

5.2 FMT and test summary

5.2.1 FMT results

Prior to setting 9 5/8" casing, the formation multi tester (FMT) was run in hole to define reservoir pressure and pressure gradients.

Two single FMT samples were taken, one 2 3/4 gal. chamber at 1571.8 m RKB and 1 gal. chamber at 1576.5 m RKB. Both contained formation water and mudfiltrate.

5.2.2 Test performance

Two tests were performed in this well. In the first test, which was carried out in the Sognefjord formation, a gravel pack was installed in the well. The second test was carried out in the silt zone utilizing a standard drill stem test string.

Test no. 1A (1562.5 - 1567 m RKB)

When the well was perforated underbalanced, it was backflushed and cleaned up at a low rate. Some formation sand was produced during the pre gravel pack test.

Two attempts to kill the well from the SSTT was necessary. After the first attempt the well had to be put on production again.

After the gravel pack job was finished, the post gravel pack test string was run. The test string had to be pulled because it was impossible to open the RBS valve.

The test consisted of a clean up period, two acid treatments with clean up and multirate flow followed by a sampling period where Nautilus equipment was used. The test was terminated by a new multirate. The test results are summarized in Table 5.2.1.

Test no. 2 (1523 - 1536 m RKB)

The well was perforated with water and air in the test string. The gas rate was too low to lift out the water. Newsco's coil tubing was used to inject nitrogen into the well and lift out the water cushion during the second flow period. The test was terminated by a third flow period without using the coil tubing. The test results are summarized in Table 5.2.1.

TEST RESULTS 31/6-6

Test no. 1A

Perforated interval : 1562.5 - 1567 m RKB

FLOW DATA

Flow period : second multirate
 Choke size : 26/64" 42/64" 64/64"
 Gas rate (1000 Sm³/D) : 231 530 779
 Bottom hole pressure (kpa) : 15604 15053 14391
 Surface pressure (kpa) : 13414 11463 8098

BUILD UP ANALYSIS

Reservoir pressure (kpa) : 15765 at 1506.75 m MSL
 Reservoir temperature (°C) : 62.5 at 1506.75 m MSL
 Kh (um²m) : 7.898
 K (um²) : 1.362 (1380 md)
 S : 56.6

Test no. 2

Perforated interval : 1523 - 1536 m RKB

FLOW DATA

Flow period : third
 Choke size : 32/64"
 Gas rate (1000 Sm³/D) : 10.7 (calculated)
 Bottom hole pressure (kpa) : 1092
 Surface pressure (kpa) : 446

BUILD UP ANALYSIS

Reservoir pressure (kpa) : 15555 at 1488.81 m MSL
 Reservoir temperature (°C) : 58 at 1488.81 m MSL
 Kh (um²m) : 0.00125
 K (um²) : 9.6 x 10⁻⁵ (0.10 md)
 S : 3.3

NORSK PETROLEUM SERVICES A/S.

OPERATING AREA Statoil
 31/6-6 Troll

MATERIALS USED PER CASING INTERVAL

36" Hole

PRODUCT	UNIT	\$ COST	ESTIMATED		ACTUAL	
			QTY	COST \$	QTY	COST \$
Bargaan	M.T.	100.00	21	2,100.00	10	1,000.00
Bentonite	M.T.	250.00	21	5,250.00	58	14,500.00
Caustic Soda	25 kg	11.25			19	213.75
Lime	40 kg	8.16			4	32.64
Q-Broxin	25 kg	13.25			18	238.50
Soda Ash	50 kg				18	365.76
Staflo	25 kg	162.38			3	487.14
Total Cost				7,350.00		16,837.79
Cost/m ³				28.27		18.46
Cost/m				80.77		150.34

NORSK PETROLEUM SERVICES A/S.

OPERATING AREA Statoil
 31/6-6 Troll

MATERIALS USED PER CASING INTERVAL

26" Hole

PRODUCT	UNIT	COST \$	ESTIMATED		ACTUAL	
			QTY	COST \$	QTY	COST \$
Bentonite	50 kg	14.80		cement job	33	488.40
Bentonite	M.T.	250.00	35	8,750.00	39	9,750.00
Bargain	M.T.	100.00	76	7,600.00	93	9,300.00
Cal. Chloride	50 kg	19.92		cement job	17	338.64
Caustic Soda	25 kg	11.25			17	191.25
Lime	25 kg	5.10			24	122.40
Soda Ash	50 kg	20.32			7	142.24
Staflo	25 kg	162.38			4	649.52
Q-Broxin	25 kg	13.25			10	132.50
XC Polymer	50 lb	258.40			4	1,305.20
Total						22,420.15

NORSK PETROLEUM SERVICES A/S.

OPERATING AREA Statoil
 31/6-6 Troll

MATERIALS USED PER CASING INTERVAL

17 1/2" Hole to 1460 m, 13 3/8" casing set at 1443 m

PRODUCT	UNIT	EST. REQUIREMENT		ACTUAL REQUIREMENT	
		QTY	COST \$	QTY	COST \$
Bargain				48	4,500.00
Barite		184	184,000.00	144	14,400.00
Dextrid		110	6,529.60	104	6,173.44
Pot. Chloride		1074	20,277.12	930	17,558.40
KCL Brine		1500 bbl	30,000.00		29,908.94
XC Polymer	25 kg	110	39,556.00	51	18,339.60
XC Polymer	50 lb			79	25,777.70
Stockopol EM45		110	15,358.20	129	18,010.98
Calcium Chloride	50 kg			24	478.08
Soda Ash	50 kg			34	690.88
Sodium Bicarbonate				30	648.00
Mica (Fine)				81	1,425.60
Wallnut (Fine)				67	1,179.20
Wallnut (Coarse)				31	545.60
Total Cost			130,120.92		139,636.42
Cost per m ³		643	202.37	716	195.02
Cost per m		780	166.82	744	187.68

NORSK PETROLEUM SERVICES A/S.

OPERATING AREA Statoil
31/6-6 Troll

MATERIALS USED PER CASING INTERVAL

12 1/4" Hole to 1772 m, 9 5/8" casing set at 1755 m

PRODUCT	UNIT	\$ COST	ESTIMATED		ACTUAL	
			QTY	COST \$	QTY	COST \$
Barite	MT	100.00	28	2,800.00	18	1,800.00
Dextrid	50 lb	59.36	94	5,579.84	172	10,209.92
Pot. Chloride	50 kg	18.88	443	8,363.84	426	8,042.88
Sod. Bicarb.	50 kg	21.60	14	302.40	33	712.80
XCD Polymer	25 kg	359.60	22	7,911.20	35	12,586.00
Soda Ash	50 kg	20.32			8	162.56
Total Cost				24,957.28		33,514.16
Cost per m ³		201.27		201.27		63.23
Cost per m		86.06		86.06		107.42

NORSK PETROLEUM SERVICES A/S.

OPERATING AREA Statoil
 31/6-6 Troll

MATERIALS USED PER CASING INTERVAL

8 1/2" Hole

PRODUCT	UNIT	\$ COST	ESTIMATED		ACTUAL	
			QTY	COST \$	QTY	COST \$
Barite	MT	100.00	16	1,600.00	30	3,000.00
Bentonite	MT	250.00	27	6,750.00	35	8,750.00
Caustic Soda	25 kg	11.25	44	495.00	43	483.75
CMC LV	25 kg	36.75	88	3,239.00	50	1,837.50
Soda Ash	50 kg	20.32	11	223.52	10	203.20
CMC HV	25 kg	36.75			26	955.50
Sod. Bicarb.	50 kg	21.60			13	280.80
Lime	25 kg	5.10			3	15.30
Q-Broxin	25 kg	13.25			34	450.50
Total Cost .				12,302.52		15,976.55
Cost per m ³						34.81
Cost per m						30.90

NORSK PETROLEUM SERVICES A/S.

OPERATING AREA Statoil
 31/6-6 Troll

TOTAL MATERIAL CONSUMPTION

MATERIAL	PACKAGING	QUANTITY
Barite	MT	192
Bargain	MT	148
Bentonite	MT	132
Bentonite	50 kg	33
Bicarbonate	50 kg	76
Calcium Chloride	50 kg	41
Caustic Soda	25 kg	79
CMC LV	25 kg	50
CMC HV	25 kg	26
Dextrid	50 lb	276
Lime	25 kg	31
Mica Fine	25 kg	81
Potassium Chloride Brine	bbl	1500
Potassium Chloride	50 kg	1356
Q-Broxin	25 kg	62
Soda Ash	50 kg	77
Staflo	25 kg	7
Stokopol EM45	25 kg	129
Wallnut Fine	25 kg	67
Wallnut Coarse	25 kg	31
XC Polymer	25 kg	90
XC Polymer	50 lb	79

GEOCHEMICAL SCREENING ANALYSIS
OF WELL NOCS 31/6-6

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REGISTRERT

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INTRODUCTION

The well NOCS 31/6-6 is situated just east of the Oseberg oil field, located at 60°41'57.08"N, 03°56'04.61"E (Figure 1). The well was drilled in 1984 to a total depth of 2290 m and plugged/abandoned as a gas discovery.

A total of eighty-nine samples was supplied by A/S Norske Shell covering the depth interval 1320 - 2290 m (TD). The samples were washed, lithologically described and all potential source rock lithologies analysed for Total Organic Carbon (TOC) content. Of the forty-four lithologies having TOC > 1 % twenty-one were selected for Rock-Eval analysis.

A sample list and tabulated analytical data are displayed in Appendix 1.

For discussion purposes the analysed section of the well was subdivided into four units termed Units 1 - 6. The units are defined by samples from the following depths:

Unit 1	1320	-	1407.5	m
Unit 2	1412.5	-	1460	m
Unit 3	1465	-	1525	m
Unit 4	1772.5	-	2070	m
Unit 5	2075	-	2120	m
Unit 6	2130	-	2290	m (TD)

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	%		
Lithology description				
1320.00				0001
	0.48	100		0001-1L
1325.00				0002
	0.36	100		0002-1L
				0002-2L
1330.00				0003
	0.37	100		0003-1L
				0003-2L
				0003-3L
1337.50				0004
	0.40	60		0004-1L
	0.12	30		0004-2L
		5		0004-3L
	3.77	5		0004-4L
				0004-5L
1342.50				0005
	0.45	70		0005-1L
	0.11	25		0005-2L
	3.35	5		0005-4L
				0005-3L
				0005-5L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type			Trb	Sample
Int Cvd	TOC%	%	Lithology description		
1347.50					0006
	0.55	65	Sh/Clst: lt gy to m gy, calc, mic, slt		0006-1L
	0.28	30	Sh/Clst: m brn		0006-2L
		5	S/Sst : lt gy, f, l		0006-4L
			tr Ca : lt or		0006-3L
			tr Cont : prp, dd		0006-5L
1352.50					0007
	0.24	50	Sh/Clst: m brn to pl y brn, calc		0007-2L
	0.49	45	Sh/Clst: lt gy, slt, calc		0007-1L
		5	Cont : prp		0007-4L
			tr Ca : lt or to or gy, fos		0007-5L
1357.50					0099
	0.54	55	Sh/Clst: lt gy, calc, slt, pyr		0099-1L
	0.27	45	Sh/Clst: m brn to pl y brn, calc		0099-2L
			tr Ca : lt or to or gy		0099-4L
			tr Sh/Clst: lt gn gy		0099-5L
1362.50					0008
	0.53	50	Sh/Clst: lt gy to m gy, slt, calc, pyr		0008-1L
	0.26	25	Sh/Clst: m brn to pl y brn, calc		0008-2L
		20	S/Sst : lt gy, f, l		0008-5L
		5	Cont : prp		0008-4L
1367.50					0101
	0.52	60	Sh/Clst: lt gy to m gy, calc, slt		0101-1L
	0.24	40	Sh/Clst: m brn to pl y brn, calc		0101-2L
			tr S/Sst : lt gy, f, l		0101-4L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
1372.50				0009
	0.47	90 Sh/Clst: lt gy to m gy, calc 5 Sh/Clst: m brn, calc 5 Cont : prp tr Sh/Clst: pl y brn		0009-1L 0009-2L 0009-4L 0009-3L
1377.50				0010
	0.44	80 Sh/Clst: lt gy to m gy, calc, pyr 15 Cont : dd, prp 5 Sh/Clst: m brn, calc tr Sh/Clst: pl y brn		0010-1L 0010-4L 0010-2L 0010-3L
1382.50				0011
	0.52	95 Sh/Clst: lt gy to m gy, calc, pyr 5 Sh/Clst: m brn, calc tr Sh/Clst: or gy tr Cont : dd, prp		0011-1L 0011-2L 0011-3L 0011-4L
1387.50				0012
	0.53	90 Sh/Clst: lt gy to m gy to brn gy, calc, pyr 5 Sh/Clst: m brn, calc 5 Sltst : lt gy tr Sh/Clst: or gy to pl y brn tr Cont : dd, prp		0012-1L 0012-2L 0012-5L 0012-3L 0012-4L
1392.50				0013
	0.43	95 Sh/Clst: lt gy to m gy, calc, pyr 5 Sh/Clst: or gy to pl y brn tr Cont : dd, prp tr Ca : lt or		0013-1L 0013-2L 0013-3L 0013-4L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
1397.50				0091
	0.49	95 Sh/Clst: lt gy to m gy, calc, pyr, fis 5 Sh/Clst: or gy to pl y brn, calc		0091-1L 0091-2L
1402.50				0092
	0.71	95 Sh/Clst: lt gy to m gy, calc, pyr, fis 5 Sh/Clst: or gy to m brn, calc		0092-1L 0092-2L
1407.50				0014
	1.05	90 Sh/Clst: lt gy to m gy, calc, pyr 10 Cont : dd, prp tr Sh/Clst: or gy to pl y brn tr Ca : lt or		0014-1L 0014-3L 0014-2L 0014-4L
1412.50				0093
	1.12	95 Sh/Clst: lt gy to m gy to brn gy, calc, pyr, fis 5 Sh/Clst: or gy to m brn, calc		0093-1L 0093-2L
1417.50				0094
	1.06	100 Sh/Clst: lt gy to m gy, calc, pyr, fis tr Sh/Clst: or gy to m brn, calc		0094-1L 0094-2L
1422.50				0015
	2.02	95 Sh/Clst: m gy 5 Cont : dd, prp tr Sh/Clst: or gy to pl y brn tr Ca : lt or		0015-1L 0015-3L 0015-2L 0015-4L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
1427.50				0016
	1.70	95 Sh/Clst: m gy, pyr 5 Cont : dd, prp tr Sh/Clst: or gy to pl y brn tr Ca : lt or		0016-1L 0016-3L 0016-2L 0016-4L
1432.50				0017
	1.44	95 Sh/Clst: m y gy to m gy, slt, pyr 5 Cont : dd, prp tr Sh/Clst: or gy to pl y brn tr Sh/Clst: m brn, calc		0017-1L 0017-3L 0017-2L 0017-4L
1437.50				0018
	1.77	95 Sh/Clst: lt gy to m gy, slt, pyr 5 Cont : dd, prp tr Ca : lt or tr Sh/Clst: m brn, calc		0018-1L 0018-3L 0018-2L 0018-4L
1442.50				0019
	1.06	100 Sh/Clst: lt gy to m gy, pyr tr Ca : lt or to or gy tr Cont : dd, prp tr Sh/Clst: m brn, calc		0019-1L 0019-2L 0019-3L 0019-4L
1445.00				0095
	1.35	100 Sh/Clst: lt gy to m gy, pyr tr Sh/Clst: m brn, calc tr Ca : lt or		0095-1L 0095-2L 0095-3L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type			Trb	Sample
Int Cvd	TOC%	%	Lithology description		
1460.00					0096
	1.99	75	Sh/Clst: m gy to lt brn gy		0096-1L
		25	Cont : cem		0096-2L
1465.00					0020
	2.48	85	Sh/Clst: m gy to drk gy		0020-1L
		15	Cont : dd, prp, cem		0020-2L
1470.00					0097
	2.51	85	Sh/Clst: m gy to drk gy		0097-1L
		15	Cont : cem		0097-2L
1475.00					0021
	2.52	80	Sh/Clst: m gy to drk gy		0021-1L
		20	Cont : dd, prp, cem		0021-2L
1480.00					0022
	2.83	90	Sh/Clst: m gy to drk gy		0022-1L
		10	Cont : dd, prp, cem		0022-2L
1485.00					0023
	2.76	85	Sh/Clst: m gy to drk gy		0023-1L
		15	Cont : ns, cem, prp		0023-2L
1490.00					0024
	2.77	95	Sh/Clst: m gy to drk gy		0024-1L
		5	Cont : cem, dd		0024-2L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type			Trb	Sample
Int Cvd	TOC%	%	Lithology description		
1495.00					0025
	3.13	100	Sh/Clst: drk gy tr Cont : cem, dd		0025-1L 0025-2L
1500.00					0026
	3.36	90	Sh/Clst: drk gy 10 Cont : prp, dd		0026-1L 0026-2L
1505.00					0027
	3.19	95	Sh/Clst: drk gy 5 Cont : prp, dd		0027-1L 0027-2L
1510.00					0028
	2.89	75	Sh/Clst: drk gy 25 Cont : prp, dd, cem		0028-1L 0028-2L
1515.00					0029
	2.79	80	Sh/Clst: drk gy 20 Cont : prp, dd, cem		0029-1L 0029-2L
1520.00					0030
	2.99	60	Sh/Clst: drk gy 30 S/Sst : w to lt gy, f, l 10 Cont : prp, dd, cem		0030-1L 0030-3L 0030-2L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type			Trb	Sample
Int Cvd	TOC%	%	Lithology description		
1525.00					0031
	3.13	40	Sh/Clst: drk gy		0031-1L
		40	Cont : prp, dd, cem, ns		0031-2L
		20	S/Sst : w to lt gy, f, l		0031-3L
1772.50					0032
		100	Cont : cem		0032-1L
1780.00					0033
		100	Cont : cem		0033-1L
		tr	S/Sst : w, f, l		0033-2L
		tr	Sh/Clst: brn gy		0033-3L
1790.00					0034
		50	Cont : cem, ns, fib, prp		0034-1L
		50	S/Sst : w to lt gy, crs, l		0034-2L
		tr	Sh/Clst: brn gy		0034-3L
1800.00					0035
		95	S/Sst : w to lt gy, crs, l, kln		0035-2L
		5	Cont : cem, prp		0035-1L
		tr	Sh/Clst: brn gy		0035-3L
1810.00					0036
		100	S/Sst : w to lt gy, crs, l, kln		0036-2L
		tr	Cont : cem, prp		0036-1L
		tr	Sh/Clst: brn gy		0036-3L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type	Trb	Sample
Int Cvd	TOC% % Lithology description		
1820.00			0037
	100 S/Sst : w to lt gy, crs, l, kln		0037-2L
	tr Cont : cem, prp		0037-1L
	tr Sh/Clst: brn gy		0037-3L
1830.00			0098
	95 S/Sst : w to lt gy, crs, l, kln		0098-1L
	5 Kaolin : w		0098-2L
	tr Coal : blk		0098-3L
	tr Cont : prp		0098-4L
1840.00			0041
	95 S/Sst : w to lt gy, crs, l, kln		0041-2L
	5 Cont : cem, prp		0041-1L
	tr Coal : blk, wx		0041-3L
	tr Sh/Clst: brn gy		0041-4L
1850.00			0038
	100 S/Sst : w to lt gy, crs, l, kln		0038-2L
	tr Cont : cem, prp		0038-1L
	tr Sh/Clst: brn gy		0038-3L
1860.00			0039
	85 S/Sst : w to lt gy, crs, l, kln		0039-2L
	10 Cont : cem, prp		0039-1L
	5 Coal : blk, wx		0039-3L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type	Trb	Sample	
Int Cvd	TOC%	%	Lithology description	
1870.00			0040	
	90	S/Sst	: w to lt gy, crs, l, kln	0040-2L
	10	Cont	: cem, prp	0040-1L
	tr	Coal	: blk, wx	0040-3L
1880.00			0042	
	100	S/Sst	: w to lt gy, crs, l, kln	0042-2L
	tr	Cont	: cem, prp	0042-1L
	tr	Ca	: lt or	0042-3L
1890.00			0043	
	100	S/Sst	: w to lt gy, crs, l, kln, mic	0043-2L
	tr	Cont	: cem, prp	0043-1L
1900.00			0044	
	95	S/Sst	: w to lt gy, crs, l, kln, mic	0044-2L
	5	Cont	: cem, prp	0044-1L
	tr	Sh/Clst:	m gy	0044-3L
1910.00			0045	
	90	S/Sst	: w to lt gy, crs, l, kln, mic	0045-2L
	10	Cont	: cem, prp, dd	0045-1L
	tr	Sh/Clst:	m gy to drk gy	0045-3L
1920.00			0046	
	100	S/Sst	: w to lt gy, crs, l, kln	0046-2L
	tr	Cont	: cem, prp, dd	0046-1L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
1930.00				0047
		95 S/Sst : w to lt gy, crs, l, kln		0047-2L
		5 Cont : cem, prp, dd		0047-1L
		tr Coal : blk		0047-3L
1940.00				0048
		95 S/Sst : w to lt gy, crs, l, kln		0048-2L
		5 Cont : cem, prp, dd		0048-1L
		tr Coal : blk		0048-3L
1950.00				0049
		90 S/Sst : lt gy to w, crs, l, kln		0049-2L
		10 Cont : cem, prp, dd		0049-1L
1960.00				0050
		95 S/Sst : lt gy to w, crs, l, kln		0050-2L
		5 Cont : cem, prp, dd		0050-1L
1970.00				0051
		100 S/Sst : lt gy to w, crs, l, kln		0051-2L
		tr Cont : cem, prp, dd		0051-1L
		tr Coal : dsk brn to blk, wx, cly		0051-3L
1980.00				0052
		100 S/Sst : lt gy to w, crs, l, kln		0052-2L
		tr Cont : cem, prp, dd		0052-1L
		tr Coal : dsk brn to blk, wx, cly		0052-3L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	%	Lithology description	
1990.00				0053
		100 S/Sst	: lt gy to w to lt or gy, crs, l, f, kln, mic	0053-2L
		tr Cont	: prp	0053-1L
2000.00				0054
		90 S/Sst	: lt gy to w to lt or gy, crs, l, f, kln, mic	0054-2L
		5 Cont	: prp, dd, cem	0054-1L
		5 Coal	: blk, wx	0054-3L
		tr Ca	: lt or	0054-4L
2010.00				0055
	48.00	95 Coal	: brn blk to blk	0055-3L
		5 S/Sst	: lt gy to w to lt or gy, crs, l, f, kln, mic	0055-2L
		tr Cont	: prp, dd, cem	0055-1L
		tr Ca	: lt or	0055-4L
2020.00				0056
		85 S/Sst	: lt gy to w to lt or gy, crs, l, f, kln	0056-2L
	49.80	15 Coal	: brn blk to blk	0056-3L
		tr Cont	: prp, dd, cem	0056-1L
2030.00				0057
		95 S/Sst	: lt gy to w to lt or gy, crs, l, f, kln	0057-2L
		5 Coal	: brn blk to blk	0057-3L
		tr Cont	: prp	0057-1L
		tr Sh/Clst:	lt gy, mic	0057-4L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	% Lithology description		
2040.00				0058
		80 S/Sst : lt gy to w, crs, l, f, kln		0058-2L
		10 Sh/Clst: lt brn gy to brn gy, mic		0058-4L
		5 Cont : prp, cem, dd		0058-1L
		5 Coal : brn blk to blk		0058-3L
2045.00				0059
		85 S/Sst : lt gy to w, crs, l, f, kln		0059-2L
		10 Sh/Clst: lt gy to lt brn gy, mic		0059-4L
	35.50	5 Coal : brn blk to blk		0059-3L
		tr Cont : prp, cem, dd		0059-1L
2050.00				0060
		80 S/Sst : lt gy to w, crs, l, f, kln		0060-2L
		10 Sh/Clst: lt gy to lt brn gy to brn gy, mic, carb		0060-4L
		5 Cont : prp, cem, dd		0060-1L
		5 Coal : brn blk to blk, wx		0060-3L
2055.00				0061
		80 S/Sst : lt gy to w, crs, l, f, kln		0061-2L
		10 Coal : blk, wx		0061-5L
		5 Cont : prp, cem, dd		0061-1L
		5 Sh/Clst: lt gy to lt brn gy to brn gy, mic, carb		0061-3L
		tr Sh/Clst: dsk brn, carb		0061-4L
2060.00				0062
		75 S/Sst : lt gy to w, crs, l, f, kln		0062-2L
		10 Sh/Clst: lt gy to lt brn gy to brn gy, mic, carb		0062-3L
		10 Coal : blk, wx		0062-5L
		5 Cont : prp, cem, dd		0062-1L
		tr Sh/Clst: dsk brn, carb		0062-4L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	%		
Lithology description				
2065.00				0063
		80 S/Sst	: lt gy to w, crs, l, f, kln	0063-2L
		10 Sh/Clst	: lt gy to lt brn gy to brn gy, mic, carb	0063-3L
		5 Sh/Clst	: dsk brn, carb	0063-4L
		5 Coal	: blk, wx	0063-5L
		tr Cont	: prp, cem, dd	0063-1L
2070.00				0064
	1.63	65 S/Sst	: lt gy to w, crs, l, f, kln	0064-2L
		25 Sh/Clst	: lt gy to lt brn gy to brn gy, mic	0064-3L
		5 Cont	: prp, cem, dd	0064-1L
		5 Sh/Clst	: dsk brn to brn blk, carb	0064-4L
2075.00				0065
	1.69	65 Sh/Clst	: lt gy to lt brn gy to brn gy, mic, slt	0065-3L
		25 S/Sst	: lt gy to w, crs, l, f, kln	0065-2L
		5 Cont	: prp, cem, dd	0065-1L
		5 Sh/Clst	: dsk brn to brn blk, carb	0065-4L
2080.00				0066
	1.51	75 Sh/Clst	: lt gy to lt brn gy to brn gy, mic, slt	0066-3L
		25 S/Sst	: lt gy to w, crs, l, f, kln	0066-2L
		tr Cont	: prp, cem, dd	0066-1L
		tr Sh/Clst	: dsk brn to brn blk, carb	0066-4L
2085.00				0067
	1.34	80 Sh/Clst	: lt gy to lt brn gy to brn gy, mic, slt	0067-3L
		10 S/Sst	: lt gy to w, crs, l, f, kln	0067-2L
		5 Cont	: prp, cem, dd	0067-1L
		5 Sh/Clst	: dsk brn to brn blk, carb	0067-4L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	%		
Lithology description				
2090.00				0068
	1.57	80	Sh/Clst: lt gy to lt brn gy, mic, slt	0068-3L
		10	Cont : prp, cem, dd	0068-1L
		10	S/Sst : lt gy to w, crs, l	0068-2L
		tr	Sh/Clst: dsk brn to brn blk, carb	0068-4L
2095.00				0069
	1.40	90	Sh/Clst: lt gy to lt brn gy, mic, slt	0069-3L
		10	Cont : prp, cem, dd	0069-1L
		tr	S/Sst : lt gy to w, crs, l	0069-2L
		tr	Sh/Clst: dsk brn to brn blk, carb	0069-4L
2100.00				0070
	1.23	85	Sh/Clst: lt gy to lt brn gy, mic, slt	0070-2L
		10	Cont : prp, cem, dd	0070-1L
		5	Sh/Clst: dsk brn to brn blk, carb	0070-3L
2105.00				0071
	1.28	95	Sh/Clst: lt gy to lt brn gy, mic, slt	0071-2L
		5	Cont : prp, cem, dd	0071-1L
		tr	Sh/Clst: dsk brn to brn blk, carb	0071-3L
2110.00				0073
	0.96	95	Sh/Clst: lt gy to lt brn gy, mic, slt	0073-2L
		5	Cont : prp, cem, dd	0073-1L
		tr	Sh/Clst: dsk brn to brn blk, carb	0073-3L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample
Int Cvd	TOC%	%		
Lithology description				
2120.00				0072
	1.20	40		0072-2L
		40		0072-4L
		20		0072-1L
		tr		0072-3L
		Sh/Clst: lt gy to lt brn gy, mic		
		Slstst : lt gy, mic		
		Cont : prp, cem, dd		
		tr Sh/Clst: dsk brn to brn blk, carb		
2130.00				0074
		75		0074-1L
		20		0074-2L
		5		0074-3L
		tr		0074-4L
		tr		0074-5L
		S/Sst : w to lt gy, crs, l, kln		
		Sh/Clst: lt gy to m gy, mic		
		Cont : cem, dd, prp		
		tr Slstst : lt gy, mic		
		tr Coal : blk		
2140.00				0075
		95		0075-1L
		5		0075-2L
		tr		0075-3L
		S/Sst : w to lt gy, crs, l, kln		
		Sh/Clst: lt gy to m gy, mic		
		tr Cont : cem, dd, prp		
2150.00				0076
		90		0076-1L
		5		0076-2L
		5		0076-3L
		S/Sst : w to lt gy, crs, l, kln		
		Sh/Clst: lt gy to m gy, mic		
		Cont : cem, dd, prp		
2160.00				0077
		85		0077-1L
		10		0077-2L
		5		0077-3L
		S/Sst : w to lt gy, crs, l, kln		
		Sh/Clst: lt gy to m gy, mic, slt		
		Cont : cem, dd, prp		

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type	Trb	Sample
Int Cvd	TOC%		

	%	Lithology description	

2170.00			0078
	100	S/Sst : w to lt gy, crs, l, kln	0078-1L
		tr Sh/Clst: lt gy to m gy, mic, slt	0078-2L
		tr Cont : cem, dd, prp	0078-3L
2180.00			0079
	100	S/Sst : w to lt gy, crs, l, kln	0079-1L
		tr Cont : prp, dd	0079-2L
		tr Sltst : lt gy, mic	0079-3L
2190.00			0080
	95	S/Sst : w to lt gy, crs, l, kln	0080-1L
	5	Sltst : lt gy to lt brn gy, mic	0080-3L
		tr Cont : prp, dd	0080-2L
2200.00			0081
	40	Sltst : lt gy to lt brn gy, mic	0081-3L
	30	S/Sst : w to lt gy, crs, l, kln	0081-1L
	20	Cont : prp, dd	0081-2L
	10	Ca : lt or	0081-4L
2210.00			0082
	50	Sltst : lt gy to lt brn gy, mic	0082-3L
	40	S/Sst : w to lt gy, crs, l, kln	0082-1L
	5	Cont : prp, dd	0082-2L
	5	Ca : lt or	0082-4L

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type	Trb	Sample
Int Cvd	TOC%	%	Lithology description
2220.00			0083
		40 S/Sst	: w to lt gy, crs, l, kln 0083-1L
		40 Sltst	: lt gy to lt brn gy, mic 0083-3L
		15 Cont	: prp, dd, cem 0083-2L
		5 Ca	: lt or 0083-4L
2230.00			0084
		75 S/Sst	: w to lt gy, crs, l, kln 0084-1L
		15 Sh/Clst:	lt gy to lt brn gy to drk gy, mic, slt 0084-4L
		10 Cont	: prp, dd, cem 0084-2L
		tr Coal	: blk 0084-5L
2240.00			0085
	0.27	60 Sh/Clst:	lt gy to m gy to lt brn gy to brn gy to drk y brn to pl y brn 0085-3L
		40 S/Sst	: w to lt gy, crs, l, kln 0085-1L
		tr Cont	: prp, dd, cem 0085-2L
2250.00			0086
	0.13	100 Sh/Clst:	lt gy to m brn to lt brn gy to brn gy to drk y brn to pl y brn 0086-2L
		tr S/Sst	: w to lt gy, crs, l, kln 0086-1L
2260.00			0087
		30 Sh/Clst:	m brn to pl brn, slt 0087-1L
		30 Sh/Clst:	lt pu to m pu 0087-2L
		30 Sh/Clst:	lt gn gy to pl ol, slt 0087-3L
	0.14	10 Sh/Clst:	lt or gy 0087-4L
		bulk	 0087-0B

Table 1 : Lithology description for well NOCS 31/6-6

Depth unit of measure: m

Depth	Type		Trb	Sample	
Int Cvd	TOC%	%			
Lithology description					
2270.00				0088	
		30		Sh/Clst: m brn to pl brn, slt	0088-1L
		30		Sh/Clst: lt pu to m pu	0088-2L
		30		Sh/Clst: lt gn gy to pl ol, slt	0088-3L
	0.12	10		Sh/Clst: lt or gy to m brn y	0088-4L
				bulk	0088-0B
2280.00				0090	
		90		S/Sst : w, crs, l	0090-4L
	0.13	10		Sh/Clst: m brn to pl brn, slt	0090-1L
				bulk	0090-0B
		tr		Sh/Clst: lt pu to m pu	0090-2L
		tr		Sh/Clst: lt gn gy to pl ol, slt	0090-3L
2290.00				0089	
		50		S/Sst : w, crs, l	0089-4L
		30		Sh/Clst: m brn to pl brn, slt	0089-1L
		10		Sh/Clst: lt pu to m pu	0089-2L
	0.16	10		Sh/Clst: lt gn gy to pl ol, slt	0089-3L
				bulk	0089-0B

Table 2 : Rock-Eval table for well NOCS 31/6-6

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
1412.50	cut	Sh/Clst: lt gy to m gy to brn gy	0.41	1.53	0.20	7.65	1.12	137	18	1.9	0.21	433	0093-1L
1422.50	cut	Sh/Clst: m gy	0.99	5.25	0.37	14.19	2.02	260	18	6.2	0.16	435	0015-1L
1437.50	cut	Sh/Clst: lt gy to m gy	0.59	2.42	0.37	6.54	1.77	137	21	3.0	0.20	436	0018-1L
1445.00	cut	Sh/Clst: lt gy to m gy	0.25	1.13	0.28	4.04	1.35	84	21	1.4	0.18	431	0095-1L
1470.00	cut	Sh/Clst: m gy to drk gy	0.44	6.42	0.27	23.78	2.51	256	11	6.9	0.06	435	0097-1L
1480.00	cut	Sh/Clst: m gy to drk gy	0.75	8.60	0.65	13.23	2.83	304	23	9.4	0.08	436	0022-1L
1495.00	cut	Sh/Clst: drk gy	0.54	9.88	0.69	14.32	3.13	316	22	10.4	0.05	433	0025-1L
1505.00	cut	Sh/Clst: drk gy	0.71	10.33	0.67	15.42	3.19	324	21	11.0	0.06	432	0027-1L
1850.00	com	bulk	0.30	2.01	1.23	1.63	1.66	121	74	2.3	0.13	438	0102-0B
1870.00	com	bulk	17.70	97.70	12.50	7.82	53.60	182	23	115.4	0.15	435	0103-0B
2040.00	com	bulk	2.36	30.54	3.63	8.41	43.20	71	8	32.9	0.07	440	0104-0B
2045.00	com	bulk	0.20	3.70	0.49	7.55	1.91	194	26	3.9	0.05	437	0105-0B
2055.00	com	bulk	0.28	6.96	0.41	16.98	3.34	208	12	7.2	0.04	437	0106-0B
2065.00	com	bulk	0.43	6.97	0.54	12.91	3.14	222	17	7.4	0.06	435	0108-0B
2075.00	cut	Sh/Clst: lt gy to lt brn gy to brn gy	0.26	3.84	0.25	15.36	1.69	227	15	4.1	0.06	435	0065-3L

Depth unit of measure: m

Depth	Typ	Lithology	S1	S2	S3	S2/S3	TOC	HI	OI	PP	PI	Tmax	Sample
2085.00	cut	Sh/Clst: lt gy to lt brn gy to brn gy	0.19	2.74	0.25	10.96	1.34	204	19	2.9	0.06	437	0067-3L
2095.00	cut	Sh/Clst: lt gy to lt brn gy	0.21	2.87	0.22	13.05	1.40	205	16	3.1	0.07	436	0069-3L
2105.00	cut	Sh/Clst: lt gy to lt brn gy	0.19	2.35	0.13	18.08	1.28	184	10	2.5	0.07	437	0071-2L
2170.00	com	bulk	0.53	2.31	0.26	8.88	1.47	157	18	2.8	0.19	436	0109-0B
2200.00	com	bulk	0.26	1.61	0.14	11.50	1.21	133	12	1.9	0.14	437	0111-0B
2230.00	com	bulk	0.24	1.85	0.24	7.71	1.38	134	17	2.1	0.11	440	0110-0B

Depth unit of measure: m

NOTE: Depths shown in results tables correspond to the composite samples' lower depth.

<u>Upper depth</u>	<u>Lower depth</u>	<u>Typ</u>	<u>Sample</u>	<u>Depth</u>	<u>Typ</u>	<u>Lithology</u>	<u>Sample</u>
1790.00	1850.00	com	0102-0 is composed of:	1790.00	cut	Sh/Clst: brn gy	034-3
				1800.00	cut	Sh/Clst: brn gy	035-3
				1810.00	cut	Sh/Clst: brn gy	036-3
				1820.00	cut	Sh/Clst: brn gy	037-3
				1840.00	cut	Sh/Clst: brn gy	041-4
				1850.00	cut	Sh/Clst: brn gy	038-3
1830.00	1870.00	com	0103-0 is composed of:	1830.00	cut	Coal : blk	098-3
				1840.00	cut	Coal : blk, wx	041-3
				1860.00	cut	Coal : blk, wx	039-3
				1870.00	cut	Coal : blk, wx	040-3
2030.00	2040.00	com	0104-0 is composed of:	2030.00	cut	Coal : brn blk to blk	057-3
				2040.00	cut	Coal : brn blk to blk	058-3
2030.00	2045.00	com	0105-0 is composed of:	2030.00	cut	Sh/Clst: lt gy, mic	057-4
				2040.00	cut	Sh/Clst: lt brn gy to brn gy, mic	058-4
				2045.00	cut	Sh/Clst: lt gy to lt brn gy, mic	059-4
2050.00	2055.00	com	0106-0 is composed of:	2050.00	cut	Sh/Clst: lt gy to lt brn gy to brn gy, mic, carb	060-4
				2055.00	cut	Sh/Clst: lt gy to lt brn gy to brn gy, mic, carb	061-3

Depth unit of measure: m

NOTE: Depths shown in results tables correspond to the composite samples' lower depth.

Upper depth	Lower depth	Typ	Sample	Depth	Typ	Lithology	Sample	
2050.00	2055.00	com	0107-0	is composed of:	2050.00	cut	Coal : brn blk to blk, wx	060-3
					2055.00	cut	Coal : blk, wx	061-5
2060.00	2065.00	com	0108-0	is composed of:	2060.00	cut	Sh/Clst: lt gy to lt brn gy to brn gy, mic, carb	062-3
					2065.00	cut	Sh/Clst: lt gy to lt brn gy to brn gy, mic, carb	063-3
2130.00	2170.00	com	0109-0	is composed of:	2130.00	cut	Sh/Clst: lt gy to m gy, mic	074-2
					2140.00	cut	Sh/Clst: lt gy to m gy, mic	075-2
					2150.00	cut	Sh/Clst: lt gy to m gy, mic	076-2
					2160.00	cut	Sh/Clst: lt gy to m gy, mic, slt	077-2
					2170.00	cut	Sh/Clst: lt gy to m gy, mic, slt	078-2
2180.00	2200.00	com	0111-0	is composed of:	2180.00	cut	Sltst : lt gy, mic	079-3
					2190.00	cut	Sltst : lt gy to lt brn gy, mic	080-3
					2200.00	cut	Sltst : lt gy to lt brn gy, mic	081-3
2210.00	2230.00	com	0110-0	is composed of:	2210.00	cut	Sltst : lt gy to lt brn gy, mic	082-3
					2220.00	cut	Sltst : lt gy to lt brn gy, mic	083-3
					2230.00	cut	Sh/Clst: lt gy to lt brn gy to drk gy, mic, slt	084-4