



NEW MEXICO ENERGY, MINERALS
& NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
2040 South Pacheco Street
Santa Fe, New Mexico 87505
(505) 827-7131

June 27, 1997

CF 6608
R- 5530

Texaco Exploration & Production, Inc.
P.O. Box 730
Hobbs, New Mexico 88241-0730

Attn: Mr. James Anderson

**RE: Injection Pressure Increase,
 Central Vacuum Unit,
 Lea County, New Mexico**

Dear Mr. Anderson:

Reference is made to your request dated May 19, 1997 to increase the surface injection pressure on 4 wells in the above referenced waterflood project. This request is based on a step rate tests conducted between December 4 and 10, 1996. The results of the test have been reviewed by my staff and we feel an increase in injection pressure on these wells is justified at this time.

You are therefore authorized to increase the surface injection pressure on the following wells:

<i>Well and Location</i>	<i>Maximum Surface Injection Pressure</i>
Central Vacuum Unit Well No.56 Unit Letter 'C', Section 36, Township 17 South, Range 34 East	2100 PSIG
Central Vacuum Unit Well No.72 Unit Letter 'H', Section 36, Township 17 South, Range 34 East	1500 PSIG
Central Vacuum Unit Well No.73 Unit Letter 'H', Section 36, Township 17 South, Range 34 East	1500 PSIG
Central Vacuum Unit Well No.99 Unit Letter 'D', Section 6, Township 18 South, Range 35 East	2300 PSIG
Located in Lea County, New Mexico.	



TEXACO

FAX TRANSMITTAL COVER SHEET

NOTE: DO NOT USE BLUE OR RED INK OR PENCIL ON THIS FORM. THEY WILL NOT REPRODUCE

DATE: 5/19/97 ☐ URGENT ☐ ROUTINE NO. OF PAGES C+14

MESSAGE TO: DAVID CATANACH

TELEPHONE NO. _____ FAX MACHINE NO. 827-1389

DEPT./DIV./SUBS. _____

LOCATION _____ ROOM NO. _____

MESSAGE FROM: JAMES ANDERSON

TELEPHONE NO. (505) 397-0420 FAX MACHINE NO. (505) 397-0450

DEPT./DIV./SUBS. _____

LOCATION _____ ROOM NO. _____

SENDING DEPT. APPROVAL _____ TIME TRANSMITTED _____

☐ RETURN ORIGINAL VIA INTER-OFFICE MAIL

☐ RETURN ORIGINAL CALL SENDER TO PICK UP

ADDITIONAL COMMENTS:



Texaco E & P

200 E. Bender Blvd.
Hobbs NM 88240
505 397 7101

December 16, 1996

New Mexico Oil Conservation Division
P.O. Box 2088
Santa Fe, NM 87501

Attention: Mr. David R. Catanach

Re: Request for Increase in Surface Injection Pressure Limits
Texaco Exploration and Production Inc.
Central Vacuum Unit
T-17/18-S, R-34/35-E, Lea County, New Mexico

Dear Mr. Catanach

Texaco requests that the surface injection pressure limit be increased for the following wells:

<u>Well No.</u>	<u>Observed Surface Parting Pressure</u>	<u>Requested Permitted Injection Pressure</u>
No. 56	2151 psig	2100 psig
No. 72	No break to 2500 psig	1500 psig
No. 73	No break to 3000 psig	1500 psig
No. 99	2350 psig	2300 psig

Requested pressures are 50 psig below the Surface Parting Pressure, unless no break occurred during the test. Wells showing no break have a requested pressure of 1500 psig. The step rate test and the results of the tests are attached.

The higher injection limits are request to obtain better sweep efficiency in the patterns and will be necessary for the miscible CO₂ flood planned to begin early 1997. If additional information is needed, please contact me at (505) 397-0420.

Yours very truly,

James Anderson
Production Engineer

attachments

cc: Mr. Jerry Sexton
Hobbs NMOCDPNXs
142 86
185, 21
203 178

WEST-TEST, INC.

A SUBSIDIARY OF JOHN WEST ENGINEERING COMPANY

Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: TEXACO EXPLORATION AND PRODUCTION

DATE: DECEMBER 4, 1996

WELL NAME: CENTRAL VACUUM UNIT NO. 56
LEA COUNTY, NEW MEXICO

WO#: 96-14-1582

PERFS = 4710-4341

PACKER DEPTH = 4239

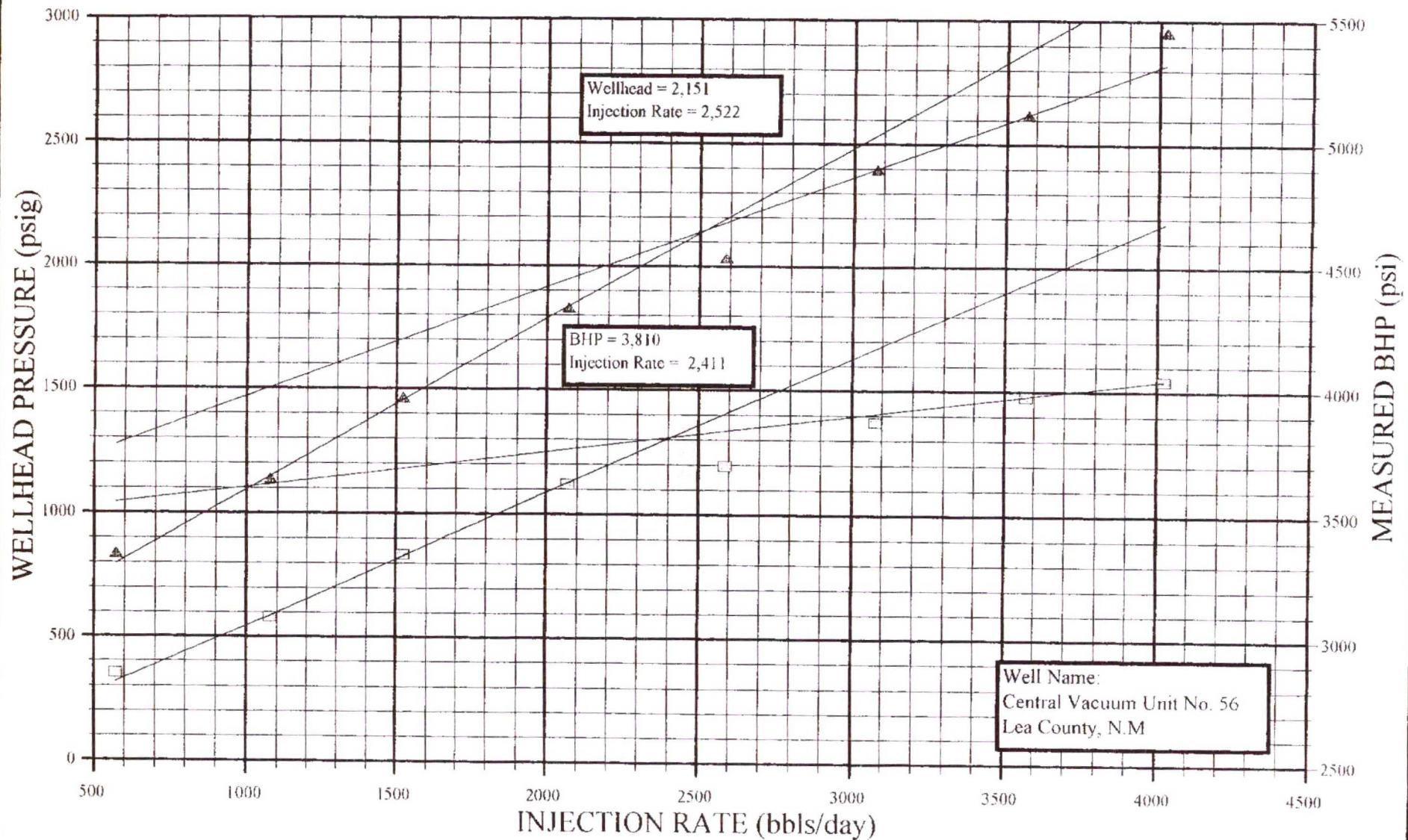
BHP GAUGE DEPTH = 4525

STEP NO. & REMARKS	TIME	(1) SURFACE TUBING PRESS. (psig)	(2) CUMMULATIVE VOL. INJECTED (bbls)	(3) INJECTION RATE (bbls/day)	(4) FRICTION HEAD LOSS (psi)	(5) CORRECTED TUBING PRESS. (psi) (1)-(4)	(6) INJECTION RATE (gpm) (3)/34.2857	(7) MEASURED BHP (psi)
1	9:40	507.7						
	9:45	706.9	1.9	547.2	12.795	694.1	15.96	2555.7
	9:50	774.1	3.9	576.0	14.068	760.0	16.80	2717.5
	9:55	807.1	5.9	576.0	14.068	793.0	16.80	2781.0
	10:00	836.3	8.0	604.8	15.397	820.9	17.64	2814.2
	10:05	823.6	9.9	547.2	12.795	810.8	15.96	2840.0
	10:10	840.0	11.9	576.0	14.068	825.9	16.80	2843.0
				571.2				2855.1
	10:15	1008.0	15.7	1094.4	46.125	961.9	31.92	
	10:20	1046.7	19.4	1065.6	43.905	1002.8	31.08	2973.0
2	10:25	1084.7	23.1	1065.6	43.905	1040.8	31.08	3010.8
	10:30	1102.4	26.9	1094.4	46.125	1056.3	31.92	3038.1
	10:35	1120.2	30.7	1094.4	46.125	1074.1	31.92	3057.8
	10:40	1141.7	34.3	1036.8	41.735	1100.0	31.92	3072.9
				1075.2			30.24	3085.0
	10:45	1274.7	39.5	1497.6	82.404	1192.3	43.68	
	10:50	1326.7	44.7	1497.6	82.404	1244.3	43.68	3178.8
	10:55	1379.8	50.0	1526.4	85.359	1294.4	43.68	3224.2
	11:00	1411.5	55.3	1526.4	85.359	1326.1	44.52	3268.1
	11:05	1441.9	60.6	1526.4	85.359	1356.5	44.52	3293.8
3	11:10	1465.9	66.0	1555.2	88.363	1377.5	44.52	3316.5
				1521.6			45.36	3337.7
	11:15	1692.8	73.4	2131.2	158.277	1534.5	62.16	
	11:20	1752.4	80.6	2073.6	150.454	1601.9	60.48	3461.7
	11:25	1786.6	87.8	2073.6	150.454	1636.1	60.48	3502.5
	11:30	1790.4	95.0	2073.6	150.454	1639.9	60.48	3534.3
	11:35	1809.4	102.1	2044.8	146.611	1662.8	59.64	3572.1
	11:40	1832.2	109.1	2016.0	142.814	1689.4	58.80	3596.2
				2068.8				3622.0

STEP NO. & REMARKS	TIME	(1) SURFACE TUBING PRESS. (psig)	(2) CUMMULATIVE VOL. INJECTED (bbls)	(3) INJECTION RATE (bbls/day)	(4) FRICTION HEAD LOSS (psi)	(5) CORRECTED TUBING PRESS. (psi) (1)-(4)	(6) INJECTION RATE (gpm) (3)/34.2857	(7) MEASURED BHP (psi)
5	11:45	2028.7	117.8	2505.6	213.526	1815.2	73.08	3688.6
	11:50	2044.0	126.8	2592.0	227.346	1816.7	75.60	3684.0
	11:55	2047.8	135.8	2592.0	227.346	1820.5	75.60	3678.0
	12:00	2040.0	144.8	2592.0	232.042	1808.2	76.44	3682.5
	12:05	2014.8	154.0	2620.8	232.042	1782.8	76.44	3685.6
	12:10	2037.7	163.0	2592.0	227.346	1810.4	75.60	3697.7
				2587.2				
	12:15	2296.0	173.8	3110.4	318.547	1977.5	90.72	3765.8
	12:20	2326.6	184.5	3081.6	313.112	2013.5	89.88	3791.5
	12:25	2340.7	195.0	3024.0	302.371	2038.3	88.20	3812.7
6	12:30	2363.7	205.8	3110.4	318.547	2045.2	90.72	3839.8
	12:35	2387.9	216.4	3052.8	307.720	2080.2	89.04	3856.5
	12:40	2399.5	227.1	3081.6	313.112	2086.4	89.88	3874.6
				3076.8				
	12:45	2579.0	239.5	3571.2	411.310	2167.7	104.16	3918.5
	12:50	2624.8	251.9	3571.2	411.310	2213.5	104.16	3942.6
	12:55	2655.4	264.4	3600.0	417.468	2237.9	105.00	3960.8
	1:00	2618.6	276.7	3542.4	405.195	2213.4	103.32	3965.3
	1:05	2650.4	289.0	3542.4	405.195	2245.2	103.32	3972.9
	1:10	2621.1	301.5	3600.0	417.468	2203.6	105.00	3978.9
7				3571.2				
	1:15	2887.1	315.8	4118.4	535.440	2351.7	120.12	4010.7
	1:20	2866.7	329.6	3974.4	501.321	2365.4	115.92	4022.8
	1:25	2871.8	343.5	4003.2	508.062	2363.7	116.76	4032.0
	1:30	2874.4	357.4	4003.2	508.062	2366.3	116.76	4038.2
	1:35	2892.2	371.4	4032.0	514.845	2377.4	117.60	4041.4
	1:40	2957.1	385.3	4003.2	508.062	2449.0	116.76	4044.5
				4022.4				
	1:41	1746.8				1746.8		3940.0
	1:42	1698.6				1698.6		3891.6
8 FALLOFF	1:43	1663.1				1663.1		3855.3
	1:44	1632.7				1632.7		3823.5
	1:45	1606.1				1606.1		3794.7
	1:50	1490.7				1490.7		3676.6
	1:55	1390.5				1390.5		3575.2

STEP RATE INJECTION TEST

TEXACO EXPLORATION AND PRODUCTION



▲ RECORDED WELLHEAD PRES. □ BOTTOM HOLE PRESSURE (4,525)

WEST-TEST, INC.
A SUBSIDIARY OF JOHN WEST ENGINEERING COMPANY
Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: TEXACO EXPLORATION AND PRODUCTION

DATE: DECEMBER 5, 1996

WELL NAME: CENTRAL VACUUM UNIT NO. 72
LEA COUNTY, NEW MEXICO

WO#: 96-14-1583

PERFS = 4373-4695

PACKER DEPTH = 4320

BHP GAUGE DEPTH = 4534

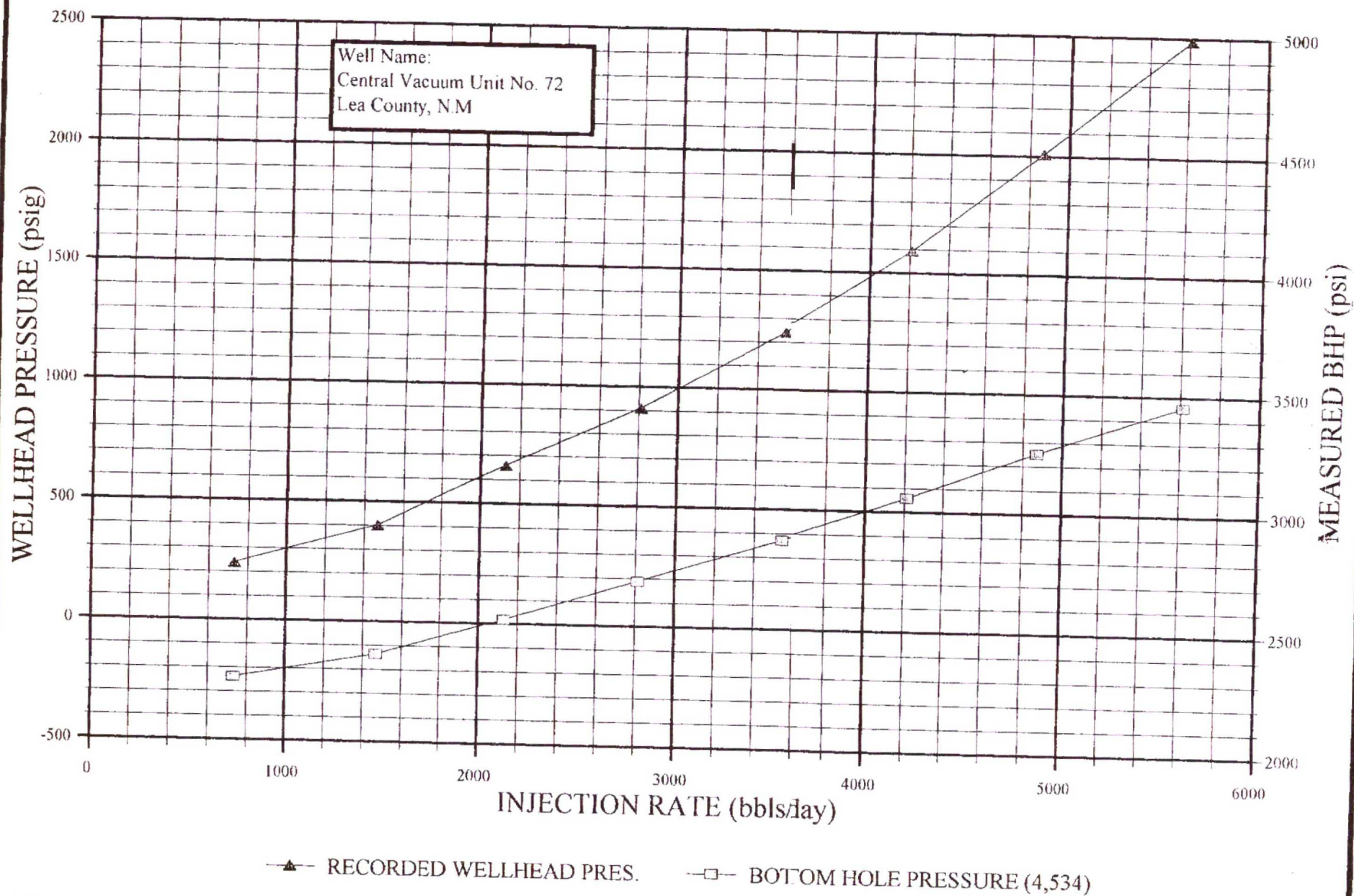
STEP NO. & REMARKS	TIME	(1) SURFACE TUBING PRESS. (psig)	(2) CUMMULATIVE VOL. INJECTED (bbls)	(3) INJECTION RATE (bbls/day)	(4) FRICTION HEAD LOSS (psi)	(5) CORRECTED TUBING PRESS. (psi) (1)-(4)	(6) INJECTION RATE (gpm) (3)/34.2857	(7) MEASURED BHP (psi)
1	9:25	506.6				506.6		2415.3
	9:30	293.4	2.1	604.8	15.428	278.0	17.64	2321.6
	9:35	271.8	4.4	662.4	18.256	253.5	19.32	2300.4
	9:40	264.2	7.0	748.8	22.904	241.3	21.84	2286.8
	9:45	254.0	9.7	777.6	24.560	229.4	22.68	2277.7
	9:50	243.8	12.5	806.4	26.269	217.5	23.52	2268.6
	9:55	241.3	15.2	777.6	24.560	216.7	22.68	2262.6
				729.6				
	10:00	352.9	20.3	1468.8	79.654	273.2	42.84	2315.5
	10:05	379.5	25.4	1468.8	79.654	299.8	42.84	2332.1
2	10:10	390.9	30.5	1468.8	79.654	311.2	42.84	2344.2
	10:15	393.4	35.6	1468.8	79.654	313.7	42.84	2353.3
	10:20	399.7	40.7	1468.8	79.654	320.0	42.84	2359.4
	10:25	403.5	45.8	1468.8	79.654	323.8	42.84	2365.4
				1468.8				
	10:30	563.4	53.2	2131.2	158.592	404.8	62.16	2431.9
	10:35	593.8	60.6	2131.2	158.592	435.2	62.16	2459.1
	10:40	610.3	68.0	2131.2	158.592	451.7	62.16	2478.8
	10:45	634.4	75.4	2131.2	158.592	475.8	62.16	2495.4
	10:50	649.6	82.8	2131.2	158.592	491.0	62.16	2509
3	10:55	661.0	90.1	2102.4	154.650	506.4	61.32	2519.6
				2126.4				
	11:00	800.6	99.9	2822.4	266.668	533.9	82.32	2589.1
	11:05	832.3	109.6	2793.6	261.656	570.6	81.48	2616.2
	11:10	861.5	119.4	2822.4	266.668	594.8	82.32	2638.9
	11:15	891.9	129.1	2793.6	261.656	630.2	81.48	2660.1
	11:20	922.3	138.9	2822.4	266.668	655.6	82.32	2675.2
	11:25	912.1	148.7	2822.4	266.668	645.4	82.32	2690.4
				2812.8				

STEP NO.		(1)	(2)	(3)	(4)	(5)	(6)	(7)
		SURFACE	CUMULATIVE	INJECTION	FRICTION	CORRECTED	INJECTION	MEASURED
REMARKS	TIME	(psig)	(bbls)	(bbls/day)	HEAD LOSS	TUBING PRESS.	RATE (gpm)	BHP
					(psi)	(psi) (1)-(4)	(3)/34.2857	(psi)
5	11:30	1141.6	161.0	3542.4	406.001	735.6	103.32	2759.9
	11:35	1173.3	173.4	3571.2	412.128	761.2	104.16	2790.2
	11:40	1193.5	185.6	3513.6	399.915	793.6	102.48	2814.3
	11:45	1216.3	198.0	3571.2	412.128	804.2	104.16	2835.5
	11:50	1232.8	210.3	3542.4	406.001	826.8	103.32	2853.7
	11:55	1244.2	222.5	3513.6	399.915	844.3	102.48	2871.8
				3542.4				
	12:00	1502.7	237.2	4233.6	564.598	938.1	123.48	2944.4
	12:05	1550.9	251.8	4204.8	557.513	993.4	122.64	2979.2
	12:10	1552.2	266.3	4176.0	550.470	1001.7	121.80	3000.4
6	12:15	1585.1	281.0	4233.6	564.598	1020.5	123.48	3023
	12:20	1583.9	295.6	4204.8	557.513	1026.4	122.64	3042.7
	12:25	1595.4	310.2	4204.8	557.513	1037.9	122.64	3059.4
				4209.6				
	12:30	1875.6	327.2	4896.0	738.810	1136.8	142.80	3135
	12:35	1913.7	344.0	4838.4	722.811	1190.9	141.12	3166.8
	12:40	1988.5	360.7	4809.6	714.871	1273.6	140.28	3195.6
	12:45	2008.7	377.6	4867.2	730.790	1277.9	141.96	3215.2
	12:50	2007.4	394.6	4896.0	738.810	1268.6	142.80	3233.3
	12:55	2011.1	411.6	4896.0	738.810	1272.3	142.80	3252.9
7				4867.2				
	1:00	2322.7	431.1	5616.0	952.284	1370.4	163.80	3327
	1:05	2349.3	450.5	5587.2	943.269	1406.0	162.96	3361.8
	1:10	2414.2	469.9	5587.2	943.269	1470.9	162.96	3396.6
	1:15	2418.0	489.5	5644.8	961.338	1456.7	164.64	3416.2
	1:20	2423.0	508.9	5587.2	943.269	1479.7	162.96	3437.4
	1:25	2490.4	528.5	5644.8	961.338	1529.1	164.64	3458.5
				5611.2				
	OUT	OF WATER						
FALLOFF	1:26	1202.0				1202.0		3272.4
	1:27	1146.2				1146.2		3204.3
	1:28	1095.5				1095.5		3152.8
	1:29	1053.7				1053.7		3092.3
	1:30	1018.2				1018.2		3074.2
	1:35	886.2				886.2		2942.6
	1:40	792.3				792.3		2848.9
	1:45	717.4				717.4		2774.8

MAY-19-97 MON 13:09 505 397 0450 P.01

STEP RATE INJECTION TEST

TEXACO EXPLORATION AND PRODUCTION



WEST-TEST, INC.
A SUBSIDIARY OF JOHN WEST ENGINEERING COMPANY
Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: TEXACO EXPLORATION AND PRODUCTION

DATE: DECEMBER 9, 1996

WELL NAME: CENTRAL VACUUM UNIT NO. 73
LEA COUNTY, NEW MEXICO

WO#: 96-14-1584

PERFS = 4388-4712

TUBING DEPTH = 4300

BHP GAUGE DEPTH = 4250

STEP NO. & REMARKS	TIME	(1) SURFACE TUBING PRESS. (psig)	(2) CUMMULATIVE VOL INJECTED (bbls)	(3) INJECTION RATE (bbls/day)	(4) FRICTION HEAD LOSS (psi)	(5) CORRECTED TUBING PRESS. (psi) (1)-(4)	(6) INJECTION RATE (gpm) (3)/34.2857	(7) MEASURED BHP (psi)
1	9:10	78.2				78.2		1996.5
	9:15	329.3	3.5	1008.0	37.208	292.1	29.40	2137.1
	9:20	345.7	7.1	1036.8	39.199	306.5	30.24	2168.8
	9:25	369.7	10.7	1036.8	39.199	330.5	30.24	2184.0
	9:30	388.6	14.3	1036.8	39.199	349.4	30.24	2197.6
	9:35	377.1	18.0	1065.6	41.237	335.9	31.08	2206.7
	9:40	397.3	21.6	1036.8	39.199	358.1	30.24	2211.2
				1036.8				
	9:45	841.6	28.6	2016.0	134.135	707.5	58.80	2370.0
	9:50	882.1	35.6	2016.0	134.135	748.0	58.80	2407.7
2	9:55	916.3	42.6	2016.0	134.135	782.2	58.80	2438.0
	10:00	936.6	49.6	2016.0	134.135	802.5	58.80	2457.6
	10:05	953.1	56.6	2016.0	134.135	819.0	58.80	2474.2
	10:10	964.4	63.5	1987.2	130.611	833.8	57.96	2487.8
				2011.2				
	10:15	1665.3	74.3	3110.4	299.188	1366.1	90.72	2697.8
	10:20	1662.8	84.9	3052.8	289.019	1373.8	89.04	
	10:25	1727.4	95.6	3081.6	294.083	1433.3	89.88	2814.1
	10:30	1748.9	106.4	3110.4	299.188	1449.7	90.72	2830.7
	10:35	1772.9	117.1	3081.6	294.083	1478.8	89.88	2853.4
3	10:40	1758.9	127.9	3110.4	299.188	1459.7	90.72	2871.5
				3091.2				
	10:45	2456.1	141.9	4032.0	483.556	1972.5	117.60	3067.9
	10:50	2428.5	155.8	4003.2	477.186	1951.3	116.76	3095.1
	10:55	2550.6	170.0	4089.6	496.413	2054.2	119.28	3108.8
	11:00	2479.3	183.9	4003.2	477.186	2002.1	116.76	3105.7
	11:05	2495.8	198.0	4060.8	489.965	2005.8	118.44	3136.0
	11:10	2511.1	212.2	4089.6	496.413	2014.7	119.28	3154.2
				4046.4				

STEP NO. & REMARKS	TIME	(1) SURFACE TUBING PRESS. (psig)	(2) CUMMULATIVE VOL. INJECTED (bbls)	(3) INJECTION RATE (bbls/day)	(4) FRICTION HEAD LOSS (psi)	(5) CORRECTED TUBING PRESS. (psi) (1)-(4)	(6) INJECTION RATE (gpm) (3)/34.2857	(7) MEASURED BHP (psi)
5	11:15	3185.9	229.4	4953.6	707.681	2478.2	144.48	3302.4
	11:20	3211.4	246.5	4924.8	700.088	2511.3	143.64	3337.2
	11:25	3199.9	263.6	4924.8	700.088	2499.8	143.64	3361.4
	11:30	3221.6	280.6	4896.0	692.533	2529.1	142.80	3385.6
	11:35	3220.3	297.5	4867.2	685.015	2535.3	141.96	3408.3
	11:40	3229.2	314.3	4838.4	677.536	2551.7	141.12	3435.6
				4900.8				
	11:45	1595.0	324.0	2793.6	245.266	1349.7	81.48	3086.1
	11:50	1557.0	333.8	2822.4	249.964	1307.0	82.32	3028.7
		1537.0	342.0	2803.0	200.549	1356.5	73.08	2997.0
6	12:00	1527.8	351.4	2563.2	209.161	1318.6	74.76	2975.8
	12:05	1538.6	360.4	2592.0	213.530	1325.1	75.60	2960.7
	12:10	1519.0	369.4	2592.0	213.530	1305.5	75.60	2948.6
				2644.8				
	12:15	1796.6	380.3	3139.2	304.333	1492.3	91.56	3012.0
	12:20	1799.2	391.1	3110.4	299.188	1500.0	90.72	3018.0
	12:25	1797.9	402.0	3139.2	304.333	1493.6	91.56	3030.1
	12:30	1805.5	412.9	3139.2	304.333	1501.2	91.56	3034.7
	12:35	1810.6	423.7	3110.4	299.188	1511.4	90.72	3039.2
	12:40	1814.4	434.5	3110.4	299.188	1515.2	90.72	3043.7
7				3124.8				
	12:45	2233.6	447.7	3801.6	433.682	1799.9	110.88	3140.5
	12:50	2228.5	460.7	3744.0	421.604	1806.9	109.20	3166.2
	12:55	2255.2	473.7	3744.0	421.604	1833.6	109.20	3188.9
	1:00	2255.3	486.8	3772.8	427.624	1827.7	110.04	3205.6
	1:05	2265.6	499.7	3715.2	415.624	1850.0	108.36	3214.7
	1:10	2311.5	512.7	3744.0	421.604	1889.9	109.20	3232.9
				3753.6				
	1:15	2750.6	528.0	4406.4	569.887	2180.7	128.52	3337.2
	1:20	2799.0	543.3	4406.4	569.887	2229.1	128.52	3356.9
8	1:25	2824.6	558.7	4435.2	576.797	2247.8	129.36	3382.6
	1:30	2828.6	574.0	4406.4	569.887	2258.7	128.52	3394.7
	1:35	2818.5	589.4	4435.2	576.797	2241.7	129.36	3405.3
	1:40	2835.1	604.7	4406.4	569.887	2265.2	128.52	3420.4
				4416.0				
NOTE: SHUT DOWN DUE TO LEAKING STEM ON WELL HEAD VALVE. FOUND HOLE IN VALVE BODY.								

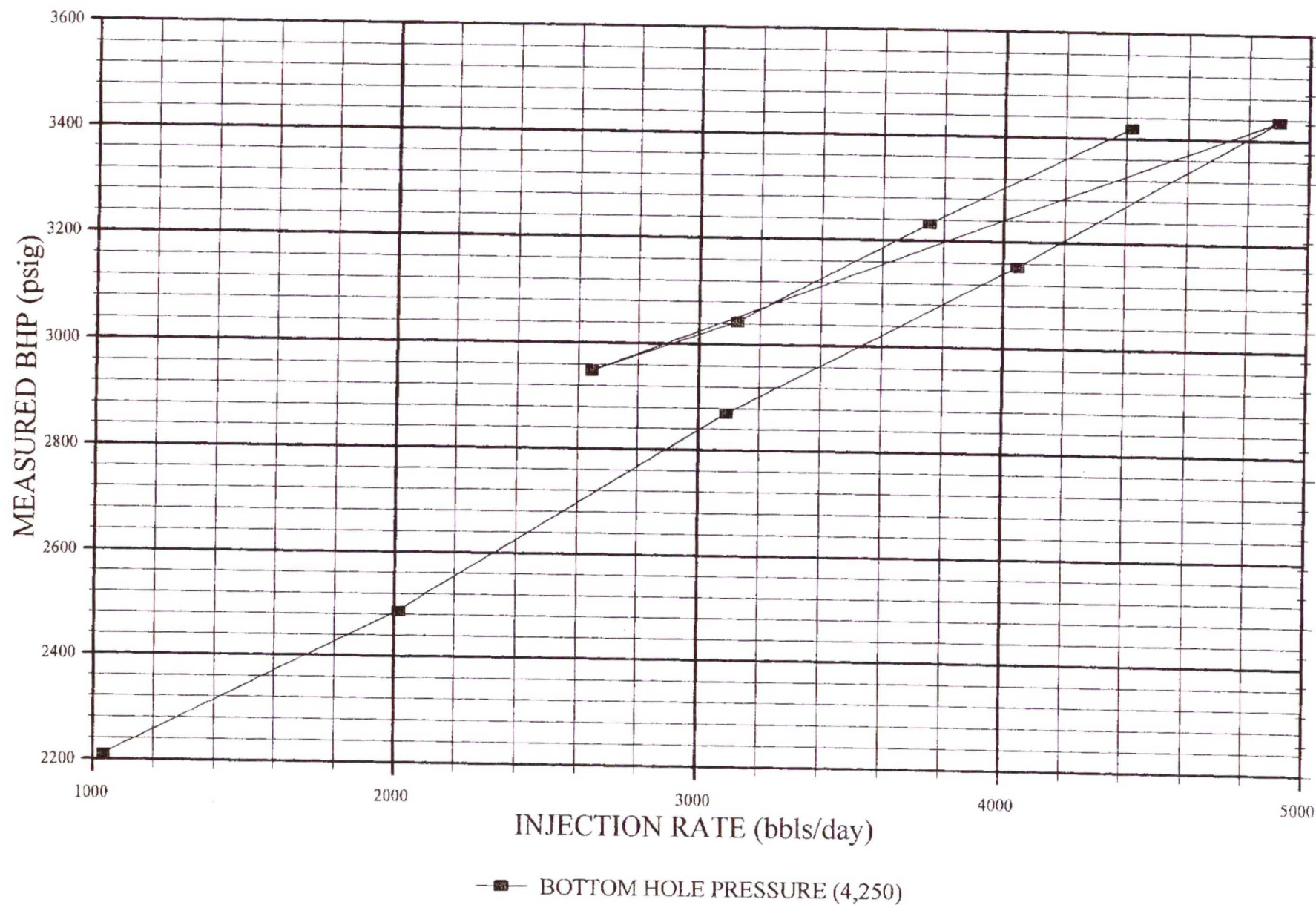
MAY-19-97 MON 13:12 505 397 0450 P.04

WEST-TEST, INC. (A SUBSIDIARY OF JOHN WEST ENGINEERING COMPANY)

STEP RATE INJECTION TEST

TEXACO EXPLORATION AND PRODUCTION

Well Name:
Central Vacuum Unit No. 73
Lea County, N.M



05/19/97 13:21 505 397 0450

MAY-19-97 MON 13:13

505 397 0450

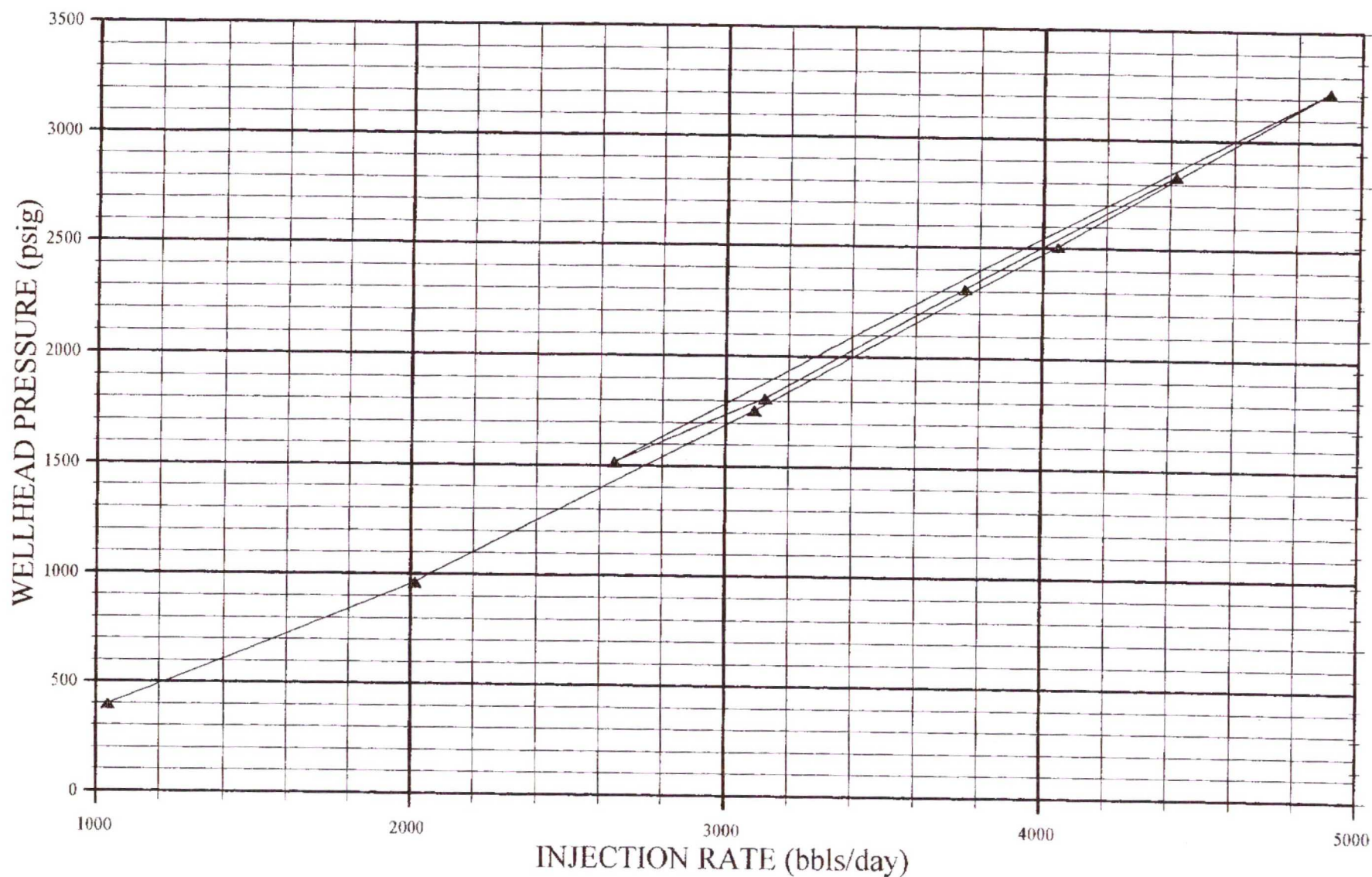
P.05

WEST-TEST, INC. (A SUBSIDIARY OF JOHN WEST ENGINEERING COMPANY)

STEP RATE INJECTION TEST

TEXACO EXPLORATION AND PRODUCTION

Well Name:
Central Vacuum Unit No. 73
Lea County, N.M



—▲— RECORDED WELLHEAD PRESSURE

WEST-TEST, INC.
A SUBSIDIARY OF JOHN WEST ENGINEERING COMPANY
Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: TEXACO EXPLORATION AND PRODUCTION

DATE: DECEMBER 10, 1996

WELL NAME: CENTRAL VACUUM UNIT NO. 99
LEA COUNTY, NEW MEXICO

WO#: 96-14-1585

PERFS = 4315-4712

TUBING DEPTH = 4271

BHP GAUGE DEPTH = 4200

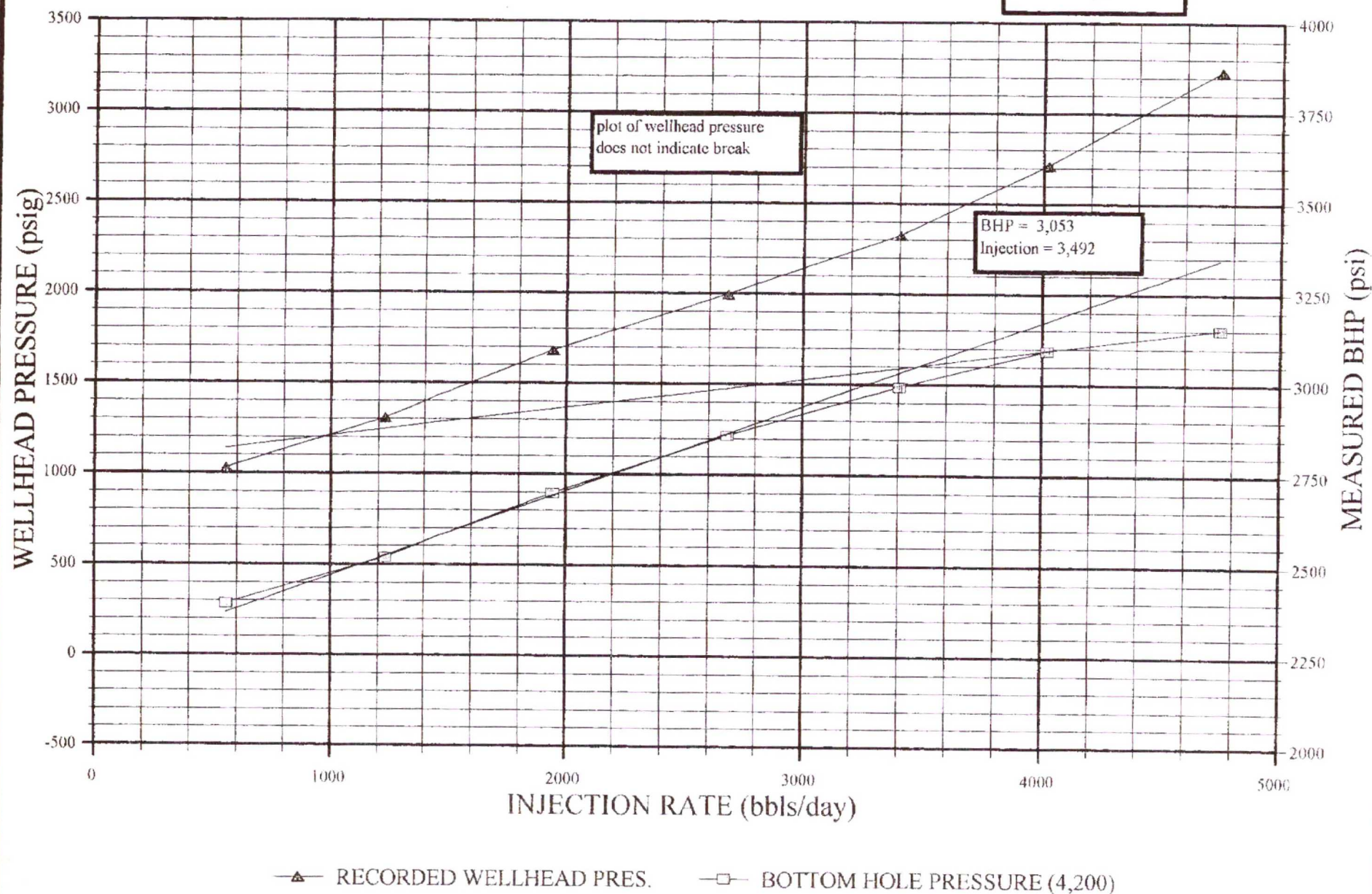
STEP NO. & REMARKS	TIME	(1) SURFACE TUBING PRESS. (psig)	(2) CUMMULATIVE VOL. INJECTED (bbls)	(3) INJECTION RATE (bbls/day)	(4) FRICTION HEAD LOSS (psi)	(5) CORRECTED TUBING PRESS. (psi) (1)-(4)	(6) INJECTION RATE (gpm) (3)/34.2857	(7) MEASURED BHP (psi)
1	9:20	889.6				889.6		2329.3
	9:25	959.4	1.9	547.2	11.876	947.5	15.96	2368.9
	9:30	993.7	3.8	547.2	11.876	981.8	15.96	2371.9
	9:35	1008.9	5.8	576.0	13.058	995.8	16.80	2381.1
	9:40	1010.1	7.7	547.2	11.876	998.2	15.96	2387.2
	9:45	1031.7	9.7	576.0	13.058	1018.6	16.80	2390.2
	9:50	1032.9	11.6	547.2	11.876	1021.0	15.96	2393.3
				556.8				
	9:55	1206.6	15.9	1238.4	53.813	1152.8	36.12	2429.9
	10:00	1245.9	20.1	1209.6	51.521	1194.4	35.28	2460.3
2	10:05	1263.6	24.4	1238.4	53.813	1209.8	36.12	2481.7
	10:10	1285.1	28.7	1238.4	53.813	1231.3	36.12	2496.9
	10:15	1308.0	33.0	1238.4	53.813	1254.2	36.12	2509.1
	10:20	1306.7	37.2	1209.6	51.521	1255.2	35.28	2521.3
				1228.8				
	10:25	1541.2	43.8	1900.8	118.885	1422.3	55.44	2564.0
	10:30	1566.6	50.4	1900.8	118.885	1447.7	55.44	2600.6
	10:35	1632.5	57.2	1958.4	125.635	1506.9	57.12	2634.1
	10:40	1642.6	64.0	1958.4	125.635	1517.0	57.12	2655.5
	10:45	1670.5	70.8	1958.4	125.635	1544.9	57.12	2676.8
3	10:50	1683.1	77.7	1987.2	129.075	1554.0	57.96	2698.1
				1944.0				
	10:55	1973.4	87.1	2707.2	228.695	1744.7	78.96	2765.2
	11:00	2016.5	96.6	2736.0	233.216	1783.3	79.80	2795.7
	11:05	1982.3	105.9	2678.4	224.215	1758.1	78.12	2814.0
	11:10	1988.6	115.1	2649.6	219.775	1768.8	77.28	2829.2
	11:15	1992.4	124.3	2649.6	219.775	1772.6	77.28	2844.5
	11:20	1997.4	133.5	2649.6	219.775	1777.6	77.28	2859.7
				2678.4				

STEP NO. & REMARKS	TIME	(1) SURFACE TUBING PRESS. (psig)	(2) CUMMULATIVE VOL. INJECTED (bbls)	(3) INJECTION RATE (bbls/day)	(4) FRICTION HEAD LOSS (psi)	(5) CORRECTED TUBING PRESS. (psi) (1)-(4)	(6) INJECTION RATE (gpm) (3)/34.2857	(7) MEASURED BHP (psi)
5	11:25	2352.3	145.0	3312.0	332.094	2020.2	96.60	2929.8
	11:30	2370.1	156.9	3427.2	353.779	2016.3	99.96	2954.2
	11:35	2358.7	168.8	3427.2	353.779	2004.9	99.96	2963.4
	11:40	2348.5	180.6	3398.4	348.299	2000.2	99.12	2963.4
	11:45	2330.6	192.4	3398.4	348.299	1982.3	99.12	2975.6
	11:50	2328.1	204.4	3456.0	359.299	1968.8	100.80	2993.9
				3403.2				
	11:55	2695.7	218.3	4003.2	471.572	2224.1	116.76	3045.7
	12:00	2711.0	232.2	4003.2	471.572	2239.4	116.76	3054.9
	12:05	2698.2	246.1	4003.2	471.572	2226.6	116.76	3061.0
6	12:10	2722.4	260.1	4032.0	477.867	2244.5	117.60	3073.2
	12:15	2726.2	274.1	4032.0	477.867	2248.3	117.60	3079.3
	12:20	2716.0	288.1	4032.0	477.867	2238.1	117.60	3094.5
				4017.6				
	12:25	3175.9	304.5	4723.2	640.371	2535.5	137.76	3152.4
	12:30	3205.3	320.9	4723.2	640.371	2564.9	137.76	3152.4
	12:35	3168.2	337.4	4752.0	647.613	2520.6	138.60	3152.4
	12:40	3219.3	353.9	4752.0	647.613	2571.7	138.60	3152.4
	12:45	3204.0	370.4	4752.0	647.613	2556.4	138.60	3152.4
	12:50	3234.7	387.0	4780.8	654.893	2579.8	139.44	3152.4
FALLOFF				4747.2				
	12:51	1402.7				1402.7		
	12:52	1374.8				1374.8		
	12:53	1362.1				1362.1		
	12:54	1350.7				1350.7		
	12:55	1341.8				1341.8		
	1:00	1310.1				1310.1		
	1:05	1277.7				1277.7		

STEP RATE INJECTION TEST

TEXACO EXPLORATION AND PRODUCTION

Well Name:
Central Vacuum
Unit No 99
Lea County, N.M



BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE NO. 6008
Order No. R-5530

APPLICATION OF TEXACO INC., FOR
A PRESSURE MAINTENANCE PROJECT,
LEA COUNTY, NEW MEXICO.

Also see R-5530-A
R-5530-B
R-5530-C
R-5530-D

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on August 17, 1977, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 20th day of September, 1977, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

- (1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.
- (2) That by Commission Order No. R-5496 dated August 9, 1977, statutory unitization was approved for the Central Vacuum Unit Area, Lea County, New Mexico.
- (3) That the applicant herein, Texaco Inc., seeks authority to institute a pressure maintenance project on the aforesaid Central Vacuum Unit Area, Vacuum Grayburg-San Andres Pool, Lea County, New Mexico, by the injection of water into the San Andres formation through the 55 wells described on Exhibit A attached to this order.
- (4) That to permit an efficient injection pattern, the unorthodox locations of the 54 new injection wells as reflected on said Exhibit A should be approved.
- (5) That the applicant further seeks the designation of a project area and the promulgation of special rules and regulations governing said project including special allowable provisions.
- (6) That the project area should consist of those proration units within the boundary of said Central Vacuum Unit upon which is located an injection well and any directly or diagonally offsetting proration unit which contains a producing well.

(7) That the total project area allowable should be equal to the sum of the basic project area allowable plus the water injection credit allowable, and said total project area allowable should be limited to 80 barrels of oil per day times the number of developed 40-acre proration units in the project area times two.

(8) That the basic project area allowable should be equal to 80 barrels of oil per day times the number of developed 40-acre proration units in the project area.

(9) That the water injection credit allowable should be based on the following formula:

$$\text{Water Injection Credit Allowable} = \left[\frac{\text{net water injected}}{\text{basic project area allowable voidage}} \right] \times \text{basic project area allowable}$$

and should be calculated as follows:

$$\text{Water Injection Credit Allowable} = \left\{ \frac{W_i - W_p}{\text{BPAA} \left[\beta_o + \left(\frac{R_p - R_s}{1000} \right) \beta_g \right]} - 1 \right\} \text{BPAA}$$

where W_i = Average daily water injection during previous month, project area
 W_p = Average daily water production during previous month, project area
 BPAA = Basic Project Area Allowable = 80 x number of 40-acre tracts in project area
 β_o = Oil formation volume factor, reservoir barrels per stock tank barrel, as determined from Exhibit B, for latest available project area reservoir pressure
 R_p = Producing gas-oil ratio, cubic feet per barrel, during previous month, project area
 R_s = Solution gas-oil ratio, cubic feet per barrel, as determined from Exhibit B, for latest available project area reservoir pressure
 β_g = Gas formation volume factor, reservoir barrels per MCF, as determined from Exhibit B, for latest available project area reservoir pressure

In no event should the Water Injection Credit Allowable be less than zero.

(10) That the project area allowable should be produced from the wells within the project area in any proportion provided that any proration unit situated on the boundary of said Central Vacuum Unit which proration unit is not directly or diagonally offset by a San Andres injection well outside the unit should not be permitted to produce in excess of 80 barrels of oil per day.

(11) That each of the newly drilled injection wells in the project should be equipped with surface casing and production casing set at approximately 350 feet and 4800 feet, respectively, and cemented to the surface.

(12) That injection should be accomplished through 2 3/8-inch plastic coated tubing installed in a packer which should be set approximately 50 feet above the uppermost perforation in the case of newly drilled wells and at approximately 4376 feet in the one well to be converted to injection.

(13) That the casing-tubing annulus in each injection well should be filled with an inert fluid and that a pressure gauge or approved leak detection device should be attached to the annulus in order to determine leakage in the casing, tubing, or packer.

(14) That the injection wells or system should be equipped with a pop-off valve or acceptable substitute which will limit the surface injection pressure to no more than 0.2 pounds per foot of depth to the uppermost perforation unless the Secretary-Director of the Commission should administratively authorize a higher pressure.

(15) That there are 15 wells, as set out on Exhibit C to this order, which are located within or immediately adjacent to the boundaries of said Central Vacuum Unit which are completed or plugged in such a manner that will not assure that they will not serve as channels for injected water to migrate from the San Andres formation to other formations or to the surface.

(16) That to prevent migration of injected water from the San Andres formation, formation injection pressure at wells offsetting the wells identified on said Exhibit C should be limited to hydrostatic pressure until such time as the wells on said Exhibit C have been repaired or it shall otherwise be demonstrated to the satisfaction of the Secretary-Director of the Commission that the same will not serve as avenues for escape of such waters.

(17) That the wells within the project should be equipped to facilitate periodic testing of the annular space between strings of production and surface casing.

(18) That the operator should take all other steps necessary to ensure that the injected water enters only the proposed injection interval and is not permitted to escape to other formations or onto the surface from injection, producing, or plugged and abandoned wells.

(19) That approval of the subject application should result in the recovery of additional volumes of oil from the Central Vacuum Unit Area, thereby preventing waste.

(20) That the application should be approved.

IT IS THEREFORE ORDERED:

X (1) That the applicant, Texaco Inc., is hereby authorized to institute a pressure maintenance project in the Central Vacuum Unit Area, Vacuum-Grayburg-San Andres Pool, Lea County, New Mexico, by the injection of water into 55 wells at orthodox and unorthodox locations as set out on Exhibit A attached to this order and by reference made a part hereof.

X (2) That each of the newly drilled injection wells shall be equipped with surface casing and production casing set at approximately 350 feet and 4800 feet, respectively, and cemented to the surface.

X (3) That injection shall be accomplished through 2 3/8-inch plastic coated tubing installed in a packer set approximately 50 feet above the uppermost perforation in the case of newly drilled wells and at approximately 4376 feet in the one existing well converted to injection.

X (4) That the casing-tubing annulus in each injection well shall be filled with an inert fluid and a pressure gauge or approved leak detection device shall be attached to the annulus in order to determine leakage in the casing, tubing, or packer.

X (5) That the injection wells or system shall be equipped with a pop-off valve or acceptable substitute which will limit the surface injection pressure to no more than 0.2 pounds per foot of depth to the uppermost perforations.

X (6) That the Secretary-Director of the Commission may
X administratively authorize a pressure limitation in excess of
that set out in Order No. (5) above upon a showing by the
operator that such higher pressure will not result in fracturing
of the confining strata. *amended - see R-5530-A*

X (7) That the applicant shall not inject water into the
formation of any well located on a 40-acre tract that has
on it, or that directly or diagonally offsets a tract that has
on it, one of the 15 wells identified on Exhibit C attached
hereto and by reference made a part hereof, at a pressure
greater than hydrostatic until such well has been repaired
or it has been shown to the satisfaction of the Secretary-
Director of the Commission that such well will not serve as
an avenue of escape for waters injected into the San Andres
formation and he has authorized a higher than hydrostatic
pressure. *amended - all R-5530-A*

X (8) That the wells within the project area shall be
equipped with risers or in another acceptable manner such as
to facilitate the periodic testing of the bradenhead for
pressure or fluid production.

X (9) That the operator shall immediately notify the super-
visor of the Commission district office at Hobbs of the failure
of the tubing or packer in any of said injection wells, the
leakage of water or oil from or around any producing well, the
X leakage of water or oil from or around any plugged and abandoned
well within the project area, or any other evidence of fluid
migration from the injection zone, and shall take such timely
steps as may be necessary or required to correct such failure
or leakage. *amended - All R-5530-A*

X (10) That the pressure maintenance project shall be
designated the Texaco Inc. Central Vacuum Unit Pressure
Maintenance Project.

X (11) That the project area of said Central Vacuum Unit
Pressure Maintenance Project shall consist of those proration
units within the boundary of the Central Vacuum Unit upon which
is located an injection well and any directly or diagonally
offsetting proration unit which contains a producing well.

X (12) That those wells within the Central Vacuum Unit
Area that are not included within the project area as defined
above shall be prorated in accordance with the Rules and
Regulations of the Commission. *amended - see R-5530-A*

*Amended
R-5530-C*

X (13) That the project area shall receive a project area allowable, and said project area allowable shall be the sum of the basic project area allowable plus the water injection credit allowable, and shall be limited to 80 barrels of oil per day times the number of developed 40-acre project area times two.

X (14) That the basic project area allowable shall be equal to 80 barrels of oil per day times the number of developed 40-acre proration units in the project area.

X (15) That the water injection credit allowable shall be based on the following formula:

$$\text{Water Injection Credit Allowable} = \left[\frac{\text{net water injected}}{\text{basic project area allowable voidage}} \right] \times \text{basic project area allowable}$$

and should be calculated as follows:

$$\text{Water Injection Credit Allowable} = \left\{ \frac{W_i - W_p}{\left[\text{BPAA} \left[\beta_o + \left(\frac{R_p - R_s}{1000} \right) \beta_g \right] \right] - 1} \right\} \text{BPAA}$$

where:

- W_i = Average daily water injection during previous month, barrels per day, project area only
- W_p = Average daily water produced during previous month, barrels per day, project area only
- BPAA = Basic Project Area Allowable = 80 x number of 40-acre tracts in project area
- β_o = Oil formation volume factor, reservoir barrels per stock tank barrel, as determined from Exhibit B (attached hereto and by reference made a part hereof), for the latest available project area reservoir pressure
- R_p = Producing gas-oil ratio, cubic feet per barrel, for previous month, project area only
- R_s = Solution gas-oil ratio, cubic feet per barrel, as determined from Exhibit B, for the latest available project area reservoir pressure
- β_g = Gas formation volume factor, reservoir barrels per MCF, as determined from Exhibit B, for latest available project area reservoir pressure

In no event shall the Water Injection Credit Allowable be less than zero, i.e., negative numbers derived from application of the above formula shall be ignored.

16 X (13) That the average project area reservoir pressure shall be determined prior to the commencement of injection of water into the reservoir and at least annually thereafter. The average project area pressure shall be the average of the pressures in at least ten representative wells selected by the operator of the unit and the Supervisor of the Hobbs District Office of the Commission at an agreed upon datum.
amended - see R-5530-A

17 X *Amend* (14) That the project area allowable may be produced from any well within the project area in any proportion provided, however, that any proration unit situated on the boundary of the Central Vacuum Unit which proration unit is not directly or diagonally offset by a San Andres injection well outside said Central Vacuum Unit shall not be permitted to produce in excess of 80 barrels of oil per day.
amended - see R-5530-A

18 X X (15) That each month the project operator shall submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total project area allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.
amended - see R-5530-A

19 X X (16) That the Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for the wells in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and, except as provided under Order (14) above, may be produced from the wells in the Project in any proportion.
amended - see R-5530-A

20 X (17) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

PHIL R. LUCERO, Chairman

EMERY C. ARNOLD, Member

JOE D. RAMEY, Member & Secretary

S E A L

dr/

*Insert
20*

CENTRAL VACUUM UNIT
Authorized Injection Wells

54 new wells to be drilled at the following locations:

<u>WELL NO.</u>	<u>LOCATION</u>	<u>SECTION</u>	<u>TOWNSHIP SOUTH</u>	<u>RANGE EAST</u>
5	1310' FNL & 1310' FWL	30	17	35
6	1310' FNL & 2630' FWL	30	17	35
7	1310' FNL & 1330' FEL	30	17	35
13	2630' FNL & 10' FEL	25	17	34
14	2630' FNL & 1310' FWL	30	17	35
15	2630' FNL & 2630' FWL	30	17	35
16	2630' FNL & 1330' FEL	30	17	35
25	1330' FSL & 1310' FWL	25	17	34
26	1330' FSL & 2630' FWL	25	17	34
27	1330' FSL & 1330' FEL	25	17	34
28	1330' FSL & 10' FEL	25	17	34
29	1330' FSL & 1310' FWL	30	17	35
30	1330' FSL & 2630' FWL	30	17	35
31	1330' FSL & 1330' FEL	30	17	35
40	10' FSL & 1310' FWL	25	17	34
41	10' FSL & 2630' FWL	25	17	34
42	10' FSL & 1330' FEL	25	17	34
43	10' FSL & 10' FEL	25	17	34
44	10' FSL & 1310' FWL	30	17	35
45	10' FSL & 2630' FWL	30	17	35
46	10' FSL & 1330' FEL	30	17	35
55	1310' FNL & 1310' FWL	36	17	34
56	1310' FNL & 2630' FWL	36	17	34
57	1310' FNL & 1330' FEL	36	17	34
58	1310' FNL & 10' FEL	36	17	34
59	1310' FNL & 1310' FWL	31	17	35
60	1310' FNL & 2630' FWL	31	17	35
61	1310' FNL & 1330' FEL	31	17	35
70	2630' FNL & 1310' FWL	36	17	34
71	2630' FNL & 2630' FWL	36	17	34
72	2630' FNL & 1330' FEL	36	17	34
73	2630' FNL & 10' FEL	36	17	34
74	2630' FNL & 1310' FWL	31	17	35
81	1330' FSL & 1310' FWL	36	17	34
82	1330' FSL & 2630' FWL	36	17	34
83	1330' FSL & 1330' FEL	36	17	34
84	1330' FSL & 10' FEL	36	17	34
85	1330' FSL & 1310' FWL	31	17	35
93	10' FSL & 1310' FWL	31	17	35
94	10' FSL & 2630' FWL	31	17	35
99	1310' FNL & 1310' FWL	6	18	35
100	1310' FNL & 2630' FWL	6	18	35
101	1310' FNL & 1330' FEL	6	18	35
106	2520' FNL & 1040' FWL	6	18	35

Case No. 6008
Order No. R-5530
Exhibit "A"

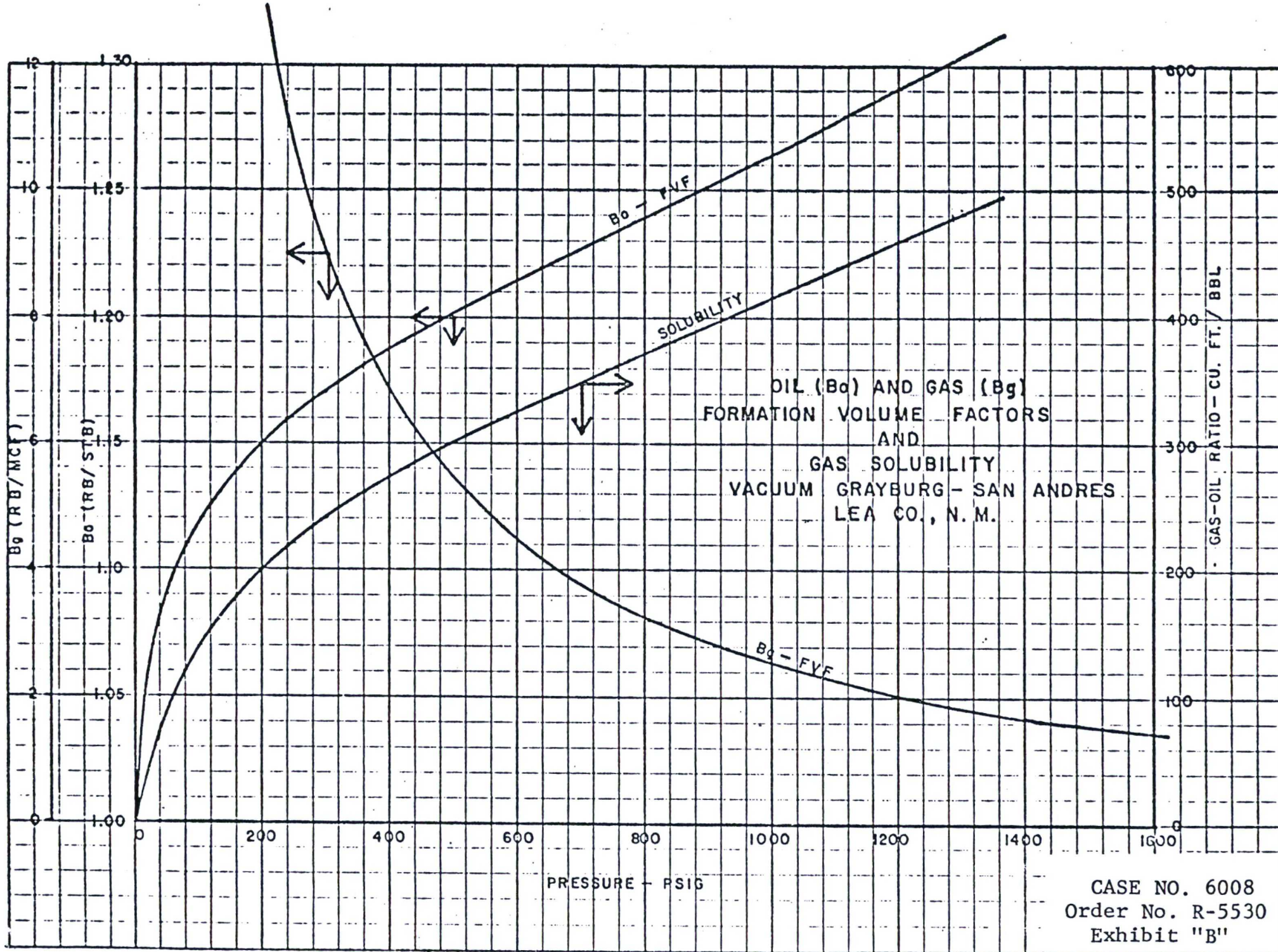
54 new wells to be drilled at the following locations continued

<u>WELL NO.</u>	<u>LOCATION</u>	<u>SECTION</u>	<u>TOWNSHIP</u> <u>SOUTH</u>	<u>RANGE</u> <u>EAST</u>
107	2450' FNL & 2630' FWL	6	18	35
108	2630' FNL & 1480' FEL	6	18	35
113	1620' FSL & 1100' FWL	6	18	35
114	1460' FSL & 2100' FWL	6	18	35
115	1600' FSL & 1500' FEL	6	18	35
120	60' FNL & 1100' FWL	7	18	35
121	400' FSL & 2380' FWL	6	18	35
122	350' FSL & 1560' FEL	6	18	35
128	1310' FNL & 200' FEL	12	18	34
129	1310' FNL & 2630' FWL	7	18	35

One existing well, Sun Oil Company Lea State "B" No. 7 located as follows:

131	2119' FNL & 918' FWL	7	18	35
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Case No. 6008
Order No. R-5530
Exhibit "A"



CASE NO. 6008
Order No. R-5530
Exhibit "B"

<u>OPERATOR</u>	<u>LEASE</u>	<u>WELL NO.</u>	<u>UT.</u>	<u>SEC.</u>	<u>TWP.</u>	<u>RGE.</u>
Continental Oil Co.	State H 35	9	H	35	17S	34E
Getty Oil Company	State AN	8	P	7	18S	35E
Getty Oil Company	State AN	9	I	7	18S	35E
Getty Oil Company	State BA	6	D	36	17S	34E
Marathon Oil Co.	Warn State A/c 2	6	K	6	18S	35E
Marathon Oil Co.	Warn State A/c 2	10	K	6	18S	35E
Mobil Oil Corp.	Bridges State	11	F	25	17S	34E
Mobil Oil Corp.	State DD	1	D	31	17S	35E
Phillips Petroleum Co.	Santa Fe	87	L	31	17S	35E
Texaco Inc.	New Mexico "AB" State	5	J	6	18S	35E
Texaco Inc.	New Mexico "AE" State	4	F	12	18S	34E
Texaco Inc.	New Mexico "O" State NCT-1	14	J	36	17S	34E
Texaco Inc.	New Mexico "O" State NCT-1	18	H	36	17S	34E
Texaco Inc.	New Mexico "P" State	1	J	7	18S	35E
Texaco Inc.	New Mexico "Q" State	4	P	25	17S	34E

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Exhibit "C"