ANADARKO PETROLEUM CORP. 1300 INDEPENDENCE PLAZA • P.O. BOX 2497 • MIDLAND, TEXAS 79702 • (915) 682-1666

Anadarko

April 4, 1990

State of New Mexico
Department of Energy and Minerals
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501
Attn: William J. LeMay
Director

Re: Corrected Request
Injection Pressure Increase
BGSAU No. 10-9
Unit Letter E, Sec. 4
T18S-R29E
Eddy County, New Mexico

Gentlemen:

You recently received a request from Anadarko Petroleum Corporation to increase the surface injection pressure limitation on Anadarko's BGSAU No. 10-9 to 1550 psig. The request was by letter dated March 28, 1990 and referenced a step rate test conducted on March 27, 1990.

In the March 28, 1990 correspondence, Anadarko requested an increase in the surface injection pressure limitation from 1945 psig to 1550 psig. The original pressure limit of 1945 psig was reported in error and should have been recorded as 1395 psig. Please accept this correction and our apology for any inconvenience this may have caused in your processing of Anadarko's request.

Sincerely,

Tommy W. Thompson, P.E.
Staff Reservoir Engineer

TWT:gks

Enclosures

cc: Jerry Buckles
OCD - Artesia
Well File

ANADARKO PETROLEUM CORPORATION • 1300 INDEPENDENCE PLAZA • P. O. BOX 2497 • MIDLAND, TEXAS 79702 • (915) 682-1666 • FAX (915) 682-9371

OIL CONSER[illegible] DIVISION
RE[illegible]
'91 JUN 5 AM 8 59

Anadarko

May 31, 1991

New Mexico Oil Conservation Commission
P. O. Box 2088
Santa Fe, New Mexico 87504
Attn: Mr. David Catanach

Re: Request For Injection Pressure Increase
Ballard Grayburg-San Andres Unit
Loco Hills Pool
Eddy County

Ballard GSU No. 8-4
660' FNL & 1980' FEL
Section 5-18S-29E

Ballard GSU No. 10-1
1980' FNL & 660' FEL
Section 5-18S-29E

Dear Mr. Catanach:

Anadarko is requesting injection pressure increases for the subject wells (based on the attached step-rate tests). The Commission granted authority for the said wells to inject up to 450 psi above parting pressure or 1550 psi, whichever is less, under Amended Order No. R-7773-A, effective September 8, 1988. According to the guidelines of this Order, injector Nos. 8-4 and 10-1 will be eligible for surface pressure limitations of 1550 psi and 1390 psi, respectively.

The pressure recording, plot and raw data have been attached for your review. If you have any questions, please contact me at 915/682-1666.

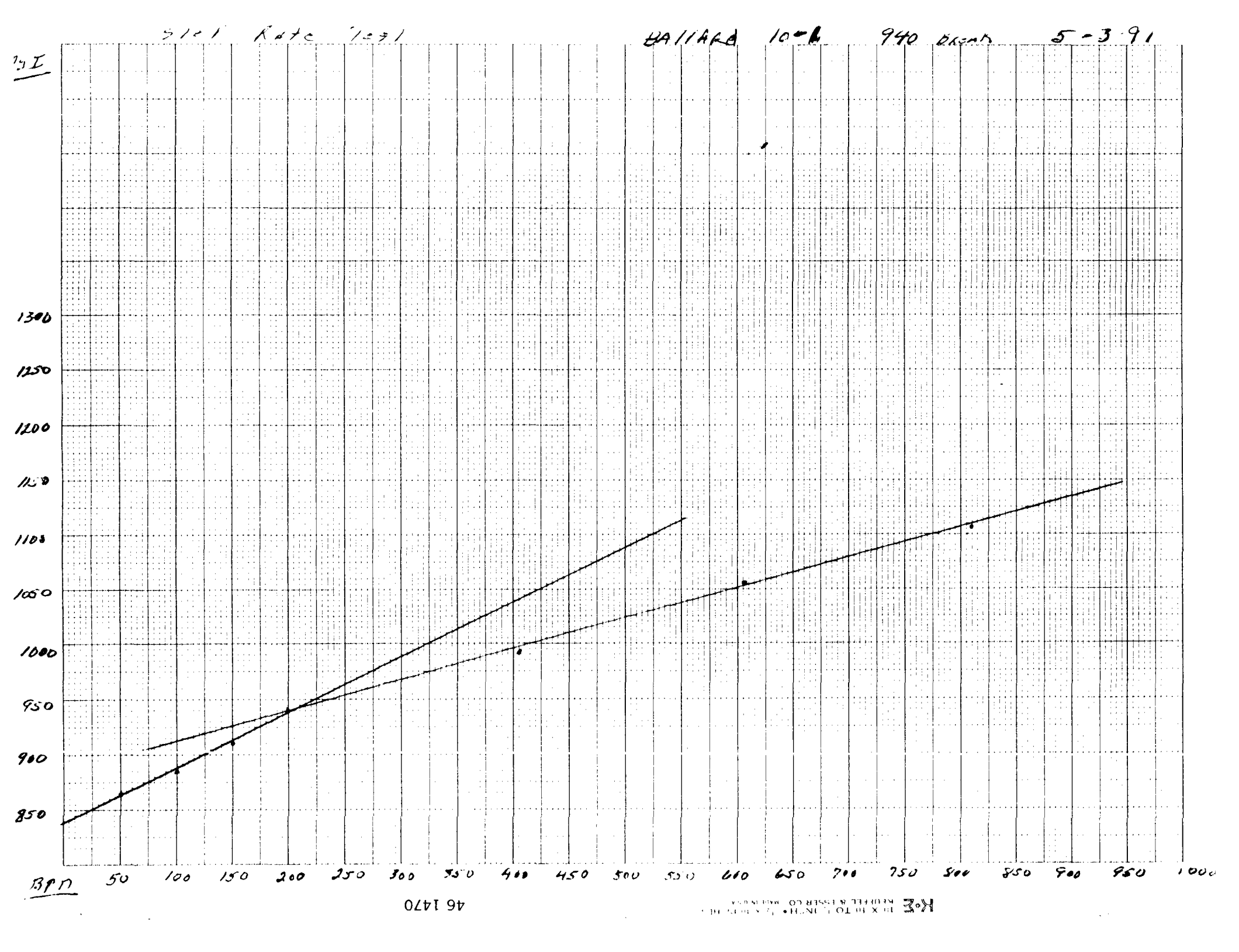
Very truly yours,

Jeff White

Jeff White
Sr. Production Engineer

JW:gks

cc: Bill Griffin (cover letter only)
Well Files


5101 Katc 1271
HALLIBURTON 10-K 940 DRUM 5-3-91
PSI
1300
1250
1200
1150
1100
1050
1000
950
900
850
BPM
50
100
150
200
250
300
350
400
450
500
550
600
650
700
750
800
850
900
950
1000

1025# CASING PSI

Ballard #10-1 Step Rate Test 5-3-91 8:00 A.M

24 HR Shut in PSI 850# TOTAL BBL START 35795.3 FINISH 35834.8

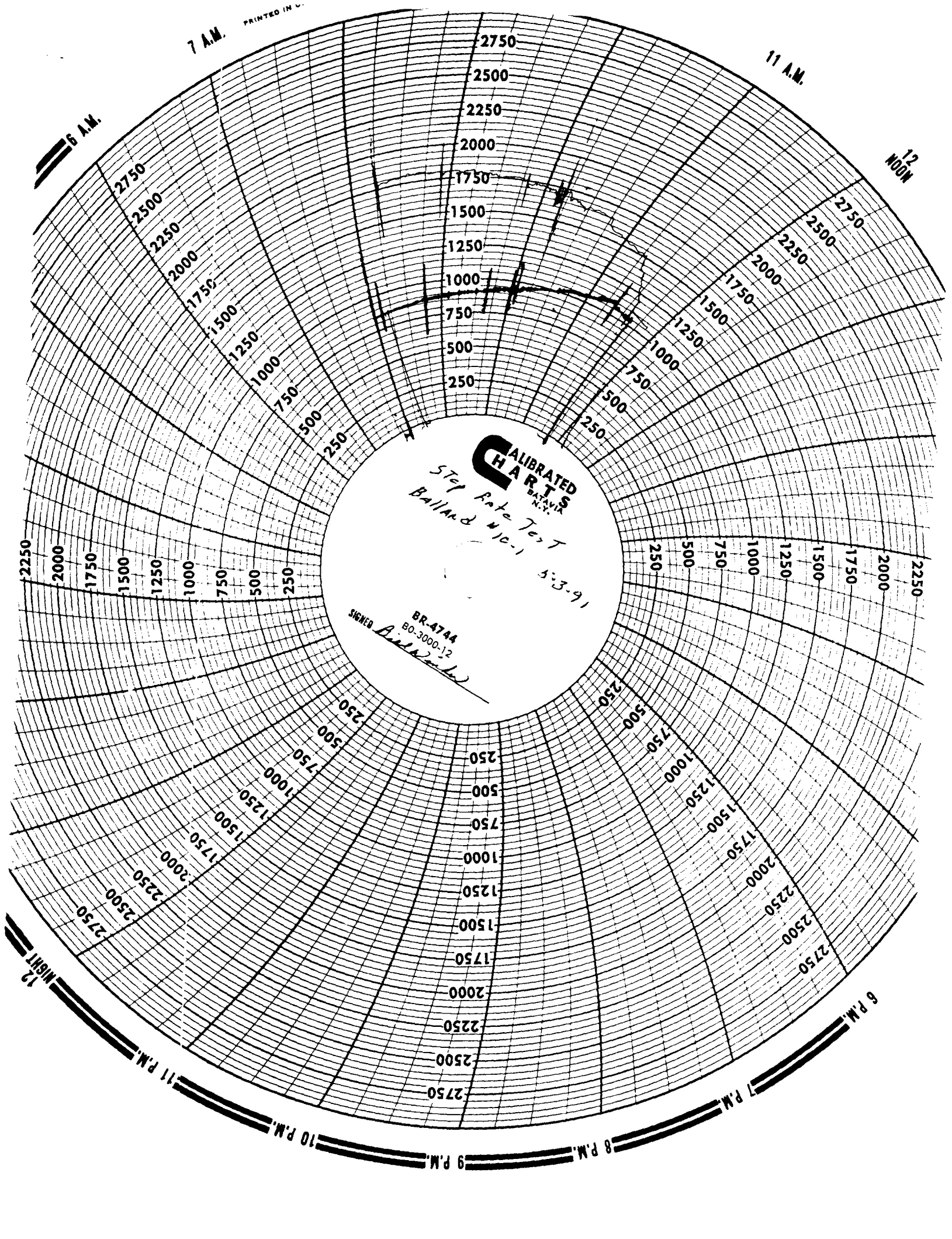
	Time	Rate	PSI		Time	Rate	PSI
(50)	8:10	50.	850	(200)	9:40	198.	920
	8:15	49.6	860		9:45	203.4	930
	8:20	48.2	865		9:50	197.3	938
	8:25	50.4	865		9:55	198.	940
✓	8:30	50.4	865		10:00	202.9	945
✓	8:35	47.5	870		10:05	198.	950
✓	8:40	50.4	870		10:10	202.9	955
AVG.		(49.5)	(864)			(200)	(940)
(100)	8:40	98.6	870	(400)	10:10	407.7	965
	8:45	97.9	875		10:15	416.2	978
	8:50	101.5	880		10:20	402.1	980
	8:55	161.2	885		10:25	402.5	990
	9.00	102.9	890		10:30	406.5	2000
	7.05	107.2	895		10:35	406.	1010
	9:10	96.8	900		10:40	401.	1018
AVG.		(100.9)	(885)	AVG.		(405)	(992)
(150)	9:10	149.7	900	(600)	10:40	604.8	1030
	9:15	149.3	900		10:45	605.5	1040
	9:20	148.2	905		10:50	604.2	1050
	9:25	151.9	910		10:55	605.5	1058
	9:30	151.2	915		11:00	602.6	1060
	9:35	151.2	918		11:05	608.4	1065
	9:40	154.0	920		11:10	601.9	1080
AVG.		(151.)	(910)	AVG.		(605)	(1058)

Ballard #10-1 Step Rate Test 5-391

Time	Rate	PSI
(800) 11:15	814.2	1095
11:20	815.7	1100
11:25	801.3	1110
11:30	801.2	1120
AVG. 11:35	(808)	(1106)
11:40		
11:45		
AVG.		
11:45		

Shut down PSI 1080

Total BBL used 39.5


6 A.M.
7 A.M.
11 A.M.
12 NOON
6 P.M.
7 P.M.
8 P.M.
9 P.M.
10 P.M.
11 P.M.
12 MIDNIGHT
CALIBRATED CHARTS BATAVIA N.Y.
Step Rate Test
Ballard Mic-1
5-3-91
BR-4744
BO-3000-12
SIGNED

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

GARREY CARRUTHERS
GOVERNOR

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

April 26, 1990

Anadarko Petroleum Corporation
P.O. Box 2497
Midland, TX 79702

Attention: Tommy W. Thompson

RE: Injection Pressure Increase
Ballard Grayburg San Andres Unit
Eddy County, New Mexico

Dear Mr. Thompson:

Reference is made to your requests dated March 26 and April 4, 9 and 20, 1990, to increase the surface injection pressure on five wells located within the Ballard Grayburg San Andres Unit Waterflood Project. This request is based on step rate tests conducted on these wells during March and April, 1990. 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
BGSAU Tract 9 Well No. 2 Unit F, Section 5, T-18 South, R-29 East, NMPM;	1550 PSIG
BGSAU Tract 10 Well No. 9 Unit E, Section 4, T-18 South, R-29 East, NMPM;	1550 PSIG

WELL AND LOCATION	MAXIMUM INJECTION SURFACE PRESSURE
BGSAU Tract 11 Well No. 1 Unit H, Section 6, T-18 South, R-29 East, NMPM;	1488 PSIG
BGSAU Tract 24 Well No. 2 Unit P, Section 5, T-18 South, R-29 East, NMPM; and	1520 PSIG
BGSAU Tract 13 Well No. 2 Unit D, Section 5, T-18 South, R-29 East, NMPM,	1550 PSIG

All in Eddy 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

cc: Oil Conservation Division - Artesia
File: Case 9364
T. Gallegos
D. Catanach

NO WAITING PERIOD

COMPANY: Amerada Petroleum Corporation

ADDRESS: P.O. Box 2497

CITY, STATE, ZIP: Midland, Texas 79702

ATTENTION: Tommy W. Thompson

Re: Injection Pressure Increase
Ballard Grayburg San Andres Unit

Eddy County, New Mexico

Dear Sir:

Reference is made to your request dated March 26, and five April 4, 9 and ~~20~~, 1990, to increase the surface injection pressure on ~~the~~ wells located within the Ballard Grayburg San Andres Unit. This request is based on step rate tests conducted on ~~these~~ wells during March and April, 1990. 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. (Waterflood Project)

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

Well & Location	Maximum Injection Surface Pressure
BGSAU Tract 9 Well No. 2 Unit F, Sec. 5, T-18 South, R-29 East, NMPM	1550 #816
BGSAU Tract 10 Well No. 9 Unit E, Sec. 4, T-18 South, R-29 East, NMPM	1550 #816
BGSAU Tract 11 Well No. 1 Unit H, Sec. 6, T-18 South, R-29 East, NMPM	1488 #816
BGSAU Tract 24 Well No. 2 Unit I, Sec. 5, T-18 South, R-29 East, NMPM	1520 #816
BGSAU Tract 13 Well No. 2 Unit D, Sec. 5, T-18 South, R-29 East, NMPM	1550 #816

All in Eddy 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.

xc: T. GALLEGOS D. CATANACH FILE- Case 9364 OCD- Artesia

ANADARKO PETROLEUM CORP. 1300 INDEPENDENCE PLAZA • P.O. BOX 2497 • MIDLAND, TEXAS 79702 • (915) 682-1666

'90 MAR 29 AM 9 45

Anadarko

March 26, 1990

State of New Mexico
Department of Energy and Minerals
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501
Attn: William J. Lemay
Director

Re: Injection Pressure Increase
BGSAU No. 11-1
Unit Letter H, Sec. 6
T18S-R29E
Eddy County, New Mexico

Gentlemen:

Anadarko Petroleum Corporation, as operator of the Ballard GSA Unit Waterflood in Eddy County, New Mexico, requests administrative approval to increase the surface injection pressure limitation on unit well Tract 11 No. 1 from 975 psig to 1488 psig. The current surface injection pressure limitation is as authorized by amended order No. R-7773-A effective September 8, 1988. Order No. R-7773-A allows for a surface injection pressure limitation of 450 psig above formation parting pressure as determined by step rate tests, or 1550 psig, whichever is less.

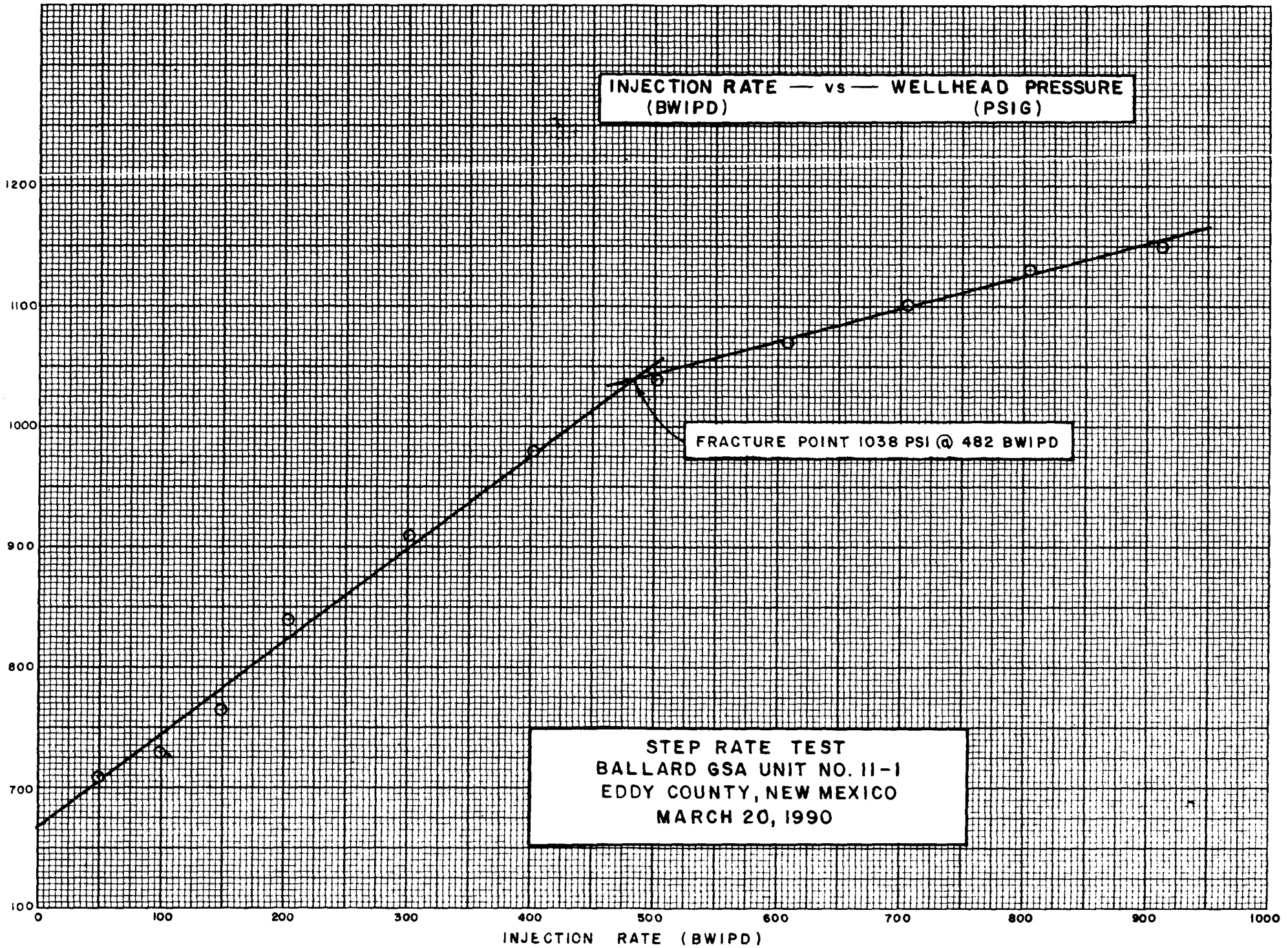
Enclosed please find two copies of a step rate test conducted March 20, 1990 on the subject well. The surface pressure readings indicate a fracture pressure of 1038 psig at an injection rate of 482 BWIPD. The request for a surface injection pressure limitation of 1488 psig is based on the 1032 psig parting pressure plus 450 psig.

Should you have any questions concerning this request, please contact myself or Mr. John Lowery at 915/682-1666.

Sincerely,

Tommy W. Thompson, P.E.
Staff Reservoir Engineer

TWT:gks
Attachments
cc: Jerry Buckles
OCD-Artesia
Well File

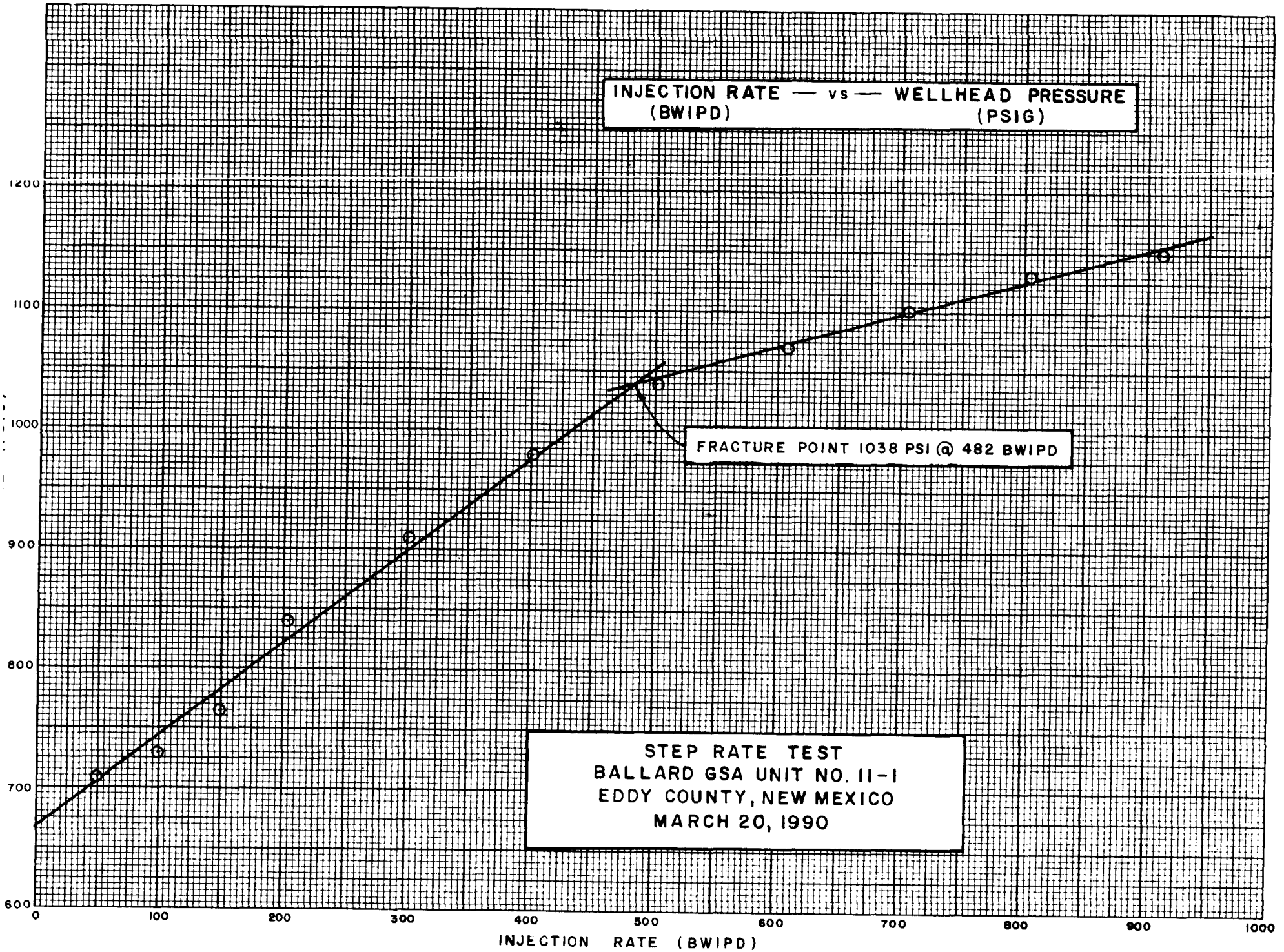

INJECTION RATE — vs — WELLHEAD PRESSURE
(BWIPD) (PSIG)
FRACTURE POINT 1038 PSI @ 482 BWIPD
STEP RATE TEST
BALLARD GSA UNIT NO. 11-1
EDDY COUNTY, NEW MEXICO
MARCH 20, 1990
1200
1100
1000
900
800
700
100
0
100
200
300
400
500
600
700
800
900
1000
INJECTION RATE (BWIPD)

STEP RATE TEST
BALLARD 11-1
MARCH 20, 1990

TIME	SURFACE INJECTION PRESSURE (PSIG)		INJECTION RATE (BWPD)
9:10	679		52
9:15	675		57
9:20	718		59
9:25	710		50
9:30	705		50
9:35	708		50
9:40	710		52
1st Setting Average Pressure =	701	Rate =	53
9:40	715		103
9:45	718		103
9:50	724		100
9:55	728		107
10:00	728		103
10:05	730		105
10:10	730		103
2nd Setting Average Pressure =	725	Rate =	103
10:10	742		150
10:15	747		150
10:20	749		150
10:25	753		153
10:30	760		150
10:35	764		153
10:40	767		150
3rd Setting Average Pressure =	755	Rate =	151
10:40	813		207
10:45	817		203
10:50	824		205
10:55	825		203
11:00	830		201
11:05	838		203
11:10	842		205
4th Setting Average Pressure =	827	Rate =	204

TIME	SURFACE INJECTION PRESSURE (PSIG)		INJECTION RATE (BWPD)
11:10	880		306
11:15	885		306
11:20	890		306
11:25	898		303
11:30	900		303
11:35	910		303
11:40	910		303
5th Setting Average Pressure =	896	Rate =	304
11:40	920		404
11:45	945		406
11:50	958		401
11:55	965		404
12:00	979		404
12:05	980		401
12:10	980		401
6th Setting Average Pressure =	961	Rate =	403
12:10	1000		508
12:15	1012		502
12:20	1019		502
12:25	1019		504
12:30	1025		506
12:35	1030		504
12:40	1038		502
7th Setting Average Pressure =	1020	Rate =	504
12:40	1058		605
12:45	1060		604
12:50	1060		602
12:55	1065		602
1:00	1065		602
1:05	1065		604
1:10	1070		609
8th Setting Average Pressure =	1063	Rate =	604
1:10	1080		702
1:15	1090		705
1:20	1100		702
1:25	1100		702
1:30	1100		702
1:35	1100		707
1:40	1100		705
9th Setting Average Pressure =	1096	Rate =	704

TIME	SURFACE INJECTION PRESSURE (PSIG)		INJECTION RATE (BWPD)
1:40	1119		805
1:45	1120		807
1:50	1120		800
1:55	1125		800
2:00	1125		804
2:05	1130		805
2:10	1130		805
10th Setting Average Pressure =	1124	Rate =	804
2:10	1142		927
2:15	1145		921
2:20	1145		910
2:25	1150		918
2:30	1150		909
2:35	1150		912
2:40	1150		912
11th Setting Average Pressure =	1147	Rate =	916


INJECTION RATE — vs — WELLHEAD PRESSURE
(BWIPD) (PSIG)
FRACTURE POINT 1038 PSI @ 482 BWIPD
STEP RATE TEST
BALLARD GSA UNIT NO. 11-1
EDDY COUNTY, NEW MEXICO
MARCH 20, 1990
1200
1100
1000
900
800
700
600
0
100
200
300
400
500
600
700
800
900
1000
INJECTION RATE (BWIPD)

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

July 15, 1991

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

Anadarko Petroleum Corporation
P.O. Box 2497
Midland, Texas 79702

Attention: Jeff White

RE: Injection Pressure Increase
Ballard Grayburg-San Andres Unit
Eddy County, New Mexico

Dear Sir:

Reference is made to your request dated May 31, 1991, to increase the surface injection pressure on two wells within the Ballard Grayburg-San Andres Unit Waterflood Project. This request is based on step rate tests conducted on these wells during May, 1991. 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 well.

WELL AND LOCATION	MAXIMUM INJECTION SURFACE PRESSURE
Ballard GSU Well No. 8-4 Unit B, Section 5, T-18 South, R-29 East, NMPM	1550 PSIG
Ballard GSU Well No. 10-1 Unit H, Section 5, T-18 South, R-29 East, NMPM	1390 PSIG

Both in Eddy 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

WJL/DC/jc

cc: Oil Conservation Division - Artesia
File: Case No. 9364
D. Catanach
R. Brown

KELLAHIN, KELLAHIN and AUBREY
Attorneys at Law
El Patio - 117 North Guadalupe
Post Office Box 2265
Santa Fé, New Mexico 87504-2265

W. Thomas Kellahin
Karen Aubrey

Jason Kellahin
Of Counsel

Telephone 982-4285
Area Code 505

May 24, 1988

RECEIVED
MAY 25 1988
OIL CONSERVATION DIVISION

Mr. Michael E. Stogner
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504

"Hand Delivered"

Re: Anadarko Petroleum Corporation
Application in Case 9364 to
Increase Injection Pressure
Limitation in Ballard Grayburg
GSA Unit Waterflood
Eddy County, New Mexico

Dear Mr. Stogner:

In accordance with your request, please find enclosed on behalf of Anadarko Petroleum Corporation a proposed order for entry in the referenced case.

Very truly yours,

W. Thomas Kellahin

WTK:ca

cc: Mr. Dan Kernaghan
Mr. John Beaird

STATE OF NEW MEXICO
DEPARTMENT OF ENERGY AND MINERALS
OIL CONSERVATION DIVISION

IN THE MATTER OF THE APPLICATION OF ANADARKO PETROLEUM CORPORATION FOR AMENDMENT TO ORDER R-7773 TO INCREASE THE INJECTION PRESSURE LIMITATION FOR THE BALLARD GRAYBURG-SAN ANDRES UNIT (GSA) WATERFLOOD PROJECT, EDDY COUNTY, NEW MEXICO.

Case: 9364

ANADARKO PETROLEUM CORPORATION'S
PROPOSED ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 8:15 A.M. on April 27, 1988 at Santa Fe, New Mexico before Examiner Michael E. Stogner.

NOW, on this ___ day of May, 1988, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS THAT:

(1) Due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) The applicant, Anadarko Petroleum Corporation, seeks the amendment of Division Order No. R-7773 to increase the surface injection limitation pressure for ten certain injection wells in its Ballard GSA Unit Waterflood Project to 450 psi above the formation parting pressure as determined from step-rate tests for said ten injection wells in the Grayburg formation of the Loco Hills Pool within the project area consisting of a portion of Sections 4, 6, 7, 17, and all of Sections 5 and 8, Township 18 South, Range 29 East, Eddy County, New Mexico.

(3) Applicant is the operator of the Ballard GSA Waterflood, Eddy County, New Mexico.

(4) The Applicant, Anadarko Production Corporation, obtained authority by Division Order R-7000 (1982 expansion) to expand its Ballard GSA Unit Waterflood project by the completion for injection or conversion to water injection of ten wells located as shown on Exhibit A, all in Township 18 South, Range 29 East, Loco Hills Pool, Eddy County, New Mexico.

(5) That decline curve analysis indicates that 237 MBO may be recovered as a result of the injection wells added to the Ballard GB-SA Unit under Order R-7773 (1985 expansion).

(6) Division Order R-7000 authorized a surface injection pressure limitation of 1550 psi.

(7) Temperature logs from injection wells operated under Order No. R-4493A (1973 project, no surface injection pressure limit) and Order No. R-7000 (1982 expansion, 1550 psi maximum surface injection pressure, $\pm$ .65 psi/ft) indicate that all injected water is being contained within the Grayburg formation.

(8) The 1985 expansion area has shown no response to injection under Order No. R-7773 (.2 psi/ft maximum surface injection pressure).

(9) The continuation of the pressure limitation imposed under R-7773 for those ten wells will result in a loss of 250 MBO of secondary oil.

(10) Injection conducted at 450 psi above the parting pressure of the formation will create a fracture that will not propagate outside of the vertical limits of the Grayburg formation.

(11) The improved injectivity from increased pressure limitations will allow for the timely completion of waterflood operations in the Ballard BG-SA Unit and result in an additional 250 MBO being recovered from the 1985 expansion area.

(12) In order to prevent waste a new pressure limitation of 450 psi above the formation parting pressure as determined by step-rate tests is required for the Ballard GS-SA Unit wells operated under Order R-7773 and as tabulated on Exhibit "A" attached hereto.

(13) That approval of this application will prevent waste, protect correlative rights, and will not constitute a risk to fresh water sources.

IT IS THEREFORE ORDERED THAT:

(1) The applicant, Anadarko Production Corporation, is hereby authorized to increase its surface injection pressure in its Ballard Grayburg-San Andres Unit Waterflood Project up to 1550 psi, all located as described in Exhibit "A" attached to this order.

(2) Jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

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

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

WILLIAM J. LEMAY,
Director

S E A L

EXHIBIT "A"

ELL	LOCATION
#10-9	1980'FNL & 1310' FWL, Sec 4
#26-4	800' FSL & 1310' FWL, Sec 4
#5-9	Unit Letter H, Section 8
#5-14	Unit Letter P, Section 8
#8-4	Unit Letter B, Section 5
#9-2	Unit Letter F, Section 5
#10-1	Unit Letter H, Section 5
#11-1	Unit Letter H, Section 6
#13-2	Unit Letter D, Section 5
#24-2	Unit Letter P, Section 5

ANADARKO PETROLEUM CORP. 1300 INDEPENDENCE PLAZA • P.O. BOX 2497 • MIDLAND, TEXAS 79702 • (915) 682-1666

Anadarko

April 20, 1990

State of New Mexico
Department of Energy and Minerals
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87501
Attn: William J. Lemay
Director

Re: Injection Pressure Increase
BGSAU No. 24-2
Unit Letter P, Sec. 5
T18S-R29E
Eddy County, New Mexico

Gentlemen:

Anadarko Petroleum Corporation, as operator of the Ballard GSA Unit Waterflood in Eddy County, New Mexico, requests administrative approval to increase the surface injection pressure limitation on unit well Tract 24 No. 2 from 1155 psig to 1520 psig. The current surface injection pressure limitation is as authorized by amended order No. R-7773-A effective September 8, 1988. Order No. R-7773-A allows for a surface injection pressure limitation of 450 psig above formation parting pressure as determined by step rate tests, or 1550 psig, whichever is less.

Enclosed please find two copies of a step rate test conducted April 3, 1990 on the subject well. The surface pressure readings indicate a fracture pressure of 1070 psig at an injection rate of 319 BWIPD. The request for a surface injection pressure limitation of 1520 psig is based on the 1070 psig parting pressure plus 450 psig.

Should you have any questions concerning this request, please contact myself or Mr. John Lowery at 915/682-1666.

Sincerely,

Tommy W. Thompson, P.E.
Staff Reservoir Engineer

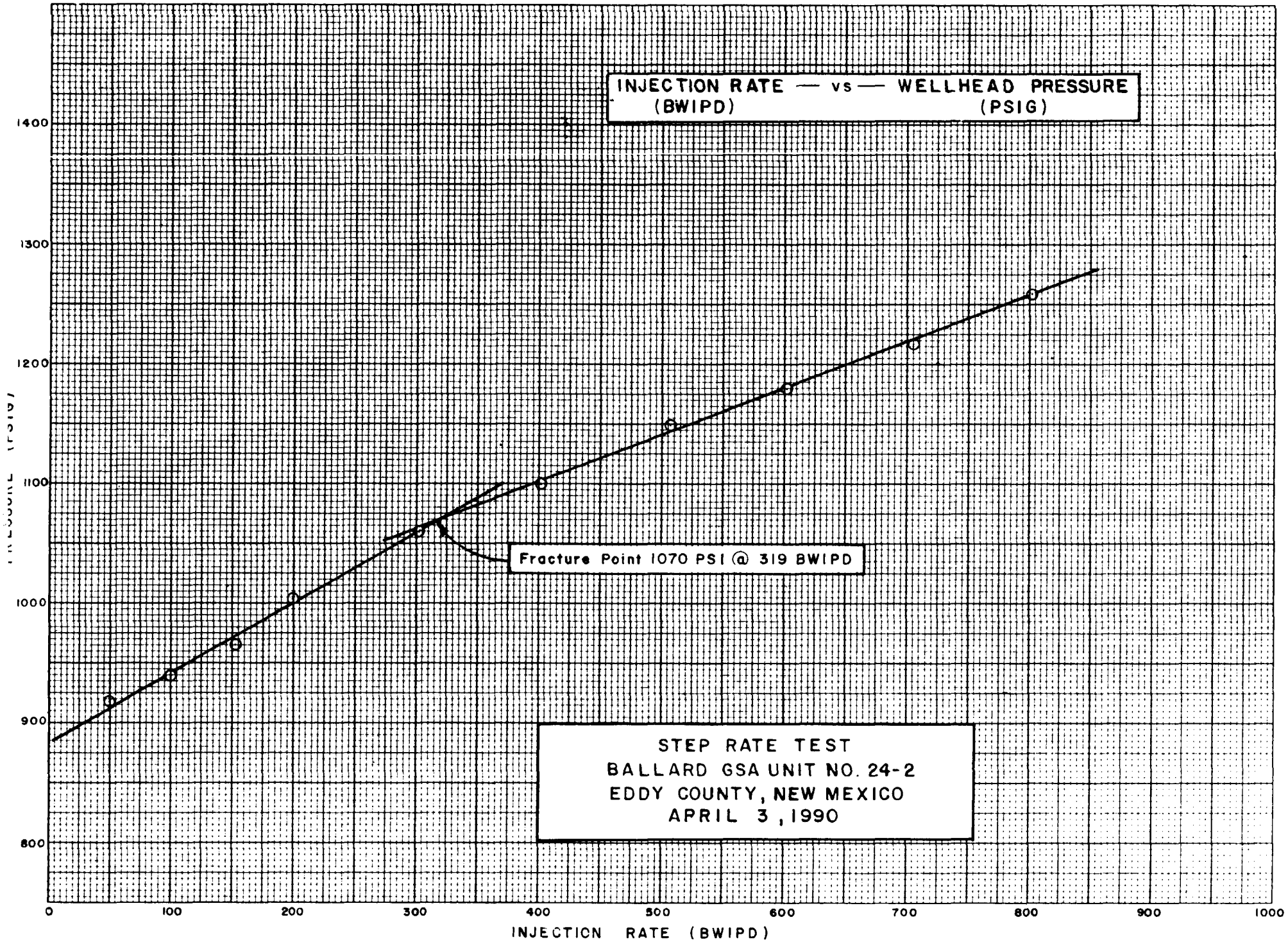
TWT:gks
Attachments
cc: Jerry Buckles
OCD-Artesia
Well File

STEP RATE TEST
BALLARD 24-2
APRIL 3, 1990

TIME	SURFACE INJECTION PRESSURE (PSIG)		INJECTION RATE (BWPD)
8:50	900		50
8:55	900		50
9:00	910		55
9:05	910		52
9:10	910		55
9:15	910		50
9:20	918		50
1st Setting Average Pressure =	908	Rate =	52
9:20	920		103
9:25	920		107
9:30	925		105
9:35	930		103
9:40	938		107
9:45	940		107
9:50	940		103
2nd Setting Average Pressure =	930	Rate =	105
9:50	945		155
9:55	948		153
10:00	955		157
10:05	960		157
10:10	960		160
10:15	965		155
10:20	965		153
3rd Setting Average Pressure =	957	Rate =	156
10:20	978		201
10:25	980		205
10:30	990		207
10:35	990		201
10:40	1000		205
10:45	1000		201
10:50	1005		201
4th Setting Average Pressure =	992	Rate =	203

TIME	SURFACE INJECTION PRESSURE (PSIG)		INJECTION RATE (BWPD)
10:50	1019		306
10:55	1020		308
11:00	1030		308
11:05	1040		303
11:10	1045		308
11:15	1058		303
11:20	1060		301
5th Setting Average Pressure =	1039	Rate =	305
11:20	1065		404
11:25	1079		404
11:30	1080		408
11:35	1090		401
11:40	1100		402
11:45	1100		408
11:50	1100		404
6th Setting Average Pressure =	1088	Rate =	404
11:50	1110		508
11:55	1120		502
12:00	1130		504
12:05	1139		508
12:10	1140		502
12:15	1145		502
12:20	1150		508
7th Setting Average Pressure =	1133	Rate =	505
12:20	1160		609
12:25	1160		604
12:30	1160		609
12:35	1165		606
12:40	1170		609
12:45	1177		602
12:50	1180		604
8th Setting Average Pressure =	1167	Rate =	606
12:50	1190		707
12:55	1200		707
1:00	1200		705
1:05	1205		709
1:10	1210		711
1:15	1218		695
1:20	1218		707
9th Setting Average Pressure =	1206	Rate =	706

TIME	SURFACE INJECTION PRESSURE (PSIG)	INJECTION RATE (BWPD)
1:20	1232	809
1:25	1238	805
1:30	1240	803
1:35	1244	803
1:40	1247	820
1:45	1250	809
1:50	1259	803
10th Setting Average Pressure =	12344	Rate = 807


INJECTION RATE — vs — WELLHEAD PRESSURE
(BWIPD) (PSIG)
1400
1300
1200
1100
1000
900
800
Fracture Point 1070 PSI @ 319 BWIPD
STEP RATE TEST
BALLARD GSA UNIT NO. 24-2
EDDY COUNTY, NEW MEXICO
APRIL 3, 1990
0
100
200
300
400
500
600
700
800
900
1000
INJECTION RATE (BWIPD)

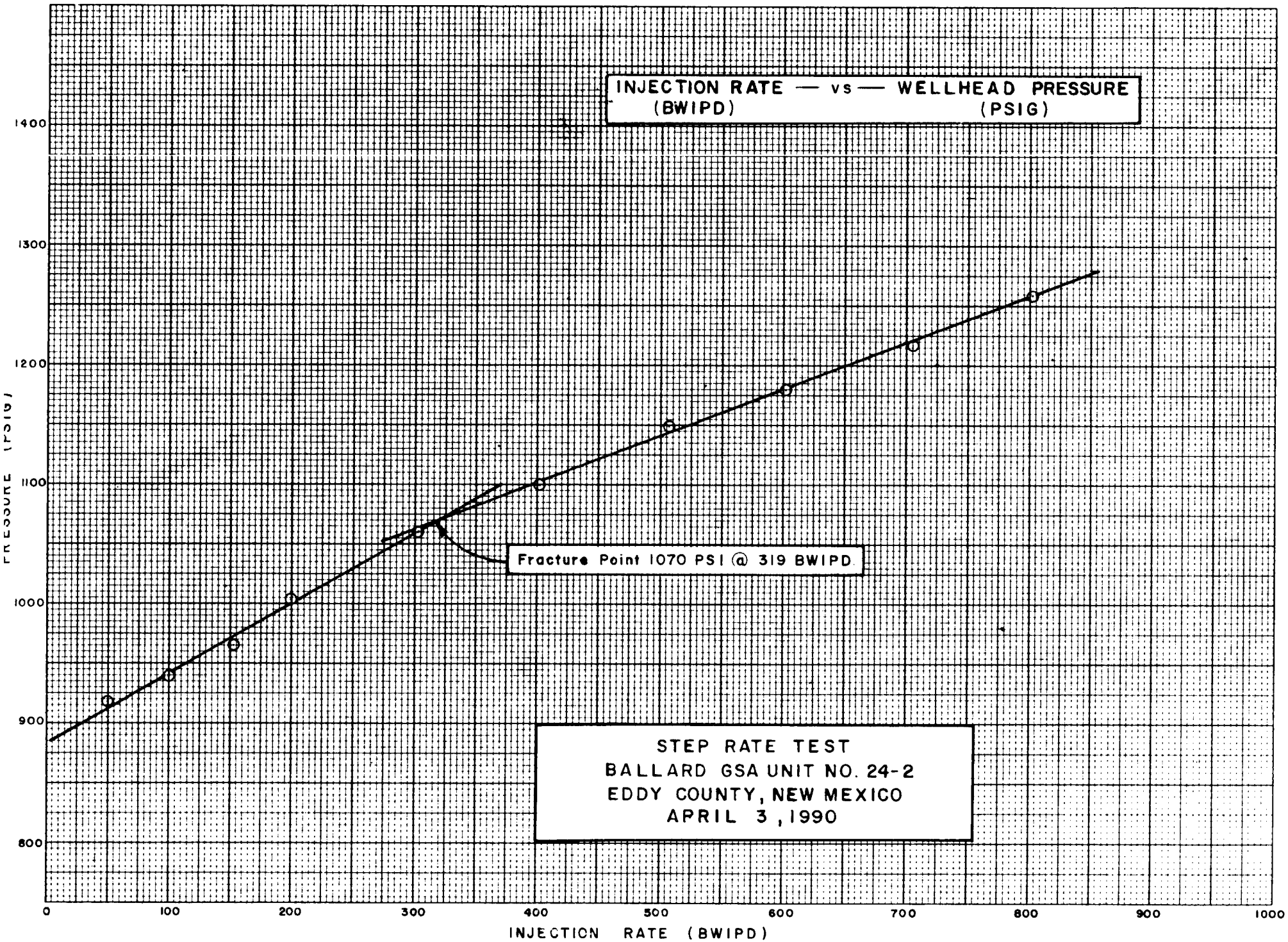
STEP RATE TEST
BALLARD 24-2
APRIL 3, 1990

TIME	SURFACE INJECTION PRESSURE (PSIG)		INJECTION RATE (BWPD)
8:50	900		50
8:55	900		50
9:00	910		55
9:05	910		52
9:10	910		55
9:15	910		50
9:20	918		50
1st Setting Average Pressure =	908	Rate =	52
9:20	920		103
9:25	920		107
9:30	925		105
9:35	930		103
9:40	938		107
9:45	940		107
9:50	940		103
2nd Setting Average Pressure =	930	Rate =	105
9:50	945		155
9:55	948		153
10:00	955		157
10:05	960		157
10:10	960		160
10:15	965		155
10:20	965		153
3rd Setting Average Pressure =	957	Rate =	156
10:20	978		201
10:25	980		205
10:30	990		207
10:35	990		201
10:40	1000		205
10:45	1000		201
10:50	1005		201
4th Setting Average Pressure =	992	Rate =	203

TIME	SURFACE INJECTION PRESSURE (PSIG)		INJECTION RATE (BWPD)
10:50	1019		306
10:55	1020		308
11:00	1030		308
11:05	1040		303
11:10	1045		308
11:15	1058		303
11:20	1060		301
5th Setting Average Pressure =	1039	Rate =	305
11:20	1065		404
11:25	1079		404
11:30	1080		408
11:35	1090		401
11:40	1100		402
11:45	1100		408
11:50	1100		404
6th Setting Average Pressure =	1088	Rate =	404
11:50	1110		508
11:55	1120		502
12:00	1130		504
12:05	1139		508
12:10	1140		502
12:15	1145		502
12:20	1150		508
7th Setting Average Pressure =	1133	Rate =	505
12:20	1160		609
12:25	1160		604
12:30	1160		609
12:35	1165		606
12:40	1170		609
12:45	1177		602
12:50	1180		604
8th Setting Average Pressure =	1167	Rate =	606
12:50	1190		707
12:55	1200		707
1:00	1200		705
1:05	1205		709
1:10	1210		711
1:15	1218		695
1:20	1218		707
9th Setting Average Pressure =	1206	Rate =	706

TIME	SURFACE INJECTION PRESSURE (PSIG)	INJECTION RATE (BWPD)
1:20	1232	809
1:25	1238	805
1:30	1240	803
1:35	1244	803
1:40	1247	820
1:45	1250	809
1:50	1259	803

10th Setting Average Pressure = 12344 Rate = 807


INJECTION RATE — vs — WELLHEAD PRESSURE
(BWIPD) (PSIG)
1400
1300
1200
1100
1000
900
800
PRESSURE (PSIG)
Fracture Point 1070 PSI @ 319 BWIPD
STEP RATE TEST
BALLARD GSA UNIT NO. 24-2
EDDY COUNTY, NEW MEXICO
APRIL 3, 1990
0
100
200
300
400
500
600
700
800
900
1000
INJECTION RATE (BWIPD)