General information

Wellbore name	34/10-33
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Field	GULLFAKS SØR
Discovery	34/10-2 Gullfaks Sør
Well name	34/10-33
Seismic location	ST 8134 - 156 CELLEPKT. 296
Production licence	050
Drilling operator	Den norske stats oljeselskap a.s
Drill permit	591-L
Drilling facility	WEST DELTA
Drilling days	82
Entered date	25.09.1988
Completed date	15.12.1988
Release date	15.12.1990
Publication date	01.01.2012
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL/GAS
Discovery wellbore	NO
1st level with HC, age	MIDDLE JURASSIC
1st level with HC, formation	BRENT GP
Kelly bushing elevation [m]	29.0
Water depth [m]	134.0
Total depth (MD) [m RKB]	3870.0
Final vertical depth (TVD) [m RKB]	3850.0
Maximum inclination [°]	20
Bottom hole temperature [°C]	135
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	STATFJORD GP
Geodetic datum	ED50
NS degrees	61° 7' 34.44'' N
EW degrees	2° 12' 57.1'' E
NS UTM [m]	6777262.00
EW UTM [m]	457756.18

UTM zone	31
NPDID wellbore	1302

Wellbore history

General

Well 34/10-33 was the sixth well drilled to reservoir level on the Gullfaks South structure. The main objective of the well was to appraise the oil and gas reserves in the Brent Group on the northern part of the structure. The gas/oil and oil/water contacts were to be confirmed at 3324 m and 3395 m MSL respectively. Secondary objective was to penetrate 50 m of the Statfjord Formation to obtain data to better understand the structural development in the area, and also update the geological model for the upper part of the formation. A positive result would lead to the drilling of a horizontal testing well as a sidetrack from this well.

Operations and results

Well was spudded with the semi-submersible installation West Delta on 25 September 1988 and drilled to TD at 3870 m in the Early Jurassic Statfjord Formation. There was some shallow gas at 477 - 478 m. Due to this the 20" casing was set at 450 m. There was a problem with a leakage in the BOP. The drill string got stuck when setting the 13 3/8" casing and the MWD and drill bit had to be changed. The well was close to vertical down to ca 2500 m. From there the well built inclination gradually up to 20 deg at TD. At TD true vertical depth is estimated to be ca 20 m less than measured depth. The well was drilled with spud mud down to 483 m, with gypsum/polymer mud from 483 m to 3161 m, and with gel/lignosulphonate/lignite mud from 3161 m to TD.

Top Brent Group, Tarbert Formation came in at 3186 m with gas and oil. FMT data showed a gas/oil contact at 3268 m, 85 m higher than prognosed. Approximately 150 m of oil was found vertically down to top Dunlin Group at 3424 m, much more than expected. No oil/water contact was seen. There was a pressure shift of 1.5 - 2 bar at around 3350 m, indicating two separate compartments in the oil zone. This had not been observed in the previous wells on Gullfaks South. Due to the large amount of oil in the Brent Group, the oil in place estimate was adjusted to 50 - 60 million Sm3.

Eighteen cores were cut in the well. One core was cut from 3152 to 3161.5 m, 14 cores in the interval 3188 to 3435 m and 3 cores from 3799 to 3840 m. The core depth was found to be from 1.00 to 3.75 m less than loggers' depth. Segregated fluid samples were obtained at 3314 m in the Ness Formation and at 3368 m in the thin Etive Formation. Sampling was attempted also at 3406 and 3406.2 m in the Rannoch Formation, but due to very low permeability no formation fluid was obtained.

The well was plugged back and classified as an oil and gas appraisal well. West Delta started the sidetrack 34/10-33A 15.12.88 at 18.30 hrs.

Testing

Four DST tests were performed in this well.

DST 1.1 tested the interval 3378 - 3394 m in the Rannoch Formation and produced 289 Sm3 oil and 51000 Sm3 gas /day through a 12.7 mm choke in the main flow. The GOR was 176, the oil density was 0.859 g/cm3, and the gas gravity was 0.680 (air = 1).

DST 1.2 tested the combined intervals 3378 - 3394 m in the Rannoch Formation plus 3359 - 3374 m in the Ness/Etive Formations and produced 1318 Sm3 oil and 211900 Sm3 gas /day through a 28.6 mm choke in the final flow. The GOR was 161, the oil

density was 0.856 g/cm3, and the gas gravity was 0.685 (air = 1). The reservoir temperature measured in the test was ca 123 deg C at reference depth 3373 m.

DST 2.1 tested the interval 3279 - 3307 m in the Ness Formation and produced 850 Sm3 oil and 376700 Sm3 gas /day through a 19.1 mm choke in the main flow. The GOR was 443, the oil density was 0.850 g/cm3, and the gas gravity was 0.665 (air = 1).

DST 2.2 tested the combined intervals 3279 - 3307 m and 3311.5 - 3329 m, both within the Ness Formation, and produced 1403 Sm3 oil and 302100 Sm3 gas /day through a 19.1 mm choke in the main flow. The GOR was 215, the oil density was 0.851 g/cm3, and the gas gravity was 0.660 (air = 1). The reservoir temperature measured in the test was ca 122 deg C at reference depth 3301.5 m.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
480.00	3668.00

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
2	3188.0	3197.0	[m]
3	3199.0	3218.7	[m]
4	3223.0	3234.7	[m]
5	3235.0	3250.9	[m]
6	3251.0	3271.0	[m]
7	3273.5	3283.2	[m]
8	3285.5	3298.0	[m]
9	3289.5	3307.6	[m]
10	3308.0	3336.0	[m]
11	3336.0	3348.9	[m]
12	3349.5	3373.0	[m]
13	3373.0	3382.5	[m]
14	3382.5	3410.3	[m]
15	3410.5	3434.9	[m]
16	3799.0	3815.7	[m]

17	3815.5	3825.9	[m]
18	3830.0	3840.0	[m]

Total core sample length [m]	279.7
Cores available for sampling?	YES

Core photos


3188-3192m


3192-3197m


3199-3202m


3202-3207m


3207-3211m


3211-3216m


3216-3218m


3226-3230m


3230-3234m


3235-3239m


3239-3243m


3243-3248m


3248-3250m


3250-3254m


3254-3259m


3259-3263m


3263-3267m


3267-3271m


3273-3278m


3278-3282m











3282-3283m 3285-3289m 3285-3294m 3294-3297m 3297-3302m







3302-3306m 3306-3307m 3308-3312m 3312-3316m 3316-3320m







3320-3325m 3325-3329m 3329-3333m 3333-3336m 3336-3340m







3340-3344m 3344-3348m 3349-3353m 3353-3357m 3357-3362m







3362-3366m 3366-3370m 3370-3373m 3373-3377m 3377-3381m







3381-3382m 3382-3387m 3387-3391m 3391-3395m 3395-3399m







3398-3403m 3403-3407m 3407-3410m 3410-3415m 3415-3418m







3418-3423m 3423-3427m 3427-3431m 3431-3434m 3431-3434m







3799-3803m 3803-3807m 3807-3811m 3811-3815m 3815-3820m







3820-3824m 3824-3828m 3828-3829m 3830-3834m 3834-3838m



3838-3840m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
3147.5	[m]	DC	GEOCH
3152.0	[m]	C	GEOCH
3152.5	[m]	C	GEOCH
3152.9	[m]	C	GEOCH
3153.4	[m]	C	GEOCH
3153.8	[m]	C	GEOCH
3154.0	[m]	C	GEOCH

3154.5	[m]	C	GEOCH
3155.6	[m]	C	GEOCH
3156.0	[m]	C	GEOCH
3156.5	[m]	C	GEOCH
3157.0	[m]	C	GEOCH
3158.5	[m]	C	GEOCH
3159.0	[m]	C	GEOCH
3159.5	[m]	C	GEOCH
3160.0	[m]	C	GEOCH
3161.2	[m]	C	GEOCH

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	TEST1,1	3378.00	3394.00		29.11.1988 - 00:00	YES
DST	TEST2	0.00	0.00		08.12.1988 - 09:00	YES
DST	TEST2,1	3279.00	3307.00	OIL	08.12.1988 - 07:31	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
163	NORDLAND GP
915	UTSIRA FM
956	NO FORMAL NAME
980	HORDALAND GP
1035	NO FORMAL NAME
1145	NO FORMAL NAME
1253	NO FORMAL NAME
1520	NO FORMAL NAME
1568	NO FORMAL NAME
1616	NO FORMAL NAME
1827	ROGALAND GP
1827	BALDER FM
1907	LISTA FM
2055	SHETLAND GP

2055	JORSALFARE FM
2350	KYRRE FM
3014	CROMER KNOLL GP
3014	MIME FM
3028	VIKING GP
3028	DRAUPNE FM
3057	HEATHER FM
3186	BRENT GP
3186	TARBERT FM
3234	NESS FM
3365	ETIVE FM
3374	RANNOCH FM
3424	DUNLIN GP
3424	DRAKE FM
3514	COOK FM
3629	BURTON FM
3676	AMUNDSEN FM
3799	STATFJORD GP

Geochemical information

Document name	Document format	Document size [MB]
1302_1	pdf	0.32
1302_2	pdf	0.48
1302_3	pdf	0.34
1302_4	pdf	0.64

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

Document name	Document format	Document size [MB]
1302_01_WDSS_General_Information	pdf	0.26
1302_02_WDSS_completion_log	pdf	0.26

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

Document name	Document format	Document size [MB]
1302_34_10_33_Completion_log	pdf	3.19
1302_34_10_33_Completion_report_1	pdf	47.33
1302_34_10_33_Completion_report_II	pdf	40.30

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3378	3394	12.7
1.3	3359	3374	28.6
2.1	3279	3307	19.1
2.2	3279	3329	19.1

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0			21.000	
1.3			30.000	123
2.1			32.000	
2.2			43.500	122

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	288	51000	0.854	0.680	176
1.3	1318	211900	0.856	0.680	161
2.1	850	376700	0.850	0.665	443
2.2	1403	302100	0.850	0.660	218

Logs

Log type	Log top depth [m]	Log bottom depth [m]
AC WAVETRAIN	2831	3432
ACDIP GR MISRUN	0	0
CBL VDL GR	163	1829
CBL VDL GR	2410	3146
CBL VDL GR	2994	3771
CDL CN GR	3771	3871

CDL GR CAL	225	3150
DIFL ACL GR	225	3150
DIFL ACL GR	3771	3871
DIFL CDL CN SL	3146	3768
DIPS GR	2850	3870
DLL MLL ACL GR	3146	3772
FMT GR	3188	3414
FMT GR	3188	3406
FMT GR	3368	3517
FMT GR	3406	3406
MWD - SN GR	231	3152
MWD - SN GR	3161	3186
MWD - SN GR	3435	3776
VESLOCITY	800	3770

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	225.0	36	226.0	0.00	LOT
SURF.COND.	20	459.0	26	466.0	1.43	LOT
INTERM.	13 3/8	1828.0	17 1/2	1844.0	1.53	LOT
INTERM.	9 5/8	3148.0	12 1/4	3161.0	1.99	LOT
LINER	7	3769.0	8 1/2	3776.0	1.96	LOT
OPEN HOLE		3870.0	6	3870.0	0.00	

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
470	1.10	12.0	3.0	WATER BASED	06.10.1988
592	1.10	12.0	3.0	WATER BASED	07.10.1988
2153	1.25	18.5	3.5	WATER BASED	14.10.1988
2322	1.25	15.0	3.0	WATER BASED	17.10.1988
2590	1.25	18.0	3.8	WATER BASED	17.10.1988
2709	1.25	17.0	5.5	WATER BASED	17.10.1988
2931	1.28	16.0	4.8	WATER BASED	18.10.1988
3014	1.34	18.0	6.2	WATER BASED	19.10.1988
3111	1.40	23.0	8.6	WATER BASED	20.10.1988

3161	1.45	21.0	6.0	WATER BASED	24.10.1988
3161	1.45	18.0	5.5	WATER BASED	24.10.1988
3174	1.45	21.0	6.0	WATER BASED	26.10.1988
3199	1.45	20.0	4.5	WATER BASED	26.10.1988
3223	1.49	21.0	6.0	WATER BASED	27.10.1988
3251	1.49	21.0	6.0	WATER BASED	01.11.1988
3280	1.49	23.0	7.0	WATER BASED	01.11.1988
3286	1.53	21.0	6.5	WATER BASED	01.11.1988
3293	1.53	24.0	6.0	WATER BASED	01.11.1988
3329	1.53	24.0	7.0	WATER BASED	02.11.1988
3350	1.53	24.0	6.5	WATER BASED	02.11.1988
3377	1.53	22.0	6.0	WATER BASED	03.11.1988
3411	1.53	20.0	6.0	WATER BASED	04.11.1988
3602	1.53	75.0	8.0	WATER BASED	07.11.1988
3619	1.50	21.0	4.0	WATER BASED	29.11.1988
3763	1.49	19.0	5.0	WATER BASED	21.11.1988
3765	1.50	23.0	8.5	WATER BASED	11.11.1988
3766	1.50	17.0	6.5	WATER BASED	14.11.1988
3776	1.50	19.0	8.5	WATER BASED	14.11.1988
3776	1.50	19.0	9.0	WATER BASED	14.11.1988
3776	1.50	19.0	6.5	WATER BASED	15.11.1988
3776	1.50	17.0	6.0	WATER BASED	17.11.1988
3776	1.50	21.0	6.0	WATER BASED	21.11.1988
3776	1.50	26.0	9.0	WATER BASED	17.11.1988
3793	1.40	22.0	6.5	WATER BASED	21.11.1988
3815	1.40	23.0	6.5	WATER BASED	22.11.1988
3831	1.40	19.0	5.0	WATER BASED	25.11.1988
3870	1.40	22.0	5.5	WATER BASED	25.11.1988

Pressure plots

The pore pressure data is sourced from well logs if no other source is specified. In some wells where pore pressure logs do not exist, information from Drill stem tests and kicks have been used. The data has been reported to the NPD, and further processed and quality controlled by IHS Markit.

Document name	Document format	Document size [MB]
1302_Formation_pressure_(Formasjonstrykk)	pdf	0.22