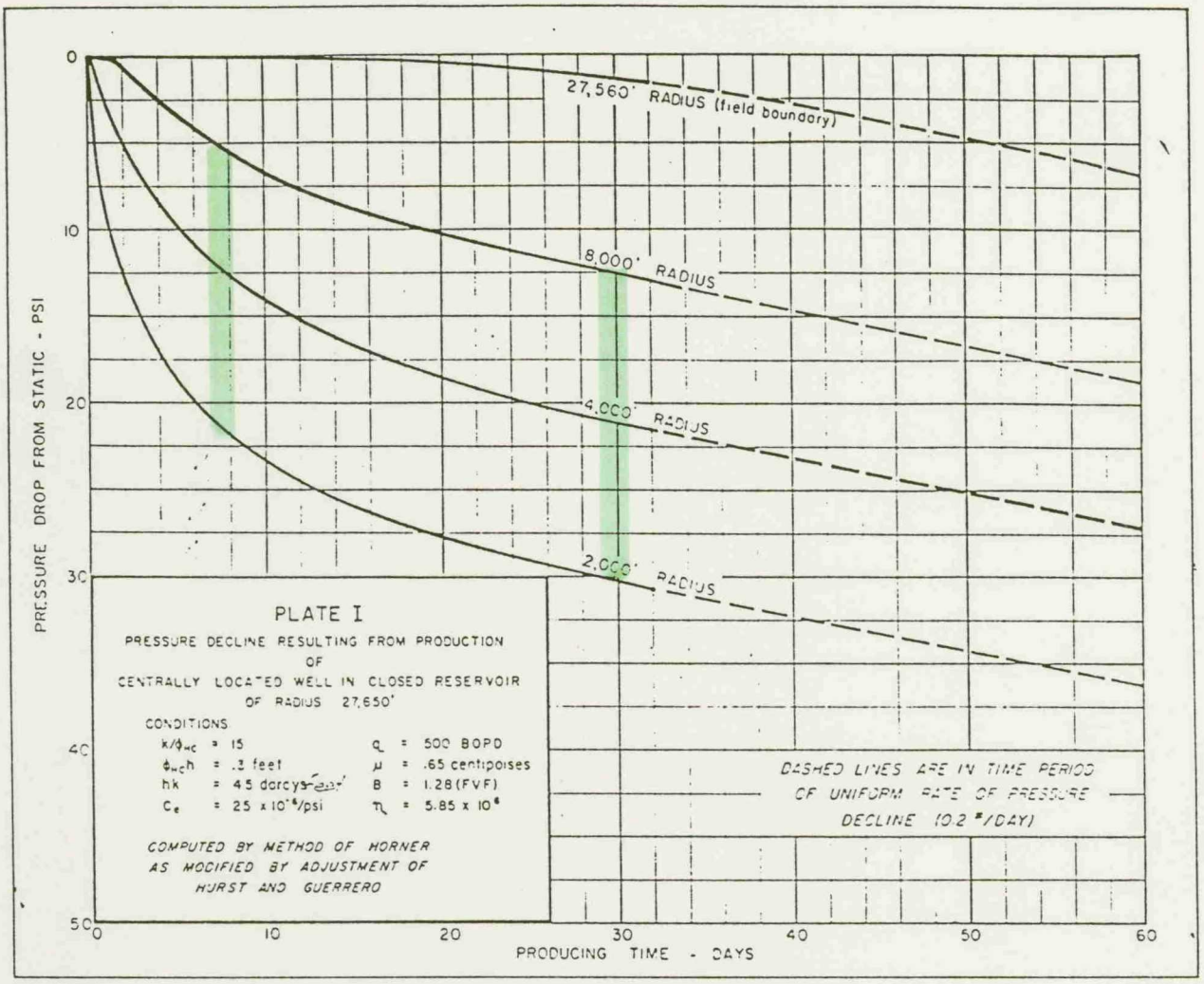

27,560' RADIUS (field boundary)
8,000' RADIUS
4,000' RADIUS
2,000' RADIUS
PRESSURE DROP FROM STATIC - PSI
PRODUCING TIME - DAYS
0
10
20
30
40
50
0
10
20
30
40
50
60
PLATE I
PRESSURE DECLINE RESULTING FROM PRODUCTION OF CENTRALLY LOCATED WELL IN CLOSED RESERVOIR OF RADIUS 27,650'
CONDITIONS
$k/\phi_{\mu c}$ = 15
$\phi_{\mu c}h$ = .3 feet
hk = 4.5 darcy-feet
C_e = 25 x 10⁻⁶/psi
q = 500 BOPD
μ = .65 centipoises
B = 1.28 (FVF)
η = 5.85 x 10⁶
COMPUTED BY METHOD OF HORNER AS MODIFIED BY ADJUSTMENT OF HURST AND GUERRERO
DASHED LINES ARE IN TIME PERIOD OF UNIFORM RATE OF PRESSURE DECLINE (0.2 #/DAY)

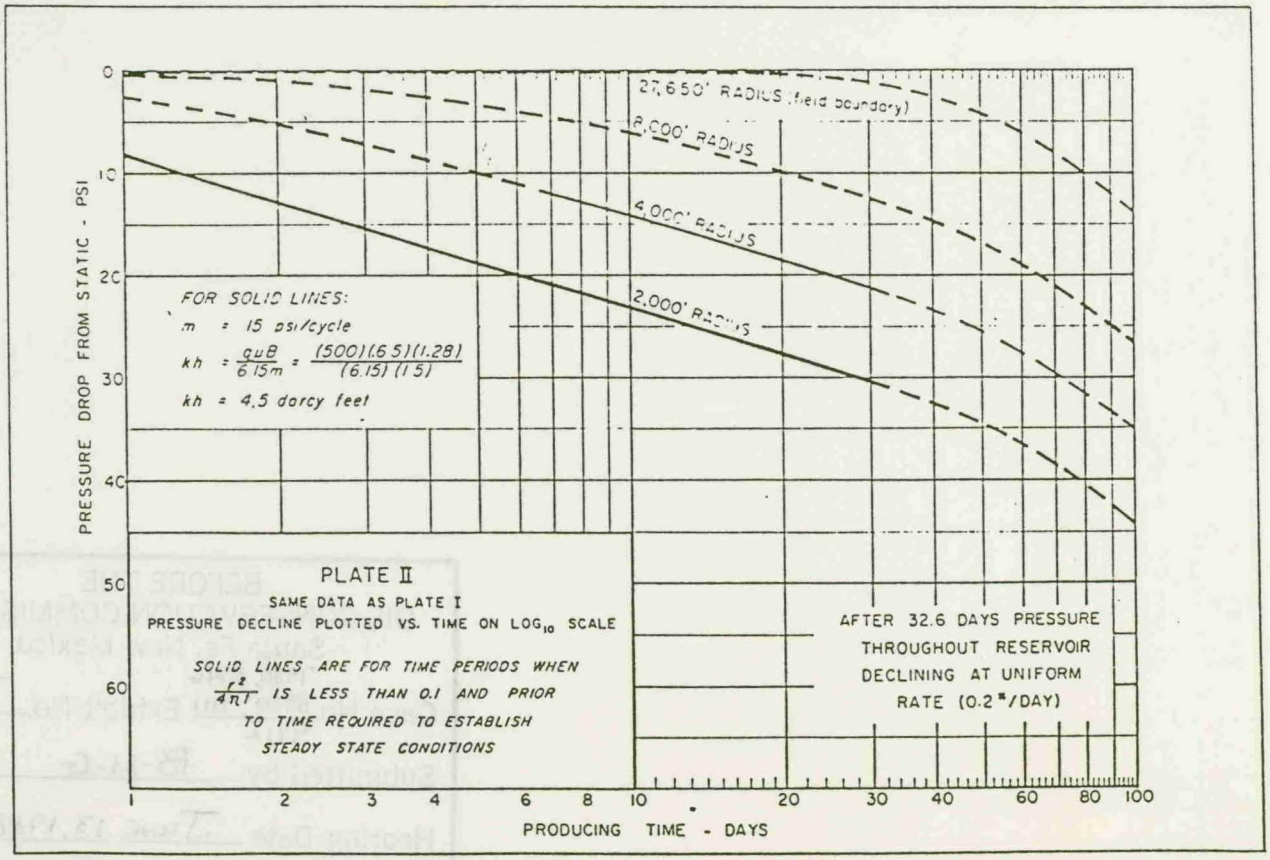
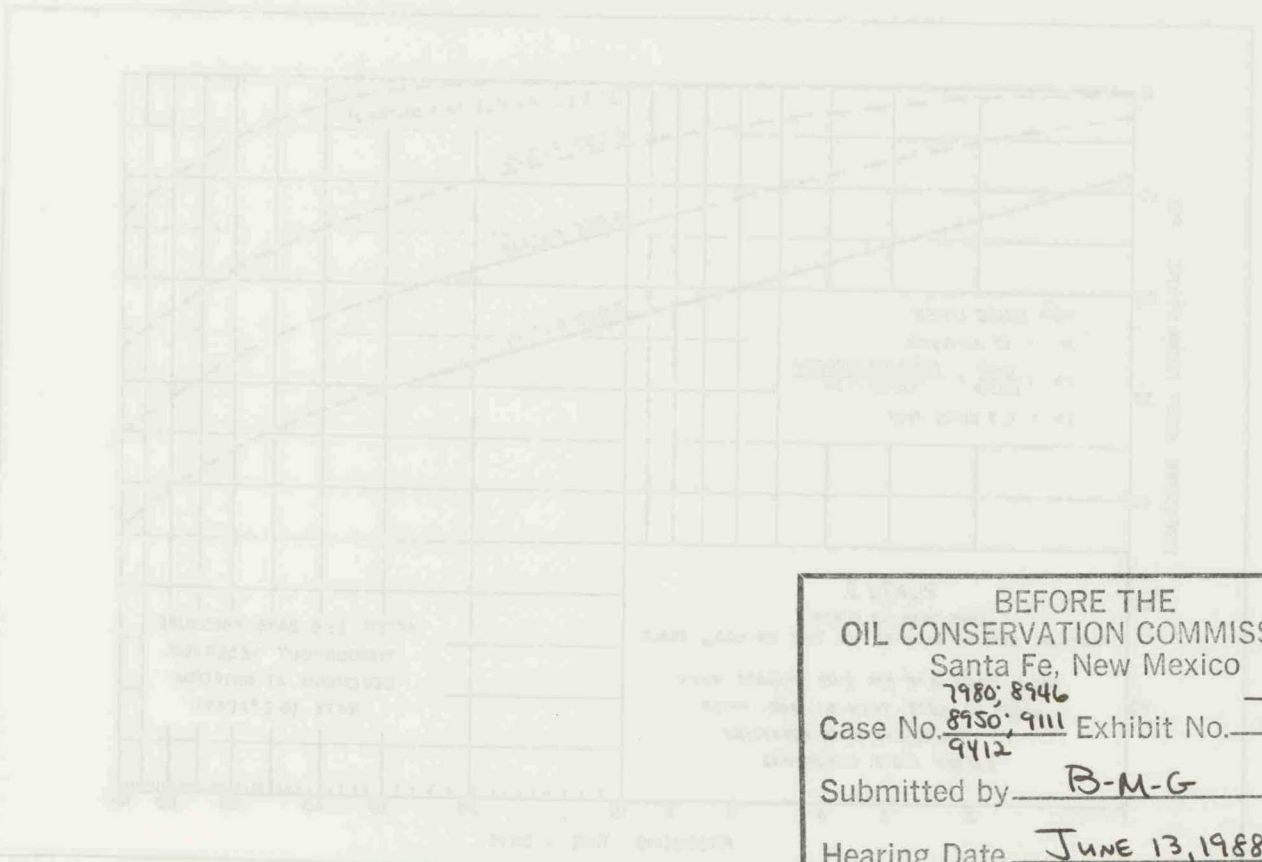

27,650' RADIUS (field boundary)
8,000' RADIUS
4,000' RADIUS
2,000' RADIUS
PRESSURE DROP FROM STATIC - PSI
PRODUCING TIME - DAYS
0
10
20
30
40
50
60
1
2
3
4
6
8
10
20
30
40
60
80
100
FOR SOLID LINES:
m = 15 psi/cycle
$kh = \frac{qu\beta}{6.15m} = \frac{(500)(.65)(1.28)}{(6.15)(15)}$
kh = 4.5 darcy feet
PLATE II
SAME DATA AS PLATE I
PRESSURE DECLINE PLOTTED VS. TIME ON LOG_{10} SCALE
SOLID LINES ARE FOR TIME PERIODS WHEN $\frac{r^2}{4\eta t}$ IS LESS THAN 0.1 AND PRIOR TO TIME REQUIRED TO ESTABLISH STEADY STATE CONDITIONS
AFTER 32.6 DAYS PRESSURE THROUGHOUT RESERVOIR DECLINING AT UNIFORM RATE (0.2 #/DAY)

Fig. No. 21



BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 7980; 8946 / 8950; 9111 / 9412 Exhibit No. 7A
Submitted by B-M-G
Hearing Date JUNE 13, 1988

7A

MIGRATION ACROSS AREA of LOW PERMEABILITY

① GAVILAN INITIAL PRESSURE
80 to 100 psi under Virgin Press

EQUATES TO ± 700,000 BBLS
(SEE John Roe press vs Cumulative production for Gavilan for 20 years → ± 100 BOPD)

② DIFFERENTIAL PRESSURE
0 to 300 psi over 20 years
Use 150

③ From $Q = \frac{1.127\ KA\ \Delta P}{\mu L}$

$$Kh = \frac{Q_{cr}}{1.127\ \Delta P \left(\frac{L}{lw}\right)}$$

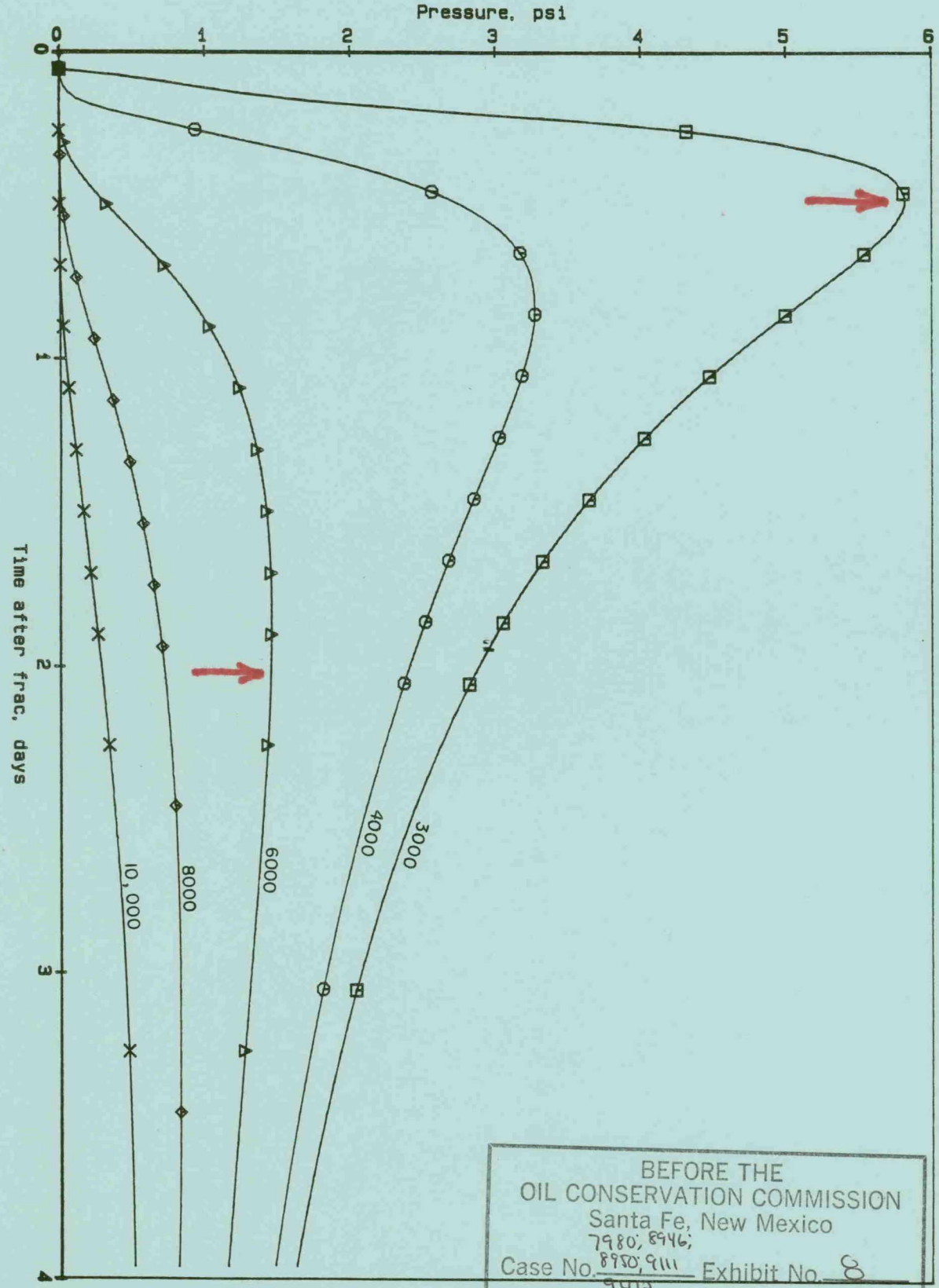
$$= \pm \frac{100 \times .6}{1.127 \times 150}\left(\frac{L}{lw}\right) = \pm .5\ \frac{L}{lw}\ \text{darcy-ft}$$

L = DISTANCE - Direction of flow
lw = WIDTH - ACROSS " " "

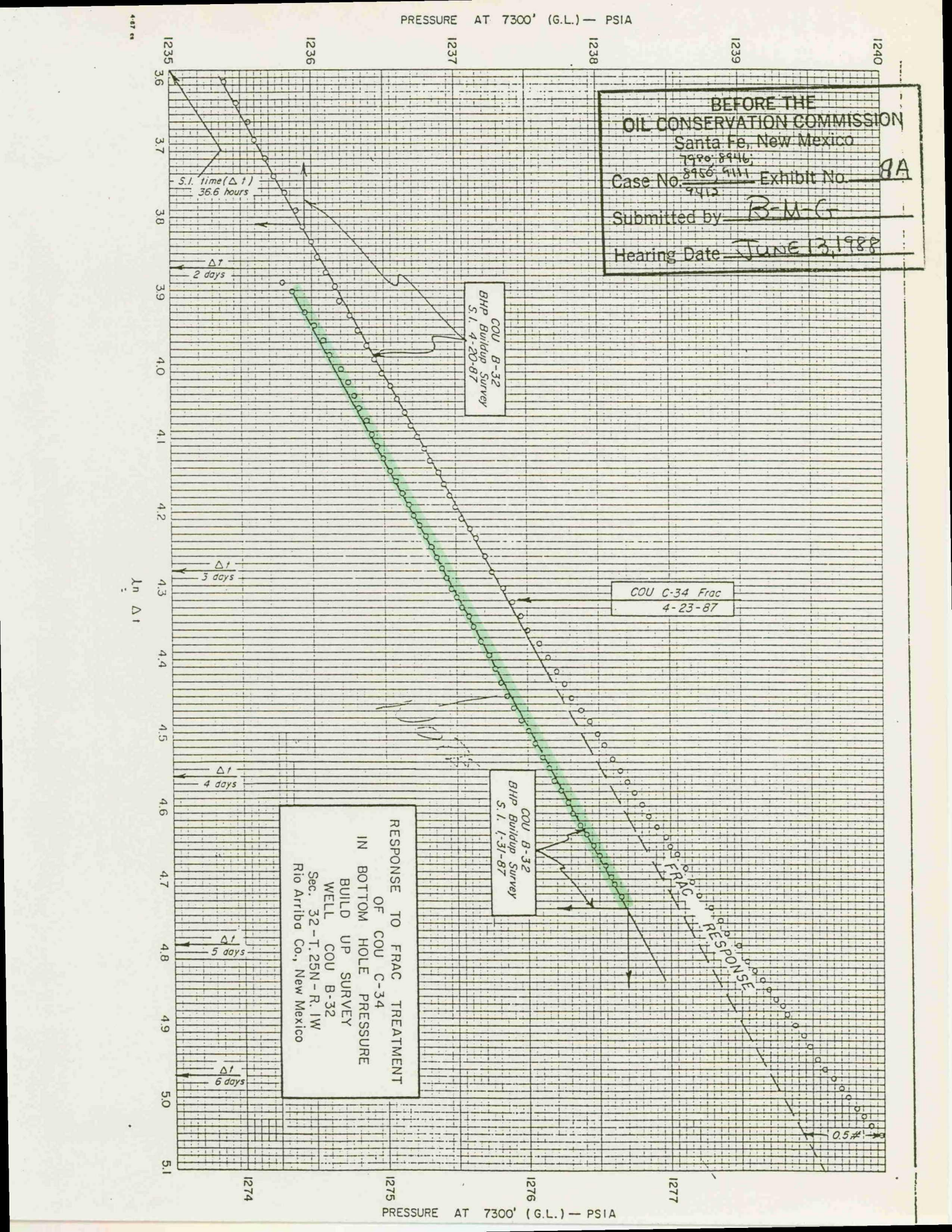
$\frac{L}{W}$	Kh
1	.5 d-ft.
1/5	.1 " "

ACCURACY: PROBABLY WITHIN ONE ORDER OF MAGNITUDE

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
7980, 8946, 8950,
Case No. 9111, 9412 Exhibit No. 7B
Submitted by B-M-G
Hearing Date JUNE 13, 1988



BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 7980; 8946; 8950; 9111 9412 Exhibit No. 8
Submitted by B-M-G
Hearing Date JUNE 13, 1988



BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 7990, 8946, 8956, 9111, 9412 Exhibit No. 8A
Submitted by B-M-G
Hearing Date June 13, 1988

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
7980; 8946;
Case No. 8950; 9111 Exhibit No. 10
9412
Submitted by B-M-G
Hearing Date June 13, 1988

COMPARISON OF EFFICIENCY OF RECOVERIES
MANCOS FORMATION

		Boulder (MMbbl)	Canada Ojitos Unit Project Area (MMbbl)	Gavilan (MMbbl)
1	Cumulative	1.8	10.0	4.0
2	Less Prod. above Bubble Point	.3	.4	.7
3	Less Migration to	0	.7	.8
4	Less COU Exp. Area Net Prod. **See Note Below (line 16)	—	.8	—
5	Net Prod. below Bubble Point	1.5	8.1	2.5
6	O-I-P MMbbls	5.5 to 6.0	30 to 50	30 to 40
7	Current % Recovery of O-I-P	27% to 25%	27% to 16%	8 to 6%

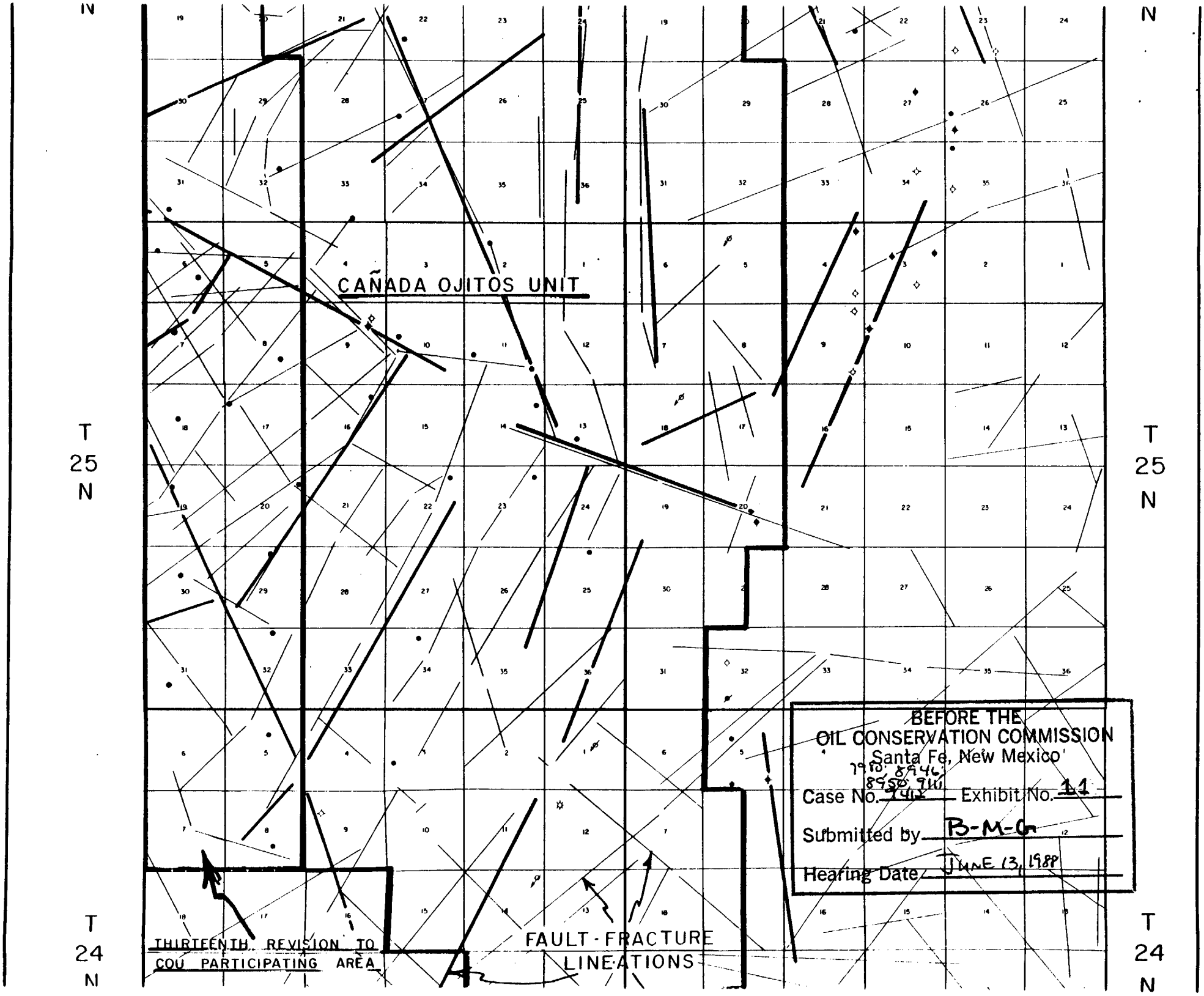
Est. Gavilan to 1/1/88:

8	Solution Gas Drive Recovery: % O-I-P	6% to 4.5%
9	bbl/acre	68
10	Total Recovery for both Solution Gas Drive & G.O. to date bbl/acre (date)	91

**NOTE EXPANSION AREA PRODUCTION, MIGRATION & GRAVITY DRAINAGE

± 17,000 Acres

11	Production	1.6 MMbbls
12	Migration Away	0.8
13	Total	2.4
	Solution Gas Drive and G.O. Recovery to 1/1/88 (same as Gavilan)	
14	17,000 Acres x 91 bbl/acre	1.6
15	Migration & G.D. from project area	0.8
16	Expansion Area Net contribution to Unit total prod.	.8


CAÑADA OJITOS UNIT
T 25 N
T 24 N
THIRTEENTH REVISION TO COU PARTICIPATING AREA
FAULT-FRACTURE LINEATIONS
BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 7940, 8946, 8950, 9111 Exhibit No. 11
Submitted by B-M-G
Hearing Date JUNE 13, 1988

MALLON OIL COMPANY

PRESSURE TRANSIENT ANALYSIS

FISHER-FEDERAL 2-1

RIO ARRIBA COUNTY, NEW MEXICO

FEBRUARY 20, 1988

TECHNICAL PRODUCTION SERVICES

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 8980, 8946, 8950 Exhibit No. 12
Submitted by B-M-G
Hearing Date JUNE 13, 1988

TEST SUMMARY

RESERVOIR PARAMETERS

P^*	1096	psia
P_{ave}	1005	psia (observed)
$P_{initial}$	808	psia
P_{final}	1005	psia
Total Mobility	38.3	md/cp
Permeability to Oil	8.7	md
Skin	-2	
Radius of Investigation	204	ft
Test Length	3	days

REMARKS

1. The test was completed and analyzed using a radial flow model. The portion analyzed is the zero change in slope portion of the derivative curve. This preceded the zero slope portion of the semi-log plot (stabilized reservoir).

2. The skin and permeabilities are relative to the estimated net height of 50 feet.

3. No period of linear flow was observed. Wellbore storage dominated the first 1/2 hour of the test.

Company :- MALLON OIL COMPANY

Well #	:-	2-1	Location	:-	SEC 2 T25N R2W
Lease	:-	FISHER FEDERAL	Field	:-	GAVILAN
Reservoir	:-	GALLUP	Test date	:-	2/20/88
County	:-	RIO ARRIBA	State	:-	NEW MEXICO

HORNER CALCULATIONS

Total flow time T = 96 hours

Data Pt.	Dt hours	Bottom hole pressure p.s.i.g	p.s.i.a	(T+t)/t	Log(T+t)/t
1	0.0000	793.20	807.85	Shut-in	-
2	0.0333	800.80	815.45	2881.000	3.4595
3	0.1333	807.00	821.65	721.000	2.8579
4	0.1667	814.30	828.95	577.000	2.7612
5	0.2000	820.30	834.95	481.000	2.6821
6	0.2333	828.60	843.25	412.429	2.6153
7	0.2667	834.70	849.35	361.000	2.5575
8	0.3000	841.40	856.05	321.000	2.5065
9	0.3333	849.30	863.95	289.000	2.4609
10	0.3667	854.30	868.95	262.818	2.4197
11	0.4000	862.60	877.25	241.000	2.3820
12	0.4333	867.60	882.25	222.538	2.3474
13	0.4680	874.50	889.15	206.128	2.3141
14	0.5055	877.20	891.85	190.911	2.2808
15	0.5462	880.80	895.45	176.771	2.2474
16	0.5897	883.30	897.95	163.804	2.2143
17	0.6370	884.80	899.45	151.706	2.1810
18	0.6878	886.40	901.05	140.569	2.1479
19	0.7428	889.80	904.45	130.235	2.1147
20	0.8022	892.90	907.55	120.676	2.0816
21	0.8663	897.30	911.95	111.812	2.0485
22	0.9355	901.30	915.95	103.619	2.0154
23	1.0103	903.50	918.15	96.018	1.9824
24	1.0912	906.50	921.15	88.979	1.9493
25	1.1783	913.30	927.95	82.471	1.9163
26	1.2725	914.10	928.75	76.442	1.8833
27	1.3742	918.30	932.95	70.861	1.8504
28	1.4838	919.50	934.15	65.697	1.8175
29	1.6025	925.40	940.05	60.906	1.7847
30	1.7305	925.70	940.35	56.475	1.7519
31	1.8687	928.70	943.35	52.374	1.7191
32	2.0178	934.70	949.35	48.576	1.6864
33	2.1788	937.20	951.85	45.060	1.6538
34	2.3528	940.90	955.55	41.802	1.6212
35	2.5405	941.50	956.15	38.788	1.5887
36	2.7433	943.90	958.55	35.994	1.5562

File :- FISHERFE

Cont....

Data Pt.	Dt hours	Bottom hole pressure p.s.i.g	p.s.i.a	(T+t)/t	Log(T+t)/t
37	2.9622	948.80	963.45	33.409	1.5239
38	3.1987	951.90	966.55	31.013	1.4915
39	3.4500	955.40	970.05	28.826	1.4598
40	3.7295	958.90	973.55	26.741	1.4272
41	4.0333	962.20	976.85	24.802	1.3945
42	4.3487	964.90	979.55	23.076	1.3632
43	4.6955	966.60	981.25	21.445	1.3313
44	5.0703	968.90	983.55	19.934	1.2996
45	5.4750	971.30	985.95	18.534	1.2680
46	5.9120	974.10	988.75	17.238	1.2365
47	6.3837	976.50	991.15	16.038	1.2052
48	6.8930	979.20	993.85	14.927	1.1740
49	7.4430	983.10	997.75	13.898	1.1430
50	8.0370	989.30	1003.95	12.945	1.1121
51	8.6783	989.60	1004.25	12.062	1.0814
52	9.3667	990.20	1004.85	11.249	1.0511
53	10.1187	990.10	1004.75	10.487	1.0207
54	10.9258	989.90	1004.55	9.787	0.9906
55	11.7975	990.00	1004.65	9.137	0.9608
56	12.7388	989.80	1004.45	8.536	0.9313
57	13.7553	989.60	1004.25	7.979	0.9020
58	14.8500	989.90	1004.55	7.465	0.8730
59	16.0378	990.00	1004.65	6.986	0.8442
60	17.3172	989.90	1004.55	6.544	0.8158
61	18.6988	990.10	1004.75	6.134	0.7877
62	20.1908	990.10	1004.75	5.755	0.7600
63	21.8017	990.20	1004.85	5.403	0.7327
64	23.5412	990.30	1004.95	5.078	0.7057
65	25.4192	990.40	1005.05	4.777	0.6791
66	25.7245	990.20	1004.85	4.732	0.6750
67	25.9833	990.20	1004.85	4.695	0.6716
68	28.0512	989.90	1004.55	4.422	0.6456
69	30.2892	989.90	1004.55	4.169	0.6201
70	32.7055	990.60	1005.25	3.935	0.5950
71	35.3147	990.90	1005.55	3.718	0.5704
72	38.1322	989.30	1003.95	3.518	0.5462
73	41.1745	990.10	1004.75	3.332	0.5226
74	44.4592	990.10	1004.75	3.159	0.4996
75	48.0062	990.30	1004.95	3.000	0.4771
76	51.8358	990.40	1005.05	2.852	0.4551
77	55.9712	991.70	1006.35	2.715	0.4338
78	60.4363	991.30	1005.95	2.588	0.4130
79	62.8008	990.60	1005.25	2.529	0.4029
80	65.2578	990.40	1005.05	2.471	0.3929
81	67.8108	989.40	1004.05	2.416	0.3830
82	70.4638	990.40	1005.05	2.362	0.3734
83	71.6872	990.30	1004.95	2.339	0.3691
84	71.8492	990.10	1004.75	2.336	0.3685

File :- FISHERFE

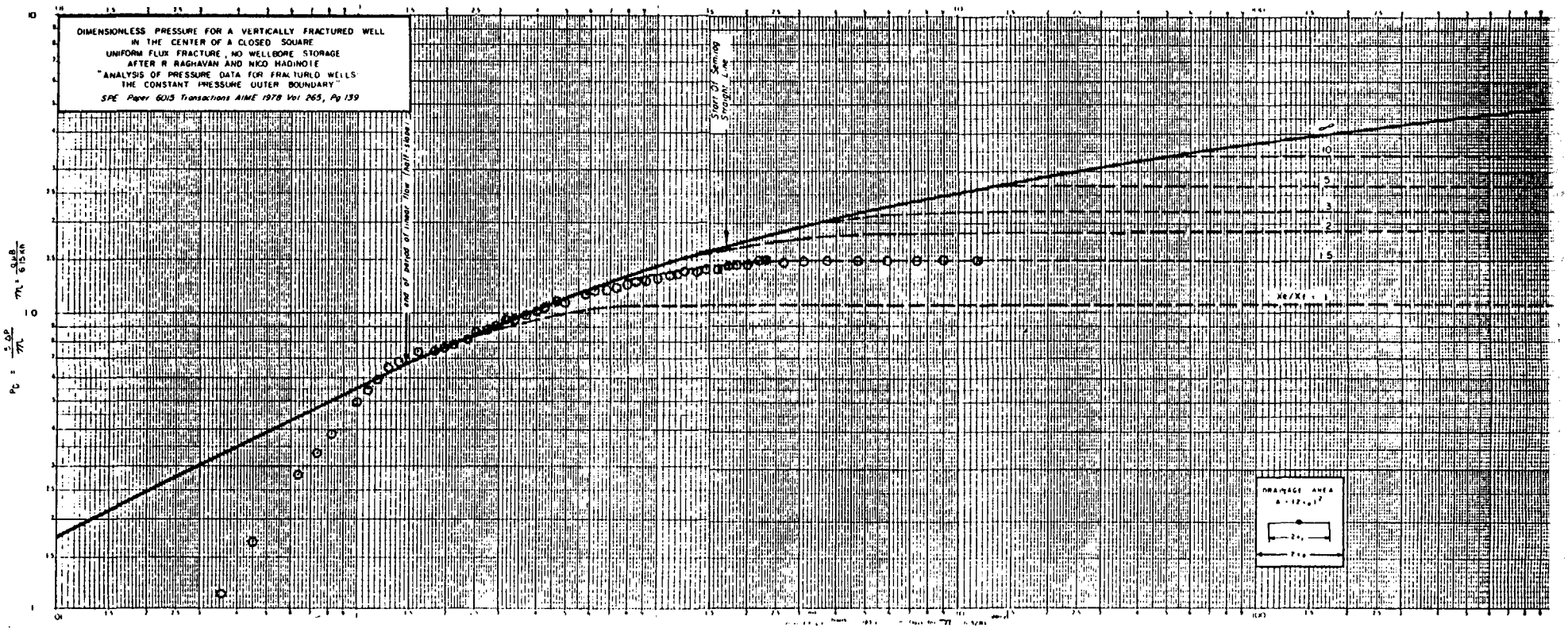
Feb. 16, 1988

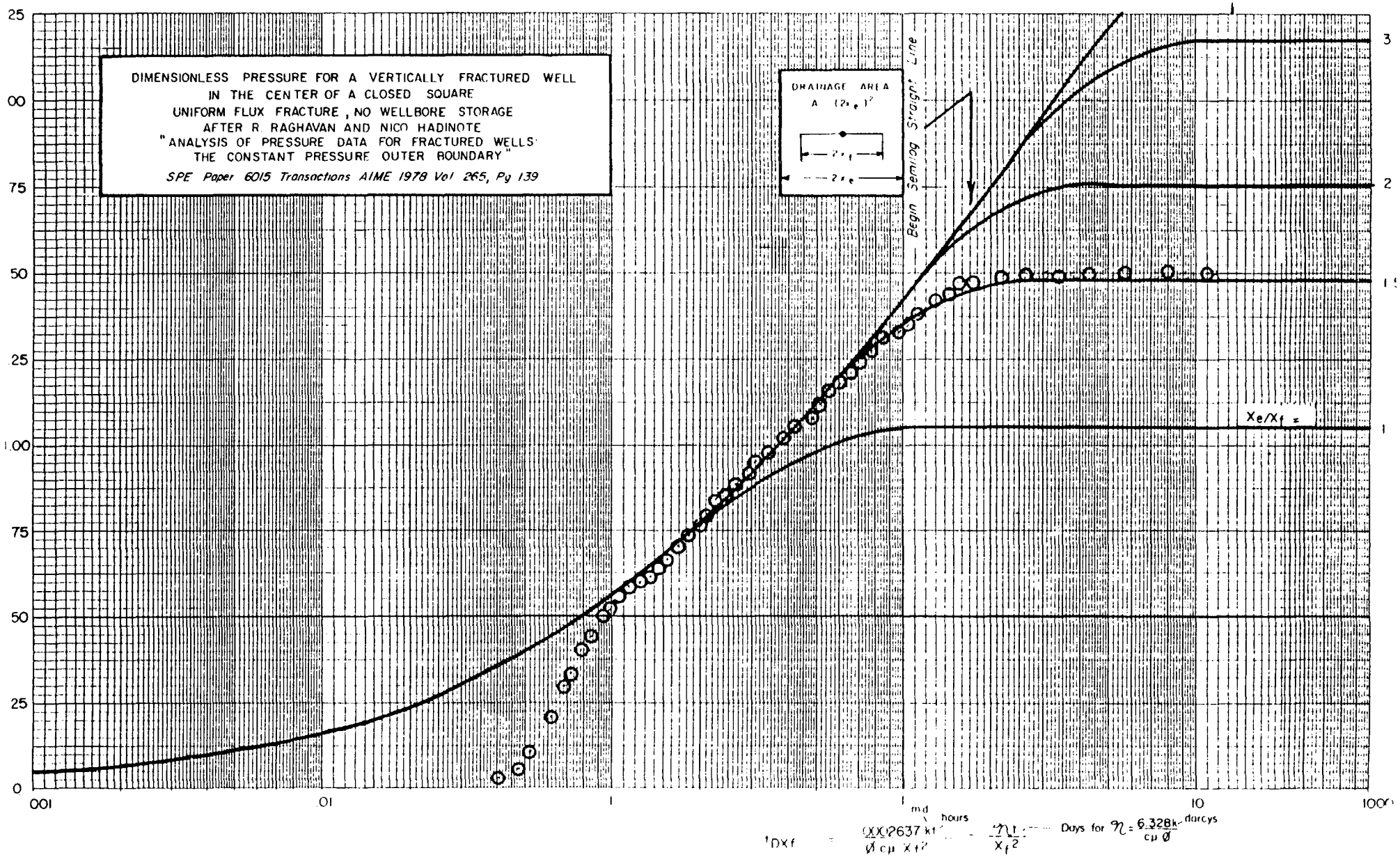
MALLON FISHER FED 2-1

Sec. 2-25N-2W

Δt (hours)	Δp (psig)	P_D for semilog plot
.033	7.6	.065
.133	13.8	.118
.167	21.1	.180
.200	27.1	.231
.233	35.4	.302
.267	41.5	.355
.300	48.2	.412
.333	56.1	.480
.367	61.1	.522
.400	69.4	.593
.433	74.4	.636
.468	81.3	.695
.506	84.0	.718
.546	87.6	.749
.590	90.1	.771
.637	91.6	.783
.688	93.2	.797
.743	96.6	.826
.802	99.7	.852
.866	104.1	.890
.936	108	.923
1.010	110	.940
1.09	113	.966
1.18	120	1.03
1.27	121	1.04
1.37	125	1.07
1.48	126	1.08
1.60	132	1.13

Δt (hours)	Δp (psig)	P_D for semilog plot
1.73	133	1.14
1.87	136	1.16
2.02	141	1.21
2.18	144	1.23
2.35	148	1.26
2.54	148	1.26
2.74	151	1.29
2.96	156	1.33
3.20	159	1.36
3.45	162	1.38
3.73	166	1.42
4.03	169	1.44
4.35	172	1.47
4.70	173	1.48
5.07	176	1.50
5.48	178	1.52
5.91	181	1.55
6.38	183	1.56
6.84	186	1.59
7.44	190	1.62
8.04	196	1.68
8.68	196	1.68


DIMENSIONLESS PRESSURE FOR A VERTICALLY FRACTURED WELL
IN THE CENTER OF A CLOSED SQUARE
UNIFORM FLUX FRACTURE, NO WELLBORE STORAGE
AFTER R RAGHAVAN AND NICO HADINOTE
"ANALYSIS OF PRESSURE DATA FOR FRACTURED WELLS
THE CONSTANT PRESSURE OUTER BOUNDARY"
SPE Paper 6015 Transactions AIME 1978 Vol 265, Pg 139
Start of Semi-log Straight Line
End of period of linear flow (half-slope)
Xe/Xf = 1
DRAINAGE AREA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THE CONSTANT PRESSURE OUTER BOUNDARY"
SPE Paper 6015 Transactions AIME 1978 Vol 265, Pg 139
DRAINAGE AREA
A (2x_e)^2
2x_f
2x_e
Begin Semilog Straight Line
Xe/Xf =
3
2
1
25
00
75
50
25
1.00
75
50
25
0
001
01
1
10
100
md
hours
Days for η = 6.328k/cμØ darcys

2-16-88

MALLON FISHER FED 2-1

FLOW RATE
272 BDPD
343 MCFC
} 1024* RB/DAY

xe/xf = 1.5

MATCH POINT { t_D = 1.0, t = 5 hours ; P_D = 1.37, ΔP = 162 }

$$\frac{Kh}{u} = \frac{qB}{7.08} \frac{P_D}{P} = \frac{1024 \times 1.37}{7.08 \times 1.62} = 1.2 \text{ d. ft.}$$

$$N = \frac{6.328 \left(\frac{Kh}{u}\right)}{\emptyset h} = \frac{6.328 \times 1.2}{550 \times 10^{-6} \times \emptyset h} = \frac{14000}{\emptyset h}$$

$$Xf^2 = \frac{Nt}{tp} = \frac{N \times 5/24}{1.0} = .21N = \frac{2880}{\emptyset h}$$

$\emptyset h$	Xf	Acres = $(2 \times 1.5Xf)^2 \div 43{,}560$
.3	98	2.0
.2	120	3.0
.05	240	12.0
.01	540	60.0

*From Mallon Report

MALLON FISHER FED 2-1

Comparison of Calculated Values
of
Total Mobility
and
Length of Induced Fracture
Test of Feb. 16, 1988

	Mallon Report	By Flow System of Constant Pressure of Boundary
Total Mobility Kh/u	1.9* darcy feet	1.2 darcy feet
Koh	.43* darcy feet	.28 darcy feet
Fracture Length	0 feet	98' for Øh = .3 128' for Øh = .2 240' for Øh = .1 540' for Øh = .05
Area of Investigation	3.0 Acres (for 204' = r)	2 for Øh = .3 3.0 for Øh = .2 12 for Øh = .1 60 for Øh = .05

Frac Treatment 6/12/85
7066 - 7872 62 .5" holes
135,000 gal. x-linked gel, 1% KCL
180,000# 20-40 sand
65-60 BPM 1800# - 2200#
ISIP 1100# 15 min. 950#

*From reports 38.34 md/cp and its assumed 50 feet for h