

TRILOBITE TESTING, L.L.C.

P.O. Box 362 • Hays, Kansas 67601

Drill-Stem Test Data

Well Name 1-13 JOHNSON Test No. 1 Date 5/3/93
Company ENSIGN OPERATING COMPANY Zone MISSISSIPPI
Address 621 17th ST #1800 DENVER CO 80293 Elevation 2480
Co. Rep./Geo. DUANE MOREDOCK Cont. DUKE #4 Est. Ft. of Pay _____
Location: Sec. 5 13 Twp. 20S Rge. 26W Co. NESS State KS
[KGS-DRL]

Interval Tested	<u>4486-4501</u>	Drill Pipe Size	<u>4.5" XH</u>
Anchor Length	<u>14</u>	Wt. Pipe I.D. - 2.7 Ft. Run	<u>225</u>
Top Packer Depth	<u>4481-4486</u>	Drill Collar - 2.25 Ft. Run	_____
Bottom Packer Depth	<u>4500</u>	Mud Wt.	<u>9.4</u> lb/Gal.
Total Depth	<u>4535</u>	Viscosity	<u>50</u>
		Filtrate	<u>10</u>

Tool Open @ 3:24 AM Initial Blow WEAK 1/2" BLOW BUILDING TO 1"

Final Blow NO BLOW

Recovery - Total Feet 15 Flush Tool? NO

Rec. 15 Feet of OIL STAINED MUDDY WATER
Rec. _____ Feet of _____
Rec. _____ Feet of _____
Rec. _____ Feet of _____
Rec. _____ Feet of _____

BHT 106 °F Gravity _____ °API @ _____ °F Corrected Gravity _____ °API
RW 1.1 @ 54.6 °F Chlorides 7000 ppm Recovery Chlorides 3700 ppm System

(A) Initial Hydrostatic Mud 2321.9 PSI AK1 Recorder No. 22150 Range 3925

(B) First Initial Flow Pressure 26.7 PSI @ (depth) 4489 w / Clock No. 30401

(C) First Final Flow Pressure 35.1 PSI AK1 Recorder No. 24174 Range 3050

(D) Initial Shut-in Pressure 1098.7 PSI @ (depth) 4498 w / Clock No. 25814

(E) Second Initial Flow Pressure 46.9 PSI AK1 Recorder No. 11058 Range 4500

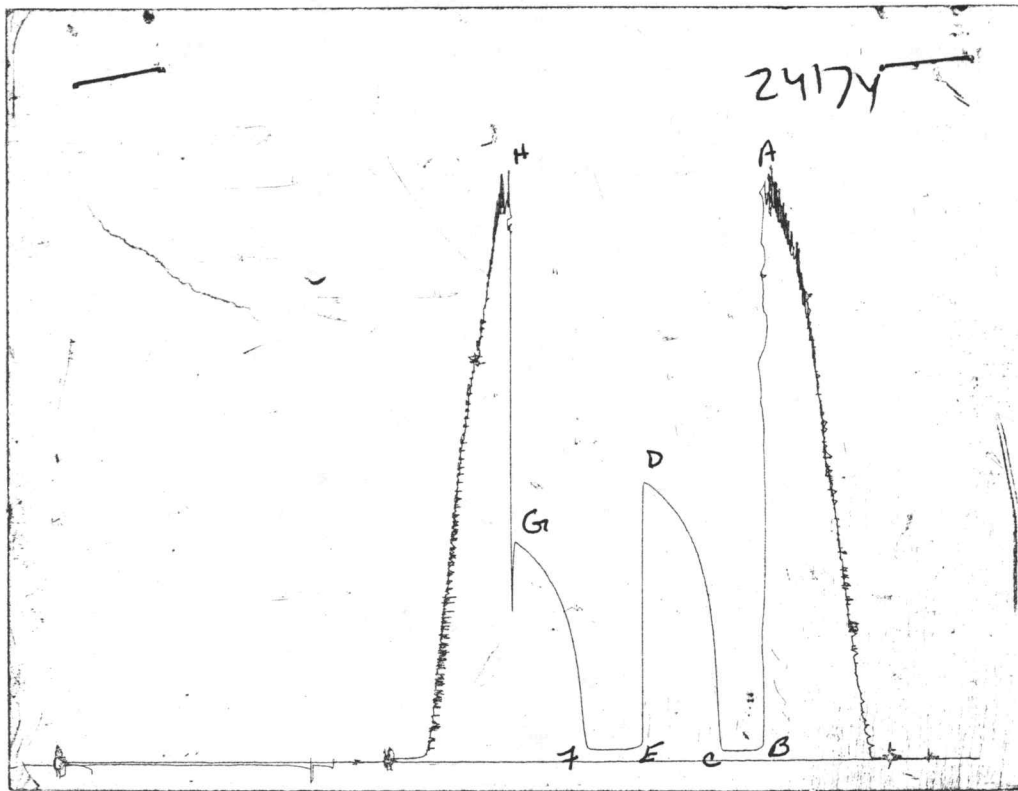
(F) Second Final Flow Pressure 46.9 PSI @ (depth) 4496 w / Clock No. 31154

(G) Final Shut-in Pressure 847.1 PSI Initial Opening 30 Final Flow 30

(H) Final Hydrostatic Mud 2265.7 PSI Initial Shut-in 60 Final Shut-in 60

Our Representative PAUL SIMPSON

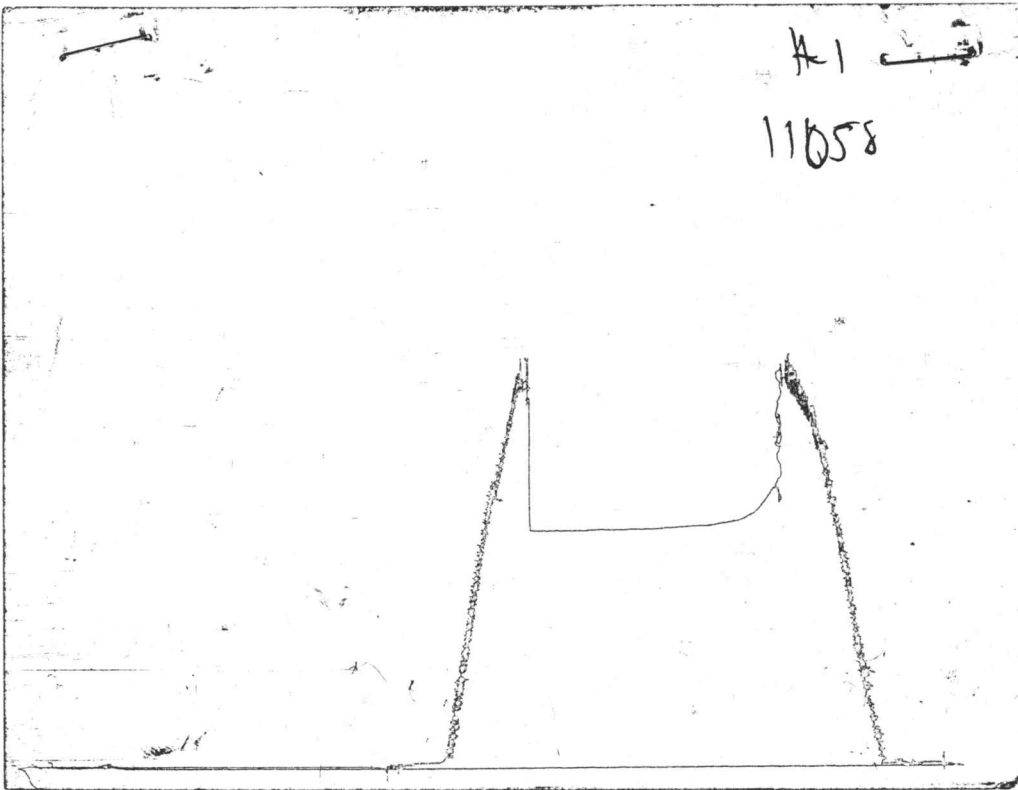
CHART PAGE



This is an actual photograph of recorder chart

	FIELD READING	OFFICE READING
(A) INITIAL HYDROSTATIC MUD	2311	2321.9
(B) FIRST INITIAL FLOW PRESSURE	19	26.7
(C) FIRST FINAL FLOW PRESSURE	29	35.1
(D) INITIAL CLOSED-IN PRESSURE	1089	1098.7
(E) SECOND INITIAL FLOW PRESSURE	38	46.9
(F) SECOND FINAL FLOW PRESSURE	38	46.9
(G) FINAL CLOSED-IN PRESSURE	837	847.1
(H) FINAL HYDROSTATIC MUD	2261	2265.7

CHART PAGE



This is an actual photograph of recorder chart

FIELD
READING

OFFICE
READING

- (A) INITIAL HYDROSTATIC MUD
- (B) FIRST INITIAL FLOW PRESSURE
- (C) FIRST FINAL FLOW PRESSURE
- (D) INITIAL CLOSED-IN PRESSURE
- (E) SECOND INITIAL FLOW PRESSURE
- (F) SECOND FINAL FLOW PRESSURE
- (G) FINAL CLOSED-IN PRESSURE
- (H) FINAL HYDROSTATIC MUD

FLUID SAMPLER DATA

Ticket No.: 5731 Date: 5/3/93
Company: ENSIGN OPERATING COMPANY
Lease: 1-13 JOHNSON Test No.: 1
County: NESS Sec.: 5 Twp.: 20S Rng.: 26W

SAMPLER RECOVERY

Gas
Oil TRACE
Mud 2500
Water 1500
Other
Pressure 12#
TOTAL 4000

PIT MUD ANALYSIS

Chlorides 3600
Resistivity 1.6 ohms@ 58.2 F
Viscosity 50
Mud Wt. 9.4
Filtrate 10
Other

SAMPLER ANALYSIS

Resistivity 1.1 ohms@ 54.6 F
Chlorides 7000 ppm.
Gravity corrected @60F

PIPE RECOVERY

TOP

Resistivity ohms@ F
Chlorides ppm

MIDDLE

Resistivity ohms@ F
Chlorides ppm

BOTTOM

Resistivity 1.08 ohms@ 54.6 F
Chlorides 7000 ppm

TRILOBITE TESTING, L.L.C.

P.O. Box 362 • Hays, Kansas 67601

Drill-Stem Test Data

Well Name 1-13 JOHNSON Test No. 2 Date 5/3/93
Company ENSIGN OPERATING COMPANY Zone CHEROKEE
Address 621 17th ST #1800 DENVER CO 80293 Elevation 2480
Co. Rep./Geo. DUANE MOREDOCK Cont. DUKE #4 Est. Ft. of Pay 4
Location: Sec. 5 Twp. 20S Rge. 26W Co. NESS State KS

Interval Tested	<u>4450-4466</u>	Drill Pipe Size	<u>4.5" XH</u>
Anchor Length	<u>16</u>	Wt. Pipe I.D. - 2.7 Ft. Run	<u>192</u>
Top Packer Depth	<u>4445-4450</u>	Drill Collar - 2.25 Ft. Run	<u>9.4</u>
Bottom Packer Depth	<u>4466</u>	Mud Wt.	<u>47</u> lb/Gal.
Total Depth	<u>4535</u>	Viscosity	<u>10</u>

Tool Open @ 5:21 PM Initial Blow WEAK SURFACE BLOW BUILDING TO 2 1/2" IN 30 MINUTES

Final Blow NO BLOW FOR 4 MINUTES WEAK SURFACE BLOW BUILDING TO 4 1/4" IN 60 MINUTES

Recovery - Total Feet 134 Flush Tool? NO

Rec. <u>50</u>	Feet of	<u>GAS IN PIPE</u>
Rec. <u>100</u>	Feet of	<u>CLEAN OIL</u>
Rec. <u>34</u>	Feet of	<u>WATER CUT MUDDY OIL 70%OIL/7%WATER/23%MUD</u>
Rec. _____	Feet of	_____
Rec. _____	Feet of	_____

BHT 118 °F Gravity 39 °API @ 70 °F Corrected Gravity 38 °API
RW _____ @ _____ °F Chlorides _____ ppm Recovery Chlorides 3700 ppm System

(A) Initial Hydrostatic Mud 2256.9 PSI AK1 Recorder No. 13308 Range 4700

(B) First Initial Flow Pressure 33.6 PSI @ (depth) 4452 w / Clock No. 17652

(C) First Final Flow Pressure 42.5 PSI AK1 Recorder No. 11057 Range 4500

(D) Initial Shut-in Pressure 1139.1 PSI @ (depth) 4458 w / Clock No. 7452

(E) Second Initial Flow Pressure 58.2 PSI AK1 Recorder No. 2023 Range 4000

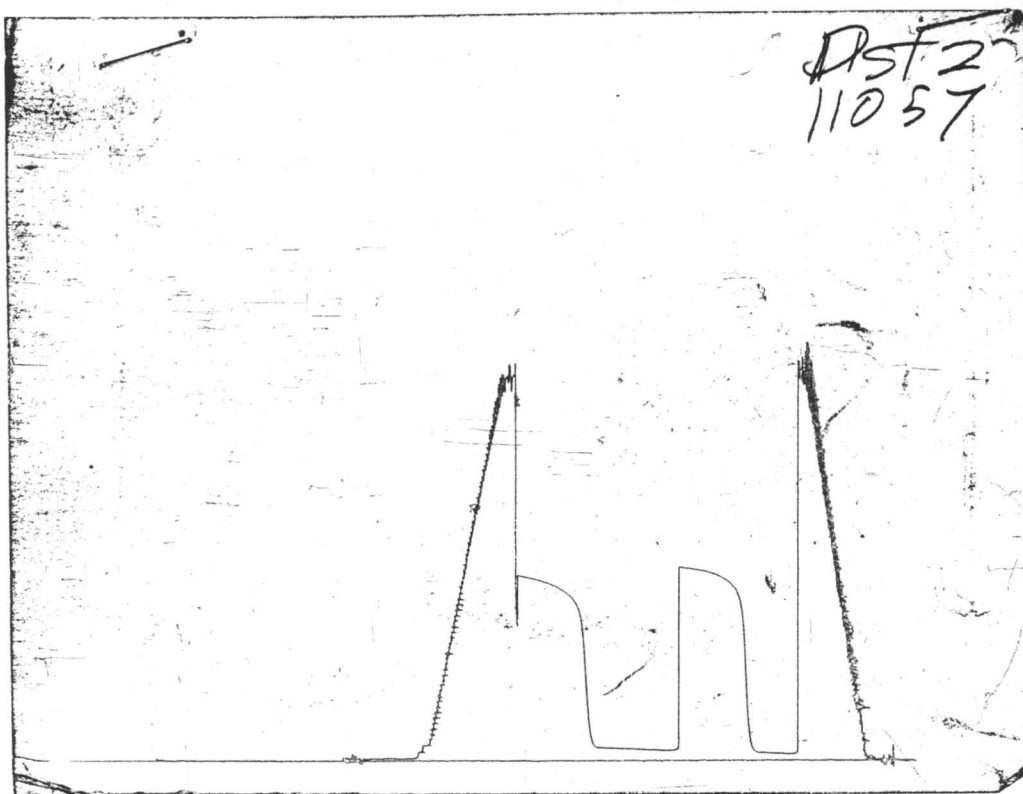
(F) Second Final Flow Pressure 71.7 PSI @ (depth) 4530 w / Clock No. 22992

(G) Final Shut-in Pressure 1085.1 PSI Initial Opening 30 Final Flow 60

(H) Final Hydrostatic Mud 2196.4 PSI Initial Shut-in 60 Final Shut-in 60

Our Representative MARK HERSKOWITZ

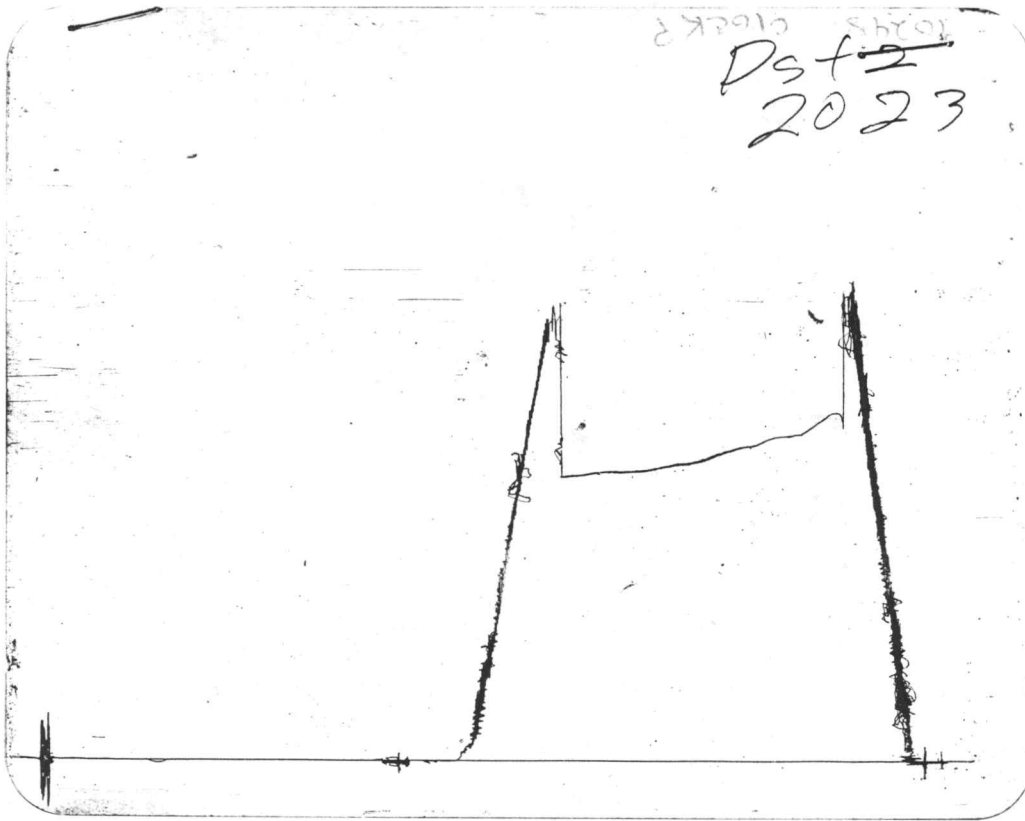
CHART PAGE



This is an actual photograph of recorder chart

	FIELD READING	OFFICE READING
(A) INITIAL HYDROSTATIC MUD	2247	2256.9
(B) FIRST INITIAL FLOW PRESSURE	24	33.6
(C) FIRST FINAL FLOW PRESSURE	34	42.5
(D) INITIAL CLOSED-IN PRESSURE	1111	1139.1
(E) SECOND INITIAL FLOW PRESSURE	48	58.2
(F) SECOND FINAL FLOW PRESSURE	72	71.7
(G) FINAL CLOSED-IN PRESSURE	1088	1085.1
(H) FINAL HYDROSTATIC MUD	2187	2196.4

CHART PAGE



This is an actual photograph of recorder chart

FIELD
READING

OFFICE
READING

- (A) INITIAL HYDROSTATIC MUD
- (B) FIRST INITIAL FLOW PRESSURE
- (C) FIRST FINAL FLOW PRESSURE
- (D) INITIAL CLOSED-IN PRESSURE
- (E) SECOND INITIAL FLOW PRESSURE
- (F) SECOND FINAL FLOW PRESSURE
- (G) FINAL CLOSED-IN PRESSURE
- (H) FINAL HYDROSTATIC MUD

COMPUTER EVALUATION BY TRILOBITE TESTING, L.L.C.

ENSIGN OPERATING COM 1-13 JOHNSON DST 2

5 20S 26W NESS KS

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*****
ELEVATION:          2480 KB      EST. PAY          4 FT
DATUM:              -1979      ZONE TESTED:     CHEROKEE
TEST INTERVAL:      4450-4466   TIME INTERVALS:  30-60-60-60
RECORDER DEPTH:     4458      VISCOSITY:       6.283 CP
BOTTOM HOLE TEMP:   118      HOLE SIZE:       7.875 IN
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CUBIC FEET OF GAS IN PIPE:      2
TOTAL FEET OF RECOVERY:        134.00 CORRECTED PIPE FILLUP:      198.066
TOTAL BARRELS OF RECOVERY:      0.94 CORR. BARRELS OF RECOVERY:  1.386 BBL
BARRELS IN DRILL PIPE:         0.00 API GRAVITY:              38
BARRELS IN WEIGHT PIPE:        0.94 FLUID GRADIENT:           0.362
BARRELS IN DRILL COLLARS:      0.00
GAS OIL RATIO:                 2.08 CU.FT/BBL
BUBBLE POINT PRESSURE:         21
UNCORRECTED INITIAL PRODUCTION: 15.01 BBL
INITIAL PRODUCTION CORRECTED TO FINAL FLOW PRESSURE: 22.18 BBL/DAY
INITIAL PRODUCTION CORRECTED TO PSEUDO STEADY FLOW STATE: 5.967
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INITIAL SLOPE          299.6029 PSI/CYCL FINAL SLOPE      276.7809 PSI/CYCLE
INITIAL P*             1196.59 PSI      FINAL P*         1195.242 PSI
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TRANSMISSIBILITY          13.03 (MD.-FT./CP.)
PERMEABILITY              20.46 (MD.)
INDICATED FLOW CAPACITY   81.85 (MD.FT)
PRODUCTIVITY INDEX        0.01 (BARREL/DAY/PSI)
DAMAGE RATIO              0.74
RADIUS OF INVESTIGATION   42.92 (FT,)
POTENTIOMETRIC SURFACE    793.77 (FT.)
DRAWDOWN FACTOR           0.113 (%)
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INITIAL FLOW

RECORDER # 11057

DST # 2

TIME(MIN)

<> PRESSURE

3	33.6	33.6
6	33.6	0
9	33.6	0
12	38.1	4.5
15	38.1	0
18	38.1	0
21	40.3	2.2
24	40.3	0
27	40.3	0
30	42.5	2.2

FINAL FLOW

RECORDER # 11057

DST # 2

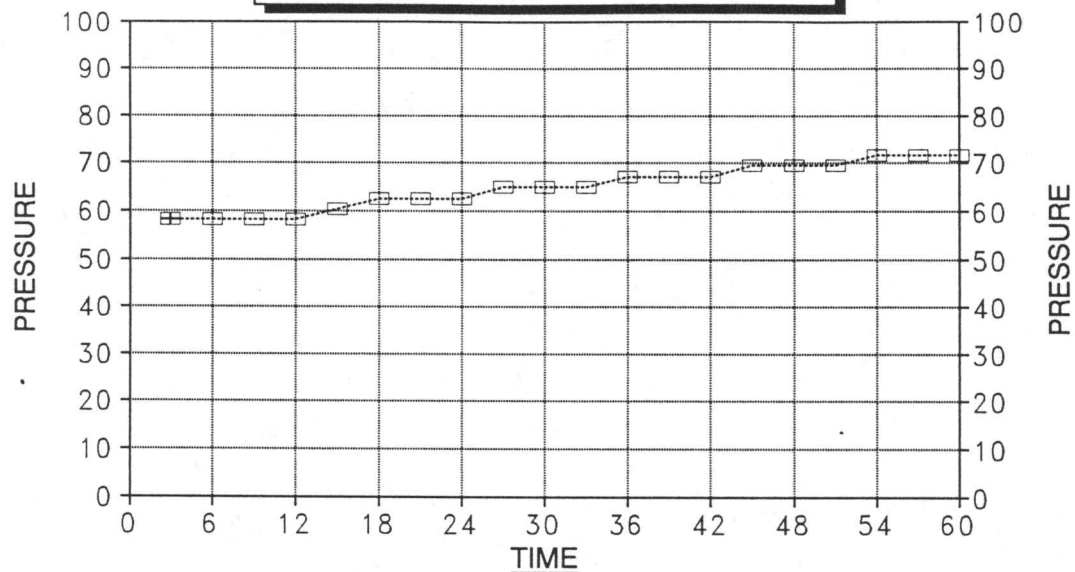
TIME(MIN)

<> PRESSURE

3	58.2	58.2
6	58.2	0
9	58.2	0
12	58.2	0
15	60.5	2.3
18	62.7	2.2
21	62.7	0
24	62.7	0
27	65.1	2.4
30	65.1	0
33	65.1	0
36	67.2	2.1
39	67.2	0
42	67.2	0
45	69.5	2.3
48	69.5	0
51	69.5	0
54	71.7	2.2
57	71.7	0
60	71.7	0

DELTA T DELTA P

FINAL FLOW / DST #2



---□--- JOHNSON 1-13

INITIAL PRODUCTION CORRECTED TO PSEUDO STEADY FLOW STATE:

5.967

JOHNSON 1-13

DST #2

INITIAL

SHUTIN

30 INITIAL FLOW TIME

SLOPE

299.6 PSI/CYCLE

P*

1196.59 PSI

TIME(MIN)	Pws (psi)	Log Horn T	<> PRESSURE	Horn T
3	279.1	1.041	279.1	11
6	801.3	0.778	522.2	6
9	976.5	0.637	175.2	4
12	1014.5	0.544	38.0	4
15	1036.9	0.477	22.4	3
18	1053.8	0.426	16.9	3
21	1071.7	0.385	17.9	2
24	1085.1	0.352	13.4	2
27	1096.4	0.325	11.3	2
X 30	1106.4	0.301	10.0	2
33	1115.4	0.281	9.0	2
36	1122.1	0.263	6.7	2
39	1126.6	0.248	4.5	2
42	1130.1	0.234	3.5	2
45	1132.2	0.222	2.1	2
48	1133.4	0.211	1.2	2
51	1135.6	0.201	2.2	2
X 54	1139.1	0.192	3.5	2

JOHNSON 1-13

DST #2

FINAL

SHUTIN

90 TOTAL FLOW TIME

SLOPE

276.8 PSI/CYCLE

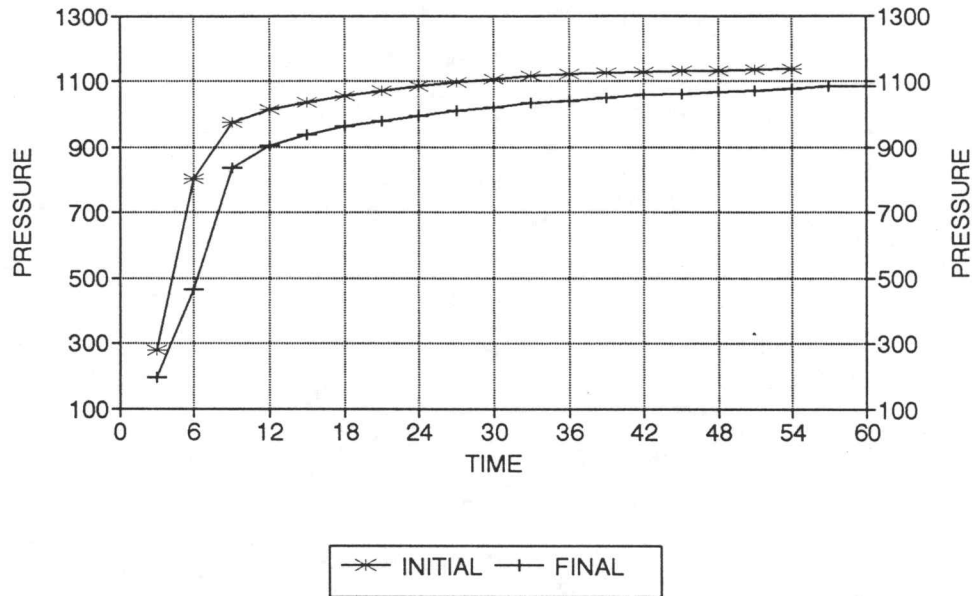
P*

1195.2 PSI

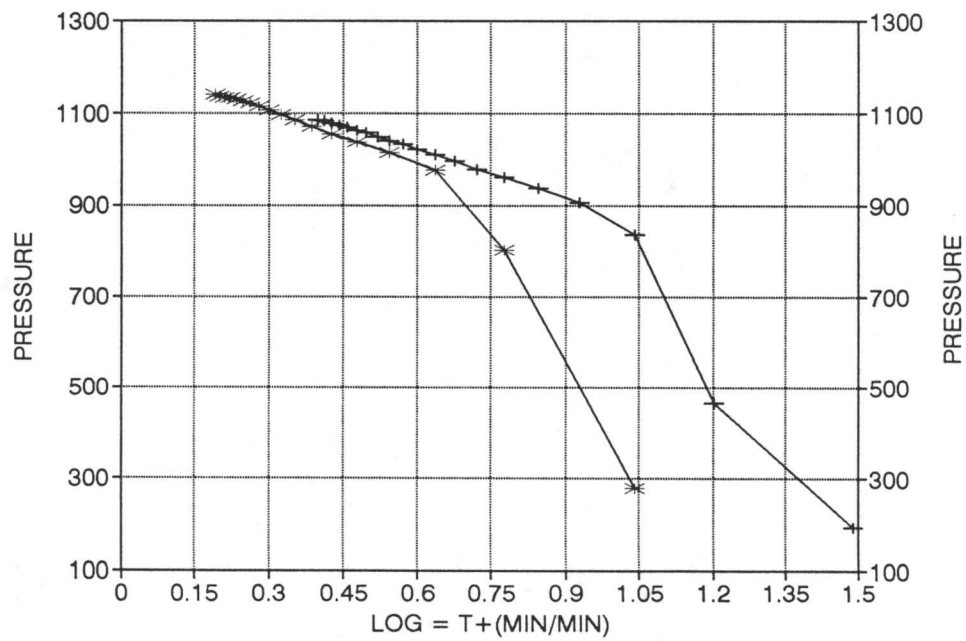
	Pws (psi)	Log Horn T	<> PRESSURE	Horn T
3	195.1	1.491	195.1	31
6	464.1	1.204	269.0	16
9	835.9	1.041	371.8	11
12	906.2	0.929	70.3	9
15	936.4	0.845	30.2	7
18	960.9	0.778	24.5	6
21	977.7	0.723	16.8	5
24	995.5	0.677	17.8	5
27	1010.1	0.637	14.6	4
30	1021.3	0.602	11.2	4
33	1032.5	0.571	11.2	4
36	1040.3	0.544	7.8	4
39	1048.2	0.520	7.9	3
42	1057.1	0.497	8.9	3
45	1061.6	0.477	4.5	3
X 48	1068.3	0.459	6.7	3
51	1072.8	0.442	4.5	3
54	1078.4	0.426	5.6	3
57	1082.9	0.411	4.5	3
X 60	1085.1	0.398	2.2	3

JOHNSON 1-13 / DST #2

DELTA T DELTA P



HORNER PLOT



FLUID SAMPLER DATA

Ticket No.: 5790 Date: 5/3/93
Company: ENSIGN OPERATING COMPANY
Lease: 1-13 JOHNSON Test No.: 2
County: NESS Sec.: 5 Twp.: 20S Rng.: 26W

SAMPLER RECOVERY

Gas
Oil 3520
Mud 480
Water
Other
Pressure 28
TOTAL 4000

SAMPLER ANALYSIS

Resistivity ohms@ F
Chlorides ppm.
Gravity corrected @60F

PIT MUD ANALYSIS

Chlorides 3700
Resistivity ohms@ F
Viscosity 47
Mud Wt. 9.4
Filtrate 10
Other

PIPE RECOVERY

TOP

Resistivity ohms@ F
Chlorides ppm

MIDDLE

Resistivity ohms@ F
Chlorides ppm

BOTTOM

Resistivity ohms@ F
Chlorides ppm

CALCULATED RECOVERY ANALYSIS

WEIGHT PIPE

DST #

2

TICKET #

5790

SAMPLE #	TOTAL FEET	GAS %	FEET	OIL %	FEET	WATER %	FEET	MUD %	FEET
1	50	100	50		0		0		0
2	100		0	100	100		0		0
3	34		0	70	23.8	7	2.38	23	7.82
4			0		0		0		0
5			0		0		0		0
TOTAL	184	27.17	50	67.282609	123.8	1.2935	2.38	4.25	7.82

		HRS OPEN	BBL/DAY
BBL OIL=	0.8666	*	1.5
BBL WATER=	0.01666	*	0.26656
BBL MUD=	0.05474		
BBL GAS=	0.35		

