

Pressure pt. 1

WORK SHEET FOR STEPWISE CALCULATION

(SUBSURFACE) PRESSURE (P_f & P_s)
(~~WELLFACE~~) (B & P_w)

Form C-122E
Adopted 9-1-65

COMPANY AZARITECHNICS LEASE Smith Forks WELL NO. 1 DATE 4-12-66

LOCATION: Unit G Section 1 Township 22 Range 23

L 7500 H 7500 LH 1.000 G 0.641 % CO₂ 4 % N₂ 4 % H₂S 4
d 1.995 F_r 1.1823 Q_m 3.236 M₂ cfd (L/H) (F_r Q_m)² .003480 P_{cr} 670 T_{cr} 372
TABLE IX & X TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	3750	3750	7500	7500					
2	GH		0	3403	2403	4807.5	4807.5					
3	37.5GH		0	90.113	90.113	180.281	180.281					
	M₂			286.6	284.6	284.7	283.6					
4	P _c or P _n		285.12	2537.8	2535.8	2820.5	2819.4					
5	P _r		3.360	3.787	3.785	4.210	4.208					
6	T		535	570	570	599	599					
7	T _r		1.438	1.532	1.538	1.610	1.610					
8	Z		.731	.787	.787	.826	.826					
9	P/Z		3080	3224.6	3222.1	3414.6	3413.3					
10	P/TZ		5.757	5.657	5.653	5.701	5.698					
11	(P/TZ) ² /1000		.03314	.03206	.03196	.03250	.03247					
12	L/H(F _r Q _m) ²		.003480	.003480	.00348	.00348	.00348					
13			.03662	.03548	.03544	.03598	.03595					
14	I _n		157.2	158.4	159.5	158.5	158.5					
15	M=P _n -P _{n-1}			284.6	284.5	283.6	283.6					
16	N=I _n +I _{n-1}			316.6	316.7	318.0	318.0					
17	M x N			90.101	90.101							
18	Σ (M x N)			90.101	90.101	180.286						

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COMPANY Atlantic Refining Co. LEASE Smith Federal WELL NO. 1 DATE 4-19-66
LOCATION: Unit 6 Section 1 Township 22 Range 23
1. 7500 H 7500 L/H 1.000 G 0.641 % CO₂ 4 % N₂ 4 % H₂S 4
d 1.995 F₁ Δ 0 M₂ cfd (L/H) (F₁ Q_m)² 0 P_{cr} 670 T_{cr} 372
TABLE IX & X TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		7500	3750	0	0						
2	GH		4807.5	2403	0	0						
3	37.5GH		180281	90113	0	0						
4	M ₁ initial			256.9	256.9	242.7	244.7					
	P _c or P _h		2817.1	2560.2	2303.3	2317.5	2315.5					
5	P _r		4208	3.821	3.438	3.439	3.456					
6	T		599	.570	.570	.570	.570					
7	T _r		1.610	1.532	1.532	1.532	1.532					
8	Z		.826	.787	.786	.786	.786					
9	P/Z		3413.3	3253.1	2930.4	2948.4	2945.9					
10	P/TZ		5.698	5.707	5.094	5.173	5.168					
11	(P/TZ) ² /1000	(10) ² /1000										
12	L/(H(F ₁ Q _m) ²)											
13		I ₁ + I ₂										
14	I _n = $\frac{1000}{P/Z}$	I ₀ ÷ I ₃	175.5	175.2	196.3	193.3	193.5					
15	M = P _n - P _{n-1}			256.9	242.7	244.7	244.6					
16	N = I _n + I _{n-1}			350.7	371.5	368.5	368.7					
17	M x N	15 x I ₆		90095			90184					
18	Σ (M x N)	Σ I ₇	180281	90186			180370					

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$$\Delta P = \frac{3(37.5GH)}{I_e + 4I_1 + I_2}$$

$$P_3 = P_2 + \Delta P$$

$$= (3)(180,281)$$

$$157.2 + 4(159.5) + 158.5$$

$$= 565.9$$

$$P_5 = 2251.2$$

$$2817.1$$

$$\Delta P = \frac{3(37.5GH)}{I_e + 4I_1 + I_2}$$

$$= \frac{112.5}{(3)(37.5)(.641)(7500)}$$

$$193.5 + 4(175.2) + 175.5$$

$$= \frac{540,843}{1069.8} = 505.6$$

$$P_w = P_5 - \Delta P$$

$$= 2311.5$$

pressure part 2

COMPANY Marine Drilling Co. LEASE Smith Field WELL NO. 1 DATE 4-19-66
LOCATION: Unit G Section 1 Township 22 Range 23
L 7500 H 7500 L/H 1.000 G 0.641 % CO₂ 4 % N₂ 41 % H₂S 41
d 1.995 F_r 0.0823 Q_m 4.175 M₂cid (L/H) (F_rQ_m)² .005793 P_{cr} 670 T_{cr} 372
TABLE IX & X TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	3750	3750	3750	7500	7500				
2	GH		0	2403	2403	2403	4807.5	4807.5				
3	37.5GH		0	90.113	90.113	90.113	180.281	180.281				
	Intermediate			291.1	295.2	296.3	296.5	300.1				
4	P _c or P _n		2201.2	2492.3	2496.4	2497.5	2794.0	2797.5				
5	P _r		3285	3720	3726	3728	4170	4175				
6	T _r		535	567	567	567	599	599				
7	T _r		1.438	1.524	1.524	1.524	1.610	1.610				
8	Z		.764	.783	.783	.783	.826	.826				
9	P/2	4:8	2881.1	3183.0	3188.2	3189.6	3382.5	3386.8				
10	P/TZ	9:6	5.385	5.614	5.623	5.625	5.647	5.654				
11	(P/TZ)/2/1000	(10)2/1000	.02900	.03520	.03618	.03640	.03887	.03968				
12	L/H(F _r Q _m) ²		.005793	.005793	.005793	.005793	.005793	.005793				
13		I ₁ + I ₂	.034793	.037313	.037411	.037433	.037680	.037761				
14	I _n	I ₀ :13	154.8	150.5	150.3	150.3	149.9	149.7				
15	M=P _n -P _{n-1}		—	295.2	296.3	296.3	300.1	300.3				
16	N=I _n +I _{n-1}		—	305.3	304.1	304.1	300.8	300.00				
17	M x N	15 x 16	—									
18	Σ (M x N)	Σ 17	—									

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$$\Delta P = \frac{3(37.5GH)}{I_1 + 4I_1 + I_2}$$
$$= \frac{3(180.281)}{3}$$

$$154.8 + 4(150.3) + 149.7$$
$$= \frac{540.843}{905.7} = 597.1$$
$$P_s = P_r + \Delta P$$
$$= 2201.2 + 597.2$$
$$= 2798.4$$

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Pressure P₂

WORK SHEET FOR STEPWISE CALCULATION
(SURFACE)
PRESSURE (P_c & P_w)
156 Q-122E
1965 9-1-65

COMPANY Atlantic Refining Co LEASE Smith Fork No. 1 WELL NO. 1 DATE 4-19-66
LOCATION: Unit 6 Section 1 Township 22 Range 23
L 7500 H 7500 L/H 1000 G 0.641 % CO₂ 4 % N₂ 4 % H₂S 4
d 1.995 F_r 4 Q_{im} 0 M₂old (1/11) (F_rQ_{im})² 0 P_{ci} 670 T_{cr} 372
TABLE IX & X TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		7500	3750	3750	0						
2	G		4807.5	7111.2	2403	0						
3	37.5GH		180281	90113	90113	0						
	Miscellaneous			255.0	256.4	256.4	253.5					
4	P _c or P _n		2798.4	2543.4	2542.0	2285.6	2288.5					
5	P _r		4117.7	3796	3794	3411	3416					
6	T		599	567	567	535	535					
7	T _r		1.610	1.524	1.524	1.438	1.438					
8	Z		.826	.783	.783	0.730	.731					
9	P/12	4/8	3387.8	3248.2	3246.4	3130.9	3130.6					
10	P/T2	9/6	5656	5729	5726	58521	5.8515					
11	(P/T2) ² /1000	(10/2)/1000										
	L/H(F _r Q _{im}) ²											
12		11 + 12										
13	$L_n \frac{1000}{P/T2}$	10/13	176.8	174.6	174.6	170.8	170.9					
14	$M = P_n - P_{n-1}$		256.4	256.4	256.4	253.5	253.4					
15	$N = L_n + L_{n-1}$		351.4	351.4	351.4	355.4	355.5					
16	M x N	15 x 16										
17	$\Sigma (M \times N)$	$\Sigma 17$	180281		90099							
18												

$$\begin{aligned} \Delta P &= 3(37.564) \\ &= \frac{I_2 + 4I_1 + I_2}{(3)(180,281)} \\ &= \frac{176.8 + 4(174.6) + 170.9}{540,843} \\ &= \frac{1046.1}{517.1} \\ P_w &= P_c - \Delta P \\ &= 2798.4 - 517.1 \\ &= 2281.3 \end{aligned}$$

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WORK SHEET FOR STEPWISE CALCULATION
(SUBSURFACE) PRESSURE (P_f & P_g)
(SURFACE) (P_c & P_w)

Form C-122E
Adopted 9-1-65

COMPANY Atlantic Refining Co LEASE Smith Federal WELL NO. 1 DATE 4-19-66

LOCATION: Unit G Section 1 Township 22 Range 23

L. 7500 H. 7500 L/H 1.000 G. 0.641 %CO₂ 4 %N₂ 4 %H₂S 4
d 1995 F_r A Q_m 4.976 W₂ 0.001 (L/H) (Q_m)² .0082296 P_c 670 T_{cr} 372

TABLE 17-8

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	3750		7500						
2	G _H		0	2403		4807.5						
3	37.5G _H		0	9011.3		18028.1						
4	M _h or M _w			313.5	314.5	315.0	318.6					
5	P _c or P _n		2133.2	2446.7	2447.7	2762.7	2766.3					
6	P _r		3184	3652	3648	4123	4129					
7	T _r		535	567	567	599	599					
8	T _r		1.438	1.524	1.524	1.610	1.610					
9	Z		.732	.782	.782	.824	.824					
10	P/Z	4:8	2944.2	3128.7	3130.0	3352.7	3357.1					
11	P/TZ	9:6	5.4471	5.5179	5.5202	5.5971	5.6045					
12	(P/TZ) ² /(Q _m) ²	(Q _m) ² /W ₂	.024671	.030408	.030473	.031328	.031404					
13	L/H(Q _m) ²		.008230	.008230	.008230	.008230	.008230					
14	I _n	I ₁ + I ₂	.037901	.038638	.038703	.039558	.039610					
15	M=P _n -P _{n-1}	I ₀ ÷I ₃	143.7	142.8	142.6	141.5	141.4					
16	N=I _n +I _{n-1}		314.5	314.7	318.6	318.4						
17	M×N	15×16	286.5	286.3	283.1	283.2						
18	Σ(M×N)	Σ17	90.099	90.099	90.099	90.171	90.171					

$$\Delta P = \frac{3(37.5G_H)}{I_e + 4I_1 + I_2}$$

$$= \frac{540.843}{855.5}$$

$$= 632.1$$

$$P_3 = P_c + \Delta P$$

$$= 2133.2 + 632.1$$

$$= 2765.3$$

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COMPANY Armstrong Co LEASE Smith Federal WELL NO. 1 DATE 4-19-66
LOCATION: Unit B Section 1 Township 22 Range 23
1. 7500 H 7500 LH 1.000 G 0.641 % CO₂ 4 % N₂ 4 % H₂S 4
d 1.995 F_r 1 Q_m 0 M₂eld (L/H) (Q_m)² 0 P_{cr} 670 P_{cr} 372
TABLE IV & X

ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1 H		7500	3750		0						
2 GH		4802.5	2403		0						
3 3/5GH		180281	90113		0						
4 P _c or P _n		27653	2512.7	2511.5	22577	2260.4					
5 P _r		41273	3.7502	3.7485	3.3697	3.3737					
6		599	567	567	535	535					
7 T _r		1.010	1.524	1.524	1.438	1.438					
8 Z		.824	.783	.783	.769	.769					
9 1/2		3355.9	32090	3207.5	2935.8	2939.4					
10 1/2		5.6025	5.6596	5.6569	5.4874	5.4912					
11 1/2											
12 L/H(F _r Q _m) ²											
13											
14 I _n = $\frac{1000}{P_{r1}^2}$		10-13	178.4	176.6	176.7	182.2	182.0				
15 M = $P_n - P_{n-1}$			253.8	253.8	251.1	251.3					
16 N = $I_n + I_{n-1}$			355.0	355.1	358.9	358.7					
17 M x N		15 x 16	9012.4	9012.4	9014.1						
18 Σ (M x N)		Σ 17	9012.4			18026.5					

$\Delta P = \frac{3(37.564)}{I_c + 4I_1 + I_2}$
 $\frac{540.843}{1067.2}$

$P_w = P_s - \Delta P$
 $= 2765.3 - 506.8$

$= 2258.5$

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WORK SHEET FOR CHAPMAN CALCULATION

(SUBSURFACE) PRESSURE (P_f & P_s)
(SURFACE) (P_c & P_w)

Form C-122E
Adopted 9-1-65

Page 1 of 4
Part 4

COMPANY Atlantic Refining Co LEASE Smith Farm WELL NO. 1 DATE 4-18-66

LOCATION: Unit 0 Section 1 Township 22 Range 23

7500 H 7500 LN 1.000 G 0.641 % CO₂ 4 % N₂ 4 % H₂S 4
1.995 P_f A 0 m 1 P_celd 0.111 (P_fQ_m)² .01181 P_{ci} 670 T_{ci} 392

TABLE IN BACK

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	3750		7500						
2	GH		0	2403		4807.5						
3	37.5GH		0	90113		180281						
4	M ₁ demands			337.0	338.8	338.9	342.9					
5	P _c or P _n			2377.2	2379.0	2717.9	2720.9					
6	P _f		3045	3.548	3.551	4.057	4.061					
7	T _f		534	567	567	599	599					
8	Z		1.435	1.524	1.524	1.610	1.610					
9	P/2		.733	.784	.784	.823	.823					
10	P/TZ		2783.3	3032.1	3034.4	3302.4	3306.0					
11	(P/TZ) ² /1000		5.2121	5.3476	5.3516	5.513	5.5191					
12	L/H(F _f Q _m) ²		.02117	.02860	.02864	.03039	.03046					
13			.01181	.01181	.01181	.01181	.01181					
14	I _n		.03898	.04041	.04045	.04220	.04227					
15	M=P _n -P _{n-1}		132.7	132.3	132.3	130.6	130.6					
16	N-I _n +I _{n-1}		338.8	338.8	338.8	342.9	342.9					
17	M x N		266.0	266.0	266.0	262.9	262.9					
18	Σ(M x N)		80121	80121	80121	80148	80148					
	Σ I ₇					180269						

$$\Delta P = 3(37564)$$

$$I_7 + 4I_1 + I_2$$

$$540,843$$

$$793.5$$

$$= 681.5$$

$$P_s = P_c + \Delta P$$

$$= 2040.2 + 681.5$$

$$= 2721.7$$

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WORK SHEET FOR STEPWISE CALCULATION
 (SUBSURFACE)
 (SURFACE)
 PRESSURE (P_f & P_s)
 (P_f & P_w)

Form 6-1-57
 Adopted 5-1-60

COMPANY Atlantic Refining Co LEASE Smith Federal WELL NO. 1 DATE 4-19-66

LOCATION: Unit G Section 1 Township 22 Range 23

1. 7500 H 7500 LM 1.000 G 0.641 % CO₂ 4 % N₂ 4 % H₂S 4
 d 1.995 F_t A 0 m M₂old (L/H) (F_tQ_m)² 0 P_{cr} 670 T_{cr} 372
 TABLE IX B X TABLE IX B X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		7500	3750		0						
2	GH		4807.5	2403		0						
3	37.5GH		180281	90113		0						
	McDonald		—	248.9	250.0	251.3	253.9					
4	P _c or P _n		2721.7	2472.8	2471.7	2220.4	2219.8					
5	P		40622	3691	3.689	3.314	3.310					
6	T		549	567	567	534	534					
7	T _f		1.610	1.524	1.524	1.435	1.435					
8	Z		.823	.782	.782	.730	.730					
9	P/Z		3307.0	3162.1	3160.7	3041.6	3038.0					
10	P/P _c		5.5208	5.5768	5.5744	5.6958	5.6891					
11	$P/P_c \times 100$											
12	$100(P/P_c)^2$											
13												
14	$I_n = \frac{1000}{P/P_c}$		181.1	179.3	179.3	175.5	175.7					
15	$M = P_n - P_{n-1}$			250.0	250.0	253.9	253.8					
16	$N = I_n + I_{n-1}$			360.4	360.4	354.8	355.0					
17	M x N											
18	$\Sigma (M \times N)$											

$$\Delta P = \frac{3(37.5GH)}{I_1 + 4I_1 + I_2}$$

$$= \frac{540.843}{1074}$$

$$= 503.6$$

$$P_w - P_s - \Delta P = 2721.7 - 503.6$$

$$= 2218.1$$

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