

**General information**

Wellbore name	1/9-1
Type	EXPLORATION
Purpose	WILDCAT
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Field	TOMMELITEN A
Discovery	1/9-1 Tommeliten Alpha
Well name	1/9-1
Seismic location	line 404-403.SP 548
Production licence	044
Drilling operator	Den norske stats oljeselskap a.s
Drill permit	167-L
Drilling facility	ROSS RIG (1)
Drilling days	127
Entered date	14.10.1976
Completed date	17.02.1977
Release date	17.02.1979
Publication date	01.04.2012
Purpose - planned	WILDCAT
Reentry	NO
Content	GAS/CONDENSATE
Discovery wellbore	YES
1st level with HC, age	PALEOCENE
1st level with HC, formation	EKOFISK FM
2nd level with HC, age	LATE CRETACEOUS
2nd level with HC, formation	TOR FM
3rd level with HC, age	LATE CRETACEOUS
3rd level with HC, formation	HOD FM
Kelly bushing elevation [m]	25.0
Water depth [m]	78.0
Total depth (MD) [m RKB]	3703.0
Bottom hole temperature [°C]	133
Oldest penetrated age	LATE CRETACEOUS
Oldest penetrated formation	HIDRA FM
Geodetic datum	ED50
NS degrees	56° 24' 5.07" N
EW degrees	2° 54' 6.49" E



NS UTM [m]	6250899.86
EW UTM [m]	493938.99
UTM zone	31
NPDID wellbore	243

Wellbore history

General

Well 1/9-1 was drilled on a salt diapir structure located in the Feda Graben in the southern North Sea. The primary objective was to test hydrocarbon accumulations in the Danian and Late Cretaceous chalk. A secondary objective was to test the Jurassic and Triassic sandstones.

Operations and results

Wildcat well 1/9-1 was spudded with the semi-submersible installation Ross Rig on 14 October 1976 and drilled to TD at 3706 m in Cenomanian age limestone (Hidra Formation). The Jurassic was not reached. The anchor chain broke on three occasions. The third breakdown occurred during the last DST. The decision was then made to suspend the well for later re-entry. The well was drilled with seawater and gel slugs down to 433 m, and with seawater-lime-lignosulphonate from 433 m to TD.

The Danian chalk (Ekofisk Formation) was reached at 3043.5 m just below a marl section. It consisted of two hydrocarbon bearing zones. Zone 1 from 3043.5 m to 3071.5 m and a tighter zone 2 from 3071.5 m to 3103.5 m. Maastrichtian (Tor Formation) starts at about 3103.5 m and is also hydrocarbon bearing with water saturations below 50% down to 3141.5 m. A transition zone with gradually increasing water content is seen from 3134.0 m down to 3182.5 m. Apart from in the oil bearing reservoirs weak oil shows on minor sandstones were recorded in the interval 2947 to 2958 m; weak to good oil shows were seen on limestone in the interval 3300 m to 3500 m; and finally weak oil shows were seen occasionally from 3645 m to 3675 m.

The chalk section was cored in 11 cores from 3048 m to 3235.5 m (Ekofisk and Tor formations) and one core (core no 12) from 3327.2 m to 3336.7 m (Hod Formation). Total core recovery was nearly 100%. No wire line fluid samples were taken.

The well was suspended on 17 February 1977 as a gas/condensate discovery.

Testing

Eight drill stem tests were performed in the Late Cretaceous and Danian chalk sections. The tests indicated an oil reservoir with a retrograde gas cap. However PVT analyses indicated that the hydrocarbon system was close to its critical point and therefore difficult to interpret.

DST 1B tested the intervals 3298 - 3302 and 3306 - 3312 m (Tor Formation). After acidizing the test produced water with less than 1% oil emulsion at a rate of 48 - 51 m3 /day on a 48/64" choke. Maximum recorded temperature was 120 deg C.

DST 2A tested the interval 3210 - 3220 m (Tor Formation). The test produced water at a rate of 53 m3 /day on a 48/64" choke. Maximum recorded temperature was 116 deg C.

DST 3 tested the interval 3174 - 3182 m (Tor Formation). The test produced water at a rate of 13 m3 /day on a 48/64" choke. Maximum recorded temperature was 117 deg C.



DST 4 tested the interval 3148 - 3157 m (Tor Formation). After acidizing the test produced 253 - 420 Sm3 oil, 152910 Sm3 gas and 108 - 180 m3 water /day on a 24/64" choke. The GOR was 365 - 606 Sm3/Sm3, oil density was 0.849 g/cm3 and gas gravity was 0.699 (air = 1). Maximum recorded temperature was 120 deg C.

DST 5 tested the interval 3120 - 3133 m (Tor Formation). After acidizing the test produced 405 - 461 Sm3 oil, 242000 -251000 Sm3 gas /day on a 24/64" choke. The GOR was 534 - 618 Sm3/Sm3, oil density was 0.818 g/cm3 and gas gravity was 0.680 (air = 1). Maximum recorded temperature was 120 deg C.

DST 5A tested the interval 3129 - 3133 m (Tor Formation). The test produced 71 - 98 Sm3 oil with 1% water, 34000 - 45000 Sm3 gas /day on a 12/64" choke. The GOR was 409 - 640 Sm3/Sm3, oil density was 0.836 g/cm3 and gas gravity was 0.710 (air = 1). Maximum recorded temperature was 121 deg C.

DST 6 tested the interval 3105 -3108.5 m (Tor Formation). The test produced 111 - 127 Sm3 oil with 1% water, 125000 - 130000 Sm3 gas /day on a 22/64" choke. The GOR was 989 - 1201 Sm3/Sm3, oil density was 0.796 g/cm3 and gas gravity was 0.708 (air = 1). Maximum recorded temperature was 118 deg C.

DST 7 tested the interval 3082 - 3088 m (Ekofisk Formation). The test gave no flow.

DST 8 tested the interval 3055 - 3068 m (Ekofisk Formation). The test produced 79 - 90 Sm3 oil with 0.5% water, 198000 - 218000 Sm3 gas /day on a 12/64" choke. The GOR was 2330 - 2740 Sm3/Sm3, oil density was 0.760 g/cm3 and gas gravity was 0.691 (air = 1). Maximum recorded temperature was 116 deg C. Attempts to test this interval with acid (DST 8A and 8B) failed as a consequence of the problems with the anchor chains.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
430.00	3706.00

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	3048.0	3057.2	[m]
2	3057.2	3075.8	[m]
3	3075.8	3094.0	[m]
4	3094.0	3105.3	[m]
5	3105.3	3123.9	[m]



6	3123.9	3142.6	[m]
7	3142.5	3160.0	[m]
8	3161.0	3179.6	[m]
9	3179.6	3197.6	[m]
10	3198.3	3216.9	[m]
11	3216.9	3234.1	[m]
12	3327.2	3335.3	[m]

Total core sample length [m]	192.5
Cores available for sampling?	YES

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	DST 1	3298.00	3302.00		23.12.1976 - 00:00	YES
DST	TEST1A	0.00	0.00		25.12.1976 - 01:00	YES
DST	TEST1B	3312.00	3306.00		25.12.1976 - 14:30	YES
DST	TEST4	3148.00	3157.00		11.01.1977 - 01:55	YES
DST	TEST5	3120.00	3133.00		17.01.1977 - 19:25	YES
DST	DST6	3105.00	3109.00		26.01.1977 - 00:00	YES
DST	DST 8	3055.00	3068.00		31.01.1977 - 15:15	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
103	NORDLAND GP
1572	HORDALAND GP
2872	ROGALAND GP
2872	BALDER FM
2884	SELE FM
2944	LISTA FM



2947	ANDREW FM
2952	LISTA FM
3013	VÅLE FM
3036	SHETLAND GP
3036	EKOFISK FM
3104	TOR FM
3312	HOD FM
3648	BLODØKS FM
3662	HIDRA FM

Composite logs

Document name	Document format	Document size [MB]
243 1 9 1	pdf	0.64

Geochemical information

Document name	Document format	Document size [MB]
243 1	pdf	1.23
243 2	pdf	2.57

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

Document name	Document format	Document size [MB]
243 1 9 1 and 1 9 2 Pore pressure fracture gradients	pdf	3.17
243 1 9 1 Completion log	pdf	2.15
243 1 9 1 Completion report I	pdf	32.92
243 1 9 1 Completion report II	pdf	38.52

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3298	3310	19.0
2.0	3210	3220	19.0
3.0	3174	3182	19.0





4.0	3148	3157	9.5
5.0	3120	3133	9.5
5.1	3129	3133	5.0
6.0	3105	3109	8.4
7.0	3082	3088	0.0
8.0	3055	3068	4.6
8.1	3055	3068	18.3

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0				120
2.0				116
3.0				117
4.0		41.000		120
5.0		27.000		120
5.1	21.000			121
6.0	14.300			118
7.0				
8.0	11.100			116
8.1	13.300			111

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0					
2.0					
3.0					
4.0	420	154000	0.849	0.699	380
5.0	460	251000	0.818	0.680	550
5.1	98	45000	0.836	0.710	600
6.0	127	130000	0.796	0.708	990
7.0					
8.0	90	218000	0.760	0.691	2336
8.1	1007				

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL GR	500	1457



CBL VDL GR	2045	2821
CBL VDL GR	2715	3325
CBL VDL GR	2821	3693
CPI	2871	3328
DST GR	2821	3335
FDC CNL GR	422	3705
HDT	2821	3335
IES SP	2821	3705
ISF SONIC	151	3705
VDL SONIC	2821	3705

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	152.0	36	152.0	0.00	LOT
SURF.COND.	20	423.0	26	433.0	0.00	LOT
INTERM.	13 3/8	1343.0	17 1/2	1355.0	1.49	LOT
INTERM.	9 5/8	2825.0	12 1/4	2836.0	0.00	LOT
LINER	7	3369.0	8 1/2	3706.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
143	1.04			spud mud	
432	1.37	50.0		spud mud	
1358	1.46	46.0		spud mud	
1960	1.91	54.0		waterbased	
2577	1.84	59.0		waterbased	
2836	1.68	56.0		waterbased	
3328	1.66	53.0		waterbased	
3683	1.65	50.0		waterbased	

Thin sections at the Norwegian Offshore Directorate

Depth	Unit
3048.00	[m]
3061.00	[m]



3070.00	[m]
3105.00	[m]
3116.00	[m]
3134.00	[m]
3144.00	[m]
3149.00	[m]
3154.00	[m]
3160.00	[m]
3217.00	[m]
3226.00	[m]
3233.00	[m]
3328.00	[m]
3336.00	[m]