General information

Wellbore name	6406/2-9 S
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	6406/2-9 S (Ragnfrid Nord)
Well name	6406/2-9
Seismic location	
Production licence	199
Drilling operator	Equinor Energy AS
Drill permit	1726-L
Drilling facility	WEST PHOENIX
Drilling days	105
Entered date	03.10.2018
Completed date	15.01.2019
Plugged and abondon date	15.01.2019
Release date	15.01.2021
Publication date	15.01.2021
Purpose - planned	WILDCAT
Reentry	NO
Content	GAS/CONDENSATE
Discovery wellbore	YES
1st level with HC, age	JURASSIC
1st level with HC, formation	TOFTE FM
2nd level with HC, age	LATE CRETACEOUS
2nd level with HC, formation	LANGE FM
Kelly bushing elevation [m]	38.6
Water depth [m]	278.0
Total depth (MD) [m RKB]	4983.0
Final vertical depth (TVD) [m RKB]	4919.0
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	TILJE FM
Geodetic datum	ED50
NS degrees	64° 48' 18.22'' N
EW degrees	6° 26' 51.08'' E
NS UTM [m]	7189352.45

EW UTM [m]	378776.59
UTM zone	32
NPDID wellbore	8562

Wellbore history

Well 6406/2-9 S was drilled to test the Ragnfrid Nord prospect on the Halten Terrace in the Norwegian Sea. The primary exploration target for the well was to prove petroleum in Middle to Lower Jurassic reservoir rocks (in the Garn and Ile formation and in the Tofte formation, respectively). The secondary exploration target was to prove petroleum in Upper Cretaceous reservoir rocks (the Lange formation) and in the Lower Jurassic (the Tilje formation), in the event of discovery in the overlying Tofte formation.

Operations and results

Wildcat well 6406/2-9 S was spudded with the semi-submersible installation West Phoenix on 3 October 2018 and drilled to TD at 4983 m (4919 m TVD) in the Early Jurassic Tilje Formation. The well was drilled with seawater and hi-vis pills down to 1515 m, with Innovert oil-based mud from 1515 m to 3429 m, and with non-aqueous BaraECD mud from 3429 m to TD.

In the primary exploration target, the well encountered a gas/condensate column of about 10 metres in the Tofte formation with moderate reservoir properties. A gas-water contact was assessed at 4737 m (4689 m TVD) and oil shows (direct fluorescence and visible cut) continued throughout the cored section to 4764 m. The entire Tofte formation totals about 140 metres, of which 120 m sandstone of poor to moderate reservoir quality are effective reservoir rocks. The cores documented a deformation/fault zone in the upper part of Tofte. The Garn and Ile formations had about 75 and 65 metres effective reservoir rock respectively, mainly with poor to moderate reservoir quality. Both formations are water bearing. In the secondary exploration target in the Lange formation, the well encountered several one to five-metre thick gas-bearing sandstone layers with poor reservoir quality in the interval 4266 to 4306 m. The uppermost layer has a three-metre gas column. This interval also had oil shows in the form of cut fluorescence. The upper part of the Tilje formation is about 105 metres, whereof 75 metres are effective reservoir rocks with water bearing sandstones, mainly with poor reservoir quality. There were no oil shows in the well apart from those mentioned in the Lange and Tofte formations

Two cores were cut in the Tofte Formation. Core #1 was cut from 4743 to 4762 m with 98.4% recovery. Core 2 was cut from 4762 to 4764 m with 59.5% recovery. MDT fluid samples were taken in the Tofte Formation at 4737.4 m (condensate) and 4753.2 m (water). The condensate samples were contaminated ca 40% with mud.

The well was permanently abandoned on 15 January 2019 as a gas/condensate discovery well.

Testing

No drill stem test was performed.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
1520.00	4982.00

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	4743.0	4761.7	[m]
2	4762.0	4763.2	[m]

Total core sample length [m]	19.9
Cores available for sampling?	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
317	NORDLAND GP
317	NAUST FM
1588	KAI FM
1982	HORDALAND GP
1982	BRYGGE FM
2453	ROGALAND GP
2453	TARE FM
2510	TANG FM
2576	SHETLAND GP
2576	SPRINGAR FM
2732	NISE FM
2904	KVITNOS FM
3486	CROMER KNOLL GP
3486	LYSING FM
3669	LANGE FM
4306	NO FORMAL NAME
4397	LYR FM
4419	VIKING GP
4419	SPEKK FM
4435	MELKE FM
4511	FANGST GP
4511	GARN FM
4601	NOT FM

4629	ILE FM
4700	BÅT GP
4700	ROR FM
4727	TOFTE FM
4880	TILJE FM

Logs

Log type	Log top depth [m]	Log bottom depth [m]
APS HLDS ECS HNGS CMR	4375	4988
MDT	4515	4759
MDT	4522	4954
MDT	4700	4737
MSCT	4512	4904
MWD - ECO TELE	4743	4983
MWD - PDX5 ARC9 TELE	382	1515
MWD - PDX6 ARC6 SADN8 TELE	3426	4367
MWD - PDX6 ECO STET TELE	4367	4743
MWD - TELE	317	382
MWD L PDX6 ARC9 TELE	1515	3426
QAIT SON SCAN QA GEO	4330	4988
USIT HD SON SCAN ABC	2790	4360
USIT HD SON SCAN ABC	2790	4360
VSI4	2427	4795
XLR	4721	4827

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	378.0	42	381.0	0.00	
SURF.COND.	20	1509.0	26	1515.0	1.77	FIT
INTERM.	14	3418.0	17 1/2	3426.0	2.00	FIT
LINER	9 7/8	4369.5	12 1/4	4367.0	2.13	FIT
OPEN HOLE		4983.0	8 1/2	4983.0	0.00	

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
595	1.64	33.0		Innovert	
1515	1.58	42.0		Innovert	
1529	1.57	35.0		Innovert	
1740	1.58	35.0		Innovert	
2115	1.58	32.0		Innovert	
2310	1.63	40.0		Innovert	
2310	1.60	40.0		Innovert	
2503	1.63	40.0		Innovert	
3262	1.64	27.0		Innovert	
3262	1.83	36.0		Innovert	
3366	1.63	40.0		Innovert	
3426	1.86	35.0		BaraECD	
3426	1.63	43.0		Innovert	
3429	1.85	37.0		BaraECD	
3520	1.83	38.0		Innovert	
3599	1.85	39.0		BaraECD	
3825	1.88	42.0		BaraECD	
3945	1.83	42.0		Innovert	
4054	1.88	43.0		BaraECD	
4156	1.87	47.0		BaraECD	
4320	1.88	48.0		BaraECD	
4368	1.87	47.0		BaraECD	
4368	1.97	50.0		BaraECD	
4505	1.95	37.0		BaraECD	
4505	1.97	40.0		BaraECD	
4630	1.96	41.0		BaraECD	
4762	1.96	49.0		BaraECD	
4983	1.96	41.0		BaraECD	
4983	1.92	46.0		BaraECD	