GJ-697-72

Stavanger, October 27, 1972

The Ministry of Industry
Oslo-dep.
Akersgt. 42
OSLO 1

ATTENTION: Petroleum Section

Dear Sirs,

Enclosed are the Reservoir Fluid Studies for Ekofisk Wells 2/4-2X and 2/4-3X.

Very truly yours,

P.W. Reynolds
District Manager

Encl.

cc: J.T. Clark

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS 75207
October 11, 1972

RESERVOIR FLUID DIVISION

Phillips Petroleum Company - Norway
P. O. Box 69
Stavanger, Norway

Attention: Mr. P. W. Reynolds

Subject: Reservoir Fluid Study
2/4-3X Well
Ekofisk Field
North Sea, Norway
Our File Number: RFL 72442

Gentlemen:

Separator liquid and vapor samples collected from the subject well were delivered to our Dallas laboratory for use in a reservoir fluid study. Presented on the following pages are the results of this study as requested by Phillips Petroleum Company - Norway.

After correcting the primary separator gas production rate by the factors shown on page one, the producing gas-liquid ratio was 1129 standard cubic feet of primary separator gas per barrel of primary separator liquid at 515 psig and 121° F. The well stream composition was then calculated using this ratio in conjunction with the measured compositions of the separator products and these data are shown on page two of the report.

The separator products were then physically recombined to their producing gas-liquid ratio, and the resulting fluid was examined in a visual cell at the reservoir temperature of 270° F. During a constant composition expansion at this temperature, the bubble point pressure of the fluid was determined to be 5433 psig. This bubble point pressure was reported by telephone to a representative of Phillips Petroleum Company in Bartlesville, and we were then informed that no further tests would be performed with this fluid.

Thank you for the opportunity of performing these tests for Phillips Petroleum Company - Norway. Should you have any questions regarding these data or if we may assist you further, please do not hesitate to contact us.

Very truly yours,

Core Laboratories, Inc.
Reservoir Fluid Analysis

P. L. Moses HS

P. L. Moses
Manager

PLM:HS:dl
7 cc. - Addressee
2 cc. - Mr. M. J. Fetkovich
Phillips Petroleum Company
Bartlesville, Oklahoma 74004

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 72442

Company Phillips Petroleum Co.-Norway Date Sampled July 9, 1972

Well 2/4-3X Province North Sea

Field Ekofisk Country Norway

FORMATION CHARACTERISTICS

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

WELL CHARACTERISTICS

Elevation	Ft.
Total Depth	Ft.
Producing Interval	10306-10465 Ft.
Tubing Size and Depth	In. to Ft.
Open Flow Potential	MMSCF/Day
Last Reservoir Pressure	7120 PSIG @ -10400 Ft.
Date	, 19
Reservoir Temperature	270 ° F. @ -10400 Ft.
Status of Well	
Pressure Gauge	

SAMPLING CONDITIONS

Flowing Tubing Pressure		PSIG
Flowing Bottom Hole Pressure		PSIG
Primary Separator Pressure		515 PSIG
Primary Separator Temperature		121 ° F.
Secondary Separator Pressure		PSIG
Secondary Separator Temperature		° F.
Field Stock Tank Liquid Gravity		36.6 ° API @ 60° F.
Primary Separator Gas Production Rate		9650 MSCF/Day
Pressure Base	14.65 PSIA	
Temperature Base	60 ° F.	
Compressibility Factor (F_{pv})	1.041	
Gas Gravity (Laboratory)	0.678	
Gas Gravity Factor (F_g)	1.2145	
Separator Liquid Production Rate @ 121° F. & 515 psig		8543.8 Bbls/Day
Primary Separator Gas/Separator Liquid Ratio		1129 SCF/Bbl
or		Bbls/MMSCF
Core Laboratories, Inc., Engineer		

REMARKS:

Hydrocarbon Analyses of Separator Products and Calculated Well Stream

Component	Separator Liquid Mol Per Cent	Separator Gas Mol Per Cent	Separator Gas GPM	Well Stream Mol Per Cent
Hydrogen Sulfide	Nil	Nil		Nil
Carbon Dioxide	0.23	0.54		0.43
Nitrogen	0.01	0.24		0.16
Methane	11.38	84.17		57.51
Ethane	5.22	9.13	2.293	7.70
Propane	5.33	3.68	1.007	4.28
iso-Butane	1.31	0.45	0.146	0.76
n-Butane	4.04	1.01	0.317	2.12
iso-Pentane	1.90	0.22	0.080	0.84
n-Pentane	2.47	0.26	0.094	1.07
Hexanes	5.21	0.15	0.061	2.00
Heptanes plus	62.90	0.15	0.068	23.13
	100.00	100.00	4.066	100.00

Properties of Heptanes plus

API gravity @ 60° F.	33.1			
Specific gravity @ 60/60° F.	0.8595			0.859
Molecular weight	230	103		229

Calculated separator gas gravity (air = 1.000) = 0.678

Calculated gross heating value for separator gas = 1183 BTU per cubic foot of dry gas @ 14.65 psia and 60° F.

Primary separator gas collected @ 515 psig and 121 °F.

Primary separator liquid collected @ 515 psig and 121 °F.

Primary separator gas/separator liquid ratio 1129 SCF/Bbl @ 121° F.

VOLUMETRIC DATA OF Reservoir Fluid SAMPLE

1. Saturation pressure (bubble-point pressure) 5433 PSIG @ 270 °F.
2. Thermal expansion of saturated oil @ 7500 PSI = $\frac{\text{V @ 270 °F}}{\text{V @ 75 °F}}$ = 1.13280
3. Compressibility of saturated oil @ reservoir temperature: Vol/Vol/PSI:

From 7500 PSI to 6500 PSI = 17.98×10^{-6}

From 6500 PSI to 5900 PSI = 21.90×10^{-6}

From 5900 PSI to 5433 PSI = 23.77×10^{-6}

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

File RFL 72442

Well 2/4-3X

Pressure-Volume Relations of Reservoir Fluid at 270° F.

Pressure, PSIG	Relative Volume
7500	0.9589
7000	0.9674
6500	0.9765
6000	0.9867
5900	0.9889
5800	0.9912
5700	0.9937
5600	0.9959
5500	0.9984
5433	1.0000
5376	1.0029
5334	1.0051
5235	1.0105
5052	1.0212
4732	1.0430
4340	1.0760
3932	1.1205
3472	1.1878
3028	1.2781
2608	1.4031
2227	1.5627
1926	1.7457
1460	2.1829
1082	2.8691
762	3.9861

Core Laboratories, Inc.
Reservoir Fluid Analysis

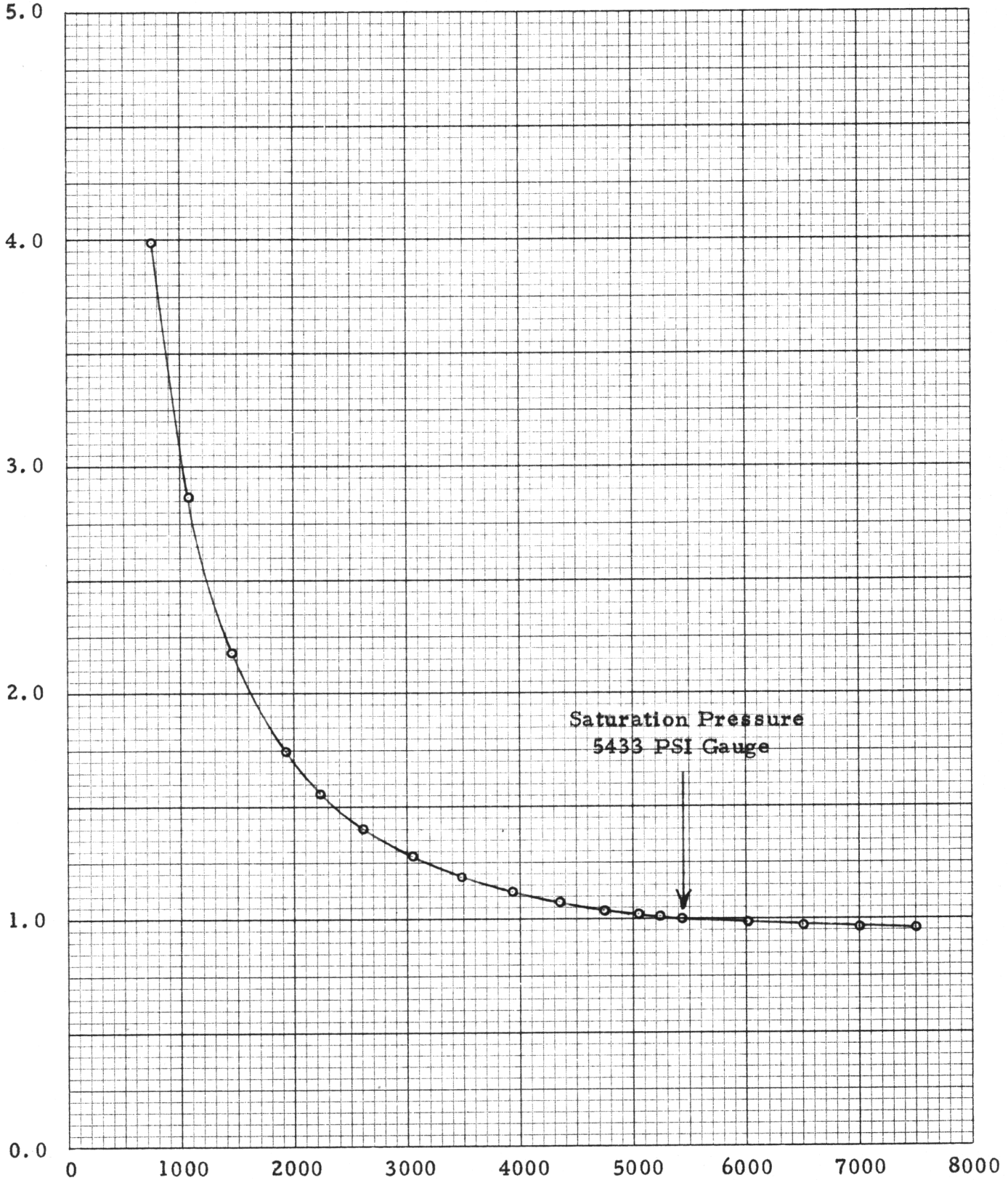
P. L. Moses MS

P. L. Moses
Manager

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

Pressure-Volume Relations of Reservoir Fluid at 270° F.

Company Phillips Petroleum Co. -Norway Formation
Well 2/4-2X Province North Sea
Field Ekofisk Country Norway



BAZ/GJ-201/70

Stavanger, August 10, 1970

Core Laboratories
P.O. Box 10185
Dallas, Texas 75207
U.S.A.

ATTENTION: Mr. Phil Moses, Mgr.
Reservoir Fluid Analysis.

Dear Sir:

Six Core Lab gas bottles and six Core Lab liquid bottles are being shipped to your office for analysis. One gas and one liquid sample were taken for each drill stem test (4 & 7), and two gas samples and two liquid samples were taken for each drill stem test (5A & 8) of well 2/4-3X. Data sheets for the sample containers are attached. Each individual, container has been tagged with sufficient information to enable it to be indentified.

It is requested that the appropriate DST gas and liquid samples be recombined and a composite wellstream analysis and a bubble point be determined for each DST. One these data have been analyzed by Phillips, a more complete PVT analysis will be requested.

All data required were furnished in the attached sheets with the exception of bottom hole pressure which will be determined after the bottom hole recorders have been read and analyzed. Please advise if any additional information concerning the hydrocarbon samples are required for your studies.

Yours very truly,

P.W. Reynolds
Area Superintendent
Drilling & Production

cc.: T.J. Jobin - London Office (r) Fred Kumpf w/attachments.
L.H. Hoelscher - London Office
W.W. Allen - Bartlesville Office

Gas & liquid taken 2130 – 2215 hrs
July 19, 70

CORE LABORATORIES, Inc.

Petroleum Reservoir Engineering
DALLAR, TEXAS

Page _____ of _____

File _____

Company Phillips Petroleum Co. Date Sampled July 19, 1970

Well 2/4-3x County North Sea

Field EKOFISK State NORWAY

FORMATION CHARACTERISTICS

Formation Name	Danian
Date First Well Completed	July 19, 19 70
Original Reservoir Pressure	PSIG at Ft.
Original Produced Gas-Liquid Ratio	1107 SCF/Bbl
Production Rage	1040 Bbls/Day
Separator Pressure and Temperature	420 PSIG 97 °F.
Liquid Gravity at 60° F.	34.2 °API
Datum	Ft. Subsea

WELL CHARACTERISTICS

Elevation	89' RKB Ft.
Total Depth	PBTD-10581' Ft.
Producing Interval	10560 - 10580 Ft.
Tubing Size and Depth	2 7/8" In. to 10472 Ft.
Open Flow Potential	MMSCF/Day
Last Reservoir Pressure	PSIG at Ft.
Date	, 19
Reservoir Temperature	268.5 °F. at 10570 Ft.
Status of Well	Flowing DST-4
Pressure Gauge	Custer 10,000 psi, 72 hrs

SAMPLING CONDITIONS

Flowing Tubing Pressure		556 PSIG
Flowing Bottom Hole Pressure		PSIG
Primary Separator Pressure		420 PSIG
Primary Separator Temperature		97 °F.
Secondary Separator Pressure		PSIG
Secondary Separator Temperature		°F.
Field Stock Tank Liquid Gravity		34.2 °API at 60° F.
Primary Separator Gas Production Rate		1151 MSCF/Day
Pressure Base	14.73 PSIA	
Temperature Base	60 °F.	
Compressibility Factor (F_{pv})	1.0273	
Gas Gravity (Laboratory)	0.665	
Gas Gravity Factor (F_g)	1.2263	
Primary Liquid Production Rate at 60° F.		1040 Bbls/Day
Primary Separator Gas/ Liquid Ratio		1107 SCF/Bbl
or		Bbls/MMSCF

Core Laboratories, Inc., Engineer

REMARKS:

Data Sheet for Recombination Samples

Company PHILLIPS | Formation Dancin

Well 2/4 - 3X | County North Sea

Field EKOFISK | State NORWAY

Gas-Oil Ratio Data:

Primary separator pressure	420 psig @ 97 °F.
Secondary separator pressure	____ psig @ ____ °F.
Barometric pressure	
Primary separator gas production rate*	1151 MSCF/day
Pressure base	14.73 psia
Temperature base	60 °F.
Compressibility factor (F_{pv})	1.0273
Assumed gas gravity	0.663
Gas gravity factor	1.2263
Stock tank liquid production rate @ 60° F.**	1040 bbls./day
Stock tank liquid gravity @ 60° F.	34.2 ° API
Primary separator gas/stock tank liquid ratio	1107 SCF/bbl.
Reservoir pressure	____ psig @ ____ ft.
Reservoir temperature	268.5 °F. @ 10570 ft.
Completion interval	10560-10580 ft.

* If gas production rate and proper factors are not known, please list the following basic data: static pressure, differential pressure, orifice size and meter run size, type and temperature.

** If liquid production measurements are made at some point other than stock tank, please indicate. If stock tank liquid volume is not at 60° F., please give correct temperature.

On the reverse side of this page, please draw a diagram of the producing system indicating points of gas and liquid measurements and points of sampling. Also fill out well summary page as when taking subsurface samples.

NOTE: For recombination studies, gas and liquid samples must be taken from primary separator.

Desired analysis: Recombination of oil & gas Sample.
Determine FVF & Viscosity

DATA SHEET

Geochemistry Branch Method 67-1C

Box Number F-45

Collection of Pressurized Gas and/or Liquid Petroleum in Cylinders

Enclose one copy in box with samples

Send one copy separately to:
J. G. Erdman
Geochemistry Branch
Phillips Research Center
Bartlesville, Oklahoma 74003

Retain one copy for your records if desired

Computer Key Card	Column		Gas	Liquid
-	-	Cylinder Number	G 88	L 61
A1	3-9	Sample Code Letters (to be assigned by Geochem. Br.)		
A1	11-13	Sample Type (to be assigned by Geochem. Br.)		
A1	14-36	Well Name (Lease, block, concession, structure, etc.)	Ekofisk 2/4	
	37-41	Well Number	2/4-3x	
A1	42-46	County or Area Name	North Sea	
A1	47-51	State or Country	NORWAY	
A1	52-78	Operator	Phillips Pet. Co.	
A2	30	Depth Reference Point (RKB, Sea level, etc)	89' RKB	
A2	37-41 43-47	Depth of Formation Sampled	Upper 10560	Lower 10580
A2	49-52	Time Sampled, 24 hr. clock	2300 hrs	2280 hrs
A2	53-60	Month, Day and Year Sampled	July 19, 70	July 19, 70
-	-	By Whom Sampled	J. Strickland	J. Strickland
A2	61-63	Geological Age of Formation Sampled		
	64-67	Lithology of Formation Sampled	Limestone	
A2	68-78	Name of Formation Sampled	Danian	
B1	11-51	Name of Sample Point(s) and Well Status	Separator, flowing DST 4.	
B1	52-55	Pressure of Sample Points, psig	420 psig	420 psig
B1	56-59	Temperature of Sample Points, ° F	96	96
B1	60-63	Pressure put in sample cylinders, psig	420 psig	420 psig
B1	64-69	Gas/oil Ratio (Give Units)	1086 +339 cu. ft/bbl	
B1	70-74 75-78	Flow Rates (Give Units)	1.3296 MMCFD	1040 BOPD
-	-	Water Production (Give Units)	1 % Grind out	

Comments:

2g. e2 liquid taken 2045-2115 hrs

PHILLIPS PETROLEUM COMPANY, Stavanger, Norway

1. Lease Name, Well No. Ekofisk
2. Field, Concession, Country North Sea, Norway
2. Name of Production Formation Danian
4. Perforated interval (Depth from RKB) 10560 - 10580
5. Source of Gas Sample Separator
6. Source of Liquid Samples Separator
7. Separator Pressure 420 psig
8. Separator Temperature 98 °F
9. Type and Working Pressure of Gas Bottle 25 psi - PPCo.
10. Type of Liquid Sample Container Companion Separator kit
11. Date Sampled July 19, 1970
12. Name of Person or Persons Taking Sample J. Strickland
13. Shipping Information as Follows:
    a) Name of Carrier
    b) Air or Ocean Bill of Lading
    c) Date Shipped
    d) Routing
    e) Shipment Number
14. Producing Rate At Time of Sampling:
    a) Separator Gas, SCF 1,329,600 SCFD
    b) Hydrocarbon Liquid, STB 1040 BOPD
15. Ratio of Separator Gas to Stock Tank Oil, Cubic Feet/Barrel 1086 cu. ft / bbl
16. Request the Gas and/or Oil Analysis to Include the Following:
    a) An Analysis of Hydrocarbons Through and Including C_7+ Yes
    b) H_2S Yes
    c) CO_2 Yes
    d) N_2 Yes
    e) H_e Yes
    f) Recombined Formation Fluid Analysis Yes
17. Bottom Hole Pressure _____ at _____ 'RKB
18. Bottom Hole Temperature 268.5 at 10570 'RKB

CL-519

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

Page ____ of ____

File ____

Company PHILLIPS PETROLEUM Date Sampled 7-23-70

Well EKOFISK 2/4-3X County NORTH SEA

Field EKOFISK State NORWAY

FORMATION CHARACTERISTICS

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

WELL CHARACTERISTICS

Elevation	RKB 89 Ft.
Total Depth	11189 Ft.
Producing Interval	10420 - 10500 Ft.
Tubing Size and Depth	2-7/8 OD In. to 10467 Ft.
Open Flow Potential	____ MMSCF/Day
Last Reservoir Pressure	____ PSIG @ ____ Ft.
Date	7-22-70, 19____
Reservoir Temperature	266 ° F. @ 10460 Ft.
Status of Well	FLOWING DST 5A SECOND FLOW
Pressure Gauge	____

SAMPLING CONDITIONS

Flowing Tubing Pressure	875 PSIG
Flowing Bottom Hole Pressure	____ PSIG
Primary Separator Pressure	610 PSIG
Primary Separator Temperature	102 ° F.
Secondary Separator Pressure	____ PSIG
Secondary Separator Temperature	____ ° F.
Field Stock Tank Liquid Gravity	35.3 ° API @ 60° F.
Primary Separator Gas Production Rate	2.744 MMSCF/Day
Pressure Base	14.73 PSIA
Temperature Base	60 ° F.
Compressibility Factor (F_{pv})	1.0372
Gas Gravity (Laboratory)	____
Gas Gravity Factor (F_g)	1.2263
____ Liquid Production Rate @ 60° F.	2719 Bbls/Day
Primary Separator Gas/____ Liquid Ratio	1009 SCF/Bbl
or	____ Bbls/MMSCF

Core Laboratories, Inc., Engineer ____

REMARKS:

Data Sheet for Recombination Samples

Company PHILLIPS PETROLEUM Formation DANIAN

Well EKOFISK 2/4-3X County NORTH SEA

Field EKOFISK State NORWAY

Gas-Oil Ratio Data:

Primary separator pressure	610 psig @ 102	° F.
Secondary separator pressure	____ psig @ ____	° F.
Barometric pressure		
Primary separator gas production rate*	2.744	MMSCF/day
Pressure base	14.73	psia
Temperature base	60	° F.
Compressibility factor (F_{pv})	1.0372	
Assumed gas gravity	0.665	
Gas gravity factor	1.2263	
Stock tank liquid production rate @ 60° F.**	2719	bbls./day
Stock tank liquid gravity @ 60° F.	35.3	° API
Primary separator gas/stock tank liquid ratio	1009	SCF/bbl.
Reservoir pressure	____ psig @ ____	ft.
Reservoir temperature	266 ° F. @ 10460	ft.
Completion interval	10420 - 10500	ft.

* If gas production rate and proper factors are not known, please list the following basic data: static pressure, differential pressure, orifice size and meter run size, type and temperature.

** If liquid production measurements are made at some point other than stock tank, please indicate. If stock tank liquid volume is not at 60° F., please give correct temperature.

On the reverse side of this page, please draw a diagram of the producing system indicating points of gas and liquid measurements and points of sampling. Also fill out well summary page as when taking subsurface samples.

NOTE: For recombination studies, gas and liquid samples must be taken from primary separator.
COMPANION GAS & LIQUID SAMPLES FROM DST No. 5A SECOND FLOW TAKEN 1830-1900 7-23-70

Desired analysis: RECOMBINATION OF SAMPLES TO DETERMINE FVF & VISCOSITY

CL-519

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

Page ____ of ____

File ____

Company PHILLIPS PETROLEUM Date Sampled 7-22-70

Well EKOFISK 2/4-3X County NORTH SEA

Field EKOFISK State NORWAY

FORMATION CHARACTERISTICS

Formation Name	DANIAN
Date First Well Completed	July 22, 1970
Original Reservoir Pressure	____ PSIG @ ____ Ft.
Original Produced Gas-Liquid Ratio	1151 SCF/Bbl
Production Rate	667 Bbls/Day
Separator Pressure and Temperature	550 PSIG 96 ° F.
Liquid Gravity at 60° F.	36.2 ° API
Datum	____ Ft. Subsea

WELL CHARACTERISTICS

Elevation	RKB 89 FT Ft.
Total Depth	11189 Ft.
Producing Interval	10420-10500 Ft.
Tubing Size and Depth	2-7/8 OD In. to 10475 Ft.
Open Flow Potential	____ MMSCF/Day
Last Reservoir Pressure	____ PSIG @ ____ Ft.
Date	7-22-70, 19____
Reservoir Temperature	266 ° F. @ 10460 Ft.
Status of Well	FLOWING, DST No 5A FIRST FLOW
Pressure Gauge	

SAMPLING CONDITIONS

Flowing Tubing Pressure		3505 PSIG
Flowing Bottom Hole Pressure		____ PSIG
Primary Separator Pressure		550 PSIG
Primary Separator Temperature		96 ° F.
Secondary Separator Pressure		____ PSIG
Secondary Separator Temperature		____ ° F.
Field Stock Tank Liquid Gravity		36.2 ° API @ 60° F.
Primary Separator Gas Production Rate		768 MSCF/Day
Pressure Base	14.73 PSIA	
Temperature Base	60 ° F.	
Compressibility Factor (F_{pv})	1.0351	
Gas Gravity (Laboratory)	0.665	
Gas Gravity Factor (F_g)	1.2263	
Primary Liquid Production Rate @ 60° F.		667 Bbls/Day
Primary Separator Gas/____ Liquid Ratio		1151 SCF/Bbl
or		____ Bbls/MMSCF
Core Laboratories, Inc., Engineer		____

REMARKS:

COMPANION GAS AND LIQUID SAMPLES FROM DST No 5A FIRST FLOW BOTH TAKEN 1815 TO 1845 HRS. 7-22-70

Data Sheet for Recombination Samples

Company PHILLIPS PETROLEUM Formation DANIAN

Well EKOFISK 2/4-3X County NORTH SEA

Field EKOFISK State NORWAY

Gas-Oil Ratio Data:

Primary separator pressure	550 psig @ 96 ° F.
Secondary separator pressure	____ psig @ ____ ° F.
Barometric pressure	
Primary separator gas production rate*	768 MSCF/day
Pressure base	14.73 psia
Temperature base	60 ° F.
Compressibility factor (F_{pv})	1.0351
Assumed gas gravity	0.665
Gas gravity factor	1.2263
Stock tank liquid production rate @ 60° F.**	667 @ 96° bbls./day
Stock tank liquid gravity @ 60° F.	36.2 ° API
Primary separator gas/stock tank liquid ratio	1151 SCF/bbl.
Reservoir pressure	____ psig @ ____ ft.
Reservoir temperature	266 ° F. @ 10460 ft.
Completion interval	10420 - 10500 ft.

* If gas production rate and proper factors are not known, please list the following basic data: static pressure, differential pressure, orifice size and meter run size, type and temperature.

** If liquid production measurements are made at some point other than stock tank, please indicate. If stock tank liquid volume is not at 60° F., please give correct temperature.

On the reverse side of this page, please draw a diagram of the producing system indicating points of gas and liquid measurements and points of sampling. Also fill out well summary page as when taking subsurface samples.

NOTE: For recombination studies, gas and liquid samples must be taken from primary separator.

COMPANION GAS AND LIQUID SAMPLES FROM DST 5A FIRST FLOW BOTH TAKEN 1815 TO 1845 HRS 7-22-70

Desired analysis: RECOMBINATION OF SAMPLES TO DETERMINE FVF AND VISCOSITY

DATA [redacted]
Geochemistry Bra[redacted]thod 67-1C

Box Number
F40

Collection of Pressurized Gas and/or Liquid Petroleum in Cylinders

Enclose one copy in box with samples

Send one copy separately to:
J. G. Erdman
Geochemistry Branch
Phillips Research Center
Bartlesville, Oklahoma 74003

Retain one copy for your records if desired

Computer Key Card	Column		Gas	Liquid
-	-	Cylinder Number	G80	L116
A1	3-9	Sample Code Letters (to be assigned by Geochem. Br.)		
A1	11-13	Sample Type (to be assigned by Geochem. Br.)		
A1	14-36	Well Name (Lease, block, concession, structure, etc.)	EKOFISK 2/4-3X	
A1	37-41	Well Number	2/4-3X	
A1	42-46	County or Area Name	NORTH SEA	
A1	47-51	State or Country	NORWAY	
A1	52-78	Operator	PHILLIPS PETROLEUM Co	
A2	30	Depth Reference Point (RKB, Sea level, etc)	89'/RKB	
A2	37-41 43-47	Depth of Formation Sampled	Upper 10420	Lower 10500
A2	49-52	Time Sampled, 24 hr. clock	1900	1920
A2	53-60	Month, Day and Year Sampled	7-22-70	7-22-70
-	-	By Whom Sampled	J. STRICKLAND	J. STRICKLAND
A2	61-63	Geological Age of Formation Sampled		
A2	64-67	Lithology of Formation Sampled	LIMESTONE	
A2	68-78	Name of Formation Sampled	DANIAN	
B1	11-51	Name of Sample Point(s) and Well Status	SEPARATORS DST No 5A FLOW No 1	
B1	52-55	Pressure of Sample Points, psig	550	550
B1	56-59	Temperature of Sample Points, °F	96	97
B1	60-63	Pressure put in sample cylinders, psig	550	550
B1	64-69	Gas/oil Ratio (Give Units)	1142 FT³/BBL	
B1	70-74 75-78	Flow Rates (Give Units)	0.746 MMCFD	653 BOPD
-	-	Water Production (Give Units)	0.1 % GRINDOUT	

Comments: _____

Collec.

PHILLIPS PETROLEUM COMPANY, Stavanger, Norway

1. Lease Name, Well No. EKOFISK 2/4-3X
2. Field, Concession, Country EKOFISK NORTH SEA NORWAY
3. Name of Production Formation DANIAN
4. Perforated interval (Depth from RKB) 10420 - 500
5. Source of Gas Sample TEST SEPARATOR DST 5-A
6. Source of Liquid Samples TEST SEPARATOR DST 5-A
7. Separator Pressure 530 PSIG
8. Separator Temperature 96°F
9. Type and Working Pressure of Gas Bottle 25 PSIG
10. Type of Liquid Sample Container HOKE 030 SAMPLE KIT I-22
11. Date Sampled 7-22-70
12. Name of Person or Persons Taking Sample J. STRICKLAND
13. Shipping Information as Follows:
    a) Name of Carrier
    b) Air or Ocean Bill of Lading
    c) Date Shipped
    d) Routing
    e) Shipment Number

SAMPLES FROM DST No 5-A FIRST FLOW TAKEN AT 1815 HRS

Producing Rate At Time of Sampling:

a) Separator Gas, ~~SCF~~ 0.746 MMCFD
b) Hydrocarbon Liquid, STB 653 BOPD 35.4°API

15. Ratio of Separator Gas to Stock Tank Oil, Cubic Feet/Barrel 1142
16. Request the Gas and/or Oil Analysis to Include the Following:
    a) An Analysis of Hydrocarbons Through and Including C_7+ yes
    b) H_2S yes
    c) CO_2 yes
    d) N_2 yes
    e) H_e yes
    f) Recombined Formation Fluid Analysis
17. Bottom Hole Pressure _____ at _____ 'RKB
18. Bottom Hole Temperature 266 at 10460 'RKB

DATA SHEET Box No. F83

Collection of Pressurized Gas and/or Liquid Petroleum in Cylinders by the API RP 44 Recommended Practice for Sampling Petroleum Reservoir Fluids - 4.221, Method No. 2 and 4.2313, Method No. 3 (Modified)(Geochemistry Branch Method 67-1D). Rev. Apr. 1, 1970

Enclose one copy in box with samples and ship to
J. F. Downie
Phillips Petroleum Co., 262 CL PRC
Bartlesville, Oklahoma 74003, USA

Send one copy separately to:
J. G. Erdman
Geochemistry Branch
Phillips Research Center
Bartlesville, Oklahoma 74003

Retain one copy for your records if desired.

Computer Key Card	Column		Gas	Liquid
-	-	Cylinder Number	G66	L51
A1	3-9	Sample Code Letters (to be assigned by Geochem. Br.)		
A1	11-13	Sample Type (to be assigned by Geochem. Br.)		
A1	14-36	Well Name (Lease, Block, Concession, Structure, etc.)	EKOFISK 2/4-3X	
A1	37-41	Well Number	2/4-3X	
A1	42-46	County or Area Name	NORTH SEA	
A4	11-78	Description	Sec.___ Twp.___ Rge.___	
A1	47-51	State or Country	NORWAY	
A1	52-78	Operator	PHILLIPS PETROLEUM Co	
A2	30	Depth Reference Point (RKB, Sea Level, etc.)	89' RKB	
A2	37-41 43-47	Depth of Interval Sampled, Feet	Upper 10420	Lower 10500
A2	49-52	Time Sampled, 24 Hour Clock	1715	1715
A2	53-60	Month, Day and Year Sampled	7-23-70	7-23-70
-	-	By Whom Sampled	J. STRICKLAND & BASIM ZIAKA	
A2	61-63	Geological Age of Formation Sampled		
A2	64-67	Lithology of Formation Tested	LIMESTONE	
A2	68-78	Name of Formation Sampled	DANIAN	
B1	11-51	Name of Sample Point(s)	TEST SEPARATOR	
B1	11-51	Well Status	DST No 5A SECOND FLOW	
B1	52-55	Pressure of Separator(s), psig	1st 600 2nd ___ 3rd ___	
B1	56-59	Temperature of Separator(s), °F	1st 100 2nd ___ 3rd ___	
B1	60-63	Pressure Put in Sample Cylinders, psig	600	600
B1	64-69	Gas-Oil Ratio, Mcf/Bbl	0.995	0.995
B1	70-74 75-78	Flow Rates, Units	2.747 M^3 SCF/Hr	2760 Bbl/~~Hr~~ DAY
-	-	Water Production (Give Units)		
		Average Temperature of Stock Tank Oil at Moment of Gauging Tank.		
		If no stock tank is used, state how and where oil rate was measured.	METER	
		Pressure Base for Gas Measurements	14.73	
		API Gravity of Stock Tank Oil, °API at 60°F	35.3	
		If not sampled at Separator:		
B1	52-55	Pressure of Sample Point(s), psig		
B1	56-59	Temperature of Sample Point(s) °F		

Comments

PHILLIPS PETROLEUM COMPANY, Stavanger, Norway

1. Lease Name, Well No. EKOFISK 2/4-3X
2. Field, Concession, Country EKOFISK NORTH SEA NORWAY
3. Name of Production Formation DANIAN
4. Perforated interval (Depth from RKB) 10420 - 500
5. Source of Gas Sample TEST SEPARATOR DST 5A
6. Source of Liquid Samples TEST SEPARATOR DST 5A
7. Separator Pressure 600 PSIG
8. Separator Temperature 98°
9. Type and Working Pressure of Gas Bottle 25 PSIG PPG
10. Type of Liquid Sample Container HOKE 0-30 SAMPLE KIT I-22
11. Date Sampled 7-23-70
12. Name of Person or Persons Taking Sample J. STRICKLAND

3. Shipping Information as Follows:
   a) Name of Carrier
   b) Air or Ocean Bill of Lading
   c) Date Shipped
   d) Routing
   e) Shipment Number

SAMPLES FROM DST No 5A SECOND FLOW TAKEN AT 1645 HRS

4. Producing Rate At Time of Sampling:
   a) Separator Gas, SCF 2.744 MMCFD
   b) Hydrocarbon Liquid, STB 2719
5. Ratio of Separator Gas to Stock Tank Oil, Cubic Feet/Barrel 1009
6. Request the Gas and/or Oil Analysis to Include the Following:
   a) An Analysis of Hydrocarbons Through and Including C_7^+ Yes
   b) H_2S Yes
   c) CO_2 Yes
   d) N_2 Yes
   e) H_e Yes
   f) Recombined Formation Fluid Analysis Yes
7. Bottom Hole Pressure _____ at _____ 'RKB
8. Bottom Hole Temperature 266 at 10460 'RKB

CL-519

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

Page _____ of _____

File _____

Company PHILLIPS PETROLEUM Date Sampled JULY 27, 1970

Well EKOFISK 2/4-3X County NORTH SEA

Field EKOFISK State NORWAY

FORMATION CHARACTERISTICS

Formation Name	DANIAN
Date First Well Completed	July 27, 1970
Original Reservoir Pressure	PSIG @ Ft.
Original Produced Gas-Liquid Ratio	SCF/Bbl
Production Rate	Bbls/Day
Separator Pressure and Temperature	270 PSIG 96 ° F.
Liquid Gravity at 60° F.	35.8 ° API
Datum	Ft. Subsea

WELL CHARACTERISTICS

Elevation	RKB 89 Ft.
Total Depth	Ft.
Producing Interval	10260 – 10340 Ft.
Tubing Size and Depth	2 7/8 In. to 10298 Ft.
Open Flow Potential	MMSCF/Day
Last Reservoir Pressure	PSIG @ Ft.
Date	July 27, 1970
Reservoir Temperature	263 ° F. @ 10300 Ft.
Status of Well	Flowing DST 7.
Pressure Gauge	Custer 10,000 psi, 72 hrs

SAMPLING CONDITIONS

Flowing Tubing Pressure	340 PSIG
Flowing Bottom Hole Pressure	PSIG
Primary Separator Pressure	250 PSIG
Primary Separator Temperature	96 ° F.
Secondary Separator Pressure	PSIG
Secondary Separator Temperature	° F.
Field Stock Tank Liquid Gravity	35.8 ° API @ 60° F.
Primary Separator Gas Production Rate	939 MSCF/Day
Pressure Base	14.73 PSIA
Temperature Base	60 ° F.
Compressibility Factor (F_{pv})	1.0170
Gas Gravity (Laboratory)	0.665
Gas Gravity Factor (F_g)	1.2263
Primary Liquid Production Rate @ 60° F.	677 Bbls/Day
Primary Separator Gas/ Liquid Ratio	1387 SCF/Bbl
or	Bbls/MMSCF

Core Laboratories, Inc., Engineer

REMARKS:

Data Sheet for Recombination Samples

Company PHILLIPS PETROLEUM Formation DANIAN

Well EKOFISK 2/4-3X County NORTH SEA

Field EKOFISK State NORWAY

Gas-Oil Ratio Data:

Primary separator pressure	270 psig @ 96 °F.
Secondary separator pressure	____ psig @ ____ °F.
Barometric pressure	
Primary separator gas production rate*	939 MSCF/day
Pressure base	14.73 psia
Temperature base	60 °F.
Compressibility factor (F_{pv})	1.0170
Assumed gas gravity	0.665
Gas gravity factor	1.2263
Stock tank liquid production rate @ 60° F.**	677 bbls./day
Stock tank liquid gravity @ 60° F.	35.8 ° API
Primary separator gas/stock tank liquid ratio	1387 SCF/bbl.
Reservoir pressure	____ psig @ ____ ft.
Reservoir temperature	____ °F. @ ____ ft.
Completion interval	10260 – 10340 ft.

* If gas production rate and proper factors are not known, please list the following basic data: static pressure, differential pressure, orifice size and meter run size, type and temperature.

** If liquid production measurements are made at some point other than stock tank, please indicate. If stock tank liquid volume is not at 60° F., please give correct temperature.

On the reverse side of this page, please draw a diagram of the producing system indicating points of gas and liquid measurements and points of sampling. Also fill out well summary page as when taking subsurface samples.

NOTE: For recombination studies, gas and liquid samples must be taken from primary separator.

Desired analysis: Recombination of Samples to determine FVF & Viscosity

PHILLIPS PETROLEUM COMPANY, Stavanger, Norway

1. Lease Name, Well No. EKOFISK 2/4-3X
2. Field, Concession, Country NORTH SEA NORWAY
2. Name of Production Formation DANIAN
4. Perforated interval (Depth from RKB) 10260-10340
5. Source of Gas Sample TEST SEPARATOR
6. Source of Liquid Samples TEST SEPARATOR
7. Separator Pressure 270 PSIG
8. Separator Temperature 93°
9. Type and Working Pressure of Gas Bottle PPG 25 PSI BOXES Nos 45 & 25
10. Type of Liquid Sample
Container HOKE 100 cc KIT No 1
11. Date Sampled July 27, 70 0730 HRS
12. Name of Person or Persons Taking Sample J. STRICKLAND
13. Shipping Information as Follows:
    a) Name of Carrier
    b) Air or Ocean Bill of Lading
    c) Date Shipped
    d) Routing
    e) Shipment Number

DUPLICATE COMPANION GAS & LIQUID SAMPLES FROM DST No. 7 TAKEN @ 0730 HRS JULY 27, 1970

14. Producing Rate At Time of Sampling:
    a) Separator Gas, SCF 0.942 M²CFD
    b) Hydrocarbon Liquid, STB 677 BOPD
15. Ratio of Separator Gas to Stock Tank Oil, Cubic Feet/Barrel 1397
16. Request the Gas and/or Oil Analysis to Include the Following:
    a) An Analysis of Hydrocarbons Through and Including C_7^+ ✓
    b) H_2S ✓
    c) CO_2 ✓
    d) N_2 ✓
    e) H_e ✓
    f) Recombined Formation Fluid Analysis ✓
17. Bottom Hole Pressure _____ at _____ 'RKB
18. Bottom Hole Temperature 263° F at 10300 'RKB

DATA SHEET Box No. F84

Collection of Pressurized Gas and/or Liquid Petroleum in Cylinders by the API RP 44 Recommended Practice for Sampling Petroleum Reservoir Fluids - 4.221, Method No. 2 and 4.2313, Method No. 3 (Modified)(Geochemistry Branch Method 67-1D). Rev. Apr. 1, 1970

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Send one copy separately to:
J. G. Erdman
Geochemistry Branch
Phillips Research Center
Bartlesville, Oklahoma 74003

Retain one copy for your records if desired.

Computer Key Card	Column		Gas	Liquid
-	-	Cylinder Number	G105	L74
A1	3-9	Sample Code Letters (to be assigned by Geochem. Br.)		
A1	11-13	Sample Type (to be assigned by Geochem. Br.)		
A1	14-36	Well Name (Lease, Block, Concession, Structure, etc.)	EKOFISK 2/4-3X	
A1	37-41	Well Number	2/4-3X	
A1	42-46	County or Area Name	NORTH SEA	
A4	11-78	Description	Sec.____ Twp.____ Rge.____	
A1	47-51	State or Country	NORWAY	
A1	52-78	Operator	PHILLIPS PET Co	
A2	30	Depth Reference Point (RKB, Sea Level, etc.)	RKB 69'	
A2	37-41 43-47	Depth of Interval Sampled, Feet	Upper 10260	Lower 10340
A2	49-52	Time Sampled, 24 Hour Clock		
A2	53-60	Month, Day and Year Sampled	7-27-70	7-27-70
-	-	By Whom Sampled	J. STRICKLAND	J. STRICKLAND
A2	61-63	Geological Age of Formation Sampled	DANIAN	
A2	64-67	Lithology of Formation Tested	LIMESTONE	
A2	68-78	Name of Formation Sampled	DANIAN	
B1	11-51	Name of Sample Point(s)	TEST SEPARATOR	
B1	11-51	Well Status	FLOWING ON DST No. 7	
B1	52-55	Pressure of Separator(s), psig	1st 270 2nd ____ 3rd ____	
B1	56-59	Temperature of Separator(s), °F	1st 93 2nd ____ 3rd ____	
B1	60-63	Pressure Put in Sample Cylinders, psig	270	270
B1	64-69	Gas-Oil Ratio, Mcf/Bbl	1.391	1.391
B1	70-74 75-78	Flow Rates, Units	0.942 m^3 SCF/D	677 Bbl/D
-	-	Water Production (Give Units)		
		Average Temperature of Stock Tank Oil at Moment of Gauging Tank.		
		If no stock tank is used, state how and where oil rate was measured.		
		Pressure Base for Gas Measurements		
		API Gravity of Stock Tank Oil, °API at 60°F	35.8	
		If not sampled at Separator:		
B1	52-55	Pressure of Sample Point(s), psig		

CORE LABORATORIES, Inc.

Petroleum Reservoir Engineering
DALLAR, TEXAS

Page _____ of _____

File _____

Company PHILLIPS Date Sampled July 29, 70

Well 2/4-3x County North Sea

Field EKOFISK State NORWAY

FORMATION CHARACTERISTICS

Formation Name	Danian
Date First Well Completed	July 29 19,70
Original Reservoir Pressure	PSIG at Ft.
Original Produced Gas-Liquid Ratio	SCF/Bbl
Production Rage	Bbls/Day
Separator Pressure and Temperature	600 PSIG 104 ° F.
Liquid Gravity at 60° F.	35.4 ° API
Datum	Ft.Subsea

WELL CHARACTERISTICS

Elevation	89' RKB Ft.
Total Depth	Ft.
Producing Interval	10260-10340, 10375-90, 10420-10500 Ft.
Tubing Size and Depth	2 7/8 In. to 10220 Ft.
Open Flow Potential	MMSCF/Day
Last Reservoir Pressure	PSIG at Ft.
Date	July 30, 1970
Reservoir Temperature	266 ° F. at 10460 Ft.
Status of Well	Flowing DST-8
Pressure Gauge	Cuartz 16,000 psi, 72 hrs

SAMPLING CONDITIONS

Flowing Tubing Pressure		3510 PSIG
Flowing Bottom Hole Pressure		PSIG
Primary Separator Pressure		600 PSIG
Primary Separator Temperature		104 °F.
Secondary Separator Pressure		PSIG
Secondary Separator Temperature		°F.
Field Stock Tank Liquid Gravity		35.4 ° API at 60° F.
Primary Separator Gas Production Rate		712 MSCF/Day
Pressure Base	14.67 PSIA	
Temperature Base	60 °F.	
Compressibility Factor (F_{pv})	1.0361	
Gas Gravity (Laboratory)	0.665	
Ga Gas Gravity Factor (F_g)	1.2263	
Liquid Production Rate at 60° F.		653 Bbls/Day
Primary Separator Gas/ Liquid Ratio		1107 SCF/Bbl
or		Bbls/MMSCF

Core Laboratories, Inc., Engineer

REMARKS: Samples taken @ 1205-1230 hrs

Data Sheet for Recombination Samples

Company PHILLIPS Formation Danian

Well 2/4-3X County North Sea

Field EKOFISK State NORWAY

Gas-Oil Ratio Data:

Primary separator pressure 600 psig @ 104° F.
Secondary separator pressure ____ psig @ ____° F.
Barometric pressure

Primary separator gas production rate* 712 MSCF/day

Pressure base	14.73 psia
Temperature base	60 ° F.
Compressibility factor (F_{pv})	1.0361
Assumed gas gravity	0.665
Gas gravity factor	1.2263

Stock tank liquid production rate @ 60° F.** 653 bbls./day

Stock tank liquid gravity @ 60° F. 35.4 ° API

Primary separator gas/stock tank liquid ratio 1093 SCF/bbl.

Reservoir pressure ____ psig @ ____ ft.
Reservoir temperature 266 ° F. @ 10960 ft.
Completion interval 10260-10340, 10375-90, 10420-10500 ft.

* If gas production rate and proper factors are not known, please list the following basic data: static pressure, differential pressure, orifice size and meter run size, type and temperature.

** If liquid production measurements are made at some point other than stock tank, please indicate. If stock tank liquid volume is not at 60° F., please give correct temperature.

On the reverse side of this page, please draw a diagram of the producing system indicating points of gas and liquid measurements and points of sampling. Also fill out well summary page as when taking subsurface samples.

NOTE: For recombination studies, gas and liquid samples must be taken from primary separator.

Desired analysis: Recombine samples, determine FVF & Viscosity

CORE LABORATORIES, Inc.

Petroleum Reservoir Engineering
DALLAR, TEXAS

Page _____ of _____

File _____

Company PHILLIPS Date Sampled July 30, 1970

Well 2/4-3X County North Sea

Field EKOFISK State NORWAY

FORMATION CHARACTERISTICS

Formation Name	Danian
Date First Well Completed	July 30 19,70
Original Reservoir Pressure	PSIG at Ft.
Original Produced Gas-Liquid Ratio	SCF/Bbl
Production Rage	Bbls/Day
Separator Pressure and Temperature	660 PSIG 123 ° F.
Liquid Gravity at 60° F.	35.6 ° API
Datum	Ft.Subsea

WELL CHARACTERISTICS

Elevation	89' RKB Ft.
Total Depth	Ft.
Producing Interval	10260-10340, 10375-90, 10420-10500 Ft.
Tubing Size and Depth	2 7/8 In. to 10220 Ft.
Open Flow Potential	MMSCF/Day
Last Reservoir Pressure	PSIG at Ft.
Date	July 30, 1970
Reservoir Temperature	266 ° F. at 10460 Ft.
Status of Well	Flowing DST 8
Pressure Gauge	Gauges 10,000 psi, 72 hrs

SAMPLING CONDITIONS

Flowing Tubing Pressure		1165 PSIG
Flowing Bottom Hole Pressure		PSIG
Primary Separator Pressure		660 PSIG
Primary Separator Temperature		123 °F.
Secondary Separator Pressure		PSIG
Secondary Separator Temperature		°F.
Field Stock Tank Liquid Gravity		35.6 ° API at 60° F.
Primary Separator Gas Production Rate		4010 MSCF/Day
Pressure Base	14.73 PSIA	
Temperature Base	60 °F.	
Compressibility Factor (F_{pv})	1.0345	
Gas Gravity (Laboratory)	0.665	
Ga Gas Gravity Factor (F_g)	1.2263	
Liquid Production Rate at 60° F.		3779 Bbls/Day
Primary Separator Gas/ Liquid Ratio		1023 SCF/Bbl
or		Bbls/MMSCF

Core Laboratories, Inc., Engineer

REMARKS: Sample taken 0800-0845 hrs.

Data Sheet for Recombination Samples

Company PHILLIPS | Formation Danian

Well 2/4-3X | County North Sea

Field EKOFISK | State NORWAY

Gas-Oil Ratio Data:

Primary separator pressure	660 psig @ 123° F.
Secondary separator pressure	____ psig @ ____° F.
Barometric pressure	
Primary separator gas production rate*	4.010 MMSCF/day
Pressure base	14.73 psia
Temperature base	60° F.
Compressibility factor (F_{pv})	1.0345
Assumed gas gravity	0.665
Gas gravity factor	1.2263
Stock tank liquid production rate @ 60° F.**	3779 bbls./day
Stock tank liquid gravity @ 60° F.	35.6 ° API
Primary separator gas/stock tank liquid ratio	1023 SCF/bbl.
Reservoir pressure	____ psig @ ____ ft.
Reservoir temperature	266° F. @ 10460 ft.
Completion interval	10260-10340, 10375-90, 10420-10500 ft.

* If gas production rate and proper factors are not known, please list the following basic data: static pressure, differential pressure, orifice size and meter run size, type and temperature.

** If liquid production measurements are made at some point other than stock tank, please indicate. If stock tank liquid volume is not at 60° F., please give correct temperature.

On the reverse side of this page, please draw a diagram of the producing system indicating points of gas and liquid measurements and points of sampling. Also fill out well summary page as when taking subsurface samples.

NOTE: For recombination studies, gas and liquid samples must be taken from primary separator.

Desired analysis: Recombine Samples & determine FVF & Viscosity

Gas & liquid taken between 0625 - 0640 hrs
DST-8

PHILLIPS PETROLEUM COMPANY, Stavanger, Norway

1. Lease Name, Well No. Ekofisk
2. Field, Concession, Country North Sea, Norway
3. Name of Production Formation Danian
4. Perforated interval (Depth from RKB) 10260-10340, 10375-10390, 10420-10500
5. Source of Gas Sample Separator
6. Source of Liquid Samples Separator
7. Separator Pressure 660 psi
8. Separator Temperature 119 °F
9. Type and Working Pressure of Gas Bottle 25 psi - PPCo.
10. Type of Liquid Sample Container Liquid - Companion Separator
11. Date Sampled July 30, 1970
12. Name of Person or Persons Taking Sample J. Strickland
13. Shipping Information as Follows:
    a) Name of Carrier _____
    b) Air or Ocean Bill of Lading _____
    c) Date Shipped _____
    d) Routing _____
    e) Shipment Number _____
14. Producing Rate At Time of Sampling:
    a) Separator Gas 3.966 MMCFD
    b) Hydrocarbon Liquid 3718 BOPD
15. Ratio of Separator Gas to Stock Tank Oil, Cubic Feet/Barrel 1067 cu. ft./bbl.
16. Request the Gas and/or Oil Analysis to Include the Following:
    a) An Analysis of Hydrocarbons Through and Including C_7+ Yes
    b) H_2S ✓
    c) CO_2 ✓
    d) N_2 ✓
    e) H_e ✓
    f) Recombined Formation Fluid Analysis ✓
17. Bottom Hole Pressure _____ at _____ 'RKB
18. Bottom Hole Temperature 266 °F at 10460 'RKB

DST-8

Gas & Liquid 1140 - 1200 hrs

PHILLIPS PETROLEUM COMPANY, Stavanger, Norway

1. Lease Name, Well No. Ekofisk
2. Field, Concession, Country North Sea, Norway
3. Name of Production Formation Danian
4. Perforated interval (Depth from RKB) 10260-10340, 10375-10420 - 10500
5. Source of Gas Sample Separator
6. Source of Liquid Samples Separator
7. Separator Pressure 600 psi
8. Separator Temperature 109 °F
9. Type and Working Pressure of Gas Bottle 25 psi - PPCo.
10. Type of Liquid Sample Container Liquid - Companion Separator
11. Date Sampled July 29, 1972
12. Name of Person or Persons Taking Sample T. Hiebland

13. Shipping Information as Follows:
   a) Name of Carrier _____
   b) Air or Ocean Bill of Lading _____
   c) Date Shipped _____
   d) Routing _____
   e) Shipment Number _____

14. Producing Rate At Time of Sampling:
   a) Separator 715 MCFD
   b) Hydrocarbon Liquid Rate 634 BOPD

Ratio of Separator Gas to Stock Tank Oil, Cubic Feet/Barrel 1125 cu. ft/bbl

Request the Gas and/or Oil Analysis to Include the Following:
   a) An Analysis of Hydrocarbons Through and Including C_7+ Yes
   b) H_2S ✓
   c) CO_2 ✓
   d) N_2 ✓
   e) H_e ✓
   f) Recombined Formation Fluid Analysis ✓

Bottom Hole Pressure _____ at _____ 'RKB

Bottom Hole Temperature 266 °F at 10460 'RKB

DATA SHEET Box No. F-74

Collection of Pressurized Gas and/or Liquid Petroleum in Cylinders by the API RP 44 Recommended Practice for Sampling Petroleum Reservoir Fluids - 4.221, Method No. 2 and 4.2313, Method No. 3 (Modified)(Geochemistry Branch Method 67-1D). Rev. Apr. 1, 1970

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Bartlesville, Oklahoma 74003, USA

Send one copy separately to:
J. G. Erdman
Geochemistry Branch
Phillips Research Center
Bartlesville, Oklahoma 74003

Retain one copy for your records if desired.

Computer Key Card	Column		Gas	Liquid
-	-	Cylinder Number	69A-2095	L-167
A1	3-9	Sample Code Letters (to be assigned by Geochem. Br.)		
A1	11-13	Sample Type (to be assigned by Geochem. Br.)		
A1	14-36	Well Name (Lease, Block, Concession, Structure, etc.)	EKOFISK	
A1	37-41	Well Number	2/4-3X	
A1	42-46	County or Area Name	NORTH SEA	
A4	11-78	Description	Sec.___ Twp.___ Rge.___	
A1	47-51	State or Country	NORWAY	
A1	52-78	Operator	PHILLIPS PETROLEUM CO. (NORWAY)	
A2	30	Depth Reference Point (RKB, Sea Level, etc.)	322' ABOVE SEA BED	
A2	37-41 43-47	Depth of Interval Sampled, Feet	Upper 10260 ~~10375~~ 10420	Lower 340 390 500
A2	49-52	Time Sampled, 24 Hour Clock	0545	0620
A2	53-60	Month, Day and Year Sampled	7-30-70	7-30-70
-	-	By Whom Sampled	Jim Strickland	
A2	61-63	Geological Age of Formation Sampled		
A2	64-67	Lithology of Formation Tested		
A2	68-78	Name of Formation Sampled	DANIAN	
B1	11-51	Name of Sample Point(s)	8" METER RUN & 2" DUMP LINE	
B1	11-51	Well Status	WELL FLOWING ON RATE #2	
B1	52-55	Pressure of Separator(s), psig	1st 650 2nd ___ 3rd ___	
B1	56-59	Temperature of Separator(s), °F	1st 119 2nd ___ 3rd ___	
B1	60-63	Pressure Put in Sample Cylinders, psig	25 PSIG	650
B1	64-69	Gas-Oil Ratio, Mcf/Bbl	1067/1	1067/1
B1	70-74 75-78	Flow Rates, Units	3.966 MMSCF/DAY	3718 Bbl/DAY
-	-	Water Production (Give Units)	0	
		Average Temperature of Stock Tank Oil at Moment of Gauging Tank.		
		If no stock tank is used, state how and where oil rate was measured.	2-3" FLO-CO METERS	
		Pressure Base for Gas Measurements	14.67	
		API Gravity of Stock Tank Oil, °API at 60°F	35.6	
		If not sampled at Separator:		
B1	52-55	Pressure of Sample Point(s), psig	650 psig	650 psig
B1	56-59	Temperature of Sample Point(s) °F	119 °F	119 °F

Comments Sample Taken As Per Instructions During Second

DATA SHEET Box No. F-79

Collection of Pressurized Gas and/or Liquid Petroleum in Cylinders by the API RP 44 Recommended Practice for Sampling Petroleum Reservoir Fluids - 4.221, Method No. 2 and 4.2313, Method No. 3 (Modified)(Geochemistry Branch Method 67-1D). Rev. Apr. 1, 1970

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Send one copy separately to:
J. G. Erdman
Geochemistry Branch
Phillips Research Center
Bartlesville, Oklahoma 74003

Retain one copy for your records if desired.

Computer Key Card	Column		Gas	Liquid
-	-	Cylinder Number	G-92	L-54
A1	3-9	Sample Code Letters (to be assigned by Geochem. Br.)		
A1	11-13	Sample Type (to be assigned by Geochem. Br.)		
A1	14-36	Well Name (Lease, Block, Concession, Structure, etc.)	2/4-3X EKOFISK FIELD, NORTH SEA NORWAY	
A1	37-41	Well Number	2/4-3X	
A1	42-46	County or Area Name	NORTH SEA	
A4	11-78	Description	Sec.____ Twp.____ Rge.____	
A1	47-51	State or Country	NORWAY	
A1	52-78	Operator	Jim Stickley - Baker Oil Tools (UK)	
A2	30	Depth Reference Point (RKB, Sea Level, etc.)	322' ABOVE SEA FLOOR	
A2	37-41 43-47	Depth of Interval Sampled, Feet	Upper 10,260' to 10,375' 10,420' 4 SHOTS per foot	Lower 10,340' to 10,390' 10,500'
A2	49-52	Time Sampled, 24 Hour Clock	1230 Hrs.	1300 Hrs 7-29-70
A2	53-60	Month, Day and Year Sampled	7-29-70	7-29-70
-	-	By Whom Sampled	Jim Stickley	BOYL
A2	61-63	Geological Age of Formation Sampled		
A2	64-67	Lithology of Formation Tested		
A2	68-78	Name of Formation Sampled	DANIAN	
B1	11-51	Name of Sample Point(s)	8" METER RUN 7.625" BORE	
B1	11-51	Well Status	FLOWING RATE #1	
B1	52-55	Pressure of Separator(s), psig	1st 590 2nd ____ 3rd ____	
B1	56-59	Temperature of Separator(s), °F	1st 102° 2nd ____ 3rd ____	
B1	60-63	Pressure Put in Sample Cylinders, psig	1800	
B1	64-69	Gas-Oil Ratio, Mcf/Bbl	1115	
B1	70-74 75-78	Flow Rates, Units	715 MSCF/DAY	634 Bbl/DAY
-	-	Water Production (Give Units)	0	
		Average Temperature of Stock Tank Oil at Moment of Gauging Tank.	—	
		If no stock tank is used, state how and where oil rate was measured.	3" Flo-Co METER	
		Pressure Base for Gas Measurements	14.67	
		API Gravity of Stock Tank Oil, °API at 60°F	35.4	
		If not sampled at Separator:		
B1	52-55	Pressure of Sample Point(s), psig	590 psig	590 psig
B1	56-59	Temperature of Sample Point(s) °F	102 °F	102 °F

Comments

PHILLIPS PETROLEUM COMPANY

9th July, 1970.

Mr. P. W. Reynolds
Stavanger Office

Attention: Mr. J.K. Fetters

The following is to confirm the Ekofisk 2/4-3X test intervals as discussed by you and Jim Settle.

Perforating depths - I E S measurements

(1)	10740	-	10780
(2)	10650	-	10680
(3)	10606	-	10618
(4)	10410	-	10500
(5)	10260	-	10350

Plus combined test of intervals 4 and 5 as per 7 July Technical Committee Meeting.

T. J. Jobin

JFS/LPS

c.c. L.H. Hoelscher

JKF/GJ
SL-035-70

Stavanger, July 3, 1970

T.J. Jobin
LONDON OFFICE

NOR/D&P/Well 2/4-3X.

Attached is our recommended test procedure for well 2/4-3X.

The test intervals are based on the assumption that the productive interval in well 2/4-3X will be similar to well 2/4-2X except approximately 200' lower. Once the well has been logged it may be necessary to modify the attached procedure.

J.K. FETTERS

cc.: L.H. Hoelscher

Encl.

WELL 2/4-3X

TESTING PROCEDURE

DST No. 1

1. Perforate the interval 10970' to 11000' with 4 shots per foot. Make Schlumberger junk basket run after perforating operation has been completed.

2. GIH with test string and a full water cushion. Test tubing to 5000 psi. Set the test string so that the pressure recorders are located near the mid-point of the perforations (± 10985').

3. Open well for a 10 minutes Initial Flow Period.

4. Shut well in for 2½ hours.

5. Open well and measure flow into the B-J tanks. It is anticipated that the zone will flow at an approximate rate of 200 bwpd. If practical, the well will be left open until formation fluid reaches the surface which will require approximately 8 hours.

6. Shut well in for 10 hours.

7. Kill well and COOH with test string.

8. Set retainer at approximately ± 10950'.

9. Pump 50 sxs. cement below retainer.

DST No. 2

1. Perforate the interval 10770' to 10860' with 4 shots per foot. Make Schlumberger junk basket run after perforating.

2. GIH with test string and full water cushion. Test the tubing to 5000 psi. Set packer with pressure recorders located near mid-point of perforations (± 10815').

3. Open well for 10 minutes Initial Flow Period.

4. Shut in well for 2½ hours.

5. Open well and clean up at high flow rate. Once flow is clean enough, put through separator. Flow well for 10 hours at a rate of 750 bopd.

6. Shut in well for 10 hours.

7. Flow well for 10 hours at maximum rate possible through test equipment.

8. Kill well and COOH with test string.

9. Lay a cement plug across the perforations 10770' to 10860'. Set a bridge plug below 10710'.

DST No. 3

1. Perforate 10660' - 10690' with 4 shots per foot. Make Schlumberger junk basket run after perforating.

2. GIH with test string and full water cushion. Test the tubing to 5000 psi. Set packer with pressure recorders located near mid-point of perforations (± 10675').

3. Open well for 10 minutes Initial Flow Period.

4. Shut in well for 2½ hours.

5. Open well and clean up at high flow rate. Once flow is clean enough, put through separator. Flow well for 10 hours at a rate of 750 bopd.

6. Shut in well for 10 hours.

7. Flow well for 10 hours at maximum rate possible through test equipment.

8. Kill well and COOH with test string.

9. Lay a cement plug across the perforations 10660' - 10690'. Set a bridge plug on top of cement plug ± 10640.

DST No. 4

1. Perforate 10530' - 10620' with 4 shots per foot. Make Schlumberger junk basket run after perforating.

2. GIH with test string and full water cushion. Test the tubing to 5000 psi. Set packer with pressure recorders located near mid-point of perforations (± 10575');

3. Open well for 10 minutes Initial Flow Period.

4. Shut in well for 2½ hours.

5. Open well and clean up at high flow rate. Once flow is clean enough, put through separator. Flow well for 10 hours at a rate of 750 bopd.

6. Shut in well for 10 hours.

7. Flow well for 10 hours at maximum rate possible through test equipment.

8. Kill well and COOH with test string.

9. Lay a cement plug across the perforations 10530' - 10620'. Set a bridge plug on top of cement plug ± 10450.

DST N. 5

1. Perforate 10310' - 10400' with 4 shots per foot. Make Schlumberger junk basket run after perforating.

2. GIH with test string and full water cushion. Test the tubing to 5000 psi. Set packer with pressure recorder located near mud-point of perforations (± 10355').

3. Open well for 10 minutes Initial Flow Period.

4. Shut in well for 2½ hours.

5. Open well and clean up at high flow rate. Once flow is clean enough, put through separator and flow well for 10 hours at a rate of 750 bopd.

6. Shut in well for 10 hours.

7. Flow well for 10 hours at maximum rate possible through test equipment.

8. Kill well and COOH with test string.

9. Lay a 50 sxs. cement plug across the perforations.

10. Set a bridge plug on top of the cement.

OIL, WATER AND GAS SAMPLES

TO BE OBTAINED DURING TESTING OPERATIONS

No.	Description	DST 1	DST 2	DST 3	DST 4	DST 5
			STEP NUMBER			
1	55 gallon Oil Sample		7	7	7	7
4	10 liter Oil Sample(Yellow container)		5&7	5&7	5&7	5&7
1	PPCo. Hig pressure Companion Liquid bottle.		5&7	5&7	5&7	5&7
1	PPCo. Geochemical High Pressure Gas Bottle.		5&7	5&7	5&7	5&7
1	PPCo. Geochemical High Pressure Liquid Bottle.		5&7	5&7	5&7	5&7
1	Core Lab High Pressure Gas Bottle.		5&7	5&7	5&7	5&7
1	10 liter Water Sample (Plastic Container)	5	5&7	5&7	5&7	5&7
	Geochemical water Sample	5	5	5	5	5

Note: Be sure wellhead pressure, temperature and flow rates are stabilized before samples are taken.

TEMPORARY SUSPENSION OF WELL 2/4-3X

1. Set a 9 5/8" bridge plug at ± 5000'. Lay a cement plug from 5000' to 4850' (50 sacks).

2. Lay a cement plug from 1500' to 1000' (175 sacks).

3. Install a Corrosion Cap on the wellhead.

PHILLIPS PETROLEUM COMPANY

24th June, 1970.

Mr. J. K. Fetters
Stavanger.

Mr. C. L. Wyndham
London Office

It is requested that the following intervals be cored in Ekofisk 2/4-3X. The depths shown are from the 2/4-2X IES log. As nearly as possible, the coring points in 2/4-3X should be correlated to the 2/4-2X depths.

1. Upper Danian

   Coring point 2/4-2X depth: 10,470 KB
   Interval: 30'

2. Middle - Tight Section

   Coring point 2/4-2X depth: 10,620 KB
   Interval: 30'

3. Lower Danian

   Coring point 2/4-2X depth: 10,750 KB
   Interval: 30'

JKF -
Jerry - If you don't get 100% recovery don't worry about it - go back to drilling to the next coring pt.

T. J. Jobin

JFS/LPS

DATA SHEET
Geochemistry Branch Method 66-7C

SAMPLING OF NON-PRESSURIZED DRILL STEM TEST FLUIDS IN TEFLON BOTTLES

Box Number
T - 61

Enclose one copy in box with samples

Send one copy separately to:
J. G. Erdman
Geochemistry Branch
Phillips Research Center
Bartlesville, Oklahoma 74003

Retain one copy for your records if desired

Computer Key		SAMPLE LABEL			
		MUD (Before Test)	TOP (First from Formations)	MIDDLE	BOTTOM (Last from Formations)
B1 11-51	Name of Sample Point	B-J Tanks	—	—	—
A2 49-52	Time sample taken	1400 hrs	0200 hrs	1410 hrs	1425 hrs
B1 11-51	Bbl Fluid from Formation	—	20	30	60
A1 3-9	Sample Code Letters (assigned by Geochem Br)				
A1 11-13	Sample Type Code (assigned by Geochem Br)				

A1 14-41	Well name and number	Ekofisk 2/4-3x
A1 42-46	County or area name	North Sea - Ekofisk
A1 47-51	State or country	NORWAY
A1 52-78	Well operator	Phillips
A2 30	Depth reference e.g. RKB etc.	322' (from sea bed to RKB)
A2 37-41	Depth of formation sampled	Upper 10740 Lower 10770
A2 53-60	Month, day, year sampled	July 9, 1970 (mud), July 10, 70 (formation samples)
A2 52-78	By whom sampled	
A2 61-63	Geological age of formation sampled	
A2 64-67	Lithology of formation sampled	Limestone
- -	Type of Drilling Mud Used	Drill aid, sea water
- -	Kind and amount, if any, of crude, Diesel, Additive etc, put in Mud	3% Diesel, Soltex
- -	Material used as cushion	Sea Water
B1 11-51	Test Procedure or well status (e.g., Reverse circulation, Swabbing, Flowing, etc.)	Flowed & reverse

COMMENT: circulated.