General information

Wellbore name	15/9-5
Type	EXPLORATION
Purpose	APPRAISAL
Status	P&A
Factmaps in new window	link to map
Main area	NORTH SEA
Field	SLEIPNER VEST
Discovery	15/6-3 Sleipner Vest
Well name	15/9-5
Seismic location	510-314 SP.735
Production licence	046
Drilling operator	Den norske stats oljeselskap a.s
Drill permit	232-L
Drilling facility	NORSKALD
Drilling days	145
Entered date	19.11.1979
Completed date	11.04.1980
Release date	11.04.1982
Publication date	08.04.2015
Purpose - planned	APPRAISAL
Reentry	NO
Content	GAS/CONDENSATE
Discovery wellbore	NO
1st level with HC, age	MIDDLE JURASSIC
1st level with HC, formation	HUGIN FM
Kelly bushing elevation [m]	25.0
Water depth [m]	108.0
Total depth (MD) [m RKB]	3946.0
Final vertical depth (TVD) [m RKB]	3945.0
Maximum inclination [°]	2.25
Bottom hole temperature [°C]	131
Oldest penetrated age	TRIASSIC
Oldest penetrated formation	SKAGERRAK FM
Geodetic datum	ED50
NS degrees	58° 24' 12.47'' N
EW degrees	1° 42' 29.2'' E
NS UTM [m]	6474503.53
EW UTM [m]	424497.43

UTM zone	31
NPDID wellbore	326

Wellbore history

General

Well 15/9-5 was drilled in the Sleipner Vest area in the Central Graben of the North Sea. The objective was to test hydrocarbons in Middle Jurassic sandstones in the Beta structure of Sleipner Vest. The well is Reference Well for the Heimdal and Våle formations.

Operations and results

Appraisal well 15/9-5 was spudded with the semi-submersible installation Norskald on 19 November 1979 and drilled to TD at 3946 m in the Triassic Skagerrak Formation. Operations met with many problems, but the well objectives were fulfilled in the end. Excessive drag when pulling core barrel out of reservoir was a severe problem, and consequently frequent reaming and circulating trips was needed. Having finished logging in the 8 1/2” section, and just started testing the BOP stack, one of the riser tension sheaves broke and fell down. Also several problems with the hydraulic BOP control system and the ball joint made nearly 12 days rig repair necessary. After this delay the hole required extensive reaming before the 7” liner could be ran and the final 6” section could be drilled. Testing operations were hampered and delayed by bad weather and test equipment breakdown. The well was drilled with spud mud down to 426 m and with seawater/lignosulphonate mud from 426 m to TD.

The well proved gas in sandstones of Middle Jurassic age from top Hugin Formation at 3526 m down to a true gas/water contact at 3662 m, based on logs and RFT samples. The Sleipner Formation was encountered at 3693 m. Logs and RFT pressure gradient proved Sleipner water filled, and ca 3 bar overpressured compared to the Hugin Formation. Shows were described on cores all through the hydrocarbon bearing reservoir. Abundant spots of fluorescence described on cuttings below ca 2000 m are described as “no shows”. According to other comments in the cuttings descriptions the fluorescence may be related to diesel addition to the mud.

Nine cores were cut in the interval 3525 to 3663.6 m. A total of 133 m core (96.8%) was recovered. A FIT fluid sample at 3536 m recovered gas, condensate and mud. An RFT fluid sample was taken at 3540 m.

The well was permanently abandoned on 11 April 1980 as a gas/condensate appraisal well.

Testing

Three Drill Stem Tests were conducted.

DST1 tested the interval 3642 m to 3646.6 m. The final flow was controlled by using two variable chokes mounted in parallel. On the smallest choke size, 2x25/64”, the well produced 583000 Sm3 gas and 181 Sm3 condensate /day. The GOR was ca 3200 Sm3/Sm3, the oil density was 45.3 °API, and the gas gravity was 0.774 (air = 1).

DST2 tested the interval 3605 to 3610 m plus 3613 to 3618 m. The final flow was controlled by using two variable chokes mounted in parallel. On the smallest choke size, 2x28.75/64”, the well produced 699400 Sm3 gas and 189 Sm3 condensate /day. The GOR was ca 3700 Sm3/Sm3, the oil density was 45.4°API, and the gas gravity was 0.773 (air = 1). The CO2 content was 9.2%. Maximum temperature during this test was

122.8 °C.

DST3 tested the interval 3536 to 3546 m. The final flow was controlled by using two variable chokes mounted in parallel. The choke size was kept at 2x45.5/64” throughout the whole flow. The well produced 815500 Sm3 gas and 212 Sm3 condensate /day. The GOR was ca 3850 Sm3/Sm3, the oil density was 40 °API, and the gas gravity was 0.771 (air = 1). The CO2 content was 7.7 %. Maximum temperature during this test was 117.8 °C.

Cuttings at the Norwegian Offshore Directorate

Cutting sample, top depth [m]	Cutting samples, bottom depth [m]
190.00	3946.00

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	3525.0	3543.4	[m]
2	3543.4	3547.0	[m]
3	3547.0	3565.4	[m]
4	3565.4	3583.8	[m]
5	3584.1	3600.4	[m]
6	3600.7	3618.9	[m]
7	3619.2	3634.9	[m]
8	3635.4	3643.8	[m]
9	3645.3	3662.3	[m]

Total core sample length [m]	134.4
Cores available for sampling?	YES

Core photos


3525-3527m


3527-3530m


3530-3533m


3533-3535m


3535-3538m


3538-3541m


3541-3543m


3543-3546m


3546-3547m


3547-3549m


3549-3552m


3552-3555m


3555-3557m


3557-3560m


3560-3563m


3563-3565m


3565-3568m


3568-3570m


3570-3573m


3573-3576m


3576-3578m


3578-3581m


3581-3583m


3584-3586m


3586-3589m


3589-3592m


3592-3594m


3594-3597m


3597-3600m


3600-3603m


3603-3606m


3606-3608m


3608-3611m


3611-3614m


3614-3615m


3616-3618m


3619-3621m


3621-3624m


3624-3627m


3627-3630m


3630-3632m


3632-3634m


3635-3638m


3638-3640m


3640-3643m


3643-3644m


3645-3648m


3648-3650m


3650-3653m


3653-3656m


3656-3658m


3658-3661m


3661-3662m

Palynological slides at the Norwegian Offshore Directorate

Sample depth	Depth unit	Sample type	Laboratory
3430.0	[m]	DC	
3435.0	[m]	DC	
3439.0	[m]	DC	
3469.0	[m]	DC	
3499.0	[m]	DC	
3520.0	[m]	DC	
3528.8	[m]	C	
3555.1	[m]	C	

3573.2	[m]	C	
3577.3	[m]	C	
3596.6	[m]	C	
3598.1	[m]	C	
3607.4	[m]	C	
3615.9	[m]	C	
3623.6	[m]	C	
3634.0	[m]	C	
3636.0	[m]	C	
3643.5	[m]	C	
3650.8	[m]	C	
3691.0	[m]	DC	
3721.0	[m]	DC	
3751.0	[m]	DC	
3781.0	[m]	DC	

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	TEST2	3588.00	3593.00		21.03.1980 - 00:00	YES

Lithostratigraphy

Top depth [mMD RKB]	Lithostrat. unit
133	NORDLAND GP
836	UTSIRA FM
1322	HORDALAND GP
1913	FRIGG FM
2290	ROGALAND GP
2290	BALDER FM
2344	SELE FM
2397	LISTA FM
2448	HEIMDAL FM
2736	VÅLE FM
2774	SHETLAND GP
2774	EKOFISK FM

2806	TOR FM
2964	HOD FM
3210	BLODØKS FM
3253	HIDRA FM
3298	CROMER KNOLL GP
3298	RØDBY FM
3331	SOLA FM
3345	ÅSGARD FM
3432	VIKING GP
3432	DRAUPNE FM
3526	VESTLAND GP
3526	HUGIN FM
3693	SLEIPNER FM
3769	SKAGERRAK FM

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

Document name	Document format	Document size [MB]
326_01_WDSS_General_Information	pdf	0.14
326_02_WDSS_completion_log	pdf	0.25

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

Document name	Document format	Document size [MB]
326_15_9_5_Completion_report_and_log	pdf	21.58

Drill stem tests (DST)

Test number	From depth MD [m]	To depth MD [m]	Choke size [mm]
1.0	3617	3647	25.0
2.0	3588	3593	0.0
3.0	3511	3521	0.0

Test number	Final shut-in pressure [MPa]	Final flow pressure [MPa]	Bottom hole pressure [MPa]	Downhole temperature [°C]
1.0				
2.0				
3.0				

Test number	Oil [Sm3/day]	Gas [Sm3/day]	Oil density [g/cm3]	Gas grav. rel.air	GOR [m3/m3]
1.0	218	768	0.799	0.768	3
2.0	229	865	0.811	0.886	4
3.0	206	813			4

Logs

Log type	Log top depth [m]	Log bottom depth [m]
ARROW PLOT	2827	3951
CBL	400	2825
FDC CNL GR	2827	3949
FDC GR	447	2833
GR CCL	182	2850
HDT	2826	3950
ISF SON GR	182	3949
VELOCITY	475	3940

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	158.0	36	158.0	0.00	LOT
SURF.COND.	20	422.0	26	437.0	1.37	LOT
INTERM.	13 3/8	1232.0	17 1/2	1243.0	1.95	LOT
INTERM.	9 5/8	2792.0	12 1/4	2807.0	1.72	LOT
LINER	7	3663.0	8 1/2	3664.0	1.96	LOT
OPEN HOLE		3921.0	6	3921.0	0.00	LOT

Drilling mud

Depth MD [m]	Mud weight [g/cm3]	Visc. [mPa.s]	Yield point [Pa]	Mud type	Date measured
204	1.04	100.0		waterbased	
436	1.09	38.0		waterbased	
795	1.09	36.0		waterbased	
1300	1.20	100.0		waterbased	
3325	1.38	45.0		waterbased	
3580	1.40	50.0		waterbased	
3778	1.35	44.0		waterbased	

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]
326_Formation_pressure_(Formasjonstrykk)	pdf	0.22