General information

Wellbore name	6406/3-3
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORWEGIAN SEA
Field	ÅSGARD
Discovery	6506/12-3 Smørbukk Sør
Well name	6406/3-3
Seismic location	ST 8403 - 445 SP. 350
Production licence	091
Drilling operator	Den norske stats oljeselskap a.s
Drill permit	526-L
Drilling facility	DYVI DELTA
Drilling days	84
Entered date	04.08.1986
Completed date	26.10.1986
Release date	26.10.1988
Publication date	28.06.2007
Purpose - planned	APPRAISAL
Reentry	NO
Content	SHOWS
Discovery wellbore	NO
Kelly bushing elevation [m]	29.0
Water depth [m]	302.0
Total depth (MD) [m RKB]	4416.0
Final vertical depth (TVD) [m RKB]	4416.0
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	ÅRE FM
Geodetic datum	ED50
NS degrees	64° 59' 49.18'' N
EW degrees	6° 53' 27.64'' E
NS UTM [m]	7209958.99
EW UTM [m]	400545.31
UTM zone	32
NPDID wellbore	949

Wellbore history

General

Well 6406/3-3 was drilled to appraise the southern part of the Beta structure, named Smørbukk South. This well was the fourth well on Smørbukk South, and it was a joint well between licenses PL 091 and PL 094. The primary target for the well was sandstones in the Middle-Early Jurassic age Halten Group (present nomenclature: Fangst and Båt Groups). The well location was chosen so that the Tomma I Formation (Garn Formation) was expected to be hydrocarbon bearing with hydrocarbon/water contacts in the Tomma III - Aldra Formations (Ile - Tilje Formations).

Operations and results

Appraisal well 6406/3-3 was spudded with the semi-submersible installation Dyvi Delta on 4 August 1986 and drilled to TD at 4416 m in the Early Jurassic Åre Formation. Operations went without significant incidents and were finished twenty days ahead of schedule. Only 5.2% rig time was registered as down time. The well was drilled with seawater/hi-vis pills/bentonite down to 1070 m, with gypsum/polymer mud from 1070 m to 2320 m, with gypsum/lignosulphonate/lignite mud from 2320 m to 3936 m, and with lignosulphonate/lignite/Anco resin mud from 3936 m to TD.

The top of the reservoir came in at 3933 m, 49 m deeper than prognosed. Cores showed poor - medium visible porosity and good to poor oil shows from the top and down to ca 3955 m (ca 3925 m TVD MSL). The oil/water contact was thus almost 65 m higher than the other holes in the Beta structure. RFT-data indicated that the rest of the Fangst and Båt Groups contained water. Weak shows were however recorded on sidewall cores in the interval 4210 m to 4262 m in the Ti1je Formation, while weak shows were recorded on well site cuttings all through Middle - Early Jurassic down to TD.

A fixed offset VSP with the source 2.6 km north of the location was shot in order to explain the surprising and negative results of the well. The VSP sections indicated a probably sealing, east-west striking fault at reservoir level approximately 1 km north of the well. Results of well 6406/3-3 indicated that the Beta structure was divided into segments bounded by minor fault trends. As a result the reserve estimates on the Beta structure were reduced by ca 33%.

Two cores were cut in the intervals 3938 - 3952.5 and 3956 - 3972.2 m in the Garn Formation. No fluid samples were taken on wire line.

The well was permanently abandoned on 26 October 1986 as a well with shows.

Testing

Two DSTs were performed in the Garn Formation in this well. DST 1 at 4003 - 4012 m produced 35 m3 water/day on a 64/64" choke. The maximum temperature measured during the test was 136 deg C. DST 2 at 3940 - 3950 m gave no flow from a tight formation. Maximum temperature measured during DST 2 was 124 deg C.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
460.00	4416.00

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	3938.0	3952.5	[m]
2	3956.0	3972.2	[m]

Total core sample length [m]	30.7
Cores available for sampling?	YES

Core photos


3938-3943m


3943-3948m


3948-3952m


3956-3961m


3961-3966m


3966-3971m


3971-3972m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
3591.0	[m]	DC	PALEO
3603.0	[m]	DC	PALEO
3618.0	[m]	DC	PALEO
3633.0	[m]	DC	PALEO
3648.0	[m]	DC	PALEO
3660.0	[m]	DC	PALEO
3675.0	[m]	DC	PALEO
3690.0	[m]	DC	PALEO

3705.0	[m]	DC	PALEO
3720.0	[m]	DC	PALEO
3732.0	[m]	DC	PALEO
3744.0	[m]	DC	PALEO
3759.0	[m]	DC	PALEO
3774.0	[m]	DC	PALEO
3789.0	[m]	DC	PALEO
3804.0	[m]	DC	PALEO
3819.0	[m]	DC	PALEO
3831.0	[m]	DC	PALEO
3846.0	[m]	DC	PALEO
3861.0	[m]	DC	PALEO
3867.0	[m]	DC	PALEO
3876.0	[m]	DC	PALEO
3891.0	[m]	DC	PALEO
3906.0	[m]	DC	PALEO
3921.0	[m]	DC	PALEO
3936.0	[m]	DC	PALEO
3942.4	[m]	C	PALEO
3947.9	[m]	C	PALEO
3951.0	[m]	DC	PALEO
3966.0	[m]	DC	PALEO
3969.6	[m]	C	PALEO
3974.0	[m]	SWC	PALEO
3981.0	[m]	DC	PALEO
3996.0	[m]	DC	PALEO
4011.0	[m]	DC	PALEO
4022.0	[m]	SWC	PALEO
4026.0	[m]	DC	PALEO
4037.0	[m]	SWC	PALEO
4041.0	[m]	DC	PALEO
4056.0	[m]	DC	PALEO
4068.0	[m]	DC	PALEO
4083.0	[m]	DC	PALEO
4095.6	[m]	SWC	PALEO
4098.0	[m]	DC	PALEO
4113.0	[m]	DC	PALEO
4128.0	[m]	DC	PALEO
4133.8	[m]	SWC	PALEO
4143.0	[m]	DC	PALEO

4151.7	[m]	SWC	PALEO
4161.0	[m]	DC	PALEO
4174.8	[m]	SWC	PALEO
4176.0	[m]	DC	PALEO
4190.3	[m]	SWC	PALEO
4191.0	[m]	DC	PALEO
4201.4	[m]	SWC	PALEO
4206.0	[m]	DC	PALEO
4209.6	[m]	SWC	PALEO
4215.0	[m]	DC	PALEO
4217.6	[m]	SWC	PALEO
4236.0	[m]	DC	PALEO
4246.6	[m]	SWC	PALEO
4251.0	[m]	DC	PALEO
4262.3	[m]	DC	PALEO
4266.0	[m]	DC	PALEO
4266.8	[m]	SWC	PALEO
4281.0	[m]	DC	PALEO
4296.0	[m]	DC	PALEO
4300.8	[m]	SWC	PALEO
4311.0	[m]	DC	PALEO
4316.5	[m]	SWC	PALEO
4326.0	[m]	DC	PALEO
4328.8	[m]	SWC	PALEO
4341.0	[m]	DC	PALEO
4347.1	[m]	SWC	PALEO
4356.0	[m]	DC	PALEO
4371.0	[m]	DC	PALEO
4386.0	[m]	DC	PALEO
4387.8	[m]	SWC	PALEO
4401.0	[m]	DC	PALEO
4403.3	[m]	SWC	PALEO
4407.8	[m]	SWC	PALEO
4413.8	[m]	SWC	PALEO
4416.0	[m]	DC	PALEO

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	RFT2D	3994.50	0.00		29.09.1986 - 00:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
331	NORDLAND GP
1390	KAI FM
1987	HORDALAND GP
1987	BRYGGE FM
2256	ROGALAND GP
2256	TARE FM
2307	TANG FM
2368	SHETLAND GP
3188	CROMER KNOLL GP
3188	LYSING FM
3222	LANGE FM
3800	VIKING GP
3800	SPEKK FM
3843	MELKE FM
3939	FANGST GP
3939	GARN FM
4038	NOT FM
4066	ILE FM
4131	BÅT GP
4131	ROR FM
4202	TILJE FM
4404	ÅRE FM

Geochemical information

Document name	Document format	Document size [MB]
949_1	pdf	0.37
949_2	pdf	10.55

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

Document name	Document format	Document size [MB]
949_01_WDSS_General_Information	pdf	0.25
949_02_WDSS_completion_log	pdf	0.34

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

Document name	Document format	Document size [MB]
949_01_6406_3_3_Completion_report	pdf	6.38
949_02_6406_3_3_Completion_report_Samples	pdf	5.59
949_03_6406_3_3_Completion_log	pdf	2.96

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL VDL CCL GR	2249	3919
CNL GR	3952	4398
CST GR	3974	4413
DLL GR	3921	4416
ISF LSS MSFL GR	2301	4417
LDL CNL GR	2301	4419
MWD - EWR GR	3925	4347
MWD - GR RES DIR	0	4317
RFT GR	3193	3218
RFT GR	3940	3964
RFT GR	3952	4398
RFT GR	3994	4286
SHDT GR	3921	4420
TEMP	0	2300
VELOCITY	1000	4000

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	442.0	36	444.0	0.00	LOT
SURF.COND.	20	1064.0	26	1083.0	1.67	LOT
INTERM.	13 3/8	2301.0	17 1/2	2536.0	1.99	LOT
INTERM.	9 5/8	3918.0	12 1/4	3936.0	1.89	LOT
LINER	7	4415.0	8 1/2	4416.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
444	1.04	35.0	15.4	WATERBASED	06.08.1986
446	1.12	37.0	19.6	WATERBASED	07.08.1986
757	1.12	42.0	23.1	WATERBASED	08.08.1986
886	1.16	32.0	4.9	WATER BASED	24.10.1986
1067	1.12	40.0	28.0	WATERBASED	11.08.1986
1067	0.00	41.0	30.8	WATERBASED	11.08.1986
1067	0.00	37.0	26.6	WATERBASED	11.08.1986
1083	1.30	39.0	14.0	WATERBASED	12.08.1986
1083	0.00	42.0	13.3	WATERBASED	13.08.1986
1083	0.00	51.0	9.8	WATERBASED	14.08.1986
1086	1.12	43.0	9.7	WATERBASED	18.08.1986
1155	1.55	57.0	7.7	WATER BASED	23.10.1986
1180	1.12	42.0	10.0	WATERBASED	18.08.1986
1330	1.12	43.0	10.0	WATERBASED	18.08.1986
1645	1.20	51.0	13.0	WATERBASED	18.08.1986
1970	1.25	53.0	14.0	WATERBASED	18.08.1986
2320	1.52	62.0	14.0	WATERBASED	19.08.1986
2320	0.00	66.0	14.0	WATERBASED	20.08.1986
2320	0.00	70.0	13.3	WATERBASED	21.08.1986
2536	1.55	54.0	8.4	WATERBASED	22.08.1986
2701	1.68	65.0	18.2	WATERBASED	25.08.1986
2866	1.68	58.0	12.0	WATERBASED	25.08.1986
2934	1.68	65.0	13.3	WATERBASED	25.08.1986
2970	1.68	62.0	11.9	WATERBASED	26.08.1986
3056	1.68	53.0	9.8	WATERBASED	27.08.1986
3093	1.68	65.0	11.2	WATERBASED	28.08.1986
3138	1.68	59.0	10.5	WATERBASED	29.08.1986

3189	1.68	50.0	9.1	WATERBASED	01.09.1986
3205	1.68	51.0	9.8	WATERBASED	01.09.1986
3259	1.68	55.0	10.5	WATERBASED	01.09.1986
3281	1.68	58.0	9.8	WATERBASED	02.09.1986
3349	1.71	55.0	9.1	WATERBASED	04.09.1986
3418	1.71	58.0	10.5	WATERBASED	04.09.1986
3488	1.71	53.0	19.5	WATERBASED	05.09.1986
3522	1.71	53.0	10.0	WATERBASED	08.09.1986
3566	1.71	56.0	10.0	WATERBASED	08.09.1986
3639	1.75	70.0	3.5	WATER BASED	21.10.1986
3639	1.75	57.0	3.5	WATER BASED	23.10.1986
3649	1.71	53.0	9.0	WATERBASED	08.09.1986
3701	1.25	45.0	2.8	WATER BASED	20.10.1986
3724	1.71	53.0	9.8	WATERBASED	09.09.1986
3772	1.71	56.0	9.8	WATERBASED	10.09.1986
3797	0.00	48.0	8.4	WATERBASED	18.09.1986
3797	1.75	53.0	11.2	WATER BASED	15.09.1986
3797	0.00	52.0	11.2	WATERBASED	15.09.1986
3797	0.00	32.0	11.2	WATERBASED	16.09.1986
3797	0.00	58.0	10.5	WATERBASED	17.09.1986
3812	1.75	60.0	11.2	WATERBASED	11.09.1986
3835	1.75	58.0	11.2	WATERBASED	12.09.1986
3884	1.75	55.0	9.8	WATERBASED	15.09.1986
3936	1.75	53.0	11.2	WATERBASED	19.09.1986
3936	0.00	60.0	12.6	WATERBASED	22.09.1986
3937	1.25	50.0	7.7	WATERBASED	22.09.1986
3974	1.25	60.0	7.0	WATERBASED	22.09.1986
3995	1.26	51.0	3.5	WATER BASED	16.10.1986
3995	1.25	55.0	2.8	WATER BASED	17.10.1986
3995	1.25	50.0	2.8	WATER BASED	20.10.1986
3995	1.25	55.0	2.8	WATER BASED	20.10.1986
4000	1.25	50.0	3.5	WATER BASED	15.10.1986
4026	1.25	58.0	7.7	WATERBASED	23.09.1986
4153	1.25	50.0	6.3	WATERBASED	24.09.1986
4193	1.25	57.0	6.3	WATERBASED	25.09.1986
4353	1.25	60.0	6.3	WATERBASED	26.09.1986
4378	1.25	55.0	5.6	WATERBASED	06.10.1986
4378	1.25	60.0	6.3	WATER BASED	06.10.1986
4378	1.25	50.0	5.6	WATER BASED	07.10.1986
4378	1.25	48.0	4.9	WATER BASED	10.10.1986

4378	1.25	54.0	7.0	WATER BASED	13.10.1986
4378	1.25	52.0	3.5	WATER BASED	14.10.1986
4378	1.25	49.0	4.9	WATER BASED	09.10.1986
4378	1.25	55.0	3.5	WATER BASED	13.10.1986
4416	1.25	57.0	5.6	WATERBASED	29.09.1986
4416	0.00	125.0	7.7	WATERBASED	30.09.1986
4416	0.00	90.0	5.6	WATERBASED	03.10.1986
4416	0.00	90.0	5.6	WATERBASED	06.10.1986
4416	0.00	70.0	6.3	WATERBASED	29.09.1986
4416	0.00	75.0	7.0	WATERBASED	29.09.1986
4416	0.00	130.0	7.0	WATERBASED	01.10.1986
4416	0.00	119.0	7.0	WATERBASED	02.10.1986
4416	0.00	70.0	5.7	WATERBASED	06.10.1986

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]
949_Formation_pressure_(Formasjonstrykk)	PDF	0.22