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November 2007

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*Keywords:* KLX14A, 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 KLX14A, which is a c. 176 m long core drilled borehole. The borehole was drilled with the orientation 112/–50°. The mapping was conducted between 2006-11-23 and 2006-12-04.

The documentation of geological structures and lithologies intersecting borehole KLX14A was made using the drill core and BIPS-images. Geological structures are correctly oriented in space along the borehole with the Boremap system.

The lithology in KLX14A is dominated by quartz monzodiorite (501036). Subordinate rock types comprise fine-grained granite (511058) and dolerite (501027).

Three sections have been highlighted based on increased fracture frequencies, alterations and structural features, and the sections cover the following intervals: 16–20 m, 37–52 m, and 75–125 m.

# Sammanfattning

Denna rapport presenterar boremapkarteringen av KLX14A som är ett ca 176 meter långt kärnborrhål. Borrhålet borrades med orienteringen 112/–50° och karterades mellan 2006-11-23 och 2006-12-04.

Dokumentationen av geologiska strukturer och litologi som genomskär borrhål KLX14A har utförts med borrkärna och BIPS-bilder. Geologiska strukturer har orienterats i rummet längs med borrhålet med Boremap systemet.

KLX14A domineras av kvartsmonzodiorit (501036). Underordnade bergarter utgörs av finkornig granit (511058) och diabas (501027).

Tre sektioner i KLX14A kan urskiljas baserat på förhöjd sprickfrekvens, bergets omvandlingar och geologiska strukturer. Dessa sektioner återfinns i följande intervall: 16–20 m, 37–52 m och 75–125 m.

# Contents

# 1 Introduction

This report gives a brief presentation of the data gained from the mapping of KLX14A 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 400-06-140. 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.

SKB investigates two potential sites for a deep repository for nuclear waste in the Swedish Precambrian basement at approximately 500 m depth. These places are Forsmark in northern Uppland and Oskarshamn in eastern Småland. In order to make a preliminary evaluation of the rock mass down to a depth of about 1,000 m at these sites, SKB has initiated a drilling program using core drilled boreholes. Every borehole usually starts with a percussion drilled part the first 100 m, where only drill cuttings are examined together with BIPS, followed by core drilling.

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

| Activity Plan | Number | Version |
|---|---|---|
| Boremapkartering av KLX14A | AP PS 400-06-140 | 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 platsundersökning 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 |

Borehole KLX14A is situated within the Laxemar area (Figure 1-1). KLX14A is a c. 176 m long core drilled borehole with orientation 112/–50°. Mapping of the borehole was performed between 2006-11-23 and 2006-12-04.

Detailed mapping of the drill cores 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.

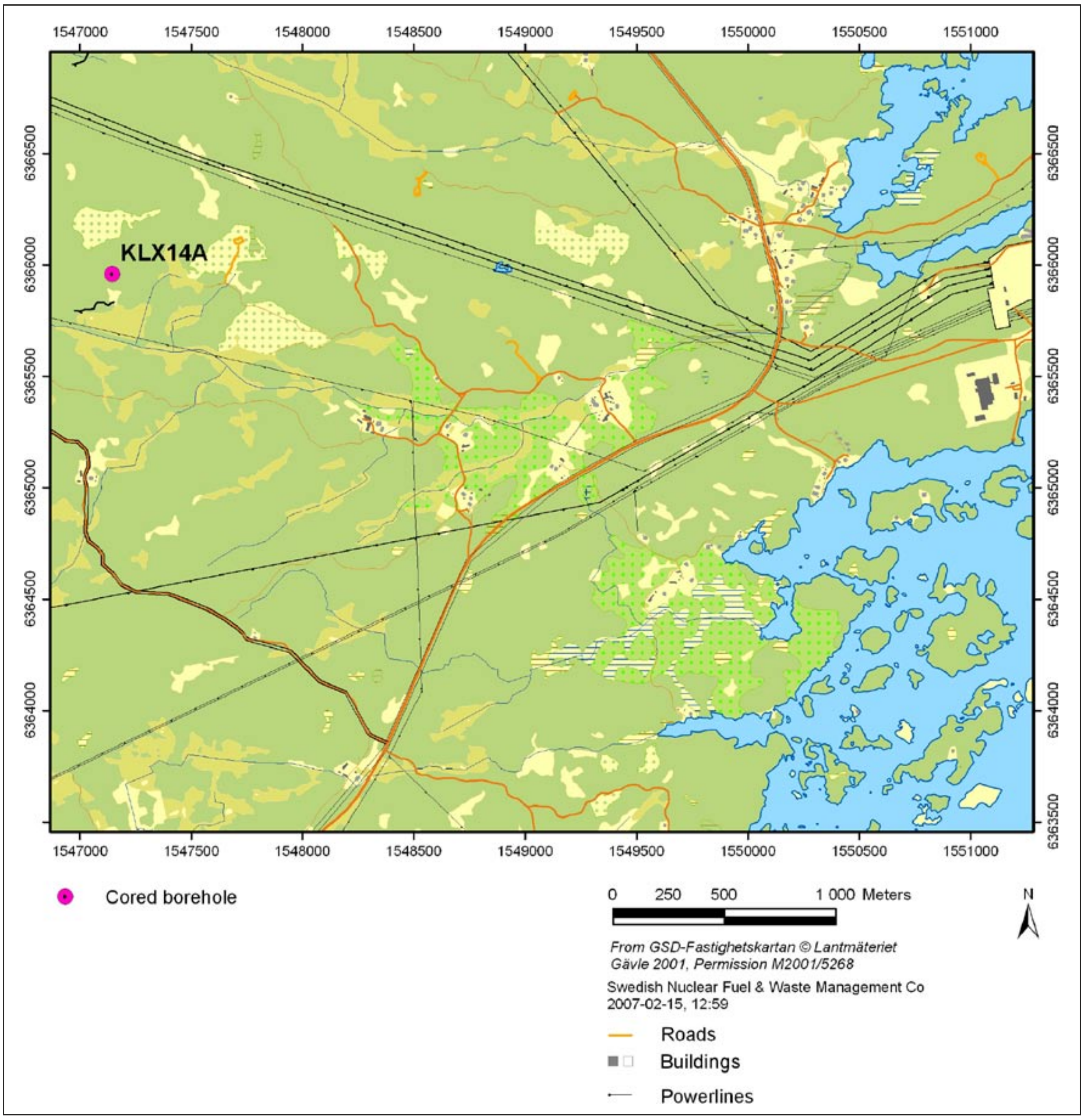



***Figure 1-1.*** *Location of the core drilled borehole KLX14A.*

# 2 Objective and scope

The principal aim of the mapping activities presented in this report is to obtain a documentation of geological structures and lithologies intersecting borehole KLX14A. Geological structures will be correctly orientated in space along the borehole with the Boremap system. The result will serve as a platform for forthcoming investigations of the drill core, as well as various site descriptive modelling.

# 3 Equipment

## 3.1 Description of software

Software used for the mapping of KLX14A was Boremap v.3.8.0, 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, pen, diluted hydrochloric acid, knife, water-filled atomiser and hand lens.

## 3.3 BIPS-image video film sequences

The BIPS-image of KLX14A covers the interval 4.00 m–174.88 m.

## 3.4 BIPS-image video film quality

The visibility of thin fractures in BIPS depends on image resolution, image contrast and image quality.

### 3.4.1 BIPS-image resolution

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.

### 3.4.2 BIPS-image contrast

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.

### 3.4.3 BIPS-image quality

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. Good quality 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 that 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 KLX14A is presented in Table 3-1.

**Table 3-1. BIPS-image quality in KLX14A.**

| From (m) | To (m) | Quality |
|---|---|---|
| 4.00 | 13.64 | Bad |
| 13.64 | 164.14 | Good |
| 164.14 | 174.88 | Acceptable |

# 4 Execution

## 4.1 General

Mapping of the drill core of the telescopic drilled borehole was performed and documented according to Activity Plan AP PS 400-06-140 (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 längd-kalibrering 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 Peter Dahlin (Geosigma AB) and Jan Ehrenborg (Mírab Mineral Resurser AB).

## 4.2 Preparations

Any depth registered in the BIPS-image deviates from the true depth in the borehole, a deviation which increases with depth, with approximately 0.4 m/100 m. This problem is eliminated by adjusting the depth of the BIPS-image to reference slots cut into the borehole walls every fiftieth meter (Appendix 7). The level for each slot is measured in the BIPS-images and then adjusted to the correct level using the correct depth value from the SICADA database.

Necessary in data for length adjustment and orientation in space are borehole diameter, reference marks, length and deviation; both collected from SICADA database (Appendices 6–8).

## 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.

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 or higher.

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

X5 Bleached fracture walls.

X7 Fractures with a fresh appearance and no detectable mineral.

X8 Fractures with epidotized/saussuritized walls.

X9 Weathered appearances.

## 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. Regular quality controls are performed. Every working day a Summary report (from Boremap) and a WellCad plot are 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 1) 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 oxidized 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 1) 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.

**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.

**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 broken 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 Apertures > 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 section 3.20– 6.41 is not covered by BIPS, a separate mapping of this section was conducted, were mapped features was mapped not orientated.

Core losses occur in the intervals: 81.680–81.730 m, 87.661–87.885 m, 90.728–90.905 m, 92.952–92.632 m and 132.931– 132.961 m.

# 5 Results

## 5.1 General

Borehole KLX14A is oriented 112/–50°. The drill core covers the interval 3.20–176.22 m and BIPS-image covers the interval 4.00–174.88 m.

All results from the mapping are principally found in the appendices. Information from the SICADA database is shown in the Geological summary table in Appendix 1 and a search path to Geological summary table is presented in Appendix 2. The BIPS-image is presented in Appendix 3, the WellCad diagram in Appendix 4 and In-data, such as borehole length, reference marks, deviation data and diameter are presented in Appendices 6–8.

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 400-06-140). 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 in KLX14A (Table 5-1) is dominated by quartz monzodiorite (501036). Subordinate rock types comprise fine-grained granite (511058) and dolerite (501027).

Three sections in KLX14A are recognized by increased fracture frequencies, alterations and structural features;

Section interval characteristics

1. 16–20 m. Increased frequency of open and sealed fractures, crush zones, brittle-ductile shear zone and red staining occurs within this section.
2. 37–52 m. Increased frequency of open and sealed fractures, crush zones, brittle-ductile shear zones, foliation, epidotization and red staining occurs within this section.
3. 75–125 m. Increased frequency of open fractures and open fractures with aperture > 0.5 mm, sealed fractures, crush zones, core loss, brittle-ductile shear zones, cataclasites, breccias, foliation, epidotization, saussuritization and red staining occurs within this section. Between 113–119 m the section is mylonitic.

**Table 5-1. Lithology distribution in KLX14A.**

| Rock types | % |
|---|---|
| Quartz monzodiorite (501036) | 97.4 |
| Fine-grained granite (511058) | 1.9 |
| Dolerite (501027) | 0.7 |

## 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. Minerals less than 0.1% are not accounted for. For X-mineral classification, see Section 4.3.5.

Calcite and chlorite are the most frequently occurring minerals in open fractures. Subordinate minerals are pyrite, clay minerals and epidote.

In sealed fractures the dominating mineral is calcite. Subordinate minerals and rock wall alteration are oxidized walls, chlorite, epidote and quartz.

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

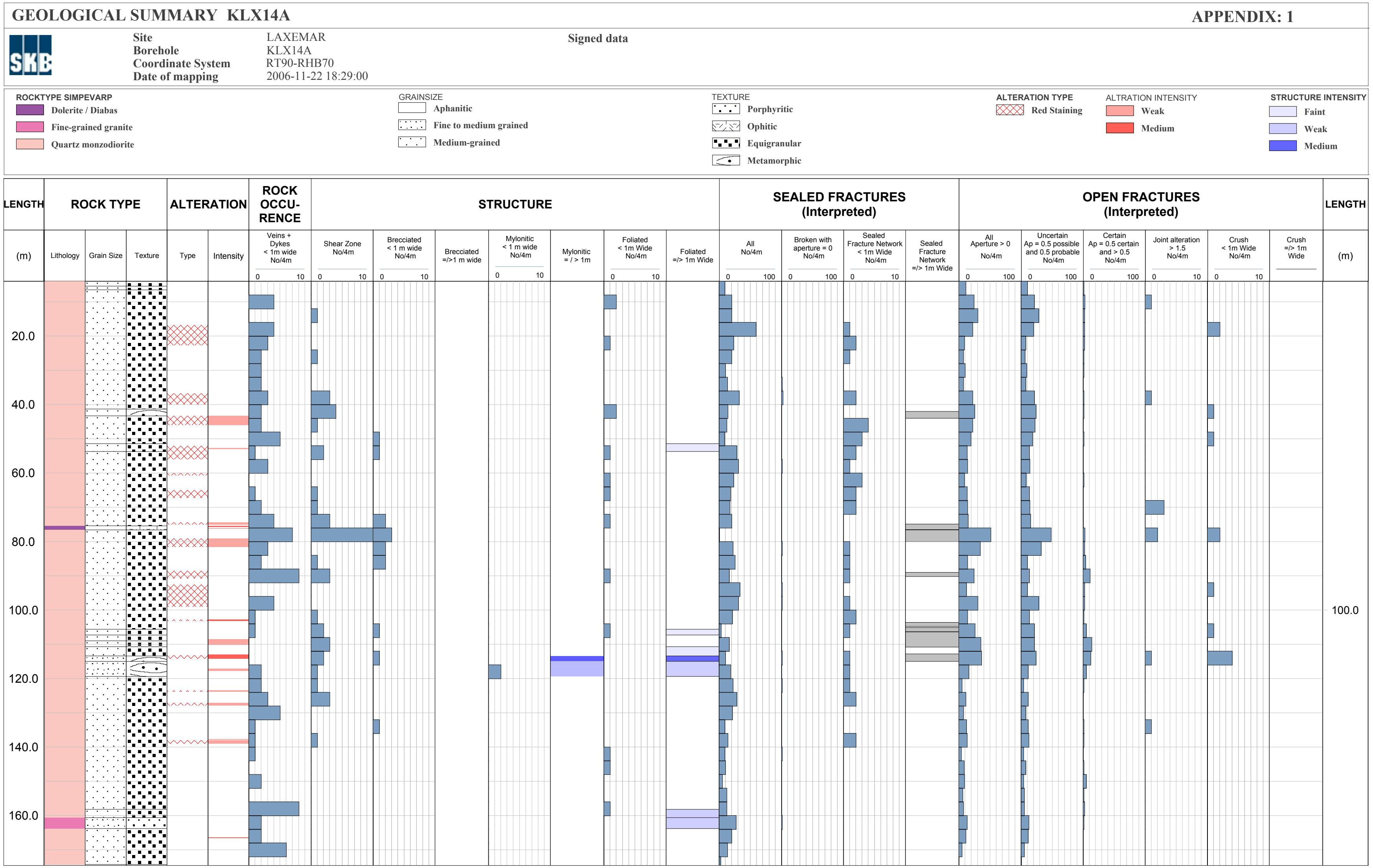
| Mineral | % |
|---|---|
| Adularia | 0.7 |
| Calcite | 90.4 |
| Chalcopyrite | 1.2 |
| Chlorite | 60.5 |
| Clay Minerals | 13.4 |
| Epidote | 8.7 |
| Flourite | 0.1 |
| Hematite | 1.6 |
| Muscovite | 0.1 |
| Oxidized Walls | 6.5 |
| Prehnite | 2.2 |
| Pyrite | 25.7 |
| Quartz | 1.2 |
| Unknown Mineral | 1.0 |
| White Feldspar | 0.1 |
| X5 | 0.1 |
| X7 | 2.8 |
| X8 | 0.9 |
| X9 | 0.4 |

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

| Mineral | % |
|---|---|
| Adularia | 0.9 |
| Calcite | 73.2 |
| Chalcopyrite | 0.3 |
| Chlorite | 19.4 |
| Clay Minerals | 0.1 |
| Epidote | 14.9 |
| Hematite | 0.6 |
| Oxidized Walls | 26.6 |
| Prehnite | 2.9 |
| Pyrite | 2.5 |
| Quartz | 10.8 |
| Red Feldspar | 1.0 |
| Serecite | 0.1 |
| White Feldspar | 0.6 |
| X5 | 2.9 |
| X7 | 1.0 |
| X8 | 4.8 |

# Appendix 1

## Geological summary table for KLX14A



## 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<br>5 | Sub 3 = 7<br>Sub 3 = 7 | Sub 4; 101 and 102 = 102<br>Sub 4; 103 and 104 = 104 | Interval |
| | Mylonite, < 1 m wide | 31 | Sub 4 = 34 | | Frequence |
| | Mylonite, >/= 1 m wide | 5<br>5 | Sub 3 = 34<br>Sub 3 = 34 | Sub 4; 101 and 102 = 102<br>Sub 4; 103 and 104 = 104 | Interval |
| | Foliated, < 1 m wide | 31 | Sub 4 = 81 | | Frequence |
| | Foliated, >/= 1 m wide | 5<br>5 | Sub 3 = 81<br>Sub 3 = 81 | Sub 4; 101 and 102 = 102<br>Sub 4; 103 and 104 = 104 | Interval |
| **Sealed fracture** | All unbroken fractures<br>and broken fractures | 3<br>2 | <br>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<br>and 0.5 probable | 2 and 3<br>2 and 3 | SNum 11>0<br>SNum 11>0 | Sub 12 = 3<br>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 3

## BIPS-image for KLX14A

| | |
|---|---|
| Borehole Name: | KLX14A |
| Mapping Name: | KLX14A_Geosigma_1 |
| Mapping Range: | 4.000 - 174.880 m |
| Diameter: | 76.0 mm |
| Printed Range: | 4.000 - 174.880 |
| Pages: | 10 |

Image File Information:

| | |
|---|---|
| File: | G:\skb\bips\oskarshamn\KLX14A\Omloggning 061109\KLX14A.BIP |
| Date/Time: | 2006-11-08 16:03:00 |
| Start Depth: | 4.000 m |
| End Depth: | 174.880 m |
| Resolution: | 1.00 mm/pixel (depth) |
| Orientation: | Gravmetric |
| Image height: | 170880 pixels |
| Image width: | 360 pixels |
| BIP Version: | BIP-III |
| Locality: | LAXEMAR |
| Borehole: | KLX14A |
| Scan Direction: | Down |
| Color adjust: | 0 0 0 (RGB) |

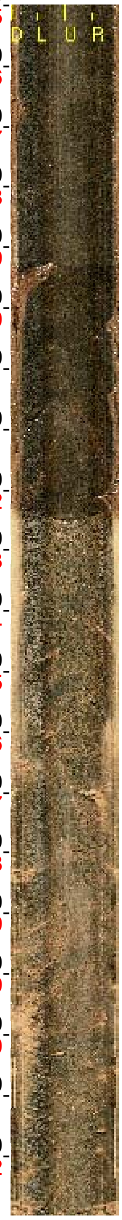
Borehole: KLX14A
Mapping: KLX14A_Geosigma_1

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

4.000 4.000
4.200 4.201
4.400 4.402
4.600 4.603
4.800 4.804
5.000 5.004
5.200 5.205
5.400 5.406
5.600 5.607
5.800 5.808
6.000 6.009
6.200 6.210
6.400 6.411
6.600 6.611
6.800 6.812
7.000 7.013
7.200 7.214
7.400 7.415
7.600 7.616
7.800 7.817

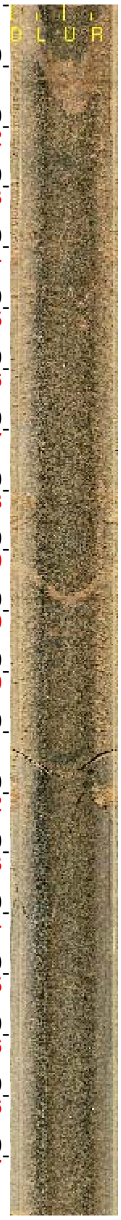

8.000 8.018
8.200 8.219
8.400 8.419
8.600 8.620
8.800 8.821
9.000 9.022
9.200 9.223
9.400 9.424
9.600 9.625
9.800 9.826
10.000 10.026
10.200 10.227
10.400 10.428
10.600 10.629
10.800 10.830
11.000 11.031
11.200 11.232
11.400 11.433
11.600 11.634
11.800 11.834


12.000 12.035
12.200 12.236
12.400 12.437
12.600 12.638
12.800 12.839
13.000 13.040
13.200 13.241
13.400 13.441
13.600 13.642
13.800 13.843
14.000 14.044
14.200 14.245
14.400 14.446
14.600 14.647
14.800 14.848
15.000 15.049
15.200 15.249
15.400 15.450
15.600 15.651
15.800 15.852




16.000 16.053
16.200 16.254
16.400 16.455
16.600 16.656
16.800 16.856
17.000 17.057
17.200 17.258
17.400 17.459
17.600 17.660
17.800 17.861
18.000 18.062
18.200 18.263
18.400 18.464
18.600 18.664
18.800 18.865
19.000 19.066
19.200 19.267
19.400 19.468
19.600 19.669
19.800 19.870


20.000 20.071
20.200 20.271
20.400 20.472
20.600 20.673
20.800 20.874
21.000 21.075
21.200 21.276
21.400 21.477
21.600 21.678
21.800 21.879
22.000 22.079
22.200 22.280
22.400 22.481
22.600 22.682
22.800 22.883
23.000 23.084
23.200 23.285
23.400 23.486
23.600 23.686
23.800 23.887

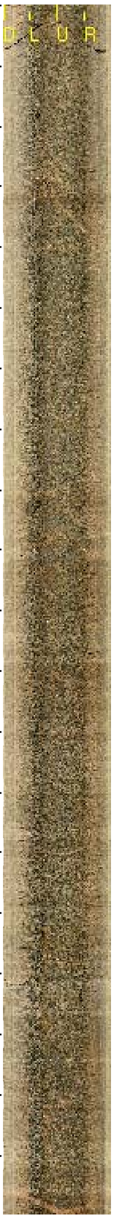



Printed: 2006-12-05 14:48:21 Scale: 1 : 20 Aspect: 150 % 2 (10)

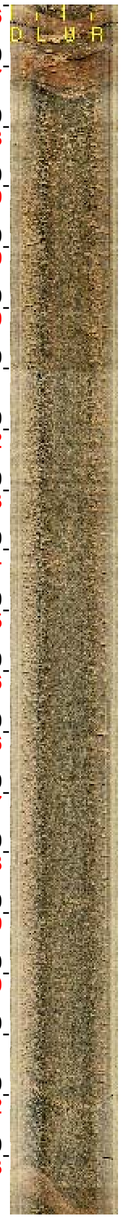
Borehole: KLX14A
Mapping: KLX14A_Geosigma_1

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

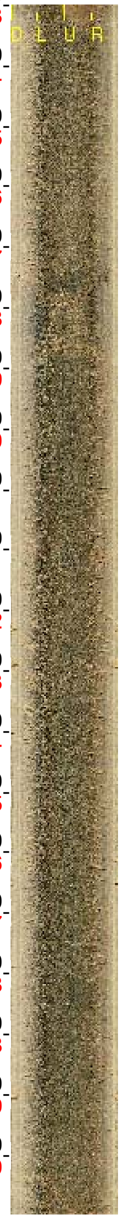
24.000
24.088
24.200
24.289
24.400
24.490
24.600
24.691
24.800
24.892
25.000
25.093
25.200
25.294
25.400
25.494
25.600
25.695
25.800
25.896
26.000
26.097
26.200
26.298
26.400
26.499
26.600
26.700
26.800
26.901
27.000
27.101
27.200
27.302
27.400
27.503
27.600
27.704
27.800
27.905



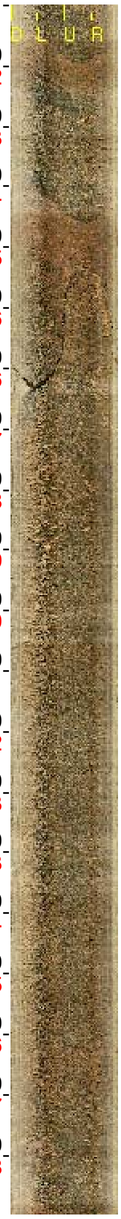

28.000
28.106
28.200
28.307
28.400
28.508
28.600
28.709
28.800
28.909
29.000
29.110
29.200
29.311
29.400
29.512
29.600
29.713
29.800
29.914
30.000
30.115
30.200
30.316
30.400
30.516
30.600
30.717
30.800
30.918
31.000
31.119
31.200
31.320
31.400
31.521
31.600
31.722
31.800
31.923



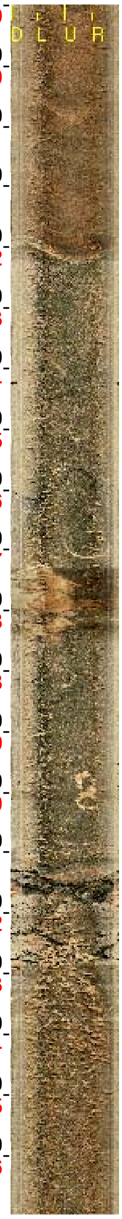

32.000
32.123
32.200
32.324
32.400
32.525
32.600
32.726
32.800
32.927
33.000
33.128
33.200
33.329
33.400
33.530
33.600
33.731
33.800
33.931
34.000
34.132
34.200
34.333
34.400
34.534
34.600
34.735
34.800
34.936
35.000
35.137
35.200
35.338
35.400
35.538
35.600
35.739
35.800
35.940




36.000
36.141
36.200
36.342
36.400
36.543
36.600
36.744
36.800
36.945
37.000
37.146
37.200
37.346
37.400
37.547
37.600
37.748
37.800
37.949
38.000
38.150
38.200
38.351
38.400
38.552
38.600
38.753
38.800
38.953
39.000
39.154
39.200
39.355
39.400
39.556
39.600
39.757
39.800
39.958



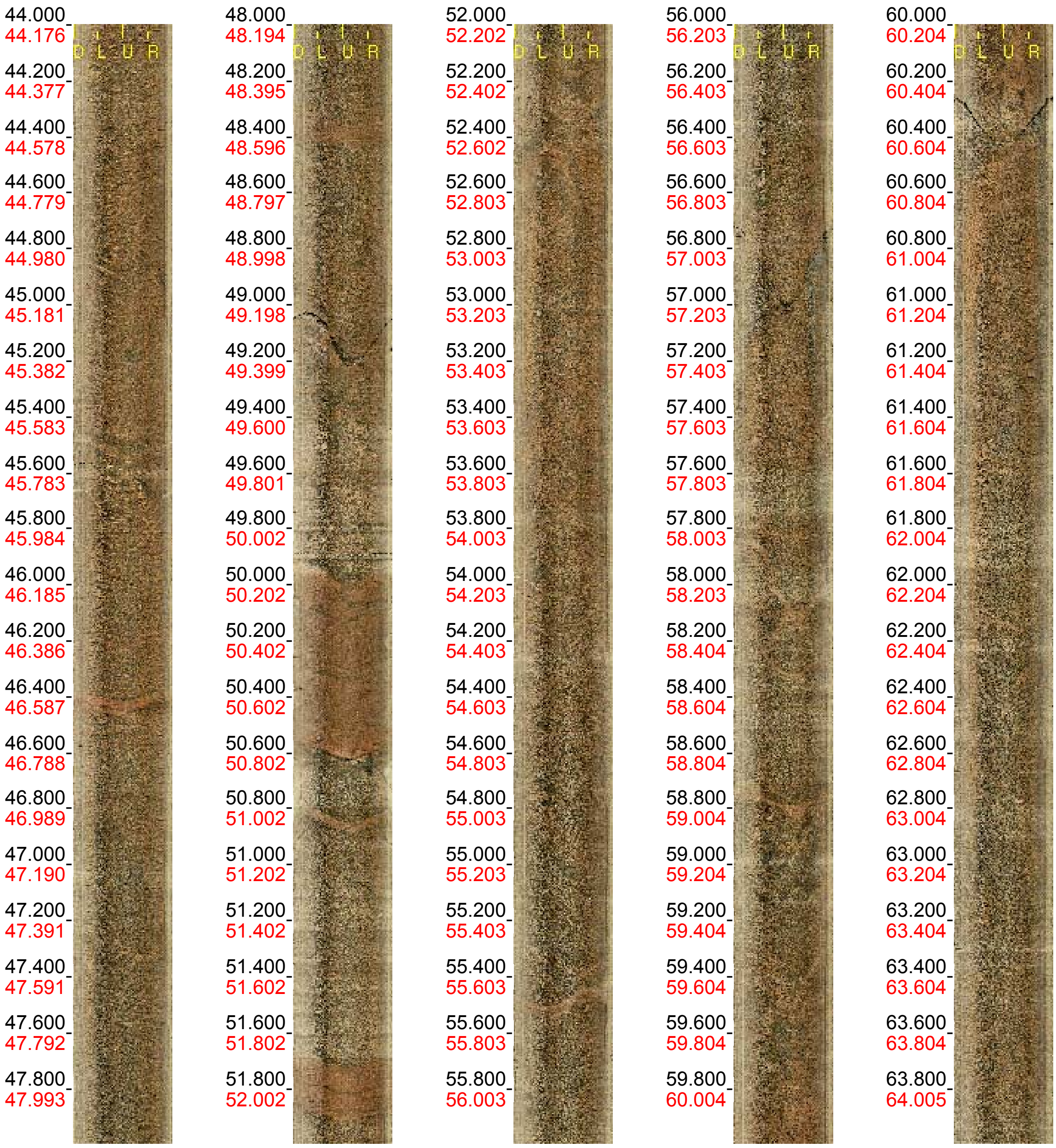

40.000
40.159
40.200
40.360
40.400
40.561
40.600
40.761
40.800
40.962
41.000
41.163
41.200
41.364
41.400
41.565
41.600
41.766
41.800
41.967
42.000
42.168
42.200
42.368
42.400
42.569
42.600
42.770
42.800
42.971
43.000
43.172
43.200
43.373
43.400
43.574
43.600
43.775
43.800
43.976




Printed: 2006-12-05 14:48:21    Scale: 1 : 20    Aspect: 150 %    3 (10)

Borehole: KLX14A
Mapping: KLX14A_Geosigma_1

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

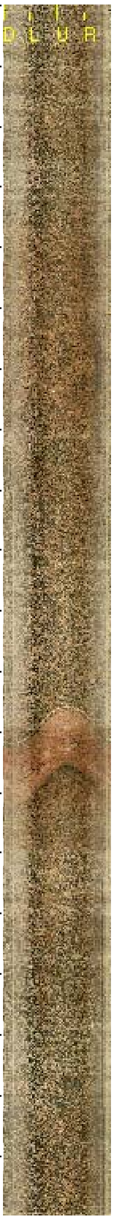



Printed: 2006-12-05 14:48:21 Scale: 1 : 20 Aspect: 150 % 4 (10)

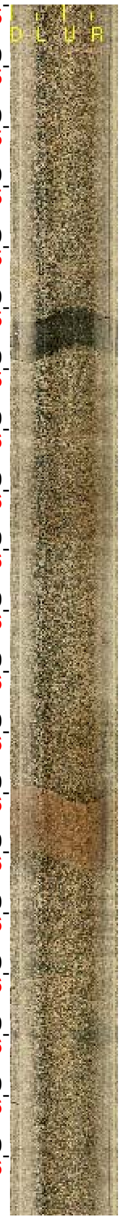
Borehole: KLX14A
Mapping: KLX14A_Geosigma_1

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

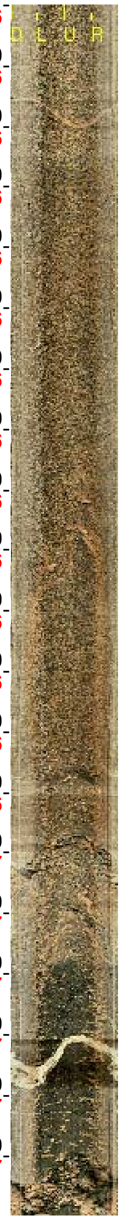
64.000
64.205
64.200
64.405
64.400
64.605
64.600
64.805
64.800
65.005
65.000
65.205
65.200
65.405
65.400
65.605
65.600
65.805
65.800
66.005
66.000
66.205
66.200
66.405
66.400
66.605
66.600
66.805
66.800
67.005
67.000
67.205
67.200
67.405
67.400
67.605
67.600
67.805
67.800
68.005



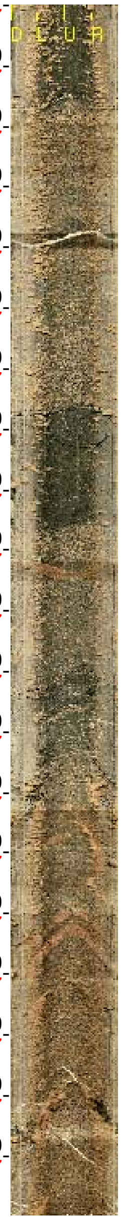

68.000
68.205
68.200
68.405
68.400
68.605
68.600
68.805
68.800
69.005
69.000
69.205
69.200
69.405
69.400
69.606
69.600
69.806
69.800
70.006
70.000
70.206
70.200
70.406
70.400
70.606
70.600
70.806
70.800
71.006
71.000
71.206
71.200
71.406
71.400
71.606
71.600
71.806
71.800
72.006



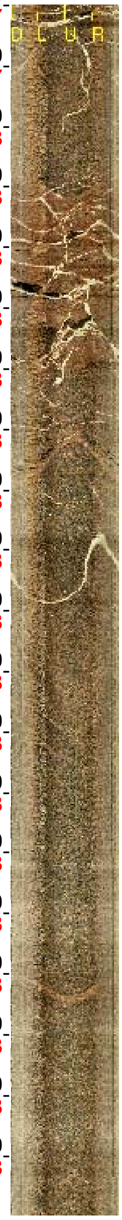

72.000
72.206
72.200
72.406
72.400
72.606
72.600
72.806
72.800
73.006
73.000
73.206
73.200
73.406
73.400
73.606
73.600
73.806
73.800
74.006
74.000
74.206
74.200
74.406
74.400
74.606
74.600
74.806
74.800
75.007
75.000
75.207
75.200
75.407
75.400
75.607
75.600
75.807
75.800
76.007




76.000
76.207
76.200
76.407
76.400
76.607
76.600
76.807
76.800
77.007
77.000
77.207
77.200
77.407
77.400
77.607
77.600
77.807
77.800
78.007
78.000
78.207
78.200
78.407
78.400
78.607
78.600
78.807
78.800
79.007
79.000
79.207
79.200
79.407
79.400
79.607
79.600
79.807
79.800
80.007



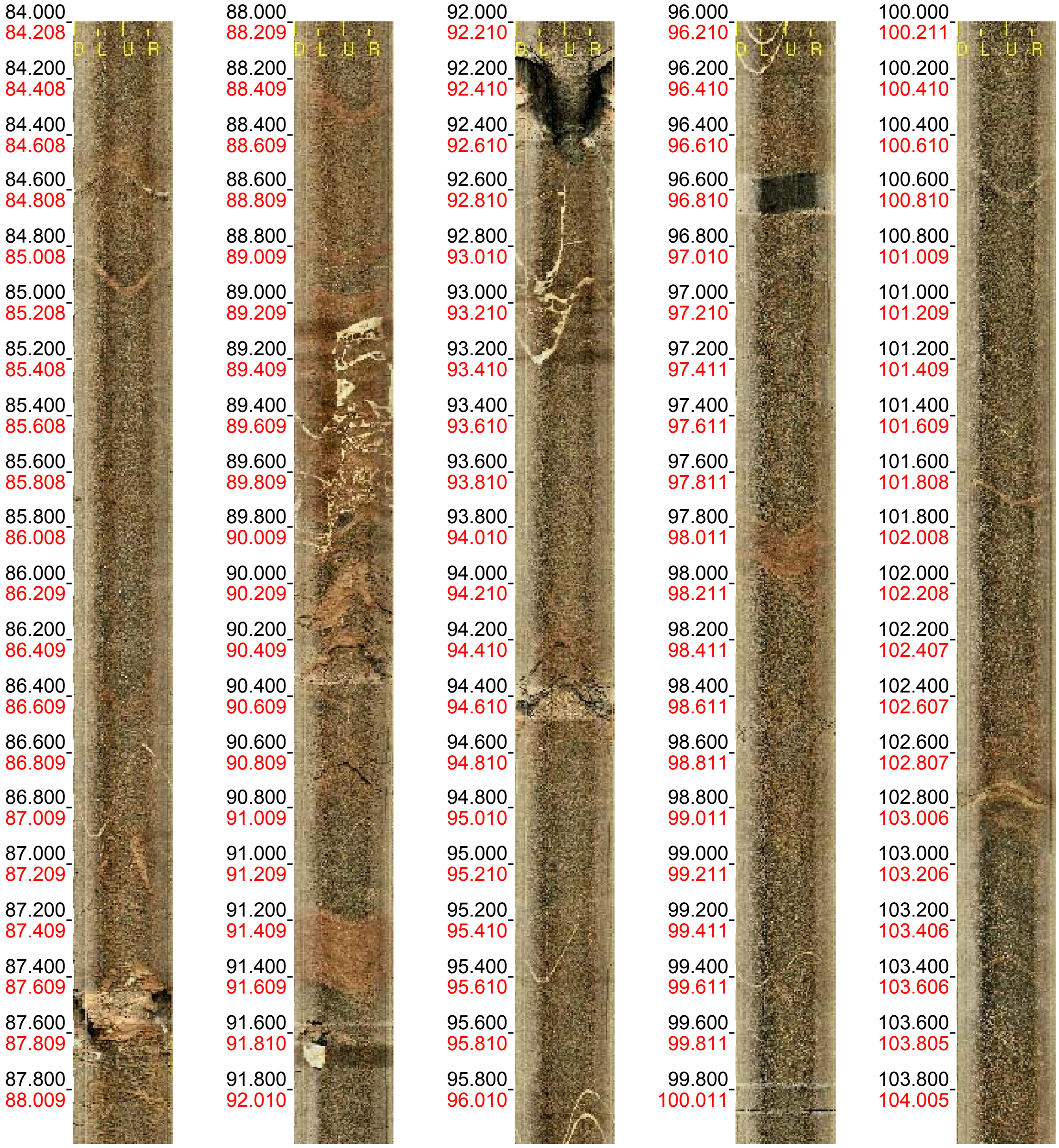

80.000
80.207
80.200
80.407
80.400
80.608
80.600
80.808
80.800
81.008
81.000
81.208
81.200
81.408
81.400
81.608
81.600
81.808
81.800
82.008
82.000
82.208
82.200
82.408
82.400
82.608
82.600
82.808
82.800
83.008
83.000
83.208
83.200
83.408
83.400
83.608
83.600
83.808
83.800
84.008




Printed: 2006-12-05 14:48:21 Scale: 1 : 20 Aspect: 150 % 5 (10)

Borehole: KLX14A
Mapping: KLX14A_Geosigma_1

Depth range: 84.000 - 104.000 m
Azimuth: 0.0
Inclination: -90.0

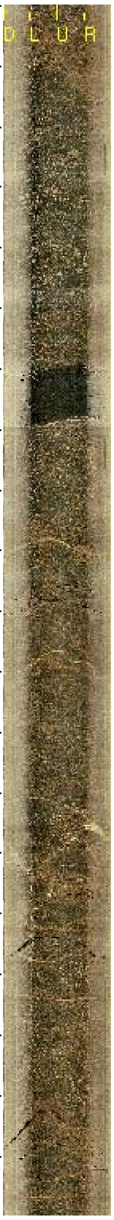



Printed: 2006-12-05 14:48:21 Scale: 1 : 20 Aspect: 150 % 6 (10)

Borehole: KLX14A
Mapping: KLX14A_Geosigma_1

Depth range: 104.000 - 124.000 m
Azimuth: 0.0
Inclination: -90.0

104.000
104.205
104.200
104.404
104.400
104.604
104.600
104.804
104.800
105.003
105.000
105.203
105.200
105.403
105.400
105.602
105.600
105.802
105.800
106.002
106.000
106.202
106.200
106.401
106.400
106.601
106.600
106.801
106.800
107.000
107.000
107.200
107.200
107.400
107.400
107.599
107.600
107.799
107.800
107.999




108.000
108.199
108.200
108.398
108.400
108.598
108.600
108.798
108.800
108.997
109.000
109.197
109.200
109.397
109.400
109.596
109.600
109.796
109.800
109.996
110.000
110.196
110.200
110.395
110.400
110.595
110.600
110.795
110.800
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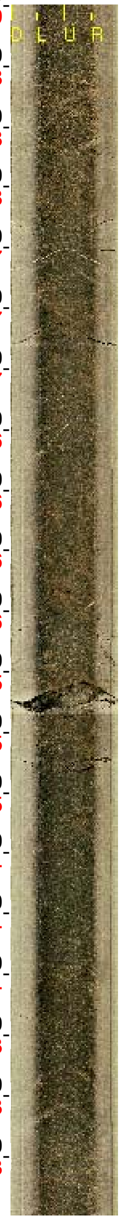
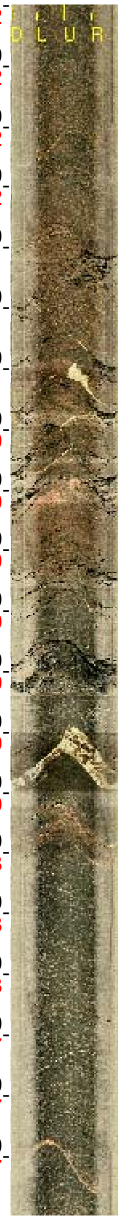
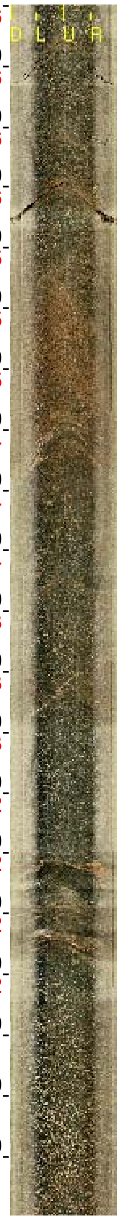
111.593
111.600
111.793
111.800
111.993



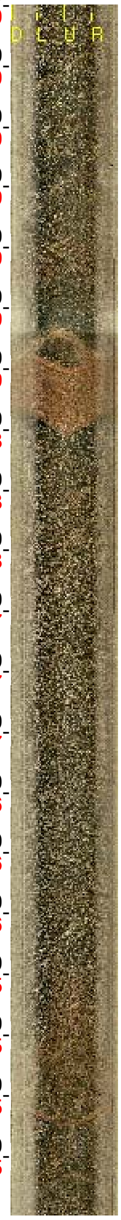

112.000
112.192
112.200
112.392
112.400
112.592
112.600
112.792
112.800
112.991
113.000
113.191
113.200
113.391
113.400
113.590
113.600
113.790
113.800
113.990
114.000
114.189
114.200
114.389
114.400
114.589
114.600
114.789
114.800
114.988
115.000
115.188
115.200
115.388
115.400
115.587
115.600
115.787
115.800
115.987




116.000
116.186
116.200
116.386
116.400
116.586
116.600
116.786
116.800
116.985
117.000
117.185
117.200
117.385
117.400
117.584
117.600
117.784
117.800
117.984
118.000
118.183
118.200
118.383
118.400
118.583
118.600
118.782
118.800
118.982
119.000
119.182
119.200
119.382
119.400
119.581
119.600
119.781
119.800
119.981




120.000
120.180
120.200
120.380
120.400
120.580
120.600
120.779
120.800
120.979
121.000
121.179
121.200
121.379
121.400
121.578
121.600
121.778
121.800
121.978
122.000
122.177
122.200
122.377
122.400
122.577
122.600
122.776
122.800
122.976
123.000
123.176
123.200
123.375
123.400
123.575
123.600
123.775
123.800
123.975

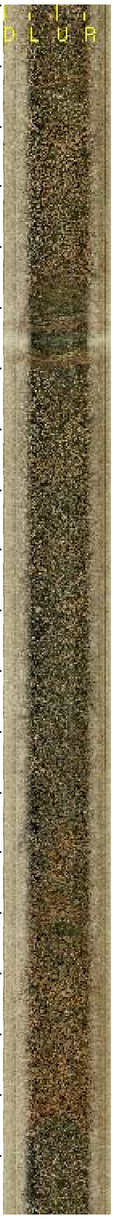



Printed: 2006-12-05 14:48:21 Scale: 1 : 20 Aspect: 150 % 7 (10)

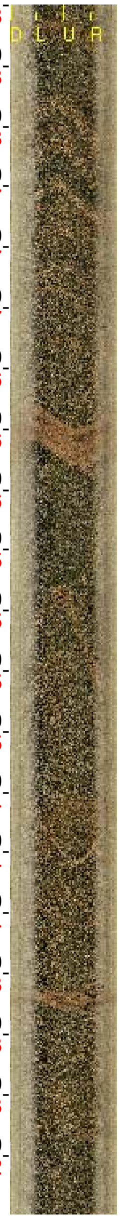
Borehole: KLX14A
Mapping: KLX14A_Geosigma_1

Depth range: 124.000 - 144.000 m
Azimuth: 0.0
Inclination: -90.0

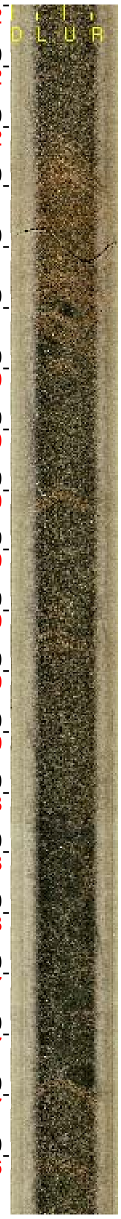
124.000
124.174
124.200
124.374
124.400
124.574
124.600
124.773
124.800
124.973
125.000
125.173
125.200
125.372
125.400
125.572
125.600
125.772
125.800
125.972
126.000
126.171
126.200
126.371
126.400
126.571
126.600
126.770
126.800
126.970
127.000
127.170
127.200
127.369
127.400
127.569
127.600
127.769
127.800
127.969



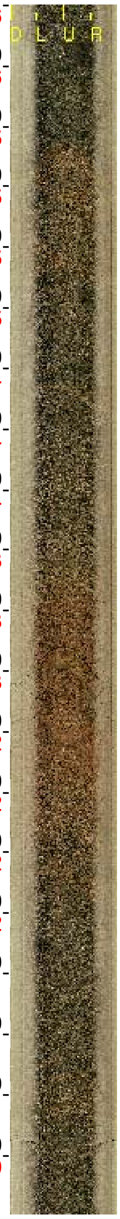

128.000
128.168
128.200
128.368
128.400
128.568
128.600
128.767
128.800
128.967
129.000
129.167
129.200
129.366
129.400
129.566
129.600
129.766
129.800
129.965
130.000
130.165
130.200
130.365
130.400
130.565
130.600
130.764
130.800
130.964
131.000
131.164
131.200
131.363
131.400
131.563
131.600
131.763
131.800
131.962




132.000
132.162
132.200
132.362
132.400
132.562
132.600
132.761
132.800
132.961
133.000
133.161
133.200
133.360
133.400
133.560
133.600
133.760
133.800
133.959
134.000
134.159
134.200
134.359
134.400
134.559
134.600
134.758
134.800
134.958
135.000
135.158
135.200
135.357
135.400
135.557
135.600
135.757
135.800
135.956




136.000
136.156
136.200
136.356
136.400
136.555
136.600
136.755
136.800
136.955
137.000
137.155
137.200
137.354
137.400
137.554
137.600
137.754
137.800
137.953
138.000
138.153
138.200
138.353
138.400
138.552
138.600
138.752
138.800
138.952
139.000
139.152
139.200
139.351
139.400
139.551
139.600
139.751
139.800
139.950




140.000
140.150
140.200
140.350
140.400
140.549
140.600
140.749
140.800
140.949
141.000
141.149
141.200
141.348
141.400
141.548
141.600
141.748
141.800
141.947
142.000
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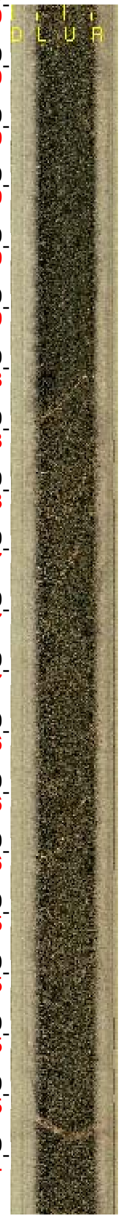
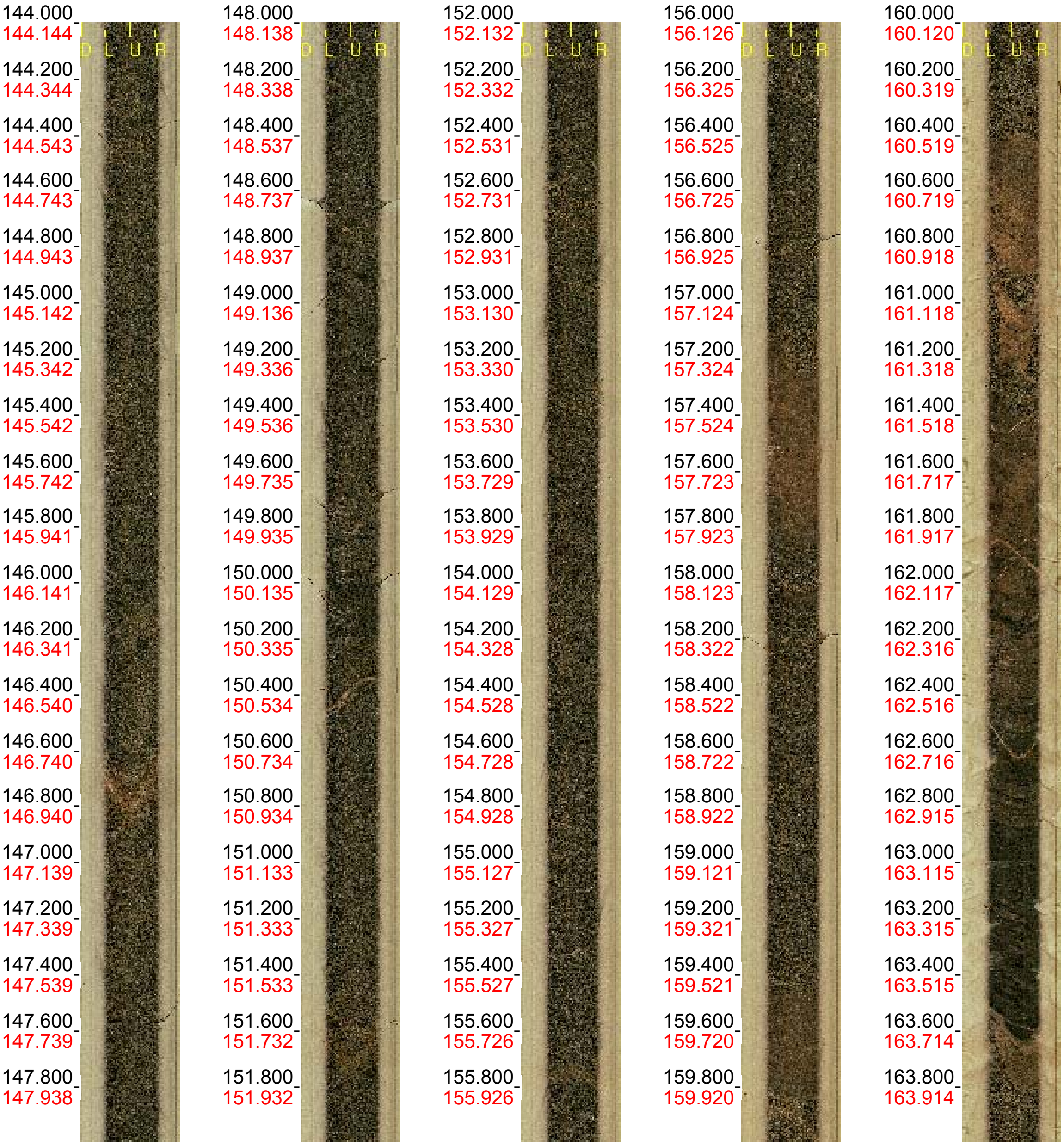
143.745
143.800
143.944




Printed: 2006-12-05 14:48:21 Scale: 1 : 20 Aspect: 150 % 8 (10)

Borehole: KLX14A
Mapping: KLX14A_Geosigma_1

Depth range: 144.000 - 164.000 m
Azimuth: 0.0
Inclination: -90.0




Printed: 2006-12-05 14:48:21　Scale: 1 : 20　Aspect: 150 %　9 (10)

Borehole: KLX14A
Mapping: KLX14A_Geosigma_1

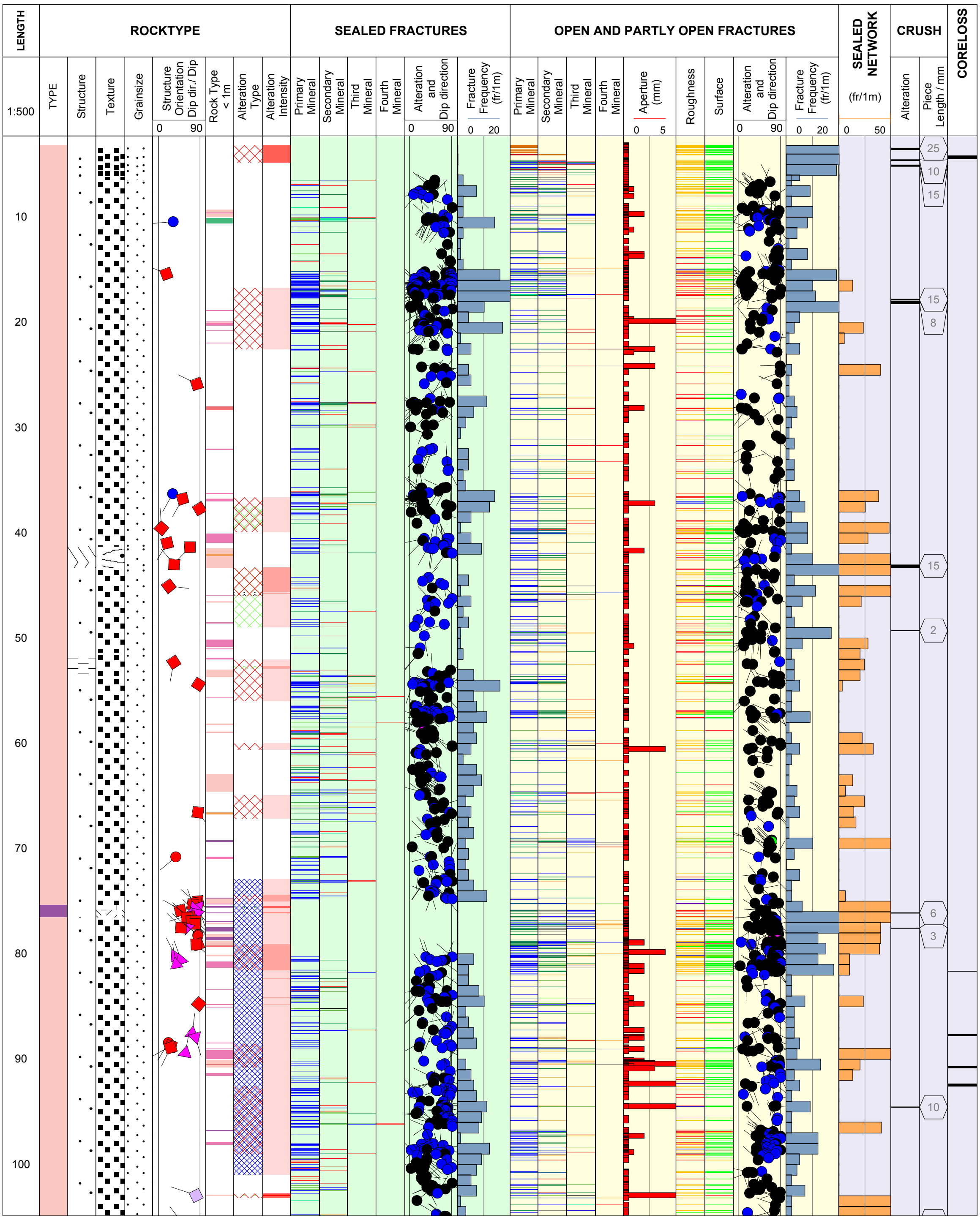
Depth range: 164.000 - 174.880 m
Azimuth: 0.0
Inclination: -90.0

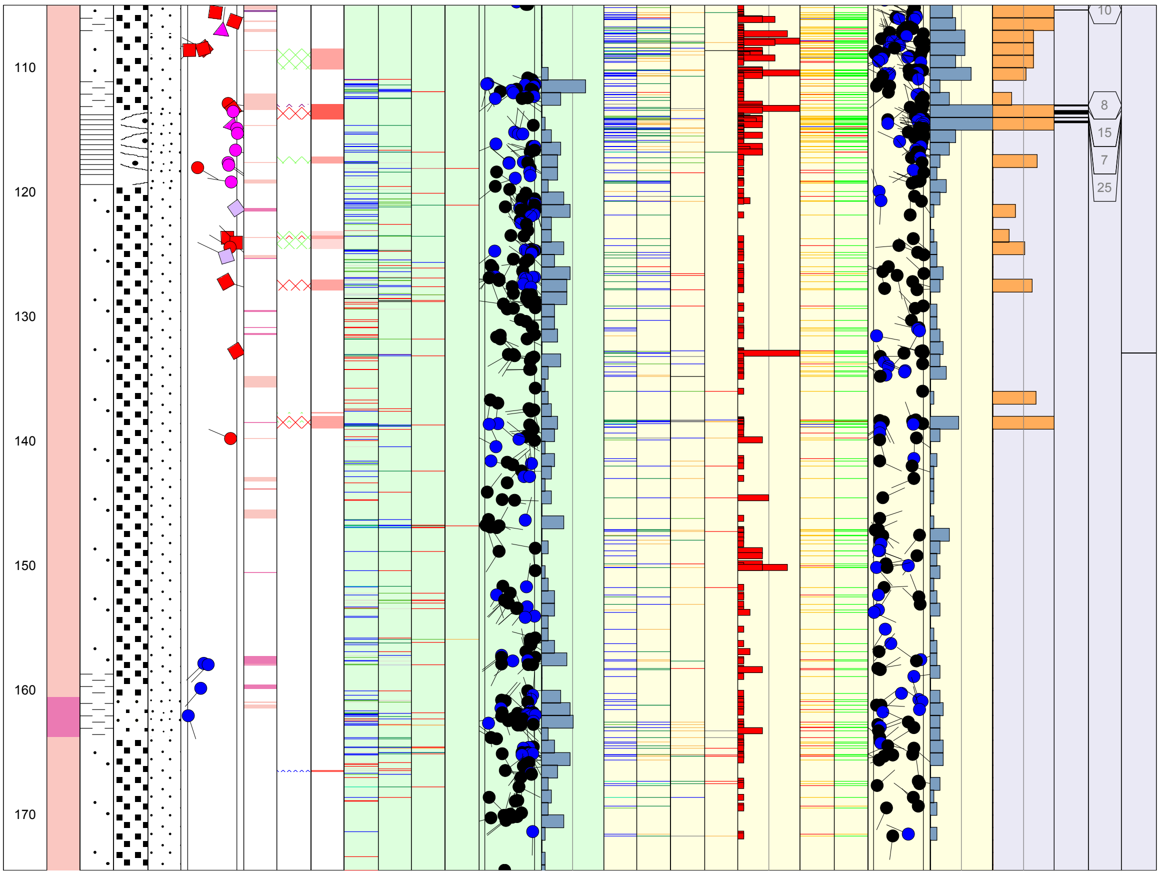

Printed: 2006-12-05 14:48:21    Scale: 1 : 20    Aspect: 150 %    10 (10)

# Appendix 4

## WellCad diagram for KLX14A

| Title | GEOLOGY IN KLX14A | | Appendix: |
|---|---|---|---|
| Site | LAXEMAR | Coordinate System | RT90-RHB70 |
| Borehole | KLX14A | Northing [m] | 6365959.69 |
| Diameter [mm] | 76 | Easting [m] | 1547146.87 |
| Length [m] | 176.270 | Elevation [m.a.s.l.] | 16.35 |
| Bearing [°] | 111.95 | Drilling Start Date | 2006-08-19 08:00:00 |
| Inclination [°] | -49.95 | Drilling Stop Date | 2006-09-04 15:22:00 |
| Date of coremapping | 2006-11-22 18:29:00 | Plot Date | 2007-10-25 22:03:45 |
| Rocktype data from | p_rock | Signed data | |




110
120
130
140
150
160
170
10
8
15
7
25

# Legend to WellCad diagram for KLX14A

**Title** LEGEND FOR LAXEMAR KLX14A

| | |
|---|---|
| Site | LAXEMAR |
| Borehole | KLX14A |
| Plot Date | 2007-10-25 22:03:45 |
| Signed data | |

### ROCKTYPE LAXEMAR

- Äspö Diorite
- Dolerite
- 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
- Ävrö quartz monzodiorite
- Ävrö granodiorite

### ROCK ALTERATION TYPE

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

### MINERAL

- Epidote
- Flourite
- Hematite
- Calcite
- Chlorite
- Quartz
- Unknown
- Pyrite
- Clay Minerals
- Prehnite
- Iron Hydroxide

### 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

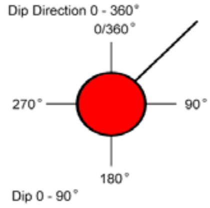
- Slightly Altered
- Moderately Altered
- Highly Altered
- Completley Altered
- Gouge
- Fresh

### FRACTURE ALTERATION

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

### FRACTURE DIRECTION

STRUKTURE ORIENTATION



## In-data: Borehole length and diameter for KLX14A

### KLX14A, 2006-08-19 08:00:00 - 2006-09-04 15:22:00 (0.300 - 176.270 m)

| Sub Secup (m) | Sub Seclow (m) | Hole Diam (m) | Comment |
|---|---|---|---|
| 0.300 | 3.200 | 0.1160 | Jordborrning |
| 3.200 | 6.450 | 0.0960 | HQ |
| 6.450 | 176.270 | 0.0758 | N/3 Corac |

Printout from SICADA 2006-11-22 18:19:31.

## In-data: Reference marks for length adjustments for KLX14A

### KLX14A, 2006-09-05 09:30:00 - 2006-09-05 14:25:00 (50.000 - 150.000 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 | 500 | 1000 | 42.0 | 90 | Yes | | Ingen klar indikation |
| 100.00 | 400.00 | 400 | 1000 | 40.0 | 90 | Yes | | Ingen klar indikation |
| 150.00 | 400.00 | 250 | 1000 | 38.0 | 90 | No | | Ingen klar indikation |

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# In-data: Borehole deviation data for KLX14A

## 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KLX14A | RT90-RHB70 | 6365959.69 | 1547146.87 | 16.35 | 0.00 | 0.00 | -49.96 | 111.95 | 0.037 | 0.511 | 0.00 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365958.97 | 1547148.66 | 14.05 | 3.00 | 2.30 | -49.96 | 111.95 | 0.037 | 0.511 | 0.02 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365958.25 | 1547150.45 | 11.75 | 6.00 | 4.59 | -49.96 | 111.94 | 0.037 | 0.511 | 0.03 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365957.53 | 1547152.24 | 9.46 | 9.00 | 6.89 | -49.94 | 111.94 | 0.037 | 0.511 | 0.05 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365956.80 | 1547154.04 | 7.16 | 12.00 | 9.18 | -49.86 | 111.94 | 0.037 | 0.511 | 0.07 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365956.08 | 1547155.83 | 4.87 | 15.00 | 11.48 | -49.83 | 111.93 | 0.037 | 0.511 | 0.09 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365955.36 | 1547157.63 | 2.58 | 18.00 | 13.77 | -49.61 | 111.93 | 0.037 | 0.511 | 0.10 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365954.63 | 1547159.43 | 0.30 | 21.00 | 16.05 | -49.56 | 111.93 | 0.037 | 0.511 | 0.12 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365953.90 | 1547161.24 | -1.98 | 24.00 | 18.33 | -49.53 | 111.92 | 0.037 | 0.511 | 0.14 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365953.18 | 1547163.05 | -4.27 | 27.00 | 20.61 | -49.41 | 111.92 | 0.037 | 0.511 | 0.16 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365952.45 | 1547164.86 | -6.54 | 30.00 | 22.89 | -49.31 | 111.91 | 0.037 | 0.511 | 0.17 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365951.71 | 1547166.68 | -8.82 | 33.00 | 25.16 | -49.23 | 112.01 | 0.037 | 0.511 | 0.19 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365950.98 | 1547168.49 | -11.09 | 36.00 | 27.43 | -49.14 | 112.13 | 0.037 | 0.511 | 0.21 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365950.24 | 1547170.31 | -13.35 | 39.00 | 29.70 | -49.01 | 112.29 | 0.037 | 0.511 | 0.23 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365949.49 | 1547172.14 | -15.61 | 42.00 | 31.96 | -48.86 | 112.41 | 0.037 | 0.511 | 0.24 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365948.73 | 1547173.96 | -17.87 | 45.00 | 34.22 | -48.78 | 112.36 | 0.037 | 0.511 | 0.26 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365947.98 | 1547175.79 | -20.13 | 48.00 | 36.48 | -48.70 | 112.69 | 0.037 | 0.511 | 0.28 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365947.21 | 1547177.62 | -22.38 | 51.00 | 38.73 | -48.60 | 112.57 | 0.037 | 0.511 | 0.30 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365946.45 | 1547179.45 | -24.63 | 54.00 | 40.98 | -48.51 | 112.57 | 0.037 | 0.511 | 0.31 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365945.69 | 1547181.29 | -26.87 | 57.00 | 43.22 | -48.38 | 112.57 | 0.037 | 0.511 | 0.33 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365944.93 | 1547183.13 | -29.12 | 60.00 | 45.46 | -48.32 | 112.41 | 0.037 | 0.511 | 0.35 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365944.16 | 1547184.98 | -31.35 | 63.00 | 47.70 | -48.17 | 112.85 | 0.037 | 0.511 | 0.37 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365943.38 | 1547186.82 | -33.59 | 66.00 | 49.94 | -48.09 | 112.88 | 0.037 | 0.511 | 0.39 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365942.60 | 1547188.67 | -35.82 | 69.00 | 52.17 | -48.00 | 113.01 | 0.037 | 0.511 | 0.40 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365941.81 | 1547190.52 | -38.05 | 72.00 | 54.39 | -47.87 | 113.18 | 0.037 | 0.511 | 0.42 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365941.01 | 1547192.37 | -40.27 | 75.00 | 56.62 | -47.80 | 113.46 | 0.037 | 0.511 | 0.44 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365940.20 | 1547194.22 | -42.49 | 78.00 | 58.84 | -47.68 | 113.70 | 0.037 | 0.511 | 0.46 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365939.39 | 1547196.07 | -44.71 | 81.00 | 61.05 | -47.63 | 113.75 | 0.037 | 0.511 | 0.48 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365938.58 | 1547197.92 | -46.92 | 84.00 | 63.27 | -47.52 | 113.75 | 0.037 | 0.511 | 0.49 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365937.76 | 1547199.77 | -49.13 | 87.00 | 65.48 | -47.45 | 113.72 | 0.037 | 0.511 | 0.51 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365936.94 | 1547201.63 | -51.34 | 90.00 | 67.69 | -47.36 | 113.69 | 0.037 | 0.511 | 0.53 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365936.13 | 1547203.50 | -53.55 | 93.00 | 69.89 | -47.24 | 113.72 | 0.037 | 0.511 | 0.55 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365935.30 | 1547205.36 | -55.75 | 96.00 | 72.09 | -47.10 | 113.75 | 0.037 | 0.511 | 0.57 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365934.48 | 1547207.23 | -57.94 | 99.00 | 74.29 | -47.00 | 113.97 | 0.037 | 0.511 | 0.58 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365933.64 | 1547209.10 | -60.13 | 102.00 | 76.48 | -46.89 | 114.05 | 0.037 | 0.511 | 0.60 | Measured | 2007-02-06 08:31 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KLX14A | RT90-RHB70 | 6365932.81 | 1547210.98 | -62.32 | 105.00 | 78.67 | -46.85 | 114.11 | 0.037 | 0.511 | 0.62 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365931.97 | 1547212.85 | -64.51 | 108.00 | 80.86 | -46.72 | 114.17 | 0.037 | 0.511 | 0.64 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365931.12 | 1547214.73 | -66.69 | 111.00 | 83.04 | -46.61 | 114.18 | 0.037 | 0.511 | 0.66 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365930.28 | 1547216.61 | -68.87 | 114.00 | 85.22 | -46.48 | 114.18 | 0.037 | 0.511 | 0.68 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365929.43 | 1547218.50 | -71.04 | 117.00 | 87.39 | -46.39 | 114.14 | 0.037 | 0.511 | 0.69 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365928.59 | 1547220.39 | -73.21 | 120.00 | 89.56 | -46.39 | 114.16 | 0.037 | 0.511 | 0.71 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365927.74 | 1547222.27 | -75.39 | 123.00 | 91.73 | -46.36 | 114.28 | 0.037 | 0.511 | 0.73 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365926.89 | 1547224.16 | -77.56 | 126.00 | 93.90 | -46.31 | 114.28 | 0.037 | 0.511 | 0.75 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365926.03 | 1547226.05 | -79.72 | 129.00 | 96.07 | -46.21 | 114.19 | 0.037 | 0.511 | 0.77 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365925.18 | 1547227.95 | -81.89 | 132.00 | 98.24 | -46.13 | 114.13 | 0.037 | 0.511 | 0.79 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365924.33 | 1547229.85 | -84.05 | 135.00 | 100.40 | -46.06 | 114.08 | 0.037 | 0.511 | 0.81 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365923.48 | 1547231.75 | -86.21 | 138.00 | 102.56 | -45.95 | 114.20 | 0.037 | 0.511 | 0.82 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365922.63 | 1547233.65 | -88.36 | 141.00 | 104.71 | -45.83 | 114.13 | 0.037 | 0.511 | 0.84 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365921.77 | 1547235.56 | -90.51 | 144.00 | 106.86 | -45.70 | 114.20 | 0.037 | 0.511 | 0.86 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365920.91 | 1547237.48 | -92.66 | 147.00 | 109.00 | -45.56 | 114.23 | 0.037 | 0.511 | 0.88 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365920.05 | 1547239.39 | -94.80 | 150.00 | 111.14 | -45.46 | 114.26 | 0.037 | 0.511 | 0.90 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365919.18 | 1547241.31 | -96.93 | 153.00 | 113.28 | -45.34 | 114.27 | 0.037 | 0.511 | 0.92 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365918.31 | 1547243.24 | -99.06 | 156.00 | 115.41 | -45.23 | 114.32 | 0.037 | 0.511 | 0.94 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365917.44 | 1547245.16 | -101.19 | 159.00 | 117.54 | -45.11 | 114.42 | 0.037 | 0.511 | 0.96 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365916.56 | 1547247.09 | -103.31 | 162.00 | 119.66 | -44.96 | 114.54 | 0.037 | 0.511 | 0.97 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365915.68 | 1547249.02 | -105.43 | 165.00 | 121.78 | -44.86 | 114.63 | 0.037 | 0.511 | 0.99 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365914.79 | 1547250.96 | -107.55 | 168.00 | 123.90 | -44.75 | 114.85 | 0.037 | 0.511 | 1.01 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365913.89 | 1547252.89 | -109.66 | 171.00 | 126.01 | -44.66 | 114.76 | 0.037 | 0.511 | 1.03 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365913.00 | 1547254.83 | -111.76 | 174.00 | 128.11 | -44.57 | 114.80 | 0.037 | 0.511 | 1.05 | Measured | 2007-02-06 08:31 |
| KLX14A | RT90-RHB70 | 6365912.32 | 1547256.30 | -113.36 | 176.27 | 129.71 | -44.57 | 114.80 | 0.037 | 0.511 | 1.06 | Measured | 2007-02-06 08:31 |

Number of rows: 60.
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