

**WELL NAME:** Bird # 1  
**COMPANY:** Thoroughbred Associates L.L.C.  
**LOCATION:** 16-32S-19W  
Comanche County, Kansas  
**DATE:** 12/30/97

TRILOBITE TESTING L.L.C.

OPERATOR : Thoroughbred Associates DATE 12-23-97  
 WELL NAME: Bird #1 KB 1991.00 ft TICKET NO: 10862 DST #1  
 LOCATION : 16-32S-19W CO Comanche KS GR 19.00 ft FORMATION: LKC  
 INTERVAL : 4400.00 To 4511.00 ft TD 4511.00 ft TEST TYPE: CONV

RECORDER DATA

Mins	Field	1	2	3	4	TIME DATA-----
PF 30 Rec.	11018	11018	13547			PF Fr. 1430 to 1500 hr
SI 45 Range(Psi )	4425.0	4425.0	4200.0	0.0	0.0	IS Fr. 1500 to 1545 hr
SF 45 Clock(hrs)	12hr	12hr	12hr			SF Fr. 1545 to 1630 hr
FS 45 Depth(ft )	4508.0	4508.0	4403.0	0.0	0.0	FS Fr. 1630 to 1715 hr

	Field	1	2	3	4	
A. Init Hydro	2178.0	2172.0	0.0	0.0	0.0	T STARTED 1130 hr
B. First Flow	1490.0	1536.0	0.0	0.0	0.0	T ON BOTM 1425 hr
B1. Final Flow	1490.0	1536.0	0.0	0.0	0.0	T OPEN 1430 hr
C. In Shut-in	1626.0	1643.0	0.0	0.0	0.0	T PULLED 1715 hr
D. Init Flow	1496.0	1569.0	0.0	0.0	0.0	T OUT 2000 hr
E. Final Flow	1482.0	1547.0	0.0	0.0	0.0	
F. Fl Shut-in	1630.0	1637.0	0.0	0.0	0.0	TOOL DATA-----
G. Final Hydro	2120.0	2121.0	0.0	0.0	0.0	Tool Wt. 2000.00 lbs
Inside/Outside	o	o	i			Wt Set On Packer 25000.00 lbs
						Wt Pulled Loose 1000000.00 lbs
						Initial Str Wt 80000.00 lbs
						Unseated Str Wt 82000.00 lbs
						Bot Choke 0.75 in
						Hole Size 7.88 in
						D Col. ID 2.25 in
						D. Pipe ID 3.50 in
						D.C. Length 540.00 ft
						D.P. Length 4168.00 ft

RECOVERY

Tot Fluid 30.00 ft of 30.00 ft in DC and 0.00 ft in DP  
 30.00 ft of Gassy mud 30%gas 70%mud  
 0.00 ft of  
 0.00 ft of

SALINITY 0.00 P.P.M. A.P.I. Gravity 0.00

BLOW DESCRIPTION

Initial Flow:  
 strong blow, bottom of bucket in 1 min. gas to surface in 4 mins.

Final Flow:  
 strong blow, gas to surface throughout, gas sample taken, gas burned

SAMPLES:  
 SENT TO:

MUD DATA-----  
 Mud Type Chemical  
 Weight 9.10 lb/cf  
 Vis. 44.00 S/L  
 W.L. 11.20 in3  
 F.C. 0.00 in  
 Mud Drop  
 Amt. of fill 0.00 ft  
 Btm. H. Temp. 126.00 F  
 Hole Condition  
 % Porosity 0.00  
 Packer Size 6.75 in  
 No. of Packers 2  
 Cushion Amt. 0.00  
 Cushion Type  
 Reversed Out  
 Tool Chased  
 Tester John Riedl  
 Co. Rep. Paul Gunzelman  
 Contr. Pickrell  
 Rig # 1  
 Unit #  
 Pump T.

Test Successful: Y



Operator.....: Thoroughbred Associates  
Well Name.....: Bird #1  
DST Number.....: 1

Location.: 16-32S-19W Comanche KS Recorder No...: 11018  
Test Type: Conventional Recorder Depth: 4508  
Formation: LKC Test Interval.: 4400-4511

RESERVOIR CALCULATIONS: Gas calculations based on shut-in #2

RESERVOIR PARAMETERS USED:

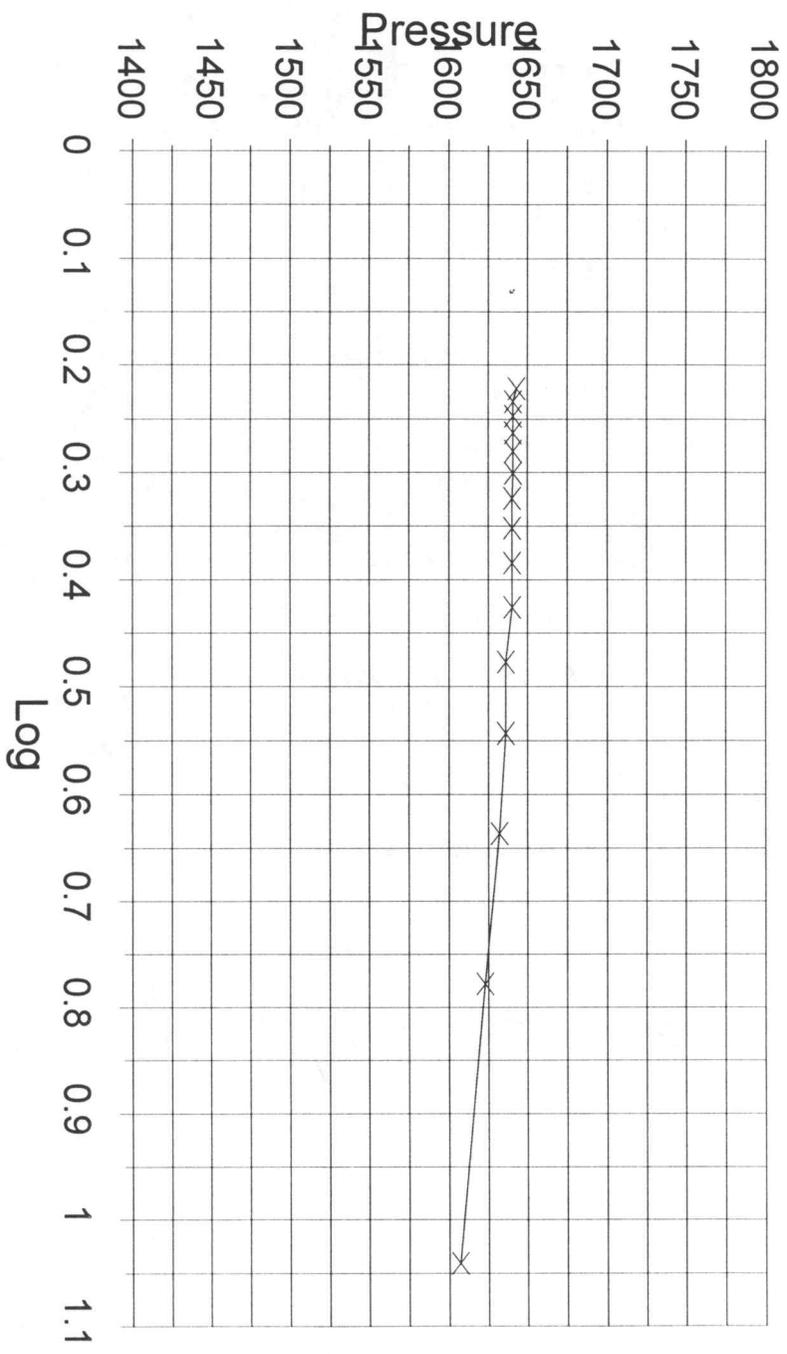
Net Pay.....: 14.00 ft  
Porosity.....: 0.12 %  
Bottom Hole Temp.....: 126.00 F  
Specific Gravity.....: 0.914  
Z factor.....: %7/3f %s  
Compressibility.....: 0.000745 /psi  
Viscosity.....: 0.0167 cp  
Total Flowing Time.....: 60.00 min.  
Flow Rate.....: 6440.00 mfc/d  
Final Flowing Pressure.....: 1547.00 psi  
Horner Slope.....: 0.0314 \*10<sup>6</sup> psi<sup>2</sup>/cycle  
Extrapolated Pressure.....: 1646.58 psi  
Assumed Drainage Radius....: 1500.00 ft  
Well Bore Radius.....: 3.94 in

RESULTS:

Effective Permeability.....: 233.472464 md  
Flow Capacity.....: 3268.6145 md.ft  
Transmissibility.....: 195725.4188 md.ft/cp  
Skin Factor.....: 5.0094  
Pressure Drop Across Skin.....: 43.5654 psi  
Radius of Investigation.....: 3626.9965 ft  
Damage Ratio.....: 1.3408  
Absolute Open Flow.....: 54898.5341 cf/d  
Absolute Open Flow W/O Damage.: 73605.9471 cf/d  
Estimated Stabilized AOF.....: 53091.3198 cf/d

# Horner Plot: Shut-in #1

P \* 1646.26 Slope .010724



# Horner Plot: Shut-in #2

P\* 1646.58 Slope .031460

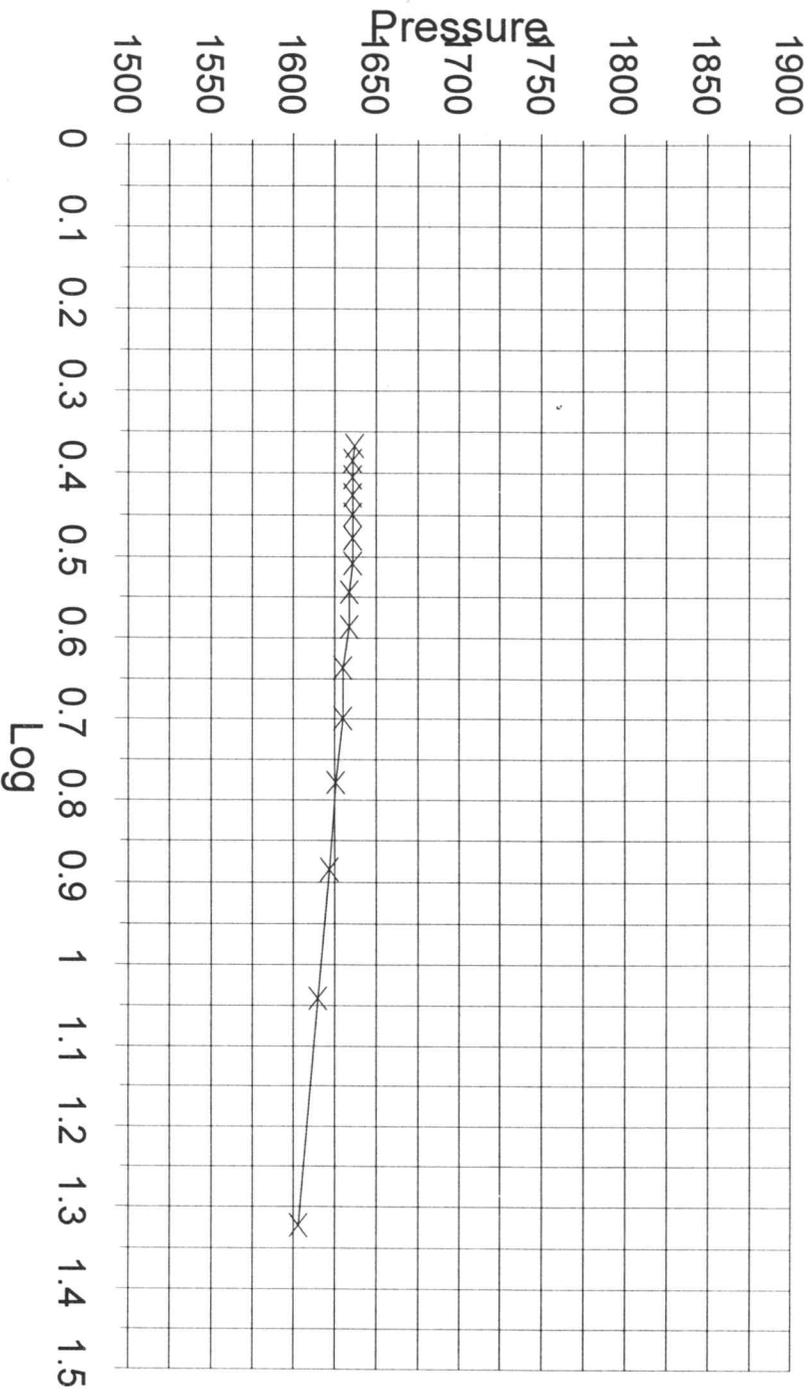
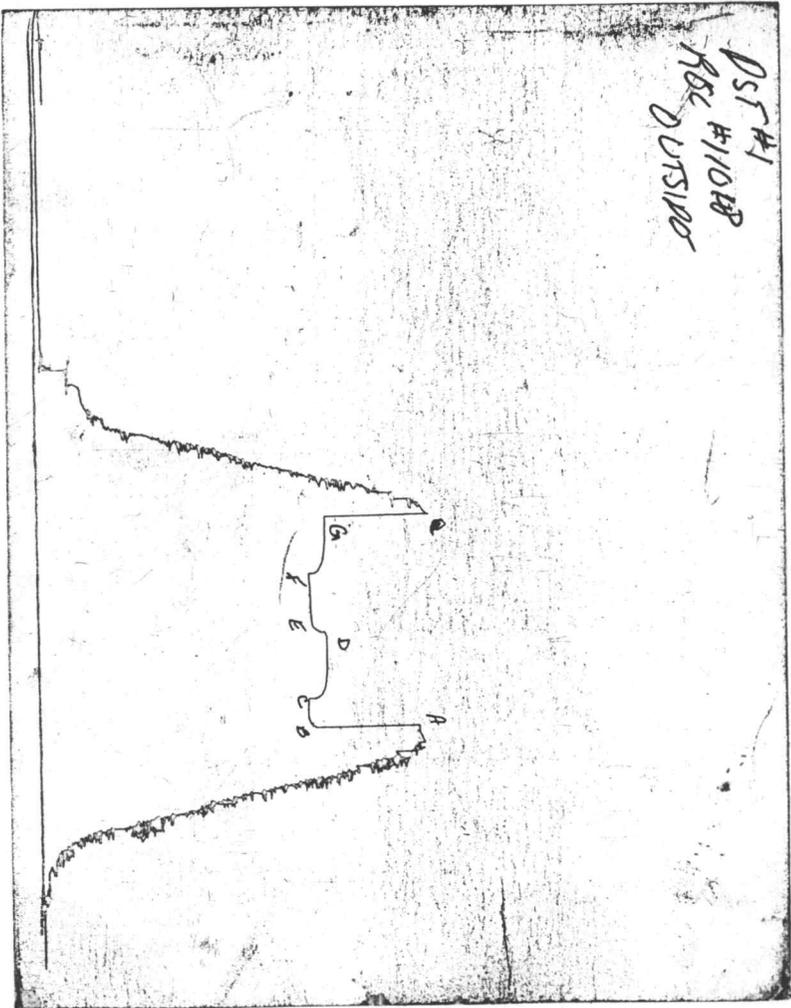


CHART PAGE



This is a photocopy of the actual AK-1 recorder chart

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### AK-1 Recorder Increments Listings

Test: Bird #1  
Date: 1-5-98

DST #1

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	Time	Pressure PSI <sub>g</sub>	◇ Pressure
***Start Flow 1	0	1536.0	1536.0
	3	1536.0	0.0
	6	1536.0	0.0
	9	1536.0	0.0
	12	1536.0	0.0
	15	1536.0	0.0
	18	1536.0	0.0
	21	1536.0	0.0
	24	1536.0	0.0
	27	1536.0	0.0
	30	1536.0	0.0

	Time	Pressure PSIg	Log Horn T	◇ Pressure	(T+dT)/dT
***Start Shutin 1	3	1607.0	1.041	1607.0	11.0
	6	1623.0	0.778	16.0	6.0
	9	1632.0	0.637	9.0	4.3
	12	1636.0	0.544	4.0	3.5
	15	1636.0	0.477	0.0	3.0
	18	1640.0	0.426	4.0	2.7
	21	1640.0	0.385	0.0	2.4
	24	1640.0	0.352	0.0	2.3
	27	1640.0	0.325	0.0	2.1
	30	1641.0	0.301	1.0	2.0
	33	1641.0	0.281	0.0	1.9
	36	1641.0	0.263	0.0	1.8
	39	1641.0	0.248	0.0	1.8
	42	1641.0	0.234	0.0	1.7
	45	1643.0	0.222	2.0	1.7

	Time	Pressure PSIg	Log Horn T	◇ Pressure	(T+dT)/dT
***Start Shutin 2	3	1603.0	1.322	1603.0	21.0
	6	1615.0	1.041	12.0	11.0
	9	1622.0	0.885	7.0	7.7
	12	1626.0	0.778	4.0	6.0
	15	1630.0	0.699	4.0	5.0
	18	1630.0	0.637	0.0	4.3
	21	1634.0	0.586	4.0	3.9
	24	1634.0	0.544	0.0	3.5
	27	1636.0	0.508	2.0	3.2
	30	1636.0	0.477	0.0	3.0
	33	1636.0	0.450	0.0	2.8
	36	1636.0	0.426	0.0	2.7
	39	1636.0	0.405	0.0	2.5
	42	1636.0	0.385	0.0	2.4
	45	1637.0	0.368	1.0	2.3

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	Time	Pressure PSIg	◇ Pressure
***Start Flow 2	3	1569.0	1569.0
	6	1562.0	-7.0
	9	1560.0	-2.0
	12	1557.0	-3.0
	15	1557.0	0.0
	18	1557.0	0.0
	21	1557.0	0.0
	24	1557.0	0.0
	27	1557.0	0.0
	30	1552.0	-5.0
	33	1552.0	0.0
	36	1552.0	0.0
	39	1549.0	-3.0
	42	1549.0	0.0
	45	1547.0	-2.0

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## NATURAL GAS ANALYSIS REPORT

Sampled by:  
 Trilobite Testing, L. L. C.  
 Hays, Kansas  
 Scott City, Kansas  
 Phone: 800-728-5369  
 Fax: 913-625-5620

Analyzed by:  
 Caraway Analytical, Inc  
 P. O. Box 2137  
 Liberal, Kansas 67905  
 Phone: 316-624-5389  
 Fax: 316-626-7108

Lab Number:	973464	Analyzed:	12/30/97
Sample From:	Bird #1 DST 1	Pressure:	
Producer:	Thoroughbred Associates, L.L.C.	Temperature:	
Date:		Location:	16-32-19
Time:		County:	Comanche
Sampler:		State:	Kansas
Source:		Formation:	Lansing

	Mole %	GPM
Helium	He: 0.267	0.000
Hydrogen	H2: 0.025	0.000
Oxygen	O2: 0.000	0.000
Nitrogen	N2: 14.702	0.000
Carbon Dioxide	CO2: 0.285	0.000
Methane	C1: 63.348	0.000
Ethane	C2: 5.351	1.431
Propane	C3: 5.405	1.489
Iso Butane	iC4: 1.225	0.401
Normal Butane	nC4: 3.034	0.957
Iso Pentane	iC5: 1.250	0.457
Normal Pentane	nC5: 0.966	0.350
Hexanes Plus	C6+: 4.142	1.807

TOTAL:	100.000	6.892
Z Fact:	0.9955	
SP.GR.:	0.9141	
BTU (SAT):	1296.6	@ 14.73 psia
BTU (DRY):	1319.5	@ 14.73 psia
OCTANE RATING:	99.3	

COMMENTS:

0.000



TRILOBITE TESTING L.L.C.

OPERATOR : Thoroughbred Associates DATE 12-28-97  
 WELL NAME: Bird #1 KB 2050.00 ft TICKET NO: 10603 DST #2  
 LOCATION : 16-32S-19W CO Comanche KS GR 2045.00 ft FORMATION: Kansas City  
 INTERVAL : 4564.00 To 4650.00 ft TD 4650.00 ft TEST TYPE: CONV

RECORDER DATA

Mins	Field	1	2	3	4	TIME DATA-----
PF 30 Rec.	10332	10332	13849			PF Fr. 2357 to 0027 hr
SI 45 Range(Psi )	4025.0	4025.0	4375.0	0.0	0.0	IS Fr. 0027 to 0112 hr
SF 30 Clock(hrs)	12hr	12hr	12hr			SF Fr. 0112 to 0142 hr
FS 45 Depth(ft )	4647.0	4647.0	4570.0	0.0	0.0	FS Fr. 0142 to 0227 hr

	Field	1	2	3	4	
A. Init Hydro	2278.0	2272.0	0.0	0.0	0.0	T STARTED 2100 hr
B. First Flow	375.0	392.0	0.0	0.0	0.0	T ON BOTM 2353 hr
B1. Final Flow	486.0	515.0	0.0	0.0	0.0	T OPEN 2357 hr
C. In Shut-in	1722.0	1736.0	0.0	0.0	0.0	T PULLED 0227 hr
D. Init Flow	385.0	401.0	0.0	0.0	0.0	T OUT 0530 hr
E. Final Flow	617.0	606.0	0.0	0.0	0.0	
F. Fl Shut-in	1722.0	1729.0	0.0	0.0	0.0	
G. Final Hydro	2218.0	2175.0	0.0	0.0	0.0	TOOL DATA-----
Inside/Outside	o	o	i			Tool Wt. 2100.00 lbs
						Wt Set On Packer 20000.00 lbs
						Wt Pulled Loose 95000.00 lbs
						Initial Str Wt 84000.00 lbs
						Unseated Str Wt 86000.00 lbs
						Bot Choke 0.75 in
						Hole Size 7.88 in
						D Col. ID 2.25 in
						D. Pipe ID 3.50 in
						D.C. Length 233.00 ft
						D.P. Length 4392.00 ft

RECOVERY

Tot Fluid 590.00 ft of 233.00 ft in DC and 357.00 ft in DP  
 4014.00 ft of Gas in pipe  
 200.00 ft of Gas cut muddy water 8% gas 42% water 50% mud  
 390.00 ft of Salt water  
 0.00 ft of  
 0.00 ft of  
 0.00 ft of  
 0.00 ft of  
 0.00 ft of

SALINITY 50000.00 P.P.M. A.P.I. Gravity 0.00

BLOW DESCRIPTION

Initial Flow:  
 strong blow, bottom of bucket in 30  
 sec. gas to surface in 3 mins.

Final Flow:

fluid to surface in 5 mins.

SAMPLES:

SENT TO:

MUD DATA-----

Mud Type	Chemical
Weight	8.90 lb/c
Vis.	61.00 S/L
W.L.	8.00 in3
F.C.	0.00 in
Mud Drop	

Amt. of fill	0.00 ft
Btm. H. Temp.	134.00 F
Hole Condition	
% Porosity	0.00
Packer Size	6.75 in
No. of Packers	2
Cushion Amt.	0.00
Cushion Type	
Reversed Out	
Tool Chased	
Tester	Darren Amerine
Co. Rep.	Paul Gunzelman
Contr.	Pickrell
Rig #	1
Unit #	
Pump T.	

Test Successful: Y

GAS RECOVERY

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COMPANY: Thoroughbred Associates

DATE: 12-28-97

WELL NAME: Bird #1

KB Elev: 2050.00 ft TICKET #10603 DST #2

WELL LOCATION: 16-32S-19W CO Comanche KS

GR Elev: 2045.00 ft FORMATION: Kansas City

INTERVAL Fr.: 4564.00 To 4650.00 T.D.: 4650.00 ft TEST TYPE: CONV

GAS RECOVERY MEASURED WITH Merla gauge

\*\*\*\*\* GAS RATES FOR FLOW #1

Time (min)	Orifice (in)	Pressure (Psi)	H2O (in)	Rate (cf/d)
10	0.75	85	0	1162000.0
20	0.75	80	0	1104000.0
30	0.75	79	0	1092000.0

Operator.....: Throughbred Associates  
Well Name.....: Bird 1  
DST Number.....: 2

Location.: 16-32S-19W Comanche KS Recorder No...: 10332  
Test Type: Coventional Recorder Depth: 4647  
Formation: Kansas City Test Interval.: 4564-4650

RESERVOIR CALCULATIONS: Gas calculations based on shut-in #2

RESERVOIR PARAMETERS USED:

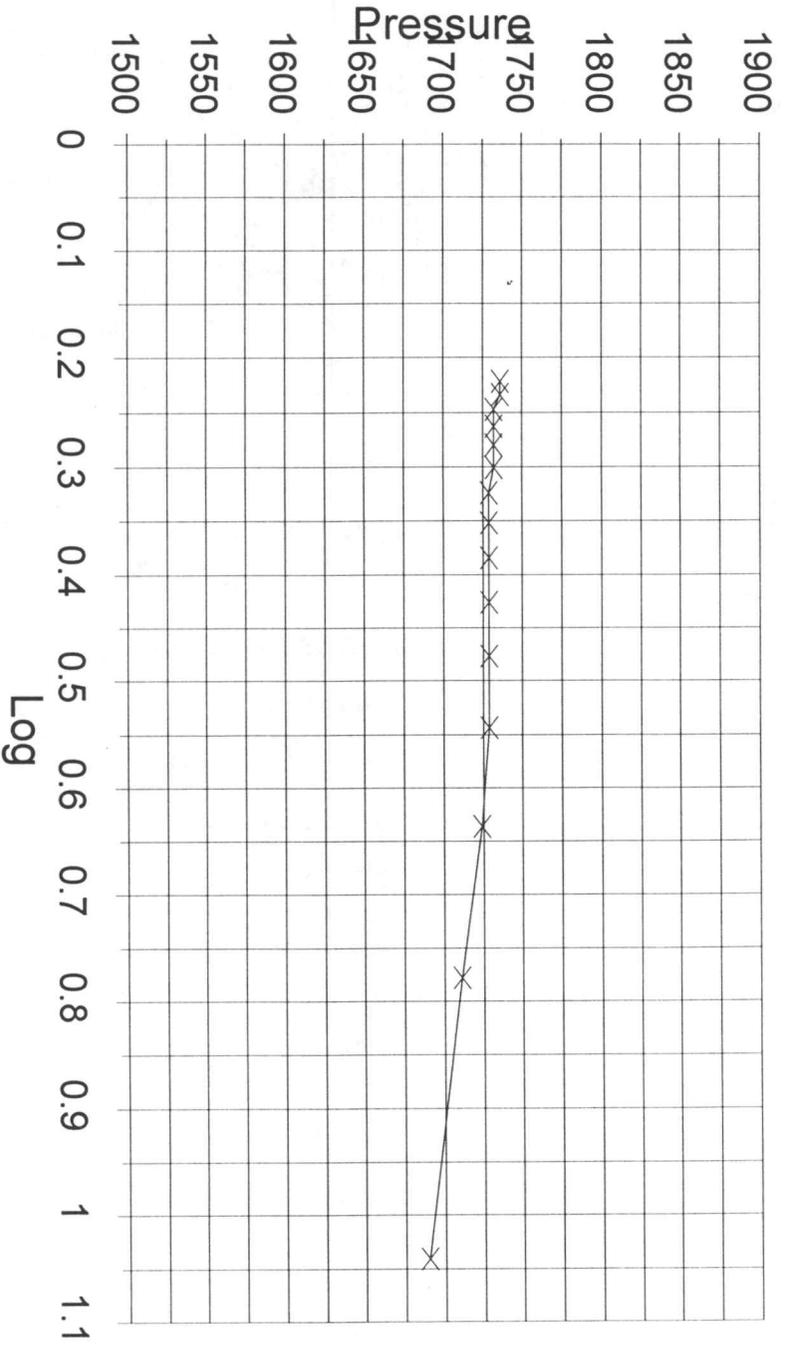
Net Pay.....: 4.00 ft  
Porosity.....: 25.00 %  
Bottom Hole Temp.....: 134.00 F  
Specific Gravity.....: 0.685  
Z factor.....: %7/3f %s  
Compressibility.....: 0.001753 /psi  
Viscosity.....: 0.0155 cp  
Total Flowing Time.....: 60.00 min.  
Flow Rate.....: 1092.00 mfc/d  
Final Flowing Pressure.....: 606.00 psi  
Horner Slope.....: 0.0467 \*10<sup>6</sup> psi<sup>2</sup>/cycle  
Extrapolated Pressure.....: 1742.46 psi  
Assumed Drainage Radius.....: 1500.00 ft  
Well Bore Radius.....: 3.94 in

RESULTS:

Effective Permeability.....: 87.827989 md  
Flow Capacity.....: 351.3120 md.ft  
Transmissibility.....: 22665.2876 md.ft/cp  
Skin Factor.....: 62.6805  
Pressure Drop Across Skin.....: 1100.1524 psi  
Radius of Investigation.....: 104.2857 ft  
Damage Ratio.....: 12.7818  
Absolute Open Flow.....: 1241.9964 cf/d  
Absolute Open Flow W/O Damage.: 15874.9904 cf/d  
Estimated Stabilized AOF.....: 6778.4910 cf/d

# Horner Plot: Shut-in #1

P \* 1743.61 Slope .026472



# Horner Plot: Shut-in #2

P\* 1742.46 Slope .046739

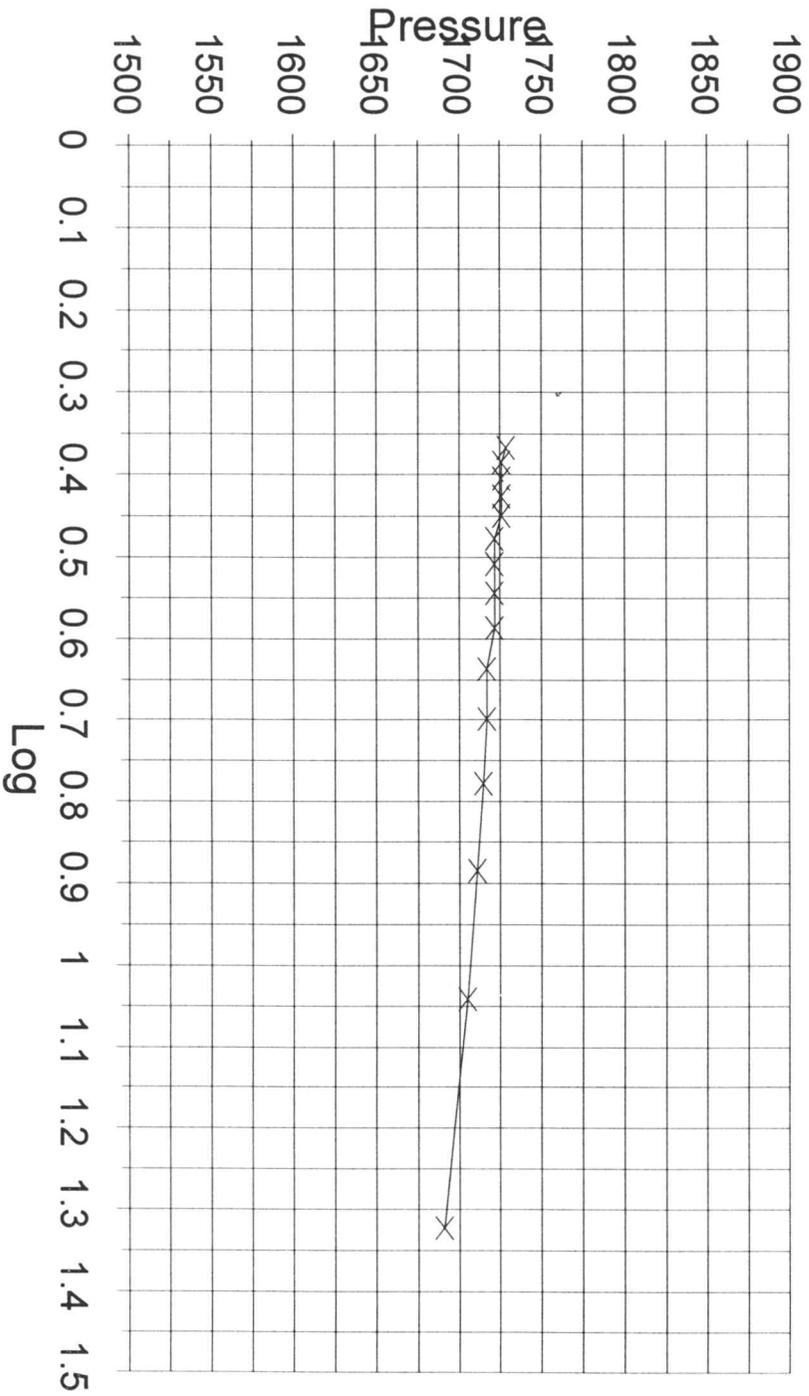
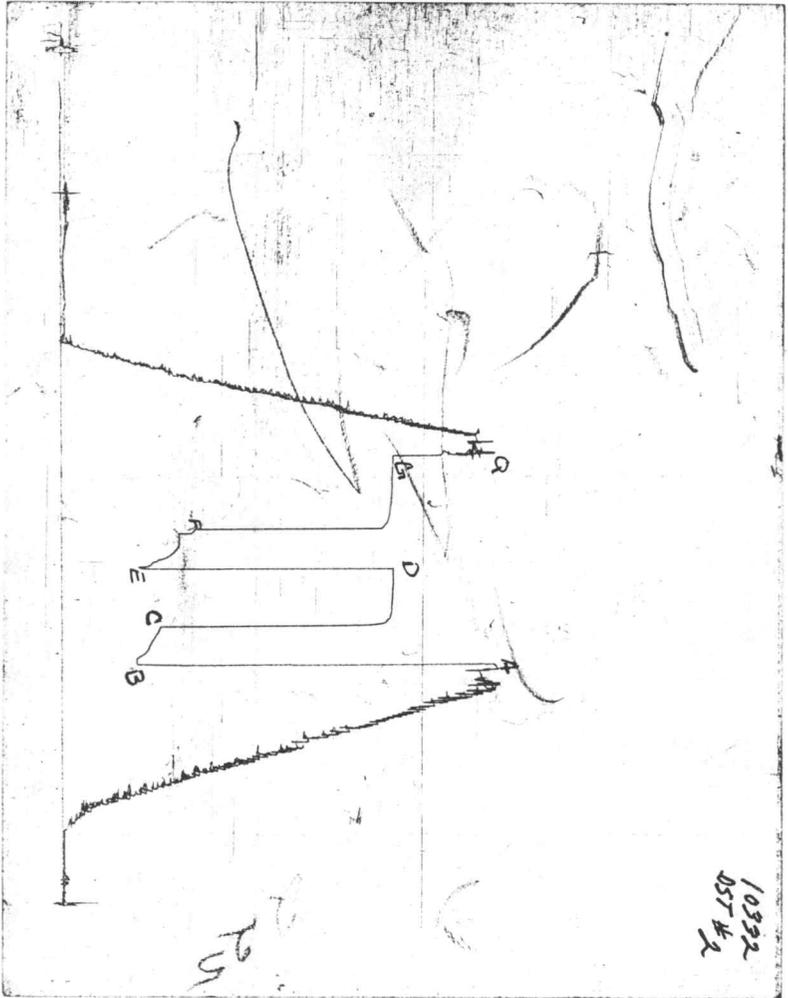


CHART PAGE



This is a photocopy of the actual AK-1 recorder chart

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### AK-1 Recorder Increments Listings

Test: Bird #1

Date: 1-6-98

DST #2

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	Time	Pressure PSIg	◇ Pressure
***Start Flow 1	0	392.0	392.0
	3	421.0	29.0
	6	444.0	23.0
	9	455.0	11.0
	12	463.0	8.0
	15	475.0	12.0
	18	487.0	12.0
	21	501.0	14.0
	24	511.0	10.0
	27	515.0	4.0
	30	515.0	0.0

	Time	Pressure PSI <sub>g</sub>	Log Horn T	◇ Pressure	(T+dT)/dT
***Start Shutin 1	3	1690.0	1.041	1690.0	11.0
	6	1711.0	0.778	21.0	6.0
	9	1724.0	0.637	13.0	4.3
	12	1729.0	0.544	5.0	3.5
	15	1729.0	0.477	0.0	3.0
	18	1729.0	0.426	0.0	2.7
	21	1729.0	0.385	0.0	2.4
	24	1729.0	0.352	0.0	2.3
	27	1729.0	0.325	0.0	2.1
	30	1732.0	0.301	3.0	2.0
	33	1732.0	0.281	0.0	1.9
	36	1732.0	0.263	0.0	1.8
	39	1732.0	0.248	0.0	1.8
	42	1736.0	0.234	4.0	1.7
	45	1736.0	0.222	0.0	1.7

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	Time	Pressure PSIg	◇ Pressure
***Start Flow 2	0	401.0	401.0
	3	462.0	61.0
	6	503.0	41.0
	9	548.0	45.0
	12	576.0	28.0
	15	592.0	16.0
	18	605.0	13.0
	21	605.0	0.0
	24	605.0	0.0
	27	605.0	0.0
	30	606.0	1.0

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	Time	Pressure PSIg	Log Horn T	◇ Pressure	(T+dT)/dT
***Start Shutin 2	3	1691.0	1.322	1691.0	21.0
	6	1705.0	1.041	14.0	11.0
	9	1711.0	0.885	6.0	7.7
	12	1715.0	0.778	4.0	6.0
	15	1717.0	0.699	2.0	5.0
	18	1717.0	0.637	0.0	4.3
	21	1722.0	0.586	5.0	3.9
	24	1722.0	0.544	0.0	3.5
	27	1722.0	0.508	0.0	3.2
	30	1722.0	0.477	0.0	3.0
	33	1726.0	0.450	4.0	2.8
	36	1726.0	0.426	0.0	2.7
	39	1726.0	0.405	0.0	2.5
	42	1726.0	0.385	0.0	2.4
	45	1729.0	0.368	3.0	2.3

## NATURAL GAS ANALYSIS REPORT

Sampled by:  
 Trilobite Testing, L. L. C.  
 Hays, Kansas  
 Scott City, Kansas  
 Phone: 800-728-5369  
 Fax: 913-625-5620

Analyzed by:  
 Caraway Analytical, Inc  
 P. O. Box 2137  
 Liberal, Kansas 67905  
 Phone: 316-624-5389  
 Fax: 316-626-7108

Lab Number:	973458	Analyzed:	12/29/97
Sample From:	Bird #1 DST 2	Pressure:	
Producer:	Thoroughbred Associates, L.L.C.	Temperature:	
Date:		Location:	16-32-19
Time:		County:	Comanche
Sampler:		State:	Kansas
Source:		Formation:	K.C.

	Mole %	GPM
Helium	He: 0.241	0.000
Hydrogen	H2: 0.001	0.000
Oxygen	O2: 0.000	0.000
Nitrogen	N2: 9.000	0.000
Carbon Dioxide	CO2: 0.001	0.000
Methane	C1: 81.004	0.000
Ethane	C2: 4.410	1.179
Propane	C3: 2.968	0.818
Iso Butane	iC4: 0.407	0.133
Normal Butane	nC4: 1.012	0.319
Iso Pentane	iC5: 0.272	0.100
Normal Pentane	nC5: 0.237	0.086
Hexanes Plus	C6+: 0.447	0.195

TOTAL: 100.000 2.830  
 Z Fact: 0.9975  
 SP.GR.: 0.6846  
 BTU (SAT): 1047.0 @ 14.73 psia  
 BTU (DRY): 1065.5 @ 14.73 psia  
 OCTANE RATING: 114.5

COMMENTS:

0.000



TRILOBITE TESTING L.L.C.

OPERATOR : Thoroughbred Associates DATE 12-30-97  
 WELL NAME: Bird #1 KB 2050.00 ft TICKET NO: 10604 DST #3  
 LOCATION : 16-32S-19W CO Comanche KS GR 2045.00 ft FORMATION: Marmaton  
 INTERVAL : 4860.00 To 4960.00 ft TD 4960.00 ft TEST TYPE: CONVENTIONAL

RECORDER DATA

Mins		Field	1	2	3	4	TIME DATA-----
PF 14	Rec.	10332	10332	13849			PF Fr. 1527 to 1541 hr
SI 47	Range(Psi )	4025.0	4025.0	4375.0	0.0	0.0	IS Fr. 1541 to 1628 hr
SF 50	Clock(hrs)	12 HR	12 HR	12 HR			SF Fr. 1628 to 1718 hr
FS 60	Depth(ft )	4957.0	4957.0	4866.0	0.0	0.0	FS Fr. 1718 to 1818 hr

	Field	1	2	3	4	
A. Init Hydro	2448.0	2431.0	0.0	0.0	0.0	T STARTED 1300 hr
B. First Flow	1296.0	1318.0	0.0	0.0	0.0	T ON BOTM 1520 hr
B1. Final Flow	1427.0	1427.0	0.0	0.0	0.0	T OPEN 1527 hr
C. In Shut-in	1804.0	1805.0	0.0	0.0	0.0	T PULLED 1816 hr
D. Init Flow	1266.0	1268.0	0.0	0.0	0.0	T OUT 2000 hr
E. Final Flow	1397.0	1411.0	0.0	0.0	0.0	
F. Fl Shut-in	1804.0	1811.0	0.0	0.0	0.0	TOOL DATA-----
G. Final Hydro	2398.0	2392.0	0.0	0.0	0.0	Tool Wt. 2100.00 lbs
Inside/Outside	0	0	I			Wt Set On Packer 20000.00 lbs
						Wt Pulled Loose 1200000.00 lb
						Initial Str Wt 88000.00 lbs
						Unseated Str Wt 88000.00 lbs
						Bot Choke 0.75 in
						Hole Size 7.88 in
						D Col. ID 2.50 in
						D. Pipe ID 3.80 in
						D.C. Length 233.00 ft
						D.P. Length 4671.00 ft

RECOVERY

Tot Fluid 10.00 ft of 10.00 ft in DC and 0.00 ft in DP  
 4894.00 ft of Gas in pipe  
 10.00 ft of Condensate  
 0.00 ft of  
 0.00 ft of

SALINITY 0.00 P.P.M. A.P.I. Gravity 0.00

BLOW DESCRIPTION

Initial Flow:  
 Strong blow, bottom of bucket in 30  
 sec. gas to surfae in 3 min.  
 Final Flow:  
 Gauge gas 9,618,000

MUD DATA-----

Mud Type	Chemical
Weight	9.20 lb/c
Vis.	47.00 S/L
W.L.	12.80 in3
F.C.	0.00 in
Mud Drop	

Amt. of fill	0.00 ft
Btm. H. Temp.	106.00 F
Hole Condition	
% Porosity	0.00
Packer Size	3.75 in
No. of Packers	2
Cushion Amt.	0.00
Cushion Type	
Reversed Out	
Tool Chased	

SAMPLES:  
 SENT TO:

Tester	Darren Amerine
Co. Rep.	Paul Gunzelman
Contr.	Pickrell
Rig #	1
Unit #	
Pump T.	

Test Successful: Y



Operator.....: Thoroughbred Associates  
Well Name.....: Bird #1  
DST Number.....: 3

Location.: 16-32S-19W                      Recorder No...: 10332  
Test Type: Conventional                    Recorder Depth: 4957  
Formation: Marmaton                        Test Interval.: 4860-4960

RESERVOIR CALCULATIONS: Gas calculations based on shut-in #2

RESERVOIR PARAMETERS USED:

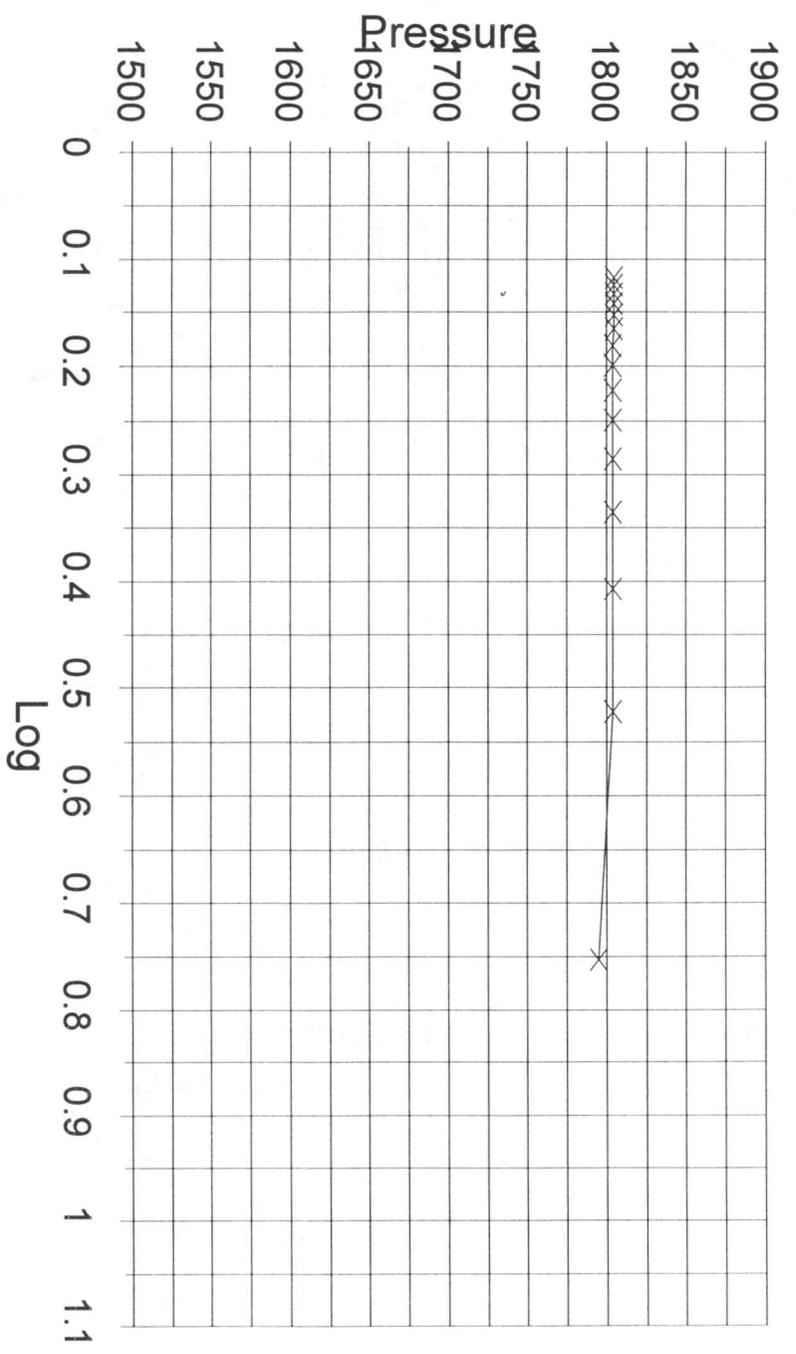
Net Pay.....: 10.00 ft  
Porosity.....: 22.00 %  
Bottom Hole Temp.....: 106.00 F  
Specific Gravity.....: 0.702  
Z factor.....: %7/3f %s  
Compressibility.....: 0.000812 /psi  
Viscosity.....: 0.0149 cp  
Total Flowing Time.....: 64.00 min.  
Flow Rate.....: 8752.00 mfc/d  
Final Flowing Pressure.....: 1411.00 psi  
Horner Slope.....: 0.0164 \*10<sup>6</sup> psi<sup>2</sup>/cycle  
Extrapolated Pressure.....: 1518.54 psi  
Assumed Drainage Radius.....: 1500.00 ft  
Well Bore Radius.....: 3.94 in

RESULTS:

Effective Permeability.....: 734.085297 md  
Flow Capacity.....: 7340.8530 md.ft  
Transmissibility.....: 492674.6961 md.ft/cp  
Skin Factor.....: 17.4492  
Pressure Drop Across Skin.....: 85.5294 psi  
Radius of Investigation.....: 497.3051 ft  
Damage Ratio.....: 3.2961  
Absolute Open Flow.....: 64049.4293 cf/d  
Absolute Open Flow W/O Damage.: 211115.5412 cf/d  
Estimated Stabilized AOF.....: 117494.5070 cf/d

# Horner Plot: Shut-in #1

P \* 1806.73 Slope .006521



# Horner Plot: Shut-in #2

$P^* 1518.54$  Slope  $.016455$

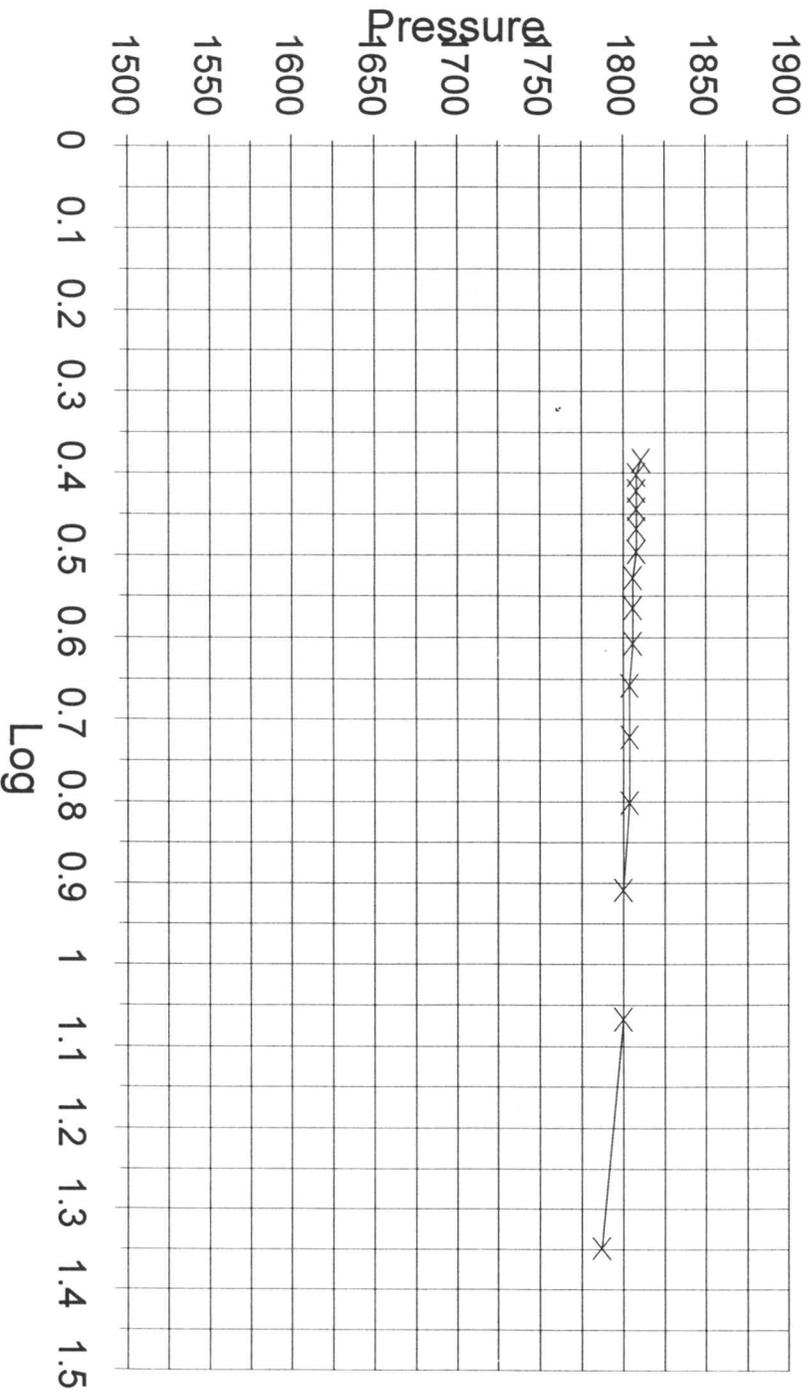
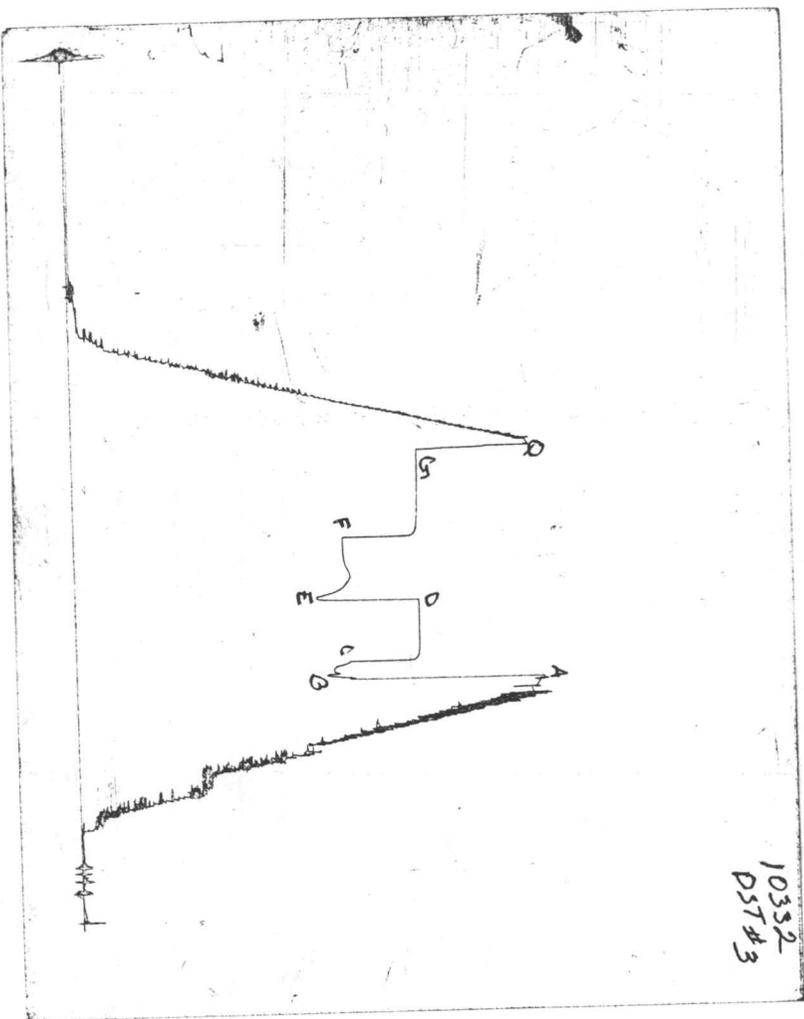


CHART PAGE



This is a photocopy of the actual AK-1 recorder chart

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### AK-1 Recorder Increments Listings

Test: Bird #1

Date: 1-6-98

DST #3

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	Time	Pressure PSIg	◇ Pressure
***Start Flow 1	0	1318.0	1318.0
	3	1347.0	29.0
	6	1352.0	5.0
	9	1360.0	8.0
	12	1416.0	56.0
	15	1437.0	21.0

	Time	Pressure PSIg	Log Horn T	◇ Pressure	(T+dT)/dT
***Start Shutin 1	3	1795.0	0.753	1795.0	5.7
	6	1804.0	0.523	9.0	3.3
	9	1804.0	0.407	0.0	2.6
	12	1804.0	0.336	0.0	2.2
	15	1804.0	0.286	0.0	1.9
	18	1804.0	0.250	0.0	1.8
	21	1804.0	0.222	0.0	1.7
	24	1804.0	0.200	0.0	1.6
	27	1804.0	0.181	0.0	1.5
	30	1805.0	0.166	1.0	1.5
	33	1805.0	0.154	0.0	1.4
	36	1805.0	0.143	0.0	1.4
	39	1805.0	0.133	0.0	1.4
	42	1805.0	0.125	0.0	1.3
	45	1805.0	0.118	0.0	1.3
	48	1805.0	0.111	0.0	1.3

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	Time	Pressure PSIg	◇ Pressure
***Start Flow 2	0	1268.0	1268.0
	3	1324.0	56.0
	6	1385.0	61.0
	9	1412.0	27.0
	12	1429.0	17.0
	15	1441.0	12.0
	18	1442.0	1.0
	21	1437.0	-5.0
	24	1426.0	-11.0
	27	1419.0	-7.0
	30	1415.0	-4.0
	33	1411.0	-4.0
	36	1411.0	0.0
	39	1411.0	0.0
	42	1411.0	0.0
	45	1411.0	0.0
	48	1411.0	0.0

	Time	Pressure PSI <sub>g</sub>	Log Horn T	◇ Pressure	(T+dT)/dT
***Start Shutin 2	3	1787.0	1.349	1787.0	22.3
	6	1800.0	1.067	13.0	11.7
	9	1800.0	0.909	0.0	8.1
	12	1804.0	0.802	4.0	6.3
	15	1804.0	0.722	0.0	5.3
	18	1804.0	0.659	0.0	4.6
	21	1806.0	0.607	2.0	4.0
	24	1806.0	0.564	0.0	3.7
	27	1806.0	0.528	0.0	3.4
	30	1808.0	0.496	2.0	3.1
	33	1808.0	0.468	0.0	2.9
	36	1808.0	0.444	0.0	2.8
	39	1808.0	0.422	0.0	2.6
	42	1808.0	0.402	0.0	2.5
	45	1811.0	0.384	3.0	2.4
	48	1811.0	0.368	0.0	2.3
	51	1811.0	0.353	0.0	2.3
	54	1811.0	0.339	0.0	2.2
	57	1811.0	0.327	0.0	2.1
	60	1811.0	0.315	0.0	2.1

## NATURAL GAS ANALYSIS REPORT

Sampled by:  
 Trilobite Testing, L. L. C.  
 Hays, Kansas  
 Scott City, Kansas  
 Phone: 800-728-5369  
 Fax: 913-625-5620

Analyzed by:  
 Caraway Analytical, Inc  
 P. O. Box 2137  
 Liberal, Kansas 67905  
 Phone: 316-624-5389  
 Fax: 316-626-7108

Lab Number:	980003	Analyzed:	12/30/97
Sample From:	Bird #1 DST 3	Pressure:	
Producer:	Thoroughbred Associates, L.L.C.	Temperature:	
Date:		Location:	16-32-19
Time:		County:	Comanche
Sampler:		State:	Kansas
Source:		Formation:	Marmaton

	Mole %	GPM
Helium	He: 0.128	0.000
Hydrogen	H2: 0.007	0.000
Oxygen	O2: 0.000	0.000
Nitrogen	N2: 4.882	0.000
Carbon Dioxide	CO2: 0.008	0.000
Methane	C1: 82.503	0.000
Ethane	C2: 5.037	1.347
Propane	C3: 3.959	1.091
Iso Butane	iC4: 0.486	0.159
Normal Butane	nC4: 1.415	0.446
Iso Pentane	iC5: 0.406	0.149
Normal Pentane	nC5: 0.489	0.177
Hexanes Plus	C6+: 0.680	0.297
	TOTAL: 100.000	3.665
	Z Fact: 0.9971	
	SP.GR.: 0.7018	
	BTU (SAT): 1140.6 @ 14.73 psia	
	BTU (DRY): 1160.8 @ 14.73 psia	
	OCTANE RATING: 118.8	

COMMENTS: Sample contained 0.275% Air 0.055  
 Bottle contained Liquids



TRILOBITE TESTING L.L.C.

OPERATOR : Thoroughbred Associates DATE 12-31-97  
 WELL NAME: Bird #1 KB 2050.00 ft TICKET NO: 10605 DST #4  
 LOCATION : 16-32S-19W CO Comanche KS GR 2045.00 ft FORMATION: Mississippi  
 INTERVAL : 5024.00 To 5110.00 ft TD 5110.00 ft TEST TYPE: CONVENTIONAL

RECORDER DATA

Mins		Field	1	2	3	4	TIME DATA-----
PF 30	Rec.	10332	10332	13849			PF Fr. 1655 to 1725 hr
SI 45	Range(Psi )	4025.0	4025.0	4375.0	0.0	0.0	IS Fr. 1725 to 1810 hr
SF 60	Clock(hrs)	12 HR	12 HR	12 HR			SF Fr. 1810 to 1910 hr
FS 60	Depth(ft )	5107.0	5107.0	5091.0	0.0	0.0	FS Fr. 1910 to 2010 hr

	Field	1	2	3	4	
A. Init Hydro	2579.0	2569.0	0.0	0.0	0.0	T STARTED 1430 hr
B. First Flow	557.0	564.0	0.0	0.0	0.0	T ON BOTM 1650 hr
B1. Final Flow	587.0	580.0	0.0	0.0	0.0	T OPEN 1655 hr
C. In Shut-in	1865.0	1842.0	0.0	0.0	0.0	T PULLED 2010 hr
D. Init Flow	577.0	566.0	0.0	0.0	0.0	T OUT 2200 hr
E. Final Flow	598.0	596.0	0.0	0.0	0.0	
F. Fl Shut-in	1865.0	1838.0	0.0	0.0	0.0	
G. Final Hydro	5418.0	2411.0	0.0	0.0	0.0	TOOL DATA-----
Inside/Outside	0	0	I			Tool Wt. 2100.00 lbs
						Wt Set On Packer 20000.00 lbs
						Wt Pulled Loose 125000.00 lbs
						Initial Str Wt 92000.00 lbs
						Unseated Str Wt 92000.00 lbs
						Bot Choke 0.75 in
						Hole Size 7.88 in
						D Col. ID 2.50 in
						D. Pipe ID 3.80 in
						D.C. Length 233.00 ft
						D.P. Length 4856.00 ft

RECOVERY

Tot Fluid 350.00 ft of 233.00 ft in DC and 117.00 ft in DP  
 4506.00 ft of Gas in pipe  
 350.00 ft of Very slightly gas cut mud  
 0.00 ft of 5% gas 95% mud  
 0.00 ft of  
 0.00 ft of  
 0.00 ft of  
 0.00 ft of  
 0.00 ft of

SALINITY 0.00 P.P.M. A.P.I. Gravity 0.00

BLOW DESCRIPTION

Initial Flow:  
 Strong blow, gas to surface in 4 min.  
 (Gauge gas)  
 Final Flow:  
 Gauge gas

MUD DATA-----

Mud Type	Chemical
Weight	9.20 lb/cf
Vis.	47.00 S/L
W.L.	14.40 in3
F.C.	0.00 in
Mud Drop	
Amt. of fill	0.00 ft
Btm. H. Temp.	108.00 F
Hole Condition	
% Porosity	0.00
Packer Size	6.75 in
No. of Packers	2
Cushion Amt.	0.00
Cushion Type	
Reversed Out	
Tool Chased	
Tester	Darren Amerine
Co. Rep.	Paul Gunzelman
Contr.	Pickrell
Rig #	1
Unit #	
Pump T.	

SAMPLES:  
 SENT TO:

Test Successful: Y



Operator.....: Thoroughbred Associates L.L.C.  
Well Name.....: Bird #1  
DST Number.....: 4

Location.: 16-32S-19W Comanche KS Recorder No...: 10332  
Test Type: Conventional Recorder Depth: 5107  
Formation: Mississippi Test Interval.: 5024-5110

RESERVOIR CALCULATIONS: Gas calculations based on shut-in #2

RESERVOIR PARAMETERS USED:

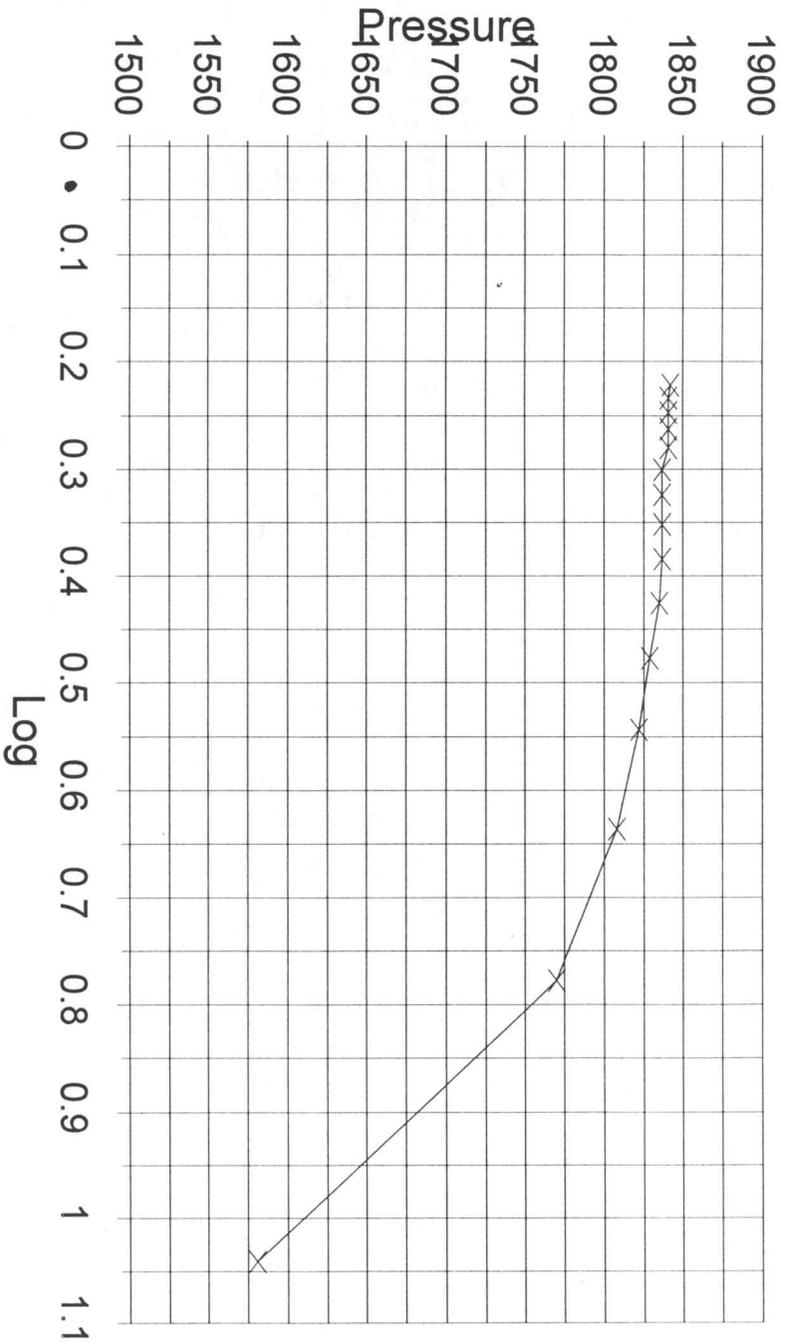
Net Pay.....: 6.00 ft  
Porosity.....: 14.00 %  
Bottom Hole Temp.....: 108.00 F  
Specific Gravity.....: 0.609  
Z factor.....: %7/3f %s  
Compressibility.....: 0.001798 /psi  
Viscosity.....: 0.0157 cp  
Total Flowing Time.....: 90.00 min.  
Flow Rate.....: 2783.00 mfc/d.  
Final Flowing Pressure.....: 596.00 psi  
Horner Slope.....: 0.0851 \*10<sup>6</sup> psi<sup>2</sup>/cycle  
Extrapolated Pressure.....: 1863.70 psi  
Assumed Drainage Radius.....: 1500.00 ft  
Well Bore Radius.....: 3.94 in

RESULTS:

Effective Permeability.....: 79.327376 md  
Flow Capacity.....: 475.9643 md.ft  
Transmissibility.....: 30316.1945 md.ft/cp  
Skin Factor.....: 38.6518  
Pressure Drop Across Skin.....: 1196.6482 psi  
Radius of Investigation.....: 159.1235 ft  
Damage Ratio.....: 7.5732  
Absolute Open Flow.....: 3099.4128 cf/d  
Absolute Open Flow W/O Damage.: 23472.5535 cf/d  
Estimated Stabilized AOF.....: 10845.1930 cf/d

# Horner Plot: Shut-in #1

P \* 1860.18 Slope .067293



# Horner Plot: Shut-in #2

P\* 1863.70 Slope .085134

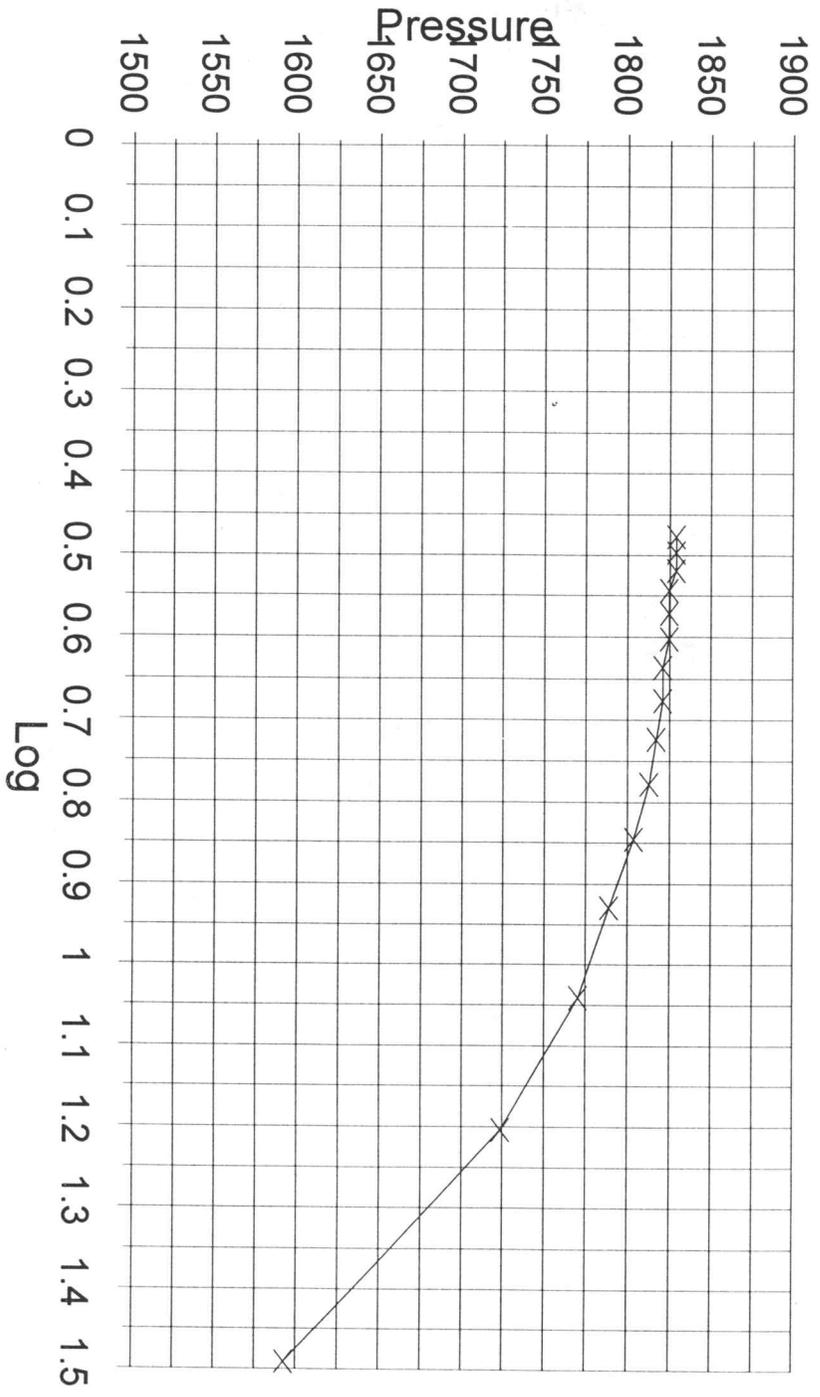
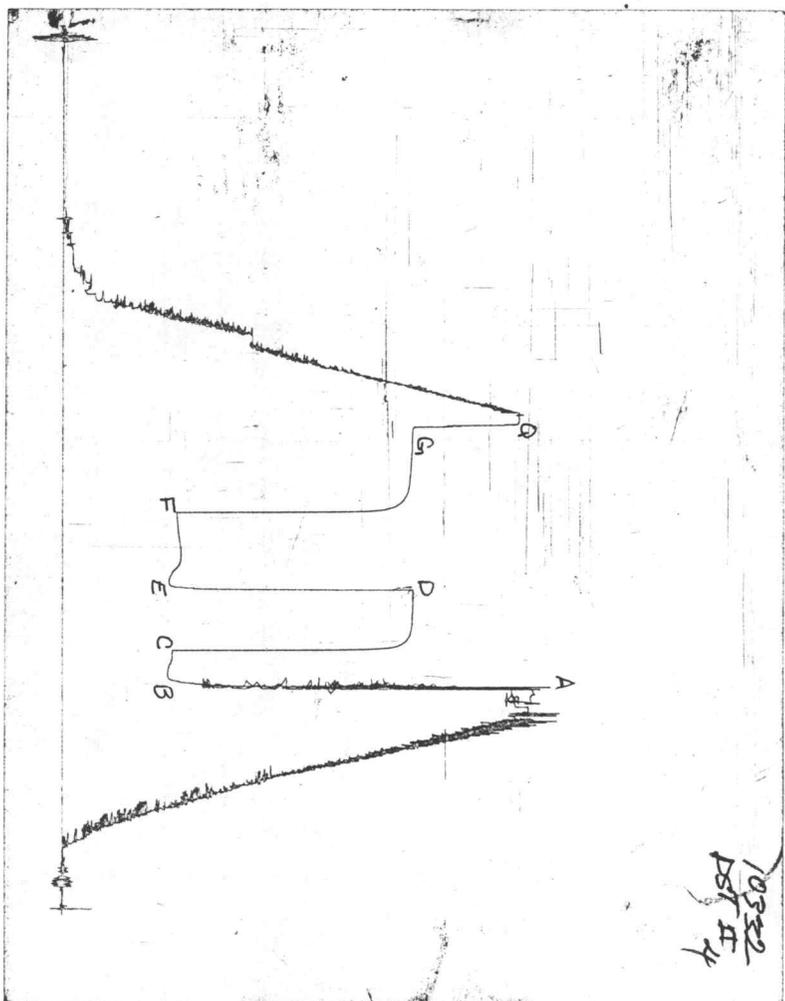


CHART PAGE



This is a photocopy of the actual AK-1 recorder chart

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### AK-1 Recorder Increments Listings

Test: Bird #1

Date: 1-6-98

DST #4

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	Time	Pressure PSIg	◇ Pressure
***Start Flow 1	0	564.0	564.0
	3	554.0	-10.0
	6	554.0	0.0
	9	557.0	3.0
	12	565.0	8.0
	15	573.0	8.0
	18	577.0	4.0
	21	577.0	0.0
	24	580.0	3.0
	27	580.0	0.0
	30	580.0	0.0

	Time	Pressure PSIg	Log Horn T	◇ Pressure	(T+dT)/dT
***Start Shutin 1	3	1581.0	1.041	1581.0	11.0
	6	1770.0	0.778	189.0	6.0
	9	1808.0	0.637	38.0	4.3
	12	1822.0	0.544	14.0	3.5
	15	1829.0	0.477	7.0	3.0
	18	1835.0	0.426	6.0	2.7
	21	1837.0	0.385	2.0	2.4
	24	1837.0	0.352	0.0	2.3
	27	1837.0	0.325	0.0	2.1
	30	1837.0	0.301	0.0	2.0
	33	1841.0	0.281	4.0	1.9
	36	1841.0	0.263	0.0	1.8
	39	1841.0	0.248	0.0	1.8
	42	1841.0	0.234	0.0	1.7
	45	1842.0	0.222	1.0	1.7

	Time	Pressure PSIg	◇ Pressure
***Start Flow 2	0	566.0	566.0
	3	558.0	-8.0
	6	563.0	5.0
	9	571.0	8.0
	12	591.0	20.0
	15	605.0	14.0
	18	616.0	11.0
	21	619.0	3.0
	24	619.0	0.0
	27	619.0	0.0
	30	619.0	0.0
	33	616.0	-3.0
	36	616.0	0.0
	39	609.0	-7.0
	42	608.0	-1.0
	45	608.0	0.0
	48	601.0	-7.0
	51	601.0	0.0
	54	599.0	-2.0
	57	596.0	-3.0
	60	596.0	0.0

	Time	Pressure PSIg	Log Horn T	◇ Pressure	(T+dT)/dT
***Start Shutin 2	3	1593.0	1.491	1593.0	31.0
	6	1724.0	1.204	131.0	16.0
	9	1771.0	1.041	47.0	11.0
	12	1789.0	0.929	18.0	8.5
	15	1804.0	0.845	15.0	7.0
	18	1813.0	0.778	9.0	6.0
	21	1817.0	0.723	4.0	5.3
	24	1821.0	0.677	4.0	4.8
	27	1821.0	0.637	0.0	4.3
	30	1825.0	0.602	4.0	4.0
	33	1825.0	0.571	0.0	3.7
	36	1825.0	0.544	0.0	3.5
	39	1829.0	0.520	4.0	3.3
	42	1829.0	0.497	0.0	3.1
	45	1829.0	0.477	0.0	3.0
	48	1829.0	0.459	0.0	2.9
	51	1834.0	0.442	5.0	2.8
	54	1834.0	0.426	0.0	2.7
	57	1834.0	0.411	0.0	2.6
	60	1838.0	0.398	4.0	2.5

## NATURAL GAS ANALYSIS REPORT

Sampled by:  
Trilobite Testing, L. L. C.  
Hays, Kansas  
Scott City, Kansas  
Phone: 800-728-5369  
Fax: 913-625-5620

Analyzed by:  
Caraway Analytical, Inc  
P. O. Box 2137  
Liberal, Kansas 67905  
Phone: 316-624-5389  
Fax: 316-626-7108

Lab Number:	980004	Analyzed:	12/30/97
Sample From:	Bird #1 DST 4	Pressure:	
Producer:	Thoroughbred Associates, L.L.C.	Temperature:	
Date:		Location:	16-32-19
Time:		County:	Comanche
Sampler:		State:	Kansas
Source:		Formation:	Miss

	Mole %	GPM
Helium	He: 0.082	0.000
Hydrogen	H2: 0.008	0.000
Oxygen	O2: 0.000	0.000
Nitrogen	N2: 1.087	0.000
Carbon Dioxide	CO2: 0.182	0.000
Methane	C1: 93.718	0.000
Ethane	C2: 2.793	0.747
Propane	C3: 0.946	0.261
Iso Butane	iC4: 0.143	0.047
Normal Butane	nC4: 0.292	0.092
Iso Pentane	iC5: 0.106	0.039
Normal Pentane	nC5: 0.118	0.043
Hexanes Plus	C6+: 0.525	0.229

TOTAL: 100.000 1.457  
Z Fact: 0.9977  
SP.GR.: 0.6088  
BTU (SAT): 1056.1 @ 14.73 psia  
BTU (DRY): 1074.8 @ 14.73 psia  
OCTANE RATING: 126.3

COMMENTS:

0.755



# TRILOBITE TESTING

P.O. Box 362 • Hays, Kansas 67601 • (913) 625-4778

## GAS VOLUME REPORT

Thoroughbred Ass, LLC  
OPERATOR

Bed #1

(Miss)

#4  
DST NO.

WELL NAME AND NO.

Tool Open 4:55 PM

Min.	Ins. of Water PSIG	Orifice Size	MCF/D	Min.	Ins. of Water PSIG	Orifice Size	MCF/D
2.5 in 4 min							
0	<del>160</del> 175	3/4	2,434,000				
	175	3/4	2,644,000				
	175	3/4	2,644,000				
5							
0	170	3/4	2,574,000				
0	190	3/4	2,853,000				
	190	3/4	2,853,000				
	190	3/4	2,853,000				
	190	3/4	2,853,000				
	185	3/4	2,783,000				

Remarks: