

**General information**

Wellbore name	6407/9-6
Type	EXPLORATION
Purpose	APPRAISAL
Status	SUSPENDED
Factmaps in new window	link to map
Main area	NORWEGIAN SEA
Field	DRAUGEN
Discovery	6407/9-1 Draugen
Well name	6407/9-6
Seismic location	84-121 SP.228
Production licence	093
Drilling operator	A/S Norske Shell
Drill permit	499-L
Drilling facility	BORGNY DOLPHIN
Drilling days	71
Entered date	02.01.1986
Completed date	13.03.1986
Release date	13.03.1988
Publication date	07.11.2005
Purpose - planned	APPRAISAL
Reentry	NO
Content	OIL
Discovery wellbore	NO
1st level with HC, age	LATE JURASSIC
1st level with HC, formation	ROGN FM
Kelly bushing elevation [m]	25.0
Water depth [m]	276.0
Total depth (MD) [m RKB]	1800.0
Final vertical depth (TVD) [m RKB]	1796.0
Maximum inclination [°]	1.9
Bottom hole temperature [°C]	57
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	ROR FM
Geodetic datum	ED50
NS degrees	64° 19' 58.07" N
EW degrees	7° 44' 23.7" E
NS UTM [m]	7134880.01
EW UTM [m]	439100.65



UTM zone	32
NPDID wellbore	871

Wellbore history

General

Well 6407/9-6 was drilled on the Draugen Field in the Haltenbanken area off shore Mid Norway. The target was the Rogn Sandstone Formation of the Late Jurassic. The objectives were to identify the western edge of the Rogn

Formation, to establish the reservoir properties and development of the basal shale, to evaluate the water injection potential in oil-bearing sand, and to calibrate the seismic velocity.

Operations and results

Appraisal well 6407/9-6 was spudded with the semi-submersible installation Borgny Dolphin 2 January 1986 and drilled to TD at 1800 m in the Early Jurassic Ror Formation. Drilling proceeded without significant problems. The well was drilled with seawater and bentonite down to 807 m, with KCl/polymer mud from 807 m to 1603 m, and with chalk mud from 1603 m to TD.

The Rogn Formation was encountered oil-bearing from the top at 1642.5 m (1617.5 m SS) down to the base at 1660 m (1633.5 m SS). Average reservoir quality over this 17.5 m interval was very good, with calculated hydrocarbon saturation of 79 % and an average porosity of 31 %. Core permeabilities in the oil-bearing interval typically ranged between 1 and 10 Darcy. The underlying Fangst Group was interpreted as fully water bearing below 1671 m (1646 m SS), however low hydrocarbon saturations were calculated in the interval 1662 m to 1671 m (1637 - 1646 m SS). These were confirmed by the observed fluorescence in the cores over this interval and by Dean-Stark fluid saturation measurements.

Four cores were cut in the interval 1646 - 1690.2 m. An FMT survey gave the same reservoir oil and water gradients as in the other wells on Draugen, and it was found that the Rogn Formation and the Fangst Group belong to the same pressure regime. One FMT fluid sample was taken at 1652.5 m in the Rogn Formation. After the well was plugged an intermittent stream of gas bubbles was observed leaking from the wellhead. Analysis of a sample of the gas showed that it consisted of methane only. The rig abandoned the location and a programme for regular monitoring of the wellhead and gas leak activity was initiated.

The well was suspended as an oil appraisal and possible water injection well on 13 March 1986.

Testing

One DST test was performed in the Rogn Formation in the interval 1643 -1656 m. The test produced 1018 Sm³/day (6400 Stb/day) on a 56/64" choke. The GOR at separator was 18.4 Sm³/Sm³ (103 scf/stb), oil gravity was 40 deg API (0.825 g/cm³), gas gravity was 0.810 (air = 1), and CO₂ content was 0.6%. Water injection in the same interval was tested with a maximum injection of 2385 Sm³/day (15000 bbl/day).

**Cuttings at the Norwegian Offshore Directorate**

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
390.00	1800.00

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	1646.0	1657.8	[m]
2	1660.0	1672.7	[m]
3	1672.7	1677.0	[m]
4	1678.8	1690.3	[m]

Total core sample length [m]	40.2
Cores available for sampling?	YES

Core photos

1646-1651m



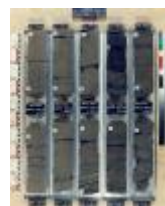
1651-1656m



1656-1657m



1660-1665m



1665-1670m



1670-1672m



1672-1677m



1678-1683m



1683-1688m



1688-1690m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
1656.5	[m]	C	RRI
1656.8	[m]	C	RRI



1657.1	[m]	C	RRI
1657.8	[m]	C	RRI
1660.1	[m]	C	RRI
1660.3	[m]	C	RRI
1660.6	[m]	C	RRI
1661.0	[m]	C	RRI
1661.2	[m]	C	RRI
1661.7	[m]	C	RRI
1662.0	[m]	C	RRI
1662.2	[m]	C	RRI
1662.4	[m]	C	RRI
1662.4	[m]	C	RRI
1663.3	[m]	C	RRI
1671.4	[m]	C	RRI
1681.9	[m]	C	RRI
1684.4	[m]	C	RRI
1689.6	[m]	C	RRI

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	SAMPLE8	1637.00	1646.00		18.02.1986 - 00:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
301	NORDLAND GP
832	HORDALAND GP
832	BRYGGE FM
1342	ROGALAND GP
1342	TARE FM
1376	TANG FM
1540	SHETLAND GP
1571	CROMER KNOLL GP
1571	LANGE FM
1611	VIKING GP



1611	SPEKK FM
1643	ROGN FM
1660	FANGST GP
1660	GARN FM
1744	NOT FM
1775	BÅT GP
1775	ROR FM

Composite logs

Document name	Document format	Document size [MB]
871	pdf	0.39

Geochemical information

Document name	Document format	Document size [MB]
871_1	pdf	0.75

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

Document name	Document format	Document size [MB]
871_01_WDSS_General_Information	pdf	0.27
871_02_WDSS_completion_log	pdf	0.17

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

Document name	Document format	Document size [MB]
871_01_Well_resume	pdf	8.93
871_02_Completion_log	pdf	0.82

Logs





Log type	Log top depth [m]	Log bottom depth [m]
ACL CBL VDL GR	303	1628
ACL CBL VDL GR	1055	1735
CDL CN GR	365	807
CDL CN GR	785	1603
CDL CNL GR	1572	1799
CORGUN	1624	1787
DIFL ACL GR	278	808
DIFL ACL GR	1572	1799
DIFL ACL SP	675	1607
DIPLOG	1616	1794
DLL MLL GR	1612	1795
FMT HP	1652	1652
VELOCITY	378	1787

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	375.0	36	382.0	0.00	LOT
SURF.COND.	20	804.0	26	812.0	1.44	LOT
INTERM.	13 3/8	1619.0	17 1/2	1628.0	1.68	LOT
INTERM.	9 5/8	1776.0	12 1/4	1800.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
354	1.03			WATER BASED	06.01.1986
375	1.03			WATER BASED	06.01.1986
382	1.06	11.0	16.0	WATER BASED	07.01.1986
382	1.03	120.0		WATER BASED	06.01.1986
416	1.15			WATER BASED	10.03.1986
416	1.15			WATER BASED	11.03.1986
416	1.15			WATER BASED	12.03.1986
484	1.15	65.0	9.0	WATER BASED	25.05.1993
609	1.14	36.0	2.0	WATER BASED	28.05.1993
613	1.11	11.0	17.0	WATER BASED	08.01.1986



810	1.12	11.0	17.0	WATER BASED	09.01.1986
810	1.13	12.0	21.0	WATER BASED	09.01.1986
810	1.03			WATER BASED	13.01.1986
812	1.03			WATER BASED	13.01.1986
812	1.03			WATER BASED	14.01.1986
812	1.03			WATER BASED	12.01.1986
817	1.35	23.0	25.0	WATER BASED	16.01.1986
860	1.14	36.0	2.0	WATER BASED	02.06.1993
860	1.14	34.0	4.0	WATER BASED	25.05.1993
860	1.14	36.0	2.0	WATER BASED	28.05.1993
1126	1.37	22.0	27.0	WATER BASED	17.01.1986
1376	1.39	31.0	31.0	WATER BASED	20.01.1986
1539	1.39	27.0	22.0	WATER BASED	20.01.1986
1554	1.16	35.0	3.0	WATER BASED	25.05.1993
1589	1.14	35.0	2.0	WATER BASED	25.05.1993
1589	1.14	34.0	3.0	WATER BASED	25.05.1993
1628	1.39	33.0	29.0	WATER BASED	21.01.1986
1628	1.39	31.0	30.0	WATER BASED	20.01.1986
1628	1.39	32.0	21.0	WATER BASED	21.01.1986
1628	1.40	33.0	29.0	WATER BASED	30.01.1986
1633	1.40	26.0	37.0	WATER BASED	30.01.1986
1641	1.15			WATER BASED	10.03.1986
1646	1.20	16.0	19.0	WATER BASED	30.01.1986
1660	1.20	16.0	19.0	WATER BASED	30.01.1986
1672	1.20	21.0	26.0	WATER BASED	30.01.1986
1678	1.20	18.0	23.0	WATER BASED	30.01.1986
1730	1.15			WATER BASED	11.02.1986
1738	1.15			WATER BASED	11.02.1986
1738	1.15			WATER BASED	12.02.1986
1738	1.15			WATER BASED	10.02.1986
1738	1.15			WATER BASED	14.02.1986
1738	1.15			WATER BASED	16.02.1986
1738	1.15			WATER BASED	20.02.1986
1738	1.15			WATER BASED	21.02.1986
1738	1.15			WATER BASED	24.02.1986
1738	1.15			WATER BASED	27.02.1986
1738	1.15			WATER BASED	28.02.1986
1738	1.15			WATER BASED	03.03.1986
1738	1.15			WATER BASED	04.03.1986
1738	1.15			WATER BASED	07.03.1986



1738	1.15			WATER BASED	07.03.1986
1738	1.03			WATER BASED	04.02.1986
1738	1.15			WATER BASED	06.02.1986
1738	1.15			WATER BASED	11.02.1986
1738	1.15			WATER BASED	17.02.1986
1738	1.15			WATER BASED	05.03.1986
1750	1.20	20.0	27.0	WATER BASED	30.01.1986
1800	1.21	19.0	26.0	WATER BASED	30.01.1986
1800	1.21	20.0	28.0	WATER BASED	03.02.1986
1800	1.21	21.0	30.0	WATER BASED	03.02.1986
1800	1.21	20.0	30.0	WATER BASED	31.01.1986
1800	1.21	21.0	22.0	WATER BASED	03.02.1986

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]
871 Formation pressure (Formasjonstrykk)	PDF	0.25

