General information

Wellbore name	6406/5-1
Type	EXPLORATION
Purpose	WILDCAT
Status	P&A
Press release	link to press release
Factmaps in new window	link to map
Main area	NORWEGIAN SEA
Discovery	6406/5-1
Well name	6406/5-1
Seismic location	SH00S2-104DA intersecting SH00S2-304D
Production licence	255
Drilling operator	A/S Norske Shell
Drill permit	1026-L
Drilling facility	TRANSOCEAN WINNER
Drilling days	129
Entered date	23.12.2001
Completed date	30.04.2002
Release date	30.04.2004
Publication date	18.05.2004
Purpose - planned	WILDCAT
Reentry	NO
Content	GAS/CONDENSATE
Discovery wellbore	YES
1st level with HC, age	MIDDLE JURASSIC
1st level with HC, formation	GARN FM
Kelly bushing elevation [m]	26.0
Water depth [m]	286.0
Total depth (MD) [m RKB]	4692.0
Final vertical depth (TVD) [m RKB]	4684.0
Bottom hole temperature [°C]	165
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	TILJE FM
Geodetic datum	ED50
NS degrees	64° 37' 16.62'' N
EW degrees	6° 36' 3.13'' E
NS UTM [m]	7168597.21
EW UTM [m]	385281.15
UTM zone	32
NPDID wellbore	4451

Wellbore history

General

Well 6406/5-1 was drilled on the Halten Terrace, on a structure south of the Kristin field. The objective of well 6406/5-1 was to test and sample the Middle-Lower Jurassic Garn, Ile and Tofte Formations.

Operations and results

Wildcat well 6406/5-1 was spudded on 23 December 2001 in 286 m water depth with the semi-submersible installation Transocean Winner and drilled to TD at 4692 m in the Early Jurassic Tilje Formation. The well encountered a kick immediately below the base of the Tertiary at 2600 m where hydrocarbons flowed to the surface. An unexpected highly pressured sandy interval of the Springar Formation contained fluid hydrocarbons. Due to problems stabilizing the well bore, the well was technically sidetracked from the 16" casing at 1435 m. The well was drilled with spud mud down to 1434 m, with KCl/PAC/glycol mud from 1434 m to 2691 m, and with Versapro oil based mud from 2691 m to TD.

The well found a 41 m hydrocarbon column in the Garn Formation. From MDT sampling the fluid was interpreted to be a rich gas/condensate with a GOR of 373 Sm3/Sm3. However, the reservoir MDT sample was estimated to have a mud contamination of 49%. Estimation of the uncontaminated reservoir fluid composition and the reservoir fluid properties using equations of state (EOS) gave a GOR of 486 Sm3/Sm3. The Ile and Tofte reservoirs were water bearing, but the cores showed fluorescence. All three prognosed reservoirs were encountered with porosities in the range of 7% to 29%.

A total of 97 m core was recovered in five cores, one core from the Garn Formation, two cores from the Ile Formation, and two cores from the Tofte Formation. MDT pressures were taken from all reservoirs and fluid samples taken from the Ile and the Garn reservoirs. The pressure measurements at the top of the Garn Formation confirmed the predicted high pressure in the reservoir. The measured pressure was 777 bar.

The well was plugged and abandoned on 30 April 2002 as a gas/condensate discovery.

Testing

No drill stem test was performed

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
1440.00	2590.00

Cuttings available for sampling?	YES

Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	4230.0	4254.4	[m]
2	4342.0	4366.1	[m]
3	4377.0	4401.5	[m]
4	4495.0	4496.5	[m]
5	4499.0	4522.5	[m]

Total core sample length [m]	98.0
Cores available for sampling?	YES

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
1470.0	[m]	DC	ICHRON
1500.0	[m]	DC	ICHRON
1520.0	[m]	DC	ICHRON
1550.0	[m]	DC	ICHRON
1610.0	[m]	DC	ICHRON
1640.0	[m]	DC	ICHRON
1670.0	[m]	DC	ICHRON
1700.0	[m]	DC	ICHRON
1730.0	[m]	DC	ICHRON
1760.0	[m]	DC	ICHRON
1820.0	[m]	DC	ICHRON
1850.0	[m]	DC	ICHRON
1880.0	[m]	DC	ICHRON
1910.0	[m]	DC	ICHRON
1940.0	[m]	DC	ICHRON
1950.0	[m]	DC	ICHRON
1960.0	[m]	DC	ICHRON
1970.0	[m]	DC	ICHRON
1970.0	[m]	DC	ICHRON
1980.0	[m]	DC	ICHRON
1990.0	[m]	DC	ICHRON
2000.0	[m]	DC	ICHRON
2010.0	[m]	DC	ICHRON
2020.0	[m]	DC	ICHRON
2030.0	[m]	DC	ICHRON
2040.0	[m]	DC	ICHRON

2050.0	[m]	DC	ICHRON
2060.0	[m]	DC	ICHRON
2070.0	[m]	DC	ICHRON
2080.0	[m]	DC	ICHRON
2090.0	[m]	DC	ICHRON
2100.0	[m]	DC	ICHRON
2110.0	[m]	DC	ICHRON
2120.0	[m]	DC	ICHRON
2130.0	[m]	DC	ICHRON
2140.0	[m]	DC	ICHRON
2150.0	[m]	DC	ICHRON
2160.0	[m]	DC	ICHRON
2170.0	[m]	DC	ICHRON
2190.0	[m]	DC	ICHRON
2210.0	[m]	DC	ICHRON
2220.0	[m]	DC	ICHRON
2240.0	[m]	DC	ICHRON
2250.0	[m]	DC	ICHRON
2270.0	[m]	DC	ICHRON
2280.0	[m]	DC	ICHRON
2290.0	[m]	DC	ICHRON
2300.0	[m]	DC	ICHRON
2310.0	[m]	DC	ICHRON
2340.0	[m]	DC	ICHRON
2350.0	[m]	DC	ICHRON
2360.0	[m]	DC	ICHRON
2370.0	[m]	DC	ICHRON
2390.0	[m]	DC	ICHRON
2400.0	[m]	DC	ICHRON
2410.0	[m]	DC	ICHRON
2420.0	[m]	DC	ICHRON
2430.0	[m]	DC	ICHRON
2440.0	[m]	DC	ICHRON
2450.0	[m]	DC	ICHRON
2460.0	[m]	DC	ICHRON
2470.0	[m]	DC	ICHRON
2480.0	[m]	DC	ICHRON
2490.0	[m]	DC	ICHRON
2500.0	[m]	DC	ICHRON
2510.0	[m]	DC	ICHRON

2520.0	[m]	DC	ICHRON
2530.0	[m]	DC	ICHRON
2540.0	[m]	DC	ICHRON
2550.0	[m]	DC	ICHRON
2560.0	[m]	DC	ICHRON
2570.0	[m]	DC	ICHRON
2580.0	[m]	DC	ICHRON
2589.0	[m]	DC	ICHRON
2601.0	[m]	DC	ICHRON
2610.0	[m]	DC	ICHRON
2619.0	[m]	DC	ICHRON
2630.0	[m]	DC	ICHRON
2640.0	[m]	DC	ICHRON
2650.0	[m]	DC	ICHRON
2660.0	[m]	DC	ICHRON
2670.0	[m]	DC	ICHRON
2680.0	[m]	DC	ICHRON
2690.0	[m]	DC	ICHRON
2710.0	[m]	DC	ICHRON
2740.0	[m]	DC	ICHRON
2770.0	[m]	DC	ICHRON
2800.0	[m]	DC	ICHRON
2820.0	[m]	DC	ICHRON
2840.0	[m]	DC	ICHRON
2870.0	[m]	DC	ICHRON
2890.0	[m]	DC	ICHRON
2910.0	[m]	DC	ICHRON
2930.0	[m]	DC	ICHRON
2940.0	[m]	DC	ICHRON
2960.0	[m]	DC	ICHRON
2970.0	[m]	DC	ICHRON
2980.0	[m]	DC	ICHRON
2990.0	[m]	DC	ICHRON
3020.0	[m]	DC	ICHRON
3040.0	[m]	DC	ICHRON
3060.0	[m]	DC	ICHRON
3080.0	[m]	DC	ICHRON
3100.0	[m]	DC	ICHRON
3120.0	[m]	DC	ICHRON
3130.0	[m]	DC	ICHRON

3160.0	[m]	DC	ICHRON
3170.0	[m]	DC	ICHRON
3190.0	[m]	DC	ICHRON
3210.0	[m]	DC	ICHRON
3220.0	[m]	DC	ICHRON
3240.0	[m]	DC	ICHRON
3250.0	[m]	DC	ICHRON
3260.0	[m]	DC	ICHRON
3280.0	[m]	DC	ICHRON
3300.0	[m]	DC	ICHRON
3310.0	[m]	DC	ICHRON
3320.0	[m]	DC	ICHRON
3330.0	[m]	DC	ICHRON
3340.0	[m]	DC	ICHRON
3350.0	[m]	DC	ICHRON
3360.0	[m]	DC	ICHRON
3380.0	[m]	DC	ICHRON
3390.0	[m]	DC	ICHRON
3410.0	[m]	DC	ICHRON
3420.0	[m]	DC	ICHRON
3440.0	[m]	DC	ICHRON
3450.0	[m]	DC	ICHRON
3460.0	[m]	DC	ICHRON
3480.0	[m]	DC	ICHRON
3490.0	[m]	DC	ICHRON
3510.0	[m]	DC	ICHRON
3520.0	[m]	DC	ICHRON
3540.0	[m]	DC	ICHRON
3550.0	[m]	DC	ICHRON
3570.0	[m]	DC	ICHRON
3590.0	[m]	DC	ICHRON
3600.0	[m]	DC	ICHRON
3770.0	[m]	DC	ICHRON
3790.0	[m]	DC	ICHRON
3820.0	[m]	DC	ICHRON
3830.0	[m]	DC	ICHRON
3850.0	[m]	DC	ICHRON
3860.0	[m]	DC	ICHRON
3950.0	[m]	DC	ICHRON
3960.0	[m]	DC	ICHRON

3970.0	[m]	DC	ICHRON
4006.0	[m]	DC	ICHRON
4014.0	[m]	DC	ICHRON
4023.0	[m]	DC	ICHRON
4032.0	[m]	DC	ICHRON
4041.0	[m]	DC	ICHRON
4068.0	[m]	DC	ICHRON
4071.0	[m]	DC	ICHRON
4074.0	[m]	DC	ICHRON
4083.0	[m]	DC	ICHRON
4092.0	[m]	DC	ICHRON
4100.0	[m]	DC	ICHRON
4110.0	[m]	DC	ICHRON
4122.0	[m]	DC	ICHRON
4134.0	[m]	DC	ICHRON
4146.0	[m]	DC	ICHRON
4155.0	[m]	DC	ICHRON
4167.0	[m]	DC	ICHRON
4179.0	[m]	DC	ICHRON
4197.0	[m]	DC	ICHRON
4206.0	[m]	DC	ICHRON
4209.0	[m]	DC	ICHRON
4220.0	[m]	DC	ICHRON
4230.0	[m]	DC	ICHRON
4231.6	[m]	C	ICHRON
4234.4	[m]	C	ICHRON
4236.5	[m]	C	ICHRON
4237.0	[m]	C	ICHRON
4239.7	[m]	C	ICHRON
4250.5	[m]	C	ICHRON
4251.7	[m]	C	ICHRON
4269.0	[m]	DC	ICHRON
4278.0	[m]	DC	ICHRON
4287.0	[m]	DC	ICHRON
4296.0	[m]	DC	ICHRON
4305.0	[m]	DC	ICHRON
4314.0	[m]	DC	ICHRON
4323.0	[m]	DC	ICHRON
4332.0	[m]	DC	ICHRON
4335.0	[m]	DC	ICHRON

4347.0	[m]	C	ICHRON
4350.1	[m]	C	ICHRON
4352.1	[m]	C	ICHRON
4355.4	[m]	C	ICHRON
4356.6	[m]	C	ICHRON
4359.1	[m]	C	ICHRON
4361.0	[m]	C	ICHRON
4363.9	[m]	C	ICHRON
4364.7	[m]	C	ICHRON
4378.0	[m]	C	ICHRON
4380.7	[m]	C	ICHRON
4385.0	[m]	C	ICHRON
4389.7	[m]	C	ICHRON
4393.7	[m]	C	ICHRON
4400.0	[m]	C	ICHRON
4401.4	[m]	C	ICHRON
4424.0	[m]	DC	ICHRON
4443.0	[m]	DC	ICHRON
4452.0	[m]	DC	ICHRON
4464.0	[m]	DC	ICHRON
4476.0	[m]	SWC	ICHRON
4486.0	[m]	SWC	ICHRON
4493.5	[m]	SWC	ICHRON
4516.0	[m]	C	ICHRON
4519.0	[m]	C	ICHRON
4521.0	[m]	DC	ICHRON
4522.5	[m]	C	ICHRON
4530.0	[m]	DC	ICHRON
4530.0	[m]	SWC	ICHRON
4540.0	[m]	SWC	ICHRON
4556.5	[m]	SWC	ICHRON
4566.0	[m]	DC	ICHRON
4568.0	[m]	SWC	ICHRON
4578.0	[m]	DC	ICHRON
4580.0	[m]	SWC	ICHRON
4590.0	[m]	DC	ICHRON
4617.0	[m]	DC	ICHRON
4635.0	[m]	SWC	ICHRON
4642.0	[m]	SWC	ICHRON
4644.0	[m]	DC	ICHRON

4650.0	[m]	SWC	ICHRON
4656.0	[m]	DC	ICHRON
4677.0	[m]	DC	ICHRON

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
312	NORDLAND GP
1452	KAI FM
1910	HORDALAND GP
1910	BRYGGE FM
2459	ROGALAND GP
2459	TARE FM
2584	SHETLAND GP
2584	SPRINGAR FM
2693	NISE FM
2872	KVITNOS FM
3377	CROMER KNOLL GP
3377	LYSING FM
3385	LANGE FM
4060	LYR FM
4072	VIKING GP
4072	SPEKK FM
4077	MELKE FM
4205	FANGST GP
4205	GARN FM
4272	NOT FM
4335	ILE FM
4443	BÅT GP
4443	ROR FM
4487	TOFTE FM
4580	ROR FM
4628	TILJE FM

Composite logs

Document name	Document format	Document size [MB]
4451	pdf	0.60

Geochemical information

Document name	Document format	Document size [MB]
4451_1	pdf	1.92
4451_2	xls	0.14
4451_3	xls	0.16

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

Document name	Document format	Document size [MB]
4451_6406_5_1_COMPLETION_LOG	.pdf	2.91
4451_6406_5_1_COMPLETION_REPORT	.pdf	7.77

Logs

Log type	Log top depth [m]	Log bottom depth [m]
AIT DSI GR	4109	4645
ASI GR	2227	4090
CSI GR	3969	4635
CST GR	4118	4655
ECRD ACTS IPLT AIT	4106	4501
EMS GR ACTS	1435	1899
EMS GR GPIT DSI	2281	2683
IPLT	4109	4670
IPLT AIT DSI	2683	4122
MDT GR	4108	4237
MDT GR	4210	4681
MDT GR	4236	4486
MDT GR	4336	4497
MWD - CDR RES GR	312	2600
MWD - CDR RES GR	2691	4692
MWD - DIR	1425	2361
PEX HALS HNGS	2281	2691

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	359.0	36	360.0	0.00	LOT
INTERM.	20	1399.0	26	1400.0	1.84	LOT
INTERM.	16	2254.0	18	2260.0	1.86	LOT
INTERM.	13 3/8	2654.0	17 1/2	2660.0	1.87	LOT
INTERM.	9 5/8	4073.0	12 1/4	4075.0	0.00	LOT
OPEN HOLE		4692.0	8 1/2	4692.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
385	1.05			SPUD MUD	
1092	1.05			SPUD MUD	
1122	1.84	31.0		POLYMER	
1287	1.05			SPUD MUD	
1297	1.84	31.0		POLYMER	
1434	1.50	23.0		KCL/PAC/GLYCOL	
1533	1.54	18.0		KCL/PAC/GLYCOL	
1616	1.48	20.0		KCL/PAC/GLYCOL	
2277	1.58	31.0		KCL/PAC/GLYCOL	
2280	1.58	31.0		KCL/PAC/GLYCOL	
2360	1.50	30.0		KCL/PAC/GLYCOL	
2364	1.75	40.0		KCL/PAC/GLYCOL	
2552	1.78	35.0		KCL/PAC/GLYCOL	
2600	1.64	28.0		KCL/PAC/GLYCOL	
2691	1.82	33.0		KCL/PAC/GLYCOL	
2830	1.78	46.0		OIL (ENVIRON)	
3901	1.87	72.0		OIL (ENVIRON)	
4115	1.87	54.0		OIL (ENVIRON)	
4149	1.97	58.0		OIL (ENVIRON)	
4230	1.97	56.0		OIL (ENVIRON)	
4313	1.97	58.0		OIL (ENVIRON)	
4372	1.97	54.0		OIL (ENVIRON)	
4378	1.97	58.0		OIL (ENVIRON)	
4401	1.97	59.0		OIL (ENVIRON)	
4434	1.97	54.0		OIL (ENVIRON)	
4496	1.97	56.0		OIL (ENVIRON)	

4523	1.97	52.0		OIL (ENVIRON)	
4692	1.90	53.0		OIL (ENVIRON)	

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]
4451_Formation_pressure_(Formasjonstrykk)	pdf	0.28