

Reservoir Fluid Study For Norske Shell Exploration & Production North Sea, Norway Well: 31/2-3

.....

A7 -

• •

,

.

Reservoir Fluid Study For Norske Shell Exploration & Production North Sea, Norway Well: 31/2-3

5th January, 1981

Norske Shell Exploration & Production, Damsle Ferusuei 43, P.O. Box 10, 40-33 Forus, Stavanger, Norway.

Attention: Mr. Dave Jolly

Subject: Reservoir Fluid Study Well: 31/2-3 North Sea, Norway Our File Number: RFLA 80090

Gentlemen,

On 7th May, 1980, an RFT subsurface fluid sample was collected during testing on the subject well and forwarded to our Aberdeen laboratory on 14th May, 1980, for use in a reservoir fluid study. In accordance with analyses requirements, the tests were performed and the results presented in this report.

The hydrocarbon composition through hexanes of the subsurface fluid was determined by low temperature fractional distillation. Due to the nature of the fluid we were unable to determine the hydrocarbon composition of the heptanes plus through eicosanes, by high temperature fractional distillation and consequently high temperature chromatography was utilized. The results of these tests in terms of both mol percent and weight percent through eicosanes plus are presented on page two.

The subsurface reservoir fluid was examined in a visual cell at the reservoir temperature of 122°F and found to exhibit a retrograde dew point at 1753 psig for RFT 4.1. The pressure-volume relations of the reservoir fluid are shown on page three.

The wellstream composition was used to calculate the cumulative stock tank liquid and sales gas recovery using normal temperature two-stage separation. Also calculated are the plant liquid products on the primary and second stage gas separator gases. The total plant products in the wellstream are also shown on this page. All recoveries are based on a one MMSCF of original reservoir fluid. It must be remembered in applying these data that the recoveries are based on 100 percent plant efficiency. These results are presented on page four.

Continued/...

Norske Shell Exploration & Production

Continued/...

Page Two

In view of these results, the reservoir fluid would usually be considered a dry gas system. Consequently, we would normally not perform a "step-wise" equilibrium (constant volume) depletion to simulate wellstream production below the dew point. We will retain the samples in our laboratory pending further instructions from Norske Shell Exploration & Production.

It has been a pleasure to be of service to Norske Shell Exploration & Production. Should any questions arise concerning the data presented in this report, please do not hesitate to contact us.

Very truly yours, Core Laboratories U.K. Ltd.,

L. K. Sebborn, Laboratory Manager - RFL

LKS/HG 15 cc addressee

Page1 of4.....

File RFLA 80090

Company Norske Shell	Date Sampled7th. May, 1980
Well	County North Sea
Field	State Norway

FORMATION CHARACTERISTICS

Formation Name	
Date First Well Completed	19
Original Reservoir Pressure	Ft.
Original Produced Gas-Liquid Ratio	SCF/Bbl
Production Rate	Bbl/Day
Separator Pressure and Temperature	º 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 Depth	Ft.
Productivity Index	Bbl/D/PSI @Bbl/Day
Last Reservoir Pressure	
Date	, 19
Reservoir Temperature	122 ° F. @ Ft. *
Status of Well	•••••
Pressure Gauge	•••••
Normal Production Rate	Bbl/Day
Gas-Oil Ratio	SCF/Bbl
Separator Pressure and Temperature	
Base Pressure	PSIA
Well Making Water	% Cut
	,,,

SAMPLING CONDITIONS

Sampled at	1433 m
Status of Well	
Gas-Oil Ratio	SCF/Bbl
Separator Pressure and Temperature	PSIG
Tubing Pressure	PSIG
Casing Pressure	PSIG
Sampled by	Schlumberger
Type Sampler	RFT

REMARKS: * Requested analysis temperature

ļ

L

Cylinder Number: SS 591

Page2..... of4......

File RFLA 80090

*(+

CompanyNorske Shell	Formation
Well	CountyNorth Sea
Field	StateNorway

HYDROCARBON ANALYSIS OF ... Reservoir Fluid GAS SAMPLE

COMPONENT	MOL PERCENT	Weight Percent
Hydrogen Sulfide	NIL	NIL
Carbon Dioxide	0.44	1.12
Nitrogen	2.15	3.49
Methane	93.93	87.16
Ethane	2.96	5.15
Propane	0.19	0.48
iso-Butane	0.04	0.13
n-Butane		
	0.01	0.02
iso-Pentane	TRACE	0.01
n-Pentane	TRACE	0.01
Hexanes	0.01	0.02
Methylcyclopentane	TRACE C.C.	0.01
Benzene	NIL	NIL
Cyclohexane	0.01	0.06
leptanes	0.03	0.20
Methylcylohexane	0.02	0.13
Toluene	TRACE	0.01
Octanes	0.05	0.38
Ethylbenzene	TRACE	0.01
leta and Para Xylene	0.01	0.07
Orthoxylene	TRACE	0.01
Vonanes	0.03	0.25
l, 2, 4 Trimethybenzene	0.01	0.08
Decanes	0.02	0.19
Undecanes	0.03	0.29
Dodecanes	0.02	0.24
Fridecanes	0.02	0.26
Tetradecanes	0.01	0.13
Pentadecanes	0.01	0.07
lexadecanes	TRACE	0.01
leptadecanes	TRACE	0.01
Octadecanes	TRACE	TRACE
Nonadecanes	TRACE	TRACE
Eicosanes plus	TRACE	TRACE
	100.00	100.00

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

. .

.

File RFLA 80090

- .

CALCULATED RECOVERY PER MMSCF OF ORIGINAL FLUID

Wellstream MSCF		1000
Normal Temperature	Separation*	
Stock Tank liquid - Primary Separator G Second Stage Gas - Stock Tank Gas - MS	as - MSCF MSCF	2.98 996.16 1.13 0.65
Total Plant Product Primary Separator G		
Propane Butanes (Total) Pentanes Plus		52 16 43
Total Plant Product Second Stage Gas -		
Propane Butanes (Total) Pentanes Plus		0.08 0.02 0.04
Total Plant Products in Wellstream - Gallons**		
Propane Butanes (Total) Pentanes Plus		52 16 175
* Recovery Bases:	Primary separation at 1250 p Second stage at 500 psig and Stock Tank at 0 psig and 27	40 [°] F
** Recovery assumes	100% plant efficiency	

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 or relied upon.

ī

Norske Shell Exploration & Production RFLA 80090

> Core Laboratories U.K. Ltd., Reservoir Fluid Analysis,

1. Laure

L. K. Sebborn, Laboratory Manager - RFL