



General information





Wellbore name	34/4-4
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Field	SNORRE
Discovery	34/4-1 Snorre
Well name	34/4-4
Seismic location	SG 8020 - 201 SP 2295
Production licence	057
Drilling operator	Saga Petroleum ASA
Drill permit	315-L
Drilling facility	DYVI ALPHA
Drilling days	146
Entered date	11.09.1982
Completed date	03.02.1983
Release date	03.02.1985
Publication date	21.12.2012
Purpose - planned	WILDCAT
Reentry	NO
Content	OIL
Discovery wellbore	NO
1st level with HC, age	LATE TRIASSIC
1st level with HC, formation	LUNDE FM
Kelly bushing elevation [m]	25.0
Water depth [m]	345.0
Total depth (MD) [m RKB]	3800.0
Final vertical depth (TVD) [m RKB]	3800.0
Bottom hole temperature [°C]	122
Oldest penetrated age	MIDDLE TRIASSIC
Oldest penetrated formation	TEIST FM (INFORMAL)
Geodetic datum	ED50
NS degrees	61° 30' 20.85" N
EW degrees	2° 14' 9.54" E
NS UTM [m]	6819527.92
EW UTM [m]	459334.80
UTM zone	31
NPDID wellbore	41



Wellbore history

General

The primary objective of the exploration well 34/4 4 was to drill the untested Triassic sequence in the fault blocks west of well 34/4-1. The well location was chosen to be stratigraphically higher relative to the Triassic sequence in well 34/4-1. The purpose of the well location was also to penetrate and core the maximum oil column above the tentative oil water contact interpreted in well 34/4-1 and to test possible lateral fluid communication with 34/4-1.

Operations and results

Wildcat well 34/4-4 was spudded with the semi-submersible installation Dyvi Alpha on 11 September 1982 and drilled to TD at 3800 in Middle Triassic sediments, Teist Formation. As much as 15 % of total rig time was WOW due to bad weather. While coring, after core number 12 was taken, the mud was replaced with seawater by accident and caused a kick, resulting in a 20 bbls influx. The well was drilled with spud mud down to 493 m, with gel mud from 493 m to 1212 m, with gypsum/polymer mud from 1212 m to 2116 m, with Lignosulphonate mud from 2116 m to 2475 m, and with lignosulphonate/Chem-X mud from 2475 m to TD.

First oil shows were recorded on cuttings from thin sandstone stringers below 2075 m, accompanied by increased gas readings. Sidewall cores from siltstone beds between 2100 and 2414 m also occasionally had oil shows.

The Early Cretaceous Åsgard Formation rested unconformably on the Late Triassic Lunde Formation at 2425 m. The Lunde Formation sandstones were oil bearing down to the oil water contact at 2586 m. The OWC was set mostly on the intersection of the oil and water pressure gradients from RFT data. The oil bearing sand was separated from the water zone by a 22 m thick residual oil zone between 2586 and 2608 m. This interval had an average net sand porosity of 22%. In the water wet sand interval between 2608 and 2794 m, the average net sand porosity was 21%. No shows were recorded below 2612 m.

A total of 180 m core was cut in 15 cores from 2433.7 to 2638.4 m in the Lunde Formation oil reservoir and down across the OWC. The core-log depth shifts were significant with the cored depth for core 1 being + 9.5 m relative to logger's depth. The shifts for the following cores decreased in a relatively regular fashion with increasing core depth to + 4.5 m for core 15. The RFT tool was run and good pressure data was obtained. RFT segregated fluid samples were taken at 2431.5 m (oil and gas), 2489.0 m (mud filtrate), 2573.0 m (oil and mud filtrate), 2605.5 m (mud filtrate), 2643.5 m (mud filtrate), and 2715.0 m (water and mud filtrate).

The well was permanently abandoned on 6 February 1985 as an oil appraisal well.

Testing

Four DST's were performed in the Late Triassic Lund Formation sandstones. The test results were considered to be some of the best so far in the North Sea.

DST 1 tested the water zone from the interval 2618.0 - 2626.0 m. At stable conditions in the final flow the well produced 83.5 m3 water/day through a 32/64" flow. Bottom hole temperature was 95.6 deg C.

DST 2 tested the interval 2572.5 - 2577.5 m. At stable conditions in the main flow the well produced 461 Sm3 oil/day through a 24/64" choke. The separator GOR was 94 Sm3/Sm3. Bottom hole temperature was 96.1 deg C. When opening up to a 52/64"



choke the production reached 1606 Sm³ oil/day. No water or sand was produced.

DST 3 tested the interval 2512.8 - 2515.8 m. After perforations the test was suspended for a week due to bad weather. The interval was re-perforated before the test was resumed. The production in this test never stabilized, possibly due to formation damage caused by the interruption period. An average oil rate of 54 Sm³/day was estimated. The oil density was 0.83 g/cm³. No water or sand was produced. Bottom hole temperature was 94.4 deg C.

DST 4 tested the interval 2429.0 - 2437.0 m. During 8 hours main flow through a 44/64" choke the rated declined slowly from 1844 Sm³ to 1717 Sm³ /day. The separator GOR was 70 Sm³/Sm³. The dead oil density was 0.82 - 0.83 g/cm³. No water or sand was produced. Bottom hole temperature was 93.3 deg C.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
500.00	3794.00

Cuttings available for sampling?	YES
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Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	2433.7	2444.1	[m]
2	2444.8	2457.0	[m]
3	2457.9	2471.3	[m]
4	2472.2	2482.5	[m]
5	2482.6	2486.0	[m]
6	2489.3	2501.9	[m]
7	2501.9	2519.5	[m]
8	2519.5	2535.0	[m]
9	2535.0	2548.6	[m]
10	2548.6	2566.8	[m]
11	2566.8	2576.1	[m]
12	2578.3	2595.4	[m]
13	2596.2	2607.5	[m]



14	2614.4	2621.3	[m]
15	2624.0	2634.6	[m]

Total core sample length [m]	182.4
Cores available for sampling?	YES

Core photos



2433-2437m



2437-2439m



2440-2442m



2443-2444m



2444-2447m



2448-2450m



2451-2454m



2455-2456m



2457-2460m



2461-2463m



2464-2467m



2468-2471m



2472-2475m



2475-2479m



2479-2482m



2482-2486m



2486-2488m



2489-2492m



2492-2496m



2496-2499m





2499-2501m



2501-2505m



2505-2507m



2508-2511m



2511-2514m



2514-2517m



2518-2519m



2519-2522m



2522-2525m



2525-2528m



2528-2532m



2532-2535m



2535-2537m



2537-2539m



2540-2547m



2547-2548m



2548-2551m



2551-2554m



2555-2558m



2558-2562m



2562-2565m



2565-2566m



2566-2570m



2570-2573m



2573-2576m



2578-2581m



2581-2585m



2585-2588m



2592-2594m



2594-2595m





2596-2598m

2599-2603m

2603-2606m

2606-2607m

2614-2617m



2617-2621m



2624-2627m



2627-2631m



2631-2634m



2603-2606m



2606-2607m



2614-2617m



2617-2621m



2624-2627m



2627-2631m



2631-2634m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
2444.9	[m]	C	RRI
2833.7	[m]	SWC	RRI
2851.5	[m]	SWC	RRI
2925.6	[m]	SWC	RRI
2930.4	[m]	SWC	RRI
2938.2	[m]	SWC	RRI
3359.2	[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	2572.00	2578.00		31.12.1982 - 08:30	YES
DST	DST4	2429.00	2437.00	OIL	22.01.1983 - 22:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
370	NORDLAND GP
1157	UTSIRA FM
1180	HORDALAND GP
1634	ROGALAND GP
1634	BALDER FM
1670	LISTA FM
1787	SHETLAND GP
1787	JORSALFARE FM
1943	KYRRE FM
2414	CROMER KNOLL GP
2414	ÅSGARD FM
2425	HEGRE GP
2425	LUNDE FM
3143	LOMVI FM
3228	TEIST FM

Geochemical information

Document name	Document format	Document size [MB]
41_GCH_1	pdf	1.01
41_GCH_2	pdf	8.32
41_GCH_3	pdf	1.83

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





Document name	Document format	Document size [MB]
41_01_WDSS_General_Information	pdf	0.19
41_02_WDSS_completion_log	pdf	0.36

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

Document name	Document format	Document size [MB]
41_34_04_04_Completion_Report_and_log	pdf	23.91

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	2618	2626	12.7
2.0	2572	2578	10.3
3.0	2512	2516	6.3
4.0	2429	2437	17.5

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0				
2.0				
3.0				
4.0				

Test number	Oil [Sm ³ /day]	Gas [Sm ³ /day]	Oil density [g/cm ³]	Gas grav. rel.air	GOR [m ³ /m ³]
1.0					
2.0	461				94
3.0	54				
4.0	1749	200000	0.830		70

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL GR	1850	2083





CBL VDL GR CCL	1750	2785
CST	2105	2428
CST	2639	2794
CST	2810	3359
CST	3363	3776
DIP	2097	2793
DIP	2788	3797
DLL MSFL NGS	2097	2793
ISF DDBHC GR	2098	2796
ISF DDBHC MSFL NGL	2788	3798
ISF LSS SP GR	494	1213
ISF LSS SP GR	1213	1713
ISF LSS SP GR	1213	2115
LDL CNL CAL GR	494	1213
LDL CNL GR	1213	2115
LDL CNL GR	2098	2797
LDL CNL GR	2788	3797
RFT	2432	2762
RFT	2893	3491
VSP	500	3798

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	493.0	36	493.0	0.00	LOT
SURF.COND.	20	1200.0	26	1212.0	1.26	LOT
INTERM.	13 3/8	2098.0	17 1/2	2115.0	1.59	LOT
INTERM.	9 5/8	2792.0	12 1/4	2800.0	1.87	LOT
OPEN HOLE		3800.0	8 1/2	3800.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
530	1.03	15.0		waterbased	
900	1.11	7.0		waterbased	
1070	1.14	7.0		waterbased	
1610	1.13	9.0		waterbased	



1910	1.28	18.0		waterbased	
2140	1.42	27.0		waterbased	
2350	1.50	25.0		waterbased	
2810	1.60	23.0		waterbased	
3360	1.62	16.0		waterbased	
3620	1.60	20.0		waterbased	

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]
41 Formation pressure (Formasjonstrykk)	pdf	0.23

