General information

Wellbore name	2/4-10
Type	EXPLORATION
Purpose	WILDCAT
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Discovery	2/4-10
Well name	2/4-10
Seismic location	PS 031310 SP.65
Production licence	018
Drilling operator	Phillips Petroleum Company Norway
Drill permit	94-L
Drilling facility	ZAPATA EXPLORER
Drilling days	69
Entered date	13.10.1973
Completed date	20.12.1973
Release date	20.12.1975
Publication date	02.04.2007
Purpose - planned	WILDCAT
Reentry	NO
Content	OIL
Discovery wellbore	YES
1st level with HC, age	LATE CRETACEOUS
1st level with HC, formation	TOR FM
Kelly bushing elevation [m]	35.0
Water depth [m]	67.0
Total depth (MD) [m RKB]	3418.0
Bottom hole temperature [°C]	114
Oldest penetrated age	LATE CRETACEOUS
Oldest penetrated formation	TOR FM
Geodetic datum	ED50
NS degrees	56° 40' 41.6'' N
EW degrees	3° 13' 21.7'' E
NS UTM [m]	6281730.28
EW UTM [m]	513645.42
UTM zone	31
NPDID wellbore	254

Wellbore history

General

Wildcat well 2/4-10 was drilled on an anticlinal structure, 4.8 km long and 2.4 km wide, lying approximately 8 km northwest of the centre of the Tor Field. The Danian limestone was the expected pay zone, and if porosity was present, the Late Cretaceous Limestone could also be hydrocarbon bearing. Prognosed top Danian was at 3139 m (10300 ft) with planned TD at 3414 m (11200 ft).

Operations and results

Well 2/4-10 was spudded with the jack-up rig Zapata Explorer on 13 October 1973 and drilled to TD at 3418 m in the Late Cretaceous Tor Formation. The well was drilled and tested in 69 days, without significant technical problems. Deviation surveys were carried out down to 2451 m and the maximum deviation to this depth was 2 deg. The well was drilled with salt-water gel and Flosal down to 497 m, with Shale Trol from 497 to 2015 m, with Unical (chromium-lignosulphonate) from 2015 m to 2819 m, and with Unical and Ligcon (caustisized lignite) from 2819 m to TD.

Top Danian limestone was encountered at 3162 m and top Late Cretaceous limestone at 3293 m. The Danian Limestone tested only small amounts of water and no oil, after acidization, on two drill stem tests. The Late Cretaceous Chalk produced oil, but with a very low GOR, and with a high amount of water, which made its commerciality questionable. These fluid characteristics were furthermore very different from the 2/4-7 fluids (Tor discovery) and indicated 2/4-10 to be on a separate structure from the Tor Field.

No cores were cut and no wire line fluid samples taken.

The well was permanently abandoned on 20 December 1973 as an oil discovery

Testing

Six DST's were conducted: DST 1 and DST 2 in the Late Cretaceous and DST 3 to DST 6 in the Danian limestone. The results given here are after acidization: DST 1 from 3304 - 3322 m flowed 583 Sm3 oil, 275 m3 water, and only 1150 Sm3 gas /day through a 24/64" choke. The oil gravity was 38.6 deg API and the GOR was as low as 2 Sm3/Sm3. DST 2 from 3304 - 3309 m flowed 122 sm3 oil, 285 m3 water, and 864 Sm3 gas /day. The oil gravity was 35.6 deg API and the GOR was reported to be 7 Sm3/Sm3. DST 3 from the interval 3255 - 3281 was aborted for technical reasons. DST 4 and 5 from the same interval failed to produce formation fluid to surface. DST 6 from 3182 - 3203 m flowed only water at a small and decreasing rate.

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
102	NORDLAND GP
1798	HORDALAND GP
3020	ROGALAND GP
3020	BALDER FM

3033	SELE FM
3079	LISTA FM
3111	VIDAR FM
3150	LISTA FM
3155	VÅLE FM
3162	SHETLAND GP
3162	EKOFISK FM
3293	TOR FM

Geochemical information

Document name	Document format	Document size [MB]
254_1	pdf	0.60
254_2	pdf	2.40

Documents - older Norwegian Offshore Directorate WDSS reports and other related documents

Document name	Document format	Document size [MB]
254_01_WDSS_General_Information	pdf	0.26

Documents - reported by the production licence (period for duty of secrecy expired)

Document name	Document format	Document size [MB]
254_01_2_4_10_Completion_Report_and_Completion_log	pdf	13.76
254_02_2_4_10_Drilling_Fluid_Summary	pdf	1.48
254_02_2_4_10_Mud_Program_and_Record	pdf	12.27
254_04_2_4_10_Cores_Geochemical_Characterization	pdf	7.34
254_05_2_4_10_Individual_well_report	pdf	13.76
254_05_2_4_10_Reservoir_Fluid_Study_DST_1_Flow_Period_4	pdf	1.19
254_05_2_4_10_Well_Testing	pdf	6.01

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3304	3322	9.5
2.0	3304	3309	25.4

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0	11.000		43.000	
2.0			31.000	

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	586	1180	0.834		2
2.0	122	864	0.846	0.856	7

Logs

Log type	Log top depth [m]	Log bottom depth [m]
BHC	489	1230
BHC-C	1230	3411
CDM AP	2865	3414
CNL CCL	3038	3343
FDC	3002	3415
GR	102	489
IES	489	3411
PML	3002	3415
SNP	3002	3415
VELOCITY	489	3411

Casing and leak-off tests

Casing type	Casing diam. [inch]	Casing depth [m]	Hole diam. [inch]	Hole depth [m]	LOT/FIT mud eqv. [g/cm3]	Formation test type
CONDUCTOR	30	137.0	36	183.0	0.00	LOT
SURF.COND.	20	489.0	26	497.0	0.00	LOT
INTERM.	13 3/8	1223.0	17 1/2	1228.0	0.00	LOT
INTERM.	9 5/8	2443.0	12 1/4	2452.0	0.00	LOT
LINER	7	3418.0	8 1/2	3418.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
133	1.12			water based	
1193	1.36			water based	
1820	1.62			water based	
2452	1.70			water based	
3046	1.71			water based	
3418	1.71			water based	