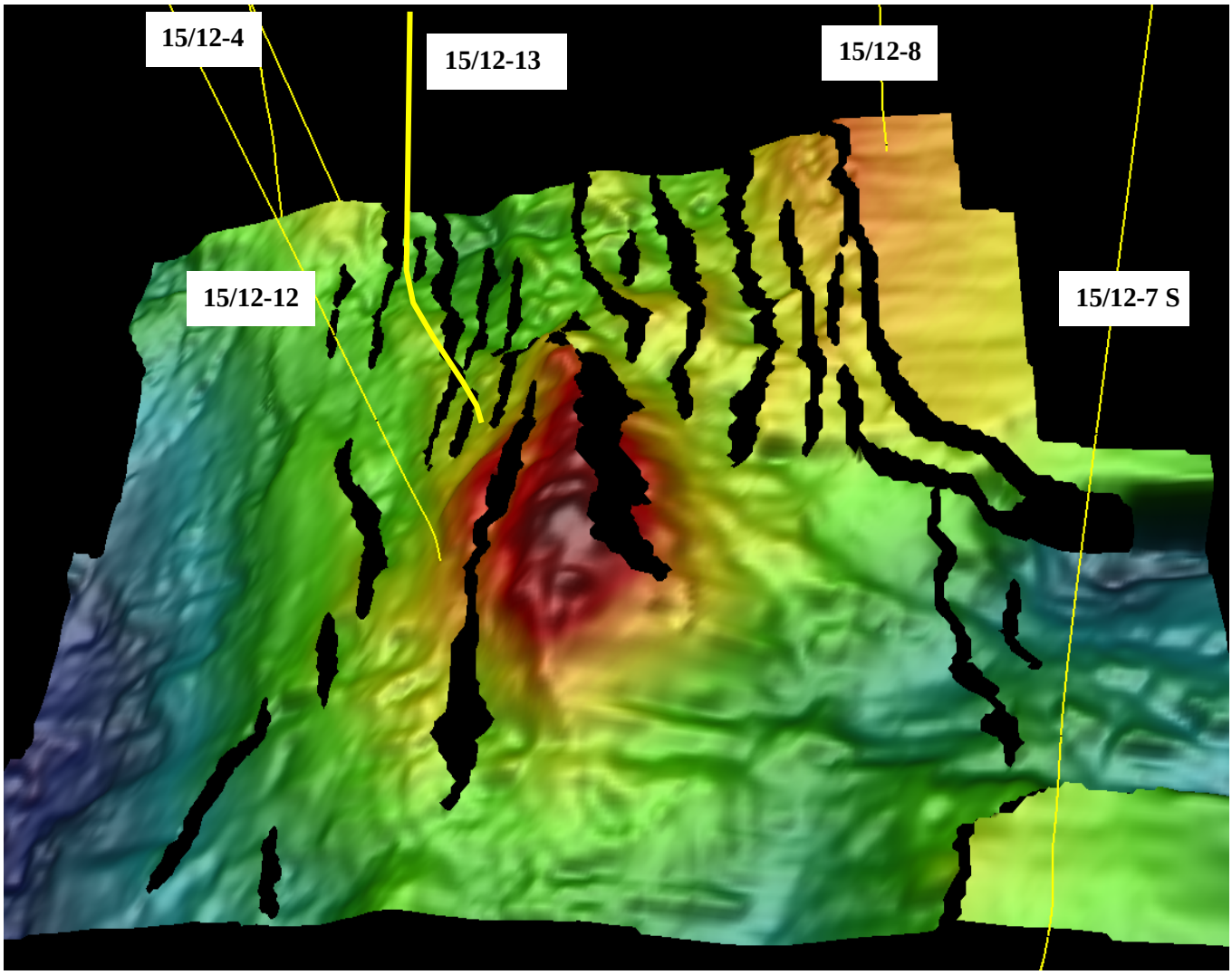
Pertra AS

Final Well Report
Wells 15/12-13, 15/12-13 A
15/12-13 B



October 2003

PERT-D-0049

Pertra AS

0	21.10. 03	Approved for use	T.Kollien/ P.Haugum	O.G.Tveiten/ S.Berg	R.Gundesø/ A.Tronstad
Rev.	**Date**	**Reason for Issue**	**Prep.**	**Checked**	**Accepted**

Title:

Final Well Report

Wells 15/12-13, 15/12-13 A, 15/12-13 B

No. of Sheets:

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LIST OF CONTENTS, WELLS 15/12-13, 15/12-13 A and 15/12-13 B

INTRODUCTION:

PREFACE

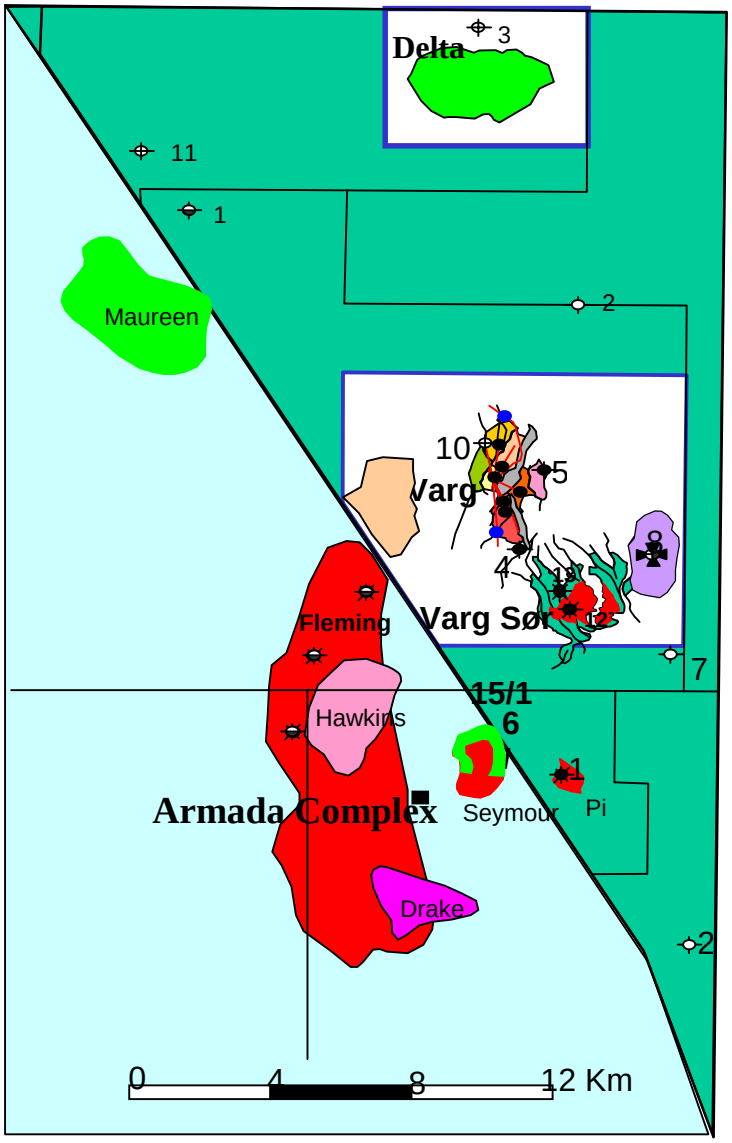
License PL038 was awarded in 1974 as part of the 3rd license round with Statoil as the operator. The license is located in block 15/12, as shown in the location map on page 3.

The licensees percentage share at the time of operation is the following:

Pertra AS (operator)	70 %
Petoro	30 %

Pertra AS ran the operation on behalf of the group, during April 2003 – June 2003.

All depths in this report are in m MD (RKB elevation is 18 m) unless otherwise stated.



Location map

SUMMARY OF WELL DATA, 15/12-13	
LOCATION:	Geographical: 58° 02’ 03.84” N 01° 55’ 04.58” E UTM: 6433198.00 N 436100.00 E HAYFORD1909,UTM Zone 31, CM 3°E
OPERATOR:	Pertra AS
RIG:	West Alpha
CONTRACTOR:	Smedvig
KB ELEVATION:	18.0 m
WATER DEPTH:	87.0 m
START OF OPERATION:	22.04.2003
REACHED TD:	07.05.2003
COMPLETED:	11.05.2003
STATUS:	P & A
FORMATION AT TD:	Late Oxfordian
TD DRILLER (m RKB):	3047 m MD
TD LOGGER (m RKB):	Not logged
DRILLING DEPTHS:	36” to 171 m 17 ½” to 1320 m 12 ¼” to 3047 m
CASING DEPTHS:	30” to 165 m 13 3/8” to 1315 m

SUMMARY OF WELL DATA, 15/12-13 A	
LOCATION:	Geographical: 58° 02’ 03.84” N 01° 55’ 04.58” E UTM: 6433198.00 N 436100.00 E HAYFORD1909,UTM Zone 31, CM 3°E
OPERATOR: RIG: CONTRACTOR:	Pertra AS West Alpha Smedvig
KB ELEVATION: WATER DEPTH:	18.0 m 87.0 m
START OF OPERATION: REACHED TD: COMPLETED: STATUS: FORMATION AT TD:	11.05.2003 13.05.2003 17.05.2003 P & A, Junked Rogaland Gr.
TD DRILLER (m RKB): TD LOGGER (m RKB):	2532 m MD Not logged
DRILLING DEPTHS:	36” to 171 m 17 ½” to 1320 m 12 ¼” to 2532 m
CASING DEPTHS:	30” to 165 m 13 3/8” to 1315 m

SUMMARY OF WELL DATA, 15/12-13 B	
LOCATION:	Geographical: 58° 02’ 03.84” N 01° 55’ 04.58” E UTM: 6433198.00 N 436100.00 E HAYFORD1909,UTM Zone 31, CM 3°E
OPERATOR: RIG: CONTRACTOR:	Pertra AS West Alpha Smedvig
KB ELEVATION: WATER DEPTH:	18.0 m 87.0 m
START OF OPERATION: REACHED TD: COMPLETED: STATUS: FORMATION AT TD:	17.05.2003 04.06.2003 12.06.2003 P & A Triassic Gr.
TD DRILLER (m RKB): TD LOGGER (m RKB):	3151 m MD Not logged
DRILLING DEPTHS:	36” to 171 m 17 ½” to 1320 m 12 ¼” to 2951 m 8 ½” to 3151 m
CASING DEPTHS:	30” to 165 m 13 3/8” to 1315 m 9 5/8” to 2920 m

SECTION A

GEOPHYSICS, GEOLOGY

AND

RESERVOIR EVALUATION

WELLS

15/12-13
15/12-13 A
15/12-13 B

Table of Content

1 Objectives

The well was drilled as an appraisal well on the Varg South discovery made by Norsk Hydro in 2001. The primary objective was:

- Define the oil/water contact in order to confirm the commerciality of the Varg South oil discovery.

The secondary objectives were:

- Assess potential Kimmeridgian Sandstone immediately above the main Oxfordian reservoir.
- Measure current reservoir pressure and fluid gradients.
- Confirm the reservoir quality of the Upper Jurassic target reservoir.
- Assess reservoir geometry.
- Confirm geophysical model in terms of depth to top reservoir and base reservoir.

The well was drilled approximately 1 km to the north of the discovery well, 15/12-12.

2 Results

Well 15/12-13 penetrated the Late Oxfordian sandstone at 2966 m TVDSS. The sand was encountered 105 m TVDSS deeper than expected, and was water-wet. The overlying Draupne and Heather formations were thicker the than prognoses, and the target area proved to be down faulted. The sand encountered was, based on biostratigraphy, the same as in well 15/12-12. As the objectives were not achieved by this well, it was decided to drill a geological side-track.

The geological side-track 15/12-13 A had a target approximately 300 m to the South West of 15/12-12. The well was abandoned at 2532 m MD, in the Rogaland Group, due to hole instability problems, and it was decided to drill a second side-track.

The second geological side-track had a target approximately 350 m to the North West of 15/12-12. A total of 144 m of Kimmeridgian to Late Oxfordian reservoir (2958-3092 m MD) was penetrated in well 15/12-13 B. The oil/water contact was established at 2964 m TVDSS, and the gas/oil contact at 2931 m TVDSS. The reservoir was found to be pressure depleted, most likely due to production from the Varg Field, and the gas/oil contact had moved downwards from 2912 m TVDSS in well 15/12-12 (drilled in 2001). After completion of the logging program, the well was permanently plugged and abandoned.

3 Biostratigraphy

Biostratigraphical evaluation was carried out on shore by Applied Petroleum Technology AS (APT). Micropalaentological and palynological analysis have formed the basis for the biostratigraphical interpretation of the well. The analysis was performed on ditch cuttings and side-wall cores. Table 3-1 and 3-2 shows the individual palynological analysis results, and Table 3-3 shows the biostratigraphical subdivision of the wellbores. For more details about the biostratigraphy, see “Wells 15/12-13B & 15/12-13 – Biostratigraphy” by APT.

3.1 15/12-13

The biostratigraphy showed that the Draupne and Heather formations were thicker than anticipated prior to drilling.

The first sand encountered was of Kimmeridigian age (Heather Formation), indicating re-deposition of Late Oxfordian sand in Kimmeridigian time. Below this, Late Oxfordian sand (RZ-1) was penetrated. This sand is the same as in the upper part of the discovery well 15/12-12.

Summary Stratigraphy 15/12-13			
Depth	**Event no.**	**Age**	**Lithostratigraphy**
2930		Uppermost sample	
2930		Early Volgian	Draupne
2960	2 or yngr	Late Kimmeridgian-Early Volgian	Heather
3000		Late Kimmeridgian	Heather
3010	8-10	Kimmeridgian	Kimm. Sand
3020	8-?19	Kimmeridgian?	
3040	21-26?	Oxfordian	RZ 1
3040		Lowermost sample	

Table 3-1: Biostratigraphical analysis 15/12-13

3.2 15/12-13 B

The first samples in this well are from the Draupne and Heather formations.

The first sand encountered is of Kimmeridgian age (Heather Formation) as in 15/12-13. Below this the sand is interpreted to be of Early to Late Oxfordian age (RZ-1, RZ-2 and RZ-3), and correlates to the discovery well 15/12-12.

The base reservoir, the Triassic Group, is uncertain due to lack of trace fossils in both sidewall cores and ditch cuttings. The top of the Triassic is placed where the abundance of trace fossils drops, guided by the well logs.

Summary Stratigraphy 15/12-13B			
Depth	**Event no.**	**Age**	**Lithostratigraphy**
2930		Uppermost sample	
2930		Early Volgian	Draupne
2935	3 or yngr		
2940 dcs	2 or yngr	BREAK?	
2940 swc	10 or oldr	Kimmeridgian	Heather
2953	11-14?		
2963	19	Late Oxfordian to basal Kimmeridgian	RZ 1 (mostly)
2963	20 or yngr		
2967	21		
3012	41	Late Oxfordian	RZ 2.1
3023	47		
3053	51	Early to Middle Oxfordian	RZ 3.1
3077	53?		
3086	58/61?		
3089	61/63		RZ 3.2
(caved)	67/71?		RZ 3.3?
3092/95		BREAK?	
3095?		Indeterminate, ?Triassic	Hegre?
3128		Lowermost sample	

Table 3-2: Biostratigraphical analysis 15/12-13 B

15/12-13			15/12-13 B		
Zone	**Depth (MD)**	**Depth (TVDSS)**	**Zone**	**Depth (MD)**	**Depth (TVDSS)**
Draupne	2855.6	2811.9	Draupne	2877.3	2788.8
Heather	2944.5	2898.9	Heather	2938.8	2847.0
Kimmeridge sand	3013.4	2966.3	Kimmeridge sand	2951.0	2858.5
RZ-1	3029.0	2982.5	RZ-1	2963.2	2870.1
			RZ-2	3014.0	2918.6
			RZ-3	3058.0	2960.1
			Triassic	3092.0	2993.9

Table 3-3: Biostratigraphical subdivision of the wellbores

4 Lithostratigraphy

All depths are in m MD (RKB elevation is 18 m).

The summary is compiled based on the biostratigraphical interpretations made on ditch cuttings and side-wall cores. MWD logs were used to aid lithological interpretation and to place formation boundaries. The formation tops are summarised in ***Table 4-1.***

Above 1320 m the well was drilled with returns to seabed, and the interpretations in this section is based on MWD logs only.

	15/12-13				15/12-13 A				15/12-13 B			
	Prognosis		Actual		Prognosis		Actual		Prognosis		Actual	
Formation	**MD**	**TVDSS**	**MD**	**TVDSS**	**MD**	**TVDSS**	**MD**	**TVDSS**	**MD**	**TVDSS**	**MD**	**TVDSS**
Nordland Gr	649.0	631.0	650.0	632.0	649.0	631.0	650.0	632.0	649.0	631.0	650.0	632.0
Utsira Fm.	1228.0	1210.0	1225.0	1207.0	1228.0	1210.0	1225.0	1207.0	1228.0	1210.0	1225.0	1207.0
Hordaland Gr	1275.0	1257.0	1240.0	1222.0	1275.0	1257.0	1240.0	1222.0	1275.0	1257.0	1240.0	1222.0
Rogaland Gr	2393.0	2354.0	2286.0	2271.2			2452.0	2268.7	2287.0	2230.0	2277.0	2221.1
Balder Fm			2286.0	2271.2			2452.0	2268.7			2277.0	2221.1
Sele Fm			2297.0	2281.9			2468.0	2280.8			2285.0	2228.6
Lista Fm			2370.0	2353.1							2344.0	2284.6
Shetland Gr	2452.3	2412.0	2453.2	2417.4					2521.0	2452.0	2519.5	2451.0
Cromer Knoll Gr	2715.8	2670.0	2723.1	2682.1					2761.0	2679.0	2756.0	2674.2
Jurassic	2842.5	2794.0	2855.6	2811.9					2873.0	2785.0	2877.3	2788.8
Draupne Fm	2842.5	2794.0	2855.6	2811.9					2873.0	2785.0	2877.3	2788.8
Heather Fm.			2944.5	2898.9							2938.8	2847.0
Kimmeridge sst	2910.9	2861.0	3013.3	2966.3							2951.0	2858.5
RZ_1	2940.5	2890.0	3029.9	2982.5					2971.0	2883.0	2963.2	2870.1
RZ_2											3014.0	2918.6
RZ_3											3058.0	2960.9
Triassic	3128.7	3084.0							3123.0	3022.0	3092.0	2993.9
TD			3047.0	2999.3			2532.0				3151.0	3051.3

Table 4-1: Lithostratigraphy

4.1 Nordland Gr. (-1240.0 m)

This interval was drilled with returns to seabed.

4.2 15/12-13

4.2.1 Hordaland Gr. (1240.0 – 2286.0 m)

The interval consists mainly of Claystone with stringers of Limestone and Dolomite.

Claystone: Olive brown to olive black and brownish black. Towards the base of the interval the Claystone becomes greenish grey to medium dark grey. The Claystone is firm, occasionally moderately hard, sub-blocky and contains micro Pyrite.
Limestone: Light yellowish brown to light brownish grey, occasionally greyish white, hard to firm, brittle, sub-blocky and crystalline.
Dolomite: Moderate brown, very hard and crystalline.

4.2.2 Rogaland Gr. (2286.0 – 2453.2 m)

Balder (2286.0 – 2297.0 m): The interval consists of Claystone and Tuff.

Claystone: Dark greenish grey to medium dark grey, firm and sub-blocky.
Tuff: Medium bluish grey to light bluish grey, soft.

Sele (2297.0 – 2370.0 m): This interval consists of Claystone with stringers of Limestone.

Claystone: Medium dark grey to dark grey, firm, sub-blocky with traces of Pyrite.
Limestone: Light grey to pinkish grey, hard, blocky and micro-crystalline.

Lista (2370.0 – 2453.2 m): This interval consists of Claystone with stringers of Limestone, Dolomite, Siltstone and Sandstone.

Claystone: Brownish grey and greenish grey, firm, sub-blocky. Traces of Micro Pyrite and Glauconite are observed.

Siltstone: Brownish grey to light brownish grey, firm, sub-blocky. Traces of Micro Pyrite.

Sandstone: Loose Quartz grains, clear to translucent, very fine to fine and well sorted.

Limestone: Very light grey to pinkish grey, hard, brittle, blocky and micro-crystalline.

Dolomite: Medium brown, very hard, blocky and micro-crystalline.

4.2.3 Shetland Gr. (2453.2 – 2723.1 m)

This interval consists of Limestone with some Siltstone stringers in the uppermost part.

Limestone: Yellowish white to greyish white, occasionally pinkish white to pale red, hard, blocky and micro-crystalline. Traces of greenish grey to brownish grey Claystone are seen throughout the interval.
Siltstone: Brownish grey, greenish grey, firm, sub-blocky with traces of Pyrite and Glauconite. Occasionally grading Sandstone.

4.2.4 Cromer Knoll Gr. (2723.1 – 2855.6 m)

The interval consists mainly of varicoloured Marls with Limestone stringers.

Marl: Medium dark grey to olive grey, moderate brown, reddish brown. The Marl is soft to firm, sub-blocky and occasionally argillaceous.
Limestone: Off white to yellowish grey, hard, brittle, micro-crystalline.

4.2.5 Jurassic Gr. (2855.6 -)

4.2.5.1 Draupne Fm. (2855.6 – 2944.6 m)

The interval consists

Claystone: Dark grey to olive black organic rich Claystone. The Claystone is soft to firm, sub-blocky and slightly calcareous.

4.2.5.2 Heather Fm. (2944.6 – 3029.9 m)

The interval consists of Claystone

Claystone: Olive black to greenish black, occasionally dark grey, soft to firm, sub-blocky and occasionally calcareous with traces carbonaceous material micro Pyrite.

Kimmeridgian Sandstone (3013.3 – 3029.9 m): Sandstone interbedded with Claystone.

Sandstone: Loose clear to translucent Quartz grains. Predominantly medium to fine, occasionally medium to coarse and well to moderately sorted. Occasionally cemented. Traces of Pyrite.
Claystone: Olive black to greenish black, firm, silty, with traces of micro Pyrite.

4.2.5.3 Late Oxfordian (3029.9 -)

RZ_1: This interval consists of Sandstone.

Sandstone: Predominantly loose Quartz grains, clear to translucent, fine to medium, occasionally coarse, moderately sorted. Argillaceous and calcite cementation is observed. Traces of Pyrite.

4.3 15/12-13 B

4.3.1 Hordaland Gr. (1240.0 – 2277.0 m)

The interval consists of Claystone with Limestone and Dolomite stringers.

Claystone: Olive brown to olive black and brownish black. Towards the base of the interval the Claystone becomes greenish grey to medium dark grey. The Claystone is firm, occasionally moderately hard, sub-blocky and contains micro Pyrite.

Limestone: Light grey to pale yellowish brown, firm to hard, blocky and occasionally argillaceous.
Dolomite: Dark yellowish brown, hard, blocky.

4.3.2 Rogaland Gr. (2277.0 – 2519.5 m)

Balder (2277.0 – 2285.0 m): The interval consists of Claystone with traces of Tuff.

Claystone: Varying colours, mainly dark greenish grey, medium dark grey and brownish grey, firm to hard and sub-blocky.
Tuff: Greyish black to medium bluish grey, firm to crumbly, sub-blocky to blocky and silty.

Sele (2285.0 – 2344.0 m): This interval consists of Claystone with Limestone stringers.

Claystone: Olive grey to olive black, occasionally greenish grey, firm to moderately hard, sub-blocky to blocky with traces of micro Pyrite.
Limestone: Whit to medium light grey, firm to hard, blocky.

Lista (2344.0 – 2519.5 m): This interval consists mainly of Claystone with Limestone stringers.

Claystone: Dark grey to olive grey, light grey, greenish grey and occasionally brownish, firm, sub-blocky and occasionally calcareous to very calcareous.
Limestone: White to light grey, medium grey, firm to moderately hard, sub-blocky to blocky.

4.3.3 Shetland Gr. (2519.5 – 2756.0 m)

This interval consists primarily of Limestone with some Claystone at the top of the interval and some minor intervals towards the base.

Limestone: Very light grey to pinkish grey, occasionally pinkish grey to pale red. Moderately hard, blocky and occasionally argillaceous.
Claystone: Olive grey, dark greenish grey, firm to moderately hard, blocky to sub-blocky, calcareous, and occasionally marly.

4.3.4 Cromer Knoll Gr. (2756.0 – 2877.3 m)

This interval consists primarily of Marl.

Marl: Varicoloured, moderate brown, pale brown to light brown, greenish grey, firm to soft, sub-blocky to blocky with traces of micro Pyrite and Glauconite. The Marl is occasionally silty.

4.3.5 Jurassic Gr. (2877.3 – 3092.0 m)

4.3.5.1 Draupne Fm. (2877.3 – 2938.8 m)

The interval consists of Claystone.

Claystone: Olive black to dark grey, organic rich, firm, sub-blocky to sub-platy, slightly calcareous with traces of micro Pyrite.

4.3.5.2 Heather Fm. (2938.8 – 2963.2 m)

The interval consists primarily of Claystone, with Sandstone towards the base of the interval.

Claystone: Olive grey to dark grey, occasionally greenish grey, soft to firm, sub-blocky, and calcareous with traces of Mica. The Claystone is occasionally silty.
Sandstone: Clear to translucent Quartz grains, very fine to fine, occasionally medium to coarse, moderate to well sorted., sub-angular to sub-rounded. The matrix is medium grey to medium dark grey, argillaceous/kaolinittic, calcareous with traces of Mica and Glauconite.

4.3.5.3 Late Oxfordian (2963.2 – 3092.0 m)

RZ-1 (2963.2 – 3014.0 m): This interval consists of Sandstone with some Claystone in the upper part of the section.

Sandstone: Loose Quartz grains, varying grain size from very fine to coarse, generally well sorted and sub-rounded. Occasionally white cement, Pyrite and Glauconite is observed.
Claystone: Greenish grey to grey, soft, sub-blocky, non to slightly calcareous, silty with traces of Glauconite.

RZ-2 (3014.0 – 3058.0 m): This interval consists of Sandstone with some minor Claystone.

Sandstone: Loose Quartz grains, clear to translucent, very fine to fine, occasionally coarse, well sorted, sub-rounded, occasionally calcareous cement.
Claystone: Light grey to grey, soft, sub-blocky with traces of Glauconite.

RZ-3 (3058.0 – 3092.0 m): This interval consists of Sandstone that becomes silty and shaly towards the base of the section.

Sandstone: Loose Quartz grains, clear to translucent, medium, occasionally coarse, occasionally very fine to fine, moderately sorted, sub-rounded, occasionally calcareous cement.
Claystone: Light grey to grey, soft, sub-blocky with traces of Glauconite.
Siltstone: Brown to yellowish brown with black spots, firm, sub-blocky.

4.3.6 Triassic Gr. (3092.0 -)

The interval consists of Sandstone and Claystone.

Sandstone: Loose Quartz grains, very fine to fine, fine to medium, occasionally coarse, moderately sorted, occasionally reddish inclusions, kao/sil cement. Traces of Pyrite
Claystone (1): Light grey to grey, soft, sub-blocky with traces of Glauconite.
Claystone (2): Reddish brown to greyish red, soft, sub-blocky.

5 Well-site Sample Description

5.1 15/12-13

Pertra as **Wellsite Sample Description** Page: 1 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	12.25	Geologists:	Seinar Eikemo/Terje Kollien	Date:	4-May-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
1330	100	CLST: olv gry-dk grn gry,occ olv blk-grn-blk,pred frm,occ sft,slily calc,occ carb	
1340	100	CLST: a/a + occ slily slty	
	Tr	LS: v lt gry-yelsh gry,frm,xln	
1350	100	CLST: a/a + blky-sbblky	
1360	100	CLST: a/a	
	Tr	LS: a/a	
1370	100	CLST: a/a	
	Tr	DOL/LS: pa brn-med brn,hd-frm	
1380	100	CLST: olv blk-brnsh blk,frm-sft,slty,occ calc,micropyr	
	Gd Tr	LS: a/a	
1390	90	CLST: a/a	
	10	LS: pa brn-lt brn,hd,xln	
1400	90	CLST: a/a	
	10	LS: a/a	
1410	70	CLST: a/a	
	30	LS: a/a	
1420	90	CLST: a/a	
	10	LS: a/a	
1430	90	CLST: dk gry,dk grnsh gry,frm,sbblky,slily slty	
	10	LS: lt brnsh gry-md lt gry,arg,frm,xln	
1440	90	CLST: a/a	
	10	LS: a/a	
1450	100	CLST: a/a	
	Tr	LS: a/a	
1460	90	CLST: a/a	
	10	LS: a/a	
1470	90	CLST: dk gry-dk grnsh gry,slily slty,frm,calc cmt	
		LS: a/a	
1480	100	CLST: a/a	
	Tr	LS: a/a	
	Tr	DOL: pa brn-mod brn,hd,xln	

Pertra as

Wellsite Sample Description

Page: 2 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	5-May-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
1490	100	CLST: dk grnsh gry-dk gry,frm-sft,slily slty,occ slily calc,tr micpyr	
	Tr	LS. Lt grnsh gry-yelsh gry,frm,microxln	
1500	90	CLST: a/a	
	10	LS: a/a	
1510	90	CLST: a/a	
	10	LS: a/a	
1520	90	CLST: a/a	
	10	LS: a/a	
1530	90	CLST: a/a	
	10	LS: a/a	
1540	100	CLST: dk grnsh gry-dkgry,occ m gry,sft-frm,slily slty,slily calc	
		occ lt brnsh gry,sft	
	Tr	LS: a/a	
1550	100	CLST: a/a	
	Tr	LS: a/a	
1560	100	CLST: a/a	
	Tr	LS: a/a	
1570	100	CLST: gry-m dk gry,occ dk gry,sft-frm,sbblky,slily calc tr pyr, slty l/P	
	Tr		
1580	100	CLST: olv gry,occ brn gy,sbblky,frm,calc ,slty l/P	
	Tr	LS: a/a	
1590	100	CLST: a/a	
	Tr	LS: a/a	
1600	90	CLST: olv gry-m dk gry,occ gry,frm,sbblky,slily calc	
	10	LS: a/a	
1610	100	CLST: a/a	
	Tr	LS: a/a	
1620	100	CLST: a/a	
	Tr	LS: a/a	
1630	100	CLST: a/a + occ brnsh gry, slty l/P	
	Tr	LS: a/a	
1640	100	CLST: a/a + micropyr	
	Tr	LS: a/a	

Pertra as

Wellsite Sample Description

Page: 3 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	5-May-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
1650	100	CLST: olv gry-m dk gry,occ gry,occ dk gry,frm,sbblky,slily calc,slty I/P	
	Tr	LS: lt brn gry-yel gry, gry wh,frm-hd,sbblky,xln	
1660	90	CLST: a/a	
	10	LS: a/a	
1670	100	CLST: a/a	
	Tr	LS: a/a	
1680	90	CLST: a/a	
	10	LS: a/a	
1690	90	CLST: a/a	
	10	LS: a/a	
1700	100	CLST:olc gry-m dk gry,occ gry,occ dk gr,frm,sbblky,slty I/P,slily calc,micropyr	
	Tr	LS: a/a	
1710	100	CLST: a/a	
	Tr	LS: a/a	
1720	100	CLST: a/a	
	Tr	LS: a/a	
1730	100	CLST: a/a	
	Tr	LS: a/a	
1740	100	CLST:olc gry-m dk gry,occ gry,occ dk gr,frm,sbblky,slty I/P,slily calc,micropyr	
	Tr	LS: lt brn gry-yel gry, gry wh,frm-hd,sbblky,xln	
1770	100	CLST: a/a	
	Tr	LS: a/a	
1780	90	CLST: a/a	
	10	LS: a/a	
1790	100	CLST: a/a	
	Tr	LS: a/a	
1800	100	CLST: a/a	
	Tr	LS: a/a	
1810	100	CLST: a/a	
	Tr	LS: a/a	
1820	100	CLST: a/a	
	Tr	LS: a/a	
1830	100	CLST: a/a	
	Tr	LS: a/a	
1840	100	CLST: a/a	
	Tr	LS: a/a	

Pertra as **Wellsite Sample Description** Page: 4 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	5-May-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
1850	100	CLST: olv gry-m dk gry,occ gry,occ brnsh gry,frm,sbblky,slily slty,slily calc, micropyr	
	Tr	LS: lt yelsh brn,occ grysh wh,hd-frm,sbblk,arg I/P,xln	
1860	100	CLST: a/a + dk olv gry	
	Tr	LS: a/a	
1870	90	CLST:dk olv gry-mdk gry,occ brnsh gry,frm,sbblky,slty I/P,non calc,micropyr	
	10	LS: a/a	
1880	100	CLST: a/a	
	Tr	LS: a/a	
1890	100	CLST: a/a + olv blk-brnsh blk	
	Tr	LS: a/a	
1900	100	CLST:olv gry-m dk gry,occ gry,frm,sbblky,slty I/P,micropyr	
	Tr	LS: a/a	
1910	100	CLST: a/a	
	Tr	LS: a/a	
1920	100	CLST: a/a	
	Tr	LS: a/a	
1930	100	CLST:olv gry-m dk gry,brnsh gry,occ gry,frm,sbblky,slty I/P,micropyr	
	Tr	LS: lt yelsh brn,occ grysh wh,hd-frm,sbblk,arg I/P,xln	
1940	100	CLST: a/a	
	Tr	LS: a/a	
1950	90	CLST: a/a	
	10	LS: a/a	
1960	80	CLST: a/a	
	10	LS: a/a	
1970	100	CLST: a/a + pyr	
	Tr	LS: a/a	
1980	100	CLST: a/a	
	Tr	LS: a/a	
1990	80	CLST: dk gry-brnsh blk, frm-hd, sbblky, i/p slty	
	20	LS: lt olv gry-grnsh gry, hd, brit, microxln	
	Tr	Dol: mod brn, v hd, brit	
2000	90	CLST: a/a	
	10	LS: a/a	
2010	80	CLST: a/a	
	20	LS: a/a	

Pertra as

Wellsite Sample Description

Page: 5 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	5-May-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
2020	90	CLST: dk gry-brnsh blk, frm-hd, slily slty, Tr Pyr	No shows
	10	LS: lt olv gry-grnsh gry, hd brit, xln	
2030	90	CLST: a/a	
	Tr	LS: a/a	
	10	DOL: mod brn, v hd, microxln, brit	
2040	90	CLST:a/a + grnsh gry-dk grnsh gry, frm	
	Tr	LS: a/a	
	10	DOL: a/a	
2050	90	CLST: dk gry-brnsh blk, lt olv gry, else a/a	
	10	LS: a/a	
2060	90	CLST: a/a	
	10	LS: a/a	
2070	100	CLST a/a, Tr Micropyr	
	Tr	LS:a/a	
2080	100	CLST: a/a, Tr Pyr	
	Tr	LS: a/a	
2090	100	CLST: a/a	No shows
	Tr	LS: a/a	
2100	90	CLST: a/a, gd Tr Micropyr	No shows
	10	LS: a/a	
2110	90	CLST: a/a	No shows
	10	LS: a/a	
2120	90	CLST: a/a	
	10	LS: a/a	
2130	100	CLST: a/a	
	Tr	LS: a/a	
2140	100	CLST: a/a	
	Tr	LS: a/a	
2150	100	CLST: a/a	
	Tr	LS: a/a	
2170	90	CLST: a/a	
	10	LS: a/a	
2180	90	CLST: a/a	
	10	LS: a/a	

Pertra as

Wellsite Sample Description

Page: 6 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	6-May-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
2200	100	CLST: dk grnsh gry-m dk gry, frm, sbblky, Tr Micropyr	No shows
	Tr	LS: m lt gry-yelsh gry, hd, blky, microxln	
2210	90	CLST: a/a	No shows
	10	LS: a/a	
2220	100	CLST: a/a	No shows
	Tr	LS: a/a	
	Tr	DOL: mod brn, v hd, microxln	
2230	90	CLST: a/a	
	10	LS: a/a	No shows
2240	100	CLST: a/a, Tr Micropyr	
	Tr	LS: a/a	
2250	90	CLST: a/a	
	10	LS: a/a	
2270	100	CLST: a/a	
	Tr	LS: a/a	
2280	100	CLST: dk grnsh gry - m dk gry, occ brnsh gry - brnsh blk, frm, sbblky	
	Tr	LS: a/a	
2290	50	CLST: a/a	
	50	Tf CLST: m blsh gry - lt blsh gry, sft, w/varic spts, blk, gry, m bl, slily calc	
2300	70	CLST: a/a	
	30	Tf CLST: a/a	
	Tr	LS: a/a	
2310	100	CLST: m dk gry - dk gry, frm, blky-sbblky, wxy	
	Tr	LS: a/a	
2320	100	CLST: a/a	
	Tr	LS: a/a	
2330	100	CLST: a/a + tr pyr	
	Tr	LS:v lt gry-pkish gry,hd,brit,microxln	
2340	100	CLST: a/a	
	Tr	LS: a/a	
2343	100	CLST: a/a	
	Tr	LS: a/a	
2346	90	CLST: a/a	
	10	LS: a/a	

Pertra as

Wellsite Sample Description

Page: 7 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	12/15/13	Sidetracked from well:			
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	6-May-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
2349	100	CLST:md dk gry-dk gry,frm,sbblky,tr pyr	
	Tr	LS:v lt gry-pksh gry,hd,blky,microxln	
2352	100	CLST: a/a	
	Tr	LS/ a/a	
2355	90	CLST: a/a + tr pyr	
	10	LS: a/a	
2358	90	CLST: a/a	
	10	LS: a/a	
2361	100	CLST: a/a	
	Tr	LS/ a/a	
2364	90	CLST: a/a	
	10	LS: a/a	
2367	90	CLST: a/a	
	10	LS: a/a	
2370	80	CLST: a/a	
	20	LS: a/a	
2373	80	CLST: a/a + gd tr pyr	
	20	LS: a/a	
2376	90	CLST: a/a	
	10	LS: a/a	
2379	90	CLST:dk gry-m dk gry,frm,sbblky,tr pyr	
		occ brnsh gry,frm-hd,micropyr	
	10	LS: a/a	
2382	90	CLST: a/a	
	10	LS: a/a	
2385	100	CLST: a/a	
	Tr	LS/ a/a	
2388	90	CLST: a/a	
	10	LS: a/a	
2391	90	CLST: a/a + tr pyr	
	10	LS: a/a	
2394	90	CLST: a/a	
	10	LS: a/a	

Pertra as

Wellsite Sample Description

Page: 8 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	6-May-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
2397	100	CLST:grnsh gry-lt grnsh gry,lt blsh gry,frm,sbblky,tr glauc	
	Tr	LS:v lt gry-pksh gry,hd,brit,blky,microxln	
	Tr	DOL: md rn,v hd,blky,microxln	
2400	100	CLST: a/a	
	Tr	DOL: a/a LS: a/a	
2403	100	CLST: a/a gd tr pyr	
	Tr	DOL: a/a LS: a/a	
2406	90	CLST: a/a	
	10	SLTST: brnsh gry,lt brnsh gry,frm,sbblky,micropyr	No shows
	Tr	DOL: a/a LS: a/a	
2409	100	CLST: a/a	No shows
	Tr	SLTST: a/a DOL: a/a LS: a/a	
2412	100	CLST: a/a	
	Tr	SST:lse snd,trnsl,vf-f	
	Tr	SLTST: a/a DOL: a/a LS: a/a	
2415	90	CLST: a/a	
	10	SLTST: brnsh gry,lt brnsh gry,frm,sbblky,micropyr	No shows
	Tr	SST:lse snd,trnsl-clr,vf	
	Tr	DOL: a/a LS: a/a	
2418	80	CLST: a/a	
	20	SLTST: brnsh gry,lt brnsh gry,frm,sbblky,micropyr	No shows
	Tr	DOL: a/a LS: a/a	
2421	100	CLST: a/a	
	Tr	DOL: a/a LS: a/a	
2424	80	CLST: a/a	
	20	SST:lse snd,clr-trnsl,vf-f,w srt	No shows
	Tr	DOL: a/a LS: a/a	
2427	100	CLST: grnsh gry-lt grnsh gry,brn-dk brn,sft-frm,sbblky,tr glauc,tr pyr	
	Tr	SST,LS,DOL: a/a	
2430	100	CLST: a/a + pred brn-dk brn	
	Tr	LS,DOL: a/a	
2433	100	CLST: a/a	
	Tr	DOL: a/a LS: a/a	
2436	100	CLST:brn-dk brn,rdsh brn,occ grnsh gry-lt grnsh gry,sft-frm,sbblky,tr glauc	
	Tr	LS,DOL: a/a	
2439	100	CLST: a/a	
	Tr	DOL: a/a LS: a/a	

Pertra as **Wellsite Sample Description** Page: 9 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	6-May-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
2442	100	CLST:grnsh gry-m dk grnsh gry,occ rdsh brn,sft-frm,sbblky,tr glauc	
	Tr	LS:v lt gry-pnksh gry,occ off wh,hd,brit,blky,microxln	
	Tr	DOL:md brn,v hd,blky,microxln	
2445	100	CLST: a/a	
	Tr	LS,DOL: a/a	
2448	100	CLST: a/a	
	Tr	LS,DOL: a/a	
2451	90	CLST: a/a + calc	
	10	LS:lt gry,frm,sbblky,arg,tr glauc	
2454	80	CLST:gry-m dk gry,occ rdsh brn,frm,sbblky,calc	
	20	LS: a/a	
	Tr	DOL: a/a	
2457	70	CLST: a/a	
	30	LS: a/a	
	Tr	DOL: a/a	
2460	90	CLST: a/a	
	10	LS: a/a	
	Tr	DOL: a/a	
2463	70	CLST: a/a	
	30	LS: a/a	
	Tr	DOL: a/a	
2466	50	CLST: a/a	
	50	LS: a/a	
2469	50	CLST: a/a	
	50	LS: a/a	
2472	90	LS: a/a	
	10	CLST: a/a	
2475	100	LS:ylsh wh-lt grysh wh,lt gry-grnsh gry,frm,sbblky	
	Tr	CLST: a/a	
2478	100	LS: a/a	
	Tr	CLST: a/a	
2481	100	LS:ylsh wh-lt grysh wh,occ lt gry-grnsh gry,frm,sbblky,tr glauc	
2484	100	LS: a/a	
2487	90	LS: a/a	
	10	SLTST:brnsh gry,grnsh gry,frm,sbblky,non calc,tr pyr,tr glauc,grd sst	
	Tr	CLST: a/a	
2490	100	LS: a/a	
	Tr	CLST: a/a	

Pertra as

Wellsite Sample Description

Page: 10 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	6-May-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
2500	100	LS:ylsh wh-lt grysh wh,occ lt gry-grnsh gry,frm,sbblky,tr glauc	
	Tr	CLST:gry-m dk gry,occ rdsh brn,frm,sbblky,calc	
2510	100	LS: a/a	
	Tr	CLST: a/a	
2520	100	LS: off wh, occ grysh wh,frm-hd,blky,microxln,arg I/P	
	Tr	CLST: grnsh gry,brnsh gry,sft-frm,sbblky,non calc,micropyr	
2540	100	LS: a/a	
	Tr	CLST: a/a	
2550	8	LS: a/a + pnksh wh-pl rd	
	20	CLST: a/a	
2560	100	LS:pnksh wh-pl rd,frm-hd,occ hd,blky,microxln	
	Tr	CLST: a/a	
2570	100	LS:grysh wh-off wh,off wh,frm-hd,occ hd,blky,microxln	
	Tr	CLST: a/a	
2580	100	LS: a/a	
	Tr	CLST: a/a	
2590	100	LS: a/a	
	Tr	CLST: a/a	
2600	100	LS: a/a	
	Tr	CLST: a/a	
2610	100	LS: a/a	
	Tr	CLST: a/a	
2620	100	LS: a/a + pksh wh - pa rd, frm	
	Tr	CLST: a/a	
2630	100	LS: grysh wh-wh, occ yelsh gry, hd, brit, blky, microxln	
	Tr	CLST: a/a	
2640	100	LS: a/a	
	Tr	CLST: a/a	
2650	100	LS: a/a	
	Tr	CLST: a/a	
2660	100	LS: a/a	
	Tr	CLST: a/a	
2670	100	LS: a/a	
	TR	CLST: a/a	
2680	100	LS: a/a	
	Tr	CLST: a/a	

Pertra as **Wellsite Sample Description** Page: 11 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	07. Mai

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
2690	100	LS: grysh wh-wh, grysh pk-gry org pk, else a/a	
	Tr	CLST: a/a	
2700	100	LS: pa rd, grysh wh, else a/a	
	Tr	CLST: a/a	
2710	100	LS: yel gry-v lt gry, pa rd, hd, fri, brit, microxln	
2720	100	LS: yel gry-v lt gry, hd, brit, microxln, occ grysh rd, xln, arg	
2730	50	LS: a/a	
	50	MRL: md dk gry-olv gry, frm, suc, sbblky	
2740	10	LS: a/a	
	90	MRL: md dk gry-olv gry a/a + dsky brn- grysh brn, slily slty, suc, fri	
2750	10	LS: yel gry-v lt gry, hd, brit, microxln	
	90	MRL: md dk gry- olv gry, a/a, + mod brn, grysh brn, frm, sbblky	
2760	100	MRL: varicol, m dk gry, grysh brn, dsky brn	
2780	90	MRL: pred grysh rd-mod brn, blky-sbblky, frm	
	10	LS: pa yelsh brn, v hd, brit, microxln	
2790	90	MRL: m dk gry, mod brn-grysh rd, grysh brn	
	10	LS: a/a	
2800	100	MRL: a/a	
	Tr	LS: a/a	
2810	100	MRL: a/a	
	Tr	LS: a/a	
2820	100	MRL: a/a + arg i/p	
	Tr	LS: a/a	
2830	50	MRL:a/a	
	50	LS: a/a	
2840	50	MRL: rdsh brn-mod brn, sft-frm, blky, arg i/p	
	50	LS: a/a	
2850	100	MRL: a/a	
2860	80	CLST: m dk gry-dk gry sft-frm, sbblky	
	20	LS: off wh, frm, sbblky, arg i/p	
	Tr	MRL: a/a	

Pertra as **Wellsite Sample Description** Page: 12 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Steinar Eikemo/Terje Kollien	Date:	7. Mai

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
2870	100	CLST: m dk gry-dk gry, sft-frm, sbblky, slily calc, olv blk	
	Tr	MRL: a/a	
2880	100	CLST: a/a	
2890	100	CLST: a/a	
2900	100	CLST: a/a	
2910	100	CLST: a/a	
2920	100	CLST: a/a	
2930	100	CLST: a/a	
2940	100	CLST: a/a	
2950	100	CLST: a/a	
2960	100	CLST: a/a slily lighter, Tr Sd	
2970	100	CLST: a/a , TR Sd	
2980	100	CLST: a/a	
2981	100	CLST: a/a	
2984	100	CLST: olv blk-grnsh blk, frm, fri, slty, slily carb, micropyr, occ calc	
	TR	LS: m gry-m dk gry, frm, fri, v arg	
2990	100	CLST: a/a	
	Tr	LS: a/a	
2993	100	CLST: a/a	
	Tr	LS: a/a	
2996	100	CLST: a/a	
	Tr	LS: a/a	
3000	100	CLST: a/a	
	Tr	LS: a/a	
	r Tr	SD: lse Qtz gr, f-m, sbrnd	
3003	100	CLST: a/a	
	Tr	LS: a/a	
	r TR	SD: clr Qtz gr a/a	
3006	100	CLST: a/a	
	Tr	LS: a/a	
	r Tr	SD a/a	
3010	100	CLST: a/a	
	Tr	LS: a/a	
	r Tr	SD: a/a	
3013	100	CLST: a/a	
	Tr	LS: a/a	
	r Tr	SD: a/a	

Pertra as

Wellsite Sample Description

Page: 13 of: 13

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13		Sidetracked from well:		
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	12.25	Geologists:	Terje Kollien/Steinar Eikemo	Date:	07.mai.03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
3016	90	CLST: olv blk-grnsh blk, frm, suc, slty, micropyr, occ calc	
	10	SST: lse Qtz gr, f-m, occ crs gr	
3020	90	CLST: a/a	
	10	SST: a/a	
3023	60	SST: clr trnsl Qtz gr, lse, m-crs, sbang-rnd, wl-mod srt, Tr Pyr	No shows
	40	CLST: a/a	
3026	90	SST: a/a + calc cmt agg	
	10	CLST a/a	
3030	90	SST: clr trnsl Qtz gr, pred lse gr, occ calc cmt, pred f-m, occ crs gr, sbang-sbrnd, mod srt, Tr Pyr	
	10	CLST: a/a	
3033	100	SST: a/a	
	Tr	CLST: a/a	
3036	100	SST: a/a, calc cmt, occ arg cmt, g Tr Pyr, micropyr	No shows
3040	100	SST: lse gr, clr Qtz, pred f-m, occ crs gr, sbang-sbrnd, mod srt, occ calc cmt, Tr Pyr, Tr arg cmt	No shows
	Tr	CLST: slty olv blk, frm, fri	
3047	90	SST: a/a	No shows
	10	CLST: a/a	

5.2 15/12-13 B

Pertra as **Wellsite Sample Description** Page: 1 of: 15

Country:	Norway		Area:	Norwegian North Sea	Field:	Varg South
Well:	15/12-13 B			Sidetracked from well:	15/12-13	
Drill floor Elev. (m):		18	Company:	Pertra as		
	Hole size:	12 1/4"	Geologists:	Magne Tillung	Date:	17-May-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
1347	20	CLST: brnsh blk, med gry, frm - sft, sblky, non calc, sl slty I.P., sl micropyr,	
		sl micromic	
	80	CMT	
1348	80	CLST: brnsh blk, olv blk, frm - sft, sbblky, sl slty, micropyr, occ blk spk/carb Mat	
	20	CMT	
1350	90	CLST: a/a	
	r	LS: lt gry - v lt gry, frm, blky, sl arg, microxln	
	10	CMT	
1360	100	CLST: a/a	
	Tr	CMT	
1370	100	CLST: a/a	
1380	100	CLST: a/a	
1390	100	CLST: brsnh blk - olv blk, r pyr nod, else a/a	
	r	LS: lt gry - pl yelsh brn, frm - hd, blky, xln - microxln	
1400	100	CLST: olv blk, sft - frm, blky - sbblky, sl calc - calc, sl micropyr,	
	r	LS: a/a	
1410	100	CLST: a/a	
	r	LS: a/a	
1420	100	CLST: a/a	
	r	LS: a/a	
1430	100	CLST: a/a	
	r	LS: a/a	
1440	100	CLST: a/a	
	r	LS: a/a	
1450	100	CLST: a/a	
	r	LS: a/a	
1460	100	CLST: a/a	
	r	LS: a/a	
1470	100	CLST: a/a	
	r	LS: a/a	
1480	100	CLST: a/a	
	r	LS: a/a	
1490	100	CLST: a/a	
	r	LS: a/a	
1500	100	CLST: v slty I.P., else a/a	
	r	LS: a/a	
1510	100	CLST: a/a	
	r	LS: a/a	

Pertra as **Wellsite Sample Description** Page: 2 of: 15

Country:	Norway	Area:	Norwegian North Sea	Field:	Varg South
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	12 1/4"	Geologists:	Magne Tillung	Date:	18-May-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
1520	100	CLST: olv blk, sft - frm, blky - sbblky, calc, sl micropyr	
	r	LS: lt gry - pl yelsh brn, frm - mod hd, blky, arg, occ sl dol	
1530	100	CLST: a/a	
	r	LS: a/a	
1540	100	CLST: a/a	
	r	LS: a/a	
1550	100	CLST: a/a	
	r	LS: a/a	
1560	100	CLST: a/a	
	r	LS: a/a	
1570	100	CLST: a/a	
	r	LS: a/a	
1580	100	CLST: olv gry - olv blk, brnsh gry, frm, sbblky - blky, calc - sl calc, sl micropyr	
	r	LS: lt gry - pl yelsh brn, frm - hd, blky, arg I.P.	
1590	100	CLST: a/a	
	r	LS: a/a	
1600	100	CLST: a/a	
	r	LS: a/a	
1610	100	CLST: a/a	
	r	LS: a/a	
1620	100	CLST: a/a	
	r	LS: a/a	
1630	100	CLST: a/a	
	r	LS: a/a	
1640	100	CLST: a/a	
	r	LS: a/a	
1650	100	CLST: a/a	
	Tr	LS: a/a	
1660	100	CLST: olv gry - olv blk, m dk gry, frm - sft, sbblky, sl - non calc, micpyr, sl slty	Tight hole
	Tr	LS: a/a	in area
			1660-1690m
1670	100	CLST: a/a	on wiper trip
	Gd Tr	LS: dol I.P., pl yelsh brn - lt brn, frm - hd, blky, arg I.P.	
1680	90	CLST: a/a	
	10	LS: a/a	
1690	100	CLST: a/a	
	Gd Tr	LS: a/a	

Pertra as

Wellsite Sample Description

Page: 3 of: 15

Country:	Norway	Area:	Norwegian North Sea	Field:	Varg South
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	12 1/4"	Geologists:	Magne Tillung	Date:	18-May-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
1700	100	CLST: olv gry - olv blk, m dk gry, frm, sbblky, sl calc - calc, micropyr	
	Tr	LS: dol, pl yelsh brn, mod hd - frm, blky, arg	
1710	100	CLST: a/a r Pyr Nod	
	Tr	LS: a/a	
1720	100	CLST: a/a	
	Tr	LS: a/a	
1730	100	CLST: calc - sl calc else a/a	
	Tr	LS: a/a	
1740	100	CLST: a/a	
	Tr	LS: a/a	
1750	100	CLST: a/a	
	Tr	LS: a/a	
1760	90	CLST: a/a	
	10	LS: a/a	
1770	90	CLST: sl calc, else a/a	
	10	LS: a/a	
1780	80	CLST: olv gry - olv blk, m dk gry, frm, sbblky, sl calc, micropyr	
	20	LS: dol, pl yelsh brn, r lt gry, frm - mod hd, blky, arg, occ grdg calc/dol CLST	
1790	100	CLST: a/a	
	Gd Tr	LS: a/a	
1800	100	CLST: a/a	
	Tr	LS: a/a	
1810	100	CLST: sl - non calc, else a/a	
	Gd Tr	LS: a/a	
1820	100	CLST: a/a	
	Gd Tr	LS: a/a	
1830	100	CLST: m dk gry, olv gry - dk gnsh gry, else a/a	
	Gd Tr	LS: a/a	
1840	90	CLST: a/a	
	10	LS: a/a	
1850	90	CLST: a/a	
	10	LS: a/a	
1860	100	CLST: a/a	
	Gd Tr	LS: a/a	
1870	100	CLST: a/a	
	Gd Tr	LS: a/a	

Pertra as **Wellsite Sample Description** Page: 4 of: 15

Country:	Norway	Area:	Norwegian North Sea	Field:	Varg South
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	12 1/4"	Geologists:	Magne Tillung	Date:	

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
1880	100	CLST: m dk gry, olv gry - dk gnsh gry, frm, sbblky, non - sl calc, micropyr	
	Tr	LS: dol, pl yelsh brn, r lt gry, frm - mod hd, blky, arg	
1890	100	CLST: a/a	
	Tr	LS: a/a	
1900	100	CLST: a/a	
	Tr	LS: a/a	
1910	100	CLST: a/a	
	Tr	LS: a/a	
1920	100	CLST: a/a	
	Tr	LS: a/a	
1930	100	CLST: a/a	
	Tr	LS: a/a	
1940	100	CLST: a/a	
	Tr	LS: a/a	
1950	100	CLST: a/a	
	Tr	LS: a/a	
1960	100	CLST: a/a	
	Tr	LS: a/a	
1970	100	CLST: a/a	
	Tr	LS: a/a	
1980	100	CLST: a/a	
	Tr	LS: a/a	
1990	100	CLST: a/a	
	Tr	LS: a/a	
2000	100	CLST: a/a	
	Tr	LS: a/a	
2010	100	CLST: a/a	
	Tr	LS: a/a	
2020	90	CLST: olv blk - olv gry, frm - sft, sbblky, sl calc, micropyr, r carb Spk	
	10	LS: lt gry - pl yelsh brn, frm - mod hd, blky - occ sbblky, arg, dol l.P.	
	Tr	DOL: dk yelsh brn, hd, blky	
2030	90	CLST: a/a	
	10	LS: a/a	
	Tr	DOL: a/a	
2040	90	CLST: olv gry, grysh blk, else a/a	
	10	LS: a/a	
	Tr	DOL: a/a	

Pertra as

Wellsite Sample Description

Page: 5 of: 15

Country:	Norway	Area:	Norwegian North Sea	Field:	Varg South
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	12 1/4"	Geologists:	Magne Tillung	Date:	19-May-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
2050	100	CLST: olv blk - grysh blk, frm - sft, sbblky, sl - non calc, micropyr, Tr carb Spk	
	Gd Tr	LS: pl yelsh brn - lt gry, frm - mod hd, blky - sbblky, arg, dol I.P.	
	r	DOL: dk yelsh brn, hd, blky	
2060	90	CLST: olv blk, dk gry, else a/a	
	10	LS: a/a	
	r	DOL: a/a	
2070	90	CLST: a/a	
	10	LS: a/a	
	r	DOL: a/a	
2080	90	CLST: a/a	
	10	LS: a/a	
	r	DOL: a/a	
2090	100	CLST: a/a	
	Gd Tr	LS: a/a	
2100	100	CLST: dk gnsh gry - olv gry, frm, sbblky, no - sl calc, micropyr	
	Gd Tr	LS: a/a	
2110	100	CLST: a/a	
	Tr	LS: a/a	
2120	100	CLST: a/a	
	Tr	LS: a/a	
2130	100	CLST: a/a	
	Gd Tr	LS: a/a	
2140	90	CLST: a/a	
	10	LS: lt gry - pl yelsh brn, frm - hd, arg, dol I.P.	
2150	90	CLST: a/a	
	10	LS: a/a	
2160	90	CLST: dk gnsh gry, olv gry, m dk gry, frm, sbblky, non - sl calc, micropyr	
	10	LS: a/a	
2170	100	CLST: dk gnsh gry, m dk gry, occ brnsh gry, frm, sbblky, non calc, occ calc, micropyr	
	Gd Tr	LS: pl yelsh brn, - lt gry, frm - mod hd, blky, arg, dol I.P.	
	r	DOL: dk yelsh brn - grysh brn, hd, blky	
2180	100	CLST: a/a	
	Gd Tr	LS: a/a	
2190	100	CLST: varic, dk gnsh gry, m dk gry, brnsh gry - brnsh blk, else a/a	
	Gd Tr	LS: a/a	
2200	100	CLST: a/a	
	Tr	LS: a/a	

Pertra as **Wellsite Sample Description** Page: 6 of: 15

Country:	Norway	Area:	Norwegian North Sea	Field:	Varg South
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	12 1/4"	Geologists:	Magne Tillung	Date:	20-May-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
2210	100	CLST: varic, dk gnsh gry, m dk gry, brnsh gry - brnsh blk, frm, sbblky, non calc,	
		occ calc, micropyr	
	Tr	LS: pl yelsh brn, - lt gry, frm - mod hd, blky, arg, dol I.P.	
2220	100	CLST: a/a	
	Tr	LS: a/a	
2230	100	CLST: pred dk gnsh gry, I.P. M dk gry, brnsh gry	
	Tr	LS: lt gry - pl yelsh brn, else a/a	
2240	100	CLST: a/a	
	Tr	LS: a/a	
2250	100	CLST: varic, dk gnsh gry, m dk gry, brnsh blk - brnsh gry, frm - mod hd,	
		sbblky - blky, non calc, sl slty I.P., r Pyr Nod	
	Gd Tr	LS/DOL: lt gry - pl yelsh brn, m lt gry, frm - hd, dol i.p.	
2260	100	CLST: pred dk gnsh gry, else a/a	
	Tr	LS: a/a	
2270	100	CLST: a/a	
	Tr	LS: a/a	
2280	100	CLST: varic, dk gnsh gy, m dk gry, olv gry, brnsh gry - brnsh blk, frm - hd,	
		sbblky, non - r sl calc	
	Tr	LS: a/a	
	Tr	TF: grysh bl - m blsh gry, frm - crmbly, sbblky - blky, slty, spk	
2290	90	CLST: pred olv gry - olv blk, m dk gry, frm, sbblky - blky, non calc, sl slty	
	10	TF: a/a	
	Tr	LS: a/a	
2300	100	CLST: m dk gry - olv gry, frm - mod hd, sbblky, - blky, non calc, micropyr	
	Tr	TF: a/a	
	r	LS: wh - m lt gry, frm - hd, blky	
2310	100	CLST: a/a	
	r	TF: a/a	
	r	LS: a/a	
2320	100	CLST: a/a	
	r	LS: a/a	
2330	100	CLST: m dk gry - olv gry, dk gnsh gry, brnsh blk, frm - mod hd, sbblky - blky,	In slty Clst:
		micropyr	no dir flor,
	Tr	LS: pred v lt gry, else a/a	v slw strmg
			mlky wh cut
2340	100	CLST: a/a	a/a
	Tr	LS: a/a	
2350	100	CLST: a/a	a/a
	Tr	LS: a/a	
2360	100	CLST: a/a	a/a
	Tr	LS: a/a	

Pertra as **Wellsite Sample Description** Page: 7 of: 15

Country:	Norway	Area:	Norwegian North Sea	Field:	Varg South
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	12 1/4"	Geologists:	Magne Tillung	Date:	20-May-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
2370	100	CLST: m dk gry - olv gry, dk gnsh gry, brnsh blk, frm - mod hd, sbblky - blky,	
		micropyr	
	Tr	LS: v lt gry - m lt gry, frm - hd, blky	
2380	100	CLST: a/a	
	Tr	LS: a/a	
2390	100	CLST: a/a	
	Tr	LS: a/a	
2400	100	CLST: a/a	
	Tr	LS: a/a	
2410	100	CLST: a/a	
	Tr	LS: a/a	
			In slty CLST:
2420	100	CLST: dk gnsh gry- m dk gry, olv gry - olv blk, r mod brn, frm, sbblky,	No dir flor,
		non - sl calc, micropyr	v slw strmg
	Tr	LS: wh - lt gry, pl telsh brn, frm - hd, blky	mlky wh cut
2430	100	CLST: a/a	
	Gd Tr	LS: I.P. dol, else a/a	
2440	100	CLST: m lt gry, dk gnsh gry - olv gry, else a/a	
	Tr	LS: a/a	
2450	100	CLST: a/a	
	Tr	LS: a/a	
2460	100	CLST: m lt gry, dk gnsh gry, olv gry, brnsh gry, r mod brn, else a/a	
	Gd Tr	LS: a/a	
2470	100	CLST: m lt gry - m gry, olv gry, dk gnsh gry, else a/a	
	Tr	LS: a/a	
2480	100	CLST: dk gnsh gry, m gry, gry brn, mod brn, a/a	
	Tr	LS: a/a	
2490	100	CLST: a/a	
	Tr	LS: a/a	
2500	100	CLST: a/a	
	Tr	LS: a/a	
2510	100	CLST: olv gry - dk gnsh gry, m gry, frm, sbblky - blky, calc - v calc I.P.	
	Gd Tr	LS: lt gry - lt olv gry, frm - hd, blky, arg	
2520	70	CLST: lt olv gry - olv gry, else a/a	
	30	LS: lt gry - m gry, frm - mod hard, blky, arg I.P.	
			In SLTST/CLS
2530	60	CLST: olv gry, dk gnsh gry, m dk gry, gry brn, else a/a	no dir flor,
	40	LS: pred v lt gry - lt gry, else a/a	yel-wh/mlky
			wh cut
2540	10	CLST: a/a	a/a
	90	LS: a/a	

Pertra as **Wellsite Sample Description** Page: 8 of: 15

Country:	Norway	Area:	Norwegian North Sea	Field:	Varg South
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	12 1/4"	Geologists:	Magne Tillung/Terje Kollien	Date:	20-May-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
2550	80	LS: v lt gry - pksh gry, mod hd, blky, microxln	In Sltst/Clst:
	20	CLST: olv gry, dk gnsh gry, m dk gry, gry brn, frm, sbblky - blky, calc-v calc I.P.	no dir flor,
			v slw yel - wh
2560	80	LS: a/a	cut flor
	20	CLST: a/a	
	r	SLTST: brnsh blk, sft - frm, fri, sbblky	a/a
2570	90	LS: a/a + r pl rd	
	10	CLST: a/a	a/a
	r	SLTST: a/a	
2580	50	LS: a/a	After
	50	CLST: a/a	wiper trip
2590	100	LS: wh - pksh gry, mod hd, blky, microxln	
	Tr	Clst: a/a	
2600	100	LS: wh, occ pksh gry - pl rd, mod hd, blky, microxln	
	r	CLST: a/a	
2610	100	LS: a/a	
	r	CLST: a/a	
2620	100	LS: wh - v lt gry, pksh gry, else a/a	
	r	CLST: a/a	
2630	100	LS: a/a	
	r	CLST: a/a	
2640	100	LS: a/a	
	r	CLST: a/a	
2650	100	LS: a/a + lt gnsh gry	
	r	CLST: a/a	
2656	100	LS: wh - v lt gry, lt gnsh gry, else a/a	Bit trip
	r	CLST: a/a	at 2656m
2660	50	LS: wh - v lt gry, mod hd, blky, microxln	
	50	CLST: olv gry - m dk gry, frm - mod hd, blky - sbblky, gen calc, occ mrly,	
		sl micropyr	
2670	80	LS: v lt gry, gnsh gry, mod hd - hd, else a/a	
	20	CLST: a/a	
2680	100	LS: r micropyr, else a/a	
	Tr	CLST:	
2690	100	LS: v lt gry - lt gry, r m lt gry, lt gnsh gry, r Fos (Foram?), else a/a	
	Tr	CLST: m dk gry, dk gnsh gry, brnsh blk, calc - non calc, else a/a	
2700	100	LS: occ m gry, sl arg, else a/a	
	Tr	CLST: a/a	

Pertra as **Wellsite Sample Description** Page: 9 of: 15

Country:	Norway	Area:	Norwegian North Sea	Field:	Varg South
Well:	15/12 - 13B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	12 1/4"	Geologists:	Magne Tillung	Date:	26-May-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
2710	90	LS: v lt - lt gry, r m lt gry, lt gnsh gry, mod hd, blky, microxln	
	10	CLST: m dk gry, dk gnsh gry, brnsh blk, frm - mod hd, blky - sbblky, calc -	
		non calc, sl micropyr	
2720	100	LS: a/a	
	Tr	CLST: a/a	
2730	100	LS: v lt gry - lt gry, lt gnsh gry, lt brnsh gry, else a/a	
	Tr		
2740	100	LS: a/a	
	Tr	CLST: a/a	
2750	100	LS: pred pk gry - lt brnsh gry, v lt gry - lt gry, r dk gn gry (glauc), frm - mod hd,	
		blky, arg, microxln	
	Tr	CLST: dk gry - brnsh blk, frm, blky - sbblky, non - sl calc, micropyr	
2760	50	LS: a/a	
	50	MRL: pl brn - lt brn, r gnsh gry, frm, sbblky - blky, gen slty, I.P. Grdg arg/slty LS	
		sl glauc I.P.	
	Tr	CLST: a/a	
2770	90	MRL: slty, m gry, gnsh gry, pl brn - lt brn, else a/a	
	10	LS: a/a	
2780	100	MRL: slty, dk gnsh gry - gnsh gry, m gry, pl brn - lt brn, else a/a	
	Tr	LS: a/a	
2790	100	MRL: slty, m dk gry, gnsh gry, mod brn - rd brn, sl micropyr, else a/a	
	Tr	LS: a/a	
2800	100	MRL: mod brn - gry brn, m gry, gnsh gry, frm - sft, sbblky - blky, micropyr,	
		silty I.P.	
	Tr	LS: v lt gry - lt gry, hd, blky, microxln	
2810	100	MRL: a/a	
	Tr	LS: a/a	
2820	100	MRL: m lt gry - dk gry, mod brn, else a/a	
	Tr	LS: lt gry - pk gry, else a/a	
2830	100	MRL: a/a	
	Tr	LS: a/a	
2840	100	MRL: varicol, mod brn, m lt gry - dk gry	
	Tr	LS: a/a	
2850	100	MRL: a/a	
	Tr	LS: a/a	
2860	90	MRL: varicol, pred mod brn	
	10	LS: v lt gry - lt gry, lt gnsh gry, mod hd - hd, blky, microxln, arg I.P.	
2870	90	MRL: a/a	
	10	LS: a/a	

Pertra as **Wellsite Sample Description** Page: 10 of: 15

Country:	Norway	Area:	Norwegian North Sea	Field:	Varg South
Well:	15/12 - 13B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	12 1/4"	Geologists:	Magne Tillung	Date:	26-May-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
2880	40	CLST: olv blk - dk gry, frm, sbblky - sbplty, sbfis, slty, sl calc, micropyr,	
		spk carb Mat	
	40	MRL: varicol, mod brn - gry brn, m lt gry - dk gry, gnsh gry, frm - sft,	
		sbblky - blky, micropyr, sl slty I.P.	
	20	LS: v lt gry - kt gry, lt gnsh gry, pl rd, mod hd - hd, blky, microxln, arg I.P.	
2890	100	CLST: micromic, else a/a	
	Tr	MRL: a/a	
	Tr	LS: a/a	
2900	100	CLST: a/a	
	Tr	MRL: a/a	
	Tr	LS: a/a	
2910	100	CLST: sl calc - non calc, else a/a	
	Tr	MRL: a/a	
	Tr	LS: a/a	
2920	100	CLST: a/a	
	Tr	MRL: a/a	
	Tr	LS: a/a	
2930	100	CLST: a/a	
	Tr	MRL: a/a	
	Tr	LS: a/a	
2940	100	CLST: olv gry - dk gry, occ mott lt gry, sft - frm, sbblky, sbfis, gen calc,	
		micromic, slty, carb Spk, r Pyr Nod	
	r	Ls: a/a	
2945	100	CLST: slty grdg SLTST I.P., dk gry - m dk gry, occ gnsh gry, mott lt gry,	In slty Sst.
		sl glauc, carb Spk, occ vf sdy	no-v dull yel
	Tr	SST: slty Mtrx, m gry, m dk gry, sft, fri, vf - f, glauc, Micmica, calc, kao?	dir Flor, slw
		occ lse Qtz Gr, vf - m, sbang - sbrndd	strmg yel-wh
			Cut,
2951	50	CLST: a/a	Res: mod bri
	50	SST: dk gry - m gry, occ gnsh gry, sft, fri, clr - trnsl Qtz Gr, vf - f, Tr m, r crs,	yel-wh ring
		mod - wl srt, sbang - sbrndd, gn slty/arg Mtrx, kao?, calc, micmica, glauc,	
		I.P. lse Gr	

Pertra as **Wellsite Sample Description** Page: 11 of: 15

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	8.5	Geologists:	Steinar Eikemo/Terje Kollien	Date:	4-Jun-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
2954	60	Barite	
	40	Cement	Shows:
	Tr	CLST: brnsh blk-grysh blk, frm-hd,brit,slily slty	Tr brt wel dir
	Tr	SST: clr,m-crs qtz gr,sbang-sbrnd,w srt	fluor
2957	60	SST: pred lse Qtz gr,clr-trnsl,f-m,sbang-sbrnd	Shows:
	40	CLST: a/a	dull welsh-wh
			dir fluor
2960	100	SST: a/a	
2963	60	SST: lse Qtz gr,clr-trnsl,pred f-m,occ crs	
	40	CLST/SLTST: grnsh gry-dk grnsh gry,sft	
2966	70	SST: a/a	Shows:
	20	CLST: a/a	Tr yel dir fluor
	10	LS: wh-pksh gry,hd,micropyr,brit	
2969	50	SST: lse Qtz gr,f-m,occ crs, w-mod srtd,subrnd,occ cl cmt	Shows:
	50	CLST: grnsh gry,gry,sft,sbblky,non-slily calc,slty,tr glauc	a/a
2972	80	SST: a/a	Shows:
	20	CLST a/a	a/a
2975	90	SST: lse Qtz gr,vf-f,occ m,occ crs,mod srtd,subrnd	Shows:
	10	CLST: a/a	a/a
2981	90	SST: lse Qtz gr,vf-f,pred f,occ m,w srtd,sbrnd	Shows:
	10	CLST: a/a	Tr yel dir fluor
	Tr	LS: wh-off wh,sft,sbblky	
2984	90	SST: a/a	Shows:
	10	CLST: a/a	Tr yel dir fluor
2987	90	SST: a/a	Shows:
	10	CLST: a/a	Tr yel dir fluor
2990	90	SST: lse Qtz gr,f-m,occ crs,w strd,occ wh sil/calc/kao cmt	Shows:
	10	CLST: a/a	Tr yel dir fluor
2993	100	SST: lse Qtz gr,f-m,pred m,occ crs,w strd,occ wh sil/calc/kao cmt	Shows:
	Tr	CLST: a/a	Tr yel dir fluor
2996	90	SST: f-m,pred m,occ crs-v crs,w-mod srtd,calc cmt,sil cmt,tr glauc,tr pyr	Shows:
	10	LS: wh-off wh,frm-hd,sbblky	dir yels wh
	Tr	CLST: a/a	fluor,no cut
			pa yel ring res
2999	100	SST: f-m, pred m, occ crs, occ cmt a/a, Tr Pyr, Tr Glauc	Shows: a/a
	TR	CLST: a/a	
3002	90	SST: a/a	Shows: a/a
	10	CLST: a/a	
	Tr	LS: wh- off wh, frm-hd, sbblky	

Pertra as **Wellsite Sample Description** Page: 12 of: 15

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	8.5	Geologists:	Steinar Eikemo/Terje Kollien	Date:	4-Jun-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
3005	100	SST: a/a + Tr blsh SST, lots of Barite	
3008	100	SST: a/a + Tr blsh SST, lots of Barite	
3011	100	SST: a/a + Tr blsh SST, lots of Barite	
3014	100	SST: f-m, lots of Barite	
3017	100	SST: f-m, lots of Barite	
	Tr	LS: a/a	
3020	40	SST: clr-trnsl, brnsh wh, vf-f, w srt, cmt, lse Gr, f-m, wl srt,	Shows: strg yel
	40	SLTST: gry- dk gry, frm, sbblky,	dir fluor, slo strmg
	20	CLST: lt gry - gry, sft, sbblky	cut, blsh wh res
3023	60	SST: lse Qtz, vf-f, wl srt, sbrnd, occ cmt	Shows a/a
	40	CLST: a/a	
	Tr	SLTST: a/a	
3026	60	SST: a/a	Shows a/a
	40	CLST: a/a	
	Tr	SLTST: a/a	
	Tr	LS: a/a	
3029	80	SST: a/a	Shows a/a
	20	SLTST: a/a	
	Tr	CLST: a/a	
3032	100	SST: pred f, + a/a dom lse Qtz	Shows a/a
	Tr	SLTST, CLST: a/a	
3035	100	SST: f-m, occ crs, occ cmt, pred lse	Shows a/a
	Tr	SLTST, CLST: a/a	
3038	100	SST: a/a, f-m	Shows a/a
3041	100	SST: a/a, f-m	Shows a/a
3044	100	SST: a/a, f-m	Shows a/a
3047	100	SST: pred lse Qtz gr, f-m, occ crs, clr, trnsl, subrnd, occ calc cmt	Shows: brgt yel dir
	tr	CLST: lt gry-gry, sft, sbblky, tr glauc	fluor, v slo blsh wh
			cut, slo strmg blsh
3050	100	SST: a/a, occ cmt	wh crsh cut
	Tr	CLST: a/a	
3053	100	SST: m, occ crs, pred lse, occ cmt	Shows: brgt yel dir
			fluor, slo-v slo blsh
3056	100	SST: a/a, occ cmt	cut, blsh fluor res
	Tr	COAL: olv blk, brnsh blk	ring
	Tr	LS: wh-off wh, frm, blky,	
3059	90	SST: a/a	Shows: a/a
	10	COAL: a/a	
	Tr	CLST: a/a	

Pertra as **Wellsite Sample Description** Page: 13 of: 15

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	8.5	Geologists:	Steinar Eikemo/Terje Kollien	Date:	4-Jun-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
3062	90	SST: a/a	Shows: brgt yelsh
	10	COAL: a/a	dir fluor, slo strmg
	Tr	CLST: a/a	blsh wh cut
3065	90	SST: a/a	Shows: a/a
	10	COAL: a/a	
	Tr	CLST: a/a	
3068	70	SST: lse Qtz, m, occ crs, occ f, mod srt,	Shows: a/a
	20	CLST: lt gry-gry, sft, sbblky, tr glauc	
	10		
3071	80	SST: pred crs, occ v crs	Shows: a/a
	10	CLST: a/a	
	10	COAL: a/a	
3074	90	SST: pred m, occ crs, occ cmt	Shows: a/a
	10	CLST: a/a	
	Tr	COAL: a/a	
3077	100	SST: a/a	Shows: a/a
	Tr	CLST: a/a	
		COAL: a/a	
3080	90	SST: a/a, + v crs	Shows: a/a
	10	CLST: a/a	
	TR	SLTST: brn-yelsh brn, w/ blk spks, frm, sbblky	
3083	90	SST: pred crs, occ v crs, occ m, mod srt, sbang- sbrnd	Shows: a/a
	10	CLST: a/a	
	Tr	SLTST: a/a	
3086	70	SST: lse Qtz gr; m-crs, occ f-m, occ v crs, sbrnd, mod srt, occ kao cmt,	Shows: dl-brgt yel
		occ sil cmt, Tr Pyr	fluor, slo blsh strmg
	20	CLST: lt gry-gry, sft, sbblky, tr glauc	cut, blsh fluor res
	10	SLTST: brn-yel brn, w/ blk spks, frm, sbblky	ring
	Tr	LS: off wh, frm, sbblky	
3089	100	SST: f-m, occ crs, occ f, mod srt	
	Tr	CLST, LS: a/a	
3092	90	SST: m-crs, occ v crs, occ f, mod srt	
	10	CLST: a/a	
	Tr	SLTST, LS: a/a	
3095	80	SST: a/a	
	20	CLST: a/a	
	Tr	SLTST, LS: a/a	
3098	90	SST: a/a	
	10	CLST: a/a	
	Tr	SLTST, LS: a/a	
3101	90	SST: f-m, occ crs, pred kao cmt, occ calc cmt,, tr Glauc,	
	10	CLST: a/a, + occ rdsh brn	

Pertra as

Wellsite Sample Description

Page: 14 of: 15

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	8.5	Geologists:	Steinar Eikemo/Terje Kollien	Date:	4-Jun-03

Depth	Lithology	Lithological Description: (Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.)	Remarks
3104	90	SST: v f-f, occ m-crs, sft wh kao cmt, tr Glauc, occ rdsh incl	
	10	CLST: a/a, + occ rdsh brn	
3107	90	SST: f-m, else a/a	
	10	CLST: a/a, + occ rdsh brn	
3110	100	SST: f-m, else a/a + occ v crs	
	Tr	CLST: a/a, + occ rdsh brn	
3113	100	SST: a/a	
	TR	CLST a/a, Tr Coal, Tr Sltst	
3116	90	SST: a/a - crs	
	10	CLST: a/a + frm	
3119	90	SST: a/a - crs	
	10	CLST: a/a	
3122	80	SST: f-m, kao (calc) cmt, occ crs, tr Glauc,	
	20	CLST: brnsh rd, sft, occ frm, sbblky	
	Tr	SLTST: yelsh brn-brn, frm-mod hd, sbblky	
3125	100	SST: a/a	
	Tr	CLST: a/a	
3128	90	SST: a/a	
	10	CLST: a/a	
3131	90	SST: lse Qtz gr, clr, trnsl, f-m, occ crs, occ v f, mod srt, wh-grnsh wh cmt,	
		Tr Glauc, occ rdsh incl	
	10	CLST: rdsh brn, sft, sbblky	
	Tr	SLTST: yelsh brn, frm-mod hd, sbblky	
3134	80	SST: a/a	No Shows
	10	CLST: a/a, dk rdsh brn, sft	
	10	SLTST: a/a	
3137	60	SST: pred lse Qtz gr a/a, occ w/ wh-grysh kao cmt	No Shows
	40	CLST: dk rdsh brn - grysh rd, pred sft, occ frm	
3140	50	SST: a/a, pred f-m, lse gr	No Shows
	Tr	SLTST: a/a	
	50	CLST: a/a	
3143	80	SST: a/a	No Shows
	TR	SLTST: a/a	
	20	CLST: dk rdsh brn- grysh rd	
3146	80	SST: pred lse gr, f-m, sbang-sbrnd, mod srt, Tr kao cmt	No Shows
	20	CLST: a/a	

Pertra as

Wellsite Sample Description

Page: 15 of: 15

Country:	Norway	Area:	North Sea	Field:	Varg S
Well:	15/12-13 B		Sidetracked from well:	15/12-13	
Drill floor Elev. (m):	18	Company:	Pertra AS		
Hole size:	8.5	Geologists:	Steinar Eikemo/Terje Kollien	Date:	4-Jun-03

Depth	Lithology	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
3149	70	SST: lse Qtz gr, pred f-v f, occ m	No shows
	30	CLST: a/a	
3151	20	SST: a/a, pred f - v f,	No shows
	80	CLST: dk rdsh brn - grysh rd, sft-frm	TD

6 Hydrocarbon Shows

The evaluation of hydrocarbon shows at the well-site were carried out in a conventional manner. A standard hydrocarbon total gas detector system (Baker Hughes Inteq) and a gas chromatograph for automatic and continuos gas analysis, recorded as PPM by volume of C1 through nC5, were operational the entire section.

Hydrocarbon shows on ditch cuttings were evaluated according to procedures described in Pertra's "Operations Geology Requirements & Guidelines".

6.1 Gas Record

For gas record in the well, see Formation Evaluation Log attached in Section C, and End of Well Report from Baker Hughes Inteq, well 15/12-13, 15/12-13 A & 15/12-13 B.

6.2 Fluorescence

Fluorescence was evaluated in the Rogaland Gr/Top Shetland Gr. and in the reservoir sections penetrated in the well. The results are summarised below.

Interval (m MD)	Source	Lithology	Shows Description
2330-2580	Cuttings	Siltstone	No direct fluorescence, slow to very slow yellowish white cut fluorescence
2958-3027	Cuttings/ CST	Sandstone	Yellow direct fluorescence, no visual cut fluorescence, pale yellow residual ring
3027-3062	Cuttings/ CST	Sandstone	Bright yellow direct fluorescence, slow streaming bluish cut fluorescence, pale bluish white residual fluorescence

Table 6-1 Fluorescence observed in well 15/12-13

No fluorescence was observed in wells 15/12-13 and 15/12-13 A.

7 Coring

Initially a 30' core was planned over top reservoir in 15/12-13. The reservoir was encountered deeper than the prognosis and the coring was cancelled.

No core was cut in 15/12-13 A

No core was cut in 15/12-13 B.

8 Logging

8.1 LWD Logging

The LWD logging was performed by Halliburton. No major logging problems occurred. The logging runs for all three wellbores are summarised below (**Table 8-1**).

More details about the LWD logging can be found in the "End of Well Report, Well 15/12-13 & 15/12-13 A & 15/12-13 B" from Halliburton.

Section	Run No.	Service	Interval (m MD)	Comment
9 7/8"	1	GR-RES	171.0 – 1320.0 m	Pilot
12.25 " (15/12-13)	2	GR-RES-ALD-BAT	1320.0 – 3047.0 m	
12.25" (15/12-13 A)	3	GR-RES-BAT	1320.0 – 2532.0 m	Junked
12.25" (15/12 13 B)	4	GR-RES-BAT	1320.0 – 2656.0 m	
12.25" (15/12 13 B)	5	GR-RES-BAT	2656.0 – 2951.0 m	
8.5" (15/12-13 B)	6	GR-RES-NEU-ALD-BAT	2951.0 – 3151.0 m	

Table 8-1: LWD logging

8.2 Wire-line Logging

Schlumberger performed the wire-line logging in well 15/12-13 B. The table below is a summary of the wire-line logs run in well. The logging results are summarised in individual chapters.

Logs	Date	Interval (m MD)	Run	Comment
MDT-GR-ACTS-ECRD	05.06.03	2960.0 – 3089.0 m	1A	Pressure points. 20 good points and 2 supercharged out of 22 attempts
MDT-GR-ACTS-ECRD	05.06.03	3028.5 – 3010.0 m	2	Sampling at 5 depths
VSP-GR	05-06.06.03	3140.0 – 2000.0 m	3	Shots fired every 10 m
CST-GR	06.06.03	2935.0 – 3120.0 m	4	21 of 30 cores recovered

Table 8-2: Wire-line logging

8.3 MDT Pressure and Sampling

Wireline formation testing was carried out by Schlumberger, with the objectives of obtaining true formation pressures and fluid gradients from the reservoir encountered in well 15/12-13 B.

Operation
Two MDT runs were carried out in well 15/12-13 B (Run 1 and 2). Below is a summary of the individual MDT runs. For more details about the tool configuration see the "End of Well Report" from Schlumberger. The valid pressure points are listed in ***Table 8-3*** and the fluid sampling in ***Table 8-4***.

Due to possible high over balance in well, it was decided to use a light tool (pressure points only) on the first run. The reservoir was found to be depleted but no major differential sticking occurred.

Run 1: 22 pre-tests were attempted resulting in 20 good pressure points, and 2 that were supercharged. No operational problems were encountered during the logging run.

Run 2: A sampling run was carried out to establish the gas/water contact. Sampling was performed at 5 depths. The 5 sampling depths were placed at depths that proved good mobility in Run 1. 4 out of 6 sample bottles were recovered (2 gas, 2 oil). Some over-pull was experienced on one the sample depths, but no major operational problems.

Test	Depth MD m	Depth TVDSS m	Mud Pressure Before BAR	Mud Pressure After BAR	Formation Pressure BAR	Drawdown Mobility MD/CP	Comment
1	3007.46	2912.25	353.417	353.410	273.646	2248.25	
2	3002.97	2907.95	352.916	352.908	273.566	1870.95	
3	2990.01	2895.58	351.418	351.426	273.313	5808.02	
4	2983.99	2889.84	350.720	350.719	273.201	3096.39	
5	2978.95	2885.05	350.155	350.147	273.095	2240.70	
6	3089.02	2990.89	363.033	363.005	294.665	6.72	Supercharged
7	3081.00	2983.11	362.077	362.066	278.525	6.95	Supercharged ?
8	3076.01	2978.28	361.512	361.486	276.767	5.59	
9	3072.02	2974.42	361.005	361.002	276.146	2.47	
10	3067.51	2970.05	360.447	360.451	275.559	771.97	
11	3063.00	2965.69	359.963	359.947	275.400	109.80	
12	3056.03	2958.96	359.133	359.122	275.999	302.72	
13	3042.02	2945.44	357.479	357.470	275.044	3292.35	
14	3037.99	2941.56	356.994	356.993	274.788	2756.05	
15	3028.49	2932.42	355.906	355.902	274.232	1296.63	
16	3024.01	2928.12	355.377	355.371	274.010	718.64	
17	3018.01	2922.36	354.671	354.662	273.935	5.76	
18	3059.98	2962.77	359.508	359.503	275.714	2.85	
19	3012.03	2916.62	353.888	353.877	273.798	489.88	
20	3016.99	2921.38	354.456	354.455	273.907	131.63	
21	3021.01	2925.23	354.920	354.930	273.981	505.11	
22	2960.02	2867.08	347.758	347.746	272.774	34.00	

Table 8-3: Valid pressure points, Run 1

Depth m MD	Depth m TVDSS	Formation Pressure Bar	Drawdown Mobility MD/CP	Comment
3010.0	2914.8	273.719	697.6	Gas – 1 sample bottle
3017.0	2921.4	273.926	72.3	Gas – 1 sample bottle
3021.0	2925.3	273.979	3210	Gas – 1 sample bottle
3024.0	2928.1	274.054	1016	Gas – 1 sample bottle
3028.5	2932.5	274.231	2790	Oil – 2 sample bottles

Table 8-4: Fluid Sampling, Run 2

8.4 VSP

A Zero Offset VSP was recorded and processed by Schlumberger in well 15/12-13 B. The data was recorded in open and cased hole using a rig source (RVSP) and the Combined Seismic Imager Tool (CSI). The primary objective was to generate a borehole calibrated, vertical time-depth function from seafloor to TD, and an enhanced migrated seismic image to aid interpretation.

A total of 114 levels (approximately 10 meters interval) were recorded from 3140 m to 2000 m MD, and 6 additional checkshot levels between 2000 m and 1400 m MD. Three 155 cu.in. Bolt 1900 LLX Guns were used as the surface source and positioned at an offset and azimuth of 55 m and 17 degrees from the wellhead.

For more information see the "Zero Offset Vertical Seismic Profile Processing Report" by Schlumberger.

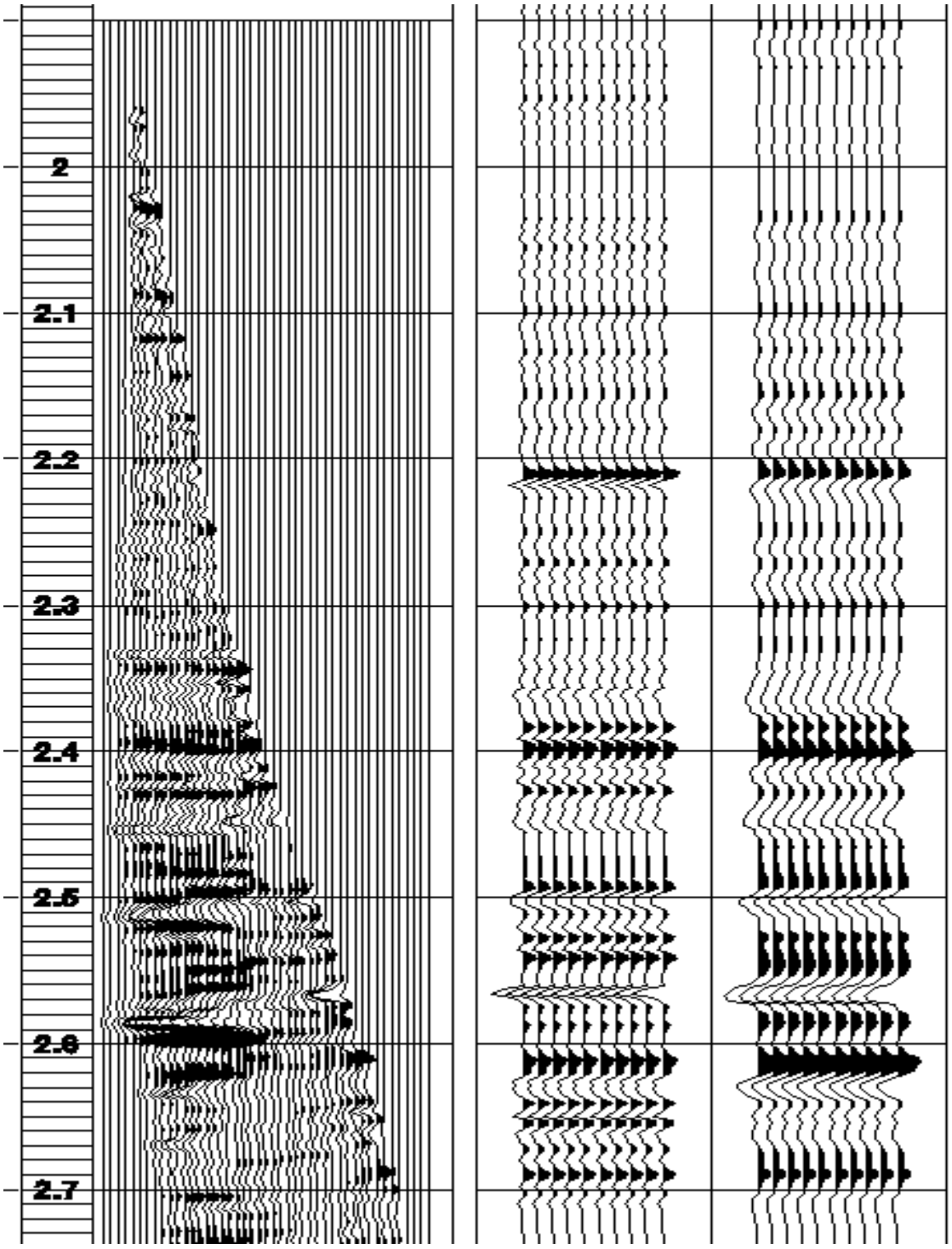


Figure 8-1: Zero Phase Migration and synthetics

8.5 Sidewall Cores

A "Chronological Sample Taker" was run by Schlumberger in the reservoir for biostratigraphic purposes in well 15/12-13 B. A total of 30 shots were fired, out of which 21 cores recovered (2 partially recovered). The recovered sidewall cores were analysed by Applied Petroleum Technologies (APT). A summary of the sample depths is listed in ***table 8-5***.

Bullet no.	Sample Depth m	Status
1	3119.9	Misfired
2	3114.9	Recovered
3	3110.9	Recovered
4	3104.9	Empty
5	3100.0	Recovered
6	3096.0	Recovered
7	3095.0	Recovered
8	3090.0	Misfired
9	3082.9	Recovered
10	3077.0	Recovered
11	3072.0	Lost
12	3065.0	Recovered
13	3053.0	Recovered
14	3044.9	Lost
15	3033.0	Recovered
16	3022.9	Recovered
17	3017.0	Recovered
18	3012.0	Recovered
19	2997.0	Partial
20	2995.0	Recovered
21	2974.8	Recovered
22	2970.0	Recovered
23	2966.9	Recovered
24	2963.0	Recovered
25	2955.0	Recovered
26	2953.0	Recovered
27	2949.9	Empty
28	2944.9	Empty
29	2939.9	Partial
30	2934.9	Recovered

Table 8-5: Sidewall cores

8.5.1 Sidewall core description

Pertra as **Sidewall Core Description** Page: 1 of: 2

Country:	Norway	Area:	North Sea	Field:	Varg Sør
Well:			SWC Run no:		1
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	8 1/2"	Geologists:	Steinar Eikemo / Terje Kollien	Date:	6/6/03

Shot no	Depth mMD	Recovery mm	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
30	2935	15	CLST: dk gry - olv blk, frm, micropyr, org, slily slty, slily calc	No Shows
29	2940	7	SLTST: m dk gry - olv gry, v arg, grdg slty Clst, Tr Micropyr, Tr v f Qtz gr	No Shows
28	2945	Empty		
27	2950	Empty		
26	2953	20	SLTST: dk gnsh gry - m dk gry, frm, fri, w/arg mtrx, gd Tr Glauc gd Tr v f - f Qtz gr	wk Hydc od, dl yel dir fluor
25	2955	22	SLTST: a/a	No Shows
24	2963	25	SLTST: a/a, grdg v f SST, Tr Glauc, slily calc	Hydc od, r Tr brgt bl dir fluor
23	2967	19	SLTST: dk gnsh gry - m blsh gry, Tr Glauc, Tr Mic, grad v f SST	No od, r Tr yel dir fluor
22	2970	20	SST: m lt gry, clr Qtz gr, f - v f, wl srt, Tr Glauc, ang - sbrnd	strg Hydc od, dl yelsh gry dir fluor
21	2975	15	SST: clr Qtz gr, f - v f, wl srt, ang- sbrnd, g Tr Micropyr, Tr Glauc	strg Hydc od, no dir fluor
20	2995	26	SST: a/a	Hydc od, no dir fluor
19	2997	4	SST: v lt gry - lt gnsh gry, v hd, wl cmt, slily calc	wk wh-lt bl fluor
18	3012	18	SST: clr Qtz gr, f - v f, occ Tr m gr, wl srt, sbang - sbrnd, Tr Micropyr	No od, yel dir fluor
17	3017	21	SST: f - v f, else a/a	wk Hydc od, yel dir fluor, slo strmg blsh wh cut, wh res
16	3023	22	SST: clr Qtz gr, pred f, occ v f, sbang - sbrnd, v wl srt	Hydc od, brgt yel dir fluor, slo strmg blsh wh cut, wh res
15	3033	16	SST: clr Qtz gr, pred f, occ v f, wl srt, sbang - sbrnd	Hydc od, brgt yel dir fluor, v slo strmg wh cut, wh res
14	3045	Lost		
13	3053	20	SST: clr Qtz gr, f -m, mod - wl srt, sbang - rnd	strg Hydc od, dl yel dir fluor, cldy wh cut
12	3065	25	SST: clr Qtz gr, m - f, mod - wl srt, sbang - sbrnd, hd, calc cmt	No Shows
11	3072	Lost		

Pertra as

Sidewall Core Description

Page: 2 of: 2

Country:	Norway	Area:	North Sea	Field:	Varg Sør
Well:	15/12-13 B			SWC Run no:	1
Drill floor Elev. (m):	18	Company:	Pertra as		
Hole size:	8 1/2"	Geologists:	Steinar Eikemo / Terje Kollien	Date:	6/6/03

Shot no	Depth mMD	Recovery mm	Lithological Description: Rock name, mod.lith, colour, grainsize, sorting, roundness, matrix cement, hardness, sed. structures, accessories, fossils, porosity, cont.	Remarks
10	3077	20	SST: clr Qtz gr, f - m, occ v f, sbang - sbrnd, mod srt, v calc cmt	wk Hydc od, no fluor
9	3083	25	CLST: grysh blk - olv blk, frm - hd, v micropyr, brit, org	No Shows
8	3090	Misfired		
7	3095	22	SST: lt blsh gry, clr Qtz gr, f - v f, wl srt, sbang - sbrnd	No Shows
6	3096	25	SST: clr Qtz gr, f - crs, mod srt, sbang - sbrnd	yel dir fluor
5	3100	18	SST: clr Qtz gr, f - crs, pred m, mod srt, sbang - sbrnd	No Shows
4	3105	Empty		
3	3111	28	CLST: pa bl - lt blsh gry, sft, stc, slily slty, slily calc	No Shows
2	3115	15	SST: blsh wh - wh, wh - clr Qtz gr, f - crs, mod srt, ang - sbang, kao cmt, slily calc	No Shows
1	3120	Misfired		

9 Petrophysical Results

9.1 Summary

This section present the petrophysical evaluation results of the reservoir section in well 15/12-13 B. The methodology used in the evaluation is also summarised. All depths quoted in this section are in m MD RKB unless otherwise stated.

The original well, 15/12-13, encountered the reservoir sand deeper than prognosticated, and below the oil/water contact. TD was set when the sand was verified due to potentially high overbalance in the well.

The geological side-track, 15/12-13 A, was abandoned at 2532 m MD (Rogaland Group), du to hole instability problems.

The second geological side-track, 15/12-13 B, penetrated a total gas and oil bearing reservoir section of 110 m MD in Kimmeridgian and Late Oxfordian. The reservoir consists of fine to medium grained sandstone with some coarser grained beds in between. The average porosity in the reservoir section is 24 % with a N/G of 0.9. The reservoir was found to be pressure depleted compared to the discovery well 15/12-12 (drilled in 2001), and communication with the Varg Field in the North is interpreted to be the reason for the depletion. The gas/oil contact was found at 2931 m TVDSS, and has moved downwards from 2912 m TVDSS in 15/12-12. The oil/water contact was found at 2964 m TVDSS (the oil/water contact was not encountered in 15/12-12).

9.2 Log Data Acquisition

LWD and wire-line data acquired in the wellbores are listed in table 8-1 and table 8-2. The quality of the LWD data is generally good.

Two MDT runs were performed in well 15/12-13 B. The first run was pressure points only and resulted in 22 good points (2 points were supercharged) out of 22 points attempted. The second MDT run was for fluid sampling to establish the gas/oil contact.

9.3 Operational Summary

Well 15/12-13 was drilled down to 3047 m MD, using a bent motor assembly and logging with LWD, and sand were encountered at 3013.3 m MD (2966.3 m TVDSS). The sand was water bearing, and the well was plugged back and side-tracked below the 13 3/8" casing shoe.

The geological side-track 15/12-13 A was drilled using a bent motor assembly, and encountered severe hole instability problems in the Hordaland Group and was junked at 2532 m MD (Rogaland Group).

The second geological side-track, 15/12-13 B, penetrated the reservoir at 2951 m MD (Kimmeridgian), and 9 5/8" liner was set at 2920 m MD. The 12.25" section was drilled using bent motor assembly and logging with LWD. The 8.5" section was drilled down to 3151 m MD (TD for the well) using a rotation assembly without motor and logging with LWD. After wire-line logging the well was permanently plugged and abandoned.

Water based mud was used in the well (BARASILC). Maximum deviation in well is 19.5 degrees just above the reservoir, and decreasing to 11.5 degrees at TD.

The log data recorded exhibit good quality. The hole appear to be in-gauge throughout the reservoir section, based on the SCOR curve (Smoothed Density Quality), the SCAL curve (ASLD density derived caliper) and surface parameters. Apart from the data recorded in the rathole below 9 5/8" liner shoe, no suspicious curve readings are observed in the data.

No environmental corrections, other than what was applied by Halliburton, were found to be necessary. All log data originate from LWD, and no depth shifts was therefore necessary. The logs available from well 15/12-13 B are listed in ***Table 8-1.***

9.4 Petrophysical Evaluation Procedure

The petrophysical model consists of a simple shaly sand log analysis model. Log analysis was conducted using an effective porosity approach where shale volume is determined from a linear gamma ray relationship. Porosity is calculated from the density log and corrected for hydrocarbon effects and shale volume. The water saturation was evaluated using the Poupon-Leveaux (Indonesia) equation.

9.5 Petrophysical log analysis in well 15/12-13 B

The following logs were used quantitatively in the analysis:

Reservoir Zone	Kimme-ridge	RZ-1	RZ-2	RZ-3	Comments
Top (m MD RKB)	2951.0	2963.2	3014.0	3058.0	
Bottom (m MD RKB)	2963.2	3014.0	3058.0	3092.0	
Shale parameters					
GRma (API)	55	55	55	55	
GRsh (API)	110	110	110	110	
ρsh (g/cc)	2.50	2.50	2.50	2.50	
Porosity parameters					
ρma (g/cc)	2.65	2.65	2.65	2.65	
ρfluid (g/cc)	0.117	0.117	0.70	0.70	1.0 below OWC
Saturation parameters					
Rw @ 127 °C (Ωm)	0.0153	0.0153	0.0153	0.0153	Field parameter
Rmf @ 20 °C (Ωm)	1)	1)	1)	1)	
Rsh (Ωm)	1.5	1.5	1.5	3	
A	1.0	1.0	1.0	1.0	Field parameter
M	1.97	1.97	1.97	1.97	Field parameter
N	2.0	2.0	2.0	2.0	Field parameter

Table 9-1: Petrophysical computation parameters

Notes:
1) Water based mud
BHT at 2990 m TVD: 110 °C

Reservoir Zone	Kimmeridge	RZ-1	RZ-2	RZ-3 – OWC	OWC-Triassic	Total Pay zone
Top (m MD RKB)	2951.0	2963.2	3014.0	3058.0	3061.3	2951.0
Bot (m MD RKB)	2963.2	3014.0	3058.0	3061.3	3092.0	3061.3
Gross (m)	12.0	50.8	44.0	3.3	30.7	110.3
Net (m)	4.5	44.9	42.0	3.3	20.0	94.7
Top (m TVDSS)	2858.5	2870.1	2918.6	2960.9	2964.0	2858.5
Bot (m TVDSS)	2870.1	2918.6	2960.9	2964.0	2993.9	2964.0
Gross (m TVT)	11.6	48.5	42.3	3.1	29.9	105.5
Net (m TVT)	4.3	42.3	40.2	3.1	19.4	89.9
Net/Gross (frac.,TVT)	0.37	0.87	0.95	1.0	0.65	0.85
Porosity (%)	0.177	0.237	0.252	0.254	0.209	0.241
Sw (%)	0.301	0.132	0.209	0.392	1.0	0.183
Log perm. arith (mD)	24.1	388.2	734.8	472.9	64.6	527.5
Log perm geom (mD)	14.0	176.2	331.2	365.2	8.2	244.3
Cut-offs:						
Porosity (%)	0.1	0.1	0.1	0.1	0.1	0.1
Vsh (%)	0.5	0.5	0.5	0.5	0.5	0.5

Table 9-2: Net sand log averages well 15/12-13 B

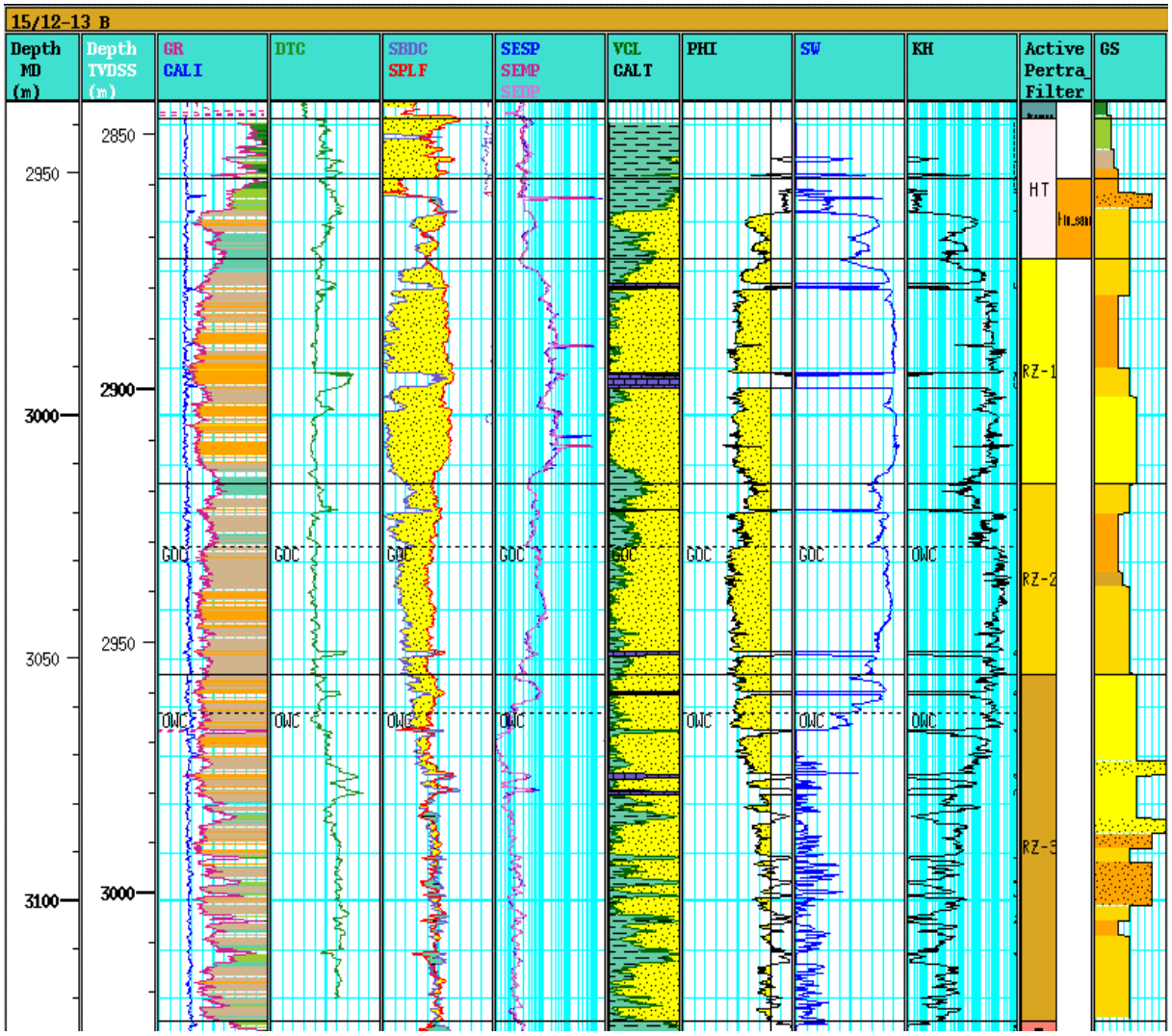


Figure 9-1: CPI plot 15/12-13 B

9.6 Fluid contacts

An interpretation of the formation pressures in 15/12-13 B is presented in **Figure 9-2**. All pressure points were acquired in the same logging run, and with the same probe (large area packer).

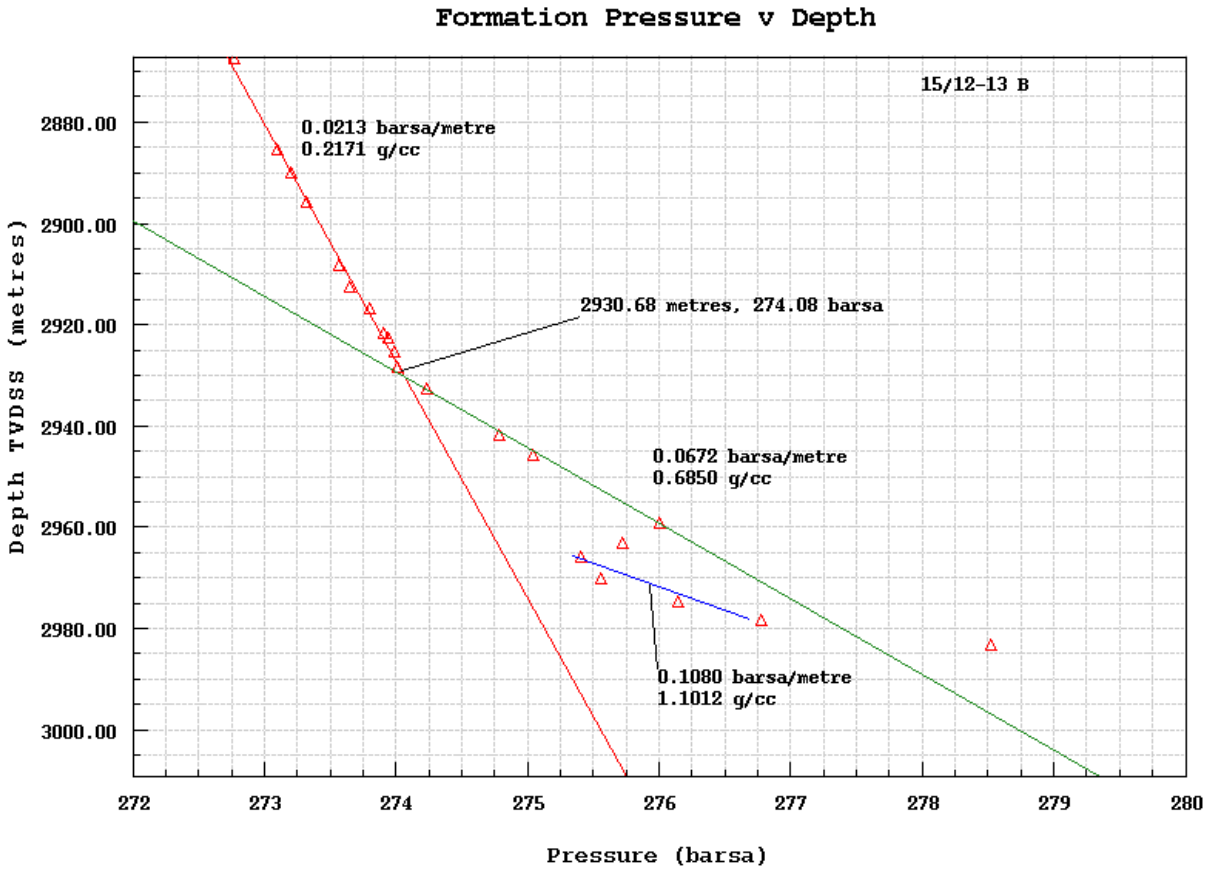


Figure 9-2: Formation pressure interpretation.

The gradients evaluated confirm that there is both gas and oil present in the reservoir. The gas gradient is interpreted to be 0.0213 bar/m (0.2171 g/cc) and the oil gradient is interpreted to be 0.0672 bar/m (0.6850 g/cc). This result in a gas/oil contact (GOC) at 2931 m TVDSS (confirmed by fluid sampling) and an oil/water contact (OWC) at 2964 m TVDSS.

The formation pressure in 15/12-13 B is lower than in the discovery well 15/12-12, and corresponds with the current reservoir pressure in the Varg Field. This implies that there is pressure communication between the Varg Field and Varg South. The GOC had also moved compared to 15/12-12, and fluid sampling was performed to establish the GOC. The results confirmed the GOC interpreted from the pressure points.

A gap is observed between the oil gradient and the water gradient interpreted from the pressure points. This may be a result of the pressure depletion occurring from the water zone below, and through Sandstone formations of varying reservoir quality.

Below is a summary is a summary fluid sampling performed with a “Live Fluid Analyser” (LFA) by Schlumberger. For details see the “End of Well Report” from Schlumberger.

9.7 Cuttings

In 15/12-13 the sample interval was 10 meters from the 13 3/8" shoe at 1315 m to 2343 m MD (50 m before the expected top Rogaland Gr.). From 2343m to 2490 m MD (Rogaland Gr.) the sample interval was 3 meters. From 2490 m (Shetland) to 2980 m MD (50 m before top sand prognosis) the sample interval was 10 meters. From 2981 to TD the sample interval was 3 meters. 3 dry samples and 1 wet sample were collected.

In 15/12-13 A, the sample interval was 10 meters from the 13 3/8" shoe at 1315 m to TD. 3 dry samples and 1 wet sample were collected.

From the 13 3/8" shoe at 1315 m to top reservoir at 2950 m MD the sample interval was 10 meters. From 2950 m MD to TD the sample interval was 3 meters. 3 dry samples and 1 wet sample were collected.

9.8 Petrophysical Formulas

Porosity: $$\Phi_e = \frac{\rho_{ma}-\rho_b}{\rho_{ma}-\rho_f} - \frac{\rho_{ma}-\rho_{sh}}{\rho_{ma}-\rho_f} V_{sh}$$

Hydrocarbon correction: $$\rho_f = S_w\rho_w + (1-S_w)\rho_{hc}$$

The hydrocarbon density in the iterative equation above is based on the assumption that in oil based mud, $S_{xo} = S_w$

Water saturation: $$S_{we} = \left[\sqrt{R_t}\left(\frac{V_{sh}^{\left(1-\frac{1}{2}V_{sh}\right)}}{\sqrt{R_{sh}}} + \frac{\Phi^{\frac{m}{2}}}{\sqrt{a\,R_w}}\right)\right]^{-\frac{2}{n}}$$

Notations:

Φ_e	= effective porosity
ρ_{ma}	= matrix density
ρ_b	= bulk density
ρ_{sh}	= shale density
ρ_{hc}	= hydrocarbon density (formation + mud filtrate)
ρ_f	= apparent fluid density
ρ_w	= density of formation water
V_{sh}	= shale volume
S_{we}	= water saturation effective, non invaded zone
S_{xo}	= water saturation, invaded zone
R_t	= true resistivity, non invaded zone
R_{sh}	= shale resistivity
R_w	= formation water resistivity
a	= Archie factor
m	= cementation exponent
n	= saturation exponent

10 Pore Pressure, Overburden, Fracture and Temperature

10.1 Pore Pressure

The pore pressure prognosis 15/12-13 was based on the available well information in the area. The prognosis for pore pressure, overburden pressure and fracture pressure was based on the discovery well 15/12-12.

The pore pressure interpretation is based on wellsite observations, surface data, LWD data and MDT measurements.

10.1.1 15/12-13

Some gas was observed on ROV, and also on the side the rig, in the 9 7/8" pilot hole. Interpretation of the LWD logs showed no gas bearing intervals in the section, and the gas was circulated out.

No parameters during drilling indicated that the pore pressure deviated from the prognosis.

10.1.2 15/12-13 A

Hole instability problems in the Hordaland Group may have been related to pore pressure deviating from the prognosis, but could also be related to reactive Claystone.

10.1.3 15/12-13 B

High gas readings in the Rogaland Group indicated anomalous high pore pressure in this area. The gas is interpreted to originate in minor Sandstone beds in the Rogaland Group, probably in the Balder Formation. The pore pressure in this interval is estimated to be around 1.52 sg, and the mud weight had to be increased 1.55 sg in order to stop the gas influx in the well.

In the reservoir MDT measurements showed that the reservoir was pressure depleted. The formation pressures measured are consistent with the minimum reservoir pressure estimated prior to drilling (0.93 sg), which is the same as the current reservoir pressure in the Varg Field.

Formation Pressures 15/12-13 B

Mean Sea Level drillfloor 18m **Water depth = 87m** **Date 15.09.03**

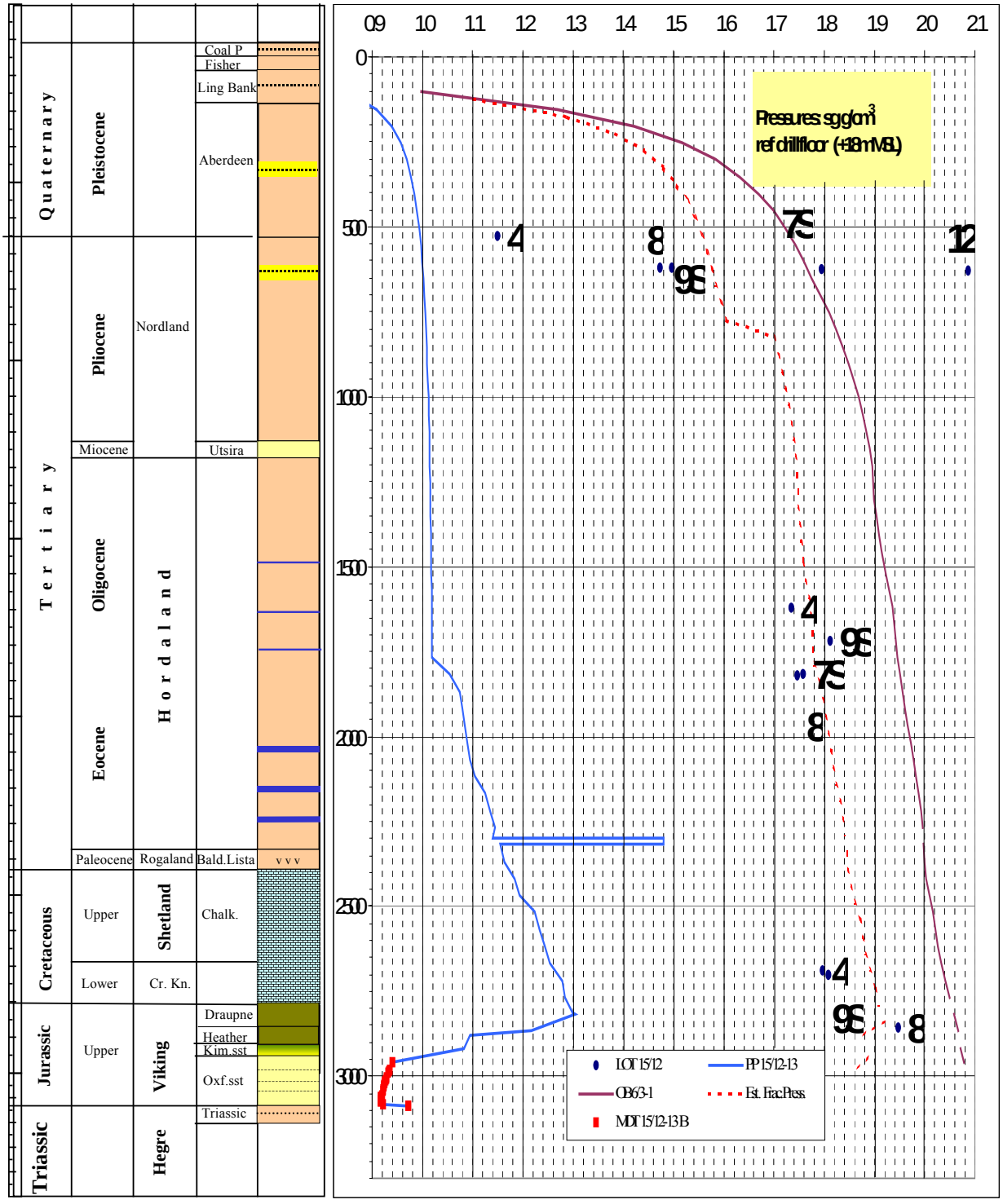


Figure 10-1: Formation pressures 15/12-13 B

10.2 Formation Strength

A leak off test of 1.71 sg equivalent mud weight was performed below the 13 3/8" casing shoe in well 15/12-13. No mud losses or hole instability problems were experienced during the drilling.

Sever hole instability was experienced in well 15/12-13 A, and the well was junked. The borehole was drilled at a higher angle than the other two wellbores and it is believed that the mud weight was too low or that the problems was related to reactive Claystone.

A formation integrity test of 1.88 sg equivalent mud weight was performed below the 9 5/8" liner shoe in well 15/12-13 B. The well was drilled with higher mud weight than the two previous wellbores, and no mud losses or hole instability problems were experienced in the well.

10.3 Overburden Gradient

The overburden gradient is based on available well data in the area.

10.4 Temperature Gradient

The figure below shows a generalised temperature gradient plot for the 15/12-A-15 area. The estimated background temperature gradient for the well is 3.6 °C/100 m and the estimated bottom hole temperature at TD is 130 °C. Locally above the reservoir the temperature gradient will be higher due to the high thermal conductivity of the salt diapirs associated with the Varg field (dashed line). No temperature measurements were taken in the well.

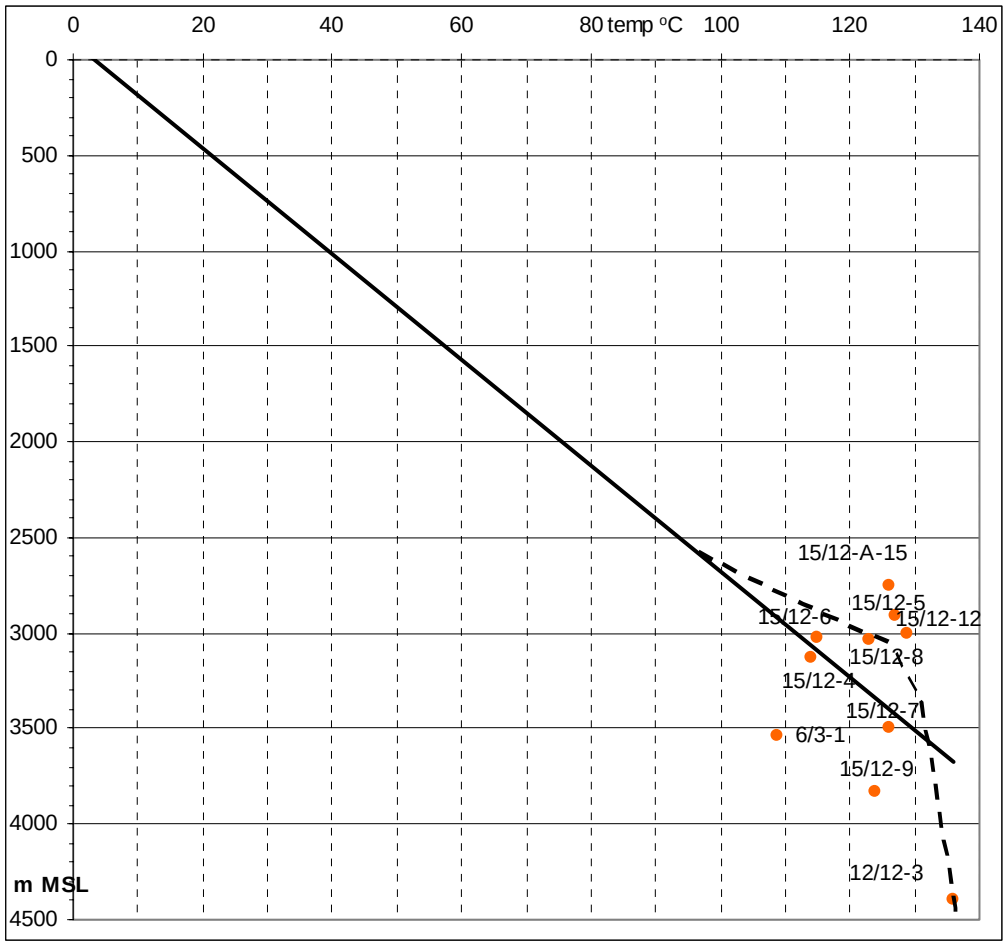


Figure 10-3: Temperature gradient

11 Geophysical Results

11.1 Introduction

The well 15/12-13 encountered sand much deeper than expected beneath an unexpectedly thick succession of shales of Heather age. Some uncertainty was associated with the depth of the Heather Fm., but the depth at which Top Heather Fm. was encountered was deeper than anticipated. The formations above the Heather Fm. were encountered approximately according to the prognosis (***Table 4-1***). The interpretation prior to drilling is shown in ***Figure 11-1***.

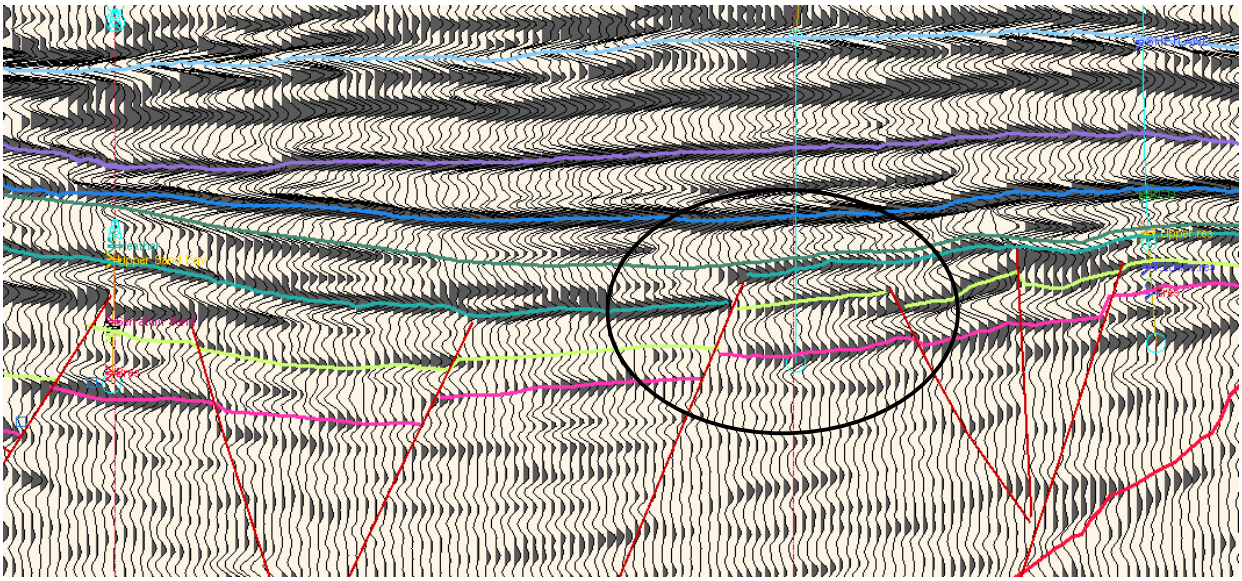


Figure 11-1: Geophysical interpretation prior to drilling well 15/12-13. 15/12-4 is on the left (North), 15/12-13 in the middle 15/12-12 to the right (South).

11.2 Results

In order to evaluate the results from the well geophysically, synthetic seismograms were created and correlated to the seismic for wells 15/12-4, 15/12-12 and 15/12-13 (***Figure 11-2***). Additionally a synthetic seismic wedge model using 15/12-13 was created (***Figure 11-3 and 11-4***). Based on the synthetic correlation a new interpretation was performed.

Synthetic seismograms

Zero offset synthetics were created for the three wells (***Figure 11-2***). A 35 Hz Riker wavelet was selected as the seismic data is zero phase. It should be noted that the sonic log in well 15/12-13 did not cover the top of the Oxfordian sand, and the seismic signal associated with this event is questionable. In order to correlate the synthetic from well 15/12-13 the seismic had to be stretched. Initially the Top Shetland event was stretched to match the seismic, and the remaining events were stretched accordingly.

Seismic modelling

Two wedge models were created using 15/12-13 well logs. Both models used a 35 Hz Riker wavelet. A through represents an increase in acoustic impedance, as with the seismic data.

In the first wedge model (***Figure 11-3***) the Heather Fm. was thinned from its maximum thickness of 67 m to 0 m. Note the change in amplitude with the thinning of the unit. Based on the model, a Heather Fm. with a thickness greater than 40 m will have a similar amplitude reflection as a reflection related to the Draupne Fm. lying conformably on top of the Oxfordian reservoir.

The second wedge model (***Figure 11-4***) represents a thinning of the Upper Jurassic shale (both Draupne and Heather formations). Thinning is applied from the top, meaning Draupne is thinned first. The model shows that the amplitude for the Top Oxfordian sand is fairly constant for all situations where Heather Fm. is present. The model also shows that, due to interference, the location of the Top Heather Fm. pick will wary with changes in thickness of the Draupne Fm.

Revised Seismic Interpretation

Based on the results from synthetic seismograms and the wedge models, the seismic interpretation was changed. ***Figure 11-5*** shows the revised seismic interpretation.

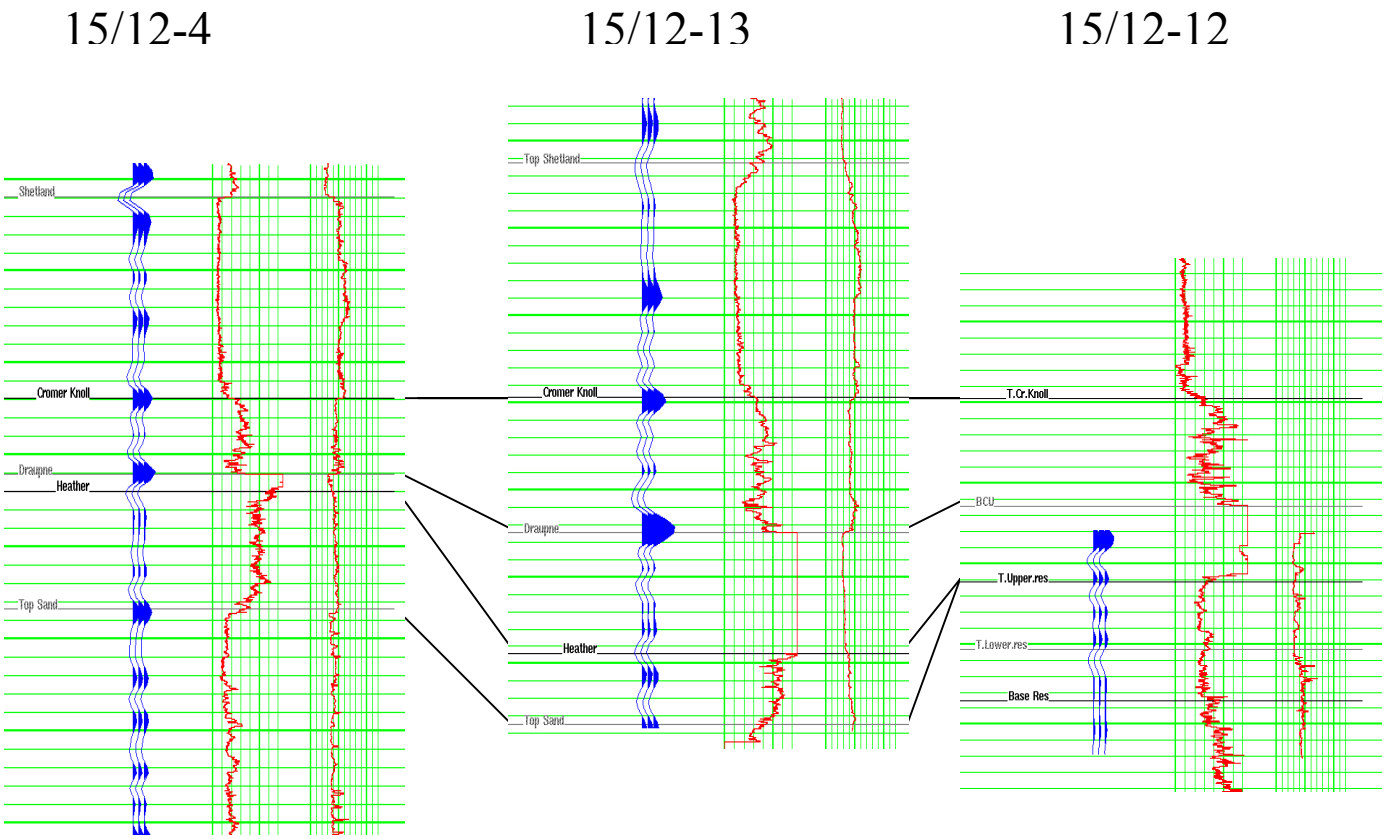


Figure 11-2: Synthetic seismograms

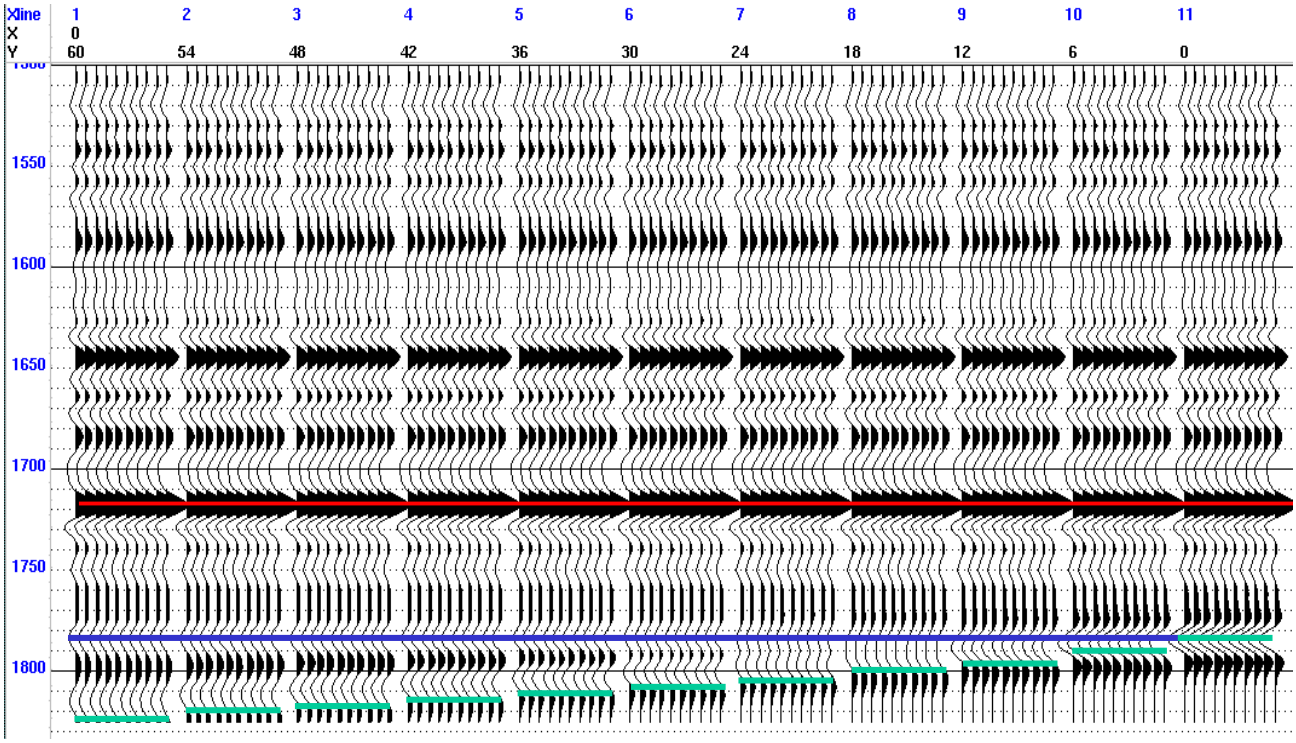


Figure 11-3: ***Synthetic seismic wedge model well 15/12-13. Only the Heather Fm. is thinning. Red line: Base Cretaceous, Blue line: Base Draupne Fm., Green line: Base Heather Fm.***

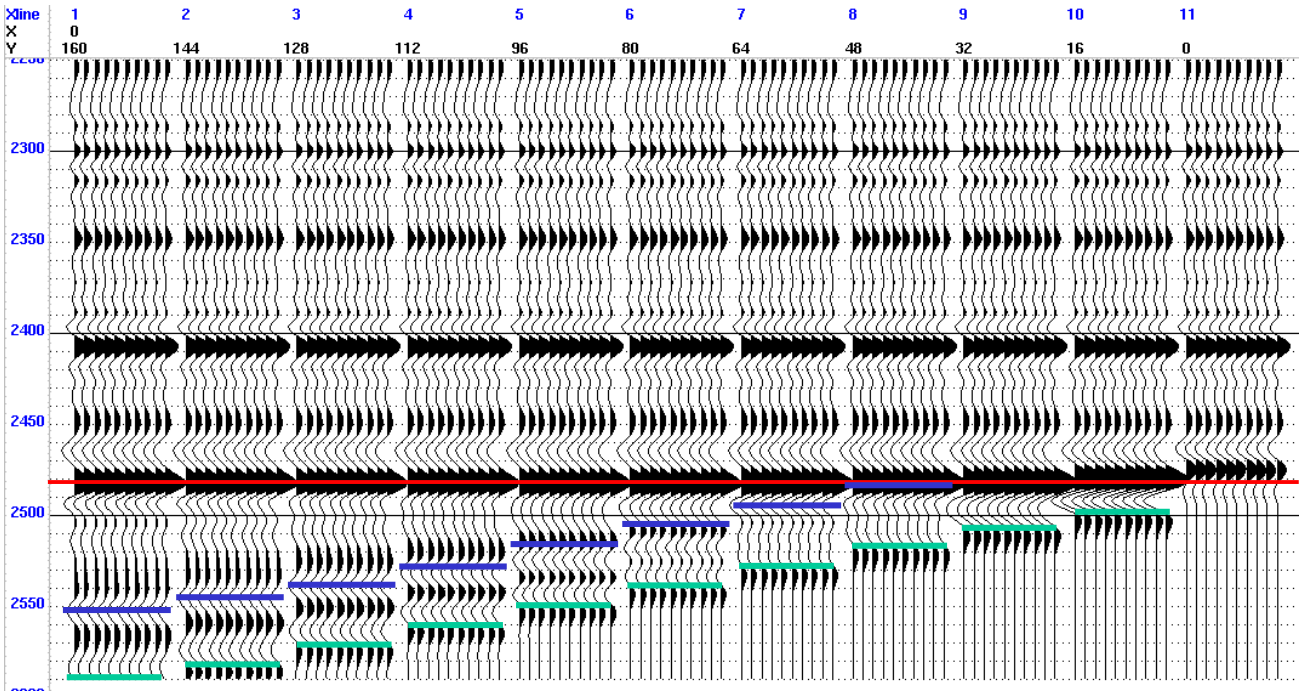


Figure 11-4: ***Synthetic seismic wedge model well 15/12-13. Both the Draupne Fm. and the Heather Fm. is thinning. Red line: Base Cretaceous, Blue line: Base Draupne Fm., Green line: Base Heather Fm.***

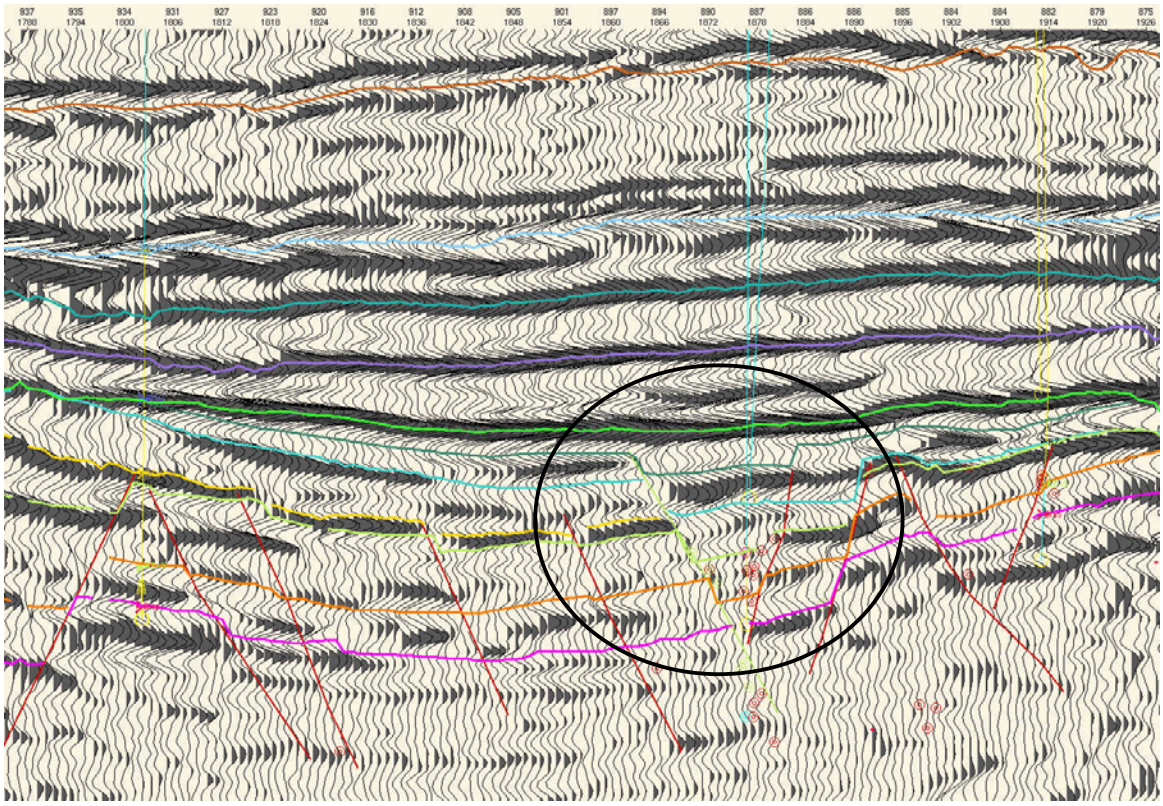


Figure 11-5: Geophysical understanding after drilling of 15/12-13. 15/12-4 is on the left (North), 15/12-13 in the middle 15/12-12 to the right (South).

11.3 Conclusions

Well 15/12-13 is quite different from the other two wells 15/12-4 and 15/12-12. Well 15/12-13 encountered a thick Draupne Fm. with two distinct sub units; an upper unit with very low velocity and a lower unit with slightly higher velocity than above but still quite low. In addition the well encountered a thick (60+ m) Heather Fm. shale sequence. This sequence was totally unexpected. With the inclusion of the Heather and the thicker Draupne the Top Reservoir event is 105 m deeper than expected. In well 15/12-4 a thin Draupne Fm was encountered with low velocity, similar to that of the deeper 15/12-13 Draupne unit and a thick Heather Fm. Well 15/12-12 encountered a thick Draupne with a velocity similar to the deeper unit and no Heather Fm sand or shale. Modelling shows us that the seismic event that was interpreted as representing the top reservoir is associated with the base of the very low velocity upper Draupne unit. The modelling also shows that the signal associated with the Top Heather/Base Draupne changes as Draupne thickens; this was not anticipated from earlier wells.

Based on the seismic data alone the results from 15/12-13 could not be anticipated without the results from the modelling. Probably not even then as the correlation between the model results and the seismic would have to be performed on a trace-by-trace evaluation.

The drilling of well 15/12-13 B came in roughly as prognosticated and had no significant implications to the seismic understanding of the Varg South area.

SECTION B

DRILLING

AND

WELL OPERATIONS

WELLS

15/12-13
15/12-13 A
15/12-13 B

CONTENTS

FIGURES

1 GENERAL INFORMATION

Well 15/12-13 was drilled as an appraisal well on the Varg South structure. The objectives were not met due to deeper Top Reservoir than anticipated. Therefore the well was plugged after drilling into the reservoir.

Well 15/12-13 A was drilled as a geological sidetrack from 15/12-13 below the 13 3/8" casing shoe. The well was plugged in the 12 ¼" section as a decision was taken to change the target due to hole problems.

Well 15/12-13 B was drilled as a sidetrack from 15/12-13 A below the 13 3/8" casing shoe with a simpler well path (lower inclination). The well was permanently plugged and abandoned after the objectives was fulfilled.

This report covers all operations from anchoring on 15/12-13 location until the anchors were pulled after drilling of the wells.

The operation was performed using the semi submersible rig West Alpha.

The rig arrived at the location April 21st 2003 and the well spudded April 23th 2003. The operation on the well finished June 11th 2003 and the rig left the location June 12th

2 GENERAL WELL DATA

WELL LOCATION

Area	Norwegian North Sea	**Well Classification:**	Appraisal
Field	Varg South	**Well design basis:**	Exploration
PL number	038 (Pertra 70%, Petoro 30%)	**Block**	15/12
H_2S, level of preparedness:			1

Well Identification:	15/12-13		Appraisal well
	15/12-13 A		Appraisal well
	15/12-13 B		Appraisal well
Spud location		N 6 433 200.01 m E 436 099.08m	
Top Reservoir	15/12-13	N 6 433 342.11 m E 436 373.89 m	2984 m TVD, RKB 3013 m MD, RKB
	15/12-13 A	N/A	N/A
	15/12-13 B	N 6 432 805.42 E 436 335.33	2877 m TVD, RKB 2951 m MD, RKB
TD	15/12-13	N 6 433 358.21 m E 436 377.91 m	3017 m TVD, RKB 3047 m MD, RKB
	15/12-13 A	N 6 432 603.71 E 436 117.22	2330 m TVD, RKB 2532 m MD, RKB
	15/12-13 B	N 6 432 757.91 E 436 358.47	3071 m TVD, RKB 3153 m MD, RKB

DRILLING RIG

Name:	West Alpha	**Rig heading:**	290.46°
Type:	Semi Submersible		
RKB-MSL:	18 m	**Water depth :**	87 m

3 BOP SKETCH

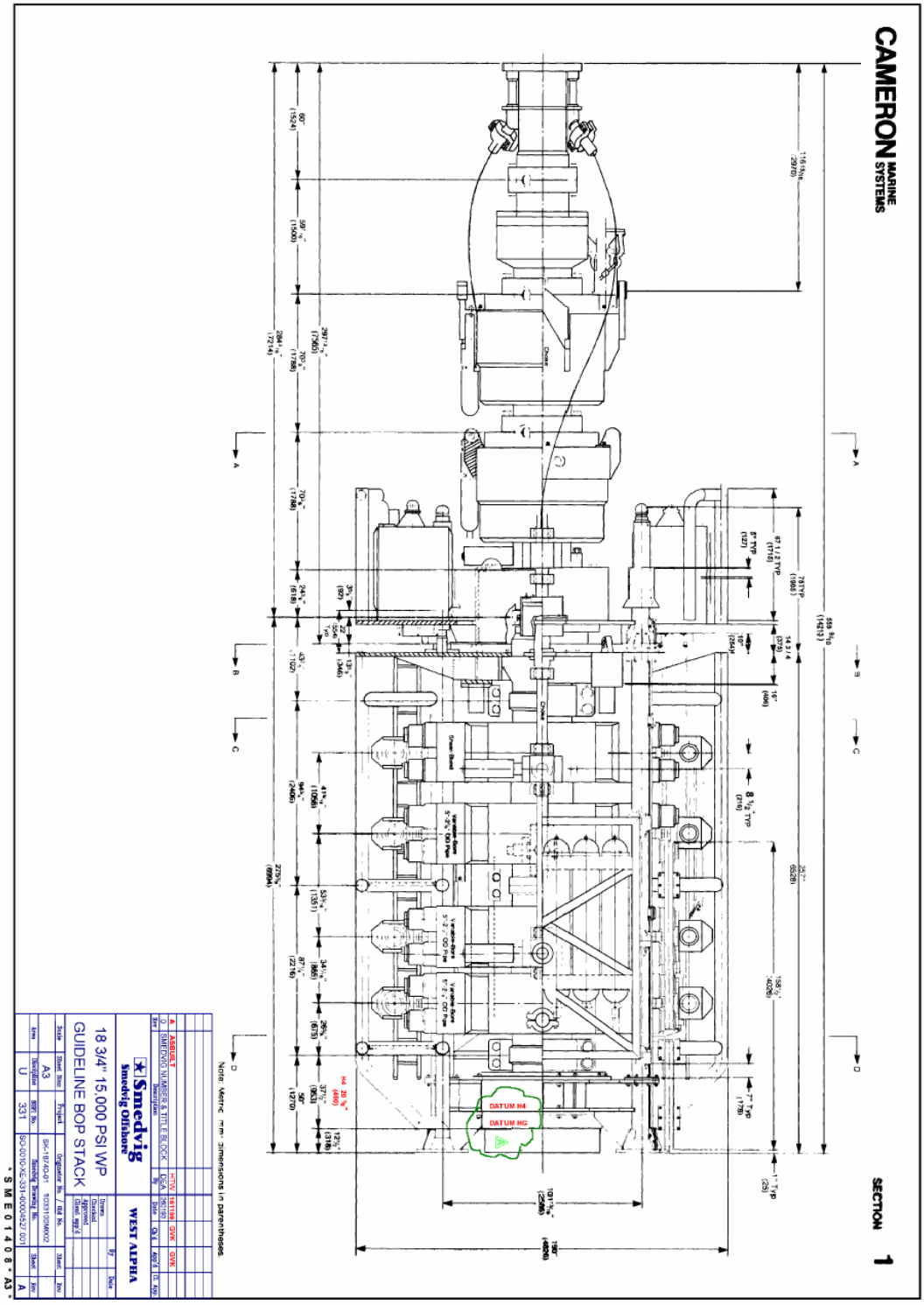


Figure 3-1 West Alpha Pressure Control Equipment

4 LIST OF MAIN CONTRACTORS

Service	Company	Address	Contact	Phone	Fax
Rig*	Smedvig Offshore	P.O. Box 110 4001 Stavanger	Karl Erik Johannessen	51509900	51509800
Multi-services**	Halliburton	Postboks 200, 4065 Stavanger	Jarl Hovden	51837000	51838383
Liner hanger	Peak	P.O.Box 162 4098 Tananger	Tore Todnem	51949000	51949001
Wellhead and conductor	Dril Quip	Lagerveien 31 4033 Stavanger	Torstein Lunder	51443700	51443701
Tubular services	ITM	NorSea Base, Building No. 42, 4056 Tananger	Frode Breivik	52040500	52040510
Base and supply boats	Statoil	Statoil Base Dusavik	Tor Sigve Gjerde	51995977 (51990000)	
Helicopter	Helicopter services		Personnel Duty	81033261	

*Includes rig positioning, anchoring, casing running and communication
**Includes Directional drilling, bits, MWD, mud , mudlogging, wireline logging, cement, casing cutting and overall sevice planning.

5 OPERATIONS ORGANISATION CHART

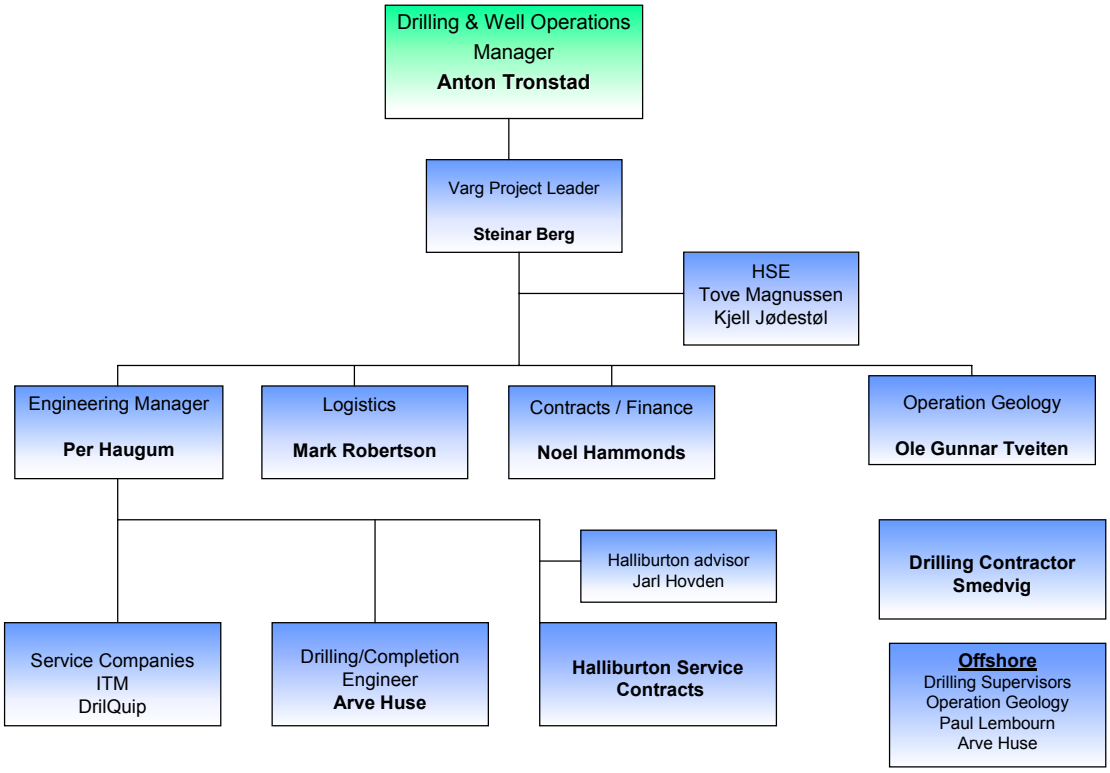


Figure 5-1 Project organization

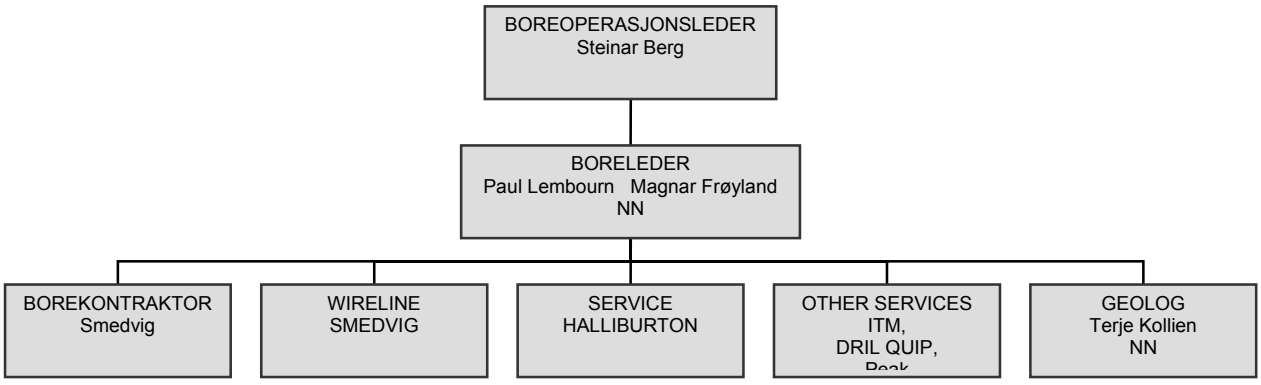


Figure 5-2 Offshore organization

6 LOCATION MAP

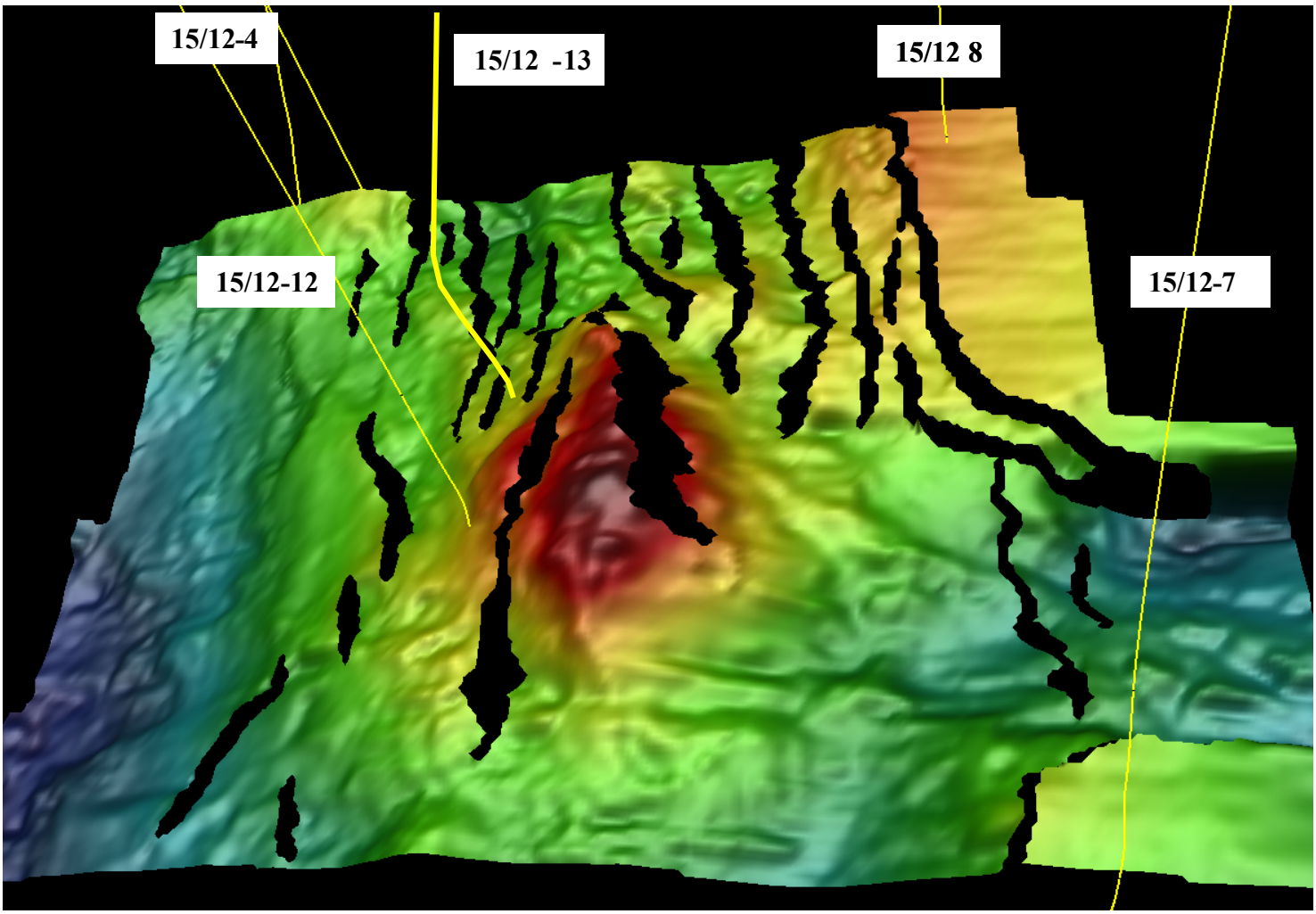


Figure 6-1 Well Location Map

7 WELL HISTORY

Well 15/12-13, 15/12-13 A and 15/12-13 B were new wells on the Varg South discovery. Only one well was planned for, but geological and operational issues called for two sidetracks.

The Varg South Discovery was made in 2001 by well 15/12-12. The objective of 15/12-13 was to define the oil water contact in order to confirm the commerciality of the Varg South oil discovery. The objectives were fulfilled by drilling of 15/12-13/A/B.

8 FINAL WELL STATUS/WELL SKETCH

Plug and abandonment status 15/12-13

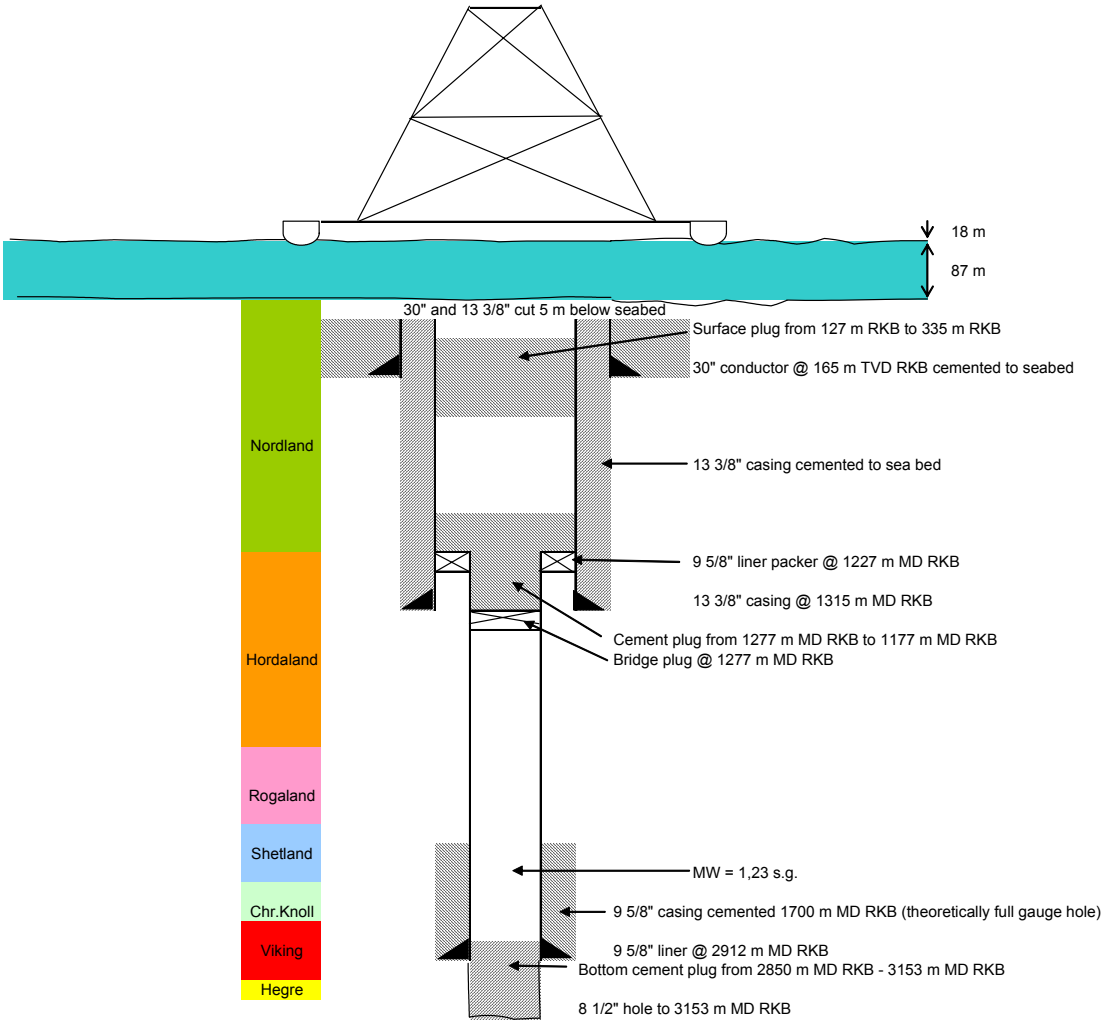


Figure 8-1 Final well status

9 WELLHEAD SKETCH

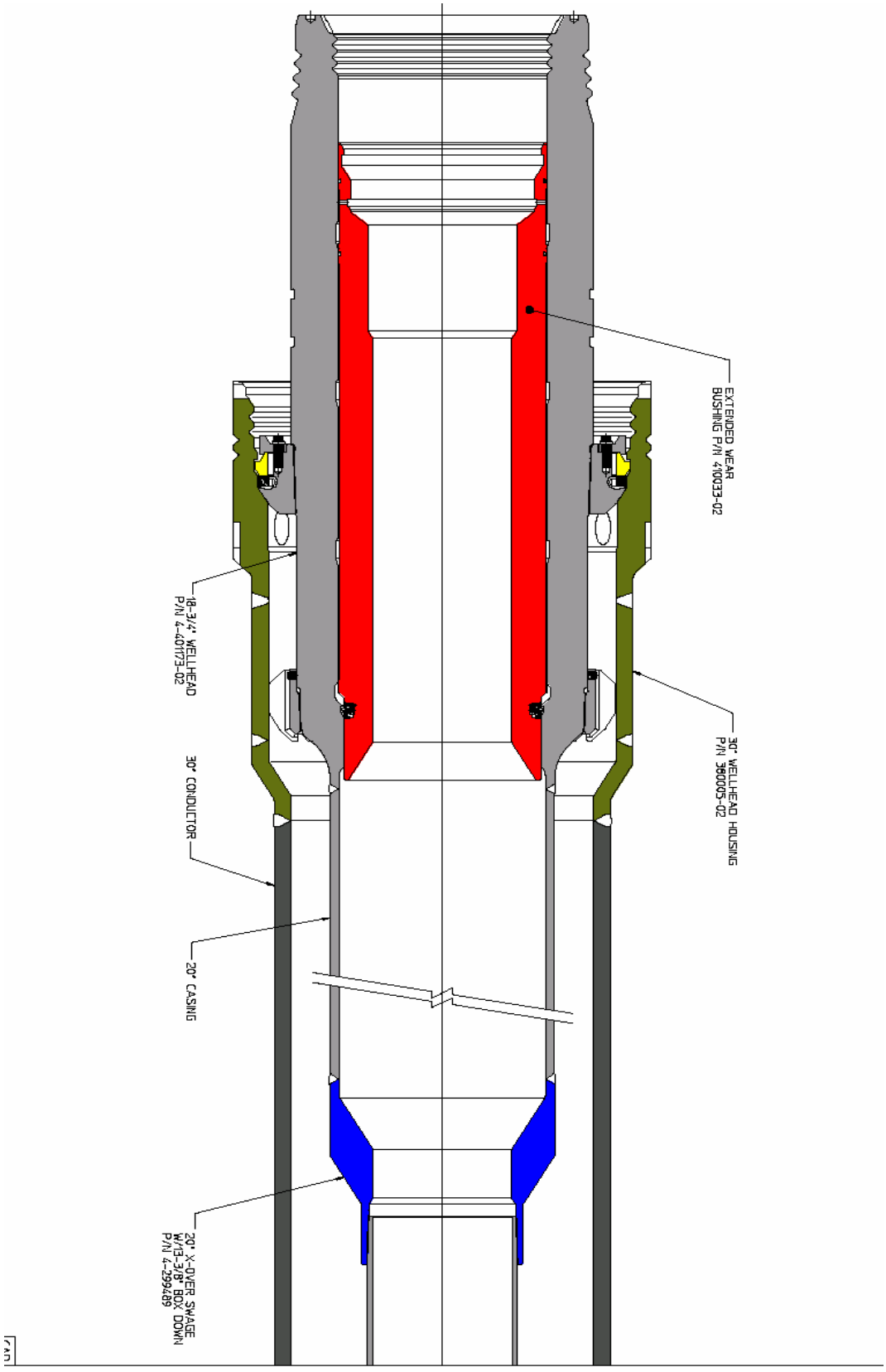


Figure 9-1 15/12-13 Wellhead

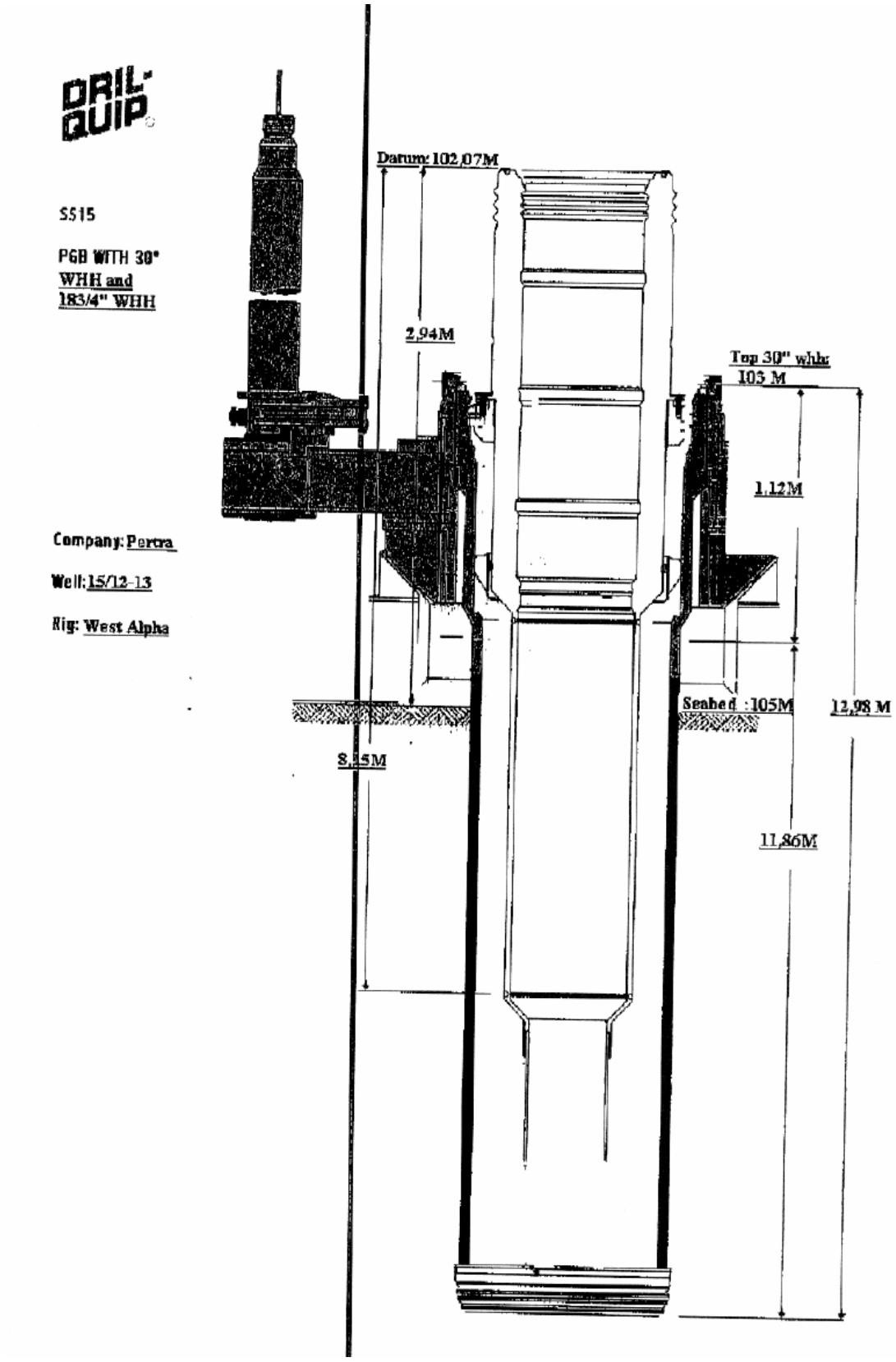


Figure 9-2 15/12-13 Wellhead space out

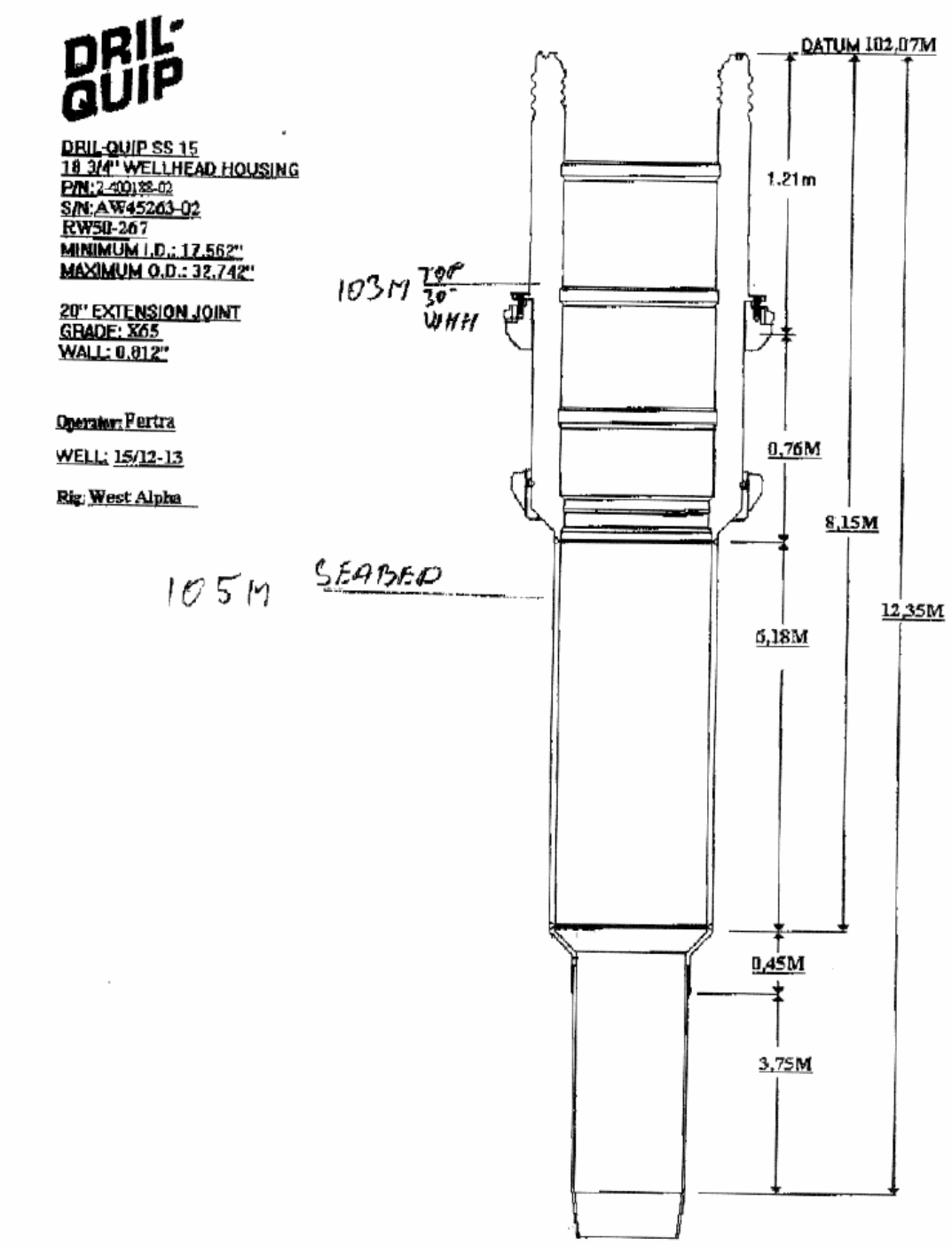


Figure 9-3 Wellhead data

10 WELL COMPLETION SKETCH

N/A

11 OPERATION SUMMARY

Operation commenced April 21th 2003 when first anchor was dropped , and finished June 12th 2003 when rig moved from the location.

11.1 RIG MOVE

Total time used: 28 hrs.
Operational time: 14 hrs.
Downtime: 14 hrs.

Operation started April 21th 2003 at 10:00 when first anchor was run. The anchor handling and preparations for drilling operations were finished April 22th 14:00

11.2 36" SECTION

Total time used: 84.5 hrs.
Operational time: 72.5 hrs.
Downtime: 12.0 hrs.

Drilling operations started April 22th. The 36" hole were drilled from 105 m RKB to 170 m with a rotary assembly consisting of a 17 ½" pilot bit and a 36" hole opener. Seawater with high viscous sweeps was used to clean the hole. Performed a wipertrip and displaced the hole to 1.50 s.g. mud. Ran the 30" conductor to 159 m were it stopped. Pulled the 30" conductor and performed a wiper trip to bottom. Drilled 36" hole from 170 m to 171 m. Displaced the hole to 1.50 s.g. mud prior to pulling out. Ran and cemented the 30" conductor. Ran a 24" bit and drilled out cement and shoe inside the 30" conductor and cleaned the rat hole.

11.3 17 ½" HOLE

Total time used: 169.0 hrs.
Operational time: 145.5 hrs.
Downtime: 23.5 hrs.

Ran the 9 7/8" bottom hole assembly and drilled 9 7/8" pilot hole from 171 m to 1320 m due to shallow gas warning. Seawater with high viscous sweeps was used to clean the hole. Displaced the hole to 1.20 s.g. mud and pulled out of the hole. Opened the pilot hole to 17 ½" with a 17 ½" bit ran on a mud motor. Seawater with high viscous sweeps was used to clean the hole. Cleaned the hole and displaced to 1.20 s.g. mud. Performed a wipertrip to the 30" shoe and observed several tight spots. Displaced the hole to 1.25 s.g. KCl mud and pulled out of the hole. Ran 13 3/8" casing. Worked though tight spots from 1190 m to 1233 m. Washed the casing down from 1233 m to 1247 m and continued to run casing to setting depth at 1315 m. Cemented the casing from the shoe to the seabed.

Ran and tested the BOP

11.4 12 ¼" SECTION

Total time used: 195.5 hrs.
Operational time: 190.0 hrs.
Downtime: 5.5 hrs.

Ran the 12 ¼" bottom hole assembly consisting of a 12 ¼" PDC bit on a mud motor. Drilled the shoetrack and displaced the hole to 1.20 s.g. barasilc mud. Performed a leak off test to 1.71 s.g. equivalent mud weight. Built inclination to 12 deg. and drilled 12 ¼" hole to TD at

3047 m MD. Due to the reservoir discovery at a deeper level than expected, it was decided to plug back the 12 ¼" hole and drill a sidetrack to a new target.

Sat a cement plug on bottom from 3047 m MD to 2805 MD. Pulled out with the cement stinger to 1635 m MD and sat a 8 m^3 high viscous mud pill. Pulled out to 1540 m MD and sat a CST tool. Sat a balanced cement plug from 1535 m MD to 1285 m MD. Pulled the cement stinger and made up the 12 ¼" bottom hole assembly.

Ran the 12 ¼" bottom hole assembly consisting of 12 ¼" PDC bit on a mud motor. Drilled cement to 1352 m were 50% new formation was observed in the samples

11.5 15/12-13 A: 12 ¼" SECTION

Total time used: 151 hrs.
Operational time: 146.5 hrs.
Downtime: 4.5 hrs.

Displaced the hole to 1.45 s.g. mud and started to drill new 12 ¼" hole. Built inclination to 40 deg. and drilled 12 ¼" hole to 2532 m MD. Pulled out of the hole for a planned wiper trip. Severe hole problems were experienced and several incidents occurred with hole packing off and temporarily stuck string. Pulled the string to surface. Due to the severe hole problems it was decided to plug back the 12 ¼" hole and drill a side track to a new target.

Ran in the hole with the cement stinger and sat a 8 m^3 high viscous mud pill from 1635 m MD to 1540 m MD. Sat a CST tool at 1540 m MD and a balanced cement plug from 1535 m MD to 1285 m MD. Pulled the cement stinger, performed a BOP test and made up the 12 ¼" bottom hole assembly.

Ran the 12 ¼" bottom hole assembly consisting of 12 ¼" PDC bit on a mud motor. Drilled cement to 1348 m were 50% new formation was observed in the samples

11.6 15/12-13 B: 12 ¼" SECTION

Total time used: 408 hrs.
Operational time: 203.5 hrs.
Downtime: 204.5 hrs.

Displaced the hole to 1.50 s.g. barasilc mud and started to drill new 12 ¼" hole. Built inclination to 18 deg. and drilled 12 ¼" hole to 1776 m MD. Performed a wipertrip to 1358 m MD and continued to drill 12 ¼" hole to 2574 m MD. Performed a wipertrip to 1746 m and continued to drill 12 ¼" hole to 2656 m MD. Pulled out of the hole due to a crack found on the main shaft on the top drive. Changed the main shaft and ran beack with the 12 ¼" bottom hole assembly after 4 days of repair. Drilled 12 ¼" hole to TD of the section at 2951 m MD. Circulated the hole clean and performed a wiper trip to 2600 m. Circulated and conditioned the mud and pulled out of the hole.

Ran the 9 5/8" liner. Severe delays in the operation were experienced due to damaged threads. Several joints had to be changed out. Ran the 9 5/8" liner to 2912 m MD with several tight spots which had to be worked through. Due to a tally failure the 9 5/8" liner was set 27 m higher than planned. Cemented the 9 5/8" liner and attempted to set the liner packer without success. Ran a tie back packer and made several unsuccessful attempts to set same. Performed a BOP test and ran in the hole with the 8 ½" bottom hole assembly to 1223 m MD.

Circulated the hole and planned to inflow test the liner lap. Due to high gas readings this plan was aborted. Ran and sat a tie back packer and obtained a good pressure test on same.

11.7 15/12-13 B: 8 ½" SECTION

Total time used: 76.5 hrs.
Operational time: 76.5 hrs.
Downtime: 0 hrs.

Ran in the hole with the 8 ½" rotary assembly with a 8 ½" PDC bit. Drilled the 9 5/8" shoe track and displaced the hole to 1.23 s.g. mud. Drilled the shoetrack and 3 m new formation. Performed a formation integrity test to 1.88 s.g. equivalent mud weight. Drilled 8 ½" hole to TD of the section at 3151 m MD. Performed a wiper trip to the 9 5/8" casing shoe, circulated the hole clean, conditioned the mud and pulled out of the hole with the drill string.

Performed logging on wireline:

Run #1: MDT pressure points
Run #2: MDT sample catching
Run #3: VSP
Run #4: CST

11.8 15/12-13 B: PERMANENT PLUG AND ABANDONMENT

Total time used: 146.5 hrs.
Operational time: 143.0 hrs.
Downtime: 3.5 hrs.

Ran in the hole with the cement stinger to bottom. Sat cement plugs in 2 steps from 3153 m MD to 2850 m MD. Displaced the hole to corrosion inhibited mud. Ran a 8 ½" bit and load tested the plug with 10 MT. Sat a bridge plug at 1277 m and pressure tested same to 240 bar. Sat a cement plug from 1277 m MD to 1177 m MD. Sat a CST tool at 346 m MD and a balanced cement plug from 335 m to 130 m. Ran a 8 ½" bit and tagged the surface plug at 127 m.

Pulled the BOP.

Ran the wellhead cutting assembly and cut the 20" x 30" wellhead 5 m below seabed. Pulled out with the wellhead, guide base and 20" x 30" stump.

Pulled the anchors.

The operations finished June 12th when the last anchor was secured on bolster.

12 DRILLING PROBLEMS AND RECOMMENDATIONS

No	Description	Recommendation
1.	After drilling 36" hole, heavy weight drill pipe was overtorqued.	Evaluate to use down hole motor on 36" hole section to avoid overtorqued heavy weight drill pipe
2.	Picked up MWD tool, RLL/P4M from deck. Test on rig floor failed due to power connection failure. Changed out insert package in the tool.	Sperry Sun to improve.
3.	Mixing conveyor for KCL broke down. Earlier Smedvig had one mixing hopper on deck, but this hopper arrangement was permanently removed. The system was still operative underneath the deck. Made a hole in the deck and continued to mix the salt. Lost two hrs rig time.	Make a temporary hatch in the deck so it can easily be used in an emergency situation if the inside hopper breaks down.
4.	When attempting to land conductor, it was not possible to pass 160 m, where it had been very hard drilling. Had to pull conductor, ream up hole and then rerun conductor.	Ream thoroughly many times up and down past gravel beds. Ensure there's no torque prior to displacing the hole to mud and pulling out.
5.	17 ½" section was wiper tripped. It was very difficult to get the hole stabilised. Displaced hole to 1.25 SG bentonite mud with 40 kg/m3 KCl. Ran casing. Tight at 1170 m. Worked casing down and landed in conductor housing.	Consider heavier mud than the standard 1.20 SG. More KCl inhibition is also recommended. Keep at least a volume of mud onboard to fill the casing while running, to avoid water coming out of the casing if it needs to be circulated down.
6.	Pulser for 12 ¼" section was set to 3000 to 4000 lpm. Pump problems and nozzle configuration led to that, a lot of the section was drilled with two pumps with a flow rate of 3100 lpm. This led to some bad data transmission.	Set pulser to flow rate 2500 to 3500 lpm.
7.	Wrong nozzle size 2 x 12 and 4 x 14 was used. This gave pressure of 310 + bar towards TD of the section. This led to pop off's blown when motor stalled.	More flow area, but not sacrifice too much hsi
8.	Some cavings seen in 12 ¼" section even with mudweight up to 1.40 SG	Weigh up to 1.40 SG prior to entering Shetland.
9.	Barasilc mud in combination with ceramic liners and the type of pistons used (White lightning), was not a good combination. 16 pistons was changed during drilling of the section.	Steel liners and green pistons
10.	MWD operator is building Pulser/directional sensor offshore (on pipe deck). This increases the chance for wrong installations and can also cause dangerous situations on pipe deck (lots of operations going on).	MWD tool should be premade from vendor. 1-2 hrs rig time would be saved when making up the BHA and risk will be reduced accordingly. Go through relevant personnel experience.
11.	During confidence test in rotary it was discovered that the Directional tool was installed upside down. Total lost time for this incident was 3.5 hours.	MWD tool should be pre made onshore.
12.	12 ¼" hole was drilled with water based mud from 1321m to section TDMD at 3047m. The sail angle was 11.5 degrees. Had to be circulated out of the hole and it packed off once. It was decided to do a sidetrack to encounter a new target. Two alternatives were evaluated, 18 deg and 40 deg sail angle. It was recommended from the rig to change to oil	Afterwards it was known from Statoil that 40 deg angle in this area was not recommended. So, before making final decision, all possible information from the area in question should be thoroughly checked accordingly.

No	Description	Recommendation
	based mud if the highest angle was determined. Decision was made to drill the highest angle with the existing water based mud. Mud weight was increased from 1.40sg to 1,45sg. The hole was drilled to 2532m and circulated clean prior to a wiper trip. The hole took weight and circulation became necessary. The hole packed off several times and consequently we became stuck on several occasions. Eventually, after 55,5 hrs the bit was on the rig floor. Further we found the bit and the top stab balled up.	
13.	When encountered hole problems it was observed that the Jar did not work. Total hours on the jar was 166 hours including back reaming/pulling out of the hole	Investigate the jar and submit a report to Pertra.
14.	BOP test tool stopped 20m above landing position in the hanger due to clay/cuttings in the riser/BOP. A cleaning run was made and the clay/cuttings were removed.	Consider cleaning this area prior to pressure test the BOP after having drilled reactive clay.
15.	Changed the wash pipe in the middle of the 12 ¼" section.	Change the wash pipe prior to start on a new long section regardless of the amount of hours on the existing wash pipe, especial in water based KCLmud.
16.	600v power supply for the drilling equipment failed. This problem can lead to shut down in drilling.	Smedvig to get spare parts on to the rig, change out the breakers or have one breaker as back up.
17.	Extended wear to pistons, liners and valves/seats while drilling with this type of mud. KCL/silica. It was noted that ceramic liners were not suitable for this mud. Most of the liners were changed out to steel liners.	Prior to start drilling with similar mud system evaluate to change out all liners/pistons. Ensure sufficient spares are available on stock. Consider increasing minimum stock.
18.	Due to sticky cuttings and clay/cuttings in the riser/BOP it was determined to rise the mud specification and increase the mud weight. No hole problems observed after this.	Afterwards it was known from Statoil that higher KCL contents was used in this area So, before making final decision, all possible information from the area in question should be thoroughly checked accordingly
19.	Observed vibrations on the drill string while drilling. The stand was reamed and it was noted an increase of vibration. Observed mud leak from the lower part of the main shaft on the top drive. Found a 180-degree crack on the main shaft and 0,2m above the intermediate sub. A used main shaft was located, machined and shipped out to West Alpha and installed.	Perform full overhaul on the DDM after finishing this well as splines are not properly machined after welding up, only grinded.
20.	Prior to repair the DDM it was decided to hang off the string in the well head. During circulating via kill and choke line the drill string became plugged because of clay/cuttings in the BOP cavities.	Consider flushing the BOP before hanging off drill string. (When planned)
21.	The Bat tool was rerun in the hole with low battery status. The battery capacity was 60% when tool arrived West Alpha. According to procedure the battery capacity should have been checked, but was forgotten.	During the operation of this well we have discovered several incidents. For future operation with Pertra it is recommended that all personnel should have minimum five years of experience.
22.	While running 9 5/8" casing several joints were rejected due to high torque and no shoulder seal was seen on the jam unit. All casing collars were used and threads were also	Inspect treads on the back loaded joints and submit a report to Pertra. Consider reducing the numbers of

No	Description	Recommendation
	damaged/Galled while backing out. The total time consumption was 41 hours. The normal running speed of the rig should indicate 11 hours. Picked up the liner hanger and ran in hole to 1755 m. Observed 11 tons down weight. Worked the string and continued to run in hole to 1839 m. Filled the string and continued to run in hole to 2102 m. The liner string had to be worked down more or less all the way down to 2930 m. The liner string was worked/pumped down with a maximum flow of 1200 ltr/45 bar. The slips segments on the hanger where not supposed to engage before 116 bar. Nevertheless the liner hanger indicated set at 2919 m. The time consumption from picking up the hanger until start cementing was 22 hours.	centrelizers installed on the liner string.
23.	The liner was cemented according to program. The liner was pressure tested to 282 bar with a negative result. The running string was pulled out and a tie back packer assembly was run in hole. The setting of the slips segments on the tieback packer did not engage with 40 tons down weight. We also tried to assist the setting by closing the BOP and pressure up the well. The shear pins did not brake. Pulled the tieback assembly out of the hole and removed 4 of the 8 shear pins in the tie back packer setting tool. Ran in hole and made a new attempt without any success. Pulled out of the hole and pressure tested the BOP. Ran in hole with 8 ½" BHA and attempted to inflow test the area between the 9 5/8" liner and the 13 3/8" casing. This proved unsuccessful and a lot of gas was circulated out. A tieback packer from Weatherford modified with a PEAK seal stem was run, set and pressure tested to 100 bar. From the first failed pressure test until final positive pressure test, the total time consumption was 4 days.	The reason for the PEAK tool not working is not yet determined. The quality assurance from the vendor should be revised. There where all indications of a mechanical problem.

13 HSE SUMMARY

	Mål	Oppnådd
LTI (lost time incidents)	0	0
H2 verdi	< 8,5	0
Antall hendelser rapportert til OD pr år	< 2	0
Akutte utslipp til ytre miljø	0	0

14 PRESSURE AND TEMPERATURE GRADIENTS

Reference is made to Section A.

15 DAILY REPORTING

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Event Name: ORIG DRILLING
Contractor Name: Smedvig
Rig Name: West Alpha

Start: 22.04.2003
Rig Release:
Rig Number: 1

Spud Date: 22.04.2003
End: 11.05.2003

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
						Dropped anchor #5 at 10:00. Anchor #1 on bottom at 12:35. #3 on bottom at 16:17. #7 on bottom at 16:32. Pre-tension on 1,4,5,8 180 ton. Pre-tension on 2,3,6,7 180 ton. #7 re-run and pre-tensioned 180 ton at 21:35. Slacked off to 100 ton at 21:45.
21.04.2003	21:30 - 00:00	2,50	10	96	Move	Took onboard piggybacks for backload. Serviced equipment. Prepared for operation.
22.04.2003	00:00 - 05:00	5,00	10	96	Prep	Prepared rig prior to going on contract with Pertra: - Completed installation of new stb lower dollyy assembly - Installed securing wire on stb upper guide wheel bolts - Installed torque wrench and bails on ddm - Checked ddm for loose parts/safety wires etc. Started mixing mud at 04:30
	05:00 - 14:00	9,00	10	97	Prep	Safety time-out. Performed derrick inspection. Installed sensor beam at monkey board. Installed sensor beam at crown compensator. Secured several bolts on eagle light. Secured bolt on lower racking arm.
	14:00 - 14:30	0,50	11	97	DCon	Rig on contract. Held risk assessment for picking up tubulars from deck.
	14:30 - 16:30	2,00	11	26	DCon	Installed mouse hole and elevator. Picked up 9 x 5" heavy weight drill-pipe from deck and racked back in derrick.
	16:30 - 17:30	1,00	11	26	DCon	Made up cement stand on 5" HWDP from deck and racked back in derrick
	17:30 - 18:30	1,00	11	26	DCon	Made up running tool for 30" housing and racked back in derrick.
	18:30 - 21:30	3,00	11	26	DCon	Picked up 36" bottomhole assembly. Picked up 6 x 9-1/2" drill collars and 3 x 8" drill collars and ran in hole to 90 m
	21:30 - 22:00	0,50	11	152	DCon	Jumped ROV to locate bit. Checked sensors on DSC while mixing mud.
	22:00 - 23:00	1,00	11	22	DCon	Made up drilling stand and tagged bottom at 104.20 m at 22:30 (depth not corrected for tide). Checked operation of anderdrift tool while mixing mud.
	23:00 - 00:00	1,00	11	14	DCon	Held spud meeting. Set bit on bottom with low weight. ROV placed out marker buoys. Continued mixing mud.
23.04.2003	00:00 - 01:00	1,00	11	152	DCon	Mixed kill mud
	01:00 - 14:00	13,00	11	14	DCon	Drilled 36" hole from 105m to 170m. Drilled with 4500lpm, 130bar, 5-20KNm, 60-75 rpm, 1-8 t WOB. Survey at 110 m = 0.75 deg, Survey at 128 m = 0.75 deg, Survey at 139 m = 0.75 deg, Survey at 161 m = 1.25 deg
	14:00 - 14:30	0,50	11	62	DCon	Swept hole with 2x10m3 hi vis pills. Maximum torque, 38KNm. Pulled out of hole from 170m to 147m. Unable to break out string from DDM.
	14:30 - 15:00	0,50	11	62	DCon	Washed down from 147m to 170m. Tagged bottom at 169,5m. Swept hole with 2x10m3 hi vis pills.
	15:00 - 15:30	0,50	11	152	DCon	Attempted to break drill string from DDM without success.
	15:30 - 16:00	0,50	11	62	DCon	Displaced well to 1.30sg mud.
	16:00 - 17:00	1,00	11	44	DCon	Pulled out of hole from 170m to 119m. No overpull observed. Excessive torque on connections.
	17:00 - 18:00	1,00	11	152	DCon	Broke out drilling pup joint and pulled out of hole from 119m to 115m.
	18:00 - 18:30	0,50	11	44	DCon	Ran in hole from 115m to 169m. Had 1m fill.
	18:30 - 20:30	2,00	11	62	DCon	Washed down to bottom at 170m and swept hole with 2x10m3 hi vis pills. Displaced hole to 1.50sg mud.
	20:30 - 21:00	0,50	11	54	DCon	Pulled out of hole from 170m to 119m. Filled hole with 14m3 1.50sg mud.
	21:00 - 22:30	1,50	11	54	DCon	Pulled out of hole from 119m. Laid out hole opener.
	22:30 - 23:00	0,50	11	97	DCon	Laid down mouse hole. Held prejob meeting prior to rig up and run conductor pipe.
	23:00 - 23:30	0,50	13	76	RCon	Rigged up to run conductor pipe.
	23:30 - 00:00	0,50	13	76	RCon	Ran 30" conductor pipe.
24.04.2003	00:00 - 01:00	1,00	13	78	RCon	Ran 30" conductor from 12m to 62m, applied a coat of grease outside of conductor from 6-1m.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Event Name: ORIG DRILLING
Contractor Name: Smedvig
Rig Name: West Alpha

Start: 22.04.2003
Rig Release:
Rig Number: 1

Spud Date: 22.04.2003
End: 11.05.2003

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
24.04.2003	01:00 - 01:30	0,50	13	78	RCon	Changed to 5" handling equipment, installed false rotary on top of conductor housing.
	01:30 - 02:30	1,00	13	58	RCon	Made up cement stinger.
	02:30 - 04:00	1,50	13	78	RCon	Made up 30" running tool, lowered down and landed in guide base, locked same, installed guide posts and wires. Filled casing with sea water, checked bulls eyes. Weight of conductor 25 tons.
	04:00 - 05:00	1,00	13	78	RCon	Ran conductor from 62m on heavy weight drill pipe, entered hole at 04:25 hr's, Took 15 ton weight at 159m.
	05:00 - 06:30	1,50	13	78	RCon	Attempted to work and wash down with 2500 lpm - 4500lpml, 20-60 bar, no progress. Conductor stopped at same depth every time.
	06:30 - 07:00	0,50	13	62	RCon	Displased hole to 1,50 sg kill mud.
	07:00 - 07:30	0,50	13	80	RCon	Pulled out of hole with 30" conductor from 159m to 97m. Displaced hole to 1.50sg mud while pooh.
	07:30 - 08:00	0,50	13	97	RCon	Held prejob meeting prior to hang off guide base and 30" conductor.
	08:00 - 10:00	2,00	13	80	RCon	Disconnected guide post no 3 and landed guide base and 30" conductor on skid trolley. Disconnected heavy weight landing string from 30" conductor pipe.
	10:00 - 11:30	1,50	13	54	RCon	Picked up 36" hole opener from deck and ran in hole to 147m. Made up drilling pup joint.
	11:30 - 13:30	2,00	13	64	RCon	Continued running in hole from 147m to 167,5m , 2,5m fill. Reamed and washed down from 167,5m to 170m. Drilled down to 171m. Continued running in hole from 147m to 167,5m , 2,5m fill. Reamed and washed down from 167,5m to 170m. Drilled down to 171m. String torqued up several times at 165m, max 18KNm. Reamed stand several times until excessive torque was redused and pumped 4x10m3 sweeps.
	13:30 - 14:00	0,50	13	62	RCon	Displaced well to 1,5sg mud.
	14:00 - 15:30	1,50	13	54	RCon	Pulled out of hole from 171m and laid down hole opener on deck.
	15:30 - 16:00	0,50	13	78	RCon	Picked up running tool for 30" conductor and made up same to 30" conductor string.
	16:00 - 16:30	0,50	13	78	RCon	Lifted guide base with 30" conductor from trolley and ran 30" conductor. Filled conductor with sea water.
	16:30 - 17:30	1,00	13	78	RCon	Ran 30" conductor on heavy weight drill pipe from 62m, entered 36" hole at 16:50 hr's, continued running in hole, hung up at 160 m, worked through tight spot and landed conductor at 165 m. Top of housing at 103 m, 2 m stick up from sea bed.
	17:30 - 18:30	1,00	13	86	RCon	Checked bulls eyes with ROV, 0.75 deg on both. Pressure tested cement line to 200bar.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Event Name: ORIG DRILLING
Contractor Name: Smedvig
Rig Name: West Alpha

Start: 22.04.2003
Rig Release:
Rig Number: 1

Spud Date: 22.04.2003
End: 11.05.2003

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
24.04.2003	18:30 - 20:00	1,50	13	88	RCon	Displace hole with 24 m3 of sea water. Pumped with 2000 lpm, 26 bar. Mixed and pumped 24m3 lead cement slurry followed by 20m3 tail cement slurry. Displaced with 3600litre of seawater. Bled off pressure and checked for back flow. Ok.
	20:00 - 00:00	4,00	13	158	RCon	Held conductor pipe in tension while waiting on cement to set up. Installed guide wire's, checked bulls eyes every ½ hr using ROV.
25.04.2003	00:00 - 04:00	4,00	13	158	RCon	Held conductor pipe in tension while waiting on cement to set up. Checked bulls eyes every ½ hr using ROV. Held prejob meeting prior to lay down bottom hole assembly.
	04:00 - 05:00	1,00	13	78	RCon	Tensioned up guide lines and slacked off weight. checked bulls eyes using ROV. 0,75 degrees on both. Released 30" conductor running tool. Pulled out of hole with cement stand and racked back in derrick.
	05:00 - 05:30	0,50	13	78	RCon	Pulled out of hole and laid down overtorqued heavy weight drilll pipe on deck.
	05:30 - 06:00	0,50	13	78	RCon	Flushed and cleaned the well head/guide base. Continued pulling out of hole. Laid down two overtorqued heavy weight drill pipe and racked back one stand in derrick.
	06:00 - 07:00	1,00	13	78	RCon	Laid down 30" running tool.
	07:00 - 08:00	1,00	13	78	RCon	Laid down cement stinger.
	08:00 - 09:00	1,00	11	54	D24	Laid down over torqued heavy weight drill pipe from derrick, broke off side entry sub and kelly cock on cement stand and racked back in derrick. Attempted to break drilling pup from DDM due to over torque without success.
	09:00 - 09:30	0,50	11	97	D24	Held prejob meeting prior to pick up drill pipe.
	09:30 - 10:00	0,50	11	143	D24	Repaired fault on magnet for gantry crane.
	10:00 - 17:30	7,50	11	54	D24	Made up 88 joints of 5" drill pipe and racked back in derrick.
	17:30 - 20:00	2,50	11	54	D24	Changed out saver sub on DDM due to high torque.
	20:00 - 23:00	3,00	11	26	D24	Made up 24" bit and installed guide rope to guide bit into the well. Picked up two joints 8" drill collars and jar from deck. Stabbed into wellhead.
	23:00 - 23:30	0,50	11	54	D24	Continued running in hole from 103m to 163m.
	23:30 - 00:00	0,50	11	20	D24	Tagged cement at 163m. Drilled cement from 163m to 164m.
26.04.2003	00:00 - 01:00	1,00	11	20	D24	Driled cement and 30" shoe from 164m to165m. Washed down to 168m and cleaned rat hole. Worked bit through shoe several times. Swept hole with 10m3 hi vis pill.
	01:00 - 02:00	1,00	11	54	D24	Pulled out of hole from 168m.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: ORIG DRILLING Start: 22.04.2003 End: 11.05.2003
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
26.04.2003	01:00 - 02:00	1,00	11	54	D24	
	02:00 - 02:30	0,50	11	26	D24	Broke off bit, laid down bit sub and cleaned rig floor.
	02:30 - 03:30	1,00	11	26	D97/8	Made up 9 7/8" bottom hole assembly. Picked up RLL, P4m and circulation sub from deck.
	03:30 - 10:30	7,00	11	26	D97/8	Attempted to test/load RLL/P4m-sub. No success due to power connection failure. Trouble shot same. Meanwhile made up drilling pup joint. Laid down RLL and P4M on deck while preparing new insert.
	10:30 - 11:30	1,00	11	54	D97/8	Made up cement stand and racked back in derrick.
	11:30 - 14:30	3,00	11	26	D97/8	Picked up RLL and P4M and tested same. Conducted shallow gas meeting with rig crew.
	14:30 - 16:30	2,00	11	26	D97/8	Continued making up 9 7/8" bottom hole assembly and ran in hole to 142m.
	16:30 - 17:00	0,50	11	54	D97/8	Made up drillling pup and ran in hole from 142m. Tagged bottom at 170m.
	17:00 - 00:00	7,00	11	14	D97/8	Drilled 9 7/8" hole from 170m to 417m. Flow checked drilling break at 175m ok. Drilled with 1-4t, 2800lpm, 95bar, RPM 115, torque 2-8KNm, String weight 70t.
27.04.2003	00:00 - 22:00	22,00	11	14	D97/8	Drilled 9 7/8" pilot hole from 417m to 1320m. Flow checked drilling break at 1047m, 1064m and 1225m, ok. Drilled into Utsira at 1225m. Drilled with 2-5t WOB, 114 RPM, 4-9 KNm, 2800LPM, 94-120bar.
	22:00 - 23:00	1,00	11	62	D97/8	Swept hole with 15m3 hi vis pill and displaced hole to 1.20sg mud.
	23:00 - 00:00	1,00	11	50	D97/8	Pulled out of hole with 9 7/8" bit from 1320m to 950m.
28.04.2003	00:00 - 01:00	1,00	11	50	D97/8	Pulled out of hole from 950m to 197m with the 9 7/8" bit. No excessive overpull observed.
	02:00 - 02:30	0,50	11	26	D97/8	Pulled out of hole with the 9 7/8" bottom hole assembly.
	02:30 - 04:00	1,50	11	38	D97/8	Down loaded MWD tool.
	04:00 - 04:30	0,50	11	26	D97/8	Broke off bit and bit sub and laid down same.
	04:30 - 08:00	3,50	11	26	D171/2	Picked up motor and tested same. Picked up new P4M tool and made up same. Made up stabilizer and ran in with bottom hole assembly from derrick. Picked up 3 joints 8" drill collars from deck and ran in hole with 17 1/2" bit from 154m to 171m.
	08:00 - 13:30	5,50	11	116	D171/2	Made up drilling pup and opened up 9 7/8" pilot hole to 17 ½" hole from 171m to 418m. Observed gas bubbles, stopped drilling and performed flow check.
	13:30 - 14:00	0,50	11	62	D171/2	Flow checked well at 418m, circulated bottoms up and continued to flow check using ROV.
	14:00 - 15:30	1,50	11	116	D171/2	Continued opened up 9 7/8" pilot hole to 17 ½" hole from 418m to 513m.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Event Name: ORIG DRILLING
Contractor Name: Smedvig
Rig Name: West Alpha

Start: 22.04.2003
Rig Release:
Rig Number: 1

Spud Date: 22.04.2003
End: 11.05.2003

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
28.04.2003	15:30 - 16:30	1,00	11	62	D171/2	Observed gas, stopped drilling and circulated bottoms up. Flow checked using ROV. No more gas observed.
	16:30 - 00:00	7,50	11	116	D171/2	Continued to open up 9 7/8" pilot hole to 17 ½" hole from 513m to 955m.
29.04.2003	00:00 - 05:30	5,50	11	116	D171/2	Continued opening up 9 7/8" pilot hole to 17 ½" hole from 955m to 1321m.
	05:30 - 09:00	3,50	11	62	D171/2	Pumped 3 x 15 m3 hi vis pills and displaced same out of hole. Pumped 10 m3 1,20 sg mud followed by 10 m3 hi vis mud and circulated same out of hole. Displaced well to 1,20sg mud.
	09:00 - 12:30	3,50	11	44	D171/2	Pulled out of hole with 17 1/2" bit from 1321m to 165m. Tight hole from 1321m to 738m. Tight spots at 423m and 329m, maximum over pull 30 t.
	12:30 - 13:00	0,50	11	62	D171/2	Circulated bottoms up in 30" shoe at 165m. Circulated with 4300lpm, 188bar, 115rpm, 3KNm.
	13:00 - 13:30	0,50	11	96	D171/2	Performed derrick inspection due to high vibration during drilling. Found loose bolts on DDM and missing safety pin on eagle light. Reinstalled same.
	13:30 - 15:30	2,00	11	44	D171/2	Ran in hole with 17 1/2" bit from 165m to 1177m. Washed and reamed through tight spots at 314m and 436m.
	15:30 - 21:00	5,50	11	138	D171/2	Washed and reamed from 1177m to 1200m several times, excessive torque and weight. Swept hole with 10 m3 hi vis pill. Circulated with 116 rpm, 3-25KNm, 275spm, 240 bar. Continued to wash and ream down from 1200 m bottom at 1321m. Meanwhile mixed KCL mud.
	21:00 - 23:00	2,00	11	143	D171/2	Mixing conveyor for KCL broke down. Performed trouble shooting on same. Installed mixing hopper on deck for mixing of KCL. Meanwhile circulated well.
	23:00 - 00:00	1,00	11	152	D171/2	Continued circulating well on seawater while mixing 1,25sg KCL mud using mixing hopper on deck.
30.04.2003	00:00 - 02:00	2,00	11	62	D171/2	Circulated 3 x hi vis pills followed by 10m3 1,5sg mud. Displaced well to 1.25sg KCL mud.
	02:00 - 05:00	3,00	11	54	D171/2	Pulled out of hole from 1321m to 237m. Worked through tight spots from 1212m to 1170m.
	05:00 - 06:30	1,50	11	26	D171/2	Pulled out of hole with bottom hole assembly.
	06:30 - 07:00	0,50	13	86	D171/2	Cleaned drill floor and prepared to rig up for running casing.
	07:00 - 07:30	0,50	13	97	R133/8	Held prejob meeting prior to rig up and run casing.
	07:30 - 08:30	1,00	13	86	R133/8	Rigged up to run 13 3/8" casing.
	08:30 - 13:00	4,50	13	78	R133/8	Ran 13 3/8" casing down to 165m. Checked shoe and float. Thread locked shoe, spacer joint and float joint.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Event Name: ORIG DRILLING
Contractor Name: Smedvig
Rig Name: West Alpha

Start: 22.04.2003
Rig Release:
Rig Number: 1

Spud Date: 22.04.2003
End: 11.05.2003

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
30.04.2003	13:00 - 13:30	0,50	13	78	R133/8	Installed casing circulating arrangement, lafleur.
	13:30 - 22:30	9,00	13	78	R133/8	Continued running 13 3/8" casing from 165m to 1201m. String took weight at 1190m. Worked through.
	22:30 - 00:00	1,50	13	82	R133/8	Changed elevator and made up 18 3/4" hanger. Pulled out flush mounted spider.
01.05.2003	00:00 - 00:30	0,50	13	78	R133/8	Worked casing down from 1201m to 1233m. Installed master bushing when hanger below rotary table. Set down 80 t, no go.
	00:30 - 01:30	1,00	13	78	R133/8	Pulled out to 1225m, made up DDM, broke circ and circulated with 500lpm, 0-17bar. Washed down from 1225m to 1247m. Filled 20" casing with sea water and closed valves on running tool.
	01:30 - 02:30	1,00	13	78	R133/8	Ran in hole with 13 3/8" casing without circulation from 1247m to 1315m and landed casing at 02:15 hrs. Performed 20t pull test ok.
	02:30 - 05:00	2,50	13	62	R133/8	Broke circulation and circulated prior to cement job. Circulated with 200lpm, 50bar. Circulated through cement hose. Meanwhile rigged down casing equipment. Observed for gas in wellhead area for 10 minutes using ROV. No gas observed.
	05:00 - 08:30	3,50	13	88	R133/8	Pumped 5 m/3 white tracer spaser. Pressure tested cement line to 345 bar.Dropped ball to release top plug. Mixed and pumped 126m3 of lead slurry, 1,56sg followed by 20m3 of tail slurry, 1,92sg. Dropped drill pipe dart to release bottom plug. Displaced cement with 1150 litres and launced wiper plug with 170bar. Lined over from cement unit to mud pump.
	08:30 - 10:00	1,50	13	88	R133/8	Displaced cement with rig pumps, bumped plug w/ 5675 strokes. Pressure up to 70 bar over final circulating pressure. Lined over to cement unit and pressure tested 13 3/8" casing to 282 bar. Bled off pressure and checked for back flow. Displaced cement with 2000lpm, 22-89bar.
	10:00 - 10:30	0,50	13	88	R133/8	Disconnected cement hose and control hoses from cement head. Disconnected running tool.
	10:30 - 11:00	0,50	13	86	R133/8	Retrieved guide wires and hung off eagle light.
	11:00 - 13:30	2,50	13	64	R133/8	Washed and cleaned well head and bulls eyes indicators before pulling out of hole.
	13:30 - 14:30	1,00	13	86	R133/8	Moved rig 30 m starboard off location.
	14:30 - 15:00	0,50	13	86	R133/8	Pulled out of hole from 96m. Laid down running tool and cement plug launcher.
	15:00 - 16:00	1,00	13	86	R133/8	Laid down cement head and one single drill pipe due to damaged box .
	16:00 - 17:00	1,00	13	26	R133/8	Laid down 17 1/2" bottom hole assembly.
	17:00 - 17:30	0,50	13	86	R133/8	Laid down elevator and bails.
	17:30 - 00:00	6,50	13	28	BOP	Prepared to run BOP. Changed saver sub. Made up logging sub to DDM. Installed bails and elevator. Disconnected rotary and rough neck rails. Prepared rig floor and deck for BOP handling.
02.05.2003	00:00 - 03:30	3,50	13	28	BOP	Lifted up the rotary and opened the drillfloor hatches. Skidded the BOP to well centre. Made up the 20" riser pup joint to the BOP. Lifted the BOP off the BOP skid and removed the skid. Landed the BOP on the spider beams.
	03:30 - 05:00	1,50	13	28	BOP	Installed the pod wires. Ran the guidewires through the BOP funnels down to the seabed. Torqued up the bolts on the 20" riser pup joint.
	05:00 - 07:00	2,00	13	28	BOP	Landed the rotary table and closed the drill floor hatches.
	07:00 - 10:00	3,00	13	28	BOP	Ran riser according to space out.
	10:00 - 11:30	1,50	13	28	BOP	Pressure tested the kill and choke lines to 345 bar and the conduit lines to 207 bar.
	11:30 - 12:30	1,00	13	28	BOP	Picked up the slip joint and greased the inner barrel.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: ORIG DRILLING Start: 22.04.2003 End: 11.05.2003
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
02.05.2003	12:30 - 15:00	2,50	13	28	BOP	Installed the kill, choke, conduit and booster lines.
	15:00 - 17:30	2,50	13	28	BOP	Installed the riser tension wires.
	17:30 - 18:00	0,50	13	32	BOP	Moved the rig to location and pressure tested the kill and choke lines to 345 bar.
	18:00 - 19:30	1,50	13	28	BOP	Installed the guide lines and landed the BOP. Connected the pod junction boxes.
	19:30 - 21:30	2,00	13	28	BOP	Installed the diverter and and connected the hydralic hoses.
	21:30 - 22:30	1,00	13	28	BOP	Laid down the diverter handling tool and the marine riser spider.Opened the catwalk machine and moved the overhead crane to the forward deck.
	22:30 - 23:00	0,50	13	32	BOP	Pressure tested the well head connector to 34/282 bar for 5/10 minutes.
	23:00 - 00:00	1,00	13	28	BOP	Installed the eagle dolly beams.
03.05.2003	00:00 - 02:00	2,00	13	28	BOP	Installed the eagle tubular handling machine and the DDM torque wrench.
	02:00 - 02:30	0,50	11	94	D171/2	Pressure tested the kelly hose to 345 bar.
	02:30 - 04:00	1,50	13	28	BOP	Installed the tracks for the Iron Roughneck and the mousehole.
	04:00 - 08:00	4,00	11	22	D121/4	Picked up 22 stands of 5" drill pipe from deck.
	08:00 - 08:30	0,50	13	32	BOP	Function tested the BOP from both pods.
	08:30 - 10:00	1,50	11	22	D121/4	Pulled 22 stands of 5" drill pipe out of the hole.
	10:00 - 14:00	4,00	11	143	D121/4	Repaired broke bandbrake on the drawworks.
	14:00 - 19:00	5,00	11	143	D121/4	Changed leaking DDM kelly cock and broken camsleeve.
	19:00 - 20:30	1,50	11	22	D121/4	Made up the emergency hang off tool
	20:30 - 22:00	1,50	11	26	D121/4	Installed the probe in the DWD tool and laid down the tool
	22:00 - 00:00	2,00	11	26	D121/4	Picked up the drilling motor and installed the sleeve and made up the bit. Made up the 12 1/4" BHA.
04.05.2003	00:00 - 06:00	6,00	11	26	D121/4	Made up the 12 1/4" BHA
	06:00 - 10:00	4,00	11	22	D121/4	Picked up 800 m of 5" drill pipe from deck.
	10:00 - 11:00	1,00	11	97	D121/4	Performed a choke drill with the crew.
	11:00 - 12:00	1,00	11	22	D121/4	Picked up 220 m of 5" drill pipe from deck.
	12:00 - 14:30	2,50	11	20	D121/4	Filled the drill string and tagged the cement plugs at 1283 m. Drilled out the cement plugs and cement to 1314 m.
	14:30 - 15:00	0,50	11	20	D121/4	Drilled out the casing shoe while displacing the well to 1,20 barasilic mud.
	15:00 - 16:00	1,00	11	18	D121/4	Cleaned out the rat hole. Drilled new formation from 1321 m to 1324 m.
	16:00 - 17:00	1,00	11	74	D121/4	Performed LOT to 1,71 sg.
	17:00 - 00:00	7,00	11	18	D121/4	Drilled 12 1/4" hole from 1324 m to 1460 m.
05.05.2003	00:00 - 00:00	24,00	11	18	D121/4	Drilled 12 1/4" hole from 1460 m to 2238 m.
06.05.2003	00:00 - 00:00	24,00	11	18	D121/4	Drilled 12 1/4" hole from 2238 m to 2732 m.
07.05.2003	00:00 - 15:00	15,00	11	18	D121/4	Drilled 12 1/4" hole from 2732 m to 2980 m. Observed a drilling brake.
	15:00 - 17:30	2,50	11	62	D121/4	Circulated bottoms up for samples.
	17:30 - 22:00	4,50	11	18	D121/4	Drilled 12 1/4" hole from 2980 m to 3047 m. Observed sand in samples from 3013 m.
	22:00 - 23:30	1,50	11	62	D121/4	Circulated bottoms up. Flow checked the well.
	23:30 - 00:00	0,50	11	54	D121/4	Pulled the drill string out of hole from 3047 m to 2925 m.
08.05.2003	00:00 - 09:30	9,50	11	54	D121/4	Lubricated out of the hole from 2925 m to 1310 m. Experienced pack off at 1892 m. Got free by down force.
	09:30 - 10:30	1,00	11	54	D121/4	Flow checked the well and pumped slug. Pulled out of the hole from 1310 m to 1258 m.
	10:30 - 15:00	4,50	11	143	D121/4	Repaired the DDM.
	15:00 - 16:30	1,50	11	54	D121/4	Pulled out of the hole from 1258 m to 258 m
	16:30 - 22:00	5,50	11	26	D121/4	Pulled the BHA out of the hole. Broke off the BAT tool and the bit.
	22:00 - 00:00	2,00	15	22	D121/4	Made up a 5" muleshoe and ran in hole to 140 m by picking up pipe from deck.
09.05.2003	00:00 - 01:00	1,00	15	22	D121/4	Ran in hole with the cement string to 231 m by picking up pipe from deck.
	01:00 - 02:00	1,00	15	54	D121/4	Ran in hole with the cement string from 231 m to 1283 m.
	02:00 - 02:30	0,50	15	54	D121/4	Made up the cementing single and laid it down on the catwalk.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Event Name: ORIG DRILLING
Contractor Name: Smedvig
Rig Name: West Alpha

Start: 22.04.2003
Rig Release:
Rig Number: 1

Spud Date: 22.04.2003
End: 11.05.2003

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
09.05.2003	02:30 - 05:00	2,50	15	64	D121/4	Washed down from 1283 m to 1535 m.
	05:00 - 08:00	3,00	15	54	D121/4	Ran in hole with the cement string from 1535 m to 3047 m.
	08:00 - 10:00	2,00	15	62	D121/4	Circulated and conditioned the mud. Observed several amounts of cuttings and cavings on the shakers.
	10:00 - 12:00	2,00	15	62	D121/4	Rigged up the cement line and continued to circulate and condition the mud.
	12:00 - 14:00	2,00	15	88	D121/4	Pressure tested the cement line to 300 bar. Pumped 8 m3 spacer, 22 m3 cement and 1 m3 spacer using the cement unit. Displaced the cement with 22775 ltr using the mud pumps.
	14:00 - 15:30	1,50	15	54	D121/4	Pulled the cement string out of the hole from 3047 m to 2500 m.
	15:30 - 16:30	1,00	15	62	D121/4	Installed the drill pipe wiper ball and circulated the hole clean. No cement in returns.
	16:30 - 18:30	2,00	15	54	D121/4	Flow checked the well and pumped slug. Pulled the cement string out of the hole from 2500 m to 1635 .
	18:30 - 19:00	0,50	15	54	D121/4	Pumped and displaced 8 m3 of high visc mud and pulled the cement string out of the hole from 1635 m to 1540 m.
	19:00 - 21:00	2,00	15	62	D121/4	Installed the CST tool and pumped it down. Pulled the cement string out of hole from 1540 m to 1535 m. Circulated and conditioned the mud.
	21:00 - 23:30	2,50	15	88	D121/4	Made up the cementing single and pressure tested the cement lines to 300 bar. Pumped 8 m3 of spacer, 28 m3 cement and 1 m3 spacer using the cement unit. Displaced the cement with 9000 litres using the cement pumps. No cement in the returns.
	23:30 - 00:00	0,50	15	88	D121/4	Laid down the cementing single on the catwalk.
10.05.2003	00:00 - 00:30	0,50	15	54	D121/4	Pulled the cement string out of hole from 1535 m to 1285 m.
	00:30 - 01:30	1,00	15	62	D121/4	Dropped the drill pipe wiper ball and circulated 1 1/2 times bottoms up.
	01:30 - 03:30	2,00	15	54	D121/4	Flowchecked the well. Pumped slug and pulled the cement string out of hole from 1285 m to 520 m.
	03:30 - 04:30	1,00	15	32	D121/4	Function tested the BOP on both pods.
	04:30 - 05:30	1,00	15	96	D121/4	Cut and slipped 116 ft drilling line.
	05:30 - 06:30	1,00	15	96	D121/4	Changed the wash pipe on the DDM.
	06:30 - 09:00	2,50	15	54	D121/4	Pulled the cement string out of the hole from 520 m to surface. Wiped wet cement off the cement string while pulling it out.
	09:00 - 11:00	2,00	15	86	D121/4	Made up the cement head for the next 9 5/8" cement job and laid down the cementing single used for the plug back.
	11:00 - 12:00	1,00	15	26	D121/4	Picked up the DWD tool and installed the probe. Laid down the DWD tool.
	12:00 - 14:30	2,50	15	26	D121/4	Picked up the mud motor and broke off the bit. Changed the stabilizer sleeve and made up the new bit. Set the angle on the mud motor to 1,15 degrees.
	14:30 - 16:30	2,00	15	26	D121/4	Made up the DWB, ALD and checked the float. Set scribe line.
	16:30 - 20:00	3,50	15	140	D121/4	Rectified the installation of the directional module piece in the DWD probe.
	20:00 - 20:30	0,50	15	26	D121/4	Set the scribe line and made up a 11 3/4" stabilizer. Made up the BAT tool.
	20:30 - 21:30	1,00	15	26	D121/4	Ran in hole with the 12 1/4" BHA from surface to 228 m.
	21:30 - 22:00	0,50	15	54	D121/4	Installed the diverter element and ran in hole with 12 1/4" bit on 5" drill pipe from 228 m to 450 m.
	22:00 - 23:30	1,50	15	22	D121/4	Filled the string. Ran in hole with 12 1/4" bit on 5" drill pipe from 450 m to 690 m by picking up range 2 drill pipe from deck.
	23:30 - 00:00	0,50	15	54	D121/4	Ran in hole with 12 1/4" bit from 690 m to 780 m.
11.05.2003	00:00 - 00:30	0,50	25	54	D121/4	Ran in hole with the drill string from 780 m to 1000 m.
	00:30 - 01:00	0,50	25	54	D121/4	Performed a kick drill with the crew. Filled the string with mud. Changed bails and elevators on the DDM.
	01:00 - 02:00	1,00	25	54	D121/4	Ran in hole with the drill string ftom 1000 m to 1265 m.
	02:00 - 05:30	3,50	25	20	D121/4	Broke the circulation and washed down from 1265 m to 1279 m. Found

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Spud Date: 22.04.2003
Event Name: ORIG DRILLING
Start: 22.04.2003
End: 11.05.2003
Contractor Name: Smedvig
Rig Release:
Rig Name: West Alpha
Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
11.05.2003	02:00 - 05:30	3,50	25	20	D121/4	firm cement at 1279 m. Drilled cement from 1279 m to 1350 m.
	05:30 - 08:00	2,50	25	20	D121/4	Started sidetrack from 1350 m to 1352 m. Samples showed 50% new formation.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Event Name: GEO SIDETRACK
Contractor Name: Smedvig
Rig Name: West Alpha

Start: 11.05.2003
Rig Release:
Rig Number: 1

Spud Date: 22.04.2003
End: 17.05.2003

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
						Drilled 12-1/4" hole from 1352 to 1378 m
11.05.2003	10:00 - 11:00	1,00	21	18	D121/4	Displaced the hole to 1.45 s.g. mud. Drilled 12-1/4" hole from 1378 m to 1383 m.
	11:00 - 12:00	1,00	21	62	D121/4	Filled shaker pits and reserve no. 2 with return mud. Changed screens on the shakers
	12:00 - 00:00	12,00	21	18	D121/4	Drilled 12-1/4" hole from 1383 m to 1652 m
12.05.2003	00:00 - 00:00	24,00	21	18	D121/4	Drilled 12 1/4" hole from 1652 m to 2345 m.
13.05.2003	00:00 - 10:00	10,00	21	18	D121/4	Drilled 12 1/4" hole from 2345 m to 2532 m.
	10:00 - 12:00	2,00	21	54	D121/4	Pulled out of the hole from 2532 m to 2503 m. Flow checked the well. Attempted to pull out of the well without circulation. No success. 25-30t overpull.
	12:00 - 14:00	2,00	21	54	D121/4	Broke circulation and circulated out of the hole from 2503 m to 2330 m due to tight hole. Circulated with 1200LPM, 65bar. At 2330 hole suddenly packed off. Neither over pull nor pressure build up was observed prior to pack off.
	14:00 - 16:00	2,00	21	62	D121/4	Worked free packed off drill string at 2330 m and circulated the hole clean. A considerable amount of cuttings came over the shakers.
	16:00 - 16:30	0,50	21	62	D121/4	Circulated of hole from 2330 m to 2310 m. Racked back one stand in derrick and continued to circulate the well clean.
	16:30 - 17:30	1,00	21	62	D121/4	Pumped out of the hole from 2310 m to 2160 m.At 2160 the hole suddenly packed off. Neither over pull nor pressure build up was observed prior to pack off. Some pressure was trapped in the string. Pumped with 2850LPM, 220bar. Pulling weight 114T.
	17:30 - 23:00	5,50	21	138	D121/4	Bled off pressure and regained return and established circulation in steps up to 3500lpm, 300bar. Worked the drill string free with 60 tons downweight 80 overpull and string rotation.
	23:00 - 00:00	1,00	21	62	D121/4	Circulated the hole clean with 3550LPM, 300bar.
14.05.2003	00:00 - 02:00	2,00	21	138	D121/4	Reamed down from 2160 m to 2197 m. Pumped with 3600 lpm and 300 Bar. Rotated with 116 RPM.
	02:00 - 05:00	3,00	21	138	D121/4	Backreamed out of the hole from 2197 m to 2110 m. Pumped with 3200 lpm and 263 Bar. Rotated with 130 RPM.
	05:00 - 06:00	1,00	21	138	D121/4	The drill string packed off at 2110 m. Worked the drill string free and etablished circulation.
	06:00 - 11:30	5,50	21	138	D121/4	Backreamed out of the hole from 2110 m to 2028 m. Pumped with 2650 lpm and 200 Bar. Rotated with 124 RPM.
	11:30 - 13:00	1,50	21	138	D121/4	Pumped a 5m3 high visc. pill and backreamed out of the hole from 2028 m to 2000 m. Pumped with 2900 lpm and 232 Bar. Rotated with 130 RPM.
	13:00 - 15:00	2,00	21	138	D121/4	The drill string packed off at 2000 m. Worked the drill string free and estabished circulation.
	15:00 - 23:30	8,50	21	138	D121/4	Backreamed out of the hole from 2000 m to 1810 m. Pumped with 2650 lpm and 200 Bar. Rotated with 125 RPM.
	23:30 - 00:00	0,50	21	138	D121/4	The drill string packed off at 1810 m. Worked the drill string free and established circulation.
15.05.2003	00:00 - 01:30	1,50	21	138	D121/4	The drill string packed off at 1810 m. Worked the string free and established circulation.
	01:30 - 10:00	8,50	21	138	D121/4	Backreamed out of the hole from 1810 m to 1305 m. Pumped with 1310 ltr/min and 59 Bar. Rotated the string with 124 RPM.
	10:00 - 11:00	1,00	21	138	D121/4	Circulated the hole clean. Pumped with 3594 ltr/min and 300 Bar. Rotated the string with 60 RPM.
	11:00 - 14:00	3,00	21	138	D121/4	Flowchecked the well and pumped slug. Pulled the drill string out of the hole from 1305 m to 288 m.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Spud Date: 22.04.2003
Event Name: GEO SIDETRACK
Start: 11.05.2003
End: 17.05.2003
Contractor Name: Smedvig
Rig Release:
Rig Name: West Alpha
Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
15.05.2003	14:00 - 17:30	3,50	21	138	D121/4	Pulled the BHA out of the hole. Observed the bit and stabilizator balled up. Installed the diverter and cleared the drill floor.
	17:30 - 18:00	0,50	21	138	D121/4	Made up the cement joint and laid it on the catwalk machine.
	18:00 - 20:30	2,50	21	138	D121/4	Made up the cement mule shoe and ran in hole with the cement string from surface to 1315 m.
	20:30 - 22:30	2,00	21	138	D121/4	Washed down with the cement string from 1315 m to 1635 m. Pumped with 1991 ltr/min and 40 Bar. Rotated with 150 RPM.
	22:30 - 23:30	1,00	21	138	D121/4	Circulated bottoms up with 4000 ltr/min.
	23:30 - 00:00	0,50	21	138	D121/4	Pumped 8 m3 with high visc. mud prior to setting the cement plug.
16.05.2003	00:00 - 00:30	0,50	25	88	D121/4	Pulled the cement string out of hole from 1635 m to 1540 m
	00:30 - 02:00	1,50	25	88	D121/4	Installed the cement joint and pumped down the CST tool. Pulled out of hole with the cement string from 1540 m to 1535 m. Rigged up the cement hose and held a prejob meeting with involved personnel.
	02:00 - 03:00	1,00	25	88	D121/4	Pumped 8 m3 spacer, pumped 28 m3 cement slurry, 1m3 spacer and displaced with 9 m3 of mud.
	03:00 - 04:00	1,00	25	88	D121/4	Pulled the cement string out of the hole from 1535 m to 1285 m.
	04:00 - 05:30	1,50	25	88	D121/4	Dropped the drill pipe wiper ball and circulated the hole clean. Dumped 30 m3 of contaminated mud.
	05:30 - 09:30	4,00	25	88	D121/4	Flow checked the well. Pumped slug and pulled the cement string out of hole from 1285 m to surface. Removed cement outside cement string. Laid down the cement single and tidy the drill floor.
	09:30 - 12:00	2,50	21	94	D121/4	Made up the cement hose to the DDM and pressure tested the mud hose and the inside BOP to 35/300 Bar for 5/10 minutes.
	12:00 - 15:00	3,00	21	94	D121/4	Made up the BOP test tool and ran in hole to 90 m. Observed weight and pulled the BOP test tool back to surface. Found BOP test tool packed with clay.
	15:00 - 16:30	1,50	21	64	D121/4	Ran in hole with a wash tool and washed from 65 m to 105 m.
	16:30 - 22:30	6,00	21	94	D121/4	Ran in hole with the BOP test tool and landed in the well head. Pressure tested the BOP to 20/290 Bar for 5/10 minutes. Function tested from Toolpushers office. Pulled out of the hole with the BOP test tool and laid it down.
	22:30 - 00:00	1,50	21	26	D121/4	Made up the 12 1/4" BHA number 2.
17.05.2003	00:00 - 03:00	3,00	21	26	D121/4	Laid down the used mud motor. Picked up the new mud motor and changed the sleeve stabilizer. Made up the bit and checked the float.
	03:00 - 04:00	1,00	21	26	D121/4	Tested the MWD and set the scrab line.
	04:00 - 05:00	1,00	21	26	D121/4	Made up the BAT tool. Ran in hole with the BHA to 65 m and changed the drilling jar.
	05:00 - 06:00	1,00	21	26	D121/4	Ran in hole with the BHA from 65 m to 173 m.
	06:00 - 06:30	0,50	21	92	D121/4	Tested the MWD with 2500 ltr/min.
	06:30 - 07:00	0,50	21	26	D121/4	Ran in hole with the BHA from 173 m to 228 m.
	07:00 - 08:30	1,50	21	54	D121/4	Ran in hole with the drillstring from 228 m to 1000 m. Filled the drillstring at 500 m.
	08:30 - 09:00	0,50	21	97	D121/4	Held a kick drill with the crew and function tested the LPR from Toolpusher's office and Drillfloor.
	09:00 - 10:00	1,00	21	54	D121/4	Ran in hole with the drillstring from 1000 m to 1253 m.
	10:00 - 10:30	0,50	21	64	D121/4	Broke the circulation and washed down from 1253 m to 1284 m.(Firm cement.)
	10:30 - 12:30	2,00	21	20	D121/4	Drilled firm cement from 1284 m to 1345 m.
	12:30 - 15:00	2,50	21	18	D121/4	Kicked off the well from 1345 m to 1348 m. 50 % formation in samples at 1348 m. Continue on well 15/12-13 B

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Spud Date: 22.04.2003
Event Name: GEO SIDETRACK
Start: 17.05.2003
End:
Contractor Name: Smedvig
Rig Release:
Rig Name: West Alpha
Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
						Drilled 12 1/4" hole from 1348 m to 1485 m. Displaced the well with new 1,5 sg Barasilic mud while drilling from 1348 m to 1350 m.(New track).
18.05.2003	00:00 - 10:00	10,00	21	18	D121/4	Drilled 12 1/4" hole from 1485 m to 1776m. Drilled with 3450lpm, 290-300bar.
	10:00 - 11:30	1,50	21	62	D121/4	Circulated hole clean while reciprocating drill string. Circulated with 3650lpm, 300bar, 130rpm.
	11:30 - 14:30	3,00	21	44	D121/4	Flow checked well for 15 minutes. Performed wiper trip to 1358m. Average overpull 5-15T, maximum over pull 20T. Encountered obstruction while running in the hole at 1665m. Worked through with 25T down weight.
	14:30 - 00:00	9,50	21	18	D121/4	Broke circulation and continued drilling 12 1/4" hole from 1776m to 2030m. Drilled with 3450lpm, 295bar, 130rpm, 5-12KNm, WOB 2-6T.
19.05.2003	00:00 - 09:00	9,00	21	18	D121/4	Drilled 12 1/4" hole from 2030 m to 2242 m. Drilled with 3250lpm, 300bar, RPM 130, torque 10-17KNm, WOB 4-9T.
	09:00 - 13:00	4,00	21	62	D121/4	Circulated and conditioned mud to get mud up to required specification. Circulated with 3520lpm, 300bar, 20-60rpm.
	13:00 - 16:00	3,00	21	18	D121/4	Drilled 12 1/4" hole from 2242 m to 2325 m. Drilled with 3250lpm, 300bar, RPM 130, torque 10-17KNm, WOB 4-9T
	16:00 - 18:00	2,00	21	143	D121/4	Circulated bottoms up prior to change wash pipe. Racked back one stand and circulated the well through the cementing hose while changing the wash pipe. Circulated with 1500lpm, rotated with 20rpm.
	18:00 - 00:00	6,00	21	18	D121/4	Drilled 12 1/4" hole from 2325 m to 2438 m. Drilled with 3250lpm, 300bar, RPM 130, torque 10-17KNm, WOB 4-9T
20.05.2003	00:00 - 02:30	2,50	21	18	D121/4	Drilled 12 1/4" hole from 2438 m to 2492 m. Drilled with 3250 lpm, 300 bar, 115 rpm, 10-15 kNm torque, 3-6 t wob.
	02:30 - 03:30	1,00	21	143	D121/4	The 600 voltage power supply (SCR) to the drilling packaged tripped. Trouble shot and resat the the control system (Cyber Base and SCR). Found one circut tripped due to hight temprature.
	03:30 - 05:00	1,50	21	18	D121/4	Drilled 12 1/4" hole from 2492 m to 2519 m. Drilled with 3250 lpm, 300 bar, 130 rpm, 10-17 kNm torque,3-6 t wob.
	05:00 - 05:30	0,50	21	38	D121/4	Relogged section from 2492 m to 2510 m due to MWD not pulsing while drilling.
	05:30 - 08:00	2,50	21	18	D121/4	Drilled 12 1/4" hole from 2519 m to 2564 m. Drilled with 3250 lpm, 295 bar, 120 rpm, 10-25 kNm torque, 1-3 t wob.
	08:00 - 09:00	1,00	21	143	D121/4	Circulated the hole with one mud pump while changing piston and seats on mud pump no 2 and no 3 due to wash outs.
	09:00 - 10:00	1,00	21	18	D121/4	Drilled 12 1/4" hole from 2564 m to 2574 m. Drilled with 3250 lpm, 295 bar, 120 rpm, 10-20 kNm torque, 1-3 t wob.
	10:00 - 12:00	2,00	21	62	D121/4	Circulated the hole clean prior to a wiper trip. Circulated with 3500 lpm, 300 bar and 65 rpm.
	12:00 - 14:30	2,50	21	44	D121/4	Performed wiper trip from 2574 m to 1746 m (previous tripped section). Max 10 ton over pull at 2400 m and at 2020 m.
	14:30 - 16:30	2,00	21	44	D121/4	Ran back from 1746 m to bottom at 2574 m. Washed down the last stand. No restictions while running in hole.
	16:30 - 17:00	0,50	21	18	D121/4	Drilled 12 1/4" hole from 2574 m to 2577 m. Drilled with 3180 lpm, 300 bar, 120 rpm, 14-20 kNm torque, 7 t wob.
	17:00 - 18:00	1,00	21	143	D121/4	Got suction problems on mud pump (MP) no 2. Re-establshed suction on the MP. Then changed piston on MP no 3, cylinder no 2 and on MP no 1, cylinder 2.
	18:00 - 23:30	5,50	21	18	D121/4	Drilled 12 1/4" hole from 2577m to 2656 m. Drilled with 3150 lpm, 300 bar, 120 rpm, 15-27 kNm torque, 4-8 t wob.
	23:30 - 00:00	0,50	21	143	D121/4	Observed vibrations on the drill string while drilling. Reamed stand and recorded increase of vibrations. Located mud leak from the lower part of

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13
Spud Date: 22.04.2003
Event Name: GEO SIDETRACK
Start: 17.05.2003
End:
Contractor Name: Smedvig
Rig Release:
Rig Name: West Alpha
Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
20.05.2003	23:30 - 00:00	0,50	21	143	D121/4	the main shaft on the Top Drive. Found a 180 degreed crack on the main shaft and 0,2 m above the intermediate sub.
21.05.2003	00:00 - 04:30	4,50	21	143	D121/4	Continued to circulate while securing the kelly cocks. Installed the circulating swedge and circulated with 1400 lpm and 85 bar. Changed to long bails prior to resiprocate the string. Continued to circulate and resiprocate the string. Max 20 percent gas at the first bottoms up. Gas readings from 2,5% to 3% during the circulation.
	04:30 - 09:00	4,50	21	143	D121/4	Performed a flow check prior to circulate bottoms up to record gas at bottoms up. Recorded 3,3% gas at bottoms up. Circulated with 3000 lpm and 280 bar. Circulated until 1,5% gas in the return.
	09:00 - 13:30	4,50	21	143	D121/4	Performed a 30 min flow check and worked the string simultaneously. Continued to circulate with 3000 lpm and 280 bar. Recorded max 5,2% gas. Increased the mud weight from 1,52 sg to 1,54 sg. Circulated until 0,45% gas readings.
	13:30 - 14:00	0,50	21	143	D121/4	Performed a flow check. Pumped the slug and rigged down the circulating assembly.
	14:00 - 20:30	6,50	21	143	D121/4	Pulled out from 2656 m to 1129 m.
	20:30 - 22:30	2,00	21	143	D121/4	Checked and made up the hang off tool. Ran in and hung off the string in the well head. Pulled out the hang off running tool. Closed the middle pipe ram. Closed the blind shear ram. Monitored the well through the kill and choke lines. Established circulation with 500 lpm and 25 bar.
	22:30 - 00:00	1,50	21	143	D121/4	Undressed the top drive prior to change the main shaft. Attempted to circulate. Stopped pumping at 48 bar. Opened the middle pipe ram and monitored the well by pumping down the kill and up the choke line.
22.05.2003	00:00 - 08:30	8,50	21	143	D121/4	Undressed the top drive prior to change the main shaft. Cut off the main shaft piece below the crack. Broke off the saver sub, kelly cocks and the intermediate sub. Performed SJA prior to break off the subs. Washed down the top drive.
	08:30 - 09:30	1,00	21	143	D121/4	Re-installed the bails on the top drive prior to retrieve the drill string with 5" drill pipe.
	09:30 - 12:00	2,50	21	143	D121/4	Ran in and engaged the hang off tool. Washed before engaging. Worked to engage the hang off tool.
	12:00 - 12:30	0,50	21	143	D121/4	Pulled out with the hang off tool. Observed tool covered with fill.
	12:30 - 13:30	1,00	21	143	D121/4	Cleaned the hang off tool. Made up the hang off running tool (with Acme threads) onto a stand drill pipe. Racked the hang off assembly in the derrick.
	13:30 - 14:00	0,50	21	143	D121/4	Pulled the stand with kelly cock and Gray valve. Found Gray valve partly plugged with mud and cuttings.
	14:00 - 14:30	0,50	21	143	D121/4	Rigged up the circulating swedge and a 2" cement hose to the drill string. Attempted to circulate the string. Pumped with 30 lpm. The pump pressure fluctuated between 10 to 115 bar. Stopped pumping and continued to monitor the well on the trip tank. Attempted to circulate with 220bar without success.
	14:30 - 00:00	9,50	21	143	D121/4	Continued to undress the top drive and dismantling the main shaft with assistance from the vendor. Circulated the marine riser with the kill and choke lines to conditioned the mud. Pumped with 1600 lpm and 7 bar.
23.05.2003	00:00 - 19:00	19,00	21	143	D121/4	Continued to undress the top drive and dismantling the main shaft with assistance from the vendor. Received new main shaft from shore Monitored the well on the trip tank. Circulated the marine riser regulary.
	19:00 - 00:00	5,00	21	143	D121/4	Installed the new redressed main shaft with assistance from the vendor.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: GEO SIDETRACK Start: 17.05.2003 End:
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
23.05.2003	19:00 - 00:00	5,00	21	143	D121/4	Dressed up the top drive. Monitored the well on the trip tank. Circulated the marine riser regulary.
24.05.2003	00:00 - 03:00	3,00	21	18	D121/4	Continued to dress up the top drive.
	03:00 - 04:00	1,00	21	18	D121/4	Rigged down the scaffolding around the top drive.
	04:00 - 05:30	1,50	21	18	D121/4	Installed the main shaft trust nut.
	05:30 - 11:30	6,00	21	18	D121/4	Installed the blower assembly on the top drive. Filled oil on the swivel and gear box. Secured the bolts and nuts on the top drive.
	11:30 - 16:30	5,00	21	18	D121/4	Installed the intermediate sub, inside BOP assembly and the saver sub. Installed the washpipe.
	16:30 - 19:00	2,50	21	18	D121/4	Installed the link assembly with bails and the torque wrench assembly. Performed a function test. Checked out the entire top drive for loose parts and tools.
	19:00 - 20:00	1,00	21	18	D121/4	Pulled out from 1130 m to 930 m. Attempted to circulate. No go. Dropped a open drift before POOH.
	20:00 - 20:30	0,50	21	18	D121/4	Function tested the BOP on blue pod from the drill floor and on the yellow pod from the remote panel.
	20:30 - 00:00	3,50	21	18	D121/4	Continued to pull out from 930 m to 27 m. Laid down 2 x 8" drill collar joints and the BAT joint with a stab. Found the string plugged with cuttings on top of the MWD (pulsation part, DWD). Held kick drill with the crew.
25.05.2003	00:00 - 01:00	1,00	21	26	D121/4	Pulled out with the bottom hole assembly.
	01:00 - 02:30	1,50	21	26	D121/4	Dumped the MWD tool (BAT and DWD) memory.
	02:30 - 03:00	0,50	21	26	D121/4	Laid down the MWD (DWD) and the bit.
	03:00 - 04:00	1,00	21	26	D121/4	Prepared to test the mud motor and the MWD (DWD).
	04:00 - 04:30	0,50	21	142	D121/4	Changed an overtorqued cross over sub from top drive and to the mud motor assembly.
	04:30 - 05:00	0,50	21	92	D121/4	Tested the mud motor and the MWD. OK.
	05:00 - 05:30	0,50	21	26	D121/4	Made up a new bit.
	05:30 - 07:00	1,50	21	26	D121/4	Programmed the MWD tool and pumped through the assembly with 2500 lpm and 75 bar according to the service hand.
	07:00 - 08:00	1,00	21	26	D121/4	Pulled out and changed bit due to increase of the nozzle size.
	08:00 - 12:00	4,00	21	54	D121/4	Set the scribe line and ran in to 1307 m with the 12 1/4" bit. Broke the circulation every 500 m.
	12:00 - 13:00	1,00	21	142	D121/4	Made up a circulating swedge. Removed the wash pipe prior to test run the top drive while slip and cut the drill line.
	13:00 - 14:30	1,50	21	96	D121/4	Slipped and cut the drilling line. Simultaneously test rotated the top drive with 180 rpm. Circulated the bottoms up through the swedge assembly.
	14:30 - 17:30	3,00	21	142	D121/4	Inspected and shimmed the top drive. Re-installed the washpipe and pressure tested it.
	17:30 - 21:00	3,50	21	54	D121/4	Continued to run in from 1307 m to 2636 m with the 12 1/4" bit. String held up with 15 ton at 2636 m. Broke the circulation every 500 m.
	21:00 - 21:30	0,50	21	54	D121/4	Washed down the stand from 2636 m to 2640 m.
	21:30 - 23:30	2,00	21	62	D121/4	Continued to wash from 2640 m to bottom at 2656 m. Circulated and conditioned the mud. Max gas during circulating was 24 % of LEL recorded by the drilling contractor in the shaker room and 7,8 % in the mud by the mud logger. Evacuated the shaker while flow checking.
	23:30 - 00:00	0,50	21	18	D121/4	Drilled 12 1/4" hole from 2656 m to 2663 m. Drilled with 1-4 t wob, 120 rpm, 16-22 kNm torque, 3000 lpm, 280 bar.
26.05.2003	00:00 - 18:30	18,50	21	18	D121/4	Drilled 12 1/4" hole from 2663 m to 2951 m. Drilled with 2-9 tons wob, 120 rpm, 9-27 knm torque, 185 spm, 3000 ltr/min. Bottom Draupne found at 2937 m.
	18:30 - 21:00	2,50	21	62	D121/4	Circulated for samples. Pumped with 185 spm and 3000 ltr/min.
	21:00 - 22:30	1,50	21	44	D121/4	Pulled the drillstring out of the hole from 2951 m to 2600 m. No

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: GEO SIDETRACK Start: 17.05.2003 End:
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
26.05.2003	21:00 - 22:30	1,50	21	44	D121/4	restrictiones was observed.
	22:30 - 23:00	0,50	21	44	D121/4	Ran in hole with the drillstring from 2600 m to 2951 m. No restrictiones was observed.
	23:00 - 00:00	1,00	21	62	D121/4	Circulated and conditioned the mud. Pumped with 185 spm and with 3000 ltr/min. Rotated the drillstring with 30 rpm.
27.05.2003	00:00 - 03:00	3,00	21	62	D121/4	Circulated and conditioned the mud. Pumped with 285 bar and 3100 ltr/min. Flowchecked the well and pumped slug.
	03:00 - 07:00	4,00	21	54	D121/4	Pulled out of the hole with the 12 1/4" bit from 2951 m to 1293 m.
	07:00 - 08:30	1,50	21	54	D121/4	Flowchecked the well. Dropped a 2 9/16" drift into the drillstring. Pulled out of hole with the 12 1/4" bit from 1293 m to 344 m.
	08:30 - 09:00	0,50	21	54	D121/4	Flowchecked the well prior to pull the BHA through the BOP and pulled the BHA out of hole from 344 m to 228 m.
	09:00 - 11:30	2,50	21	26	D121/4	Held a prejob meeting with the crew and pulled the BHA out of the hole from 228 m to surface.
	11:30 - 12:30	1,00	21	26	D121/4	Downloaded the MWD and broke off the bit. Racked the MWD stand in the derrick.
	12:30 - 13:30	1,00	23	76	R95/8L	Cleared the drill floor. Held a prejob meeting with involved personnel.
	13:30 - 15:00	1,50	23	76	R95/8L	Rigged up for running the 9 5/8" liner.
	15:00 - 00:00	9,00	23	78	R95/8L	Ran the 9 5/8" liner string according to running list to 120 m. Difficult to stab and make up joints number 5,6,7 and 8. These joints where laid down due to damaged threads.
28.05.2003	00:00 - 06:30	6,50	23	78	R95/8L	Ran 9 5/8" liner from 120 m to 471 m. Laid down liner joints no. 41,40 and 37 due to damaged threads.
	06:30 - 07:30	1,00	23	128	R95/8L	Repaired software failure on the eagle light.
	07:30 - 18:00	10,50	23	78	R95/8L	Ran 9 5/8" liner from 471 m to 932 m. Laid down liner joints no. 12,80 and 81 due to damaged threads.
	18:00 - 18:30	0,50	23	128	R95/8L	Reprogrammed software on the eagle light.
	18:30 - 23:30	5,00	23	78	R95/8L	Ran 9 5/8" liner from 932 m to 1316 m.
	23:30 - 00:00	0,50	23	78	R95/8L	Made up the circulating head on the 9 5/8" liner and circulated for 10 minutes. Pumped 970 ltr/min with 20 bar.
29.05.2003	00:00 - 02:30	2,50	23	78	R95/8L	Ran the 9 5/8" liner from 1316 m to 1453 m.
	02:30 - 03:00	0,50	23	126	R95/8L	Laid down liner joint no. 19 and 20 due to damaged threads.
	03:00 - 06:00	3,00	23	78	R95/8L	Ran the 9 5/8" liner from 1453 m to 1681 m.
	06:00 - 07:00	1,00	23	78	R95/8L	Picked up the liner hanger. Checked and made up the liner hanger.
	07:00 - 08:00	1,00	23	76	R95/8L	Rigged down the liner running equipment and cleared the drill floor. Held a prejob meeting with involved personnel prior to start running the 9 5/8" liner on the landing string.
	08:00 - 09:00	1,00	23	78	R95/8L	Ran in hole with the 9 5/8" liner from 1681 m to 1755 m. Observed 11 tons downweight. Worked the string and continued to run the 9 5/8" liner in hole to 1839 m.
	09:00 - 11:00	2,00	23	62	R95/8L	Filled the running string and broke circulation. Increased the SPM in steps and circulated the hole clean with 1500 ltr/min and 40 bar.
	11:00 - 13:00	2,00	23	78	R95/8L	Ran the 9 5/8" liner from 1859 m to 2102 m.
	13:00 - 13:30	0,50	23	78	R95/8L	Observed 11 tons downweight at 2102 m. Worked the liner free.
	13:30 - 14:30	1,00	23	78	R95/8L	Ran the 9 5/8" liner from 2102 m to 2295 m.
	14:30 - 15:00	0,50	23	78	R95/8L	Observed 11 tons downweight at 2295 m, worked the liner free. Ran the 9 5/8" liner from 2295 m to 2322 m.
	15:00 - 17:30	2,50	23	78	R95/8L	Filled the running string and broke the circulation. Increased the SPM in steps to 1500 ltr/min and 45 bar. Worked the string down from 2322 m to 2350 m.
	17:30 - 20:00	2,50	23	78	R95/8L	Ran the 9 5/8" liner from 2350 m to 2405 m. Observed 10 tons downweigth at at 2405. Circulated bottoms up with 1200 ltr/min and 45 bar.
	20:00 - 21:30	1,50	23	64	R95/8L	Washed the 9 5/8" liner down from 2405 m to 2514 m. Pumping with 1200

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: GEO SIDETRACK Start: 17.05.2003 End:
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
29.05.2003	20:00 - 21:30	1,50	23	64	R95/8L	ltr/min and 40 bar.
	21:30 - 22:30	1,00	23	78	R95/8L	Ran the 9 5/8" liner from 2514 m to 2761 m. Observed 10 tons downweight at 2761 m.
	22:30 - 23:00	0,50	23	64	R95/8L	Washed 9 5/8" liner down from 2761 m to 2788 m.
	23:00 - 23:30	0,50	23	78	R95/8L	Ran the 9 5/8" liner from 2788 m to 2939 m. This depth was later corrected to 2912 m.
	23:30 - 00:00	0,50	23	78	R95/8L	Made up the cementing stand and installed the high pressure hoses.
30.05.2003	00:00 - 01:30	1,50	23	78	R95/8L	Work and circulated the 9 5/8" liner out of hole from 2925 m to 2912 m. Racked the cement stand and added a stand of 5" drill pipe due to a misscount in the tally.
	01:30 - 02:00	0,50	23	78	R95/8L	Washed the 9 5/8" liner from 2912 m to 2930 m. Pumped with 182 ltr/min and 43 bar. Observed 50 tons restriction at 2930 m. Attempt to run the liner in hole to planned setting depth. The liner indicated set at 2920 m.
	02:00 - 04:00	2,00	23	78	R95/8L	Circulated the hole at 2920 m with 181 ltr/min and 62 bar. Pulled the 9 5/8" liner out from 2920 m to 2912 m. Made up the cement stand and ran in hole to 2920 m. Observed the hanger set.
	04:00 - 05:00	1,00	23	78	R95/8L	Pressure tested the surface lines to 345 bar. Dropped the ball and sheared with 271 bar.
	05:00 - 10:30	5,50	23	62	R95/8L	Circulated the well prior to the cement job with 2000 ltr/min and 255 bar. After 3300 strokes pumped the flowrate was reduced due to loss in the hole. Increased the flow in steps from 200 ltr/min to 1300 ltr/min and 90 bar.
	10:30 - 13:00	2,50	23	88	R95/8L	Pumped 20 m3 of spacer. Mixed and pumped 35 m3 of 1,9 sg cement slurry. Dispaced the cement with 1500 ltr/min using the rig pumps. Bumped the plug at 4557 strokes. No losses was observed.
	13:00 - 15:30	2,50	23	78	R95/8L	Pressure tested the liner to 282 bar for 10 minutes. Attempt to set the PBR and pressure tested without any success. Made several attempts without any success.
	15:30 - 16:30	1,00	23	62	R95/8L	Circulated bottoms up with 1975 ltr/min and 40 bar.
	16:30 - 19:30	3,00	23	54	R95/8L	Flowchecked the well and pumped slug. Pulled the liner running string out of hole to surface.
	19:30 - 00:00	4,50	23	54	R95/8L	Made up the tieback packer assembly and ran in hole to 1074 m.
31.05.2003	00:00 - 00:30	0,50	23	140	R95/8L	Ran in hole with the tieback packer from 1074 m to 1184 m.
	00:30 - 01:30	1,00	23	140	R95/8L	Made up the top drive and circulated for 5 min with 282 ltr/min and 8 bar. Ran in hole from 1184 m to 1212 m. Recorded up/down weights both 80 tons. Continued to run in hole from 1212 m and tagged top of PBR at 1227 m while pumping with 283 ltr/min and 8 bar. Entered the tieback and observed a pressure increase of 2,5 bar.
	01:30 - 03:00	1,50	23	140	R95/8L	Made several unsuccessful attempts to set the tieback packer by 40 tons downweight. Pressured up to 50 bar to assist setting with the upper annular closed. Observed leakoff to the formation at 30 bar.
	03:00 - 04:30	1,50	23	140	R95/8L	Pulled out of the PBR without observing any overpull. Flowchecked the well. Pulled out of hole from 1227 m to 1101 m.
	04:30 - 09:00	4,50	23	140	R95/8L	Flowchecked the well and pumped slug. Pulled out of hole from 1101 m to surface.
	09:00 - 09:30	0,50	23	140	R95/8L	Removed 4 of the shear pins on the tieback packer setting tool. Added one stand of 8" drill collar to the running string.
	09:30 - 14:30	5,00	23	140	R95/8L	Ran in hole with the tieback packer assembly from surface to 1184 m.
	14:30 - 15:00	0,50	23	140	R95/8L	Washed down from 1184 m to 1227 m with 300 ltr/min and 7 bar.
	15:00 - 17:30	2,50	23	140	R95/8L	Stung in the PBR and performed the low pressure test to 50 bar. Attempted to set the tieback packer with 40 tons downweight. Closed the upper pipe ram and pressured the annulus up to 88 bar to assist setting. Observed pressure dropped to 25 bar. Opened the upper pipe ram and

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: GEO SIDETRACK Start: 17.05.2003 End:
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
31.05.2003	15:00 - 17:30	2,50	23	140	R95/8L	attempted to reset the tieback packer. Closed the upper annular preventer and pressured up to 30 bar. Attempted to increase the pressure to 50 bar. The pressure dropped off to 35 bar. Closed the upper pipe ram and opened the upper annular preventer. Attempted to increase the pressure without any success.
	17:30 - 22:00	4,50	23	140	R95/8L	Flowchecked the well and pulled out of hole with the tieback packer assembly from 1227 m to surface.
	22:00 - 23:30	1,50	23	32	R95/8L	Made up the wash tool and ran in hole. Washed the slip joint and BOP area.
	23:30 - 00:00	0,50	23	32	R95/8L	Continued to run in hole the BOP test tool and landed in the well head.
01.06.2003	00:00 - 00:30	0,50	23	32	R95/8L	Landed the BOP test tool in the wellhead.
	00:30 - 03:30	3,00	23	32	R95/8L	Pressure tested the BOP on the yellow pod to 25/289 bar for 5/10 minutes. Function tested the BOP on the blue pod from the Toolpushers office.
	03:30 - 04:30	1,00	23	32	R95/8L	Pressure tested the mud hose and the I-BOP on the top drive to 35/345bar for 5/10 minutes.
	04:30 - 06:00	1,50	23	32	R95/8L	Pulled the BOP test tool and the washing tool to the surface and laid them down.
	06:00 - 06:30	0,50	23	54	R95/8L	Laid down the cement head.
	06:30 - 07:30	1,00	21	152	R95/8L	Cleared the drillfloor and performed a safety check on the top drive.
	07:30 - 13:30	6,00	21	26	D81/2	Made up the 8 1/2" BHA.
	13:30 - 15:30	2,00	21	54	D81/2	Ran in hole from 223 m to 650 m. Filled the string and tested the MWD. Circulated the well due to 8 % gas reading.
	15:30 - 16:30	1,00	21	54	D81/2	Ran in hole from 650 m to 1110 m.
	16:30 - 17:00	0,50	21	62	R95/8L	Circulated the hole and observed 8 % gas in the mud and 64 % LEL in the shaker house after 1700 strokes. Flowchecked the well on the trip tank.
	17:00 - 19:30	2,50	21	62	R95/8L	Closed the upper annular preventer on the BOP and circulated the well over the chokes and the poor boy degasser. Recorded 8,4 % gas with open chokes.
	19:30 - 20:00	0,50	21	62	R95/8L	Flowchecked the well on the trip tank. Opened the upper annular preventer and observed a gain. Closed in the well.
	20:00 - 20:30	0,50	21	54	R95/8L	Ran in hole from 1110 m to 1223 m.
	20:30 - 22:30	2,00	21	62	R95/8L	Circulated bottoms up with 1827 ltr/min and 149 bar. Reduced flow to 1079 ltr/min and 55 bar. Maximum gas reading was 16,08 %.
	22:30 - 23:00	0,50	21	62	R95/8L	Flowchecked the well on the trip tank. Circulated the active pit over the shakers to verify degasser function.
	23:00 - 23:30	0,50	21	54	R95/8L	Pulled out of hole from 1223 m to 1165 m.
	23:30 - 00:00	0,50	21	62	R95/8L	Circulated the hole while increasing the mudweight from 1,54 sg to 1,65 sg.
02.06.2003	00:00 - 02:00	2,00	21	138	R95/8L	Circulated the hole and increased the mud weight from 1,55 sg to 1,65 sg. Maximum gas reading was 16,52 %
	02:00 - 04:30	2,50	21	138	R95/8L	Flow checked the well. Circulated bottoms up with maximum gas reading 10,76 %.
	04:30 - 08:30	4,00	21	138	R95/8L	Increased the mud weight from 1,65 sg to 1,67 sg. Circulated the well and the maximum gas reading was 9,1%.
	08:30 - 09:00	0,50	21	138	R95/8L	Circulated the surface volum to verify degasser function. 2% gas in suction mud.
	09:00 - 11:00	2,00	21	138	R95/8L	Circulated the well and increased the mud weight from 1,67 sg to 1,68 sg.
	11:00 - 11:30	0,50	21	138	R95/8L	Flow checked the well.
	11:30 - 13:30	2,00	21	138	R95/8L	Pulled the drill string out of hole from 1223 m to 360 m.
	13:30 - 16:00	2,50	21	138	R95/8L	Pulled the 8 1/2" BHA out of hole. Removed the radioactive sources and downloaded the MWD. Racked the BHA in the derrick.
	16:00 - 18:00	2,00	21	140	R95/8L	Made up the tieback packer assembly and ran in hole with the BHA to 201 m.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: GEO SIDETRACK Start: 17.05.2003 End:
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
02.06.2003	18:00 - 21:30	3,50	21	140	R95/8L	Ran in hole with the tieback packer assembly on drill pipe from 201 m to 1212 m.
	21:30 - 22:30	1,00	21	140	R95/8L	Made up the top drive and ran in hole to 1227 m. Set the tieback packer according to PEAK procedure. Pressure tested the packer to 100 bar.
	22:30 - 23:00	0,50	21	140	R95/8L	Circulated bottoms up. Maximum gas reading was 6,2 %.
	23:00 - 23:30	0,50	21	140	R95/8L	Pressure tested the tieback packer to a surface pressure of 200 bar for 10 minutes.
	23:30 - 00:00	0,50	21	140	R95/8L	Pulled the tieback packer running assembly out of hole from 1227 m to 1020 m.
03.06.2003	00:00 - 01:00	1,00	21	138	D121/4	Pulled the running string for the tieback packer out of the hole from 1020 m to 202 m.
	01:00 - 01:30	0,50	21	138	D121/4	Pulled the tieback packer running tool out of the hole and laid it down.
	01:30 - 04:30	3,00	21	26	D121/4	Made up the 8 1/2" BHA and ran in hole from surface to 223 m.
	04:30 - 05:00	0,50	21	52	D121/4	Ran in hole with the 8 1/2" drilling assembly from 223 m to 425 m on drill pipe.
	05:00 - 08:30	3,50	21	143	D121/4	Ran in the hole with the 8 1/2" drilling assembly from 425 m to 822 m. The trip was continued from 425 m to 822 m using manual handling equipment due to break down of the Iron Roughneck.
	08:30 - 11:00	2,50	21	26	D121/4	Ran in hole with 5 joints of 8" drill collars and a drilling jar. Pulled them out and laid them down on deck.
	11:00 - 12:00	1,00	21	143	D121/4	Ran in hole from 822 m to 905 m with the 8 1/2" drillstring using manual handling equipment.
	12:00 - 14:00	2,00	21	52	D121/4	Tested the MWD at 905 m and continued to run in the hole with the 8 1/2" drilling assembly from 905 to 1700 m using manual handling equipment..
	14:00 - 14:30	0,50	21	143	D121/4	Evaluated the tripping operation at 1700 m.
	14:30 - 17:30	3,00	21	52	D121/4	Ran in hole from 1700 m to 2872 m with the 8 1/2" drillstring using manual handling equipment.
	17:30 - 20:00	2,50	21	62	D121/4	Held a prejob meeting prior to displacing the well to 1,23 sg mud. Picked up one single 5" drill pipe and ran in hole from 2827 m to 2841 m. Filled the drill string, ran in hole and tagged the 9 5/8" liner landing collar at 2883 m.
	20:00 - 22:30	2,50	21	20	D121/4	Displaced the kill, choke and booster lines to 1,23 sg mud. Drilled the landing collar and shoe track from 2883 m to 2912 m while displacing the hole to 1,23 sg mud. No firm cement was found below the landing collar.
	22:30 - 00:00	1,50	21	20	D121/4	Flowchecked the tieback packer for 30 minutes. Held a prejob meeting with involved personnel prior to drilling out the 9 5/8" liner shoe.
04.06.2003	00:00 - 02:30	2,50	21	14	D81/2	Drilled out the landing collar and the shoetrack. No firm cement in the shoetrack. Drilled out the 9 5/8" liner shoe at 2919 m Worked the shoe area. Drilled out the rathole. No firm cement in the rathole. Drilled 3 m of new formation from 2951 m to 2954 m. Worked the shoetrack and pulled the bit into the liner shoe at 2919 m.
	02:30 - 03:30	1,00	21	74	D81/2	Performed a FIT test equivalent to 1,88 sg with 183 bar surface pressure.
	03:30 - 04:00	0,50	21	14	D81/2	Ran in hole to 2954 m and drilled 8 1/2" hole from 2954 m to 2957 m. Pulled the bit into the liner shoe at 2919 m.
	04:00 - 05:00	1,00	21	74	D81/2	Performed a verification of the FIT test equivalent to 1,58 sg with 100 bar surface pressure.
	05:00 - 08:30	3,50	21	14	D81/2	Ran in hole to bottom and drilled 8 1/2" hole from 2957 m to 3021 m. Drilled with 2023 ltr/min and 148 bar. RPM was 100 and the drilling torque was 17 knm
	08:30 - 10:00	1,50	21	140	D81/2	Pulled one stand and changed out leaking connection of 5" drill pipe. Found 4 other damaged connectiones on top of stands.
	10:00 - 16:00	6,00	21	14	D81/2	Drilled 8 1/2" hole from 3021 m to 3151 m with the same drilling parameters.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: GEO SIDETRACK Start: 17.05.2003 End:
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
04.06.2003	16:00 - 17:00	1,00	21	62	D81/2	Circulated the well.
	17:00 - 18:00	1,00	21	54	D81/2	Pulled out of hole from 3151 m to 3104 m. The string was sticky on connectiones. Maximum overpull on one connection was 30 tons. Pumped the string out from 3104 m to 3077 m. Pulled the string out of hole from 3077 m to 2910 m.
	18:00 - 19:00	1,00	21	54	D81/2	Ran in hole from 2910 m to 3153 m and tagged bottom at 3153 m.
	19:00 - 20:30	1,50	21	62	D81/2	Circulated bottoms up and taged bottom at 3153 m.
	20:30 - 21:30	1,00	21	54	D81/2	Flowchecked the well and pumped slug. Pulled out of hole from 3153 m to 2910 m. No overpull was observed.
	21:30 - 00:00	2,50	21	54	D81/2	Flowchecked the well at 2910 m and continued to pull out of hole from 2910 m to 627 m.
05.06.2003	00:00 - 00:30	0,50	21	54	D81/2	Pulled the drillstring out of the hole from 627 m to 223 m. Flowchecked prior to pulling the BHA through the BOP.
	00:30 - 03:00	2,50	21	26	D81/2	Pulled the BHA out of the hole from 223 m to surface.
	03:00 - 03:30	0,50	24	66	D81/2	Rigged up for wire line logging.
	03:30 - 00:00	20,50	24	68	D81/2	Made up tool string no. 1 MDT,GR,ACTS in at 04:15 hrs out at 13:20 hrs. Made up toolstring no. 2 MDT with sample catcher in at 14:00 hrs out at 20:40 hrs. Made up tool string no. 3 ACTS,GR,VSP in at 22:00 hrs.
06.06.2003	00:00 - 07:30	7,50	24	68	D81/2	Logged the hole with logging tool no. 3, ACTS,GR,VPS out at 06:45 hrs.
	07:30 - 17:00	9,50	24	68	D81/2	Logged the hole with logging tool no. 4, CST,GR inn at 09:00 hrs and out at 15:40 hrs. A total of 21 core samples was recovered out of 30. Two was lost in the well and seven was partial empty. Laid down the wireline logging equipment.
	17:00 - 19:30	2,50	25	54	D81/2	Laid down the 8" mud motor assembly. Cleared the drill floor. Held a pre job meeting with involved personnel prior to picking up 3 1/2" cementing string. Changed to 3 1/2" handling equipment. Installed the diverter bag.
	19:30 - 21:00	1,50	25	54	P&A	Made up the 3 1/2" diverter sub and ran in hole with 3 1/2" drill pipe to 150 m.
	21:00 - 21:30	0,50	25	143	P&A	One seger ring was observed below the top drive. Investigated the origin of the seger ring.
	21:30 - 22:30	1,00	25	54	P&A	Ran in hole with 3 1/2" drill pipe from 150 m to 299 m.
	22:30 - 00:00	1,50	25	54	P&A	Ran in hole with the cement string from 299 m to 900 m.
07.06.2003	00:00 - 02:00	2,00	25	54	P&A	Ran in hole with the cement string from 900 m to 2850 m
	02:00 - 02:30	0,50	25	54	P&A	Made up a circulating swedge on a joint of 5" drill pipe and laid it down on the catwalk machine.
	02:30 - 03:30	1,00	25	64	P&A	Broke the circulation and washed from 2850 m to 2920 m.
	03:30 - 04:30	1,00	25	54	P&A	Ran in hole with the cementing string from 2920 m to 3153 m. Tagged bottom with 5 tons.
	04:30 - 08:00	3,50	25	62	P&A	Circulated bottoms up with 2500 SPM and 135 bar.. Held a pre job meeting with involved personnel prior to cementing. Observed a gas level of 10 %. Inceased the mudweight to 1,26 sg. Reduced the gas reading to 0,8%.
	08:00 - 09:30	1,50	25	88	P&A	Made up the cement joint and pressure tested the cementing hose to 345 bar for 5 minutes prior to setting cement plug no. 1a. Pumped 6 m3 of spacer. Pumped 8,2 m3 of cement slurry. Pumped 0,3 m3 spacer behind the cement slurry. Displaced the cement slurry with 24m3 mud. All pumping was done with the cement unit.
	09:30 - 10:00	0,50	25	54	P&A	Pulled the cement string out of hole from 3153 m to 2980 m.
	10:00 - 11:30	1,50	25	62	P&A	Circulated 1 1/2 times bottoms up with 120 RPM. Dumped 40 m3 contaminated mud.
	11:30 - 12:30	1,00	25	88	P&A	Made up the cement joint and pressure testet the cement hose to 345 bar for 5 minutes. Pumped 6 m3 of spacer. Pumped 9,2 m3 og cement slurry.

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: GEO SIDETRACK Start: 17.05.2003 End:
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
07.06.2003	11:30 - 12:30	1,00	25	88	P&A	Pumped 07 m3 of spacer. Displaced the cement slurry with 22,2 m3. Pumped 1200 ltr/min and rotated 20 RPM. All puming was done with the cement unit.
	12:30 - 13:00	0,50	25	54	P&A	Pulled the cementing string out of hole from 2980 m to 2750 m. Mixed in corrositon innhibitor.
	13:00 - 14:00	1,00	25	62	P&A	Circulated 1 1/2 times bottoms up with 2500 ltr/min and 130 bar. Mixed corrosition innhibitor. Rotated with 120 RPM. Dumped 13 m3 of contaminated mud.
	14:00 - 15:00	1,00	25	48	P&A	Flowchecked the well and pumped slug. Investigated unstable volum due to foam in the mud.
	15:00 - 17:00	2,00	25	54	P&A	Pulled the cement string out of the hole from 2750 m to 1290 m.
	17:00 - 17:30	0,50	25	64	P&A	Washed the setting area for the bridge plug from 1290 m to 1260 m. Pumped with 3000 ltr/min and 140 bar.
	17:30 - 20:30	3,00	25	54	P&A	Pulled the cement string out of hole from 1260 m to surface. Laid down the 3 1/2" cement stinger.
	20:30 - 22:30	2,00	25	54	P&A	Changed handling equipment. Held a prejob meeting with involved personnel prior to using manual handling equipment.Laid down exess tubular from the derrick.
	22:30 - 00:00	1,50	25	54	P&A	Ran in hole with 8 1/2" bit from surface to 1000 m.
08.06.2003	00:00 - 01:00	1,00	25	54	P&A	Ran in the hole with 8 1/2" bit from 1000 m to 1971 m.
	01:00 - 03:00	2,00	25	152	P&A	Cut and slipped 116' of drilling line.
	03:00 - 05:00	2,00	25	54	P&A	Ran in the hole with 8 1/2" bit from 1971 m to 2850 m.
	05:00 - 05:30	0,50	25	94	P&A	Tagged the cement with 10 tons at 2850 m. Pressure tested the bottom cement plug to 245 bar for 10 minutes.
	05:30 - 06:30	1,00	25	54	P&A	Pumped slug, pulled out of hole from 2850 m to 2799 m and laid down the BAT tool.
	06:30 - 07:00	0,50	25	54	P&A	Pulled out of the hole with 8 1/2" bit from 2799 m to 2577 m
	07:00 - 08:00	1,00	25	54	P&A	Laid down the drilling jar and 2 joints of drill collar.
	08:00 - 09:00	1,00	25	54	P&A	Pulled out of the hole with 8 1/2" bit from 2577 m to 1532 m. Held a pre job meeting prior to laying down 5" drill pipe using the eagle light.
	09:00 - 10:00	1,00	25	54	P&A	Pulled out of the hole with 8 1/2" bit from 1532 m to 1395 m while laying out 5" drill pipe.
	10:00 - 10:30	0,50	25	54	P&A	Laid down the accelerator and 2 joints of 6 1/2" drill collar.
	10:30 - 16:30	6,00	25	54	P&A	Continued to pull out of the hole with 8 1/2" bit from 1395 m to surface while laying down 5" drill pipe.
	16:30 - 17:00	0,50	25	54	P&A	Made up the bridge plug running tool and the bridge plug on 5" drill pipe.
	17:00 - 19:30	2,50	25	54	P&A	Ran in hole with the bridge plug from suface to 1277 m.
	19:30 - 20:30	1,00	25	54	P&A	Set the bridge plug at 1277 m. Plulled free with 16 tons overpull. Pressure tested the bridge plug to 240 bar for 10 minutes.
	20:30 - 22:00	1,50	25	88	P&A	Held a pre job meeting with involved personnel prior to cementing plug no. 2. Pressure tested the cement line to 345 bar. Pumped 6 m3 spacer. Mixed and pumped 10 m3 cement slurry. Pumped 0,85 m3 spacer. Displaced the cement with 8,2 m3 1,26 sg mud. All pumping was done with the cement unit.
	22:00 - 22:30	0,50	25	54	P&A	Pulled out of hole from 1277 m to 991 m.
	22:30 - 23:30	1,00	25	62	P&A	Circulated 1 1/2 times bottoms up.
	23:30 - 00:00	0,50	25	54	P&A	Pumped slug and pulled out of the hole with the bridge plug running tool from 991 m to 850 m.
09.06.2003	00:00 - 03:30	3,50	25	143	P&A	Performed repair after collision between top drive and eagle light.
	03:30 - 05:00	1,50	25	54	P&A	Pulled out of hole from 850 m to 441 m while laying out drill pipe.
	05:00 - 06:00	1,00	25	143	P&A	Changed broken hydraulic hose on the iron roughneck.
	06:00 - 07:00	1,00	25	54	P&A	Pulled out of the hole from 441 m to 385 m without using the eagle light.
	07:00 - 09:00	2,00	25	54	P&A	Held a pre job meeting with the oncomming crew and pulled out of hole

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: GEO SIDETRACK Start: 17.05.2003 End:
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
09.06.2003	07:00 - 09:00	2,00	25	54	P&A	from 303 m to surface.
	09:00 - 09:30	0,50	25	54	P&A	Made up the mule shoe on 5" drill pipe and ran in hole from surface to 346 m.
	09:30 - 10:00	0,50	25	62	P&A	Circulated bottoms up and pressure tested the cement hose to 200 bar. Held a pre job meeting with involved personnel prior to the cement job.
	10:00 - 11:30	1,50	25	88	P&A	Installed and pumped down the cement support tool. Pulled out of hole from 346 m to 335 m. Pumped 10 m3 of seawater spacer. Pumped 17 m3 of cement slurry. Displaced the cement with 0,8 m3 seawater. All pumping was done with the cement unit.
	11:30 - 12:00	0,50	25	54	P&A	Pulled out of hole from 335 m to 130 m.
	12:00 - 13:00	1,00	25	62	P&A	Reversed out exessive cement. Dumped 2 m3 of contaminated mud.
	13:00 - 17:30	4,50	25	54	P&A	Laid down exessive tubular from the derrick.
	17:30 - 18:30	1,00	25	54	P&A	Removed diverter and wipers and laid down the emergency hang off tool.
	18:30 - 21:00	2,50	25	54	P&A	Laid down one stand of 9 1/2" drill collar from the derrick.
	21:00 - 22:00	1,00	25	54	P&A	Made up the wear bushing running tool and ran in hole to 90 m.
	22:00 - 23:00	1,00	25	62	P&A	Displaced the riser, kill, choke and booster lines to seawater. Washed the BOP bore.
	23:00 - 00:00	1,00	25	54	P&A	Retrieved the wear bushing with 25 tons over pull. Pulled the wear bushing to surface and laid it down.
10.06.2003	00:00 - 00:30	0,50	25	26	P&A	Laid down 3 joints of 9 1/2" drill collars.
	00:30 - 03:30	3,00	25	30	P&A	Made preparationes for pulling the BOP.
	03:30 - 05:00	1,50	25	88	P&A	Ran in hole with the 8 1/2" bit and tagged cement plug no. 3 at 127 m. Pulled out of hole from 127 m to 60 m and pressure tested cement plug no. 3 to 128 bar.
	05:00 - 10:00	5,00	25	30	P&A	Rigged up to pull the BOP.
	10:00 - 16:30	6,50	25	30	P&A	Disconnected the BOP from the well head. Pulled the rig 30 m off location to the starboard. Laid down the diverter and the slip joint.
	16:30 - 17:30	1,00	25	143	P&A	Changed a leaking hydraulic hose on the gantry crane.
	17:30 - 20:30	3,00	25	30	P&A	Pulled the BOP and riser. Landed the BOP on the moon pool spider beams.
	20:30 - 22:30	2,00	25	30	P&A	Raised the drill floor. Picked up the BOP and landed it on the BOP transporter.
	22:30 - 00:00	1,50	25	30	P&A	Skidded the BOP to the storage area.
11.06.2003	00:00 - 00:30	0,50	25	30	P&A	Parked and secured the BOP.
	00:30 - 02:00	1,50	25	30	P&A	Lowered rotary and closed hatches. Prepared rig floor to lay down riser joints. Moved rig to well center.
	02:00 - 03:00	1,00	25	30	P&A	Laid down riser pup joint and rigged down the BOP pulling equipment.
	03:00 - 04:00	1,00	25	84	P&A	Rigged up to run cutting assembly. Adjusted the draw work brakes.
	04:00 - 06:30	2,50	25	84	P&A	Ran in with the wellhead cutting assembly and stabbed into the wellhead. Started cutting the 20" and 30" casings 5 m below seabed with 2800-3200 lpm/120-155 bar. Got pressure build up to 250 bar.
	06:30 - 08:30	2,00	25	84	P&A	Attempted to latch MOST tool, but without sucess due to VX ring left in wellhead. Removed the VX ring and locked the MOST tool to the wellhead. Attempted to pull the wellhead loose with 160 MT overpull without success.
	08:30 - 09:30	1,00	25	84	P&A	Continued to cut the 20" and 30" casing 5 m below seabed with 3200 lpm/235 bar. The pressure increased to 197 bar. Pulled the wellhead free with 140 MT overpull
	09:30 - 10:00	0,50	25	84	P&A	Pulled out with the wellhead, guide base and 20" x 30" stump.
	10:00 - 11:30	1,50	25	84	P&A	Landed the guide base on the moonpool skid and secured same. Disconnected the MOST tool and laid down same.
	11:30 - 13:00	1,50	25	84	P&A	Made up the guide base retrieving tool and engaged same to guide base. Retrieved casing stump and laid down same. Skidded the guide base to

Operations Summary Report

Legal Well Name: 15/12-13
Common Well Name: 15/12-13 Spud Date: 22.04.2003
Event Name: GEO SIDETRACK Start: 17.05.2003 End:
Contractor Name: Smedvig Rig Release:
Rig Name: West Alpha Rig Number: 1

Date	From - To	Hours	Code	Sub Code	Phase	Description of Operations
11.06.2003	11:30 - 13:00	1,50	25	84	P&A	deck.
	13:00 - 16:00	3,00	25	24	P&A	Laid down remaining tubulars from the derrick: 2 x 5" DP, 9 x 5" HWDP and 6 x 8" DC's.
	16:00 - 00:00	8,00	20	4	P&A	Pulled the anchors. Anchor #5 on bolster 16:25 hrs., #1 on bolster 18:18 hrs., #8 on bolster 17:45 hrs., #7 on bolster 20:13 hrs., #4 on bolster 22:08 hrs.
12.06.2003	00:00 - 06:30	6,50	20	4	P&A	Pulled the anchors. Anchor #3 on bolster 00:30 hrs., #2 on bolster 05:58 hrs., #6 on bolster 07:20 hrs. Rig under tow from 06:30.

16 CASING AND LINER DATA

Size	Shoe (m TVD RKB)	Shoe (m MD RKB)	Top (m TVD RKB)	Top (m MD RKB)	Weight (lbs/ft)	Grade	Connection	Collapse rating (bar)	Burst rating (bar)	Tension minimum yield (kdaN)
30”	165	165	105	105	1” WT	X-52	SL-60	109	230	2110
20”	117	117	105	105	169	X-65	Buttweld	188	319	1415
13 3/8”	1315	1315	117	117	72	N-80	Buttress	184	371	750
9 5/8”	2843	2919	1227	1227	47/53.5	L-80	NSCC	328	474	482

17 CEMENTING DATA

OPERATIONAL SUMMARY:

On the following pages you will find a description of the cement jobs executed in this plug and abandonment operation. Each description will include a summary of events in addition to slurry and spacer recipes. In the table below all the jobs are listed in a chronological order:

Job description	Date
30" conductor casing	24/04/2003
13 3/8" surface casing	01/05/2003
Open hole plug for sidetrack 1	09/05/2003
Kick off plug for sidetrack 1	09/05/2003
Kick off plug for sidetrack 2	16/05/2003
9 5/8" liner	30/05/2003
P&A plug 1	07/06/2003
P&A plug 2	08/06/2003
P&A plug 3	09/06/2003

30" conductor casing

Key facts:

WELL DATA - 30" CONDUCTOR					
Casing Depth, MD	[m]	165	BHST	[C]	7
Casing Depth, TVD	[m]	165	BHCT	[C]	9
Conductor Size	["]	30	WOC Time	[hrs]	6
Conductor Thickness	["]	1	Mud Type		WBM
Slurry Volume (lead/tail)	[m^3]	24/20	Mud Weight	[SG]	1.5
Hole Size	["]	36	TOC, MD	[m]	Seabed @ 105
OH Excess (lead/tail)	[%]	200/100	TOC, TVD	[m]	Seabed @ 105

Slurry recipe:

CEMENT SLURRY DESIGN & DATA				
Slurry design	Dyckerhoff class "G" Cement w/ 0.1% EZ-FLO	**Amount:**		**Units**
		Lead	Tail	
	Econolite	3.20		Liter/100kg
	Liquid $CaCl_2$		4.33	Liter/100kg
	NF-6	0.10	0.10	Liter/100kg
	Sea Water	94.8	39.4	Liter/100kg
	Density	**1.56**	**1.95**	**SG**
	Total Mix Fluid	98.1	43.8	Liter/100kg
	Yield	129.2	75	Liter/100kg
	Typical data for			
	Thickening Time at 7 °C:			
	Time to 70 BC	3	>2	Hrs
	Required hang off strength	8 hrs		100 psi

Summary of events:

- Deployed 4" glass fibre inner core barrel as cementing stinger.
- Circulated hole clean with 1.5 times the casing volume of seawater.
- Pressure tested surface lines to 345 bar.
- Mixed and pumped 24 m^3 1.56 SG lead slurry.
- Mixed and pumped 20 m^3 1.95 SG tail slurry.
- Displaced cement to drillfloor with seawater and loaded 1 ea Ø150 mm wiperball.
- Continued to displace with seawater to approximately 5 meter above the float shoe.
- No cement returns observed from ROV
- Confirmed that there where no backflow during bleed off.
- Held tension until cement samples had set up.
- Released running tool.
- Found cement at 164m when drilling out shoe.

13 3/8" surface casing

Key facts:

WELL DATA – 13 3/8" SURFACE CASING					
Casing Depth, MD	[m]	1315	BHST	[C]	55
Casing Depth, TVD	[m]	1315	BHCT	[C]	30
Casing Size	["]	13 3/8	WOC Time	[hrs]	12
Casign Weight	[kg/m]	107.15	Mud Type		WBM
Slurry Volume (lead/tail)	[m^3]	123/20	Mud Weight	[SG]	1.25
Hole Size	["]	17.5	TOC, MD	[m]	Seabed @ 105
OH Excess (lead/tail)	[%]	40/40	TOC, TVD	[m]	Seabed @ 105

Slurry recipe:

CEMENT SLURRY DESIGN & DATA				
Slurry design	Dyckerhoff class "G" Cement w/ 0.1% EZ-FLO	**Amount:**		**Units**
		Lead	Tail	
	Econolite	3.20	-	Liter/100kg
	HR-4L	2.00	0.15	Liter/100kg
	NF-6	0.10	0.10	Liter/100kg
	Sea Water	93.37	-	Liter/100kg
	Fresh Water	-	43.45	Liter/100kg
	Density	**1.56**	**1.92**	**SG**
	Total Mix Fluid	98.67	43.70	Liter/100kg
	Yield	129.82	74.86	Liter/100kg
Lab results:	Typical data for			
NS-250-2	Thickening Time at 30 °C:			
NS-136-4	Time to 30 BC	7:32	4:02	Hrs
	Time to 70 BC	**8:07**	**4:32**	**Hrs**
	Time to 100 BC	8:25	4:42	Hrs
	Compressive strength at 55 ° C	10:17	5:08	50 psi
		--	8:17	500 psi
		439 psi	1480 psi	24 hours

Summary of events:

- Washed and reamed through tight spots at 314m and 436 m while running in hole.
- Washed and reamed from 1177m to 1321m. Experienced excessive torque and weight.
- Circulated well with 200 lpm prior to cement job, no gas observed.
- Pumped 10 m^3 white tracer spacer.
- Pressure tested cement lines to 345 bar.
- Dropped ball to release bottom plug.
- Mixed and pumped 126 m^3 1.56 SG lead slurry.
- Mixed and pumped 20 m^3 1.92 SG tail slurry.
- Dropped drill pipe dart to release top plug.
- Displaced with cement unit and launched wiper plug with 170 bar.
- Lined over to mud pumps and continued displacement until plug bumped.
- Cement returns observed from ROV.
- Pressure tested the 13 3/8" casing to 282 bar with cement unit.
- Confirmed that there where no backflow during bleed off.
- Disconnected running tool.
- Found cement at 1283m when drilling out shoe.

Open hole plug for sidetrack 1

Key facts:

WELL DATA			
Depth to Plug Bottom MD:	3 047 m	Lower Hole Size:	12 ¼ inch
Depth to Plug Bottom TVD:	2 998 m	Lower Hole Excess:	20 %
Depth to Plug Top MD:	2 805 m	Drill Pipe Size:	5 inch
Depth to Plug Top TVD:	2 760 m	BHST Temperature:	132 °C
Length Cement Plug:	242 m	BHCT Temperature (API):	93 °C
Drilling Mud Type:	WBM	Spacer volume:	8 m^3
Drilling Mud Weight:	1,35 S.G	Spacer fluid:	Tuned E+

Slurry recipe:

CEMENT SLURRY DESIGN & TEST RESULTS			
Slurry design:	Dyckerhoff "G" + 35% SSA-1 + 0,1% Ez-Flo		**Units**
	Halad 413L	4,00	ltr/100 kg
	CFR-3L	1,00	ltr/100 kg
	HR-5L	0,40	ltr/100 kg
	NF-6	0,10	ltr/100 kg
	Fresh water	51,22	ltr/100 kg
	Density	**1,90**	**SG**
	Total Mix Fluid	56,72	ltr/100 kg
	Yield	101,18	ltr/100 kg
Test results	Thickening Time at 93 C		Cement samples
	Time to 30 BC	05:17	Hrs:Mins
	Time to 70 BC	05:24	Hrs:Mins
Lab reference NS03-Z-266-3	Time to 100 BC	05:27	Hrs:Mins
	API Free Water, vertical	0	%
	SG top/bottom	1,90/1,90	SG / SG
	API fluid loss at BHCT	60	cc/30 min
	Fann readings at BHCT	46	300 RPM
		31	200 RPM
		15	100 RPM
		9	60 RPM
		6	30 RPM
		2	6 RPM
		1	3 RPM
	API gel strength, 10sec/min	2/3	centiPoise
	UCA compressive strength	04:50	50 psi
		05:58	500 psi
		17:22	2234 psi

Summary of events:

- Ran in hole with cement string to 3047 m MD.
- Circulated and conditioned the mud.
- Pressure tested the cement line to 300 bar.
- Pumped 8 m^3 Tuned Spacer E+.
- Mixed and pumped 22 m^3 1.90 SG cement, followed by 1 m^3 spacer behind to balance.
- Displaced cement with 22775 litre mud using the rig pumps.
- Pulled cement string out of the hole from 3047m to 2500m.
- Installed drillpipe wiper ball and circulated the hole clean.
- No cement in return.
- Pulled out of hole to 1635m to place Hi-Vis for the next cement job.

Next page contains a job plot for this open hole cement plug.

Kick off plug for sidetrack 1

Key facts:

WELL DATA			
Depth to Plug Bottom MD:	1 535 m	Lower Hole Size:	12 ¼ inch
Depth to Plug Bottom TVD:	1 530 m	Lower Hole Excess:	50 %
Depth to Plug Top MD:	1 285 m	Upper Hole size:	12,347 inch
Depth to Plug Top TVD:	1 285 m	Upper Hole Excess:	20 %
Length Cement Plug:	250 m	Drill Pipe Size:	5 inch
Drilling Mud Type:	WBM	BHST Temperature:	58 °C
Drilling Mud Weight:	1,40 S.G	BHCT Temperature (API):	44 °C
Spacer fluid:	Tuned E+	Spacer volume:	8 m^3

Slurry recipe:

CEMENT SLURRY DESIGN & TEST RESULTS			
Slurry design:	Dyckerhoff "G" + 0,1% Ez-Flo		**Units**
	CFR-3L	0,90	ltr/100 kg
	HR-4L	0,40	ltr/100 kg
	NF-6	0,10	ltr/100 kg
	Fresh water	33,86	ltr/100 kg
	Density	**2,04**	**SG**
	Total Mix Fluid	35,26	ltr/100 kg
	Yield	66,42	ltr/100 kg
	Thickening Time at 44 C		Cement samples
Test results	Time to 30 BC	3:30	Hrs:Mins
	Time to 70 BC	3:48	Hrs:Mins
Lab reference NS03-Z-287-1	Time to 100 BC	3:55	Hrs:Mins
	API Free Water, vertical	0	%
	SG top/bottom	2,04/2,04	SG / SG
	Fann readings at BHCT	90	300 RPM
		57	200 RPM
		27	100 RPM
		17	60 RPM
		9	30 RPM
		2	6 RPM
		1	3 RPM
	API gel strength, 10sec/min	5/8	centiPoise
	UCA compressive strength	06:33	50 psi
		07:42	500 psi
		22:43	2957 psi

Summary of events:

- Pumped and displaced 8 m^3 Hi-Vis mud with cement string at 1635m MD.
- Pulled string out of hole to 1540m.
- Installed the CST tool and displaced it out of the string.
- Pulled cement string out of hole from 1540m to 1635m MD.
- Circulated and conditioned the mud.
- Pressure tested the cement lines to 300 bar.
- Pumped 8 m^3 Tuned Spacer E+.
- Mixed and pumped 28 m^3 2.04 SG cement, followed by 1 m^3 spacer behind to balance.
- Displaced cement with 9000 litres using the rig pumps.
- Pulled cement string out of hole from 1535m to 1285m MD.
- Dropped drill pipe wiper ball and circulated 1 ½ BU.
- The well was later kicked off successfully at 1352m MD.

Next page contains a job plot for this kick off plug.

Kick off plug for sidetrack 2

Key facts:

WELL DATA			
Depth to Plug Bottom MD:	1 535 m	Lower Hole Size:	12 ¼ inch
Depth to Plug Bottom TVD:	1 530 m	Lower Hole Excess:	50 %
Depth to Plug Top MD:	1 284 m	Upper Hole size:	12,347 inch
Depth to Plug Top TVD:	1 284 m	Upper Hole Excess:	20 %
Length Cement Plug:	251 m	Drill Pipe Size:	5 inch
Drilling Mud Type:	WBM	BHST Temperature:	58 °C
Drilling Mud Weight:	1,50 S.G	BHCT Temperature (API):	44 °C
Spacer fluid:	Tuned E+	Spacer volume:	8 m^3

Slurry recipe:

Used the same slurry recipe as for the first KOP.

Summary of events:

- Washed down with the cement string from1315m to 1635m MD. Pumped with 1991 ltr/min.
- Circulated bottoms up with 4000 ltr/min.
- Pumped 8 m^3 Hi-Vis mud as a foundation for the CST tool.
- Pulled the cement string out of hole from 1635m to 1540m.
- Installed and pumped down the CST tool.
- Pulled out of hole with cement string from 1540m to 1535m.
- Pumped 8 m^3 Tuned Spacer E+.
- Mixed and pumped 28 m^3 2.04 SG cement, followed by 1 m^3 spacer behind to balance.
- Displaced cement with 9000 litres of mud using the rig pumps.
- Pulled cement string out of hole from 1535m to 1285m MD.
- Dropped drill pipe wiper ball and circulated 1 ½ BU.
- Dumped 30 m^3 of contaminated mud.
- Cement was later found at 1284m MD, and the well was successfully kicked off from 1345m to 1348 m MD.

Next page contains a job plot for this kick off plug.

9 5/8" liner

Key facts:

WELL DATA – 9 5/8" Liner					
Liner Depth, MD	[m]	2920	BHST	[C]	127
Liner Size	["]	9 5/8	BHCT	[C]	92
Liner Weight	[Lb/ft]	53,5	WOC Time	[hrs]	12
Slurry Volume	[m^3]	35	Mud Type		WBM
Hole Size	["]	12 ¼	Mud Weight	[SG]	1.55
OH Excess	[%]	25	TOC, MD	[m]	± 2013

Slurry recipe:

CEMENT SLURRY DESIGN & TEST RESULTS			
Slurry design:	Dyckerhoff "G" + 35% SSA-1 + 0,1% Ez-Flo		**Units**
	Halad 413L	4,00	ltr/100 kg
	CFR-3L	1,00	ltr/100 kg
	HR-5L	0,60	ltr/100 kg
	NF-6	0,10	ltr/100 kg
	Fresh water	51,03	ltr/100 kg
	Density	**1,90**	**SG**
	Total Mix Fluid	56,73	ltr/100 kg
	Yield	101,19	ltr/100 kg
Test results	Thickening Time at 92 C		Cement samples
	Time to 30 BC	04:59	Hrs:Mins
	Time to 70 BC	05:05	Hrs:Mins
Lab reference NS03-Z-298-3	Time to 100 BC	05:07	Hrs:Mins
	API Free Water, vertical	0	%
	SG top/bottom	1,90/1,90	SG / SG
	API fluid loss at BHCT	60	cc/30 min
	Fann readings at BHCT	46	300 RPM
		31	200 RPM
		15	100 RPM
		9	60 RPM
		6	30 RPM
		2	6 RPM
		1	3 RPM
	API gel strength, 10sec/min	2/3	centiPoise
	UCA compressive strength	04:50	50 psi
		05:58	500 psi
		17:22	2234 psi

P&A plug 1

Objective:

The requirements for this plug were to properly cover and secure any hydrocarbon bearing formations. According to the NPD requirements, there must be a competent cement plug across the HC zones and it must extend 50 meters into the last casing size.

Due to the long length of the plug it was pumped in two stages.

Key facts:

WELL DATA			
Depth to Plug Bottom MD:	3 153 m	Lower Hole Size:	8,500 inch
Depth to Plug Bottom TVD:	3 068m	Lower Hole Excess:	10
Depth to Plug Top MD:	2 850 m	Casing I D:	8,535 inch
Depth to Plug Top TVD:	2 790m	Upper Hole Excess:	0 %
Length Cement Plug:	284 m	Drill Pipe Size:	5 inch
Length Tail Pipe:	350 m	Tail Pipe Size:	3,5 inch
Drilling Mud Type:	WBM	BHST Temperature:	128 °C
Drilling Mud Weight:	1,26 S.G	BHCT Temperature:	90 °C
Spacer fluid:	Tuned E+	Spacer volume:	6 m^3

Slurry recipe:

CEMENT SLURRY DESIGN & DATA					
Design:	Dyckerhoff "G" + 0,1% Ez-Flo +35% SSA-1			**Units**	
	HR-5L	1,60	0,18	Lhk	Gps
	Gascon	4,00	0,45	Lhk	Gps
	Halad-413L	4,50	0,50	Lhk	Gps
	CFR-3L	1,00	0,11	Lhk	Gps
	NF-6	0,10	0,01	Lhk	Gps
	Fresh Water	46,20	5,20	Lhk	Gps
	Density	**1,90**	**15,86**	**SG**	**Ppg**
	Total Mix Fluid	57,40	6,46	Lhk	Gps
	Yield	101,85	1,53	Lhk	$^{ft3}/_{sk}$
Lab ref: **NS03-Z-357**	Thickening Time at BHCT				
	Time to 30 BC	4:03		Hrs:min	
	Time to 70 BC	4:17		Hrs:min	
	Time to 100 BC	4:30		Hrs:min	
	API Free Water, 0 deviation	0		%	
	API Fluid loss	106		cc/30 min	
	Fann rheology at BHCT	85		300 rpm	
		63		200 rpm	
		37		100 rpm	
		29			
		24			
		20		6 rpm	
		19		3 rpm	
	Plastic Viscosity	72		CP	
	Yield point	13		$^{lb}/_{100\ ft^2}$	
	Compressive strength at BHST	14:12 hrs		50 Psi	
		14:59 hrs		500 Psi	
		2719 Psi		20:17 Hrs	

Summary of events:

- Ran in hole with the cementing string to 3153m MD.
- Circulated bottoms up with 2500 SPM. Observed a gas level of 10 %.
- Increased mudweight to 1.26 SG; reduced gas reading to 0.8%.
- Pressure tested surface lines to 345 bar fro 5 minutes.
- Pumped 6 m^3 Tuned Spacer E+.
- Pumped 8.2 m^3 of 1.90 SG cement, followed by 0.3 m^3 spacer behind to balance.
- Displaced slurry with 24 m^3 mud. All pumping was done with cement unit.
- Pulled cement string out of hole from 3153m to 2980m MD.
- Circulated 1 ½ times BU.
- Dumped 40 m^3 contaminated mud.
- Pressure tested cement hose to 345 bar for 5 min.
- Pumped 6 m^3 Tuned Spacer E+.
- Pumped 9.2 m^3 of 1.90 SG cement, followed by 0.7 m^3 spacer behind to balance.
- Displaced slurry with 22.2 m^3 mud at 1200 ltr/min while rotating. All pumping was done with cement unit.
- Pulled cement string out of hole from 2980m to 2750m MD.
- Mixed in corrosion inhibitator.
- Circulated 1 ½ times BU.
- Dumped 13 m^3 contaminated mud.
- Later the plug was tagged with 10 tons at 2850m, and pressure tested to 245 bar for 10 minutes.

The next two pages contains job plots for P&A plug 1a and 1b

P&A plug 2

Job objective:

Secure any potential exposed annulus during the permanent P&A. The function of plug #2 is to secure any leak past the liner top.

This was done with placement of a mechanical plug in the lower end of the 13 3/8" casing and subsequent placement of cement to 50 meters above the liner top packer. The foundation was a bridge plug converted 9 5/8 EZSV sat by using a mechanical setting tool.

Key facts:

WELL DATA			
Depth to Plug Bottom MD:	1 277 m	Casing I D:	8,535 inch
Depth to Plug Bottom TVD:	1 277 m	Lower Hole Excess:	20 %
Depth to Plug Top MD:	1 177 m	Casing I D:	12,347 inch
Depth to Plug Top TVD:	1 177 m	Upper Hole Excess:	20 %
Length Cement Plug:	100 m	Drill Pipe Size:	5 inch
Length Tail Pipe:	150 m	Tail Pipe Size:	3,5 inch
Drilling Mud Type:	WBM	BHST Temperature:	57 °C
Drilling Mud Weight:	1,26 S.G	BHCT Temperature:	35 °C
Spacer fluid:	Tuned E+	Spacer volume:	6 m^3

Slurry recipe:

CEMENT SLURRY DESIGN & DATA					
Design:	Dyckerhoff "G" + 0,1% Ez-Flo			**Units**	
	HR-4L	0,30	0,03	lhk	gps
	NF-6	0,10	0,01	lhk	gps
	Freshwater	40,97	4,62	lhk	gps
	Density	**1,95**	**16,27**	**SG**	**ppg**
	Total Mix Fluid	41,37	4,66	lhk	gps
	Yield	72,52	1,09	lhk	$^{ft3}/_{sk}$
Lab ref: **NS03-Z-359**	Thickening Time at BHCT				
	Time to 30 BC	3:40		hrs:min	
	Time to 70 BC	4:00		hrs:min	
	Time to 100 BC	4:10		hrs:min	
	Fann rheology at BHCT	129		300 rpm	
		112		200 rpm	
		88		100 rpm	
		32		6 rpm	
		23		3 rpm	
	Plastic Viscosity	62		cP	
	Yield point	68		$^{lb}/_{100\ ft^2}$	
	Compressive strength at 7 C	4:44 hrs		50 Psi	
		10:29 hrs		500 Psi	
		1309 Psi		20 Hrs	

Summary of events:

- Pulled cement string out of the hole from 2750m to 1290m.
- Washed the setting area for bridge plug from 1290m to 1260m.
- Pulled cement string out of hole.
- Ran in hole with 8 ½" bit to load and pressure test previous plug.
- Ran out of hole with 8 ½" inch bit.
- Made up bridge plug with running tool on 5" DP.
- Sat bridge plug at 1277m and pressure tested it to 240 bar for 10 minutes.
- Pressure tested surface lines to 345 bar.
- Pumped 6 m^3 Tuned Spacer E+.
- Pumped 10 m^3 of 1.95 SG cement, followed by 0.85 m^3 spacer behind to balance.
- Displaced slurry with 8.2 m^3. All pumping was done with cement unit.
- Pulled cement string out of hole from 1277m to 991m.
- Circulated 1 ½ times BU.

Next page contains a job plot for this cased hole plug job.

P&A plug 3

Job objective:

The plan was to isolate the upper 200 meters of the 13 3/8" casing. Top of cement should be no less than 50 meters from seabed, so creating a proper foundation for the P&A was essential.
A mechanical support tool (CST) was used for this purpose.

Key facts:

WELL DATA			
Depth to Plug Bottom MD:	335 m	Casing I D:	12,347 inch
Depth to Plug Bottom TVD:	335 m	Lower Hole Excess:	20 %
Depth to Plug Top MD:	130 m	Drill Pipe Size:	5 inch
Depth to Plug Top TVD:	130 m	BHST Temperature:	15 °C
Length Cement Plug:	205 m	BHCT Temperature:	10 °C
Drilling Mud Type:	Seawater	Drilling Mud Weight:	1,00 S.G
Spacer fluid:	Seawater	Spacer volume:	10 m^3

Slurry recipe:

CEMENT SLURRY DESIGN & DATA					
Design:	Dyckerhoff "G" + 0,1% Ez-Flo +23 % SSA-1			**Units**	
	Calcium chloride – liquid	3,00	0,34	lhk	gps
	NF-6	0,10	0,01	lhk	gps
	Sea Water	49,71	5,63	lhk	gps
	Density	**1,92**	**16,00**	**SG**	**ppg**
	Total Mix Fluid	52,81	5,98	lhk	gps
	Yield	92,71	1,39	lhk	$^{ft3}/_{sk}$
Lab ref: **NS03-Z-358**	Thickening Time at BHCT				
	Time to 30 BC	4:07		hrs:min	
	Time to 70 BC	4:54		hrs:min	
	Time to 100 BC	5:13		hrs:min	
	Fann rheology at BHCT	118		300 rpm	
		101		200 rpm	
		82		100 rpm	
		72		6 rpm	
		64		3 rpm	
	Plastic Viscosity	28		cP	
	Yield point	19		$^{lb}/_{100\ ft^2}$	

Summary of events:

- Made up the mule shoe on 5" DP and ran in hole to 346m.
- Circulated bottoms up and pressure tested the cement hose to 200 bar.
- Installed and pumped down the cement support tool.
- Pulled out of hole from 346m to 335m.
- Pumped 10 m^3 of seawater spacer.
- Pumped 17 m^3 of 1.92 SG cement.
- Displaced cement with 0.8 m^3 seawater.
- Pulled out of hole from 335m to 130m.
- Reversed out excessive cement.
- Dumped 2 m^3 of contaminated mud.
- Performed other operations while cement sat up.
- Ran in hole with 8 ½" bit and tagged plug at 127m.
- Pulled out of hole to 60m and pressure tested plug to 128 bar.

Next page contains a job plot for this surface plug job.

MATERIAL USAGE AND DISCHARGE

TOTAL USAGE & DISCHARGE

Product	SFT class	Unit	Total usage	Discharges	
				Left in well	Return to sea
Cement cl. "G"	Plonor	MT	361	351	10
SSA-1	Plonor	MT	24	22	2
EZ-FLO	Plonor	kg	361	351	10
CaCl2 liquid	Plonor	ltr	1910	1812	98
CFR-3L	Red	ltr	1254	1235	19
Econolite	Plonor	ltr	3840	3800	40
Gascon469	Yellow	ltr	1000	944	56
Halad-413L	Red	ltr	2820	2781	39
HR-4L	Plonor	ltr	2590	2574	16
HR-5L	Plonor	ltr	1105	1067	38
NF-6	Yellow	ltr	464	458	6
Tuned Spacer E+	Plonor	kg	1956	1779	177
Dye Marker E+	Plonor	kg	100	0	100

The mass balance in the table above only includes the categories <Left in well> and <Return to sea>. There were no injection to other wells and no losses to the formation during the cement jobs.

The planned material usage refers to the cement program from the pre-drilling meeting in March. The following factors contribute to the discrepancy between planned and actual usage:

- Phase #2 of the drilling period, with its 3 cement operations, was not planned for in the original cement program.
- The 9 5/8" liner job was extended with approximately 20 m^3 of cement slurry, due to the requirements of a higher top of cement.
- There are also always minor changes in the recipe during the lab testing that take place just prior to the cement jobs. The slurries are then tested under existing well conditions while the additive amounts are adjusted to give desired properties, such as thickening time, fluid loss control etc.

Product	Unit	Usage		Main cause of variance in planned/actual usage:
		Planned	Actual	
Cement cl. "G"	MT	233	361	111 MT in phase #2, and 20 MT extra on 9 5/8" liner
SSA-1	MT	12	24	Used 10 MT on P&A due to wrong placement in bulk
EZ-FLO	kg	233	361	Follows the cement usage
CaCl2 liquid	ltr	2149	1910	
CFR-3L	ltr	324	1254	Used 1064 litre extra in phase #2 operations
Econolite	ltr	3659	3840	
Gascon469	ltr	459	1000	Change in cement recipe during lab testing
Halad-413L	ltr	1319	2820	875 litre in phase #2, and 800 litre extra on 9 5/8" liner
HR-4L	ltr	2101	2590	460 litre in phase #2
HR-5L	ltr	573	1105	300 litre in phase #2, and 120 litre extra on 9 5/8" liner
NF-6	ltr	293	464	200 litre in phase #2
Tuned Spacer E+	kg	684	1956	1127 kg in phase #2
Dye Marker E+	kg	0	100	Not planned for in original cement program

TOTAL USAGE SEPERATED INTO CEMENTING OPERATIONS

Product	Unit	Phase #1			Phase #2				Phase #3					Total Sum
		30"	13 3/8"	Sum	Res Plug	KOP 1	KOP 2	Sum	9 5/8"	P&A #1	P&A #2	P&A #3	Sum	
Cement cl. "G"	MT	48	126	174	24	50	37	111	33	11	15	17	76	361
SSA-1	MT			0				0	11	3	5	5	24	24
EZ-FLO	kg	48	126	174	24	50	37	111	33	11	15	17	76	361
CaCl2 liquid	ltr	1200		1200				0				710	710	1910
CFR-3L	ltr			0	218	406	440	1064		190			190	1254
Econolite	ltr	630	3210	3840				0					0	3840
Gascon469	ltr			0				0		1000			1000	1000
Halad-413L	ltr			0	875			875	1000	945			1945	2820
HR-4L	ltr		2010	2010		200	260	460			120		120	2590
HR-5L	ltr			0	300			300	225	580			805	1105
NF-6	ltr	38	110	148	40	140	20	200	76	20	20		116	464
Tuned Spacer E+	kg			0	450	450	227	1127	298	381	150		829	1956
Dye Marker E+	kg		100	100				0					0	100

TOTAL DISCHARGE SEPERATED INTO CEMENTING OPERATIONS

Product	Unit	Phase #1			Phase #2				Phase #3					Total Sum
		30"	13 3/8"	Sum	Res Plug	KOP 1	KOP 2	Sum	9 5/8"	P&A #1	P&A #2	P&A #3	Sum	
Cement cl. "G"	MT	5		5				0			4	1	5	10
SSA-1	MT			0				0			1	1	2	2
EZ-FLO	kg	5		5				0			4	1	5	10
CaCl2 liquid	ltr	50		50				0				48	48	98
CFR-3L	ltr			0				0		19			19	19
Econolite	ltr	30	10	40				0					0	40
Gascon469	ltr			0				0		56			56	56
Halad-413L	ltr			0				0		39			39	39
HR-4L	ltr			0				0			16		16	16
HR-5L	ltr			0				0		38			38	38
NF-6	ltr		6	6				0					0	6
Tuned Spacer E+	kg			0	50	50		100		75	2		77	177
Dye Marker E+	kg		100	100				0					0	100

18 DRILLING FLUIDS

Fluid Property Recap:Water-Based Fluid

Well : 15/12-13b
Operator: Pertra AS

Date	Depth	FL Temp	Density	Fun Visc	Rheology @ 48.89C					Filtration					Filtrate Analysis						Sand	Retort Analysis				MBT	Rheometer Dial Reading					
					PV	YP	Gels			API	HTHP	Cake		Temp	pH	Pm	Pf	Mf	Cl	Total Hard		Corr Sol	LGS	Oil	Water%							
						Pa				ml/30 min	ml/30 min	API/HTHP 32nd in				ml	ml	ml	mg/l	mg/l	% by Vol	% by Vol	% by Vol	% by Vol	by Vol							
	m	Deg C	SG	sec/qt	cP		10s	10m	30m					Deg C												kg/m3 E	600	300	200	100	6	3
04/23/03	145.0		1.050	210															0	0		0.0	0.0		97.0	0.0						
04/24/03	167.0		1.050	250															0	0		0.0	0.0		97.0	0.0						
04/25/03	167.0		1.050	200	7	18													0	0		0.0	0.0		97.0	0.0	52	45	42	39	30.0	30.0
04/26/03	169.0		1.070	220	5	22	32	32											0	0		0.0	0.0		97.0	0.0	55	50	47	43	33.0	32.0
04/27/03	0.0		1.030	0	1														0	0		0.0	0.0		99.0	0.0	2	1				
04/27/03	1,200.0		1.070	230	4	24	32	32											0	0		0.0	0.0		97.0	0.0	58	54	51	46	33.0	32.0
04/28/03	0.0		1.070	200	5	21	31	31											0	0		4.5	4.4		95.3	0.0	53	48	44	41	31.0	31.0
04/29/03	1,320.0		1.200	0	8	15	20	20											0	0		7.8	2.9		92.0	0.0	47	39	36	31	22.0	20.0
04/29/03	0.0		1.030	300															0	0		0.0	0.0	98.0	0.0	0.0						
04/30/03	1,320.0		1.250	0	10	15	9	9											35,000	0		8.2	3.0		90.0	0.0	51	41	36	30	18.0	17.0
05/02/03	1,320.0		1.200	39	11	5	2	3		0.5		1			12.00		2.50	35.50	95,000	0		2.7	0.2		89.3	0.0	32	21	14	11	2.0	1.0
05/03/03	1,320.0		1.200	45	14	4	1	2		1.6		1			12.00		0.60	31.90	80,000	0		3.4	0.3		90.0	0.0	36	22	17	11	3.0	2.0
05/04/03	1,320.0		1.200	0	13	4	1	2		1.6		1			12.00		5.50	36.50	80,000	0		3.4	0.3		90.0	0.0	35	22	16	10	3.0	2.0
05/04/03	1,450.0	20	1.195	55	18	4	3	2		1.8		1			11.80		8.75	42.50	80,000	0		3.4	0.6		90.0	0.0	44	26	22	15	3.0	2.0
05/05/03	1,556.0	24	1.200	0	17	4	4	6		1.9		1			11.80		5.00	36.30	80,000	0		3.4	0.3		90.0	6.2	43	26	23	16	5.0	4.0
05/05/03	1,666.0	28	1.200	0	15	7	4	6		2.1		1			11.70		1.30	32.50	88,000	0		3.7	1.5		89.0	14.3	44	29	23	16	6.0	5.0
05/05/03	1,950.0	36	1.260	0	19	12	4	5		2.1		1			11.60		1.30	32.50	70,000	0		8.0	4.8		86.5	28.5	63	44	36	24	9.0	8.0
05/05/03	2,087.0	43	1.280	54	19	12	5	6		2.1		1			11.60		0.50	31.20	67,000	0		9.3	5.9		85.5	34.0	62	43	35	25	6.0	5.0
05/06/03	2,367.0	48	1.300	51	19	11	4	5		2.2		1			11.55		0.00	31.20	64,500	0		10.1	5.9		85.0	36.0	61	42	34	24	9.0	8.0
05/06/03	2,465.0	40	1.320	0	21	10	4	5		2.0		1			11.50		7.50	28.75	77,000	0		10.1	5.6		84.0	28.5	62	41	33	23	9.0	8.0
05/06/03	2,567.0	47	1.350	0	22	11	8	10		2.3		1			11.50		7.50	29.40	77,000	0		11.2	5.8		83.0	35.0	67	45	36	25	9.0	8.0
05/06/03	2,720.0	51	1.370	53	22	12	8	10		2.2		1			11.50		0.00	31.40	67,000	0		12.5	6.5		82.5	35.0	68	46	37	25	9.0	8.0
05/07/03	2,780.0	52	1.380	53	23	11	8	10		2.4		1			11.36		0.50	32.80	74,000	0		11.4	4.2		83.0	38.0	68	45	36	25	9.0	8.0
05/07/03	2,872.0	50	1.380	0	23	10	4	5		2.3		1			11.40		2.50	34.50	77,000	0	0.10	13.3	8.0		81.0	50.0	67	44	35	24	9.0	8.0
05/07/03	2,980.0	56	1.395	0	30	13	6	7		2.2		1			11.30		0.00	32.00	77,000	0		13.3	7.1		81.0	46.3	87	57	47	35	11.0	10.0
05/07/03	3,040.0	60	1.394	57	27	18	7	8		2.5		1			11.75		0.00	35.50	74,500	0	0.10	13.5	7.4		81.0	50.0	91	64	53	39	14.0	12.0
05/08/03	3,047.0		1.400	58	27	18	7	8		2.5		1			11.75		0.00	35.50	75,000	0		13.5	7.0		81.0	44.0	91	64	53	39	14.0	12.0
05/09/03	2,700.0		1.400	61	27	18	7	8		0.5		1			11.75		0.00	35.50	75,000	0		13.5	7.0		81.0	45.0	91	64	53	39	14.0	12.0
05/10/03	3,047.0		1.400	65	29	17	6	7		6.6		1			11.60		0.00	35.00	75,000	0		13.5	7.0		81.0	46.0	93	64	52	38	13.0	12.0
05/10/03	3,047.0		1.400	90	28	13	3	4		1.2		1			12.00		7.50	30.00	80,000	0		9.8	0.3		84.0	20.0	84	56	44	30	7.0	6.0
05/11/03	1,433.0	35	1.440	50	30	12	6	7		1.6		1			11.90		0.00	35.00	74,000	0		11.4	0.4		83.0	14.0	84	54	41	26	7.0	6.0
05/11/03	1,624.0	47	1.450	70	25	12	4	5		1.5		1			11.88		0.00	47.50	80,000	0	0.25	12.0	1.3		82.0	43.0	76	51	41	28	10.0	8.0
05/12/03	1,940.0	53	1.450	65	25	15	5	7		1.8		1			11.82		2.00	37.50	75,000	0		12.4	1.8		82.0	40.0	81	56	44	31	9.0	8.0

Norway
North Sea

Varg
North Sea Norway

Baroid Drilling Fluids

Printed:15-Jul-03

Fluid Property Recap:Water-Based Fluid

Well : 15/12-13b
Operator: Pertra AS

Date	Depth	FL Temp	Density	Fun Visc	Rheology @ 48.89C					Filtration					Filtrate Analysis						Sand	Retort Analysis				MBT	Rheometer Dial Reading					
					PV	YP	Gels			API	HTHP	Cake		Temp	pH	Pm	Pf	Mf	Cl	Total		Corr	LGS	Oil	Water%							
						Pa				ml/30 min	ml/30 min	API/HTHP 32nd in				ml	ml	mg/l	Hard mg/l	% by Vol	Sol % by Vol	% by Vol	% by Vol	by Vol							
	m	Deg C	SG	sec/qt	cP		10s	10m	30m					Deg C												kg/m3 E	600	300	200	100	6	3
05/12/03	2,259.0	54	1.450	64	25	12	5	6		1.9		1			11.66		1.00	36.00	76,000	0	0.10	12.3	1.7		82.0	49.0	76	51	42	29	10.0	9.0
05/13/03	2,456.0	55	1.455	54	28	13	5	7		2.0		1			11.47		7.50	32.50	80,000	0	0.10	13.0	3.1		81.0	50.0	84	56	45	32	10.0	9.0
05/13/03	2,532.0	54	1.465	54	25	12	5	7		2.5		1			11.39		5.00	30.00	72,000	0	0.10	14.8	5.3		80.0	100.0	74	49	39	27	9.0	8.0
05/13/03	2,532.0	53	1.465	53	25	11	5	7		2.1		1			11.58		9.00	34.00	76,000	0	0.10	14.4	4.9		80.0	100.0	73	48	39	27	9.0	7.0
05/14/03	2,532.0	45	1.465	54	23	12	5	7		2.2		1			11.36		3.80	28.80	78,000	0		14.3	4.7		80.0	100.0	72	49	37	24	10.0	8.0
05/14/03	2,532.0	37	1.480	53	24	12	4	7	9	1.9		1			11.62		7.50	30.00	116,000	0	0.10	13.3	4.3		78.0	86.0	72	48	39	27	9.0	7.0
05/15/03	2,532.0	33	1.480	54	22	11	5	7		2.2		1			11.80		8.75	33.75	116,000	0	0.15	13.3	4.3		78.0	93.0	67	45	36	26	10.0	9.0
05/15/03	2,532.0	47	1.500	55	24	15	5	7		2.4		1			11.42		7.50	32.50	110,000	0		14.9	5.8		77.0	100.0	80	56	45	32	10.0	9.0
05/15/03	2,532.0	34	1.490	55	24	12	4	7		2.1		1			11.62		7.50	32.50	114,000	0	0.10	13.4	3.9		78.0	93.0	72	48	38	26	10.0	9.0
05/16/03	2,532.0		1.500	73	24	15	6	10		2.2		1			11.76	25.00			0	0		22.8	14.3		77.0	93.0	79	55	45	33	15.0	13.0
05/17/03	1,340.0	24	1.490	60	22	11	5	6		2.3									0	0		21.8	12.9		78.0	93.0	66	44	35	25	7.0	6.0
05/17/03	1,359.0	25	1.495	70	24	12	5	7		4.0		1			12.15		7.50	30.50	90,000	0		12.8	0.7		80.5	14.0	72	48	39	27	9.0	7.0
05/17/03	1,460.0	42	1.500	68	26	10	6	7		2.0		1			12.02		0.00	32.50	90,000	0		13.3	1.4		80.0	28.0	73	47	37	25	7.0	6.0
05/18/03	1,620.0	45	1.500	66	24	13	5	7		2.0		1			11.96		0.00	35.00	90,000	0		13.3	1.4		80.0	30.8	75	51	41	29	10.0	9.0
05/18/03	1,775.0	49	1.510	60	26	14	5	6		2.0		1			12.15		8.80	32.50	84,000	0	0.10	13.8	1.3		80.0	29.0	82	56	46	33	11.0	9.0
05/18/03	1,840.0	47	1.500	59	25	13	5	7		1.8		1			11.90		9.00	33.00	88,000	162	0.10	14.5	3.7		79.0	43.0	78	53	43	33	11.0	9.0
05/18/03	1,970.0	45	1.500	59	28	15	9	13		1.8		1			12.20		3.00	36.50	88,000	0	0.10	14.5	3.7		79.0	49.0	87	59	48	33	10.0	9.0
05/19/03	2,136.0	49	1.500	59	28	16	5	6		2.0		1			12.20		7.00	31.00	88,000	0	0.10	14.5	3.7		79.0	49.0	89	61	48	34	10.0	9.0
05/19/03	2,245.0	57	1.520	59	23	14	5	7		1.8		1			11.62		5.00	40.00	118,000	0	0.10	14.2	3.7		77.0	50.0	76	53	43	31	10.0	9.0
05/19/03	2,300.0	55	1.510	50	23	14	5	7		1.8		1			11.68		0.00	46.00	119,000	0	0.10	13.6	3.2		77.5	57.0	75	52	43	31	10.0	9.0
05/19/03	2,407.0	55	1.500	50	26	16	5	7		1.8		1			12.00		4.00	31.25	130,000	0	0.10	12.6	2.6		77.5	57.0	86	60	49	36	10.0	9.0
05/20/03	2,500.0	54	1.500	64	26	18	6	7		2.0		1			11.90		9.50	34.00	104,000	0	0.10	13.7	3.2		78.5	50.0	89	63	52	37	12.0	11.0
05/20/03	2,576.0	55	1.525	54	26	17	6	7		1.8		1			11.72		3.00	39.00	115,000	0	0.10	14.5	3.7		77.0	57.0	87	61	51	37	12.0	11.0
05/20/03	2,636.0	57	1.510	64	25	19	7	9		2.0		1			11.67		4.50	38.50	120,000	0	0.10	14.0	4.1		77.0	57.0	89	64	53	38	15.0	14.0
05/21/03	2,625.0	52	1.510	57	25	19	7	9		2.2		1			11.60		0.00	35.00	115,000	0	0.10	14.5	4.6		77.0	56.0	89	64	53	39	15.0	14.0
05/21/03	2,656.0		1.540	56	24	17	6	8		2.1		1			11.65		1.00	36.00	114,000	0	0.10	14.5	2.9		77.0	57.0	83	59	50	36	14.0	12.0
05/22/03	2,656.0		1.540	56	24	17	6	8		2.1		1			11.65		1.00	36.00	114,000	0	0.10	14.5	2.9		77.0	57.0	83	59	50	36	14.0	12.0
05/22/03	1,152.0	19	1.535	64	24	17	7	9		1.6		1			11.80		9.00	32.50	100,000	0	0.10	15.7	4.5		77.0	57.0	84	60	49	36	14.0	12.0
05/23/03	1,152.0	19	1.540	66	25	19	7	9		2.0		1			11.60		1.00	36.00	114,000	0	0.10	14.5	2.9		77.0	57.0	89	64	53	39	15.0	14.0
05/23/03	0.0	18	1.540	58	24	17	7	9		1.8		1			12.00		9.00	32.50	95,000	0	0.10	16.1	4.7		77.0	57.0	83	59	49	36	14.0	13.0
05/24/03	0.0		1.540	65	22	17	6	8		1.8		1			11.70		2.00	35.00	105,000	0	0.10	15.3	3.8		77.0	55.0	80	58	48	35	14.0	12.0
05/24/03	0.0		1.540	64	22	17	6	8		1.8		1			11.80		2.50	35.50	105,000	0	0.10	15.3	3.8		77.0	57.0	80	58	49	35	14.0	12.0
05/25/03	0.0		1.540	64	22	17	6	8		1.8		1			11.80		2.50	35.50	105,000	0	0.10	15.3	3.8		77.0	57.0	80	58	49	35	14.0	12.0

Norway
North Sea

Varg
North Sea Norway

Baroid Drilling Fluids

Printed:15-Jul-03

Fluid Property Recap:Water-Based Fluid

Well : 15/12-13b
Operator: Pertra AS

Date	Depth	FL Temp	Density	Fun Visc	Rheology @ 48.89C					Filtration					Filtrate Analysis						Sand	Retort Analysis				MBT	Rheometer Dial Reading					
					PV	YP	Gels			API	HTHP	Cake		Temp	pH	Pm	Pf	Mf	Cl	Total		Corr	LGS	Oil	Water%							
						Pa				ml/30 min	ml/30 min	API/HTHP	32nd in			ml	ml	mg/l	Hard mg/l	% by Vol	Sol % by Vol	% by Vol	% by Vol	by Vol							
	m	Deg C	SG	sec/qt	cP		10s	10m	30m					Deg C												kg/m3 E	600	300	200	100	6	3
05/26/03	2,650.0	34	1.545	68	31	20	11	16		2.5		1			12.10		7.50	35.00	110,000	0	1.50	15.4	4.0		76.5	63.0	103	72	59	44	23.0	22.0
05/26/03	2,706.0	47	1.540	56	22	16	7	10		2.3		1			12.01		0.00	33.00	119,000	0	0.20	14.1	2.4		77.0	55.0	78	56	46	34	16.0	14.0
05/26/03	2,812.0	58	1.540	54	25	14	6	8		2.4		1			12.19		5.00	40.00	110,000	0	0.50	14.3	2.2		77.5	55.0	80	55	45	33	14.0	12.0
05/26/03	2,890.0	58	1.540	53	22	15	6	9		2.6		1			12.04		6.25	42.00	111,000	0	0.50	14.8	3.2		77.0	55.0	76	54	44	33	14.0	13.0
05/26/03	2,970.0	63	1.540	55	26	14	7	10		2.5		1			12.10		6.00	41.00	110,000	0	0.50	14.9	3.3		77.0	56.0	82	56	46	34	15.0	14.0
05/27/03	2,951.0		1.540	55	26	14	7	10		2.5		1			12.10		6.00	41.00	110,000	0	0.50	14.9	3.3		77.0	56.0	82	56	46	34	15.0	14.0
05/27/03	0.0		1.550	52	21	14	6	10		2.3		1			12.00		3.00	39.00	108,000	0	0.50	15.1	2.8		77.0	56.0	72	51	42	31	15.0	13.0
05/28/03	0.0		1.560	53	21	14	6	10		2.3		1			12.00		3.00	39.00	108,000	0	0.50	15.1	2.2		77.0	56.0	72	51	42	31	15.0	13.0
05/28/03	0.0		1.570	55	22	14	7	10		2.2		1			12.00		3.00	40.00	105,000	0	0.50	15.3	1.9		77.0	56.0	74	52	44	33	17.0	15.0
05/29/03	0.0		1.560	55	22	14	7	10		2.2		1			12.00		3.00	40.00	105,000	0	0.50	15.3	2.5		77.0	56.0	74	52	44	33	17.0	15.0
05/29/03	2,400.0		1.560	60	26	15	10	13		2.3		1			12.10		0.00	35.00	110,000	0	0.50	15.4	3.1		76.5	63.0	84	58	49	39	18.0	19.0
05/30/03	2,951.0		1.560	0	32	20	13	15		2.5		1			12.00		4.00	30.00	110,000	0	0.50	16.0	4.1		76.0	70.0	105	73	61	47	28.0	25.0
05/30/03	0.0		1.550	55	22	13	8	12		2.6		2			12.00		3.00	28.00	103,000	0	0.50	16.0	4.4		76.5	63.0	71	49	40	30	16.0	15.0
05/31/03	2,951.0		1.550	58	22	13	8	11		2.6		1			11.70		7.00	30.00	104,000	0	0.50	15.9	4.3		76.5	63.0	71	49	40	30	16.0	15.0
05/31/03	0.0		1.220	0	16	7	2	2		3.0		1			11.10				59,000	0		7.4	5.3		88.0	0.0	46	30	23	15	4.0	3.0
06/01/03	0.0		1.560	58	22	13	8	11		2.6		1			11.70		7.00	30.00	104,000	0	0.50	16.1	3.9		76.4	63.0	71	49	40	30	16.0	15.0
06/01/03	0.0		1.230	0	28	9	3	4		3.0		1			11.10				59,000	0		6.3	2.6		89.0	0.0	75	47	36	24	7.0	6.0
06/02/03	2,951.0	26	1.690	57	19	15	13	18		3.1		2			11.86		0.00	23.00	94,000	0		20.0	2.8		73.5	50.0	70	51	42	33	28.0	26.0
06/02/03	0.0		1.230	70	18	12	4	4		3.0		1			11.30	2.50	1.60	2.80	56,000	0		5.5	0.8		90.0	0.0	60	42	35	25	9.0	8.0
06/03/03	2,951.0		1.690	57	19	15				3.1		2			11.83		0.00	23.00	94,000	0		20.0	2.8		73.5	50.0	70	51	42	33	28.0	26.0
06/03/03	2,908.0	25	1.230	65	21	11	4	4		3.0		1			11.10	2.50	1.60	2.80	56,000	0	0.10	6.6	2.9		89.0	0.0	65	44	36	26	10.0	8.0
06/04/03	2,970.0	25	1.230	70	17	13	4	4		2.9		1			11.05	2.10	1.20	2.40	61,000	0	0.10	6.1	2.4		89.0	7.0	62	45	39	27	9.0	8.0
06/04/03	3,040.0	38	1.235	90	17	13	4	4		2.8	8.0	1	2	120	10.98	1.90	0.94	1.90	62,000	0	0.15	6.6	3.0		88.5	7.0	61	44	38	26	9.0	8.0
06/04/03	3,150.0	40	1.230	72	17	13	4	4		1.9	4.9	1	1	120	10.60	1.40	0.64	1.60	56,000	0	0.75	6.6	2.9		89.0	14.0	61	44	38	26	8.0	7.0
06/04/03	3,151.0		1.230	70	20	12	4	4		1.8	4.9	1	1	120	10.50	1.30	0.70	1.50	56,000	0	0.20	6.6	2.9		89.0	14.0	66	46	38	27	9.0	8.0
06/05/03	0.0		1.230	70	20	12	4	4		1.8	4.9	1		120	10.50	1.30	0.70	1.50	56,000	0		6.6	2.9		89.0	14.0	66	46	38	27	9.0	8.0
06/06/03	3,153.0		1.230	70	20	12	4	4		1.8	4.9	1	1	120	10.50	1.30	0.70	1.50	56,000	0		6.6	2.9		89.0	14.0	66	46	38	27	9.0	8.0
06/07/03	3,153.0		1.230	70	19	12	3	4		1.9	5.9	1	1	120	10.50	0.94	0.60	1.60	56,000	56		6.6	2.9		89.0	14.0	63	44	38	26	8.0	7.0
06/07/03	3,153.0	34	1.260	71	21	12	3	4		1.9	5.9	1	1	120	10.45	0.90	0.60	0.14	56,000	56		6.6	1.0		89.0	14.0	67	46	38	27	8.0	7.0
06/08/03	3,153.0		1.260	72	21	12	3	4		1.9	5.9	1	1	120	10.50	0.90	0.60	1.40	56,000	56		7.6	3.0		88.0	14.0	67	46	38	27	8.0	7.0
06/08/03	3,153.0		1.260	72	21	12	3	4		1.9	5.9	1	1	120	10.50	0.90	0.60	1.40	56,000	56		7.6	3.0		88.0	14.0	67	46	38	27	8.0	7.0

Norway | Varg | Baroid Drilling Fluids
North Sea | North Sea Norway

Printed:15-Jul-03

HALLIBURTON
Baroid

Pertra AS

DISCHARGE FROM DRILLING

SHEET B1 **DISCHARGE FROM DRILLING**

Rig West Alpha | Block no 15/12 | Well no 13

Reporting period From 22-Apr-03 To 10-Jun-03 | Operation Total Well

Drilling mud (m3)

Section in

Mud type | Density kg/l

Volume Built & Recd	Lost to formation	Dumped	To sea Lost with cuttings	Injection	Next Sect	Returned
3891 m3	568	3001	322			

Cuttings

Length drilled	Theoretical hole vol.	Estimated hole vol.	Cuttings density	Cuttings amt.
5927 m	570 m3	658 m3	16.35 kg/l	1710 tonn

Cuttings to sea (tonn)	Cuttings to land (tonn)	Cuttings reinjected (tonn)
1710		

Mud chemicals

Trade name	Function group	Used tonn	Lost to form. tonn	Disch. to sea tonn	Injection tonn	Next Sect. tonn	Returned to land tonn
BARACARB	16	14.050	4.566	9.484			
BARASIL-S	21	294.509	72.469	222.040			
BARAZAN	18	6.725	1.765	4.960			
Barite	16	1,063.000	200.188	862.812			
BAROFIBRE	17	0.669		0.669			
Bentonite	16	160.000		160.000			
Defoam Green	4	0.075	0.024	0.051			
DEXTRID E	18	26.220	6.896	19.324			
GEM GP	21	65.442	16.103	49.339			
Guar Gum	18	2.900		2.900			
Lime	11	0.860		0.860			
Mica	17						
N-VIS Hi	18	0.680		0.680			
PAC L	18	10.264	2.678	7.587			
Potassium Chloride	16	399.609	102.381	297.227			
Soda Ash	11	2.400	0.016	2.384			
STARCIDE	1						
Walnut	17						
BARASCAV L	5	0.266	0.266				

19 BIT AND HYDRAULIC DATA

Bit Record Summary for Well: 15/12-13, 13A &13B

Bit Dimension	Manufactor	Bit Type	Serial No	No Rr	Iadc Bitcode	Nozzles	Tfa	Depth Out	Meters Drilled	Hours	Rop	Rpm Min	Rpm Max	Wob Min	Wob Max	Flow Min	Flow Max	Pressure Min	Pressure Max	Dull grad
17 1/2"	SDBS	XT1SC	10382435	3	115M	1x12 + 3x14	4.7100	715.0	483.0	6.5	74.3	60	60	1.0	1.0	950	950			1 2 WT A E I NO TD
24"	SDBS	SS33SGJ4	737473	RR1	115M	1x18 + 3x20	.5630	170.0	6.0	1.5	4.0	115	115	4.0	4.0					1 1 WT A FEF I NO TD
9 7/8"	SDBS	EBXL12D	10381774		437W	2 x 18, 19, 22	.9010	1320.0	1150.0	21.4	53.7	0	114	2.0	5.0	0	2800	94	120	0 0 NO A E I NO TD
17 1/2"	SDBS	EBXTD12DSCL	757129		435W	1x16J4 + 2x18 + 1x22	1.1260	1321.0	1151.0	25.2	45.7	115	115	8.0	8.0	2800	2800			1 1 WT A E I NO TD
12 1/4"	SDBS	FM2643DRI2	5985359	2	M232	6x14 Vortex	.8800	3047.0	1726.0	52.3	33.0	115	115	10.0	20.0	3500	3500			1 3 CT G X 1 BT TD
12 1/4"	SDBS	FM2843	10421129		M333	4x14 + 4x12 Vortex	1.0430	2532.0	1182.0	32.8	36.0	115	115	10.0	20.0	3500	3500			HP
12 1/4"	SDBS	FM2843	10421129	1	M333	4x14 + 4x12 Vortex	1.0430	2656.0	1308.0	27.8	47.0	120	120	4.0	9.0	3250	3250			1 2 CT G X I WT DHT/HP
12 1/4"	SDBS	FM2643DRI2	5995878	1	M232	6x14 Vortex	1.1700	2951.0	295.0	14.0	21.0	120	120	5.0	20.0	3000	3000			0 1 CT G X I WT TD
8 1/2"	SDBS	FS2645ERCI	10407243	1		6x11 Vortex	.5570	3153.0	202.0	7.7	26.3	100	100	5.0	5.0	2000	2000			0 1 LT S X I ER TD

Drill bits Performance summary

Well **15/12-13**

Section **17 1/2"**

System	Group	Formation	MD (M)	Bit run	Comments
Quaternary	**Pletstocene**	**Clay interbedded with Sand**	232	**XT1C** **sn:10382435** **483 m** **6.5 hrs** **74.3 m/hr** **Bit run 1** **1-2-WT-A-E-I-NO-TD**	Drilled from 232m to 715m MD with a 36" Hole Opener. No problems drilling this section. Bit came out with some wear on teeth, otherwise in good and rerunable conditions.
			715	**TD**	

ion: Use same bit type in similar application.

Drill bits Performance summary
Well **15/12-13**
Section **24"**

System	Group	Formation	MD (M)	Bit run	Comments
Quaternary	**Pletstocene**	**Clay interbedded with Sand**	164	**XT1C** **sn:737473** **6 m** **1.5 hrs** **4 m/hr** **Bit run 1** **1-1-WT-A-FEF-I-NO-TD**	Drilled cement and 30" shoe from 164m to 165m. Washed down ot 168m and cleaned rat hole. Worked bit throught shoe several times. Swept hole with 10m3 hi vis pill.
			170	**TD**	

ation: Use similar bit for same application.

Drill bits Performance summary

Well **15/12-13**

Section **9 7/8" Pilot Hole**

System	Group	Formation	MD (M)	Bit run	Comments
Quaternary / Tertiary	Nordland	Undifferentiated (Interpreted as Clay Interbedded with Sand)	170	**EBXT12D** **sn:10381774** **1150 m** **21.4 hrs** **53.7 m/hr** **Bit run 1** **0-0-NO-A-E-I-NO-TD**	Tagged bottom at 170m MD. Drilled to TD at 1320m MD without any operational problems and with the following parameters: 2-5t WOB, 114 RPM, 4-9Knm TORQUE, 2800 LPM and 94-120 Bar PRESSURE. Drilled into Utsira formation at 1225 m MD. Bit performed well with high ROP and came out of hole as new.
Tertiary	Nordland	Utsira			
Tertiary	Hordaland	Clay Stones	1320	**TD**	

SDBS recommendation: Bit selected due to potential boulders. Non observed and a milled tooth could have done a simial job.

Drill bits Performance summary

Well 15/12-13

Section 17 1/2"

System	Group	Formation	MD (M)	Bit run	Comments
Quaternary	Nordland	Undifferentiated (Interpreted as Clay Interbedded with Sand)	170	**EBXTD12DS sn:757129** **1151 m** **25.2 hrs** **45.7 m/hr** **Bit run 1** **1-1-WT-A-E-I-NO-TD**	Tagged bottom at 170m MD. No problems observed drilling to TD at 1321m MD. Displaced well to 1.20 SG Mud prior to Pooh. Tight hole were observed from 1321m to 738m and tight spots from 423m to 329m. Max overpull 30 tons. Washed and Reamed to TD to improve hole condition. Excessive torque and weight in the interval between 1177m and 1200m MD were encountered.
Tertiary	Nordland	Utsira			Washed and Reamed to TD to improve hole condition. Excessive torque and weight in the interval between 1177m and 1200m MD were encountered. Bit performed good with respect to ROP and came out in good and rerunable condition.
Tertiary	Hordaland	Clay Stones	1321	**TD**	

SDBS recommendation: Drilled with high controlled ROP. Based on dull condition, a more aggressive IADC code could have been selected. However, a more aggressive bit would not necessarily give higher penetration rate in this application.

Drill bits Performance summary

Well 15/12 13

Section 12 1/4"

System	Group	Formation	MD (M)	Bit run	Comments
Tertiary	Hordaland	Claystones with traces of Limestone and Dolomite	1321	**FM2643DRI/2** **sn:5985359** **1726 m** **58 hrs** **29.8 m/hr** **Bit run 1** **1-3-CT-G-X-1-BT-TD**	Drilled 3m of new formation from 1321 to 1324m MD and performed LOT to 1.71 sg. Continued drilling with no problems to 2732m MD. Observed a drilling break at 2980m MD. Circulated bottoms up for samples. Observed sand in samples at 3013m MD. Pulled the drill string out of the hole at 3047m MD. Experienced pack off at 1892m. Got free by down force. Drilling parameters; WOB- 10-20t, Flow :1100-3500 lpm, RPM: 115+ Motor Bit performed well with respect to the formation type it drilled and the long run it had. Bit came out with 2 ea damaged/bursted Vortexx nozzles. A CPI is raised to investigate what might be the reason of this happening. Bit also had chipped and broken cutters and will therefore be scrapped.
			2420		
		Marl			
Cretaceous		Chalky Limestone's	2445		
			2667		
Jurassic	Rogaland	Marls w/ Limestone and C			
	Shet-land				
Tria-ssic	Knoll				
	Viking		3047	**TD**	

SDBS recommendation: The major contribution to the success was the directional planning. By avoiding steering in the chalk formation were we able to add sufficient WOB to drill the chalk effectively. The ROP through the chalk was high compare to offsets. Some problems keeping toolface while kicking off from vertical, but minor correction in the tangent section went without any problems. Slightly left hand walk tendency. Recommend to run similar design in tangent sections to maintain the high ROP, but evaluate the directional requirements. A 6 bladed bit might be to aggressive if large directional changes is desired.

Drill bits Performance summary

Well **15/12 13A**

Section **12 1/4"**

System	Group	Formation	MD (M)	Bit run	Comments
Tertiary	**Hordaland**	**Claystones with traces of Limestone and Dolomite**	1350	**FM2843DR** **sn:10421129** **1182 m** **45 hrs** **26.3 m/hr** **Bit run 1** **NOT SEEN**	No problems while drilling to TD at 2532m MD for this sidetrack. Good directional control kicking off from vertical. Hugh hole problems while POOH. Hole packed off several times and tight spots were noticed. No overpull nor pressure build up was observed prior to pack off. At the interval 2310m to 2160m it was pumped with 2850 lpm, 220 Bar and pulling weight 114 tonnes. At 1810m hole packed off again. Worked the string free and established circulation. While pulling the BHA it was observed that bit and stabilisator was balled up from loose clay while POOH.
	Rogaland				
	Shetla	**Marl with clay stone**	2532	**TD**	

SDBS recommendation: Better directional control than with the FM2643. Additional 5-10ton more WOB needed to maintain same ROP as in first track. Unfortunately, the bit was pulled before the chalk, hence no offset information with this bit in this application. Expected the FM2843 would drill slower in this section than the FM2643. Recommendation for the future would be to select bit based on directional profile.

Drill bits Performance summary

Well **15/12 13B**

Section **12 1/4"**

System	Group	Formation	MD (M)	Bit run	Comments
Tertiary	Hordaland	Claystones with traces of Limestone and Dolomite	1348	**FM2843DR** **sn:10421129** **1308 m** **45 hrs** **26.3 m/hr** **Bit run 2** **1-2-CT-G-X-I-WT-DHT**	Drilled firm cement from 1284m to 1345m MD. Kicked off the well from 1345m to 1348m. Continued to drill well 15/12-13B to 2242m MD with 3250 Lpm, 300 Bar pressure, 130 Rpm, 10-17 Knm Torque and Wob 4-9 Tonnes. At 2492m MD the power supply (SCR) to the drilling package tripped due to high temperature. Resat the control system and found that one circuit tripped. Observed vibrations on the drill string while drilling from 2577m to 2656m MD. Reamed stand and recorded increase of vibrations. Located Mud leak from the lower part of the main shaft on the Top Drive. While repairing rig equipment, MWD plugged while Bit came out with 1 ea damaged/bursted vortexx nozzle as for previous 12 1/4" bit. A Non Conformance is raised to investigate why this happened. Bit had some chipped cutters on gauge in addition to minor wear on gauge cutters.
	Rogaland	Mar			
	Shetla	Limestone w traces of Claystone	2656	**TD**	

SDBS recommendation: See previous run.

Drill bits Performance summary

Well 15/12-13B

Section 12 1/4"

System	Group	Formation	MD (M)	Bit run	Comments
Cretaceous	Shetland	Calky Lime-stone	2656	**FM2643DRI/2** **sn:5995878** **295 m** **20 hrs** **14.8 m/hr** **Bit run 1** **0-1-CT-G-X-I-WT-TD**	Drilled 12 1/4" hole from 2656m to 2951m MD. Drilled with 2-9 tons Wob, 120 Rpm, 9-27 Knm Torque 185 Spm and 3000 Lpm. No drilling problems or restrictions occured in this run. Bit performed well with high ROP in the Shetland formation. High torque spikes was the limiting factor. Bit had minor wear on gauge and came out in rerunable condition.
	Cromer Knoll	Marls w/ traces of Sand and Limestone			
		Siltstone grading to Claystone			
Jurassic	Viking	Interbedded Sandstone shale w/ occasionally Limestone and cemented Sandstone	2951	**TD**	

SDBS recommendation: Run similar bit in same application. Very high ROP through the Shetland.

Drill bits Performance summary

Well **15/12 13B**

Section **8 1/2"**

System	Group	Formation	MD (M)	Bit run	Comments
Jurassic	**Viking**	**Interbedded Sandstone Shale with occasionally Limestone or cemented Sandstone**	2951	**FS2645** **sn:10407243** **202 m** **9.5 hrs** **21.3 m/hr** **Bit run 1** **0-1-LT-S-X-I-ER-TD**	No firm cement were noticed when drilling the shoetrack and rathole. Drilled from 2957m to 3021m MD with no problems and with the following parameters: 2023 Lpm, 148 Bar, 100 Rpm and 17 Knm Torque. Pulled one stand to change a leaking connection of the 5" drill pipe. Then drilled with same parameters to 3151m MD. The string was sticky through connections when pooh. Max overpull in one connection was 30 tons. Bit performed well with respect to formation it drilled i.e; occasionally limestone and cemented sandstone. Bit came out with one chipped cutter on Shoulder and erosion wear in the same area.
Triassic	**Hegre**		3153	**TD**	

SDBS recommendation: Recommendation is to run a very similar aggressive bit for this application. ROP limited by data accusation.

Hydraulics Summary Report

Well : 15/12-13b
Operator: Pertra AS

Rpt No	Rpt Date	Hole MD	Hole Size	ECD @ Csg Shoe	ECD @ Bit	Flow Rate	Btms Up Time	Total Circ Time	Pres Drop Pipe	Pres Drop Bit	Pres Drop Ann	Total Pres Drop	Hyd Meth	Circ Pres	Ann Vel Riser	Ann Vel DP	Ann Vel DC	Bit HHSI	Bit Jet Vel	Bit Imp Force
		m	in	SG	SG	l/min	Min	Min	bar	bar	bar	bar		bar	m/min	m/min	m/min	hhp/in2	m/sec	N
001	4/22/03	0.0	0.000																	
002	4/23/03	167.0	36.000																	
003	4/24/03	167.0	36.000																	
004	4/25/03	167.0	36.000	1.030	1.030	4,271	5.23	5.39		92.9		92.9	HB	310.0			12.2	1.96	127.7	9,354.86
005	4/26/03	410.0	9.875	1.074	1.170	2,573	12.15	13.21	14.1	19.8	4.0	43.9	HB	70.0		4.0	151.5	1.49	57.9	2,653.82
006	4/27/03	1,320.0	9.875	1.030	1.030	2,799	19.57	22.60		22.6		22.6	HB	115.0		4.3	164.8	1.85	63.0	3,024.29
007	4/28/03	1,320.0	9.875	1.074	1.091	4,401	30.58	32.28	54.5	60.3	2.0	132.3	HB	230.0		6.8	35.9	7.75	101.0	7,918.47
008	4/29/03	1,320.0	17.500																	
009	4/30/03	1,320.0	17.500																	
010	5/01/03	1,320.0	17.500																	
011	5/02/03	1,320.0	17.500																	
012	5/03/03	1,320.0	17.500																	
013	5/04/03	1,460.0	12.250	1.203	1.205	3,009	34.41	56.28	95.7	58.8	1.5	199.2	HB	170.0	16.3	46.6	69.0	3.36	94.3	5,649.65
014	5/05/03	2,238.0	12.250	1.297	1.301	3,560	42.94	62.14	156.3	88.1	4.6	296.2	HB	285.0	19.2	25.0	81.6	5.95	111.6	8,466.09
015	5/06/03	2,732.0	12.250	1.388		3,074	57.18	80.96	164.5	70.3	5.5	287.6	HB	286.0	16.6	21.6	70.5	4.10	96.4	6,758.58
016	5/07/03	3,047.0	12.250	1.380									HB							
017	5/08/03	3,047.0	12.250	1.400	1.400								HB							
018	5/09/03	1,320.0	12.250																	
019	5/10/03	1,320.0	12.250																	
020	5/11/03	1,653.0	12.250	1.471	1.477	3,608	32.16	50.18	162.7	63.7	4.2	268.8	HB	290.0	19.5	55.9	82.7	4.36	89.1	7,765.92
021	5/12/03	2,353.0	12.250	1.471	1.477	3,398	47.21	67.94	182.9	56.5	5.8	298.9	HB	300.0	18.4	52.6	77.9	3.64	83.9	6,886.87
022	5/13/03	2,532.0	12.250	1.485	1.489	3,543	41.82	62.75	188.7	62.1	4.9	299.0	HB	300.0	19.2	54.9	81.3	4.17	87.5	7,567.30
023	5/14/03	2,532.0	12.250	1.498	1.502	2,670	48.78	75.92	106.5	35.6	3.9	174.7	HB	200.0	14.4	41.3	61.2	1.80	66.0	4,339.55
024	5/15/03	2,532.0	12.250	1.506	1.507	1,861	63.33	95.27	34.9	0.1	2.7	51.0	HB	50.0	10.1	28.8		0.01	3.3	154.14
025	5/16/03	1,285.0	17.500																	
026a	5/17/03	1,348.0	12.250			1,618	59.71	76.97				23.0		50.0	8.7	25.1	37.1		40.0	
026b		1,485.0	12.250	1.517	1.521	3,640	28.92	47.76	171.4	67.1	3.1	301.3	HB	301.3	19.7	56.4	83.5	4.63	89.9	8,178.46
027	5/18/03	2,030.0	12.250	1.523	1.529	3,398	41.15	61.76	180.4	58.4	5.6	313.8	HB	290.0	18.4	52.6	77.9	3.77	83.9	7,124.35
028	5/19/03	2,438.0	12.250	1.524	1.529	3,204	51.72	73.84	173.1	52.0	6.9	290.0	HB	278.0	17.3	49.6	73.5	3.16	79.1	6,333.40

Hydraulics Summary Report

Well : 15/12-13b
Operator: Pertra AS

Rpt No	Rpt Date	Hole MD	Hole Size	ECD @ Csg Shoe	ECD @ Bit	Flow Rate	Btms Up Time	Total Circ Time	Pres Drop Pipe	Pres Drop Bit	Pres Drop Ann	Total Pres Drop	Hyd Meth	Circ Pres	Ann Vel Riser	Ann Vel DP	Ann Vel DC	Bit HHSI	Bit Jet Vel	Bit Imp Force
		m	in	SG	SG	l/min	Min	Min	bar	bar	bar	bar		bar	m/min	m/min	m/min	hhp/in2	m/sec	N
029	5/20/03	2,656.0	12.250	1.539	1.545	3,139	57.19	64.39	182.0	50.2	8.9	299.0	HB	299.0	17.0	48.6	72.0	2.99	77.5	6,120.62
030	5/21/03	2,656.0	12.250	1.540	1.540								HB							
031	5/22/03	2,656.0	12.250	1.535	1.535								HB							
032	5/23/03	2,656.0	12.250	1.540	1.540								HB							
033	5/24/03	2,656.0	12.250																	
034	5/25/03	2,663.0	12.250	1.567	1.572	3,074	58.55	76.15	169.1	38.5	8.3	283.9	HB	284.0	16.6	47.6	70.5	2.25	67.2	5,301.30
035	5/26/03	2,951.0	12.250	1.582		3,009	59.81	78.12	200.5	37.0	11.1	323.5	HB	250.0	16.3	46.6	69.0	2.11	65.8	5,096.93
036	5/27/03	2,951.0	12.250	1.540	1.540								HB							
037	5/28/03	2,951.0	12.250																	
038	5/29/03	2,951.0	12.250																	
039	5/30/03	2,951.0	12.250																	
040	5/31/03	2,951.0	12.250																	
f041	6/01/03	2,951.0	12.250	1.560	1.560								HB							
042	6/02/03	2,951.0	12.250	1.690	1.690								HB							
043	6/03/03	2,952.0	8.500	1.230	1.230								HB							
044	6/04/03	3,153.0	8.500																	
045	6/05/03	3,153.0	8.500																	
046	6/06/03	3,153.0	8.500	1.230	1.230								HB							
047	6/07/03	2,840.0	0.000	1.260	1.260								HB							
048	6/08/03	2,840.0	0.000																	
048		1,127.0	0.000																	
049	6/09/03	1,127.0	0.000																	
049		0.0	0.000																	
050	6/10/03	0.0	0.000																	

20 BOTTOM-HOLE ASSEMBLIES

sperry-sun
DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13

BHA ID #: 1

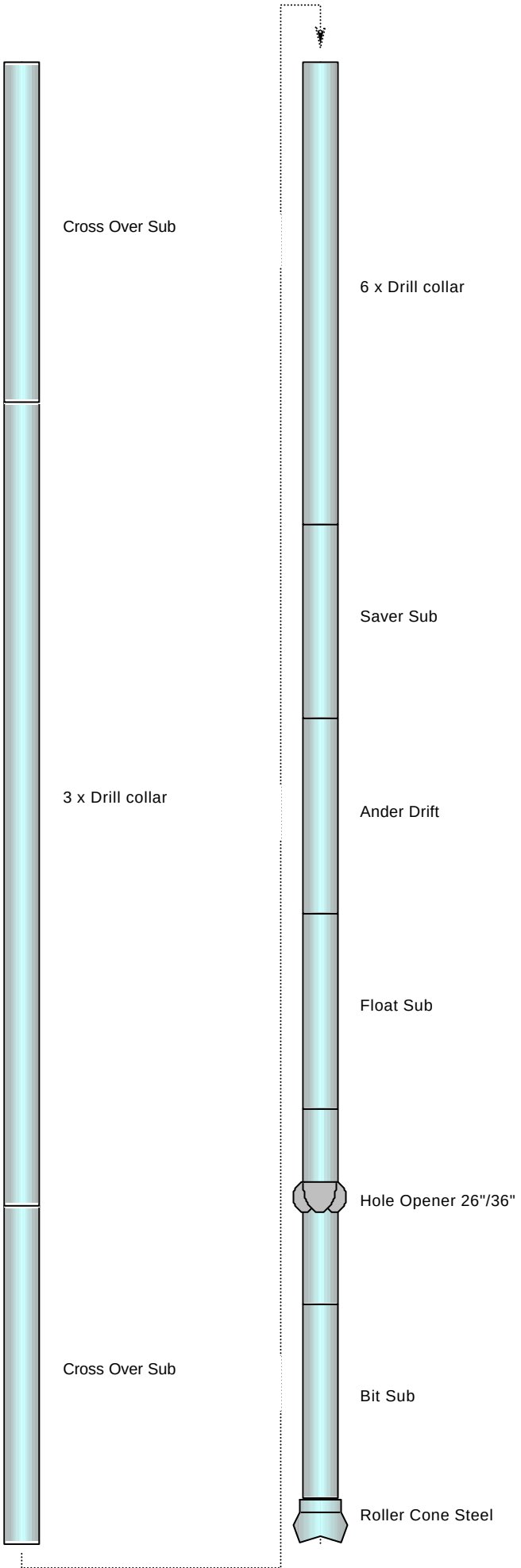
36" Hole-Opener

BHA Configuration

O.D.	Length	Description
17.5"	0.41m	Roller Cone Steel
9.5"	0.91m	Bit Sub
9.5"	3.96m	Hole Opener 26"/36"
9.5"	0.91m	Float Sub
9.5"	2.53m	Ander Drift
9.5"	0.55m	Saver Sub
9.5"	53.34m	6 x Drill collar
9.437"	0.86m	Cross Over Sub
8"	26.86m	3 x Drill collar
7.875"	0.91m	Cross Over Sub

BHA Discussion

Spud well. Drill from 105m to 170m



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594 **BHA# 1**

BHA# 1 : **Date In** 22-04-20(**MD In (m):** 105 **TVD In(m) :** 105 **Date Out** 23-04-200 **MD Out (m):** 170 **TVD Out(m):** 170

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
1	17.500	Security	EBXTD12D				2-2-WT-A -E-I-WT-TD

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	Roller Cone Steel		17.500	3.000	36.000	795.63	P 7-5/8" Reg	0.41	
2	Bit Sub		9.500	3.000		217.48	B 7-5/8" Reg	0.91	
3	Hole Opener 26"/36"		9.500	3.000	36.000	217.48	B 7-5/8" Reg	3.96	
4	Float Sub		9.500	3.000		217.48	B 7-5/8" Reg	0.91	
5	Ander Drift		9.500	3.000		217.48	B 7-5/8" Reg	2.53	
6	Saver Sub		9.500	3.000		217.48	B 7-5/8" Reg	0.55	
7	6 x Drill collar		9.500	3.000		217.00	B 7-5/8" Reg	53.34	
8	Cross Over Sub	WHA722	9.437	3.000		214.28	B 6-5/8" Reg	0.86	
9	3 x Drill collar		8.000	3.000		147.00	B 6-5/8" Reg	26.86	
10	Cross Over Sub	WHA648	7.875	3.000		141.90	B 6-5/8" Reg	0.91	
								91.24	

Parameter	Min	Max	Ave
WOB (t) :			
RPM (rpm) :			
Flow (L/min):			
SPP (bar) :			

Activity	Hrs
Drilling :	13.00
Reaming :	2.50
Circ-Other :	1.50
Total :	17.00

BHA Weight	(lb)
in Air (Total) :	59349
in Mud (Total) :	
in Air (Bel Jars :	0
in Mud (Bel Jars :	

Drill String	OD(in)	Len (m)
DP(S)-NC50(XH)-19.50#	5.000	79

PERFORMANCE

	In	Out
Inclination (deg)	0.00	0.73
Azimuth (deg)	0.00	358.30

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :	75.00	0			
Rotated :	-10.00	0			
Total :	65.00	5	0.34	0.00	0.34

COMMENTS

Spud well. Drill from 105m to 170m

sperry-sun
DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13

BHA ID #: 2

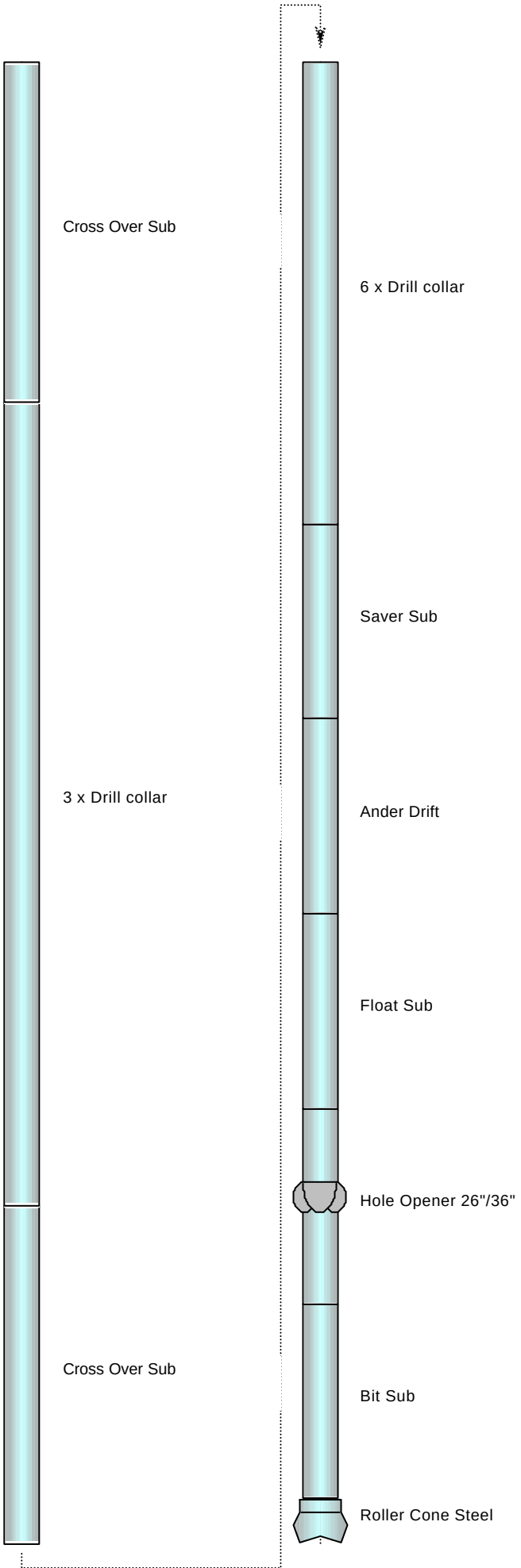
36" Clean-Out

BHA Configuration

O.D.	Length	Description
17.5"	0.41m	Roller Cone Steel
9.5"	0.91m	Bit Sub
9.5"	3.96m	Hole Opener 26"/36"
9.5"	0.91m	Float Sub
9.5"	2.53m	Ander Drift
9.5"	0.55m	Saver Sub
9.5"	53.34m	6 x Drill collar
9.437"	0.86m	Cross Over Sub
8"	26.86m	3 x Drill collar
7.875"	0.91m	Cross Over Sub

BHA Discussion

Hang off casing. Clean hole to 170m. Drill 170 - 171m



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594 **BHA# 2**

BHA# 2 : **Date In** 24-04-20(**MD In (m):** 170 **TVD In(m) :** 170 **Date Out** 24-04-200 **MD Out (m):** 171 **TVD Out(m):** 171

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
1rr1	17.500	Security	EBXTD12D				

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	Roller Cone Steel		17.500	3.000	36.000	795.63	P 7-5/8" Reg	0.41	
2	Bit Sub		9.500	3.000		217.48	B 7-5/8" Reg	0.91	
3	Hole Opener 26"/36"		9.500	3.000	36.000	217.48	B 7-5/8" Reg	3.96	
4	Float Sub		9.500	3.000		217.48	B 7-5/8" Reg	0.91	
5	Ander Drift		9.500	3.000		217.48	B 7-5/8" Reg	2.53	
6	Saver Sub		9.500	3.000		217.48	B 7-5/8" Reg	0.55	
7	6 x Drill collar		9.500	3.000		217.00	B 7-5/8" Reg	53.34	
8	Cross Over Sub	WHA722	9.437	3.000		214.28	B 6-5/8" Reg	0.86	
9	3 x Drill collar		8.000	3.000		147.00	B 6-5/8" Reg	26.86	
10	Cross Over Sub	WHA648	7.875	3.000		141.90	B 6-5/8" Reg	0.91	
								91.24	

Parameter	Min	Max	Ave
WOB (t) :			
RPM (rpm) :			
Flow (L/min):			
SPP (bar) :			

Activity	Hrs
Drilling :	0.25
Reaming :	1.75
Circ-Other :	0.50
Total :	2.50

BHA Weight	(lb)
in Air (Total) :	59349
in Mud (Total) :	
in Air (Bel Jars :	0
in Mud (Bel Jars :	

Drill String	OD(in)	Len (m)
DP(S)-NC50(XH)-19.50#	5.000	80

PERFORMANCE

	In	Out
Inclination (deg)	0.73	0.74
Azimuth (deg)	358.30	358.30

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :	10.00	0			
Rotated :	-9.00	0			
Total :	1.00	4	0.34	0.00	0.00

COMMENTS

Hang off casing. Clean hole to 170m. Drill 170 - 171m

sperry-sun
DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13

BHA ID #: 3

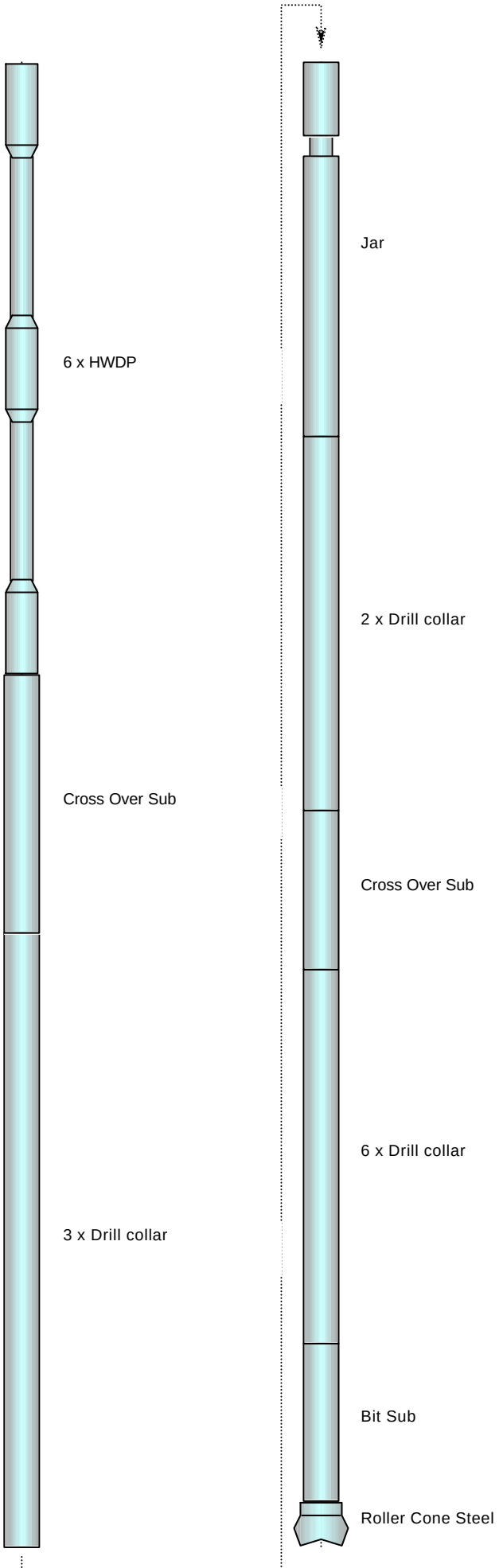
24" Conductor Clean-Out

BHA Configuration

O.D.	Length	Description
24"	0.56m	Roller Cone Steel
9.468"	0.77m	Bit Sub
9.5"	53.34m	6 x Drill collar
9.5"	0.86m	Cross Over Sub
8"	17.36m	2 x Drill collar
8"	11.25m	Jar
8"	26.86m	3 x Drill collar
7.875"	0.96m	Cross Over Sub
5"	55.44m	6 x HWDP

BHA Discussion

Cleanout conductor. Drill cement 163 - 165m. Wash to 168m



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594 **BHA# 3**

BHA# 3 : **Date In** 25-04-20(**MD In (m):** 171 **TVD In(m) :** 171 **Date Out** 26-04-200 **MD Out (m):** 171 **TVD Out(m):** 171

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
2	24.000	Security	XT1C	737473	2x20, 1x18	0.862	4-1-NO-A -E-I-NO-TD

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	Roller Cone Steel	737473	24.000		24.000		P 7-5/8" Reg	0.56	
2	Bit Sub	WE1127	9.468	3.000		215.85	B 7-5/8" Reg	0.77	
3	6 x Drill collar		9.500	3.000		217.00	B 7-5/8" Reg	53.34	
4	Cross Over Sub	WHA722	9.500	3.000		217.48	B 6-5/8" Reg	0.86	
5	2 x Drill collar		8.000	2.810		150.00	B 6-5/8" Reg	17.36	
6	Jar	108017	8.000	2.750		151.06	B 6-5/8" Reg	11.25	
7	3 x Drill collar		8.000	2.810		150.00	B 6-5/8" Reg	26.86	
8	Cross Over Sub	GF35062	7.875	2.875		143.87	B 4-1/2" IF	0.96	
9	6 x HWDP		5.000	3.000		49.30	B 4-1/2" IF	55.44	
								167.40	

Parameter	Min	Max	Ave
WOB (t) :			
RPM (rpm) :			
Flow (L/min):			
SPP (bar) :			

Activity	Hrs
Drilling :	0.00
Reaming :	0.00
Circ-Other :	1.50
Total :	1.50

BHA Weight	(lb)
in Air (Total) :	
in Mud (Total) :	
in Air (Bel Jars :	0
in Mud (Bel Jars :	

Drill String	OD(in)	Len (m)
DP(S)-FH-25.60#	5.000	4

PERFORMANCE

	In	Out
Inclination (deg)	0.74	0.74
Azimuth (deg)	358.30	358.30

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :	9.00				
Rotated :	-9.00				
Total :	0.00				

COMMENTS

Cleanout conductor. Drill cement 163 - 165m. Wash to 168m

sperry-sun
DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13

BHA ID #: 4

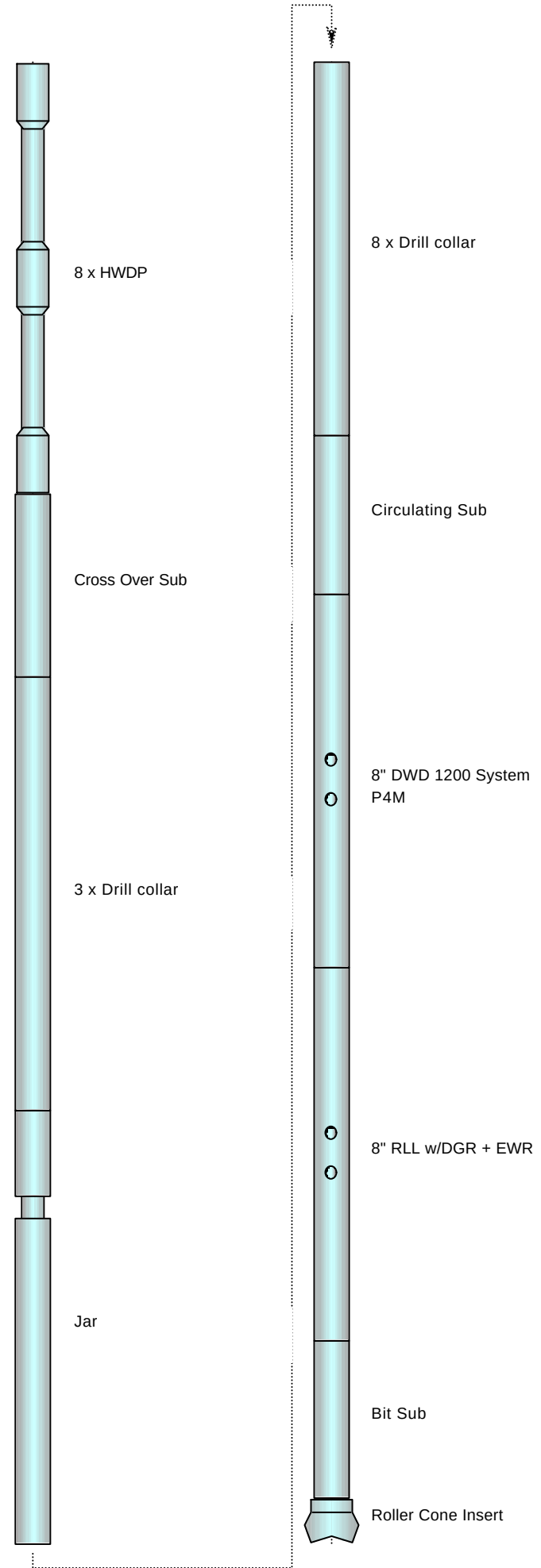
9-7/8" Pilot Hole

BHA Configuration

O.D.	Length	Description
9.875"	0.29m	Roller Cone Insert
7.437"	0.86m	Bit Sub
8"	8.81m	8" RLL w/DGR + EWR
8"	4.73m	8" DWD 1200 System P4M
8"	0.94m	Circulating Sub
8"	69.52m	8 x Drill collar
8"	11.25m	Jar
8"	26.86m	3 x Drill collar
7.875"	0.96m	Cross Over Sub
5"	73.73m	8 x HWDP

BHA Discussion

Drill 9 7/8" Pilot hole from 171m to 1321m



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594

BHA# 4

BHA# 4 : **Date In** 26-04-20(**MD In (m):** 171 **TVD In(m) :** 171 **Date Out** 28-04-200 **MD Out (m):** 1321 **TVD Out(m):** 1321

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
3	9.875	Security	EBXL12	10381774	1x19, 1x22, 2x18	1.145	4-4-WT-A -E-I-NO-TD

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	Roller Cone Insert	10381774	9.875		9.875		P 6-5/8" Reg	0.29	
2	Bit Sub	6353050400	7.437	2.750		127.80	B 6-5/8" Reg	0.86	
3	8" RLL w/DGR + EWR		8.000	2.375		156.21	B 6-5/8" Reg	8.81	
4	8" DWD 1200 System P4M		8.000	2.375		156.21	B 6-5/8" Reg	4.73	
5	Circulating Sub	64725	8.000	2.250		157.75	B 6-5/8" Reg	0.94	
6	8 x Drill collar		8.000	3.000		147.22	B 6-5/8" Reg	69.52	
7	Jar	108017	8.000	2.750		151.06	B 6-5/8" Reg	11.25	
8	3 x Drill collar		8.000	2.810		150.00	B 6-5/8" Reg	26.86	
9	Cross Over Sub	GF35062	7.875	2.875		143.87	B 4-1/2" IF	0.96	
10	8 x HWDP		5.000	3.000		49.30	B 4-1/2" IF	73.73	
								197.95	

Parameter	Min	Max	Ave
WOB (t) :	2.50	9.00	4.79
RPM (rpm) :	80	120	110
Flow (L/min):	1950	2790	2675
SPP (bar) :	40.0	109.0	92.3

Activity	Hrs
Drilling :	29.00
Reaming :	0.00
Circ-Other :	1.00
Total :	30.00

BHA Weight	(lb)
in Air (Total) :	
in Mud (Total) :	
in Air (Bel Jars :	0
in Mud (Bel Jars :	

Drill String	OD(in)	Len (m)
DP(S)-NC50(XH)-19.50#	5.000	1123

PERFORMANCE

	In	Out
Inclination (deg)	0.74	0.82
Azimuth (deg)	358.30	38.63

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :	9.00	0			
Rotated :	1141.00	40			
Total :	1150.00	40	0.00	0.00	0.01

COMMENTS

Drill 9 7/8" Pilot hole from 171m to 1321m

sperry-sun
DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13

BHA ID #: 5

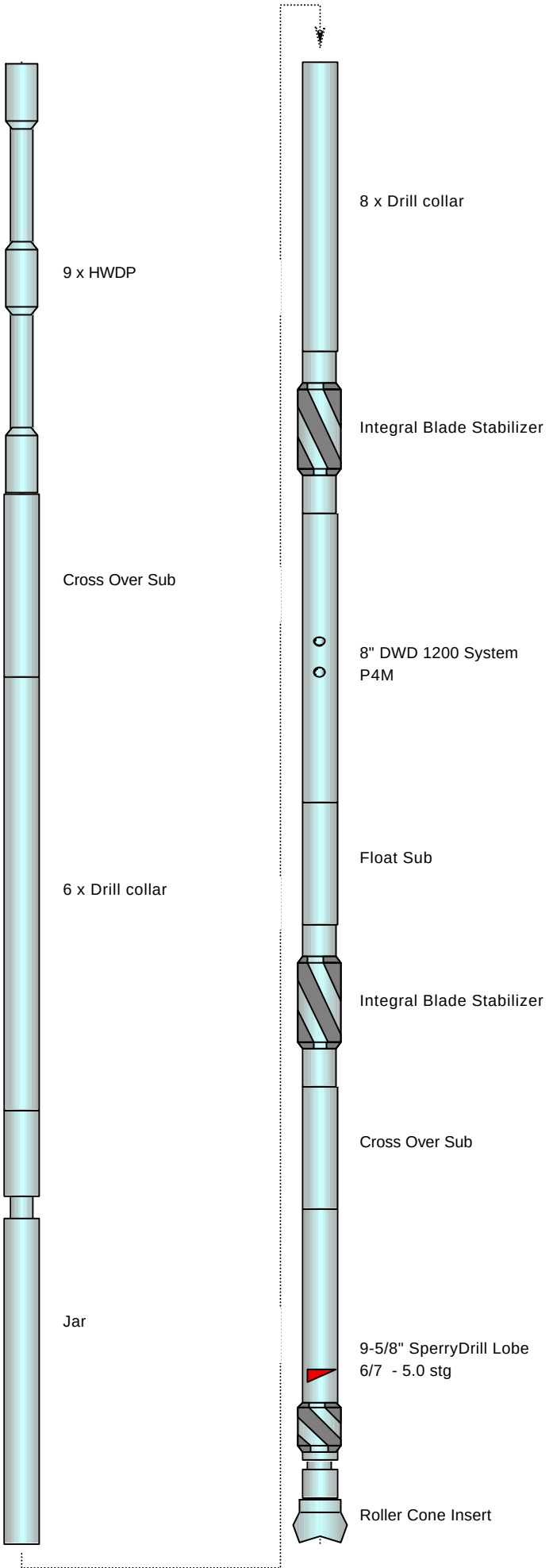
17-1/2" Hole-Opener

BHA Configuration

O.D.	Length	Description
17.5"	0.4m	Roller Cone Insert
9.625"	8.27m	9-5/8" SperryDrill Lobe 6/7 - 5.0 stg
9.5"	1.36m	Cross Over Sub
9.5"	1.64m	Integral Blade Stabilizer
8.062"	0.64m	Float Sub
8"	4.77m	8" DWD 1200 System P4M
8"	2.33m	Integral Blade Stabilizer
8"	69.52m	8 x Drill collar
8"	11.25m	Jar
8"	53.72m	6 x Drill collar
7.875"	0.96m	Cross Over Sub
5"	82.97m	9 x HWDP

BHA Discussion

Open 9 7/8" Pilot hole to 17 1/2" from 171m to 1320m



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594

BHA# 5

BHA# 5 : **Date In** 28-04-20(**MD In (m):** **TVD In(m) :** 0 **Date Out** 30-04-200 **MD Out (m):** **TVD Out(m)** 0

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
4	17.500	Security	EBXTD12DS	757129	6x14	0.902	1-1-WT-A -E-I-NO-TD

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs
1	9.625	SSDS	SperryDrill	963154	0.78°			

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	Roller Cone Insert	757129	17.500		17.500		P 7-5/8" Reg	0.40	
2	9-5/8" SperryDrill Lobe 6/7 - 5.0 stg	963154	9.625	6.135		147.21	B 7-5/8" Reg	8.27	
3	Cross Over Sub	117002	9.500	3.000		217.48	B 6-5/8" Reg	1.36	
4	Integral Blade Stabilizer	74419	9.500	3.000	17.000	217.48	B 6-5/8" Reg	1.64	10.85
5	Float Sub	63022	8.062	2.750		153.73	B 6-5/8" Reg	0.64	
6	8" DWD 1200 System P4M	162070	8.000	2.375		156.21	B 6-5/8" Reg	4.77	
7	Integral Blade Stabilizer	64803	8.000	2.812	17.250	150.14	B 6-5/8" Reg	2.33	18.25
8	8 x Drill collar		8.000	3.000		147.22	B 6-5/8" Reg	69.52	
9	Jar	4119590	8.000	2.750		151.06	B 6-5/8" Reg	11.25	
10	6 x Drill collar		8.000	2.810		150.00	B 6-5/8" Reg	53.72	
11	Cross Over Sub	GF35062	7.875	2.875		143.87	B 4-1/2" IF	0.96	
12	9 x HWDP		5.000	3.000		49.30	B 4-1/2" IF	82.97	
								237.83	

Parameter	Min	Max	Ave
WOB (t) :			
RPM (rpm) :			
Flow (L/min):			
SPP (bar) :			

Activity	Hrs
Drilling :	20.00
Reaming :	5.50
Circ-Other :	10.50
Total :	36.00

BHA Weight	(lb)
in Air (Total) :	
in Mud (Total) :	
in Air (Bel Jars :	0
in Mud (Bel Jars :	

Drill String	OD(in)	Len (m)
DP(S)-NC50(XH)-19.50#	5.000	

PERFORMANCE

	In	Out
Inclination (deg)	0.00	0.00
Azimuth (deg)	0.00	0.00

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :					
Rotated :					
Total :					

COMMENTS

Open 9 7/8" Pilot hole to 17 1/2" from 171m to 1320m

sperry-sun
DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13

BHA ID #: 6

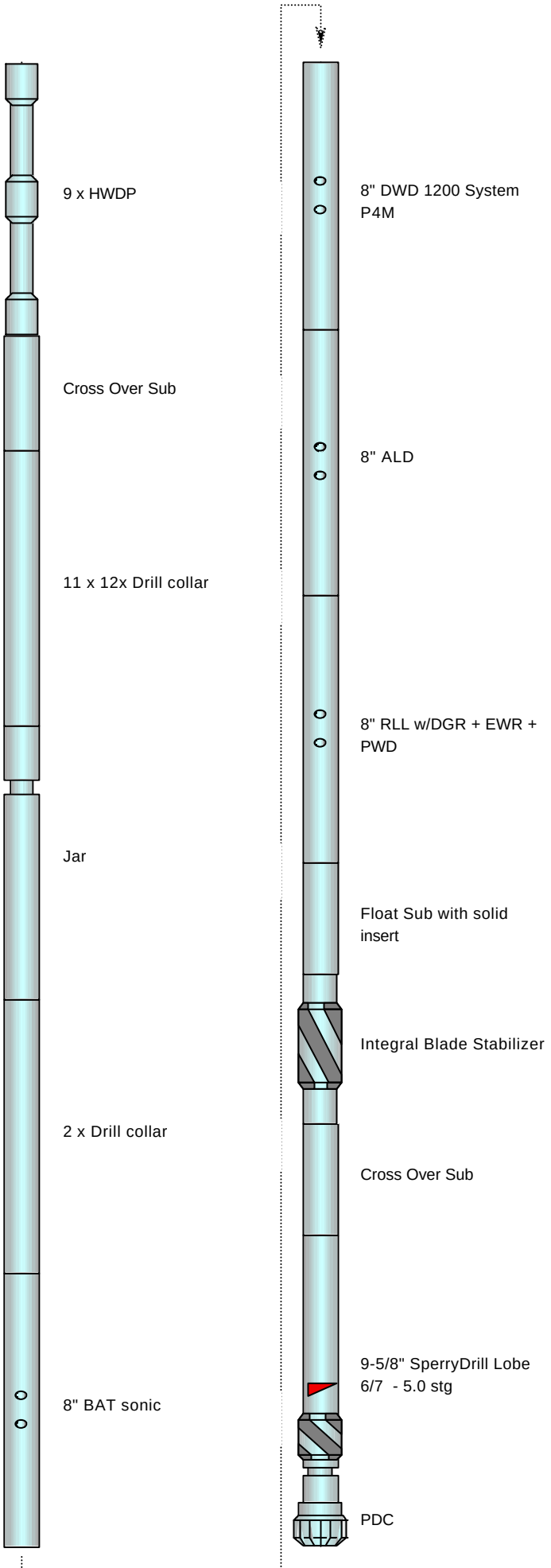
12-1/4" Steerable

BHA Configuration

O.D.	Length	Description
12.25"	0.27m	PDC
9.625"	8.54m	9-5/8" SperryDrill Lobe 6/7 - 5.0 stg
9.5"	1.06m	Cross Over Sub
8"	2.21m	Integral Blade Stabilizer
8.062"	0.64m	Float Sub with solid insert
8"	9.12m	8" RLL w/DGR + EWR + PWD
8"	6.11m	8" ALD
8"	4.77m	8" DWD 1200 System P4M
8"	6.97m	8" BAT sonic
8"	18m	2 x Drill collar
8"	11.25m	Jar
8"	108m	11 x 12x Drill collar
7.875"	0.96m	Cross Over Sub
5"	82.97m	9 x HWDP

BHA Discussion

Drill cement from 1283m and shoe at 1315m. Clean rathole to 1321m.
Drill formation from 1321m - 3047m



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594 **BHA# 6**

BHA# 6 : **Date In** 04-05-20(**MD In (m):** 1321 **TVD In(m) :** 1321 **Date Out** 08-05-200 **MD Out (m):** 3047 **TVD Out(m)** 3017

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
5	12.250	Security DBS	FM2643DRI2	5985359	4x14, 2x12	0.822	1-2-CT-A -X-I-LT-TD

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs
2	9.625	SSDS	SperryDrill	963166	1.15°		11.0	90.75

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	PDC	5985359	12.250	3.000	12.250	377.57	P 6-5/8" Reg	0.27	
2	9-5/8" SperryDrill Lobe 6/7 - 5.0 stg	963166	9.625	6.135	12.125	147.21	B 7-5/8" Reg	8.54	1.05
3	Cross Over Sub	113513	9.500	3.000		217.48	B 6-5/8" Reg	1.06	
4	Integral Blade Stabilizer	64763	8.000	2.810	12.000	150.17	B 6-5/8" Reg	2.21	10.86
5	Float Sub with solid insert	63022	8.062	2.750		153.73	B 6-5/8" Reg	0.64	
6	8" RLL w/DGR + EWR + PWD		8.000	2.375		156.21	B 6-5/8" Reg	9.12	
7	8" ALD		8.000	2.375		156.21	B 6-5/8" Reg	6.11	
8	8" DWD 1200 System P4M	162070	8.000	3.250		143.03	B 6-5/8" Reg	4.77	
9	8" BAT sonic		8.000	2.375		156.21	B 6-5/8" Reg	6.97	
10	2 x Drill collar		8.000	3.000		147.22	B 6-5/8" Reg	18.00	
11	Jar	4119590	8.000	2.750		151.06	B 6-5/8" Reg	11.25	
12	12x Drill collar		8.000	2.810		150.00	B 6-5/8" Reg	108.00	
13	Cross Over Sub	GF35062	7.875	2.875		143.87	B 4-1/2" IF	0.96	
14	9 x HWDP		5.000	3.000		49.30	B 4-1/2" IF	82.97	
								260.87	

Parameter	Min	Max	Ave
WOB (t) :	1.00	10.00	2.61
RPM (rpm) :	80	150	118
Flow (L/min):	3000	3640	3247
SPP (bar) :	177.0	300.0	257.0

Activity	Hrs
Drilling :	76.00
Reaming :	6.75
Circ-Other :	8.00
Total :	90.75

BHA Weight (lb)	
in Air (Total)	: 101535
in Mud (Total)	: 83601
in Air (Bel Jars	: 28936
in Mud (Bel Jars	: 23825

Drill String	OD(in)	Len (m)
DP(S)-NC50(XH)-19.50#	5.000	2786

PERFORMANCE

	In	Out
Inclination (deg)	0.82	11.86
Azimuth (deg)	38.63	68.31

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :	156.00	13			
Rotated :	1570.00	24			
Total :	1726.00	23	0.19	0.00	0.19

COMMENTS

Drill cement from 1283m and shoe at 1315m. Clean rathole to 1321m.
Drill formation from 1321m - 3047m

sperry-sun
DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13 A

BHA ID #: 7

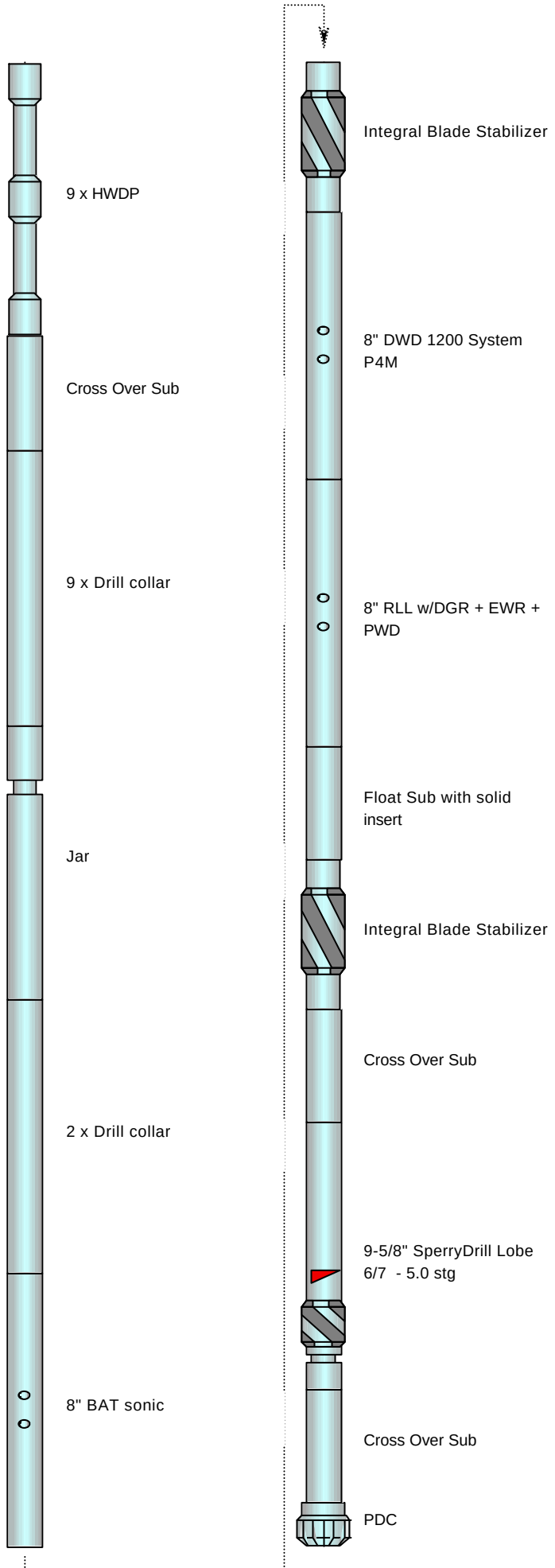
12-1/4" Sidetrack#1

BHA Configuration

O.D.	Length	Description
12.25"	0.37m	PDC
9.625"	0.36m	Cross Over Sub
9.625"	8.53m	9-5/8" SperryDrill Lobe 6/7 - 5.0 stg
9.5"	1.35m	Cross Over Sub
8"	2.21m	Integral Blade Stabilizer
8.062"	0.64m	Float Sub with solid insert
8"	9.12m	8" RLL w/DGR + EWR + PWD
8"	4.77m	8" DWD 1200 System P4M
8"	2.09m	Integral Blade Stabilizer
8"	6.97m	8" BAT sonic
8"	18m	2 x Drill collar
8"	11.25m	Jar
8"	81m	9 x Drill collar
7.875"	0.96m	Cross Over Sub
5"	82.97m	9 x HWDP

BHA Discussion

Drill cement from 1229m to 1350m and kick off.
Drill formation from 1350m - 2532m



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13 A
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594 **BHA# 7**

BHA# 7 : **Date In** 11-05-20(**MD In (m):** 1350 **TVD In(m) :** 1350 **Date Out** 15-05-200 **MD Out (m):** 2532 **TVD Out(m):** 2330

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
6	12.250	Security DBS	FM2843DRI2	1041129	4x14, 4x12	1.043	0-0-BU-A -X-I-PN-HP

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs
3	9.625	SSDS	SperryDrill	963154	1.15°	14	9.5	129.10

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	PDC	1041129	12.250	3.000	12.250	377.57	P 6-5/8" Reg	0.37	
2	Cross Over Sub	69277	9.625	3.000		223.88	B 7-5/8" Reg	0.36	
3	9-5/8" SperryDrill Lobe 6/7 - 5.0 stg	963154	9.625	6.135	12.000	147.21	B 7-5/8" Reg	8.53	1.51
4	Cross Over Sub	117002	9.500	3.000		217.48	B 6-5/8" Reg	1.35	
5	Integral Blade Stabilizer	64763	8.000	3.000	12.000	147.22	B 6-5/8" Reg	2.21	11.60
6	Float Sub with solid insert	63022	8.062	2.750		153.73	B 6-5/8" Reg	0.64	
7	8" RLL w/DGR + EWR + PWD		8.000	2.375		156.21	B 6-5/8" Reg	9.12	
8	8" DWD 1200 System P4M	32795	8.000	3.250		143.03	B 6-5/8" Reg	4.77	
9	Integral Blade Stabilizer	67161	8.000	2.810	11.750	150.17	B 6-5/8" Reg	2.09	28.40
10	8" BAT sonic		8.000	2.375		156.21	B 6-5/8" Reg	6.97	
11	2 x Drill collar		8.000	3.000		147.22	B 6-5/8" Reg	18.00	
12	Jar	4119590	8.000	2.750		151.06	B 6-5/8" Reg	11.25	
13	9 x Drill collar		8.000	2.810		150.00	B 6-5/8" Reg	81.00	
14	Cross Over Sub	GF35062	7.875	2.875		143.87	B 4-1/2" IF	0.96	
15	9 x HWDP		5.000	3.000		49.30	B 4-1/2" IF	82.97	
								230.59	

Parameter	Min	Max	Ave
WOB (t) :	1.00	25.00	3.38
RPM (rpm) :	100	130	124
Flow (L/min):	2500	3772	3450
SPP (bar) :	146.0	306.0	286.7

Activity	Hrs
Drilling :	47.95
Reaming :	28.63
Circ-Other :	16.53
Total :	93.10

BHA Weight	(lb)
in Air (Total) :	86715
in Mud (Total) :	70737
in Air (Bel Jars :	27404
in Mud (Bel Jars :	22355

Drill String	OD(in)	Len (m)
DP(S)-NC50(XH)-19.50#	5.000	2301

PERFORMANCE

	In	Out
Inclination (deg)	0.84	40.36
Azimuth (deg)	40.97	178.36

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :	349.59	13			2.50
Rotated :	832.41	29	-0.20	-0.42	
Total :	1182.00	25	1.00	0.00	1.04

COMMENTS

Drill cement from 1229m to 1350m and kick off.
Drill formation from 1350m - 2532m

sperry-sun
DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13 B

BHA ID #: 8

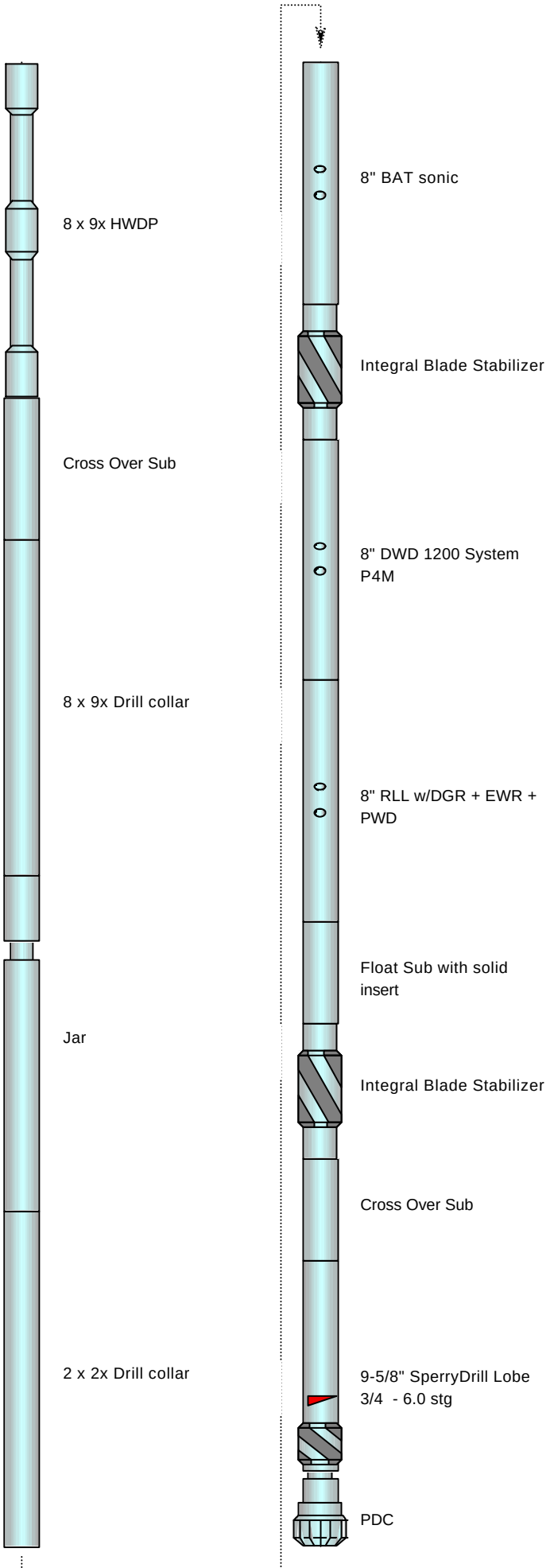
12-1/4" Sidetrack#2

BHA Configuration

O.D.	Length	Description
12.25"	0.37m	PDC
9.625"	9.04m	9-5/8" SperryDrill Lobe 3/4 - 6.0 stg
9.5"	1.35m	Cross Over Sub
8"	2.21m	Integral Blade Stabilizer
8.062"	0.64m	Float Sub with solid insert
8"	9.12m	8" RLL w/DGR + EWR + PWD
8"	4.77m	8" DWD 1200 System P4M
8"	2.18m	Integral Blade Stabilizer
8"	6.97m	8" BAT sonic
8"	17.15m	2 x 2x Drill collar
8"	11.27m	Jar
8"	79.41m	8 x 9x Drill collar
7.875"	0.96m	Cross Over Sub
5"	82.97m	8 x 9x HWDP

BHA Discussion

BRT 17/5/03 at 04:00hrs. ART 25/5/03 at 02:30hrs.
BRT hrs. = 190.5hrs
Drill cement from 1284m to 1345m and kick off.
Drill formation from 1345m - 2656m
Total circ. hrs. = 83.2
Drilling hrs. = 36.9
Avg. ROP = 35.5m/hr



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13 B
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594 **BHA# 8**

BHA# 8 : **Date In** 17-05-20(**MD In (m):** 1345 **TVD In(m) :** 1345 **Date Out** 25-05-200 **MD Out (m):** 2656 **TVD Out(m):** 2598

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
6rr1	12.250	Security DBS	FM2843DRI2	1041129	4x14, 4x12	1.043	1-2-CT-S -X-I-PN-RIG

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs
4	9.625	SSDS	SperryDrill	963026	1.15°	14	10.3	83.18

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	PDC	1041129	12.250	3.000	12.250	377.57	P 6-5/8" Reg	0.37	
2	9-5/8" SperryDrill Lobe 3/4 - 6.0 stg	963026	9.625	6.219	12.125	144.46	B 7-5/8" Reg	9.04	1.15
3	Cross Over Sub	117002	9.500	3.000		217.48	B 6-5/8" Reg	1.35	
4	Integral Blade Stabilizer	64763	8.000	3.000	12.000	147.22	B 6-5/8" Reg	2.21	11.75
5	Float Sub with solid insert	63022	8.062	2.750		153.73	B 6-5/8" Reg	0.64	
6	8" RLL w/DGR + EWR + PWD		8.000	2.375		156.21	B 6-5/8" Reg	9.12	
7	8" DWD 1200 System P4M	32795	8.000	3.250		143.03	B 6-5/8" Reg	4.77	
8	Integral Blade Stabilizer	64762	8.000	2.810	12.000	150.17	B 6-5/8" Reg	2.18	28.59
9	8" BAT sonic		8.000	2.375		156.21	B 6-5/8" Reg	6.97	
10	2x Drill collar		8.000	3.000		147.22	B 6-5/8" Reg	17.15	
11	Jar	80183	8.000	2.750		151.06	B 6-5/8" Reg	11.27	
12	9x Drill collar		8.000	2.810		150.00	B 6-5/8" Reg	79.41	
13	Cross Over Sub	GF35062	7.875	2.875		143.87	B 4-1/2" IF	0.96	
14	9x HWDP		5.000	3.000		49.30	B 4-1/2" IF	82.97	
								228.41	

Parameter	Min	Max	Ave
WOB (t) :	1.00	8.00	3.44
RPM (rpm) :	80	130	118
Flow (L/min):	2500	3750	3371
SPP (bar) :	161.0	304.0	286.2

Activity	Hrs
Drilling :	57.55
Reaming :	0.93
Circ-Other :	24.70
Total :	83.18

BHA Weight	(lb)
in Air (Total) :	85476
in Mud (Total) :	69075
in Air (Bel Jars :	26938
in Mud (Bel Jars :	21769

Drill String	OD(in)	Len (m)
DP(S)-NC50(XH)-19.50#	5.000	2428

PERFORMANCE

	In	Out
Inclination (deg)	0.97	19.47
Azimuth (deg)	37.28	151.24

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :	150.00	14			2.50
Rotated :	1161.00	24	0.05	-0.06	
Total :	1311.00	23	0.42	0.00	0.46

COMMENTS

BRT 17/5/03 at 04:00hrs. ART 25/5/03 at 02:30hrs.
BRT hrs. = 190.5hrs
Drill cement from 1284m to 1345m and kick off.
Drill formation from 1345m - 2656m
Total circ. hrs. = 83.2
Drilling hrs. = 36.9
Avg. ROP = 35.5m/hr

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DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13 B

BHA ID #: 9

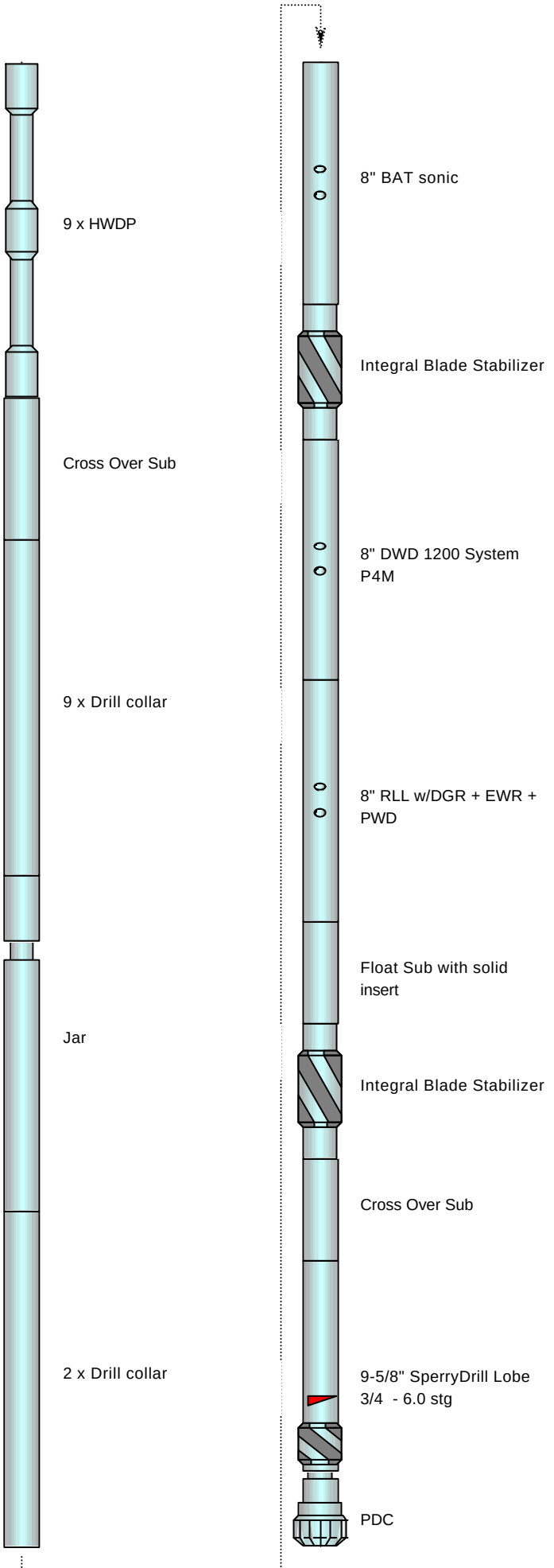
12-1/4" Steerable

BHA Configuration

O.D.	Length	Description
12.25"	0.33m	PDC
9.625"	9.04m	9-5/8" SperryDrill Lobe 3/4 - 6.0 stg
9.5"	1.35m	Cross Over Sub
8"	2.21m	Integral Blade Stabilizer
8.062"	0.64m	Float Sub with solid insert
8"	9.12m	8" RLL w/DGR + EWR + PWD
8"	4.77m	8" DWD 1200 System P4M
8"	2.18m	Integral Blade Stabilizer
8"	6.97m	8" BAT sonic
8"	17.15m	2 x Drill collar
8"	11.27m	Jar
8"	79.41m	9 x Drill collar
7.875"	0.96m	Cross Over Sub
5"	82.97m	9 x HWDP

BHA Discussion

BRT 25/5/03 @08:00hrs. ART27/5/03 @ 12:30
depth in 2656m
BRThrs = 52.5hrs
Drill formation from 2656m - 2951m
Total Meters = 295m
Total circ. hrs. = 24.7
Drilling hrs. = 14.2
Avg. ROP = 20.8m/hr



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13 B
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594

BHA# 9

BHA# 9 : **Date In** 25-05-20(**MD In (m):** 2656 **TVD In(m) :** 2598 **Date Out** 27-05-200 **MD Out (m):** 2951 **TVD Out(m):** 2877

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
7	12.250	Security DBS	FM2643	5995878	6x16	1.178	1-1-WT-S -X-I-CT-TD

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs
5	9.625	SSDS	SperryDrill	963026	1.15°	14	29.6	110.68

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	PDC	5995878	12.250	3.000	12.250	377.57	P 6-5/8" Reg	0.33	
2	9-5/8" SperryDrill Lobe 3/4 - 6.0 stg	963026	9.625	6.219	12.125	144.46	B 7-5/8" Reg	9.04	1.11
3	Cross Over Sub	117002	9.500	3.000		217.48	B 6-5/8" Reg	1.35	
4	Integral Blade Stabilizer	64763	8.000	3.000	12.000	147.22	B 6-5/8" Reg	2.21	11.71
5	Float Sub with solid insert	63022	8.062	2.750		153.73	B 6-5/8" Reg	0.64	
6	8" RLL w/DGR + EWR + PWD		8.000	2.375		156.21	B 6-5/8" Reg	9.12	
7	8" DWD 1200 System P4M	32795	8.000	3.250		143.03	B 6-5/8" Reg	4.77	
8	Integral Blade Stabilizer	64762	8.000	2.810	12.000	150.17	B 6-5/8" Reg	2.18	28.55
9	8" BAT sonic		8.000	2.375		156.21	B 6-5/8" Reg	6.97	
10	2 x Drill collar		8.000	3.000		147.22	B 6-5/8" Reg	17.15	
11	Jar	80183	8.000	2.750		151.06	B 6-5/8" Reg	11.27	
12	9 x Drill collar		8.000	2.810		150.00	B 6-5/8" Reg	79.41	
13	Cross Over Sub	GF35062	7.875	2.875		143.87	B 4-1/2" IF	0.96	
14	9 x HWDP		5.000	3.000		49.30	B 4-1/2" IF	82.97	
								228.37	

Parameter	Min	Max	Ave
WOB (t) :	2.00	10.00	5.39
RPM (rpm) :	120	130	121
Flow (L/min):	2990	3160	3067
SPP (bar) :	290.0	300.0	294.3

Activity	Hrs
Drilling :	19.00
Reaming :	2.00
Circ-Other :	6.50
Total :	27.50

BHA Weight	(lb)
in Air (Total) :	85427
in Mud (Total) :	68710
in Air (Bel Jars :	26888
in Mud (Bel Jars :	21627

Drill String	OD(in)	Len (m)
DP(S)-NC50(XH)-19.50#	5.000	2723

PERFORMANCE

	In	Out
Inclination (deg)	19.47	18.69
Azimuth (deg)	151.24	148.36

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :	0.00	0			
Rotated :	295.00	16			
Total :	295.00	16	-0.08	-0.29	0.12

COMMENTS

BRT 25/5/03 @08:00hrs. ART27/5/03 @ 12:30
depth in 2656m
BRThrs = 52.5hrs
Drill formation from 2656m - 2951m
Total Meters = 295m
Total circ. hrs. = 24.7
Drilling hrs. = 14.2
Avg. ROP = 20.8m/hr

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DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13 B

BHA ID #: 12

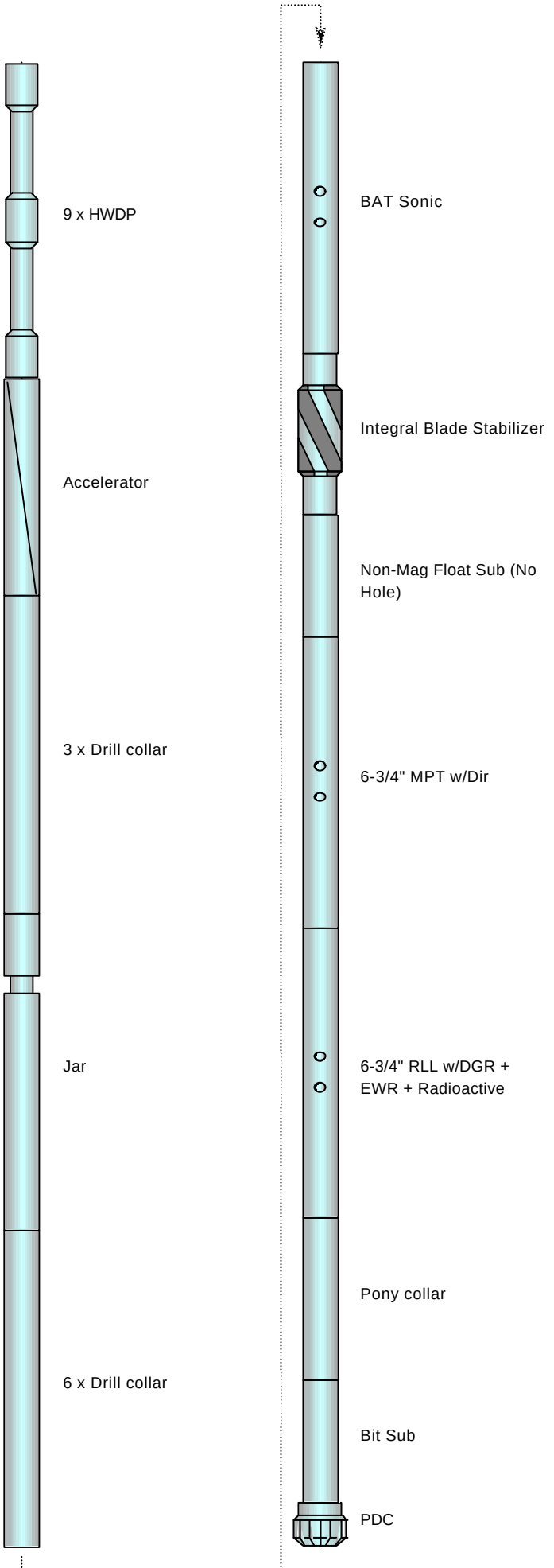
8-1/2" Rotary Logging#1 BHA

BHA Configuration

O.D.	Length	Description
6"	0.29m	PDC
6.375"	0.74m	Bit Sub
6.875"	4.47m	Pony collar
6.625"	14.54m	6-3/4" RLL w/DGR + EWR + Radioactive
6.75"	6.01m	6-3/4" MPT w/Dir
6.75"	0.79m	Non-Mag Float Sub (No Hole)
6.438"	1.58m	Integral Blade Stabilizer
6.69"	6.8m	BAT Sonic
6.5"	53.63m	6 x Drill collar
6.5"	11.73m	Jar
6.5"	26.7m	3 x Drill collar
6.5"	12.77m	Accelerator
5"	82.97m	9 x HWDP

BHA Discussion

Rig BHA's 10 and 11 were unsuccessful Tie Back Packer runs to seal between the 13 3/8" casing and the 9 5/8" liner.
BRT 1/6/03 @10:00hrs. ART 2/6/03 @16:00hrs
depth in 2951m Drilling hrs. = 0
Avg. ROP = n/a Total circ. hrs. = 18.1hrs
BRThrs = 30 hrs
Total Meters = 0m
Gas coming into hole, circulated and weighted up mud to 1.69sg prior to Pooh to run another Tie Back Packer to seal the liner lap.



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13 B
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594 **BHA# 12**

BHA# 12 : **Date In** 01-06-20(**MD In (m):** 2951 **TVD In(m) :** 2877 **Date Out** 02-06-200 **MD Out (m):** 2951 **TVD Out(m):** 2877

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
8	6.000	Security DBS	FS2645	10407243	6x11	0.557	0-0-NO-A -X-I-NO-BHA

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	PDC	10407243	6.000	3.000	8.500	72.27	P 4-1/2" Reg	0.29	
2	Bit Sub	WJA 405	6.375	2.940		85.64	B N.C. 50	0.74	
3	Pony collar	67144	6.875	2.750		106.27	B N.C. 50	4.47	
4	6-3/4" RLL w/DGR + EWR + Radioactive	15920	6.625	1.920	8.187	107.61	B N.C. 50	14.54	
5	6-3/4" MPT w/Dir	15806	6.750	1.920		112.09	B N.C. 50	6.01	
6	Non-Mag Float Sub (No Hole)	FS008	6.750	4.000		79.13	B N.C. 50	0.79	
7	Integral Blade Stabilizer	NM 5084	6.438	2.750	8.250	90.70	B N.C. 50	1.58	27.49
8	BAT Sonic	1592406	6.690	1.920		109.93	B N.C. 50	6.80	
9	6 x Drill collar		6.500	2.875		90.96	B N.C. 50	53.63	
10	Jar	65331	6.500	2.750		92.85	B N.C. 50	11.73	
11	3 x Drill collar		6.500	2.875		90.96	B N.C. 50	26.70	
12	Accelerator	65055	6.500	2.750		92.85	B N.C. 50	12.77	
13	9 x HWDP		5.000	3.000		49.30	B N.C. 50	82.97	
								223.02	

Parameter	Min	Max	Ave
WOB (t) :			
RPM (rpm) :			
Flow (L/min):			
SPP (bar) :			

Activity	Hrs
Drilling :	0.00
Reaming :	0.00
Circ-Other :	17.25
Total :	17.25

BHA Weight	(lb)
in Air (Total) :	57163
in Mud (Total) :	45977
in Air (Bel Jars :	28312
in Mud (Bel Jars :	22771

Drill String	OD(in)	Len (m)
DP(S)-NC50(XH)-19.50#	5.000	2728

PERFORMANCE

	In	Out
Inclination (deg)	18.69	18.69
Azimuth (deg)	148.36	148.36

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :					
Rotated :					
Total :					

COMMENTS

Rig BHA's 10 and 11 were unsuccessful Tie Back Packer runs to seal between the 13 3/8" casing and the 9 5/8" liner.
BRT 1/6/03 @10:00hrs. ART 2/6/03 @16:00hrs
depth in 2951m Drilling hrs. = 0
Avg. ROP = n/a Total circ. hrs. = 18.1hrs
BRThrs = 30 hrs
Total Meters = 0m
Gas coming into hole, circulated and weighted up mud to 1.69sg prior to Pooh to run another Tie Back Packer to seal the liner lap.

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DRILLING SERVICES

BHA Schematic

Pertra as

15/12-13 B

BHA ID #: 14

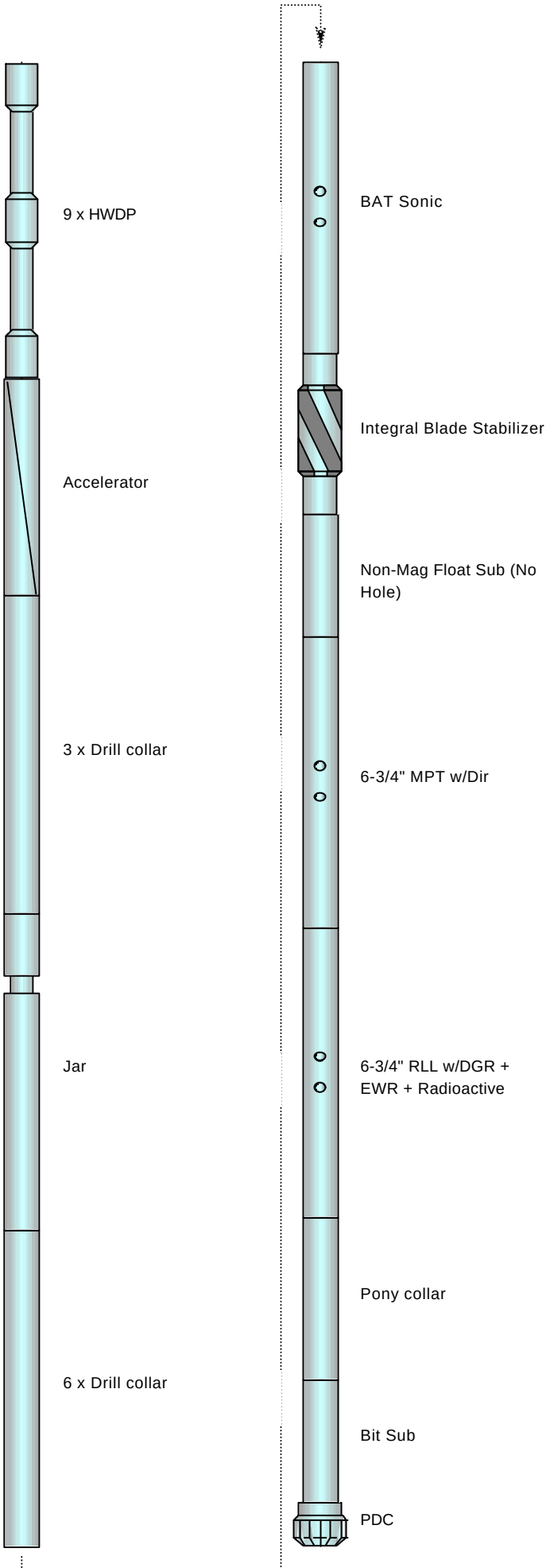
8-1/2" Rotary Logging#2 BHA

BHA Configuration

O.D.	Length	Description
6"	0.29m	PDC
6.375"	0.74m	Bit Sub
6.875"	4.47m	Pony collar
6.625"	14.54m	6-3/4" RLL w/DGR + EWR + Radioactive
6.75"	6.01m	6-3/4" MPT w/Dir
6.75"	0.79m	Non-Mag Float Sub (No Hole)
6.438"	1.58m	Integral Blade Stabilizer
6.69"	6.8m	BAT Sonic
6.5"	53.63m	6 x Drill collar
6.5"	11.73m	Jar
6.5"	26.7m	3 x Drill collar
6.5"	12.77m	Accelerator
5"	82.97m	9 x HWDP

BHA Discussion

Rig BHA 13 was a Tie Back Packer run to seal between the 13 3/8" casing and the 9 5/8" liner.
BRT 3/6/03 @03:00hrs. ART 5/6/03 @03:00hrs
depth in 2953m Drilling hrs. = 7.6 (+1.6 for Shoe Track)
Avg. ROP = 26.6m/hr Total circ. hrs. = 15.7hrs
BRThrs = 48 hrs
Total Meters = 202m



sperry-sun DRILLING SERVICES

BHA Report

Operator : Pertra as
Well Number : 15/12- 13 B
Field : Varg 15/12
Slot : 15/12-13
Rig : West Alpha
Job # : NR-DD-0002304594 **BHA# 14**

BHA# 14 : **Date In** 03-06-20(**MD In (m):** 2951 **TVD In(m) :** 2877 **Date Out** 05-06-200 **MD Out (m):** 3153 **TVD Out(m):** 3071

BIT DATA

Bit #	OD (in)	MFR	Style	Serial#	Nozzles (/32's)	TFA (in²)	Dull Condition
8rr1	6.000	Security DBS	FS2645	10407243	6x11	0.557	1-1-WT-A -X-I-LT-TD

MOTOR DATA

Run #	OD (in)	MFR	Model	Serial#	Bend	Nzl (/32's)	Avg Dif (bar)	Cum Circ Hrs

COMPONENT DATA

Item #	Description	Serial #	OD (in)	ID (in)	Gauge (in)	Weight (lbs/ft)	Top Con	Length (m)	Bit - Center Blade (m)
1	PDC	10407243	6.000	3.000	8.500	72.27	P 4-1/2" Reg	0.29	
2	Bit Sub	WJA 405	6.375	2.940		85.64	B N.C. 50	0.74	
3	Pony collar	67144	6.875	2.750		106.27	B N.C. 50	4.47	
4	6-3/4" RLL w/DGR + EWR + Radioactive	15920	6.625	1.920	8.187	107.61	B N.C. 50	14.54	
5	6-3/4" MPT w/Dir	15806	6.750	1.920		112.09	B N.C. 50	6.01	
6	Non-Mag Float Sub (No Hole)	FS008	6.750	4.000		79.13	B N.C. 50	0.79	
7	Integral Blade Stabilizer	NM 5084	6.438	2.750	8.250	90.70	B N.C. 50	1.58	27.49
8	BAT Sonic	1592406	6.690	1.920		109.93	B N.C. 50	6.80	
9	6 x Drill collar		6.500	2.875		90.96	B N.C. 50	53.63	
10	Jar	65331	6.500	2.750		92.85	B N.C. 50	11.73	
11	3 x Drill collar		6.500	2.875		90.96	B N.C. 50	26.70	
12	Accelerator	65055	6.500	2.750		92.85	B N.C. 50	12.77	
13	9 x HWDP		5.000	3.000		49.30	B N.C. 50	82.97	
								223.02	

Parameter	Min	Max	Ave
WOB (t) :	1.00	3.00	2.43
RPM (rpm) :	100	100	100
Flow (L/min):	2000	2000	2000
SPP (bar) :	142.0	155.0	149.5

Activity	Hrs
Drilling :	10.00
Reaming :	2.25
Circ-Other :	5.75
Total :	18.00

BHA Weight	(lb)
in Air (Total) :	57163
in Mud (Total) :	48229
in Air (Bel Jars :	28312
in Mud (Bel Jars :	23887

Drill String	OD(in)	Len (m)
DP(S)-NC50(XH)-19.50#	5.000	2930

PERFORMANCE

	In	Out
Inclination (deg)	18.69	11.51
Azimuth (deg)	148.36	162.12

	Distance(m)	ROP (m/hr)	Build (°/30m)	Turn (°/30m)	DLS (°/30m)
Oriented :	0.00	0			
Rotated :	202.00	20			
Total :	202.00	20	-1.07	2.04	1.18

COMMENTS

Rig BHA 13 was a Tie Back Packer run to seal between the 13 3/8" casing and the 9 5/8" liner.
BRT 3/6/03 @03:00hrs. ART 5/6/03 @03:00hrs
depth in 2953m Drilling hrs. = 7.6 (+1.6 for Shoe Track)
Avg. ROP = 26.6m/hr Total circ. hrs. = 15.7hrs
BRThrs = 48 hrs
Total Meters = 202m

21 DIRECTIONAL DRILLING, DRILLING PARAMETERS AND DEVIATION DATA

sperry-sun DRILLING SERVICES

Survey and Drilling Parameters

Operator : Pertra as
Well Number : 15/12- 13
Rig : West Alpha

Field : Varg 15/12
Slot : 15/12-13
Job # : NR-DD-0002304594

North Ref : Grid **Declination :** -0.92° **VS Dir :** 150.00° (from Wellhead)

WELLBORE SURVEY										DRILLING PARAMETERS								
Measured Depth (m)	Incl Angle (deg)	Azi Dir (deg)	Vertical Depth (m)	Vertical Section (m)	Coordinates N/S (m)	Coordinates E/W (m)	DLS (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	WOB (t)	RPM	Flow Rate (L/min)	Stand Pipe (bar)	Orientation From (m)	Orientation To (m)	Tool Face (deg)	BHA No. (#)	Comment
0.00	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00									Tieon
105.00	0.00	0.00	105.0	0.0	0.0	0.0	0.00	0.00	0.00								1	
240.20	1.51	358.30	240.2	-1.6	1.8	-0.1	0.34	0.34	0.00	5.00	90	2470	65.0				4	
270.50	1.89	356.45	270.5	-2.4	2.7	-0.1	0.38	0.38	-1.83	5.00	90	2470	65.0				4	
297.50	1.65	358.35	297.5	-3.1	3.5	-0.1	0.27	-0.27	2.11	9.00	90	2530	77.0				4	
321.80	1.62	359.31	321.7	-3.7	4.2	-0.1	0.05	-0.04	1.19	9.00	90	2530	77.0				4	
349.50	1.56	5.33	349.4	-4.4	5.0	-0.1	0.19	-0.06	6.52	9.00	90	2530	77.0				4	
377.30	1.49	5.02	377.2	-5.0	5.7	-0.1	0.08	-0.08	-0.33	9.00	90	2530	77.0				4	
402.50	1.67	358.87	402.4	-5.6	6.4	0.0	0.29	0.21	-7.32	4.50	100	2530	75.0				4	
433.40	1.48	357.95	433.3	-6.3	7.3	-0.1	0.19	-0.18	-0.89	4.50	100	2530	75.0				4	
462.10	1.54	5.11	462.0	-6.9	8.0	0.0	0.21	0.06	7.48	4.30	120	2530	75.0				4	
490.90	1.49	359.23	490.8	-7.6	8.8	0.0	0.17	-0.05	-6.13	4.30	120	2530	75.0				4	
518.40	1.43	1.89	518.3	-8.2	9.5	0.0	0.10	-0.07	2.90	2.50	115	2760	93.0				4	
545.60	1.36	0.91	545.5	-8.8	10.1	0.0	0.08	-0.08	-1.08	2.50	115	2760	93.0				4	
573.60	1.00	3.58	573.5	-9.2	10.7	0.0	0.39	-0.39	0.00	2.50	115	2760	93.0				4	
596.80	1.15	9.97	596.7	-9.6	11.1	0.1	0.25	0.19	0.00	2.50	115	2760	93.0				4	
625.30	0.99	12.52	625.2	-10.0	11.7	0.2	0.18	-0.17	0.00	2.50	115	2760	93.0				4	
653.50	1.14	12.02	653.3	-10.4	12.2	0.3	0.16	0.16	0.00	2.50	115	2760	93.0				4	
680.30	0.94	3.78	680.1	-10.8	12.6	0.4	0.28	-0.22	0.00	2.50	115	2760	93.0				4	
707.10	1.06	10.62	706.9	-11.1	13.1	0.4	0.19	0.13	0.00	5.00	115	2750	97.0				4	
735.20	0.93	1.37	735.0	-11.5	13.6	0.5	0.22	-0.14	0.00	5.00	115	2750	97.0				4	
764.44	0.90	7.00	764.3	-11.9	14.1	0.5	0.10	-0.03	0.00	5.00	115	2750	97.0				4	
791.30	0.88	2.62	791.1	-12.3	14.5	0.6	0.08	-0.02	0.00	5.00	115	2750	97.0				4	
818.50	0.79	358.79	818.3	-12.6	14.9	0.6	0.12	-0.10	0.00	5.00	115	2750	97.0				4	
848.50	0.75	358.56	848.3	-13.0	15.3	0.6	0.04	-0.04	0.00	5.00	115	2750	97.0				4	
874.70	0.74	1.38	874.5	-13.2	15.6	0.6	0.04	-0.01	0.00	5.00	115	2750	97.0				4	
902.60	0.79	10.42	902.4	-13.5	16.0	0.6	0.14	0.05	0.00	6.00	115	2730	102.0				4	
930.60	0.63	9.68	930.4	-13.8	16.3	0.7	0.17	-0.17	0.00	6.00	115	2730	102.0				4	
958.50	0.84	16.87	958.3	-14.1	16.7	0.7	0.25	0.23	0.00	6.00	115	2730	102.0				4	

sperry-sun DRILLING SERVICES

Survey and Drilling Parameters

Operator : Pertra as
Well Number : 15/12- 13
Rig : West Alpha

Field : Varg 15/12
Slot : 15/12-13
Job # : NR-DD-0002304594

North Ref : Grid **Declination :** -0.92° **VS Dir :** 150.00° (from Wellhead)

WELLBORE SURVEY										DRILLING PARAMETERS								
Measured Depth (m)	Incl Angle (deg)	Azi Dir (deg)	Vertical Depth (m)	Vertical Section (m)	Coordinates N/S (m)	Coordinates E/W (m)	DLS (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	WOB (t)	RPM	Flow Rate (L/min)	Stand Pipe (bar)	Orientation From (m)	Orientation To (m)	Tool Face (deg)	BHA No. (#)	Comment
987.50	0.64	20.04	987.3	-14.3	17.0	0.9	0.21	-0.21	0.00	6.00	115	2730	102.0				4	
1012.20	0.61	29.31	1012.0	-14.5	17.3	1.0	0.13	-0.04	0.00	6.50	115	2770	107.0				4	
1041.10	0.57	28.02	1040.9	-14.6	17.5	1.1	0.04	-0.04	0.00	6.50	115	2770	107.0				4	
1069.60	0.20	114.91	1069.4	-14.7	17.6	1.2	0.62	-0.39	0.00	6.50	115	2770	107.0				4	
1097.60	0.20	50.46	1097.4	-14.6	17.6	1.3	0.23	0.00	0.00	6.50	115	2770	107.0				4	
1124.30	0.25	3.48	1124.1	-14.7	17.7	1.3	0.21	0.06	0.00	3.50	115	2790	109.0				4	
1149.90	0.25	31.14	1149.7	-14.8	17.8	1.4	0.14	0.00	0.00	3.50	115	2790	109.0				4	
1179.90	0.86	36.86	1179.7	-14.9	18.1	1.5	0.61	0.61	0.00	3.50	115	2790	109.0				4	
1206.80	1.00	60.28	1206.6	-15.0	18.4	1.9	0.45	0.16	0.00	3.00	115	2790	109.0				4	
1232.90	0.67	15.27	1232.7	-15.1	18.6	2.1	0.81	-0.38	0.00	3.00	115	2790	109.0				4	
1260.20	0.66	36.07	1260.0	-15.2	18.9	2.2	0.26	-0.01	0.00	3.00	115	2790	109.0				4	
1288.80	0.75	40.60	1288.6	-15.4	19.2	2.5	0.11	0.09	0.00	3.00	115	2790	109.0				4	
1307.10	0.74	40.16	1306.9	-15.5	19.4	2.6	0.00	-0.02	0.00	3.00	115	2790	109.0				4	
1353.00	0.99	35.99	1352.8	-15.7	19.9	3.0	0.17	0.16	0.00	1.00		3000	177.0	1350	1353	58m	6	
1380.00	2.65	60.38	1379.8	-15.8	20.4	3.7	1.99	1.84	0.00	4.00	100	3000	184.0	1353	1368	58m	6	
1407.40	3.62	74.70	1407.1	-15.6	20.9	5.1	1.36	1.06	15.68	4.00	100	3000	184.0	1381	1394	60m	6	
1434.70	4.83	78.52	1434.4	-15.0	21.4	7.1	1.36	1.33	4.20	3.00	100	3000	180.0	1409	1423	55m	6	
1462.80	5.77	84.65	1462.3	-14.0	21.8	9.6	1.17	1.00	6.54	3.00	100	3000	180.0	1437	1452	HS	6	
														1454	1459	HS	6	
1490.60	8.09	80.11	1489.9	-12.8	22.2	12.9	2.57	2.50	-4.90	3.00	100	3000	180.0	1467	1482	25L	6	
1518.00	11.15	80.76	1516.9	-11.2	23.0	17.5	3.35	3.35	0.71	3.00	100	3050	180.0	1494	1509	25L	6	
1545.10	11.61	75.87	1543.5	-9.5	24.1	22.7	1.18	0.51	-5.41	2.00	110	3050	180.0	1520	1533	90L	6	
1590.00	12.00	59.37	1587.5	-8.3	27.6	31.1	2.26	0.26	-11.02	1.00		3300	215.0	1550	1563	110L	6	
														1574	1590	110L	6	
1600.40	12.20	57.93	1597.6	-8.4	28.7	33.0	1.04	0.58	-4.15	1.00	110	3500	235.0	1590	1591	110L	6	
1628.10	12.13	58.13	1624.7	-8.6	31.8	37.9	0.09	-0.08	0.22	1.00	100	3100	190.0				6	
1653.40	11.76	57.10	1649.5	-8.8	34.6	42.3	0.51	-0.44	-1.22	1.00	100	3100	190.0				6	
1682.80	11.54	57.37	1678.3	-9.1	37.8	47.3	0.23	-0.22	0.28	2.00	100	3580	260.0				6	
1710.60	11.51	57.72	1705.5	-9.3	40.8	52.0	0.08	-0.03	0.38	1.00	100	3060	187.0				6	

sperry-sun DRILLING SERVICES

Survey and Drilling Parameters

Operator : Pertra as
Well Number : 15/12- 13
Rig : West Alpha

Field : Varg 15/12
Slot : 15/12-13
Job # : NR-DD-0002304594

North Ref : Grid **Declination :** -0.92° **VS Dir :** 150.00° (from Wellhead)

WELLBORE SURVEY										DRILLING PARAMETERS								
Measured Depth (m)	Incl Angle (deg)	Azi Dir (deg)	Vertical Depth (m)	Vertical Section (m)	Coordinates N/S (m)	Coordinates E/W (m)	DLS (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	WOB (t)	RPM	Flow Rate (L/min)	Stand Pipe (bar)	Orientation From (m)	Orientation To (m)	Tool Face (deg)	BHA No. (#)	Comment
1736.80	11.56	57.73	1731.2	-9.5	43.6	56.4	0.06	0.06	0.01	1.00	100	3060	187.0				6	
1765.90	11.42	57.34	1759.7	-9.8	46.7	61.3	0.17	-0.14	-0.40	1.00	100	3060	187.0				6	
1792.70	11.32	57.37	1786.0	-10.0	49.5	65.8	0.11	-0.11	0.03	1.00	130	3190	200.0				6	
1820.70	11.11	57.36	1813.4	-10.3	52.5	70.4	0.23	-0.23	-0.01	1.00	130	3190	200.0				6	
1876.60	10.89	57.23	1868.3	-10.8	58.2	79.3	0.12	-0.12	-0.07	1.00	130	3190	200.0				6	
1904.20	10.90	57.90	1895.4	-11.0	61.0	83.7	0.14	0.01	0.73	1.00	130	3640	230.0	1887	1890	60R	6	
1931.80	10.42	57.52	1922.5	-11.2	63.8	88.1	0.53	-0.52	-0.41	1.00	130	3640	230.0				6	
1958.10	10.27	56.90	1948.4	-11.4	66.3	92.0	0.21	-0.17	-0.71	1.00	130	3640	230.0				6	
1986.10	10.24	58.21	1976.0	-11.6	69.0	96.2	0.25	-0.03	1.40	1.00	130	3640	230.0				6	
2013.70	9.53	61.00	2003.2	-11.7	71.4	100.3	0.93	-0.77	3.03	3.00	100	3570	280.0				6	
2040.90	9.64	61.79	2030.0	-11.6	73.6	104.3	0.19	0.12	0.87	3.00	100	3570	280.0				6	
2068.60	10.60	61.02	2057.2	-11.4	75.9	108.6	1.05	1.04	-0.83	3.00	105	3560	290.0	2045	2051	25L	6	
2095.80	10.43	59.71	2084.0	-11.4	78.3	112.9	0.32	-0.19	-1.44	3.00	105	3200	246.0				6	
2123.30	10.20	59.67	2111.0	-11.4	80.8	117.1	0.25	-0.25	-0.04	2.00	105	3500	295.0				6	
2150.90	10.19	59.52	2138.2	-11.5	83.3	121.3	0.03	-0.01	-0.16	2.00	105	3500	295.0				6	
2178.40	10.13	59.48	2165.3	-11.5	85.8	125.5	0.07	-0.07	-0.04	2.00	105	3500	295.0				6	
2206.30	10.11	60.04	2192.7	-11.5	88.2	129.8	0.11	-0.02	0.60	2.00	105	3500	295.0				6	
2233.50	9.98	59.98	2219.5	-11.5	90.6	133.9	0.14	-0.14	-0.07	2.00	105	3500	295.0				6	
2260.20	10.02	59.82	2245.8	-11.5	92.9	137.9	0.05	0.04	-0.18	2.00	105	3500	295.0				6	
2287.10	11.10	58.83	2272.3	-11.6	95.4	142.1	1.22	1.20	-1.10	2.00	100	3500	290.0	2268	2274	15L	6	
2314.90	11.02	59.41	2299.5	-11.7	98.2	146.7	0.15	-0.09	0.63	2.00	100	3500	290.0				6	
2342.80	11.19	59.48	2326.9	-11.7	100.9	151.3	0.18	0.18	0.08	2.00	105	3530	300.0				6	
2370.70	11.10	60.10	2354.3	-11.8	103.6	156.0	0.16	-0.10	0.67	2.00	105	3530	300.0				6	
2398.00	10.98	60.99	2381.1	-11.7	106.2	160.5	0.23	-0.13	0.98	3.00	110	3130	290.0				6	
2426.10	10.98	61.73	2408.7	-11.6	108.8	165.2	0.15	0.00	0.79	3.00	110	3130	290.0				6	
2454.10	10.83	62.38	2436.2	-11.4	111.2	169.9	0.21	-0.16	0.70	3.00	130	3130	290.0				6	
2480.70	10.84	63.21	2462.3	-11.1	113.5	174.4	0.18	0.01	0.94	3.00	130	3130	290.0				6	
2509.80	11.09	63.26	2490.9	-10.8	116.0	179.3	0.26	0.26	0.05	3.00	130	3130	290.0				6	
2536.20	11.14	63.49	2516.8	-10.5	118.3	183.9	0.08	0.06	0.26	3.00	130	3130	290.0				6	

sperry-sun DRILLING SERVICES

Survey and Drilling Parameters

Operator : Pertra as
Well Number : 15/12- 13
Rig : West Alpha

Field : Varg 15/12
Slot : 15/12-13
Job # : NR-DD-0002304594

North Ref : Grid **Declination :** -0.92° **VS Dir :** 150.00° (from Wellhead)

WELLBORE SURVEY										DRILLING PARAMETERS								
Measured Depth (m)	Incl Angle (deg)	Azi Dir (deg)	Vertical Depth (m)	Vertical Section (m)	Coordinates N/S (m)	Coordinates E/W (m)	DLS (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	WOB (t)	RPM	Flow Rate (L/min)	Stand Pipe (bar)	Orientation From (m)	Orientation To (m)	Tool Face (deg)	BHA No. (#)	Comment
2565.60	11.33	63.86	2545.6	-10.2	120.8	189.0	0.21	0.19	0.38	3.00	130	3130	290.0				6	
2621.40	11.47	64.02	2600.3	-9.4	125.7	198.9	0.08	0.08	0.09	4.00	140	3020	296.0				6	
2646.30	11.52	64.04	2624.7	-9.1	127.9	203.4	0.06	0.06	0.02	4.00	140	3020	296.0				6	
2674.50	11.58	64.76	2652.3	-8.6	130.3	208.4	0.17	0.06	0.77	7.00	100	3000	280.0				6	
2700.50	11.65	64.54	2677.8	-8.2	132.5	213.2	0.10	0.08	-0.25	4.00	120	3100	290.0				6	
2730.30	11.59	64.89	2707.0	-7.7	135.1	218.6	0.09	-0.06	0.35	2.00	120	3100	285.0				6	
2757.80	11.47	65.11	2733.9	-7.2	137.4	223.6	0.14	-0.13	0.24	6.00	120	3200	300.0	2737	2740	145L	6	
2787.30	11.58	65.97	2762.8	-6.7	139.9	229.0	0.21	0.11	0.87	6.00	120	3200	300.0				6	
2813.80	11.67	66.69	2788.8	-6.1	142.0	233.8	0.19	0.10	0.82	3.00	150	3100	293.0				6	
2841.90	11.50	67.41	2816.3	-5.4	144.2	239.0	0.24	-0.18	0.77	3.00	150	3100	293.0				6	
2895.80	11.76	66.52	2869.1	-4.1	148.5	249.0	0.18	0.14	-0.50	3.00	150	3100	293.0				6	
2923.50	11.89	67.32	2896.2	-3.4	150.7	254.3	0.23	0.14	0.87	3.00	150	3100	293.0				6	
2977.20	12.00	68.26	2948.8	-1.9	154.9	264.5	0.12	0.06	0.53	3.00	150	3100	293.0				6	
3004.50	11.86	68.31	2975.5	-1.1	157.0	269.8	0.15	-0.15	0.05	3.00	150	3100	293.0				6	
3047.00	11.86	68.31	3017.1	0.2	160.2	277.9	0.00	0.00	0.00	3.00	140	3200	300.0				7	

sperry-sun DRILLING SERVICES

Survey and Drilling Parameters

Operator : Pertra as
Well Number : 15/12- 13 A
Rig : West Alpha

Field : Varg 15/12
Slot : 15/12-13
Job # : NR-DD-0002304594

North Ref : Grid **Declination :** -0.92° **VS Dir :** 150.00° (from Wellhead)

WELLBORE SURVEY										DRILLING PARAMETERS								
Measured Depth (m)	Incl Angle (deg)	Azi Dir (deg)	Vertical Depth (m)	Vertical Section (m)	Coordinates N/S (m)	Coordinates E/W (m)	DLS (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	WOB (t)	RPM	Flow Rate (L/min)	Stand Pipe (bar)	Orientation From (m)	Orientation To (m)	Tool Face (deg)	BHA No. (#)	Comment
1350.00	0.97	36.20	1349.8	-15.7	19.9	3.0	0.00	0.00	0.00	1.00		2500	146.0				7	Tieon
1377.90	3.89	187.94	1377.7	-15.0	19.1	3.0	5.13	3.14	0.00	7.00	116	3500	280.0	1350	1355	180m	7	
														1355	1367	180m	7	
1404.90	6.52	188.78	1404.6	-13.1	16.7	2.7	2.92	2.92	0.93	2.00	116	3652	282.0	1378	1393	180m	7	
1432.60	8.33	190.37	1432.0	-10.4	13.2	2.1	1.97	1.96	1.72	2.00	116	3268	227.0	1406	1421	HS	7	
1459.20	9.79	183.07	1458.3	-7.0	9.0	1.6	2.09	1.65	-8.23	1.00	116	3280	234.0	1433	1449	30L	7	
1487.20	11.76	180.12	1485.8	-2.5	3.8	1.5	2.19	2.11	-3.16	1.00	116	3280	234.0	1460	1475	20L	7	
1515.40	14.06	176.37	1513.3	3.0	-2.5	1.7	2.60	2.45	-3.99	1.00	130	3650	274.0	1488	1508	20L	7	
1542.70	17.31	176.47	1539.6	9.6	-9.9	2.1	3.57	3.57	0.11	1.00	130	3650	274.0	1515	1535	HS	7	
1570.00	19.73	178.79	1565.4	17.3	-18.5	2.5	2.78	2.66	2.55	2.00		3660	275.0	1543	1557	HS	7	
														1559	1565	HS	7	
1596.60	22.11	179.58	1590.3	25.6	-28.0	2.6	2.70	2.68	0.89	1.00	130	3660	276.0	1570	1583	HS	7	
1624.50	24.20	177.10	1615.9	35.2	-39.0	2.9	2.48	2.25	-2.67	1.00		3650	290.0	1597	1610	15L	7	
														1624	1625	20L	7	
1652.40	25.66	176.54	1641.2	45.7	-50.7	3.6	1.59	1.57	-0.60	1.00	130	3640	290.0	1625	1634	20L	7	
1679.70	26.98	177.11	1665.7	56.5	-62.8	4.3	1.48	1.45	0.63	1.00		3610	291.0	1653	1662	HS	7	
														1679	1680	HS	7	
1707.60	28.73	177.42	1690.4	68.1	-75.9	4.9	1.89	1.88	0.33	2.00	130	3650	297.0	1680	1691	HS	7	
1734.90	29.99	176.95	1714.2	80.0	-89.2	5.5	1.41	1.38	-0.52	2.00	130	3650	290.0	1708	1718	HS	7	
1762.20	31.54	175.65	1737.6	92.6	-103.2	6.4	1.85	1.70	-1.43	2.00	130	3660	290.0	1736	1748	HS	7	
1790.10	34.55	175.41	1761.0	106.3	-118.3	7.6	3.24	3.24	-0.26	1.00	130	3610	290.0	1764	1780	HS	7	
1817.20	37.66	176.93	1782.9	120.6	-134.2	8.7	3.58	3.44	1.68	2.00	130	3610	297.0	1791	1807	15R	7	
1845.30	37.83	176.68	1805.1	136.0	-151.4	9.6	0.24	0.18	-0.27	4.00	123	3545	300.0	1818	1823	15R	7	
1873.20	37.49	176.79	1827.2	151.2	-168.4	10.6	0.37	-0.37	0.12	4.00	123	3545	300.0				7	
1900.40	38.65	177.09	1848.6	166.1	-185.2	11.5	1.30	1.28	0.33	2.00	125	3520	298.0	1880	1893	40R	7	
1927.70	38.80	177.13	1869.9	181.3	-202.2	12.4	0.17	0.16	0.04	2.00	125	3520	298.0				7	
1955.10	39.90	178.90	1891.1	196.7	-219.6	13.0	1.72	1.20	1.94	2.00	122	3425	292.0	1930	1943	40R	7	
1981.80	39.93	178.98	1911.6	211.7	-236.7	13.3	0.07	0.03	0.09	2.00	122	3425	292.0				7	
2009.00	39.74	178.31	1932.5	227.0	-254.2	13.7	0.52	-0.21	-0.74	1.00	117	3438	298.0				7	

sperry-sun DRILLING SERVICES

Survey and Drilling Parameters

Operator : Pertra as
Well Number : 15/12- 13 A
Rig : West Alpha

Field : Varg 15/12
Slot : 15/12-13
Job # : NR-DD-0002304594

North Ref : Grid **Declination :** -0.92° **VS Dir :** 150.00° (from Wellhead)

WELLBORE SURVEY										DRILLING PARAMETERS								
Measured Depth (m)	Incl Angle (deg)	Azi Dir (deg)	Vertical Depth (m)	Vertical Section (m)	Coordinates N/S (m)	Coordinates E/W (m)	DLS (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	WOB (t)	RPM	Flow Rate (L/min)	Stand Pipe (bar)	Orientation From (m)	Orientation To (m)	Tool Face (deg)	BHA No. (#)	Comment
2035.80	39.51	178.89	1953.1	242.0	-271.2	14.1	0.49	-0.26	0.65	5.00	130	3390	296.0				7	
2063.70	38.96	178.79	1974.7	257.4	-288.9	14.5	0.60	-0.59	-0.11	5.00	130	3390	296.0				7	
2091.10	40.60	179.20	1995.8	272.8	-306.4	14.8	1.82	1.80	0.45	2.00	115	3460	297.0	2068	2081	20R	7	
2118.70	40.54	178.21	2016.8	288.5	-324.4	15.2	0.70	-0.07	-1.08	2.00	115	3360	297.0				7	
2145.80	40.31	178.14	2037.4	304.0	-341.9	15.7	0.26	-0.25	-0.08	1.00	115	3360	297.0				7	
2175.00	39.95	177.87	2059.7	320.6	-360.7	16.4	0.41	-0.37	-0.28	1.00	115	3360	297.0				7	
2202.80	41.16	180.14	2080.8	336.4	-378.8	16.7	2.06	1.31	2.45	3.00	130	3390	300.0	2178	2194	55R	7	
2230.60	40.83	180.29	2101.8	352.2	-397.0	16.6	0.37	-0.36	0.16	2.00		3390	290.0	2230	2231	50R	7	
2258.60	41.06	180.95	2123.0	368.0	-415.4	16.4	0.52	0.25	0.71	3.00	130	3400	302.0	2231	2239	50R	7	
2285.80	40.49	181.01	2143.6	383.2	-433.1	16.1	0.63	-0.63	0.07	3.00	130	3400	302.0				7	
2313.00	40.72	180.91	2164.2	398.4	-450.8	15.8	0.26	0.25	-0.11	3.00	130	3400	302.0				7	
2340.90	41.93	180.10	2185.2	414.2	-469.3	15.7	1.42	1.30	-0.87	1.00	130	3380	297.0	2316	2328	15R	7	
2368.90	41.55	179.33	2206.1	430.4	-487.9	15.8	0.68	-0.41	-0.82	2.00	130	3350	306.0				7	
2396.10	41.35	179.21	2226.4	446.1	-505.9	16.0	0.24	-0.22	-0.13	2.00	130	3340	300.0				7	
2423.40	40.87	179.58	2247.0	461.8	-523.9	16.2	0.59	-0.53	0.41	7.00	130	3350	303.0				7	
2451.00	40.57	179.57	2267.9	477.4	-541.9	16.3	0.33	-0.33	-0.01	9.00	130	3300	305.0				7	
2478.30	40.26	179.15	2288.7	492.9	-559.6	16.5	0.45	-0.34	-0.46	15.00	100	3260	305.0				7	
2505.60	40.31	178.75	2309.5	508.3	-577.2	16.8	0.29	0.05	-0.44	15.00		3266	296.0	2505	2506	30R	7	
2532.00	40.31	178.75	2329.7	523.3	-594.3	17.2	0.00	0.00	0.00	15.00	130	3266	300.0	2506	2507	30R	8	
														2508	2526	50R	8	

sperry-sun DRILLING SERVICES

Survey and Drilling Parameters

Operator : Pertra as
Well Number : 15/12- 13 B
Rig : West Alpha

Field : Varg 15/12
Slot : 15/12-13
Job # : NR-DD-0002304594

North Ref : Grid **Declination :** -0.92° **VS Dir :** 150.00° (from Wellhead)

WELLBORE SURVEY										DRILLING PARAMETERS								
Measured Depth (m)	Incl Angle (deg)	Azi Dir (deg)	Vertical Depth (m)	Vertical Section (m)	Coordinates N/S (m)	Coordinates E/W (m)	DLS (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	WOB (t)	RPM	Flow Rate (L/min)	Stand Pipe (bar)	Orientation From (m)	Orientation To (m)	Tool Face (deg)	BHA No. (#)	Comment
1345.00	0.95	36.56	1344.8	-15.7	19.8	3.0	0.00	0.00	0.00	1.00		2500	161.0				8	Tieon
1365.00	3.96	135.38	1364.8	-15.1	19.4	3.5	6.32	4.52	0.00	3.00	80	3500	257.0	1345	1365	150m	8	
1391.60	6.56	133.38	1391.3	-12.7	17.7	5.3	2.94	2.93	-2.26	2.00	80	3700	290.0	1370	1385	150m	8	
1419.50	8.03	139.24	1418.9	-9.3	15.2	7.7	1.77	1.58	6.30	2.00	80	3700	300.0	1392	1407	30R	8	
1446.80	9.95	142.69	1445.9	-5.1	11.8	10.4	2.19	2.11	3.79	3.00	100	3650	288.0	1420	1430	30R	8	
														1434	1434	20R	8	
1474.10	12.86	147.49	1472.7	0.3	7.4	13.5	3.36	3.20	5.27	4.00	100	3650	288.0	1449	1463	30R	8	
1501.40	14.92	151.60	1499.2	6.9	1.7	16.8	2.51	2.26	4.52	2.00	100	3560	288.0	1478	1491	35R	8	
1529.30	14.98	151.01	1526.1	14.1	-4.6	20.2	0.18	0.06	-0.63	2.00	100	3560	288.0				8	
1556.60	17.25	153.31	1552.3	21.6	-11.3	23.8	2.59	2.49	2.53	2.00	100	3560	288.0	1533	1543	15R	8	
1583.90	16.98	153.14	1578.4	29.7	-18.4	27.4	0.30	-0.30	-0.19	2.00	100	3560	288.0				8	
1610.60	17.40	151.55	1603.9	37.5	-25.4	31.0	0.71	0.47	-1.79	2.00	100	3560	288.0				8	
1638.50	19.33	147.71	1630.4	46.3	-33.0	35.5	2.45	2.08	-4.13	2.00	100	3560	288.0	1613	1623	20L	8	
1666.40	19.16	148.41	1656.8	55.5	-40.8	40.4	0.31	-0.18	0.75	2.00	100	3525	295.0				8	
1693.70	18.92	147.54	1682.6	64.4	-48.4	45.1	0.41	-0.26	-0.96	3.00	130	3500	295.0				8	
1721.60	18.60	146.76	1709.0	73.4	-55.9	49.9	0.44	-0.34	-0.84	5.00	130	3460	290.0				8	
1748.90	18.37	146.29	1734.9	82.0	-63.1	54.7	0.30	-0.25	-0.52	5.00	130	3460	290.0				8	
1776.20	18.00	147.49	1760.8	90.5	-70.2	59.4	0.58	-0.41	1.32	5.00	130	3460	290.0				8	
1804.10	17.55	152.22	1787.4	99.0	-77.6	63.6	1.63	-0.48	5.09	4.00	130	3460	304.0	1777	1802	100R	8	
1832.00	17.43	152.33	1814.0	107.4	-85.0	67.6	0.13	-0.13	0.12	2.00	130	3167	247.0				8	
1859.30	17.20	152.25	1840.1	115.5	-92.2	71.3	0.25	-0.25	-0.09	2.00	130	3167	247.0				8	
1886.60	17.15	151.57	1866.1	123.6	-99.3	75.1	0.23	-0.05	-0.75	2.00	130	3400	295.0				8	
1913.90	16.90	151.77	1892.2	131.6	-106.4	78.9	0.28	-0.27	0.22	2.00	130	3400	295.0				8	
1941.20	16.61	151.31	1918.4	139.4	-113.3	82.7	0.35	-0.32	-0.51	2.00	130	3400	295.0				8	
1967.90	16.51	151.37	1944.0	147.1	-120.0	86.3	0.11	-0.11	0.07	2.00	130	3400	295.0				8	
1995.20	16.40	150.89	1970.2	154.8	-126.7	90.1	0.19	-0.12	-0.53	2.00	130	3420	300.0				8	
2021.19	16.27	151.18	1995.1	162.1	-133.1	93.6	0.18	-0.15	0.33	2.00	130	3420	300.0				8	
2049.80	16.16	150.48	2022.6	170.1	-140.1	97.5	0.24	-0.12	-0.73	2.00	130	3420	300.0				8	
2077.10	16.17	150.03	2048.8	177.7	-146.7	101.3	0.14	0.01	-0.49	2.00	130	3420	300.0				8	

sperry-sun DRILLING SERVICES

Survey and Drilling Parameters

Operator : Pertra as
Well Number : 15/12- 13 B
Rig : West Alpha

Field : Varg 15/12
Slot : 15/12-13
Job # : NR-DD-0002304594

North Ref : Grid **Declination :** -0.92° **VS Dir :** 150.00° (from Wellhead)

WELLBORE SURVEY										DRILLING PARAMETERS								
Measured Depth (m)	Incl Angle (deg)	Azi Dir (deg)	Vertical Depth (m)	Vertical Section (m)	Coordinates N/S (m)	Coordinates E/W (m)	DLS (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	WOB (t)	RPM	Flow Rate (L/min)	Stand Pipe (bar)	Orientation From (m)	Orientation To (m)	Tool Face (deg)	BHA No. (#)	Comment
2105.00	18.38	152.50	2075.4	186.0	-154.0	105.2	2.50	2.38	2.66	2.00	130	3420	300.0	2079	2090	30R	8	
2132.90	18.24	152.50	2101.9	194.7	-161.8	109.3	0.15	-0.15	0.00	2.00	130	3200	255.0				8	
2188.80	17.98	151.14	2155.0	212.1	-177.1	117.5	0.27	-0.14	-0.73	7.00	130	3388	290.0				8	
2216.60	17.69	151.30	2181.5	220.6	-184.5	121.6	0.32	-0.31	0.17	2.00	130	3329	290.0				8	
2243.90	17.45	150.05	2207.5	228.8	-191.7	125.6	0.49	-0.26	-1.37	2.00	130	3329	290.0				8	
2271.20	18.26	153.38	2233.5	237.2	-199.1	129.6	1.43	0.89	3.66	3.00	100	3267	265.0	2251	2258	55R	8	
2299.00	18.33	153.61	2259.9	245.9	-206.9	133.5	0.11	0.08	0.25	3.00	100	3273	286.0				8	
2326.40	18.34	152.84	2285.9	254.5	-214.6	137.4	0.27	0.01	-0.84	3.00	100	3273	286.0				8	
2354.30	18.43	152.64	2312.4	263.3	-222.4	141.4	0.12	0.10	-0.22	3.00	100	3273	286.0				8	
2381.50	18.56	152.66	2338.2	271.9	-230.1	145.3	0.14	0.14	0.02	7.00	130	3200	295.0				8	
2409.20	18.57	153.13	2364.5	280.7	-237.9	149.4	0.16	0.01	0.51	7.00	130	3200	295.0				8	
2436.50	18.66	153.04	2390.3	289.4	-245.7	153.3	0.10	0.10	-0.10	6.50	130	3200	298.0				8	
2463.80	18.60	152.99	2416.2	298.1	-253.5	157.3	0.07	-0.07	-0.05	8.00	110	3210	290.0				8	
2491.10	18.65	152.94	2442.1	306.9	-261.2	161.2	0.06	0.05	-0.05	8.00	110	3210	290.0				8	
2519.00	18.75	152.65	2468.5	315.8	-269.2	165.3	0.15	0.11	-0.31	5.00	110	3269	290.0				8	
2546.30	18.96	151.81	2494.3	324.6	-277.0	169.4	0.38	0.23	-0.92	4.00	125	3200	290.0				8	
2573.70	19.19	152.17	2520.2	333.5	-284.9	173.6	0.28	0.25	0.39	4.00	125	3200	290.0				8	
2601.00	19.18	151.89	2546.0	342.5	-292.8	177.8	0.10	-0.01	-0.31	7.00	110	3150	290.0				8	
2641.80	19.37	151.51	2584.5	356.0	-304.7	184.2	0.17	0.14	-0.28	7.00	110	3150	290.0				8	
2669.00	19.57	150.99	2610.2	365.0	-312.6	188.6	0.29	0.22	-0.57	4.00	120	3000	290.0				9	
2696.90	19.45	150.70	2636.5	374.4	-320.8	193.1	0.17	-0.13	-0.31	9.00	120	2991	290.0				9	
2724.80	19.27	150.74	2662.8	383.6	-328.8	197.7	0.19	-0.19	0.04	9.00	120	2991	290.0				9	
2752.80	19.30	150.34	2689.2	392.9	-336.9	202.2	0.15	0.03	-0.43	5.00	120	3090	300.0				9	
2807.40	19.30	149.81	2740.7	410.9	-352.5	211.2	0.10	0.00	-0.29	2.00	120	3130	300.0				9	
2834.70	19.13	149.45	2766.5	419.9	-360.3	215.7	0.23	-0.19	-0.40	7.00	130	2990	290.0				9	
2862.00	18.95	149.46	2792.3	428.8	-368.0	220.3	0.20	-0.20	0.01	3.00	120	3109	295.0				9	
2890.50	18.92	148.82	2819.3	438.0	-375.9	225.0	0.22	-0.03	-0.67	3.00	120	3114	295.0				9	
2918.30	18.84	148.20	2845.6	447.0	-383.6	229.7	0.23	-0.09	-0.67	3.00	120	3114	295.0				9	
2925.80	18.84	148.70	2852.7	449.5	-385.6	231.0	0.65	0.00	2.00	3.00	120	3114	295.0				9	

sperry-sun DRILLING SERVICES

Survey and Drilling Parameters

Operator : Pertra as
Well Number : 15/12- 13 B
Rig : West Alpha

Field : Varg 15/12
Slot : 15/12-13
Job # : NR-DD-0002304594

North Ref : Grid **Declination :** -0.92° **VS Dir :** 150.00° (from Wellhead)

WELLBORE SURVEY										DRILLING PARAMETERS								
Measured Depth (m)	Incl Angle (deg)	Azi Dir (deg)	Vertical Depth (m)	Vertical Section (m)	Coordinates N/S (m)	Coordinates E/W (m)	DLS (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	WOB (t)	RPM	Flow Rate (L/min)	Stand Pipe (bar)	Orientation From (m)	Orientation To (m)	Tool Face (deg)	BHA No. (#)	Comment
2943.00	18.81	148.29	2869.0	455.0	-390.4	233.9	0.24	-0.05	-0.72	3.00	120	3114	295.0				9	
2971.50	18.39	148.53	2896.0	464.1	-398.1	238.6	0.45	-0.44	0.25	1.00	100	2000	146.0				14	
3026.60	15.99	151.79	2948.6	480.4	-412.2	246.8	1.41	-1.31	1.77	2.50	100	2000	142.0				14	
3053.90	15.18	154.17	2974.9	487.7	-418.7	250.1	1.13	-0.89	2.62	3.00	100	2000	155.0				14	
3081.80	14.27	157.12	3001.9	494.7	-425.2	253.0	1.27	-0.98	3.17	3.00	100	2000	155.0				14	
3109.70	13.15	160.50	3029.0	501.3	-431.3	255.4	1.48	-1.20	3.63	3.00	100	2000	155.0				14	
3127.00	12.52	160.29	3045.9	505.1	-435.0	256.7	1.10	-1.09	-0.36	3.00	100	2000	155.0				14	
3151.00	11.59	161.97	3069.3	510.0	-439.7	258.3	1.24	-1.16	2.10								14	
3153.00	11.59	161.97	3071.3	510.4	-440.1	258.5	0.00	0.00	0.00									

SPERRY-SUN DRILLING SERVICES MAGUTM v3.00

GEOGRAPHIC/UTM CO-ORDINATE CONVERSIONS & MAGNETIC PARAMETER CALCULATIONS

Grid Convergence

COMPANY : Pertra as
PLATFORM ID : West Alpha
WELL NAME : 15/12-13
DATE : 28.04.2003
JOB No. : NR-DD-0002304594

All values calculated at MEAN SEA Level using Magnetic Model: IGBGCF02

Geographic/UTM Co-ordinates in NORTHERN hemisphere at WELL-HEAD

UTM GRID ZONE = 31V CENTRAL MERIDIAN = 3.000

	GEOGRAPHIC	U.T.M. (m)	U.T.M. (ft)
Latitude (Northing) :	58: 2: 3.833	6433198.000	21106292.651
Longitude (Easting) :	1:55: 4.576	436100.000	1430774.278

UTM GRID Convergence = -0.9180 degrees
MAGNETIC Convergence = -2.0384 degrees

GRID NORTH is 0:55: 4.857 WEST of TRUE NORTH
MAGNETIC NORTH is 2: 2:18.345 WEST of GRID NORTH

To convert a MAGNETIC direction to a TRUE direction; SUBTRACT 2.956 deg
To convert a MAGNETIC direction to a GRID direction; SUBTRACT 2.038 deg
To convert a TRUE direction to a GRID direction; ADD 0.918 deg

Components of Earth's Magnetic Field relative to TRUE NORTH on 28/APR/2003

Component	Magnitude	Rate of Change
Declination :	-2.956 deg. = -2:57:23.2	9.2 Minutes/year
Inclination/Dip :	71.305 deg. = 71:18:19.7	0.3 Minutes/year
Horizontal :	16058 Nanotesla	4 nT/year
Northward :	16036 Nanotesla	7 nT/year
Eastward :	-827 Nanotesla	43 nT/year
Vertical :	47456 Nanotesla	29 nT/year
Total Field :	50099 Nanotesla	29 nT/year

Checksummed Datasets (WELL-HEAD) :

North Reference :	TRUE	GRID	MAGNETIC
Total Field (nT) :	50099	50099	50099
Dip Angle (deg) :	71.31	71.31	71.31
Total Correction (deg) :	-2.96	-2.04	0.00
Checksum Value :	183880	184524	185952

PERTRA as
Block 15/12
VARG
West Alpha 15/12-13
Well 15/12-13
15/12-13_Extrapolation

Sperry-Sun

Geodetic Report

4 July, 2003

Your Ref: Definitive 15/12-13
Surface Coordinates: 6433198.00 N, 436100.00 E (58° 02' 03.8327" N, 1° 55' 04.5758" E)
Grid Coordinate System: UTM Zone 31 on ED50 Datum, Meters

Surface Coordinates relative to Field Centre: 4873.30 S, 1543.40 E (Grid)
Surface Coordinates relative to Structure: 0.00 N, 0.00 E (Grid)
Kelly Bushing Elevation: 18.00m above Mean Sea Level
Water Depth: 87.00m

Survey Ref: svy1464

HALLIBURTON
Sperry-Sun

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
15/12-13_MWD 17-1/2"									
0.00	0.000	0.000	0.00	0.00 N	0.00 E	58° 02' 03.8327" N	1° 55' 04.5758" E	6433198.00 N	436100.00 E
105.00	0.000	0.000	105.00	0.00 N	0.00 E	58° 02' 03.8327" N	1° 55' 04.5758" E	6433198.00 N	436100.00 E
240.20	1.510	358.300	240.18	1.78 N	0.05 W	58° 02' 03.8903" N	1° 55' 04.5708" E	6433199.78 N	436099.95 E
270.50	1.890	356.450	270.47	2.68 N	0.10 W	58° 02' 03.9193" N	1° 55' 04.5673" E	6433200.68 N	436099.90 E
297.50	1.650	358.350	297.46	3.51 N	0.13 W	58° 02' 03.9462" N	1° 55' 04.5642" E	6433201.51 N	436099.87 E
321.80	1.620	359.310	321.75	4.20 N	0.15 W	58° 02' 03.9686" N	1° 55' 04.5626" E	6433202.20 N	436099.85 E
349.50	1.560	5.330	349.44	4.97 N	0.12 W	58° 02' 03.9934" N	1° 55' 04.5637" E	6433202.97 N	436099.88 E
377.30	1.490	5.020	377.23	5.71 N	0.05 W	58° 02' 04.0172" N	1° 55' 04.5671" E	6433203.71 N	436099.95 E
402.50	1.670	358.870	402.42	6.40 N	0.03 W	58° 02' 04.0397" N	1° 55' 04.5677" E	6433204.40 N	436099.97 E
433.40	1.480	357.950	433.31	7.25 N	0.05 W	58° 02' 04.0671" N	1° 55' 04.5654" E	6433205.25 N	436099.95 E
462.10	1.540	5.110	462.00	8.01 N	0.03 W	58° 02' 04.0915" N	1° 55' 04.5660" E	6433206.01 N	436099.97 E
490.90	1.490	359.230	490.79	8.77 N	0.00 E	58° 02' 04.1161" N	1° 55' 04.5670" E	6433206.77 N	436100.00 E
518.40	1.430	1.890	518.28	9.47 N	0.00 E	58° 02' 04.1387" N	1° 55' 04.5668" E	6433207.47 N	436100.00 E
545.60	1.360	0.910	545.47	10.13 N	0.02 E	58° 02' 04.1601" N	1° 55' 04.5671" E	6433208.13 N	436100.02 E
573.60	1.000	3.580	573.46	10.70 N	0.04 E	58° 02' 04.1788" N	1° 55' 04.5678" E	6433208.70 N	436100.04 E
596.80	1.150	9.970	596.66	11.13 N	0.09 E	58° 02' 04.1927" N	1° 55' 04.5706" E	6433209.13 N	436100.09 E
625.30	0.990	12.520	625.15	11.66 N	0.20 E	58° 02' 04.2097" N	1° 55' 04.5764" E	6433209.66 N	436100.20 E
653.50	1.140	12.020	653.35	12.17 N	0.31 E	58° 02' 04.2263" N	1° 55' 04.5826" E	6433210.17 N	436100.31 E
680.30	0.940	3.780	680.15	12.65 N	0.38 E	58° 02' 04.2418" N	1° 55' 04.5864" E	6433210.65 N	436100.38 E
707.10	1.060	10.620	706.94	13.11 N	0.44 E	58° 02' 04.2568" N	1° 55' 04.5897" E	6433211.11 N	436100.44 E
735.20	0.930	1.370	735.04	13.60 N	0.49 E	58° 02' 04.2725" N	1° 55' 04.5924" E	6433211.60 N	436100.49 E
764.44	0.900	7.000	764.27	14.06 N	0.52 E	58° 02' 04.2875" N	1° 55' 04.5940" E	6433212.06 N	436100.52 E
791.30	0.880	2.620	791.13	14.48 N	0.56 E	58° 02' 04.3010" N	1° 55' 04.5958" E	6433212.48 N	436100.56 E
818.50	0.790	358.790	818.33	14.87 N	0.57 E	58° 02' 04.3138" N	1° 55' 04.5957" E	6433212.87 N	436100.57 E
848.50	0.750	358.560	848.32	15.28 N	0.56 E	58° 02' 04.3268" N	1° 55' 04.5948" E	6433213.28 N	436100.56 E

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
874.70	0.740	1.380	874.52	15.62 N	0.56 E	58° 02' 04.3378" N	1° 55' 04.5944" E	6433213.62 N	436100.56 E
902.60	0.790	10.420	902.42	15.99 N	0.60 E	58° 02' 04.3498" N	1° 55' 04.5964" E	6433213.99 N	436100.60 E
930.60	0.630	9.680	930.42	16.33 N	0.66 E	58° 02' 04.3609" N	1° 55' 04.5998" E	6433214.33 N	436100.66 E
958.50	0.840	16.870	958.32	16.67 N	0.74 E	58° 02' 04.3721" N	1° 55' 04.6047" E	6433214.67 N	436100.74 E
987.50	0.640	20.040	987.31	17.03 N	0.86 E	58° 02' 04.3837" N	1° 55' 04.6115" E	6433215.03 N	436100.86 E
1012.20	0.610	29.310	1012.01	17.27 N	0.97 E	58° 02' 04.3916" N	1° 55' 04.6180" E	6433215.27 N	436100.97 E
1041.10	0.570	28.020	1040.91	17.53 N	1.11 E	58° 02' 04.4002" N	1° 55' 04.6265" E	6433215.53 N	436101.11 E
1069.60	0.200	114.910	1069.41	17.64 N	1.22 E	58° 02' 04.4036" N	1° 55' 04.6332" E	6433215.64 N	436101.22 E
1097.60	0.200	50.460	1097.41	17.65 N	1.31 E	58° 02' 04.4040" N	1° 55' 04.6382" E	6433215.65 N	436101.31 E
1124.30	0.250	3.480	1124.11	17.74 N	1.35 E	58° 02' 04.4068" N	1° 55' 04.6405" E	6433215.74 N	436101.35 E
1149.90	0.250	31.140	1149.71	17.84 N	1.38 E	58° 02' 04.4102" N	1° 55' 04.6424" E	6433215.84 N	436101.38 E
1179.90	0.860	36.860	1179.71	18.08 N	1.55 E	58° 02' 04.4179" N	1° 55' 04.6524" E	6433216.08 N	436101.55 E
1206.80	1.000	60.280	1206.60	18.35 N	1.87 E	58° 02' 04.4271" N	1° 55' 04.6720" E	6433216.35 N	436101.87 E
1232.90	0.670	15.270	1232.70	18.62 N	2.11 E	58° 02' 04.4356" N	1° 55' 04.6862" E	6433216.62 N	436102.11 E
1260.20	0.660	36.070	1260.00	18.90 N	2.24 E	58° 02' 04.4448" N	1° 55' 04.6941" E	6433216.90 N	436102.24 E
1288.80	0.750	40.600	1288.60	19.17 N	2.46 E	58° 02' 04.4538" N	1° 55' 04.7072" E	6433217.17 N	436102.46 E
1307.10	0.740	40.160	1306.90	19.35 N	2.62 E	58° 02' 04.4597" N	1° 55' 04.7164" E	6433217.35 N	436102.62 E

15/12-13_MWD 12-1/4"

1353.00	0.990	35.990	1352.79	19.90 N	3.04 E	58° 02' 04.4776" N	1° 55' 04.7417" E	6433217.90 N	436103.04 E
1380.00	2.650	60.380	1379.78	20.40 N	3.72 E	58° 02' 04.4940" N	1° 55' 04.7827" E	6433218.40 N	436103.72 E
1407.40	3.620	74.700	1407.14	20.94 N	5.11 E	58° 02' 04.5123" N	1° 55' 04.8666" E	6433218.94 N	436105.11 E
1434.70	4.830	78.520	1434.36	21.39 N	7.06 E	58° 02' 04.5280" N	1° 55' 04.9854" E	6433219.39 N	436107.06 E
1462.80	5.770	84.650	1462.34	21.76 N	9.63 E	58° 02' 04.5412" N	1° 55' 05.1415" E	6433219.76 N	436109.63 E

Survey Report for West Alpha 15/12-13 - Well 15/12-13
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Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
1490.60	8.090	80.110	1489.94	22.23 N	12.95 E	58° 02' 04.5580" N	1° 55' 05.3433" E	6433220.23 N	436112.95 E
1518.00	11.150	80.760	1516.95	22.98 N	17.46 E	58° 02' 04.5848" N	1° 55' 05.6178" E	6433220.98 N	436117.46 E
1545.10	11.610	75.870	1543.51	24.07 N	22.70 E	58° 02' 04.6227" N	1° 55' 05.9355" E	6433222.07 N	436122.70 E
1590.00	12.000	59.370	1587.48	27.55 N	31.10 E	58° 02' 04.7396" N	1° 55' 06.4441" E	6433225.55 N	436131.10 E
1600.40	12.200	57.930	1597.65	28.69 N	32.96 E	58° 02' 04.7772" N	1° 55' 06.5565" E	6433226.69 N	436132.96 E
1628.10	12.130	58.130	1624.72	31.78 N	37.91 E	58° 02' 04.8797" N	1° 55' 06.8552" E	6433229.78 N	436137.91 E
1653.40	11.760	57.100	1649.48	34.58 N	42.33 E	58° 02' 04.9726" N	1° 55' 07.1220" E	6433232.58 N	436142.33 E
1682.80	11.540	57.370	1678.27	37.80 N	47.32 E	58° 02' 05.0791" N	1° 55' 07.4232" E	6433235.80 N	436147.32 E
1710.60	11.510	57.720	1705.51	40.78 N	52.01 E	58° 02' 05.1779" N	1° 55' 07.7059" E	6433238.78 N	436152.01 E
1736.80	11.560	57.730	1731.18	43.57 N	56.44 E	58° 02' 05.2706" N	1° 55' 07.9732" E	6433241.57 N	436156.44 E
1765.90	11.420	57.340	1759.70	46.69 N	61.33 E	58° 02' 05.3737" N	1° 55' 08.2682" E	6433244.69 N	436161.33 E
1792.70	11.320	57.370	1785.97	49.54 N	65.78 E	58° 02' 05.4682" N	1° 55' 08.5366" E	6433247.54 N	436165.78 E
1820.70	11.110	57.360	1813.44	52.47 N	70.36 E	58° 02' 05.5655" N	1° 55' 08.8132" E	6433250.47 N	436170.36 E
1876.60	10.890	57.230	1868.31	58.24 N	79.34 E	58° 02' 05.7564" N	1° 55' 09.3547" E	6433256.24 N	436179.34 E
1904.20	10.900	57.900	1895.41	61.03 N	83.74 E	58° 02' 05.8491" N	1° 55' 09.6203" E	6433259.03 N	436183.74 E
1931.80	10.420	57.520	1922.54	63.76 N	88.06 E	58° 02' 05.9395" N	1° 55' 09.8807" E	6433261.76 N	436188.06 E
1958.10	10.270	56.900	1948.41	66.32 N	92.03 E	58° 02' 06.0243" N	1° 55' 10.1202" E	6433264.32 N	436192.03 E
1986.10	10.240	58.210	1975.96	68.99 N	96.24 E	58° 02' 06.1129" N	1° 55' 10.3740" E	6433266.99 N	436196.24 E
2013.70	9.530	61.000	2003.15	71.39 N	100.32 E	58° 02' 06.1926" N	1° 55' 10.6205" E	6433269.39 N	436200.32 E
2040.90	9.640	61.790	2029.97	73.56 N	104.30 E	58° 02' 06.2648" N	1° 55' 10.8608" E	6433271.56 N	436204.30 E
2068.60	10.600	61.020	2057.24	75.89 N	108.57 E	58° 02' 06.3423" N	1° 55' 11.1189" E	6433273.89 N	436208.57 E
2095.80	10.430	59.710	2083.98	78.34 N	112.88 E	58° 02' 06.4239" N	1° 55' 11.3795" E	6433276.34 N	436212.88 E
2123.30	10.200	59.670	2111.04	80.83 N	117.13 E	58° 02' 06.5064" N	1° 55' 11.6362" E	6433278.83 N	436217.13 E
2150.90	10.190	59.520	2138.20	83.30 N	121.35 E	58° 02' 06.5885" N	1° 55' 11.8905" E	6433281.30 N	436221.35 E
2178.40	10.130	59.480	2165.27	85.76 N	125.53 E	58° 02' 06.6703" N	1° 55' 12.1429" E	6433283.76 N	436225.53 E

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
2206.30	10.110	60.040	2192.74	88.23 N	129.76 E	58° 02' 06.7523" N	1° 55' 12.3986" E	6433286.23 N	436229.76 E
2233.50	9.980	59.980	2219.52	90.60 N	133.87 E	58° 02' 06.8311" N	1° 55' 12.6468" E	6433288.60 N	436233.87 E
2260.20	10.020	59.820	2245.82	92.93 N	137.88 E	58° 02' 06.9083" N	1° 55' 12.8890" E	6433290.93 N	436237.88 E
2287.10	11.100	58.830	2272.26	95.45 N	142.12 E	58° 02' 06.9919" N	1° 55' 13.1449" E	6433293.45 N	436242.12 E
2314.90	11.020	59.410	2299.54	98.18 N	146.70 E	58° 02' 07.0827" N	1° 55' 13.4212" E	6433296.18 N	436246.70 E
2342.80	11.190	59.480	2326.92	100.92 N	151.33 E	58° 02' 07.1734" N	1° 55' 13.7006" E	6433298.92 N	436251.33 E
2370.70	11.100	60.100	2354.30	103.63 N	155.99 E	58° 02' 07.2636" N	1° 55' 13.9820" E	6433301.63 N	436255.99 E
2398.00	10.980	60.990	2381.09	106.20 N	160.54 E	58° 02' 07.3490" N	1° 55' 14.2569" E	6433304.20 N	436260.54 E
2426.10	10.980	61.730	2408.68	108.77 N	165.23 E	58° 02' 07.4344" N	1° 55' 14.5407" E	6433306.77 N	436265.23 E
2454.10	10.830	62.380	2436.17	111.25 N	169.91 E	58° 02' 07.5170" N	1° 55' 14.8235" E	6433309.25 N	436269.91 E
2480.70	10.840	63.210	2462.30	113.53 N	174.36 E	58° 02' 07.5932" N	1° 55' 15.0923" E	6433311.53 N	436274.36 E
2509.80	11.090	63.260	2490.86	116.03 N	179.30 E	58° 02' 07.6764" N	1° 55' 15.3911" E	6433314.03 N	436279.30 E
2536.20	11.130	63.490	2516.77	118.31 N	183.85 E	58° 02' 07.7524" N	1° 55' 15.6661" E	6433316.31 N	436283.85 E
2565.60	11.330	63.860	2545.61	120.84 N	188.98 E	58° 02' 07.8372" N	1° 55' 15.9764" E	6433318.84 N	436288.98 E
2621.40	11.470	64.020	2600.31	125.69 N	198.89 E	58° 02' 07.9989" N	1° 55' 16.5756" E	6433323.69 N	436298.89 E
2646.30	11.520	64.040	2624.71	127.86 N	203.35 E	58° 02' 08.0715" N	1° 55' 16.8454" E	6433325.86 N	436303.35 E
2674.50	11.580	64.760	2652.34	130.30 N	208.44 E	58° 02' 08.1530" N	1° 55' 17.1533" E	6433328.30 N	436308.44 E
2700.50	11.650	64.540	2677.80	132.54 N	213.17 E	58° 02' 08.2279" N	1° 55' 17.4395" E	6433330.54 N	436313.17 E
2730.30	11.590	64.890	2706.99	135.11 N	218.60 E	58° 02' 08.3135" N	1° 55' 17.7678" E	6433333.11 N	436318.60 E
2757.80	11.470	65.110	2733.94	137.43 N	223.58 E	58° 02' 08.3912" N	1° 55' 18.0692" E	6433335.43 N	436323.58 E
2787.30	11.580	65.970	2762.84	139.87 N	228.95 E	58° 02' 08.4729" N	1° 55' 18.3938" E	6433337.87 N	436328.95 E
2813.80	11.670	66.690	2788.80	142.01 N	233.84 E	58° 02' 08.5447" N	1° 55' 18.6898" E	6433340.01 N	436333.84 E
2841.90	11.500	67.410	2816.33	144.21 N	239.04 E	58° 02' 08.6185" N	1° 55' 19.0044" E	6433342.21 N	436339.04 E
2895.80	11.760	66.520	2869.12	148.47 N	249.03 E	58° 02' 08.7611" N	1° 55' 19.6097" E	6433346.47 N	436349.03 E
2923.50	11.890	67.320	2896.23	150.69 N	254.26 E	58° 02' 08.8358" N	1° 55' 19.9258" E	6433348.69 N	436354.26 E

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2977.20	12.000	68.260	2948.77	154.89 N	264.55 E	58° 02' 08.9769" N	1° 55' 20.5489" E	6433352.89 N	436364.55 E
3004.05	11.862	68.309	2975.04	156.95 N	269.70 E	58° 02' 09.0459" N	1° 55' 20.8612" E	6433354.95 N	436369.70 E

15/12-13_Extrapolation

3047.00	11.862	68.309	3017.07	160.21 N	277.91 E	58° 02' 09.1557" N	1° 55' 21.3580" E	6433358.21 N	436377.91 E

All data is in Metres unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to Well. Northings and Eastings are relative to Structure.
Global Northings and Eastings are relative to UTM Zone 31 on ED50 Datum, Meters.

Coordinate System is UTM Zone 31 on ED50 Datum, Meters.
Grid Convergence at Surface is -0.918°. Magnetic Convergence at Surface is 2.019° (13-Jun-03)

Based upon Minimum Curvature type calculations, at a Measured Depth of 3047.00m.,
The Bottom Hole Displacement is 320.78m., in the Direction of 60.037° (Grid).

PERTRA as
Block 15/12
VARG
West Alpha 15/12-13
Well 15/12-13
15/12-13_Extrapolation

Sperry-Sun

Survey Report

4 July, 2003

Your Ref: Definitive 15/12-13
Surface Coordinates: 6433198.00 N, 436100.00 E (58° 02' 03.8327" N, 1° 55' 04.5758" E)
Grid Coordinate System: UTM Zone 31 on ED50 Datum, Meters

Surface Coordinates relative to Field Centre: 4873.30 S, 1543.40 E (Grid)
Surface Coordinates relative to Structure: 0.00 N, 0.00 E (Grid)
Kelly Bushing Elevation: 18.00m above Mean Sea Level
Water Depth: 87.00m

Survey Ref: svy1464

HALLIBURTON
Sperry-Sun

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Northings (m)	Eastings (m)	Vertical Section (m)	Dogleg Rate (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	Toolface Azimuth
15/12-13_MWD 17-1/2"										
0.00	0.000	0.000	0.00	0.00 N	0.00 E	0.00				
105.00	0.000	0.000	105.00	0.00 N	0.00 E	0.00				
240.20	1.510	358.300	240.18	1.78 N	0.05 W	0.84	0.34	0.34	0.00	358.300
270.50	1.890	356.450	270.47	2.68 N	0.10 W	1.25	0.38	0.38	-1.83	-9.144
297.50	1.650	358.350	297.46	3.51 N	0.13 W	1.64	0.27	-0.27	2.11	167.208
321.80	1.620	359.310	321.75	4.20 N	0.15 W	1.97	0.05	-0.04	1.19	138.082
349.50	1.560	5.330	349.44	4.97 N	0.12 W	2.38	0.19	-0.06	6.52	112.750
377.30	1.490	5.020	377.23	5.71 N	0.05 W	2.81	0.08	-0.08	-0.33	-173.433
402.50	1.670	358.870	402.42	6.40 N	0.03 W	3.17	0.29	0.21	-7.32	-46.393
433.40	1.480	357.950	433.31	7.25 N	0.05 W	3.58	0.19	-0.18	-0.89	-172.879
462.10	1.540	5.110	462.00	8.01 N	0.03 W	3.97	0.21	0.06	7.48	75.959
490.90	1.490	359.230	490.79	8.77 N	0.00 E	4.38	0.17	-0.05	-6.12	-110.754
518.40	1.430	1.890	518.28	9.47 N	0.00 E	4.73	0.10	-0.07	2.90	132.843
545.60	1.360	0.910	545.47	10.13 N	0.02 E	5.08	0.08	-0.08	-1.08	-161.669
573.60	1.000	3.580	573.46	10.70 N	0.04 E	5.38	0.39	-0.39	2.86	172.649
596.80	1.150	9.970	596.66	11.13 N	0.09 E	5.64	0.25	0.19	8.26	41.856
625.30	0.990	12.520	625.15	11.66 N	0.20 E	5.99	0.18	-0.17	2.68	164.698
653.50	1.140	12.020	653.35	12.17 N	0.31 E	6.34	0.16	0.16	-0.53	-3.795
680.30	0.940	3.780	680.15	12.65 N	0.38 E	6.64	0.28	-0.22	-9.22	-147.283
707.10	1.060	10.620	706.94	13.11 N	0.44 E	6.93	0.19	0.13	7.66	48.304
735.20	0.930	1.370	735.04	13.60 N	0.49 E	7.22	0.22	-0.14	-9.88	-133.547
764.44	0.900	7.000	764.27	14.06 N	0.52 E	7.48	0.10	-0.03	5.78	111.254
791.30	0.880	2.620	791.13	14.48 N	0.56 E	7.72	0.08	-0.02	-4.89	-108.564
818.50	0.790	358.790	818.33	14.87 N	0.57 E	7.92	0.12	-0.10	-4.22	-150.100
848.50	0.750	358.560	848.32	15.28 N	0.56 E	8.11	0.04	-0.04	-0.23	-175.696
874.70	0.740	1.380	874.52	15.62 N	0.56 E	8.28	0.04	-0.01	3.23	106.662
902.60	0.790	10.420	902.42	15.99 N	0.60 E	8.50	0.14	0.05	9.72	72.059
930.60	0.630	9.680	930.42	16.33 N	0.66 E	8.72	0.17	-0.17	-0.79	-177.090
958.50	0.840	16.870	958.32	16.67 N	0.74 E	8.97	0.25	0.23	7.73	27.334
987.50	0.640	20.040	987.31	17.03 N	0.86 E	9.25	0.21	-0.21	3.28	170.013
1012.20	0.610	29.310	1012.01	17.27 N	0.97 E	9.47	0.13	-0.04	11.26	111.125
1041.10	0.570	28.020	1040.91	17.53 N	1.11 E	9.72	0.04	-0.04	-1.34	-162.274
1069.60	0.200	114.910	1069.41	17.64 N	1.22 E	9.87	0.62	-0.39	91.46	160.345
1097.60	0.200	50.460	1097.41	17.65 N	1.31 E	9.95	0.23	0.00	-69.05	-122.225
1124.30	0.250	3.480	1124.11	17.74 N	1.35 E	10.02	0.21	0.06	-52.79	-99.149
1149.90	0.250	31.140	1149.71	17.84 N	1.38 E	10.10	0.14	0.00	32.41	103.830
1179.90	0.860	36.860	1179.71	18.08 N	1.55 E	10.37	0.61	0.61	5.72	8.054
1206.80	1.000	60.280	1206.60	18.35 N	1.87 E	10.79	0.45	0.16	26.12	81.750
1232.90	0.670	15.270	1232.70	18.62 N	2.11 E	11.13	0.81	-0.38	-51.74	-138.002
1260.20	0.660	36.070	1260.00	18.90 N	2.24 E	11.38	0.26	-0.01	22.86	102.745
1288.80	0.750	40.600	1288.60	19.17 N	2.46 E	11.71	0.11	0.09	4.75	34.049
1307.10	0.740	40.160	1306.90	19.35 N	2.62 E	11.93	0.02	-0.02	-0.72	-150.446

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Northings (m)	Eastings (m)	Vertical Section (m)	Dogleg Rate (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	Toolface Azimuth
15/12-13_MWD 12-1/4"										
1353.00	0.990	35.990	1352.79	19.90 N	3.04 E	12.57	0.17	0.16	-2.73	-16.225
1380.00	2.650	60.380	1379.78	20.40 N	3.72 E	13.41	1.99	1.84	27.10	37.543
1407.40	3.620	74.700	1407.14	20.94 N	5.11 E	14.88	1.36	1.06	15.68	46.213
1434.70	4.830	78.520	1434.36	21.39 N	7.06 E	16.81	1.36	1.33	4.20	15.003
1462.80	5.770	84.650	1462.34	21.76 N	9.63 E	19.21	1.17	1.00	6.54	34.140
1490.60	8.090	80.110	1489.94	22.23 N	12.95 E	22.32	2.57	2.50	-4.90	-15.546
1518.00	11.150	80.760	1516.95	22.98 N	17.46 E	26.61	3.35	3.35	0.71	2.354
1545.10	11.610	75.870	1543.51	24.07 N	22.70 E	31.68	1.18	0.51	-5.41	-66.921
1590.00	12.000	59.370	1587.48	27.55 N	31.10 E	40.70	2.26	0.26	-11.02	-91.533
1600.40	12.200	57.930	1597.65	28.69 N	32.96 E	42.88	1.04	0.58	-4.15	-57.178
1628.10	12.130	58.130	1624.72	31.78 N	37.91 E	48.71	0.09	-0.08	0.22	149.046
1653.40	11.760	57.100	1649.48	34.58 N	42.33 E	53.95	0.51	-0.44	-1.22	-150.554
1682.80	11.540	57.370	1678.27	37.80 N	47.32 E	59.87	0.23	-0.22	0.28	166.213
1710.60	11.510	57.720	1705.51	40.78 N	52.01 E	65.42	0.08	-0.03	0.38	113.391
1736.80	11.560	57.730	1731.18	43.57 N	56.44 E	70.66	0.06	0.06	0.01	2.295
1765.90	11.420	57.340	1759.70	46.69 N	61.33 E	76.45	0.17	-0.14	-0.40	-151.165
1792.70	11.320	57.370	1785.97	49.54 N	65.78 E	81.73	0.11	-0.11	0.03	176.630
1820.70	11.110	57.360	1813.44	52.47 N	70.36 E	87.17	0.23	-0.23	-0.01	-179.474
1876.60	10.890	57.230	1868.31	58.24 N	79.34 E	97.82	0.12	-0.12	-0.07	-173.631
1904.20	10.900	57.900	1895.41	61.03 N	83.74 E	103.03	0.14	0.01	0.73	85.814
1931.80	10.420	57.520	1922.54	63.76 N	88.06 E	108.13	0.53	-0.52	-0.41	-171.855
1958.10	10.270	56.900	1948.41	66.32 N	92.03 E	112.85	0.21	-0.17	-0.71	-143.720
1986.10	10.240	58.210	1975.96	68.99 N	96.24 E	117.83	0.25	-0.03	1.40	97.974
2013.70	9.530	61.000	2003.15	71.39 N	100.32 E	122.57	0.93	-0.77	3.03	147.365
2040.90	9.640	61.790	2029.97	73.56 N	104.30 E	127.10	0.19	0.12	0.87	50.487
2068.60	10.600	61.020	2057.24	75.89 N	108.57 E	131.96	1.05	1.04	-0.83	-8.401
2095.80	10.430	59.710	2083.98	78.34 N	112.88 E	136.92	0.32	-0.19	-1.44	-126.060
2123.30	10.200	59.670	2111.04	80.83 N	117.13 E	141.85	0.25	-0.25	-0.04	-178.236
2150.90	10.190	59.520	2138.20	83.30 N	121.35 E	146.73	0.03	-0.01	-0.16	-110.713
2178.40	10.130	59.480	2165.27	85.76 N	125.53 E	151.58	0.07	-0.07	-0.04	-173.313
2206.30	10.110	60.040	2192.74	88.23 N	129.76 E	156.49	0.11	-0.02	0.60	101.765
2233.50	9.980	59.980	2219.52	90.60 N	133.87 E	161.23	0.14	-0.14	-0.07	-175.427
2260.20	10.020	59.820	2245.82	92.93 N	137.88 E	165.87	0.05	0.04	-0.18	-34.862
2287.10	11.100	58.830	2272.26	95.45 N	142.12 E	170.80	1.22	1.20	-1.10	-10.023
2314.90	11.020	59.410	2299.54	98.18 N	146.70 E	176.13	0.15	-0.09	0.63	126.001
2342.80	11.190	59.480	2326.92	100.92 N	151.33 E	181.50	0.18	0.18	0.08	4.569
2370.70	11.100	60.100	2354.30	103.63 N	155.99 E	186.89	0.16	-0.10	0.67	127.210
2398.00	10.980	60.990	2381.09	106.20 N	160.54 E	192.12	0.23	-0.13	0.98	125.586
2426.10	10.980	61.730	2408.68	108.77 N	165.23 E	197.47	0.15	0.00	0.79	90.363
2454.10	10.830	62.380	2436.17	111.25 N	169.91 E	202.77	0.21	-0.16	0.70	140.974
2480.70	10.840	63.210	2462.30	113.53 N	174.36 E	207.76	0.18	0.01	0.94	86.740
2509.80	11.090	63.260	2490.86	116.03 N	179.30 E	213.29	0.26	0.26	0.05	2.203
2536.20	11.130	63.490	2516.77	118.31 N	183.85 E	218.37	0.07	0.05	0.26	48.045
2565.60	11.330	63.860	2545.61	120.84 N	188.98 E	224.08	0.22	0.20	0.38	19.995
2621.40	11.470	64.020	2600.31	125.69 N	198.89 E	235.08	0.08	0.08	0.09	12.808

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Northings (m)	Eastings (m)	Vertical Section (m)	Dogleg Rate (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	Toolface Azimuth
2646.30	11.520	64.040	2624.71	127.86 N	203.35 E	240.03	0.06	0.06	0.02	4.567
2674.50	11.580	64.760	2652.34	130.30 N	208.44 E	245.66	0.17	0.06	0.77	67.756
2700.50	11.650	64.540	2677.80	132.54 N	213.17 E	250.88	0.10	0.08	-0.25	-32.432
2730.30	11.590	64.890	2706.99	135.11 N	218.60 E	256.86	0.09	-0.06	0.35	130.572
2757.80	11.470	65.110	2733.94	137.43 N	223.58 E	262.34	0.14	-0.13	0.24	159.982
2787.30	11.580	65.970	2762.84	139.87 N	228.95 E	268.21	0.21	0.11	0.87	57.795
2813.80	11.670	66.690	2788.80	142.01 N	233.84 E	273.51	0.19	0.10	0.82	58.540
2841.90	11.500	67.410	2816.33	144.21 N	239.04 E	279.11	0.24	-0.18	0.77	139.970
2895.80	11.760	66.520	2869.12	148.47 N	249.03 E	289.90	0.18	0.14	-0.50	-35.044
2923.50	11.890	67.320	2896.23	150.69 N	254.26 E	295.54	0.23	0.14	0.87	51.978
2977.20	12.000	68.260	2948.77	154.89 N	264.55 E	306.55	0.12	0.06	0.53	60.977
3004.05	11.862	68.309	2975.04	156.95 N	269.70 E	312.04	0.15	-0.15	0.05	175.802

15/12-13_Extrapolation

3047.00	11.862	68.309	3017.07	160.21 N	277.91 E	320.78	0.00	0.00	0.00	-173.655

All data is in Metres unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to Well. Northings and Eastings are relative to Structure.

The Dogleg Severity is in Degrees per 30 metres.
Vertical Section is from RKB (W.Alpha) and calculated along an Azimuth of 60.037° (Grid).

Coordinate System is UTM Zone 31 on ED50 Datum, Meters.
Grid Convergence at Surface is -0.918°. Magnetic Convergence at Surface is 2.019° (13-Jun-03)

Based upon Minimum Curvature type calculations, at a Measured Depth of 3047.00m.,
The Bottom Hole Displacement is 320.78m., in the Direction of 60.037° (Grid).

Casing details

From		To		
Measured Depth (m)	Vertical Depth (m)	Measured Depth (m)	Vertical Depth (m)	Casing Detail
<Surface>	<Surface>	114.00	114.00	30" Conductor
<Surface>	<Surface>	1307.10	1306.90	13 3/8" Casing

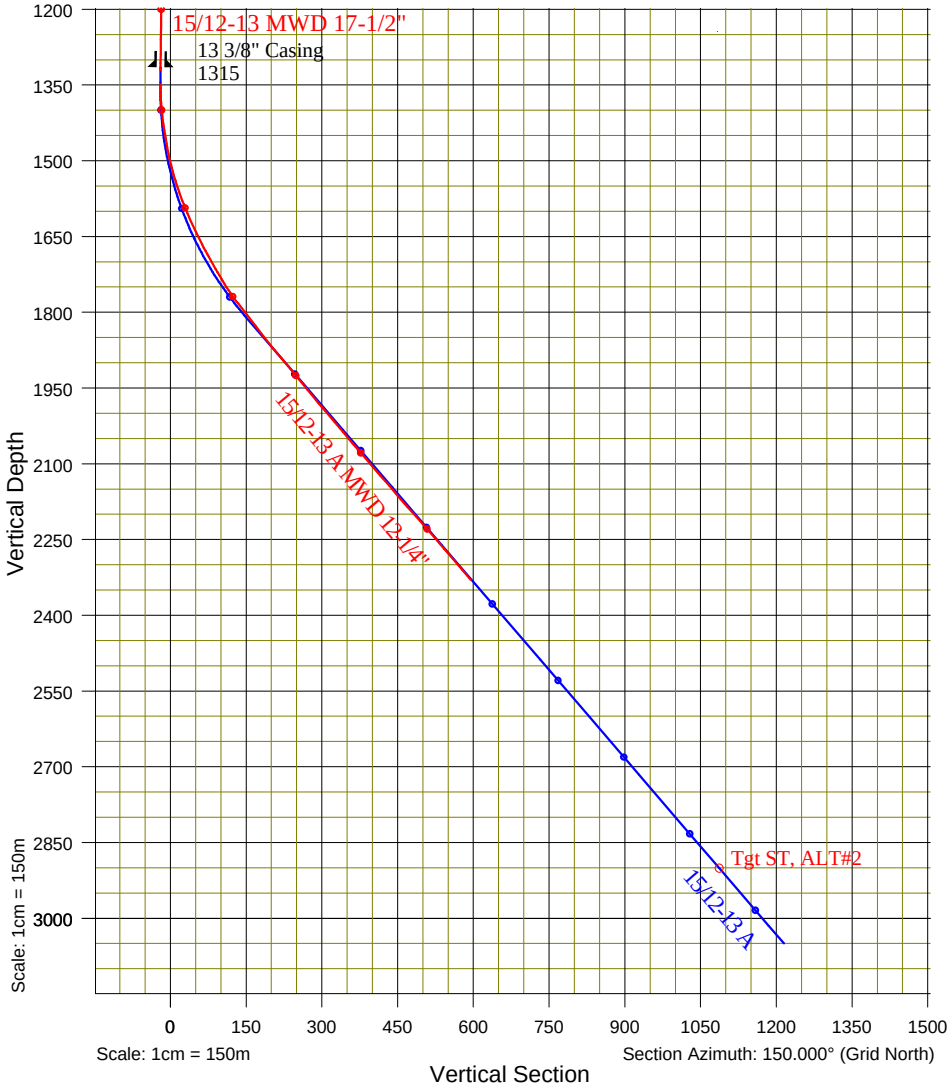
Block 15/12
VARG
15/12-13 Exploration
Definitive 15/12-13 A

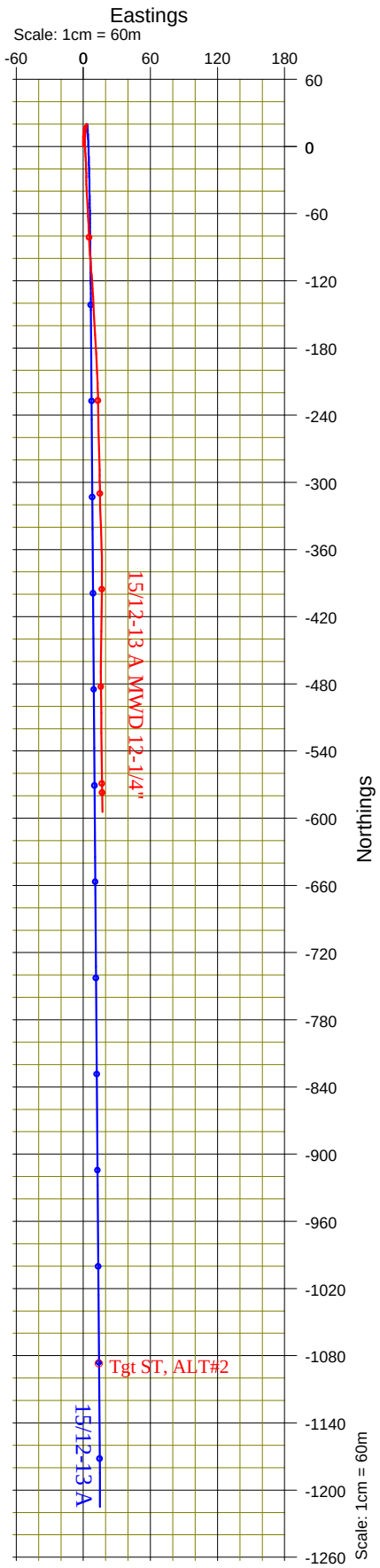
Current Structure Properties

Structure :	15/12-13 Exploration
Structure is centered on	
Ref. Global Coordinates :	6433198.00 N, 436100.00 E
Ref. Field Centre :	4873.30 S, 1543.40 E
Ref. Geographical Coordinates :	58° 02' 03.8327" N, 1° 55' 04.5758" E
Vertical Reference :	Structure
Horizontal Reference :	Structure
Grid North Convergence :	-0.918°
Coordinate System :	UTM Zone 31 on ED50 Datum, Meters
North Reference :	Grid North
Units :	Metres

Current Well Properties

Well :	15/12-13 Exploration
Horizontal Coordinates:	
Ref. Global Coordinates :	6433198.00 N, 436100.00 E
Ref. Structure :	0.00 N, 0.00 E
Ref. Geographical Coordinates :	58° 02' 03.8327" N, 1° 55' 04.5758" E
RKB Elevation :	18.00m above Mean Sea Level 18.00m above Structure
Grid North Convergence :	-0.918°
North Reference :	Grid North
Units :	Metres





PGS

PERTRA as
Block 15/12
VARG
West Alpha 15/12-13
Well 15/12-13
15/12-13 A_Extrapolation

Sperry-Sun

Geodetic Report

4 July, 2003

Your Ref: Definitive 15/12-13 A
Surface Coordinates: 6433198.00 N, 436100.00 E (58° 02' 03.8327" N, 1° 55' 04.5758" E)
Grid Coordinate System: UTM Zone 31 on ED50 Datum, Meters

Surface Coordinates relative to Field Centre: 4873.30 S, 1543.40 E (Grid)
Surface Coordinates relative to Structure: 0.00 N, 0.00 E (Grid)
Kelly Bushing Elevation: 18.00m above Mean Sea Level
Water Depth: 87.00m

Survey Ref: svy1465

HALLIBURTON
Sperry-Sun

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 A

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
15/12-13_MWD 17-1/2"									
0.00	0.000	0.000	0.00	0.00 N	0.00 E	58° 02' 03.8327" N	1° 55' 04.5758" E	6433198.00 N	436100.00 E
105.00	0.000	0.000	105.00	0.00 N	0.00 E	58° 02' 03.8327" N	1° 55' 04.5758" E	6433198.00 N	436100.00 E
240.20	1.510	358.300	240.18	1.78 N	0.05 W	58° 02' 03.8903" N	1° 55' 04.5708" E	6433199.78 N	436099.95 E
270.50	1.890	356.450	270.47	2.68 N	0.10 W	58° 02' 03.9193" N	1° 55' 04.5673" E	6433200.68 N	436099.90 E
297.50	1.650	358.350	297.46	3.51 N	0.13 W	58° 02' 03.9462" N	1° 55' 04.5642" E	6433201.51 N	436099.87 E
321.80	1.620	359.310	321.75	4.20 N	0.15 W	58° 02' 03.9686" N	1° 55' 04.5626" E	6433202.20 N	436099.85 E
349.50	1.560	5.330	349.44	4.97 N	0.12 W	58° 02' 03.9934" N	1° 55' 04.5637" E	6433202.97 N	436099.88 E
377.30	1.490	5.020	377.23	5.71 N	0.05 W	58° 02' 04.0172" N	1° 55' 04.5671" E	6433203.71 N	436099.95 E
402.50	1.670	358.870	402.42	6.40 N	0.03 W	58° 02' 04.0397" N	1° 55' 04.5677" E	6433204.40 N	436099.97 E
433.40	1.480	357.950	433.31	7.25 N	0.05 W	58° 02' 04.0671" N	1° 55' 04.5654" E	6433205.25 N	436099.95 E
462.10	1.540	5.110	462.00	8.01 N	0.03 W	58° 02' 04.0915" N	1° 55' 04.5660" E	6433206.01 N	436099.97 E
490.90	1.490	359.230	490.79	8.77 N	0.00 E	58° 02' 04.1161" N	1° 55' 04.5670" E	6433206.77 N	436100.00 E
518.40	1.430	1.890	518.28	9.47 N	0.00 E	58° 02' 04.1387" N	1° 55' 04.5668" E	6433207.47 N	436100.00 E
545.60	1.360	0.910	545.47	10.13 N	0.02 E	58° 02' 04.1601" N	1° 55' 04.5671" E	6433208.13 N	436100.02 E
573.60	1.000	3.580	573.46	10.70 N	0.04 E	58° 02' 04.1788" N	1° 55' 04.5678" E	6433208.70 N	436100.04 E
596.80	1.150	9.970	596.66	11.13 N	0.09 E	58° 02' 04.1927" N	1° 55' 04.5706" E	6433209.13 N	436100.09 E
625.30	0.990	12.520	625.15	11.66 N	0.20 E	58° 02' 04.2097" N	1° 55' 04.5764" E	6433209.66 N	436100.20 E
653.50	1.140	12.020	653.35	12.17 N	0.31 E	58° 02' 04.2263" N	1° 55' 04.5826" E	6433210.17 N	436100.31 E
680.30	0.940	3.780	680.15	12.65 N	0.38 E	58° 02' 04.2418" N	1° 55' 04.5864" E	6433210.65 N	436100.38 E
707.10	1.060	10.620	706.94	13.11 N	0.44 E	58° 02' 04.2568" N	1° 55' 04.5897" E	6433211.11 N	436100.44 E
735.20	0.930	1.370	735.04	13.60 N	0.49 E	58° 02' 04.2725" N	1° 55' 04.5924" E	6433211.60 N	436100.49 E
764.44	0.900	7.000	764.27	14.06 N	0.52 E	58° 02' 04.2875" N	1° 55' 04.5940" E	6433212.06 N	436100.52 E
791.30	0.880	2.620	791.13	14.48 N	0.56 E	58° 02' 04.3010" N	1° 55' 04.5958" E	6433212.48 N	436100.56 E
818.50	0.790	358.790	818.33	14.87 N	0.57 E	58° 02' 04.3138" N	1° 55' 04.5957" E	6433212.87 N	436100.57 E
848.50	0.750	358.560	848.32	15.28 N	0.56 E	58° 02' 04.3268" N	1° 55' 04.5948" E	6433213.28 N	436100.56 E

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 A

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
874.70	0.740	1.380	874.52	15.62 N	0.56 E	58° 02' 04.3378" N	1° 55' 04.5944" E	6433213.62 N	436100.56 E
902.60	0.790	10.420	902.42	15.99 N	0.60 E	58° 02' 04.3498" N	1° 55' 04.5964" E	6433213.99 N	436100.60 E
930.60	0.630	9.680	930.42	16.33 N	0.66 E	58° 02' 04.3609" N	1° 55' 04.5998" E	6433214.33 N	436100.66 E
958.50	0.840	16.870	958.32	16.67 N	0.74 E	58° 02' 04.3721" N	1° 55' 04.6047" E	6433214.67 N	436100.74 E
987.50	0.640	20.040	987.31	17.03 N	0.86 E	58° 02' 04.3837" N	1° 55' 04.6115" E	6433215.03 N	436100.86 E
1012.20	0.610	29.310	1012.01	17.27 N	0.97 E	58° 02' 04.3916" N	1° 55' 04.6180" E	6433215.27 N	436100.97 E
1041.10	0.570	28.020	1040.91	17.53 N	1.11 E	58° 02' 04.4002" N	1° 55' 04.6265" E	6433215.53 N	436101.11 E
1069.60	0.200	114.910	1069.41	17.64 N	1.22 E	58° 02' 04.4036" N	1° 55' 04.6332" E	6433215.64 N	436101.22 E
1097.60	0.200	50.460	1097.41	17.65 N	1.31 E	58° 02' 04.4040" N	1° 55' 04.6382" E	6433215.65 N	436101.31 E
1124.30	0.250	3.480	1124.11	17.74 N	1.35 E	58° 02' 04.4068" N	1° 55' 04.6405" E	6433215.74 N	436101.35 E
1149.90	0.250	31.140	1149.71	17.84 N	1.38 E	58° 02' 04.4102" N	1° 55' 04.6424" E	6433215.84 N	436101.38 E
1179.90	0.860	36.860	1179.71	18.08 N	1.55 E	58° 02' 04.4179" N	1° 55' 04.6524" E	6433216.08 N	436101.55 E
1206.80	1.000	60.280	1206.60	18.35 N	1.87 E	58° 02' 04.4271" N	1° 55' 04.6720" E	6433216.35 N	436101.87 E
1232.90	0.670	15.270	1232.70	18.62 N	2.11 E	58° 02' 04.4356" N	1° 55' 04.6862" E	6433216.62 N	436102.11 E
1260.20	0.660	36.070	1260.00	18.90 N	2.24 E	58° 02' 04.4448" N	1° 55' 04.6941" E	6433216.90 N	436102.24 E
1288.80	0.750	40.600	1288.60	19.17 N	2.46 E	58° 02' 04.4538" N	1° 55' 04.7072" E	6433217.17 N	436102.46 E
1307.10	0.740	40.160	1306.90	19.35 N	2.62 E	58° 02' 04.4597" N	1° 55' 04.7164" E	6433217.35 N	436102.62 E
15/12-13_MWD 12-1/4"									
1350.00	0.974	36.197	1349.79	19.86 N	3.01 E	58° 02' 04.4763" N	1° 55' 04.7399" E	6433217.86 N	436103.01 E
15/12-13 A_MWD 12-1/4"									
1377.90	3.890	187.940	1377.67	19.11 N	3.02 E	58° 02' 04.4521" N	1° 55' 04.7412" E	6433217.11 N	436103.02 E
1404.90	6.520	188.780	1404.56	16.69 N	2.66 E	58° 02' 04.3736" N	1° 55' 04.7216" E	6433214.69 N	436102.66 E
1432.60	8.330	190.370	1432.03	13.16 N	2.06 E	58° 02' 04.2593" N	1° 55' 04.6884" E	6433211.16 N	436102.06 E
1459.20	9.790	183.070	1458.29	9.01 N	1.59 E	58° 02' 04.1247" N	1° 55' 04.6639" E	6433207.01 N	436101.59 E
1487.20	11.760	180.120	1485.80	3.78 N	1.46 E	58° 02' 03.9555" N	1° 55' 04.6609" E	6433201.78 N	436101.46 E

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 A

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
1515.40	14.060	176.370	1513.28	2.52 S	1.67 E	58° 02' 03.7522" N	1° 55' 04.6799" E	6433195.48 N	436101.67 E
1542.70	17.310	176.470	1539.56	9.88 S	2.13 E	58° 02' 03.5143" N	1° 55' 04.7152" E	6433188.12 N	436102.13 E
1570.00	19.730	178.790	1565.45	18.54 S	2.48 E	58° 02' 03.2345" N	1° 55' 04.7448" E	6433179.46 N	436102.48 E
1596.60	22.110	179.580	1590.29	28.04 S	2.61 E	58° 02' 02.9276" N	1° 55' 04.7621" E	6433169.96 N	436102.61 E
1624.50	24.200	177.100	1615.95	39.00 S	2.94 E	58° 02' 02.5733" N	1° 55' 04.7928" E	6433159.00 N	436102.94 E
1652.40	25.660	176.540	1641.25	50.75 S	3.59 E	58° 02' 02.1941" N	1° 55' 04.8441" E	6433147.25 N	436103.59 E
1679.70	26.980	177.110	1665.71	62.83 S	4.26 E	58° 02' 01.8037" N	1° 55' 04.8967" E	6433135.17 N	436104.26 E
1707.60	28.730	177.420	1690.38	75.85 S	4.88 E	58° 02' 01.3831" N	1° 55' 04.9472" E	6433122.15 N	436104.88 E
1734.90	29.990	176.950	1714.17	89.22 S	5.54 E	58° 02' 00.9513" N	1° 55' 05.0004" E	6433108.78 N	436105.54 E
1762.20	31.540	175.650	1737.63	103.15 S	6.44 E	58° 02' 00.5013" N	1° 55' 05.0692" E	6433094.85 N	436106.44 E
1790.10	34.550	175.410	1761.02	118.32 S	7.63 E	58° 02' 00.0116" N	1° 55' 05.1563" E	6433079.68 N	436107.63 E
1817.20	37.660	176.930	1782.91	134.25 S	8.69 E	58° 01' 59.4972" N	1° 55' 05.2364" E	6433063.75 N	436108.69 E
1845.30	37.830	176.680	1805.13	151.42 S	9.65 E	58° 01' 58.9424" N	1° 55' 05.3116" E	6433046.58 N	436109.65 E
1873.20	37.490	176.790	1827.22	168.44 S	10.62 E	58° 01' 58.3928" N	1° 55' 05.3874" E	6433029.56 N	436110.62 E
1900.40	38.650	177.090	1848.63	185.19 S	11.51 E	58° 01' 57.8518" N	1° 55' 05.4583" E	6433012.81 N	436111.51 E
1927.70	38.800	177.130	1869.93	202.25 S	12.37 E	58° 01' 57.3008" N	1° 55' 05.5274" E	6432995.75 N	436112.37 E
1955.10	39.900	178.900	1891.12	219.61 S	12.97 E	58° 01' 56.7399" N	1° 55' 05.5808" E	6432978.39 N	436112.97 E
1981.80	39.930	178.980	1911.59	236.74 S	13.29 E	58° 01' 56.1863" N	1° 55' 05.6169" E	6432961.26 N	436113.29 E
2009.00	39.740	178.310	1932.48	254.16 S	13.70 E	58° 01' 55.6234" N	1° 55' 05.6590" E	6432943.84 N	436113.70 E
2035.80	39.510	178.890	1953.12	271.24 S	14.12 E	58° 01' 55.0712" N	1° 55' 05.7011" E	6432926.76 N	436114.12 E
2063.70	38.960	178.790	1974.73	288.89 S	14.48 E	58° 01' 54.5011" N	1° 55' 05.7401" E	6432909.11 N	436114.48 E
2091.10	40.600	179.200	1995.79	306.41 S	14.78 E	58° 01' 53.9346" N	1° 55' 05.7759" E	6432891.59 N	436114.78 E
2118.70	40.540	178.210	2016.76	324.36 S	15.19 E	58° 01' 53.3546" N	1° 55' 05.8181" E	6432873.64 N	436115.19 E
2145.80	40.310	178.140	2037.39	341.92 S	15.75 E	58° 01' 52.7871" N	1° 55' 05.8694" E	6432856.08 N	436115.75 E
2175.00	39.950	177.870	2059.71	360.73 S	16.40 E	58° 01' 52.1794" N	1° 55' 05.9276" E	6432837.27 N	436116.40 E

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 A

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
2202.80	41.160	180.140	2080.83	378.80 S	16.71 E	58° 01' 51.5954" N	1° 55' 05.9641" E	6432819.20 N	436116.71 E
2230.60	40.830	180.290	2101.82	397.04 S	16.64 E	58° 01' 51.0058" N	1° 55' 05.9778" E	6432800.96 N	436116.64 E
2258.60	41.060	180.950	2122.97	415.39 S	16.44 E	58° 01' 50.4126" N	1° 55' 05.9836" E	6432782.61 N	436116.44 E
2285.80	40.490	181.010	2143.56	433.15 S	16.14 E	58° 01' 49.8382" N	1° 55' 05.9824" E	6432764.85 N	436116.14 E
2313.00	40.720	180.910	2164.22	450.85 S	15.84 E	58° 01' 49.2658" N	1° 55' 05.9816" E	6432747.15 N	436115.84 E
2340.90	41.930	180.100	2185.17	469.27 S	15.68 E	58° 01' 48.6702" N	1° 55' 05.9898" E	6432728.73 N	436115.68 E
2368.90	41.550	179.330	2206.06	487.91 S	15.78 E	58° 01' 48.0676" N	1° 55' 06.0136" E	6432710.09 N	436115.78 E
2396.10	41.350	179.210	2226.45	505.91 S	16.00 E	58° 01' 47.4857" N	1° 55' 06.0451" E	6432692.09 N	436116.00 E
2423.40	40.870	179.580	2247.02	523.86 S	16.19 E	58° 01' 46.9056" N	1° 55' 06.0742" E	6432674.14 N	436116.19 E
2451.00	40.570	179.570	2267.93	541.87 S	16.33 E	58° 01' 46.3236" N	1° 55' 06.0999" E	6432656.13 N	436116.33 E
2478.30	40.260	179.150	2288.72	559.57 S	16.53 E	58° 01' 45.7515" N	1° 55' 06.1293" E	6432638.43 N	436116.53 E
2505.60	40.310	178.750	2309.55	577.22 S	16.85 E	58° 01' 45.1812" N	1° 55' 06.1662" E	6432620.78 N	436116.85 E

15/12-13 A_Extrapolation

2532.00	40.310	178.750	2329.68	594.29 S	17.22 E	58° 01' 44.6294" N	1° 55' 06.2056" E	6432603.71 N	436117.22 E

All data is in Metres unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to Well. Northings and Eastings are relative to Structure.
Global Northings and Eastings are relative to UTM Zone 31 on ED50 Datum, Meters.

Coordinate System is UTM Zone 31 on ED50 Datum, Meters.
Grid Convergence at Surface is -0.918°. Magnetic Convergence at Surface is 2.019° (13-Jun-03)

Based upon Minimum Curvature type calculations, at a Measured Depth of 2532.00m.,
The Bottom Hole Displacement is 594.54m., in the Direction of 178.340° (Grid).

PERTRA as
Block 15/12
VARG
West Alpha 15/12-13
Well 15/12-13
15/12-13 A_Extrapolation

Sperry-Sun

Survey Report

4 July, 2003

Your Ref: Definitive 15/12-13 A
Surface Coordinates: 6433198.00 N, 436100.00 E (58° 02' 03.8327" N, 1° 55' 04.5758" E)
Grid Coordinate System: UTM Zone 31 on ED50 Datum, Meters

Surface Coordinates relative to Field Centre: 4873.30 S, 1543.40 E (Grid)
Surface Coordinates relative to Structure: 0.00 N, 0.00 E (Grid)
Kelly Bushing Elevation: 18.00m above Mean Sea Level
Water Depth: 87.00m

Survey Ref: svy1465

HALLIBURTON
Sperry-Sun

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 A

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Northings (m)	Eastings (m)	Vertical Section (m)	Dogleg Rate (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	Toolface Azimuth
15/12-13_MWD 17-1/2"										
0.00	0.000	0.000	0.00	0.00 N	0.00 E	0.00				
105.00	0.000	0.000	105.00	0.00 N	0.00 E	0.00				
240.20	1.510	358.300	240.18	1.78 N	0.05 W	-1.78	0.34	0.34	0.00	358.300
270.50	1.890	356.450	270.47	2.68 N	0.10 W	-2.68	0.38	0.38	-1.83	-9.144
297.50	1.650	358.350	297.46	3.51 N	0.13 W	-3.51	0.27	-0.27	2.11	167.208
321.80	1.620	359.310	321.75	4.20 N	0.15 W	-4.21	0.05	-0.04	1.19	138.082
349.50	1.560	5.330	349.44	4.97 N	0.12 W	-4.97	0.19	-0.06	6.52	112.750
377.30	1.490	5.020	377.23	5.71 N	0.05 W	-5.71	0.08	-0.08	-0.33	-173.433
402.50	1.670	358.870	402.42	6.40 N	0.03 W	-6.40	0.29	0.21	-7.32	-46.393
433.40	1.480	357.950	433.31	7.25 N	0.05 W	-7.25	0.19	-0.18	-0.89	-172.879
462.10	1.540	5.110	462.00	8.01 N	0.03 W	-8.00	0.21	0.06	7.48	75.959
490.90	1.490	359.230	490.79	8.77 N	0.00 E	-8.76	0.17	-0.05	-6.12	-110.754
518.40	1.430	1.890	518.28	9.47 N	0.00 E	-9.46	0.10	-0.07	2.90	132.843
545.60	1.360	0.910	545.47	10.13 N	0.02 E	-10.12	0.08	-0.08	-1.08	-161.669
573.60	1.000	3.580	573.46	10.70 N	0.04 E	-10.70	0.39	-0.39	2.86	172.649
596.80	1.150	9.970	596.66	11.13 N	0.09 E	-11.13	0.25	0.19	8.26	41.856
625.30	0.990	12.520	625.15	11.66 N	0.20 E	-11.65	0.18	-0.17	2.68	164.698
653.50	1.140	12.020	653.35	12.17 N	0.31 E	-12.16	0.16	0.16	-0.53	-3.795
680.30	0.940	3.780	680.15	12.65 N	0.38 E	-12.63	0.28	-0.22	-9.22	-147.283
707.10	1.060	10.620	706.94	13.11 N	0.44 E	-13.09	0.19	0.13	7.66	48.304
735.20	0.930	1.370	735.04	13.60 N	0.49 E	-13.58	0.22	-0.14	-9.88	-133.547
764.44	0.900	7.000	764.27	14.06 N	0.52 E	-14.04	0.10	-0.03	5.78	111.254
791.30	0.880	2.620	791.13	14.48 N	0.56 E	-14.45	0.08	-0.02	-4.89	-108.564
818.50	0.790	358.790	818.33	14.87 N	0.57 E	-14.85	0.12	-0.10	-4.22	-150.100
848.50	0.750	358.560	848.32	15.28 N	0.56 E	-15.25	0.04	-0.04	-0.23	-175.696
874.70	0.740	1.380	874.52	15.62 N	0.56 E	-15.59	0.04	-0.01	3.23	106.662
902.60	0.790	10.420	902.42	15.99 N	0.60 E	-15.96	0.14	0.05	9.72	72.059
930.60	0.630	9.680	930.42	16.33 N	0.66 E	-16.30	0.17	-0.17	-0.79	-177.090
958.50	0.840	16.870	958.32	16.67 N	0.74 E	-16.65	0.25	0.23	7.73	27.334
987.50	0.640	20.040	987.31	17.03 N	0.86 E	-17.00	0.21	-0.21	3.28	170.013
1012.20	0.610	29.310	1012.01	17.27 N	0.97 E	-17.24	0.13	-0.04	11.26	111.125
1041.10	0.570	28.020	1040.91	17.53 N	1.11 E	-17.50	0.04	-0.04	-1.34	-162.274
1069.60	0.200	114.910	1069.41	17.64 N	1.22 E	-17.60	0.62	-0.39	91.46	160.345
1097.60	0.200	50.460	1097.41	17.65 N	1.31 E	-17.60	0.23	0.00	-69.05	-122.225
1124.30	0.250	3.480	1124.11	17.74 N	1.35 E	-17.69	0.21	0.06	-52.79	-99.149
1149.90	0.250	31.140	1149.71	17.84 N	1.38 E	-17.79	0.14	0.00	32.41	103.830
1179.90	0.860	36.860	1179.71	18.08 N	1.55 E	-18.02	0.61	0.61	5.72	8.054
1206.80	1.000	60.280	1206.60	18.35 N	1.87 E	-18.29	0.45	0.16	26.12	81.750
1232.90	0.670	15.270	1232.70	18.62 N	2.11 E	-18.55	0.81	-0.38	-51.74	-138.002
1260.20	0.660	36.070	1260.00	18.90 N	2.24 E	-18.82	0.26	-0.01	22.86	102.745
1288.80	0.750	40.600	1288.60	19.17 N	2.46 E	-19.09	0.11	0.09	4.75	34.049
1307.10	0.740	40.160	1306.90	19.35 N	2.62 E	-19.27	0.02	-0.02	-0.72	-150.446

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 A

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Northings (m)	Eastings (m)	Vertical Section (m)	Dogleg Rate (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	Toolface Azimuth
15/12-13_MWD 12-1/4"										
1350.00	0.974	36.197	1349.79	19.86 N	3.01 E	-19.76	0.17	0.16	-2.77	-16.225
15/12-13 A_MWD 12-1/4"										
1377.90	3.890	187.940	1377.67	19.11 N	3.02 E	-19.02	5.13	3.14	163.16	157.279
1404.90	6.520	188.780	1404.56	16.69 N	2.66 E	-16.61	2.92	2.92	0.93	2.078
1432.60	8.330	190.370	1432.03	13.16 N	2.06 E	-13.10	1.97	1.96	1.72	7.266
1459.20	9.790	183.070	1458.29	9.01 N	1.59 E	-8.96	2.09	1.65	-8.23	-41.858
1487.20	11.760	180.120	1485.80	3.78 N	1.46 E	-3.73	2.19	2.11	-3.16	-17.093
1515.40	14.060	176.370	1513.28	2.52 S	1.67 E	2.56	2.60	2.45	-3.99	-21.851
1542.70	17.310	176.470	1539.56	9.88 S	2.13 E	9.94	3.57	3.57	0.11	0.525
1570.00	19.730	178.790	1565.45	18.54 S	2.48 E	18.61	2.78	2.66	2.55	18.040
1596.60	22.110	179.580	1590.29	28.04 S	2.61 E	28.10	2.70	2.68	0.89	7.129
1624.50	24.200	177.100	1615.95	39.00 S	2.94 E	39.07	2.48	2.25	-2.67	-26.159
1652.40	25.660	176.540	1641.25	50.75 S	3.59 E	50.83	1.59	1.57	-0.60	-9.438
1679.70	26.980	177.110	1665.71	62.83 S	4.26 E	62.93	1.48	1.45	0.63	11.095
1707.60	28.730	177.420	1690.38	75.85 S	4.88 E	75.96	1.89	1.88	0.33	4.869
1734.90	29.990	176.950	1714.17	89.22 S	5.54 E	89.34	1.41	1.38	-0.52	-10.569
1762.20	31.540	175.650	1737.63	103.15 S	6.44 E	103.30	1.85	1.70	-1.43	-23.780
1790.10	34.550	175.410	1761.02	118.32 S	7.63 E	118.49	3.24	3.24	-0.26	-2.591
1817.20	37.660	176.930	1782.91	134.25 S	8.69 E	134.45	3.58	3.44	1.68	16.684
1845.30	37.830	176.680	1805.13	151.42 S	9.65 E	151.64	0.24	0.18	-0.27	-42.093
1873.20	37.490	176.790	1827.22	168.44 S	10.62 E	168.68	0.37	-0.37	0.12	168.862
1900.40	38.650	177.090	1848.63	185.19 S	11.51 E	185.45	1.30	1.28	0.33	9.179
1927.70	38.800	177.130	1869.93	202.25 S	12.37 E	202.52	0.17	0.16	0.04	9.487
1955.10	39.900	178.900	1891.12	219.61 S	12.97 E	219.89	1.72	1.20	1.94	46.262
1981.80	39.930	178.980	1911.59	236.74 S	13.29 E	237.02	0.07	0.03	0.09	59.727
2009.00	39.740	178.310	1932.48	254.16 S	13.70 E	254.45	0.52	-0.21	-0.74	-114.136
2035.80	39.510	178.890	1953.12	271.24 S	14.12 E	271.54	0.49	-0.26	0.65	122.096
2063.70	38.960	178.790	1974.73	288.89 S	14.48 E	289.18	0.60	-0.59	-0.11	-173.478
2091.10	40.600	179.200	1995.79	306.41 S	14.78 E	306.71	1.82	1.80	0.45	9.246
2118.70	40.540	178.210	2016.76	324.36 S	15.19 E	324.66	0.70	-0.07	-1.08	-95.700
2145.80	40.310	178.140	2037.39	341.92 S	15.75 E	342.24	0.26	-0.25	-0.08	-168.862
2175.00	39.950	177.870	2059.71	360.73 S	16.40 E	361.06	0.41	-0.37	-0.28	-154.304
2202.80	41.160	180.140	2080.83	378.80 S	16.71 E	379.13	2.06	1.31	2.45	51.520
2230.60	40.830	180.290	2101.82	397.04 S	16.64 E	397.35	0.37	-0.36	0.16	163.453
2258.60	41.060	180.950	2122.97	415.39 S	16.44 E	415.69	0.52	0.25	0.71	62.247
2285.80	40.490	181.010	2143.56	433.15 S	16.14 E	433.43	0.63	-0.63	0.07	176.090
2313.00	40.720	180.910	2164.22	450.85 S	15.84 E	451.12	0.26	0.25	-0.11	-15.838
2340.90	41.930	180.100	2185.17	469.27 S	15.68 E	469.53	1.42	1.30	-0.87	-24.152
2368.90	41.550	179.330	2206.06	487.91 S	15.78 E	488.16	0.68	-0.41	-0.82	-126.836
2396.10	41.350	179.210	2226.45	505.91 S	16.00 E	506.17	0.24	-0.22	-0.13	-158.383
2423.40	40.870	179.580	2247.02	523.86 S	16.19 E	524.11	0.59	-0.53	0.41	153.262
2451.00	40.570	179.570	2267.93	541.87 S	16.33 E	542.11	0.33	-0.33	-0.01	-178.758

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 A

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Northings (m)	Eastings (m)	Vertical Section (m)	Dogleg Rate (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	Toolface Azimuth
2478.30	40.260	179.150	2288.72	559.57 S	16.53 E	559.81	0.45	-0.34	-0.46	-138.865
2505.60	40.310	178.750	2309.55	577.22 S	16.85 E	577.46	0.29	0.05	-0.44	-79.211

15/12-13 A_Extrapolation

2532.00	40.310	178.750	2329.68	594.29 S	17.22 E	594.54

All data is in Metres unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to Well. Northings and Eastings are relative to Structure.

The Dogleg Severity is in Degrees per 30 metres.
Vertical Section is from RKB (W.Alpha) and calculated along an Azimuth of 178.340° (Grid).

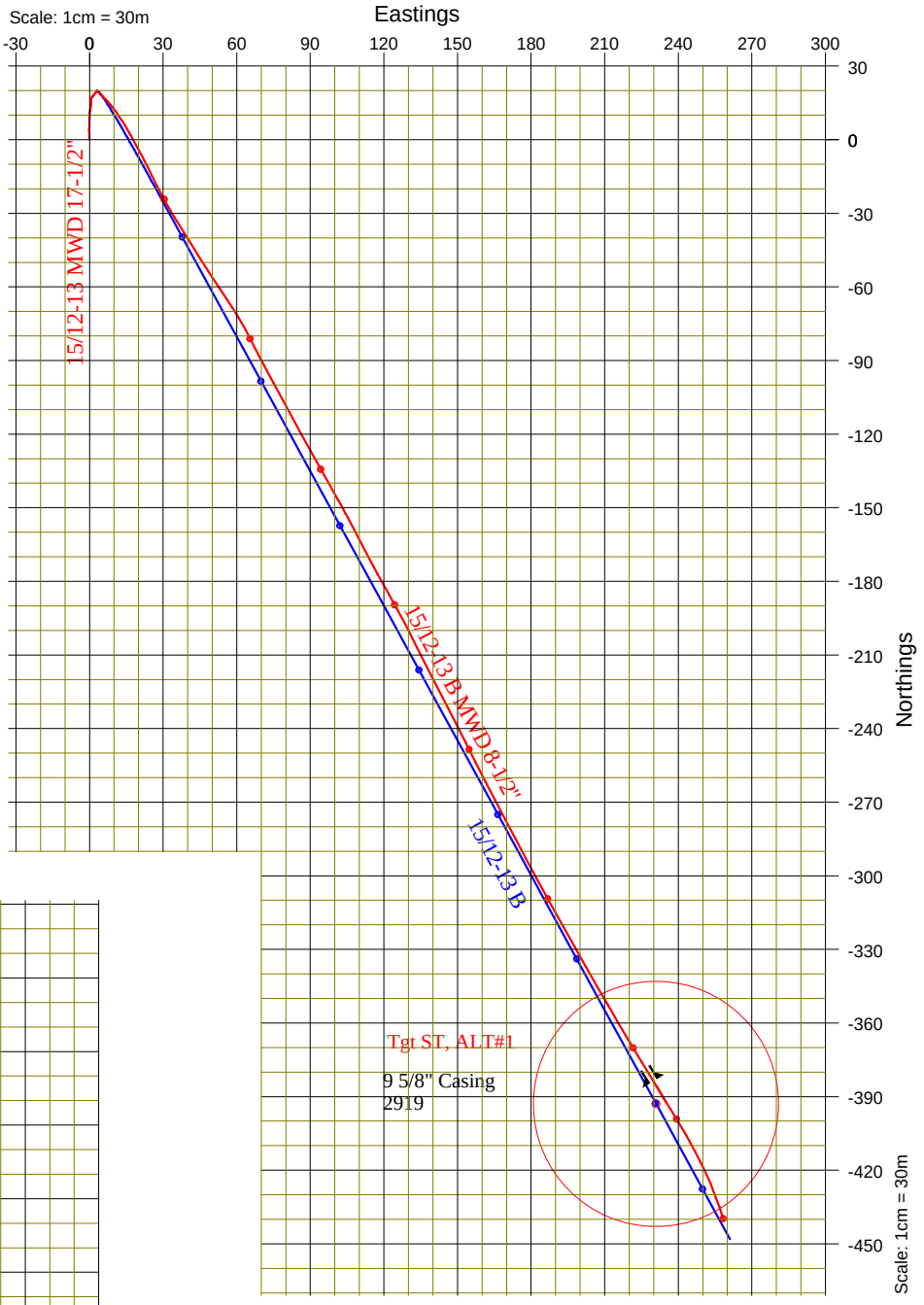
Coordinate System is UTM Zone 31 on ED50 Datum, Meters.
Grid Convergence at Surface is -0.918°. Magnetic Convergence at Surface is 2.019° (13-Jun-03)

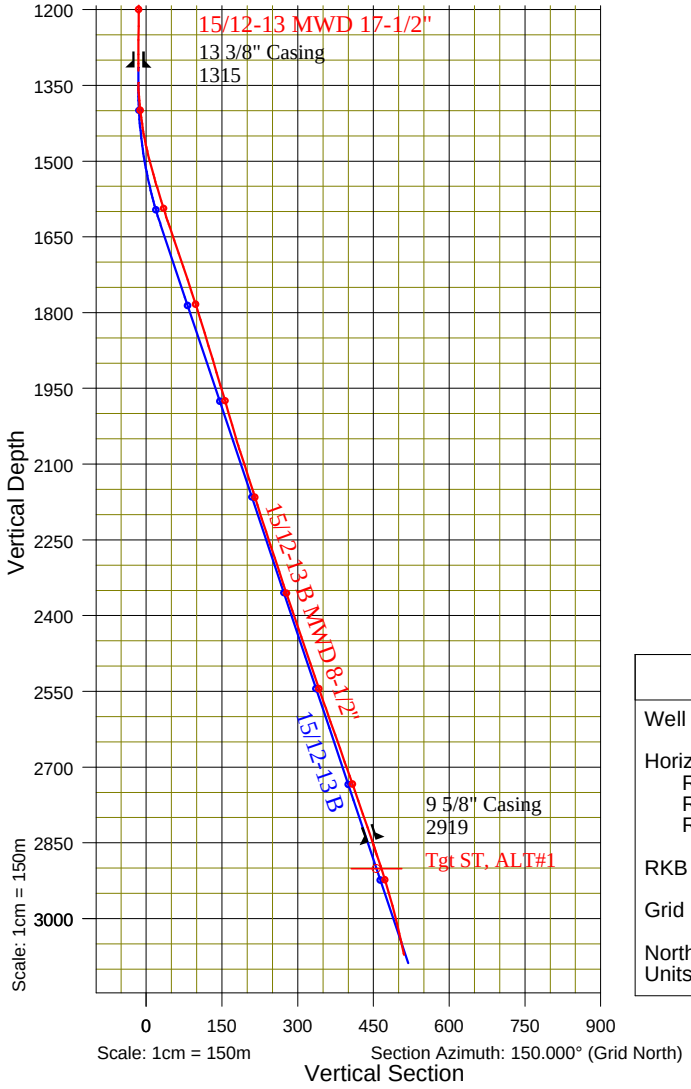
Based upon Minimum Curvature type calculations, at a Measured Depth of 2532.00m.,
The Bottom Hole Displacement is 594.54m., in the Direction of 178.340° (Grid).

Casing details

From		To		
Measured Depth (m)	Vertical Depth (m)	Measured Depth (m)	Vertical Depth (m)	Casing Detail
<Surface>	<Surface>	114.00	114.00	30" Conductor
<Surface>	<Surface>	1307.10	1306.90	13 3/8" Casing

Block 15/12
VARG
15/12-13 Exploration
Definitive 15/12-13 B





Current Well Properties

Well :	15/12-13 Exploration
Horizontal Coordinates:	
Ref. Global Coordinates :	6433198.00 N, 436100.00 E
Ref. Structure :	0.00 N, 0.00 E
Ref. Geographical Coordinates :	58° 02' 03.8327" N, 1° 55' 04.5758" E
RKB Elevation :	18.00m above Mean Sea Level 18.00m above Structure
Grid North Convergence :	-0.918°
North Reference :	Grid North
Units :	Metres

PERTRA as
Block 15/12
VARG
West Alpha 15/12-13
Well 15/12-13
15/12-13 B_Extrapolation

Sperry-Sun

Geodetic Report

4 July, 2003

Your Ref: Definitive 15/12-13 B
Surface Coordinates: 6433198.00 N, 436100.00 E (58° 02' 03.8327" N, 1° 55' 04.5758" E)
Grid Coordinate System: UTM Zone 31 on ED50 Datum, Meters

Surface Coordinates relative to Field Centre: 4873.30 S, 1543.40 E (Grid)
Surface Coordinates relative to Structure: 0.00 N, 0.00 E (Grid)
Kelly Bushing Elevation: 18.00m above Mean Sea Level
Water Depth: 87.00m

Survey Ref: svy1466

HALLIBURTON
Sperry-Sun

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 B

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
15/12-13_MWD 17-1/2"									
0.00	0.000	0.000	0.00	0.00 N	0.00 E	58° 02' 03.8327" N	1° 55' 04.5758" E	6433198.00 N	436100.00 E
105.00	0.000	0.000	105.00	0.00 N	0.00 E	58° 02' 03.8327" N	1° 55' 04.5758" E	6433198.00 N	436100.00 E
240.20	1.510	358.300	240.18	1.78 N	0.05 W	58° 02' 03.8903" N	1° 55' 04.5708" E	6433199.78 N	436099.95 E
270.50	1.890	356.450	270.47	2.68 N	0.10 W	58° 02' 03.9193" N	1° 55' 04.5673" E	6433200.68 N	436099.90 E
297.50	1.650	358.350	297.46	3.51 N	0.13 W	58° 02' 03.9462" N	1° 55' 04.5642" E	6433201.51 N	436099.87 E
321.80	1.620	359.310	321.75	4.20 N	0.15 W	58° 02' 03.9686" N	1° 55' 04.5626" E	6433202.20 N	436099.85 E
349.50	1.560	5.330	349.44	4.97 N	0.12 W	58° 02' 03.9934" N	1° 55' 04.5637" E	6433202.97 N	436099.88 E
377.30	1.490	5.020	377.23	5.71 N	0.05 W	58° 02' 04.0172" N	1° 55' 04.5671" E	6433203.71 N	436099.95 E
402.50	1.670	358.870	402.42	6.40 N	0.03 W	58° 02' 04.0397" N	1° 55' 04.5677" E	6433204.40 N	436099.97 E
433.40	1.480	357.950	433.31	7.25 N	0.05 W	58° 02' 04.0671" N	1° 55' 04.5654" E	6433205.25 N	436099.95 E
462.10	1.540	5.110	462.00	8.01 N	0.03 W	58° 02' 04.0915" N	1° 55' 04.5660" E	6433206.01 N	436099.97 E
490.90	1.490	359.230	490.79	8.77 N	0.00 E	58° 02' 04.1161" N	1° 55' 04.5670" E	6433206.77 N	436100.00 E
518.40	1.430	1.890	518.28	9.47 N	0.00 E	58° 02' 04.1387" N	1° 55' 04.5668" E	6433207.47 N	436100.00 E
545.60	1.360	0.910	545.47	10.13 N	0.02 E	58° 02' 04.1601" N	1° 55' 04.5671" E	6433208.13 N	436100.02 E
573.60	1.000	3.580	573.46	10.70 N	0.04 E	58° 02' 04.1788" N	1° 55' 04.5678" E	6433208.70 N	436100.04 E
596.80	1.150	9.970	596.66	11.13 N	0.09 E	58° 02' 04.1927" N	1° 55' 04.5706" E	6433209.13 N	436100.09 E
625.30	0.990	12.520	625.15	11.66 N	0.20 E	58° 02' 04.2097" N	1° 55' 04.5764" E	6433209.66 N	436100.20 E
653.50	1.140	12.020	653.35	12.17 N	0.31 E	58° 02' 04.2263" N	1° 55' 04.5826" E	6433210.17 N	436100.31 E
680.30	0.940	3.780	680.15	12.65 N	0.38 E	58° 02' 04.2418" N	1° 55' 04.5864" E	6433210.65 N	436100.38 E
707.10	1.060	10.620	706.94	13.11 N	0.44 E	58° 02' 04.2568" N	1° 55' 04.5897" E	6433211.11 N	436100.44 E
735.20	0.930	1.370	735.04	13.60 N	0.49 E	58° 02' 04.2725" N	1° 55' 04.5924" E	6433211.60 N	436100.49 E
764.44	0.900	7.000	764.27	14.06 N	0.52 E	58° 02' 04.2875" N	1° 55' 04.5940" E	6433212.06 N	436100.52 E
791.30	0.880	2.620	791.13	14.48 N	0.56 E	58° 02' 04.3010" N	1° 55' 04.5958" E	6433212.48 N	436100.56 E
818.50	0.790	358.790	818.33	14.87 N	0.57 E	58° 02' 04.3138" N	1° 55' 04.5957" E	6433212.87 N	436100.57 E
848.50	0.750	358.560	848.32	15.28 N	0.56 E	58° 02' 04.3268" N	1° 55' 04.5948" E	6433213.28 N	436100.56 E

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 B

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
874.70	0.740	1.380	874.52	15.62 N	0.56 E	58° 02' 04.3378" N	1° 55' 04.5944" E	6433213.62 N	436100.56 E
902.60	0.790	10.420	902.42	15.99 N	0.60 E	58° 02' 04.3498" N	1° 55' 04.5964" E	6433213.99 N	436100.60 E
930.60	0.630	9.680	930.42	16.33 N	0.66 E	58° 02' 04.3609" N	1° 55' 04.5998" E	6433214.33 N	436100.66 E
958.50	0.840	16.870	958.32	16.67 N	0.74 E	58° 02' 04.3721" N	1° 55' 04.6047" E	6433214.67 N	436100.74 E
987.50	0.640	20.040	987.31	17.03 N	0.86 E	58° 02' 04.3837" N	1° 55' 04.6115" E	6433215.03 N	436100.86 E
1012.20	0.610	29.310	1012.01	17.27 N	0.97 E	58° 02' 04.3916" N	1° 55' 04.6180" E	6433215.27 N	436100.97 E
1041.10	0.570	28.020	1040.91	17.53 N	1.11 E	58° 02' 04.4002" N	1° 55' 04.6265" E	6433215.53 N	436101.11 E
1069.60	0.200	114.910	1069.41	17.64 N	1.22 E	58° 02' 04.4036" N	1° 55' 04.6332" E	6433215.64 N	436101.22 E
1097.60	0.200	50.460	1097.41	17.65 N	1.31 E	58° 02' 04.4040" N	1° 55' 04.6382" E	6433215.65 N	436101.31 E
1124.30	0.250	3.480	1124.11	17.74 N	1.35 E	58° 02' 04.4068" N	1° 55' 04.6405" E	6433215.74 N	436101.35 E
1149.90	0.250	31.140	1149.71	17.84 N	1.38 E	58° 02' 04.4102" N	1° 55' 04.6424" E	6433215.84 N	436101.38 E
1179.90	0.860	36.860	1179.71	18.08 N	1.55 E	58° 02' 04.4179" N	1° 55' 04.6524" E	6433216.08 N	436101.55 E
1206.80	1.000	60.280	1206.60	18.35 N	1.87 E	58° 02' 04.4271" N	1° 55' 04.6720" E	6433216.35 N	436101.87 E
1232.90	0.670	15.270	1232.70	18.62 N	2.11 E	58° 02' 04.4356" N	1° 55' 04.6862" E	6433216.62 N	436102.11 E
1260.20	0.660	36.070	1260.00	18.90 N	2.24 E	58° 02' 04.4448" N	1° 55' 04.6941" E	6433216.90 N	436102.24 E
1288.80	0.750	40.600	1288.60	19.17 N	2.46 E	58° 02' 04.4538" N	1° 55' 04.7072" E	6433217.17 N	436102.46 E
1307.10	0.740	40.160	1306.90	19.35 N	2.62 E	58° 02' 04.4597" N	1° 55' 04.7164" E	6433217.35 N	436102.62 E
15/12-13_MWD 12-1/4"									
1345.00	0.946	36.558	1344.79	19.79 N	2.96 E	58° 02' 04.4741" N	1° 55' 04.7370" E	6433217.79 N	436102.96 E
15/12-13 B_ MWD 12-1/4"									
1365.00	3.960	135.380	1364.78	19.43 N	3.55 E	58° 02' 04.4627" N	1° 55' 04.7729" E	6433217.43 N	436103.55 E
1391.60	6.560	133.380	1391.26	17.73 N	5.30 E	58° 02' 04.4088" N	1° 55' 04.8812" E	6433215.73 N	436105.30 E
1419.50	8.030	139.240	1418.93	15.16 N	7.73 E	58° 02' 04.3269" N	1° 55' 05.0319" E	6433213.16 N	436107.73 E
1446.80	9.950	142.690	1445.90	11.84 N	10.40 E	58° 02' 04.2210" N	1° 55' 05.1981" E	6433209.84 N	436110.40 E
1474.10	12.860	147.490	1472.66	7.40 N	13.46 E	58° 02' 04.0790" N	1° 55' 05.3892" E	6433205.40 N	436113.46 E

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 B

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
1501.40	14.920	151.600	1499.16	1.75 N	16.77 E	58° 02' 03.8980" N	1° 55' 05.5961" E	6433199.75 N	436116.77 E
1529.30	14.980	151.010	1526.11	4.56 S	20.22 E	58° 02' 03.6956" N	1° 55' 05.8129" E	6433193.44 N	436120.22 E
1556.60	17.250	153.310	1552.34	11.27 S	23.75 E	58° 02' 03.4808" N	1° 55' 06.0345" E	6433186.73 N	436123.75 E
1583.90	16.980	153.140	1578.43	18.44 S	27.37 E	58° 02' 03.2508" N	1° 55' 06.2621" E	6433179.56 N	436127.37 E
1610.60	17.400	151.550	1603.94	25.43 S	31.04 E	58° 02' 03.0267" N	1° 55' 06.4922" E	6433172.57 N	436131.04 E
1638.50	19.330	147.710	1630.42	33.00 S	35.49 E	58° 02' 02.7842" N	1° 55' 06.7711" E	6433165.00 N	436135.49 E
1666.40	19.160	148.410	1656.76	40.80 S	40.36 E	58° 02' 02.5345" N	1° 55' 07.0752" E	6433157.20 N	436140.36 E
1693.70	18.920	147.540	1682.56	48.36 S	45.08 E	58° 02' 02.2928" N	1° 55' 07.3704" E	6433149.64 N	436145.08 E
1721.60	18.600	146.760	1708.98	55.89 S	49.94 E	58° 02' 02.0517" N	1° 55' 07.6744" E	6433142.11 N	436149.94 E
1748.90	18.370	146.290	1734.87	63.11 S	54.72 E	58° 02' 01.8207" N	1° 55' 07.9724" E	6433134.89 N	436154.72 E
1776.20	18.000	147.480	1760.81	70.25 S	59.37 E	58° 02' 01.5925" N	1° 55' 08.2631" E	6433127.75 N	436159.37 E
1804.10	17.550	152.220	1787.38	77.61 S	63.65 E	58° 02' 01.3568" N	1° 55' 08.5310" E	6433120.39 N	436163.65 E
1832.00	17.430	152.330	1813.99	85.03 S	67.55 E	58° 02' 01.1189" N	1° 55' 08.7760" E	6433112.97 N	436167.55 E
1859.30	17.200	152.250	1840.05	92.22 S	71.33 E	58° 02' 00.8883" N	1° 55' 09.0133" E	6433105.78 N	436171.33 E
1886.60	17.150	151.570	1866.13	99.33 S	75.13 E	58° 02' 00.6604" N	1° 55' 09.2516" E	6433098.67 N	436175.13 E
1913.90	16.900	151.770	1892.24	106.37 S	78.92 E	58° 02' 00.4349" N	1° 55' 09.4896" E	6433091.63 N	436178.92 E
1941.20	16.610	151.310	1918.38	113.29 S	82.67 E	58° 02' 00.2131" N	1° 55' 09.7249" E	6433084.71 N	436182.67 E
1967.90	16.510	151.370	1943.97	119.97 S	86.32 E	58° 01' 59.9992" N	1° 55' 09.9539" E	6433078.03 N	436186.32 E
1995.20	16.400	150.890	1970.15	126.74 S	90.05 E	58° 01' 59.7822" N	1° 55' 10.1880" E	6433071.26 N	436190.05 E
2021.19	16.270	151.180	1995.09	133.13 S	93.59 E	58° 01' 59.5772" N	1° 55' 10.4100" E	6433064.87 N	436193.59 E
2049.80	16.160	150.480	2022.57	140.11 S	97.49 E	58° 01' 59.3537" N	1° 55' 10.6541" E	6433057.89 N	436197.49 E
2077.10	16.170	150.030	2048.79	146.71 S	101.26 E	58° 01' 59.1424" N	1° 55' 10.8904" E	6433051.29 N	436201.26 E
2105.00	18.380	152.500	2075.43	153.98 S	105.23 E	58° 01' 58.9094" N	1° 55' 11.1396" E	6433044.02 N	436205.23 E
2132.90	18.240	152.500	2101.91	161.75 S	109.28 E	58° 01' 58.6602" N	1° 55' 11.3938" E	6433036.25 N	436209.28 E
2188.80	17.980	151.140	2155.05	177.07 S	117.48 E	58° 01' 58.1693" N	1° 55' 11.9087" E	6433020.93 N	436217.48 E

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 B

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
2216.00	17.690	151.300	2180.94	184.37 S	121.49 E	58° 01' 57.9353" N	1° 55' 12.1603" E	6433013.63 N	436221.49 E
2243.90	17.450	150.050	2207.54	191.71 S	125.62 E	58° 01' 57.7001" N	1° 55' 12.4188" E	6433006.29 N	436225.62 E
2271.20	18.260	153.380	2233.52	199.08 S	129.58 E	58° 01' 57.4638" N	1° 55' 12.6674" E	6432998.92 N	436229.58 E
2299.00	18.330	153.610	2259.92	206.89 S	133.47 E	58° 01' 57.2134" N	1° 55' 12.9123" E	6432991.11 N	436233.47 E
2326.40	18.340	152.840	2285.93	214.59 S	137.35 E	58° 01' 56.9666" N	1° 55' 13.1565" E	6432983.41 N	436237.35 E
2354.30	18.430	152.640	2312.40	222.41 S	141.38 E	58° 01' 56.7158" N	1° 55' 13.4097" E	6432975.59 N	436241.38 E
2381.50	18.560	152.660	2338.20	230.07 S	145.35 E	58° 01' 56.4701" N	1° 55' 13.6588" E	6432967.93 N	436245.35 E
2409.20	18.570	153.130	2364.46	237.92 S	149.37 E	58° 01' 56.2184" N	1° 55' 13.9113" E	6432960.08 N	436249.37 E
2436.50	18.660	153.040	2390.33	245.69 S	153.31 E	58° 01' 55.9692" N	1° 55' 14.1593" E	6432952.31 N	436253.31 E
2463.80	18.600	152.990	2416.20	253.46 S	157.27 E	58° 01' 55.7200" N	1° 55' 14.4080" E	6432944.54 N	436257.27 E
2491.10	18.650	152.940	2442.07	261.23 S	161.23 E	58° 01' 55.4710" N	1° 55' 14.6571" E	6432936.77 N	436261.23 E
2519.00	18.750	152.650	2468.50	269.19 S	165.32 E	58° 01' 55.2160" N	1° 55' 14.9141" E	6432928.81 N	436265.32 E
2546.30	18.960	151.810	2494.33	276.99 S	169.43 E	58° 01' 54.9657" N	1° 55' 15.1723" E	6432921.01 N	436269.43 E
2573.70	19.190	152.170	2520.23	284.90 S	173.64 E	58° 01' 54.7123" N	1° 55' 15.4362" E	6432913.10 N	436273.64 E
2601.00	19.180	151.890	2546.01	292.82 S	177.85 E	58° 01' 54.4583" N	1° 55' 15.7004" E	6432905.18 N	436277.85 E
2641.00	19.370	151.510	2583.77	304.45 S	184.11 E	58° 01' 54.0857" N	1° 55' 16.0932" E	6432893.55 N	436284.11 E
2669.00	19.570	150.990	2610.17	312.63 S	188.59 E	58° 01' 53.8235" N	1° 55' 16.3748" E	6432885.37 N	436288.59 E
2696.90	19.450	150.700	2636.46	320.77 S	193.13 E	58° 01' 53.5628" N	1° 55' 16.6593" E	6432877.23 N	436293.13 E
2724.80	19.270	150.740	2662.79	328.83 S	197.66 E	58° 01' 53.3044" N	1° 55' 16.9429" E	6432869.17 N	436297.66 E
2752.80	19.300	150.340	2689.22	336.89 S	202.21 E	58° 01' 53.0464" N	1° 55' 17.2279" E	6432861.11 N	436302.21 E
2807.40	19.300	149.810	2740.75	352.53 S	211.21 E	58° 01' 52.5454" N	1° 55' 17.7917" E	6432845.47 N	436311.21 E
2834.70	19.130	149.450	2766.53	360.28 S	215.75 E	58° 01' 52.2972" N	1° 55' 18.0761" E	6432837.72 N	436315.75 E
2862.50	18.950	149.460	2792.81	368.09 S	220.36 E	58° 01' 52.0471" N	1° 55' 18.3646" E	6432829.91 N	436320.36 E
2890.50	18.920	148.820	2819.29	375.89 S	225.02 E	58° 01' 51.7973" N	1° 55' 18.6562" E	6432822.11 N	436325.02 E
2918.30	18.840	148.200	2845.59	383.56 S	229.72 E	58° 01' 51.5518" N	1° 55' 18.9500" E	6432814.44 N	436329.72 E

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 B

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Local Coordinates Northings (m)	Local Coordinates Eastings (m)	Geographic Coordinates Latitude	Geographic Coordinates Longitude	Global Coordinates Northings (m)	Global Coordinates Eastings (m)
2925.80	18.840	148.700	2852.69	385.62 S	230.99 E	58° 01' 51.4857" N	1° 55' 19.0293" E	6432812.38 N	436330.99 E
15/12-13 B_MWD 8-1/2"									
2943.00	18.810	148.290	2868.97	390.35 S	233.89 E	58° 01' 51.3342" N	1° 55' 19.2106" E	6432807.65 N	436333.89 E
2971.50	18.390	148.530	2895.98	398.10 S	238.65 E	58° 01' 51.0864" N	1° 55' 19.5084" E	6432799.90 N	436338.65 E
3026.60	15.990	151.790	2948.62	412.20 S	246.77 E	58° 01' 50.6346" N	1° 55' 20.0173" E	6432785.80 N	436346.77 E
3053.90	15.180	154.170	2974.92	418.73 S	250.11 E	58° 01' 50.4252" N	1° 55' 20.2269" E	6432779.27 N	436350.11 E
3081.80	14.270	157.120	3001.90	425.19 S	253.04 E	58° 01' 50.2180" N	1° 55' 20.4117" E	6432772.81 N	436353.04 E
3109.70	13.150	160.500	3029.01	431.35 S	255.43 E	58° 01' 50.0201" N	1° 55' 20.5637" E	6432766.65 N	436355.43 E
3127.00	12.520	160.290	3045.87	434.97 S	256.72 E	58° 01' 49.9037" N	1° 55' 20.6458" E	6432763.03 N	436356.72 E
3151.00	11.590	161.970	3069.34	439.71 S	258.35 E	58° 01' 49.7513" N	1° 55' 20.7494" E	6432758.29 N	436358.35 E
15/12-13 B_Extrapolation									
3153.00	11.590	161.970	3071.30	440.09 S	258.47 E	58° 01' 49.7390" N	1° 55' 20.7573" E	6432757.91 N	436358.47 E

All data is in Metres unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to Well. Northings and Eastings are relative to Structure.
Global Northings and Eastings are relative to UTM Zone 31 on ED50 Datum, Meters.

Coordinate System is UTM Zone 31 on ED50 Datum, Meters.
Grid Convergence at Surface is -0.918°. Magnetic Convergence at Surface is 2.019° (13-Jun-03)

Based upon Minimum Curvature type calculations, at a Measured Depth of 3153.00m.,
The Bottom Hole Displacement is 510.38m., in the Direction of 149.574° (Grid).

PERTRA as
Block 15/12
VARG
West Alpha 15/12-13
Well 15/12-13
15/12-13 B_Extrapolation

Sperry-Sun

Survey Report

4 July, 2003

Your Ref: Definitive 15/12-13 B
Surface Coordinates: 6433198.00 N, 436100.00 E (58° 02' 03.8327" N, 1° 55' 04.5758" E)
Grid Coordinate System: UTM Zone 31 on ED50 Datum, Meters

Surface Coordinates relative to Field Centre: 4873.30 S, 1543.40 E (Grid)
Surface Coordinates relative to Structure: 0.00 N, 0.00 E (Grid)
Kelly Bushing Elevation: 18.00m above Mean Sea Level
Water Depth: 87.00m

Survey Ref: svy1466

HALLIBURTON
Sperry-Sun

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 B

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Northings (m)	Eastings (m)	Vertical Section (m)	Dogleg Rate (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	Toolface Azimuth
15/12-13_MWD 17-1/2"										
0.00	0.000	0.000	0.00	0.00 N	0.00 E	0.00				
105.00	0.000	0.000	105.00	0.00 N	0.00 E	0.00				
240.20	1.510	358.300	240.18	1.78 N	0.05 W	-1.56	0.34	0.34	0.00	358.300
270.50	1.890	356.450	270.47	2.68 N	0.10 W	-2.36	0.38	0.38	-1.83	-9.144
297.50	1.650	358.350	297.46	3.51 N	0.13 W	-3.10	0.27	-0.27	2.11	167.208
321.80	1.620	359.310	321.75	4.20 N	0.15 W	-3.70	0.05	-0.04	1.19	138.082
349.50	1.560	5.330	349.44	4.97 N	0.12 W	-4.35	0.19	-0.06	6.52	112.750
377.30	1.490	5.020	377.23	5.71 N	0.05 W	-4.95	0.08	-0.08	-0.33	-173.433
402.50	1.670	358.870	402.42	6.40 N	0.03 W	-5.54	0.29	0.21	-7.32	-46.393
433.40	1.480	357.950	433.31	7.25 N	0.05 W	-6.28	0.19	-0.18	-0.89	-172.879
462.10	1.540	5.110	462.00	8.01 N	0.03 W	-6.92	0.21	0.06	7.48	75.959
490.90	1.490	359.230	490.79	8.77 N	0.00 E	-7.56	0.17	-0.05	-6.12	-110.754
518.40	1.430	1.890	518.28	9.47 N	0.00 E	-8.16	0.10	-0.07	2.90	132.843
545.60	1.360	0.910	545.47	10.13 N	0.02 E	-8.72	0.08	-0.08	-1.08	-161.669
573.60	1.000	3.580	573.46	10.70 N	0.04 E	-9.21	0.39	-0.39	2.86	172.649
596.80	1.150	9.970	596.66	11.13 N	0.09 E	-9.55	0.25	0.19	8.26	41.856
625.30	0.990	12.520	625.15	11.66 N	0.20 E	-9.95	0.18	-0.17	2.68	164.698
653.50	1.140	12.020	653.35	12.17 N	0.31 E	-10.34	0.16	0.16	-0.53	-3.795
680.30	0.940	3.780	680.15	12.65 N	0.38 E	-10.72	0.28	-0.22	-9.22	-147.283
707.10	1.060	10.620	706.94	13.11 N	0.44 E	-11.08	0.19	0.13	7.66	48.304
735.20	0.930	1.370	735.04	13.60 N	0.49 E	-11.47	0.22	-0.14	-9.88	-133.547
764.44	0.900	7.000	764.27	14.06 N	0.52 E	-11.86	0.10	-0.03	5.78	111.254
791.30	0.880	2.620	791.13	14.48 N	0.56 E	-12.20	0.08	-0.02	-4.89	-108.564
818.50	0.790	358.790	818.33	14.87 N	0.57 E	-12.54	0.12	-0.10	-4.22	-150.100
848.50	0.750	358.560	848.32	15.28 N	0.56 E	-12.89	0.04	-0.04	-0.23	-175.696
874.70	0.740	1.380	874.52	15.62 N	0.56 E	-13.18	0.04	-0.01	3.23	106.662
902.60	0.790	10.420	902.42	15.99 N	0.60 E	-13.48	0.14	0.05	9.72	72.059
930.60	0.630	9.680	930.42	16.33 N	0.66 E	-13.75	0.17	-0.17	-0.79	-177.090
958.50	0.840	16.870	958.32	16.67 N	0.74 E	-14.00	0.25	0.23	7.73	27.334
987.50	0.640	20.040	987.31	17.03 N	0.86 E	-14.25	0.21	-0.21	3.28	170.013
1012.20	0.610	29.310	1012.01	17.27 N	0.97 E	-14.40	0.13	-0.04	11.26	111.125
1041.10	0.570	28.020	1040.91	17.53 N	1.11 E	-14.56	0.04	-0.04	-1.34	-162.274
1069.60	0.200	114.910	1069.41	17.64 N	1.22 E	-14.59	0.62	-0.39	91.46	160.345
1097.60	0.200	50.460	1097.41	17.65 N	1.31 E	-14.56	0.23	0.00	-69.05	-122.225
1124.30	0.250	3.480	1124.11	17.74 N	1.35 E	-14.61	0.21	0.06	-52.79	-99.149
1149.90	0.250	31.140	1149.71	17.84 N	1.38 E	-14.69	0.14	0.00	32.41	103.830
1179.90	0.860	36.860	1179.71	18.08 N	1.55 E	-14.80	0.61	0.61	5.72	8.054
1206.80	1.000	60.280	1206.60	18.35 N	1.87 E	-14.88	0.45	0.16	26.12	81.750
1232.90	0.670	15.270	1232.70	18.62 N	2.11 E	-14.98	0.81	-0.38	-51.74	-138.002
1260.20	0.660	36.070	1260.00	18.90 N	2.24 E	-15.16	0.26	-0.01	22.86	102.745
1288.80	0.750	40.600	1288.60	19.17 N	2.46 E	-15.28	0.11	0.09	4.75	34.049
1307.10	0.740	40.160	1306.90	19.35 N	2.62 E	-15.36	0.02	-0.02	-0.72	-150.446

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 B

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Northings (m)	Eastings (m)	Vertical Section (m)	Dogleg Rate (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	Toolface Azimuth
15/12-13_MWD 12-1/4"										
1345.00	0.946	36.558	1344.79	19.79 N	2.96 E	-15.57	0.17	0.16	-2.85	-16.225
15/12-13 B_ MWD 12-1/4"										
1365.00	3.960	135.380	1364.78	19.43 N	3.55 E	-14.96	6.32	4.52	148.23	111.632
1391.60	6.560	133.380	1391.26	17.73 N	5.30 E	-12.61	2.94	2.93	-2.26	-5.031
1419.50	8.030	139.240	1418.93	15.16 N	7.73 E	-9.16	1.77	1.58	6.30	29.775
1446.80	9.950	142.690	1445.90	11.84 N	10.40 E	-4.94	2.19	2.11	3.79	17.393
1474.10	12.860	147.490	1472.66	7.40 N	13.46 E	0.43	3.36	3.20	5.27	20.430
1501.40	14.920	151.600	1499.16	1.75 N	16.77 E	6.98	2.51	2.26	4.52	27.598
1529.30	14.980	151.010	1526.11	4.56 S	20.22 E	14.18	0.18	0.06	-0.63	-68.771
1556.60	17.250	153.310	1552.34	11.27 S	23.75 E	21.75	2.59	2.49	2.53	16.816
1583.90	16.980	153.140	1578.43	18.44 S	27.37 E	29.76	0.30	-0.30	-0.19	-169.584
1610.60	17.400	151.550	1603.94	25.43 S	31.04 E	37.64	0.71	0.47	-1.79	-48.971
1638.50	19.330	147.710	1630.42	33.00 S	35.49 E	46.43	2.45	2.08	-4.13	-33.916
1666.40	19.160	148.410	1656.76	40.80 S	40.36 E	55.62	0.31	-0.18	0.75	126.713
1693.70	18.920	147.540	1682.56	48.36 S	45.08 E	64.52	0.41	-0.26	-0.96	-130.629
1721.60	18.600	146.760	1708.98	55.89 S	49.94 E	73.49	0.44	-0.34	-0.84	-142.276
1748.90	18.370	146.290	1734.87	63.11 S	54.72 E	82.13	0.30	-0.25	-0.52	-147.284
1776.20	18.000	147.480	1760.81	70.25 S	59.37 E	90.64	0.58	-0.41	1.31	135.457
1804.10	17.550	152.220	1787.38	77.61 S	63.65 E	99.15	1.63	-0.48	5.10	109.522
1832.00	17.430	152.330	1813.99	85.03 S	67.55 E	107.53	0.13	-0.13	0.12	164.650
1859.30	17.200	152.250	1840.05	92.22 S	71.33 E	115.64	0.25	-0.25	-0.09	-174.128
1886.60	17.150	151.570	1866.13	99.33 S	75.13 E	123.70	0.23	-0.05	-0.75	-104.307
1913.90	16.900	151.770	1892.24	106.37 S	78.92 E	131.69	0.28	-0.27	0.22	166.913
1941.20	16.610	151.310	1918.38	113.29 S	82.67 E	139.55	0.35	-0.32	-0.51	-155.647
1967.90	16.510	151.370	1943.97	119.97 S	86.32 E	147.16	0.11	-0.11	0.07	170.324
1995.20	16.400	150.890	1970.15	126.74 S	90.05 E	154.89	0.19	-0.12	-0.53	-129.204
2021.19	16.270	151.180	1995.09	133.13 S	93.59 E	162.20	0.18	-0.15	0.33	148.034
2049.80	16.160	150.480	2022.57	140.11 S	97.49 E	170.18	0.24	-0.12	-0.73	-119.704
2077.10	16.170	150.030	2048.79	146.71 S	101.26 E	177.78	0.14	0.01	-0.49	-85.652
2105.00	18.380	152.500	2075.43	153.98 S	105.23 E	186.06	2.50	2.38	2.66	19.544
2132.90	18.240	152.500	2101.91	161.75 S	109.28 E	194.82	0.15	-0.15	0.00	180.000
2188.80	17.980	151.140	2155.05	177.07 S	117.48 E	212.18	0.27	-0.14	-0.73	-122.238
2216.00	17.690	151.300	2180.94	184.37 S	121.49 E	220.50	0.32	-0.32	0.18	170.485
2243.90	17.450	150.050	2207.54	191.71 S	125.62 E	228.92	0.48	-0.26	-1.34	-123.053
2271.20	18.260	153.380	2233.52	199.08 S	129.58 E	237.29	1.43	0.89	3.66	53.167
2299.00	18.330	153.610	2259.92	206.89 S	133.47 E	245.99	0.11	0.08	0.25	45.995
2326.40	18.340	152.840	2285.93	214.59 S	137.35 E	254.59	0.27	0.01	-0.84	-88.001
2354.30	18.430	152.640	2312.40	222.41 S	141.38 E	263.38	0.12	0.10	-0.22	-35.121
2381.50	18.560	152.660	2338.20	230.07 S	145.35 E	272.00	0.14	0.14	0.02	2.803
2409.20	18.570	153.130	2364.46	237.92 S	149.37 E	280.80	0.16	0.01	0.51	86.400
2436.50	18.660	153.040	2390.33	245.69 S	153.31 E	289.50	0.10	0.10	-0.10	-17.746
2463.80	18.600	152.990	2416.20	253.46 S	157.27 E	298.20	0.07	-0.07	-0.05	-165.117

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 B

Measured Depth (m)	Incl.	Azim.	Vertical Depth (m)	Northings (m)	Eastings (m)	Vertical Section (m)	Dogleg Rate (°/30m)	Build Rate (°/30m)	Turn Rate (°/30m)	Toolface Azimuth
2491.10	18.650	152.940	2442.07	261.23 S	161.23 E	306.91	0.06	0.05	-0.05	-17.736
2519.00	18.750	152.650	2468.50	269.19 S	165.32 E	315.84	0.15	0.11	-0.31	-43.053
2546.30	18.960	151.810	2494.33	276.99 S	169.43 E	324.65	0.38	0.23	-0.92	-52.673
2573.70	19.190	152.170	2520.23	284.90 S	173.64 E	333.60	0.28	0.25	0.39	27.261
2601.00	19.180	151.890	2546.01	292.82 S	177.85 E	342.56	0.10	-0.01	-0.31	-96.335
2641.00	19.370	151.510	2583.77	304.45 S	184.11 E	355.76	0.17	0.14	-0.29	-33.612
2669.00	19.570	150.990	2610.17	312.63 S	188.59 E	365.08	0.28	0.21	-0.56	-41.158
2696.90	19.450	150.700	2636.46	320.77 S	193.13 E	374.40	0.17	-0.13	-0.31	-141.230
2724.80	19.270	150.740	2662.79	328.83 S	197.66 E	383.65	0.19	-0.19	0.04	175.806
2752.80	19.300	150.340	2689.22	336.89 S	202.21 E	392.89	0.15	0.03	-0.43	-77.395
2807.40	19.300	149.810	2740.75	352.53 S	211.21 E	410.94	0.10	0.00	-0.29	-90.250
2834.70	19.130	149.450	2766.53	360.28 S	215.75 E	419.92	0.23	-0.19	-0.40	-145.295
2862.50	18.950	149.460	2792.81	368.09 S	220.36 E	428.99	0.19	-0.19	0.01	178.966
2890.50	18.920	148.820	2819.29	375.89 S	225.02 E	438.08	0.22	-0.03	-0.69	-98.522
2918.30	18.840	148.200	2845.59	383.56 S	229.72 E	447.07	0.23	-0.09	-0.67	-112.033
2925.80	18.840	148.700	2852.69	385.62 S	230.99 E	449.49	0.65	0.00	2.00	90.237

15/12-13 B_MWD 8-1/2"

2943.00	18.810	148.290	2868.97	390.35 S	233.89 E	455.04	0.24	-0.05	-0.72	-102.970
2971.50	18.390	148.530	2895.98	398.10 S	238.65 E	464.13	0.45	-0.44	0.25	169.784
3026.60	15.990	151.790	2948.62	412.20 S	246.77 E	480.41	1.41	-1.31	1.77	159.678
3053.90	15.180	154.170	2974.92	418.73 S	250.11 E	487.73	1.13	-0.89	2.62	142.854
3081.80	14.270	157.120	3001.90	425.19 S	253.04 E	494.78	1.27	-0.98	3.17	141.932
3109.70	13.150	160.500	3029.01	431.35 S	255.43 E	501.30	1.48	-1.20	3.63	146.059
3127.00	12.520	160.290	3045.87	434.97 S	256.72 E	505.08	1.10	-1.09	-0.36	-175.867
3151.00	11.590	161.970	3069.34	439.71 S	258.35 E	509.99	1.24	-1.16	2.10	160.150

15/12-13 B_Extrapolation

3153.00	11.590	161.970	3071.30	440.09 S	258.47 E	510.38

All data is in Metres unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to Well. Northings and Eastings are relative to Structure.

The Dogleg Severity is in Degrees per 30 metres.
Vertical Section is from RKB (W.Alpha) and calculated along an Azimuth of 149.574° (Grid).

Coordinate System is UTM Zone 31 on ED50 Datum, Meters.
Grid Convergence at Surface is -0.918°. Magnetic Convergence at Surface is 2.019° (13-Jun-03)

Based upon Minimum Curvature type calculations, at a Measured Depth of 3153.00m.,
The Bottom Hole Displacement is 510.38m., in the Direction of 149.574° (Grid).

Survey Report for West Alpha 15/12-13 - Well 15/12-13
Your Ref: Definitive 15/12-13 B

Casing details

From		To		
Measured Depth (m)	**Vertical Depth (m)**	**Measured Depth (m)**	**Vertical Depth (m)**	**Casing Detail**
<Surface>	<Surface>	114.00	114.00	30" Conductor
<Surface>	<Surface>	1307.10	1306.90	13 3/8" Casing
<Surface>	<Surface>	2919.00	2846.26	9 5/8" Casing

22 COMPLETION DETAILS

N/A

23 DRILLING CURVE

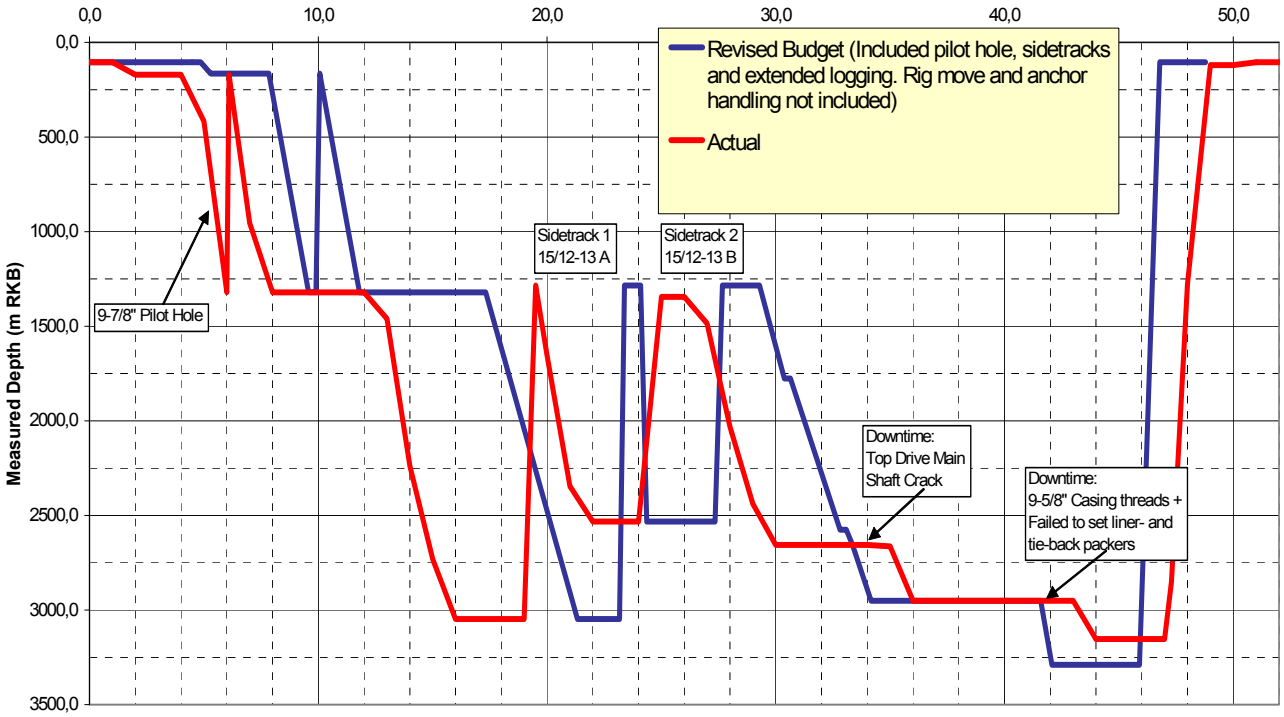


Figure 23-1 Drilling Curve

24 TIME SUMMARY

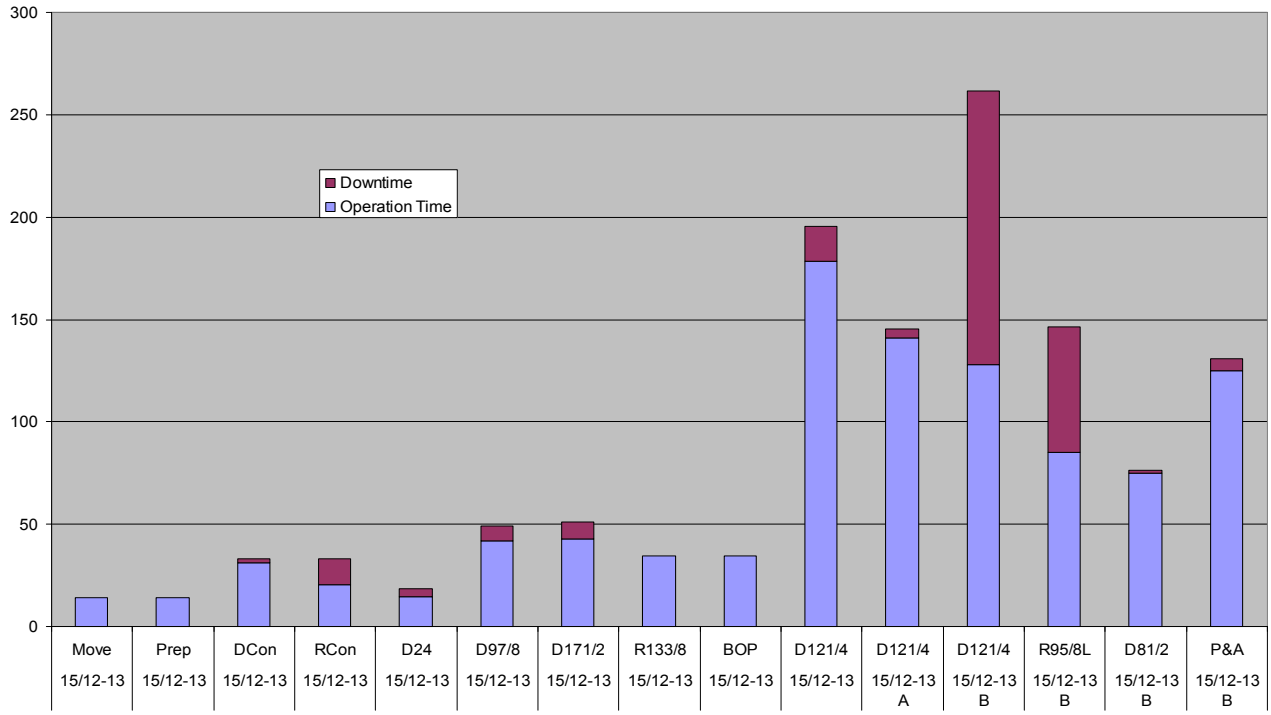


Figure 24-1 Time Breakdown

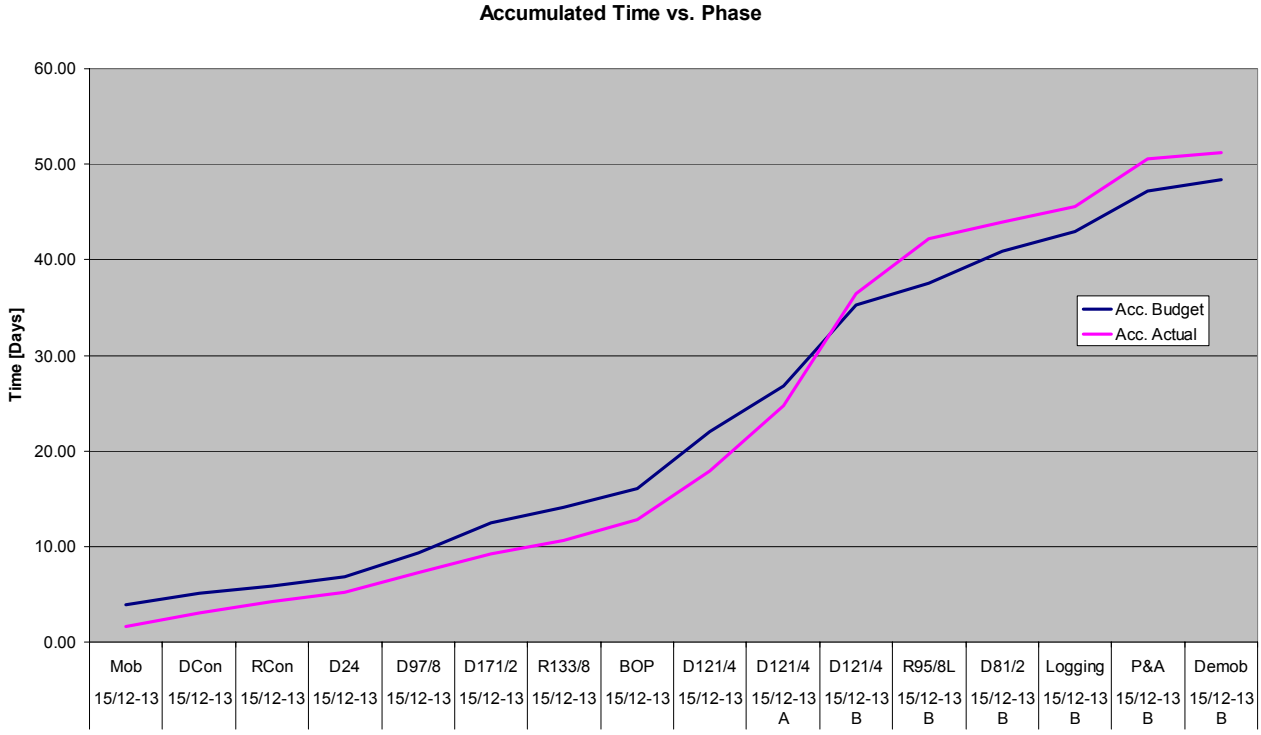


Figure 24-2 Accumulated Time

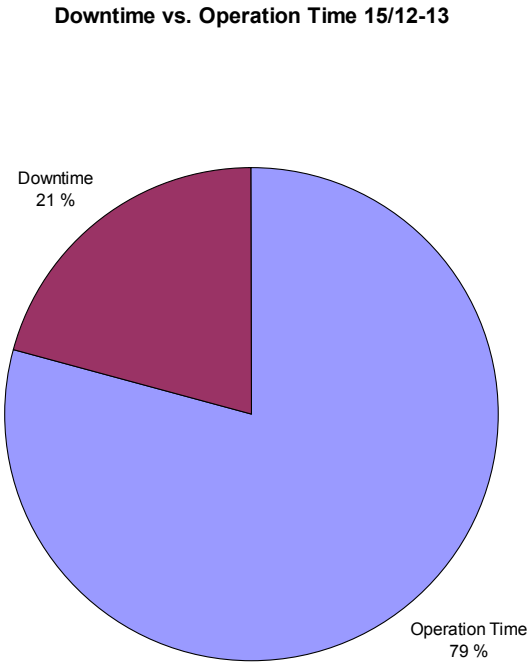


Figure 24-3 Downtime pie-chart

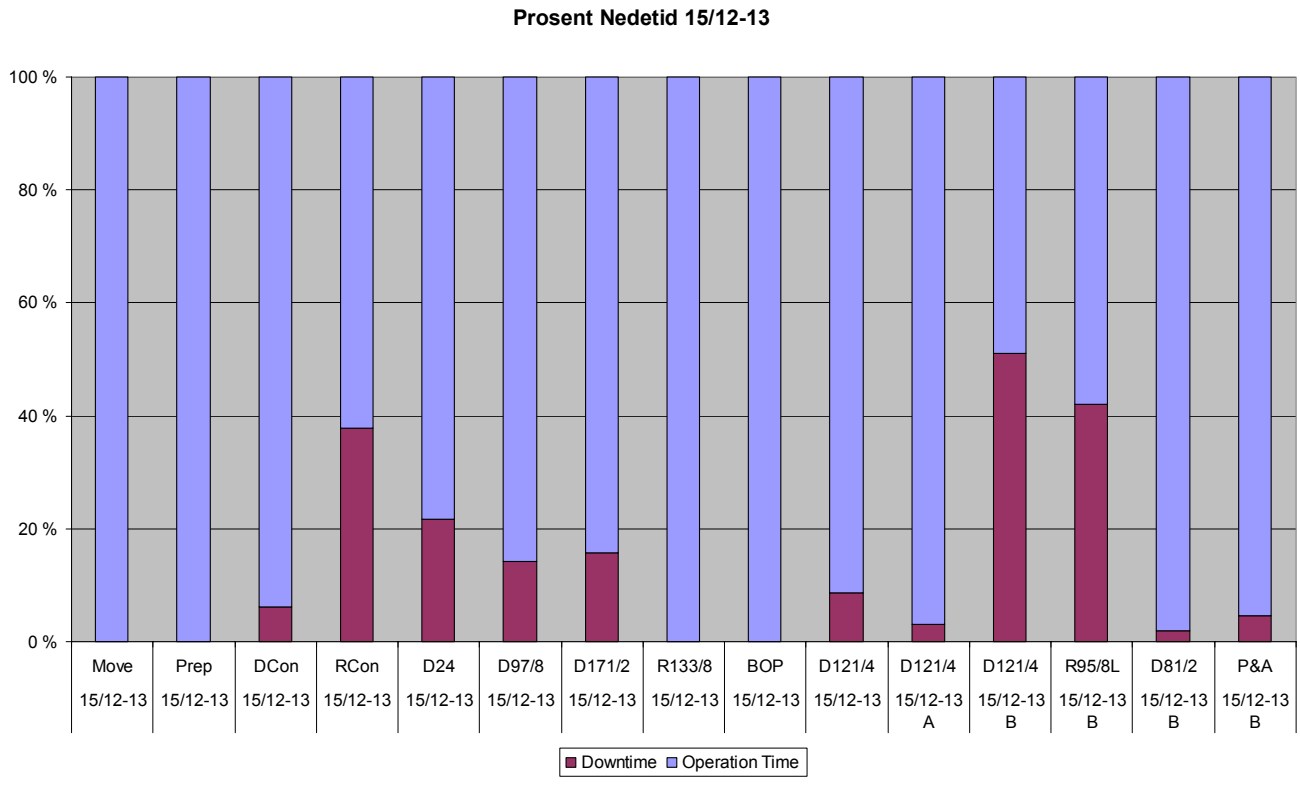


Figure 24-4 Percent Downtime

COMPOSITE LOG

Company : PERTRA AS
Field : Varg South
Area : North Sea

Comments :
Rig: West Alpha
Depth Reference: m MD
KB = 18 m
Logs run: GR/RES/NEU/ALD/BAT/DIR (LWD, Halliburton)
Geologists: S. Eikemo/M. Tillung/T. Kollien

Username : avocat
Date : 16/10/2003
Project : pl038
Depth Scale : 1:500

○ 15/12-13 B

Active Depth MD (m)
Depth TVDSS (m)
CALI - COMPOSITE 6.00 16.00
GR - COMPOSITE 0.00 150.00
DTS - COMPOSITE 440.00 40.00
DTC - COMPOSITE 140.00 40.00
SPLF - COMPOSITE 45.00 -15.00
SBDC - COMPOSITE 1.95 2.95
SEDP - COMPOSITE 0.20 2000.00
SEMP - COMPOSITE 0.20 2000.00
SESP - COMPOSITE 0.20 2000.00
CALT 0.00 1.00
VCL 0.00 1.00
PHI 0.50 0.00
SW 1.00 0.00
KH 0.01 10000.00
Active Zonation FWR 15/12-13 B Levels: 1 2
GS - Grain -0.20 1.00
Remarks

GOC
OWC

Draupne
HT
kim-sand
RZ-1
RZ-2
RZ-3
Triassic

CLST: slty grdg SLTST I/ dk gy-m dk gy,occ gnsh g mott lt gy,slily glauc, carb Spk,occ vf sdy

SST: dk gy-m dk gy,occ gnsh gy,sft,fri,clr-trns Qtz gr,vf-f,Tr m,r crs, mod-w srt,sbang-sbrnd,ar cmt,calc,micmica,glauc

SST: pred lse Qtz gr, clr-trnsl,f-m,sbang-sbrn

SST: lse Qtz gr,f-m, occ crs,w-mod srt,sbrnd, occ cl cmt

SST: lse Qtz gr,vf-f, occ m,occ crs,mod srt, sbrnd

SST: lse Qtz gr,vf-f, pred f,occ m,w srt,sbrnd

SST: f-m,pred m,occ crs, occ cmt,Tr Pyr,Tr Glauc

SST: clr-trnsl,brnsh wh, vf-f,w srt,cmt,lse Gr,f-w srt
SLTST: gry-dk gry,frm, sbblky
CLST:lt gry-gry,sft,sblk

SST: pred lse Qtz,f-m, occ crs,occ crs,clr,trns sbrnd,occ calc cmt

SST: lse Qtz,pred crs, occ v crs,mod srt,sbrnd

SST: pred crs,occ v crs, occ m,mod srt,sbang-sbrn

SST: lse Qtz,m-crs,occ f-m,occ v crs,sbrnd,mod srt,occ kao cmt, occ sil cmt

SST: m-crs,occ v crs, occ f,mod srt

SST: f-m, occ crs,pred kao cmt,occ calc cmt, Tr Glauc

SST: vf-f,occ m-crs, sft wh kao cmt, Tr Glauc occ rdsh incl

SST: lse Qtz,clr,trnsl, f-m,occ crs,occ vf,mod srt,wh-gnsh wh cmt, Tr Glauc,occ rdsh incl

CLST: rdsh brn-mod brn, sft-frm,non calc, sbblky-blky,occ slty, r Tr Micromic

COMPOSITE LOG

Company	:	PERTRA AS
Field	:	Varg South
Area	:	North Sea

Comments: Rig: West Alpha
Depth Reference: m MD
KB = 18 m
Logs run: GR/RES/NEU/ALD/BAT/DIR (LWD, Halliburton)
Geologists: S. Eikemo/M. Tillung/T. Kollien

Username	:	avocat
Date	:	16/10/2003
Project	:	pl038
Depth Scale	:	1:1000

15/12-13 B

Remarks

CLST: olv blk, sft-frm, blky-sbblky, Tr org Mat, Micropyr

CLST: olv blk, sft-frm, blky-sbblky, v slty I/P, v calc I/P, Tr org Mat, Micropyr, Ls

CLST: olv blk, sft-frm, blky-sbblky, slily calc, occ slty, Tr Micropyr, Ls

CLST: olv gy-dk gnsh gy, dk gy, sft-frm, blky-sbblky, occ calc, Tr Micropyr, Glauc

Tr LS: wh-pl yelsh brn, frm-mod hd, blky, microxln occ arg, Tr Micropyr

DOL: pl yelsh brn-dk yelsh brn, frm-mod hd, blky, occ arg, Tr Micropyr

CLST: olv gy-olv blk, sft-frm, blky-sbblky, slily calc, occ slty, Tr Micropyr

CLST: olv gy-olv blk, sft-frm, blky-sbblky, slily calc, Tr org Mat, Micropyr, Ls

DOL: pl yelsh brn-dk yelsh brn, frm-mod hd, blky, occ arg, Tr Micropyr

CLST: olv gy, gnsh gy-olv blk, sft-frm, blky-sbblky, slily calc, Tr org Mat, Micropyr, Ls

CLST: dk gy-dk gnsh gy, olv gy, sft-frm, blky-sbblky, slily calc, occ slty, Tr org Mat Tr Pyr

CLST: m dk gy-dk gnsh gy occ m blsh gy, sft-frm, blky-sbblky, slily calc, Tr Micropyr, Glauc

CLST: varic, dk gnsh gy, m dk gy, olv gy, brnsh gy-brnsh blk, frm-hd, sbblky, Tr TF: grysh bl-m blsh g frm-crmbly, sbblky-blky

CLST: olv blk, frm, occ blsh gy, blky-sbblky, occ slty, Tr Micropyr,

CLST: gn gy-occlt brn gy frm-mod hd, sbblky-blky, occ slty, slily calc I/P, Tr Micropyr, Micmica, Glauc

CLST: gn gy-occ lt brn g frm, sbblky-blky, slily calc, Tr Pyr, Micmica

Tr DOL: dk brnsh gy, hd-v hd, blky, crptxln, Tr Micropyr

CLST: gn gy, occ lt brn g frm-mod hd, sbblky-blky, calc-v calc, I/P grd Mrl, Tr Micropyr

LS: yelsh gy-pl gy, v lt gy, frm-mod hd, sbblky-blky, occ arg, Tr Micropyr

CLST: m dk gy, frm-mod hd blky-sbplty, gen calc, occ mrly, gen slty, Tr Micropyr, Micmica, org Mat

LS: lt gy-lt gnsh gy, mod hd-hd, blky, occ mrly, gen crptxln, r Tr Micropy

MRL: pred lt brn-mod brn occ gnsh gy, frm, blky, slty I/P, occ grad LS, Tr Micropyr, Micmica

CLST: olv gy-olv blk, sft-frm, sbfis, blky-sbplt slily calc I/P, Tr Micmica, Tr org Mat

CLST: slty grdg SLTST I/ dk gy-m dk gy, occ gnsh g mott lt gy, slily glauc, carb Spk, occ vf sdy

SST: pred lse Qtz gr, clr-trnsl, f-m, sbang-sbrn

SST: lse Qtz gr, f-m, occ crs, w-mod srt, sbrnd, occ cl cmt

SST: lse Qtz gr, vf-f, occ m, occ crs, mod srt, sbrnd

SST: f-m, pred m, occ crs, occ cmt, Tr Pyr, Tr Glauc

SST: clr-trnsl, brnsh wh, vf-f, w srt, cmt, lse Gr, f- w srt
SLTST: gry-dk gry, frm, sbblky

SST: pred lse Qtz, f-m, occ crs, occ crs, clr, trns sbrnd, occ calc cmt

SST: lse Qtz, pred crs, occ v crs, mod srt, sbrnd

SST: pred crs, occ v crs, occ m, mod srt, sbang-sbrn

SST: m-crs, occ v crs, occ f, mod srt

SST: f-m, occ crs, pred kao cmt, occ calc cmt, Tr Glauc

SST: vf-f, occ m-crs, sft wh kao cmt, Tr Glauc occ rdsh incl

SST: lse Qtz, clr, trnsl, f-m, occ crs, occ vf, mod srt, wh-gnsh wh cmt, Tr Glauc, occ rdsh incl

COMPOSITE LOG

Company : PERTRA AS
Field : Varg South
Area : North Sea

Comments: Rig: West Alpha
Depth Reference: m MD
KB = 18 m
Logs run: GR/RES/ALD/BAT/DIR (LWD, Halliburton)
Geologists: S. Eikemo/T. Kollien

Username : avocat
Date : 20/10/2003
Project : pl038
Depth Scale : 1:1000

15/12-13

Remarks

CLST: dk yelsh brn-pl yelsh brn,olv blk, sft-frm,blky,slty I/P, occ sh,slily calc, r micropyr
Tr LS: pl yelsh brn, frm-modhd,blky,microxln, occ arg
CLST: olv gry,brnsh gry-brnsh blk,sft-frm,blky, slty I/P,slily calc, r glauc,r micropyr
Tr LS: pl yelsh brn, frm-mod hd,blky,microxln Tr Clst
CLST: olv gry-lt olv gry occ pl yelsh brn,sft-frm blky,slty I/P,slily calc Tr Galuc,Tr micropyr
CLST: olv gry,occ lt olv gry,occ yelsh brn,sft-fr blky,slty I/P,slily calc calc,r glauc,Tr micropyr
LS: lt yelsh brn, frm-mod hd,microxln, suc I/P,arg I/P
CLST: olv gry-dk gry, occ yelsh brn,sft-frm, blky,slty I/P,calc, r glauc,Tr micropyr
CLST: olv gry-dk gry, occ dk gn gry,sft-frm, blky,slyu I/P,non calc-calc,Tr micropyr
LS: lt yelsh brn,frm-mod hd,occ hd,microxln, arg I/P,grad DOL I/P
CLST: olv gry-dk gry, occ brnsh blk,sft-frm, blky,slty I/P,non-slily calc,Tr micropyr
CLST: olv gry-dk gry, occ brnsh blk,sft-frm, blky,slty I/P,non-slily calc,Tr micropyr
LS: pl yelsh brn-lt yels brn,occ lt gry-wh, frm-mod hd,microxln, arg I/P,occ lam
CLST: olv blk-brnsh blk, sft-frm,blky,slty I/P, non-v slily calc, Tr micropyr
LS: pl yelsh brn-lt yels brn,frm-mod hd,microxln, arg I/P,occ lam
LS: pl yelsh brn-lt yels brn,frm-mod hd,occ v hd, microxln,arg I/P,occ lam grad DOL I/P
CLST: olv gry-olv blk, occ brnsh blk,sft-frm, blky,slty I/P,non-v slil calc,Tr micropyr
CLST: olv gry-olv blk, dk gnsh gry-grysh gn, occ mod yelsh brn,sft-fr blky,slty I/P,slily calc Tr micropyr
CLST: olv gry-olv blk, dk gnsh gry-grysh gn, occ mod yelsh brn,sft-fr blky,slty I/P, slily cal Tr micropyr
CLST: dk gnsh gy,grysh g occ mod yelsh brn, occ olv gn-olv blk, sft-frm,blky,slty I/P, Tr micropyr
TF CLST: m blsh gry-lt blsh gry,sft, w/varic sptd,blk,gry,m b slily calc
CLST: dk gnsh gy-m dk gy occ brnsh gry-brnsh blk, sft-frm,blky,slty I/P, non-v slilycalc, Tr micropyr
LS: v lt gry-pksh gry,hd brit,microxln
CLST: dk gry-m dk gry, occ brnsh gry,frm-hd, blky,slty I/P,non-v slil calc,Tr micropyr
SLTST: brnsh gry, lt brnsh gry,frm,sbblky, micropyr
SST: clr-trnsl,lse gr, vf-f,w srtd
CLST: gnsh gy-lt gnsh gy brn-dk brn,sft-frm,blky, slty I/P,non-v slily cal Tr Glauc,Tr micropyr
LS: yelsh wh-lt grysh wh lt gry-gnsh gry,frm, sbblky,microxln
SLTST: brnsh gry,gnsh gr frm,sbblky,non calc, Tr Pyr,Tr Glauc, grad SST I/P
LS: wh-off wh,r pl rd, frm-mod hd,occ v hd,blky microxln,arg I/P, r micropyr
CLST: olv gry-olv blk, occ brnsh blk,sft-frm, occ mod hd,blky,slty I/P non calc,Tr micropyr
LS: pred pl rd,wh-off wh frm-mod hd,occ v hd,blky microxln,arg I/P
LS: wh-off wh,r pl rd, frm-mod hd,occ v hd, blky,microxln,arg I/P
LS: wh-off wh,mod hd-v h microxln,arg I/P
LS: wh-off wh,occ pl rd, mod hd-v hd,blky, microxln,arg I/P
LS: wh-off wh, pl rd-lt brnsh gry, mod hd-v hd,blky, microxln,arg I/P
MRL: olv gry-dk gnsh gry brnsh gry,gnsh gry, sft-frm,blky,v calc
MRL: pred mod brn-grysh brn,olv gry-dk gns gry,gnsh gry,sft-frm, blky,v calc
LS: wh-off wh,occ pl rd, mod hd-v hd,blky,microxl arg I/P
MRL: mod brn-grysh brn, occ gnsh gry,sft-frm,blk arg I/P
CLST: olv blk,sft-frm, blky,slty,non-slily calc micropyr,Tr carb Mat
CLST: olv blk,sft-frm, blky,slty,calc,micropyr
Tr SD: trsnp-trnsl,vf-f, sbrnd-rnd,w srt
CLST: olv blk-gnsh blk, frm,fri,blky,slily carb, occ calc cmt,micropyr
SST: pred lse Qtz gr, clr-trnsl,occ calc cmt, pred vf-m,occ crs, sbang-sbrndd,mod srt, Tr Pyr
SST: lse Qtz gr,clr-trns m-crs,sbang-rnd,w-mod sr Tr Pyr
SST: lse gr,clr Qtz, pred f-m,occ crs,sbamg-sbrndd,mod strd,occ calc cmt,Tr Pyr,Tr arg cmt

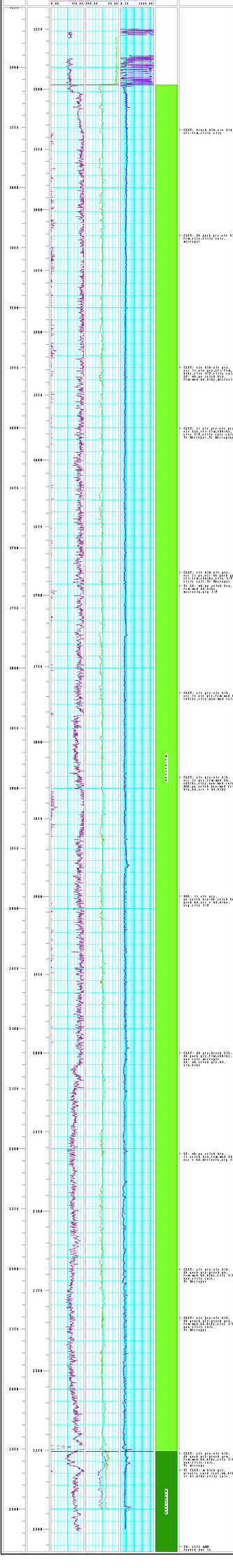
COMPOSITE LOG

Company	:	PETRA AS
Field	:	Varg South
Area	:	North Sea

Comments: Rig: West Alpha
Depth Reference: m MD
KB = 18 m
Logs run: GR/RES/BAT/DIR (LWD, Halliburton)
Geologists: S. Elkems

Username	: avecat
Date	: 24/10/2003
Project	: p1038
Depth Scale	: 1:1000

15/12-13 A



BAKER HUGHES
INTEQ

FORMATION EVALUATION LOG
PERTRA AS : 15/12-13

SCALE: 1 : 500

PENETRATION RATE (m/hr)
160 120 80 40
WEIGHT ON BIT (tonnes)
40 30 20 10
DRILL STRING RPM (RPM)
160 120 80 40

DEPTH (mMD) | CORE | CUTTINGS LITHOLOGY | AVG. DITCH GAS (%) 0.01 0.1 1 10 20 | METHANE (ppm) ETHANE (ppm) PROPANE (ppm) I-BUTANE (ppm) N-BUTANE (ppm) I-PENTANE (ppm) N-PENTANE (ppm) 1k 10k 100k | OIL SHOWS | CUT FLUORESCENCE | INTERPRETED LITHOLOGY | REMARKS DESCRIPTIONS

-23/04/03

NB#1 SDBS XT1C
17 1/2" w/36" HO
In at 105m, drilled 65m
2-2-WT-A-E-I-WT-TD

Well 15/12-13 spudded at 104.2m MD 23/04/03

RETURNS TO SEABED
DRILLED WITH SEAWATER
AND HIGH VIS PILLS

150

30" Conductor set at 165mMD (165.0mTVD)

-24/04/03

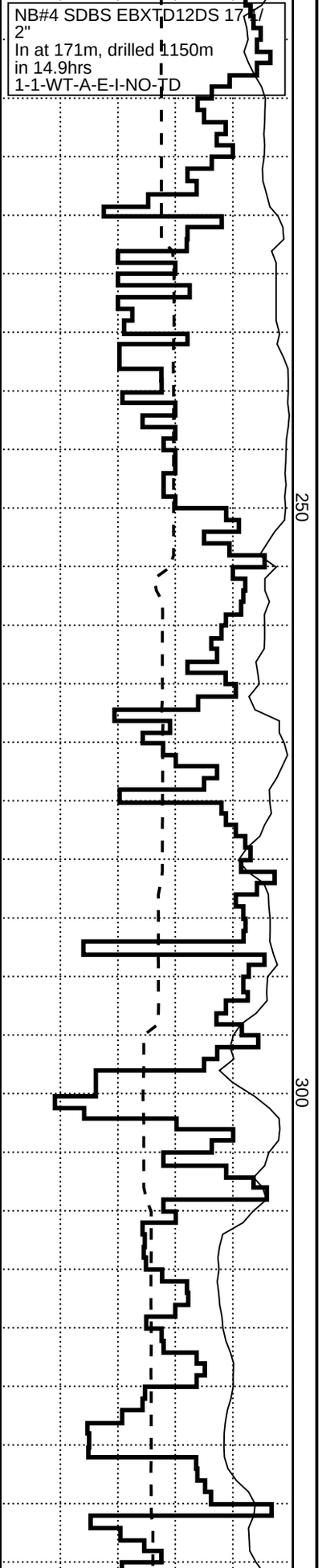
NB#1RR SDBS XT1C
17 1/2" w/36" HO
In at 170m, drilled 1m
2-2-WT-A-E-I-WT-TD

DATA RECORDING COMMENCED AT 171m

NB#2 SDBS XT1C 24"
In at 171m
4-1-NO-A-E-I-WT-TD

NB#3 SDBS EBXL12 9 5/8"
In at 171m, drilled 1149m
in 21.4hrs
4-4-NO-A-E-I-WT-TD

200



Svy@ 216.9mMD (216.9mTVD)
Inc 1.58 Azi 358.00

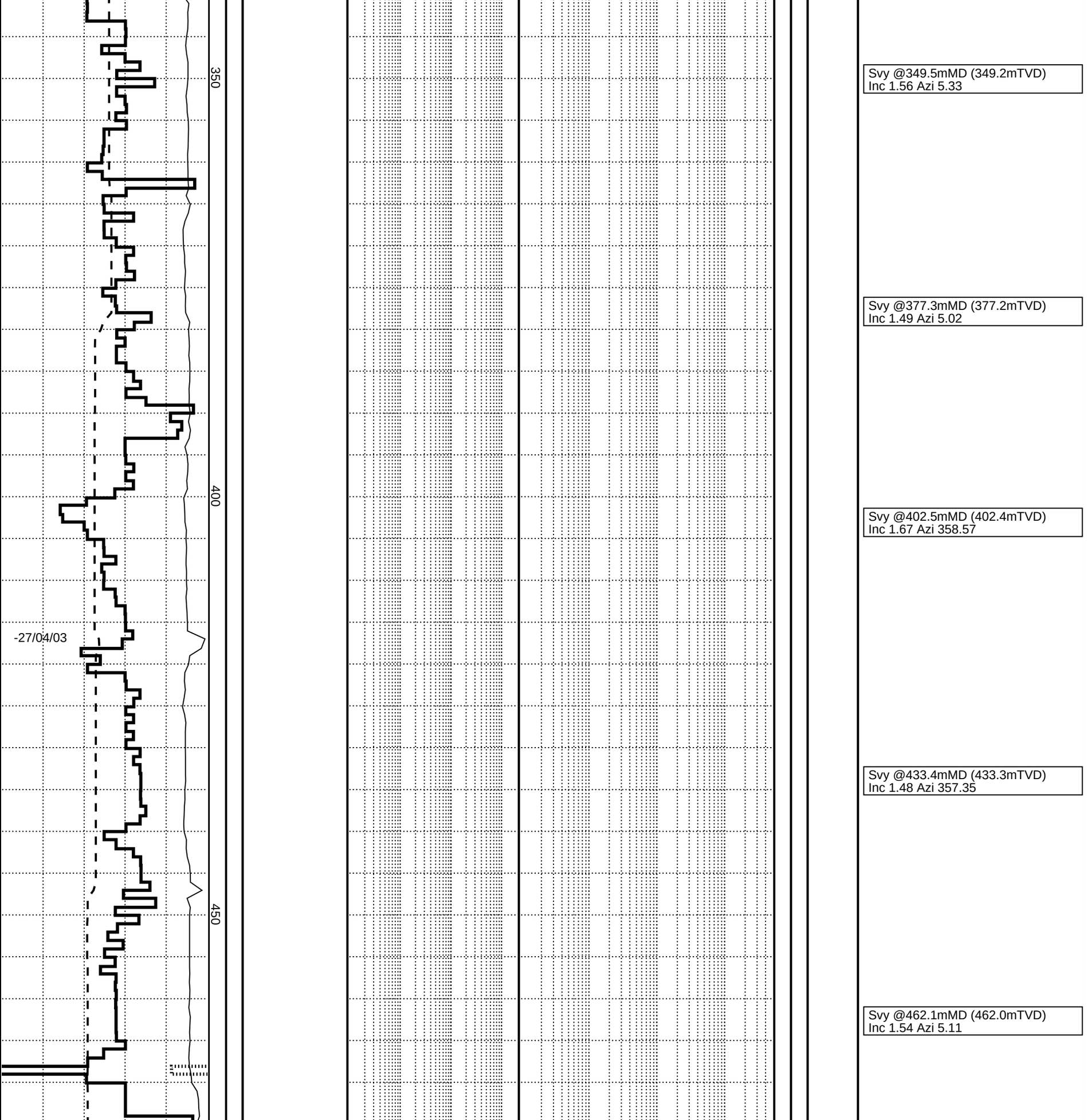
Svy @240.2mMD (240.2mTVD)
Inc 1.51 Azi 358.30

Svy @270.5mMD (270.4mTVD)
Inc 1.89 Azi 356.45

Svy @297.5mMD (297.4mTVD)
Inc 1.65 Azi 358.35

RETURNS TO SEABED
DRILLED WITH SEAWATER
AND HIGH VIS PILLS

Svy @321.8mMD (321.7mTVD)
Inc 1.62 Azi 359.31


350
400
450
-27/04/03
Svy @349.5mMD (349.2mTVD)
Inc 1.56 Azi 5.33
Svy @377.3mMD (377.2mTVD)
Inc 1.49 Azi 5.02
Svy @402.5mMD (402.4mTVD)
Inc 1.67 Azi 358.57
Svy @433.4mMD (433.3mTVD)
Inc 1.48 Azi 357.35
Svy @462.1mMD (462.0mTVD)
Inc 1.54 Azi 5.11

Svy @490.9mMD (490.8mTVD)
Inc 1.49 Azi 359.23

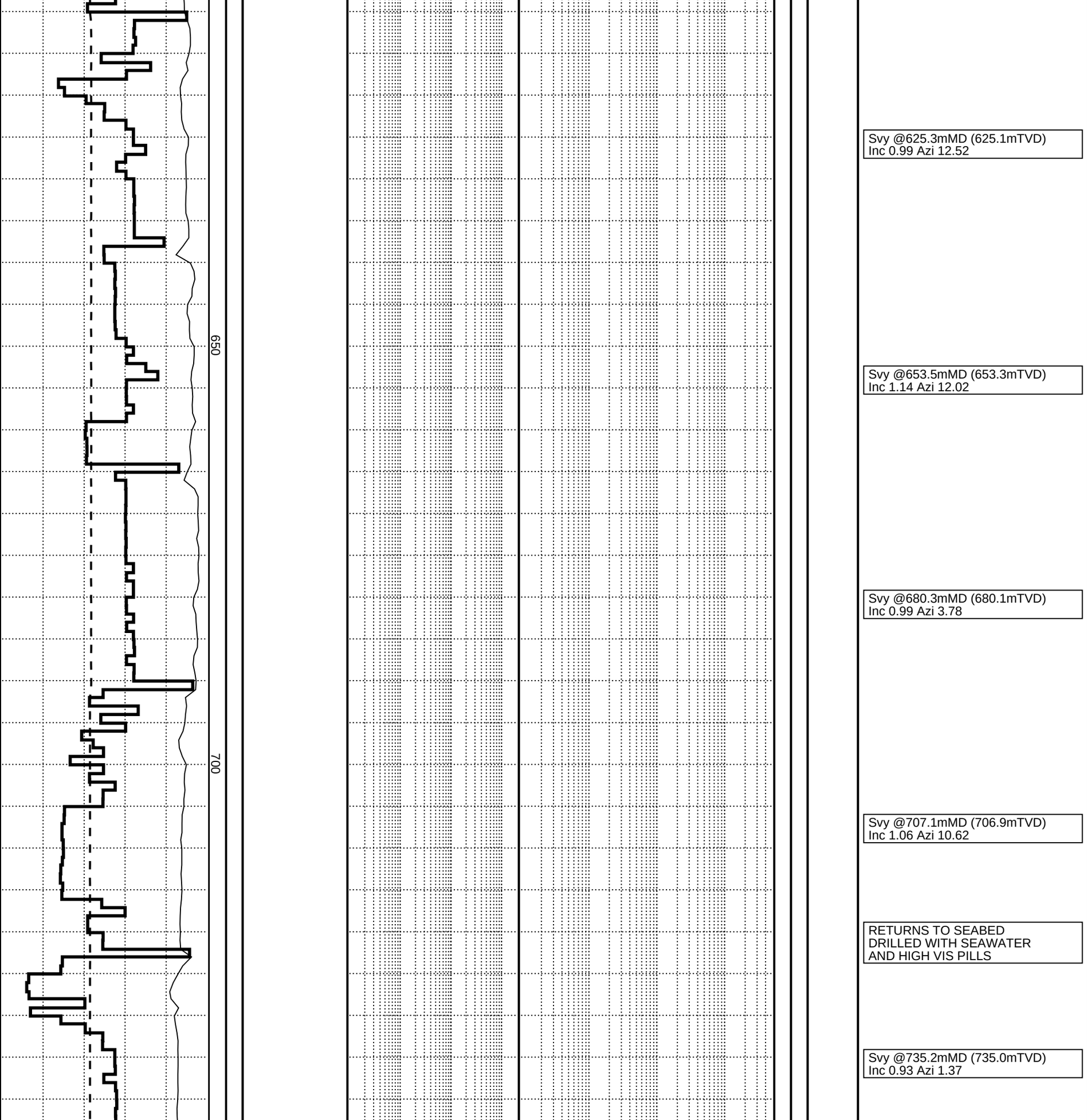
Svy @518.4mMD (518.3mTVD)
Inc 1.43 Azi 1.89

RETURNS TO SEABED
DRILLED WITH SEAWATER
AND HIGH VIS PILLS

Svy @545.6mMD (545.5mTVD)
Inc 1.36 Azi 0.91

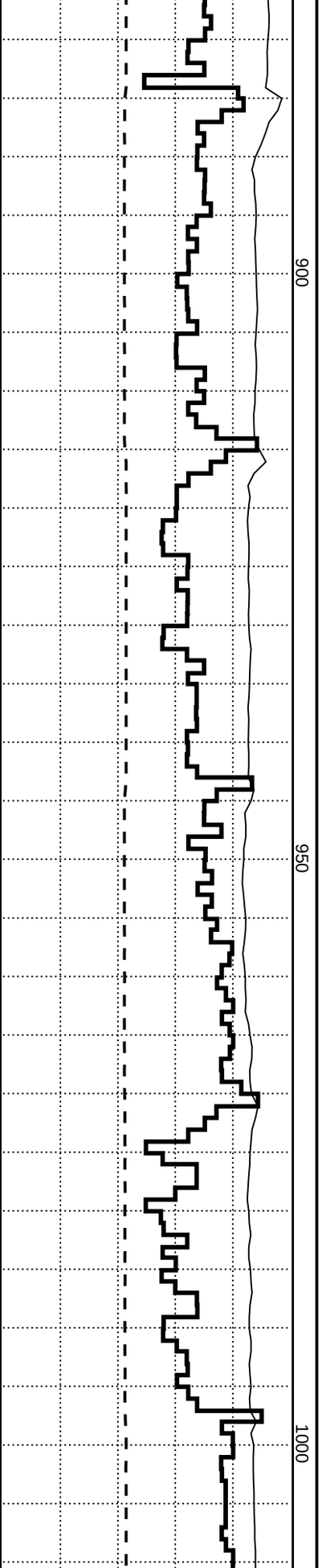
Svy @573.6mMD (573.4mTVD)
Inc 1.00 Azi 3.58

Svy @596.8mMD (596.6mTVD)
Inc 1.15 Azi 9.97


650
700
Svy @625.3mMD (625.1mTVD)
Inc 0.99 Azi 12.52
Svy @653.5mMD (653.3mTVD)
Inc 1.14 Azi 12.02
Svy @680.3mMD (680.1mTVD)
Inc 0.99 Azi 3.78
Svy @707.1mMD (706.9mTVD)
Inc 1.06 Azi 10.62
RETURNS TO SEABED
DRILLED WITH SEAWATER
AND HIGH VIS PILLS
Svy @735.2mMD (735.0mTVD)
Inc 0.93 Azi 1.37

Svy @818.5mMD (818.3mTVD)
Inc 0.74 Azi 358.79

Svy @874.7mMD (874.5mTVD)
Inc 0.74 Azi 1.38



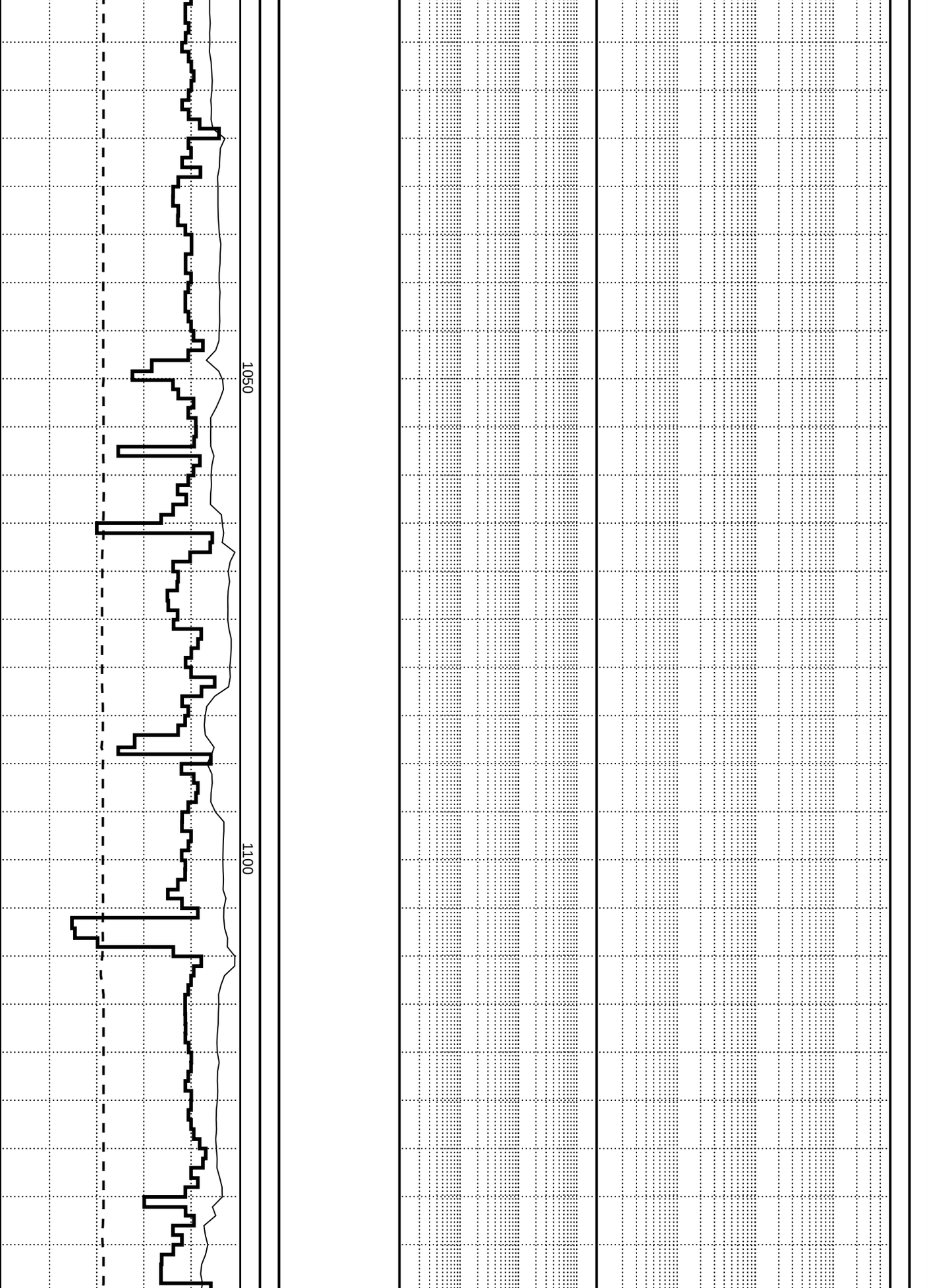
Svy @902.6mMD (902.4mTVD)
Inc 0.79 Azi 10.42

RETURNS TO SEABED
DRILLED WITH SEAWATER
AND HIGH VIS PILLS

Svy @930.6mMD (930.4mTVD)
Inc 0.63 Azi 9.68

Svy @958.5mMD (958.3mTVD)
Inc 0.84 Azi 16.87

Svy @987.5mMD (987.3mTVD)
Inc 0.64 Azi 20.04



Svy @1012.2mMD (1012.0mTVD)
Inc 0.61 Azi 29.31

Svy @1041.1mMD (1040.9mTVD)
Inc 0.57 Azi 28.02

Svy @1069.6mMD (1069.4mTVD)
Inc 0.20 Azi 114.91

Svy @1097.6mMD (1097.4mTVD)
Inc 0.20 Azi 50.46

RETURNS TO SEABED
DRILLED WITH SEAWATER
AND HIGH VIS PILLS

Svy @1124.3mMD (1124.1mTVD)
Inc 0.25 Azi 3.48

Svy @1149.9mMD (1149.7mTVD)
Inc 0.25 Azi 41.14

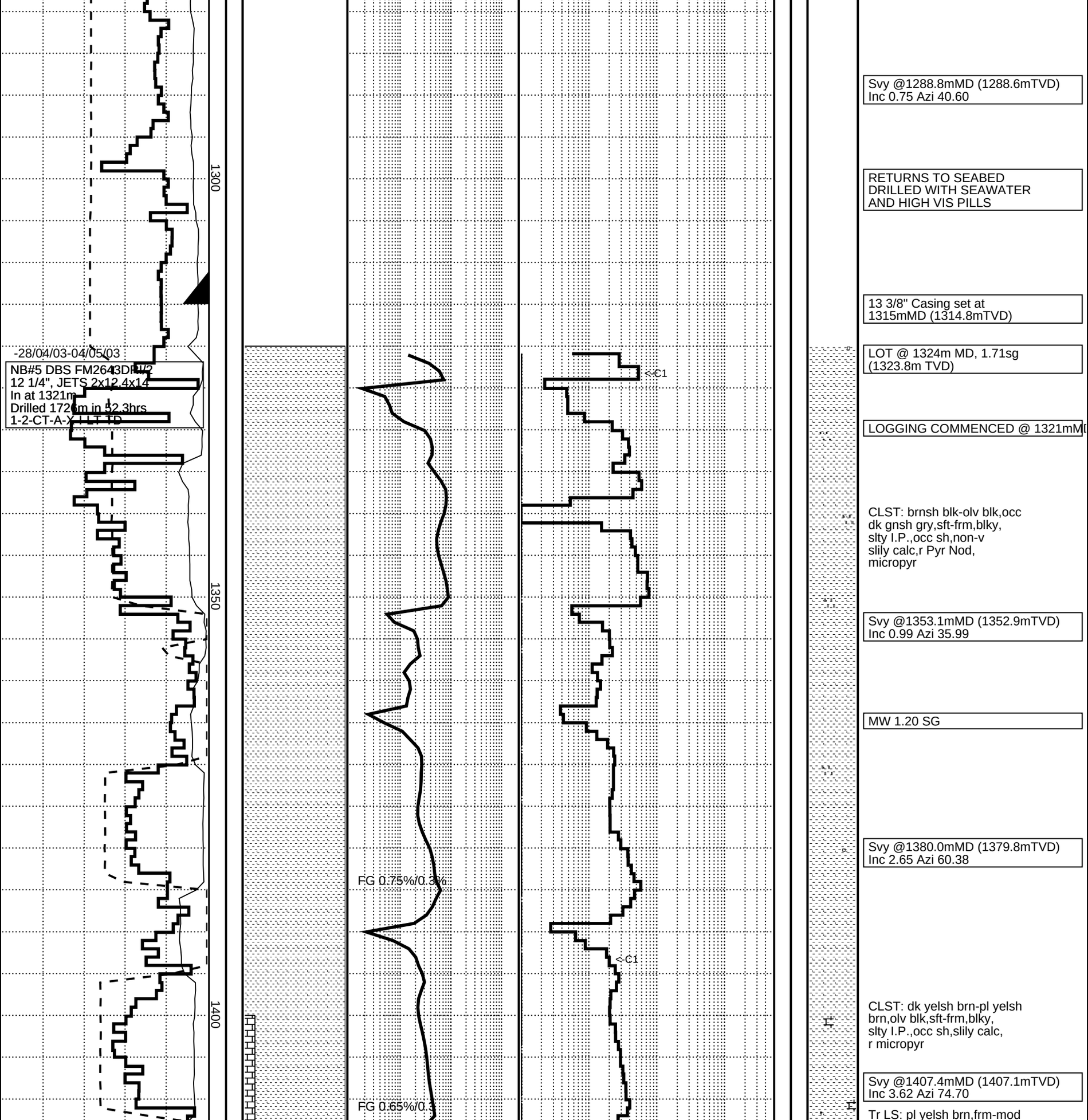
Svy @1179.9mMD (1179.7mTVD)
Inc 0.86 Azi 36.86

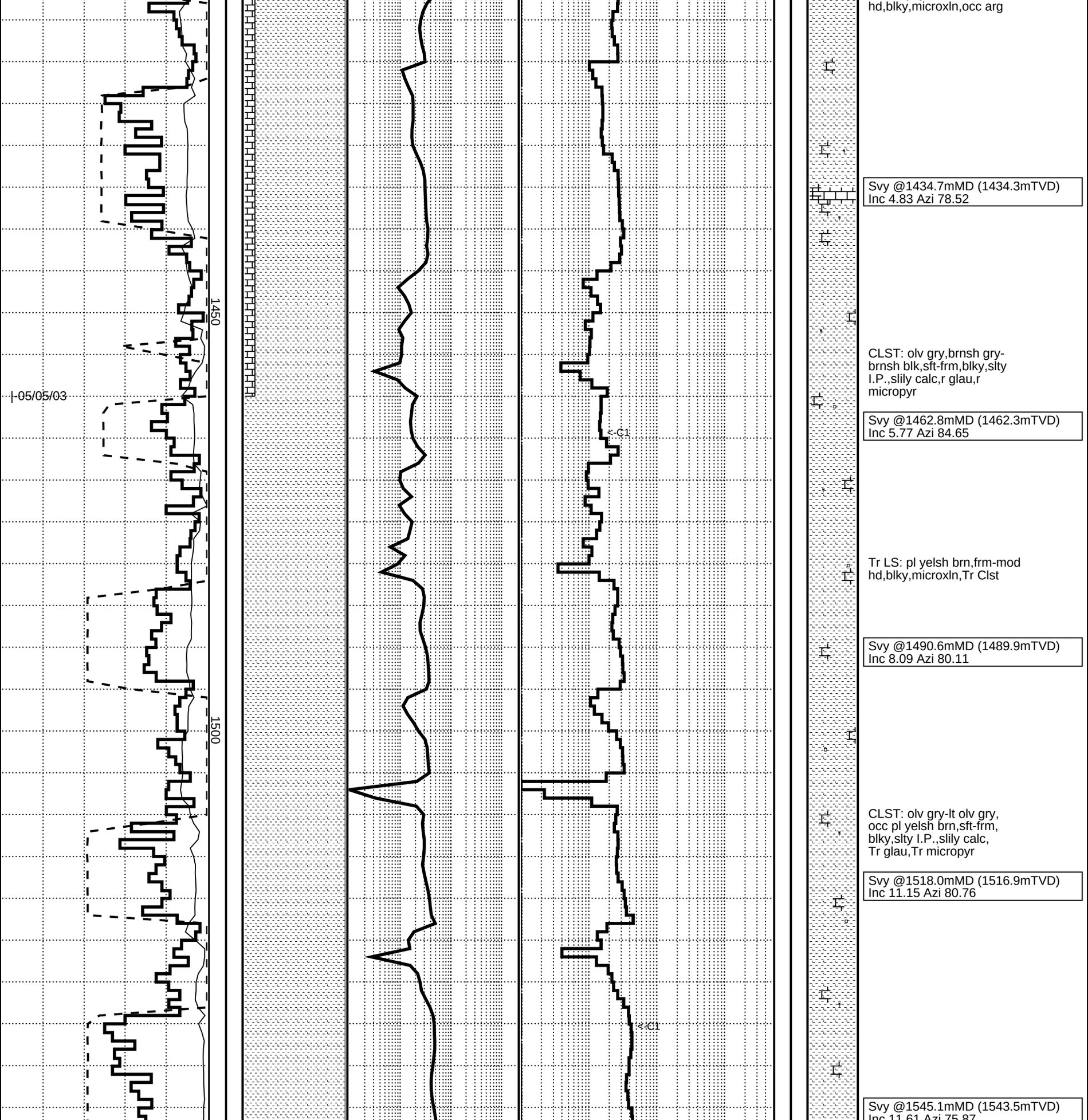
Svy @1206.8mMD (1206.6mTVD)
Inc 1.00 Azi 60.28

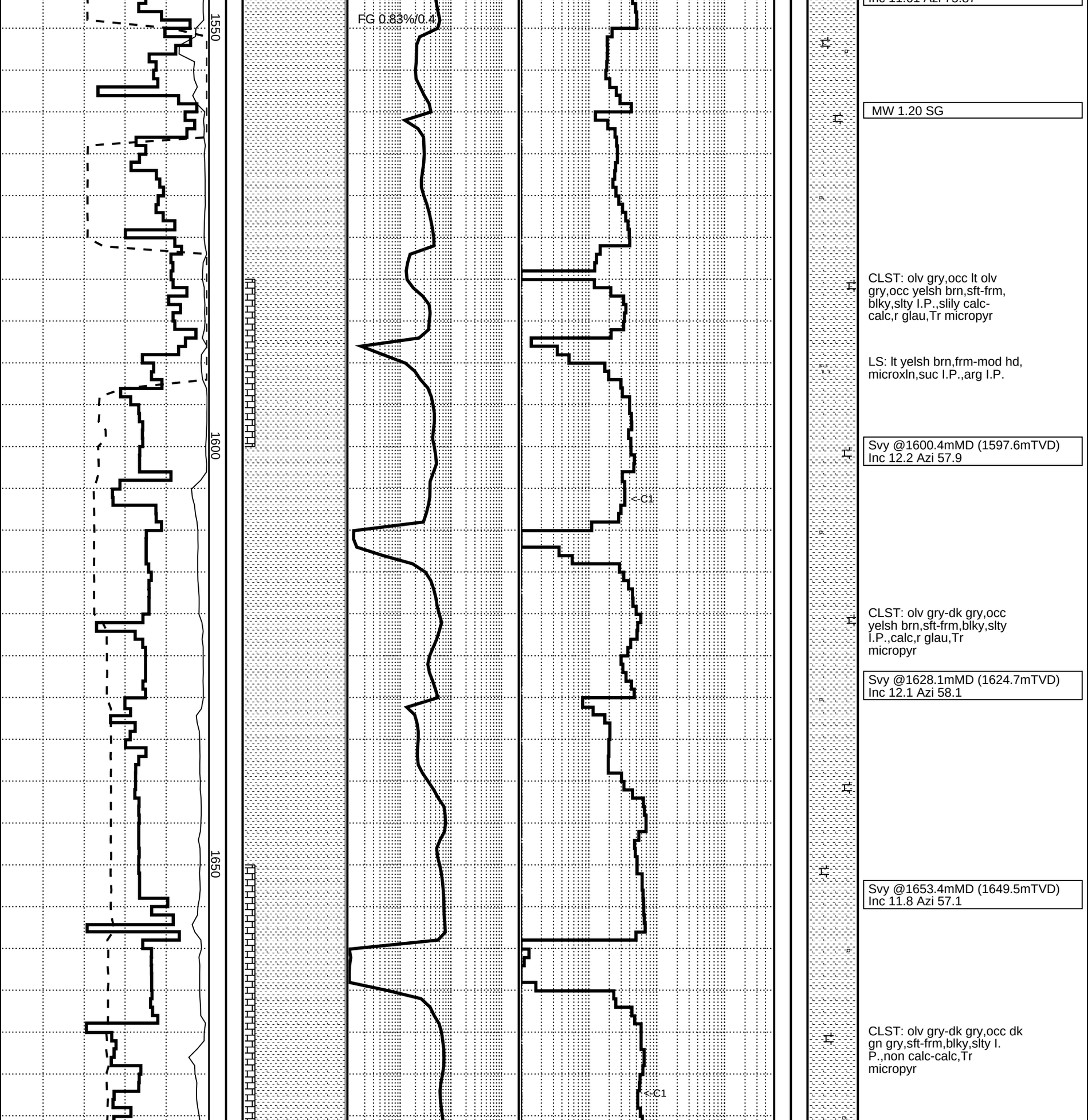
Svy @1232.9mMD (1232.7mTVD)
Inc 0.67 Azi 15.27

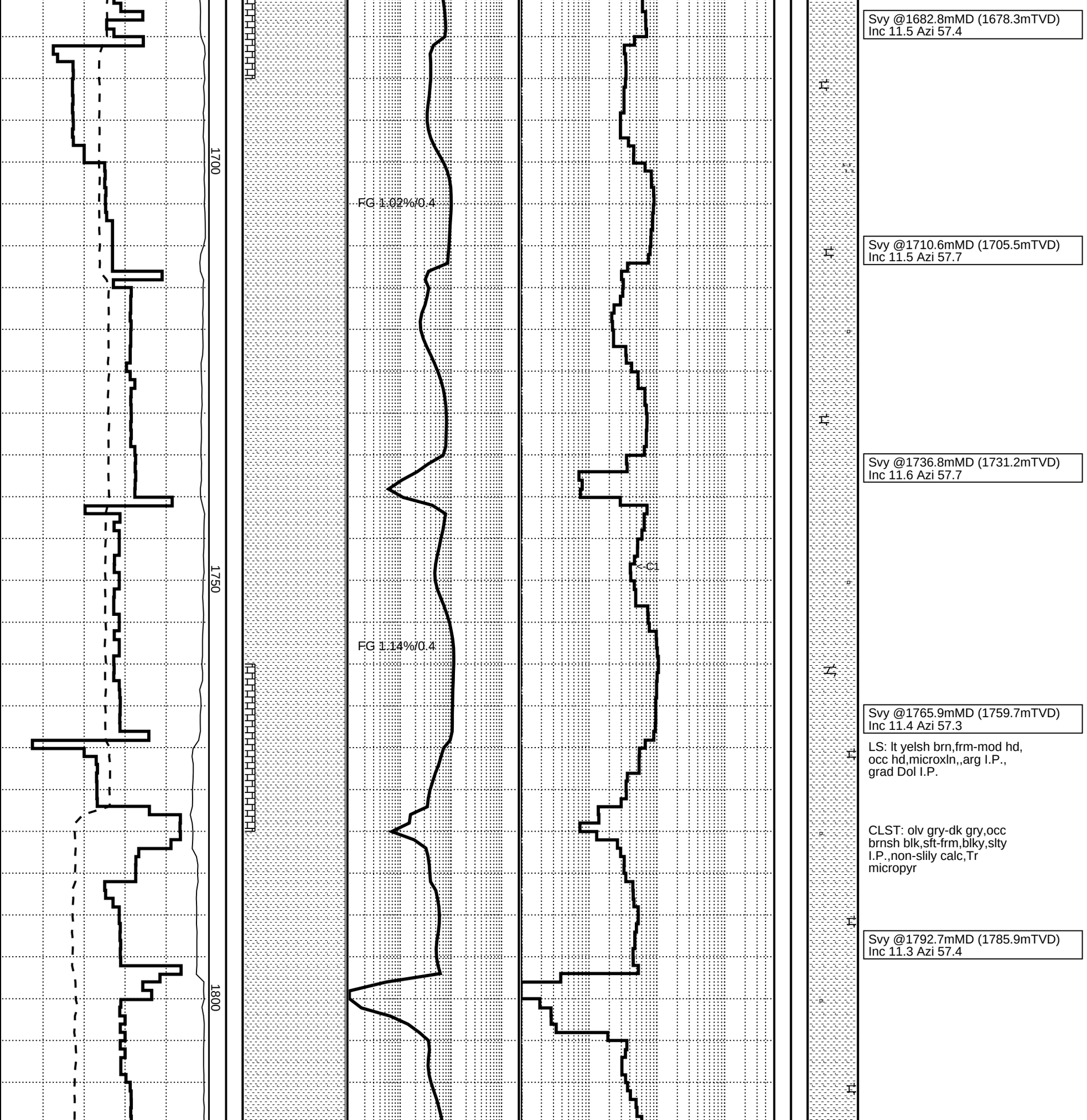
Svy @1260.2mMD (1260.0mTVD)
Inc 0.66 Azi 36.07

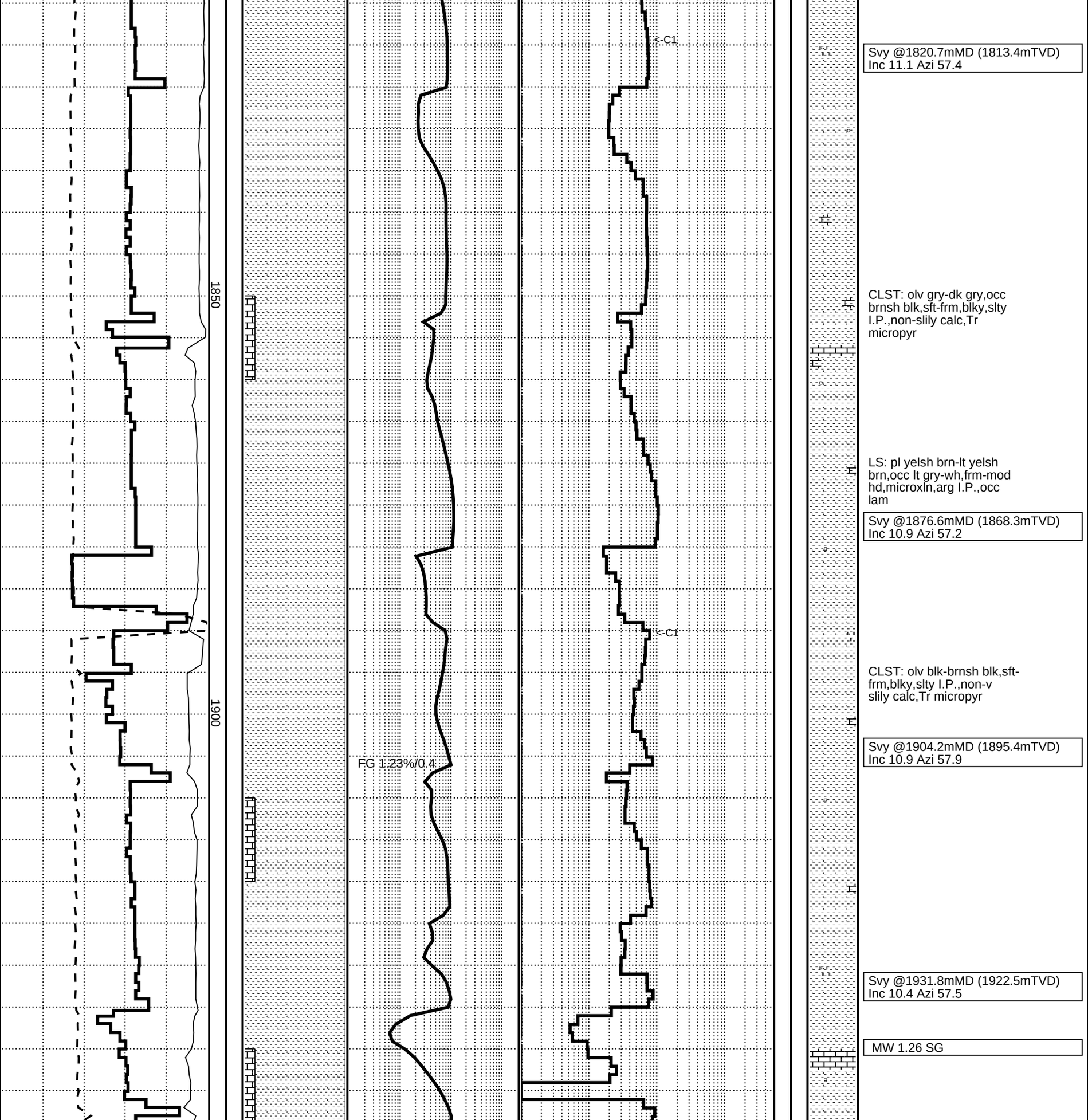
HORDALAND GP
1275m MD (1275.0m TVD)

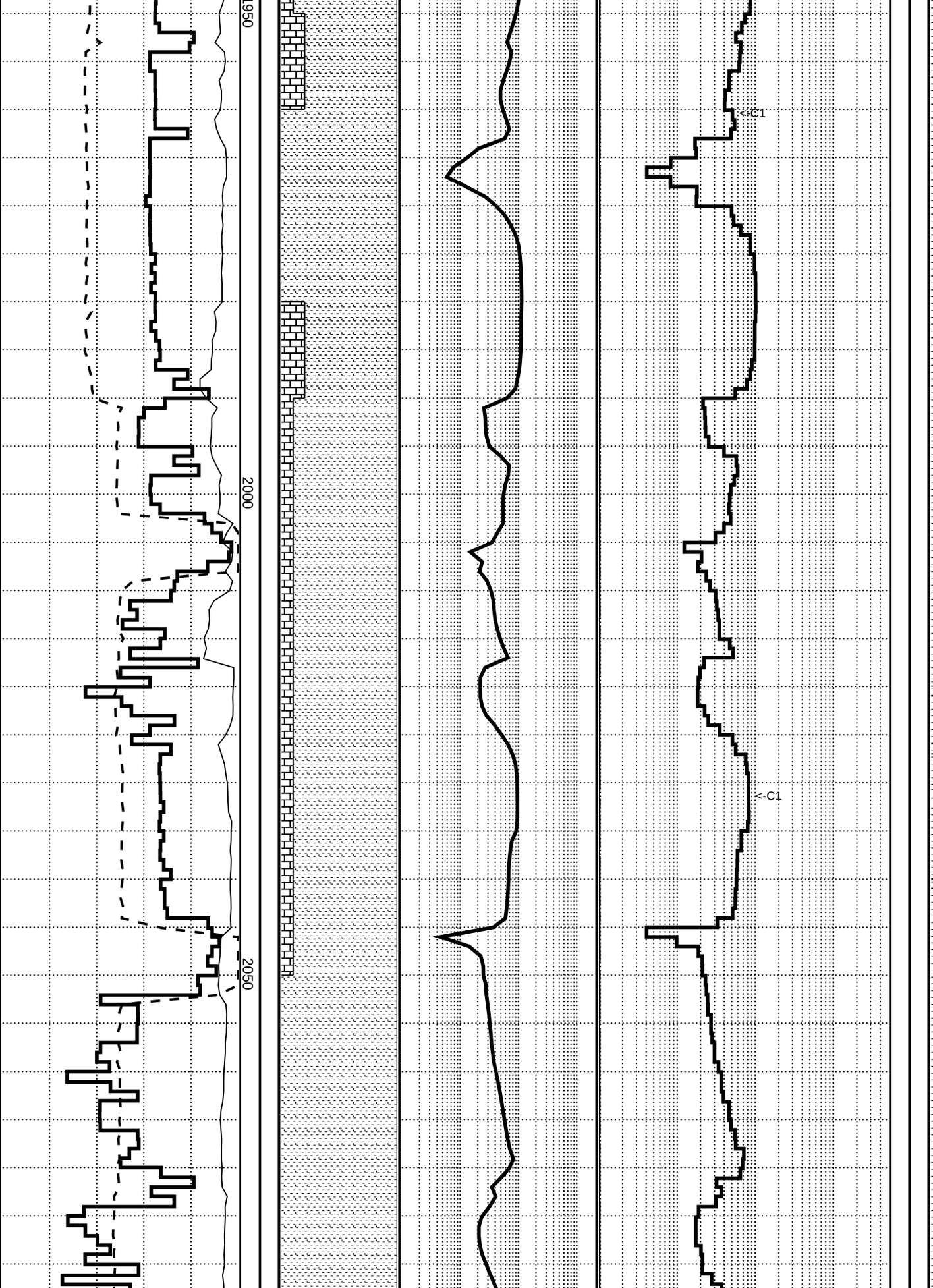

1300
1350
1400
-28/04/03-04/05/03
NB#5 DBS FM2643DH//2
12 1/4", JETS 2x12,4x14
In at 1321m
Drilled 172.6m in 32.3hrs
1-2-CT-A-X-I-LT-TD
<-C1
FG 0.75%/0.3%
<-C1
FG 0.65%/0.3
Svy @1288.8mMD (1288.6mTVD)
Inc 0.75 Azi 40.60
RETURNS TO SEABED
DRILLED WITH SEAWATER
AND HIGH VIS PILLS
13 3/8" Casing set at
1315mMD (1314.8mTVD)
LOT @ 1324m MD, 1.71sg
(1323.8m TVD)
LOGGING COMMENCED @ 1321mMD
CLST: brnsh blk-olv blk,occ
dk gnsh gry,sft-frm,blky,
slty I.P.,occ sh,non-v
slily calc,r Pyr Nod,
micropyr
Svy @1353.1mMD (1352.9mTVD)
Inc 0.99 Azi 35.99
MW 1.20 SG
Svy @1380.0mMD (1379.8mTVD)
Inc 2.65 Azi 60.38
CLST: dk yelsh brn-pl yelsh
brn,olv blk,sft-frm,blky,
slty I.P.,occ sh,slily calc,
r micropyr
Svy @1407.4mMD (1407.1mTVD)
Inc 3.62 Azi 74.70
Tr LS: pl yelsh brn,frm-mod


hd,blky,microxln,occ arg
Svy @1434.7mMD (1434.3mTVD)
Inc 4.83 Azi 78.52
1450
|-05/05/03
CLST: olv gry,brnsh gry-
brnsh blk,sft-frm,blky,slty
l.P.,slily calc,r glau,r
micropyr
Svy @1462.8mMD (1462.3mTVD)
Inc 5.77 Azi 84.65
>C1
Tr LS: pl yelsh brn,frm-mod
hd,blky,microxln,Tr Clst
Svy @1490.6mMD (1489.9mTVD)
Inc 8.09 Azi 80.11
1500
CLST: olv gry-lt olv gry,
occ pl yelsh brn,sft-frm,
blky,slty l.P.,slily calc,
Tr glau,Tr micropyr
Svy @1518.0mMD (1516.9mTVD)
Inc 11.15 Azi 80.76
<C1
Svy @1545.1mMD (1543.5mTVD)
Inc 11.61 Azi 75.87


1550
1600
1650
FG 0.83%/0.4
<-C1
<-C1
MW 1.20 SG
CLST: olv gry,occ lt olv gry,occ yelsh brn,sft-frm, blky,slty I.P.,slily calc-calc,r glau,Tr micropyr
LS: lt yelsh brn,frm-mod hd, microxln,suc I.P.,arg I.P.
Svy @1600.4mMD (1597.6mTVD) Inc 12.2 Azi 57.9
CLST: olv gry-dk gry,occ yelsh brn,sft-frm,blky,slty I.P.,calc,r glau,Tr micropyr
Svy @1628.1mMD (1624.7mTVD) Inc 12.1 Azi 58.1
Svy @1653.4mMD (1649.5mTVD) Inc 11.8 Azi 57.1
CLST: olv gry-dk gry,occ dk gn gry,sft-frm,blky,slty I. P.,non calc-calc,Tr micropyr


1700
1750
1800
FG 1.02%/0.4
FG 1.14%/0.4
<-C1
Svy @1682.8mMD (1678.3mTVD)
Inc 11.5 Azi 57.4
Svy @1710.6mMD (1705.5mTVD)
Inc 11.5 Azi 57.7
Svy @1736.8mMD (1731.2mTVD)
Inc 11.6 Azi 57.7
Svy @1765.9mMD (1759.7mTVD)
Inc 11.4 Azi 57.3
LS: lt yelsh brn,frm-mod hd,
occ hd,microxln,,arg l.P.,
grad Dol l.P.
CLST: olv gry-dk gry,occ
brnsh blk,sft-frm,blky,slty
l.P.,non-slily calc,Tr
micropyr
Svy @1792.7mMD (1785.9mTVD)
Inc 11.3 Azi 57.4


1850
1900
<-C1
<-C1
FG 1.23%/0.4
Svy @1820.7mMD (1813.4mTVD)
Inc 11.1 Azi 57.4
CLST: olv gry-dk gry,occ brnsh blk,sft-frm,blky,slty l.P.,non-slily calc,Tr micropyr
LS: pl yelsh brn-lt yelsh brn,occ lt gry-wh,frm-mod hd,microxln,arg l.P.,occ lam
Svy @1876.6mMD (1868.3mTVD)
Inc 10.9 Azi 57.2
CLST: olv blk-brnsh blk,sft-frm,blky,slty l.P.,non-v slily calc,Tr micropyr
Svy @1904.2mMD (1895.4mTVD)
Inc 10.9 Azi 57.9
Svy @1931.8mMD (1922.5mTVD)
Inc 10.4 Azi 57.5
MW 1.26 SG



LS: pl yelsh brn-lt yelsh brn,frm-mod hd,microxln,arg I.P.,occ lam

Svy @1958.1mMD (1948.4mTVD)
Inc 10.3 Azi 56.9

Svy @1986.1mMD (1975.9mTVD)
Inc 10.2 Azi 58.2

LS: pl yelsh brn-lt yelsh brn,frm-mod hd,occ v hd, microxln,arg I.P.,occ lam, grad DOL I.P.

CLST: olv gry-olv blk,occ brnsh blk,sft-frm,blky,slty I.P.,non-v slily calc,Tr micropyr

Svy @ 2013.7mMD (2031.1mTVD)
Inc 9.5 Azi 61.0

Svy @ 2040.9mMD (2030.9mTVD)
Inc 9.6 Azi 61.8

CLST: olv gry-olv blk,dk gnsh gry-grysh gn,occ mod yelsh brnsh,sft-frm,blky, slty I.P.,non-v slily calc, Tr micropyr

Svy @ 2068.6mMD (2057.2mTVD)
Inc 10.6 Azi 61.0

MW 1.28 SG

Svy @2095.8mMD (2084.0mTVD)
Inc 10.4 Azi 59.7

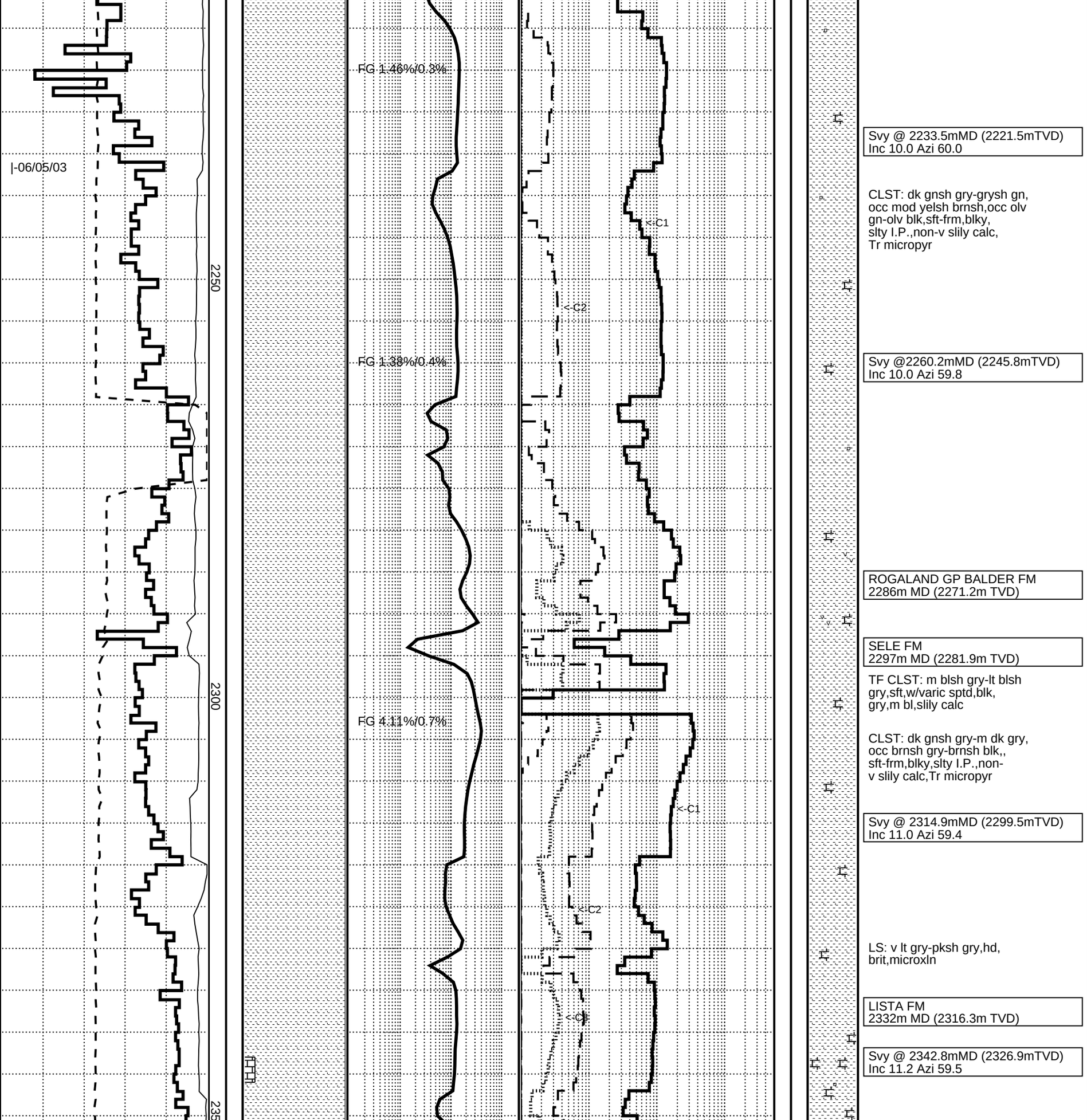
Svy @2123.3mMD (2111.0mTVD)
Inc 10.2 Azi 59.7

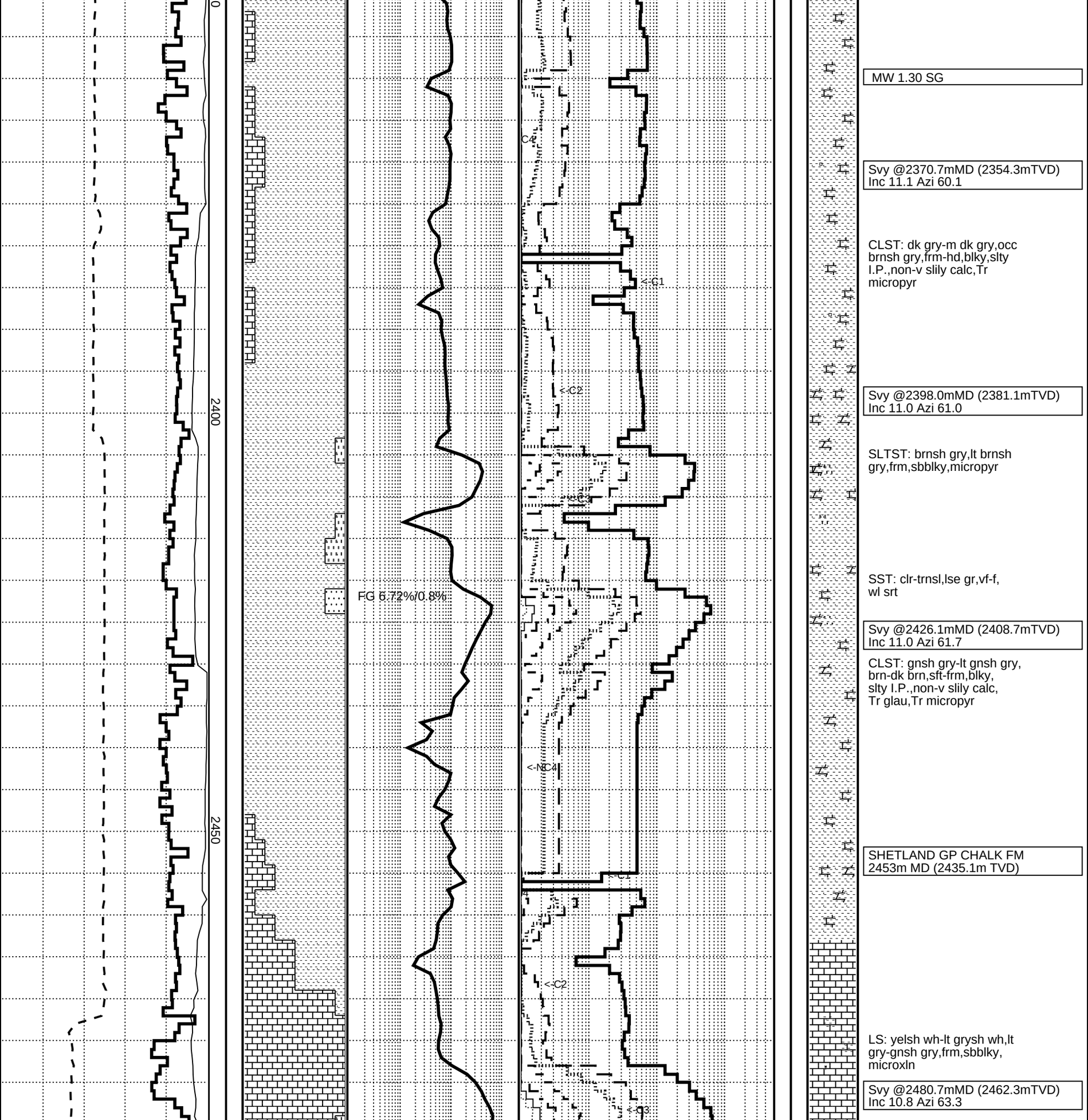
CLST: olv gry-olv blk,dk
gnsh gry-grysh gn,occ mod
yelsh brnsh,sft-frm,blky,
slty I.P.,non-v slily calc,
Tr micropyr

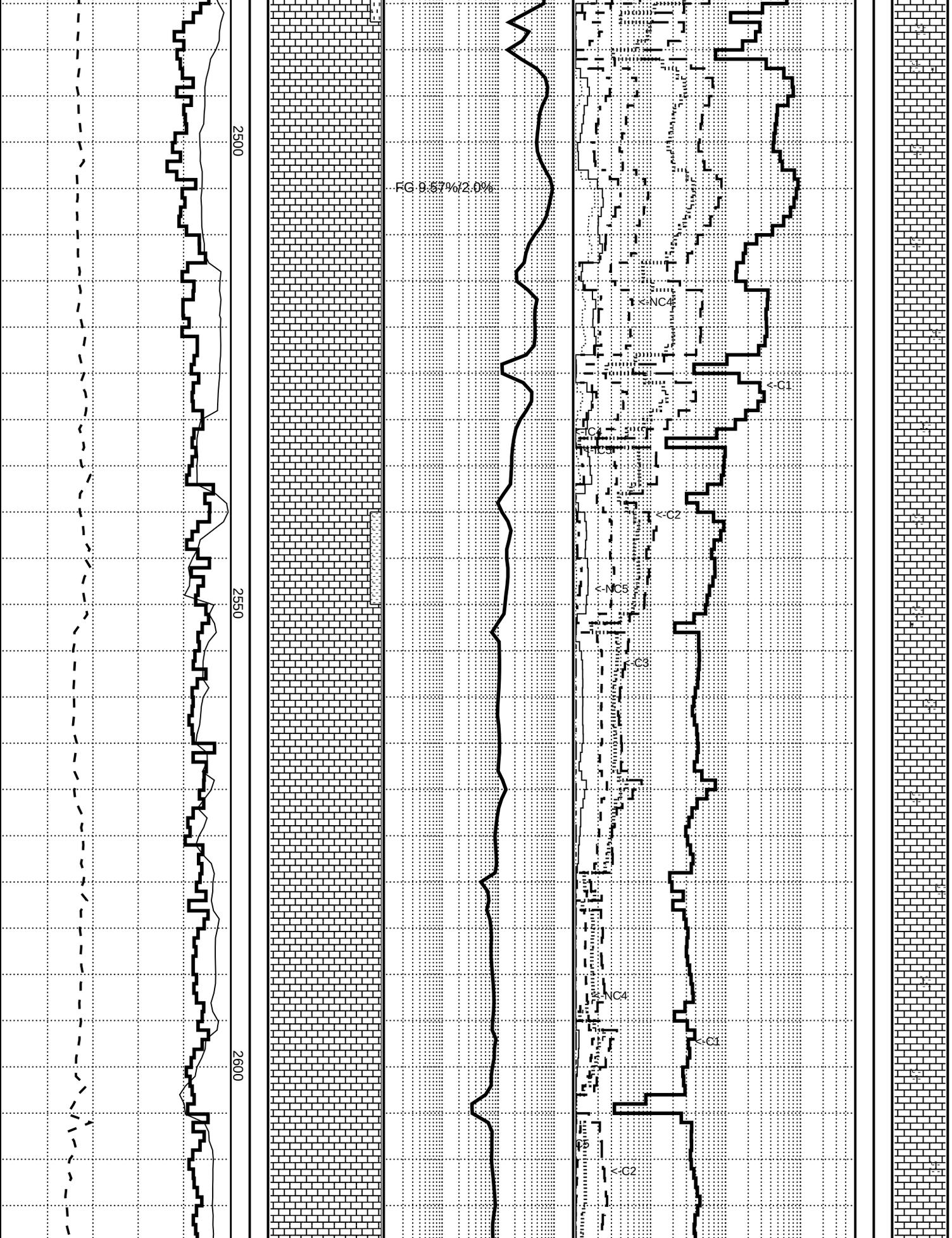
Svy @ 2150.9mMD (2138.2mTVD)
Inc 10.2 Azi 59.5

Svy @ 2178.4mMD (2165.3mTVD)
Inc 10.1 Azi 59.5

Svy @2206.3mMD (2192.7mTVD)
Inc 10.1 Azi 60.0


|-06/05/03
2250
2300
FG 1.46%/0.3%
FG 1.38%/0.4%
FG 4.11%/0.7%
<-C1
<-C2
<-C1
<-C2
<-C3
Svy @ 2233.5mMD (2221.5mTVD)
Inc 10.0 Azi 60.0
CLST: dk gnsh gry-grysh gn,
occ mod yelsh brnsh,occ olv
gn-olv blk,sft-frm,blky,
slty l.P.,non-v slily calc,
Tr micropyr
Svy @2260.2mMD (2245.8mTVD)
Inc 10.0 Azi 59.8
ROGALAND GP BALDER FM
2286m MD (2271.2m TVD)
SELE FM
2297m MD (2281.9m TVD)
TF CLST: m blsh gry-lt blsh
gry,sft,w/varic sptd,blk,
gry,m bl,slily calc
CLST: dk gnsh gry-m dk gry,
occ brnsh gry-brnsh blk,,
sft-frm,blky,slty l.P.,non-
v slily calc,Tr micropyr
Svy @ 2314.9mMD (2299.5mTVD)
Inc 11.0 Azi 59.4
LS: v lt gry-pksh gry,hd,
brit,microxln
LISTA FM
2332m MD (2316.3m TVD)
Svy @ 2342.8mMD (2326.9mTVD)
Inc 11.2 Azi 59.5


2400
2450
FG 6.72%/0.8%
<-C1
<-C2
<-C3
<-NC4
MW 1.30 SG
Svy @2370.7mMD (2354.3mTVD)
Inc 11.1 Azi 60.1
CLST: dk gry-m dk gry,occ
brnsh gry,frm-hd,blky,slty
I.P.,non-v slily calc,Tr
micropyr
Svy @2398.0mMD (2381.1mTVD)
Inc 11.0 Azi 61.0
SLTST: brnsh gry,lt brnsh
gry,frm,sbblky,micropyr
SST: clr-trnsl,lse gr,vf-f,
wl srt
Svy @2426.1mMD (2408.7mTVD)
Inc 11.0 Azi 61.7
CLST: gnsh gry-lt gnsh gry,
brn-dk brn,sft-frm,blky,
slty I.P.,non-v slily calc,
Tr glau,Tr micropyr
SHETLAND GP CHALK FM
2453m MD (2435.1m TVD)
LS: yelsh wh-lt grysh wh,lt
gry-gnsh gry,frm,sbblky,
microxln
Svy @2480.7mMD (2462.3mTVD)
Inc 10.8 Azi 63.3



SLTST: brnsh gry,gnsh gry, frm,sbblky,non calc,Tr Pyr, Tr glauc,grad SST l.P.

Svy @ 2509.8mMD (2490.8mTVD) Inc 11.1 Azi 63.3

Svy @2536.2mMD (2516.7mTVD) Inc 11.1 Azi 63.5

LS: wh-off wh,r pl rd,frm-mod hd,occ v hd,blky, microxln,arg I.P.,r micropyr

CLST: olv gry-olv blk,occ brnsh blk,sft-frm,occ mod hd,blky,slty I.P.,non calc, Tr micropyr

LS: pred pl rd,wh-off wh, frm-mod hd,occ v hd,blky, microxln,arg I.P.

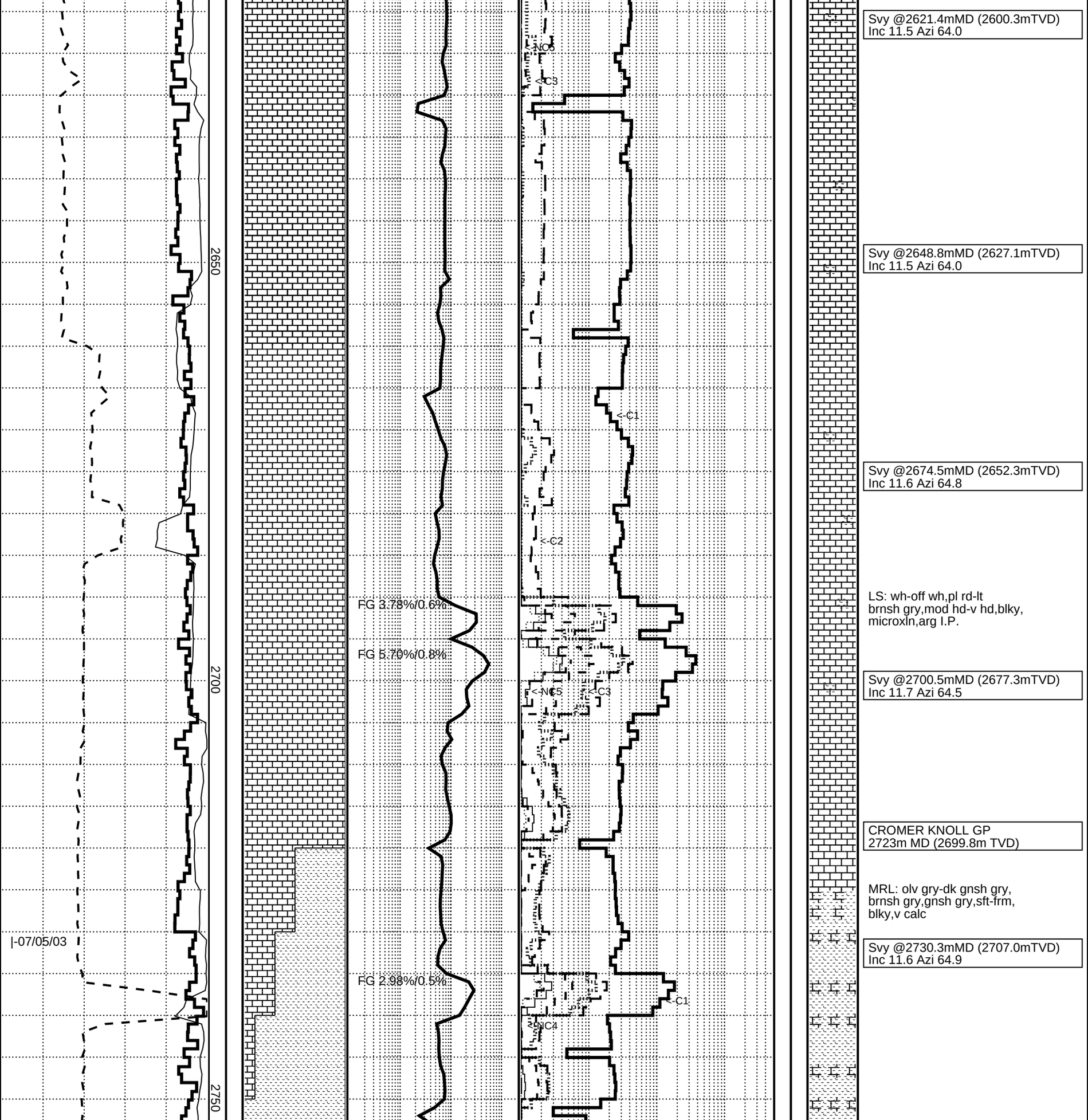
Svy @2565.6mMD (2545.6mTVD) Inc 11.3 Azi 63.9

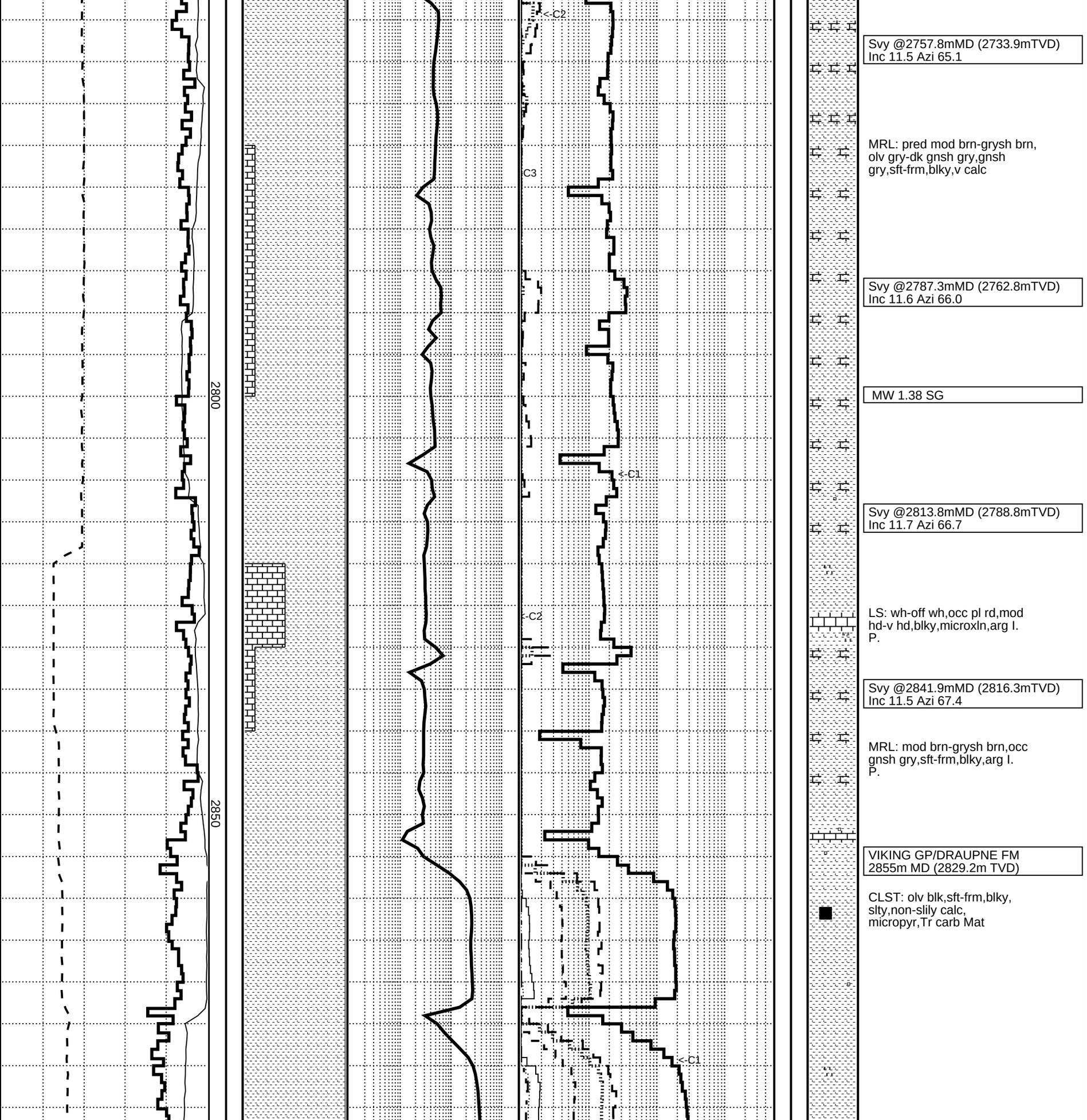
LS: wh-off wh,r pl rd,frm-mod hd,occ v hd,blky, microxln,arg I.P.

MW 1.35 SG

LS: wh-off wh,mod hd-v hd, microxln,arg I.P.

LS: wh-off wh,occ pl rd,mod hd-v hd,blky,microxln,arg I. P.


2650
2700
2750
|-07/05/03
<-NC3
<-C3
<-C1
<-C2
FG 3.78%/0.6%
FG 5.70%/0.8%
<-NC5
<-C3
FG 2.98%/0.5%
<-C1
<-NC4
Svy @2621.4mMD (2600.3mTVD)
Inc 11.5 Azi 64.0
Svy @2648.8mMD (2627.1mTVD)
Inc 11.5 Azi 64.0
Svy @2674.5mMD (2652.3mTVD)
Inc 11.6 Azi 64.8
LS: wh-off wh,pl rd-lt
brnsh gry,mod hd-v hd,blky,
microxln,arg I.P.
Svy @2700.5mMD (2677.3mTVD)
Inc 11.7 Azi 64.5
CROMER KNOLL GP
2723m MD (2699.8m TVD)
MRL: olv gry-dk gnsh gry,
brnsh gry,gnsh gry,sft-frm,
blky,v calc
Svy @2730.3mMD (2707.0mTVD)
Inc 11.6 Azi 64.9



Svy @2757.8mMD (2733.9mTVD)
Inc 11.5 Azi 65.1

MRL: pred mod brn-grysh brn, olv gry-dk gnsh gry,gnsh gry,sft-frm,blky,v calc

Svy @2787.3mMD (2762.8mTVD)
Inc 11.6 Azi 66.0

MW 1.38 SG

Svy @2813.8mMD (2788.8mTVD)
Inc 11.7 Azi 66.7

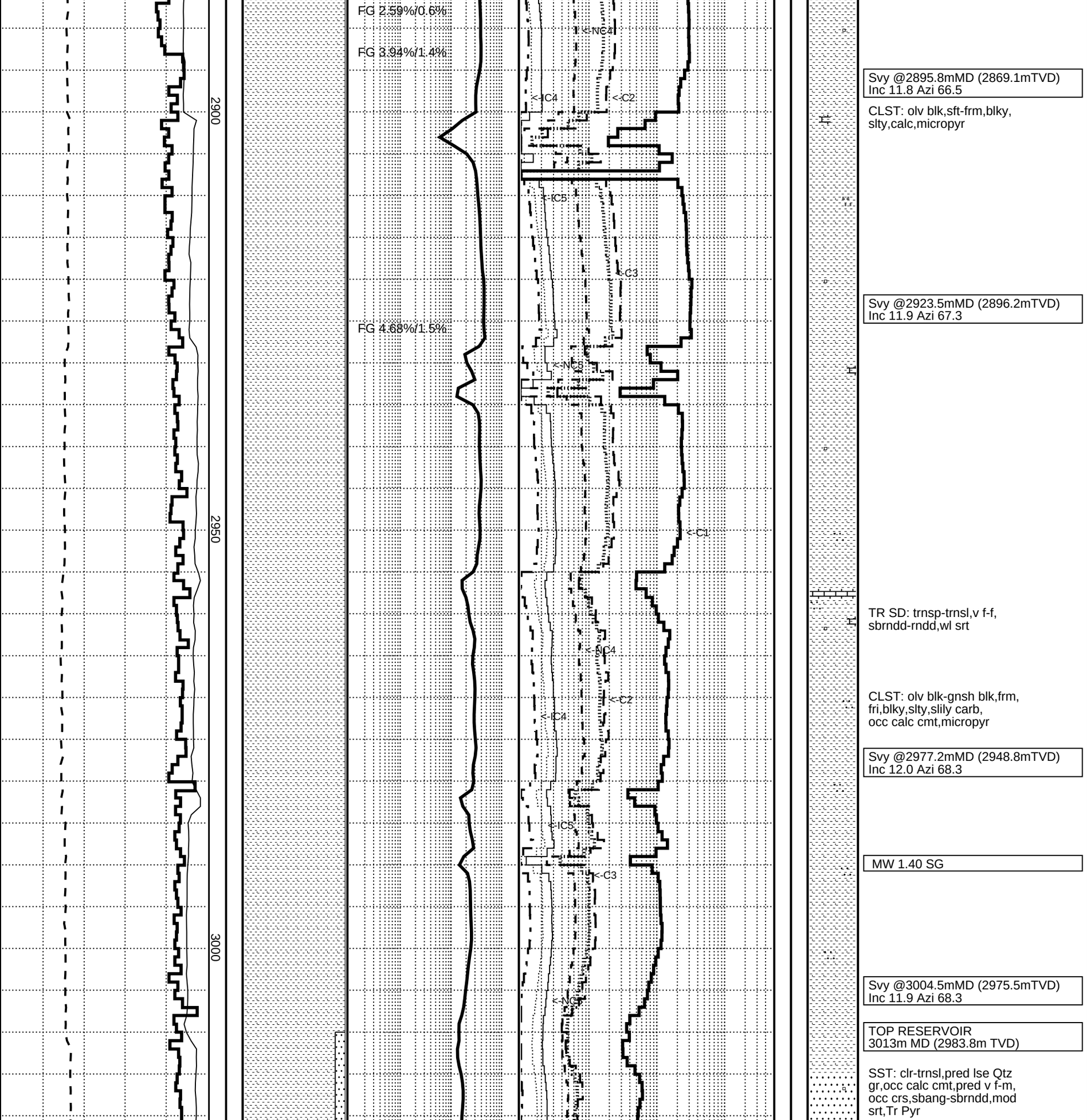
LS: wh-off wh,occ pl rd,mod hd-v hd,blky,microxln,arg l. P.

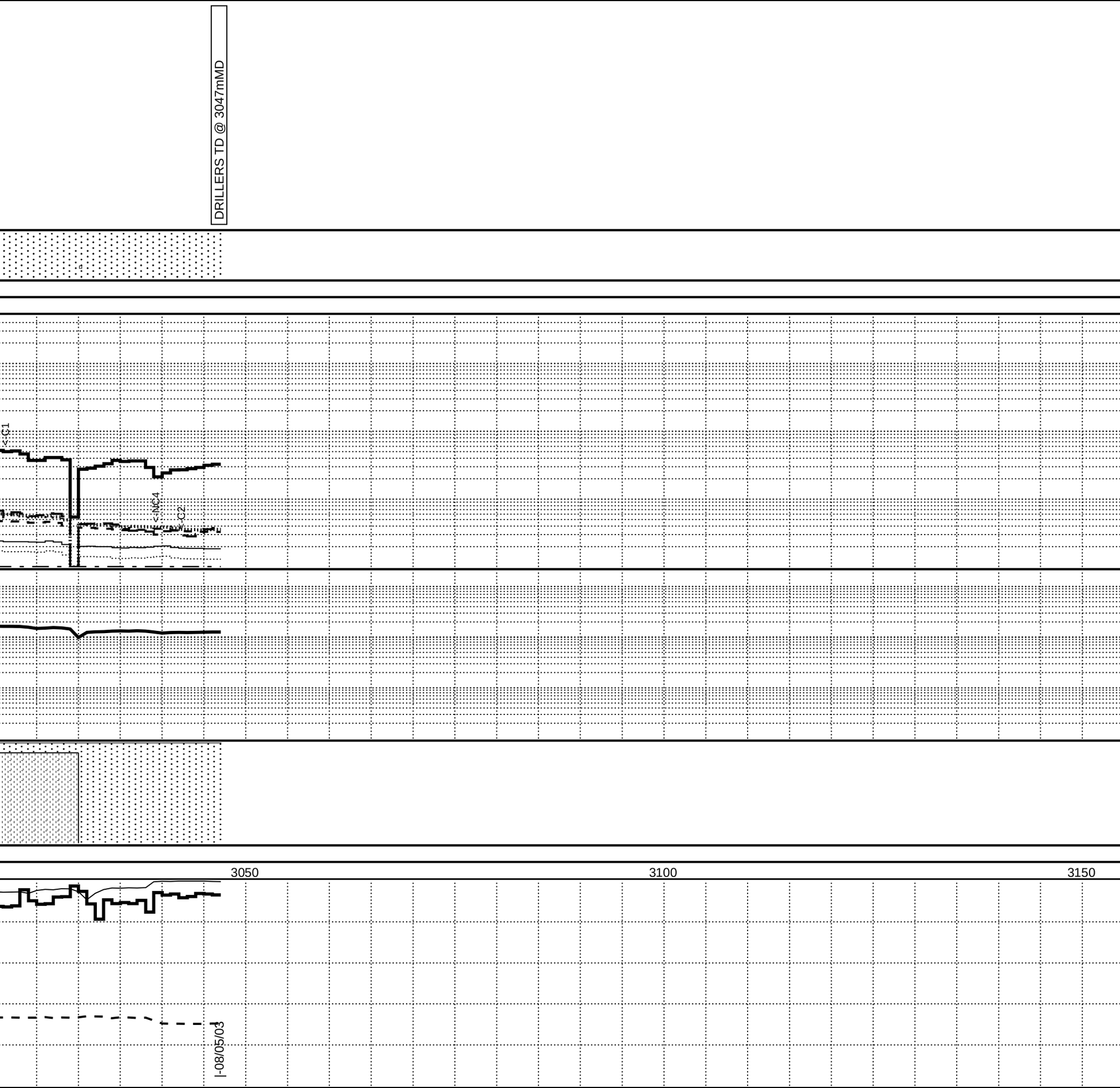
Svy @2841.9mMD (2816.3mTVD)
Inc 11.5 Azi 67.4

MRL: mod brn-grysh brn,occ gnsh gry,sft-frm,blky,arg l. P.

VIKING GP/DRAUPNE FM
2855m MD (2829.2m TVD)

CLST: olv blk,sft-frm,blky, slty,non-slily calc, micropyr,Tr carb Mat


2900
2950
3000
FG 2.59%/0.6%
FG 3.94%/1.4%
FG 4.68%/1.5%
<-NC4
<-IC4
<-C2
<-IC5
<-C3
<-NC5
<-C1
<-IC4
<-C2
<-IC4
<-IC5
<-C3
<-NC5
Svy @2895.8mMD (2869.1mTVD)
Inc 11.8 Azi 66.5
CLST: olv blk,sft-frm,blky,
slty,calc,micropyr
Svy @2923.5mMD (2896.2mTVD)
Inc 11.9 Azi 67.3
TR SD: trnsp-trnsl,v f-f,
sbrndd-rndd,wl srt
CLST: olv blk-gnsh blk,frm,
fri,blky,slty,slily carb,
occ calc cmt,micropyr
Svy @2977.2mMD (2948.8mTVD)
Inc 12.0 Azi 68.3
MW 1.40 SG
Svy @3004.5mMD (2975.5mTVD)
Inc 11.9 Azi 68.3
TOP RESERVOIR
3013m MD (2983.8m TVD)
SST: clr-trnsl,pred lse Qtz
gr,occ calc cmt,pred v f-m,
occ crs,sbang-sbrndd,mod
srt,Tr Pyr


DRILLERS TD @ 3047mMD
<iC1
<nC4
iC2
3050
3100
3150
|-08/05/03

BAKER HUGHES
INTEQ

FORMATION EVALUATION LOG
PERTRA AS : 15/12-13A

SCALE: 1 : 500

PENETRATION RATE (m/hr)
160 120 80 40
WEIGHT ON BIT (tonnes)
40 30 20 10
DRILL STRING RPM (RPM)
160 120 80 40

DEPTH (mMD) | CORE | CUTTINGS LITHOLOGY | AVG. DITCH GAS (%) 0.01 0.1 1 10 20 | METHANE (ppm) | ETHANE (ppm) | PROPANE (ppm) | I-BUTANE (ppm) | N-BUTANE (ppm) | I-PENTANE (ppm) | N-PENTANE (ppm) 1k 10k 100k | OIL SHOWS | CUT FLUORESCENCE | INTERPRETED LITHOLOGY | REMARKS / DESCRIPTIONS

|-11/05/03

NB#6 DBS FM2843
12 1/4", Jets 4x12, 4x14
In at 1352m
Drilled 37m cement
in 3.0 hrs
Drilled 1180m in 32.1 hrs
0-0-CT-G-X-I-PN-HP

1350
1400
1450

<-C1
<-C1

Kick off @ 1352m MD

CLST: brnsh blk-olv blk, pred sft,occ frm,blky,slty I.P,non-slily calc

Svy @ 1377.9mMD (1377.7mTVD)
Inc 3.9 Azi 187.9

MW: 1.45 SG

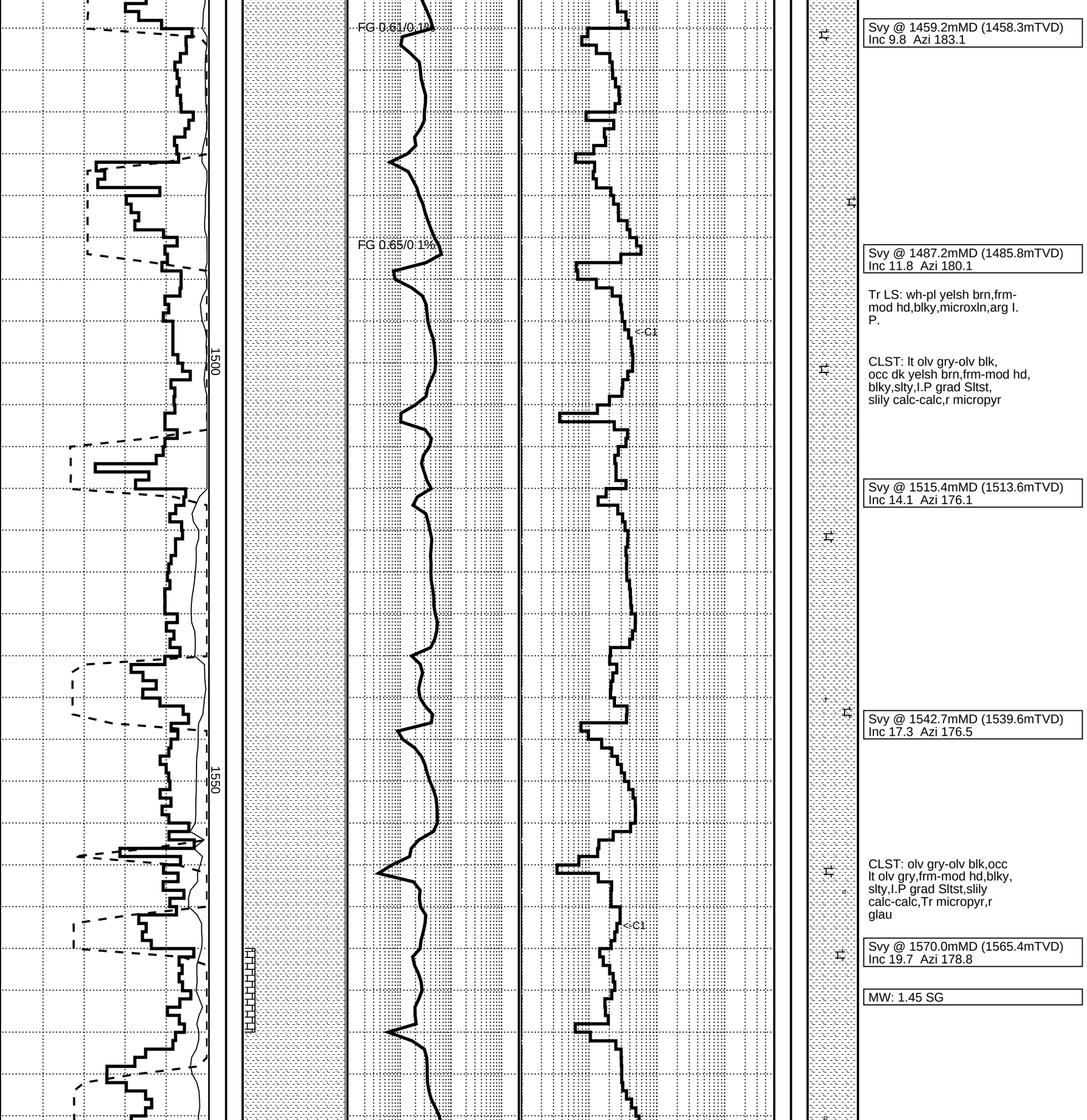
Tr LS: wh-pl yelsh brn,frm-mod hd,blky,microxln,arg I. P.

Svy @ 1404.9mMD (1404.5mTVD)
Inc 6.5 Azi 188.8

CLST: brnsh blk-olv blk,dk yelsh brn,frm,occ sft,blky, slty I.P,slily calc,r micropyr

Svy @ 1432.6mMD (1432.0mTVD)
Inc 8.3 Azi 190.4

CLST: olv gry-olv blk,occ brnsh blk, occ dk yelsh brn, frm,occ sft,blky,slty I.P, non-slily calc



Svy @ 1459.2mMD (1458.3mTVD)
Inc 9.8 Azi 183.1

Svy @ 1487.2mMD (1485.8mTVD)
Inc 11.8 Azi 180.1

Tr LS: wh-pl yelsh brn,frm-mod hd,blky,microxln,arg I. P.

CLST: lt olv gry-olv blk, occ dk yelsh brn,frm-mod hd, blky,slty,I.P grad Sltst, slily calc-calc,r micropyr

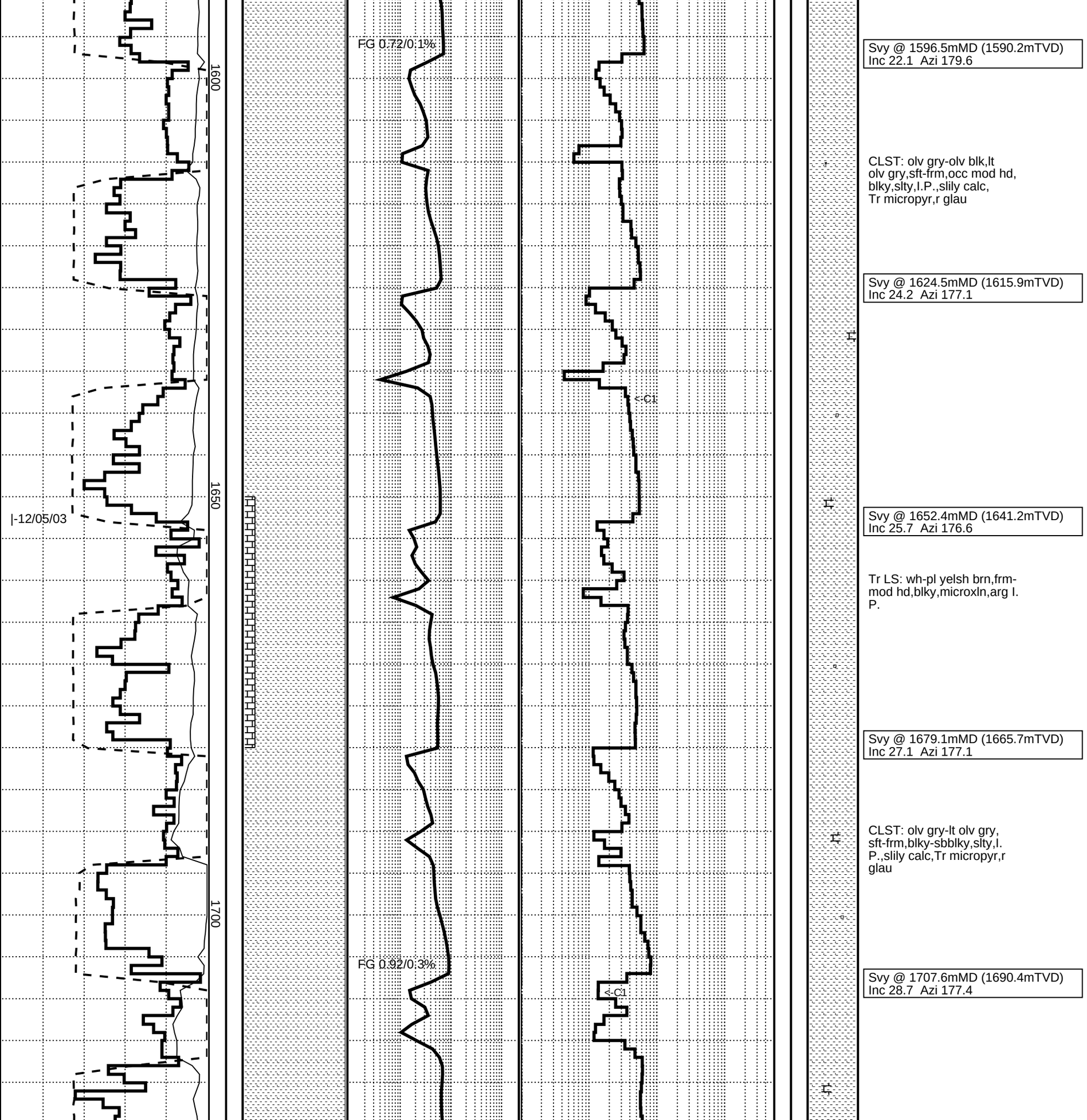
Svy @ 1515.4mMD (1513.6mTVD)
Inc 14.1 Azi 176.1

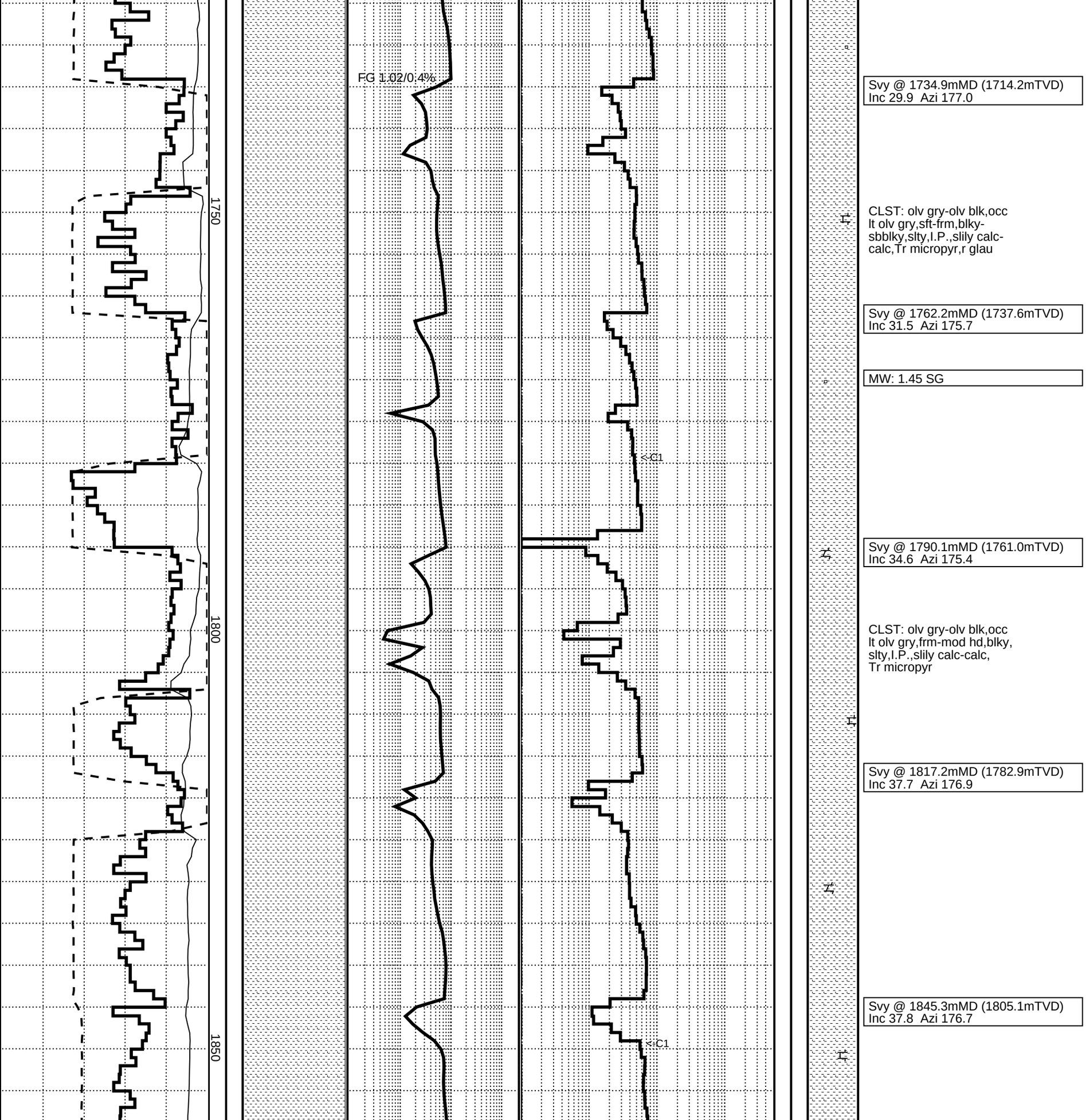
Svy @ 1542.7mMD (1539.6mTVD)
Inc 17.3 Azi 176.5

CLST: olv gry-olv blk,occ lt olv gry,frm-mod hd,blky, slty,I.P grad Sltst,slily calc-calc,Tr micropyr,r glau

Svy @ 1570.0mMD (1565.4mTVD)
Inc 19.7 Azi 178.8

MW: 1.45 SG


1600
1650
1700
|-12/05/03
FG 0.72/0.1%
<-C1
FG 0.92/0.3%
<-C1
Svy @ 1596.5mMD (1590.2mTVD)
Inc 22.1 Azi 179.6
CLST: olv gry-olv blk,lt olv gry,sft-frm,occ mod hd, blky,slty,I.P.,slily calc, Tr micropyr,r glau
Svy @ 1624.5mMD (1615.9mTVD)
Inc 24.2 Azi 177.1
Svy @ 1652.4mMD (1641.2mTVD)
Inc 25.7 Azi 176.6
Tr LS: wh-pl yelsh brn,frm-mod hd,blky,microxln,arg I. P.
Svy @ 1679.1mMD (1665.7mTVD)
Inc 27.1 Azi 177.1
CLST: olv gry-lt olv gry, sft-frm,blky-sbblky,slty,I. P.,slily calc,Tr micropyr,r glau
Svy @ 1707.6mMD (1690.4mTVD)
Inc 28.7 Azi 177.4



Svy @ 1734.9mMD (1714.2mTVD)
Inc 29.9 Azi 177.0

CLST: olv gry-olv blk,occ
lt olv gry,sft-frm,blky-
sbblky,slty,I.P.,slily calc-
calc,Tr micropyr,r glau

Svy @ 1762.2mMD (1737.6mTVD)
Inc 31.5 Azi 175.7

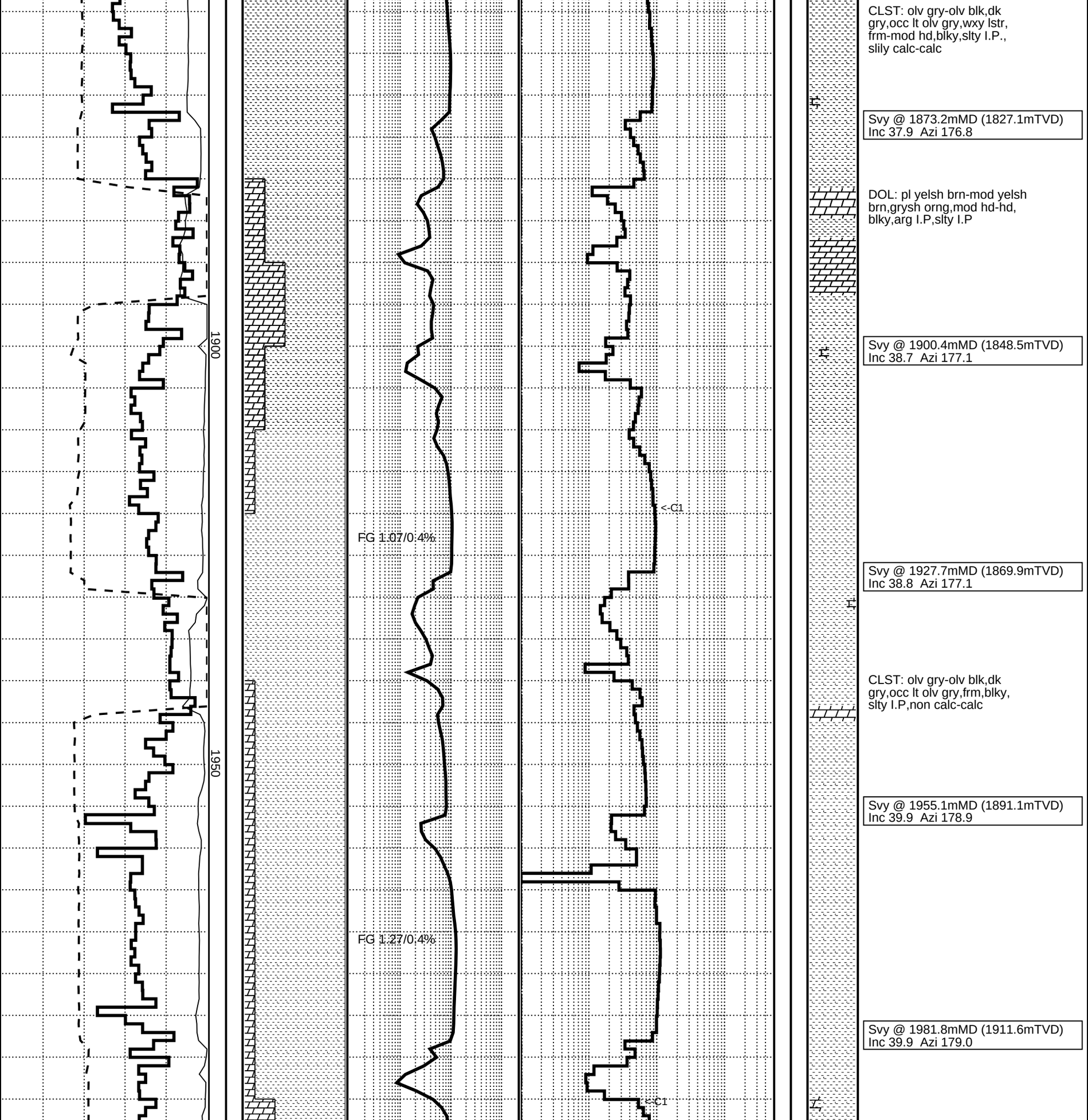
MW: 1.45 SG

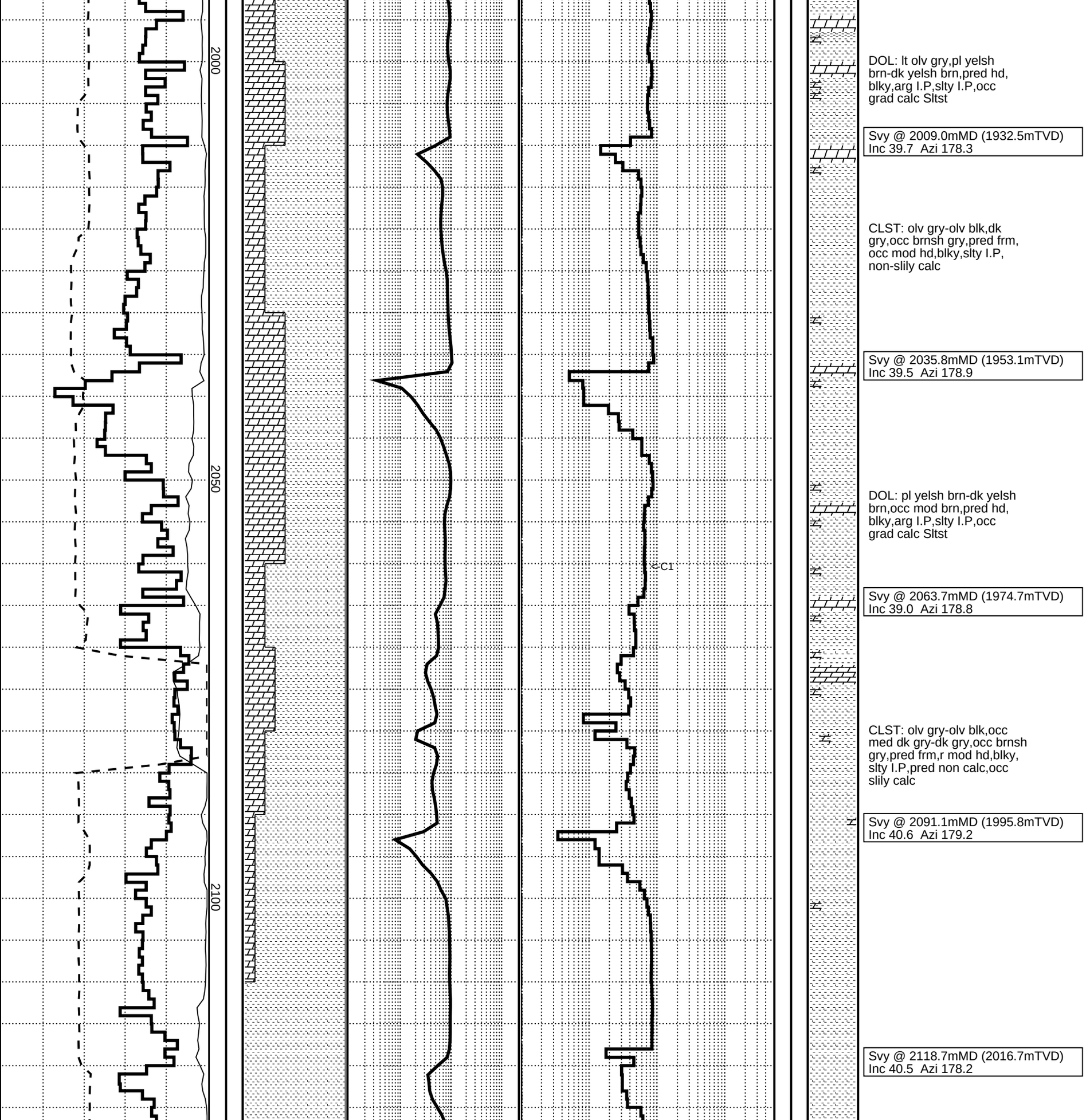
Svy @ 1790.1mMD (1761.0mTVD)
Inc 34.6 Azi 175.4

CLST: olv gry-olv blk,occ
lt olv gry,frm-mod hd,blky,
slty,I.P.,slily calc-calc,
Tr micropyr

Svy @ 1817.2mMD (1782.9mTVD)
Inc 37.7 Azi 176.9

Svy @ 1845.3mMD (1805.1mTVD)
Inc 37.8 Azi 176.7


1900
1950
FG 1.07/0.4%
FG 1.27/0.4%
<-C1
<-C1
CLST: olv gry-olv blk,dk gry,occ lt olv gry,wxy lstr, frm-mod hd,blky,slty I.P., slily calc-calc
Svy @ 1873.2mMD (1827.1mTVD) Inc 37.9 Azi 176.8
DOL: pl yelsh brn-mod yelsh brn,grysh orng,mod hd-hd, blky,arg I.P,slty I.P
Svy @ 1900.4mMD (1848.5mTVD) Inc 38.7 Azi 177.1
Svy @ 1927.7mMD (1869.9mTVD) Inc 38.8 Azi 177.1
CLST: olv gry-olv blk,dk gry,occ lt olv gry,frm,blky, slty I.P,non calc-calc
Svy @ 1955.1mMD (1891.1mTVD) Inc 39.9 Azi 178.9
Svy @ 1981.8mMD (1911.6mTVD) Inc 39.9 Azi 179.0



DOL: lt olv gry,pl yelsh brn-dk yelsh brn,pred hd, blky,arg l.P,slty l.P,occ grad calc Sltst

Svy @ 2009.0mMD (1932.5mTVD)
Inc 39.7 Azi 178.3

CLST: olv gry-olv blk,dk gry,occ brnsh gry,pred frm, occ mod hd,blky,slty l.P, non-slily calc

Svy @ 2035.8mMD (1953.1mTVD)
Inc 39.5 Azi 178.9

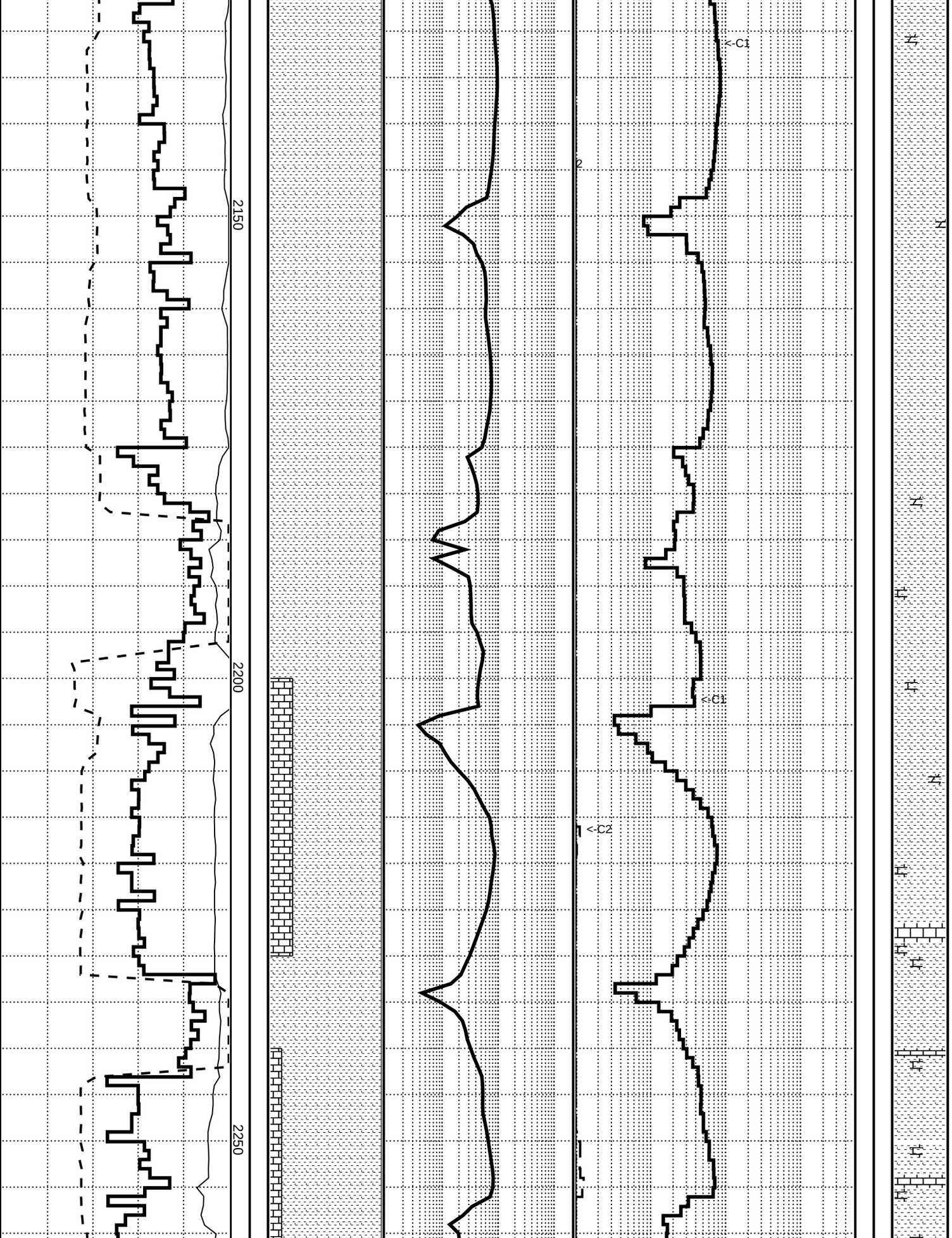
DOL: pl yelsh brn-dk yelsh brn,occ mod brn,pred hd, blky,arg l.P,slty l.P,occ grad calc Sltst

Svy @ 2063.7mMD (1974.7mTVD)
Inc 39.0 Azi 178.8

CLST: olv gry-olv blk,occ med dk gry-dk gry,occ brnsh gry,pred frm,r mod hd,blky, slty l.P,pred non calc,occ slily calc

Svy @ 2091.1mMD (1995.8mTVD)
Inc 40.6 Azi 179.2

Svy @ 2118.7mMD (2016.7mTVD)
Inc 40.5 Azi 178.2



Svy @ 2145.8mMD (2037.4mTVD)
Inc 40.3 Azi 178.1

CLST: olv gry-olv blk,dsky blsh gn-med blsh gry,dk gnsh gry,pred frm,r mod hd, blky,slty l.P,pred non calc

Svy @ 2175.0mMD (2059.7mTVD)
Inc 40.0 Azi 177.9

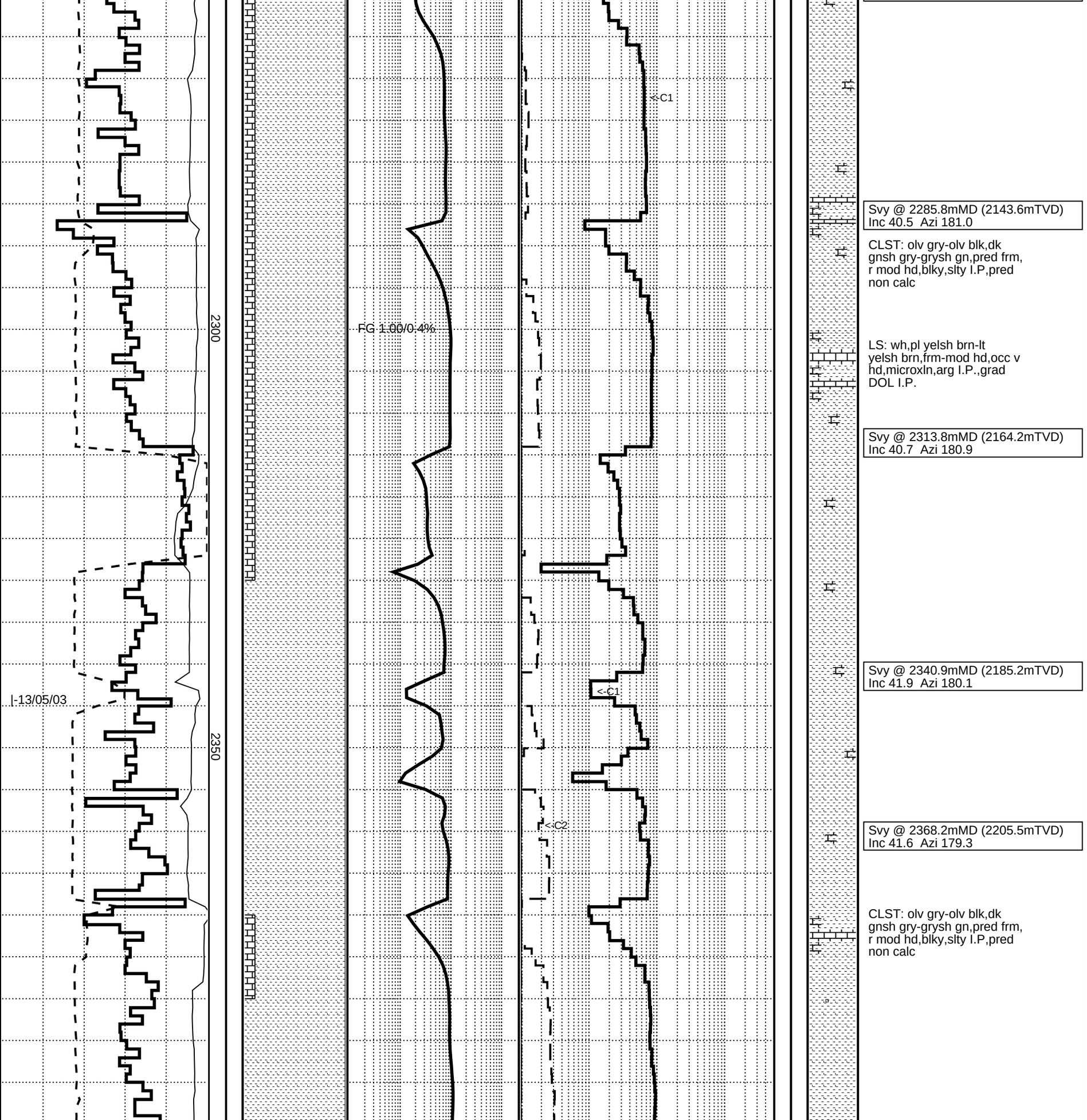
Svy @ 2202.8mMD (2080.8mTVD)
Inc 41.2 Azi 180.1

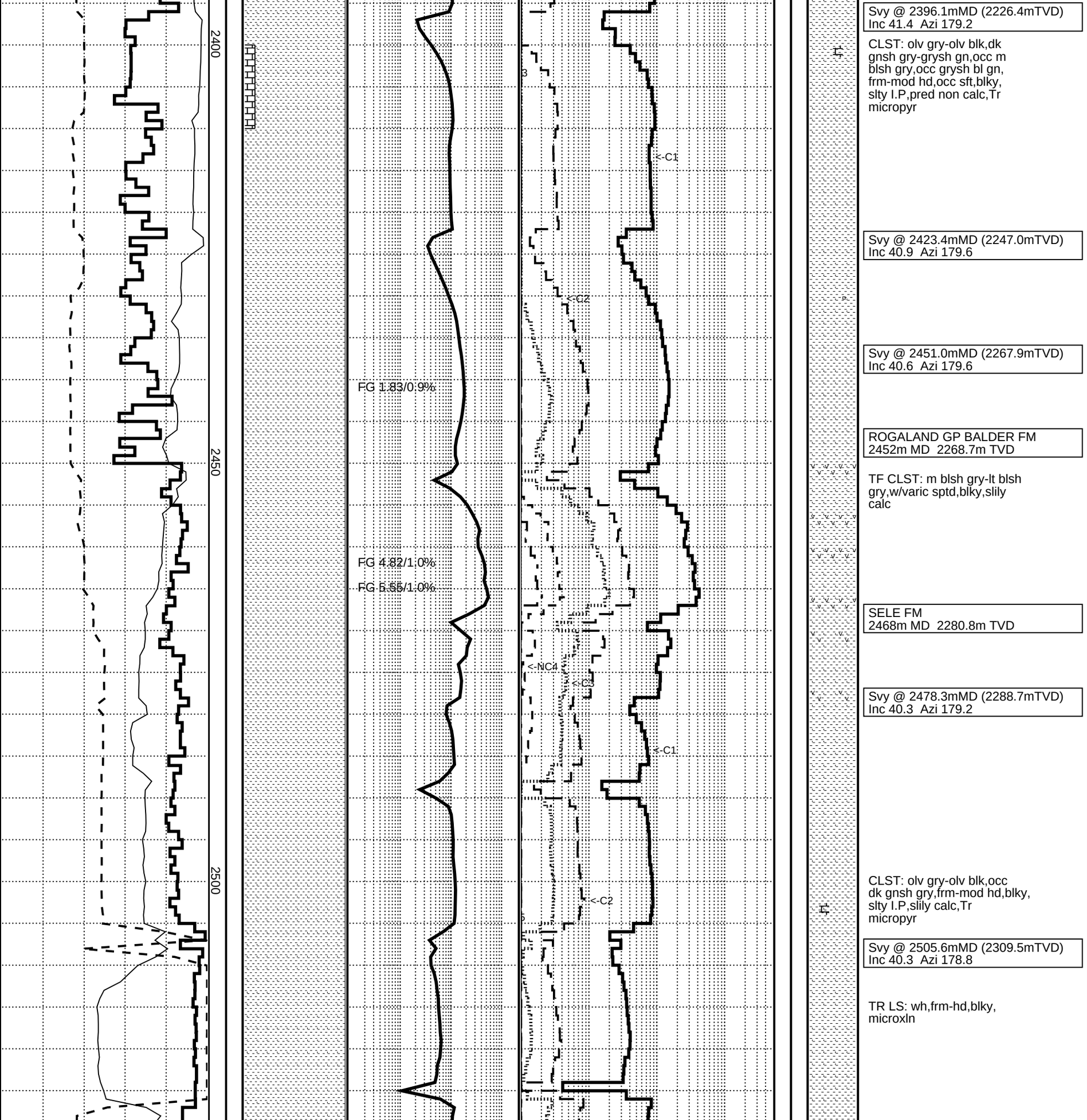
LS: wh,pl yelsh brn-lt yelsh brn,frm-mod hd,occ v hd,microxln,arg l.P.,grad DOL l.P.

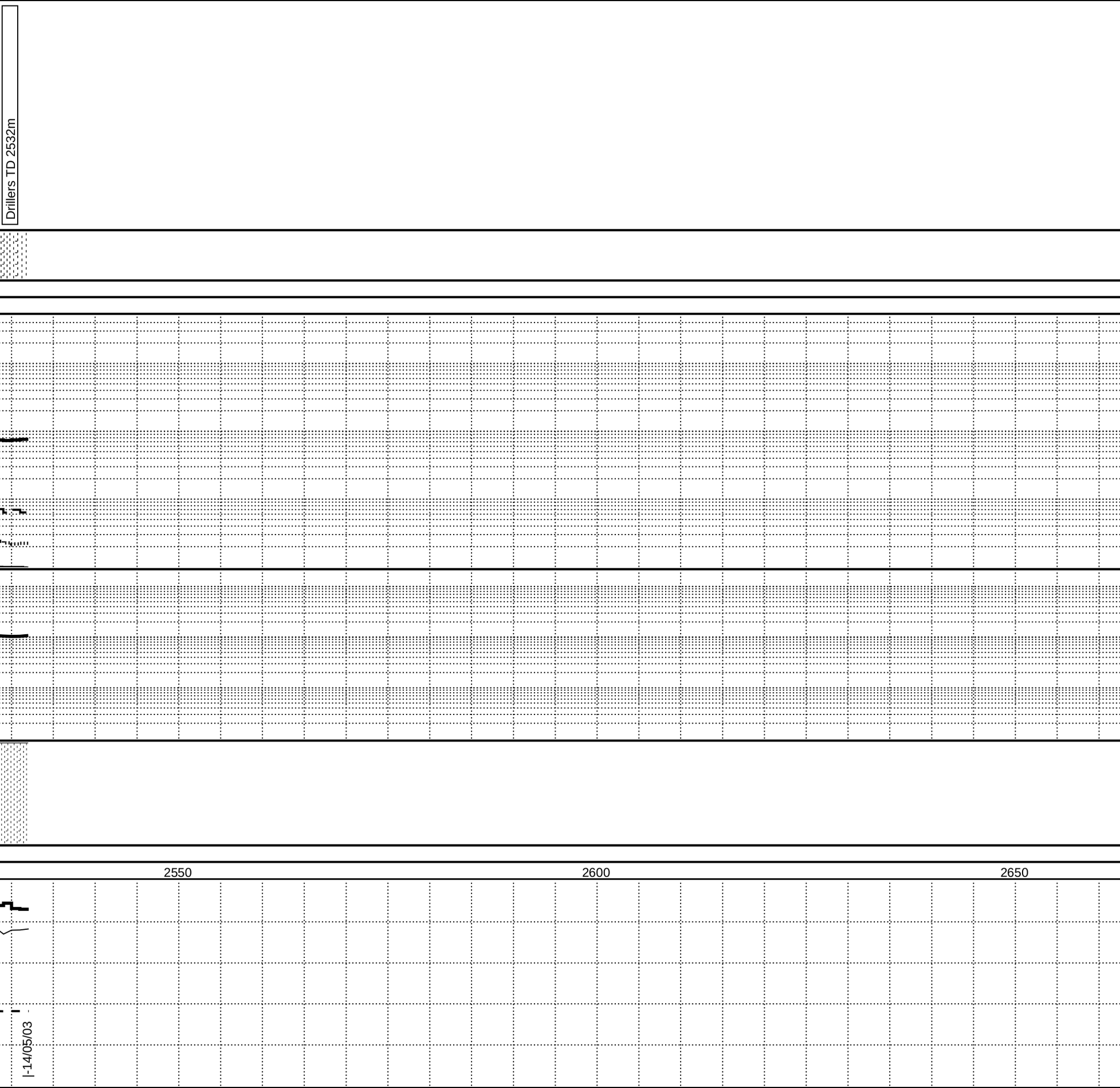
CLST: olv gry-olv blk,dk gnsh gry-grysh gn,pred frm, r mod hd,blky,slty l.P,pred non calc

Svy @ 2230.6mMD (2101.8mTVD)
Inc 40.8 Azi 180.3

Svy @ 2258.5mMD (2122.9mTVD)
Inc 41.1 Azi 181.0


2300
2350
|-13/05/03
FG 1.00/0.4%
<-C1
<-C1
<-C2
Svy @ 2285.8mMD (2143.6mTVD)
Inc 40.5 Azi 181.0
CLST: olv gry-olv blk,dk
gnsh gry-grysh gn,pred frm,
r mod hd,blky,slty l.P,pred
non calc
LS: wh,pl yelsh brn-lt
yelsh brn,frm-mod hd,occ v
hd,microxln,arg l.P.,grad
DOL l.P.
Svy @ 2313.8mMD (2164.2mTVD)
Inc 40.7 Azi 180.9
Svy @ 2340.9mMD (2185.2mTVD)
Inc 41.9 Azi 180.1
Svy @ 2368.2mMD (2205.5mTVD)
Inc 41.6 Azi 179.3
CLST: olv gry-olv blk,dk
gnsh gry-grysh gn,pred frm,
r mod hd,blky,slty l.P,pred
non calc


2400
2450
2500
FG 1.83/0.9%
FG 4.82/1.0%
FG 5.55/1.0%
<-C1
<-C2
<-NC4
<-C3
<-C1
<-C2
Svy @ 2396.1mMD (2226.4mTVD)
Inc 41.4 Azi 179.2
CLST: olv gry-olv blk,dk gnsh gry-grysh gn,occ m blsh gry,occ grysh bl gn, frm-mod hd,occ sft,blky, slty I.P,pred non calc,Tr micropyr
Svy @ 2423.4mMD (2247.0mTVD)
Inc 40.9 Azi 179.6
Svy @ 2451.0mMD (2267.9mTVD)
Inc 40.6 Azi 179.6
ROGALAND GP BALDER FM
2452m MD 2268.7m TVD
TF CLST: m blsh gry-lt blsh gry,w/varic sptd,blky,slily calc
SELE FM
2468m MD 2280.8m TVD
Svy @ 2478.3mMD (2288.7mTVD)
Inc 40.3 Azi 179.2
CLST: olv gry-olv blk,occ dk gnsh gry,frm-mod hd,blky, slty I.P,slily calc,Tr micropyr
Svy @ 2505.6mMD (2309.5mTVD)
Inc 40.3 Azi 178.8
TR LS: wh,frm-hd,blky, microxln


Drillers TD 2532m
2550
2600
2650
14/05/03

BAKER HUGHES
INTEQ

FORMATION EVALUATION LOG
PERTRA AS : 15/12-13 B

SCALE: 1 : 500

PENETRATION RATE (m/hr)
160 120 80 40
WEIGHT ON BIT (tonnes)
40 30 20 10
DRILL STRING RPM (RPM)
160 120 80 40

DEPTH (mMD) | CORE | CUTTINGS LITHOLOGY | AVG. DITCH GAS (%) 0.01 0.1 1 10 20 | METHANE (ppm) ETHANE (ppm) PROPANE (ppm) I-BUTANE (ppm) N-BUTANE (ppm) I-PENTANE (ppm) N-PENTANE (ppm) 1k 10k 100k | OIL SHOWS | CUT FLUORESCENCE | INTERPRETED LITHOLOGY | REMARKS / DESCRIPTIONS

NB#7 RR1 DB3 FM 2843
12 1/4",Jets 4x12, 4x14
In at 1348
Drilled 64m cement
in 3 hrs
Drilled 1308m in 36.9
hrs
1-2-CT-S-X-I-PN-RIG

1350
1400
1450

FG 0.5/0.3%
FG 0.5/0.2%
<-C1
<-C1

Kick off @ 1348m MD

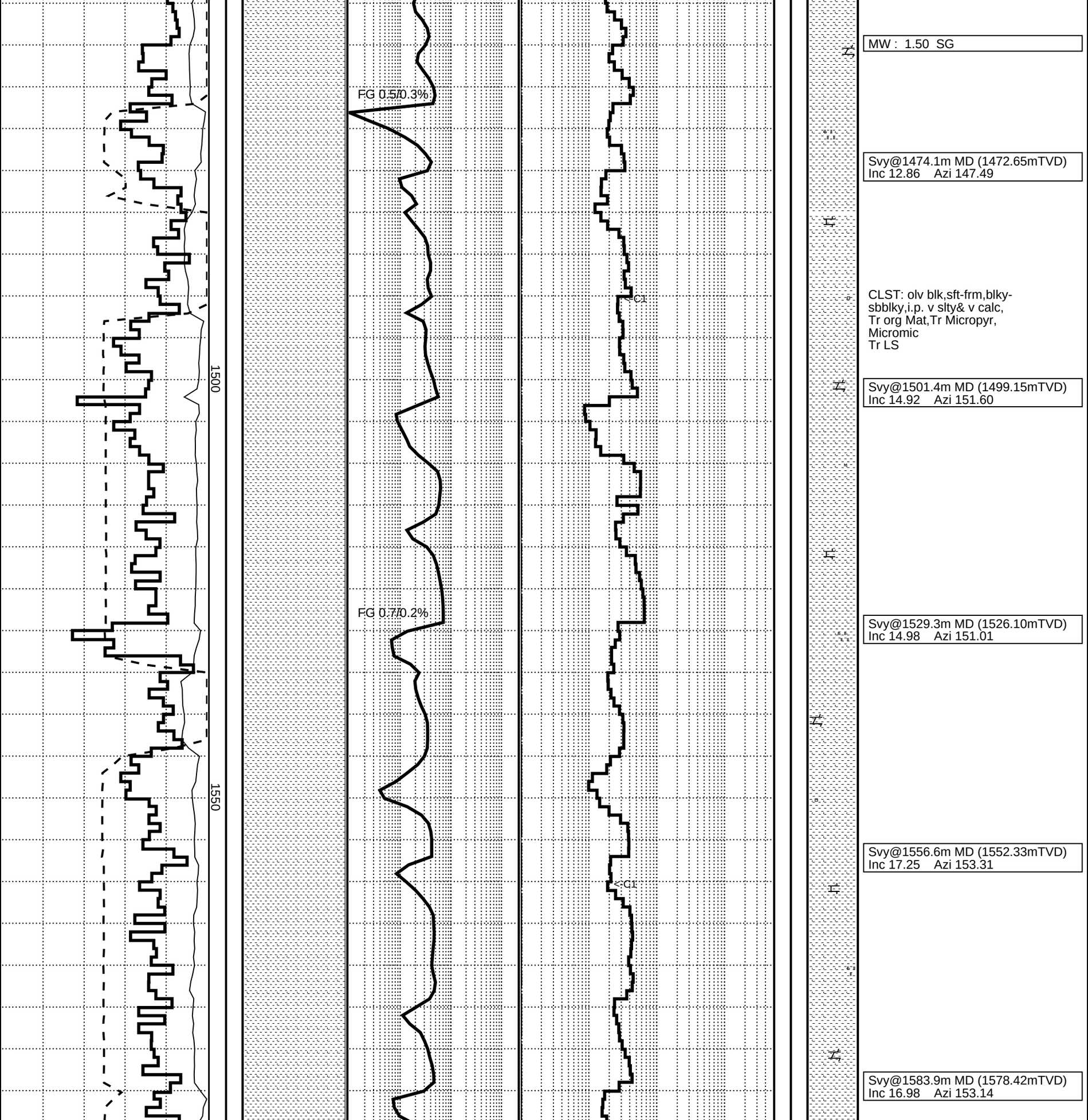
CLST: olv blk,sft-frm,blky-sbblky,Tr org Mat,Tr Micropyr

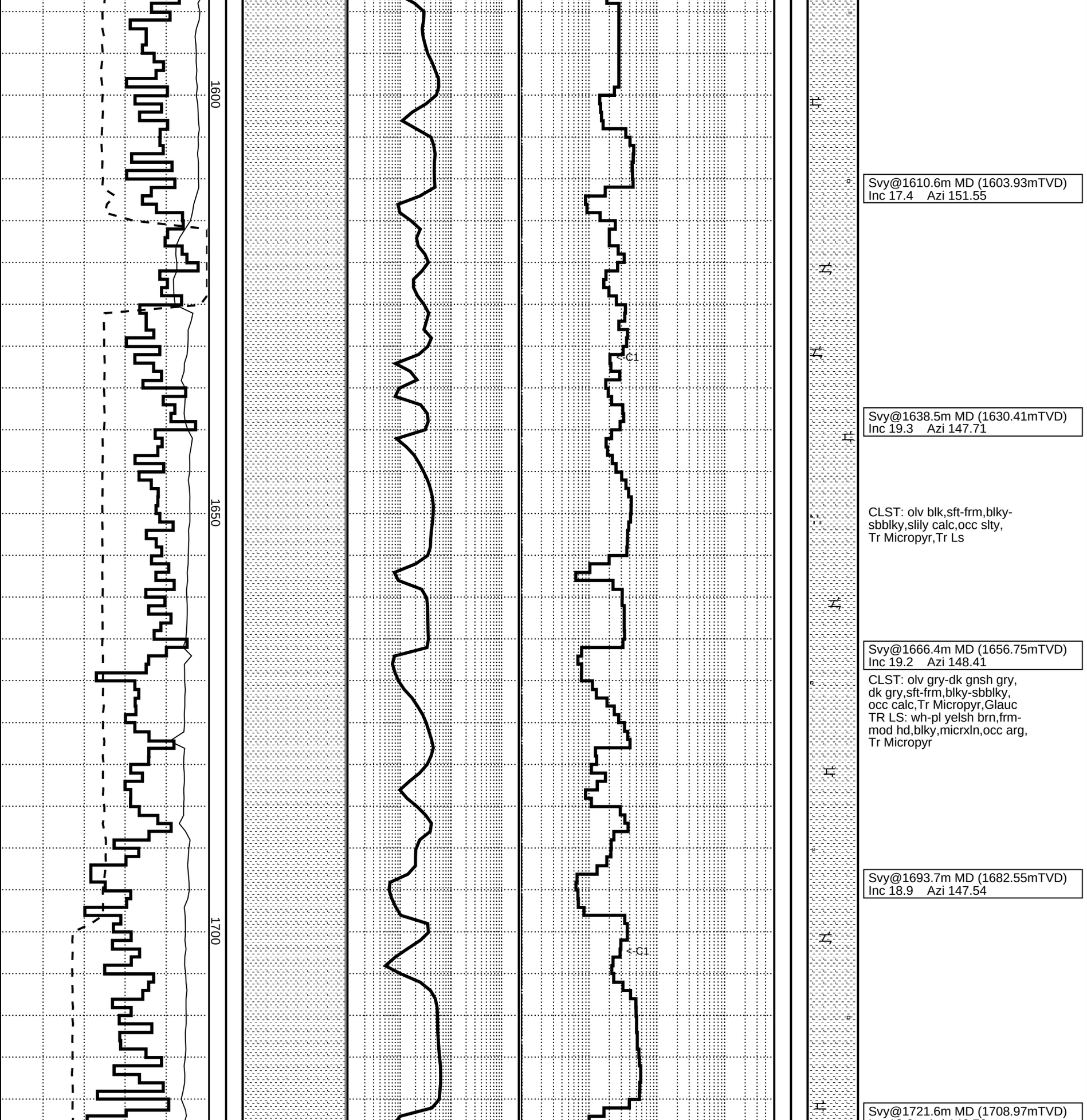
Svy@1365.0m MD (1364.77mTVD)
Inc 3.96 Azi 135.38

Svy@1391.6m MD (1391.25mTVD)
Inc 6.56 Azi 133.38

Svy@1419.5m MD (1418.93mTVD)
Inc 8.03 Azi 139.24

Svy@1446.8m MD (1445.89mTVD)
Inc 9.95 Azi 142.69


1500
1550
FG 0.5/0.3%
FG 0.7/0.2%
C1
C1
MW : 1.50 SG
Svy@1474.1m MD (1472.65mTVD)
Inc 12.86 Azi 147.49
CLST: olv blk,sft-frm,blky-
sbblky,i.p. v slty& v calc,
Tr org Mat,Tr Micropyr,
Micromic
Tr LS
Svy@1501.4m MD (1499.15mTVD)
Inc 14.92 Azi 151.60
Svy@1529.3m MD (1526.10mTVD)
Inc 14.98 Azi 151.01
Svy@1556.6m MD (1552.33mTVD)
Inc 17.25 Azi 153.31
Svy@1583.9m MD (1578.42mTVD)
Inc 16.98 Azi 153.14



Svy@1610.6m MD (1603.93mTVD)
Inc 17.4 Azi 151.55

Svy@1638.5m MD (1630.41mTVD)
Inc 19.3 Azi 147.71

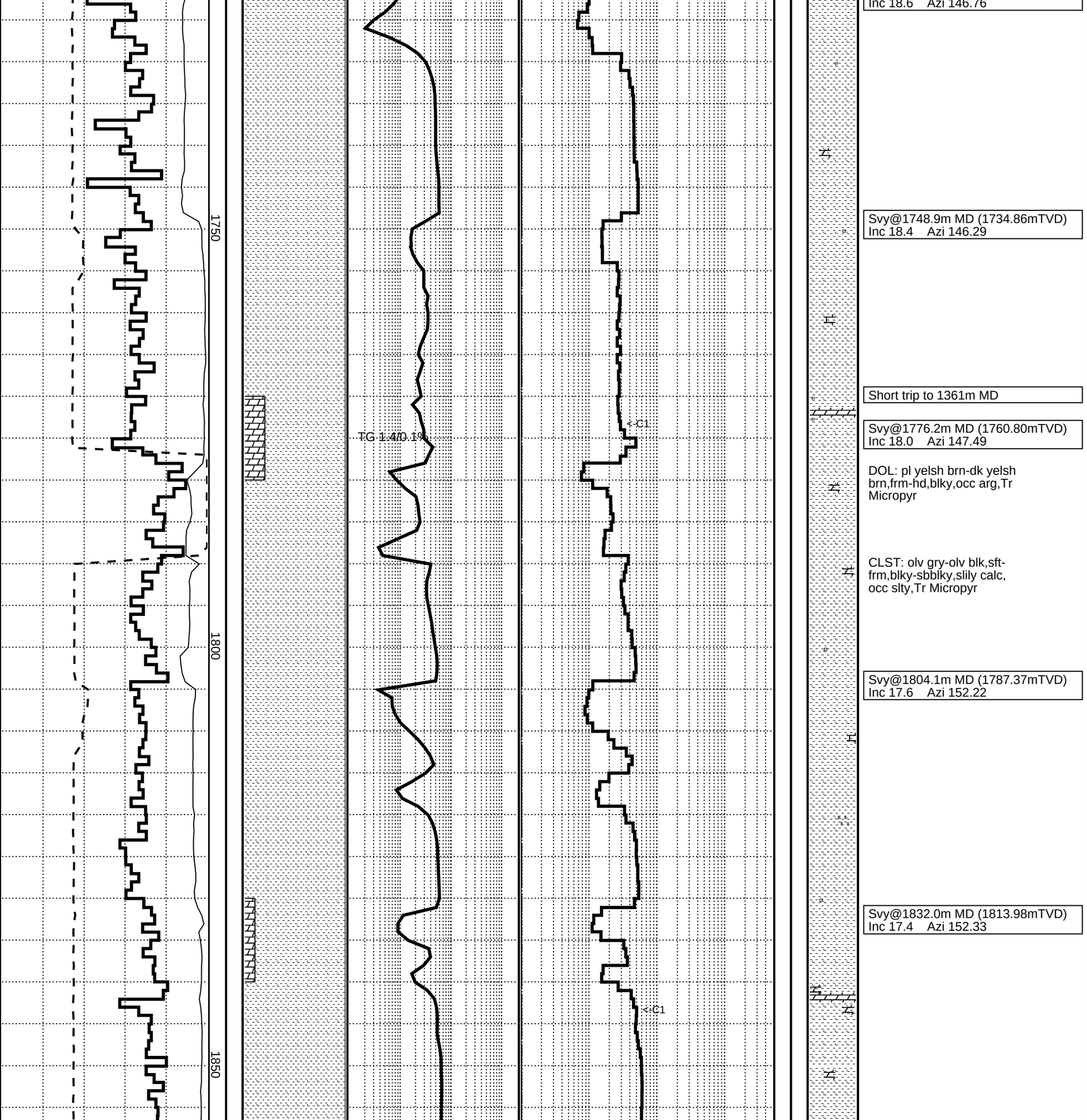
CLST: olv blk,sft-frm,blky-sbblky,slily calc,occ slty, Tr Micropyr,Tr Ls

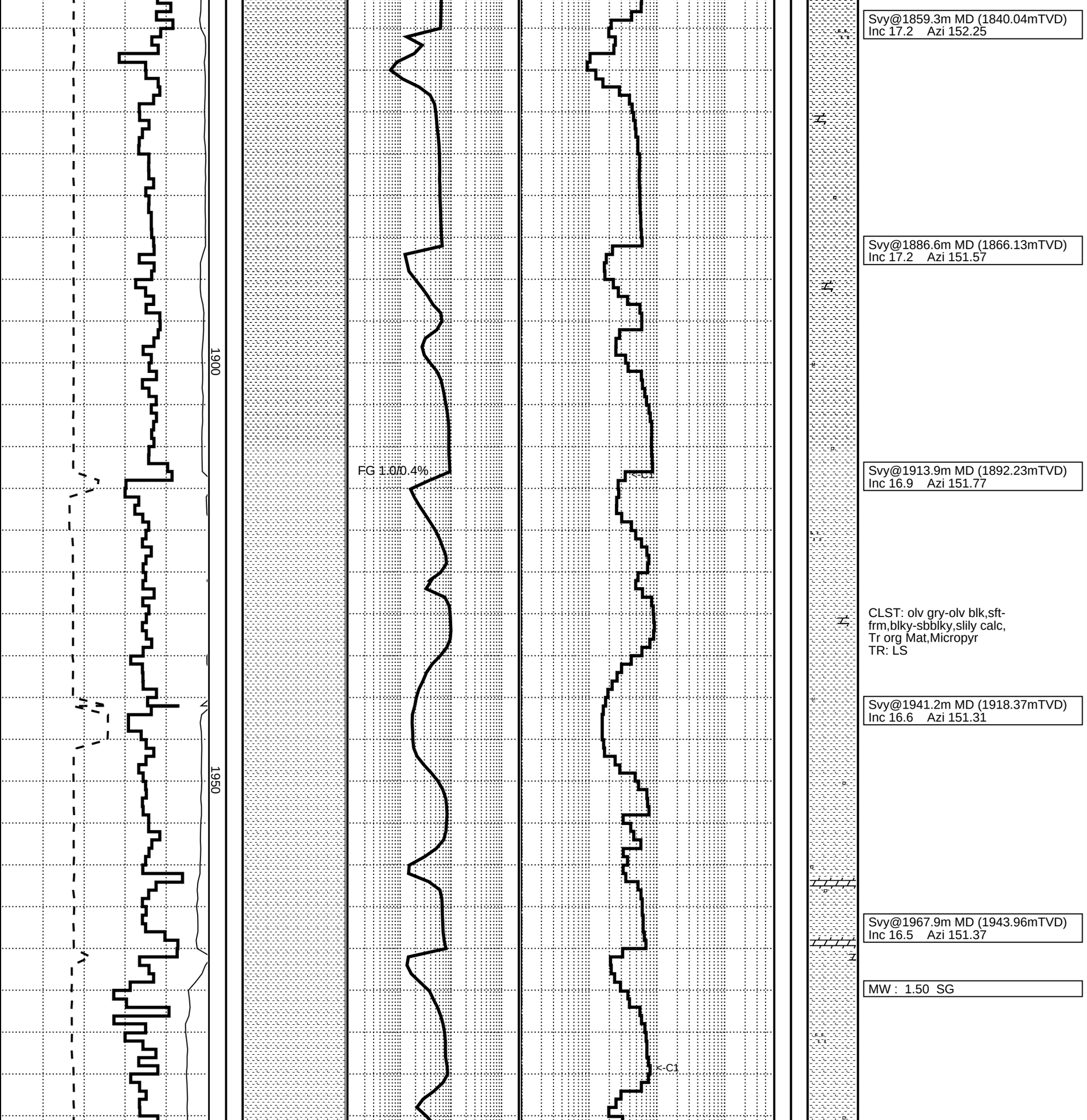
Svy@1666.4m MD (1656.75mTVD)
Inc 19.2 Azi 148.41

CLST: olv gry-dk gnsh gry, dk gry,sft-frm,blky-sbblky, occ calc,Tr Micropyr,Glauc
TR LS: wh-pl yelsh brn,frm-mod hd,blky,micrxln,occ arg, Tr Micropyr

Svy@1693.7m MD (1682.55mTVD)
Inc 18.9 Azi 147.54

Svy@1721.6m MD (1708.97mTVD)


1750
1800
1850
TG 1.4/0.1%
<-C1
<-C1
Inc 18.6 Azi 146.76
Svy@1748.9m MD (1734.86mTVD)
Inc 18.4 Azi 146.29
Short trip to 1361m MD
Svy@1776.2m MD (1760.80mTVD)
Inc 18.0 Azi 147.49
DOL: pl yelsh brn-dk yelsh brn,frm-hd,blky,occ arg,Tr Micropyr
CLST: olv gry-olv blk,sft-frm,blky-sbblky,slily calc, occ slty,Tr Micropyr
Svy@1804.1m MD (1787.37mTVD)
Inc 17.6 Azi 152.22
Svy@1832.0m MD (1813.98mTVD)
Inc 17.4 Azi 152.33



Svy@1859.3m MD (1840.04mTVD)
Inc 17.2 Azi 152.25

Svy@1886.6m MD (1866.13mTVD)
Inc 17.2 Azi 151.57

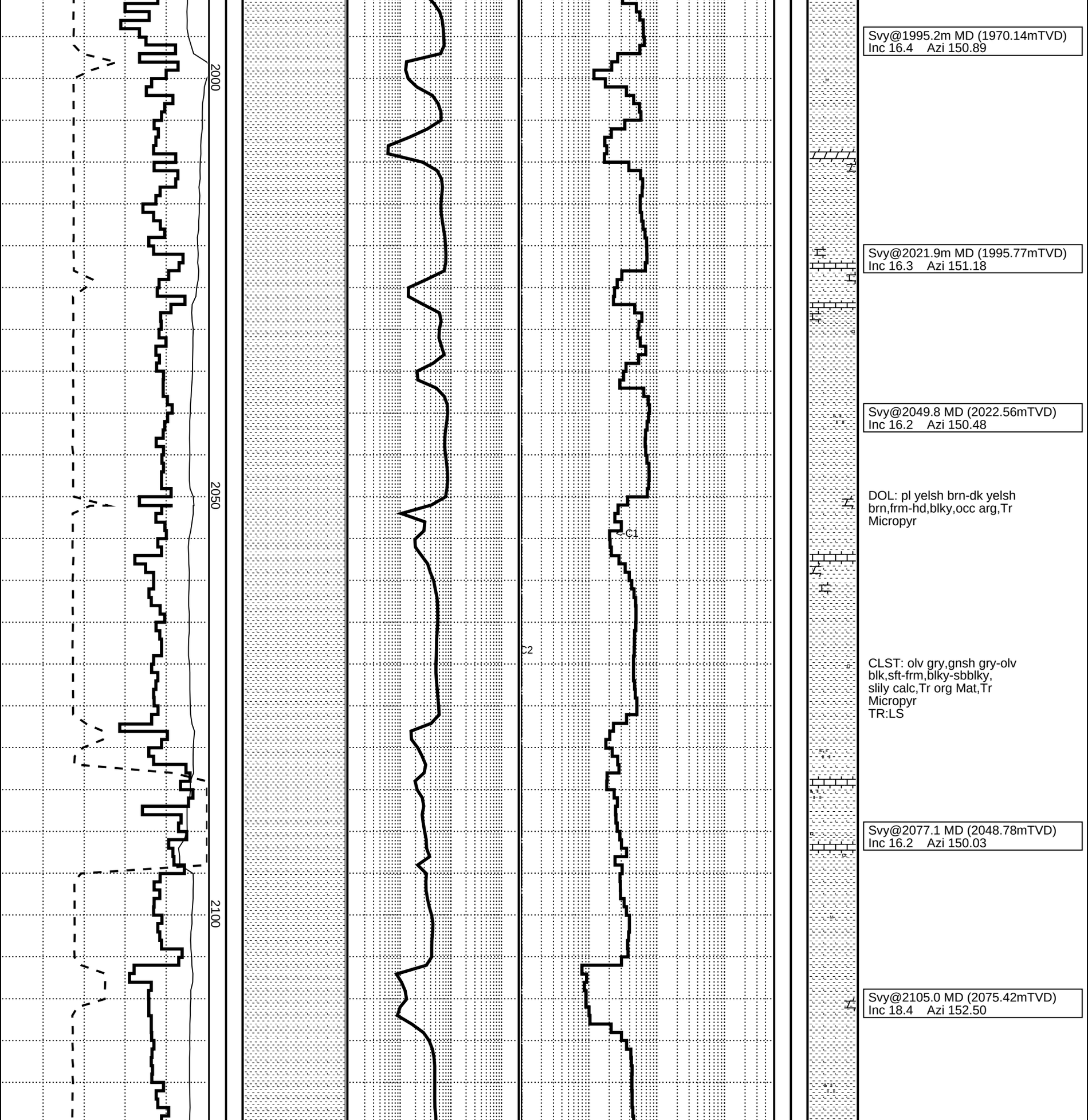
Svy@1913.9m MD (1892.23mTVD)
Inc 16.9 Azi 151.77

CLST: olv gry-olv blk,sft-frm,blky-sbblky,slily calc,
Tr org Mat,Micropyr
TR: LS

Svy@1941.2m MD (1918.37mTVD)
Inc 16.6 Azi 151.31

Svy@1967.9m MD (1943.96mTVD)
Inc 16.5 Azi 151.37

MW : 1.50 SG



Svy@1995.2m MD (1970.14mTVD)
Inc 16.4 Azi 150.89

Svy@2021.9m MD (1995.77mTVD)
Inc 16.3 Azi 151.18

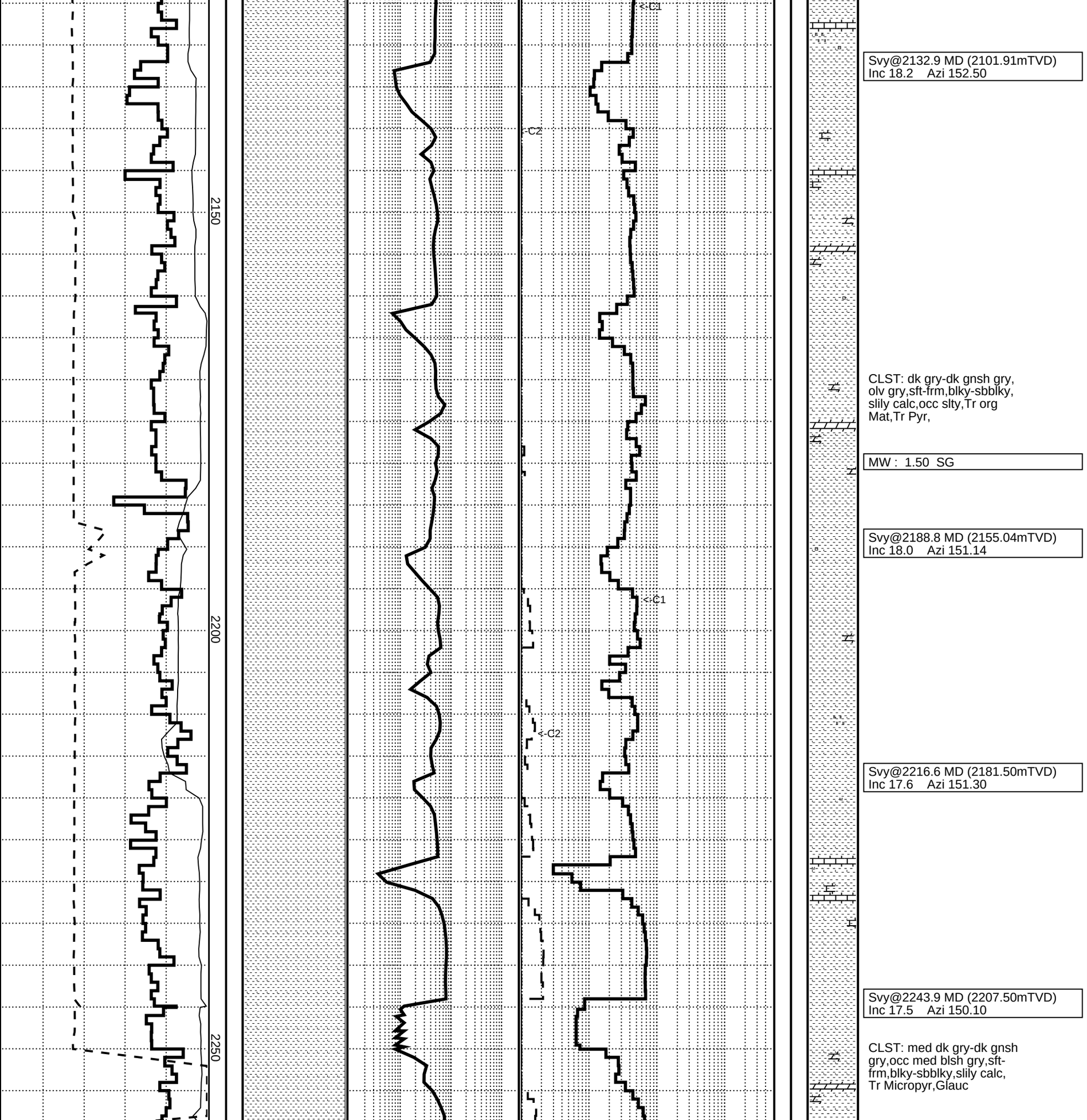
Svy@2049.8 MD (2022.56mTVD)
Inc 16.2 Azi 150.48

DOL: pl yelsh brn-dk yelsh brn,frm-hd,blky,occ arg,Tr Micropyr

CLST: olv gry,gnsh gry-olv blk,sft-frm,blky-sbblky, slily calc,Tr org Mat,Tr Micropyr
TR:LS

Svy@2077.1 MD (2048.78mTVD)
Inc 16.2 Azi 150.03

Svy@2105.0 MD (2075.42mTVD)
Inc 18.4 Azi 152.50



Svy@2132.9 MD (2101.91mTVD)
Inc 18.2 Azi 152.50

CLST: dk gry-dk gnsh gry,
olv gry,sft-frm,blky-sbblky,
slily calc,occ slty,Tr org
Mat,Tr Pyr,

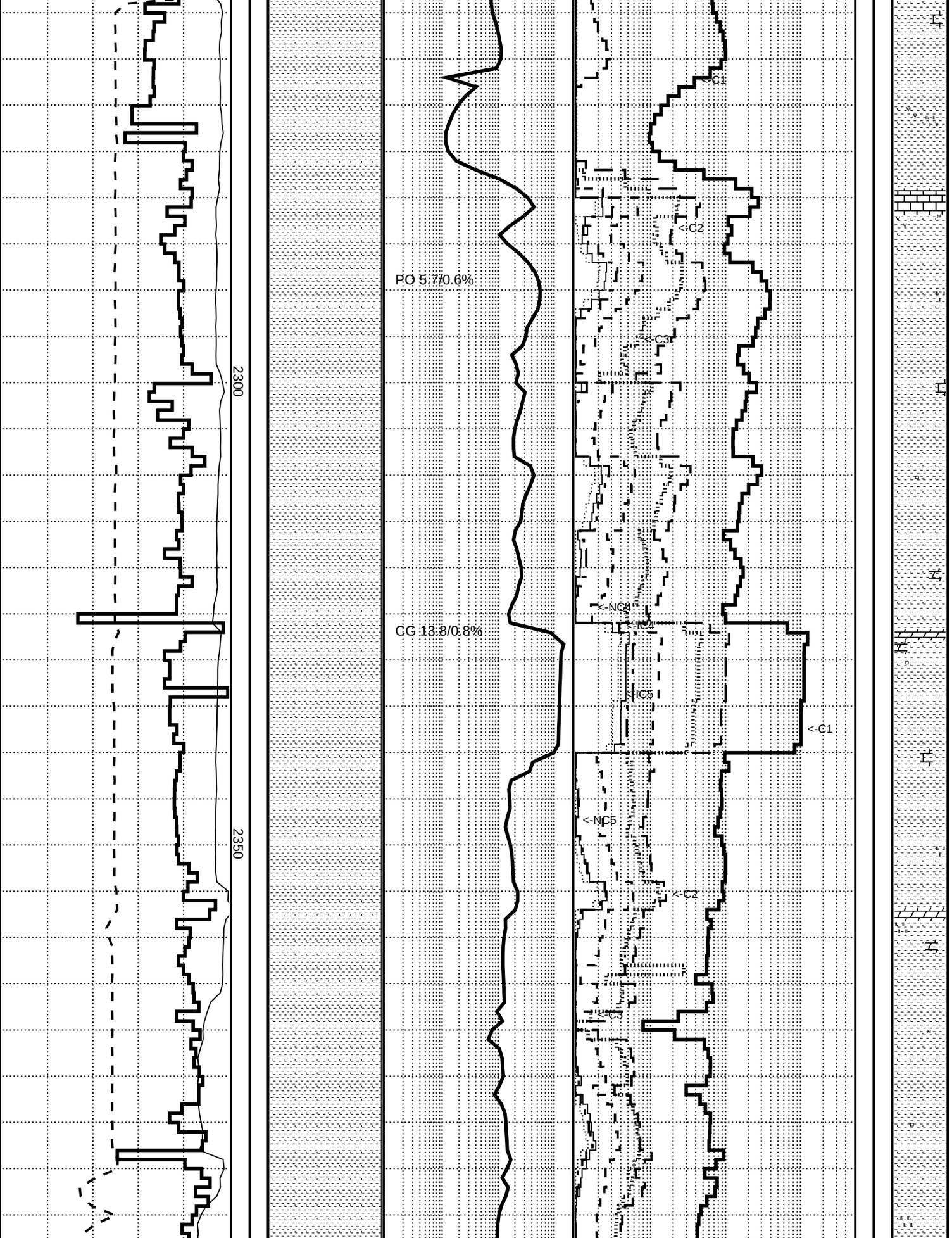
MW : 1.50 SG

Svy@2188.8 MD (2155.04mTVD)
Inc 18.0 Azi 151.14

Svy@2216.6 MD (2181.50mTVD)
Inc 17.6 Azi 151.30

Svy@2243.9 MD (2207.50mTVD)
Inc 17.5 Azi 150.10

CLST: med dk gry-dk gnsh
gry,occ med blsh gry,sft-
frm,blky-sbblky,slily calc,
Tr Micropyr,Glauc



Svy@2271.2 MD (2233.51mTVD)
Inc 18.3 Azi 153.38

ROGALAND GR./BALDER FM.
2275m MD (2237.1m TVD)

SELE FM.
2285m MD (2246.6m TVD)

Svy@2299.0 MD (2259.91mTVD)
Inc 18.3 Azi 153.61

CLST: olv blk,frm,occ blsh gry,blky-sbblky,occ slty,Tr Microrpyr
Tr Ls

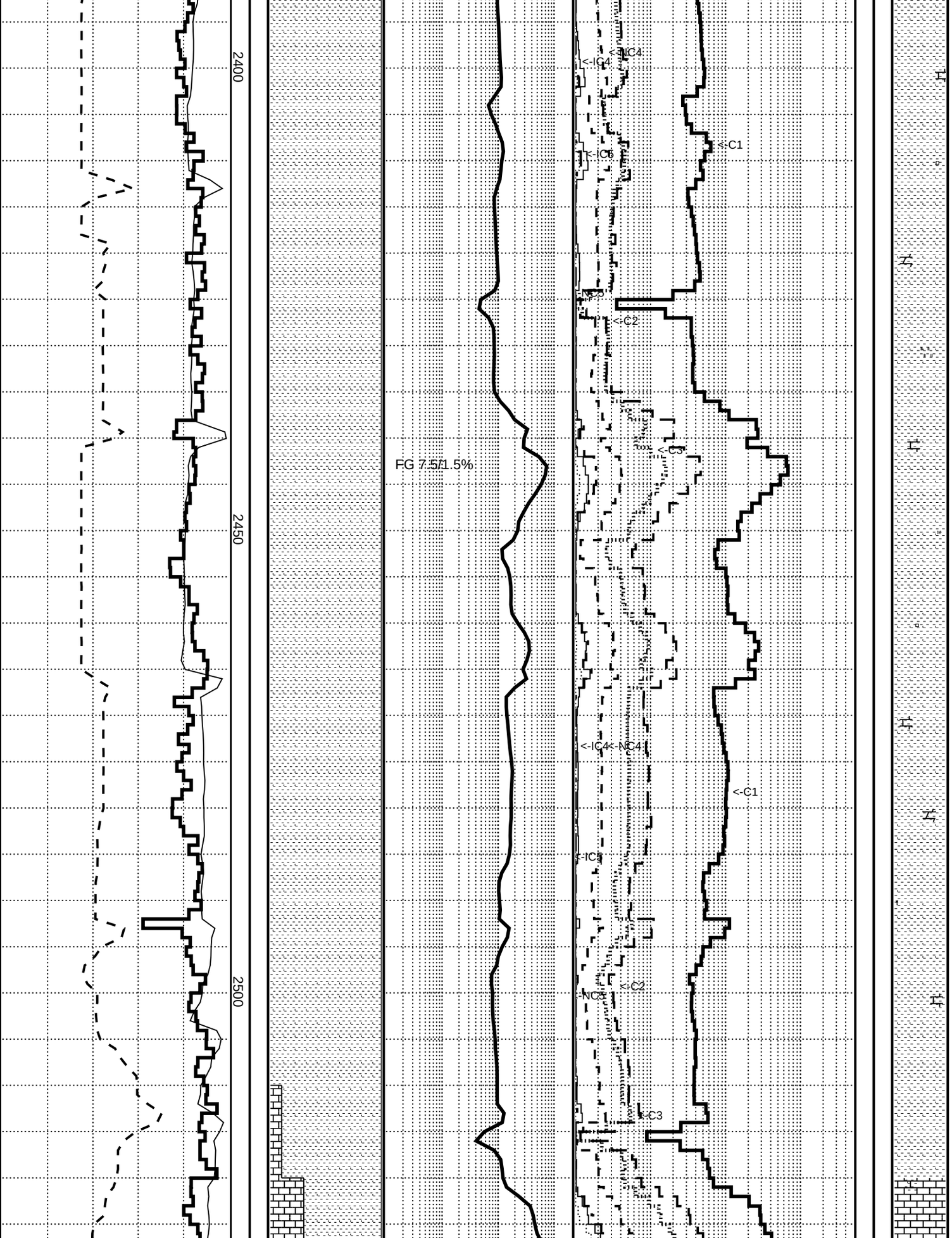
Svy@2326.4 MD (2285.92mTVD)
Inc 18.3 Azi 152.84

LISTA FM.
2344m MD (2302.6m TVD)

Svy@2354.3 MD (2312.39mTVD)
Inc 18.4 Azi 152.64

CLST: gn gry-occ lt brn gry, frm-mod hd,sbblky-blky,occ slty,slily calc l.P,Tr Micropyr,Micromic,Glauc

Svy@2381.5 MD (2338.19mTVD)
Inc 18.6 Azi 152.66



MW : 1.50 SG

Svy@2409.2 MD (2364.45mTVD)
Inc 18.6 Azi 153.13

Svy@2436.5 MD (2390.32mTVD)
Inc 18.7 Azi 153.04

CLST: gn gry-occ lt brn gry, frm,sbblky-blky,slily calc. Tr Pyr,Micromic
TR: DOL dk brnsh gry,hd-v hd,blky,crptxl,Tr Micropyr

Svy@2463.8 MD (2416.19mTVD)
Inc 18.6 Azi 152.99

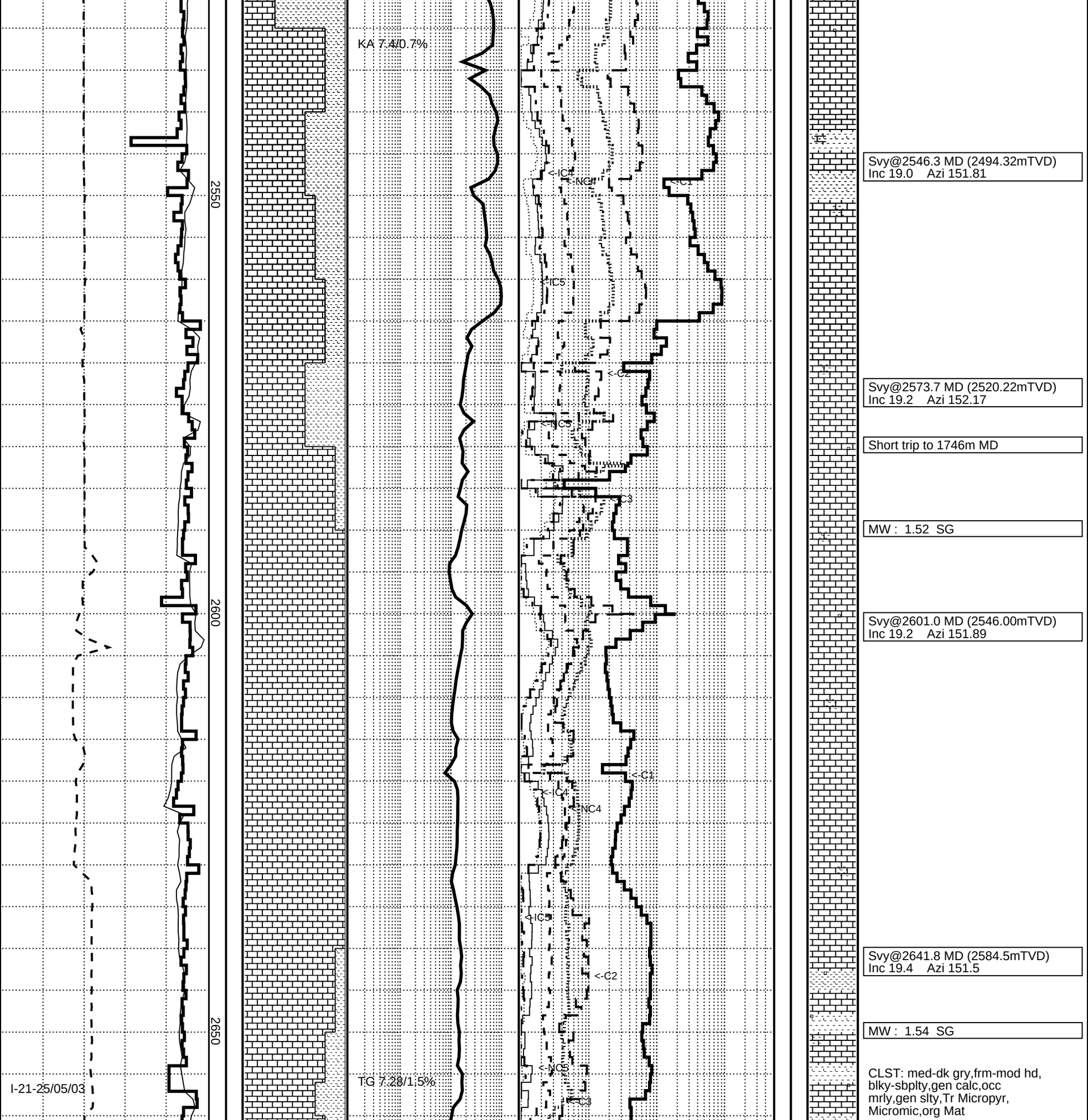
MAUREEN FM.
2493m MD (2443.9m TVD)

Svy@2491.1 MD (2442.06mTVD)
Inc 18.7 Azi 152.94

SHETLAND GP.
2517m MD (2466.6m TVD)

CLST: gn gry-occ lt brn gry, frm-mod hd,sbblky-blky,calc-v calc,i.p. grad Mrl,Tr Micropyr

LS: yelsh gry-pl gry,v lt gry,frm-mod hd,sbblky-blky, occ arg,Tr Micropyr



Svy@2546.3 MD (2494.32mTVD)
Inc 19.0 Azi 151.81

Svy@2573.7 MD (2520.22mTVD)
Inc 19.2 Azi 152.17

Short trip to 1746m MD

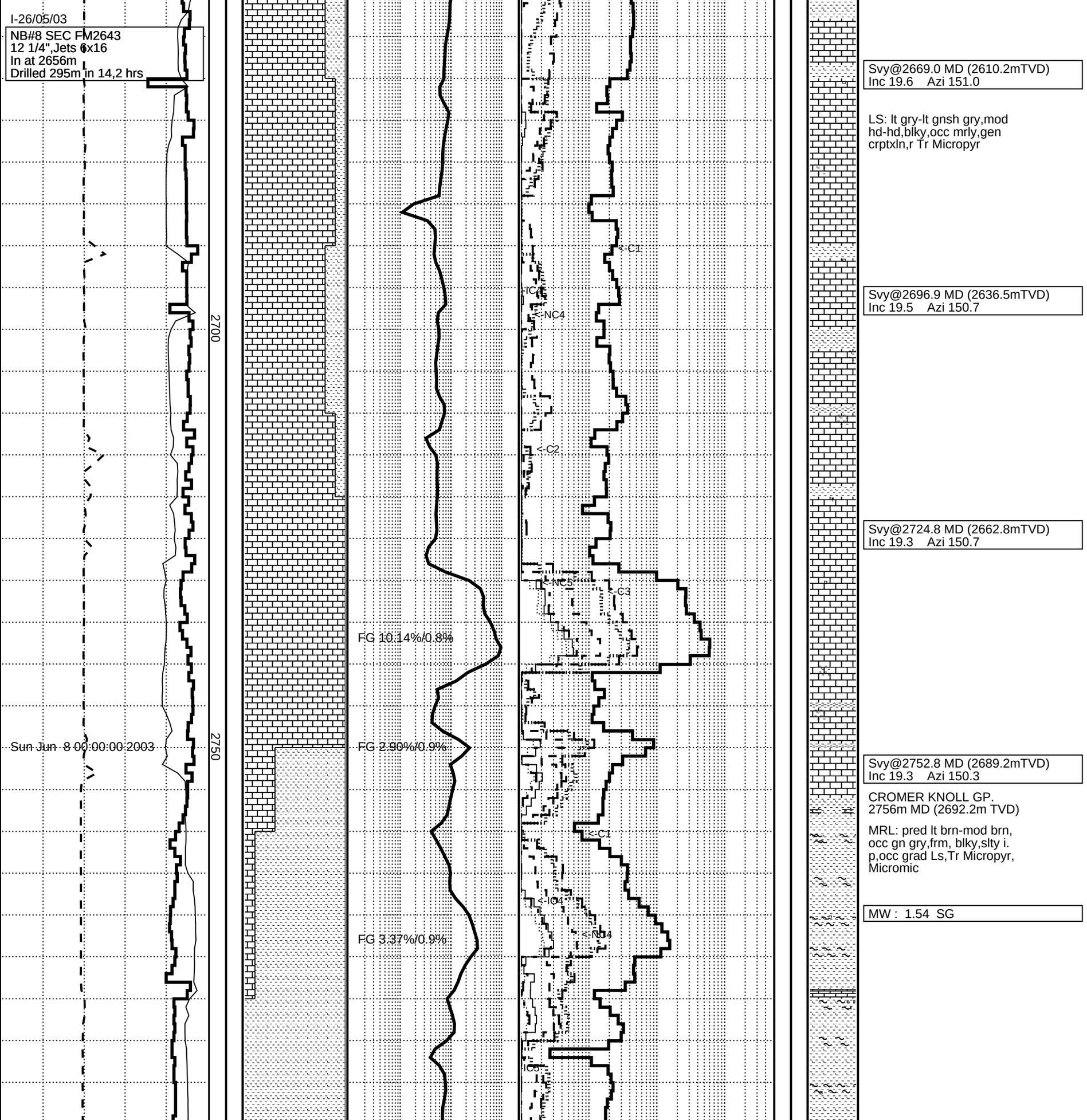
MW : 1.52 SG

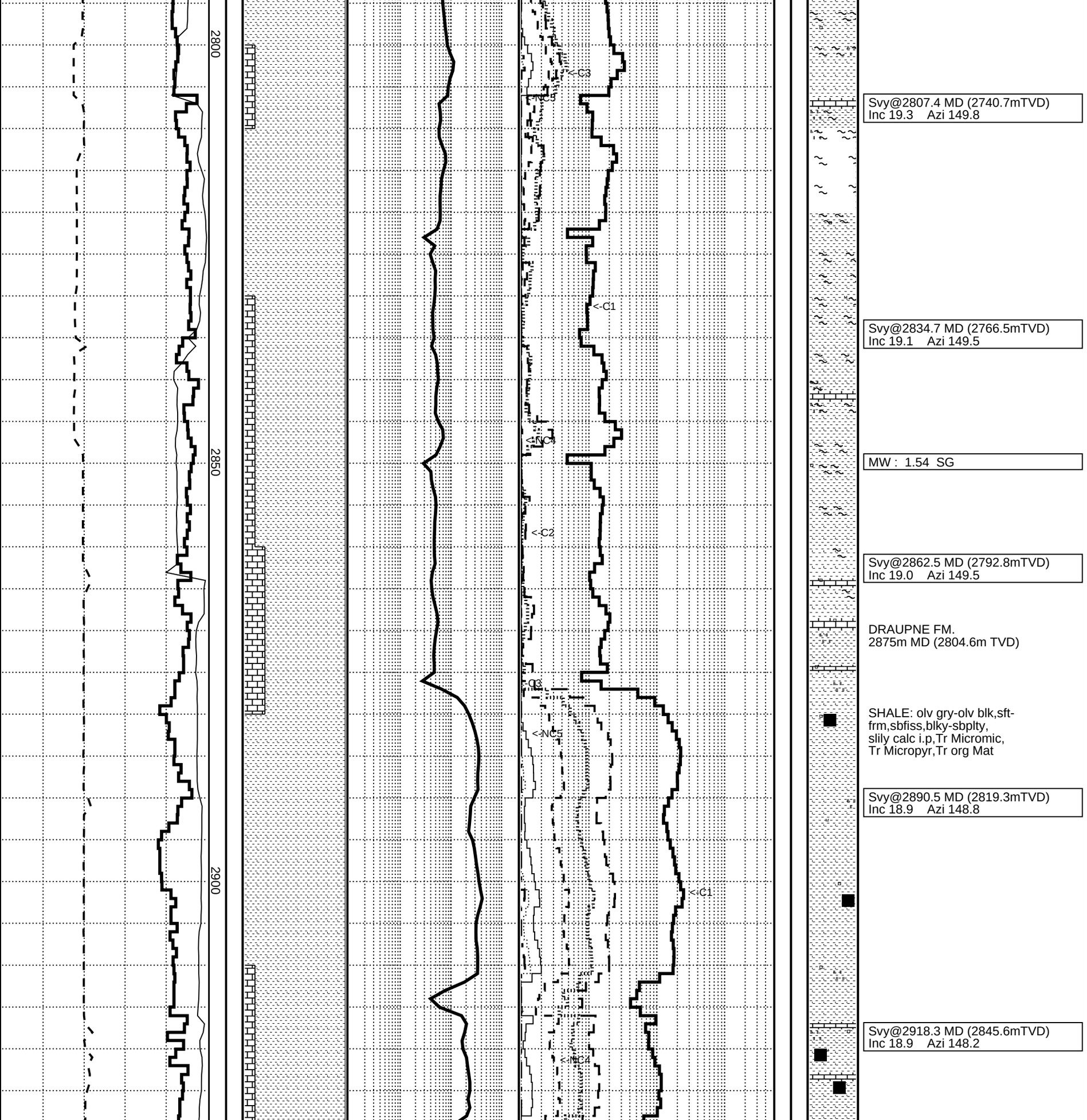
Svy@2601.0 MD (2546.00mTVD)
Inc 19.2 Azi 151.89

Svy@2641.8 MD (2584.5mTVD)
Inc 19.4 Azi 151.5

MW : 1.54 SG

CLST: med-dk gry,frm-mod hd,
blky-sbplty,gen calc,occ
mrly,gen slty,Tr Micropyr,
Micromic,org Mat


I-26/05/03
NB#8 SEC FM2643
12 1/4",Jets 6x16
In at 2656m
Drilled 295m in 14,2 hrs
2700
2750
Sun Jun 8 00:00:00 2003
<-C1
IC4
<-NC4
<-C2
NC5
<-C3
FG 10.14%/0.8%
FG 2.90%/0.9%
<-C1
<-IC4
<-NC4
FG 3.37%/0.9%
IC5
Svy@2669.0 MD (2610.2mTVD)
Inc 19.6 Azi 151.0
LS: lt gry-lt gnsh gry,mod
hd-hd,blky,occ mrly,gen
crptxln,r Tr Micropyr
Svy@2696.9 MD (2636.5mTVD)
Inc 19.5 Azi 150.7
Svy@2724.8 MD (2662.8mTVD)
Inc 19.3 Azi 150.7
Svy@2752.8 MD (2689.2mTVD)
Inc 19.3 Azi 150.3
CROMER KNOLL GP.
2756m MD (2692.2m TVD)
MRL: pred lt brn-mod brn,
occ gn gry,frm, blky,slty i.
p,occ grad Ls,Tr Micropyr,
Micromic
MW : 1.54 SG



Svy@2807.4 MD (2740.7mTVD)
Inc 19.3 Azi 149.8

Svy@2834.7 MD (2766.5mTVD)
Inc 19.1 Azi 149.5

MW : 1.54 SG

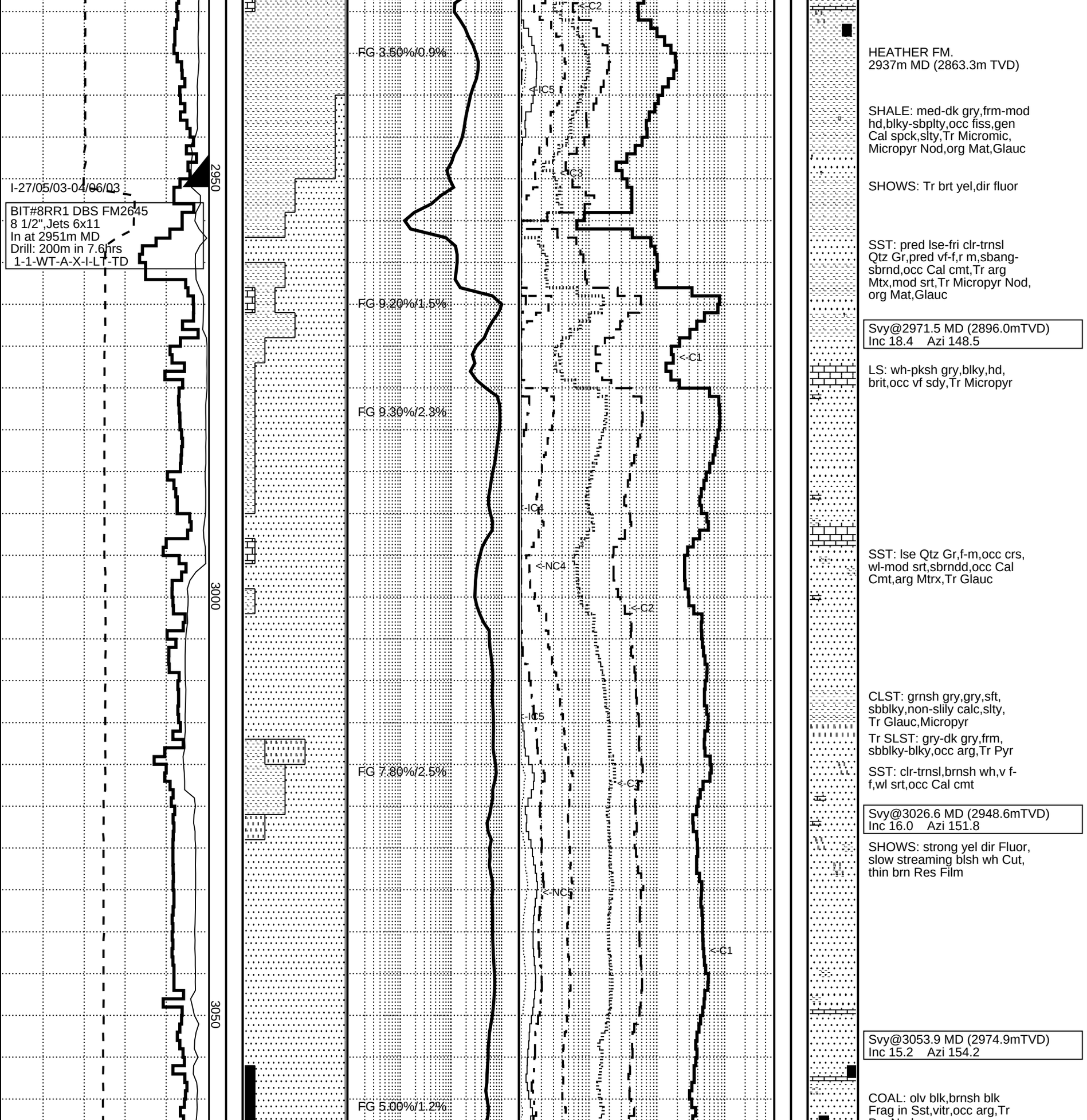
Svy@2862.5 MD (2792.8mTVD)
Inc 19.0 Azi 149.5

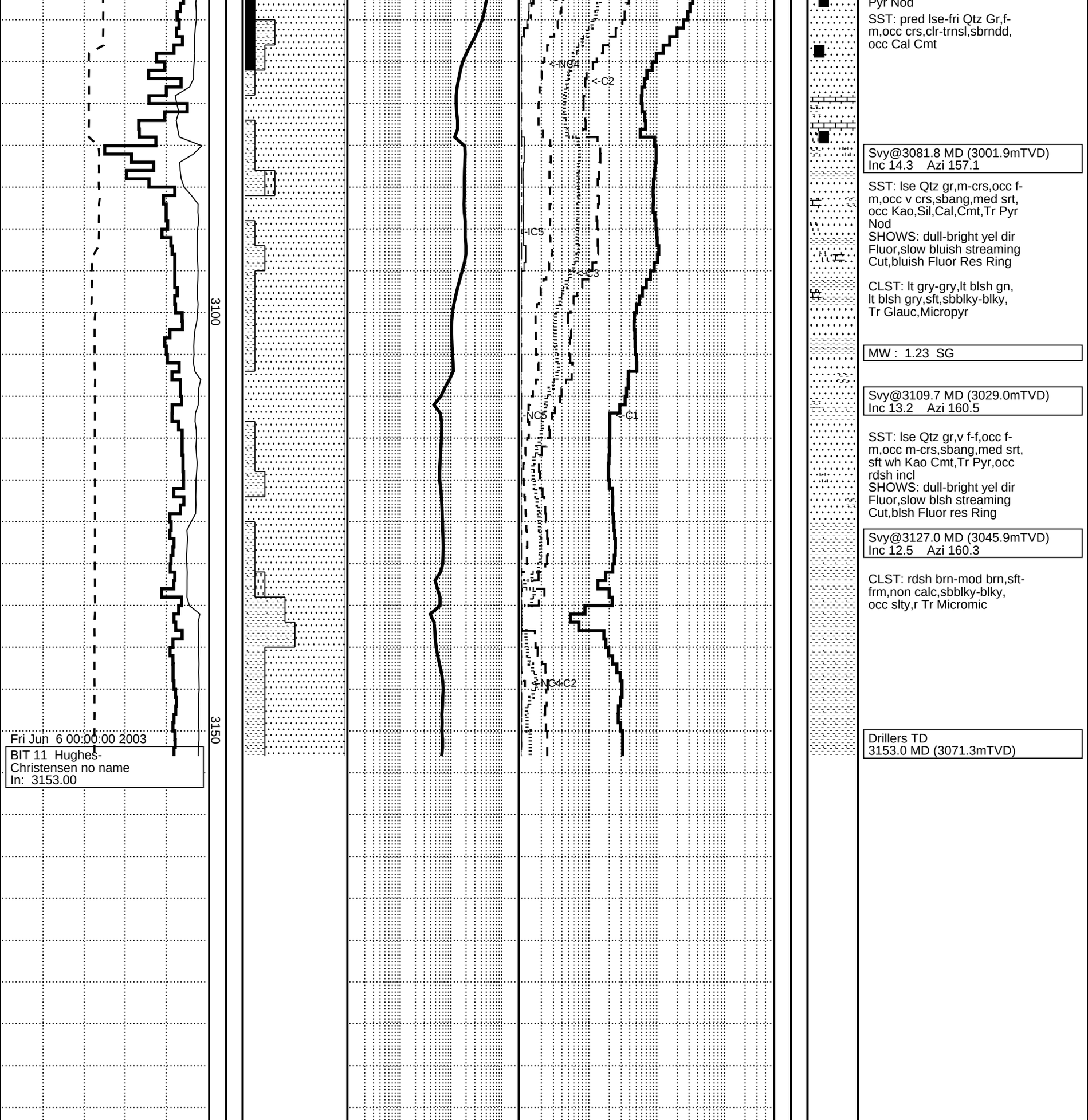
DRAUPNE FM.
2875m MD (2804.6m TVD)

SHALE: olv gry-olv blk,sft-frm,sbfiss,blky-sbplty, slily calc i.p,Tr Micromic, Tr Micropyr,Tr org Mat

Svy@2890.5 MD (2819.3mTVD)
Inc 18.9 Azi 148.8

Svy@2918.3 MD (2845.6mTVD)
Inc 18.9 Azi 148.2


I-27/05/03-04/06/03
BIT#8RR1 DBS FM2645
8 1/2",Jets 6x11
In at 2951m MD
Drill: 200m in 7.6hrs
1-1-WT-A-X-I-LT-TD
2950
3000
3050
FG 3.50%/0.9%
FG 9.20%/1.5%
FG 9.30%/2.3%
FG 7.80%/2.5%
FG 5.00%/1.2%
<-C2
<-IC5
<-IC3
<-C1
<-IC4
<-NC4
<-C2
<-IC5
<-C3
<-NC5
<-C1
HEATHER FM.
2937m MD (2863.3m TVD)
SHALE: med-dk gry,frm-mod hd,blky-sbplty,occ fiss,gen Cal spck,slty,Tr Micromic, Micropyr Nod,org Mat,Glauc
SHOWS: Tr brt yel,dir fluor
SST: pred lse-fri clr-trnsl Qtz Gr,pred vf-f,r m,sbang-sbrnd,occ Cal cmt,Tr arg Mtx,mod srt,Tr Micropyr Nod, org Mat,Glauc
Svy@2971.5 MD (2896.0mTVD)
Inc 18.4 Azi 148.5
LS: wh-pksh gry,blky,hd, brit,occ vf sdy,Tr Micropyr
SST: lse Qtz Gr,f-m,occ crs, wl-mod srt,sbrndd,occ Cal Cmt,arg Mtrx,Tr Glauc
CLST: grnsh gry,gry,sft, sbblky,non-slily calc,slty, Tr Glauc,Micropyr
Tr SLST: gry-dk gry,frm, sbblky-blky,occ arg,Tr Pyr
SST: clr-trnsl,brnsh wh,v f-f,wl srt,occ Cal cmt
Svy@3026.6 MD (2948.6mTVD)
Inc 16.0 Azi 151.8
SHOWS: strong yel dir Fluor, slow streaming blsh wh Cut, thin brn Res Film
Svy@3053.9 MD (2974.9mTVD)
Inc 15.2 Azi 154.2
COAL: olv blk,brnsh blk Frag in Sst,vitr,occ arg,Tr


Pyr Nod
SST: pred lse-fri Qtz Gr,f-m,occ crs,clr-trnsl,sbrndd, occ Cal Cmt
<-NC4
<-C2
Svy@3081.8 MD (3001.9mTVD)
Inc 14.3 Azi 157.1
SST: lse Qtz gr,m-crs,occ f-m,occ v crs,sbang,med srt, occ Kao,Sil,Cal,Cmt,Tr Pyr Nod
SHOWS: dull-bright yel dir Fluor,slow bluish streaming Cut,bluish Fluor Res Ring
-IC5
-C3
CLST: lt gry-gry,lt blsh gn, lt blsh gry,sft,sbblky-blky, Tr Glauc,Micropyr
MW : 1.23 SG
Svy@3109.7 MD (3029.0mTVD)
Inc 13.2 Azi 160.5
-NC4
-C1
SST: lse Qtz gr,v f-f,occ f-m,occ m-crs,sbang,med srt, sft wh Kao Cmt,Tr Pyr,occ rdsh incl
SHOWS: dull-bright yel dir Fluor,slow blsh streaming Cut,blsh Fluor res Ring
Svy@3127.0 MD (3045.9mTVD)
Inc 12.5 Azi 160.3
-NC4 C2
CLST: rdsh brn-mod brn,sft-frm,non calc,sbblky-blky, occ slty,r Tr Micromic
3100
3150
Fri Jun 6 00:00:00 2003
BIT 11 Hughes-Christensen no name
In: 3153.00
Drillers TD
3153.0 MD (3071.3mTVD)