TRILOBITE TESTING, L.L.C.

P.O. Box 362 • Hays, Kansas 67601

Drill-Stem Test Data

Well Name: BOALDIN #1-20 | Test No.: 1 | Date: 4/11/93

Company: ENSIGN OPERATING COMPANY | Zone: GREENWOOD

Address: 621 17th ST #1800 DENVER CO 80293 | Elevation: 3686

Co. Rep./Geo.: JOHN PRUITT | Cont.: G & J DRLG RIG #12 | Est. Ft. of Pay: 7

Location: Sec.: 20 | Twp.: 35S | Rge.: 43W | Co.: MORTON | State: KS

Interval Tested: 3120-3130 | Drill Pipe Size: 4.5" XH

Anchor Length: 10 | Wt. Pipe I.D. - 2.7 Ft. Run:

Top Packer Depth: 3115 | Drill Collar – 2.25 Ft. Run: 630

Bottom Packer Depth: 3120 | Mud Wt.: 8.8 lb/Gal.

Total Depth: 3130 | Viscosity: 46 | Filtrate: 11.6

Tool Open @: 7:00 PM | Initial Blow: SURFACE BLOW - BUILT TO 5"

ISI: BLED OFF BLOW - NO BLOW BACK

Final Blow: 1" BLOW - BOTTOM OF BUCKET IN 12 MINUTES

FSI: BLED OFF BLOW - NO BLOW BACK

Recovery - Total Feet: 100 | Flush Tool?: NO

Rec.: 100 | Feet of: MUDDY WATER

Rec.: | Feet of:

Rec.: | Feet of:

Rec.: | Feet of:

Rec.: | Feet of:

BHT: 103 °F | Gravity: °API | @ °F Corrected Gravity °API

RW: 0.642 | @: 70 °F | Chlorides: 8600 ppm Recovery | Chlorides: 2700 ppm System

(A) Initial Hydrostatic Mud: 1536.9 PSI | AK1 Recorder No.: 11038 | Range: 4225

(B) First Initial Flow Pressure: 18.3 PSI | @ (depth): 3122 | w / Clock No.: 25813

(C) First Final Flow Pressure: 29.6 PSI | AK1 Recorder No.: 5495 | Range: 4200

(D) Initial Shut-in Pressure: 451.3 PSI | @ (depth): 3127 | w / Clock No.: 27585

(E) Second Initial Flow Pressure: 46.8 PSI | AK1 Recorder No.: | Range:

(F) Second Final Flow Pressure: 57.7 PSI | @ (depth): | w / Clock No.:

(G) Final Shut-in Pressure: 441.1 PSI | Initial Opening: 30 | Final Flow: 60

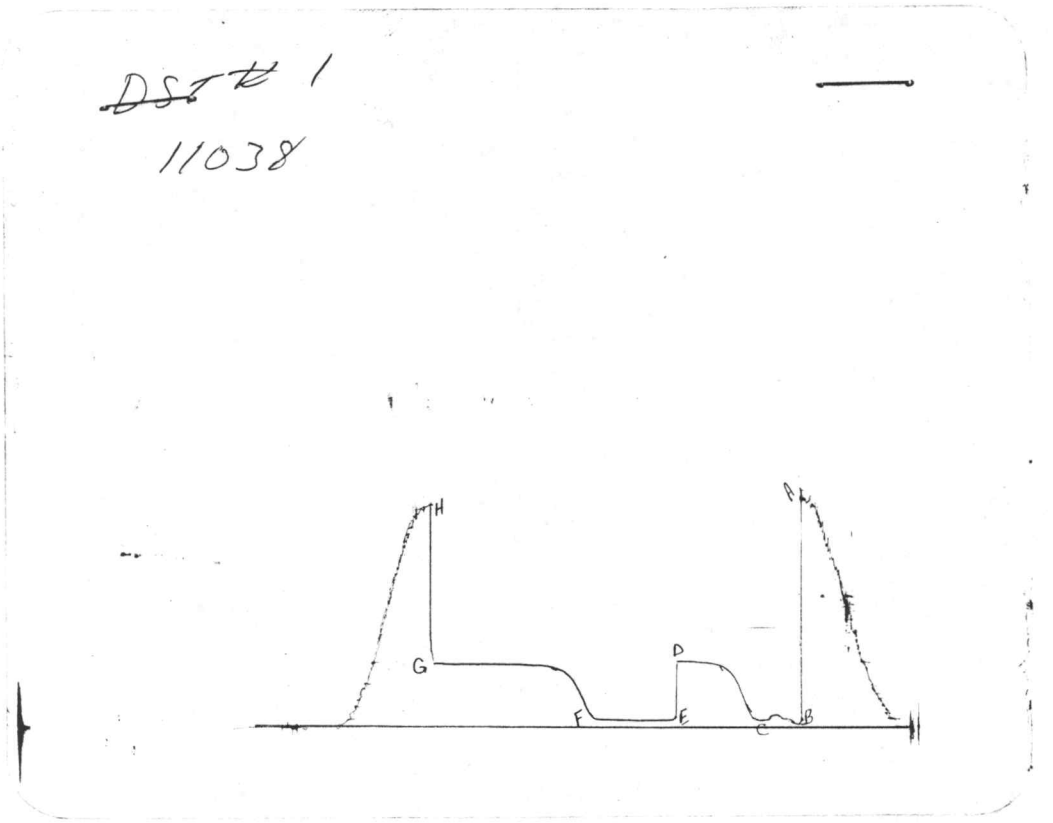
(H) Final Hydrostatic Mud: 1488.7 PSI | Initial Shut-in: 60 | Final Shut-in: 120

Our Representative: TOM HORACEK

CHART PAGE

~~DST #1~~

11038



This is an actual photograph of recorder chart

	FIELD READING	OFFICE READING
(A) INITIAL HYDROSTATIC MUD	1531	1536.9
(B) FIRST INITIAL FLOW PRESSURE	22	18.3
(C) FIRST FINAL FLOW PRESSURE	33	29.6
(D) INITIAL CLOSED-IN PRESSURE	461	451.3
(E) SECOND INITIAL FLOW PRESSURE	45	46.8
(F) SECOND FINAL FLOW PRESSURE	56	57.7
(G) FINAL CLOSED-IN PRESSURE	439	441.1
(H) FINAL HYDROSTATIC MUD	1489	1488.7

FLUID SAMPLER DATA

Ticket No.: 5665 Date: 4/11/93

Company: ENSIGN OPERATING COMPANY

Lease: BOALDIN #1-20 Test No.: 1

County: MORTON Sec.: 20 Twp.: 35S Rng.: 43W

SAMPLER RECOVERY

Gas

Oil

Mud 4000

Water

Other

Pressure 150

TOTAL 4000

SAMPLER ANALYSIS

Resistivity 0.642 ohms@ 70 F

Chlorides 8600 ppm.

Gravity corrected @60F

PIT MUD ANALYSIS

Chlorides 2700

Resistivity ohms@ F

Viscosity 46

Mud Wt. 8.8

Filtrate 11.6

Other

PIPE RECOVERY

TOP

Resistivity ohms@ F

Chlorides ppm

MIDDLE

Resistivity ohms@ F

Chlorides ppm

BOTTOM

Resistivity 0.642 ohms@ 70 F

Chlorides 8600 ppm

TRILOBITE TESTING, L.L.C.

P.O. Box 362 • Hays, Kansas 67601

Drill-Stem Test Data

Well Name: BOALDIN #1-20 Test No. 2 Date 4/15/93

Company: ENSIGN OPERATING COMPANY Zone MORROW

Address: 621 17th ST #1800 DENVER CO 80293 Elevation 3686

Co. Rep./Geo. JOHN PRUITT Cont. G & J DRLG RIG #12 Est. Ft. of Pay 17

Location: Sec. 20 Twp. 35S Rge. 43W Co. MORTON State KS

Interval Tested 4140-4310 Drill Pipe Size 4.5" XH

Anchor Length 170 Wt. Pipe I.D. - 2.7 Ft. Run

Top Packer Depth 4135 Drill Collar – 2.25 Ft. Run 540

Bottom Packer Depth 4140 Mud Wt. 8.9 lb/Gal.

Total Depth 4310 Viscosity 47 Filtrate 10

Tool Open @ 5:32 Initial Blow BOTTOM IN 1 MINUTE - GAS TO SURFCE IN 18 MINUTES

Final Blow STRONG BLOW - BOTTOM OF BUCKET IN 7 MINUTES /GAS TOO SMALL TO MEASURE / GOOD SHUT IN BLOW BACK

Recovery - Total Feet 900 Flush Tool? NO

Rec. 3210 Feet of GAS IN PIPE

Rec. 630 Feet of SLTLY GAS CUT DRLG MUD - 10% GAS/ 90% MUD

Rec. 270 Feet of MUDDY WATER

Rec. Feet of

Rec. Feet of

BHT 121 °F Gravity °API @ °F Corrected Gravity °API

RW 0.41 @ 80 °F Chlorides 14000 ppm Recovery Chlorides 2500 ppm System

(A) Initial Hydrostatic Mud 1972.3 PSI AK1 Recorder No. 13850 Range 4325

(B) First Initial Flow Pressure 320.5 PSI @ (depth) 4146 w / Clock No. 27585

(C) First Final Flow Pressure 378.2 PSI AK1 Recorder No. 13851 Range 4425

(D) Initial Shut-in Pressure 409.1 PSI @ (depth) 4307 w / Clock No. 14389

(E) Second Initial Flow Pressure 409.1 PSI AK1 Recorder No. Range

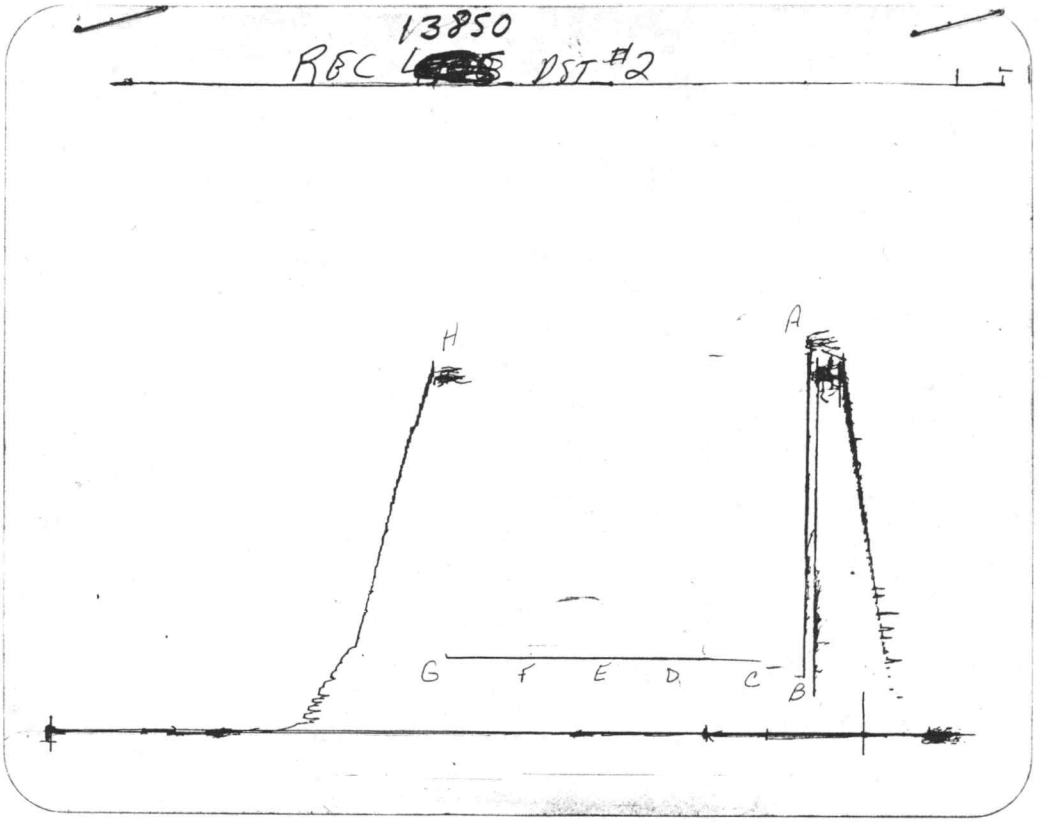
(F) Second Final Flow Pressure 409.1 PSI @ (depth) w / Clock No.

(G) Final Shut-in Pressure 409.1 PSI Initial Opening 30 Final Flow 60

(H) Final Hydrostatic Mud 1952.6 PSI Initial Shut-in 60 Final Shut-in 120

Our Representative JOHN RIEDL

CHART PAGE



This is an actual photograph of recorder chart

	FIELD READING	OFFICE READING
(A) INITIAL HYDROSTATIC MUD	1985	1972.3
(B) FIRST INITIAL FLOW PRESSURE	321	320.5
(C) FIRST FINAL FLOW PRESSURE	375	378.2
(D) INITIAL CLOSED-IN PRESSURE	406	409.1
(E) SECOND INITIAL FLOW PRESSURE	406	409.1
(F) SECOND FINAL FLOW PRESSURE	406	409.1
(G) FINAL CLOSED-IN PRESSURE	406	409.1
(H) FINAL HYDROSTATIC MUD	1941	1952.6

BOALDIN #1-20 DST #2
INITIAL SHUTIN

30 TOTAL FLOW TIME

Slope psi/cycle
P * psi

TIME(MIN)	Pws (psi)	Log Horn T	<> PRESSURE	Horn T
3	409.1	1.041	409.1	11
6	409.1	0.778	0.0	6
9	409.1	0.637	0.0	4
12	409.1	0.544	0.0	4
15	409.1	0.477	0.0	3
18	409.1	0.426	0.0	3
21	409.1	0.385	0.0	2
24	409.1	0.352	0.0	2
27	409.1	0.325	0.0	2
30	409.1	0.301	0.0	2
33	409.1	0.281	0.0	2
36	409.1	0.263	0.0	2
39	409.1	0.248	0.0	2
42	409.1	0.234	0.0	2
45	409.1	0.222	0.0	2
48	409.1	0.211	0.0	2
51	409.1	0.201	0.0	2
54	409.1	0.192	0.0	2
57	409.1	0.184	0.0	2
60	409.1	0.176	0.0	2

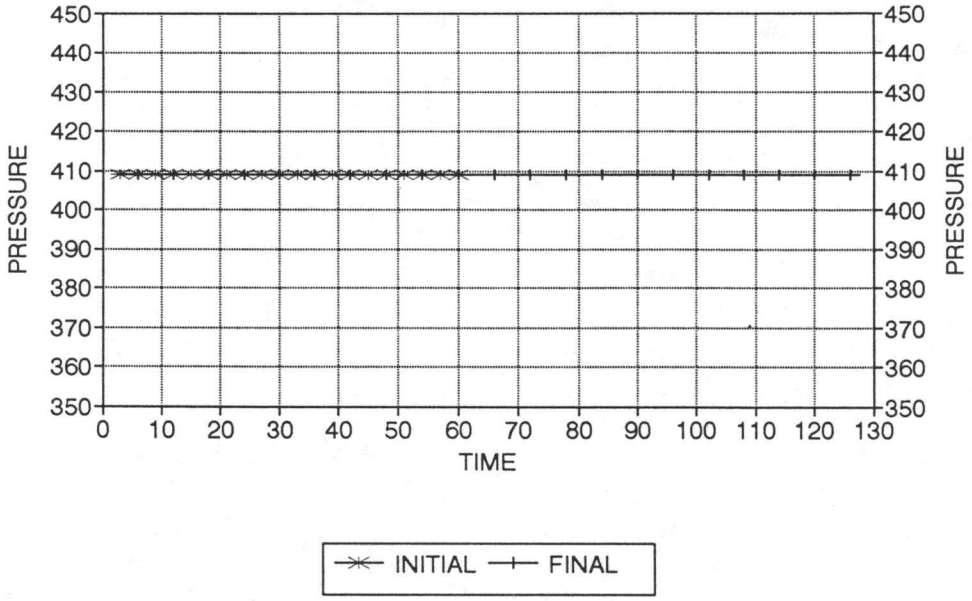
BOALDIN #1-20 DST #2
FINAL SHUTIN

90 TOTAL FLOW TIME

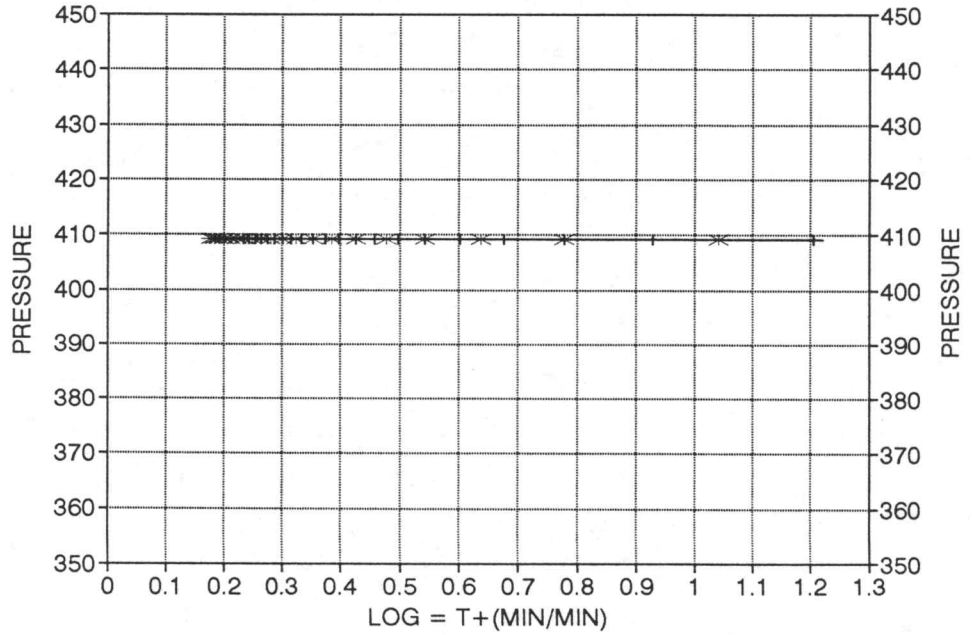
Slope psi/cycle
P * psi

	Pws (psi)	Log Horn T	<> PRESSURE	Horn T
6	409.1	1.204	409.1	16
12	409.1	0.929	0.0	9
18	409.1	0.778	0.0	6
24	409.1	0.677	0.0	5
30	409.1	0.602	0.0	4
36	409.1	0.544	0.0	4
42	409.1	0.497	0.0	3
48	409.1	0.459	0.0	3
54	409.1	0.426	0.0	3
60	409.1	0.398	0.0	3
66	409.1	0.374	0.0	2
72	409.1	0.352	0.0	2
78	409.1	0.333	0.0	2
84	409.1	0.316	0.0	2
90	409.1	0.301	0.0	2
96	409.1	0.287	0.0	2
102	409.1	0.275	0.0	2
108	409.1	0.263	0.0	2
114	409.1	0.253	0.0	2
120	409.1	0.243	0.0	2
126	409.1	0.234	0.0	2

BOALDIN #1-20 / DST #2
DELTA T DELTA P



HORNER PLOT



GAS VOLUME REPORT

ENSIGN OPERATING COMPANY

BOALDIN #1-20 DST # 2

MIN	PSIG	ORIFICE	MCF/D	MIN	PSIG	ORIFICE	MCF/D
20	75	0.5	465	TOO SMALL TO MEASURE			
25	45	0.5	311				
30	38	0.5	275				

Remarks: GAS SAMPLE TAKEN FROM FIRST OPENING/GAS DID BURN

FLUID SAMPLER DATA

Ticket No.: 5494 **Date:** 4/15/93

Company: ENSIGN OPERATING COMPANY

Lease: BOALDIN #1-20 **Test No.:** 2

County: MORTON **Sec.:** 20 **Twp.:** 35S **Rng.:** 43W

SAMPLER RECOVERY

Gas	1.7 cu ft
Oil	
Mud	
Water	
Other	
Pressure	375
TOTAL	4000

SAMPLER ANALYSIS

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

PIT MUD ANALYSIS

Chlorides	2500		
Resistivity		ohms@	F
Viscosity	47		
Mud Wt.	8.9		
Filtrate	10		
Other			

PIPE RECOVERY

TOP

Resistivity	3	ohms@	70	F
Chlorides	1800			ppm

MIDDLE

Resistivity	3	ohms@	70	F
Chlorides	1800			ppm

BOTTOM

Resistivity	0.41	ohms@	80	F
Chlorides	14000			ppm

TRILOBITE TESTING, L.L.C.

P.O. Box 362 • Hays, Kansas 67601

Drill-Stem Test Data

Well Name BOALDIN #1-20 Test No. 3 Date 4/17/93

Company ENSIGN OPERATING COMPANY Zone KEYS

Address 621 17th ST #1800 DENVER CO 80293 Elevation 3686

Co. Rep./Geo. JOHN PRUITT Cont. G & J DRLG RIG #12 Est. Ft. of Pay 25

Location: Sec. 20 Twp. 35S Rge. 43W Co. MORTON State KS

Interval Tested 4472-4585

Anchor Length 113

Top Packer Depth 4467-4472

Bottom Packer Depth 4585

Total Depth 4750

Drill Pipe Size 4.5" XH

Wt. Pipe I.D. - 2.7 Ft. Run

Drill Collar – 2.25 Ft. Run 390

Mud Wt. 9.0 lb/Gal.

Viscosity 63 Filtrate 10

Tool Open @ 8:20 PM Initial Blow STRONG BLOW - BOTTOM OF BUCKET IN 1 MINUTE
GAS TO SURFACE IN 5 MINUTES GAUGED @ 1057 MCF

Final Blow BOTTOM OF BUCKET AS TOOL OPENED
OIL MIST TO SURFACE IN 50 MINUTES GAUGED @ 1162 MCF

Recovery - Total Feet 1010 Flush Tool? NO

Rec. 1010 Feet of CLEAN GASSY OIL 40%GAS/60%OIL

Rec. Feet of

Rec. Feet of

Rec. Feet of

Rec. Feet of

BHT 120 °F Gravity 41 °API @ 70 °F Corrected Gravity 40.2 °API

RW @ °F Chlorides ppm Recovery Chlorides 1500 ppm System

(A) Initial Hydrostatic Mud 2241.9 PSI AK1 Recorder No. 13850 Range 4325

(B) First Initial Flow Pressure 345.5 PSI @ (depth) 4567 w / Clock No. 27594

(C) First Final Flow Pressure 446.6 PSI AK1 Recorder No. 13851 Range 4425

(D) Initial Shut-in Pressure 696.5 PSI @ (depth) 4577 w / Clock No. 14389

(E) Second Initial Flow Pressure 478.6 PSI AK1 Recorder No. 1055 Range 4200

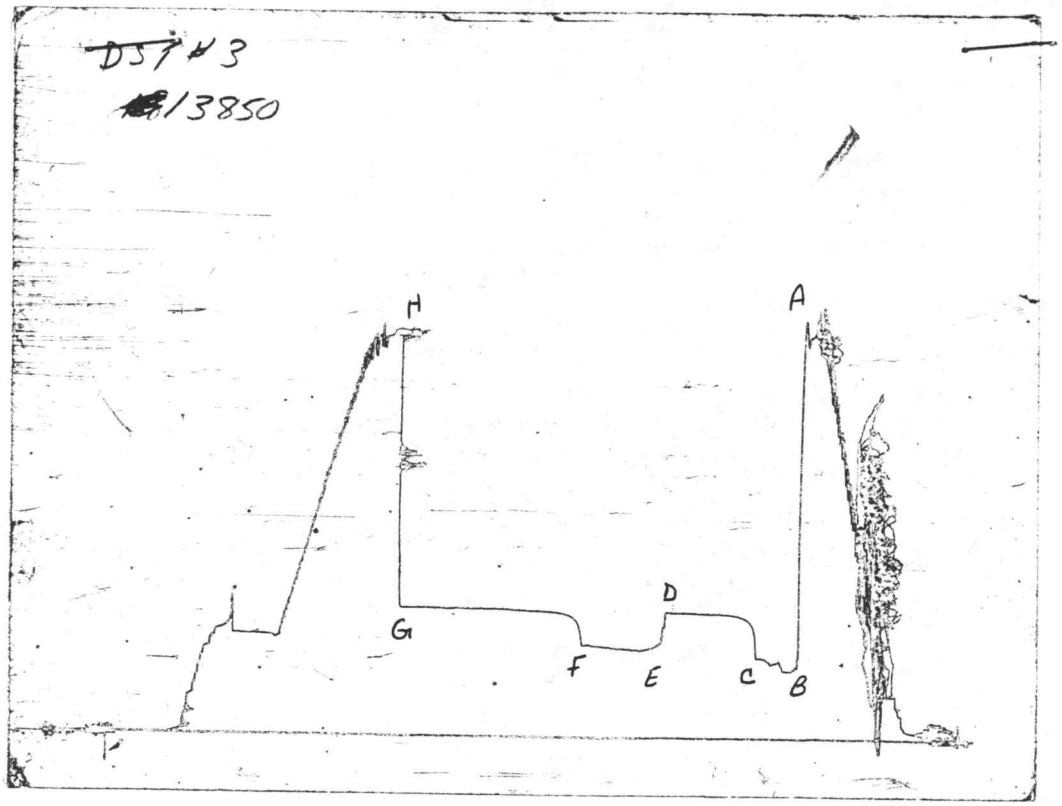
(F) Second Final Flow Pressure 497.3 PSI @ (depth) 4747 w / Clock No. 27585

(G) Final Shut-in Pressure 703.1 PSI Initial Opening 30 Final Flow 55

(H) Final Hydrostatic Mud 2015.6 PSI Initial Shut-in 60 Final Shut-in 120

Our Representative TOM HORACEK

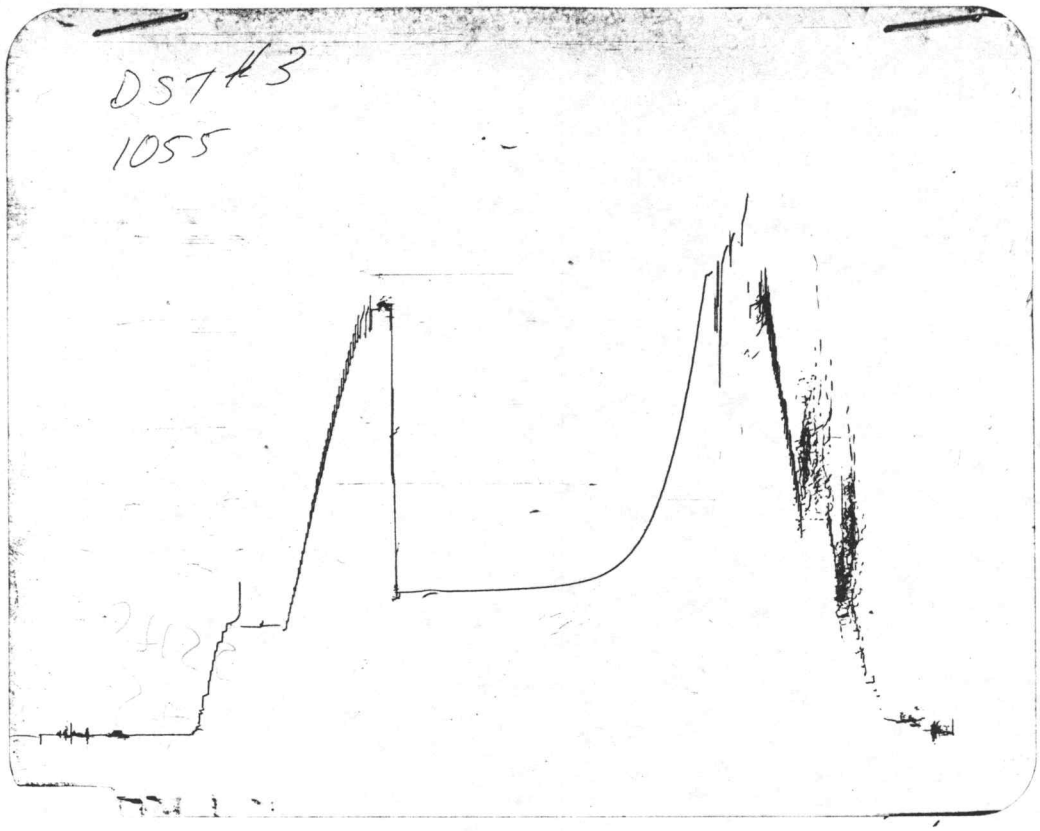
CHART PAGE



This is an actual photograph of recorder chart

	FIELD READING	OFFICE READING
(A) INITIAL HYDROSTATIC MUD	2229	2241.9
(B) FIRST INITIAL FLOW PRESSURE	322	345.5
(C) FIRST FINAL FLOW PRESSURE	433	446.6
(D) INITIAL CLOSED-IN PRESSURE	696	696.5
(E) SECOND INITIAL FLOW PRESSURE	466	478.6
(F) SECOND FINAL FLOW PRESSURE	500	497.3
(G) FINAL CLOSED-IN PRESSURE	696	703.1
(H) FINAL HYDROSTATIC MUD	2207	2015.6

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 BOALDIN #1-20 DST 3

20 35S 43W MORTON KS

ELEVATION:	3686 KB		EST. PAY	25	FT
DATUM:	-892		ZONE TESTED:	KEYS	
TEST INTERVAL:	4472-4585		TIME INTERVALS:	30-55-60-120	
RECORDER DEPTH:	4577		VISCOSITY:	1.624	CP
BOTTOM HOLE TEMP:	120		HOLE SIZE:	7.875	IN

CUBIC FEET OF GAS IN PIPE:	68590			
TOTAL FEET OF RECOVERY:	1010.00	CORRECTED PIPE FILLUP:	1392.997	
TOTAL BARRELS OF RECOVERY:	10.72	CORR. BARRELS OF RECOVERY:	16.170	BBL
BARRELS IN DRILL PIPE:	8.82	API GRAVITY:	40	
BARRELS IN WEIGHT PIPE:	0.00	FLUID GRADIENT:	0.357	
BARRELS IN DRILL COLLARS:	1.91			
GAS OIL RATIO:	6396.26	CU.FT/BBL		
BUBBLE POINT PRESSURE:	704			

UNCORRECTED INITIAL PRODUCTION:	181.67	BBL
INITIAL PRODUCTION CORRECTED TO FINAL FLOW PRESSURE:	273.93	BBL/DAY
INITIAL PRODUCTION CORRECTED TO PSEUDO STEADY FLOW STATE:	129.416	

INITIAL SLOPE	89.02	PSI/CYCL	FINAL SLOPE	5.50	PSI/CYCLE
INITIAL P*	710	PSI	FINAL P*	704	PSI

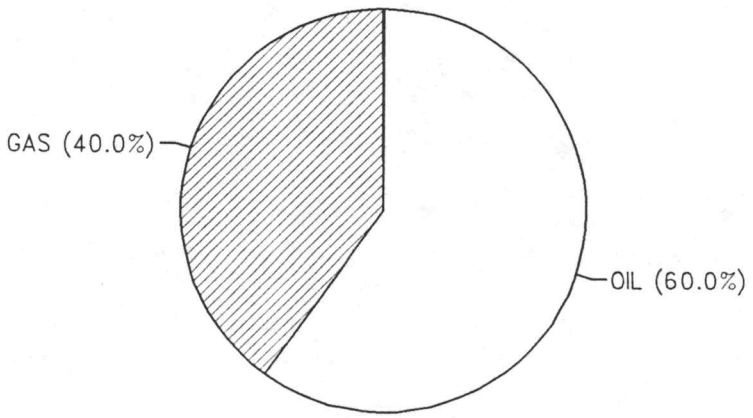
TRANSMISSIBILITY	8098.51	(MD.-FT./CP.)
PERMEABILITY	526.19	(MD.)
INDICATED FLOW CAPACITY	13154.69	(MD.FT)
PRODUCTIVITY INDEX	9.15	(BARREL/DAY/PSI)
DAMAGE RATIO	6.88	
RADIUS OF INVESTIGATION	211.49	(FT,)
POTENTIOMETRIC SURFACE	741.58	(FT.)
DRAWDOWN FACTOR	0.845	(%)
THEORETICAL POTENTIAL FROM FINAL FLOW PRESSURE	1883.98	
THEORETICAL POTENTIAL FROM PSEUDO STEADY FLOW STATE	890.06	

CALCULATED RECOVERY ANALYSIS

DST # 3 TICKET # 5495

SAMPLE #	TOTAL FEET	%	GAS FEET	%	OIL FEET	%	WATER FEET	%	MUD FEET
DRILL 1	620	40	248	60	372	0	0	0	0
PIPE 2			0		0		0		0
3			0		0		0		0
4			0		0		0		0
5			0		0		0		0
6			0		0		0		0
WEIGHT 1			0		0		0		0
PIPE 2			0		0		0		0
3			0		0		0		0
4			0		0		0		0
DRILL 1	390	40	156	60	234	0	0	0	0
COLLAR 2			0		0		0		0
3			0		0		0		0
4			0		0		0		0
5			0		0		0		0
TOTAL	1010		404		606		0		0

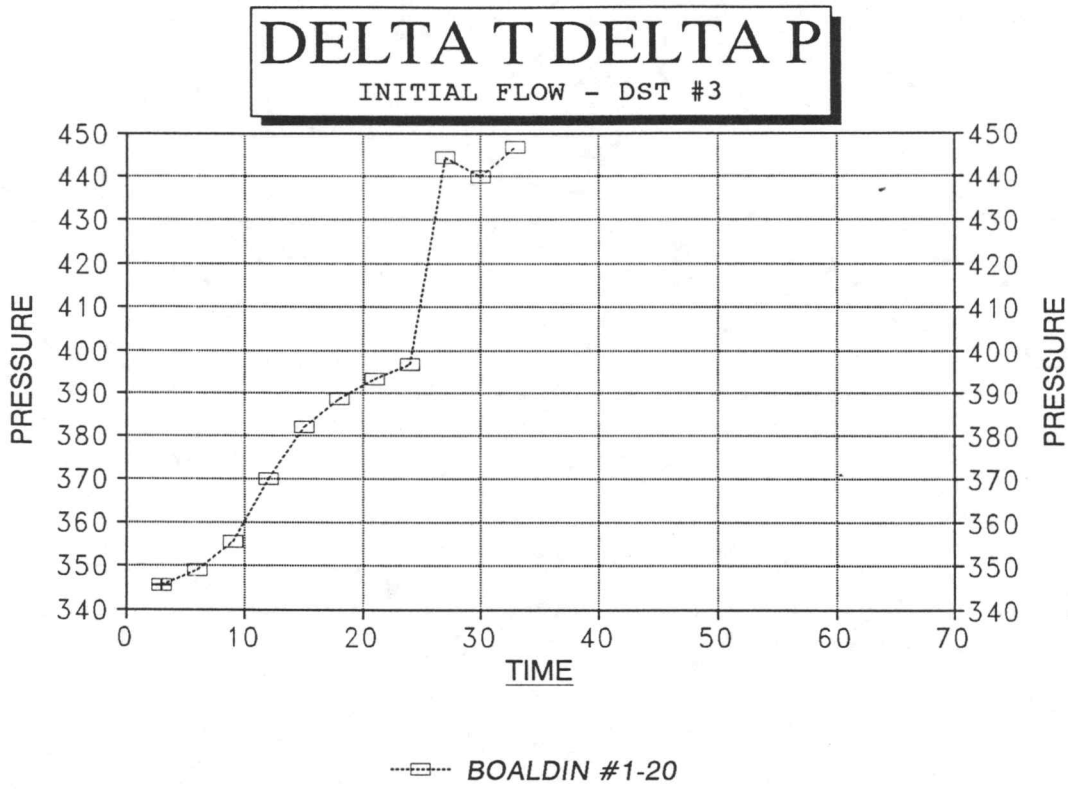
			HRS OPEN	BBL/DAY
BBL OIL=	6.4341	*	1.42	108.74535
BBL WATER=	0	*		0
BBL MUD=	0			
BBL GAS =	4.2894			



INITIAL FLOW

RECORDER # 13851 DST # 3

TIME(MIN)	PRESSURE	<> PRESSURE
3	345.5	345.5
6	348.8	3.3
9	355.5	6.7
12	369.9	14.4
15	382.2	12.3
18	388.8	6.6
21	393.3	4.5
24	396.6	3.3
27	444.4	47.8
30	439.9	-4.5
33	446.6	6.7



INITIAL PRODUCTION CORRECTED TO PSEUDO STEADY FLOW STATE: 129.416

BOALD-IN #1-20 DST #3
INITIAL SHUTIN

30 TOTAL FLOW TIME

Slope 89.02 psi/cycle
P * 710 psi

	TIME(MIN)	Pws (psi)	Log Horn T	<> PRESSURE	Horn T
	3	446.6	1.041	446.6	11
	6	636.5	0.778	189.9	6
	9	668.1	0.637	31.6	4
	12	680.1	0.544	12.0	4
	15	686.7	0.477	6.6	3
	18	688.9	0.426	2.2	3
	21	688.9	0.385	0.0	2
	24	691.1	0.352	2.2	2
	27	691.1	0.325	0.0	2
	30	691.1	0.301	0.0	2
	33	691.1	0.281	0.0	2
	36	692.1	0.263	1.0	2
	39	692.1	0.248	0.0	2
	42	692.1	0.234	0.0	2
	45	693.2	0.222	1.1	2
	48	693.2	0.211	0.0	2
	51	694.3	0.201	1.1	2
	54	694.3	0.192	0.0	2
	57	694.3	0.184	0.0	2
	60	695.4	0.176	1.1	2
X	63	695.4	0.169	0.0	1
	66	696.5	0.163	1.1	1
X	69	696.5	0.157	0.0	1

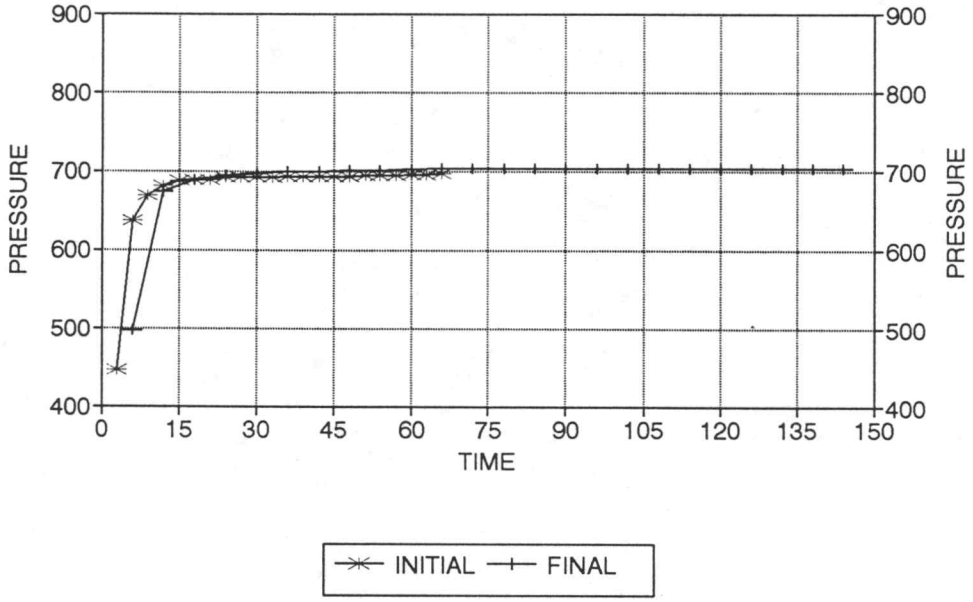
BOALDIN #1-29 DST #3
FINAL SHUTIN

85 TOTAL FLOW TIME

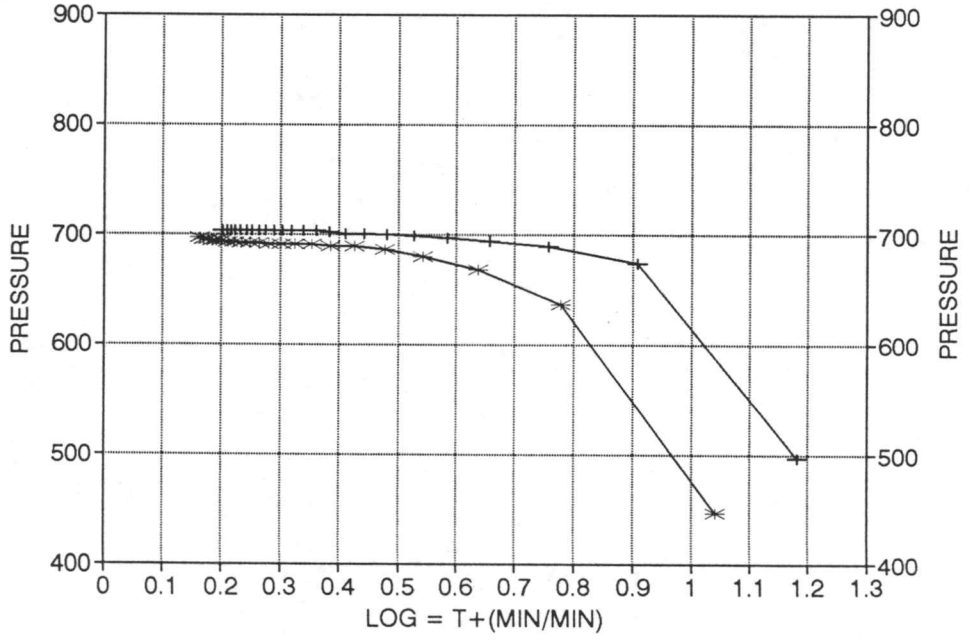
Slope 5.50 psi/cycle
P * 704 psi

		Pws (psi)	Log Horn T	<> PRESSURE	Horn T
	6	497.3	1.181	497.3	15
	12	674.6	0.908	177.3	8
	18	688.9	0.758	14.3	6
	24	694.3	0.657	5.4	5
	30	696.5	0.584	2.2	4
	36	698.7	0.526	2.2	3
	42	699.8	0.481	1.1	3
	48	700.9	0.443	1.1	3
	54	700.9	0.411	0.0	3
X	60	702.1	0.383	1.2	2
	66	703.1	0.359	1.0	2
	72	703.1	0.339	0.0	2
	78	703.1	0.320	0.0	2
	84	703.1	0.304	0.0	2
	90	703.1	0.289	0.0	2
	96	703.1	0.275	0.0	2
	102	703.1	0.263	0.0	2
	108	703.1	0.252	0.0	2
	114	703.1	0.242	0.0	2
	120	703.1	0.233	0.0	2
	126	703.1	0.224	0.0	2
	132	703.1	0.216	0.0	2
	138	703.1	0.208	0.0	2
X	144	703.1	0.201	0.0	2

BOALDIN #1-20 / DST #3
DELTA T DELTA P



HORNER PLOT



GAS VOLUME REPORT

ENSIGN OPERATING COMPANY

BOALDIN #1-20 DST # 3

MIN	PSIG	ORIFICE	MCF/D
10	23	1	796
20	27	1	887
30	35	1	1057

MIN	PSIG	ORIFICE	MCF/D
10	31	1	973
20	23	1	769
30	21	1	749
40	19	1	699
50	20	1	725
60	40	1	1162

Remarks: GAS TO SURFACE IN 5 MINUTES / GAS WILL BURN

FLUID SAMPLER DATA

Ticket No.: 5495 Date: 4/17/93

Company: ENSIGN OPERATING COMPANY

Lease: BOALDIN #1-20 Test No.: 3

County: MORTON Sec.: 20 Twp.: 35S Rng.: 43W

SAMPLER RECOVERY

Gas 2200

Oil 1800

Mud

Water

Other

Pressure 500

TOTAL 4000

SAMPLER ANALYSIS

Resistivity ohms@ F

Chlorides ppm.

Gravity corrected @60F

PIT MUD ANALYSIS

Chlorides 1500

Resistivity ohms@ F

Viscosity 63

Mud Wt. 9.0

Filtrate 10

Other

PIPE RECOVERY

TOP

Resistivity ohms@ F

Chlorides ppm

MIDDLE

Resistivity ohms@ F

Chlorides ppm

BOTTOM

Resistivity ohms@ F

Chlorides ppm