

CF 10613

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION



BRUCE KING  
GOVERNOR

ANITA LOCKWOOD  
CABINET SECRETARY

October 1, 1993

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

WJC, Inc.  
P.O. Box 7  
Post, TX 79356

Attention: Donald R. Rogers

**RE: Injection Pressure Increase - J.G. Cox SWD Well No. 1,  
Lea County, New Mexico**

Dear Mr. Rogers:

Reference is made to your request dated June 7, 1993 to increase the surface injection pressure on the above-referenced well. This request is based on a step rate tests conducted on this well on June 4, 1993. The results of the test has been reviewed by my staff and we feel an increase in injection pressure on this well 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
J.G. Cox SWD Well No. 1 660' FNL & 1980' FWL Unit C, Section 13, Township 17 South, Range 38 East	1112 PSIG
This well is located in 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

WJL/BES/amg

cc: Oil Conservation Division - Hobbs  
File: Case No. 10613  
D. Catanach

NO WAITING PERIOD

COMPANY: WJC, INC.  
ADDRESS: P.O. Box 7  
CITY, STATE, ZIP: Post, Texas 79356  
ATTENTION: Mr. Donald R. Rogers

*RE: Injection Pressure Increase  
J.G. Cox SWD Well No.1  
Sec.13-T17S-R38E  
Lea County, New Mexico*

Dear Sir:

Reference is made to your request dated **June 7, 1993**, to increase the surface injection pressure on **the above referenced well**. This request is based on a step rate test conducted on this well **June 4, 1993**. The results of the tests have been reviewed by my staff and we feel an increase in injection pressure on this well is justified at this time.

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

<u>Well &amp; Location</u>	<u>Maximum Injection Surface Pressure</u>
<b>J.G. Cox SWD Well No.1 660' FNL &amp; 1980' FWL Unit Letter "C", Section 13-T17S-R38E Lea County, New Mexico</b>	<b>1112 psig</b>

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/BES/

xc: D. Catanach FILE - Case No.10613 OCD - Hobbs



OIL CONSERVATION DIVISION  
RECEIVED

'93 JUN 14 AM 8 48

**W J C**, Inc.



(806) 495-2896

W. J. Collier, P.E.

(915) 685-4171

State of New  
Energy, Miner  
Resources D  
Oil Conservat  
P. O. Box 208  
Santa Fe, New

RE: J. G. Co

Sir:

WJC, Inc.  
June 3, 1993,  
the above-refe  
County).

Halliburt  
injection tubi

Please fil  
plotted as to  
gradient being

WJC, Inc.  
limit to 1600 p

*Mr. Stone,*  
*I delivered the enclosed*  
*information packet to Mr. Sexton*  
*@ Hobbs on the 3<sup>rd</sup> of Sept. 93.*  
*He advised that I*  
*send the information to*  
*your office for evaluation*  
*and that you would reply*  
*at a better date.*

ffice on  
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obbs in Lea

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e" results  
nt or frac

e approved

*Thank You,*  
*Don Rogers*

*Prod. Man. - WJC, Inc.*

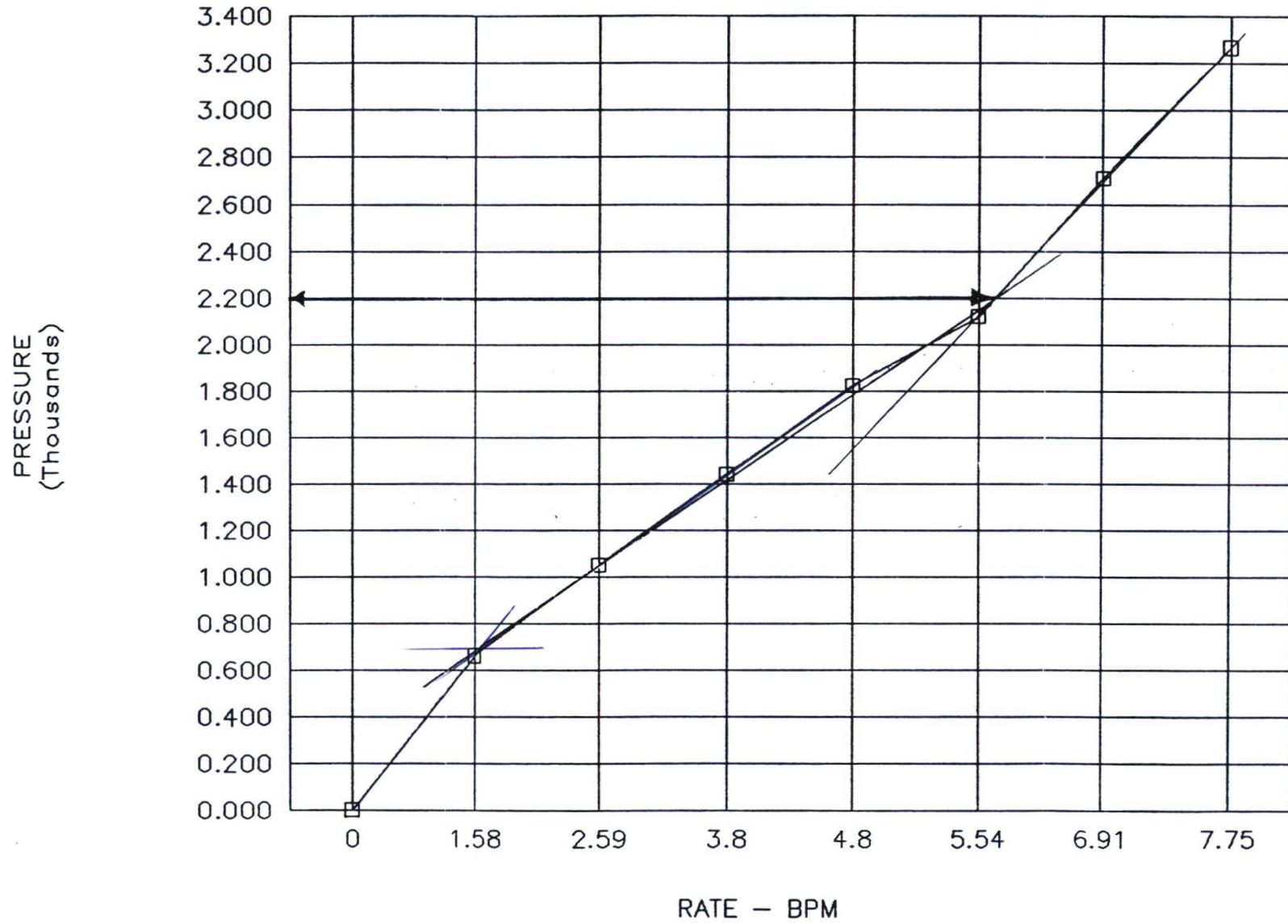
*Don Rogers*  
Donald R. Rogers  
Production Manager

DRR/gs  
Enclosure  
cc: Oil Conservation Division  
District I Office  
Hobbs, New Mexico

*PERMITTED BY R.9802*  
*- AUTHORIZED TO 1000PS*

# COX SWD

## FRACTURE GRADIENT





STATE OF NEW MEXICO  
**ENERGY AND MINERALS DEPARTMENT**  
 OIL CONSERVATION DIVISION  
 HOBBS DISTRICT OFFICE

June 14, 1993

BRUCE KING  
 GOVERNOR

POST OFFICE BOX 1980  
 HOBBS, NEW MEXICO 88240  
 (505) 393-6161

OIL CONSERVATION DIVISION  
 P.O. BOX 2088  
 SANTA FE, NEW MEXICO 87504-2088

RE: APPLICATION FOR PRESSURE LIMIT INCREASE FOR DISPOSAL & INJECTION WELLS

Gentlemen:

I have examined the step rate test for the:

WJC Inc.	J.G. Cox SWD	#1-C	13-17-38
Operator	Lease & Well No.	Unit	S-T-R

and my recommendations are as follows:

OK Bonnie REPIOTTED - CUMULATIVE LOGS

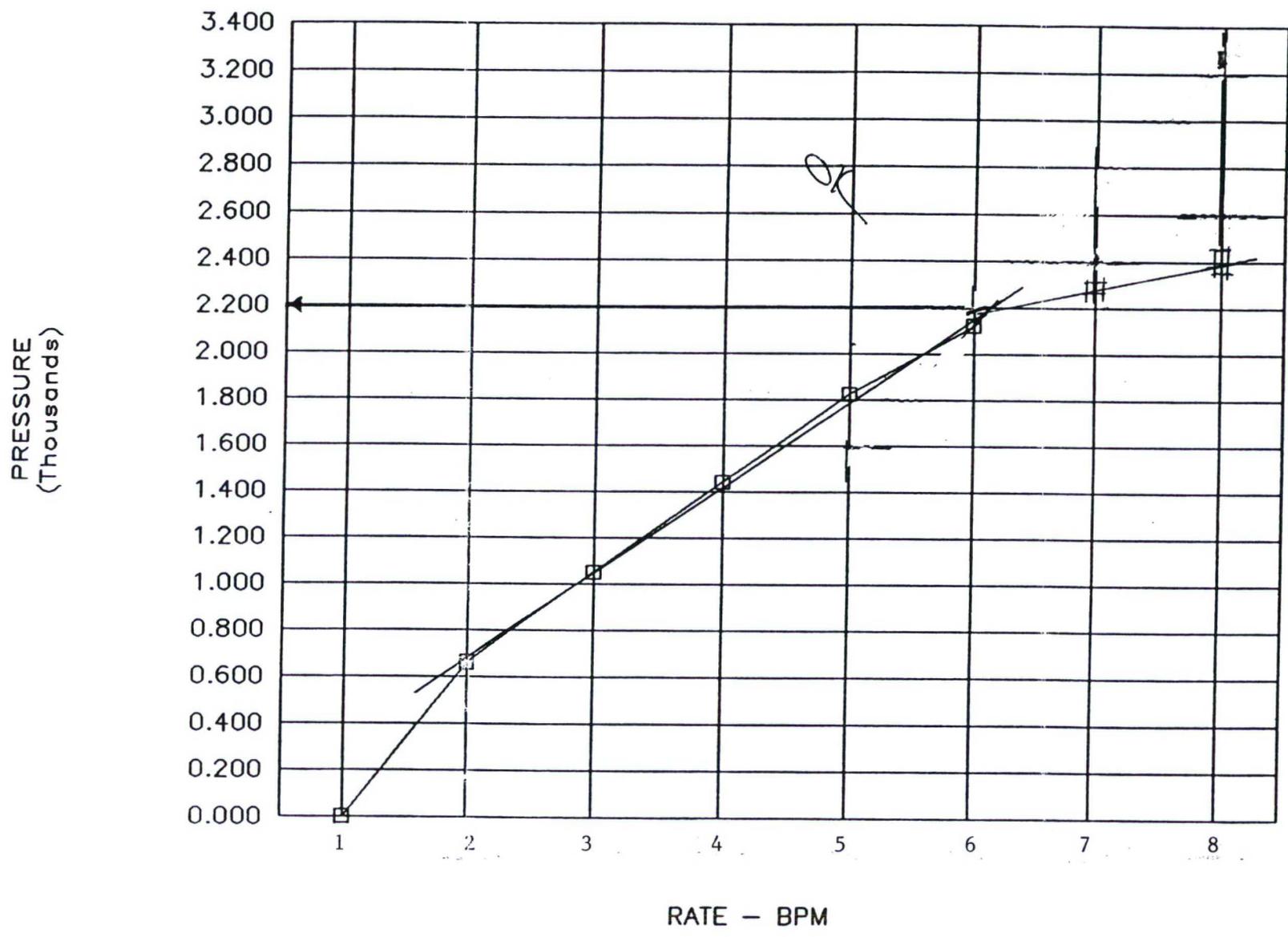
Very truly yours

Jerry Sexton  
 Supervisor, District I

/bp

# COX SWD

## FRACTURE GRADIENT





**HALLIBURTON SERVICES**

July 1, 1993

TO: Mr. Donald R. Rogers  
WJC, Inc.  
P.O. Box 3857  
Midland, Texas 79702

FROM: Ken Borgen  
Area Technical Manager  
Halliburton Energy Services  
Midland, Texas 79702

RE: J. G. Cox SWD No. 1  
Step Rate Test Analysis

Dear Mr. Rogers,

The step rate data obtained from the J. G. Cox SWD No.1 well on June 4, 1993 has been interpreted to identify the fracturing pressure. The fracturing pressure has been determined to be 1,300 psig at 3.3 bpm. The 1,300 psig pressure represents the observed well head injection pressure for the well bore configuration at the time the test was made.

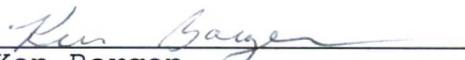
Interpretation of the step rate data required taking the injection rate and pressure, listed in one minute increments, from the right margin of the real time strip chart. Tubing, packer mandrel and exit port friction pressures were calculated and subtracted from the injection pressure. These pressures were then plotted against the injection rates with the fracturing pressure being identified by the break in the slope.

The fracturing pressure was determined to be 1,300 psig (which includes friction) at an injection rate of 3.3 bpm. This equates to a fracturing pressure gradient of 0.57 to 0.58 psi/ft.

The step rate chart, field data and a tabulation of friction pressures are attached for your reference.

If you need further assistance or have any questions concerning this analysis please let me know. I can be reached at 915-682-4305.

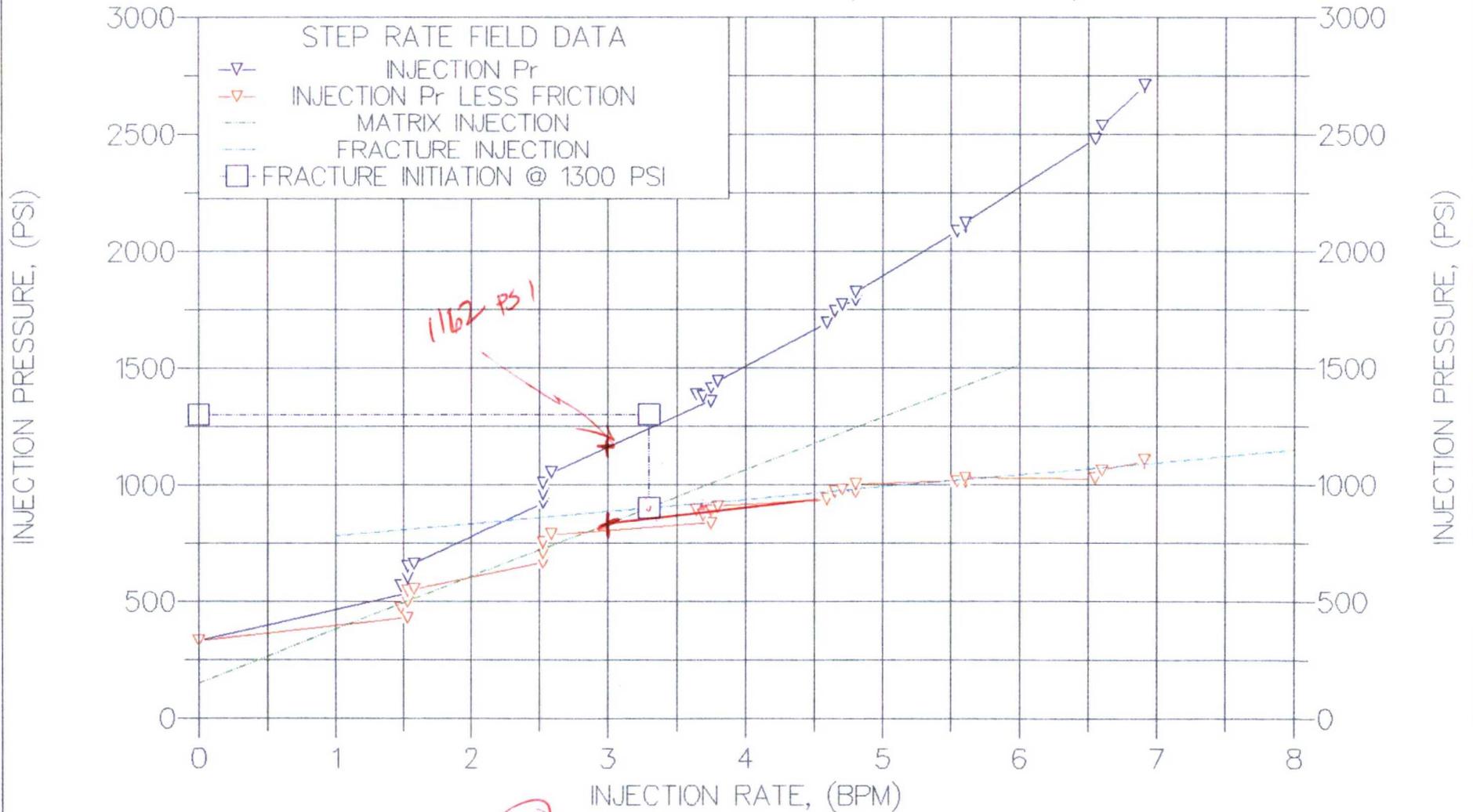
Sincerely,

  
Ken Borgen  
Area Technical Manager

cc: Ken Smith - Hobbs

WJC, INC.  
 J.G. COX SWD #1  
 LEA COUNTY, NEW MEXICO

STEP RATE TEST ANALYSIS - JUNE 4, 1993  
 FRAC PRESSURE = 1300 PSI @ 3.3 BPM (WITH FRICTION)



ALLOW 1112 PSI (RS)

WJC, INC. : J.G. COX SWD #1  
LEA COUNTY, NEW MEXICO

STEP RATE TEST ANALYSIS - JUNE 4, 1993 - CORRECTION FOR FRICTION PRESSURE  
FRAC PRESSURE = 1300 PSI @ 3.3 BPM (INCLUDING FRICTION PRESSURE)

PUMP TIME HH:MM:SS	TBG Pr (psi)	INJ RATE (bpm)	FLUID DENSITY (ppg)	TBG FRICT (psi)	PKR FRICT (psi)	INJ **Pr (psi)	INJ GRAD psi/ft	REYNOLDS NUMBER
9:47:23	330	.00	8.65	.0	.0	330	.507	0
9:48:23	531	1.53	8.66	86.4	15.2	429	.525	9.7068e6
9:49:23	566	1.48	8.39	81.4	13.8	471	.518	9.0968e6
9:50:23	598	1.53	8.40	86.4	14.9	497	.523	9.4154e6
9:51:23	646	1.53	8.33	86.4	14.8	545	.528	9.3369e6
9:52:23	661	1.58	8.40	91.6	15.7	554	.533	9.7231e6
9:53:23	919	2.53	8.30	213.6	40.0	665	.547	1.5384e7
9:54:23	959	2.53	8.34	213.6	40.0	705	.556	1.5458e7
9:55:23	1,006	2.53	8.26	213.6	39.9	752	.560	1.5310e7
9:56:23	1,050	2.59	8.36	222.8	41.8	785	.571	1.5863e7
9:57:23	1,356	3.75	8.36	433.8	87.7	834	.580	2.2967e7
9:58:23	1,385	3.64	8.34	411.2	82.6	891	.589	2.2240e7
9:59:23	1,377	3.69	8.43	421.4	85.3	870	.590	2.2789e7
10:00:23	1,412	3.75	8.37	433.8	88.2	890	.590	2.2994e7
10:01:23	1,441	3.80	8.39	444.3	90.6	906	.594	2.3357e7
10:02:23	1,692	4.59	8.39	624.2	132.4	935	.599	2.8212e7
10:03:23	1,742	4.65	8.34	638.9	135.5	968	.602	2.8411e7
10:04:23	1,768	4.70	8.43	651.3	138.7	978	.608	2.9026e7
10:05:23	1,787	4.80	8.42	676.5	144.8	966	.606	2.9609e7
10:06:23	1,821	4.80	8.40	676.5	144.8	1,000	.611	2.9538e7
10:07:23	1,823	4.80	8.40	676.5	145.1	1,001	.611	2.9538e7
10:08:23	2,084	5.54	8.45	875.7	193.4	1,015	.616	3.4295e7
10:09:23	2,103	5.60	8.32	892.8	197.0	1,013	.609	3.4133e7
10:10:23	2,120	5.60	8.43	892.8	197.2	1,030	.617	3.4585e7
10:11:23	2,120	5.60	8.49	892.8	197.7	1,029	.621	3.4831e7
10:12:23	2,479	6.55	8.45	1,183.7	270.5	1,025	.618	4.0548e7
10:13:23	2,537	6.60	8.46	1,200.0	275.8	1,061	.624	4.0905e7
10:14:23	2,702	6.91	8.55	1,303.3	303.4	1,095	.635	4.3282e7
10:15:23	2,708	6.91	8.40	1,303.3	302.6	1,102	.628	4.2523e7
10:16:23	2,709	6.91	8.39	1,303.3	302.1	1,104	.628	4.2472e7

COLUMN HEADING DEFINITION

PUMP TIME	:	STRIP CHART TIME OF DATA USED FOR ANALYSIS
TBG Pr	:	INJECTION TUBING PRESSURE INCLUDING PIPE FRICTION
INJ RATE	:	INJECTION RATE DURING STEP RATE TEST
FLUID DENSITY	:	FLUID DENSITY OF INJECTION FLUID
TBG FRICT	:	FRICTION PRESSURE OF FLUID IN TUBING
PKR FRICT	:	FRICTION PRESSURE DROP ACROSS PAKER
INJ **Pr	:	INJECTION PRESSURE LESS TUBING AND PACKER FRICTION
INJ GRAD	:	EQUIVILANT FLUID GRADIENT AT FORMATION FACE
REYNOLDS NUMBER	:	DIMENSIONLESS REYNOLDS NUMBER

Friction Loss Values for Fresh Water

DIAMETER (INCH)	2.441	1.250				
LENGTH (FT)	4800	5				

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FLOW RATE (BPM)	FRICTION PRESSURE (PSI)		TOTAL (PSI)
-----			-----
0.5	11.2	0.3	11.5
1.0	39.2	1.0	40.2
1.5	81.3	2.1	83.4
2.0	136.4	3.5	139.9
2.5	203.8	5.3	209.1
3.0	283.0	7.3	290.3
3.5	373.4	9.7	383.1
4.0	474.9	12.3	487.2
4.5	587.1	15.2	602.3
5.0	709.7	18.4	728.0
5.5	842.5	21.8	864.3
6.0	985.3	25.5	1010.8
6.5	1138.0	29.4	1167.5
7.0	1300.4	33.6	1334.1
7.5	1472.4	38.1	1510.5
8.0	1653.7	42.8	1696.5
8.5	1844.4	47.7	1892.2
9.0	2044.3	52.9	2097.2
9.5	2253.3	58.3	2311.6
10.0	2471.2	63.9	2535.1

H A L L I B U R T O N   S E R V I C E S

The above report is based on sound engineering practices, but because of variable well conditions and other information which must be relied upon, Halliburton makes no warranty, express or implied, as to the accuracy of the data or of any calculations or opinions expressed herein. You agree that Halliburton shall not be liable for any loss or damage whether due to negligence or otherwise arising out of or in connection with such data calculations or opinions.



STATE OF NEW MEXICO  
ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION



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

June 16, 1993

WJC, Inc.  
P.O. Box 3857  
Midland, Texas 79702

Attn: Donald R. Rogers  
Production Manager

915-685-4171

RE: *Request for Injection Pressure  
Increase - J.G. Cox SWD No.1*

Dear Mr. Rogers,

In reference to the step-rate test you submitted as evidence for requesting an increase in injection pressure on the captioned well, there seems to be a slight problem.

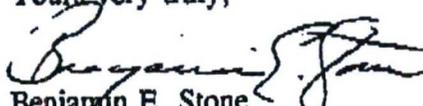
The graph you supplied (run by Halliburton), has the pressure break moving in the wrong direction. The break should be the result of a reduction in injection pressure which would indicate the formation is fracturing. This break shows an increase in pressure indicating something else occurred. In fact, if any fracture occurred, from the data shown, it may have been at approximately 680 psi. However, there are not sufficient data points below that point to prove that is the case either.

Our suggestion is that you contact Halliburton Services and have them interpret the data proving a fracture occurred and at what pressure. Whatever the explanation, I don't think this office could be convinced this is the case from the data obtained.

To administratively approve your request, a new step-rate should run indicating a clear reduction in the gradient pressure, with 3 or 4 steps on either side of the break.

Please contact me if I may be of assistance.

Yours very truly,

  
Benjamin E. Stone  
Engineering Tech II

/BES WJC\_SWD

# COX SWD FRACTURE GRADIENT

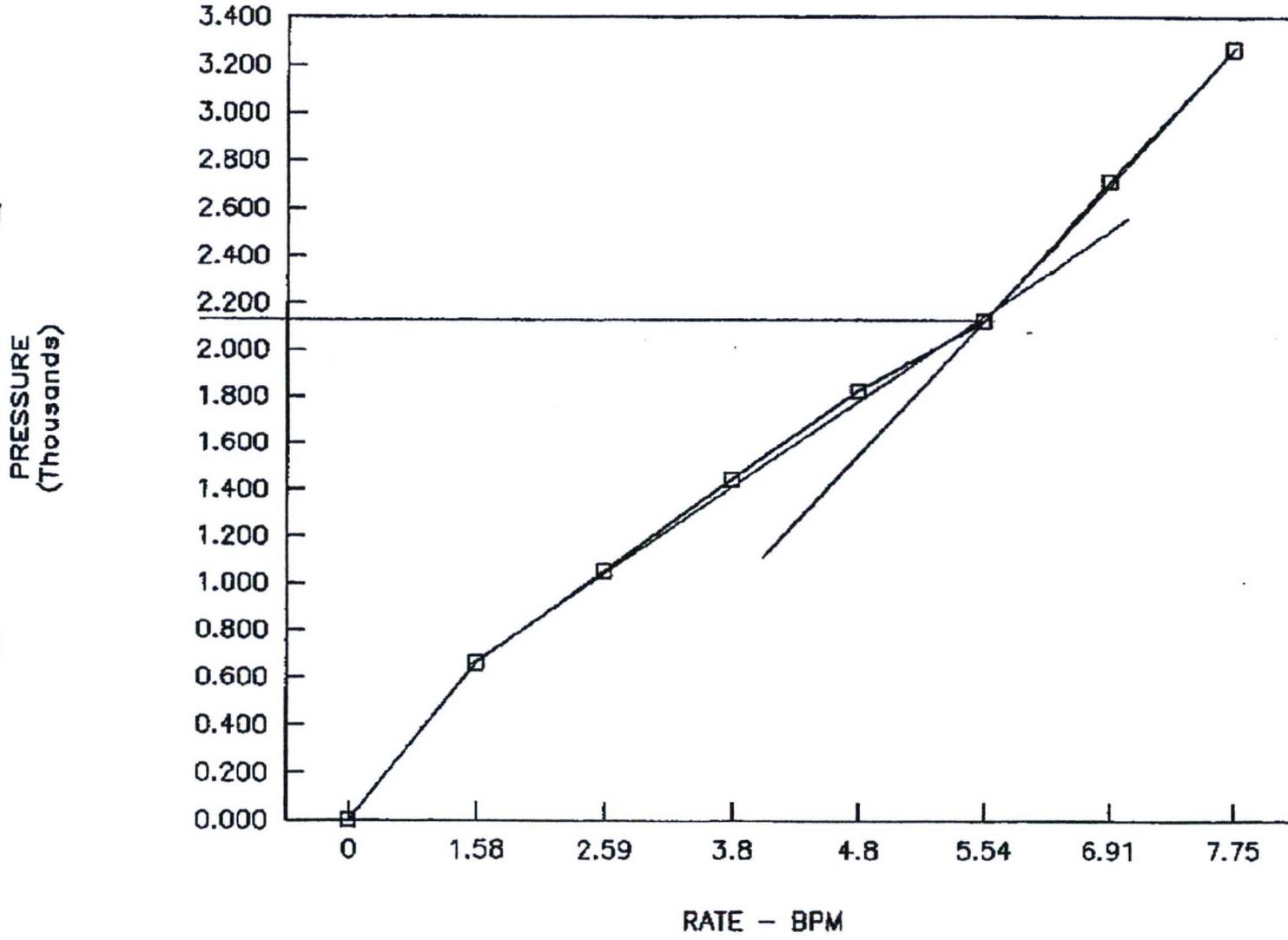




CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS		PRESSURE (PSI)		DESCRIPTION OF OPERATION AND MATERIALS
				T	C	TUBING	CASING	
	7:00							on location / safety meeting
	9:46					300		open well
	9:47	1.5	2	✓		530		begin step rate test
	9:52	1.5	7	✓		1660		
	9:52	2.5	8	✓		800		increase rate
	9:57	2.5	18	✓		1050		
	9:57	3.5	20	✓		1340		increase rate
	10:02	3.5	36	✓		1450		
	10:02	4.5	37	✓		1630		increase rate
	10:07	4.5	63	✓		1820		
	10:07	5.5	64	✓		2030		increase rate
	10:12	5.5	86	✓		2100		
	10:12	6.5	87	✓		2400		increase rate
	10:14	6.5	102	✓		2570		
	10:14	7.0	104	✓		2700		increase rate
	10:16	7.0	120	✓		2700		shutdown
	10:17					1060		isip
	10:22					1000		5 minute
	10:27					975		10 minute
	10:32					927		15 minute

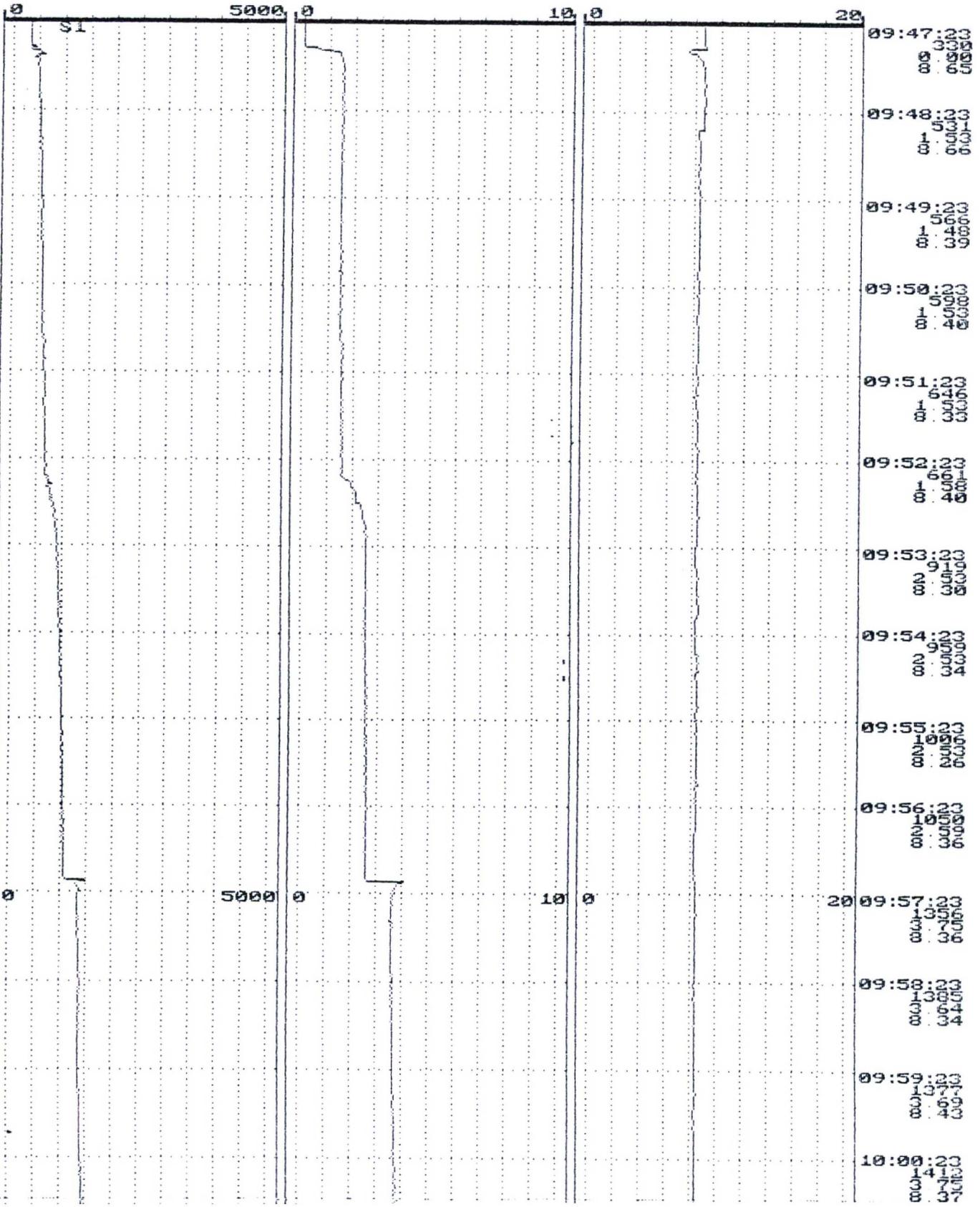
\*\*\*\*\*  
 REALTIME STRIP CHART  
 \*\*\*\*\*

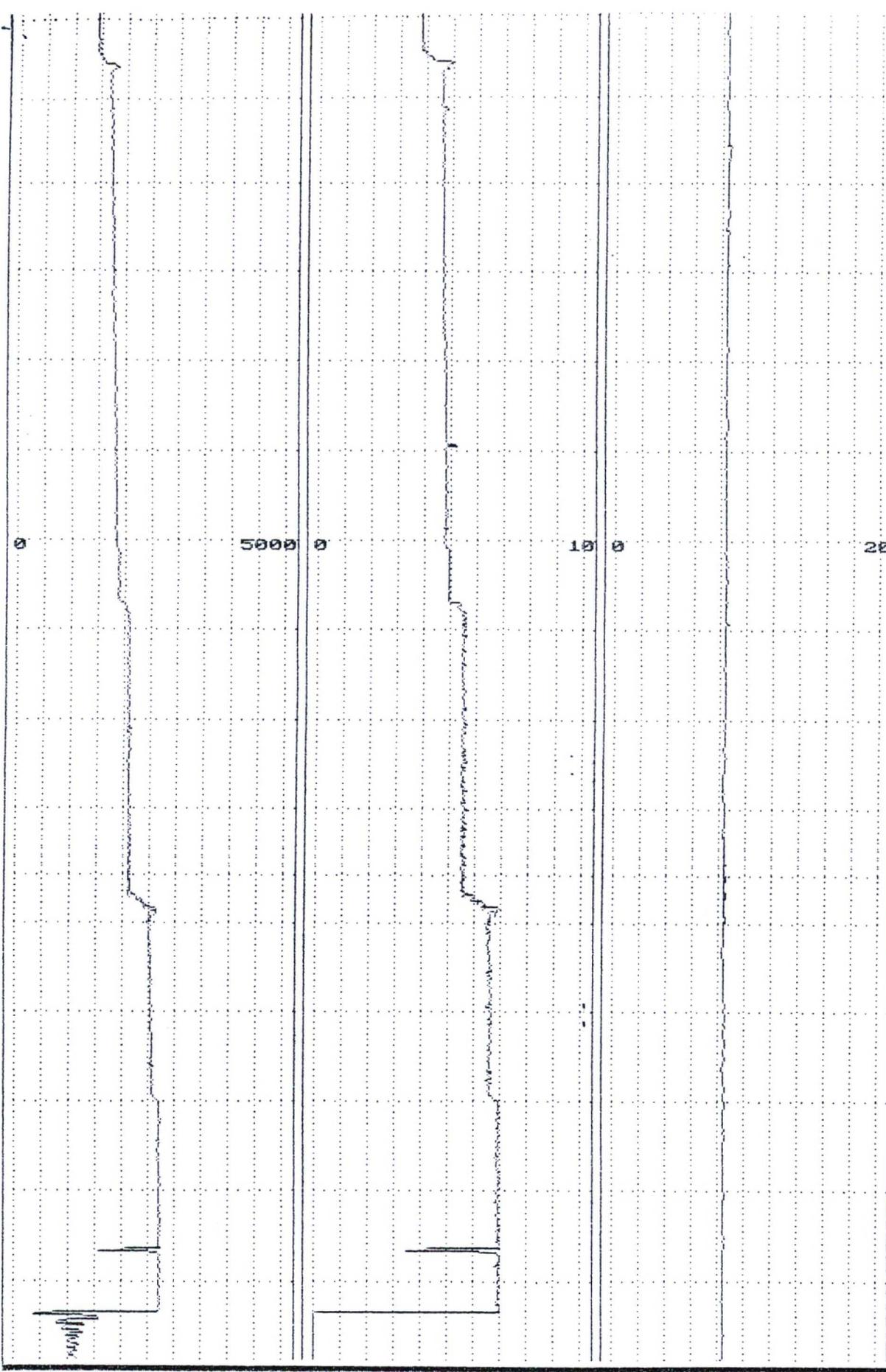
1. Tubing Press (psi)
2. Slurry Rate (bpm)
3. Slurry Density (lb/gal)

TUBING PRESS  
psi

SLURRY RATE  
bpm

SLURRY DENSITY  
lb/gal

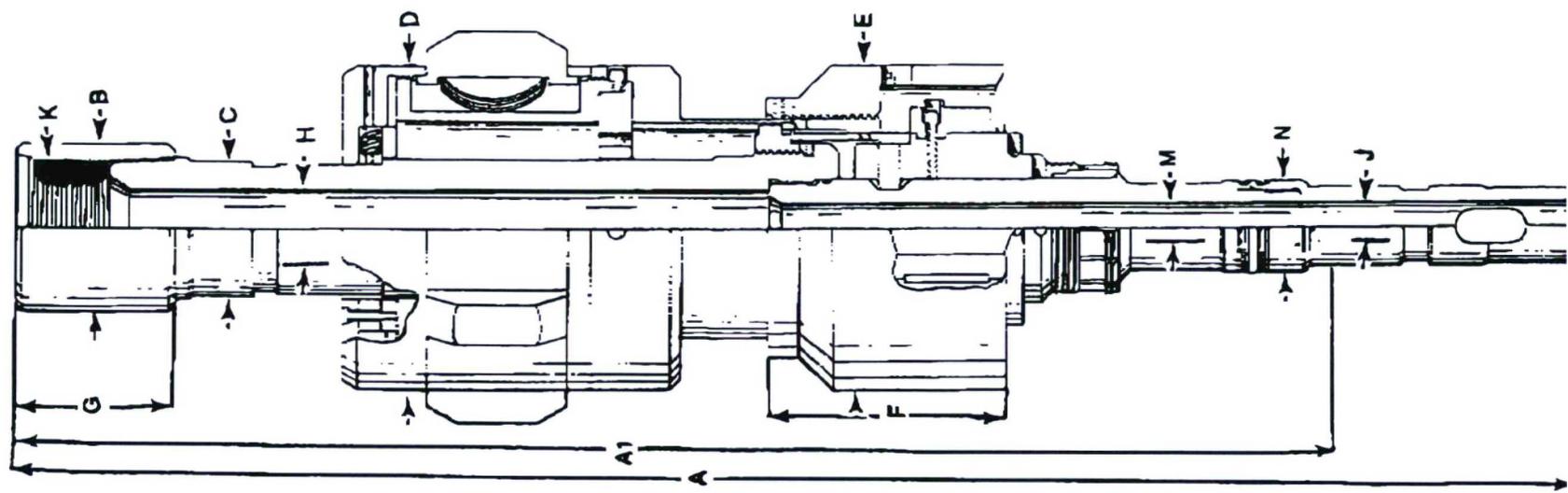




10:01 00000 40000 00000  
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 10:16 00000 40000 00000  
 10:17:19

**PRODUCTION OIL TOOLS**

*Ken Barkin*



**'MST' MECHANICAL SETTING TOOL DIMENSIONAL DATA**

SIZE	43	45	47	48	49	51	53	54	55
A	42.0	42.0	50.5	50.50	50.50	50.50	50.50	50.50	50.50
A1	38.50	38.50	47.00	47.00	47.00	47.00	47.00	47.00	47.00
B	3.06	3.06	3.68	3.68	3.68	3.68	3.68	3.68	3.68
C	1.90	1.90	3.09	3.09	3.09	3.09	3.09	3.09	3.09
D	3.75	4.50	5.40	6.25	7.125	8.00	9.00	10.00	11.50
E	3.59	4.310	5.37	6.312	7.13	8.125	9.44	10.44	12.00
F	7.06	7.06	7.44	6 1/2					
G	5.75	5.75	5.25	5.25	5.25	5.25	5.25	5.25	5.25
H	1.00	1.00	1.75	1.75	1.75	1.75	1.75	1.75	1.75
J	.875	.875	1.250	1.250	1.250	1.250	1.250	1.250	1.250
K	2-3/8" O.D. EU BRD			2-7/8" O.D. EU BRD					
M	.750	.750	1.312	1.312	1.312	1.312	1.312	1.312	1.312
N	1.340	1.340	1.995	1.995	1.995	1.965	1.965	1.955	1.955

*9 5/8 Cement Retain  
COP #1 SWD*

*I.D. of Stinger 1/4"  
or 1.22 sq. in.*

*4 ports 1/4" = 1.767 sq. in.*

*Thanks  
Don Rogers  
WJL, Inc*