

CORE LABORATORIES UK LTD.
Petroleum Reservoir Engineering
ABERDEEN, SCOTLAND

EXPLORATION LIBRARY
NOCS 7/12-6, W. 4.3

RESERVOIR FLUID STUDY

for

B.P. Petroleum Development Limited

Well: 7/12-6 DST 1

North Sea, Norway.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

19th October 1981

B.P. Petroleum Development Limited
Sorflateveien 11
P.O. Box 3077
Mariero
4001 Stavanger
Norway

Subject: Reservoir Fluid Study
Well: 7/12-6 DST 1
Field: Tor
North Sea, Norway
Our File Number:
RFLA 81182

Attention: Mr. T. N. D. Hares.

Gentlemen,

On the 16th July 1981 samples of single phase reservoir fluid were collected from the subject well and forwarded to our Aberdeen laboratory for analysis. The results of these analyses as requested by a representative of B.P. Petroleum Development Limited are presented in the following report.

Prior to analysis the room temperature bubble point pressures of the three samples were determined as 978 psig 970 psig and 980 psig for cylinders 9214-322, 9214-181 and 9214-169. Since these figures were in good agreement, the samples were blended and the resulting fluid used for the entire study.

The hydrocarbon composition of the reservoir fluid through nondecenes was determined by the use of both low and high temperature fractional distillation. This composition may be found on page two.

A portion of reservoir fluid was placed in a high pressure visual cell and pressure-volume relations performed at the requested temperatures of 60°F, 180°F and 300°F. During these tests bubble point pressures of 978 psig, 1316 psig and 1602 psig respectively were observed. The results of the pressure-volume relations and the associated compressibility data may be found on pages three through eight.

A large portion of the fluid was then subjected to differential vaporization at the reservoir temperature of 300°F resulting in the liberation of a total of 744 standard cubic feet of gas per barrel of residual oil with an associated relative oil volume of 1.734 barrels of saturated oil per barrel of residual oil. This test was performed over a series of eleven steps during which oil density, gas gravity and gas deviation factor were monitored. These data are presented on page nine.

The viscosity of the reservoir fluid was determined over the full range of pressures in a rolling ball viscosimeter. The viscosity ranged from a minimum of 0.236 centipoise at saturation pressure to a maximum of 1.095 centipoise at atmospheric pressure. These data are presented on page twelve. The gas viscosity data was calculated using the correlation of Burrows and Edwards.

Continued Over/.....

A single stage flash separation test was performed at zero psig and 60°F and the oil and gas collected and analysed for hydrocarbon composition. The factors and data derived from this test may be found on page fourteen.

The hydrocarbon composition of the separator gas to decanes plus was determined by gas chromatography. The hydrocarbon composition of the separator liquid to eicosanes plus was determined by both low and high temperature fractional distillation.

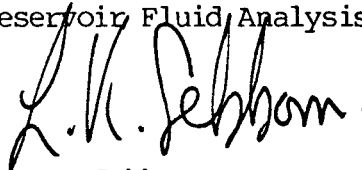
Utilising the experimentally determined hydrocarbon composition of the separator products in conjunction with the measured gas-oil ratio, a wellstream composition was calculated. These compositions are presented on page fifteen.

At conditions specified by B.P. Petroleum Development Limited, two multi-stage flash separations were performed in the laboratory. The factors and data derived from these tests may be found on pages sixteen and eighteen.

It has been a pleasure to be of service to B.P. Petroleum Development Limited. Should any questions arise concerning data presented in this report, or if we can be of further assistance, please do not hesitate to contact us.

Yours very truly

Core Laboratories UK Limited
Reservoir Fluid Analysis



Les K. Sebborn
Laboratory Manager

LKS/STB
15cc/Addressee

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 2 of 19

File RFLA 81182

Company BP Petroleum Development Norway Formation Triassic
 Well 7/12-6 DST 1 County North Sea
 Field Ula State Norway

HYDROCARBON ANALYSIS OF RESERVOIR FLUID SAMPLE*

COMPONENT	MOL PERCENT	WEIGHT PERCENT	DENSITY	API	MOL WEIGHT
Hydrogen Sulfide	NIL	NIL			
Carbon Dioxide	1.75	0.65			
Nitrogen	1.76	0.42			
Methane	20.41	2.78			
Ethane	7.25	1.85			
Propane	8.72	3.27			
iso-Butane	2.12	1.05			
n-Butane	6.07	3.00			
iso-Pentane	2.03	1.24			
n-Pentane	3.07	1.88			
Hexanes	3.30	2.41			
Heptanes	5.20	4.22	0.7214	64.4	96
Octanes	5.80	5.04	0.7394	59.7	103
Nonanes	4.17	4.18	0.7558	55.5	118
Decanes	3.16	3.56	0.7718	54.1	134
Undecanes	2.53	3.14	0.7768	50.2	147
Dodecanes	2.02	2.85	0.7878	47.9	167
Tridecanes	2.22	3.33	0.7936	46.6	177
Tetradecanes	1.98	3.20	0.8005	45.1	191
Pentadecanes	1.67	2.91	0.8155	41.8	206
Hexadecanes	1.44	2.63	0.8209	40.7	218
Heptadecanes	1.92	3.86	0.8235	40.2	237
Octadecanes	0.81	1.72	0.8288	39.1	250
Nonadecanes	1.11	2.41	0.8348	37.8	257
Eicosane plus	9.49	38.40	0.9014	25.3	479
	<u>100.00</u>	<u>100.00</u>			

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 judgement 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 profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 3 of 19

File RFLA 81182

Well 7/12-6 DST 1

VOLUMETRIC DATA OF RESERVOIR FLUID SAMPLE

1. Saturation pressure (bubble-point pressure) $\frac{978}{V @ 60} \text{ PSIG @ } 60 \text{ } ^\circ\text{F.}$
2. Thermal expansion of saturated oil @ 5000 PSIG = $\frac{V @ 60}{V @ 60} \text{ } ^\circ\text{F.} = \underline{1.00000}$
3. Compressibility of saturated oil @ reservoir temperature: Vol/Vol/PSI:
From 8000 PSIG to 6000 PSIG = 4.97×10^{-6}
From 6000 PSIG to 4000 PSIG = 5.67×10^{-6}
From 4000 PSIG to 2000 PSIG = 6.52×10^{-6}
From 2000 PSIG to 978 PSIG = 7.75×10^{-6}

CORE LABORATORIES UK LTD.
Petroleum Reservoir Engineering
ABERDEEN, SCOTLAND

Page 4 of 19

File RFLA 81182

Well 7/12-6 DST 1

PRESSURE-VOLUME RELATIONS AT 60°F.

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume(1)</u>	<u>Y</u> <u>Function(2)</u>
8000	0.9584	
7000	0.9630	
6000	0.9680	
5000	0.9734	
4000	0.9791	
3000	0.9854	
2000	0.9921	
1300	0.9974	
1200	0.9982	
1100	0.9990	
1000	0.9990	
<u>978</u> Saturation Pressure	1.0000	
964	1.0052	2.771
948	1.0114	2.745
920	1.0229	2.709
870	1.0459	2.660
808	1.0802	2.576
754	1.1164	2.502
700	1.1593	2.440
651	1.2070	2.372
599	1.2678	2.305
544	1.3451	2.250
481	1.4630	2.164
431	1.5889	2.083
373	1.7832	1.991
328	1.9870	1.920
260	2.4349	1.820
202	2.0664	1.731
144	4.2259	1.626

- (1) Relative Volume: V/V_{sat} is barrels at indicated pressure per barrel at saturation pressure.
- (2) Y Function = $\frac{(P_{sat}-P)}{(P_{abs}) (V/V_{sat}-1)}$

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 judgement 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 profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 5 of 19

File RFLA 81182

Well 7/12-6 DST 1

VOLUMETRIC DATA OF RESERVOIR FLUID SAMPLE

1. Saturation pressure (bubble-point pressure) $\frac{1316}{V} \text{ PSIG @ } 180 \text{ }^\circ\text{F.}$
2. Thermal expansion of saturated oil @ 5000 PSIG = $\frac{V \text{ @ } 180 \text{ }^\circ\text{F.}}{V \text{ @ } 60 \text{ }^\circ\text{F.}} = \underline{1.06310}$
3. Compressibility of saturated oil @ reservoir temperature: Vol/Vol/PSI:
From 8000 PSIG to 6000 PSIG = 7.04×10^{-6}
From 6000 PSIG to 4000 PSIG = 8.46×10^{-6}
From 4000 PSIG to 2000 PSIG = 10.15×10^{-6}
From 2000 PSIG to 1316 PSIG = 11.29×10^{-6}

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 6 of 19

File RFLA 81182

Well 7/12-6 DST 1

PRESSURE-VOLUME RELATIONS AT 180°F.

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume(1)</u>	<u>Y</u> <u>Function(2)</u>
8000	0.9422	
7000	0.9487	
6000	0.9557	
5000	0.9635	
4000	0.9721	
3000	0.9816	
2000	0.9923	
1700	0.9958	
1600	0.9970	
1500	0.9983	
1400	0.9996	
<u>1316</u> Saturation Pressure	1.0000	
1296	1.0062	2.467
1260	1.0180	2.440
1211	1.0358	2.395
1140	1.0651	2.342
1058	1.1055	2.280
961	1.1647	2.208
873	1.2339	2.133
792	1.3131	2.074
698	1.4373	1.982
627	1.5593	1.919
559	1.7093	1.859
495	1.9075	1.774
398	2.3039	1.703
314	2.8992	1.602
235	3.8926	1.492

(1) Relative Volume: V/Vsat is barrels at indicated pressure per barrel at saturation pressure.

(2) Y Function =
$$\frac{(P_{sat}-P)}{(P_{abs}) (V/V_{sat}-1)}$$

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 profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 7 of 19

File RFLA 81182

Well 7/12-6 DST 1

VOLUMETRIC DATA OF RESERVOIR FLUID SAMPLE

1. Saturation pressure (bubble-point pressure) $\frac{1602}{V @ 300} \text{ PSIG @ } 300 \text{ }^\circ\text{F.}$
2. Thermal expansion of saturated oil @ 5000 PSIG = $\frac{V @ 300}{V @ 60} \text{ }^\circ\text{F.} = \underline{1.13731}$
3. Compressibility of saturated oil @ reservoir temperature: Vol/Vol/PSI:
From 8000 PSIG to 6000 PSIG = 9.86×10^{-6}
From 6000 PSIG to 4000 PSIG = 12.48×10^{-6}
From 4000 PSIG to 1602 PSIG = 17.21×10^{-6}
4. Specific volume at saturation pressure 0.02514 at 300 °F.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 8 of 19

File RFLA 81182

Well 7/12-6 DST 1

PRESSURE-VOLUME RELATIONS AT 300°F.

<u>Pressure</u> <u>PSIG</u>	<u>Relative</u> <u>Volume(1)</u>	<u>Y</u> <u>Function(2)</u>
8000	0.9164	
7000	0.9251	
6000	0.9348	
5000	0.9459	
4000	0.9587	
3000	0.9734	
2000	0.9914	
1900	0.9935	
1800	0.9957	
1700	0.9979	
1602	1.0000	
Saturation Pressure		
1592	1.0029	2.130
1556	1.0139	2.105
1503	1.0313	2.081
1433	1.0572	2.040
1345	1.0948	1.994
1240	1.1491	1.934
1150	1.2058	1.885
1055	1.2794	1.830
943	1.3897	1.765
831	1.5370	1.697
728	1.7211	1.631
588	2.0922	1.540
466	2.6451	1.436
350	3.5697	1.335

- (1) Relative Volume: V/V_{sat} is barrels at indicated pressure per barrel at saturation pressure.
- (2) Y Function = $\frac{(P_{sat}-P)}{(P_{abs})(V/V_{sat}-1)}$

DIFFERENTIAL VAPORIZATION AT 300°F.

Pressure PSIG	Solution Gas/Oil Ratio(1)	Relative Oil Volume(2)	Relative Total Volume(3)	Oil Density gm/cc	Deviation Factor Z	Gas Formation Volume Factor(4)	Incremental Gas Gravity
1602	744	1.734	1.734	0.6372			
1500	710	1.715	1.791	0.6402	0.904	0.01285	1.008
1300	646	1.677	1.937	0.6463	0.910	0.01490	1.006
1100	585	1.640	2.142	0.6530	0.919	0.01774	1.018
900	519	1.598	2.477	0.6607	0.932	0.02193	1.041
700	456	1.559	3.016	0.6682	0.945	0.02845	1.090
500	389	1.510	4.051	0.6785	0.961	0.04018	1.177
300	306	1.447	6.650	0.6904	0.976	0.06670	1.362
200	256	1.403	9.967	0.6999	0.984	0.09853	1.545
132	216	1.365	14.986	0.7080	0.989	0.14484	1.768
93	183	1.332	21.090	0.7150	0.992	0.19774	1.977
0	0	1.119		0.7523			2.758

At 60°F = 1.000

Y_{oi} ≈ 0.2990 psia/yft @ 300°F, 7160 psia
Y_{oc} ≈ 0.6372 ret. vol = 0.69 g/cc

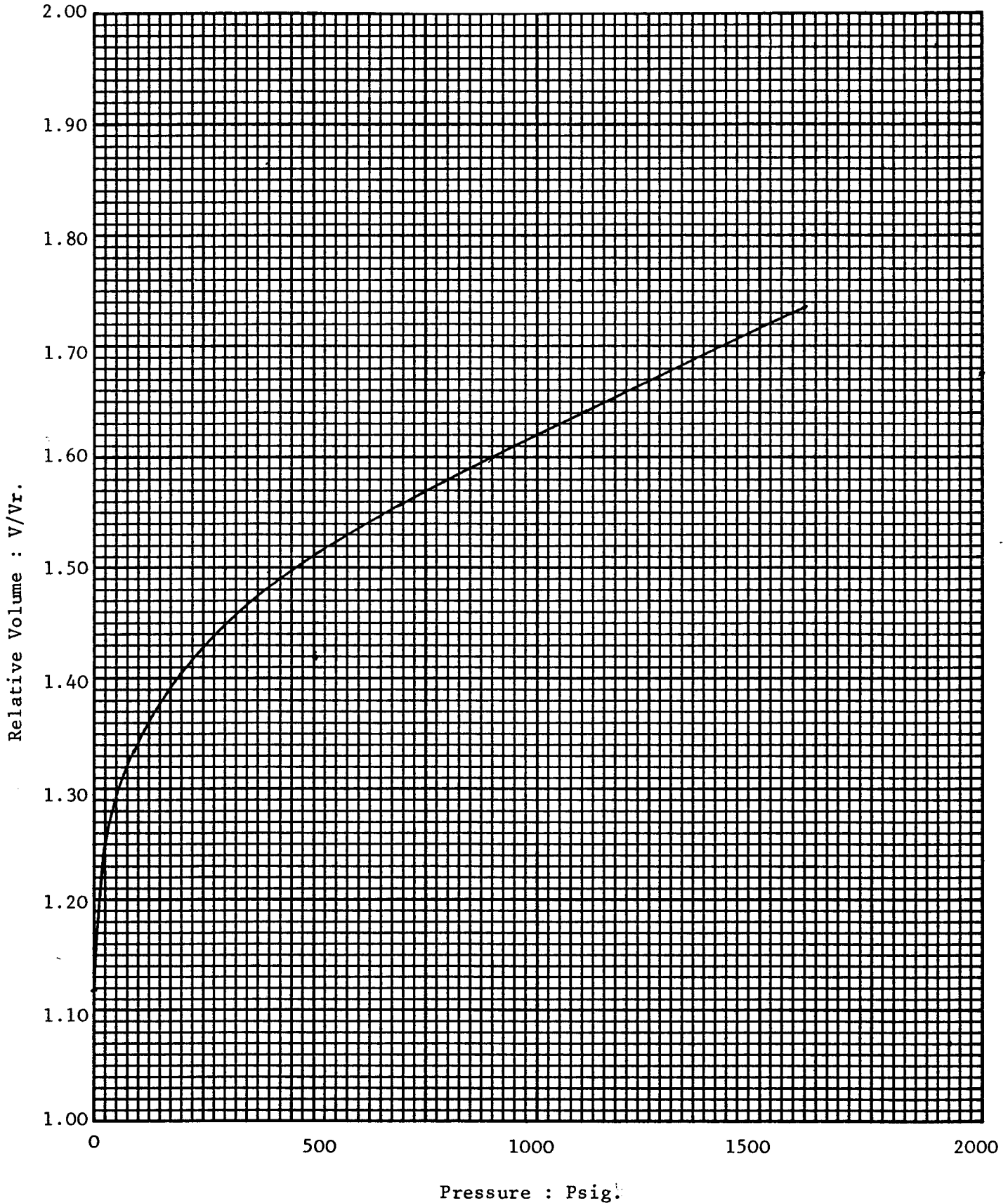
Gravity of Residual Oil = 36.4°API at 60°F.

- (1) Cubic feet of gas at 14.73 psia and 60°F. per barrel of residual oil at 60°F.
- (2) Barrels of oil at indicated pressure and temperature per barrel of residual oil at 60°F.
- (3) Barrels of oil plus liberated gas at indicated pressure and temperature per barrel of residual oil at 60°F.
- (4) Cubic feet of gas at indicated pressure and temperature per cubic foot at 14.73 psia 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 judgement 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 profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

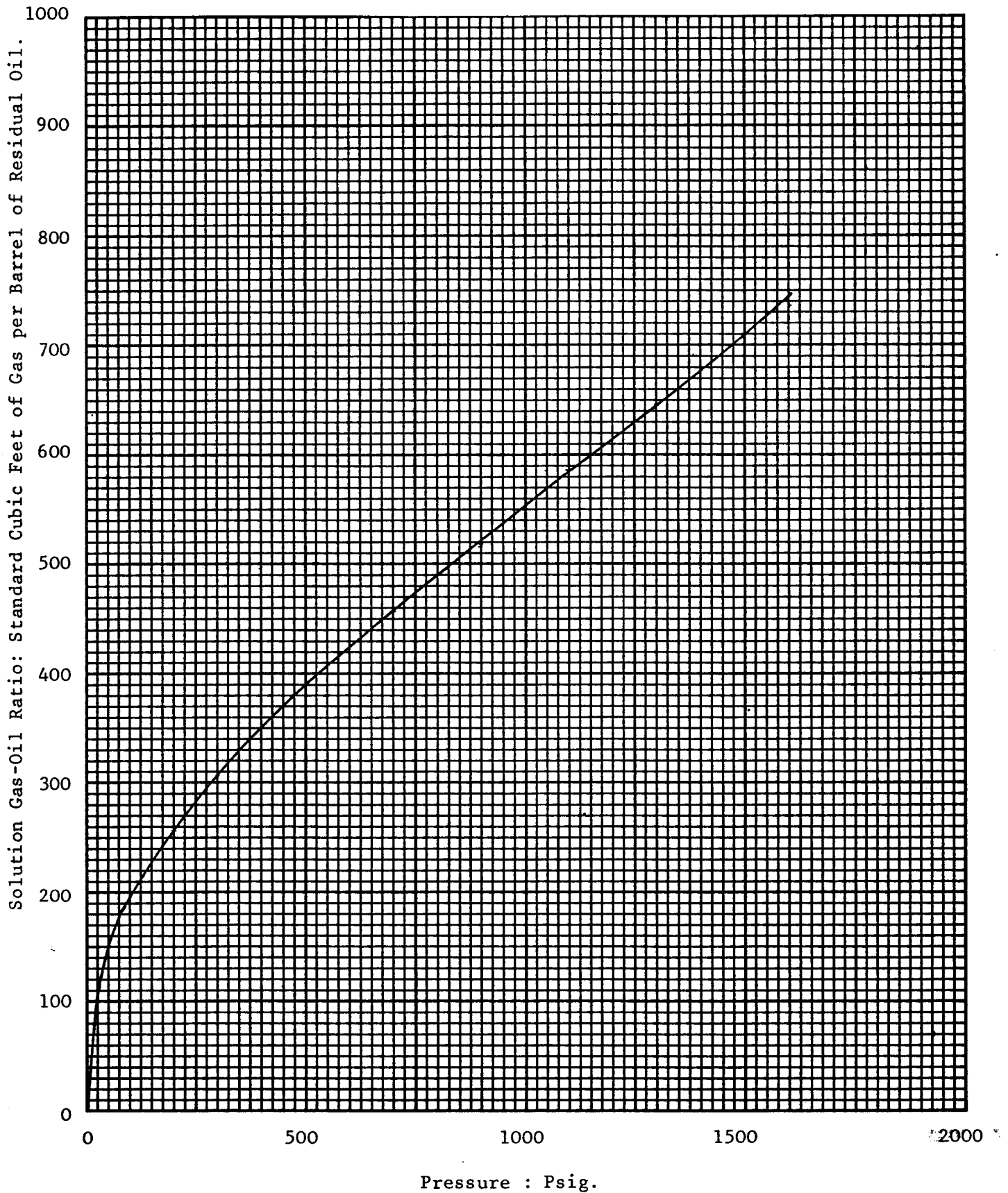
Differential Vaporisation of Reservoir Fluid at 300°F.

Company	B.P. Petroleum Development Ltd	Formation	Triassic
Well	7/12-6 DST 1	County	North Sea
Field	Ula	State	Norway



Differential Vaporisation of Reservoir Fluid at 300°F.

Company	B.P. Petroleum Development Ltd	Formation	Triassic
Well	7/12-6 DST 1	County	North Sea
Field	Ula	State	Norway



CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 12 of 19

File RFLA 81221

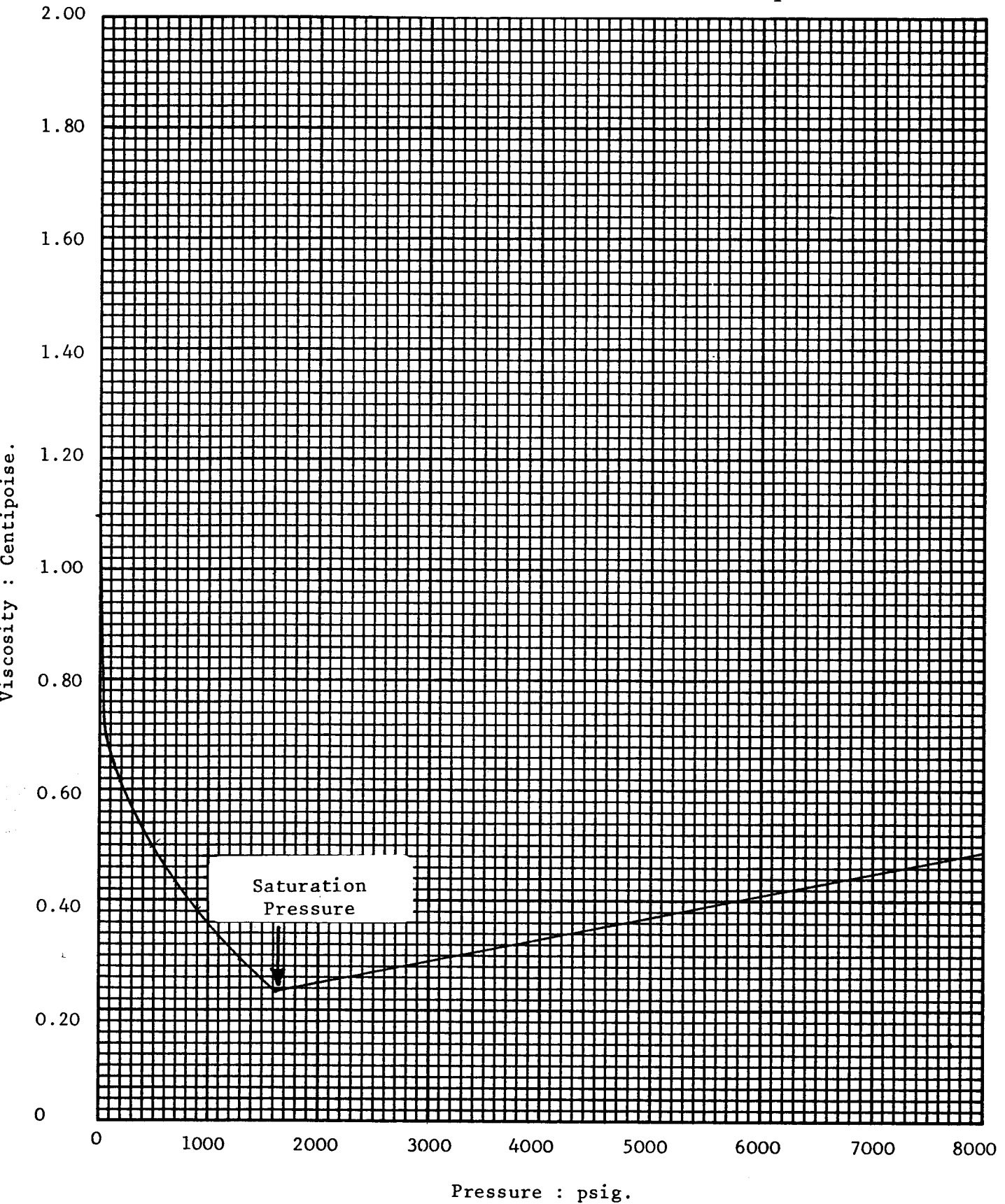
Well N-4A

VISCOSITY DATA AT 300°F.

<u>Pressure PSIG</u>	<u>Oil Viscosity Centipoise</u>	<u>Calculated Gas Viscosity Centipoise</u>	<u>Oil/Gas Viscosity Ratio</u>
8000 <i>7160</i>	0.487 <i>0.454</i>		
7000	0.448		
6000	0.411		
5000	0.372		
4000	0.332		
3000	0.292		
2000	0.252		
1700	0.240		
1602 Saturation Pressure	0.236		
1500	0.258	0.0169	15.27
1300	0.293	0.0162	18.09
1100	0.336	0.0156	21.54
900	0.381	0.0150	25.40
700	0.438	0.0144	30.42
500	0.500	0.0136	36.76
300	0.575	0.0126	45.63
200	0.618	0.0119	51.93
132	0.639	0.0112	57.05
93	0.697	0.0106	65.75
0	1.095		

Viscosity of Reservoir Fluid at 300°F.

Company	<u>B.P. Petroleum Development Ltd</u>	Formation	<u>Triassic</u>
Well	<u>7/12-6 DST 1</u>	County	<u>North Sea</u>
Field	<u>Ula</u>	State	<u>Norway</u>



CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 14 of 19

File RFLA 81182

Well 7/12-6 DST 1

SEPARATOR TESTS OF RESERVOIR FLUID SAMPLE

Separator Pressure, PSI Gauge	Separator Temperature °F.	Separator Gas/Oil Ratio(1)	Stock Tank Gas/Oil Ratio(1)	Stock Tank Gravity °API @ 60°F.	Shrinkage Factor, Vr/Vsat(2)	Formation Volume Factor Vsat/Vr(3)	Specific Gravity of Flashed Gas
0	60	487		41.5	0.6906	1.448	1.107

Oil and gas collected and analysed for hydrocarbon composition.

- (1) Separator and Stock Tank Gas/Oil Ratio in cubic feet of gas at 14.73 psia and 60°F per barrel of stock tank oil at 60°F.
- (2) Shrinkage Factor: Vr/Vsat is barrels of stock tank oil at 60°F per barrel of saturated oil at 1602 psig and 300°F.
- (3) Formation Volume Factor: Vsat/Vr is barrels of saturated oil at 1602 psig and 300°F per barrel of stock tank oil at 60°F.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 15 of 19

File RFLA 81182

Well 7/12-6 DST 1

HYDROCARBON ANALYSES OF SEPARATOR PRODUCTS AND CALCULATED WELL STREAM

<u>Component</u>	<u>Separator Liquid</u>		<u>Separator Gas</u>		<u>Well Stream</u>
	<u>Mol Percent</u>	<u>Mol Percent</u>	<u>Mol Percent</u>	<u>GPM</u>	<u>Mol Percent</u>
Hydrogen Sulfide	NIL	NIL			NIL
Carbon Dioxide	0.02	3.79			1.74
Nitrogen	TRACE	3.63			1.66
Methane	0.21	45.06			20.73
Ethane	0.70	15.41			7.43
Propane	2.61	16.34		4.495	8.89
iso-Butane	1.40	2.97		0.971	2.12
n-Butane	4.76	7.60		2.395	6.06
iso-Pentane	2.51	1.43		0.523	2.02
n-Pentane	4.12	1.95		0.706	3.13
Hexanes	5.78	0.75		0.306	3.48
Heptanes	9.31	0.68	)		5.36
Octanes	10.38	0.24	)		5.74
Nonanes	7.47	0.08	)	0.486	4.09
Decanes	5.69	0.05	)		3.11
Undecanes	4.41	0.02	)		2.40
Dodecanes	3.48	TRACE			1.89
Tridecanes	3.87	TRACE			2.10
Tetradecanes	3.50	NIL			1.90
Pentadecanes	2.95	NIL			1.60
Hexadecanes	2.71	NIL			1.47
Heptadecanes	3.28	NIL			1.78
Octadecanes	1.62	NIL			0.88
Nonadecanes	1.92	NIL			1.04
Eicosane plus	17.30	NIL			9.38
	<u>100.00</u>	<u>100.00</u>		<u>9.882</u>	<u>100.00</u>

Properties of Eicosanes plus

API gravity @ 60°F.	<u>25.3</u>	
Specific gravity @ 60/60°F.	<u>0.9022</u>	<u>0.902</u>
Molecular weight	<u>477</u>	<u>477</u>

Calculated separator gas gravity (air=1.000) = 1.107
 Calculated gross heating value for separator gas = 1719 BTU
 per cubic foot of dry gas @ 14.73 psia and 60°F.

Primary separator gas/separator liquid ratio 487 SCF/Bbl @ 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 operation, or profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 16 of 19

File RFLA 81182

Well 7/12-6 DST 1

SEPARATOR TESTS OF RESERVOIR FLUID SAMPLE

Separator Pressure PSI Gauge	Separator Temperature °F.	Gas/Oil Ratio (1)	Gas/Oil Ratio (2)	Stock Tank Gravity °API @ 60°F.	Formation Volume Factor(3)	Separator Volume Factor(4)	Specific Gravity of Flashed Gas
520	255	246	295			1.200	0.990
to 140	215	91	105			1.152	1.211
to 30	195	55	61			1.102	1.660
to 0	60	2	2	42.0	1.431	1.000	+

→
463

+ Insufficient gas for analysis.

- (1) Gas/Oil Ratio in cubic feet of gas at 14.73 psia and 60°F. per barrel of oil at indicated pressure and temperature.
- (2) Gas/Oil Ratio in cubic feet of gas at 14.73 psia and 60°F. per barrel of stock tank oil at 60°F.
- (3) Formation Volume Factor is barrels of saturated oil at 1602 psig and 300°F. per barrel of stock tank oil at 60°F.
- (4) Separator Volume Factor is barrels of oil at indicated pressure and temperature per barrel of stock tank oil at 60°F.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 17 of 19

File RFLA 81182

Well 7/12-6 DST 1

HYDROCARBON ANALYSES OF SEPARATOR GAS SAMPLES

Separator Conditions: 520 PSIG @ 255°F. 140 PSIG @ 215°F. 30 PSIG @ 195°F.

<u>Component</u>	<u>Mol Percent</u>	<u>GPM</u>	<u>Mol Percent</u>	<u>GPM</u>	<u>Mol Percent</u>	<u>GPM</u>
Hydrogen Sulfide	NIL		NIL		NIL	
Carbon Dioxide	3.98		3.77		1.87	
Nitrogen	5.39		1.86		0.23	
Methane	54.93		38.66		11.24	
Ethane	13.49		17.75		15.64	
Propane	11.22	3.087	18.73	5.153	29.55	8.129
iso-Butane	1.73	0.566	3.09	1.010	6.43	2.103
n-Butane	4.48	1.412	8.08	2.546	18.31	5.770
iso-Pentane	0.96	0.351	1.74	0.637	4.25	1.555
n-Pentane	1.51	0.547	2.73	0.989	6.60	2.390
Hexanes	1.01	0.412	1.83	0.746	3.44	1.403
Heptanes	0.80	)	1.13	)	1.75)
Octanes	0.35	) 0.590	0.44	) 0.799	0.50	) 1.108
Nonanes	0.10	)	0.11	)	0.11)
Decanes plus	0.05	)	0.08	)	0.08)
	<u>100.00</u>	<u>6.965</u>	<u>100.00</u>	<u>11.880</u>	<u>100.00</u>	<u>22.458</u>

Calculated gas gravity (Air=1.000): 0.990 1.211 1.660

Calculated gross heating value (BTU per cubic foot of dry gas at 14.73 psia and 60°F.): 1502 1909 2681

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 profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

ABERDEEN, SCOTLAND

Page 18 of 19

File RFLA 81182

Well 7/12-6 DST 1

SEPARATOR TESTS OF RESERVOIR FLUID SAMPLE

Separator Pressure PSI Gauge	Separator Temperature °F.	Gas/Oil Ratio (1)	Gas/Oil Ratio (2)	Stock Tank Gravity °API @ 60°F.	Formation Volume Factor(3)	Separator Volume Factor(4)	Specific Gravity of Flashed Gas
520	255	247	297			1.202	0.994
to 125	160	73	80			1.092	1.042
to 0	60	60	60	42.9	1.408	1.000	1.362

437 c 255 °F 520 3500

- (1) Gas/Oil Ratio in cubic feet of gas at 14.73 psia and 60°F. per barrel of oil at indicated pressure and temperature.
- (2) Gas/Oil Ratio in cubic feet of gas at 14.73 psia and 60°F. per barrel of stock tank oil at 60°F.
- (3) Formation Volume Factor is barrels of saturated oil at 1602 psig and 300°F. per barrel of stock tank oil at 60°F.
- (4) Separator Volume Factor is barrels of oil at indicated pressure and temperature per barrel of stock tank oil at 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 operation, or profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering
ABERDEEN, SCOTLAND

Page 19 of 19

File RFLA 81182

Well 7/12-6 DST 1

HYDROCARBON ANALYSES OF SEPARATOR GAS SAMPLES

Separator Conditions: 520 PSIG @ 255°F. 125 PSIG @ 160°F. 0 PSIG @ 60°F.

<u>Component</u>	<u>Mol Percent</u>	<u>GPM</u>	<u>Mol Percent</u>	<u>GPM</u>	<u>Mol Percent</u>	<u>GPM</u>
Hydrogen Sulfide	NIL		NIL		NIL	
Carbon Dioxide	3.98		4.46		3.07	
Nitrogen	5.38		2.35		0.39	
Methane	54.69		47.67		18.89	
Ethane	13.48		18.47		23.65	
Propane	11.26	3.098	15.73	4.317	32.38	8.908
iso-Butane	1.74	0.569	2.22	0.724	5.05	1.651
n-Butane	4.54	1.431	5.30	1.666	11.35	3.577
iso-Pentane	0.99	0.362	0.98	0.358	1.78	0.651
n-Pentane	1.58	0.572	1.45	0.524	2.14	0.775
Hexanes	1.07	0.436	0.66	0.269	0.67	0.273
Heptanes	0.79	)	0.41	)	0.36)
Octanes	0.35	) 0.586	0.18	) 0.322	0.14	) 0.286
Nonanes	0.10	)	0.07	)	0.07)
Decanes plus	0.05	)	0.05	)	0.06)
	<u>100.00</u>	<u>7.054</u>	<u>100.00</u>	<u>8.180</u>	<u>100.00</u>	<u>16.121</u>

Calculated gas gravity (Air=1.000): 0.994 1.042 1.362

Calculated gross heating value (BTU per cubic foot of dry gas at 14.73 psia and 60°F.): 1509 1618 2188

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 profitability of any oil, gas or other mineral well or sand in connection with which such report is used or relied upon.

CORE LABORATORIES UK LTD.

Petroleum Reservoir Engineering

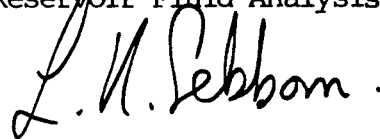
ABERDEEN, SCOTLAND

B.P. PETROLEUM DEVELOPMENT LIMITED

Well: 7/12-6 DST 1

RFLA 81182

Core Laboratories UK Limited
Reservoir Fluid Analysis

A handwritten signature in black ink, appearing to read "L. K. Sebborn". The signature is written in a cursive style with a large initial "L" and a period at the end.

Les K. Sebborn
Laboratory Manager