



Generell informasjon

Brønnbane navn	6305/4-1
Type	EXPLORATION
Formål	APPRAISAL
Status	P&A
Pressemelding	lenke til pressemelding
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORWEGIAN SEA
Felt	ORMEN LANGE
Funn	6305/5-1 Ormen lange
Brønn navn	6305/4-1
Seismisk lokalisering	inline 4152 & x-line 5028
Utvinningstillatelse	209
Boreoperatør	Norsk Hydro Produksjon AS
Boretillatelse	1025-L
Boreinnretning	SCARABEO 5
Boredager	82
Borestart	14.03.2002
Boreslutt	03.06.2002
Frigitt dato	03.06.2004
Publiseringsdato	29.06.2004
Opprinnelig formål	APPRAISAL
Gjenåpnet	NO
Innhold	GAS
Funnbrønnbane	NO
1. nivå med hydrokarboner, alder	PALEOCENE
1. nivå med hydrokarboner, formasjon.	EGGA FM (INFORMAL)
Avstand, boredekk - midlere havflate [m]	25.0
Vanndybde ved midlere havflate [m]	1002.0
Totalt målt dybde (MD) [m RKB]	2975.0
Totalt vertikalt dybde (TVD) [m RKB]	2974.0
Maks inklinasjon [°]	5.7
Temperatur ved bunn av brønnbanen [°C]	84
Eldste penetrerte alder	LATE CRETACEOUS
Eldste penetrerte formasjon	SPRINGAR FM
Geodetisk datum	ED50



NS grader	63° 34' 17.76" N
ØV grader	5° 17' 55.93" E
NS UTM [m]	7051501.85
ØV UTM [m]	614148.32
UTM sone	31
NPDID for brønnbanen	4441

Brønnhistorie

**General**

The appraisal well 6305/4-1 is located in the north western part of the direct hydrocarbon indicator (DHI) area of the Ormen Lange Field, in the eastern part of block 6305/4 in PL209. There were three main objectives for the well, all having equal priority. The first objective was to reduce the risk of the worst-case scenario of reservoir compartmentalisation. The second objective was to address the potential slide risk due to reservoir drainage of the main production area, and the third objective was to reduce the risk of worst-case GIIP through improved knowledge on the hydrocarbon distribution. Further important objectives were to test the reservoir quality closer to the NW margin of the gas field as well as to acquire a new check point for geophysical, geological and petrophysical interpretations.

Operations and results

The well was spudded on 16 March 2002 and reached a total depth of 2975 m in the Late Cretaceous Springar Formation. In general, the drilling conditions experienced in well 6305/4-1 are as predicted. The well was drilled with seawater and hi-vis pills to 1756 m and with KCl/polymer/glycol (Glydril) mud from 1756 m to TD. In tie-well 6305/5-1 problems with borehole instability was experienced in the Eocene deposits. No such problems were reported from well 6305/4-1, but loss of mud to the formation was experienced during the leak off test at 1749 m.

All drilling objectives were met. All logging and well test objectives were met. The well proved good reservoir quality in the Egga Reservoir Unit, which was thinner than prognosed. A δGas Down Toð situation was encountered in the lowermost Egga Formation. Isolated, overpressured water filled sands were found in the underlying units. Shows were recorded only in the reservoir section. A single day production test indicates dynamic sealing for parts of 3 of the 4 seismically interpreted faults, which surround the well location. One 60 ft core was cut in the Ooze section of the Brygge Formation from 1761 m to 1779 m (Core #1). Additional 3 x 60 ft cores were cut from 2769 m in the Egga reservoir sand to 2817.3 m. When Core # 3 was at rig floor it started to expand due to trapped gas. Approximately 1,5 - 2m of core came out of the inner barrel and partly disintegrated on rig floor. The upper part of the inner barrel contained therefore gaps between core pieces. As a result, the measured depths do not fit the actual depth of the reservoir for core # 3.

Formation temperatures using Horner plots were estimated at 2660 m and 2975 m giving 72°C and 84°C, respectively. This gives an average formation temperature gradient of 4.31°C / 100m TVD assuming 1.8°C at seafloor. It was prognosed a gradient of 4.4°C. The small discrepancy may be due to the uncertainty of the method used. The result was within the range of data from nearby wells. The average gradient may be further divided into one gradient of 4.52°C from seafloor to 2660 m and then one gradient of 3.81°C from 2660 m to 2975 m. However, the long marine riser is known to cool down the mud to such an extent that the use of only Horner plots to estimate the formation temperature becomes doubtful. The well was tested and a temperature of 86,9°C was estimated at 2783.5 m. This would give an average formation temperature gradient of 4,84°C/ 100 m TVD, which is higher than prognosed. With a gradient of 4,84°C/ 100 m TVD the BHST at TD (2975m) equals to 96,1°C. Eight MDT samples were taken in the Reservoir at 2788.8 m. All eight recovered gas. One MDT sample taken at 2811.1 m recovered water.

The well was permanently plugged and abandoned after testing as a gas appraisal well on 2 June 2002.

Testing

A production test was carried out, producing 1.87 mil Sm³ gas and 153 Sm³ condensate /day through a 80/64" choke at 135 bar.á



Borekaks i Sokkeldirektoratet

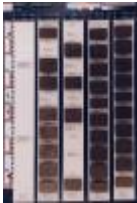
Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
1780.00	2961.00
Borekaks tilgjengelig for prøvetaking?	YES

Borekjerne i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
1	1761.0	1778.6	[m]
2	2769.0	2788.2	[m]
3	2788.0	2806.4	[m]
4	2807.0	2817.3	[m]

Total kjerneprøve lengde [m]	65.5
Kjerner tilgjengelig for prøvetaking?	YES

Kjernebilder



1761-1766m



1766-1771m



1771-1776m



1776-1778m



2769-2773m



2773-2777m



2777-2781m



2781-2785m



2785-2788m



2788-2792m





2792-2796m 2796-2800m 2800-2804m 2804-2806m 2807-2811m



2811-2815m



2815-2817m

Palynologiske preparater i Søkeldirektoratet

Prøve dybde	Dybde enhet	Prøve type	Laboratorie
1762.0	[m]	C	OD
1762.5	[m]	C	RRI
1762.9	[m]	C	OD
1765.5	[m]	C	RRI
1765.8	[m]	C	OD
1769.8	[m]	C	OD
1770.0	[m]	C	OD
1771.2	[m]	C	RRI
1771.9	[m]	C	OD
1780.0	[m]	C	RRI
1800.0	[m]	DC	RRI
1820.0	[m]	DC	RRI
1840.0	[m]	DC	RRI
1860.0	[m]	DC	RRI
1880.0	[m]	DC	RRI
1900.0	[m]	DC	RRI
1910.0	[m]	DC	RRI
1920.0	[m]	DC	RRI
1930.0	[m]	DC	RRI
1940.0	[m]	DC	RRI
1960.0	[m]	DC	RRI
1980.0	[m]	DC	RRI
2000.0	[m]	DC	RRI
2020.0	[m]	DC	RRI
2040.0	[m]	DC	RRI
2060.0	[m]	DC	RRI
2080.0	[m]	DC	RRI



2100.0	[m]	DC	RRI
2120.0	[m]	DC	RRI
2140.0	[m]	DC	RRI
2160.0	[m]	DC	RRI
2180.0	[m]	DC	RRI
2200.0	[m]	DC	RRI
2220.0	[m]	DC	RRI
2240.0	[m]	DC	RRI
2260.0	[m]	DC	RRI
2280.0	[m]	DC	RRI
2290.0	[m]	DC	RRI
2300.0	[m]	DC	RRI
2320.0	[m]	DC	RRI
2340.0	[m]	DC	RRI
2360.0	[m]	DC	RRI
2380.0	[m]	DC	RRI
2400.0	[m]	DC	RRI
2410.0	[m]	DC	RRI
2420.0	[m]	DC	RRI
2440.0	[m]	DC	RRI
2460.0	[m]	DC	RRI
2480.0	[m]	DC	RRI
2500.0	[m]	DC	RRI
2510.0	[m]	DC	RRI
2520.0	[m]	DC	RRI
2530.0	[m]	DC	RRI
2540.0	[m]	DC	RRI
2550.0	[m]	DC	RRI
2560.0	[m]	DC	RRI
2580.0	[m]	DC	RRI
2590.0	[m]	DC	RRI
2600.0	[m]	DC	RRI
2610.0	[m]	DC	RRI
2620.0	[m]	DC	RRI
2630.0	[m]	DC	RRI
2640.0	[m]	DC	RRI
2650.0	[m]	DC	RRI
2660.0	[m]	DC	RRI
2670.0	[m]	DC	RRI
2690.0	[m]	DC	RRI



2710.0 [m]	DC	RRI
2720.0 [m]	DC	RRI
2727.0 [m]	DC	RRI
2730.0 [m]	DC	RRI
2733.0 [m]	DC	RRI
2739.0 [m]	DC	RRI
2742.0 [m]	DC	RRI
2745.0 [m]	DC	RRI
2748.0 [m]	DC	RRI
2751.0 [m]	DC	RRI
2755.5 [m]	SWC	RRI
2757.0 [m]	SWC	RRI
2758.0 [m]	SWC	RRI
2758.7 [m]	SWC	RRI
2759.0 [m]	SWC	RRI
2759.6 [m]	SWC	RRI
2760.0 [m]	SWC	RRI
2764.0 [m]	SWC	RRI
2765.5 [m]	SWC	RRI
2767.5 [m]	SWC	RRI
2769.1 [m]	C	RRI
2769.5 [m]	C	RRI
2771.4 [m]	C	RRI
2773.3 [m]	C	RRI
2776.0 [m]	C	RRI
2777.3 [m]	C	RRI
2777.4 [m]	C	RRI
2779.7 [m]	C	RRI
2780.2 [m]	C	RRI
2781.7 [m]	C	RRI
2782.0 [m]	C	RRI
2783.5 [m]	C	RRI
2784.0 [m]	C	RRI
2784.2 [m]	C	RRI
2786.3 [m]	C	RRI
2787.9 [m]	C	RRI
2790.0 [m]	DC	RRI
2794.0 [m]	C	RRI
2794.7 [m]	C	RRI
2795.0 [m]	DC	RRI



2796.0 [m]	DC	RRI
2799.3 [m]	C	RRI
2800.6 [m]	C	RRI
2801.6 [m]	C	RRI
2802.0 [m]	DC	RRI
2802.5 [m]	C	RRI
2806.0 [m]	C	RRI
2808.0 [m]	DC	RRI
2808.6 [m]	C	RRI
2809.1 [m]	C	RRI
2810.3 [m]	C	RRI
2811.2 [m]	C	RRI
2812.2 [m]	C	RRI
2812.5 [m]	C	RRI
2812.8 [m]	C	RRI
2813.4 [m]	C	RRI
2814.0 [m]	DC	RRI
2814.0 [m]	C	RRI
2814.6 [m]	C	RRI
2815.5 [m]	C	RRI
2817.0 [m]	C	RRI
2819.0 [m]	SWC	RRI
2820.4 [m]	SWC	RRI
2821.5 [m]	SWC	RRI
2826.0 [m]	DC	RRI
2829.0 [m]	DC	RRI
2833.2 [m]	SWC	RRI
2835.0 [m]	DC	RRI
2835.5 [m]	SWC	RRI
2840.0 [m]	SWC	RRI
2841.0 [m]	DC	RRI
2844.0 [m]	DC	RRI
2853.0 [m]	DC	RRI
2856.0 [m]	DC	RRI
2859.0 [m]	DC	RRI
2862.0 [m]	DC	RRI
2865.0 [m]	DC	RRI
2871.0 [m]	DC	RRI
2877.0 [m]	DC	RRI
2880.0 [m]	DC	RRI



2883.0	[m]	DC	RRI
2886.0	[m]	DC	RRI
2889.0	[m]	DC	RRI
2892.0	[m]	DC	RRI
2898.0	[m]	DC	RRI
2904.0	[m]	DC	RRI
2910.0	[m]	DC	RRI
2916.0	[m]	DC	RRI
2925.0	[m]	DC	RRI
2931.0	[m]	DC	RRI
2937.0	[m]	DC	RRI
2943.0	[m]	DC	RRI
2949.0	[m]	DC	RRI
2955.0	[m]	DC	RRI
2961.0	[m]	DC	RRI
2967.0	[m]	DC	RRI
2970.0	[m]	DC	RRI
2973.0	[m]	DC	RRI

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
1027	NORDLAND GP
1027	NAUST FM
1662	KAI FM
1701	HORDALAND GP
1701	BRYGGE FM
2394	ROGALAND GP
2394	TARE FM
2529	TANG FM
2769	EGGA FM (INFORMAL)
2829	SHETLAND GP
2829	SPRINGAR FM

Spleisede logger

Dokument navn	Dokument format	Dokument størrelse [KB]
4441	pdf	0.28





Dokumenter - rapportert av utvinningstillatelsen (frigitt ihht til regelverk)

Dokument navn	Dokument format	Dokument størrelse [KB]
4441_6305_4_1_COMPOSITE_PLOT	.PDF	0.54
4441_6305_4_1_DRILLING_COMPLETION_REPORT	.PDF	2.60
4441_6305_4_1_GEOLOGICAL_COMPLETION_REPORT	.PDF	1.07

Borestrengtester (DST)

Test nummer	Fra dybde MD [m]	Til dybde MD [m]	Reduksjonsventil størrelse [mm]
1.0	2770	2797	31.7

Test nummer	Endelig avstengningstrykk [MPa]	Endelig strømningsstrykk [MPa]	Bunnhullstrykk [MPa]	Borehullstemperatur [°C]
1.0		15.300		

Test nummer	Olje produksjon [Sm3/dag]	Gass produksjon [Sm3/dag]	Oljetetthet [g/cm3]	Gasstyngde rel. luft	GOR [m3/m3]
1.0	145	1860000			12827

Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [m]
CMR+ HNGS	2740	2900
DSI CSP GPIT EMS	1765	2674
FMI DSI	2713	2964
MDT	2828	2854
MSCT	2755	2847
MWD LWD - CDR	1105	1749
MWD LWD - DIR	1026	1066
MWD LWD - PP	1026	1108





MWD LWD - PP ADN ARC GVR ISON	1026	1751
MWD LWD - PP ARC5 RAB	2719	2975
MWD LWD - PP CDR RAB	2650	2723
MWD LWD - PP CDR RAB ADN ISON	1749	2786
MWD LWD - PP VISION675 RAB	2719	2768
PEX HALS SP	996	2692
SP HRLA PEX	2569	2975
VSP	1100	2960

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	1105.0	36	1108.0	0.00	LOT
INTERM.	20	1749.0	26	1756.0	1.40	LOT
INTERM.	9 5/8	2719.0	12 1/4	2725.0	1.57	LOT
OPEN HOLE		2975.0	8 1/2	2975.0	0.00	LOT

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	flytegrense [Pa]	Type slam	Dato, måling
1022	1.30			WATER BASED	
1083	1.10	14.0		WATER BASED	
1125	1.03	14.0		WATER BASED	
1380	1.03	14.0		WATER BASED	
1508	1.07	14.0		WATER BASED	
1749	1.25	12.0		WATER BASED	
1749	0.00			WATER BASED	
1756	0.00			WATER BASED	
2444	1.30	16.0		WATER BASED	
2696	1.30	17.0		WATER BASED	
2725	1.33	14.0		WATER BASED	
2788	1.30	19.0		WATER BASED	
2925	1.32			WATER BASED	
2974	1.32	16.0		WATER BASED	
2975	1.30	17.0		WATER 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 brønnspar. Trykkdataene er rapportert inn til Oljedirektoratet og videre prosessert og kvalitetssikret av IHS Markit.

Dokument navn	Dokument format	Dokument størrelse [KB]
4441 Formation pressure (Formasjonstrykk)	pdf	0.30

