NEW MEXICO ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

Oil Conservation Division

CF 10103
R-9359

July 27, 1995

Sage Energy Company
P.O. Drawer 3068
Midland, Texas 79702-3068

Attn: Mr. Jay H. Hardy

RE: Injection Pressure Increase North Vacuum (Abo) North Unit Waterflood Project Lea County, New Mexico

Dear Mr. Hardy:

Reference is made to your request dated June 28, 1995 to increase the surface injection pressure on three wells in the above referenced waterflood project. This request is based on a step rate tests conducted between November 16 and 18, 1994. 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:

Well and Location	Maximum Injection Surface Pressure
NVANU 1B Well No.1, Unit F, Section 1	3480 PSIG
NVANU 19 Well No.1, Unit H, Section 2	2810 PSIG
NVANU 19 Well No.2, Unit J, Section 2	3090 PSIG
All located in Township 17 South, Range 34 East, Lea County, New Mexico.	

The Division Director may rescind this injection pressure increase if it becomes apparent that the injected water is not being confined to the injection zone or is endangering any fresh water aquifers.

Sincerely,

William J. LeMay
Director

OFFICE OF THE SECRETARY - P. O. BOX 6429 - SANTA FE, NM 87505-6429 - (505) 827-5950
ADMINISTRATIVE SERVICES DIVISION - P. O. BOX 6429 - SANTA FE, NM 87505-6429 - (505) 827-5925
ENERGY CONSERVATION AND MANAGEMENT DIVISION - P. O. BOX 6429 - SANTA FE, NM 87505-6429 - (505) 827-5900
FORESTRY AND RESOURCES CONSERVATION DIVISION - P. O. BOX 1948 - SANTA FE, NM 87504-1948 - (505) 827-5830
MINING AND MINERALS DIVISION - P. O. BOX 6429 - SANTA FE, NM 87505-6429 - (505) 827-5970
OIL CONSERVATION DIVISION - P. O. BOX 6429 - SANTA FE, NM 87505-6429 - (505) 827-7131
PARK AND RECREATION DIVISION - P. O. BOX 1147 - SANTA FE, NM 87504-1147 - (505) 827-7465

WJL/BES

cc: Oil Conservation Division - Hobbs
File: Case File No.10103; PSI-X 3rd QTR 95
1st

PSIX N/R

CONSERVATION DIVISION
RECEIVED
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SAGE ENERGY COMPANY
P. O. DRAWER 3068
MIDLAND, TEXAS 79702

915/683-5271

June 28, 1995

State of New Mexico
Oil Conservation Division
P.O. Box 2088
Santa Fe, New Mexico 87504

Attention: Mr. David Catanach, Petroleum Engineer

Re: Injection Pressure Increase on Three Water Injection Wells
North Vacuum (Abo) North Unit (NVANU) (Order No. R-9359)
Lea County, New Mexico

Dear Mr. Catanach:

Sage Energy Company respectfully requests permission from the OCD to increase the allowable surface injection pressures on the subject wells (see attachment) from 1723 psig to the pressures as shown. This request is based on step rate tests which were run on the injection wells from November 16 - 18, 1994, by John West Engineering Company (copies attached).

Very truly yours,

Jay H. Hardy

Jay H. Hardy
V.P. Engineering

JHH/tjs

cc: OCD - Hobbs, Bonnie Pritchard
Well Files

Sage Energy Company
North Vacuum (Abo) North Unit
Lea County, New Mexico

REQUESTED SURFACE INJECTION PRESSURES

WELL AND LOCATION	MAXIMUM INJECTION SURFACE PRESSURE
Section 1, Township 17 South, Range 34 East, NMPM	
NVANU 1B No. 1, Unit F	3480 ~~3520~~ PSIG
Section 2, Township 17 South, Range 34, East, NMPM	
NVANU 19 No. 1, Unit H	2810 ~~2860~~ PSIG
NVANU 19 No. 2, Unit J	3090 ~~3140~~ PSIG

WEST-TEST, INC.

A SUBSIDIARY OF JOHN WEST ENGINEERING COMPANY

Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: SAGE ENERGY COMPANY

DATE: NOVEMBER 16, 1994

WELL NAME: NORTH VACUUM (ABO) NORTH UNIT 19 NO. 1
LEA COUNTY, NEW MEXICO

WO#: 94-14-1918

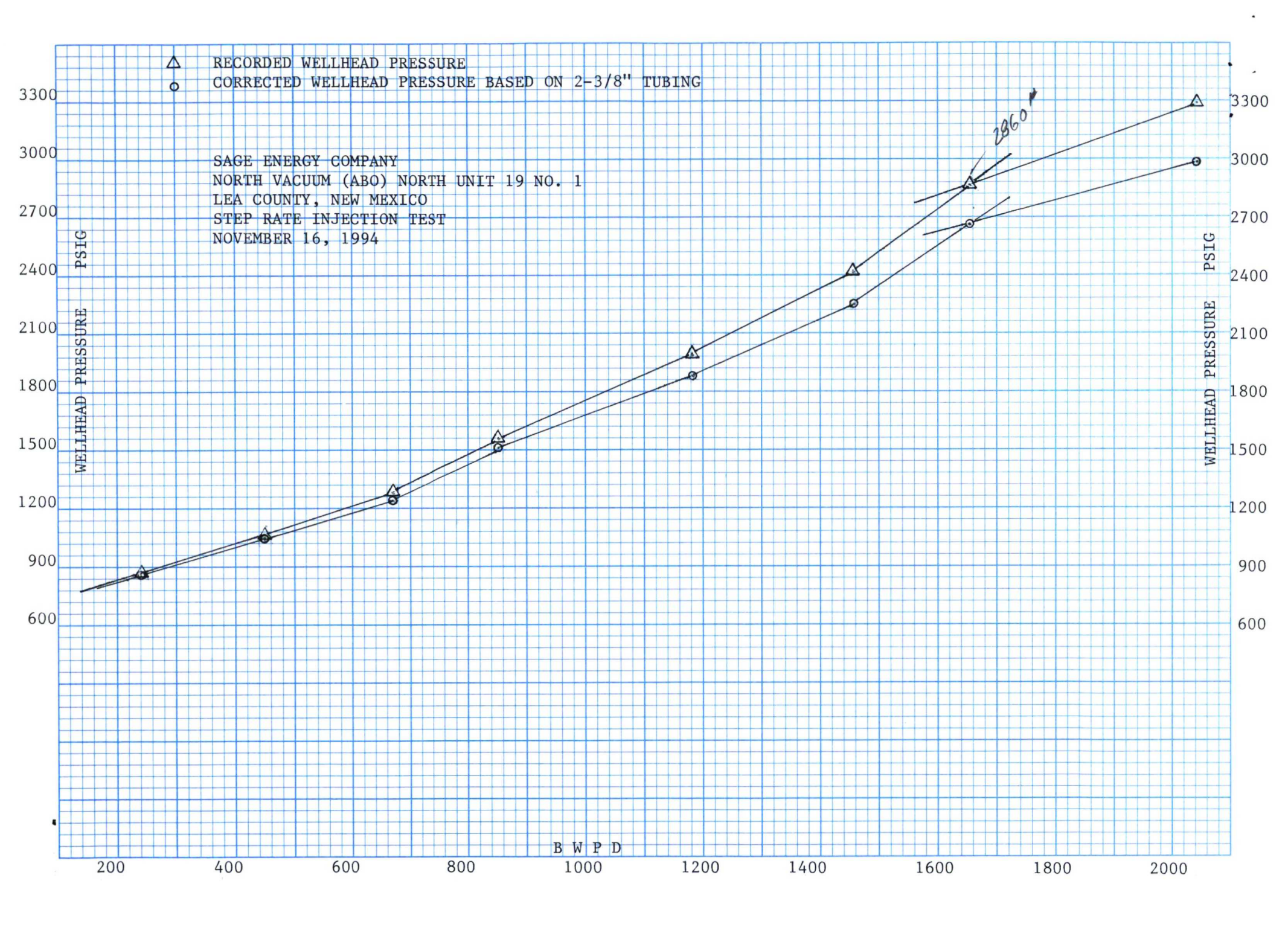
PERFS = 8695-8712

PACKER DEPTH = 8671

BHP GAUGE DEPTH = 8703

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)
	9:15	694.8				694.8		
	9:20	795.6	0.9	259.2	6.176	789.4	7.56	
	9:25	852.9	1.7	230.4	4.967	847.9	6.72	
1	9:30	856.6	2.5	230.4	4.967	851.6	6.72	
				240.0				
	9:35	957.5	4.1	460.8	17.907	939.6	13.44	
	9:40	1003.5	5.7	460.8	17.907	985.6	13.44	
2	9:45	1049.5	7.2	432.0	15.891	1033.6	12.60	
				451.2				
	9:50	1155.7	9.5	662.4	35.042	1120.7	19.32	
	9:55	1244.0	11.8	662.4	35.042	1209.0	19.32	
3	10:00	1282.4	14.2	691.2	37.912	1244.5	20.16	
				672.0				
	10:05	1410.3	17.2	864.0	57.288	1353.0	25.20	
	10:10	1498.6	20.2	864.0	57.288	1441.3	25.20	
4	10:15	1558.8	23.1	835.2	53.805	1505.0	24.36	
				854.4				
	10:20	1768.7	27.2	1180.8	102.103	1666.6	34.44	
	10:25	1883.9	31.3	1180.8	102.103	1781.8	34.44	
5	10:30	1981.1	35.4	1180.8	102.103	1879.0	34.44	
				1180.8				
	10:35	2184.9	40.5	1468.8	152.896	2032.0	42.84	
	10:40	2305.3	45.5	1440.0	147.396	2157.9	42.00	
6	10:45	2405.1	50.6	1468.8	152.896	2252.2	42.84	
				1459.2				
	10:50	2616.7	56.6	1728.0	206.524	2410.2	50.40	
	10:55	2769.4	62.7	1756.8	212.937	2556.5	51.24	
7	11:00	2868.2	68.9	1785.6	219.439	2648.8	52.08	
				1756.8				

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)
	11:05	3090.6	75.9	2016.0	274.676	2815.9	58.80	
	11:10	3182.0	83.0	2044.8	281.980	2900.0	59.64	
8	11:15	3282.4	90.2	2073.6	289.371	2993.0	60.48	
				2044.8				
FALLOFF	11:16	2958.9				2958.9		
	11:17	2889.5				2889.5		
	11:18	2852.9				2852.9		
	11:19	2813.6				2813.6		
	11:20	2777.5				2777.5		
	11:25	2636.0				2636.0		
	11:30	2527.8				2527.8		


RECORDED WELLHEAD PRESSURE
CORRECTED WELLHEAD PRESSURE BASED ON 2-3/8" TUBING
SAGE ENERGY COMPANY
NORTH VACUUM (ABO) NORTH UNIT 19 NO. 1
LEA COUNTY, NEW MEXICO
STEP RATE INJECTION TEST
NOVEMBER 16, 1994
2860
WELLHEAD PRESSURE PSIG
WELLHEAD PRESSURE PSIG
3300
3000
2700
2400
2100
1800
1500
1200
900
600
B W P D
200
400
600
800
1000
1200
1400
1600
1800
2000

WEST – TEST, INC.

A SUBSIDIARY OF JOHN WEST ENGINEERING COMPANY

Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: SAGE ENERGY COMPANY

DATE: NOVEMBER 17, 1994

WELL NAME: NORTH VACUUM (ABO) NORTH UNIT 19 NO. 2
LEA COUNTY, NEW MEXICO

WO#: 94-14-1919

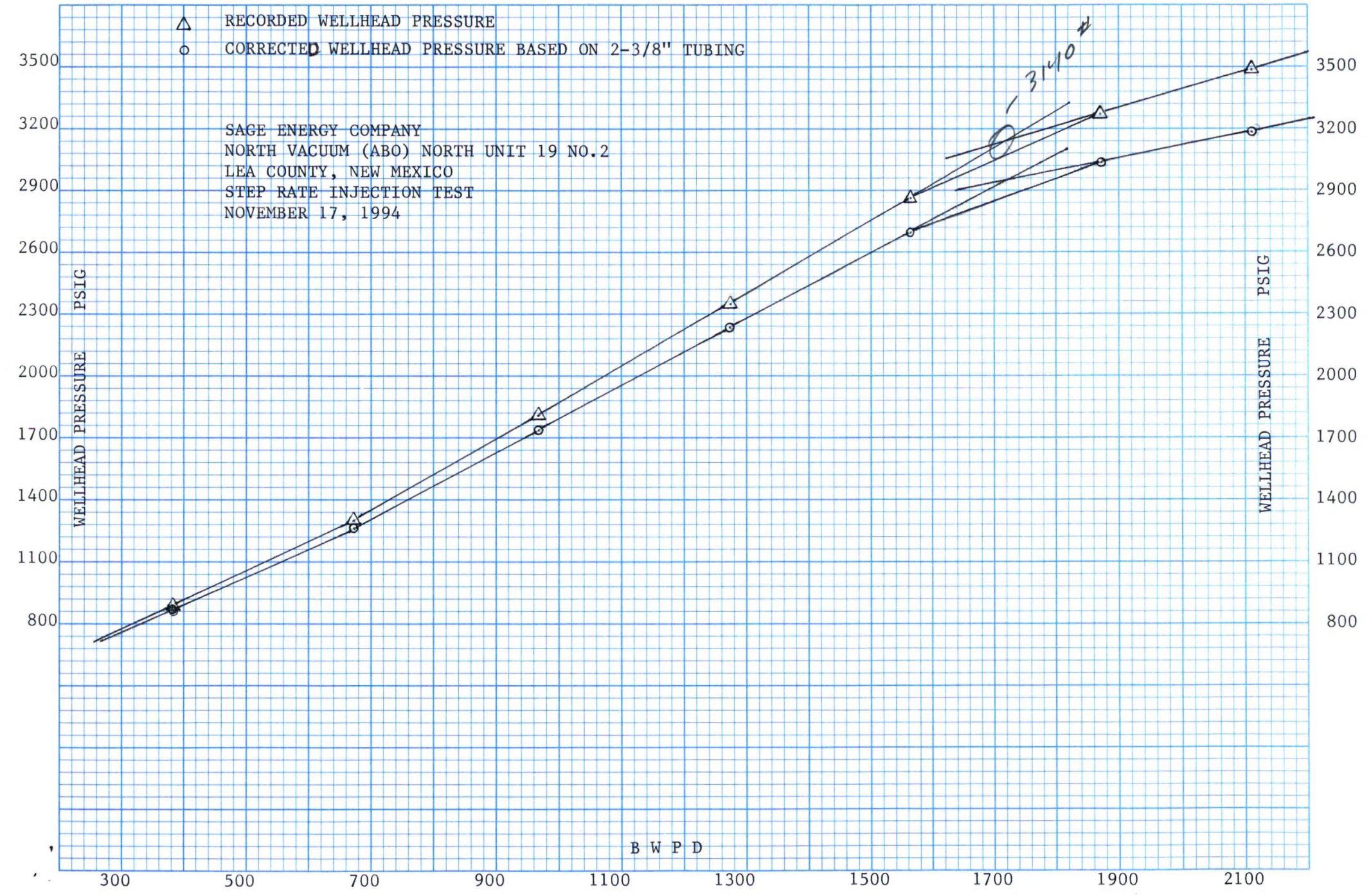
PERFS = 8694-8706

PACKER DEPTH = 8639

BHP GAUGE DEPTH = 8700

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)
	8:35	589.3				589.3		
	8:40	724.2	1.4	403.2	13.982	710.2	11.76	
	8:45	812.2	2.7	374.4	12.191	800.0	10.92	
1	8:50	872.2	4.0	374.4	12.191	860.0	10.92	
				384.0				
	8:55	1086.8	6.3	662.4	35.030	1051.8	19.32	
	9:00	1217.1	8.6	662.4	35.030	1182.1	19.32	
2	9:05	1296.3	11.0	691.2	37.899	1258.4	20.16	
				672.0				
	9:10	1557.3	14.3	950.4	68.311	1489.0	27.72	
	9:15	1699.3	17.7	979.2	72.190	1627.1	28.56	
3	9:20	1809.4	21.1	979.2	72.190	1737.2	28.56	
				969.6				
	9:25	2077.0	25.5	1267.2	116.313	1960.7	36.96	
	9:30	2230.7	30.0	1296.0	121.250	2109.4	37.80	
4	9:35	2351.2	34.4	1267.2	116.313	2234.9	36.96	
				1276.8				
	9:40	2625.7	39.8	1555.2	169.890	2455.8	45.36	
	9:45	2751.6	45.3	1584.0	175.756	2575.8	46.20	
5	9:50	2862.0	50.7	1555.2	169.890	2692.1	45.36	
				1564.8				
	9:55	3098.7	57.1	1843.2	232.634	2866.1	53.76	
	10:00	3195.3	63.7	1900.8	246.261	2949.0	55.44	
6	10:05	3266.1	70.2	1872.0	239.403	3026.7	54.60	
				1872.0				
	10:10	3422.1	77.6	2131.2	304.312	3117.8	62.16	
	10:15	3456.8	84.8	2073.6	289.271	3167.5	60.48	
7	10:20	3490.3	92.2	2131.2	304.312	3186.0	62.16	
				2112.0				

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)
FALLOFF	10:21	3147.3				3147.3		
	10:22	3076.4				3076.4		
	10:23	3031.2				3031.2		
	10:24	2984.9				2984.9		
	10:25	2942.5				2942.5		
	10:30	2759.9				2759.9		
	10:35	2609.4				2609.4		


RECORDED WELLHEAD PRESSURE
CORRECTED WELLHEAD PRESSURE BASED ON 2-3/8" TUBING
SAGE ENERGY COMPANY
NORTH VACUUM (ABO) NORTH UNIT 19 NO.2
LEA COUNTY, NEW MEXICO
STEP RATE INJECTION TEST
NOVEMBER 17, 1994
3140 #
WELLHEAD PRESSURE PSIG
WELLHEAD PRESSURE PSIG
3500
3200
2900
2600
2300
2000
1700
1400
1100
800
B W P D
300
500
700
900
1100
1300
1500
1700
1900
2100

WEST – TEST, INC.

A SUBSIDIARY OF JOHN WEST ENGINEERING COMPANY

Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: SAGE ENERGY COMPANY

DATE: NOVEMBER 18, 1994

WELL NAME: NORTH VACUUM (ABO) NORTH UNIT TR 1 "B" NO.1
LEA COUNTY, NEW MEXICO

WO#: 94-14-1920

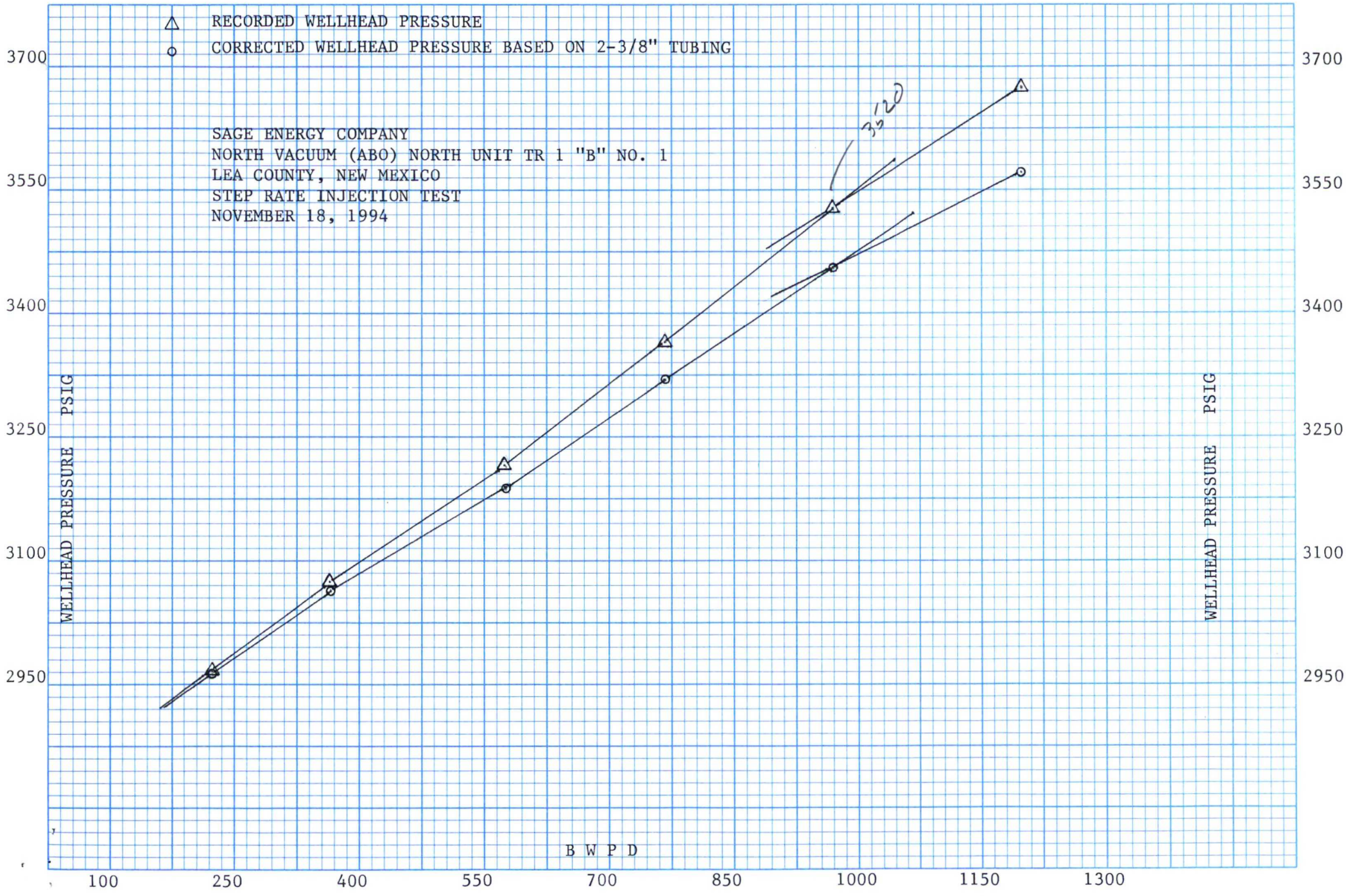
PERFS = 8731 – 8766

PACKER DEPTH = 8695

BHP GAUGE DEPTH = 8747

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)
	8:45	2788.7				2788.7		
	8:50	2888.9	0.5	144.0	2.093	2886.8	4.20	
	8:55	2922.2	1.1	172.8	2.932	2919.3	5.04	
1	9:00	2964.5	1.7	172.8	2.932	2961.6	5.04	
				163.2				
	9:05	3011.9	3.0	374.4	12.257	2999.6	10.92	
	9:10	3050.4	4.2	345.6	10.570	3039.8	10.08	
2	9:15	3073.5	5.5	374.4	12.257	3061.2	10.92	
				364.8				
	9:20	3146.8	7.5	576.0	27.195	3119.6	16.80	
	9:25	3178.9	9.5	576.0	27.195	3151.7	16.80	
3	9:30	3214.8	11.5	576.0	27.195	3187.6	16.80	
				576.0				
	9:35	3298.4	14.2	777.6	47.381	3251.0	22.68	
	9:40	3333.0	16.8	748.8	44.186	3288.8	21.84	
4	9:45	3366.3	19.5	777.6	47.381	3318.9	22.68	
				768.0				
	9:50	3443.6	22.8	950.4	68.680	3374.9	27.72	
	9:55	3486.2	26.3	1008.0	76.578	3409.6	29.40	
5	10:00	3523.6	29.6	950.4	68.680	3454.9	27.72	
				969.6				
	10:05	3595.7	33.8	1209.6	107.298	3488.4	35.28	
	10:10	3638.2	38.0	1209.6	107.298	3530.9	35.28	
6	10:15	3672.9	42.1	1180.8	102.620	3570.3	34.44	
				1200.0				

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)
FALLOFF	10:16	3553.0		2016.0	276.065	3276.9	58.80	
	10:17	3547.9		2016.0	276.065	3271.8	58.80	
	10:18	3542.7		2016.0	276.065	3266.6	58.80	
	10:19	3533.7		2016.0		3533.7		
	10:20	3523.4				3523.4		
	10:25	3487.2				3487.2		
	10:30	3458.8				3458.8		


RECORDED WELLHEAD PRESSURE
CORRECTED WELLHEAD PRESSURE BASED ON 2-3/8" TUBING
SAGE ENERGY COMPANY
NORTH VACUUM (ABO) NORTH UNIT TR 1 "B" NO. 1
LEA COUNTY, NEW MEXICO
STEP RATE INJECTION TEST
NOVEMBER 18, 1994
3420
WELLHEAD PRESSURE PSIG
3700
3550
3400
3250
3100
2950
B W P D
100
250
400
550
700
850
1000
1150
1300