

MULTIPOINT AND ONE POINT BACK PRESSURE TEST FOR GAS WELL

Type Test ☒ Initial ☐ Annual ☐ Special				Test Date 3/18/88		APR 11 '88	
Company Bass Enterprises Production Co.				Connection Natural Gas Pipeline Co. of America			
Pool Indian Flats				Formation Atoka		Unit Big Eddy Unit	
Completion Date March 7, 88		Total Depth 12,750'		Plug Back TD 11,882		Elevation 3196.2' GL	
Farm or Lease Name Big Eddy UNIT				Well No. 93			
Ceq. Size 5.5"	Wt. 17#	d	Set At 12750'	Perforations: From To		Well No.	
Tbg. Size 2.375"	Wt. 4.70#	d	Set At 11,418'	Perforations: From 11518 To 11538		Unit Sec. Twp. Rge. K 36 21S 28E	
Type Well - Single - Bradenhead - G.C. or G.O. Multiple Single				Packer Set At 11,418		County Eddy	
Producing Thru Tbg.		Reservoir Temp. °F 185° @ 11402 GL		Mean Annual Temp. °F		Baro. Press. - P _a	
State NM							
L 11,418	H 11,418	G _g .602	% CO ₂ .93	% N ₂ .55	% H ₂ S	Prover	Meter Run 3.068
						Taps FLG.	

FLOW DATA						TUBING DATA		CASING DATA		Duration of Flow	
NO.	Prover Line Size	X	Orifice Size	Press. p.s.i.g.	Diff. h _w	Temp. °F	Press. p.s.i.g.	Temp. °F	Press. p.s.i.g.		Temp. °F
SI							4123		Pkr.		238.6 hr
1.	3 x .75			246.3	.85	73	3812		"		1 hr.
2.	3 x .75			286.8	3.13	69	3587		"		1 hr.
3.	3 x .75			390.5	10.13	66	2940		"		1 hr.
4.	3 x .75			509.5	14.05	67	2200		"		1 hr.
5.											

RATE OF FLOW CALCULATIONS							
NO.	Coefficient (24 Hour)	$\sqrt{h_w P_m}$	Pressure P _m	Flow Temp. Factor Ft.	Gravity Factor F _g	Super Compress. Factor, F _{pv}	Rate of Flow Q, Mcfd
1	2.672	14.85	259.5	.9877	1.289	1.021	52
2	2.672	30.64	300.0	.9915	1.289	1.024	107
3	2.672	63.95	403.7	.9943	1.289	1.036	227
4	2.672	85.70	522.7	.9933	1.289	1.041	305
5							

NO.	P _r	Temp. °R	T _r	Z	Gas Liquid Hydrocarbon Ratio	A.P.I. Gravity of Liquid Hydrocarbons	Specific Gravity Separator Gas	Specific Gravity Flowing Fluid	Critical Pressure	Critical Temperature
1	.39	533	1.48	.960	7.3		.602	X X X X X X X X	671	358
2	.45	529	1.47	.954				X X X X X		
3	.60	526	1.46	.931						
4	.78	527	1.47	.922						
5										

NO.	P _i ²	P _w	P _w ²	P _c ² - P _w ²
1		4401.0	19368.8	2652.6
2		4198.0	17623.2	4398.2
3		3381.6	11435.2	10586.2
4		2889.7	8347.5	13673.9
5				

(1) $\frac{P_c^2}{P_c^2 - P_w^2} = 1.610$

(2) $\left[\frac{P_c^2}{P_c^2 - P_w^2} \right]^n = 1.610$

AOF = Q $\left[\frac{P_c^2}{P_c^2 - P_w^2} \right]^n = .491$

Absolute Open Flow 491 Mcfd @ 15.025

Angle of Slope θ 45°

Slope, n 1.000

Remarks: This test calculated from known BHP's.
Made 3.97 bbl oil during test.
Made 2.98 bbl water during test.

Approved By Division	Conducted By:	Calculated By:	Checked By:
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* Calculated static BHP to surface and used this to calculate AOF.

WORK SHEET FOR CALCULATION OF WELLHEAD PRESSURES (P_c or P_w) FROM KNOWN BOTTOM HOLE PRESSURE (P_f or P_s)

COMPANY Bass Enterprises LEASE Big Eddy Unit WELL NO. 93 DATE 3/19/88

LOCATION: Unit K Section 36 Township 21S Range 28E

L 11418 H 11418 L/H 1.00 G .602 % CO₂ .93 % N₂ .55 % H₂S

* Flowing BHP's corrected to surface pressures.

GH 6874 P_{cr} 671 T_{cr} 358
1st TABLE IX & X 2nd 3rd 4th

LINE	1	2	3	4	5	6	7	8
1	$T_w(W.H. \cdot R)$	534	534	534	534	534	534	534
2	$T_g(B.H. \cdot R)$	645	645	645	645	645	645	645
3	$T = (\frac{T_w + T_g}{2})$	589.5	589.5	589.5	589.5	589.5	589.5	589.5
4	Z (Est.)	1.015	.968	.995	.950	.934	.897	.844
5	TZ	598.3	570.6	586.6	560.0	550.6	528.8	497.5
6	GH/TZ	11.489	12.047	11.718	12.275	12.485	12.999	13.388
7	e^s (Table XIV)	1.539	1.571	1.552	1.585	1.597	1.628	1.679
8	P_f or P_s	5516.2	5516.2	5285.2	5285.2	4570.2	4570.2	3744.2
9	P_f or P_s P_s^2	30428.5	30428.5	27933.3	27933.3	20886.7	20886.7	14019.0
10	$P_c^2 = P_f^2 / e^s$ or $P_w^2 = P_s^2 / e^s$	19771.6	19368.9	17998.3	17623.5	13078.7	12827.9	8350.4
11	P_c or P_w	4446.5	<u>4401.0</u>	4242.4	<u>4198.0</u>	3616.4	<u>3581.6</u>	2889.7
12	$P = (\frac{P_w + P_s}{2})$ or $(\frac{P_c + P_f}{2})$	4981.3	4958.6	4763.8	4741.6	4093.3	4075.9	3316.9
13	$P_r = (P/P_{cr})$	7.42	7.39	7.10	7.07	6.10	6.07	4.94
14	$T_r = (T/T_{cr})$	1.64	1.64	1.64	1.64	1.64	1.64	1.64
15	Z (Table XI)	.968	.967	.950	.948	.897	.895	.844

WORK SHEET FOR CALCULATION OF WELLHEAD PRESSURES (P_c or P_w)

FROM KNOWN BOTTOM HOLE PRESSURE (P_f or P_g)

Form C-122F
Adopted 9-1-65

COMPANY Bass Enterprises LEASE Big Eddy Unit WELL NO. 93 DATE 3/19/88
LOCATION: Unit K Section 36 Township 21S Range 28E
L 11,418 H 11,418 L/H 1.000 G .602 %CO₂ .93 %N₂ .55 %H₂S
* Static BHP corrected to GH 6874 P_{cr} 671 T_{cr} 358
surface pressure. TABLE B X TABLE B X

LINE		1	2	3	4	5	6	7	8
1	$T_w(W.H. \cdot R)$	534	534						
2	$T_s(B.H. \cdot R)$	645	645						
3	$T = (\frac{T_w + T_s}{2})$	589.5	589.5						
4	Z (Est.)	1.046	.996						
5	TZ	616.6	587.1						
6	GH/TZ	11.148	11.708						
7	e^s (Table XIV)	1.519	1.551						
8	$P_{1000} P_s$ XXXX P_s	5844.2	5844.2						
9	$P_{1000} P_s^2$ XXXX P_s^2	34154.7	34154.7						
10	$P_c^2 = P_f^2 / e^s$ or $P_w^2 = P_g^2 / e^s$	22485.0	22021.1						
11	P_c or P_w	4741.8	<u>4692.7</u>						
12	$P \cdot (\frac{P_w + P_s}{2})$ or $(\frac{P_c + P_f}{2})$	5293.0	5268.5						
13	$P_r = (P/P_{cr})$	7.88	7.85						
14	$T_r = (T/T_{cr})$	1.64	1.64						
15	Z (Table XI)	.996	.993						