BENSON-MONTIN-GREER DRILLING CORP.

EXHIBITS IN CASE NO. 4067
BEFORE THE
NEW MEXICO OIL CONSERVATION
COMMISSION

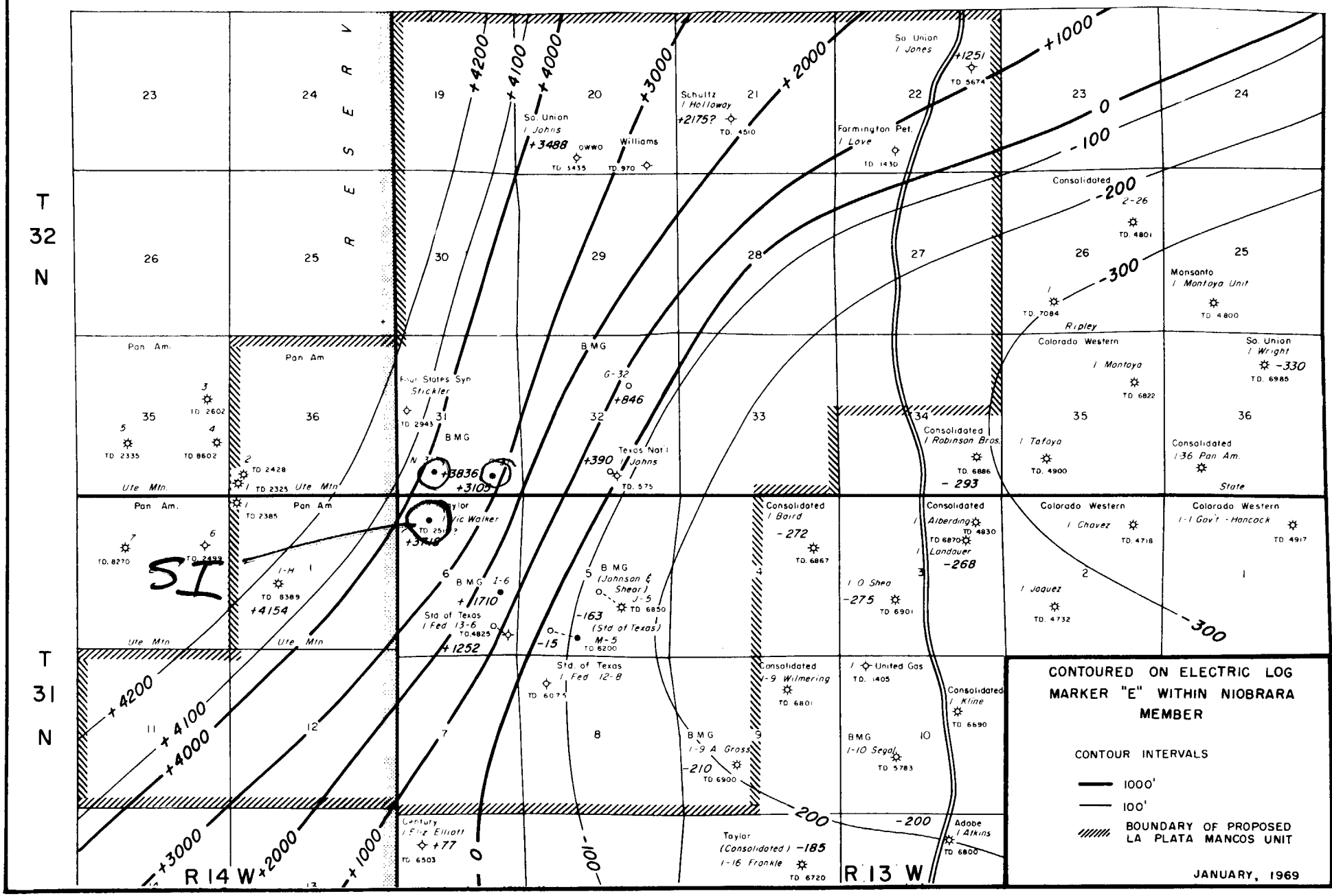
March 5, 1969

INDEX

STRUCTURAL CONTOUR MAP

OF

NIOBRARA MEMBER OF MANCOS SHALE FORMATION



CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS 75207
July 3, 1968

RESERVOIR FLUID ANALYSIS

Benson-Montin-Greer Drilling Corporation
221 Petroleum Center Building
Farmington, New Mexico

Attention: Mr. Virgil Stoabs

Subject: Reservoir Fluid Study
Lloyd B. Taylor
Vic Walker No. 1 Well
La Plata Gallup Field
San Juan County, New Mexico
Our File Number: RFL 5096

Gentlemen:

Three samples of subsurface fluid were collected at a depth of 2250 feet in the subject well by a representative of Core Laboratories, Inc. on May 27, 1968. These samples were submitted to our Dallas laboratory for use in a reservoir fluid study, and the results of this study are presented on the following pages.

Upon receiving the samples in our laboratory the bubble-point pressure of each sample was measured at 74° F., as requested. Sample No. 1 had a bubble-point pressure of 185 psig, Sample No. 2 was 186 psig and Sample No. 3 was 187 psig. These values were reported by telephone to a representative of Benson-Montin-Greer Drilling Corporation and we were then authorized to complete the remainder of the study using Subsurface Sample No. 3.

The bubble-point pressure of the reservoir fluid was measured to be 234 psig at the reservoir temperature of 107° F. During differential pressure depletion at this temperature the fluid evolved 125 cubic feet of gas at 14.7 psia and 60° F. per barrel of residual oil at 60° F. The associated formation volume factor was 1.090 barrels of saturated fluid per barrel of residual oil.

The density of the liquid phase and the properties of the evolved gases were measured at several succeeding pressure levels during this depletion.

Under similar depletion conditions at 107° F. the viscosity of the fluid was measured from pressures exceeding reservoir pressure to atmospheric pressure. The viscosity of the liquid phase varied from a minimum of 1.86 centipoises at saturation pressure to a maximum of 2.99 centipoises at atmospheric pressure.

Thank you for the opportunity of performing this study for you. Should you have any questions regarding the data or if we may assist you further in any manner, please do not hesitate to contact us.

Very truly yours,

Core Laboratories, Inc.
Reservoir Fluid Analysis

P. L. Moses HS

P. L. Moses
Manager

PLM:HS:dr
7 cc. - Addressee

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 5096

Company Lloyd B. Taylor — Date Sampled May 27, 1968

Well Vic Walker No. 1 — County San Juan

Field La Plata Gallup — State New Mexico

FORMATION CHARACTERISTICS

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

WELL CHARACTERISTICS

Elevation	_____ Ft.
Total Depth	2510 Ft.
Producing Interval	2248-2510 Ft.
Tubing Size and Depth	_____ In. to _____ Ft.
Productivity Index	_____ Bbl/D/PSI @ _____ Bbl/Day
Last Reservoir Pressure	303 PSIG @ 2250 Ft.
Date	May 27, 1968
Reservoir Temperature	105* °F. @ 2250 Ft.
Status of Well	Shut in
Pressure Gauge	Amerada
Normal Production Rate	_____ Bbl/Day
Gas-Oil Ratio	_____ SCF/Bbl
Separator Pressure and Temperature	_____ PSIG, _____ °F.
Base Pressure	_____ PSIA
Well Making Water	_____ % Cut

SAMPLING CONDITIONS

Sampled at	2250 Ft.
Status of Well	Shut in
Gas-Oil Ratio	_____ SCF/Bbl
Separator Pressure and Temperature	_____ PSIG, _____ °F.
Tubing Pressure	_____ PSIG
Casing Pressure	0 PSIG
Core Laboratories Engineer	NT
Type Sampler	Perco

REMARKS: * Temperature extrapolated to mid-point of producing interval = 107° F.

VOLUMETRIC DATA OF Reservoir Fluid SAMPLE

1. Saturation pressure (bubble-point pressure) 234 PSIG @ 107 °F.

2. Thermal expansion of saturated oil @ 2000 PSI $= \frac{V \text{ @ } 107\ ^\circ F}{V \text{ @ } 72.5\ ^\circ F} =$ 1.01790

3. Compressibility of saturated oil @ reservoir temperature: Vol/Vol/PSI:

   From 2000 PSI to 1100 PSI = 6.61×10^{-6}

   From 1100 PSI to 600 PSI = 6.90×10^{-6}

   From 600 PSI to 234 PSI = 7.28×10^{-6}

4. Specific volume at saturation pressure: ft ^{3}/lb 0.02032 @ 107 °F.

5. Bubble-point pressure of subsurface samples at 74° F.:

Sample Number	Pressure, PSIG
1	185
2	186
3	187

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted); but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper opera-

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS 75207

File RFL 5096

Well Vic Walker No. 1

Reservoir Fluid SAMPLE TABULAR DATA

PRESSURE PSI GAUGE	PRESSURE-VOLUME RELATION @ 107 °F., RELATIVE VOLUME OF OIL AND GAS, V/Vsat.	VISCOSITY OF OIL @ 107 °F., CENTIPOISES	DIFFERENTIAL LIBERATION @ 107 °F.		
			GAS/OIL RATIO LIBERATED PER BARREL OF RESIDUAL OIL	GAS/OIL RATIO IN SOLUTION PER BARREL OF RESIDUAL OIL	RELATIVE OIL VOLUME, V/VR
2000	0.9880	2.16			1.077
1700	0.9899	2.11			1.079
1400	0.9919	2.05			1.081
1100	0.9939	2.00			1.083
800	0.9960	1.95			1.086
700	0.9966				1.086
600	0.9973				1.087
500	0.9981	1.90			1.088
400	0.9988				1.089
300	0.9996	1.87			1.090
234	1.0000	1.86	0	125	1.090
232	1.0025				
230	1.0072				
226	1.0156				
219	1.0314				
210	1.0552				
200		1.87			
198	1.0868				
191			10	115	1.087
184	1.1342				
169	1.1977				
154	1.2846				
150		1.91			
140			23	102	1.081
137	1.3956				
121	1.5383				
106	1.7285				
100		1.97			
90			40	85	1.074
88	2.0268				
72	2.5018				
57			55	70	1.067

V = Volume at given pressure
Vsat. = Volume at saturation pressure and the specified temperature.
VR = Residual oil volume at 14.7 PSI absolute and 60° F.

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted); but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper opera-

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS 75207

File RFL 5096

Well Vic Walker No. 1

Reservoir Fluid SAMPLE TABULAR DATA

PRESSURE PSI GAUGE	PRESSURE-VOLUME RELATION @ 107 °F., RELATIVE VOLUME OF OIL AND GAS, V/VSAT.	VISCOSITY OF OIL @ 107 °F., CENTIPOISES	DIFFERENTIAL LIBERATION @ 107 °F.		
			GAS/OIL RATIO LIBERATED PER BARREL OF RESIDUAL OIL	GAS/OIL RATIO IN SOLUTION PER BARREL OF RESIDUAL OIL	RELATIVE OIL VOLUME, V/VR
55	3.2804				
50		2.07			
0		2.99	125	0	1.023
				@ 60° F.	= 1.000

Gravity of residual oil = 40.1° API @ 60° F.

V = Volume at given pressure
VSAT. = Volume at saturation pressure and the specified temperature.
VR = Residual oil volume at 14.7 PSI absolute and 60° F.

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted); but

Differential Pressure Depletion at 107° F.

Pressure PSIG	Oil Density Gms/Cc	Gas Gravity	Deviation Factor Z
234	0.7881		
191	0.7890	0.789	0.903
140	0.7912	0.845	0.932
90	0.7930	0.945	0.953
57	0.7949	1.081	
0	0.8060	1.560	

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted); but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper...

SEPARATOR TESTS OF Reservoir Fluid SAMPLE

SEPARATOR PRESSURE, PSI GAUGE	SEPARATOR TEMPERATURE, ° F.	SEPARATOR GAS/OIL RATIO See Foot Note (1)	STOCK TANK GAS/OIL RATIO See Foot Note (1)	STOCK TANK GRAVITY, ° API @ 60° F.	SHRINKAGE FACTOR, $V_R/V_{SAT.}$ See Foot Note (2)	FORMATION VOLUME FACTOR, $V_{SAT.}/V_R$ See Foot Note (3)	SPECIFIC GRAVITY OF FLASHED GAS
0	76	122		40.3	0.9149	1.093	1.212
20	76	79	26	41.1	0.9226	1.084	
40	75	60	41	41.1	0.9246	1.082	
80	75	37	70	40.8	0.9199	1.087	

(1) Separator and Stock Tank Gas/Oil Ratio in cubic feet of gas @ 60° F. and 14.7 PSI absolute per barrel of stock tank oil @ 60° F.

(2) Shrinkage Factor: $V_R/V_{SAT.}$ is barrels of stock tank oil @ 60° F. per barrel of saturated oil @ 234 PSI gauge and 107 ° F.

(3) Formation Volume Factor: $V_{SAT.}/V_R$ is barrels of saturated oil @ 234 PSI gauge and 107 ° F. per barrel of stock tank oil @ 60° F.

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted); but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper opera-

Company Lloyd B. Taylor Formation Gallup

Well Vic Walker No. 1 County San Juan

Field La Plata Gallup State New Mexico

HYDROCARBON ANALYSIS OF Reservoir Fluid SAMPLE

COMPONENT	MOL PER CENT	WEIGHT PER CENT	DENSITY @ 60° F. GRAMS PER CUBIC CENTIMETER	° API @ 60° F.	MOLECULAR WEIGHT
Hydrogen Sulfide					
Carbon Dioxide	0.07	0.02			
Nitrogen	0.02	0.01			
Methane	5.39	0.53			
Ethane	4.30	0.80			
Propane	7.45	2.04			
iso-Butane	1.45	0.52			
n-Butane	5.87	2.12			
iso-Pentane	2.71	1.22			
n-Pentane	3.45	1.55			
Hexanes	6.68	3.58			
Heptanes plus	62.61	87.61	0.8438	36.0	225
	100.00	100.00			

Core Laboratories, Inc.
Reservoir Fluid Analysis

P. L. Moses

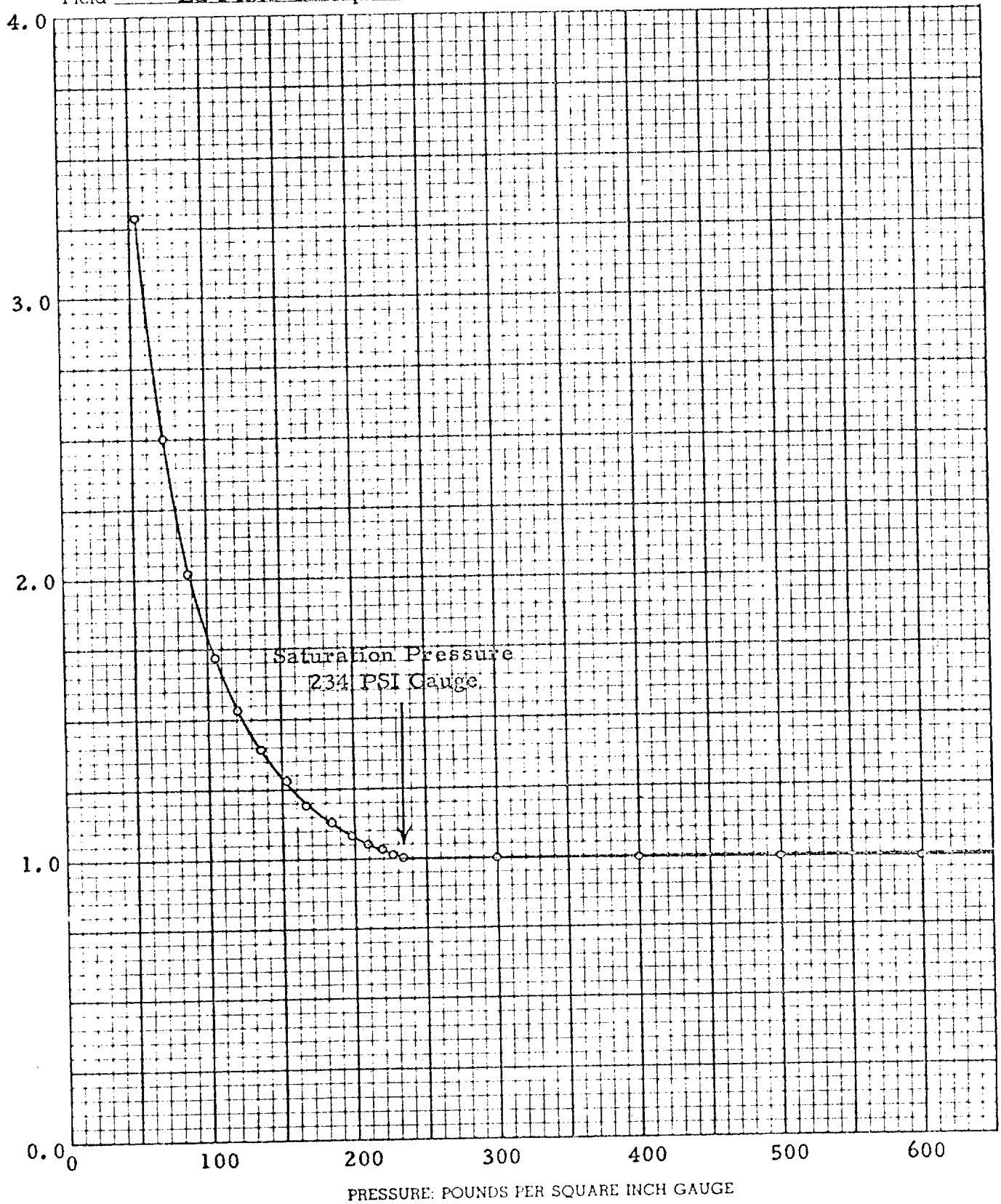
P. L. Moses
Manager

These analyses, opinions or interpretations are based on observations and material supplied by the client to whom, and for whose exclusive and confidential use, this report is made. The interpretations or opinions expressed represent the best judgment of Core Laboratories, Inc. (all errors and omissions excepted); but Core Laboratories, Inc. and its officers and employees, assume no responsibility and make no warranty or representations as to the productivity, proper operation, or profitableness of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

PRESSURE-VOLUME RELATIONS OF RESERVOIR FLUID

Company Lloyd B. Taylor
Well Vic Walker No. 1
Field La Plata Gallup

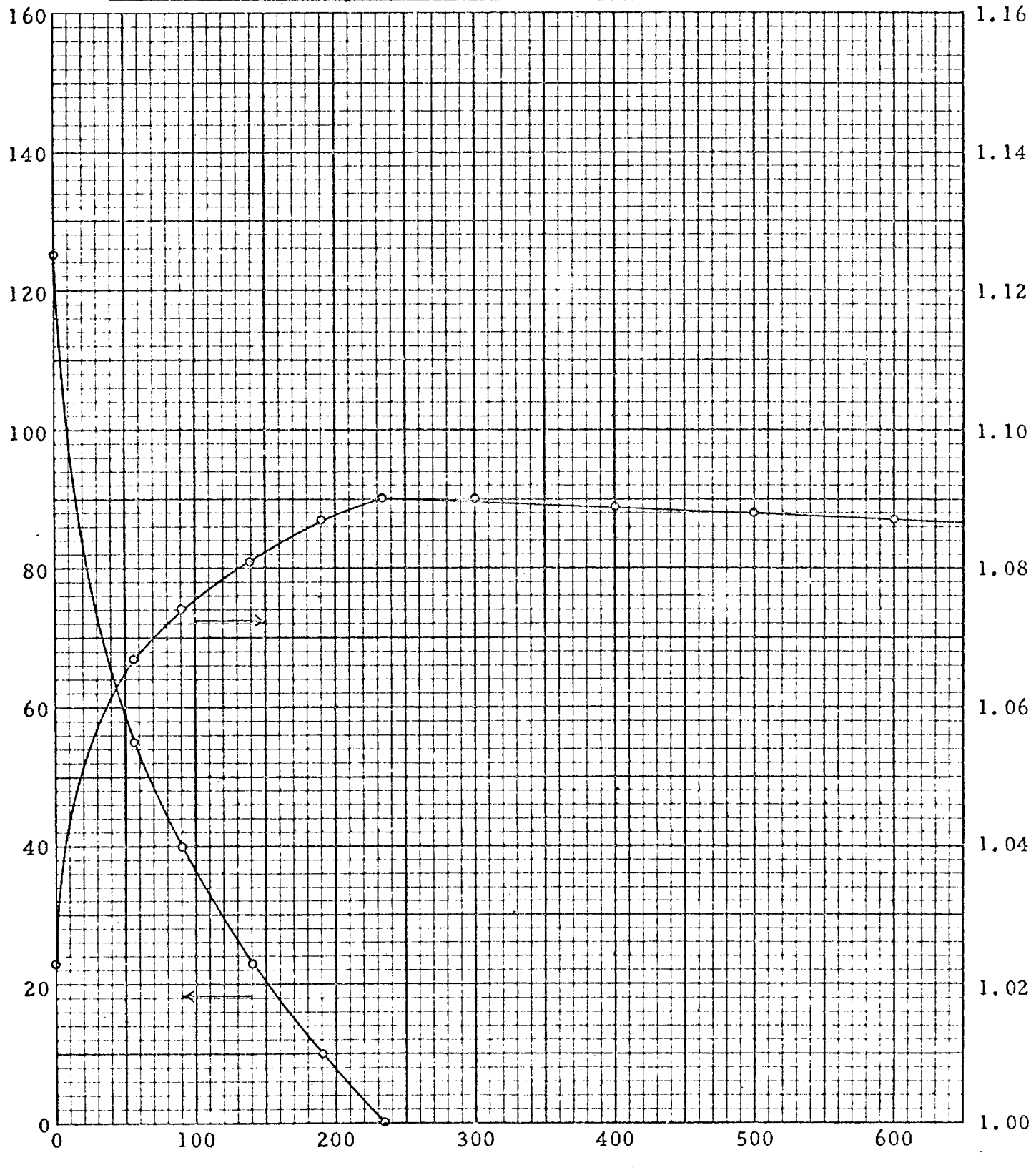
Formation Gallup
County San Juan
State New Mexico



PRESSURE: POUNDS PER SQUARE INCH GAUGE

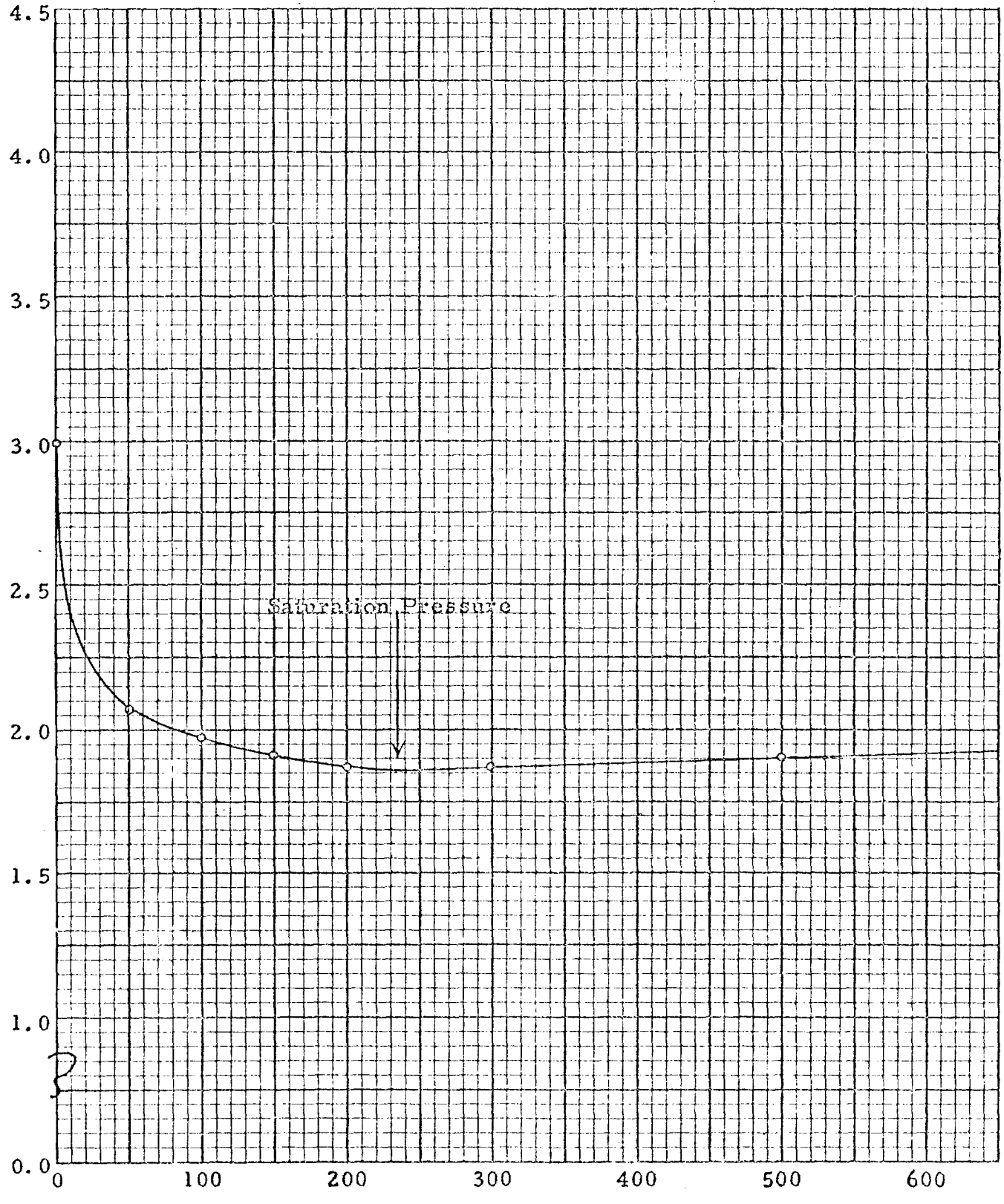
DIFFERENTIAL VAPORIZATION OF RESERVOIR FLUID

Company Lloyd B. Taylor — Formation Gallup
Well Vic Walker No. 1 — County San Juan
Field La Plata Gallup — State New Mexico



VISCOSITY OF RESERVOIR FLUID

Company Lloyd B. Taylor Formation Gallup
Well Vic Walker No. 1 County San Juan
Field La Plata Gallup State New Mexico



PRESSURE: POUNDS PER SQUARE INCH GAUGE

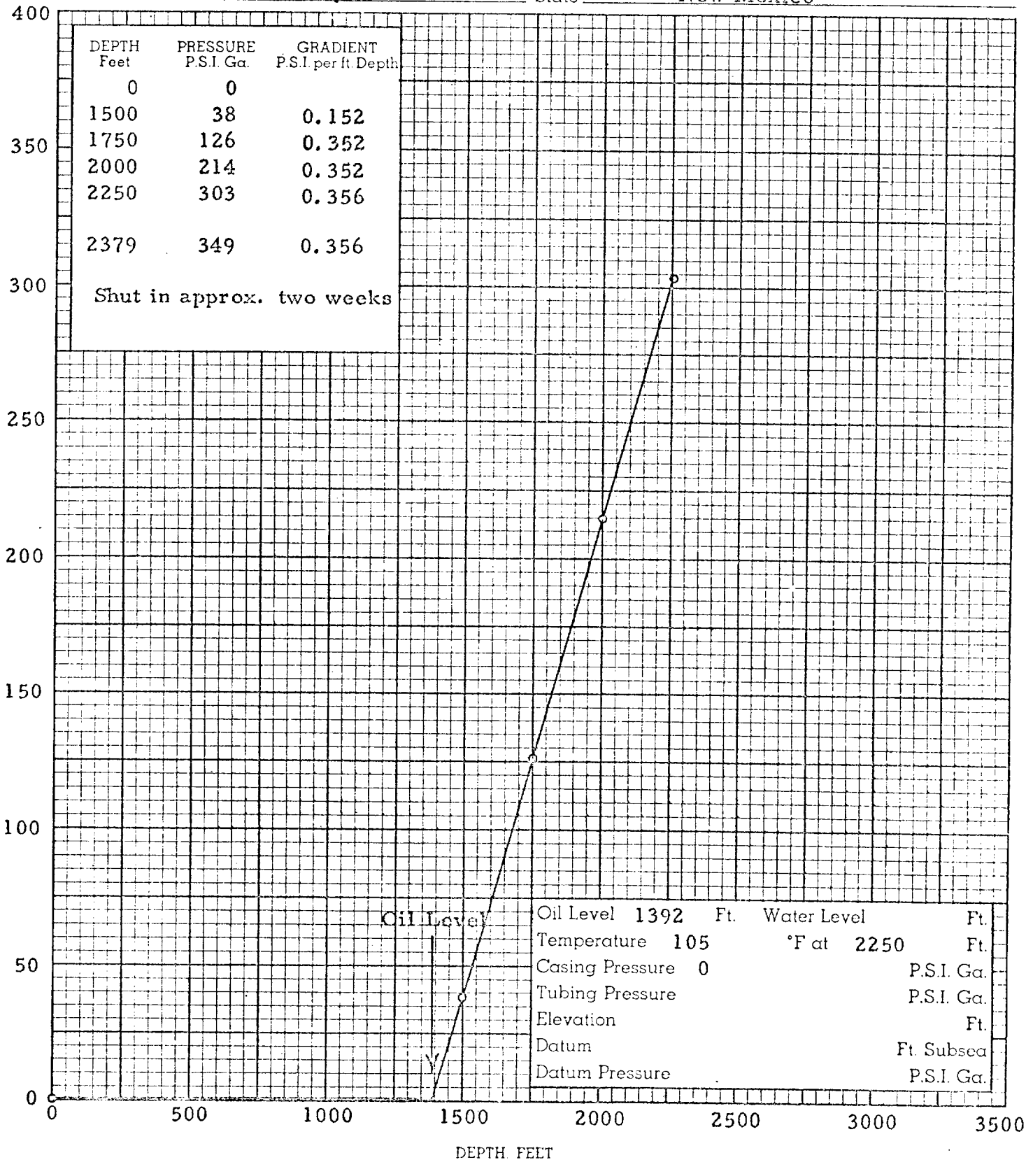
CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 5096

Company Lloyd B. Taylor — Formation Gallup
Well Vic Walker No. 1 — County San Juan
Field La Plata Gallup — State New Mexico

DEPTH Feet	PRESSURE P.S.I. Ga.	GRADIENT P.S.I. per ft. Depth
0	0	
1500	38	0.152
1750	126	0.352
2000	214	0.352
2250	303	0.356
2379	349	0.356

Shut in approx. two weeks



Oil Level	1392 Ft.	Water Level	Ft.
Temperature	105	°F at 2250	Ft.
Casing Pressure	0		P.S.I. Ga.
Tubing Pressure			P.S.I. Ga.
Elevation			Ft.
Datum			Ft. Subsea
Datum Pressure			P.S.I. Ga.