General information

Wellbore name	6406/9-3
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	6406/9-3 (Onyx Sør)
Well name	6406/9-3
Seismic location	SH0902MZ10.inline 5601 & crossline 3096
Production licence	255
Drilling operator	A/S Norske Shell
Drill permit	1439-L
Drilling facility	TRANSOCEAN BARENTS
Drilling days	165
Entered date	18.04.2013
Completed date	29.09.2013
Release date	29.09.2015
Publication date	29.09.2015
Purpose - planned	WILDCAT
Reentry	NO
Content	GAS
Discovery wellbore	YES
1st level with HC, age	MIDDLE JURASSIC
1st level with HC, formation	ILE FM
Kelly bushing elevation [m]	40.0
Water depth [m]	298.0
Total depth (MD) [m RKB]	5138.0
Final vertical depth (TVD) [m RKB]	5135.0
Maximum inclination [°]	6.6
Bottom hole temperature [°C]	186
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	TILJE FM
Geodetic datum	ED50
NS degrees	64° 25' 15.99'' N
EW degrees	6° 58' 42.79'' E
NS UTM [m]	7145667.70
EW UTM [m]	402625.05

UTM zone	32
NPDID wellbore	7141

Wellbore history

General

Well 6406/9-3 was drilled on the Onyx prospect between the Linnorm, Mjøsa and Noatun discoveries in the southern part of the Halten Terrace in the Norwegian Sea. The primary objective was to prove petroleum in the Middle to Early Jurassic sequence (Ile, Tofte, and Tilje formations. The secondary objective was to evaluate potential Åre Formation reservoirs.

Operations and results

Wildcat well 6406/9-3 was spudded with the semi-submersible installation Transocean Barents on 18 April 2013 and drilled to TD at 5138 m in the Early Jurassic Tilje Formation. No shallow gas was observed by the ROV at the wellhead or the MWD while drilling the 9-7/8'' pilot hole to a planned depth of 637 m. During drilling of the 26'' section at 1288 m a minor shallow water flow with some gas bubbles was observed at the wellhead and it was recognised that the Kai Formation was penetrated underbalanced. It was decided to set the 20'' casing shallow. Low leak-off at the 20'' shoe required running a 16'' contingency liner. The 14 3/4'' x 17 1/2'' section was drilled to section TD at 2270 m. A bad cement job around the 13 5/8'' casing caused a technical sidetrack from 1645 m. The sidetrack is named 6406/9-3 T2. While drilling the basal part of the lower Cretaceous Lange Formation the interpreted real-time pore pressure exceeded the pre-drill high-case prediction and consequently the 10'' casing was set shallower than planned. The well was drilled with seawater and hi-vis sweeps down to 1288 m, with Glydril mud from 1288 m to 2294 m in both well tracks, and with EMS-400 oil based mud from 2294 m to TD.

The well penetrated the two primary reservoir targets of Jurassic age: the Ile Formation at 4635 m and the Tilje Formation at 4954 m. A non-commercial gas reservoir was evaluated in the Ile Formation. The free water level is indicated to be between 4695 and 4704 m based mainly on the mixed gas and water in the MDT sample at 4697 m. The Upper/Middle Tilje Formations was found to be tight and residual gas bearing, while the Lower Tilje Formation was confirmed water bearing. Due to the non-commercial discovery in the primary target, the Åre Formation was not drilled. Oil shows were described on the core in the Ile Formation. On cuttings, there were no shows that could be distinguished from the oil based mud.

One 27m core was taken in the Lower Ile Formation from 4704 m to 4731 m with 99.9% recovery. MDT fluid samples were taken at 4697 m (water and gas) and at 4715.4 m (water). Both samples had mud filtrate contamination.

The well was permanently abandoned on 29 September 2013 as a minor gas discovery.

Testing

No drill stem test was performed.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
1298.00	2268.00

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	4704.0	4731.0	[m]

Total core sample length [m]	27.0
Cores available for sampling?	YES

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
1650.0	[m]	DC	SHELL
1670.0	[m]	DC	SHELL
1690.0	[m]	DC	SHELL
1710.0	[m]	DC	SHELL
1750.0	[m]	DC	SHELL
1770.0	[m]	DC	SHELL
1790.0	[m]	DC	SHELL
1810.0	[m]	DC	SHELL
1830.0	[m]	DC	SHELL
1850.0	[m]	DC	SHELL
1870.0	[m]	DC	SHELL
1890.0	[m]	DC	SHELL
1910.0	[m]	DC	SHELL
1930.0	[m]	DC	SHELL
1950.0	[m]	DC	SHELL
1970.0	[m]	DC	SHELL
1990.0	[m]	DC	SHELL
2010.0	[m]	DC	SHELL
2030.0	[m]	DC	SHELL
2050.0	[m]	DC	SHELL
2070.0	[m]	DC	SHELL
2090.0	[m]	DC	SHELL

2110.0	[m]	DC	SHELL
2120.0	[m]	DC	SHELL
2130.0	[m]	DC	SHELL
2150.0	[m]	DC	SHELL
2170.0	[m]	DC	SHELL
2190.0	[m]	DC	SHELL
2210.0	[m]	DC	SHELL
2230.0	[m]	DC	SHELL
2240.0	[m]	DC	SHELL
2250.0	[m]	DC	SHELL
2270.0	[m]	DC	SHELL
2290.0	[m]	DC	SHELL
2310.0	[m]	DC	SHELL
2330.0	[m]	DC	SHELL
2350.0	[m]	DC	SHELL
2370.0	[m]	DC	SHELL
2390.0	[m]	DC	SHELL
2410.0	[m]	DC	SHELL
2430.0	[m]	DC	SHELL
2450.0	[m]	DC	SHELL
2470.0	[m]	DC	SHELL
2490.0	[m]	DC	SHELL
2510.0	[m]	DC	SHELL
2530.0	[m]	DC	SHELL
2550.0	[m]	DC	SHELL
2570.0	[m]	DC	SHELL
2590.0	[m]	DC	SHELL
2610.0	[m]	DC	SHELL
2630.0	[m]	DC	SHELL
2650.0	[m]	DC	SHELL
2670.0	[m]	DC	SHELL
2690.0	[m]	DC	SHELL
2710.0	[m]	DC	SHELL
2730.0	[m]	DC	SHELL
2750.0	[m]	DC	SHELL
2770.0	[m]	DC	SHELL
2790.0	[m]	DC	SHELL
2810.0	[m]	DC	SHELL
2830.0	[m]	DC	SHELL
2850.0	[m]	DC	SHELL

2870.0	[m]	DC	SHELL
2890.0	[m]	DC	SHELL
2910.0	[m]	DC	SHELL
2930.0	[m]	DC	SHELL
2950.0	[m]	DC	SHELL
2970.0	[m]	DC	SHELL
2990.0	[m]	DC	SHELL
3010.0	[m]	DC	SHELL
3030.0	[m]	DC	SHELL
3050.0	[m]	DC	SHELL
3070.0	[m]	DC	SHELL
3090.0	[m]	DC	SHELL
3110.0	[m]	DC	SHELL
3130.0	[m]	DC	SHELL
3150.0	[m]	DC	SHELL
3170.0	[m]	DC	SHELL
3190.0	[m]	DC	SHELL
3210.0	[m]	DC	SHELL
3230.0	[m]	DC	SHELL
3250.0	[m]	DC	SHELL
3270.0	[m]	DC	SHELL
3290.0	[m]	DC	SHELL
3310.0	[m]	DC	SHELL
3330.0	[m]	DC	SHELL
3341.0	[m]	DC	SHELL
3355.0	[m]	DC	SHELL
3370.0	[m]	DC	SHELL
3390.0	[m]	DC	SHELL
3410.0	[m]	DC	SHELL
3430.0	[m]	DC	SHELL
3450.0	[m]	DC	SHELL
3470.0	[m]	DC	SHELL
3490.0	[m]	DC	SHELL
3510.0	[m]	DC	SHELL
3530.0	[m]	DC	SHELL
3550.0	[m]	DC	SHELL
3570.0	[m]	DC	SHELL
3590.0	[m]	DC	SHELL
3610.0	[m]	DC	SHELL
3630.0	[m]	DC	SHELL

3650.0	[m]	DC	SHELL
3670.0	[m]	DC	SHELL
3690.0	[m]	DC	SHELL
3710.0	[m]	DC	SHELL
3730.0	[m]	DC	SHELL
3750.0	[m]	DC	SHELL
3770.0	[m]	DC	SHELL
3790.0	[m]	DC	SHELL
3810.0	[m]	DC	SHELL
3830.0	[m]	DC	SHELL
3850.0	[m]	DC	SHELL
3870.0	[m]	DC	SHELL
3890.0	[m]	DC	SHELL
3910.0	[m]	DC	SHELL
3930.0	[m]	DC	SHELL
3950.0	[m]	DC	SHELL
3970.0	[m]	DC	SHELL
3990.0	[m]	DC	SHELL
4010.0	[m]	DC	SHELL
4030.0	[m]	DC	SHELL
4050.0	[m]	DC	SHELL
4070.0	[m]	DC	SHELL
4090.0	[m]	DC	SHELL
4110.0	[m]	DC	SHELL
4130.0	[m]	DC	SHELL
4150.0	[m]	DC	SHELL
4170.0	[m]	DC	SHELL
4190.0	[m]	DC	SHELL
4210.0	[m]	DC	SHELL
4230.0	[m]	DC	SHELL
4248.0	[m]	DC	SHELL
4266.0	[m]	DC	SHELL
4284.0	[m]	DC	SHELL
4302.0	[m]	DC	SHELL

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
338	NORDLAND GP

338	NAUST FM
1238	KAI FM
1494	HORDALAND GP
1494	BRYGGE FM
2119	ROGALAND GP
2119	TARE FM
2241	TANG FM
2324	SHETLAND GP
2324	SPRINGAR FM
2466	NISE FM
2699	KVITNOS FM
2870	CROMER KNOLL GP
2870	LYSING FM
3299	LANGE FM
4182	LYR FM
4200	VIKING GP
4200	SPEKK FM
4218	MELKE FM
4491	FANGST GP
4491	GARN FM
4591	NOT FM
4635	ILE FM
4743	BÅT GP
4743	ROR FM
4805	TOFTE FM
4840	ROR FM
4954	TILJE FM

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL CCL GR	1550	2255
MWD - DIR	0	456
MWD - RES GR DIR	456	2270
MWD - SON DEN POR GR DIR	456	637

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	36	45.0	42	0.0	0.00	
CONDUCTOR	36	450.0	42	455.0	0.00	
SURF.COND.	20	1284.0	26	1288.0	1.58	LOT
INTERM.	16	1605.0	20	1608.0	1.76	LOT
INTERM.	13 3/8	2261.0	17 1/2	2270.0	1.91	FIT
OPEN HOLE		2273.0	12 1/4	2273.0	0.00	

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
40	1.03			Seawater	
40	1.37			KPM KCl Polymer	
456	1.20			KPM KCl Polymer	
466	1.37			KPM KCl Polymer	
1288	1.37			KPM KCl Polymer	
1288	1.50			Glydril	
1400	1.52			Glydril	
1580	1.55			Glydril	
1608	1.55			Glydril	
1765	1.75			Glydril	
2270	1.80			EMS-4400	
2270	1.75			Glydril	
2294	1.73			Glydril	
2297	1.80			Oil Based	
3626	1.86			EMS-4400	
4086	1.83			EMS-4400	
4331	1.94			EMS-4400	
4704	1.86			EMS-4400	
5113	1.86			EMS-4400	
5138	1.86			EMS-4400	