



STATE OF NEW MEXICO
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT
OIL CONSERVATION DIVISION



BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

February 4, 1993

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87504
(505) 827-5800

Greenhill Petroleum Corporation
11490 Westheimer Road
Suite 200
Houston, TX 77077-6841

Attention: Michael J. Newport

**RE: Injection Pressure Increase Lovington Paddock Unit
Well Nos. 9 and 10 Waterflood Project Lea County,
New Mexico**

Dear Mr. Newport:

Reference is made to your request dated January 27, 1993 to increase the surface injection pressure on two wells in the Lovington Paddock Unit. This request is based on step rate tests conducted on these wells between January 18 and 19, 1993. The results of the tests have been reviewed by my staff and we feel an increase in injection pressure on these wells is justified at this time.

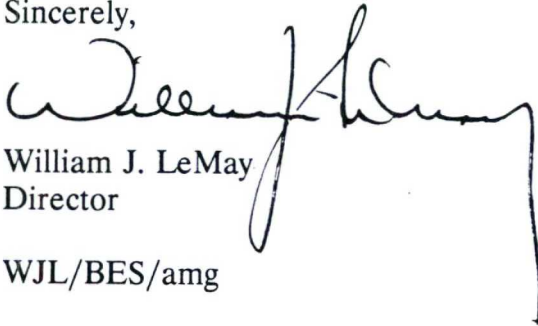
You are therefore authorized to increase the surface injection pressure on the following wells:

Well and Location	Maximum Injection Surface Pressure
Lovington Paddock Unit No. 9 660' FSL - 1980' FWL Unit N, Section 30, Township 16 South, Range 37 East	1745
Lovington Paddock Unit No. 10 660' FNL - 2440' FEL Unit B, Section 31, Township 16 South, Range 37 East	1620
All wells located in Lea County, New Mexico.	

Injection Pressure Increase
Greenhill Petroleum Corporation
February 4, 1993
Page 2

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,

A handwritten signature in black ink, appearing to read 'William J. LeMay', with a long, sweeping horizontal stroke extending to the right.

William J. LeMay
Director

WJL/BES/amg

cc: Oil Conservation Division - Hobbs
Oil Conservation Division - D. Catanach
File: Case File 10549

NO WAITING PERIOD

COMPANY: GREENHILL PETROLEUM CORPORATION
ADDRESS: 11490 WESTHEIMER ROAD, SUITE 200
CITY, STATE, ZIP: HOUSTON, TEXAS 77077-6841
ATTENTION: MICHAEL J. NEWPORT

Re: Injection Pressure Increase
LOVINGTON PADDOCK UNIT
WELL NOS. 9 AND 10
LEA County, New Mexico

Dear Sir:

Reference is made to your request dated JANUARY 27, 1993, to increase the surface injection pressure on TWO (2) WELL IN THE LOVINGTON PADDOCK UNIT. This request is based on step rate tests conducted on these wells JANUARY 18 AND 19, 1993. The results of the tests 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:

<u>Well & Location</u>	<u>Maximum Injection Surface Pressure</u>
<u>LOVINGTON PADDOCK UNIT No. 9</u>	<u>1745</u>
<u>660' FSL & 1980' FWL</u>	
<u>"N" 30-16S-37E</u>	
<u>LOVINGTON PADDOCK UNIT No. 10</u>	<u>1620</u>
<u>660' FNL & 2440' FEL</u>	
<u>"B" 31-16S-37E</u>	
<u> </u>	
<u> </u>	
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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.

xc: T. GALLEGOS

D. CATANACH

FILE- R-9741

OCD- HOBBS

CASE File 10549



GREENHILL PETROLEUM CORPORATION

Incorporated in Delaware, U.S.A.

11490 WESTHEIMER ROAD, SUITE 200
HOUSTON, TEXAS 77077-6841
TELEPHONE (713) 589-8484
FAX (713) 589-7892

RECEIVED
1993 FEB 11 AM 10 10

January 27, 1993

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

Attention: Mr. David Catanach

Re: Lovington Paddock
Wells Number 9 and 10
Lea County, New Mexico

Gentlemen:

Enclosed please find the step rate test graphs and charts covering Wells Number 9 and 10. Greenhill hereby requests permission to increase the surface injection pressure on the above listed wells. This request is based upon the step rate tests conducted on these wells.

Please contact me if I can provide you with additional information.

Very truly yours,

Michael J. Newport
Land Manager - Permian Basin

MJN:KLD
93.063

Enclosure

LOVINGTON PADDOCK UNIT

STEP-RATE TEST RESULTS

WELL IDENTIFICATION	LPU # 9	LPU # 10
Surface Parting pressure/psig	1,800	1,650
Bottom Hole Pressure/psig	4,430	4,320
Midperf depth/ft.	6,200	6,200
Fracture Gradient psi/ft.	0.71	0.70
Requested Injection Pressure/psig	750 <i>1745</i>	1,600 <i>1620</i>

MJN:KLD
93.062

01/27/93

GREENHILL PETROLEUM CORP.

LOVINGTON PADDOCK UNIT WELL NO. 10

STEP-RATE INJECTION TEST

JANUARY 19, 1993

2200

2000

1800

1600

1400

1200

1000

800

WELL HEAD PRESSURE
PSIG

4900

4700

4500

4300

4100

3900

3700

3500

BOTTOM HOLE PRESSURE
PSIG

B W P D

300

600

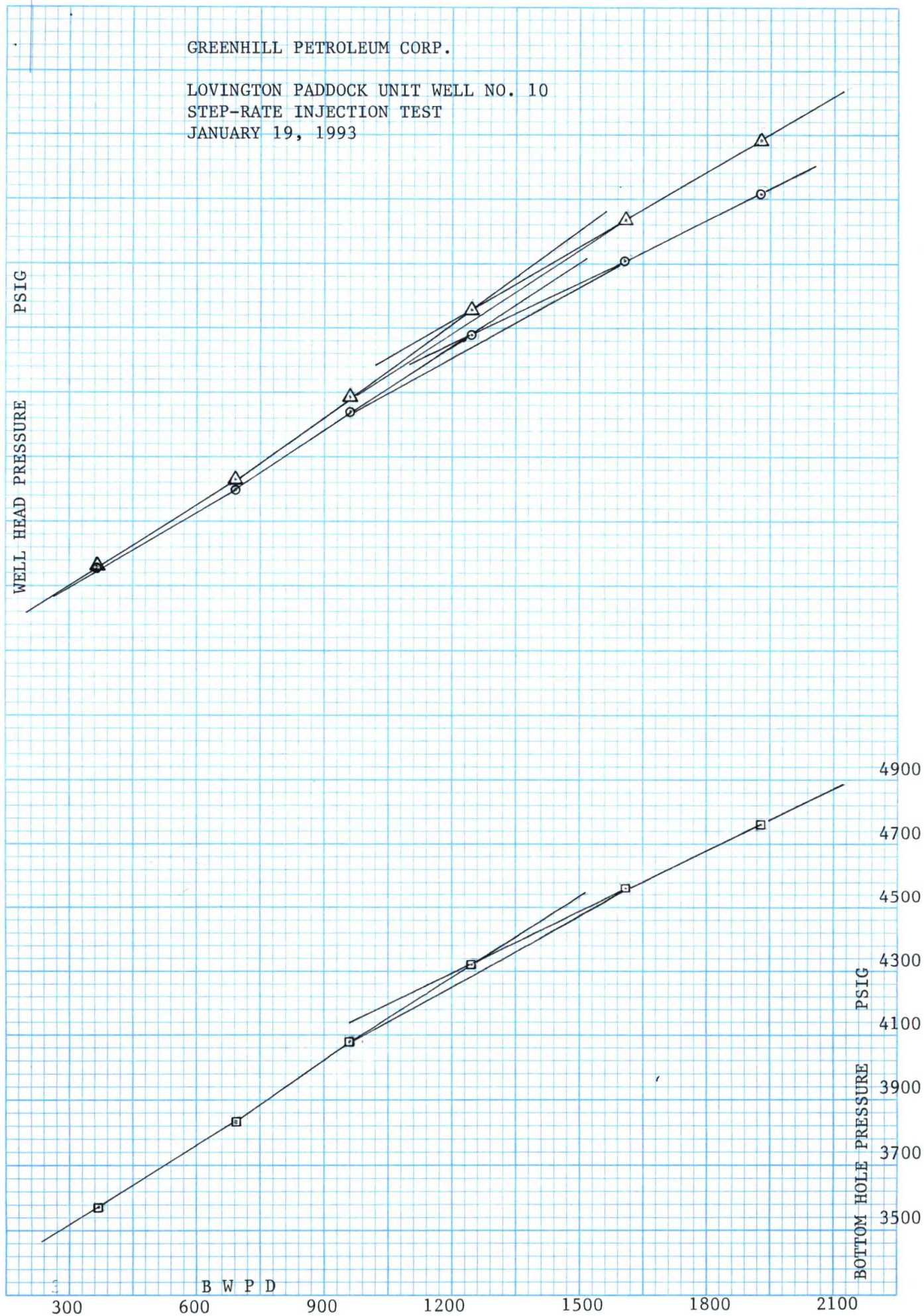
900

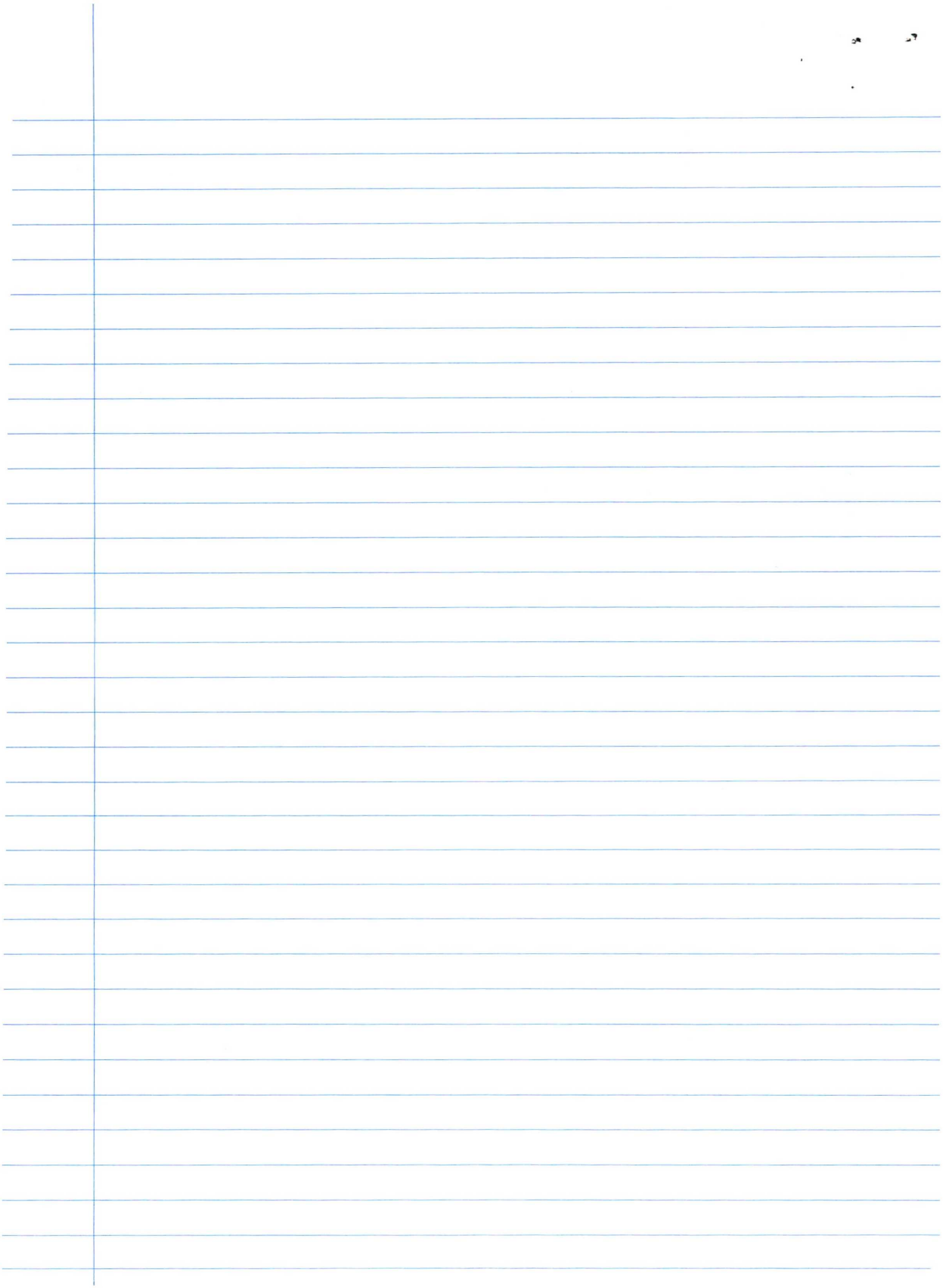
1200

1500

1800

2100





JOHN WEST ENGINEERING COMPANY

Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: Greenhill Petroleum Corporation

DATE: JANUARY 19, 1993

WELL NAME: LOVINGTON PADDOCK UNIT WELL NO. 10
Lea County, New Mexico

WO#: 93-14-0067

MID-PERFS. =

PACKER DEPTH = 6049

CASING = 6105

BHP GAUGE DEPTH = 6100

TOTAL DEPTH = 6360

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	10:50	663.1				663.1		3380
	10:55	769.2	1.3	374.4	8.548	760.7	10.92	3480
	11:00	814.6	2.5	345.6	7.371	807.2	10.08	3535
	11:05	861.4	3.8	374.4	8.548	852.9	10.92	3578
				364.8				
2	11:10	987.7	6.2	691.2	26.573	961.1	20.16	3691
	11:15	1056.1	8.6	691.2	26.573	1029.5	20.16	3767
	11:20	1123.1	11.0	691.2	26.573	1096.5	20.16	3827
				691.2				
3	11:25	1254.9	14.4	979.2	50.616	1204.3	28.56	3939
	11:30	1338.4	17.7	950.4	47.896	1290.5	27.72	4020
	11:35	1386.5	21.0	950.4	47.896	1338.6	27.72	4082
				960.0				
4	11:40	1521.9	25.2	1209.6	74.828	1447.1	35.28	4186
	11:45	1587.7	29.7	1296.0	85.015	1502.7	37.80	4262
	11:50	1659.9	34.0	1238.4	78.157	1581.7	36.12	4322
				1248.0				
5	11:55	1797.9	39.7	1641.6	131.650	1666.3	47.88	4429
	12:00	1870.0	45.2	1584.0	123.232	1746.8	46.20	4503
	12:05	1933.3	50.8	1612.8	127.409	1805.9	47.04	4568
				1612.8				
6	12:10	2076.5	57.5	1929.6	177.537	1899.0	56.28	4659
	12:15	2136.0	64.2	1929.6	177.537	1958.5	56.28	4723
	12:20	2189.2	70.9	1929.6	177.537	2011.7	56.28	4774
				1929.6				

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	12:21	1990.4				1990.4		4737
	12:22	1963.8				1963.8		4708
	12:23	1939.7				1939.7		4682
	12:24	1917.0				1917.0		4658
	12:25	1896.7				1896.7		4638
	12:30	1810.6				1810.6		4549
	12:35	1741.0				1741.0		4476

GREENHILL PETROLEUM CORP.

LOVINGTON PADDOCK UNIT WELL NO. 10

STEP-RATE INJECTION TEST

JANUARY 19, 1993

2200

2000

1800

1600

1400

1200

1000

800

PSIG

WELL HEAD PRESSURE

4900

4700

4500

4300

4100

3900

3700

3500

PSIG

BOTTOM HOLE PRESSURE

B W P D

300

600

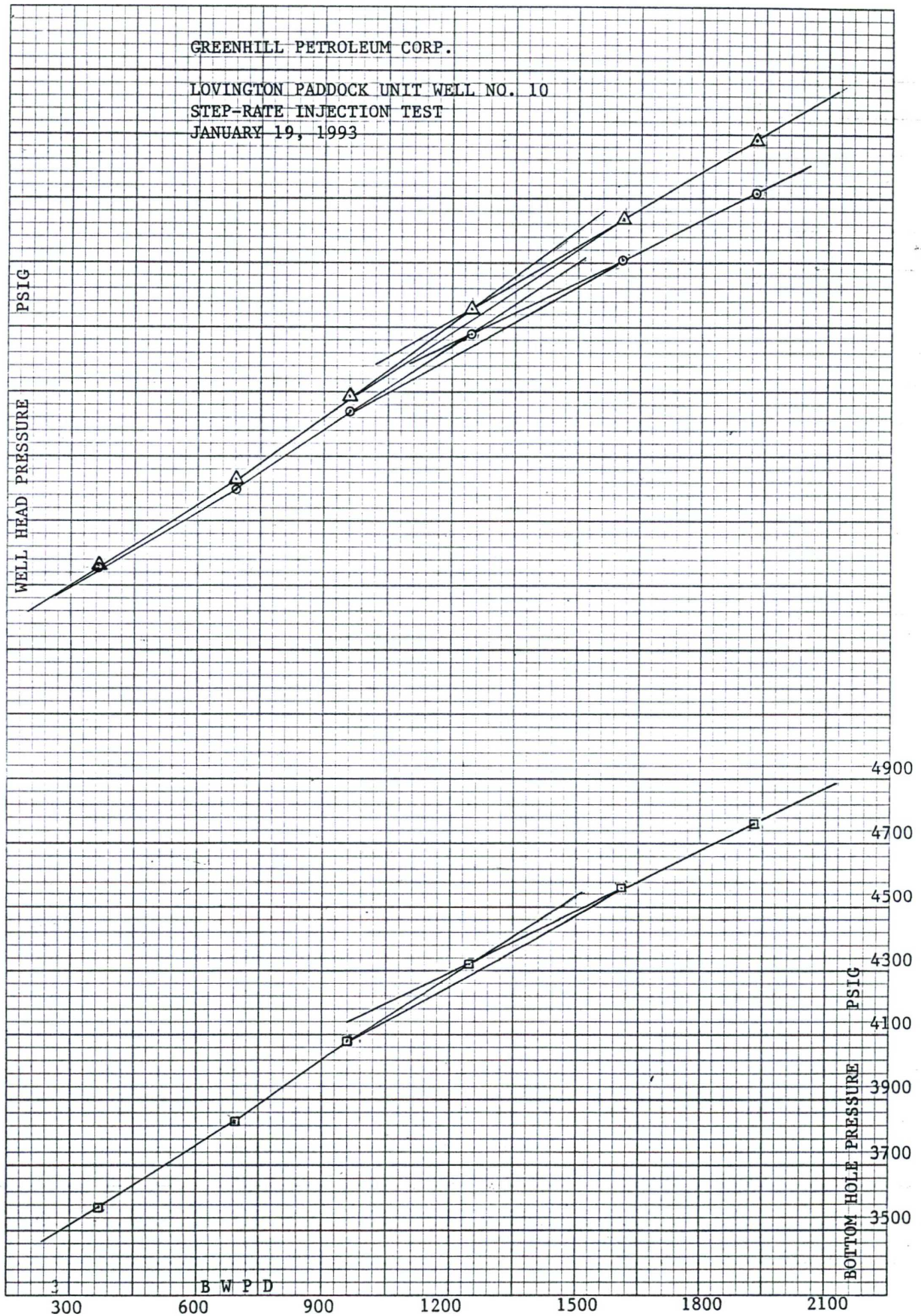
900

1200

1500

1800

2100



JOHN WEST ENGINEERING COMPANY

Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: Greenhill Petroleum Corporation

DATE: JANUARY 18, 1983

WELL NAME: LOVINGTON PADDOCK UNIT WELL NO. 10
Lea County, New Mexico

WO#: 83-14-0067

MID-PERFS. =

PACKER DEPTH = 6049

CASING = 6105

BHP GAUGE DEPTH = 6100

TOTAL DEPTH = 6360

STEP NO. & REMARKS	TIME	(1) SURFACE TUBING PRESS. (psig)	(2) CUMULATIVE VOL. INJECTED (bbls)	(3) INJECTION RATE (bbls/day)	(4) FRICTION HEAD LOSS (ps)	(5) CORRECTED TUBING PRESS. (ps) (1) - (4)	(6) INJECTION RATE (gpm) (3)/34.2867	(7) MEASURED BHP (ps)
1	10:50	663.1				663.1		3380
	10:55	769.2	1.3	374.4	8.548	760.7	10.92	3480
	11:00	814.6	2.5	345.6	7.371	807.2	10.08	3535
	11:05	861.4	3.8	374.4	8.548	852.9	10.92	3578
2				364.8				
	11:10	987.7	6.2	691.2	26.573	961.1	20.16	3691
	11:15	1056.1	8.6	691.2	26.573	1029.5	20.16	3767
	11:20	1123.1	11.0	691.2	26.573	1096.5	20.16	3827
3				691.2				
	11:25	1254.9	14.4	979.2	50.616	1204.3	28.56	3939
	11:30	1338.4	17.7	950.4	47.896	1290.5	27.72	4020
	11:35	1386.5	21.0	950.4	47.896	1338.6	27.72	4082
4				960.0				
	11:40	1521.9	25.2	1209.6	74.828	1447.1	35.28	4186
	11:45	1587.7	29.7	1296.0	85.015	1502.7	37.80	4262
	11:50	1659.9	34.0	1238.4	78.157	1581.7	36.12	4322
5				1248.0				
	11:55	1797.9	39.7	1641.6	131.650	1666.3	47.88	4429
	12:00	1870.0	45.2	1584.0	123.232	1746.8	46.20	4503
	12:05	1933.3	50.8	1612.8	127.409	1805.9	47.04	4568
6				1612.8				
	12:10	2076.5	57.5	1929.6	177.537	1899.0	56.28	4659
	12:15	2136.0	64.2	1929.6	177.537	1958.5	56.28	4723
	12:20	2189.2	70.9	1929.6	177.537	2011.7	56.28	4774
				1929.6				

Page 2

JOHN WEST ENGINEERING COMPANY

Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: Greenhill Petroleum Corporation

DATE: JANUARY 18, 1993

WELL NAME: LOVINGTON PADDOCK UNIT WELL NO. 10

WO#: 93-14-0067

Lea County, New Mexico

MID-PERFS. =

PACKER = 6049

CASING = 6105

BHP GAUGE DEPTH = 6100

TOTAL DEPTH = 6360

STEP NO. & REMARKS	TIME	(1) SURFACE TUBING PRESS. (psig)	(2) CUMMULATIVE VOL. INJECTED (bbis)	(3) INJECTION RATE (bbis/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	9:55	651.4				651.4		3374
	10:00	755.0	1.2	345.6	7.685	747.3	10.08	3468
	10:05	804.2	2.5	374.4	8.912	795.3	10.92	3525
	10:10	848.5	3.8	374.4	8.912	839.6	10.92	3577
				364.8				
2	10:15	982.4	6.0	633.6	23.586	958.8	18.48	3667
	10:20	1010.2	8.0	576.0	19.774	990.4	16.80	3726
	10:25	1059.5	10.1	604.8	21.641	1037.9	17.64	3776
3				604.8				
	10:30	1179.8	13.3	921.6	47.174	1132.6	26.88	3894
	10:35	1300.0	16.6	950.4	49.938	1250.1	27.72	3992
	10:40	1381.1	20.2	1036.8	58.659	1322.4	30.24	4075
4				969.6				
	10:45	1545.6	25.0	1382.4	99.879	1445.7	40.32	4211
	10:50	1657.0	29.7	1353.6	96.064	1560.9	39.48	4305
	10:55	1722.9	34.3	1353.6	96.064	1626.8	39.48	4379
FALLOFF				1353.6				
	10:56	1598.8				1598.8		4336
	10:57	1553.2				1553.2		4298
	10:58	1522.9				1522.9		4269
	10:59	1497.5				1497.5		4243
	11:00	1476.0				1476.0		4219
RANOUT OF H2O FILTER PLUGGED	11:05	1391.2				1391.2		4132
	11:10	1329.2				1329.2		4069

JOHN WEST ENGINEERING COMPANY

Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: Greenhill Petroleum Corporation

DATE: JANUARY 18, 1993

WELL NAME: LOVINGTON PADDOCK UNIT WELL NO. 10

WO#: 93-14-0067

Lea County, New Mexico

MID-PERFS. =

PACKER = 6049

CASING = 6105

BHP GAUGE DEPTH = 6100

TOTAL DEPTH = 6360

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) (8)/34.2957	(7) MEASURED BHP (psi)
1	9:55	651.4				651.4		3374
	10:00	755.0	1.2	345.6	7.685	747.3	10.08	3468
	10:05	804.2	2.5	374.4	8.912	795.3	10.92	3525
	10:10	848.5	3.8	374.4	8.912	839.6	10.92	3577
				364.8				
2	10:15	982.4	6.0	633.6	23.586	958.8	18.48	3667
	10:20	1010.2	8.0	576.0	19.774	990.4	16.80	3726
	10:25	1059.5	10.1	604.8	21.641	1037.9	17.64	3776
3				604.8				
	10:30	1179.8	13.3	921.6	47.174	1132.6	26.88	3894
	10:35	1300.0	16.6	950.4	49.938	1250.1	27.72	3992
	10:40	1381.1	20.2	1036.8	58.659	1322.4	30.24	4075
4				969.6				
	10:45	1545.6	25.0	1382.4	99.879	1445.7	40.32	4211
	10:50	1657.0	29.7	1353.6	96.064	1560.9	39.48	4305
	10:55	1722.9	34.3	1353.6	96.064	1626.8	39.48	4379
FALLOFF				1353.6				
	10:56	1598.8				1598.8		4336
	10:57	1553.2				1553.2		4298
	10:58	1522.9				1522.9		4269
	10:59	1497.5				1497.5		4243
	11:00	1476.0				1476.0		4219
	11:05	1391.2				1391.2		4132
RANOUT OF H2O FILTER PLUGGED	11:10	1329.2				1329.2		4069

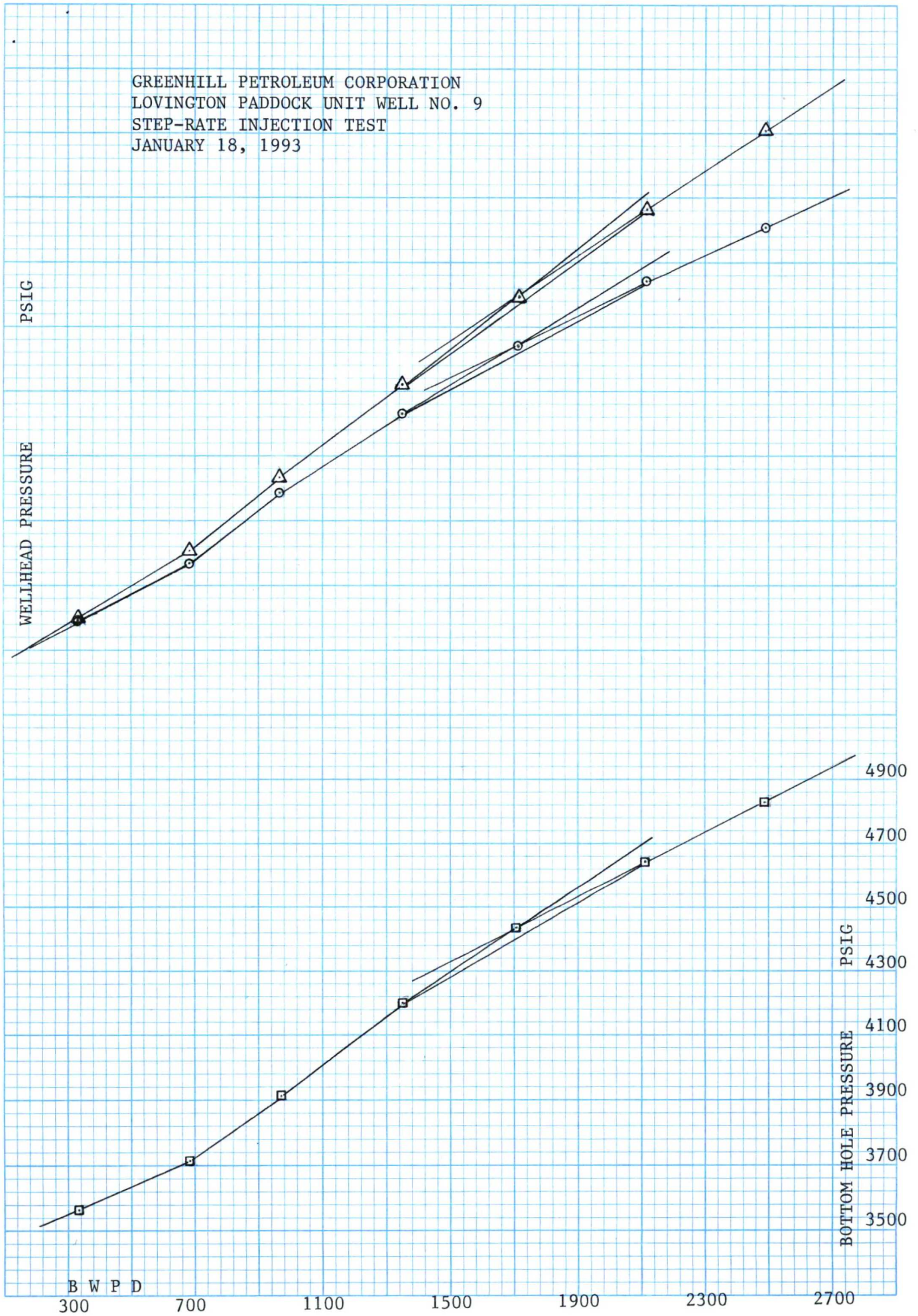
GREENHILL PETROLEUM CORPORATION
LOVINGTON PADDOCK UNIT WELL NO. 9
STEP-RATE INJECTION TEST
JANUARY 18, 1993

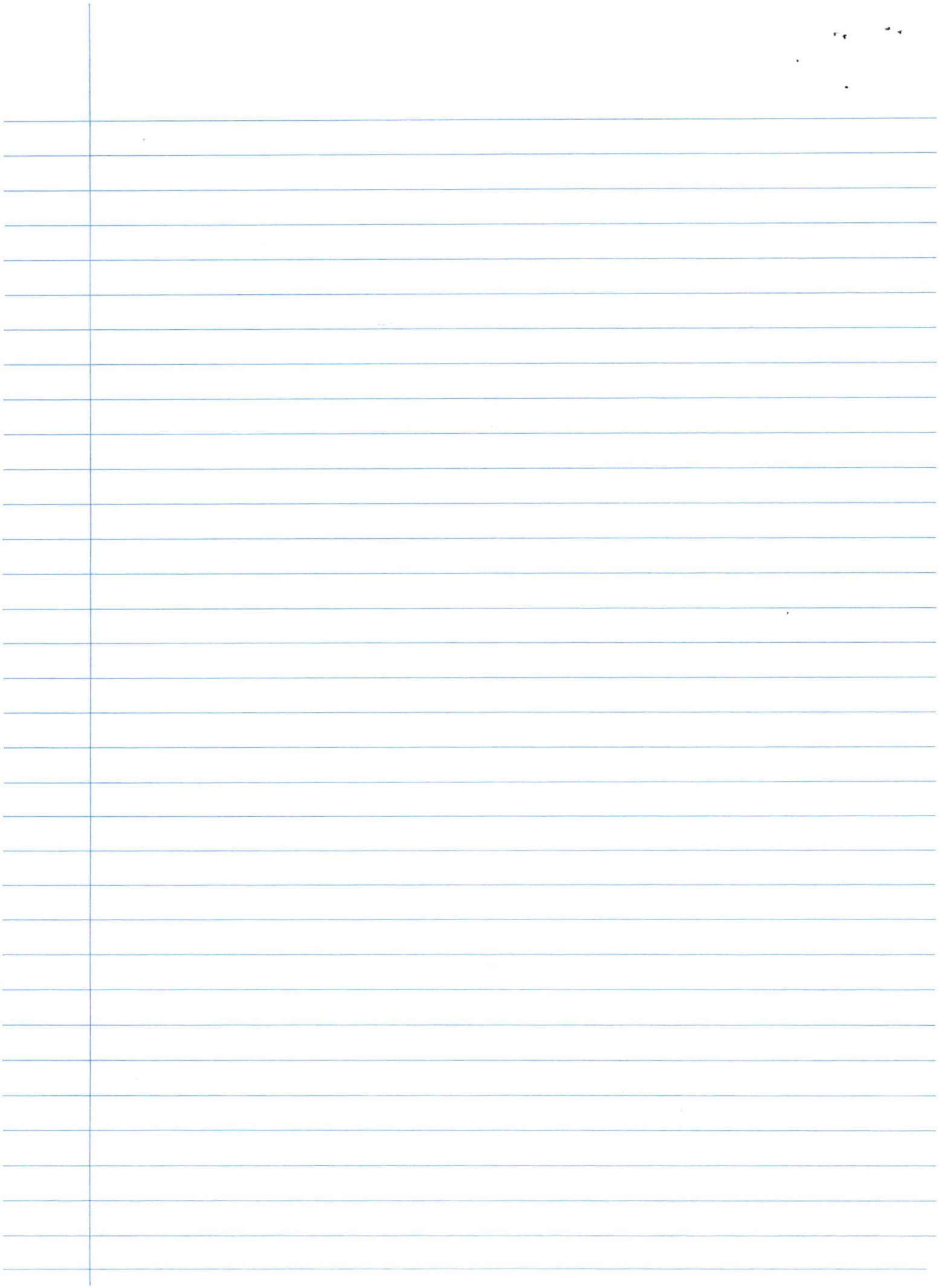
2300
2100
1900
1700
1500
1300
1100
900
700

PSIG
WELLHEAD PRESSURE

B W P D
300 700 1100 1500 1900 2300 2700

4900
4700
4500
4300
4100
3900
3700
3500
PSIG
BOTTOM HOLE PRESSURE





JOHN WEST ENGINEERING COMPANY

Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: Greenhill Petroleum Corporation

DATE: JANUARY 18, 1993

WELL NAME: LOVINGTON PADDOCK UNIT NO. 9

WO#: 93-14-0067

Lea County, New Mexico

MID-PERFS. =

CASING = 6270

PACKER DEPTH = 6093

BHP GAUGE DEPTH: 6200

TOTAL DEPTH = 6380

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) (8)/34.2857	(7) MEASURED BHP (psi)
1	1:10	670.9				670.9		3430.00
	1:15	731.6	1.2	345.6	7.710	723.9	10.08	3496.00
	1:20	783.4	2.4	345.6	7.710	775.7	10.08	3537.00
	1:25	808.7	3.5	316.8	6.563	802.1	9.24	3567.00
				336.0				
2	1:30	913.7	5.9	691.2	27.793	885.9	20.16	3652.00
	1:35	960.5	8.3	691.2	27.793	932.7	20.16	3711.00
	1:40	1006.0	10.7	691.2	27.793	978.2	20.16	3716.00
3				691.2				
	1:45	1130.1	14.1	979.2	52.939	1077.2	28.56	3846.00
	1:50	1180.8	17.5	979.2	52.939	1127.9	28.56	3911.00
	1:55	1232.7	20.8	950.4	50.095	1182.6	27.72	3906.00
4				969.6				
	2:00	1383.3	25.5	1353.6	96.366	1286.9	39.48	4063.00
	2:05	1441.6	30.2	1353.6	96.366	1345.2	39.48	4138.00
	2:10	1518.8	34.8	1324.8	92.607	1426.2	38.64	4201.00
				1344.0				
5	2:15	1656.8	40.8	1728.0	151.398	1505.4	50.40	4297.00
	2:20	1730.2	46.7	1699.2	146.763	1583.4	49.56	4371.00
	2:25	1794.8	52.7	1728.0	151.398	1643.4	50.40	4435.00
				1718.4				
6	2:30	1949.3	60.1	2131.2	223.162	1726.1	62.16	4522.00
	2:35	2012.6	67.5	2131.2	223.162	1789.4	62.16	4591.00
	2:40	2063.2	74.8	2102.4	217.615	1845.6	61.32	4649.00
				2121.6				
7	2:45	2215.2	83.5	2505.6	301.059	1914.1	73.08	4720.00
	2:50	2262.0	92.2	2505.6	301.059	1960.9	73.08	4776.00
	2:55	2305.1	100.8	2476.8	294.689	2010.4	72.24	4823.00
				2496.0				

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GREENHILL PETROLEUM CORPORATION
LOVINGTON PADDOCK UNIT WELL NO. 9
STEP-RATE INJECTION TEST
JANUARY 18, 1993

WELLHEAD PRESSURE
PSIG

WELLHEAD PRESSURE
PSIG

B W P D

300

700

1100

1500

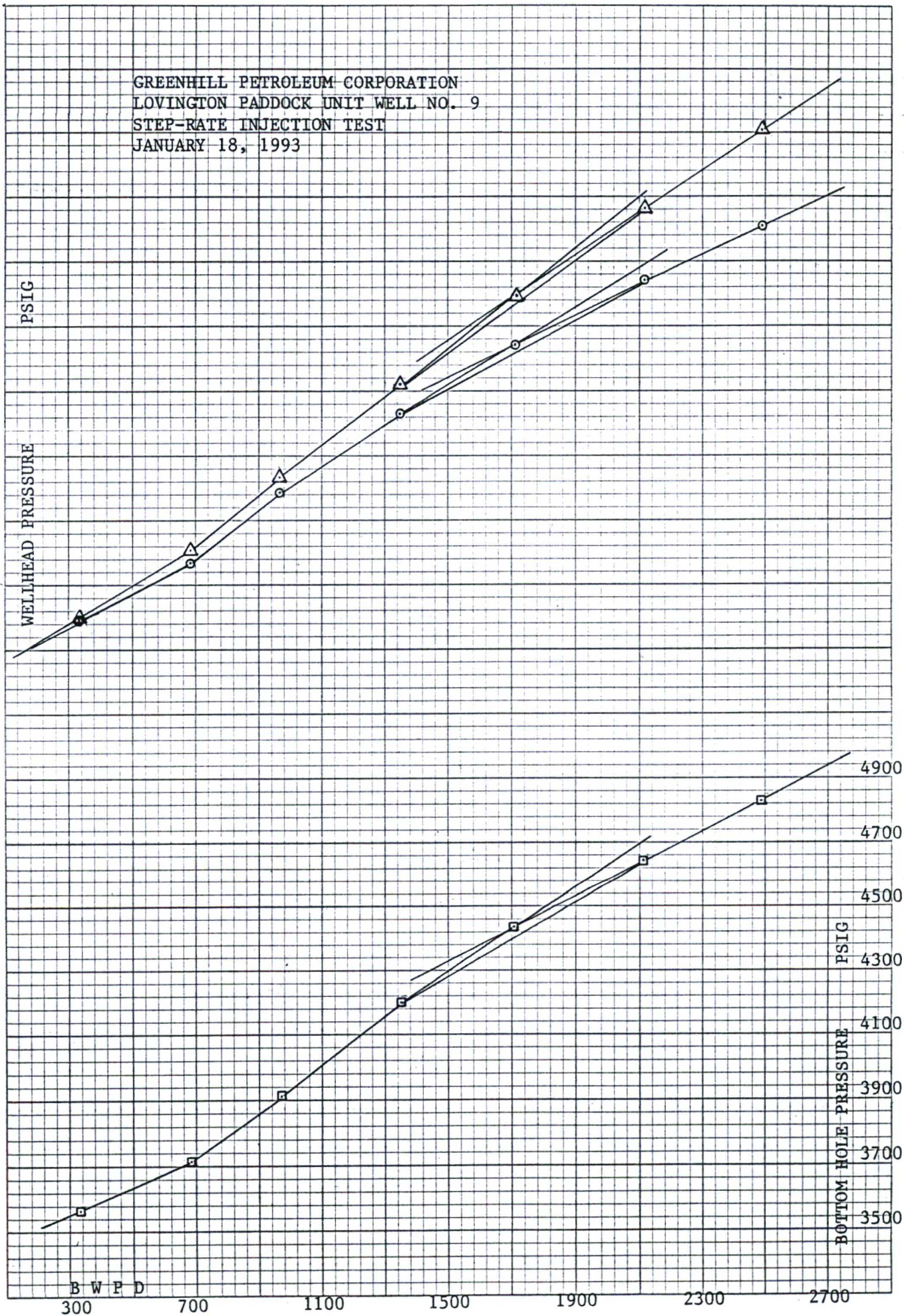
1900

2300

2700

BOTTOM HOLE PRESSURE
PSIG

4900
4700
4500
4300
4100
3900
3700
3500



JOHN WEST ENGINEERING COMPANY

Hobbs, New Mexico

STEP RATE INJECTION TEST

CLIENT: Greenhill Petroleum Corporation

DATE: JANUARY 18, 1989

WELL NAME: LOVINGTON Paddock UNIT NO. 9

WO#: 93-14-0087

Lea County, New Mexico

MID-PERFS. =

CASING = 6270

PACKER DEPTH = 6093

BHP GAUGE DEPTH: 6200

TOTAL DEPTH = 6380

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) (8)/34.2857	(7) MEASURED BHP (psi)
1	1:10	670.9				670.9		3430.00
	1:15	731.6	1.2	345.6	7.710	723.9	10.08	3496.00
	1:20	783.4	2.4	345.6	7.710	775.7	10.08	3537.00
	1:25	808.7	3.5	316.8	6.563	802.1	9.24	3567.00
				336.0				
2	1:30	913.7	5.9	691.2	27.793	885.9	20.16	3652.00
	1:35	960.5	8.3	691.2	27.793	932.7	20.16	3711.00
	1:40	1006.0	10.7	691.2	27.793	978.2	20.16	3716.00
3				691.2				
	1:45	1130.1	14.1	979.2	52.939	1077.2	28.56	3846.00
	1:50	1180.8	17.5	979.2	52.939	1127.9	28.56	3911.00
	1:55	1232.7	20.8	950.4	50.095	1182.6	27.72	3906.00
4				969.6				
	2:00	1383.3	25.5	1353.6	96.366	1286.9	39.48	4063.00
	2:05	1441.6	30.2	1353.6	96.366	1345.2	39.48	4138.00
	2:10	1518.8	34.8	1324.8	92.607	1426.2	38.64	4201.00
				1344.0				
5	2:15	1656.8	40.8	1728.0	151.398	1505.4	50.40	4297.00
	2:20	1730.2	46.7	1699.2	146.763	1583.4	49.56	4371.00
	2:25	1794.8	52.7	1728.0	151.398	1643.4	50.40	4435.00
				1718.4				
6	2:30	1949.3	60.1	2131.2	223.162	1726.1	62.16	4522.00
	2:35	2012.6	67.5	2131.2	223.162	1789.4	62.16	4591.00
	2:40	2063.2	74.8	2102.4	217.615	1845.6	61.32	4649.00
				2121.6				
7	2:45	2215.2	83.5	2505.6	301.059	1914.1	73.08	4720.00
	2:50	2262.0	92.2	2505.6	301.059	1960.9	73.08	4776.00
	2:55	2305.1	100.8	2476.8	294.689	2010.4	72.24	4823.00
				2496.0				

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