

CORE LABORATORIES-CANADA, LTD.



1982-01-27

Rideau Petroleums Ltd.
1401, 614 - 5th Ave. S.W.
Calgary, Alberta

Attention: Mr. Don Burns

Partial Reservoir Fluid Study

Rideau West Kirkella 5-17-12-29 (W1M)
West Kirkella Field, Manitoba, Canada
Our File Number: 7013-82-03

Gentlemen:

Subsurface samples of reservoir fluid were collected from the above well by a representative of Core Laboratories-Canada Ltd. on 1981-12-31 and sent to our Calgary laboratory for use in a partial PVT study.

A portion of the reservoir fluid was transferred at high pressure to a high pressure-windowed cell and then heated at constant pressure to the reported reservoir temperature of 37.8°C. The pressure-volume relations of the fluid were measured during a constant expansion down to the saturation pressure of 848 kPa (gauge) at 37.8°C. The results of this test are shown on pages 2 and 3.

The viscosity of the fluid was measured under depletion conditions at 37.8°C, from pressures exceeding the saturation pressure down to the saturation pressure. The viscosity data is summarized on page 4.

The differential vaporization of the reservoir fluid and viscosities below the saturation pressure were not determined due to the low saturation pressure of 848 kPa (gauge).

One separator flash was run at 0 kPa (gauge) and room conditions. The results of this test can be found on page 5.

Thank you for the opportunity to perform this study for you. Should you have any questions concerning this data, please contact us.

Yours truly,

CORE LABORATORIES-CANADA LTD.

A handwritten signature in dark ink, appearing to read "Tom B. Martin", is written over the printed name.
Tom B. Martin

TG:cd

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CALGARY, ALBERTA

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Company <u>Rideau Petroleums Ltd.</u>	Formation <u>Lodgepole</u>
Well <u>Rideau West Kirkella 5-17-12-29 (W1M)</u>	Province <u>Manitoba</u>
Field <u>West Kirkella</u>	Country <u>Canada</u>

RESERVOIR CHARACTERISTICS

Type of Formation	<u>Limestone</u>
Discovery Well and Date on Production	<u>9-8-12-29 W1M - 1978-06</u>
Original Reservoir Pressure (gauge)	<u>6 890</u> kPa at <u>200</u> m subsea
Original Separator Pressure (gauge) and Temperature	<u>N.A.</u> kPa and <u> </u> °C
Sep. Gas Flow Rate at 101.325 kPa (abs.) and 15°C	<u>N.A.</u> m ³ /d
Stock Tank Oil Flow Rate at 15°C	<u>10</u> m ³ /d
Separator Gas/Stock Tank Oil Ratio	<u>Not Measured</u> [1]
Original Gas-Oil Interface	<u>None</u> m subsea
Original Oil-Water Interface	<u>-215 to -225</u> m subsea

WELL CHARACTERISTICS

Elevation	<u>536.6</u> KB <u> </u> m
Total Depth	<u>775</u> m KB
Producing Interval (Perforations)	<u>750.5 - 753.5</u> m KB
Tubing Size and Depth	<u>60</u> mm at <u>756</u> m KB
Casing Size and Depth	<u>114</u> mm at <u>774</u> m KB
Date Well on Production	<u>1982-01-11</u>
Last Shut-in Bottom Hole Pressure (gauge)	<u>N.A.</u> kPa at <u> </u> m CF
Date	<u> </u>
Type of Pressure Survey	<u> </u>
Pressure Survey By	<u> </u>
Date Well Shut-in	<u>Well Not Produced Prior to</u> <u>1982-01-11</u>
Last Shut-in Bottom Hole Temperature	<u> </u> °C at <u> </u> m CF
Date	<u> </u>
Temperature Obtained By	<u> </u>
Test Separator Pressure (gauge) and Temperature	<u> </u> kPa and <u> </u> °C
Sep. Gas Flow Rate at 101.325 kPa (abs.) and 15°C	<u> </u> m ³ /d
Stock Tank Oil Flow Rate at 15°C	<u> </u> m ³ /d
Separator Gas/Stock Tank Oil Ratio	<u> </u> [1]
Status of Well	<u>Shut-in to 1982-01-11 / Pumping Oil</u> <u>Well after 1982-01-11</u>

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VOLUMETRIC DATA OF RESERVOIR FLUID SAMPLE

1. Saturation pressure (bubble point pressure) 848 kPa (gauge) @ 37.8 °C
2. Thermal expansion of saturated oil @ 34 474 kPa (gauge) = $\frac{V@ 37.8^{\circ}\text{C}}{V@ 23.3^{\circ}\text{C}} = \underline{1.01068}$
3. Density at saturation pressure: 878.0 kg/m³ @ 37.8 °C
4. Compressibility of saturated oil @ reservoir temperature: Vol/ Vol/MPa:

From	<u>848</u>	kPa to	<u>3 447</u>	kPa =	<u>8.48×10^{-4}</u>
From	<u>3 447</u>	kPa to	<u>6 895</u>	kPa =	<u>7.28×10^{-4}</u>
From	<u>6 895</u>	kPa to	<u>10 342</u>	kPa =	<u>7.01×10^{-4}</u>
From	<u>10 342</u>	kPa to	<u>13 790</u>	kPa =	<u>6.73×10^{-4}</u>
From	<u>13 790</u>	kPa to	<u>20 684</u>	kPa =	<u>6.62×10^{-4}</u>
From	<u>20 684</u>	kPa to	<u>27 579</u>	kPa =	<u>5.91×10^{-4}</u>
From	<u>27 579</u>	kPa to	<u>34 474</u>	kPa =	<u>5.79×10^{-4}</u>

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PRESSURE-VOLUME RELATIONS AT 37.8°C

<u>Gauge Pressure, kPa</u>	<u>Relative Volume, V/Vsat (1)</u>
34 474	0.9782
31 026	0.9801
27 579	0.9821
24 132	0.9840
20 684	0.9861
17 237	0.9883
13 790	0.9906
10 342	0.9929
6 895	0.9953
3 447	0.9978
2 758	0.9984
2 068	0.9989
1 379	0.9995
<u>848</u>	<u>1.0000</u>

(1) Cubic metres at indicated pressure and temperature per cubic metre of saturated oil.

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VISCOSITY AT 37.8°C

<u>Gauge Pressure, kPa</u>	<u>Oil Viscosity, mPa•s</u>
34 474	18.86
31 026	18.14
27 579	17.43
24 132	16.73
20 684	16.02
17 237	15.30
13 790	14.59
10 342	13.89
6 895	13.21
3 447	12.46
1 724	11.91
<u>848</u>	<u>11.62</u>

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Well Rideau West

Kirkella 5-17-12-29 (W1M)

SEPARATOR TEST OF RESERVOIR FLUID SAMPLE

Separator Gauge Pressure, kPa	Separator Temperature °C	Gas/Oil Ratio (1)	Gas/Oil Ratio (2)	Stock Tank Oil Gravity, °API @ 15.56°C	Formation Volume Factor (3)	Separator Volume Factor (4)	Relative Density of Liberated Gas (AIR = 1.000)
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0	20.0	3.19	3.19	26.8	1.025	1.003	1.197
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Total 3.19

- (1) Cubic metres of gas @ 101.325 kPa (absolute) and 15°C per cubic metre of oil @ indicated pressure and temperature.
- (2) Cubic metres of gas @ 101.325 kPa (absolute) and 15°C per cubic metre of stock tank oil @ 15°C.
- (3) Cubic metres of saturated oil @ 848 kPa (gauge) and 37.8 °C per cubic metre of stock tank oil @ 15°C.
- (4) Cubic metres of oil @ indicated pressure and temperature per cubic metre of stock tank oil @ 15°C.



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B-99

CONTAINER IDENTITY

HYDROCARBON LIQUID ANALYSIS

7013-82-03

LABORATORY NUMBER

Rideau Petroleums Ltd.

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OPERATOR

PAGE

LSD 5-17-12-29 W1M

LOCATION

Rideau West Kirkella 5-17-12-29

WELL OR SAMPLE LOCATION NAME

536.6

KB ELEV., m

GRD. ELEV., m

West Kirkella, Manitoba

FIELD OR AREA

Lodgepole

POOL OR ZONE

Core Laboratories

SAMPLER

TEST TYPE & NO.

TEST RECOVERY

POINT OF SAMPLE

AMT. & TYPE CUSHION

MUD RESISTIVITY

750.5 - 753.5

TEST INTERVALS OR PERFS., m

PUMPING

FLOWING

GAS LIFT

SWAB

WATER

m³/d

OIL

m³/d

GAS

m³/d

SEPARATOR RESERVOIR

CONTAINER
WHEN SAMPLED

CONTAINER
WHEN RECEIVED

SEPARATOR

PRESSURES, kPa (gauge)

TEMPERATURES, °C

1981-12-31

1982-01-26

DATE SAMPLED (Y/M/D) DATE RECEIVED (Y/M/D) DATE ANALYSED (Y/M/D)

ANALYST

REMARKS

COMPONENT	MOLE FRACTION	MASS FRACTION	LIQUID VOL FRACTION
N ₂	.0000	.0000	.0000
CO ₂	.0222	.0041	.0044
H ₂ S	.0000	.0000	.0000
C ₁	TRACE	TRACE	TRACE
C ₂	.0067	.0008	.0021
C ₃	.0319	.0058	.0103
iC ₄	.0152	.0037	.0058
C ₄	.0327	.0079	.0121
iC ₅	.0230	.0069	.0099
C ₅	.0122	.0037	.0052
C ₆ ⁺	.8561	.9671	.9502
TOTAL	1.0000	1.0000	1.0000

OBSERVED PROPERTIES OF C₆⁺ RESIDUE (15/15° C)

912.0
DENSITY kg/m³

.9128
RELATIVE DENSITY

23.6
API @ 15.5° C

272
RELATIVE MOLECULAR MASS

CALCULATED PROPERTIES OF TOTAL SAMPLE (15/15° C)

896.0
DENSITY kg/m³

.8968
RELATIVE DENSITY

26.3
API @ 15.5° C

240.75
RELATIVE MOLECULAR MASS

REMARKS

COMPANY
LOCATION
SAMPLED FROM

Rideau Petroleums Ltd.
LSD 5-17-12-29 W1M

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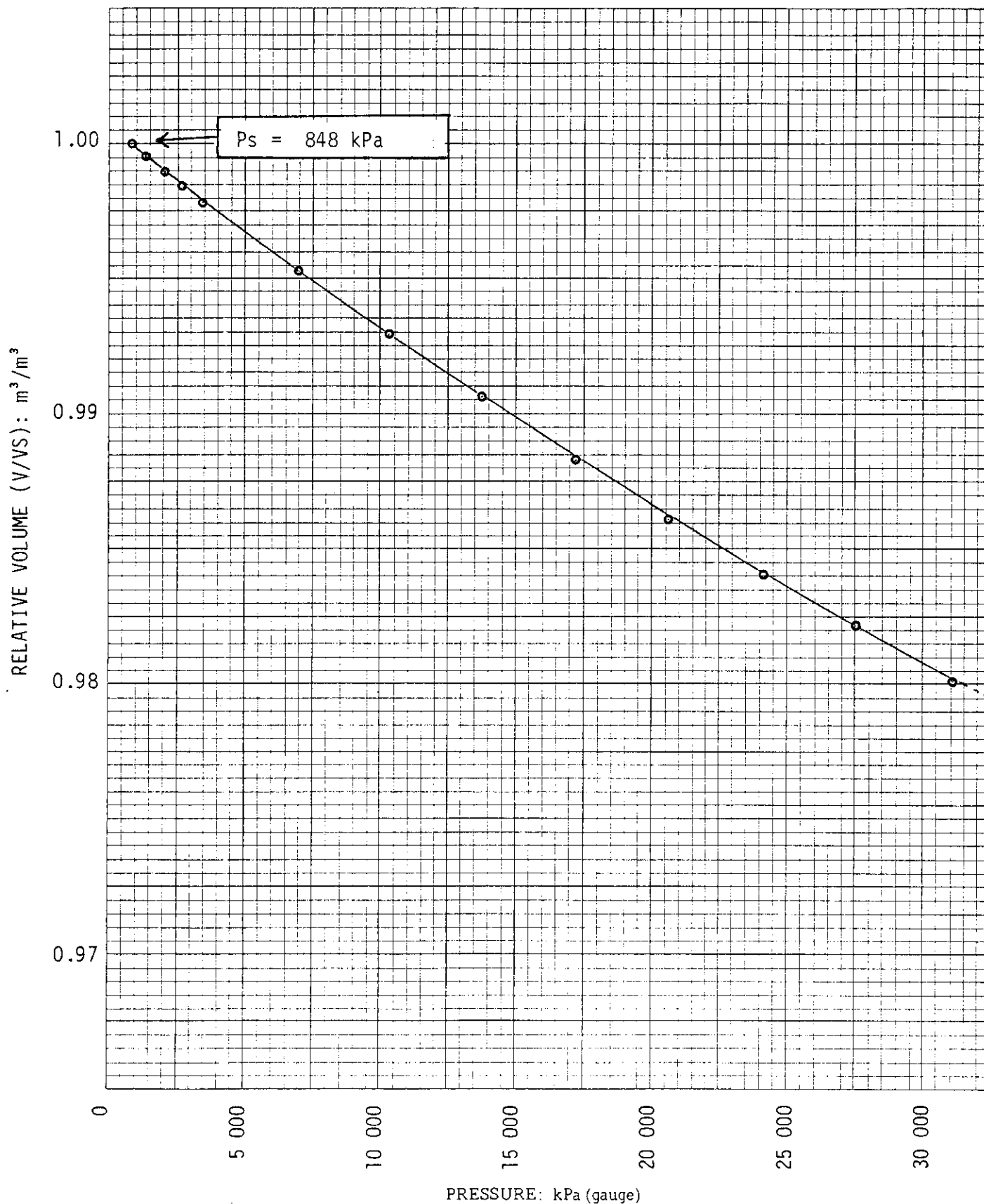
Analysis of C₆⁺ Fraction to C₃₀⁺

<u>Boiling Point Range (°C)</u>	<u>Component</u>	<u>Carbon Number</u>	<u>Mole Fraction</u>	<u>Mass Fraction</u>
36.1- 68.9	Hexanes	C ₆	.0146	.0058
68.9- 98.3	Heptanes	C ₇	.0317	.0150
98.3-125.6	Octanes	C ₈	.0464	.0249
125.6-150.6	Nonanes	C ₉	.0486	.0293
150.6-173.9	Decanes	C ₁₀	.0577	.0386
173.9-196.1	Undecanes	C ₁₁	.0436	.0320
196.1-215.0	Dodecanes	C ₁₂	.0557	.0446
215.0-235.0	Tridecanes	C ₁₃	.0555	.0481
235.0-252.2	Tetradecanes	C ₁₄	.0542	.0506
252.2-270.6	Pentadecanes	C ₁₅	.0362	.0361
270.6-287.8	Hexadecanes	C ₁₆	.0352	.0375
287.8-302.8	Heptadecanes	C ₁₇	.0317	.0358
302.8-317.2	Octadecanes	C ₁₈	.0292	.0349
317.2-330.0	Nonadecanes	C ₁₉	.0258	.0326
330.0-344.4	Eicosanes	C ₂₀	.0245	.0325
344.4-357.2	Heneicosanes	C ₂₁	.0217	.0302
357.2-369.4	Docosanes	C ₂₂	.0169	.0246
369.4-380.0	Tricosanes	C ₂₃	.0158	.0242
380.0-391.1	Tetracosanes	C ₂₄	.0152	.0241
391.1-401.7	Pentacosanes	C ₂₅	.0141	.0234
401.7-412.2	Hexacosanes	C ₂₆	.0133	.0230
412.2-422.2	Heptacosanes	C ₂₇	.0123	.0220
422.2-431.7	Octacosanes	C ₂₈	.0092	.0172
431.7-441.1	Nonacosanes	C ₂₉	.0084	.0162
441.1 Plus	Triacontanes Plus	C ₃₀ ⁺	.0842	.2380
<u>AROMATICS</u>				
80.0	Benzene	C ₆ H ₆	.0002	.0001
110.6	Toluene	C ₇ H ₈	.0040	.0017
136.1-138.9	Ethylbenzene, p + m-Xylene	C ₈ H ₁₀	.0160	.0080
144.4	o-Xylene	C ₈ H ₁₀	.0042	.0021
168.9	1,2,4 Trimethylbenzene	C ₉ H ₁₂	.0093	.0053
<u>NAPHTHENES</u>				
68.9	Cyclopentane	C ₅ H ₁₀	.0002	.0001
72.2	Methylcyclopentane	C ₆ H ₁₂	.0052	.0021
81.1	Cyclohexane	C ₆ H ₁₂	.0083	.0033
101.1	Methylcyclohexane	C ₇ H ₁₄	.0070	.0032
	TOTAL		.8561	.9671
	Mole Fraction of C ₇ ⁺			.8276
	Mass Fraction of C ₇ ⁺			.9557
	Calculated Relative Molecular Mass of C ₇ ⁺			278.
	Calculated Relative Density of C ₇ ⁺			.9230
	Calculated Density of C ₇ ⁺ (kg/m ³)			922.2

The above boiling point ranges refer to the normal paraffin hydrocarbon boiling in that range. Other hydrocarbons (aromatics, olefins, naphthenes and branched hydrocarbons) may have higher or lower carbon numbers, but are grouped and reported according to their boiling point.

RELATIVE VOLUME (V/V_S) AT 37.8°C

Company	Rideau Petroleums Ltd.	Formation	Lodgepole
Well	Rideau West Kirkella 5-17-12-29 (W1M)	Province	Manitoba
Field	West Kirkella	Country	Canada



OIL VISCOSITY AT 37.8°C

Company	Rideau Petroleums Ltd.	Formation	Lodgepole
Well	Rideau West Kirkella 5-17-12-29 (WIM)	Province	Manitoba
Field	West Kirkella	Country	Canada

