

# RHSU 82-33 PERFORATION SUMMARY

May 5, 1987

<u>Date</u>	<u>Time</u>	<u>Description</u>
05/05/87	1230 pm	SI RHSU 82-33 at surge tank.
	1300 pm	Isolate 82-33 flowline, open well to atmosphere, slight steam blow. R/U Dresser Atlas.
	1600 pm	Well still blowing slight amount of steam. We are unsure of BHT that the perforating guns will be exposed to (temp. limit = 325°F). Make decision to run temperature log from surface to 1710'. Found maximum temperature = 316°F and the fluid level to be at approximately 600'.
	1630 pm	RIH w/20' of 4" guns with 22 gram charges at 4 SPF and 120 phasing. Correlate as follows:

Cased hole log: Gearhart Gamma Ray Correlation log, dated 3/9/83, run #1.

Open hole log: Schlumberger Induction Gamma Ray log, dated 11/28/75, run #1.

Gamma Ray correlation at 1650 shows:

Open = cased - 1

Log collars o.k. CCL to top shot = 2'. Fired when CCL read 1648 (+2' puts top shot 1650, perforated 1650-70). All depths per open hole log.

Note: Appeared gun fired and then blew itself uphole, the whip-lash that followed sheared the guns right off the top sub. Fish = 20' of 4" guns (apparently fired) POOH w/top sub.

V<sub>f</sub> water

300°F = .01745  $\frac{FT^3}{CUB}$

350°F = .01799

Q<sub>w</sub> Q<sub>BR</sub>

7.66 PPG  
X1.03  
BRW 7.8858  
57.31  $\frac{FT^3}{FT^3}$

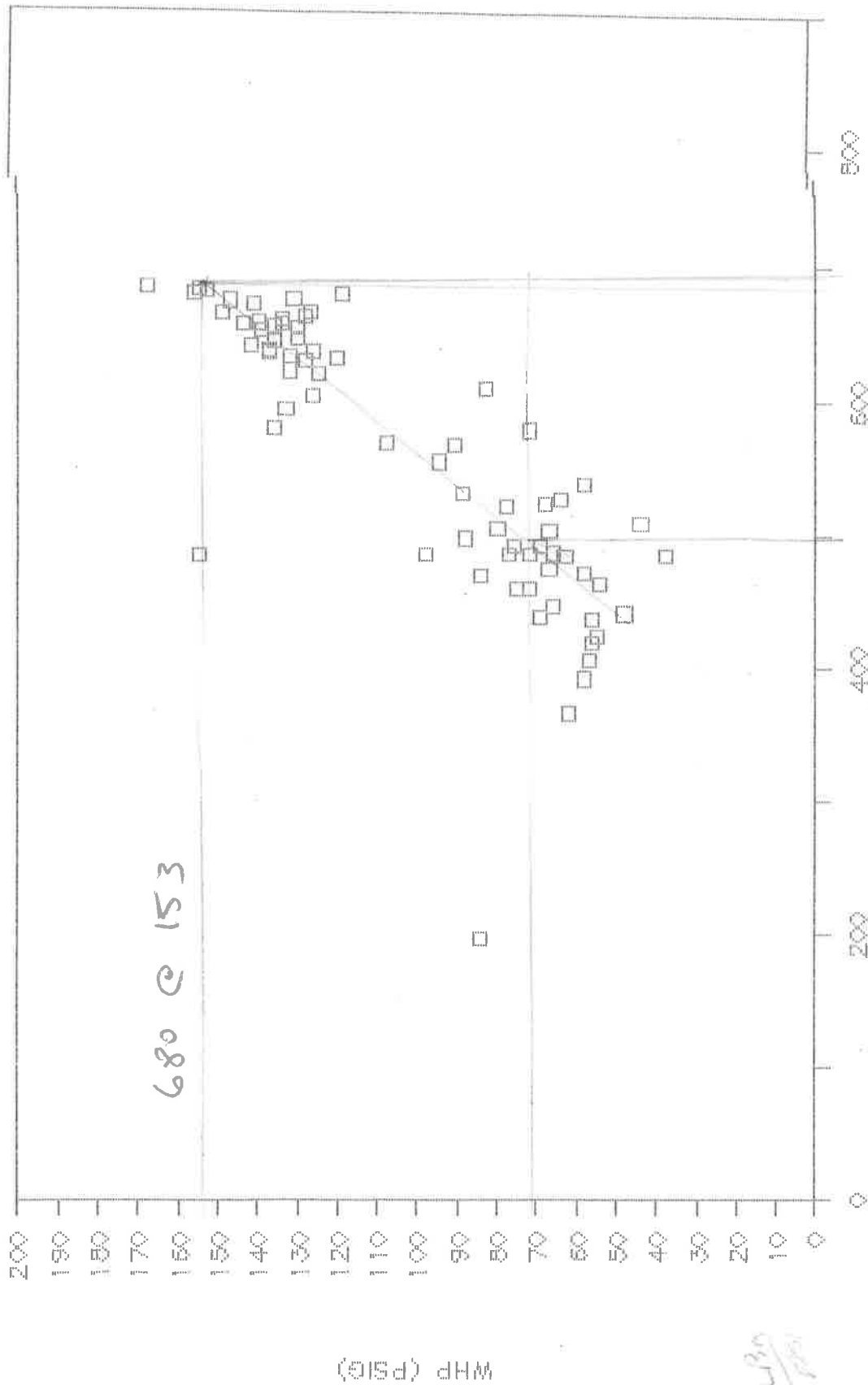
FT<sup>3</sup>  
2.48 gal

7.43 7.65 53.58  $\frac{FT^3}{FT^3}$

Q = 12369 PPG (1052) 1650 =  $\Delta$  HH  
= 20 PSI  
IF BHP - SAME  
WHIP US RATE  
CAN JURY  
20 PSI  
DEPENDS ON  
BRINE TEMP

<u>Date</u>	<u>Time</u>	<u>Description</u>
05/05/87	1730 pm	P/U sinker bar, RIH to shoe at 2004', no tag or bobbles. POOH.
	1830 pm	R/D Dresser Atlas N/D 10" 300 RF X 7" 8RD companion flange. N/U crown valve, return well to injection.
		Note: Injectivity was increased, see attachment #1.
		Curve 1 - 1/1/87 - 3/13/87 Daily averages
		Curve 2 - 3/14/87 - 5/5/87 Daily averages after cool fluids injected
		Curve 3 - 5/6/87 - 5/21/87 Daily averages after reperforation

# RHSU 82-33 INJECTION CAPACITY

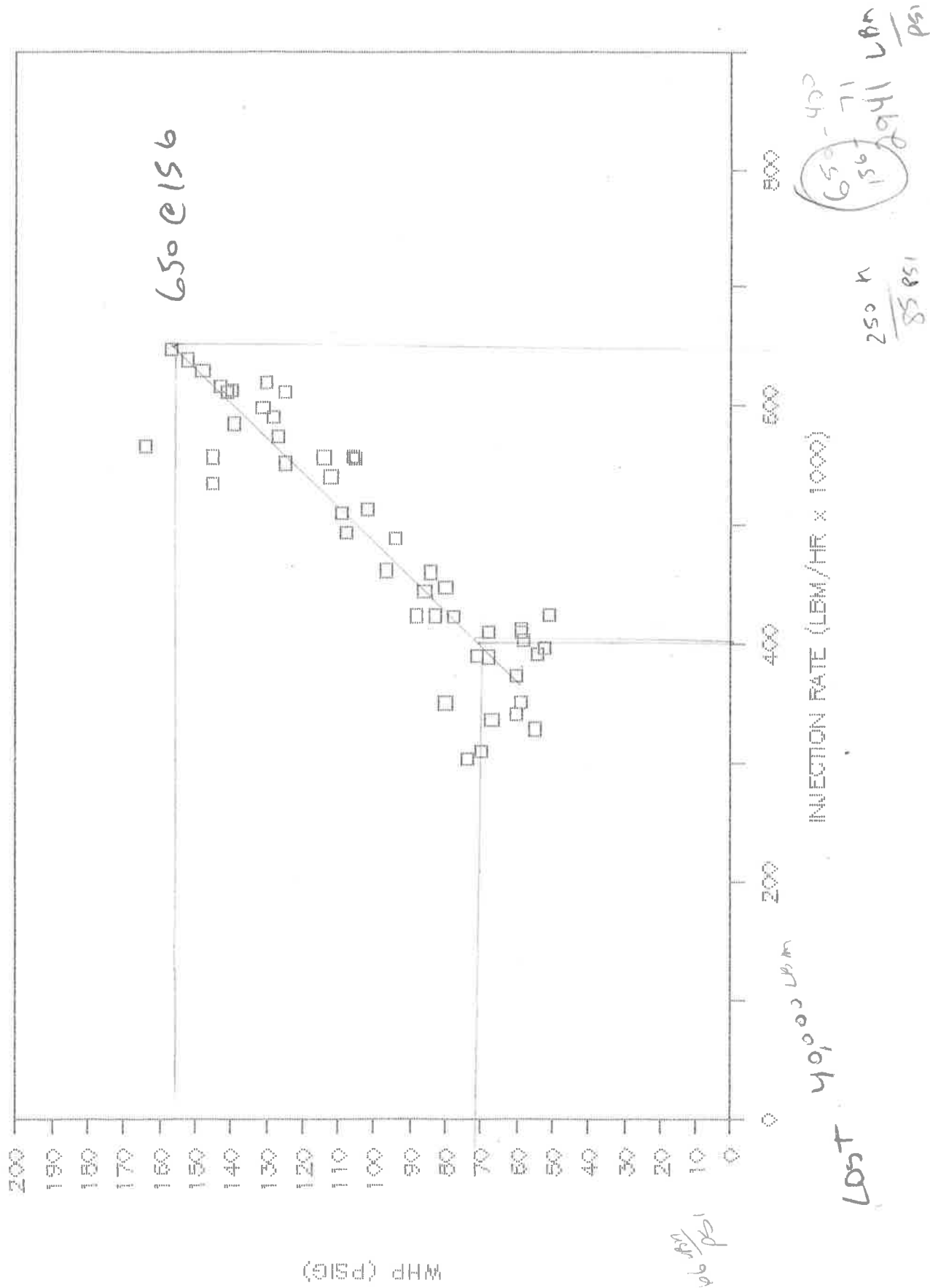


$$\frac{680 \times 450}{153 - 71} = \frac{240}{82}$$

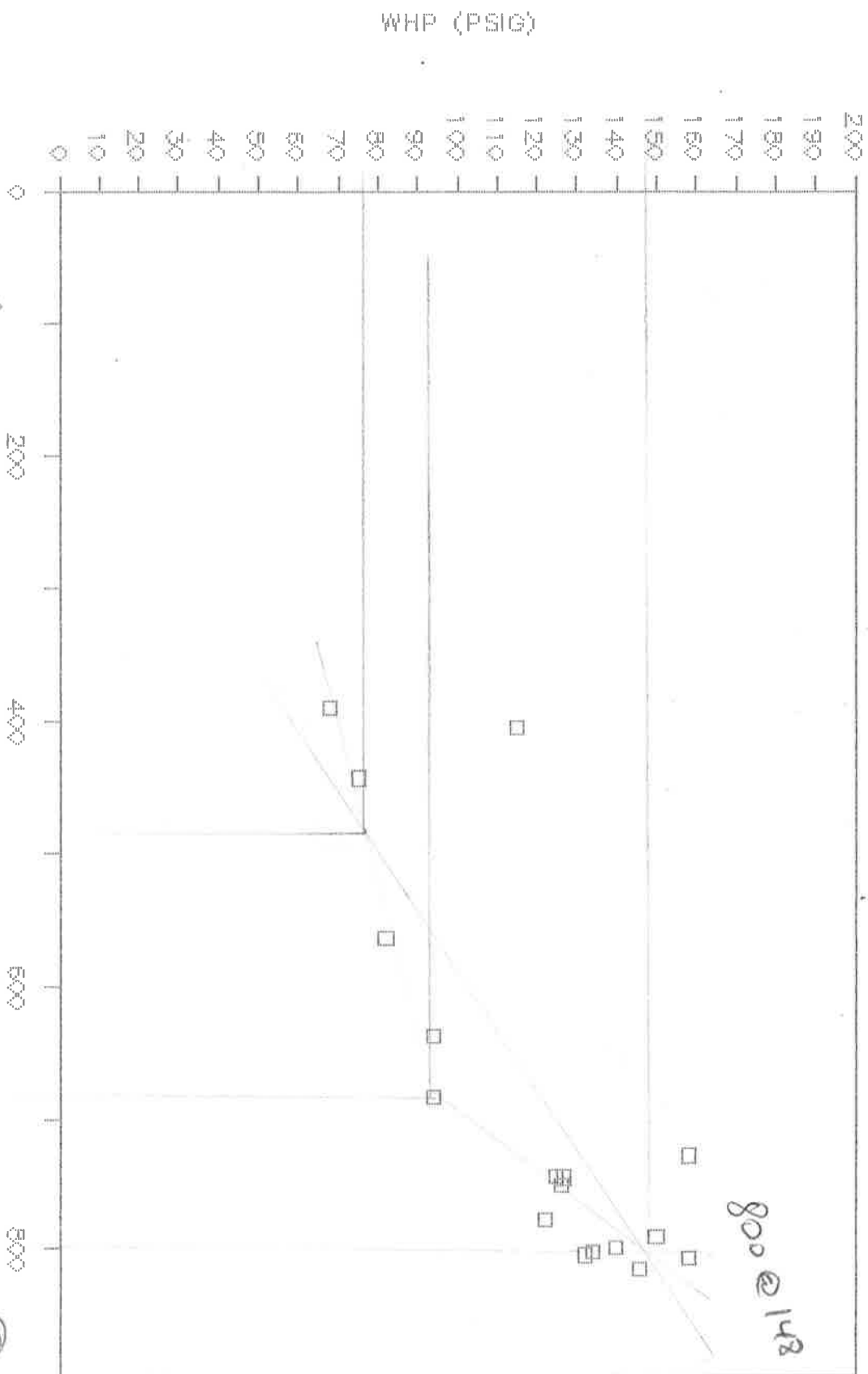
$$2926 \frac{\text{LBM}}{\text{HR}}$$

$$\frac{680}{153}$$

# RHSU 82-33 INJECTION CAPACITY



# RHSU 82-33 INJECTION CAPACITY



WHP  
Low  
510 PS

5400  $\frac{cm^3}{hr}$

800  
148

INJECTION RATE (LBM/HR x 1000)

450  $\frac{cm^3}{hr}$

450  $\frac{cm^3}{hr}$

800-480  
148 77

120  
51

Attachment #1

Curve 3

## Workover Procedure

## Re-Perforate

RHSU Well 82-33

Description of Work: Obtain radio silence. RU perforating gun, CCL logging tool and lubricator. Correlate depth and perforate 9 5/8" casing from 1650' to 1670' (4 holes/ft), a total of 40 holes.

Important Data:	Casing	- 9 5/8" 40# K-55 set at 2001' RKB
	Casing I.D.	- 8.835"
	Casing Thickness	- 0.395"
	Hole Diameter	- 12 1/4" Bit
		- 12.9" to 15" (caliper)
	Bottomhole Temperature	- 260°F
	All Depths RKB	- 21' above ground level
	DV Collar	- 1547' to 1553'
	Perforation Gun:	- 4" hollow carrier with
		Densi-Jet XIX charges
	Phasing	- 120°
	Shots/ft	- 4
	Gram charge	- 19 gram
	Berea penetration	- 11.16"
	EHD	- 0.53"

Phillips Geothermal Responsible Personnel

Perforation Job Supervisor:	Mark Payne Station Motel, Rm 34 Milford, Utah	(801) 387-2481
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Field Supervisor:	Bob Rice N. Main Milford, Utah	(801) 387-5009
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Salt Lake City Office:	Mike Kerna	Office: (801) 263-3129
	Project Engineer	Home: (801) 942-3460
	Terry Allen	Office: (801) 263-3129
	Engineering Supervisor	Home: (801) 277-0339
	Tom Turner	Office: (801) 263-3129
	Director, Development & Operations	Home: (801) 942-4566

Procedure:

1. Upon shutting off flow to 82-33 obtain stabilized FBHP at the following flowrates: Maximum, 300,000, 200,000, and 100,000. Plot on provided graph.
2. Two days prior to the perforation reroute 54-3 fluids to 14-2. Close in all flow to 82-33 and drain line. Pull pressure chamber and laydown 3" lubricator.
3. Hold safety meeting. All employees are to wear hard hats and steel-toed shoes.
4. MI wireline company. Obtain radio silence. All PPCo, UP&L, Biphase, and other contract personnel will be notified.
5. RU wireline truck. Load perforating gun.
6. RU lubricator with perforating gun and CCL logging tool. Attach to the 10" class 300 raised face flange.
7. Shoot perforating gun from 1650' to 1670' (1975 Schlumberger Induction-Gamma Ray Log - see attached log section) at 4 holes/ft for a total of 40 holes after performing the following:
  - a. Log from 1500' to 1800'. Correlate collars using 1975 Schlumberger Induction-Gamma Ray Log.
  - b. Drop tools 50' below shooting position and log slowly into shooting position. Shooting position = depth of top shot minus length between top shot and CCL measure point (see Attachment III).
8. POOH and RD lubricator and wireline truck.
9. Rerun pressure chamber.
10. Begin reinjecting into 82-33. Monitor flowrate and FBHP hourly. After pressure has stabilized perform Step 1, again recording and plotting FBHP vs the various flowrates.



## ATTACHMENT I

### EMERGENCY ACTION PROCEDURES AND NOTIFICATION LISTS

- A. If injuries have occurred, arrangements will be made by the field supervisor to care for the injured party(ies). First aid supplies will be available at the site. At least one person on each crew will be trained in first aid. In addition, "A Handbook of Safe Industrial Practices and Fundamental First Aid Techniques" will be available at the well site.
- B. If there is a threat to local residents, the Sheriff and/or Police Department will be notified as soon as possible. (See Attachment II)
- C. Field personnel will contact the Roosevelt Field Superintendent and consult with him as to any further or supplemental steps which may be necessary or advisable. If he cannot be reached, the field people should trace up the line of command to the next higher level of authority.

Robert C. Rice  
Roosevelt Field Superintendent  
P. O. Box 858  
Milford, Utah 84751  
Office: (808) 387-2442  
Home: (808) 387-5009

- D. All prescribed safety practices and procedures will be followed. All members of the drilling crew will perform duties assigned for the specific purpose, following specified safety practices.
- E. Any spills that may have occurred will be contained.
- F. A pump truck will be in the vicinity, and earth moving equipment may be obtained from local contractors, if necessary.
- G. The Roosevelt Field Superintendent will:

- 1. Brief his immediate supervisors on the situation and course of action underway:

Thomas A. Turner  
Director, Development and Operations  
655 East 4500 South  
Salt Lake City, Utah 84107  
Office: (801) 263-3129  
Home: (801) 942-4566

David L. Reese  
Manager, Geothermal Operations  
655 East 4500 South  
Salt Lake City, Utah 84107  
Office: (801) 263-3129  
Home: (801) 943-4661

- 2. Advise and consult as soon as practicable the Project Engineer and/or the Engineering Supervisor:

Michael J. Kerna  
Project Engineer  
655 East 4500 South  
Salt Lake City, Utah 84107  
Office: (801) 263-3129  
Home: (801) 942-3460

Terry S. Allen  
Engineering Supervisor  
655 East 4500 South  
Salt Lake City, Utah 84107  
Office: (801) 263-3129  
Home: (801) 277-0339

- H. If any injuries have occurred, arrangements will be made to care for the injured party(ies).

Hospitals

Milford Valley Memorial Hospital      (801) 387-2411  
451 North Main  
Milford, Utah 84751

Beaver Valley Hospital      (801) 438-2416  
85 North 400 East  
Beaver, Utah

Valley View Medical Center      (801) 586-6587  
595 South 75 East  
Cedar City, Utah

Doctors

Dr. P. A. Symond      (801) 387-2844 or  
405 S. Main      (801) 438-2416  
Milford, Utah

Dr. Henrie Terry or      (801) 438-2844 or  
Dr. Noal Robinson      (801) 438-2416  
95 North 400 East  
Beaver, Utah

Ambulance Service

Ground:

Milford      (801) 387-2854  
Beaver      (801) 438-2651  
Beaver      (801) 438-2201

Air:

Cedar City      (801) 373-1508  
Cedar City      (801) 586-3881  
Richfield      (801) 896-5484

## ATTACHMENT II

### Organizations for Handling Emergencies

Phillips Petroleum Company's on-site supervisor will have the responsibility and authority to respond immediately to any emergency situation. Depending on the nature of the emergency, the Phillips supervisor will contact, as appropriate, the following:

Milford Police Department	(801) 387-2251
Milford Fire Department	(801) 387-2441 or 387-2433
Utah Highway Patrol Cedar City, Utah	(801) 586-9445
Beaver County Sheriff Department	(801) 438-2862 or 387-2750

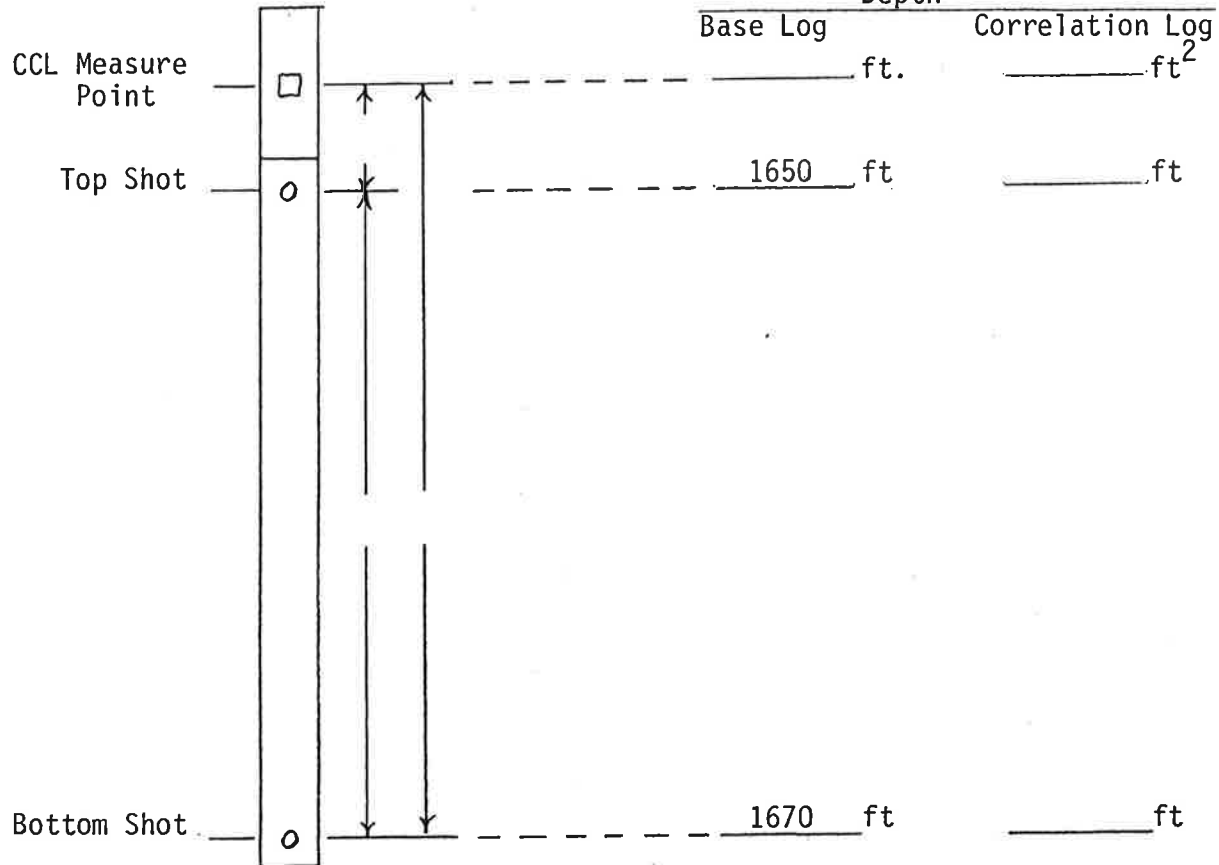
# ATTACHMENT III

Well: 82-33

Date/Time:

Total Interval to be Perforated: 20'

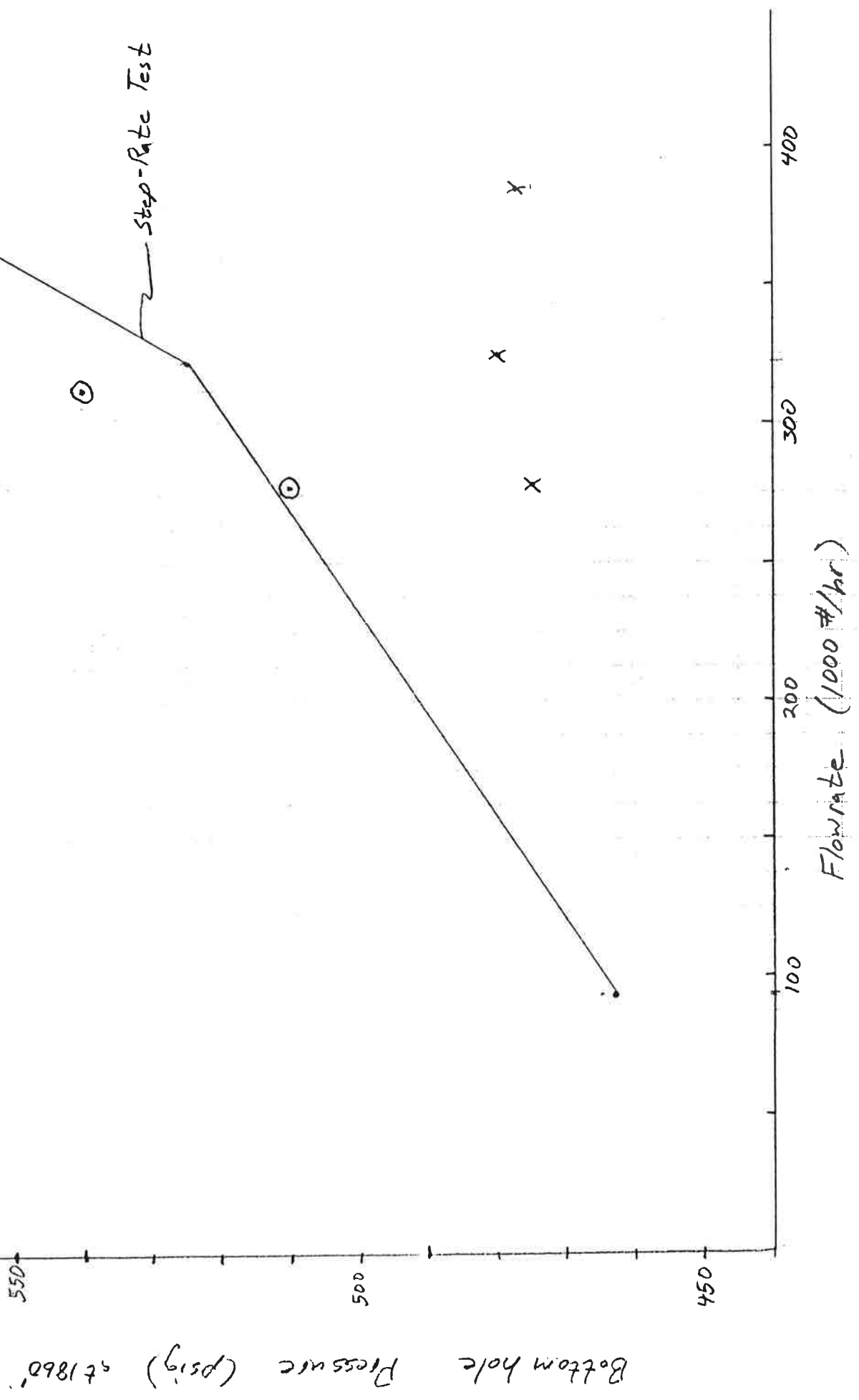
Shooting \*  
Depth



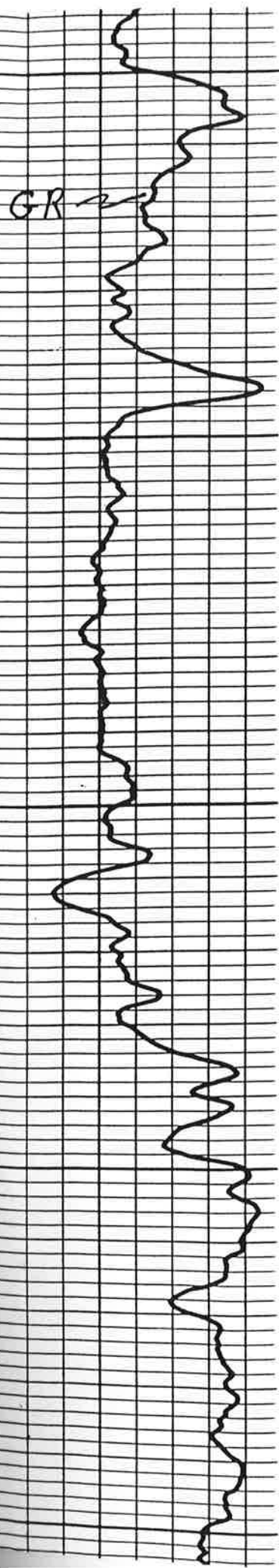
\* All depths are RKB (21 ft above GL)

Well 82-33 Injectivity

X - Start of LTT #3  
O - After dumping pond



Note: Previous Step rate graphs plotted wrong



1978  
Perfs

A hand-drawn geophysical log on grid paper. The log consists of three main curves plotted against depth, indicated by tick marks on the left margin. The top curve is labeled "DV Tool" and shows a series of sharp, downward-pointing spikes. The middle curve is labeled "Induction Resistivity" and shows a series of sharp, upward-pointing spikes. The bottom curve is labeled "Conduction" and shows a series of sharp, downward-pointing spikes. The curves are plotted on a grid with major lines every 10 units and minor lines every 1 unit. The log is oriented vertically, with depth increasing downwards.

WELL: Roosevelt KGRA, No. 82-33

FIELD: Roosevelt Hot Springs, Beaver County, Utah

LOCATION: NE, NE, SEC 33 - 26S- 9W

DEPTH: 6028 TD      PBD ELEVATION: 5833 GL5855 RKB

HOLE: 26" TO 168', 17½" TO 616'

12¼" TO 2004, 8½ TO 6028'

CASING: 20", 91# CSA164 CMT W/ 400 Sx, Class B  
3% CaCl<sub>2</sub>

13 3/8", 54.5 CSA 575 CMT W/ 500 Sx, Class B,  
1:1 perlite, 40% silica flour, 2%

9 5/8", 40# Gel, .2% CFR, .4% HR-4.  
CSA2001 RKB CMT W/ 200 Sx, Class B,

9 5/8", 40# 1:1 perlite, 40% silica flour, 2%  
Gel, .4% HR-4, .5% CFR-2  
CSA2001 RKB CMT W/ 600 Sx, Class B,

1:1 perlite, 40% silica flour, 2%  
Gel, .4% HR-4, .5% CFR-2

PERFS: 1647 to 1662 w/ 4JSPF  
357.8°F.

MAXIMUM STATIC BHT @ 5810' MAXIMUM STATIC BHP           

9 5/8" @ 2001'

LOGS: SEE ATTACHED SHEET

ISO. ZONE: .

FRACTURES: 1655 - 57, 5740

LOSS CIRC: 1623' to 2240', 3410 - 18'

DRLG BRK:

HISTORY:

8½" @ 6028'



## Chevron Resources Company

A Division of Chevron Industries, Inc.  
P.O. Box 858, Milford, UT 84751

Re: RHSU 82-33 PERFORATION CLEAN  
JUNE 21, 1990

Terry S. Allen:

On June 15th, 1990 we cleaned out the silica damage at injection well RHSU 82-33 perforations with the use of Dialog's string shot method. The silica damage is the result of operations. Although injection capacity had been reduced by the silica damage, it had not yet caused power plant curtailment. This was the ninth workover to restore injection capacity at these 1650-70 foot perforations. This was the second time a string shot was used. The other methods have been HF acid and re-perforating. All methods have proven to be successful. After this cleanout, injection capacity on a lbm/psi basis, improved 47 percent. The post cleanout maximum injection rate was = 782 k lbm/hr at 200 psig WHP. The job was done with Dialog's wireline and Pomwrenke's mast truck. These service companies were already in the field to caliper at RHSU 13-10. The field was already reduced with 13-10 offline for an acid cleanout so no further production was lost when we took RHSU 82-33 offline. Total job cost to clean these perforations = \$3863, including a transportation split with 13-10. Attached are a job log and a summary of past cleanouts. As always, I have retained copies of all here in the field. Please pass along this information as you see fit.

#7, #8, #9 } HISTORY  
→ ACS  
C: EVALUATION  
A:

See A: 1 8233CLEA

Ronald J. Dorovi

Ronald J. Dorovi | 6/21/90

Operations Engineer  
Roosevelt Hot Springs Unit

attachments



# RHSU 82-33 PERFORATION CLEANOUT HISTORY

CLEANOUT #	DATE	METHOD - REMARKS	POST CLEANOUT INJECTION PERFORMANCE	PRE CLEANOUT INJECTION PERFORMANCE
	March 1978	Initial perforation - 1647-67 feet.		
1)	March 1983	1st Reperforation 1650-70 feet.		
2)	May 1984	2nd Reperforation 1650-70 feet.		
3)	Dec. 11, 1985	3rd Reperforation 1650-70 feet. Perforated at 4 spf with Gearhart, cost = \$3589.	795 k LBM/HR at 185 psig WHP	558 k LBM/HR AT 67 psig WHP
4)	May 5, 1987	4th Reperforation 1650-70 feet. Perforated at 4 spf, 120 deg phasing, 4 inch guns, 22 gram charges with Dresser Atlas. Cost = \$4200, includes a temperature log.	804 k LBM/HR at 130 psig WHP	498 k LBM/HR at 155 psig WHP
5)	Oct. 15, 1987	5th Reperforation 1650-70 feet. Perforated at 4 spf, 90 deg phasing, 4 inch guns, 23 gram charges with Gearhart. Cost = \$3690.	780 k LBM/HR at 195 psig WHP	418 k LBM/HR at 218 psig WHP
6)	Nov. 8, 1988	1st HF Acid Job. Pumped 1000 gals. Formic gals. and 2000 gals. 12-6 Super Mud Acid with Dowell. Cost = \$8633.	840 k LBM/HR at 195 psig WHP	585 k LBM/HR at 205 psig WHP
7)	Oct. 10, 1989	2nd HF Acid job. Pumped 1250 gals. Formic Acid and 2500 gals 12-6 Super Mud Acid with Dowell. Cost = \$11366.	675 k LBM/HR at 198 psig WHP	435 k LBM/HR at 210 psig WHP
8)	Nov. 30, 1989	Stringshot #1 across 1650-70 feet. Four - 20 foot lengths at 70 grains/ft (280 grains/ft total). Used Dialog, total job cost = \$4431.	802 k LBM/HR at 194 psig WHP	500 k LBM/HR at 210 psig WHP
9)	June 15, 1990	Stringshot # 2 across 1648-73 feet. Four - 25 ft. lengths at 70 grains/ft (280 grains/ft total). Used Dialog, total job cost = \$3863.	782 k LBM/HR at 200 psig WHP	558 k LBM/HR at 210 psig WHP

DATE	TIME	EVENT
2/19/90	noon	Field shut in on grid and then runback problems. Lost power to all and field drained up into RHSU 82-33, including blowdown. Silica deposition in injection zone occurred again. Injection rate prior to plugging was = 746 k lbm/hr at 200 psig WHP (3730 lbm/psi). The injection rate after plugging was = 626 k lbm/hr at 215 psig WHP (2911 lbm/psi). Power plant production was not curtailed by this reduced injection capacity.
6/14/90		Injection capacity down to 558 k lbm/hr at 210 psig WHP (2657 lbm/psi). Although power plant production was not yet affected by this reduced injection capacity, we decided to clean RHSU 82-33 perforations now with Dialog's string shot. The main reason we did it now was that Dialog was in the field already to caliper at RHSU 13-10. Besides being cost effective to clean the perms now, it was also a good time as production would not be further reduced, as RHSU 13-10 was already offline for an acid cleanout.
6/15/90	0745	Power plant at 17.3 MWe with RHSU 13-10 offline for scale cleanout. Decrease flow to RHSU 82-33, send all of field's brine to RHSU 14-2.
	0830	Shut in RHSU 82-33. SIWHP = 60 psig, began bleeding off to atmosphere.
	0930	SIWHP now at 0 psig.
	1000	Dialog and Pomwrenke mast truck on location. We completed post acid caliper at RHSU 13-10 this morning at 0030am. Pomwrenke R/D mast truck at 13-10 this morning at 0800am in daylight. They then headed out to 82-33 and R/U. Dialog began building the string shot.
	1330	Completed building string shot. Made 4 - 25 ft lengths of 70 grain/ft primer cord. We did not put on those homemade centralizers this time. We also did not R/U a lubricator and RIH wide open.
	1345	Correlated OK using Gearhart cased hole correlation log (3/9/83). 1650 open = 1651 cased (Open = Schlumberger Induction - GR log 11/28/75 run # 1). Getting on depth is simple using the DV tool at 1548 - 54.5 feet cased. The string shot was larger than the 1650 - 70 ft perforations (string shot = 25 ft long). So we shot 2+ ft on both sides 1647+ to 1672+, open hole depth. String shot went off OK. Shock wave of steam at surface for a split second as we were open at surface. All OK, POOH, R/D all. Total job cost = \$ 3863. (split transpo w/13-10).
	1346	Flowline had been shut in since 0830am, temperature = 274 deg F. Notify UP&L to send flow this way and we opened pit by-pass.
	1355	Temperature still 274 deg F, open 82-33 block valve and start injecting.
	1425	It appeared there was a slug of blowdown that was sent to us (thanks UP&L) as injection temperature dropped to 251 deg F. We injected 251 to 274 deg F fluid for about one half hour. This was not a low pressure/inadequate flow problem, as the WHP = 80 to 120 psig, and the flow was 400 to 600 k lbm/hr. Finally at 1425 the temperature started climbing. It is hard to say if this hurt the well, but I'm sure it did not help. This is another example of problems created by this two company set up.
6/15/90	2000	RHSU 13-10 back on line, field up to 23 + MWe, run maximum injection test at RHSU 82-33. It appears the well is alot better, 782 k lbm/hr at 200 psig WHP.

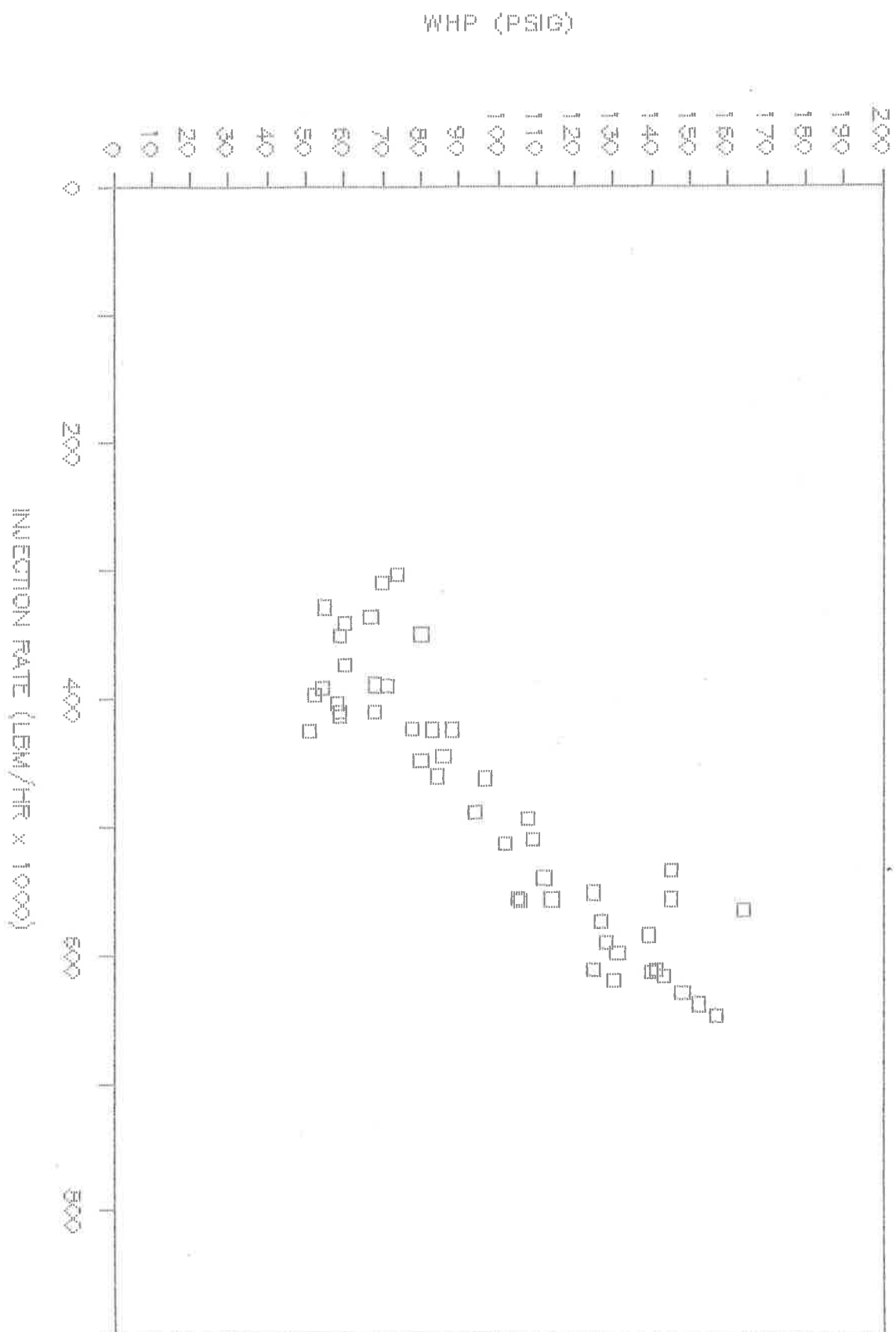
Well Data:            Perfs: 1650-70 ft.            Open Hole: 2001-6028 ft.  
                          (Perfs take all injected fluid)

Casing = 9 5/8 in, 40 #/ft, K-55, BT&C, set at 2001 ft.

Casing = 9 5/8 in, 40 #/ft, K-55, BT&C, set at 2001 ft. <sup>Scale drawn across the perforations</sup>  
Gravity flow injection well

RJP 6/21/90

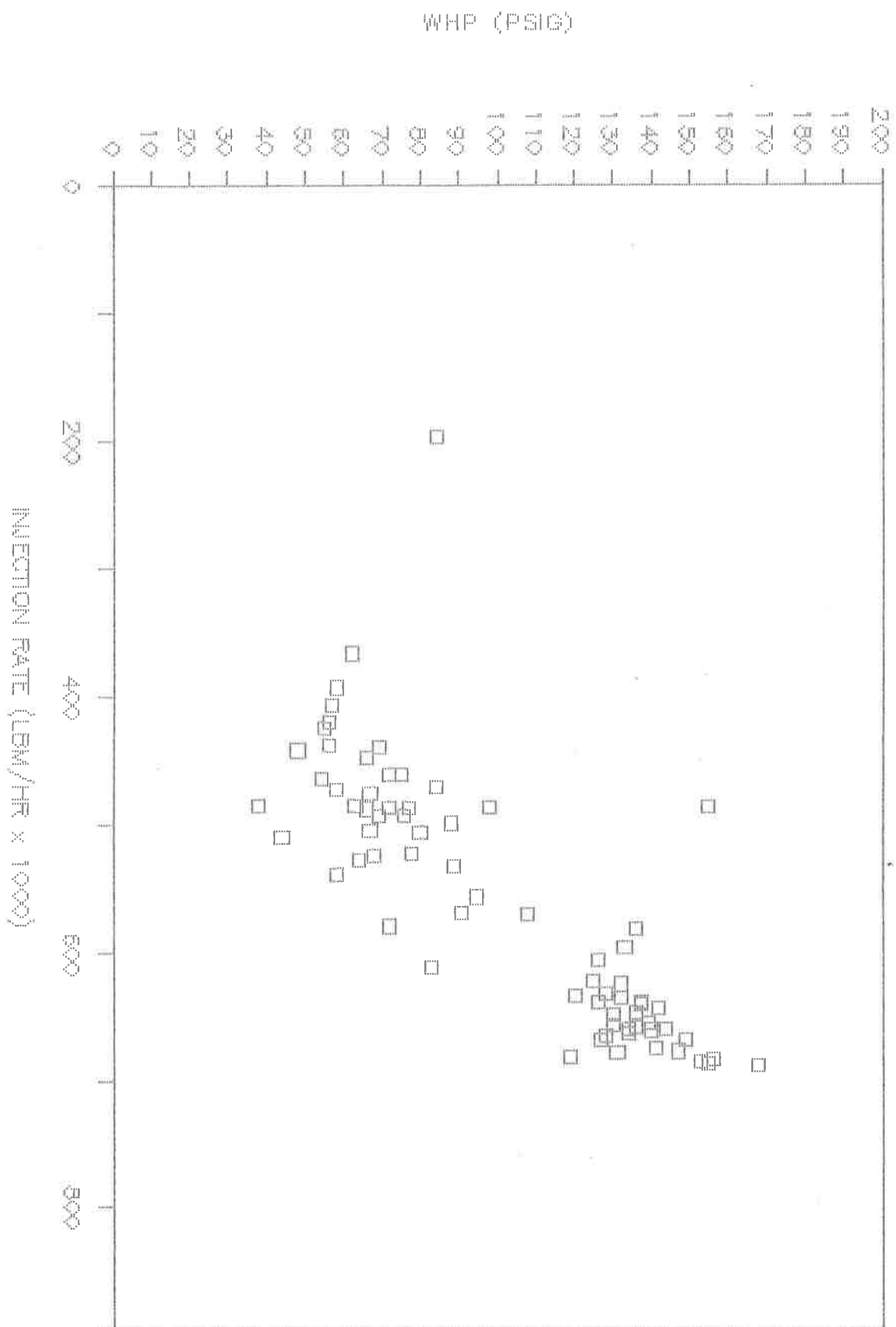
# RHSU 82-33 INJECTION CAPACITY



Attachment # 1

Curve # 2

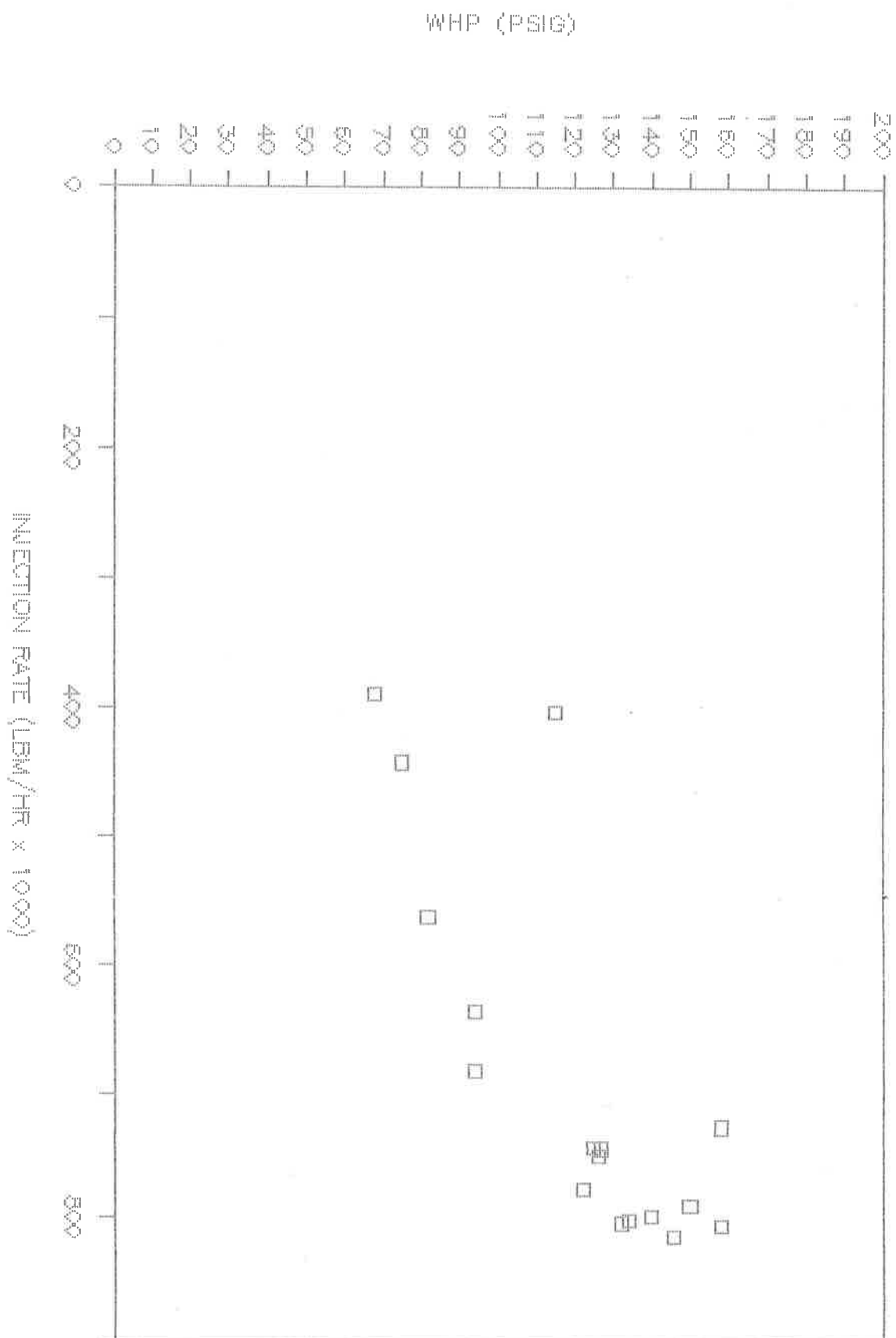
# RHSU 82-33 INJECTION CAPACITY



Attachment #1

Curve 1

# RHSU 82-33 INJECTION CAPACITY



Curve # 3

A drive  
file name

82-33 Ic

82-33 INJECTION CAPACITY (JAN.1,1987--MAR.13,1987)

Cg

WHP	INJECTION RATE
*****	*****
132.0	625.4
126.0	639.6
128.0	632.3
132.0	635.8
130.0	649.6
127.0	669.2
168.0	688.1
134.0	664.4
133.0	596.7
155.0	686.7
131.0	679.3
141.0	675.6
78.0	522.3
58.0	538.8
68.0	524.2
88.0	499.1
76.0	493.2
67.0	475.6
58.0	471.7
72.0	460.8
66.0	447.0
56.0	437.2
56.0	419.2
57.0	406.8
58.0	392.7
69.0	439.3
91.0	568.7
62.0	366.1
64.0	528.0
77.0	487.2
155.0	486.6
48.0	441.7
89.0	533.2
95.0	556.7
84.0	470.8
83.0	610.9
75.0	459.9
72.0	487.0
69.0	493.2
67.0	504.2
66.0	487.3
63.0	485.6
98.0	487.0
108.0	570.0
72.0	579.5
38.0	485.5
54.0	463.8
80.0	506.7

09

Curve 1

Q

Q

44.0	509.4
56.0	419.1
55.0	424.2
125.0	623.3
134.0	661.3
137.0	641.5
153.0	685.1
128.0	665.6
136.0	648.0
119.0	681.8
156.0	683.9
142.0	644.6
149.0	669.4
137.0	639.8
139.0	655.4
136.0	659.1
120.0	634.8
126.0	606.0
130.0	656.9
144.0	660.8
140.0	661.4
147.0	678.2
136.0	582.4
84.0	196.1

680

D80

C-10

D10

C-81

b 81

# 82-33 INJECTION CAPACITY (MAR.14,1987--MAY 4,1987)

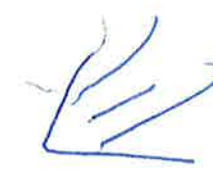
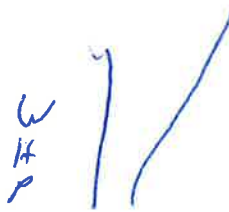
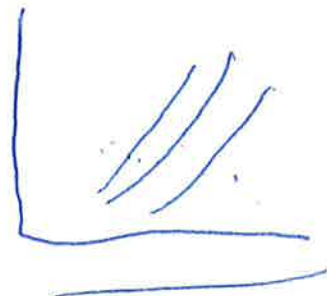
WHP	INJECTION RATE
*****	*****

5-10

68.0	389.2
84.0	459.8
51.0	424.2
60.0	340.4
59.0	350.8
60.0	373.6
59.0	412.9
68.0	409.4
59.0	409.6
52.0	396.3
54.0	391.1
58.0	403.5
130.0	619.6
152.0	638.8
157.0	647.5
106.0	557.1
164.0	565.9
143.0	616.5
131.0	598.1
125.0	611.2
141.0	611.3
148.0	629.9
138.0	584.4

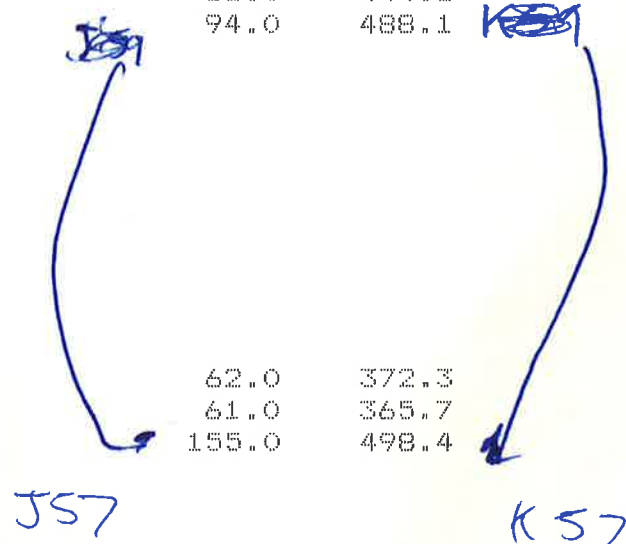
h-10

Curve 2



140.0	612.6
127.3	573.6
128.4	590.0
112.0	540.4
114.0	556.6
102.0	513.4
105.0	555.8
109.0	509.2
108.0	493.1
145.0	534.4
125.0	551.8
70.0	309.3
74.0	302.5
55.0	328.3
71.0	389.4
145.0	556.4
97.0	461.4
88.0	423.6
78.0	422.3
80.0	447.2
67.0	335.3
80.0	349.5
83.0	423.6
86.0	444.6
94.0	488.1

TOTAL  
Flow



B2-33 INJECTION CAPACITY (MAY 5, 1987--MAY 21, 1987)

WHP	INJECTION RATE
*****	*****
115.0	404.6
158.0	730.3
82.0	563.5
122.0	778.7
132.0	805.7
134.0	803.7
94.0	683.4
94.0	637.4
126.0	752.7
126.0	746.7
139.6	800.7
146.3	816.3
158.1	808.0
68.0	389.4
75.0	443.0

P10      Q10      Curve 3



7310 44810  
125.2 745.9  
150.0 792.4

~~Q23~~

~~Q23~~

Q 26

P26

3-5-87

INJECTION TEST #2

Time	#82-33 PSIG	#14-2	X10 <sup>3</sup> lbs/hr
10:27	756.9	132.0	1063.4
10:33	733.9	130.5	1464.9
10:38	741.5	130.5	1447.4
10:43	735.4	129.1	1457.2
10:48	731.7	129.1	1412.6
10:53	752.8	129.1	1371.1
10:58	748.5	129.1	1470.2
11:03	742.8	129.1	1501.5
11:08	742.8	129.1	1488.3
11:13	748.8	129.1	1491.4
11:18	738.9	129.8	1488.3
11:23	733.0	129.1	1480.8
11:28	754.5	129.1	1481.4
11:33	756.5	130.5	1486.4
11:38	748.7	129.1	1490.1
11:43	758.4	129.8	1489.3
11:48	756.5	129.8	1488.2
11:53	746.9	129.8	1486.2

3-5-87

Injection Test <sup>WHP</sup>

Time	<u>82-33</u>	PSIG	<u>14-2</u>
9:30	729.6	114.4	1442.0
9:35	506.4	85.1	1470.4
9:40	760.3	91.0	1476.2
9:45	1209.3	88.0	1430.0
9:50	1384.3	82.2	1272.3
9:55	491.6	57.3	1302.2
9:58	1538.9	99.0	1276.8

Roy  
Shaburn

# 82-33 InJ. Capacity

10/16	$\frac{T}{301}$	$\frac{f}{67}$	$\frac{IR}{453.1}$
17	3014	62	480
18	304	70	492.4
19	300	78	520.1
20	307	113	695.3
21	312	90	601.7
22	308	77	565.6
23	303	78	568.8
24	310	78	587.7
25	305	73	535.2
26	290	59	445.1
27	300	52	480.7
28	290	46	506.3
29	305	76	576
30	302	68	597
31	303	70	621

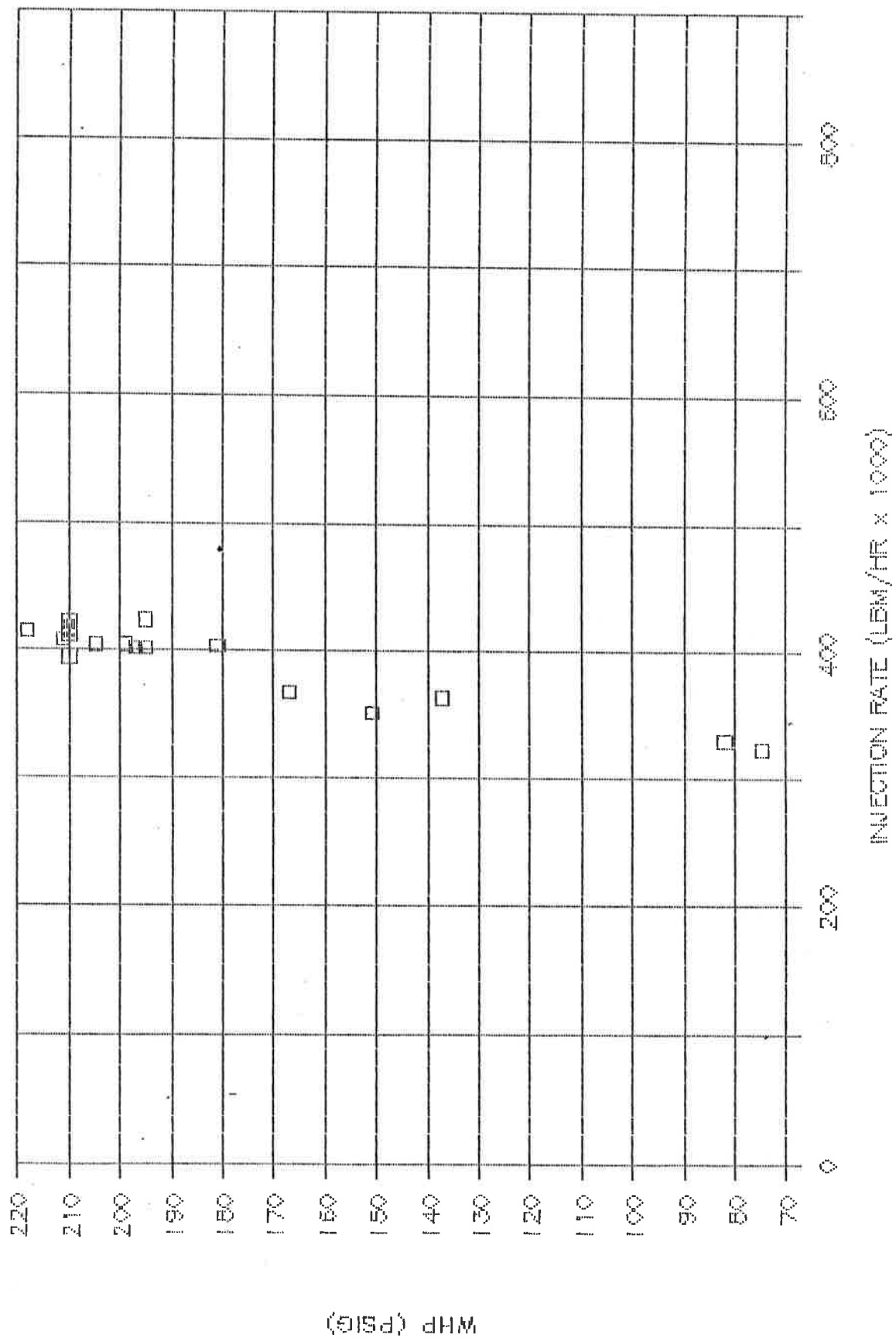
1987

1	301	64	532.5
2	306	99	627.8
3	0	0	581.9
4	305	122	674.5
5	300	103	623.1
6	297	90	648.6
7	302	99	592.2
8	302	72	541.6
9	303	65	538.9
10	301	99	649.6
11	302	97	636
12	310	119	631.4
13	300	103	644.6
14	302	130	664.5
15	301	86	537.3

82-33

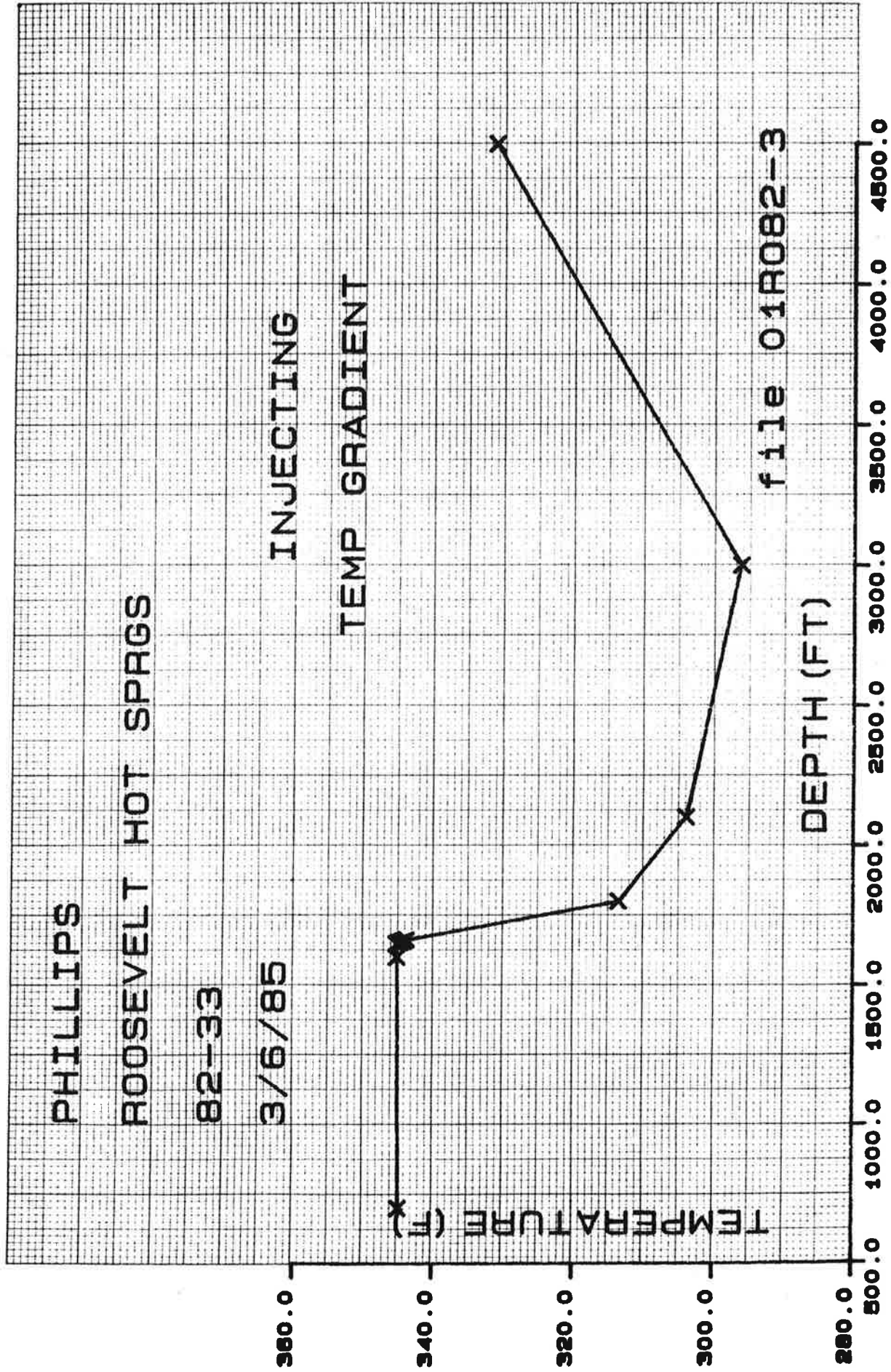
DATE	WHP	INJ. RATE
*****		
9/25/87	82.0	329.5
9/26/87	75.0	323.1
9/27/87	137.0	363.0
9/28/87	195.0	423.8
9/29/87	167.0	366.5
9/30/87	210.0	416.1
10/1/87	199.0	404.0
10/2/87	210.0	415.2
10/3/87	210.0	411.5
10/4/87	210.0	394.1
10/5/87	210.0	416.0
10/6/87	205.0	404.1
10/7/87	210.0	417.0
10/8/87	197.0	402.0
10/9/87	218.0	414.5
10/10/87	195.0	402.0
10/11/87	211.0	408.2
10/12/87	210.0	422.8
10/13/87	181.0	403.1
10/14/87	151.0	350.7
10/15/87	<del>107.0</del>	<del>482.2</del> 60.1H
10/16/87	67.0	453.1
10/17/87	62.0	480.1
10/18/87	70.0	492.4
10/19/87	78.0	520.1
10/20/87	113	695.3
10/21/87	90	600
10/22/87	77	565.6

# RHSU 82-33 INJECTION CAPACITY











PRUETT INDUSTRIES INC  
8915 ROSEDALE HWY, BAKERSFIELD, CA. 93308  
(805) 589-2768

SUB-SURFACE TEMPERATURE SURVEY

CO. PHILLIPS		RUN 01 FIELD ROOSEVELT HOT S WELL 82-33
EFF DEPTH 6028'		WELL STAT INJECTING TOOL HUNG
CASING 9 5/8 TO -2001'		CASING PRESS ON BOTTOM 5:59
LINER -		TUBING PRESS OFF BOTTOM 6:04
DATE 030685		ELEMENT RANGE 57 - 487 ZERO POINT 22'
ELEVATION		ZONE SHUT-IN
MAX TEMP		PICK-UP ON-PROD
PERF 1647 -1670'		CAL SER NO. 31 MRP
TUBING -		
UNITS ENGLISH	PURPOSE	INJECTING TEMPERATURE GRADIENT

SURVEY DATA

CO. PHILLIPS		RUN 01 FIELD ROOSEVELT HOT S WELL 82-33
TIME DEPTH P/T GRAD		TIME DEPTH P/T GRAD
1:00 700 345.0 0.000		1:00 1662 343.9 -.088
1:00 1600 345.2 .000		1:00 1800 313.5 -.220
1:00 1647 345.2 0.000		1:00 2100 303.9 -.032
1:00 1652 344.7 -.088		1:00 3000 296.1 -.009
1:00 1657 344.3 -.088		1:00 4500 331.2 .023

INJECTION RATE 420,000 TO 450,000 LBS / HR