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Oskarshamn site investigation

Boremap mapping of telescopic drilled borehole KLX27A

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January 2008

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

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

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

Abstract

This report presents the Boremap mapping of KLX27A, which is a c. 650 m long telescopic core drilled borehole. The borehole was drilled with the orientation 0.7/-65°. The mapping was conducted between 2007-12-12 and 2008-01-10.

The documentation of geological structures and lithologies intersecting borehole KLX27A was made using the drill core and BIPS-images. Geological structures are correctly oriented in space along the borehole with the Boremap system.

The lithology in KLX27A (Table 5-1) is dominated by quartz monzodiorite (501036). Subordinate rock types comprise fine-grained diorite-gabbro (505102) and fine-grained granite (511058).

Seven sections have been highlighted based on increased fracture frequencies, alterations and structural features. These sections cover the following intervals: 105.9–109.8 m, 167.9–167.5 m, 208.5–254.0 m, 337.4–340.0 m, 370.5–375.0 m, 595.2–596.6 m and 634.9–644.8 m.

Sammanfattning

Denna rapport presenterar boremapkarteringen av KLX27A som är ett ca 650 meter långt kärnborrhål. Borrhålet borrades med orienteringen 0.7/-65° och karterades mellan 2007-12-12 och 2008-01-10.

Dokumentationen av geologiska strukturer och litologi som genomskär borrhål KLX27A har utförts med borkärna och BIPS-bilder. Geologiska strukturer har orienterats i rummet längs med borrhålet med Boremap systemet.

KLX27A domineras av kvartsmonzodiorit (501036). Underordnade bergarter utgörs av finkornig diorit-gabbro (505102) och finkornig granit (511058).

Sju sektioner i KLX27A kan urskiljas baserat på förhöjd sprickfrekvens, bergets omvandlingar och geologiska strukturer. Dessa sektioner återfinns i följande intervall: 105,9–109,8 m, 167,9–167,5 m, 208,5–254,0 m, 337,4–340,0 m, 370,5–375,0 m, 595,2–596,6 m och 634,9–644,8 m.

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1 Introduction

This report gives a brief presentation of the data gained from the mapping of KLX27A in the Laxemar area, which is one of the activities performed within the site investigation at Oskarshamn. The work was carried out in accordance with activity plan AP PS 400-07-070. In Table 1-1 controlling documents for performing this activity are listed. Both activity plan and method descriptions are SKB's internal controlling documents. Rock type nomenclature that has been used is shown in Table 1-2.

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

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

Activity plan	Number	Version
Boremapkartering av KLX27A	AP PS 400-07-070	1.0
Method descriptions	Number	Version
Nomenklatur vid Boremapkartering	SKB MD 143.008	2.0
Method Description for Boremap mapping	SKB MD 143.006	2.0
Mätsystembeskrivning för Boremap	SKB MD 146.005	1.0
Instruktion: Regler för bergarters benämningar vid platsundersökning i Oskarshamn	SKB MD 132.004	1.0
Instruktion för längdkalibrering vid undersökningar i kärnbråhåll	SKB MD 620.010	2.0

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

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

Borehole KLX27A is situated within the Laxemar area (Figure 1-1). KLX27A is a c. 650 m long telescopic borehole with the orientation 0.7/−65°. Mapping of the borehole was performed between 2007-12-12 and 2008-01-10.

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

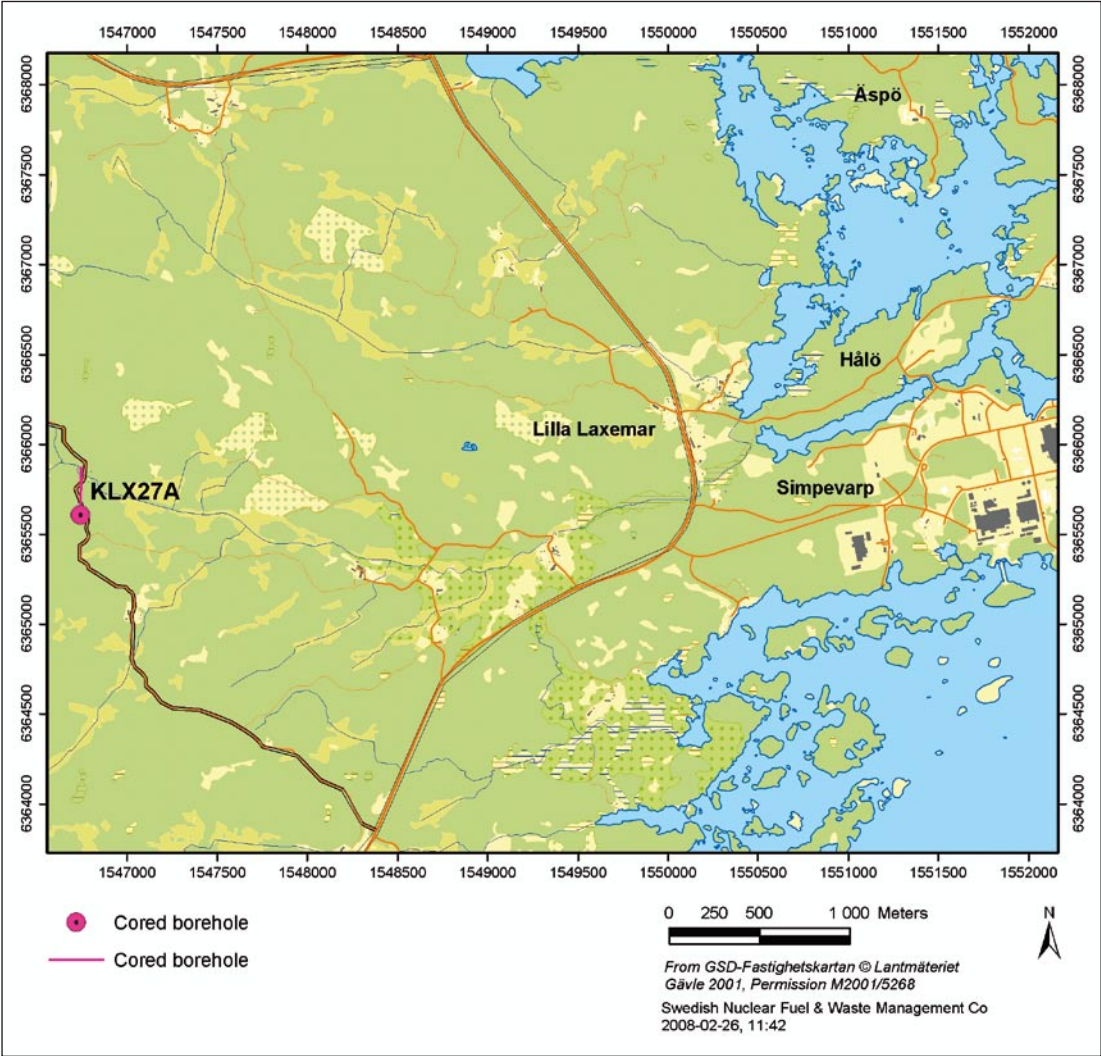


Figure 1-1. Location of the core drilled borehole KLX27A.

2 Objective and scope

The principal aim of the mapping activities presented in this report is to obtain a documentation of geological structures and lithologies intersecting borehole KLX27A. Geological structures will be correctly orientated in space along the borehole with the Boremap system. The result will serve as a platform for forthcoming investigations of the drill core, as well as various site descriptive modelling.

3 Equipment

3.1 Description of software

Software used for the mapping of KLX27A was Boremap v.3.9 with bedrock and mineral standards of SKB. The data presentation was made using WellCad v.4, Microsoft Access and Microsoft Excel. Boremap is the software that unites orthodox core mapping with modern video mapping, where Boremap shows the image from BIPS (Borehole Image Processing System) and extracts the geometrical parameters: length, width, strike and dip from the image.

3.2 Other equipment

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

3.3 BIPS-image video film sequences

The BIPS-image of KLX27A covers the interval 76.00–648.381 m.

3.4 BIPS-image video film quality

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

3.4.1 BIPS-image resolution

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

3.4.2 BIPS-image contrast

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

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

3.4.3 BIPS-image quality

BIPS-image quality is sometimes limited due to:

- 1) blackish coatings probably related to the drilling equipment,
- 2) vertical bleached bands from the clayey mixture of drill cuttings and water,
- 3) light and dark bands at high angle to the drill hole related to the automatic aperture of the video camera,
- 4) vertical enlargements of pixels due to stick-slip movement of the camera probe.

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

The image quality is classified into four levels; good, acceptable, bad and very bad. Good quality means a more or less clear image which is easy to interpret. If the quality is acceptable it means that the image is not good, but that the mapping can be performed without any problems. An image of bad quality is somewhat difficult to interpret while an image of very bad quality cannot be interpreted except from very obvious and outstanding features. When the BIPS-image quality is so bad that fractures and structures cannot be identified, they can still be oriented using the guide-line method (Section 4.3.3). The BIPS-image quality for KLX27A is presented in Table 3-1.

Table 3-1. BIPS-image quality in KLX27A.

From (m)	To (m)	Quality
76	317	Good
317	566	Acceptable
566	648	Good

4 Execution

4.1 General

Mapping of the drill core of the telescopic drilled borehole was performed and documented according to activity plan AP PS 400-07-070 (SKB, internal document) referring to the Method Description for Boremap mapping (SKB MD 143.006, v.2.0), Nomenklatur vid Boremapkartering (SKB MD 143.008, v.2.0), Instruktion: Regler för bergarters benämningar vid platsundersökningen i Oskarshamn (SKB MD 132.004, v.1.0) and Instruktion för längdkalibrering vid undersökningar i kärnbråhåll (SKB MD 620.010, v.2.0).

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

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

The mapping was performed by Karl-Johan Mattsson and Stefan Eklund (Geosigma AB).

4.2 Preparations

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

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

4.3 Execution of measurements

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

4.3.1 Fracture definitions

Definitions of different fracture types and aperture, crush zones and sealed fracture network are found in Nomenklatur vid Boremapkartering (SKB MD 143.008, v.2.0).

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

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

4.3.2 Fracture alteration and joint alteration number

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

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

- a) fracture wall alterations,
- b) fracture mineral fillings assumed to have been deposited from circulating water-rich solutions,
- c) fracture mineral fillings most likely resulting from altered wall rock material.

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

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

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

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

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

4.3.3 Mapping of fractures not visible in the BIPS-image

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

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

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

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

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

4.3.4 Definition of veins and dikes

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

4.3.5 Mineral codes

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

X5 Bleached fracture walls.

X7 Fractures with a fresh appearance and no detectable mineral.

X8 Fractures with epidotized/saussuritized walls.

4.4 Data handling

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

4.5 Geological summary table, general description

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

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

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

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

4.5.1 Columns in the Geological summary table

The Geological summary table includes the following 23 columns:

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

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

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

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

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

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

Column 7: *Structure/Shear zone < 1 m wide*, frequency column. This column includes ductile shear structures as well as brittle-ductile shear structures and these are mapped as rock occurrences in Boremap.

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

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

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

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

Column 12: *Structure/Foliation < 1 m wide* is a frequency column. Sections with foliation < 1 m wide are mapped as rock occurrence/structure in Boremap.

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 as well as broken fractures interpreted to have broken up artificially during/after drilling.

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

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

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

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

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

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

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

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

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

4.6 Nonconformities

Core loss occurs at 95.507–95.559 m, 253.807–253.867 m and at 503.597–503.612 m.

5 Results

5.1 General

Borehole KLX27A is oriented 0.7/–65°. The drill core covers the interval 76.00–650.560 m and the BIPS-image covers the interval 76.00 m–648.381 m.

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

Original data from the reported activity are stored in the primary database SICADA. Data are traceable in SICADA by the activity plan number (AP PS 400-07-070). Only data in the databases are accepted for further interpretation and modelling. The data presented in this report are regarded as copies of the original data. Data in the databases may be revised, if needed. Such revisions will not necessarily result in a revision of the P-report, although the normal procedure is that major revisions entail a revision of the P-report. Minor revisions are normally presented as supplements, available at www.skb.se.

5.2 Lithology and structures

The lithology in KLX27A (Table 5-1) is dominated by quartz monzodiorite (501036). Subordinate rock types comprise fine-grained diorite-gabbro (505102) and fine-grained granite (511058).

Table 5-1. Lithology distribution in KLX27A.

Rock types	%
Quartz monzodiorite (501036)	95.9
Fine-grained diorite-gabbro (505102)	2.1
Fine-grained granite (511058)	1.9

Seven sections in KLX27A are recognized by increased fracture frequencies, alterations and structural features:

Section interval characteristics

1. 105.9–109.8 m. Increased frequency of open and sealed fractures, sealed fracture networks and breccias. One gouge occurs within the section. The section is faint to strong red stained.
2. 167.9–176.5 m. Increased frequency of sealed fractures, sealed fracture networks, cataclasites and brittle-ductile shear zones. Slight increased frequency of open fractures. The section is partly weak to strong red stained.
3. 208.5–254.0 m. Increased frequency of open fractures and open fractures with aperture > 0.5 mm, sealed fractures, sealed fracture networks, brittle-ductile and ductile shear zones, cataclasites, breccias and mylonites. Six crush zones and two gauges occur in the section. The section is weak to medium red stained.
4. 337.4–340.0 m. Increased frequency of sealed fractures and sealed fracture networks, brittle-ductile shear zones and breccias. Slight increased frequency of open fractures.
5. 370.5–375.0 m. Increased frequency of sealed fractures and sealed fracture networks. Slight increased frequency of open fractures and brittle ductile shear zones. The section is weak to strong red stained.
6. 595.2–596.6 m. Increased frequency of sealed fractures, sealed fracture networks and ductile deformation.
7. 634.9–644.8 m. Increased frequency of sealed fractures, sealed fracture networks and brittle-ductile shear zones. Slight increased frequency of open fractures. The section is partly strong red stained.

5.3 Fracture mineralogy

Tables 5-2 and 5-3 show the frequency of minerals and rock wall alteration in sealed fractures and open fractures respectively. Minerals less than 0.1% are not accounted for. For X-mineral classification, see Section 4.3.5.

Calcite and chlorite are the most frequently occurring minerals in open fractures. Subordinate minerals are clay minerals, epidote and pyrite. In sealed fractures the dominating minerals and rock wall alterations are calcite, oxidized walls and chlorite. Subordinate minerals and rock wall alteration are epidote and quartz.

Table 5-2. Frequency of minerals and rock wall alteration in open fractures.

Mineral	%
Calcite	80.4
Chlorite	68.0
Clay minerals	25.7
Epidote	11.3
Pyrite	11.1
Quartz	7.5
Oxidized walls	6.4
X7	5.2
Hematite	4.3
Prehnite	1.3
X8	0.8
Galena	0.7
Adularia	0.5
Unknown mineral	0.4
Zeolite	0.4
X5	0.1

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

Mineral	%
Calcite	54.4
Oxidized walls	37.7
Chlorite	33.5
Epidote	15.6
Quartz	13.6
Prehnite	8.1
Adularia	4.6
White feldspar	3.5
Hematite	3.1
Red feldspar	1.6
X5	1.5
Pyrite	1.3
X8	0.8
X7	0.2
Clay minerals	0.2
Biotite	0.1

Search paths for the Geological summary table

TABLE HEAD LINES		INFORMATION SOURCE			PRESENTATION
Head lines	Sub head lines	Varcode	First suborder	Second suborder	Interval / frequency
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		Frequency
Structure	Shear zone	31	Sub 4 = 41 and 42		Frequency
	Brecciated, < 1m wide	31	Sub 4 = 7		Frequency
	Brecciated, >= 1m wide	5	Sub 3 = 7	Sub 4; 101 and 102 = 102	Interval
		5	Sub 3 = 7	Sub 4; 103 and 104 = 104	
	Mylonite, < 1 m wide	31	Sub 4 = 34		Frequency
	Mylonite, >= 1 m wide	5	Sub 3 = 34	Sub 4; 101 and 102 = 102	Interval
		5	Sub 3 = 34	Sub 4; 103 and 104 = 104	
	Foliation zone, < 1 m wide	31	Sub 4 = 81		Frequency
Foliation zone, >= 1 m wide	5	Sub 3 = 81	Sub 4; 101 and 102 = 102	Interval	
	5	Sub 3 = 81	Sub 4; 103 and 104 = 104		
Sealed fracture	All unbroken fractures and broken fractures	3			Frequency
		2	SNUM 11= 0		
	Broken fractures, Aperture = 0	2	SNum 11 = 0		Frequency
	Sealed fracture network < 1 m wide	32			Frequency
Sealed fracture network >= 1 m wide	32			Interval	
Open fractures	All, Aperture > 0	2 and 3	SNum 11>0		Frequency
	Uncertain, Aperture = 0.5 possible and 0.5 probable	2 and 3	SNum 11>0	Sub 12 > 1	Frequency
	Certain, Aperture = 0.5 certain	2 and 3	SNum 11>0	Sub 12 = 1	Frequency
	Joint alteration > 1.5	2	SNum16 > 1.5		Frequency
	Crush < 1 m wide	4			Frequency
	Crush >= 1 m wide	4			Interval

BIPS-image for KLX27A

Borehole Image Report

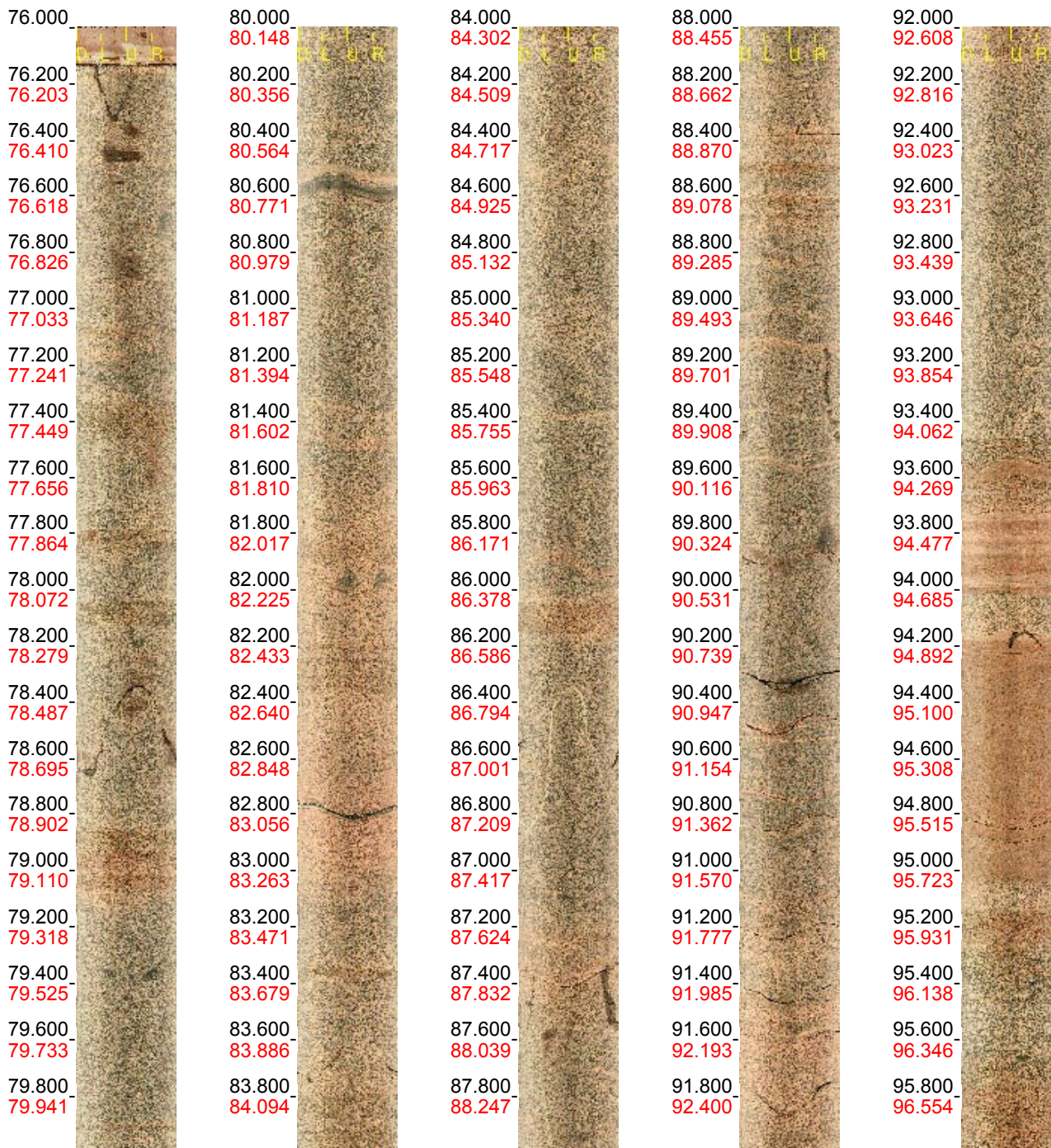
Borehole Name: KLX27A
Mapping Name: KLX27A_KJMSE_3
Mapping Range: 76.133 - 646.514 m
Diameter: 76.0 mm
Printed Range: 76.000 - 646.624
Pages: 30

Image File Information:

File: G:\skb\bips\oskarshamn\KLX27A\Used\KLX27A_76-646m.BIP
Date/Time: 2007-12-06 08:33:00
Start Depth: 76.000 m
End Depth: 646.624 m
Resolution: 1.00 mm/pixel (depth)
Orientation: Gravimetric
Image height: 570624 pixels
Image width: 360 pixels
BIP Version: BIP-III
Locality: LAXEMAR
Borehole: KLX27A
Scan Direction: Down
Color adjust: 0 0 0 (RGB)

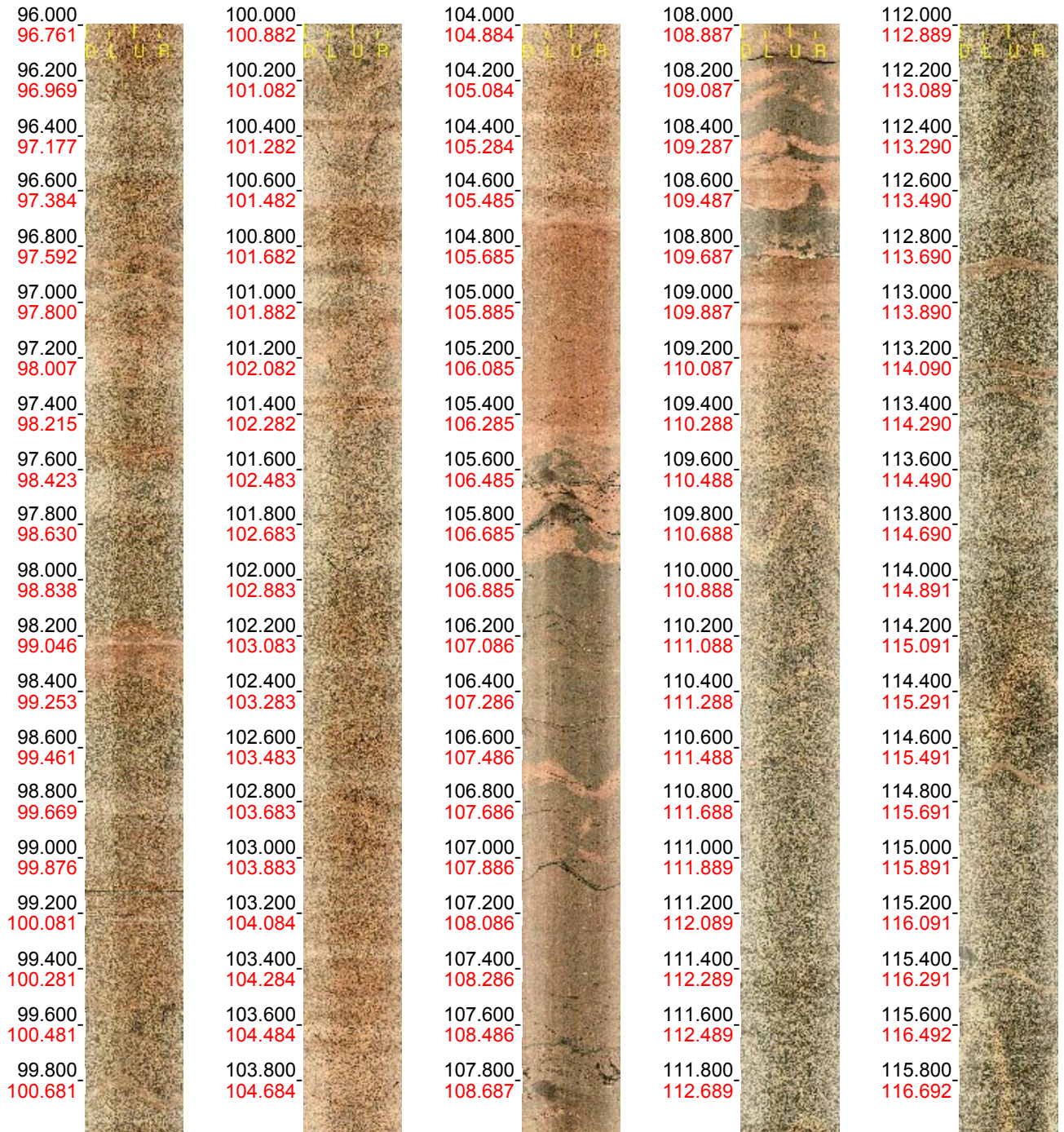
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 76.000 - 96.000 m
 Azimuth: 0.7
 Inclination: -65.2



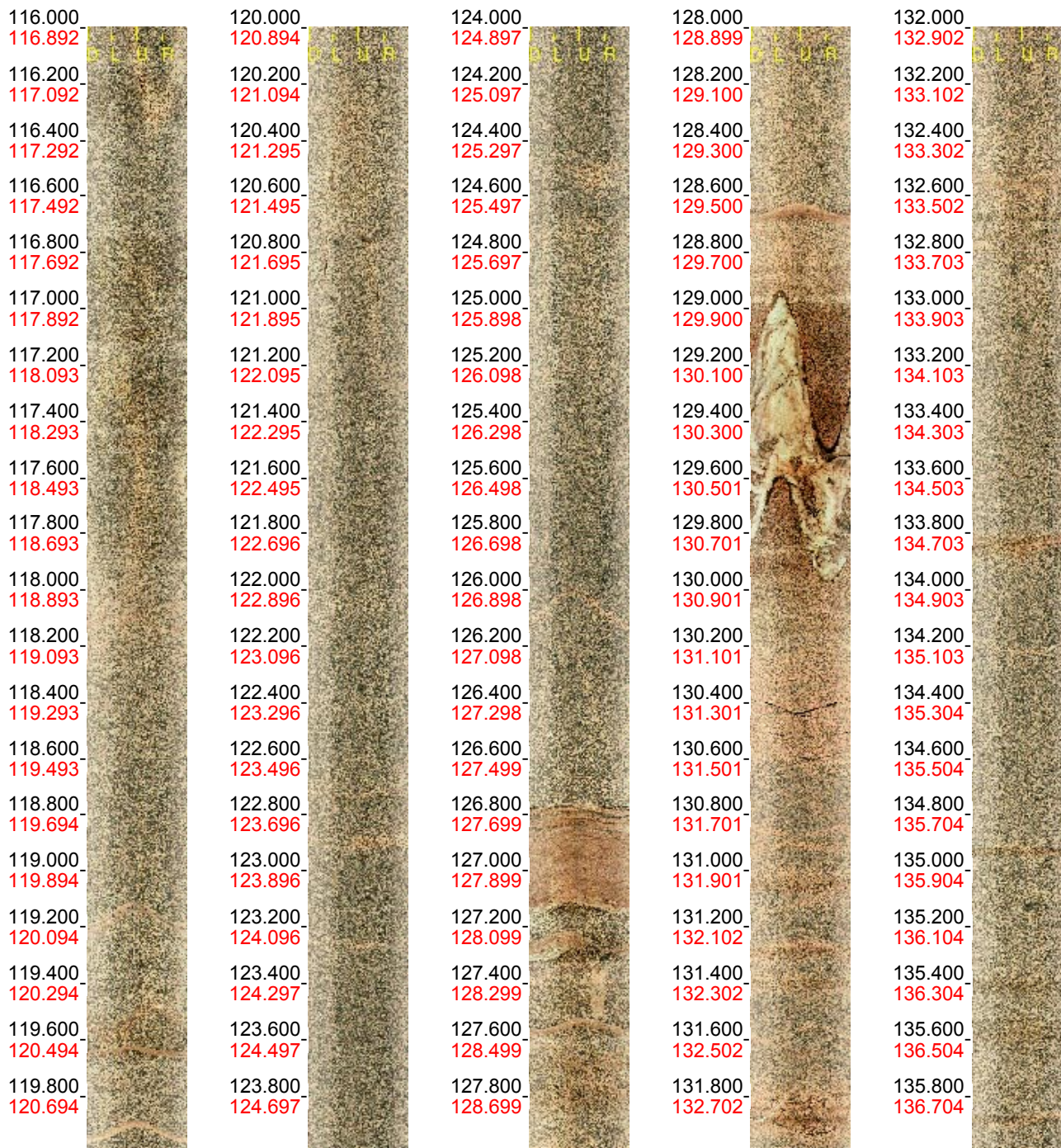
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 96.000 - 116.000 m
 Azimuth: 0.9
 Inclination: -65.0



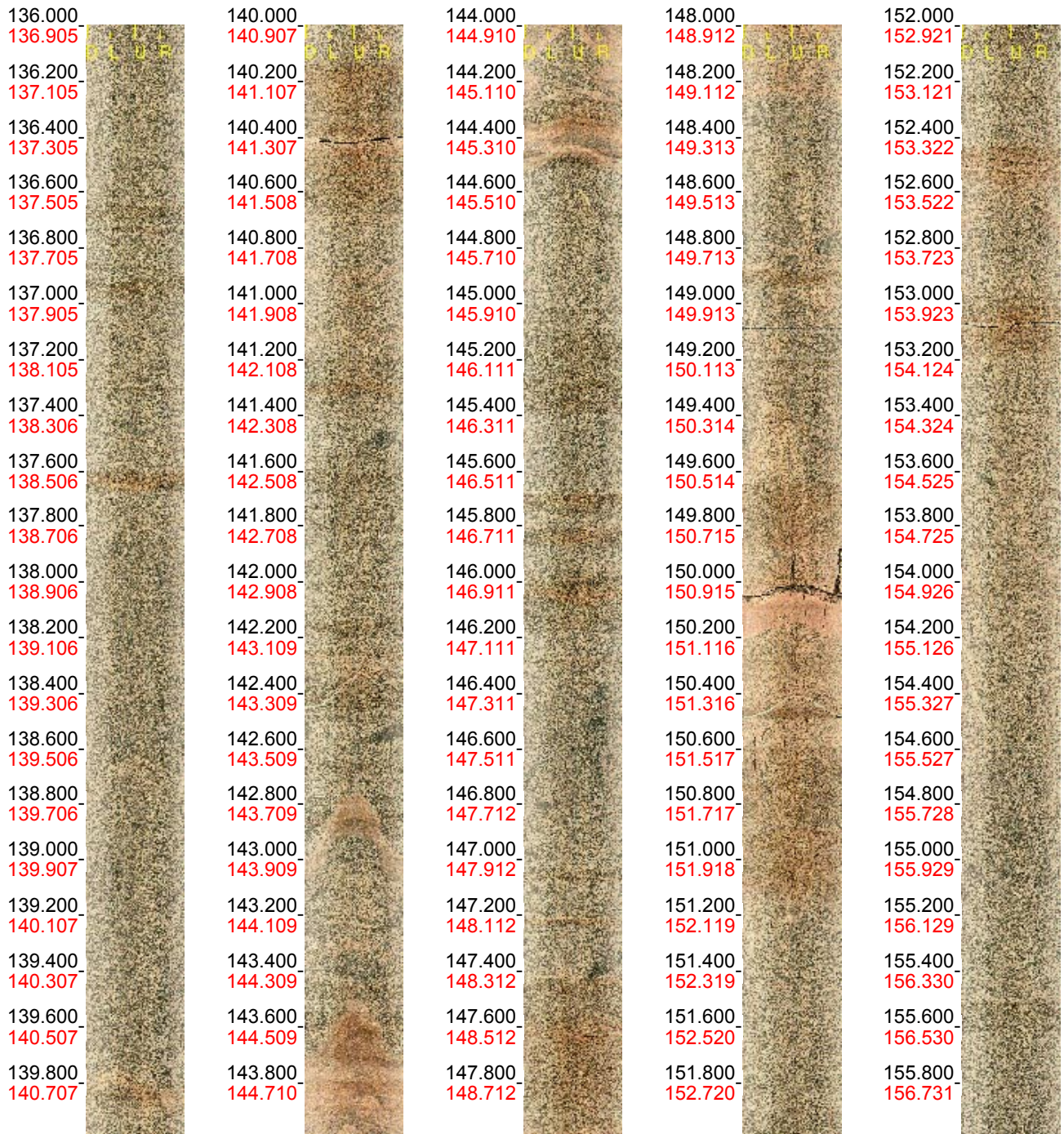
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 116.000 - 136.000 m
 Azimuth: 1.0
 Inclination: -64.8



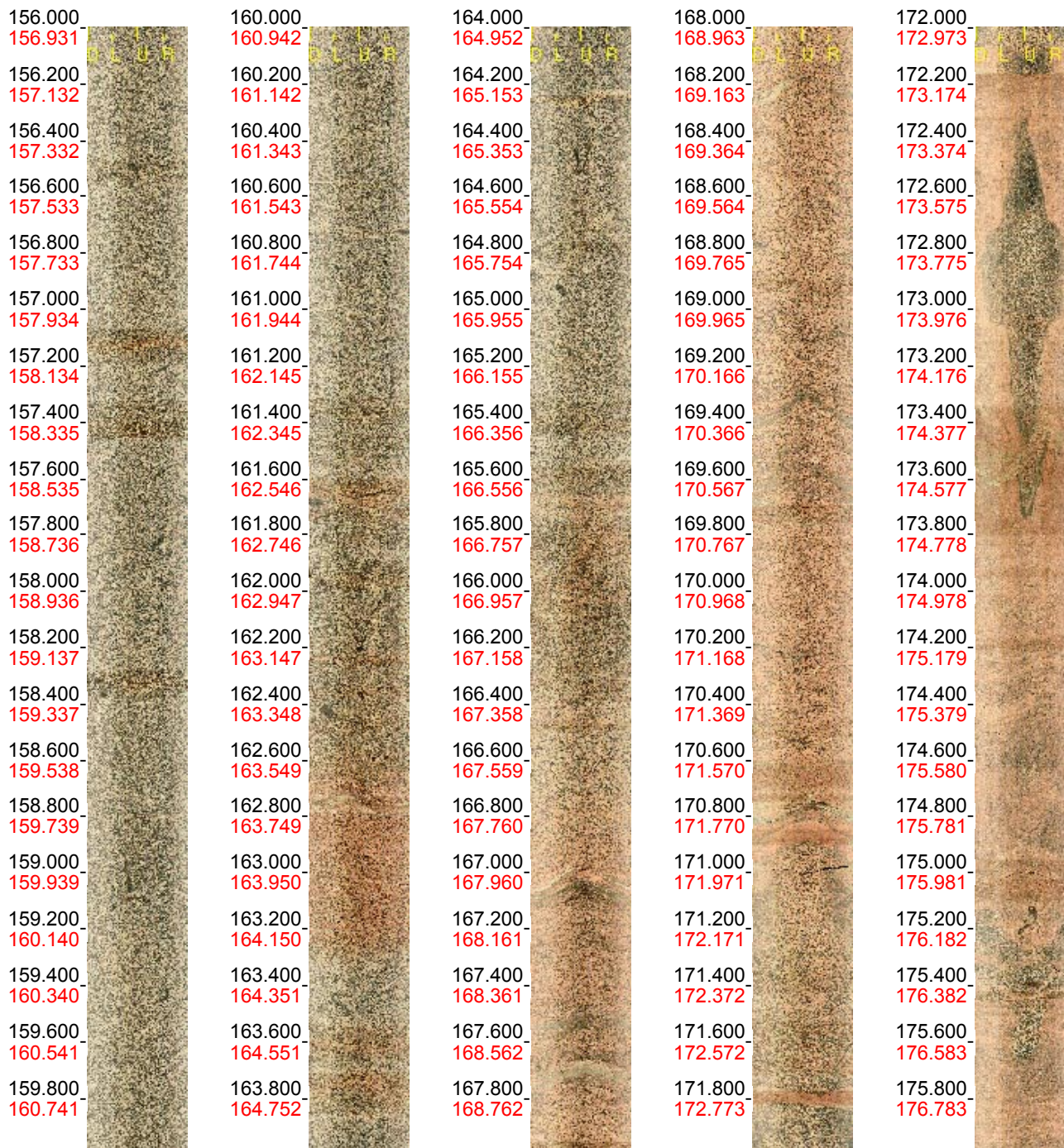
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 136.000 - 156.000 m
Azimuth: 1.0
Inclination: -64.7



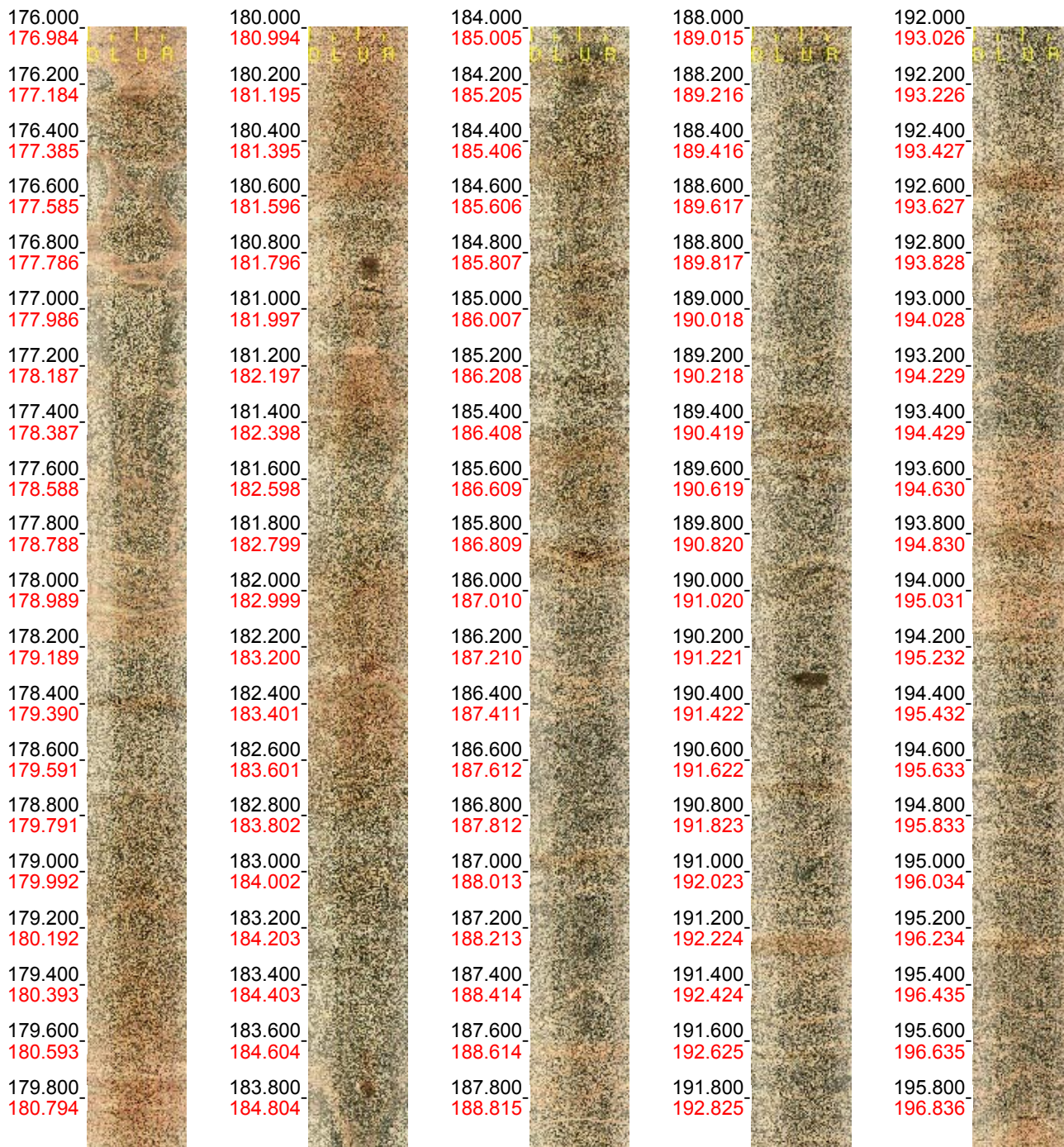
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 156.000 - 176.000 m
 Azimuth: 0.8
 Inclination: -64.5



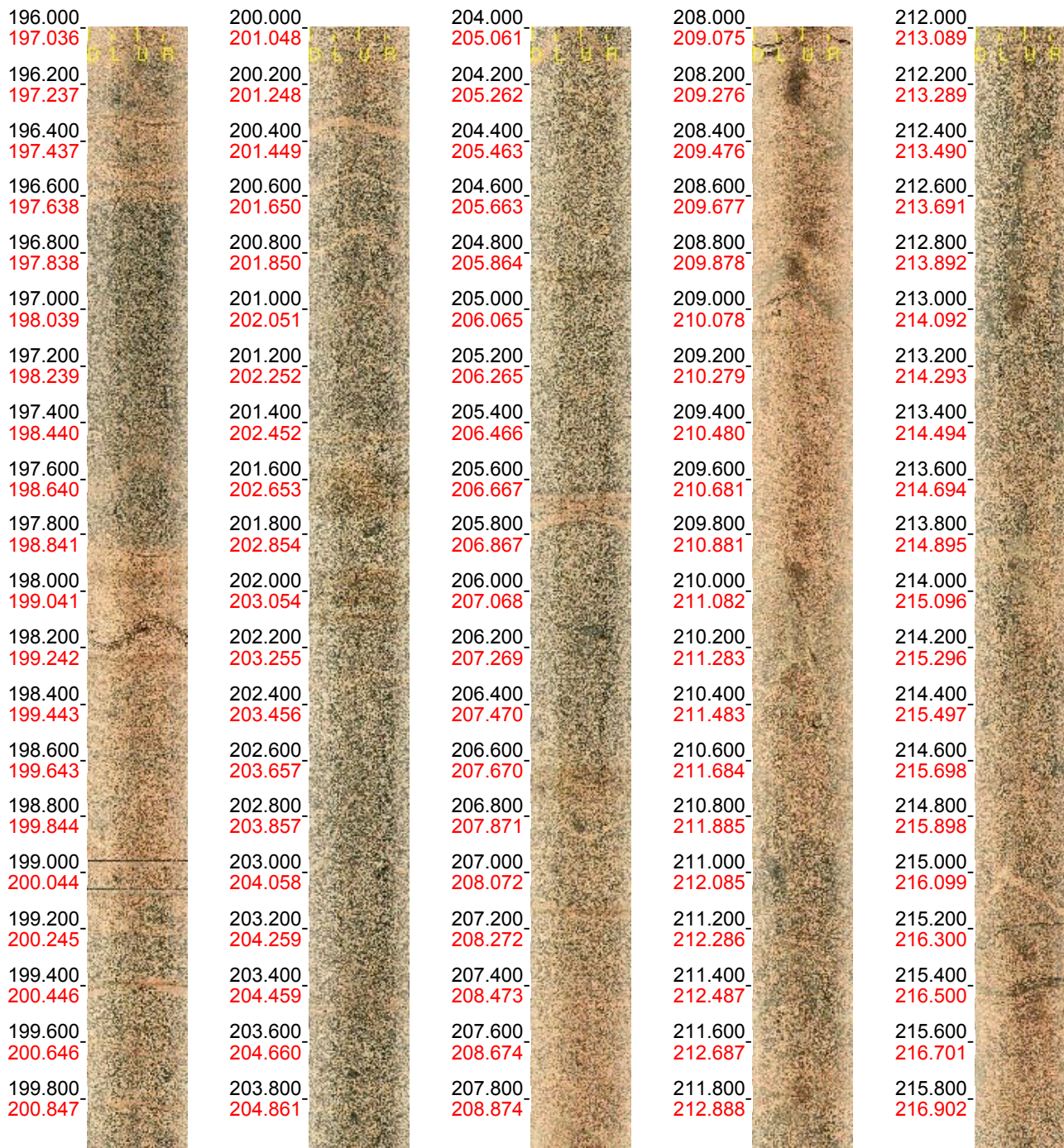
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 176.000 - 196.000 m
Azimuth: 0.6
Inclination: -64.5



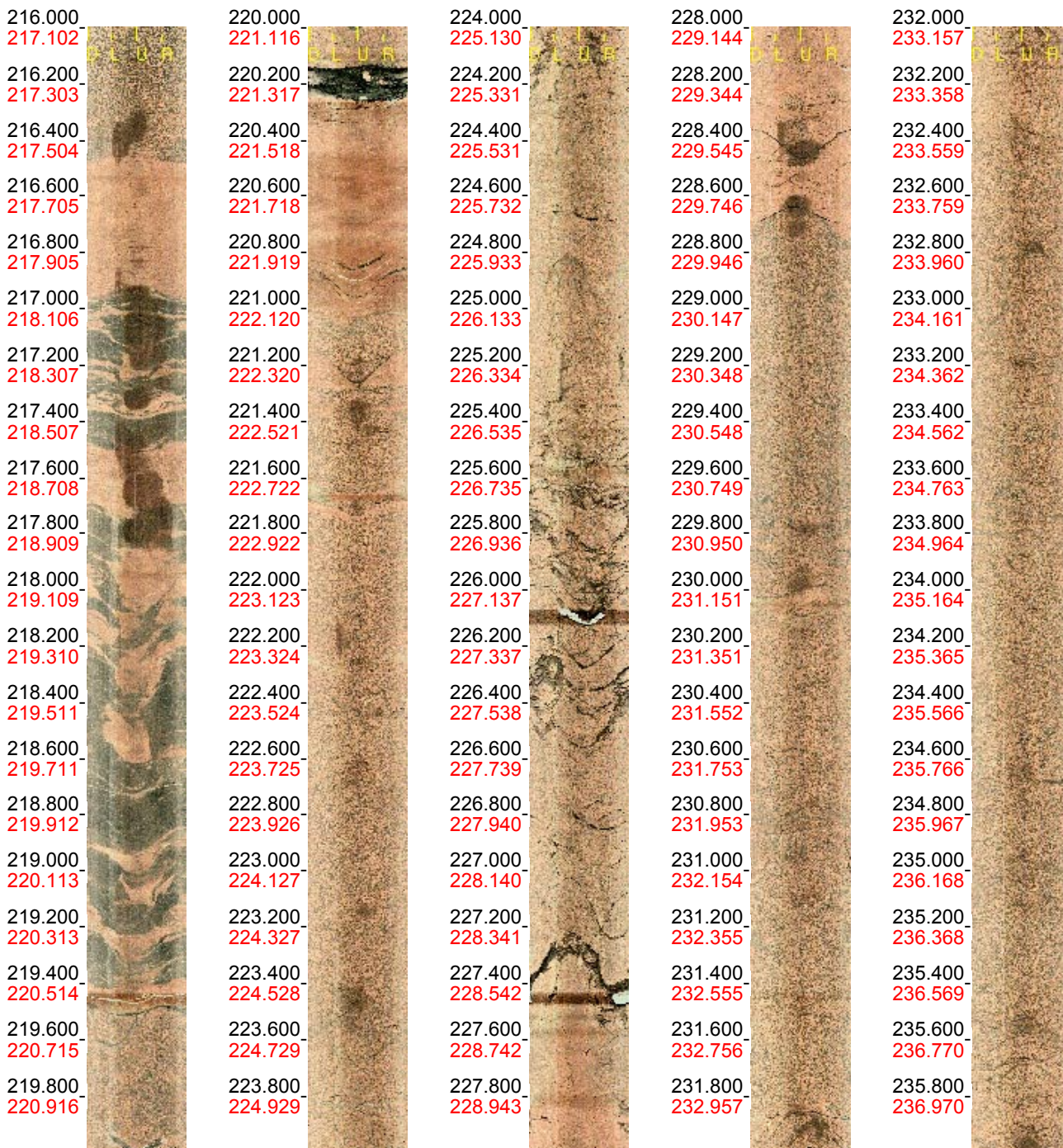
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 196.000 - 216.000 m
 Azimuth: 1.0
 Inclination: -64.6



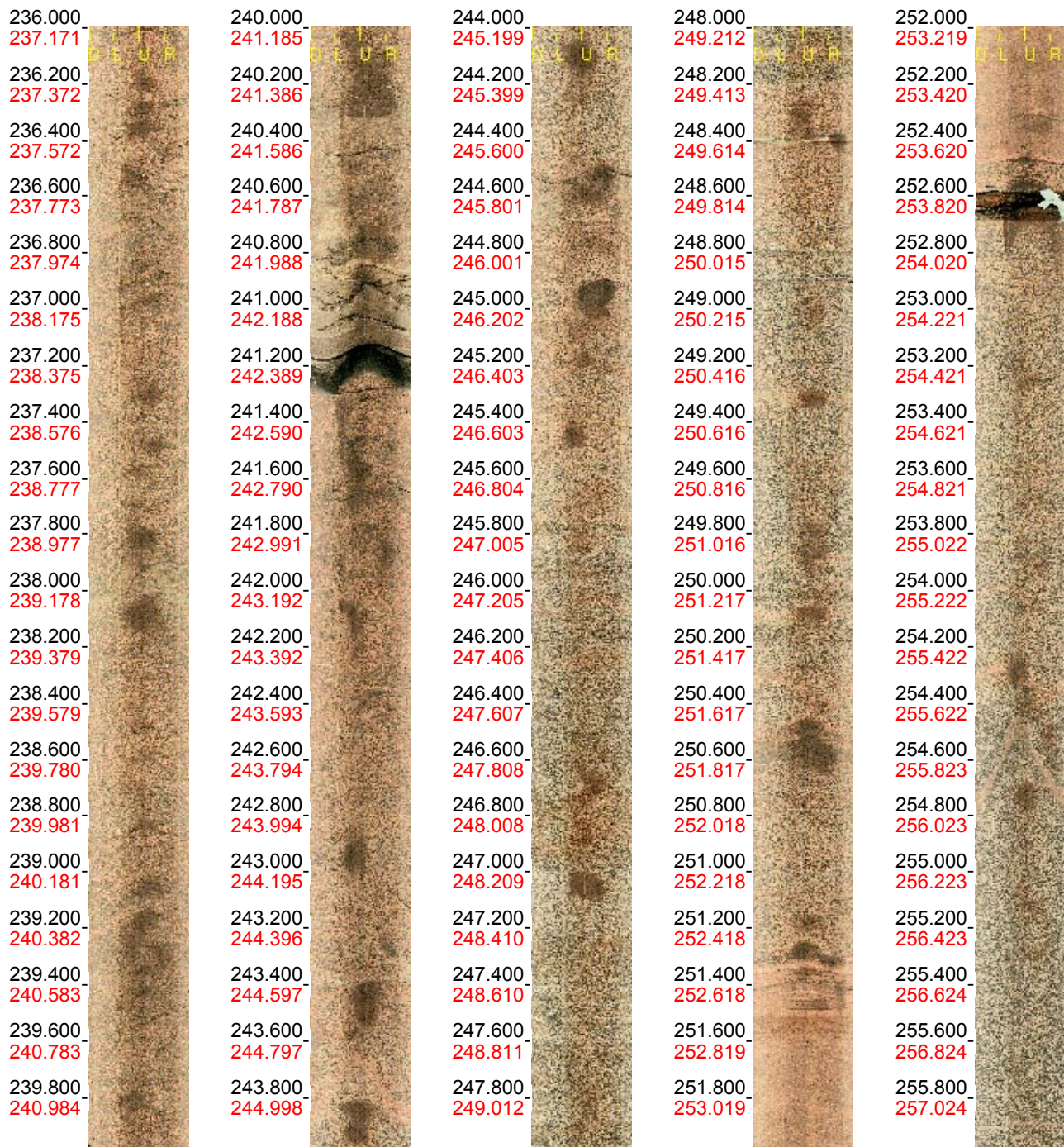
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 216.000 - 236.000 m
Azimuth: 0.5
Inclination: -64.5



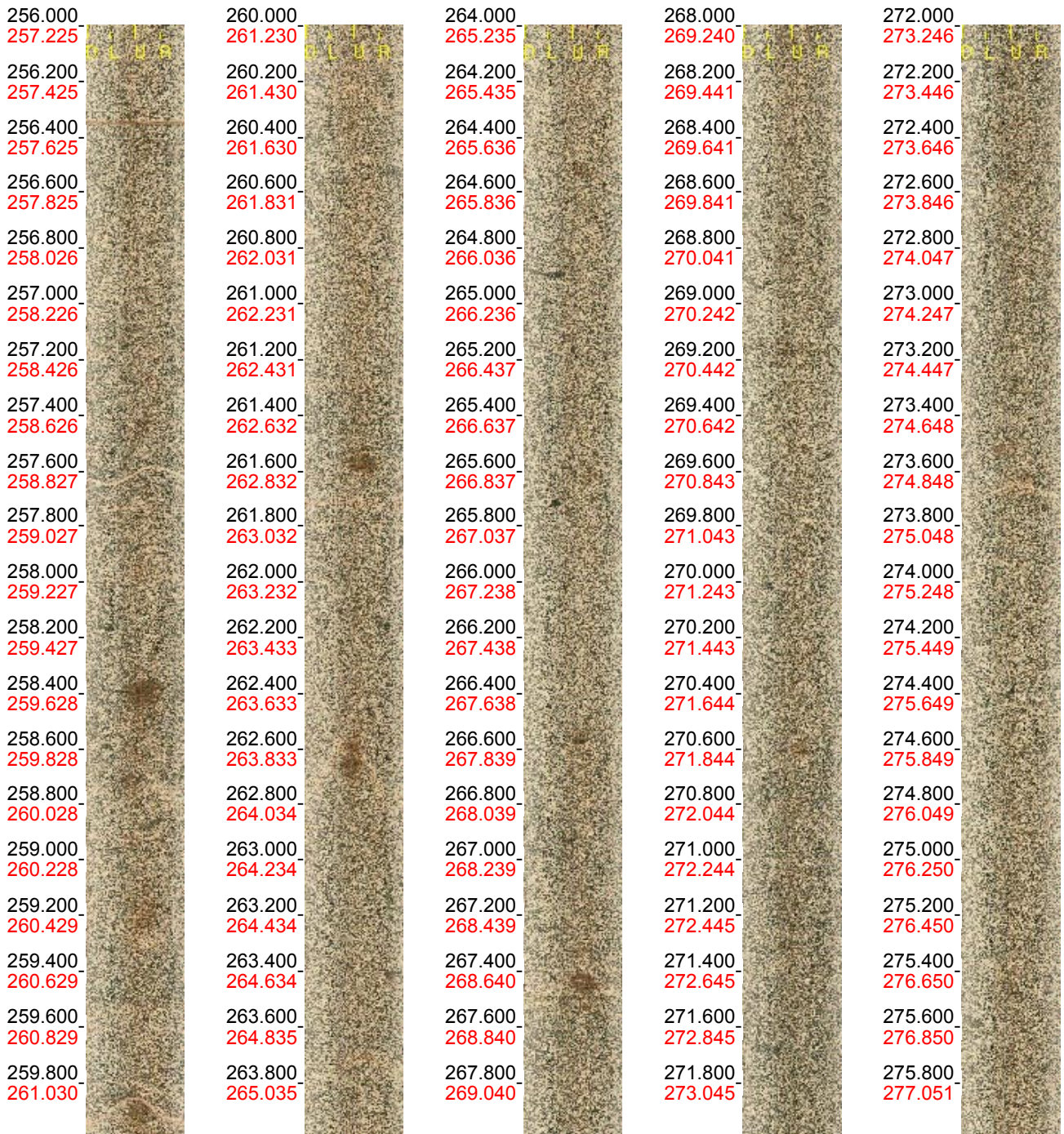
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 236.000 - 256.000 m
 Azimuth: 0.4
 Inclination: -64.4



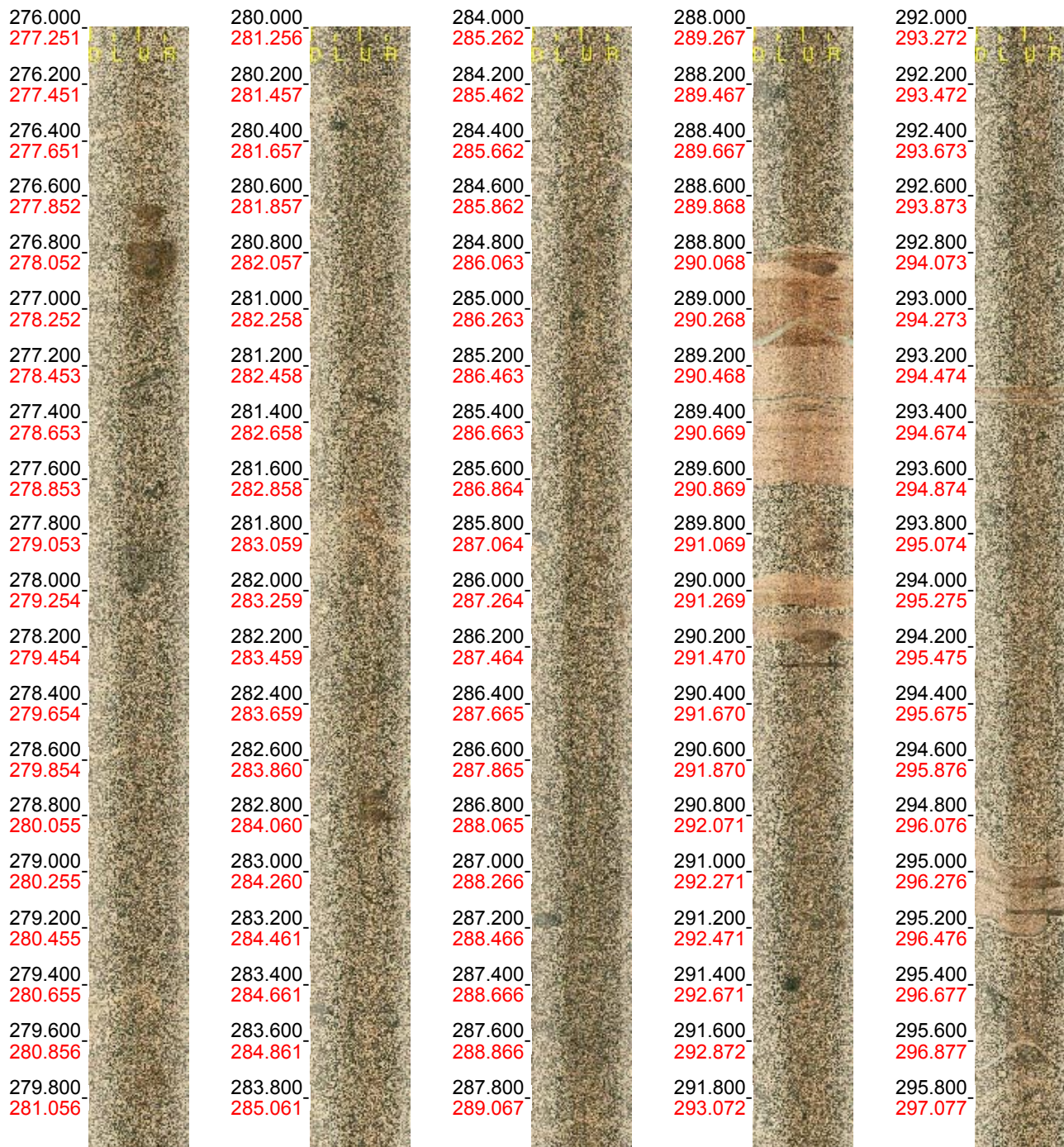
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 256.000 - 276.000 m
 Azimuth: 1.0
 Inclination: -64.1



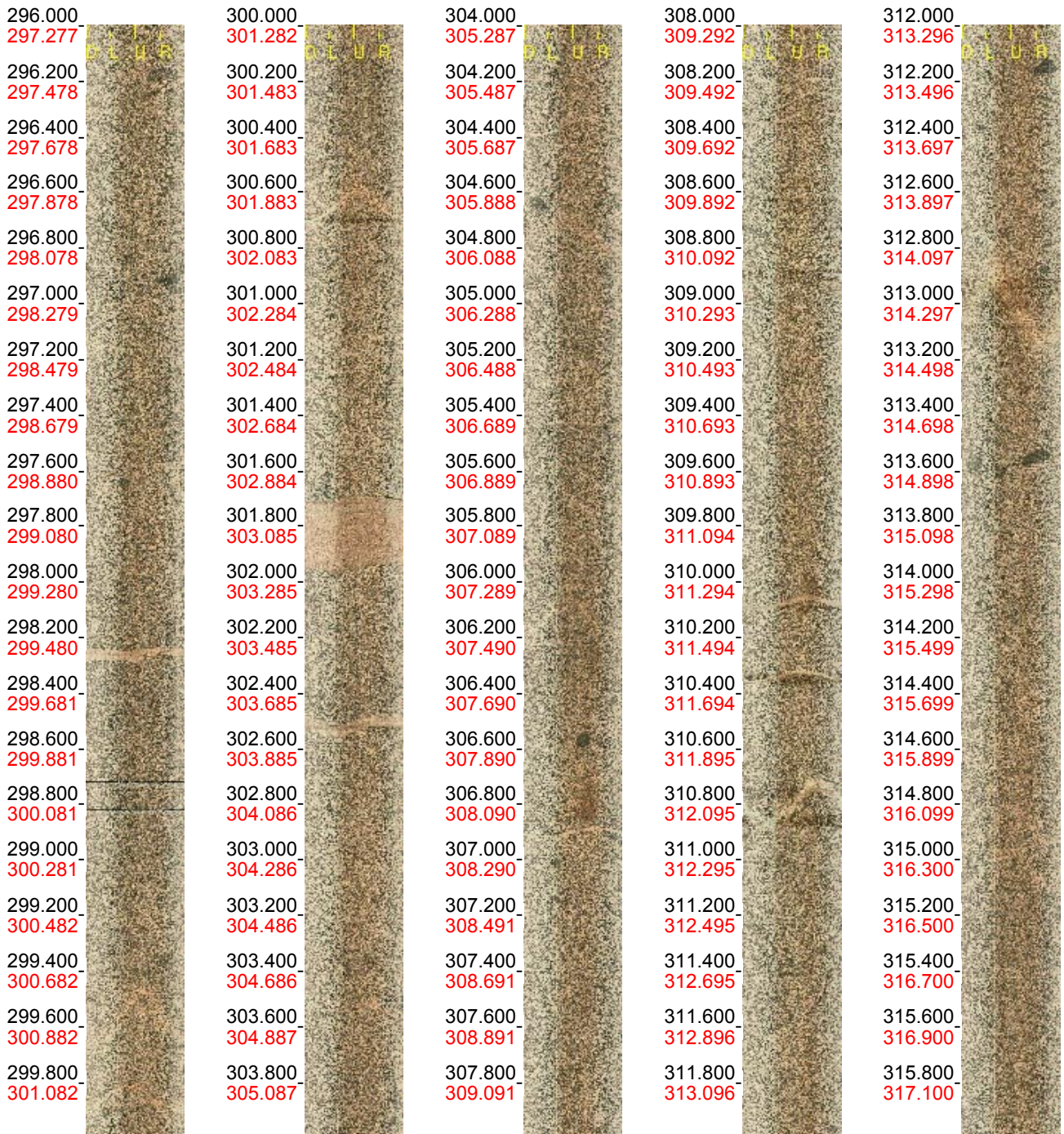
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 276.000 - 296.000 m
 Azimuth: 0.9
 Inclination: -64.0



Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 296.000 - 316.000 m
Azimuth: 0.8
Inclination: -64.0



Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 316.000 - 336.000 m
 Azimuth: 0.9
 Inclination: -64.0



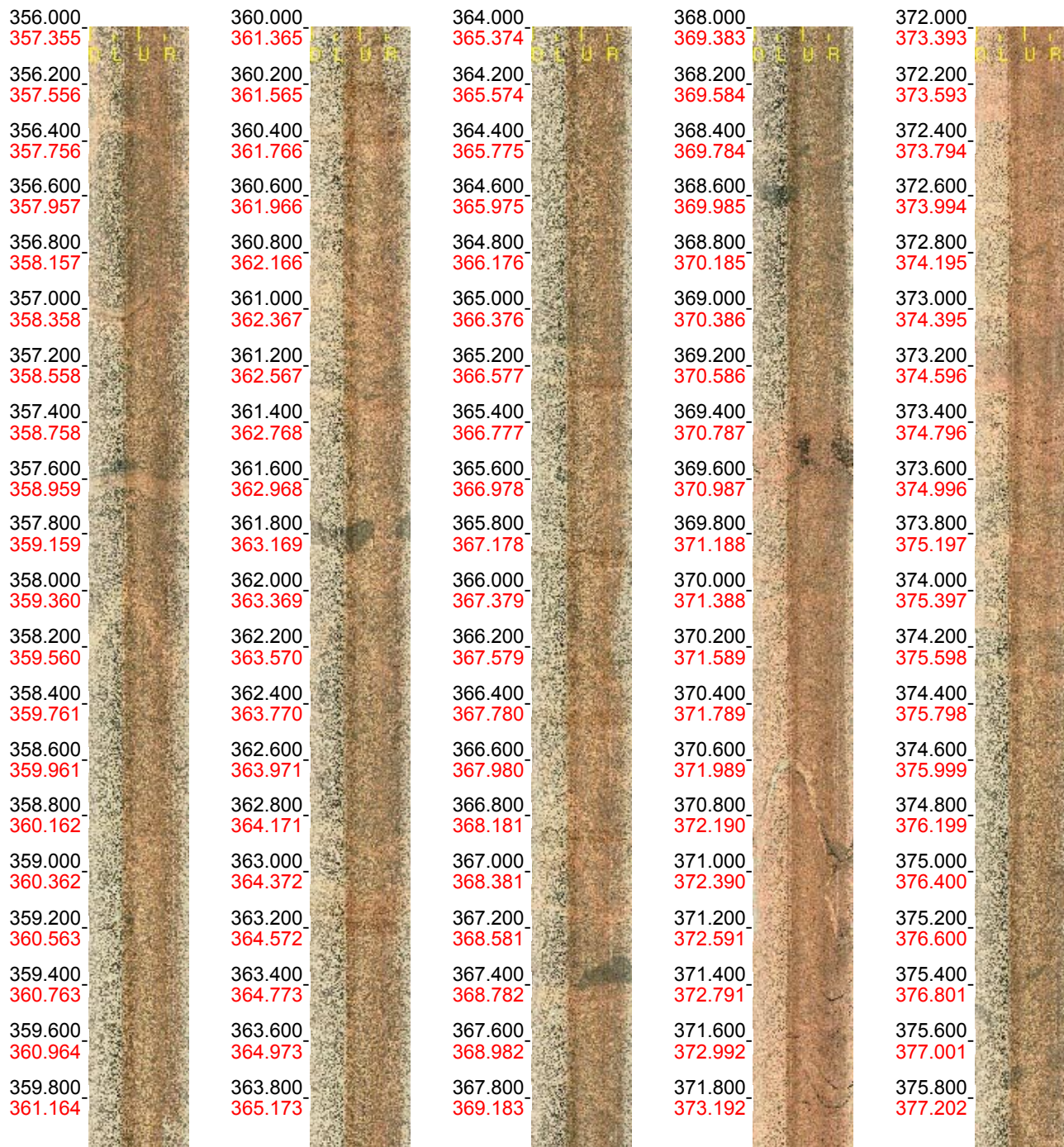
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 336.000 - 356.000 m
Azimuth: 0.7
Inclination: -64.0



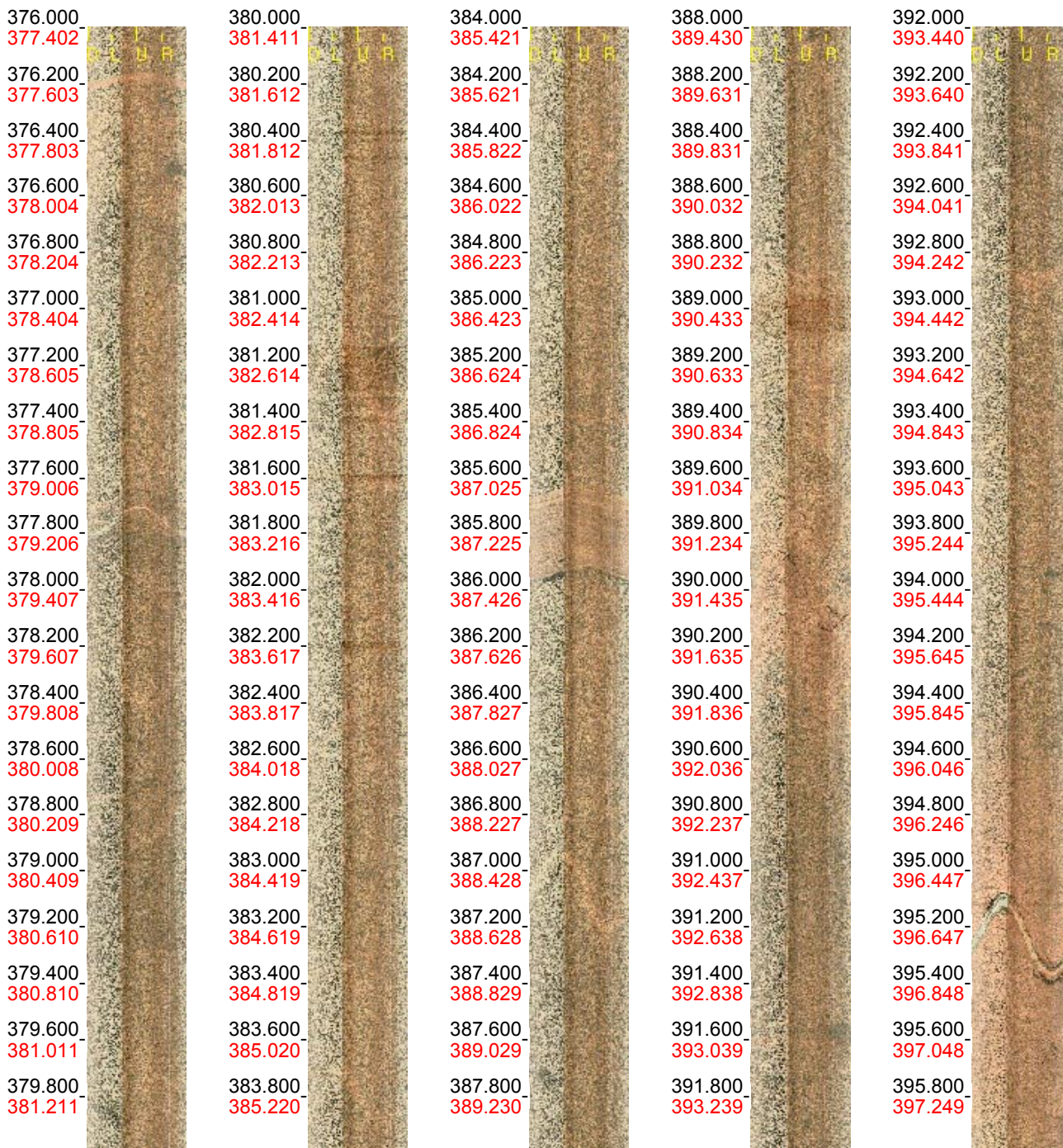
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 356.000 - 376.000 m
 Azimuth: 0.5
 Inclination: -63.9



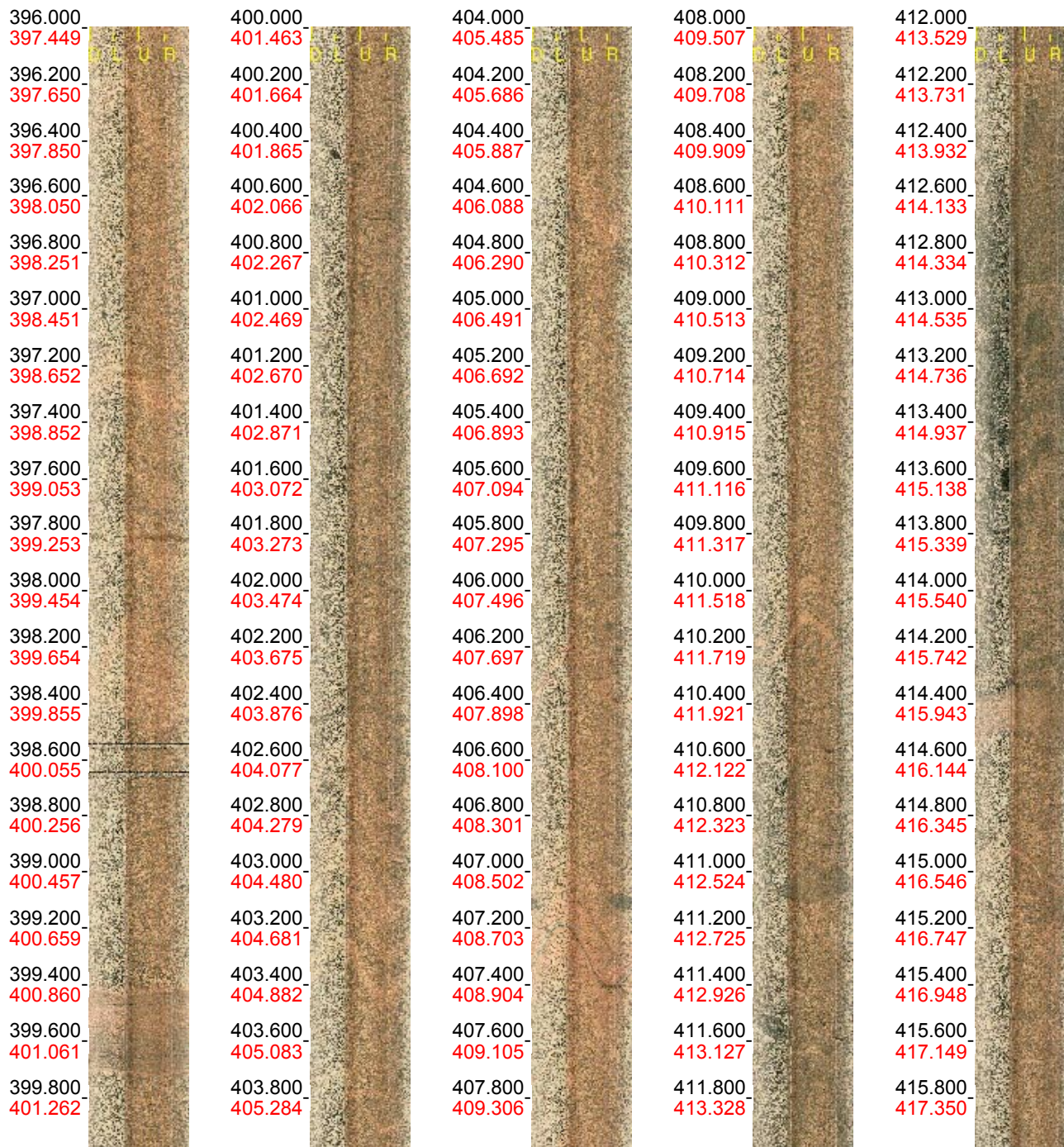
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 376.000 - 396.000 m
Azimuth: 0.6
Inclination: -63.8



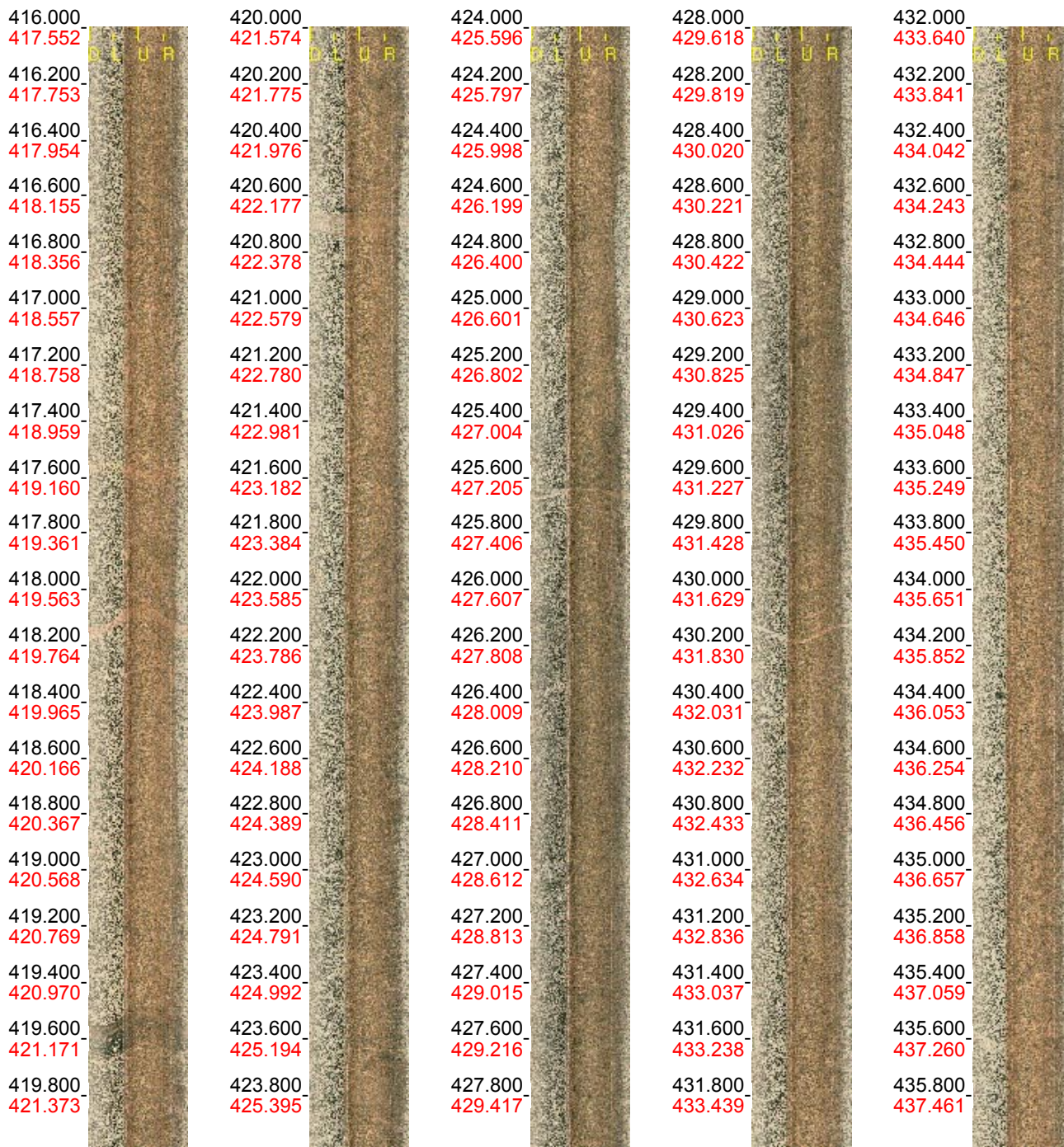
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 396.000 - 416.000 m
 Azimuth: 0.3
 Inclination: -63.7



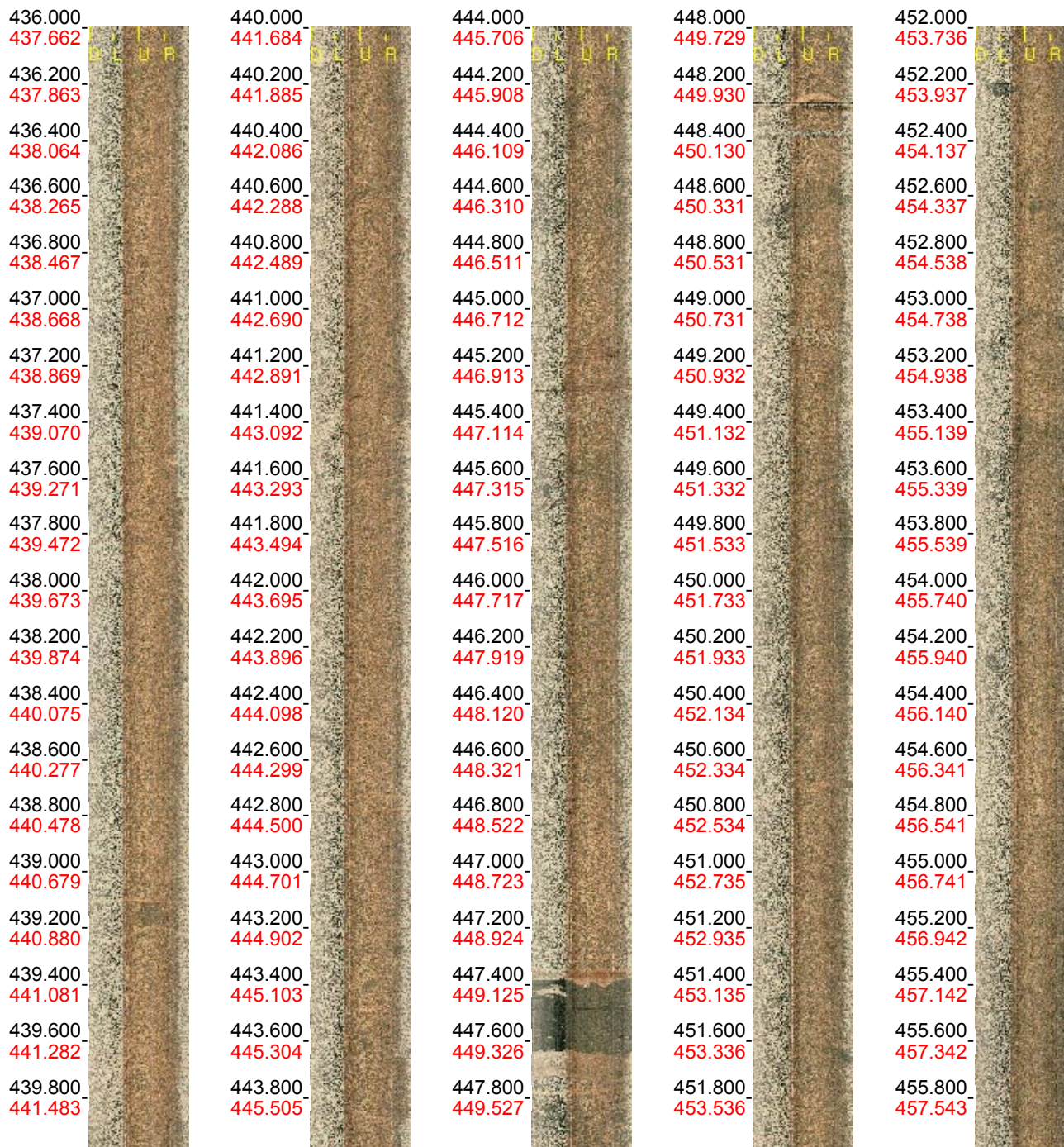
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 416.000 - 436.000 m
Azimuth: 0.1
Inclination: -63.6



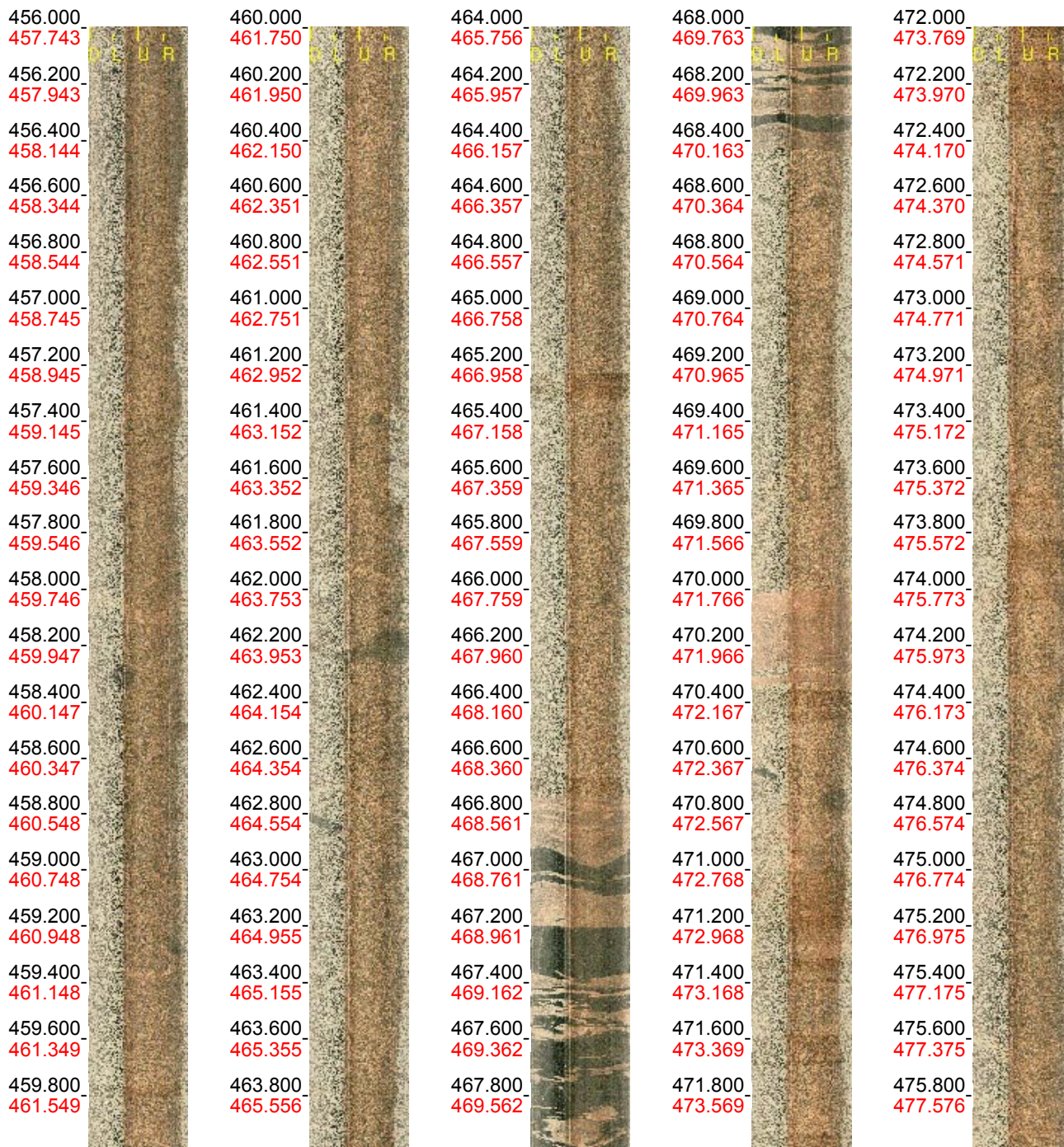
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 436.000 - 456.000 m
Azimuth: 0.2
Inclination: -63.5



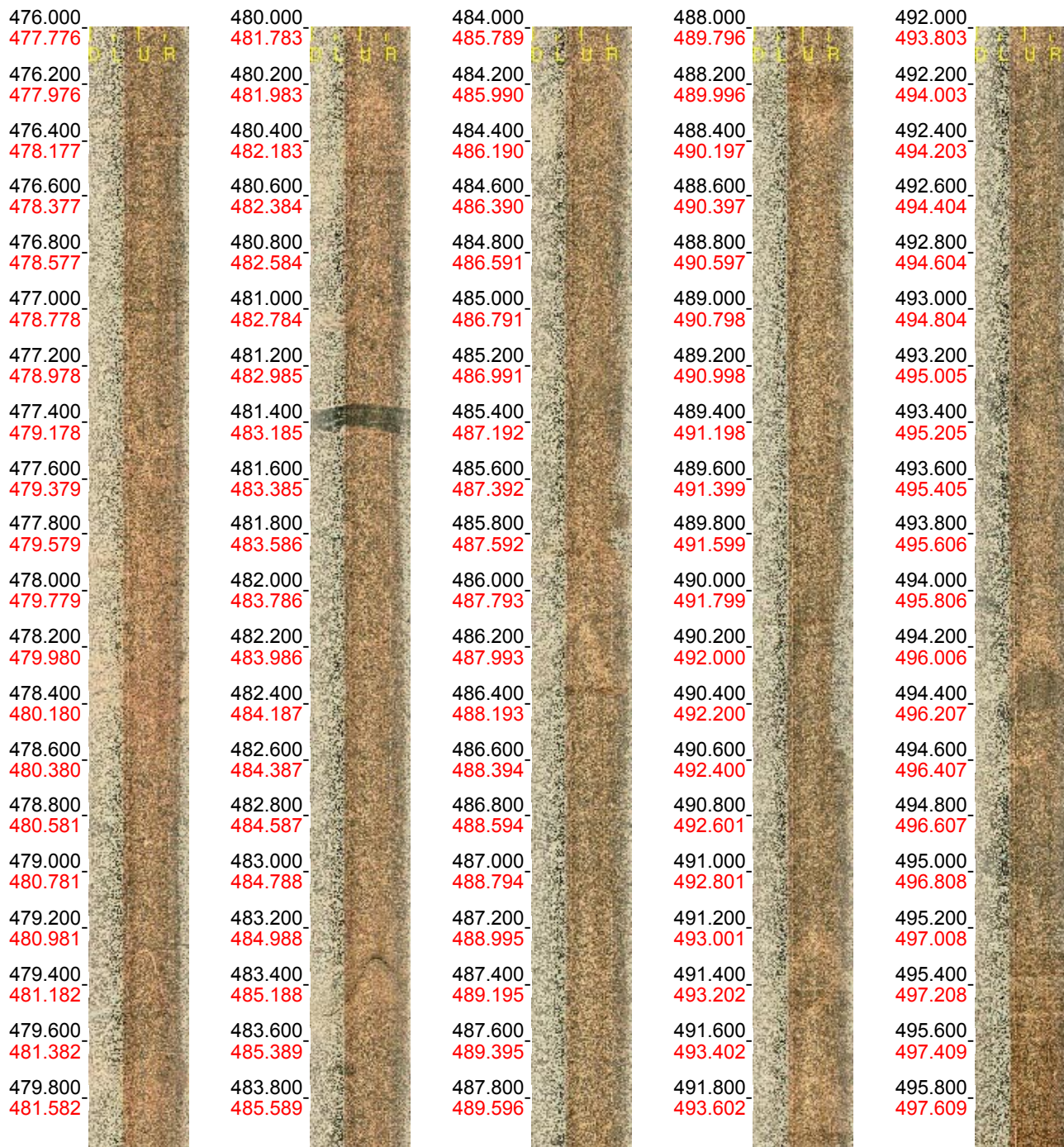
Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 456.000 - 476.000 m
 Azimuth: 359.9
 Inclination: -63.3



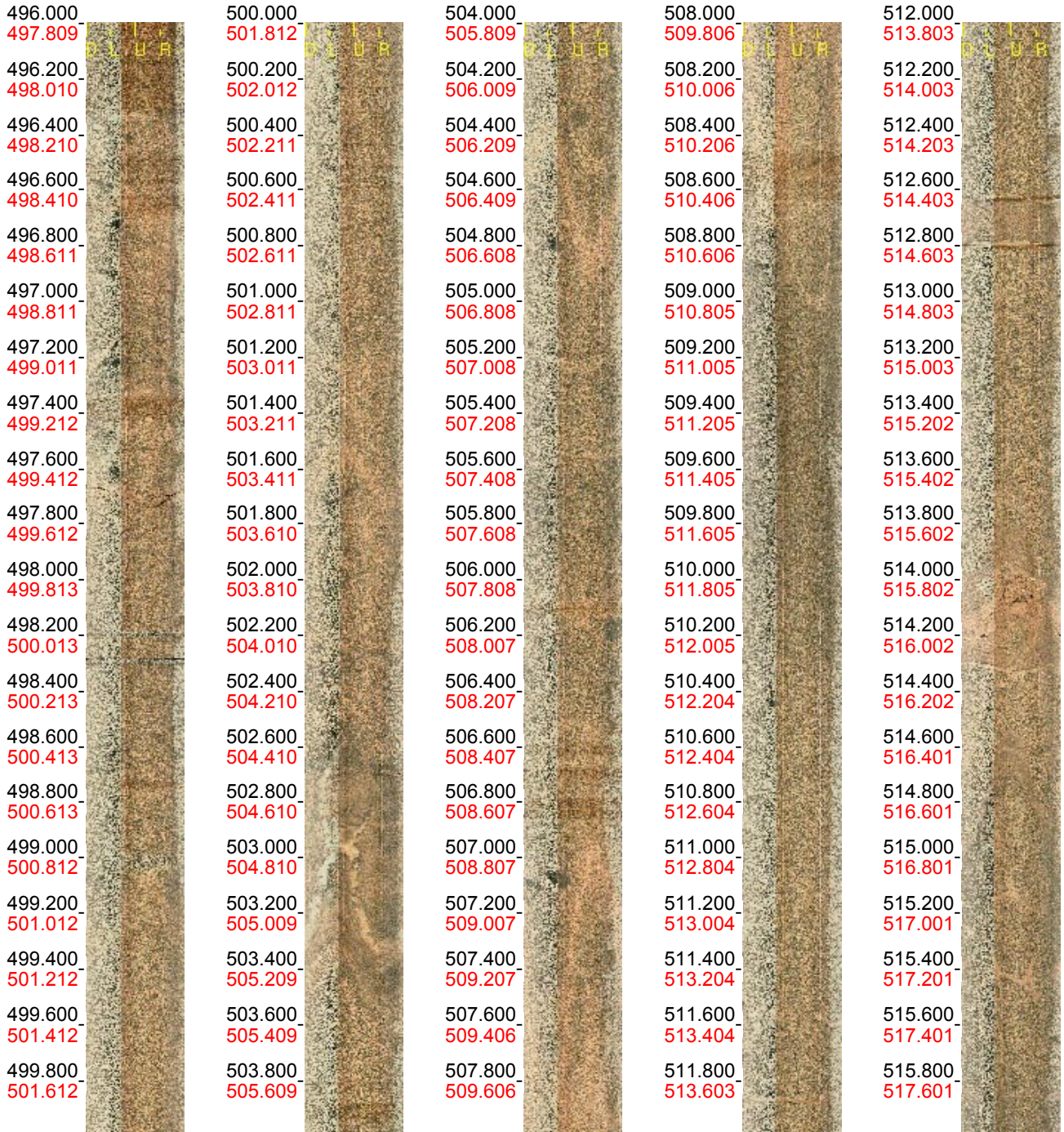
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 476.000 - 496.000 m
Azimuth: 359.8
Inclination: -63.3



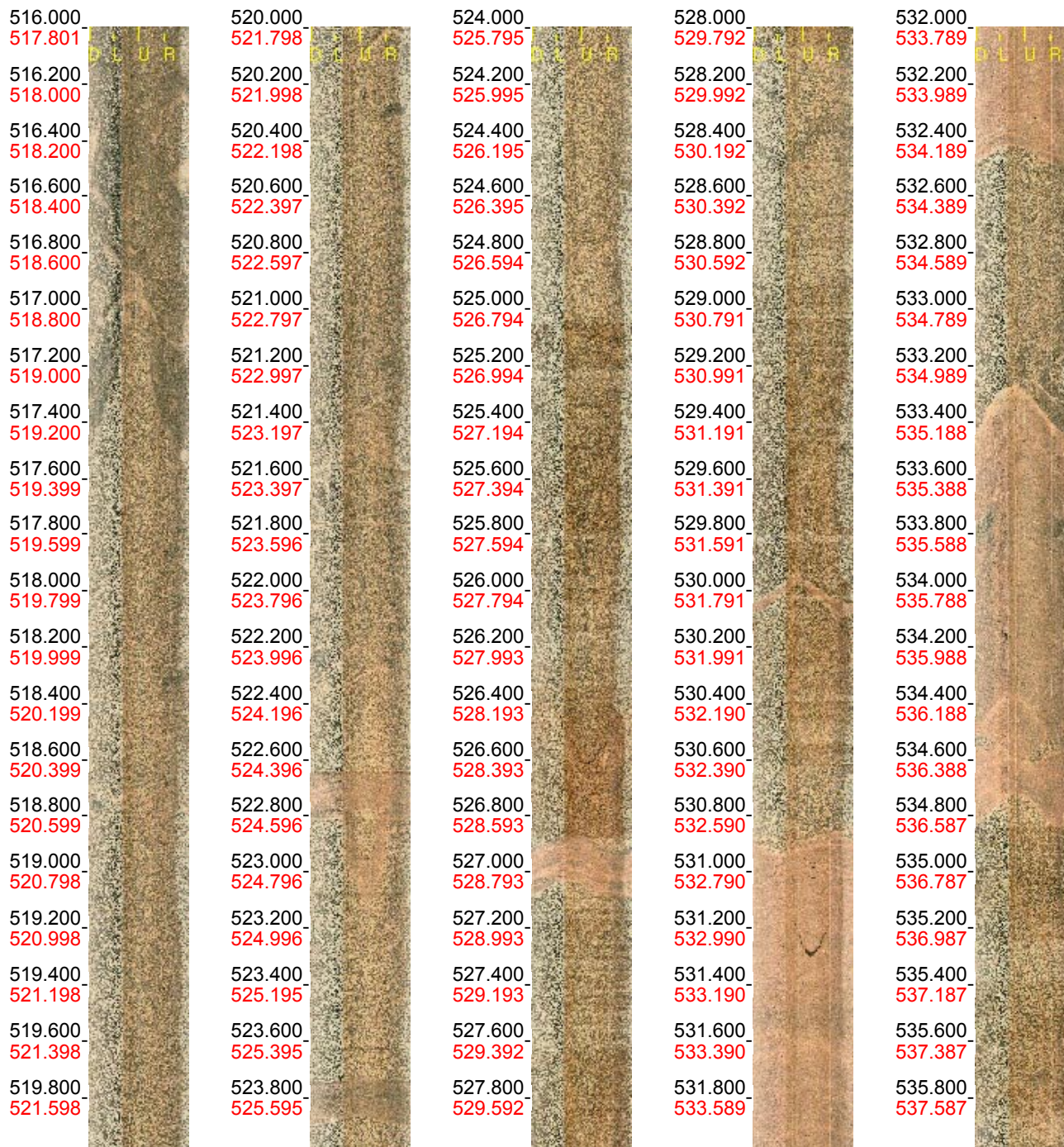
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 496.000 - 516.000 m
Azimuth: 359.9
Inclination: -63.2



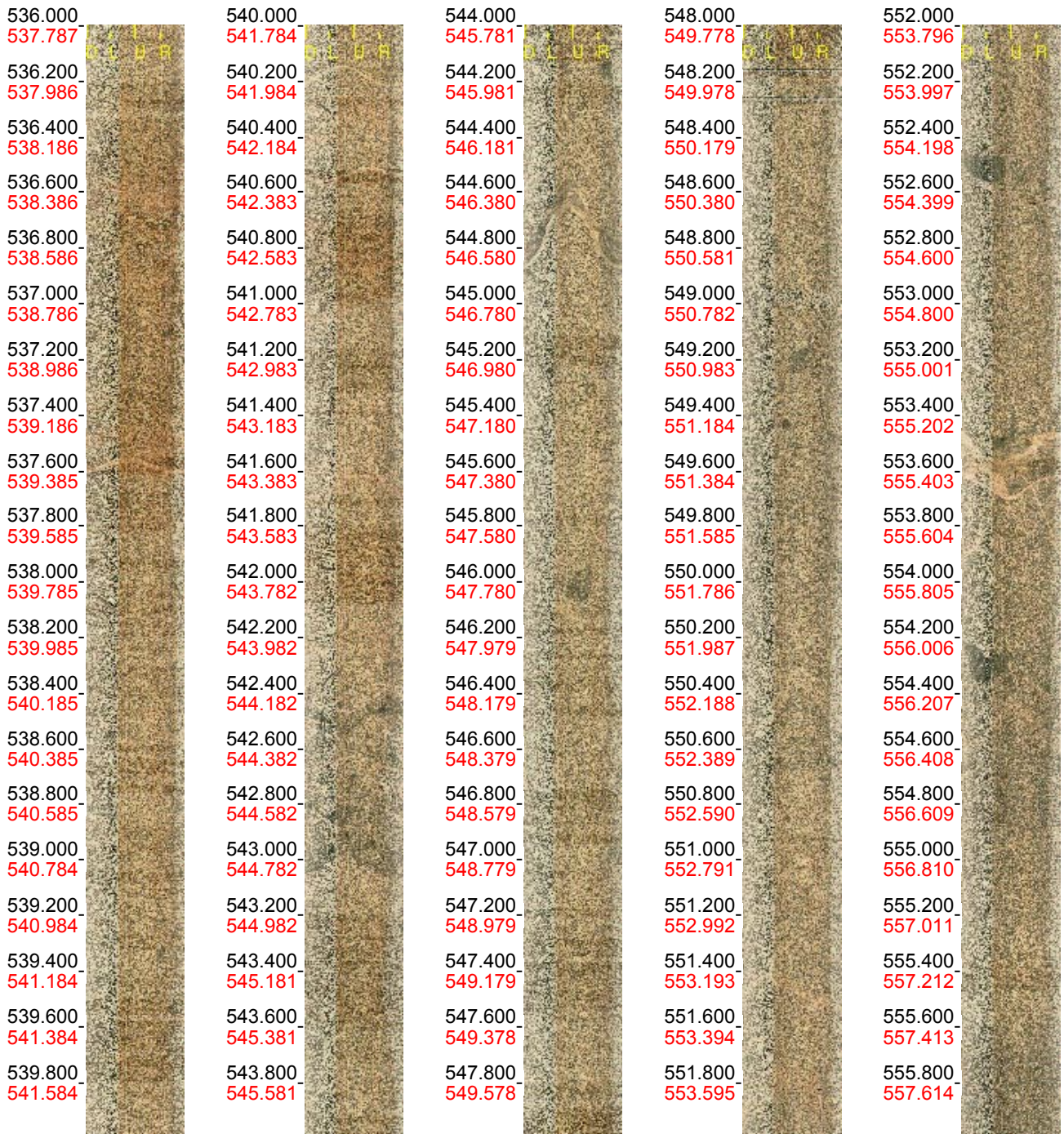
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 516.000 - 536.000 m
Azimuth: 359.9
Inclination: -63.0



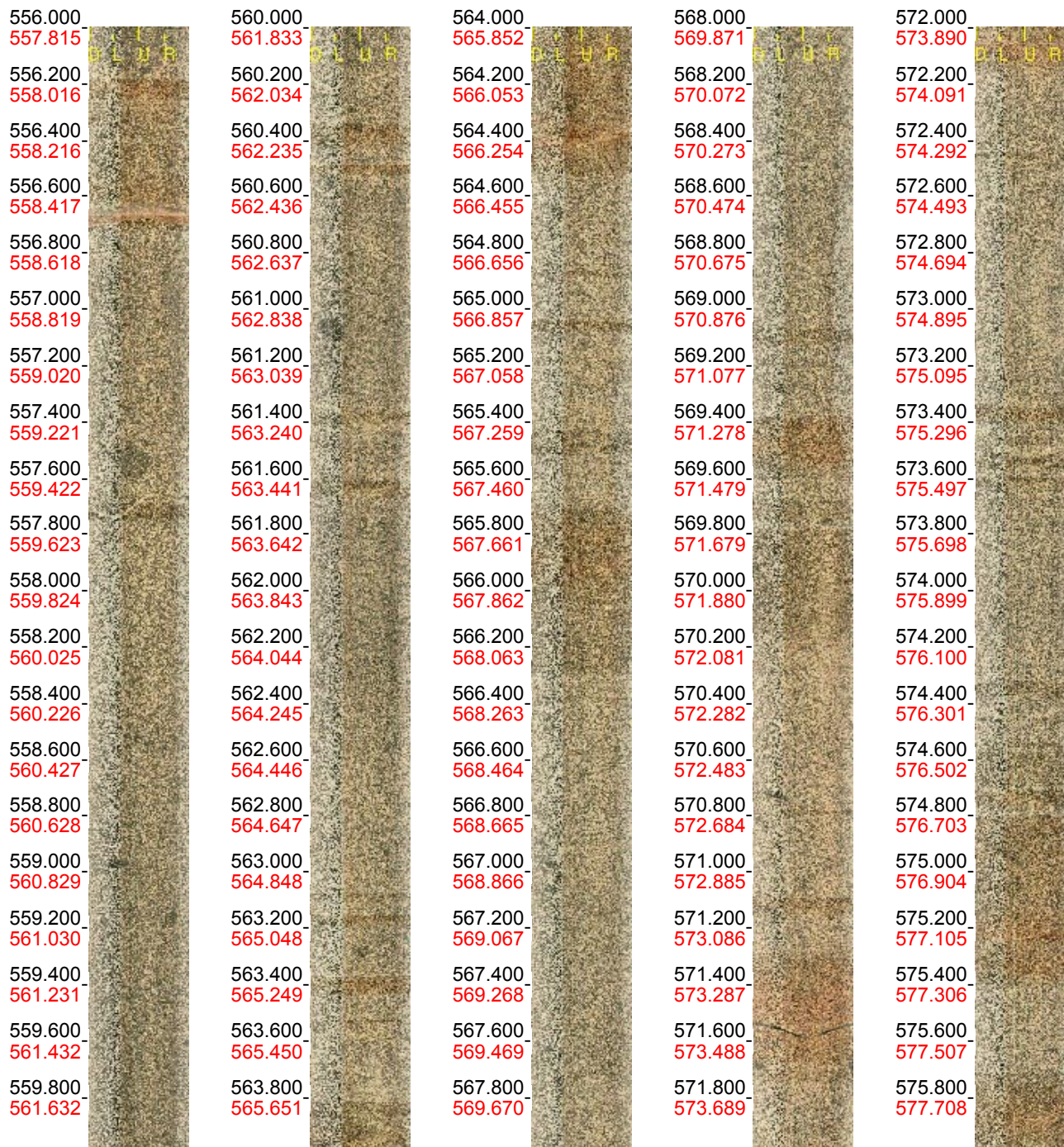
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 536.000 - 556.000 m
Azimuth: 0.0
Inclination: -62.8



Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 556.000 - 576.000 m
 Azimuth: 360.0
 Inclination: -62.6



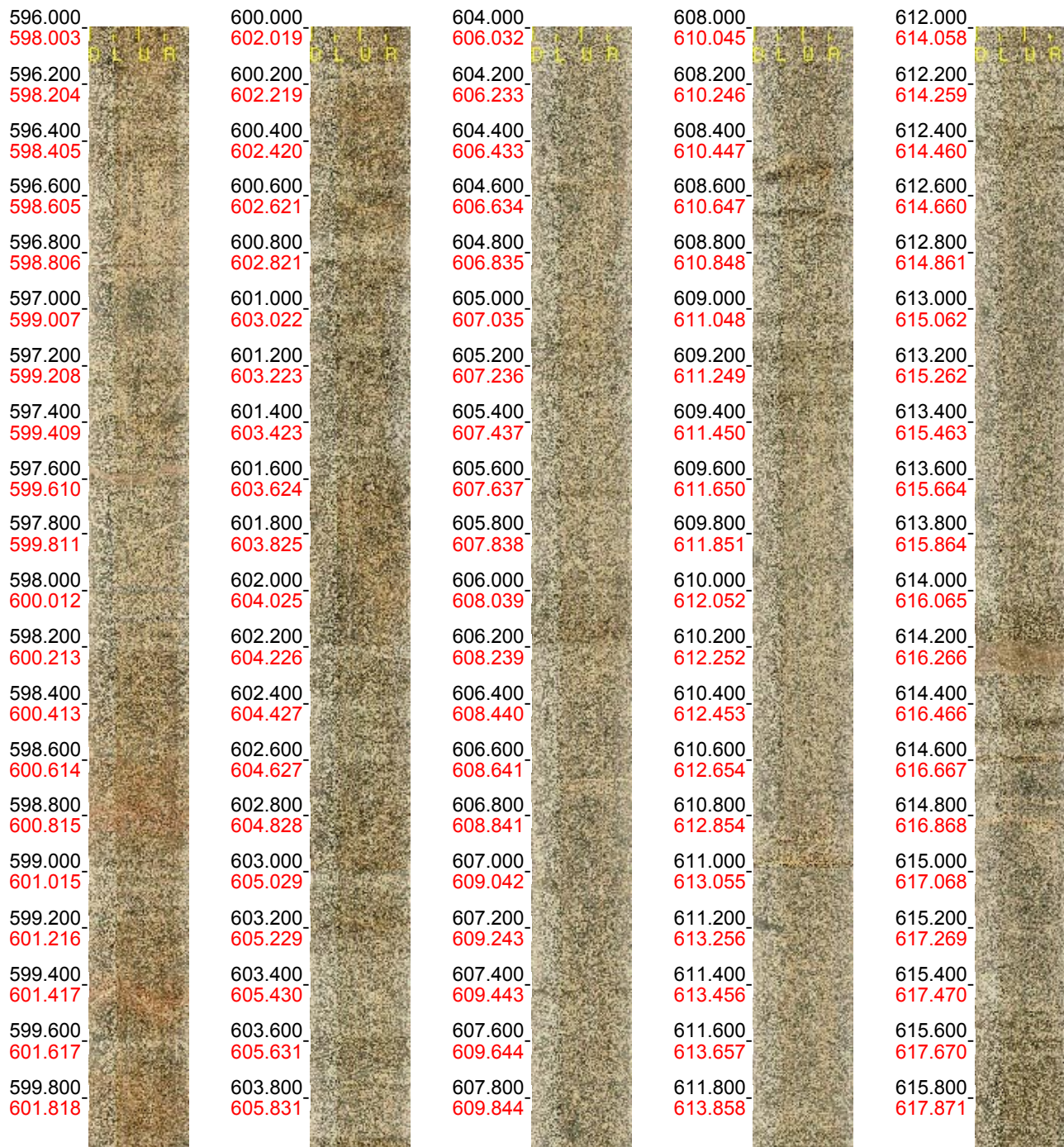
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 576.000 - 596.000 m
Azimuth: 0.2
Inclination: -62.5



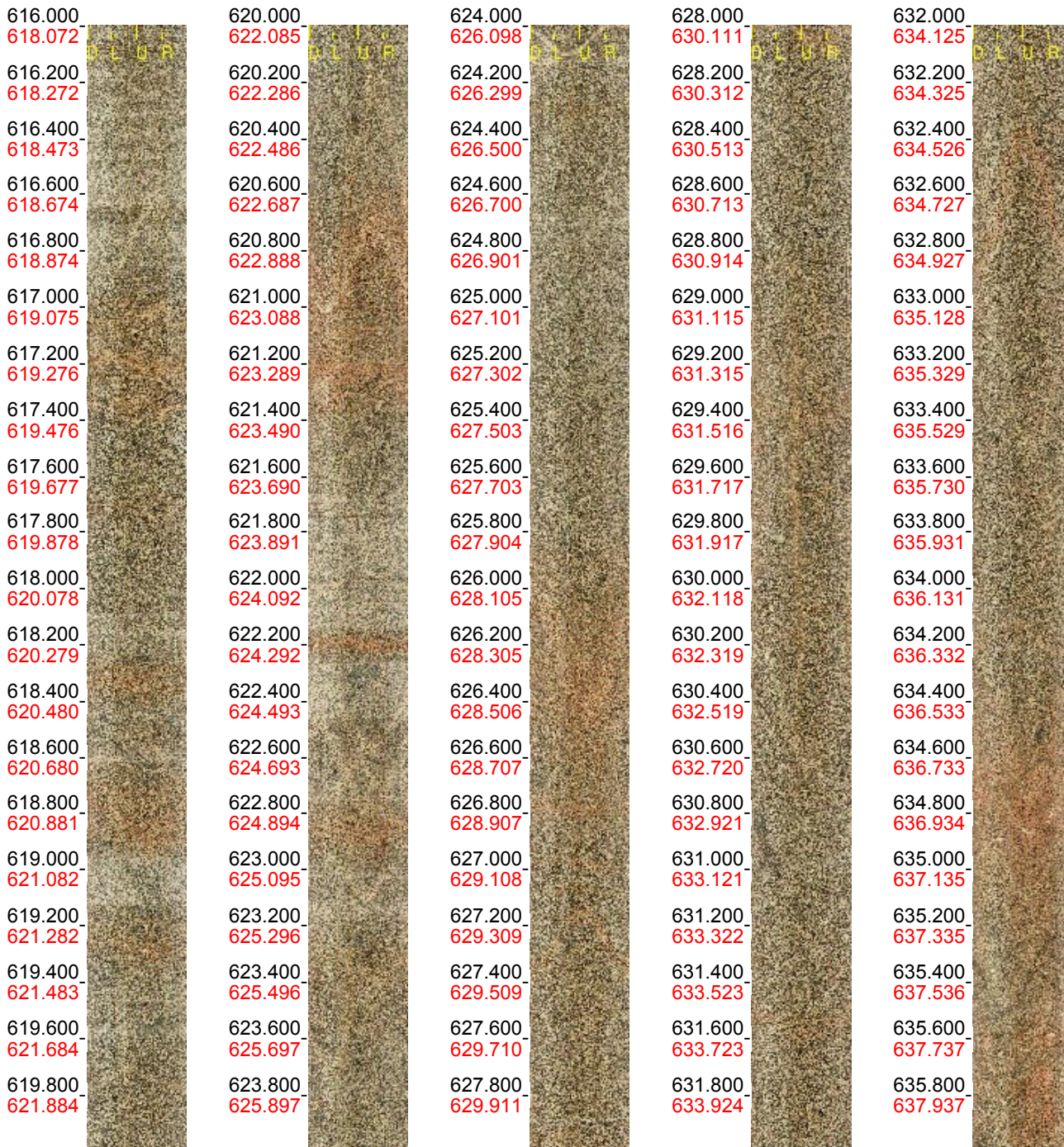
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

Depth range: 596.000 - 616.000 m
Azimuth: 359.7
Inclination: -62.4



Borehole: KLX27A
 Mapping: KLX27A_KJMSE_3

Depth range: 616.000 - 636.000 m
 Azimuth: 0.3
 Inclination: -62.1




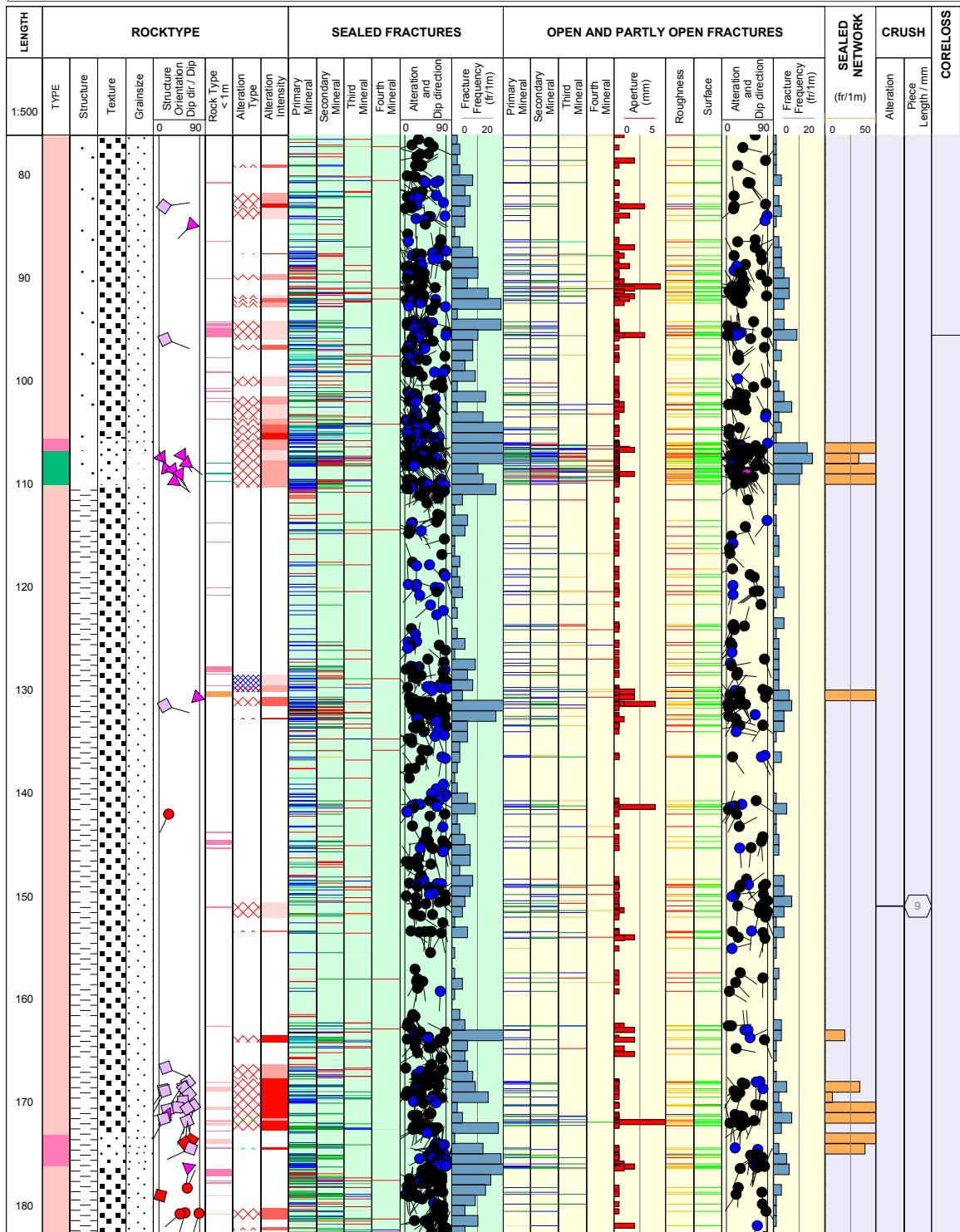
Borehole: KLX27A
Mapping: KLX27A_KJMSE_3

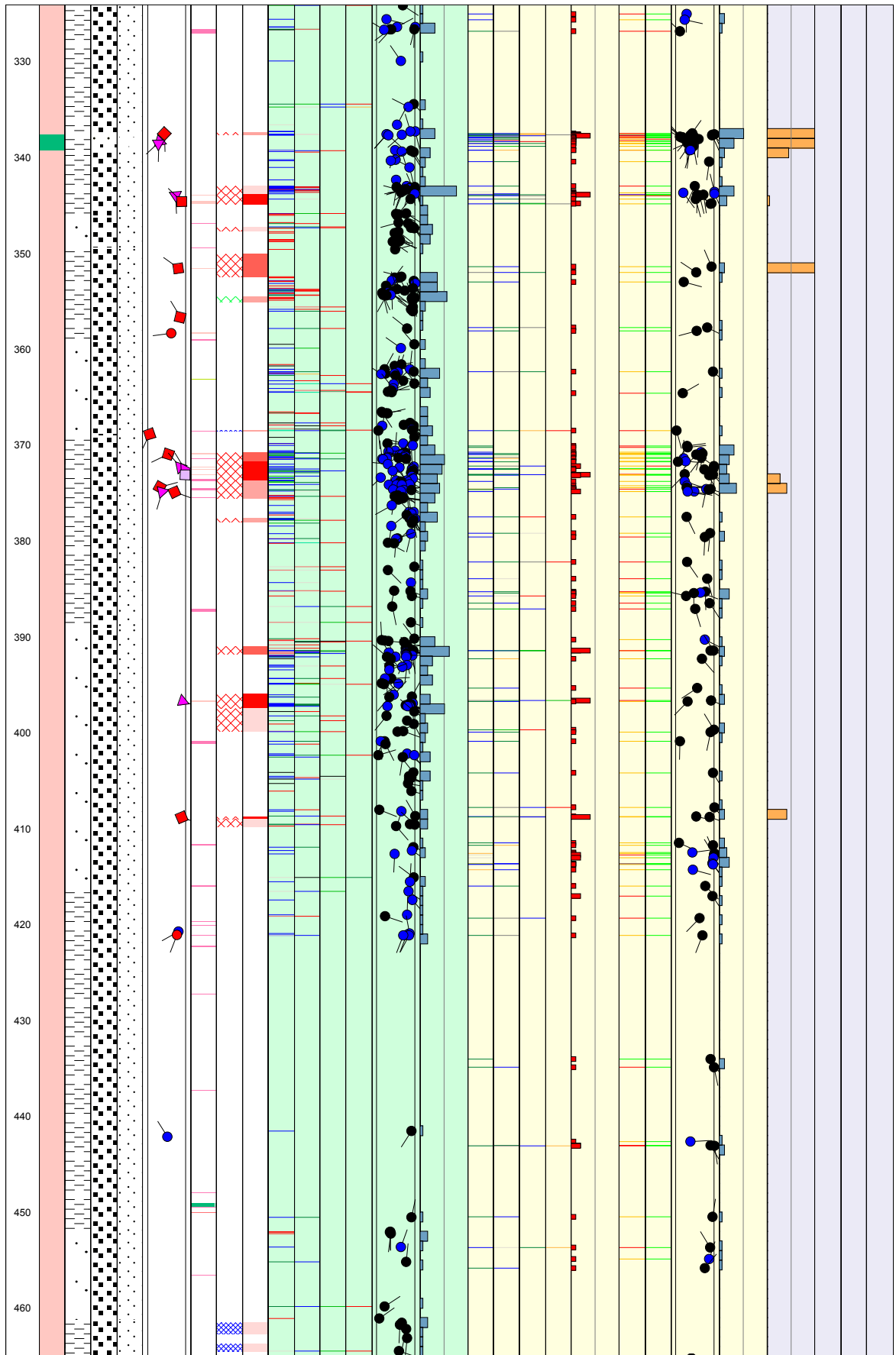
Depth range: 636.000 - 646.624 m
Azimuth: 1.3
Inclination: -61.6

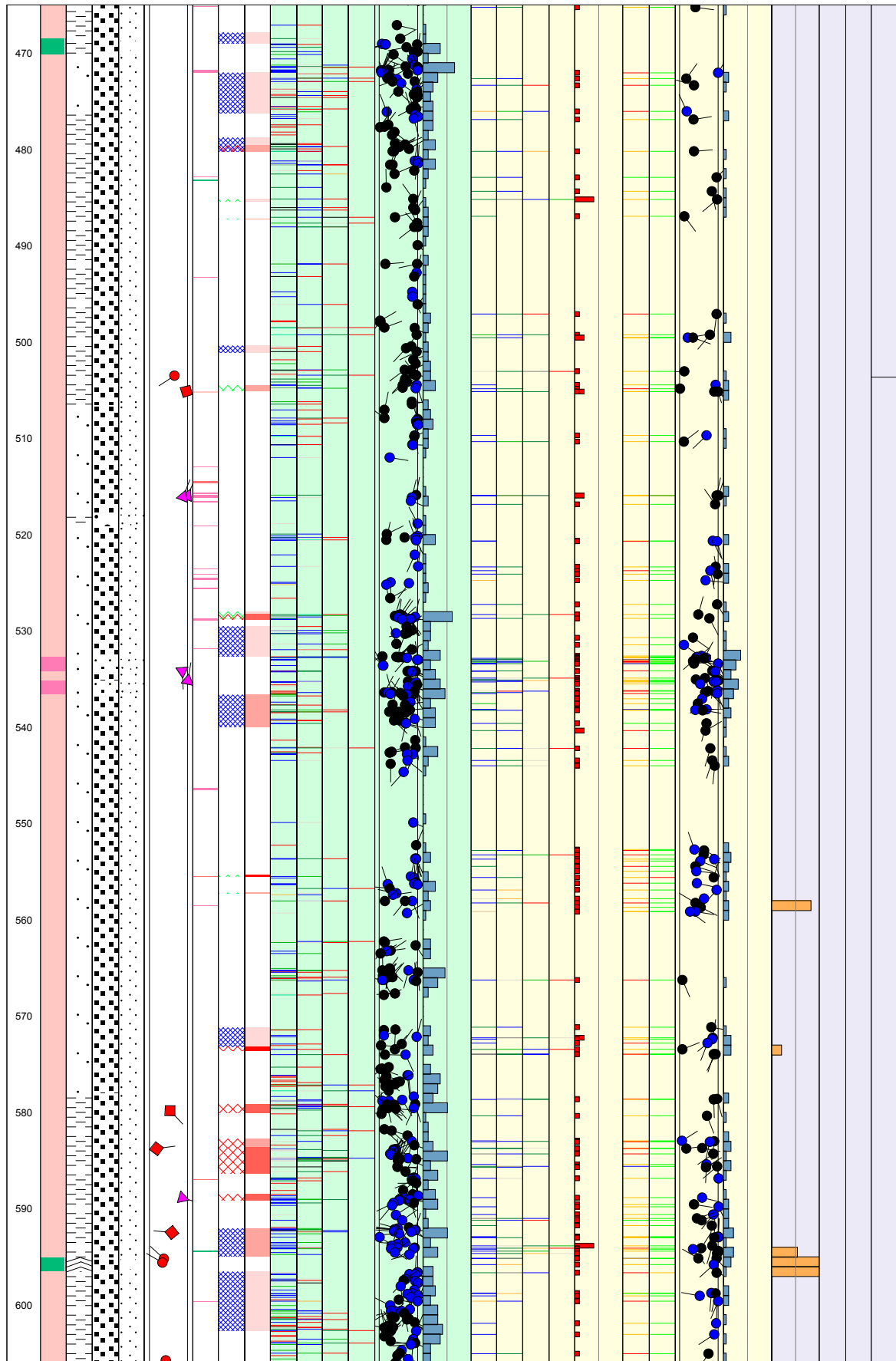


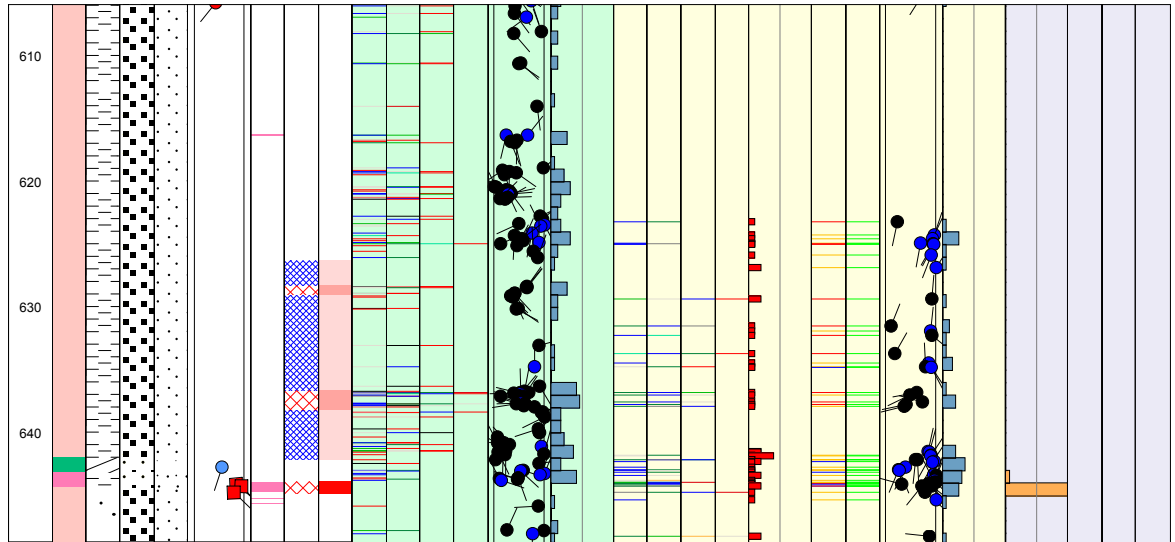
WellCad diagram for KLX27A

Title GEOLOGY IN KLX27A		Appendix:		
	Site	LAXEMAR	Coordinate System	RT90-RHB70
	Borehole	KLX27A	Northing [m]	6365608.29
	Diameter [mm]	76	Easting [m]	1546742.63
	Length [m]	650.560	Elevation [m.a.s.l.]	16.98
	Bearing [°]	0.73	Drilling Start Date	2007-10-08 14:00:00
	Inclination [°]	-65.36	Drilling Stop Date	2007-11-21 11:30:00
	Date of coremapping	2007-12-12 09:03:00	Plot Date	2008-01-31 22:14:09
	Rocktype data from	p_rock	Signed data	


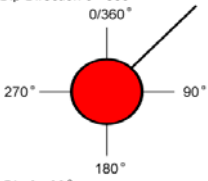








Legend to WellCad diagram for KLX27A

Title		LEGEND FOR LAXEMAR		KLX27A	
		Site	LAXEMAR		
		Borehole	KLX27A		
		Plot Date	2008-01-31 22:14:09		
		Signed data			
ROCKTYPE LAXEMAR		ROCK ALTERATION TYPE		MINERAL	
<ul style="list-style-type: none"> Äspö Diorite Dolerite Fine-grained Göttemargranite Coarse-grained Göttemargranite Fine-grained granite Pegmatite Granite Ävrö granite Quartz monzodiorite Diorite / Gabbro Fine-grained dioritoid Fine-grained diorite-gabbro Sulphide mineralization Sandstone Soil Ävrö quartz monzodiorite Ävrö granodiorite 		<ul style="list-style-type: none"> Oxidized Chloritised Epidotised Weathered Tectonized Sericitized Quartz dissolution Silicification Argillization Albitization Carbonatization Saussuritization Steatitization Uralitization Laumontitization Fract zone alteration 		<ul style="list-style-type: none"> Epidote Calcite Chlorite Quartz Unknown Pyrite Clay Minerals Zeolite Prehnite 	
STRUCTURE		STRUCTURE ORIENTATION		ROCK ALTERATION INTENSITY	
<ul style="list-style-type: none"> Cataclastic Schistose Gneissic Mylonitic Ductile Shear Zone Brittle-Ductile Zone Veined Banded Massive Foliated Brecciated Lineated 		<ul style="list-style-type: none"> Cataclastic Bedded Gneissic Schistose Brittle-Ductile Shear Zone Ductile Shear Zone Lineated Banded Veined Brecciated Foliated Mylonitic 		<ul style="list-style-type: none"> No intensity Faint Weak Medium Strong 	
TEXTURE		ROUGHNESS		FRACTURE ALTERATION	
<ul style="list-style-type: none"> Hornfelsed Porphyritic Ophitic Equigranular Augen-Bearing Unequigranular Metamorphic 		<ul style="list-style-type: none"> Planar Undulating Stepped Irregular 		<ul style="list-style-type: none"> Slightly Altered Moderately Altered Highly Altered Completely Altered Gouge Fresh 	
GRAINSIZE		SURFACE		CRUSH ALTERATION	
<ul style="list-style-type: none"> Aphanitic Fine-grained Fine to medium grained Medium to coarse grained Coarse-grained Medium-grained 		<ul style="list-style-type: none"> Rough Smooth Slickensided 		<ul style="list-style-type: none"> Slightly Altered Moderately Altered Highly Altered Completely Altered Gouge Fresh 	
				<p>FRACTURE DIRECTION</p> <p>STRUKTURE ORIENTATION</p> <p>Dip Direction 0 - 360° 0/360°</p>  <p>Dip 0 - 90°</p>	

In-data: Borehole length and diameter for KLX27A

Hole Diam T - Drilling: Borehole diameter

KLX27A, 2007-10-08 14:00:00 - 2007-11-21 11:30:00 (75.600 - 650.560 m)

Sub Secup (m)	Sub Seclow (m)	Hole Diam (m)	Comment	QC
75.600	77.020	0.0860	T-86	*
77.020	650.560	0.0758	Corac N/3	*

Printout from SICADA 2007-12-12 09:02:06.

In-data: Reference marks for length adjustments for KLX27A

Reference Mark T - Reference mark in drillhole

KLX27A, 2007-11-27 10:00:00 - 2007-11-28 13:00:00 (100.000 - 630.000 m)

Bhlen (m)	Rotation Speed (rpm)	Start Flow (l/h)	Stop Flow (l/h)	Stop Pressure (bar)	Cutter Time (s)	Trace Detectable	Cutter Diameter (mm)	Comment QC
100.00	400.00	200.000	1000.000	32.0	32.00	Yes		*
150.00	400.00	200.000	1000.000	30.0	33.00	Yes		*
200.00	400.00	180.000	1000.000	28.0	35.00	Yes		*
250.00	400.00	250.000	1000.000	28.0	28.00	Yes		*
300.00	400.00	170.000	1000.000	28.0	28.00	Yes		*
350.00	400.00	170.000	100.000	28.0	30.00	Yes		*
400.00	400.00	180.000	1000.000	29.0	38.00	Yes		*
450.00	400.00	180.000	1000.000	30.0	30.00	Yes		*
500.00	400.00	170.000	1000.000	30.0	36.00	Yes		*
550.00	400.00	190.000	1000.000	30.0	36.00	Yes		*
600.00	400.00	200.000	1000.000	30.0	40.00	Yes		*
630.00	400.00	180.000	1000.000	30.0	40.00	Yes		*

Printout from SICADA 2007-12-12 09:04:09.

In-data: Borehole deviation data for KLX27A

SICADA - Coordinate Information for KLX27A (Object type: Cored borehole)

Northing (m)	Easting (m)	Elevation (m)	Coordinate System	Length (m)	Vertical Depth (m)	Inclination (degrees)	Bearing (degrees)	Inclination Uncertainty	Bearing Uncertainty	Radius Uncertainty	Origin
6365608.29	1546742.63	16.98	RT90-RHB70	0.00	0.00	-65.37	0.73	0.205	0.545	0.00	Measured
6365609.54	1546742.65	14.25	RT90-RHB70	3.00	2.73	-65.32	0.73	0.205	0.545	0.01	Measured
6365610.79	1546742.67	11.53	RT90-RHB70	6.00	5.45	-65.29	0.89	0.205	0.545	0.02	Measured
6365612.05	1546742.69	8.80	RT90-RHB70	9.00	8.18	-65.24	1.04	0.205	0.545	0.04	Measured
6365613.31	1546742.71	6.08	RT90-RHB70	12.00	10.90	-65.19	1.20	0.205	0.545	0.05	Measured
6365614.57	1546742.74	3.36	RT90-RHB70	15.00	13.62	-65.15	1.35	0.205	0.545	0.06	Measured
6365615.83	1546742.77	0.63	RT90-RHB70	18.00	16.35	-65.09	1.51	0.205	0.545	0.07	Measured
6365617.09	1546742.80	-2.09	RT90-RHB70	21.00	19.07	-65.06	1.17	0.205	0.545	0.08	Measured
6365618.36	1546742.83	-4.81	RT90-RHB70	24.00	21.79	-65.09	1.17	0.205	0.545	0.10	Measured
6365619.62	1546742.85	-7.53	RT90-RHB70	27.00	24.51	-65.12	1.16	0.205	0.545	0.11	Measured
6365620.88	1546742.88	-10.25	RT90-RHB70	30.00	27.23	-65.14	1.36	0.205	0.545	0.12	Measured
6365622.14	1546742.91	-12.97	RT90-RHB70	33.00	29.95	-65.16	1.49	0.205	0.545	0.13	Measured
6365623.40	1546742.94	-15.69	RT90-RHB70	36.00	32.67	-65.13	1.49	0.205	0.545	0.14	Measured
6365624.66	1546742.98	-18.41	RT90-RHB70	39.00	35.39	-65.13	1.64	0.205	0.545	0.16	Measured
6365625.93	1546743.01	-21.14	RT90-RHB70	42.00	38.12	-65.11	1.50	0.205	0.545	0.17	Measured
6365627.19	1546743.05	-23.86	RT90-RHB70	45.00	40.84	-65.15	1.44	0.205	0.545	0.18	Measured
6365628.45	1546743.07	-26.58	RT90-RHB70	48.00	43.56	-65.17	1.24	0.205	0.545	0.19	Measured
6365629.70	1546743.10	-29.30	RT90-RHB70	51.00	46.28	-65.21	1.20	0.205	0.545	0.20	Measured
6365630.96	1546743.13	-32.03	RT90-RHB70	54.00	49.01	-65.23	1.10	0.205	0.545	0.22	Measured
6365632.22	1546743.15	-34.75	RT90-RHB70	57.00	51.73	-65.23	1.01	0.205	0.545	0.23	Measured
6365633.48	1546743.17	-37.48	RT90-RHB70	60.00	54.46	-65.22	1.01	0.205	0.545	0.24	Measured
6365634.73	1546743.19	-40.20	RT90-RHB70	63.00	57.18	-65.19	0.92	0.205	0.545	0.25	Measured
6365635.99	1546743.21	-42.92	RT90-RHB70	66.00	59.90	-65.19	0.93	0.205	0.545	0.26	Measured
6365637.25	1546743.23	-45.65	RT90-RHB70	69.00	62.63	-65.17	0.92	0.205	0.545	0.28	Measured
6365638.51	1546743.25	-48.37	RT90-RHB70	72.00	65.35	-65.25	0.92	0.205	0.545	0.29	Measured
6365639.77	1546743.27	-51.09	RT90-RHB70	75.00	68.07	-65.19	0.72	0.205	0.545	0.30	Measured
6365641.02	1546743.29	-53.82	RT90-RHB70	78.00	70.80	-65.18	0.71	0.205	0.545	0.31	Measured
6365642.28	1546743.30	-56.54	RT90-RHB70	81.00	73.52	-65.17	0.76	0.205	0.545	0.32	Measured
6365643.54	1546743.32	-59.26	RT90-RHB70	84.00	76.24	-65.14	0.82	0.205	0.545	0.34	Measured
6365644.81	1546743.34	-61.98	RT90-RHB70	87.00	78.96	-65.12	0.96	0.205	0.545	0.35	Measured
6365646.07	1546743.36	-64.70	RT90-RHB70	90.00	81.68	-65.08	0.95	0.205	0.545	0.36	Measured
6365647.33	1546743.38	-67.42	RT90-RHB70	93.00	84.40	-65.06	0.88	0.205	0.545	0.37	Measured
6365648.60	1546743.40	-70.14	RT90-RHB70	96.00	87.12	-65.03	0.91	0.205	0.545	0.38	Measured
6365649.87	1546743.42	-72.86	RT90-RHB70	99.00	89.84	-64.99	0.91	0.205	0.545	0.40	Measured
6365651.14	1546743.44	-75.58	RT90-RHB70	102.00	92.56	-64.94	0.89	0.205	0.545	0.41	Measured
6365652.41	1546743.46	-78.30	RT90-RHB70	105.00	95.28	-64.89	0.83	0.205	0.545	0.42	Measured
6365653.68	1546743.48	-81.01	RT90-RHB70	108.00	97.99	-64.87	0.79	0.205	0.545	0.43	Measured
6365654.95	1546743.50	-83.73	RT90-RHB70	111.00	100.71	-64.85	0.80	0.205	0.545	0.44	Measured
6365656.23	1546743.52	-86.45	RT90-RHB70	114.00	103.43	-64.84	1.06	0.205	0.545	0.46	Measured

6365657.50	1546743.54	-89.16	RT90-RHB70	117.00	106.14	-64.84	0.89	0.205	0.545	0.47	Measured
6365658.78	1546743.56	-91.88	RT90-RHB70	120.00	108.86	-64.80	0.89	0.205	0.545	0.48	Measured
6365660.06	1546743.58	-94.59	RT90-RHB70	123.00	111.57	-64.79	0.88	0.205	0.545	0.49	Measured
6365661.34	1546743.60	-97.30	RT90-RHB70	126.00	114.28	-64.78	0.88	0.205	0.545	0.50	Measured
6365662.61	1546743.62	-100.02	RT90-RHB70	129.00	117.00	-64.77	0.91	0.205	0.545	0.52	Measured
6365663.89	1546743.64	-102.73	RT90-RHB70	132.00	119.71	-64.73	1.01	0.205	0.545	0.53	Measured
6365665.18	1546743.66	-105.44	RT90-RHB70	135.00	122.42	-64.70	1.01	0.205	0.545	0.54	Measured
6365666.46	1546743.68	-108.16	RT90-RHB70	138.00	125.14	-64.66	1.04	0.205	0.545	0.55	Measured
6365667.74	1546743.71	-110.87	RT90-RHB70	141.00	127.85	-64.63	0.91	0.205	0.545	0.57	Measured
6365669.03	1546743.73	-113.58	RT90-RHB70	144.00	130.56	-64.61	0.88	0.205	0.545	0.58	Measured
6365670.32	1546743.75	-116.29	RT90-RHB70	147.00	133.27	-64.59	0.90	0.205	0.545	0.59	Measured
6365671.60	1546743.77	-119.00	RT90-RHB70	150.00	135.98	-64.59	0.90	0.205	0.545	0.60	Measured
6365672.89	1546743.79	-121.71	RT90-RHB70	153.00	138.69	-64.57	0.85	0.205	0.545	0.61	Measured
6365674.18	1546743.80	-124.42	RT90-RHB70	156.00	141.40	-64.56	0.78	0.205	0.545	0.63	Measured
6365675.47	1546743.82	-127.13	RT90-RHB70	159.00	144.11	-64.54	0.79	0.205	0.545	0.64	Measured
6365676.76	1546743.84	-129.83	RT90-RHB70	162.00	146.81	-64.52	0.72	0.205	0.545	0.65	Measured
6365678.05	1546743.85	-132.54	RT90-RHB70	165.00	149.52	-64.52	0.61	0.205	0.545	0.66	Measured
6365679.34	1546743.87	-135.25	RT90-RHB70	168.00	152.23	-64.50	0.50	0.205	0.545	0.68	Measured
6365680.63	1546743.88	-137.96	RT90-RHB70	171.00	154.94	-64.47	0.50	0.205	0.545	0.69	Measured
6365681.92	1546743.89	-140.66	RT90-RHB70	174.00	157.64	-64.47	0.49	0.205	0.545	0.70	Measured
6365683.22	1546743.90	-143.37	RT90-RHB70	177.00	160.35	-64.48	0.62	0.205	0.545	0.71	Measured
6365684.51	1546743.92	-146.08	RT90-RHB70	180.00	163.06	-64.52	0.71	0.205	0.545	0.73	Measured
6365685.80	1546743.93	-148.79	RT90-RHB70	183.00	165.77	-64.55	0.92	0.205	0.545	0.74	Measured
6365687.09	1546743.96	-151.50	RT90-RHB70	186.00	168.48	-64.58	0.97	0.205	0.545	0.75	Measured
6365688.37	1546743.98	-154.21	RT90-RHB70	189.00	171.19	-64.60	0.95	0.205	0.545	0.76	Measured
6365689.66	1546744.00	-156.92	RT90-RHB70	192.00	173.90	-64.60	0.95	0.205	0.545	0.77	Measured
6365690.95	1546744.02	-159.63	RT90-RHB70	195.00	176.61	-64.60	0.94	0.205	0.545	0.79	Measured
6365692.23	1546744.04	-162.34	RT90-RHB70	198.00	179.32	-64.59	0.96	0.205	0.545	0.80	Measured
6365693.52	1546744.06	-165.05	RT90-RHB70	201.00	182.03	-64.57	0.91	0.205	0.545	0.81	Measured
6365694.81	1546744.08	-167.76	RT90-RHB70	204.00	184.74	-64.55	0.91	0.205	0.545	0.82	Measured
6365696.10	1546744.10	-170.46	RT90-RHB70	207.00	187.44	-64.53	0.88	0.205	0.545	0.84	Measured
6365697.39	1546744.12	-173.17	RT90-RHB70	210.00	190.15	-64.53	0.76	0.205	0.545	0.85	Measured
6365698.68	1546744.14	-175.88	RT90-RHB70	213.00	192.86	-64.52	0.58	0.205	0.545	0.86	Measured
6365699.97	1546744.15	-178.59	RT90-RHB70	216.00	195.57	-64.53	0.50	0.205	0.545	0.87	Measured
6365701.26	1546744.16	-181.30	RT90-RHB70	219.00	198.28	-64.55	0.48	0.205	0.545	0.88	Measured
6365702.55	1546744.17	-184.01	RT90-RHB70	222.00	200.99	-64.54	0.48	0.205	0.545	0.90	Measured
6365703.84	1546744.18	-186.71	RT90-RHB70	225.00	203.69	-64.45	0.47	0.205	0.545	0.91	Measured
6365705.14	1546744.19	-189.42	RT90-RHB70	228.00	206.40	-64.43	0.40	0.205	0.545	0.92	Measured
6365706.43	1546744.20	-192.13	RT90-RHB70	231.00	209.11	-64.41	0.35	0.205	0.545	0.93	Measured
6365707.73	1546744.21	-194.83	RT90-RHB70	234.00	211.81	-64.41	0.33	0.205	0.545	0.95	Measured
6365709.02	1546744.21	-197.54	RT90-RHB70	237.00	214.52	-64.40	0.33	0.205	0.545	0.96	Measured
6365710.32	1546744.22	-200.24	RT90-RHB70	240.00	217.22	-64.35	0.51	0.205	0.545	0.97	Measured
6365711.62	1546744.24	-202.95	RT90-RHB70	243.00	219.93	-64.30	0.74	0.205	0.545	0.98	Measured

6365712.92	1546744.26	-205.65	RT90-RHB70	246.00	222.63	-64.27	0.80	0.205	0.545	1.00	Measured
6365714.22	1546744.27	-208.35	RT90-RHB70	249.00	225.33	-64.22	0.78	0.205	0.545	1.01	Measured
6365715.53	1546744.29	-211.05	RT90-RHB70	252.00	228.03	-64.19	0.82	0.205	0.545	1.02	Measured
6365716.84	1546744.31	-213.75	RT90-RHB70	255.00	230.73	-64.16	0.92	0.205	0.545	1.03	Measured
6365718.14	1546744.33	-216.45	RT90-RHB70	258.00	233.43	-64.13	1.14	0.205	0.545	1.05	Measured
6365719.45	1546744.36	-219.15	RT90-RHB70	261.00	236.13	-64.12	0.95	0.205	0.545	1.06	Measured
6365720.76	1546744.38	-221.85	RT90-RHB70	264.00	238.83	-64.08	0.92	0.205	0.545	1.07	Measured
6365722.08	1546744.40	-224.55	RT90-RHB70	267.00	241.53	-64.06	0.94	0.205	0.545	1.08	Measured
6365723.39	1546744.42	-227.25	RT90-RHB70	270.00	244.23	-64.05	0.94	0.205	0.545	1.10	Measured
6365724.70	1546744.44	-229.94	RT90-RHB70	273.00	246.92	-64.03	0.86	0.205	0.545	1.11	Measured
6365726.01	1546744.46	-232.64	RT90-RHB70	276.00	249.62	-64.03	0.86	0.205	0.545	1.12	Measured
6365727.33	1546744.48	-235.34	RT90-RHB70	279.00	252.32	-64.03	0.87	0.205	0.545	1.13	Measured
6365728.64	1546744.50	-238.03	RT90-RHB70	282.00	255.01	-64.02	0.89	0.205	0.545	1.15	Measured
6365729.96	1546744.52	-240.73	RT90-RHB70	285.00	257.71	-64.02	0.89	0.205	0.545	1.16	Measured
6365731.27	1546744.54	-243.43	RT90-RHB70	288.00	260.41	-64.02	0.90	0.205	0.545	1.17	Measured
6365732.58	1546744.56	-246.12	RT90-RHB70	291.00	263.10	-64.02	0.91	0.205	0.545	1.18	Measured
6365733.90	1546744.58	-248.82	RT90-RHB70	294.00	265.80	-64.00	0.86	0.205	0.545	1.20	Measured
6365735.21	1546744.60	-251.52	RT90-RHB70	297.00	268.50	-63.99	0.82	0.205	0.545	1.21	Measured
6365736.53	1546744.62	-254.21	RT90-RHB70	300.00	271.19	-63.98	0.81	0.205	0.545	1.22	Measured
6365737.85	1546744.64	-256.91	RT90-RHB70	303.00	273.89	-63.98	0.76	0.205	0.545	1.23	Measured
6365739.16	1546744.66	-259.61	RT90-RHB70	306.00	276.59	-63.98	0.74	0.205	0.545	1.25	Measured
6365740.48	1546744.67	-262.30	RT90-RHB70	309.00	279.28	-63.98	0.74	0.205	0.545	1.26	Measured
6365741.79	1546744.69	-265.00	RT90-RHB70	312.00	281.98	-63.98	0.81	0.205	0.545	1.27	Measured
6365743.11	1546744.71	-267.69	RT90-RHB70	315.00	284.67	-63.98	0.85	0.205	0.545	1.28	Measured
6365744.42	1546744.73	-270.39	RT90-RHB70	318.00	287.37	-63.97	0.90	0.205	0.545	1.30	Measured
6365745.74	1546744.75	-273.08	RT90-RHB70	321.00	290.06	-63.97	0.81	0.205	0.545	1.31	Measured
6365747.06	1546744.77	-275.78	RT90-RHB70	324.00	292.76	-63.97	0.77	0.205	0.545	1.32	Measured
6365748.37	1546744.79	-278.48	RT90-RHB70	327.00	295.46	-63.97	0.78	0.205	0.545	1.33	Measured
6365749.69	1546744.81	-281.17	RT90-RHB70	330.00	298.15	-63.97	0.85	0.205	0.545	1.35	Measured
6365751.01	1546744.82	-283.87	RT90-RHB70	333.00	300.85	-63.97	0.81	0.205	0.545	1.36	Measured
6365752.32	1546744.84	-286.56	RT90-RHB70	336.00	303.54	-63.97	0.72	0.205	0.545	1.37	Measured
6365753.64	1546744.86	-289.26	RT90-RHB70	339.00	306.24	-63.95	0.69	0.205	0.545	1.38	Measured
6365754.96	1546744.87	-291.95	RT90-RHB70	342.00	308.93	-63.95	0.69	0.205	0.545	1.40	Measured
6365756.28	1546744.89	-294.65	RT90-RHB70	345.00	311.63	-63.95	0.68	0.205	0.545	1.41	Measured
6365757.59	1546744.90	-297.34	RT90-RHB70	348.00	314.32	-63.94	0.62	0.205	0.545	1.42	Measured
6365758.91	1546744.92	-300.04	RT90-RHB70	351.00	317.02	-63.94	0.44	0.205	0.545	1.43	Measured
6365760.23	1546744.93	-302.73	RT90-RHB70	354.00	319.71	-63.93	0.44	0.205	0.545	1.45	Measured
6365761.55	1546744.94	-305.43	RT90-RHB70	357.00	322.41	-63.91	0.44	0.205	0.545	1.46	Measured
6365762.87	1546744.95	-308.12	RT90-RHB70	360.00	325.10	-63.91	0.46	0.205	0.545	1.47	Measured
6365764.19	1546744.96	-310.82	RT90-RHB70	363.00	327.80	-63.90	0.54	0.205	0.545	1.48	Measured
6365765.51	1546744.97	-313.51	RT90-RHB70	366.00	330.49	-63.89	0.50	0.205	0.545	1.50	Measured
6365766.83	1546744.98	-316.20	RT90-RHB70	369.00	333.18	-63.88	0.48	0.205	0.545	1.51	Measured
6365768.15	1546744.99	-318.90	RT90-RHB70	372.00	335.88	-63.87	0.48	0.205	0.545	1.52	Measured

6365769.47	1546745.00	-321.59	RT90-RHB70	375.00	338.57	-63.86	0.53	0.205	0.545	1.53	Measured
6365770.79	1546745.02	-324.28	RT90-RHB70	378.00	341.26	-63.84	0.59	0.205	0.545	1.55	Measured
6365772.12	1546745.03	-326.98	RT90-RHB70	381.00	343.96	-63.81	0.44	0.205	0.545	1.56	Measured
6365773.44	1546745.04	-329.67	RT90-RHB70	384.00	346.65	-63.78	0.41	0.205	0.545	1.57	Measured
6365774.77	1546745.05	-332.36	RT90-RHB70	387.00	349.34	-63.77	0.34	0.205	0.545	1.58	Measured
6365776.09	1546745.06	-335.05	RT90-RHB70	390.00	352.03	-63.76	0.34	0.205	0.545	1.60	Measured
6365777.42	1546745.06	-337.74	RT90-RHB70	393.00	354.72	-63.75	0.33	0.205	0.545	1.61	Measured
6365778.75	1546745.07	-340.43	RT90-RHB70	396.00	357.41	-63.72	0.26	0.205	0.545	1.62	Measured
6365780.08	1546745.08	-343.12	RT90-RHB70	399.00	360.10	-63.72	0.25	0.205	0.545	1.63	Measured
6365781.40	1546745.08	-345.81	RT90-RHB70	402.00	362.79	-63.72	0.25	0.205	0.545	1.65	Measured
6365782.73	1546745.09	-348.50	RT90-RHB70	405.00	365.48	-63.71	0.42	0.205	0.545	1.66	Measured
6365784.06	1546745.10	-351.19	RT90-RHB70	408.00	368.17	-63.69	0.33	0.205	0.545	1.67	Measured
6365785.39	1546745.11	-353.88	RT90-RHB70	411.00	370.86	-63.68	0.25	0.205	0.545	1.69	Measured
6365786.72	1546745.11	-356.57	RT90-RHB70	414.00	373.55	-63.64	0.07	0.205	0.545	1.70	Measured
6365788.06	1546745.11	-359.26	RT90-RHB70	417.00	376.24	-63.61	0.04	0.205	0.545	1.71	Measured
6365789.39	1546745.11	-361.94	RT90-RHB70	420.00	378.92	-63.57	0.06	0.205	0.545	1.72	Measured
6365790.73	1546745.11	-364.63	RT90-RHB70	423.00	381.61	-63.56	0.19	0.205	0.545	1.74	Measured
6365792.06	1546745.12	-367.31	RT90-RHB70	426.00	384.29	-63.55	0.24	0.205	0.545	1.75	Measured
6365793.40	1546745.13	-370.00	RT90-RHB70	429.00	386.98	-63.52	0.27	0.205	0.545	1.76	Measured
6365794.74	1546745.13	-372.68	RT90-RHB70	432.00	389.66	-63.48	0.24	0.205	0.545	1.77	Measured
6365796.08	1546745.14	-375.37	RT90-RHB70	435.00	392.35	-63.47	0.24	0.205	0.545	1.79	Measured
6365797.42	1546745.14	-378.05	RT90-RHB70	438.00	395.03	-63.44	0.22	0.205	0.545	1.80	Measured
6365798.76	1546745.15	-380.74	RT90-RHB70	441.00	397.72	-63.42	0.25	0.205	0.545	1.81	Measured
6365800.10	1546745.15	-383.42	RT90-RHB70	444.00	400.40	-63.39	0.23	0.205	0.545	1.83	Measured
6365801.45	1546745.16	-386.10	RT90-RHB70	447.00	403.08	-63.37	0.04	0.205	0.545	1.84	Measured
6365802.79	1546745.16	-388.78	RT90-RHB70	450.00	405.76	-63.36	359.97	0.205	0.545	1.85	Measured
6365804.14	1546745.15	-391.46	RT90-RHB70	453.00	408.44	-63.36	359.82	0.205	0.545	1.86	Measured
6365805.48	1546745.15	-394.15	RT90-RHB70	456.00	411.13	-63.34	359.82	0.205	0.545	1.88	Measured
6365806.83	1546745.15	-396.83	RT90-RHB70	459.00	413.81	-63.34	359.94	0.205	0.545	1.89	Measured
6365808.17	1546745.15	-399.51	RT90-RHB70	462.00	416.49	-63.33	359.96	0.205	0.545	1.90	Measured
6365809.52	1546745.14	-402.19	RT90-RHB70	465.00	419.17	-63.30	359.97	0.205	0.545	1.91	Measured
6365810.87	1546745.14	-404.87	RT90-RHB70	468.00	421.85	-63.30	359.90	0.205	0.545	1.93	Measured
6365812.22	1546745.14	-407.55	RT90-RHB70	471.00	424.53	-63.28	359.86	0.205	0.545	1.94	Measured
6365813.57	1546745.14	-410.23	RT90-RHB70	474.00	427.21	-63.28	359.81	0.205	0.545	1.95	Measured
6365814.92	1546745.13	-412.91	RT90-RHB70	477.00	429.89	-63.28	359.82	0.205	0.545	1.97	Measured
6365816.27	1546745.13	-415.59	RT90-RHB70	480.00	432.57	-63.26	359.87	0.205	0.545	1.98	Measured
6365817.62	1546745.13	-418.27	RT90-RHB70	483.00	435.25	-63.25	359.89	0.205	0.545	1.99	Measured
6365818.97	1546745.12	-420.94	RT90-RHB70	486.00	437.92	-63.24	359.89	0.205	0.545	2.00	Measured
6365820.32	1546745.12	-423.62	RT90-RHB70	489.00	440.60	-63.20	359.91	0.205	0.545	2.02	Measured
6365821.67	1546745.12	-426.30	RT90-RHB70	492.00	443.28	-63.20	359.82	0.205	0.545	2.03	Measured
6365823.02	1546745.11	-428.98	RT90-RHB70	495.00	445.96	-63.19	359.88	0.205	0.545	2.04	Measured
6365824.38	1546745.11	-431.66	RT90-RHB70	498.00	448.64	-63.18	359.91	0.205	0.545	2.06	Measured
6365825.73	1546745.11	-434.33	RT90-RHB70	501.00	451.31	-63.16	0.01	0.205	0.545	2.07	Measured

6365827.08	1546745.11	-437.01	RT90-RHB70	504.00	453.99	-63.16	359.95	0.205	0.545	2.08	Measured
6365828.44	1546745.11	-439.69	RT90-RHB70	507.00	456.67	-63.15	359.88	0.205	0.545	2.09	Measured
6365829.80	1546745.10	-442.36	RT90-RHB70	510.00	459.34	-63.11	359.87	0.205	0.545	2.11	Measured
6365831.15	1546745.10	-445.04	RT90-RHB70	513.00	462.02	-63.08	359.97	0.205	0.545	2.12	Measured
6365832.51	1546745.10	-447.71	RT90-RHB70	516.00	464.69	-63.05	359.91	0.205	0.545	2.13	Measured
6365833.87	1546745.10	-450.39	RT90-RHB70	519.00	467.37	-63.01	359.98	0.205	0.545	2.15	Measured
6365835.24	1546745.10	-453.06	RT90-RHB70	522.00	470.04	-62.98	359.91	0.205	0.545	2.16	Measured
6365836.60	1546745.10	-455.73	RT90-RHB70	525.00	472.71	-62.94	359.96	0.205	0.545	2.17	Measured
6365837.96	1546745.10	-458.40	RT90-RHB70	528.00	475.38	-62.89	0.06	0.205	0.545	2.19	Measured
6365839.33	1546745.10	-461.07	RT90-RHB70	531.00	478.05	-62.86	0.19	0.205	0.545	2.20	Measured
6365840.70	1546745.10	-463.74	RT90-RHB70	534.00	480.72	-62.86	0.15	0.205	0.545	2.21	Measured
6365842.07	1546745.11	-466.41	RT90-RHB70	537.00	483.39	-62.84	0.05	0.205	0.545	2.22	Measured
6365843.44	1546745.11	-469.08	RT90-RHB70	540.00	486.06	-62.81	0.00	0.205	0.545	2.24	Measured
6365844.81	1546745.11	-471.75	RT90-RHB70	543.00	488.73	-62.78	359.99	0.205	0.545	2.25	Measured
6365846.19	1546745.11	-474.41	RT90-RHB70	546.00	491.39	-62.71	359.88	0.205	0.545	2.26	Measured
6365847.56	1546745.10	-477.08	RT90-RHB70	549.00	494.06	-62.70	359.84	0.205	0.545	2.28	Measured
6365848.94	1546745.10	-479.75	RT90-RHB70	552.00	496.73	-62.67	359.82	0.205	0.545	2.29	Measured
6365850.32	1546745.09	-482.41	RT90-RHB70	555.00	499.39	-62.65	359.87	0.205	0.545	2.30	Measured
6365851.69	1546745.09	-485.07	RT90-RHB70	558.00	502.05	-62.62	0.06	0.205	0.545	2.32	Measured
6365853.07	1546745.09	-487.74	RT90-RHB70	561.00	504.72	-62.61	0.06	0.205	0.545	2.33	Measured
6365854.46	1546745.09	-490.40	RT90-RHB70	564.00	507.38	-62.59	359.86	0.205	0.545	2.34	Measured
6365855.84	1546745.09	-493.06	RT90-RHB70	567.00	510.04	-62.56	359.85	0.205	0.545	2.36	Measured
6365857.22	1546745.09	-495.73	RT90-RHB70	570.00	512.71	-62.55	359.97	0.205	0.545	2.37	Measured
6365858.60	1546745.09	-498.39	RT90-RHB70	573.00	515.37	-62.53	0.11	0.205	0.545	2.38	Measured
6365859.99	1546745.09	-501.05	RT90-RHB70	576.00	518.03	-62.50	0.13	0.205	0.545	2.39	Measured
6365861.37	1546745.10	-503.71	RT90-RHB70	579.00	520.69	-62.49	0.20	0.205	0.545	2.41	Measured
6365862.76	1546745.10	-506.37	RT90-RHB70	582.00	523.35	-62.47	0.16	0.205	0.545	2.42	Measured
6365864.15	1546745.10	-509.03	RT90-RHB70	585.00	526.01	-62.45	0.16	0.205	0.545	2.43	Measured
6365865.54	1546745.10	-511.69	RT90-RHB70	588.00	528.67	-62.42	359.92	0.205	0.545	2.45	Measured
6365866.92	1546745.10	-514.35	RT90-RHB70	591.00	531.33	-62.39	359.84	0.205	0.545	2.46	Measured
6365868.31	1546745.10	-517.01	RT90-RHB70	594.00	533.99	-62.39	359.82	0.205	0.545	2.47	Measured
6365869.71	1546745.09	-519.67	RT90-RHB70	597.00	536.65	-62.38	359.78	0.205	0.545	2.49	Measured
6365871.10	1546745.09	-522.32	RT90-RHB70	600.00	539.30	-62.37	359.71	0.205	0.545	2.50	Measured
6365872.49	1546745.08	-524.98	RT90-RHB70	603.00	541.96	-62.36	359.71	0.205	0.545	2.51	Measured
6365873.88	1546745.07	-527.64	RT90-RHB70	606.00	544.62	-62.34	359.71	0.205	0.545	2.53	Measured
6365875.27	1546745.07	-530.30	RT90-RHB70	609.00	547.28	-62.33	359.76	0.205	0.545	2.54	Measured
6365876.67	1546745.06	-532.95	RT90-RHB70	612.00	549.93	-62.31	359.82	0.205	0.545	2.55	Measured
6365878.06	1546745.06	-535.61	RT90-RHB70	615.00	552.59	-62.22	359.99	0.205	0.545	2.57	Measured
6365879.46	1546745.06	-538.26	RT90-RHB70	618.00	555.24	-62.16	0.23	0.205	0.545	2.58	Measured
6365880.87	1546745.07	-540.91	RT90-RHB70	621.00	557.89	-62.06	0.31	0.205	0.545	2.59	Measured
6365882.27	1546745.08	-543.56	RT90-RHB70	624.00	560.54	-61.97	0.38	0.205	0.545	2.61	Measured
6365883.68	1546745.09	-546.21	RT90-RHB70	627.00	563.19	-61.91	0.55	0.205	0.545	2.62	Measured
6365885.10	1546745.10	-548.86	RT90-RHB70	630.00	565.84	-61.83	0.79	0.205	0.545	2.63	Measured

6365886.52	1546745.13	-551.50	RT90-RHB70	633.00	568.48	-61.77	1.11	0.205	0.545	2.65	Measured
6365887.94	1546745.16	-554.14	RT90-RHB70	636.00	571.12	-61.69	1.25	0.205	0.545	2.66	Measured
6365889.36	1546745.19	-556.78	RT90-RHB70	639.00	573.76	-61.60	1.38	0.205	0.545	2.67	Measured
6365890.79	1546745.22	-559.42	RT90-RHB70	642.00	576.40	-61.48	1.38	0.205	0.545	2.69	Measured
6365892.22	1546745.26	-562.06	RT90-RHB70	645.00	579.04	-61.47	1.22	0.205	0.545	2.70	Measured
6365893.66	1546745.28	-564.69	RT90-RHB70	648.00	581.67	-61.44	0.97	0.205	0.545	2.72	Measured
6365894.88	1546745.30	-566.94	RT90-RHB70	650.56	583.92	-61.44	0.97	0.205	0.545	2.73	Measured

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