CF 10613

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

POST OFFICE BOX 2088

STATE LAND OFFICE BUILDING SANTA FE, NEW MEXICO 87504

(505) 827-5800

BRUCE KING GOVERNOR

ANITA LOCKWOOD CABINET SECRETARY

> 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 abovereferenced 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, \cap William J. LeMay Director

WJL/BES/amg

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



October 1, 1993

NO WAITING PERIOD

COMPANY: WJC, INC. ADDRESS: **P.O.** Box 7 Post, Texas 79356 CITY, STATE, ZIP: **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:

Well & Location

J.G. Cox SWD Well No.1 660' FNL & 1980' FWL Unit Letter "C", Section 13-T17S-R38E 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/

Maximum Injection Surface Pressure

1112 psig





(806) 495-2896

W. J. Collier, P.E.

T ----

(915) 685-4171

State of New Energy, Miner Resources D Oil Conservat P. O. Box 208 Santa Fe, New Into J. G. Coy RE: Sir: ffice on WJC, Inc. ite" test on June 3, 1993, obbs in Lea the above-refe County). ng down the Halliburt injection tubi: e" results Please fil nt or frac plotted as to gradient being approved WJC, Inc. limit to 1600 p

Donald R. Røgers Production Manager

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

PERMITTED BY R. 9802 - AUTIFORIZED TO 1000PS,

P. O. Box 7 Post, Texas 79356 P. O. Box 3857 Midland, Texas 79702

COX SWD

FRACTURE GRADIENT



RATE - BPM



ENERGY AND MINERALS DEPARTMENT OIL CONSERVATION DIVISION HOBBS DISTRICT OFFICE

June 14, 1993

BRUCE KING

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

OIL CONSERVATION DIVISON 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	Bon	NIE	Repl	07760-	Curry	E LEOPOJUK

ery truly yours Sexton Jerry

Supervisor, District I

/Ър

COX SWD



RATE - BPM

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PRESSURE (Thousands)



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 - 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

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DIAMETER LENGTH	(INCH) (FT)	2.441 4800	1.250 5 				
FLOW RATE (BPM)	2			FRICTION (PS	PRESSURE SI)	1	TOTAL (PSI)
$\begin{array}{c} 0.5\\ 1.0\\ 1.5\\ 2.0\\ 2.5\\ 3.0\\ 3.5\\ 4.0\\ 4.5\\ 5.0\\ 5.5\\ 6.0\\ 6.5\\ 7.0\\ 7.5\\ 8.0\\ 8.5\\ 9.0\\ 9.5\\ 10.0 \end{array}$	_	11.2 39.2 81.3 136.4 203.8 283.0 373.4 474.9 587.1 709.7 842.5 985.3 1138.0 1300.4 1472.4 1653.7 1844.4 2044.3 2253.3 2471.2	0.3 1.0 2.1 3.5 5.3 7.3 9.7 12.3 15.2 18.4 21.8 25.5 29.4 33.6 38.1 42.8 47.7 52.9 58.3 63.9				$\begin{array}{c} 11.5\\ 40.2\\ 83.4\\ 139.9\\ 209.1\\ 290.3\\ 383.1\\ 487.2\\ 602.3\\ 728.0\\ 864.3\\ 1010.8\\ 1167.5\\ 1334.1\\ 1510.5\\ 1696.5\\ 1892.2\\ 2097.2\\ 2311.6\\ 2535.1\end{array}$

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.



BRUCE KING GUVERNOR

ANITA LOCKWOOD CABINET SECRETARY

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

Donald R. Rogers Attn: Production Manager 915-685-4171

Request for Injection Pressure RE: 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.

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

June 16, 1993

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 proved 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_yery truly,

Benjamin E. Stone

Engineering Tech II

BES WIC_SWD

POST OFFICE BOX 2008 STATE LAND OFFICE BUILDING SANTA FE, NEW MEXICO 87504 (505) 827-5800



FRACTURE GRADIENT



RATE - BPM

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PRESSURE (Thousands)

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FORM 2025-R2

FIELD OFFICE

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FORM 201	3 R-2			JOB	TYPE	stepr	ate	DATE 4 4-93
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FIELD OFFICE

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2.	Slurry	Rate	(bpm)
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'MST' MECHANICAL SETTING TOOL DIMENSIONAL DATA

64	95/g Cenert Retains	SIZE	43	45	47	48	49	51	53	54	55
	(OKAISWD	*	42.0	42.0	50.5	50.50	50.50	50.50	50.50	50.50	50.50
	11.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	A1	38.50	38.50	47.00	47.00	47.00	47.00	47.00	47.00	47.00
2	ID OP ST: nger IT	В	3.06	3.06	3.68	3.68	3.68	3.68	3.68	3.68	3.68
- 60	9 1.22 sq in	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
6	1 1-1+3/ = 17/25 T	E	3.59	4.310	5.37	6.312	7.13	8.125	9.44	10.44	12.00
128	+ ports 14 - 1.161 9.11.	F	7.06	7.06	7.44			61	12		
90	-1-4-	G	5.75	5.75	5.25	5.25	5.25	5.25	5.25	5.25	5.25
	I MAIN S	н	1.00	1.00	1.75	1.75	1.75	1.75	1.75	1.75	1.75
	Don Logers	J	.875	.875	1.250	1.250	1.250	1.250	1.250	1.250	1.250
	617. 5	ĸ	2-3/8" O.D	EU SRD			2-7/	O.D. EU	BRD		
	WJC, INC	M	.750	.750	1,312	1.312	1.312	1.312	1.312	1.312	1.312
1	Sector and the sector of the	N	1.340	1.340	1.995	1.995	1.995	1.965	1.955	1.955	1.955

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PROD. 01L TOOLS

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FROM DAKOTA, RESOURCES

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