James K. Abbey

DEAR DIANA,

ENCLOSED ARE COPIES OF THE ORIGINAL INJECTION REQUEST. NOTE, I HAVE ATTACHED A REVISED CALC. SURFACE PRESSURE. THIS NEW VALUE IS LOWER THAN WHAT APPEARS ON THE FIRST REQUEST AND REPRESENTS MORE HYDROSTATIC PRESSURE AT THE BOMB THAN ORIGINALLY CALCULATED. I HOPE THIS ERROR DOES NOT ADD TO THE CONFUSION.

I ALSO INCLUDED ALL CORRESPONDENCE, BUT YOU MAY ALREADY HAVE THIS INFO.

SINCERELY,

JIM ABBEY

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

September 22, 1992

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

RECEIVED
OCT 02 1992
OIL CON. DIV.
DIST. 3

Blackwood & Nichols Company
P.O. Box 1237
Durango, Colorado 81302-1237

Attention: Jim Abbey

RE: Injection Pressure Increase
Northeast Blanco Unit
Middle Mesa SWD No.2
San Juan County, New Mexico

Dear Mr. Abbey:

Reference is made to the injection pressure increase which was approved on September 14, 1992. The approval was based on the mistaken assumption that the step rate data supplied with your request was actual data on the Middle Mesa SWD No.2. It has been brought to my attention that this is not the case. Inferred data from another well will not suffice for injection pressure increase.

The injection pressure increase approved on September 14, 1992, is hereby rescinded.

Sincerely,

William J. LeMay
Director

WJL/BS/jc

cc: Oil Conservation Division - Aztec
File SWD-441

RECEIVED
SEP 2[illegible] 1992
BLACKWOOD & NICHOLS CO., LTD.

STATE OF NEW MEXICO

ENERGY, MINERALS AND NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

ANITA LOCKWOOD
CABINET SECRETARY

September 14, 1992

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

Blackwood & Nichols Company
P.O. Box 1237
Durango, Colorado 81302-1237

Jim Abbey

RE: Injection Pressure Increase
Northeast Blanco Unit
Middle Mesa SWD No. 2
San Juan County, New Mexico

Dear Mr. Abbey:

Reference is made to your request dated July 20, 1992, to increase the surface injection pressure on the Middle Mesa SWD No. 2. This request is based on a step rate tests conducted on this well March 3, 1992. 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 well:

WELL AND LOCATION	MAXIMUM INJECTION SURFACE PRESSURE
NEBU Middle Mesa SWD No. 2 555' FNL & 720' FEL Section 11, T-31N, R-7W San Juan County, New Mexico	2500 PSIG

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 - Aztec
File: SWD-441

OCD

BLACKWOOD & NICHOLS CO.
A LIMITED PARTNERSHIP
P.O. BOX 1237
DURANGO, COLORADO 81302-1237

(303) 247-0728

August 6, 1992

Mr. Frank Chavez
Oil Conservation Division
1000 Rio Brazos Road
Aztec, New Mexico 87410

Re: Explanation of Friction Factors Used in the Middle Mesa SWD #2 Application for Increased Surface Injection Pressure

Dear Frank:

Diana Fairhurst mentioned your request that I provide a short explanation of how the friction factors were calculated to arrive at a surface injection pressure for the Middle Mesa SWD #2.

The friction data in psig/1000' from the Pump Mesa SWD #1 Step Rate test was plotted on a rate vs. friction pressure log-log graph. A best-fit straight line was drawn through the data points. The result was a friction curve for produced coal water in 3-1/2" diameter plastic-lined tubing for any pump rate. The factor was then multiplied by the packer setting depth of 8171' to obtain a friction pressure at a corresponding rate. The 7" casing friction factor was insignificant and not added into surface pressure.

My intention was to use the Pump Mesa friction data since it more accurately represents the behavior of produced coal water in plastic-lined tubing. As it turns out, the friction curve matches fairly closely at high rates to published data using unlined tubing and fresh water.

Attachment 1 is a table comparing our friction factors with Western's published data. This information is graphically represented on Western's friction curve. Also attached ia a copy of the table submitted with the Pump Mesa SWD #1 raw friction data.

Please call if you should have any further questions.

Sincerely,

Jim Abbey

Attachments

ATTACHMENT 1

MIDDLE MESA SWD #2
STEP RATE TEST 3/3/92
BOTTOM HOLE PRESSURE INSTRUMENT SET @ 8700'
FLUID TYPE: FRESH WATER
INJECTED DOWN 7" CASIING
3-1/2" PLASTIC LINED TBG SET @ 8171'
STATIC SURFACE SHUT-IN PRESSURE: 212 PSIG

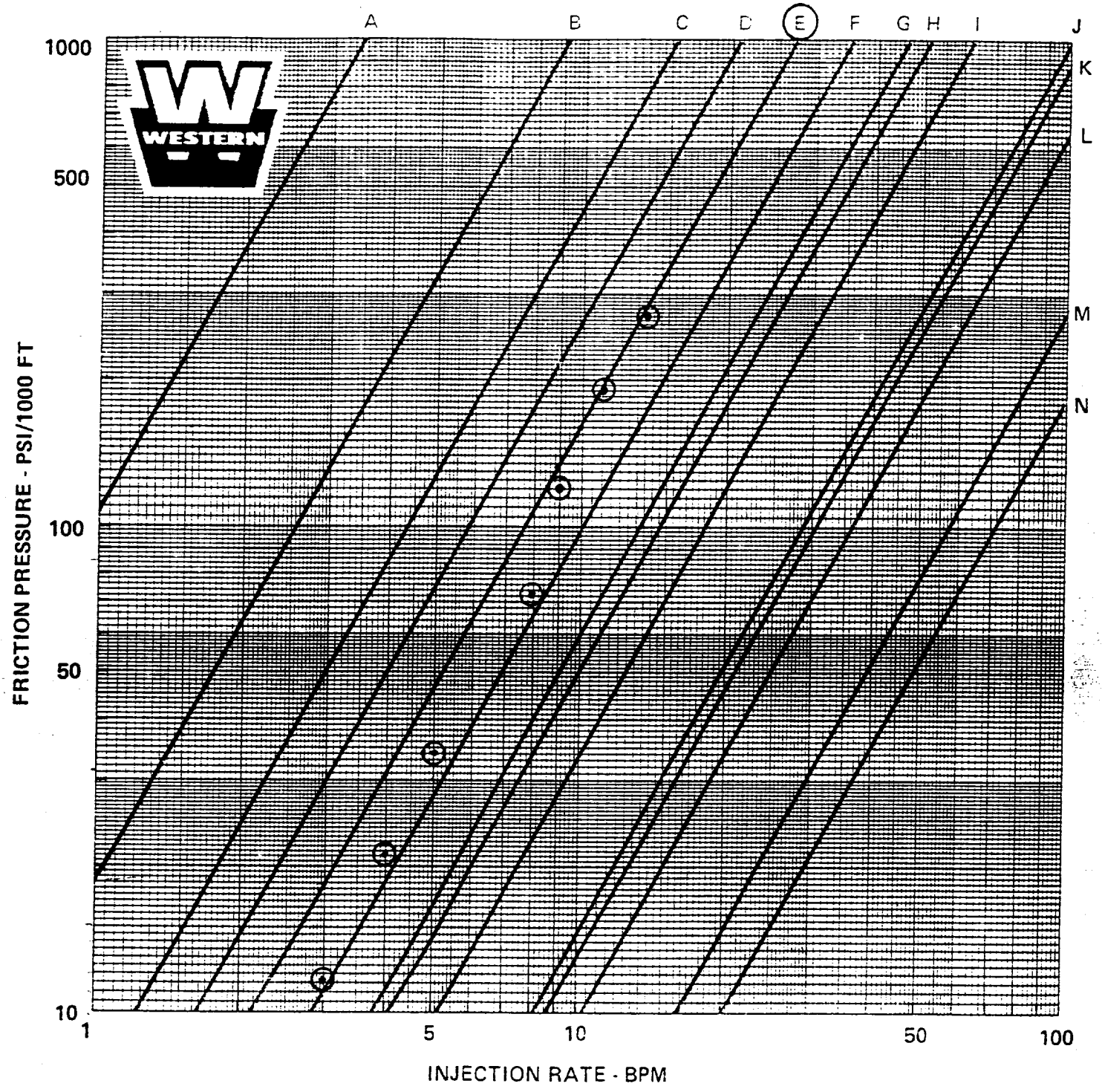
INJECTION RATE (BPM)	BTM HOLE PRESSURE (PSIG)	3-1/2" TBG FRICTION FACTOR (PSI/1000FT)	FRICTION PRESSURE (PSIG)	CALC SURF PRESSURE (PSIG)	PUBLISHED DATA 3 1/2" TBG FRICTION FACTOR (PSI/1000FT)
0.57	3982	0.30	2	643	0
1.00	3998	1.14	9	665	3
1.54	4022	2.85	23	703	6
1.98	4044	4.95	40	742	9
2.96	4124	11.64	95	877	18
3.98	4191	21.68	177	1026	31
4.98	4268	34.68	283	1209	45
7.00	4409	73.70	602	1669	85
8.84	4567	123.30	1007	2233	125
11.01	4738	193.20	1579	2975	195
12.98	4853	272.50	2227	3738	270

ATTACHMENT 2

Blackwood & Nichols Co. Ltd. Date: 4-2-91
Pump Mesa SWD #1
Step rate test.
Morrison,Bluff,Entrada
Top perforation at 8152', bottom at 8970'.
Bottom hole recorder depth: 8985'

STAGE	TIME	RATE bpm	SURFACE psig	BHP psig	FRICTION psig	HP psig
1	12:46:42	1.17	1117	5015	-8	3890
2	13:01:24	2.10	1200	5062	28	3890
3	13:16:24	3.00	1317	5107	100	3890
4	13:31:24	4.00	1450	5164	176	3890
5	13:46:06	5.10	1660	5217	333	3890
6	14:01:06	6.30	1860	5271	479	3890
7	14:16:24	7.20	2050	5315	625	3890
8	14:31:06	7.90	2240	5351	779	3890
9	15:05:54	9.00	2549	5450	989	3890
10	15:19:24	10.00	2824	5487	1227	3890

FRESH WATER



A - 1 1/4", 2.4-lb tubing
B - 2 3/8", 4.7-lb tubing
C - 2 7/8", 6.5-lb tubing
D - 2 3/8" x 4 1/2", 9.5-lb annulus
E - 3 1/2", 9.3-lb tubing
F - 2 7/8" x 5 1/2", 15.5 lb annulus
G - 4", 11-lb tubing
H - 2 3/8" x 5 1/2", 15.5-lb annulus
I - 4 1/2", 9.5-lb casing
J - 5 1/2", 15.5-lb casing
K - 2 7/8" x 7", 23-lb annulus
L - 2 3/8" x 7", 23-lb annulus
M - 7", 23-lb casing
N - 7 5/8", 29.7-lb casing

⊙ - MIDDLE MESA COOC #2 FRICTION DATA POINTS.

BLACKWOOD & NICHOLS CO.
A LIMITED PARTNERSHIP
P.O. BOX 1237
DURANGO, COLORADO 81302-1237

(303) 247-0728

OCD

July 20, 1992

Mr. Dave Catanach
Oil Conservation Division
P. O. Box 2088
Santa Fe, New Mexico 87504

RE: Injection pressure increase
Northeast Blanco Unit Middle Mesa SWD #2
Section 11, T31N, R7W
San Juan County, New Mexico

Dear Mr. Catanach:

The Middle Mesa SWD #2 injection pressure is quickly approaching the maximum allowable of 1617 psig. Enclosed for your review are a location map, wellbore diagram, and step rate pump results that support our request for a surface pressure limit of 2500 psig.

CURRENT NEEDS

The Middle Mesa SWD #2 is one of two Morrison Entrada injection facilities servicing 43 producing coal bed methane wells in the Middle Mesa geographic area (see location map). The last eleven coal wells are scheduled for first delivery this month. The produced water will be injected at the Middle Mesa SWD #2 facility.

We are concerned that a surface pressure limit of 1617 psig will not meet our future injection volume requirements. Reservoir pressures appear to be increasing at an alarming rate. The first week of continuous injection (5-17-92) averaged 880 psig at 5200 BWPD. On 7-12-92 the well averaged 1270 psig at 4910 BWPD. Faced with this type of reservoir behavior and an increase in water production from the eleven new wells, Blackwood & Nichols is in a position to request the State of New Mexico to issue a revised surface injection pressure limit.

STEP RATE RESULTS

The step rate pump test was performed down 7" casing after all zones were fractured stimulated. Attached are two graphs representing the surface and bottom hole pressure vs rate curves. Friction data was based on the Pump Mesa SWD #1 step rate test and was used to project 3-1/2" tubing surface injection pressure for the MM SWD #2 surface pressure curve (see attachment #1).

The bottom hole pressures indicate an absence of parting below 11 BPM. This is consistent with previous Morrison Entrada tests on the Middle Mesa SWD #1 and Pump Mesa SWD #1. A surface pressure of 2500 psig is our maximum facility working pressure and will enable us to meet anticipated peak disposal rates on Middle Mesa.

SUMMARY

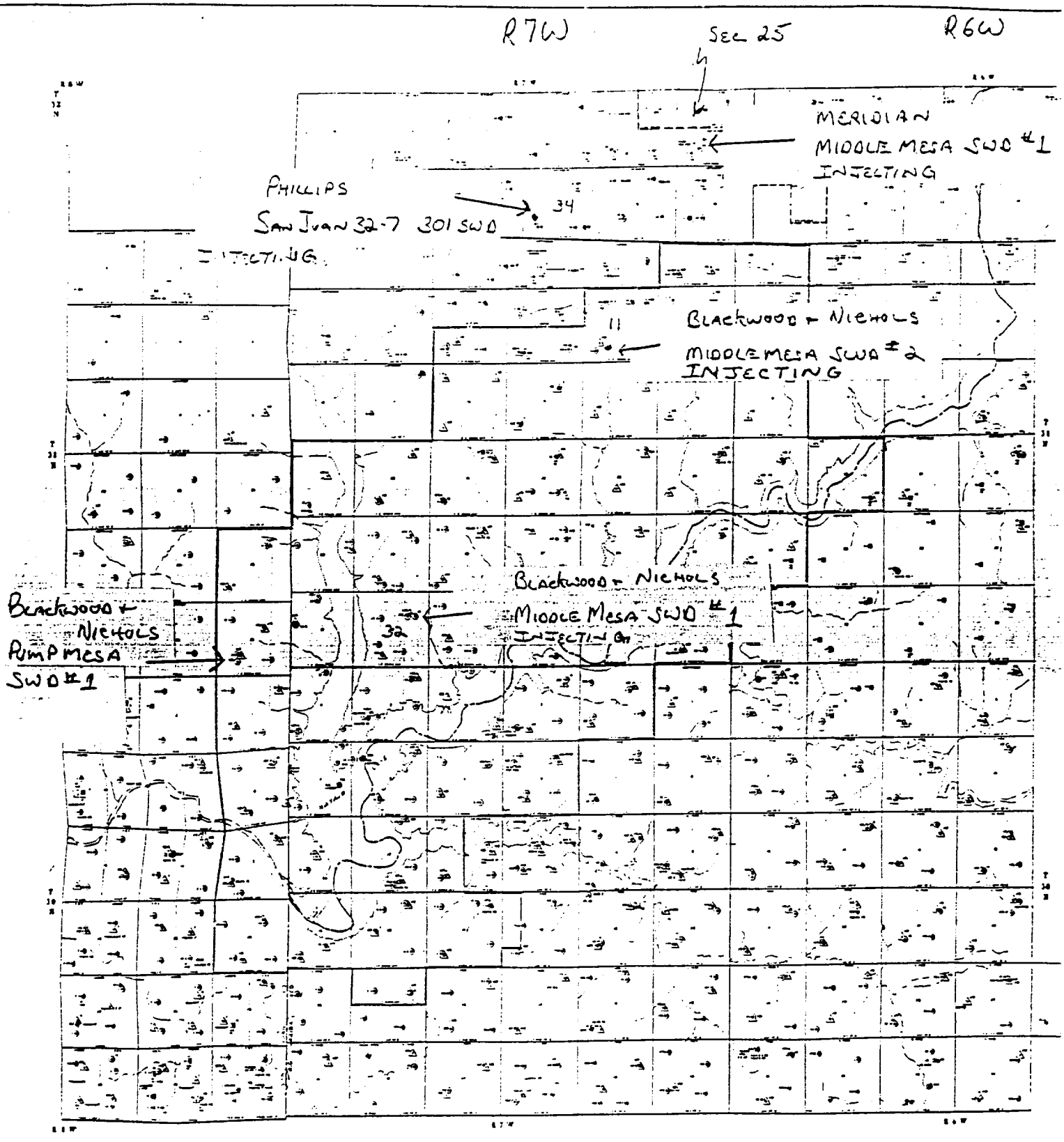
Blackwood & Nichols requests a revised surface injection pressure of 2500 psig for the Middle Mesa SWD #2 and believes this pressure will not result in contamination of other formation fluids above the Morrison Entrada injection interval.

Sincerely,

Jim Abbey
Operations Engineer

Attachments

cc: Frank Chavez, OCD, Aztec, NM
Tom Pepper, OKC



BLACKWOOD & NICHOLS CO., LTD.
NORTHEAST BLANCO UNIT
SAN JUAN & RIO ARRIBA COS., N. M.

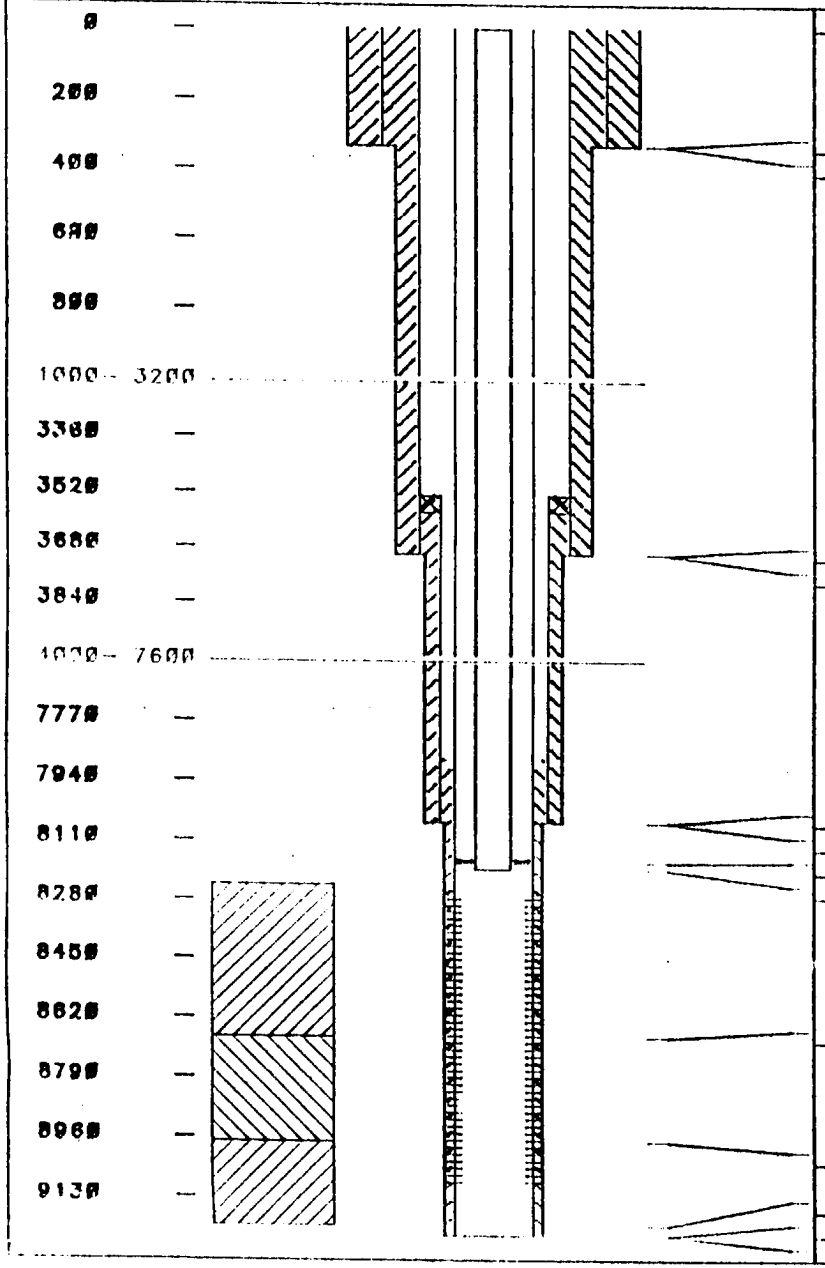
2-20-92

Lease: NEBU
Well #: MMSWD#2

Spud Date: 09/09/1991
KB. 13
TD: 9240

Comp Date: 03/04/1992
ELEV: 6505
PBTD: 9210

API #: 30-045-28553-
Location: Sec 11 Twn 31N Rng 7W
County: SAN JUAN
State: NEW MEXICO
Field: NEBU
Operator: BLACKWOOD & NICHOLS



Start	End	Size	Length	Description
0.0	334.0	20.000	334.0	Casing: 94#/FT, K-55.
0.0	334.0		334.0	Cement: CEMENT TO SURFACE
0.0	3700.0	13.375	3700.0	Casing: 61#/FT & 68#/FT, K-55.
0.0	3700.0		3700.0	Cement: CEMENT TO SURFACE
3528.0	8059.0	9.625	4531.0	Liner: Baker liner hanger.
3528.0	8059.0		4531.0	Cement: Top of cement above 7880'.
8179.0	8171.0	7.000	1.0	Packer: BAKER MODEL F WIRELINE.
0.0	8192.0	3.500	8192.0	Tubing: 9.3#/FT J-55, PLASTIC LINED.
8236.0	8674.0		438.0	Formation: MORRISON
8674.0	8972.0		298.0	Formation: BLUFF
8972.0	9210.0		238.0	Formation: ENTRADA
7850.0	9240.0		1390.0	Cement: Top of cement above 7880'.
0.0	9240.0	7.000	9240.0	Casing: 26#/FT & 29#/FT, N-80 & 20#/FT

ATTACHMENT 1

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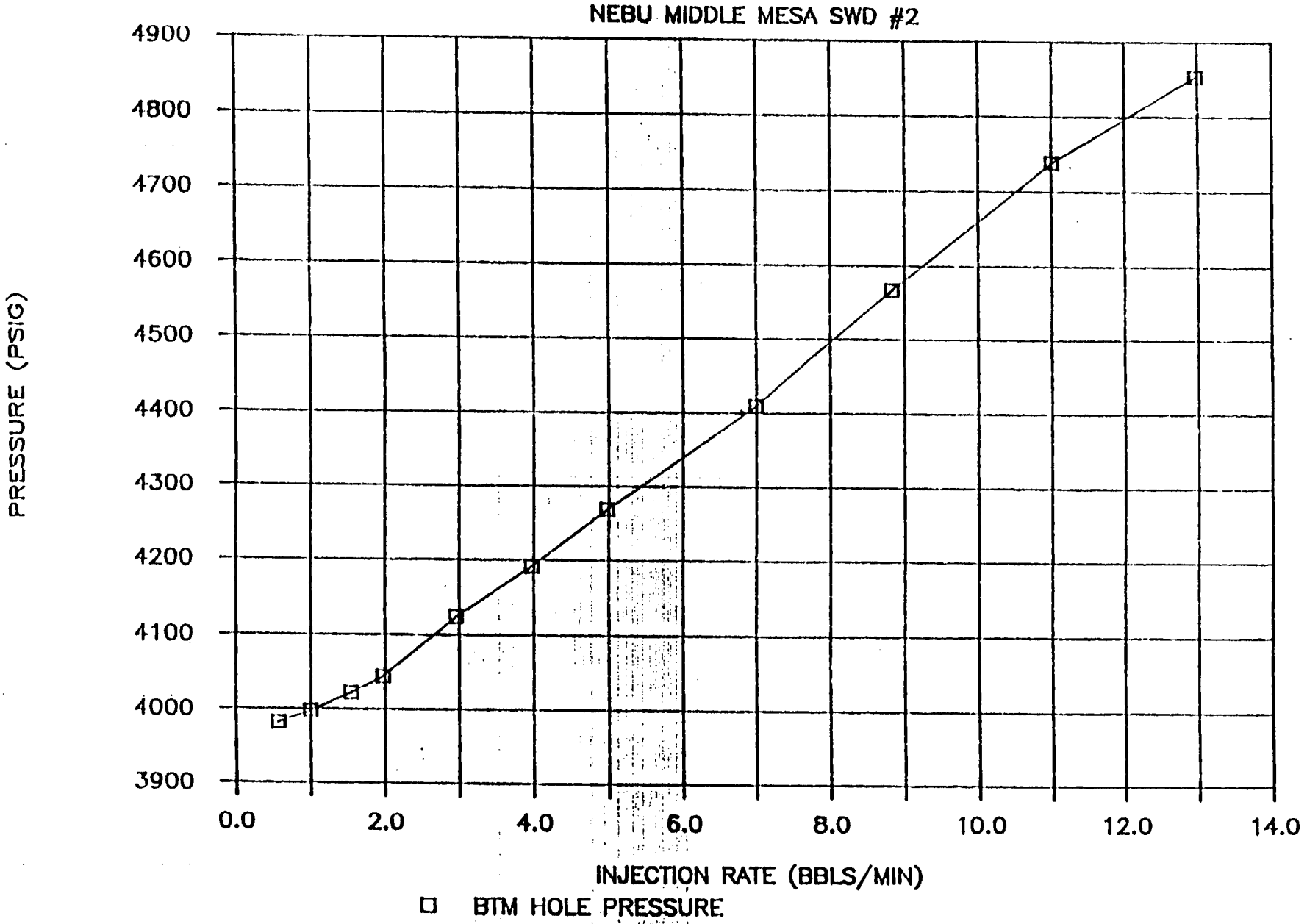
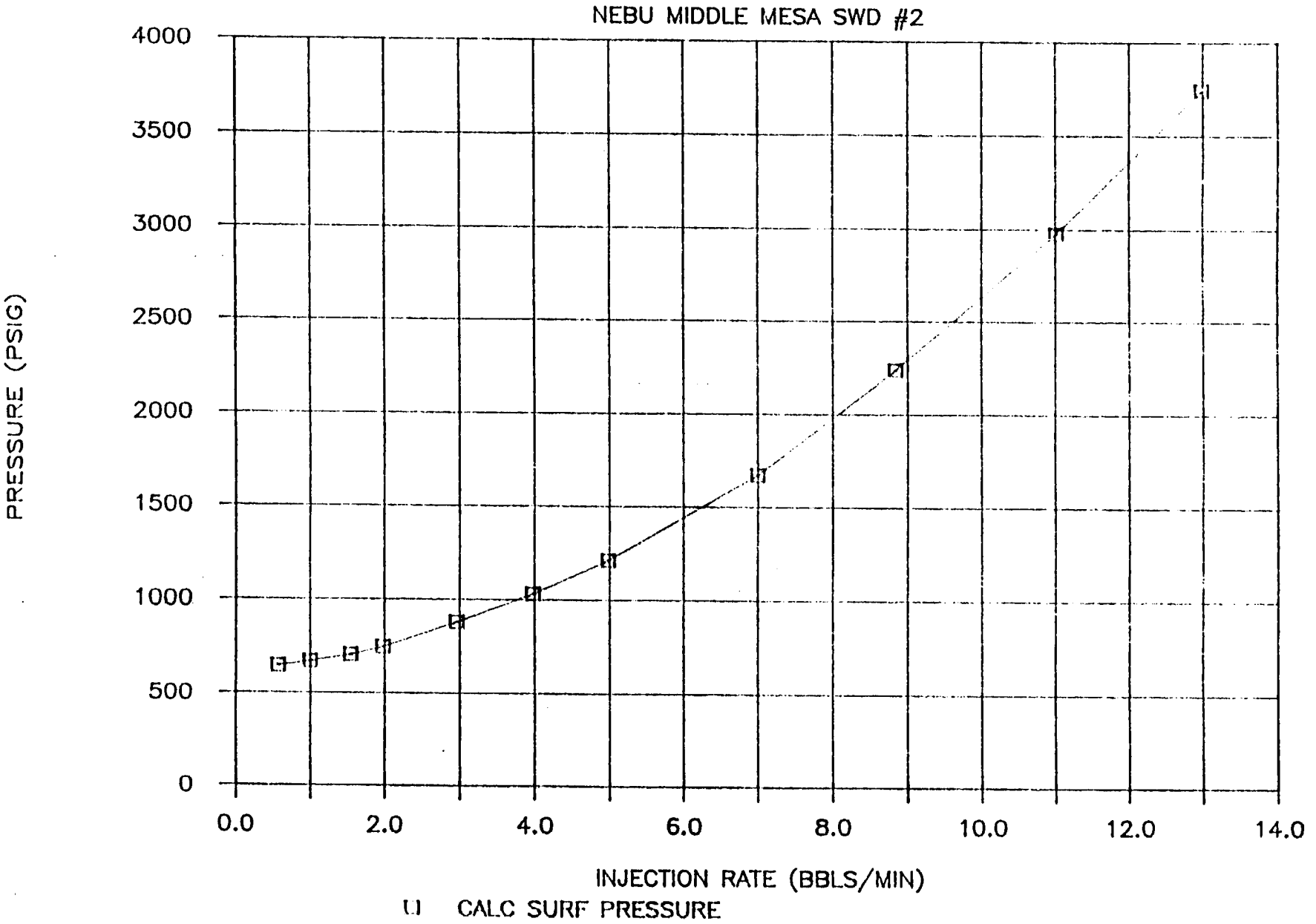
BLACKWOOD & NICHOLS CO.



BLACKWOOD & NICHOLS CO.

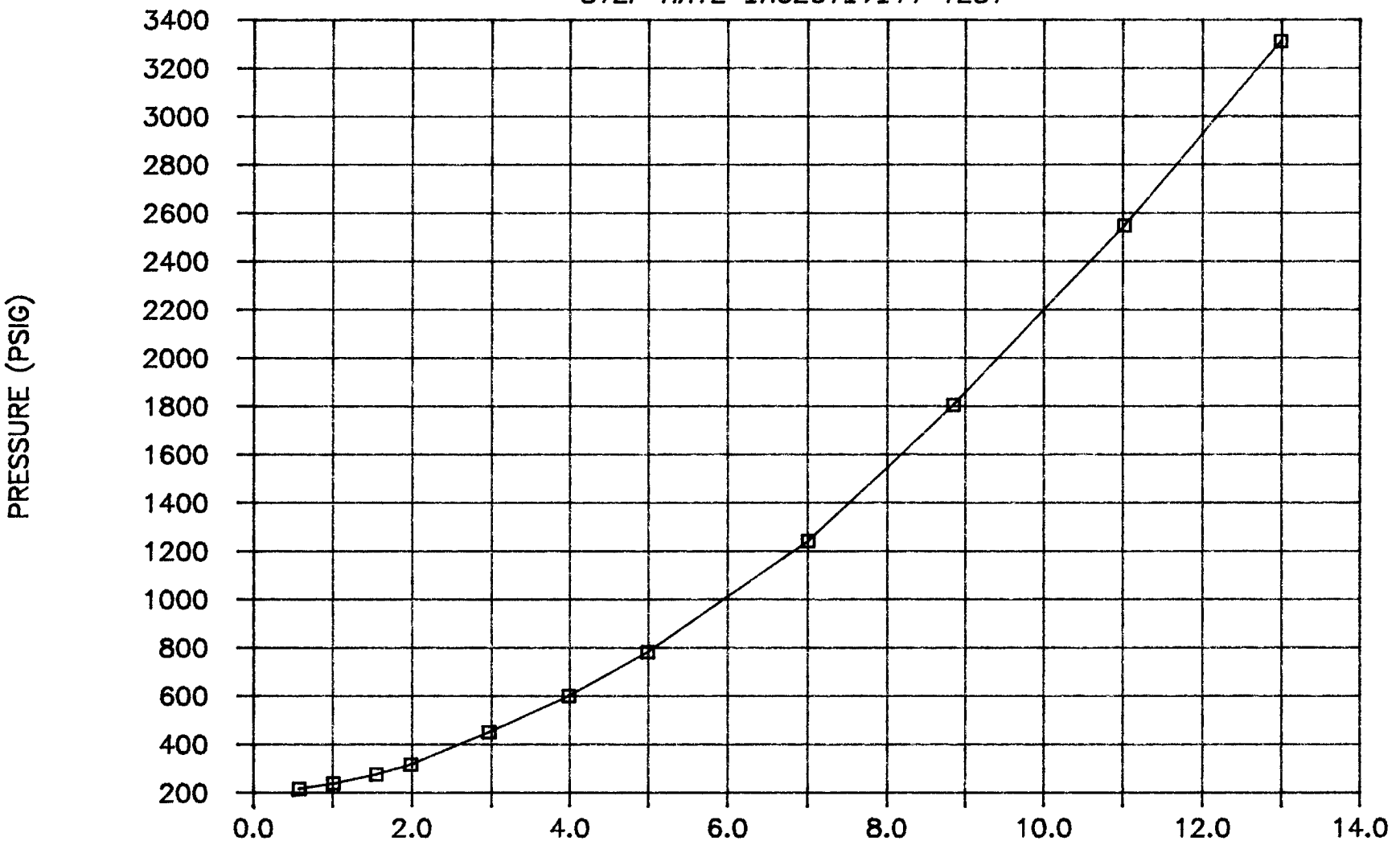


REVISED

BLACKWOOD & NICHOLS CO.

NEBU MIDDLE MESA SWD #2

STEP RATE INJECTIVITY TEST



ATTACHMENT 1
REVISED

MIDDLE MESA SWD #2
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