

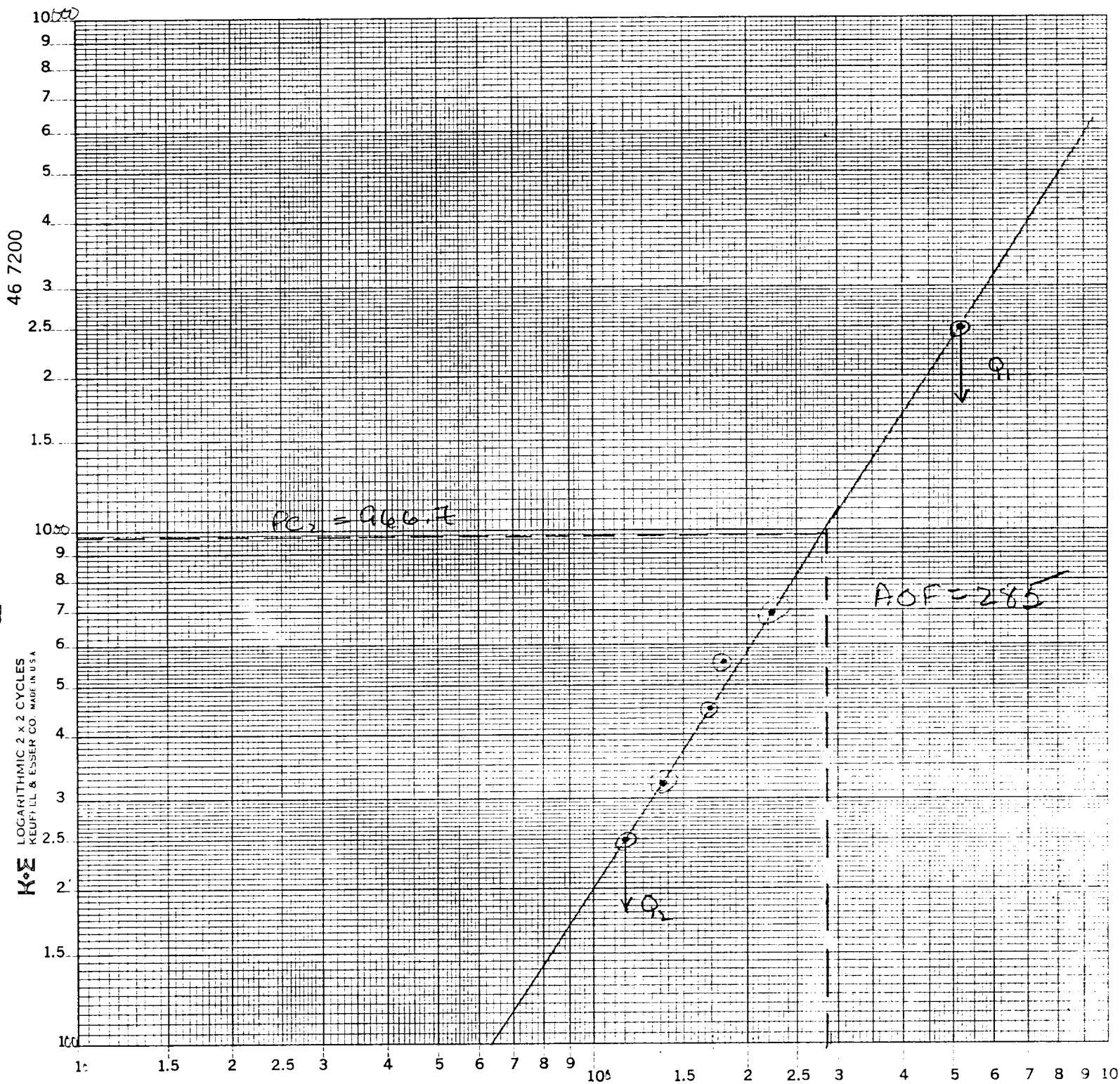
MULTIPOINT AND ONE POINT BACK PRESSURE TEST FOR GAS WELL

Type Test ☒ Initial ☐ Annual ☐ Special		Test Date		RECEIVED			
Company Yates Petroleum Corp		Connection Transwestern Pipeline		AUG 26 1982			
Pool Pecos Slope - Abo Gas		Formation Abo		Unit O. C. D.			
Completion Date 3/11/82		Total Depth 4950		Plug Back TD 4939			
Elevation 3766 GL		Form or Lease Name Thunderhead TD					
Cas. Size 4 1/2"	Wt. 9.5#	d 4.090	Set At 4950	Perforations: From 4347 To 4571	Well No. 1		
Trg. Size 2 3/8"	Wt. 4.7#	d 1.995	Set At 4309	Perforations: From To	Unit Soc. Twp. Rge. D 32 8s 26e		
Type Well - Single - Bradenhead - G.C. or G.O. Multiple Single				Packer Set At 4309			
Producing Thru Tubing		Reservoir Temp. °F 101 4459		Mean Annual Temp. °F 62			
Baro. Press. - P _a 13.2 PSI		State New Mexico					
L 4309	H 4309	C _q .653	% CO ₂ 1.12%	% N ₂ 7.61%	% H ₂ S 0		
Prover -		Meter Run 2"		Taps Flanged			
FLOW DATA							
NO.	Prover Line Size	X	Orifice Size	Press. p.s.i.g.	Diff. h _w		
SI							
1.	2.067 x .625			405	8.2		
2.	2.067 x .625			400	12.8		
3.	2.067 x .625			395	14.5		
4.	2.067 x .625			405	22		
5.							
TUBING DATA							
				Press. p.s.i.g.	Temp. °F		
				970			
				790	62°		
				705	62°		
				628	62°		
				520	62°		
CASING DATA							
				Press. p.s.i.g.	Temp. °F		
RATE OF FLOW CALCULATIONS							
NO.	Coefficient (24 Hour)	$\sqrt{h_w P_m}$	Pressure P _m	Flow Temp. Factor Ft.	Gravity Factor F _g	Super Compress. Factor, F _{pv}	Rate of Flow Q, Mscf/d
1	1.866	58.4	418.2	.9795	1.237	1.030	136
2	1.866	72.7	413.2	.9831	1.237	1.031	170
3	1.866	76.9	408.2	.9831	1.237	1.031	180
4	1.866	95.9	418.2	.9831	1.237	1.031	224
5							
NO.	F _g	Temp. °R	T _f	Z	Gas Liquid Hydrocarbon Ratio Dry Mcf/bbl.		
1	.63	542°	1.54	.942	A.P.I. Gravity of Liquid Hydrocarbons -- Deg.		
2	.63	538°	1.53	.941	Specific Gravity Separator Gas .653 XXXXXX		
3	.62	538°	1.53	.941	Specific Gravity Flowing Fluid XXXXX .653		
4	.63	538°	1.53	.941	Critical Pressure 660 P.S.I.A. 660 P.S.I.A.		
5					Critical Temperature 352 R 352 R		
P_c 983.2 P_c^2 966.7							
NO.	P _w	P _w ²	P _c ² - P _w ²	(1) $\frac{P_c^2}{P_c^2 - P_w^2} = 1.442$ (2) $\left[\frac{P_c^2}{P_c^2 - P_w^2} \right]^n = 1.271$			
1	645.1	644.7	322				
2	515.8	516.7	450				
3	411.1	411.7	555				
4	284.3	285.1	681.6	AOF = Q $\left[\frac{P_c^2}{P_c^2 - P_w^2} \right]^n = 285$			
5							
Absolute Open Flow 285				Mscf @ 15.025		Angle of Slope θ .655	
Remarks:							
Approves By Division							
Conducted By: David Weaver		Calculated By: Andie Alderson		Checked By:			

COMPANY United Industries LEASE Thunderhead TD WELL NO. 1 DATE 8/25/82
 LOCATION: Unit D Section 32 Township 8S Range 26E
4309 H 4309 L/H 1 G 653 % CO₂ 1.12% % N₂ 7.6% % H₂S 0
 d 1.995 F_r .01823 GH 2814 P_{cr} 660 T_{cr} 352

LINE	1st	2nd	3rd	4th		
1 Q _m	136	170	180	224		
2 T _w (W.H. °R)	522	522	522	522		
3 T _s (B.H. °R)	561	561	561	561		
4 T = $(\frac{T_w + T_s}{2})$	541.5	541.5	541.5	541.5		
5 Z (Est.)	884	900	908	924		
6 T _Z	480.31	487.35	491.68	500.35		
7 C _H /T _Z	5.859	5.774	5.723	5.624		
8 e ^s (Table XIV)	1.2110	1.2112	1.2119	1.235		
9 1-e ^s (Table XIV)	0.194	0.195	0.193	0.190		
10 P _L	803.2	716.2	641.2	533.2		
11 P _L ² /1000	645.1	515.8	411.1	284.3		
12 F _r (Table XV)	0.1823	0.1823	0.1823	0.1823		
13 F _c = F _r T _Z	8.756	8.884	8.963	9.121		
14 F _c Q _m	1.191	1.510	1.613	2.043		
15 L/H (F _c Q _m) ²	1.418	2.281	2.603	4.175		
16 F _{ax} = L/H (F _c Q _m) ² (1-e ^s)	0.249	0.445	0.502	0.793		
17 P _w ² = P _L ² + F _w	645.4	516.3	411.6	285.1		
18 P _s ² = e ^s P _w ²	764.2	675.7	510.0	352.1		
19 P _s	896.8	771.0	714.2	593.4		
20 P = $(\frac{P_L + P_s}{2})$	850.0	751.6	677.7	563.3		
21 P _r = (P/P _L)	1.29	1.14	1.03	.85		
22 T _r = (T/T _{cr})	1.54	1.54	1.54	1.54		
23 Z (Table XI)	1.887	1.900	1.908	1.924		

Yates Petroleum Corp
 Thunderhead TD #1
 32-85-26e
 Chavez County



$$\begin{aligned}(P_{c2} - P_{w2})_1 &= 2500 \\ (P_{c2} - P_{w2})_2 &= 250 \\ Q_1 &= 520 \\ Q_2 &= 115\end{aligned}$$

$$\begin{aligned}\log Q_1 &= 2.716 \\ \log Q_2 &= 2.061 \\ n &= .65531 = .655\end{aligned}$$