963

HALLIBURTON SERVICES

TICKET NO. 82417800

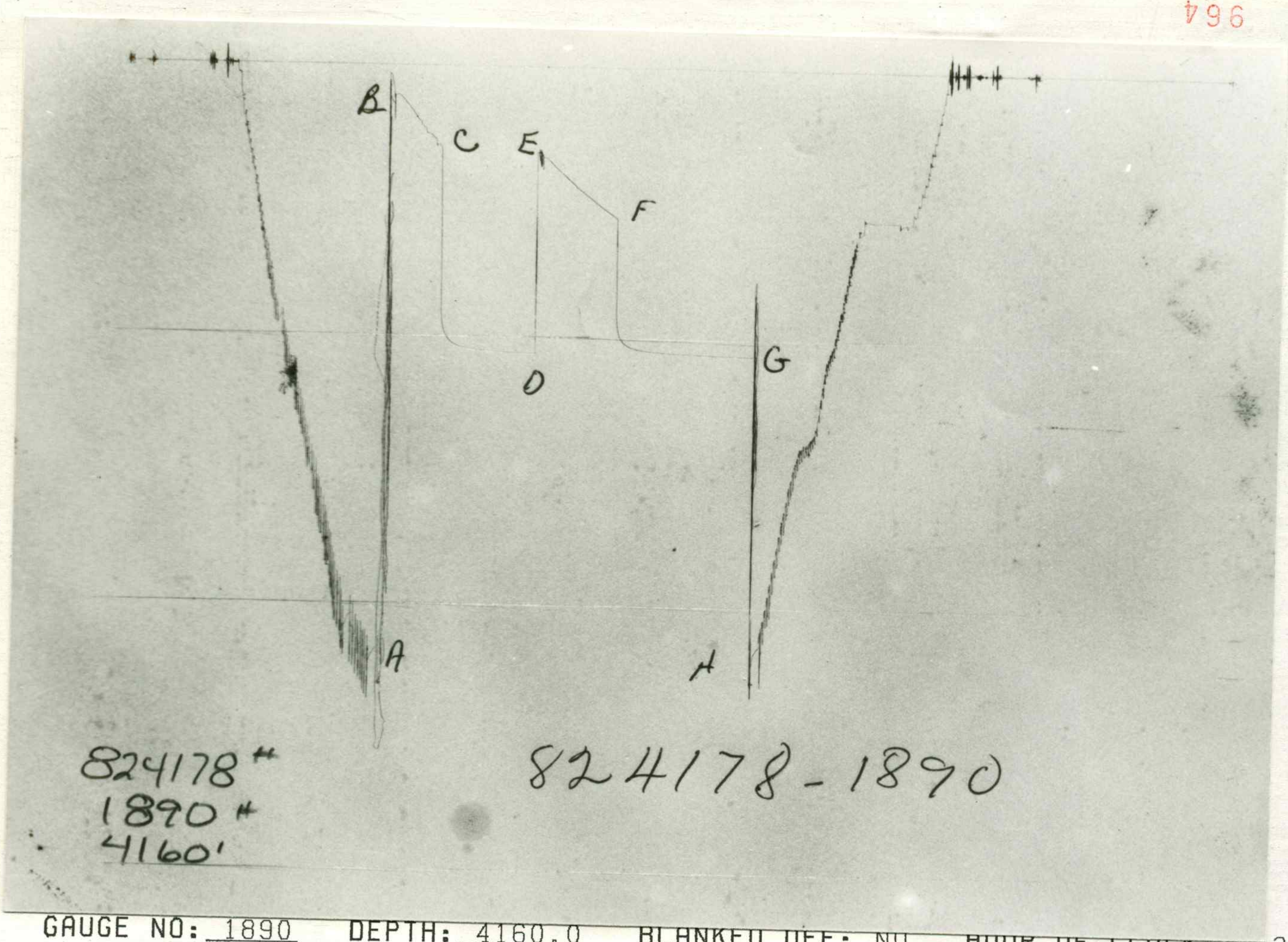
10-SEP-84

HAYS

FORMATION TESTING SERVICE RE

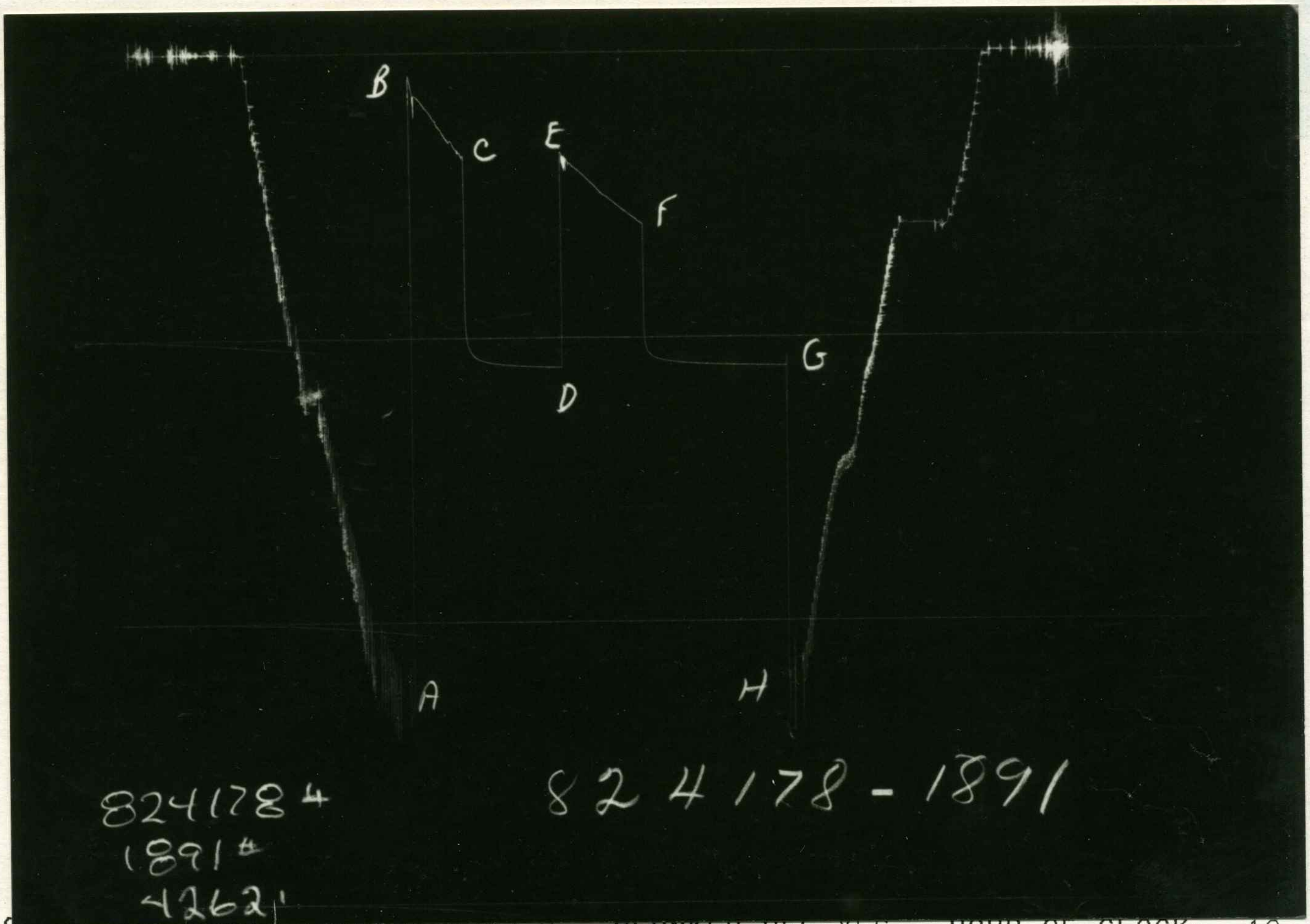
LEASE NAME	WELL NO.	TEST NO.	TESTED INTERVAL	LEASE OWNER/COMPANY NAME
KRANZ	1	1	4180.' - 4265.'	SPINES EXPLORATION INCORPORATED

LEGAL LOCATION SEC. - TWP. - RNG.	FIELD AREA	COUNTY	STATE
33-15-21		TREGO	KANSAS DR



GAUGE NO: 1890 DEPTH: 4160.0 BLANKED OFF: NO HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE REPORTED	PRESSURE CALCULATED	TIME REPORTED	TIME CALCULATED	TYPE
A	INITIAL HYDROSTATIC		2160.8			
B	INITIAL FIRST FLOW		32.9	30.0	32.5	F
C	FINAL FIRST FLOW		301.3			
C	INITIAL FIRST CLOSED-IN		301.3	60.0	57.6	C
D	FINAL FIRST CLOSED-IN		1060.6			
E	INITIAL SECOND FLOW		318.7	45.0	49.7	F
F	FINAL SECOND FLOW		556.4			
F	INITIAL SECOND CLOSED-IN		556.4	90.0	85.3	C
G	FINAL SECOND CLOSED-IN		1060.6			
H	FINAL HYDROSTATIC		2145.7			



GAUGE NO: 1891 DEPTH: 4262.0 BLANKED OFF: YES HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	2324	2204.8			
B	INITIAL FIRST FLOW	87	80.0	30.0	32.5	F
C	FINAL FIRST FLOW	365	360.5			
C	INITIAL FIRST CLOSED-IN	365	360.5	60.0	57.6	C
D	FINAL FIRST CLOSED-IN	1113	1102.2			
E	INITIAL SECOND FLOW	365	348.1	45.0	49.7	F
F	FINAL SECOND FLOW	608	602.2			
F	INITIAL SECOND CLOSED-IN	608	602.2	90.0	85.3	C
G	FINAL SECOND CLOSED-IN	1078	1100.8			
H	FINAL HYDROSTATIC	2182	2173.9			

EQUIPMENT & HOLE DATA

FORMATION TESTED: CHREE
NET PAY (ft):
GROSS TESTED FOOTAGE: 85.0
ALL DEPTHS MEASURED FROM: KELLY BUSHING
CASING PERFS. (ft):
HOLE OR CASING SIZE (in): 7.875
ELEVATION (ft): 0
TOTAL DEPTH (ft): 4265.0
PACKER DEPTH(S) (ft): 4175, 4180
FINAL SURFACE CHOKE (in):
BOTTOM HOLE CHOKE (in): 0.750
MUD WEIGHT (lb/gal): 9.70
MUD VISCOSITY (sec): 38
ESTIMATED HOLE TEMP. (°F):
ACTUAL HOLE TEMP. (°F): 118 @ 4260.0 ft

TICKET NUMBER: 82417800

DATE: 9-4-84 TEST NO: 1

TYPE DST: OPEN HOLE

HALLIBURTON CAMP: HAYS

TESTER: D.MORGAN

WITNESS: GEORGE MC CALEB

DRILLING CONTRACTOR: MURFIN #16

FLUID PROPERTIES FOR RECOVERED MUD & WATER

SOURCE	RESISTIVITY	CHLORIDES
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm

SAMPLER DATA

Psig AT SURFACE:
cu.ft. OF GAS:
cc OF OIL:
cc OF WATER:
cc OF MUD:
TOTAL LIQUID cc:

HYDROCARBON PROPERTIES

OIL GRAVITY (°API): @ °F
GAS/OIL RATIO (cu.ft. per bbl):
GAS GRAVITY:

CUSHION DATA

TYPE	AMOUNT	WEIGHT

RECOVERED:

1330' OF WATERY MUD (5% MUD, 95% WATER).

MEASURED FROM TESTER VALVE

REMARKS:

TYPE & SIZE MEASURING DEVICE: ______

TICKET NO: 82417800

TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
9-4-84					
0300					CALLED OUT
0500					ON LOCATION
0730					PICKED UP AND MADE UP TOOL
0755					TOOL IN TABLE
0800					TOOL STARTED DOWN HOLE
0927					TOOL ON BOTTOM
0930					OPENED TOOL WITH A STRONG BLOW,
					7 1/4" IN 5.4 MINUTES.
1000					TOOL CLOSED WITH NO BLOW
1100					OPENED TOOL WITH A STRONG BLOW
					7 1/4" IN 5.5 MINUTES.
1145					CLOSED TOOL WITH NO BLOW
1315					TOOL OFF BOTTOM
1330					TOOL STARTED UP HOLE
1430					SET UP TO REVERSE OUT
1540					TOOL IN TABLE
1610					TOOL LAID DOWN

TICKET NO: 82417800

CLOCK NO: 3121 HOUR: 12

HALLIBURTON SERVICES

GAUGE NO: 1890

DEPTH: 4160.0

REF		MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
			FIRST FLOW			
B	1	0.0	32.9			
	2	5.0	109.1	76.1		
	3	10.0	136.9	27.9		
	4	15.0	173.9	37.0		
	5	20.0	221.6	47.7		
	6	25.0	253.4	31.8		
	7	30.0	292.6	39.2		
C	8	32.5	301.3	8.8		
			FIRST CLOSED-IN			
C	1	0.0	301.3			
	2	1.0	961.6	660.3	1.0	1.528
	3	2.0	983.7	682.4	1.9	1.240
	4	3.0	997.8	696.4	2.7	1.074
	5	4.0	1006.3	705.0	3.5	0.962
	6	5.0	1014.7	713.4	4.4	0.871
	7	6.0	1019.9	718.6	5.1	0.805
	8	7.0	1025.1	723.8	5.8	0.750
	9	8.0	1028.3	727.0	6.4	0.705
	10	9.0	1031.3	729.9	7.0	0.664
	11	10.0	1034.0	732.6	7.7	0.627
	12	12.0	1038.1	736.8	8.8	0.568
	13	14.0	1042.1	740.7	9.8	0.520
	14	16.0	1044.1	742.8	10.7	0.482
	15	18.0	1046.6	745.3	11.6	0.447
	16	20.0	1048.4	747.1	12.4	0.419
	17	22.0	1049.8	748.5	13.1	0.393
	18	24.0	1051.2	749.8	13.8	0.371
	19	26.0	1052.1	750.7	14.4	0.352
	20	28.0	1053.2	751.8	15.0	0.334
	21	30.0	1054.1	752.8	15.6	0.319
	22	35.0	1056.0	754.7	16.8	0.285
	23	40.0	1057.5	756.2	17.9	0.258
	24	45.0	1058.4	757.1	18.9	0.236
	25	50.0	1059.6	758.3	19.7	0.217
	26	55.0	1060.7	759.4	20.4	0.202
D	27	57.6	1060.6	759.3	20.8	0.194
			SECOND FLOW			
E	1	0.0	318.7			
	2	8.0	347.1	28.3		
	3	16.0	393.5	46.5		
	4	24.0	438.3	44.7		
	5	32.0	478.5	40.2		
	6	40.0	515.9	37.5		
	7	48.0	550.6	34.7		
F	8	49.7	556.4	5.8		

REF		MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
			SECOND CLOSED-IN			
F	1	0.0	556.4			
	2	1.0	975.5	419.1	1.0	1.931
	3	2.0	995.6	439.2	1.9	1.628
	4	3.0	1005.5	449.1	2.9	1.451
	5	4.0	1013.8	457.4	3.9	1.328
	6	5.0	1019.2	462.8	4.7	1.242
	7	6.0	1023.2	466.7	5.6	1.167
	8	7.0	1026.3	469.9	6.4	1.107
	9	8.0	1029.3	472.9	7.3	1.053
	10	9.1	1032.1	475.7	8.2	1.003
	11	10.0	1034.1	477.7	8.9	0.965
	12	12.0	1038.3	481.8	10.5	0.894
	13	14.0	1041.1	484.6	12.0	0.836
	14	16.0	1042.5	486.1	13.4	0.788
	15	18.0	1043.7	487.2	14.7	0.746
	16	20.0	1044.9	488.5	16.1	0.708
	17	22.0	1046.4	489.9	17.4	0.674
	18	24.0	1047.4	490.9	18.6	0.646
	19	26.0	1048.4	492.0	19.7	0.619
	20	28.0	1049.4	492.9	20.9	0.595
	21	30.0	1050.3	493.8	22.0	0.573
	22	35.0	1052.1	495.6	24.5	0.525
	23	40.0	1053.1	496.7	26.9	0.485
	24	45.0	1054.8	498.3	29.1	0.451
	25	50.0	1055.7	499.2	31.1	0.422
	26	55.0	1056.6	500.1	32.9	0.397
	27	60.0	1057.8	501.4	34.7	0.375
	28	70.0	1058.6	502.1	37.8	0.337
	29	80.0	1060.2	503.7	40.5	0.307
G	30	85.3	1060.6	504.2	41.8	0.293

REMARKS:

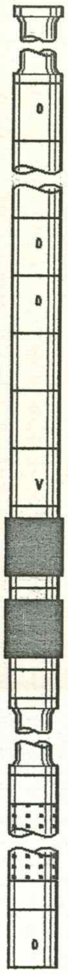
TICKET NO: 82417800	GAUGE NO: 1891
CLOCK NO: 11657 HOUR: 12	DEPTH: 4262.0

HALLIBURTON SERVICES

REF		MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t+\Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
FIRST FLOW						
B	1	0.0	80.0			
	2	5.0	155.1	75.2		
	3	10.0	193.4	38.3		
	4	15.0	234.1	40.7		
	5	20.0	279.1	45.0		
	6	25.0	308.9	29.8		
	7	30.0	349.6	40.7		
C	8	32.5	360.5	10.9		
FIRST CLOSED-IN						
C	1	0.0	360.5			
	2	1.0	1009.7	649.2	1.0	1.533
	3	2.0	1035.1	674.6	1.9	1.229
	4	3.0	1047.6	687.1	2.8	1.071
	5	4.0	1056.0	695.5	3.6	0.956
	6	5.0	1062.2	701.7	4.3	0.874
	7	6.0	1067.3	706.8	5.1	0.806
	8	7.0	1070.9	710.4	5.8	0.751
	9	8.0	1073.9	713.4	6.4	0.705
	10	9.0	1076.1	715.7	7.0	0.665
	11	10.0	1079.2	718.7	7.7	0.627
	12	12.0	1082.2	721.7	8.8	0.569
	13	14.0	1084.9	724.4	9.8	0.521
	14	16.0	1086.8	726.3	10.7	0.481
	15	18.0	1089.1	728.6	11.6	0.448
	16	20.0	1090.1	729.6	12.4	0.419
	17	22.0	1091.5	731.0	13.1	0.393
	18	24.0	1092.8	732.3	13.8	0.372
	19	26.0	1093.7	733.2	14.4	0.352
	20	28.0	1095.0	734.5	15.0	0.334
	21	30.0	1095.8	735.3	15.6	0.319
	22	35.0	1097.0	736.6	16.9	0.285
	23	40.0	1098.9	738.4	17.9	0.258
	24	45.0	1100.1	739.6	18.9	0.236
	25	50.0	1101.0	740.5	19.7	0.217
	26	55.0	1101.9	741.5	20.4	0.201
D	27	57.6	1102.2	741.7	20.8	0.194
SECOND FLOW						
E	1	0.0	348.1			
	2	8.0	397.8	49.7		
	3	16.0	438.4	40.6		
	4	24.0	487.1	48.8		
	5	32.0	523.1	36.0		
	6	40.0	559.5	36.3		
	7	48.0	596.1	36.7		
F	8	49.7	602.2	6.1		
SECOND CLOSED-IN						
F	1	0.0	602.2			
	2	1.0	1031.6	429.3	1.0	1.909
	3	2.0	1046.7	444.5	1.9	1.629
	4	3.0	1056.1	453.8	2.9	1.455
	5	4.0	1061.2	459.0	3.8	1.337
	6	5.0	1065.6	463.4	4.7	1.241
	7	6.0	1068.7	466.4	5.6	1.166
	8	7.0	1071.5	469.3	6.4	1.105
	9	8.0	1073.5	471.3	7.3	1.053
	10	9.0	1075.6	473.4	8.1	1.007
	11	10.0	1077.1	474.9	8.9	0.964
	12	12.0	1079.7	477.5	10.5	0.895
	13	14.0	1082.2	480.0	12.0	0.837
	14	16.0	1083.6	481.4	13.4	0.788
	15	18.0	1085.5	483.3	14.8	0.745
	16	20.0	1086.6	484.4	16.1	0.709
	17	22.0	1087.9	485.6	17.4	0.675
	18	24.0	1088.6	486.3	18.6	0.646
	19	26.0	1089.7	487.5	19.7	0.619
	20	28.0	1090.6	488.3	20.9	0.595
	21	30.0	1091.4	489.1	22.0	0.573
	22	35.0	1092.8	490.5	24.5	0.525
	23	40.0	1094.2	492.0	26.9	0.485
	24	45.0	1095.4	493.1	29.1	0.451
	25	50.0	1096.5	494.3	31.1	0.422
	26	55.0	1097.7	495.5	32.9	0.397
	27	60.0	1098.0	495.8	34.7	0.375
	28	70.0	1099.1	496.8	37.8	0.337
	29	80.0	1100.4	498.1	40.5	0.307
G	30	85.3	1100.8	498.6	41.8	0.293

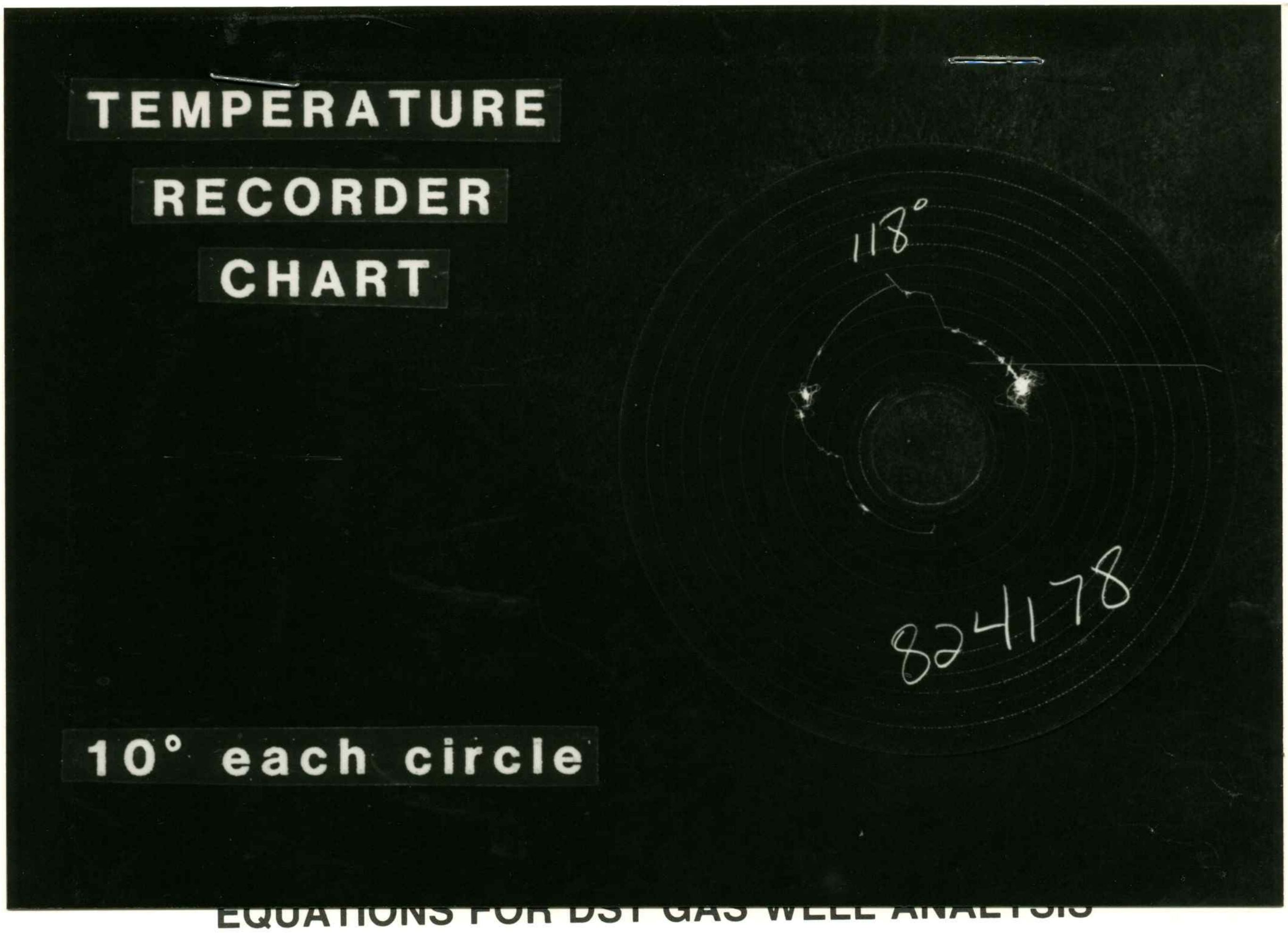
REMARKS:

TICKET NO. 82417800



		O.D.	I.D.	LENGTH	DEPTH
1	DRILL PIPE......................	4.500	3.826	4023.0	
50	IMPACT REVERSING SUB...........	5.750	2.750	1.0	4023.0
3	DRILL COLLARS..................	6.250	2.250	124.0	
12	DUAL CIP VALVE.................	5.000	0.870	6.0	
60	HYDROSPRING TESTER.............	5.000	0.750	5.0	4158.0
80	AP RUNNING CASE................	5.000	3.060	4.0	4160.0
15	JAR............................	5.000	1.750	5.0	
16	VR SAFETY JOINT................	5.000	1.000	3.0	
70	OPEN HOLE PACKER...............	6.750	1.530	5.0	4175.0
70	OPEN HOLE PACKER...............	6.750	1.530	4.0	4180.0
5	CROSSOVER......................	5.000	3.750	2.0	
1	DRILL PIPE.....................	4.500	3.826	62.0	
5	CROSSOVER......................	5.000	3.750	2.0	
20	FLUSH JOINT ANCHOR.............	5.000	3.840	12.0	
83	HT-500 TEMPERATURE CASE........	5.000		1.5	4260.0
81	BLANKED-OFF RUNNING CASE........	5.000		4.0	4262.0
	TOTAL DEPTH				4265.0

EQUIPMENT DATA



EQUATIONS FOR DST GAS WELL ANALYSIS

Indicated Flow Capacity	$kh = \dfrac{1637\ Q_g\ T}{m}$	md-ft
Average Effective Permeability	$k = \dfrac{kh}{h}$	md
Skin Factor	$S = 1.151 \left[\dfrac{m(P^*) - m(P_f)}{m} - \text{LOG}\ \dfrac{k(t/60)}{\phi\ \mu\ c_t r_w^2} + 3.23 \right]$	—
Damage Ratio	$DR = \dfrac{m(P^*) - m(P_f)}{m(P^*) - m(P_f) - 0.87\ mS}$	—
Indicated Flow Rate (Maximum)	$AOF_1 = \dfrac{Q_g\ m(P^*)}{m(P^*) - m(P_f)}$	MCFD
Indicated Flow Rate (Minimum)	$AOF_2 = Q_g \sqrt{\dfrac{m(P^*)}{m(P^*) - m(P_f)}}$	MCFD
Approx. Radius of Investigation	$r_i = 0.032 \sqrt{\dfrac{k(t/60)}{\phi \mu c_t}}$	ft

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HALLIBURTON
SERVICES

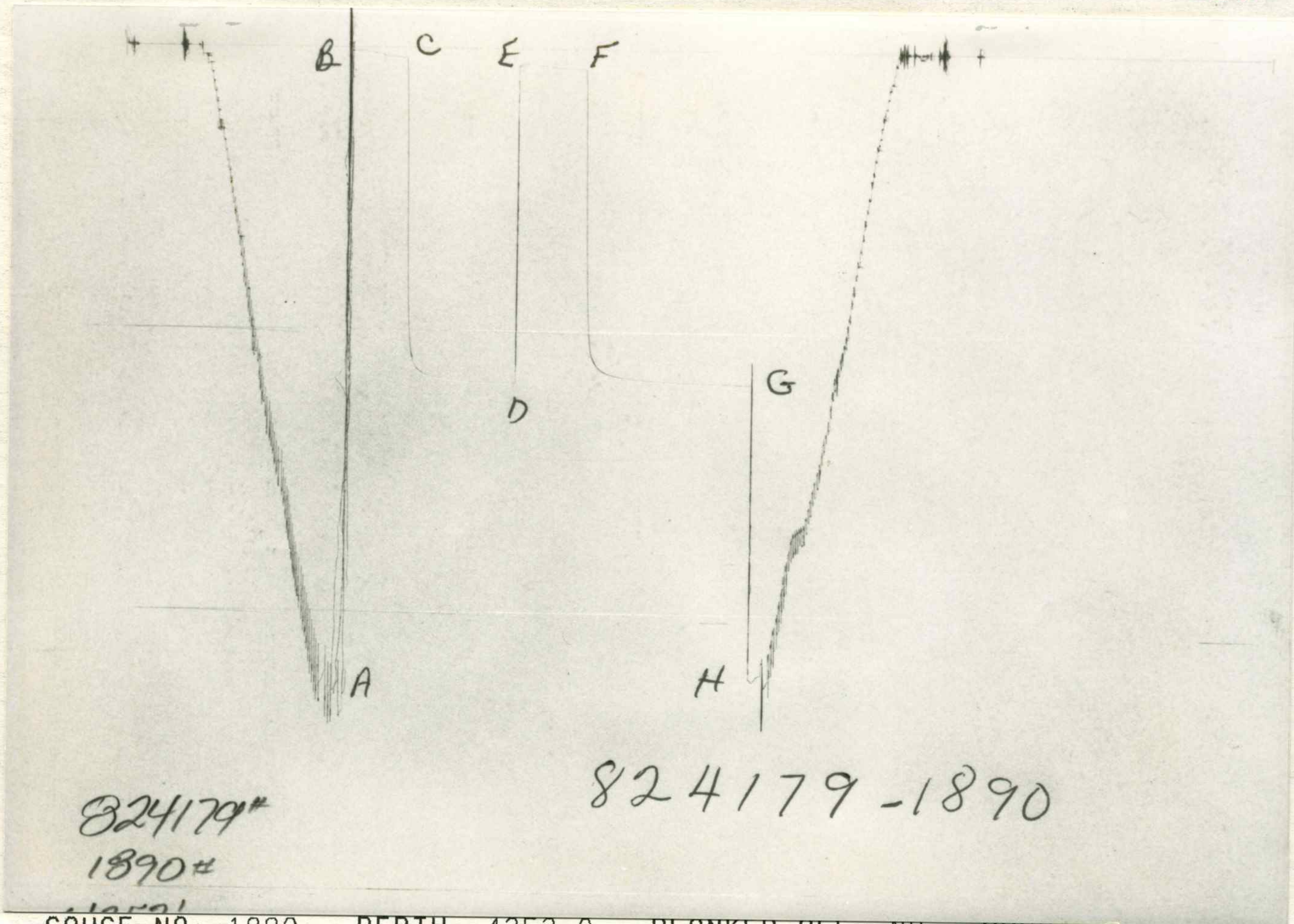
TICKET NO. 82417900

10-SEP-84

HAYS

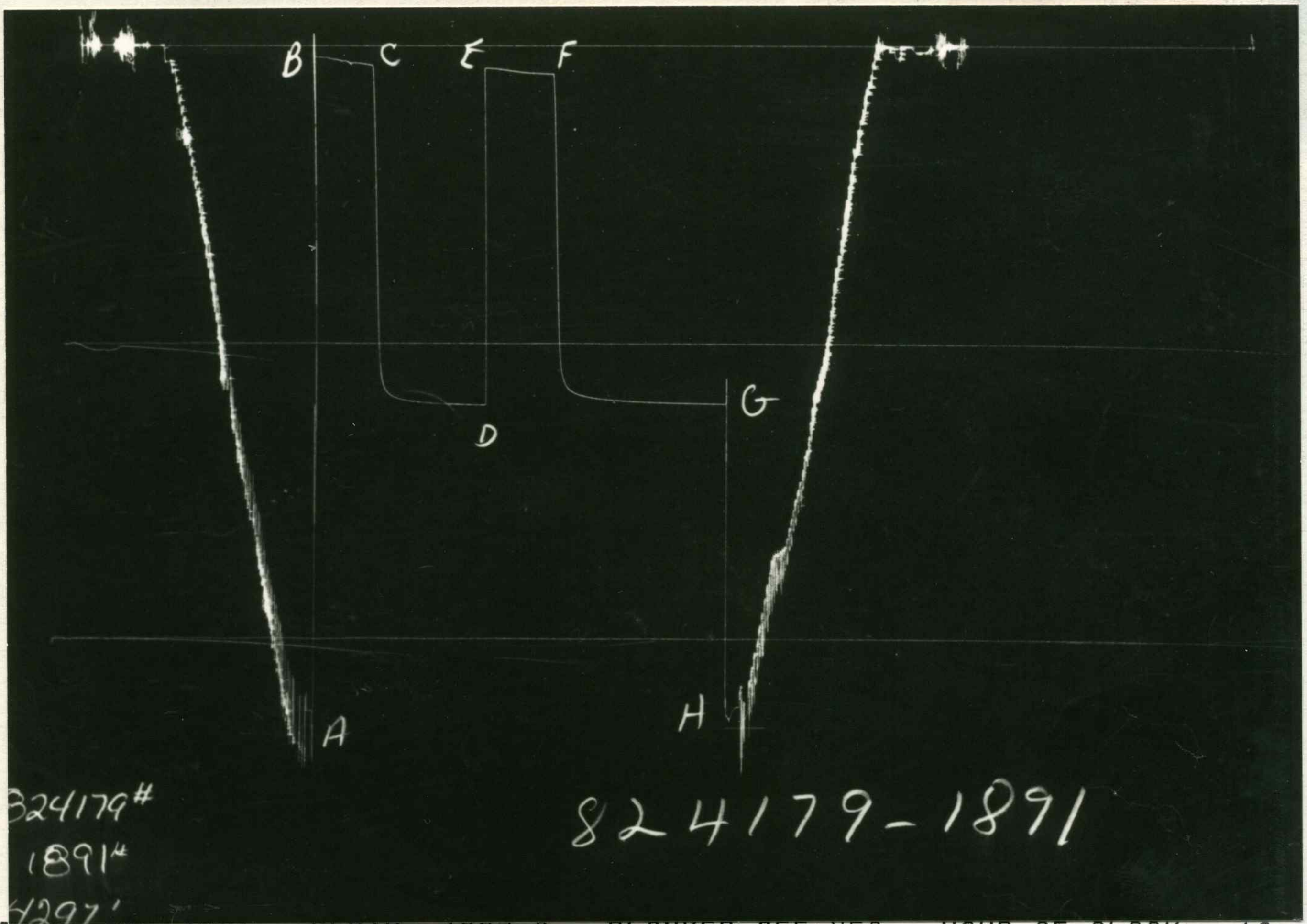
FORMATION TESTING SERVICE REPORT

KRANZ	LEASE NAME
1	WELL NO.
2	TEST NO.
4272.' - 4300.'	TESTED INTERVAL
SPINES EXPLORATION, INCORPORATED	LEASE OWNER/COMPANY NAME
33-15-21	LEGAL LOCATION SEC. - TWP. - RNG.
	FIELD AREA
TREGO	COUNTY
KANSAS	STATE
DR	



GAUGE NO: 1890 DEPTH: 4252.0 BLANKED OFF: NO HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE REPORTED	PRESSURE CALCULATED	TIME REPORTED	TIME CALCULATED	TYPE
A	INITIAL HYDROSTATIC		2249.9			
B	INITIAL FIRST FLOW		11.7	30.0	33.6	F
C	FINAL FIRST FLOW		37.8			
C	INITIAL FIRST CLOSED-IN		37.8	60.0	64.6	C
D	FINAL FIRST CLOSED-IN		1184.3			
E	INITIAL SECOND FLOW		64.7	45.0	40.4	F
F	FINAL SECOND FLOW		70.8			
F	INITIAL SECOND CLOSED-IN		70.8	90.0	98.4	C
G	FINAL SECOND CLOSED-IN		1180.4			
H	FINAL HYDROSTATIC		2212.7			



GAUGE NO: 1891 DEPTH: 4297.0 BLANKED OFF: YES HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE REPORTED	PRESSURE CALCULATED	TIME REPORTED	TIME CALCULATED	TYPE
A	INITIAL HYDROSTATIC	2306	2266.0			
B	INITIAL FIRST FLOW	52	37.6	30.0	33.6	F
C	FINAL FIRST FLOW	70	64.8			
C	INITIAL FIRST CLOSED-IN	70	64.8	60.0	64.6	C
D	FINAL FIRST CLOSED-IN	1200	1204.8			
E	INITIAL SECOND FLOW	70	74.8	45.0	40.4	F
F	FINAL SECOND FLOW	87	94.5			
F	INITIAL SECOND CLOSED-IN	87	94.5	90.0	98.4	C
G	FINAL SECOND CLOSED-IN	1200	1200.5			
H	FINAL HYDROSTATIC	2271	2228.8			

EQUIPMENT & HOLE DATA

FORMATION TESTED:
NET PAY (ft):
GROSS TESTED FOOTAGE: 28.0
ALL DEPTHS MEASURED FROM: KELLY BUSHING
CASING PERFS. (ft):
HOLE OR CASING SIZE (in): 7.875
ELEVATION (ft): 0
TOTAL DEPTH (ft): 4300.0
PACKER DEPTH(S) (ft): 4267, 4272
FINAL SURFACE CHOKE (in):
BOTTOM HOLE CHOKE (in): 0.750
MUD WEIGHT (lb/gal): 10.00
MUD VISCOSITY (sec): 44
ESTIMATED HOLE TEMP. (°F):
ACTUAL HOLE TEMP. (°F): 122 @ 4295.0 ft

TICKET NUMBER: 82417900
DATE: 9-5-84 TEST NO: 2
TYPE DST: OPEN HOLE
HALLIBURTON CAMP: HAYS
TESTER: MORGAN
WITNESS: MC CALEB
DRILLING CONTRACTOR: MURFIN #16

FLUID PROPERTIES FOR RECOVERED MUD & WATER

SOURCE	RESISTIVITY	CHLORIDES
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm

SAMPLER DATA

Psig AT SURFACE:
cu.ft. OF GAS:
cc OF OIL:
cc OF WATER:
cc OF MUD:
TOTAL LIQUID cc:

HYDROCARBON PROPERTIES

OIL GRAVITY (°API): @ °F
GAS/OIL RATIO (cu.ft. per bbl):
GAS GRAVITY:

CUSHION DATA

TYPE	AMOUNT	WEIGHT

RECOVERED:

154' OF WATERY MUD

MEASURED FROM TESTER VALVE

REMARKS:

TIMES GIVEN AND RECORDED DO NOT AGREE

USED STANDARD CLOCK FACTOR TO OBTAIN TIMES

TYPE & SIZE MEASURING DEVICE: ______

TICKET NO: 82417900

TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
9-5-84					
0015					CALLED OUT
0130					ON LOCATION
0215					PICKED UP AND MADE UP TOOL
0245					TOOL IN TABLE
0250					TOOL STARTED DOWN HOLE
0407					TOOL ON BOTTOM
0410					OPENED TOOL WITH A WEAK BLOW,
					BUILDING TO 2 1/4".
0440					CLOSED TOOL WITH NO BLOW
0540					OPENED TOOL WITH A WEAK BLOW,
					BUILDING TO 1/4" BLOW.
0625					CLOSED TOOL WITH NO BLOW
0755					TOOL OFF BOTTOM
0915					TOOL IN TABLE
1000					TOOL LAID DOWN

TICKET NO: 82417900		GAUGE NO: 1890
CLOCK NO: 3121 HOUR: 12	HALLIBURTON SERVICES	DEPTH: 4252.0

REF		MINUTES	PRESSURE	ΔP	$\frac{t\times\Delta t}{t+\Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
			FIRST FLOW			
B	1	0.0	11.7			
	2	5.0	11.7	0.0		
	3	10.0	14.2	2.5		
	4	15.0	19.7	5.4		
	5	20.0	26.0	6.3		
	6	25.0	30.6	4.6		
	7	30.0	34.3	3.7		
C	8	33.6	37.8	3.4		
			FIRST CLOSED-IN			
C	1	0.0	37.8			
	2	4.0	1104.5	1066.8	3.5	0.978
	3	8.0	1143.1	1105.3	6.5	0.717
	4	12.0	1156.6	1118.9	8.8	0.581
	5	16.0	1164.3	1126.5	10.8	0.492
	6	20.0	1169.1	1131.4	12.5	0.429
	7	24.0	1172.4	1134.6	14.0	0.381
	8	28.0	1174.7	1137.0	15.3	0.342
	9	32.0	1176.6	1138.9	16.4	0.312
	10	36.0	1178.2	1140.5	17.4	0.287
	11	40.0	1179.6	1141.8	18.3	0.265
	12	44.0	1180.8	1143.1	19.1	0.247
	13	48.0	1181.1	1143.4	19.8	0.231
	14	52.0	1181.8	1144.1	20.4	0.217
	15	56.0	1182.6	1144.9	21.0	0.204
	16	60.0	1183.4	1145.6	21.6	0.193
D	17	64.6	1184.3	1146.5	22.1	0.182
			SECOND FLOW			
E	1	0.0	64.7			
	2	8.0	54.5	-10.2		
	3	16.0	59.3	4.8		
	4	24.0	65.2	5.9		
	5	32.0	68.4	3.3		
F	6	40.4	70.8	2.4		
			SECOND CLOSED-IN			
F	1	0.0	70.8			
	2	6.0	1113.8	1043.0	5.6	1.125
	3	12.0	1144.3	1073.5	10.3	0.856
	4	18.0	1155.8	1085.0	14.5	0.709
	5	24.0	1162.2	1091.4	18.1	0.611
	6	30.0	1166.7	1095.9	21.3	0.540
	7	36.0	1168.9	1098.1	24.2	0.485
	8	42.0	1171.5	1100.7	26.8	0.441
	9	48.0	1173.2	1102.4	29.1	0.405

REF		MINUTES	PRESSURE	ΔP	$\frac{t\times\Delta t}{t+\Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
			SECOND CLOSED-IN - CONTINUED			
	10	54.0	1174.7	1103.9	31.2	0.375
	11	60.0	1176.0	1105.2	33.2	0.349
	12	66.0	1177.2	1106.4	34.9	0.327
	13	72.0	1177.9	1107.0	36.5	0.307
	14	78.0	1178.2	1107.4	38.0	0.290
	15	84.0	1178.8	1108.0	39.4	0.275
	16	90.0	1180.0	1109.2	40.6	0.261
	17	96.0	1180.5	1109.7	41.8	0.248
G	18	98.4	1180.4	1109.6	42.3	0.244

REMARKS:

TICKET NO: 82417900

CLOCK NO: 11657 HOUR: 12

HALLIBURTON SERVICES

GAUGE NO: 1891

DEPTH: 4297.0

FIRST FLOW

REF	MINUTES	PRESSURE	ΔP	$\frac{t\times\Delta t}{t+\Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
B 1	0.0	37.6			
2	5.0	38.9	1.3		
3	10.0	43.8	4.9		
4	15.0	48.3	4.5		
5	20.0	56.4	8.1		
6	25.0	57.9	1.5		
7	30.0	61.9	4.0		
C 8	33.6	64.8	3.0		

FIRST CLOSED-IN

REF	MINUTES	PRESSURE	ΔP	$\frac{t\times\Delta t}{t+\Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
C 1	0.0	64.8			
2	4.0	1118.6	1053.8	3.6	0.974
3	8.0	1166.7	1101.9	6.5	0.717
4	12.0	1179.8	1115.0	8.8	0.580
5	16.0	1187.2	1122.4	10.8	0.492
6	20.0	1190.8	1126.0	12.5	0.429
7	24.0	1193.6	1128.7	14.0	0.381
8	28.0	1195.8	1131.0	15.3	0.342
9	32.0	1197.7	1132.8	16.4	0.312
10	36.0	1199.1	1134.3	17.4	0.287
11	40.0	1200.5	1135.6	18.3	0.265
12	44.0	1201.3	1136.5	19.1	0.247
13	48.0	1201.9	1137.1	19.8	0.231
14	52.0	1203.1	1138.3	20.4	0.217
15	56.0	1203.9	1139.1	21.0	0.204
16	60.0	1203.9	1139.1	21.6	0.193
D 17	64.6	1204.8	1140.0	22.1	0.182

SECOND FLOW

REF	MINUTES	PRESSURE	ΔP	$\frac{t\times\Delta t}{t+\Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
E 1	0.0	74.8			
2	8.0	77.9	3.0		
3	16.0	83.9	6.0		
4	24.0	90.0	6.2		
5	32.0	92.6	2.5		
F 6	40.4	94.5	1.9		

SECOND CLOSED-IN

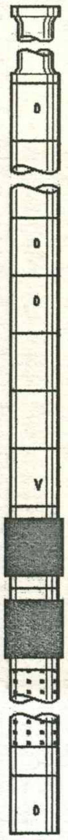
REF	MINUTES	PRESSURE	ΔP	$\frac{t\times\Delta t}{t+\Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
F 1	0.0	94.5			
2	6.0	1140.1	1045.6	5.5	1.127
3	12.0	1166.0	1071.5	10.3	0.856
4	18.0	1175.8	1081.3	14.5	0.709
5	24.0	1182.1	1087.6	18.2	0.611
6	30.0	1185.8	1091.3	21.3	0.540
7	36.0	1188.7	1094.2	24.2	0.485
8	42.0	1191.2	1096.7	26.8	0.441
9	48.0	1192.8	1098.3	29.1	0.405

SECOND CLOSED-IN - CONTINUED

REF	MINUTES	PRESSURE	ΔP	$\frac{t\times\Delta t}{t+\Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
10	54.0	1194.3	1099.9	31.2	0.375
11	60.0	1195.7	1101.3	33.2	0.349
12	66.0	1197.0	1102.6	34.9	0.327
13	72.0	1197.0	1102.5	36.5	0.307
14	78.0	1198.0	1103.5	38.0	0.290
15	84.0	1198.7	1104.2	39.4	0.275
16	90.0	1199.5	1105.0	40.6	0.261
17	96.0	1200.4	1105.9	41.8	0.248
G 18	98.4	1200.5	1106.0	42.3	0.244

REMARKS:

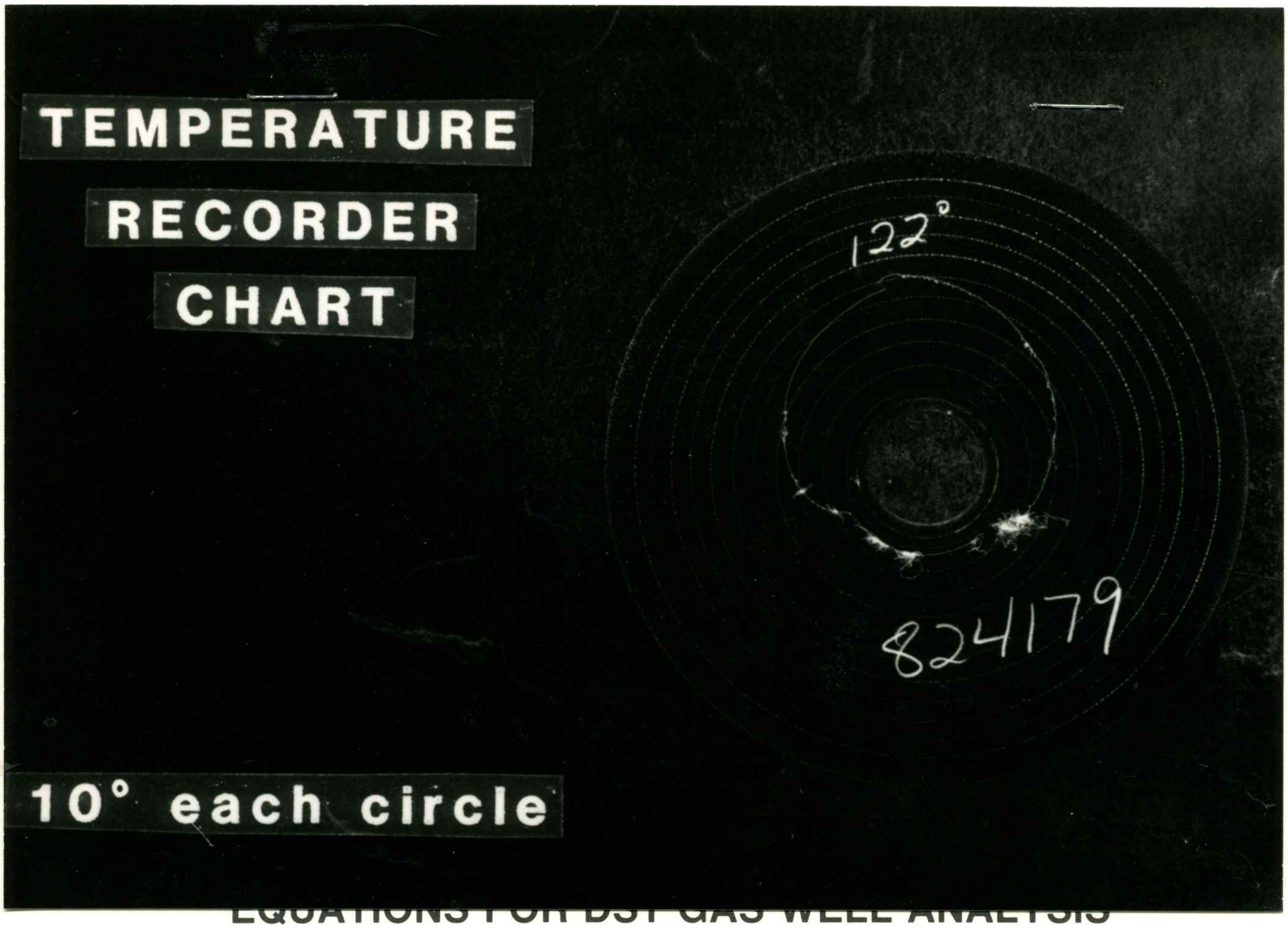
TICKET NO. 82417900



		O.D.	I.D.	LENGTH	DEPTH
1	DRILL PIPE......................	4.500	3.826	4115.0	
50	IMPACT REVERSING SUB...........	5.750	2.750	1.0	4115.0
3	DRILL COLLARS..................	6.250	2.250	124.0	
12	DUAL CIP VALVE.................	5.000	0.870	6.0	
60	HYDROSPRING TESTER.............	5.000	0.750	5.0	4250.0
80	AP RUNNING CASE................	5.000	3.060	4.0	4252.0
15	JAR............................	5.000	1.750	5.0	
16	VR SAFETY JOINT................	5.000	1.000	3.0	
70	OPEN HOLE PACKER...............	6.750	1.530	5.0	4267.0
70	OPEN HOLE PACKER...............	6.750	1.530	4.0	4272.0
20	FLUSH JOINT ANCHOR.............	5.000	3.840	21.0	
83	HT-500 TEMPERATURE CASE........	5.000		1.5	4295.0
81	BLANKED-OFF RUNNING CASE.......	5.000		4.0	4297.0

TOTAL DEPTH 4300.0

EQUIPMENT DATA



EQUATIONS FOR DST GAS WELL ANALYSIS

Indicated Flow Capacity

$$kh = \frac{1637\ Q_g\ T}{m}$$

md-ft

Average Effective Permeability

$$k = \frac{kh}{h}$$

md

Skin Factor

$$S = 1.151 \left[\frac{m(P^*) - m(P_f)}{m} - \mathrm{LOG}\ \frac{k(t/60)}{\phi\ \mu\ c_t r_w^2} + 3.23 \right]$$

—

Damage Ratio

$$DR = \frac{m(P^*)\ -\ m(P_f)}{m(P^*) - m(P_f) - 0.87\ mS}$$

—

Indicated Flow Rate (Maximum)

$$AOF_1 = \frac{Q_g\ m(P^*)}{m(P^*) - m(P_f)}$$

MCFD

Indicated Flow Rate (Minimum)

$$AOF_2 = Q_g \sqrt{\frac{m(P^*)}{m(P^*) - m(P_f)}}$$

MCFD

Approx. Radius of Investigation

$$r_i = 0.032 \sqrt{\frac{k(t/60)}{\phi \mu c_t}}$$

ft