



General information

Wellbore name	6406/2-2
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORWEGIAN SEA
Field	KRISTIN
Discovery	6406/2-1 Lavrans
Well name	6406/2-2
Seismic location	HWM 94- ROW 1790 & COLUMN 2070
Production licence	199
Drilling operator	Saga Petroleum ASA
Drill permit	825-L
Drilling facility	ROSS RIG (2)
Drilling days	107
Entered date	12.12.1995
Completed date	27.03.1996
Release date	27.03.1998
Publication date	24.09.2002
Purpose - planned	APPRAISAL
Reentry	NO
Content	GAS/CONDENSATE
Discovery wellbore	NO
1st level with HC, age	MIDDLE JURASSIC
1st level with HC, formation	ILE FM
2nd level with HC, age	EARLY JURASSIC
2nd level with HC, formation	TOFTE FM
Kelly bushing elevation [m]	24.0
Water depth [m]	272.0
Total depth (MD) [m RKB]	5367.0
Final vertical depth (TVD) [m RKB]	5351.0
Maximum inclination [°]	15.3
Bottom hole temperature [°C]	183
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	ÅRE FM
Geodetic datum	ED50
NS degrees	64° 49' 46.35" N
EW degrees	6° 34' 15.43" E



NS UTM [m]	7191848.60
EW UTM [m]	384740.99
UTM zone	32
NPDID wellbore	2644

Wellbore history

General

Well 6406/2-2 was drilled on the B structure (Lavrans discovery) in the eastern part of the block, south of an east-west trending cross fault. The discovery well 6406/2-1 had previously been drilled on the northern segment of the B structure. The cross fault was suspected to act as a pressure barrier between the two segments, causing variation in fluid types. The main objective of well 6406/2-2 was to prove hydrocarbons and verify fluid contacts in the southern segment, which seemed to differ from the northern segment in both the nature and intensity of the seismic amplitudes. An additional objective was to investigate any differences in reservoir development between the two segments.

Operations and results

Appraisal well 6406/2-2 was spudded 12 December 1995 with the semi-submersible installation "Ross Rig" and TD was reached at 5367 m (5351 mTVD) 12 February 1996 in the Åre Formation. The well was drilled water based with bentonite down to 1272 m, with KCl and glycol (ANCO 208) from 1272 to 2858 m, and with oil-based mud from 2858 m to TD. The formation tops were drilled in accordance with the prognosis, and the lithologies drilled were largely similar to those reported from 6406/2-1. The Jurassic succession was encountered 5-100 m deeper than in well 6406/2-1, due to the lower structural position of well 6406/2-2. As in well 6406/2-1, well 6406/2-2 proved the presence of thick reservoir sandstones in the Garn, Ile, Tofte and Tilje Formations. In addition, an 8 m thick sand was drilled in the lower part of the Ror Formation. The reservoir quality showed large variations, with generally poor porosity in the Garn Formation, good porosity in parts of the Ile Formation, generally good porosity in the Tofte Formation, and zones with good porosity especially in the lower part of the Tilje Formation. Other parts of the Ile and Tilje Formations, as well as the sandstone beds in the upper part of the Åre Formation, were tight as a result of silica cementing. Sandy intervals within the Cromer Knoll Group proved to contain thin beds of impure sandstone with poor reservoir quality. As in well 6406/2-1, the reservoir quality of the Jurassic sandstone intervals is highly variable, with zones of good porosity both in the Ile, Tofte, Tilje Formations, and the lower part of the Ror Formation. Twelve cores were obtained from the Garn, Ile, Tofte, Lower Ror and Tilje Formations. A total of 410,2 m was drilled, of which 408,65 m was recovered. Formation multi tester (FMT) samples containing hydrocarbons were obtained from the Ile, Tofte and intra Lower Ror sands. All FMT samples were contaminated with oil-based mud. The rig operations were terminated 27 March 1996 after two production tests and the well was suspended as a gas/condensate appraisal well.

Testing

Two production tests were performed in the Tofte Formation and the lower part of the Ile Formation. DST 2 gave maximum rates of 1021 000 Sm³/day gas and 557 Sm³/day condensate through a 68/64" choke. The average separator GOR during the 40/64" choke period in DST 2 was 2050 Sm³ /Sm³ at separator conditions of about 41.5 bar and 30 deg C, which is lower than in well 6406/2-1. Hydrocarbons were proven down to 4745 m in the Ile Formation, and down to 4927 m in the Tofte Formation.



Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
1280.00	5367.00

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	4479.0	4495.0	[m]
2	4626.0	4647.7	[m]
3	4648.0	4684.9	[m]
4	4685.0	4722.3	[m]
5	4722.3	4759.2	[m]
6	4868.0	4905.0	[m]
7	4905.0	4941.9	[m]
8	4942.0	4979.2	[m]
9	4979.5	5016.5	[m]
10	5016.5	5053.9	[m]
11	5054.0	5091.4	[m]
12	5091.5	5128.7	[m]

Total core sample length [m]	408.7
Cores available for sampling?	YES

Core photos



4479-4484m



4484-4489m



4489-4494m



4494-4495m



4626-4631m



4631-4636m



4636-4641m



4641-4646m



4646-4647m



4648-4653m



4653-4658m



4658-4663m



4663-4668m



4668-4673m



4673-4678m



4678-4683m



4683-4685m



4685-4690m



4690-4695m



4695-4700m



4700-4705m



4705-4710m



4710-4715m



4715-4720m



4720-4722m



4722-4727m



4727-4732m



4732-4737m



4737-4742m



4742-4747m



4747-4752m



4752-4757m



4757-4759m



4868-4873m



4873-4878m



4878-4883m



4883-4888m



4888-4893m



4893-4898m



4898-4903m



4903-4905m



4905-4910m



4910-4915m



4915-4920m



4920-4925m



4925-4930m



4930-4935m



4935-4940m



4940-4941m



4942-4947m



4947-4952m



4952-4957m



4957-4962m



4962-4967m



4967-4972m



4972-4977m



4977-4979m



4979-4984m



4984-4989m



4989-4994m



4994-4999m



4999-5004m



5004-5009m



5009-5014m



5014-5016m



5016-5021m



5021-5026m



5026-5031m



5031-5036m



5036-5041m



5041-5046m



5046-5051m



5051-5054m



5054-5059m



5059-5064m



5064-5069m



5069-5074m



5074-5079m



5079-5084m



5084-5089m



5089-5091m



5091-5096m



5096-5101m



5101-5106m



5106-5111m



5111-5116m



5116-5121m



5126-5129m



5121-5126m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
1290.0	[m]	DC	STRAT
1310.0	[m]	DC	STRAT
1330.0	[m]	DC	STRAT



1350.0 [m]	DC	STRAT
1370.0 [m]	DC	STRAT
1390.0 [m]	DC	STRAT
1410.0 [m]	DC	STRAT
1430.0 [m]	DC	STRAT
1450.0 [m]	DC	STRAT
1470.0 [m]	DC	STRAT
1490.0 [m]	DC	STRAT
1510.0 [m]	DC	STRAT
1530.0 [m]	DC	STRAT
1550.0 [m]	DC	STRAT
1570.0 [m]	DC	STRAT
1590.0 [m]	DC	STRAT
1610.0 [m]	DC	STRAT
1630.0 [m]	DC	STRAT
1650.0 [m]	DC	STRAT
1670.0 [m]	DC	STRAT
1690.0 [m]	DC	STRAT
1720.0 [m]	DC	STRAT
1730.0 [m]	DC	STRAT
1750.0 [m]	DC	STRAT
1770.0 [m]	DC	STRAT
1790.0 [m]	DC	STRAT
1800.0 [m]	DC	STRAT
1830.0 [m]	DC	STRAT
1850.0 [m]	DC	STRAT
1870.0 [m]	DC	STRAT
1890.0 [m]	DC	STRAT
1910.0 [m]	DC	STRAT
1930.0 [m]	DC	STRAT
1950.0 [m]	DC	STRAT
1970.0 [m]	DC	STRAT
1990.0 [m]	DC	STRAT
2010.0 [m]	DC	STRAT
2030.0 [m]	DC	STRAT
2050.0 [m]	DC	STRAT
2060.0 [m]	DC	STRAT
2080.0 [m]	DC	STRAT
2090.0 [m]	DC	STRAT
2110.0 [m]	DC	STRAT



2130.0	[m]	DC	STRAT
2150.0	[m]	DC	STRAT
2170.0	[m]	DC	STRAT
2190.0	[m]	DC	STRAT
2210.0	[m]	DC	STRAT
2230.0	[m]	DC	STRAT
2250.0	[m]	DC	STRAT
2270.0	[m]	DC	STRAT
2290.0	[m]	DC	STRAT
2310.0	[m]	DC	STRAT
2330.0	[m]	DC	STRAT
2350.0	[m]	DC	STRAT
2370.0	[m]	DC	STRAT
2390.0	[m]	DC	STRAT
2410.0	[m]	DC	STRAT
2430.0	[m]	DC	STRAT
2450.0	[m]	DC	STRAT
2470.0	[m]	DC	STRAT
2490.0	[m]	DC	STRAT
2510.0	[m]	DC	STRAT
2530.0	[m]	DC	STRAT
2550.0	[m]	DC	STRAT
2570.0	[m]	DC	STRAT
2590.0	[m]	DC	STRAT
2610.0	[m]	DC	STRAT
2630.0	[m]	DC	STRAT
2650.0	[m]	DC	STRAT
2670.0	[m]	DC	STRAT
2690.0	[m]	DC	STRAT
2710.0	[m]	DC	STRAT
2735.0	[m]	DC	STRAT
2745.0	[m]	DC	STRAT
2765.0	[m]	DC	STRAT
2785.0	[m]	DC	STRAT
2815.0	[m]	DC	STRAT
2825.0	[m]	DC	STRAT
2845.0	[m]	DC	STRAT
2865.0	[m]	DC	STRAT
2875.0	[m]	DC	STRAT
2895.0	[m]	DC	STRAT



2915.0	[m]	DC	STRAT
2935.0	[m]	DC	STRAT
2955.0	[m]	DC	STRAT
2975.0	[m]	DC	STRAT
2995.0	[m]	DC	STRAT
3015.0	[m]	DC	STRAT
3035.0	[m]	DC	STRAT
3055.0	[m]	DC	STRAT
3075.0	[m]	DC	STRAT
3085.0	[m]	DC	STRAT
3110.0	[m]	DC	STRAT
3130.0	[m]	DC	STRAT
3145.0	[m]	DC	STRAT
3170.0	[m]	DC	STRAT
3185.0	[m]	DC	STRAT
3205.0	[m]	DC	STRAT
3225.0	[m]	DC	STRAT
3245.0	[m]	DC	STRAT
3265.0	[m]	DC	STRAT
3285.0	[m]	DC	STRAT
3295.0	[m]	DC	STRAT
3315.0	[m]	DC	STRAT
3335.0	[m]	DC	STRAT
3355.0	[m]	DC	STRAT
3375.0	[m]	DC	STRAT
3390.0	[m]	DC	STRAT
3410.0	[m]	DC	STRAT
3425.0	[m]	DC	STRAT
3445.0	[m]	DC	STRAT
3465.0	[m]	DC	STRAT
3485.0	[m]	DC	STRAT
3505.0	[m]	DC	STRAT
3525.0	[m]	DC	STRAT
3545.0	[m]	DC	STRAT
3565.0	[m]	DC	STRAT
3585.0	[m]	DC	STRAT
3605.0	[m]	DC	STRAT
3625.0	[m]	DC	STRAT
3645.0	[m]	DC	STRAT
3665.0	[m]	DC	STRAT



3685.0	[m]	DC	STRAT
3695.0	[m]	DC	STRAT
3715.0	[m]	DC	STRAT
3735.0	[m]	DC	STRAT
3755.0	[m]	DC	STRAT
3775.0	[m]	DC	STRAT
3795.0	[m]	DC	STRAT
3815.0	[m]	DC	STRAT
3835.0	[m]	DC	STRAT
3855.0	[m]	DC	STRAT
3875.0	[m]	DC	STRAT
3895.0	[m]	DC	STRAT
3915.0	[m]	DC	STRAT
3935.0	[m]	DC	STRAT
3955.0	[m]	DC	STRAT
3975.0	[m]	DC	STRAT
3995.0	[m]	DC	STRAT
4015.0	[m]	DC	STRAT
4035.0	[m]	DC	STRAT
4055.0	[m]	DC	STRAT
4075.0	[m]	DC	STRAT
4095.0	[m]	DC	STRAT
4115.0	[m]	DC	STRAT
4135.0	[m]	DC	STRAT
4155.0	[m]	DC	STRAT
4175.0	[m]	DC	STRAT
4195.0	[m]	DC	STRAT
4215.0	[m]	DC	STRAT
4235.0	[m]	DC	STRAT
4255.0	[m]	DC	STRAT
4265.0	[m]	DC	STRAT
4305.0	[m]	DC	STRAT
4325.0	[m]	DC	STRAT
4345.0	[m]	DC	STRAT
4365.0	[m]	DC	STRAT
4375.0	[m]	DC	STRAT
4385.0	[m]	DC	STRAT
4395.0	[m]	DC	STRAT
4405.0	[m]	DC	STRAT
4415.0	[m]	DC	STRAT



4425.0 [m]	DC	STRAT
4435.0 [m]	DC	STRAT
4445.0 [m]	DC	STRAT
4453.0 [m]	DC	STRAT
4461.0 [m]	DC	STRAT
4473.0 [m]	DC	STRAT
4521.0 [m]	DC	STRAT
4536.0 [m]	DC	STRAT
4542.0 [m]	DC	STRAT
4554.0 [m]	DC	STRAT
4569.0 [m]	DC	STRAT
4581.0 [m]	DC	STRAT
4605.0 [m]	DC	STRAT
4617.0 [m]	DC	STRAT
4629.0 [m]	C	STRAT
4645.0 [m]	C	STRAT
4664.0 [m]	C	STRAT
4682.0 [m]	C	STRAT
4692.0 [m]	C	STRAT
4700.0 [m]	C	STRAT
4710.0 [m]	C	STRAT
4767.0 [m]	DC	STRAT
4791.0 [m]	DC	STRAT
4803.0 [m]	DC	STRAT
4812.0 [m]	DC	STRAT
4824.0 [m]	DC	STRAT
4836.0 [m]	DC	STRAT
4848.0 [m]	DC	STRAT
4860.0 [m]	DC	STRAT
4894.0 [m]	C	STRAT
4930.0 [m]	C	STRAT
4939.0 [m]	C	STRAT
4947.4 [m]	C	OD
4947.4 [m]	C	OD
4948.0 [m]	C	STRATLAB
4957.0 [m]	C	STRATL
4966.0 [m]	C	STRATL
4977.0 [m]	C	STRATL
4983.0 [m]	C	STRATL
4992.0 [m]	C	STRATL



5000.0	[m]	C	STRATL
5009.0	[m]	C	STRATL
5019.0	[m]	C	STRATL
5028.0	[m]	C	STRATL
5047.0	[m]	C	STRATL
5056.0	[m]	C	STRATL
5063.0	[m]	C	STRATL
5073.0	[m]	C	STRATL
5083.0	[m]	C	STRATL
5091.0	[m]	C	STRATL
5094.0	[m]	C	STRATL
5101.0	[m]	C	STRATL
5110.0	[m]	C	STRATL
5126.0	[m]	C	STRATL
5139.0	[m]	DC	STRATL
5151.0	[m]	DC	STRATL
5163.0	[m]	DC	STRATL
5175.0	[m]	DC	STRATL
5187.0	[m]	DC	STRATL
5199.0	[m]	DC	STRATL
5223.0	[m]	DC	STRATL
5235.0	[m]	DC	STRATL
5259.0	[m]	DC	STRATL
5271.0	[m]	DC	STRATL
5283.0	[m]	DC	STRATL
5295.0	[m]	DC	STRATL
5307.0	[m]	DC	STRATL
5319.0	[m]	DC	STRATL
5331.0	[m]	DC	STRATL
5343.0	[m]	DC	STRATL
5355.0	[m]	DC	STRATL
5367.0	[m]	DC	STRATL

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
296	NORDLAND GP
296	NAUST FM
1561	KAI FM



1865	HORDALAND GP
1865	BRYGGE FM
2416	ROGALAND GP
2416	TARE FM
2481	TANG FM
2540	SHETLAND GP
2540	SPRINGAR FM
2683	NISE FM
2882	KVITNOS FM
3445	CROMER KNOLL GP
3445	LYSING FM
3459	LANGE FM
4354	LYR FM
4375	VIKING GP
4375	SPEKK FM
4389	MELKE FM
4461	FANGST GP
4461	GARN FM
4576	NOT FM
4623	ILE FM
4756	BÅT GP
4756	ROR FM
4868	TOFTE FM
4928	ROR FM
4978	TILJE FM
5291	ÅRE FM

Composite logs

Document name	Document format	Document size [MB]
2644	pdf	0.70

Geochemical information

Document name	Document format	Document size [MB]
2644_1	pdf	1.61
2644_2	pdf	1.94





2644_3	pdf	1.87
2644_4	pdf	1.71
2644_5	pdf	1.19

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

Document name	Document format	Document size [MB]
2644_6406_2_2_COMPLETION_REPORT_AND_COMPLETION_LOG	pdf	39.22

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	4927	4868	19.1
2.0	4746	4715	27.0

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0	51.000	10.000	52.000	176
2.0	41.000	32.000	51.000	171

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	91	223000	0.804	0.941	2450
2.0	575	1021000	0.784	1.030	1808

Logs

Log type	Log top depth [m]	Log bottom depth [m]
DPIL MAC DSL	4469	5127
DPIL MAC XDL CN	2849	4477
DPIL MAC ZDL	1252	2855
FMT QDYNE	3452	4949
HEXDIP CBIL	4466	5358
MRIL	4495	5155
MWD DIR	396	382





MWD RES DIR GR	382	5284
RCOR	2910	4825
ZDL CN DEL2	4469	4851
ZDL CN DEL2 DSL	4750	5370
ZDL CN ORIT	4587	5130

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	382.0	36	383.0	0.00	LOT
INTERM.	18 5/8	1252.0	20	1254.0	1.69	LOT
INTERM.	13 3/8	2849.0	17 1/2	2850.0	1.84	LOT
INTERM.	9 5/8	4467.0	12 1/4	4468.0	1.82	LOT
LINER	7	5367.0	8 1/2	5367.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
387	1.03			WATER BASED	
470	1.20	10.0		WATER BASED	
1094	1.20	10.0		WATER BASED	
1272	1.20	10.0		WATER BASED	
1272	1.25	10.0		WATER BASED	
1489	1.30	26.0		KCL MUD	
2122	1.48	32.0		KCL MUD	
2598	1.64	46.0		KCL MUD	
2654	1.64	46.0		KCL MUD	
2858	1.66	33.0		KCL MUD	
3204	1.55	44.0		OIL BASED	
3450	1.55	45.0		OIL BASED	
3539	1.57	50.0		OIL BASED	
3840	1.57	54.0		OIL BASED	
4157	1.59	50.0		OIL BASED	
4215	1.62	55.0		OIL BASED	
4215	1.62	51.0		OIL BASED	
4450	1.62	46.0		OIL BASED	
4474	1.64	47.0		OIL BASED	



4486	1.35	28.0		OIL BASED	
4589	1.35	32.0		OIL BASED	
4626	1.35	30.0		OIL BASED	
4648	1.35	30.0		OIL BASED	
4685	1.35	32.0		OIL BASED	
4759	1.35	33.0		OIL BASED	
4828	1.35	31.0		OIL BASED	
4868	1.33	34.0		OIL BASED	
4942	1.32	35.0		OIL BASED	
4980	1.32	30.0		OIL BASED	
5017	1.32	35.0		OIL BASED	
5054	1.32	34.0		OIL BASED	
5129	1.32	37.0		OIL BASED	
5182	1.32	37.0		OIL BASED	
5236	1.32	38.0		OIL BASED	
5248	1.32	40.0		OIL BASED	
5292	1.32	44.0		OIL BASED	
5336	1.32	39.0		OIL BASED	
5367	1.32	39.0		OIL BASED	

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]
2644 Formation pressure (Formasjonstrykk)	pdf	0.29

