GJ-697-72

Stavanger, October 27, 1972

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

ATTENTION: Petroleum Section

Dear Sirs,

Enclosed as the Reservoir Flid Studies 66r Hkofisk Wells 2/4-2X and 2/4-3X.

Very truly yours,

P.W. Reynolds District Manager

Encl.

cc: J.T. Clark

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.

Phillips Petroleum Company - Norway 2/4-3X Well

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,

P. L. Moses HS

Core Laboratories, Inc. Reservoir Fluid Analysis

P. L. Moses

Manager

PLM:HS:dl

7 cc. - Addressee

2 cc. - Mr. M. J. Fetkovich
Phillips Petroleum Company
Bartlesville, Oklahoma 74004

Petroleum Reservoir Engineering
DALLAS. TEXAS

			Page_	l_of	5
			File_		72442
Company_	Phillips Petroleum Co Norway	_ Date Sampled_	July 9,		
Well	2/4-3X	_ Province	North S		
		Country			
Field	Ekofisk	_Country	Norway	y	
	FORMATION CHA	RACTERISTICS			
Formation	Name	- 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 1965 - 196			
	t Well Completed	·			, 19
	Reservoir Pressure			PSIG @	
~	roduced Gas-Liquid Ratio				SCF/Bbl
	oduction Rate	·			Bbls/Day
	parator Pressure and Temperature	•		PSIG	° <b>F</b> .
	uid Gravity at 60° F.				° API
Datum					Ft. Subsea
- Country	WELL CHARA	CTERISTICS			
Elevation	WELL CHARA	CIERRITOS			Ft.
Total Dep	th				Ft.
Producing		1	0306-104	65	
<del></del>	ze and Depth	<del></del>			Ft.
-	v Potential	· ——		111. 00_	Ft _MMSCF/Day
=	ervoir Pressure	7	2120 1	DCIC @	10400 Ft.
			120	_	
Dat	·		270 0		, 19 0400 Ft.
	servoir Temperature	<u></u>	.70	r. @ <u>-</u> -	O±00 Ft.
	tus of Well				
Pre	ssure Gauge				
T	SAMPLING C	ONDITIONS			DOLO
–	Cubing Pressure			·········	PSIG
. •	Bottom Hole Pressure	·	-1 -		PSIG
	Separator Pressure		515		PSIG
Primary S	Separator Temperature	<u></u>	21		° F.
	Separator Pressure				PSIG
· -	Separator Temperature	· <u></u>		·	° <b>F.</b>
	k Tank Liquid Gravity		36.6	°	API @ 60° F.
_	Separator Gas Production Rate		9650	·	MSCF/Day
and the second second		65 PSIA			
Ten	mperature Base $\frac{60}{1}$	° F.			
Cor	inpressionity ractor (r <sub>nv</sub> )	041			
Gas	Glavity (Dabbiatory)	678			
Gas	s Gravity Factor $(\mathbf{F_g})$	2145			
Separat	or Liquid Production Rate @121° F.	~ F	3543.8		Bbls/Day
Primary S	Separator Gas/ Separator Liquid Ratio	<u> </u>	1129		SCF/Bbl
	or			· 	_Bbls/MMSCF
Core Labo	oratories, Inc., Engineer				
DEMADE	· ·				

Petroleum Reservoir Engineering
DALLAS, TEXAS

Page	2	of	5	
File	RFL 724	142		
Well	2/4-3X			

#### Hydrocarbon Analyses of Separator Products and Calculated Well Stream

	Separator Liquid	Separator (	Gas	Well Stream
Component	Mol Per Cent	Mol Per Cent	GPM	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.				0.859
Molecular weight	230	103		229
More weight				

Calculated separator gas gravity (air = 1.000) = 0.678Calculated gross heating value for separator gas = 1183 BTU per cubic foot of dry gas @ 14.65 psia and  $60^{\circ}$  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.

Petroleum Reservoir Engineering
DALLAS, TEXAS

Page-	<u>3</u> o	£	5
File_	RFL 7	2442	
Well_	2/4-32	ζ	

# VOLUMETRIC DATA OF Reservoir Fluid SAMPLE

1. Saturation pressure (bubble-point pressure)

5433 PSIG @ 270 °F.

2. Thermal expansion of saturated oil @ $\frac{7500}{V}$  PSI =  $\frac{V @ 270 \text{ °F}}{V @ 75 \text{ °F}} = \frac{1.13280}{1.13280}$ 

3. Compressibility of saturated oil @ reservoir temperature: Vol/Vol/PSI:

From 7500 PSI to 6500 PSI =  $17.98 \times 10^{-6}$ 

From 6500 PSI to 5900 PSI =  $21.90 \times 10^{-6}$ 

From 5900 PSI to 5433 PSI =  $23.77 \times 10^{-6}$ 

# Petroleum Reservoir Engineering DALLAS, TEXAS

Page	4 of5
File	RFL 72442
Well	2/4-3X

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

Pressure,	Relative
PSIG	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
5 <b>2</b> 35	1.0105
5052	1.0212
4732	1.0430
4340	1.0760
3932	1.1205
347 <b>2</b>	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

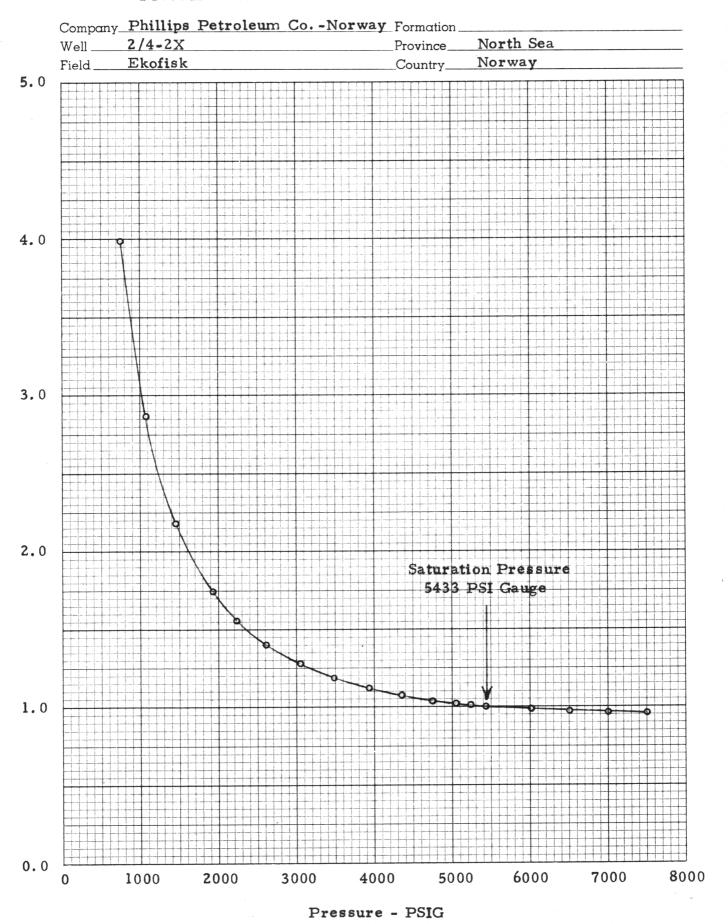
P. L. Moses

P. L. Moses Manager

# CORE LABORATORIES, INC. Petroleum Reservoir Engineering DALLAS, TEXAS

Page <u>5</u> of <u>5</u> File <u>RFL 72442</u>

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



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 diquid samples be recombined and a composite wellstream analysis and a bubble point be determined for each DET. One these data have been analyzed by Phillips, a more complete PVT analysis will be requested.

Att 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

Jas & liquid taken 2130-22/5 hrs. July 19,70

### CORE LABORATORIES, Inc.

# Petroleum Reservoir Engineering DALLAR, TEXAS

				of
01.44	0 /	Fi		-
Company Phillips	Petroleum Co.	Date Sam	pled Jul	ly 19,1970
Well $2/4-3x$		County_/	Vorth Le	<u> </u>
Field EKOFISK		State	NORW.	AY
	FORMATION CHARACT	TERISTICS		
Formation Name			A and	
Date First Well Comp		Ju	les 19	19,70
Original Reservoir P			# PSIG_	
Original Produced Ga Production Ra			1107	SCF/Bbl_ Bbls/Day
Separator Pre	ssure and Temperature	$=$ $\frac{7}{42}$	PSIG	97° F.
Liquid Gravit	y at 60° F.		34.2	OAPI
Datum				Ft.Subsea_
	WELL CHARACTER	RISTICS		
Elevation			89 (	PKB Ft.
Total Depth		PBTD	-10581'	Ft.
Producing Interval Tubing Size and Dept	h		60 - 10	
Open Flow Potential		21/8	In. to	0 /0472 Ft. MMSCF/Day
Last Reservoir Press	ure		PSIG a	
Date Reservoir Temp	0.77 + 11.70			, 19
Status of Well			5 ° F. a	
Pressure Gauge			en 10.000	
			<b>,</b>	
Flowing Tubing Press	SAMPLING CONDI	TTIONS	ه - د سو	
Flowing Bottom Hole	ure Pressure		556	PSIG PSIG
Primary Separator Pro	essure		420	PSIG
Primary Separator Ter Secondary Separator 1		***	97	o <sub>F</sub> .
Secondary Separator !				PSIG OF.
Field Stock Tank Liqu	uid Gravity	3 <	7.2 ° A	PI at 60° F.
Primary Separator Gas Pressure Base	<u> </u>		151	MSCF/Day
Temperature Base	$\frac{14.73}{6}$ PS	F.		
Compressibility				
(Fp.				
Gas Gravity (La) Ga Gas Gravity Fac		- National Property of the Control o		
Primary Liquid Product	tion Rate at 600 F.		1040	Bbls/Day
Primary Separator Gas	s/Liquid	Ratio	1107	SCF/Bbl
	or			Bbls/MMSCF

Core Laboratories, Inc., Engineer

REMARKS:

### Data Sheet for Recombination Samples

Company PHILLIPS	Formation	Danian
Well 2/4-3×	County /	Vorth Sea
Field EKOFISK		NORWAY
Gas-Oil Ratio Data:		
Primary separator pressure Secondary separator pressure Barometric pressure		
Primary separator gas production rate*		
Pressure base Temperature base Compressibility factor (Fpv) Assumed gas gravity Gas gravity factor 1.0273 0.663 1.2263		
Stock tank liquid production rate @ 60° F.	<del>* *</del>	
Stock tank liquid gravity @ 60° F.		34. 2 ° API
Primary separator gas/stock tank liquid ra	tio	
Reservoir pressure Reservoir temperature Completion interval		psig @ ft.  268.5° F. @ /0570ft.  /0560-/0580 ft.
* If gas production rate and proper factor ing basic data: static pressure, different run size, type and temperature.	s are not kn ntial pressu	nown, please list the follow are, orifice size and meter
** If liquid modustion was access		

- 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.

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

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

## DATA SHEET

Geochemistry Branch Method 67-10

Box Number

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

Retain one copy for your records if desired

Geochemistry Branch Phillips Research Center Computer Key Bartlesville, Oklahoma 7/4003 Card Column <u>Gas</u> Liquid G88 Cylinder Number 61 Al 3-9 Sample Code Letters (to be assigned by Geochem. Br.) Al 11-13 Sample Type (to be assigned by Geochem. Br.) Ekofisk 2/4 14-36 Well Name (Lease, block, concession, structure, etc.) 37-41 Well Number  $^{2}/_{4}$  - 3xAl 42-46 County or Area Name North Sea Al 47-51 State or Country NORWAY Al 52-78 Phillips Pet. Co. Operator Depth Reference Point (RKB, Sea level, etc) Ã2 30 89 RKB A2 37-41 Depth of Formation Sampled Upper 10560 Lower 10580 43-47 A2 49-52 Time Sampled, 24 hr. clock 2300 hrs 2230 hrs A2 53-60 Month, Day and Year Sampled July 19,70 By Whom Sampled A2 61-63 Geological Age of Formation Sampled 64-67 Lithology of Formation Sampled A2 68-78 Name of Formation Sampled Name of Sample Point(s) and Well Status Bl 11-51 DST 4. Bl Pressure of Sample Points, psig 52-55 Bl 56-59 Temperature of Sample Points, O F B1 60-63 Pressure put in sample cylinders, psig Bl 64-69 Gas/oil Ratio (Give Units) 339 cu.ft/ B1 70-74 Flow Rates (Give Units) 1.3296 MMCFD 1040 BOPD 75-78 Water Production (Give Units) to gund out Comments:



# PHILLIPS PETROLEUM COMPANY, Stavanger, Norway

1.	Lease Name, Well No. Ekofisk	2. Field, Concession,	Cour	try_/	Vonth Sea	, Norway	
2.	Name of Production Formation Danier	4. Perforated interval	(De	epth f	rom RKB) /	0560-1058	0
5.	Source of Gas Sample Separator	6. Source of Liquid Sa	mple	s_S	eparator		
	Separator Pressure 420 pay	8. Separator Temperatu	ire		98°F		
	Type and Working Pressure of Gas Bottle 25 psi	-PPC.	10.	Туре	of Liquid	Sample	
	Container Companion Separator kit 11. Date So						
	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						
L4.	Producing Rate At Time of Sampling:						
	a) Separator Gas, SCF /./329,600 SCFD						
	b) Hydrocarbon Liquid, STB /040 ROPD				·		
15.	Ratio of Separator Gas to Stock Tank Oil, Cubic	Feet/Barrel	3	2u. +	t/66/	·	
L6.	Request the Gas and/or Oil Analysis to Include the	he Following:					1
	a) An Analysis of Hydrocarbons Through and Inclu	uding C7+ Yes					
	b) H <sub>2</sub> S <u>(fes</u>						
	c) co <sub>2</sub> yes						
	d) N <sub>2</sub> <u>Yes</u>						
	e) He Yes						
	f) Recombined Formation Fluid Analysis 4	'es					
17.	Bottom Hole Pressure at	¹ RKB	•				
.8.	Bottom Hole Temperature 268.5 at /	0570 'RKB					

Petroleum Reservoir Engineering
DALLAS, TEXAS

	Pageof
	File
Comment PHILLIPS PETROLEUM DE	ata Samalad 7-23-70
Company PHILLIPS PETROLEUM Da Well EKOFISK 2/4-3X Co Field EKOFISK St	ounty NARTH SEA
Well FROFISK 214 SK	Alaguas
Field EKOFISE. St	ate /00/curr
FORMATION CHARA	_
Formation Name	PANIAN
Date First Well Completed	
Original Reservoir Pressure	PSIG @Ft.
Original Produced Gas-Liquid Ratio	SCF/Bbl
Production Rate	Bbls/Day
Separator Pressure and Temperature	PSIG° <b>F</b> .
Liquid Gravity at 60° F.	° API
Datum	Ft. Subsea
WELL CHARACTE	
Elevation	<i>FCB</i> 89 Ft.
Total Depth	
Producing Interval	10420 - 10500 75 Ft.
Tubing Size and Depth	2-7/8 0D In. to 104 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 5 A SECOND
Pressure Gauge	
SAMPLING CONI	DITIONS
Flowing Tubing Pressure	PSIG
Flowing Bottom Hole Pressure	PSIG
Primary Separator Pressure	<u>610</u> PSIG
Primary Separator Temperature	<u>/02</u> ° F.
Secondary Separator Pressure	PSIG
Secondary Separator Temperature	° F.
Field Stock Tank Liquid Gravity	° API @ 60° F.
Primary Separator Gas Production Rate	2.744 M MSCF/Day
Pressure Base 14.7	<sup>3</sup> PSIA
Temperature Base 60	° F.
Compressibility Factor $(F_{nv})$	
Gas Gravity (Laboratory)	
Gas Gravity (Laboratory)  Gas Gravity Factor (F <sub>g</sub> )  // 2-2	263
(-g)	27/9 Bbls/Day
Liquid Production Rate @ 60° F.	
Primary Separator Gas/Liquid Ratio or	Bbls/MMSCF
Core Laboratories, Inc., Engineer	
REMARKS:	

# Data Sheet for Recombination Samples

a 0.			
Well <u>FROFISK</u> 2/4-3x	Formation		
Well FROFISK 2/4-3x	County	MURTH SE	<del>-</del>
Field EKOFISK	State	HURWAY	
Gas-Oil Ratio Data:		/	
Primary separator pressure Secondary separator pressure Barometric pressure		<b>6/0</b> psi	g @ <u>/02</u> ° F.
Primary separator gas production rate*		2,744	MMSCF/day
Pressure base Temperature base Compressibility factor (F <sub>pv</sub> ) Assumed gas gravity Gas gravity factor  14.73 psia 60 F. 60 F. 60 F.	:		
Stock tank liquid production rate @ 60° F.*	· <b>*</b>	2719	bbls./day
Stock tank liquid gravity @ 60° F.	•	35,3	° API
Primary separator gas/stock tank liquid rat	io	1009	SCF/bbl.
Reservoir pressure Reservoir temperature Completion interval		-	g @ ft. · @ 10460ft. (0500 ft.
* If gas production rate and proper factors ing basic data: static pressure, differen run size, type and temperature.	are not ki tial pressi	noun mlongo i	
** If liquid production measurements are mad please indicate. If stock tank liquid vo correct temperature.	e at some p lume is not	point other th t at 60° F., p	an stock tank, lease give
On the reverse side of this page, please drindicating points of gas and liquid measure fill out well summary page as when taking s	ments and r	nainte of comm	ucing system ling. Also
NOTE: For recombination studies, gas and l primary separator.  Commences GAS 4 LIQUID SAM SECOND FLOW TAKEN 1830-190	ne-	· ••	
_		70	

Desired analysis: RECOMBINATION OF SAMPLES TO DEFERMINE
FUF & VISCOSITY

Petroleum Reservoir Engineering
DALLAS, TEXAS

	Pageof
	File
$\rho$	7 22 H
Company [HILLIPS   ETROLEUM	Date Sampled /-22-/0
Well EKOFISK 2/4-3X	County North SEA
Company PHILLIPS PETROLEUM  Well EKOFISK 2/4-3X  Field EKOFISK	State Norway
FORMATION CHA	
Formation Name	DANIAN
Date First Well Completed	July 22 , 1970
Original Reservoir Pressure	PSIG @Ft.
Original Produced Gas-Liquid Ratio	SCF/Bbl
Production Rate	667Bbls/Day
Separator Pressure and Temperature	<u>550</u> PSIG <u>96</u> ° F.
Liquid Gravity at 60° F.	36.2 ° API
Datum	Ft. Subsea
WELL CHARA	CTERISTICS
Elevation	
Total Depth	
Producing Interval	/0420-10500 45 Ft.
Tubing Size and Depth	2-7/8 0D In. to $104$ Ft.
Open Flow Potential	MMSCF/Day
Last Reservoir Pressure	PSIG @Ft.
Date	7-22-70
Reservoir Temperature	266 ° F. @ 10460 Ft.
Status of Well	FLOWING DET HOSA FIRST FL
Pressure Gauge	
SAMPLING C	ONDITIONS
Flowing Tubing Pressure	<u> 35.05</u> PSIG
Flowing Bottom Hole Pressure	PSIG
Primary Separator Pressure	
Primary Separator Temperature	
Secondary Separator Pressure	PSIG
Secondary Separator Temperature	° F.
Field Stock Tank Liquid Gravity	<u>36.2</u> ° API @ 60° F. 76 & MSCF/Day
Primary Separator Gas Production Rate	MSCF/Day  708 MSCF/Day
Troubart Band	77 PSIA 60 ∘ F
Temperature Base	035/
Gas Gravity (Laboratory)	. <b>665</b> 2263
Gas Gravity Factor (Fg)	667 Bbls/Day
Liquid Production Rate @ 60° F.	
Primary Separator Gas/Liquid Ratio	Bbls/MMSCF
Core Laboratories, Inc., Engineer	
REMARKS:	
COMPANION GAS AND LIG	OUID SAMPLES FROM DST NO 5A
MRST FROW BUTH 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 EKOFISIK	State	MORWAY
Gas-Oil Ratio Data:		<b>/</b>
Primary separator pressure Secondary separator pressure Barometric pressure		550 psig @ 96 ° F. psig @ F.
Primary separator gas production rate*		768 MSCF/day
Pressure base Temperature base Compressibility factor (F <sub>pv</sub> ) Assumed gas gravity Gas gravity factor  1.2263		
Stock tank liquid production rate @ 60° F.*	*	669 6 bbls./day
Stock tank liquid gravity @ 60° F.		36.2 bbls./day
Primary separator gas/stock tank liquid rat	io	//5/ SCF/bbl.
Reservoir pressure Reservoir temperature Completion interval		psig @ ft.  266 ° F. @ 10460ft.  10420 ~ 10500 ft.
* If gas production rate and proper factors	are not kno	Wn nleace list the fall

- \* 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  $60^{\circ}$  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.

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

Desired analysis: RECOMBINATION OF SAMPLES TO DEFERMINE FUE AND VISCOSITY

# Geochemistry Branchod 67-10

Box Number

Collection of Pressurized Gas and/or Liquid Petroleum in Cylinders Enclose one copy Send one copy separately to: Retain one copy for in box with samples J. G. Erdman your records if desired Geochemistry Branch Phillips Research Center Computer Key Bartlesville, Oklahoma 74003 Card Column Gas Liquid Cylinder Number Al 3-9 Sample Code Letters (to be assigned by Geochem. Br.) Al 11-13 Sample Type (to be assigned by Geochem. Br.) Al 14-36 Well Name (Lease, block, concession, structure, etc.) 37-41 Well Number Al 42-46 County or Area Name A7 47-51 State or Country Al 52-78 Operator Ã2 30 Depth Reference Point (RKB, Sea level, etc) A2 37-41 Depth of Formation Sampled \_Lower /0500 43-47 49-52 **A2** Time Sampled, 24 hr. clock A2 53-60 Month, Day and Year Sampled By Whom Sampled A2 61-63 Geological Age of Formation Sampled 64-67 Lithology of Formation Sampled A2 68-78 Name of Formation Sampled Bl Name of Sample Point(s) and Well Status 11-51 FLOW NO 1 B1 Pressure of Sample Points, psig 52-55 550 *55*0 Bl 56-59 Temperature of Sample Points, O F Bl Pressure put in sample cylinders, psig 60-63 Bl 64-69 Gas/oil Ratio (Give Units) Bl70-74 Flow Rates (Give Units) 75-78 Water Production (Give Units)

Collec\*

Comments:



1.	Lease Name, Well No. EKOFISK 2/4-3X		, ,
•	Name of Production Formation Davian	_ 4. Perforated interval (Depth	from RKB) <u>/04/20 - 500</u>
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 Ps	10. Type	e of Liquid Sample
	Container HOKE D30 SAMAE KT I-22 11. Date	Sampled $7-22-70$ 12. Name	e of Person or Persons
	Taking Sample J. STRIKLAND		
13.	Shipping Information as Follows:		
	a) Name of Carrier		
	b) Air or Ocean Bill of Lading	- SAMPLES FROM	DST No SA FIRST
	c) Date Shipped	- FLOW TAKEN A	- 1915 do.
	d) Routing	——————————————————————————————————————	1 1013 1123
	e) Shipment Number	-	
	Traducing Rate At Time of Sampling:		
	a) Separator Gas, SET 0,746 MMCFD		
	b) Hydrocarbon Liquid, STB 653 BOPO 3	5.4°API	
15.	Ratio of Separator Gas to Stock Tank Oil, Cubic	Feet/Barrel	
16.	Request the Gas and/or Oil Analysis to Include		
	a) An Analysis of Hydrocarbons Through and Inc	luding C <sub>7</sub> +	
		/	
	b) H <sub>2</sub> S <u>yes</u> c) CO <sub>2</sub> <u>yes</u>		
	d) N <sub>2</sub> <u>yes</u>		
	e) H <sub>e</sub> <u>yes</u>		
	f) Recombined Formation Fluid Analysis	Annual Control of the	
<u>7</u> .	Bottom Hole Pressureat	'RKB	
18.	Bottom Hole Temperature 266 at	10460 'RKB	

# DATA SHEET

Box No. <u>F83</u>

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

Comments

Send one copy separately to: J. G. Erdman Geochemistry Branch Phillips Research Center Bartlesville, Oklahoma 74003 Retain one copy for your records if desired.

	,			
	ter Key		Co-	Tionid
Card	Column		Gas	<u>liquid</u> 251
-	<del>-</del>	Cylinder Number	966	
Al	3-9	Sample Code Letters (to be assigned by Geochem. Br.)		
Al	11-13	Sample Type (to be assigned by Geochem. Br.)		
Al	14-36	Well Name (Lease, Block, Concession, Structure, etc.)	EKOFISK.	2/4-3x
Al.	37-41	Well Number		2/4-3x
Al	42-46	County or Area Name	MORTH SE	<u></u>
A4	11-78	Description	SecTwp.	Rge
Al	47-51	State or Country	MORWAY	
Al	52-78	Operator	PHILLIPS F	ETROLEUM CO
A2	30	Depth Reference Point (RKB, Sea Level, etc.)	89 RKI	<u>3'</u>
A2	37-41 43-47	Depth of Interval Sampled, Feet Upper	10420 L	wer <u>/0500</u>
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	1. 5TRI	CLAND & BASIM ZIAKA
A2	61-63	Geological Age of Formation Sampled	/	
A2	64-67	Lithology of Formation Tested	LIMESTO	NE
A2	68-78	Name of Formation Sampled	DANIAN	
B1	11-51	Name of Sample Point(s)	TES, SE	PARA TOR
Bl	11-51	Well Status DST No 5 A SECOND	FLOW	
B1	52-55	Pressure of Separator(s), psig 1st 60	<u>ට</u> 2nd	3rd
В1	<b>56-</b> 59	Temperature of Separator(s), °F lst 100	2nd	3rd
Bl	60-63	Pressure Put in Sample Cylinders, psig	1000	600
B1	64-69	Gas-Oil Ratio, Mcf/Bbl	0.993	0.995
B1	70-74 75-78	Flow Rates, Units	2.747 M SCF/	Hr 2160 Bb1/F
-	<del>-</del>	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:		
Bl	52-55	Pressure of Sample Point(s), psig		
Bl	56-59	Temperature of Sample Point(s) °F		

# PHILLIPS PETROLEUM COMPANY, Stavanger, Norway

1.	Lease Name, Well No. EKOFISK 2/4-3K		Country Exagisk NORTH SEA NORMY
	Name of Production Formation DANIAN		1 (Depth from RKB) /1420 - 500
5.	Source of Gas Sample TEST SEPARATOR DST 5A		amples Test SEPARATOR DST 5 A
	Separator Pressure 600 PSIG	8. Separator Temperat	
	Type and Working Pressure of Gas Bottle 25 Psic.		10. Type of Liquid Sample
8	Container Hove 0-30 Samme Ky I-22 11. Date So	ampled <u>7-23-70</u>	12. Name of Person or Persons
	Taking Sample J. STRIKLAND		
3.	Shipping Information as Follows:		
	a) Name of Carrier		
	b) Air or Ocean Bill of Lading	SAMPLES	FROM DST 11. 50 SECOND
	c) Date Shipped	FLOW TH	FROM DST No 519 SECOND
	d) Routing	•	1645 HAS
	e) Shipment Number		
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	
€.	Request the Gas and/or Oil Analysis to Include to		
	a) An Analysis of Hydrocarbons Through and Incl		
	b) H <sub>2</sub> S //Ko	$\mathcal{O}$	
	c) co <sub>2</sub> (le		
	d) N <sub>2</sub> iles		
	e) H		
	f) Recombined Formation Fluid Analysis Us		
***	Bottom Hole Pressureat	¹ RKB	
	Bottom Hole Temperature 266 at	10460 'RKB	
	-		

Petroleum Reservoir Engineering DALLAS, TEXAS

	File
Company Physics PETEN EUM	
Well Fig. 5.cm 2/4-3X	Date Sampled Joly 27, 1970  County North SEA
Well Ercorisk 214 Dr	County 1/22 212
Field EKOFISK	State Morecony
	HARACTERISTICS
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.	° API
Datum	Ft. Subsea
WELL CHA	RACTERISTICS
Elevation	
Total Depth	Ft
Producing Interval	10260 - 10340 Ft
Tubing Size and Depth	2 7/8 In. to /3298 Ft.
Open Flow Potential	MMSCF/Day
Last Reservoir Pressure	PSIG @Ft
Date	July 27 , 1970
Reservoir Temperature	July 27, 1970 263 ° F.@ 10300 Ft
Status of Well	Flowing OST 7.
Pressure Gauge	Custer 10,000 pm, 72 hr
<del>-</del>	CONDITIONS
Flowing Tubing Pressure	340PSIG
Flowing Bottom Hole Pressure	PSIG
Primary Separator Pressure	250PSIG
Primary Separator Temperature	96° F
Secondary Separator Pressure	PSIC
Secondary Separator Temperature	° F
Field Stock Tank Liquid Gravity	° API @ 60° F
Primary Separator Gas Production Rate	939MSCF/Day
Pressure Base	/4.73 PSIA
Temperature Base	<u>60</u> ∘ <b>F</b> .
Compressibility Factor $(F_{nv})$	1.0170
Gas Gravity (Laboratory)	0.665
Gas Gravity Factor (Fg)	1.2263
Primary Liquid Production Rate @ 60° F.	Bbls/Day
Primary Separator Gas/Liquid R	atio
	orBbls/MMSCI
Core Laboratories, Inc., Engineer	
REMARKS:	

# Data Sheet for Recombination Samples

Company PHILLIPS PETROLEUM	Formation_	DANIAN
Well FROFISK 2/4-3X	County	HORTH SEA
Field <u>EKOFISK</u>	State	HORTH SEA HORWAY
Gas-Oil Ratio Data:		/
Primary separator pressure Secondary separator pressure Barometric pressure		270 psig @ 96 ° F. psig @ ° F.
Primary separator gas production rate*		939 MSCF/day
Pressure base Temperature base Compressibility factor (F <sub>pv</sub> ) Assumed gas gravity Gas gravity factor  (F <sub>pv</sub> ) (0.665) (1.2263)		
Stock tank liquid production rate @ 60° F.*	<del>( X</del>	
Stock tank liquid gravity @ 60° F.		35,8 ° API
Primary separator gas/stock tank liquid rat	io	SCF/bbl.
Reservoir pressure Reservoir temperature Completion interval		psig @ ft.  O F. @ ft.  /0260 - /0340 ft.
* If gas production rate and proper factors ing basic data: static pressure, different run size, type and temperature.	are not kno tial pressure	wn, please list the follow e, orifice size and meter
** If liquid production measurements are mad please indicate. If stock tank liquid vo correct temperature.	e at some pos clume is not a	int other than stock tank, at 60° F., please give
On the reverse side of this page, please drindicating points of gas and liquid measure fill out well summary page as when taking s	ments and no-	inte of compliant Alas

Desired analysis: Recombination of Samples Vedetermine FVFl
Viscovity

For recombination studies, gas and liquid samples must be taken from

NOTE:

primary separator.



# PHILLIPS PETROLEUM COMPANY, Stavanger, Norway

	- 1 11 Companies Country 1/10TH SEA NORMAY
1.	Lease Name, Well No. <u>EKOFISK 2/4-3X</u> 2. Field, Concession, Country North SEA Norway
2.	Name of Production Formation Davian 4. Perforated interval (Depth from RKB) /0260-/0340
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 PPC. 25 Psi Boxes Nos 45 4 25 10. Type of Liquid Sample
	Container Hore 100 cc 14THo 1 11. Date Sampled lay 27,70 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 Duprate Companion Gas & Liquid Samples
	c) Date Shipped From DST No. 7 TAKEN @ 0730 HRS
	d) Routing
	e) Shipment Number
14.	Producing Rate At Time of Sampling:
	a) Separator Gas, SCF 0.942 M <sup>2</sup> CFO
	b) Hydrocarbon Liquid, STB 677 BOPO
15.	Ratio of Separator Gas to Stock Tank Oil, Cubic Feet/Barrel /397
16.	Request the Gas and/or Oil Analysis to Include the Following:
2)	a) An Analysis of Hydrocarbons Through and Including C7+
	b) H <sub>2</sub> S
	c) co <sub>2</sub>
	d) N <sub>2</sub>
	e) H <sub>e</sub>
	f) Recombined Formation Fluid Analysis
17.	Bottom Hole Pressureat 'RKB
1.8.	Bottom Hole Temperature Z63° F at 10300 'RKB

# DATA SHEET

Box No. <u>F84</u>

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.

<i></i>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		
Comput Card	ter Key Column		Gas Liquid
-	-	Cylinder Number	G105 L74
Al	3-9	Sample Code Letters (to be assigned by Geochem. Br.)	
Al	11-13	Sample Type (to be assigned by Geochem. Br.)	
Al	14-36	Well Name (Lease, Block, Concession, Structure, etc.)	FROFISK 2/4-3X
Al .	37-41	Well Number	2/4-3x
Al	42-46	County or Area Name	NORTH SEA
A.4	11-78	Description	Sec Twp Rge
Al	47-51	State or Country	HURMAY
Al	52-78	Operator	PANCIPS PET Co
A2	30	Depth Reference Point (RKB, Sea Level, etc.)	PKP 89'
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	Paucin
A2	64-67	Lithology of Formation Tested	- LIME JONE
_A2	68-78	Name of Formation Sampled	Dansal
81	11-51	Name of Sample Point(s)	TELT SEPARATOR
B1	11-51	Well Status Flowing on UST AL. 7	
B1	52-55	rressure of Separator(s), parg 18t/	0 2nd 3rd
Bl	<b>56-</b> 59	Temperature of Separator(s), °F 1st 93	
Bl	60-63	Pressure Put in Sample Cylinders, psig	270 270
Bl	64-69	Gas-Oil Ratio, Mcf/Bbl	/39/ 1.39/
B1	70-74 75-78	Flow Rates, Units	0.942 M SCF/Fr 6/1 Bb
-	_	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:	
Вì	52-55	Pressure of Sample Point(s). psig	

# Petroleum Reservoir Engineering DALLAR, TEXAS

			I	Page	of
			E	rile	
Company_	PHILLIPS		_Date Sa	ampled Jul	4 29, 70
Well	2/4-3x		_County_	North -	y 29, 70 fea
Field	EKOFISK		_State	NORWI	94
	FORMA	TION CHARACTER	RISTICS		
Formation	n Name			An . i	
Date Firs	st Well Completed			July 29	19,70
	Reservoir Pressure			PSIG	at Ft
	Produced Gas-Liquid	Ratio			SCF/Bbl_
	roduction Rage eparator Pressure and	Tomporature	· -	e - DCTC	Bbls/Day
	iquid Gravity at 60°			35.4	104 ° F
Datum		T .		3314	Ft.Subsea
				9-10-	
	WE	LL CHARACTERIS	STICS		
Elevation	n			89' K	ZKB Ft.
Total Der			-	0//	Ft
Producing	g Interval		10260	-10340,10375-90	10420-10500 Ft.
	ize and Depth				10220 Ft.
	w Potential ervoir Pressure			2020	MMSCF/Day
Dat				PSIG a	tFt.
Res	servoir Temperature		26	6 ° F. a	
	atus of Well		F	lowing DST	and the same of th
Pre	essure Gauge		Cus	Ver 16,000 p	ai, 72 hrs
	SA	MPLING CONDITI	ONS		
Flowing 7	Tubing Pressure			3510	PSIC
Flowing E	Bottom Hole Pressure				PSIC
	Separator Pressure			600	PSIC
	Separator Temperature V Separator Pressure			104	o <sub>F</sub> .
	Separator Temperatu	re	388 <u></u>		PSIC OF.
Field Sto	ock Tank Liquid Gravi	ty	3	5.4 ° A	PI at 60° F
Primary S	Separator Gas Product	ion Rate		717	MSCF/Day
	essure Base	14.67 PSIA			
	mperature Base mpressibility Factor	60 °F.			
CON	$(F_{pv})$	1.6361			
	Gravity (Laboratory)	0.665			
Ga Gas	Gravity Factor (Fg)	1.2263			
Li Daim	iquid Production Rate			653	Bbls/Day
Primary S	Separator Gas/	Liquid Ra	tio	1107	SCF/Bbl
		or			Bbls/MMSCF
Core Taho	ratories Inc Frai	0000			

Core Laboratories, Inc., Engineer

REMARKS: Samples taken @ 1205-1230 hrs

# Data Sheet for Recombination Samples

Company PHILLIPS	Formation Danian
Well 2/4-3×	County North See
Field EKOFISK	State NORWAY
Gas-Oil Ratio Data:	
Primary separator pressure Secondary separator pressure Barometric pressure	600 psig @ 104° F. psig @ 0 F.
Primary separator gas production rate*	7/2 MSCF/day
Pressure base Temperature base Compressibility factor (F <sub>pv</sub> ) Assumed gas gravity Gas gravity factor  14.73 psia 60 ° F. 1.0361 0.665 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 rat	io <u>/093</u> SCF/bbl.
Reservoir pressure Reservoir temperature Completion interval	psig @ ft. <u>266</u> F. @ <u>10460</u> ft. 102 <u>60-10340,10375-90</u> , ft.
* If gas production rate and proper factors ing basic data: static pressure, differen run size, type and temperature.	are not known, please list the follow- tial pressure, orifice size and meter
** If liquid production measurements are mad please indicate. If stock tank liquid vo correct temperature.	e at some point other than stock tank, lume is not at 60° F., please give
On the reverse side of this page, please drindicating points of gas and liquid measurefill out well summary page as when taking s	ments and points of sampling Also
NOTE: For recombination studies, gas and 1 primary separator.	iquid samples must be taken from

Desired analysis: Recombine Samples, detimene FVF & Viscourty

# Petroleum Reservoir Engineering DALLAR, TEXAS

	Pageof
	File
Company PHILLIPS	Date Sampled July 30,1970
Well 2/4-3x	County North Sea
Field EKOFISK	State NORWAY
FORMATION CHAI	
Formation Name	n n
Date First Well Completed	<u>July</u> 30 19,70
Original Reservoir Pressure	PSIG at Ft.
Original Produced Gas-Liquid Ratio	SCF/Bbl
Production Rage	Bbls/Dav
Separator Pressure and Temperat	ture 660 PSIG 123 ° F
Liquid Gravity at 60° F.	
Datum	Ft.Subsea_
WELL CHARAC	· · · · · · · · · · · · · · · · · · ·
Elevation	89 RKB Ft.
Total Depth	Ft.
Producing Interval	10260-10340, 10375-90, 16426-10500
Tubing Size and Depth	27/8 In. to 10220 Ft.
Open Flow Potential	MMSCF/Day
Last Reservoir Pressure Date	PSIG at Ft.
Reservoir Temperature	July 30 , 1970 266 ° F. at 10460 Ft.
Status of Well	
Pressure Gauge	Flowing DST 8 Custer 10,000 psi 72 hrs
SAMPLING CO	
Flowing Tubing Pressure	
Flowing Bottom Hole Pressure	PSIC
Primary Separator Pressure Primary Separator Temperature	660 PSIO
Secondary Separator Pressure	/23 °F.
Secondary Separator Temperature	PSIC OF
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	o <sub>F</sub> .
Compressibility Factor	
(F <sub>py</sub> ) 1,034	
Gas Gravity (Laboratory)  Ga Gas Gravity Factor (F.)  1.2.2.6	
Ga Gas Gravity Factor(F <sub>g</sub> )  Liquid Production Rate at 600 F	
or	iid Ratio 1023 SCF/Bbl Bbls/MMSCF
Core Laboratories, Inc., Engineer	
DEMARKS. Samule Taken 0800-0895	- his.

#### Data Sheet for Recombination Samples

Company PHILLIPS	$Formation_{\underline{}}$	Dania
Well 2/4-3x	County	North Sca
Field EKOFISK	State	NORWAY
Gas-Oil Ratio Data:		
Primary separator pressure Secondary separator pressure Barometric pressure		
Primary separator gas production rate*		4.610 MMSCF/day
Pressure base Temperature base Compressibility factor (Fpv) Assumed gas gravity Gas gravity factor  1.2263		
Stock tank liquid production rate @ 60° F.	<del>(**</del>	37.79 bbls./day
Stock tank liquid gravity @ 60° F.	•	35.6 ° API
Primary separator gas/stock tank liquid rat	cio	
Reservoir pressure Reservoir temperature Completion interval		psig @ ft. <b>266</b> F. @ 10460 ft.  10260-10340,10375-90, ft.
* If gas production rate and proper factors ing basic data: static pressure, different run size, type and temperature.	s are not kr ntial pressu	nown, please list the follow-
** If liquid production measurements are made please indicate. If stock tank liquid voccorrect temperature.	le at some polume is not	point other than stock tank, at 60° F., please give

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 a determine FVF & Viscourly.



## PHILLIPS PETROLEUM COMPANY, Stavanger, Norway

	. Lease Name, Well No. <u>Ekofisk</u>	2. Field, Con	cession,	Country	North S	ea, Norw	ay
•	. Name of Production Formation Danian	4. Perforated	linterval	. (Depth	from RKB)		
	Source of Gas Sample Separator	6. Source of	Liquid Sa	mples_	Separat	10420	- 10500
· ·	Separator Pressure 660 pai	8. Separator	Temperatu	ıre	119	·/=	<u> </u>
¥	Type and Working Pressure of Gas Bottle 25 pai -	PPG.		10. Typ	e of Liqui	d Sample	
	Container Liquid - Companion Separator 11. Date San				e of Perso	n or Persor	ıs
	Taking Sample J. Grickland						
•	. Shipping Information as Follows:					·	
	a) Name of Carrier					•	
	b) Air or Ocean Bill of Lading						
	c) Date Shipped						
	d) Routing						
	e) Shipment Number						
	. Producing Rate At Trans 11 Sampling:						
	a) Separator Community 3.966 MMCFO						
	b) Hydrocarbon in this sid 3718 BOPD				A. 1		
et	Ratio of Separator Gas to Stock Tank Oil, Cubic Fe	eet/Barrel	106	<u>,7 c</u>	1.44./bb	ــــــــــــــــــــــــــــــــــــــ	
_	Request the Gas and/or Oil Analysis to Include the	e Following:					
	a) An Analysis of Hydrocarbons Through and Includ	ding C <sub>7</sub> +	Yes				
	b) H <sub>2</sub> S		U				
	c) co <sub>2</sub>	•					
	d) $N_2$						
	e) H <sub>e</sub>						
	f) Recombined Formation Fluid Analysis						
	Bottom Hole Pressureat		'RKB				
	ottom Hole Temperature 266 F at	10460	'RKB				
	and the state of the control of the		ay and a second second second				机煮煮到 医皮肤病毒

Lease Name, Well No. <u>Ekofisk</u>	2. Field, Concession, Country North Ser, Norway
Name of Production Formation Danian	4. Perforated interval (Depth from RKB) 10260-102340, 10375
Source of Gas Sample Separator	6. Source of Liquid Samples Separator 10420 - 10300
Separator Pressure 600 psi	8. Separator Temperature /04 °F
Type and Working Pressure of Gas Bottle 🤰	5 pai - PPC . 10. Type of Liquid Sample
Container Liquid - Commanion Scho. Vir 11.	Date Sampled July 29, 1970 12. Name of Person or Persons
Taking Sample J. Strictland	
Shipping Information as Follows:	
a) Name of Carrier	
b) Air or Ocean Bill of Lading	
c) Date Shipped	
d) Routing	
e) Shipment Number	
Producing Rate At The Life Eampling:	
a) Sepalatoria 715 M	CFD_
b) Hydrodarbox 1	
Ratio of Separator Gas to Stock Tank Oil,	
Request the Gas and/or Oil Analysis to Inc	
a) An Analysis of Hydrocarbons Through an	
b) H <sub>2</sub> S	- /
c) CO <sub>2</sub>	
0, 002	

### DATA SHEET

Collection of Fressurized 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.

Compu	ter Key		
Card	Column		Gas <u>Liquid</u>
-		Cylinder Number	69A-2095 1-167
Al	3-9	Sample Code Letters (to be assigned by Geochem. Br.)	
Al	11-13	Sample Type (to be assigned by Geochem. Br.)	
Al	14-36	Well Name (Lease, Block, Concession, Structure, etc.)	EKOFISK
Al	37-41	Well Number	2/4 - 3X
Al	42-46	County or Area Name	NORTH SEA
A4	11-78	Description	Sec Twp Rge
Al	47-51	State or Country	NORWAY
Al	52-78	Operator	PHILLIPS PETROLEUM CO. (NORWBY)
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 340
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	Dim Strukland
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" Merea Run & 2" Domp Live
B1	11-51	Well Status Well Flowing on Rom	re #2
B1	52-55	Pressure of Separator(s), psig lst 6:	50 2nd 3rd
B1	<b>56-</b> 59	Temperature of Separator(s), oF lst _//	19 2nd 3rd
B1	60-63	Pressure Put in Sample Cylinders, psig	25 PSi6 650
B <b>1</b>	64-69	Gas-Oil Ratio, Mcf/Bbl	1067/1 1067/1
B1	70-74 75-78	Flow Rates, Units	3.966 MMSCF/ 3718 Bb]
-	-	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.	2-3" Flo-Co METERS
		Pressure Base for Gas Measurements	14.67
		API Gravity of Stock Tank Oil, °API at 60°I	
	If not	sampled at Separator:	
B1	52-55	Pressure of Sample Point(s), psig	650 pai 650 nous
B1	56-59	Temperature of Sample Point(s) °F	119°F 119°F
Commen	ite S	ande Tous Os Par Temanine	Dua'va Coa

DATA SHEET

Box No. <u>1--79</u>

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

Comments

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

Retain one copy for your records if desired.

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	ter Key		Gaa	Liquid
Card	Column	Culindan Number	Gas G-92	L - 54
	-	Cylinder Number	<u> </u>	
Al	3-9	Sample Code Letters (to be assigned by Geochem. Br.)		
Al	11-13	Sample Type (to be assigned by Geochem. Br.)		
Al	14-36	Well Name (Lease, Block, Concession, Structure, etc.)	2/4-3X E NOCWAY	KOFISK FIELD NOETHS
Al	37-41	Well Number	2/4-3x	/
Al	42-46	County or Area Name	NORTH SE	<i>B</i>
D <sub>A4</sub>	11-78	Description	SecTwp.	Rge
Al	47-51	State or Country	Noxway	
Al	52-78	Operator	Jim Stulling	-BAKEROIT Tods (UK)
A2	30	Depth Reference Point (RKB, Sea Level, etc.)	322' ABOU	SEA Floor
A2	37-41 43-47	Depth of Interval Sampled, Feet Upper	10-260 Lot	wer 10,390;
A2	49-52	Time Sampled, 24 Hour Clock	4 SHOTS PER for	1300 Hrs 7-29-70
A2	53-60	Month, Day and Year Sampled	7-29-70	7-29-70
_	-	By Whom Sampled	I'm Strikland	BUKL
A2	61-63	Geological Age of Formation Sampled	<del>/</del>	
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 ROD	7.625" Bore
Bl	11-51	_	-lowing Rase	
Bl	52-55	Pressure of Separator(s), psig lst 59		3rd
B <b>1</b> .	56-59	Temperature of Separator(s), °F lst 10		3rd
B1	60-63	Pressure Put in Sample Cylinders, psig	1800	
B <b>1</b>	64-69	Gas-Oil Ratio, Mcf/Bbl	1115	
B1	70-74 75-78	Flow Rates, Units	715 MSCF/	€ 634 Bb1/#
-	-	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.	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:		
Bl	52-55	Pressure of Sample Point(s), psig	590 pair	590 pay
B1	56-59	Temperature of Sample Point(s) °F	100 F	102°F



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
ÌχŚ	10606	_	10618

(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. John

# JFS/LPS

c.c. L.H. Hoelscher

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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.

#### 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').
- 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 midpoint 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.
- 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 midpoint 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 ( $\pm$  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 N	UMBER		
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					
1	Gas Bottle. PPCo. Geochemical High Pressure		5&7	5&7	5&7	5&7
	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			· Value		
	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.





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: 10470 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'

JEM It was don't recovery deit to yet.

T. J. John

# DATA SHEET

# Geochemistry Branch Method 66-70

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

Box Number T - 6/

Enclose	one	copy	in
box wit	n sar	nples	

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

Retain one copy for your records if desired

	· · · · · · · · · · · · · · · · · · ·	bartles	ville, Oklanoma	4 (4003	
Computer				PLE LABEL	
Key			TOP		BOTTOM
		MUD (Before Test)	(First from Formations)	MIDDLE	(Last from Formations)
		(Defote lesc)	FORMACIONS)	MIDIA	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 <b>-</b> 51	Bbl Fluid from Formation		20	30	60
	ample Code Letters ssigned by Geochem Br	)			
	Sample Type Code assigned by Geochem B	r)			
11 14-41	Well name and number		Ekofisk	2/4	- 3x
11 42-46	County or area name		North,	dea -	Ekofisk
11 47-51	State or country		NORU	IAY	
11. 52-78	Well operator		Phillip	ی ح	
2 30	Depth reference e.g.	RKB etc.	322'(	from Se	a bed to RKB)
12 37-41	Depth of formation sa	ampled Uppe	er <u>/0740</u>	<u>)</u> Lo	wer 10770
2 53-60	Month, day, year sam	pled	July 9, 197	0 (mud),	July 10, 70 ( formation San
12 52-78	By whom sampled				
2 61-63	Geological age of for	rmation sampled			
2 64-67	Lithology of formation	on sampled	Limes	tone	
<del>-</del> -	Type of Drilling Mud	Used	Dullar	d, sea	water
	Kind and amount, if a Diesel, Additive etc		3% Decel	, Soltex	
1	Material used as cush	ion	Sea Wal	ter	
B1 11-51	Test Procedure or welle.g., Reverse circula	ll status ation, Swabbing,	Flowing, etc.	) Flowe	d & reverse
COMMENT:	_circula te d				· · · · · · · · · · · · · · · · · · ·