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Keywords: MDZ, KLX26A, KLX26B, Geology, Drill core mapping, Boremap, Fractures, BIPS, Laxemar.

This report concerns a study which was conducted for SKB. The conclusions and viewpoints presented in the report are those of the authors and do not necessarily coincide with those of the client.

Data in SKB's database can be changed for different reasons. Minor changes in SKB's database will not necessarily result in a revised report. Data revisions may also be presented as supplements, available at www.skb.se.

A pdf version of this document can be downloaded from www.skb.se.

Abstract

This report presents the Boremap mapping of MDZ boreholes KLX26A and KLX26B.

The purpose of the MDZ core drilled boreholes is to obtain enhanced knowledge and understanding for the assessment of hydraulic patterns and physical properties as well as the properties and need of injection, by comparing the relation of existing structures to lithology, orientation, geophysical character, rock stress, ground-water conditions and tectonics in the area of interest.

The lithology in KLX26A is dominated by diorite/gabbro (501033). Subordinate rock type comprises fine-grained granite (511058), Ävrö granite (501044), quartz monzodiorite (501036) and fine-grained diorite-gabbro (505102). The lithology in KLX26B is dominated by diorite/gabbro (501033). Subordinate rock type is fine-grained granite (511058).

Six sections in KLX26A and two sections in KLX26B have been highlighted based on increased fracture frequencies, alterations and structural features.

Sammanfattning

Denna rapport presenterar boremapkarteringen av MDZ borrhålen KLX26A och KLX26B.

Målsättningen med MDZ borrhålen är att erhålla ökad kunskap och förståelse för bedömning av det aktuella områdets hydrauliska mönster, fysikaliska egenskaper och behov av injektering genom att sammanställa befintliga strukturers koppling till litologi, geofysisk karaktär, bergspänning, grundvattenförhållanden och tektonik.

Litologin i KLX26A domineras av diorit/gabbro (501033). Underordnade bergarter är finkornig granit (511058), Ävrögranit (501044), kvartsmonzodiorit (501036) och finkornig dioritoid (505102). Litologin i KLX26B domineras av diorit/gabbro (501033). Underordnad bergart är finkornig granit (511058)

Sex sektioner i KLX26A samt två sektioner i KLX26B kan urskiljas baserat på förhöjd sprickfrekvens, sidobergsomvandlingar och geologiska strukturer.

Contents

1 Introduction

This document reports the data gained from the mapping of MDZ boreholes (Minor Deformation Zone) KLX26A and KLX26B in the Laxemar area, which is one of the activities performed within the site investigation at Oskarshamn The work was carried out in accordance with activity plan AP PS 400-06-123. In Table 1-1 controlling documents for performing this activity are listed. Both activity plan and method descriptions are SKB's internal controlling documents. Rock type nomenclature that has been used is shown in Table 1-2.

The MDZ boreholes are situated within the Laxemar area (Figure 1-1). Mapping of the drill cores was performed between 2006-09-12 and 2006-09-19. Table 1-3 shows the orientation of the boreholes.

Detailed mapping of the drill core is essential for a three dimensional modelling of the geology at depth. The mapping is based on the use of BIPS-image (Borehole Image Processing System) of the borehole wall and by the study of the drill core itself. The BIPS-image enables the study of orientations, since the Boremap software calculates strike and dip of planar features such as foliations, rock contacts and fractures.

Table 1-1. Controlling documents for the performance of the activity.

Activity plan	**Number**	**Version**
Boremapkartering av KLX26A and KLX26B	AP PS 400-06-123	1.0
Method descriptions	**Number**	**Version**
Nomenklatur vid Boremapkartering	SKB MD 143.008	1.0
Method Description for Boremap mapping	SKB MD 143.006	2.0
Mätsystembeskrivning för Boremap	SKB MD 146.005	1.0
Instruktion: Regler för bergarters benämningar vid plats-undersökningen i Oskarshamn	SKB MD 132.004	1.0
Instruktion för längdkalibrering vid undersökningar i kärnborrhål	SKB MD 620.010	2.0

Table 1-2. Rock type nomenclature for the site investigation at Oskarshamn.

Rock type	Rock code	Rock description
Dolerite	501027	Dolerite
Fine-grained Götemar granite	531058	Granite, fine-to medium-grained, ("Götemar granite")
Coarse-grained Götemar granite	521058	Granite, coarse-grained, ("Götemar granite")
Fine-grained granite	511058	Granite, fine-to medium-grained
Pegmatite	501061	Pegmatite
Granite	501058	Granite, medium- to coarse-grained
Ävrö granite	501044	Granite to quartz monzodiorite, generally porphyritic
Quartz monzodiorite	501036	Quartz monzonite to monzodiorite, equigranular to weakly porphyritic
Diorite/gabbro	501033	Diorite to gabbro
Fine-grained dioritoid	501030	Intermediate magmatic rock
Fine-grained diorite-gabbro	505102	Mafic rock, fine-grained
Sulphide mineralization	509010	Sulphide mineralization
Sandstone	506007	Sandstone

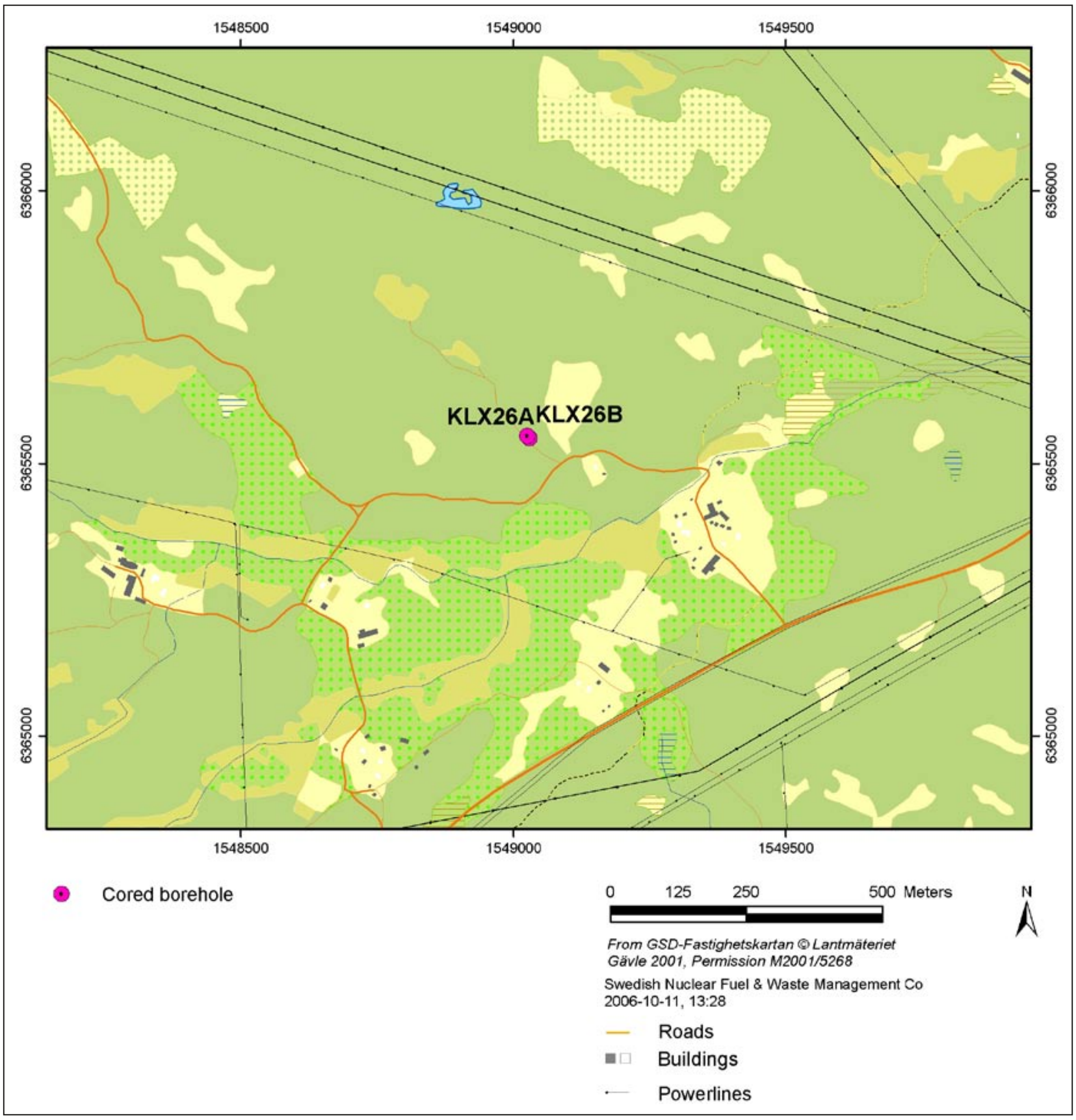


Figure 1-1. *Location of the core drilled MDZ boreholes.*

Table 1-3. Orientation of the MDZ boreholes.

Borehole	Bearing (°)	Inclination (°)	Length (m)
KLX26A	093.50	–60.40	101.14
KLX26B	173.40	–60.00	50.37

2 Objective and scope

The core drilled boreholes KLX26A and KLX26B are drilled within the Minor Deformation Zone program (MDZ).

The purpose of the MDZ program is to obtain enhanced knowledge and understanding for the assessment of hydraulic patterns, physical properties and the need of injection by compiling the relation of existing structures to lithology, orientation, geophysical character, rock stress, ground-water conditions and tectonics in the area of interest.

3 Equipment

3.1 Description of software

Software used for the mapping was Boremap v. 3.7, with bedrock and mineral standards of SKB. The data presentation was made using WellCad v. 4, Microsoft Access and Microsoft Excel. Boremap is the software that unites orthodox core mapping with modern video mapping, where Boremap shows the image from BIPS (Borehole Image Processing System) and extracts the geometrical parameters: length, width, strike and dip from the image.

3.2 Other equipment

The following equipment is used to facilitate the core mapping: folding rule and pen, diluted hydrochloric acid, knife, water-filled atomiser and hand lens.

3.3 BIPS-image sequences

Table 3-1. BIPS-image length.

Borehole	Length (m)
KLX26A	4.00–99.97
KLX26B	4.00–50.07

3.4 BIPS-image: resolution, contrast and quality

The visibility of thin fractures in BIPS depends on image resolution, image contrast and image quality. Resolution of the BIPS-image is perhaps the principal reason why very thin fractures as well as very thin apertures are not visible in the BIPS-image and the resolution depends on the BIPS video camera pixel size and illumination angle.

Thick fractures are always visible in both drill core and the BIPS-image. However, the visibility of thin fractures depends strongly on the contrast between the fracture and the wall rock. A bright fracture in a dark rock is clearly visible in the BIPS-image. But a bright coloured fracture in a light coloured rock might, however, be clearly visible in the drill core but not visible in the BIPS-image, especially if the fracture and wall rock have the same colour. The opposite is true for dark fractures.

In very rare cases when the BIPS-image contrast between a very thin fracture and the wall rock is very strong the fracture might be visible in the BIPS-image even if it is not visible in the drill core.

BIPS-image quality is sometimes limited due to:

1) blackish coatings probably related to the drilling equipment,

2) vertical bleached bands from the clayey mixture of drill cuttings and water,

3) light and dark bands at high angle to the drill hole related to the automatic aperture of the video camera,
4) vertical enlargements of pixels due to stick-slip movement of the camera probe.

Vertical bleached bands and blackish coatings are usually the main disturbances in the BIPS-image quality.

The image quality is classified into four levels; good, acceptable, bad and very bad. With good quality it means a more or less clear image which is easy to interpret. If the quality is acceptable it means that the image is not good, but the mapping can be performed without any problems. An image of bad quality is somewhat difficult to interpret while an image of very bad quality cannot be interpreted except from very obvious and outstanding features. When the BIPS-image quality is so bad that fractures and structures cannot be identified they can still be oriented using the *guide-line method* (Section 4.3.3). The BIPS-image quality for the MDZ boreholes is presented in Table 3-2.

Table 3-2. BIPS-image quality.

Borehole	Interval (m)	Quality
KLX26A	4.00–52.00	Good
	52.00–99.97	Acceptable
KLX26B	4.00–23.80	Good
	23.80–50.07	Acceptable

4 Execution

4.1 General

Mapping of the drill core of the borehole was performed and documented according to activity plan AP PS 400-06-123 (SKB, internal document) referring to the *Method Description for Boremap mapping* (SKB MD 143.006, v. 2.0), *Nomenklatur vid Boremapkartering* (SKB MD 143.008, v. 1.0), *Instruktion: Regler för bergarters benämningar vid platsundersökningen i Oskarshamn* (SKB MD 132.004, v. 1.0) and *Instruktion för längdkalibrering vid undersökningar i kärnborrhål* (SKB MD 620.010, v. 2.0), all of them SKB internal documents.

The drill core was displayed on inclined roller tables and mapped in its entire length with the Boremap software. The core mapping was carried out without any detailed geological knowledge of the area but with access to geophysical logs from the borehole and rock samples.

The term *oxidation* has been used as an alteration type until the mapping of KLX05. However, research has shown that the red colour of the bedrock is actually not only a result of oxidation. Since April 2005 the term *red staining* is used instead of the term *oxidation.*

The mapping was performed by Karl-Johan Mattsson and Gunnar Rauséus (Geosigma AB) and Jan Ehrenborg (MIRAB)

4.2 Preparations

Any depth registered in the BIPS-image deviates from the true depth in the borehole, a deviation which increases with depth, about 0.5 m/100 m. This problem is usually eliminated by adjusting the depth of the BIPS-image to reference slots cut into the borehole walls every fiftieth meter, but the MDZ boreholes lack these reference marks.

Necessary data adjustment is borehole diameter, reference marks, length and deviation; both collected from SICADA database (Appendices 6–8). The Boremap software uses all the data extracted from SICADA database to calculate the true orientations of the different observations.

4.3 Execution of measurements

Concepts used during the core mapping, are defined in this chapter.

4.3.1 Fracture definitions

Definitions of different fracture types and aperture crush zones and sealed fracture network are found in *Nomenklatur vid Boremapkartering* (SKB MD 143.008, v. 1.0), SKB internal document. Apertures for broken fractures have been mapped in accordance with the definitions in MD 143.008 v. 1.0.

Two types of fractures are mapped in Boremap; broken and unbroken. Broken are fractures that split the core while unbroken fractures do not split the core. All fractures are described with their fracture minerals and other characteristics, e.g. width, aperture and roughness. Visible apertures are measured down to 1 mm in the BIPS-image. Smaller apertures, which are impossible to detect in the BIPS-image, are denoted a value of 0.5 mm. If the core pieces don't fit well, the aperture is considered "probable". If the core pieces do fit well, but the fracture surfaces are dull or altered, the aperture is considered "possible".

All fractures with apertures > 0 mm are treated as open in the SICADA database. Only few broken fractures are given the aperture = 0 mm. Unbroken fractures usually have apertures = 0 mm. Unbroken fractures that have apertures > 0 mm are interpreted as partly open and are included in the open-category. Open and sealed fractures are finally frequency calculated and shown in Appendix 1.

4.3.2 Fracture alteration and joint alteration number

Joint alteration number is principally related to the thickness of, and the clay content in a fracture. Thick fractures rich in clay minerals are given joint alteration numbers between 2 and 3. The majority of the broken fractures are very thin to extremely thin and seldom contain clay minerals. These fractures receive joint alteration numbers between 1 and 2.

A subdivision of fractures with joint alteration numbers between 1 and 2 was introduced to facilitate both the evaluation process for fracture alterations and the possibility to compare the alterations between different fractures in the boreholes. The subdivision is based on fracture mineralogy as follows:

a) fracture wall alterations,

b) fracture mineral fillings assumed to have been deposited from circulating water-rich solutions,

c) fracture mineral fillings most likely resulting from altered wall rock material.

Joint alteration number equal to 1: Fractures with or without wall rock alteration, e.g. oxidation or epidotization, and without mineral fillings is considered as fresh. The joint alteration number is thus set to 1.

Minerals such as calcite, quartz, fluorite, zeolites, laumontite and sulphides are regarded as deposited by circulating water-rich solutions and not as true fracture alteration minerals. The joint alteration number is thus set to 1.

Joint alteration number equal to 1.5: epidote, prehnite, hematite, chlorite and/or clay minerals are regarded as fracture minerals most likely resulting from altered wall rock. A weak alteration is thus assumed and the joint alteration number was set to 1.5. Extra considerations have been given to clay minerals since the occurrence of these minerals often resulted in a higher joint alteration number.

Joint alteration numbers higher than 1.5: When the mineral fillings is thick and contain a few mm of clay minerals, often together with epidote and chlorite, the joint alteration number is set to 2. In rare cases, when a fracture contains 5–10 mm thick clay, together with chlorite, the joint alteration number is set to 3.

When the alteration of a fracture is too thick (and/or intense) to give the fracture the joint alteration number 1.5 and too thin and/or weak to give it a 2, 1.7 and 1.8 is used.

4.3.3 Mapping of fractures not visible in the BIPS-image

Not all fractures are visible in the BIPS-images, and these fractures are orientated by using the *guide-line method*, based on the following data:

- Amplitude (measured along the drill core) which is the interval between fracture extremes along the drill core.
- The relation between the orientations of the fracture trace, measured on the drill core and a well defined structure visible in the BIPS-image.
- Absolute depth.

Orientation of fractures and other structures with the *guide-line method* is done in the following way: The first step is to calculate the amplitude of the fracture trace in the BIPS-image (with 76 mm diameter) from the measured fracture amplitude in the drill core (with 50 mm diameter). The second step is the correction of strike and dip. This is done by rotating the fracture trace in the BIPS-image relative to a feature with known orientation. The fracture trace is then put at the correct depth according to the depth measured on the drill core.

The *guide-line method* can be used to orientate any feature that is not visible in the BIPS-image. It is also a valuable tool to control that the personnel working with the drill core is observing the same feature as the personnel delineating the trace in the BIPS-image, especially in intervals rich in fractures.

The error of orientating fractures using the *guide-line method* is not known but experience and an estimation using stereographic plots indicated that the error is most likely insignificant. Accordingly, the *guide-line method* is so far considered better than mapping lots of non-oriented fractures. The fractures in question are mapped as "non-visible in BIPS" and can therefore be separated from fractures visible in BIPS which probably have a more accurate orientation.

4.3.4 Definition of veins and dikes

Rock occurrence is the way Boremap handles the occurrence of lithology up to 1 m wide. Chiefly two different rock occurrences are mapped: veins and dikes. These two are separated by their respectively length in the drill core; veins are set to 0–20 cm and dikes are set to 20–100 cm. Rock occurrences that covers more than 100 cm of the drill core are mapped under the feature *rock type.*

4.3.5 Mineral codes

In cases where properties and/or minerals are not represented in the mineral list, the following mineral codes have been used:

X2 gypsum

X5 bleached fracture walls

X7 broken fracture with a fresh appearance and no mineral fill

X8 fractures with epidotized/saussuritized walls

X9 weathered appearance

4.4 Data handling

Mapping of the drill core is performed on-line on the SKB network, in order to obtain the best possible data security. Before every break (>15 minutes) a back-up is saved on the local disk. As a regular quality check every working day a summary report (from Boremap) and a WellCad plot is printed in order to find possible misprints. The mapping is also quality checked by a routine in Boremap before it is exported to and archived in SICADA database. Personnel from SKB also perform spot test controls and regular quality revisions. All primary data is stored in SKB's database SICADA and only these data are later used for interpretation and modelling.

4.5 Geological summary table, general description

A geological summary table (Appendix 1a and 1b) is an overview of the features mapped with the Boremap software. It also facilitates comparisons between Boremap information collected from different boreholes and is more objective than a pure descriptive borehole summary. All information is taken directly from the Boremap database using simple and well defined search paths for each geological parameter (Appendix 2).

The geological summary table consists of 23 columns, each one representing a specific geological parameter, presented as either intervals or frequencies (see Section 4.5.1 for column description). Intervals are calculated for parameters with a width ≥ 1 m and frequencies for parameters with a width < 1 m. Frequency information is treated as point observations. It should be noted that parameters with a thickness of only 1 mm get the same "value" as a similar parameter with a thickness of 999 mm since both are treated as point observations and used for frequency calculations.

Parameters are sometimes related in such a way that the mapping of one parameter cause a decrease in the frequency of another parameter. This type of intimate relationship between parameters has been noted for the following cases;

- There is a decrease in the frequency of *unbroken fractures* with oxidised walls and without mineral fillings in intervals mapped with *Alteration – red staining.*
- No *unbroken fractures* are mapped in intervals of *sealed fracture network*.
- No *broken fractures* are mapped in intervals with *crush.*
- Hybrid rock and composite dikes generally include a large amount of fine to medium grained granite veins. These veins are not mapped and the frequency presented for veins + dikes in column 6 (Appendix 1a and 1b) are lower than the true frequency in composite dike intervals.

4.5.1 Columns in the geological summary table

The geological summary table includes the following 23 columns:

Column 1: *Rock type/Lithology*, interval column. Only lithologies longer than 1 m are presented here. Shorter lithologies are presented in column 6. This column is identical with the ordinary WellCad presentation.

Column 2: *Rock type/Grain size*, interval column. Interval limits follows column 1. This column is identical with the ordinary WellCad presentation.

Column 3: *Rock type/Texture*, interval column. Interval limits follows column 1. This column is identical with the ordinary WellCad presentation.

Column 4: *Alteration/Type*, interval column. No frequency column is presented for alteration/type. The alteration/type column are identical with the ordinary WellCad presentation.

Column 5: *Alteration/Intensity*, interval column. This column is identical with the ordinary WellCad presentation.

Column 6: *Rock occurrence/Veins + Dikes < 1 m wide*, frequency column. This rock type column can be seen as the frequency complement to the rock type/lithology interval column. Only rock type sections that are thinner than 1 m can be described as rock occurrences in Boremap. Thicker rock type sections are mapped as rock type.

Column 7: *Structure/Shear zone < 1 m wide*, frequency column. This column includes ductile shear structures as well as brittle-ductile shear structures and these are mapped as rock occurrences in Boremap. Ductile sections in mm – cm scale are mapped as shear structures and in dm – m scale as sections with foliation in column 12.

Column 8: *Structure/Brecciated < 1 m wide*, frequency column. Breccias < 1 m wide are mapped as rock occurrence in Boremap. Very thin micro breccias along sealed/natural fracture planes are generally not considered.

Column 9: *Structure/Brecciated ≥ 1 m wide*, interval column. Breccias > 1 m wide are mapped as rock type/structure in Boremap.

Column 10: *Structure/Mylonite < 1 m wide*, frequency column. Mylonites < 1 m wide are mapped as rock occurrence/structure in Boremap.

Column 11: *Structure/Mylonite ≥ 1 m wide* is an interval column. Mylonites > 1 m wide are mapped as rock type/structure in Boremap.

Column 12: *Structure/Foliated < 1 m wide* is a frequency column. Sections with foliation < 1 m wide are mapped as rock occurrence/structure in Boremap. Very thin sections with foliation are called ductile shear structures and presented in column 7.

Column 13: *Structure/Foliated ≥ 1 m wide* is an interval column. Sections with foliation ≥ 1 m wide are mapped as rock type/structure in Boremap.

Column 14: *Sealed fractures/All*, frequency column. This column includes all fractures mapped as unbroken in the Boremap system as well as unbroken fractures interpreted to have broken up artificially during/after drilling.

Column 15: *Sealed fractures/Broken fractures with aperture = 0*, frequency column. This column includes unbroken fractures interpreted to have broken up artificially during/after drilling.

Column 16: *Sealed fractures/Sealed fracture network < 1 m wide*, frequency column. The sealed fracture network parameter is the only parameter that is generally evaluated directly from observations of the drill core. These types of sealed fractures can only in rare cases be observed in the BIPS-image.

Column 17: *Sealed fractures/Sealed fracture network ≥ 1 m wide*, interval column.

Column 18: *Open fractures/All, aperture > 0*, frequency column. This column includes all broken fractures, both fractures that with certainty were open before drilling and fractures that probably or possibly were open before drilling.

Column 19: *Open fractures/Uncertain, aperture = 0.5 probable + 0.5 possible*, frequency column. This column includes fractures that probably or possibly open before drilling.

Column 20: *Open fractures/Certain, aperture = 0.5 and > 0.5*, frequency column. This column includes fractures that certainly were open before drilling.

Column 21: *Open fractures/Joint alteration > 1.5*, frequency column. This column show fractures with stronger joint alteration than normal. This parameter is generally correlated with the location of lithologies with a more weathered appearance.

Column 22: *Open fractures/Crush < 1 m wide*, frequency column. This column includes shorter sections with crush.

Column 23: *Open fractures/Crush ≥ 1 m wide*, interval column. This column includes longer sections with crush.

4.6 Nonconformities

The uppermost 4 m of the boreholes is not covered by a BIPS-image. These sections have not been mapped.

Due to the lack of reference marks in KLX26B, recorded length from the BIPS-logging was used.

Core loss, in KLX26A, was mapped in the interval 40.033–41.030 m.

Core loss, in KLX26B, was mapped in five intervals: 27.930–28.060 m, 28.420–28.650 m, 32.244–32.374 m, 36.242–36.322 and 44.143–44.303 m.

5 Results

5.1 General

All results from the mapping are principally found in the appendices. Information from the SICADA database is shown in the geological summary tables in Appendix 1 and as WellCad diagrams in Appendix 4. The BIPS-images are presented in Appendix 3 and 3b. The search paths to the geological summary table are presented in Appendix 2 and in-data, such as borehole length, reference marks, deviation data and borehole diameter are presented in Appendices 6–8.

The MDZ boreholes KLX26A and KLX26B vary between 50.37 m and 100.14 m in length (Table 5-1).

Original data from the reported activity are stored in the primary database SICADA. Data are traceable in SICADA by the Activity Plan number (AP PS 400-06-123). Only data in databases are accepted for further interpretation and modelling. The data presented in this report are regarded as copies of the original data. Data in the databases may be revised, if needed. Such revisions will not necessarily result in a revision of the P-report, although the normal procedure is that major revisions entail a revision of the P-report. Minor revisions are normally presented as supplements, available at *www.skb.se*.

5.2 Lithology and structures

The lithology (Table 5-2) in KLX26A, is in the interval 4.00 to 93.00 m dominated by diorite/gabbro (501033). This section is intersected by fine grained granite (511058) in the interval 23.00 to 46.00 m. The interval between 93.00 m and 101.00 m includes 2.00 to 4.00 m sections of quartz monzodiorite (501036), fine-grained diorite-gabbro (505102) and Ävrö granite (501044). The lithology in KLX26B is dominated by diorite/gabbro (501033), the diorite/gabbro is intersected by a fine-grained granite between 27.00 m and 44.00 m borehole length.

Six sections in KLX26A and two sections in KLX26B are recognized by anomalous fracture frequencies, alterations and structural features.

Table 5-1. Length of the MDZ drill cores.

Borehole	Length (m)
KLX26A	0–101.14
KLX26B	0–50.37

Table 5-2. Lithology in the MDZ boreholes.

Rock type	KLX26A (%)	KLX26B (%)
Diorite/gabbro (501033)	68.3	62.7
Fine-grained granite (511058)	19.6	37.3
Ävrö granite (501044)	5.5	
Quartz monzodiorite (501036)	4.3	
Fine-grained diorite-gabbro (505102)	2.3	

Section interval characteristics

KLX26A

1. 5–7 m. Increased frequency of open fractures and open fractures with an aperture > 0.5 mm, sealed fracture networks, crush zone and saussuritization occurs within this section.
2. 16–20 m. Increased frequency of open fractures and open fractures with an aperture > 0.5 mm, sealed fracture networks, breccia and brittle-ductile shear zone occurs within this section.
3. 37–56 m. Increased frequency of open fractures, sealed fracture networks, crush zone, core loss, brecciation, brittle-ductile and ductile shear zones, foliation, epidotization and red staining and occurs within this section. This interval also includes an intrusion of fine-grained granite (511058).
4. 58–66 m. Increased frequency of open fractures, sealed fracture networks, brittle-ductile and ductile shear zones, foliation and red staining and occurs within this section.
5. 73–77 m. Increased frequency of open fractures, sealed fracture networks, crush zone, brecciation, brittle-ductile and ductile shear zones, foliation, and epidotization occurs within this section.
6. 96–100 m. Increased frequency of open fractures, sealed fracture networks, crush zone, brittle-ductile and ductile shear zones occurs within this section. This interval also includes an intrusion of fine-grained diorite-gabbro (505102).

KLX26B

1. 4–9 m. Increased frequency of open fractures with an aperture > 0.5 mm, sealed fractures and brittle-ductile shear zones occurs within this section.
2. 37–56 m. Increased frequency of open fractures and open fractures with an aperture > 0.5 mm, sealed fracture networks, core loss, brittle-ductile and ductile shear zones and foliation occurs within this section. This interval also includes an intrusion of fine-grained granite (511058).

5.3 Fracture mineralogy

Tables 5-3 and 5-4 show the frequency of minerals and rock wall alteration in sealed fractures and open fractures respectively. For X-mineral classification, see Section 4.3.5.

The most frequently occurring minerals in sealed fractures are for KXL26A, epidote, calcite and chlorite. Subordinated rock wall alterations and minerals are oxidized walls, pyrite, quartz and adularia. KLX26B is dominated by calcite and subordinated minerals are chlorite, quartz, epidote and hematite.

In KLX26A and KLX26B calcite and chlorite are the most frequently occurring minerals in open fractures, followed by pyrite, clay minerals, epidote and hematite. Interesting to mention is the occurrence of gypsum (X2) in KLX26A.

Table 5-3. Frequency of minerals and rock wall alteration in open fractures.

Mineral	KLX26A (%)	KLX26B (%)
Adularia	5.1	5.9
Calcite	85.9	87.9
Chlorite	76.9	66.5
Clay Minerals	39.5	10.9
Epidote	21.5	8.4
Flourite	–	0.8
Hematite	8.3	16.7
Iron Hydroxide	0.9	–
Oxidized Walls	5.1	0.4
Prehnite	0.5	0.4
Pyrite	36.0	22.2
Quartz	2.8	1.3
Red Feldspar	0.5	–
Sphalerite	0.2	–
Unknown Mineral	0.5	–
White Feldspar	0.7	–
Zeolite	0.5	–
X2	0.2	–
X5	0.5	–
X7	1.2	4.6
X8	0.7	1.3
X9	0.5	0.8

Table 5-4. Frequency of minerals and rock wall alteration in sealed fractures.

Mineral	KLX26A (%)	KLX26B (%)
Adularia	7.7	0.9
Calcite	46.3	78.3
Chlorite	41.3	34.9
Clay Minerals	0.3	–
Epidote	50.3	18.9
Hematite	2.4	12.3
Laumontite	–	1.9
Oxidized Walls	15.3	6.6
Prehnite	0.5	2.8
Pyrite	12.7	7.5
Quartz	11.1	24.5
Red Feldspar	0.8	0.9
Sphalerite	0.3	–
Unknown mineral	0.3	–
White Feldspar	2.6	0.9
X5	4.8	0.9
X7	0.8	0.9
X8	1.3	2.8
X9	0.3	–

Geological summary table KLX26A

GEOLOGICAL SUMMARY KLX26A — **APPENDIX: 1a**

Site	LAXEMAR
Borehole	KLX26A
Coordinate System	RT90-RHB70
Date of mapping	2006-09-05 18:33:00

Signed data

ROCKTYPE SIMPEVARP: Fine-grained granite; Ävrö granite; Quartz monzodiorite; Diorite / Gabbro; Fine-grained diorite-gabbro

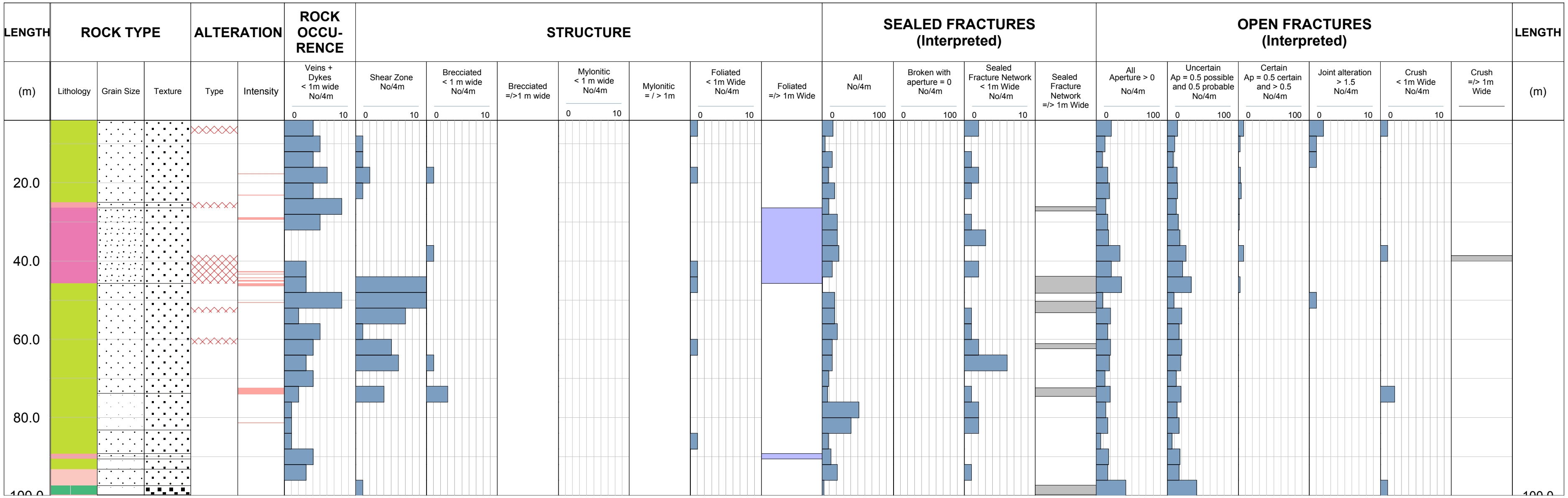
GRAINSIZE: Fine-grained; Fine to medium grained; Medium-grained

TEXTURE: Porphyritic; Equigranular

ALTERATION TYPE: Oxidized

ALTRATION INTENSITY: Weak; Medium

STRUCTURE INTENSITY: Weak



Geological summary table KLX26B

GEOLOGICAL SUMMARY KLX26B — **APPENDIX: 1b**

SKB

Site	LAXEMAR	**Signed data**
Borehole	KLX26B	
Coordinate System	RT90-RHB70	
Date of mapping	2006-09-13 09:19:00	

ROCKTYPE SIMPEVARP
- Fine-grained granite
- Diorite / Gabbro

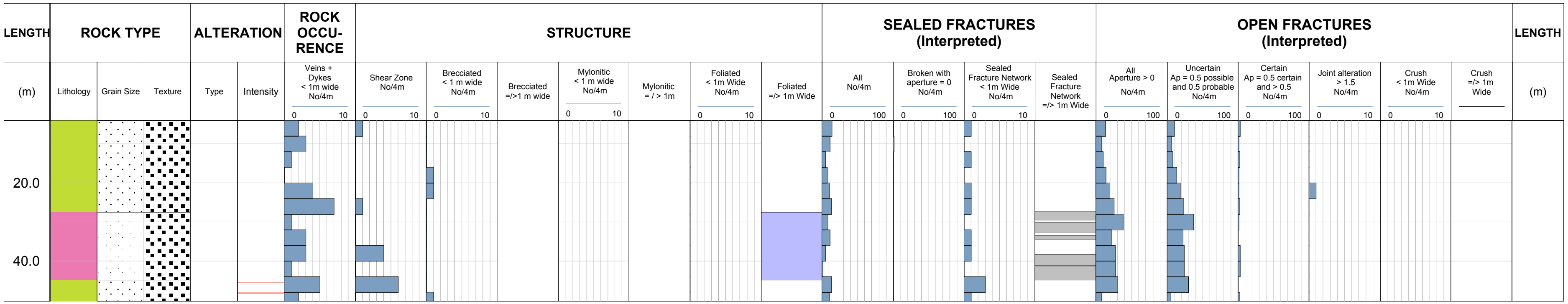
GRAINSIZE
- Fine-grained
- Medium-grained

TEXTURE
- Equigranular

ALTERATION TYPE

ALTRATION INTENSITY
- Weak

STRUCTURE INTENSITY
- Weak



Appendix 2

Search paths for the geological summary table

TABLE HEAD LINES		INFORMATION SOURCE			PRESENTATION
Head lines	**Sub head lines**	**Varcode**	**First suborder**	**Second suborder**	**Interval / frequence**
Rock type	Lithology	5	Sub 1		Interval
	Grain size	5	Sub 5		Interval
	Texture	5	Sub 6		Interval
Alteration	Type	7	Sub 1 = 700		Interval
	Intensity	7	Sub 1 = 700	Sub 2	Interval
Rock occurrence	Vein + dyke	31	Sub 1 = 2 and 18		Frequence
Structure	Shear zone, < 1m wide	31	Sub 4 = 41 and 42		Frequence
	Brecciated, < 1m wide	31	Sub 4 = 7		Frequence
	Brecciated, >/= 1m wide	5 5	Sub 3 = 7 Sub 3 = 7	Sub 4; 101 and 102 = 102 Sub 4; 103 and 104 = 104	Interval
	Mylonite, < 1 m wide	31	Sub 4 = 34		Frequence
	Mylonite, >/= 1 m wide	5 5	Sub 3 = 34 Sub 3 = 34	Sub 4; 101 and 102 = 102 Sub 4; 103 and 104 = 104	Interval
	Foliated, < 1 m wide	31	Sub 4 = 81		Frequence
	Foliated, >/= 1 m wide	5 5	Sub 3 = 81 Sub 3 = 81	Sub 4; 101 and 102 = 102 Sub 4; 103 and 104 = 104	Interval
Sealed fracture	All unbroken fractures and broken fractures	3 2	 SNUM 11= 0		Frequence
	Broken fractures, Aperture = 0	2	SNum 11 = 0		Frequence
	Sealed fracture network < 1 m wide	32			Frequence
	Sealed fracture network>/= 1 m wide	32			Interval
Open fractures	All, Aperture > 0	2 and 3	SNum 11>0		Frequence
	Uncertain, Aperture = 0.5 possible and 0.5 probable	2 and 3 2 and 3	SNum 11>0 SNum 11>0	Sub 12 = 3 Sub 12 = 2	Frequence
	Certain, Aperture = 0.5 and >0.5	2 and 3	SNum 11>0	Sub 12 = 1	Frequence
	Joint alteration > 1.5	2	SNum16 > 1.5		Frequence
	Crush < 1 m wide	4			Frequence
	Crush >/= 1 m wide	4			Interval

Appendix 3a

BIPS-image of KLX26A

Borehole Image Report

Borehole Name:	KLX26A
Mapping Name:	KLX26A_JE_GR_1
Mapping Range:	4.000 - 102.000 m
Diameter:	76.0 mm
Printed Range:	4.000 - 99.872
Pages:	6

Image File Information:

File:	G:\skb\bips\oskarshamn\KLX26A\KLX26A.BIP
Date/Time:	2006-09-11 13:15:00
Start Depth:	4.000 m
End Depth:	99.872 m
Resolution:	1.00 mm/pixel (depth)
Orientation:	Gravmetric
Image height:	95872 pixels
Image width:	360 pixels
BIP Version:	BIP-III
Locality:	LAXEMAR
Borehole:	KLX26A
Scan Direction:	Down
Color adjust:	0 0 0 (RGB)

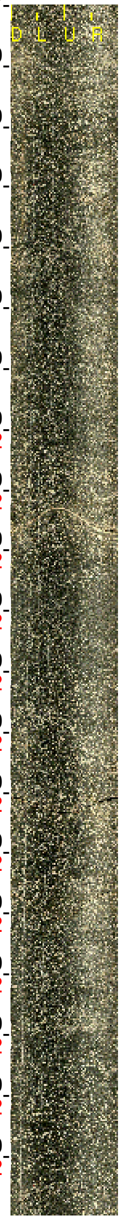
Printed: 2006-10-03 15:31:47 Scale: 1 : 20 Aspect: 150 % 1 (6)

Borehole: KLX26A
Mapping: KLX26A_JE_GR_1

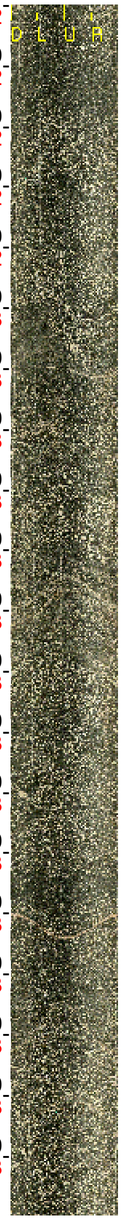
Depth range: 4.000 - 24.000 m
Azimuth: 0.0
Inclination: -90.0

4.000 4.000
4.200 4.200
4.400 4.400
4.600 4.600
4.800 4.800
5.000 5.000
5.200 5.200
5.400 5.400
5.600 5.600
5.800 5.801
6.000 6.001
6.200 6.201
6.400 6.401
6.600 6.601
6.800 6.801
7.000 7.001
7.200 7.201
7.400 7.401
7.600 7.601
7.800 7.801

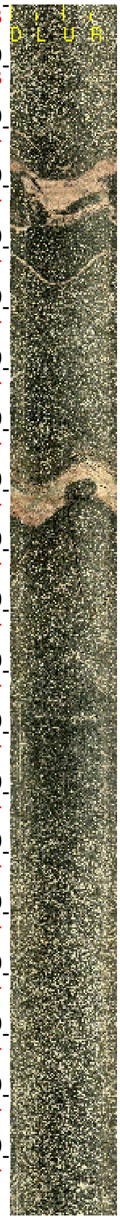
8.000 8.001
8.200 8.201
8.400 8.401
8.600 8.601
8.800 8.801
9.000 9.001
9.200 9.201
9.400 9.402
9.600 9.602
9.800 9.802
10.000 10.002
10.200 10.202
10.400 10.402
10.600 10.602
10.800 10.802
11.000 11.002
11.200 11.202
11.400 11.402
11.600 11.602
11.800 11.802



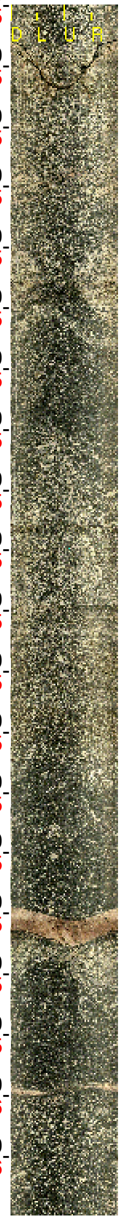
12.000 12.002
12.200 12.202
12.400 12.402
12.600 12.602
12.800 12.802
13.000 13.003
13.200 13.203
13.400 13.403
13.600 13.603
13.800 13.803
14.000 14.003
14.200 14.203
14.400 14.403
14.600 14.603
14.800 14.803
15.000 15.003
15.200 15.203
15.400 15.403
15.600 15.603
15.800 15.803



16.000 16.003
16.200 16.203
16.400 16.404
16.600 16.604
16.800 16.804
17.000 17.004
17.200 17.204
17.400 17.404
17.600 17.604
17.800 17.804
18.000 18.004
18.200 18.204
18.400 18.404
18.600 18.604
18.800 18.804
19.000 19.004
19.200 19.204
19.400 19.404
19.600 19.604
19.800 19.804



20.000 20.005
20.200 20.205
20.400 20.405
20.600 20.605
20.800 20.805
21.000 21.005
21.200 21.205
21.400 21.405
21.600 21.605
21.800 21.805
22.000 22.005
22.200 22.205
22.400 22.405
22.600 22.605
22.800 22.805
23.000 23.005
23.200 23.205
23.400 23.405
23.600 23.606
23.800 23.806



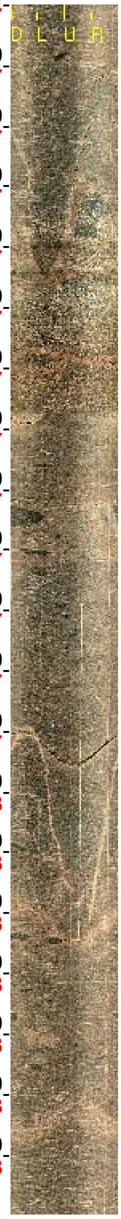
Printed: 2006-10-03 15:31:47 Scale: 1 : 20 Aspect: 150 % 2 (6)

Borehole: KLX26A
Mapping: KLX26A_JE_GR_1

Depth range: 24.000 - 44.000 m
Azimuth: 0.0
Inclination: -90.0

24.000
24.006
24.200
24.206
24.400
24.406
24.600
24.606
24.800
24.806
25.000
25.006
25.200
25.206
25.400
25.406
25.600
25.606
25.800
25.806
26.000
26.006
26.200
26.206
26.400
26.406
26.600
26.606
26.800
26.806
27.000
27.007
27.200
27.207
27.400
27.407
27.600
27.607
27.800
27.807

28.000
28.007
28.200
28.207
28.400
28.407
28.600
28.607
28.800
28.807
29.000
29.007
29.200
29.207
29.400
29.407
29.600
29.607
29.800
29.807
30.000
30.007
30.200
30.207
30.400
30.407
30.600
30.608
30.800
30.808
31.000
31.008
31.200
31.208
31.400
31.408
31.600
31.608
31.800
31.808



32.000
32.008
32.200
32.208
32.400
32.408
32.600
32.608
32.800
32.808
33.000
33.008
33.200
33.208
33.400
33.408
33.600
33.608
33.800
33.808
34.000
34.008
34.200
34.209
34.400
34.409
34.600
34.609
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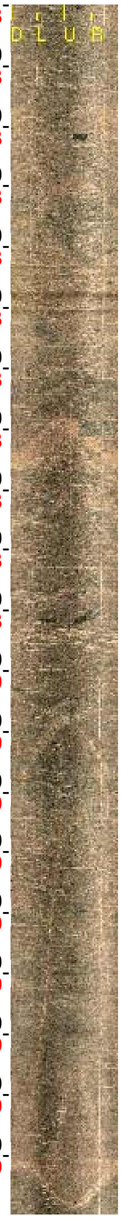
35.609
35.800
35.809



36.000
36.009
36.200
36.209
36.400
36.409
36.600
36.609
36.800
36.809
37.000
37.009
37.200
37.209
37.400
37.409
37.600
37.609
37.800
37.810
38.000
38.010
38.200
38.210
38.400
38.410
38.600
38.610
38.800
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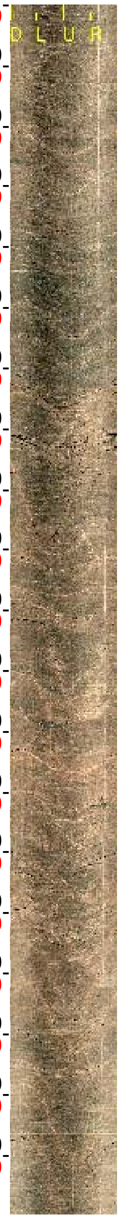
39.600
39.610
39.800
39.810



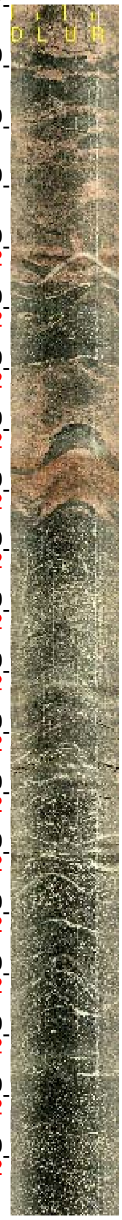
40.000
40.010
40.200
40.210
40.400
40.410
40.600
40.610
40.800
40.810
41.000
41.010
41.200
41.211
41.400
41.411
41.600
41.611
41.800
41.811
42.000
42.011
42.200
42.211
42.400
42.411
42.600
42.611
42.800
42.811
43.000
43.011
43.200
43.211
43.400
43.411
43.600
43.611
43.800
43.811

Printed: 2006-10-03 15:31:47 Scale: 1 : 20 Aspect: 150 % 3 (6)

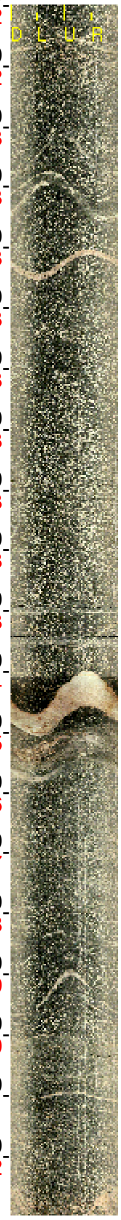
Borehole: KLX26A
Mapping: KLX26A_JE_GR_1

Depth range: 44.000 - 64.000 m
Azimuth: 0.0
Inclination: -90.0

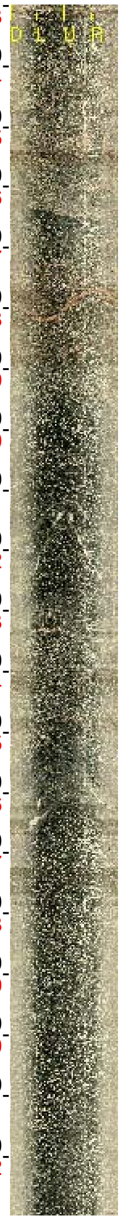
44.000 44.011
44.200 44.211
44.400 44.411
44.600 44.611
44.800 44.812
45.000 45.012
45.200 45.212
45.400 45.412
45.600 45.612
45.800 45.812
46.000 46.012
46.200 46.212
46.400 46.412
46.600 46.612
46.800 46.812
47.000 47.012
47.200 47.212
47.400 47.412
47.600 47.612
47.800 47.812



48.000 48.012
48.200 48.212
48.400 48.413
48.600 48.613
48.800 48.813
49.000 49.013
49.200 49.213
49.400 49.413
49.600 49.613
49.800 49.813
50.000 50.013
50.200 50.214
50.400 50.415
50.600 50.616
50.800 50.817
51.000 51.018
51.200 51.219
51.400 51.420
51.600 51.621
51.800 51.822



52.000 52.023
52.200 52.224
52.400 52.425
52.600 52.626
52.800 52.827
53.000 53.028
53.200 53.229
53.400 53.430
53.600 53.631
53.800 53.832
54.000 54.033
54.200 54.234
54.400 54.435
54.600 54.636
54.800 54.837
55.000 55.038
55.200 55.239
55.400 55.440
55.600 55.641
55.800 55.842



56.000 56.043
56.200 56.244
56.400 56.445
56.600 56.646
56.800 56.847
57.000 57.048
57.200 57.249
57.400 57.450
57.600 57.651
57.800 57.852
58.000 58.053
58.200 58.254
58.400 58.455
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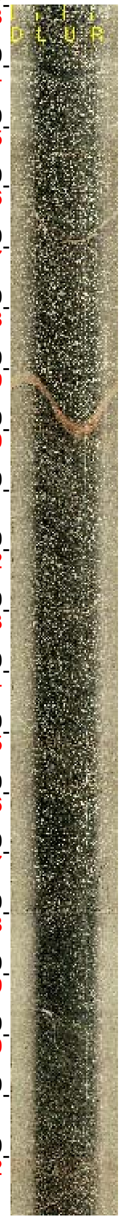
59.600 59.661
59.800 59.862



60.000 60.063
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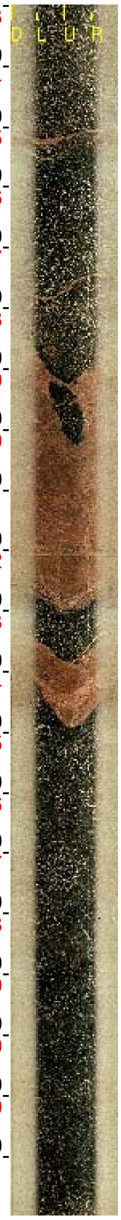
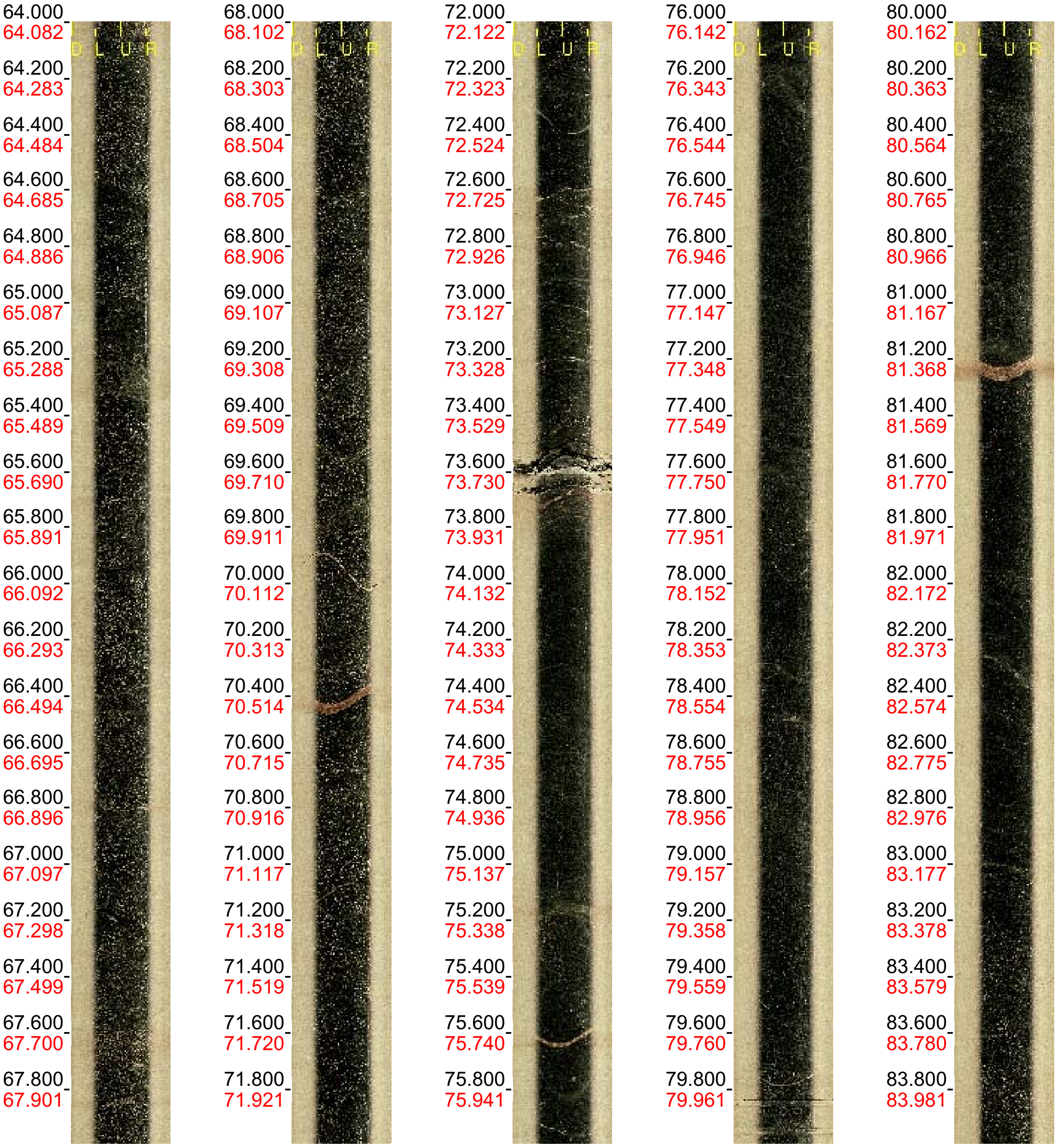
60.600 60.666
60.800 60.867
61.000 61.068
61.200 61.269
61.400 61.470
61.600 61.671
61.800 61.872
62.000 62.073
62.200 62.274
62.400 62.475
62.600 62.676
62.800 62.877
63.000 63.078
63.200 63.279
63.400 63.480
63.600 63.680
63.800 63.881



Printed: 2006-10-03 15:31:47 Scale: 1 : 20 Aspect: 150 % 4 (6)

Borehole: KLX26A
Mapping: KLX26A_JE_GR_1

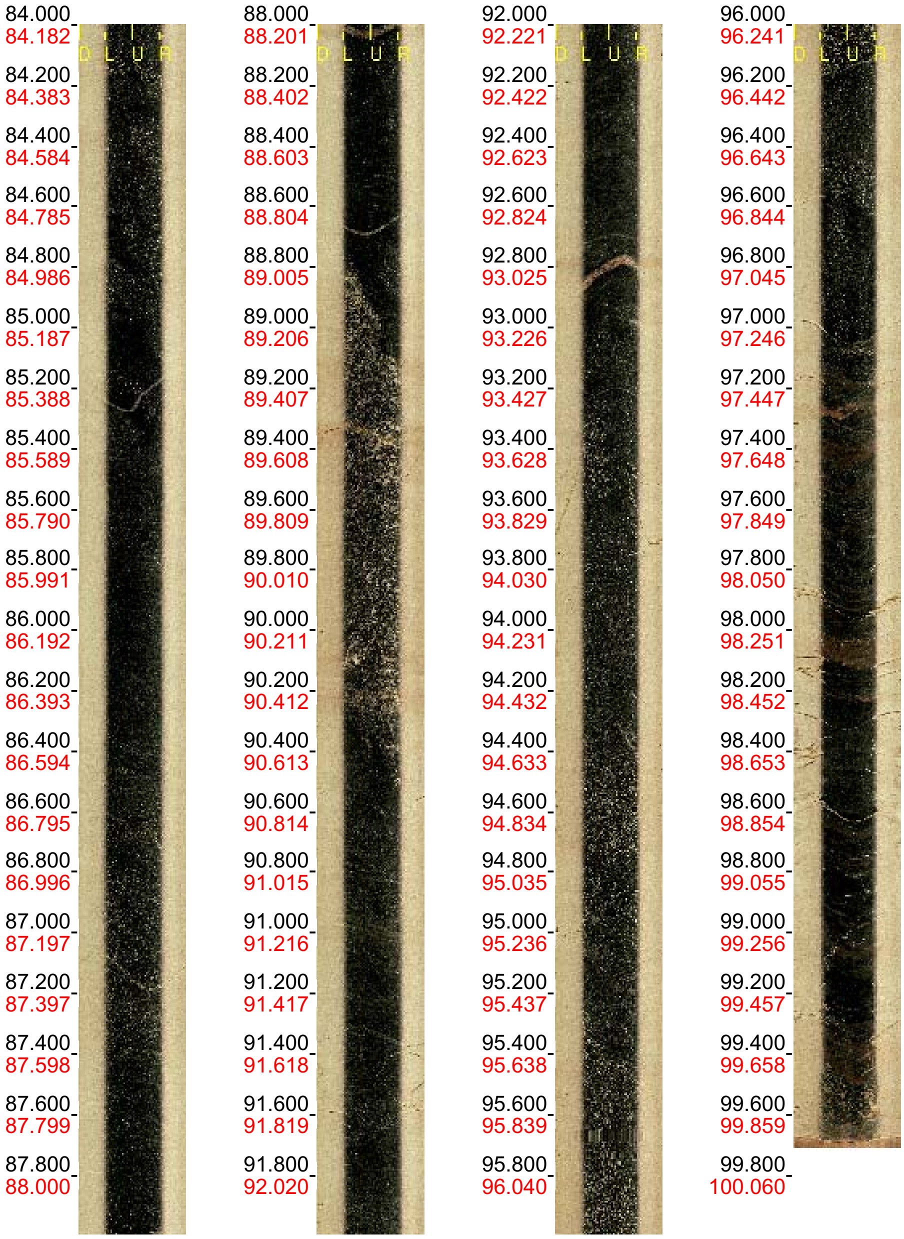
Depth range: 64.000 - 84.000 m
Azimuth: 0.0
Inclination: -90.0



Printed: 2006-10-03 15:31:47   Scale: 1 : 20   Aspect: 150 %   5 (6)

Borehole: KLX26A
Mapping: KLX26A_JE_GR_1

Depth range: 84.000 - 99.872 m
Azimuth: 0.0
Inclination: -90.0



Printed: 2006-10-03 15:31:47   Scale: 1 : 20   Aspect: 150 %   6 (6)

Appendix 3b

BIPS-image of KLX26B

Borehole Image Report

Borehole Name:	KLX26B
Mapping Name:	KLX26B_KJM
Mapping Range:	4.001 - 50.370 m
Diameter:	76.0 mm
Printed Range:	4.000 - 50.208
Pages:	4

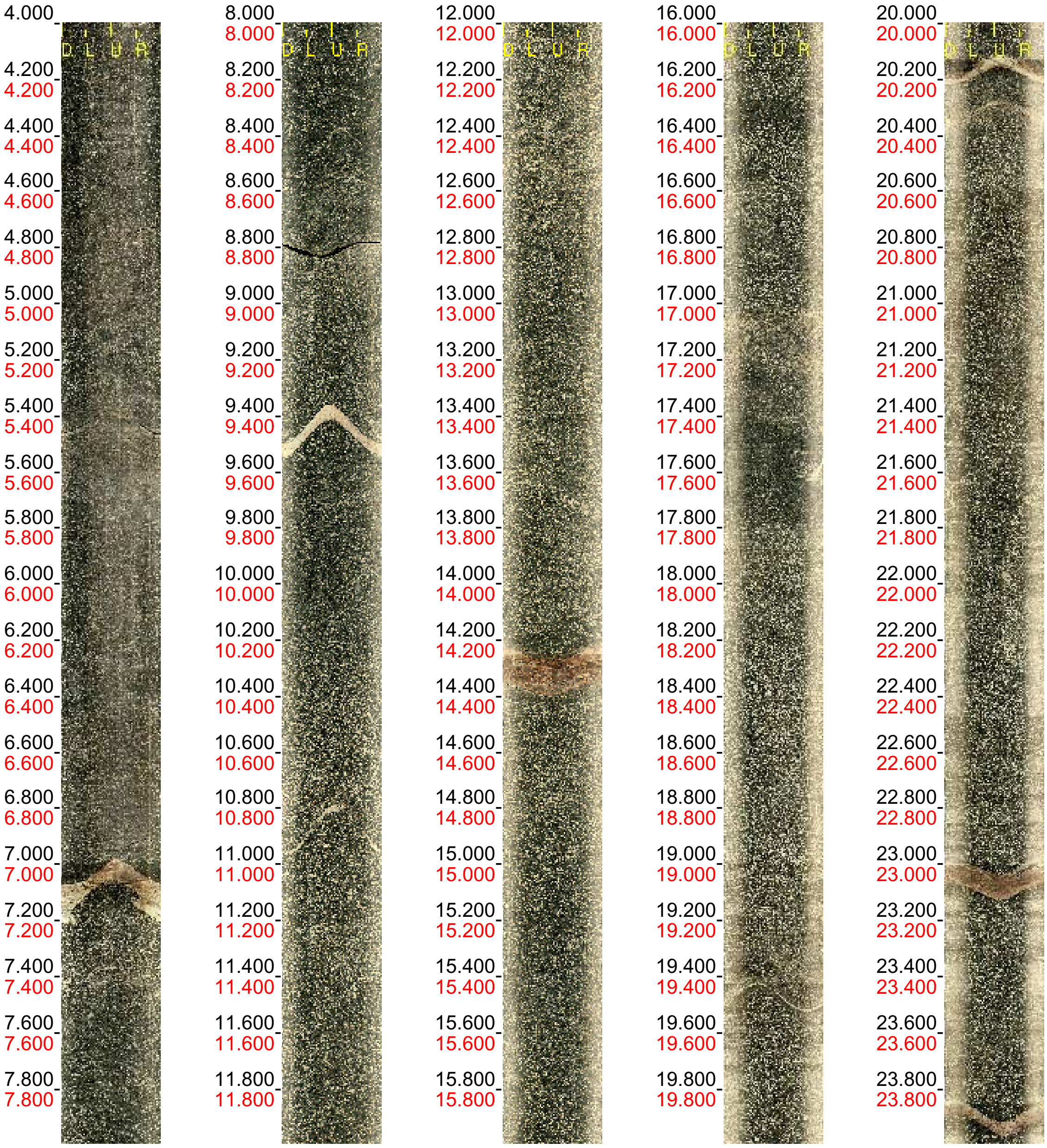
Image File Information:

File:	D:\BIPS_Images\KLX26B\KLX26B.BIP
Date/Time:	2006-09-11 14:43:00
Start Depth:	4.000 m
End Depth:	50.208 m
Resolution:	1.00 mm/pixel (depth)
Orientation:	Gravmetric
Image height:	46208 pixels
Image width:	360 pixels
BIP Version:	BIP-III
Locality:	LAXEMAR
Borehole:	KLX26B
Scan Direction:	Down
Color adjust:	0 0 0 (RGB)

Printed: 2006-10-03 16:15:32 Scale: 1 : 20 Aspect: 150 % 1 (4)

Borehole: KLX26B
Mapping: KLX26B_KJM

Depth range: 4.000 - 24.000 m
Azimuth: 137.4
Inclination: -60.0



Printed: 2006-10-03 16:15:32 Scale: 1 : 20 Aspect: 150 % 2 (4)

Borehole: KLX26B
Mapping: KLX26B_KJM

Depth range: 24.000 - 44.000 m
Azimuth: 137.4
Inclination: -60.0

Printed: 2006-10-03 16:15:32 Scale: 1 : 20 Aspect: 150 % 3 (4)

Borehole: KLX26B
Mapping: KLX26B_KJM

Depth range: 44.000 - 50.208 m
Azimuth: 137.4
Inclination: -60.0

44.000
44.000
44.200
44.200
44.400
44.400
44.600
44.600
44.800
44.800
45.000
45.000
45.200
45.200
45.400
45.400
45.600
45.600
45.800
45.800
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47.600
47.600
47.800
47.800

48.000
48.000
48.200
48.200
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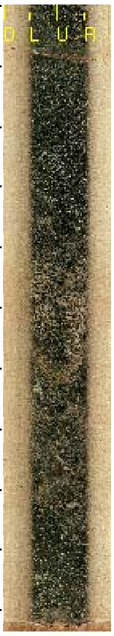
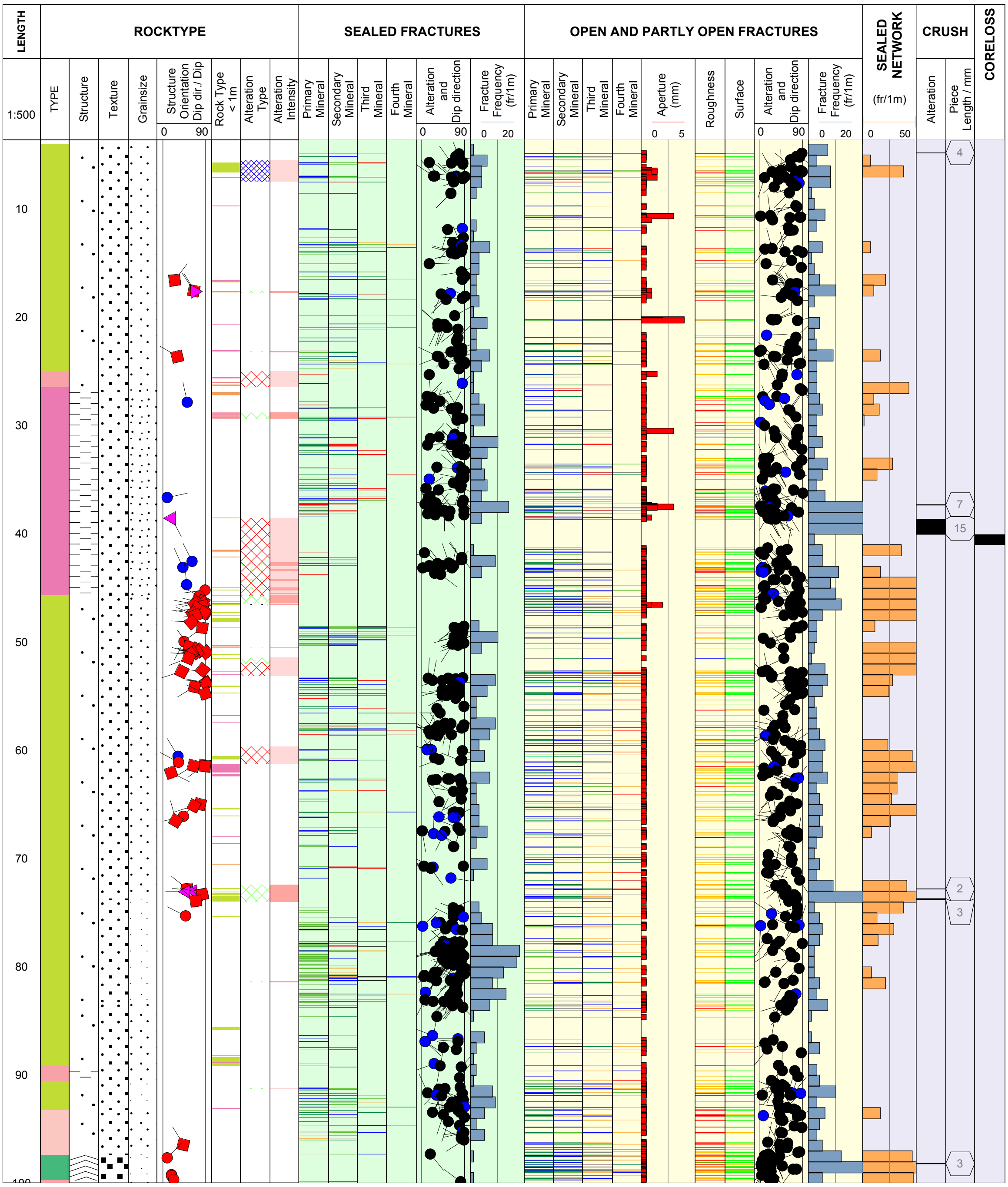
51.400
51.600
51.800



Printed: 2006-10-03 16:15:32 Scale: 1 : 20 Aspect: 150 % 4 (4)

WellCad diagram of KLX26A

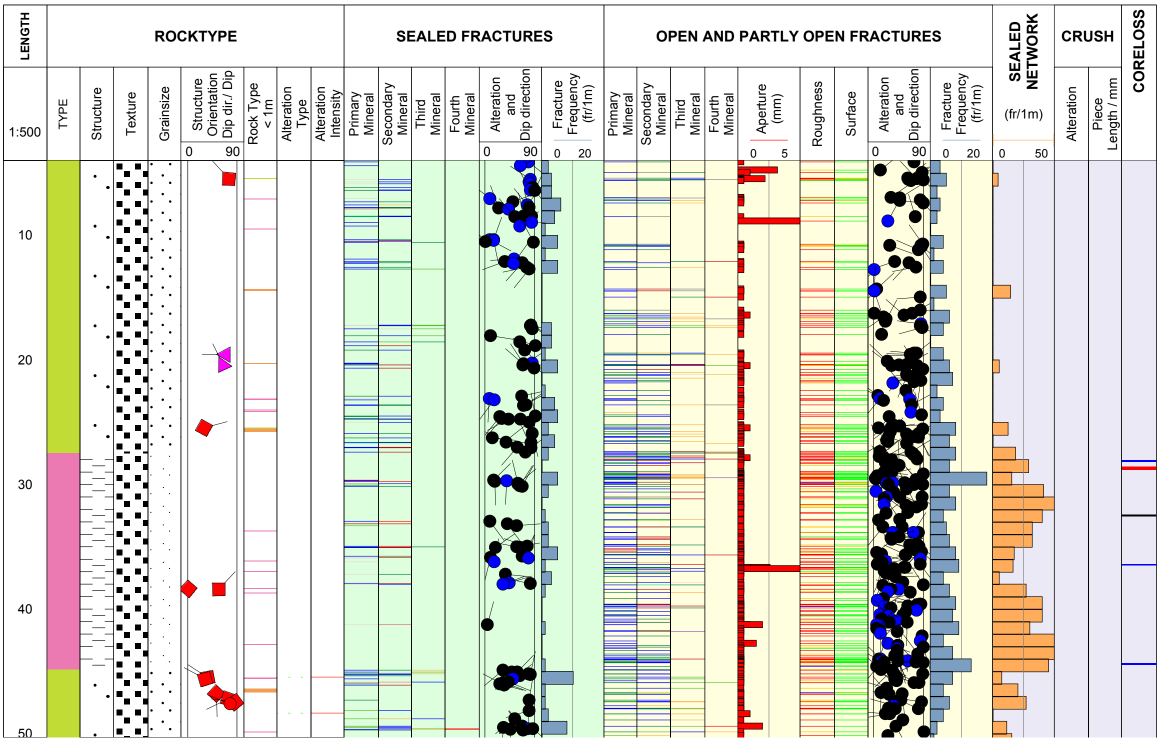
Title	GEOLOGY IN KLX26A		Appendix:
Site	LAXEMAR	Coordinate System	RT90-RHB70
Borehole	KLX26A	Northing [m]	6365546.49
Diameter [mm]	76	Easting [m]	1549029.90
Length [m]	101.140	Elevation [m.a.s.l.]	15.63
Bearing [°]	93.47	Drilling Start Date	2006-08-03 06:00:00
Inclination [°]	-60.44	Drilling Stop Date	2006-08-11 11:00:00
Date of coremapping	2006-09-05 18:33:00	Plot Date	2007-10-25 22:03:45
Rocktype data from	p_rock	Signed data	



Appendix 4b

WellCad diagram of KLX26B

Title	GEOLOGY IN KLX26B		Appendix:
Site	LAXEMAR	Coordinate System	RT90-RHB70
Borehole	KLX26B	Northing [m]	6365550.66
Diameter [mm]	76	Easting [m]	1549025.61
Length [m]	50.370	Elevation [m.a.s.l.]	15.82
Bearing [°]	137.42	Drilling Start Date	2006-08-12 09:00:00
Inclination [°]	-60.00	Drilling Stop Date	2006-08-17 07:15:00
Date of coremapping	2006-09-13 09:19:00	Plot Date	2007-10-25 22:03:45
Rocktype data from	p_rock	Signed data	



Appendix 5

Legend to WellCad diagram

Title LEGEND FOR LAXEMAR **Appendix: 5**

SKB

Site	LAXEMAR
Borehole	
Plot Date	2006-09-24 21:10:11
Signed data	

ROCKTYPE LAXEMAR

- Äspö Diorite
- Dolerite / Diabas
- Fine-grained Götemargranite
- Coarse-grained Götemargranite
- Fine-grained granite
- Pegmatite
- Granite
- Ävrö granite
- Quartz monzodiorite
- Diorite / Gabbro
- Fine-grained dioritoid
- Fine-grained diorite-gabbro
- Sulphide mineralization
- Sandstone
- Soil

ROCK ALTERATION

- Oxidized
- Chloritisized
- Epidotisized
- Weathered
- Tectonized
- Sericitisized
- Quartz dissolution
- Silicification
- Argillization
- Albitization
- Carbonatization
- Saussuritization
- Steatitization
- Uralitization
- Laumontitization
- Fract zone alteration

MINERAL

- Biotite
- Epidote
- Flourite
- White Feldspar
- Hematite
- Calcite
- Chlorite
- Chalcopyrite
- Quartz
- Red Feldspar
- Muscovite
- Unknown
- Pyrite
- Clay Minerals
- Laumontite
- Prehnite
- Oxidized Walls

STRUCTURE

- Cataclastic
- Schistose
- Gneissic
- Mylonitic
- Ductile Shear Zone
- Brittle-Ductile Zone
- Veined
- Banded
- Massive
- Foliated
- Brecciated
- Lineated

TEXTURE

- Hornfelsed
- Porphyritic
- Ophitic
- Equigranular
- Augen-Bearing
- Unequigranular
- Metamorphic

GRAINSIZE

- Aphanitic
- Fine-grained
- Fine to medium grained
- Medium to coarse grained
- Coarse-grained
- Medium-grained

STRUCTURE ORIENTATION

- Cataclastic
- Bedded
- Gneissic
- Schistose
- Brittle-Ductile Shear Zone
- Ductile Shear Zone
- Lineated
- Banded
- Veined
- Brecciated
- Foliated
- Mylonitic

ROCK ALTERATION INTENSITY

- No intensity
- Faint
- Weak
- Medium
- Strong

ROUGHNESS

- Planar
- Undulating
- Stepped
- Irregular

SURFACE

- Rough
- Smooth
- Slickensided

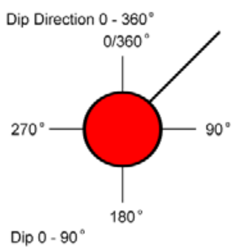
CRUSH ALTERATION

- Slightly Altered
- Moderately Altered
- Highly Altered
- Completley Altered
- Gouge
- Fresh

FRACTURE ALTERATION

- Slightly Altered
- Moderately Altered
- Highly Altered
- Completely Altered
- Gouge
- Fresh

FRACTURE DIRECTION
STRUKTURE ORIENTATION



Appendix 6a

In-data: Borehole length and diameter for KLX26A

Hole diam T – Drilling: Borehole diameter

KLX26A, 2006-08-08 06:00:00 – 2006-08-11 11:00:00

Sub secup (m)	Sub seclow (m)	Hole diam (m)	Comment
0.300	2.640	0.0960	
2.640	101.140	0.0758	

Printout from SICADA 2006-10-03 15:28:15.

In-data: Borehole length and diameter for KLX26B

Hole diam T – Drilling: Borehole diameter

KLX26B, 2006-08-12 00:00:00

Sub secup (m)	Sub seclow (m)	Hole diam (m)	Comment
0.300	2.310	0.0960	
2.310	50.370	0.0758	

Printout from SICADA 2006-10-10 08:31:30.

In-data: Reference marks for length adjustments for KLX26A

Reference mark T – Reference mark in drillhole

KLX26A, 2006-08-18 09:00:00 – 2006-08-18 12:20:00 (50.00–80.00 m)

Bhlen (m)	Rotation speed (rpm)	Start flow (l/h)	Stop flow (l/h)	Stop pressure (bar)	Cutter time (s)	Trace detectable	Cutter diameter (mm)	Comment
50.00	400.00	350	1,000	44.0	44			
80.00	400.00	350	1,000	46.0	38			

Printout from SICADA 2006-10-03 15:14:04.

Appendix 8a

In-data: Borehole deviation data for KLX26A

Deviations protocol – KLX26A

SICADA – object_location

Idcode	Coord system	Northing (m)	Easting (m)	Elevation (m.a.s.l.)	Length (m)	Vertical depth (m)	Inclination (degrees)	Bearing (degrees)	Inclination uncert (degrees)	Bearing uncert (degrees)	Radius uncert (m)	Origin	Indat
KLX26A	RT90-RHB70	6365546.49	1549029.90	15.63	0.00	0.00	–60.45	93.47	0.050	0.907	0.00	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365546.40	1549031.37	13.02	3.00	2.61	–60.45	93.47	0.050	0.907	0.02	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365546.31	1549032.85	10.41	6.00	5.22	–60.45	93.48	0.050	0.907	0.05	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365546.22	1549034.33	7.80	9.00	7.83	–60.45	93.50	0.050	0.907	0.07	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365546.13	1549035.80	5.19	12.00	10.44	–60.45	93.52	0.050	0.907	0.09	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365546.04	1549037.28	2.58	15.00	13.05	–60.45	93.54	0.050	0.907	0.12	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365545.95	1549038.76	–0.03	18.00	15.66	–60.40	93.54	0.050	0.907	0.14	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365545.86	1549040.24	–2.64	21.00	18.27	–60.31	93.57	0.050	0.907	0.16	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365545.75	1549041.72	–5.24	24.00	20.87	–60.26	94.50	0.050	0.907	0.19	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365545.64	1549043.21	–7.85	27.00	23.48	–60.22	94.52	0.050	0.907	0.21	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365545.52	1549044.69	–10.45	30.00	26.08	–60.19	94.25	0.050	0.907	0.23	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365545.42	1549046.18	–13.05	33.00	28.68	–60.17	93.81	0.050	0.907	0.26	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365545.32	1549047.67	–15.65	36.00	31.28	–60.15	93.67	0.050	0.907	0.28	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365545.22	1549049.16	–18.26	39.00	33.88	–60.11	93.86	0.050	0.907	0.31	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365545.11	1549050.66	–20.85	42.00	36.48	–59.95	94.78	0.050	0.907	0.33	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365544.98	1549052.15	–23.45	45.00	39.08	–59.90	95.30	0.050	0.907	0.35	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365544.83	1549053.65	–26.05	48.00	41.68	–59.86	96.01	0.050	0.907	0.38	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365544.67	1549055.15	–28.64	51.00	44.27	–59.78	96.03	0.050	0.907	0.40	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365544.51	1549056.65	–31.23	54.00	46.86	–59.76	96.03	0.050	0.907	0.43	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365544.35	1549058.16	–33.82	57.00	49.45	–59.68	96.10	0.050	0.907	0.45	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365544.19	1549059.67	–36.41	60.00	52.04	–59.61	96.34	0.050	0.907	0.47	Measured	2007-02-06 08:38

Idcode	Coord system	Northing (m)	Easting (m)	Elevation (m.a.s.l.)	Length (m)	Vertical depth (m)	Inclination (degrees)	Bearing (degrees)	Inclination uncert (degrees)	Bearing uncert (degrees)	Radius uncert (m)	Origin	Indat
KLX26A	RT90-RHB70	6365544.02	1549061.17	–39.00	63.00	54.63	–59.56	96.41	0.050	0.907	0.50	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365543.84	1549062.68	–41.58	66.00	57.21	–59.55	97.28	0.050	0.907	0.52	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365543.64	1549064.19	–44.17	69.00	59.80	–59.52	97.49	0.050	0.907	0.55	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365543.44	1549065.70	–46.75	72.00	62.38	–59.45	97.60	0.050	0.907	0.57	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365543.24	1549067.22	–49.34	75.00	64.97	–59.39	97.60	0.050	0.907	0.59	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365543.04	1549068.73	–51.92	78.00	67.55	–59.34	97.10	0.050	0.907	0.62	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365542.87	1549070.25	–54.50	81.00	70.13	–59.28	95.64	0.050	0.907	0.64	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365542.73	1549071.78	–57.08	84.00	72.71	–59.27	95.22	0.050	0.907	0.67	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365542.59	1549073.31	–59.66	87.00	75.29	–59.24	95.22	0.050	0.907	0.69	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365542.44	1549074.83	–62.23	90.00	77.86	–59.22	95.60	0.050	0.907	0.71	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365542.29	1549076.36	–64.81	93.00	80.44	–59.16	95.60	0.050	0.907	0.74	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365542.13	1549077.89	–67.39	96.00	83.01	–59.15	96.55	0.050	0.907	0.76	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365541.96	1549079.42	–69.96	99.00	85.59	–59.14	96.60	0.050	0.907	0.79	Measured	2007-02-06 08:38
KLX26A	RT90-RHB70	6365541.83	1549080.51	–71.80	101.14	87.43	–59.14	96.60	0.050	0.907	0.81	Measured	2007-02-06 08:38

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In-data: Borehole deviation data for KLX26B

Deviations protocol – KLX26B

SICADA – object_location

Idcode	Coord system	Northing (m)	Easting (m)	Elevation (m.a.s.l.)	Length (m)	Vertical depth (m)	Inclination (degrees)	Bearing (degrees)	Inclination uncert (degrees)	Bearing uncert (degrees)	Radius uncert (m)	Origin	Indat
KLX26B	RT90-RHB70	6365550.66	1549025.61	15.82	0.00	0.00	–60.01	137.42	0.035	0.608	0.00	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365549.55	1549026.63	13.22	3.00	2.60	–60.01	137.42	0.035	0.608	0.02	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365548.45	1549027.64	10.63	6.00	5.20	–60.01	137.51	0.035	0.608	0.03	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365547.34	1549028.65	8.03	9.00	7.79	–60.00	137.60	0.035	0.608	0.05	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365546.23	1549029.66	5.43	12.00	10.39	–60.00	137.69	0.035	0.608	0.06	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365545.12	1549030.67	2.83	15.00	12.99	–59.97	137.78	0.035	0.608	0.08	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365544.01	1549031.68	0.23	18.00	15.59	–59.97	138.26	0.035	0.608	0.10	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365542.88	1549032.67	–2.36	21.00	18.19	–59.98	138.72	0.035	0.608	0.11	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365541.75	1549033.66	–4.96	24.00	20.78	–60.00	139.29	0.035	0.608	0.13	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365540.61	1549034.64	–7.56	27.00	23.38	–60.00	139.29	0.035	0.608	0.14	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365539.48	1549035.62	–10.16	30.00	25.98	–60.00	139.08	0.035	0.608	0.16	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365538.35	1549036.60	–12.76	33.00	28.58	–59.97	139.08	0.035	0.608	0.18	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365537.21	1549037.58	–15.35	36.00	31.17	–59.89	139.32	0.035	0.608	0.19	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365536.06	1549038.56	–17.95	39.00	33.77	–59.81	139.64	0.035	0.608	0.21	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365534.91	1549039.54	–20.54	42.00	36.36	–59.70	139.64	0.035	0.608	0.22	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365533.75	1549040.52	–23.13	45.00	38.95	–59.62	139.93	0.035	0.608	0.24	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365532.59	1549041.50	–25.71	48.00	41.54	–59.59	139.60	0.035	0.608	0.26	Measured	2007-02-06 08:39
KLX26B	RT90-RHB70	6365531.68	1549042.27	–27.76	50.37	43.58	–59.59	139.60	0.035	0.608	0.27	Measured	2007-02-06 08:39

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