

**General information**

Wellbore name	35/12-4 S
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	35/12-2 (Grosbeak)
Well name	35/12-4
Seismic location	MN9201SG8603M06-inline 3634 & crossline 1951
Production licence	378
Drilling operator	Wintershall Norge ASA
Drill permit	1352-L
Drilling facility	SONGA DELTA
Drilling days	65
Entered date	23.04.2011
Completed date	26.06.2011
Release date	26.06.2013
Publication date	26.06.2013
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL/GAS
Discovery wellbore	NO
1st level with HC, age	MIDDLE JURASSIC
1st level with HC, formation	NESS FM
2nd level with HC, age	MIDDLE JURASSIC
2nd level with HC, formation	FENSFJORD FM
Kelly bushing elevation [m]	29.0
Water depth [m]	360.0
Total depth (MD) [m RKB]	3585.0
Final vertical depth (TVD) [m RKB]	2766.0
Maximum inclination [°]	51
Bottom hole temperature [°C]	106
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	STATFJORD GP
Geodetic datum	ED50
NS degrees	61° 11' 6.76" N



EW degrees	3° 41' 29.4" E
NS UTM [m]	6783775.12
EW UTM [m]	537183.78
UTM zone	31
NPDID wellbore	6589

Wellbore history

**General**

Well 35/12-4 S was drilled on the Ryggsteinen Ridge/Uer Terrace structural elements in the Northern North Sea. The objective was to appraise the 35/12-2 Grosbeak discovery, a multi-level discovery, with hydrocarbons in the Sognefjord Formation (gas), in the Fensfjord Formation (oil) and in the Ness Formation (oil). The gas discovered in the Sognefjord Formation is deemed unproducible due to low permeabilities. Only the Fensfjord Formation and the Brent Group are appraisal targets. The majority of the volumes are expected to be located in the Brent Group. The Statfjord Formation was a tertiary objective.

Operations and results

Appraisal well 35/12-4 S was spudded with the semi-submersible installation Songa Delta on 23 April 2011 and drilled to TD at 3585 m (2766 m TVD) in the Early Jurassic Statfjord Formation. No significant problem was encountered in the operations. The well was drilled with sea water and hi-vis sweeps down to 501 m, with Aquadril mud from 501 m to 1315 m, and with Carbosea oil based mud from 1315 m to TD.

Base Cretaceous unconformity/top Heather Formation was penetrated at 2503.5 m (2080 m TVD). A sharp increase in the NearBit Resistivity LWD tool and increased gas values were seen on penetrating the Fensfjord Formation at 2526.5 m (2095 m TVD). The sandstones had an average porosity of 24 % when using a 10 % porosity cut-off. A gross oil column of approximately 14 m TVD was found in the Fensfjord Formation with an OWC at 2552 m (2112 m TVD) based on the pressure gradients. On penetrating the top of the Ness Formation at 3070.5 m (2441 m TVD), an increase in background gas was noticed. The Ness sandstones had an average porosity of 21.7 %, when using a 10% porosity cut-off. A gross oil column of approximately 40 m TVD was found with OWC at 3135 m (2482 m TVD). The sandstones of the Statfjord Formation were water-bearing. These sandstones had an average porosity of 17.8% when using a 10% porosity cut-off. Weak shows were recorded in minor silty sandstone towards base of the Kyrre Formation and in minor loose sand in the Heather Formation. There were shows in the hydrocarbon bearing sections of the Fensfjord and Ness formations, but no shows below the OWC's.

Five conventional cores were cut, one in the Fensfjord Formation from 2529.5 m to 2564 m and four in the Ness Formation from 3076 m to 3151.5 m in the Ness Formation. Fluid samples were taken with the RCI tool. Twelve (12) x 700 cc sample bottles were filled at six (6) sampling stations: at 2539.9 (oil) and 2561.5 m (water) in the Fensfjord Formation, and at 3136.5 m (water), 3126.0 m (oil), 3104.4 m (oil), and 3086.7 m (oil) in the Ness Formation.

The well was permanently abandoned on 26 June 2011 as a gas and oil appraisal well.

Testing

One drill stem test was carried out in the Ness Formation in the interval 3082 - 3127 m (2448 - 2477 m TVD). The test produced 69260 Sm³ gas and 767 Sm³ oil /day through a 44/64" choke in the main flow. The GOR was 90.4 Sm³/Sm³, the oil density was 0.806 g/cm³, and the gas gravity was 0.758 (air = 1). The maximum bottom hole temperature recorded in the main flow was 95.2 deg C.

Cuttings at the Norwegian Offshore Directorate



Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
510.00	3585.00

Cuttings available for sampling?	YES
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Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	2529.5	2564.4	[m]
2	3076.0	3088.0	[m]
3	3088.0	3095.7	[m]
4	3098.0	3124.9	[m]
5	3125.0	3151.8	[m]

Total core sample length [m]	108.2
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		3127.00	3082.00	OIL	11.02.2009 - 07:25	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
389	NORDLAND GP
539	UTSIRA FM
644	NO FORMAL NAME
650	HORDALAND GP
650	NO FORMAL NAME
798	NO FORMAL NAME
1085	NO FORMAL NAME
1303	ROGALAND GP
1303	BALDER FM
1367	SELE FM



1444	LISTA FM
1521	NO FORMAL NAME
1653	LISTA FM
1771	NO FORMAL NAME
1891	LISTA FM
1959	VÅLE FM
1999	SHETLAND GP
1999	JORSALFARE FM
2106	KYRRE FM
2504	VIKING GP
2504	HEATHER FM
2527	FENSFJORD FM
2683	HEATHER FM
3071	BRENT GP
3071	NESS FM
3177	ETIVE FM
3205	RANNOCH FM
3250	OSEBERG FM
3255	DUNLIN GP
3255	DRAKE FM
3324	COOK FM
3534	STATFJORD GP

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3082	3127	17.4

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

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	1010	90243	0.807	0.746	89

Logs



Log type	Log top depth [m]	Log bottom depth [m]
EARTH IMAGER	2500	3225
LWD - DIR	389	501
LWD - ECD GR RES CAL DEN NEU DT	1315	2409
LWD - ECD GR RES DIR DEN	3315	3585
LWD - GR ECD RES DIR	389	501
LWD - RES ECD GR DIR CAL DEN NEU	2409	3315
LWD - RES ECD GR DIR DT	501	1315
MREX	3060	3150
RCI	2533	3272
RCI	3315	3585
SBT	2404	3312
SLAM	2366	3315
VSP	505	3315
VSP	2404	3585

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	443.0	36	443.0	0.00	LOT
SURF.COND.	20	498.0	26	501.0	0.00	LOT
PILOT HOLE		501.0	9 7/8	501.0	0.00	LOT
INTERM.	13 3/8	1308.0	17 1/2	1315.0	0.00	LOT
INTERM.	9 5/8	2404.0	12 1/4	2409.0	0.00	LOT
LINER	7	3312.0	8 1/2	3315.0	0.00	LOT
OPEN HOLE		3585.0	6	3585.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
2060	1.24	21.0		Carbosea	
2238	1.37	33.0		Carbosea	
3235	1.24	22.0		Carbosea	
3235	1.24			CaCl2 brine	
3235	1.24			CaCl2 brine	



3503	1.24	26.0		CARBO-SEA	
3585	1.27	29.0		CARBO-SEA	
3585	1.26	31.0		CARBO-SEA	
3585	1.24	27.0		CARBO-SEA	