Generell informasjon

Brønnbane navn	6406/2-2
Type	EXPLORATION
Formål	APPRAISAL
Status	P&A
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORWEGIAN SEA
Felt	KRISTIN
Funn	6406/2-1 Lavrans
Brønn navn	6406/2-2
Seismisk lokalisering	HWM 94- ROW 1790 & COLUMN 2070
Utvinningstillatelse	199
Boreoperatør	Saga Petroleum ASA
Boretillatelse	825-L
Boreinnretning	ROSS RIG (2)
Boredager	107
Borestart	12.12.1995
Boreslutt	27.03.1996
Frigitt dato	27.03.1998
Publiseringsdato	24.09.2002
Opprinnelig formål	APPRAISAL
Gjenåpnet	NO
Innhold	GAS/CONDENSATE
Funnbrønnbane	NO
1. nivå med hydrokarboner, alder	MIDDLE JURASSIC
1. nivå med hydrokarboner, formasjon.	ILE FM
2. nivå med hydrokarboner, alder	EARLY JURASSIC
2. nivå med hydrokarboner, formasjon	TOFTE FM
Avstand, boredekk - midlere havflate [m]	24.0
Vanndybde ved midlere havflate [m]	272.0
Totalt målt dybde (MD) [m RKB]	5367.0
Totalt vertikalt dybde (TVD) [m RKB]	5351.0
Maks inklinasjon [°]	15.3
Temperatur ved bunn av brønnbanen [°C]	183
Eldste penetrerte alder	EARLY JURASSIC

Eldste penetrerte formasjon	ÅRE FM
Geodetisk datum	ED50
NS grader	64° 49' 46.35'' N
ØV grader	6° 34' 15.43'' E
NS UTM [m]	7191848.60
ØV UTM [m]	384740.99
UTM sone	32
NPDID for brønnbanen	2644

Brønnhistorie

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 m 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.

Borekaks i Sokkeldirektoratet

Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
1280.00	5367.00

Borekaks tilgjengelig for prøvetaking?	YES

Borekjerner i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
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 kjerneprøve lengde [m]	408.7
Kjerner tilgjengelig for prøvetaking?	YES

Kjernebilder


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

Palynologiske preparater i Sokkeldirektoratet

Prøve dybde	Dybde enhet	Prøve type	Laboratorie
1290.0	[m]	DC	STRAT
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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
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1630.0	[m]	DC	STRAT
1650.0	[m]	DC	STRAT
1670.0	[m]	DC	STRAT
1690.0	[m]	DC	STRAT
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1730.0	[m]	DC	STRAT
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1770.0	[m]	DC	STRAT
1790.0	[m]	DC	STRAT
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2490.0	[m]	DC	STRAT
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2895.0	[m]	DC	STRAT
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3695.0	[m]	DC	STRAT
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3775.0	[m]	DC	STRAT

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3835.0	[m]	DC	STRAT
3855.0	[m]	DC	STRAT
3875.0	[m]	DC	STRAT
3895.0	[m]	DC	STRAT
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5355.0	[m]	DC	STRATL
5367.0	[m]	DC	STRATL

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
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

Spleisede logger

Dokument navn	Dokument format	Dokument størrelse [KB]
2644	pdf	0.70

Geokjemisk informasjon

Dokument navn	Dokument format	Dokument størrelse [KB]
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

Dokumenter - rapportert av utvinningstillatelsen (frigitt ihht til regelverk)

Dokument navn	Dokument format	Dokument størrelse [KB]
2644_6406_2_2_COMPLETION_REPORT_AND_COMPLETION_LOG	pdf	39.22

Borestrengtester (DST)

Test nummer	Fra dybde MD [m]	Til dybde MD [m]	Reduksjonsventil størrelse [mm]
1.0	4927	4868	19.1
2.0	4746	4715	27.0

Test nummer	Endelig avstengningstrykk [MPa]	Endelig strømningstrykk [MPa]	Bunnhullstrykk [MPa]	Borehullstemperatur [°C]
1.0	51.000	10.000	52.000	176
2.0	41.000	32.000	51.000	171

Test nummer	Olje produksjon [Sm3/dag]	Gass produksjon [Sm3/dag]	Oljetetthet [g/cm3]	Gasstyngde rel. luft	GOR [m3/m3]
1.0	91	223000	0.804	0.941	2450
2.0	575	1021000	0.784	1.030	1808

Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [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

Foringsrør og formasjonsstyrketester

Type utforing	Utforing diam. [tommer]	Utforing dybde [m]	Brønnbane diam. [tommer]	Brønnbane dyp [m]	LOT/FIT slam eqv. [g/cm3]	Type formasjonstest
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

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	Flytegrense [Pa]	Type slam	Dato, måling
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	

Trykkplott

Porertrykksdataene kommer fra logging i brønnen hvis ingen annen kilde er oppgitt. I noen brønner der trykk ikke er logget, er det brukt informasjon fra formasjonstester eller brønnspark. Trykkdataene er rapportert inn til Oljedirektoratet og videre prosessert og kvalitetssikret av IHS Markit.

Dokument navn	Dokument format	Dokument størrelse [KB]
2644_Formation_pressure_(Formasjonstrykk)	pdf	0.29