North Chaveroo Permo Penn — Sept. 17, 1986 Case #8305

Production Data

Hyperbolic Decline, $Q_t = q_i^n (q_i^{1-n} - q_t^{1-n})/(1-n) D_i$

Well	Cum Prod to 8-31-86		Reserves to q_t = 200 BOPM
Smith ZJ #1	88,540	Where q_i = 1213 BOPM, D_i = .0426, n = .9945	51,083
Weistrop ABB #1	29,014	q_i = 725 BOPM, D_i = .0470, n = .986	20,856
Burgland AAG #1	9,885	q_i = 484 BOPM, D_i = .0280, n = .850	14,307
Tucker ABI #2	248		

Field total	127,687
+Reserves to 200 B/M	86,246 ✓
Ult Rec to 200 BOPM	213,933
Adtl Res to 75 BOPM	55,720
Max Ult Recovery	269,653 STBO

Total, Reserves 200 BOPM		86,246 ✓
Reserves to q_t =	75 BOPM	Change
Smith	78,666	+ 27,583
Weistrop	35,184	+ 14,328
Burgland	28,116	+ 13,809
Add'l Reserves to 75 BOPM		55,720

Volumetric Analysis of Isopach Map

Planimetered Areas: All Sec 11, E/2 Sec. 10, N/2N/2 Sec 14, T8S-R33E:

line	0.06 ϕ.ft	855.0	acres (Est.)	00.0	
	0.1	754.47	Volume	80.4	ϕ.ac. ft.
	0.2	598.67	(Frustrum of cone)	67.5	
	0.3	449.83		52.2	
	0.4	308.30		37.7	
	0.5	208.46		25.7	
	0.6	131.66		16.9	
	0.7	70.95		10.0	
	0.8	18.29		4.2	
	0.84	5.00	Est.	0.4	
			Total	315.0	porosity acre feet

Where Weighted Average Oil Saturation $(1-S_w)$ = 69.1%
Weighted Average Formation Volume Factor = 1.685 RB/STB
Weighted Average Recovery Factor = 27.1 %

Then Max. Ultimate Oil Recovery = ϕ Acft (7758)$(1-S_w)$ RF/FVF
= 315 (7758)(0.691)(0.271)/1.685 = 271,600 STBO

BEFORE EXAMINER
OIL CONSERVATION
Yates 4
8305

No. Chaveroo Permo-Penn Sept 17, 1986 Case # 8305

Weistrop ABB Fed #1

	ϕ	S_w
8258-60	.132	.37
60-62	.170	.37
62-64	.158	.37
64-66	.122	.37
66-68	.106	.37
68-69	.030	.37
	.718	.37

h = 11ft Avg ϕ .0653 Avg S_w = 37% G_o = 45.9 API = 0.7977, G_g = 0.96, GOR = 2065

Wt of dissolved gas = $\frac{2065}{379}(.96)28.98$ = 151.585 lb. Vol. of dissolved gas = $\frac{151.585}{25.6}$ = 5.921

Wt of 1 STBO = .7977(5.615)62.4 = 279.495 Vol. of 1 STBO = 5.615

Wt of 1 RBO = 431.08 lb. pseudo. Volume of 1 RBO = 11.536 cf

pseudo-density of R.BO = $\frac{431.08}{11.536}$ = 37.37 lb/cf.

density correct for 2609 psi BHP = 1.42+

density correct for 142°F BHT = 3.45-

Corrected density of 1 RBO = 35.34 lb/cf FVF. $\frac{431.08}{5.615(35.34)}$ = 2.172 RB/STB

Viscosity of Res. Oil = 0.225 cp.

Relative Permeability to Oil, $k_o = \frac{141.2(113\ BOPD)(.225\ cp)(7.3\ \frac{in}{fm})}{(11ft)(2609-659\ psi)}$ = 1.22 md.

k_w = .68 md

Recovery factor = .114 + .272 log k + .265 S_w − .136 log μ − 1.538ϕ − .00035h = 0.222

Burgland AAG #1

	ϕ	S_w
8246-48	.092	.40
49-50	.033	.59
52-54	.092	.40
54-56	.108	.40
56-58	.098	.41
58-60	.080	.42
60-62	.094	.42
62-64	.114	.38

h = 15ft; Avg ϕ = 7 1/5 = .0474; Avg S_w = 41.2%; G_o = 45° API = .8017; G_g = 1.05; GOR = 850/1

Wt of dissolved gas = $\frac{850}{379}(1.05)28.98$ = 68.244 lb. Vol. of dis. gas = $68.244/28.15$ = 2.425

Wt of 1 STBO = .8017(5.615)62.4 = 280.896 Vol. of STBO = 5.615

Wt of 1 RBO = 349.14 lb. pseudo Vol of 1 RBO = 8.04 cf

pseudo-density of RBO = $\frac{349.14}{8.04}$ = 43.43

density correct for 2670 BHP = 1.00+

density correct for 142° BHT = 2.43-

Corrected density of RBO = 42.00 lb/cf FVF = $\frac{349.14}{5.615(42)}$ = 1.48 RB/STB

Viscosity of Reservoir Oil = 0.38 cp.

Relative Permeability to Oil, $k_o = \frac{141.2(16.6)(.38)7.3}{15(2670-130)}$ = 0.17 md.

$k_w = \frac{72.2}{16.6} \times 0.17$ = 0.74 md.

Recovery factor = (.114 − .011 + .098 + .088 − .100 − .004) = 0.185

Weighted Average Values

		fraction	S_o	ΣS_o	β_o	$\Sigma \beta_o$	R.F.	Σ R.F
Smith	Cum Wt. Rec: 167,206	.6201	.722	.448	1.56	.967	.309	.192
Weistrop	44,198	.2381	.670	.159	2.172	.517	.222	.053
Burgland	38,001	.1409	.588	.083	1.48	.209	.185	.026
Tucker	248	.0009	.620	.002	2.50	.002		.271
Total	269,653			.691		1.685		