General information

Wellbore name	2/1-9
Type	EXPLORATION
Purpose	WILDCAT
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Field	GYDA
Discovery	2/1-9 Gyda Sør
Well name	2/1-9
Seismic location	X-OVER 3D LINE 560 AND X-LINE 570
Production licence	019 B
Drilling operator	BP Norway Limited U.A.
Drill permit	676-L
Drilling facility	ROSS ISLE
Drilling days	83
Entered date	15.04.1991
Completed date	06.07.1991
Plugged date	06.07.1991
Release date	06.07.1993
Publication date	16.10.2007
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL
Discovery wellbore	YES
1st level with HC, age	LATE JURASSIC
1st level with HC, formation	ULA FM
Kelly bushing elevation [m]	23.0
Water depth [m]	66.0
Total depth (MD) [m RKB]	4298.0
Final vertical depth (TVD) [m RKB]	4298.0
Maximum inclination [°]	2.2
Bottom hole temperature [°C]	160
Oldest penetrated age	LATE PERMIAN
Oldest penetrated formation	ZECHSTEIN GP
Geodetic datum	ED50
NS degrees	56° 51' 37.77'' N
EW degrees	3° 5' 4.77'' E
NS UTM [m]	6302000.77

EW UTM [m]	505162.30
UTM zone	31
NPDID wellbore	1667

Wellbore history

General

Well 2/1-9 was drilled on the Gyda South structure, a fault/dip closure in the Late Jurassic fairway on the eastern flank of the Central Graben, 6 km south of the Gyda Field. The main objective of the well was to test the Late Jurassic "Gyda sandstone" (Ula Formation) target and prove a volume of oil that was commercial as a tie back development to the Gyda platform. Secondary reservoir potential existed in both the Middle Jurassic and in the uppermost part of the Triassic. Estimated TD was 4275 m TVD RKB.

Operations and results

Appraisal well 2/1-9 was spudded with the semi submersible rig Ross Isle 15 March 1991 and drilled to TD at 4298 m in the late Permian Zechstein Group. No significant problems were encountered in the operations. No shallow gas was detected. The well was drilled with seawater and high viscosity slugs down to 900 m, and with Aquamul ether-based invert emulsion mud system from 900 m to TD.

A 59 m Forties Formation sandstone sequence was encountered at 2923 m in the Late Paleocene and another ca 30 m thick sandstone sequence at 3025 m within the Lista Formation. Top Mandal Formation was encountered at 4013.5 m, 10.5m deeper than predicted. Top Ula Formation was encountered hydrocarbon bearing from 4048 to 4209 m, which was 111 m thicker than expected. The OWC was interpreted from logs to be at 4137.0 m, while the cores taken had good oil shows all through the cored section, i.e. down to 4153 m. No reservoir sections were encountered in the Middle Jurassic. No Triassic sediments were penetrated by the well.

Five cores were cut continuously from 4019 m to 4153 m with 100% recovery. Core 1 covered the lower part of the Mandal, Farsund, and the upper part of the Ula Formation. Cores 2, 3, 4 and 5 were cut in the Ula Formation. Good oil shows was observed throughout the cored section of the Ula sandstone. RFT fluid samples were taken at 4088.7 m (oil), 4137.0 m (oil), 4151 (water), and 4177 m (water).

Well 2/1-9 was considered a potential water injector for the Gyda South discovery, and to be sidetracked up-dip as a producer. A full evaluation of the DST and PVT data would be performed together with a geological remapping and evaluation of the discovery. The well was thus suspended on 6 July 1991, as an oil discovery. It would be re-entered later, after the above evaluations had been completed.

Testing

One DST was run in the interval 4078 - 4108 m and resulted in an oil rate of 166 Sm3 oil/day through a 32/64" choke. The gas rate was 91180 Sm3/day and the water rate was 120 Sm3/day. The GOR was 548 Sm3/Sm3 and the oil gravity was 43 deg API. Due to the presence of H2S the lower part of the Ula Formation was not tested.

Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	4019.0	4046.0	[m]
2	4046.0	4074.0	[m]
3	4074.0	4102.0	[m]
4	4102.0	4124.5	[m]
5	4125.0	4153.0	[m]

Total core sample length [m]	133.5
Cores available for sampling?	YES

Core photos


4019-4024m


4024-4029m


4039-4034m


4034-4039m


4039-4044m


4044-4046m


4046-4051m


4051-4056m


4056-4061m


4061-4066m


4066-4071m


4071-4074m


4074-4079m


4079-4084m


4084-4089m


4089-4094m


4094-4099m


4099-4102m


4102-4107m


4107-4112m


4112-4117m


4117-4122m


4122-4124m


4125-4130m


4130-4135m


4135-4140m


4140-4145m


4145-4150m


4150-4152m

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		0.00	0.00			YES
DST	DST1	4108.00	4078.00		14.06.1991 - 00:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
89	NORDLAND GP
1814	HORDALAND GP
2898	ROGALAND GP
2898	BALDER FM
2915	SELE FM
2923	FORTIES FM
2982	LISTA FM
3055	VIDAR FM
3143	LISTA FM
3158	VÅLE FM
3168	SHETLAND GP
3168	EKOFISK FM
3256	TOR FM

3617	HOD FM
3765	BLODØKS FM
3783	HIDRA FM
3800	CROMER KNOLL GP
3800	RØDBY FM
3838	SOLA FM
3852	TUXEN FM
3867	ÅSGARD FM
4014	TYNE GP
4014	MANDAL FM
4034	FARSUND FM
4048	VESTLAND GP
4048	ULA FM
4257	BRYNE FM
4289	ZECHSTEIN GP

Composite logs

Document name	Document format	Document size [MB]
1667	pdf	0.50

Geochemical information

Document name	Document format	Document size [MB]
1667_1	pdf	0.33
1667_2	pdf	0.97

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

Document name	Document format	Document size [MB]
1667_01_WDSS_General_Information	pdf	1.46
1667_02_WDSS_completion_log	pdf	0.22

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

Document name	Document format	Document size [MB]
1667_2_1_9_COMPLETION_LOG	pdf	1.76
1667_2_1_9_COMPLETION_REPORT	pdf	11.33

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	4078	4108	17.4

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0	7.000		23.600	160

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	165	90577			549

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL CCL GR	2040	2895
CBL VDL CCL GR	3761	4249
CST GR	3500	3947
CST GR	3957	4288
DIL LLS GR	0	3954
DIL SDT GR	3945	4298
ENERJET CCL	4078	4093
ENERJET CCL	4093	4108
GR CCL	2700	2700
GR CCL	4003	4003
GR CCL	4150	4150
JUNK BASKET CCL	3980	3980
JUNK BASKET CCL	4250	4250
LDL CNL NGT	3945	4298
MWD - RWD	88	4289
OBDT GR	3945	4298

PERM PACKER	4003	4003
RFT GR SAMPLE	4049	4243
RFT SAMPLE	4088	4088
RFT SAMPLE	4151	4151
RFT SAMPLE	4177	4177
VELOCITY	500	4213

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	164.0	36	166.0	0.00	LOT
INTERM.	20	895.0	26	897.0	1.74	LOT
INTERM.	13 3/8	2893.0	17 1/2	2896.0	2.03	LOT
INTERM.	9 5/8	3938.0	12 1/4	3940.0	2.15	LOT
LINER	7	4275.0	8 1/2	4289.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
415	0.00			OIL BASED	
426	1.57	42.0		OIL BASED	
900	1.04			WATER BASED	
961	1.20	31.0		WATER BASED	
1583	1.39	49.0		WATER BASED	
2153	1.60	72.0		WATER BASED	
2474	1.60	64.0		WATER BASED	
2529	1.60	74.0		WATER BASED	
2682	1.60	73.0		WATER BASED	
2874	1.60	71.0		WATER BASED	
2901	1.60	77.0		WATER BASED	
3018	1.60	69.0		WATER BASED	
3114	1.60	68.0		WATER BASED	
3173	1.60	7.7		WATER BASED	
3193	1.60	57.0		WATER BASED	
3243	1.60	60.0		WATER BASED	
3253	1.60	68.0		WATER BASED	
3318	1.60	76.0		WATER BASED	

3413	1.60	79.0		WATER BASED	
3610	1.60	80.0		WATER BASED	
3775	1.73	85.0		WATER BASED	
3847	1.73	77.0		WATER BASED	
3910	1.73	82.0		OIL BASED	
3947	1.73	91.0		OIL BASED	
3967	1.72	82.0		OIL BASED	
4019	1.62	51.0		OIL BASED	
4039	1.56	49.0		OIL BASED	
4074	1.56	47.0		OIL BASED	
4102	1.57	53.0		OIL BASED	
4125	0.14	53.0		OIL BASED	
4153	1.57	53.0		OIL BASED	
4240	1.58	56.0		OIL BASED	
4289	1.59	72.0		OIL BASED	

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]
1667_Formation_pressure_(Formasjonstrykk)	PDF	0.21