

PARTIAL FLUID STUDY
FOR
STATOIL
WELL: 6407/1-3

CORE LAB

CORE LABORATORIES NORSK

ÅGOTNES

PARTIAL FLUID STUDY

FOR

STATOIL

WELL: 6407/1-3



CORE LAB NORSK

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COAST CENTRE BASE
ÅGOTNES
BERGEN NORWAY
Postboks 63—CCB

6 FEBRUARY 1984

Statoil
Damsgårdsgaten 131
P.O. Box 1212
N-5001 Bergen

Attention: Jon Hanstveit

Subject: Partial Fluid Study
Well: 6407/1-3
Haltenbanken Field
Norwegian Sea, Norway
Our File Number: RFLN 830006

Gentlemen:

On the 8th December 1983 a Schlumberger one gallon RFT chamber, number RFS AD 40, was recieved in our Ågotnes Laboratory for evaluation of the contents. Presented in the following report are the results of tests performed as requested by a representative of Statoil.

Upon receipt in the laboratory the opening pressure of the chamber was determined to be 132.4 barg at 16.5 degrees C, the sample contained in the chamber was found to have a bubble point of 293 barg at 16.5 degrees C. Whilst maintaining the pressure in the chamber well in excess of the saturation pressure a sample of fluid was removed for visual examination; measurement of gas-oil ratio, gas gravity, hydrocarbon gas composition, and oil gravity. There after, two pressurised samples were collected and the total contents of the chamber measured. During bleed-down samples of gas and oil were collected in the containers provided by Statoil. The resultant volumetric and ratio data may be found on page two, and the hydrocarbon composition of the evolved gas, determined by gas chromatography, on page three.

The hydrocarbon composition of the first pressurised sample collected was determined by low temperature fractional distillation. This composition in terms of both mol and weight percent may be found on page four.

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Page Two

A small quantity of this fluid was charged to a high pressure windowed cell and thermally expanded to the reservoir temperature of 135 degrees C. During a constant composition expansion at this temperature, the fluid was found to have a bubble point of 327.85 barg. The results of the pressure-volume measurements may be found on page five.

Thank you for the opportunity to be of service to Statoil. If 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 Norsk



Duncan Thow
Operations Supervisor
Reservoir Fluid Analysis

DT/ACE
7cc/Addressee

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Petroleum Reservoir Engineering
ÅGOTNES

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CompanySTATOIL..... Date Sampled
Well6407/1-3..... CountyNORWEGIAN SEA.....
FieldHALTENBANKEN..... StateNORWAY.....

FORMATION CHARACTERISTICS

Formation Name
Date First Well Completed 19.....
Original Reservoir PressurePSIG @Ft.
Original Produced Gas-Liquid RatioSCF/Bbl
 Production Rate Bbl/Day
 Separator Pressure and TemperaturePSIG..... ° F.
 Oil Gravity at 60°F. ° API
Datum Ft. Subsea
Original Gas Cap

WELL CHARACTERISTICS

Elevation Ft.
Total Depth Ft.
Producing Interval Ft.
Tubing Size and DepthIn. to..... Ft.
Productivity IndexBbl/D/PSI @Bbl/Day
Last Reservoir Pressure376.1..... BARG @Ft.
 Date 19.....
 Reservoir Temperature135..... ° C @ Ft.
 Status of Well
 Pressure Gauge
Normal Production Rate Bbl/Day
 Gas-Oil RatioSCF/Bbl
 Separator Pressure and TemperaturePSIG..... ° F.
 Base Pressure PSIA
Well Making Water % Cut

SAMPLING CONDITIONS

Sampled at3692..... M
Status of Well
 Gas-Oil RatioSCF/Bbl
 Separator Pressure and TemperaturePSIG..... ° F.
 Tubing Pressure PSIG
 Casing Pressure PSIG
Sampled bySCHLUMBERGER.....
Type SamplerR.F.T.....

REMARKS: Weld failed on original test cap at approximately 275 Barg.

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SUMMARY OF DATA FROM EXAMINATION OF FLUID

IN RFT CHAMBER NUMBER RFS AD 40

Opening Pressure at 16.5 degrees C	132.4 BARG
Saturation Pressure (Bubble Point) at 16.5 degrees C.	293.0 BARG
Sample Volume at 377.1 Barg and 16.5 degrees C.	3.294 L
Gas Oil Ratio of initial fluid	122.4 SCM/M3
Oil Density at 15 degrees C.	0.8743 G/CM3
Initial Gas Gravity (air = 1.000)	0.707
Gas Gravity during bleed down (air = 1.000)	0.712

RECOVERY DATA

Fluid collected at 943 Barg	1.380 L
Total gas evolved (at 1.0133 Bar and 15 degrees C)	169.656 L
Total oil recovered during bleed down	1.463 L
Water/Mud filterate recovered	0.150 L

SATURATION PRESSURE OF TRANSFERRED FLUIDS

Saturation Pressure (bubble point) of fluid sample one (cylinder number 811138) at 16 degrees C.	300.6 BARG
Saturation Pressure (bubble point) of fluid sample two (cylinder number 811136) at 16 degrees C.	299.4 BARG

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FieldHALTENBANKEN..... StateNORWAY.....

HYDROCARBON ANALYSIS OFEVOLVED..... GAS SAMPLE

Component	Mol Percent	L/100M3
Carbon Dioxide	2.68	
Nitrogen	0.39	
Methane	84.24	
Ethane	5.91	21.068
Propane	3.04	11.155
iso-Butane	0.56	2.442
n-Butane	1.61	6.767
iso-Pentane	0.45	2.196
n-Pentane	0.58	2.801
Hexanes	0.35	1.904
Heptanes plus	0.19	1.150
	<u>100.00</u>	<u>49.483</u>

Calculated Gas Gravity = $\frac{0.705}{1.000}$ (Air = 1.000)
 Calculated Gross heating value = $\frac{43.63}{1.000}$ MJ per meter cubed of
 dry gas at 1.0133 Bar
 and 15 degrees C.

Collected at $\frac{0}{16}$ BARG
 and $\frac{16}{16}$ Deg.C.

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Company STATOIL Date Sampled
 Well 6407/1-3 County NORWEGIAN SEA
 Field HALTENBANKEN State NORWAY

HYDROCARBON ANALYSIS OF RESERVOIR FLUID... SAMPLE

COMPONENT	MOL PERCENT	WEIGHT PERCENT	DENSITY @ 60° F. GRAMS PER CUBIC CENTIMETER	° API @ 60° F.	MOLECULAR WEIGHT
Hydrogen Sulfide	NIL	NIL			
Carbon Dioxide	1.66	0.68			
Nitrogen	0.10	0.03			
Methane	53.28	7.90			
Ethane	3.85	1.07			
Propane	2.29	0.93			
iso-Butane	0.47	0.25			
n-Butane	1.43	0.77			
iso-Pentane	0.60	0.40			
n-Pentane	0.89	0.60			
Hexanes	1.53	1.21			
Heptanes plus	33.90	86.16	0.8807	29.0	275.
	100.00	100.00			

Cylinder Number: 811138

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VOLUMETRIC DATA OF RESERVOIR FLUID SAMPLE

1. Saturation pressure (bubble-point) 327.85 BARG at 135 C.
2. Thermal expansion of saturated oil 448.16 BARG = $\frac{V_{135\text{ C.}}}{V_{15.3\text{ C.}}} = 1.12146$
3. Compressibility of saturated oil reservoir temperature: Vol/Vol/BAR:

From 448.16 BARG to 376.11 BARG= 17.27×10^{-5}
 From 376.11 BARG to 344.74 BARG= 19.05×10^{-5}
 From 344.74 BARG to 327.85 BARG= 19.20×10^{-5}

PRESSURE/VOLUME RELATIONS AT 135 DEGREES C.

PRESSURE BARG	RELATIVE VOLUME V/VSAT (1)
448.16	0.9785
413.69	0.9843
393.00	0.9879
376.11	0.9908
351.63	0.9954
344.74	0.9968
337.84	0.9981
330.95	0.9995
327.85	1.0000

- 1) Relative Volume: V/Vsat is volume at indicated pressure per unit volume at saturation pressure.

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Reservoir Fluid Analysis

A handwritten signature in black ink, appearing to read "Duncan Thow". The signature is written in a cursive style with a large initial "D" and a long horizontal stroke at the end.

Duncan Thow
Operations Supervisor