

15-025-20858

4-30-25W

Well: Goeller 1-4 (15-025-20858)

	from, ft	to, ft	thickness, ft
DST range:	5300	5335	35
Pay SD#1			
Pay SD#2	5316	5322	6
Pay SD#3			
Morrow pay			6

entered data
 read from correlations
 read from Horner plot
 calculation

Reservoir gas properties:

Sp gr. =	0.73	gas specific gravity (avg from 3 samples)
Tpc =	386 R	pseudocritical temp
Ppc =	660 psia	pseudocritical pressure

DST analysis - Gas using SPE Monograph method:

Pi =	800 psi	
m =	31.5 psi/cycle	
Qg =	163 Mcfd	
Pwf =	289 psi	(related to Qg - end of second flow)
P I hr =		

Transmissibility:

$Kh/\mu = 162.6 \cdot Qg \cdot Bg/m$

$Bg = Psc \cdot Tr \cdot 1000 \cdot Z / (p \cdot Tsc \cdot 5.614)$ gas formation volume factor

Psc =	14.65 psi	pr at standard conditions
Tr =	576 R	Res temp = 116 F
Tsc =	520 R	Std temp in R
$p = (Pi + Pwf) / 2$	544.5 psi	avg of static and flowing pressure

Tpr =	1.49	pseudo reduced temp
Ppr =	0.85	pseudo reduced pressure
Z =	0.92	compressibility factor at p and Tr

$Bg = 4.88$ RBWcf

$Kh/\mu = 4109.3383$ md-ft/cp

Permeability:

$h = 6$ ft pay

Mol wt of air =	29 lb/lb mole	
Mol wt of gas =	21.17 lb/lb mole	
$\mu @ 1 \text{ atm} =$	0.0111 cp	(@ 130F)
Vis ratio =	1.2 cp	at corresponding Tpr and Ppr

gas vis (μ) = 0.0133 cp

$K = 9.1$ md

DST analysis - Gas using Low pressure gas method:

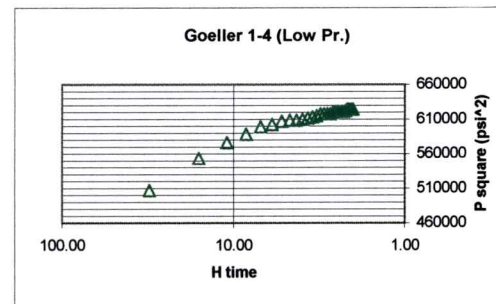
Mg =	50000 psi ² /cycle
Qg =	163 Mcfd

Transmissibility:

$Kh/\mu = 1637 \cdot Qg \cdot Tr \cdot Z / Mg$

$Kh/\mu = 2827.98167$ md-ft/cp

$K = 6.3$ md



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entered data
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Reservoir gas properties:

Sp gr., Rog =	0.73	gas specific gravity (avg from 3 samples)
Tpc =	386 R	pseudocritical temp
Ppc =	660 psia	pseudocritical pressure

DST analysis - Oil:

Pi =	800 psi	
m =	31.5 psi/cycle	
Qo =	62.16 bbl/d	
Qg =	163 Mcf/d	(doubtful if the well produced 16300 Mcf/d)
Pwf =	289 psi	(related to Qo - end of second flow)
P I hr =		

Transmissibility:

$$Kh/\mu_o = 162.6 \cdot Q_o \cdot B_o / m$$

GOR, Rs =	2622.3 scf/bbl
API stock tank =	46
Sp gr oil, Roo =	0.80
Res temp =	116 F

$$B_o = 0.972 + 0.000147 \cdot (R_s \cdot (R_{og}/R_{oo})^{0.5} + 1.25 \cdot T)^{1.175}$$

$$B_o @ \text{ bubble pt} = 2.52 \text{ bbl/STB}$$

GOR outside range of correlation chart
oil formation volume factor

$$Kh/\mu_o = 809.37249 \text{ md-ft/cp}$$

Permeability:

$$h = 6 \text{ ft pay}$$

$$\mu_o, 1 \text{ atm \& res temp} = 1.3 \text{ cp}$$

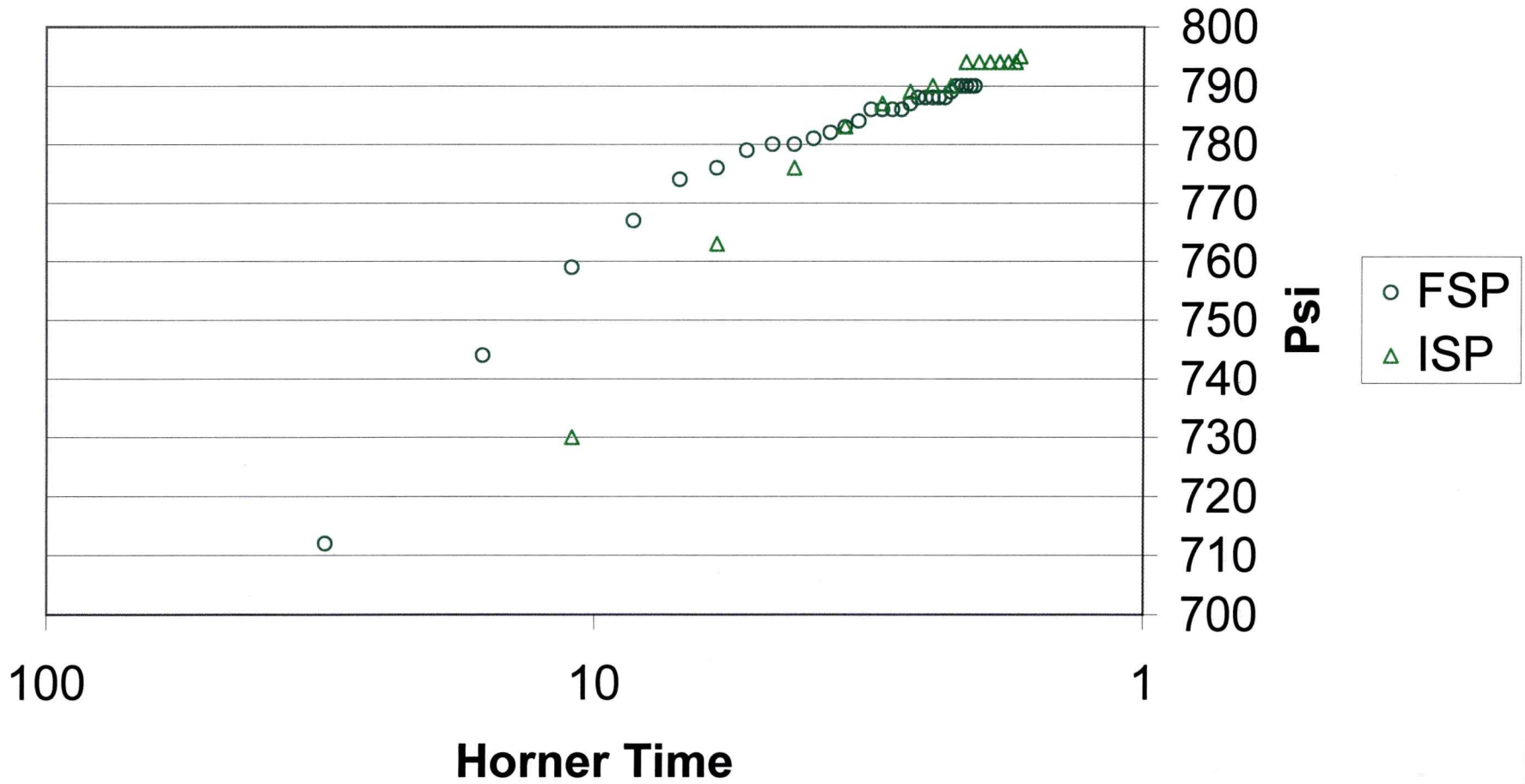
$$\mu_o, \text{ gas sat.} = 0.2 \text{ cp approx.}$$

GOR outside range of correlation chart

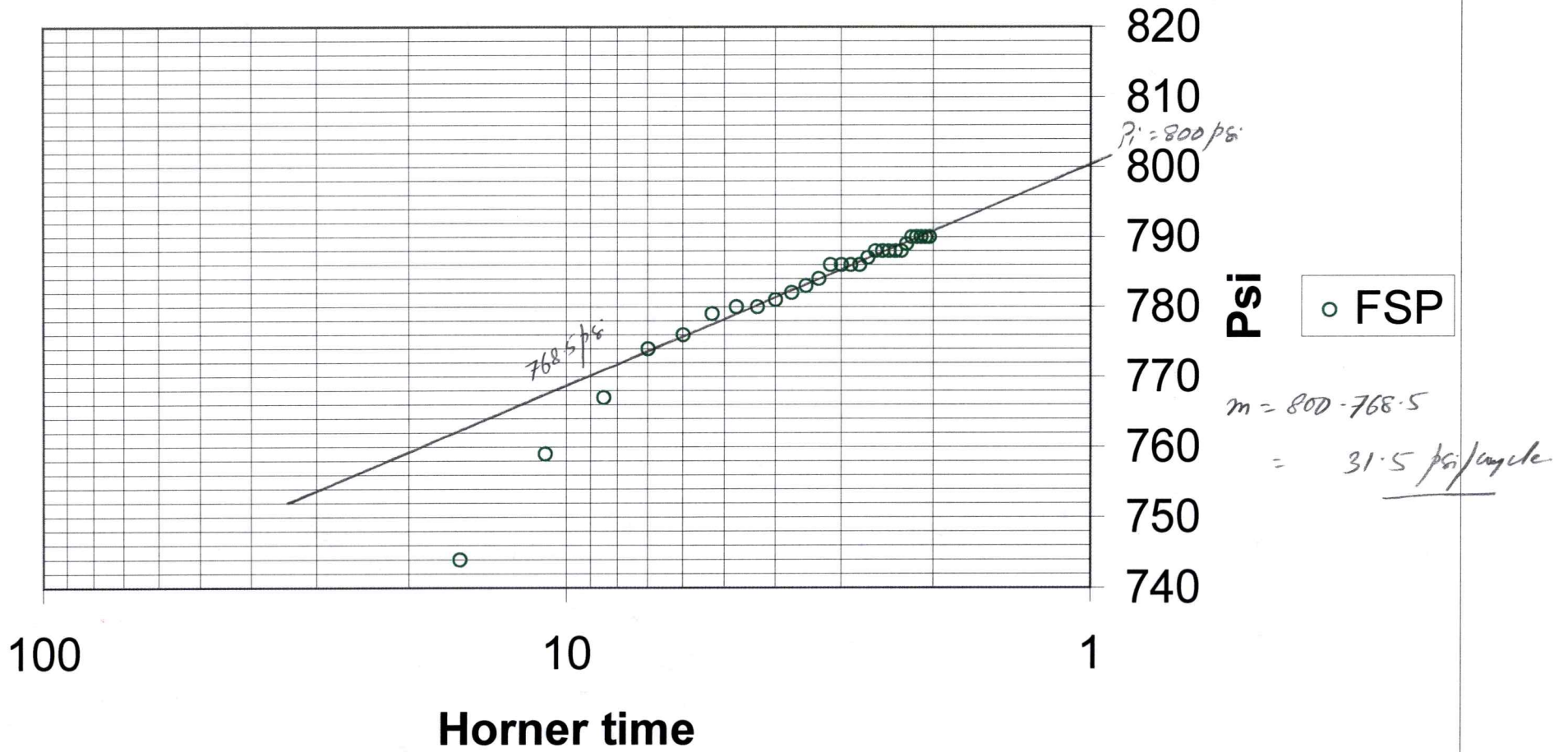
$$K = 27.0 \text{ md}$$

Goeller 1-4 (15-025-20858)

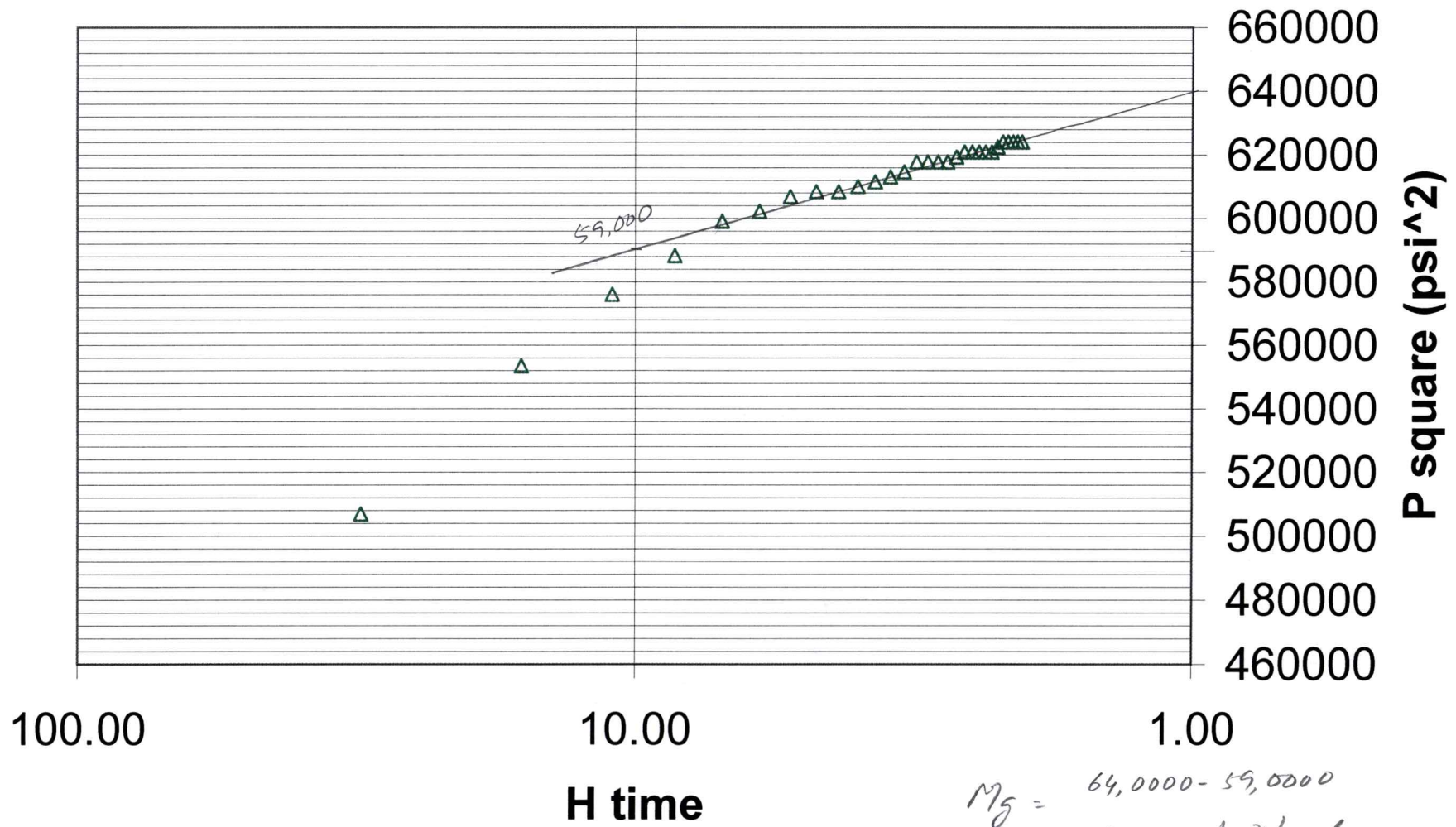
5300-5335 ft



Goeller 1-4 (15-025-20858) 5300-5335 ft



Goeller 1-4 (Low Pr.)



$$M_5 = 64,000 - 59,000 = 5,000 \text{ psi}^2/\text{cycle}$$

4-30-25W
API # 15-025-20858

CRUDE OIL TESTING, INC.

DATE 11/18/84

TEST TICKET NO. 4754

Company: Murfin Drilling Co.
Company Address: 250 N Water Suite 300 Wichita KS 67202
Location: Sec. 4 Twp. 30S Range 25W Co. Clark State KS
Well Name & Number: 1-4 Goeller Code E9

ENGINEERING DATA	Elevation	2582 KB	Drill Pipe Length	4777	ID 3.8 "
	Mud Viscosity	44	Weight Pipe Length		
	Mud Weight	9.2	Drill Collar Length	501	ID 2.25"
	Water Loss	7.3	Top Packer Depth	5295	
	Type of Mud Chemical		Bottom Packer Depth	5300	
	Anchor Length	35	Tool Joint Size	4.5	FH
	Hole Size	7 7/8	Test Tool Size	5 1/2	
	Casing Size	8 5/8	Packer Size	6 3/4	
	Surface Choke	3/4	Reversed Out	No	
	Bottom Choke	3/4	Recorder #	11085	
	Extra Equipment			None	

REMARKS

DST #1
Gas to surface in 20 min. on 1st open.
Gas bottle sent in to be analyzed.
See additional sheet.

FORMATION

Marrow sand. Zone	Test Type Conventional
Interval 5300 To 5335	Total Depth 5335
Open 30 Shut In 45	Open 60 Shut In 90
Packer(s) Set 03:09AM	Started Off Bottom 06:57AM
Blow 1st Opening Strong off bottom of bucket in 1 min.	
2nd Opening Strong steady blow.	

RECOVERY

Total Feet 950
Recovered 465 feet of Gassy oil.
Recovered 485 feet of Gassy slightly mud cut oil.

CALCULATED
RECOVERY

Gas 274.15 ^H Oil 617.95 ^H Water 36.77 ^H Mud 21.13 ^H
Gravity (Oil) 46 Test Water Chlorides 12,000 PPM
Test Area Temperature 116F Mud System Chlorides 5,000 PPM

PRESSURE

	FIELD READING	OFFICE READING	
(A) Initial Hydrostatic Mud	2597	2601	PSI
(B) First Initial Flow Pressure	165	168	PSI
(C) First Final Flow Pressure	187	195	PSI
(D) Initial Closed-In Pressure	800	796	PSI
(E) Second Initial Flow Pressure	209	216	PSI
(F) Second Final Flow Pressure	286	290	PSI
(G) Final Closed-In Pressure	789	790	PSI
(H) Final Hydrostatic Mud	2565	2583	PSI

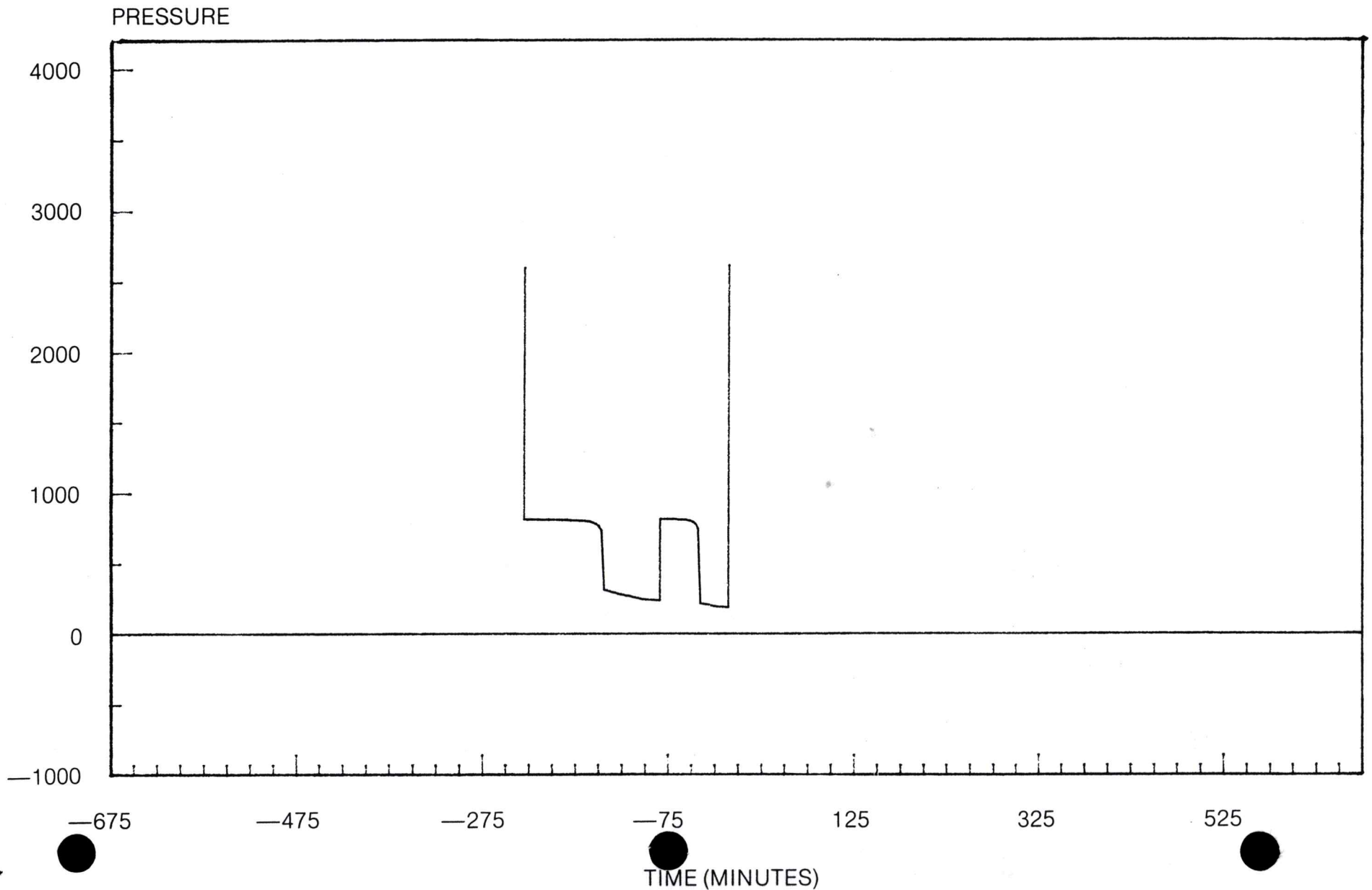
CRUDE OIL TESTING INC.

FOR: Murfin Drilling Co.

TEST 4754

DST 1

11/18/84



PRESSURE BREAKDOWN

TEST TICKET NO. 4754

DST Number: 1 Recorder Number: 11085 Clock Number: 19124

First Flow Pressure		Initial Shut-In		Second Flow Pressure		Final Shut-In	
Mins.	Press.	Mins.	Press.	Mins.	Press.	Mins.	Press.
0	167	<i>30</i> 0	195	<i>75</i> 0	215	<i>135</i> 0	289
3	167	<i>33</i> 3	730	3	217	<i>138</i> 3	712
6	169	<i>36</i> 6	763	6	217	<i>141</i> 6	744
9	170	9	776	9	218	<i>144</i> 9	759
12	172	12	783	12	219	<i>147</i> 12	767
15	175	15	787	15	221	<i>150</i> 15	774
18	179	18	789	18	223	<i>153</i> 18	776
21	186	21	790	21	228	<i>156</i> 21	779
24	189	24	790	24	232	<i>159</i> 24	780
27	192	27	794	27	236	<i>162</i> 27	780
30	195	30	794	30	240	<i>165</i> 30	781
		33	794	33	246	<i>168</i> 33	782
		36	794	36	248	<i>171</i> 36	783
		39	794	39	254	<i>174</i> 39	784
		42	794	42	258	<i>177</i> 42	786
		<i>75</i> 44	795	45	263	<i>180</i> 45	786
				48	269	<i>183</i> 48	786
				51	273	<i>186</i> 51	786
				54	279	<i>189</i> 54	787
				57	285	<i>192</i> 57	788
				<i>135</i> 60	289	<i>195</i> 60	788
						<i>198</i> 63	788
						<i>201</i> 66	788
						<i>204</i> 69	788
						<i>207</i> 72	789
						<i>210</i> 75	790
						<i>213</i> 78	790
						<i>216</i> 81	790
						<i>219</i> 84	790
						<i>222</i> 87	790

Total ft. of oil recovered = 612 ft. This was contained in 501 ft. of dr. coll. and 117 ft of drill pipe

DST NUMBER 1

TEST TICKET NO. 4754

Company: Murfin Drilling Co.

Date: 11/18/84

Drill Collar Feet	ID	Weight Feet	Pipe ID	Drill Pipe Feet	Pipe ID	Average ID	Gals/Foot
501'	2.250"	0	0.000	117'	3.800"	2.5433	0.264

→ Avg ZD
→ Total flow time
 $T = 90$
 $= \frac{501 \times 2.25 + 117 \times 3.8}{(501 + 117)}$
 $= 2.5433$

Bbls Recovered/Test = 2.5887 Est Bbls/Day = 41.4192

Initial Shut-In

PRESS. TIME	T/t	(T+t)/t	LOG T/t	LOG (T+t)/t
794 27	3.333	4.333	0.52288	0.63682
790 24	3.750	4.750	0.57403	0.67669
790 21	4.286	5.286	0.63202	0.72310
789 18	5.000	6.000	0.69897	0.77815
787 15	6.000	7.000	0.77815	0.84510

1st flow = 30 min
2nd flow = 60 min
Total flow = 90 min
Pec. in 90 min = 950' @ 5600

Final Shut-In

Press. Time	T/t	(T+t)/t	Log T/t	Log (T+t)/t
774 15	6.000	7.000	0.77815	0.84510
767 12	7.500	8.500	0.87506	0.92942
759 9	10.000	11.000	1.00000	1.04139
744 6	15.000	16.000	1.17609	1.20412
712 3	30.000	31.000	1.47712	1.49136

Time Option is Log (T+t)/t

IP(0)	IP(1)	FP(0)	FP(1)	M	Kh/B	DR	Q1	Pts
823.5	777.2	838.6	762.2	76.4	88.133	1.013	41.958	1,3
822.0	776.8	838.1	762.0	76.2	88.439	1.017	42.103	1-3
812.4	781.6	844.3	761.4	82.9	81.238	1.934	80.094	1-4
810.7	782.4	856.8	761.0	95.8	70.287	1.808	74.881	1-5

Graph Data For Points

Initial Time	Initial Pressure	Final Time	Final Pressure
0.6368	794	0.8450	774
0.6766	790	0.9294	767
0.7231	790	1.0413	759
0.7781	789	1.2041	744
0.8450	787	1.4913	712

1 BBL = 42 US Gal.

1 cu ft = 7.481 Gal

1 BBL = 5.614 ft³

1 Gal = .1337 ft³

Graph Data For Lines

0	810.68	0	856.82
1	782.43	1	761.00

ZONE EVALUATION - Page 2

DST Number 1

TEST TICKET NO. 4754

Company: Murfin Drilling Co.

Date: 11/18/84

P.S.I. Slope Cycle (From Log $\frac{T + t}{t}$)

$$M = G_0 - G_1 \quad 95.82$$

Damage Ratio:

$$DR = .183 \frac{P_s - P_f}{M} \quad 1.81$$

Effective Pay:

$$\frac{Kh}{B} = \frac{162.6 Q}{M} \quad 70.29 \text{ Md. Ft.}$$

Theoretical Potential With
Damage Removed (for DR greater than 1):

$$Q_1 = Q DR \quad 74.88 \text{ Bbls/Day}$$

Production:

2.59 Bbls/Hour

$$Q = \frac{1440 R}{T}$$

41.42 Bbls/Day

These calculations are based upon information furnished by you and taken from drill stem test pressure charts and are furnished for your information. In furnishing such calculations and evaluations, Crude Oil Testing Inc. is merely expressing an opinion. You agree that Crude Oil Testing Inc. makes no warranty as to the accuracy of such calculations or opinions, and Crude Oil Testing Inc. shall not be liable for any loss or damage, whether due to negligence or otherwise in connection with such calculations and opinions.

EQUIPMENT DATA

TOOL SEQUENCE REPORT

DST Number: 1

TEST TICKET NO. 4754

WELL NAME: 1-4 Goeller

WELL LOCATION: 4-30S-25W

Tool #	Tool	Length	I.D.	O.D.
1	Drill Pipe - 4.5"	4777.00	3.826	4.50
4	Drill Collar - 6"	501.00	2.250	6.00
8	Circulating Sub	1.00	3.000	5.00
9	Shut-In Tool	5.45	0.870	5.00
10	Hydraulic Tool	5.60	1.000	5.00
14	Packer	5.35	1.530	6.75
14	Packer	5.35	1.530	6.75
6	Anchor	31.00	2.750	5.00
15	Recorder Carrier	1.00		5.00
16	Bull Plug	2.00		5.00
	Total Depth	5334.75		

CALCULATED RECOVERY ANALYSIS

DST Number: 1

TEST TICKET NO. 4754

Sample #	Total Feet	***** Gas **** %	**** Feet	***** Oil **** %	**** Feet	***** Mud **** %	**** Feet
1	465	10.00	46.50	90.00	418.50	0.00	0.00
2	391	45.00	175.95	45.00	175.95	3.00	11.73
3	94	55.00	51.70	25.00	23.50	10.00	9.40
TOTAL	<u>950</u>	28.86	<u>274.15</u>	65.05	<u>617.95</u>	2.22	<u>21.13</u>

Sample #	**** Water *** %	*** Feet	Chlorides (PPM)	Resistivity (Ohms)	Temperature (Deg)
1	0.00	0.00			
2	7.00	27.37			
3	10.00	9.40	12,000		
TOTAL	3.87	<u>36.77</u>			

GAS TEST REPORT

Company: Murfin Drilling Co.

Date: 11/18/84

DST #1 Test Ticket #4754

Formation: Marrow Sand

Tool Open: 3:12 A.M.

Gas to Surface: 20 Min @ 3:32

Time	Inches Water	PSIG	Size Orifice	MCF P/D
20 Min	29		1.5"	381,000
30 Min	12		1.5"	241,000

(2nd Open)

0 Min	4.5		1.5"	148,000
10 Min	6		1.5"	170,000
20 Min	6		1.5"	170,000
30 Min	6		1.5"	170,000
40 Min	5.5		1.5"	163,000
50 Min	5.5		1.5"	163,000
60 Min	5.5		1.5"	163,000

REMARKS: Geol. has gas bottle.