

**General information**

Wellbore name	6406/3-10
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	6406/3-10 (Bergknapp)
Well name	6406/3-10
Seismic location	
Production licence	836 S
Drilling operator	Wintershall Norge AS
Drill permit	1793-L
Drilling facility	SCARABEO 8
Drilling days	81
Entered date	08.11.2019
Completed date	05.04.2020
Plugged date	12.07.2021
Release date	05.04.2022
Publication date	08.08.2022
Purpose - planned	WILDCAT
Reentry	NO
Content	OIL
Discovery wellbore	YES
1st level with HC, age	EARLY JURASSIC
1st level with HC, formation	ILE FM
2nd level with HC, age	MIDDLE JURASSIC
2nd level with HC, formation	TILJE FM
3rd level with HC, age	MIDDLE JURASSIC
3rd level with HC, formation	GARN FM
Kelly bushing elevation [m]	34.0
Water depth [m]	312.7
Total depth (MD) [m RKB]	4600.0
Final vertical depth (TVD) [m RKB]	4600.0
Maximum inclination [°]	1.3
Bottom hole temperature [°C]	161
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	ÅRE FM



Geodetic datum	ED50
NS degrees	64° 56' 16.19" N
EW degrees	6° 46' 42.63" E
NS UTM [m]	7203549.93
EW UTM [m]	395009.97
UTM zone	32
NPDID wellbore	8928

Wellbore history



General

Well 6406/3-10 was drilled to test the Bergknapp prospect on the Halten Terrace in the Norwegian Sea. The primary objective was to prove oil in the Middle to Early Jurassic Fangst and B t groups. In case of a discovery the well would be tested and cored.

Operations and results

Wildcat well 6406/3-10 was spudded with the semi-submersible installation West Mira on 8 November 2019. West Mira completed drilling the top hole to TD in the 16" section at 2287 m and installed the 13 3/8" intermediate casing. However, problems caused by the very rough winter season and inability to essential crew change during the Covid 19 pandemic it was decided to suspend the well on 29 January 2020 and complete the remaining well scope with a different drilling unit. Two months later, the Scarabeo 8 went on contract on 3 March 2020 and drilled the remaining part of the well to TD at 4600 m in the Early Jurassic re Formation. The well was drilled with seawater and hi-vis pills down to 418 m, with KCl/polymer/GEM mud from 418 m to 1197 m and with Innovert NS oil-based mud from 1197 m to final TD. Scarabeo 8 went off contract on 5 April 2020 and the wellbore 6406/3-10 was again suspended for a year until it was re-entered with DeepSea Aberdeen for drill stem testing.

The well proved hydrocarbons in the Garn, Ile, Tilje and re formations. The Garn Formation had an oil column of at least 60 meters, with the oil-water contact estimated at 4128.7 m based on the log response and the oil and water samples taken in the reservoir. The Ile Formation was penetrated with a 65-meter oil column. The reservoir has a high hydrocarbon saturation at the top of the interval, while the rest of the reservoir is likely in a transition zone. The reservoir was classified as poor and not producible and the hydrocarbon-water contact was not established. The Tilje Formation has an oil column of at least 120 meters. The Tilje reservoir has two oil-saturated intervals separated by a shaly zone, and a water-saturated zone at the base. ODTs in the Upper and Lower Tilje are estimated at 4458 m and 4506 m, respectively. The re Formation contains a lighter oil than Garn, Ile, and Tilje, Geochemical analyses also indicated a more terrigenous source for this oil. No oil-water contact was established. There were no oil shows other than in the hydrocarbon-bearing formations in the Fangst and B t Groups.

No cores were cut in 6406/3-10, coring was instead planned to do in a side-track. Wireline fluid samples were taken at 4065.2 m (Oil), 4114.7 m (oil and trace water), 4132.2 m (water), 4231.8 m (OBM filtrate), 4447.7 m (oil), 4480 m (oil), 4502.7 m (oil), and 4528 m (water).

The well was plugged back for side-tracking on 14 July as an oil discovery.

Testing

Three DSTs were run in the well during 15 June and 2 July 2021. DST 1 in the Lower Tilje Formation tested the interval 4487.5 - 4492.6 m, DST 2 in the Upper Tilje Formation with tested the interval 4432.0 - 4454.5 m, and DST 3 in the Garn Formation with tested the interval 4057.7 - 4096. 0 m. The main flow results are given here. DST 1 produced 417 Sm³ oil and 125149 Sm³ gas/day through a 36/64 " choke. This gives a GOR of 300 Sm³/Sm³. The bottom hole temperature in the test was 156 C. DST 2 produced 92 Sm³ oil and 24604 Sm³ gas/day through a 26/64 " choke. This gives a GOR of 267 Sm³/Sm³. The bottom hole temperature in the test was 156 C. DST 3 produced 45 Sm³ oil and 22542 Sm³ gas/day through a 24/64 " choke. This gives a GOR of 501 Sm³/Sm³. The bottom hole temperature in the test was 149 C.

**Cuttings at the Norwegian Offshore Directorate**

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
430.00	4600.00

Cuttings available for sampling?	YES
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Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
347	NORDLAND GP
347	NAUST FM
1547	KAI FM
1969	HORDALAND GP
1969	BRYGGE FM
2340	ROGALAND GP
2340	TARE FM
2406	TANG FM
2467	SHETLAND GP
2467	SPRINGAR FM
2623	NISE FM
2810	KVITNOS FM
3352	CROMER KNOLL GP
3352	LYSING FM
3442	LANGE FM
4032	VIKING GP
4032	SPEKK FM
4044	MELKE FM
4065	FANGST GP
4065	GARN FM
4140	NOT FM
4192	ILE FM
4256	BÅT GP
4256	ROR FM
4293	TOFTE FM
4335	ROR FM
4386	TILJE FM
4533	ÅRE FM

**Logs**

Log type	Log top depth [m]	Log bottom depth [m]
6CAL DSL RCX SDP	4064	4538
6CAL DSL RCX SSP	4049	4600
DSL CN ZDL FTEX 3DEX HDIL	4049	4600
DSL MRX FLEX 6CAL	4049	4600
LWD - DIR	345	418
LWD - DIR PWD GR RES	418	1197
LWD - DIR PWD GR RES ABG	1197	2287
LWD - DIR PWD GR RES RAB DEN NEU	4055	4600
LWD - DIR PWG GR RES ABG DEN NEU	2287	4055
LWD - SON FTWD ABG FTWD	4055	4600
MC SWC	4049	4600
VSI5	4049	4600
XMAC GXPL ORIT UXPL	4049	4600

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	417.5	42	419.0	0.00	
SURF.COND.	20	1191.5	26	1198.0	1.88	FIT
INTERM.	13 3/8	2281.5	17 1/2	2293.0	1.95	FIT
LINER	9 5/8	4049.0	12 1/4	4058.0	1.87	FIT
OPEN HOLE		4600.0	8 1/2	4600.0	0.00	

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
340	1.26	19.0	4.7	INNOVERT	
360	1.02	1.0	3.8	Sea Water	
417	1.39		11.9	Water	
1086	1.39		15.3	Water	
1147	1.38		12.9	Water	
1197	1.50		11.4	Oil	
1197	1.39		11.0	Water	



1239	1.50		9.5	Oil	
1786	1.52		13.4	Oil	
2090	1.55		14.3	Oil	
2270	1.74		7.6	Oil	
4055	1.76		7.6	Oil	
4055	1.25		5.7	Oil	
4470	1.27		0.4	Salt Base	
4476	1.26		7.6	Oil	
4476	1.27		0.4	Salt Base	
4534	1.25		7.1	Oil	
4596	1.26	20.0	4.7	INNOVERT	
4600	1.25		6.2	Oil	
5037	1.02	1.0	3.8	Sea Water	