

N. MEXICO OIL CONSERVATION COMM:
MULTIPOINT AND ONE POINT BACK PRESSURE TEST FOR GAS WELL

Form C-122
Revised 9-1-65

Type Test ☒ Initial ☐ Annual ☐ Special						Test Date 9/14/68			
Company Aztec Oil & Gas Co.				Connection Southern Union					
Pool South Corbin Morrow				Formation Morrow				Unit	
Completion Date 7/28/67		Total Depth 13463		Plug Back TD 13436		Elevation 3841 DF		Farm or Lease Name Federal MA	
Csg. Size 5-1/2	Wt. 20 & 17	d -	Set At 13461	Perforations: From 13218 To 13424		Well No. 2			
Tbg. Size 2-1/16	Wt. 3.40	d 1.750	Set At 13414	Perforations: From Open To Ended		Unit I	Sec. 21	Twp. 18	Rge. 33
Type Well - Single - Bradenhead - G.G. or G.O. Multiple G.O. Dual						Packer Set At 13180		County Lea	
Producing Thru Tbg. 172 @ 13378		Reservoir Temp. °F 13378		Mean Annual Temp. °F 60		Baro. Press. - P _a 13.2		State New Mexico	
L	H	Gg .668	% CO ₂ -	% N ₂ -	% H ₂ S 0	Prover	Meter Run I	Taps FLG	

FLOW DATA						TUBING DATA		GASING DATA		Duration of Flow	
NO.	Prover Line Size	X	Orifice Size	Press. p.s.i.g.	Diff. h _w	Temp. °F	Press. p.s.i.g.	Temp. °F	Press. p.s.i.g.		Temp. °F
SI							3052		choke		24 Hrs
1.	3 x 1.75			295	3.0	110	3022	80	5/64		3
2.	3 x 1.75			410	7.9	85	2960	80	7/64		2
3.	3 x 1.75			440	21.0	90	2842	80	10/64		1-1/2
4.	3 x 1.75			490	60.0	80	2477	80	14.5/64		1-1/2
5.											

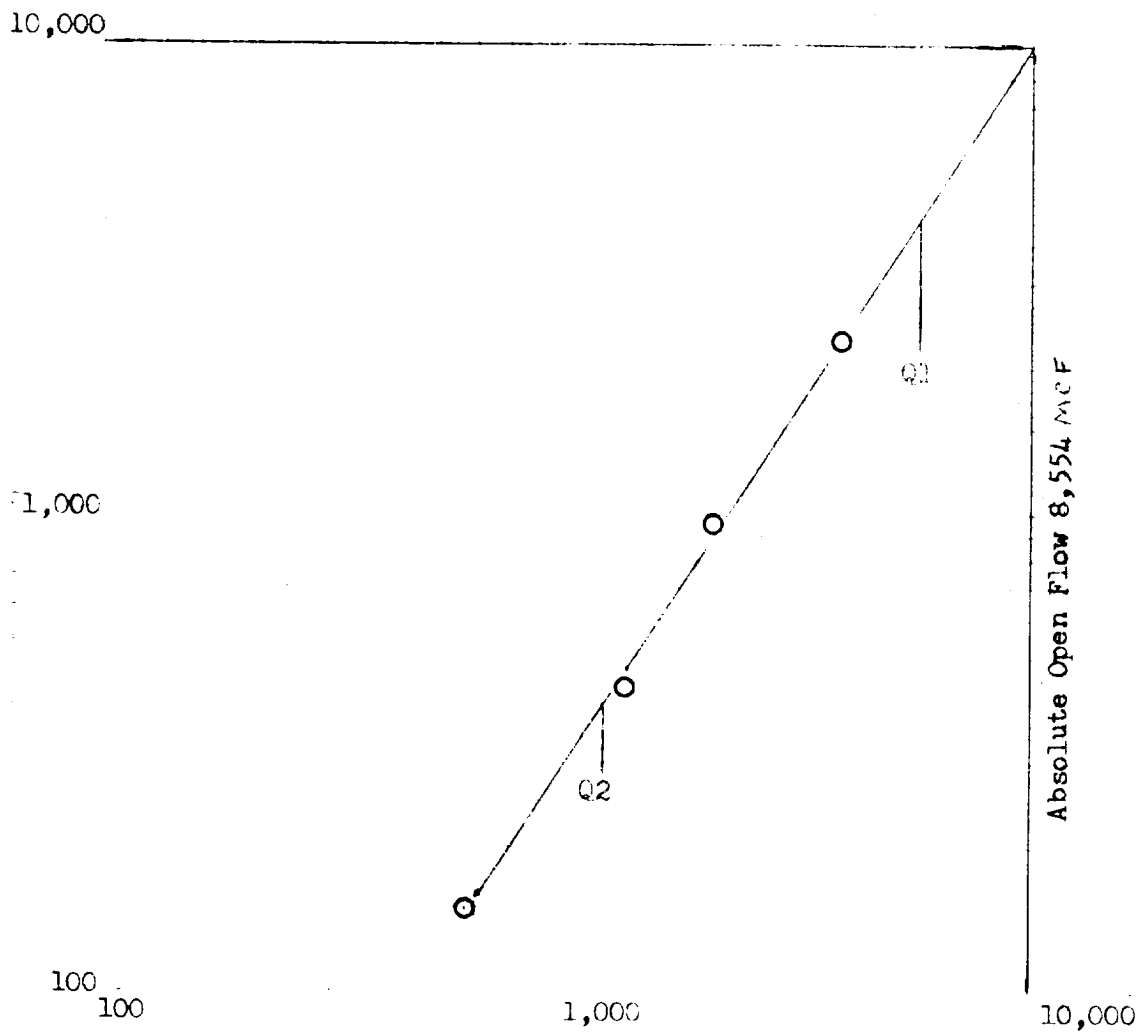
RATE OF FLOW CALCULATIONS							
NO.	Coefficient (24 Hour)	$\sqrt{h_w P_m}$	Pressure P _m	Flow Temp. Factor Ft.	Gravity Factor Fg	Super Compress. Factor, Fpv	Rate of Flow Q, Mcfd
1	15.61	30.41	308.2	.9551	1.224	1.024	568
2	15.61	57.83	423.2	.9768	1.224	1.139	1229
3	15.61	97.57	453.2	.9723	1.224	1.040	1885
4	15.61	173.8	503.2	.9813	1.224	1.047	3412
5							

NO.	P _r	Temp. °R	T _r	Z	Gas Liquid Hydrocarbon Ratio 84.86 Mcf/bbl.
1.	.46	570	1.51	.954	A.P.I. Gravity of Liquid Hydrocarbons 53.7 Deg.
2.	.63	545	1.44	.926	Specific Gravity Separator Gas .668 X X X X X X X X
3.	.68	550	1.46	.925	Specific Gravity Flowing Fluid X X X X X .7641
4.	.75	540	1.43	.912	Critical Pressure 670 P.S.I.A. 667 P.S.I.A.
5.					Critical Temperature 378 °R 411 °R

P _c 3065.2	P _c ² 9395	(1) $\frac{P_c^2}{P_c^2 - P_w^2} = \underline{4.043}$	(2) $\left[\frac{P_c^2}{P_c^2 - P_w^2} \right]^n = \underline{2.507}$
NO.	P _t ²	P _w	P _w ²
1		3040.9	9247
2		2993.4	8960
3		2905.0	8439
4		2660.1	7076
5			

Absolute Open Flow 8554 Mcfd @ 15.025		Angle of Slope θ _____	Slope, n 0.658
Remarks: _____			
Approved By Commission: <i>[Signature]</i>	Conducted By: <i>[Signature]</i>	Calculated By: <i>[Signature]</i>	Checked By: _____

Aztec Oil & Gas Company
 Federal MA No. 2
 Unit 1, Sec. 21, T13S, R33E
 Lea County, New Mexico
 September 14, 1968



Q MCFPD

Log Q1 = 3.6989700
 Log Q2 = 3.0413927
 n = 0.6575773

N XICO OIL CONSERVATION COMMISS
WELL LOCATION AND ACREAGE DEDICATION PLAT

Form C-102
Supersedes C-128
Effective 1-1-65

All distances must be from the outer boundaries of the Section.

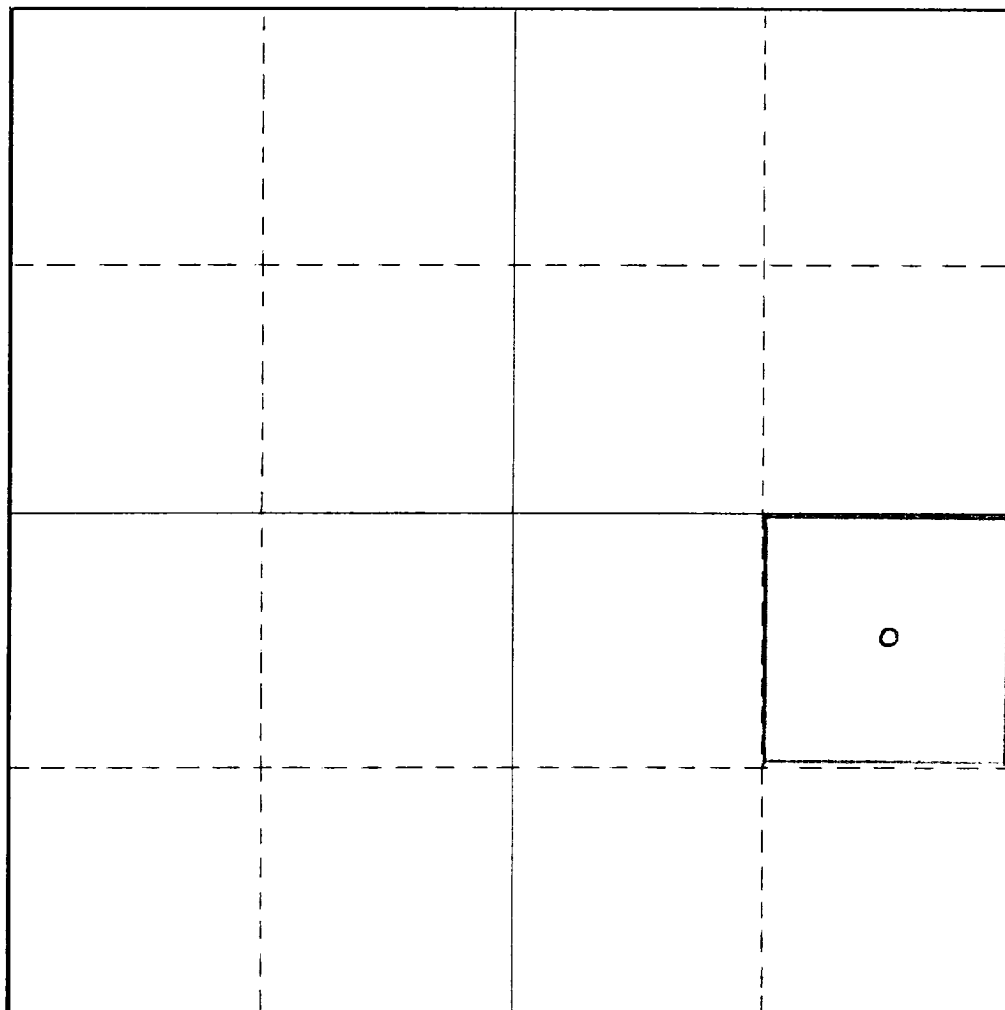
Operator AZTEC OIL & GAS COMPANY			Lease FEDERAL MA		Well No. 2
Unit Letter I	Section 21	Township 18 South	Range 33 East	County Lea	
Actual Footage Location of Well: 1980 feet from the South line and 660 feet from the East line					
Ground Level Elev. 3825.9	Producing Formation Wolfcamp		Pool Undesignated		Dedicated Acreage: 40 Acres

1. Outline the acreage dedicated to the subject well by colored pencil or hachure marks on the plat below.
2. If more than one lease is dedicated to the well, outline each and identify the ownership thereof (both as to working interest and royalty).
3. If more than one lease of different ownership is dedicated to the well, have the interests of all owners been consolidated by communitization, unitization, force-pooling, etc?

☐ Yes ☐ No If answer is "yes," type of consolidation _____

If answer is "no," list the owners and tract descriptions which have actually been consolidated. (Use reverse side of this form if necessary.) _____

No allowable will be assigned to the well until all interests have been consolidated (by communitization, unitization, forced-pooling, or otherwise) or until a non-standard unit, eliminating such interests, has been approved by the Commission.



CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief.

Name **original signed by**
LESTER L. DUKE
Position **Lester L. Duke**
District Superintendent

Company
Aztec Oil & Gas Co.

Date
September 25, 1967

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervision, and that the same is true and correct to the best of my knowledge and belief.

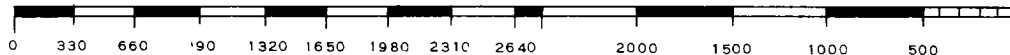
Date Surveyed
April 4, 1967

Registered Professional Engineer and/or Land Surveyor

Original signed by
John W. West

Certificate No.

676



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

Form C-122-E
Adopted 9-1-65

COMPANY Astec Oil & Gas Co. LEASE Federal MA WELL NO. 2 DATE 9/14/68

LOCATION: Unit I Section 21 Township 18 S Range 33 E

L 13,414 H 13,414 L/H 1.000 G .781 % CO₂ - % N₂ - % H₂S -

d 1.750 F_f .025671 Q_m .568 M²ctd (L/H) (F_fQ_m)² .000213 P_{ci} 666 T_{ci} 418
TABLE IX & X TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	6707		13,414						
2	GH		0	5238		10,476						
3	37.5GH		0	196,425		392,850						
4	P _c or P _n		3035.2	3844.2	3838.2	4641.2	4629.2	4628.2				
5	P _f		4.56	5.77	5.76	6.97	6.95	6.95				
6	T		540	586	586	632	632	632				
7	T _f		1.29	1.40	1.40	1.51	1.51	1.51				
8	Z		.685	.811	.810	.923	.921	.921				
9	P/Z P/Z		4431	4740	4739	5028	5026	5026				
10	P/TZ		8.21	8.09	8.09	7.96	7.95	7.95				
11	(P/TZ) ² /1000 (10 ² /1000)		.067404	.065448	.065448	.063362	.063203	.063203				
12	L/H(F _f Q _m) ²		.000213	.000213	.000213	.000213	.000213	.000213				
13			.067617	.065661	.065661	.063575	.063416	.063416				
14	I _n		121.419	123.209	123.209	125.206	125.362	125.362				
15	M=P _n -P _{n-1}			809	803	803	791	790				
16	N=I _n +I _{n-1}			244.628	244.628	248.415	248.571	248.571				
17	M x N				196.436			196.371				
18	Σ (M x N)				196.436			392.807				

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

Form C-122-E
Adopted 9-1-65

COMPANY Aztec Oil & Gas Co. LEASE Federal MA WELL NO. 2 DATE 9/14/68

LOCATION: Unit I Section 21 Township 18 S Range 33 E

L 13,414 H 13,414 L/H 1.000 G .781 % CO₂ - % N₂ - % H₂S -

d 1.750 P_T 025671 Q_m .568 M² cfd (L/H) (F_T Q_m)² .000213 P_{CT} 666 T_{CT} 418

P = 1,178.550 - 1587.3 P_w = 4628.2 - 1587.3 = 3040.9
742.489

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		13,414	6707			0					
2	GH		10,476	5238			0					
3	37.5GH		392,850	196,425			0					
4	P _c or P _n		4628.2	3847.2	3840.2	3841.2	3054.2	3040.2				
5	P _f		6.95	5.78	5.77	5.77	4.59	4.56				
6	T		632	586	586	586	540	540				
7	T _f		1.51	1.40	1.40	1.40	1.29	1.29				
8	Z		.921	.811	.811	.811	.687	.685				
9	P/Z P/Z	4 ÷ 8	5026	4744	4735	4736	4446	4438				
10	P/TZ	9 ÷ 6	7.95	8.10	8.08	8.08	8.23	8.22				
11	(P/TZ) 2/1000	(10) 2/1000										
12	L/H(F _T Q _m) ²											
13		I ₁ + I ₂										
14	I _n	I ₀ ÷ I ₃	125.786	123.457	123.762	123.762	121.507	121.655				
15	M = P _n · P _n ⁻¹			781	788	787	787	801				
16	N = I _n + I _n ⁻¹			249.243	249.548	249.548	245.269	245.417				
17	M × N	I ₅ × I ₆										
18	Σ (M × N)	Σ I ₇	392,850			196,456						

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

Form C-122-E
Adopted 9-1-65

COMPANY Aztec Oil & Gas Co. LEASE Federal WA WELL NO. 2 DATE 9/14/68

LOCATION: Unit I Section 21 Township 18 S Range 33 E

L 13,414 H 13,414 L/H 1.000 G .708 % CO₂ - % N₂ - % H₂S -
d 1.750 P_f 25671 Q_m 1.229 M²cid (L/H) (F_rQ_m)² .000995 P_{cr} 668 T_{cr} 392
TABLE IX & X TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	6707			13,414					
2	GH		0	4749			9497					
3	37.5GH		0	178,088			356,138					
4	P _c or P _n		2973.2	3662.2	3659.2	3658.2	4343.2	4337.2				
5	P _r		4.45	5.48	5.48	5.48	6.50	6.49				
6	T		540	586	586	586	632	632				
7	T _r		1.38	1.49	1.49	1.49	1.61	1.61				
8	Z		.723	.830	.830	.830	.920	.919				
9	P/Z P/Z		4112	4412	4409	4407	4721	4719				
10	P/TZ		7.61	7.53	7.52	7.52	7.47	7.47				
11	(P/TZ) ² /1000	(10) ² /1000	.057912	.056701	.056550	.056550	.055801	.055801				
12	L/(H(F _r Q _m) ²)		.000995	.000995	.000995	.000995	.000995	.000995				
13		I ₁ + I ₂	.058907	.057696	.057545	.057545	.056796	.056796				
14	I _n	I ₀ - I ₃	129.186	130.512	130.680	130.680	131.523	131.523				
15	M = P _n - P _{n-1}			689	686	685	685	679				
16	N = I _n + I _{n-1}			259.698	259.866	259.866	262.203	262.203				
17	M x N	I ₅ x I ₆				178.008		178.036				
18	Σ (M x N)	Σ I ₇				178.008		356.044				

WORK SHEET FOR STEPWISE CALCULATION

(SUBSURFACE) PRESSURE (P_f & P_s)
(SURFACE) (P_c & P_w)Form C-122-E
Adopted 9-1-65

Rate Two

COMPANY Astec Oil & Gas Co. LEASE Federal MA WELL NO. 2 DATE 9/24/68LOCATION: Unit I Section 21 Township 18 S Range 33 EL 13,414 H 13,414 L/H 1.000 G .708 % CO₂ - % N₂ - % H₂S -

$$P = \frac{1,068,414}{795,092} = 1343.8 \quad P_w = 4337.2 - 1343.8 = 2993.4$$

$$d \frac{1.750}{P_{0.025671} Q_m} \frac{1.229}{M^2 cfd} (L/H) (F_r Q_m)^2 \frac{.000995}{P_{CT}} \frac{668}{TABLE IX \& X} T_{CT} \frac{392}{TABLE IX \& X}$$

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		13,414	6707		0						
2	GH		9497	4749		0						
3	37.5GH		356,138	178,088		0						
4	P _c or P _n		4337.2	3672.2	3669.2	3001.2	2992.2	2993.2				
5	P _r		6.49	5.50	5.49	4.49	4.48	4.48				
6	T		632	586	586	540	540	540				
7	T _r		1.61	1.49	1.49	1.38	1.38	1.38				
8	Z		.919	.831	.830	.725	.725	.725				
9	P/Z P/Z	4÷8	4729	4419	4421	4140	4127	4129				
10	P/TZ	9÷6	7.47	7.54	7.54	7.67	7.64	7.65				
11	(P/TZ) 2/1000	(10) 2/1000										
12	L/H(F _r Q _m) ²											
13		11 + 12										
14	I _n	10÷13	133.869	132.626	132.626	130.378	130.890	130.719				
15	M=P _n -P _{n-1}			665	668	668	677	676				
16	N=I _n +I _{n-1}			266.495	266.495	263.004	263.516	263.345				
17	M x N	15 x 16			178,019			178,021				
18	Σ (M x N)	Σ 17	356,138		178,119							

Rate Three

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

Form C-122-E
Adopted 9-1-65

COMPANY Aztec Oil & Gas Co. LEASE Federal MA WELL NO. 2 DATE 9/14/68

LOCATION: Unit I Section 21 Township 18 S Range 33 E

L 13.414 H 13.414 L/H 1.000 G .704 % CO₂ - % N₂ - % H₂S -

d 1.750 P_f 025671 m 1.885 M² cfd (L/H) (F_fQ_m)² .002342 P_{cr} 668 T_{cr} 392
TABLE IX & X TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	6707		13.414						
2	GH		0	4722		9443						
3	37.5GH		0	177,075		354,113						
4	P _c or P _n		2855.2	3537.2	3536.2	4218.2	4215.2					
5	P _r		4.27	5.30	5.29	6.31	6.31					
6	T		540	586	586	632	632					
7	T _r		1.38	1.49	1.49	1.61	1.61					
8	Z		.715	.820	.819	.912	.912					
9	P/Z P/Z	4÷8	3993	4314	4318	4625	4622					
10	P/TZ	9÷6	7.39	7.36	7.37	7.32	7.31					
11	(P/TZ) 2/1000	(10) 2/1000	.054612	.054170	.054317	.053582	.053436					
12	L/H(F _r Q _m) ²		.002342	.002342	.002342	.002342	.002342					
13		I ₁ + I ₂	.056954	.056512	.056659	.055924	.055778					
14	I _n	I ₀ ÷ I ₃	129.753	130.238	130.076	130.892	131.055					
15	M = P _n - P _{n-1}			682	681	682	679					
16	N = I _n + I _{n-1}			259.991	259.829	260.968	261.131					
17	M × N	I ₅ × I ₆			176.944							
18	Σ (M × N)	Σ I ₇			176.944							

WORK SHEET FOR STEPWISE CALCULATION

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

Form C-122-E
Adopted 9-1-65

COMPANY Aztec Oil & Gas Co. LEASE Federal MA WELL NO. 2 DATE 9/14/68

LOCATION: Unit I Section 21 Township 18 S Range 23 E

L. 13,414 H 13,414 L/H 1.000 G .704 % CO₂ - % N₂ - % H₂S -

$$P = \frac{1.062,339}{810.850} = \frac{1.750}{1310.2} \frac{P_{025671} Q_m}{P_w} = \frac{1.885}{4215.2 - 1310.2} \frac{M^2 cfd (L/H) (F_i Q_m)^2}{2905.0} \frac{P_{cf}}{668} \frac{T_{cf}}{392}$$

TABLE IX & X TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		13,414	6707		0						
2	GH		9443	4722		0						
3	37.5GH		354,113	177,075		0						
4	P_c or P_h		4215.2	3568.2	3564.2	2913.2	2904.2	2905.2				
5	P_i		6.31	5.34	5.34	4.36	4.35	4.35				
6	T		632	586	586	540	540	540				
7	T_i		1.61	1.49	1.49	1.38	1.38	1.38				
8	Z		.912	.822	.822	.718	.718	.718				
9	P/Z P/Z	$\frac{4}{9} \div \frac{8}{6}$	4622	4341	4336	4057	4045	4046				
10	P/TZ	$\frac{9}{6} \div \frac{6}{6}$	7.31	7.40	7.40	7.51	7.49	7.49				
11	$(P/TZ)^2/1000$	$(\frac{10}{10})^2/1000$										
12	$L/H(F_i Q_m)^2$											
13		$\frac{11}{1} + \frac{12}{2}$										
14	I_h	$\frac{10}{1} \div \frac{13}{3}$	136.799	135.135	135.135	133.156	133.511	133.511				
15	$M = P_h - P_{h-1}$			64.7	651	651	660	659				
16	$N = I_h + I_{h-1}$			271.934	271.934	268.291	268.646	268.646				
17	$M \times N$	$\frac{15}{1} \times \frac{16}{6}$		177.029			177.038					
18	$\Sigma (M \times N)$	$\Sigma 17$	354,113	177,084								

WORK SHEET FOR STEPWISE CALCULATION

(SUBSURFACE) PRESSURE (P_f & P_s)
(SURFACE) PRESSURE (P_c & P_w)Form C-122-E
Adopted 9-1-65

Rate Four

COMPANY Astec Oil & Gas Co. LEASE Federal MA WELL NO. 2 DATE 9/14/68

LOCATION: Unit I Section 21 Township 18 S Range 33 E

L 13,414 H 13,414 L/H 1.000 G .688 % CO₂ - % N₂ - % H₂S -

d 1.750 $F_i Q_m$ 3.412 $M^2 \text{ cfd}$ (L/H) ($F_i Q_m$)² .007672 P_{cr} 669 T_{cr} 385

TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	6707			13,414					
2	GH		0	4614			9229					
3	37.5GH		0	173,025			346,088					
4	P_c or P_h		2490.2	3155.2	3161.2	3162.2	3833.2	3844.2	3845.2			
5	P_r		3.72	4.72	4.73	4.73	5.73	5.75	5.75			
6	T		540	586	586	586	632	632	632			
7	T_r		1.40	1.52	1.52	1.52	1.64	1.64	1.64			
8	Z		.708	.806	.806	.806	.889	.890	.890			
9	P/Z P/Z	$\bar{Z} \div 8$	3518	3915	3922	3923	4312	4319	4320			
10	P/TZ	$\bar{Z} \div 6$	6.51	6.68	6.69	6.69	6.82	6.83	6.84			
11	$(P/TZ)^{2/1000}$	$(\bar{Z} \div 1000)^{2/1000}$	.042380	.044622	.044756	.044756	.046512	.046649	.046786			
12	$L/H(F_i Q_m)^2$		.007672	.007672	.007672	.007672	.007672	.007672	.007672			
13		$\bar{I} \div 12$	.050052	.052294	.052428	.052428	.054184	.054321	.054458			
14	I_n	$\bar{I} \div 13$	130.064	127.739	127.603	127.603	125.867	125.734	125.601			
15	$M = P_n - P_{n-1}$			665	671	672	671	682	683			
16	$N = I_n + I_{n-1}$			257.803	257.667	257.666	253.470	253.337	253.204			
17	$M \times N$	$\bar{I} 5 \times \bar{I} 6$				173,152						
18	$\Sigma (M \times N)$	$\Sigma \bar{I} 7$				173,152						

WORK SHEET FOR STEPWISE CALCULATION

(SUBSURFACE) PRESSURE (P_f & P_s)
(SURFACE) (P_c & P_w)Form C-122-E
Adopted 9-1-65COMPANY Aztec Oil & Gas Co. LEASE Federal MA WELL NO. 2 DATE 9/14/68LOCATION: Unit I Section 21 Township 18 S Range 33 EL 13,414 H 13,414 L/H 1.000 G .688 % CO₂ - % N₂ - % H₂S -

$$P = \frac{1.038,264}{876.127} = 1185.1$$

$$P_w = 3845.2 - 1185.1 = 2660.1$$

$$P_f = 1.750$$

$$P_i = 0.025671$$

$$Q_m = 3.412$$

$$M^2_{ctd} (L/H) (F_r Q_m)^2 = .007672$$

$$P_{cr} = 669$$

$$T_{cr} = 385$$

TABLE IX & X

TABLE IX & X

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		13,414	6707	0							
2	GH		9229	4614	0							
3	37.5GH		346,088	173,025	0							
4	P_c or P_n		3845.2	3253.2	2661.2	2659.2						
5	P_r		5.75	4.86	3.98	3.97						
6	T		632	586	540	540						
7	T_r		1.64	1.52	1.40	1.40						
8	Z		.890	.811	.715	.715						
9	P/Z P/Z	$4 \div 8$	4320	4011	3722	3719						
10	P/TZ	$9 \div 6$	6.84	6.84	6.89	6.89						
11	$(P/TZ)^2/1000$	$(10 \div 1000)$										
12	$L/H(F_r Q_m)^2$											
13		$11 \div 12$										
14	I_n	$10 \div 13$	146.198	146.198	145.137	145.137						
15	$M = P_n - P_{n-1}$			592	592	594						
16	$N = I_n + I_{n-1}$			292.396	291.335	291.335						
17	$M \times N$	15×16		173,098		173,053						
18	$\Sigma (M \times N)$	$\Sigma 17$	346,088	172,990								