P-06-159

Oskarshamn site investigation

RAMAC, BIPS and deviation logging in boreholes KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 and HLX40 and BIPS and deviation logging in KLX19A

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July 2006

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Keywords: BIPS, RAMAC, Radar, TV.

Abstract

This report includes the data gained in geophysical logging operations performed within the site investigation at Oskarshamn. The logging operations presented here includes borehole radar (RAMAC), BIPS and deviation logging in the core drilled boreholes KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A and KLX20A and in the percussion drilled boreholes HLX38 and HLX40. The report also includes BIPS and deviation logging in the core drilled borehole KLX19A. All measurements were conducted by Malå Geoscience AB/RAYCON during the period May to July 2006.

The objective of the radar surveys is to achieve information on the rock mass around the borehole. Borehole radar is used to investigate the nature and the structure of the rock mass enclosing the boreholes.

The objective of the BIPS logging is to achieve information of the borehole including occurrence of rock types as well as determination of fracture distribution and orientation.

The objective of the deviation measurement is to achieve information on borehole coordinates as well as dip and azimuth along the borehole length.

This report describes the equipment used as well as the measurement procedures and data gained. For the BIPS survey, the result is presented as images. Radar data is presented in radargrams and the identified reflectors are listed. The deviation measurement is presented as a list of data.

The borehole radar data quality from KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 and HLX40 was good to satisfying, but in parts of lower quality due to more conductive conditions. This conductive environment of course reduces the possibility to distinguish and interpret possible structures in the rock mass which otherwise could give a reflection.

However, the borehole radar measurements resulted in 34 identified radar reflectors in KLX11B and of these 5 were orientated (strike/dip). In KLX11C the corresponding figures are 33 and 3, in KLX11D 32 and 7, in KLX11E 39 and 9, in KLX11F 41 and 5; in KLX18A 139 and 23 and in KLX20A 95 and 21. In HLX38 52 radar reflectors were identified and in HLX40 22 reflectors were identified.

The BIPS measurements performed was of acceptable quality except for the loggings in KLX11B to F. A second measurement run was carried out in KLX11C to KLX11F. Unfortunately KLX11B was blocked with other equipment during the time for the re-measurement. The re-measurement resulted in improved image quality for KLX11C to KLX11F.

Sammanfattning

Denna rapport omfattar geofysiska loggningar inom platsundersökningsprogrammet för Oskarshamn. Mätningarna som presenteras här omfattar borrhålsradarmätningar (RAMAC), och BIPS-loggningar i kärnborrhålen KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A och KLX20A, samt i hammarborrhålen HLX38 och HLX40. Rapporten innehåller också BIPS i kärnborrhål KLX19A. I alla borrhål genomfördes även avvikelsemätningar, s k krökningsmätningar. Alla mätningar är utförda av Malå Geoscience AB/RAYCON under perioden maj–juli 2006.

Syftet med radarmätningarna är att samla information om bergmassan runt borrhålet. Borrhålsradar används till att karakterisera bergets egenskaper och strukturer i bergmassan närmast borrhålet.

Syftet med BIPS-loggningen är att skaffa information om borrhålet inkluderande förekommande bergarter och bestämning av sprickors fördelning och deras orientering.

Syftet med krökningsmätningarna är att mäta lutning och riktning och därmed få fram koordinater för punkter längs med borrhålet.

Rapporten beskriver utrustningen som använts liksom mätprocedurer och en beskrivning och tolkning av data som erhållits. För BIPS-loggningen presenteras data som plottar längs med borrhålet. Radardata presenteras i radargram och en lista över tolkade radarreflektorer ges. Krökningsmätningen presenteras som en lista med lägesdata.

Borrhålsradardata från KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 och HLX40 var god till tillfredställande, men i delar var djuppenetrationen sämre troligen till stor del beroende på en konduktiv miljö. En konduktiv miljö minskar möjligheterna att identifiera strukturer från borrhålsradardata.

Dock har 34 radarreflektorer identifierats i KLX11B och av dessa har 5 orienterats (med strykning/stupning). Motsvarande siffror för KLX11C är 33 och 3; för KLX11D 32 och 7, för KLX11E 39 och 9, för KLX11F 41 och 5, för KLX18A 139 och 23, och för KLX20A 95 och 21. I HLX38 har 52 radarreflektorer identifierats och 22 reflektorer identifierades i HLX40.

BIPS-mätningarna var av acceptabel kvalitet förutom i borrhålen KLX11B till KLX11F. En omloggning utfördes därför i dessa borrhål. Tyvärr var KLX11B blockerad av annan utrustning vid mättillfället och kunde därför inte loggas om. Omloggningen innebar en förbättrad kvalitet i KLX11C till KLX11F.

Contents

1 Introduction

This report presents the data gained in geophysical logging operations, which is one of the activities performed within the site investigation at Oskarshamn. The logging operations presented here includes borehole radar (RAMAC) and BIPS measurements in the core drilled boreholes KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A and KLX20A and in the percussion drilled boreholes HLX38 and HLX40. In all boreholes deviation measurements were also carried out.

The work was carried out in accordance with activity plan AP PS 400-06-058. In Table 1-1 controlling documents for performing this activity are listed. Both activity plan and method descriptions are SKB's internal controlling documents.

This report includes measurements from 0 to 95 m in KLX11B, from 0 to 115 m in KLX11C, from 0 to 115 m in KLX11E, from 0 to 115 m in KLX11F, from 100 to 605 m in KLX18A, from 5 to 96 m in KX19A from 100 to 450 m in KLX20A, from 0 to 196 m in HLX38 and from 0 to 196 m in HLX40.

The boreholes KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX19A and KLX20A are core drilled with a diameter of 76 mm. The percussion drilled boreholes HLX38 and HLX40 are drilled with diameter of 139 mm.

All measurements were conducted by Malå Geoscience AB/RAYCON during May 2006. The investigation site and location of the boreholes is shown in Figure 1-1.

The used investigation techniques comprised:

- Borehole radar measurements (Malå Geoscience AB:s RAMAC system) with dipole and directional radar antennas.
- Borehole TV logging with the so-called BIP-system (Borehole Image Processing System), which is a high resolution, side viewing, colour borehole TV system.
- Borehole deviation equipment (Flexit SmartTool from Flexit AB), measuring azimuth, inclination (dip), tool face (gravity and magnetic) and magnetic dip.

The delivered raw and processed data have been inserted in the database of SKB (SICADA) and data are traceable by the activity plan number.

Table 1-1. Controlling documents for the performance of the activity (SKB internal controlling documents).

Activity plan	**Number**	**Version**
Borrhålsradar, BIPS och Flexit-mätning i KLX20A, KLX18A, KLX11B-F, HLX38 och HLX40	AP PS 400-06-058	1.0
Bips och krökningsmätning med Flexit i grovdelen på KLX19A	Tillägg till AP PS 400-06-058	1.0
BIPS och Flexit-mätning i KLX22A, KLX22B, KLX23A, KLX23B samt BIPS i KLX11B, KLX11C, KLX11D, KLX11E och KLX11F	Tillägg till AP PS 400-06-058	1.0
Method descriptions	**Number**	**Version**
Metodbeskrivning för TV- loggning med BIPS	SKB MD 222.006	1.0
Metodbeskrivning för borrhålsradar	SKB MD 252.020	2.0
Metodbeskrivning för krökningsmätning av hammar- och kärnborrhål	SKB MD 224.001	1.0

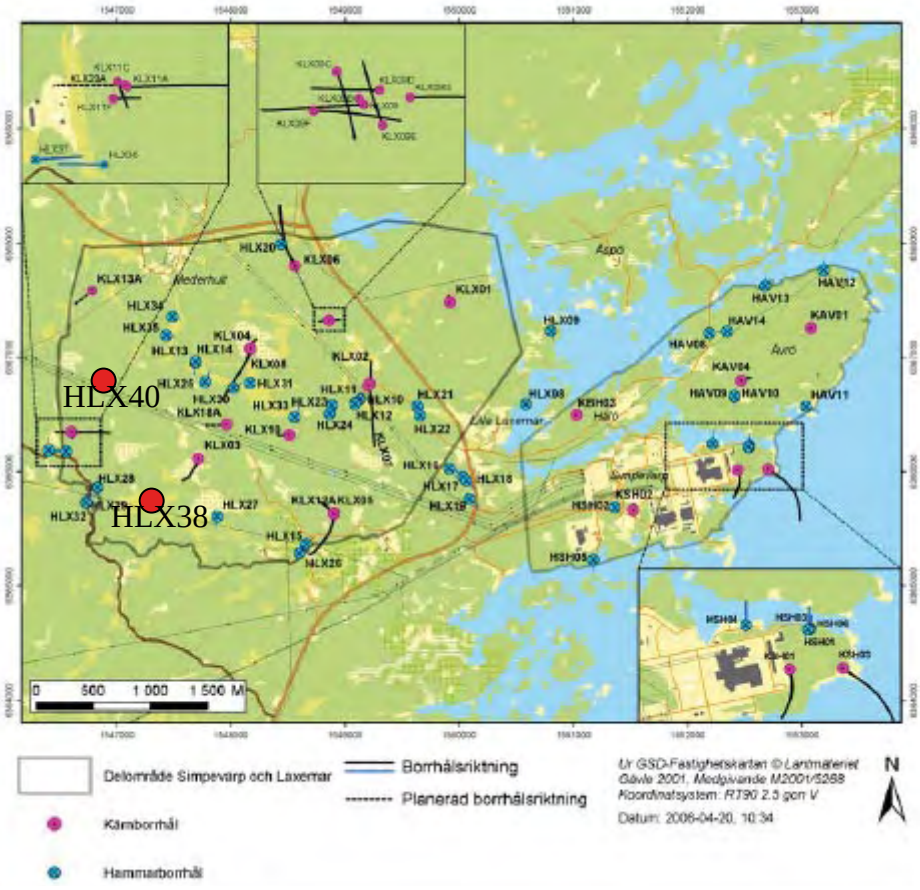


Figure 1-1. *Map of the location of the boreholes KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 and HLX40 in the Laxemar subarea, Oskarshamn, see also Figure 5-2.*

2 Objective and scope

The objective of the radar and BIPS surveys is to achieve information on the borehole conditions (borehole wall) as well as on the rock mass around the borehole. Borehole radar is engaged to investigate the nature and the structure of the rock mass enclosing the boreholes, and borehole TV for geological surveying of the borehole including determination of rock types as well as fracture distribution and orientation.

The objective of deviation logging is to achieve information of the borehole coordinates as well as dip and azimuth along the entire borehole length.

This report describes the equipment used for the radar, BIPS and deviation surveys as well as the measurement procedures and data gained. For the BIPS survey, the result is presented as images. Radar data is presented in radargrams and the identified reflectors are listed. The deviation measurements are presented as lists of data (coordinates etc).

3 Equipment

3.1 Radar measurements RAMAC

The RAMAC GPR system owned by SKB is a fully digital GPR system where emphasis has been laid on fast survey speed and easy field operation. The system operates dipole and directional antennas (see Figure 3-1). A system description is given in the SKB internal controlling document MD 252.021.

The borehole radar system consists of a transmitter and a receiver antenna. During operation an electromagnetic pulse, within the frequency range of 20 MHz up to 250 MHz, is emitted into the bedrock. Once a feature, e.g. a water-filled fracture, with sufficiently different electrical properties is encountered, the pulse is reflected back to the receiver and recorded.

The directional antenna

Figure 3-1. *Example of a borehole radar antenna.*

3.2 TV-Camera, BIPS

The BIPS 1500 system used is owned by SKB and described in SKB internal controlling document MD 222.005. The BIPS method for borehole logging produces a digital scan of the borehole wall. In principle, a standard CCD video camera is installed in the probe in front of a conical mirror (see Figure 3-2). An acrylic window covers the mirror part and the borehole image is reflected through the window and displayed on the cone, from where it is recorded. During the measuring operation, pixel circles are grabbed with a resolution of 360 pixels/circle.

The system orientates the BIPS images according to two alternative methods, either using a compass (vertical boreholes) or with a gravity sensor (inclined boreholes).

3.3 Deviation measurements, Flexit SmartTool

The deviation measurements were carried out with the Flexit SmartTool Deviation equipment, Figure 3-3. The system is based on station readings.

The system consist of a borehole probe (SensIT) including 3-component magnetometers and accelerometers, measuring a number of different parameters. Table 3-1 describe the delivered parameters. Inside the probe the radio link is also built in were all data is downloaded after the end of the survey. The probe are controlled during the measurement either by an external PC and the software package called MeasureIT or a data pad StoreIT. For processing and reporting data the PC software MeasureIT and DisplayIT are used.

In the Flexit SmartTool system there is a magnetic integrity check to detect magnetic disturbance in the survey measurements. Magnetic disturbance results in incorrect/inaccurate azimuth values. The operator can select the average values for this parameters in the MeasureIT software and run a magnetic integrity check and if necessary change or delete azimuth values. If the azimuth value is changed the new added value by the operator is interpolated from the nearby station readings.

For more information and technical specification visit www.flexit.se.

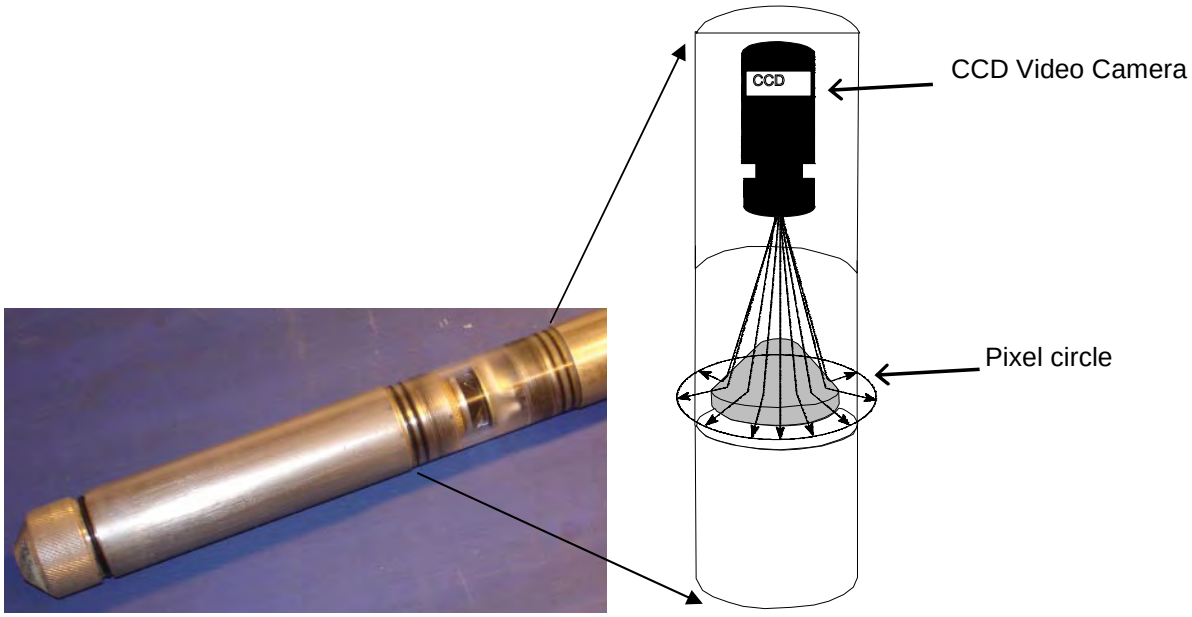


Figure 3-2. *The BIP-system. Illustration of the conical mirror scanning.*

Figure 3-3. *The FlexIT SmartTool-system. Illustration of the set-up in the borehole.*

Table 3-1. Flexit SmartTool result tables.

Dip:	Inclination of the borehole at the position for reading.
Azimuth:	Direction of the borehole at the position for reading.
Easting Northing and Elevation:	Co-ordinate of the borehole at the position for reading.
Mag. Field:	Strength of earth's magnetic field.
Mag. Dip:	Inclination of earth's magnetic field.
Grav. Field:	Indicates if the probe was moved during recording at that station.
Status:	Indicates if the azimuth value at the reading station was disturbed or changed by the operator. If the azimuth value has been edited or the magnetic integrity check have indicated a magnetic disturbance at the reading station a symbol with more than two "hands" is visible in the status field. 
Updown:	Shows the distance the actual reading station is above or below the planned straight line for the borehole given the starting direction.
Left/Right:	Shows the distance the actual reading station is left or right the planned straight line for the borehole given the starting direction.
Short Fall:	Shows the amount the actual point falls short of the planned survey point.

4 Execution

4.1 General

4.1.1 RAMAC Radar

The measurements in KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 and HLX40 were carried out with dipole radar antennas, with frequencies of 250, 100 and 20 MHz. In the core drilled boreholes measurements were also carried out using the directional antenna, with a central frequency of 60 MHz.

During logging the dipole antennas (transmitter and receiver) were lowered continuously into the borehole and data were recorded on a field PC along the measured interval. The measurement with the directional antenna is made stepwise, with a short pause for each measurement occasion. The antennas (transmitter and receiver, both for dipole and directional) are kept at a fixed separation by glass fibre rods according to Tables 4-1 to 4-9. See also Figure 3-1 and 4-1.

All measurements were performed in accordance with the instructions and guidelines from SKB (internal document MD 252.020). All cleaning of the antennas and cable was performed according to the internal document SKB MD 600.004 before the logging operation.

The functionality of the directional antenna was tested before measurements in KLX20A and KLX18A. These tests were performed by measurements in the air, where the receiver antenna and the transmitter antenna are placed apart. While transmitting and measuring the receiver antenna is turned around and by that giving the direction from the receiver antenna to the transmitter antenna. The difference in direction is measured by compass and the result difference achieved from the directional antenna was about 3 to 6 degrees. This can be considered to be very good due to the disturbed environment, with metallic objects etc at the test site.

For more information on system settings used in the investigation of KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 and HLX40, see Tables 4-1 to 4-9 below.

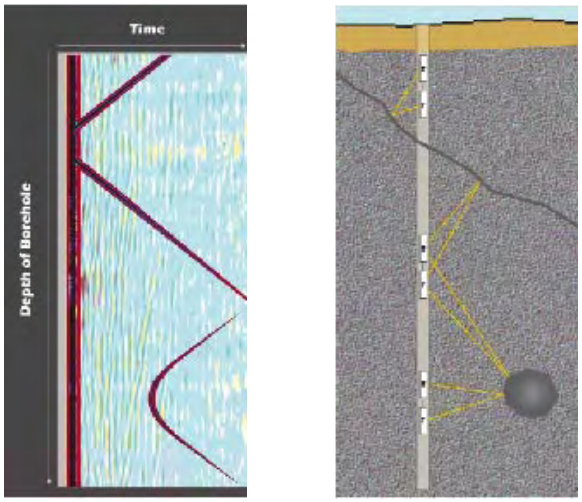


Figure 4-1. *The principle of radar borehole reflection survey and an example of result.*

Table 4-1. Radar logging information from KLX11B.

Site:	**Oskarshamn**	**Logging company:**		**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX11B**	**Equipment:**		**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**		**MALÅ GeoScience AB**	
Operator:	**CG**	**Antenna**			
		Directional	**250 MHz**	**100 MHz**	**20 MHz**
Logging date:		06-05-11	06-05-10	06-05-10	06-05-11
Reference:		T.O.C.	T.O.C.	T.O.C.	T.O.C.
Sampling frequency (MHz):		615	2,424	891	239
Number of samples:		512	619	518	518
Number of stacks:		32	Auto	Auto	Auto
Signal position:		410.5	–0.35	–0.35	1.42
Logging from (m):		3.4	1.5	2.6	6.25
Logging to (m):		93.4	96.5	96.6	91.25
Trace interval (m):		0.5	0.1	0.2	0.25
Antenna separation (m):		5.73	2.4	3.9	10.05

Table 4-2. Radar logging information from KLX11C.

Site:	**Oskarshamn**	**Logging company:**		**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX11C**	**Equipment:**		**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**		**MALÅ GeoScience AB**	
Operator:	**CG**	**Antenna**			
		Directional	**250 MHz**	**100 MHz**	**20 MHz**
Logging date:		06-05-13	06-05-13	06-05-13	06-05-13
Reference:		T.O.C.	T.O.C.	T.O.C.	T.O.C.
Sampling frequency (MHz):		615	2,424	891	239
Number of samples:		512	619	518	518
Number of stacks:		32	Auto	Auto	Auto
Signal position:		410.5	–0.35	–0.35	1.42
Logging from (m):		3.4	1.5	2.6	6.25
Logging to (m):		113.4	117.5	116.6	112.75
Trace interval (m):		0.5	0.1	0.2	0.25
Antenna separation (m):		5.73	2.4	3.9	10.05

Table 4-3. Radar logging information from KLX11D.

Site:	**Oskarshamn**	**Logging company:**		**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX11D**	**Equipment:**		**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**		**MALÅ GeoScience AB**	
Operator:	**CG**	**Antenna**			
		Directional	**250 MHz**	**100 MHz**	**20 MHz**
Logging date:		06-05-13	06-05-13	06-05-13	06-05-13
Reference:		T.O.C.	T.O.C.	T.O.C.	T.O.C.
Sampling frequency (MHz):		615	2,424	891	239
Number of samples:		512	619	518	518
Number of stacks:		32	Auto	Auto	Auto
Signal position:		410.5	–0.35	–0.35	1.42
Logging from (m):		3.4	1.5	2.6	6.25
Logging to (m):		113.4	117.1	116.6	112.25
Trace interval (m):		0.5	0.1	0.2	0.25
Antenna separation (m):		5.73	2.4	3.9	10.05

Table 4-4. Radar logging information from KLX11E.

Site:	**Oskarshamn**	**Logging company:**		**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX11E**	**Equipment:**		**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**		**MALÅ GeoScience AB**	
Operator:	**CG**	**Antenna**			
		Directional	**250 MHz**	**100 MHz**	**20 MHz**
Logging date:		06-05-13	06-05-13	06-05-13	06-05-13
Reference:		T.O.C.	T.O.C.	T.O.C.	T.O.C.
Sampling frequency (MHz):		615	2,424	891	239
Number of samples:		512	619	518	518
Number of stacks:		32	Auto	Auto	Auto
Signal position:		410.5	–0.35	–0.35	1.42
Logging from (m):		3.4	1.5	2.6	6.25
Logging to (m):		113.4	117.4	117.6	111.25
Trace interval (m):		0.5	0.1	0.2	0.25
Antenna separation (m):		5.73	2.4	3.9	10.05

Table 4-5. Radar logging information from KLX11F.

Site:	**Oskarshamn**	**Logging company:**		**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX11F**	**Equipment:**		**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**		**MALÅ GeoScience AB**	
Operator:	**CG**	**Antenna**			
		Directional	**250 MHz**	**100 MHz**	**20 MHz**
Logging date:		06-05-13	06-05-13	06-05-14	06-05-14
Reference:		T.O.C.	T.O.C.	T.O.C.	T.O.C.
Sampling frequency (MHz):		615	2,424	891	239
Number of samples:		512	619	518	518
Number of stacks:		32	Auto	Auto	Auto
Signal position:		410.5	–0.35	–0.35	1.42
Logging from (m):		3.4	1.5	2.6	6.25
Logging to (m):		113.4	117.7	116.0	111.75
Trace interval (m):		0.5	0.1	0.2	0.25
Antenna separation (m):		5.73	2.4	3.9	10.05

Table 4-6. Radar logging information from KLX18A.

Site:	**Oskarshamn**	**Logging company:**		**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX18A**	**Equipment:**		**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**		**MALÅ GeoScience AB**	
Operator:	**CG**	**Antenna**			
		Directional	**250 MHz**	**100 MHz**	**20 MHz**
Logging date:		06-05-16	06-05-15	06-05-16	06-05-16
Reference:		T.O.C.	T.O.C.	T.O.C.	T.O.C.
Sampling frequency (MHz):		615	2,424	891	239
Number of samples:		512	619	518	518
Number of stacks:		32	Auto	Auto	Auto
Signal position:		410.5	–0.35	–0.35	1.42
Logging from (m):		103.4	101.5	102.6	106.25
Logging to (m):		598.4	606.5	606.6	603.55
Trace interval (m):		0.5	0.1	0.2	0.25
Antenna separation (m):		5.73	2.4	3.9	10.05

Table 4-7. Radar logging information from KLX20A.

Site:	Oskarshamn	Logging company:		MALÅ GeoScience AB/RAYCON	
BH:	KLX20A	Equipment:		SKB RAMAC	
Type:	Directional/Dipole	Manufacturer:		MALÅ GeoScience AB	
Operator:	CG	Antenna			
		Directional	250 MHz	100 MHz	20 MHz
Logging date:		06-05-10	06-05-09	06-05-09	06-05-09
Reference:		T.O.C.	T.O.C.	T.O.C.	T.O.C.
Sampling frequency (MHz):		615	2,424	891	239
Number of samples:		512	619	518	518
Number of stacks:		32	Auto	Auto	Auto
Signal position:		410.5	–0.35	–0.35	1.42
Logging from (m):		103.4	101.5	102.6	106.25
Logging to (m):		448.4	450.5	451.9	447.15
Trace interval (m):		0.5	0.1	0.2	0.25
Antenna separation (m):		5.73	2.4	3.9	10.05

Table 4-8. Radar logging information from HLX38.

Site:	Oskarshamn	Logging company:	MALÅ GeoScience AB/RAYCON	
BH:	HLX38	Equipment:	SKB RAMAC	
Type:	Dipole	Manufacturer:	MALÅ GeoScience	
Operator:	CG	Antenna		
		250 MHz	100 MHz	20 MHz
Logging date:		06-05-14	06-05-14	06-05-14
Reference:		T.O.C.	T.O.C.	T.O.C.
Sampling frequency (MHz):		2,424	891	239
Number of samples:		619	518	518
Number of stacks:		Auto	Auto	Auto
Signal position:		–0.35	–0.35	–1.42
Logging from (m):		1.5	2.6	6.25
Logging to (m):		197.8	196.4	192.85
Trace interval (m):		0.1	0.2	0.25
Antenna separation (m):		2.4	3.9	10.05

Table 4-9. Radar logging information from HLX40.

Site:	Oskarshamn	Logging company:	MALÅ GeoScience AB/RAYCON	
BH:	HLX40	Equipment:	SKB RAMAC	
Type:	Dipole	Manufacturer:	MALÅ GeoScience	
Operator:	CG	Antenna		
		250 MHz	100 MHz	20 MHz
Logging date:		06-05-17	06-05-17	06-05-17
Reference:		T.O.C.	T.O.C.	T.O.C.
Sampling frequency (MHz):		2,424	891	239
Number of samples:		619	518	518
Number of stacks:		Auto	Auto	Auto
Signal position:		–0.35	–0.35	–1.42
Logging from (m):		1.5	2.6	6.25
Logging to (m):		196.5	195.6	191.85
Trace interval (m):		0.1	0.2	0.25
Antenna separation (m):		2.4	3.9	10.05

4.1.2 BIPS

All measurements were performed in accordance with the instructions and guidelines from SKB (internal document MD 222.006). All cleaning of the probe and cable was performed according to the internal document SKB MD 600.004 before the logging operation.

During the measurement, a pixel circle with a resolution of 360 pixels/circle was used and the digital circles were stored at every 1 mm on a MO-disc in the surface unit. The maximum speed during data collection was 1.5 m/minute.

A gravity sensor was used to measure the orientation of the images in the boreholes KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX19A, KLX20A, HLX38 and HLX40. In KLX11B a magnetic sensor was used.

In order to control the quality of the system, calibration measurements were performed in a test pipe before logging and after logging. Figure 4-2 show the results of the test logging performed before and after the logging campaign in May 2006. The results showed no difference regarding the colours and focus of the images. Results of the test loggings were included in the delivery of the raw data.

The BIPS logging information is found in the header for every single borehole presented in Appendices 10 to 19 in this report.

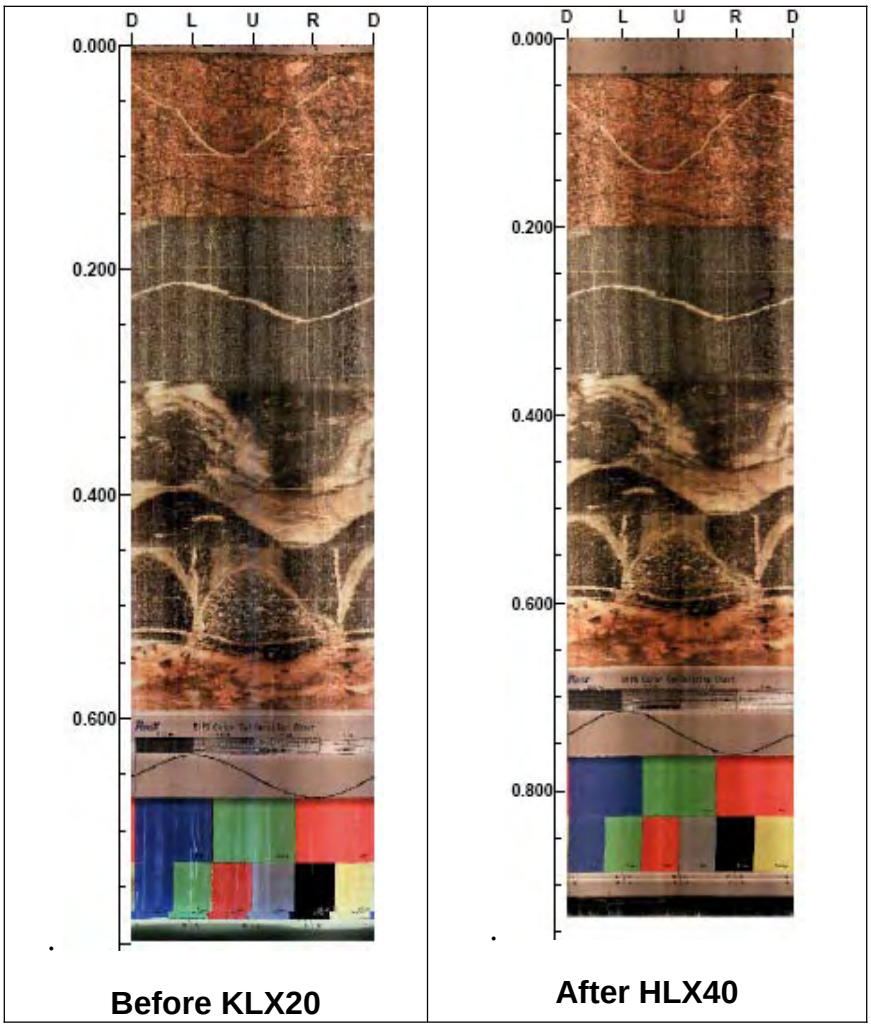


Figure 4-2. *Results from logging in the test pipe before and after the logging campaign in May 8th to 17th, 2006. The length scales are not essential in the test measurements.*

4.1.3 Deviation measurements

The deviation measurements were carried out according to the instructions and guidelines from SKB (internal document MD 224.001). All cleaning of the probe and cable was performed according to the internal document SKB MD 600.004 before the logging operation.

During the logging a measurement were performed for each 3 m. The logging was carried out in two directions, both from the surface measuring to the bottom of the borehole and a second run measuring from the bottom of the borehole up to the surface. For the operation in the borehole the RAMAC/BIPS winch installed in the container was used together with the standard length measuring devices. For an accurate depth control the length recording was adjusted regularly for every 50 m by the actual marks on the logging cable.

4.1.4 Length measurements

During logging the depth recording for the RAMAC systems is taken care of by a measuring wheel mounted on the cable winch. The logging is measured from TOC (Top of Casing). The length is adjusted to the bottom of casing when visible in the BIPS image.

During the BIPS logging in core drilled boreholes, where the reference marks in the borehole wall is visible on the image, the position where the depth mark is visible is marked with scotch tape on the logging cable. During BIPS logging the measured length was adjusted to true length according to depth mark visible in the BIPS image. The adjusted true length is marked with red in the image plot together with the non-adjusted measured length. The non-adjusted length is marked with black as seen in Appendices 10 to 19. The tape marks on the logging cable are then used for controlling the RAMAC measurement.

The experience we have from earlier measurements with dipole antennas in the core drilled boreholes in Forsmark and Oskarshamn for the radar logging is that the depth divergence is less than 100 cm in the deepest parts of a 1,000 m deep borehole.

The depth divergence is taken into account in the resulting tables in Chapter 5.

4.2 Analyses and Interpretation

4.2.1 Radar

The result from radar measurements is most often presented in the form of a radargram where the position of the probes is shown along one axis and the propagation of the radar wave propagation and reflection is shown along the other axis. The amplitude of the received signal is shown in the radargram with a grey scale where black colour corresponds to the large positive signals and white colour to large negative signals. Grey colour corresponds to no reflected signals.

The presented data in this report is adjusted for the measurement point of the antennas. The measurement point is defined to be the central point between the transmitter and the receiver antenna.

The two basic patterns to interpret in borehole measurements are point and plane reflectors. In the reflection mode, borehole radar essentially gives a high-resolution image of the rock mass, showing the geometry of plane structures which may or may not, intersect the borehole (contact between layers, thin marker beds, fractures) or showing the presence of local features around the borehole (cavities, lenses etc).

The distance to a reflecting plane is determined by measuring the difference in arrival time between the direct and the reflected pulse. The basic assumption is that the speed of propagation is the same everywhere.

There are several ways to determine the radar wave propagation velocity. Each of them has its advantages and its disadvantages. For this logging campaign the velocity determination was performed between KLX07A and KLX07B by keeping the transmitter fixed in one borehole while moving the receiver downwards in a nearby borehole. The velocity measurement was performed with the 20 MHz antennas in boreholes KLX07A and KLX07B /1/.

The result is plotted in Figure 4-3 and the calculation shows a velocity varying between 110 and 117 m/micro seconds. The lower velocities most probably represent a fracture zone in the depth interval 40 to 60 m.

The visualization of data is made with ReflexWin, a Windows based processing software for filtering and analysis of borehole radar data. The processing steps are shown in Tables 4-10 to 4-18. It should be observed that the processing steps in these tables below refer to Appendices 1 to 9 in this report. The filters applied affect the whole borehole length and are not always suitable in all parts, depending on the geological conditions and conductivity of the borehole fluid. During interpretation further processing can be done, most often in form of bandpass filtering. This filtering can be applied just in parts of the borehole, where needed.

For the interpretation of the intersection angle between the borehole axis and the planes visible on the radargrams the RadinterSKB software has been used. The interpreted intersection points and intersection angles of the detected structures are presented in the Tables 5-10 to 5-18 and are also visible on the radargrams in Appendices 1 to 9.

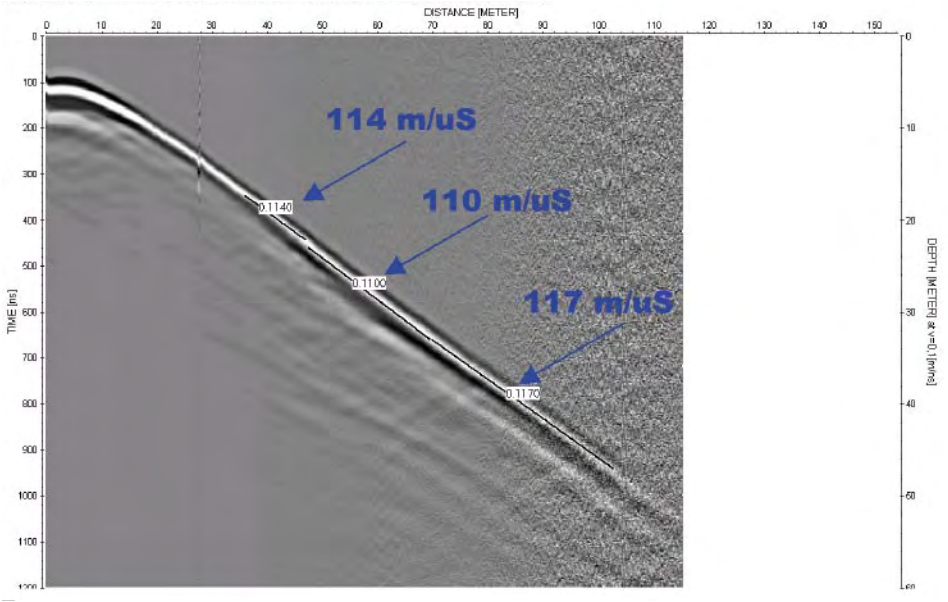


Figure 4-3. *Results from velocity measurements /1/.*

Table 4-10. Processing steps for borehole radar data from KLX11B.

Site:	**Oskarshamn**	**Logging company:**	**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX11B**	**Equipment:**	**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**	**MALÅ GeoScience AB**	
Interpret:	**JG**	**Antenna**		
	Directional	**250 MHz**	**100 MHz**	**20 MHz**
Processing:	Move start time (–43 samples)	Move start time (–14.4)	Move start time (–21.9)	Move start time (–99)
	DC shift (400–510)	DC shift (190–240)	DC shift (460–520)	DC shift (1,800–2,100)
	Time gain (start 89 lin 100 exp 3)	Gain (start 12 lin 1.2 exp 1)	Gain (start 40 lin 1.4 exp 0.5)	Gain (start 80 lin 1.7 exp 0.2)
	(FIR)			

Table 4-11. Processing steps for borehole radar data from KLX11C.

Site:	**Oskarshamn**	**Logging company:**	**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX11C**	**Equipment:**	**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**	**MALÅ GeoScience AB**	
Interpret:	**JG**	**Antenna**		
	Directional	**250 MHz**	**100 MHz**	**20 MHz**
Processing:	Move start time (–41 samples)	Move start time (–20.5)	Move start time (–21.9)	Move start time (–81.6)
	DC shift (400–510)	DC shift (190–240)	DC shift (460–520)	DC shift (1,800–2,100)
	Time gain (start 76 lin 100 exp 2)	Gain (start 12 lin 1 exp 0.6)	Gain (start 48 lin 3 exp 0.4)	Gain (start 107 lin 3 exp 0.3)
	(FIR)			

Table 4-12. Processing steps for borehole radar data from KLX11D.

Site:	**Oskarshamn**	**Logging company:**	**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX11D**	**Equipment:**	**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**	**MALÅ GeoScience AB**	
Interpret:	**JG**	**Antenna**		
	Directional	**250 MHz**	**100 MHz**	**20 MHz**
Processing:	Move start time (–39 samples)	Move start time (–21.9)	Move start time (–24.3)	Move start time (–81.7)
	DC shift (400–510)	DC shift (190–240)	DC shift (460–520)	DC shift (1,800–2,100)
	Time gain (start 84 lin 100 exp 2)	Gain (start 17 lin 2.5 exp 1)	Gain (start 42 lin 2 exp 0.6)	Gain (start 131 lin 3 exp 0.2)
	(FIR)			

Table 4-13. Processing steps for borehole radar data from KLX011E.

Site:	**Oskarshamn**	**Logging company:**	**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX11E**	**Equipment:**	**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**	**MALÅ GeoScience AB**	
Interpret:	**JG**	**Antenna**		
	Directional	**250 MHz**	**100 MHz**	**20 MHz**
Processing:	Move start time (–40 samples)	Move start time (–20.9)	Move start time (–24)	Move start time (–99.8)
	DC shift (400–510)	DC shift (190–240)	DC shift (460–530)	DC shift (1,800–2,100)
	Time gain (start 83 lin 100 exp 2)	Gain (start 11 lin 1.4 exp 1)	Gain (start 36 lin 1.4 exp 0.8)	Gain (start 100 lin 3 exp 0.2)
	(FIR)			

Table 4-14. Processing steps for borehole radar data from KLX11F.

Site:	**Oskarshamn**	**Logging company:**	**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX11F**	**Equipment:**	**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**	**MALÅ GeoScience AB**	
Interpret:	**JG**	**Antenna**		
	Directional	**250 MHz**	**100 MHz**	**20 MHz**
Processing:	Move start time (–47samples)	Move start time (–21.3)	Move start time (–21.9)	Move start time (–98.2)
	DC shift (400–510)	DC shift (190–240)	DC shift (460–520)	DC shift (1,800–2,100)
	Time gain (start 84 lin 100 exp 2)	Gain (start 18 lin 1.7 exp 1)	Gain (start 32 lin 2 exp 0.6)	Gain (start 120 lin 2 exp 0.2)
	(FIR)			

Table 4-15. Processing steps for borehole radar data from KLX18A.

Site:	**Oskarshamn**	**Logging company:**	**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX18A**	**Equipment:**	**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**	**MALÅ GeoScience AB**	
Interpret:	**JG**	**Antenna**		
	Directional	**250 MHz**	**100 MHz**	**20 MHz**
Processing:	Move start time (–45 samples)	Move start time (–14.3)	Move start time (–24.3)	Move start time (–91.9)
	DC shift (400–510)	DC shift (190–240)	DC shift (460–520)	DC shift (1,800–2,100)
	Time gain (start 81 lin 100 exp 3)	Gain (start 16 lin 2.5 exp 1.2)	Gain (start 44 lin 4.3 exp 0.6)	Gain (start 71 lin 3.6 exp 0.2)
	(FIR)			

Table 4-16. Processing steps for borehole radar data from KLX20A.

Site:	**Oskarshamn**	**Logging company:**	**MALÅ GeoScience AB/RAYCON**	
BH:	**KLX20A**	**Equipment:**	**SKB RAMAC**	
Type:	**Directional/Dipole**	**Manufacturer:**	**MALÅ GeoScience AB**	
Interpret:	**JG**	**Antenna**		
	Directional	**250 MHz**	**100 MHz**	**20 MHz**
Processing:	Move start time (–38 samples)	Move start time (–18.1)	Move start time (–21.4)	Move start time (–97)
	DC shift (400–510)	DC shift (190–240)	DC shift (460–520)	DC shift (1,800–2,100)
	Time gain (start 61 lin 100 exp 3)	Gain (start 15 lin 3 exp 1.2)	Gain (start 34 lin 6.2 exp 0.4)	Gain (start 116 lin 8.9 exp 0.2)
	(FIR)			

Table 4-17. Processing steps for borehole radar data from HLX38.

Site:	**Oskarshamn**	**Logging company:**	**MALÅ GeoScience AB/RAYCON**	
BH:	**HLX38**	**Equipment:**	**SKB RAMAC**	
Type:	**Dipole**	**Manufacturer:**	**MALÅ GeoScience AB**	
Interpret:	**JG**	**Antenna**		
		250 MHz	**100 MHz**	**20 MHz**
Processing:		Move start time (–19.8)	Move start time (–34)	Move start time (–102)
		DC removal (190–240)	DC removal (460–520)	DC removal (1,800–2,100)
		Gain (start 26 linear 8 exp. 1.1)	Gain (start 33 linear 2.3 exp 0.6)	Gain (start 98 linear 3, exp 0)

Table 4-18. Processing steps for borehole radar data from HLX40.

Site:	**Oskarshamn**	**Logging company:**	**MALÅ GeoScience AB/RAYCON**	
BH:	**HLX40**	**Equipment:**	**SKB RAMAC**	
Type:	**Dipole**	**Manufacturer:**	**MALÅ GeoScience AB**	
Interpret:	**JG**	**Antenna**		
		250 MHz	**100 MHz**	**20 MHz**
Processing:		Move start time (–21.5) DC removal (190–240) Gain (start 431 linear 6 exp. 2)	Move start time (–32.2) DC removal (460–520) Gain (start 55 linear 1.1 exp 0.03)	Move start time (–92.3) DC removal (1,800–2,100) Gain (start 120 linear 4.3, exp 0.1)

4.2.2 BIPS

The visualization of data is made with BDPP, a Windows based processing software for filtering, presentation and analysis of BIPS data. As no fracture mapping of the BIPS image is performed, the raw data was delivered on a CD-ROM together with printable pictures in *.pdf format before the field crew left the investigation site.

The printed results were delivered with measured length, together with adjusted length according to the length marks visible in the BIPS image. For printing of the BIPS images the printing software BIPP from RaaX was used.

4.2.3 Deviation measurements

The resulting data from the deviation measurements were corrected relatively to the magnetic North, 2.53 degrees east of RT90 North for the presentation in Appendices 20 to 29. For delivery to SICADA the azimuth was delivered relatively to magnetic North.

4.3 Nonconformities

To improve the BIPS images in KLX11B to KLX11F a second logging campaign was performed in July 2006. Unfortunate it was not possible to access KLX11B because of a container for hydraulic testing blocked the borehole.

5 Results

The results from the BIPS measurements for KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX19A, KLX20A, HLX38 and HLX40 were delivered as raw data (*.bip-files) on CD-ROM and MO-discs to SKB together with printable BIPS pictures in *.pdf format before the field crew left the investigation site. The information of the measurements was registered in SICADA, and the digital data and VHS tapes stored by SKB.

The RAMAC radar data was delivered as raw data (file format *.rd3 or *.rd5) for KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 and HLX40 with corresponding information files (file format *.rad) whereas the data processing steps and results are presented in this report. Relevant information, including the interpretation presented in this report, was inserted into the SKB database SICADA.

The results from the deviation measurement were delivered to SKB in form of raw Flexit files and Excel-files, and also presented in Appendices 20 and 29 in this report. Each reading station depth are referred from T.O.C. in the appendices.

The delivered raw and processed data have been inserted in the database of SKB (SICADA) and data are traceable by the activity plan number.

5.1 RAMAC logging

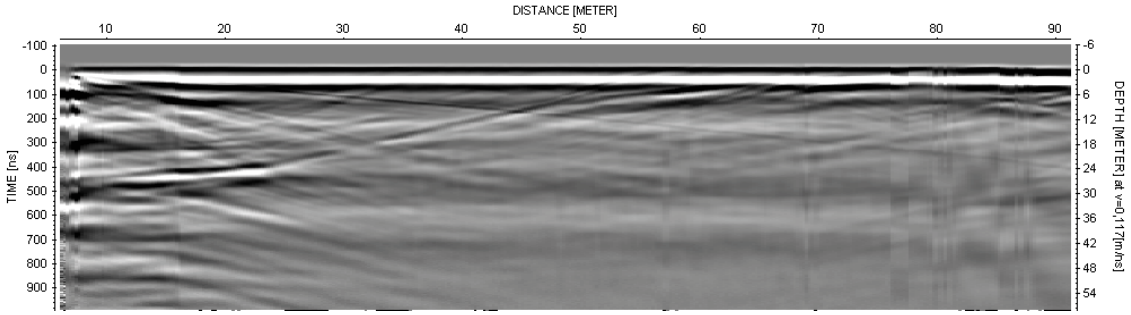
The results of the interpretation of the radar measurements are presented in Tables 5-1 to 5-28. Radardata is also visualized in Appendices 1 to 9. It should be remembered that the images in Appendices 1 to 9 are only a composite picture of all events 360 degrees around the borehole, and do not reflect the orientation of the structures.

Only the larger clearly visible structures are interpreted in RadinterSKB. Overviews of the four different boreholes are given in Figure 5-1 below. A number of minor structures also exist, indicated in Appendices 1 to 9. Often a number of structures can be noticed, but most probably lying so close to each other that it is impossible to distinguish one from the other. Larger structures parallel to the borehole, if present, are also indicated in Appendices 1 to 9. It should also be pointed out that reflections interpreted will always get an intersection point with the borehole, but being located further away. They may in some cases not reach the borehole.

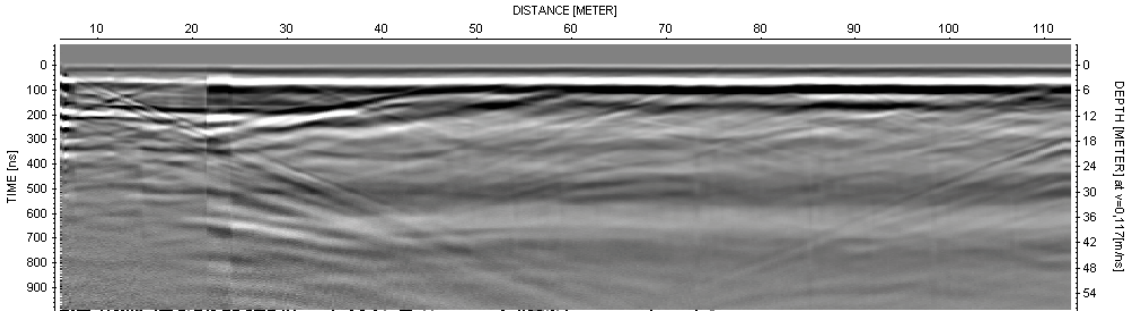
In Figure 5-2 the locations of the boreholes KLX11A, KLX11B, KLX11C, KLX11D, KLX11E, KLX11F and KLX20A are shown. As seen some of these seven boreholes are situated quite closely to each other, and can be identified in the radardata as clear hyperbolas or as a reflector (see Appendices 1 to 6).

From the directional antenna loggings the direction (given as the RadInter Object direction) from some of the different borehole to closely situated boreholes could be determined as follows:

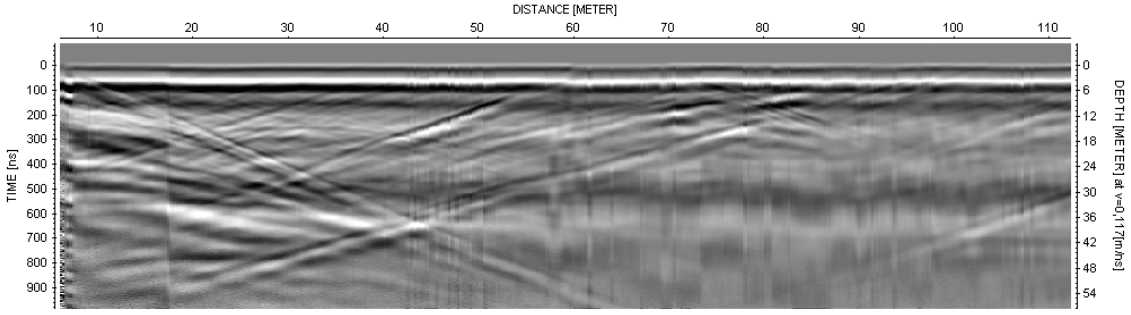
- From KLX11B to KLX11A approximately 84 degrees (magnetic roll).
- From KLX11D to KLX11A approximately 276 degrees (gravity roll).
- From KLX11E to KLX11B approximately 312 degrees (gravity roll).



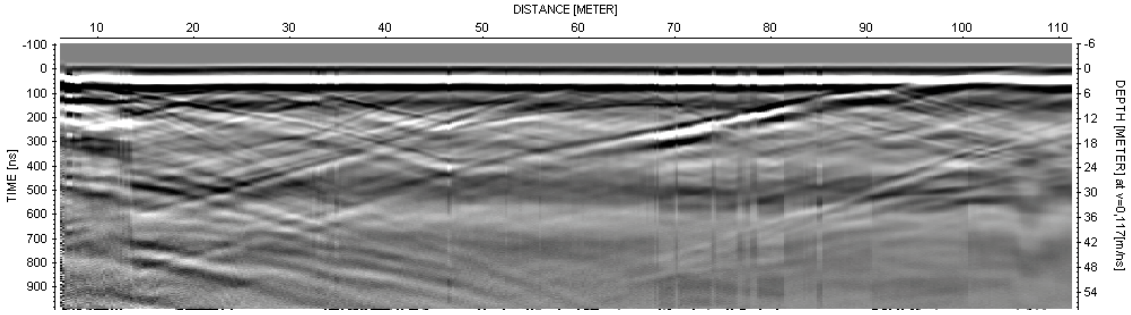
KLX11B



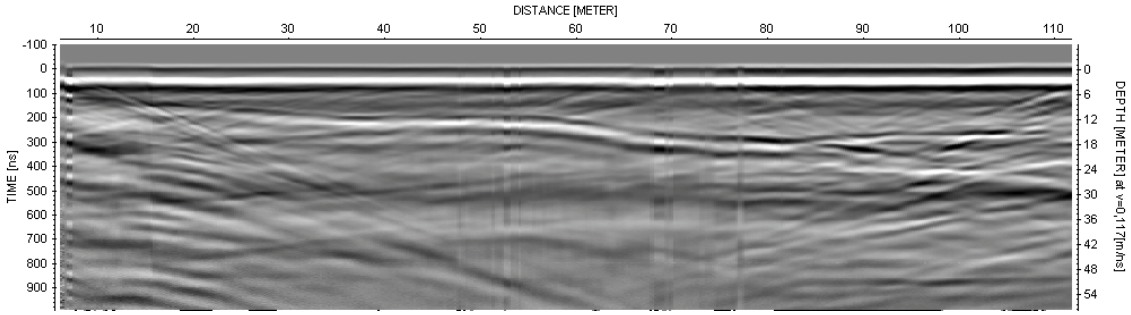
KLX11C



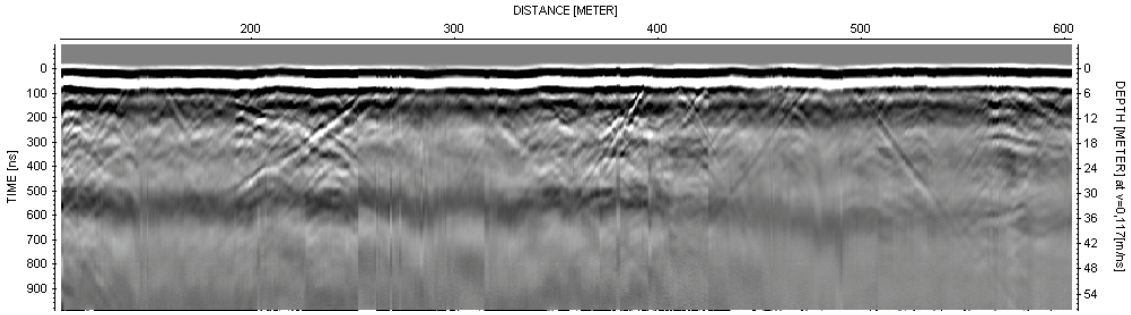
KLX11D



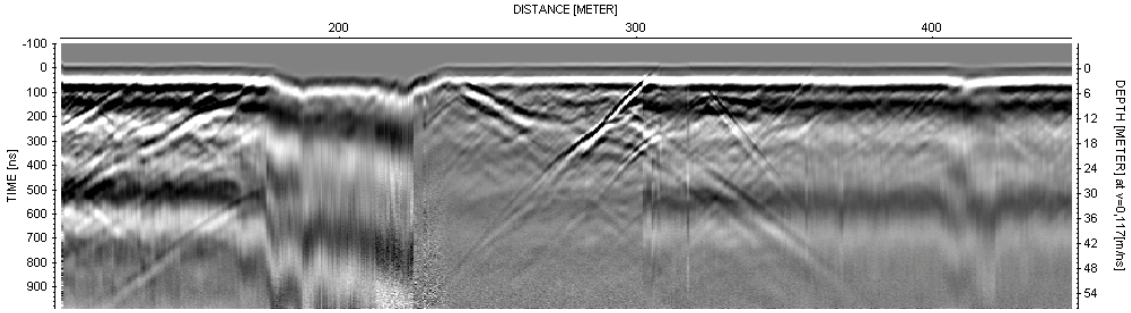
KLX11E



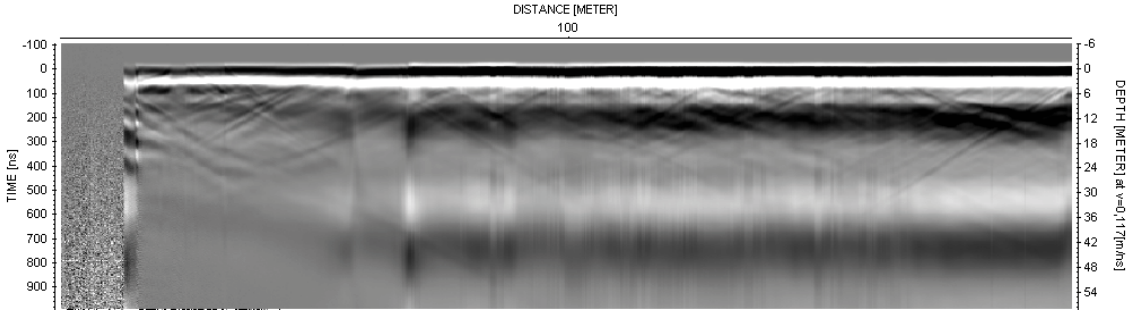
KLX11F



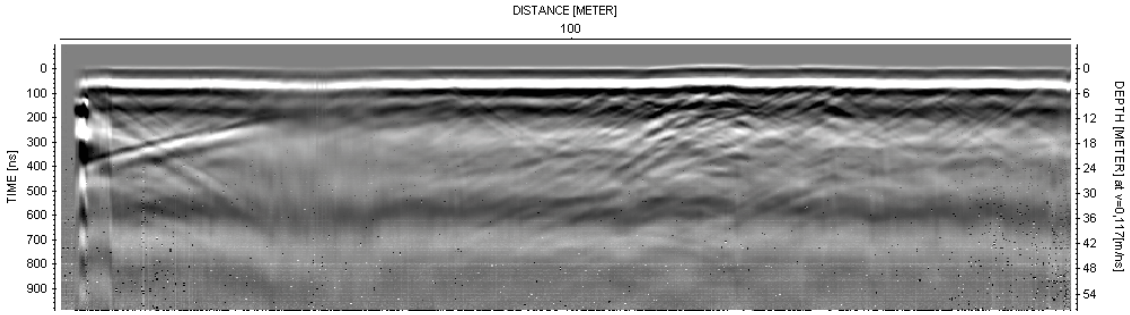
KLX18A



KLX20A



HLX38



HLX40

Figure 5-1. *An overview (20 MHz data) of the radar data for the nine different boreholes. Observe that the length (x-scale) differs between the different boreholes.*

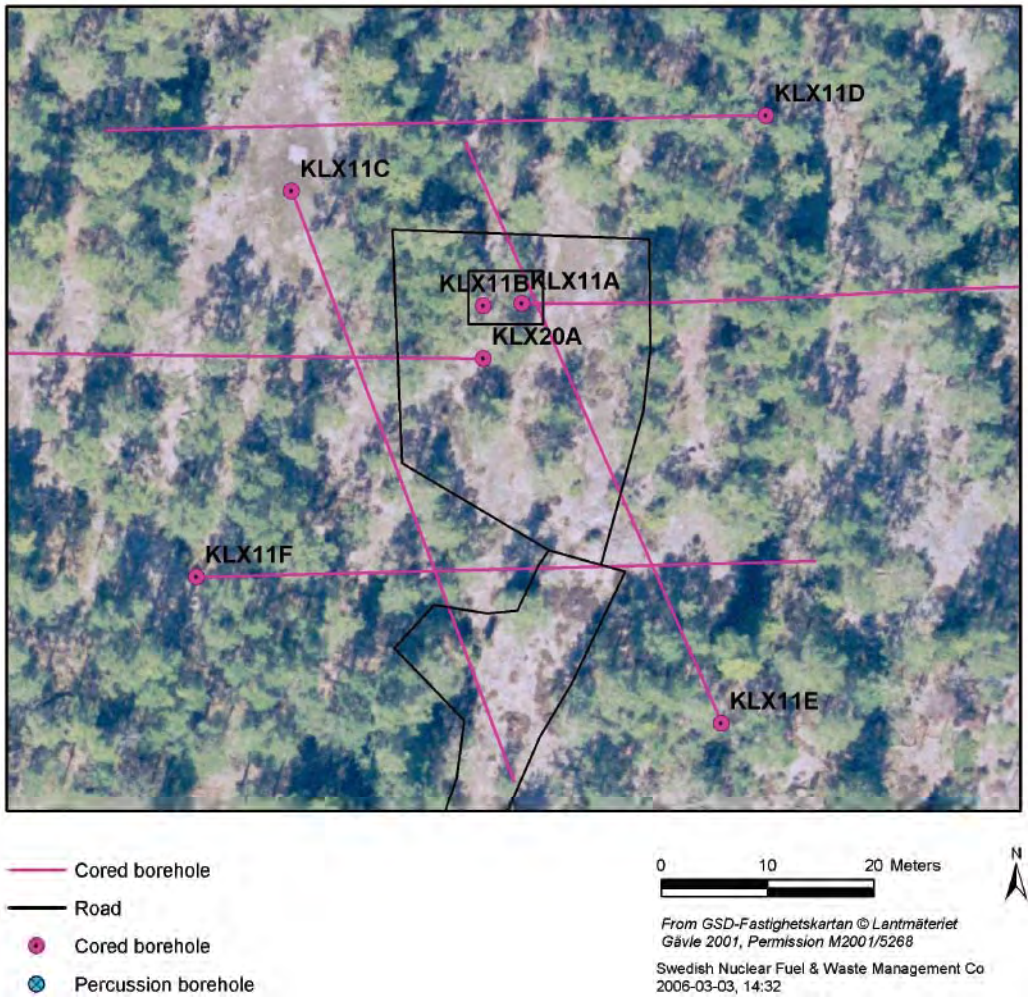


Figure 5-2. *Plan of drill-site KLX11.*

The data quality from KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 and HLX40, (as seen in Appendices 1 to 9) is good to satisfying, but in parts of lower quality due to more electrical conductive conditions. This is seen in parts of all the nine boreholes. The data from HLX40 is however, rather bad along the whole borehole length. See Figure 5-3. An electrical conductive environment makes the radar wave to attenuate, which decreases the penetration. This conductive environment of course also reduces the possibility to distinguish and interpret possible structures in the rock which otherwise could give a reflection.

This effect is also seen in the directional antenna for the core drilled boreholes, which makes it more difficult to interpret the direction to the identified structures.

In parts with an increased conductivity and thereby a decreased depth penetration most often only the edges of structures can be distinguished, giving an intersection angle of 90 degrees.

As also seen in Appendices 1 to 9 the resolution and penetration of radar waves depend on the antenna frequency used. Low antenna frequency gives less resolution but higher penetration depth compared to a higher frequency. If structures can be identified with all three antenna frequencies, it can probably be explained by that the structure is quite significant.

In Table 5-1 to 5-9 below the distribution of identified structures along the borehole are listed for KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 and HLX40.

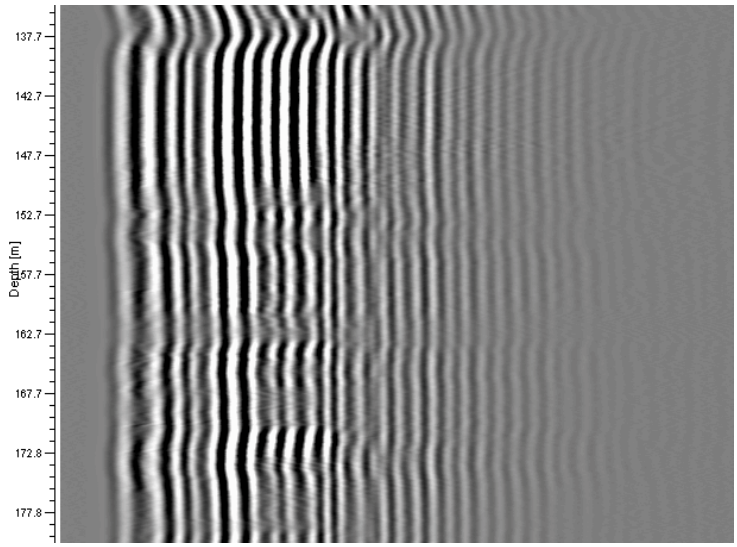


Figure 5-3. *Example of bad data quality from HLX40, 250 MHz data. The conductive borehole fluid in combination with the borehole diameter creates a severe ringing.*

Table 5-1. Identified structures as a function of depth in KLX11B.

Depth (m)	No. of structures
–20	5
20 – 40	8
40 – 60	6
60 – 80	9
80 – 100	3
100 –	3

Table 5-2. Identified structures as a function of depth in KLX11C.

Depth (m)	No. of structures
–20	7
20 – 40	3
40 – 60	6
60 – 80	4
80 – 100	3
100 –	10

Table 5-3. Identified structures as a function of depth in KLX11D.

Depth (m)	No. of structures
–20	7
20 – 40	2
40 – 60	5
60 – 80	6
80 – 100	5
100 – 120	5
120 –	2

Table 5-4. Identified structures as a function of depth in KLX11E.

Depth (m)	No. of structures
–20	8
20 – 40	3
40 – 60	6
60 – 80	8
80 – 100	5
100 – 120	6
120 –	3

Table 5-5. Identified structures as a function of depth in KLX11F.

Depth (m)	No. of structures
–20	6
20 – 40	6
40 – 60	6
60 – 80	9
80 – 100	3
100 – 120	9
120 –	2

Table 5-6. Identified structures as a function of depth in KLX18A.

Depth (m)	No. of structures
100 – 150	13
150 – 200	12
200 – 250	17
250 – 300	12
300 – 350	16
350 – 400	11
400 – 450	15
450 – 500	12
500 – 550	12
550 – 600	15
600 –	4

Table 5-7. Identified structures as a function of depth in KLX20A.

Depth (m)	No. of structures
– 100	2
100 – 150	16
150 – 200	13
200 – 250	10
250 – 300	18
300 – 350	12
350 – 400	9
400 – 450	14
450 –	1

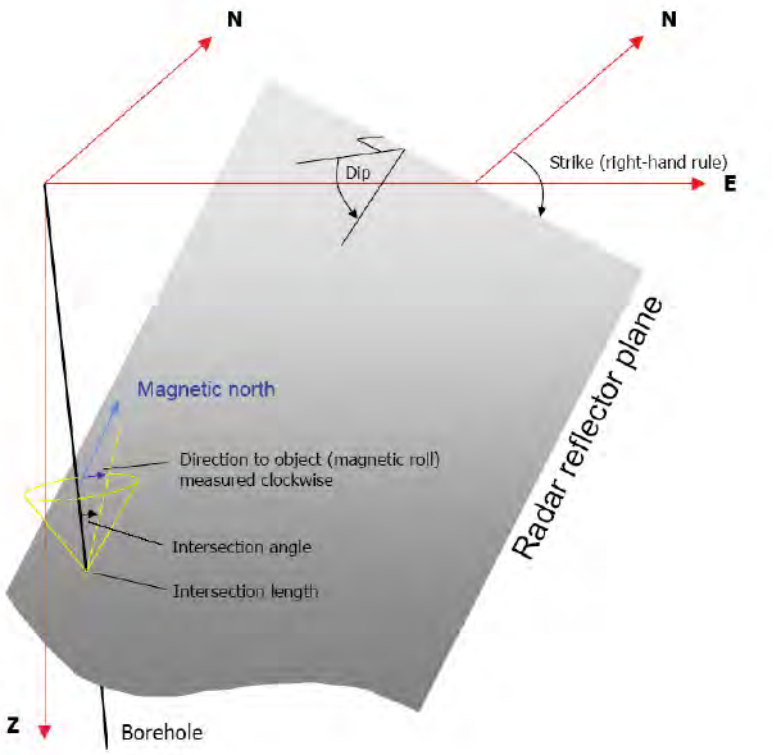
Table 5-8. Identified structures as a function of depth in HLX38.

Depth (m)	No. of structures
–20	1
20 – 40	4
40 – 60	2
60 – 80	6
80 – 100	8
100 – 120	6
120 – 140	7
140 – 160	6
160 – 180	6
180 –	6

Table 5-9. Identified structures as a function of depth in HLX40.

Depth (m)	No. of structures
–20	–
20 – 40	2
40 – 60	1
60 – 80	1
80 – 100	2
100 – 120	4
120 – 140	2
140 – 160	3
160 – 180	5
180 –	2

Tables 5-10 to 5-18 summarises the interpretation of radar data from KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 and HLX40. For KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A and KLX20A the direction to the reflector is also given. As seen some radar reflectors in Tables 5-10 to 16 are marked with ±, which indicates an uncertainty in the interpretation of direction. The direction can in these cases be ±180 degrees. The direction to the reflector (the plane) is defined in Figure 5-4 and Figure 5-5. As the borehole inclination is less than 85 degrees the direction to object is calculated using gravity roll. The direction to object and the intersection angle are recalculated to strike and dip, also given in Tables 5-10 to 5-16. The plane strike is the angle between line of the plane's cross-section with the surface and the Magnetic North direction. It counts clockwise and can be between 0 and 359 degrees. A strike of 0 degrees implies a dip to the east while a strike of 180 degrees implies a dip to the west. The plane dip is the angle between the plane and the surface. It can vary between 0 and 90 degrees.



Magnetic Roll

Figure 5-4. *Definition of intersection angle, direction to object using magnetic roll, dip and strike using the right hand rule as presented in Table 5-10.*

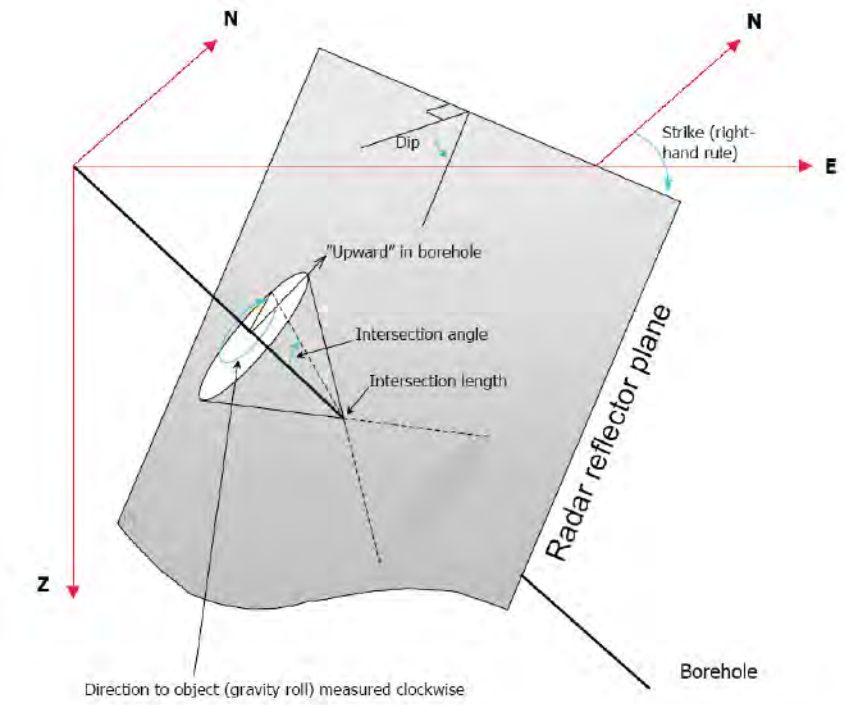


Figure 5-5. *Definition of intersection angle, direction to object using gravity roll, dip and strike using the right hand rule as presented in Tables 5-11 to 5-16.*

Observe that a structure can have several different angles, if the structure is undulating, and thereby also different intersection depths is given with different ID. This is seen for structure 18 in Table 5-10 and Appendix 1. To this structure, most likely, also structure 18x and 18xx belongs.

Table 5-10. Interpretation of radar reflectors from the dipole antennas 250, 100 and 20 MHz, and the directional antenna 60 MHz in borehole KLX11B.

RADINTER MODEL INFORMATION
(Directional antenna)

Site: **Oskarshamn**
Borehole name: **KLX11B**
Nominal velocity (m/µs): **117.0**

Name	Intersection depth	Intersection angle	RadInter direction to object (magnetic roll)	Dip 1	Strike 1	Dip 2	Strike 2
28	–2.6	8	342	82	72		
29	–3.6	41	39	53	129		
1	9.4	51					
4	10.8	48					
2	13.8	59					
3	21.2	73					
5	22.8	70					
6	24.6	64					
9	25.0	24					
10	27.4	45					
7	28.5	77					
8	29.5	54					
11	39.1	78					
13	42.8	70					
12	43.6	63					
14	45.6	79					
15	49.6	66					
19	50.1	33	273	57	3		
23	58.9	52					
16	60.2	44					
17	61.4	44					
18x	61.7	67					
18	64.7	35	258 ±	53	309	53	168
18xx	69.1	39					
21x	70.6	38					
24	73.4	69					
20	75.6	66					
22	78.3	59					
27	81.0	72					
21	93.2	16	270	75	0		
25	97.5	38					
26	100.8	37					
30	104.6	36					
21xx	245.8	8					

Table 5-11. Interpretation of radar reflectors from the dipole antennas 250, 100 and 20 MHz, and the directional antenna 60 MHz in borehole KLX11C.

RADINTER MODEL INFORMATION
(Directional antenna)

Site: **Oskarshamn**
Borehole name: **KLX11C**
Nominal velocity (m/µs): **117.0**

Name	Intersection depth	Intersection angle	RadInter direction to object (gravity roll)	Dip 1	Strike 1	Dip 2	Strike 2
31x	–159.0	5					
3	–102.8	5					
1	–2.1	26					
2	5.2	51					
4	11.3	58					
5	14.0	58					
6	19.1	67					
7	21.5	55					
8	27.3	54					
10	44.5	54					
9	45.8	44	165 ±	13	19	72	235
13	47.7	45					
11	50.7	42					
12	54.5	60					
15	57.9	47					
14	61.9	46					
31	64.6	31					
16	65.5	54					
17	71.1	54					
18	80.1	82	81 ±	34	267	30	221
19	85.6	34					
20	94.2	33					
21	100.3	64					
22	102.0	49					
23	112.1	29					
24	110.1	50					
25	117.2	38					
26	125.6	25					
30	138.9	57					
29	141.6	48					
27	145.9	18	132 ±	54	5	87	21
28	192.4	10					
32			333				

Table 5-12. Interpretation of radar reflectors from the dipole antennas 250, 100 and 20 MHz, and the directional antenna 60 MHz in borehole KLX11D.

RADINTER MODEL INFORMATION
(Directional antenna)

Site: **Oskarshamn**
Borehole name: **KLX11D**
Nominal velocity (m/µs): **117.0**

Name	Intersection depth	Intersection angle	RadInter direction to object (gravity roll)	Dip 1	Strike 1	Dip 2	Strike 2
2	5.4	37					
1	7.1	44					
4	7.4	52	177 ±	5	164	69	1
3	10.1	47					
5	13.5	52					
6	14.9	51					
7	17.3	57					
9	24.4	86					
8	30.1	47	342	76	351		
11	40.4	39					
10	41.0	54					
13	49.1	50	0 ±	72	3	5	183
14	52.8	50	318	69	335		
12	58.8	11					
16	62.7	53	21	70	17		
17	63.8	63					
15	66.0	25					
18	66.9	56	198	10	278		
24	69.1	49					
19	79.5	80					
30	80.9	19					
20	85.0	77					
21	90.6	53					
23	95.2	42					
22	97.1	42					
28	104.9	29					
25	107.4	37					
31	107.4	41	12	82	13		
29	109.5	42					
27	119.2	44					
26	120.6	39					
32	161.1	49					

Table 5-13. Interpretation of radar reflectors from the dipole antennas 250, 100 and 20 MHz, and the directional antenna 60 MHz in borehole KLX11E.

RADINTER MODEL INFORMATION
(Directional antenna)

Site: **Oskarshamn**
Borehole name: **KLX11E**
Nominal velocity (m/µs): **117.0**

Name	Intersection depth	Intersection angle	RadInter direction to object (gravity roll)	Dip 1	Strike 1	Dip 2	Strike 2
1	–10.5	28	291	75	5		
2	3.5	27					
3	4.8	63					
2x	5.1	33					
4	10.7	70					
5	14.1	38	294	68	12		
6	16.4	61					
7	19.4	32	123 ±	44	162	74	18
33	20.7	61					
8	29.4	40					
9	31.1	54					
10	41.0	38	117	45	155		
15	42.1	53					
11	43.0	36					
35	50.2	58					
12	53.9	65					
13	55.8	65	228 ±	21	13	47	86
14	61.1	37					
16	68.9	63					
17	70.6	31					
18	71.3	40	342 ±	78	49	23	206
19	72.2	44					
20	73.1	42					
21	77.8	46					
22	79.9	50	288	52	18		
23	80.7	29					
24	82.7	64					
25	88.8	69					
28x	94.7	44					
26	97.1	78					
34	107.6	56					
29	110.9	46					
28	113.7	26	258 ±	62	336	73	130
30	115.5	35					
31	118.2	43					
27	118.6	15					
32	123.0	48					
36	131.8	40					
37	136.7	50	0 ±	70	63	12	243

Table 5-14. Interpretation of radar reflectors from the dipole antennas 250, 100 and 20 MHz, and the directional antenna 60 MHz in borehole KLX11F.

RADINTER MODEL INFORMATION
(Directional antenna)

Site: **Oskarshamn**
Borehole name: **KLX11F**
Nominal velocity (m/µs): **117.0**

Name	Intersection depth	Intersection angle	RadInter direction to object (gravity roll)	Dip 1	Strike 1	Dip 2	Strike 2
38	–63.7	10	333	74	328		
2	9.4	55					
1	11.3	39					
3	13.9	59					
4	15.0	16					
5	16.7	45					
6	22.5	53					
7	26.0	41					
8	27.3	48					
9	29.3	51					
11	36.0	36					
12	39.4	50					
10	43.4	17					
31	45.2	60					
13	50.0	41	141 ±	29	285	71	147
30	51.5	19					
14	54.8	44					
15	56.6	47					
17	67.1	63					
16	67.2	30					
28	67.7	77					
18	70.9	37					
10x	72.6	7					
16x	73.1	17					
19	74.9	49					
33	77.6	16					
18x	77.9	21					
20	80.9	43	213 ±	26	60	72	200
21	84.9	60					
22	92.9	61	180 ±	1	176	58	176
23	103.0	48					
24	104.2	58					
25	106.8	49	177 ±	11	345	71	173
26	108.7	50					
29	110.0	49					
27	110.1	40					
36	114.4	55					
32	117.7	70					
35	187.3	18					
34	206.1	12					
37			300				

Table 5-15. Interpretation of radar reflectors from the dipole antennas 250, 100 and 20 MHz, and the directional antenna 60 MHz in borehole KLX18A.

RADINTER MODEL INFORMATION
(Directional antenna)

Site: **Oskarshamn**
Borehole name: **KLX18A**
Nominal velocity (m/µs): **117.0**

Name	Intersection depth	Intersection angle	RadInter direction to object (gravity roll)	Dip 1	Strike 1	Dip 2	Strike 2
1	108.6	39					
2	109.7	60					
19	108.0	9	168	70	176		
5	111.9	53					
3	113.0	50					
4	117.0	51					
6	121.2	56					
11	129.7	43					
7	132.2	21					
8	137.2	56	135 ±	25	129	39	333
7x	139.9	15	108 ±	71	114	78	299
9	140.2	62					
10	148.7	58	138 ±	26	133	40	335
12	150.7	58					
15	150.9	41					
13	155.1	49					
18	165.3	48					
14	166.0	41					
16	170.3	48					
17	174.3	56					
21	174.9	45					
20	186.0	63					
22	190.6	58					
23	194.1	59					
25	199.7	80					
26	201.4	50					
27	204.3	57					
24	204.9	48					
28	206.3	59					
29	208.7	65					
30	218.4	58	114 ±	27	96	34	305
31	221.1	55					
34	225.7	48					
32	226.7	44					
33	228.1	46					
35	231.8	62	288	31	301		
36	235.9	62					
39	239.9	40					
41	241.4	47					
37	242.1	66					
42	245.9	54					
38	247.9	24					
43	252.2	53	288 ±	41	296	36	94
44	257.5	63					
45	259.4	60	306 ±	38	314	29	111

RADINTER MODEL INFORMATION
(Directional antenna)

Site: **Oskarshamn**
Borehole name: **KLX18A**
Nominal velocity (m/µs): **117.0**

Name	Intersection depth	Intersection angle	RadInter direction to object (gravity roll)	Dip 1	Strike 1	Dip 2	Strike 2
46	263.1	44					
47	272.7	58	285 ±	33	297	28	87
48	275.2	36					
40	280.3	13					
49x	283.3	21					
50	283.3	60					
132	287.0	21	249	65	251		
49	288.2	25					
51	299.2	35					
52	306.2	63					
54	306.2	21					
53	307.2	59					
133	308.7	5					
55	315.3	56	123 ±	28	107	38	311
56	316.3	42					
57	319.0	47					
58	319.8	28					
59	324.7	38					
129	332.3	59					
60	334.1	64	135 ±	22	118	35	323
62	336.1	51					
61	337.6	52					
63	340.6	55					
64	347.4	55					
65	348.8	56					
66	356.2	63					
67	358.8	66					
68	360.1	55					
69	362.5	57					
71	370.5	64	339 ±	36	342	19	148
72	377.8	72	303 ±	18	325	10	73
130	380.0	51					
75	383.5	35					
74	383.7	43					
70	384.6	26					
76	399.1	49					
73	400.4	19					
77	401.1	56					
78	402.3	58	108 ±	30	92	35	299
79	408.5	37					
80	414.7	67					
81	419.3	39					
88	422.4	43					
82	423.4	33					
83	425.4	33					
84	431.4	56					
107x	432.2	5	6	87	186		

RADINTER MODEL INFORMATION
(Directional antenna)

Site: **Oskarshamn**
Borehole name: **KLX18A**
Nominal velocity (m/µs): **117.0**

Name	Intersection depth	Intersection angle	RadInter direction to object (gravity roll)	Dip 1	Strike 1	Dip 2	Strike 2
85	432.6	57					
87	440.8	69					
86	442.7	52					
89	448.8	66					
90	450.2	47					
91	457.9	21					
91x	461.6	32					
92	462.6	44					
93	469.9	45					
94	473.4	42					
95	476.5	59					
107	482.3	9	18	89	18		
96	485.0	45	192	37	193		
97	493.8	51	351 ±	51	354	33	172
98	496.1	63					
99	499.3	69					
100	500.2	60					
101	506.2	56					
102	508.7	65					
122x	511.9	9					
105	512.3	56					
103	516.3	66					
104	521.4	63	303 ±	36	314	26	107
106	525.6	62	210 ±	22	220	37	23
108	539.1	76					
112	542.1	24					
109	542.8	31					
110	543.9	50					
111	552.9	51					
122	557.1	23	93 ±	67	89	67	277
113	563.6	47					
114	569.7	57					
115	572.3	57	294 ±	37	305	30	99
117	577.0	65					
116	577.4	54					
118	580.3	68					
119	581.8	67					
134	582.4	69					
121	586.0	56					
123	588.6	53					
124	595.4	48					
125	596.9	70					
120	597.2	12					
126	601.8	59					
127	608.6	58					
128	615.1	66					
131	616.5	10					

Table 5-16. Interpretation of radar reflectors from the dipole antennas 250, 100 and 20 MHz, and the directional antenna 60 MHz in borehole KLX20A.

RADINTER MODEL INFORMATION
(Directional antenna)

Site: **Oskarshamn**
Borehole name: **KLX20A**
Nominal velocity (m/µs): **117.0**

Name	Intersection depth	Intersection angle	RadInter direction to object (gravity roll)	Dip 1	Strike 1	Dip 2	Strike 2
85x	1.3	4					
84	92.7	27					
1	106.0	71					
2	109.9	44					
3	112.3	51					
4	115.7	59					
5	120.0	54	39 ±	69	26	24	303
6	124.8	57					
7	127.3	51	138 ±	27	79	74	337
8	130.4	53	186 ±	4	290	78	8
9	135.1	51					
10	137.5	46					
12	140.5	47					
11	141.2	35	168	18	151		
13	144.4	60	0 ±	69	4	10	4
14	146.6	39					
15	147.8	47					
17	149.5	53					
16	154.6	45					
18	155.6	27					
91	158.1	41					
19	160.4	65					
20	170.4	28					
21	171.5	35					
22	175.0	29	228	42	261		
23	178.7	50	201	13	289		
23x	183.0	30					
24	183.1	41					
25	184.3	58					
22x	195.5	18					
46	199.9	5	162	46	160		
85	220.7	24	354	74	178		
27	221.6	48	153	18	92		
26	227.6	42					
28	230.6	35					
28x	231.7	46					
29	239.2	40					
89	239.3	32					
30	240.4	48					
33	247.1	57					
31	249.9	43					
32	251.4	44					
35	252.9	49					
34	256.5	57					
40	262.0	63					
48	262.7	21					
37	264.3	32					

RADINTER MODEL INFORMATION
(Directional antenna)

Site: **Oskarshamn**
Borehole name: **KLX20A**
Nominal velocity (m/µs): **117.0**

Name	Intersection depth	Intersection angle	RadInter direction to object (gravity roll)	Dip 1	Strike 1	Dip 2	Strike 2
36	265.8	30	57 ±	87	53	48	271
38	269.1	53					
39	270.2	41					
86	272.9	46					
42	277.6	45					
41	279.9	58					
43	281.3	39					
44	282.7	47	171 ±	7	127	84	359
45	284.9	53					
51	293.0	60					
49	296.7	52					
50	298.9	57	348 ±	73	358	11	42
87	304.8	22					
52x	311.9	57					
52	312.7	49	36 ±	78	29	23	286
81	314.6	53					
54	321.1	31					
54x	323.6	40					
55	325.8	50					
56	335.5	53					
90	337.7	45	315	79	334		
57	339.4	59					
88	345.1	30					
58	348.8	55	186 ±	11	351	77	12
59	352.9	57					
60	364.5	69	213 ±	28	343	61	20
82	369.6	32					
61	373.3	56					
62	377.1	67					
63	380.2	65	189 ±	18	355	68	11
64	384.5	40					
65	391.2	35	264	62	300		
67	397.7	67					
66	400.9	42					
68	403.9	60					
80	406.8	36					
70	410.5	50					
69	416.6	37					
71	418.5	39					
74	424.6	57	243	47	291		
72	425.5	37	270	65	305		
73	427.8	36					
77	429.7	37					
83	435.4	37					
76	443.0	36					
75	446.1	34					
79	447.4	55					
78	462.1	25					

Table 5-17. Interpretation of radar reflectors from the dipole antennas 250, 100 and 20 MHz, in borehole HLX38.

RADINTER MODEL INFORMATION
(20, 100 and 250 MHz Dipole Antennas)

Site: **Oskarshamn**
Borehole name: **HLX38**
Nominal velocity (m/µs): **117.0**

Reflector type	Name	Intersection depth	Intersection angle
PLANE	48	2.8	43
PLANE	1	24.6	46
PLANE	3	22.8	65
PLANE	2	26.4	80
PLANE	4	30.2	90
PLANE	5	44.0	52
PLANE	6	51.6	42
PLANE	7	60.0	48
PLANE	8	62.5	47
PLANE	10	65.2	41
PLANE	9	65.3	50
PLANE	11	77.4	34
PLANE	12	77.4	48
PLANE	13	86.5	69
PLANE	14	89.5	43
PLANE	15	90.7	50
PLANE	17	93.3	29
PLANE	51	95.0	17
PLANE	16	95.5	32
PLANE	18	97.6	19
PLANE	19	96.6	56
PLANE	15x	107.4	28
PLANE	20	110.7	45
PLANE	21	113.7	56
PLANE	24	114.5	48
PLANE	22	114.9	64
PLANE	23	116.4	57
PLANE	26	122.2	38
PLANE	25	126.7	44
PLANE	27	128.7	42
PLANE	28	130.2	51
PLANE	29	132.0	58
PLANE	30	133.4	43
PLANE	31	136.9	65
PLANE	32	144.9	50
PLANE	33	148.0	41
PLANE	36	149.6	48
PLANE	34	151.6	49
PLANE	49	159.4	43
PLANE	35	159.5	53
PLANE	47	163.0	41
PLANE	37	163.7	61
PLANE	38	165.8	76
PLANE	39	173.0	44
PLANE	40	176.7	47
PLANE	41	178.0	51
PLANE	50	190.8	52
PLANE	42	191.5	61
PLANE	43	195.4	58
PLANE	46	198.5	72
PLANE	44	200.3	80
PLANE	45	203.6	57

Table 5-18. Interpretation of radar reflectors from the dipole antennas 250, 100 and 20 MHz, in borehole HLX40.

RADINTER MODEL INFORMATION
(20, 100 and 250 MHz Dipole Antennas)

Site: Oskarshamn
Borehole name: HLX40
Nominal velocity (m/µs): 117.0

Reflector type	Name	Intersection depth	Intersection angle
PLANE	1	24.0	50
PLANE	2	39.2	68
PLANE	3	53.3	90
PLANE	4	69.5	73
PLANE	6	85.3	26
PLANE	5	96.2	50
PLANE	19	108.6	16
PLANE	7	108.9	83
PLANE	10	110.9	47
PLANE	8	116.0	51
PLANE	17	120.6	65
PLANE	9	135.0	53
PLANE	11	152.9	56
PLANE	12	154.4	42
PLANE	20	159.7	30
PLANE	22	164.0	36
PLANE	18	168.5	66
PLANE	14	170.2	35
PLANE	21	179.0	50
PLANE	13	179.9	68
PLANE	16	194.6	40
PLANE	15	196.1	69

In Appendices 1 to 9, the amplitude of the first arrival is plotted against the depth, for the 250 MHz dipole antennas. The amplitude variation along the borehole indicates changes of the electrical conductivity of the volume of rock surrounding the borehole. A decrease in this amplitude may indicate fracture zones, clay or rock volumes with increases in water content, i.e. increases in electric conductivity. The decrease in amplitude is shown in Tables 5-19 to 5-27.

Table 5-19. Borehole length intervals in KLX11B with decreased amplitude for the 250 MHz antenna.

Length (m)	Length (m)
0–15	85–90
65	90–95

Table 5-20. Borehole length intervals in KLX11C with decreased amplitude for the 250 MHz antenna.

Length (m)	Length (m)
0–30	

Table 5-21. Borehole length intervals in KLX11D with decreased amplitude for the 250 MHz antenna.

Length (m)	Length (m)
0–15	90–100
60–65	105–110

Table 5-22. Borehole length intervals in KLX11E with decreased amplitude for the 250 MHz antenna.

Length (m)	Length (m)
0–10	110–115

Table 5-23. Borehole length intervals in KLX11F with decreased amplitude for the 250 MHz antenna.

Length (m)	Length (m)
0–15	70

Table 5-24. Borehole length intervals in KLX18A with decreased amplitude for the 250 MHz antenna.

Length (m)	Length (m)
135–145	375–380
195–200	400–405
205	445–450
275	455
280–295	480–490
335	535–540
355–365	590

Table 5-25. Borehole length intervals in KLX20A with decreased amplitude for the 250 MHz antenna.

Length (m)	Length (m)
130–135	310–315
140	365
170–180	375
180–235	410–420
265	425

Table 5-26. Borehole length intervals in HLX38 with decreased amplitude for the 250 MHz antenna.

Length (m)	Length (m)
20–35	95
45–60	160
60–65	165
75–80	

Table 5-27. Borehole length intervals in HLX40 with decreased amplitude for the 250 MHz antenna.

Length (m)	Length (m)
40–70	150–170
115–120	175–185
135–140	195–200

Finally, the structures considered as the most important (clear in the radargram, identified with several antenna frequencies, stretching out far from the borehole wall etc.) are listed in Table 5-28 below.

Observe that it can be very difficult to classify different structures in an objective manner, along a borehole. This is due to the fact that the water quality (the electrical conductivity) amongst others varies along the borehole length and by that reason affects the results of the radar logging, by for instance attenuating the radar waves differently. Also the intersection angle of the identified structures affects the amplitude on the resulting radargram. A small angle will most often give an increased amplitude than a larger angle, and by that a more clear structure.

Table 5-28. Some important structures in KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX20A, HLX38 and HLX40.

Borehole	KLX11B	KLX11C	KLX11D	KLX11E	KLX11F
Structures	12, 20, 21, 21x, 21xx and 29	3, 18, 20, 27. 29, 30, 31 and 31x	13, 16, 18 and 31	1, 5, 13, 18, 19, 21, 28, 28x and 37	13, 19, 34 and 35

Borehole	KLX18A	KLX20A	HLX38	HLX40
Structures	9, 10, 19, 47, 49, 60, 70, 78, 96, 97, 107, 107x, 116, 132 and 133	7, 11, 12, 23, 23x, 36, 46, 52, 52x, 54, 54x, 57, 60, 69, 72, 75, 85, 85x and 89	8, 9, 15 ,15x, 31 and 45	8, 15, 19, 20 and 22

5.2 BIPS logging

The BIPS pictures from KLX11B, KLX11C, KLX11D, KLX11E, KLX11F, KLX18A, KLX19A, KLX20A, HLX38 and HLX40 are presented in Appendices 10 to 19.

In order to control the quality of the system, calibration measurements were performed in a test pipe before and after the logging. The resulting images displayed with no difference regarding the colours and focus of the images. Results of the test loggings were included in the delivery of the raw data.

To get the best possible depth accuracy, the BIPS images are adjusted to the reference marks in the core drilled boreholes. For the percussion boreholes the marks on the logging cable at 110 metre and 150 metre were used for adjustment of the depth.

The error in the depth recording depends mainly on the tension of the cable and error of the depth readings from the measuring wheel. The adjusted depth is showed in red colour and the recording depth have black colour in the printouts.

The BIPS images from the first run in the boreholes KLX11B to KLX11F was not of acceptable quality for the geologists. Therefore a second logging campaign was performed after the boreholes were cleaned by nitrogen blowing and rested for a couple of weeks. At the time for the second logging campaign KLX11B was not accessible due to other equipment blocking that borehole. The second logging improved the image quality due to lesser mud content and in general better water quality. In this report the second run is presented for KLX11C, KLX11D, KLX11E and KLX11F. The presented result from KLX11B is from the top of the borehole acceptable but from 43 metre down to the bottom of the borehole the water quality gradual gets worse. Due to the fact that the borehole is vertical the probe rotates during the logging. This can easily been observed on the images were darker and brighter parts of the images slowly rotate along the borehole. In the last 15 metres in the borehole it is impossible to see the borehole wall due to muddy water.

In KLX18A there exists very little of the discolouring effect induced from the drilling that are commonly seen in core drilled boreholes. The image quality is of lower quality in the upper part of the borehole due to a rotating camera during the logging and due to the presence of some mud that reduces the visibility. From 200 metre the image quality is getting better down to 500 metre were an increasing level of mud covering the lowermost part of the borehole partly again limits the visibility.

During the drilling of the KLX19A a BIPS logging from the casing shoe down to 98 metre was performed after the finish of the drilling of the 140 mm borehole. The logging resulted in very good image quality from 50 metre down to the bottom. The reason for reduced image quality down to 50 metre are due to muddy water for the time of the logging.

The images in KLX20A is not effected by the common discolouring induced by the drilling. The quality problems is related to the automatic iris function on the camera. In the upper part of the borehole this is obvious when the iris function very rapidly changes settings in the camera and creates bands with contrast defects, due to the automatic iris function in the camera.

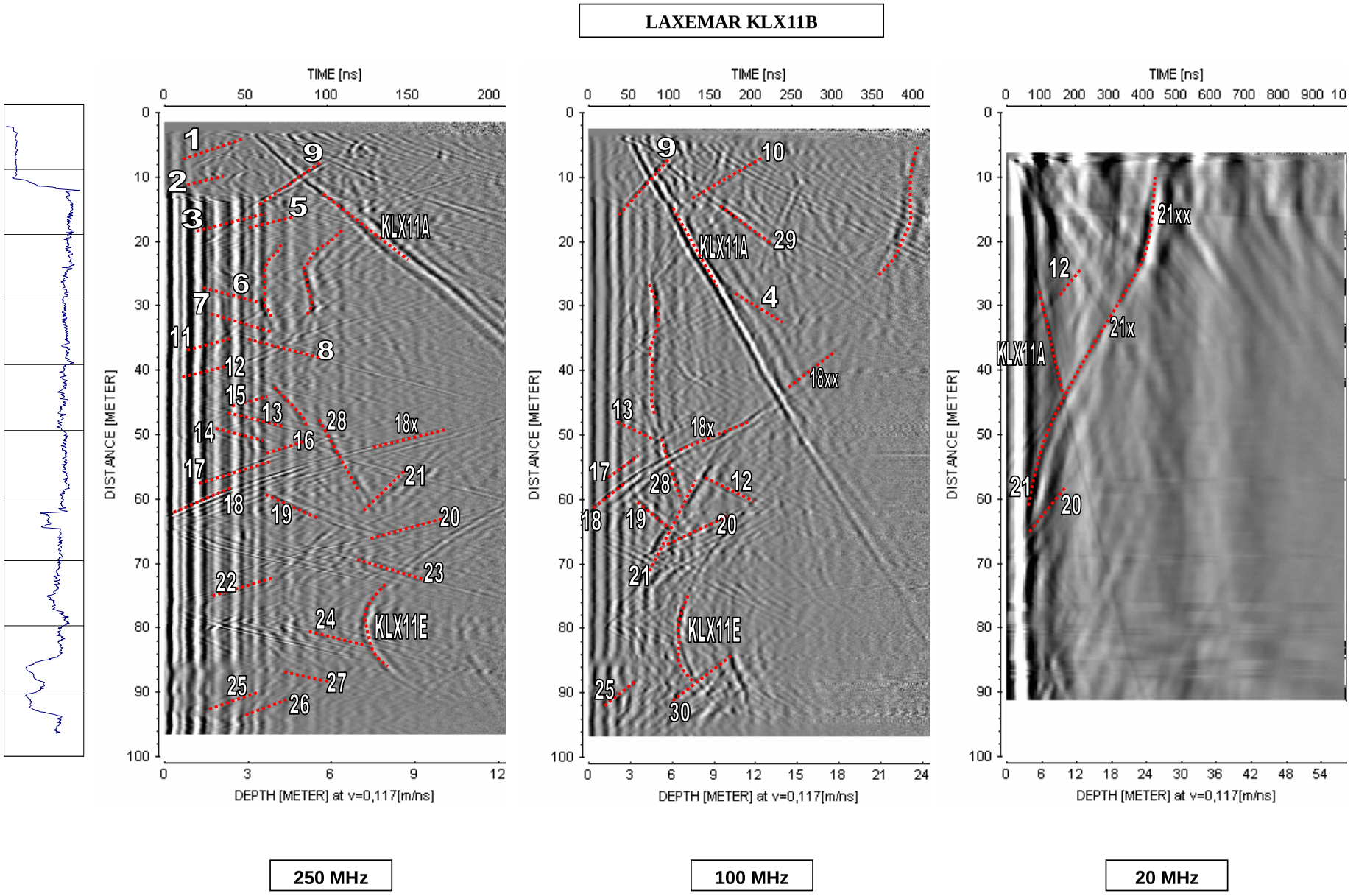
The images quality in HLX38 is not of the best quality, due to dirty borehole water. The dirty water starts at the big open fracture at 65 metres. Below that depth the quality is not acceptable for geological characterization.

HLX40 shows a very good image quality along the borehole and creates no problem for the geological characterization.

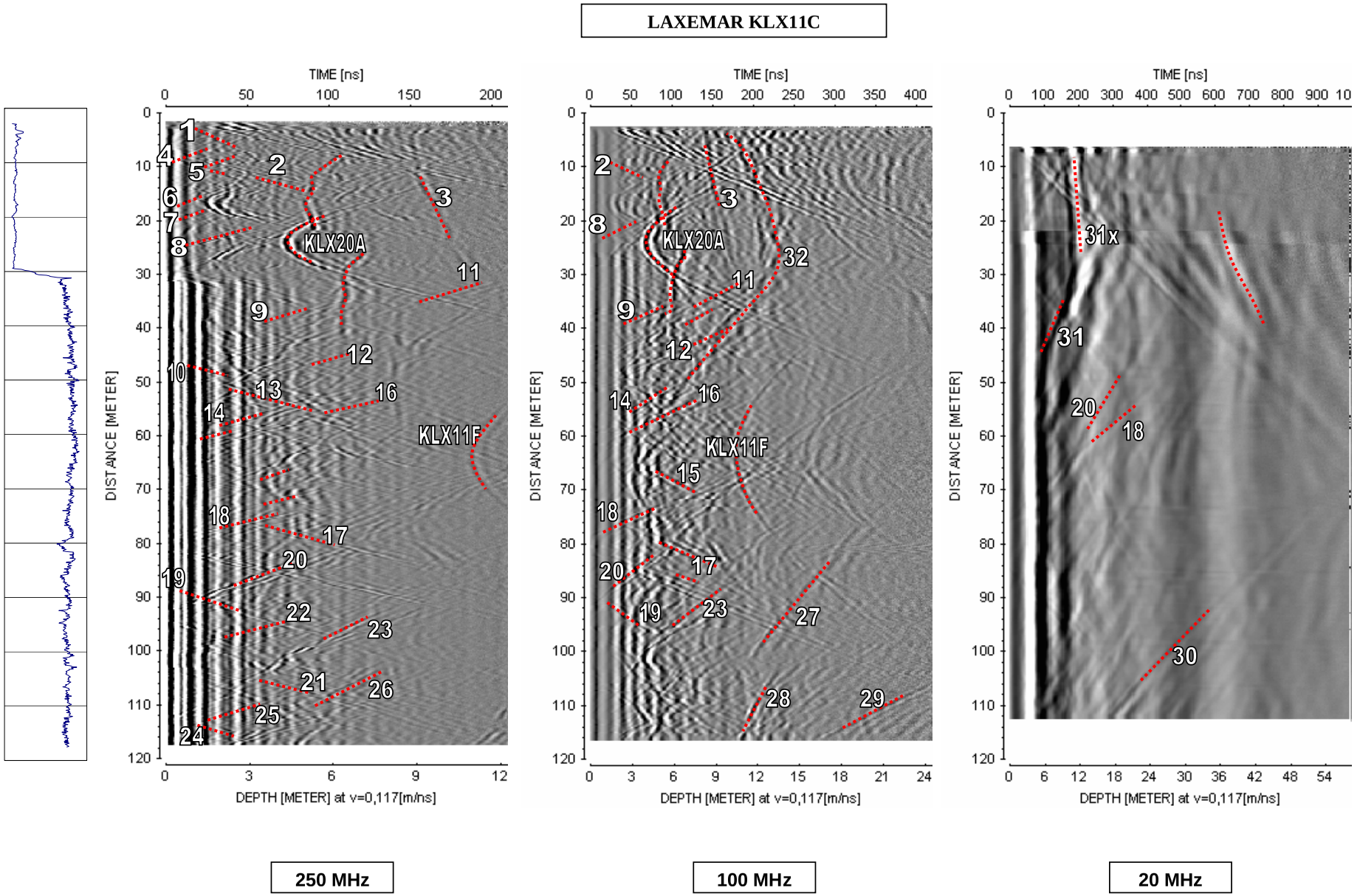
References

/1/ **Gustafsson J, Gustafsson C, 2005.** Oskarshamn site investigation. RAMAC and BIPS logging in boreholes KLX07A, KLX07B, HLX34 and HLX35 and deviation logging in boreholes KLX07B, HLX34 and HLX35. SKB P-05-231, Svensk Kärnbränslehantering AB.

Radar logging in KLX11B, 0 to 95 m, dipole antennas 250, 100 and 20 MHz

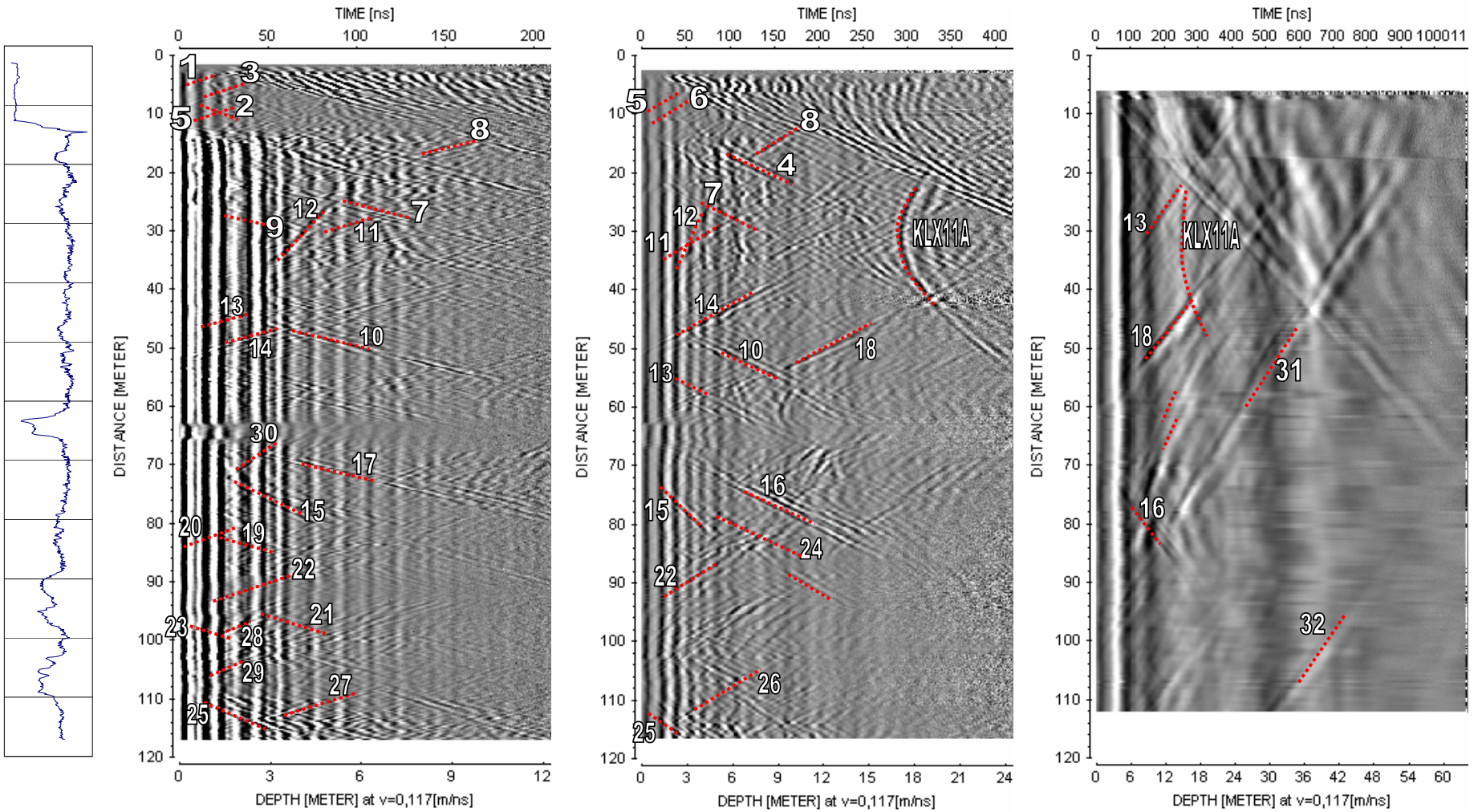


Radar logging in KLX11C, 0 to 115 m, dipole antennas 250, 100 and 20 MHz



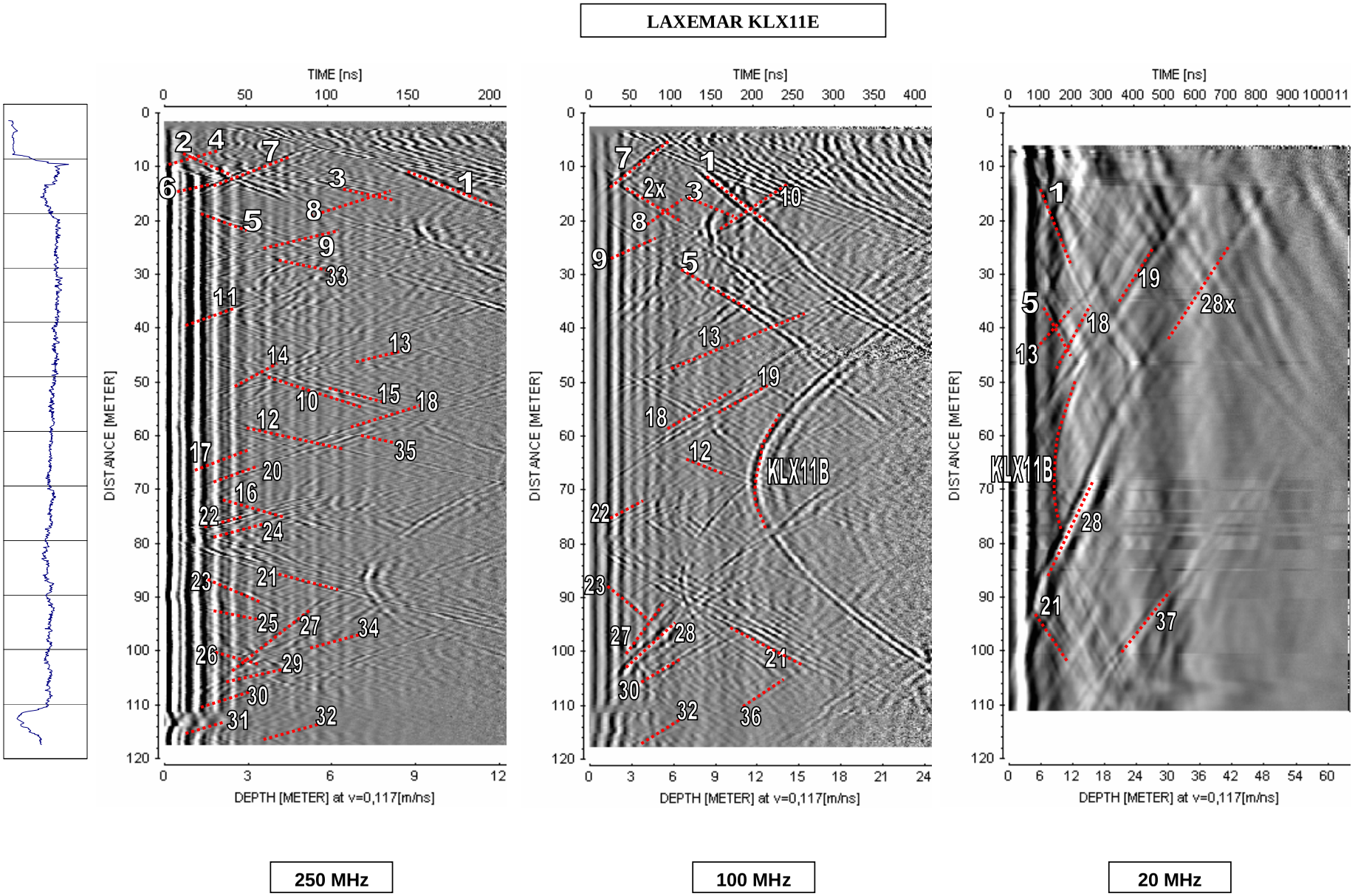
Radar logging in KLX11D, 0 to 115 m, dipole antennas 250, 100 and 20 MHz

LAXEMAR KLX11D

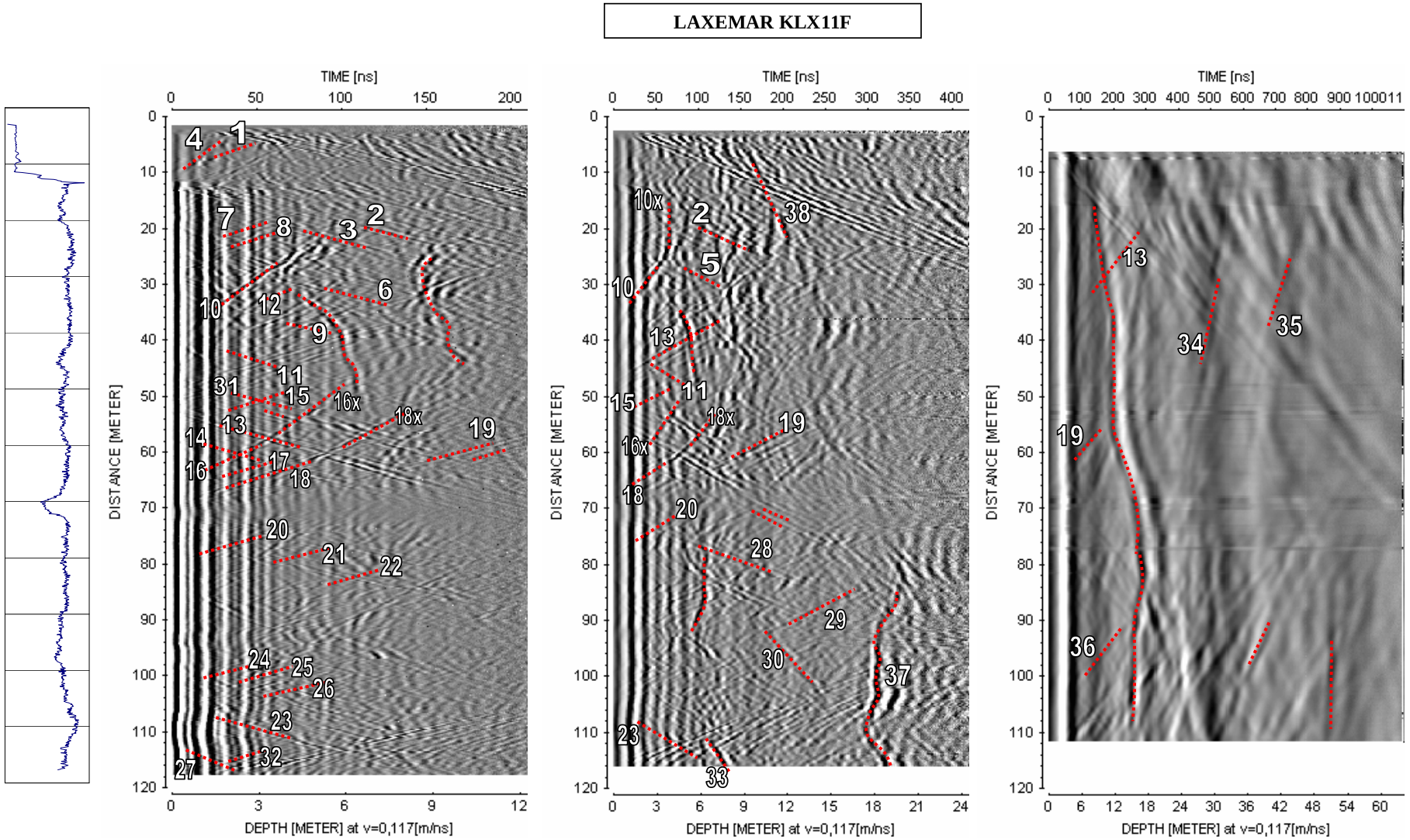


250 MHz **100 MHz** **20 MHz**

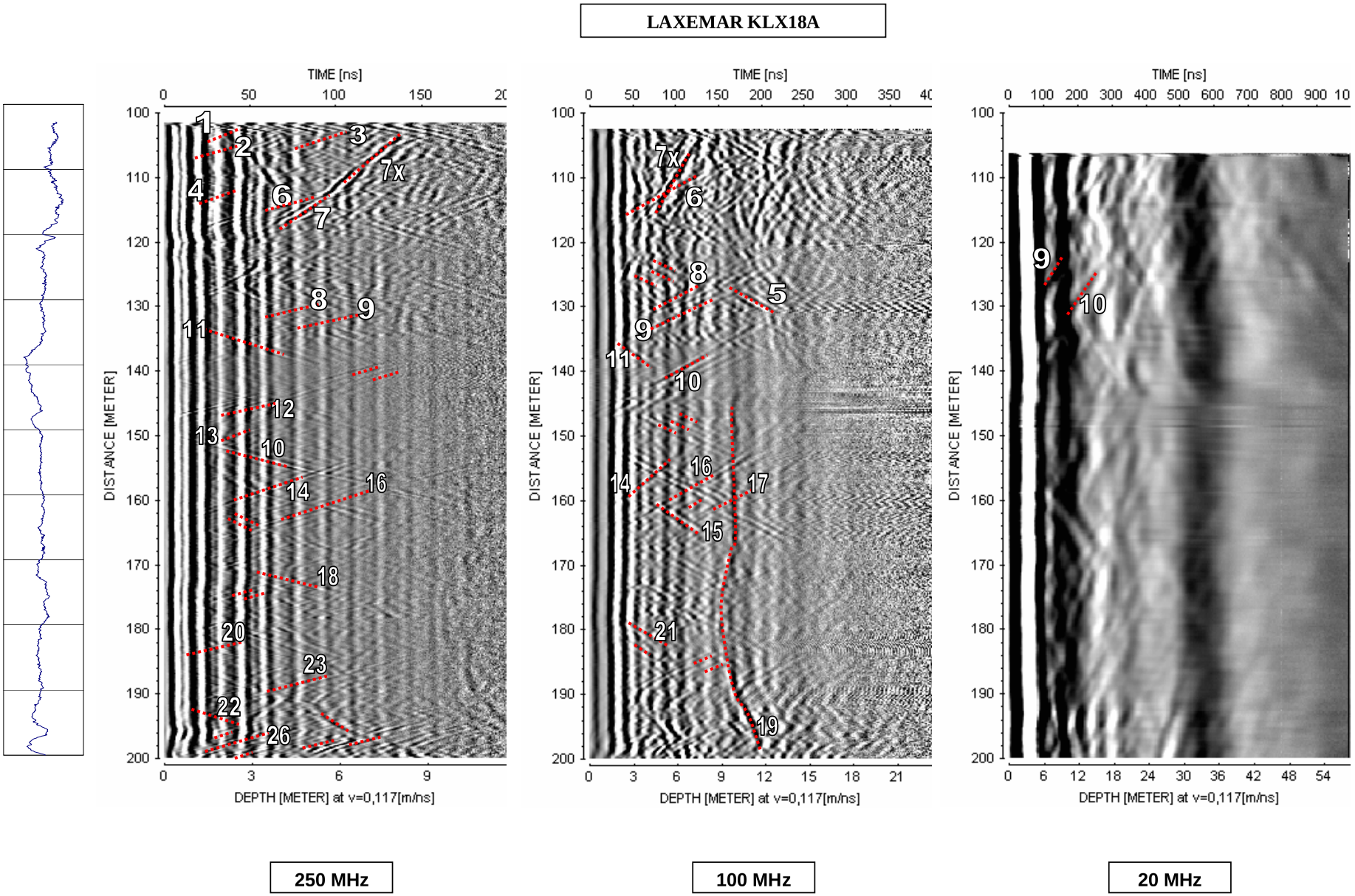
Radar logging in KLX11E, 0 to 115 m, dipole antennas 250, 100 and 20 MHz

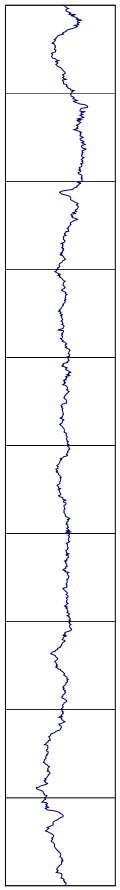


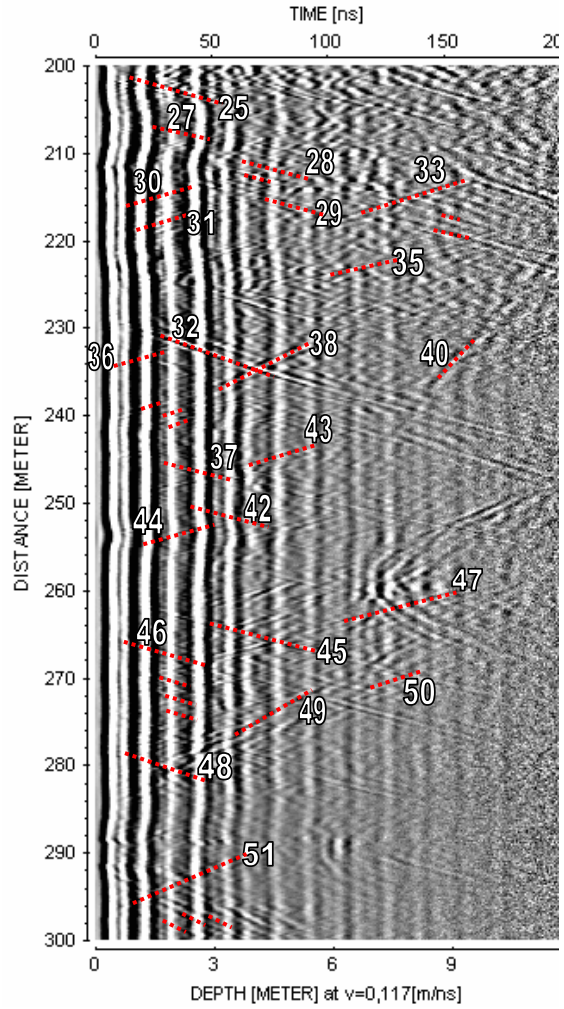
Radar logging in KLX11F, 0 to 115 m, dipole antennas 250, 100 and 20 MHz



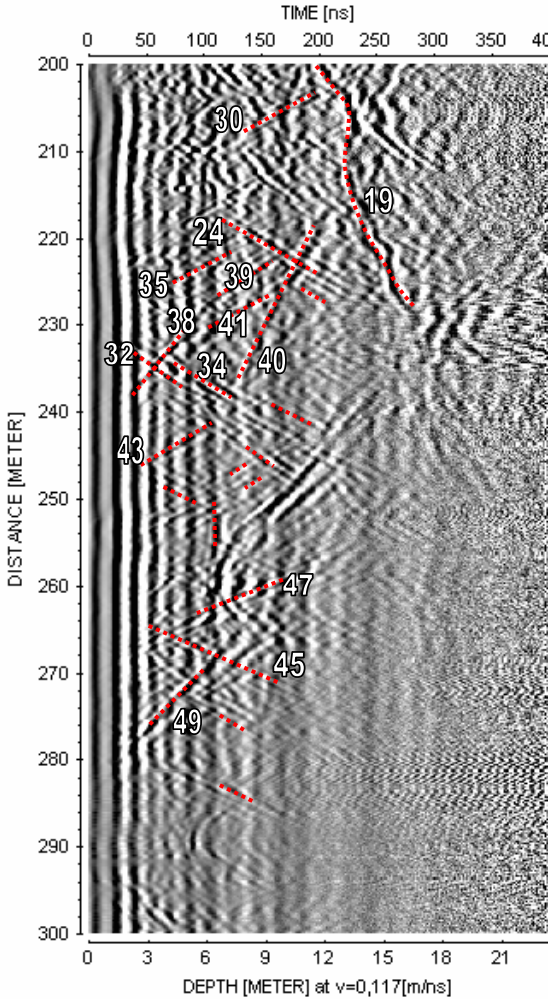
Radar logging in KLX18A, 100 to 605 m, dipole antennas 250, 100 and 20 MHz



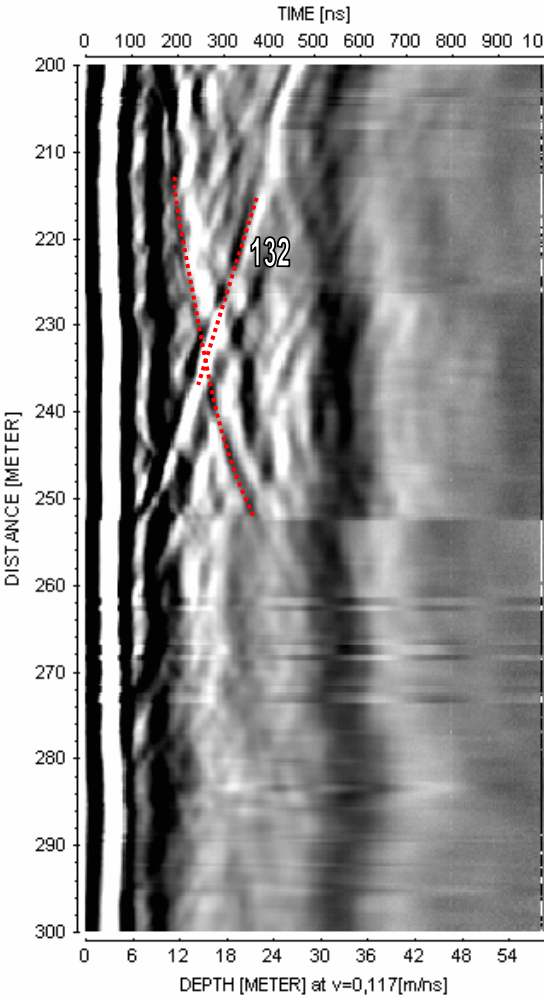




250 MHz

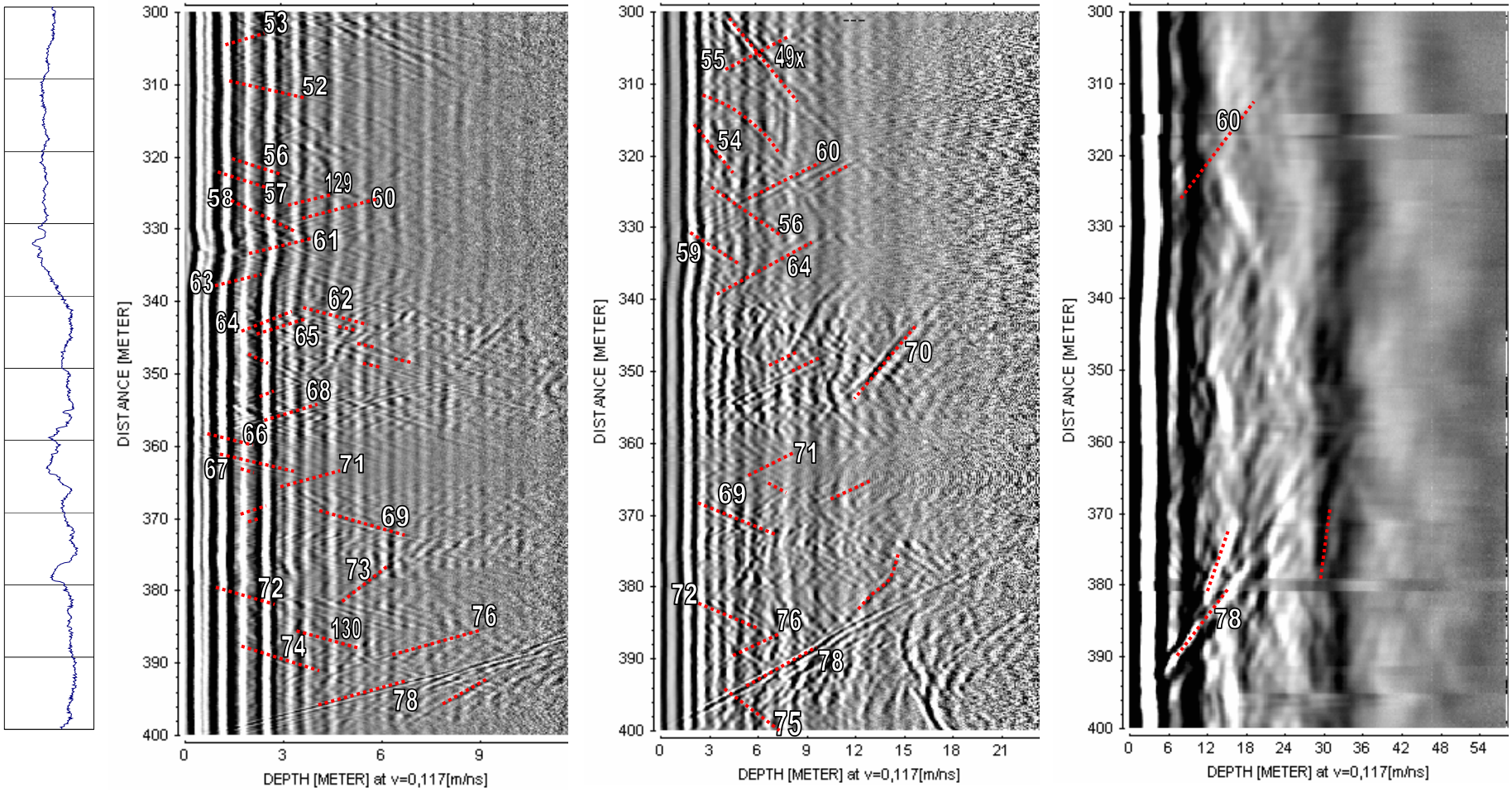


100 MHz



20 MHz

LAXEMAR KLX18A

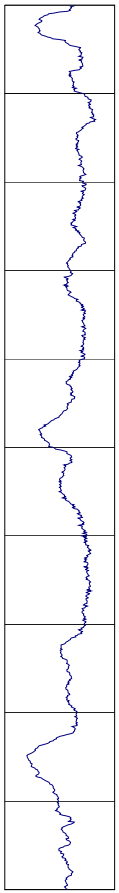


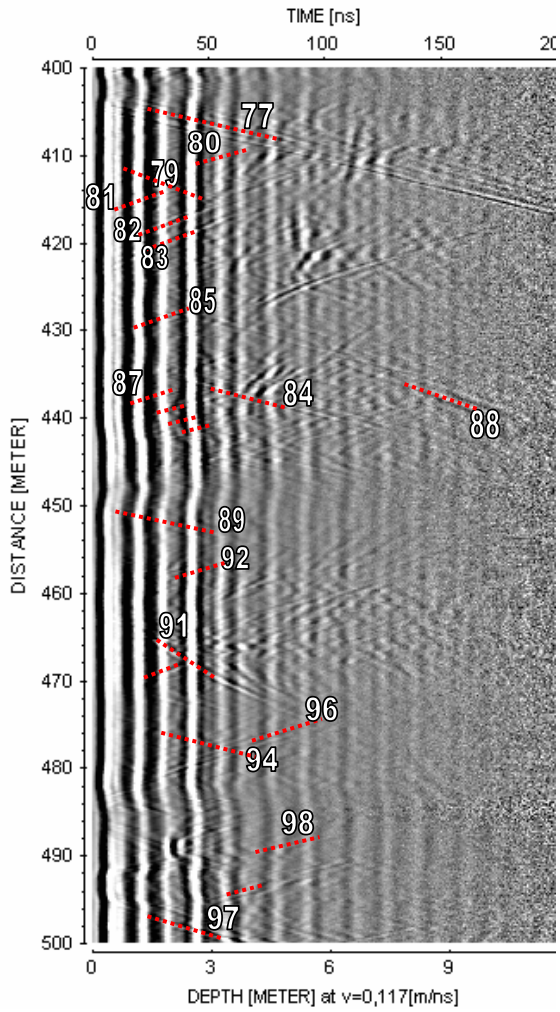
250 MHz

100 MHz

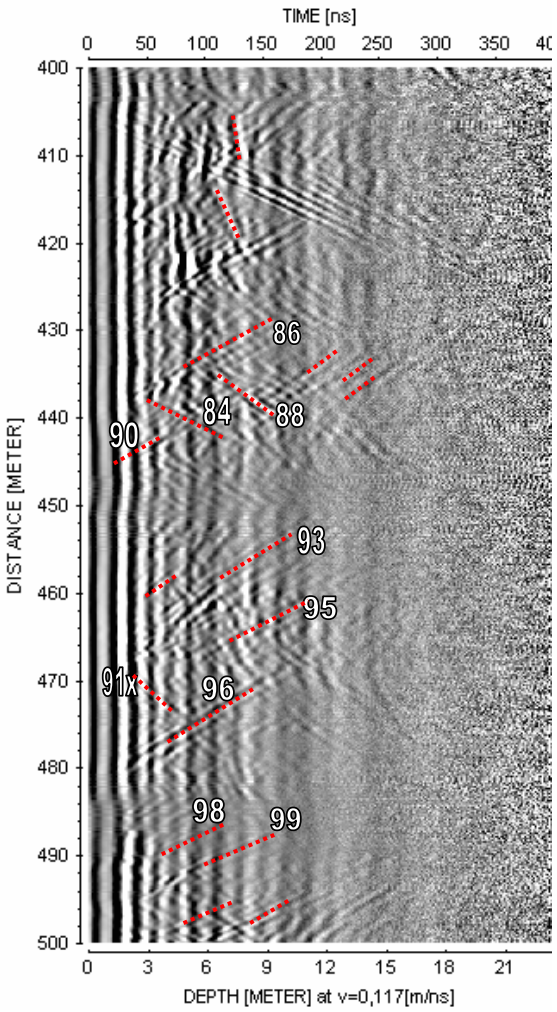
20 MHz

LAXEMAR KLX18A

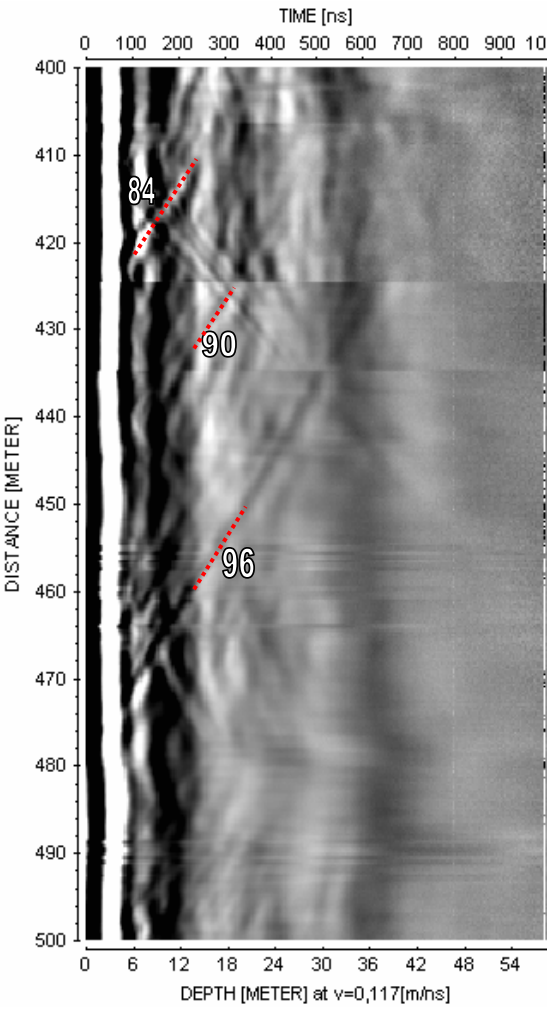




250 MHz

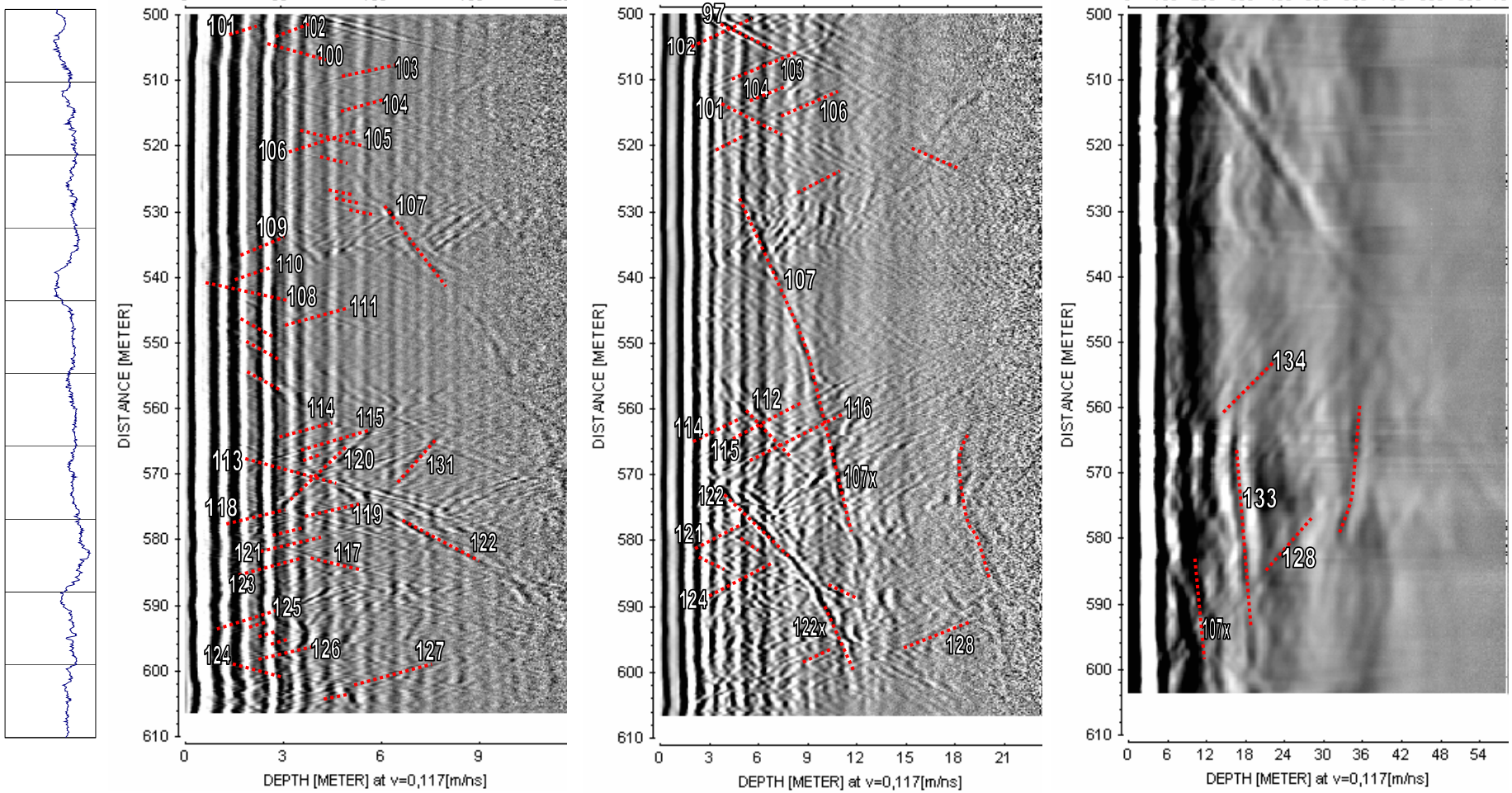


100 MHz



20 MHz

LAXEMAR KLX18A

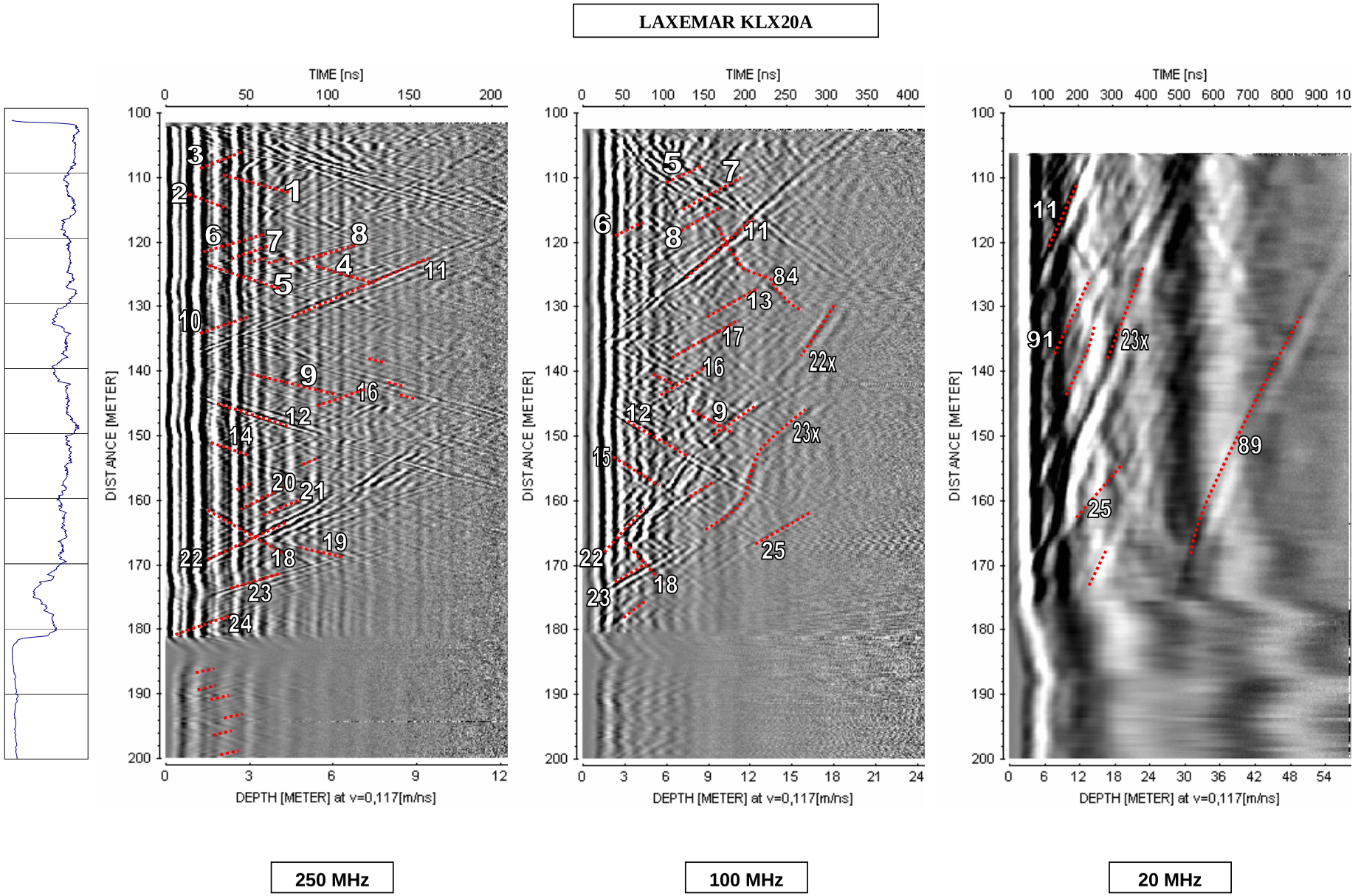


250 MHz

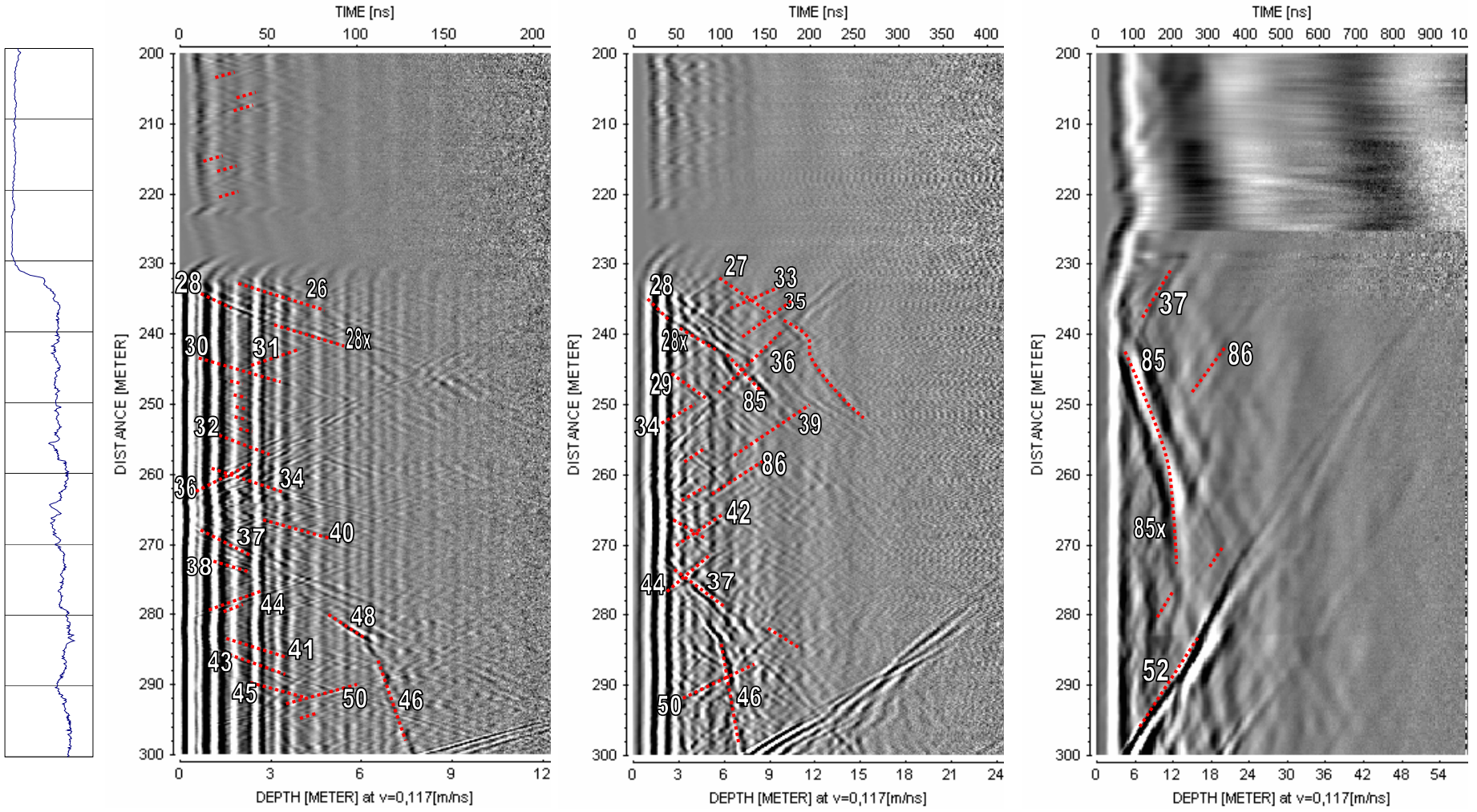
100 MHz

20 MHz

Radar logging in KLX20A, 100 to 450 m, dipole antennas 250, 100 and 20 MHz

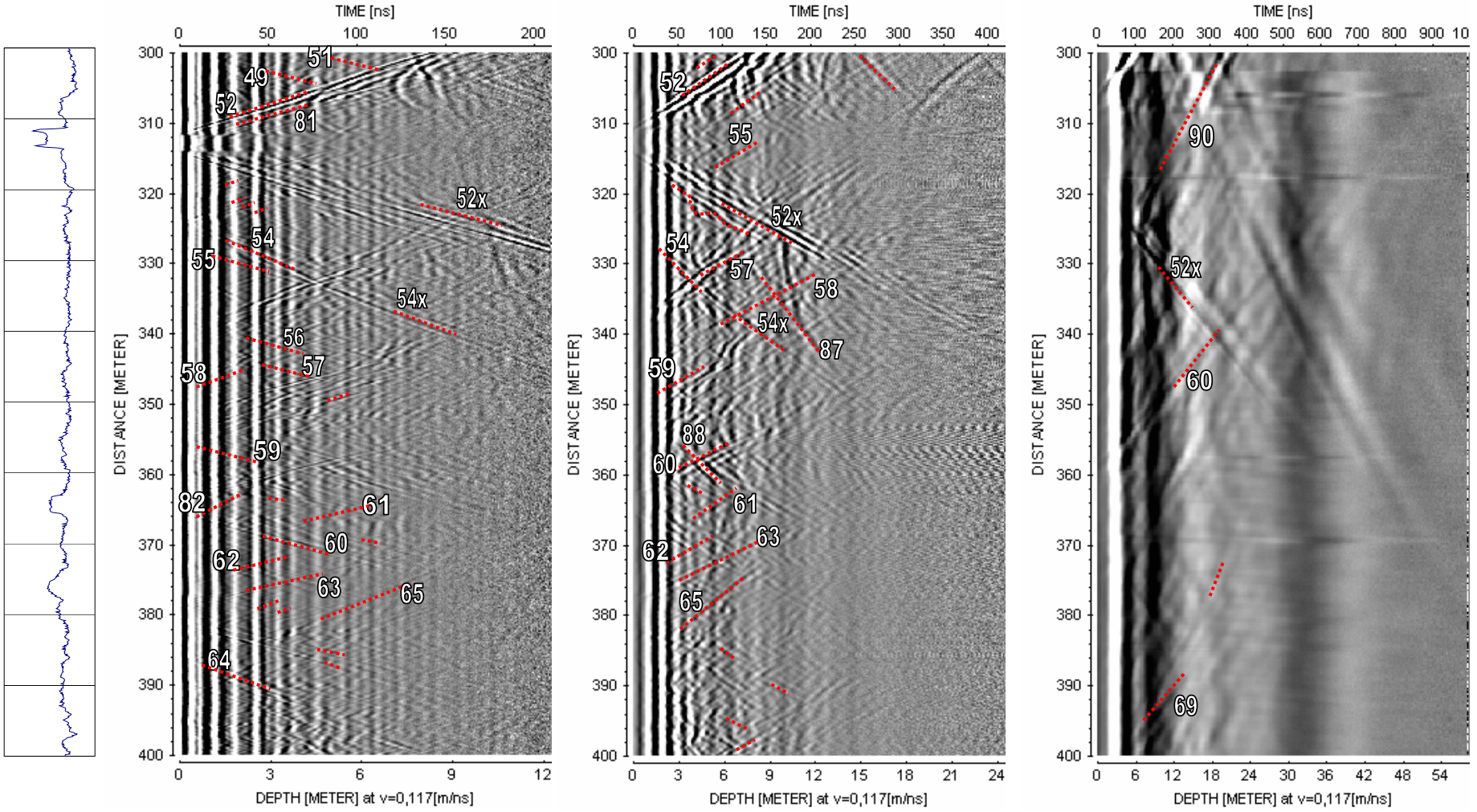


LAXEMAR KLX20A



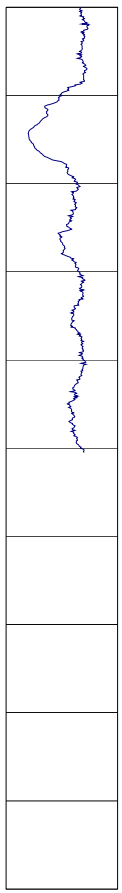
250 MHz | **100 MHz** | **20 MHz**

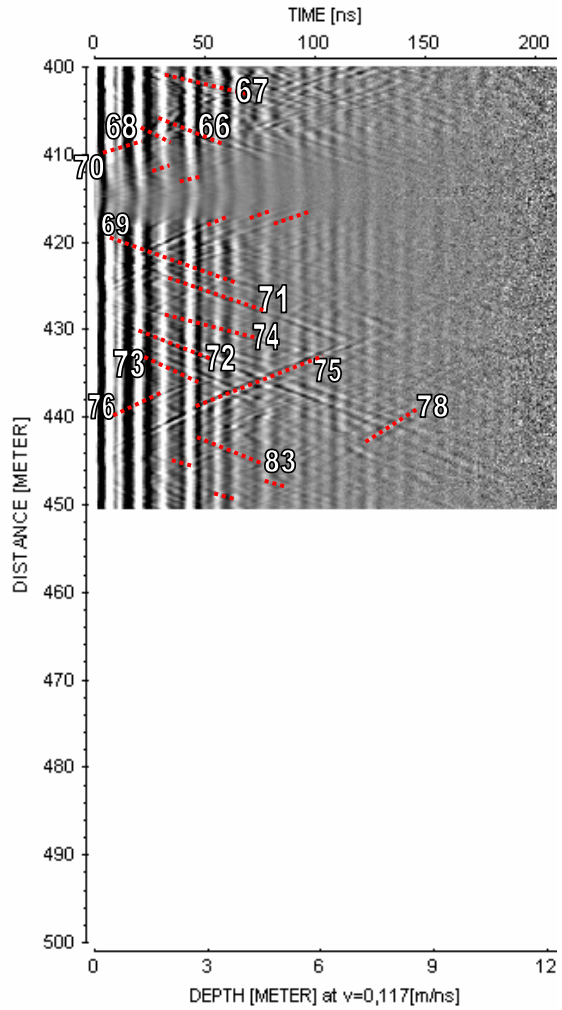
LAXEMAR KLX20A



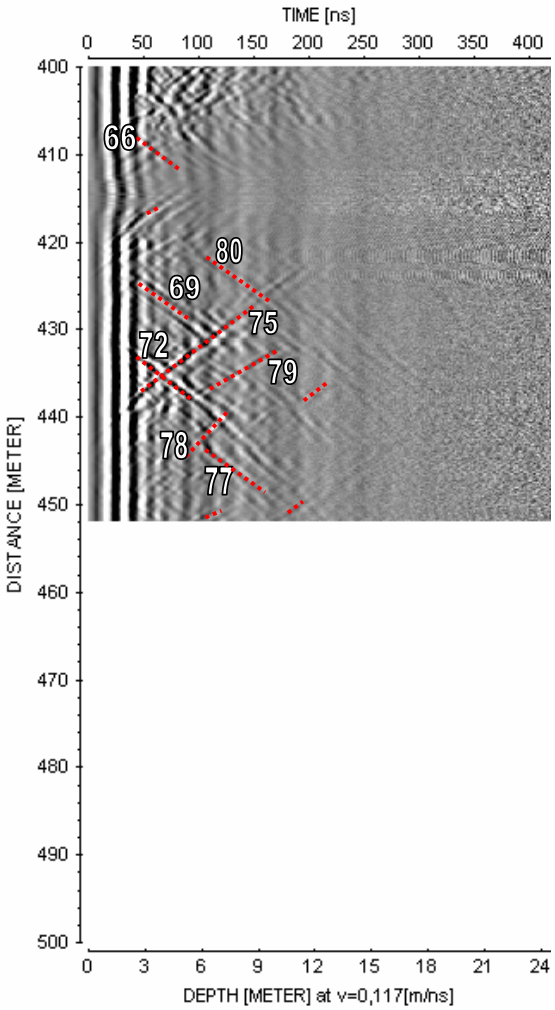
250 MHz **100 MHz** **20 MHz**

LAXEMAR KLX20A

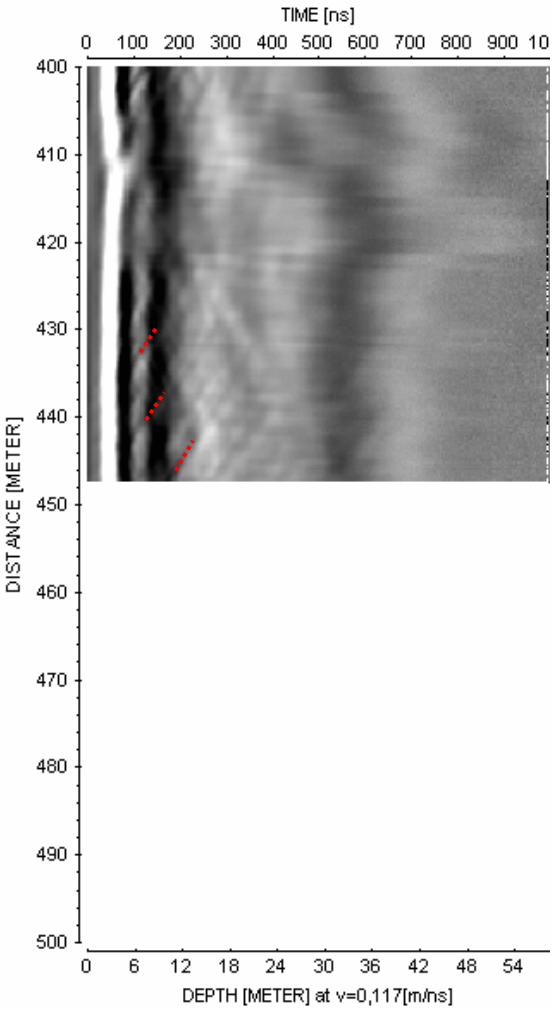




250 MHz

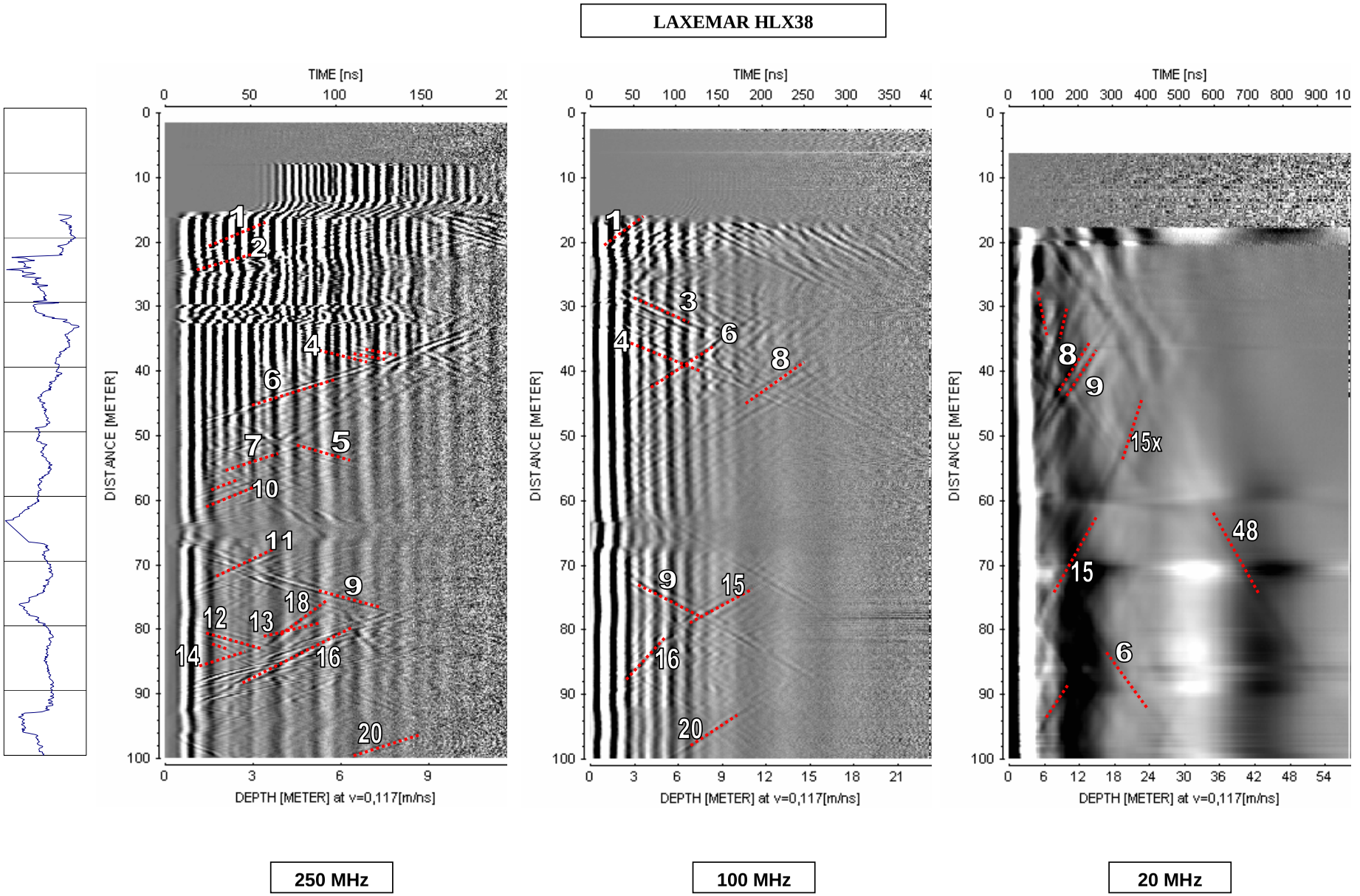


100 MHz

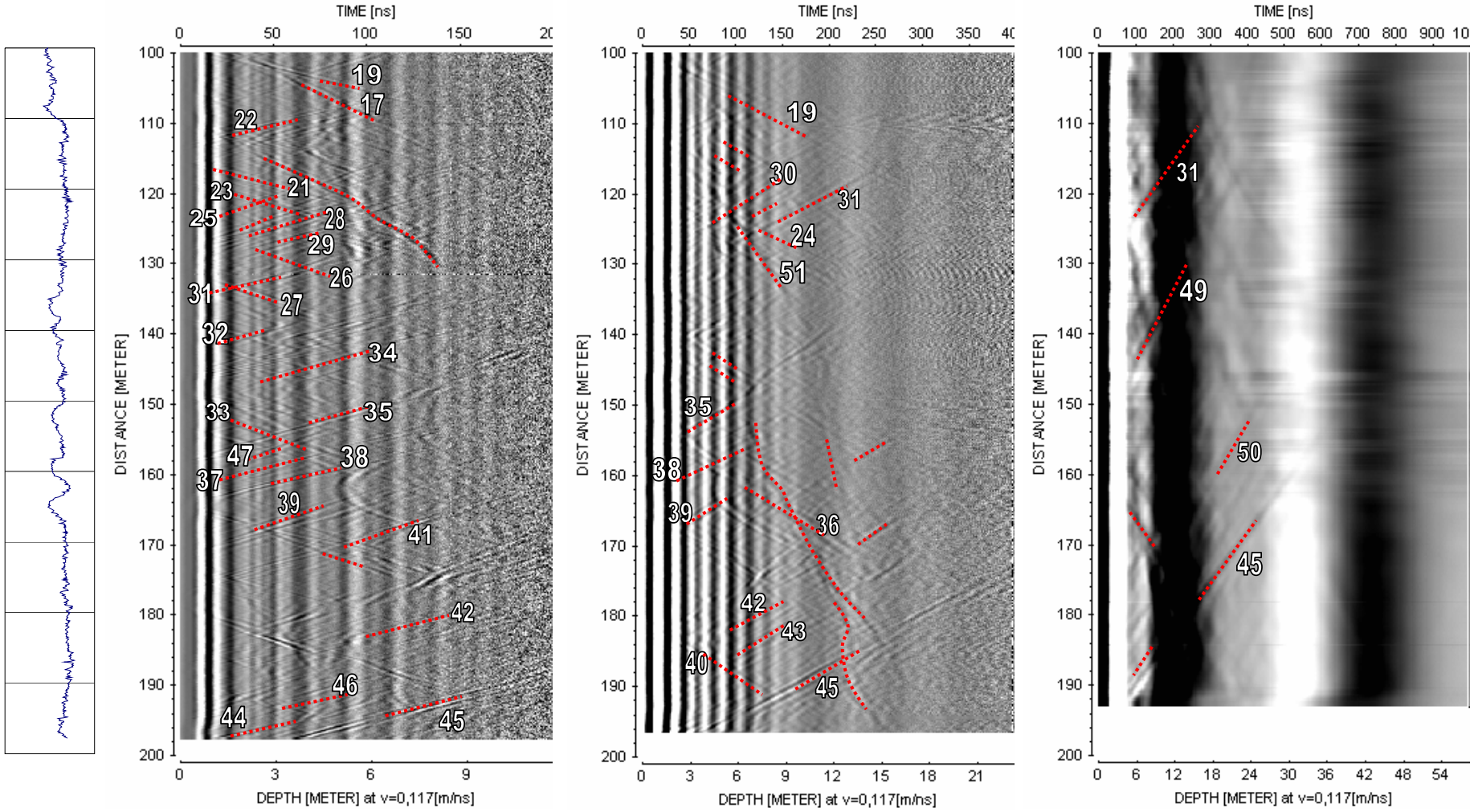


20 MHz

Radar logging in HLX38, 0 to 196 m, dipole antennas 250, 100 and 20 MHz

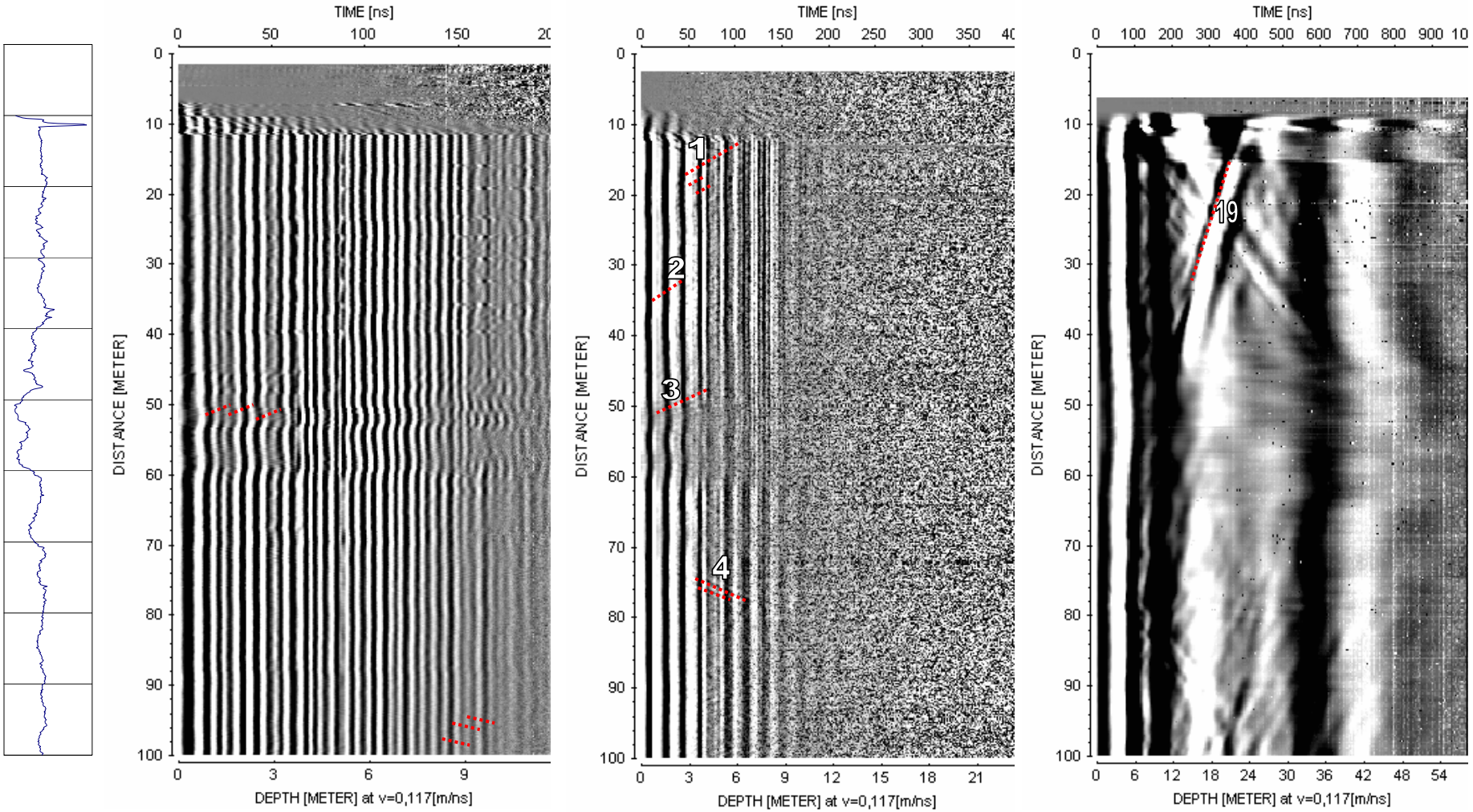


LAXEMAR HLX38



Radar logging in HLX40, 0 to 196 m, dipole antennas 250, 100 and 20 MHz

LAXEMAR HLX40

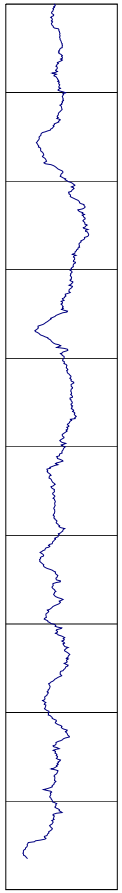


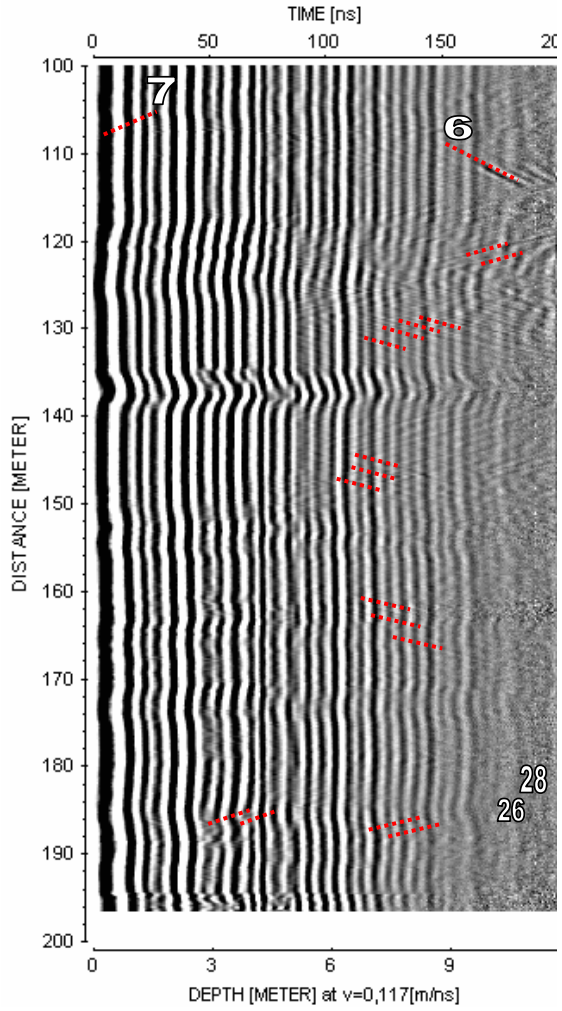
250 MHz

100 MHz

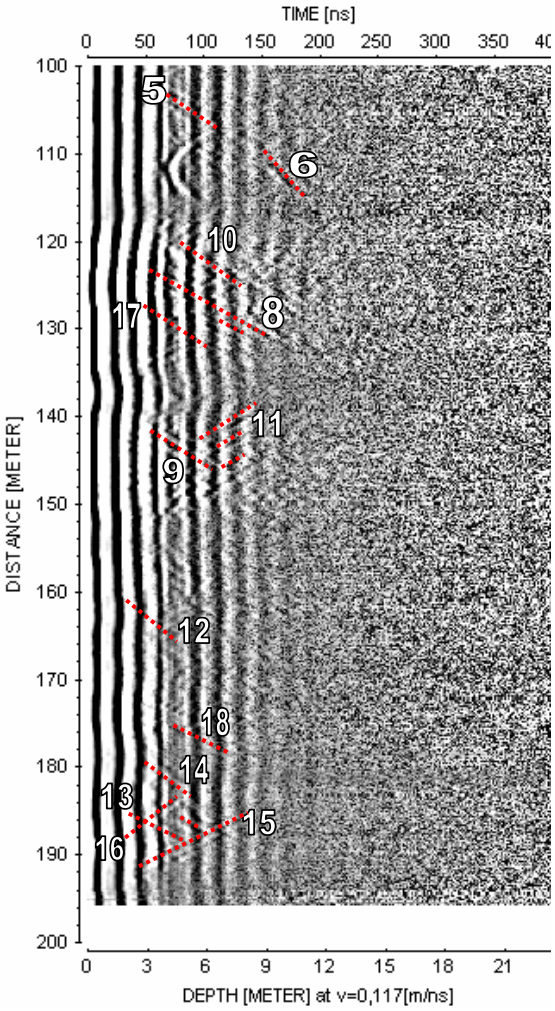
20 MHz

LAXEMAR HLX40

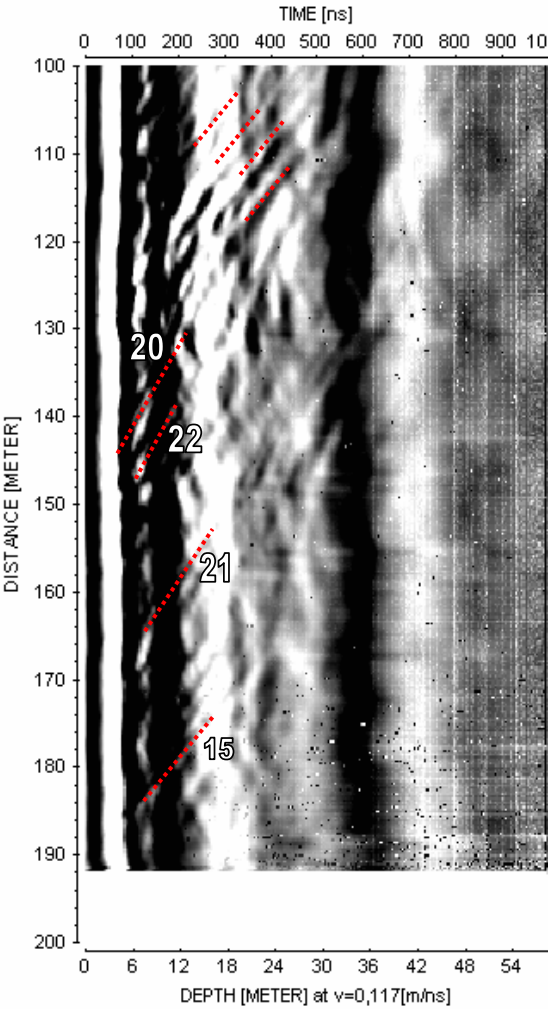




250 MHz



100 MHz



20 MHz

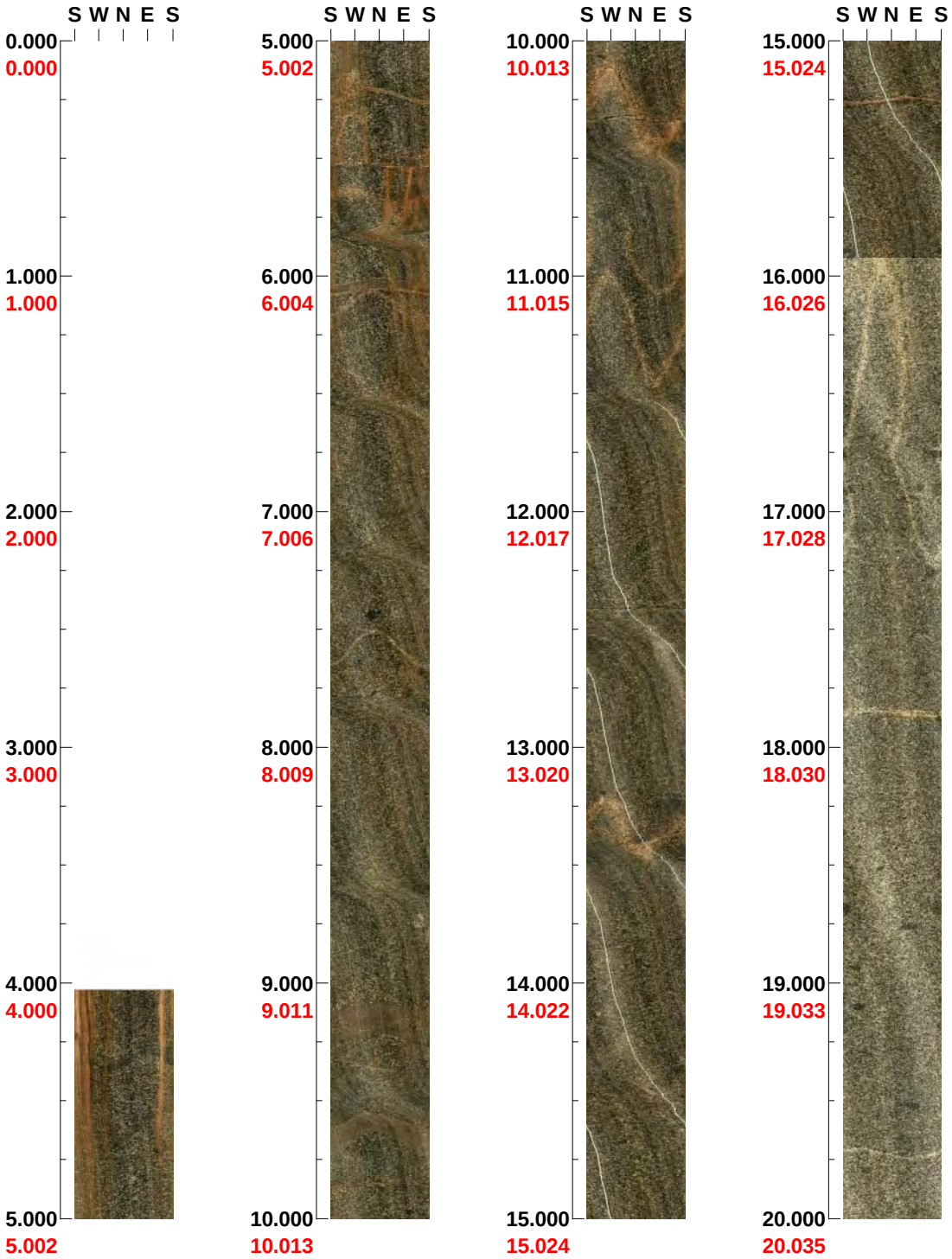
BIPS logging in KLX11B, 4 to 90 m

Project name: Laxemar

Image file	**: c:\work\r5560k~1\bips\klx11b.bip**
BDT file	**: c:\work\r5560k~1\bips\klx11b.bdt**
Locality	**: LAXEMAR**
Bore hole number	**: KLX11B**
Date	**: 06/08/15**
Time	**: 09:19:00**
Depth range	**: 4.030 - 99.325 m**
Azimuth	**: 0**
Inclination	**: -90**
Diameter	**: 76.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/25**
Aspect ratio	**: 175 %**
Pages	**: 5**
Color	**:**  **+0 +0 +0**

Project name: Laxemar
Bore hole No.: KLX11B **Azimuth: 0** **Inclination: -90**

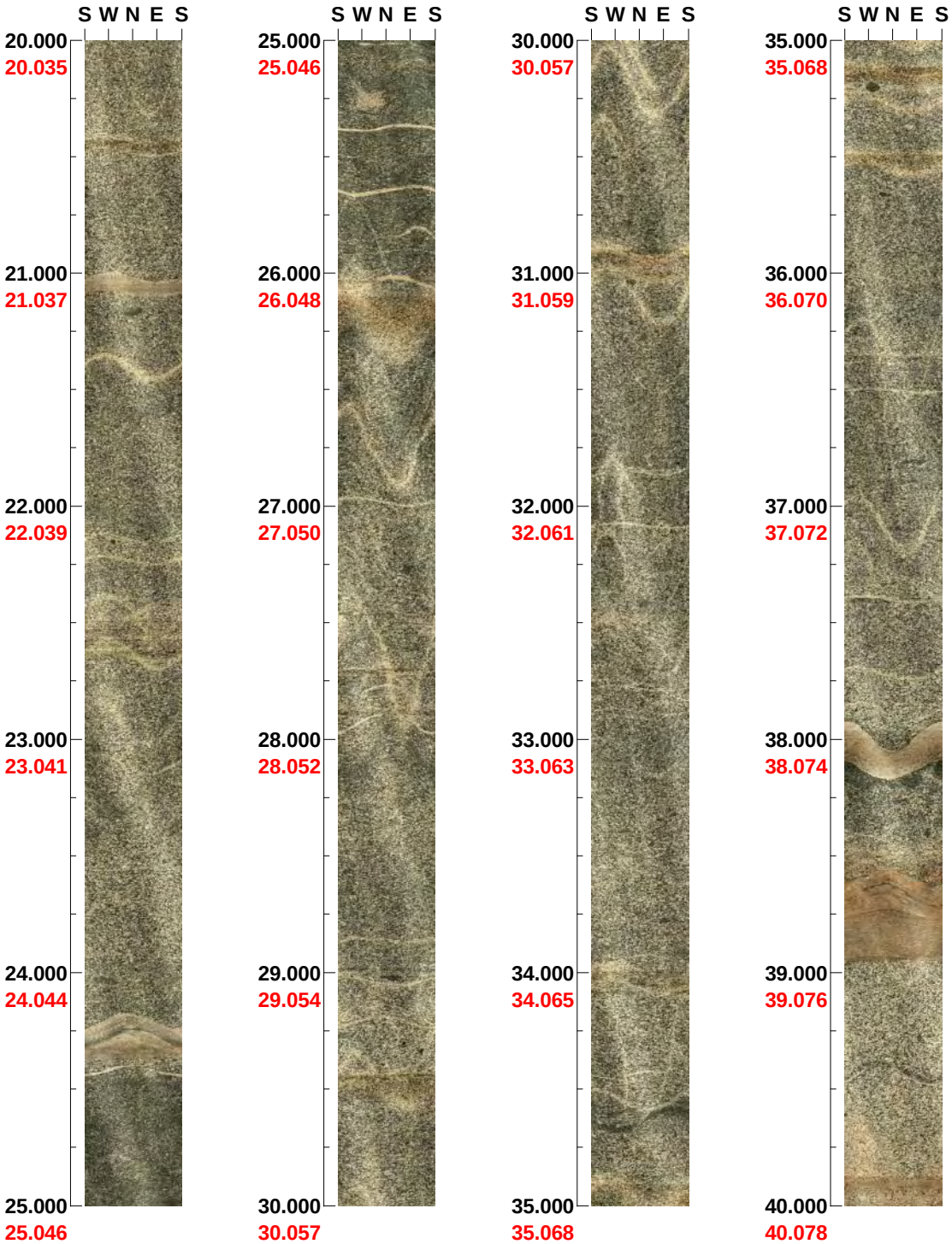
Depth range: 0.000 - 20.000 m



(1 / 5) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11B **Azimuth: 0** **Inclination: -90**

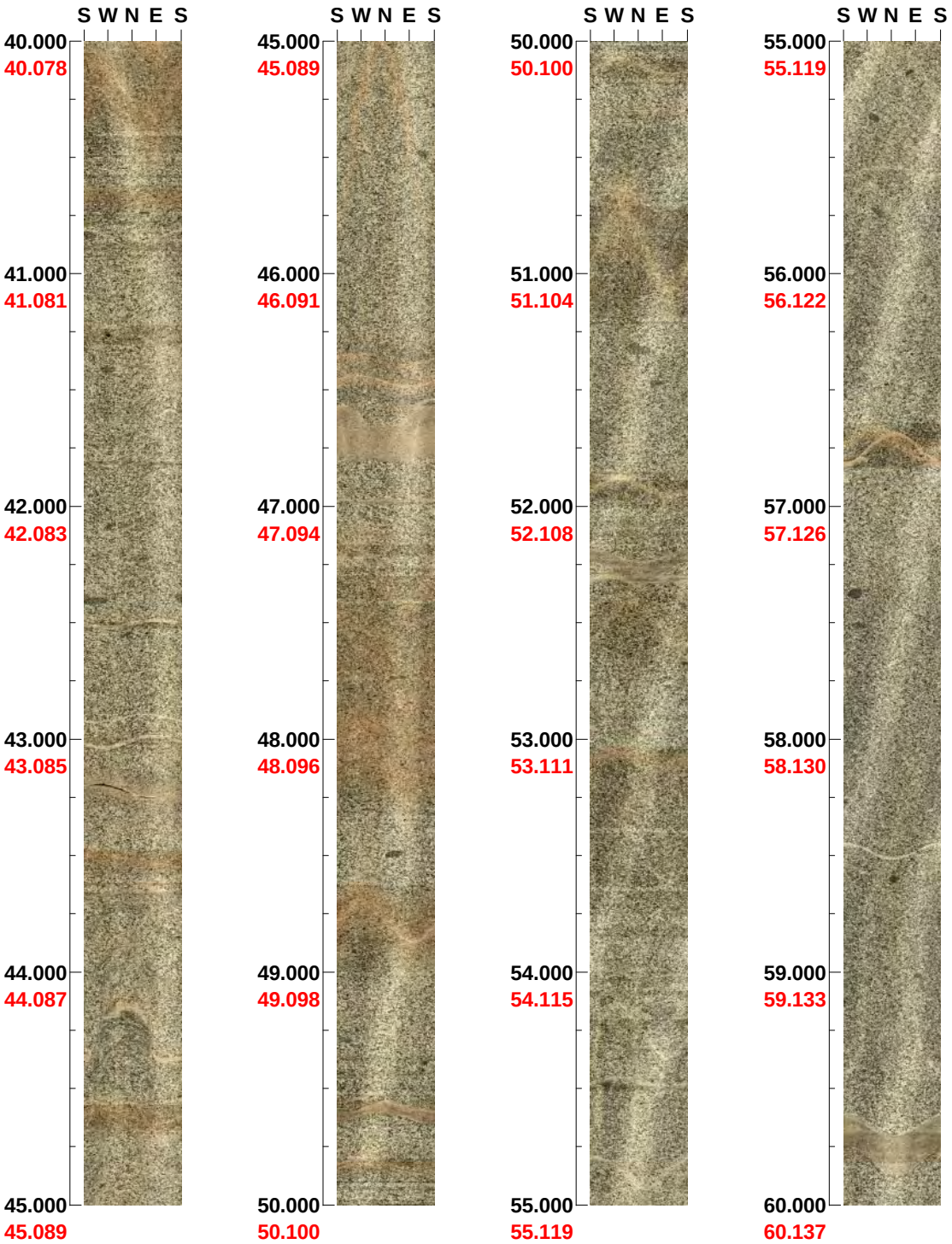
Depth range: 20.000 - 40.000 m



(2 / 5) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11B **Azimuth: 0** **Inclination: -90**

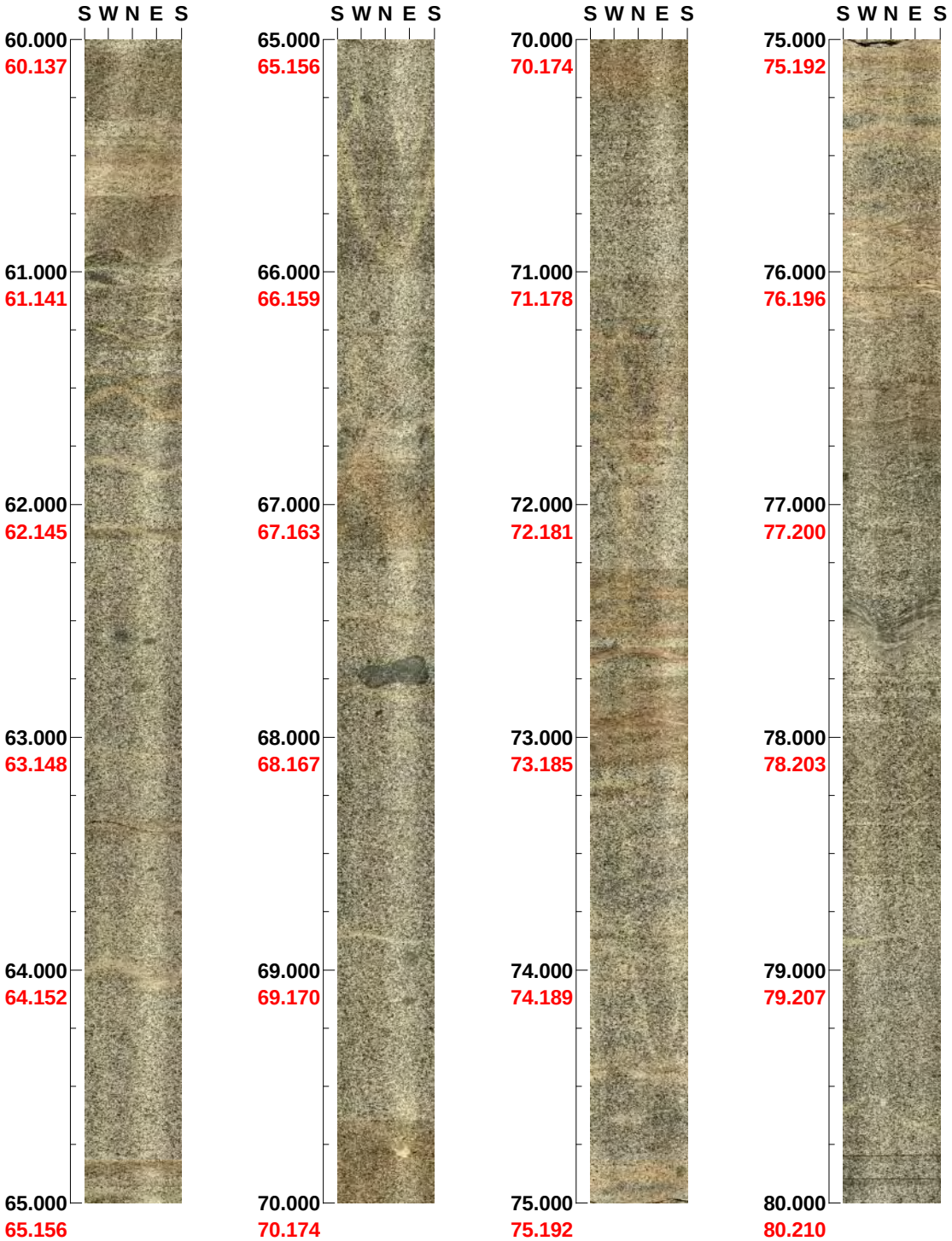
Depth range: 40.000 - 60.000 m



(3 / 5) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11B **Azimuth: 0** **Inclination: -90**

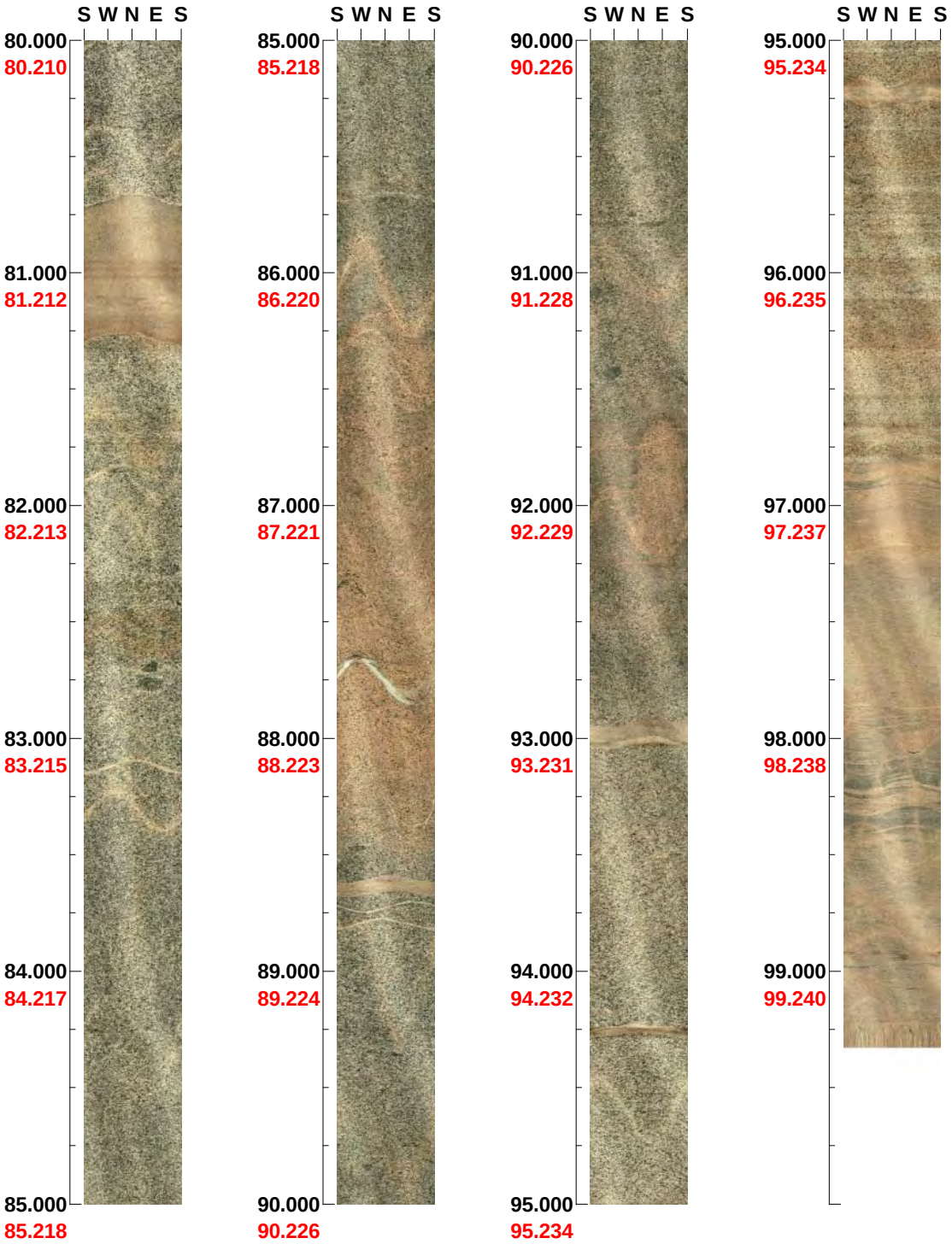
Depth range: 60.000 - 80.000 m



(4 / 5) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11B **Azimuth: 0** **Inclination: -90**

Depth range: 80.000 - 99.325 m



(5 / 5) **Scale: 1/25** **Aspect ratio: 175 %**

Appendix 11

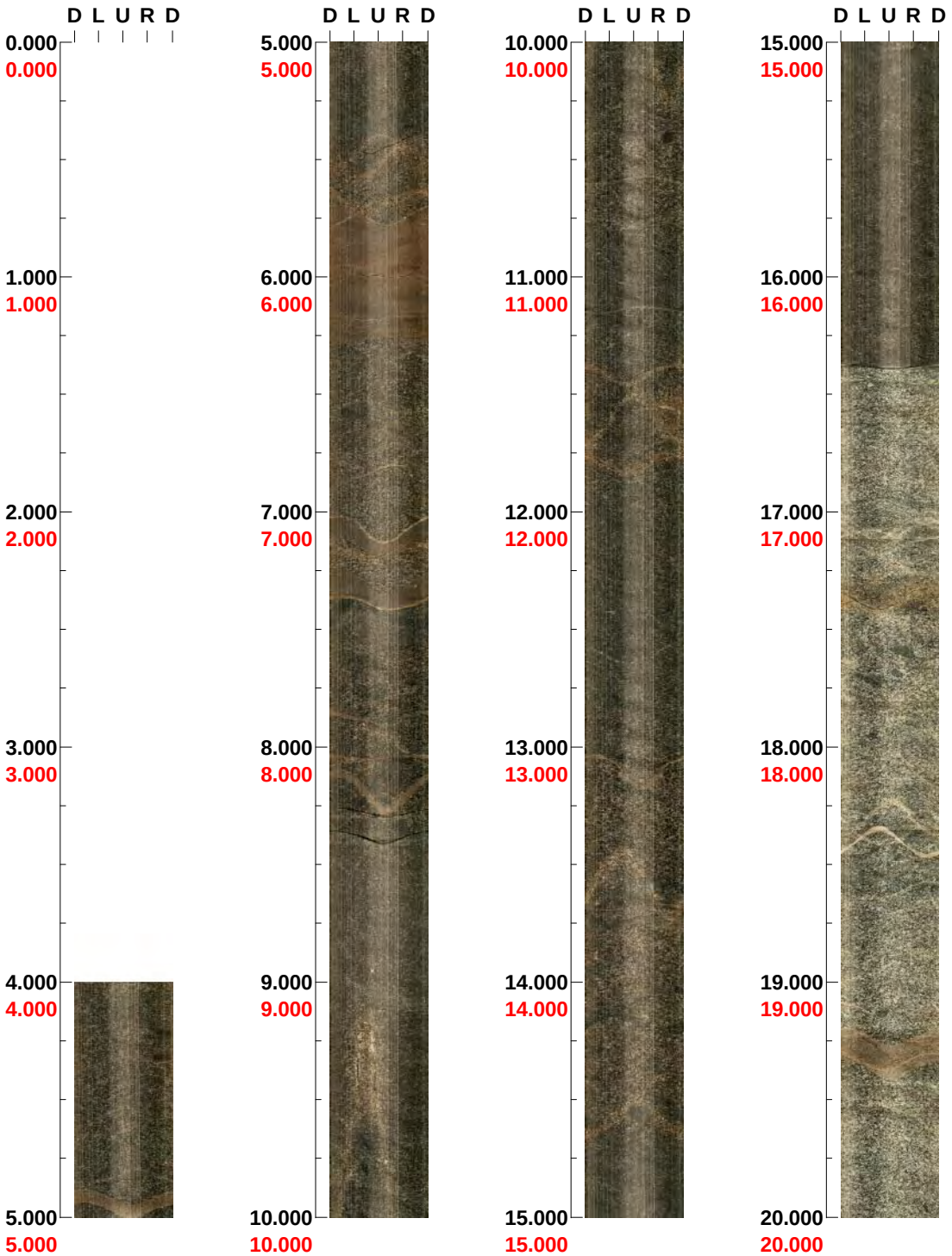
BIPS logging in KLX11C, 4 to 120 m

Project name: Laxemar

Image file	**: c:\work\r5560k~1\bips\klx11c.bip**
BDT file	**: c:\work\r5560k~1\bips\klx11c.bdt**
Locality	**: LAXEMAR**
Bore hole number	**: KLX11C**
Date	**: 06/07/04**
Time	**: 09:17:00**
Depth range	**: 4.000 - 119.617 m**
Azimuth	**: 159**
Inclination	**: -60**
Diameter	**: 76.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/25**
Aspect ratio	**: 175 %**
Pages	**: 6**
Color	**:**  **+0 +0 +0**

Project name: Laxemar
Bore hole No.: KLX11C **Azimuth: 159** **Inclination: -60**

Depth range: 0.000 - 20.000 m



(1 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

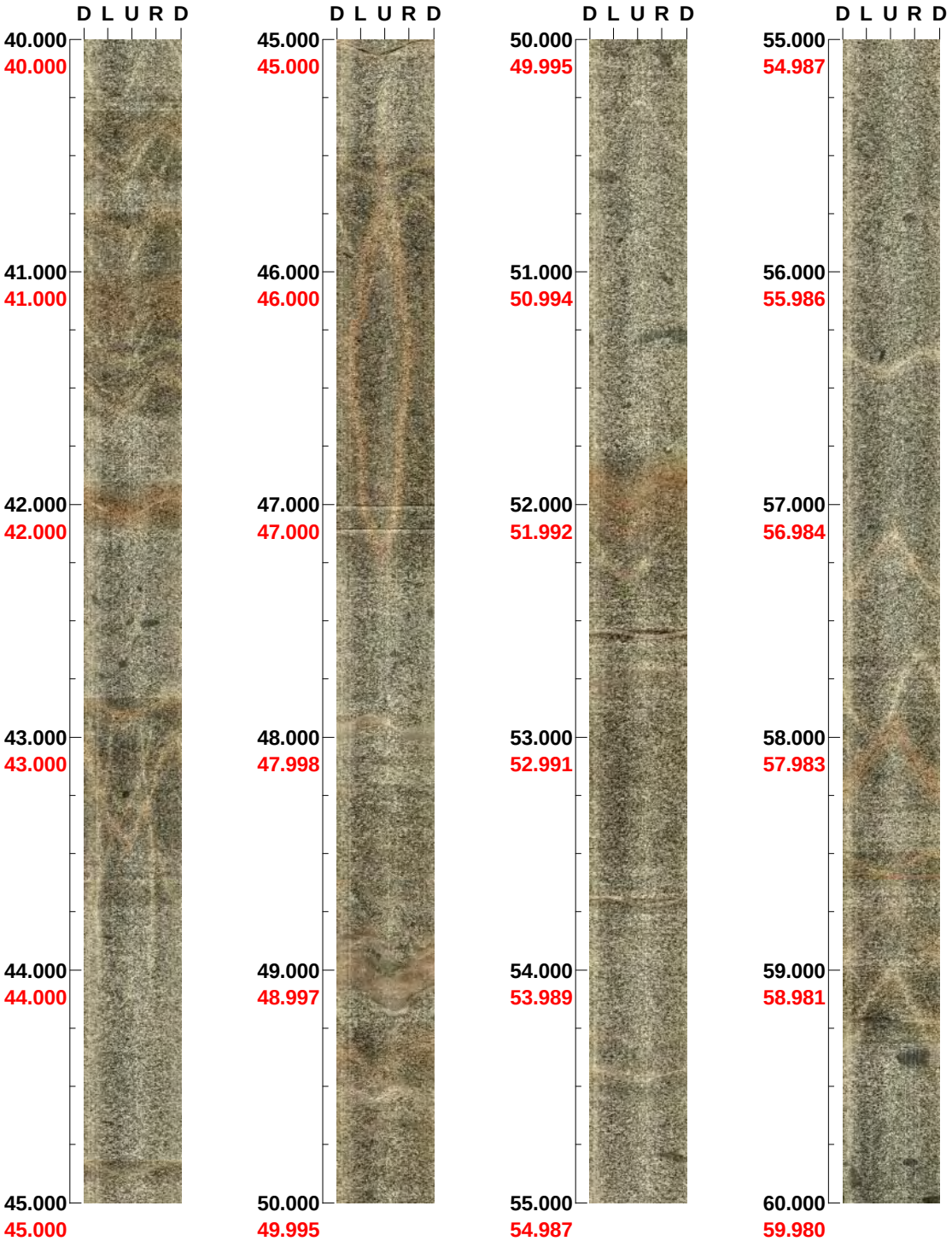
Project name: Laxemar
Bore hole No.: KLX11C **Azimuth: 159** **Inclination: -60**

Depth range: 20.000 - 40.000 m

(2 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11C **Azimuth: 159** **Inclination: -60**

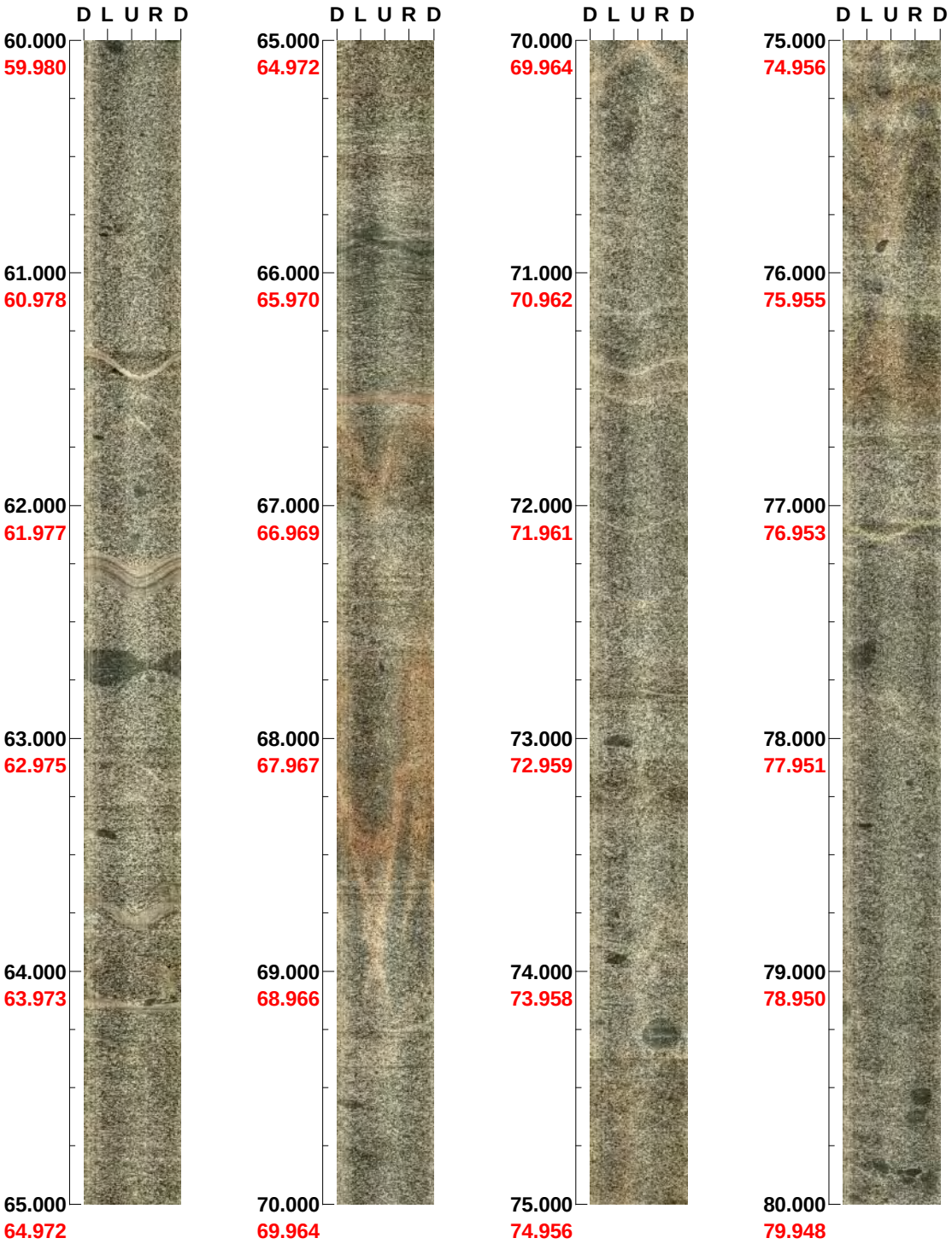
Depth range: 40.000 - 60.000 m



(3 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11C **Azimuth: 159** **Inclination: -60**

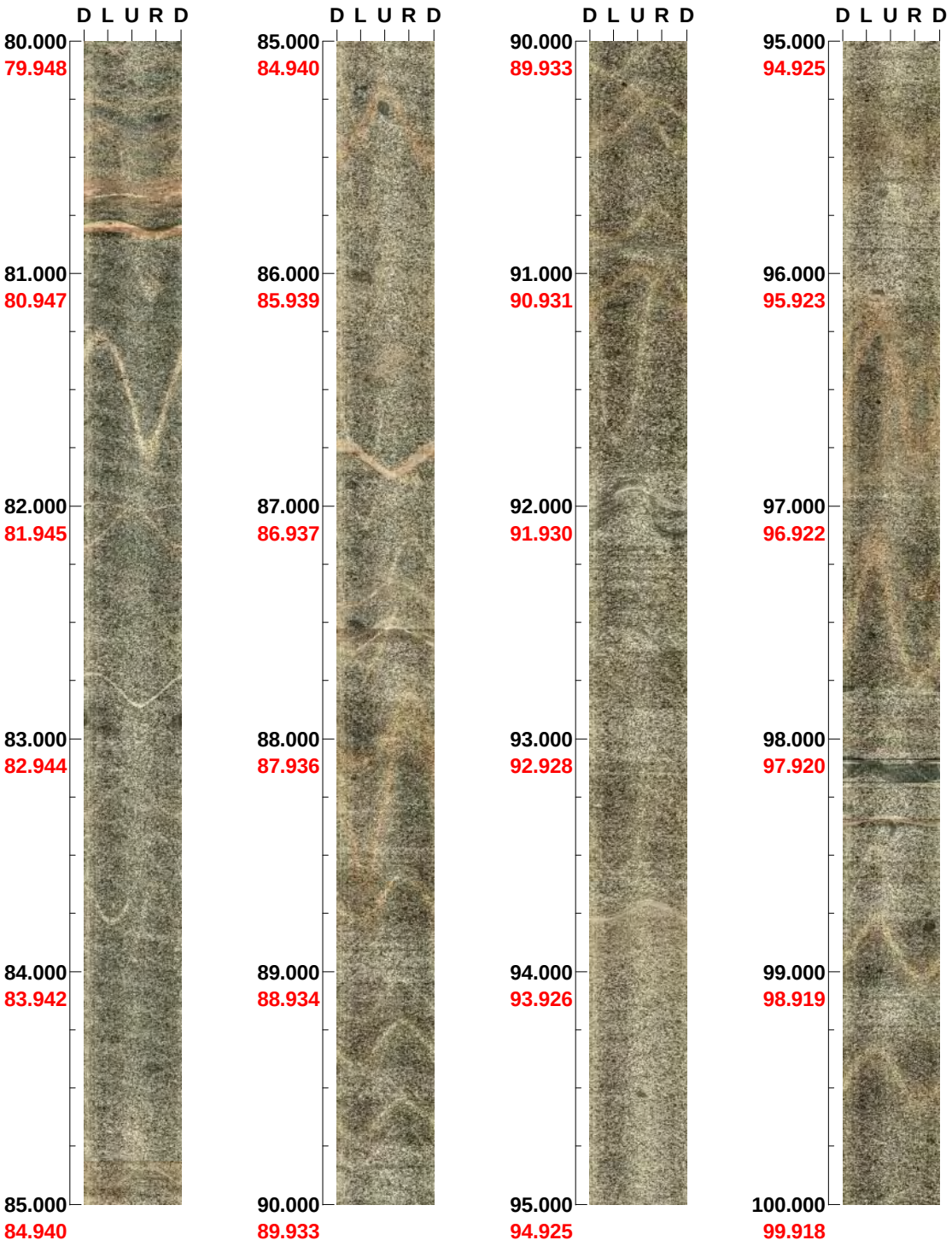
Depth range: 60.000 - 80.000 m



(4 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11C **Azimuth: 159** **Inclination: -60**

Depth range: 80.000 - 100.000 m



(5 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11C **Azimuth: 159** **Inclination: -60**

Depth range: 100.000 - 119.617 m

(6 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Appendix 12

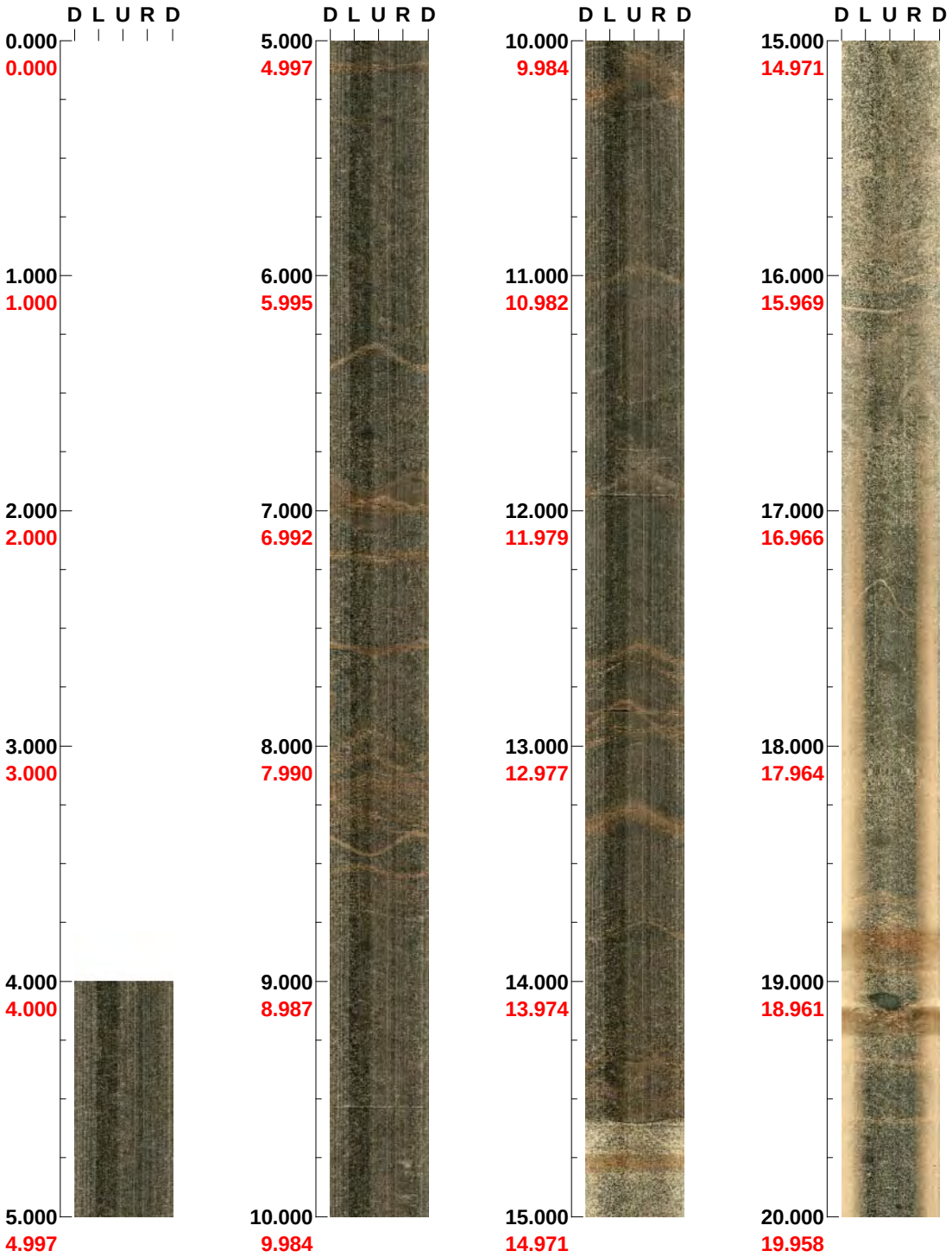
BIPS logging in KLX11D, 4 to 118 m

Project name: Laxemar

Image file	**: c:\work\r5560k~1\bips\klx11d.bip**
BDT file	**: c:\work\r5560k~1\bips\klx11d.bdt**
Locality	**: LAXEMAR**
Bore hole number	**: KLX11D**
Date	**: 06/07/04**
Time	**: 12:37:00**
Depth range	**: 4.000 - 119.323 m**
Azimuth	**: 270**
Inclination	**: -60**
Diameter	**: 76.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/25**
Aspect ratio	**: 175 %**
Pages	**: 6**
Color	**: +0 +0 +0**

Project name: Laxemar
Bore hole No.: KLX11D **Azimuth: 270** **Inclination: -60**

Depth range: 0.000 - 20.000 m



(1 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11D **Azimuth: 270** **Inclination: -60**

Depth range: 20.000 - 40.000 m

(2 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11D **Azimuth: 270** **Inclination: -60**

Depth range: 40.000 - 60.000 m

(3 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11D **Azimuth: 270** **Inclination: -60**

Depth range: 60.000 - 80.000 m

(4 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11D **Azimuth: 270** **Inclination: -60**

Depth range: 80.000 - 100.000 m

(5 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11D **Azimuth: 270** **Inclination: -60**

Depth range: 100.000 - 119.323 m

(6 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Appendix 13

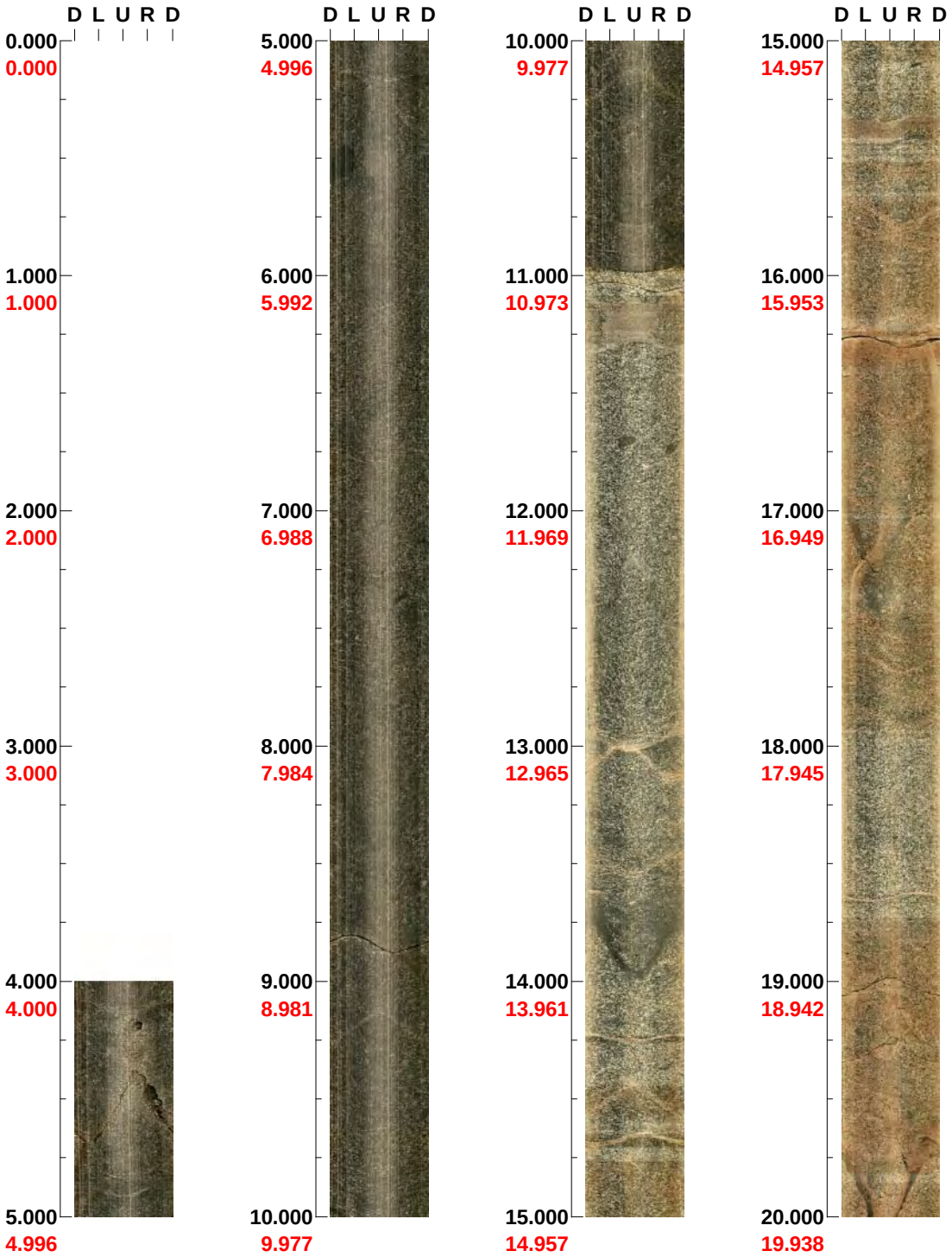
BIPS logging in KLX11E, 4 to 121 m

Project name: Laxemar

Image file	**: c:\work\r5560k~1\bips\klx11e.bip**
BDT file	**: c:\work\r5560k~1\bips\klx11e.bdt**
Locality	**: LAXEMAR**
Bore hole number	**: KLX11E**
Date	**: 06/07/04**
Time	**: 14:19:00**
Depth range	**: 4.000 - 121.339 m**
Azimuth	**: 340**
Inclination	**: -60**
Diameter	**: 76.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/25**
Aspect ratio	**: 175 %**
Pages	**: 7**
Color	**: +0 +0 +0**

Project name: Laxemar
Bore hole No.: KLX11E **Azimuth: 340** **Inclination: -60**

Depth range: 0.000 - 20.000 m



(1 / 7) **Scale: 1/25** **Aspect ratio: 175 %**

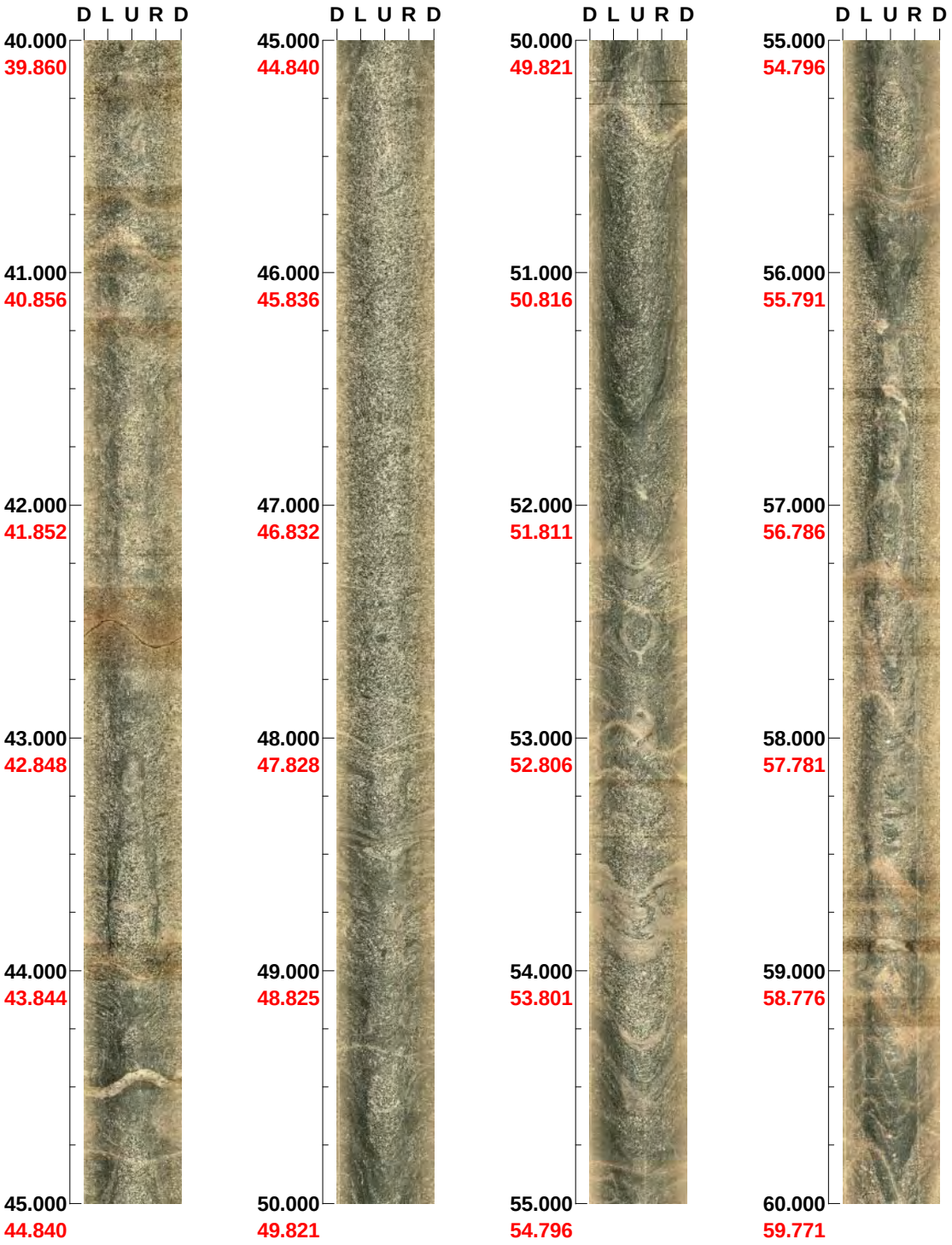
Project name: Laxemar
Bore hole No.: KLX11E **Azimuth: 340** **Inclination: -60**

Depth range: 20.000 - 40.000 m

(2 / 7) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11E **Azimuth: 340** **Inclination: -60**

Depth range: 40.000 - 60.000 m



(3 / 7) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11E **Azimuth: 340** **Inclination: -60**

Depth range: 60.000 - 80.000 m

(4 / 7) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11E **Azimuth: 340** **Inclination: -60**

Depth range: 80.000 - 100.000 m

(5 / 7) **Scale: 1/25** **Aspect ratio: 175 %**

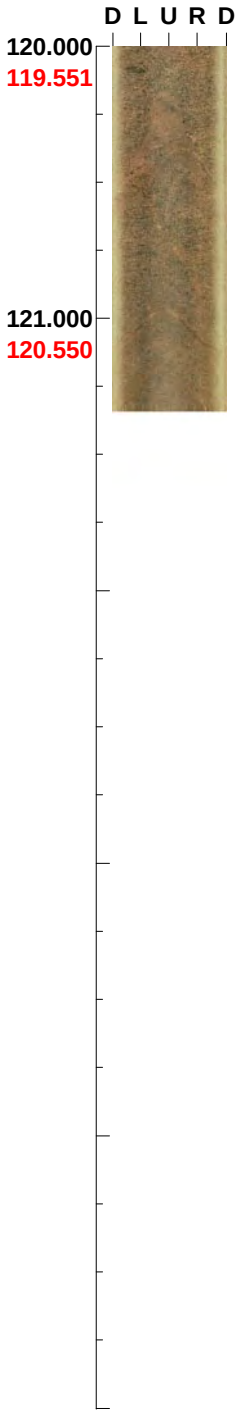
Project name: Laxemar
Bore hole No.: KLX11E **Azimuth: 340** **Inclination: -60**

Depth range: 100.000 - 120.000 m

(6 / 7) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11E **Azimuth: 340** **Inclination: -60**

Depth range: 120.000 - 121.339 m



(7 / 7) **Scale: 1/25** **Aspect ratio: 175 %**

Appendix 14

BIPS logging in KLX11F, 4 to 119 m

Project name: Laxemar

Image file	**: c:\work\r5560k~1\bips\klx11f.bip**
BDT file	**: c:\work\r5560k~1\bips\klx11f.bdt**
Locality	**: LAXEMAR**
Bore hole number	**: KLX11F**
Date	**: 06/07/04**
Time	**: 10:56:00**
Depth range	**: 4.000 - 118.900 m**
Azimuth	**: 90**
Inclination	**: -60**
Diameter	**: 76.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/25**
Aspect ratio	**: 175 %**
Pages	**: 6**
Color	**:**  **+0 +0 +0**

Project name: Laxemar
Bore hole No.: KLX11F **Azimuth: 90** **Inclination: -60**

Depth range: 0.000 - 20.000 m

(1 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11F **Azimuth: 90** **Inclination: -60**

Depth range: 20.000 - 40.000 m

(2 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11F **Azimuth: 90** **Inclination: -60**

Depth range: 40.000 - 60.000 m

(3 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11F **Azimuth: 90** **Inclination: -60**

Depth range: 60.000 - 80.000 m

(4 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

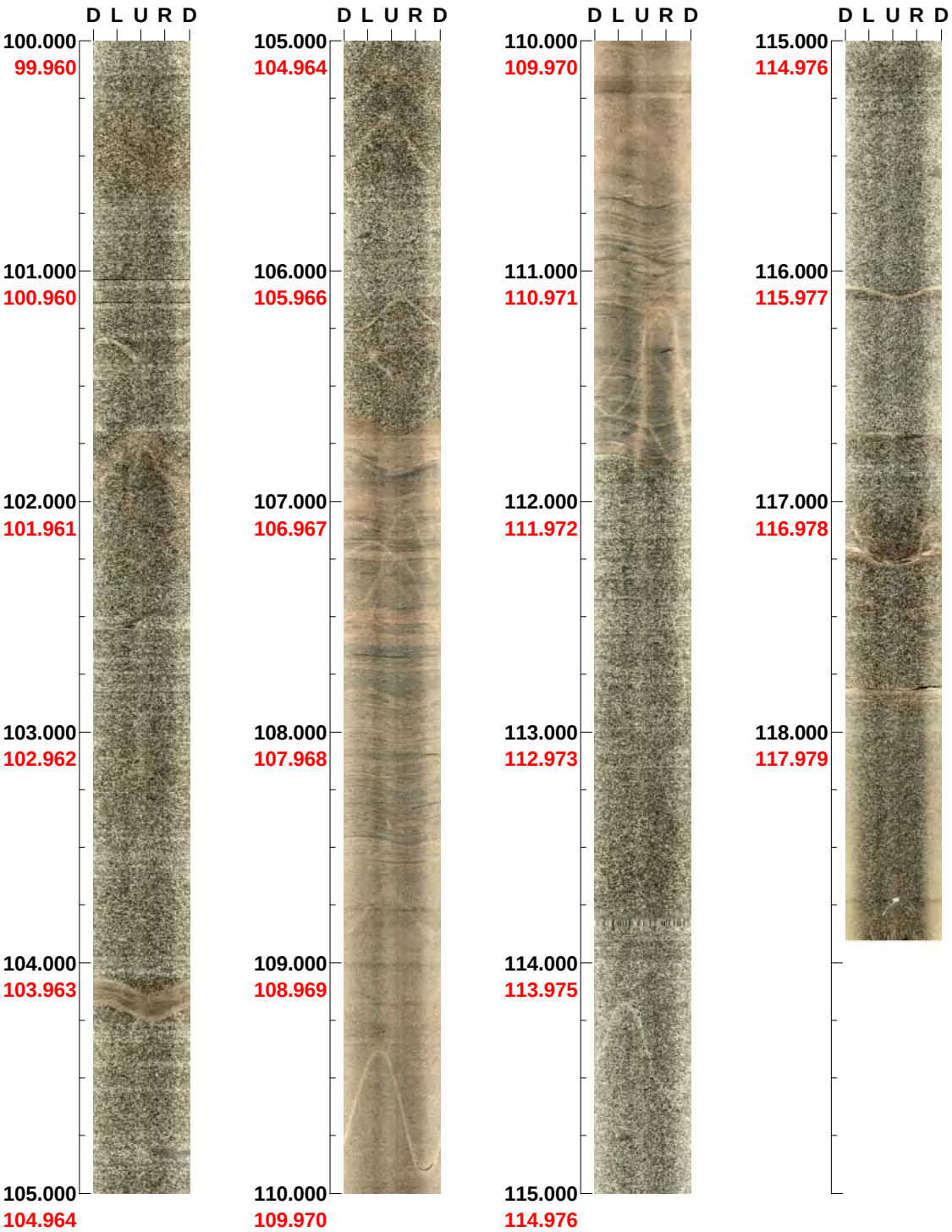
Project name: Laxemar
Bore hole No.: KLX11F **Azimuth: 90** **Inclination: -60**

Depth range: 80.000 - 100.000 m

(5 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX11F **Azimuth: 90** **Inclination: -60**

Depth range: 100.000 - 118.900 m



(6 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Appendix 15

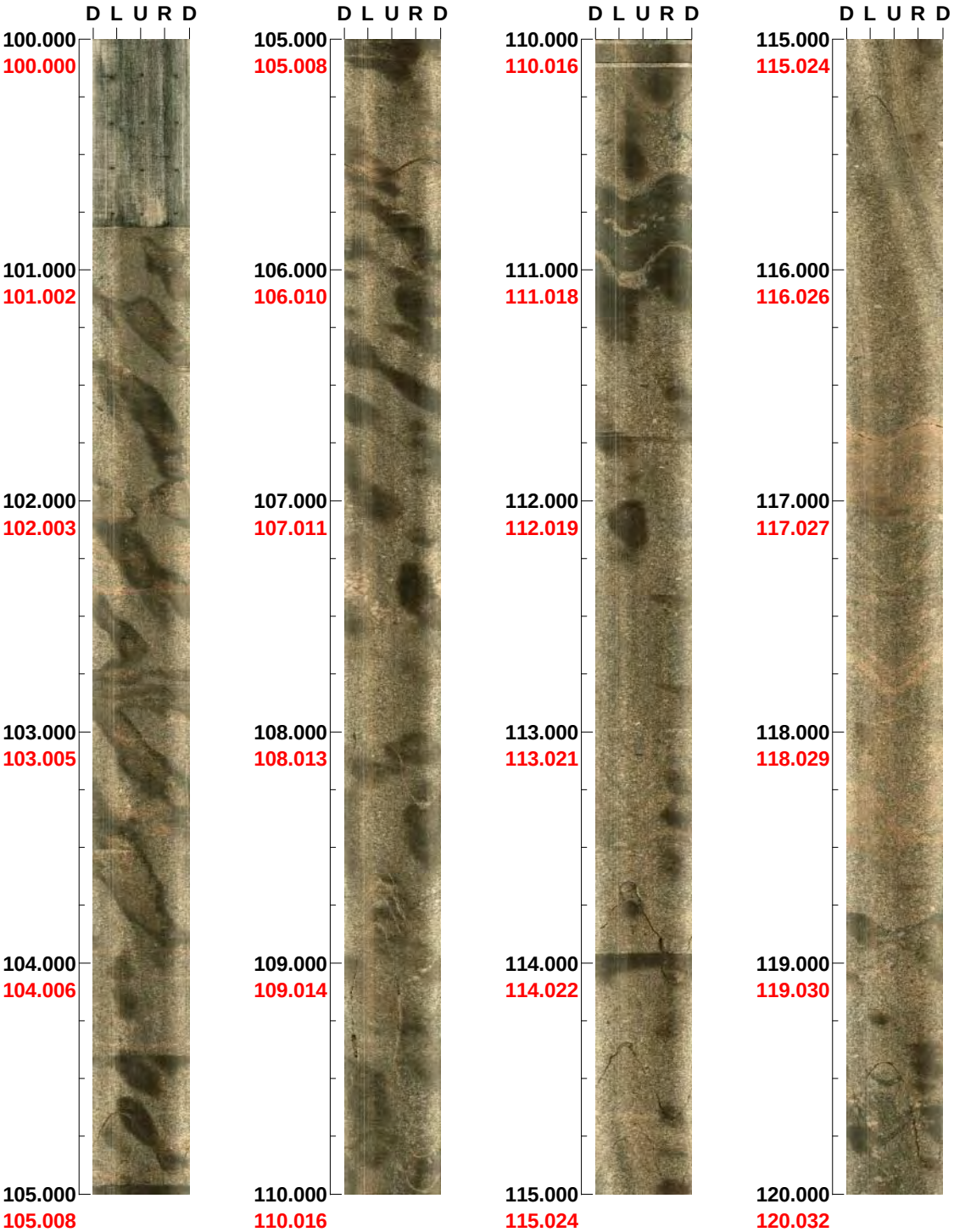
BIPS logging in KLX18A, 100 to 609 m

Project name: Laxemar

Image file	**: c:\work\r5533a~1\bips\klx18a_1.bip**
BDT file	**: c:\work\r5533a~1\bips\klx18a_1.bdt**
Locality	**: LAXEMAR**
Bore hole number	**: KLX18A**
Date	**: 06/05/15**
Time	**: 10:41:00**
Depth range	**: 100.000 - 604.902 m**
Azimuth	**: 271**
Inclination	**: 82**
Diameter	**: 76.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/25**
Aspect ratio	**: 175 %**
Pages	**: 27**
Color	**:**  **+0 +0 +0**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 100.000 - 120.000 m



(1 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

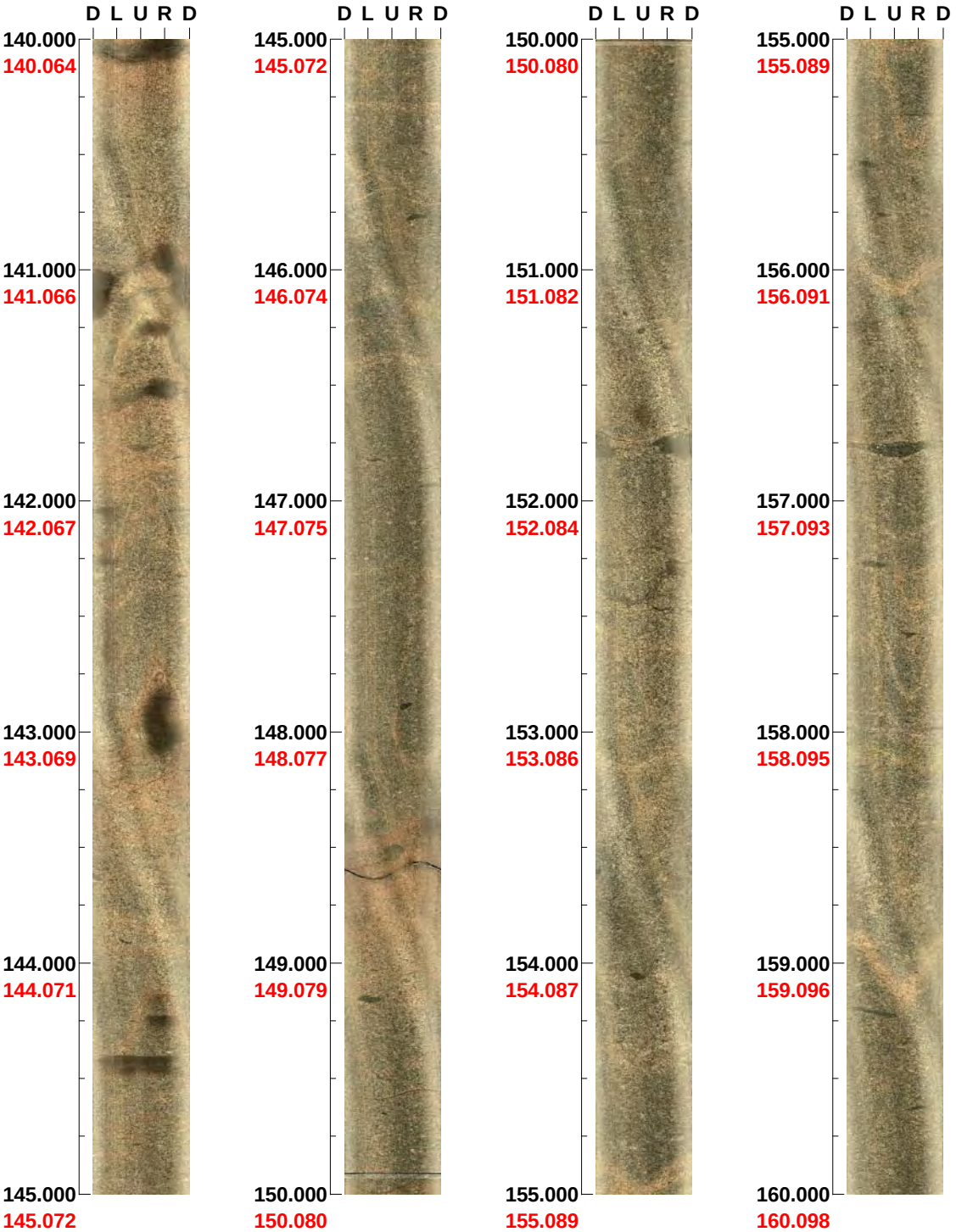
Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 120.000 - 140.000 m

(2 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

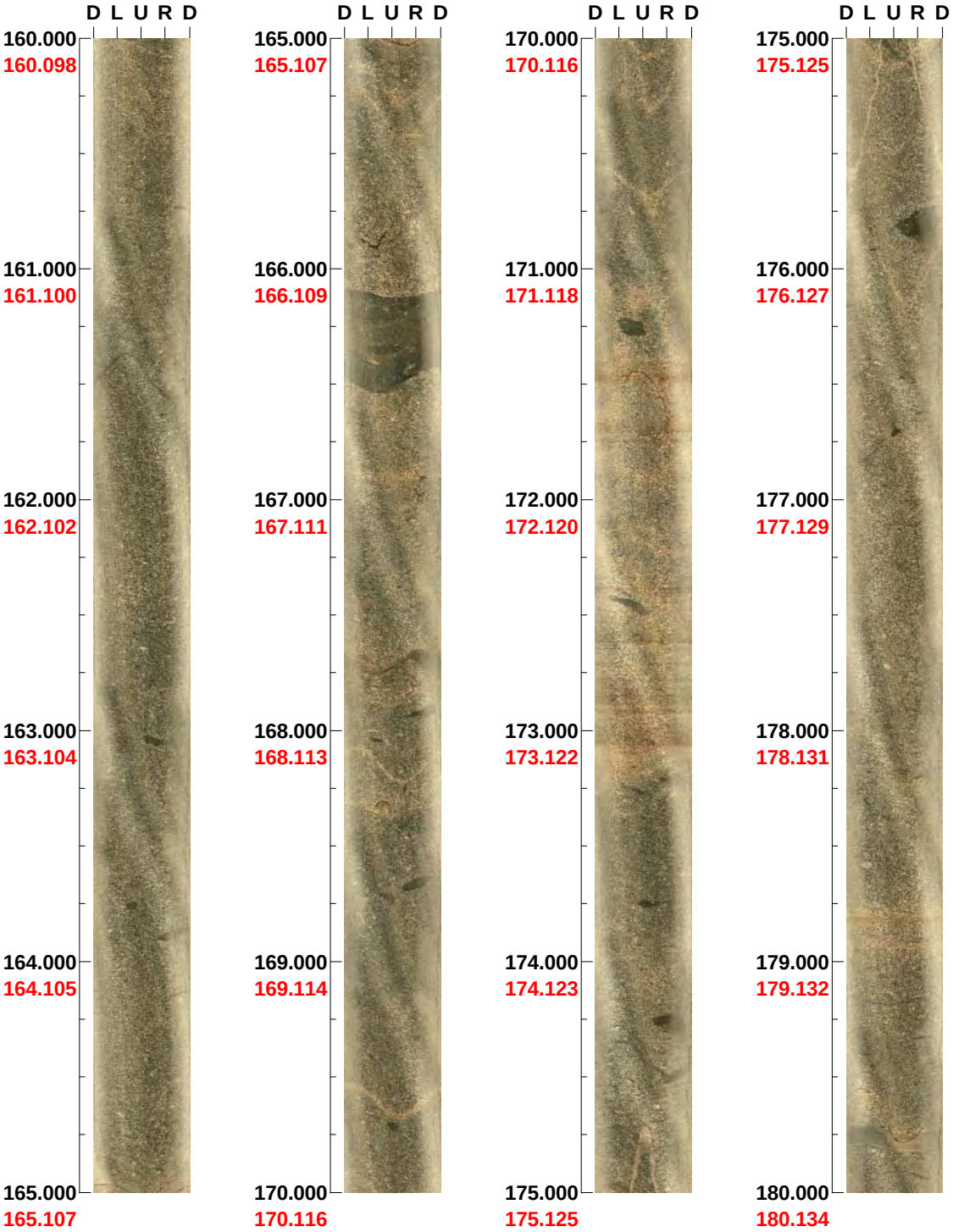
Depth range: 140.000 - 160.000 m



(3 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

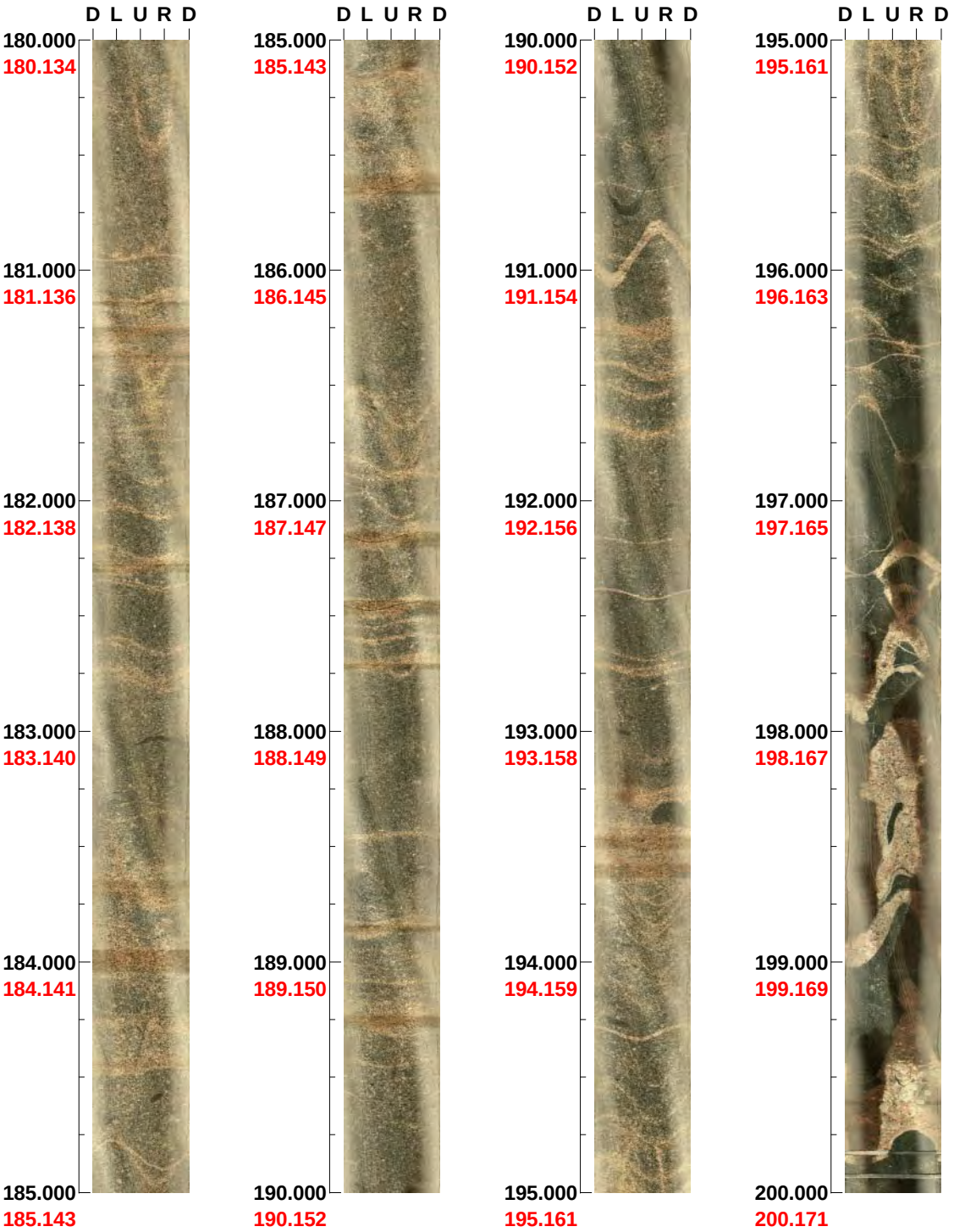
Depth range: 160.000 - 180.000 m



(4 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 180.000 - 200.000 m



(5 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 200.000 - 220.000 m

(6 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 220.000 - 240.000 m

(7 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 240.000 - 260.000 m

(8 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 260.000 - 280.000 m

(9 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 280.000 - 300.000 m

(10 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

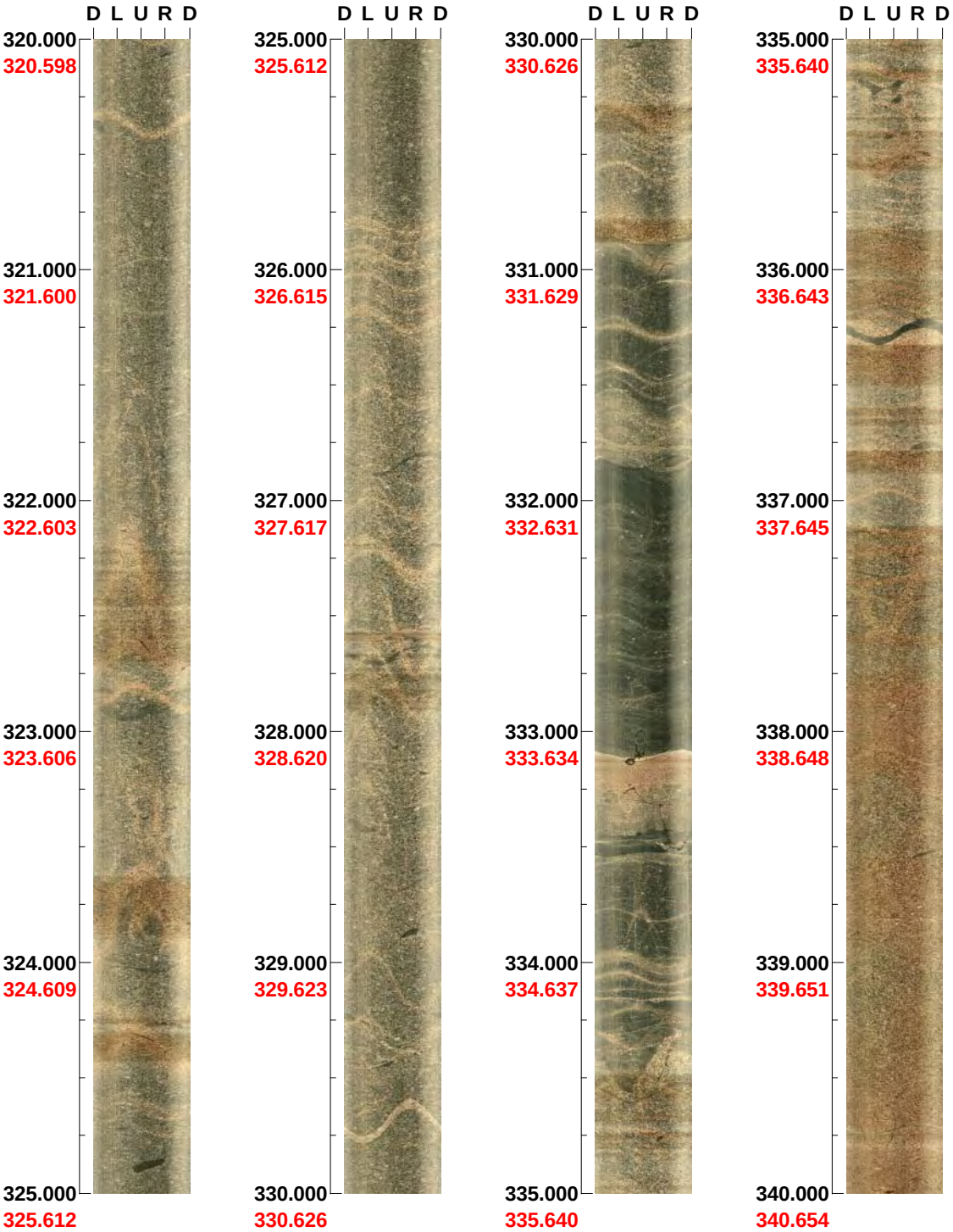
Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 300.000 - 320.000 m

(11 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 320.000 - 340.000 m



(12 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

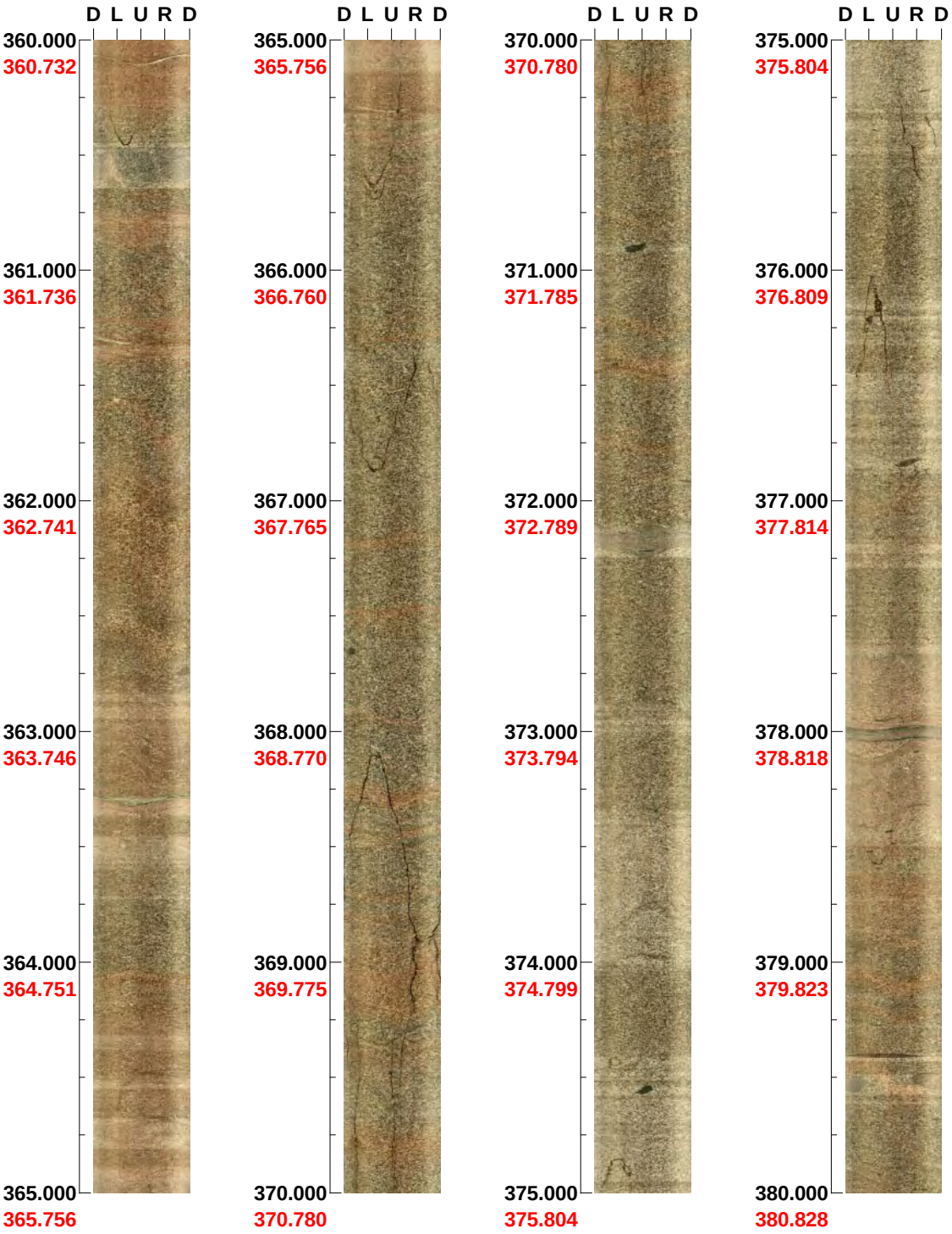
Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 340.000 - 360.000 m

(13 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

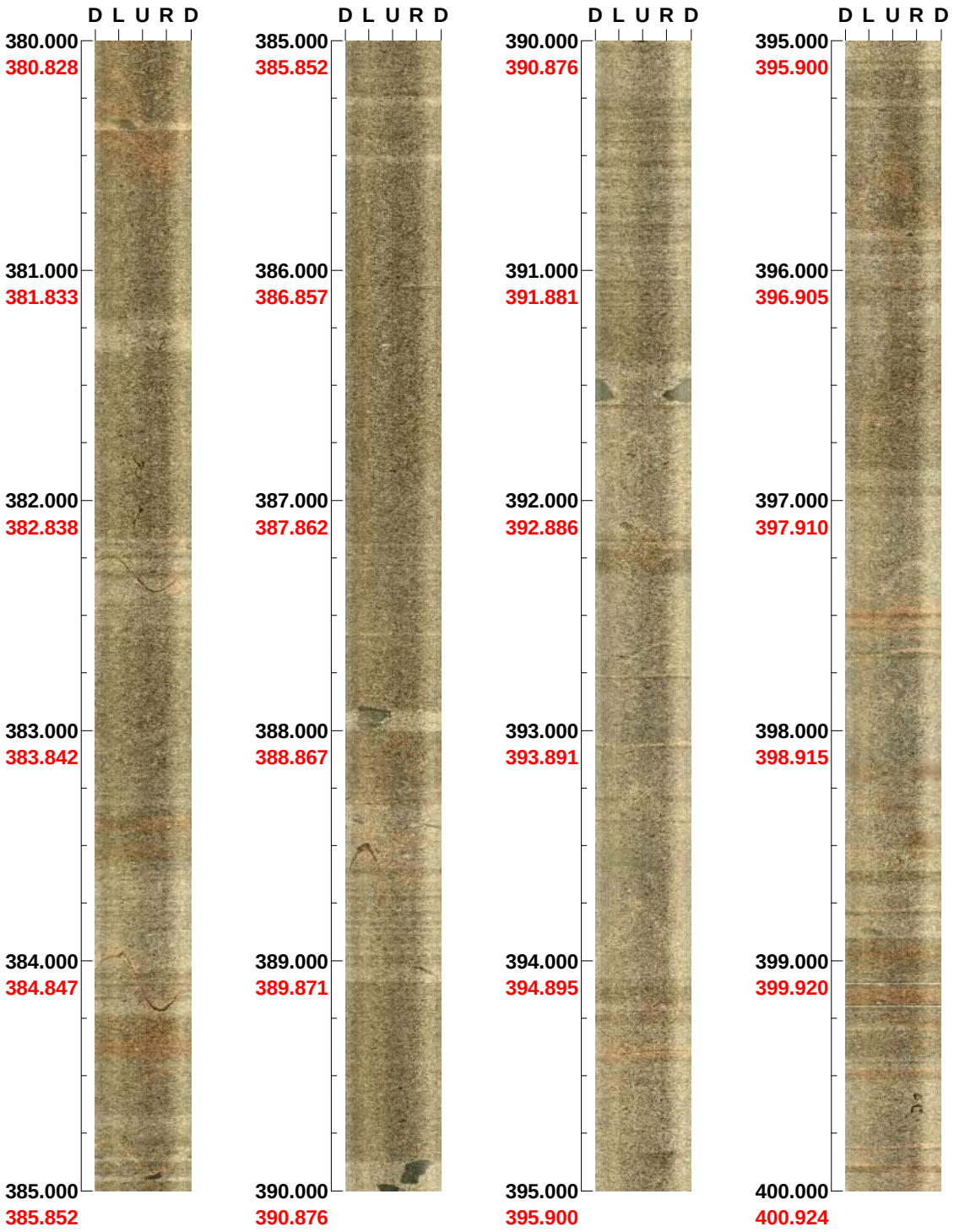
Depth range: 360.000 - 380.000 m



(14 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

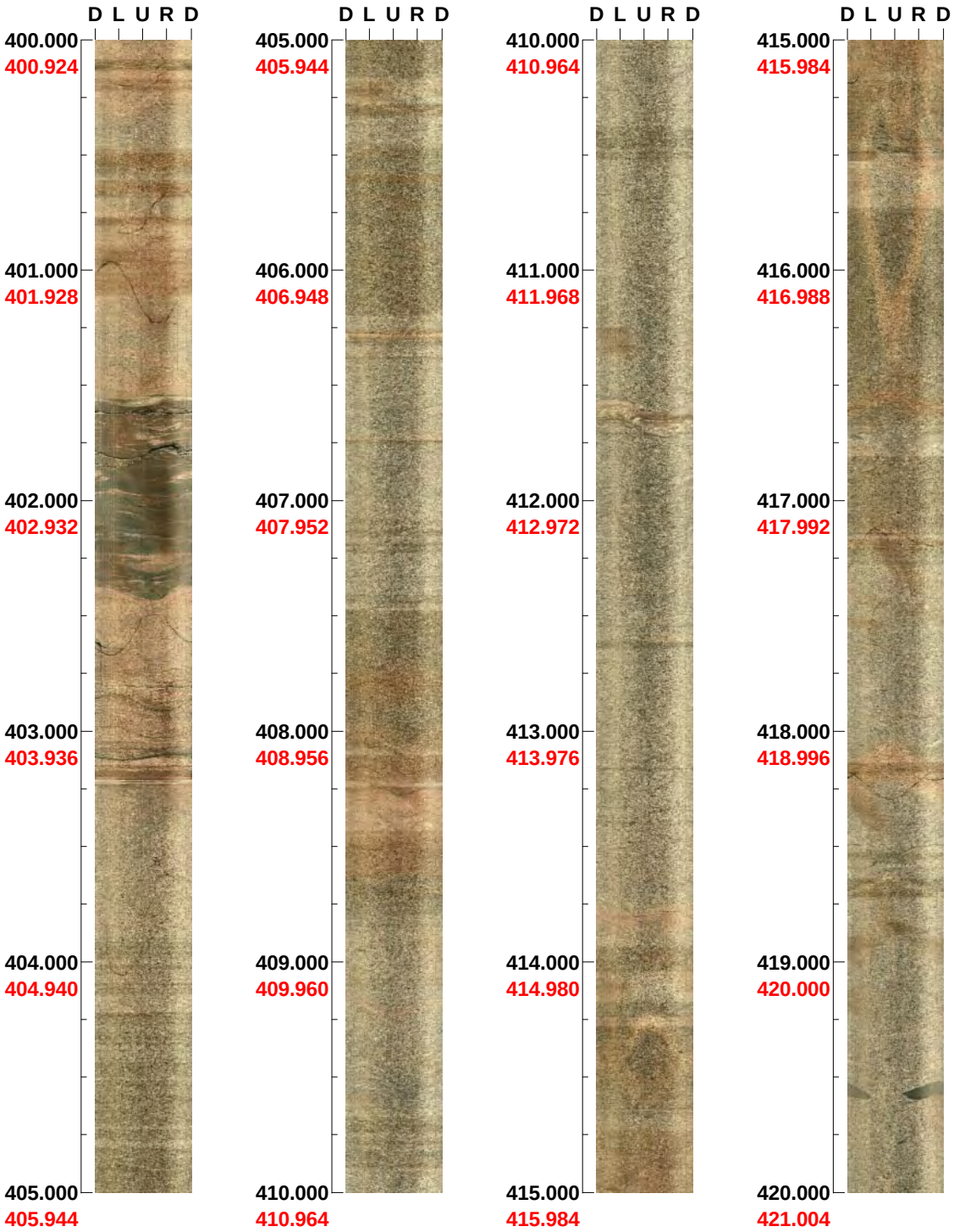
Depth range: 380.000 - 400.000 m



(15 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 400.000 - 420.000 m



(16 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 420.000 - 440.000 m

(17 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

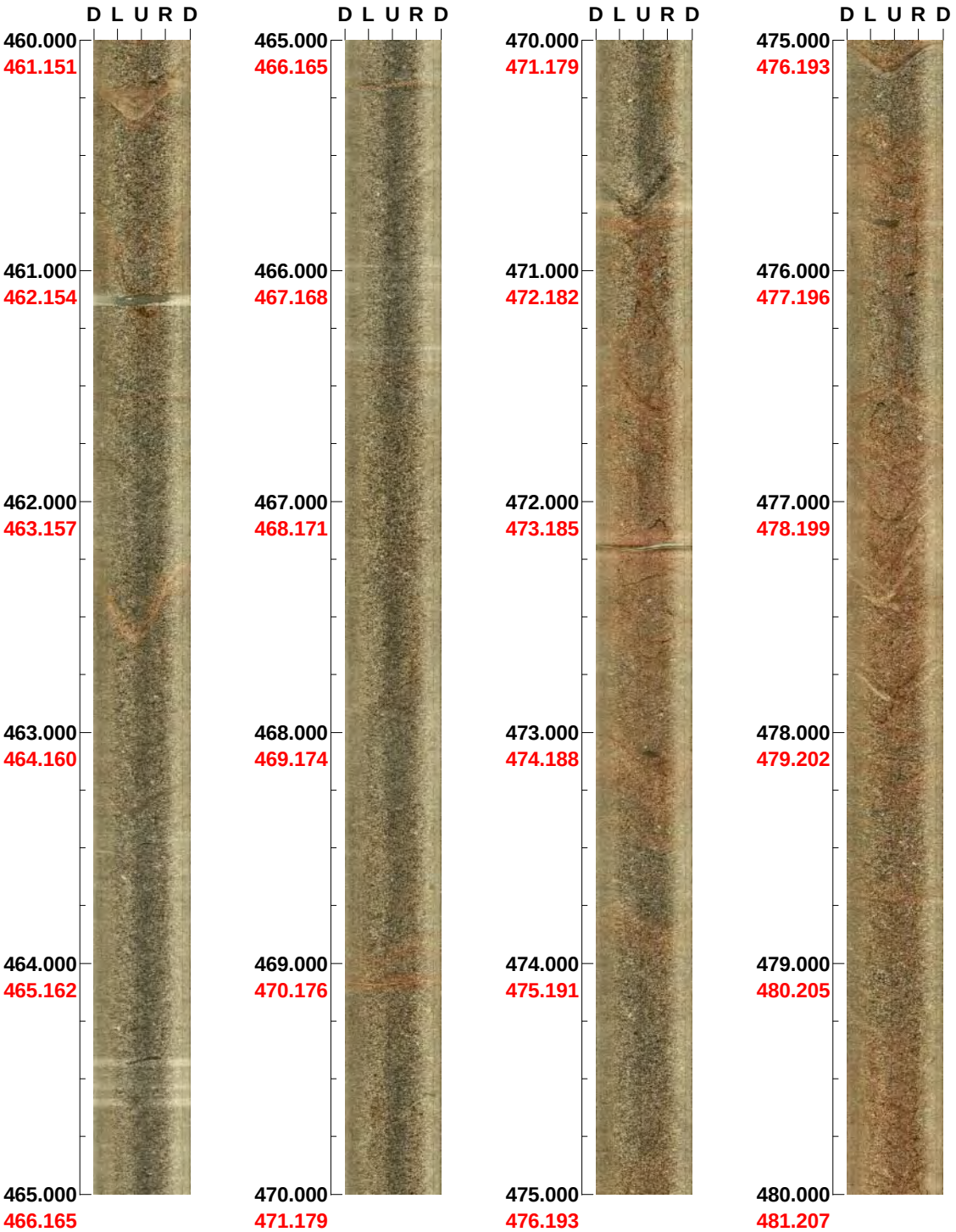
Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 440.000 - 460.000 m

(18 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

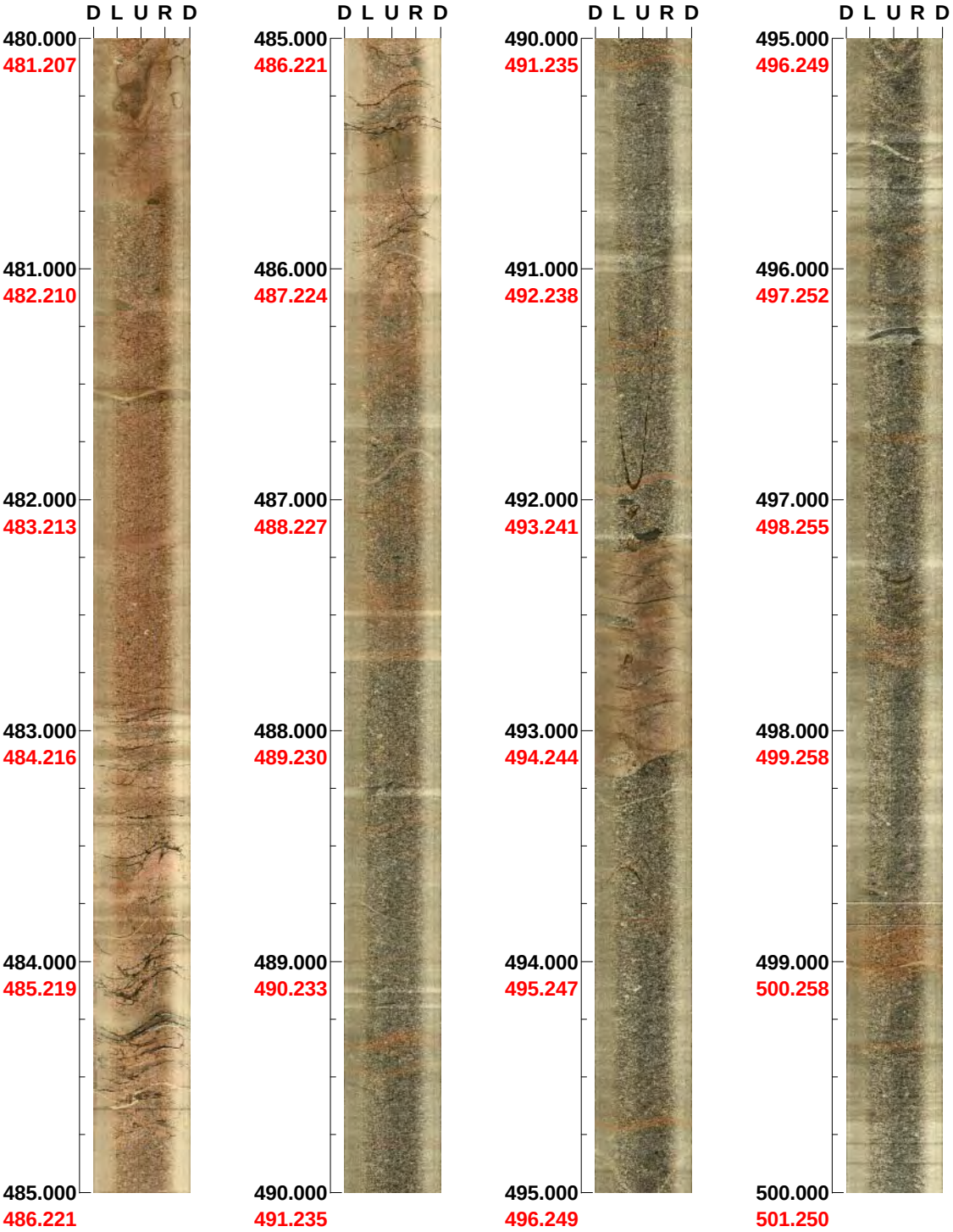
Depth range: 460.000 - 480.000 m



(19 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: 82**

Depth range: 480.000 - 500.000 m



(20 / 21) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: -82**

Depth range: 500.000 - 520.000 m

(1 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: -82**

Depth range: 520.000 - 540.000 m

(2 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: -82**

Depth range: 540.000 - 560.000 m

(3 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

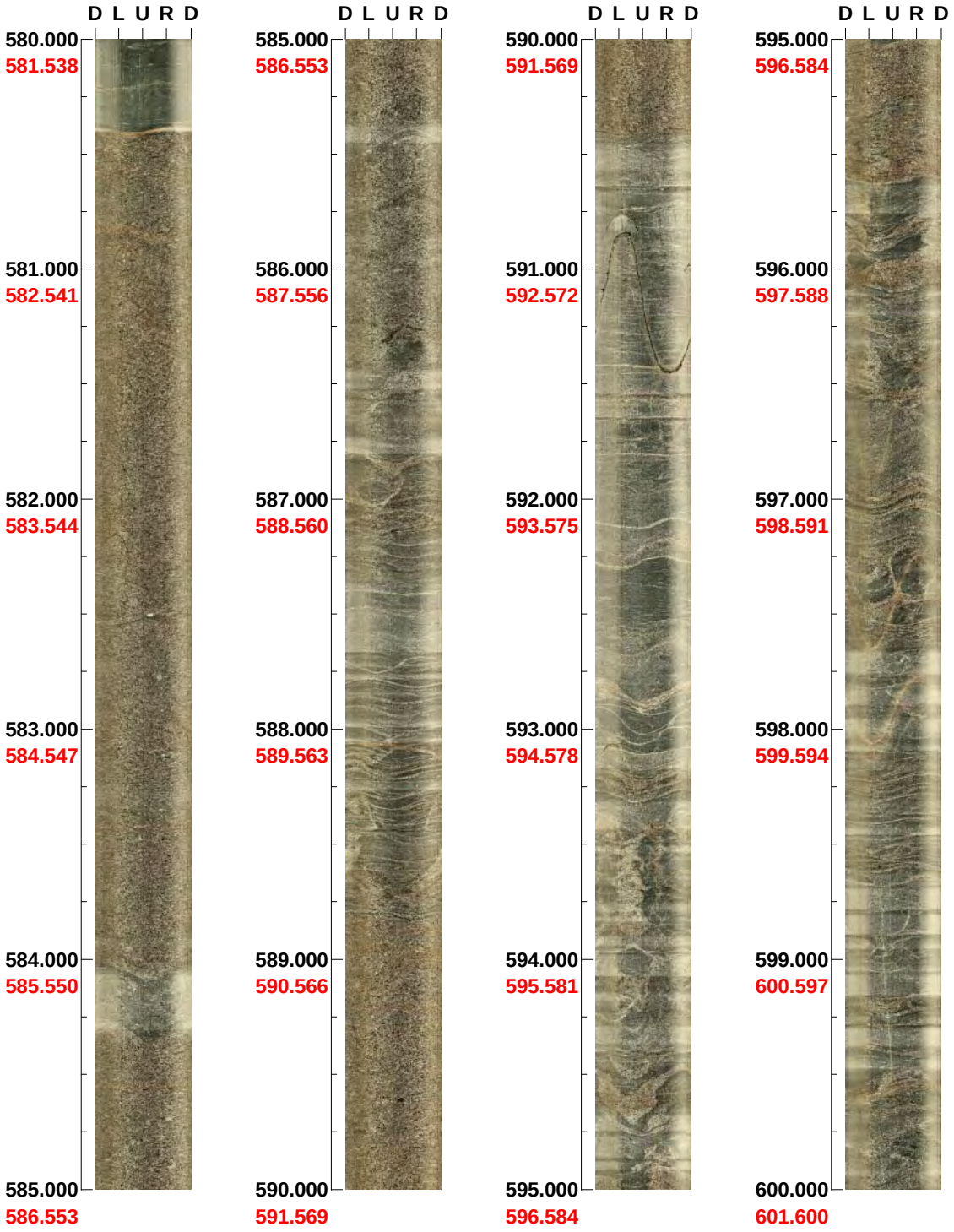
Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: -82**

Depth range: 560.000 - 580.000 m

(4 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: -82**

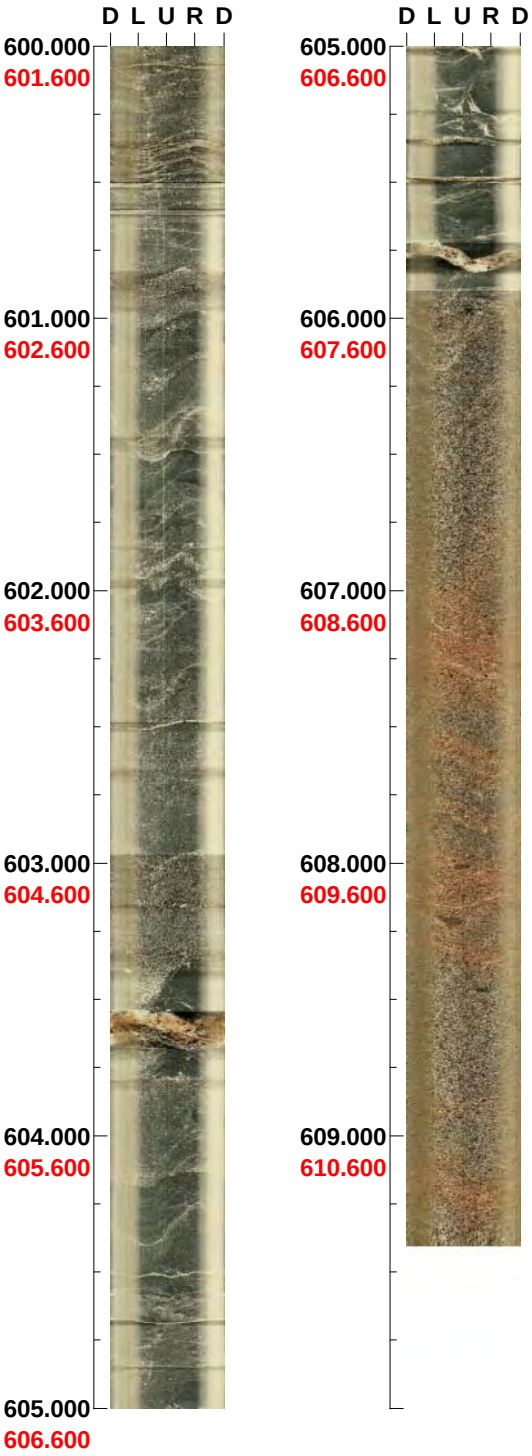
Depth range: 580.000 - 600.000 m



(5 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX18A **Azimuth: 271** **Inclination: -82**

Depth range: 600.000 - 609.402 m



(6 / 6) **Scale: 1/25** **Aspect ratio: 175 %**

Appendix 16

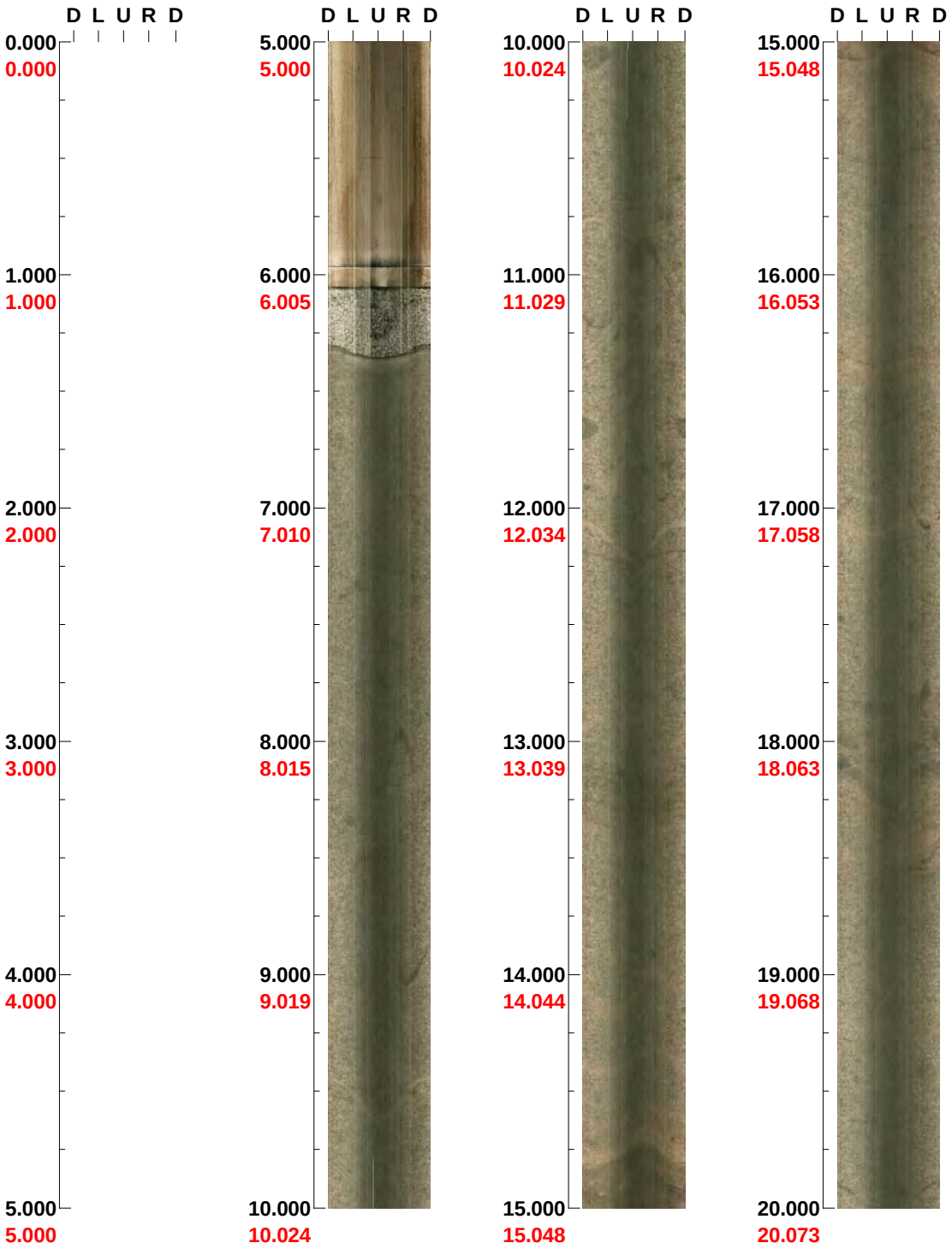
BIPS logging in KLX19A, 5 to 97 m

Project name: Laxemar

Image file	**: c:\work\r5533a~1\bips\klx19a.bip**
BDT file	**: c:\work\r5533a~1\bips\klx19a.bdt**
Locality	**: LAXEMAR**
Bore hole number	**: KLX19A**
Date	**: 06/05/14**
Time	**: 12:31:00**
Depth range	**: 5.000 - 97.929 m**
Azimuth	**: 196**
Inclination	**: -57**
Diameter	**: 140.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/25**
Aspect ratio	**: 100 %**
Pages	**: 5**
Color	**:**  **+0 +0 +0**

Project name: Laxemar
Bore hole No.: KLX19A **Azimuth: 196** **Inclination: -57**

Depth range: 0.000 - 20.000 m



(1 / 5) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: KLX19A **Azimuth: 196** **Inclination: -57**

Depth range: 20.000 - 40.000 m

(2 / 5) **Scale: 1/25** **Aspect ratio: 100 %**

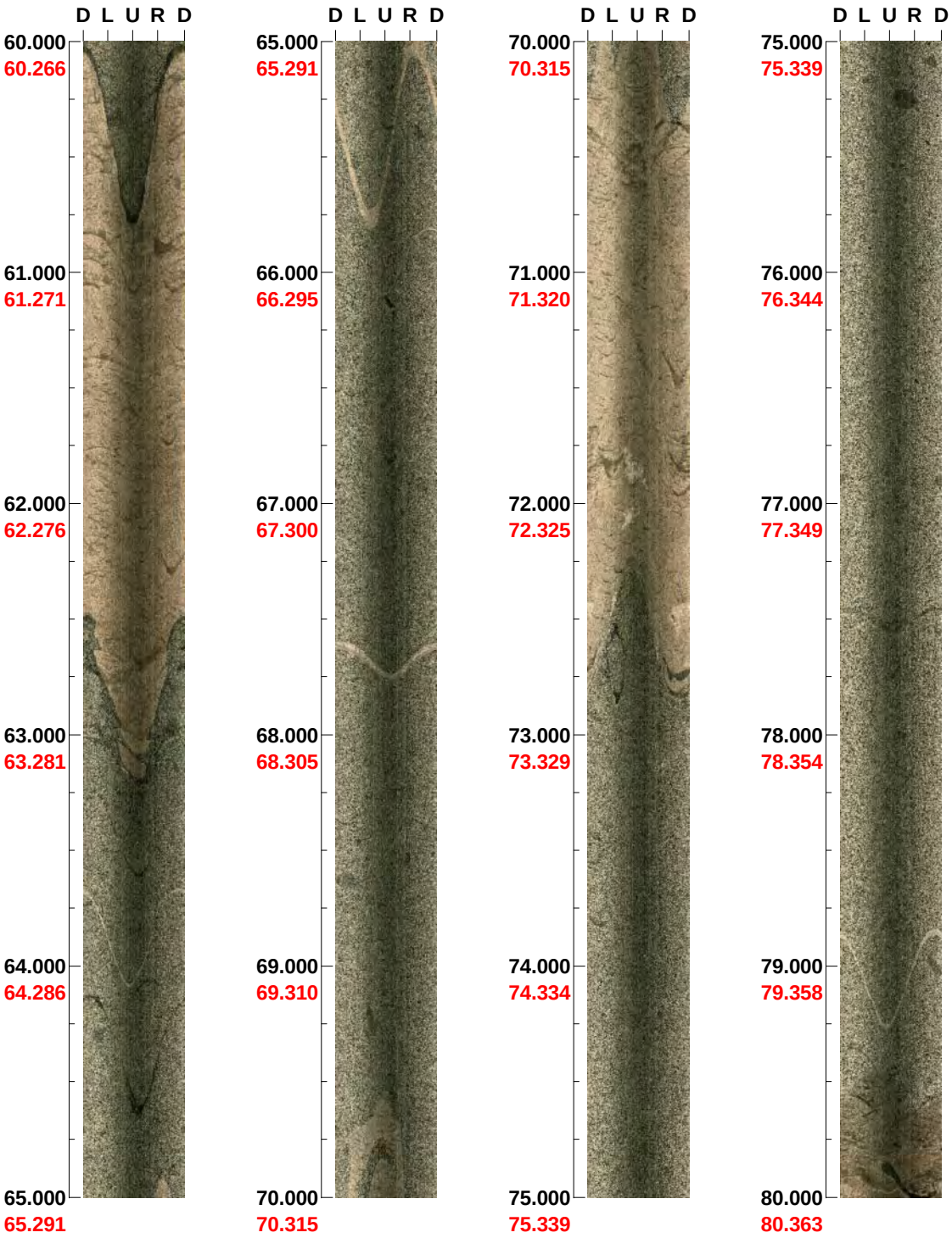
Project name: Laxemar
Bore hole No.: KLX19A **Azimuth: 196** **Inclination: -57**

Depth range: 40.000 - 60.000 m

(3 / 5) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: KLX19A **Azimuth: 196** **Inclination: -57**

Depth range: 60.000 - 80.000 m



(4 / 5) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: KLX19A **Azimuth: 196** **Inclination: -57**

Depth range: 80.000 - 97.929 m

(5 / 5) **Scale: 1/25** **Aspect ratio: 100 %**

BIPS logging in KLX20A, 100 to 455 m

Project name: Laxemar

Image file	**: c:\work\r5533a~1\bips\klx20a.bip**
BDT file	**: c:\work\r5533a~1\bips\klx20a.bdt**
Locality	**: LAXEMAR**
Bore hole number	**: KLX20A**
Date	**: 06/05/09**
Time	**: 11:14:00**
Depth range	**: 100.000 - 455.540 m**
Azimuth	**: 271**
Inclination	**: -50**
Diameter	**: 76.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/25**
Aspect ratio	**: 175 %**
Pages	**: 18**
Color	**:**  **+0 +0 +0**

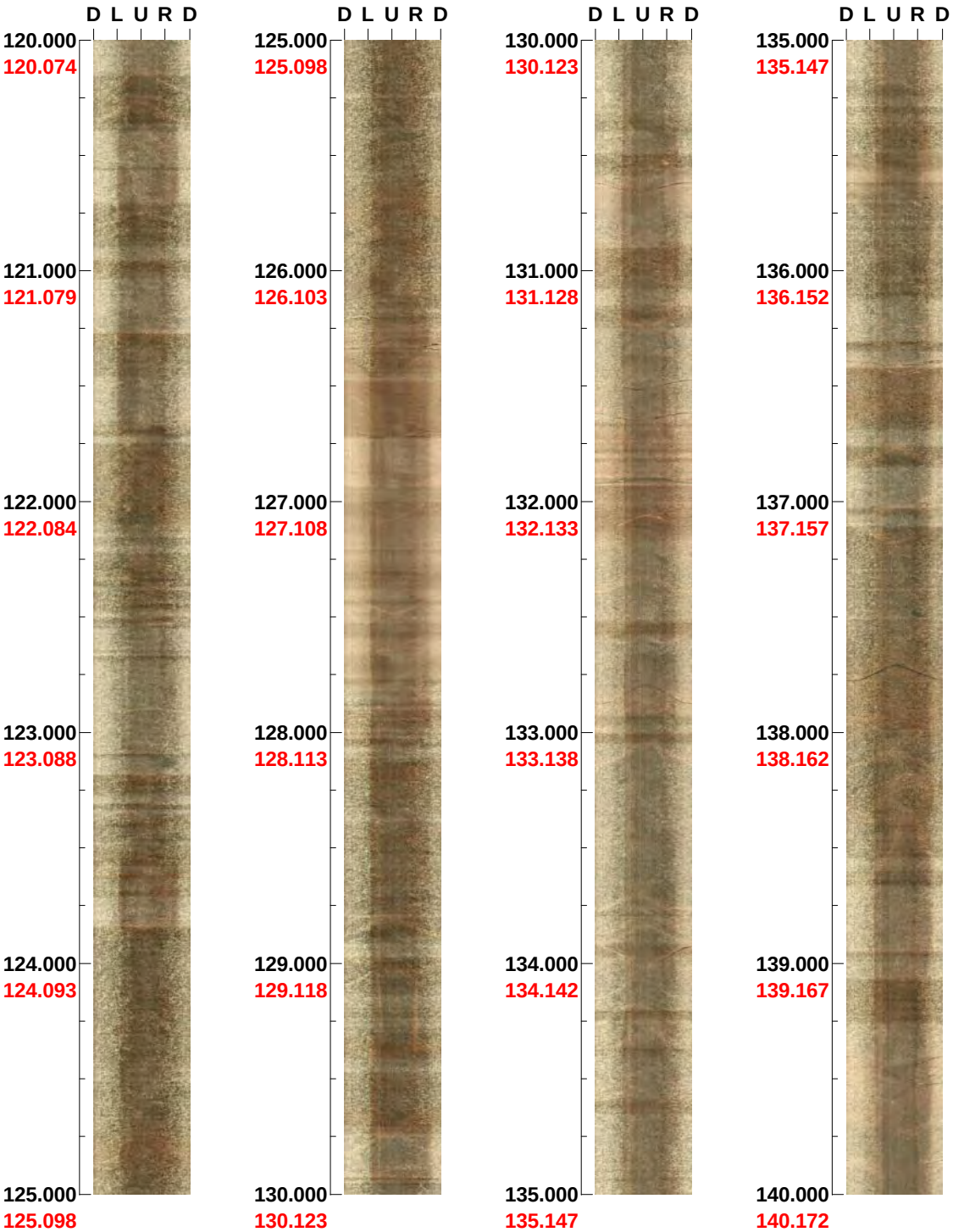
Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 100.000 - 120.000 m

(1 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

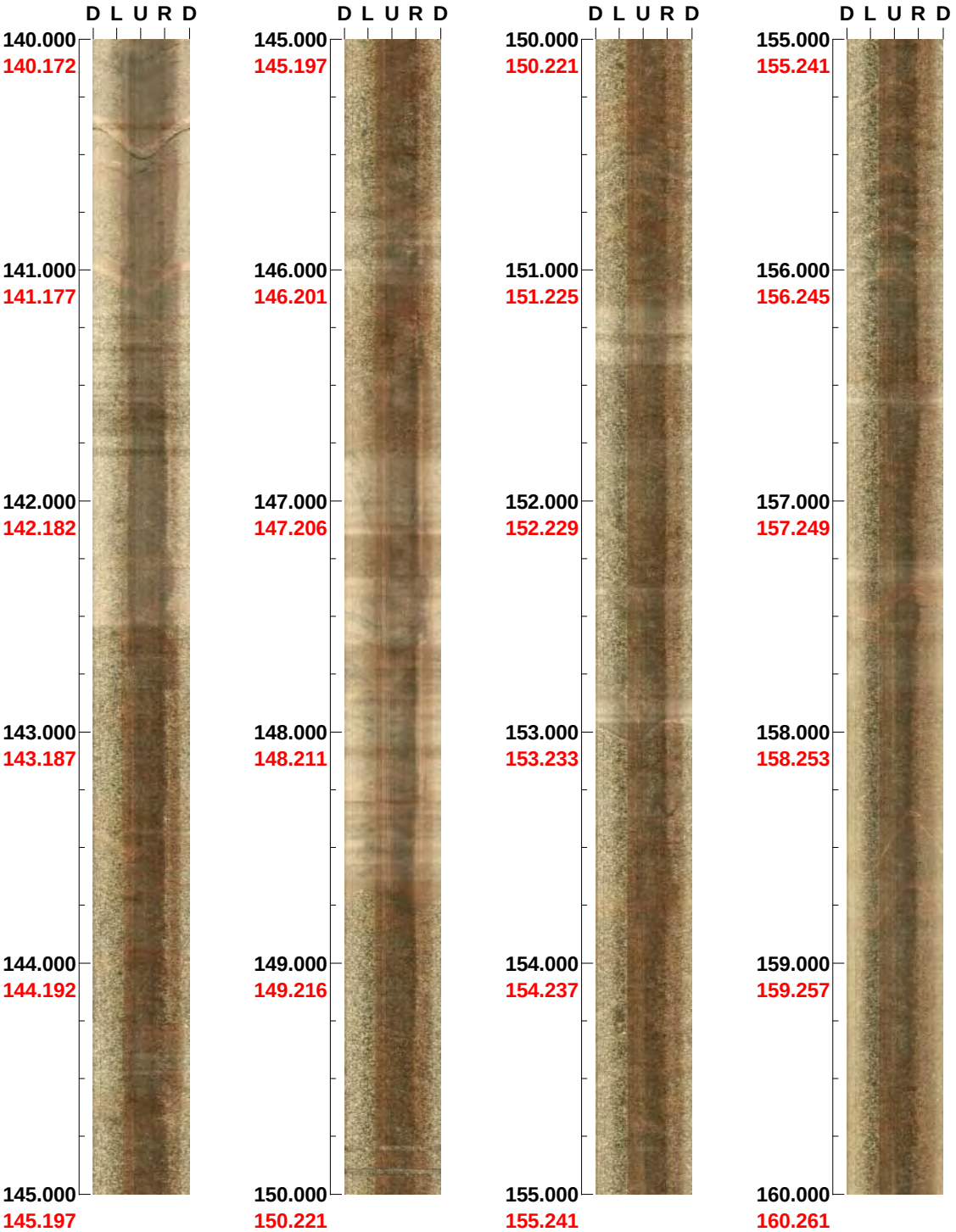
Depth range: 120.000 - 140.000 m



(2 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 140.000 - 160.000 m



(3 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 160.000 - 180.000 m

(4 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 180.000 - 200.000 m

(5 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 200.000 - 220.000 m

(6 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 220.000 - 240.000 m

(7 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 240.000 - 260.000 m

(8 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 260.000 - 280.000 m

(9 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 280.000 - 300.000 m

(10 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 300.000 - 320.000 m

(11 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 320.000 - 340.000 m

(12 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 340.000 - 360.000 m

(13 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 360.000 - 380.000 m

(14 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 380.000 - 400.000 m

(15 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 400.000 - 420.000 m

(16 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 420.000 - 440.000 m

(17 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

Project name: Laxemar
Bore hole No.: KLX20A **Azimuth: 271** **Inclination: -50**

Depth range: 440.000 - 455.540 m

(18 / 18) **Scale: 1/25** **Aspect ratio: 175 %**

BIPS logging in HLX38, 15 to 199 m

Project name: Laxemar

Image file	**: c:\work\r5533a~1\bips\hlx38.bip**
BDT file	**: c:\work\r5533a~1\bips\hlx38.bdt**
Locality	**: LAXEMAR**
Bore hole number	**: HLX38**
Date	**: 06/05/14**
Time	**: 16:04:00**
Depth range	**: 15.000 - 198.765 m**
Azimuth	**: 110**
Inclination	**: -59**
Diameter	**: 140.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/25**
Aspect ratio	**: 100 %**
Pages	**: 10**
Color	**:**  **+0 +0 +0**

Project name: Laxemar
Bore hole No.: HLX38 **Azimuth: 110** **Inclination: -59**

Depth range: 0.000 - 20.000 m

(1 / 10) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX38 **Azimuth: 110** **Inclination: -59**

Depth range: 20.000 - 40.000 m

(2 / 10) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX38 **Azimuth: 110** **Inclination: -59**

Depth range: 40.000 - 60.000 m

(3 / 10) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX38 **Azimuth: 110** **Inclination: -59**

Depth range: 60.000 - 80.000 m

(4 / 10) **Scale: 1/25** **Aspect ratio: 100 %**

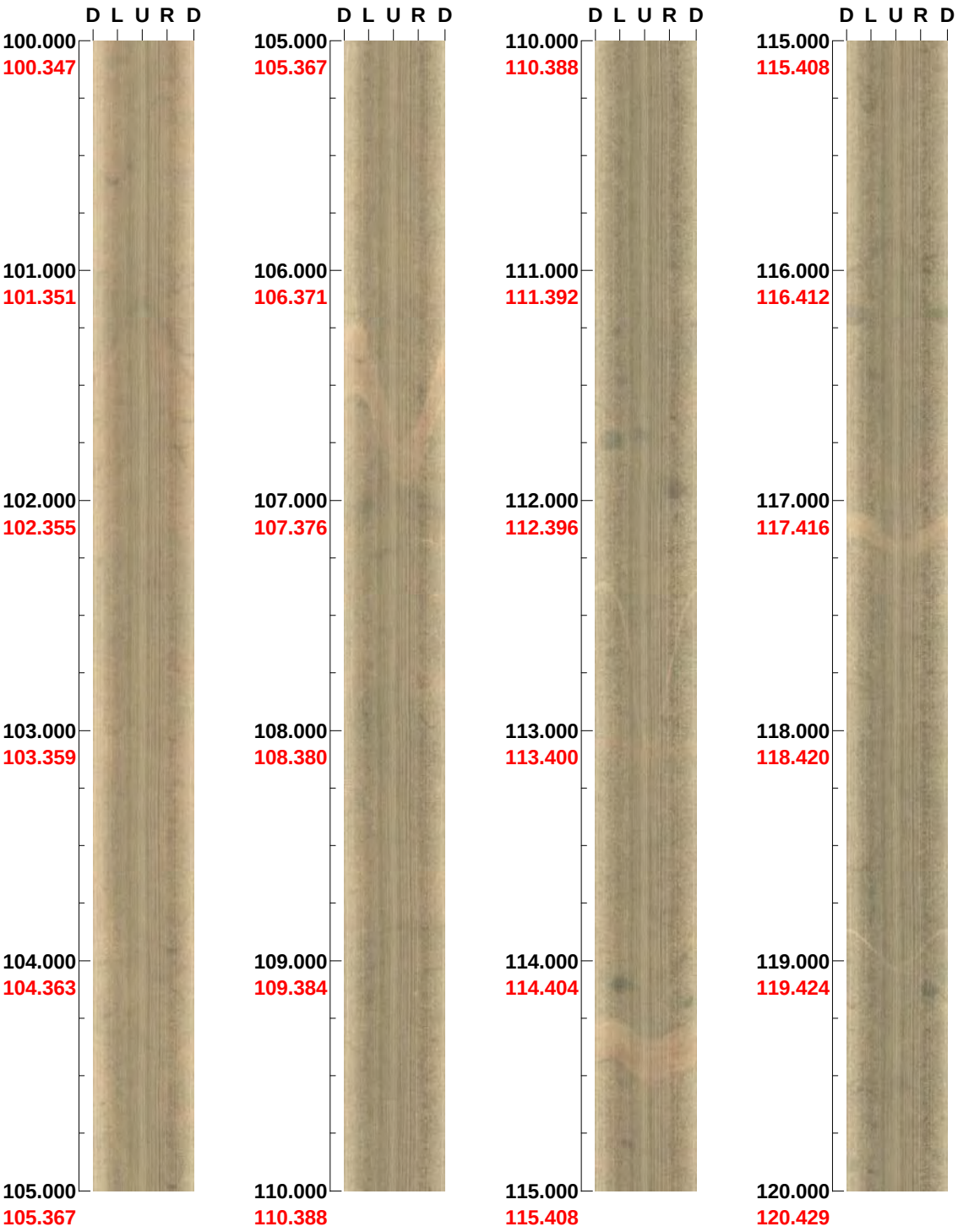
Project name: Laxemar
Bore hole No.: HLX38 **Azimuth: 110** **Inclination: -59**

Depth range: 80.000 - 100.000 m

(5 / 10) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX38 **Azimuth: 110** **Inclination: -59**

Depth range: 100.000 - 120.000 m



(6 / 10) **Scale: 1/25** **Aspect ratio: 100 %**

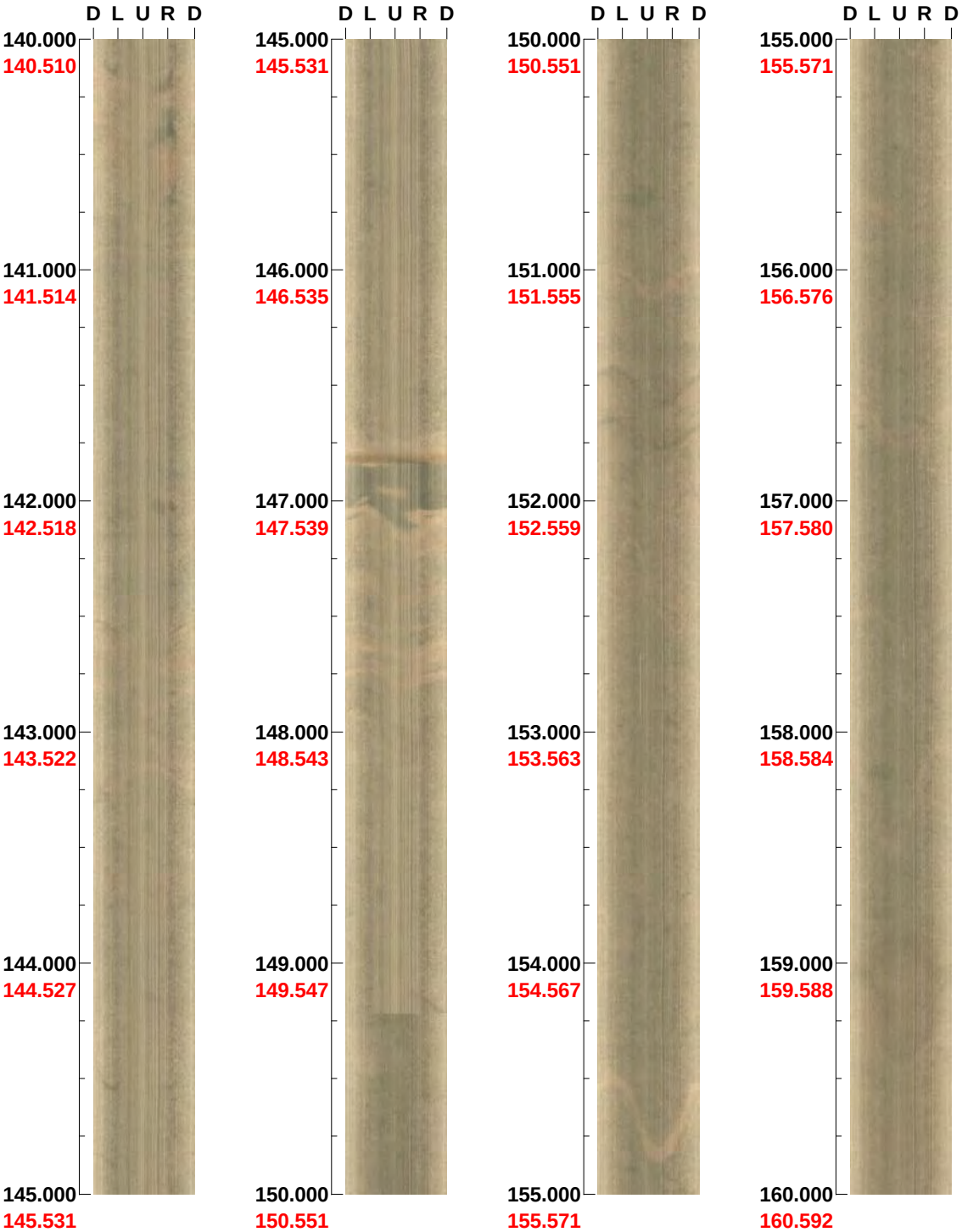
Project name: Laxemar
Bore hole No.: HLX38 **Azimuth: 110** **Inclination: -59**

Depth range: 120.000 - 140.000 m

(7 / 10) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX38 **Azimuth: 110** **Inclination: -59**

Depth range: 140.000 - 160.000 m



(8 / 10) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX38 **Azimuth: 110** **Inclination: -59**

Depth range: 160.000 - 180.000 m

(9 / 10) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX38 **Azimuth: 110** **Inclination: -59**

Depth range: 180.000 - 198.765 m

(10 / 10) **Scale: 1/25** **Aspect ratio: 100 %**

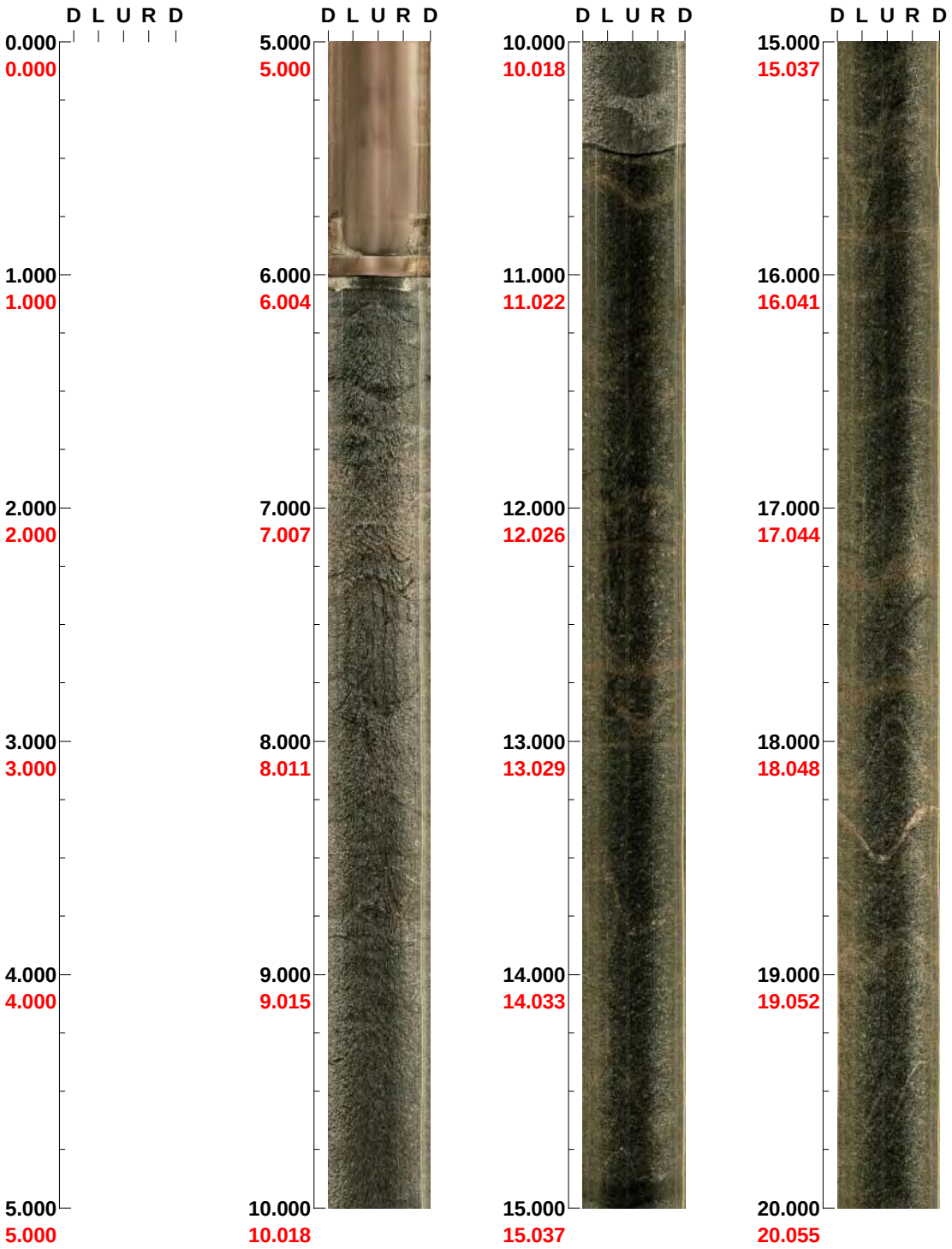
BIPS logging in HLX40, 5 to 198 m

Project name: Laxemar

Image file	**: c:\work\r5533a~1\bips\hlx40_1.bip**
BDT file	**: c:\work\r5533a~1\bips\hlx40_1.bdt**
Locality	**: LAXEMAR**
Bore hole number	**: HLX40**
Date	**: 06/05/16**
Time	**: 19:10:00**
Depth range	**: 5.000 - 198.402 m**
Azimuth	**: 10**
Inclination	**: -60**
Diameter	**: 140.0 mm**
Magnetic declination	**: 0.0**
Span	**: 4**
Scan interval	**: 0.25**
Scan direction	**: To bottom**
Scale	**: 1/25**
Aspect ratio	**: 100 %**
Pages	**: 11**
Color	**:**  **+0 +0 +0**

Project name: Laxemar
Bore hole No.: HLX40 **Azimuth: 10** **Inclination: -60**

Depth range: 0.000 - 20.000 m



(1 / 6) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX40 **Azimuth: 10** **Inclination: -60**

Depth range: 20.000 - 40.000 m

(2 / 6) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX40 **Azimuth: 10** **Inclination: -60**

Depth range: 40.000 - 60.000 m

(3 / 6) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX40 **Azimuth: 10** **Inclination: -60**

Depth range: 60.000 - 80.000 m

(4 / 6) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX40 **Azimuth: 10** **Inclination: -60**

Depth range: 80.000 - 100.000 m

(5 / 6) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX40 **Azimuth: 10** **Inclination: -60**

Depth range: 100.000 - 120.000 m

(1 / 5) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX40 **Azimuth: 10** **Inclination: -60**

Depth range: 120.000 - 140.000 m

(2 / 5) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX40 **Azimuth: 10** **Inclination: -60**

Depth range: 140.000 - 160.000 m

(3 / 5) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX40 **Azimuth: 10** **Inclination: -60**

Depth range: 160.000 - 180.000 m

(4 / 5) **Scale: 1/25** **Aspect ratio: 100 %**

Project name: Laxemar
Bore hole No.: HLX40 **Azimuth: 10** **Inclination: -60**

Depth range: 180.000 - 198.402 m

(5 / 5) **Scale: 1/25** **Aspect ratio: 100 %**

Deviation logging in KLX11B, 0 to 102 m

New MeasureIT files

Survey name:	**KLX11B**
Survey date:	09/05/2006 09:16:40
Project:	PLU
Location:	Laxemar

Country:	Sweden
Survey company:	RAYCON
Surveyed by:	Christer Gustafsson
Survey type:	STANDARD
Operating conditions:	
General comments:	
Client name:	SKB
Client ID number:	AP PS 400-06-58
Client reference:	Nisse Håkansson
Drill company:	
Drill rig:	
Drill diameter:	76
Survey direction:	INTO hole
Survey run on:	Wireline
Magnetic Var.:	2,53 degrees East of North

Conventions	
Linear units:	Metres
Angular units:	Degrees
Temperature units:	Centigrade
Co-ordinate system:	0 North
Elevation positive	Up
Dip origin:	0 Horizontal
Dip positive:	Up

Magnetic Integrity Check (MagIC)	Mid value	± limit	
Field strength:	50000	1000	nano Tesla
Magnetic dip:	71.0	1.5	Degrees

SURVEY	Actual start	End of survey	Difference
Station:	0,0	102,0	102,0
East:	1546604,89	1546604,79	-0,10
North:	6366339,51	6366338,62	-0,89
Elevation:	27,27	-74,73	-102,00
Dip:	-89,51	-89,54	-0,03
Azimuth:	136,16	190,90	54,74

OFFSETS at end
Offsets relative to: ACTUAL START
0,30 metres downwards
0,69 metres right
0,00 metres shortfall

Printed on: 2006-08-08 07:53:22

Survey name : KLX11B

Survey date : 09/05/2006 09:16:40

Printed on 2006-08-08 07:53:37

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
0,0	-89,51	136,16	1546604,89	6366339,51	27,27	52695	65,91	1,000647	✍✍✍	0,00	0,00	0,00
3,0	-89,93	140,00	1546604,90	6366339,50	24,27	49945	69,64	1,000672	✍	-0,01	0,00	0,00
6,0	-89,74	148,00	1546604,90	6366339,49	21,27	49631	70,21	1,000254	✍	-0,03	0,00	0,00
9,0	-89,86	153,92	1546604,91	6366339,48	18,27	50631	70,38	1,000369	✍	-0,04	0,00	0,00
12,0	-89,58	167,62	1546604,91	6366339,47	15,27	49819	70,83	1,000210	✍	-0,06	0,01	0,00
15,0	-89,46	180,33	1546604,92	6366339,44	12,27	49912	70,76	1,000166	✍	-0,06	0,03	0,00
18,0	-89,47	189,58	1546604,91	6366339,42	9,27	49912	70,78	1,000958	✍	-0,07	0,05	0,00
21,0	-89,44	179,84	1546604,91	6366339,39	6,27	49723	70,82	0,998889	✍	-0,08	0,07	0,00
24,0	-89,41	187,69	1546604,91	6366339,36	3,27	49660	70,55	1,000236	✍	-0,08	0,09	0,00
27,0	-89,42	172,43	1546604,91	6366339,33	0,27	49647	70,62	0,999867	✍	-0,08	0,11	0,00
30,0	-89,42	187,57	1546604,91	6366339,30	-2,73	49529	70,83	1,000174	✍	-0,09	0,13	0,00
33,0	-89,45	194,14	1546604,90	6366339,27	-5,73	49485	70,47	1,002915	✍	-0,10	0,16	0,00
36,0	-89,60	191,06	1546604,90	6366339,24	-8,73	49588	70,52	1,003077	✍	-0,11	0,18	0,00
39,0	-89,45	190,90	1546604,89	6366339,22	-11,73	50524	71,35	1,000413	✍	-0,12	0,20	0,00
42,0	-89,43	189,68	1546604,89	6366339,19	-14,73	49747	70,87	1,000233	✍	-0,13	0,22	0,00
45,0	-89,44	191,18	1546604,88	6366339,16	-17,73	49891	70,83	1,000230	✍	-0,14	0,25	0,00
48,0	-89,50	189,08	1546604,88	6366339,13	-20,73	50279	71,19	0,997901	✍	-0,15	0,27	0,00
51,0	-89,44	194,56	1546604,87	6366339,11	-23,73	49659	71,01	1,000964	✍	-0,16	0,29	0,00
54,0	-89,45	197,43	1546604,86	6366339,08	-26,73	49671	70,79	1,000046	✍	-0,17	0,32	0,00
57,0	-89,37	195,16	1546604,86	6366339,05	-29,73	49708	70,69	1,000060	✍	-0,18	0,34	0,00
60,0	-89,38	177,76	1546604,85	6366339,02	-32,73	49433	71,08	0,999082	✍	-0,18	0,37	0,00
63,0	-89,40	197,47	1546604,85	6366338,99	-35,73	49692	71,15	1,000300	✍	-0,19	0,39	0,00
66,0	-89,30	179,36	1546604,84	6366338,95	-38,73	49453	71,11	1,000136	✍	-0,19	0,42	0,00
69,0	-89,49	195,03	1546604,84	6366338,92	-41,73	49463	70,80	1,000101	✍	-0,20	0,44	0,00
72,0	-89,37	190,67	1546604,83	6366338,89	-44,73	49463	70,95	0,999939	✍	-0,21	0,47	0,00
75,0	-89,53	196,89	1546604,83	6366338,86	-47,73	49520	70,86	0,999850	✍	-0,22	0,49	0,00
78,0	-89,52	196,42	1546604,82	6366338,84	-50,73	50145	71,43	0,999913	✍	-0,23	0,51	0,00
81,0	-89,48	197,24	1546604,81	6366338,82	-53,73	49744	70,81	1,001811	✍	-0,24	0,54	0,00
84,0	-89,48	198,28	1546604,80	6366338,79	-56,73	49406	70,94	0,999736	✍	-0,26	0,56	0,00
87,0	-89,46	189,39	1546604,80	6366338,76	-59,73	49498	71,01	1,000227	✍	-0,27	0,58	0,00
90,0	-89,38	178,84	1546604,80	6366338,73	-62,73	49566	71,29	1,000058	✍	-0,27	0,61	0,00
93,0	-89,49	179,22	1546604,80	6366338,70	-65,73	49580	71,27	0,999857	✍	-0,28	0,63	0,00
96,0	-89,47	176,57	1546604,80	6366338,68	-68,73	49777	71,21	0,999859	✍	-0,28	0,64	0,00

Survey name : KLX11B

Survey date : 09/05/2006 09:16:40

Printed on 2006-08-08 07:53:37

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
99,0	-89,48	195,27	1546604,79	6366338,65	-71,73	49421	71,11	0,999980	✍	-0,29	0,67	0,00
102,0	-89,54	190,90	1546604,79	6366338,62	-74,73	50104	70,96	0,999849	✍	-0,30	0,69	0,00

Deviation logging in KLX11C, 0 to 117 m

New MeasureIT files

Survey name:	**KLX11C**
Survey date:	10/05/2006 21:08:17
Project:	PLU
Location:	Laxemar

Country:	Sweden
Survey company:	RAYCON
Surveyed by:	Christer Gustafsson
Survey type:	STANDARD
Operating conditions:	
General comments:	
Client name:	SKB
Client ID number:	AP PS 400-06-58
Client reference:	Nisse Håkansson
Drill company:	
Drill rig:	
Drill diameter:	76
Survey direction:	INTO hole
Survey run on:	Wireline
Magnetic Var.:	2,53 degrees East of North

Conventions	
Linear units:	Metres
Angular units:	Degrees
Temperature units:	Centigrade
Co-ordinate system:	0 North
Elevation positive	Up
Dip origin:	0 Horizontal
Dip positive:	Up

Magnetic Integrity Check (MagIC)	Mid value	± limit	
Field strength:	50000	1000	nano Tesla
Magnetic dip:	71.0	1.5	Degrees

SURVEY	Actual start	End of survey	Difference
Station:	0,0	117,0	117,0
East:	1546586,89	1546604,49	17,60
North:	6366350,26	6366295,03	-55,23
Elevation:	27,20	-74,41	-101,61
Dip:	-60,62	-59,40	1,22
Azimuth:	159,34	166,18	6,84

OFFSETS at end
Offsets relative to: ACTUAL START
0,59 metres upwards
3,01 metres right
0,06 metres shortfall

Printed on: 2006-08-08 07:57:53

Survey name : KLX11C

Survey date : 10/05/2006 21:08:17

Printed on 2006-08-08 07:58:06

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
0,0	-60,62	159,34	1546586,89	6366350,26	27,20	49607	69,75	0,997627	✍	0,00	0,00	0,00
3,0	-60,73	160,30	1546587,40	6366348,88	24,58	50213	70,48	0,999701	✍	0,00	0,01	0,00
6,0	-60,83	158,47	1546587,91	6366347,51	21,97	50283	70,78	1,000924	✍	-0,01	0,01	0,00
9,0	-60,75	159,52	1546588,44	6366346,14	19,35	50199	70,92	1,001376	✍	-0,02	0,00	0,00
12,0	-60,71	159,46	1546588,95	6366344,77	16,73	50193	70,90	1,001463	✍	-0,03	0,01	0,00
15,0	-60,70	159,60	1546589,46	6366343,39	14,11	50130	71,01	1,001207	✍	-0,03	0,01	0,00
18,0	-60,64	158,90	1546589,99	6366342,02	11,50	50599	71,18	1,001240	✍	-0,03	0,01	0,00
21,0	-60,64	160,05	1546590,50	6366340,64	8,88	50119	70,53	1,001041	✍	-0,03	0,01	0,00
24,0	-60,64	160,05	1546591,00	6366339,26	6,27	50063	70,70	1,001316	✍	-0,04	0,03	0,00
27,0	-60,63	160,09	1546591,50	6366337,88	3,65	50009	70,69	1,001356	✍	-0,04	0,05	0,00
30,0	-60,62	160,06	1546592,01	6366336,49	1,04	50010	70,73	1,000646	✍	-0,04	0,07	0,00
33,0	-60,55	161,79	1546592,49	6366335,10	-1,57	49866	70,86	1,000797	✍	-0,04	0,11	0,00
36,0	-60,56	160,57	1546592,96	6366333,71	-4,19	49939	70,81	1,000978	✍	-0,03	0,16	0,00
39,0	-60,54	159,57	1546593,47	6366332,32	-6,80	50023	71,22	1,000782	✍	-0,03	0,18	0,00
42,0	-60,47	161,33	1546593,96	6366330,93	-9,41	49938	71,21	1,000890	✍	-0,02	0,21	0,00
45,0	-60,40	161,32	1546594,43	6366329,53	-12,02	49974	70,87	1,000944	✍	-0,02	0,26	0,00
48,0	-60,38	161,59	1546594,91	6366328,12	-14,63	49961	70,88	1,000687	✍	0,00	0,31	0,00
51,0	-60,34	161,83	1546595,37	6366326,71	-17,23	49927	70,90	1,000772	✍	0,01	0,37	0,00
54,0	-60,34	162,03	1546595,83	6366325,30	-19,84	50366	71,27	1,000861	✍	0,02	0,44	0,00
57,0	-60,36	162,63	1546596,28	6366323,89	-22,45	49958	70,72	1,001077	✍	0,03	0,52	0,00
60,0	-60,35	162,38	1546596,73	6366322,47	-25,06	49850	70,87	1,001017	✍	0,05	0,60	-0,01
63,0	-60,33	162,37	1546597,18	6366321,06	-27,66	50016	70,88	1,000524	✍	0,06	0,68	-0,01
66,0	-60,35	162,44	1546597,63	6366319,64	-30,27	50245	70,78	1,001022	✍	0,07	0,76	-0,01
69,0	-60,31	163,14	1546598,07	6366318,22	-32,88	50002	70,64	1,000706	✍	0,08	0,85	-0,01
72,0	-60,26	163,07	1546598,50	6366316,80	-35,48	50047	70,65	1,000726	✍	0,10	0,94	-0,01
75,0	-60,27	163,20	1546598,93	6366315,38	-38,09	49985	70,64	1,001042	✍	0,12	1,04	-0,01
78,0	-60,18	163,53	1546599,36	6366313,95	-40,69	49757	70,74	1,000777	✍	0,13	1,15	-0,01
81,0	-60,15	163,14	1546599,78	6366312,52	-43,29	49916	70,99	1,000894	✍	0,15	1,25	-0,02
84,0	-60,15	164,16	1546600,20	6366311,09	-45,89	49826	70,73	1,000566	✍	0,17	1,36	-0,02
87,0	-60,05	164,25	1546600,61	6366309,65	-48,50	49759	70,84	1,000861	✍	0,20	1,49	-0,02
90,0	-60,01	164,69	1546601,01	6366308,20	-51,09	49823	70,83	1,000436	✍	0,22	1,62	-0,02
93,0	-59,93	164,20	1546601,42	6366306,76	-53,69	49931	70,91	1,000754	✍	0,25	1,76	-0,03
96,0	-59,86	164,65	1546601,82	6366305,31	-56,29	49791	70,98	1,000454	✍	0,28	1,89	-0,03

Survey name : KLX11C
Survey date : 10/05/2006 21:08:17

Printed on 2006-08-08 07:58:06

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
99,0	-59,82	164,63	1546602,22	6366303,85	-58,88	49743	71,01	1,000589	✍	0,32	2,03	-0,03
102,0	-59,75	165,15	1546602,61	6366302,40	-61,47	49899	71,10	1,000936	✍	0,36	2,18	-0,04
105,0	-59,64	165,20	1546603,00	6366300,93	-64,06	49781	71,04	1,000776	✍	0,40	2,33	-0,04
108,0	-59,58	165,64	1546603,38	6366299,46	-66,65	50056	70,80	1,000539	✍	0,44	2,49	-0,05
111,0	-59,52	165,85	1546603,76	6366297,99	-69,24	49757	71,00	1,000316	✍	0,49	2,66	-0,05
114,0	-59,48	165,99	1546604,13	6366296,51	-71,82	49900	70,99	1,000805	✍	0,54	2,84	-0,06
117,0	-59,40	166,18	1546604,49	6366295,03	-74,41	49794	71,07	1,000865	✍	0,59	3,01	-0,06

Deviation logging in KLX11D, 0 to 120 m

New MeasureIT files

Survey name:	**KLX11D**
Survey date:	09/05/2006 09:16:40
Project:	PLU
Location:	Laxemar

Country:	Sweden
Survey company:	RAYCON
Surveyed by:	Christer Gustafsson
Survey type:	STANDARD
Operating conditions:	
General comments:	
Client name:	SKB
Client ID number:	AP PS 400-06-58
Client reference:	Nisse Håkansson
Drill company:	
Drill rig:	
Drill diameter:	76
Survey direction:	INTO hole
Survey run on:	Wireline
Magnetic Var.:	2,53 degrees East of North

Conventions	
Linear units:	Metres
Angular units:	Degrees
Temperature units:	Centigrade
Co-ordinate system:	0 North
Elevation positive	Up
Dip origin:	0 Horizontal
Dip positive:	Up

Magnetic Integrity Check (MagIC)			
	Mid value	± limit	
Field strength:	50000	1000	nano Tesla
Magnetic dip:	71.0	1.5	Degrees

SURVEY	Actual start	End of survey	Difference
Station:	0,0	120,0	120,0
East:	1546631,42	1546566,15	-65,27
North:	6366357,37	6366360,24	2,87
Elevation:	25,57	-75,02	-100,59
Dip:	-59,15	-54,93	4,22
Azimuth:	268,70	275,57	6,87

OFFSETS at end
Offsets relative to: ACTUAL START
4,38 metres upwards
4,35 metres right
0,21 metres shortfall

Printed on: 2006-08-08 08:02:13

Survey name : KLX11D

Survey date : 09/05/2006 09:16:40

Printed on 2006-08-08 08:02:24

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
0,0	-59,15	268,70	1546631,42	6366357,37	25,57	51489	71,04	0,997641	✍✍	0,00	0,00	0,00
3,0	-59,08	269,04	1546629,88	6366357,34	23,00	49905	70,96	1,002184	✍	0,00	0,00	0,00
6,0	-58,82	269,75	1546628,33	6366357,32	20,43	50011	70,66	1,000933	✍	0,01	0,02	0,00
9,0	-58,71	270,19	1546626,78	6366357,32	17,86	49801	70,63	1,001291	✍	0,03	0,06	0,00
12,0	-58,58	270,45	1546625,22	6366357,33	15,30	49853	70,70	1,001202	✍	0,06	0,10	0,00
15,0	-58,47	270,27	1546623,65	6366357,34	12,74	50047	70,23	0,999451	✍	0,09	0,15	0,00
18,0	-58,38	269,74	1546622,08	6366357,34	10,18	49362	71,10	0,998938	✍	0,13	0,18	0,00
21,0	-58,26	268,61	1546620,50	6366357,32	7,63	49696	70,61	0,999232	✍	0,17	0,20	0,00
24,0	-58,20	270,07	1546618,92	6366357,30	5,08	50074	70,57	0,998731	✍	0,22	0,21	0,00
27,0	-58,12	270,19	1546617,34	6366357,30	2,53	49648	70,73	0,998899	✍	0,27	0,25	0,00
30,0	-58,07	269,54	1546615,76	6366357,30	-0,02	49944	70,32	0,998821	✍	0,33	0,29	0,00
33,0	-58,01	270,92	1546614,17	6366357,31	-2,56	49742	70,77	0,999105	✍	0,38	0,33	0,00
36,0	-57,94	270,98	1546612,58	6366357,33	-5,10	49720	70,75	0,998878	✍	0,44	0,39	-0,01
39,0	-57,81	271,09	1546610,98	6366357,36	-7,64	49589	70,73	0,998994	✍	0,51	0,46	-0,01
42,0	-57,73	270,84	1546609,38	6366357,39	-10,18	50481	70,94	0,998577	✍	0,58	0,52	-0,01
45,0	-57,57	271,31	1546607,78	6366357,42	-12,72	49753	70,96	0,998868	✍	0,66	0,59	-0,01
48,0	-57,40	271,49	1546606,17	6366357,46	-15,25	49620	70,72	0,998904	✍	0,74	0,66	-0,01
51,0	-57,27	271,05	1546604,55	6366357,49	-17,77	49859	70,93	0,998556	✍	0,84	0,73	-0,02
54,0	-57,15	272,46	1546602,92	6366357,54	-20,29	50950	70,64	0,999015	✍	0,94	0,82	-0,02
57,0	-57,02	271,87	1546601,29	6366357,61	-22,81	49890	70,73	0,998697	✍	1,04	0,92	-0,02
60,0	-56,94	272,18	1546599,66	6366357,66	-25,33	49767	70,79	0,998478	✍	1,15	1,01	-0,03
63,0	-56,87	272,35	1546598,02	6366357,73	-27,84	49834	70,90	0,998399	✍	1,27	1,12	-0,03
66,0	-56,78	277,61	1546596,39	6366357,87	-30,35	49718	72,16	0,998756	✍	1,38	1,30	-0,04
69,0	-56,62	272,74	1546594,75	6366358,02	-32,86	49745	70,79	0,998425	✍	1,50	1,48	-0,05
72,0	-56,49	272,92	1546593,10	6366358,10	-35,36	49704	70,88	0,998332	✍	1,63	1,60	-0,05
75,0	-56,43	272,84	1546591,44	6366358,18	-37,86	49703	70,83	0,998782	✍	1,77	1,72	-0,06
78,0	-56,25	274,06	1546589,78	6366358,28	-40,36	49710	71,03	0,998919	✍	1,91	1,86	-0,06
81,0	-56,21	274,15	1546588,12	6366358,40	-42,85	49809	70,76	0,998522	✍	2,06	2,02	-0,07
84,0	-56,06	273,29	1546586,45	6366358,51	-45,35	49649	70,74	0,998570	✍	2,21	2,16	-0,08
87,0	-55,97	273,05	1546584,78	6366358,60	-47,83	49622	70,79	0,998333	✍	2,37	2,29	-0,09
90,0	-55,94	274,62	1546583,10	6366358,72	-50,32	49789	70,82	0,998810	✍	2,53	2,44	-0,09
93,0	-55,76	276,55	1546581,43	6366358,88	-52,80	49706	71,31	0,998815	✍	2,69	2,64	-0,10
96,0	-55,71	274,98	1546579,75	6366359,05	-55,28	49760	71,33	0,998585	✍	2,86	2,85	-0,12

Survey name : KLX11D

Survey date : 09/05/2006 09:16:40

Printed on 2006-08-08 08:02:24

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
99,0	-55,60	275,82	1546578,06	6366359,21	-57,76	49656	71,13	0,998661	✍	3,03	3,05	-0,13
102,0	-55,52	274,63	1546576,37	6366359,36	-60,23	49791	71,03	0,998573	✍	3,21	3,24	-0,14
105,0	-55,39	274,65	1546574,68	6366359,50	-62,70	49619	71,11	0,998583	✍	3,40	3,42	-0,15
108,0	-55,35	274,41	1546572,98	6366359,64	-65,17	49627	70,89	0,998462	✍	3,59	3,59	-0,16
111,0	-55,28	274,45	1546571,27	6366359,77	-67,64	50521	71,72	0,998506	✍	3,78	3,76	-0,17
114,0	-55,17	275,36	1546569,57	6366359,91	-70,10	49390	71,10	0,999069	✍	3,98	3,95	-0,18
117,0	-55,12	275,27	1546567,86	6366360,07	-72,57	50169	71,20	0,998797	✍	4,18	4,14	-0,20
120,0	-54,93	275,57	1546566,15	6366360,24	-75,02	50075	70,92	0,998344	✍	4,38	4,35	-0,21

Deviation logging in KLX11E, 0 to 120 m

New MeasureIT files

Survey name:	**KLX11E**
Survey date:	08/05/2006 20:15:56
Project:	PLU
Location:	Laxemar

Country:	Sweden
Survey company:	RAYCON
Surveyed by:	Christer Gustafsson
Survey type:	STANDARD
Operating conditions:	
General comments:	
Client name:	SKB
Client ID number:	AP PS 400-06-58
Client reference:	Nisse Håkansson
Drill company:	
Drill rig:	
Drill diameter:	76
Survey direction:	INTO hole
Survey run on:	Wireline
Magnetic Var.:	2,53 degrees East of North

Conventions	
Linear units:	Metres
Angular units:	Degrees
Temperature units:	Centigrade
Co-ordinate system:	0 North
Elevation positive	Up
Dip origin:	0 Horizontal
Dip positive:	Up

Magnetic Integrity Check (MagIC)			
	Mid value	± limit	
Field strength:	50000	1000	nano Tesla
Magnetic dip:	71.0	1.5	Degrees

SURVEY	Actual start	End of survey	Difference
Station:	0,0	120,0	120,0
East:	1546627,23	1546606,97	-20,26
North:	6366300,40	6366357,26	56,86
Elevation:	22,65	-81,00	-103,65
Dip:	-60,86	-58,15	2,71
Azimuth:	336,17	344,81	8,64

OFFSETS at end
Offsets relative to: ACTUAL START
2,11 metres upwards
4,44 metres right
0,16 metres shortfall

Printed on: 2006-08-08 08:11:24

Survey name : KLX11E

Survey date : 08/05/2006 20:15:56

Printed on 2006-08-08 08:11:35

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
0,0	-60,86	336,17	1546627,23	6366300,40	22,65	49394	71,58	1,001929	✍	0,00	0,00	0,00
3,0	-60,92	336,04	1546626,64	6366301,73	20,03	49553	71,42	0,998737	✍	0,00	0,00	0,00
6,0	-61,02	335,95	1546626,05	6366303,06	17,41	49621	70,70	1,002072	✍	-0,01	-0,01	0,00
9,0	-60,86	334,82	1546625,44	6366304,39	14,78	49969	70,92	0,999944	✍	-0,01	-0,03	0,00
12,0	-60,92	335,61	1546624,83	6366305,71	12,16	49639	71,07	0,999280	✍	-0,01	-0,05	0,00
15,0	-60,87	336,08	1546624,23	6366307,05	9,54	49961	70,88	0,998743	✍	-0,01	-0,06	0,00
18,0	-60,79	336,28	1546623,64	6366308,38	6,92	49607	70,96	0,998934	✍	-0,01	-0,06	0,00
21,0	-60,70	337,13	1546623,06	6366309,73	4,30	49669	70,94	0,999019	✍	-0,01	-0,04	0,00
24,0	-60,52	337,10	1546622,49	6366311,09	1,69	49615	71,19	0,994464	✍	0,01	-0,02	0,00
27,0	-60,53	337,11	1546621,91	6366312,45	-0,92	49779	71,00	0,999274	✍	0,02	0,00	0,00
30,0	-60,48	336,98	1546621,34	6366313,81	-3,53	49686	71,12	0,998845	✍	0,04	0,03	0,00
33,0	-60,43	337,93	1546620,77	6366315,17	-6,14	49421	71,12	0,998473	✍	0,06	0,06	0,00
36,0	-60,36	338,11	1546620,22	6366316,55	-8,75	49486	71,11	0,998953	✍	0,09	0,11	0,00
39,0	-60,31	338,78	1546619,67	6366317,93	-11,36	49607	71,19	0,998663	✍	0,11	0,17	0,00
42,0	-60,21	338,17	1546619,12	6366319,31	-13,96	49653	71,27	0,998774	✍	0,14	0,23	0,00
45,0	-60,10	338,95	1546618,58	6366320,70	-16,56	49650	71,43	0,999060	✍	0,18	0,29	0,00
48,0	-60,06	338,01	1546618,03	6366322,09	-19,17	49493	71,52	0,998710	✍	0,22	0,35	0,00
51,0	-60,01	339,70	1546617,49	6366323,49	-21,76	49650	71,10	0,999089	✍	0,26	0,42	-0,01
54,0	-59,94	340,21	1546616,97	6366324,90	-24,36	49638	71,12	0,998920	✍	0,30	0,52	-0,01
57,0	-59,88	340,12	1546616,46	6366326,32	-26,96	49587	71,15	0,999470	✍	0,35	0,62	-0,01
60,0	-59,85	341,36	1546615,97	6366327,74	-29,55	49592	71,38	0,998862	✍	0,40	0,74	-0,01
63,0	-59,80	340,78	1546615,48	6366329,17	-32,15	49419	71,12	0,999171	✍	0,45	0,87	-0,02
66,0	-59,93	340,97	1546614,98	6366330,59	-34,74	49510	71,34	1,003983	✍	0,50	1,00	-0,02
69,0	-59,60	341,85	1546614,50	6366332,02	-37,33	49531	71,35	0,998899	✍	0,55	1,13	-0,02
72,0	-59,54	341,41	1546614,02	6366333,46	-39,92	49589	71,17	0,999071	✍	0,61	1,28	-0,03
75,0	-59,43	341,58	1546613,54	6366334,91	-42,50	49501	71,18	0,998853	✍	0,68	1,42	-0,03
78,0	-59,37	341,82	1546613,06	6366336,36	-45,09	49548	71,11	0,999156	✍	0,75	1,57	-0,04
81,0	-59,31	342,02	1546612,59	6366337,81	-47,67	49542	70,98	0,998918	✍	0,82	1,72	-0,04
84,0	-59,19	342,45	1546612,12	6366339,27	-50,24	49585	71,16	0,999129	✍	0,90	1,88	-0,05
87,0	-59,09	342,84	1546611,66	6366340,74	-52,82	49560	71,16	0,998384	✍	0,98	2,06	-0,05
90,0	-59,00	343,29	1546611,21	6366342,22	-55,39	49764	71,14	0,998978	✍	1,06	2,24	-0,06
93,0	-58,98	343,50	1546610,77	6366343,70	-57,96	49621	71,25	0,999124	✍	1,15	2,43	-0,07
96,0	-58,80	343,73	1546610,33	6366345,18	-60,53	49649	70,97	0,998988	✍	1,24	2,64	-0,07

Survey name : KLX11E

Survey date : 08/05/2006 20:15:56

Printed on 2006-08-08 08:11:35

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
99,0	-58,77	343,80	1546609,90	6366346,68	-63,10	49487	71,27	0,998753	✍	1,34	2,84	-0,08
102,0	-58,65	343,34	1546609,46	6366348,17	-65,66	49446	71,04	0,998940	✍	1,44	3,04	-0,09
105,0	-58,62	343,79	1546609,01	6366349,67	-68,22	49377	71,06	0,999165	✍	1,54	3,24	-0,10
108,0	-58,50	344,50	1546608,59	6366351,18	-70,78	49470	71,03	0,998985	✍	1,65	3,46	-0,11
111,0	-58,46	344,65	1546608,17	6366352,69	-73,34	49635	71,21	0,998692	✍	1,76	3,69	-0,12
114,0	-58,34	344,80	1546607,75	6366354,20	-75,89	49550	71,37	0,998644	✍	1,88	3,92	-0,13
117,0	-58,32	346,38	1546607,36	6366355,73	-78,45	49618	71,09	0,999132	✍	1,99	4,18	-0,14
120,0	-58,15	344,81	1546606,97	6366357,26	-81,00	50057	71,34	0,998934	✍	2,11	4,44	-0,16

Deviation logging in KLX11F, 0 to 120 m

New MeasureIT files

Survey name:	**KLX11F**
Survey date:	08/05/2006 20:15:56
Project:	PLU
Location:	Laxemar

Country:	Sweden
Survey company:	RAYCON
Surveyed by:	Christer Gustafsson
Survey type:	STANDARD
Operating conditions:	
General comments:	
Client name:	SKB
Client ID number:	AP PS 400-06-58
Client reference:	Nisse Håkansson
Drill company:	
Drill rig:	
Drill diameter:	76
Survey direction:	INTO hole
Survey run on:	Wireline
Magnetic Var.:	2,53 degrees East of North

Conventions	
Linear units:	Metres
Angular units:	Degrees
Temperature units:	Centigrade
Co-ordinate system:	0 North
Elevation positive	Up
Dip origin:	0 Horizontal
Dip positive:	Up

Magnetic Integrity Check (MagIC)	Mid value	± limit	
Field strength:	50000	1000	nano Tesla
Magnetic dip:	71.0	1.5	Degrees

SURVEY	Actual start	End of survey	Difference
Station:	0,0	120,0	120,0
East:	1546577,96	1546637,96	60,00
North:	6366314,09	6366310,58	-3,51
Elevation:	24,46	-79,36	-103,82
Dip:	-61,42	-59,00	2,42
Azimuth:	88,61	98,36	9,75

OFFSETS at end
Offsets relative to: ACTUAL START
2,92 metres upwards
4,96 metres right
0,18 metres shortfall

Printed on: 2006-08-08 10:25:42

Survey name : KLX11F

Survey date : 08/05/2006 20:15:56

Printed on 2006-08-08 10:25:50

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
0,0	-61,42	88,61	1546577,96	6366314,09	24,46	50821	71,96	0,999366	✍	0,00	0,00	0,00
3,0	-61,16	88,92	1546579,40	6366314,12	21,83	49888	70,93	0,999485	✍	0,01	0,00	0,00
6,0	-61,05	89,92	1546580,85	6366314,14	19,20	49504	71,02	0,999758	✍	0,02	0,02	0,00
9,0	-60,97	89,53	1546582,30	6366314,14	16,58	50198	70,96	1,000065	✍	0,04	0,05	0,00
12,0	-60,91	89,35	1546583,76	6366314,16	13,96	49612	71,11	0,999625	✍	0,07	0,07	0,00
15,0	-60,82	89,80	1546585,22	6366314,17	11,34	49833	70,93	0,999552	✍	0,10	0,10	0,00
18,0	-60,77	90,04	1546586,69	6366314,17	8,72	49671	71,01	0,999506	✍	0,13	0,13	0,00
21,0	-60,70	90,90	1546588,15	6366314,16	6,10	49746	71,06	0,999821	✍	0,16	0,18	0,00
24,0	-60,63	90,53	1546589,62	6366314,14	3,48	49783	70,95	0,999398	✍	0,20	0,23	0,00
27,0	-60,55	90,01	1546591,10	6366314,13	0,87	50024	71,12	0,999227	✍	0,25	0,28	0,00
30,0	-60,45	91,09	1546592,57	6366314,12	-1,74	49885	71,10	0,999812	✍	0,29	0,33	0,00
33,0	-60,36	91,26	1546594,05	6366314,09	-4,35	49721	70,88	0,999304	✍	0,34	0,39	-0,01
36,0	-60,14	91,02	1546595,54	6366314,06	-6,95	49807	70,93	0,993285	✍	0,40	0,46	-0,01
39,0	-60,26	92,37	1546597,03	6366314,01	-9,56	49998	71,25	0,999130	✍	0,47	0,54	-0,01
42,0	-60,19	91,60	1546598,52	6366313,96	-12,16	49773	70,94	0,999122	✍	0,53	0,63	-0,01
45,0	-60,12	92,93	1546600,01	6366313,90	-14,76	49698	71,22	0,998963	✍	0,59	0,72	-0,01
48,0	-60,06	92,03	1546601,51	6366313,84	-17,36	49801	71,05	0,999001	✍	0,66	0,82	-0,01
51,0	-59,97	92,15	1546603,01	6366313,78	-19,96	49883	71,03	0,999421	✍	0,73	0,91	-0,02
54,0	-59,90	92,85	1546604,51	6366313,72	-22,56	49897	71,01	0,998943	✍	0,80	1,02	-0,02
57,0	-59,83	93,45	1546606,01	6366313,64	-25,15	49864	70,89	0,998886	✍	0,88	1,13	-0,02
60,0	-59,77	93,47	1546607,52	6366313,54	-27,75	49900	70,96	0,998752	✍	0,96	1,26	-0,03
63,0	-59,69	93,53	1546609,03	6366313,45	-30,34	49769	71,00	0,998870	✍	1,04	1,39	-0,03
66,0	-59,65	94,26	1546610,54	6366313,35	-32,93	49856	70,82	0,999080	✍	1,13	1,53	-0,04
69,0	-59,55	94,08	1546612,05	6366313,24	-35,51	49735	70,94	0,998884	✍	1,22	1,68	-0,04
72,0	-59,52	92,65	1546613,57	6366313,15	-38,10	50063	71,56	0,999042	✍	1,31	1,80	-0,04
75,0	-59,47	95,20	1546615,09	6366313,05	-40,68	49658	70,95	0,999134	✍	1,40	1,94	-0,05
78,0	-59,46	94,76	1546616,61	6366312,91	-43,27	49762	70,88	0,999182	✍	1,50	2,11	-0,06
81,0	-59,43	95,14	1546618,13	6366312,78	-45,85	49741	70,87	0,998677	✍	1,59	2,28	-0,06
84,0	-59,43	96,21	1546619,65	6366312,63	-48,43	49733	70,81	0,998952	✍	1,69	2,47	-0,07
87,0	-59,37	95,17	1546621,17	6366312,48	-51,02	49701	71,03	0,998601	✍	1,78	2,66	-0,08
90,0	-59,35	95,66	1546622,69	6366312,34	-53,60	49658	70,98	0,998566	✍	1,88	2,84	-0,08
93,0	-59,34	95,76	1546624,21	6366312,18	-56,18	49784	71,06	0,998886	✍	1,98	3,03	-0,09
96,0	-59,28	95,42	1546625,73	6366312,03	-58,76	50619	70,97	0,998766	✍	2,08	3,21	-0,10

Survey name : KLX11F

Survey date : 08/05/2006 20:15:56

Printed on 2006-08-08 10:25:50

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
99,0	-59,21	95,88	1546627,26	6366311,88	-61,34	49818	70,91	0,998665	✍	2,18	3,40	-0,11
102,0	-59,17	96,56	1546628,79	6366311,72	-63,91	49758	71,03	0,998834	✍	2,29	3,61	-0,11
105,0	-59,18	96,79	1546630,31	6366311,54	-66,49	49847	71,03	0,998788	✍	2,39	3,82	-0,12
108,0	-59,13	97,26	1546631,84	6366311,35	-69,06	49810	71,24	0,998856	✍	2,49	4,05	-0,13
111,0	-59,11	96,27	1546633,37	6366311,17	-71,64	50529	71,22	0,998402	✍	2,60	4,27	-0,14
114,0	-59,09	96,36	1546634,90	6366311,00	-74,21	50536	71,23	0,998668	✍	2,71	4,47	-0,15
117,0	-59,09	98,18	1546636,43	6366310,80	-76,79	49723	71,04	0,998947	✍	2,82	4,70	-0,16
120,0	-59,00	98,36	1546637,96	6366310,58	-79,36	49587	70,90	0,998635	✍	2,92	4,96	-0,18

Deviation logging in KLX18A, 0 to 609 m

New MeasureIT files

Survey name:	**KLX18A**
Survey date:	15/05/2006 22:15:08
Project:	PLU
Location:	Laxemar

Country:	Sweden
Survey company:	RAYCON
Surveyed by:	Christer Gustafsson
Survey type:	STANDARD
Operating conditions:	
General comments:	
Client name:	SKB
Client ID number:	AP PS 400-06-58
Client reference:	Nisse Håkansson
Drill company:	
Drill rig:	
Drill diameter:	76
Survey direction:	INTO hole
Survey run on:	Wireline
Magnetic Var.:	2,53 degrees East of North

Conventions	
Linear units:	Metres
Angular units:	Degrees
Temperature units:	Centigrade
Co-ordinate system:	0 North
Elevation positive	Up
Dip origin:	0 Horizontal
Dip positive:	Up

Magnetic Integrity Check (MagIC)	Mid value	± limit	
Field strength:	50000	1000	nano Tesla
Magnetic dip:	71.0	1.5	Degrees

SURVEY	Actual start	End of survey	Difference
Station:	0,0	609,0	609,0
East:	1547966,34	1547864,37	-101,97
North:	6366413,39	6366419,64	6,25
Elevation:	21,01	-579,31	-600,32
Dip:	-82,12	-79,69	2,43
Azimuth:	271,40	277,96	6,56

OFFSETS at end
Offsets relative to: ACTUAL START
18,80 metres upwards
3,75 metres right
0,35 metres shortfall

Printed on: 2006-08-08 08:58:49

Survey name : KLX18A

Survey date : 15/05/2006 22:15:08

Printed on 2006-08-08 08:59:06

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
0,0	-82,12	271,40	1547966,34	6366413,39	21,01	102622	68,68	1,000541	✍✍✍	0,00	0,00	0,00
3,0	-82,28	271,40	1547965,93	6366413,40	18,04	55233	77,43	1,000279	✍✍✍	0,00	0,00	0,00
6,0	-82,22	271,40	1547965,53	6366413,41	15,07	11317	77,64	1,000921	✍✍✍	-0,01	0,00	0,00
9,0	-82,24	271,40	1547965,12	6366413,42	12,09	87113	11,16	0,999625	✍✍✍	-0,02	0,00	0,00
12,0	-82,23	271,40	1547964,72	6366413,43	9,12	77935	85,33	0,999668	✍✍✍	-0,02	0,00	0,00
15,0	-82,14	271,40	1547964,31	6366413,44	6,15	56542	79,33	1,000356	✍✍✍	-0,03	0,00	0,00
18,0	-82,15	271,40	1547963,90	6366413,45	3,18	52360	71,93	1,000887	✍✍	-0,03	0,00	0,00
21,0	-82,12	271,40	1547963,49	6366413,46	0,20	87047	80,50	0,999986	✍✍✍	-0,03	0,00	0,00
24,0	-82,11	271,40	1547963,08	6366413,47	-2,77	21649	71,85	1,000502	✍✍	-0,03	0,00	0,00
27,0	-82,10	271,40	1547962,67	6366413,48	-5,74	33759	69,57	1,000842	✍✍	-0,03	0,00	0,00
30,0	-82,01	271,40	1547962,25	6366413,49	-8,71	20013	53,48	1,000561	✍✍✍	-0,02	0,00	0,00
33,0	-82,03	271,40	1547961,83	6366413,50	-11,68	26003	64,35	1,000213	✍✍✍	-0,02	0,00	0,00
36,0	-81,91	271,40	1547961,42	6366413,51	-14,65	60836	81,92	1,000921	✍✍✍	-0,01	0,00	0,00
39,0	-81,83	271,40	1547960,99	6366413,52	-17,62	56499	82,29	1,000758	✍✍✍	0,00	0,00	0,00
42,0	-81,75	271,60	1547960,56	6366413,53	-20,59	99536	85,06	1,000660	✍✍✍	0,02	0,00	0,00
45,0	-81,79	271,60	1547960,13	6366413,54	-23,56	4599	-6,75	0,999552	✍✍✍	0,04	0,00	0,00
48,0	-81,78	271,60	1547959,71	6366413,56	-26,53	84461	76,32	1,000507	✍✍✍	0,05	0,00	0,00
51,0	-81,69	271,60	1547959,27	6366413,57	-29,50	27937	53,43	1,000755	✍✍✍	0,07	0,01	0,00
54,0	-81,55	271,60	1547958,84	6366413,58	-32,47	56073	88,62	0,999250	✍✍✍	0,10	0,01	0,00
57,0	-81,52	271,60	1547958,40	6366413,59	-35,43	56946	72,29	1,000325	✍✍	0,13	0,01	0,00
60,0	-81,36	271,60	1547957,95	6366413,60	-38,40	88477	80,39	0,999432	✍✍✍	0,17	0,01	0,00
63,0	-81,28	271,60	1547957,50	6366413,62	-41,37	18661	-4,58	1,000094	✍✍✍	0,21	0,01	0,00
66,0	-81,22	271,60	1547957,04	6366413,63	-44,33	99748	79,37	1,000057	✍✍✍	0,25	0,01	0,00
69,0	-81,07	271,60	1547956,58	6366413,64	-47,29	90193	84,86	1,000588	✍✍✍	0,31	0,01	0,00
72,0	-80,98	271,60	1547956,11	6366413,66	-50,26	59483	80,68	1,000418	✍✍✍	0,36	0,02	0,00
75,0	-80,95	271,60	1547955,64	6366413,67	-53,22	19376	47,69	1,000172	✍✍✍	0,42	0,02	0,00
78,0	-80,89	271,60	1547955,17	6366413,68	-56,18	100394	67,51	0,999787	✍✍✍	0,49	0,02	0,00
81,0	-80,81	271,80	1547954,69	6366413,70	-59,14	110228	58,07	1,000899	✍✍✍	0,55	0,02	0,00
84,0	-80,80	271,80	1547954,21	6366413,71	-62,11	77590	84,71	0,999991	✍✍✍	0,62	0,03	-0,01
87,0	-80,92	271,80	1547953,73	6366413,73	-65,07	67943	46,60	1,000513	✍✍✍	0,69	0,03	-0,01
90,0	-80,83	271,80	1547953,26	6366413,74	-68,03	109921	56,13	0,999467	✍✍✍	0,75	0,03	-0,01
93,0	-80,65	271,80	1547952,78	6366413,76	-70,99	68872	80,58	1,001042	✍✍✍	0,82	0,04	-0,01
96,0	-80,63	271,80	1547952,29	6366413,77	-73,95	37151	21,93	1,000339	✍✍✍	0,90	0,04	-0,01

Survey name : KLX18A

Survey date : 15/05/2006 22:15:08

Printed on 2006-08-08 08:59:06

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
99,0	-80,65	271,80	1547951,80	6366413,79	-76,91	73093	77,08	1,000465	✍✍✍	0,98	0,04	-0,01
102,0	-80,69	271,80	1547951,32	6366413,80	-79,87	50407	71,20	0,999055	✍	1,05	0,05	-0,01
105,0	-80,67	271,67	1547950,83	6366413,82	-82,83	50072	71,32	0,999664	✍	1,13	0,05	-0,01
108,0	-80,57	273,43	1547950,34	6366413,84	-85,79	49610	71,32	1,000720	✍	1,21	0,06	-0,01
111,0	-80,56	272,97	1547949,85	6366413,87	-88,75	49866	71,26	1,000790	✍	1,29	0,07	-0,01
114,0	-80,54	272,66	1547949,36	6366413,89	-91,71	50175	70,94	1,000741	✍	1,37	0,09	-0,01
117,0	-80,56	271,57	1547948,87	6366413,91	-94,67	49201	70,70	1,000052	✍	1,45	0,09	-0,02
120,0	-80,59	271,82	1547948,37	6366413,92	-97,63	49016	69,52	0,999589	✍	1,53	0,09	-0,02
123,0	-80,52	273,13	1547947,88	6366413,95	-100,59	50126	71,28	1,000355	✍	1,62	0,10	-0,02
126,0	-80,54	272,76	1547947,39	6366413,97	-103,55	49438	70,89	1,001218	✍	1,70	0,12	-0,02
129,0	-80,55	272,78	1547946,90	6366413,99	-106,51	49305	71,03	1,000630	✍	1,78	0,13	-0,02
132,0	-80,54	272,27	1547946,41	6366414,02	-109,47	49220	70,85	1,001176	✍	1,86	0,14	-0,02
135,0	-80,57	272,16	1547945,91	6366414,03	-112,43	49879	70,80	1,000462	✍	1,94	0,15	-0,02
138,0	-80,52	271,68	1547945,42	6366414,05	-115,38	50595	70,66	1,000725	✍	2,03	0,15	-0,02
141,0	-80,49	272,32	1547944,93	6366414,07	-118,34	49560	70,76	1,000564	✍	2,11	0,16	-0,02
144,0	-80,52	272,43	1547944,43	6366414,09	-121,30	49500	70,93	0,999604	✍	2,20	0,16	-0,03
147,0	-80,54	269,09	1547943,94	6366414,10	-124,26	49744	70,95	0,999609	✍	2,28	0,16	-0,03
150,0	-80,51	272,05	1547943,45	6366414,10	-127,22	49340	70,59	0,999902	✍	2,36	0,15	-0,03
153,0	-80,48	272,33	1547942,95	6366414,12	-130,18	49317	70,94	0,999856	✍	2,45	0,16	-0,03
156,0	-80,44	272,38	1547942,45	6366414,14	-133,14	49134	70,67	1,000516	✍	2,53	0,17	-0,03
159,0	-80,43	272,74	1547941,96	6366414,16	-136,10	49367	70,71	1,000427	✍	2,62	0,18	-0,03
162,0	-80,57	272,51	1547941,46	6366414,19	-139,06	49217	70,74	1,000076	✍	2,71	0,19	-0,03
165,0	-80,44	272,79	1547940,97	6366414,21	-142,01	49526	70,75	1,000656	✍	2,79	0,20	-0,03
168,0	-80,45	273,11	1547940,47	6366414,23	-144,97	49261	70,93	1,000989	✍	2,88	0,21	-0,04
171,0	-80,45	272,92	1547939,97	6366414,26	-147,93	49011	70,56	1,000434	✍	2,96	0,23	-0,04
174,0	-80,40	273,12	1547939,47	6366414,29	-150,89	49005	70,97	1,000632	✍	3,05	0,24	-0,04
177,0	-80,45	272,05	1547938,98	6366414,31	-153,85	49040	70,75	1,000061	✍	3,14	0,25	-0,04
180,0	-80,41	272,87	1547938,48	6366414,33	-156,81	49602	70,63	0,999799	✍	3,23	0,26	-0,04
183,0	-80,37	272,77	1547937,98	6366414,35	-159,76	49769	70,68	1,000621	✍	3,32	0,27	-0,04
186,0	-80,38	272,22	1547937,48	6366414,38	-162,72	49708	70,56	1,000889	✍	3,41	0,28	-0,04
189,0	-80,45	272,04	1547936,98	6366414,39	-165,68	48541	70,99	0,999624	✍	3,50	0,29	-0,05
192,0	-80,37	273,21	1547936,48	6366414,42	-168,64	49322	71,19	1,000739	✍	3,59	0,30	-0,05
195,0	-80,44	273,00	1547935,98	6366414,44	-171,60	48152	70,38	1,000218	✍✍	3,68	0,31	-0,05

Survey name : KLX18A

Survey date : 15/05/2006 22:15:08

Printed on 2006-08-08 08:59:06

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
198,0	-80,42	271,65	1547935,48	6366414,47	-174,55	48837	71,38	1,000095	✍	3,77	0,32	-0,05
201,0	-80,52	270,87	1547934,98	6366414,48	-177,51	50195	71,16	1,000121	✍	3,85	0,32	-0,05
204,0	-80,37	272,66	1547934,49	6366414,49	-180,47	49377	71,05	1,001183	✍	3,94	0,32	-0,05
207,0	-80,38	273,55	1547933,98	6366414,52	-183,43	47883	71,01	1,001021	✍	4,03	0,34	-0,05
210,0	-80,35	271,83	1547933,48	6366414,54	-186,39	49752	71,06	1,001038	✍	4,12	0,35	-0,05
213,0	-80,38	270,77	1547932,98	6366414,55	-189,34	49250	70,50	1,001009	✍	4,22	0,35	-0,06
216,0	-80,37	272,28	1547932,48	6366414,57	-192,30	49316	70,94	1,000785	✍	4,31	0,35	-0,06
219,0	-80,38	270,97	1547931,98	6366414,58	-195,26	49232	70,65	1,000966	✍	4,40	0,35	-0,06
222,0	-80,37	273,66	1547931,48	6366414,60	-198,22	49228	69,29	1,000929	✍	4,49	0,36	-0,06
225,0	-80,37	272,57	1547930,98	6366414,63	-201,17	48985	70,62	1,000808	✍	4,58	0,37	-0,06
228,0	-80,33	271,67	1547930,47	6366414,65	-204,13	49188	70,28	1,001038	✍	4,67	0,38	-0,06
231,0	-80,33	273,10	1547929,97	6366414,67	-207,09	49727	70,59	1,001096	✍	4,77	0,39	-0,06
234,0	-80,33	272,04	1547929,47	6366414,69	-210,05	49386	70,70	1,001172	✍	4,86	0,40	-0,07
237,0	-80,30	270,79	1547928,96	6366414,70	-213,00	49119	70,41	1,000892	✍	4,95	0,40	-0,07
240,0	-80,29	271,42	1547928,46	6366414,71	-215,96	49441	70,50	1,000837	✍	5,05	0,40	-0,07
243,0	-80,22	272,31	1547927,95	6366414,73	-218,92	49187	70,55	1,001125	✍	5,15	0,40	-0,07
246,0	-80,24	272,36	1547927,44	6366414,75	-221,87	49245	70,92	1,001055	✍	5,25	0,41	-0,07
249,0	-80,22	271,78	1547926,93	6366414,77	-224,83	49396	70,64	1,001060	✍	5,34	0,42	-0,07
252,0	-80,24	272,02	1547926,42	6366414,79	-227,79	49310	70,65	1,001112	✍	5,44	0,42	-0,08
255,0	-80,23	272,38	1547925,91	6366414,81	-230,74	49408	70,82	1,000909	✍	5,54	0,43	-0,08
258,0	-80,22	272,12	1547925,41	6366414,83	-233,70	49328	71,03	1,000812	✍	5,64	0,43	-0,08
261,0	-80,22	271,20	1547924,90	6366414,84	-236,66	49351	70,59	1,001126	✍	5,74	0,44	-0,08
264,0	-80,25	272,70	1547924,39	6366414,86	-239,61	49658	70,84	1,001025	✍	5,84	0,44	-0,08
267,0	-80,24	272,25	1547923,88	6366414,88	-242,57	49440	70,60	1,001246	✍	5,94	0,45	-0,08
270,0	-80,24	272,34	1547923,37	6366414,90	-245,53	49390	70,75	1,000637	✍	6,04	0,46	-0,09
273,0	-80,25	272,61	1547922,86	6366414,92	-248,48	49804	70,63	1,000611	✍	6,13	0,47	-0,09
276,0	-80,26	271,03	1547922,36	6366414,94	-251,44	49244	70,62	1,000878	✍	6,23	0,47	-0,09
279,0	-80,27	270,79	1547921,85	6366414,95	-254,40	49503	70,44	1,000915	✍	6,33	0,47	-0,09
282,0	-80,23	272,41	1547921,34	6366414,96	-257,35	49588	70,46	1,000708	✍	6,43	0,47	-0,09
285,0	-80,23	273,28	1547920,83	6366414,99	-260,31	49590	70,52	1,000974	✍	6,52	0,48	-0,09
288,0	-80,15	274,48	1547920,32	6366415,02	-263,27	49897	69,97	1,001080	✍	6,62	0,51	-0,10
291,0	-80,09	272,66	1547919,81	6366415,05	-266,22	49548	69,91	1,001337	✍	6,73	0,52	-0,10
294,0	-80,05	273,87	1547919,29	6366415,08	-269,18	50041	70,54	1,000887	✍	6,84	0,54	-0,10

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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
297,0	-80,08	273,56	1547918,78	6366415,11	-272,13	49754	70,41	1,000924	✍	6,94	0,56	-0,10
300,0	-80,04	273,14	1547918,26	6366415,15	-275,09	49387	70,50	1,001052	✍	7,05	0,58	-0,10
303,0	-80,04	272,85	1547917,74	6366415,17	-278,04	49504	70,75	1,001049	✍	7,16	0,59	-0,11
306,0	-80,04	272,80	1547917,22	6366415,20	-281,00	49815	70,69	1,001477	✍	7,27	0,61	-0,11
309,0	-80,06	272,95	1547916,70	6366415,22	-283,95	49114	70,19	1,000868	✍	7,38	0,62	-0,11
312,0	-80,05	273,92	1547916,19	6366415,25	-286,91	50700	70,53	1,000949	✍	7,48	0,64	-0,11
315,0	-80,06	273,53	1547915,67	6366415,29	-289,86	49230	70,99	1,000628	✍	7,59	0,66	-0,11
318,0	-80,05	273,23	1547915,15	6366415,32	-292,82	50335	71,08	1,000909	✍	7,70	0,68	-0,12
321,0	-80,04	272,75	1547914,64	6366415,35	-295,77	49292	70,43	1,000739	✍	7,81	0,69	-0,12
324,0	-80,03	273,00	1547914,12	6366415,37	-298,73	49356	71,04	1,000781	✍	7,92	0,71	-0,12
327,0	-80,01	273,36	1547913,60	6366415,40	-301,68	49380	70,82	1,000701	✍	8,03	0,72	-0,12
330,0	-80,00	274,75	1547913,08	6366415,44	-304,63	48393	71,01	1,000994	✍	8,14	0,75	-0,12
333,0	-79,98	273,88	1547912,56	6366415,48	-307,59	47614	70,51	1,001117	✍	8,25	0,77	-0,13
336,0	-79,99	273,42	1547912,04	6366415,51	-310,54	49366	70,70	1,000778	✍	8,36	0,79	-0,13
339,0	-79,98	272,81	1547911,52	6366415,54	-313,50	50050	70,83	1,001056	✍	8,47	0,81	-0,13
342,0	-79,97	272,72	1547910,99	6366415,56	-316,45	49725	70,86	1,001030	✍	8,58	0,82	-0,13
345,0	-79,97	272,95	1547910,47	6366415,59	-319,41	49643	70,85	1,001401	✍	8,69	0,83	-0,13
348,0	-79,94	273,01	1547909,95	6366415,62	-322,36	49855	70,94	1,000681	✍	8,81	0,85	-0,14
351,0	-79,96	273,15	1547909,43	6366415,65	-325,31	49944	71,00	1,000979	✍	8,92	0,86	-0,14
354,0	-79,96	272,76	1547908,90	6366415,67	-328,27	49867	70,75	1,000860	✍	9,03	0,88	-0,14
357,0	-79,94	273,11	1547908,38	6366415,70	-331,22	50061	70,69	1,001095	✍	9,15	0,89	-0,14
360,0	-79,93	272,98	1547907,86	6366415,73	-334,18	50303	70,79	1,000337	✍	9,26	0,91	-0,14
363,0	-79,95	273,55	1547907,33	6366415,76	-337,13	50138	70,70	1,000709	✍	9,37	0,92	-0,15
366,0	-79,93	273,07	1547906,81	6366415,79	-340,08	49689	70,59	1,000965	✍	9,49	0,94	-0,15
369,0	-79,91	273,35	1547906,29	6366415,82	-343,04	49797	70,61	1,001020	✍	9,60	0,96	-0,15
372,0	-79,92	273,34	1547905,76	6366415,85	-345,99	49836	70,73	1,001158	✍	9,72	0,98	-0,15
375,0	-79,95	272,77	1547905,24	6366415,87	-348,94	50024	71,00	1,001026	✍	9,83	0,99	-0,16
378,0	-79,94	272,97	1547904,72	6366415,90	-351,90	49809	70,75	1,001185	✍	9,95	1,00	-0,16
381,0	-79,94	273,76	1547904,19	6366415,93	-354,85	49735	70,61	1,001116	✍	10,06	1,02	-0,16
384,0	-79,90	273,31	1547903,67	6366415,96	-357,81	49775	70,69	1,001123	✍	10,17	1,04	-0,16
387,0	-79,94	273,22	1547903,14	6366415,99	-360,76	49775	70,73	1,000993	✍	10,29	1,06	-0,16
390,0	-79,94	273,17	1547902,62	6366416,02	-363,71	49820	70,61	1,000937	✍	10,40	1,08	-0,17
393,0	-79,94	273,17	1547902,10	6366416,05	-366,67	49559	70,74	1,001112	✍	10,52	1,09	-0,17

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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
396,0	-79,97	273,38	1547901,57	6366416,08	-369,62	49655	70,80	1,001209	✍	10,63	1,11	-0,17
399,0	-79,94	273,60	1547901,05	6366416,11	-372,58	49875	70,66	1,001054	✍	10,74	1,13	-0,17
402,0	-79,97	273,64	1547900,53	6366416,15	-375,53	51139	71,09	1,001028	✍	10,86	1,15	-0,18
405,0	-79,95	272,80	1547900,01	6366416,18	-378,48	49633	70,64	1,001199	✍	10,97	1,16	-0,18
408,0	-79,94	273,21	1547899,48	6366416,20	-381,44	49665	70,55	1,000852	✍	11,08	1,18	-0,18
411,0	-79,96	273,83	1547898,96	6366416,24	-384,39	49626	70,61	1,000995	✍	11,20	1,20	-0,18
414,0	-79,95	273,26	1547898,44	6366416,27	-387,35	49886	70,72	1,001216	✍	11,31	1,22	-0,18
417,0	-79,95	273,03	1547897,92	6366416,30	-390,30	49627	70,62	1,000783	✍	11,42	1,23	-0,19
420,0	-79,97	273,05	1547897,39	6366416,32	-393,25	50253	70,79	1,001025	✍	11,54	1,25	-0,19
423,0	-79,98	274,16	1547896,87	6366416,36	-396,21	49735	70,74	1,000729	✍	11,65	1,27	-0,19
426,0	-79,91	273,30	1547896,35	6366416,39	-399,16	49395	70,79	1,001066	✍	11,76	1,29	-0,19
429,0	-79,92	273,27	1547895,83	6366416,42	-402,11	49793	70,63	1,000860	✍	11,88	1,31	-0,20
432,0	-79,95	273,48	1547895,30	6366416,45	-405,07	49592	70,61	1,001025	✍	11,99	1,33	-0,20
435,0	-79,97	273,67	1547894,78	6366416,49	-408,02	49854	70,65	1,000902	✍	12,10	1,35	-0,20
438,0	-79,98	273,63	1547894,26	6366416,52	-410,98	49672	70,74	1,000861	✍	12,21	1,37	-0,20
441,0	-79,97	273,05	1547893,74	6366416,55	-413,93	49676	70,79	1,001395	✍	12,33	1,38	-0,20
444,0	-79,98	275,25	1547893,22	6366416,59	-416,89	49328	70,97	1,000927	✍	12,44	1,41	-0,21
447,0	-79,98	274,42	1547892,70	6366416,63	-419,84	50185	70,75	1,001060	✍	12,55	1,44	-0,21
450,0	-80,00	274,21	1547892,18	6366416,67	-422,79	50124	70,54	1,000975	✍	12,66	1,47	-0,21
453,0	-80,02	274,85	1547891,66	6366416,71	-425,75	50106	70,50	1,000549	✍	12,77	1,50	-0,21
456,0	-80,01	274,32	1547891,14	6366416,75	-428,70	49690	70,54	1,000943	✍	12,88	1,52	-0,22
459,0	-80,02	274,09	1547890,62	6366416,79	-431,66	50039	70,68	1,001036	✍	12,99	1,55	-0,22
462,0	-80,02	274,04	1547890,10	6366416,83	-434,61	49699	70,68	1,001096	✍	13,10	1,57	-0,22
465,0	-80,01	274,23	1547889,58	6366416,87	-437,57	49536	70,48	1,001258	✍	13,21	1,60	-0,22
468,0	-80,00	273,54	1547889,06	6366416,90	-440,52	49585	70,77	1,001043	✍	13,32	1,62	-0,22
471,0	-79,99	274,44	1547888,54	6366416,94	-443,48	50197	70,76	1,001383	✍	13,43	1,64	-0,23
474,0	-79,99	273,52	1547888,02	6366416,97	-446,43	49950	70,51	1,001274	✍	13,54	1,67	-0,23
477,0	-80,00	272,64	1547887,50	6366417,00	-449,38	50226	70,55	1,001310	✍	13,65	1,68	-0,23
480,0	-79,99	274,82	1547886,98	6366417,03	-452,34	49326	71,16	1,001379	✍	13,76	1,70	-0,23
483,0	-80,00	273,16	1547886,46	6366417,07	-455,29	50497	70,26	1,000914	✍	13,87	1,73	-0,23
486,0	-79,98	272,53	1547885,94	6366417,10	-458,25	50555	70,54	1,001117	✍	13,98	1,74	-0,24
489,0	-79,95	273,92	1547885,42	6366417,13	-461,20	49806	70,67	1,000967	✍	14,09	1,76	-0,24
492,0	-79,99	273,86	1547884,90	6366417,16	-464,16	50635	70,21	1,001279	✍	14,21	1,78	-0,24

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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
495,0	-79,97	274,02	1547884,38	6366417,20	-467,11	49278	70,63	1,001520	✍	14,32	1,80	-0,24
498,0	-79,97	274,02	1547883,86	6366417,23	-470,06	49145	70,91	1,000829	✍	14,43	1,83	-0,24
501,0	-79,98	276,09	1547883,34	6366417,28	-473,02	48622	71,36	1,001125	✍	14,54	1,86	-0,25
504,0	-79,95	275,07	1547882,82	6366417,33	-475,97	49079	70,59	1,001684	✍	14,65	1,90	-0,25
507,0	-79,95	275,36	1547882,30	6366417,38	-478,93	50417	70,80	1,000899	✍	14,76	1,93	-0,25
510,0	-79,95	275,68	1547881,77	6366417,43	-481,88	49770	70,63	1,001091	✍	14,88	1,97	-0,25
513,0	-79,93	275,65	1547881,25	6366417,48	-484,83	49569	70,81	1,001197	✍	14,99	2,01	-0,26
516,0	-79,93	275,90	1547880,73	6366417,53	-487,79	49726	70,54	1,001260	✍	15,10	2,05	-0,26
519,0	-79,89	275,38	1547880,21	6366417,59	-490,74	49791	70,66	1,001206	✍	15,22	2,09	-0,26
522,0	-79,89	276,31	1547879,68	6366417,64	-493,69	49844	70,60	1,001217	✍	15,33	2,13	-0,26
525,0	-79,88	275,81	1547879,16	6366417,69	-496,65	49863	70,59	1,001000	✍	15,45	2,17	-0,27
528,0	-79,88	276,01	1547878,64	6366417,75	-499,60	49713	70,68	1,001355	✍	15,56	2,21	-0,27
531,0	-79,88	276,22	1547878,11	6366417,81	-502,55	49749	70,76	1,001168	✍	15,68	2,26	-0,27
534,0	-79,86	276,66	1547877,59	6366417,86	-505,51	49338	70,90	1,000994	✍	15,79	2,30	-0,27
537,0	-79,83	275,60	1547877,06	6366417,92	-508,46	49788	70,73	1,001019	✍	15,91	2,35	-0,28
540,0	-79,86	276,80	1547876,54	6366417,98	-511,41	49822	70,85	1,001118	✍	16,03	2,39	-0,28
543,0	-79,87	277,04	1547876,01	6366418,04	-514,37	49477	70,68	1,001076	✍	16,14	2,44	-0,28
546,0	-79,85	276,41	1547875,49	6366418,10	-517,32	49356	70,66	1,001438	✍	16,26	2,49	-0,28
549,0	-79,84	276,93	1547874,96	6366418,16	-520,27	49728	70,68	1,001168	✍	16,38	2,54	-0,29
552,0	-79,83	276,90	1547874,44	6366418,23	-523,23	50108	70,60	1,001153	✍	16,49	2,59	-0,29
555,0	-79,84	277,67	1547873,91	6366418,30	-526,18	49849	70,85	1,001181	✍	16,61	2,65	-0,29
558,0	-79,80	276,57	1547873,38	6366418,36	-529,13	49493	70,69	1,001603	✍	16,73	2,70	-0,30
561,0	-79,80	277,57	1547872,86	6366418,43	-532,08	49661	70,69	1,001102	✍	16,85	2,75	-0,30
564,0	-79,76	277,58	1547872,33	6366418,50	-535,04	49495	70,79	1,001100	✍	16,97	2,81	-0,30
567,0	-79,75	277,90	1547871,80	6366418,57	-537,99	49480	70,83	1,001143	✍	17,09	2,87	-0,30
570,0	-79,73	277,94	1547871,27	6366418,64	-540,94	49612	71,03	1,001079	✍	17,21	2,93	-0,31
573,0	-79,72	277,01	1547870,74	6366418,71	-543,89	49452	71,02	1,001172	✍	17,33	2,98	-0,31
576,0	-79,73	278,49	1547870,21	6366418,78	-546,84	49377	70,61	1,000953	✍	17,45	3,04	-0,31
579,0	-79,72	279,14	1547869,68	6366418,87	-549,80	50920	71,23	1,001307	✍	17,57	3,11	-0,32
582,0	-79,71	278,53	1547869,15	6366418,95	-552,75	49389	70,75	1,000888	✍	17,69	3,18	-0,32
585,0	-79,69	276,96	1547868,62	6366419,02	-555,70	48847	71,20	1,001465	✍	17,82	3,24	-0,32
588,0	-79,68	277,62	1547868,09	6366419,09	-558,65	49374	70,83	1,000881	✍	17,94	3,30	-0,33
591,0	-79,68	278,22	1547867,56	6366419,16	-561,60	49039	70,86	1,001232	✍	18,06	3,36	-0,33

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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
594,0	-79,71	278,66	1547867,03	6366419,24	-564,55	49235	70,77	1,001403	✍	18,19	3,42	-0,33
597,0	-79,69	278,70	1547866,50	6366419,32	-567,51	49415	70,71	1,001101	✍	18,31	3,49	-0,34
600,0	-79,68	276,86	1547865,96	6366419,40	-570,46	48854	70,80	1,001300	✍	18,43	3,55	-0,34
603,0	-79,70	278,69	1547865,43	6366419,47	-573,41	49364	70,86	1,001069	✍	18,56	3,61	-0,34
606,0	-79,68	279,87	1547864,90	6366419,55	-576,36	50644	70,91	1,001297	✍	18,68	3,68	-0,35
609,0	-79,69	277,96	1547864,37	6366419,64	-579,31	49950	70,94	1,001025	✍	18,80	3,75	-0,35

Deviation logging in KLX19A, 0 to 99 m

New MeasureIT files

Survey name:	**KLX19A**
Survey date:	14/05/2006 12:41:23
Project:	PLU
Location:	Laxemar

Country:	Sweden
Survey company:	RAYCON
Surveyed by:	Christer Gustafsson
Survey type:	STANDARD
Operating conditions:	
General comments:	
Client name:	SKB
Client ID number:	AP PS 400-06-58
Client reference:	Nisse Håkansson
Drill company:	
Drill rig:	
Drill diameter:	140
Survey direction:	INTO hole
Survey run on:	Wireline
Magnetic Var.:	2,53 degrees East of North

Conventions	
Linear units:	Metres
Angular units:	Degrees
Temperature units:	Centigrade
Co-ordinate system:	0 North
Elevation positive	Up
Dip origin:	0 Horizontal
Dip positive:	Up

Magnetic Integrity Check (MagIC)			
	Mid value	± limit	
Field strength:	50000	1000	nano Tesla
Magnetic dip:	71.0	1.5	Degrees

SURVEY	Actual start	End of survey	Difference
Station:	0,0	99,0	99,0
East:	1547004,62	1546988,47	-16,15
North:	6365901,42	6365851,09	-50,33
Elevation:	16,87	-66,83	-83,70
Dip:	-57,42	-57,97	-0,55
Azimuth:	197,13	197,47	0,34

OFFSETS at end
Offsets relative to: ACTUAL START
0,53 metres downwards
0,60 metres right
0,01 metres shortfall

Printed on: 2006-08-08 09:15:35

Survey name : KLX19A

Survey date : 14/05/2006 12:41:23

Printed on 2006-08-08 09:15:51

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
0,0	-57,42	197,13	1547004,62	6365901,42	16,87	62475	55,16	0,999276	✍✍✍	0,00	0,00	0,00
3,0	-57,25	197,50	1547004,14	6365899,87	14,34	30627	8,55	0,999204	✍✍✍	0,00	0,01	0,00
6,0	-57,24	198,00	1547003,64	6365898,33	11,82	50364	69,87	0,997357	✍	0,01	0,02	0,00
9,0	-57,32	198,31	1547003,14	6365896,79	9,30	50339	71,04	0,998218	✍	0,02	0,05	0,00
12,0	-57,36	198,07	1547002,63	6365895,25	6,77	50561	71,26	0,997952	✍	0,02	0,08	0,00
15,0	-57,34	198,82	1547002,12	6365893,71	4,25	50188	71,44	0,998221	✍	0,03	0,12	0,00
18,0	-57,40	198,35	1547001,60	6365892,18	1,72	50064	71,24	0,998583	✍	0,03	0,16	0,00
21,0	-57,48	198,27	1547001,10	6365890,65	-0,81	50128	71,11	0,998339	✍	0,03	0,19	0,00
24,0	-57,53	198,27	1547000,59	6365889,12	-3,34	50097	71,06	0,998620	✍	0,02	0,23	0,00
27,0	-57,59	198,18	1547000,09	6365887,59	-5,87	50026	70,94	0,998101	✍	0,02	0,26	0,00
30,0	-57,61	198,53	1546999,58	6365886,06	-8,40	50059	71,06	0,998444	✍	0,01	0,29	0,00
33,0	-57,67	197,57	1546999,09	6365884,54	-10,94	49871	71,02	0,998590	✍	0,00	0,32	0,00
36,0	-57,68	198,55	1546998,59	6365883,01	-13,47	50435	71,19	0,998603	✍	-0,02	0,34	0,00
39,0	-57,75	197,99	1546998,09	6365881,49	-16,01	49921	71,00	0,998144	✍	-0,03	0,37	0,00
42,0	-57,83	197,90	1546997,59	6365879,97	-18,55	49879	70,96	0,998126	✍	-0,05	0,40	0,00
45,0	-57,86	198,19	1546997,10	6365878,45	-21,09	50080	71,16	0,998271	✍	-0,08	0,42	0,00
48,0	-57,92	198,13	1546996,60	6365876,93	-23,63	50127	70,88	0,998364	✍	-0,10	0,45	0,00
51,0	-57,93	197,95	1546996,11	6365875,42	-26,17	50332	71,33	0,999538	✍	-0,13	0,48	0,00
54,0	-57,90	196,40	1546995,64	6365873,90	-28,71	51242	70,59	0,997935	✍	-0,15	0,48	0,00
57,0	-57,85	197,71	1546995,17	6365872,37	-31,25	49892	70,47	0,998170	✍	-0,18	0,48	0,00
60,0	-57,84	197,42	1546994,69	6365870,85	-33,79	50076	70,72	0,997872	✍	-0,20	0,49	0,00
63,0	-57,87	197,29	1546994,21	6365869,33	-36,33	50197	70,90	0,998242	✍	-0,22	0,49	0,00
66,0	-57,88	197,52	1546993,73	6365867,80	-38,87	50100	70,92	0,998077	✍	-0,25	0,50	0,00
69,0	-57,89	197,80	1546993,25	6365866,28	-41,41	50103	70,69	0,998313	✍	-0,27	0,52	0,00
72,0	-57,89	198,60	1546992,75	6365864,77	-43,96	49955	70,55	0,997739	✍	-0,29	0,55	0,00
75,0	-57,91	197,50	1546992,26	6365863,25	-46,50	49858	70,87	0,997872	✍	-0,32	0,57	0,00
78,0	-57,90	197,59	1546991,78	6365861,73	-49,04	49911	70,78	0,997824	✍	-0,35	0,58	0,00
81,0	-57,90	197,56	1546991,30	6365860,21	-51,58	49485	71,02	0,997559	✍	-0,37	0,60	0,00
84,0	-57,92	197,70	1546990,81	6365858,70	-54,12	49676	71,17	0,997850	✍	-0,40	0,61	0,00
87,0	-57,94	196,71	1546990,34	6365857,17	-56,66	49914	71,38	0,998202	✍	-0,42	0,61	0,00
90,0	-57,92	197,18	1546989,88	6365855,65	-59,21	49863	70,80	0,998202	✍	-0,45	0,61	0,00
93,0	-57,96	196,74	1546989,41	6365854,13	-61,75	49979	70,83	0,998226	✍	-0,48	0,60	0,00
96,0	-57,96	197,24	1546988,95	6365852,61	-64,29	49958	70,76	0,998215	✍	-0,51	0,60	-0,01

Survey name : KLX19A
Survey date : 14/05/2006 12:41:23

Printed on 2006-08-08 09:15:52

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
99,0	-57,97	197,47	1546988,47	6365851,09	-66,83	49965	70,79	0,998025	✍	-0,53	0,60	-0,01

Deviation logging in KLX20A, 0 to 456 m

New MeasureIT files

Survey name:	**KLX20A**
Survey date:	08/05/2006 18:22:59
Project:	PLU
Location:	Laxemar

Country:	Sweden
Survey company:	RAYCON
Surveyed by:	Christer Gustafsson
Survey type:	STANDARD
Operating conditions:	
General comments:	
Client name:	SKB
Client ID number:	AP PS 400-06-58
Client reference:	Nisse Håkansson
Drill company:	
Drill rig:	
Drill diameter:	76
Survey direction:	INTO hole
Survey run on:	Wireline
Magnetic Var.:	2,53 degrees East of North

Conventions	
Linear units:	Metres
Angular units:	Degrees
Temperature units:	Centigrade
Co-ordinate system:	0 North
Elevation positive	Up
Dip origin:	0 Horizontal
Dip positive:	Up

Magnetic Integrity Check (MagIC)	Mid value	± limit	
Field strength:	50000	1000	nano Tesla
Magnetic dip:	71.0	1.5	Degrees

SURVEY	Actual start	End of survey	Difference
Station:	0,0	456,0	456,0
East:	1546604,89	1546299,85	-305,04
North:	6366334,57	6366357,30	22,73
Elevation:	27,24	-309,79	-337,03
Dip:	-49,93	-41,01	8,92
Azimuth:	270,60	281,67	11,07

OFFSETS at end
Offsets relative to: ACTUAL START
16,66 metres upwards
19,53 metres right
1,59 metres shortfall

Printed on: 2006-08-08 09:22:09

Survey name : KLX20A

Survey date : 08/05/2006 18:22:59

Printed on 2006-08-08 09:22:21

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
0,0	-49,93	270,60	1546604,89	6366334,57	27,24	50859	-57,95	0,997162	✍✍	0,00	0,00	0,00
3,0	-50,03	270,00	1546602,96	6366334,58	24,94	49583	76,90	1,000171	✍✍	0,00	-0,01	0,00
6,0	-50,00	270,00	1546601,03	6366334,58	22,64	53420	70,66	0,999723	✍✍	-0,01	-0,03	0,00
9,0	-49,97	270,00	1546599,10	6366334,58	20,35	50147	71,20	0,999808	✍	-0,01	-0,05	0,00
12,0	-49,87	270,00	1546597,17	6366334,58	18,05	49079	70,82	1,000113	✍	-0,01	-0,07	0,00
15,0	-49,95	270,00	1546595,24	6366334,58	15,76	50557	72,58	1,000088	✍✍	-0,01	-0,09	0,00
18,0	-49,97	270,00	1546593,31	6366334,58	13,46	50145	71,44	1,000000	✍	-0,01	-0,11	0,00
21,0	-50,10	271,82	1546591,38	6366334,61	11,16	49545	71,74	0,999919	✍	-0,02	-0,10	0,00
24,0	-50,10	272,52	1546589,46	6366334,68	8,86	49638	71,25	0,999207	✍	-0,02	-0,05	0,00
27,0	-50,20	272,62	1546587,54	6366334,77	6,55	50304	71,46	0,999326	✍	-0,04	0,02	0,00
30,0	-50,19	270,00	1546585,62	6366334,81	4,25	49233	73,41	0,999600	✍✍	-0,05	0,04	0,00
33,0	-50,21	269,57	1546583,70	6366334,81	1,95	50415	70,67	0,999496	✍	-0,07	0,01	0,00
36,0	-50,29	269,87	1546581,78	6366334,80	-0,36	50232	70,45	0,999302	✍	-0,08	-0,01	0,00
39,0	-50,49	270,00	1546579,87	6366334,79	-2,67	50503	70,30	0,999046	✍	-0,11	-0,04	0,00
42,0	-50,35	272,11	1546577,96	6366334,83	-4,98	50231	69,37	0,999031	✍	-0,13	-0,02	0,00
45,0	-50,45	271,70	1546576,05	6366334,89	-7,30	49943	71,09	0,998698	✍	-0,16	0,02	0,00
48,0	-50,39	270,00	1546574,14	6366334,92	-9,61	50218	69,80	0,999077	✍	-0,18	0,03	0,00
51,0	-50,48	270,42	1546572,23	6366334,93	-11,92	49491	69,47	0,998924	✍	-0,21	0,02	0,00
54,0	-50,47	269,66	1546570,32	6366334,93	-14,24	50080	69,37	0,998792	✍	-0,24	0,00	0,00
57,0	-50,64	271,39	1546568,41	6366334,95	-16,55	49079	71,26	0,999106	✍	-0,27	0,00	0,00
60,0	-50,58	270,44	1546566,51	6366334,98	-18,87	49089	73,46	0,998755	✍	-0,31	0,01	0,00
63,0	-50,55	270,07	1546564,60	6366334,99	-21,19	50843	71,06	0,998998	✍	-0,34	-0,01	0,00
66,0	-50,61	271,53	1546562,70	6366335,01	-23,51	50276	71,43	0,998586	✍	-0,37	0,00	0,00
69,0	-50,64	270,09	1546560,79	6366335,04	-25,82	49869	73,08	0,998790	✍	-0,41	0,01	0,00
72,0	-50,62	270,00	1546558,89	6366335,04	-28,14	50220	72,60	0,998388	✍✍	-0,45	-0,01	-0,01
75,0	-50,70	272,24	1546556,99	6366335,08	-30,46	51188	69,30	0,998714	✍✍	-0,48	0,01	-0,01
78,0	-50,67	269,68	1546555,09	6366335,11	-32,78	50620	71,41	0,999284	✍	-0,52	0,02	-0,01
81,0	-50,69	272,48	1546553,19	6366335,15	-35,11	50115	69,40	0,998452	✍	-0,56	0,03	-0,01
84,0	-50,70	270,00	1546551,29	6366335,19	-37,43	50857	71,48	0,998745	✍	-0,60	0,06	-0,01
87,0	-50,77	271,54	1546549,39	6366335,21	-39,75	49586	71,19	0,998893	✍	-0,65	0,06	-0,01
90,0	-50,66	270,79	1546547,49	6366335,25	-42,07	49767	71,00	0,998632	✍	-0,69	0,08	-0,01
93,0	-50,64	270,00	1546545,59	6366335,26	-44,39	49580	71,18	0,998760	✍	-0,73	0,07	-0,01
96,0	-50,67	271,30	1546543,69	6366335,29	-46,71	49350	71,99	0,998921	✍	-0,76	0,08	-0,01

Survey name : KLX20A

Survey date : 08/05/2006 18:22:59

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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
99,0	-50,82	270,00	1546541,79	6366335,31	-49,04	51994	72,08	0,997468	✍✍	-0,81	0,08	-0,01
102,0	-50,56	270,96	1546539,89	6366335,32	-51,36	49750	71,02	0,998352	✍	-0,85	0,07	-0,01
105,0	-50,61	270,18	1546537,99	6366335,34	-53,67	49604	71,03	0,999158	✍	-0,88	0,07	-0,01
108,0	-50,59	272,01	1546536,08	6366335,38	-55,99	49486	71,22	0,998191	✍	-0,91	0,09	-0,01
111,0	-50,57	270,86	1546534,18	6366335,43	-58,31	49603	71,08	0,999036	✍	-0,95	0,12	-0,01
114,0	-50,52	270,95	1546532,27	6366335,46	-60,63	49687	71,01	0,998694	✍	-0,98	0,13	-0,01
117,0	-50,52	272,06	1546530,36	6366335,51	-62,94	49743	70,92	0,998662	✍	-1,01	0,16	-0,01
120,0	-50,48	271,51	1546528,46	6366335,57	-65,26	49606	71,04	0,998473	✍	-1,04	0,20	-0,01
123,0	-50,36	272,70	1546526,55	6366335,64	-67,57	49721	71,03	0,998812	✍	-1,07	0,25	-0,01
126,0	-50,21	271,75	1546524,63	6366335,71	-69,88	49601	71,11	0,998718	✍	-1,09	0,30	-0,01
129,0	-50,11	272,01	1546522,71	6366335,77	-72,18	50052	71,30	0,998965	✍	-1,10	0,34	-0,01
132,0	-50,02	271,81	1546520,79	6366335,84	-74,48	50105	71,35	0,999100	✍	-1,11	0,39	-0,01
135,0	-49,92	271,66	1546518,86	6366335,90	-76,78	49712	70,96	0,998843	✍	-1,11	0,43	-0,01
138,0	-49,81	272,16	1546516,92	6366335,96	-79,07	50031	71,05	0,998677	✍	-1,11	0,47	-0,01
141,0	-49,70	272,37	1546514,99	6366336,04	-81,36	49751	71,03	0,999288	✍	-1,10	0,53	-0,01
144,0	-49,56	273,41	1546513,05	6366336,14	-83,65	49617	71,12	0,998954	✍	-1,08	0,60	-0,01
147,0	-49,49	272,75	1546511,10	6366336,24	-85,93	50232	71,21	0,998897	✍	-1,06	0,69	-0,02
150,0	-49,41	271,65	1546509,15	6366336,32	-88,21	49750	71,05	0,999155	✍	-1,04	0,74	-0,02
153,0	-49,32	272,35	1546507,20	6366336,38	-90,48	49659	71,00	0,999329	✍	-1,01	0,79	-0,02
156,0	-49,23	273,90	1546505,25	6366336,49	-92,76	49993	71,11	0,998746	✍	-0,98	0,88	-0,02
159,0	-49,15	272,05	1546503,29	6366336,59	-95,03	49975	71,21	0,998911	✍	-0,94	0,96	-0,02
162,0	-49,04	272,78	1546501,33	6366336,67	-97,30	49587	70,95	0,999377	✍	-0,90	1,02	-0,02
165,0	-48,92	273,01	1546499,36	6366336,77	-99,56	49731	70,97	0,998992	✍	-0,85	1,10	-0,02
168,0	-48,83	273,44	1546497,39	6366336,89	-101,82	49657	71,04	0,999415	✍	-0,79	1,19	-0,02
171,0	-48,77	274,45	1546495,42	6366337,02	-104,08	49553	70,88	0,999070	✍	-0,74	1,30	-0,03
174,0	-48,76	272,36	1546493,44	6366337,14	-106,33	49469	71,16	0,999163	✍	-0,68	1,40	-0,03
177,0	-48,66	274,03	1546491,47	6366337,25	-108,59	49750	70,98	0,999180	✍	-0,61	1,49	-0,03
180,0	-48,57	272,21	1546489,49	6366337,36	-110,84	49333	70,90	0,999086	✍	-0,55	1,58	-0,03
183,0	-48,53	273,36	1546487,50	6366337,45	-113,09	49631	70,99	0,999239	✍	-0,48	1,65	-0,03
186,0	-48,55	273,10	1546485,52	6366337,57	-115,33	49592	71,02	0,999003	✍	-0,41	1,75	-0,04
189,0	-48,54	273,20	1546483,54	6366337,67	-117,58	49568	71,04	0,999082	✍	-0,33	1,83	-0,04
192,0	-48,55	273,62	1546481,56	6366337,79	-119,83	49501	71,08	0,999025	✍	-0,26	1,93	-0,04
195,0	-48,48	274,01	1546479,57	6366337,92	-122,08	49550	71,01	0,999107	✍	-0,19	2,04	-0,04

Survey name : KLX20A

Survey date : 08/05/2006 18:22:59

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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
198,0	-48,43	273,32	1546477,59	6366338,05	-124,32	49486	71,04	0,999055	✍	-0,12	2,15	-0,05
201,0	-48,44	274,10	1546475,60	6366338,18	-126,57	49594	70,95	0,999345	✍	-0,04	2,26	-0,05
204,0	-48,41	273,14	1546473,61	6366338,31	-128,81	49405	71,14	0,999393	✍	0,04	2,36	-0,05
207,0	-48,45	273,69	1546471,63	6366338,43	-131,06	49500	71,07	0,999269	✍	0,11	2,46	-0,06
210,0	-48,46	273,46	1546469,64	6366338,55	-133,30	49524	70,96	0,999077	✍	0,19	2,56	-0,06
213,0	-48,44	273,31	1546467,65	6366338,67	-135,55	49530	70,95	0,999117	✍	0,26	2,66	-0,06
216,0	-48,45	272,81	1546465,67	6366338,77	-137,79	49679	70,73	0,999021	✍	0,34	2,74	-0,06
219,0	-48,52	273,30	1546463,68	6366338,88	-140,04	49536	70,99	0,999013	✍	0,42	2,83	-0,07
222,0	-48,55	273,65	1546461,70	6366339,00	-142,29	49921	70,86	0,999244	✍	0,49	2,93	-0,07
225,0	-48,62	273,68	1546459,72	6366339,13	-144,54	49568	70,85	0,998925	✍	0,55	3,04	-0,07
228,0	-48,67	272,95	1546457,74	6366339,24	-146,79	49525	70,95	0,999026	✍	0,62	3,13	-0,07
231,0	-48,70	273,58	1546455,76	6366339,35	-149,04	49532	70,60	0,999319	✍	0,68	3,22	-0,07
234,0	-48,71	272,78	1546453,79	6366339,46	-151,30	49746	70,86	0,999161	✍	0,75	3,31	-0,08
237,0	-48,73	273,32	1546451,81	6366339,57	-153,55	49771	70,92	0,999510	✍	0,81	3,40	-0,08
240,0	-48,75	273,36	1546449,83	6366339,68	-155,81	49563	70,97	0,998982	✍	0,87	3,49	-0,08
243,0	-48,76	273,39	1546447,86	6366339,80	-158,06	49760	70,89	0,999529	✍	0,93	3,59	-0,08
246,0	-48,73	273,53	1546445,89	6366339,92	-160,32	49577	71,01	0,999117	✍	0,99	3,68	-0,08
249,0	-48,74	273,09	1546443,91	6366340,03	-162,57	49576	70,88	0,999148	✍	1,05	3,78	-0,09
252,0	-48,71	273,79	1546441,93	6366340,15	-164,83	49628	70,93	0,999218	✍	1,11	3,88	-0,09
255,0	-48,68	272,86	1546439,96	6366340,27	-167,08	49639	70,92	0,999270	✍	1,17	3,97	-0,09
258,0	-48,66	273,39	1546437,98	6366340,38	-169,33	49631	70,91	0,999045	✍	1,24	4,06	-0,09
261,0	-48,65	273,82	1546436,00	6366340,50	-171,59	49584	71,07	0,999290	✍	1,30	4,16	-0,10
264,0	-48,61	273,80	1546434,02	6366340,63	-173,84	49607	70,79	0,999127	✍	1,37	4,27	-0,10
267,0	-48,62	273,81	1546432,04	6366340,76	-176,09	49824	70,62	0,999144	✍	1,44	4,38	-0,10
270,0	-48,56	273,10	1546430,06	6366340,88	-178,34	49711	70,83	0,999248	✍	1,50	4,48	-0,10
273,0	-48,47	272,24	1546428,08	6366340,98	-180,59	49893	70,97	0,999488	✍	1,58	4,55	-0,11
276,0	-48,43	273,21	1546426,09	6366341,07	-182,83	49997	70,85	0,998892	✍	1,65	4,63	-0,11
279,0	-48,34	271,11	1546424,10	6366341,15	-185,07	49603	70,52	0,999225	✍	1,73	4,68	-0,11
282,0	-48,29	273,56	1546422,11	6366341,23	-187,31	49918	70,89	0,999427	✍	1,82	4,74	-0,11
285,0	-48,22	272,80	1546420,11	6366341,34	-189,55	49766	70,74	0,999268	✍	1,90	4,83	-0,11
288,0	-48,17	274,14	1546418,12	6366341,46	-191,79	50046	70,62	0,999318	✍	1,99	4,93	-0,12
291,0	-48,13	273,59	1546416,12	6366341,59	-194,02	49759	70,96	0,999363	✍	2,08	5,05	-0,12
294,0	-48,01	273,68	1546414,12	6366341,72	-196,26	49720	70,95	0,999374	✍	2,18	5,15	-0,12

Survey name : KLX20A

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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
297,0	-47,86	274,07	1546412,11	6366341,86	-198,48	49777	70,83	0,999412	✍	2,28	5,27	-0,13
300,0	-47,71	274,04	1546410,10	6366342,00	-200,70	49736	70,97	0,999151	✍	2,39	5,39	-0,13
303,0	-47,55	274,37	1546408,09	6366342,15	-202,92	49839	70,84	0,999569	✍	2,51	5,52	-0,14
306,0	-47,43	273,97	1546406,07	6366342,29	-205,13	49787	70,96	0,999533	✍	2,63	5,64	-0,14
309,0	-47,29	274,74	1546404,04	6366342,45	-207,34	49922	71,07	0,999256	✍	2,76	5,78	-0,15
312,0	-47,11	274,97	1546402,01	6366342,62	-209,54	49724	70,93	0,999356	✍	2,90	5,93	-0,16
315,0	-47,03	274,53	1546399,97	6366342,79	-211,74	49838	70,87	0,999481	✍	3,05	6,07	-0,16
318,0	-46,87	274,85	1546397,93	6366342,96	-213,93	49726	70,90	0,999515	✍	3,20	6,22	-0,17
321,0	-46,73	274,28	1546395,88	6366343,12	-216,12	49759	70,92	0,999370	✍	3,36	6,36	-0,18
324,0	-46,62	274,87	1546393,83	6366343,29	-218,30	49642	71,21	0,999357	✍	3,53	6,50	-0,19
327,0	-46,41	274,59	1546391,77	6366343,46	-220,47	49808	70,96	0,999346	✍	3,70	6,65	-0,19
330,0	-46,33	274,20	1546389,71	6366343,61	-222,65	49801	70,97	0,999470	✍	3,89	6,79	-0,20
333,0	-46,20	276,21	1546387,64	6366343,80	-224,81	49742	71,07	0,999473	✍	4,07	6,96	-0,21
336,0	-46,09	275,34	1546385,58	6366344,01	-226,98	49927	70,95	0,999242	✍	4,26	7,14	-0,23
339,0	-45,94	275,38	1546383,50	6366344,21	-229,14	49942	70,88	0,999659	✍	4,46	7,32	-0,24
342,0	-45,81	275,90	1546381,42	6366344,41	-231,29	49690	70,97	0,999529	✍	4,67	7,50	-0,25
345,0	-45,72	275,79	1546379,34	6366344,62	-233,44	49855	70,96	0,999564	✍	4,88	7,69	-0,26
348,0	-45,58	275,73	1546377,26	6366344,84	-235,58	49594	70,95	0,999462	✍	5,10	7,88	-0,28
351,0	-45,54	277,07	1546375,17	6366345,07	-237,73	49821	70,83	0,999919	✍	5,32	8,09	-0,29
354,0	-45,44	276,75	1546373,08	6366345,32	-239,87	49886	70,93	0,999394	✍	5,54	8,32	-0,31
357,0	-45,32	276,94	1546370,99	6366345,57	-242,00	50105	71,08	0,999378	✍	5,77	8,55	-0,33
360,0	-45,22	277,09	1546368,89	6366345,83	-244,13	49913	70,76	0,999568	✍	6,00	8,79	-0,35
363,0	-45,10	278,92	1546366,80	6366346,13	-246,26	49860	70,83	0,999648	✍	6,24	9,06	-0,37
366,0	-44,94	276,78	1546364,70	6366346,42	-248,38	49695	70,89	0,999529	✍	6,48	9,33	-0,39
369,0	-44,81	277,55	1546362,59	6366346,68	-250,50	49789	70,88	0,999634	✍	6,74	9,57	-0,41
372,0	-44,70	277,22	1546360,48	6366346,95	-252,61	49658	70,86	0,999626	✍	7,00	9,82	-0,43
375,0	-44,54	277,53	1546358,36	6366347,23	-254,72	49567	70,91	0,999953	✍	7,26	10,08	-0,45
378,0	-44,42	277,69	1546356,24	6366347,51	-256,82	49638	71,07	0,999836	✍	7,54	10,34	-0,48
381,0	-44,31	277,93	1546354,11	6366347,80	-258,92	49682	70,93	0,999768	✍	7,81	10,61	-0,50
384,0	-44,15	278,10	1546351,98	6366348,10	-261,01	49613	70,59	0,999799	✍	8,10	10,88	-0,53
387,0	-44,02	277,79	1546349,85	6366348,40	-263,10	49638	70,53	0,999642	✍	8,39	11,16	-0,56
390,0	-43,88	278,15	1546347,71	6366348,70	-265,18	49517	70,35	0,999586	✍	8,69	11,44	-0,59
393,0	-43,77	278,71	1546345,57	6366349,02	-267,26	50376	70,98	1,000065	✍	8,99	11,73	-0,62

Survey name : KLX20A

Survey date : 08/05/2006 18:22:59

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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
396,0	-43,69	279,03	1546343,43	6366349,35	-269,33	50660	70,85	0,999888	✍	9,30	12,04	-0,65
399,0	-43,62	279,10	1546341,28	6366349,69	-271,40	50786	70,83	0,999798	✍	9,61	12,36	-0,68
402,0	-43,51	278,97	1546339,14	6366350,04	-273,47	49382	70,90	0,999751	✍	9,92	12,68	-0,71
405,0	-43,37	279,16	1546336,99	6366350,38	-275,53	49450	70,98	0,999881	✍	10,25	13,00	-0,75
408,0	-43,25	279,72	1546334,83	6366350,74	-277,59	49689	70,91	0,999816	✍	10,57	13,34	-0,79
411,0	-43,14	280,27	1546332,68	6366351,12	-279,64	49854	71,04	0,999829	✍	10,90	13,69	-0,82
414,0	-43,04	282,00	1546330,53	6366351,54	-281,69	49759	71,22	1,000061	✍	11,23	14,10	-0,87
417,0	-42,89	279,42	1546328,37	6366351,95	-283,74	49838	70,81	0,999900	✍	11,57	14,48	-0,91
420,0	-42,80	279,08	1546326,20	6366352,30	-285,78	49728	71,07	0,999795	✍	11,92	14,81	-0,95
423,0	-42,60	279,68	1546324,03	6366352,66	-287,81	49645	71,04	0,999764	✍	12,28	15,15	-0,99
426,0	-42,49	279,63	1546321,85	6366353,03	-289,84	49741	70,97	0,999953	✍	12,64	15,50	-1,04
429,0	-42,29	279,87	1546319,66	6366353,41	-291,86	49684	71,02	1,000024	✍	13,01	15,85	-1,08
432,0	-42,16	279,93	1546317,47	6366353,79	-293,88	49747	70,71	0,999694	✍	13,39	16,21	-1,13
435,0	-42,01	279,80	1546315,28	6366354,17	-295,89	49716	70,91	1,000168	✍	13,78	16,57	-1,17
438,0	-41,82	280,63	1546313,08	6366354,57	-297,89	49807	70,92	0,999699	✍	14,17	16,94	-1,22
441,0	-41,65	281,18	1546310,89	6366354,99	-299,89	49811	70,96	0,999867	✍	14,57	17,34	-1,28
444,0	-41,49	280,83	1546308,68	6366355,42	-301,88	49666	70,79	1,000290	✍	14,98	17,74	-1,33
447,0	-41,36	282,28	1546306,48	6366355,87	-303,87	49947	71,10	1,000218	✍	15,40	18,17	-1,39
450,0	-41,23	282,53	1546304,28	6366356,35	-305,85	50040	70,98	1,000190	✍	15,81	18,63	-1,46
453,0	-41,04	282,02	1546302,07	6366356,83	-307,82	49780	70,93	0,999975	✍	16,23	19,09	-1,52
456,0	-41,01	281,67	1546299,85	6366357,30	-309,79	49721	70,85	1,000186	✍	16,66	19,53	-1,59

Deviation logging in HLX38, 0 to 198 m

New MeasureIT files

Survey name:	**HLX38**
Survey date:	14/05/2006 19:53:45
Project:	PLU
Location:	Laxemar

Country:	Sweden
Survey company:	RAYCON
Surveyed by:	Christer Gustafsson
Survey type:	STANDARD
Operating conditions:	
General comments:	
Client name:	SKB
Client ID number:	AP PS 400-06-58
Client reference:	Nisse Håkansson
Drill company:	
Drill rig:	
Drill diameter:	140
Survey direction:	INTO hole
Survey run on:	Wireline
Magnetic Var.:	2,53 degrees East of North

Conventions	
Linear units:	Metres
Angular units:	Degrees
Temperature units:	Centigrade
Co-ordinate system:	0 North
Elevation positive	Up
Dip origin:	0 Horizontal
Dip positive:	Up

Magnetic Integrity Check (MagIC)	Mid value	± limit	
Field strength:	50000	1000	nano Tesla
Magnetic dip:	71.0	1.5	Degrees

SURVEY	Actual start	End of survey	Difference
Station:	0,0	198,0	198,0
East:	1547146,08	1547255,13	109,05
North:	6365868,86	6365828,93	-39,93
Elevation:	11,53	-148,38	-159,91
Dip:	-59,33	-47,96	11,37
Azimuth:	110,43	108,48	-1,95

OFFSETS at end
Offsets relative to: ACTUAL START
18,32 metres upwards
0,65 metres left
1,23 metres shortfall

Printed on: 2006-08-07 23:18:08

Survey name : HLX38

Survey date : 14/05/2006 19:53:45

Printed on 2006-08-07 23:18:43

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
0,0	-59,33	110,43	1547146,08	6365868,86	11,53	50784	70,34	1,001515	✍	0,00	0,00	0,00
3,0	-59,69	111,89	1547147,50	6365868,31	8,94	50263	70,90	1,001074	✍	-0,01	0,02	0,00
6,0	-59,57	111,39	1547148,91	6365867,75	6,36	50339	71,33	0,995014	✍	-0,03	0,05	0,00
9,0	-59,50	111,86	1547150,32	6365867,19	3,77	49855	71,17	0,997468	✍	-0,04	0,08	0,00
12,0	-59,25	116,13	1547151,72	6365866,57	1,19	50474	71,77	0,997509	✍	-0,04	0,18	0,00
15,0	-59,04	112,06	1547153,12	6365865,94	-1,39	50052	71,39	0,997558	✍	-0,04	0,28	0,00
18,0	-58,76	112,36	1547154,56	6365865,36	-3,96	49964	71,08	0,997373	✍	-0,01	0,32	0,00
21,0	-58,59	112,75	1547156,00	6365864,76	-6,52	49839	71,36	0,997514	✍	0,02	0,38	-0,01
24,0	-58,45	111,87	1547157,45	6365864,16	-9,08	50234	71,29	0,997290	✍	0,06	0,43	-0,01
27,0	-58,31	112,36	1547158,90	6365863,57	-11,63	50248	71,35	0,997445	✍	0,11	0,48	-0,01
30,0	-58,15	110,71	1547160,37	6365862,99	-14,18	50625	71,68	0,997828	✍	0,17	0,51	-0,01
33,0	-57,91	112,46	1547161,85	6365862,41	-16,73	49916	71,59	0,998624	✍	0,24	0,54	-0,01
36,0	-57,77	111,41	1547163,33	6365861,81	-19,27	49362	71,38	0,999029	✍	0,31	0,58	-0,01
39,0	-57,52	112,01	1547164,82	6365861,22	-21,80	49693	71,30	0,998044	✍	0,40	0,62	-0,01
42,0	-57,31	111,73	1547166,32	6365860,61	-24,33	49861	71,50	0,997929	✍	0,50	0,66	-0,01
45,0	-57,10	111,93	1547167,83	6365860,01	-26,85	50247	71,62	0,997764	✍	0,61	0,70	-0,02
48,0	-56,91	111,19	1547169,35	6365859,41	-29,37	49848	71,39	0,998383	✍	0,73	0,73	-0,02
51,0	-56,74	111,63	1547170,88	6365858,81	-31,88	50012	71,33	0,997958	✍	0,86	0,76	-0,02
54,0	-56,53	109,77	1547172,42	6365858,23	-34,38	49886	71,36	0,997814	✍	1,01	0,77	-0,02
57,0	-56,36	111,27	1547173,97	6365857,65	-36,88	49905	71,14	0,997550	✍	1,16	0,77	-0,03
60,0	-56,16	111,64	1547175,52	6365857,04	-39,38	49506	71,26	0,997956	✍	1,32	0,80	-0,03
63,0	-56,02	111,12	1547177,08	6365856,43	-41,87	50084	71,58	0,997208	✍	1,49	0,83	-0,04
66,0	-55,80	111,62	1547178,65	6365855,81	-44,35	50020	71,28	0,997029	✍	1,67	0,86	-0,04
69,0	-55,72	112,55	1547180,21	6365855,18	-46,83	49980	71,11	0,997080	✍	1,85	0,91	-0,05
72,0	-55,54	111,60	1547181,78	6365854,54	-49,31	49637	71,41	0,997219	✍	2,04	0,95	-0,06
75,0	-55,35	111,15	1547183,37	6365853,92	-51,78	49747	71,37	0,996608	✍	2,25	0,98	-0,06
78,0	-55,18	111,12	1547184,96	6365853,31	-54,24	49660	71,39	0,997152	✍	2,46	1,00	-0,07
81,0	-55,03	110,94	1547186,56	6365852,69	-56,71	49609	71,40	0,997037	✍	2,68	1,02	-0,08
84,0	-54,88	110,62	1547188,17	6365852,08	-59,16	49567	71,42	0,997083	✍	2,91	1,03	-0,09
87,0	-54,69	110,49	1547189,79	6365851,47	-61,61	49556	71,40	0,997056	✍	3,15	1,04	-0,10
90,0	-54,53	110,31	1547191,42	6365850,87	-64,06	49512	71,42	0,996910	✍	3,39	1,03	-0,11
93,0	-54,48	110,26	1547193,06	6365850,26	-66,50	49500	71,36	0,996808	✍	3,65	1,03	-0,12
96,0	-54,32	110,17	1547194,69	6365849,66	-68,94	49490	71,38	0,996985	✍	3,91	1,02	-0,13

Survey name : HLX38
Survey date : 14/05/2006 19:53:45
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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
99,0	-54,19	110,00	1547196,34	6365849,06	-71,38	49455	71,39	0,996757	✍	4,17	1,01	-0,14
102,0	-54,09	109,63	1547197,99	6365848,46	-73,81	49451	71,42	0,996555	✍	4,44	0,99	-0,15
105,0	-53,91	110,75	1547199,65	6365847,85	-76,23	50233	71,06	0,997030	✍	4,72	0,99	-0,17
108,0	-53,73	110,22	1547201,31	6365847,23	-78,66	49760	71,13	0,996973	✍	5,01	0,99	-0,18
111,0	-53,52	109,97	1547202,98	6365846,62	-81,07	49718	71,16	0,996936	✍	5,31	0,98	-0,19
114,0	-53,33	109,98	1547204,66	6365846,01	-83,48	49699	71,10	0,996816	✍	5,62	0,96	-0,21
117,0	-53,10	109,99	1547206,35	6365845,40	-85,88	49707	71,16	0,996808	✍	5,94	0,95	-0,23
120,0	-52,89	109,68	1547208,05	6365844,78	-88,28	49658	71,16	0,997054	✍	6,27	0,93	-0,25
123,0	-52,72	109,75	1547209,75	6365844,17	-90,67	49579	70,97	0,996988	✍	6,61	0,91	-0,27
126,0	-52,48	109,63	1547211,47	6365843,56	-93,05	49766	71,11	0,997070	✍	6,96	0,88	-0,29
129,0	-52,34	108,70	1547213,20	6365842,96	-95,43	49988	71,07	0,996700	✍	7,32	0,84	-0,31
132,0	-52,10	109,43	1547214,93	6365842,36	-97,80	49849	70,99	0,996663	✍	7,69	0,80	-0,33
135,0	-51,91	108,25	1547216,68	6365841,76	-100,16	50691	71,10	0,996916	✍	8,07	0,75	-0,36
138,0	-51,70	108,85	1547218,44	6365841,17	-102,52	49804	71,38	0,996553	✍	8,47	0,69	-0,38
141,0	-51,43	108,19	1547220,21	6365840,58	-104,87	49947	71,23	0,996663	✍	8,87	0,63	-0,41
144,0	-51,23	110,09	1547221,98	6365839,96	-107,21	49713	71,15	0,996717	✍	9,29	0,58	-0,44
147,0	-51,05	108,85	1547223,75	6365839,34	-109,55	49909	71,18	0,996688	✍	9,71	0,55	-0,47
150,0	-50,92	109,15	1547225,54	6365838,72	-111,88	49799	71,01	0,996969	✍	10,15	0,51	-0,50
153,0	-50,74	109,31	1547227,33	6365838,10	-114,21	50046	70,87	0,996760	✍	10,59	0,47	-0,54
156,0	-50,56	108,31	1547229,13	6365837,48	-116,53	49901	71,17	0,996633	✍	11,04	0,41	-0,57
159,0	-50,44	108,52	1547230,94	6365836,88	-118,84	50040	71,20	0,996681	✍	11,50	0,34	-0,61
162,0	-50,25	108,60	1547232,76	6365836,27	-121,15	50008	71,28	0,996936	✍	11,97	0,28	-0,65
165,0	-50,09	108,91	1547234,58	6365835,65	-123,45	50156	71,01	0,996687	✍	12,45	0,23	-0,68
168,0	-49,93	107,96	1547236,40	6365835,05	-125,75	49815	71,20	0,996578	✍	12,93	0,16	-0,72
171,0	-49,73	108,39	1547238,24	6365834,44	-128,05	49744	71,22	0,996569	✍	13,43	0,08	-0,77
174,0	-49,61	108,41	1547240,09	6365833,83	-130,33	49821	71,20	0,996861	✍	13,93	0,01	-0,81
177,0	-49,37	108,50	1547241,93	6365833,21	-132,61	49794	71,26	0,996552	✍	14,44	-0,05	-0,85
180,0	-49,24	108,57	1547243,79	6365832,59	-134,89	50035	71,04	0,996661	✍	14,96	-0,12	-0,90
183,0	-48,92	108,59	1547245,65	6365831,96	-137,15	50153	70,95	0,997360	✍	15,50	-0,18	-0,95
186,0	-48,74	106,83	1547247,53	6365831,36	-139,41	50399	70,89	0,998555	✍	16,04	-0,27	-1,00
189,0	-48,54	108,87	1547249,42	6365830,76	-141,66	49868	70,85	0,999328	✍	16,60	-0,36	-1,05
192,0	-48,33	108,10	1547251,31	6365830,12	-143,91	50041	71,04	0,999137	✍	17,16	-0,43	-1,11
195,0	-48,08	106,43	1547253,22	6365829,53	-146,15	50113	71,03	0,999072	✍	17,74	-0,54	-1,17

Survey name : HLX38

Survey date : 14/05/2006 19:53:45

Printed on 2006-08-07 23:18:43

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
198,0	-47,96	108,48	1547255,13	6365828,93	-148,38	49796	71,10	0,999222	✍	18,32	-0,65	-1,23

Deviation logging in HLX40, 0 to 198 m

New MeasureIT files

Survey name:	**HLX40**
Survey date:	17/05/2006 01:04:06
Project:	PLU
Location:	Laxemar

Country:	Sweden
Survey company:	RAYCON
Surveyed by:	Christer Gustafsson
Survey type:	STANDARD
Operating conditions:	
General comments:	
Client name:	SKB
Client ID number:	AP PS 400-06-58
Client reference:	Nisse Håkansson
Drill company:	
Drill rig:	
Drill diameter:	140
Survey direction:	INTO hole
Survey run on:	Wireline
Magnetic Var.:	2,53 degrees East of North

Conventions	
Linear units:	Metres
Angular units:	Degrees
Temperature units:	Centigrade
Co-ordinate system:	0 North
Elevation positive	Up
Dip origin:	0 Horizontal
Dip positive:	Up

Magnetic Integrity Check (MagIC)	Mid value	± limit	
Field strength:	50000	1000	nano Tesla
Magnetic dip:	71.0	1.5	Degrees

SURVEY	Actual start	End of survey	Difference
Station:	0,0	198,0	198,0
East:	1546943,95	1546960,74	16,79
North:	6366906,76	6367024,81	118,05
Elevation:	25,74	-131,45	-157,19
Dip:	-59,88	-44,73	15,15
Azimuth:	11,03	4,86	-6,17

OFFSETS at end
Offsets relative to: ACTUAL START
24,12 metres upwards
6,11 metres left
2,28 metres shortfall

Printed on: 2006-08-07 23:28:08

Survey name : HLX40

Survey date : 17/05/2006 01:04:06

Printed on 2006-08-07 23:28:22

Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
0,0	-59,88	11,03	1546943,95	6366906,76	25,74	50617	71,86	0,997609	✍	0,00	0,00	0,00
3,0	-59,82	11,56	1546944,25	6366908,24	23,15	49973	70,31	1,001770	✍	0,00	0,01	0,00
6,0	-59,83	11,55	1546944,55	6366909,72	20,55	50679	71,17	1,000944	✍	0,00	0,02	0,00
9,0	-59,71	11,93	1546944,85	6366911,19	17,96	50050	70,92	1,001489	✍	0,01	0,04	0,00
12,0	-59,47	12,48	1546945,18	6366912,68	15,37	50190	70,83	1,001510	✍	0,03	0,07	0,00
15,0	-59,29	12,31	1546945,50	6366914,17	12,79	49508	70,91	1,001418	✍	0,05	0,11	0,00
18,0	-59,01	11,14	1546945,82	6366915,68	10,22	49788	71,39	1,001519	✍	0,09	0,13	0,00
21,0	-58,88	13,41	1546946,15	6366917,19	7,65	50227	71,42	1,001017	✍	0,14	0,16	0,00
24,0	-58,69	11,98	1546946,49	6366918,71	5,08	49050	71,09	1,001357	✍	0,19	0,20	0,00
27,0	-58,57	11,32	1546946,80	6366920,24	2,52	49739	70,92	1,001001	✍	0,26	0,22	0,00
30,0	-58,29	11,12	1546947,11	6366921,78	-0,04	49776	70,88	1,001754	✍	0,34	0,23	0,00
33,0	-58,11	12,56	1546947,43	6366923,32	-2,59	49627	71,26	1,001625	✍	0,42	0,25	-0,01
36,0	-57,83	10,59	1546947,75	6366924,88	-5,13	48839	70,72	1,001555	✍	0,52	0,26	-0,01
39,0	-57,61	9,40	1546948,03	6366926,46	-7,67	49636	71,08	1,001663	✍	0,64	0,24	-0,01
42,0	-57,31	9,43	1546948,29	6366928,05	-10,20	49213	72,12	1,001460	✍	0,76	0,19	-0,01
45,0	-57,10	8,04	1546948,54	6366929,66	-12,72	50195	69,90	1,001398	✍	0,90	0,12	-0,02
48,0	-56,82	7,36	1546948,76	6366931,28	-15,23	50662	70,65	1,001981	✍	1,05	0,03	-0,02
51,0	-56,65	7,71	1546948,97	6366932,91	-17,74	50998	70,70	1,001786	✍	1,21	-0,07	-0,03
54,0	-56,43	8,53	1546949,21	6366934,55	-20,24	50427	70,88	1,002110	✍	1,39	-0,15	-0,03
57,0	-56,21	7,42	1546949,44	6366936,19	-22,74	50713	70,71	1,001819	✍	1,57	-0,24	-0,04
60,0	-56,02	10,55	1546949,70	6366937,85	-25,23	49576	71,13	1,001776	✍	1,77	-0,30	-0,05
63,0	-55,82	10,66	1546950,01	6366939,50	-27,72	49904	69,94	1,001925	✍	1,97	-0,32	-0,06
66,0	-55,62	11,05	1546950,33	6366941,16	-30,19	50525	71,06	1,001644	✍	2,19	-0,32	-0,06
69,0	-55,39	11,50	1546950,66	6366942,82	-32,67	50426	70,89	1,001903	✍	2,42	-0,31	-0,07
72,0	-55,18	10,74	1546950,99	6366944,50	-35,13	48874	70,35	1,002151	✍	2,66	-0,31	-0,08
75,0	-54,96	10,45	1546951,31	6366946,19	-37,59	49104	71,23	1,001947	✍	2,91	-0,32	-0,09
78,0	-54,72	11,41	1546951,63	6366947,89	-40,04	49178	70,83	1,001877	✍	3,18	-0,33	-0,10
81,0	-54,51	7,93	1546951,92	6366949,60	-42,49	49206	71,94	1,001947	✍	3,45	-0,37	-0,12
84,0	-54,24	8,53	1546952,18	6366951,33	-44,93	49434	71,18	1,002014	✍	3,74	-0,45	-0,13
87,0	-54,04	6,34	1546952,40	6366953,07	-47,36	48671	71,84	1,002078	✍	4,03	-0,56	-0,15
90,0	-53,75	10,63	1546952,66	6366954,82	-49,79	48629	71,88	1,002069	✍	4,34	-0,64	-0,17
93,0	-53,53	10,98	1546953,00	6366956,56	-52,20	49526	70,62	1,002292	✍	4,67	-0,65	-0,18
96,0	-53,28	8,97	1546953,31	6366958,32	-54,61	49347	71,12	1,002184	✍	5,01	-0,68	-0,20

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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
99,0	-52,95	10,19	1546953,61	6366960,10	-57,01	48941	71,70	1,002115	✍	5,36	-0,73	-0,22
102,0	-52,76	9,91	1546953,92	6366961,88	-59,40	48883	71,37	1,002263	✍	5,73	-0,76	-0,25
105,0	-52,49	9,30	1546954,23	6366963,68	-61,78	48868	71,82	1,002228	✍	6,10	-0,80	-0,27
108,0	-52,20	10,32	1546954,54	6366965,49	-64,16	48555	72,10	1,002143	✍	6,50	-0,84	-0,30
111,0	-52,01	9,21	1546954,85	6366967,30	-66,53	48927	71,43	1,001837	✍	6,90	-0,88	-0,33
114,0	-51,78	6,18	1546955,10	6366969,14	-68,89	49719	71,53	1,002289	✍	7,32	-0,99	-0,36
117,0	-51,53	7,70	1546955,32	6366970,98	-71,24	49205	71,46	1,002159	✍	7,74	-1,12	-0,39
120,0	-51,30	8,16	1546955,58	6366972,84	-73,59	49374	69,77	1,001890	✍	8,18	-1,23	-0,42
123,0	-51,10	4,51	1546955,79	6366974,70	-75,92	49751	70,88	1,002029	✍	8,63	-1,38	-0,46
126,0	-50,83	6,55	1546955,97	6366976,58	-78,25	49835	71,03	1,002309	✍	9,08	-1,56	-0,50
129,0	-50,59	4,97	1546956,16	6366978,47	-80,58	50560	70,87	1,002053	✍	9,56	-1,73	-0,54
132,0	-50,26	3,73	1546956,31	6366980,38	-82,89	49704	70,86	1,002258	✍	10,04	-1,96	-0,59
135,0	-50,01	12,11	1546956,57	6366982,28	-85,19	47984	73,18	1,002120	✍✍	10,54	-2,06	-0,64
138,0	-49,70	6,13	1546956,88	6366984,19	-87,49	49841	71,13	1,002034	✍	11,06	-2,13	-0,68
141,0	-49,43	5,98	1546957,08	6366986,12	-89,77	49229	71,12	1,002253	✍	11,59	-2,29	-0,73
144,0	-49,09	5,64	1546957,28	6366988,07	-92,04	49296	71,46	1,002416	✍	12,13	-2,47	-0,79
147,0	-48,94	5,50	1546957,47	6366990,03	-94,31	49620	71,22	1,001974	✍	12,69	-2,66	-0,85
150,0	-48,64	6,54	1546957,68	6366992,00	-96,57	49089	71,00	1,002057	✍	13,26	-2,83	-0,91
153,0	-48,43	5,28	1546957,88	6366993,97	-98,81	49425	71,35	1,001991	✍	13,85	-3,01	-0,97
156,0	-48,13	7,36	1546958,10	6366995,96	-101,05	48532	71,38	1,001880	✍	14,44	-3,17	-1,04
159,0	-47,86	7,46	1546958,36	6366997,95	-103,28	49128	70,74	1,002227	✍	15,06	-3,30	-1,10
162,0	-47,64	6,58	1546958,61	6366999,95	-105,50	48402	71,62	1,002099	✍	15,68	-3,44	-1,17
165,0	-47,37	5,77	1546958,83	6367001,96	-107,71	48941	72,03	1,002024	✍	16,32	-3,61	-1,25
168,0	-47,13	5,11	1546959,02	6367003,99	-109,92	48325	72,07	1,002180	✍	16,97	-3,81	-1,32
171,0	-46,81	5,01	1546959,20	6367006,03	-112,11	49101	71,14	1,002272	✍	17,63	-4,02	-1,40
174,0	-46,56	5,53	1546959,39	6367008,08	-114,29	48300	71,08	1,002276	✍	18,30	-4,23	-1,49
177,0	-46,34	7,33	1546959,62	6367010,13	-116,47	48553	71,99	1,002012	✍	18,99	-4,40	-1,57
180,0	-46,10	5,75	1546959,86	6367012,19	-118,63	48755	72,28	1,002246	✍	19,70	-4,56	-1,66
183,0	-45,83	4,89	1546960,05	6367014,27	-120,79	48494	71,38	1,002430	✍	20,41	-4,77	-1,75
186,0	-45,62	4,24	1546960,22	6367016,36	-122,94	49608	73,85	1,001965	✍	21,13	-5,00	-1,85
189,0	-45,34	2,64	1546960,34	6367018,46	-125,08	49397	72,03	1,002067	✍	21,86	-5,28	-1,96
192,0	-45,16	3,57	1546960,46	6367020,57	-127,21	49344	71,60	1,001994	✍	22,60	-5,57	-2,06
195,0	-44,89	3,38	1546960,59	6367022,68	-129,33	51004	70,91	1,002273	✍	23,36	-5,85	-2,17

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Station Metres	Dip Degrees	Azimuth Degrees	Easting Metres	Northing Metres	Elevation Metres	Mag.Field nT	Mag.Dip Degrees	Grav.Field G	Status *	UpDown Metres	LeftRight Metres	Shortfall Metres
198,0	-44,73	4,86	1546960,74	6367024,81	-131,45	48954	71,28	1,002259	✍	24,12	-6,11	-2,28