TICKET NO. 65055800

14-APR-83

PRATT
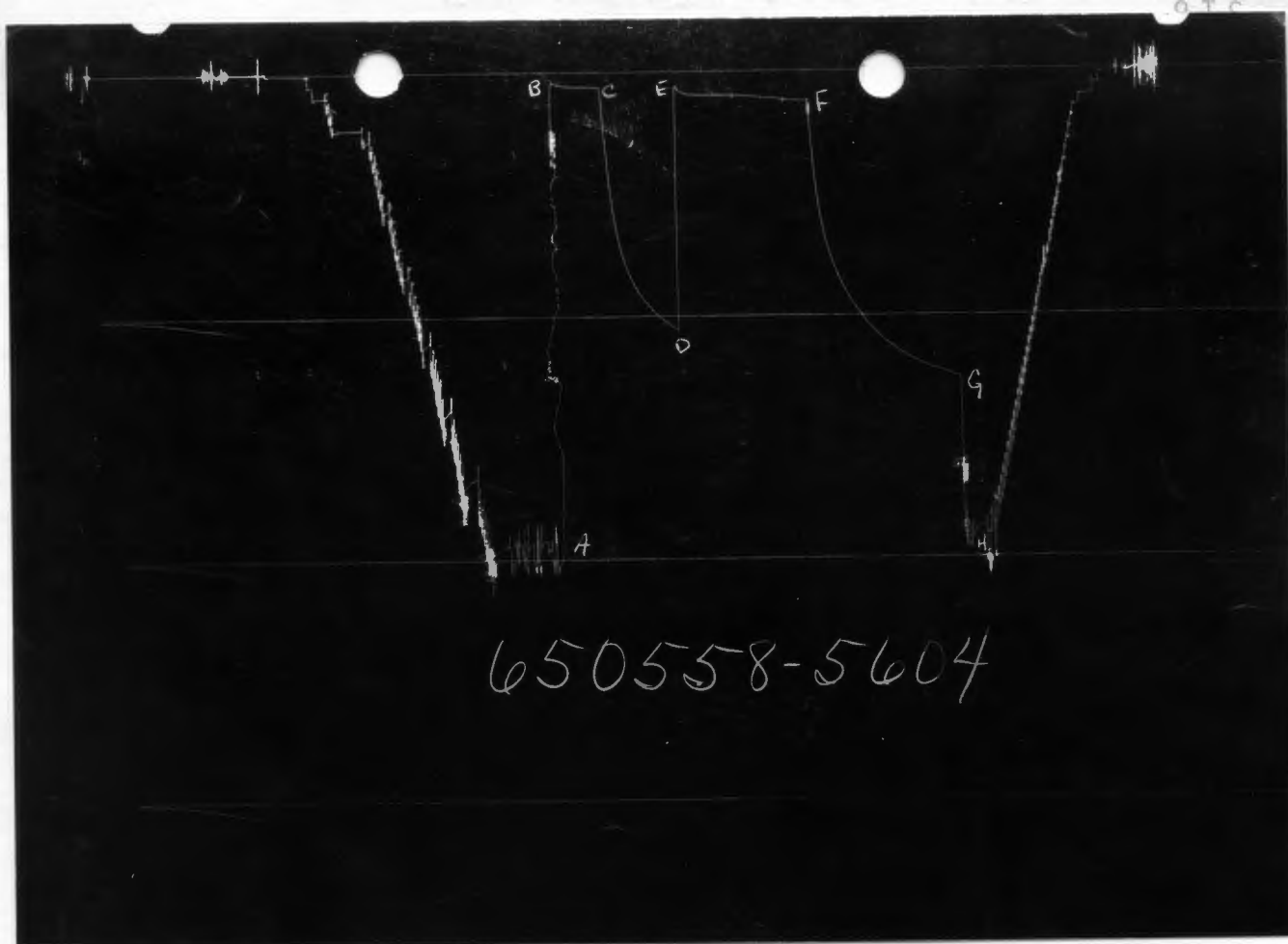
FORMATION TESTING SERVICE REPORT

650558-5605
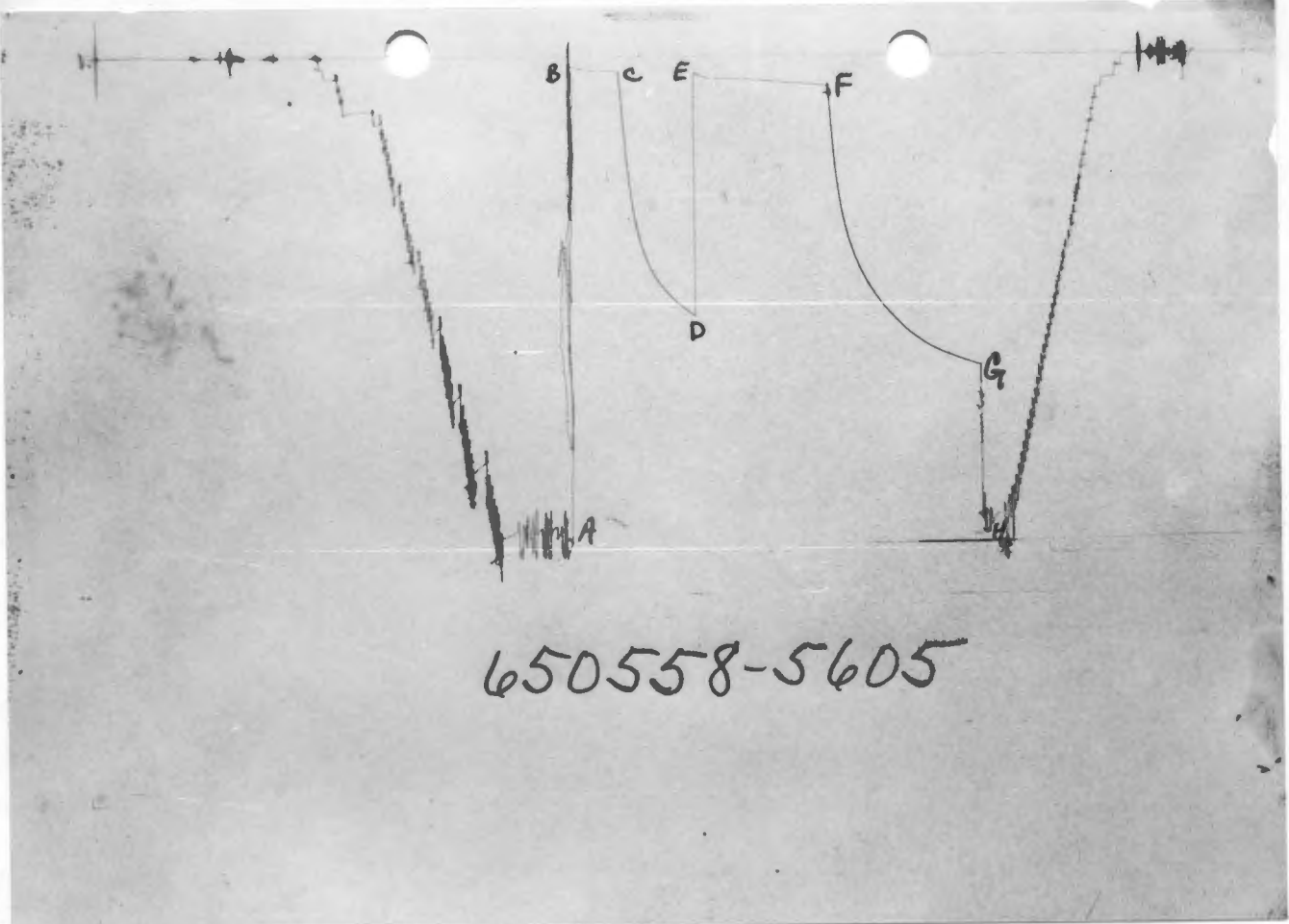
GAUGE NO: 5605   DEPTH: 3958.0   BLANKED OFF: NO   HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC		1914.4			
B	INITIAL FIRST FLOW		40.5	30.0	29.9	F
C	FINAL FIRST FLOW		63.1			
C	INITIAL FIRST CLOSED-IN		63.1	45.0	44.9	C
D	FINAL FIRST CLOSED-IN		1056.7			
E	INITIAL SECOND FLOW		66.9	80.0	80.3	F
F	FINAL SECOND FLOW		124.5			
F	INITIAL SECOND CLOSED-IN		124.5	90.0	89.8	C
G	FINAL SECOND CLOSED-IN		1262.7			
H	FINAL HYDROSTATIC		1867.6			

650558-5604

GAUGE NO: 5604   DEPTH: 3993.0   BLANKED OFF: YES   HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC	2014	1924.0			
B	INITIAL FIRST FLOW	41	40.8	30.0	29.9	F
C	FINAL FIRST FLOW	62	66.0			
C	INITIAL FIRST CLOSED-IN	62	66.0	45.0	44.9	C
D	FINAL FIRST CLOSED-IN	1066	1062.3			
E	INITIAL SECOND FLOW	62	62.7	80.0	80.3	F
F	FINAL SECOND FLOW	123	125.9			
F	INITIAL SECOND CLOSED-IN	123	125.9	90.0	89.8	C
G	FINAL SECOND CLOSED-IN	1251	1262.9			
H	FINAL HYDROSTATIC	1952	1877.4			

650558-6144

GAUGE NO: 6144   DEPTH: 4040.0   BLANKED OFF: YES   HOUR OF CLOCK: 12

ID	DESCRIPTION	PRESSURE		TIME		TYPE
		REPORTED	CALCULATED	REPORTED	CALCULATED	
A	INITIAL HYDROSTATIC					
B	INITIAL FIRST FLOW			30.0		F
C	FINAL FIRST FLOW					
C	INITIAL FIRST CLOSED-IN			45.0		C
D	FINAL FIRST CLOSED-IN					
E	INITIAL SECOND FLOW			80.0		F
F	FINAL SECOND FLOW					
F	INITIAL SECOND CLOSED-IN			90.0		C
G	FINAL SECOND CLOSED-IN					
H	FINAL HYDROSTATIC					

EQUIPMENT & HOLE DATA

FORMATION TESTED: _____ DOUGLAS _____
NET PAY (ft): _____ 3.0
GROSS TESTED FOOTAGE: _____ 18.0
ALL DEPTHS MEASURED FROM: _KELLY BUSHING_
CASING PERFS. (ft): _____
HOLE OR CASING SIZE (in): _____ 7.875
ELEVATION (ft): _____ 1894
TOTAL DEPTH (ft): _____ 4860.0
PACKER DEPTH(S) (ft): _3974, 3980, 3998_
FINAL SURFACE CHOKE (in): _____ 0.250
BOTTOM HOLE CHOKE (in): _____ 0.750
MUD WEIGHT (lb/gal): _____ 8.90
MUD VISCOSITY (sec): _____ 48
ESTIMATED HOLE TEMP. (°F): _____ 110
ACTUAL HOLE TEMP. (°F): ___ @ _____ ft

TICKET NUMBER: 65055800

DATE: 4-10-83   TEST NO: 1

TYPE DST: _OFF BTM.STRADDLE_

HALLIBURTON CAMP:
_____ PRATT

TESTER: _ROBERT E. MARTIN_
MARTIN COLLINS

WITNESS: _SCOTT ALBERG.GEOL._
_____

DRILLING CONTRACTOR:
WHEATSTATE (RIG# 2)

FLUID PROPERTIES FOR RECOVERED MUD & WATER

SOURCE	RESISTIVITY		CHLORIDES	
PIT	0.230 @	40 °F	16000	ppm
TOP	0.350 @	75 °F	16956	ppm
MIDDLE	0.290 @	75 °F	19782	ppm
BOTTOM	0.190 @	75 °F	30521	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:

189 FEET OF MUDDY WATER
30 FEET OF MUD
219 FEET - TOTAL RECOVERY

MEASURED FROM TESTER VALVE

REMARKS:

ELEVATION SHOWN IS AT GROUND LEVEL
STYLUS DISENGAGED ON B.T. # 6144.

	IRON	PH	CALCIUM	MAGNESIUM	SULFATES
TOP	NEG	9.5	492	-	MODERATE
MIDDLE	NEG	6.85	615	-	LIGHT
BOTTOM	NEG	6.5	2458	747	MODERATE

TYPE & SIZE MEASURING DEVICE:	MERLA 2" TESTER	TICKET NO: 65055800

TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
4-10-83					
2347					CALLED OUT.
0025					LEFT CAMP.
0130					ON LOCATION-RIG PULLING PIPE.
0210					STARTED CLOCKS.
0245					PICKED UP TOOL.
0330					TOOL AT THE TABLE.
0410					TOOL THRU THE TABLE.
0652					SIDE WALL ANCHOR SET - TOOL DID
					NOT SLIDE.
0655					INITIAL OPENING - HAD A STRONG
					BLOW OFF BOTTOM OF THE BUCKET
					IMMEDIATELY.
0718					GAS TO THE SURFACE IN 23 MINUTES
					UNMEASURABLE.
0725					INITIAL CLOSED IN PRESSURE.
0810					FINAL OPENING - HAD A STRONG
					BLOW.
0820	1/8"	2.0	3.92		GAS TO THE SURFACE IMMEDIATELY.
0825	1/8"	2.0	3.92		
0830	"	2.0	3.92		CAUGHT GAS SAMPLE.
0835	"	1.8	3.528		
0840	"	1.8	3.528		
0845	"	2.0	3.92		
0850	"	2.0	3.92		
0855	"	2.8	4.64		
0900	"	4.8	6.24		
0905	"	6.4	7.31		CAUGHT GAS SAMPLE.
0910	"	7.2	7.82		
0915	"	8.5	8.59		
0920	"	8.7	8.70		
0925	"	8.8	8.77		
0929	"	8.8	8.77		
0930					FINAL CLOSED IN PERIOD.
1100					UNSEATED HOOK.
1235					TOOL AT THE TABLE.
1400					TOOL LAID DOWN.

TICKET NO: 65055800	HALLIBURTON SERVICES	GAUGE NO: 5605
CLOCK NO: 6947 HOUR: 12		DEPTH: 3958.0

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$	REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log \frac{t+\Delta t}{\Delta t}$
							SECOND CLOSED-IN – CONTINUED				
						13	60.0	1184.9	1060.3	38.9	0.453
	FIRST FLOW					14	65.0	1202.4	1077.8	40.9	0.431
						15	70.0	1216.6	1092.0	42.8	0.411
B 1	0.0	40.5				16	75.0	1229.4	1104.9	44.6	0.393
2	5.0	46.0	5.5			17	80.0	1241.8	1117.3	46.4	0.376
3	10.0	54.3	8.3			18	85.0	1254.3	1129.8	48.0	0.361
4	15.0	58.5	4.2			G 19	89.8	1262.7	1138.1	49.5	0.348
5	20.0	59.2	0.7								
6	25.0	60.4	1.2								
C 7	29.9	63.1	2.7								
	FIRST CLOSED-IN										
C 1	0.0	63.1									
2	4.0	409.2	346.1	3.5	0.928						
3	8.0	634.5	571.4	6.3	0.674						
4	12.0	756.4	693.3	8.6	0.543						
5	16.0	833.6	770.6	10.4	0.458						
6	20.0	887.2	824.1	12.0	0.397						
7	24.0	928.9	865.8	13.3	0.352						
8	28.0	960.7	897.6	14.5	0.316						
9	32.0	988.4	925.3	15.4	0.287						
10	36.0	1013.6	950.5	16.3	0.262						
11	40.0	1035.1	972.0	17.1	0.242						
D 12	44.9	1056.7	993.7	18.0	0.222						
	SECOND FLOW										
E 1	0.0	66.9									
2	10.0	89.4	22.5								
3	20.0	93.3	3.9								
4	30.0	96.1	2.9								
5	40.0	99.7	3.6								
6	50.0	106.5	6.9								
7	60.0	112.0	5.4								
8	70.0	117.1	5.1								
F 9	80.3	124.5	7.5								
	SECOND CLOSED-IN										
F 1	0.0	124.5									
2	5.0	538.4	413.9	4.8	1.360						
3	10.0	715.7	591.1	9.2	1.079						
4	15.0	819.5	695.0	13.2	0.923						
5	20.0	893.2	768.7	16.9	0.814						
6	25.0	953.6	829.0	20.4	0.733						
7	30.0	1000.8	876.3	23.6	0.670						
8	35.0	1043.3	918.7	26.6	0.618						
9	40.0	1077.7	953.2	29.3	0.575						
10	45.0	1111.5	986.9	32.0	0.538						
11	50.0	1139.2	1014.6	34.4	0.506						
12	55.0	1164.0	1039.5	36.7	0.478						

REMARKS:

TICKET NO: 65055800		**HALLIBURTON** SERVICES	GAUGE NO: 5604
CLOCK NO: 3004 HOUR: 12			DEPTH: 3993.0

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$		REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
								SECOND CLOSED-IN – CONTINUED				
							13	60.0	1183.1	1057.2	38.8	0.453
							14	65.0	1199.6	1073.7	40.9	0.431
		FIRST FLOW					15	70.0	1213.9	1088.0	42.8	0.411
							16	75.0	1227.0	1101.1	44.6	0.393
B	1	0.0	40.8				17	80.0	1238.6	1112.7	46.4	0.376
	2	5.0	52.7	11.9			18	85.0	1251.8	1126.0	48.0	0.361
	3	10.0	58.5	5.9		G	19	89.8	1262.9	1137.1	49.5	0.348
	4	15.0	61.3	2.8								
	5	20.0	61.3	0.0								
	6	25.0	63.0	1.7								
C	7	29.9	66.0	3.0								

FIRST FLOW and related values above.

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log\frac{t+\Delta t}{\Delta t}$
		FIRST CLOSED-IN			
C	1	0.0	66.0		
	2	4.0	414.3	348.3	3.5	0.931
	3	8.0	638.9	572.8	6.3	0.675
	4	12.0	758.4	692.4	8.6	0.542
	5	16.0	834.0	768.0	10.4	0.457
	6	20.0	889.1	823.0	12.0	0.397
	7	24.0	930.2	864.1	13.3	0.352
	8	28.0	964.4	898.4	14.5	0.315
	9	32.0	992.4	926.4	15.5	0.287
	10	36.0	1017.6	951.5	16.3	0.263
	11	40.0	1038.6	972.6	17.1	0.243
D	12	44.9	1062.3	996.3	18.0	0.222

SECOND FLOW

REF	MINUTES	PRESSURE	ΔP
E	1	0.0	62.7	
	2	10.0	95.3	32.5
	3	20.0	98.8	3.5
	4	30.0	98.8	0.0
	5	40.0	101.2	2.5
	6	50.0	107.4	6.2
	7	60.0	112.4	5.0
	8	70.0	121.1	8.7
F	9	80.3	125.9	4.7

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	125.9		
	2	5.0	534.7	408.8	4.8	1.364
	3	10.0	709.6	583.7	9.2	1.079
	4	15.0	813.5	687.6	13.2	0.922
	5	20.0	890.0	764.1	16.9	0.814
	6	25.0	952.2	826.4	20.4	0.733
	7	30.0	1000.1	874.2	23.6	0.670
	8	35.0	1046.0	920.1	26.6	0.618
	9	40.0	1080.0	954.1	29.4	0.574
	10	45.0	...9	985.0	31.9	0.538
	11	50.0	.4	1012.5	34.4	0.506
	12	55.0	1...2.8	1037.0	36.7	0.478

REMARKS:

		O.D.	I.D.	LENGTH	DEPTH
1	DRILL PIPE......................	4.500	3.826	3664.0	
50	IMPACT REVERSING SUB............	5.750	2.750	1.0	3664.0
3	DRILL COLLARS...................	6.250	2.250	280.0	
5	CROSSOVER.......................	6.250	2.250	1.0	
12	DUAL CIP VALVE.................	5.000	0.870	6.0	
60	HYDROSPRING TESTER.............	5.000	0.750	5.0	3956.0
80	AP RUNNING CASE.................	5.000	3.060	4.0	3958.0
15	JAR...........................	5.000	1.750	5.0	
16	VR SAFETY JOINT.................	5.000	1.000	3.0	
17	PRESSURE EQUALIZING CROSSOVER...	5.000	2.620	1.0	
70	OPEN HOLE PACKER................	6.750	1.530	6.0	3974.0
70	OPEN HOLE PACKER................	6.750	1.530	6.0	3980.0
20	FLUSH JOINT ANCHOR.............	5.000	2.370	9.0	
17	PRESSURE EQUALIZING CROSSOVER...	5.000	2.620	1.0	
80	AP RUNNING CASE.................	5.000	3.060	4.0	3993.0
70	OPEN HOLE PACKER................	6.750	1.530	6.0	3998.0
5	CROSSOVER.......................	5.000	2.000	1.0	
20	FLUSH JOINT ANCHOR.............	5.000	2.370	30.0	
5	CROSSOVER.......................	5.000	2.000	1.0	
90	SIDE WALL ANCHOR...............	6.750	1.620	5.0	4035.0
81	BLANKED-OFF RUNNING CASE........	5.000		4.0	4040.0
	TOTAL DEPTH				4860.0

EQUIPMENT DATA

EQUATIONS FOR DST LIQUID WELL ANALYSIS

Transmissibility
$$\frac{kh}{\mu} = \frac{162.6\,QB}{m} \qquad \frac{md\text{-}ft}{cp}$$

Indicated Flow Capacity
$$kh = \frac{kh}{\mu}\,\mu \qquad md\text{-}ft$$

Average Effective Permeability
$$k = \frac{kh}{h} \qquad md$$

Damage Ratio
$$DR = .183\,\frac{P^* - P_f}{m} \qquad \text{———}$$

Theoretical Potential w / Damage Removed
$$Q_1 = Q\,DR \qquad BPD$$

Approx. Radius of Investigation
$$r_i = 4.63\,\sqrt{kt} \qquad ft$$

EQUATIONS FOR DST GAS WELL ANALYSIS

Indicated Flow Capacity
$$kh = \frac{1637\,Q_g\,T}{m} \qquad md\text{-}ft$$

Average Effective Permeability
$$k = \frac{kh}{h} \qquad md$$

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

Damage Ratio
$$DR = \frac{m(P^*) - m(P_f)}{m(P^*) - m(P_f) - 0.87\,mS} \qquad \text{———}$$

Indicated Flow Rate (Maximum)
$$AOF_1 = \frac{Q_g\,m(P^*)}{m(P^*) - m(P_f)} \qquad MCFD$$

Indicated Flow Rate (Minimum)
$$AOF_2 = Q_g\,\sqrt{\frac{m(P^*)}{m(P^*) - m(P_f)}} \qquad MCFD$$

Approx. Radius of Investigation
$$r_i = 0.032\,\sqrt{\frac{kt}{\phi\mu c_t}} \qquad ft$$

NOMENCLATURE

B	=	Formation Volume Factor (Res Vol / Std Vol)	——
c_t	=	System Total Compressibility	(Vol / Vol) / psi
DR	=	Damage Ratio	——
h	=	Estimated Net Pay Thickness	Ft
k	=	Permeability	md
m	=	(Liquid) Slope Extrapolated Pressure Plot	psi/cycle
		(Gas) Slope Extrapolated m(P) Plot	MM psi^2/ cp/cycle
$m(P^*)$	=	Real Gas Potential at P*	MM psi^2/cp
$m(P_f)$	=	Real Gas Potential at P_f	MM psi^2/cp
AOF_1	=	Maximum Indicated Absolute Open Flow at Test Conditions	MCFD
AOF_2	=	Minimum Indicated Absolute Open Flow at Test Conditions	MCFD
P^*	=	Extrapolated Static Pressure	Psig
P_f	=	Final Flow Pressure	Psig
Q	=	Liquid Production Rate During Test	BPD
Q_1	=	Theoretical Liquid Production w/ Damage Removed	BPD
Q_g	=	Measured Gas Production Rate	MCFD
r_i	=	Approximate Radius of Investigation	Ft
r_w	=	Radius of Well Bore	Ft
S	=	Skin Factor	
t	=	Total Flow Time Previous to Closed-in	Minutes
Δt	=	Closed-in Time at Data Point	Minutes
T	=	Temperature Rankine	°R
ϕ	=	Porosity	——
μ	=	Viscosity of Gas or Liquid	cp
Log	=	Common Log	