

**General information**

Wellbore name	6407/9-3
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	6407/9-3
Seismic location	84 - 140 SP. 529
Production licence	093
Drilling operator	A/S Norske Shell
Drill permit	463-L
Drilling facility	BORGNY DOLPHIN
Drilling days	87
Entered date	03.05.1985
Completed date	28.07.1985
Release date	28.07.1987
Publication date	28.06.2007
Purpose - planned	APPRAISAL
Reclassified to wellbore	6407/9-A-53 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]	25.0
Water depth [m]	279.0
Total depth (MD) [m RKB]	1868.0
Final vertical depth (TVD) [m RKB]	1868.0
Bottom hole temperature [°C]	63
Oldest penetrated age	EARLY JURASSIC
Oldest penetrated formation	TILJE FM
Geodetic datum	ED50
NS degrees	64° 19' 48.94" N
EW degrees	7° 46' 30.91" E
NS UTM [m]	7134564.04
EW UTM [m]	440802.82



UTM zone	32
NPDID wellbore	469

Wellbore history

General

Appraisal well 6407/9-3 was the third well on the antiform structure of the Draugen Field in the Haltenbanken area. It was placed on the crestal part of the structure, some four kilometres south of the discovery well. The main objectives of the well were to evaluate the lateral continuity and quality of the reservoir; to establish the velocity trend in a North-South direction; to improve the volumetric estimate; and to evaluate the oil deliverability.

Operations and results

Appraisal well 6407/9-3 was spudded with the semi-submersible installation Borgny Dolphin 3 may 1985 and drilled to TD at 1868 m in the Early Jurassic Tilje Formation. Drilling proceeded without serious problems, except for the sections through glacial deposits were boulders caused minor problems. After setting 13 3/8" casing at 1601 m the RKB datum was shifted one m to 26 m above MSL. Operations were interrupted for nearly 17 days from 13 June 1985 by a crew strike. Although amplitude anomalies indicated gas charged sands, no shallow gas was encountered. The well was drilled with seawater and bentonite down to 781 m, with KCl mud from 781 m to 1617 m, and with chalk mud from 1617 m to TD.

The top of the Rogn Formation was penetrated at 1630 m (1604 m SS) and the reservoir was oil bearing down to an oil-water contact at 1664 m (1638 m SS), which is in line with the OWC observed in the other Draugen wells. The contact in this well was interpreted in the transition between the good sands and the basal shales and was for that reason not very clear. The average hydrocarbon saturation was calculated as 82% over the 34 m oil column. Average porosity was 31% in this interval, of which 16.7 m had a porosity above 32.5%. Prior to testing an FMT survey was carried out: the reservoir pressure measured was hydrostatic, 2395 psia at datum (1630 m SS). The Garn Formation was penetrated from 1685 m to 1770 m and was water wet. Oil and oil shows were recorded in the Rogn formation only, not in any other porous section in the well. Nine conventional cores were cut in the interval 1620.5 m to 1679.8 m. One FMT oil sample was taken at 1637.5 m.

The oil appraisal well 6407/9-3 was suspended 28 July 1985 as a possible producer. In 1993 it was re-entered reclassified to development well (producer).

Testing

One DST test was performed. The oil column was perforated from 1630.5 m to 1642.5 m (1606.5 to 1618.5 m SS). The interval was gravel packed and flow rates up to 2496 Sm³/day (15700 stb/d) were achieved during the clean up. A multirate test incorporating 4 flow periods with a total flow duration of 36 hrs and a 24 hrs pressure build-up survey was carried out. The evaluation showed an average permeability of 5.7 Darcy over 36 m. Skins calculated ranged from 24 to 29. Observed productivity indices after gravel packing varied from 147 to 166 stb/d/psi. The calculated ideal PI is 660 stb/d/psi. With flow rate at 2496 Sm³/day on a 2 x 128/64" choke, GOR was 18 - 27 Sm³/Sm³ (100 - 150 scf/stb), oil gravity was 40 deg API, CO₂ content was 0.75%, and H₂S was not detectable.



Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
390.00	1869.00

Cuttings available for sampling?	YES
----------------------------------	-----

Cores at the Norwegian Offshore Directorate

Core sample number	Core sample - top depth	Core sample - bottom depth	Core sample depth - uom
1	1620.5	1621.2	[m]
2	1621.8	1623.3	[m]
5	1627.5	1628.0	[m]
6	1634.0	1650.9	[m]
7	1652.0	1667.0	[m]
8	1667.0	1672.0	[m]
9	1673.0	1679.8	[m]

Total core sample length [m]	46.4
Cores available for sampling?	YES

Core photos



1620-1621m



1621-1623m



1627-1628m



1634-1639m



1639-1644m



1644-1649m



1649-1650m



1652-1657m



1657-1662m



1662-1667m



1667-1672m



1673-1678m



1678-1679m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
1640.2	[m]	C	RRI
1667.6	[m]	C	RRI
1668.2	[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	TEST1E	1631.00	1643.00		20.07.1985 - 01:30	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
304	NORDLAND GP
803	HORDALAND GP
1310	ROGALAND GP
1310	TARE FM
1353	TANG FM
1518	SHETLAND GP
1555	CROMER KNOLL GP
1555	LANGE FM
1593	VIKING GP
1593	SPEKK FM
1630	ROGN FM
1668	SPEKK FM
1685	FANGST GP



1685	GARN FM
1771	NOT FM
1797	BÅT GP
1797	ROR FM
1821	TILJE FM

Composite logs

Document name	Document format	Document size [MB]
469	pdf	0.42

Geochemical information

Document name	Document format	Document size [MB]
469_1	pdf	1.33

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

Document name	Document format	Document size [MB]
469_01_WDSS_General_Information	pdf	0.32
469_02_WDSS_completion_log	pdf	0.16

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

Document name	Document format	Document size [MB]
469_01_Well_resume	pdf	5.94
469_02_Completion_log	pdf	0.88

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	1631	1643	50.8





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	2500	49000	0.825	0.810	21

Logs

Log type	Log top depth [m]	Log bottom depth [m]
CDL CNL GR	350	778
CDL CNL GR	550	1596
CDL CNL SPL	1450	1865
CORGUN	770	1601
CORGUN	1601	1868
DIFL ACL SP GR	266	779
DIFL ACL SP GR	702	1605
DIFL ACL SP GR	1504	1867
DIPLOG	1595	1862
DLL MLL GR	1580	1864
FMT	1630	1847
VELOCITY	401	1863

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	376.5	36	383.0	0.00	LOT
SURF.COND.	20	770.0	26	780.0	1.46	LOT
INTERM.	13 3/8	1601.0	17 1/2	1617.0	1.66	LOT
INTERM.	9 5/8	1843.0	12 1/4	1868.0	0.00	LOT

Drilling mud



Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
314	1.03			WATER BASED	06.05.1985
383	1.03			WATER BASED	06.05.1985
385	1.03			WATER BASED	07.05.1985
385	1.03	10.0	36.0	WATER BASED	09.05.1985
385	1.03	10.0	36.0	WATER BASED	09.05.1985
418	1.25			WATER BASED	29.07.1985
750	1.10	8.0	48.0	WATER BASED	13.05.1985
760	1.08	6.0	29.0	WATER BASED	09.05.1985
780	1.09	6.0	60.0	WATER BASED	10.05.1985
780	1.11	7.0	49.0	WATER BASED	13.05.1985
780	1.11	10.0	30.0	WATER BASED	13.05.1985
780	1.11	10.0	30.0	WATER BASED	13.05.1985
780	1.11	11.0	38.0	WATER BASED	21.05.1985
780	1.11	11.0	38.0	WATER BASED	21.05.1985
780	1.11	7.0	49.0	WATER BASED	13.05.1985
970	1.30	25.0	29.0	WATER BASED	21.05.1985
1250	1.15			WATER BASED	29.07.1985
1274	1.32	23.0	21.0	WATER BASED	21.05.1985
1512	1.34	23.0	19.0	WATER BASED	21.05.1985
1512	1.34	24.0	22.0	WATER BASED	21.05.1985
1512	1.34	24.0	22.0	WATER BASED	21.05.1985
1570	1.15			WATER BASED	26.07.1985
1612	1.22	18.0	28.0	WATER BASED	31.05.1985
1617	1.38	25.0	23.0	WATER BASED	21.05.1985
1617	1.38	25.0	24.0	WATER BASED	22.05.1985
1617	1.38	25.0		WATER BASED	23.05.1985
1617	1.38	25.0	24.0	WATER BASED	22.05.1985
1617	1.38	25.0		WATER BASED	23.05.1985
1620	1.24	13.0	21.0	WATER BASED	29.05.1985
1627	1.22	19.0	29.0	WATER BASED	03.06.1985
1633	1.21	19.0	29.0	WATER BASED	03.06.1985
1649	1.22	18.0	27.0	WATER BASED	12.06.1985
1665	1.22	21.0	28.0	WATER BASED	14.06.1985
1665	1.22	21.0	28.0	WATER BASED	17.06.1985
1665	1.22	21.0	28.0	WATER BASED	17.06.1985
1666	1.15			WATER BASED	16.07.1985
1666	1.15			WATER BASED	22.07.1985



1666	1.15			WATER BASED	15.07.1985
1666	1.15			WATER BASED	22.07.1985
1666	1.15			WATER BASED	10.07.1985
1666	1.15			WATER BASED	12.07.1985
1666	1.15			WATER BASED	15.07.1985
1666	1.15			WATER BASED	18.07.1985
1666	1.15			WATER BASED	19.07.1985
1666	1.15			WATER BASED	23.07.1985
1666	1.15			WATER BASED	25.07.1985
1666	1.15			WATER BASED	26.07.1985
1666	1.15			WATER BASED	09.07.1985
1666	1.15			WATER BASED	10.07.1985
1666	1.15			WATER BASED	12.07.1985
1666	1.15			WATER BASED	16.07.1985
1666	1.15			WATER BASED	18.07.1985
1666	1.15			WATER BASED	19.07.1985
1666	1.15			WATER BASED	23.07.1985
1666	1.15			WATER BASED	25.07.1985
1666	1.15			WATER BASED	26.07.1985
1667	1.23	20.0	30.0	WATER BASED	03.06.1985
1673	1.23	21.0	28.0	WATER BASED	13.06.1985
1684	1.23	21.0	30.0	WATER BASED	03.06.1985
1818	1.22	19.0	28.0	WATER BASED	10.06.1985
1818	1.22	19.0	29.0	WATER BASED	11.06.1985
1818	1.22	19.0	29.0	WATER BASED	11.06.1985
1857	1.21	18.0	27.0	WATER BASED	05.06.1985
1868	1.21	18.0	28.0	WATER BASED	06.06.1985
1868	1.21	18.0	27.0	WATER BASED	06.06.1985
1868	1.21	18.0	27.0	WATER BASED	07.06.1985
1868	1.21	18.0	29.0	WATER BASED	10.06.1985
1868	1.21	18.0	27.0	WATER BASED	07.06.1985
1868	1.21	18.0	29.0	WATER BASED	10.06.1985
1868	1.21	18.0	27.0	WATER BASED	06.06.1985

Thin sections at the Norwegian Offshore Directorate

Depth	Unit
1640.30	[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]
469 Formation pressure (Formasjonstrykk)	PDF	0.25

