General information

Wellbore name	29/9-1
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Field	MARTIN LINGE
Discovery	30/7-2
Well name	29/9-1
Seismic location	CDP 239276 (NH 8101)
Production licence	040
Drilling operator	Norsk Hydro Produksjon AS
Drill permit	390-L
Drilling facility	TREASURE SEEKER
Drilling days	155
Entered date	23.09.1983
Completed date	24.02.1984
Release date	24.02.1986
Publication date	01.08.2010
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL/GAS
Discovery wellbore	NO
1st level with HC, age	EOCENE
1st level with HC, formation	FRIGG FM
2nd level with HC, age	MIDDLE JURASSIC
2nd level with HC, formation	BRENT GP
Kelly bushing elevation [m]	25.0
Water depth [m]	104.0
Total depth (MD) [m RKB]	4703.0
Final vertical depth (TVD) [m RKB]	4703.0
Maximum inclination [°]	4.1
Bottom hole temperature [°C]	147
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	STATFJORD GP
Geodetic datum	ED50
NS degrees	60° 28' 33.19'' N
EW degrees	1° 59' 58.95'' E

NS UTM [m]	6704986.97
EW UTM [m]	445007.97
UTM zone	31
NPDID wellbore	31

Wellbore history

General

Well 29/9-1 is located on the Hild structure ca 1.5 km west of the UK border on the eastern margin of the East Shetland Basin in the North Sea. The well was drilled to appraise the 30/7-2 discovery. The main objectives were to test the hydrocarbon prospectivity and reservoir parameters of the Middle and Early Jurassic sequence. The well was planned to be drilled 50 m into the Statfjord Formation at a total depth of 4640 +/- 200 m.

Operations and results

Appraisal well 29/9-1 was spudded with the semi-submersible installation Treasure Seeker on 23 September 1983 and drilled to TD at 4703 m in the Early Jurassic Statfjord Formation. During drilling of the 17 1/2" hole, tight hole problems were experienced. The 9 5/8" casing had to be run twice due to problems with the casing hanger seal. Due to high temperature and lack of circulation the mud in the 7" liner gelled up and had to be replaced several times. This caused difficulties operating the testing tool. The well was drilled with seawater and gel slugs down to 1057 m and with KCl/polymer mud from 1057 m to TD. Mud retort test showed 4-5% oil in the mud from top of the 12 1/4" section at 2752 m, declining to traces at 3732 m.

The well encountered oil in the Frigg Formation in the interval 1782 to 1787 m (OWC), and gas in the middle Jurassic Brent Group from 4386.5 m to 4421 m (gas down to top Dunlin Group; no hydrocarbon contact was encountered).

The Frigg Formation (1782-1981 m) consisted of predominantly of fine to coarse grained porous sandstones. The uppermost 2.5 m was tight and calcareous cemented. Net pay was thus 2.5 m with 31% average porosity and 40% average water saturation, based on logs. No RFTs or drill stem tests were performed through this section. The upper part of the Brent Group, the Tarbert and most of the Ness Formation was faulted out. The remaining section of the Ness Formation (4386.5 - 4393.5m) consisted of shales with interbedded coals and stringers of sandstones. Fairly clean fine to coarse grained sandstones made up the underlying Etive Formation (4393.5 - 4405.5 m). The Rannoch Formation (4405.5 - 4415m) was a relatively tight sequence of very fine grained micaceous and silty sandstones. The Broom Formation (4415 - 4421m) constitutes the base of the Brent Group and consisted of fine to coarse grained pebbly sandstones. The net pay for the whole Brent Group was calculated to 10.6m of a gross thickness of 34,5m giving a net to gross ratio of 0.3. The average porosity was calculated from logs to 14.3% with an average water saturation of 53.6%.

Oil shows in the Frigg Formation became weaker below OWC and died completely at 1844 m. Poor hydrocarbon shows occasionally observed on limestones and marls in the Cretaceous section were not considered significant. Good shows were seen on cores from the Brent reservoir. No shows were recorded below bas Brent Group.

Three cores were cut in the middle Jurassic sequence from 4386 to 4436 m with 96 to 100% recovery. No RFT pressure recordings or sampling were performed due to badly washed out hole over the reservoir section.

The well was permanently abandoned on 24 February as a gas as an oil and gas appraisal well.

Testing

A drill stem test (DST) was performed over the interval 4394 - 4405 m in the Etive Formation. The well produced at maximum only 9769 Sm3 (0.345 MMft3) gas/day through a 1.27cm (32/64") choke. The gravity of the gas was 0.774 (air=l). Only traces of condensate were produced. Bottom hole temperature measured in the test was 141.1 deg C.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
220.00	4703.00

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	4386.0	4403.8	[m]
2	4404.0	4417.5	[m]
3	4419.0	4430.1	[m]

Total core sample length [m]	42.4
Cores available for sampling?	YES

Core photos


4386-4390m


3290-4394m


4394-4398m


4398-4402m


4402-4406m


4406-4410m


4410-4414m


4414-4417m


4418-4422m


4422-4436m


4426-4430m


4430-4434m


4434-4436m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
2922.5	[m]	SWC	IKU
2931.5	[m]	SWC	IKU
2942.5	[m]	SWC	IKU
3151.0	[m]	SWC	IKU
3485.5	[m]	SWC	IKU
3625.0	[m]	SWC	IKU
3771.0	[m]	SWC	IKU
3848.0	[m]	SWC	IKU
3883.5	[m]	SWC	IKU
3896.5	[m]	SWC	IKU
3983.0	[m]	SWC	IKU
4014.0	[m]	SWC	IKU
4035.0	[m]	SWC	IKU
4067.0	[m]	SWC	IKU
4116.0	[m]	SWC	IKU
4169.0	[m]	SWC	IKU
4211.0	[m]	SWC	IKU
4246.0	[m]	SWC	IKU
4262.0	[m]	SWC	IKU
4290.0	[m]	SWC	IKU
4336.0	[m]	SWC	IKU
4345.0	[m]	SWC	IKU
4360.0	[m]	SWC	IKU
4386.1	[m]	C	IKU
4417.3	[m]	C	IKU
4419.4	[m]	C	IKU
4421.2	[m]	C	IKU
4428.8	[m]	C	IKU
4431.1	[m]	C	IKU
4508.0	[m]	SWC	IKU
4555.0	[m]	SWC	IKU
4685.0	[m]	SWC	IKU

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
129	NORDLAND GP
416	UTSIRA FM
840	NO FORMAL NAME
859	HORDALAND GP
859	SKADE FM
935	NO FORMAL NAME
1303	GRID FM
1399	NO FORMAL NAME
1782	FRIGG FM
1981	ROGALAND GP
1981	UNDIFFERENTIATED
2015	LISTA FM
2074	HEIMDAL FM
2151	LISTA FM
2310	VÅLE FM
2355	SHETLAND GP
2355	EKOFISK FM
2398	JORSALFARE FM
2633	KYRRE FM
3604	TRYGGVASON FM
3770	BLODØKS FM
3785	SVARTE FM
3906	CROMER KNOLL GP
3906	RØDBY FM
3980	VIKING GP
3980	DRAUPNE FM
4049	HEATHER FM
4387	BRENT GP
4387	NESS FM
4394	ETIVE FM
4406	RANNOCH FM
4415	BROOM FM
4421	DUNLIN GP
4421	DRAKE FM
4487	COOK FM
4530	BURTON FM
4562	AMUNDSEN FM
4640	STATFJORD GP

Composite logs

Document name	Document format	Document size [MB]
31	pdf	0.88

Geochemical information

Document name	Document format	Document size [MB]
31_1	pdf	0.73
31_2	pdf	0.24
31_3	pdf	0.89
31_4	pdf	0.94

Documents - older Norwegian Offshore Directorate WDSS reports and other related documents

Document name	Document format	Document size [MB]
31_01_WDSS_General_Information	pdf	0.21
31_02_WDSS_completion_log	pdf	0.42

Documents - reported by the production licence (period for duty of secrecy expired)

Document name	Document format	Document size [MB]
31_29_9_1_Completion_log	pdf	3.81
31_29_9_1_Completion_report	pdf	19.35

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	4394	4405	12.7

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		10000		0.774	

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL	1858	3925
CST	2250	2748
CST	2922	3695
CST	3698	3950
CST	3950	4321
CST	4014	4625
CST	4026	4595
CST	4336	4704
DLL MSFL	4200	4703
HDT	1700	3955
ISF LSS GR SP	213	4703
LDT CNL GR CAL	1039	4703
SHDT	3927	4703
VSP	2980	4705

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	213.5	36	215.0	0.00	LOT
SURF.COND.	20	1040.5	26	1057.0	1.54	LOT
INTERM.	13 3/8	2724.0	17 1/2	2751.0	1.91	LOT
INTERM.	9 5/8	3927.0	12 1/4	3950.0	2.19	LOT
LINER	7	4546.0	8 3/8	4703.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
250	1.06	48.0		WATER BASED	
450	1.10	48.0		WATER BASED	
565	1.04	30.0		WATER BASED	
905	1.06	32.0		WATER BASED	
1050	1.11	47.0		WATER BASED	
1250	1.12	53.0		WATER BASED	
1550	1.13	50.0		WATER BASED	
1750	1.14	47.0		WATER BASED	
1920	1.20	49.0		WATER BASED	
2000	1.25	49.0		WATER BASED	
2120	1.26	46.0		WATER BASED	
2220	1.32	45.0		WATER BASED	
2250	1.38	52.0		WATER BASED	
2300	1.39	52.0		WATER BASED	
2400	1.38	52.0		WATER BASED	
2750	1.42	56.0		WATER BASED	
3700	1.50	45.0		WATER BASED	
3810	1.53	46.0		WATER BASED	
3860	1.80	52.0		WATER BASED	
3950	1.97	47.0		WATER BASED	
4050	1.98	30.0		WATER BASED	
4150	2.02	26.0		WATER BASED	