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Boremap mapping of core drilled borehole KLX03

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Abstract

Borehole KLX03 is a deep (c 1,000 m) cored borehole, drilled within the site investigation program in the Oskarshamn site investigation area. This telescopic borehole was drilled 2004. No B-hole was drilled, therefore drill core does not exist for the interval 0–100 m. Only drill cuttings are available for this interval.

The principal aim of the mapping activities presented in this report was to obtain a detailed documentation in Boremap of geological structures and lithologies intersected by the borehole KLX03. Geological structures were correctly orientated in space along the borehole. The results will serve as a platform for forthcoming investigations of the drill core, as well as various site descriptive modelling.

The drill core was displayed in its entire length on inclined roller tables and mapped with the Boremap system, in order to get good overview and working situation. Depth registered in the BIPS-image deviates from the true depth in the borehole. This problem was eliminated by adjusting the depth according to reference slots, visible in the BIPS-image, cut into the borehole wall every fiftieth meter (Appendix 8). The mapping was performed on-line on the SKB network, in order to obtain the best possible data security, and quality checked by a standard routine in Boremap before it was exported to the SICADA database.

Geological parameters mapped in Boremap are presented in a Geological Summary table (Appendix 1). This is an easy to read overview of the geological parameters which facilitates comparison between Boremap information collected from different boreholes.

Drill core KLX03 was subdivided into five sections according to interpretation of the Geological Summary table (Appendix 1). Section I (100–450 m) and section II (450–620 m) are made up almost exclusively by Ävrö granite (501044) and sections III (620–730 m), IV (730–800 m) and V (800–1,000 m) by quartz monzodiorite (501036).

Especially section II is very homogeneous and almost lacks structures, alteration and open as well as sealed fractures. Section IV is the most anomalous section in KLX03. It is heterogeneous and made up of 1 to 20 m thick bands of varying lithologies. It is also rich in structures as well as open and sealed fractures and shows the most continuous and strongest oxidation of all sections in KLX03. Section IV can be classified as a deformation zone as shown by richness in structures and fractures and the occurrence of two intervals with strong ductile deformation. The upper interval, 732.45–733.15 m, is accompanied by strong clay alteration in several cm-dm scale bands and the lower interval, 795.10–795.45 m, contain quartz schlieren.

Sammanfattning

Borrhål KLX03 är ett djupt (ca 1 000 m) kärnborrhål, vilket borrats inom ramen för platsundersökningarna i Oskarshamnsområdet. Hålet borrades under 2004. Inget B-hål borrades, så borrkärna saknas för intervallet 0–100 m. Endast borrkax finns i detta intervall.

Huvudsyftet med de karteringsaktiviteter som presenteras i denna rapport var att göra en detaljerad dokumentation i Boremap av de geologiska strukturer och litologier som skärs av borrhål KLX03. Boremapsystemet möjliggör absolut orientering av geologiska strukturer utefter borrhålet. Karterade data kommer att ligga till grund för framtida tolkningar av bergets egenskaper i Laxemarområdet ner till 1 000 m djup.

Borrkärnan lades upp på lutande bord och karterades med Boremap-systemet. Djup som registreras i BIPS-bilden avviker från det sanna djupvärdet i borrhålet. Dessa avvikelser eliminerades genom att djupen justeras i förhållande till, i BIPS-bilden synliga referensmärken, vilka slipats in i borrhålsväggen för var 50:e meter (Appendix 8). För att få största möjliga datasäkerhet skedde karteringen on-line på SKB:s nätverk. Den karterade informationen kvalitetssäkrades genom en standardrutin i Boremap innan den exporterades till databasen SICADA.

Geologiska parametrar presenteras i en Geological Summary table (Appendix 1). Denna tabell är en lättläst översikt över de Boremap-karterade geologiska parametrarna vilket underlättar jämförelse mellan Boremap-information som samlats in från olika borrhål.

Borrhål KLX03 har delats in i fem sektioner enligt tolkningen av Geological Summary table (Appendix 1). Sektion I (100–450 m) och II (450–620 m) består av Ävrögranit (501044). De övriga sektionerna (III 620–730 m, IV 730–800 m och V 800–1 000 m) utgörs av kvartsmonzodiorit (501036).

Sektion II är väldigt homogen och saknar nästan helt strukturer, omvandlingar och även sprickor, såväl öppna som läkta, är lågfrekventa. Sektion IV är den mer anomala delen av KLX03. Litologin är heterogen och utgörs av 1–20 m breda intervall med varierande bergarter. Denna sektion skiljer sig från de övriga, då den är rik på strukturer och rik på både läkta och öppna sprickor. Oxidationen i denna sektion är den mest uthålliga och har den starkaste intensiteten i KLX03. Sektion IV kan klassas som en deformationszon, vilket visar sig i att den uppvisar många strukturer och sprickor. Två kortare intervall i denna sektion uppvisat stark plastisk deformation. Det övre intervallet som är 60 cm, från (732,45 m), har blivit utsatt för stark leromvandling i flera centimeter till decimeter breda band. Det lägre intervallet 30 cm brett (795,10 m), innehåller kvartssliror.

Contents

1 Introduction

This document reports the data gained by Boremap mapping of the borehole within the Laxemar investigation area, which is one of the activities performed within the site investigations at Oskarshamn. The work was carried out in accordance with activity plan AP PS 400-04-103. In Table 1-1 controlling documents for performing this activity are listed. Both activity plan and method descriptions are SKB's internal controlling documents.

Since 2002, SKB investigates two potential sites for a deep deposition of 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 km at these sites, SKB has initiated a drilling program using core drilled boreholes.

The borehole KLX03 was drilled in 2004 and the borehole is situated within the Laxemar area (Figure 1-1). KLX03 is telescopic, which means that the uppermost 100 m were drilled by percussion drilling followed by core drilling (100–1,000 m). Therefore no drill core exists for the uppermost 100 m.

Detailed mapping of the drill cores is essential for a three dimensional understanding of the geology at depth. The mapping is based on the use of so called BIPS-images of the borehole wall and by the study of the drill core itself. The BIPS-images enable the study of orientations, since the Boremap software calculates strike and dip of planar structures such as foliations, rock contacts and fractures. Also the fracture apertures in the rock can be estimated.

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

Activity plan	Number	Version
Boremapkartering av kärnborrhål KLX03	AP PS 400-04-103	1.0
Method descriptions	**Number**	**Version**
Nomenklatur vid Boremapkartering	PM internal document	2004-02-05
Method Description for Boremap mapping	SKB MD 143.006	1.0

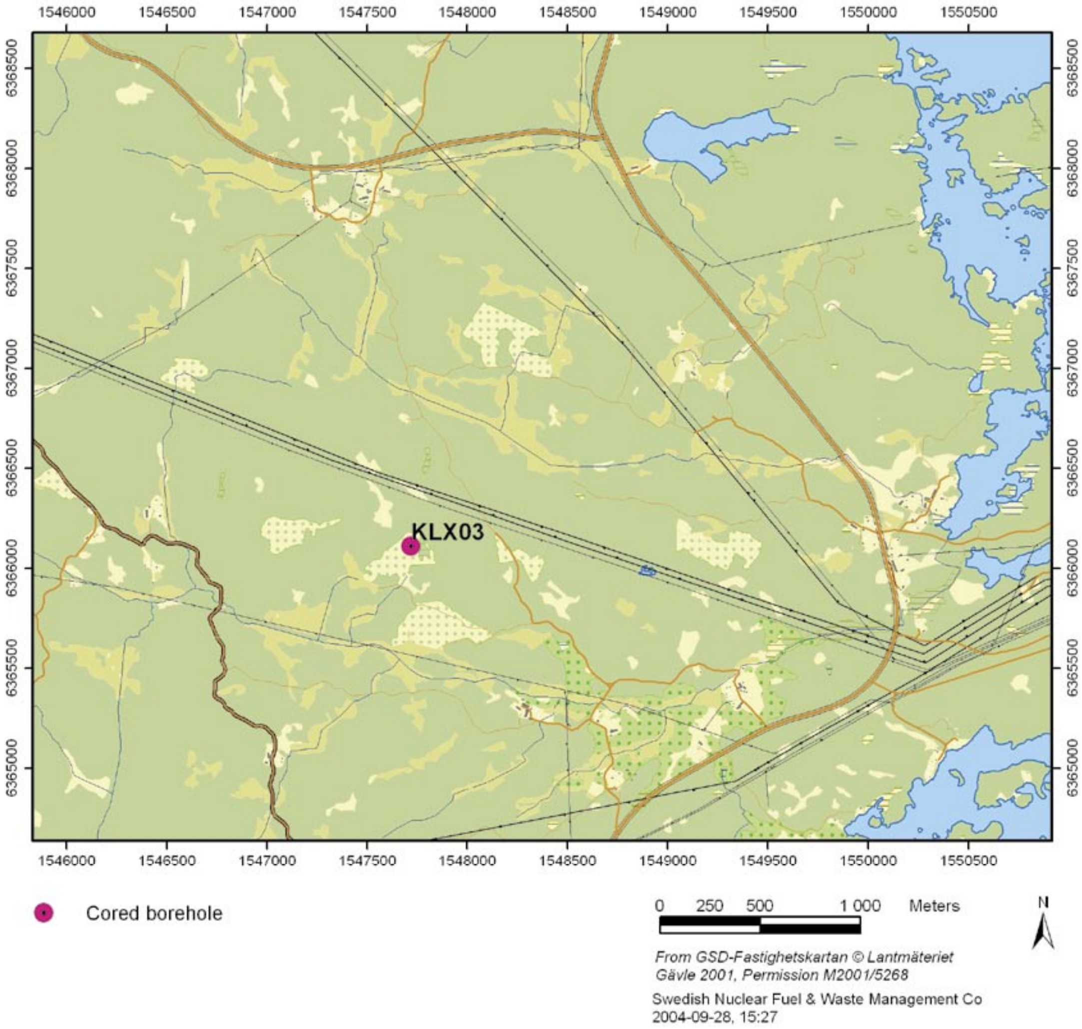


Figure 1-1. *Location of the core drilled borehole KLX03.*

2 Objective and scope

The principal aim of the mapping activities presented in this report is to obtain a detailed documentation of geological structures and lithologies intersected by the borehole KLX03. Geological structures will be correctly orientated in space along the borehole. The results 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

The mapping was performed in Boremap v. 3.4.3.1, with bedrock and mineral standards of SKB. The final data presentation was made using StereoNet, WellCad v. 3.2, and BIPS Image Print.

Boremap is the software that unite orthodox core mapping with modern video mapping. The software deals with the mapping data as well as the internal communication between programs. Boremap shows the video 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 was used to facilitate the core mapping: folding rule and pen, hydrochloric acid, knife, water-filled atomizer and hand lens.

3.3 BIPS-image video film sequences

The BIPS video film of KLX03 covers the interval 101.48–998.10 m and the drill core the interval 101.43–1,000.12 m.

3.4 BIPS-image video film quality

The main reasons why thinner fractures are visible or not in the BIPS-image are image resolution, image contrast and image quality.

3.4.1 BIPS-image resolution

The BIPS-image resolution is perhaps the principal reason why very thin fractures as well as very thin apertures are not visible in the BIPS-image. The theoretical resolution depends on the BIPS video camera pixel size and illumination angle. In this case one pixel represents 0.66 mm × 1 mm (width × length).

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 colour contrast between the fracture and the wall rock.

A light fracture in a dark rock is clearly visible in the BIPS-image. A light fracture in a light 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 the rare case 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. Such fractures were given the mineral code X9 in first mineral fill.

3.4.3 BIPS-image quality

The BIPS-image quality is sometimes limited by disturbances such as:

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 right 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.

Problems related to the video camera aperture and the enlargement of pixels are can be neglected in KLX03.

The main disturbances for the BIPS-image quality in KLX03 are vertical bleached bands but also blackish coatings.

The image quality is classified into four classes; good, acceptable, bad and very bad. With good quality means a more or less clear image, easy to interpret. With acceptable quality means that the image is not really good, but that the mapping can be performed without problems. An image with bad quality is somewhat difficult to interpret and an image with very bad quality cannot be interpreted and only very obvious and outstanding features can be mapped. It should be remembered that even if only 10–20% of the image is visible this is often enough for an acceptable interpretation. When the BIPS-image quality is so bad that fractures and structures can not be identified in the BIPS-image, they can still be oriented using the *guide-line method* (chapter 4.3.3). Better cleaning of the borehole could increase the mapping quality drastically.

The BIPS-image quality in KLX03 is presented in Table 3-1.

Table 3-1. BIPS-image quality.

Sec Up (m)	Sec Low (m)	Interval (m)	Quality
101	110	9	Bad-Very bad
110	145	35	Good-Acceptable
145	185	40	Bad-Very bad
185	220	35	Good-Acceptable
220	290	70	Good
290	389	99	Good-Acceptable
389	440	51	Acceptable
440	495	55	Good-Acceptable
495	535	40	Bad-Very bad
535	665	130	Acceptable
665	705	40	Good
705	760	55	Good-Acceptable
760	795	35	Acceptable
795	898	103	Good-Acceptable
898	909	11	Bad-Very bad
909	964	55	Acceptable
964	998	34	Bad-Very bad

4 Execution

4.1 General

The Boremap-mapping of the telescopic drilled borehole KLX03 was performed and documented according to activity plan AP PS 400-04-103 (SKB, internal document) referring to the Method Description for Boremap mapping (SKB MD 143.006, v.1.0, SKB, internal controlling document).

The first 100 m of KLX03 was drilled using percussion drilling technique and therefore no drill core was received. The core therefore covers the interval 101.43–1,000.12 m.

The whole drill core was displayed on inclined roller tables in its entire length and mapped with the Boremap-system at Simpevarp core mapping facility. The core mapping was carried out without detailed geological knowledge of the area but with access to rock samples and geophysical logs.

The mapping was performed by Jan Ehrenborg (Mírab) and Peter Dahlín (GEOSIGMA).

4.2 Preparations

Any depth registered in the BIPS-image deviates from the true depth in the borehole, a deviation which increases with depth. This problem was eliminated by adjusting the depth according to reference slots cut into the borehole every fiftieth meter (Appendix 8). The level for each slot was measured in the BIPS-images and then adjusted to the correct level using the correct depth value from the SICADA database.

The observations were oriented in true space. Data necessary for this adjustment were borehole diameter and borehole orientation; both collected from SICADA database (Appendices 6 and 7).

4.3 Execution of measurements

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

4.3.1 Fracture definitions

Definition of different fracture types, also crush and sealed fracture network, are found in a PM "Nomenklatur vid Boremapkartering" (internal SKB document). Apertures for broken fractures have been mapped in accordance with the definitions in this PM.

In the mapping phase, fractures that have parted the core are mapped as BROKEN and fractures that have not parted the core are mapped as UNBROKEN. All fractures are described with their fracture minerals and other characteristics, such as width and aperture. Visible apertures are measured down to 1 mm in the BIPS-image. Smaller apertures, which are impossible to measure in the BIPS-image, are denoted a value of 0.5 mm. Core pieces with bad fit were characterized as "probable aperture" and fractures with a dull or altered surface as "possible aperture".

All fractures that have apertures > 0 mm, are in SICADA database interpreted as OPEN. Only few BROKEN fractures are given the aperture 0 mm. Usually UNBROKEN fractures have apertures = 0 mm, but if UNBROKEN fractures possess apertures > 0 mm, they are interpreted as "partly open" and included in the OPEN-category. OPEN and SEALED fractures are finally frequency calculated and shown in (Appendices 1 and 5).

4.3.2 Fracture alteration and joint alteration number

The joint alteration number is principally related to the thickness of, and the clay content in, a fracture. Thicker fractures rich in clay minerals therefore get joint alteration numbers 2–3. The majority of fractures in KLX03, however, are very thin to extremely thin and seldom contain clay minerals and therefore receive a 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 and was 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 were considered as fresh. The joint alteration number is thus set to 1.

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

Joint alteration number equal to 1.5

Other minerals as epidote, prehnite, hematite, chlorite and/or clay minerals are regarded as fracture minerals most likely resulting from altered wall rock material. 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 thicker and contain a few mm thick bands of clay minerals, often together with minerals like epidote and chlorite, the joint alteration number is set to 2. In rare cases, when a fracture contains 5–10 mm thick clayey bands, together with epidote and 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 were 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:

- Absolute depth.
- Amplitude (along core). The interval along a drill core which is cut by a fracture, i.e. from upper to lower extremes of a fracture 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.

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. Anyhow, the *guide-line method* is so far considered better than only marking fractures that are non-visible in the BIPS-images as planes perpendicular to the borehole. 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.

When using the *guide-line method* the difference between the 50 mm drill core diameter and the 76 mm borehole diameter must be considered. This difference result in displacements of the structures seen in the drill core compared with the structures seen in the BIPS-image which represents the borehole walls. This displacement is zero for structures that cut the drill core at right angle and successively becomes larger as the orientation of the structure approximates the direction of the drill core axis. This displacement always has to be corrected for, since displacements of a few cm are common even if they seldom reach 10 cm.

Orientation of fractures and other structures with the *guide-line method* is done in the following way: The first step in the guide-line method is to correct the amplitude of the fracture trace in the BIPS-image to the higher amplitude value. 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 is then located at the correct depth according to the depth measured on the drill core.

The *guide-line method* can be used to orientate any fracture/structure that is not visible or 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 fracture/structure as the personnel delineating the fracture trace in the BIPS-image, especially in intervals rich in fractures.

4.3.4 Definition of veins and dikes

Veins and dykes are differentiated by their respectively width. Veins are set to 0–20 cm wide and dykes are set to 20–100 cm wide. Since the maximum width of *rock occurrence* is 100 cm wider dykes are mapped under *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:

X1 gypsum.

X2 apophyllite.

X5 whitish, bleached feldspar.

X6 the drill core is broken at right angle to the drill core and the broken surfaces have a polished appearance. This is believed to indicate that a sealed fracture broke up during drilling and where the two drill core parts have rotated against each other wearing away the mineral fill.

X7 broken fracture with a fresh appearance and no mineral fill.

X8 fractures with epidotized walls.

X9 sealed fractures visible in the BIPS-image but not in the drill core.

4.4 Data handling

The mapping 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.

The mapping is 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. Only these data are to be used for further interpretation and modelling.

4.5 Geological Summary table, general description

The Geological Summary table (Appendix 1) is an overview of the geological parameters mapped with the Boremap system. It also facilitates comparisons between Boremap information collected from different boreholes and is more objective than a pure descriptive borehole summary.

The Geological Summary table is the result of cooperation between Jan Ehrenborg from the mapping personnel at Simpevarp and Pär Kinnbom from PO (site investigation, Oskarshamn). The aim was to make a standard form in handy A4-size, where all information is taken directly from the SICADA database by using simple and well defined search paths for each geological parameter (Appendix 2).

The search paths are, however, yet not automatic and the geological information therefore has to be extracted from the SICADA database before it is reworked on separate Excel-files and finally presented in the Geological Summary table. At the moment it is only possible to extract the Rock Type and Alteration parameters directly from the SICADA database.

The main reason why the information in the SICADA database cannot be extracted automatically is the lack of a mathematical formula for calculation of frequencies for different parameters. Such a formula will be added.

The Geological Summary table is made up of 23 columns, each one representing a specific geological parameter. The geological parameters are presented as either intervals or frequencies. Intervals are calculated for parameters with a width ≥ 1 m and frequencies for parameters with a width < 1 m. Frequency information is treated as if it does not have any extension along the borehole axis. They are treated as point observations. It should be noted that parameters with a thickness of only 1 mm therefore has 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-oxidation*.
- No *unbroken fractures* are mapped in intervals of *sealed fracture network*.
- No *broken fractures* are mapped in intervals with *crush*.
- Composite dykes generally include a large amount of fine- to medium-grained granite veins (511058). These veins are not mapped and the frequency presented for veins + dykes in column 6 (Appendix 1) are lower than the true frequency in composite dyke 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 / Oxidation*, interval column. No frequency column is presented for alteration/oxidation. The alteration/oxidation column is 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 + Dykes < 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.

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 / Foliation < 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 / Foliation ≥ 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 and this includes unbroken fractures where the drill core is not broken 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 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 certain and > 0.5*, frequency column. This column includes fractures that with certainty 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.

5 Results

The results of the Boremap mapping of KLX03 are principally found in the appendices. The information in from Boremap database has been compressed to the size of an A4-sheet in the Geological Summary table, Appendix 1. The search paths for the Geological Summary table are presented in Appendix 2. Stereographic diagrams of the orientation of open fractures are presented in Appendix 3. The BIPS-images of KLX03 are shown in Appendix 4 and the corresponding WellCad diagrams in Appendix 5. In-data, like borehole length, diameter and borehole orientation data are presented in Appendices 6, 7 and 8.

5.1 Geological Summary table, KLX03

All length information in this chapter is taken from the Geological Summary table and therefore includes an error of 5–10 m.

The Geological Summary table for KLX03 is presented in Appendix 1.

Rock types mapped in KLX03 are shown in Table 5-1.

The interval 100–620 m is made up of Ävrö granite (501044) and the interval 620–1,000 m of quartz monzodiorite (501036). Sparsely occurring 1–30 m thick bands of other lithologies occur all through KLX03. Interval 730–800 m is the lithologically most heterogeneous interval of KLX03.

Oxidation occurs all through KLX03 except for interval 380–610 m. Interval 100–380 m is sparsely and faintly oxidized, the strongest oxidation occur in the interval 610–820 m and the interval 820–1,000 m is rather faintly oxidized like the upper part of KLX03.

The vein frequency does not show any significant changes throughout KLX03 except for higher frequencies in the interval 620–730 m. The minima in vein frequencies in the interval 730–800 m are probably artificial since the fine-grained diorite-gabbro (505102) at 730 and 790 m are very rich in veins. These are, however, included in the rock type and therefore not mapped with the Boremap system. It is thus believed that the true vein frequency maxima in KLX03 cover the interval 620–800 m.

Shear structures occur sparsely all through KLX03. The peak at 810 m is probably related to the deformation in section IV which covers the interval 730–800 m.

Table 5-1. Rock types in KLX03.

Percent of whole core	Rock type
56.4%	Ävrö granite (501044)
37.0%	Quartz monzodiorite (501036)
3.2%	Fine-grained diorite-gabbro (505102)
1.9%	Diorite/gabbro (501033)
1.1%	Fine-grained granite (511058)
0.1%	Fine-grained dioritoid (501030)

Breccias are sparse in KLX03. Most breccias are located to the interval 730–780 m within section IV. The thickest breccia, over 1 m wide, also occur in this interval.

No mylonites were mapped in KLX03.

Foliation structures occur all through KLX03. They are more common in the interval 600–800 m. Foliation is frequent and stronger in the fine-grained diorite-gabbro (505102) and the fine-grained granite (511058) bands. The interval 100–620 m which is almost exclusively made up of Ävrö granite (501044) almost lack foliation.

Maxima and minima in the frequencies of unbroken fractures (interpreted) and broken fractures (interpreted) follow one another all through KLX03. Normal fracture frequencies in the interval 100–450 m are followed by low fracture frequencies in the interval 450–620 m. Thereafter follows frequency maxima in the interval 620–800 m and the fracture frequencies drops in the interval 800–1,000 m especially for broken fractures (interpreted). Especially interval 730–800 m show frequency maxima of broken fractures.

High joint alteration numbers are more common in the interval 620–800 m than in the rest of KLX03.

Intervals with crush are rare throughout KLX03 and where they occur they never reach any significant thickness.

KLX03 has been subdivided into five sections according to rock types, alteration intensities, structures and fractures as shown in the Geological Summary table (Appendix 1).

Section I, 100–450 m, is made up of Ävrö granite (501044) except for very few and thin bands with other lithologies. This section is sparsely and faintly oxidized and no geological parameter stands out. Fracture frequencies are normal and the section is homogeneous with respect to the geological parameters mapped.

Section II, 450–620 m, is also made up of Ävrö granite (501044) but bands with other lithologies are extremely rare. Oxidation is almost missing and fracture frequencies, both for broken and unbroken fractures, is the lowest in KLX03. Also structures and rock occurrences show very low frequencies.

Section III, 620–730 m, is made up of quartz monzodiorite (501036). Frequencies of rock occurrences, foliated zones, broken and unbroken fractures and high joint alteration numbers are higher than in sections I and II and oxidation is stronger.

Section IV, 730–800 m, is the most anomalous section in KLX03. This section is lithologically the most heterogeneous section in KLX03 although it is dominated by quartz monzodiorite (501036). Several, up to 15 m thick, bands of other lithologies occur. All of this section is oxidized with varying intensities. Structures are more common in other sections, for example, breccias and foliated intervals. Long sections of sealed fracture networks occur; broken fractures show stronger maxima than in the rest of KLX03 and section IV show strong maxima in the frequencies of high joint alteration numbers.

Section V, 800–1,000 m, is made up of quartz monzodiorite (501036) with the exception of an approximately 5 m thick band of fine-grained granite (511058) at approximately 900 m. Section V is rather faintly oxidized in thin scattered zones, does not show any maxima in structure frequencies, low broken fracture frequencies and no crush zones. The band of fine-grained granite (511058) show strong foliation and is almost covered with a continuous sealed fracture network indicating that the granite has served as a local deformation zone within section V.

The only geologically outstanding section in KLX03 is section IV. This section can be defined as a deformation zone as indicated by rapidly alternating lithologies, rather strong and continuous oxidation, maxima in breccia frequencies, strong ductile deformation accompanied by chlorite alteration in bands of melanocratic rock, long intervals of sealed fracture network, high frequencies of broken fractures and high joint alteration numbers. Strong ductile deformation in fine-grained diorite-gabbro (505102) bands occur at intervals 732.45–733.15 m and 795.10–795.45 m. Clay alteration accompany the deformation in several cm-dm scale bands at 732.44–732.47 m, 732.58–732.80 m, 732.86–732.88 m, 732.98–733.05 m, and 733.14–733.16 m. Schlieren with quartz occur in the probable deformation zone 795.10–795.45 m.

5.2 Orientation of broken fractures

Broken fractures are presented in stereogram for each 100 m interval in KLX03 (Appendix 3). Fracture orientation values are strike/dip values using the right hand rule.

The orientation for borehole KLX03 at ground zero level is 199/-74.5°.

Broken fractures not visible in the BIPS-image were oriented according to the *guide-line method* (see chapter 4.2.3). In rare cases where it was impossible to use the *guide-line method* these fractures have a comment and are not oriented.

There is a general strong overrepresentation of broken fractures cutting the core at high angles compared to fractures cutting the core at low angles. This results in artificially high anomaly values for fractures cutting the borehole at high angles and in distortion of anomaly shapes in the stereographic plots. These distortions show up as a tendency for anomalies to obtain a semi-circular shape, effects that are stronger the longer the plotted depth interval. It is therefore not recommended to plot intervals longer than 100 m in stereograms.

A sub horizontal fracture set (5–18°) show up as the strongest anomaly for broken fractures all through KLX03. The orientation of this fracture set varies strongly with depth partly depending on low dip angles. Common orientations are WNW-ESE and NNW-SSE.

The strongest stereogram maximum in KLX03, except for the sub horizontal fracture set maximum, is a WNW-ESE fracture set with high dip angles (70–81°).

Very few and weak fracture set maxima occur in the NW-SE to NNW-SSE to N-S sector.

A NNE-SSW fracture set maximum with moderate dip (45–54°) occur in the interval 300–1,000 m. This fracture set have a more NE-SW orientation in the interval 500–600 m and a more N-S orientation in the interval 700–800 m.

ENE-WNW fracture set orientations are extremely rare and the only stereogram maximum occurs in the interval 900–1,000 m (67°).

Fractures with W-E orientations and high dip angle (85–90°) occur as low to very low stereographic maxima all through KLX03.

Almost all fractures in the interval 220–270 m dip < 30°. This trend can be extended to the interval 190–300 m.

5.3 Fracture mineralogies

Percentages of minerals on open fractures are shown in Table 5-2 and percentages of minerals in sealed fractures are shown in Table 5-3. Hematite, adularia, prehnite, laumontite, sericite, chalcopyrite, apophyllite, sphalerite and fluorite were excluded since each one of these mineral represented < 1%.

Mineral fillings detected on broken fractures were to 60% made up of chlorite and calcite, with approximately 30% each and clay minerals and pyrite with approximately 10% each.

Mineral fillings detected on unbroken fractures were to 50% made up of calcite and oxidized walls (not a mineral fill) and quartz and chlorite together make up approximately 25%.

Table 5-2. Percentages of mineral fillings in open fractures, KLX03.

Percent	Mineral
31.9	Chlorite
28.3	Calcite
10.9	Clay minerals
9.7	Pyrite
7.2	Oxidized Walls
4.2	Hematite
2.5	Quartz
1.9	Epidote

Table 5-3. Percentages of mineral fillings in sealed fractures in KLX03.

Percent	Mineral
25.7	Calcite
23.6	Oxidized walls
13.4	Chlorite
12.7	Quartz
8.9	X8 (epidotized walls.)
4.1	Pyrite
3.7	Epidote
2.8	X7 (no visible mineral fill and fresh fracture surfaces)
1.4	X1 (gypsum)
1.0	Clay minerals

6 Discussion

The information presented in the Geological Summary table has so far been extracted directly from the SICADA database and from Excel files of Mapping Data and Comments from Boremap database. No information presented in the Geological Summary table for KLX03 is taken from other Comment Excel files as for earlier boreholes.

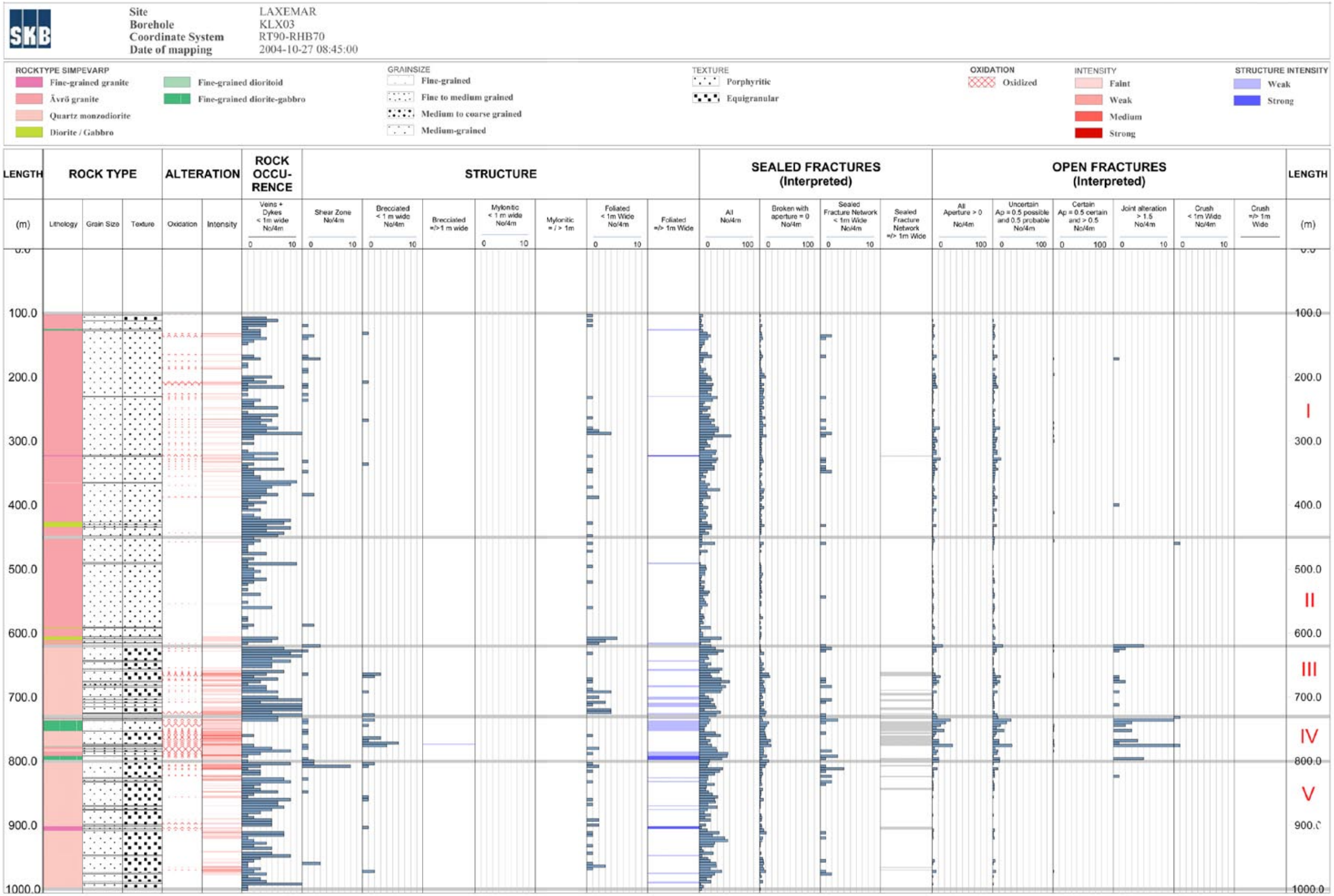
The structural term *veined* is in KLX03 used for rocks interpreted as hybrids between two different magma types. The rock type name is from the principal magma type.

The concept *sealed network* has been extended to include also unbroken fractures that are extremely thin no matter whether they can be seen only in the drill core, only in the BIPS-image or in both. Numerous very thin unbroken fractures with oxidized walls are a good example of this. These fractures can mostly be identified both in the drill core and the BIPS-image but this can be a time consuming task if such fractures are plentiful.

Breaks at approximately right angle to the drill core might be interpreted as broken fractures. This can result in artificial maxima of broken fractures in stereograms.

Appendix 1

Geological Summary table, KLX03



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	Oxidation	7	Sub 1 = 700		Interval
	Oxidation intensity	7	Sub 1 = 700	Sub 2	Interval
Rock occurrence	Vein + dyke	31	Sub 1 = 2 and 18		Frequence
Structure	Shear zone	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
	Foliation zone, < 1 m wide	31	Sub 4 = 81		Frequence
	Foliation zone, >/= 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 certain	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

Stereographic projections of open fractures, KLX03

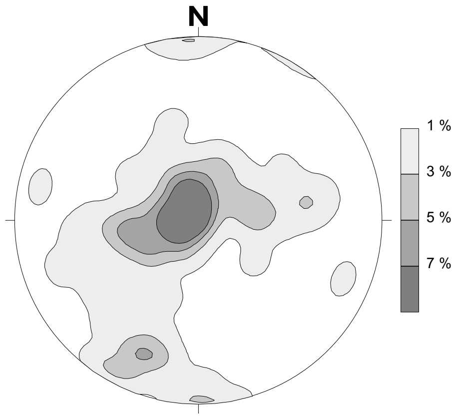


Figure 1: Open fractures 100-200m (n=105)

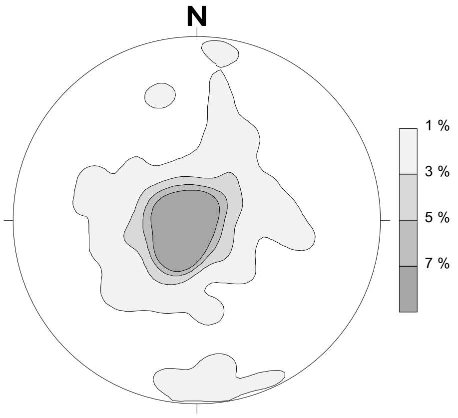


Figure 2: Open fractures 200-300m (n=218)

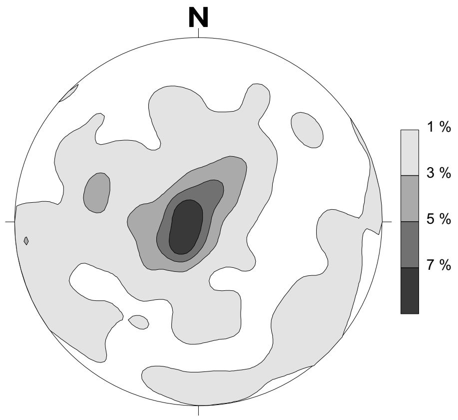


Figure 3: Open fractures 300-400m (n=118)

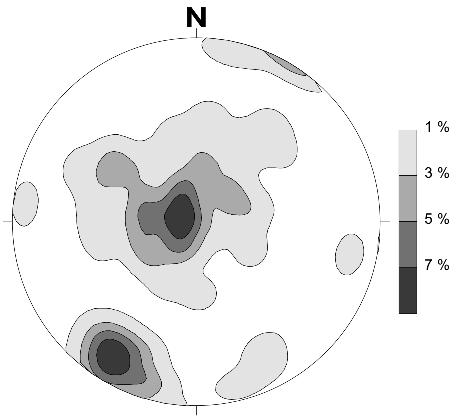


Figure 4: Open fractures 400-500m (n=86)

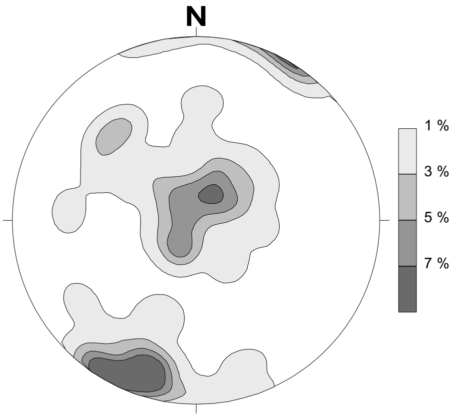


Figure 5: Open fractures 500-600m (n=70)

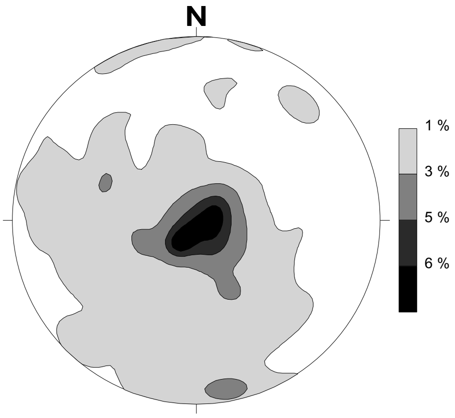


Figure 6: Open fractures 600-700m (n=223)

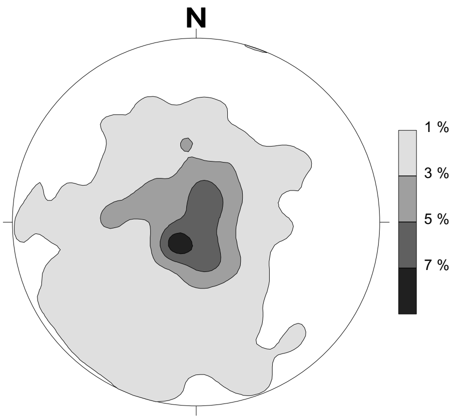


Figure 7: Open fractures 700-800 (n=454)

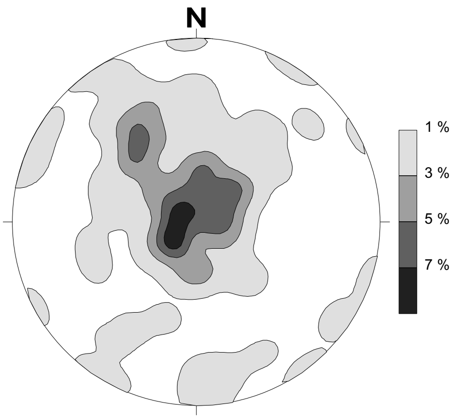


Figure 8: Open fractures 800-900m (n=101)

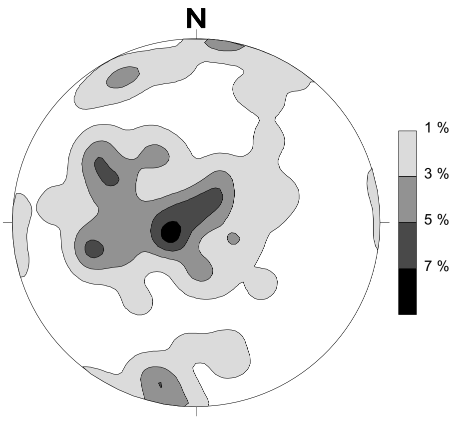


Figure 9: Open fractures 900-1000m (n=105)

Appendix 4

BIPS-images of KLX03

Borehole Image Report

Borehole Name:	KLX03
Mapping Name:	KLX03_JEPD_1
Mapping Range:	100.000 - 994.336 m
Diameter:	76.0 mm
Printed Range:	100.000 - 994.336
Pages:	37

Image File Information:

File:	C:\PROGRAM\Boremap\KLX03\KLX03_100-994m.BIP
Date/Time:	2004-09-26 08:32:00
Start Depth:	100.000 m
End Depth:	994.336 m
Resolution:	1.00 mm/pixel (depth)
Orientation:	Gravmetric
Image height:	894336 pixels
Image width:	360 pixels
BIP Version:	BIP-III
Locality:	LAXEMAR
Borehole:	KLX03
Scan Direction:	Down
Color adjust:	0 0 0 (RGB)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 100.000 - 125.000 m
Azimuth: 201.3
Inclination: -75.0

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 2 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

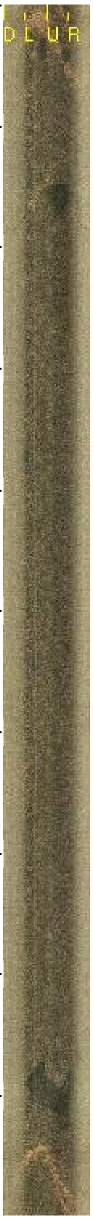
Depth range: 125.000 - 150.000 m
Azimuth: 202.9
Inclination: -75.1

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 3 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 150.000 - 175.000 m
Azimuth: 204.3
Inclination: -75.0

150.000
150.269
150.500
150.772
151.000
151.275
151.500
151.778
152.000
152.281
152.500
152.783
153.000
153.286
153.500
153.789
154.000
154.292
154.500
154.794



155.000
155.297
155.500
155.800
156.000
156.303
156.500
156.805
157.000
157.308
157.500
157.811
158.000
158.314
158.500
158.816
159.000
159.319
159.500
159.822

160.000
160.325
160.500
160.827
161.000
161.330
161.500
161.833
162.000
162.336
162.500
162.838
163.000
163.341
163.500
163.844
164.000
164.347
164.500
164.849

165.000
165.352
165.500
165.855
166.000
166.358
166.500
166.860
167.000
167.363
167.500
167.866
168.000
168.369
168.500
168.871
169.000
169.374
169.500
169.877

170.000
170.380
170.500
170.882
171.000
171.385
171.500
171.888
172.000
172.391
172.500
172.893
173.000
173.396
173.500
173.899
174.000
174.402
174.500
174.904

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 4 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 175.000 - 200.000 m
Azimuth: 204.6
Inclination: -75.1

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 5 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 200.000 - 225.000 m
Azimuth: 206.2
Inclination: -75.1

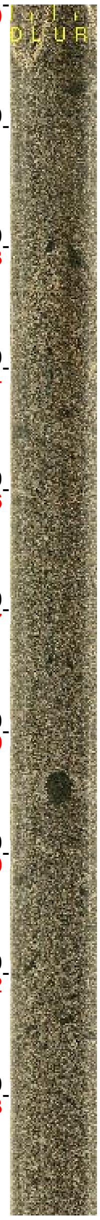
Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 6 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 225.000 - 250.000 m
Azimuth: 207.9
Inclination: -75.1

225.000 / 225.619
225.500 / 226.121
226.000 / 226.622
226.500 / 227.124
227.000 / 227.625
227.500 / 228.127
228.000 / 228.628
228.500 / 229.130
229.000 / 229.631
229.500 / 230.133

230.000 / 230.635
230.500 / 231.136
231.000 / 231.638
231.500 / 232.139
232.000 / 232.641
232.500 / 233.142
233.000 / 233.644
233.500 / 234.145
234.000 / 234.647
234.500 / 235.148



235.000 / 235.650
235.500 / 236.151
236.000 / 236.653
236.500 / 237.154
237.000 / 237.656
237.500 / 238.157
238.000 / 238.659
238.500 / 239.160
239.000 / 239.662
239.500 / 240.163

240.000 / 240.665
240.500 / 241.166
241.000 / 241.668
241.500 / 242.169
242.000 / 242.671
242.500 / 243.172
243.000 / 243.674
243.500 / 244.175
244.000 / 244.677
244.500 / 245.178

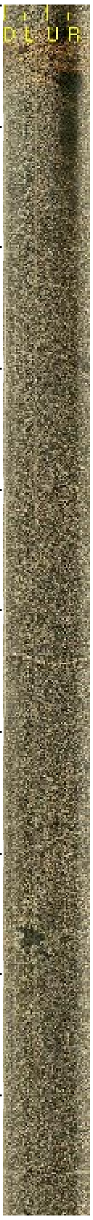
245.000 / 245.680
245.500 / 246.181
246.000 / 246.683
246.500 / 247.184
247.000 / 247.686
247.500 / 248.188
248.000 / 248.689
248.500 / 249.191
249.000 / 249.692
249.500 / 250.194

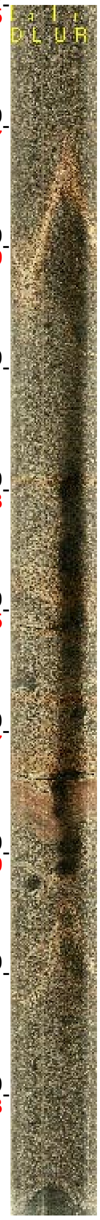
Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 7 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 250.000 - 275.000 m
Azimuth: 208.9
Inclination: -75.2

250.000	250.696	255.000	255.715	260.000	260.735	265.000	265.754	270.000	270.774
250.500	251.198	255.500	256.217	260.500	261.237	265.500	266.256	270.500	271.276
251.000	251.700	256.000	256.719	261.000	261.739	266.000	266.758	271.000	271.778
251.500	252.202	256.500	257.221	261.500	262.241	266.500	267.260	271.500	272.280
252.000	252.704	257.000	257.723	262.000	262.743	267.000	267.762	272.000	272.782
252.500	253.205	257.500	258.225	262.500	263.245	267.500	268.264	272.500	273.284
253.000	253.707	258.000	258.727	263.000	263.747	268.000	268.766	273.000	273.786
253.500	254.209	258.500	259.229	263.500	264.249	268.500	269.268	273.500	274.288
254.000	254.711	259.000	259.731	264.000	264.751	269.000	269.770	274.000	274.790
254.500	255.213	259.500	260.233	264.500	265.252	269.500	270.272	274.500	275.292





Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 8 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 275.000 - 300.000 m
Azimuth: 210.6
Inclination: -75.2

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 9 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 300.000 - 325.000 m
Azimuth: 212.0
Inclination: -75.4

300.000
300.892
300.500
301.394
301.000
301.896
301.500
302.398
302.000
302.900
302.500
303.402
303.000
303.904
303.500
304.406
304.000
304.908
304.500
305.410

305.000
305.912
305.500
306.414
306.000
306.916
306.500
307.418
307.000
307.920
307.500
308.423
308.000
308.925
308.500
309.427
309.000
309.929
309.500
310.431

310.000
310.933
310.500
311.435
311.000
311.937
311.500
312.439
312.000
312.941
312.500
313.443
313.000
313.945
313.500
314.447
314.000
314.949
314.500
315.451

315.000
315.953
315.500
316.455
316.000
316.958
316.500
317.460
317.000
317.962
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318.464
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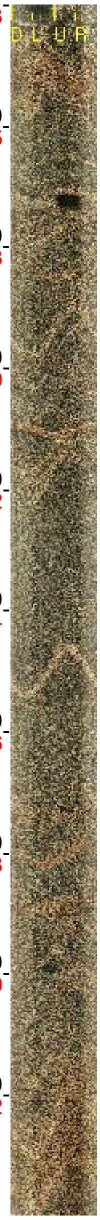
318.966
318.500
319.468
319.000
319.970
319.500
320.472



320.000
320.974
320.500
321.476
321.000
321.978
321.500
322.480
322.000
322.982
322.500
323.484
323.000
323.986
323.500
324.488
324.000
324.990
324.500
325.493

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 10 (37)

Borehole: KLX03

Mapping: KLX03_JEPD_1

Depth range: 325.000 - 350.000 m

Azimuth: 212.0

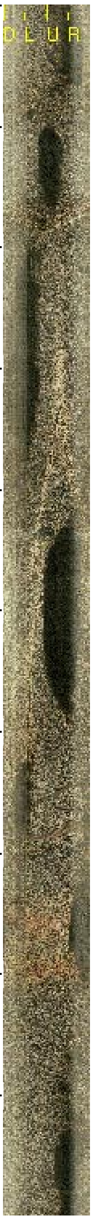
Inclination: -75.4

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 11 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 350.000 - 375.000 m
Azimuth: 214.1
Inclination: -75.5

350.000
351.097
350.500
351.599
351.000
352.101
351.500
352.603
352.000
353.105
352.500
353.607
353.000
354.108
353.500
354.610
354.000
355.112
354.500
355.614



355.000
356.116
355.500
356.618
356.000
357.120
356.500
357.622
357.000
358.124
357.500
358.625
358.000
359.127
358.500
359.629
359.000
360.131
359.500
360.633

360.000
361.135
360.500
361.637
361.000
362.139
361.500
362.640
362.000
363.142
362.500
363.644
363.000
364.146
363.500
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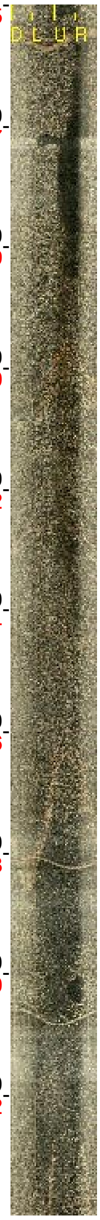
365.150
364.500
365.652



365.000
366.154
365.500
366.656
366.000
367.157
366.500
367.659
367.000
368.161
367.500
368.663
368.000
369.165
368.500
369.667
369.000
370.169
369.500
370.671

370.000
371.173
370.500
371.674
371.000
372.176
371.500
372.678
372.000
373.180
372.500
373.682
373.000
374.184
373.500
374.686
374.000
375.188
374.500
375.689

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 12 (37)

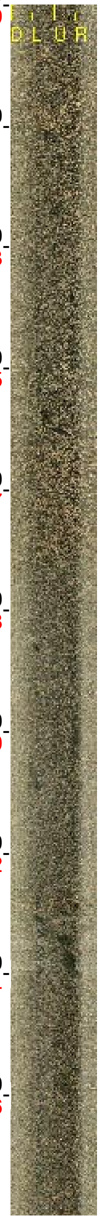
Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 375.000 - 400.000 m
Azimuth: 214.1
Inclination: -75.6

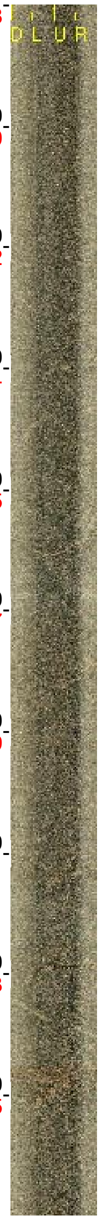
375.000
376.191
375.500
376.693
376.000
377.195
376.500
377.697
377.000
378.199
377.500
378.701
378.000
379.203
378.500
379.705
379.000
380.206
379.500
380.708

380.000
381.210
380.500
381.712
381.000
382.214
381.500
382.716
382.000
383.218
382.500
383.720
383.000
384.221
383.500
384.723
384.000
385.225
384.500
385.727

385.000
386.229
385.500
386.731
386.000
387.233
386.500
387.735
387.000
388.237
387.500
388.738
388.000
389.240
388.500
389.742
389.000
390.244
389.500
390.746



390.000
391.248
390.500
391.750
391.000
392.252
391.500
392.754
392.000
393.255
392.500
393.757
393.000
394.259
393.500
394.761
394.000
395.263
394.500
395.765



395.000
396.267
395.500
396.769
396.000
397.271
396.500
397.772
397.000
398.274
397.500
398.776
398.000
399.279
398.500
399.782
399.000
400.284
399.500
400.786

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 13 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

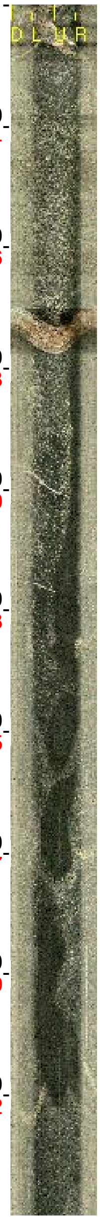
Depth range: 400.000 - 425.000 m
Azimuth: 215.6
Inclination: -75.7

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 14 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 425.000 - 450.000 m
Azimuth: 216.1
Inclination: -75.9

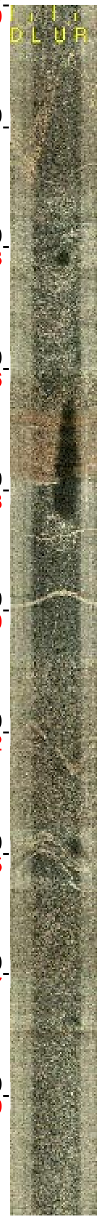
425.000	426.401
425.500	426.904
426.000	427.406
426.500	427.908
427.000	428.410
427.500	428.913
428.000	429.415
428.500	429.917
429.000	430.419
429.500	430.922



430.000	431.424
430.500	431.926
431.000	432.428
431.500	432.931
432.000	433.433
432.500	433.935
433.000	434.437
433.500	434.940
434.000	435.442
434.500	435.944

435.000	436.446
435.500	436.949
436.000	437.451
436.500	437.953
437.000	438.455
437.500	438.958
438.000	439.460
438.500	439.962
439.000	440.464
439.500	440.967

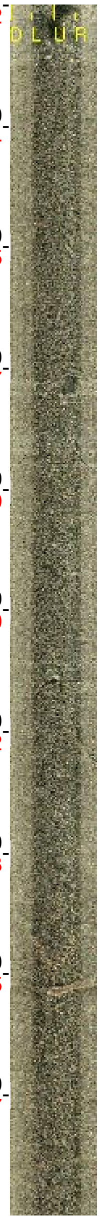
440.000	441.469
440.500	441.971
441.000	442.473
441.500	442.976
442.000	443.478
442.500	443.980
443.000	444.482
443.500	444.985
444.000	445.487
444.500	445.989



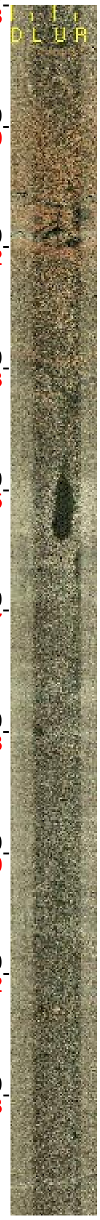
445.000	446.491
445.500	446.994
446.000	447.496
446.500	447.998
447.000	448.500
447.500	449.003
448.000	449.505
448.500	450.007
449.000	450.509
449.500	451.010

Printed: 2005-03-07 15:14:29　Scale: 1 : 25　Aspect: 150 %　15 (37)

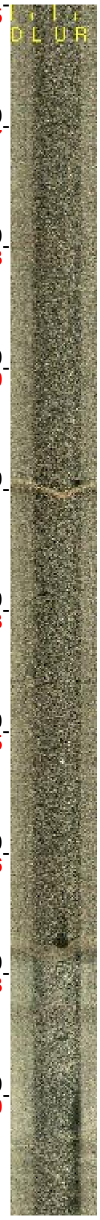
450.000 451.512
450.500 452.014
451.000 452.515
451.500 453.017
452.000 453.519
452.500 454.020
453.000 454.522
453.500 455.023
454.000 455.525
454.500 456.027



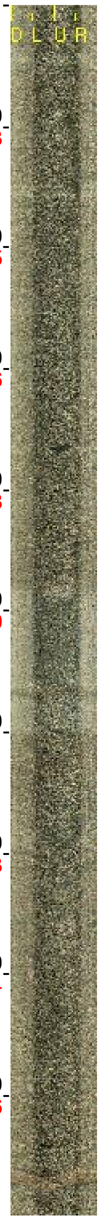
455.000 456.528
455.500 457.030
456.000 457.532
456.500 458.033
457.000 458.535
457.500 459.037
458.000 459.538
458.500 460.040
459.000 460.542
459.500 461.043



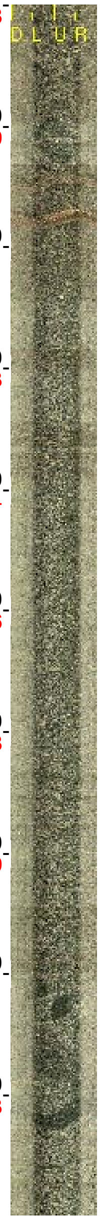
460.000 461.545
460.500 462.047
461.000 462.548
461.500 463.050
462.000 463.551
462.500 464.053
463.000 464.555
463.500 465.056
464.000 465.558
464.500 466.060



465.000 466.561
465.500 467.063
466.000 467.565
466.500 468.066
467.000 468.568
467.500 469.070
468.000 469.571
468.500 470.073
469.000 470.574
469.500 471.076



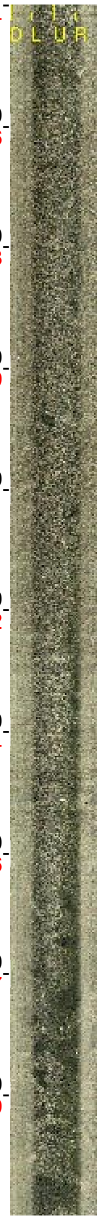
470.000 471.578
470.500 472.079
471.000 472.581
471.500 473.083
472.000 473.584
472.500 474.086
473.000 474.588
473.500 475.089
474.000 475.591
474.500 476.093



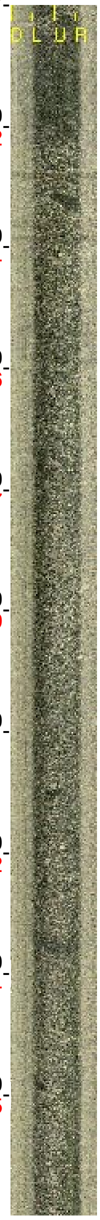
Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 475.000 - 500.000 m
Azimuth: 217.0
Inclination: -76.3

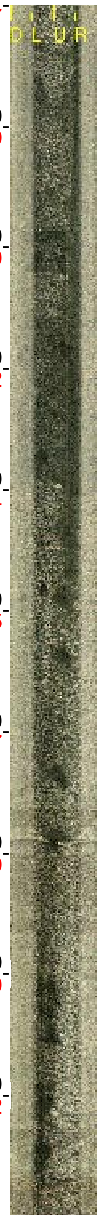
475.000
476.594
475.500
477.096
476.000
477.598
476.500
478.099
477.000
478.601
477.500
479.102
478.000
479.604
478.500
480.106
479.000
480.607
479.500
481.109



480.000
481.611
480.500
482.112
481.000
482.614
481.500
483.116
482.000
483.617
482.500
484.119
483.000
484.621
483.500
485.122
484.000
485.624
484.500
486.125



485.000
486.627
485.500
487.129
486.000
487.630
486.500
488.132
487.000
488.634
487.500
489.135
488.000
489.637
488.500
490.139
489.000
490.640
489.500
491.142



490.000
491.644
490.500
492.145
491.000
492.647
491.500
493.149
492.000
493.650
492.500
494.152
493.000
494.653
493.500
495.155
494.000
495.657
494.500
496.158

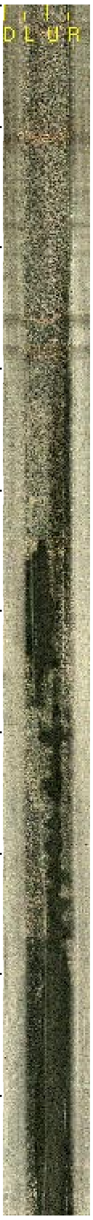
495.000
496.660
495.500
497.162
496.000
497.663
496.500
498.165
497.000
498.667
497.500
499.168
498.000
499.670
498.500
500.172
499.000
500.674
499.500
501.177

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 17 (37)

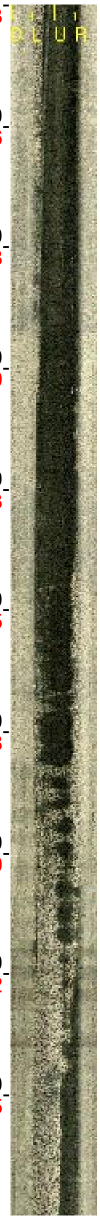
Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 500.000 - 525.000 m
Azimuth: 215.3
Inclination: -76.3

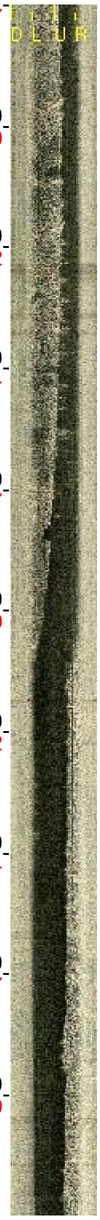
500.000
501.679
500.500
502.181
501.000
502.684
501.500
503.186
502.000
503.689
502.500
504.191
503.000
504.694
503.500
505.196
504.000
505.698
504.500
506.201



505.000
506.703
505.500
507.206
506.000
507.708
506.500
508.210
507.000
508.713
507.500
509.215
508.000
509.718
508.500
510.220
509.000
510.722
509.500
511.225

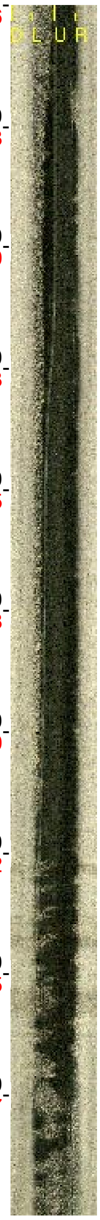


510.000
511.727
510.500
512.230
511.000
512.732
511.500
513.234
512.000
513.737
512.500
514.239
513.000
514.742
513.500
515.244
514.000
515.747
514.500
516.249



515.000
516.751
515.500
517.254
516.000
517.756
516.500
518.259
517.000
518.761
517.500
519.263
518.000
519.766
518.500
520.268
519.000
520.771
519.500
521.273

520.000
521.776
520.500
522.278
521.000
522.780
521.500
523.283
522.000
523.785
522.500
524.288
523.000
524.790
523.500
525.292
524.000
525.795
524.500
526.297

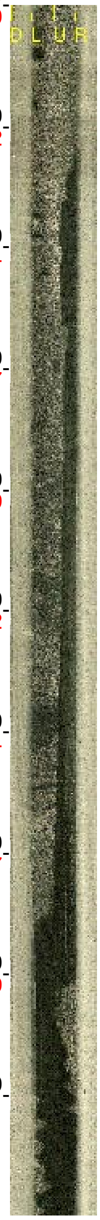


Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 18 (37)

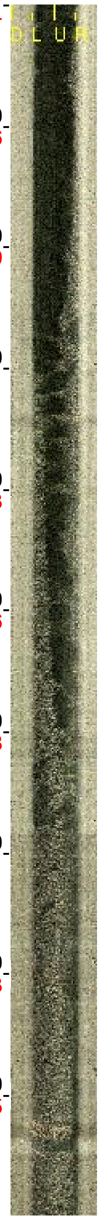
Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 525.000 - 550.000 m
Azimuth: 207.3
Inclination: -76.1

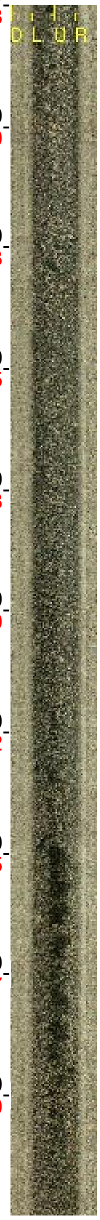
525.000
526.800
525.500
527.302
526.000
527.804
526.500
528.307
527.000
528.809
527.500
529.312
528.000
529.814
528.500
530.317
529.000
530.819
529.500
531.321



530.000
531.824
530.500
532.326
531.000
532.829
531.500
533.331
532.000
533.833
532.500
534.336
533.000
534.838
533.500
535.341
534.000
535.843
534.500
536.345



535.000
536.848
535.500
537.350
536.000
537.853
536.500
538.355
537.000
538.858
537.500
539.360
538.000
539.862
538.500
540.365
539.000
540.867
539.500
541.370



540.000
541.872
540.500
542.374
541.000
542.877
541.500
543.379
542.000
543.882
542.500
544.384
543.000
544.886
543.500
545.389
544.000
545.891
544.500
546.394

545.000
546.896
545.500
547.398
546.000
547.901
546.500
548.403
547.000
548.906
547.500
549.408
548.000
549.911
548.500
550.412
549.000
550.914
549.500
551.416

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 19 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 550.000 - 575.000 m
Azimuth: 207.6
Inclination: -75.9

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 20 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 575.000 - 600.000 m
Azimuth: 210.1
Inclination: -76.2

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 21 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 600.000 - 625.000 m
Azimuth: 212.6
Inclination: -76.0

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 22 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

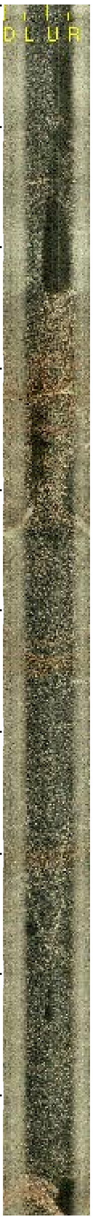
Depth range: 625.000 - 650.000 m
Azimuth: 214.1
Inclination: -76.2

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 23 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 650.000 - 675.000 m
Azimuth: 216.4
Inclination: -76.3

650.000
652.318
650.500
652.821
651.000
653.323
651.500
653.826
652.000
654.328
652.500
654.831
653.000
655.333
653.500
655.835
654.000
656.338
654.500
656.840

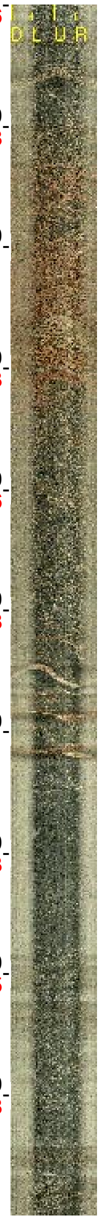


655.000
657.343
655.500
657.845
656.000
658.348
656.500
658.850
657.000
659.352
657.500
659.855
658.000
660.357
658.500
660.860
659.000
661.362
659.500
661.865

660.000
662.367
660.500
662.870
661.000
663.372
661.500
663.874
662.000
664.377
662.500
664.879
663.000
665.382
663.500
665.884
664.000
666.387
664.500
666.889

665.000
667.392
665.500
667.894
666.000
668.396
666.500
668.899
667.000
669.401
667.500
669.904
668.000
670.406
668.500
670.909
669.000
671.411
669.500
671.914

670.000
672.416
670.500
672.918
671.000
673.421
671.500
673.923
672.000
674.426
672.500
674.928
673.000
675.431
673.500
675.933
674.000
676.435
674.500
676.938



Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 24 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 675.000 - 700.000 m
Azimuth: 218.2
Inclination: -76.3

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 25 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 700.000 - 725.000 m
Azimuth: 220.3
Inclination: -76.6

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 26 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 725.000 - 750.000 m
Azimuth: 222.7
Inclination: -76.6

Printed: 2005-03-07 15:14:29   Scale: 1 : 25   Aspect: 150 %   27 (37)

Borehole: KLX03

Mapping: KLX03_JEPD_1

Depth range: 750.000 - 775.000 m

Azimuth: 225.0

Inclination: -76.6

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 28 (37)

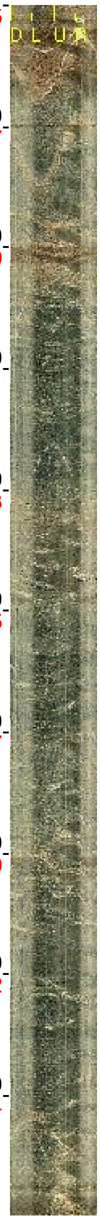
Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 775.000 - 800.000 m
Azimuth: 226.8
Inclination: -76.8

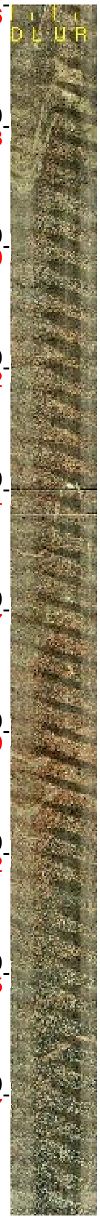
775.000
777.913
775.500
778.415
776.000
778.917
776.500
779.419
777.000
779.921
777.500
780.423
778.000
780.925
778.500
781.427
779.000
781.930
779.500
782.432

780.000
782.934
780.500
783.436
781.000
783.938
781.500
784.440
782.000
784.942
782.500
785.444
783.000
785.946
783.500
786.448
784.000
786.950
784.500
787.452

785.000
787.954
785.500
788.456
786.000
788.958
786.500
789.461
787.000
789.963
787.500
790.465
788.000
790.967
788.500
791.469
789.000
791.971
789.500
792.473



790.000
792.975
790.500
793.477
791.000
793.979
791.500
794.481
792.000
794.983
792.500
795.485
793.000
795.987
793.500
796.490
794.000
796.992
794.500
797.494



795.000
797.996
795.500
798.498
796.000
799.000
796.500
799.502
797.000
800.004
797.500
800.507
798.000
801.009
798.500
801.512
799.000
802.015
799.500
802.517

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 29 (37)

Borehole: KLX03

Mapping: KLX03_JEPD_1

Depth range: 800.000 - 825.000 m

Azimuth: 228.5

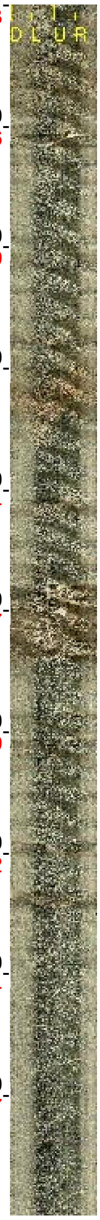
Inclination: -76.6

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 30 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

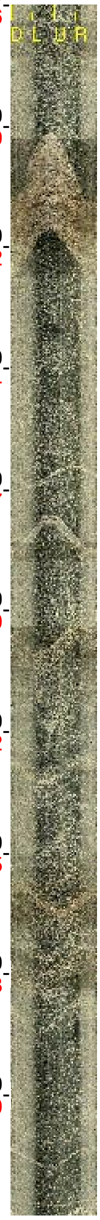
Depth range: 825.000 - 850.000 m
Azimuth: 230.3
Inclination: -76.7

825.000 828.153
825.500 828.656
826.000 829.159
826.500 829.661
827.000 830.164
827.500 830.667
828.000 831.169
828.500 831.672
829.000 832.174
829.500 832.677

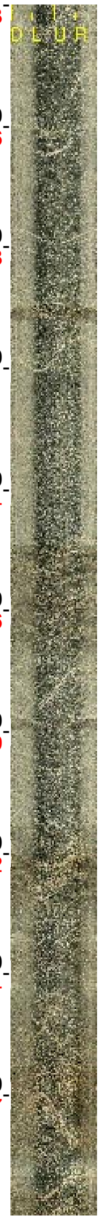


830.000 833.180
830.500 833.682
831.000 834.185
831.500 834.688
832.000 835.190
832.500 835.693
833.000 836.196
833.500 836.698
834.000 837.201
834.500 837.704

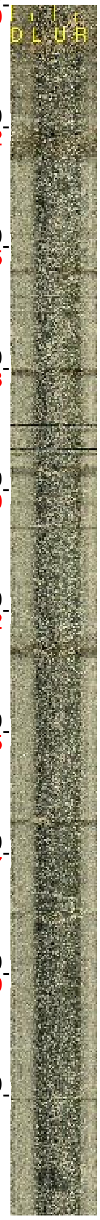
835.000 838.206
835.500 838.709
836.000 839.212
836.500 839.714
837.000 840.217
837.500 840.720
838.000 841.222
838.500 841.725
839.000 842.228
839.500 842.730



840.000 843.233
840.500 843.736
841.000 844.238
841.500 844.741
842.000 845.244
842.500 845.746
843.000 846.249
843.500 846.752
844.000 847.254
844.500 847.757



845.000 848.260
845.500 848.762
846.000 849.265
846.500 849.768
847.000 850.270
847.500 850.772
848.000 851.275
848.500 851.777
849.000 852.279
849.500 852.781



Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 31 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

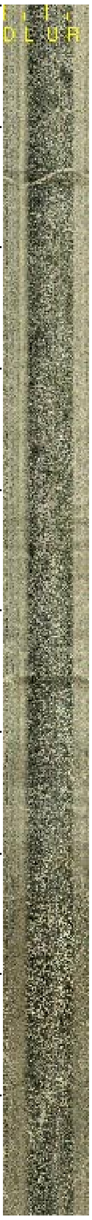
Depth range: 850.000 - 875.000 m
Azimuth: 232.8
Inclination: -76.9

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 32 (37)

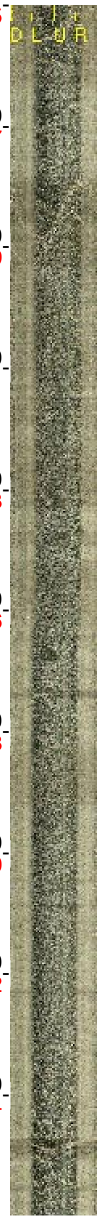
Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 875.000 - 900.000 m
Azimuth: 234.7
Inclination: -77.0

875.000	878.393
875.500	878.895
876.000	879.397
876.500	879.899
877.000	880.402
877.500	880.904
878.000	881.406
878.500	881.908
879.000	882.410
879.500	882.912



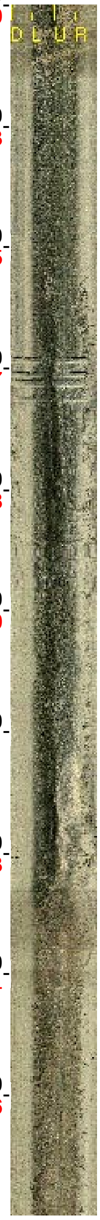
880.000	883.415
880.500	883.917
881.000	884.419
881.500	884.921
882.000	885.423
882.500	885.926
883.000	886.428
883.500	886.930
884.000	887.432
884.500	887.934



885.000	888.437
885.500	888.939
886.000	889.441
886.500	889.943
887.000	890.445
887.500	890.948
888.000	891.450
888.500	891.952
889.000	892.454
889.500	892.956

890.000	893.458
890.500	893.961
891.000	894.463
891.500	894.965
892.000	895.467
892.500	895.969
893.000	896.472
893.500	896.974
894.000	897.476
894.500	897.978

895.000	898.480
895.500	898.983
896.000	899.485
896.500	899.987
897.000	900.488
897.500	900.990
898.000	901.491
898.500	901.993
899.000	902.494
899.500	902.996

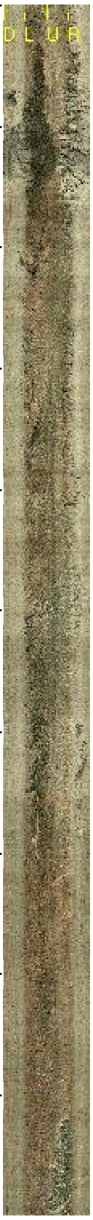


Printed: 2005-03-07 15:14:29   Scale: 1 : 25   Aspect: 150 %   33 (37)

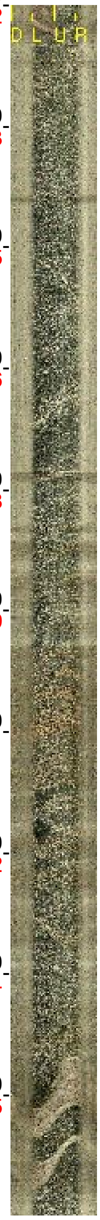
Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 900.000 - 925.000 m
Azimuth: 236.5
Inclination: -77.1

900.000 903.497
900.500 903.999
901.000 904.500
901.500 905.002
902.000 905.503
902.500 906.005
903.000 906.506
903.500 907.007
904.000 907.509
904.500 908.010



905.000 908.512
905.500 909.013
906.000 909.515
906.500 910.016
907.000 910.518
907.500 911.019
908.000 911.521
908.500 912.022
909.000 912.524
909.500 913.025



910.000 913.526
910.500 914.028
911.000 914.529
911.500 915.031
912.000 915.532
912.500 916.034
913.000 916.535
913.500 917.037
914.000 917.538
914.500 918.040

915.000 918.541
915.500 919.043
916.000 919.544
916.500 920.046
917.000 920.547
917.500 921.048
918.000 921.550
918.500 922.051
919.000 922.553
919.500 923.054

920.000 923.556
920.500 924.057
921.000 924.559
921.500 925.060
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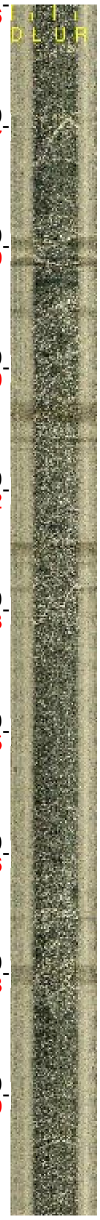
924.500 928.069



Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 34 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 925.000 - 950.000 m
Azimuth: 238.9
Inclination: -76.9

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 35 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

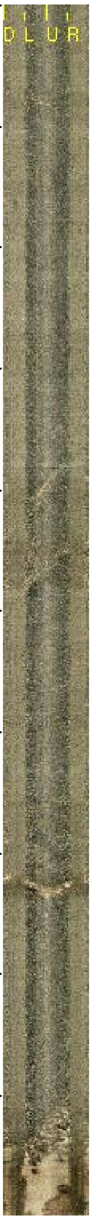
Depth range: 950.000 - 975.000 m
Azimuth: 241.9
Inclination: -76.9

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 36 (37)

Borehole: KLX03
Mapping: KLX03_JEPD_1

Depth range: 975.000 - 994.336 m
Azimuth: 243.8
Inclination: -76.9

975.000 978.775
975.500 979.277
976.000 979.780
976.500 980.282
977.000 980.785
977.500 981.287
978.000 981.790
978.500 982.292
979.000 982.795
979.500 983.297



980.000 983.800
980.500 984.302
981.000 984.805
981.500 985.307
982.000 985.809
982.500 986.312
983.000 986.814
983.500 987.317
984.000 987.819
984.500 988.322

985.000 988.824
985.500 989.327
986.000 989.829
986.500 990.332
987.000 990.834
987.500 991.337
988.000 991.839
988.500 992.342
989.000 992.844
989.500 993.347

990.000 993.849
990.500 994.352
991.000 994.854
991.500 995.357
992.000 995.859
992.500 996.361
993.000 996.864
993.500 997.366
994.000 997.869
994.500

Printed: 2005-03-07 15:14:29 Scale: 1 : 25 Aspect: 150 % 37 (37)

Appendix 5

WellCad diagram of KLX03

Title	LEGEND FOR LAXEMAR	KLX03

Site LAXEMAR
Borehole KLX03
Plot Date 2005-02-09 22:06:44

ROCKTYPE LAXEMAR
- 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

MINERAL
- Epidote
- Hematite
- Calcite
- Chlorite
- Chalcopyrite
- Quartz
- Unknown
- Pyrite
- Sphalerite
- Clay Minerals
- 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

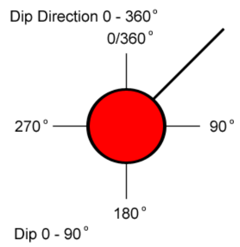
ROUGHNESS
- Planar
- Undulating
- Stepped
- Irregular

SURFACE
- Rough
- Smooth
- Slickensided

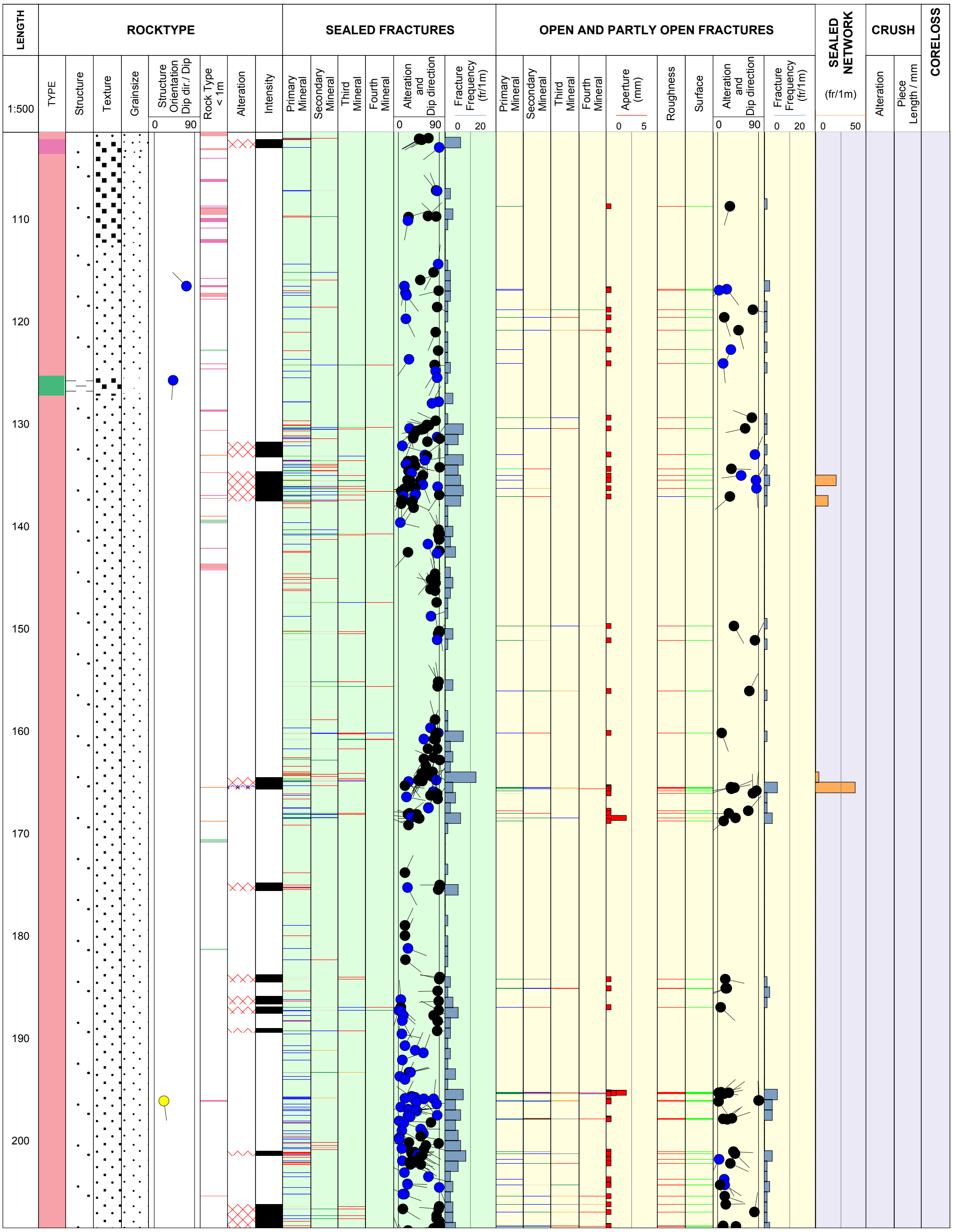
CRUSH ALTERATION
- Slightly Altered
- Moderately Altered
- Highly Altered
- Completley Altered
- Gouge
- Fresh

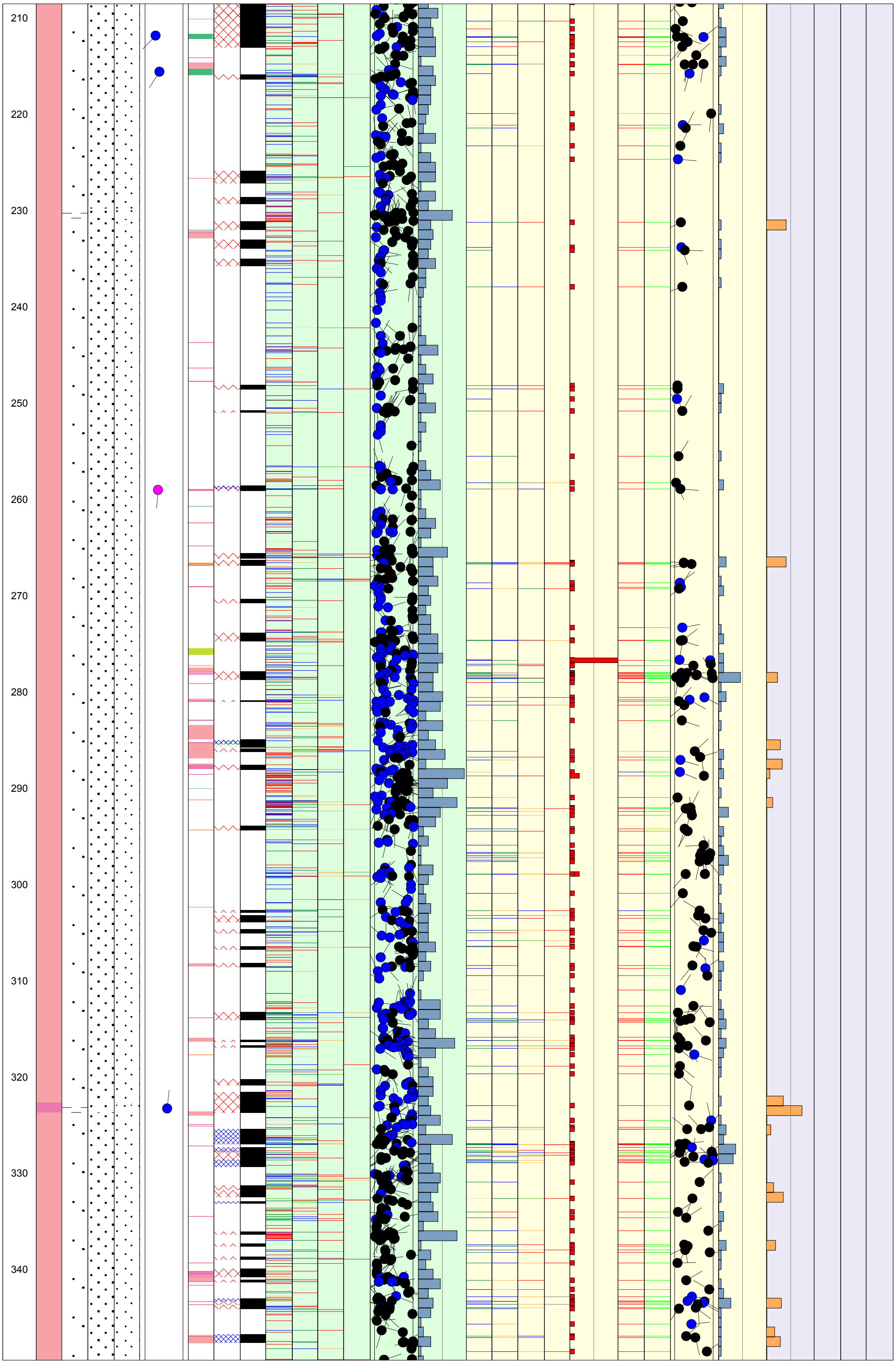
FRACTURE ALTERATION
- Fresh
- Gouge
- Completely Altered
- Highly Altered
- Moderately Altered
- Slightly Altered

FRACTURE DIRECTION
STRUKTURE ORIENTATION



Title GEOLOGY IN KLX03			**Appendix:** 5
Site	LAXEMAR	**Coordinate System**	RT90-RHB70
Borehole	KLX03	**Northing [m]**	6366112.59
Diameter [mm]	76	**Easting [m]**	1547718.93
Length [m]	1000.420	**Elevation [m.a.s.l.]**	18.49
Bearing [°]	199.04	**Drilling Start Date**	2004-05-03 14:30:00
Inclination [°]	-74.92	**Drilling Stop Date**	2004-09-07 09:00:00
Date of mapping	2004-10-27 08:45:00	**Plot Date**	2005-02-08 22:10:04
Rocktype data from	p_rock_XXXXX	**Fracture data from**	p_fract_core

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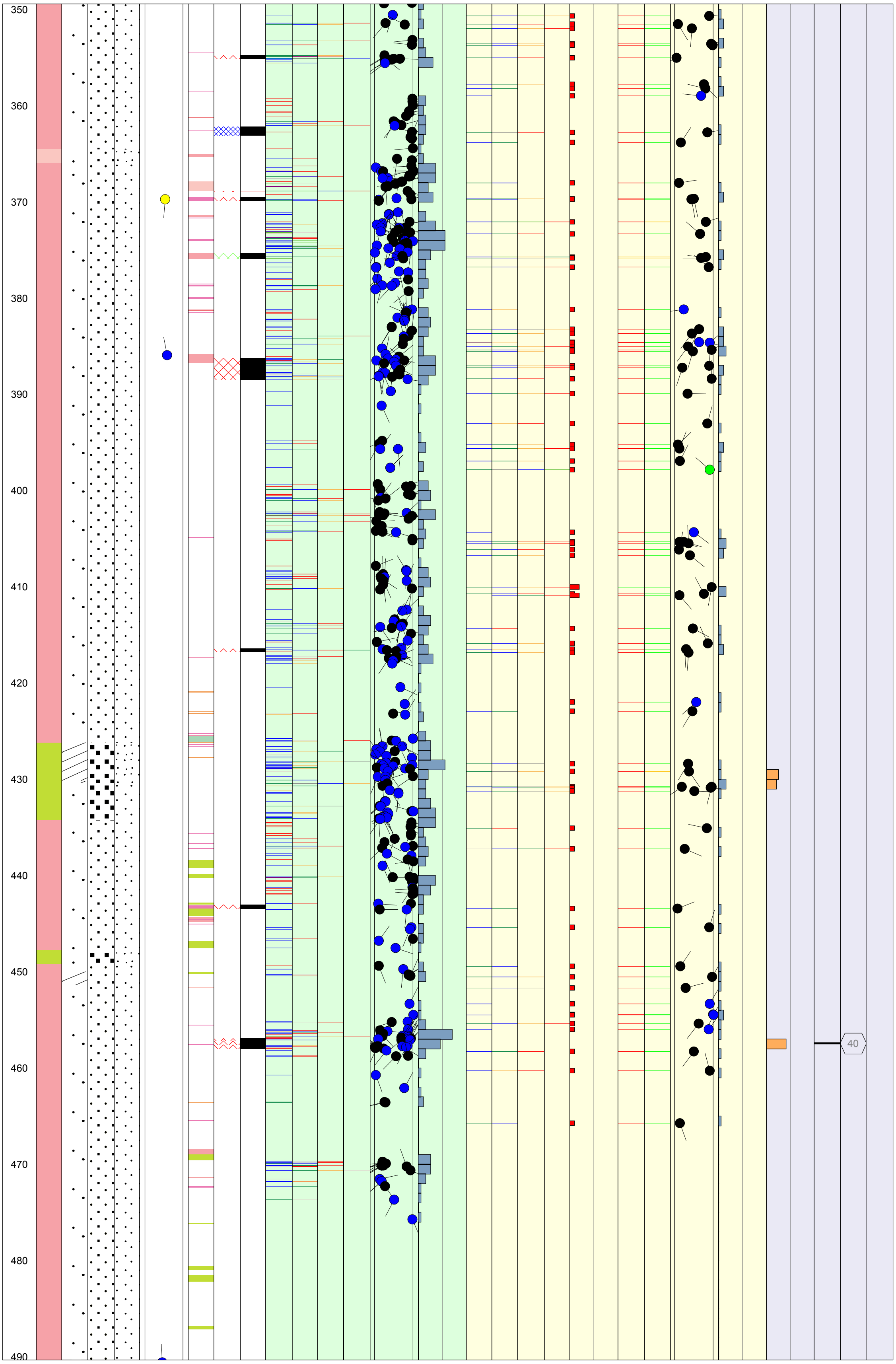
250
260
270
280
290
300
310
320
330
340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390
400
410
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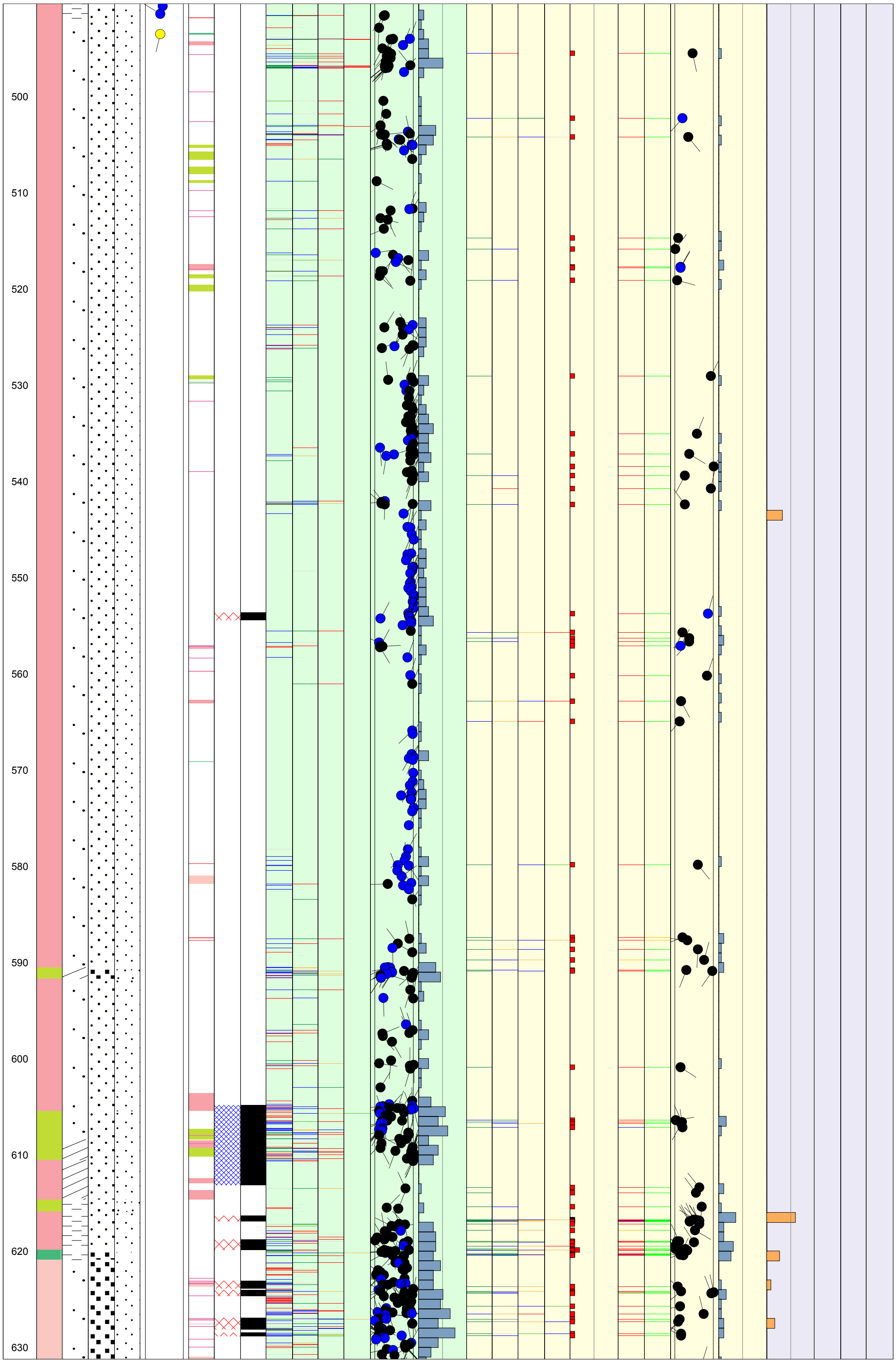
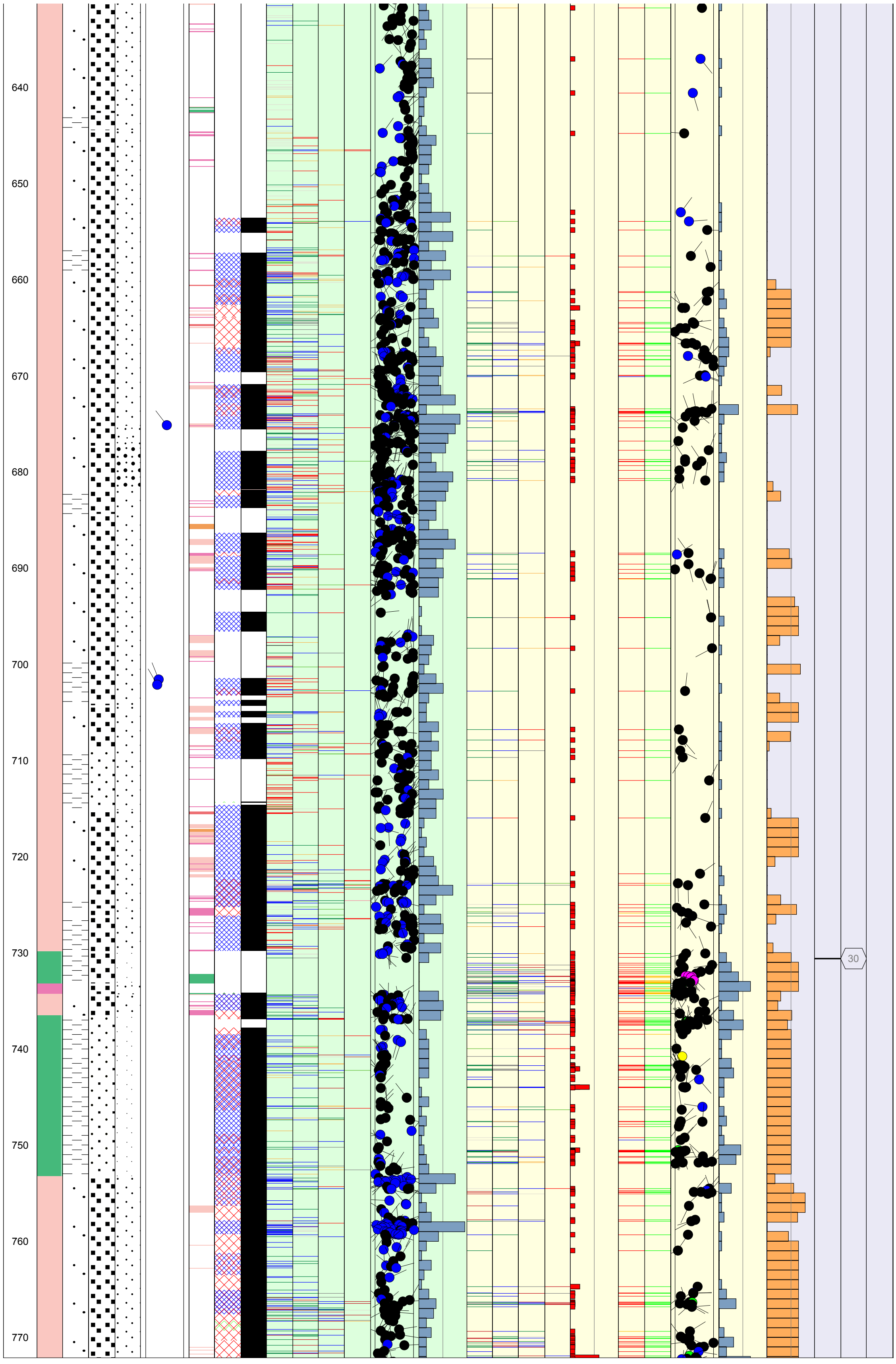
430
440
450
460
470
480
490
40


500
510
520
530
540
550
560
570
580
590
600
610
620
630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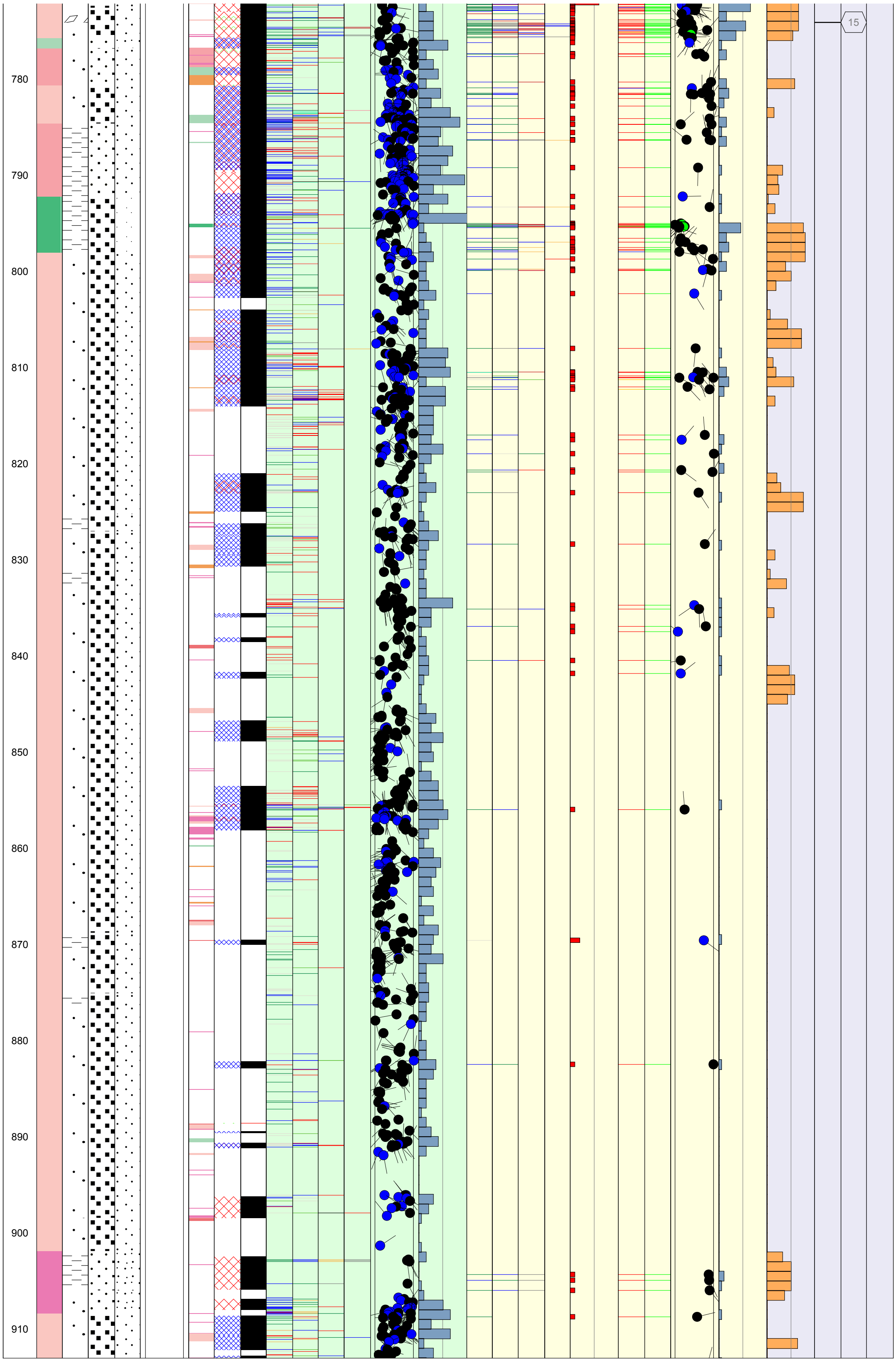
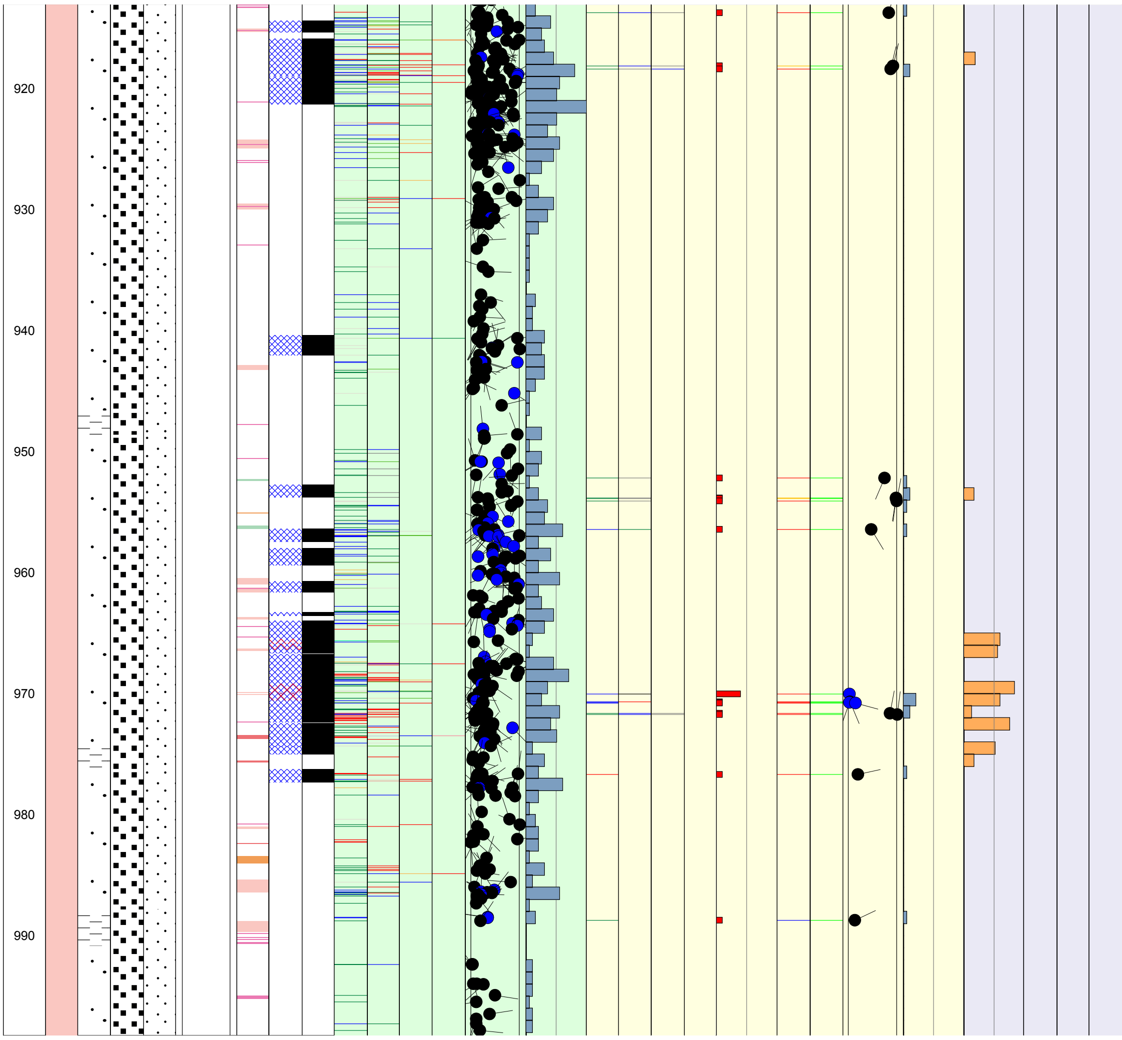
650
660
670
680
690
700
710
720
730
740
750
760
770
30


780
790
800
810
820
830
840
850
860
870
880
890
900
910
15



920
930
940
950
960
970
980
990

Appendix 6

In-data: Borehole length and diameter for KLX03

Hole Diam T - Drilling: Borehole diameter

KLX03, 2004-05-28 18:00:00 - 2004-09-07 09:00:00 (100.350 - 1000.420 m)

Sub Secup (m)	Sub Seclow (m)	Hole Diam (m)	Comment
100.350	101.400	0.086	T-86
101.400	1000.420	0.076	Corac N/50

Printout from SICADA 2004-12-10 14:09:52.

Appendix 7

In-data: Borehole orientation data for KLX03

Maxibor T - Borehole deviation: Maxibor

KLX03, 2004-09-09 00:00:00 (0.000 - 993.000 m)

Length (m)	Northing (m)	Easting (m)	Elevation (m)	Coord System	Inclination (degrees)	Bearing (degrees)	Local A (m)	Local B (m)	Local C (m)	Extrapol Flag
0.00	6366112.59	1547718.92	-18.49	RT90-RHB70	-74.93	199.04	0.0000	0.0000	0.0000	
3.00	6366111.85	1547718.67	-15.59	RT90-RHB70	-74.83	199.00	0.7800	0.0000	0.0000	
6.00	6366111.11	1547718.41	-12.70	RT90-RHB70	-74.78	199.17	1.5600	0.0000	0.0100	
9.00	6366110.37	1547718.15	-9.80	RT90-RHB70	-74.74	199.20	2.3500	0.0000	0.0100	
12.00	6366109.62	1547717.89	-6.91	RT90-RHB70	-74.72	199.22	3.1400	0.0000	0.0200	
15.00	6366108.87	1547717.63	-4.01	RT90-RHB70	-74.74	199.29	3.9300	0.0100	0.0300	
18.00	6366108.13	1547717.37	-1.12	RT90-RHB70	-74.77	199.41	4.7200	0.0100	0.0400	
21.00	6366107.39	1547717.11	1.77	RT90-RHB70	-74.88	199.54	5.5100	0.0100	0.0500	
24.00	6366106.65	1547716.85	4.67	RT90-RHB70	-74.91	199.69	6.2900	0.0200	0.0500	
27.00	6366105.91	1547716.58	7.57	RT90-RHB70	-74.93	199.89	7.0700	0.0300	0.0600	
30.00	6366105.18	1547716.32	10.46	RT90-RHB70	-74.97	200.04	7.8500	0.0400	0.0600	
33.00	6366104.45	1547716.05	13.36	RT90-RHB70	-75.00	200.30	8.6300	0.0600	0.0500	
36.00	6366103.72	1547715.78	16.26	RT90-RHB70	-75.08	200.62	9.4100	0.0700	0.0500	
39.00	6366103.00	1547715.51	19.16	RT90-RHB70	-75.21	200.86	10.1800	0.0900	0.0400	
42.00	6366102.28	1547715.24	22.06	RT90-RHB70	-75.25	200.96	10.9400	0.1200	0.0300	
45.00	6366101.57	1547714.96	24.96	RT90-RHB70	-75.27	200.84	11.7100	0.1400	0.0100	
48.00	6366100.86	1547714.69	27.86	RT90-RHB70	-75.34	200.67	12.4700	0.1700	-0.0100	
51.00	6366100.15	1547714.43	30.76	RT90-RHB70	-75.37	200.39	13.2300	0.1900	-0.0300	
54.00	6366099.44	1547714.16	33.67	RT90-RHB70	-75.38	200.27	13.9900	0.2100	-0.0500	
57.00	6366098.73	1547713.90	36.57	RT90-RHB70	-75.35	200.22	14.7400	0.2200	-0.0800	
60.00	6366098.01	1547713.64	39.47	RT90-RHB70	-75.38	200.36	15.5000	0.2400	-0.1000	
63.00	6366097.30	1547713.37	42.37	RT90-RHB70	-75.45	200.50	16.2600	0.2600	-0.1200	
66.00	6366096.60	1547713.11	45.28	RT90-RHB70	-75.43	200.55	17.0100	0.2800	-0.1500	
69.00	6366095.89	1547712.84	48.18	RT90-RHB70	-75.34	200.51	17.7700	0.3000	-0.1800	
72.00	6366095.18	1547712.58	51.08	RT90-RHB70	-75.30	200.40	18.5300	0.3100	-0.2000	
75.00	6366094.47	1547712.31	53.99	RT90-RHB70	-75.30	200.35	19.2900	0.3300	-0.2200	
78.00	6366093.75	1547712.05	56.89	RT90-RHB70	-75.31	200.20	20.0500	0.3500	-0.2400	
81.00	6366093.04	1547711.79	59.79	RT90-RHB70	-75.33	199.83	20.8100	0.3700	-0.2600	
84.00	6366092.32	1547711.53	62.69	RT90-RHB70	-75.30	199.51	21.5700	0.3800	-0.2800	
87.00	6366091.61	1547711.27	65.59	RT90-RHB70	-75.16	199.54	22.3300	0.3800	-0.3000	
90.00	6366090.88	1547711.02	68.49	RT90-RHB70	-75.02	199.90	23.1000	0.3900	-0.3100	
93.00	6366090.15	1547710.75	71.39	RT90-RHB70	-74.95	200.43	23.8700	0.4000	-0.3200	
96.00	6366089.42	1547710.48	74.29	RT90-RHB70	-74.92	200.79	24.6500	0.4200	-0.3200	
99.00	6366088.69	1547710.20	77.19	RT90-RHB70	-74.92	201.07	25.4300	0.4400	-0.3200	
102.00	6366087.97	1547709.92	80.08	RT90-RHB70	-74.92	201.28	26.2100	0.4700	-0.3200	
105.00	6366087.24	1547709.64	82.98	RT90-RHB70	-74.91	201.50	26.9900	0.5000	-0.3200	

108.00	6366086.51	1547709.35	85.88	RT90-RHB70	-74.92	201.63	27.7700	0.5400	-0.3200
111.00	6366085.79	1547709.07	88.77	RT90-RHB70	-74.93	201.88	28.5500	0.5700	-0.3200
114.00	6366085.06	1547708.78	91.67	RT90-RHB70	-74.95	202.17	29.3300	0.6100	-0.3200
117.00	6366084.34	1547708.48	94.57	RT90-RHB70	-74.96	202.42	30.1100	0.6500	-0.3200
120.00	6366083.62	1547708.19	97.46	RT90-RHB70	-74.98	202.56	30.8900	0.7000	-0.3200
123.00	6366082.90	1547707.89	100.36	RT90-RHB70	-74.98	202.81	31.6600	0.7500	-0.3300
126.00	6366082.19	1547707.59	103.26	RT90-RHB70	-74.99	202.98	32.4400	0.8000	-0.3300
129.00	6366081.47	1547707.28	106.16	RT90-RHB70	-74.97	203.16	33.2100	0.8500	-0.3400
132.00	6366080.76	1547706.98	109.05	RT90-RHB70	-74.97	203.31	33.9900	0.9100	-0.3400
135.00	6366080.04	1547706.67	111.95	RT90-RHB70	-75.00	203.52	34.7600	0.9600	-0.3500
138.00	6366079.33	1547706.36	114.85	RT90-RHB70	-75.00	203.62	35.5400	1.0200	-0.3500
141.00	6366078.62	1547706.05	117.75	RT90-RHB70	-75.02	203.77	36.3100	1.0900	-0.3600
144.00	6366077.91	1547705.73	120.64	RT90-RHB70	-75.01	203.84	37.0900	1.1500	-0.3600
147.00	6366077.20	1547705.42	123.54	RT90-RHB70	-75.02	203.95	37.8600	1.2200	-0.3700
150.00	6366076.49	1547705.11	126.44	RT90-RHB70	-75.04	204.08	38.6300	1.2800	-0.3800
153.00	6366075.78	1547704.79	129.34	RT90-RHB70	-75.07	204.19	39.4000	1.3500	-0.3900
156.00	6366075.08	1547704.47	132.24	RT90-RHB70	-75.09	204.30	40.1700	1.4200	-0.4000
159.00	6366074.37	1547704.16	135.14	RT90-RHB70	-75.08	204.40	40.9400	1.4900	-0.4100
162.00	6366073.67	1547703.84	138.04	RT90-RHB70	-75.06	204.49	41.7100	1.5600	-0.4200
165.00	6366072.97	1547703.52	140.93	RT90-RHB70	-75.05	204.60	42.4800	1.6400	-0.4300
168.00	6366072.26	1547703.19	143.83	RT90-RHB70	-75.06	204.80	43.2500	1.7100	-0.4400
171.00	6366071.56	1547702.87	146.73	RT90-RHB70	-75.07	204.93	44.0200	1.7900	-0.4500
174.00	6366070.86	1547702.54	149.63	RT90-RHB70	-75.08	205.10	44.7900	1.8700	-0.4600
177.00	6366070.16	1547702.22	152.53	RT90-RHB70	-75.08	205.26	45.5600	1.9500	-0.4700
180.00	6366069.46	1547701.89	155.43	RT90-RHB70	-75.09	205.44	46.3200	2.0300	-0.4900
183.00	6366068.77	1547701.55	158.33	RT90-RHB70	-75.08	205.59	47.0900	2.1200	-0.5000
186.00	6366068.07	1547701.22	161.23	RT90-RHB70	-75.10	205.71	47.8600	2.2100	-0.5100
189.00	6366067.37	1547700.89	164.12	RT90-RHB70	-75.12	205.81	48.6200	2.3000	-0.5300
192.00	6366066.68	1547700.55	167.02	RT90-RHB70	-75.11	205.91	49.3900	2.3900	-0.5400
195.00	6366065.99	1547700.21	169.92	RT90-RHB70	-75.11	206.07	50.1500	2.4800	-0.5600
198.00	6366065.30	1547699.88	172.82	RT90-RHB70	-75.14	206.21	50.9200	2.5700	-0.5700
201.00	6366064.61	1547699.54	175.72	RT90-RHB70	-75.17	206.46	51.6800	2.6700	-0.5900
204.00	6366063.92	1547699.19	178.62	RT90-RHB70	-75.19	206.60	52.4400	2.7700	-0.6100
207.00	6366063.23	1547698.85	181.52	RT90-RHB70	-75.22	206.81	53.2000	2.8700	-0.6300
210.00	6366062.55	1547698.51	184.42	RT90-RHB70	-75.25	206.86	53.9600	2.9700	-0.6500
213.00	6366061.87	1547698.16	187.32	RT90-RHB70	-75.26	207.00	54.7200	3.0800	-0.6700
216.00	6366061.19	1547697.81	190.23	RT90-RHB70	-75.27	207.14	55.4800	3.1800	-0.7000
219.00	6366060.51	1547697.47	193.13	RT90-RHB70	-75.30	207.29	56.2300	3.2900	-0.7200
222.00	6366059.83	1547697.12	196.03	RT90-RHB70	-75.29	207.45	56.9800	3.4000	-0.7500
225.00	6366059.16	1547696.77	198.93	RT90-RHB70	-75.30	207.52	57.7400	3.5100	-0.7800
228.00	6366058.48	1547696.41	201.83	RT90-RHB70	-75.30	207.71	58.4900	3.6200	-0.8000
231.00	6366057.81	1547696.06	204.73	RT90-RHB70	-75.28	207.89	59.2400	3.7400	-0.8300
234.00	6366057.13	1547695.70	207.64	RT90-RHB70	-75.28	208.06	60.0000	3.8600	-0.8600

237.00	6366056.46	1547695.34	210.54	RT90-RHB70	-75.28	208.29	60.7500	3.9700	-0.8900
240.00	6366055.79	1547694.98	213.44	RT90-RHB70	-75.27	208.46	61.5000	4.1000	-0.9100
243.00	6366055.12	1547694.62	216.34	RT90-RHB70	-75.25	208.59	62.2500	4.2200	-0.9400
246.00	6366054.45	1547694.25	219.24	RT90-RHB70	-75.21	208.74	63.0100	4.3500	-0.9700
249.00	6366053.78	1547693.89	222.14	RT90-RHB70	-75.22	208.91	63.7600	4.4800	-0.9900
252.00	6366053.11	1547693.52	225.04	RT90-RHB70	-75.27	209.07	64.5200	4.6100	-1.0200
255.00	6366052.44	1547693.14	227.94	RT90-RHB70	-75.26	209.31	65.2700	4.7400	-1.0500
258.00	6366051.77	1547692.77	230.84	RT90-RHB70	-75.26	209.52	66.0200	4.8800	-1.0800
261.00	6366051.11	1547692.40	233.75	RT90-RHB70	-75.27	209.69	66.7700	5.0200	-1.1100
264.00	6366050.45	1547692.02	236.65	RT90-RHB70	-75.27	209.96	67.5200	5.1600	-1.1400
267.00	6366049.79	1547691.64	239.55	RT90-RHB70	-75.28	210.23	68.2700	5.3000	-1.1700
270.00	6366049.13	1547691.25	242.45	RT90-RHB70	-75.29	210.44	69.0200	5.4500	-1.2000
273.00	6366048.47	1547690.87	245.35	RT90-RHB70	-75.30	210.60	69.7600	5.6000	-1.2300
276.00	6366047.81	1547690.48	248.25	RT90-RHB70	-75.31	210.75	70.5100	5.7500	-1.2700
279.00	6366047.16	1547690.09	251.16	RT90-RHB70	-75.31	210.86	71.2500	5.9100	-1.3000
282.00	6366046.51	1547689.70	254.06	RT90-RHB70	-75.31	210.96	72.0000	6.0600	-1.3400
285.00	6366045.86	1547689.31	256.96	RT90-RHB70	-75.32	211.06	72.7400	6.2200	-1.3700
288.00	6366045.20	1547688.92	259.86	RT90-RHB70	-75.32	211.11	73.4900	6.3800	-1.4100
291.00	6366044.55	1547688.52	262.76	RT90-RHB70	-75.32	211.25	74.2300	6.5400	-1.4500
294.00	6366043.90	1547688.13	265.67	RT90-RHB70	-75.35	211.47	74.9700	6.7000	-1.4900
297.00	6366043.26	1547687.73	268.57	RT90-RHB70	-75.39	211.70	75.7100	6.8600	-1.5200
300.00	6366042.61	1547687.34	271.47	RT90-RHB70	-75.42	211.86	76.4500	7.0300	-1.5700
303.00	6366041.97	1547686.94	274.37	RT90-RHB70	-75.47	211.99	77.1900	7.2000	-1.6100
306.00	6366041.33	1547686.54	277.28	RT90-RHB70	-75.50	212.13	77.9200	7.3600	-1.6600
309.00	6366040.70	1547686.14	280.18	RT90-RHB70	-75.50	212.18	78.6500	7.5300	-1.7100
312.00	6366040.06	1547685.74	283.09	RT90-RHB70	-75.48	212.12	79.3900	7.7000	-1.7500
315.00	6366039.42	1547685.34	285.99	RT90-RHB70	-75.49	212.10	80.1200	7.8800	-1.8000
318.00	6366038.79	1547684.94	288.90	RT90-RHB70	-75.52	212.13	80.8500	8.0500	-1.8500
321.00	6366038.15	1547684.54	291.80	RT90-RHB70	-75.52	212.21	81.5800	8.2100	-1.9000
324.00	6366037.52	1547684.14	294.71	RT90-RHB70	-75.53	212.21	82.3100	8.3900	-1.9500
327.00	6366036.88	1547683.74	297.61	RT90-RHB70	-75.54	212.31	83.0400	8.5600	-2.0000
330.00	6366036.25	1547683.34	300.52	RT90-RHB70	-75.54	212.38	83.7700	8.7300	-2.0500
333.00	6366035.62	1547682.94	303.42	RT90-RHB70	-75.56	212.61	84.5000	8.9000	-2.1000
336.00	6366034.99	1547682.54	306.33	RT90-RHB70	-75.56	212.90	85.2300	9.0800	-2.1600
339.00	6366034.36	1547682.13	309.23	RT90-RHB70	-75.57	213.08	85.9500	9.2600	-2.2100
342.00	6366033.73	1547681.72	312.14	RT90-RHB70	-75.55	213.31	86.6800	9.4400	-2.2700
345.00	6366033.11	1547681.31	315.04	RT90-RHB70	-75.54	213.45	87.4000	9.6200	-2.3200
348.00	6366032.48	1547680.90	317.95	RT90-RHB70	-75.54	213.47	88.1300	9.8100	-2.3700
351.00	6366031.86	1547680.48	320.85	RT90-RHB70	-75.55	213.54	88.8500	10.0000	-2.4300
354.00	6366031.23	1547680.07	323.76	RT90-RHB70	-75.58	213.62	89.5800	10.1800	-2.4800
357.00	6366030.61	1547679.66	326.66	RT90-RHB70	-75.60	213.67	90.3000	10.3700	-2.5400
360.00	6366029.99	1547679.24	329.57	RT90-RHB70	-75.59	213.73	91.0200	10.5600	-2.6000
363.00	6366029.37	1547678.83	332.47	RT90-RHB70	-75.56	213.83	91.7500	10.7500	-2.6600

366.00	6366028.75	1547678.41	335.38	RT90-RHB70	-75.56	213.94	92.4700	10.9400	-2.7200
369.00	6366028.13	1547677.99	338.28	RT90-RHB70	-75.56	213.98	93.1900	11.1300	-2.7700
372.00	6366027.51	1547677.58	341.19	RT90-RHB70	-75.57	214.12	93.9200	11.3200	-2.8300
375.00	6366026.89	1547677.16	344.09	RT90-RHB70	-75.58	214.27	94.6400	11.5200	-2.8900
378.00	6366026.27	1547676.74	347.00	RT90-RHB70	-75.61	214.37	95.3600	11.7200	-2.9500
381.00	6366025.65	1547676.32	349.91	RT90-RHB70	-75.63	214.48	96.0800	11.9100	-3.0100
384.00	6366025.04	1547675.89	352.81	RT90-RHB70	-75.67	214.58	96.8000	12.1100	-3.0700
387.00	6366024.43	1547675.47	355.72	RT90-RHB70	-75.70	214.70	97.5100	12.3100	-3.1400
390.00	6366023.82	1547675.05	358.63	RT90-RHB70	-75.72	214.82	98.2200	12.5100	-3.2000
393.00	6366023.21	1547674.63	361.53	RT90-RHB70	-75.72	214.90	98.9400	12.7100	-3.2700
396.00	6366022.61	1547674.20	364.44	RT90-RHB70	-75.73	215.02	99.6500	12.9100	-3.3400
399.00	6366022.00	1547673.78	367.35	RT90-RHB70	-75.72	215.17	100.3600	13.1200	-3.4100
402.00	6366021.40	1547673.35	370.25	RT90-RHB70	-75.75	215.33	101.0700	13.3200	-3.4800
405.00	6366020.79	1547672.93	373.16	RT90-RHB70	-75.78	215.41	101.7800	13.5300	-3.5500
408.00	6366020.19	1547672.50	376.07	RT90-RHB70	-75.81	215.51	102.4900	13.7400	-3.6200
411.00	6366019.59	1547672.07	378.98	RT90-RHB70	-75.83	215.58	103.1900	13.9500	-3.7000
414.00	6366019.00	1547671.65	381.89	RT90-RHB70	-75.86	215.56	103.9000	14.1600	-3.7800
417.00	6366018.40	1547671.22	384.80	RT90-RHB70	-75.89	215.64	104.6000	14.3600	-3.8500
420.00	6366017.81	1547670.79	387.71	RT90-RHB70	-75.89	215.72	105.3000	14.5700	-3.9300
423.00	6366017.21	1547670.37	390.62	RT90-RHB70	-75.90	215.69	106.0000	14.7800	-4.0100
426.00	6366016.62	1547669.94	393.53	RT90-RHB70	-75.90	215.59	106.7000	14.9900	-4.0900
429.00	6366016.02	1547669.51	396.44	RT90-RHB70	-75.90	215.40	107.4000	15.2000	-4.1700
432.00	6366015.43	1547669.09	399.34	RT90-RHB70	-75.93	215.31	108.1000	15.4100	-4.2500
435.00	6366014.83	1547668.67	402.25	RT90-RHB70	-75.93	215.38	108.8000	15.6100	-4.3300
438.00	6366014.24	1547668.25	405.16	RT90-RHB70	-75.97	215.53	109.5000	15.8200	-4.4100
441.00	6366013.65	1547667.83	408.08	RT90-RHB70	-76.03	215.74	110.2000	16.0200	-4.5000
444.00	6366013.06	1547667.40	410.99	RT90-RHB70	-76.07	216.03	110.8900	16.2300	-4.5900
447.00	6366012.48	1547666.98	413.90	RT90-RHB70	-76.09	216.23	111.5800	16.4400	-4.6800
450.00	6366011.89	1547666.55	416.81	RT90-RHB70	-76.11	216.35	112.2700	16.6500	-4.7700
453.00	6366011.31	1547666.12	419.72	RT90-RHB70	-76.14	216.57	112.9600	16.8700	-4.8600
456.00	6366010.74	1547665.70	422.64	RT90-RHB70	-76.17	216.73	113.6400	17.0800	-4.9600
459.00	6366010.16	1547665.27	425.55	RT90-RHB70	-76.19	216.94	114.3300	17.3000	-5.0500
462.00	6366009.59	1547664.84	428.46	RT90-RHB70	-76.20	217.05	115.0100	17.5200	-5.1500
465.00	6366009.02	1547664.41	431.38	RT90-RHB70	-76.20	217.17	115.6900	17.7400	-5.2500
468.00	6366008.45	1547663.97	434.29	RT90-RHB70	-76.20	217.29	116.3700	17.9700	-5.3500
471.00	6366007.88	1547663.54	437.20	RT90-RHB70	-76.18	217.40	117.0500	18.1900	-5.4600
474.00	6366007.31	1547663.10	440.11	RT90-RHB70	-76.17	217.49	117.7300	18.4200	-5.5600
477.00	6366006.74	1547662.67	443.03	RT90-RHB70	-76.19	217.57	118.4100	18.6400	-5.6600
480.00	6366006.17	1547662.23	445.94	RT90-RHB70	-76.20	217.71	119.0900	18.8700	-5.7600
483.00	6366005.61	1547661.79	448.85	RT90-RHB70	-76.22	217.79	119.7700	19.1000	-5.8600
486.00	6366005.04	1547661.36	451.77	RT90-RHB70	-76.25	217.88	120.4400	19.3300	-5.9700
489.00	6366004.48	1547660.92	454.68	RT90-RHB70	-76.28	217.96	121.1200	19.5600	-6.0700
492.00	6366003.92	1547660.48	457.60	RT90-RHB70	-76.32	217.87	121.7900	19.7900	-6.1800

495.00	6366003.36	1547660.05	460.51	RT90-RHB70	-76.31	216.94	122.4600	20.0200	-6.2900
498.00	6366002.79	1547659.62	463.43	RT90-RHB70	-76.31	215.09	123.1400	20.2400	-6.4000
501.00	6366002.21	1547659.21	466.34	RT90-RHB70	-76.31	213.97	123.8200	20.4300	-6.4900
504.00	6366001.62	1547658.81	469.26	RT90-RHB70	-76.30	213.73	124.5100	20.6200	-6.5900
507.00	6366001.03	1547658.42	472.17	RT90-RHB70	-76.31	213.16	125.1900	20.8000	-6.6800
510.00	6366000.44	1547658.03	475.09	RT90-RHB70	-76.26	212.01	125.8800	20.9700	-6.7800
513.00	6365999.83	1547657.65	478.00	RT90-RHB70	-76.17	210.73	126.5800	21.1300	-6.8600
516.00	6365999.22	1547657.29	480.91	RT90-RHB70	-76.11	209.44	127.2800	21.2800	-6.9400
519.00	6365998.59	1547656.93	483.82	RT90-RHB70	-76.07	208.80	127.9900	21.4100	-7.0200
522.00	6365997.96	1547656.58	486.74	RT90-RHB70	-76.10	208.24	128.7000	21.5300	-7.0900
525.00	6365997.32	1547656.24	489.65	RT90-RHB70	-76.14	207.25	129.4100	21.6400	-7.1600
528.00	6365996.68	1547655.91	492.56	RT90-RHB70	-76.15	206.45	130.1200	21.7500	-7.2300
531.00	6365996.04	1547655.59	495.47	RT90-RHB70	-76.12	206.25	130.8300	21.8400	-7.3000
534.00	6365995.39	1547655.28	498.39	RT90-RHB70	-76.08	206.34	131.5500	21.9300	-7.3600
537.00	6365994.75	1547654.96	501.30	RT90-RHB70	-76.07	206.66	132.2600	22.0200	-7.4300
540.00	6365994.10	1547654.63	504.21	RT90-RHB70	-76.06	206.97	132.9800	22.1200	-7.5000
543.00	6365993.46	1547654.30	507.12	RT90-RHB70	-76.04	207.18	133.6900	22.2200	-7.5600
546.00	6365992.81	1547653.97	510.03	RT90-RHB70	-75.98	207.40	134.4100	22.3200	-7.6300
549.00	6365992.17	1547653.64	512.94	RT90-RHB70	-75.94	207.53	135.1300	22.4200	-7.6900
552.00	6365991.52	1547653.30	515.85	RT90-RHB70	-75.91	207.71	135.8500	22.5300	-7.7500
555.00	6365990.88	1547652.96	518.76	RT90-RHB70	-75.92	208.01	136.5700	22.6400	-7.8100
558.00	6365990.23	1547652.62	521.67	RT90-RHB70	-75.95	208.35	137.2900	22.7600	-7.8700
561.00	6365989.59	1547652.27	524.58	RT90-RHB70	-75.99	208.53	138.0100	22.8700	-7.9300
564.00	6365988.95	1547651.93	527.49	RT90-RHB70	-76.02	208.79	138.7300	22.9900	-8.0000
567.00	6365988.32	1547651.58	530.41	RT90-RHB70	-76.03	209.16	139.4400	23.1200	-8.0600
570.00	6365987.68	1547651.23	533.32	RT90-RHB70	-76.04	209.53	140.1600	23.2400	-8.1300
573.00	6365987.05	1547650.87	536.23	RT90-RHB70	-76.05	209.88	140.8700	23.3700	-8.2000
576.00	6365986.43	1547650.51	539.14	RT90-RHB70	-76.03	210.19	141.5800	23.5100	-8.2700
579.00	6365985.80	1547650.14	542.05	RT90-RHB70	-76.00	210.32	142.2900	23.6500	-8.3400
582.00	6365985.17	1547649.78	544.96	RT90-RHB70	-75.98	210.54	143.0000	23.7900	-8.4100
585.00	6365984.55	1547649.41	547.87	RT90-RHB70	-75.97	210.80	143.7100	23.9400	-8.4800
588.00	6365983.92	1547649.04	550.78	RT90-RHB70	-75.97	210.96	144.4300	24.0900	-8.5500
591.00	6365983.30	1547648.66	553.69	RT90-RHB70	-76.01	211.31	145.1400	24.2400	-8.6200
594.00	6365982.68	1547648.29	556.60	RT90-RHB70	-76.05	211.72	145.8500	24.3900	-8.6900
597.00	6365982.07	1547647.90	559.52	RT90-RHB70	-76.06	212.10	146.5500	24.5500	-8.7700
600.00	6365981.45	1547647.52	562.43	RT90-RHB70	-76.07	212.41	147.2500	24.7100	-8.8500
603.00	6365980.84	1547647.13	565.34	RT90-RHB70	-76.11	212.72	147.9600	24.8800	-8.9300
606.00	6365980.24	1547646.74	568.25	RT90-RHB70	-76.16	213.09	148.6600	25.0500	-9.0100
609.00	6365979.64	1547646.35	571.16	RT90-RHB70	-76.20	213.50	149.3500	25.2200	-9.0900
612.00	6365979.04	1547645.96	574.08	RT90-RHB70	-76.25	213.88	150.0500	25.4000	-9.1800
615.00	6365978.45	1547645.56	576.99	RT90-RHB70	-76.28	214.13	150.7400	25.5900	-9.2700
618.00	6365977.86	1547645.16	579.91	RT90-RHB70	-76.30	214.27	151.4200	25.7700	-9.3700
621.00	6365977.27	1547644.76	582.82	RT90-RHB70	-76.31	214.49	152.1100	25.9600	-9.4600

624.00	6365976.69	1547644.36	585.74	RT90-RHB70	-76.32	214.67	152.7900	26.1500	-9.5600
627.00	6365976.10	1547643.96	588.65	RT90-RHB70	-76.32	214.92	153.4800	26.3400	-9.6600
630.00	6365975.52	1547643.55	591.57	RT90-RHB70	-76.30	215.05	154.1600	26.5300	-9.7600
633.00	6365974.94	1547643.14	594.48	RT90-RHB70	-76.31	215.16	154.8400	26.7300	-9.8600
636.00	6365974.36	1547642.73	597.40	RT90-RHB70	-76.32	215.39	155.5200	26.9200	-9.9500
639.00	6365973.78	1547642.32	600.31	RT90-RHB70	-76.33	215.66	156.2000	27.1200	-10.0600
642.00	6365973.20	1547641.91	603.23	RT90-RHB70	-76.35	215.85	156.8800	27.3300	-10.1600
645.00	6365972.63	1547641.49	606.14	RT90-RHB70	-76.36	216.01	157.5600	27.5300	-10.2600
648.00	6365972.06	1547641.08	609.06	RT90-RHB70	-76.37	216.19	158.2400	27.7400	-10.3700
651.00	6365971.49	1547640.66	611.97	RT90-RHB70	-76.40	216.37	158.9100	27.9500	-10.4700
654.00	6365970.92	1547640.24	614.89	RT90-RHB70	-76.41	216.63	159.5900	28.1600	-10.5800
657.00	6365970.35	1547639.82	617.80	RT90-RHB70	-76.41	216.81	160.2600	28.3700	-10.6900
660.00	6365969.79	1547639.40	620.72	RT90-RHB70	-76.41	216.92	160.9300	28.5900	-10.8000
663.00	6365969.23	1547638.98	623.64	RT90-RHB70	-76.41	217.13	161.6000	28.8000	-10.9100
666.00	6365968.66	1547638.55	626.55	RT90-RHB70	-76.40	217.39	162.2700	29.0200	-11.0200
669.00	6365968.10	1547638.12	629.47	RT90-RHB70	-76.40	217.66	162.9400	29.2400	-11.1300
672.00	6365967.54	1547637.69	632.38	RT90-RHB70	-76.42	217.85	163.6100	29.4700	-11.2400
675.00	6365966.99	1547637.26	635.30	RT90-RHB70	-76.45	218.04	164.2800	29.6900	-11.3600
678.00	6365966.43	1547636.82	638.22	RT90-RHB70	-76.45	218.26	164.9400	29.9200	-11.4700
681.00	6365965.88	1547636.39	641.13	RT90-RHB70	-76.46	218.56	165.6000	30.1600	-11.5900
684.00	6365965.33	1547635.95	644.05	RT90-RHB70	-76.48	218.88	166.2700	30.3900	-11.7100
687.00	6365964.79	1547635.51	646.97	RT90-RHB70	-76.48	219.14	166.9300	30.6300	-11.8300
690.00	6365964.24	1547635.07	649.88	RT90-RHB70	-76.48	219.36	167.5800	30.8700	-11.9500
693.00	6365963.70	1547634.62	652.80	RT90-RHB70	-76.50	219.56	168.2400	31.1100	-12.0800
696.00	6365963.16	1547634.18	655.72	RT90-RHB70	-76.50	219.92	168.9000	31.3600	-12.2000
699.00	6365962.62	1547633.73	658.63	RT90-RHB70	-76.49	220.23	169.5500	31.6100	-12.3300
702.00	6365962.09	1547633.28	661.55	RT90-RHB70	-76.49	220.55	170.2100	31.8600	-12.4600
705.00	6365961.56	1547632.82	664.47	RT90-RHB70	-76.51	220.93	170.8600	32.1200	-12.5900
708.00	6365961.03	1547632.36	667.38	RT90-RHB70	-76.54	221.29	171.5100	32.3800	-12.7200
711.00	6365960.50	1547631.90	670.30	RT90-RHB70	-76.53	221.61	172.1500	32.6400	-12.8500
714.00	6365959.98	1547631.44	673.22	RT90-RHB70	-76.56	221.98	172.8000	32.9100	-12.9900
717.00	6365959.46	1547630.97	676.14	RT90-RHB70	-76.59	222.29	173.4400	33.1800	-13.1300
720.00	6365958.95	1547630.50	679.06	RT90-RHB70	-76.61	222.48	174.0800	33.4600	-13.2700
723.00	6365958.44	1547630.03	681.97	RT90-RHB70	-76.63	222.77	174.7200	33.7300	-13.4100
726.00	6365957.93	1547629.56	684.89	RT90-RHB70	-76.65	223.00	175.3500	34.0100	-13.5600
729.00	6365957.42	1547629.09	687.81	RT90-RHB70	-76.64	223.23	175.9900	34.2900	-13.7000
732.00	6365956.92	1547628.62	690.73	RT90-RHB70	-76.64	223.40	176.6200	34.5800	-13.8500
735.00	6365956.41	1547628.14	693.65	RT90-RHB70	-76.62	223.55	177.2500	34.8600	-14.0000
738.00	6365955.91	1547627.66	696.57	RT90-RHB70	-76.63	223.65	177.8800	35.1500	-14.1500
741.00	6365955.41	1547627.18	699.49	RT90-RHB70	-76.66	223.75	178.5100	35.4400	-14.3000
744.00	6365954.91	1547626.70	702.41	RT90-RHB70	-76.67	224.07	179.1400	35.7300	-14.4500
747.00	6365954.41	1547626.22	705.33	RT90-RHB70	-76.69	224.48	179.7700	36.0200	-14.6100
750.00	6365953.92	1547625.74	708.24	RT90-RHB70	-76.70	224.84	180.3900	36.3200	-14.7600

753.00	6365953.43	1547625.25	711.16	RT90-RHB70	-76.68	225.08	181.0100	36.6200	-14.9200
756.00	6365952.94	1547624.76	714.08	RT90-RHB70	-76.68	225.33	181.6300	36.9200	-15.0800
759.00	6365952.45	1547624.27	717.00	RT90-RHB70	-76.68	225.65	182.2500	37.2300	-15.2400
762.00	6365951.97	1547623.78	719.92	RT90-RHB70	-76.72	225.94	182.8700	37.5400	-15.4100
765.00	6365951.49	1547623.28	722.84	RT90-RHB70	-76.72	226.26	183.4900	37.8500	-15.5700
768.00	6365951.01	1547622.78	725.76	RT90-RHB70	-76.73	226.50	184.1000	38.1700	-15.7400
771.00	6365950.54	1547622.28	728.68	RT90-RHB70	-76.72	226.71	184.7100	38.4800	-15.9100
774.00	6365950.07	1547621.78	731.60	RT90-RHB70	-76.70	226.97	185.3200	38.8000	-16.0800
777.00	6365949.60	1547621.28	734.52	RT90-RHB70	-76.67	227.22	185.9300	39.1300	-16.2500
780.00	6365949.13	1547620.77	737.44	RT90-RHB70	-76.65	227.43	186.5400	39.4500	-16.4200
783.00	6365948.66	1547620.26	740.36	RT90-RHB70	-76.65	227.65	187.1500	39.7800	-16.5900
786.00	6365948.19	1547619.75	743.28	RT90-RHB70	-76.66	227.91	187.7600	40.1100	-16.7600
789.00	6365947.73	1547619.23	746.20	RT90-RHB70	-76.68	228.13	188.3600	40.4500	-16.9300
792.00	6365947.27	1547618.72	749.12	RT90-RHB70	-76.68	228.31	188.9700	40.7900	-17.1100
795.00	6365946.81	1547618.20	752.04	RT90-RHB70	-76.69	228.51	189.5700	41.1200	-17.2900
798.00	6365946.35	1547617.69	754.96	RT90-RHB70	-76.71	228.71	190.1700	41.4600	-17.4600
801.00	6365945.89	1547617.17	757.87	RT90-RHB70	-76.72	228.91	190.7700	41.8000	-17.6400
804.00	6365945.44	1547616.65	760.79	RT90-RHB70	-76.73	229.18	191.3700	42.1500	-17.8300
807.00	6365944.99	1547616.13	763.71	RT90-RHB70	-76.75	229.39	191.9600	42.4900	-18.0100
810.00	6365944.54	1547615.61	766.63	RT90-RHB70	-76.77	229.59	192.5600	42.8400	-18.2000
813.00	6365944.10	1547615.08	769.56	RT90-RHB70	-76.77	229.81	193.1500	43.1900	-18.3900
816.00	6365943.66	1547614.56	772.48	RT90-RHB70	-76.79	230.09	193.7400	43.5400	-18.5800
819.00	6365943.22	1547614.03	775.40	RT90-RHB70	-76.80	230.37	194.3200	43.8900	-18.7700
822.00	6365942.78	1547613.51	778.32	RT90-RHB70	-76.82	230.63	194.9100	44.2500	-18.9600
825.00	6365942.35	1547612.98	781.24	RT90-RHB70	-76.83	230.94	195.4900	44.6100	-19.1600
828.00	6365941.91	1547612.45	784.16	RT90-RHB70	-76.84	231.23	196.0700	44.9700	-19.3600
831.00	6365941.49	1547611.91	787.08	RT90-RHB70	-76.87	231.42	196.6500	45.3300	-19.5600
834.00	6365941.06	1547611.38	790.00	RT90-RHB70	-76.88	231.67	197.2300	45.7000	-19.7600
837.00	6365940.64	1547610.85	792.92	RT90-RHB70	-76.89	231.98	197.8000	46.0700	-19.9700
840.00	6365940.22	1547610.31	795.85	RT90-RHB70	-76.90	232.27	198.3700	46.4400	-20.1800
843.00	6365939.80	1547609.77	798.77	RT90-RHB70	-76.91	232.51	198.9400	46.8100	-20.3900
846.00	6365939.39	1547609.23	801.69	RT90-RHB70	-76.92	232.76	199.5100	47.1800	-20.6000
849.00	6365938.98	1547608.69	804.61	RT90-RHB70	-76.92	233.04	200.0700	47.5600	-20.8100
852.00	6365938.57	1547608.15	807.53	RT90-RHB70	-76.92	233.31	200.6300	47.9400	-21.0300
855.00	6365938.17	1547607.61	810.46	RT90-RHB70	-76.92	233.55	201.2000	48.3200	-21.2500
858.00	6365937.76	1547607.06	813.38	RT90-RHB70	-76.93	233.78	201.7500	48.7100	-21.4700
861.00	6365937.36	1547606.51	816.30	RT90-RHB70	-76.93	234.07	202.3100	49.0900	-21.6900
864.00	6365936.96	1547605.96	819.22	RT90-RHB70	-76.94	234.29	202.8700	49.4800	-21.9100
867.00	6365936.57	1547605.41	822.14	RT90-RHB70	-76.95	234.45	203.4200	49.8700	-22.1400
870.00	6365936.17	1547604.86	825.07	RT90-RHB70	-76.96	234.68	203.9700	50.2700	-22.3700
873.00	6365935.78	1547604.31	827.99	RT90-RHB70	-76.96	234.81	204.5200	50.6600	-22.5900
876.00	6365935.39	1547603.76	830.91	RT90-RHB70	-76.95	234.81	205.0700	51.0600	-22.8200
879.00	6365935.00	1547603.20	833.84	RT90-RHB70	-76.95	234.92	205.6200	51.4500	-23.0500

882.00	6365934.61	1547602.65	836.76	RT90-RHB70	-76.97	235.10	206.1700	51.8500	-23.2800
885.00	6365934.23	1547602.09	839.68	RT90-RHB70	-76.99	235.30	206.7200	52.2500	-23.5100
888.00	6365933.84	1547601.54	842.60	RT90-RHB70	-77.01	235.48	207.2600	52.6500	-23.7500
891.00	6365933.46	1547600.98	845.53	RT90-RHB70	-77.02	235.71	207.8100	53.0500	-23.9800
894.00	6365933.08	1547600.43	848.45	RT90-RHB70	-77.04	235.88	208.3500	53.4500	-24.2200
897.00	6365932.70	1547599.87	851.37	RT90-RHB70	-77.05	236.12	208.8800	53.8500	-24.4600
900.00	6365932.33	1547599.31	854.30	RT90-RHB70	-77.05	236.53	209.4200	54.2600	-24.7100
903.00	6365931.96	1547598.75	857.22	RT90-RHB70	-77.02	236.94	209.9500	54.6700	-24.9500
906.00	6365931.59	1547598.18	860.14	RT90-RHB70	-77.00	237.35	210.4900	55.0800	-25.2000
909.00	6365931.22	1547597.62	863.07	RT90-RHB70	-76.98	237.63	211.0200	55.5000	-25.4500
912.00	6365930.86	1547597.05	865.99	RT90-RHB70	-76.99	237.91	211.5400	55.9200	-25.7000
915.00	6365930.50	1547596.47	868.91	RT90-RHB70	-76.99	238.25	212.0700	56.3500	-25.9500
918.00	6365930.15	1547595.90	871.84	RT90-RHB70	-76.96	238.49	212.5900	56.7700	-26.2000
921.00	6365929.80	1547595.32	874.76	RT90-RHB70	-76.94	238.73	213.1200	57.2000	-26.4600
924.00	6365929.44	1547594.74	877.68	RT90-RHB70	-76.95	238.99	213.6400	57.6400	-26.7100
927.00	6365929.09	1547594.16	880.60	RT90-RHB70	-76.93	239.26	214.1600	58.0700	-26.9700
930.00	6365928.75	1547593.58	883.53	RT90-RHB70	-76.93	239.54	214.6700	58.5100	-27.2300
933.00	6365928.40	1547592.99	886.45	RT90-RHB70	-76.93	239.75	215.1900	58.9500	-27.4900
936.00	6365928.06	1547592.41	889.37	RT90-RHB70	-76.93	240.03	215.7000	59.3900	-27.7600
939.00	6365927.72	1547591.82	892.29	RT90-RHB70	-76.93	240.39	216.2200	59.8400	-28.0200
942.00	6365927.39	1547591.23	895.22	RT90-RHB70	-76.93	240.61	216.7300	60.2800	-28.2900
945.00	6365927.05	1547590.64	898.14	RT90-RHB70	-76.92	240.88	217.2300	60.7400	-28.5600
948.00	6365926.72	1547590.05	901.06	RT90-RHB70	-76.92	241.12	217.7400	61.1900	-28.8300
951.00	6365926.40	1547589.45	903.98	RT90-RHB70	-76.93	241.37	218.2400	61.6400	-29.1000
954.00	6365926.07	1547588.86	906.90	RT90-RHB70	-76.93	241.78	218.7400	62.1000	-29.3800
957.00	6365925.75	1547588.26	909.83	RT90-RHB70	-76.91	242.06	219.2400	62.5600	-29.6600
960.00	6365925.43	1547587.66	912.75	RT90-RHB70	-76.91	242.33	219.7400	63.0200	-29.9400
963.00	6365925.12	1547587.06	915.67	RT90-RHB70	-76.91	242.61	220.2300	63.4900	-30.2200
966.00	6365924.80	1547586.45	918.59	RT90-RHB70	-76.93	242.91	220.7300	63.9600	-30.5100
969.00	6365924.50	1547585.85	921.51	RT90-RHB70	-76.93	243.25	221.2200	64.4300	-30.7900
972.00	6365924.19	1547585.24	924.44	RT90-RHB70	-76.92	243.55	221.7000	64.9000	-31.0800
975.00	6365923.89	1547584.64	927.36	RT90-RHB70	-76.92	243.88	222.1900	65.3800	-31.3800
978.00	6365923.59	1547584.03	930.28	RT90-RHB70	-76.92	244.15	222.6700	65.8600	-31.6700
981.00	6365923.29	1547583.42	933.20	RT90-RHB70	-76.91	244.38	223.1500	66.3400	-31.9700
984.00	6365923.00	1547582.80	936.13	RT90-RHB70	-76.89	244.64	223.6200	66.8200	-32.2700
987.00	6365922.71	1547582.19	939.05	RT90-RHB70	-76.88	244.85	224.1000	67.3100	-32.5700
993.00	6365922.13	1547580.95	944.89	RT90-RHB70	-76.85	245.23	225.0500	68.2900	-33.1700

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In-data: Reference marks for length adjustments for KLX03

Reference Mark T - Reference mark in drillhole

KLX03, 2004-09-11 - 2004-09-14 (110.000 - 950.000 m)

Bhlen (m)	Rotation Speed (rpm)	Start Flow (l/min)	Stop Flow (l/min)	Stop Pressure (bar)	Cutter Time (s)	Trace Detectable	Cutter Diameter (mm)	Comment
110.00	400.00	200	1000	48.0	185	JA		
150.00	400.00	220	1000	46.0	149	JA		
200.00	400.00	210	1000	49.0	140	JA		
250.00	400.00	200	1000		220	JA		Inget tryckfall
300.00	400.00	200	1000	50.0	356	JA		
350.00	400.00	200	1000	51.0	430	JA		
399.00	400.00	300	1000	45.0	232	JA		
400.00	400.00	200	1000		425	JA		Inget tryckfall
450.00	400.00	340	1000	47.0	311	JA		
500.00	400.00	380	1000	50.0	390	JA		
550.00	400.00	380	1000	50.0	666	JA		
600.00	400.00	380	1000	50.0	727	JA		Inget tryckfall
650.00	400.00	240	1000	32.0	120	JA		
700.00	400.00	240	1000	36.0	100	JA		
750.00	400.00	240	1000	36.0	80	JA		
800.00	400.00	240	1000	36.0	90	JA		
850.00	400.00	260	1000	38.0	120	JA		
900.00	400.00	280	1000	32.0		JA		(150) Ingen säker indikation tryckfall
950.00	400.00	240	1000	32.0		JA		(150) Ingen indikation tryckfall

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