

Form C-108
Application for Authorization to Inject
San Isidro 13-11

BEFORE EXAMINED BY COMMISSION

PROJECT NO. 1

- I. **PURPOSE:** The purpose of this application is to request approval to inject gas into the San Isidro 13-11 well, Section 13-Township 20 North-Range 3 West, Sandoval County, New Mexico. The gas re-injection is requested to allow disposal of the produced gas. This will allow unrestricted oil production in the Rio Puerco Field. Currently, due to gas venting restrictions, many wells are only allowed to produce part time during the month. This application does not qualify for administrative approval.
- II. **OPERATOR:** Gary-Williams Oil Producers, 370 17th Street, Suite 5300, Denver, Colorado 80202. Telephone (303) 628-3800.
- III. **WELL DATA:** See Attachment A.
- IV. **PROJECT EXPANSION:** This is not an expansion of an existing project.
- V. **MAP:** See Attachment B.
- VI. **TABULATION OF DATA IN AREA OF REVIEW:** See Attachment C.
- VII. **PROPOSED OPERATIONS:** Summarized below, full detail in Attachment D.
- (1) The proposed average and maximum daily rates and volumes are expected to be .250-3.00 MMCFD with an estimated 3 MMCF per day injected.
 - (2) The system will be a closed system.
 - (3) The average injection pressure will be 1,400 psi with a maximum allowable surface pressure of 1,700 psi.
 - (4) The Gas injected into the Mancos formation is produced Mancos gas. It is compatible with existing reservoir fluids, and requires no additional analysis.
 - (5) Not required. This project is injecting Mancos Gas into the Mancos formation.
- VIII. **GEOLOGICAL DATA :** The Mancos formation (Upper Cretaceous) is roughly 800' below the Point Lookout formation, and 900' above the Greenhorn formation. The Mancos has been subdivided into four zones called the Gallup "A", "B", "C", and "D".

The Mancos interval in the Rio Puerco area consists of highly interbedded very fine grained sandstones, siltstones and shales. Sandstones within the interval have very low porosities and permeabilities, usually averaging below 5% and 0.5 md respectively. The productive system is based primarily on natural fracturing which provides a permeability system to assist the drainage from the low porosity and permeability matrix blocks. The Mancos interval is very consistent throughout the Rio Puerco area.

- IX. STIMULATION PROGRAM: There is no planned stimulation planned prior to injection of gas.
- X. LOGS AND TEST DATA: All required logs and test data have been filed with the Division and will not be included in this application.
- XI. FRESH WATER ANALYSIS: There are no fresh water wells within the one mile area of interest surrounding this well.
- XII. AFFIRMATIVE STATEMENT: All available data has been reviewed and it is the undersigned's professional opinion that there is no evidence of open faults or other geological or hydrological phenomoma which could lead to the contamination of any zone containing drinking water.
- XIII. PROOF OF NOTICE: A copy of this form has been mailed to operators within one-half mile of the well. The only operator is Benson-Montin-Greer, Farmington, New Mexico. The surface leasee is Eugene Johnson & Sons, Cuba, New Mexico.
- XIV. CERTIFICATION: I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name Richard Shuster Title Petroleum Engineer/Agent

Signature *Richard Shuster* Date January 15, 1991

APPLICATION TO DISPOSE OF SALT WATER BY INJECTION INTO A POROUS FORMATION

OPERATOR Gary-Williams Oil Producer, Inc.		ADDRESS 370 17th St. Suite 5300, Denver, CO 80202	
LEASE NAME San Isidro 13	WELL NO. 11	FIELD Rio Puerco Mancos	COUNTY Sandoval
LOCATION UNIT LETTER <u>K</u> ; WELL IS LOCATED <u>1980</u> FEET FROM THE <u>South</u> LINE AND <u>1980</u> FEET FROM THE <u>East</u> LINE. SECTION <u>13</u> TOWNSHIP <u>20 North</u> RANGE <u>3 West</u> NMPM.			

CASING AND TUBING DATA					
NAME OF STRING	SIZE	SETTING DEPTH	BACKS CEMENT	TOP OF CEMENT	TOP DETERMINED BY
SURFACE CASING					
36#, J-55 STC	9-5/8"	436' KB	135	Surface	Circulated to Surface
INTERMEDIATE					
23#, J-55 STC	7"	3346' KB	205 sx Foamed 195 sx Class B	Surface	Circulated and Capped
LONG STRING					
Liner		3140-			
10.5#, J-55 STC	4-1/2"	4262' KB	160	3473	Reversed out excess Bond Log
TUBING					
4.7#, EUE	2-3/8"	3175' KB	NAME, MODEL AND DEPTH OF TUBING PACKER Baker Model C Set @ 3665'		

NAME OF PROPOSED INJECTION FORMATION Mancos Gallup		TOP OF FORMATION 3610' KB	BOTTOM OF FORMATION 4172'
IS INJECTION THROUGH TUBING, CASING, OR ANNULUS? Tubing		PERFORATIONS OR OPEN HOLES Perforations	PROPOSED INTERVAL(S) OF INJECTION 3691'-4127'
IS THIS A NEW WELL DRILLED FOR DISPOSAL? Yes	IF ANSWER IS NO, FOR WHAT PURPOSE WAS WELL ORIGINALLY DRILLED?		HAS WELL EVER BEEN PERFORATED IN ANY ZONE OTHER THAN THE PROPOSED INJECTION ZONE? No

LIST ALL SUCH PERFORATED INTERVALS AND BACKS OF CEMENT USED TO SEAL OFF OR SQUEEZE EACH
N/A

DEPTH OF BOTTOM OF DEEPEST FRESH WATER ZONE IN THIS AREA Ojo Alamo 305'		DEPTH OF BOTTOM OF NEXT HIGHER OIL OR GAS ZONE IN THIS AREA Menefee 2652'		DEPTH OF TOP OF NEXT LOWER OIL OR GAS ZONE IN THIS AREA Semilla 4425' (est top)	
ANTICIPATED DAILY INJECTION VOLUME (BBLS.)	MINIMUM	MAXIMUM	OPEN OR CLOSED TYPE SYSTEM	IS INJECTION TO BE BY GRAVITY OR PRESSURE?	APPROX. PRESSURE (PSI)
	250 mcf	2000 mcf	Closed	Pressure	1400-1700
ANSWER YES OR NO WHETHER THE FOLLOWING WATERS ARE MINERALIZED TO SUCH A DEGREE AS TO BE UNFIT FOR DOMESTIC, STOCK, IRRIGATION, OR OTHER GENERAL USE -			WATER TO BE DISPOSED OF	NATURAL WATER IN DISPOSAL ZONE	ARE WATER ANALYSES ATTACHED?
			N/A Gas		

NAME AND ADDRESS OF SURFACE OWNER (OR LESSEE, IF STATE OR FEDERAL LAND)
Lessee - Eugene Johnson & Sons, Box 244, Cuba, NM 87013

LIST NAMES AND ADDRESSES OF ALL OPERATORS WITHIN ONE-HALF (1/2) MILE OF THIS INJECTION WELL
Benson-Montin-Greer Attn: Al Greer
221 Petroleum Center Building
Farmington, NM 87401

HAVE COPIES OF THIS APPLICATION BEEN SENT TO EACH OF THE FOLLOWING?	SURFACE OWNER Yes	EACH OPERATOR WITHIN ONE-HALF MILE OF THIS WELL Yes
ARE THE FOLLOWING ITEMS ATTACHED TO THIS APPLICATION (SEE RULE 701-8)	PLAT OF AREA Yes	ELECTRICAL LOG No
		DIAGRAMMATIC SKETCH OF WELL Yes

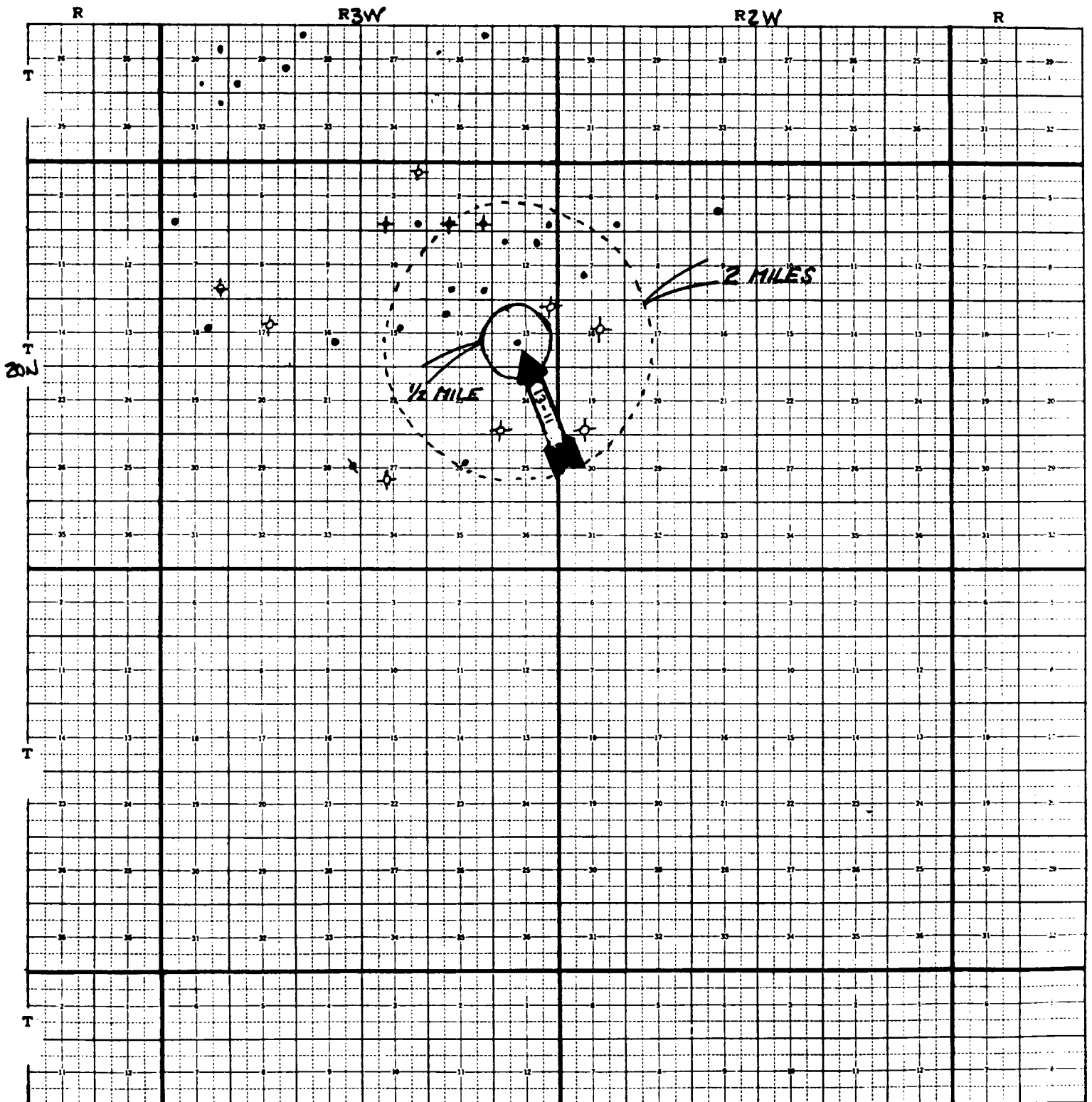
I hereby certify that the information above is true and complete to the best of my knowledge and belief.

Richard Shuster
(Signature)

Petroleum Engineer/Agent
(Title)

January 15, 1991
(Date)

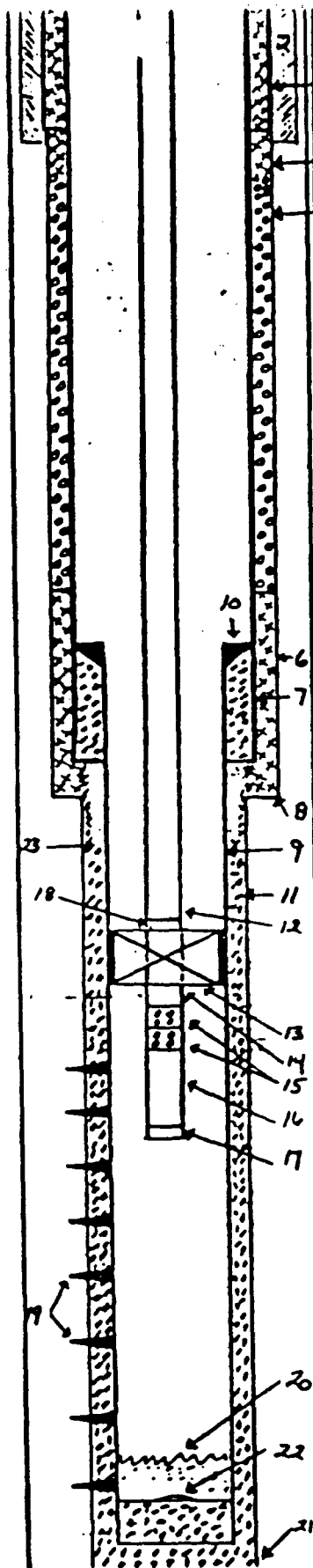
NOTE: Should waivers from the surface owner and all operators within one-half mile of the proposed injection well not accompany this application, the New Mexico Oil Conservation Division will hold the application for a period of 15 days from the date of receipt by the Division's Santa Fe office. If at the end of the 15-day waiting period no protest has been received by the Santa Fe office, the application will be processed. If a protest is received, the application will be set for hearing, if the applicant so requests. SEE RULE 701.

County SANDOVALState NEW MEXICOFour Township Island plat ($\frac{1}{2}$ " to the mile)

ATTACHMENT C
SAN ISIDRO 13-11
WELL LOCATION MAP
FORM C-108

TABULATION OF ALL WELLS WITHIN 1/2 MILE RADIUS OF SAN ISIDRO 13-11

There are no wells located in the 1/2 mile area of review.



WELL # <u>SAN JUAN 13-11</u>		SIZE	7	4 1/2	2 3/8
FIELD <u>Rio Puerco Mancos</u>		WEIGHT	25	10.5	4.7
COUNTY <u>SANDOVAL</u>		GRADE	J55	J55	J55
STATE <u>NEW MEXICO</u>		THREAD	840	840	840
DATE <u>10-22-85</u>		DEPTH	334	3140	3715
☒ NEW COMPLETION ☐ WORKOVER					

ITEM NO.	EQUIPMENT AND SERVICES
1.	13 1/2" Hole Drilled To 449' KB
2.	1352x CLASS B CEMENT SURFACE TO 449' KB
3.	36" J-55 STE CASING S-T @ 436' KB
4.	455x CLASS B CEMENT SURFACE - 450' KB
5.	205x FLAMED CLASS B 450-2400' KB
6.	1505x CLASS B TAIL CEMENT 2400-3360' KB
7.	23" J-55 STE CASING S-T @ 3346
8.	8 3/4" Hole Drilled To 3360
9.	10.5" J-55 STE LINE S-T 3140-4262' KB
10.	4 1/2" LINE HANGER WITH PACK-OFF @ 3140 KB
11.	160 5x 65/35 PER 3140 - 4265' KB
12.	2 3/8" TUBING S-T @ 3715' KB
13.	BAKER MODEL C PACKER. PACKING ELEMENT @ 3665 KB
14.	2 3/8" x 6' SUB
15.	2 3/8" x 4' PRELOCATION SUBS (200) 3672-3680' KB
16.	FULL JOINT OF 2 3/8" TUBING
17.	2 3/8" TAPPED BULL PLUG. (TO SEAL S-T FROM HOLE PRESSURE BOMB) @ 3715 KB
18.	FINIPPLE (1.8150) @ 3660
19.	PREPARATIONS 3691-4127
20.	FILL @ 4085' KB
21.	6 1/2" Hole TO 4265' KB
22.	LATCH DOWN PLY @ 4219
23.	ROUND LOG INDICATOR CEMENT TOP @ 3473

COMMENTS:

6-21-85 PRESSURE TEST 9 5/8" CASING TO 1500 PSI
 6-25-85 PRESSURE TEST 7" CASING TO 1500 PSI
 7-30-85 PRESSURE TEST 7" & 4 1/2" CASING TO 3500 PSI

NOTE: LATCH DOWN PLY DID NOT HOLD. LINE CEMENT FALL BACK 218' EVEN THO 255x OF CEMENT WAS REVERSED OUT DURING CEMENTING OPERATIONS. EXCELLENT BOND IS INDICATED ACROSS LINE LAP.

PREPARED BY

Ray

OFFICE

Englewood

PHONE



MIDLAND, TEXAS / FARMINGTON, NEW MEXICO
GRAND JUNCTION, COLORADO

P. O. Box 5247
Midland, Texas 79704
(915) 682-5574

November 6, 1985

Gary-Williams Oil Producer, Inc.
115 Inverness Drive East
Englewood, CO 80112

Attention: Mr. Ray Hager

Subject: Step Rate Test and Fall Off
Measurement
San Isidro No. 13-11
San Juan Basin Gallup Field
Sandoval County, New Mexico
Our File No. 2-17476-SRT&FO

Gentlemen:

Attached hereto are the results of a step rate injectivity test and fall off measurement which were conducted on the above captioned well October 22 through October 30, 1985.

The data presented are in tabular and graphical form.

It has been our pleasure to have conducted this service for you. If we may be of further assistance, please call us at any time.

Respectfully submitted,

TEFTELLER, INC.

Neil Tefteller

NT/lw

cc: Mr. Chuck Emerson
Gary-Williams Oil Producer, Inc.
Box 396
Cuba, NM 87013

TEFTELLER, INC.
RESERVOIR ENGINEERING DATA
MIDLAND, TEXAS

WELL : SAN ISIDRO NO. 13-11

PAGE 1 OF 6

FIELD : SAN JUAN BASIN GALLUP

FILE 2-17476-SRT&FO

CHRONOLOGICAL PRESSURE AND PRODUCTION DATA

1985 DATE	STATUS OF WELL	TIME	ELAPSED TIME HRS. MIN.	INJECTION RATE MCF/DAY	TUBING PRESSURE PSIG	BHP @ 3722' PSIG
10-22	Arrived on location, well shut-in	15:45				
	Release tandem instruments at 3722'	16:45				632
		17:45				637
		18:45				642
		19:45				646
		20:45				649
		21:45				652
		22:45				654
		23:45				657
10-23		00:45				659
		01:45				661
		02:45				664
		03:45				666
		04:45				668
		05:45				670
		06:45				672
		07:45				673
		08:45			640	675
	Start injectivity test Rate No. 1	08:47				
		08:53	0 06			731
		08:59	0 12			783
		09:05	0 18			822
		09:11	0 24			854
		09:17	0 30			886
		09:23	0 36			915
		09:29	0 42			941
		09:35	0 48			962
		09:41	0 54			981
		09:47	1 00			999
		09:53	1 06			1015
		09:59	1 12			1029
		10:05	1 18			1043
		10:11	1 24			1055
		10:17	1 30			1064
		10:23	1 36			1073
		10:29	1 42			1081
		10:35	1 48			1188
		10:41	1 54			1097
		10:47	2 00	1.00	*986	1105
	Injection stopped	10:47	0 00			

TEFTELLER, INC.
RESERVOIR ENGINEERING DATA
MIDLAND, TEXAS

WELL : SAN ISIDRO NO. 13-11

PAGE 2 OF 6

FIELD : SAN JUAN BASIN GALLUP

FILE 2-17476-SRT&FO

CHRONOLOGICAL PRESSURE AND PRODUCTION DATA

1985 DATE	STATUS OF WELL	TIME	ELAPSED TIME HRS.MIN.	INJECTION RATE MCF/DAY	TUBING PRESSURE PSIG	BHP @ 3722' PSIG
10-23		10:49	0 02			1101
	Start Rate No. 2	10:49	0 00			
		10:55	0 06			1119
		11:01	0 12			1133
		11:07	0 18			1143
		11:13	0 24			1152
		11:19	0 30			1161
		11:25	0 36			1169
		11:31	0 42			1176
		11:37	0 48			1183
		11:43	0 54			1188
		11:47	0 58	1.50	1073	1192
	Injection stopped	11:47	0 00			
		11:49	0 02		1044	1184
	Start Rate No. 3	11:49	0 00			
		11:55	0 06			
		12:01	1 12			1201
		12:07	0 18			1215
		12:13	0 24			1221
		12:19	0 30			1225
		12:25	0 36			1229
		12:31	0 42			1233
		12:37	0 48			1236
		12:43	0 54			1239
		12:47	0 58	2.00	1137	1242
		12:47	0 00			
		12:49	0 02		1090	1236
	Start Rate No. 4	12:49	0 00			
		12:55	0 06			1247
		13:01	0 12			1253
		13:07	0 18			1256
		13:13	0 24			1260
		13:19	0 30			1263
		13:25	0 36			1266
		13:31	0 42			1269
		13:37	0 48			1271
		13:43	0 54			1274
		13:47	0 58	2.50	1182	1276

TEFTELLER, INC.
RESERVOIR ENGINEERING DATA
MIDLAND, TEXAS

WELL : SAN ISIDRO NO. 13-11

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FIELD : SAN JUAN BASIN GALLUP

FILE 2-17476-SRT&FO

CHRONOLOGICAL PRESSURE AND PRODUCTION DATA

1985 DATE	STATUS OF WELL	TIME	ELAPSED TIME HRS.MIN.	INJECTION RATE MCF/DAY	TUBING PRESSURE PSIG	BHP @ 3722' PSIG
10-23	Injection stopped	13:47	0 00			
		13:49	0 02		1121	1265
	Start Rate No. 5	13:49	0 00			
		13:55	0 06			1280
		14:01	0 12			1284
		14:07	0 18			1288
		14:13	0 24			1291
		14:19	0 30			1294
		14:25	0 36			1296
		14:31	0 42			1298
		14:37	0 48			1301
		14:43	0 54			1303
	Start Rate No. 6	14:47	0 58	3.00	1228	1304
		14:47	0 00			
		14:53	0 06			1313
		14:59	0 12			1317
		15:05	0 18			1320
		15:11	0 24			1323
		15:17	0 30			1326
		15:23	0 36			1329
	Start Rate No. 7	15:27	0 40	4.00	1309	1332
		15:27	0 00			
		15:33	0 06			1347
		15:39	0 12			1351
		15:45	0 18			1357
		15:51	0 24			1362
		15:57	0 30			1367
		16:03	0 36			1370
	Injection stopped	16:07	0 40	6.00	1467	1371
		16:07				
		16:13	0 06			1347
		16:19	0 12			1342
		16:25	0 18			1338
		16:31	0 24			1335
		16:37	0 30			1332
		16:43	0 36			1330
		16:49	0 42			1329
		16:55	0 48			1327
		17:01	0 54			1326
		17:07	1 00			1324

TEFTELLER, INC.
RESERVOIR ENGINEERING DATA
MIDLAND, TEXAS

WELL : SAN ISIDRO NO. 13-11

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FIELD : SAN JUAN BASIN GALLUP

FILE 2-17476-SRT&FO

CHRONOLOGICAL PRESSURE AND PRODUCTION DATA

1985 DATE	STATUS OF WELL	TIME	ELAPSED TIME HRS.MIN.	INJECTION RATE MCF/DAY	TUBING PRESSURE PSIG	BHP @ 3722' PSIG
10-23		17:22	1 15			1320
		17:37	1 30			1315
		17:52	1 45			1311
		18:07	2 00			1307
		18:37	2 30			1303
		19:07	3 00			1298
		19:37	3 30			1294
		20:07	4 00			1289
		21:07	5 00			1278
		22:07	6 00			1269
		23:07	7 00			1262
10-24		00:07	8 00			1254
		01:07	9 00			1247
		02:07	10 00			1239
		03:07	11 00			1230
		04:07	12 00			1222
		06:07	14 00			1207
		08:07	16 00			1187
		10:07	18 00			1169
		12:07	20 00			1149
		14:07	22 00			1129
		16:07	24 00			1110
		18:07	26 00			1090
		20:07	28 00			1070
		22:07	30 00			1050
10-25		00:07	32 00			1032
		02:07	34 00			1014
		04:07	36 00			996
		06:07	38 00			979
		08:07	40 00			965
		10:07	42 00			952
		12:07	44 00			939
		14:07	46 00			925
		16:07	48 00			912

TEFTELLER, INC.
RESERVOIR ENGINEERING DATA
MIDLAND, TEXAS

WELL : SAN ISIDRO NO. 13-11

PAGE 5 OF 6

FIELD : SAN JUAN BASIN GALLUP

FILE 2-17476-SRT&FO

CHRONOLOGICAL PRESSURE AND PRODUCTION DATA

DATE	STATUS OF WELL	TIME	ELAPSED TIME HRS.MIN.	INJECTION RATE MCF/DAY	TUBING PRESSURE PSIG	BHP @ 3722' PSIG
0-26		20:07	52 00			887
		00:07	56 00			866
		04:07	60 00			844
		08:07	64 00			837
		12:07	68 00			825
		16:07	72 00			812
0-27		20:07	76 00			802
		00:07	80 00			791

Final Injection Pressure

((2))

WELL HISTORY

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GARY-WILLIAMS OIL PRODUCER	115 Inverness Drive East Englewood, Colorado 80112
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Operating Agreement: _____	Call on Production: _____
Operator: <u>GWOP</u>	Contractor: <u>Young Drilling Rig #2</u>
Well Name: <u>#13-11 San Isidro</u>	Lease: _____
Location: <u>NE SW 13-20N-3W</u>	Elevation: GL <u>6879'</u> KB <u>6892'</u>
County: <u>Sandoval</u> State: <u>NM</u>	PTD: <u>4300'</u> Type: <u>Dev</u>
Prospect/Field: <u>Rio Puerco</u>	Deal Number: <u>640.31</u>
GWOP's WI: <u>25.73025%</u>	Spud Date: <u>6/19/85</u>

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Date	Depth	Progress History
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10/24/85

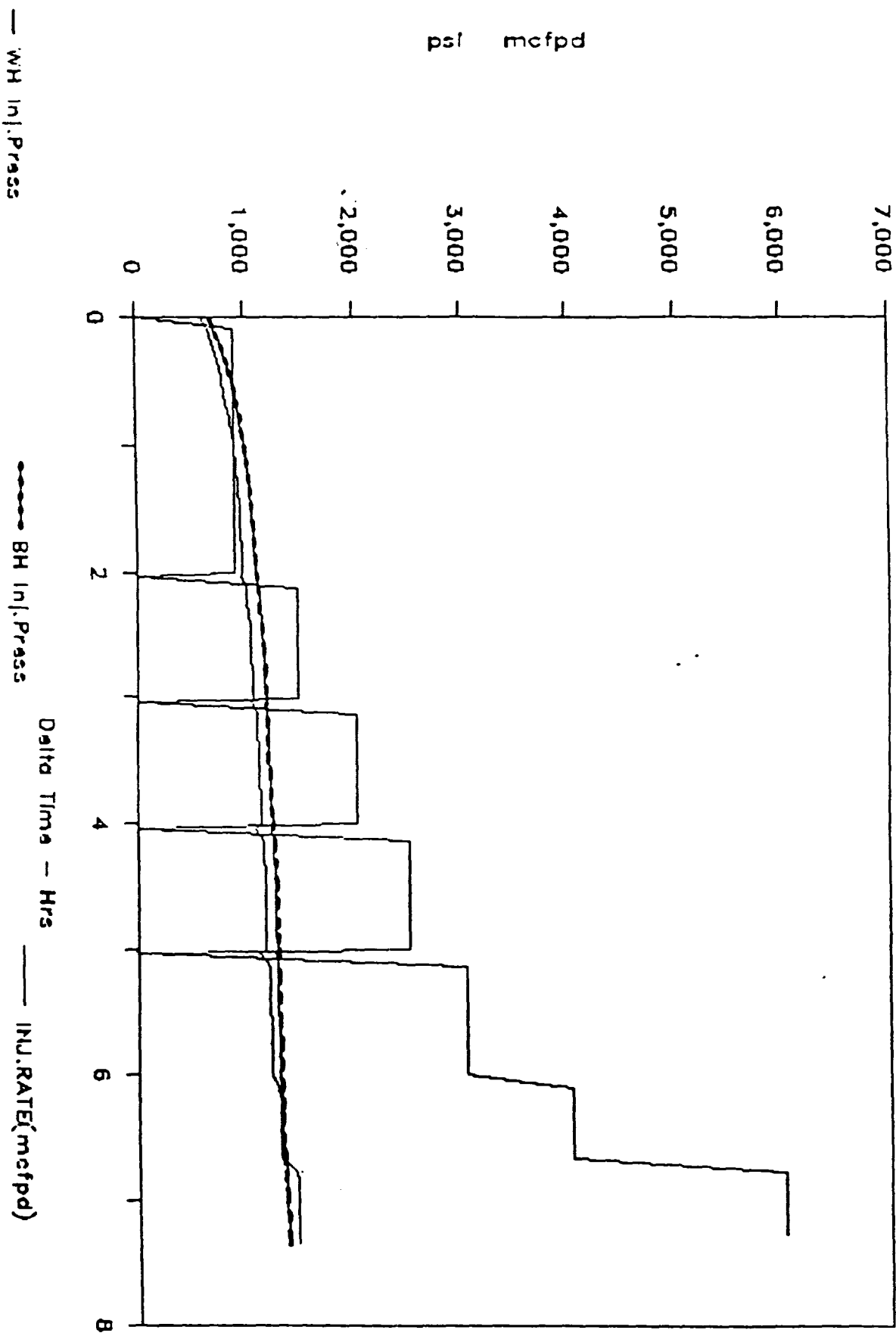
NU Howco. Pumped a total of 755,400 scf nitrogen via 2-3/8" tbg for injectivity test as follows:

STAGE	RATE (SCF/MIN)	MCFD RATE	STARTING SURFACE PRESSURE	FINAL SURFACE PRESSURE	STAGE LENGTH (MINS)
1	700	1 mm	613	966	120
2	1048	1.5 mm	1013	1050	60
3	1403	2 mm	1085	1135	60
4	1744	2.5 mm	1152	1182	60
5	2098	3 mm	1204	1228	60
6	2800	4 mm	1281	1389	40
7	4200	6 mm	1476	1469	40

Conducted leak off test after Stages 2, 3, and 7. Only immediate friction pressure losses were observed.

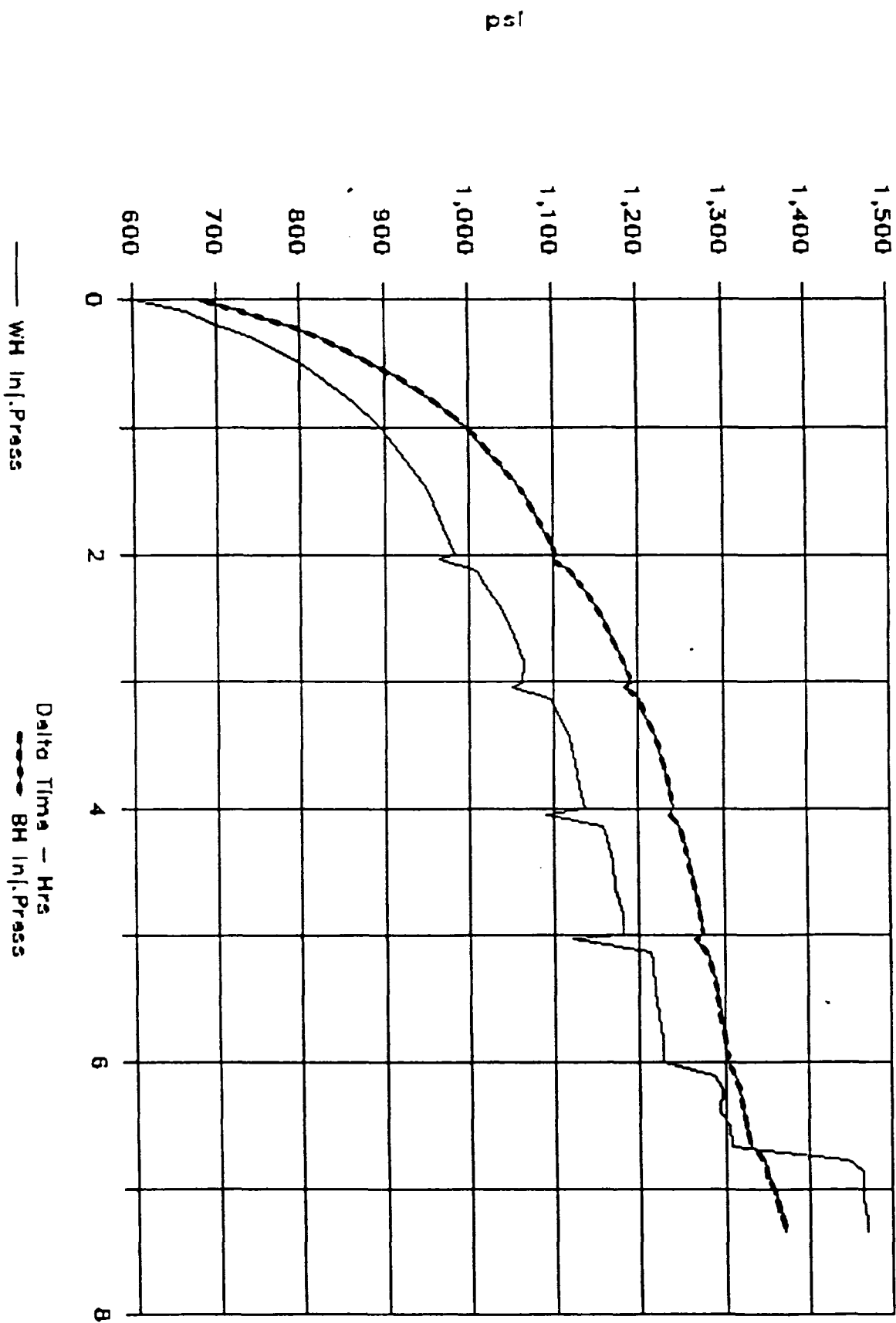
San Isidro #13-II Injectivity Test

Rio Puerco Mancos Oil Pool



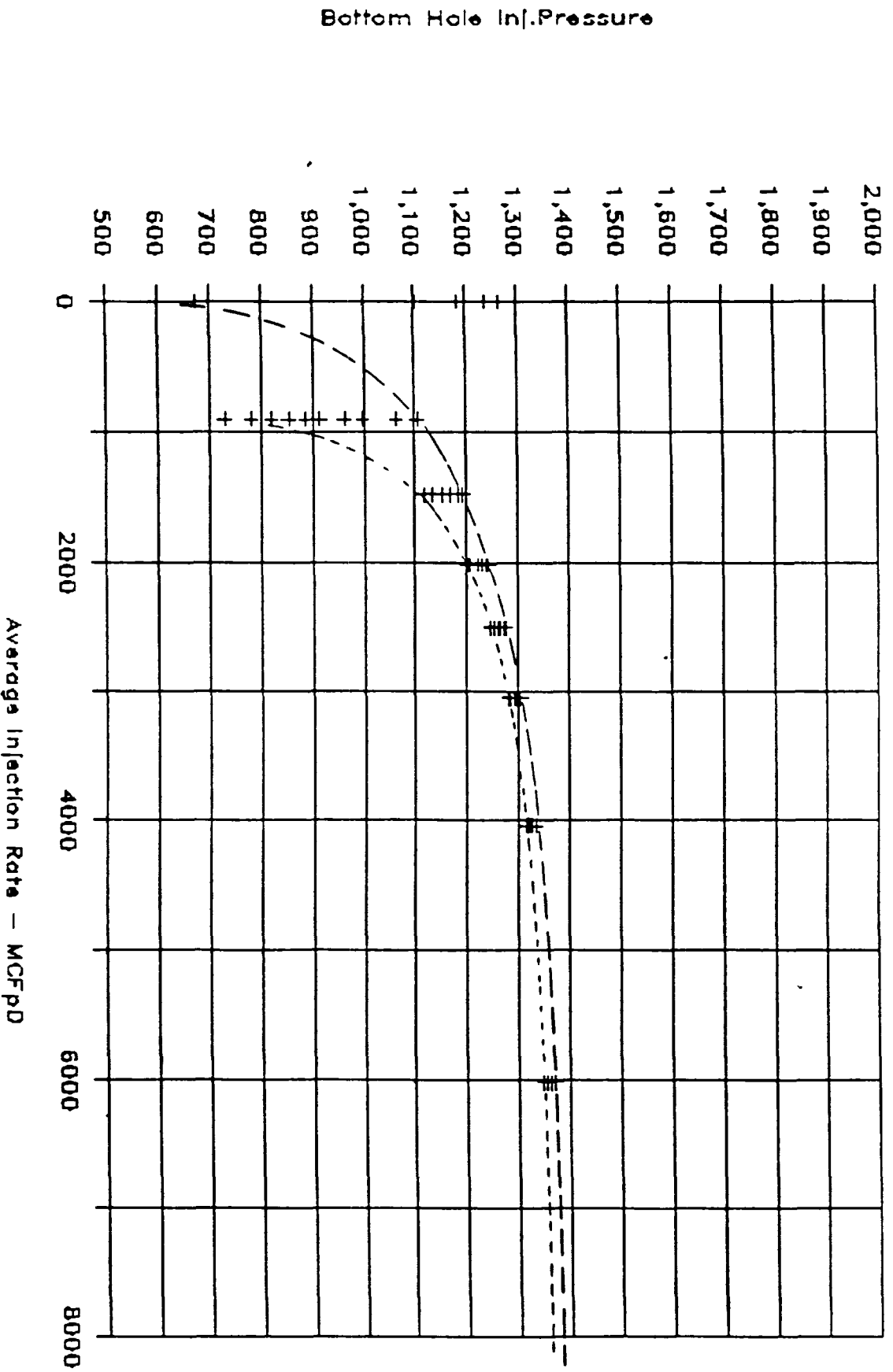
San Isidro #13-II Injectivity Test

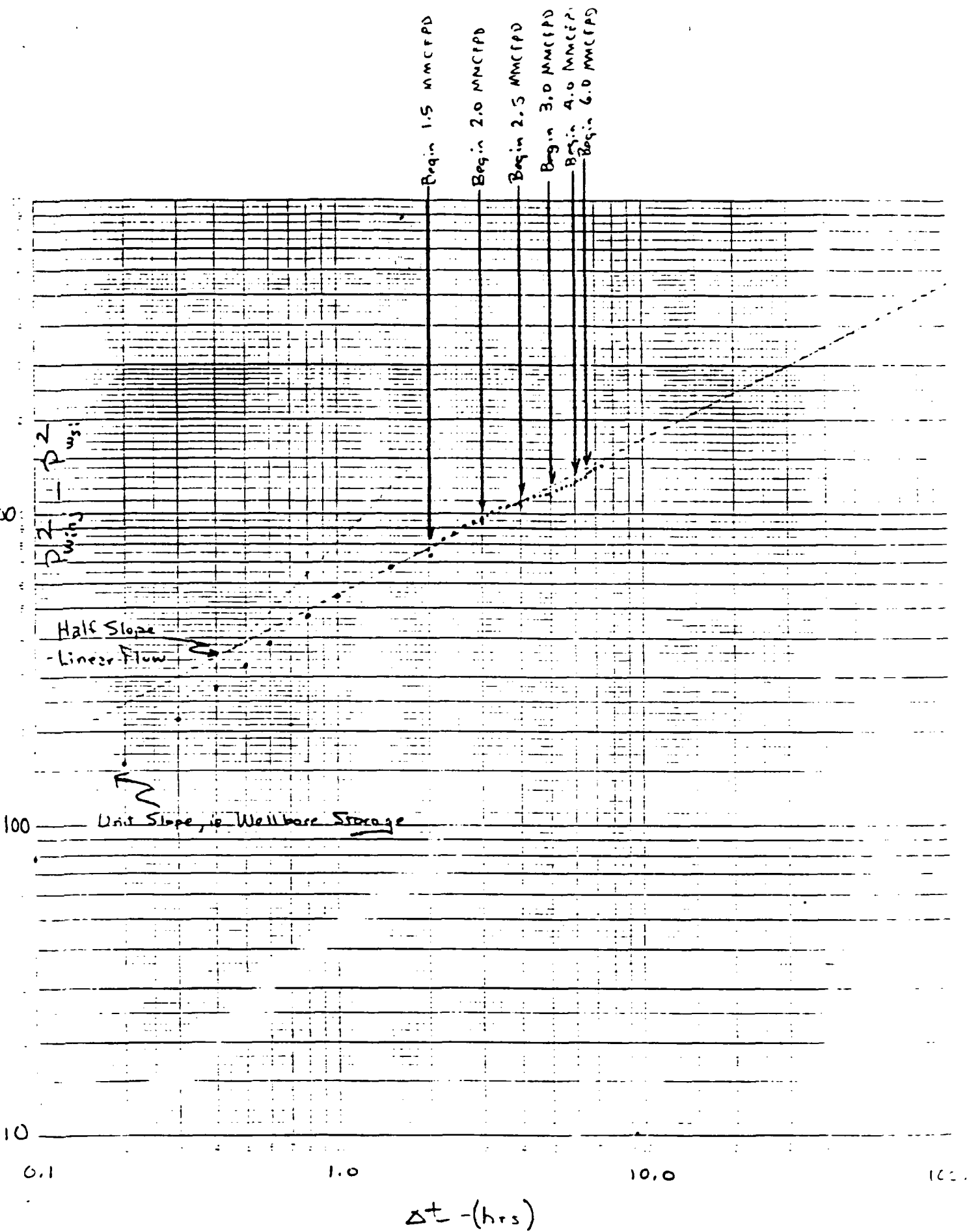
Rio Puerto Mancos Oil Pool



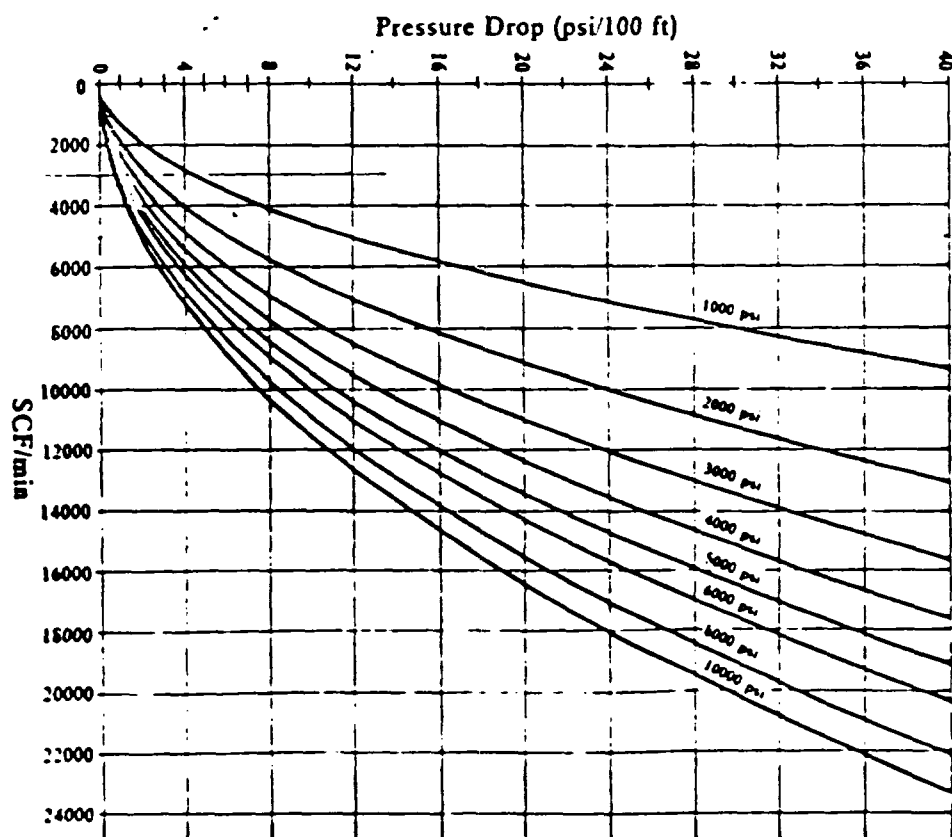
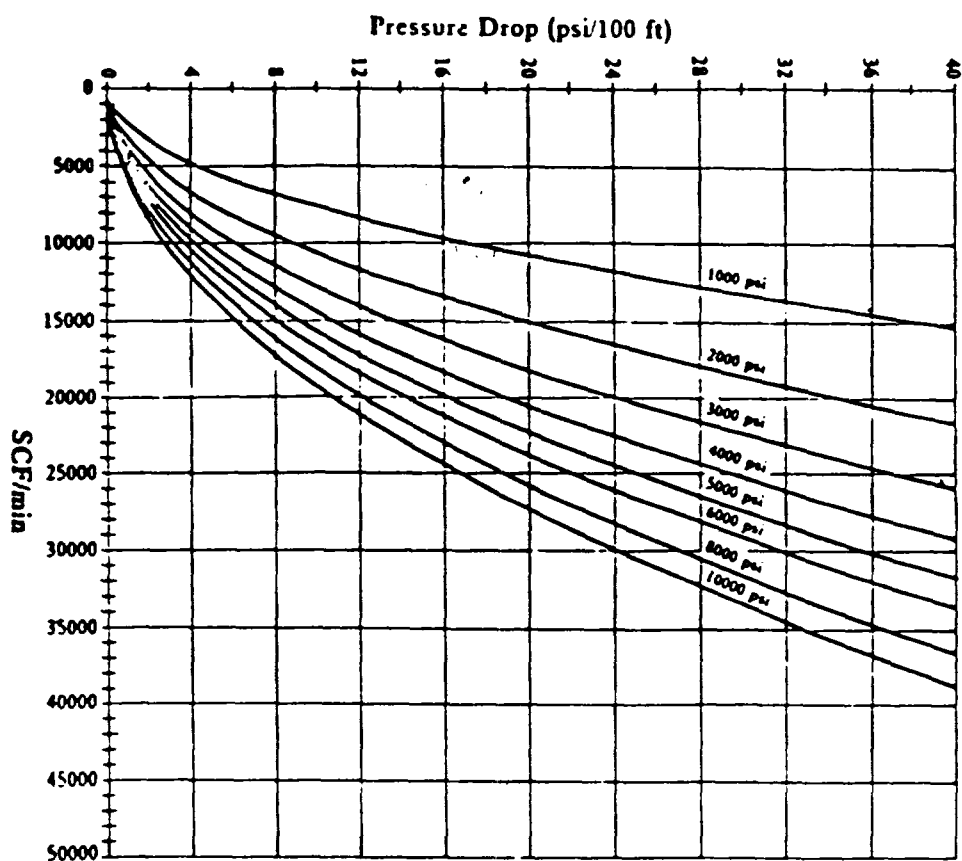
San Isidro #13-II Injectivity Test

Rio Puerco Mancos Oil Pool





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||
|| 22 || 33094



P_{ws}

$$K_a = \frac{1637 \text{ g } \mu\text{z } T}{\text{mPR} \cdot h}$$

$$K_a \cdot h = \frac{(1637)(2224)(0.001)(1.0)(580)}{(1455)}$$

$$K_a \cdot h = 1451 \text{ m } \mu\text{z } T + N_2$$

Average Rate thru Test:

$$Q = \frac{695 \text{ mCF}}{7.5 \text{ hrs}} \times 2 + 1 = 2224 \text{ MCF/D}$$

μ & Z are estimated !!!

ΔT

max slope
mPR =

2015-560 = 1455 psi/cycle

