 441.00	1 570.42
1.5444	1 399.57	1 581.78
1.5889	1 360.44	1 592.80
1.6333	1 323.45	1 603.48

1.6778	1 288.42	1 613.83
1.7222	1 255.20	1 623.61
1.7667	1 223.64	1 632.82
1.8111	1 193.64	1 641.84
1.8556	1 165.07	1 650.65
1.9000	1 137.84	1 659.21
1.9444	1 111.86	1 667.58
1.9889	1 087.03	1 675.77
2.0333	1 063.30	1 683.74
2.0778	1 040.57	1 691.55
2.1222	1 018.80	1 699.20
2.1667	997.92	1 706.68
2.2111	977.88	1 714.04
2.2556	958.63	1 721.20
2.3000	940.13	1 728.28
2.3444	922.33	1 735.15
2.3889	905.19	1 741.88
2.4333	888.67	1 748.41
2.4778	872.75	1 754.80
2.5222	857.39	1 760.97
2.5667	842.56	1 767.02
2.6111	828.23	1 772.79
2.6556	814.39	1 778.25
2.7000	801.00	1 783.50
2.7444	788.05	1 788.60
2.7889	775.50	1 793.56
2.8333	763.35	1 798.34
2.8778	751.58	1 802.93
2.9222	740.16	1 807.34
2.9667	729.09	1 811.57
3.0111	718.34	1 815.38
3.0556	707.91	1 819.08
3.1000	697.77	1 822.66
3.1444	687.93	1 826.09
3.1889	678.35	1 829.42
3.2333	669.04	1 832.58
3.2778	659.98	1 835.62
3.3222	651.17	1 838.51
3.3667	642.58	1 841.26
3.4111	634.22	1 843.90
3.4556	626.08	1 846.44
3.4944	619.12	1 848.53
3.5389	611.36	1 850.84
3.5833	603.79	1 853.03
3.6278	596.41	1 855.13
3.6722	589.20	1 857.06
3.7167	582.17	1 858.97
3.7611	575.30	1 860.81
3.8056	568.59	1 862.57
3.8500	562.04	1 864.26
3.8944	555.64	1 865.89
3.9389	549.38	1 867.37
3.9833	543.26	1 868.80

4.0278	537.28	1 870.16
4.0722	531.42	1 871.46
4.1167	525.70	1 872.68
4.1611	520.09	1 873.79
4.2056	514.61	1 874.87
4.2500	509.24	1 875.88
4.2944	503.98	1 876.85
4.3389	498.82	1 877.75
4.3833	493.78	1 878.61
4.4278	488.83	1 879.43
4.4722	483.98	1 880.20
4.5167	479.23	1 880.91
4.5611	474.57	1 881.54
4.6056	470.00	1 882.14
4.6500	465.52	1 882.68
4.6944	461.12	1 883.15
4.7389	456.80	1 883.57
4.7833	452.57	1 883.95
4.8278	448.41	1 884.28
4.8722	444.33	1 884.58
4.9167	440.32	1 884.85
4.9611	436.39	1 885.06
5.0056	432.52	1 885.22
5.0500	428.72	1 885.30
5.0556	428.25	1 885.31
5.0611	427.78	1 885.34

Buildup Results

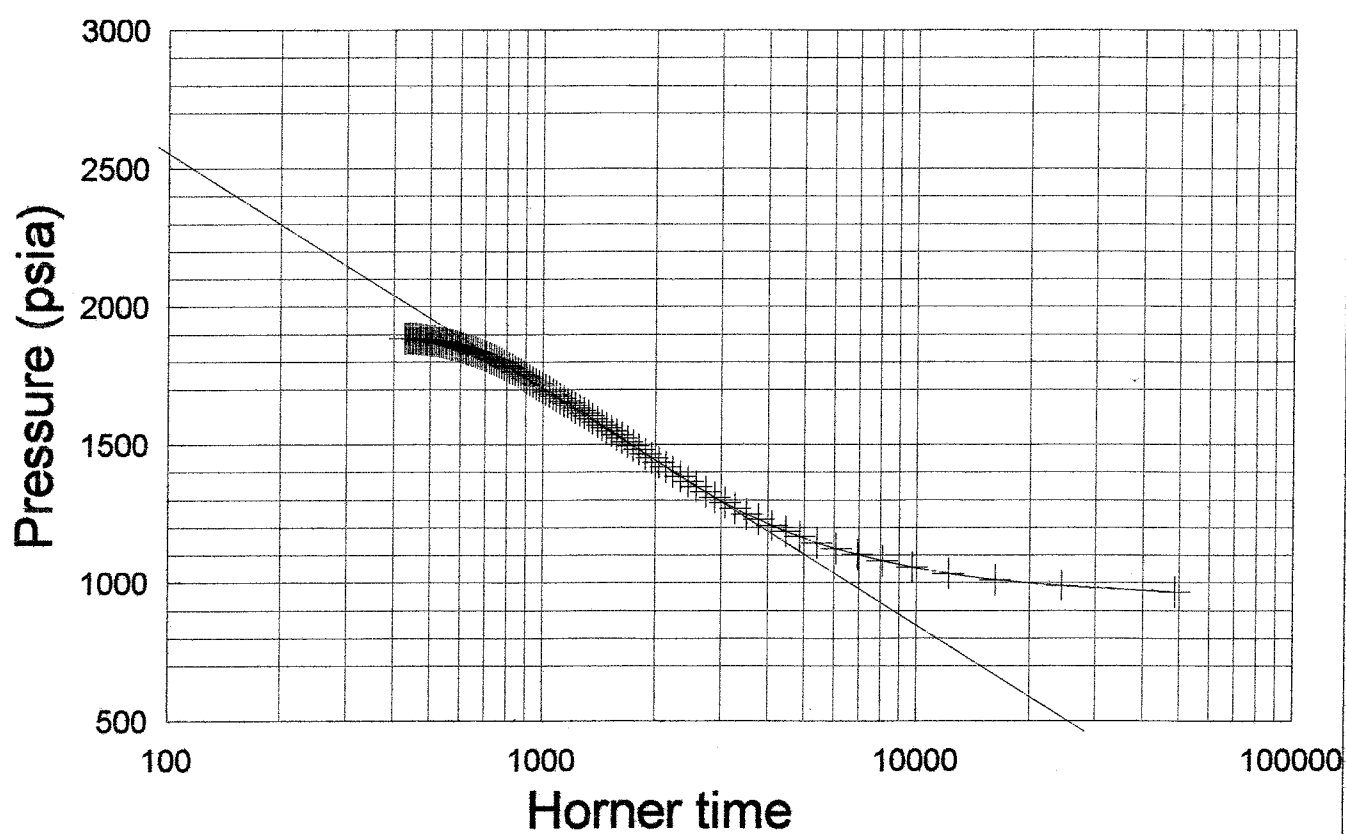
P*	4070 psia
P (1 hr)	1420 psia
m	760 psi/cycle
k	0.94 md
s	-2.79

~~Well pressure~~ I think would be less than the
engineered in this reservoir.

Fluid level $\rightarrow$ 8600' MD (7008' VD) (0.2732 psi/ft oil Grd)
 Gauge $\rightarrow$ 8920' MD (7284' VD) $\Rightarrow$ 1885 $\rightarrow$ $P^* = 2150$ psi
 MFD $\rightarrow$ 9167' MD (7485' VD) = 1940 psi

$$F_m \text{ Grad} = \frac{2150}{7485} = 0.2872 \text{ psi/ft}$$

Horner Method



Fluid Level at Static Condition

Measured Depth (ft)	Vertical depth(ft)	Pressure (psia)	Grad (psi/ft)
0	0	1562.65	-
1000	999.89	1597.26	0.0346
2000	1 992.32	1635.82	0.0389
3000	2 770.05	1664.83	0.0373
4000	3 495.18	1691.69	0.0370
5000	4 270.09	1720.72	0.0375
6000	4 997.26	1748.26	0.0379
6500	5 348.08	1760.11	0.0338
7000	5 725.55	1773.57	0.0357
7500	6 111.80	1786.32	0.0330
8000	6 510.83	1798.99	0.0318
8200	6 674.97	1801.25	0.0138
8400	6 840.93	1804.84	0.0216
8600	7 007.74	1807.26	0.0145
8800	7 175.12	1853.02	0.2734
8929	7 283.78	1882.81	0.2742

Levels

	MD (ft)	VD (ft)
Oil Level =	8600	7 008
Middle point perforateds	8929	7 284

Pressures and Gradients

	Pressure (psia)	Gradient (psi/ft)
MPP	1 882.81	0.2585
Gauges	1882.81	0.2585

Wet Gas Gradient =	0.0349	psi/ft
Oil Gradient =	0.2737	psi/ft

Pressure (psia) vs Vertical Depth (ft)

