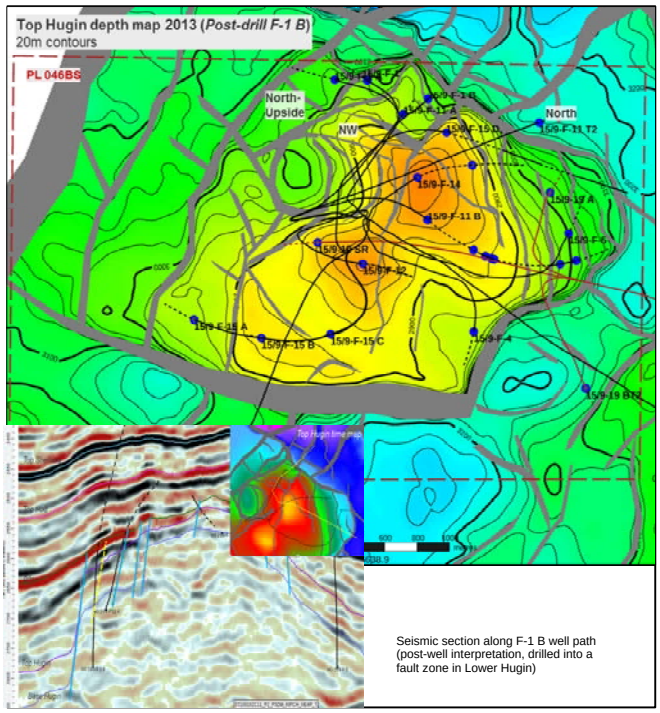
COMPLETION LOG

VOLVE

Scale: 1 / 500

Well: NO 15/9-F-1 B

Location Map



Seismic section along F-1 B well path (post-well interpretation, drilled into a fault zone in Lower Hugin)

KB Elevation	54.9 m	**Country**	Norway
Water Depth	91 m	**Licence**	PL046 BS
Depth Reference	RKB		
		Owners	Statoil (59.6%, Op.), ExxonMobil Norway (30.4%), Bayerngas Norge (10%)
Total Depth (Driller)	3465.0 m MD RKB 3259.9 m TVD RKB		
		Field	Volve
Formation at Total Depth	Sleipner	**Rig**	Mærsk Inspirer
Date Sidetracked	29.08.2013		
Date Reached TD	06.09.2013	**Drilling Contractor**	Mærsk
Date Completed	25.12.2013	**Mudlogging Company**	Baker Hughes
Well Status	P&A oil; sidetracked	**Logging Company**	Schlumberger
		MWD Company	Baker Hughes
Well Classification	water injector (NW segment)	**Geologists**	S. Mitchinson, U. Bryla
Prepared by	P. Kaiser		
Controlled by	P. Kaiser, J. Gilpin		
Date	01.02.2014		
Revision	0		
Well Coordinates	**UTM zone 31 N**	6478566.69 m N	435046.49 m E
	Geographic ED50	58° 26' 29.907 N	1° 53' 14.707 E

Casing Records

Diameter	Shoe depth m MD RKB	Shoe depth m TVD RKB
13 3/8" Casing shoe	2595.4	2451.0
9 5/8" Casing shoe	3090,1	2895.1
7" Liner shoe	3463,3	3257.9

LOT / FIT

Type	Result g/cc	Depth m MD RKB	Depth m TVD RKB

Comments

Objectives:
- water injector to support oil production from the Volve Northwest segment via existing producers up-flank in the Main Field

Summary:
- encountered an oil filled Hugin Formation; ~20 m TVD deeper than prognosed
- Upper Hugin and Thief zone were present, but most of the Lower Hugin stratigraphy was however missing/faulted out, giving a total Hugin thickness of 58 m TVD, opposed to 82 m TVD present in F-11 A
- reservoir properties were good and similar to F-11 A, however the main difference compared to other main field oil-bearing wells, was generally higher water saturations
- despite of several injection tests and re-perforating only a small, restricted area was pressurised

Comments: N/A

Logs

Run no.	Log type	Logged interval
1	GR, RES	2617-3097
2	GR, RES, DEN, NEU, AC, ACS, FPWD	3097-3465

Perforated Intervals

Interval no.	Perforation top m MD RKB	Perforation bottom m MD RKB
1	3296	3304
2	3278	3284
2	3245	3251
3	3254	3262
4	3273	3274.5
4	3288	3294
I	3288	3294
I	3245	3251
II	3264	3276
II	3245	3251

Pressure Points (TesTrak)

Test no.	Depth m MD RKB	Depth m TVD RKB	Pressure bar	Test no.	Depth m MD RKB	Depth m TVD RKB	Pressure bar
1	3330.0	3125.28	344.675	6	3273.5	3069.29	347.050
2	3301.5	3096.94	349.407	7	3266.5	3062.41	346.523
3	3296.0	3091.49	348.639	8	3261.0	3057.02	345.604
4	3291.0	3086.55	348.236	9	3255.0	3051.16	345.124
5	3280.5	3076.18	347.584	10	3247.0	3043.36	344.563

Lithology Legend

CONGLOMERATE, SEDIMENTARY BRECCIA, SAND / SANDSTONE, SILT / SILTSTONE, FISSILE SILTSTONE, MUDSTONE, FISSILE MUDSTONE, CLAY / CLAYSTONE, SHALE, MARL, CHALK, LIMESTONE, DOLOMITIC LIMESTONE, CALCAREOUS DOLOMITE, DOLOMITE, GENERAL VOLCANICS, TUFF

SANDY, VERY; SANDY; SANDY, SLIGHTLY; SILTY, VERY; SILTY; SILTY, SLIGHTLY; ARGILLACEOUS; CALCITE; DOLOMITE

GLAUCONITE, HALITE, PYRITE, SIDERITE, MICA, KAOLINITE, CARBONACEOUS, CHAMOSITE, PHOSPHORITE

BITUMINOUS, TUFFACEOUS, CHALKY, COAL FRAGMENTS, CHERT, CHLORITE, MARLY, ANHYDRITIC

MACROFOSSILS, GEN.; MACROFOSSIL FRAGS; MICROFOSSILS, GEN.; SHELL BED; ALGAE

FISH REMAINS, FISH SCALES, FORAMINIFERA, GASTROPODS, GRAPTOLITES

SPOROMORPHS, STROMAPOROIDS, STEMS / TWIGS, LEAF BLADES, TRILOBITES

Symbol Legend

Casing shoe
Liner hanger
Liner shoe
Milled window
Deviation survey - MWD
Deviation survey - Other

DST

Open hole
Open hole (rerun)
Through casing
Through casing (rerun)

SHOWS

Oil stain
Fluorescence
Visible cut
Fluorescence cut
Gas shows
Dipmeter

COAL
BROWN COAL
ANHYDRITE
SALT
GYPSUM

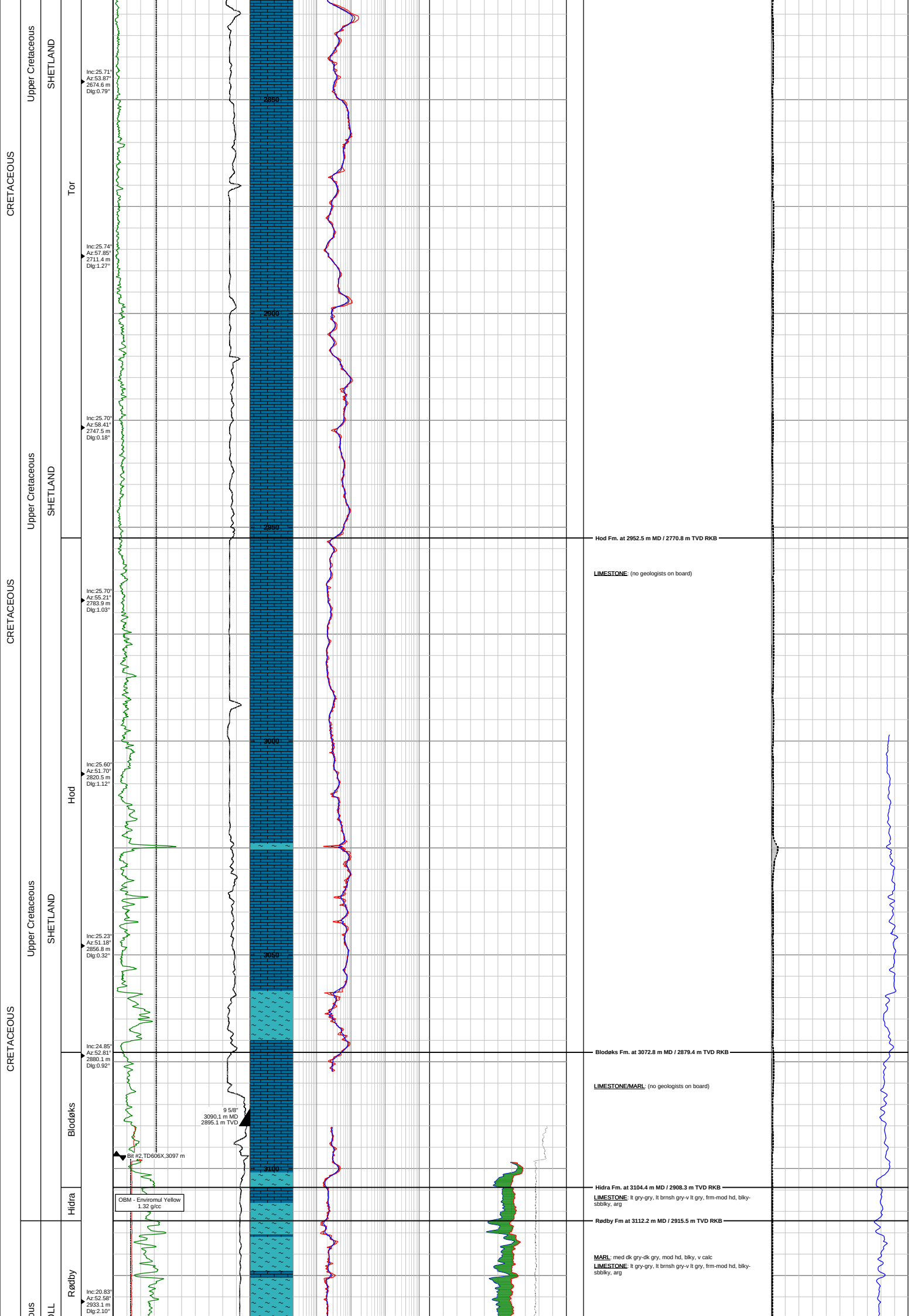
GENERAL INTRUSIVE
SILICIC INTRUSIVE
MAFIC INTRUSIVE
DYKES & SILLS
GENERAL METAMORPHIC

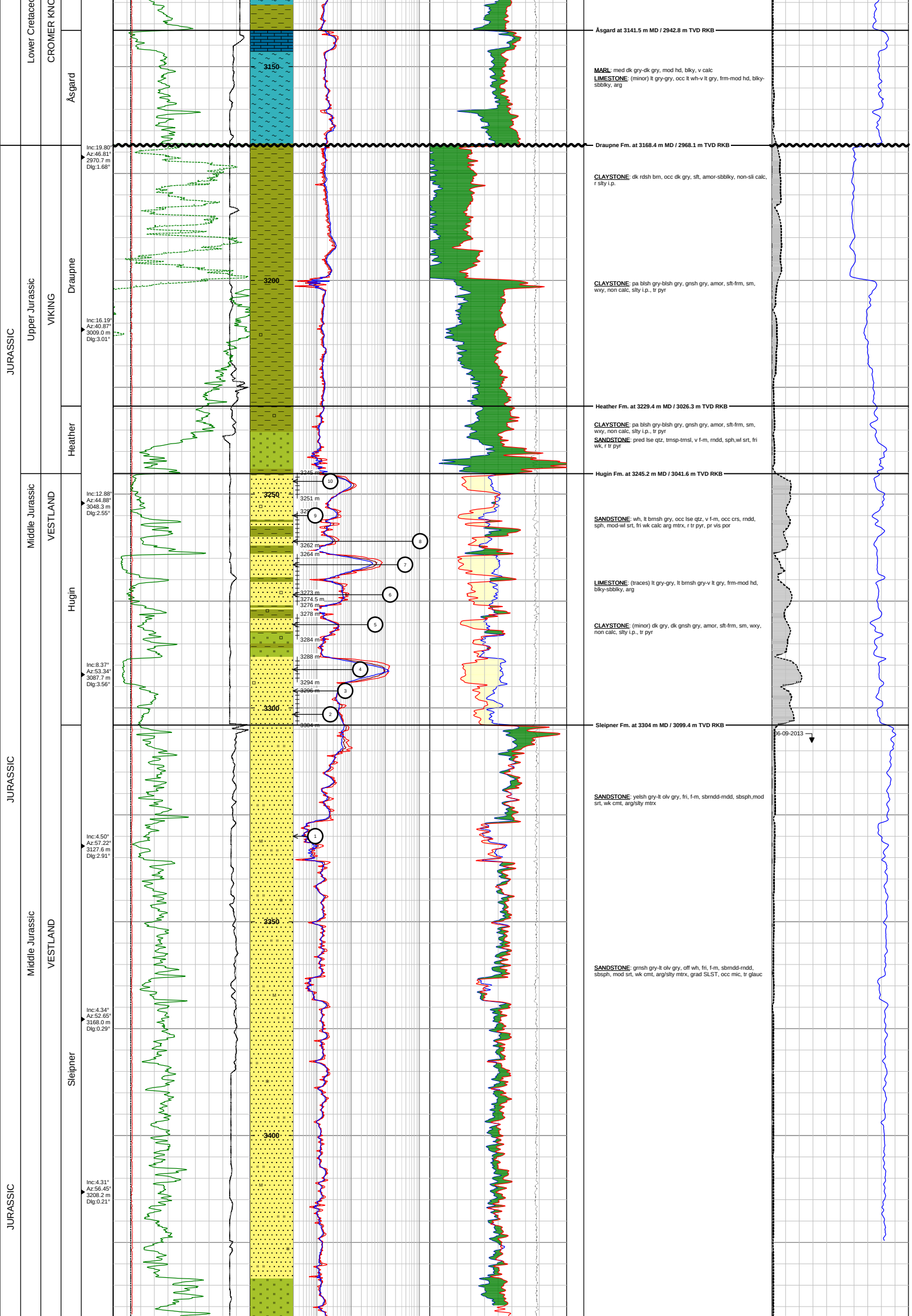
AMMONITES
BELEMNITES
BRACHIOPODS
BRYOZOA
CHAROPHYTES
ECHINOIDS
CONCRETIONS, GEN.
OOIDS
CONODONTS
CORALS
CRINOIDS
BIVALVES
SPICULES
OSTRACODS
PISOLITHS
CLASTS
VERTEBRATES
MAR. MICROPLANKTON
OOZE
PLANT REMAINS
PELLETS
PSEUDO OOLITHS

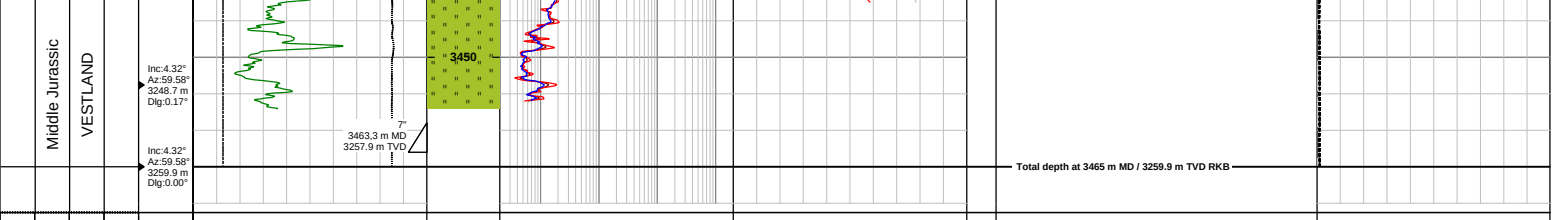
CALCITE CEMENTED
DOLOMITE CEMENTED
SIDERITE CEMENTED
QUARTZ CEMENTED
KAOLIN CEMENTED
ILLITE CEMENTED
SMECTITE CEMENTED
CHLORITE CEMENTED
CARBONATE CEMENTED

Core interval
Sidewall core
(No recovery)
Perforation interval
Formation
pressure test
Dipmeter
Azi / Inc
Mud gain
Mud loss

STRATIGRAPHY				DIRECTIONAL SURVEYS	GR / CALI / ROP	Depths m MD RKB	RESISTIVITY	NEU / DEN	HYDROCARBON SHOWS	LITHOLOGICAL DESCRIPTION	AC / GAS
SYSTEM	SERIES	GROUP	FORMATION		CALI 6 in 26 ROP 200 m/h 0 BS 6 in 26 GR 0 api 150	LITHOLOGY	Resistivity Deep 0.2 ohmm 2000 Resistivity Medium 0.2 ohmm 2000 Resistivity Medium (A) 0.2 ohmm 2000	DENC -0.5 g/cc 0.5 DEN 1.95 g/cc 2.95 NEU 0.45 frac -0.15			AC 240 um/ft 40 TGAS 0 % 30
PALAEOGENE	Palaeocene	ROGALAND	Lista	Bit #1,TD605,2617 m MD Inc:28.92° Az:35.26° 2472.8 m Dlg:1.50°	OBM - Enviromul Yellow 1.28 g/cc	2650				2617 m: sidetracked from 15/9-F-1 SANDSTONE: (no geologists on board)	
				Inc:27.75° Az:38.27° 2493.6 m Dlg:2.35°							
				Inc:26.12° Az:44.21° 2529.8 m Dlg:2.32°							
			Ty			2700				Ty Fm. at 2694.8 m MD / 2538.9 m TVD RKB SANDSTONE: (no geologists on board)	
				Inc:26.09° Az:51.43° 2566.1 m Dlg:2.36°		2750					
				Inc:26.08° Az:54.07° 2601.9 m Dlg:0.87°							30-08-2013
			Ekofisk							Ekofisk Fm. at 2771 m MD / 2607.3 m TVD RKB LIMESTONE: (no geologists on board)	
										Tor Fm. at 2789 m MD / 2623.5 m TVD RKB	
				Inc:25.90° Az:51.49° 2638.5 m Dlg:0.84°		2800				LIMESTONE: (no geologists on board)	


CRETACEOUS
Upper Cretaceous
SHETLAND
Tor
Hod
Blodøks
Hidra
Rødby
Inc:25.71°
Az:53.87°
2674.6 m
Dlg:0.79°
Inc:25.74°
Az:57.85°
2711.4 m
Dlg:1.27°
Inc:25.70°
Az:58.41°
2747.5 m
Dlg:0.18°
Inc:25.70°
Az:55.21°
2783.9 m
Dlg:1.03°
Inc:25.60°
Az:51.70°
2820.5 m
Dlg:1.12°
Inc:25.23°
Az:51.18°
2856.8 m
Dlg:0.32°
Inc:24.85°
Az:52.81°
2880.1 m
Dlg:0.92°
Inc:20.83°
Az:52.58°
2933.1 m
Dlg:2.10°
2850
2900
2950
3000
3050
3100
9 5/8"
3090,1 m MD
2895.1 m TVD
Bit #2,TD606X,3097 m
OBM - Enviromul Yellow
1.32 g/cc
Hod Fm. at 2952.5 m MD / 2770.8 m TVD
LIMESTONE: (no geologists on board)
Blodøks Fm. at 3072.8 m MD / 2879.4 m TVD
LIMESTONE/MARL: (no geologists on board)
Hidra Fm. at 3104.4 m MD / 2908.3 m TVD
LIMESTONE: lt gry-gry, lt brnsh gry-v lt gry, frm-mod hd, blky-sbblky, arg
Rødby Fm at 3112.2 m MD / 2915.5 m TVD
MARL: med dk gry-dk gry, mod hd, blky, v calc
LIMESTONE: lt gry-gry, lt brnsh gry-v lt gry, frm-mod hd, blky-sbblky, arg


Lower Cretaceous
CROMER KNOLL
Åsgard
JURASSIC
Upper Jurassic
VIKING
Draupne
Heather
Middle Jurassic
VESTLAND
Hugin
Sleipner
Åsgard at 3141.5 m MD / 2942.8 m TVD RKB
MARL: med dk gry-dk gry, mod hd, blky, v calc
LIMESTONE: (minor) lt gry-gry, occ lt wh-v lt gry, frm-mod hd, blky-sbblky, arg
Draupne Fm. at 3168.4 m MD / 2968.1 m TVD RKB
Inc:19.80°
Az:46.81°
2970.7 m
Dlg:1.68°
CLAYSTONE: dk rdsh brn, occ dk gry, sft, amor-sbblky, non-sli calc, r slty i.p.
CLAYSTONE: pa blsh gry-blsh gry, gnsh gry, amor, sft-frm, sm, wxy, non calc, slty i.p., tr pyr
Inc:16.19°
Az:40.87°
3009.0 m
Dlg:3.01°
Heather Fm. at 3229.4 m MD / 3026.3 m TVD RKB
CLAYSTONE: pa blsh gry-blsh gry, gnsh gry, amor, sft-frm, sm, wxy, non calc, slty i.p., tr pyr
SANDSTONE: pred lse qtz, trnsp-trnsl, v f-m, rndd, sph,wl srt, fri wk, r tr pyr
Hugin Fm. at 3245.2 m MD / 3041.6 m TVD RKB
Inc:12.88°
Az:44.88°
3048.3 m
Dlg:2.55°
SANDSTONE: wh, lt brnsh gry, occ lse qtz, v f-m, occ crs, rndd, sph, mod-wl srt, fri wk calc arg mtrx, r tr pyr, pr vis por
LIMESTONE: (traces) lt gry-gry, lt brnsh gry-v lt gry, frm-mod hd, blky-sbblky, arg
CLAYSTONE: (minor) dk gry, dk gnsh gry, amor, sft-frm, sm, wxy, non calc, slty i.p., tr pyr
Inc:8.37°
Az:53.34°
3087.7 m
Dlg:3.56°
Sleipner Fm. at 3304 m MD / 3099.4 m TVD RKB
06-09-2013
SANDSTONE: yelsh gry-lt olv gry, fri, f-m, sbrndd-mdd, sbsph,mod srt, wk cmt, arg/slty mtrx
Inc:4.50°
Az:57.22°
3127.6 m
Dlg:2.91°
SANDSTONE: grnsh gry-lt olv gry, off wh, fri, f-m, sbrndd-rndd, sbsph, mod srt, wk cmt, arg/slty mtrx, grad SLST, occ mic, tr glauc
Inc:4.34°
Az:52.65°
3168.0 m
Dlg:0.29°
Inc:4.31°
Az:56.45°
3208.2 m
Dlg:0.21°
3150
3200
3250
3300
3350
3400
3245 m
3251 m
3262 m
3264 m
3273 m
3274.5 m
3276 m
3278 m
3284 m
3288 m
3294 m
3296 m
3304 m



SYSTEM	SERIES	GROUP	FORMATION	DIRECTIONAL SURVEYS	GR / CALI / ROP	LITHOLOGY	RESISTIVITY	NEU / DEN	HYDROCARBON SHOWS	LITHOLOGICAL DESCRIPTION	AC / GAS
					GR api: 0 – 150 BS in: 6 – 26 ROP m/h: 200 – 0 CALI in: 6 – 26		Resistivity Medium (A) ohmm: 0.2 – 2000 Resistivity Medium ohmm: 0.2 – 2000 Resistivity Deep ohmm: 0.2 – 2000	NEU frac: 0.45 – -0.15 DEN g/cc: 1.95 – 2.95 DENC g/cc: -0.5 – 0.5			TGAS %: 0 – 30 AC um/ft: 240 – 40

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Project file version : v4.00
Designed for Winlog Version 4