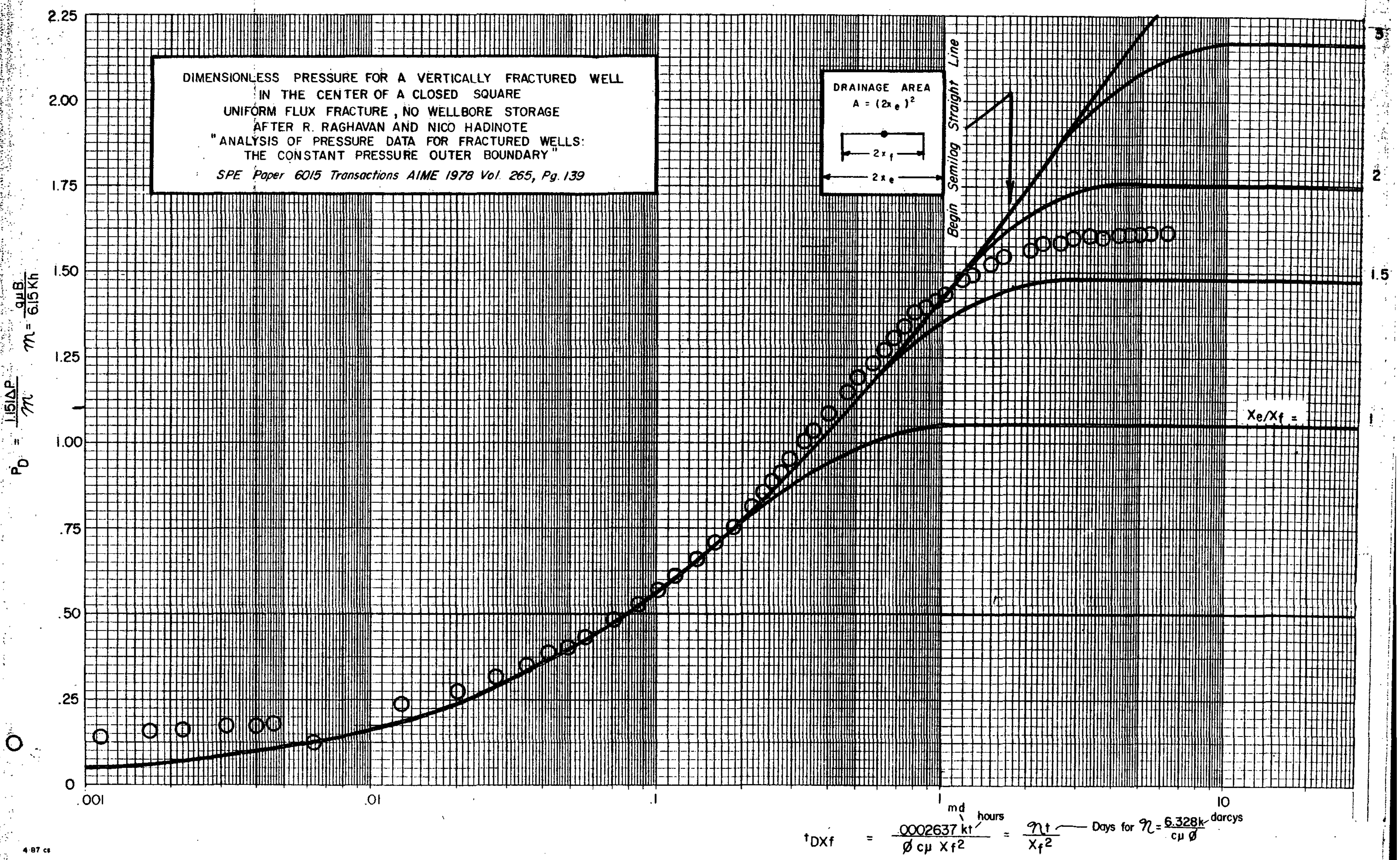

DIMENSIONLESS PRESSURE FOR A VERTICALLY FRACTURED WELL
IN THE CENTER OF A CLOSED SQUARE
UNIFORM FLUX FRACTURE, NO WELLBORE STORAGE
AFTER R. RAGHAVAN AND NICO HADINOTE
"ANALYSIS OF PRESSURE DATA FOR FRACTURED WELLS:
THE CONSTANT PRESSURE OUTER BOUNDARY"
SPE Paper 6015 Transactions AIME 1978 Vol. 265, Pg. 139
DRAINAGE AREA
A = (2xe)²
2xf
2xe
Begin Semilog Straight Line
Xe/Xf =
1
1.5
2
3
$P_D = \frac{1.151\Delta P}{m}$ $m = \frac{q\mu B}{6.15 Kh}$
2.25
2.00
1.75
1.50
1.25
1.00
.75
.50
.25
0
.001
.01
.1
1
10
$t_{DXf} = \frac{.0002637\,kt}{\phi c \mu X_f^2} = \frac{\eta t}{X_f^2}$ — Days for $\eta = \frac{6.328k}{c\mu\phi}$
md
hours
darcys
4-87 cs

CANADA OJITOS UNIT K-13
PRESSURE FALL-OFF TEST
MAY 1, 1987

Semi-log plot of data as shown on the facing page gives a little different perspective and a slight adjustment in matching appears in order, as shown.

In either case the ratio of Xe/Xf approximates 1.6 to 1.7.

And, clearly, the flow system is not one of a closed reservoir (plotted points would be above and to the left of the line for infinite conditions).

Also note that the plotted points have leveled off prior to the system's reaching the point at which the semi-log straight line starts - hence they cannot be used to accurately estimate transmissibility.

Transmissibility of the tight block can be estimated only by recognizing the flow system as one of constant pressure at the boundary, as shown on the following pages.

COU K-13 PRESSURE FALL-OFF TEST MAY 1 1987

1,000 MCF/D on S.I.

FROM SEMI-LOG PLOT

MATCH POINT: $t_D = 1.0$ $P_D = 1.38$

$t = 13$ hrs $f(\Delta P) = 1.325 \times 10^6$

$$m = \frac{1.151 f(\Delta P)}{P_D} = \frac{1.151 \times 1.325 \times 10^6}{1.38} = 1.105 \times 10^6$$

$$K_g h = \frac{1000\, Q \mu_i \left(\frac{T}{610.9}\right)}{m}$$

$$= \frac{1000 \times 1000 \times .0115 \times \left(\frac{610}{610.9}\right)}{1.105 \times 10^6}$$

$= .010$ darcy feet

$\frac{K_g h}{\mu_i} = .87$

$r_e / r_f = 1.7$ from curve

$t = 13/24$ days

$$\eta / r_f^2 = \frac{t_D r_f}{t} = \frac{1.0}{13/24} = 1.85 \qquad r_f^2 = \frac{\eta}{1.85}$$

$$\eta = \frac{6.328 \left(\frac{Kh}{\mu}\right)}{C_T \times \phi h} = \frac{6.328 \times .87}{600 \times 10^{-6}\, \phi h} = \frac{9.2 \times 10^3}{\phi h}$$

$$r_f^2 = \frac{\eta}{1.85} = \frac{9.2 \times 10^3}{\phi h \times 1.85}$$

ϕh	r_f	Acres $= 2 r_e^2 \div 43560$
.2	158	7
.1	222	13
.05	315	26
.033	388	40

K-13 PRESSURE FALL-OFF
SHUT IN MAY 1, 1987

Bomb Time (1)	Δt Time (2)	Pressure Psia (3)	$2\int_0^P \left(\frac{P}{Z\frac{\mu}{\mu_i}}\right) dP$ (4) ($\times 10^6$)	$2\int_0^{1915} \left(\frac{P}{Z\frac{\mu}{\mu_i}}\right) dP - Col(4)$ (5)	For semilog plot P_D from $f(\Delta P) \times \frac{1.151}{m} = f(\Delta P) \times \frac{1.151}{1.07 \times 10^6}$ (6)
	.000	1915.98	3.530	.010	.011
72.176	.008	1912.02	3.515	.025	.027
72.184	.016	1910.11	3.507	.033	.035
72.192	.024	1908.35	3.500	.040	.043
72.200	.032	1906.73	3.496	.044	.047
72.208	.044	1904.46	3.483	.057	.061
72.232	.056	1902.31	3.479	.061	.066
72.244	.068	1900.26	3.475	.065	.070
72.350	.174	1885.47	3.423	.117	.126
72.450	.274	1873.70	3.385	.155	.167
72.550	.374	1863.29	3.350	.190	.204
72.650	.474	1853.78	3.318	.222	.239
72.750	.574	1844.95	3.300	.240	.258
72.850	.674	1836.63	3.264	.276	.297
72.950	.774	1828.79	3.238	.302	.325
73.150	.974	1814.20	3.190	.350	.376
73.350	1.174	1800.79	3.146	.394	.424
73.550	1.374	1788.34	3.108	.432	.465
73.750	1.574	1776.68	3.070	.470	.506
74.050	1.874	1760.46	3.015	.525	.565
74.350	2.174	1746.64	2.975	.565	.608
74.650	2.474	1731.92	2.927	.613	.659
75.050	2.874	1715.14	2.874	.666	.716
75.350	3.174	1703.52	2.838	.702	.755
75.550	3.374	1696.16	2.813	.727	.782
75.850	3.674	1685.69	2.782	.758	.815
76.150	3.974	1675.83	2.750	.790	.850
76.650	4.474	1660.62	2.702	.838	.901
76.950	4.774	1652.18	2.672	.868	.934
77.550	5.374	1636.64	2.613	.927	.997
78.250	6.074	1620.49	2.577	.963	1.036
79.050	6.874	1604.28	2.530	1.010	1.086
79.750	7.574	1591.79	2.492	1.048	1.127
80.450	8.274	1580.54	2.462	1.078	1.160
81.150	8.974	1570.48	2.430	1.110	1.194

K-13 PRESSURE FALL-OFF
SHUT IN MAY 1, 1987

Bomb Time (1)	Δt Time (2)	Pressure Psia (3)	$2\int_0^P \left(\frac{P}{Z\frac{\mu}{\mu_i}}\right) dP$ (4) $(\times 10^6)$	$2\int_0^{1915} \left(\frac{P}{Z\frac{\mu}{\mu_i}}\right) dP - Col(4)$ (5)	For semilog plot P_D from $f(\Delta P) \times \frac{1.151}{m}$ $= f(\Delta P) \times \frac{1.151}{1.07 \times 10^6}$ (6)
81.950	9.774	1560.33	2.400	1.140	1.226
82.750	10.574	1551.39	2.374	1.166	1.254
83.750	11.574	1541.72	2.347	1.193	1.283
84.750	12.574	1533.44	2.320	1.220	1.312
85.750	13.574	1526.32	2.300	1.240	1.334
87.750	15.574	1514.92	2.268	1.272	1.368
88.750	16.574	1510.34	2.254	1.286	1.383
91.750	19.574	1499.63	2.222	1.318	1.418
95.250	23.074	1490.86	2.200	1.340	1.441
98.250	26.074	1485.37	2.185	1.355	1.458
101.750	29.574	1480.55	2.172	1.368	1.472
106.250	34.074	1475.99	2.160	1.380	1.484
109.750	37.574	1473.31	2.152	1.388	1.493
115.250	43.074	1470.12	2.144	1.396	1.502
120.250	48.074	1467.99	2.140	1.400	1.506
126.750	54.574	1465.93	2.132	1.408	1.515
130.250	58.074	1465.07	2.130	1.410	1.517
135.750	63.574	1463.98	2.128	1.412	1.519
142.250	70.074	1463.02	2.126	1.414	1.521
151.750	79.574	1461.98	2.124	1.416	1.523
164.250	92.074	1461.17	2.120	1.420	1.527