General information

Wellbore name	35/11-18 A
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Press release	link to press release
Factmaps in new window	link to map
Main area	NORTH SEA
Discovery	35/11-18 (Syrah)
Well name	35/11-18
Seismic location	3D survey ST9303 inline 10000 .xline 1452
Production licence	248
Drilling operator	Wintershall Norge AS
Drill permit	1604-L
Drilling facility	BORGLAND DOLPHIN
Drilling days	80
Entered date	27.09.2015
Completed date	16.12.2015
Release date	16.12.2017
Publication date	16.12.2017
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL/GAS
Discovery wellbore	NO
1st level with HC, age	LATE JURASSIC
1st level with HC, formation	INTRA HEATHER FM SS
2nd level with HC, age	MIDDLE JURASSIC
2nd level with HC, formation	BRENT GP
3rd level with HC, age	EARLY JURASSIC
3rd level with HC, formation	COOK FM
Kelly bushing elevation [m]	31.0
Water depth [m]	366.0
Total depth (MD) [m RKB]	4020.0
Final vertical depth (TVD) [m RKB]	3905.0
Maximum inclination [°]	24.5
Bottom hole temperature [°C]	151
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	STATFJORD GP

Geodetic datum	ED50
NS degrees	61° 9' 24.41'' N
EW degrees	3° 20' 38.09'' E
NS UTM [m]	6780460.23
EW UTM [m]	518509.99
UTM zone	31
NPDID wellbore	7813

Wellbore history

General

Well 35/11-18 A is a geological sidetrack to well 35/11-18 on the Marflo Spur/Lomre Terrace, west of the Vega Field in the North Sea. Well 35/11-18 made hydrocarbon discoveries in Intra-Heather Formation sandstone, in the Tarbert Formation and in the Oseberg Formation. The overall objective was to appraise the 35/11-18 Syrah discovery. The primary target was to prove commercial volumes of hydrocarbons in the Tarbert-Upper Ness, Lower Ness-Etive, Oseberg and Cook formations. The secondary target was to penetrate and prove hydrocarbons in the Late Jurassic Intra-Heather Formation sandstone.

Operations and results

Appraisal well 30/11-18 A kicked off from 1775 m in well 30/11-18 on 27 September 2015. It was drilled with the semi-submersible installation Borgland Dolphin to 4020 m (3905 m TVD) in the Early Jurassic Statfjord Group. Technical problems during DST led to a week downtime. Otherwise no significant problem was encountered in the operations. The well was drilled with Innovert oil based mud from kick-off to TD.

Top Draupne Formation was penetrated at 3088 m (3005 m TVD). As in the main bore, clear hydrocarbon shows and increased gas values were seen on penetrating the Late Jurassic Heather Formation. A 35 m thick Intra-Heather Formation sandstone of Kimmeridgian age proved to be gas filled with a GDT. Further, thin Oxfordian aged Intra-Heather Formation sandstones in this formation proved oil-filled. Both Kimmeridgian and Oxfordian sandstones had an average porosity of 13.6 % when using a 10 % cut off. No oil-water contact was established (ODT). Top Brent Group, Tarbert Formation was penetrated at 3540 m (3437 m TVD). All Brent Group reservoirs were oil-filled, as well as the Early Jurassic Cook Formation. Pressure measurements show that all formations have a common aquifer, but with seven different oil gradients in the oil-filled formations, suggesting at least seven pressure compartments. Oil shows on cuttings were described but noted to be uncertain due to the oil based mud. Good continuous oil shows are recorded on the core down to ca 3740 m.

One 53.5 m core was cut with 100% recovery from 3705.5 to 3759.0 m in the Oseberg Formation. The core-log depth shift is +1.54 m. MDT fluid samples were taken at 3590.8 m (oil), 3659.1 m (oil), 3707.9 m (oil), 3737.8 m (water) and 3830.1 m (oil).

The well was permanently abandoned on 16 December 2015 as an oil and gas appraisal well.

Testing

Two Drill Stem Tests were conducted in this well. DST 1 tested the interval 3804 to 3834 m (3692 to 3722 m TVD) in the Cook Formation. This test produced 520 Sm3/d of oil and 97074 Sm3/d of gas through a 32/64" choke. The DST temperature was 144.4 °C. PVT analyses gave a total solution GOR at bubble point of 341.7 Sm3/Sm3. Oil density at standard conditions is 0.818 g/cm3.

DST 2 tested the interval 3704 to 3724 m (3594 to 3614 m TVD) in the Oseberg Formation. The test was aborted in the first attempt due to malfunction in the downhole isolation and circulating valve (SLB’s IRDV). The test was re-run as DST 2B. This test produced 856 Sm3/d of oil and 219060 Sm3/d of gas through a 40/64" choke. The DST temperature was 141.2 °C. PVT analyses gave a total solution GOR at bubble point of 370.2 Sm3/Sm3. Oil density at standard conditions is 0.809 g/cm3.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
1750.00	4020.38

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	3705.8	3759.3	[m]

Total core sample length [m]	53.5
Cores available for sampling?	YES

Oil samples at the Norwegian Offshore Directorate

Test type	Bottle number	Top depth MD [m]	Bottom depth MD [m]	Fluid type	Test time	Samples available
DST		0.00	0.00	OIL	07.11.2015 - 20:25	YES
DST	DST 1	0.00	0.00	OIL	07.11.2015 - 20:20	YES
DST	DST 2B	0.00	0.00	OIL	22.11.2015 - 12:10	YES
DST	DST 2B	0.00	0.00	OIL	26.11.2015 - 12:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
397	NORDLAND GP
397	UNDIFFERENTIATED
806	UTSIRA FM
948	HORDALAND GP
948	UNDIFFERENTIATED
1711	ROGALAND GP
1711	BALDER FM
1798	SELE FM
1828	LISTA FM

1995	VÅLE FM
2020	SHETLAND GP
2020	JORSALFARE FM
2180	KYRRE FM
2934	TRYGGVASON FM
2983	CROMER KNOLL GP
2983	RØDBY FM
3005	SOLA FM
3012	ÅSGARD FM
3088	VIKING GP
3088	DRAUPNE FM
3160	HEATHER FM
3228	INTRA HEATHER FM SS
3257	HEATHER FM
3303	INTRA HEATHER FM SS
3316	HEATHER FM
3540	BRENT GP
3540	TARBERT FM
3657	ETIVE FM
3665	RANNOCH FM
3705	OSEBERG FM
3750	DUNLIN GP
3750	DRAKE FM
3808	COOK FM
3928	AMUNDSEN FM
3943	JOHANSEN FM
3953	AMUNDSEN FM
3968	STATFJORD GP
3968	UNDIFFERENTIATED

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3804	3834	12.7
2.0	3704	3724	15.8

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0				144

2.0				141

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	520	97074	0.818		341
2.0	856	219060	0.809		370

Logs

Log type	Log top depth [m]	Log bottom depth [m]
GR RES NEU DEN	3417	3857
IMAGE SON	1682	3857
MWD - DIR	397	494
MWD - GR RES PWD DIR	494	1742
MWD - GR RES PWD DIR NEU DEN	3424	3857
MWD - GR RES PWD DIR NEU DEN PRE	3857	4020
MWD - GR RES PWD DIR NEU DEN SON	1775	3424
PRESS SAMPLE	3219	3311
PRESSURE NMR	3416	3849
SAMPLE	3590	3830
SWC	3219	3320
SWC	3583	3848
VSP	1667	3847

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	486.5	36	494.0	0.00	
SURF.COND.	20	1104.0	26	1111.0	0.00	
		1114.0		1114.0	1.54	LOT
INTERM.	13 3/8	1736.0	17 1/2	1742.0	0.00	
		1745.0		1745.0	1.53	LOT
INTERM.	9 5/8	3417.0	12 1/4	3424.0	0.00	
		3427.0		3427.0	1.87	LOT
LINER	7	4018.0	8 1/2	4020.0	0.00	

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
1058	1.29	33.0		PERFORMADRIL	
1400	1.29	33.0		PERFORMADRIL	
1600	1.41	27.0		INNOVERT	
1750	1.29	16.0		INNOVERT NS	
1900	1.41	26.0		INNOVERT	
2100	1.29	15.0		INNOVERT NS	
2718	1.29	14.0		INNOVERT NS	
3115	1.41	19.0		INNOVERT NS	
3424	1.41	22.0		INNOVERT NS	
3428	1.59	30.0		INNOVERT NS	
3675	1.59	28.0		INNOVERT NS	
3854	1.59	26.0		INNOVERT NS	
4020	1.59			Calcium Chloride/ Bromide Brine	