

NEW XICO OIL CONSERVATION COMMISSIC
MULTIPOINT AND ONE POINT BACK PRESSURE TEST FOR GAS WELL

Form C-122
Revised 9-1-65

Type Test ☒ Initial ☐ Annual ☐ Special						Test Date 4-26-76			
Company Texas West Oil & Gas Corporation				Connection Transwestern Pipeline Company					
Pool Bell Lake South, (Morrow)				Formation Morrow				Unit	
Completion Date 4-27-76		Total Depth 14,296'		Plug Back TD 14,249'		Elevation 3612.4		Farm or Lease Name Madera	
Csq. Size 5.00"	Wt. 18.00#	d 4.276"	Set At 14,294'	Perforations: From 13,963 To 13,982		Well No. 1			
Tbg. Size 2.875 EUE	Wt. 6.50#	d 2.441"	Set At 11,596'	Perforations: From Open Ended To		Unit G	Sec. 5	Twp. 24S	Rge. 34E
Type Well - Single - Bradenhead - G.G. or G.O. Multiple Single Completion						Packer Set At 11,596'		County Lea	
Producing Thru Tubing 2-7/8		Reservoir Temp. °F 180 @ 13,973		Mean Annual Temp. °F 60		Baro. Press. - P _a 13.2		State New Mexico	
H 13973	G _g 13973	% CO ₂ 0.572	% N ₂ 0.49	% H ₂ S 0.23	Prover 0.00	Meter Run X	Taps Flange		

FLOW DATA							TUBING DATA		CASING 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							4455	72			
1.	4.00		2.00	570	70.00"	48	1695	70			1.00 hr
2.	4.00		2.00	570	75.00"	66	1700	75			1.00 hr
3.	4.00		2.00	585	78.00"	72	1815	78			2.50 hr
4.	4.00		2.00	600	80.00"	72	1950	80			2.00 hr
5.	4.00		2.00	420	69.00"	72	2415	69			1.50 hr

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	23.18	202.049	583.20	1.0117	1.3222	1.0500	6579
2	23.18	209.141	583.20	0.9943	1.3222	1.0440	6654
3	23.18	216.008	598.20	0.9887	1.3222	1.0430	6827
4	23.18	221.486	613.20	0.9887	1.3222	1.0040	6738
5	23.18	172.890	433.20	0.9887	1.3222	1.0310	5401

NO.	P _r	Temp. °R	T _r	Z	Gas Liquid Hydrocarbon Ratio _____ Mcf/bbl.
1	0.87	508	1.47	0.903	A.P.I. Gravity of Liquid Hydrocarbons None Produced Deg.
2	0.87	526	1.52	0.914	Specific Gravity Separator Gas 0.572 X X X X X X X X
3	0.89	532	1.54	0.912	Specific Gravity Flowing Fluid X X X X X 0.572
4	0.91	532	1.54	0.910	Critical Pressure 672 P.S.I.A. 672 P.S.I.A.
5	0.64	532	1.54	0.935	Critical Temperature 346 R 346 R

NO.	P _c	P _w	P _w ²	P _c ² - P _w ²	(1) $\frac{P_c^2}{P_c^2 - P_w^2} =$	(2) $\left[\frac{P_c^2}{P_c^2 - P_w^2} \right]^n =$
	4468.2	19965			1.46558	1.4656
1		1841.3	3390	16575		
2		1853.2	3434	16530		
3		1964.9	3861	16104		
4		2084.4	4345	15620		
5		2518.4	6342	13622		

AOFP = Q $\left[\frac{P_c^2}{P_c^2 - P_w^2} \right]^n =$ **7916**

(1) $\frac{P_c^2}{P_c^2 - P_w^2} =$ **1.46558**

(2) $\left[\frac{P_c^2}{P_c^2 - P_w^2} \right]^n =$ **1.4656**

Absolute Open Flow 7916 Mcfd @ 15.025	Angle of Slope ϕ 45.00	Slope, n 1.000
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Remarks: _____

Approved By Commission: _____	Conducted By: Tom Hansen Company	Calculated By: Whitey Harrington	Checked By: L. N. Gannavant
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WORK SHEET FOR STEPWISE CALCULATION

(SUBSURFACE) (P_f & P_s)
 PRESSURE (P_c & P_w)
 FORM C-122-E
 (Page 1 of 10)

COMPANY Texas West Oil & Gas Company LEASE Madera WELL NO. 1 DATE 4-26-76

SECTION 5 TOWNSHIP 24-S RANGE 34-E

13973 H 13973 L/H 1.00 G 0.572 % CO₂ 0.49 % N₂ 0.23 % H₂S 0.00
 d 2.441 F 0.010763 Q_m 6.579 M² cfd (L/H) (F Q_m)² 0.005014 P_{cr} 672 T_{cr} 346

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	6987		13973						
2	GH		0	3996		7993						
3	37.5GH		0	149860		299721						
4	P _c or P _n		1708.2	2101.2	2106.2	2504.2	2513.2					
5	P _r		2.54	3.13	3.13	3.73	3.74					
6	T		530	585	585	640	640					
7	T _r		1.53	1.69	1.69	1.85	1.85					
8	Z		0.808	0.858	0.858	0.903	0.903					
9	P/Z P/Z		4 ÷ 8	2115.42	2448.95	2454.78	2773.20	2783.17				
10	P/TZ		9 ÷ 6	3.9914	4.1862	4.1962	4.3331	4.3487				
11	(P/TZ) ² /1000		(10 ² /1000)	0.015931	0.017525	0.017608	0.018776	0.018911				
12	L/H(F _r Q _m) ²			0.005014	0.005014	0.005014	0.005014	0.005014				
13			11 + 12	0.020945	0.022539	0.022622	0.023790	0.023925				
14	I _n		10 ÷ 13	190.564	185.736	185.491	182.141	181.762				
15	M=P _n - P _{n-1}			393	398	398	407	408				
16	M=1 _n + 1 _{n-1}			376.300	376.055	367.632	367.253					
17	M x N		15 x 16	149670			149472					
18	Σ (M x N)		Σ 17	149670			299142					

$$\Delta P = \frac{3[299721]}{190.564 + 4[185.491] + 181.762} = \frac{899163}{1111.290} = 806.9 \quad P = 1708.2 + 806.9 = 2515.1$$

WORK SHEET FOR STEPWISE CALCULATION

(SURFACE) PRESSURE
(P_c & P_w)

Form C-122-E

RATE NO. 1

(PAGE 2)

COMPANY Texas West Oil & Gas Company LEASE Madera TOWNSHIP 24-S RANGE 34-E DATE 4-26-76

SECTION 5 G 0.572 % CO₂ 0.49 % N₂ 0.23 % H₂S 0.00

13973 H 13973 L/H 1.00 Q_m M² cfd (L/H) (F O₂)² P_{cr} 672 T_{cr} 346

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		13973	6987								
2	GH		7993	3996	0							
3	37.5GH		299721	149860	0							
4	P _c or P _n		2515.1	2189.0	2230.4	2196.6	2199.3					
5	P _r		3.74	3.26	3.32	3.27	3.27					
6	T		640	505	530	530	530					
7	T _r		1.85	1.69	1.53	1.53	1.53					
8	Z		0.903	0.856	0.786	0.787	0.787					
9	P/Z P/Z		2785.27	2557.25	2837.33	2790.78	2794.19					
10	P/TZ		4.3520	4.3714	5.3535	5.2656	5.2721					
11	(P/TZ) ² /1000	(10 ² /1000)										
12	L/H(F O ₂) ²											
13		$\frac{11}{11} + \frac{12}{12}$										
14	I _n	$\frac{10}{10} \div \frac{13}{13}$	229.780	228.761	186.795	189.911	189.679					
15	M=P _n - P _{n-1}			326	327	361	358	358				
16	N=1 _n + 1 _{n-1}			458.542	415.557	418.673	418.441					
17	M x N	$\frac{15}{15} \times \frac{16}{16}$		149811			149802					
18	$\sum (M \times N)$	$\sum \frac{17}{17}$		149811			299613					

$$\Delta P = \frac{229.780 + 4 \left[\frac{299721}{228.761} \right] + 189.679}{899163} = 673.8 \quad P = 2515.1 - 673.8 = 1841.3$$

COMPANY Texas West Oil & Gas Company LEASE Madera RATE NO. 2 DATE 4-26-76

CATION: UNIT SECTION 5 TOWNSHIP 24-S RANGE 34-E

13973 H 13973 L/H 1.00 G 0.572 % CO₂ 0.49 % N₂ 0.23 % H₂S 0.00
d 2.441 F 0.010763 Q_m 6.674 M² cfd (L/H) (F_r Q_m)² 0.005160 P_{cr} 672 T_{cr} 346

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	6987		13973						
2	SH		0	3996		7993						
3	37.5GH		0	149860		299721						
4	P _c or P _n		1713.2	2105.2	2111.2	2509.2	2520.2					
5	P _r		2.55	3.13	3.14	3.73	3.75					
6	T		535	588	588	640	640					
7	T _r		1.55	1.70	1.70	1.85	1.85					
8	Z		0.816	0.862	0.862	0.903	0.903					
9	P/Z P/Z		4 ÷ 8	2099.51	2442.23	2778.74	2790.92					
10	P/TZ		9 ÷ 6	3.9243	4.1570	4.3418	4.3608					
11	(P/TZ) ² /1000		(10 ² /1000)	0.015400	0.017281	0.018851	0.019017					
12	L/H(F _r Q _m) ²			0.005160	0.005160	0.005160	0.005160					
13				11 + 12	0.020560	0.022440	0.022539					
14	I _n			10 ÷ 13	190.870	185.246	180.825					
15	M=P _n - P _{n-1}			392	398	398	409	410				
16	N=1 _n + 1 _{n-1}			376.116	375.831	365.786	365.334					
17	M x N			15 x 16	149581		149422					
18	Σ (M x N)			Σ 17	149581	299002	299002					

$$\Delta P = \frac{3 \left[\frac{299721}{190.870 + 4 \left[\frac{184.961}{180.374} \right] + 180.374} \right]}{899163} = 809.3 \quad P = 1713.2 + 809.3 = 2522.5$$

COMPANY Texas West Oil & Gas Company

LEASE

Madera

WELL NO. 1

DATE 4-26-76

LOCATION: UNIT

SECTION

5

TOWNSHIP

24-S

RANGE

34-E

L 13973

H

13973

L/H

1.00

G

0.572

% CO₂

0.49

% N₂

0.23

% H₂S

0.00

d F_r

Q_m

M_{cf}d

(L/H) (F_o)²

F_oM_o

P_{cr}

672

T_{cr}

346

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		13973	6987	0							
	GH		7993	3996	0							
3	37.5GH		299721	149860	0							
4	P _c or P _n		2522.5	2195.4	2226.5	2197.1	2199.5					
5	P _r		3.75	3.27	3.31	3.27	3.27					
6	T		640	588	535	535	535					
7	T _r		1.85	1.70	1.55	1.55	1.55					
8	Z		0.903	0.860	0.796	0.797	0.797					
9	P/Z P/Z		2793.47	2552.84	2798.90	2758.47	2761.42					
10	P/TTZ		4.3648	4.3453	5.2316	5.1560	5.1615					
11	(P/TTZ) ² /1000		(10 ² /1000)									
12	L/H(F _o Q _m) ²											
13												
14	I _n		10 ÷ 13									
15	M=P _n - P _{n-1}		229.106	230.136	191.147	193.948	193.741					
16	N=1 _n + 1 _{n-1}			327	326	356	354					
17	M x N			459.242	421.282	424.084	423.877					
18	Σ (M x N)		Σ 17	150172			299801					

$$\Delta P = \frac{3[299721]}{229.106 + 4[230.136] + 193.741} = \frac{899163}{1343.391} = 669.3$$

$$P = 2522.5 - 669.3 = 1853.2$$

COMPANY Texas West Oil & Gas Company LEASE Madera WELL NO. 1 DATE 4-26-76

LOCATION: UNIT 13973 SECTION 5 TOWNSHIP 24-S RANGE 34-E

d 2.441 F 0.010763 Q_m 6.827 M²cf/d (L/H) (F_Q)² 0.005399 P_{cr} 672 T_{cr} 346

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	6987		13973						
2	GH		0	3996		7993						
3	37.5GH		0	149860		299721						
4	P _c or P _n		1828.2	2238.2	2244.2	2661.2	2672.2					
5	P _r		2.72	3.33	3.34	3.96	3.98					
6	T		538	589	589	640	640					
7	T _r		1.55	1.70	1.70	1.85	1.85					
8	Z		0.810	0.859	0.859	0.904	0.905					
9	P/Z P/Z		2258.43	2605.59	2612.57	2943.81	2954.34					
10	P/TZ		4.1978	4.4237	4.4356	4.5997	4.6162					
11	(P/TZ) ² /1000	(10 ² /1000)	0.017622	0.019570	0.019675	0.021157	0.021309					
12	L/H(F _r Q _m) ²		0.005399	0.005399	0.005399	0.005399	0.005399					
13			11 + 12	0.023021	0.024969	0.025074	0.026556	0.026708				
14	L _n		10 ÷ 13	177.172	176.902	173.205	172.838					
15	M=P _n -P _{n-1}		182.348	410	416	417	428	428				
16	N=1 _n +1 _{n-1}			359.520	359.251	350.107	349.740					
17	M x N		15 x 16	149448	149448		149689					
18	Σ (M x N)	Σ 17		149448			299137					

$$\Delta P = \frac{3[299721]}{182.348 + 177.172 + 176.902 + 173.205 + 172.838} = \frac{899163}{1062.794} = 846.0$$

$$P = 1828.2 + 846.0 = 2674.2$$

WORK SHEET FOR STEPWISE CALCULATION

(P_F & P_S)
PRESSURE (P_C & P_w)
RATE NO. 3
(PAGE 6)

Form C-122-E

COMPANY Texas West Oil & Gas Company LEASE Madera WELL NO. 1 DATE 4-26-76

LOCATION: UNIT SECTION 5 TOWNSHIP 24-S RANGE 34-E

L 13973 H 13973 L/H 1.00 G 0.572 % CO₂ 0.49 % N₂ 0.23 % H₂S 0.00
d F_r Q_m M² cfd (L/H) (F_r Q_m)² P_{cr} 672 T_{cr} 346

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		13973	6987	0							
	GH		7993	3996	0							
3	37.5GH		299721	149860	0							
4	P _C or P _n		2674.2	2328.1	2367.7	2336.3						
5	P _r		3.98	3.46	3.52	3.48						
6	T		640	589	538	538						
7	T _r		1.85	1.70	1.55	1.55						
8	Z		0.905	0.858	0.794	0.794						
9	P/Z P/Z		2956.55	2713.35	2981.97	2942.48						
10	P/TZ		4.6196	4.6067	5.5427	5.4693						
11	(P/TZ) ² /1000	(10 ² /1000)										
12	L/H(F _r Q _m) ²											
13		11 + 12										
14	I _n	10 ÷ 13	216.468	217.075	180.418	182.839						
15	M=P _n - P _{n-1}		346	346	377	375						
16	N=I _n + I _{n-1}		433.544	397.493	399.914							
17	M x N	15 x 16	150006	150006	150423							
18	Σ (M x N)	Σ 17	150006	300429								

$$Delta P = \frac{3[299721]}{216.468 + 4[217.075] + 182.839} = \frac{899163}{1267.607} - 709.3 \quad P = 2674.2 \quad 709.3 = 1964.9$$

WORK SHEET FOR STEADY-STATE CALCULATION

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

FORM C-122-E

RATE NO. 4

(PAGE 7)

COMPANY Texas West Oil & Gas Company LEASE Madera WELL NO. 1 DATE 4-26-76

LOCATION: UNIT 13973 SECTION 5 TOWNSHIP 24-S RANGE 34-E

L 13973 H 13973 L/H 1.00 G 0.572 % CO₂ 0.49 % N₂ 0.23 % H₂S 0.00
d 2.441 F 0.010763 Q_m 6.738 M² cfd (L/H) (F Q_m)² 0.005259 P_{cr} 672 T_{cr} 346

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	6987		13973						
	GH		0	3996		7993						
3	37.5GH		0	149860		299721						
4	P _c or P _n		1963.2	2387.2	2393.2	2623.2	2833.2	2839.2	2834.2			
5	P _r		2.92	3.55	3.56	4.20	4.22	4.23	4.22			
6	T		540	590	590	640	640	640	640			
7	T _r		1.56	1.71	1.71	1.85	1.85	1.85	1.85			
8	Z		0.808	0.861	0.861	0.907	0.877	0.908	0.907			
9	P/Z P/Z		4 ÷ 8	2428.50	2771.62	2778.59	3112.68	3230.56	3128.60	3124.81		
10	P/TZ		9 ÷ 6	4.4972	4.7095	4.8636	5.0477	4.8884	4.8825			
11	(P/TZ) ² /1000		0.020225	0.022068	0.022179	0.023654	0.025480	0.023897	0.023839			
12	L/H(F Q _m) ²		0.005259	0.005259	0.005259	0.005259	0.005259	0.005259	0.005259			
13			11 + 12	0.025484	0.027327	0.027438	0.028914	0.030739	0.029156	0.029098		
14	I _n		10 ÷ 13	176.470	171.903	171.638	168.211	164.213	167.664	167.794		
15	M=P _n -P _{n-1}			424	430	430	440	446	441	441		
16	N=1 _n +1 _{n-1}			348.373	348.108	339.848	335.850	339.302	339.432			
17	M x N		15 x 16	149686	149686				149690			
18	Σ (M x N)		Σ 17	149686					299376			

$$\Delta P = \frac{3[299721]}{176.470 + 4[171.638] + 167.794} = \frac{899163}{1030.816} = 872.3$$

$$P = 1963.2 + 872.3 = 2835.5$$

RATE NO. 4

COMPANY Texas West Oil & Gas Company

LEASE

Madera

WELL NO. 1

DATE 4-26-76

LOCATION: UNIT

SECTION

5

TOWNSHIP

24-S

RANGE

34-E

L 13973 H 13973

L/H

1.00

G

0.572

% CO₂

0.49

% N₂

0.23

% H₂S

0.00

d F r Q_m

M² cfd

(L/H)

(F Q_m)²

P_{cr}

672

T_{cr}

346

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		13973	6987	0							
	GH		7993	3996	0							
3	37.5GH		299721	149860	0							
4	P _c or P _n		2835.5	2469.5	2505.2	2473.7						
5	P _r		4.22	3.67	3.73	3.63						
6	T		640	590	540	540						
7	T _r		1.85	1.71	1.56	1.56						
8	Z		0.907	0.860	0.798	0.798						
9	P/Z P/Z		4 ÷ 8	3126.24	2870.49	3137.79	3098.26					
10	P/TZ		9 ÷ 6	4.8848	5.8107	5.7375						
11	(P/TZ) ² /1000		(10 ² /1000)									
12	L/H(F Q _m) ²											
13												
14	L _n											
15	M = P _n - P _{n-1}											
16	N = L _n + L _{n-1}											
17	M x N											
18	Σ (M x N)											

$$\Delta P = \frac{204.719 + 4 \left[\frac{299721}{17} \right]}{899153} = \frac{1197.170}{751.1}$$

$$P = 2835.5 - 751.1 = 2084.4$$

RATE NO. 5

COMPANY Texas West Oil & Gas Company

LEASE

Madera

WELL NO. 1

DATE 4-26-76

LOCATION: UNIT

SECTION

5

TOWNSHIP

24-S

RANGE

34-E

L 13973

H 13973

L/H 1.00

G

0.572

% CO₂

0.49

% N₂

0.23

% H₂S

0.00

d 2.441

F

0.011763

Q_m

5.401

M² cfd(L/H) (F O₂)²I_M

0.004036

P_{cr}

672

T_{cr} 346

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		0	6987	13973							
	GH		0	3996	7993							
3	37.5GH		0	149860	299721							
4	P _c or P _n											
			2428.2	2918.2	3403.2	3403.2						
5	P _r		3.61	4.34	5.07	5.06						
6	T		529	585	640	640						
7	T _r		1.53	1.69	1.85	1.85						
8	Z		0.785	0.857	0.925	0.925						
9	P/Z P/Z		4 ÷ 6	3095.22	3403.55	3682.55	3681.12					
10	P/TZ		9 ÷ 6	5.8511	5.7540	5.7518						
11	(P/TZ) ² /1000		(10 ² /1000)	0.034235	0.033907	0.033083						
12	L/H (F O ₂) ²		0.004036	0.004036	0.004036	0.004036						
13			11 + 12	0.038271	0.037944	0.037145	0.037119					
14	I _n		10 ÷ 13	152.884	153.464	154.908	154.954					
15	M = P _n - P _{n-1}			490	489	485	485					
16	N = I _n + I _{n-1}			306.348	308.372	308.419						
17	M x N		15 x 16	150111		149583						
18	Σ (M x N)		Σ 17	150111		299694						

$$\Delta P = \frac{3 \left[\frac{299721}{152.884 + 1} \right] + 153.464}{899163} = \frac{921.694}{921.694} = 975.6$$

$$P = 2428.2 + 975.6 = 3403.8$$

FORM C-122-E
PRESSURE (SURFACE)
(P_c & P_w)

Form C-122-E
(PAGE 10)

RATE NO. 5

COMPANY Texas West Oil & Gas Company

LEASE

Madera

WELL NO. 1

DATE 4-26-76

OCCUPATION: UNIT

SECTION

5

TOWNSHIP

24-S

RANGE

34-E

13973 H 13973 L/H 1.00 G 0.572 $\% CO_2$ 0.49 $\% N_2$ 0.23 $\% H_2S$ 0.00

d F Q_m M²cfd (L/H) ($F_r O_r$)² P_{cr} 672 T_{cr} 346

LINE	ITEM	SOURCE	1	2	3	4	5	6	7	8	9	10
1	H		13973	6987		0						
2	GH		7993	3996		0						
3	3,500 GH		299721	149860		0						
4	P _c or P _n		3403.8	2973.2	2966.6	2529.9	2517.0					
5	P _r		5.07	4.42	4.41	3.76	3.75					
6	T		640	585	585	529	529					
7	T _r		1.85	1.69	1.69	1.53	1.53					
8	Z		0.926	0.858	0.858	0.785	0.785					
9	P/Z P/Z		3677.80	3463.66	3455.96	3221.94	3205.54					
10	P/TZ		5.7466	5.9259	5.9127	6.0906	6.0596					
11	(P/TZ) ² /1000	(10 ² /1000										
12	L/H($F_r O_r$) ²											
13		$\frac{11 + 12}{10 \div 13}$										
14	I _n		174.017	168.752	169.128	164.187	165.027					
15	M = P _n - P _{n-1}			431	437	437	450	446				
16	N = I _n + I _{n-1}			342.769	343.145	333.315	334.155					
17	M x N	$\frac{15 \times 16}{17}$		147733			150370					
18	$\sum (M \times N)$	$\sum \frac{17}{17}$		147733			298103					

$$\Delta P = \frac{3 \left[\frac{299721}{174.017 + 4 \left[\frac{169.128}{165.027} + 165.027 \right]} \right]}{899163} = 885.4 \quad P = 3403.8 - 885.4 = 2518.4$$

COMPANY Texas West Oil & Gas CompanyFIELD Bell Lake, So. MorrowLEASE MaderaWELL 1COUNTY LeaSTATE New MexicoDATE 4-26-76