General information

Wellbore name	34/4-5
Type	EXPLORATION
Purpose	WILDCAT
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Discovery	34/4-5
Well name	34/4-5
Seismic location	SG 8320 - 442 SP 188
Production licence	057
Drilling operator	Saga Petroleum ASA
Drill permit	395-L
Drilling facility	TREASURE SAGA
Drilling days	146
Entered date	13.11.1983
Completed date	06.04.1984
Release date	06.04.1986
Publication date	18.05.2004
Purpose - planned	WILDCAT
Reentry	NO
Content	OIL
Discovery wellbore	YES
1st level with HC, age	EARLY JURASSIC
1st level with HC, formation	COOK FM
2nd level with HC, age	EARLY JURASSIC
2nd level with HC, formation	STATFJORD GP
Kelly bushing elevation [m]	26.0
Water depth [m]	379.0
Total depth (MD) [m RKB]	3917.0
Final vertical depth (TVD) [m RKB]	3910.0
Maximum inclination [°]	8.1
Bottom hole temperature [°C]	140
Oldest penetrated age	LATE TRIASSIC
Oldest penetrated formation	LUNDE FM
Geodetic datum	ED50
NS degrees	61° 41' 9.49'' N
EW degrees	2° 17' 52'' E
NS UTM [m]	6839561.78

EW UTM [m]	462840.14
UTM zone	31
NPDID wellbore	37

Wellbore history

General

Wildcat well 34/4-5 was drilled on the Mort Horst in the Northeastern part of the block. The purpose of the well was to test the Zeta structure for hydrocarbons and to test the stratigraphy below the Base Cretaceous Unconformity. The well encountered hydrocarbons in the Cook Formation and in the Statfjord Formation.

Operations and results

The well was spudded with the semi-submersible installation Treasure Saga on November 13 1983 and drilled to TD at 3917 m in Early - Middle Triassic sediments of the Lunde Formation. The well was drilled with seawater and bentonite down to 533 m, with bentonite/gypsum mud from 533 m to 1113 m, with gypsum/polymer mud from 1113 m to 2025 m, with gypsum/lignosulfonate (Unical) mud from 2025 m to 3200 m, and with lignosulfonate from 3200 m to TD.

Due to severe boulder problems in the 26" hole section, the well had to be re-spudded three times before the 20" casing could be run and cemented. The 20" casing had to be worked and washed down to the planned depth. This action most likely buckled or partly collapsed the 20" casing. It took approximately 5 days to drill/mill out the bottom section of the 20" casing. Circulation was lost at 2026 m when drilling the 17 1/2" hole. Due to the lost circulation, the 13 3/8" casing had to be set at 2011 m. The 12 1/4" section had to be plugged back from 3106 m to 3005 m due to severe hole deviation problems. The maximum hole angle was 8.75°. Re-drilling this hole section and deepening it down to 3200 m the hole angle varied between 3° and 4°. The 9 5/8" casing was set at 3195 m. The 8 1/2" hole section was drilled down to 3424 m, where the first core was cut. The core recovered shale, and it was decided to drill ahead. The hole was drilled down to 3470 m, where a new drill break occurred. While circulating bottoms up for samples a kick was taken. A total of 43 bbls were gained before closing in the well. Six cores were cut down to 3538 m. Analysis of the formation indicated that the potential reservoir section had not been reached. The hole was this time drilled down to 3561 m, where a new drill break occurred. This time 10 cores were cut down to 3648,6 m. A 7" liner was run in the 8 1/2" hole with the liner shoe set at 3757 m.

The well proved a stratigraphic section ranging in age from possibly Early Triassic to Pleistocene. Minor sand development was penetrated in Miocene and Oligocene. The Cretaceous section was composed of claystones. In the Jurassic two sandstone horizons were encountered, the Cook Formation (3416 m to 3520 m) and the Statfjord Formation (3558.5 m to 3599 m). The Triassic rocks were inter-bedded sandstones, siltstones and claystones. Several unconformities were observed in the well, four in Tertiary, two in Cretaceous, a major unconformity at 3245 m between Callovian and Valanginian, one in Middle Jurassic and a fault cut out in Early Jurassic. Gas peaks up to 7.5 % with shows in limestone stringers were observed in the interval 2137 m to 2600 m in the Late Cretaceous Shetland Group. Weak shows was observed on the core from 3424 m to 3438 m. Good shows with up to 39 % gas was observed in the Cook Formation from 3454 m to 3483 m, from 3483 m shows gradually decreased in intensity. From 3564 good shows appeared in sandstones, and from 3571 m to 3586 m good shows were observed in massive sandstone of the Statfjord Formation. Below 3586 m shows gradually disappeared. No shows were observed below 3603 m. Testing of the two sandstones proved movable oil present in the Cook Formation and immoveable oil in the Statfjord Formation. Both sandstones were tightly cemented, with poor reservoir

qualities. A total of 17 cores were cut as described above. The overall recovery was 95%. Logging operations were hampered by tool sticking, causing considerable discrepancies between drillers and loggers depth. This did not affect the Cook and Statfjord Formation Sands. No fluid samples were taken on wire line. The well was permanently abandoned on 6 April 1983 as a non-commercial oil discovery.

Testing

Two drill stem test were carried out, one in the Statfjord sand and one in the Intra Cook sand. The Statfjord drill stem test, 3589.0 m to 3598.5 m produced water with traces of oil. A rate of 27 Sm3 water/day was obtained through an 8/64 inch choke with a wellhead pressure of 2.51 MPa.

The Cook drill stem test, 3462.7 m to 3480.7 m, produced oil with 19 per cent water. A rate of 48 Sm3 liquid/day was obtained through a 10/64 inch choke and a wellhead pressure of 13.65 MPa. The GOR was measured to 240 Sm3/Sm3 at separator conditions of 1.14 MPa and 40.6 °C. The dead oil density was 0.83 g/cc. At the end of the Cook drill stem test, a hydrate plug was formed in the test string. It was removed by circulating hot mud in the riser and hot tapping of the test string.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
510.00	3868.00

Cuttings available for sampling?	NO

Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	3423.0	3437.7	[m]
2	3473.0	3481.4	[m]
3	3484.0	3496.2	[m]
4	3496.0	3507.6	[m]
5	3508.0	3518.0	[m]
6	3519.0	3526.7	[m]
7	3527.0	3536.7	[m]
8	3564.0	3569.5	[m]
9	3571.0	3580.0	[m]
10	3580.0	3588.5	[m]
11	3588.0	3595.0	[m]
12	3595.0	3604.2	[m]
13	3605.0	3609.0	[m]
14	3610.0	3617.0	[m]
15	3617.0	3621.2	[m]

16	3621.0	3630.2	[m]
17	3630.0	3648.8	[m]

Total core sample length [m]	156.7
Cores available for sampling?	YES

Core photos


3423-3426m


3427-3430m


3431-3434m


3435-3437m


3473-3476m


3477-3480m


3481-3482m


3483-3486m


3487-3490m


3491-3494m


3495-3496m


3496-3499m


3500-3503m


3504-3507m


3508-3511m


3512-3515m


3516-3517m


3518-3521m


3522-3525m


3526-3527m

3527-3530m 3531-3534m 3535-3536m 3564-3567m 3568-3569m


3571-3574m

3575-3578m

3579-3580m

3580-3583m

3584-3587m


3588-3589m

3589-3592m

3593-3594m

3595-3598m

3599-3602m


3603-3604m

3605-3608m

3609-3610m

3610-3613m

3614-3616m


3617-3620m

3621-3624m

3625-3628m

3629-3630m

3630-3633m


3634-3637m

3638-3641m

3642-3645m

3646-3648m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
2059.0	[m]	SWC	RRI

2090.0	[m]	SWC	RRI
2166.0	[m]	SWC	RRI
2198.0	[m]	SWC	RRI
2240.0	[m]	SWC	RRI
2282.0	[m]	SWC	RRI
2292.0	[m]	SWC	RRI
2343.0	[m]	SWC	RRI
2374.5	[m]	SWC	RRI
2415.0	[m]	SWC	RRI
2468.0	[m]	SWC	RRI
2510.2	[m]	SWC	RRI
2574.0	[m]	SWC	RRI
2771.0	[m]	SWC	RRI
2895.7	[m]	SWC	RRI
2944.5	[m]	SWC	RRI
3000.0	[m]	SWC	RRI
3015.0	[m]	SWC	RRI
3024.5	[m]	SWC	RRI
3031.0	[m]	SWC	RRI
3085.0	[m]	SWC	RRI
3098.0	[m]	SWC	RRI
3104.0	[m]	SWC	RRI
3115.0	[m]	SWC	RRI
3233.0	[m]	SWC	RRI
3280.0	[m]	SWC	RRI
3300.0	[m]	SWC	RRI
3320.0	[m]	SWC	RRI
3345.0	[m]	SWC	RRI
3370.0	[m]	SWC	RRI
3414.5	[m]	SWC	RRI
3420.0	[m]	SWC	RRI

Oil samples at the Norwegian Offshore Directorate

Test type	Bottle number	Top depth MD [m]	Bottom depth MD [m]	Fluid type	Test time	Samples available
DST	DST2	3462.70	3480.70		30.03.1984 - 16:15	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
405	NORDLAND GP
1240	UTSIRA FM
1332	HORDALAND GP
1805	ROGALAND GP
1805	BALDER FM
1838	LISTA FM
1925	SHETLAND GP
1925	JORSALFARE FM
2145	KYRRE FM
3015	TRYGGVASON FM
3235	CROMER KNOLL GP
3235	RØDBY FM
3241	ÅSGARD FM
3245	VIKING GP
3245	HEATHER FM
3266	DUNLIN GP
3266	DRAKE FM
3416	COOK FM
3520	AMUNDSEN FM
3559	STATFJORD GP
3599	HEGRE GP
3599	LUNDE FM

Composite logs

Document name	Document format	Document size [MB]
37	pdf	0.70

Geochemical information

Document name	Document format	Document size [MB]
37_1	pdf	3.31

37_2	pdf	6.33

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

Document name	Document format	Document size [MB]
37_01_WDSS_General_Information	pdf	0.24
37_02_WDSS_completion_log	pdf	0.33

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

Document name	Document format	Document size [MB]
37_34_4_5_COMPLETION_REPORT_AND_LOG	pdf	17.97

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3599	3589	3.2
2.0	3481	3463	4.0

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0	2.060			132
2.0	13.680		62.550	128

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0					
2.0	48	11520	0.834	0.820	240

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CDL CNL GR	3195	3766
CDL CNL GR	3600	3915

CDL CNL SP	0	0
CDL GR	1080	2022
CDL GR	2011	3197
COREGUN	0	0
COREGUN	0	0
DIFL BHC GR	503	1112
DIFL BHC GR	1080	2022
DIFL BHC GR	2011	3197
DIFL BHC GR	3195	3770
DIFL BHC GR	3595	3916
DLL MLL GR	3217	3769
FMT	3239	3627
FMT	3464	3904
GR	405	1112
SHDT	3195	3766
SP	3185	3530
VELOCITY	3195	3916
VSP	510	3900

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	504.0	36	514.0	0.00	LOT
SURF.COND.	20	1102.0	26	1103.0	1.55	LOT
INTERM.	13 3/8	2011.0	17 1/2	2020.0	1.89	LOT
INTERM.	9 5/8	3187.0	12 1/4	3200.0	2.15	LOT
LINER	7	3917.0	8 1/2	3917.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
525	1.04	6.0	19.0	WATER BASED	
600	1.07	7.0	19.0	WATER BASED	
700	1.08	10.0	18.0	WATER BASED	
900	1.13	10.0	22.0	WATER BASED	
1355	1.20	16.0	20.0	WATER BASED	
1610	1.26	16.0	22.0	WATER BASED	

1830	1.38	22.0	27.0	WATER BASED	
2030	1.47	26.0	27.0	WATER BASED	
2190	1.62	21.0	29.0	WATER BASED	
2350	1.71	28.0	26.0	WATER BASED	
2985	1.68	17.0	24.0	WATER BASED	
3260	1.74	19.0	12.0	WATER BASED	
3650	1.87	21.0	12.0	WATER BASED	

Thin sections at the Norwegian Offshore Directorate

Depth	Unit
3601.25	[m]
3595.75	[m]
3584.50	[m]
3579.00	[m]
3572.75	[m]
3568.00	[m]
3508.95	[m]
3487.60	[m]
3483.38	[m]
3480.75	[m]
3476.50	[m]
3474.20	[m]
3564.25	[m]
3572.50	[m]
3575.50	[m]
3579.25	[m]
3586.00	[m]
3591.00	[m]
3595.25	[m]
3599.25	[m]

Pressure plots

The pore pressure data is sourced from well logs if no other source is specified. In some wells where pore pressure logs do not exist, information from Drill stem tests and kicks have been used. The data has been reported to the NPD, and further processed and quality controlled by IHS Markit.

Document name	Document format	Document size [MB]
37_Formation_pressure_(Formasjonstrykk)	pdf	0.21