Generell informasjon

Brønnbane navn	1/9-1
Type	EXPLORATION
Formål	WILDCAT
Status	P&A
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORTH SEA
Felt	TOMMELITEN A
Funn	1/9-1 Tommeliten Alpha
Brønn navn	1/9-1
Seismisk lokalisering	line 404-403.SP 548
Utvinningstillatelse	044
Boreoperatør	Den norske stats oljeselskap a.s
Boretillatelse	167-L
Boreinnretning	ROSS RIG (1)
Boredager	127
Borestart	14.10.1976
Boreslutt	17.02.1977
Frigitt dato	17.02.1979
Publiseringsdato	01.04.2012
Opprinnelig formål	WILDCAT
Gjenåpnet	NO
Innhold	GAS/CONDENSATE
Funnbrønnbane	YES
1. nivå med hydrokarboner, alder	PALEOCENE
1. nivå med hydrokarboner, formasjon.	EKOFISK FM
2. nivå med hydrokarboner, alder	LATE CRETACEOUS
2. nivå med hydrokarboner, formasjon	TOR FM
3. nivå med hydrokarboner, alder	LATE CRETACEOUS
3. nivå med hydrokarboner, formasjon	HOD FM
Avstand, boredekk - midlere havflate [m]	25.0
Vanndybde ved midlere havflate [m]	78.0
Totalt målt dybde (MD) [m RKB]	3703.0
Temperatur ved bunn av brønnbanen [°C]	133
Eldste penetrerte alder	LATE CRETACEOUS

Eldste penetrerte formasjon	HIDRA FM
Geodetisk datum	ED50
NS grader	56° 24' 5.07'' N
ØV grader	2° 54' 6.49'' E
NS UTM [m]	6250899.86
ØV UTM [m]	493938.99
UTM sone	31
NPDID for brønnbanen	243

Brønnhistorie

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.

Borekaks i Sokkeldirektoratet

Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
430.00	3706.00

Borekaks tilgjengelig for prøvetaking?	YES

Borekjerner i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
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 kjerneprøve lengde [m]	192.5
Kjerner tilgjengelig for prøvetaking?	YES

Oljeprøver i Sokkeldirektoratet

Test type	Flaske nummer	Topp dyp MD [m]	Bunn dyp MD [m]	Væske type	Test tidspunkt	Prøver tilgjengelig
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

Litostratigrafi

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

Spleisede logger

Dokument navn	Dokument format	Dokument størrelse [KB]
243_1_9_1	pdf	0.64

Geokjemisk informasjon

Dokument navn	Dokument format	Dokument størrelse [KB]
243_1	pdf	1.23
243_2	pdf	2.57

Dokumenter - rapportert av utvinningstillatelsen (frigitt ihht til regelverk)

Dokument navn	Dokument format	Dokument størrelse [KB]
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

Borestrengtester (DST)

Test nummer	Fra dybde MD [m]	Til dybde MD [m]	Reduksjonsventil til størrelse [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 nummer	Endelig avstengningstrykk [MPa]	Endelig strømningstrykk [MPa]	Bunnhullstrykk [MPa]	Borehullstemperatur [°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 nummer	Olje produksjon [Sm3/dag]	Gass produksjon [Sm3/dag]	Oljetetthet [g/cm3]	Gasstyngde rel. luft	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				

Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [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

Foringsrør og formasjonsstyrketester

Type utforing	Utforing diam. [tommer]	Utforing dybde [m]	Brønnbane diam. [tommer]	Brønnbane dyp [m]	LOT/FIT slam eqv. [g/cm3]	Type formasjonstest
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

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	Flytegrense [Pa]	Type slam	Dato, måling
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	

Tynnslip i Sokkeldirektoratet

Dybde	Enhet
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]