



Generell informasjon

Brønnbane navn	24/9-7 A
Type	EXPLORATION
Formål	APPRAISAL
Status	P&A
Pressemelding	lenke til pressemelding
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORTH SEA
Felt	VOLUND
Funn	24/9-5 Volund
Brønn navn	24/9-7
Seismisk lokalisering	inline 958 5590 NH 960
Utvinningstillatelse	150
Boreoperatør	Marathon Petroleum Norge AS
Boretillatelse	1074-L
Boreinnretning	DEEPSEA DELTA
Boredager	6
Borestart	25.03.2004
Boreslutt	29.03.2004
Plugget dato	29.03.2004
Frigitt dato	29.03.2006
Publiseringsdato	23.05.2006
Opprinnelig formål	APPRAISAL
Gjenåpnet	NO
Innhold	OIL/GAS
Funnbrønnbane	NO
1. nivå med hydrokarboner, alder	EOCENE
1. nivå med hydrokarboner, formasjon.	NO FORMAL NAME
Avstand, boredekk - midlere havflate [m]	29.0
Vanndybde ved midlere havflate [m]	124.0
Totalt målt dybde (MD) [m RKB]	2277.0
Totalt vertikalt dybde (TVD) [m RKB]	2217.0
Maks inklinasjon [°]	32.1
Temperatur ved bunn av brønnbanen [°C]	77
Eldste penetrerte alder	PALEOCENE
Eldste penetrerte formasjon	HEIMDAL FM



Geodetisk datum	ED50
NS grader	59° 28' 42.6" N
ØV grader	1° 57' 44.49" E
NS UTM [m]	6593946.86
ØV UTM [m]	441212.92
UTM sone	31
NPDID for brønnbanen	4919

Brønnhistorie

General

Well 24/9-7 was drilled on the Hamsun prospect located immediately to the west and south west of the Gekko structure in PL203 (Figure 1). The prospect was a "horse-shoe" shape around the Grieg structure, drilled by wells 24/9-5 and 24/9-6 in 1993 and 1994. The Hamsun prospect was defined by the recognition and interpretation of a series of distinct seismic anomalies and mapped as a sandstone injection complex, sourced from early Eocene Hermod Formation sands. These anomalies were interpreted to represent oil-filled, highly porous sandstone dykes and sills. Several well bores were proposed to test the prospect. The prime vertical well was planned to intersect the thickest part of the injection complex to test bright amplitude, low acoustic impedance seismic reflectors interpreted to represent major sandstone dyke complexes. A sidetrack well bore was planned depending on the results of the first well.

Operations and results

A total of four wells were drilled from the surface location for 24/9-7 (the planned vertical well, an unplanned down-dip sidetrack 24/9-7 A, the planned up-dip sidetrack 24/9-7 B and a further unplanned lateral sidetrack 24/9-7 C). Taken as a whole, the four well bores took a total of 43.11 days to drill. All were drilled from the semi-submersible installation Deepsea Delta. No significant problems were encountered in the operations. Well 24/9-7 was drilled with seawater down to 953 m. From this depth to TD 24/9-7 and all sidetracks were drilled with Versavert oil based mud.

The prime vertical well bore 24/9-7 was spudded on 2 March 2004 and drilled to TD at 2280 m in the Late Paleocene Heimdal Formation. The well was plugged back for sidetracking on 24 March 2004. Well 24/9-7 A was kicked off at 1500 m and drilled to TD at 2277 m (2216.9 m TVD) in Heimdal Formation sandstone. The well was plugged back for a second sidetrack on 28 March 2004. Well bore 24/9-7-B was sidetracked from 1060 m and drilled to TD at 2230 m (2120.1 m TVD) in Lista Formation claystone. This well bore was plugged back for the final sidetrack on 2 April 2004. Sidetrack 24/9-7 C was kicked off at 1000 m and drilled to TD at 2363 m (2078.5 m TVD) in Sele Formation claystone.

Well 24/9-7 encountered hydrocarbons in two injected sandstone dyke complexes ("upper" and "lower"), together with numerous thin injectites distributed throughout the formations in proximity to the main dyke features. Thin injectite sands were first noted at 1822.6 m TVD, ca 54 m TVD shallower than the main injection feature. The upper, gas-bearing complex was penetrated at 1876.9 m TVD and the lower oil-bearing complex was penetrated at 1961.8 m TVD. Average porosities in the pay zones were estimated to 31.7% in the upper complex and 31.3% in the lower complex. The gas-oil and oil-water contacts were not seen directly on logs or core, but were interpreted at 1920 m TVD and 2024.8 m TVD respectively, based on formation pressure gradients.

Based on these results, sidetrack 24/9-7 A was permitted to evaluate the upper dyke



complex down-dip in the oil leg with the intention of encountering an OWC in the lower complex. This sidetrack encountered the upper and lower complexes, approximately 126 m to the north of the original well, at 1927.6 m TVD and 2032.4 m TVD respectively. Gas-bearing pay was encountered distributed in thin breccia injectite intervals above the upper complex, which was oil-bearing throughout with ca 31.6 m vertical oil pay with average porosity of 32.2%. The lower complex was entirely water bearing as it was penetrated below the previously noted OWC. Wire line log interpretation and formation pressure analysis confirmed the oil column data and results recorded in 24/9-7 and the well was plugged back for the programmed up-dip sidetrack.

Well 24/9-7B was drilled to the planned target location up-dip of the main dyke feature but at 1794 m TVD encountered only thin, sporadic, gas-bearing injectites in the fringe complex.

Well 24/9-7C was drilled with LWD tools to a tight target 728 m northeast of the initial vertical well. The well encountered oil-bearing injected sandstone with a clearly defined OWC at 2024.3 m TVD. Confirmation of the OWC was obtained through formation pressure analysis and a total of 29 m vertical oil pay was recognized with an average porosity of 33.5%.

Four conventional cores were cut from 1830 m to 1916 m in 24/9-7 and one core from 1922.5 m to 1978 m in 24/9-7 B. Four suites of logs were run in 24/9-7 with RCI fluid sampling at different depths within the reservoir. Single Phase samples were taken as follows: oil from 1965 m and 1966.5 m in the lower dyke; 2 gas from 1887 m and 1893.5 m in the upper dyke. PVT samples were taken as follows: oil samples were taken at 1965 m and 1966.5 m; gas was sampled at 1906.5 m, 1887 m, and 1893.5 m. The samples analysed showed a gas gravity of 0.679 sg while the oil samples analysed showed a density of 858.3kg/m³, viscosity of 0.75cp and a gas/oil ratio (GOR) 104.5 m³/m³. Three suites of logs were acquired in 24/9-7A, again with fluid sampling in the reservoir section. Here, PVT samples were taken as follows: oil from 1996 m and water from 2095 m. A single suite of logs was acquired in each of 24/9-7 B and 24/9-7 C.

Rig operations were completed and the wells temporarily suspended on 11 April 2004. The well bores were classified as gas oil appraisal wells.

Testing

No drill stem test was performed in the well bores.

Borekaks i Sokkeldirektoratet

Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
1520.00	2277.00

Borekaks tilgjengelig for prøvetaking?	YES
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Oljeprøver i Sokkeldirektoratet



Test type	Flaske nummer	Topp dyp MD [m]	Bunn dyp MD [m]	Væske type	Test tidspunkt	Prøver tilgjengelig
DST		1996.00	0.00	OIL	09.02.2005 - 00:00	YES

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
153	NORDLAND GP
460	UTSIRA FM
722	HORDALAND GP
722	NO FORMAL NAME
1149	GRID FM
1268	NO FORMAL NAME
1305	GRID FM
1329	NO FORMAL NAME
1941	ROGALAND GP
1941	BALDER FM
1952	NO FORMAL NAME
2007	BALDER FM
2075	NO FORMAL NAME
2096	BALDER FM
2133	SELE FM
2192	LISTA FM
2248	HEIMDAL FM

Spleisede logger

Dokument navn	Dokument format	Dokument størrelse [KB]
4919 24 9 7 A	pdf	0.22

Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [m]
GR HDIL ZDL CNL XMAC	1450	2271
LWD - RAB6 ARC6 GR	1490	2271





RCI GR	1865	2126
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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
OPEN HOLE		2277.0	8 1/2	2277.0	0.00	LOT

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	Flytegrense [Pa]	Type slam	Dato, måling
1147	1.31	26.0		VERSAVERT OBM	
1350	1.30	26.0		VERSAVERT OBM	
1978	1.30	23.0		VERSAVERT OBM	
2230	1.30	24.0		VERSAVERT OBM	

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]
4919 Formation pressure (Formasjonstrykk)	pdf	0.20

