



Generell informasjon

Brønnbane navn	1/9-6 S
Type	EXPLORATION
Formål	APPRAISAL
Status	SUSPENDED
Faktakart i nytt vindu	lenke til kart
Hovedområde	NORTH SEA
Felt	TOMMELITEN GAMMA
Funn	1/9-4 Tommeliten Gamma
Brønn navn	1/9-6
Seismisk lokalisering	ST 404-410.shot point 100
Utvinningstillatelse	044
Boreoperatør	Den norske stats oljeselskap a.s
Boretillatelse	318-L
Boreinnretning	SEDCO 703
Boredager	256
Borestart	21.03.1982
Boreslutt	01.12.1982
Frigitt dato	01.12.1984
Publiseringsdato	10.10.2012
Opprinnelig formål	APPRAISAL
Gjenåpnet	NO
Innhold	GAS/CONDENSATE
Funnbrønnbane	NO
1. nivå med hydrokarboner, alder	PALEOCENE
1. nivå med hydrokarboner, formasjon.	EKOFISK FM
2. nivå med hydrokarboner, alder	LATE CRETACEOUS
2. nivå med hydrokarboner, formasjon	TOR FM
Avstand, boredekk - midlere havflate [m]	26.0
Vanndybde ved midlere havflate [m]	76.0
Totalt målt dybde (MD) [m RKB]	3880.0
Totalt vertikalt dybde (TVD) [m RKB]	3529.0
Maks inklinasjon [°]	32.5
Temperatur ved bunn av brønnbanen [°C]	135
Eldste penetrerte alder	LATE CRETACEOUS



Eldste penetrerte formasjon	HOD FM
Geodetisk datum	ED50
NS grader	56° 29' 3.85" N
ØV grader	2° 56' 0.14" E
NS UTM [m]	6260135.61
ØV UTM [m]	495896.49
UTM sone	31
NPDID for brønnbanen	44

Brønnhistorie

General

Well 1/9-6 S was drilled on the north-west flank of the Tommeliten Gamma structure in the Feda Graben in the southern North Sea. The main objective was to appraise the Tommeliten Field. The well was drilled deviated due to the planned use of this well as a production well. The main targets were the Ekofisk and Tor formations.

Operations and results

Appraisal well 1/9-6 was spudded with the semi-submersible installation Sedco 703 on 21 March 1982. Drilling of the 36" and 26" holes went without incident. There was some difficulty in getting logging tools in the 17 1/2" hole. Gumbo problems occurred while drilling the 12 1/4" hole and both open hole and cased hole logging runs were plagued with tool failures. Differential sticking also occurred while drilling the bottom part of the 8 1/2" hole. TD was set 3880 m, 99 m into the Late Cretaceous Hod Formation. After retrieving the RFT the well began flowing and sloughing large amounts of shale below the 9 5/8" shoe. While circulating and reaming to TD, the pipe became stuck many times due to shale sloughing above the bit. A bit and bit sub were left in the hole during these hole problems, and were never recovered. The well was drilled with "native" mud/seawater down to 1471 m and with polymer/dispersed solids/lignosulphonate/seawater from 1471 m to TD.

Top Ekofisk Formation was penetrated at 3411 m (3110 m TVD) and top Tor Formation at 3516 m (3199 m TVD). Both formations were gas/condensate bearing. No other permeable section in the well had indications of hydrocarbons.

A total of 14 cores were cut in the interval 3415.7 - 3619 m in the Ekofisk and Tor formations. Problems with jamming and differential sticking occurred while coring. The overall recovery was 90%. One run with the RFT tool on wire line was conducted, taking 14 good pressure points, but no fluid sample due to tight formation and stuck tool.

After testing the well was suspended on 1 December as a possible future producer. It is classified as a gas/condensate appraisal well.

Testing

Four DST's were performed in this well. Technical and operational problems plagued all tests.

DST1 tested the interval 3771.6 - 3776.8 m (3424.0 - 3428.6 m TVD) in the water zone at base Tor Formation. A few m3 water was produced in each of several flow periods. The temperature recorded in DST 1, at measurement depth 3750.4 m varied between 130.7 deg C and 133.0 deg C for different periods and gauges, with 131.7 deg C taken as a representative temperature.



DST 2, 2A, and 2B tested the interval 3636.3 - 3654.6 m (3301.0 - 3316.7 m TVD) in the lower Tor Formation. The first test, DST 2, was aborted due to technical problems. Maximum rate achieved from DST 2A was 536604 Sm³/day of gas and 477 Sm³/day of condensate on 32/64" choke. GOR was 1125 Sm³/Sm³, oil density was 0.810, and gas gravity was 0.689 (air = 1). H₂S was measured to be 4-6 ppm and the CO₂ content was measured to be 3%. This test was aborted when the tester valve cut the wire line, and the zone was retested as DST 2B. The maximum flow rates were then close to 700 x 10 Sm³/day of gas and 500 - 550 Sm³/day of condensate on a 28/64". The maximum temperature in different flows from this interval, measured at 3652 m, varied between 121.8 and 122.4 deg C

DST 3 tested the intervals 3587.5 - 3578.4 m, 3569.2 - 3560.1 m and 3550.9 - 3523.5 m in the Tor Formation. It flowed 243808 Sm³ gas and 231 Sm³ condensate/day on a 16/64" choke after acidizing. GOR was 1054 Sm³/Sm³, condensate density was 0.823 g/cm³ and gas gravity was 0.680 (air = 1). Final build-up period was terminated mid-way due to technical problems. Same interval was tested in DST3A without further acidizing. This test produced 241259 Sm³ gas and 202 Sm³ condensate/day on a 20/64" choke. The GOR was 1196 Sm³/Sm³, the oil density was 0.791 g/cm³ and gas gravity was 0.684 (air = 1). The temperature measured at 3522.6 m was 131.1 deg C

DST 4 was perforated in two intervals, the upper zone from 3416.8 - 3426.0 m (3114.8 - 3122.7 m TVD) and the second from 3444.2 - 3459.4 m (3138.2 - 3151.3 m TVD), both in the Ekofisk formation. It produced gas and condensate after stimulation. The maximum rates from these intervals were 834213 Sm³ gas and approximately 559 Sm³ condensate/day of condensate on a 56/64" choke. The GOR was 1491 Sm³/Sm³ on this choke. A GOR of 2800 Sm³/Sm³ was measured before acidization, with a low flowing pressure.

Borekaks i Sokkeldirektoratet

Borekaksprøve, topp dybde [m]	Borekaksprøve, bunn dybde [m]
170.00	3880.00

Borekaks tilgjengelig for prøvetaking?	YES
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Borekjerter i Sokkeldirektoratet

Kjerneprøve nummer	Kjerneprøve - topp dybde	Kjerneprøve - bunn dybde	Kjerneprøve dybde - enhet
1	3415.7	3426.3	[m]
2	3427.0	3444.4	[m]
3	3445.0	3457.0	[m]
4	3463.6	3481.1	[m]
5	3481.7	3499.5	[m]
6	3500.9	3517.8	[m]
7	3518.7	3530.0	[m]
8	3530.5	3534.3	[m]
9	3537.9	3555.0	[m]



10	3556.5	3573.5	[m]
11	3575.0	3584.4	[m]
12	3584.8	3597.5	[m]
13	3598.0	3615.8	[m]
14	3618.1	3618.7	[m]

Total kjerneprøve lengde [m]	182.0
Kjerner tilgjengelig for prøvetaking?	YES

Kjernebilder



3415-3420m



3420-3425m



3425-3426m



3427-3432m



3432-3437m



3437-3442m



3442-3444m



3445-3450m



3450-3455m



3455-3457m



3463-3468m



3468-3473m



3473-3478m



3478-3481m



3481-3486m



3486-3491m



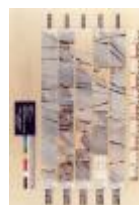
3491-3496m



3496-3499m



3500-3505m



3505-3510m



3510-3515m



3515-3517m



3518-3523m



3523-3528m



3528-3530m



3530-3534m



3537-3542m



3542-3547m



3547-3552m



3552-3555m



3556-3561m



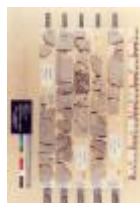
3561-3566m



3566-3571m



3571-3573m



3575-3580m



3580-3584m



3584-3589m



3589-3594m



3594-3597m



3598-3602m



3603-3608m



3608-3613mj



3613-3615m



3618-3619m

Oljeprøver i Sokkeldirektoratet



Test type	Flaske nummer	Topp dyp MD [m]	Bunn dyp MD [m]	Væske type	Test tidspunkt	Prøver tilgjengelig
DST	TEST2A	3636.00	3655.00		17.09.1982 - 00:00	YES
DST	TEST2B	3655.00	3636.00		17.09.1982 - 00:00	YES
DST	TEST3	3523.00	3587.00		03.10.1982 - 00:00	YES
DST	TEST4	3417.00	3459.00		25.11.1982 - 00:00	YES

Litostratigrafi

Topp Dyb [mMD RKB]	Litostrat. enhet
102	NORDLAND GP
1755	HORDALAND GP
3242	ROGALAND GP
3242	BALDER FM
3275	SELE FM
3322	LISTA FM
3400	VÅLE FM
3411	SHETLAND GP
3411	EKOFISK FM
3516	TOR FM
3781	HOD FM

Dokumenter - eldre Sokkeldirektoratets WDSS rapporter og andre relaterte dokumenter

Dokument navn	Dokument format	Dokument størrelse [KB]
44_01_WDSS_General_Information	pdf	0.20
44_02_WDSS_completion_log	pdf	0.24

Dokumenter - rapportert av utvinningstillatelsen (frigitt ihht til regelverk)

Dokument navn	Dokument format	Dokument størrelse [KB]
44_1_9_6_Analyst_report	pdf	2.63
44_1_9_6_Analyst_report_Enc_1	pdf	0.71





44 1 9 6 Analyst report Enc 2	pdf	3.98
44 1 9 6 Analyst report Enc 3	pdf	0.07
44 1 9 6 Analyst report Enc 4	pdf	0.05
44 1 9 6 Analyst report Enc 5	pdf	0.06
44 1 9 6 Analyst report Enc 6	pdf	0.05
44 1 9 6 Completion report	pdf	47.50
44 1 9 6 Conventional core analysis	pdf	2.77
44 1 9 6 Drilling Programme	pdf	2.96
44 1 9 6 Drilling Programme Vedlegg 1	pdf	0.11
44 1 9 6 Drilling Programme Vedlegg 2	pdf	0.09
44 1 9 6 Drilling Programme Vedlegg 3	pdf	0.03
44 1 9 6 Drilling Programme Vedlegg 4	pdf	0.46
44 1 9 6 Formation Testing Report Test3A	pdf	3.85
44 1 9 6 Formation Testing Report Test4	pdf	1.95
44 1 9 6 Geokjemiske Kjernelogger Ekofisk Torfms	pdf	1.22
44 1 9 6 High Accuracy Pressure Temp DS T1 SSDR	pdf	2.56
44 1 9 6 High Accuracy Pressure Temp DS T1 TPT82138	pdf	2.79
44 1 9 6 High Accuracy Pressure Temp DS T2A	pdf	2.60
44 1 9 6 Offshore Gas Testing	pdf	0.25
44 1 9 6 Paleo and strat final report	pdf	5.86
44 1 9 6 Petrophysical Analysis	pdf	2.70
44 1 9 6 Pressure Survey Report Sperry D ST2B Bottom Hole	pdf	1.90
44 1 9 6 Pressure Survey Report Sperry D ST3A	pdf	1.39
44 1 9 6 Pressure Survey Report Sperry D ST4	pdf	0.88
44 1 9 6 Pressure Test Data Summary Sperry DST3A	pdf	0.41
44 1 9 6 PVT Study on Recombined sample DST3A	pdf	0.61
44 1 9 6 PVT Study Report DST2B	pdf	1.08
44 1 9 6 PVT Study Report DST3A	pdf	1.11
44 1 9 6 PVT Study Report DST4	pdf	1.10
44 1 9 6 Special Core Analysis	pdf	0.33
44 1 9 6 Special Core Analysis CoreLab	pdf	11.68
44 1 9 6 Special Core Analysis Geco Jan84	pdf	4.85
44 1 9 6 S Completion log	pdf	2.59





44 1 9 6 TBP distillation of condensate DS T3A	pdf	0.33
44 1 9 6 TBP distillation of condensate DS T4	pdf	0.39
44 1 9 6 Water Analysis DST1	pdf	0.65
44 1 9 6 Well Testing Report	pdf	6.62
44 1 9 6 Well Testing Report DST1	pdf	3.18
44 1 9 6 Well Testing Report DST2B	pdf	6.06
44 1 9 6 Well Testing Report DST2 2A	pdf	3.77
44 1 9 6 Well Testing Report DST3	pdf	2.33
44 1 9 6 Well Testing Report DST3A	pdf	6.49
44 1 9 6 Well Testing Report DST4	pdf	10.47
44 1 9 6 Well Testing Report Vedlegg 1	pdf	0.20
44 1 9 6 Well Testing Report Vedlegg 2	pdf	0.14

Borestrengtester (DST)

Test nummer	Fra dybde MD [m]	Til dybde MD [m]	Reduksjonsven til størrelse [mm]
1.0	3772	3777	0.0
2.0	3636	3655	11.1
3.0	3524	3588	17.4
4.0	3417	3459	22.2

Test nummer	Endelig avstengningstrykk [MPa]	Endelig strømningstrykk [MPa]	Bunnhullstrykk [MPa]	Borehullstemperatur [°C]
1.0				
2.0				
3.0				
4.0				

Test nummer	Olje produksjon [Sm3/dag]	Gass produksjon [Sm3/dag]	Oljetetthet [g/cm3]	Gasstyngde rel. luft	GOR [m3/m3]
1.0					
2.0	500	530000	0.799	0.705	1115
3.0	700	850000	0.828	0.687	1215
4.0	605	850000	0.878	0.695	1406





Logger

Type logg	Topp dyp for logg [m]	Bunn dyp for logg [m]
CBL	435	1452
CNL	1100	1500
COMPARISON FDC GR	3139	3877
DLL MSFL GR	3139	3876
EPT PDC GR	3139	3877
ISF BHC GR SP	462	3154
ISF BHC NGT SP	2980	3877
ISF SON GR SP	100	478
LDL GR	462	1223
LDL GR	1451	3153
LDT CNL	3139	3877
NGT	2980	3867
OH VAVEFORM	3139	3867
OH VDL	3139	3867
PEQ	3400	3800
RFT	3139	3880
SHDT	3139	3880

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
CONDUCTOR	30	168.0	36	168.0	0.00	LOT
SURF.COND.	20	463.0	26	479.0	1.34	LOT
INTERM.	13 3/8	1453.0	17 1/2	1472.0	1.87	LOT
INTERM.	9 5/8	3140.0	12 1/4	3155.0	2.06	LOT
LINER	7	3866.0	8 1/2	3880.0	0.00	LOT

Boreslam

Dybde MD [m]	Egenvekt, slam [g/cm3]	Viskositet, slam [mPa.s]	flytegrense [Pa]	Type slam	Dato, måling
163	1.05			spud mud	
478	1.02			spud mud	
701	1.08			waterbased	



1471	1.31			waterbased	
1471	1.33			waterbased	
1729	1.70			waterbased	
2869	1.87			waterbased	
3155	1.87			waterbased	
3359	1.70			waterbased	
3414	1.65			waterbased	
3537	1.58			waterbased	
3574	1.57			waterbased	
3879	1.59			waterbased	

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]
44 Formation pressure (Formasjonstrykk)	pdf	0.21

