PARTIAL FLUID STUDY

for

A/S Norske Shell Exploration & Production

Well: 31/2-6 Gas Test

North Sea, Norway.

CORE LABORATORIES UK LTD.
Petroleum Reservoir Engineering
ABERDEEN, SCOTLAND

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18th June 1982

A/S Norske Shell Exploration & Production
Gamle Forusvei 43
N-4033 Forus
NORWAY

Subject: Partial Fluid Study
Well: 31/2-6 GAS TEST
North Sea, Norway.
Our File: RFLA 820070

Attention: Mr. B. Rheinholdstein.

Gentlemen,

On the 7th October 1981 samples of gas and condensate were collected from the subject well and subsequently forwarded to our Aberdeen laboratory for analysis. The results of these analyses as requested in telex FOR 190208 are presented in the following report.

The hydrocarbon composition of the separator gas was determined by gas chromatography and that of the separator liquid by low temperature fractional distillation and chromatography.

The separator liquid sample was subjected to flash separation at 0 psig and 60°F in order to correct the gas-condensate ratio to separator conditions. The data derived from this separation may be found on page three.

Utilising the experimentally derived compositions of the separator products in conjunction with the separation test data and the quoted gas-condensate ratio of 3.7 Bbls/MMSCF a wellstream composition was calculated. These compositions through nonadecanes are to be found on page two.

The separator products were physically recombined at this ratio and the resulting fluid utilised for the remainder of the study.

A portion of the the fluid was placed in a visual cell at 154°F and pressure-volume relations performed. The compressibility factor Z was used in conjunction with the pressure-volume relations to calculate the Z factor at each pressure. These data are presented on page four.

We thank you for this opportunity to be of service to A/S Norske Shell Exploration & Production. 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.

Very truly yours

Core Laboratories UK Limited
Reservoir Fluid Analysis

L. K. Sebborn

LKS/stb
10cc/Addressee

Les. K. Sebborn
Laboratory Manager

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Petroleum Reservoir Engineering
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Company A/S Norske Shell Expl. & Prod. Date Sampled 7th October 1981

Well 31/2-6 County North Sea

Field Block 31/2 State Norway

FORMATION CHARACTERISTICS

Formation Name	Clean Sands
Date First Well Completed	, 19
Original Reservoir Pressure	PSIG @ M.
Original Produced Gas-Liquid Ratio	SCF/Bbl
Production Rate	Bbls/Day
Separator Pressure and Temperature	PSIG °F.
Liquid Gravity at 60°F.	°API
Datum	M. Subsea

WELL CHARACTERISTICS

Elevation	25 M.
Total Depth	M.
Producing Interval	1518 to 1536 M.
Tubing Size and Depth	5/3½ In. to 1510.28 M.
Open Flow Potential	MMSCF/Day
Last Reservoir Pressure	2284.5 PSIG @ 1506.5 M.
Date	7th October , 1981
Reservoir Temperature	154 * °F. @ M.
Status of Well	
Pressure Gauge	

SAMPLING CONDITIONS

Flowing Tubing Pressure		1795 PSIG
Flowing Bottom Hole Pressure		2169 PSIG
Primary Separator Pressure		450 PSIG
Primary Separator Temperature		60 °F.
Secondary Separator Pressure		PSIG
Secondary Separator Temperature		°F.
Field Stock Tank Liquid Gravity		°API @ 60°F.
Primary Separator Gas Production Rate		MSCF/Day
Pressure Base	14.73 PSIA	
Temperature Base	60 °F.	
Compressibility Factor (F_{pv})	1.0336	
Gas Gravity (Laboratory)	0.595	
Gas Gravity Factor (F_g)	1.2964	
Liquid Production Rate @ 60°F.		Bbls/Day
Primary Separator Gas/ Stock Tank Liquid Ratio		270270 + SCF/Bbl
	or	3.7 + Bbls/MMSCF
Sampled by		Flopetrol

REMARKS: * Requested analysis temperature. + Data supplied by A/S Norske Shell.

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Well 31/2-6 GAS TEST

HYDROCARBON ANALYSES OF SEPARATOR PRODUCTS AND CALCULATED WELL STREAM

Component	Separator Liquid Mol Percent	Separator Gas Mol Percent	GPM	Well Stream Mol Percent	
Hydrogen Sulfide	NIL	NIL		NIL	
Carbon Dioxide	0.30	0.63		0.63	
Nitrogen	TRACE	1.45		1.44	
Methane	13.43	93.74		93.43	
Ethane	3.36	3.34		3.34	
Propane	0.98	0.28		0.28	
iso-Butane	2.53	0.34		0.35	
n-Butane	0.26	0.02		0.02	
iso-Pentane	1.42	0.05		0.06	
n-Pentane	0.39	0.01		0.01	
Hexanes	4.84	0.05		0.07	
Methylcyclopentane	1.00	0.02		0.02	0.12
Benzene	NIL	NIL		NIL	
Cyclohexane	3.64	0.02		0.03	
Heptanes	5.89	0.02		0.04	0.10
Methylcyclohexane	11.12	0.02		0.06	
Toluene	0.96	TRACE		0.01	0.01
Octanes	10.84	0.01		0.05	
Ethylbenzene	1.25	TRACE		0.01	0.06
Meta & Para Xylene	2.78	TRACE		0.01	
Ortho Xylene	2.08	TRACE		0.01	0.02
Nonanes	8.16	TRACE		0.03	
1,2,4, Trimethylbenzene	1.23	NIL		0.01	
Decanes	9.33	TRACE		0.04	
Undecanes	5.11	NIL		0.02	
Dodecanes	2.28	NIL		0.01	
Tridecanes	2.00	NIL		0.01	
Tetradecanes	1.59	NIL		0.01	
Pentadecanes	0.84	NIL		TRACE	
Hexadecanes	0.75	NIL		TRACE	
Heptadecanes	0.60	NIL		TRACE	
Octadecanes	0.35	NIL		TRACE	
Nonandecanes	0.25	NIL		TRACE	
Eicosanes plus	0.44	NIL		TRACE	
	100.00	100.00		100.00	

Properties of Heptanes plus

Specific gravity @ 60/60°F.	0.7954		0.773
Molecular weight	128	103 (assumed)	122

SEPARATOR TESTS OF SEPARATOR LIQUID SAMPLE

Separator Pressure, PSI Gauge	Separator Temperature °F.	Separator Gas/Oil Ratio(1)	Stock Tank Gas/Oil Ratio(1)	Stock Tank Oil Density gm/cc	Shrinkage Factor, Vr/Vsat(2)	Formation Volume Factor Vsat/Vr(3)	Specific Gravity of Flashed Gas
0	60	144		0.7830	0.9326	1.0722	0.840

(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 450 psig and 60°F.
(3) Formation Volume Factor: Vsat/Vr is barrels of saturated oil at 450 psig and 60°F per barrel of stock tank oil at 60°F.

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Well 31/2-6

PRESSURE-VOLUME RELATIONS AT 154°F.

Pressure PSIG		Relative Volume	Compressbility Factor Z
2500		0.9116	0.801
2400		0.9479	0.800
2275	Reservoir Pressure	1.0000	0.800
2200		1.0350	0.801
2100		1.0865	0.803
2000		1.1435	0.805
1900		1.2094	0.809
1800		1.2839	0.814
1600		1.4716	0.830
1400		1.7148	0.848
1200		2.0542	0.872
1000		2.5363	0.899
800		3.2548	0.927
600		4.4538	0.957

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

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