

WORKSHEET FOR CALCULATION OF SKIN EFFECT COLUMN WELLHEAD PRESSURE (P_w)

COMPANY NRC LEASE Palmer Est. BY WELL NO. 9 DATE 3-24-81

LOCATION: Unit L Section 22 Township 17S Range 25E

6443 H 6443 L/H 1.022 C 0.700 % CO₂ 0.06 % N₂ 0.96 % H₂S N.I.
2 1/8" - 63.98 (5.953) = 38.19 d 2.4673 F_r 0.009602 GH 4510 P_{cr} 692 T_{cr} 398
5 1/2" - 45.12 (4.003) = 11.03 6443 (4.003) = 34.22 0.769 H₂O

LINE	1	2	3	4					
1 Q _m	SI	1	2	3	4				
2 T _w (W.H. °R)	516	527	530	532	533				
3 T _s (B.H. °R)	532	581	580	579	577				
4 T = ($\frac{T_w + T_s}{2}$)	549	554	555	555	556				
5 Z (Est.)	0.6905	0.7135	0.730	0.7645	0.7985				
6 T _Z	379.085	395.279	405.150	429.459	443.966				
7 GH/T _Z	11.8970	11.4097	11.1317	10.5502	10.1524				
8 e ^s (Table XIV)	1.56227	1.5340	1.5181	1.48535	1.4637				
9 1-e ^s (Table XIV)		0.3481	0.3415	0.3268	0.3168				
10 P _t	1869.2	1632.2	1479.2	1205.2	1036.2				
11 P _t ² /1000	3493.9	2664.08	2183.03	1452.51	1073.71				
12 F _r (Table XV)	0.44614	0.42786	0.41744	0.39565	0.38094				
13 F _c = F _r T _Z		3.7955	3.390	4.1040	4.263				
14 F _c Q _m		0.9565	1.334	1.863	2.225				
15 L/H (F _c Q _m) ²		0.915	1.781	3.472	4.952				
16 F _w = L/H (F _c Q _m) ² (1-e ^s)		0.32	0.61	1.13	1.57				
17 P _w ² = P _t ² + F _w		2664.40	2188.64	1453.64	1075.28				
18 P _s ² = e ^s P _w ²	5453.4	4037.2	3322.6	2159.2	1573.9				
19 P _s	2336.9	2021.7	1822.8	1469.4	1254.5				
20 P = ($\frac{P_t + P_s}{2}$)	2102.7	1826.9	1651.0	1337.3	1145.4				
21 P _r = (P/P _{cr})	3.039	2.640	2.386	1.933	1.655				
22 T _r = (T/T _{cr})	1.379	1.392	1.394	1.396	1.397				
23 Z (Table XI)	0.605	0.605	0.605	0.605	0.605				