STATOIL

Petrophysical evaluation report

PL204 B-Prospect
Well 24/12-4

02c94*141

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Well 24/12-4

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1 Summary

The main objective of well 24/12-4 was to test the combined structural / stratigraphic trap and the hydrocarbon potential in the B-Prospect within PL 204. The Hermod Formation sandstone was the primary reservoir target.

A petrophysical evaluation has been performed for the Sele, Hermod, Lista and Heimdal Formations. Sand sequences with good reservoir properties were found in the Hermod and Heimdal Formations, but all of these proved to be water bearing.

As a result of water bearing reservoirs, a reduced data acquisition programme was performed. Only standard logs as gamma ray, resistivity, density, neutron and sonic were run in addition to a velocity survey (VSP). Formation pressures, fluid samples and core data were not collected in this well.

Standard methods has been used in the petrophysical evaluation. Density - neutron logs were used to calculate shale volume, density log to calculate effective porosity and the Indonesia Equation to calculate water saturation. For definition of net sand, cut-off values of 12 % for porosity and 40 % for shale volume was used. For definition of net pay, an additional cut-off of 60% was used for water saturation. For further details regarding the evaluation, see Chapter 8.

The computed results are shown in Table 1.1, Figure 8.3 and Attachment 1 (CPI plot).

Formation	Top Sele to TD	Sele	Hermod	Lista	Heimdal *
Top Formation (m MD RKB)	2120.5	2120.5	2138.5	2206.0	2223.5
Base Formation (m MD RKB)	2245.0 *	2138.5	2206.0	2223.5	2245.0 *
Gross interval (m MD)	124.5	18.0	67.5	17.5	21.5
Net sand (m MD)	34.9	0.0	21.5	1.1	12.3
Net pay (m MD)	0.0	0.0	0.0	0.0	0.0
Net sand / gross	0.28	0.0	0.32	0.06	0.57
Porosity net sand (%)	26.1	-	26.4	19.9	26.0
* Heimdal Formation is only evaluated as far down as density / neutron log was recorded					

Table 1.1: Results

2 Introduction

The objective of this work is to evaluate the petrophysical properties of the Sele, Hermod, Lista and Heimdal Formations in well 24/12-4 (ref. Figure 2.1 Location map)
The computations have been performed with the program Petroworks developed by Landmark.

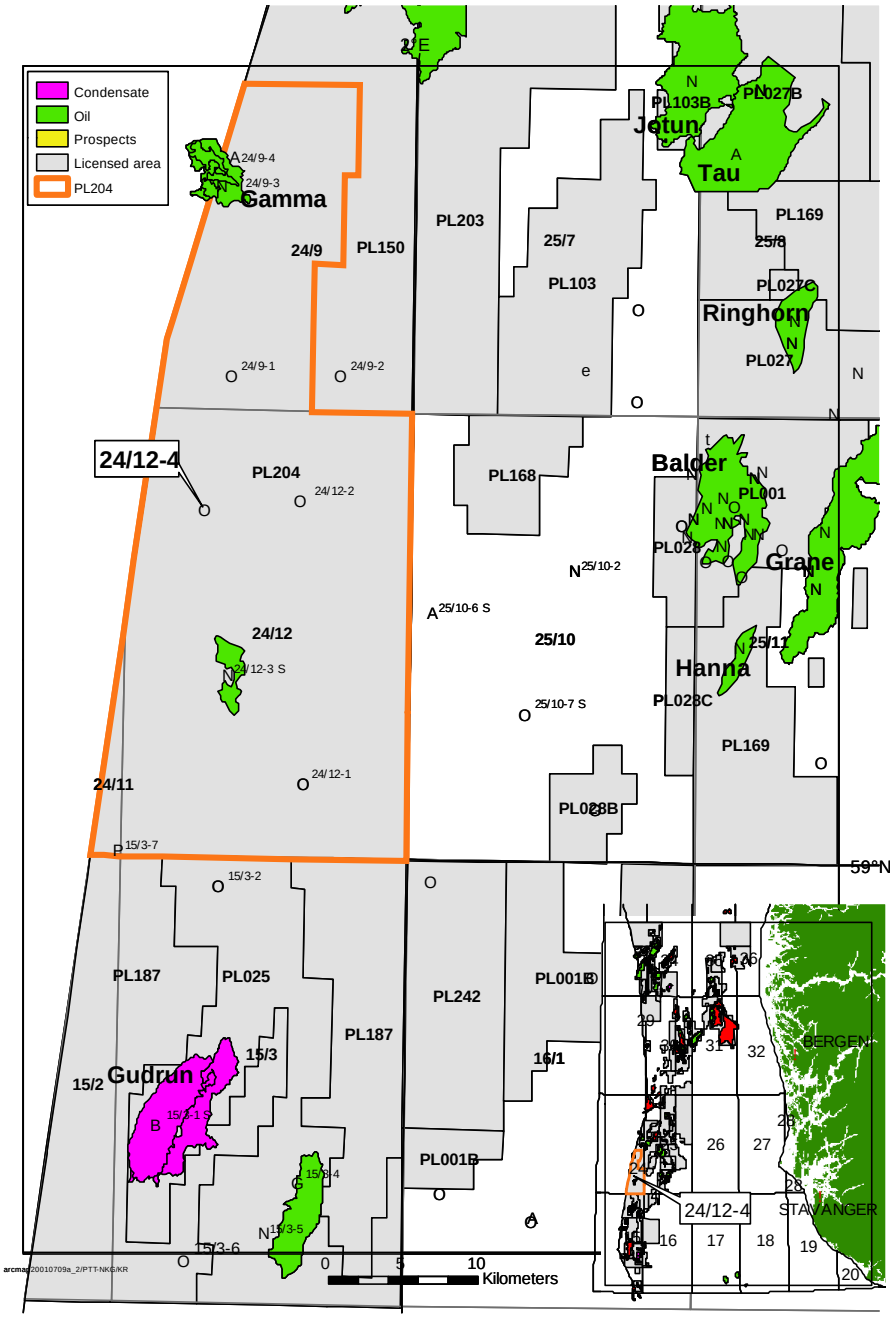

Fig. 2.1: Location map

3 General Well Data

Well	: 24/12-4
Country	: Norway
Prospect	: B-Prospect
License	: PL 204
RKB elevation	: 25 m
Water depth	: 115 m
Total depth (loggers depth)	: 2266.2 mMD RKB, 2265.7 mTVD RKB
Formation at TD	: Heimdal Formation

For additional well data, see Final Well Report.

4 Formation Pressure Summary

No formation pressure measurements were performed in this well.

5 Temperature Analysis

Temperature data is only available from the first logging run (PEX-DSI), hence extrapolation of log temperatures is not applicable.
The evaluation of the well temperature gradient has therefore mainly been based on the measured and extrapolated log temperatures from well 24/12-3.

Figure 5.1 shows the estimated temperature gradient together with measured and extrapolated temperatures. Table 5.1 shows the measured temperature from well 24/12-4.

Source	Run	Ref. depth m MD RKB	Time since circulation (hours)	Circulation time (hours)	Temp. (ºC)	Extrapolated Temp. (ºC)
PEX-DSI	1A	2245.0	10.5	1.5	67	-
ASI-GR	1A	-	-	1.5	Not recorded	-
CSI-GR	1A	-	-	1.5	Not recorded	-

Table 5.1: Measured temperatures from well 24/12-4

PL 204
RKB - MSL: 25 m
Water Depth: 115 m

Well 24/12-4
Temperature Plot

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Made by: ANy | Date:31.01.02

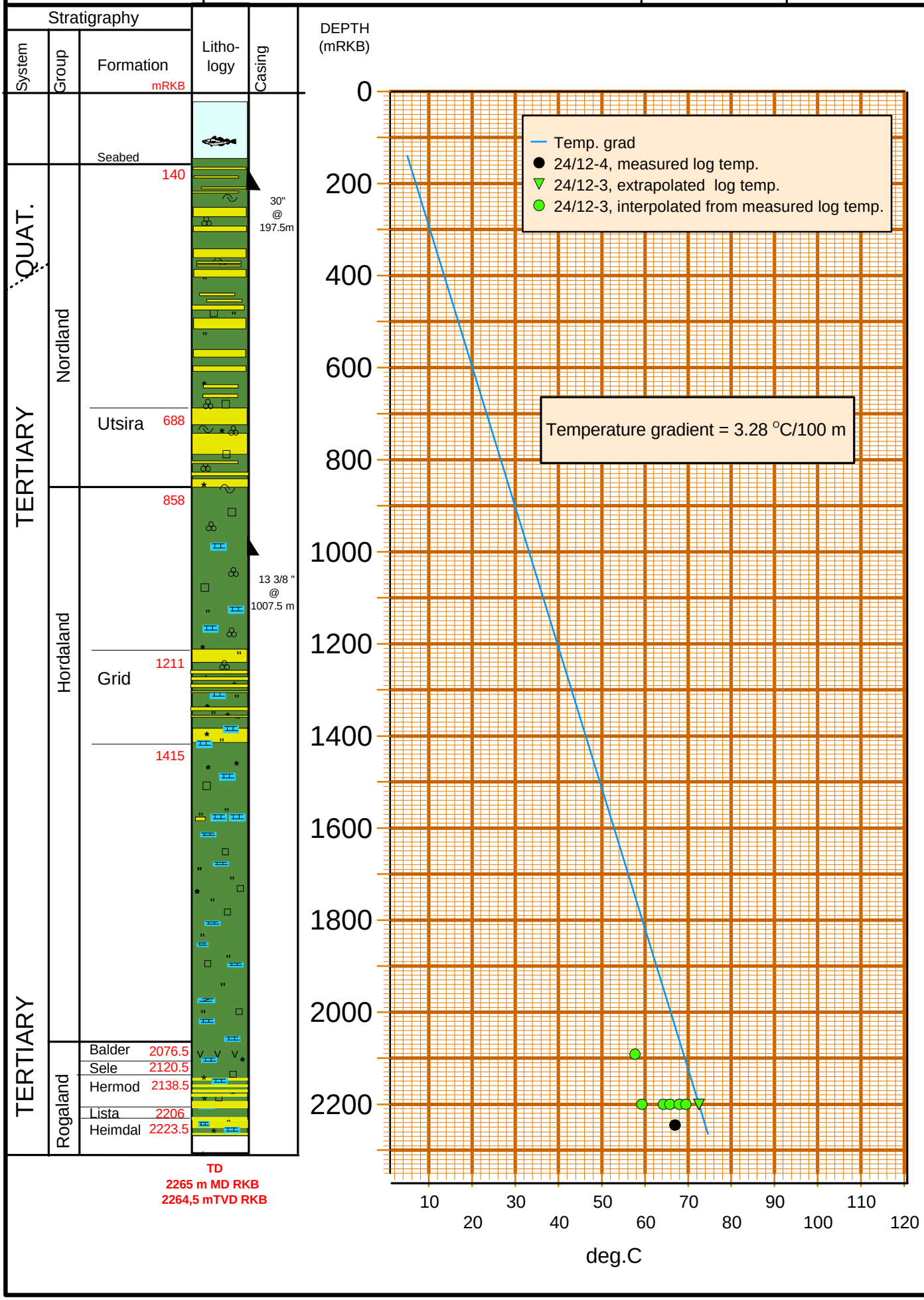

Fig. 5.1

6 Coring and Core Data

No cores were cut in this well.

7 Logging and log quality

7.1 Wireline logging

The wireline logging contractor for this well was Schlumberger Offshore Service NV. The logging programme executed is listed in Table 7.1. For further details on logging operations, see Appendix A, Log Operation Report

Tool combination	Run #	Interval m MD RKB	Comments
PEX-DSI	1A	2266.0 - 380.0	PEX was logged in the entire open hole interval. DSI also logged in casing up to 380 m
ASI-GR (VSP)	1A	1400.0 - 603.0	Unable to pass 1425 m. Performed VSP survey from 1400 m and upwards.
CSI-GR (VSP)	1A	2260.0 - 600.0	Logged the remaining VSP program

Table 7.1: Wireline log runs

7.2 LWD

The MWD contractor for this well was Baker Hughes Inteq. The logging runs are listed in Table 7.2.

Run #	Interval (m MD RKB)	Collar diam.	Tool	Comments
1	197 - 1014	8 ¼"	MPR	Service: GR, RES, DIR, Pressure, Near bit incl in 17 ½" hole section. Had to use the back-up tool due to damaged threads
2	1014 - 2265	6 ¾"	MPR Lite	Apart from pressure sub failure while drilling cement in the 13 $^{3}/_{8}$" shoe track, no problems

Table 7.2: MWD runs

7.3 Log quality

MWD logs:

Both real-time and memory resistivity data were a little spiky in Run 1, but the quality improved downwards and no spikes were observed in the lower 200 m of the section. The spikes were removed manually on the memory log. The edited log curves are of acceptable quality, although the resolution of data is somewhat reduced.
A MPR Lite tool with two resistivity curves (the 2 MHz phase and attenuation) and a GR was run in Run 2. The quality of these log curves are good.

Wireline logs:

The recorded caliper log showed a hole size of approximately 8” over most of the 8.5” hole section. No obvious explanation could be found at rig site, and unfortunately a post log calibration was not done. This erroneous caliper was presented on the original log prints and used in the environmental corrections.
The PEX caliper tool was later checked and calibrated onshore. Based on this investigation, Schlumberger has concluded that the caliper was not correctly calibrated offshore, probably due to a wrongly installed ring during calibration. Data from the onshore calibration has been used to correct the caliper log and perform new environmental corrections on the gamma ray and neutron log curves.
In the lower part of the hole, especially the 50 meters above TD, the caliper shows a cork screw hole. However, it does not seem to have any significant impact on the quality of the density and neutron logs.
The DSI sonic was recorded both in open hole and in casing. Both the sonic compressional (DTCO) and shear (DTSM) curves in the open hole look acceptable. The selected DTCO curve is the average between the delta-T curves from the transmitter and receiver arrays. Some minor discrepancies exists between these two curves, especially in the interval 2218–2241 m where several thin stringers of 0.5 to 1 m thickness have different delta-T values. This indicates that the DTCO could be slightly improved, but the effects are probably small.
The same is probably valid for DTSM, where data from the upper dipole has been used for the entire open hole, while both upper and lower dipoles were recorded.
The quality of the sonic data within the casing is very questionable. The DTCO from shoe to approximately 580 m is potentially acceptable in parts of the interval, but above this depth the values are certainly wrong and too fast. The DTSM is questionable in the entire casing interval, and is not considered to be useful at all above 700 m. Reprocessing might improve the data quality in some intervals, but this has not been done due to the limited benefit, and the expectation of only insignificant improvements.

8 Petrophysical evaluation

8.1 Interpretation interval

Log evaluation has been performed in the interval 2115.0 m – 2245.0 m MD RKB. This includes the Sele, Hermod, Lista and upper part of the Heimdal Formation.

8.2 Log corrections and depth shifting

Splicing, editing and depth shifting of logs has been done according to the NPD's Reporting requirements for digital well data.
For further details of log corrections and depth shifting, see Appendix B.

8.3 Input parameters

8.3.1 Log curves

The following log curves were used in the evaluation:

HGR as the gamma ray curve
HRHO as the density curve
NPHI as the neutron curve
HRD as the true resistivity curve

The HRD curve is from the MWD services, the other curves are from the wireline log run. All log curves are composited according to NPD's 'Reporting requirements for digital well data'.

8.3.2 Temperature data

A temperature of 74 ºC at 2245 m MD RKB and a temperature gradient of 3.28 ºC/100 m has been used in the analysis.

8.3.3 Formation water resistivity

R_w = 0.050 ohmm at 70 ^oC is used in the analysis. The R_w value is extrapolated from the Pickett plot, ref. Figure 8.2

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The R_w –value of 0.50 ohmm at a temperature of 70 ºC gives a formation water salinity of approximately 70 000 ppm equivalent NaCl consentration (Ref. Baker Atlas chart " Resistivity of Solutions").

8.3.4 Mud properties

Mud system:	Novatec, oil based mud
Mud weight	1.35 g/cm³
Oil/water ratio:	73/27
Chlorides:	20000 mg/l
Solids:	18 volume %
Mud filtrate	R_{mf} is not applicable
Mud	R_m is not applicable
Mud cake	R_{mc} is not applicable

8.3.5 Shale parameters

Shale parameters have been picked from cross plot (ref. Figure 8.1) and visual inspection of the logs.

Shale density	RHO_{sh} = 2.33 g/cm³
Shale neutron porosity	NEU_{sh} = 42 %
Shale resistivity	R_{sh} = 1.0 ohmm

8.4 Computations

8.4.1 Shale volume calculations

The shale volume (Vsh) was calculated from a density-neutron cross plot. This cross plot is shown in Figure 8.1.

8.4.2 Porosity calculations

Effective log porosity, PHIE, was calculated from the density log by the following equation:

$$PHIE = ((RHO_{ma} - HRHO) / (RHO_{ma} - RHO_{fl}) - Vsh * ((RHO_{ma} - RHO_{sh}) / (RHO_{ma} - RHO_{fl}))$$

Where,

RHO_{ma}	=	matrix density (sand)	= 2.65 g/cm³
RHO_{fl}	=	formation fluid density	= 0.95 g/cm³
RHO_{sh}	=	density of shale	= 2.33 g/cm³
HRHO	=	bulk density	
Vsh	=	shale volume	

8.4.3 Water saturation calculations

Water saturation was calculated using the Indonesian equation (Poupon-Leveaux), with the MWD deep resistivity curve HRD used as R_t.

$$Sw = ((Rt/Rsh)^{1/2} * VSH^{(1-(VSH/2))} + (Rt/Ro)^{1/2})^{-2/n}$$

Where

$Ro = a * Rw / (PHIE)^m$
a = tortuosity factor = 1.0
m= cementation exponent = 2.0
n = saturation exponent = 2.0

Standard values has been used for a, m and n.

8.5 Permeability calculations

Permeability has not been calculated.

8.6 Results

The computed curves are shown in the CPI plot, ref. Figure 8.3 and Attachment 1. Statistics are shown in Table 8.6.1.
A porosity cut-off of 12.0 % and a shale volume cut-off of 40 % has been used to define the net sand. An additional water saturation cut-off of 60% has been used to define net pay.
Calculation of the porosity has some uncertainties as no core data is available for correlation. The main uncertainty is probably related to the invasion of the oil based mud filtrate and whether this invasion is beyond the investigation depth for the density tool. An average between the mud filtrate and the formation water density has been used. The uncertainty of the porosity is estimated to be +/- 5%, which corresponds to approximately +/- 1.5 % units for a porosity of 27 %.
As no water samples are available in this well, the formation water resistivity (Rw) was derived from a Pickett plot. The derived Rw value matches fairly well with data in offset wells.
The uncertainties in the calculated water saturation is probably mainly related to the uncertainties in porosity and Rw. However, these uncertainties could not change the conclusion of water bearing reservoirs.

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Top Formation (m MD RKB)	2120.5	2120.5	2138.5	2206.0	2223.5
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Gross interval (m MD)	124.5	18.0	67.5	17.5	21.5
Net sand (m MD)	34.9	0.0	21.5	1.1	12.3
Net pay (m MD)	0.0	0.0	0.0	0.0	0.0
Net sand / gross	0.28	0.0	0.32	0.06	0.57
Porosity net sand (%)	26.1	-	26.4	19.9	26.0
* Heimdal Formation is only evaluated as far down as density / neutron log was recorded					

Table 8.6.1: Statistics

Well 24/12-4

Density/neutron crossplot

Hermod, Lista and Heimdal Formations

Depth Interval: 2138.50 - 2245.00

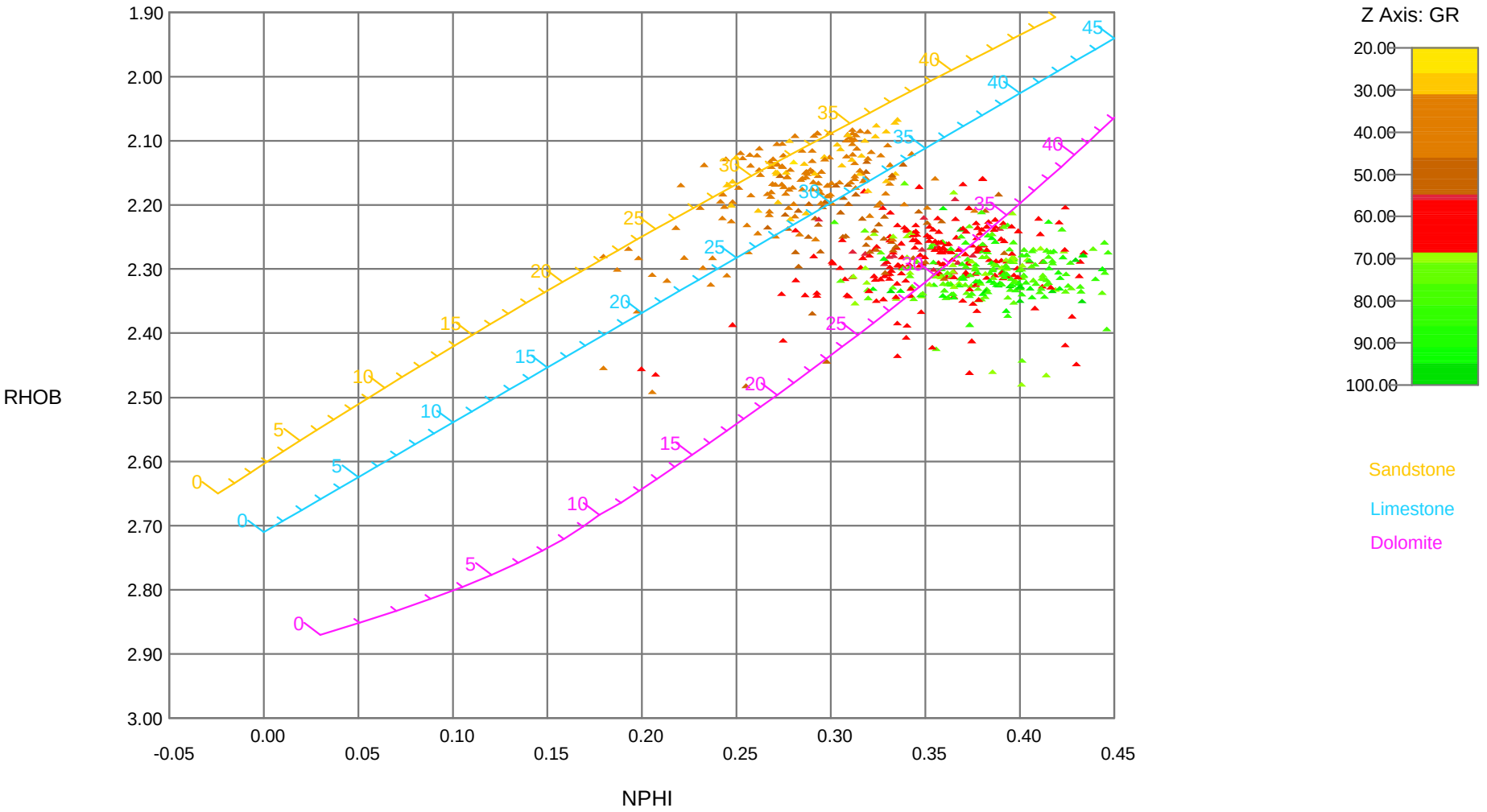


Figure 8.1

Well 24/12-4

Pickett plot

Hermod Formation

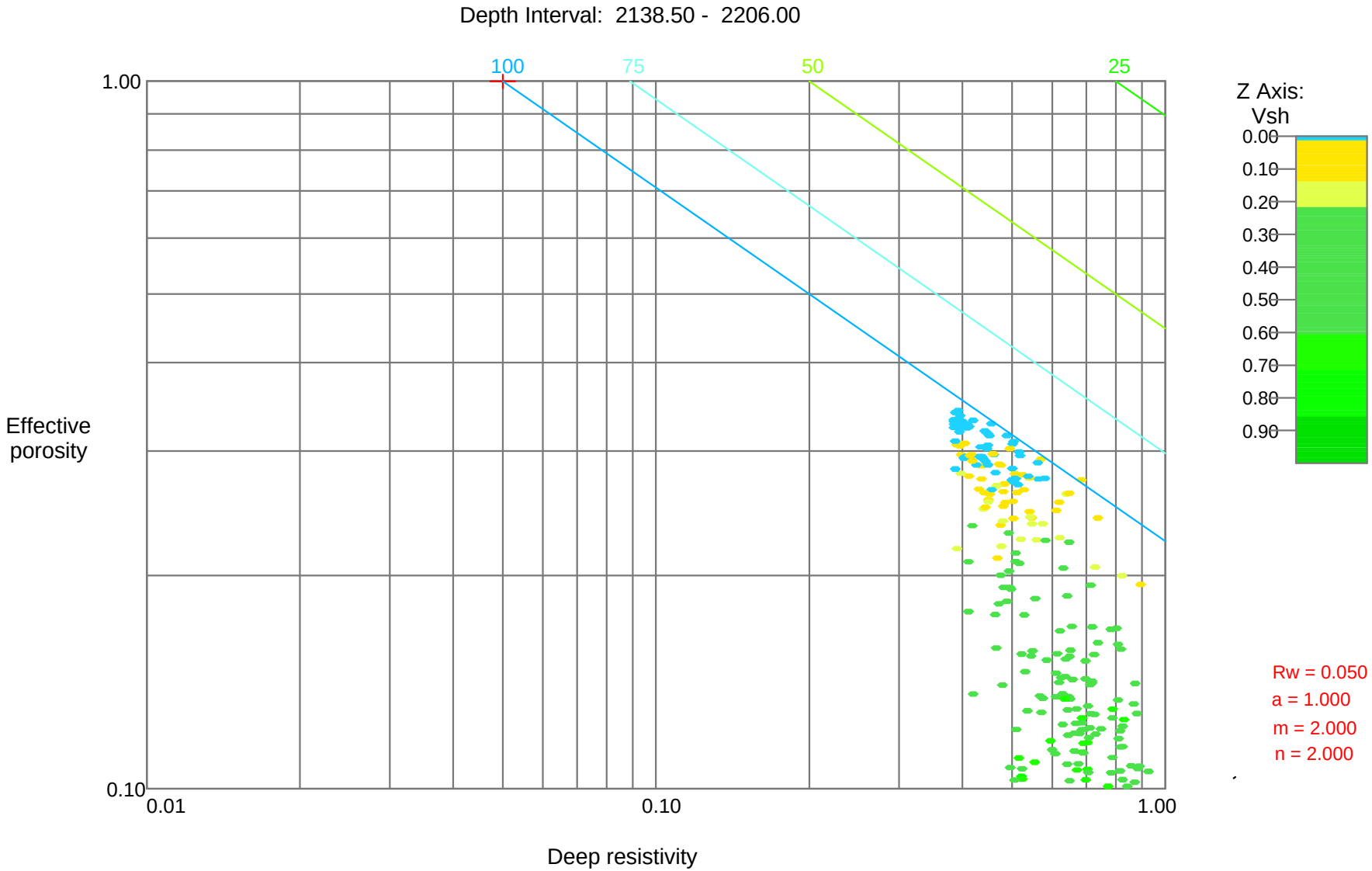
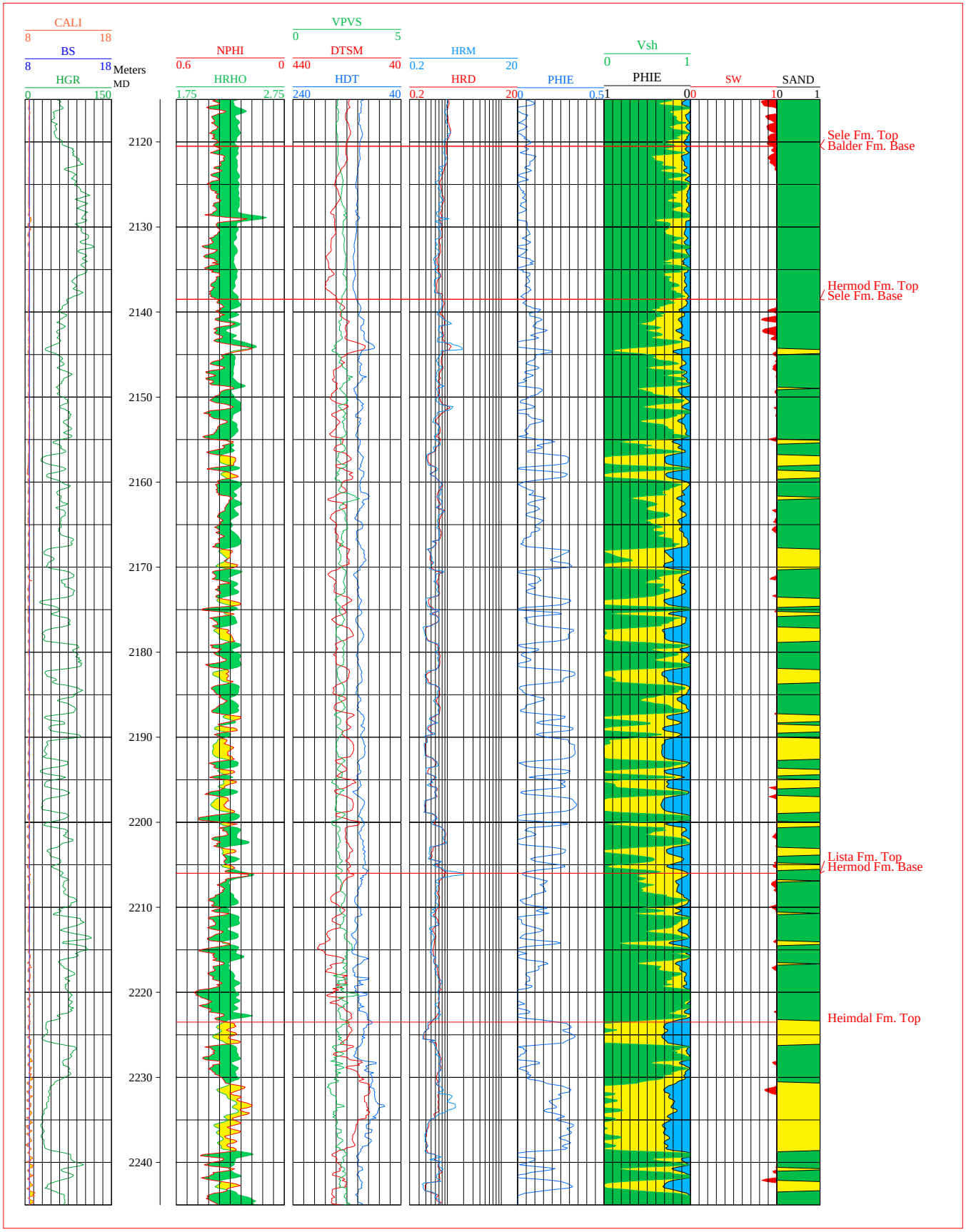


Figure 8.2


CALI
8
18
BS
8
18
HGR
0
150
Meters
MD
NPHI
0.6
0
HRHO
1.75
2.75
VPVS
0
5
DTSM
440
40
HDT
240
40
HRM
0.2
20
HRD
0.2
200
PHIE
0.5
Vsh
0
1
PHIE
1
0
SW
0
1
SAND
2120
2130
2140
2150
2160
2170
2180
2190
2200
2210
2220
2230
2240
Sele Fm. Top
Balder Fm. Base
Hermod Fm. Top
Sele Fm. Base
Lista Fm. Top
Hermod Fm. Base
Heimdal Fm. Top

9 Appendices

A. Log operations report
B. Depth shifting, splicing and editing of log curves

Appendix A

Log Operation Report
Well 24/12-4
Reservoir logging 8 1/2" hole

Well- and mud information

FIELD: Wildcat	**WELL**: 24/12-4 B - Prospect	**DATE**: 09 - 11.09.2001

TYPE OF OPERATION: Open hole reservoir logging, 8 1/2" hole section

STATOIL ENGINEERS: Tor Finn Kristensen, Tore A. Svånå

LOGGING COMPANY: Schlumberger

LOGGING ENGINEERS: C. Medeossi, S. Allan, K. Gordon

WELL DATA	
Type: Exploration	
Area / Block: PL204 / Norway / 24/12-4	
Slot:	
UTM-N: 6 562 418 m Latitude: 59 ^{o} 11' 36.95" N	
UTM-E: 429 265 m Longitude: 01 ^{o} 45' 42.69" E	
RKB height: 25 m	
Water depth: 115 m	
Max. angle: 1.90 ^{o} At depth: 2068 m MD Direction: 11.50 ^{o}	
TD Driller: 2265 m MD RKB	
TD Logger: 2066 MD RKB	
Casing shoe Driller: 1007.5 m MD RKB	
Casing shoe Logger: 1008 m MD RKB	
Bit size: 8 1/2"	
Casing size: 13 3/8"	

MUD DATA
Type: NOVATEC (OBM)
Density: 1.35 g/cc
Viscosity: PV = 23 mPas @ 50^{o} C
Fluid loss: 1.6 HTHP
Salinity: 20000 mg/l (Chlorides)
pH:
Calcium:
Solids: 17.00 vol%
Rm: not applicable
Rmf: not applicable
Rmc: not applicable
Circulation time: 1.5 hours
Stop circ.: 09.09.01 12:00

MAX. BOTTOM HOLE TEMPERATURE

Temp ^{o}C	Date	Time	Depth m MD RKB
67	09:09.01	22:25	2245

-

Logging program and operational comments

LOGGING PROGRAM				
#	**TOOL COMBINATION**	**RUN**	**INTERVAL m MD RT**	**Temp. ºC**
1	DSI - PEX - -ACTS 09.09 - 18:00 to 10.09 - 03:00	1A	2266 - 380 m	67.0
2	ASI - GR - ACTS 10.09 - 15:15 to 10.09 - 23:00	1A	1400 - 603 m	
3	CSI - GR - ACTS 10.09 - 23:00 to 11.09 - 06:30	1A	2260 - 600 m	

ANALYSIS OF TOTAL TIME, DOWN TIME AND LOST TIME				
#	**TOTAL TIME (hrs)**	**DOWN TIME (hrs)**	**LOST TIME (hrs)**	**COMMENTS**
1	9		0.25	Electronic card in aquisition system hung up
WOW	12.25			Waiting on weather between run 1 and 2
2	7.75		1.0	Unable to pass below 1425m with ASI-GR. While logging up lost signals from both hydrophones. Had to pull into shoe while repairing. After repair, logged the VSP program within 13 3/8" casing.
3	7.5	2.0		2 hours was spent before getting below 1400m where the ASI-GR log stopped. Logged from TD to 1400 m, and the gaps above caused by the failure in the hydrophones during ASI-run
Total:	**36.5**	**2.0**	**1.25**	

FAILURES/COMMENTS

Run 1A, DSI - PEX – ACTS:
The plan was to take repeat section just below the shoe after the main log. While logging main log from TD, bad spooling occurred at 2100 m. We had to go down a few meters and decided to go to TD and use the logged section as repeat. There was not much extra time involved and weather forecast indicated that we had to WOW after the run was completed.
FEC, which is an electronic card in the aquisition system failed while logging. The card had to be restarted and was checked while logging down 40-50m. The card was working OK. 15 minutes was lost before we were logging at same depth again.

Run 1A, ASI - GR – ACTS:
After we stood up at 1425m, a GR tie in was done. First station was with lower geophone at 1400 m. At the next station, with lower geophone at 1289.5m, both hydrophone signals were lost. Since the 5-geophone tool was set over the Grid Formation with spring loaded geophones, we did not take the chance to leave it there, and pulled up into the shoe. And since the geophones were opened, it was not longer possible to run into hole again from this depth.
When the airgun package was pulled out of the sea both lines to the hydrophones were found to be broken. Rough weather is probably the main reason for this. The lines were replaced and we started logging from the shoe after one hour lost time.

Run 1A, CSI - GR – ACTS:
This run went very well. Some flickering was seen on the tension when we passed 1420 - 1427m, indicating that some obstructions / ledges were present.
Good data was obtained and the operation went fast to be a one-geophone tool.

Operations

SEQUENCE OF EVENTS

DATE	TIME	EVENT
		Log #1, DSI - PEX - ACTS (Run 1A)
09.09.2001	18:00	Start rig up wireline
	18:30	Start pick up tools
	19:35	Prejob safety meeting on drill floor
	19:45	Start checking tools
	20:00	Loaded sources
	20:20	Start RIH
	20:50	Start down log from shoe
	22:00	Start repeat section from TD, bad spooling at 2100m, had to go down, therefore made this log repeat section
	22:25	Start main log from TD (2266m)
	22:55	FEC (electronic card in aquisition system) hung up at 1907m. Stopped log, restarted FEC and logged up from 1950m, OK.
	23:10	At same depth logging up, lost 15 minutes.
10.10.2001	00:40	Finished main log in casing shoe
	00:45	Start record DSI in casing, low frequences on upper dipole. After 40m decided to log with low frequences on both dipoles.
	00:50	Start recording DSI in casing, low frequences on both dipoles.
	01:50	Recorded top section with lower dipole standard frequences
	02:00	Stopped DSI in casing at 375m, POOH.
	02:20	Tool string at surface
	03:00	Finished rig down DSI-PEX. Wind to high for crane operations, unable to jump airguns into water. WOW
		Log #2, ASI - GR - ACTS (Run 1A)
	15:15	Start rig up ASI, array seismic imager with 5 geophones
	16:35	RIH, check shots at 600m, 944,8m and 1210m. Not able to pass below 1425m, small washout on caliper.
	19:15	Made depth tie with GR.
	19:40	Start survey at first station, 1400m
	20:00	At second station, 1289,5m. No hydrophone signals. POOH into shoe while lifting airguns out of water. Found lines to both hydrophones broken, replaced same and jumped airguns into water again. 1 hour lost time!!!!
	21:00	Started survey again at 995m
	21:55	Finished survey at 603m, POOH
	2215	OOH. Rigged down ASI-GR-ACTS (primary VSP tool with 5 geophones).

Log #3, CSI - GR - ACTS (Run 1A)		
	23:00	Start rig up CSI (combinable seismic imager), backup VSP tool with 1 geophone.
	23:30	Start RIH
11.09.2001	00:00	Check shot at 600m, good data
11.09.2001	00:05	RIH. Down hole tool electronic check before entering open hole
	00:35	Check shot at 1200m, good data
	01:10	GR depth tie at 2100m, 2.5m shallow
	01:30	Check shot at 2080m, good data.
	01:50	Start survey at 2260m, 20m level spacing up to 1500m, 50m spacing up to 900m, good data
	05:12	Completed survey, POOH
	05:45	At surface, rig down
	06:30	Finished rig down wireline

Appendix B: Depth shifting, splicing and editing of log curves

The depth shifting, editing and splicing of log curves has been done according to NPD's 'Reporting requirements for digital well data'. This job has been performed by Logtek AS on behalf of Statoil, and below is a copy of their Audit Trail (Information) file:

```
OPERATOR: STATOIL
WELL    : 24/12-4     L1012
FIELD   : B-PROSPECT
RIG     : BYFORD DOLPHIN
COUNTRY : NORWAY

- Wireline and MWD data plotted and verified to prints.
  MWD GR-MPR-MPRL, run 1-2:
  Digital curve WBCS reported in "kg" and in "tonnes" on field print.
  Digital curve RPTH reported in "seconds" and in "minutes" on field print.
- Depth units are meters.

- Quality comments (the comments on sonic log are from John Philips, Schlumberger):
. DSI-GR through casing, run 1A: Poor DSI data in zones. Compressional data above
  575 m incorrect. Poor measurements in zones below 575 m - i.e. 595-607 m,
  685-698 m.
. shear above 704: this strong arrival has been seen before in casing.
  It correlates to a significant increase in DT-compressional (~130->170). At that
  value a 'shear' of 280 is not reasonable. It fits with observations & suggestions
  that shear in casing above ~270us/ft gives way to a casing mode.
  The repeat section over this zone in standard frequency mode is similar apart
  from generated an extra peak in places at faster DT ( e.g. 475-500m). This is
  possibly a dispersive mode present at higher frequencies - not useful. Shear
  above 704 has to be considered not measurable.
. Shear below 704: potentially OK : the generally faster DT2(upper dipole)has been
  used (which seems reasonable). However shear should be checked against
  compressional for consistency of Vp/Vs.
. TLD-HGNS-DSI-GR-ACTS, run 1A: Data above 1008 m logged in casing.
  Density data affected by large/washed out borehole above 1017 m.
. MWD GR-MPR, run 1: Data above 197 m logged in casing.
. MWD GR-MRPL, run 2: Data above 1008 m logged in casing.

- Editing on WLC_PETROPHYSICAL_COMPOSITE.LIS:
. DSI-GR through casing, run 1A:
  Repeated values in top/bottom of logged interval replaced by empty values.
  Data from upper and lower casing pass merged at 480.1 m.
. TLD-HGNS-DSI-GR-ACTS, run 1A:
  Repeated values in top/bottom of logged interval replaced by empty values.
. MWD GR-MRPL, run 2: Resistivity data affected by casing 1007.2 m and have been
  replaced by empty values in this zone.

- Editing on WLC_COMPOSITE.LIS:
. Density data affected by casing/large borehole above 1012.1 m and has been
  replaced by empty values in this zone.
. AC readings above 573.9 m invalid and not used in composite. Questionable AC
  readings replaced by empty values in following intervals:
  596.0-605.8 m and 688.4-691.0 m
  DTTP and DTRP used in zones in order to improve AC quality:
  DTRP: 573.9-577.4 m, 691.0-696.8 m
  DTTP: 587.4-590.4 m, 683.8-689.0 m
. RDEP and RMED affected by casing above 196.1 m and have been replaced by empty
  values in this zone.
- Depth shifting:
  Depth shifting applied to MWD GR-MPR-MRPL, run 1-2 from Baker Hughes Inteq
  in order to match wireline data:

  Reference curve : GR (DSI-GR through casing, run 1A)
                    GR, DTCO & RHOZ (TLD-HGNS-DSI-GR-ACTS, run 1A)
  Offset curve    : GRAM & RPCH (MWD GR-MPR-MRPL, run 1-2)
```

```
  Curves shifted  : All curves

. Shift pairs used:

   Observed: Actual:
   197.000   197.000
   691.134   688.238
   822.503   819.455
   859.841   856.945
   941.375   938.936
   947.166   945.642
   978.865   977.494
   995.629   992.276
  1007.974  1006.297
  1010.869  1009.040
  1017.575  1015.441
  1042.568  1040.130
  1103.224  1100.328
  1111.453  1108.100
  1125.626  1122.121
  1130.808  1127.760
  1146.200  1143.305
  1188.568  1184.758
  1193.140  1190.092
  1204.874  1201.217
  1206.703  1203.655
  1211.123  1207.465
  1215.847  1212.799
  1225.144  1222.705
  1245.260  1242.517
  1253.642  1251.204
  1258.976  1255.624
  1264.615  1262.482
  1303.782  1302.410
  1322.832  1322.222
  1336.548  1336.091
  1351.178  1350.112
  1357.884  1357.122
  1365.809  1364.894
  1374.800  1374.800
  1377.696  1377.391
  1383.640  1383.182
  1414.272  1413.510
  1420.216  1419.758
  1430.122  1431.036
  1434.846  1435.913
  1445.971  1446.733
  1460.602  1460.906
  1465.326  1465.783
  1474.318  1474.775
  1488.948  1489.405
  1508.455  1508.303
  1515.466  1514.399
  1527.353  1526.591
  1533.601  1533.754
  1548.689  1548.232
  1558.595  1557.985
  1574.292  1573.987
  1580.540  1580.236
  1614.068  1614.068
  1662.989  1662.989
  1676.705  1678.076
  1708.404  1708.556
  1723.796  1724.406
  1741.627  1742.694
  1756.105  1756.562
  1771.650  1772.717
  1827.124  1827.733
  1888.693  1888.998
  1953.006  1953.006
```

Observed:	Actual:
1964.131	1964.741
1981.352	1981.352
1989.582	1989.582
2021.434	2021.129
2029.663	2029.511
2036.064	2035.759
2041.550	2041.093
2049.475	2049.628
2064.106	2065.172
2078.126	2079.041
2088.794	2089.556
2094.128	2094.433
2114.550	2114.702
2123.389	2123.389
2151.278	2151.278
2158.746	2159.051
2176.120	2176.120
2184.349	2184.197
2192.579	2192.274
2194.408	2194.712
2196.236	2196.541
2200.199	2200.199
2204.466	2204.466
2206.142	2205.076
2207.667	2206.905
2213.000	2212.696
2227.783	2228.240
2240.585	2240.280
2247.595	2246.986
2255.672	2256.130

CURVE SUMMARY, file WLC_COMPOSITE.LIS:

The curve GR consists of the following:

Main Services	Curve	Run no.	Date (start)	Interval (meters)	Merge depth (meters)
MWD GR-MPR	GRAM	1	02-SEP-01	190.2-1000.8	1000.8
TLD-HGNS-DSI-GR-ACTS	GR	1A	09-SEP-01	1000.8-2243.0	2243.0
MWD GR-MPRL	GRAM	2	06-SEP-01	2243.0-2264.4	

The curve CALI consists of the following:

TLD-HGNS-DSI-GR-ACTS	HCAL	1A	09-SEP-01	983.8-2250.3	

The curve RDEP consists of the following:

MWD GR-MPR-MRPL	RACH	1-2	02-SEP-01	196.1-2263.1	

The curve RMED consists of the following:

MWD GR-MPR-MRPL	RPCH	1-2	02-SEP-01	196.1-2263.1	

The curve AC consists of the following:

DSI-GR through casing	DTCO	1A	09-SEP-01	380.5-1012.5	1012.5
TLD-HGNS-DSI-GR-ACTS	DTCO	1A	09-SEP-01	1012.5-2264.4	

The curve DEN consists of the following:

TLD-HGNS-DSI-GR-ACTS	RHOZ	1A	09-SEP-01	1012.1-2251.6	

The curve PEF consists of the following:

TLD-HGNS-DSI-GR-ACTS	PEFZ	1A	09-SEP-01	1010.4-2251.3	

The curve NEU consists of the following:

TLD-HGNS-DSI-GR-ACTS	NPHI	1A	09-SEP-01	983.8-2250.4	

The curve BS consists of the following:

	BS			203.0-2265.0	

CURVE SUMMARY, file WLC_PETROPHYSICAL_COMPOSITE.LIS

File #2:

Main Services	Curve	Run no.	Date (start)	Interval (meters)	Merge depth (meters)	Depth shifted	Edited
DSI-GR through casing	CHR1	1A	09-SEP-01	380.5-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	CHR1	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	CHR2	1A	09-SEP-01	380.5-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	CHR2	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	CHRP	1A	09-SEP-01	379.8-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	CHRP	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	CHRS	1A	09-SEP-01	379.8-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	CHRS	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	CHTP	1A	09-SEP-01	379.8-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	CHTP	1A	09-SEP-01	1012.5-2264.4		No	No
DSI-GR through casing	CHTS	1A	09-SEP-01	379.8-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	CHTS	1A	09-SEP-01	1012.5-2264.4		No	No
DSI-GR through casing	CS	1A	09-SEP-01	376.9- 995.5	995.5	No	No
TLD-HGNS-DSI-GR-ACTS	CS	1A	09-SEP-01	995.5-2268.8		No	No
DSI-GR through casing	CVEL	1A	09-SEP-01	376.9- 995.5	995.5	No	No
TLD-HGNS-DSI-GR-ACTS	CVEL	1A	09-SEP-01	995.5-2268.8		No	No
DSI-GR through casing	DF	1A	09-SEP-01	376.9- 995.5	995.5	No	No
TLD-HGNS-DSI-GR-ACTS	DF	1A	09-SEP-01	995.5-2268.8		No	No
DSI-GR through casing	DT1	1A	09-SEP-01	380.5-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	DT1	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	DT1R	1A	09-SEP-01	380.5-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	DT1R	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	DT2	1A	09-SEP-01	380.5-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	DT2	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	DT2R	1A	09-SEP-01	380.5-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	DT2R	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	DT4P	1A	09-SEP-01	379.8-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	DT4P	1A	09-SEP-01	1012.5-2264.4		No	No
DSI-GR through casing	DTCO	1A	09-SEP-01	380.5-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	DTCO	1A	09-SEP-01	1012.5-2264.4		No	No
DSI-GR through casing	DTRP	1A	09-SEP-01	379.8-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	DTRP	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	DTSM	1A	09-SEP-01	380.5-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	DTSM	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	DTTP	1A	09-SEP-01	379.8-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	DTTP	1A	09-SEP-01	1012.5-2264.4		No	No
DSI-GR through casing	GR	1A	09-SEP-01	377.2- 995.5	995.5	No	No
TLD-HGNS-DSI-GR-ACTS	GR	1A	09-SEP-01	995.5-2245.8		No	No
TLD-HGNS-DSI-GR-ACTS	HCAL	1A	09-SEP-01	983.6-2251.3		No	No
DSI-GR through casing	PR	1A	09-SEP-01	380.5-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	PR	1A	09-SEP-01	1012.5-2260.7		No	No
DSI-GR through casing	TENS	1A	09-SEP-01	376.9- 995.5	995.5	No	No
TLD-HGNS-DSI-GR-ACTS	TENS	1A	09-SEP-01	995.5-2268.8		No	No
DSI-GR through casing	VPVS	1A	09-SEP-01	380.5-1012.5	1012.5	No	No
TLD-HGNS-DSI-GR-ACTS	VPVS	1A	09-SEP-01	1012.5-2260.7		No	No

File #4:

TLD-HGNS-DSI-GR-ACTS	CDF	1A	09-SEP-01	983.6-2268.8		No	No
TLD-HGNS-DSI-GR-ACTS	CS	1A	09-SEP-01	983.6-2268.8		No	No
TLD-HGNS-DSI-GR-ACTS	CVEL	1A	09-SEP-01	983.6-2268.8		No	No
TLD-HGNS-DSI-GR-ACTS	DSOZ	1A	09-SEP-01	1003.8-2251.7		No	No
TLD-HGNS-DSI-GR-ACTS	ECGR	1A	09-SEP-01	983.6-2245.9		No	No
TLD-HGNS-DSI-GR-ACTS	GR	1A	09-SEP-01	983.6-2245.9		No	No
TLD-HGNS-DSI-GR-ACTS	HCAL	1A	09-SEP-01	983.8-2250.3		No	No
TLD-HGNS-DSI-GR-ACTS	HDRA	1A	09-SEP-01	1003.8-2251.7		No	No
TLD-HGNS-DSI-GR-ACTS	HTEM	1A	09-SEP-01	983.6-2268.8		No	No
TLD-HGNS-DSI-GR-ACTS	NPHI	1A	09-SEP-01	983.8-2250.4		No	No
TLD-HGNS-DSI-GR-ACTS	PEFZ	1A	09-SEP-01	1003.8-2251.3		No	No
TLD-HGNS-DSI-GR-ACTS	RHOZ	1A	09-SEP-01	1003.8-2251.6		No	No
TLD-HGNS-DSI-GR-ACTS	TENS	1A	09-SEP-01	983.6-2268.8		No	No

File #6:

Main Services	Curve	Run no.	Date (start)	Interval (meters)	Merge depth (meters)	Depth shifted	Edited
MWD GR-MPR-MRPL	GRAM	1-2	02-SEP-01	190.2-2264.4		Yes	No
MWD GR-MPR-MRPL	RACH	1-2	02-SEP-01	190.2-2263.1		Yes	Yes
MWD GR-MPR	RACL	1	02-SEP-01	190.3-1000.0		Yes	No
MWD GR-MPR	PCSH	1	02-SEP-01	190.2-1000.0		Yes	No
MWD GR-MPR-MRPL	ROPS	1-2	02-SEP-01	203.0-2265.4		Yes	No
MWD GR-MPR-MRPL	RPCH	1-2	02-SEP-01	190.2-2263.1		Yes	Yes
MWD GR-MPR	RPCL	1	02-SEP-01	190.5-1000.2		Yes	No
MWD GR-MPR-MRPL	RPTH	1-2	02-SEP-01	190.2-2263.0		Yes	No
MWD GR-MPR-MRPL	TCDM	1-2	02-SEP-01	205.7-2265.0		Yes	No
MWD GR-MPR-MRPL	WBCS	1-2	02-SEP-01	203.0-2265.4		Yes	No

10 Attachments

1. CPI plot, scale 1:200, Sele, Hermod, Lista and Heimdal Formations