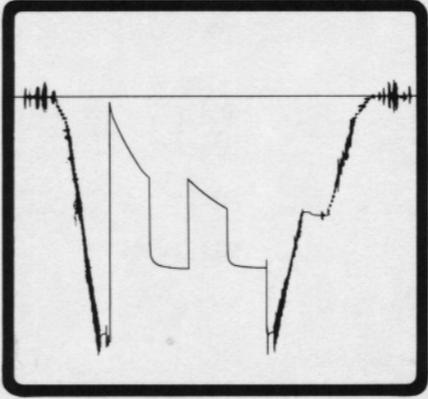
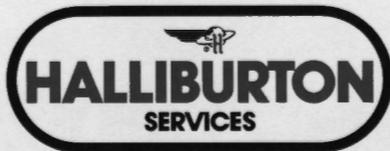


FORMATION TESTING SERVICE REPORT



CITY OF SICKLUM
LEASE NAME
3-18
WELL NO.
1
TEST NO.
SURF. - 3110
TESTED INTERVAL
KUCF OIL COMPANY
LEASE OWNER/COMPANY NAME



Duncan, Oklahoma 73536



A Halliburton Company

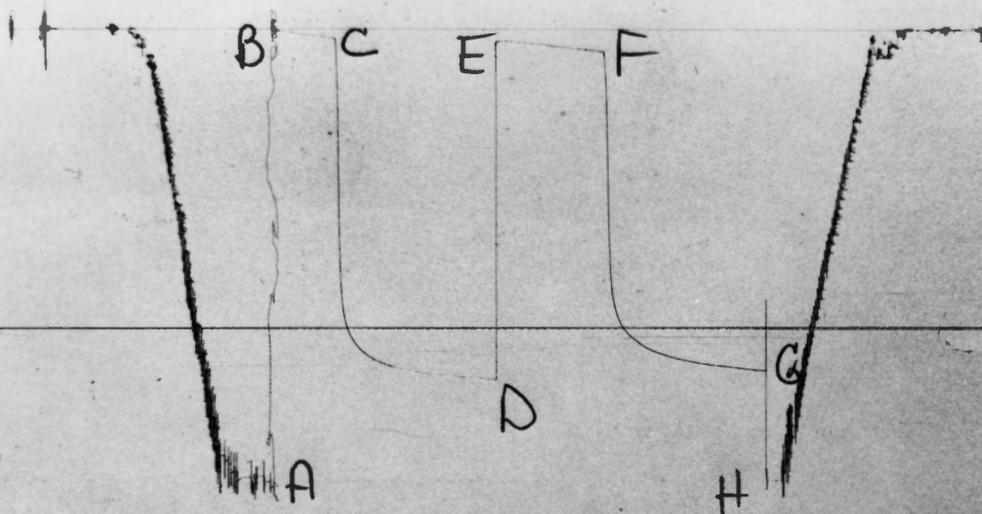
FEB 24 1983



TICKET NO. 68730100
 21-FEB-83
 HAYS

FORMATION TESTING SERVICE REPORT

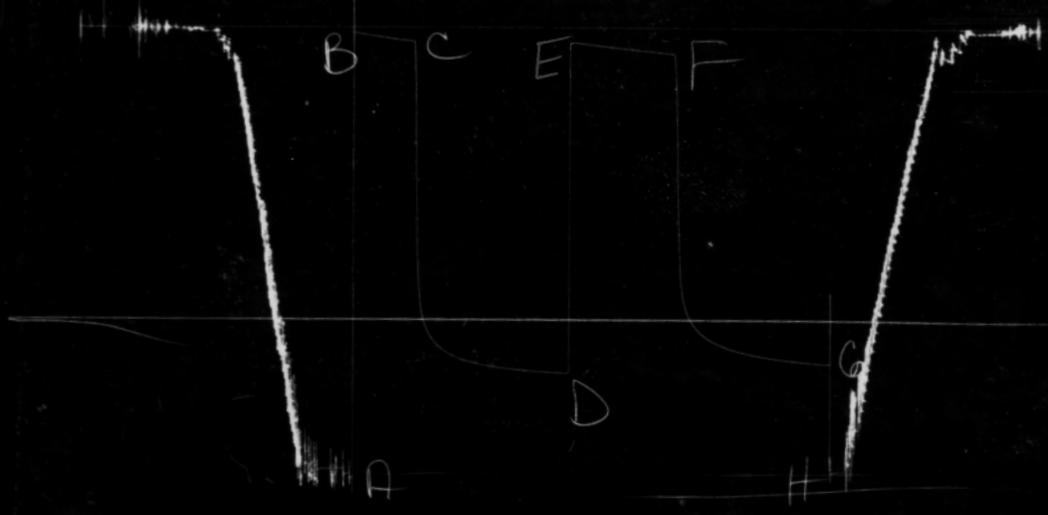
CITY OF STOCKTON	3-18	TEST NO.	3088.1 - 3110.1	RUPE OIL COMPANY
LEASE NAME	WELL NO.	TESTED INTERVAL		LEASE OWNER/COMPANY NAME
LEGAL LOCATION SEC. - TWP. - RANG.	18-T-17	FIELD AREA	STOCKTON	COUNTY
				ROOKS
				STATE KANSAS
				PW/IC



687301 - 7733

GAUGE NO: 7733 DEPTH: 3081.0 BLANKED OFF: NO HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC		1492.2			
B	INITIAL FIRST FLOW		5.9			
C	FINAL FIRST FLOW		32.7	30.0	34.3	F
C	INITIAL FIRST CLOSED-IN		32.7			
D	FINAL FIRST CLOSED-IN		1168.3	90.0	87.9	C
E	INITIAL SECOND FLOW		48.1			
F	FINAL SECOND FLOW		77.1	60.0	59.0	F
F	INITIAL SECOND CLOSED-IN		77.1			
G	FINAL SECOND CLOSED-IN		1138.3	90.0	88.9	C
H	FINAL HYDROSTATIC		1505.3			



687301-7740

687301
#7740
3107.0

GAUGE NO: 7740 DEPTH: 3107.0 BLANKED OFF: YES HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	1537	1505.7			
B	INITIAL FIRST FLOW	18	19.9	30.0	34.3	F
C	FINAL FIRST FLOW	53	48.5			
C	INITIAL FIRST CLOSED-IN	53	48.5	90.0	87.9	C
D	FINAL FIRST CLOSED-IN	1182	1177.1			
E	INITIAL SECOND FLOW	53	55.5	60.0	59.0	F
F	FINAL SECOND FLOW	88	88.8			
F	INITIAL SECOND CLOSED-IN	88	88.8	90.0	88.9	C
G	FINAL SECOND CLOSED-IN	1164	1145.0			
H	FINAL HYDROSTATIC	1519	1513.1			

EQUIPMENT & HOLE DATA

FORMATION TESTED: KANSAS CITY
 NET PAY (ft): _____
 GROSS TESTED FOOTAGE: 22.0
 ALL DEPTHS MEASURED FROM: KELLY BUSHING
 CASING PERFS. (ft): _____
 HOLE OR CASING SIZE (in): 7.875
 ELEVATION (ft): 0
 TOTAL DEPTH (ft): 3110.0
 PACKER DEPTH(S) (ft): 3088
 FINAL SURFACE CHOKE (in): 0.250
 BOTTOM HOLE CHOKE (in): 0.750
 MUD WEIGHT (lb/gal): 9.20
 MUD VISCOSITY (sec): 45
 ESTIMATED HOLE TEMP. (°F): _____
 ACTUAL HOLE TEMP. (°F): 93 @ 3105.0 ft

TICKET NUMBER: 68730100

DATE: 2-14-83 TEST NO: 1

TYPE DST: OPEN HOLE

HALLIBURTON CAMP: HAYS

TESTER: D. MORGAN

WITNESS: J. CHRISLER

DRILLING CONTRACTOR: KAN DRIL CO. #2

FLUID PROPERTIES FOR RECOVERED MUD & WATER

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

SAMPLER DATA

Pstg 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:

140 FEET OF WATERY DRILLING MUD WITH A VERY FEW SPOTS OF OIL

MEASURED FROM TESTER VALVE

REMARKS:

TICKET NO: 68730100

CLOCK NO: 28254 HOUR: 12



GAUGE NO: 7733

DEPTH: 3081.0

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	5.9			
2	5.0	6.2	0.3		
3	10.0	11.8	5.6		
4	15.0	17.0	5.2		
5	20.0	21.4	4.4		
6	25.0	25.6	4.2		
7	30.0	30.1	4.6		
C 8	34.3	32.7	2.6		
FIRST CLOSED-IN					
C 1	0.0	32.7			
2	5.0	971.5	938.7	4.4	0.893
3	10.0	1042.4	1009.6	7.7	0.648
4	15.0	1077.0	1044.2	10.4	0.517
5	20.0	1098.6	1065.8	12.6	0.434
6	25.0	1113.3	1080.6	14.5	0.375
7	30.0	1123.7	1091.0	16.0	0.331
8	35.0	1132.6	1099.8	17.3	0.297
9	40.0	1139.5	1106.7	18.5	0.269
10	45.0	1145.2	1112.5	19.5	0.246
11	50.0	1149.6	1116.9	20.3	0.227
12	55.0	1153.3	1120.6	21.1	0.210
13	60.0	1156.1	1123.4	21.8	0.196
14	65.0	1158.9	1126.2	22.5	0.184
15	70.0	1162.0	1129.2	23.0	0.173
16	75.0	1164.2	1131.5	23.5	0.164
17	80.0	1166.1	1133.4	24.0	0.155
18	85.0	1168.1	1135.3	24.4	0.147
D 19	87.9	1168.3	1135.6	24.7	0.143
SECOND FLOW					
E 1	0.0	48.1			
2	10.0	43.1	-5.0		
3	20.0	50.1	7.0		
4	30.0	56.8	6.7		
5	40.0	64.9	8.1		
6	50.0	71.0	6.1		
F 7	59.0	77.1	6.1		
SECOND CLOSED-IN					
F 1	0.0	77.1			
2	6.0	928.8	851.7	5.7	1.217
3	12.0	1006.9	929.9	10.7	0.942
4	18.0	1039.7	962.7	15.1	0.792
5	24.0	1064.6	987.5	19.1	0.689
6	30.0	1080.0	1003.0	22.7	0.613

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log \frac{t + \Delta t}{\Delta t}$
SECOND CLOSED-IN - CONTINUED					
7	36.0	1092.3	1015.2	-26.0	0.555
8	42.0	1101.4	1024.4	28.9	0.508
9	48.0	1108.7	1031.7	31.7	0.469
10	54.0	1115.4	1038.3	34.2	0.436
11	60.0	1120.0	1042.9	36.5	0.407
12	66.0	1123.7	1046.6	38.6	0.383
13	72.0	1128.2	1051.2	40.6	0.361
14	78.0	1132.4	1055.3	42.5	0.341
15	84.0	1136.2	1059.2	44.2	0.324
G 16	88.9	1138.3	1061.3	45.5	0.312

REMARKS:

TICKET NO: 68730100
 CLOCK NO: 28268 HOUR: 12



GAUGE NO: 7740
 DEPTH: 3107.0

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	19.9			
2	5.0	22.8	2.8		
3	10.0	28.6	5.8		
4	15.0	33.0	4.4		
5	20.0	37.1	4.1		
6	25.0	41.2	4.1		
7	30.0	44.8	3.6		
C 8	34.3	48.5	3.7		
FIRST CLOSED-IN					
C 1	0.0	48.5			
2	5.0	982.7	934.2	4.4	0.895
3	10.0	1056.8	1008.3	7.7	0.646
4	15.0	1090.2	1041.7	10.5	0.516
5	20.0	1110.0	1061.5	12.6	0.434
6	25.0	1125.0	1076.5	14.5	0.375
7	30.0	1134.8	1086.3	16.0	0.331
8	35.0	1143.3	1094.8	17.3	0.297
9	40.0	1149.3	1100.8	18.5	0.269
10	45.0	1154.8	1106.3	19.5	0.246
11	50.0	1159.0	1110.5	20.3	0.227
12	55.0	1162.9	1114.4	21.1	0.210
13	60.0	1165.8	1117.3	21.8	0.196
14	65.0	1168.5	1120.0	22.4	0.184
15	70.0	1170.7	1122.2	23.0	0.173
16	75.0	1172.9	1124.4	23.5	0.164
17	80.0	1174.6	1126.1	24.0	0.155
18	85.0	1176.3	1127.8	24.4	0.147
D 19	87.9	1177.1	1128.6	24.7	0.143
SECOND FLOW					
E 1	0.0	55.5			
2	10.0	56.1	0.6		
3	20.0	64.0	7.9		
4	30.0	70.5	6.5		
5	40.0	77.1	6.5		
6	50.0	83.2	6.2		
F 7	59.0	88.8	5.6		
SECOND CLOSED-IN					
F 1	0.0	88.8			
2	6.0	932.7	843.9	5.6	1.218
3	12.0	1016.6	927.8	10.6	0.944
4	18.0	1052.3	963.5	15.1	0.790
5	24.0	1073.1	984.3	19.1	0.689
6	30.0	1089.0	1000.2	22.7	0.614

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log \frac{t + \Delta t}{\Delta t}$
SECOND CLOSED-IN - CONTINUED					
7	36.0	1100.1	1011.3	26.0	0.555
8	42.0	1109.6	1020.8	29.0	0.508
9	48.0	1116.7	1027.9	31.7	0.469
10	54.0	1123.7	1034.9	34.2	0.436
11	60.0	1128.3	1039.5	36.5	0.407
12	66.0	1132.7	1043.9	38.7	0.383
13	72.0	1136.6	1047.8	40.6	0.361
14	78.0	1140.1	1051.3	42.5	0.341
15	84.0	1143.9	1055.1	44.2	0.324
G 16	88.9	1145.0	1056.2	45.5	0.312

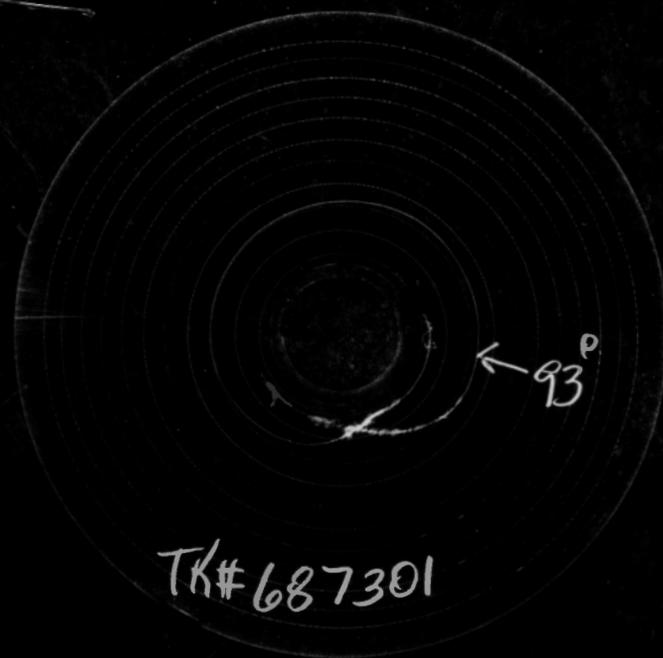
REMARKS:

		O.D.	I.D.	LENGTH	DEPTH	
1		DRILL PIPE.....	4.500	3.826	2884.0	
3		DRILL COLLARS.....	6.250	2.250	62.0	
50		IMPACT REVERSING SUB.....	5.750	2.750	1.0	2946.0
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	3081.0
80		AP RUNNING CASE.....	5.000	3.060	4.0	3081.0
70		OPEN HOLE PACKER.....	6.750	1.530	5.0	3088.0
20		FLUSH JOINT ANCHOR.....	5.000	3.840	15.5	
83		HT-500 TEMPERATURE CASE.....	5.000	3.826	1.5	3105.0
81		BLANKED-OFF RUNNING CASE.....	5.000		4.0	3107.0
TOTAL DEPTH						3110.0

TEMPERATURE

RECORDER

CHART



10° each circle

Indicated Flow Capacity

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

md-ft

Average Effective Permeability

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

md

Skin Factor

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

Damage Ratio

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

Indicated Flow Rate (Maximum)

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

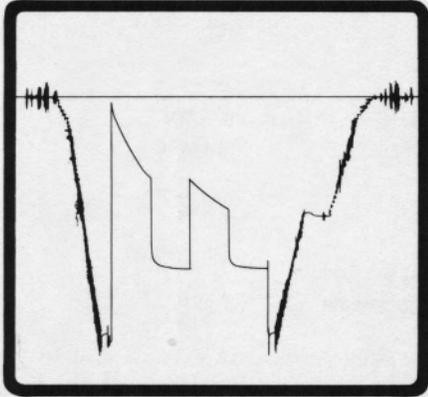
Indicated Flow Rate (Minimum)

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

Approx. Radius of Investigation

$$r_i = 0.032 \sqrt{\frac{kt}{\phi \mu c_t}} \text{ ft}$$

FORMATION TESTING SERVICE REPORT



CITY OF STOCKTON
LEASE NAME

3-18
WELL NO.

2
TEST NO.

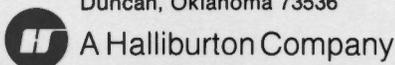
3223.1 - 3245.1
TESTED INTERVAL

RUPE OIL COMPANY
LEASE OWNER/COMPANY NAME

FEB 24 1983



Duncan, Oklahoma 73536

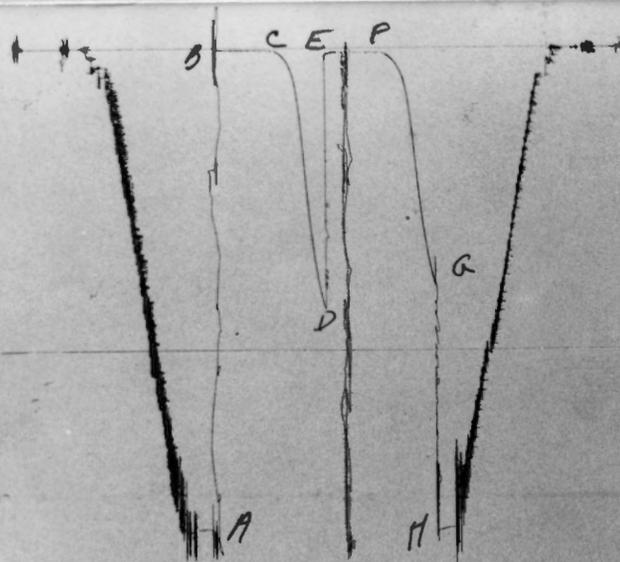




TICKET NO. 53935800
21-FEB-83
HAYS

FORMATION TESTING SERVICE REPORT

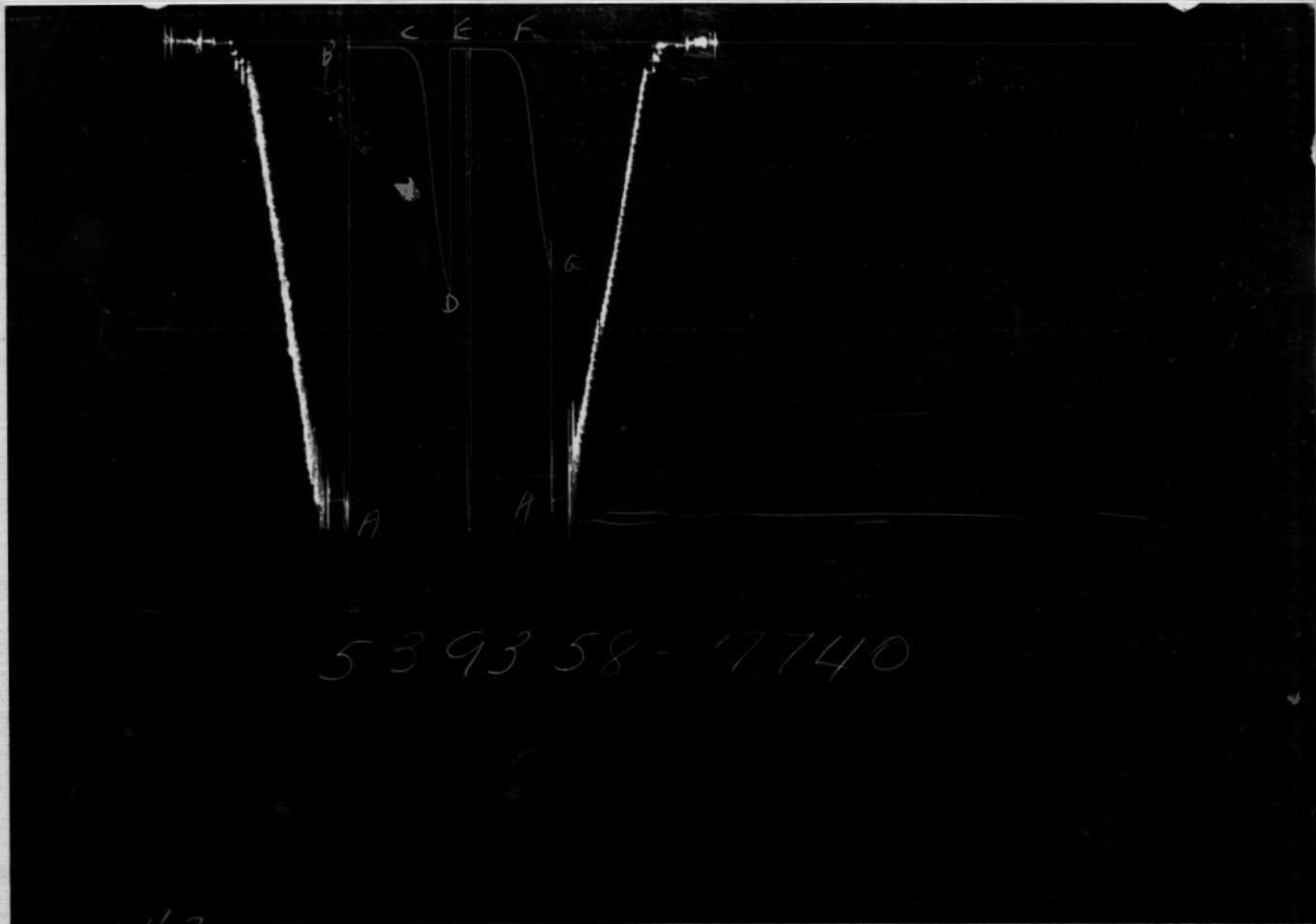
CITY OF STOCKTON	3-18	2	3223.1 - 3245.1	RUPE OIL COMPANY
LEASE NAME	WELL NO.	TEST NO.	TESTED INTERVAL	LEASE OWNER/COMPANY NAME
LEGAL LOCATION SEC. - TWP. - RANG.	18-7-17	FIELD AREA	STOCKTON	COUNTY
				ROOKS
				STATE KANSAS SM-DR



539358 - 7733

GAUGE NO: 7733 DEPTH: 3216.0 BLANKED OFF: NO HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC		1605.5			
B	INITIAL FIRST FLOW		7.3			
C	FINAL FIRST FLOW		11.0	30.0	31.5	F
C	INITIAL FIRST CLOSED-IN		11.0			
D	FINAL FIRST CLOSED-IN		873.4	30.0	28.8	C
E	INITIAL SECOND FLOW		27.9			
F	FINAL SECOND FLOW		15.8	30.0	30.7	F
F	INITIAL SECOND CLOSED-IN		15.8			
G	FINAL SECOND CLOSED-IN		793.4	30.0	29.0	C
H	FINAL HYDROSTATIC		1599.9			



GAUGE NO: 7740 DEPTH: 3242.0 BLANKED OFF: YES HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	1590	1613.4			
B	INITIAL FIRST FLOW	18	22.0	30.0	31.5	F
C	FINAL FIRST FLOW	18	23.0			
C	INITIAL FIRST CLOSED-IN	18	23.0	30.0	28.8	C
D	FINAL FIRST CLOSED-IN	881	878.7			
E	INITIAL SECOND FLOW	18	30.4	30.0	30.7	F
F	FINAL SECOND FLOW	18	28.3			
F	INITIAL SECOND CLOSED-IN	18	28.3	30.0	29.0	C
G	FINAL SECOND CLOSED-IN	793	794.5			
H	FINAL HYDROSTATIC	1590	1603.4			

EQUIPMENT & HOLE DATA

FORMATION TESTED: KANSAS CITY
 NET PAY (ft): 2.0
 GROSS TESTED FOOTAGE: 22.0
 ALL DEPTHS MEASURED FROM: KELLY BUSHING
 CASING PERFS. (ft): _____
 HOLE OR CASING SIZE (in): 7.875
 ELEVATION (ft): 1023
 TOTAL DEPTH (ft): 3245.0
 PACKER DEPTH(S) (ft): 3223
 FINAL SURFACE CHOKE (in): 0.250
 BOTTOM HOLE CHOKE (in): 0.750
 MUD WEIGHT (lb/gal): 9.60
 MUD VISCOSITY (sec): 47
 ESTIMATED HOLE TEMP. (°F): _____
 ACTUAL HOLE TEMP. (°F): 92 @ 3240.0 ft

TICKET NUMBER: 53935800
 DATE: 2-16-83 TEST NO: 2
 TYPE DST: OPEN HOLE
 HALLIBURTON CAMP: HAYS
 TESTER: A. WERTH
 WITNESS: J. CHRISLER
 DRILLING CONTRACTOR: KANSAS DRILLING CO. #2

FLUID PROPERTIES FOR RECOVERED MUD & WATER

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

SAMPLER DATA

Pstg 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:

4' OF OIL CUT MUD

MEASURED FROM TESTER VALVE

REMARKS:

TICKET NO: 53935800
 CLOCK NO: 28268 HOUR: 12



GAUGE NO: 7733
 DEPTH: 3216.0

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	7.3			
C 2	31.5	11.0	3.7		
FIRST CLOSED-IN					
C 1	0.0	11.0			
2	3.0	20.9	9.9	2.7	1.061
3	6.0	39.8	28.8	5.1	0.793
4	9.0	70.7	59.7	7.0	0.654
5	12.0	139.2	128.2	8.7	0.561
6	15.0	288.2	277.2	10.2	0.491
7	18.0	483.1	472.1	11.5	0.439
8	21.0	643.8	632.8	12.6	0.397
9	24.0	761.2	750.2	13.6	0.364
10	27.0	842.0	831.0	14.5	0.336
D 11	28.8	873.4	862.4	15.1	0.321
SECOND FLOW					
E 1	0.0	27.9			
<input type="checkbox"/> 2	9.6	15.5	-12.4		
<input type="checkbox"/> 3	11.7	15.3	-0.2		
F 4	30.7	15.8	0.5		
SECOND CLOSED-IN					
F 1	0.0	15.8			
2	3.0	22.6	6.8	2.8	1.342
3	6.0	36.9	21.2	5.5	1.054
4	9.0	60.0	44.2	7.9	0.898
5	12.0	100.3	84.5	10.1	0.791
6	15.0	189.0	173.2	12.1	0.711
7	18.0	348.2	332.5	13.9	0.649
8	21.0	527.1	511.4	15.7	0.597
9	24.0	656.8	641.0	17.3	0.555
10	27.0	748.6	732.8	18.8	0.519
G 11	29.0	793.4	777.6	19.8	0.498

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log \frac{t + \Delta t}{\Delta t}$
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LEGEND:

1 BEFORE BYPASS

2 AFTER BYPASS

REMARKS:

TICKET NO: 53935800

GAUGE NO: 7740

CLOCK NO: 28254 HOUR: 12



DEPTH: 3242.0

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	22.0			
C 2	31.5	23.0	1.1		
FIRST CLOSED-IN					
C 1	0.0	23.0			
2	3.0	31.5	8.5	2.7	1.065
3	6.0	49.2	26.2	5.1	0.793
4	9.0	79.3	56.3	7.0	0.654
5	12.0	146.5	123.5	8.7	0.560
6	15.0	293.7	270.7	10.2	0.491
7	18.0	479.7	456.7	11.4	0.440
8	21.0	643.7	620.6	12.6	0.398
9	24.0	766.1	743.1	13.6	0.364
10	27.0	851.7	828.7	14.5	0.336
D 11	28.8	878.7	855.7	15.1	0.321
SECOND FLOW					
E 1	0.0	30.4			
<input type="checkbox"/> 2	9.5	25.3	-5.1		
<input type="checkbox"/> 3	11.7	25.3	0.0		
F 4	30.7	28.3	3.0		
SECOND CLOSED-IN					
F 1	0.0	28.3			
2	3.0	37.1	8.8	2.8	1.342
3	6.0	52.6	24.3	5.5	1.053
4	9.0	78.8	50.5	7.9	0.897
5	12.0	123.2	94.9	10.1	0.791
6	15.0	221.3	193.0	12.1	0.711
7	18.0	374.5	346.2	14.0	0.648
8	21.0	531.3	503.0	15.7	0.598
9	24.0	654.3	626.0	17.3	0.555
10	27.0	749.8	721.5	18.8	0.519
G 11	29.0	794.5	766.2	19.8	0.498

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log \frac{t + \Delta t}{\Delta t}$
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LEGEND:

1 BEGINNING OF BYPASS

2 END OF BYPASS

REMARKS:

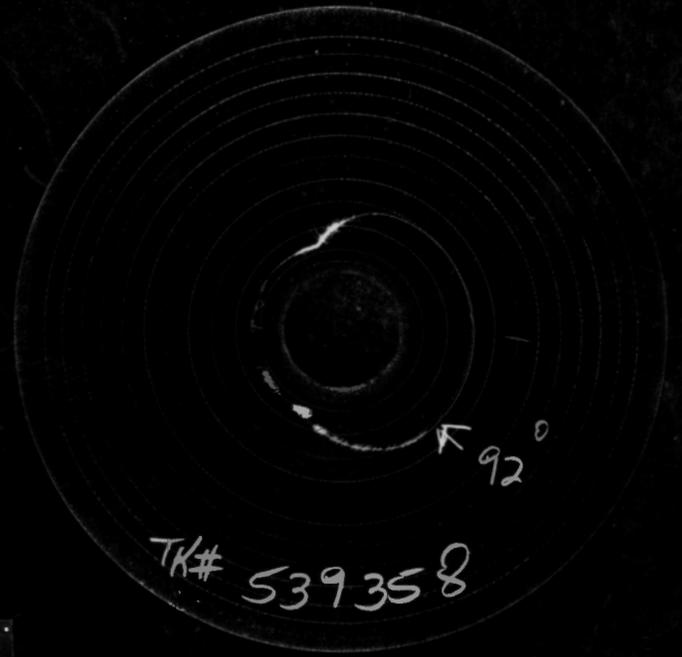
		O.D.	I.D.	LENGTH	DEPTH	
1		DRILL PIPE.....	4.500	3.826	3020.0	
3		DRILL COLLARS.....	6.250	2.250	62.0	
50		IMPACT REVERSING SUB.....	6.250	2.250	1.0	3079.0
3		DRILL COLLARS.....	6.250	2.250	124.0	
12		DUAL CIP VALVE.....	5.000	0.870	6.0	
60		HYDROSPRING TESTER.....	5.000	0.750	5.0	3214.0
80		AP RUNNING CASE.....	5.000	3.060	4.0	3216.0
70		OPEN HOLE PACKER.....	6.750	1.530	5.0	3223.0
20		FLUSH JOINT ANCHOR.....	5.000	3.840	15.5	
83		HT-500 TEMPERATURE CASE.....	5.000	3.876	1.5	3240.0
81		BLANKED-OFF RUNNING CASE.....	5.000		4.0	3242.0
TOTAL DEPTH					3245.0	

EQUIPMENT DATA

TEMPERATURE

RECORDER

CHART



10° each circle

Indicated Flow Capacity

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

md-ft

Average Effective Permeability

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

md

Skin Factor

$$S = 1.151 \left[\frac{m(P^*) - m(P_f)}{m} - \text{LOG} \frac{kt}{\phi \mu c_f w^2} + 3.23 \right] \text{ ---}$$

Damage Ratio

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

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

$$r_i = 0.032 \sqrt{\frac{kt}{\phi \mu c_t}}$$

ft