

GEOLOGIC AND ENGINEERING CHARACTERIZATION OF  
GERALDINE FORD FIELD, REEVES AND CULBERSON  
COUNTIES, TEXAS - ANALYSIS OF RESERVOIR FLUIDS

Topical Report - 1997

By  
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April 1998

Performed Under Contract No. DE-FC22-95BC14936

Bureau of Economic Geology  
The University of Texas at Austin  
Austin, Texas



National Petroleum Technology Office  
U. S. DEPARTMENT OF ENERGY  
Tulsa, Oklahoma

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Culberson Counties, Texas - Analysis Of Reservoir Fluids

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Prepared for  
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Assistant Secretary for Fossil Energy

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**CORE LABORATORIES, INC.**  
*Petroleum Reservoir Engineering*  
**DALLAS, TEXAS**

**Special Study**

**for**

**CONTINENTAL OIL COMPANY**

**Ford Geraldine Unit No. 157**  
**Ford Geraldine Delaware Sand Unit**  
**Texas**

**CORE LABORATORIES, INC.**

*Petroleum Reservoir Engineering*

DALLAS, TEXAS 75207

February 9, 1978

RESERVOIR FLUID DIVISION

Continental Oil Company  
P. O. Box 1267  
Ponca City, Oklahoma 74601

Attention: Mr. Dave Baldwin

Subject: Special Study  
Ford Geraldine Unit No. 157  
Delaware Sand  
Our File Number: RFL 77420

Gentlemen:

On June 14, 1977, separator gas and liquid samples were collected from the subject well and forwarded to our Dallas laboratory for use in a special study. This report presents the complete results of that study.

The hydrocarbon analyses of the separator gas and liquid samples were conducted by routine gas chromatography and low temperature fractional distillation, respectively. These measured compositions were used in conjunction with the recorded gas-liquid ratio of 200 standard cubic feet of gas per barrel of stock tank liquid to calculate a well stream composition. These compositions are presented on page two of the report. This information was reported to a representative of Continental Oil Company and we were subsequently instructed to recombine the separator products in the laboratory and use the resulting reservoir fluid to complete the special study.

A portion of the recombined fluid was placed in a high pressure visual cell and thermally expanded to the reservoir temperature of 83°F. The fluid was subjected to a constant composition expansion and exhibited an observed saturation pressure of 441 psig. A summation of the various volumetric data collected from this test is presented on page three.

The viscosity of the original reservoir fluid was then determined at 83°F., through a series of pressures beginning well above saturation pressure to atmospheric pressure. These values showed a variation from a minimum at saturation pressure of 1.25 centipoises to a maximum at atmospheric pressure of 2.61 centipoises. These values are listed on page four and graphically represented on page five.

The reservoir fluid was then used with carbon dioxide in the performance of a solubility and swelling test at 83°F. A series of seven injections of carbon dioxide were made and the following data monitored during the course of the test: cumulative carbon dioxide injected, swollen volume, and bubble point pressure. In addition, each mixture was subjected to a partial pressure-volume relations test at the reservoir temperature. Mixture No. 8 was collected in the laboratory and subjected to similar viscosity measurements as were performed on the original reservoir fluid. These viscosity values showed a variation from a minimum at the saturation pressure of 0.58 centipoise to a maximum at atmospheric pressure of 2.66 centipoises. The results of the aforementioned tests are presented in tabular and graphical forms on pages six through 17.

Having depleted the available supply of reservoir fluid sample, it was necessary at this time to perform a second recombination of separator products. This was accomplished using identical procedures utilized at the outset of this study.

Five packed column displacement tests were then performed using the reservoir fluid and carbon dioxide. These miscibility displacement tests were performed at 83°F. and at pressures of 1600 psig, 1400 psig, 1200 psig, 900 psig and 800 psig. All of the tests except the one conducted at 800 psig showed the fluids to be miscible. The results of these tests are presented on pages 18 through 29.

Thank you for this opportunity to be of service to Continental Oil Company. Should you have any questions concerning the data presented in this report or if we may be of further assistance in any way, please do not hesitate to call upon us.

Very truly yours,

Core Laboratories, Inc.



P. L. Moses, Manager  
Reservoir Fluid Analysis

PLM:HRF:dr  
7 cc. - Addressee

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Company Continental Oil Company Date Sampled June 14, 1977

Well Ford Geraldine Unit No. 157 County \_\_\_\_\_

Field Fort Geraldine Delaware Sand Unit State Texas

**FORMATION CHARACTERISTICS**

Formation Name \_\_\_\_\_  
 Date First Well Completed \_\_\_\_\_, 19\_\_\_\_  
 Original Reservoir Pressure \_\_\_\_\_ PSIG @ \_\_\_\_\_ Ft.  
 Original Produced Gas-Liquid Ratio \_\_\_\_\_ SCF/Bbl  
 Production Rate \_\_\_\_\_ Bbls/Day  
 Separator Pressure and Temperature \_\_\_\_\_ PSIG \_\_\_\_\_ ° F.  
 Liquid Gravity at 60° F. \_\_\_\_\_ ° API  
 Datum \_\_\_\_\_ Ft. Subsea

**WELL CHARACTERISTICS**

Elevation \_\_\_\_\_ Ft.  
 Total Depth \_\_\_\_\_ Ft.  
 Producing Interval \_\_\_\_\_ Ft.  
 Tubing Size and Depth \_\_\_\_\_ In. to \_\_\_\_\_ Ft.  
 Open Flow Potential \_\_\_\_\_ MMSCF/Day  
 Last Reservoir Pressure \_\_\_\_\_ PSIG @ \_\_\_\_\_ Ft.  
 Date \_\_\_\_\_, 19\_\_\_\_  
 Reservoir Temperature 83 ° F. @ \_\_\_\_\_ Ft.  
 Status of Well \_\_\_\_\_  
 Pressure Gauge \_\_\_\_\_

**SAMPLING CONDITIONS**

Flowing Tubing Pressure \_\_\_\_\_ PSIG  
 Flowing Bottom Hole Pressure \_\_\_\_\_ PSIG  
 Primary Separator Pressure 46 PSIG  
 Primary Separator Temperature 100 ° F.  
 Secondary Separator Pressure \_\_\_\_\_ PSIG  
 Secondary Separator Temperature \_\_\_\_\_ ° F.  
 Field Stock Tank Liquid Gravity \_\_\_\_\_ ° API @ 60° F.  
 Primary Separator Gas Production Rate \_\_\_\_\_ MSCF/Day  
 Pressure Base 14.65 PSIA  
 Temperature Base 60 ° F.  
 Compressibility Factor ( $F_{pv}$ ) \_\_\_\_\_  
 Gas Gravity (Laboratory) 1.135  
 Gas Gravity Factor ( $F_g$ ) \_\_\_\_\_  
 \_\_\_\_\_ Liquid Production Rate @ 60 ° F. \_\_\_\_\_ Bbls/Day  
 Primary Separator Gas/Stock Tank Liquid Ratio 200 SCF/Bbl  
 or \_\_\_\_\_ Bbls/MMSCF

Sampled by \_\_\_\_\_

REMARKS:

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Well Ford Geraldine Unit No. 157

**Hydrocarbon Analyses of Separator Products and Calculated Well Stream**

<u>Component</u>	<u>Separator Liquid Mol Percent</u>	<u>Separator Gas Mol Percent</u>	<u>GPM</u>	<u>Well Stream Mol Percent</u>
Hydrogen Sulfide	Nil	0.06		0.01
Carbon Dioxide	0.01	0.23		0.06
Nitrogen	0.04	0.80		0.21
Methane	0.57	38.34		9.02
Ethane	2.43	23.94	6.366	7.25
Propane	7.41	22.53	6.164	10.79
iso-Butane	2.13	2.97	0.966	2.32
n-Butane	6.64	6.53	2.047	6.62
iso-Pentane	2.96	1.33	0.484	2.60
n-Pentane	3.47	1.44	0.519	3.02
Hexanes	8.07	0.96	0.389	6.48
Heptanes plus	66.27	0.87	0.393	51.62
	<u>100.00</u>	<u>100.00</u>	<u>17.328</u>	<u>100.00</u>

**Properties of Heptanes plus**

API gravity @ 60° F.	<u>38.5</u>		
Specific gravity @ 60/60° F.	<u>0.8321</u>		<u>0.832</u>
Molecular weight	<u>205</u>	<u>103</u>	<u>205</u>

Calculated separator gas gravity (air = 1.000) = 1.135  
 Calculated gross heating value for separator gas = 1887 BTU  
 per cubic foot of dry gas @ 14.65 psia and 60° F.

Primary separator gas collected @ 46 psig and 100 °F., on June 14, 1977.  
 Primary separator liquid collected @ 46 psig and 100 °F., on June 14, 1977.

Primary separator gas/separator liquid ratio 194 SCF/Bbl @ 60 ° F.  
 Primary separator liquid/stock tank liquid ratio 1.033 Bbls @ 60 ° F./Bbl

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Original  
**VOLUMETRIC DATA OF Reservoir Fluid SAMPLE**

1. Saturation pressure (bubble-point pressure) 441 PSIG @ 83 °F.
2. Specific volume at saturation pressure: ft<sup>3</sup>/lb 0.02115 @ 83 °F.
3. Thermal expansion of saturated oil @ 5000 PSI =  $\frac{V @ 83 \text{ °F}}{V @ 68 \text{ °F}} = \underline{1.00660}$
4. Compressibility of saturated oil @ reservoir temperature: Vol/Vol/PSI:
  - From 5000 PSI to 3500 PSI =  $5.76 \times 10^{-6}$
  - From 3500 PSI to 2000 PSI =  $6.41 \times 10^{-6}$
  - From 2000 PSI to 441 PSI =  $7.33 \times 10^{-6}$

5. Pressure-Volume Relations:

Pressure PSIG	Relative Volume(1)	Density (Gm/Cc.)
5000	0.9706	0.7803
4500	0.9734	0.7782
4000	0.9761	0.7759
3500	0.9791	0.7736
3000	0.9821	0.7711
2500	0.9853	0.7686
2000	0.9886	0.7661
1500	0.9921	0.7634
1400	0.9928	0.7629
1000	0.9957	0.7607
800	0.9971	0.7595
700	0.9979	0.7589
600	0.9987	0.7583
500	0.9995	0.7577
<u>441</u>	1.0000	0.7574

(1) Relative Volume: V/V<sub>sat</sub> is barrels at indicated pressure per barrel at saturation pressure.

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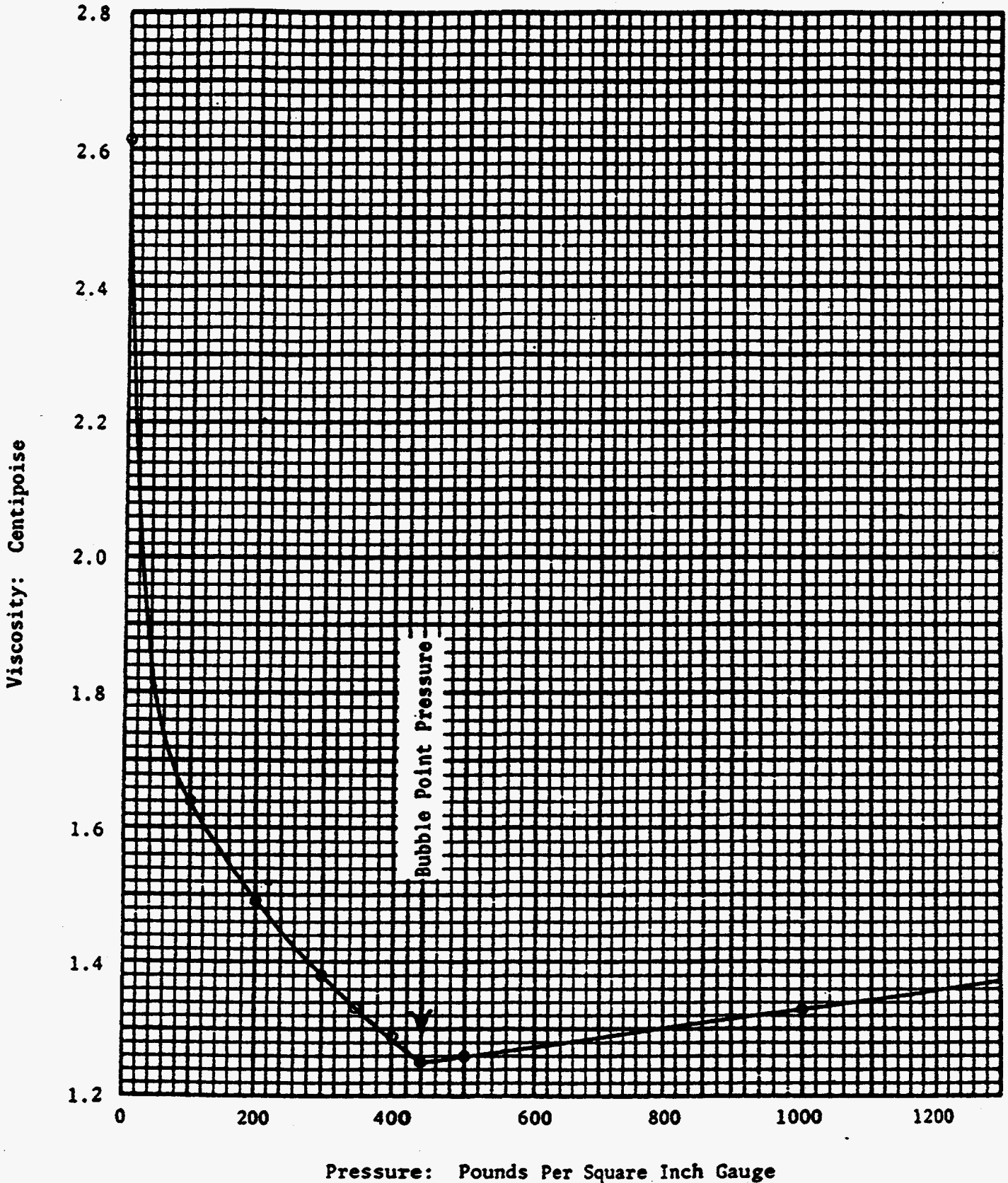
Viscosity of Original Reservoir Fluid at 83°F.

<u>Pressure</u> <u>(PSIG)</u>	<u>Viscosity</u> <u>(Centipoise)</u>
5000	1.85
4000	1.72
3000	1.59
2000	1.46
1000	1.33
500	1.26
441	1.25
400	1.29
350	1.33
300	1.38
200	1.49
100	1.64
0	2.61

Gravity of Residual Oil = 43.0°API @ 60°F.

Viscosity of Original Reservoir Fluid at 83°F.

Company Continental Oil Company Formation \_\_\_\_\_  
Well Ford Geraldine Unit No. 157 County \_\_\_\_\_  
Field Ford Geraldine Delaware Sand Unit State Texas



Saturation Pressure Data on Reservoir  
Fluid and Carbon Dioxide Mixtures at 83°F.

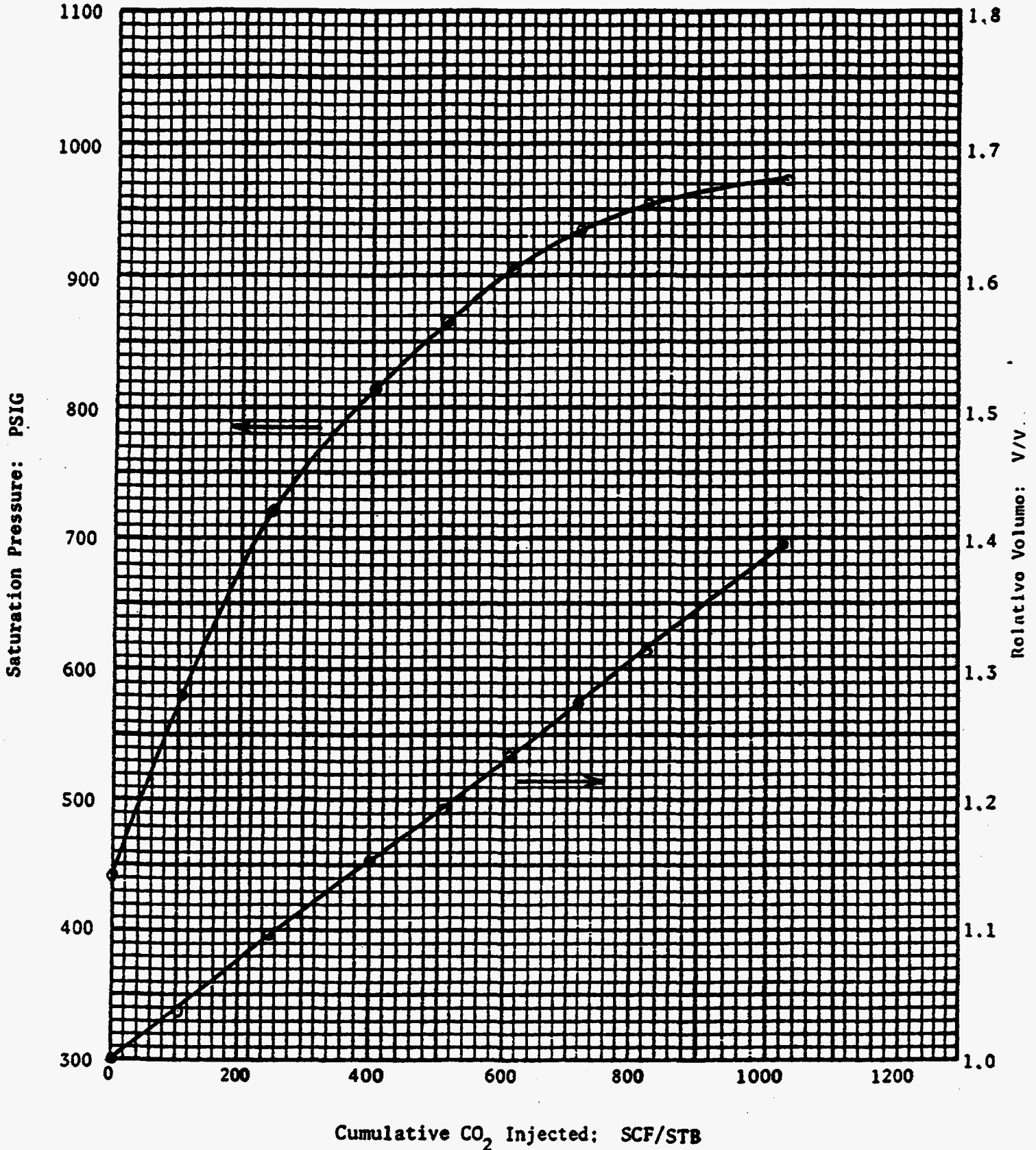
<u>Mixture No.</u>	<u>Cumulative Gas Injected SCF/Bbl(1)</u>	<u>Relative Volume(2)</u>	<u>Saturation Pressure PSIG</u>
*0	0	1.0000	441
1	105	1.0391	580
2	253	1.0953	721
3	401	1.1515	815
4	507	1.1916	865
5	612	1.2335	906
6	718	1.2747	935
7	823	1.3144	955
8	1034	1.3980	972

• Original Reservoir Fluid

- (1) SCF/Bbl is cubic feet of injection gas added at 14.65 psia and 60°F. per barrel of original reservoir fluid saturated at 441 psig and 83°F.
- (2) Relative Volume is barrels of swollen fluid at saturation pressure and 83°F. per barrel of original reservoir fluid saturated at 441 psig and 83°F.

Solubility and Swelling Test at 83°F.

Company Continental Oil Company Formation \_\_\_\_\_  
Well Ford Geraldine Unit No. 157 County \_\_\_\_\_  
Field Ford Geraldine Delaware Sand Unit State Texas



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Pressure-Volume Relations of Mixture No. 1 at 83°F.

<u>Pressure PSIG</u>	<u>Relative Volume(1)</u>	<u>Total Relative Volume(2)</u>
5000	0.9691	1.0070
4500	0.9720	1.0100
4000	0.9751	1.0132
3500	0.9783	1.0166
3000	0.9816	1.0200
2500	0.9851	1.0236
2000	0.9887	1.0274
1500	0.9925	1.0313
1000	0.9964	1.0354
800	0.9982	1.0372
700	0.9990	1.0381
600	0.9999	1.0390
<u>580</u>	1.0000	1.0391

- (1) Relative volume is volume of Mixture No. 1 at indicated pressure per volume of saturated fluid at 580 psig and 83°F.
- (2) Total relative volume is volume of Mixture No. 1 at indicated pressure per volume of original saturated reservoir fluid at 441 psig and 83°F.

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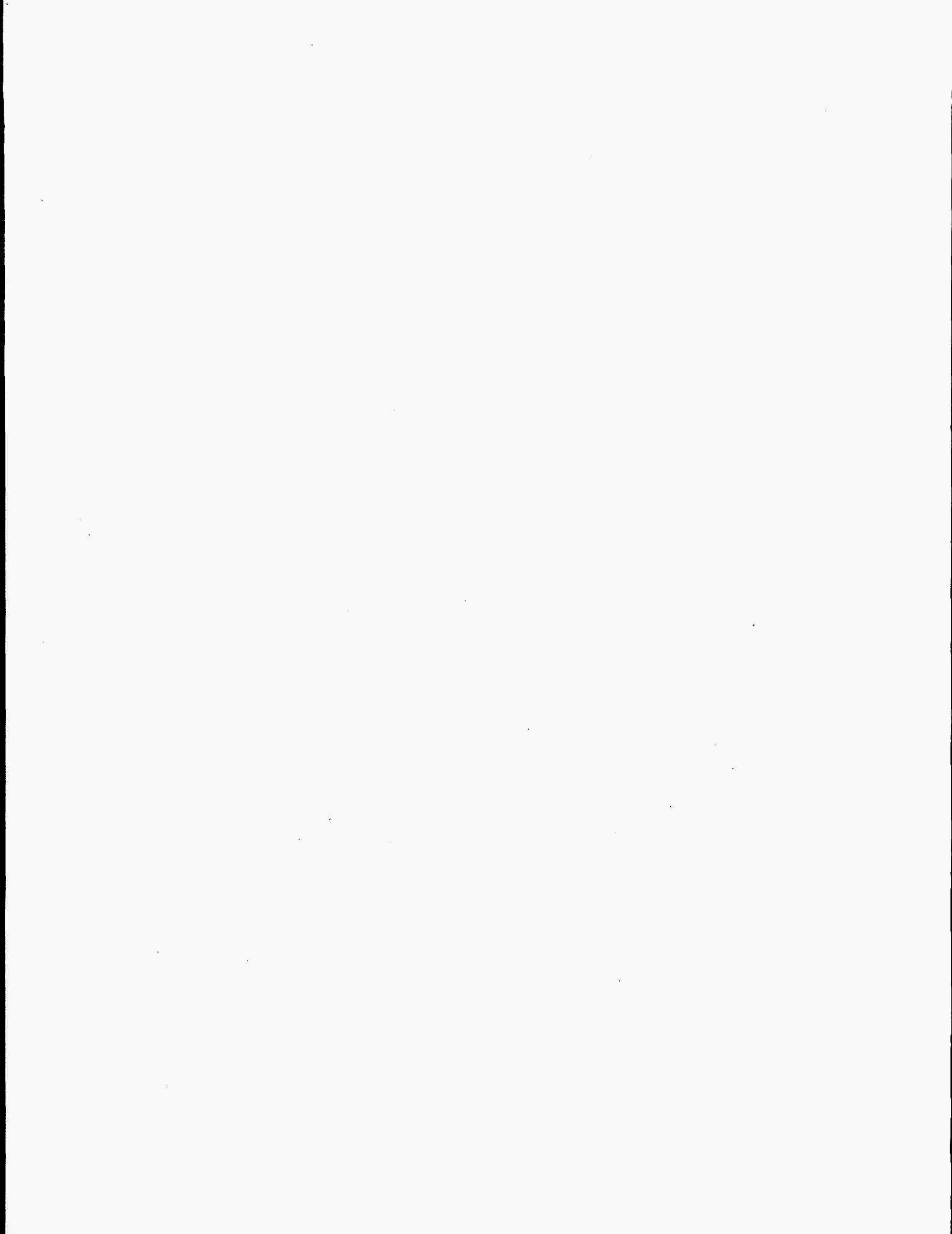
Pressure-Volume Relations of Mixture No. 2 at 83°F.

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume(1)</u>	<u>Total</u> <u>Relative</u> <u>Volume(2)</u>
5000	0.9667	1.0588
4500	0.9700	1.0624
4000	0.9732	1.0660
3500	0.9767	1.0698
3000	0.9805	1.0739
2500	0.9883	1.0825
2000	0.9913	1.0858
1500	0.9925	1.0871
1000	0.9971	1.0921
900	0.9983	1.0934
800	0.9992	1.0944
<u>721</u>	1.0000	1.0953

- (1) Relative volume is volume of Mixture No. 2 at indicated pressure per volume of saturated fluid at 721 psig and 83°F.
- (2) Total relative volume is volume of Mixture No. 2 at indicated pressure per volume of original saturated reservoir fluid at 441 psig and 83°F.

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Pressure-Volume Relations of Mixture No. 4 at 83°F.

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume(1)</u>	<u>Total</u> <u>Relative</u> <u>Volume(2)</u>
5000	0.9632	1.1478
4500	0.9668	1.1520
4000	0.9706	1.1566
3500	0.9745	1.1612
3000	0.9789	1.1664
2500	0.9832	1.1716
2000	0.9880	1.1773
1500	0.9930	1.1833
1200	0.9962	1.1871
1100	0.9973	1.1884
1000	0.9985	1.1898
900	0.9996	1.1911
<u>865</u>	1.0000	1.1916

- (1) Relative volume is volume of Mixture No. 4 at indicated pressure per volume of saturated fluid at 865 psig and 83°F.
- (2) Total relative volume is volume of Mixture No. 4 at indicated pressure per volume of original saturated reservoir fluid at 441 psig and 83°F.

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Pressure-Volume Relations of Mixture No. 5 at 83°F.

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume(1)</u>	<u>Total</u> <u>Relative</u> <u>Volume(2)</u>
5000	0.9614	1.1859
4500	0.9652	1.1906
4000	0.9693	1.1956
3500	0.9735	1.2008
3000	0.9779	1.2063
2500	0.9827	1.2121
2000	0.9877	1.2183
1500	0.9930	1.2249
1300	0.9954	1.2278
1200	0.9966	1.2293
1100	0.9977	1.2307
1000	0.9989	1.2322
<u>906</u>	1.0000	1.2335

- (1) Relative volume is volume of Mixture No. 5 at indicated pressure per volume of saturated fluid at 906 psig and 83°F.
- (2) Total relative volume is volume of Mixture No. 5 at indicated pressure per volume of original saturated reservoir fluid at 441 psig and 83°F.

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Pressure-Volume Relations of Mixture No. 6 at 83°F.

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume(1)</u>	<u>Total</u> <u>Relative</u> <u>Volume(2)</u>
5000	0.9594	1.2229
4500	0.9634	1.2280
4000	0.9675	1.2333
3500	0.9720	1.2390
3000	0.9767	1.2450
2500	0.9817	1.2514
2000	0.9871	1.2582
1500	0.9929	1.2656
1300	0.9954	1.2688
1200	0.9966	1.2704
1100	0.9979	1.2720
1000	0.9992	1.2737
<u>935</u>	1.0000	1.2747

- (1) Relative volume is volume of Mixture No. 6 at indicated pressure per volume of saturated fluid at 935 psig and 83°F.
- (2) Total relative volume is volume of Mixture No. 6 at indicated pressure per volume of original saturated reservoir fluid at 441 psig and 83°F.

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Pressure-Volume Relations of Mixture No. 7 at 83°F.

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume(1)</u>	<u>Total</u> <u>Relative</u> <u>Volume(2)</u>
5000	0.9577	1.2588
4500	0.9618	1.2642
4000	0.9662	1.2700
3500	0.9708	1.2760
3000	0.9757	1.2825
2500	0.9809	1.2893
2000	0.9866	1.2968
1500	0.9926	1.3047
1300	0.9953	1.3082
1200	0.9967	1.3100
1100	0.9979	1.3117
1000	0.9994	1.3136
<u>955</u>	1.0000	1.3144

- (1) Relative volume is volume of Mixture No. 7 at indicated pressure per volume of saturated fluid at 955 psig and 83°F.
- (2) Total relative volume is volume of Mixture No. 7 at indicated pressure per volume of original saturated reservoir fluid at 441 psig and 83°F.

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Pressure-Volume Relations of Mixture No. 8 at 83°F.

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume(1)</u>	<u>Total</u> <u>Relative</u> <u>Volume(2)</u>
5000	0.9532	1.3326
4500	0.9576	1.3388
4000	0.9624	1.3454
3500	0.9673	1.3523
3000	0.9727	1.3599
2500	0.9785	1.3680
2000	0.9849	1.3769
1500	0.9918	1.3865
1300	0.9949	1.3909
1200	0.9965	1.3931
1100	0.9980	1.3952
1000	0.9996	1.3974
<u>972</u>	1.0000	1.3980

- (1) Relative volume is volume of Mixture No. 8 at indicated pressure per volume of saturated fluid at 972 psig and 83°F.
- (2) Total relative volume is volume of Mixture No. 8 at indicated pressure per volume of original saturated reservoir fluid at 441 psig and 83°F.

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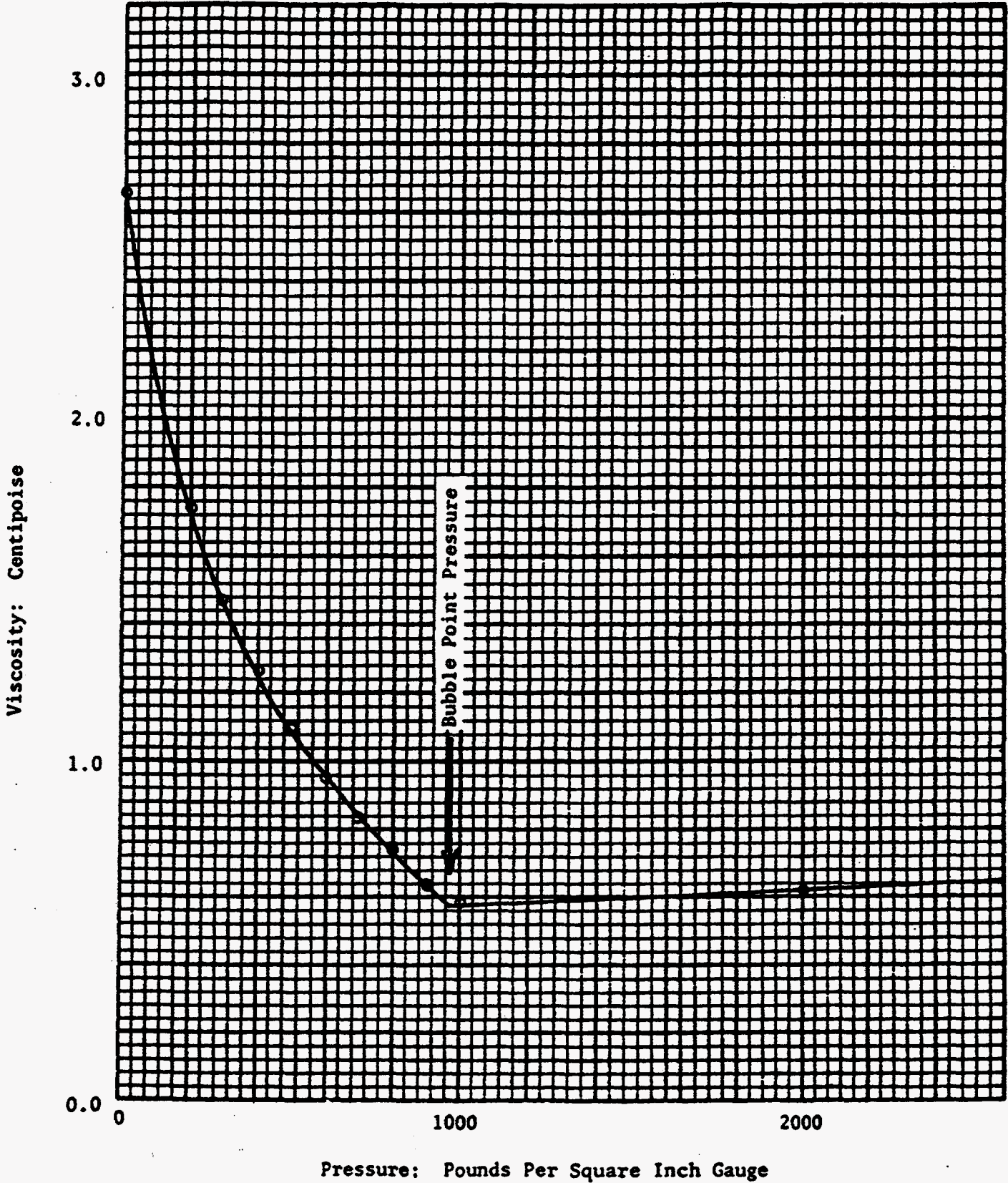
Viscosity of Mixture No. 8 at 83°F.

<u>Pressure</u> <u>(PSIG)</u>	<u>Viscosity</u> <u>(Centipoise)</u>
5000	0.76
4000	0.72
3000	0.67
2000	0.62
1000	0.59
<u>972</u>	0.58
900	0.64
800	0.74
700	0.84
600	0.95
500	1.10
400	1.26
300	1.47
200	1.74
0	2.66

Gravity of Residual Oil = 42.1°API @ 60°F.

Viscosity of Mixture No. 8 at 83°F.

Company Continental Oil Company Formation \_\_\_\_\_  
Well Ford Geraldine Unit No. 157 County \_\_\_\_\_  
Field Ford Geraldine Delaware Sand Unit State Texas





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**Packed Column Displacement Study**  
**Summary of Basic Data**

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<b>Sand Packed Column Properties</b>	
Length, feet	36
Internal Diameter, inches	0.25
Porosity, percent	36.2
<b>Operating Conditions</b>	
Column Temperature, °F.	83
Separator Pressure, psig	0
Separator Temperature, °F.	72
<b>Reservoir Fluid Properties</b>	
Saturation Pressure at 83°F., psig	441
Gas/Oil Ratio, SCF/STB	286
Formation Volume Factor, Bbls at 441 psig/STB	1.137
Stock Tank Oil Gravity, °API @ 60°F.	43.5
Gas Gravity (Air=1.000)	1.263

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**Packed Column Displacement Study at 1600 PSIG and 83°F.**  
**Injection Gas - Carbon Dioxide**

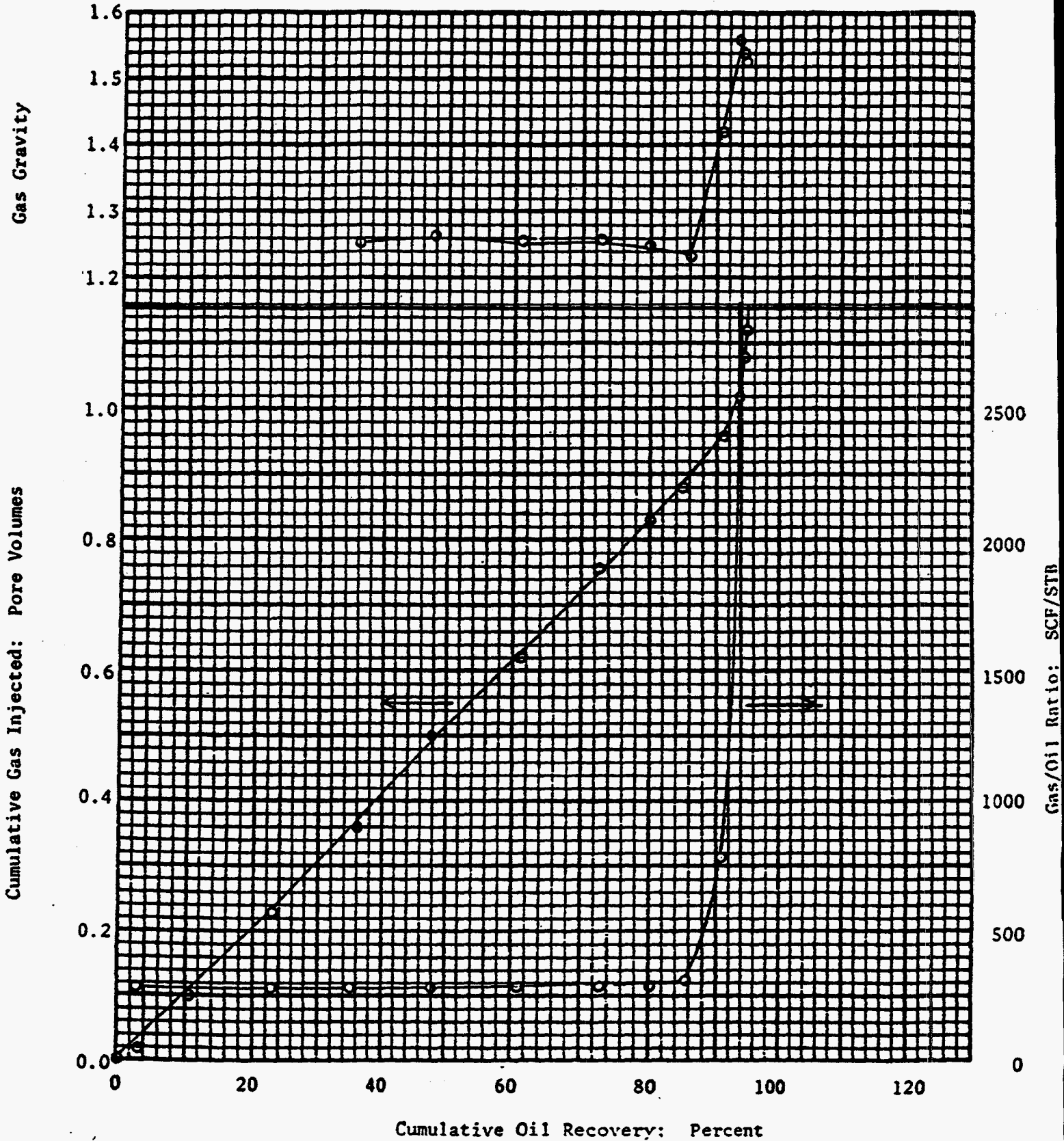
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<u>Cumulative Gas Injected (Pore Volumes)</u>	<u>Cumulative Oil Recovery (Percent)</u>	<u>Gas/Oil Ratio SCF/STB</u>	<u>Gas Gravity</u>	<u>Oil Gravity (*API @ 60°F.)</u>
0	0			
0.02	2.9	282		
0.10	10.6	280		
0.23	23.4	286		
0.36	35.6	289	1.254	43.3
0.50	48.2	290	1.261	
0.62	60.8	292	1.254	43.2
0.76	73.0	292	1.258	
0.83	79.9	292	1.248	
0.88	85.5	306	1.234	43.3
0.96	91.3	782	1.420	
1.02	93.9	4211	1.563	43.3
1.08	94.4	30630	1.549	
1.14	94.5	138780	1.534	

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Packed Column Displacement Study at 1600 PSIG and 83°F.  
 Injection Gas - Carbon Dioxide

Company Continental Oil Company Formation \_\_\_\_\_  
 Well Ford Geraldine Unit No. 157 County \_\_\_\_\_  
 Field Ford Geraldine Delaware Sand Unit State Texas



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Well Ford Geraldine Unit No. 157

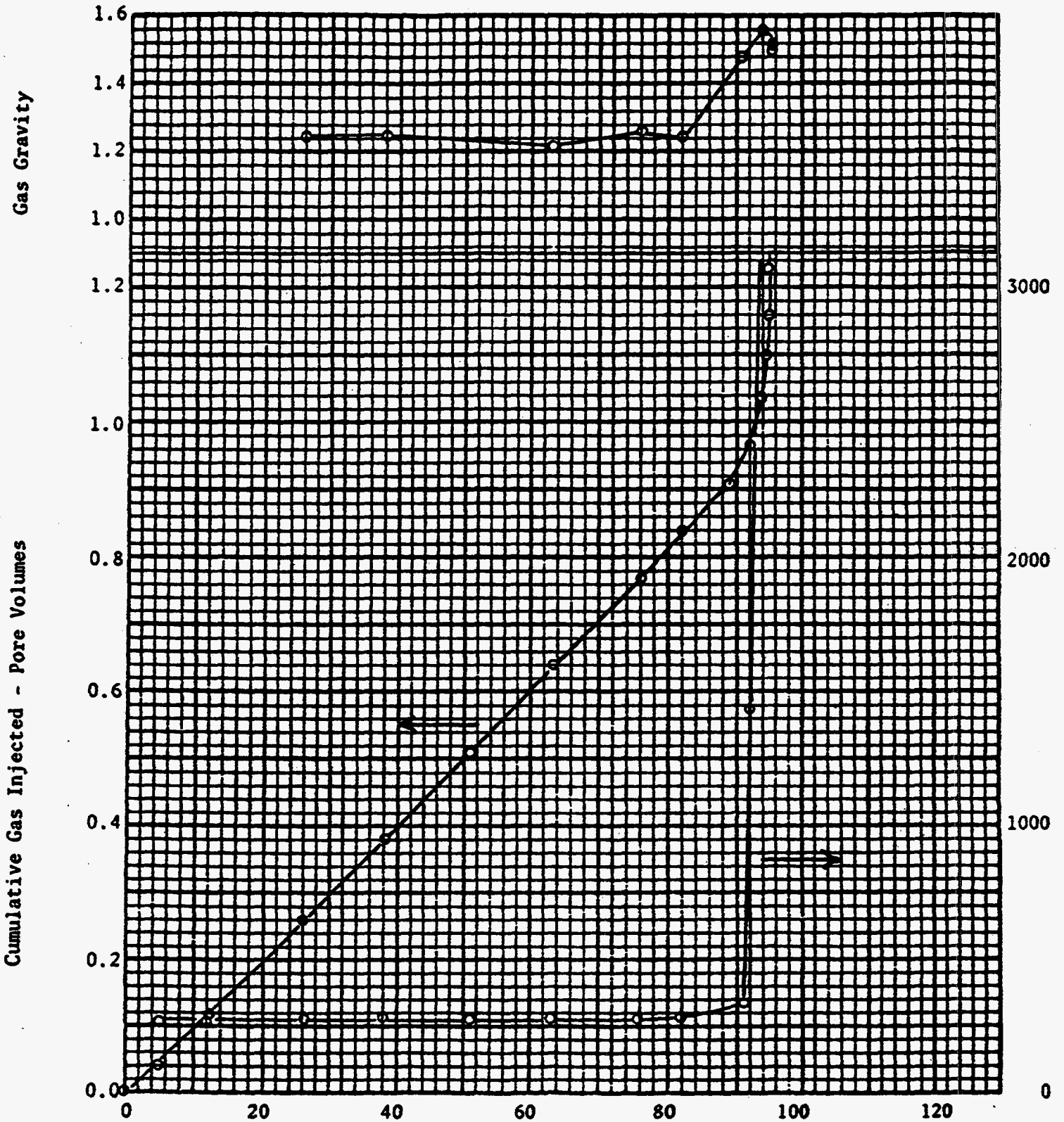
**Packed Column Displacement Study at 1400 PSIG and 83°F.**  
Injection Fluid - Carbon Dioxide

<u>Cumulative Gas Injected (Pore Volumes)</u>	<u>Cumulative Oil Recovery (Percent)</u>	<u>Gas/Oil Ratio SCF/STB</u>	<u>Gas Gravity</u>	<u>Oil Gravity (°API @ 60°F.)</u>
0	0	0		
0.04	5.3	268		
0.12	12.4	285		
0.26	25.9	281	1.251	43.3
0.38	38.3	285	1.248	
0.51	50.6	288		43.1
0.64	62.7	290	1.216	
0.77	76.2	290	1.264	43.2
0.84	82.4	291	1.249	
0.91	88.7	344	1.251	
0.97	92.4	1442	1.480	43.2
1.04	94.3	6996	1.560	
1.10	94.6	45790	1.540	
1.16	94.7	119480	1.530	
1.23	94.8	166660	1.527	

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Packed Column Displacement Study at 1400 PSIG and 83°F.  
 Injection Gas - Carbon Dioxide

Company Continental Oil Company Formation \_\_\_\_\_  
 Well Ford Geraldine Unit No. 157 County \_\_\_\_\_  
 Field Ford Geraldine Delaware Sand Unit State Texas



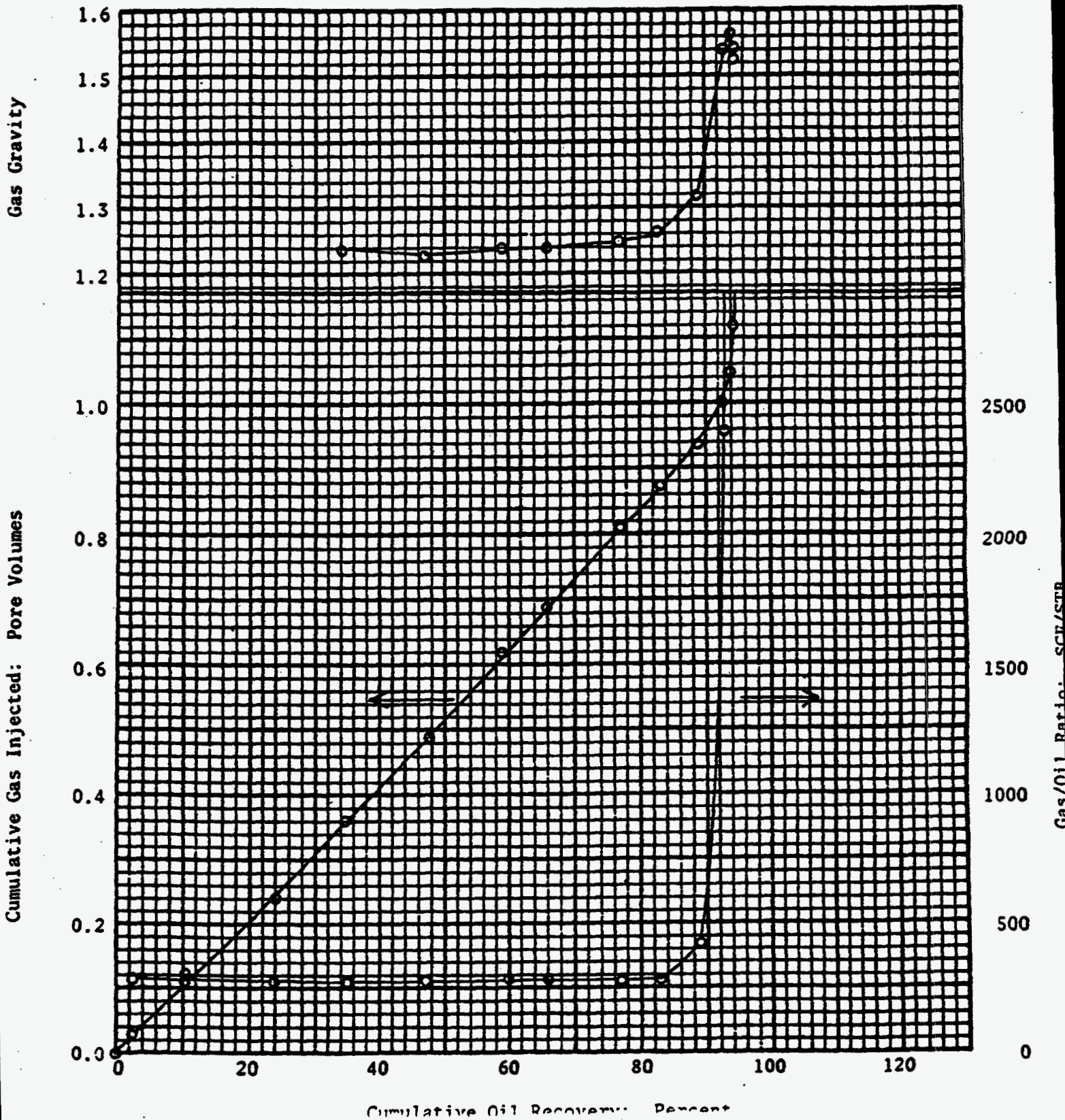
Packed Column Displacement Study at 1200 PSIG and 83°F.  
Injection Gas - Carbon Dioxide

<u>Cumulative Gas Injected (Pore Volumes)</u>	<u>Cumulative Oil Recovery (Percent)</u>	<u>Gas/Oil Ratio SCF/STB</u>	<u>Gas Gravity</u>	<u>Oil Gravity (°API @ 60°F.)</u>
0	0			
0.03	2.3	280		
0.12	10.5	271		
0.24	24.0	272		43.3
0.36	34.7	274	1.242	
0.49	47.5	281	1.234	
0.62	59.4	285	1.241	43.3
0.69	66.4	287	1.240	
0.81	76.9	281	1.248	
0.87	83.4	284	1.255	43.2
0.94	89.3	421	1.317	
1.00	93.0	2398	1.541	43.3
1.05	93.9	11540	1.561	
1.12	94.2	71975	1.542	
1.17	94.3	108790	1.534	
1.22	94.4	121460	1.535	



Packed Column Displacement Study at 1200 PSIG and 83°F.  
 Injection Gas - Carbon Dioxide

Company Continental Oil Company Formation \_\_\_\_\_  
 Well Ford Geraldine Unit No. 157 County \_\_\_\_\_  
 Field Ford Geraldine Delaware Sand Unit State Texas



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**Packed Column Displacement Study at 800 PSIG and 83°F.**  
**Injection Gas - Carbon Dioxide**

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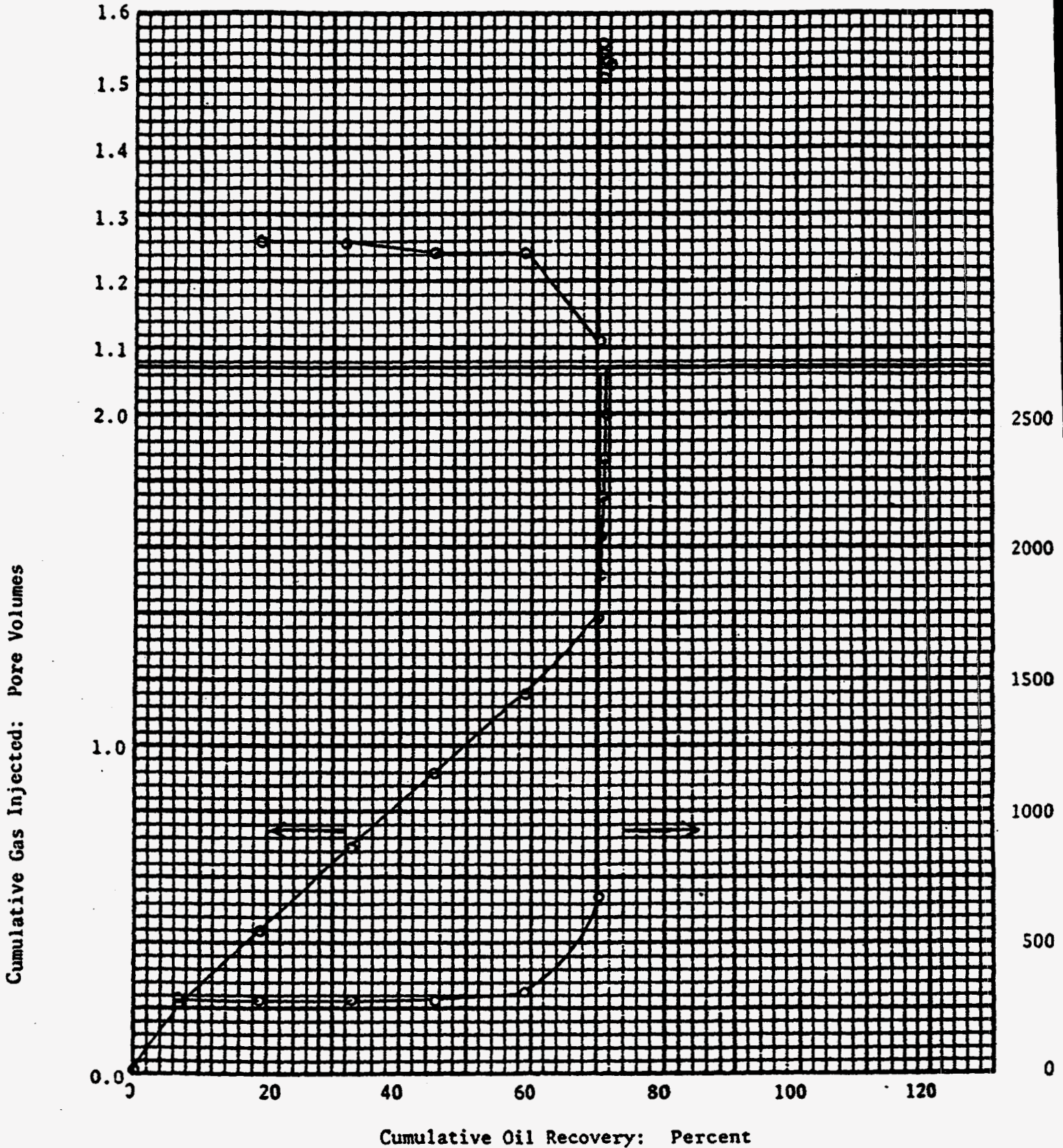
<u>Cumulative Gas Injected (Pore Volumes)</u>	<u>Cumulative Oil Recovery (Percent)</u>	<u>Gas/Oil Ratio SCF/STB</u>	<u>Gas Gravity</u>	<u>Oil Gravity (°API @ 60°F.)</u>
0	0			
0.05	0.3			
0.21	7.3	270		
0.44	19.1	277	1.258	43.4
0.69	32.9	281	1.259	
0.92	44.8	280	1.244	43.3
1.16	59.1	313	1.244	
1.39	70.3	663	1.102	43.1
1.52	70.6	9109	1.505	
1.63	70.7	70795	1.550	40.7
1.75	71.0	27500	1.537	
1.87	71.3	27590	1.536	
2.00	71.6	21510	1.539	
2.15	71.9	34355	1.550	
2.27	72.0	42430	1.335	
2.39	72.2	21515	1.542	
2.52	72.3	65160	1.527	

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Packed Column Displacement Study at 800 PSIG and 83°F.  
 Injection Gas - Carbon Dioxide

Company Continental Oil Company Formation \_\_\_\_\_  
 Well Ford Geraldine Unit No. 157 County \_\_\_\_\_  
 Field Ford Geraldine Delaware Sand Unit State Texas



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*Petroleum Reservoir Engineering*  
**DALLAS, TEXAS**

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Well Ford Geraldine Unit  
No. 157

**Packed Column Displacement Study**  
**Summary of Basic Data**

**Sand Packed Column Properties**

Length, feet	40.0
Internal Diameter, inches	0.18
Porosity, percent	39.2

**Operating Conditions**

Column Temperature, °F.	83
Separator Pressure, psig	0
Separator Temperature, °F.	72

**Reservoir Fluid Properties**

Saturation Pressure at 83°F., psig	441
Gas/Oil Ratio, SCF/STB	286
Formation Volume Factor, Bbls at 441 psig/STB	1.137
Stock Tank Oil Gravity, °API @ 60°F.	43.0
Gas Gravity (Air=1.000)	1.263