

**General information**

Wellbore name	6407/9-5
Type	EXPLORATION
Purpose	APPRAISAL
Status	RE-CLASS TO DEV
Factmaps in new window	link to map
Main area	NORWEGIAN SEA
Field	DRAUGEN
Discovery	6407/9-1 Draugen
Well name	6407/9-5
Seismic location	84 - 127 SP. 563
Production licence	093
Drilling operator	A/S Norske Shell
Drill permit	482-L
Drilling facility	WEST VENTURE OLD
Drilling days	63
Entered date	12.09.1985
Completed date	13.11.1985
Release date	13.11.1987
Publication date	09.03.2009
Purpose - planned	APPRAISAL
Reclassified to wellbore	6407/9-A-55 H
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]	33.0
Water depth [m]	286.0
Total depth (MD) [m RKB]	1820.0
Final vertical depth (TVD) [m RKB]	1819.0
Bottom hole temperature [°C]	48
Oldest penetrated age	MIDDLE JURASSIC
Oldest penetrated formation	NOT FM
Geodetic datum	ED50
NS degrees	64° 16' 42.35" N
EW degrees	7° 44' 14.66" E
NS UTM [m]	7128824.58
EW UTM [m]	438858.99



UTM zone	32
NPDID wellbore	492

Wellbore history

**General**

Well 6407/9-5 was the fifth well drilled on the Draugen Field in the southern Haltenbanken area. Wells 6407/9-1, 6407/9-2 and 6407/9-3 delineated an areally extensive oil accumulation in relatively thin Late Jurassic Rogn Formation sandstone. Net oil sand thicknesses in these wells were 39, 12 and 34 m respectively. The oil gravity was 40 deg API. Well 6407/9-4, located on the west flank of the northern accumulation, confirmed pinch out of the Rogn Formation and encountered similar oil in the underlying Garn formation. The initial conditions of pressure and oil water contact in this well (1638.5 m MSL) were similar to those in the Rogn Formation accumulation. The objectives of well 6407/9-5 were to delineate top structure and rock qualities in the southern culmination. Prognosed TD was 1805 m in rocks of Triassic age, or a maximum depth of 4000 m.

Operations and results

Appraisal well 6407/9-5 was spudded with the semi-submersible installation West Venture on 12 September 1985 and drilled to TD at 1820 m in the Early Jurassic Not Formation. Drilling proceeded without serious problems, except for the sections through glacial deposits where huge boulders caused minor problems. The well was drilled vertical. Deepest reported deviation survey was at 1675 m (1675 m TVD RKB). To this depth maximum deviation from vertical was 0.66 deg. The well was drilled with seawater and bentonite down to 811 m, with KCl/polymer mud from 811 m to 1625 m, and with chalk mud from 1625 m to TD.

The Rogn Formation was encountered at 1654 m, 15 m deeper than prognosed. Light oil was discovered, as known from the other wells in the Draugen field. The oil/water contact was found at 1671 m (1639 m MSL), the same contact as in the other wells drilled on the Draugen Field. Average reservoir quality over this 17 m interval was good, with a calculated hydrocarbon saturation of 76% and a porosity of 27%. Core permeabilities from the oil interval typically ranged between 1 and 10 Darcy. The base of the Rogn Formation, from 1704.0 - 1734.0 was laminated, bituminous shales with occasionally sandy and silty beds, which were strongly pyrite cemented. This interval forms a thick impermeable layer between the Rogn and the underlying Garn sands. The underlying water bearing Garn Formation contained 32 m of sandstone with 32 % average porosity. Oil shows were recorded only in the Rogn Formation reservoir from top and down to 1675 m. No shows were seen elsewhere in the well.

Four cores were cut in the interval 1654 - 1703 m in the Rogn Formation. No fluid samples were acquired on wire line, although several attempts were made.

On completion of the testing the well was suspended on 13 November 1985 as a possible future oil producer. It was re-entered in April 1993. It was taken in use as an oil producer and renamed 6407/9-A-55 H.

Testing

One DST test was performed in the interval 1654 - 1661 m (1621 to 1628 m MSL).

The well produced up to a maximum of 1210 Sm³ oil /day of 40 deg API oil through a 1" choke. Separator GOR was measured at 18.2 Sm³/Sm³. The gas gravity was 0.818 (air = 1) with 0.35% CO₂ and 0 ppm H₂S. Initial reservoir pressure was calculated as 2394 psia at 1663 m (1630 m MSL). The previously established Draugen reservoir pressure of 2392 psia (at datum) was within the accuracy of the gauges.

**Cuttings at the Norwegian Offshore Directorate**

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
420.00	1820.00

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	1654.3	1668.7	[m]
2	1671.0	1672.9	[m]
3	1674.0	1683.7	[m]
4	1685.0	1701.4	[m]

Total core sample length [m]	42.4
Cores available for sampling?	YES

Core photos

1654-1659m



1659-1664m



1664-1668m



1671-1672m



1674-1679m



1679-1683m



1685-1690m



1690-1695m



1790-1695m



1695-1700m



1685-1701m



1700-1701m

**Palynological slides at the Norwegian Offshore Directorate**

Sample depth	Depth unit	Sample type	Laboratory
1250.0	[m]	DC	FUGRO
1260.0	[m]	DC	FUGRO
1270.0	[m]	DC	FUGRO
1280.0	[m]	DC	FUGRO
1290.0	[m]	DC	FUGRO
1300.0	[m]	DC	FUGRO
1310.0	[m]	DC	FUGRO
1320.0	[m]	DC	FUGRO
1330.0	[m]	DC	FUGRO
1340.0	[m]	DC	FUGRO
1350.0	[m]	DC	FUGRO
1360.0	[m]	DC	FUGRO
1370.0	[m]	DC	FUGRO
1380.0	[m]	DC	FUGRO
1390.0	[m]	DC	FUGRO
1400.0	[m]	DC	FUGRO
1410.0	[m]	DC	FUGRO
1420.0	[m]	DC	FUGRO
1657.5	[m]	C	APT
1660.8	[m]	C	APT
1672.4	[m]	C	APT
1674.3	[m]	C	APT
1683.3	[m]	C	APT
1699.7	[m]	C	APT
1700.4	[m]	C	APT
1700.7	[m]	C	APT
1701.0	[m]	C	APT
1701.4	[m]	C	APT

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	DST1	1654.00	1661.00		30.10.1985 - 01:30	YES

**Lithostratigraphy**

Top depth [mMD RKB]	Lithostrat. unit
319	NORDLAND GP
319	NAUST FM
670	MOLO FM
787	HORDALAND GP
787	BRYGGE FM
1305	ROGALAND GP
1305	TARE FM
1347	TANG FM
1530	SHETLAND GP
1579	CROMER KNOLL GP
1619	VIKING GP
1619	SPEKK FM
1654	ROGN FM
1705	SPEKK FM
1733	FANGST GP
1733	GARN FM
1793	NOT FM

Composite logs

Document name	Document format	Document size [MB]
492	pdf	0.34

Geochemical information

Document name	Document format	Document size [MB]
492_1	pdf	1.27
492_2	pdf	0.19
492_3	pdf	0.48

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





Document name	Document format	Document size [MB]
492_01_WDSS_General_Information	pdf	0.26
492_02_WDSS_completion_log	pdf	0.14

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

Document name	Document format	Document size [MB]
492_01_6407_9_5_Completion_report	pdf	5.16
492_02_6407_9_5_Completion_log	pdf	0.92

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	1654	1661	25.4

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0				

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	1203	23000	0.825	0.785	17

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CBL	1193	1679
CBL VDL	1150	1680
DLL MSFL GR	1617	1811
GR	1300	1625
GR	1550	1604
ISF LSS GR	317	810
ISF LSS GR	803	1606
ISF LSS GR	1617	1815
LDL CNL GR	397	811





LDL CNL GR	803	1606
LDL CNL NGS	1617	1816
RFT	1617	1807
RFT	1658	1760
RFT	1658	1760
SHDT	1617	1810
SWS	1100	1605
SWS	1618	1807
WST	489	1800

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	396.0	36	408.0	0.00	LOT
CONDUCTOR	30	408.0	36	408.0	0.00	LOT
SURF.COND.	20	801.0	26	811.0	1.52	LOT
INTERM.	13 3/8	1617.0	17 1/2	1625.0	1.72	LOT
INTERM.	9 5/8	1800.0	12 1/4	1820.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
408	1.04	120.0		WATER BASED	16.09.1985
420	1.25			WATER BASED	11.11.1985
420	1.25			WATER BASED	12.11.1985
520	1.04	60.0		WATER BASED	16.09.1985
811	1.09	80.0		WATER BASED	17.09.1985
811	1.09	120.0		WATER BASED	18.09.1985
811	1.04	120.0		WATER BASED	19.09.1985
811	1.03			WATER BASED	20.09.1985
811	1.03			WATER BASED	23.09.1985
908	1.35	47.0	26.0	WATER BASED	23.09.1985
1220	1.40	50.0	27.0	WATER BASED	24.09.1985
1220	1.40	24.0	24.0	WATER BASED	25.09.1985
1595	1.15			WATER BASED	07.11.1985
1595	1.15			WATER BASED	11.11.1985
1616	1.40	20.0	21.0	WATER BASED	26.09.1985



1619	1.15			WATER BASED	05.11.1985
1619	1.15			WATER BASED	06.11.1985
1625	1.40	21.0	22.0	WATER BASED	27.09.1985
1625	1.40	22.0	23.0	WATER BASED	30.09.1985
1625	1.40	23.0	23.0	WATER BASED	30.09.1985
1654	1.20	16.0	24.0	WATER BASED	01.10.1985
1660	1.19	47.0	27.0	WATER BASED	07.10.1985
1674	1.20	21.0	28.0	WATER BASED	02.10.1985
1679	1.18	18.0	22.0	WATER BASED	09.10.1985
1684	1.18	13.0	14.0	WATER BASED	10.10.1985
1688	1.15			WATER BASED	14.10.1985
1688	1.15			WATER BASED	15.10.1985
1688	1.15			WATER BASED	16.10.1985
1688	1.15			WATER BASED	17.10.1985
1688	1.15			WATER BASED	18.10.1985
1688	1.15			WATER BASED	21.10.1985
1688	1.15			WATER BASED	22.10.1985
1688	1.15			WATER BASED	23.10.1985
1688	1.15			WATER BASED	24.10.1985
1688	1.15			WATER BASED	28.10.1985
1688	1.15			WATER BASED	29.10.1985
1688	1.15			WATER BASED	31.10.1985
1688	1.15			WATER BASED	04.11.1985
1688	1.15			WATER BASED	11.10.1985
1689	1.15			WATER BASED	14.10.1985
1703	1.20	22.0	29.0	WATER BASED	03.10.1985
1788	1.19	20.0	27.0	WATER BASED	08.10.1985
1820	1.20	21.0	29.0	WATER BASED	04.10.1985
1820	1.20	23.0	23.0	WATER BASED	07.10.1985

Thin sections at the Norwegian Offshore Directorate

Depth	Unit
1638.00	[m]

**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]
492 Formation pressure (Formasjonstrykk)	PDF	0.25

