House Field - Seven Rivers
Volumetric Recoverable Reserves

Volumetric analysis uses the formula from Applied Petroleum Reservoir Engineering by Craft and Hawkins Copyright 1959 on page 26:

$G = 43{,}560 \times Vb \times \phi \times (1-Sw) \times Bg$, cubic feet.

Modified to give recoverable reserves by multiplying by a recovery factor assumed to be 90%.

$G = 43.56 \times Vb \times \phi \times (1-Swi) \times Bgi \times$ Rec. Fac., MCF.

Vb = Bulk Reservoir Volume, A x h, acre-feet

A = Area, acres

h = Net pay height, feet

ϕ = Porosity, %

Swi = Average connate water, %

$Bgi = \text{Gas volume factor} = \frac{Tsc\ Pres}{Tres\ Psc\ Z}$

Tsc = Temperature at standard conditions, 60°F = 520°R

Pres = Reservoir pressure, psia

Tres = Reservoir temperature, OR

Psc = Pressure at standard conditions, 14.65 psia

Z = Gas compressibility factor

Rec. Fac. = Recovery Factor, %

Reservoir pressure is calculated using shut-in tubing pressure plus a gas pressure gradient of 0.056 psi/ft.

SITP from Dwight's P Vs V plot = 1565 psig
Pres = 1565 + 0.056 (3000) = 1734 psig
Atmospheric pressure is approximately 13.2 psi
1734 + 13.2 = 1747.2 psia

Reservoir temperature is calculated using a base temperature of 60°F plus a temperature gradient of 1°F/100 feet.
Tres = 60 + (1°/100 x 3000) = 90°F

$$Bgi = \frac{Tsc\ Pres}{Tres\ Psc\ Z} = \frac{(60 + 460)(1747.2)}{(90 + 460)(14.65)(0.63)}$$

$$= 178.98$$

Volumetric Recoverable Reserves at

I. 160 acres, 14 ft net pay, 17% porosity, 30% connate water.

$G = 43.56 \times A \times h \times \emptyset \times (1-Swi) \times Bgi \times R.F.$

$= 43.56 \times 160 \times 14 \times .17 \times (1-.3) \times 178.98 \times .9$

= 1,870,380 MCF

II. 80 acres, 14 ft. net pay, 17% porosity, 30% connate water.

$G = 43.56 \times 80 \times 14 \times .17 \times (1-.3) \times 178.98 \times .9$

= 935,190 MCF

House Field - Seven Rivers
P/Z Analysis

Dwight's plot of pressure vs volume of MGF's J. Wright Well No. 1 was used to draw the P/Z curve.

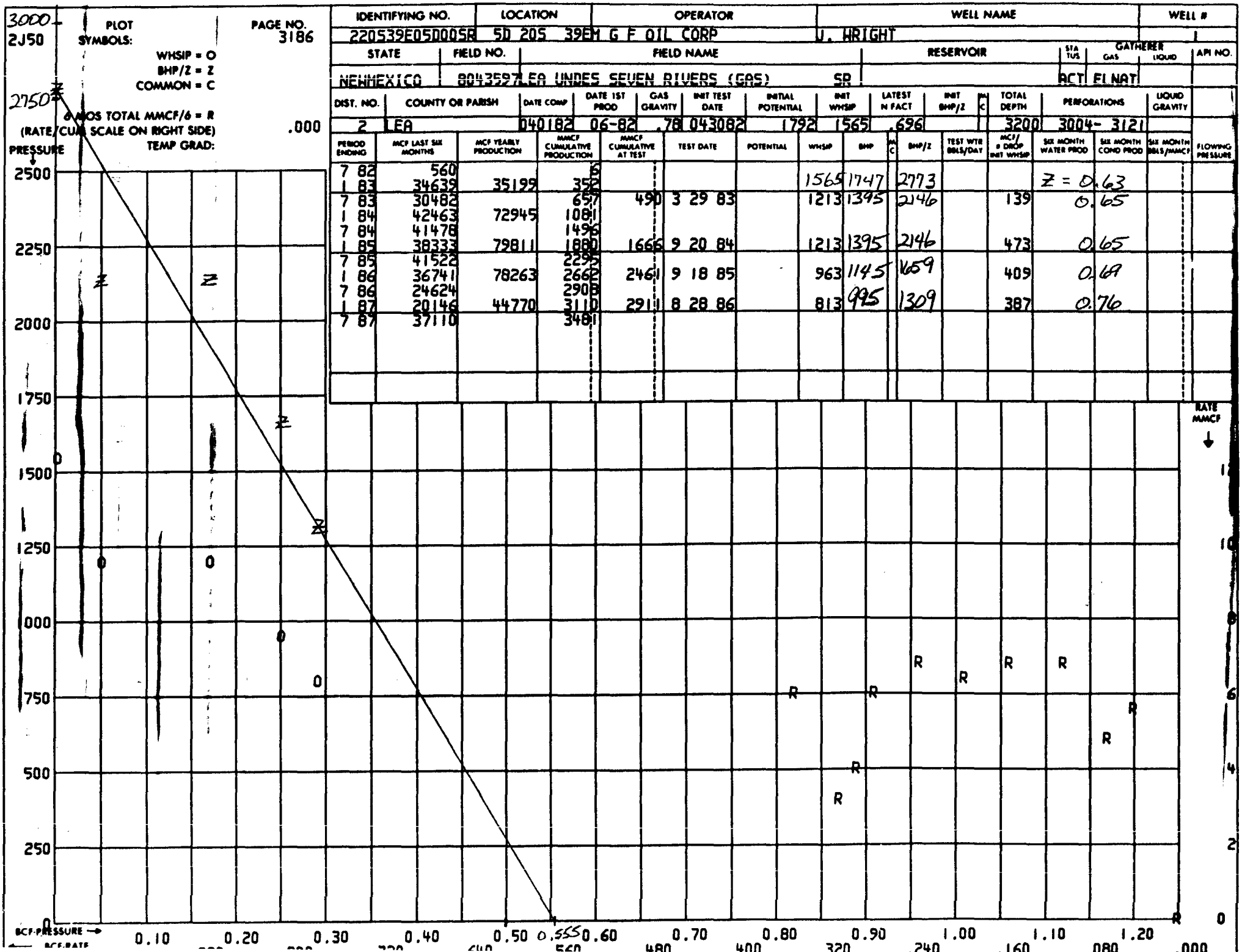
Z factors were calculated from the Gas Processors Suppliers Association's Engineering Data Book, Ninth Edition, 1972, using Fig. 16-7C "Compressibility of Low-Molecular-Weight Natural Gases".

Fig. 16-7C is for gas with a specific gravity of 0.8. The specific gravity of the J. Wright Well No. 1 is 0.78.

A bottom hole temperature of 90°F was assumed based on an average gradient of 1°F/100 ft. and 60°F base temperature.

A gas pressure gradient of 0.056 psi/ft was assumed, adding 169 psi to the tubing pressure to get the bottom hole pressure.

The P/Z analysis shows a 100% drawdown to yield 555,000 MCF. A 90% recovery factor shows 500,000 MCF.



IDENTIFYING NO.	LOCATION	OPERATOR	WELL NAME	WELL #
220539E050005R	5D 20S 39EM	G F OIL CORP	J. WRIGHT	

STATE	FIELD NO.	FIELD NAME	RESERVOIR	STATUS	GATHERER GAS	GATHERER LIQUID	API NO.
NEW MEXICO	80432597	LEA UNDES SEVEN RIVERS (GAS)	SR	ACT	EL NAT		

DIST. NO.	COUNTY OR PARISH	DATE COMP	DATE 1ST PROD	GAS GRAVITY	INIT TEST DATE	INITIAL POTENTIAL	INIT WHSIP	LATEST N FACT	INIT BHP/Z	M C	TOTAL DEPTH	PERFORATIONS	LIQUID GRAVITY	
2	LEA	040182	06-82	.78	043082	1792	1565	.696			3200	3004- 3121		

PERIOD ENDING	MCF LAST SIX MONTHS	MCF YEARLY PRODUCTION	MMCF CUMULATIVE PRODUCTION	MMCF CUMULATIVE AT TEST	TEST DATE	POTENTIAL	WHSIP	BHP	M C	BHP/Z	TEST WTR BBLS/DAY	MCF/ # DROP INIT WHSIP	SIX MONTH WATER PROD	SIX MONTH COND PROD	SIX MONTH BBLS/MMCF	FLOWING PRESSURE
7 82	560		6				1565	1747		2773			Z = 0.63			
1 83	34639	35199	352													
7 83	30482		657	490	3 29 83		1213	1395		2146		139	0.65			
1 84	42463	72945	1081													
7 84	41478		1496													
1 85	38333	79811	1880	1666	9 20 84		1213	1395		2146		473	0.65			
7 85	41522		2295													
1 86	36741	78263	2662	2461	9 18 85		963	1145		1659		409	0.69			
7 86	24624		2908													
1 87	20146	44770	3110	2911	8 28 86		813	995		1309		387	0.76			
7 87	37110		3481													

FIG. 16-7C

Compressibility of low-molecular-weight natural gases