

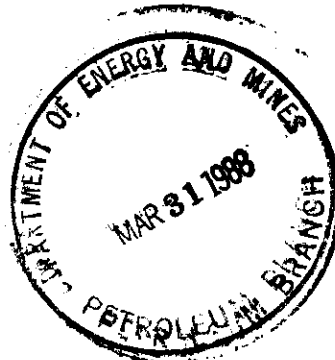


March 22, 1988

Manitoba Energy & Mines
555, 330 Graham Avenue
Winnipeg, Manitoba
R3C 4E3

ATTENTION: Mr. L. R. Dubreuil

Dear Bob:



RE: Bakken Sand - PVT & Reservoir Pressure Data

Subsurface pressure buildup tests have been conducted on wells 2-28-10-29 and 3-28-10-29 WPM. In the case of 2-28, bottom hole recorders were run and in 3-28, an accoustical well sounder was used to obtain the necessary data. Once we have interpreted the data, a copy will be forwarded to you. A pressure buildup test (bottom hole recorders) is currently underway at 4-28-10-29 WPM.

The PVT test on 3-28-10-29 WPM has been completed and the results are attached.

Yours truly,

A handwritten signature in dark ink, appearing to read 'S. Bruce McKay'.

S. Bruce McKay
Production Manager

SBM/lak
Enclosure

cc: Energy & Mines file

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

4805-12 STREET N.E. CALGARY, ALBERTA T2E 4R3



TELEPHONE
(403) ~~XXXXXXX~~
291-3024

1988-02-10

Newscope Resources Limited
1600, 700 - 9 Avenue SW
Calgary, Alberta
T2P 3V4

Attention: Mr. Bruce McKay

Dear Sir:

Re: Reservoir Fluid Study
Newscope et al Daly 3-28-10-29 W1

The following pages present the results of a reservoir fluid study on a recombined sample of separator oil and gas taken at the subject well by representatives of Chemical & Geological Laboratories Ltd.

The GOR at time of sampling was measured to be 10.00 m³/m³ from a separator operating at 207 kPa (gauge) and 15°C.

The separator oil and gas were recombined using the above ratio and a portion of the recombined sample was flashed through a separator operating at 207 kPa (gauge) and 15°C to verify the GOR. The ratio was found to 9.96 m³/m³.

The fluid study was conducted on this mixture which has a saturation pressure of 2 000 kPa (gauge) at the reservoir temperature of 31°C.

Thank you for this opportunity to have been of service to you.

Yours truly,

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

Kevin Brunner
PVT Department

KB/jah

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Lab. No. C88-0047

Company NEWSCOPE RESOURCES LIMITED

Well Newscope et al Daly 3-28-10-29 W1

Field Daly Province Manitoba

FORMATION CHARACTERISTICS

Formation Name	<u>Bakken "A"</u>
Date First Well Completed	<u>October 1986</u>
Original Reservoir Pressure	<u>8646</u> kPa @ <u>880</u> m
Original Produced Gas-Oil Ratio	<u>9.0</u> m ³ /d
Production Rate	<u>To Lease Tank</u> kPa
Separator Pressure and Temperature	<u>41° API</u>
Oil Density at 15°C	<u> </u> m Subsea
Datum	<u>N/A</u>
Original Gas Cap	

WELL CHARACTERISTICS

Elevation	<u>KB: 536 m</u>	<u>GRD: 531.8 m</u>	<u> </u> m
Total Depth	<u>900</u>	<u> </u> m	
Producing Interval	<u>871.2 - 873.2</u>	<u> </u> m	<u>KB</u>
Tubing Size and Depth	<u>60.3</u> mm	<u>876.9</u>	<u> </u> m
Productivity Index	<u> </u>	<u> </u> m ³ /(kPa-d)	
Last Reservoir Pressure	<u> </u> kPa @	<u> </u> m	
Date	<u>31</u>	<u>°C @</u>	<u>900</u> m
Reservoir Temperature	<u>Producing Oil Well</u>	<u> </u>	
Status of Well	<u> </u>	<u> </u>	
Pressure Survey By	<u> </u>	<u> </u>	
Normal Production Rate	<u> </u>	<u> </u> m ³ /d	
Gas-Oil Ratio	<u>10</u>	<u>m³/m³</u>	
Separator Pressure and Temperature	<u>207</u>	<u>kPa</u>	<u>15</u> °C
Base Pressure	<u> </u>	<u> </u> kPa (abs)	
Well Making Water	<u> </u>	<u> </u>	

SAMPLING CONDITIONS

Sampled at	<u>Separator</u>	<u> </u> m
Status of Well	<u>Pumping</u>	
Gas-Oil Ratio	<u>20.7</u>	<u>kPa</u>
Separator Pressure and Temperature	<u>15</u>	<u>°C</u>
Tubing Pressure	<u> </u>	<u> </u> kPa
Casing Pressure	<u> </u>	<u> </u> kPa
Date Sampled	<u>1988-01-18</u>	
Sampled by	<u>C & G Labs.</u>	

PVT ANALYSIS SUMMARY

RESERVOIR TEMPERATURE 31 °CBUBBLE-POINT PRESSURE 2000 kPa at 31 °C

COMPRESSIBILITY of saturated oil at reservoir temperature

FROM 20 685 TO 13 790 kPa = 0.000967 MPa⁻¹FROM 13 790 TO 6 895 kPa = 0.001075 MPa⁻¹FROM 6 895 TO 3 448 kPa = 0.001202 MPa⁻¹THERMAL EXPANSION of saturated oil at 20 685 kPa = 0.0008126 per °CSPECIFIC VOLUME at bubble-point pressure and reservoir temperature = 1.2880 L/kgDENSITY at bubble-point pressure and reservoir temperature 776.4 kg/m³OIL VISCOSITY 1.239 mPa s at bubble-point pressure and reservoir temperatureRESIDUAL STOCK TANK OIL DENSITY 813.9 kg/m³ flashed through a separator operating at
311 kPa and 22.2 °CRELATIVE DENSITY OF SEPARATOR GAS 1.165 Flashed through a separator operating at
311 kPa and 22.2 °CFORMATION VOLUME FACTOR 1.120 Cubic metres reservoir oil at bubble-point pressure per cubic metre residual oil - by differential liberation at reservoir temperature.RESIDUAL OIL VOLUME 0.8929 Cubic metres residual oil per cubic metre reservoir oil at bubble point pressure - by differential liberation at reservoir temperature.SOLUTION GAS OIL RATIO 27.29 by differential liberation at reservoir temperature.

Note: Volume of residual oil is at 15°C

Lab. No. C88-0047Well Newscope et al Daly
3-28-10-29 W1PRESSURE - VOLUME RELATIONS AT 31 °C

PRESSURE P _{ga} /kPa	RELATIVE VOLUME OF OIL AND GAS	Y FUNCTION	ABSOLUTE VISCOSITY OF OIL η / mPa.s
20 685	0.9802		
17 237	0.9839		
13 790	0.9868		
10 343	0.9905		
6 895	0.9941		
3 448	0.9982		
2 069	0.9999		
2 000	1.0000		
1 903	1.0066	7.2991	
1 841	1.0115	7.1204	
1 786	1.0167	6.9825	
1 379	1.0705	5.9487	
1 035	1.1675	5.0749	
690	1.3956	4.1855	
345	2.1280	3.2888	

Relative Volume = V/V_{sat}

V = Volume at given pressure

V_{sat} = Volume at saturation pressure at the specified temperatureP_{sat} = Saturation pressure at the specified temperature

$$Y \text{ Function} = \frac{P_{\text{sat}} - P}{P_{\text{abs}} \left(\frac{V}{V_{\text{sat}}} - 1 \right)}$$

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Lab. No. C88-0047

Well Newscope et al Daly
3-28-10-29 W1

DIFFERENTIAL VAPORIZATION AT 31 °C

Pressure Pga/kPa	Oil Density $\rho / \text{kg} \cdot \text{m}^{-3}$	Relative Oil Volume (1)	Relative Total Volume (2)	Solution Gas/Oil Ratio (3)	Incremental Gas Relative Density	Cumulative Gas Relative Density	Deviation Factor Z	Gas Formation Volume Factor (4)	Gas Expansion Factor (5)
2 000	776.4	1.120	1.120	27.29					
1 379	777.2	1.116	1.204	26.06	0.982	0.982	0.974	0.07093	14.10
1 035	777.8	1.114	1.314	25.13	0.987	0.984	0.974	0.09267	10.79
690	778.6	1.111	1.551	24.00	1.013	0.994	0.974	0.13362	7.48
345	779.8	1.106	2.330	22.18	1.085	1.026	0.974	0.23953	4.18
0	807.2	1.013	33.32	0.00	1.641	1.526	1.000(e)	1.18371	0.85

0 818.2 @ 15°C 41.44 API @ 60°F

- (1) Cubic metres of oil at indicated pressure and temperature per cubic metre of residual oil at 15°C.
- (2) Cubic metres of oil plus liberated gas at indicated pressure and temperature per cubic metre of residual oil at 15°C.
- (3) Cubic metres of gas at 101.325 kPa (abs) and 15°C per cubic metre of residual oil at 15°C.
- (4) Cubic metres of gas at indicated pressure and temperature per cubic metre at 101.325 kPa (abs) and 15°C.
- (5) Cubic metres of gas at 101.325 kPa (abs) and 15°C per cubic metre at indicated pressure and temperature.

VISCOSITY AT 31 °C

<u>Pressure</u> <u>kPa</u>	<u>Oil Viscosity</u> <u>mPa.s</u>	<u>* Gas Viscosity</u> <u>mPa.s</u>	<u>Oil/Gas</u> <u>Viscosity</u> <u>Ratio</u>
20 685	1.604		
17 237	1.534		
13 790	1.461		
10 343	1.391		
6 895	1.322		
3 448	1.263		
2 069	1.240		
2 000	1.239		
1 379	1.243	0.0102	123.82
1 035	1.247	0.0101	125.45
690	1.264	0.0099	129.70
345	1.305	0.0096	138.02
0	2.020	0.0080	252.50

* Calculated from the correlation by Lee, Eakin and Gonzalez:

"The Viscosity of Natural Gases", August 1966 - Journal of Petroleum Technology.

SEPARATOR TESTS

SEPARATOR PRESSURE <i>P_g/kPa</i>	SEPARATOR TEMPERATURE <i>t/°C</i>	SEPARATOR GAS/OIL RATIO <i>See Foot Note (1)</i>	STOCK TANK GAS/OIL RATIO <i>See Foot Note (1)</i>	STOCK TANK OIL DENSITY <i>@ 15 °C g/kg.m⁻³</i>	SHRINKAGE FACTOR <i>V_t/V_{sat} See Foot Note (2)</i>	FORMATION VOLUME FACTOR <i>V_{sat}/V_t See Foot Note (3)</i>	RELATIVE DENSITY OF FLASHED GAS STAGE	
							1 st	2 nd
311	22.2	8.17	14.99	813.9	0.9061	1.104	1.165	1.625
207	23.3	11.94	11.35	814.8	0.9033	1.107	1.200	1.641
104	23.3	16.83	6.13	916.1	0.9009	1.110	1.323	1.643
0	23.3	28.93	-	818.1	0.8900	1.124	1.495	

(1) Separator and stock tank Gas/Oil Ratio in cubic metres of gas @ 101 325 kPa absolute and 15°C per cubic metre of stock tank oil @ 15°C

(2) Shrinkage Factor (V_t/V_{sat}) is cubic metres of stock tank oil @ 15°C per cubic metre of saturated oil @ 2000 kPa gauge and 31 °C.

(3) Formation Volume Factor (V_{sat}/V_t) is cubic metres of saturated oil @ 2000 kPa gauge and 31 °C per cubic metre of stock tank oil @ 15°C



CHEMICAL & GEOLOGICAL LABORATORIES LTD.



GAS ANALYSIS

CONTAINER IDENTITY LS-1		LABORATORY NUMBER C88-0047-1	
LICENCE NUMBER		OPERATOR NAME NEWSCOPE RESOURCES LIMITED	
LOCATION 3-28-10-29 W1		WELL NAME NEWSCOPE ET AL DALY 3-28-10-29	
FIELD OR AREA DALY		POOL OR ZONE BAKKEN "A"	
TEST TYPE NO.		NAME OF SAMPLER I.M.	
MULTIPLE RECOVERY Y N		TEST RECOVERY	
TEST INTERVAL (metres)		SAMPLING POINT SEPARATOR	
PERFORATIONS (metres) 871.2 - 873.2		AMT. & TYPE OF CUSHION	
		MUD RESISTIVITY @ 25°C	
		TYPE OF PRODUCTION PUMPING FLOWING GAS LIFT SWAB	
		PRODUCTION RATES WATER m ³ /d OIL m ³ /d GAS 10 ³ m ³ /d	
		GAUGE PRESSURE kPa SEPARATOR 207 TREATER RESERVOIR SOURCE SAMPLED RECEIVED 210	
		TEMPERATURE °C SEPARATOR 15 TREATER RESERVOIR SOURCE SAMPLED RECEIVED 23	
DATE SAMPLED (Y-M-D) 88-01-18		DATE RECEIVED (Y-M-D) 88-01-20	
		DATE REPORTED (Y-M-D) 88-02-10	
		ANALYST D. MINIONS	
		OTHER INFORMATION	

COMP	MOLE FRACTION		PETROLEUM LIQUID CONTENT ml/m ³
	AIR FREE AS RECEIVED	AIR FREE ACID GAS FREE	
H ₂	0.0002	0.0002	
He	0.0006	0.0006	
N ₂	0.2679	0.2699	
CO ₂	0.0072	0.0000	
H ₂ S	0.0000	0.0000	
C ₁	0.2166	0.2182	
C ₂	0.2258	0.2274	
C ₃	0.2006	0.2021	737.5
IC ₄	0.0217	0.0219	94.7
NC ₄	0.0429	0.0432	180.6
IC ₅	0.0055	0.0055	26.9
NC ₅	0.0061	0.0061	29.5
C ₆	0.0025	0.0025	13.7
C ₇	0.0013	0.0013	8.0
C ₈	0.0007	0.0007	4.8
C ₉	0.0002	0.0002	1.5
C ₁₀₊	0.0002	0.0002	1.6
TOTAL	1.0000	1.0000	1098.8

GROSS HEATING VALUE MJ/m ³ 15°C AND 101.325 kPa			
MOISTURE AND ACID GAS FREE MEASURED		CALCULATED 53.17	
DETERMINED DEW POINT		°C	
VAPOUR PRESSURE PENTANES PLUS		100. kPa	
RELATIVE DENSITY			
MOISTURE FREE AS SAMPLED MEASURED		CALCULATED 1.105	
MOISTURE AND ACID GAS FREE MEASURED		CALCULATED 1.102	
PSEUDO CRITICAL PROPERTIES (CALCULATED)			
AS SAMPLED pPc(abe) 4206 kPa		pTc 255.5 K	
ACID GAS FREE pPc(abe) 4183. kPa		pTc 254.5 K	
H ₂ S g/m ³		0.00	
RELATIVE MOLECULAR MASS		TOTAL GAS 32.00	
C ₇		110.14	
C ₅₊ ML/MOL		2.033	

GROSS HEATING VALUE AS PER AGA REPORT #5

52.80 MAJ/M³ @ 15C AND 101.325 KPATHIS SEPARATOR GAS WAS USED IN THE
RECOMBINATION OF THE RESERVOIR FLUID.



CHEMICAL & GEOLOGICAL LABORATORIES LTD.



LIQUID ANALYSIS

LABORATORY NUMBER

C88-0047

CONTAINER IDENTITY

PVT #7

LICENCE NUMBER

OPERATOR NAME

NEWSCOPE RESOURCES LIMITED

LOCATION

3-28-10-29 W1

WELL NAME

NEWSCOPE ET AL DALY 3-28-10-29

ELEVATIONS (metres)

K.B.

536

GRD.

531.8

FIELD OR AREA

DALY

POOL OR ZONE

BAKKEN "A"

NAME OF SAMPLER

I.M.

COMPANY

C & G LABS.

TEST TYPE

NO.

MULTIPLE
RECOVERY

Y N

TEST RECOVERY

SAMPLING POINT

RECOMBINED RESERVOIR FLUID

AMT. & TYPE OF CUSHION

MUD RESISTIVITY

@ 25°C

TEST INTERVAL (metres)

PERFORATIONS (metres)

871.2 - 873.2

TYPE OF PRODUCTION

PUMPING

FLOWING

GAS LIFT

SWAB

PRODUCTION RATES

WATER

m³/d

OIL

m³/d

GAS

10³m³/d

GAUGE PRESSURE

kPa

SEPARATOR

TREATER

RESERVOIR

SOURCE

SAMPLED

RECEIVED

20685

TEMPERATURE

°C

SEPARATOR

TREATER

RESERVOIR

SOURCE

SAMPLED

RECEIVED

23.3

DATE SAMPLED (Y-M-D)

88-01-18

DATE RECEIVED (Y-M-D)

88-01-20

DATE REPORTED (Y-M-D)

88-02-10

ANALYST

D. MINIONS

OTHER INFORMATION

COMP.	MOLE FRACTION	MASS FRACTION	VOLUME FRACTION
N ₂	0.0220	0.0041	0.0040
CO ₂	0.0010	0.0003	0.0003
H ₂ S	0.0000	0.0000	0.0000
C ₁	0.0188	0.0020	0.0053
C ₂	0.0360	0.0073	0.0160
C ₃	0.0798	0.0236	0.0367
IC ₄	0.0222	0.0087	0.0121
NC ₄	0.0649	0.0253	0.0342
IC ₅	0.0247	0.0119	0.0151
NC ₅	0.0271	0.0131	0.0164
C ₆	0.0507	0.0293	0.0348
C ₇₊	0.6528	0.8744	0.8251
C ₈			
C ₉			
C ₁₀			
C ₁₁			
C ₁₂₊			
TOTAL	1.0000	1.0000	1.0000

PROPERTIES OF FRACTIONS (CALCULATED)

DENSITY AT 15°C

	MOLE FRACTION	MASS FRACTION	VOLUME FRACTION	RELATIVE	ABSOLUTE kg/m ³	RELATIVE MOLECULAR MASS
C ₁₂₊						
C ₇₊	0.6528	0.8744	0.8251	0.838	837.	200.0
C ₆₊	0.7035	0.9037	0.8599	0.831	830.	191.8
C ₅₊	0.7553	0.9287	0.8914	0.824	823.	183.6

PROPERTIES OF TOTAL SAMPLE

DENSITY AT 15°C

RELATIVE		ABSOLUTE kg/m ³		RELATIVE MOLECULAR MASS	
DETERMINED	CALCULATED	DETERMINED	CALCULATED	DETERMINED	CALCULATED
	0.790		789.		149.2



CHEMICAL & GEOLOGICAL LABORATORIES LTD.



COMPANY : NEWSCOPE RESOURCES LIMITED
WELL NAME: NEWSCOPE ET AL DALY 3-28-10-29
LOCATION: 3-28-10-29 W1
SAMPLE: RECOMBINED RESERVOIR FLUID

LAB NO: C88-0047
DATE: 88-02-10

ANALYSIS OF C7+ FRACTION

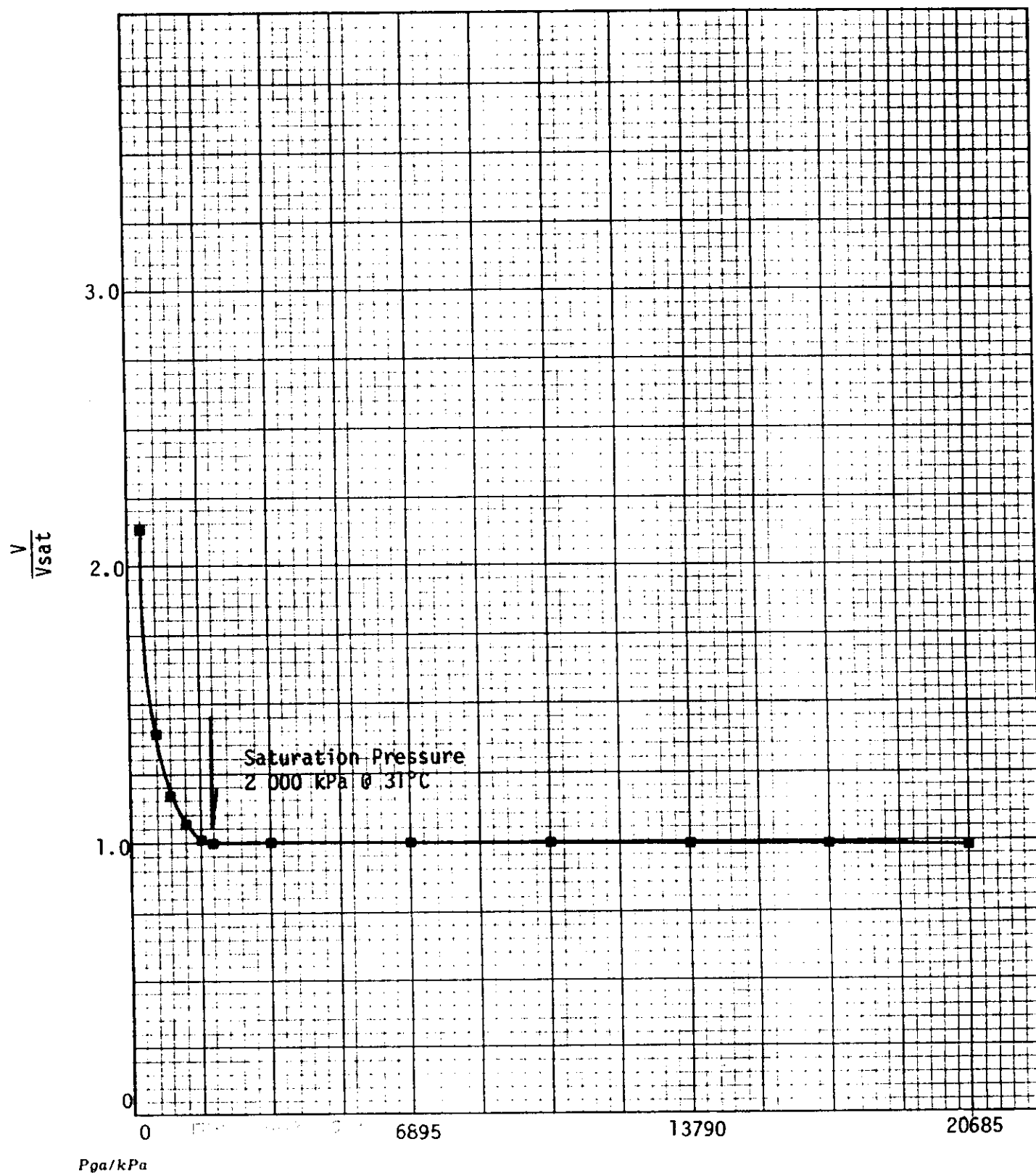
CARBON NUMBER	MOLE FRAC	MASS FRAC	COMPONENT	BOILING POINT RANGE (°C)
C7	0.1216	0.0938	Heptanes	69. - 98.
C8	0.0979	0.0864	Octanes	98. - 126.
C9	0.0601	0.0595	Nonanes	126. - 151.
C10	0.0723	0.0795	Decanes	151. - 174.
C11	0.0440	0.0532	Undecanes	174. - 196.
C12	0.0354	0.0466	Dodecanes	196. - 216.
C13	0.0310	0.0441	Tridecanes	216. - 235.
C14	0.0256	0.0392	Tetradecanes	235. - 253.
C15	0.0238	0.0390	Pentadecanes	253. - 271.
C16	0.0177	0.0310	Hexadecanes	271. - 287.
C17	0.0192	0.0356	Heptadecanes	287. - 302.
C18	0.0157	0.0310	Octadecanes	302. - 317.
C19	0.0141	0.0292	Nonadecanes	317. - 331.
C20	0.0075	0.0164	Eicosanes	331. - 344.
C21	0.0089	0.0204	Heneicosanes	344. - 356.
C22	0.0075	0.0179	Docosanes	356. - 369.
C23	0.0076	0.0192	Tricosanes	369. - 380.
C24	0.0049	0.0129	Tetracosanes	380. - 391.
C25	0.0050	0.0135	Pentacosanes	391. - 402.
C26	0.0042	0.0120	Hexacosanes	402. - 412.
C27	0.0038	0.0112	Heptacosanes	412. - 422.
C28	0.0033	0.0099	Octacosanes	422. - 432.
C29	0.0029	0.0093	Nonacosanes	432. - 441.
C30+	0.0188	0.0636	triacontanes Plus	441+
TOTAL	0.6528	0.8744		

CALCULATED PROPERTIES OF C7+:

RELATIVE MOLECULAR MASS: 200.0
RELATIVE DENSITY: 0.838

Relative Volume of Oil & Gas

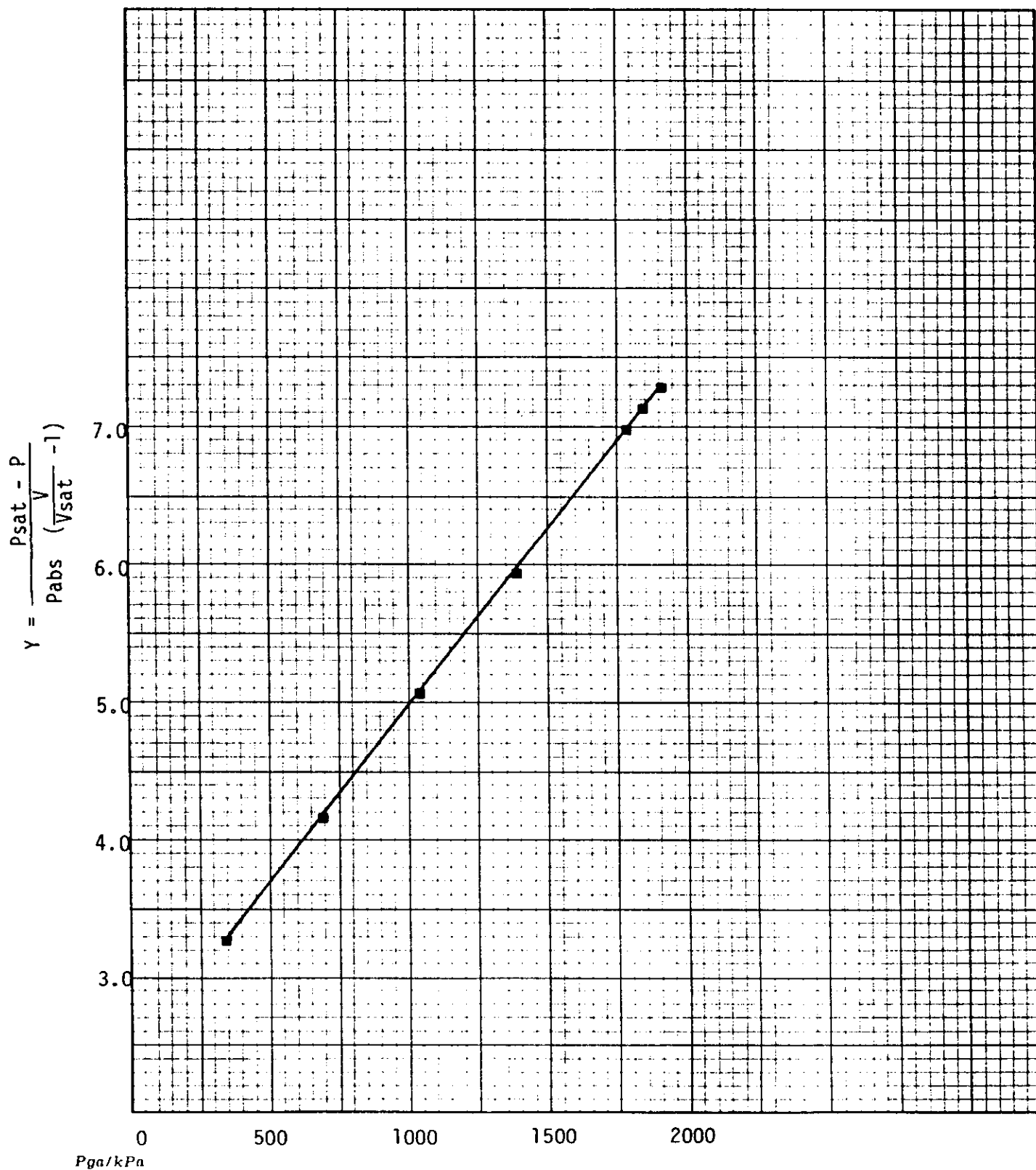
Lab. No. C88-0047

Well Newscope et al Daly
3-28-10-29 W1

Y Function

Lab. No. C88-0047

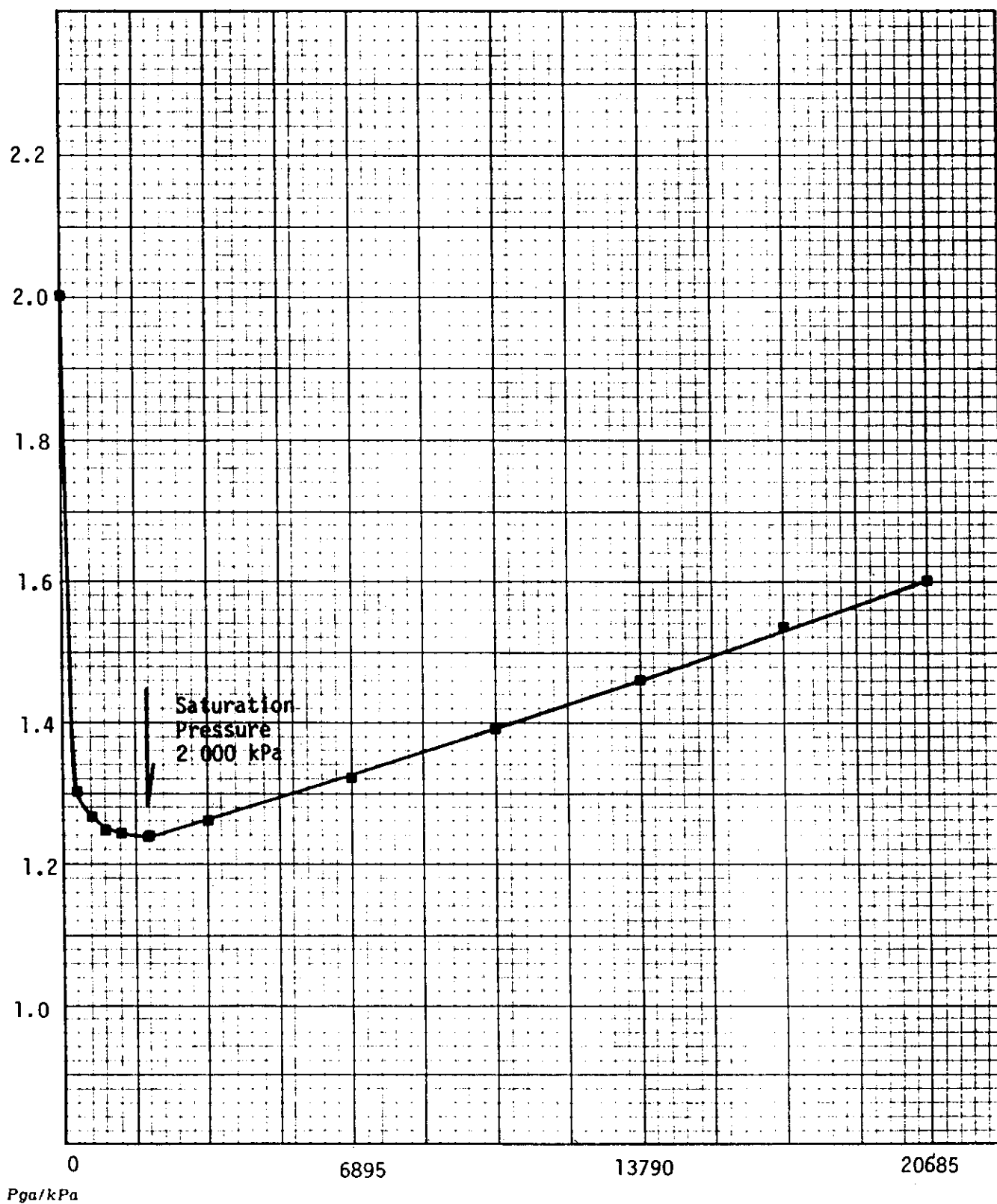
Well Newscope et al Daly
3-28-10-29 W1



Viscosity of Oil @ 31°C

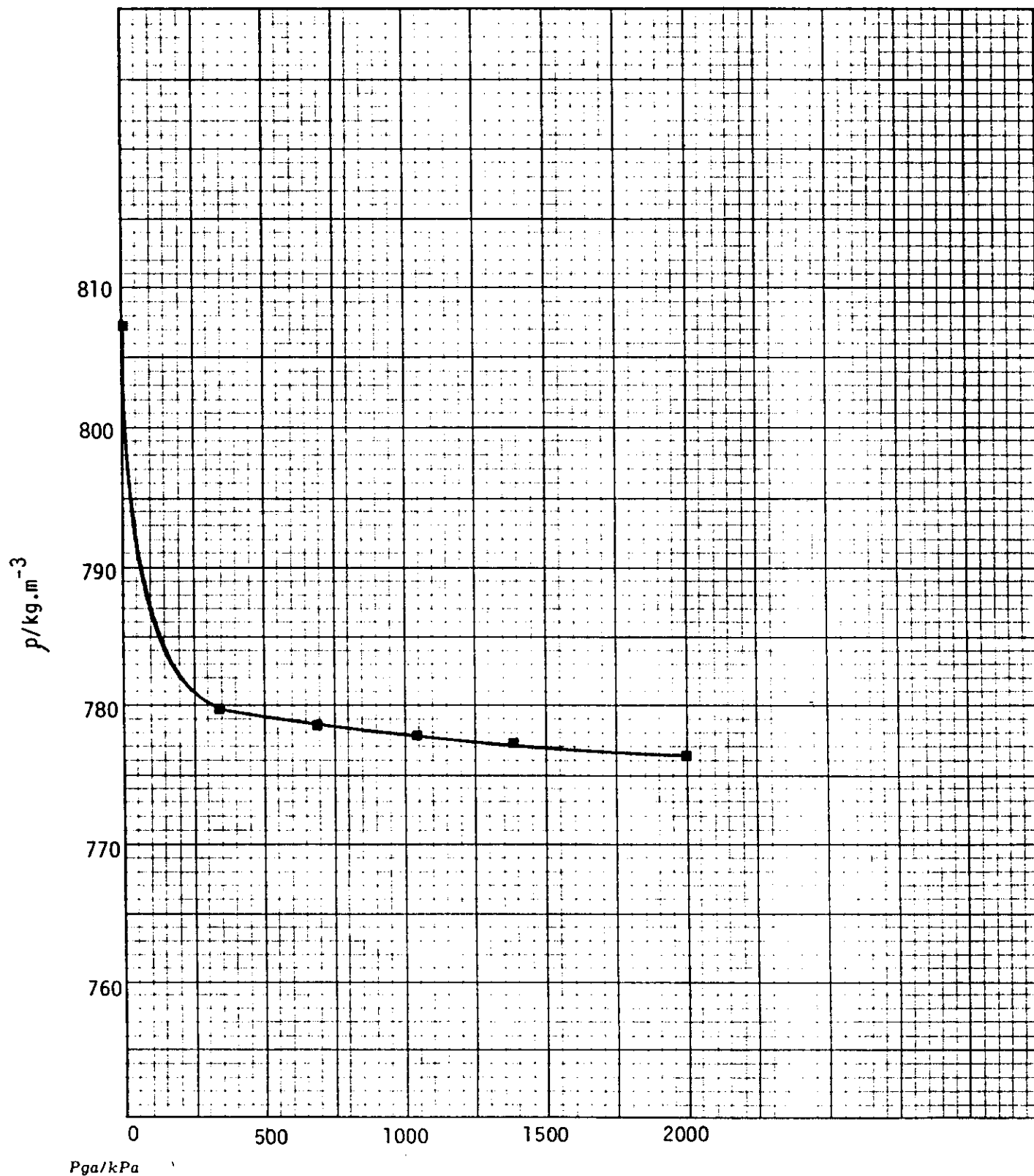
Lab. No. C88-0047

Well Newscope et al Daly
3-28-10-29 WI



Density of Liquid Produced
By Differential Vaporization

Lab. No. C88-0047

Well Newscope et al Daly
3-28-10-29 W1

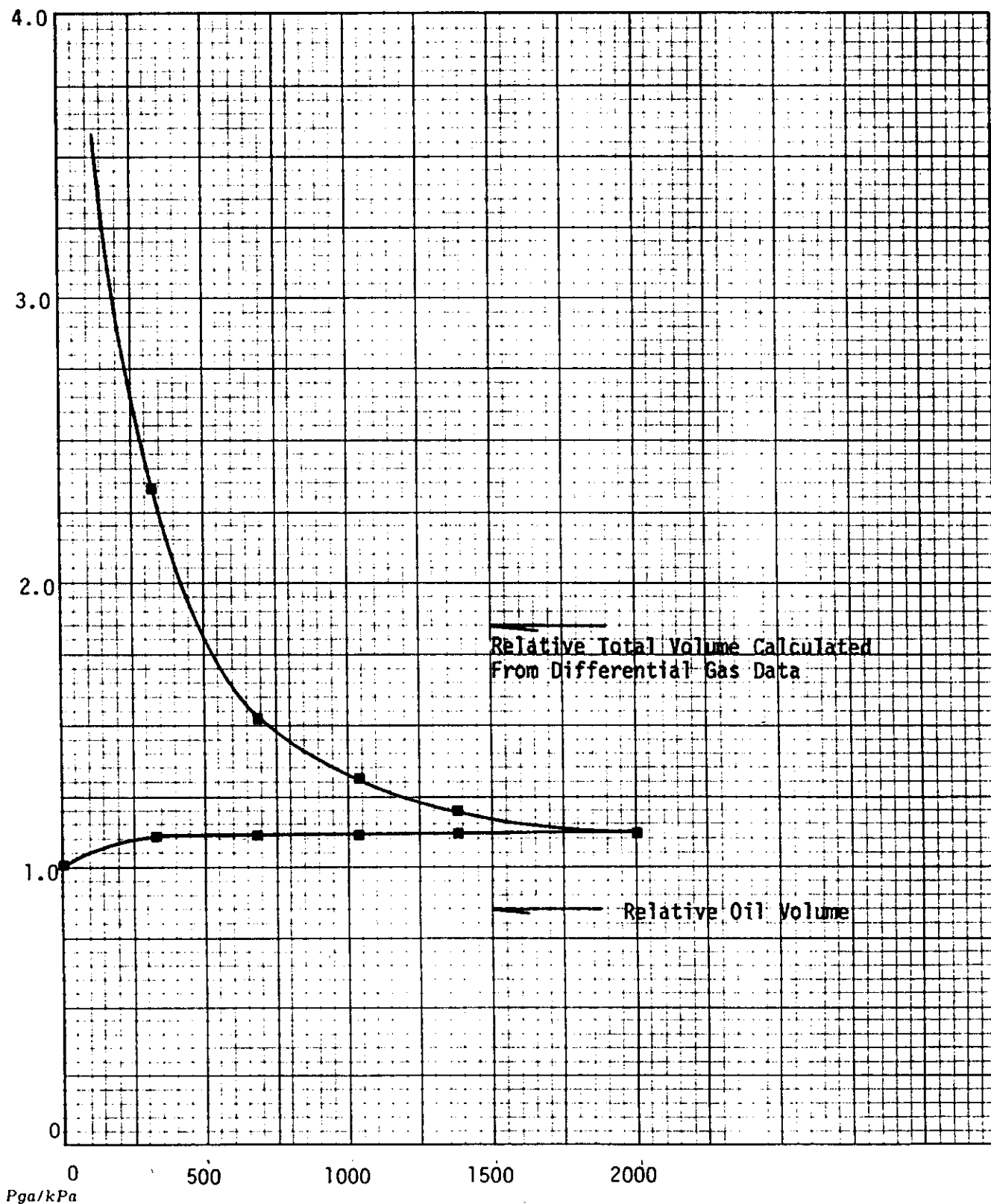
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Relative Total Volume
Of Oil & Gas Per Cubic Metre
Of Residual Oil (Differential)

Lab. No. C88-0047

Well Newscope et al Daly
3-28-10-29 W1



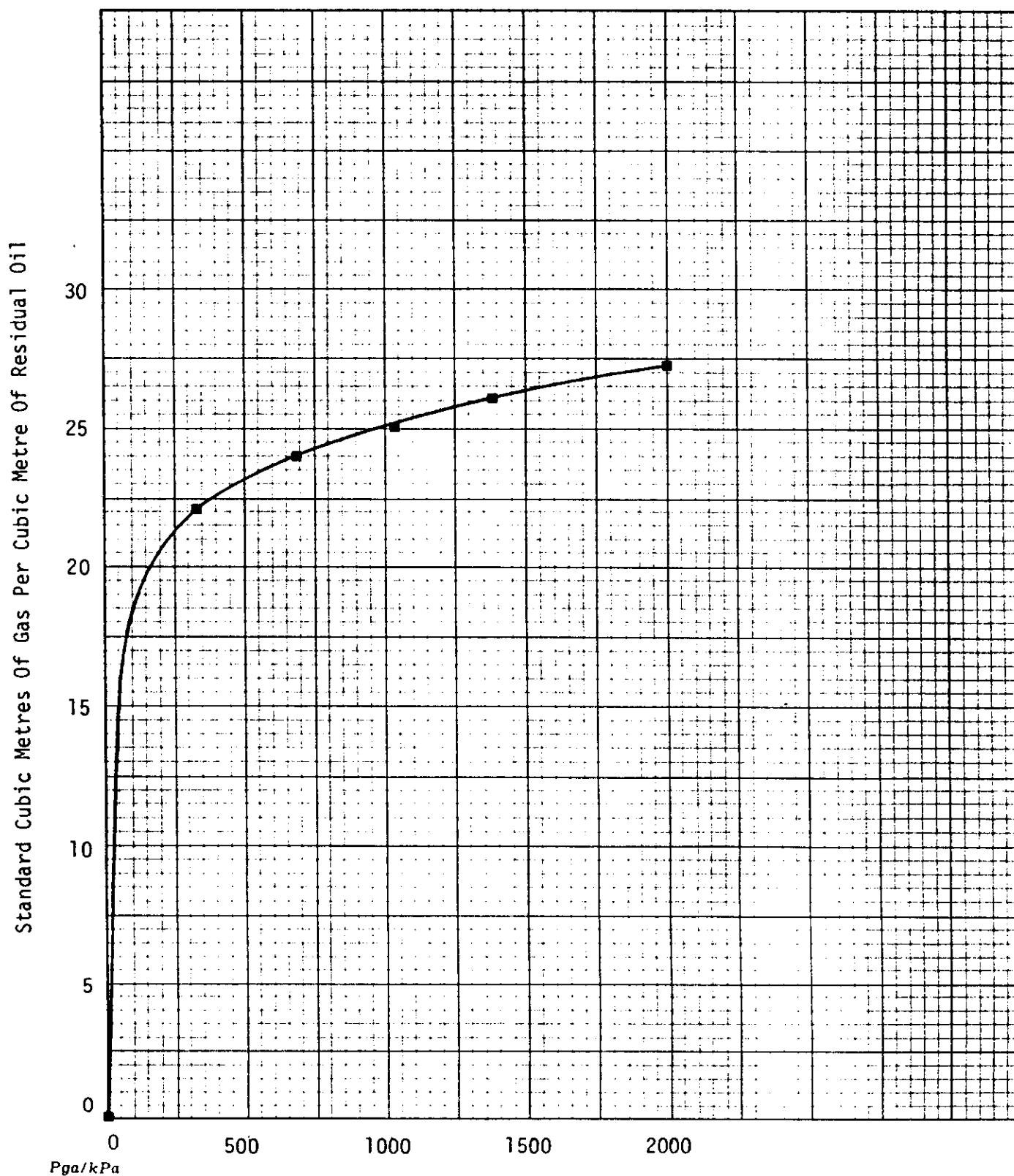
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Gas In Solution
By Differential Vaporization

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Lab. No. C88-0047

Well Newscope et al Daly
3-28-10-29 WT



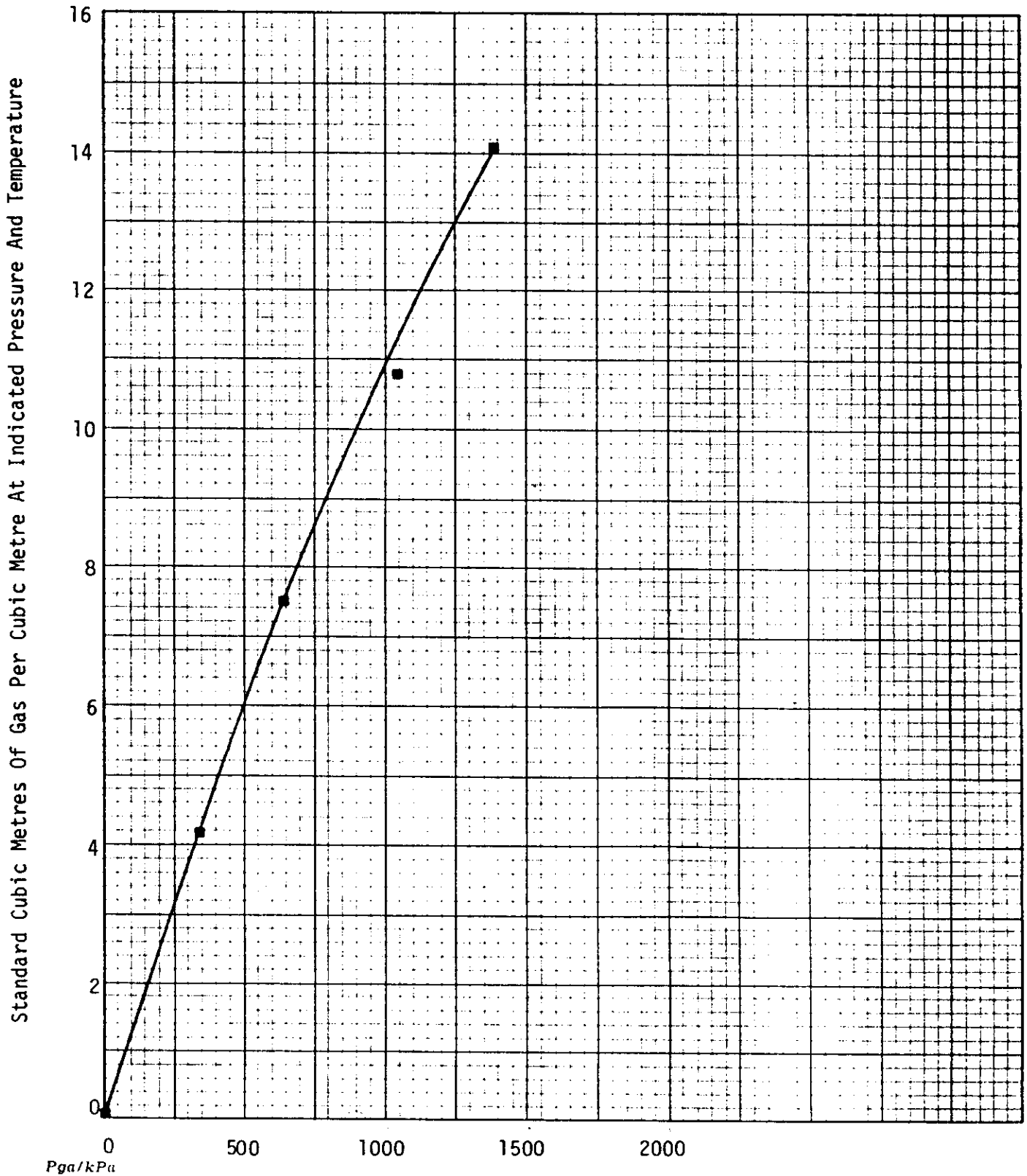
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Expansion Factor Of Gas
By Differential Vaporization

Lab. No. C88-0047

Well Newscope et al Daly
3-28-10-29 W1





Energy and Mines

Petroleum

555 — 330 Graham Avenue
Winnipeg, Manitoba, CANADA
R3C 4E3

(204) 945-6577

November 5, 1987

Newscope Resources Limited
1600, 700 — 9th Avenue S.W.
CALGARY, Alberta
T2P 3V4

Attention: S.B. McKay, Production Manager

Re: Daly Bakken A Pool
PVT Data

Dear Bruce:

Drilling carried out by your Company over the last two years has resulted in the discovery and development of the subject Pool. Development drilling and early production performance indicates that the Pool is a significant discovery.

In order to properly evaluate and develop the Pool for maximum recovery, basic reservoir information should be obtained. One of the most important pieces of information that can be obtained for a new pool is a PVT analysis of a reservoir fluid sample. Due to the possibility that production may result in pressure drawdown below the bubble point, this data should be obtained early in the life of the reservoir.

We note that as of yet, no reservoir fluid PVT analysis has been submitted for the above Pool. You are therefore requested, under Section 93 of Regulations to submit plans to obtain this data. We request that your plans be submitted prior to December 1, 1987 and that a full PVT analysis be submitted prior to January 31, 1988.

In addition, we request that you submit plans for a survey designed to determine the average reservoir pressure of the Pool.

Any questions or comments in this regard may be directed to the undersigned.

Yours sincerely,

L.R. Dubreuil
Chief Petroleum Engineer
Petroleum Division

LRD:dah