

**General information**

Wellbore name	2/1-6
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Field	GYDA
Discovery	2/1-3 Gyda
Well name	2/1-6
Seismic location	BP 80 - 27 B SP. 2268
Production licence	019 B
Drilling operator	BP Norway Limited U.A.
Drill permit	413-L
Drilling facility	DYVI ALPHA
Drilling days	105
Entered date	30.04.1984
Completed date	12.08.1984
Release date	12.08.1986
Publication date	12.03.2011
Purpose - planned	APPRAISAL
Reentry	NO
Content	DRY
Discovery wellbore	NO
Kelly bushing elevation [m]	25.0
Water depth [m]	66.0
Total depth (MD) [m RKB]	4588.0
Final vertical depth (TVD) [m RKB]	4582.0
Maximum inclination [°]	2.5
Bottom hole temperature [°C]	166
Oldest penetrated age	LATE TRIASSIC
Oldest penetrated formation	SKAGERRAK FM
Geodetic datum	ED50
NS degrees	56° 55' 14.81" N
EW degrees	3° 1' 38.37" E
NS UTM [m]	6308709.14
EW UTM [m]	501663.54
UTM zone	31
NPDID wellbore	109



Wellbore history

General

Well 2/1-6 is located on the northern side of the Gyda structure on the Cod Terrace in the North Sea. The main target was the Late Jurassic Sandstone, informally called the Gyda sandstone member. The well was located such that it should prove the oil water contact of the 2/1-3 oil discovery, and by this establish whether 2/1-3, 2/1-4 and 1/3-3 all have encountered the same oil accumulation on the two sides of the saddle point. It should also test further the extent and the quality of this Upper Jurassic reservoir.

Operations and results

Appraisal well 2/1-6 was spudded with the semi-submersible installation Dyvi Alpha on 30 April 1984 and drilled to TD at 4583 m (4588 m loggers depth), one metre into Late Triassic sediments of the Skagerrak Formation. The well was drilled with seawater and pre-hydrated bentonite spud mud down to 635 m, with KCl/polymer mud from 635 m to 3424 m, with lignosulfonate mud from 3424 m to 4124 m, and with high temperature polymer mud from 4124 m to TD.

The Gyda sandstone member was penetrated at 4173 m logger's depth. The reservoir is 205 metres thick, generally very fine to fine grained sandstone, but with a 28 metre thick siltstone incorporated in the uppermost part. Reservoir properties were very variable. Reasonable reservoir properties were found near the top of the reservoir. They were poor in an upper siltstone zone, in an intermediate 77 metre thick quartz overgrowth zone and at the base of the 2/1-3 sand where it shaled out into the Farsund Formation. Shows were recorded from 4174 to 4178 m in a sandstone that had very low permeability, and could not be tested. Minor patchily developed shows were observed from 4178 down to 4203 m, all within the fairly tight siltstone. No OWC was seen in the well. However, a possible OWC has been established at 4185 m (4160 m MSL), on the basis of a re-interpretation of RFT data from the wells 2/1-3, 4, 6 and 1/3-3 combined with pressure readings in the water zone of 2/1-6.

Eight cores were cut between 4127 and 4165.35 m. Four cores were cut between 4303 and 4391.5 m. Recovery was 100% for all cores. For all cores the core depth is 4 m less than logger's depth. The RFT tool was run for pressure and fluid samples. A fluid sample was taken at 4208 m. Rig site resistivity measurements and laboratory water analysis confirmed the samples to be mud filtrate. Sampling was attempted in the interval 4173-4175 m. The sand interval was tight and neither pressure measurements nor sample were obtained.

The well was permanently abandoned on 12 August 1984 as a dry appraisal well.

Testing

Two drill stem tests/water injection tests were performed in the Gyda member sandstone. Both tests confirmed the reservoir to be water bearing.

DST1 perforated 4328.75 - 4340.75 m and produced 288 B/D of water with 1.17 specific gravity in the main flow period, through a 64/64" choke. In the following injection period the final injection rate was 240 B/D of treated sea water and the final surface injection pressure was 7000 psig.

DST2 perforated 4210 - 4241 m and produced 3379 B/D of water with 1.17 specific gravity in the main flow through a 28/64" choke. In the following injection period the final injection rate, before acidization, was 2880 B/D of treated sea water and the final surface injection pressure was 5245psig. After acidization the final injection rate was 7544 B/D of



treated sea water and the final surface injection pressure was 4955 psig.

A number of temperature sensors were employed in the tests and maximum temperatures from 146 to 162 deg C were recorded. Among these maximum temperatures of 319 deg F (159.4 deg C) and 318 (158.9 deg C) in DST1 and DST2 respectively seem to be the more representative and in agreement with corrected wire line temperatures.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
170.00	4581.00

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	4127.0	4153.3	[m]
2	4153.7	4181.3	[m]
3	4181.4	4208.6	[m]
4	4208.5	4235.4	[m]
5	4235.4	4245.6	[m]
6	4245.6	4254.7	[m]
7	4254.6	4263.2	[m]
8	4263.3	4265.4	[m]
9	4303.0	4313.0	[m]
10	4313.0	4336.8	[m]
11	4336.8	4364.3	[m]
12	4364.3	4391.5	[m]

Total core sample length [m]	226.4
Cores available for sampling?	YES

Core photos



4127-4133m



4133-4139m



4139-4144m



4145-4151m



4151-4154m



4153-4159m



4159-4165m



4165-4170m



4171-4177m



4177-4181m



4181-4187m



4187-4193m



4193-4199m



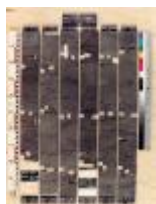
4199-4205m



4205-4209m



4208-4214m



4214-4220m



4220-4226m



4226-4232m



4232-4235m



4235-4241m



4241-4246m



4245-4251m



4251-4254m



4254-4260m



4260-4263m



4263-4266m



4303-4309m



4309-4314m



4313-4319m



4319-4325m



4325-4331m



4331-4336m



4336-4342m



4342-4347m



4348-4354m



4354-4360m



4360-4364m



4364-4370m



4370-4376m



4376-4382m



4382-4387m



4388-4392m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
4100.0	[m]	DC	HRS
4110.0	[m]	DC	HRS
4124.0	[m]	C	APT
4127.0	[m]	C	HRS
4132.0	[m]	C	HRS
4133.0	[m]	C	APT
4139.0	[m]	C	APT
4143.6	[m]	C	HRS
4145.0	[m]	C	APT
4148.0	[m]	C	HRS
4151.0	[m]	C	APT
4152.9	[m]	C	HRS
4153.0	[m]	C	APT
4156.5	[m]	C	HRS
4157.0	[m]	C	APT
4163.0	[m]	C	APT



4163.6 [m]	C	HRS
4168.7 [m]	C	APT
4168.9 [m]	C	HRS
4169.7 [m]	C	APT
4170.6 [m]	C	APT
4172.7 [m]	C	APT
4173.7 [m]	C	APT
4174.7 [m]	C	APT
4175.7 [m]	C	APT
4176.7 [m]	C	APT
4176.9 [m]	C	HRS
4177.7 [m]	C	APT
4178.7 [m]	C	APT
4181.0 [m]	C	HRS
4181.4 [m]	C	APT
4182.5 [m]	C	APT
4185.3 [m]	C	HRS
4185.4 [m]	C	APT
4186.4 [m]	C	APT
4189.4 [m]	C	APT
4191.5 [m]	C	APT
4194.4 [m]	C	APT
4196.4 [m]	C	APT
4197.3 [m]	C	HRS
4197.4 [m]	C	APT
4200.3 [m]	C	APT
4205.7 [m]	C	HRS
4208.2 [m]	C	APT
4210.1 [m]	C	APT
4211.4 [m]	C	HRS
4218.0 [m]	C	HRS
4220.1 [m]	C	APT
4222.5 [m]	C	HRS
4226.1 [m]	C	APT
4232.1 [m]	C	APT
4236.8 [m]	C	HRS
4237.0 [m]	C	APT
4239.3 [m]	C	APT
4244.0 [m]	C	APT
4246.0 [m]	C	APT



4246.0	[m]	C	HRS
4246.9	[m]	C	APT
4256.1	[m]	C	APT
4260.8	[m]	C	APT
4261.2	[m]	C	APT
4262.6	[m]	C	HRS
4304.5	[m]	C	APT
4305.1	[m]	C	APT
4307.5	[m]	C	APT
4309.0	[m]	C	APT
4321.5	[m]	C	APT
4329.2	[m]	C	HRS
4333.8	[m]	C	HRS
4334.2	[m]	C	APT
4336.5	[m]	C	APT
4350.1	[m]	C	APT
4350.5	[m]	C	APT
4351.8	[m]	C	APT
4355.8	[m]	C	APT
4360.8	[m]	C	APT
4362.1	[m]	C	APT
4362.5	[m]	C	HRS
4363.8	[m]	C	APT
4367.0	[m]	C	APT
4368.2	[m]	C	APT
4369.7	[m]	C	APT
4370.3	[m]	C	APT
4372.0	[m]	C	HRS
4372.3	[m]	C	APT
4375.2	[m]	C	APT
4377.2	[m]	C	APT
4379.2	[m]	C	APT
4381.3	[m]	C	APT
4383.2	[m]	C	APT
4385.2	[m]	C	APT
4387.2	[m]	C	APT
4389.2	[m]	C	APT
4391.0	[m]	C	HRS
4391.2	[m]	C	APT
4394.0	[m]	C	HRS



4400.0	[m]	C	HRS
4412.0	[m]	C	HRS
4445.0	[m]	C	HRS
4487.0	[m]	C	HRS
4526.0	[m]	C	HRS
4551.0	[m]	C	HRS
4566.0	[m]	C	HRS
4569.0	[m]	C	HRS

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
91	NORDLAND GP
1793	HORDALAND GP
2947	ROGALAND GP
2947	BALDER FM
2970	SELE FM
2987	FORTIES FM
3033	LISTA FM
3128	VIDAR FM
3173	LISTA FM
3196	VÅLE FM
3215	SHETLAND GP
3215	EKOFISK FM
3312	TOR FM
3660	HOD FM
3788	BLODØKS FM
3806	HIDRA FM
3825	CROMER KNOLL GP
3825	RØDBY FM
3853	TUXEN FM
3897	ÅSGARD FM
4104	TYNE GP
4104	MANDAL FM
4165	FARSUND FM
4426	HAUGESUND FM
4560	VESTLAND GP
4560	ULA FM
4566	BRYNE FM



4587	NO GROUP DEFINED
4587	SKAGERRAK FM

Composite logs

Document name	Document format	Document size [MB]
109	pdf	0.80

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

Document name	Document format	Document size [MB]
109 01 WDSS General Information	pdf	0.24
109 02 WDSS completion log	pdf	0.39

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

Document name	Document format	Document size [MB]
109 2 1 6 Completion Report	pdf	17.51

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	4329	4340	25.4
2.0	4241	4210	11.1

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0	16.000			
2.0	12.500			

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





2.0					
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Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL GR	500	2000
DIPMETER	4114	4563
DLL MSFL GR SP CALI	4113	4583
ISF BHC MAFL GR CALI SP	2006	3913
ISF BHC MAFL GR CALI SP	3600	4123
ISF GR SLS MSFL CALI SP	626	2001
ISF LSS GR	90	635
ISF LSS MSFL GR CALI SP	4113	4586
LDL CNL NGL	4113	4587
NGT RATIO	4113	4587
VSP	650	4578

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	166.0	36	167.0	0.00	LOT
SURF.COND.	20	626.0	26	635.0	1.56	LOT
INTERM.	13 3/8	2006.0	17 1/2	2016.0	1.90	LOT
INTERM.	9 5/8	4112.0	12 1/4	4121.0	2.12	LOT
LINER	7	4579.0	8 1/2	4583.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
151	1.05			WATER BASED	10.05.1984
166	1.04			WATER BASED	10.05.1984
167	1.05			WATER BASED	13.05.1984
320	1.08	4.0	5.0	WATER BASED	13.05.1984
481	1.09	3.0	8.0	WATER BASED	13.05.1984
635	1.15	5.0	26.0	WATER BASED	13.05.1984
660	1.14	19.0	28.0	WATER BASED	13.05.1984



1140	1.20	14.0	10.0	WATER BASED	14.05.1984
1415	1.42	22.0	12.0	WATER BASED	14.05.1984
1718	1.50	22.0	12.0	WATER BASED	14.05.1984
1850	1.50	24.0	6.2	WATER BASED	14.05.1984
2010	1.54	23.0	5.3	WATER BASED	15.05.1984
2220	1.55	19.0	6.2	WATER BASED	20.05.1984
2414	1.55	17.0	7.2	WATER BASED	20.05.1984
2543	1.55	18.0	5.8	WATER BASED	22.05.1984
2743	1.55	21.0	7.2	WATER BASED	23.05.1984
2951	1.56	23.0	5.8	WATER BASED	24.05.1984
3013	1.56	22.0	15.4	WATER BASED	25.05.1984
3168	1.57	27.0	13.4	WATER BASED	28.05.1984
3208	1.58	21.0	9.1	WATER BASED	28.05.1984
3231	1.58	20.0	11.0	WATER BASED	28.05.1984
3300	1.57	19.0	9.1	WATER BASED	29.05.1984
3311	1.58	22.0	5.8	WATER BASED	31.05.1984
3354	1.58	23.0	8.6	WATER BASED	01.06.1984
3424	1.58	25.0	8.2	WATER BASED	01.06.1984
3486	1.58	30.0	6.7	WATER BASED	04.06.1984
3578	1.58	32.0	8.2	WATER BASED	04.06.1984
3625	1.58	32.0	7.2	WATER BASED	04.06.1984
3669	1.58	28.0	6.7	WATER BASED	05.06.1984
3716	1.58	30.0	7.7	WATER BASED	06.06.1984
3733	1.58	33.0	7.7	WATER BASED	07.06.1984
3746	1.58	33.0	7.7	WATER BASED	08.06.1984
3763	1.58	31.0	7.2	WATER BASED	12.06.1984
3768	1.58	30.0	7.2	WATER BASED	12.06.1984
3775	1.58	28.0	6.2	WATER BASED	12.06.1984
3811	1.58	34.0	8.0	WATER BASED	15.06.1984
3845	1.58	28.0	6.0	WATER BASED	15.06.1984
3876	1.57	29.0	7.0	WATER BASED	15.06.1984
3886	1.59	26.0	6.2	WATER BASED	17.06.1984
3927	1.58	30.0	7.7	WATER BASED	17.06.1984
3961	1.58	29.0	9.6	WATER BASED	17.06.1984
4011	1.58	28.0	9.6	WATER BASED	20.06.1984
4066	1.58	25.0	13.4	WATER BASED	20.06.1984
4118	1.58	21.0	5.3	WATER BASED	21.06.1984
4121	1.58	21.0	5.3	WATER BASED	22.06.1984
4121	1.69	26.0	13.4	WATER BASED	27.06.1984
4121	1.58	21.0	5.3	WATER BASED	22.06.1984



4121	1.69	26.0	13.4	WATER BASED	27.06.1984
4124	1.56	15.0	9.6	WATER BASED	02.07.1984
4137	1.56	19.0	9.6	WATER BASED	02.07.1984
4180	1.56	21.0	11.0	WATER BASED	02.07.1984
4235	1.56	23.0	11.5	WATER BASED	03.07.1984
4245	1.56	21.0	11.0	WATER BASED	04.07.1984
4262	1.56	18.0	10.6	WATER BASED	05.07.1984
4268	1.56	22.0	10.6	WATER BASED	06.07.1984
4284	1.56	19.0	11.5	WATER BASED	06.07.1984
4303	1.56	19.0	12.0	WATER BASED	06.07.1984
4313	1.56	20.0	15.5	WATER BASED	10.07.1984
4337	1.56	19.0	15.4	WATER BASED	11.07.1984
4378	1.57	20.0	14.9	WATER BASED	12.07.1984
4393	1.56	16.0	6.2	WATER BASED	13.07.1984
4478	1.55	21.0	12.0	WATER BASED	16.07.1984
4583	1.55	18.0	12.0	WATER BASED	16.07.1984

Thin sections at the Norwegian Offshore Directorate

Depth	Unit
4127.00	[m]
4164.00	[m]
4181.00	[m]
4197.00	[m]
4334.00	[m]
4354.00	[m]
4363.00	[m]
4374.00	[m]
4391.00	[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]
109 Formation pressure (Formasjonstrykk)	PDF	0.22

