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November 2005

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*Keywords:* KAV04A, KAV04B, Geology, Drill core mapping, Boremap, Fractures, Ävrö, Simpevarp, BIPS.

# Abstract

Borehole KAV04A is a deep (c 1,000 m) cored borehole, drilled within the site investigation program in the Simpevarp area. The borehole was drilled 2004. It is telescopic implying that the upper part, 0–100 m, is percussion drilled and has a larger diameter than the core drilled part. To cover up for the missing core for the uppermost 100 m another core drilled borehole, KAV04B, was drilled adjacent to KAV04A down to 100 m. In this report KAV04 refer to KAV04A plus KAV04B.

Rock types, alterations, fractures and other structures were studied using the drill core and BIPS-images and the information was documented in the software Boremap. All these data will be used in further interpretation of the bedrock conditions in the area down to a depth of 1,000 m.

KAV04 is lithologically heterogeneous and made up of rather thin bands with different lithologies, generally 5–25 m thick. It is therefore, at a first glance, difficult to recognize natural geological sections in the drill core and thus to subdivide KAV04 in such sections. However, considering all the information in Appendix 1, KAV04 has been subdivided into the following 6 sections. Section I (0–215 m) is characterized by Ävrö granite. Section II (215–600 m) is characterized by rapid changes between bands of different lithologies. Section III (600–865 m) is characterized by 2–40 m thick intervals of fine-grained granite alternating with Ävrö granite. Section IV (865–950 m) is made up exclusively of fine-grained dioritoid. Section V (950–1,002 m) is characterized by even more rapid changes in lithology than in section II. The mylonite in the interval 1,002–1,003.4 m, is extremely thin for the scale in Appendix 1, it is here presented as a separate section, section VI.

Section I is lithologically very homogeneous and dominated by Ävrö granite with few very thin bands of other lithologies. This section is less oxidized than other sections in KAV04 and has lower frequencies of veins and dykes, shear zones and unbroken and broken fractures. No crush zones and very few and thin intervals of sealed fracture networks were observed in this section.

Section II differs from section I in that it is made up of rapidly alternating bands, 2–30 m thick, with different lithologies. This section show stronger oxidation than section I, higher frequencies of unbroken and broken fractures than section I, and more and longer intervals of sealed fracture networks and intervals with foliation. Crush zones are, as in section I, sparsely occurring and thinner than 1 m.

Section III is to 40% made up of 2–40 m thick bands of fine-grained granite alternating principally with thicker bands of Ävrö granite. This section show stronger and more continuous oxidation than section II as well as wider intervals with foliation, wider intervals of sealed fracture network and intervals with crush as well as higher frequencies of broken fractures. The low frequencies of veins and dykes with fine-grained granite are artificial and depends on that most fine-grained granites occur in thicker bands and are thus presented in the lithology column.

Section IV is made up of an 85 m thick band of fine-grained dioritoid. This interval almost lacks oxidation, has high frequencies of veins and dykes as well as of shear zones and breccias. Foliation is almost lacking. The section is almost covered by a continuous sealed fracture network, has high frequencies of broken fractures and is rather rich in crush zones.

Section V is made up of rapidly alternating bands, only 1–5 m thick, with different lithologies. This section show rather strong oxidation and is rich in veins and dykes. The frequencies of sealed fractures (interpreted), sealed fracture networks and crush zones are lower than for section IV, but the frequencies of broken fractures are as high as for sections III and IV.

Section VI is extremely thin and only includes the last 1.4 m of KAV04. It includes mylonite together with strong foliation and indicates that KAV04 most likely has reached some kind of weakness zone at this depth.

KAV04 show the following general tendencies towards depth for the geo parameters presented in Appendix 1, except for section IV, where the fine-grained dioritic lithology strongly influences some of the geo parameters:

- Oxidation gets stronger with depth.
- Veins are more numerous with depth.
- Shear zones and foliated intervals are more numerous with depth.
- Sealed fracture network are more numerous and wider with depth.
- Broken fractures are more numerous with depth.
- Crush zones are more numerous with depth.
- High joint alteration numbers are lacking in the lower part of KAV04.

These changes in geo parameter frequencies might have a relation with the occurrence of the mylonite below 1,000 m in KAV04. This indicates a possible relationship between high oxidation intensity as well as high frequencies of structures, unbroken and broken fractures, sealed fracture network and crush zones with distance to the mylonite.

# Sammanfattning

Borrhål KAV04A är ett djupt (ca 1 000 m) kärnborrhål som borrats inom ramen för platsundersökningarna i Oskarshamn. Borrningen utfördes under 2004. Borrhålet är teleskopiskt, vilket betyder att de översta 100 m är hammarborrade och har en större diameter än den kärnborrade delen (100–1 000 m). För att komplettera de översta 100 m där borrkärna saknas, borrades ytterligare ett kärnborrhål, KAV04B, i omedelbar närhet av KAV04A.

Bergarter, omvandlingar, sprickor och andra strukturer studerades både i borrkärnan och i BIPS-bilderna, samt dokumenterades i programmet Boremap. Dessa data kommer att ligga till grund för framtida tolkningar av bergets egenskaper i Simpevarpsområdet ner till 1 000 m djup.

KAV04 är litologiskt heterogent och uppbyggt av ganska tunna band, vanligtvis 5–25 m tjocka, av olika litologier. Det är därför, vid en första anblick, svårt att dela upp KAV04 i naturliga geologiska sektioner. Med hänsyn tagen till informationen i Appendix 1 har KAV04 här indelats i följande 6 sektioner. Sektion I (0–215 m) karakteriseras av Ävrögranit. Sektion II (215–600 m) karakteriseras av snabb växling mellan band med olika litologier. Sektion III (600–865 m) karakteriseras av 2–40 m tjocka band med finkornig granit som växellagrar med Ävrögranit. Sektion IV (865–950 m) utgöres uteslutande av finkornig dioritoid. Sektion V (950–1 002 m) karakteriseras av ännu snabbare litologiska förändringar än i sektion II och de enskilda litologiska banden är endast 2–5 m breda. Myloniten i intervallet 1 002–1 003,4 m, är extremt smalt för skalan i Appendix 1, men presenteras här som en separat sektion, sektion VI.

Sektion I är litologiskt mycket homogen och domineras helt av Ävrögranit med få tunna band av andra litologier. Denna sektion är mindre oxiderad än andra sektioner i KAV04 och har lägre frekvenser av gångar, skjuvzoner (= shear zones) och öppna sprickor (tolkade). Inga krosszoner och mycket få och tunna intervaller med läkta spricknätverk observerades i denna sektion.

Sektion II skiljer sig från sektion I genom den snabba växellagringen mellan 2–30 m tjocka band av olika litologier. Denna sektion uppvisar kraftigare oxidation än sektion I och har högre frekvenser av läkta och öppna sprickor (tolkade) än denna sektion. Sektion II har också längre intervaller med läkta spricknätverk och foliation. Krosszoner är, liksom i sektion I, få och de är tunnare än 1 m.

Sektion III utgöres till 40 % av upp till 2–40 m tjocka band av finkornig granit som huvudsakligen växellagrar med Ävrögranit. Denna sektion är kraftigare och mer kontinuerligt oxiderad än sektion II. Den uppvisar också bredare intervaller med foliation, läkta spricknätverk och intervaller med kross samt har högre frekvenser av öppna sprickor (tolkade) än motsvarande geoparametrar i sektionerna I och II. Gångar och skjuvzoner är färre än i sektion II. De låga frekvenserna av finkorniga granitgångar är artificiella och beror på att denna bergart, i denna sektion, uppträder som tjockare band och således presenteras i litologikolumnen.

Sektion IV utgörs av en 85 m tjock finkornig dioritoid. Detta intervall saknar nästan oxidation men har högre frekvenser av gångar, skjuvzoner och breccior. Foliation saknas nästan helt. Denna sektion täcks nästan helt av ett kontinuerligt nätverk av läkta sprickor (tolkade), har högre frekvenser av öppna sprickor (tolkade) och är ganska rik på krosszoner.

Sektion V utgöres av snabbt växellagrande, endast 1–5 m tjocka, band av olika litologier. Denna sektion uppvisar ganska kraftig oxidation och är rik på gångar. Frekvenserna av läkta sprickor (tolkade), läkta spricknätverk och krosszoner är lägre än för sektion IV, men frekvenserna av öppna sprickor (tolkade) är lika höga som för sektionerna III och IV.

Sektion VI är extremt tunn och utgör endast de 1.4 djupaste metrarna av KAV04, 1 002–1 003,4 m. I denna sektion finns mylonit tillsammans med kraftig foliation.

Med undantag för sektion IV, inom vilken den finkorniga dioritiska litologin kraftigt påverkat utvecklingen av flera av de geoparametrar som presenteras i Appendix 1, så uppvisar KAV04 följande generella tendenser mot djupet:

- Oxidationen ökar mot djupet.
- Frekvensen av gångar ökar mot djupet.
- Skjuvzoner och intervaller med foliation är vanligare mot djupet.
- Läkta spricknätverk är vanligare och bredare mot djupet.
- Frekvensen av öppna sprickor ökar mot djupet
- Frekvensen och bredden av krosszoner ökar mot djupet.
- Höga värden för *”joint alteration numbers”* saknas i de undre delarna av KAV04.

Dessa förändringar i frekvenserna av olika geoparametrar kan vara relaterade till uppträdandet av mylonitzonen under 1 000 m i KAV04. Detta indikerar ett möjligt samband mellan hög oxidationsintensitet och höga frekvenser för strukturer, öppna och läkta sprickor (tolkade), läkta spricknätverk samt krosszoner med avståndet till myloniten. Ju närmare myloniten man kommer desto högre är frekvenserna.

# Contents

# 1 Introduction

This document reports data gained by Boremap mapping of the core drilled, 1,000 m deep, borehole KAV04A and the complementary borehole KAV04B (Figure 1-1).

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

| Activity plan | Number | Version |
|---|---|---|
| Boremapkartering av KAV04 | AP PS 400-04-044 | 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 |

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 Simpevarp 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.

KAV04 includes two boreholes: KAV04A and KAV04B. KAV04A is telescopic, which means that the uppermost 100 m were drilled by percussion drilling followed by core drilling (100–1,000 m). Since drill core is missing for the uppermost 100 m, another core drilled borehole, KAV04B, was drilled adjacent to KAV04A to cover up the interval 0–100 m. In this report both boreholes are referred to as KAV04. The borehole was drilled in 2004.

Detailed mapping of the drill cores is essential for a three dimensional understanding of the geology at depth. The Boremap mapping is based on the use of 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. Important to keep in mind is that the mappings only represent the bedrock where this is intersected by the drill holes.

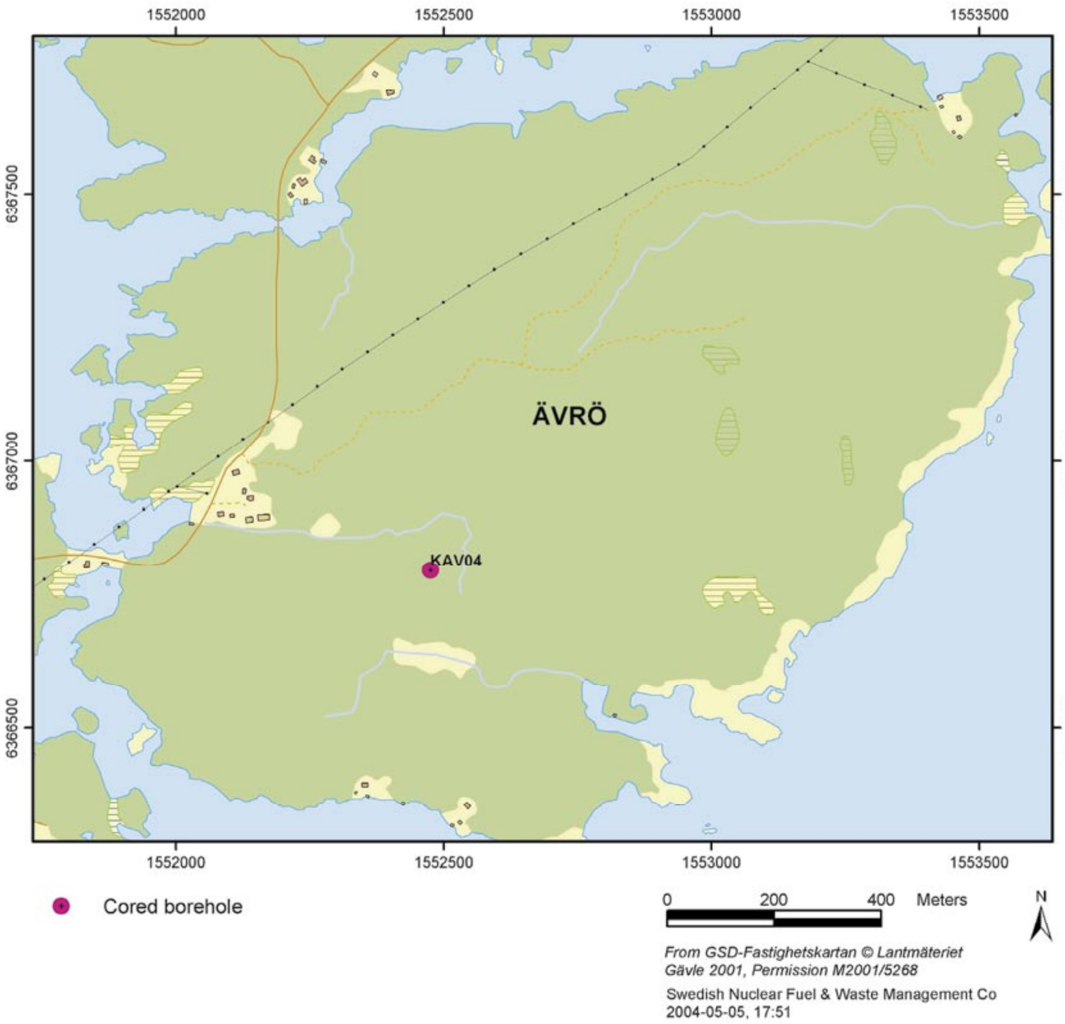



***Figure 1-1.*** *Location of the core drilled borehole KAV04.*

# 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 intersecting borehole KAV04. 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. 3.4.2, loaded with the bedrock and mineral standards of SKB. The final data presentation was made using StereoNet, WellCad v. 3.2, and BIPS Image Print.

Boremap is a computerized system that unite orthodox core mapping with modern video mapping. Boremap is the central of the system and deals with the mapping 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 of KAV04 consists of four sequences. The first BIPS video sequence covers KAV04B which is the interval 11.53–99.33 m, while the others cover KAV04A. The second sequence covers the interval 100.95–601.96 m, the third sequence covers the interval 600–808 m and the fourth sequence the interval 808–1,001.37 m. There are no BIPS-images neither where KAV04B and KAV04A meet in the interval 99.33–100.95 m nor in the 8 cm long interval 601.96–602.04 m. The sequences 2, 3 and 4 were put together covering the interval 100.95–1,001.37 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 was 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, which sometimes formed a spiral pattern,
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 neglectable in KAV04.

The main disturbances for the BIPS-image quality in KAV04 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, easy to interpret image. 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 extremely thick and outstanding fractures can eventually 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 these can still be oriented using the guide-line method (chapter 4.2.3)

Good to very good image quality is rare in KAV04 but 40% of the borehole length can be classified as good to acceptable. The BIPS-image quality in KAV04 is as follows; 11.5–25 m bad, 25–50 m acceptable to bad, 50–150 m good to acceptable, 150–263 m acceptable to bad, 263–290 m good, 290–353 m good to acceptable, 353–357 m very bad, 357–398 m bad, 398–403 m very bad, 403–429 m good to acceptable, 429–435 m good, 435–601.96 m good to acceptable, 601.96–602.04 m no image, 602.04–944 m acceptable to bad and 944–1,000 good to acceptable.

# 4 Execution

The Boremap-mapping of the telescopic drilled borehole KAV04 was performed and documented according to activity plan AP PS 400-04-044 (SKB, internal document) referring to the Method Description for Boremap mapping (SKB MD 143.006, v.1.0, SKB, internal controlling document).

KAV04 includes two boreholes, KAV04A and KAV04B. The first 100 m of KAV04A was drilled by percussion drilling and therefore no drill core was received. A core drilled borehole, KAV04B, was therefore drilled adjacent to KAV04A in order to get a representative core for the uppermost section. Borehole KAV04B covers the interval 5.36–101.03 m and borehole KAV04A covers the interval 100.25–1,004 m. The two boreholes thus overlap.

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

To maintain systematic judgements in the mapping, each geologist had the same task throughout the mapping. Vladislav Stejskal was responsible for handling the drill core and Jan Ehrenborg for the delineation of structures in the BIPS-image.

## 4.1 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: 10). The level for each slot was measured in the BIPS-images and then adjusted to the correct level using the correct depth value in SICADA.

The orientations of the observations were adjusted to true space. Data necessary for this adjustment were borehole diameter, length and deviation; all collected from SICADA (Appendices: 8 and 9).

## 4.2 Execution of measurements

Concepts used during the Boremap mapping are defined in this chapter.

### 4.2.1 Fracture definitions

Definitions of different fracture types, also crush and sealed fracture network, are found in a PM "Nomenklatur vid Boremapkartering" (internal SKB document). Apertures for 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 observe 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 in the SICADA database that possess apertures > 0 mm, are interpreted as “open”. Only few “broken fractures” have been given the aperture 0 mm. “unbroken fractures” have apertures = 0 mm. 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 the composite log (see Appendices 6 and 7).

### 4.2.2 Fracture alteration and joint alteration number

The joint alteration number is principally related with the thickness of, and the clay content in, a fracture. Thicker fractures rich in clay minerals therefore get joint alteration numbers 2–3. The absolute majority of fractures in KAV04, however, are very thin to extremely thin and rarely contain clay minerals and therefore get 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 and 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, for example oxidation or epidotization, and without mineral fillings were considered as fresh. The joint alteration number was thus set to 1.

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

#### *Joint alteration number equal to 1.5*

Epidote, prehnite, hematite, chlorite and/or clay minerals were regarded as fracture minerals most likely resulting from altered wall rock material. A weak alteration was thus assumed and the joint alteration number was set to 1.5. Extra consideration was given to clay minerals since the occurrence of these often resulted in a higher joint alteration number.

#### *Joint alteration numbers higher than 1.5*

When the mineral fillings were thicker and contained a few mm thick bands of clay minerals, often together with minerals like epidote and chlorite, the joint alteration number was set to 2. In the extremely 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 was 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.

### 4.2.3 Mapping of broken fractures not visible in the BIPS-image

Not all fractures that cut the drill core are visible in the BIPS-images. Such fractures were orientated using the guide-line method, based on the following data:

- Absolute depth.
- Amplitude (measured along the drill core). The amplitude is the interval along a drill core which is cut by a fracture.
- Exact orientation of the fracture trace, measured on the drill core in relation to a close lying, well defined, geological 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 much 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 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.

### 4.2.4 Definition of veins versus dikes

Veins and dykes were differentiated by the width. Veins were set to 0–20 cm wide and dykes 20–100 cm wide. Since the maximum width of *rock occurrences* is 100 cm wider dykes are mapped under the feature *rock type*.

### 4.2.5 Use of mineral codes

Extra mineral codes have been used as follows:

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.

## 4.3 Data handling

The mapping was performed on-line on the SKB network, in order to obtain the best possible data security. Before every break (exceeding 15 minutes) a back-up was saved on the local disk.

The mapping was quality checked by a routine in Boremap before it was exported to and archived in SICADA. Personnel from SKB also performed spot test controls and regular quality revisions.

All primary data are stored in the SKB SICADA database. Only these data are to be used for further interpretation and modelling.

# 5 Results

The results of the Boremap mapping of KAV04 are principally found in the appendices. The information in Boremap has been compressed to the size of an A4-sheet in the Geological Summary table, Appendix 1. The search paths for this table are presented in Appendix 2. Stereographic diagrams of the orientation of open fractures are presented in Appendix 3. The BIPS-images of KAV04A and KAV04B are shown in Appendices 4 and 5 and the corresponding WellCad diagrams in Appendices 6 and 7. In data, like borehole length, diameter, orientation and reference marks are presented in Appendices 8, 9 and 10.

## 5.1 Geological Summary table, general description

The Geological Summary table (see Appendix 1) is an easy to read 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 summary of a borehole.

This 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 (see Appendix 2).

The search paths cannot, however, yet be used in an automatic way and therefore the geological information has first been extracted from the SICADA database, then reworked on separate Excel-files and last 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 to calculate frequencies for different parameters. Such a formula will be added.

The need to rework the SICADA information on separate Excel-files exists because some information is written in the *Comment* field for individual observations in Boremap, and therefore has to be extracted manually. This problem is also being dealt with.

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 very large amount of fine- to medium-grained granite veins. Usually all of these veins are not mapped and the frequency presented for veins + dykes in column 6 (see Appendix 1) is lower than the true frequency in composite dyke intervals.

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.

## 5.2 Geological Summary table, KAV04

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 KAV04 is presented in Appendix 1.

KAV04 is dominated by Ävrö granite. The Ävrö granite clearly dominate in the interval 0–300 m while the interval 300–1,000 m is much more heterogeneous and characterized by rapid alternations between thinner sections of Ävrö granite, quartz monzodiorite, fine-grained dioritoid, fine-grained granite and two very thin occurrences of diorite/gabbro at approximately 450 m.

The thickest interval of fine-grained dioritoid occurs from 865–950 m. This interval is rich in veins and dykes, rich in shear zones and thinner breccias, lack foliation and mylonites, is totally covered by a sealed fracture network and is rich in crush zones.

Oxidation occurs all through KAV04. The interval 0–350 m is less oxidized, 350–700 m somewhat more oxidized and 700–1,000 m most oxidized.

The vein frequency shows a general increase towards depth. They are fairly common all through KAV04 but less common in the intervals 0–200 m and 735–825 m. The low frequency of veins in the intervals 600–735 m and 825–865 m depends on thick fine-grained granites in these intervals which are presented in the lithology column.

Shear structures occur all through KAV04 but are more common in the intervals 500–650 m and 750–1,000 m.

Breccias occur all through KAV04 but are more common in the intervals 500–650 m, 790–835 m and 925–945 m.

Few thin mylonites occur in the upper 320 m of KAV04. The drill core, however, ends with a thick mylonite in the interval 1,002–1,003.4 m where the drill core ends.

Foliation structures occur all through KAV04. They are more common in the intervals 550–800 m and 950–1,000 m. Foliation is frequent in the fine-grained granites in the interval 600–865 m. The fine-grained dioritoid in the interval 865–950 m lack foliation structures.

Both the frequencies of unbroken fractures and broken fractures increase continuously towards depth.

Sealed fractures (interpreted) are fairly common throughout KAV04. The fine-grained dioritoid generally show higher frequencies of sealed fractures (interpreted) than other rock types and the fine-grained dioritoid in the interval 865–950 m is completely covered with a sealed fracture network. KAV04 is very rich in sealed fracture networks in the interval 700–1,000 m.

High frequencies of broken fractures seem to occur with a spacing of 100 or 150 m.

High joint alteration numbers are more common in the interval 450–550 m than in the rest of KAV04.

Intervals with crush are frequent in the interval 690–1,000 m for KAV04. This interval also includes several crush zones thicker than 1 m.

No abrupt geological change does occur in KAV04 until a thick mylonite together with strong foliation occurs below 1,000 m. It continues to the end of the drill core at 1,003.4 m. This change probably indicates a thick and strong weakness zone at this depth.

There is a strong uncertainty whether broken fractures were open before or during/after drilling. This is shown by columns 19 (Open fractures interpreted, uncertain) and 20 (Open fractures interpreted, certain) in the Geological Summary table for KAV04 (see Appendix 1). The reason for this is that the core has a tendency to break up along existing sealed fractures. It is probable that this problem is related to the geology in the area and not a general problem for the Boremap mapping system.

## 5.3 Orientation of broken fractures

Stereograms of broken fractures for each 100 m interval in KAV04 are presented in Appendix 3. The stereographic information is from plane to pole plot data. Fracture orientation values are strike/dip values using the right hand rule.

The orientation for borehole KAV04A at ground level is 077/-85.

Broken fractures not visible in the BIPS-image were oriented according to the guide-line method (see chapter 4.2.3). They were thus not drawn as lines at right angle to the drill core in BIPS.

There is a general strong overrepresentation of broken fractures cutting the borehole at high angles compared to fractures cutting the borehole 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 the same stereogram.

A sub horizontal fracture set (1°–10° dip) show the strongest maximum for broken fractures in the interval 0–100 m. This fracture set, which generally strike E-W, can be followed as a strong maximum in the interval 0–400 m and as a weak maximum in the interval 400–500 m where it disappears. It turns up again as a strong maximum in the interval 800–900 m.

Fractures striking WNW-NNW are rare in the upper 200 m of borehole KAV04. They are not rare from 200–400 m and more common in the interval 400–1,000 m. There is a general change for broken fractures striking WNW-NNW, from a WNW orientation (25°–35° dip) in the depth interval 200–500 m to a NW orientation in the interval 500–800 m to a NNW orientation in the interval 600–1,000 m.

A N-S striking fracture set with steep dips to the east (65°–85° dip) occur in the interval 200–900 m. The same fracture set have moderate dips of 45° dip to the east in the interval 900–1,000 m. The same fracture set orientation but with a moderate dip to the west (30°–45° dip) occurs in the interval 200–600 m.

The anomaly picture of NNE-SSW to ENE-WSW striking fracture sets is somewhat heterogeneous in the stereographic plot. A strong maximum with moderate dips (35°–65° dip) undulates between a NNE-SSW and a NE-SW orientation in the interval 100–900 m. ENE-WSW orientations is extremely rare.

Broken fractures are generally oriented as a sub horizontal fracture set and as fracture sets with NW-SE, N-S and NE-SW orientations with moderate dips towards SW, W and NW respectively.

# 6 Discussion

Fractures that are invisible in the BIPS-image were mapped using “the guide-line method”. Fractures not visible in the BIPS-image were mapped as if they lay 90° towards the borehole in the very rare cases when guide structures were lacking.

In the mapping of KAV04A Boremap v. 3.4.2 has been used.

For earlier mappings the thinnest width used for fractures was 1 mm. For KAV04 the thinnest width has been changed to 0.5 mm for fractures with mineral fillings. Fractures without mineral fillings and with aperture 0 were given the width 0.1 mm.

A new definition for *crush* was introduced 2004-07-09 (“Nomenklatur vid Boremapkartering” by Larsson, PM, 2004-06-16, Version 1.0 SKB (internal controlling document) when the mapping had reached the depth 577 m. The depth interval 11.5–577 m were revised with respect to the new definition of the crush parameter and a crush zone was defined for the interval 409.77–409.91 m. The new definition was used for the interval 577–1,003.42 m.

The mineral code X5 has been added, see chapter 4.2.5 *Use of mineral codes*.

Drill core box 145 had turned over before the mapping started. It was possible to fit all the pieces in the box together except for the two shorter intervals. These were mapped as *missing core piece*.

Quartz dissolution of the rock is mentioned in the comment to a fracture close to the quartz dissolution interval. These comments always begin with QD. Quartz dissolution was mapped in the following three intervals; 158.6–159.8 m, 253.68–254.08 m and 255.57–257.39 m.

Neither depth nor orientation of structures and lithological contacts could be mapped with accuracy in the interval 1,000.514–1,003.42 m, where the drill core ends. It is important to notice the reasons for this since a structural change occurs below 1,000.514 m. These reasons are;

- There is a break in the drill core at 1,000.514 m and the two drill core pieces that meet at this depth does not match.
- The BIPS-image ends at 1,001.368 m which means that no BIPS-image exists for the last 2.05 m of the drill core.
- The quality of the BIPS-image in the interval 1,000.514–1,001.368 m is of very bad quality and can not be used for location of structures or lithological contacts.

Appendix 1

# Geological Summary table, KAV04

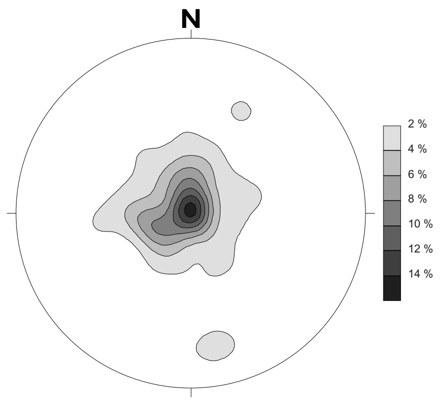
## Appendix 2

## Search paths for the Geological Summary table

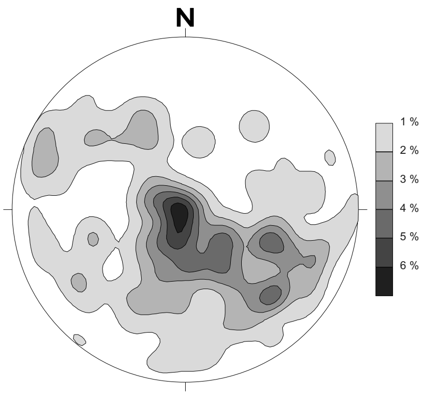
| TABLE HEAD LINES | | INFORMATION SOURCE | | | PRESENTATION |
|---|---|---|---|---|---|
| **Head lines** | **Sub head lines** | **Varcode** | **First suborder** | **Second suborder** | **Interval / frequence** |
| **Rock type** | Lithology | 5 | Sub 1 | | Interval |
| | Grain size | 5 | Sub 5 | | Interval |
| | 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 or 18 | | Frequence |
| **Structure** | Shear zone | 31 | Sub 4 = 41 or 42 | | Frequence |
| | Brecciated, < 1m wide | 31 | Sub 4 = 7 | | Frequence |
| | Brecciated, >/= 1m wide | 5<br>5 | Sub 3 = 7<br>Sub 3 = 7 | Sub 4; 101 or 102 = 102<br>Sub 4; 103 or 104 = 104 | Interval |
| | Mylonite, < 1 m wide | 31 | Sub 4 = 34 | | Frequence |
| | Mylonite, >/= 1 m wide | 5<br>5 | Sub 3 = 34<br>Sub 3 = 34 | Sub 4; 101 or 102 = 102<br>Sub 4; 103 or 104 = 104 | Interval |
| | Foliation zone, < 1 m wide | 31 | Sub 4 = 81 | | Frequence |
| | Foliation zone, >/= 1 m wide | 5<br>5 | Sub 3 = 81<br>Sub 3 = 81 | Sub 4; 101 or 102 = 102<br>Sub 4; 103 or 104 = 104 | Interval |
| **Sealed fracture** | All unbroken fractures<br>and broken fractures | 3<br>2 | <br>SNUM 11= 0 | | Frequence |
| | Broken fractures, Aperture = 0 | 2 | SNum 11 = 0 | | Frequence |
| | Sealed fracture network < 1 m wide | 32 | | | Frequence |
| | Sealed fracture network>/= 1 m wide | 32 | | | Interval |
| **Open fractures** | All, Aperture > 0 | 2 and 3 | SNum 11>0 | | Frequence |
| | Uncertain, Aperture = 0.5 possible<br>and 0.5 probable | 2 and 3<br>2 and 3 | SNum 11>0<br>SNum 11>0 | Sub 12 = 3<br>Sub 12 = 2 | Frequence |
| | Certain, Aperture = 0.5 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**

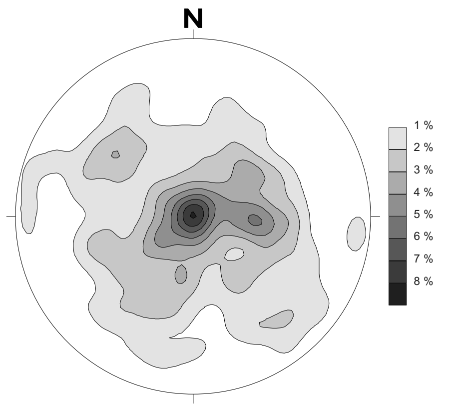
## Stereographic projections of open fractures, KAV04



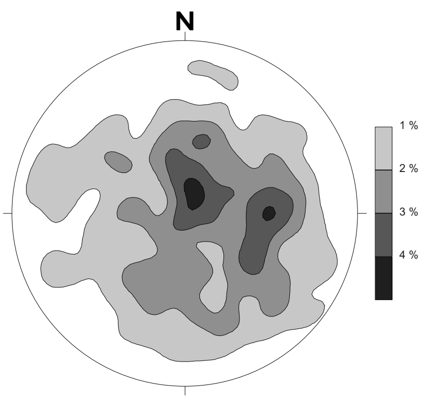

KAV04 0-100 m (352 fractures)



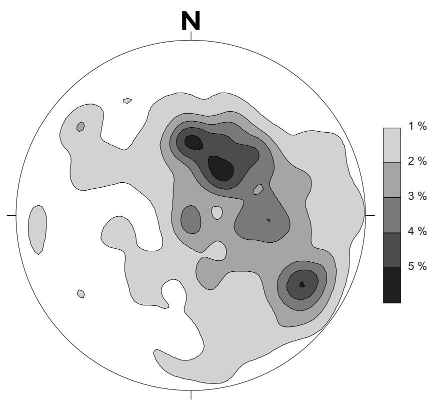

KAV04 100-200 m (173 fractures)




KAV04 200-300 m (326 fractures)

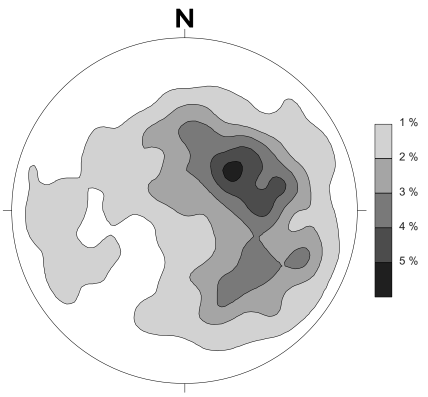



KAV04 300-400 m (349 fractures)

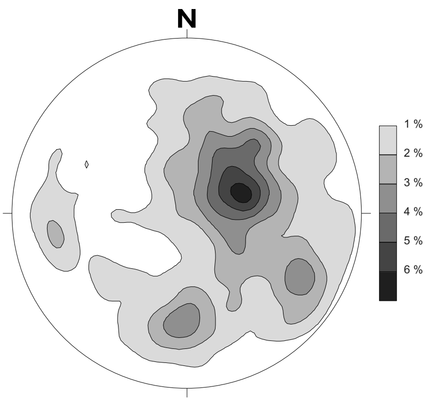



KAV04 400-500 m (364 fractures)

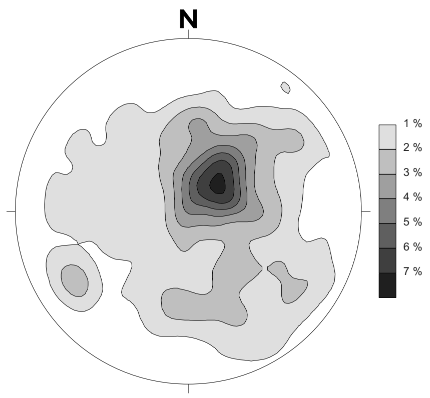
Stereograms of poles of planes of broken fractures with apperture in borehole KAV04, Schmidt's Net, lower hemisphere.



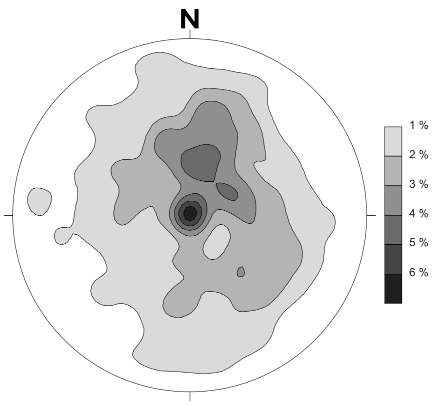

KAV04  500-600 m (578 fractures)



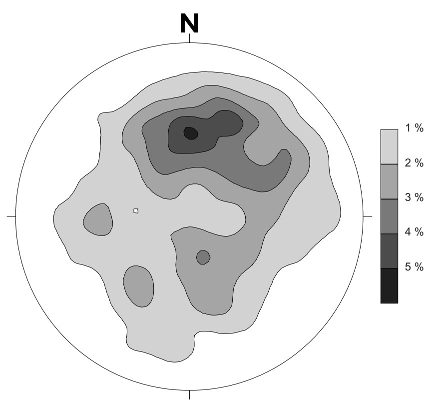

KAV04  600-700 m (457 fractures)




KAV04  700-800 m (569 fractures)




KAV04  800-900 m (612 fractures)




KAV04  900-999 m (672 fractures)

Stereograms of poles of planes of broken fractures with aperture in borehole KAV04, Schmidt's Net, lower hemisphere.

## Appendix 4

# BIPS-images of KAV04B

**Project name: Oskarshamn**

| | |
|---|---|
| Image file | : g:\skb\bips\oskars~1\kav04b\used\kav04b.bip |
| BDT file | : g:\skb\bips\oskars~1\kav04b\used\kav04b.bdt |
| Locality | : SIMPAN |
| Bore hole number | : KAV04B |
| Date | : 04/05/24 |
| Time | : 20:59:00 |
| Depth range | : 11.000 - 99.363 m |
| Azimuth | : 0 |
| Inclination | : -89 |
| Diameter | : 76.0 mm |
| Magnetic declination | : 0.0 |
| Span | : 4 |
| Scan interval | : 0.25 |
| Scan direction | : To bottom |
| Scale | : 1/25 |
| Aspect ratio | : 150 % |
| Pages | : 5 |
| Color | : +0 +0 +0 |

**Project name: Oskarshamn**

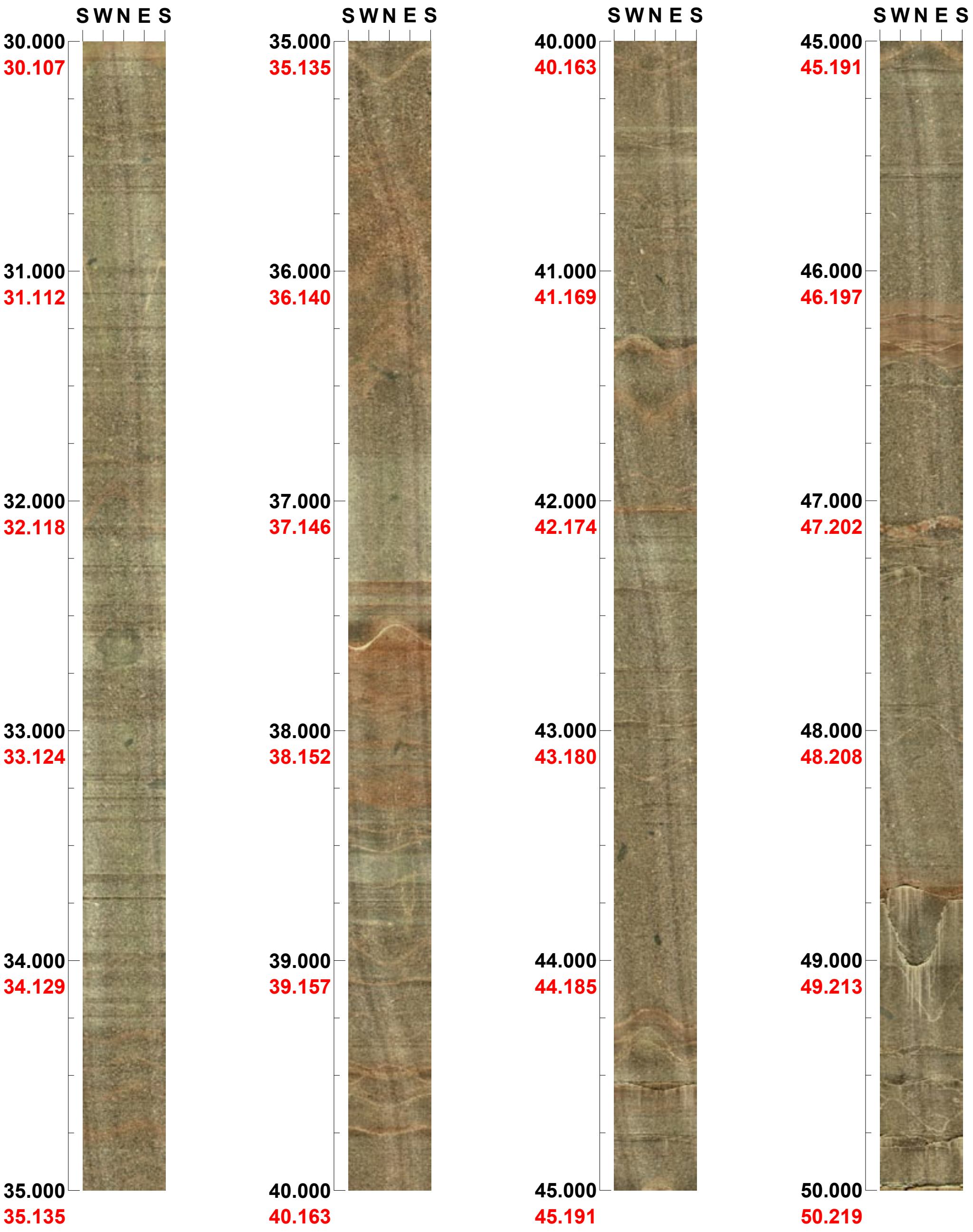
**Bore hole No.: KAV04B** **Azimuth: 0** **Inclination: -89**

**Depth range: 10.000 - 30.000 m**


**( 1 / 5 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04B** Azimuth: 0 Inclination: -89

**Depth range: 30.000 - 50.000 m**




( 2 / 5 ) Scale: 1/25 Aspect ratio: 150 %

**Project name: Oskarshamn**
**Bore hole No.: KAV04B** **Azimuth: 0** **Inclination: -89**

**Depth range: 50.000 - 70.000 m**


**( 3 / 5 )** **Scale: 1/25** **Aspect ratio: 150 %**

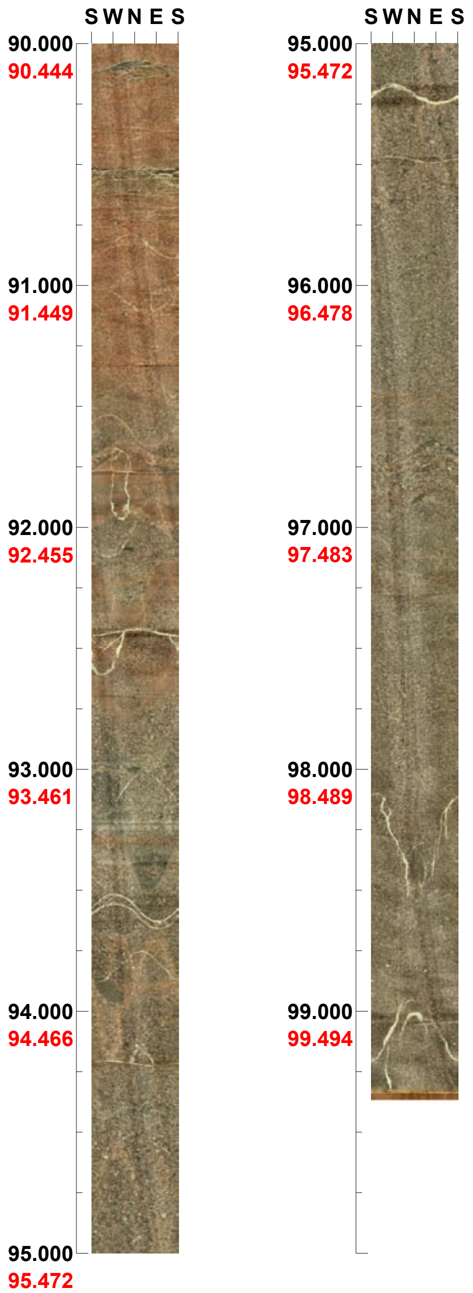
**Project name: Oskarshamn**
**Bore hole No.: KAV04B** **Azimuth: 0** **Inclination: -89**

**Depth range: 70.000 - 90.000 m**


**( 4 / 5 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04B** **Azimuth: 0** **Inclination: -89**

**Depth range: 90.000 - 99.363 m**




**( 5 / 5 )** **Scale: 1/25** **Aspect ratio: 150 %**

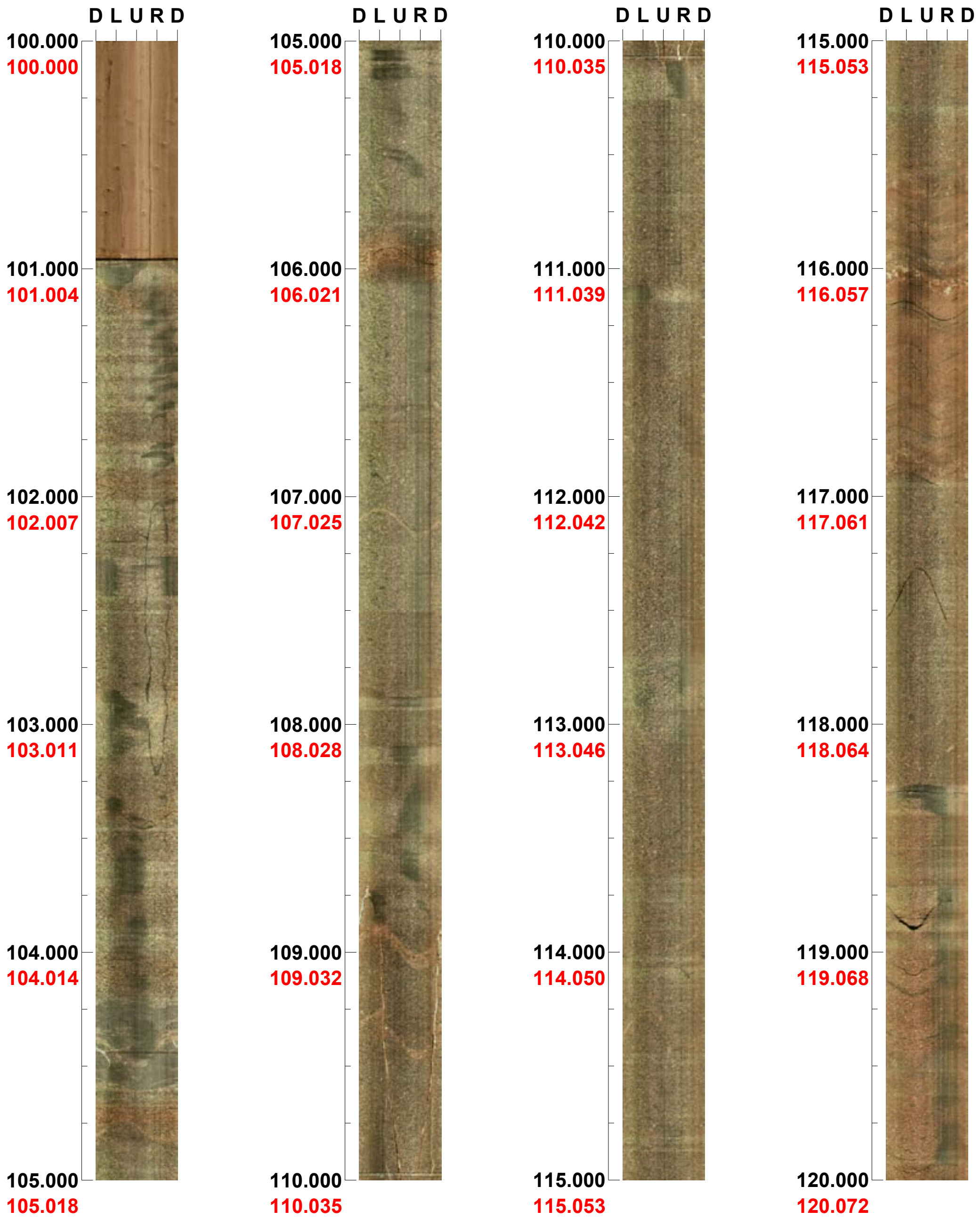
## BIPS-images of KAV04A

**Project name: Oskarshamn**

| | |
|---|---|
| Image file | : d:\klippbox\kav04a\kav04a~1.bip |
| BDT file | : d:\klippbox\kav04a\kav04a~1.bdt |
| Locality | : SIMPAN |
| Bore hole number | : KAV04A |
| Date | : 04/05/24 |
| Time | : 13:48:00 |
| Depth range | : 100.000 - 998.778 m |
| Azimuth | : 64 |
| Inclination | : -85 |
| Diameter | : 76.0 mm |
| Magnetic declination | : 0.0 |
| Span | : 4 |
| Scan interval | : 0.25 |
| Scan direction | : To bottom |
| Scale | : 1/25 |
| Aspect ratio | : 150 % |
| Pages | : 45 |
| Color | : +0 +0 +0 |

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 64** **Inclination: -85**

**Depth range: 100.000 - 120.000 m**




**( 1 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**

**Bore hole No.: KAV04A** **Azimuth: 61** **Inclination: -85**

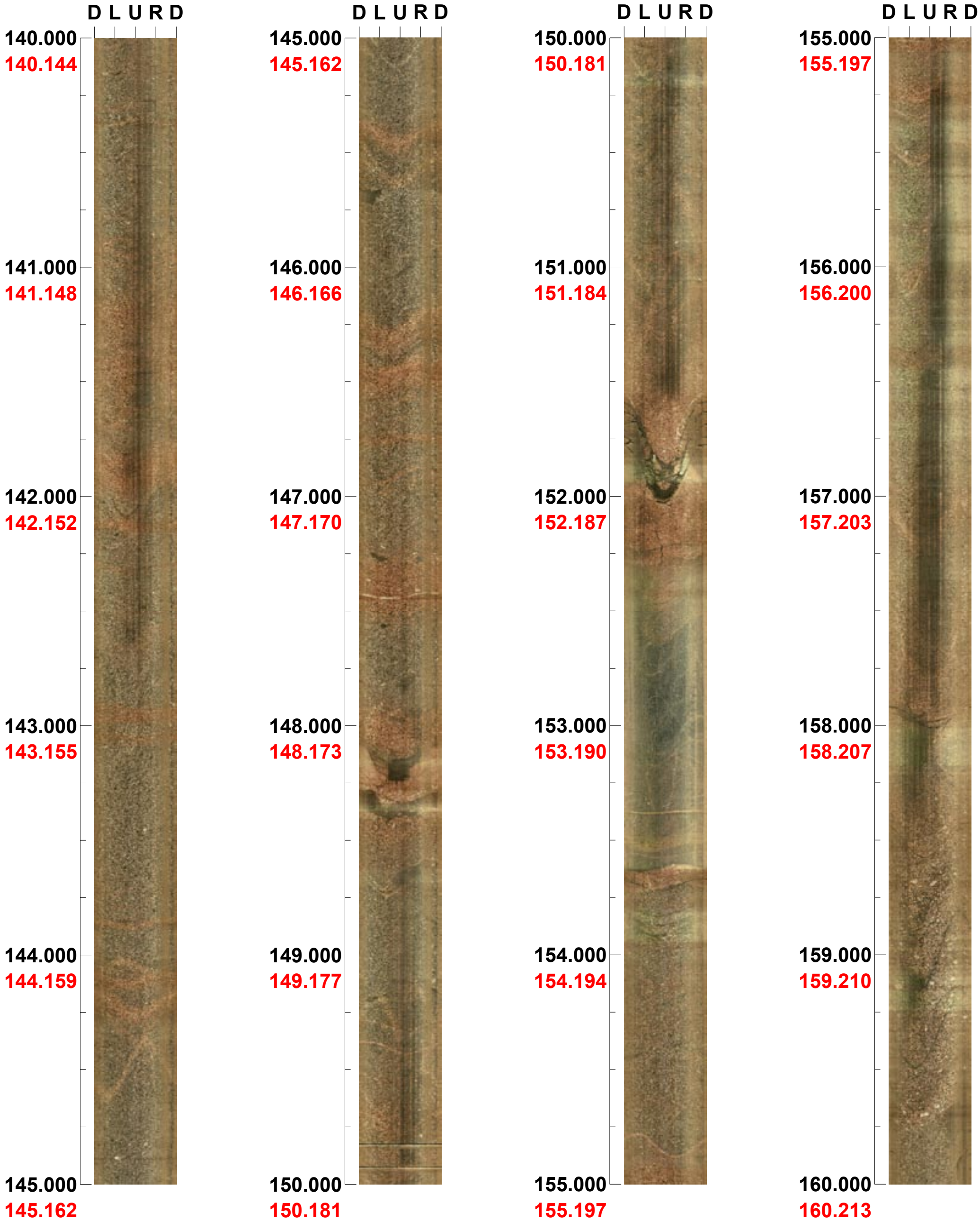
**Depth range: 120.000 - 140.000 m**


**( 2 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**

**Bore hole No.: KAV04A** **Azimuth: 61** **Inclination: -85**

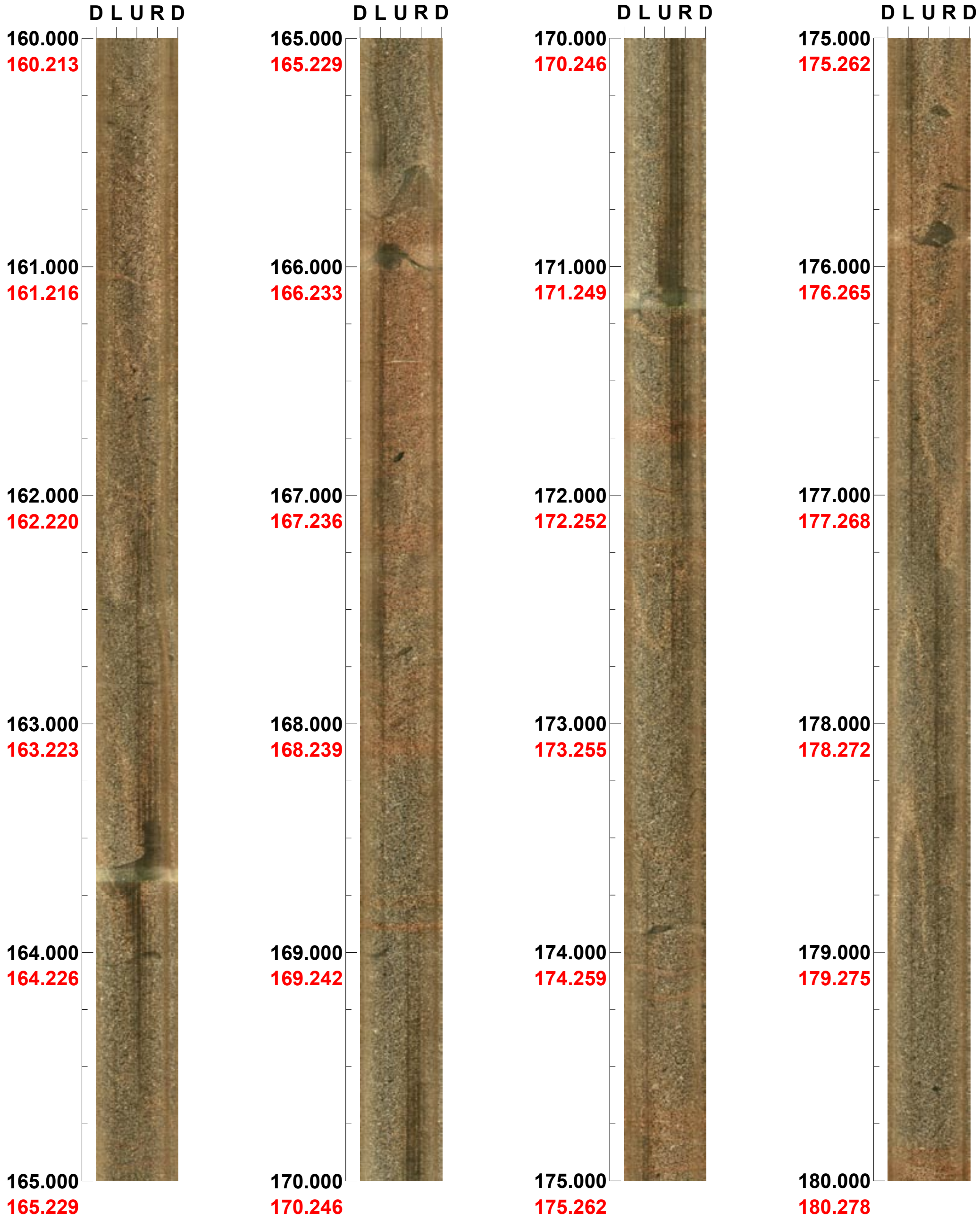
**Depth range: 140.000 - 160.000 m**




**( 3 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 62** **Inclination: -85**

**Depth range: 160.000 - 180.000 m**

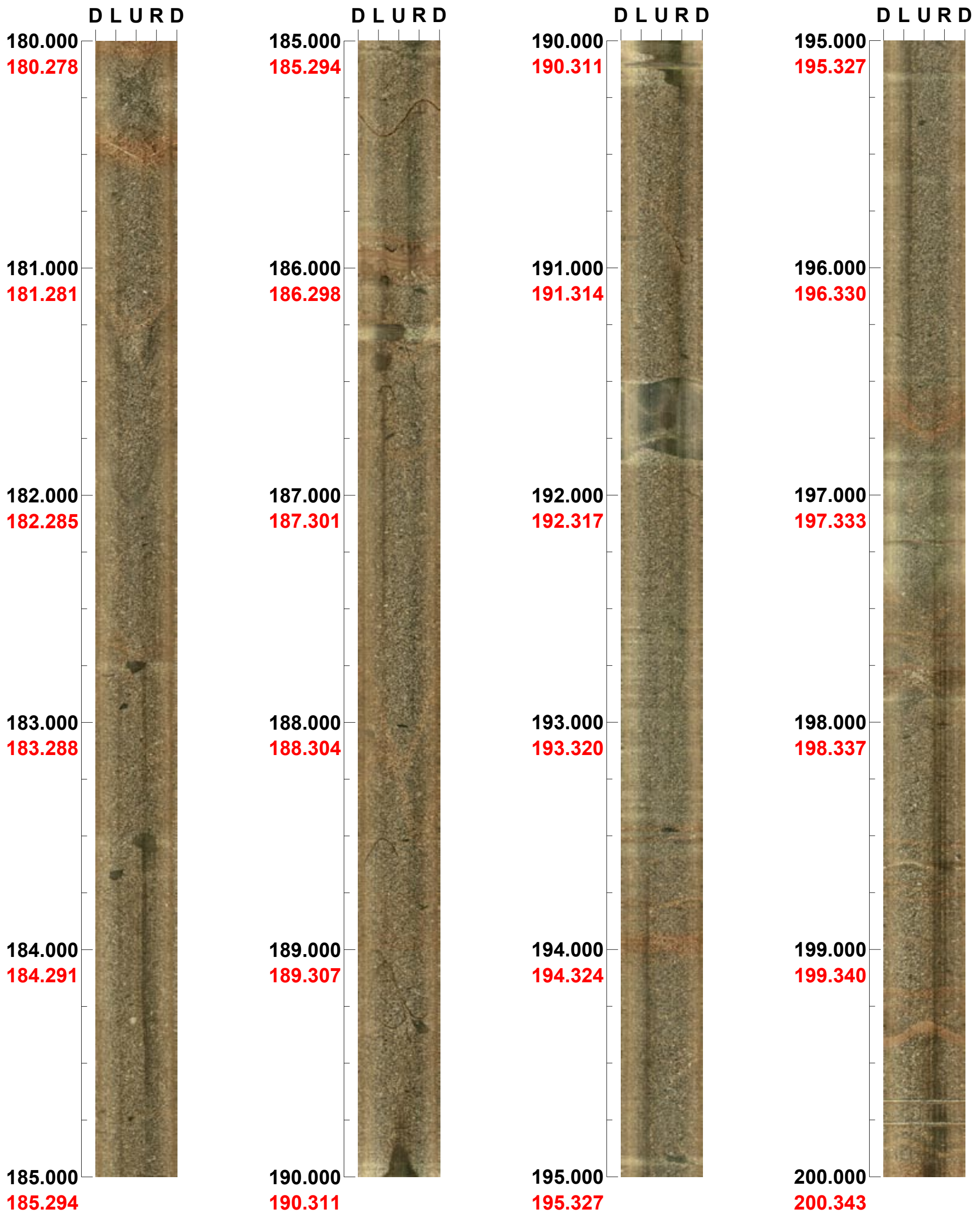



**( 4 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**

**Bore hole No.: KAV04A** **Azimuth: 63** **Inclination: -85**

**Depth range: 180.000 - 200.000 m**




**( 5 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 64** **Inclination: -85**

**Depth range: 200.000 - 220.000 m**


**( 6 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**

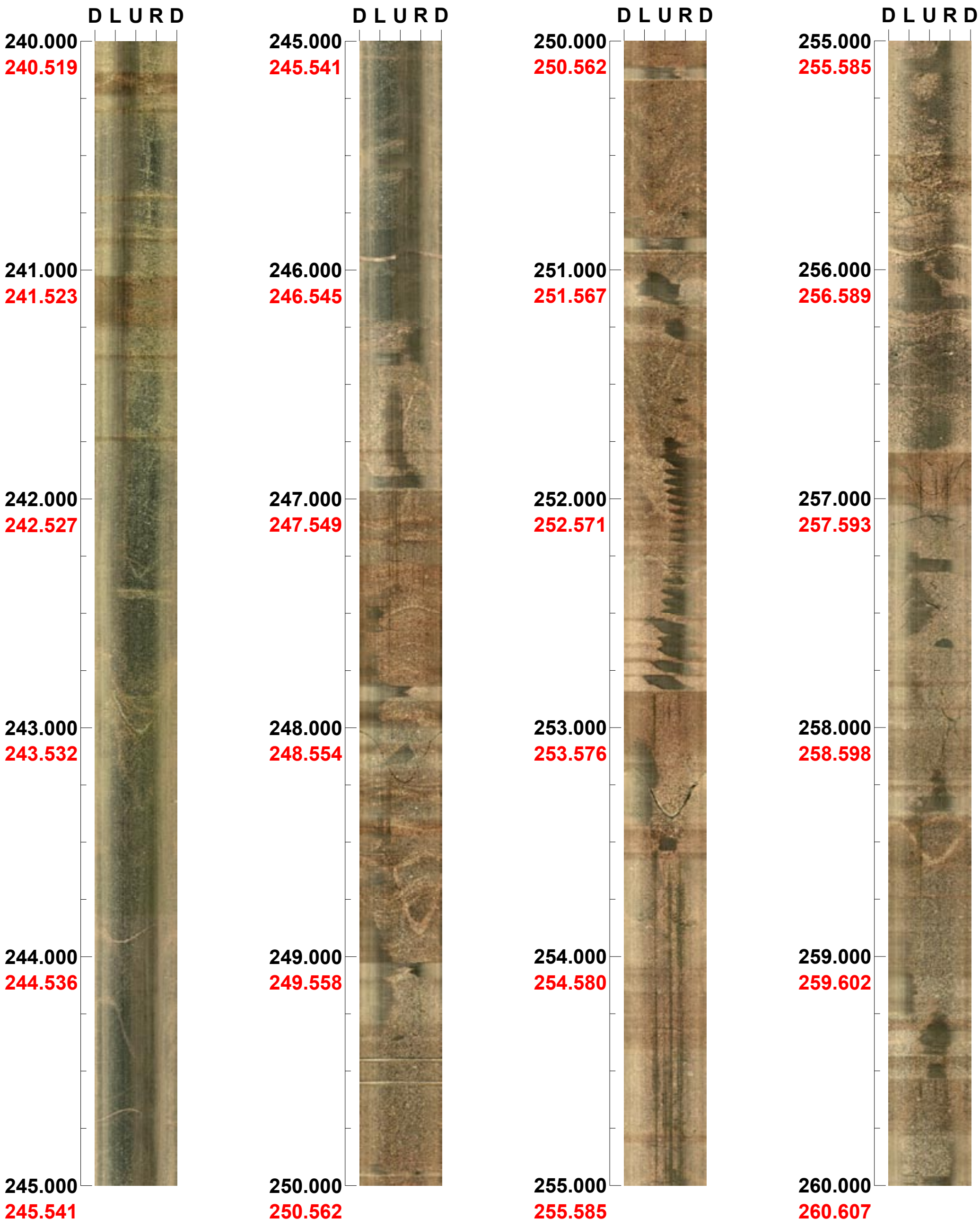
**Bore hole No.: KAV04A** **Azimuth: 63** **Inclination: -85**

**Depth range: 220.000 - 240.000 m**


**( 7 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 63** **Inclination: -85**

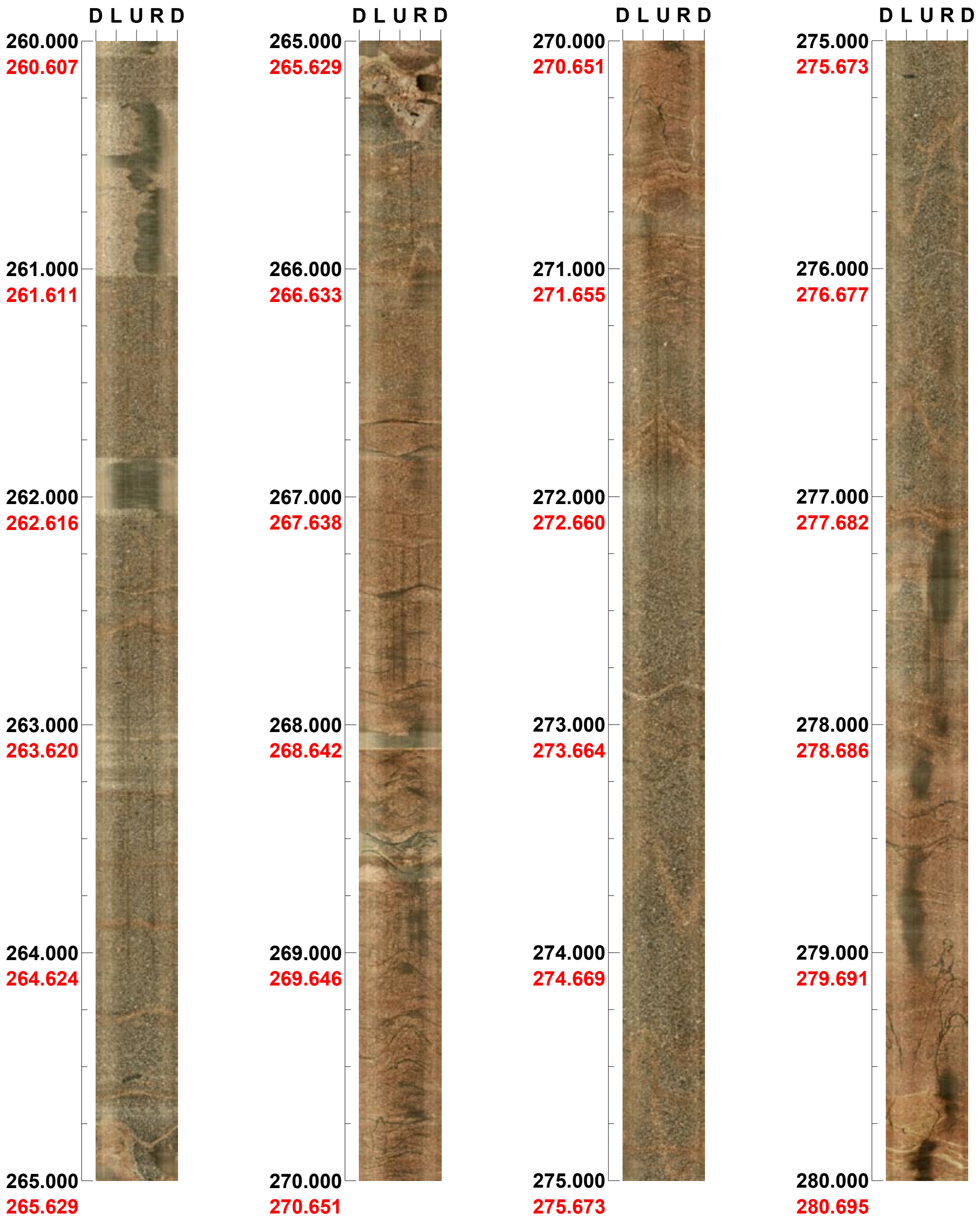
**Depth range: 240.000 - 260.000 m**




**( 8 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 65** **Inclination: -85**

**Depth range: 260.000 - 280.000 m**

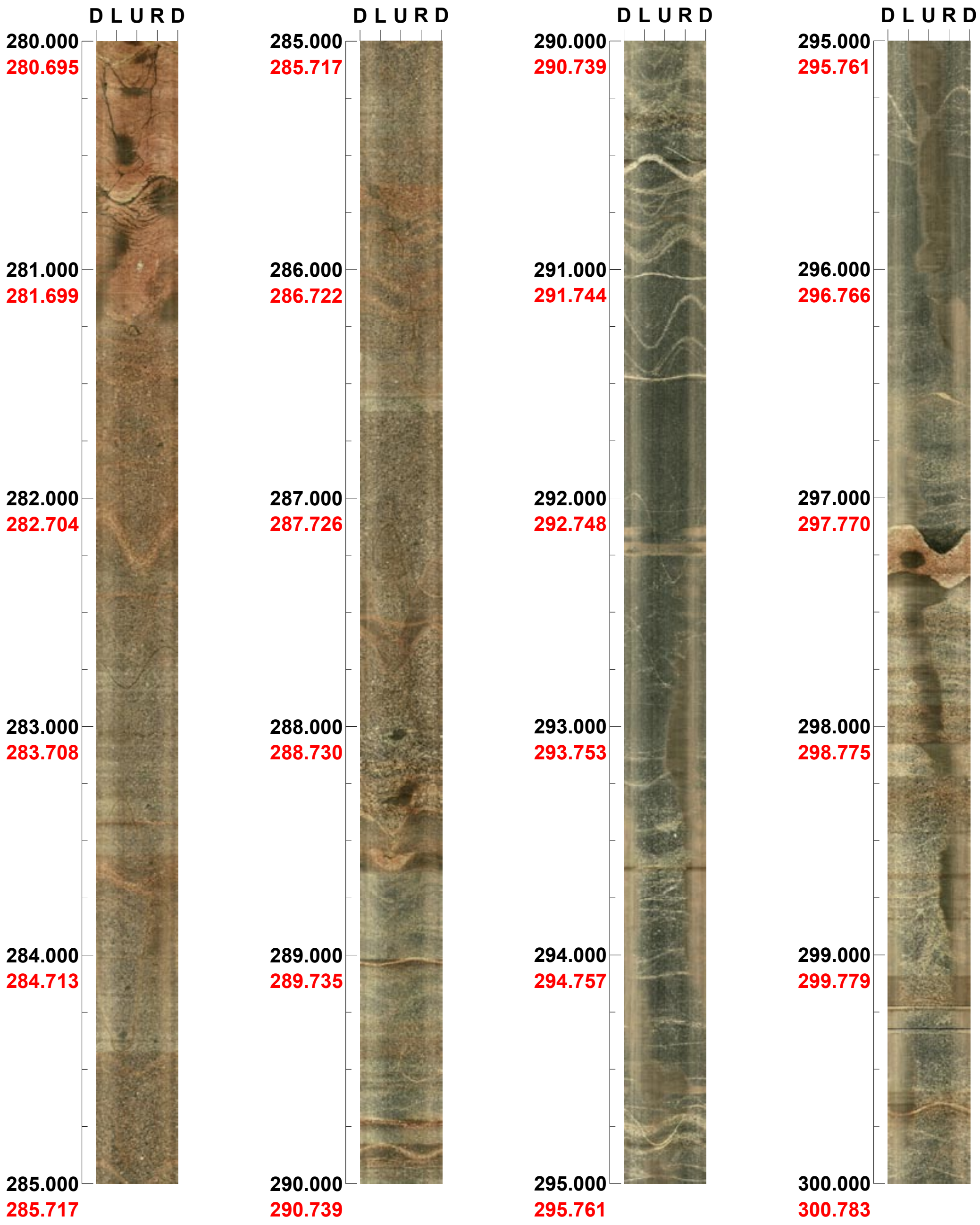



**( 9 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**

**Bore hole No.: KAV04A** **Azimuth: 65** **Inclination: -85**

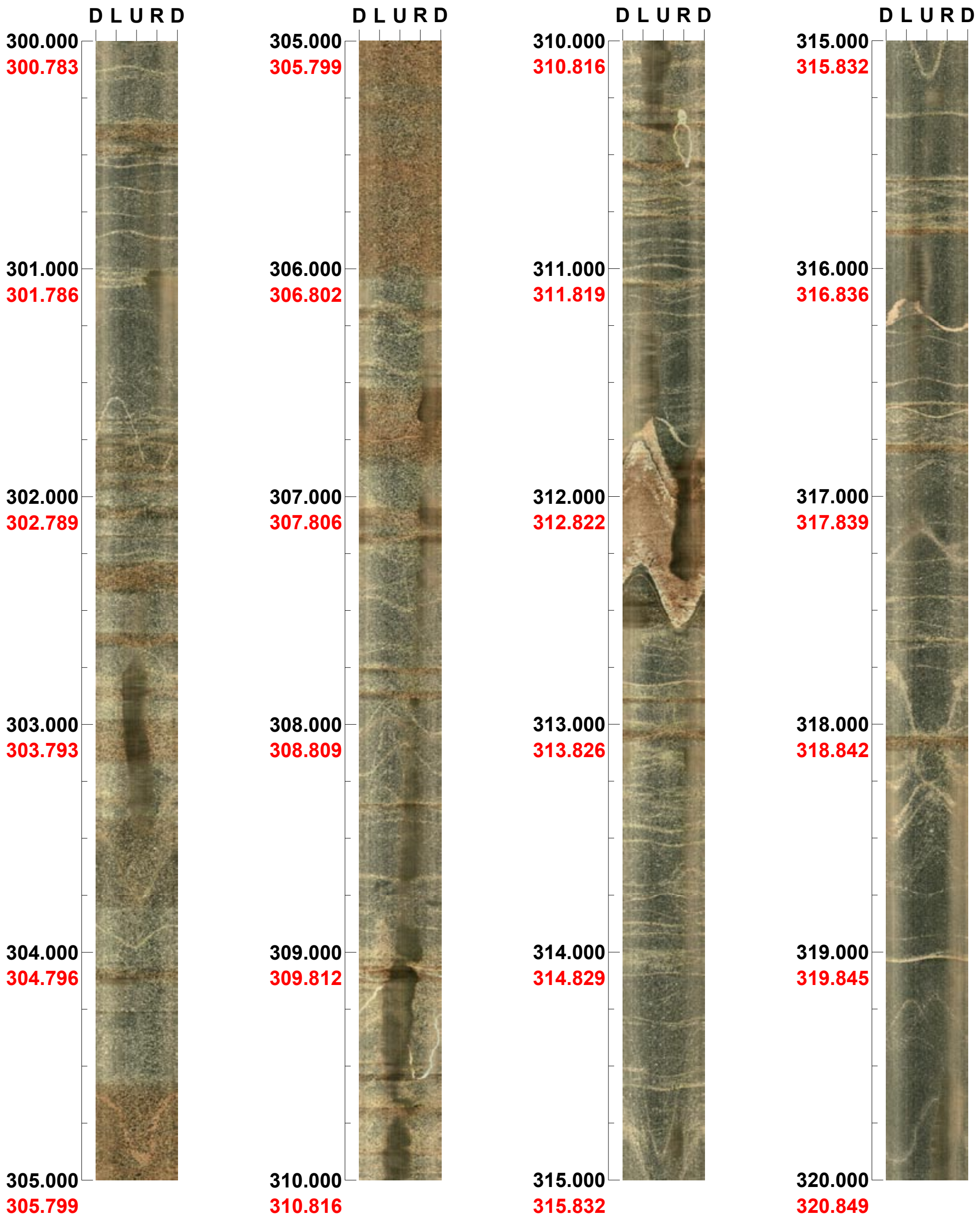
**Depth range: 280.000 - 300.000 m**




**( 10 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 64** **Inclination: -86**

**Depth range: 300.000 - 320.000 m**




**( 11 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 65** **Inclination: -85**

**Depth range: 320.000 - 340.000 m**


**( 12 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 67** **Inclination: -86**

**Depth range: 340.000 - 360.000 m**


**( 13 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 65** **Inclination: -85**

**Depth range: 360.000 - 380.000 m**


**( 14 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

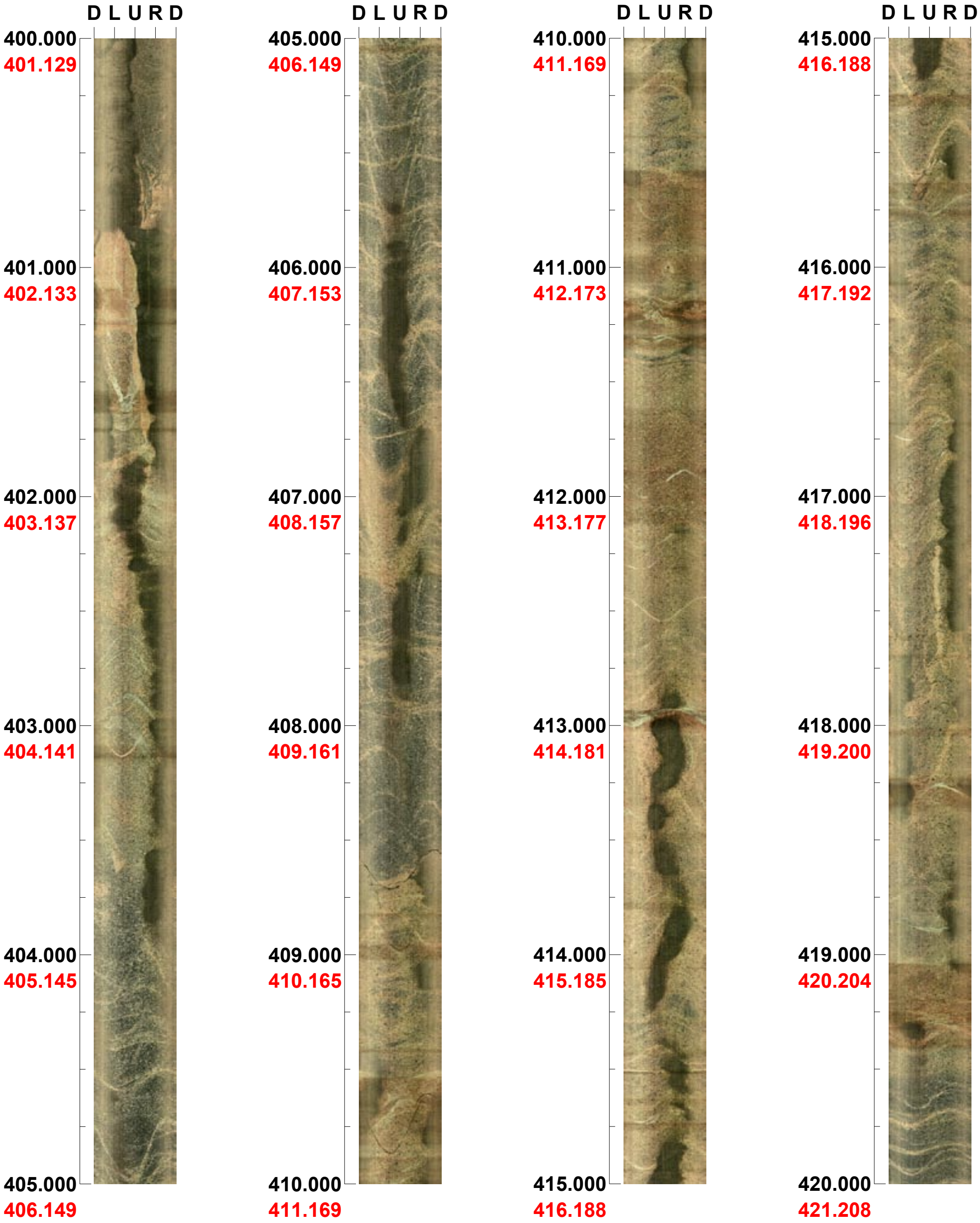
**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 65** **Inclination: -85**

**Depth range: 380.000 - 400.000 m**


**( 15 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

Project name: Oskarshamn
Bore hole No.: KAV04A Azimuth: 68 Inclination: -85

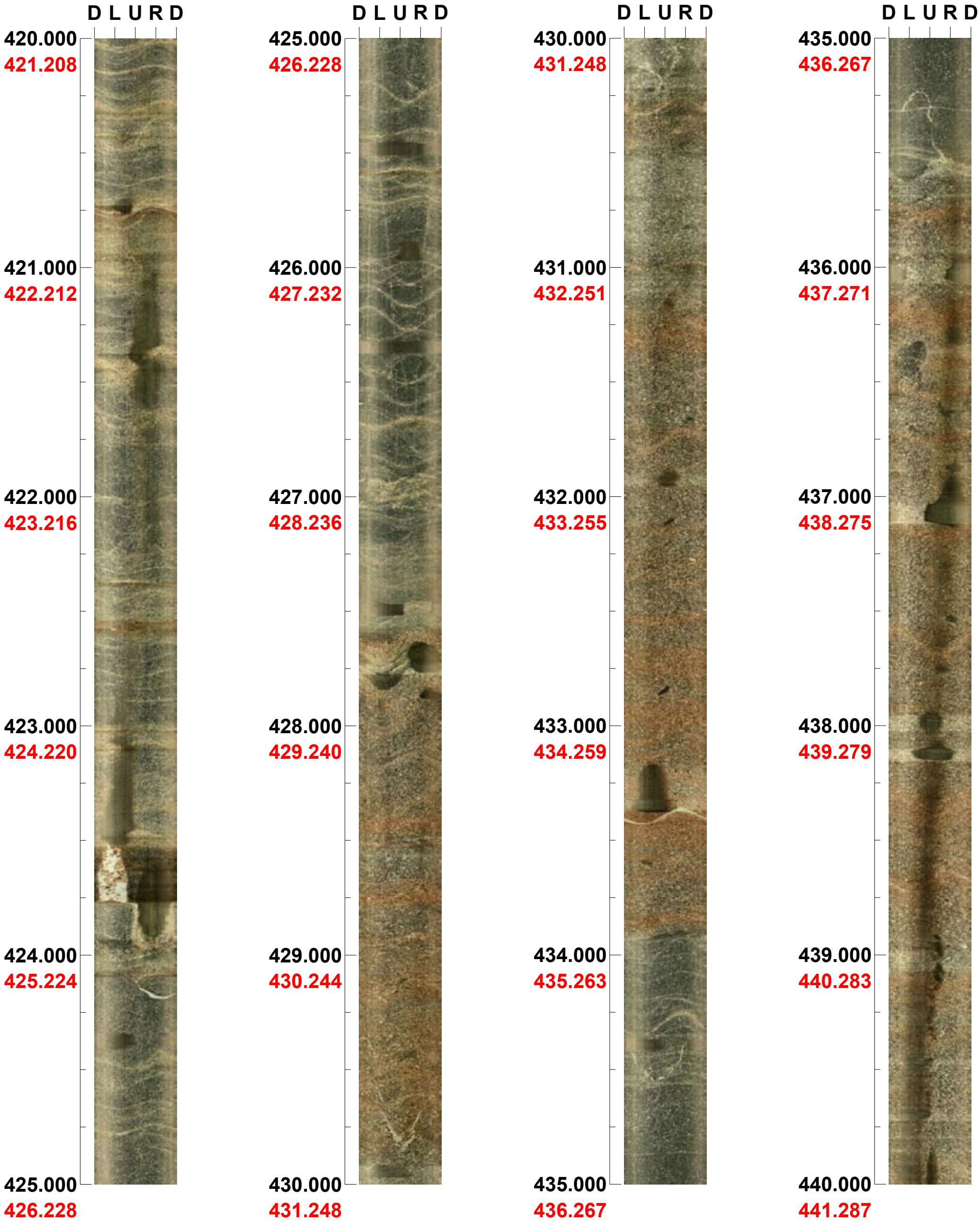
Depth range: 400.000 - 420.000 m




( 16 / 45 ) Scale: 1/25 Aspect ratio: 150 %

Project name: Oskarshamn
Bore hole No.: KAV04A Azimuth: 69 Inclination: -85

Depth range: 420.000 - 440.000 m




( 17 / 45 ) Scale: 1/25 Aspect ratio: 150 %

**Project name: Oskarshamn**

**Bore hole No.: KAV04A** **Azimuth: 69** **Inclination: -85**

**Depth range: 440.000 - 460.000 m**


**( 18 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 71** **Inclination: -85**

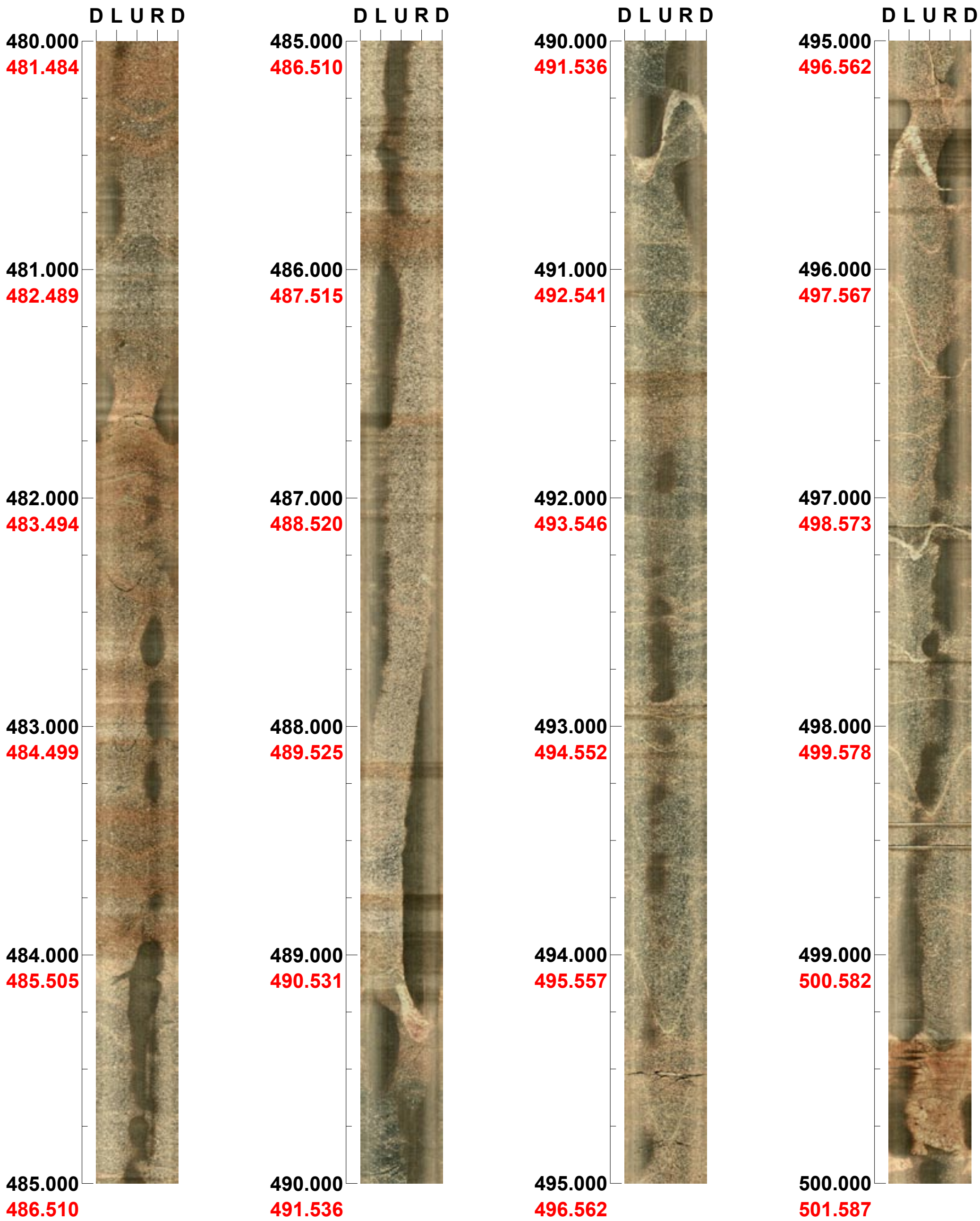
**Depth range: 460.000 - 480.000 m**


**( 19 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**

**Bore hole No.: KAV04A** **Azimuth: 73** **Inclination: -85**

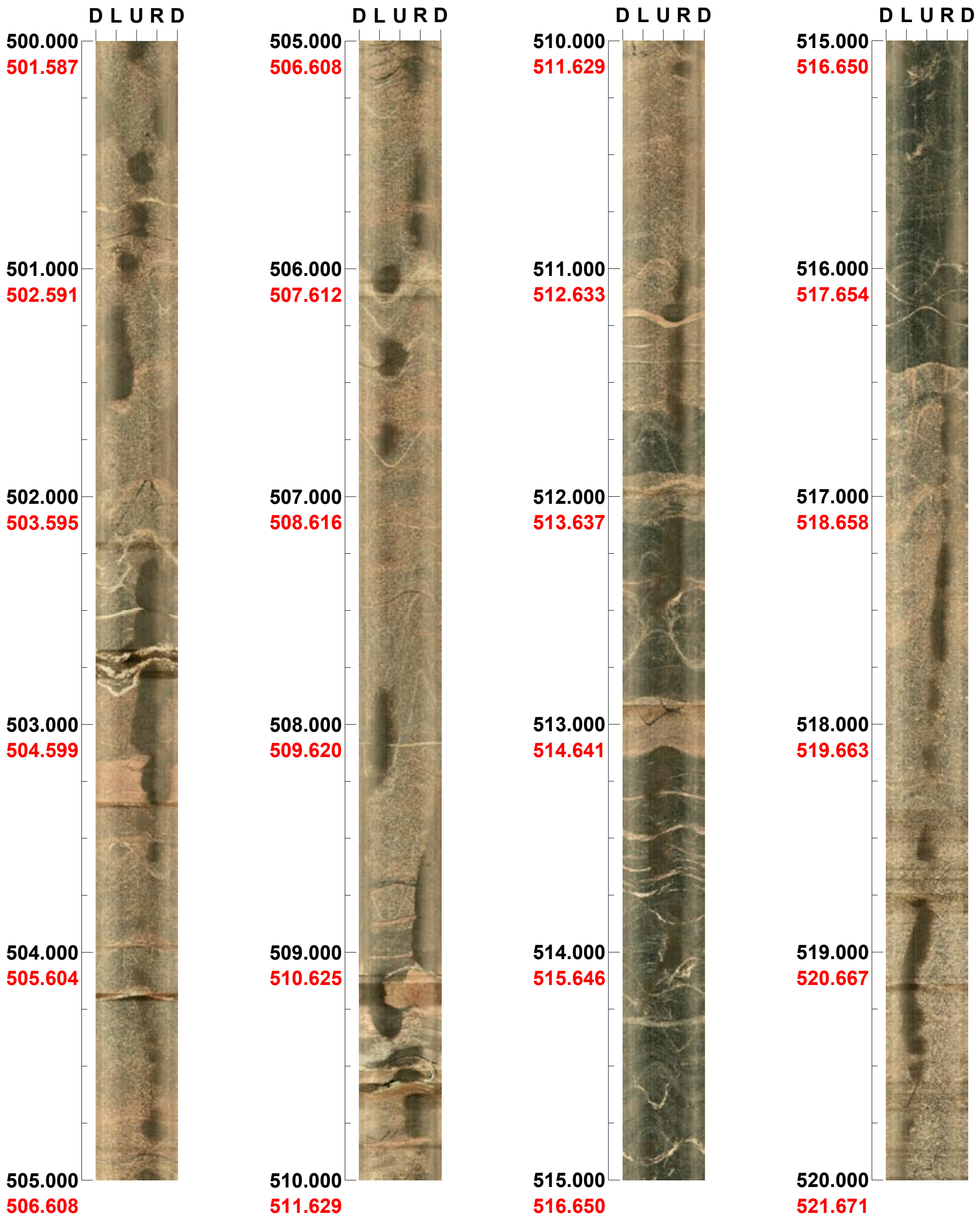
**Depth range: 480.000 - 500.000 m**




**( 20 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

Project name: Oskarshamn
Bore hole No.: KAV04A　　　　Azimuth: 72　　　Inclination: -85

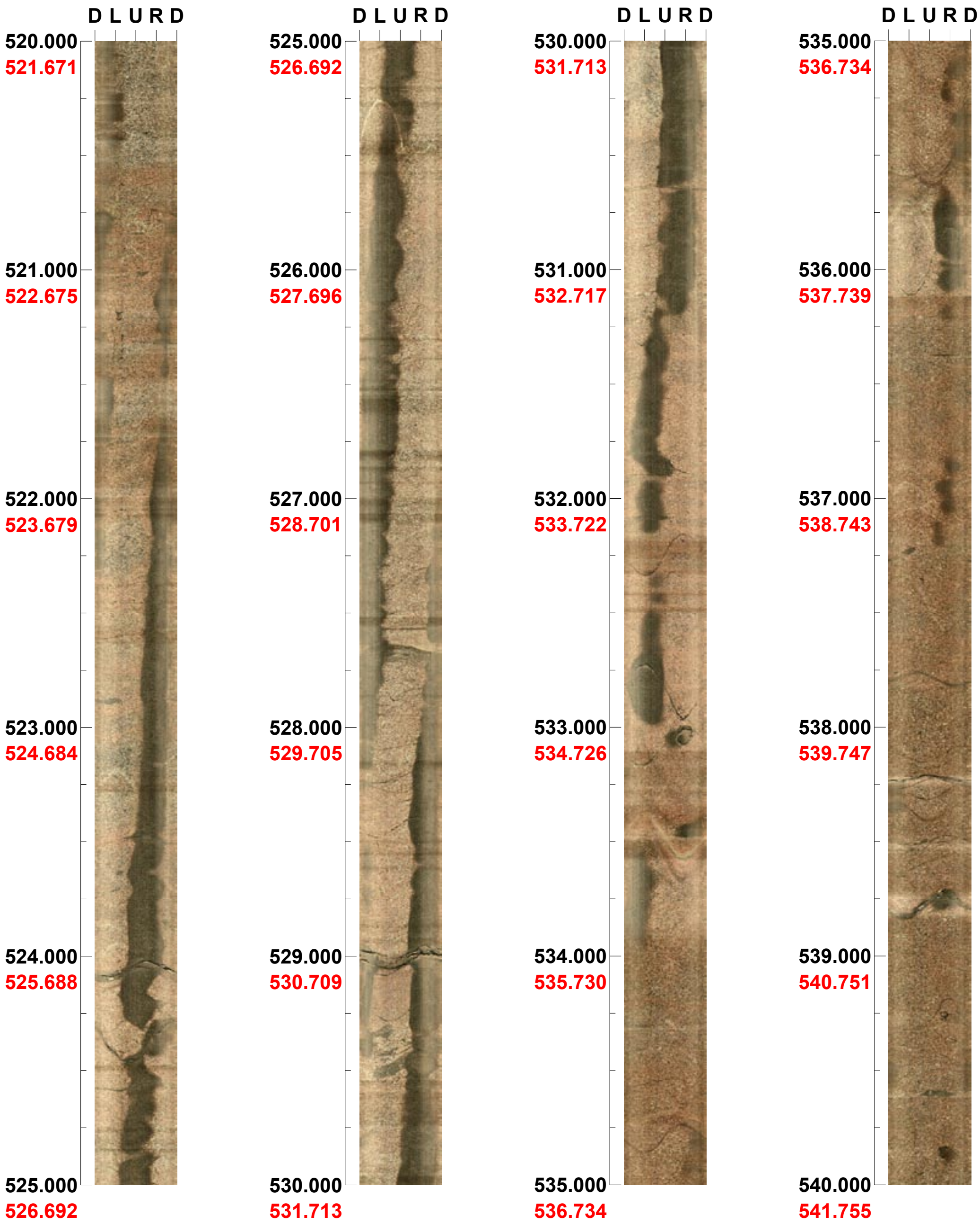
Depth range: 500.000 - 520.000 m




( 21 / 45 )　　Scale: 1/25　　Aspect ratio: 150 %

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 73** **Inclination: -85**

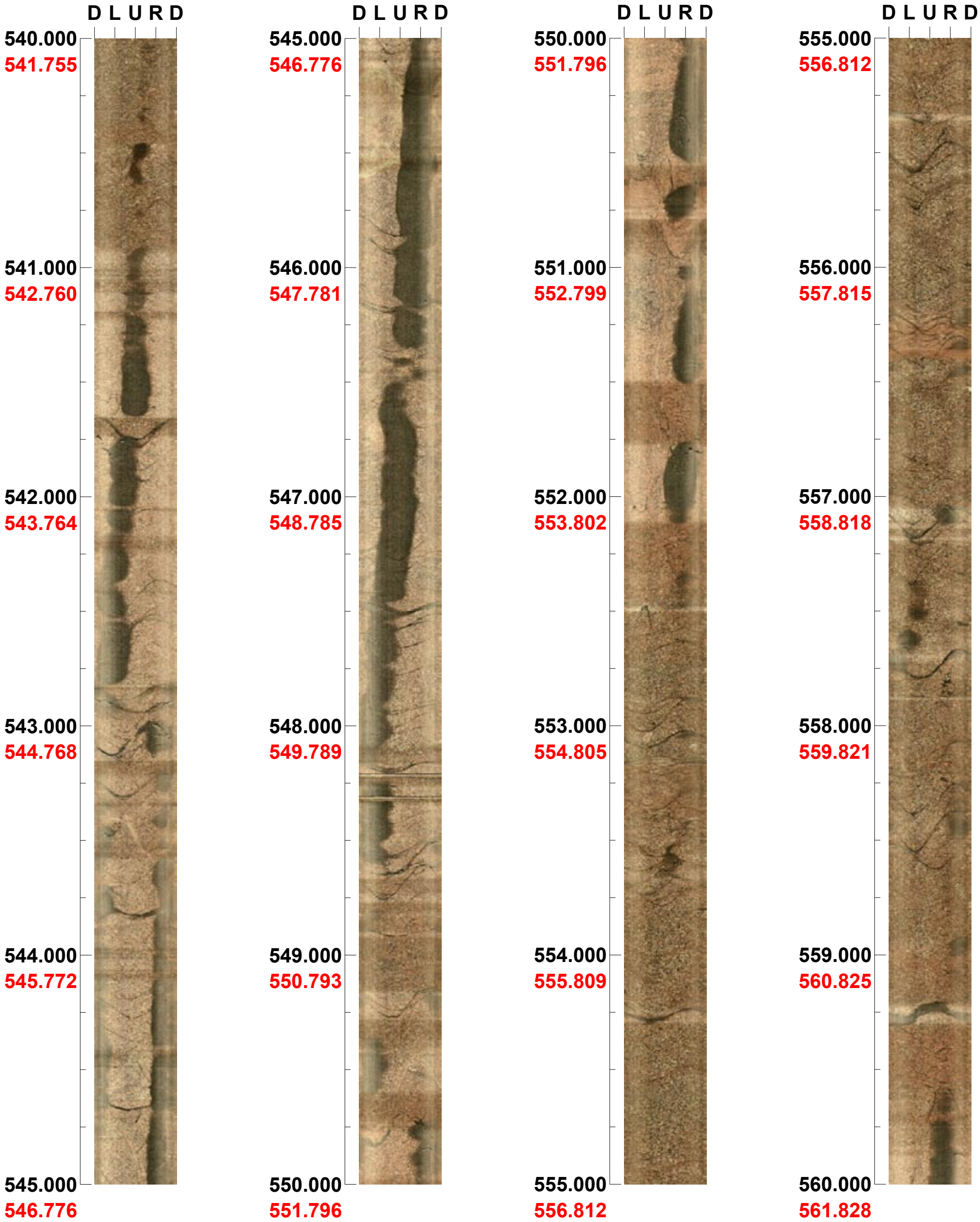
**Depth range: 520.000 - 540.000 m**




**( 22 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

Project name: Oskarshamn
Bore hole No.: KAV04A Azimuth: 75 Inclination: -85

Depth range: 540.000 - 560.000 m




( 23 / 45 ) Scale: 1/25 Aspect ratio: 150 %

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 76** **Inclination: -85**

**Depth range: 560.000 - 580.000 m**

D L U R D

560.000 / 561.828
561.000 / 562.831
562.000 / 563.834
563.000 / 564.837
564.000 / 565.841
565.000 / 566.844

D L U R D

565.000 / 566.844
566.000 / 567.847
567.000 / 568.850
568.000 / 569.854
569.000 / 570.857
570.000 / 571.860

D L U R D

570.000 / 571.860
571.000 / 572.863
572.000 / 573.866
573.000 / 574.870
574.000 / 575.873
575.000 / 576.876

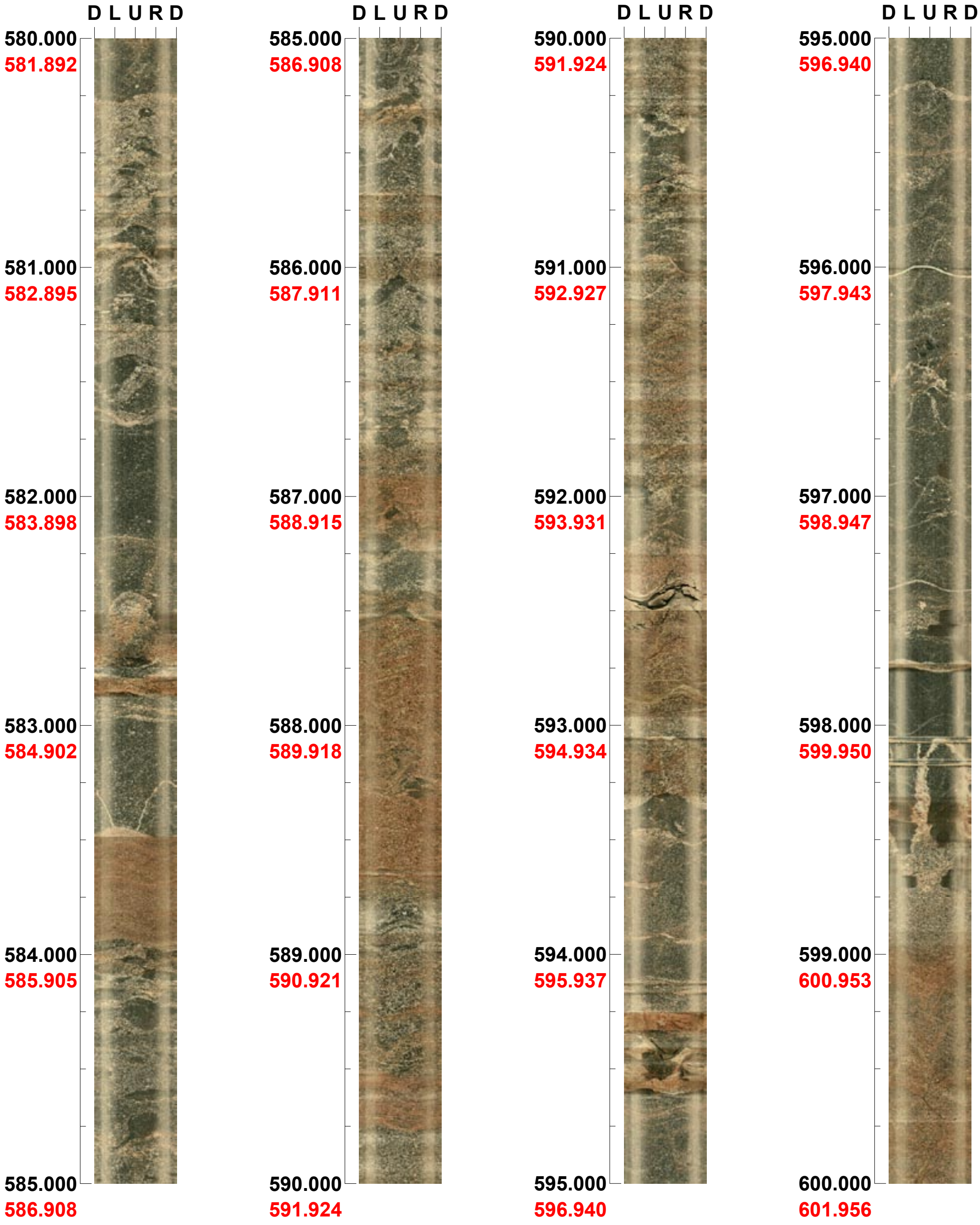
D L U R D

575.000 / 576.876
576.000 / 577.879
577.000 / 578.882
578.000 / 579.886
579.000 / 580.889
580.000 / 581.892

**( 24 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 75** **Inclination: -85**

**Depth range: 580.000 - 600.000 m**




**( 25 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 75** **Inclination: -85**

**Depth range: 600.000 - 620.000 m**


**( 26 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 78** **Inclination: -85**

**Depth range: 620.000 - 640.000 m**


**( 27 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

Project name: Oskarshamn
Bore hole No.: KAV04A                    Azimuth: 78        Inclination: -85

Depth range:  640.000 - 660.000 m


( 28 / 45 )        Scale: 1/25        Aspect ratio: 150 %

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 78** **Inclination: -85**

**Depth range: 660.000 - 680.000 m**


**( 29 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

Project name: Oskarshamn

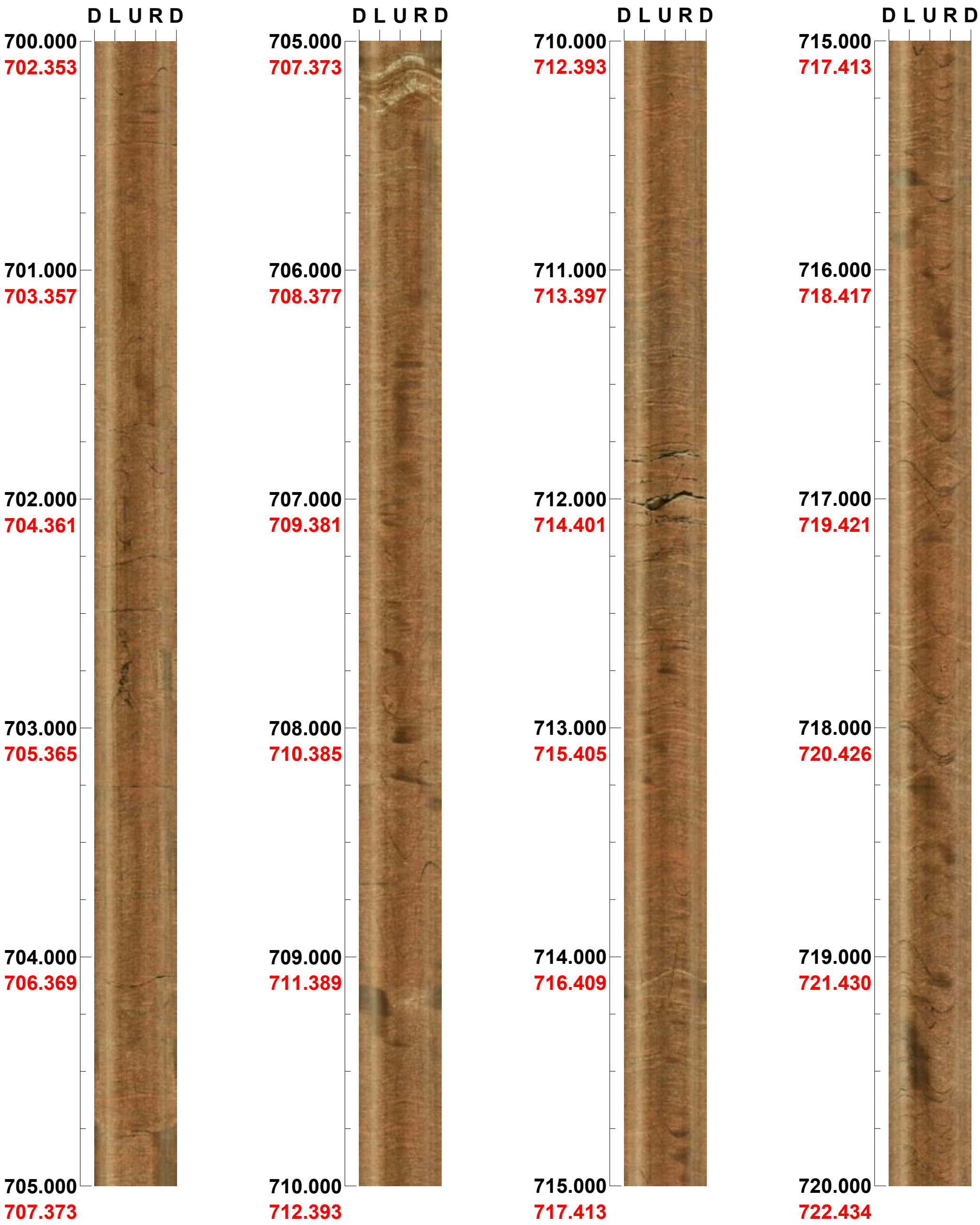
Bore hole No.: KAV04A Azimuth: 78 Inclination: -85

Depth range: 680.000 - 700.000 m


( 30 / 45 ) Scale: 1/25 Aspect ratio: 150 %

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 78** **Inclination: -85**

**Depth range: 700.000 - 720.000 m**




**( 31 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**

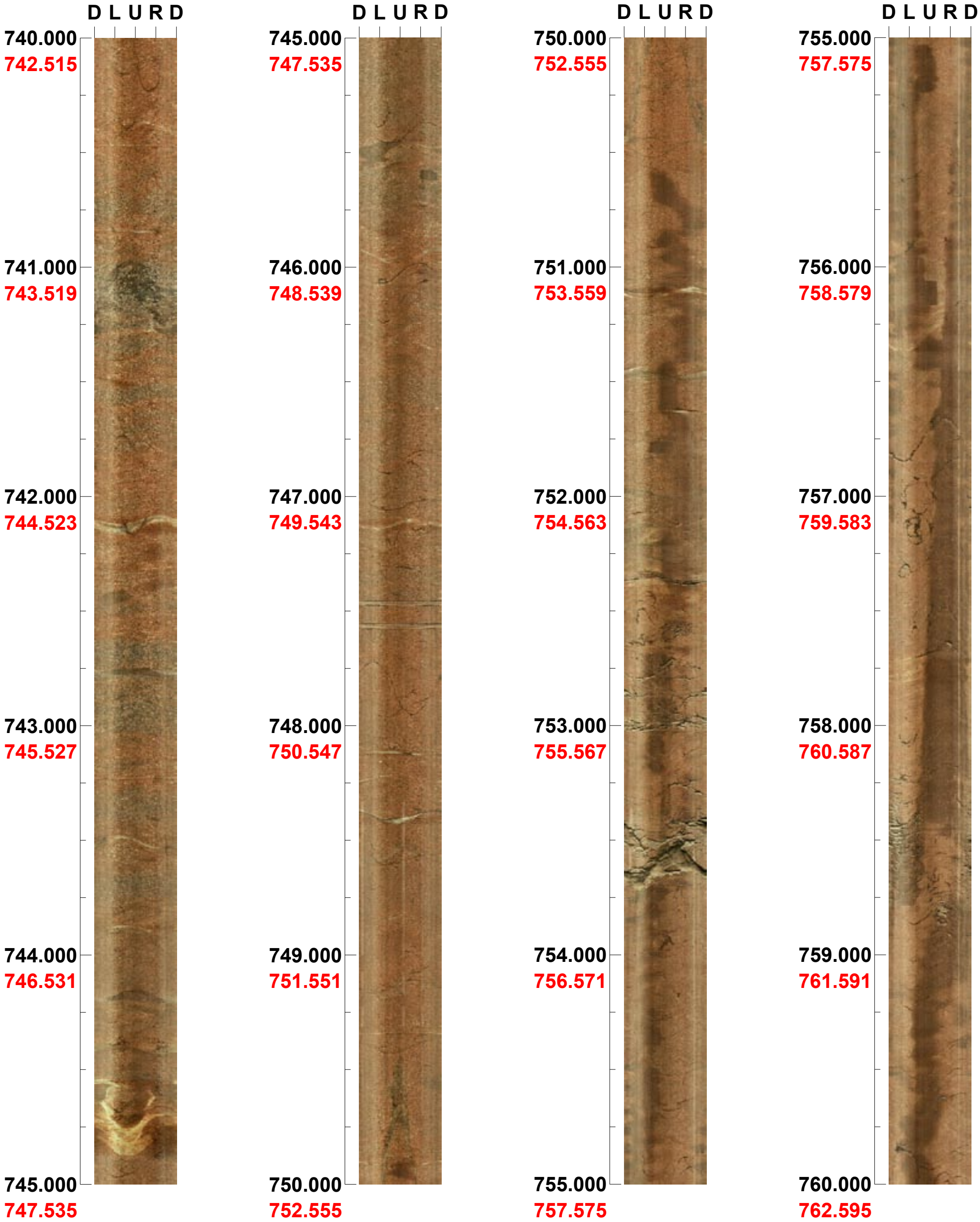
**Bore hole No.: KAV04A** **Azimuth: 83** **Inclination: -85**

**Depth range: 720.000 - 740.000 m**


**( 32 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

Project name: Oskarshamn
Bore hole No.: KAV04A Azimuth: 80 Inclination: -85

Depth range: 740.000 - 760.000 m




( 33 / 45 ) Scale: 1/25 Aspect ratio: 150 %

**Project name: Oskarshamn**

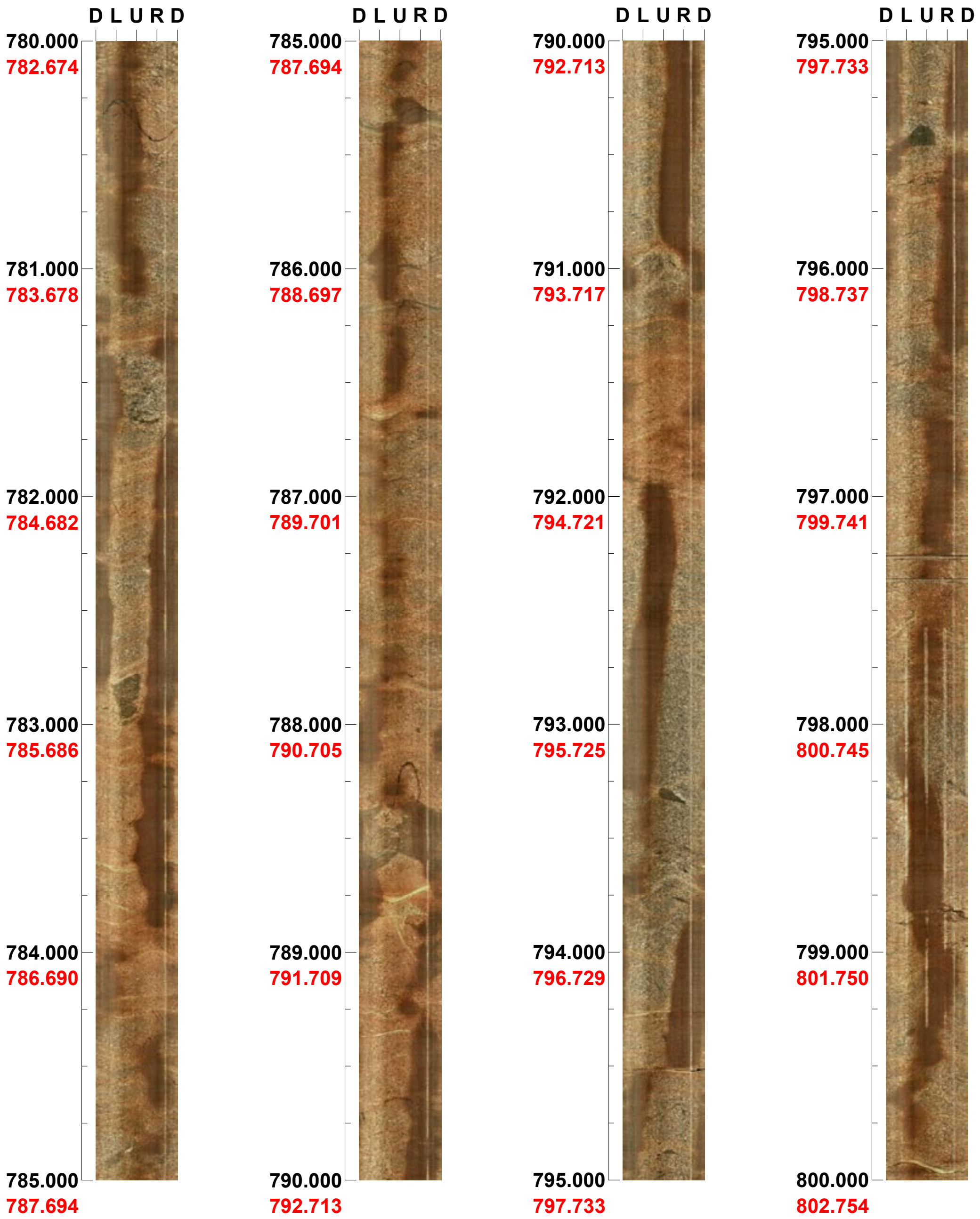
**Bore hole No.: KAV04A** **Azimuth: 81** **Inclination: -85**

**Depth range: 760.000 - 780.000 m**


**( 34 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 81** **Inclination: -85**

**Depth range: 780.000 - 800.000 m**




**( 35 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

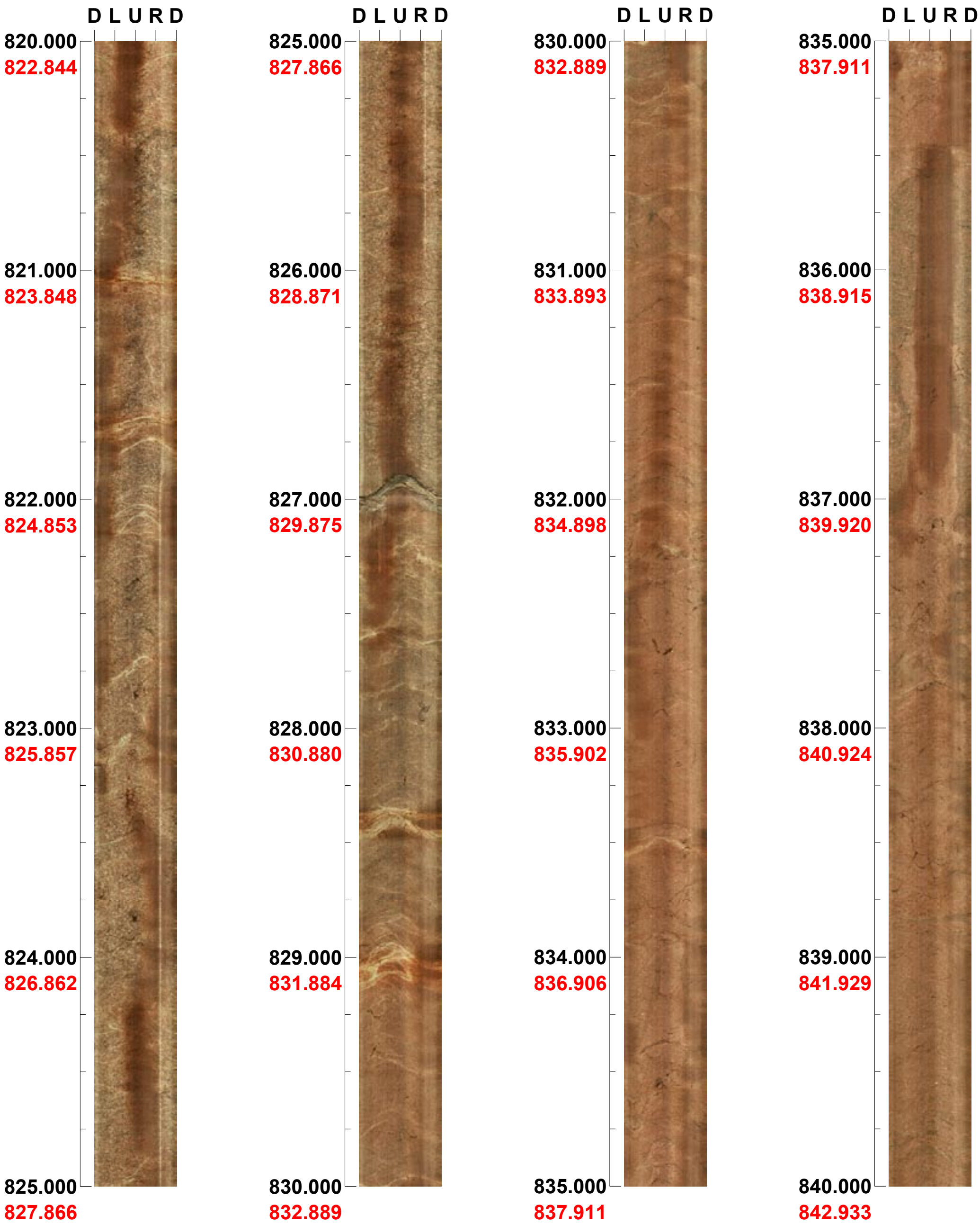
**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 83** **Inclination: -85**

**Depth range: 800.000 - 820.000 m**


**( 36 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

Project name: Oskarshamn
Bore hole No.: KAV04A　　Azimuth: 83　　Inclination: -84

Depth range:  820.000 - 840.000 m

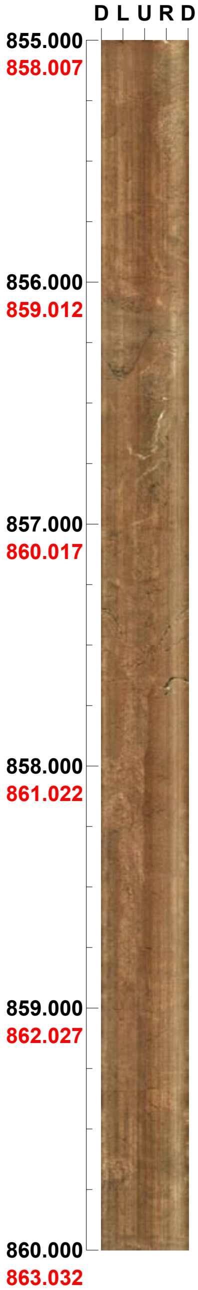



( 37 / 45 )　　Scale: 1/25　　Aspect ratio: 150 %

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 85** **Inclination: -84**

**Depth range: 840.000 - 860.000 m**




**( 38 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**
**Bore hole No.: KAV04A** **Azimuth: 83** **Inclination: -84**

**Depth range: 860.000 - 880.000 m**


**( 39 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**

**Bore hole No.: KAV04A** **Azimuth: 83** **Inclination: -84**

**Depth range: 880.000 - 900.000 m**


**( 40 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

**Project name: Oskarshamn**

**Bore hole No.: KAV04A** **Azimuth: 87** **Inclination: -85**

**Depth range: 900.000 - 920.000 m**


**( 41 / 45 )** **Scale: 1/25** **Aspect ratio: 150 %**

Project name: Oskarshamn
Bore hole No.: KAV04A Azimuth: 90 Inclination: -85

Depth range: 920.000 - 940.000 m


( 42 / 45 ) Scale: 1/25 Aspect ratio: 150 %

Project name: Oskarshamn
Bore hole No.: KAV04A                                   Azimuth: 87        Inclination: -85

Depth range:  940.000 - 960.000 m


( 43 / 45 )          Scale: 1/25          Aspect ratio: 150 %

Project name: Oskarshamn

Bore hole No.: KAV04A — Azimuth: 87 — Inclination: -85

Depth range: 960.000 - 980.000 m


( 44 / 45 ) Scale: 1/25 Aspect ratio: 150 %

Project name: Oskarshamn
Bore hole No.: KAV04A Azimuth: 87 Inclination: -85

Depth range: 980.000 - 998.778 m


( 45 / 45 ) Scale: 1/25 Aspect ratio: 150 %

# Appendix 6

## WellCad diagram of KAV04B

**Title** LEGEND FOR ÄVRÖ KAV04B

| | |
|---|---|
| **Site** | ÄVRÖ |
| **Borehole** | KAV04B |
| **Plot Date** | 2005-07-04 23:22:47 |

ROCKTYPE ÄVRÖ

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

ROCK ALTERATION

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

MINERAL

- Epidote
- Hematite
- Calcite
- Chlorite
- Quartz
- Unknown
- Corundum
- Clay Minerals
- Iron Hydroxide
- 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

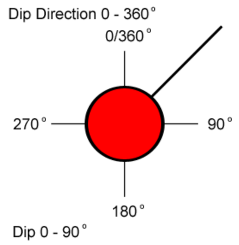
- Slightly Altered
- Moderately Altered
- Highly Altered
- Completley Altered
- Gouge
- Fresh

FRACTURE ALTERATION

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

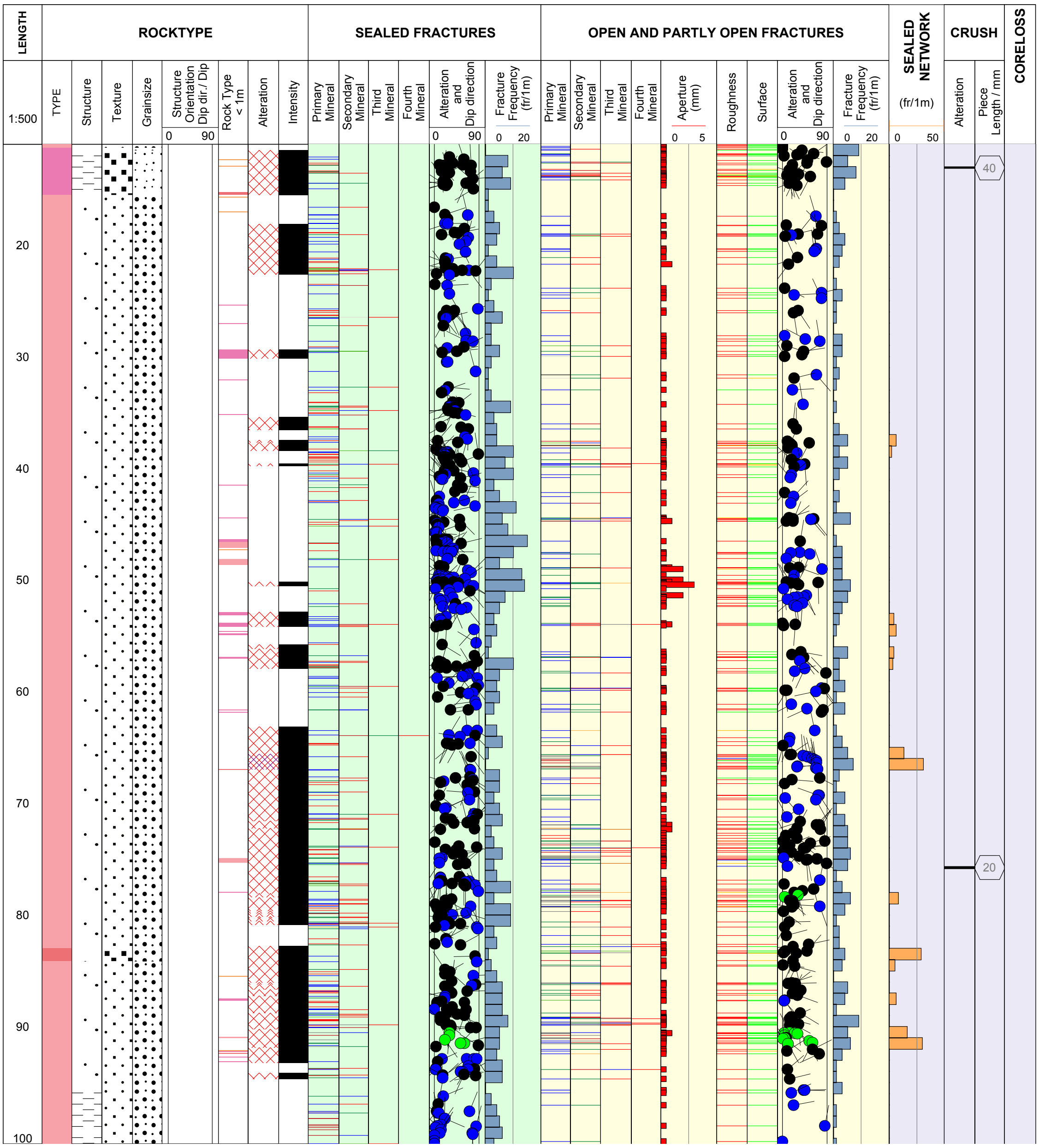
FRACTURE DIRECTION

**STRUKTURE ORIENTATION**



**Title GEOLOGY IN KAV04B** **Appendix:**

| | | | |
|---|---|---|---|
| **Site** | ÄVRÖ | **Coordinate System** | RT90-RHB70 |
| **Borehole** | KAV04B | **Northing [m]** | 6366795.64 |
| **Diameter [mm]** | 76 | **Easting [m]** | 1552474.47 |
| **Length [m]** | 101.030 | **Elevation [m.a.s.l.]** | 10.35 |
| **Bearing [°]** | 134.27 | **Drilling Start Date** | 2004-05-12 07:20:00 |
| **Inclination [°]** | -89.83 | **Drilling Stop Date** | 2004-05-18 07:31:00 |
| **Date of mapping** | 2004-05-24 20:59:00 | **Plot Date** | 2005-02-10 22:06:57 |
| **Rocktype data from** | p_rock_XXXXX | **Fracture data from** | p_fract_core |



# WellCad diagram of KAV04A

Title LEGEND FOR ÄVRÖ KAV04A

Site ÄVRÖ
Borehole KAV04A
Plot Date 2005-02-09 22:06:44

**ROCKTYPE ÄVRÖ**

- 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
- Clay Minerals
- Laumontite
- Zeolite
- 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**

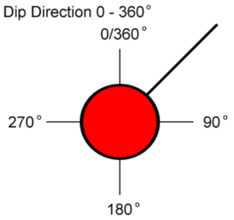
- Slightly Altered
- Moderately Altered
- Highly Altered
- Completley Altered
- Gouge
- Fresh

**FRACTURE ALTERATION**

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

FRACTURE DIRECTION
**STRUKTURE ORIENTATION**

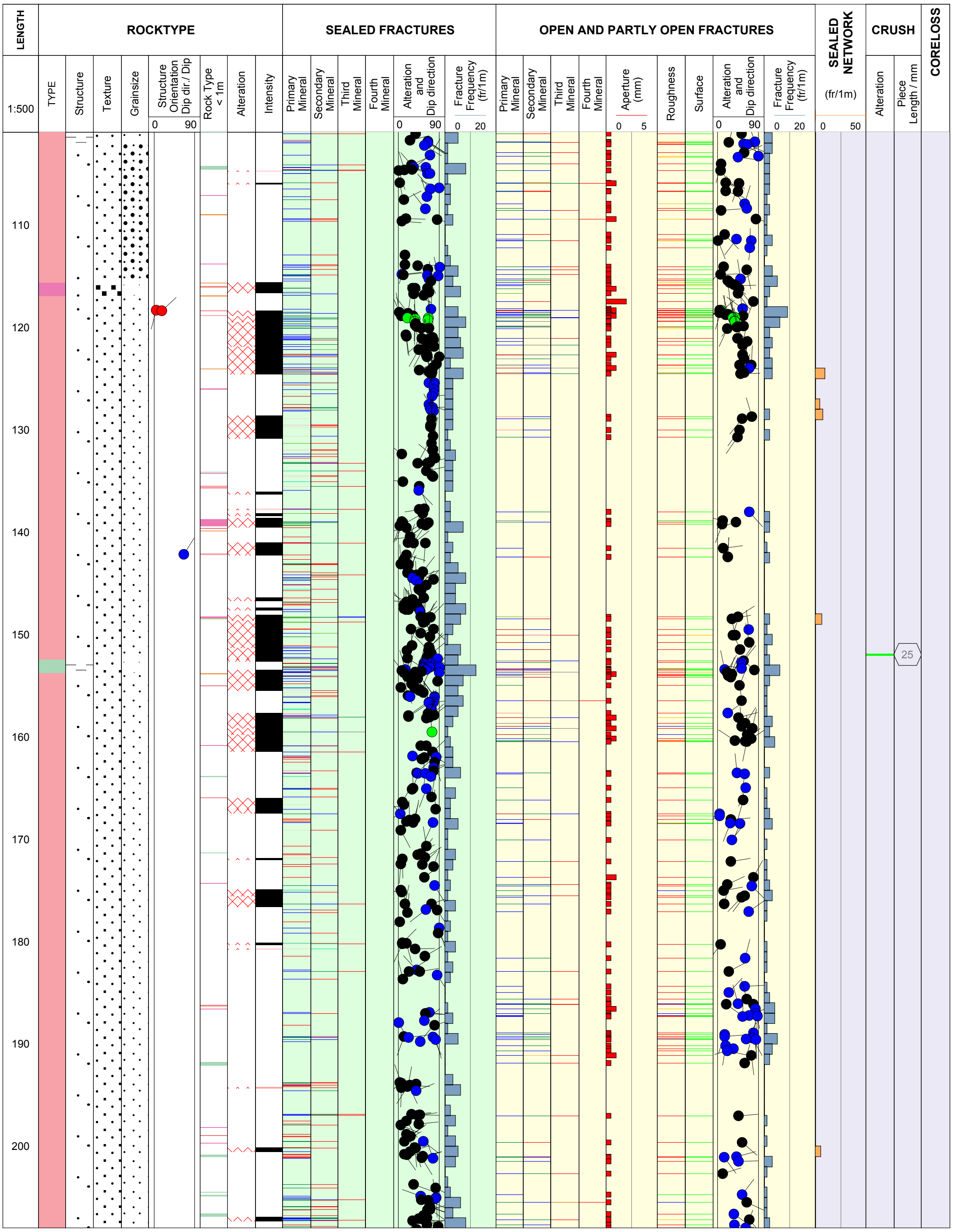
Dip Direction 0 - 360°

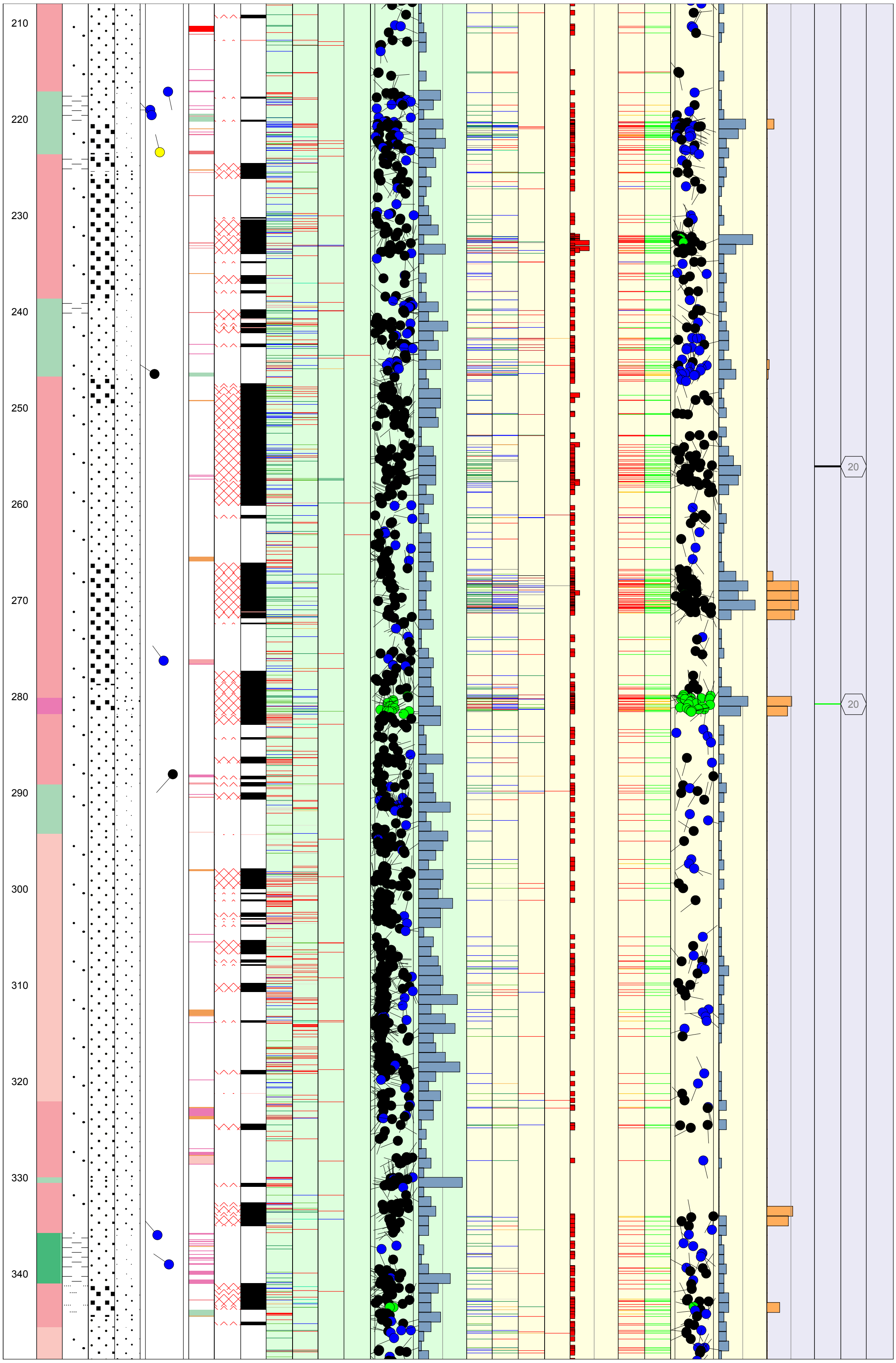



Dip 0 - 90°

**Title** **GEOLOGY IN KAV04A** **Appendix:**

| | | | |
|---|---|---|---|
| **Site** | ÄVRÖ | **Coordinate System** | RT90-RHB70 |
| **Borehole** | KAV04A | **Northing [m]** | 6366795.76 |
| **Diameter [mm]** | 76 | **Easting [m]** | 1552475.00 |
| **Length [m]** | 1004.000 | **Elevation [m.a.s.l.]** | 10.35 |
| **Bearing [°]** | 77.03 | **Drilling Start Date** | 2003-10-06 09:00:00 |
| **Inclination [°]** | -84.90 | **Drilling Stop Date** | 2004-05-03 14:53:00 |
| **Date of mapping** | 2004-06-01 08:47:00 | **Plot Date** | 2005-02-08 22:10:04 |
| **Rocktype data from** | p_rock_XXXXX | **Fracture data from** | p_fract_core |

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340
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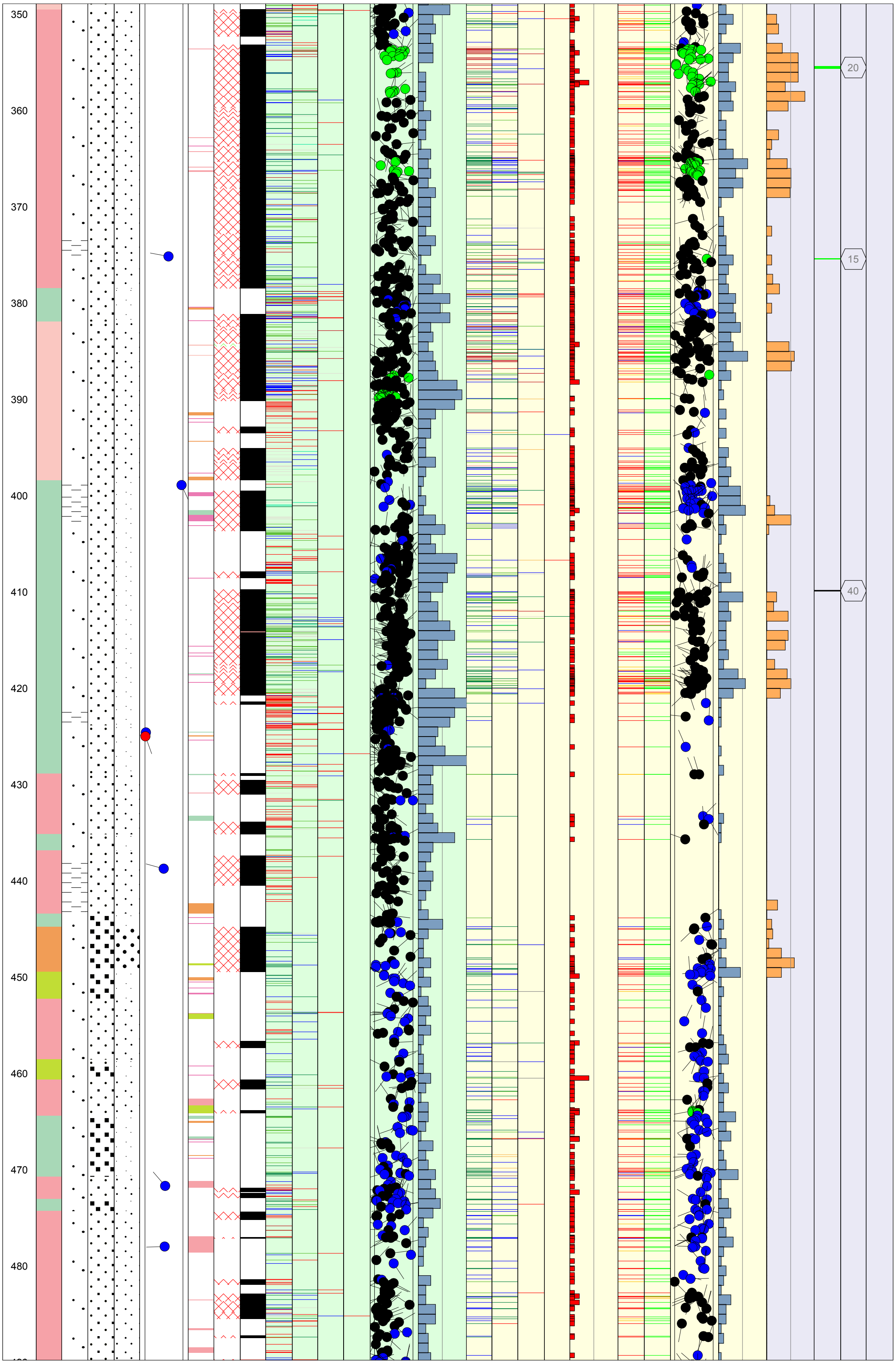
20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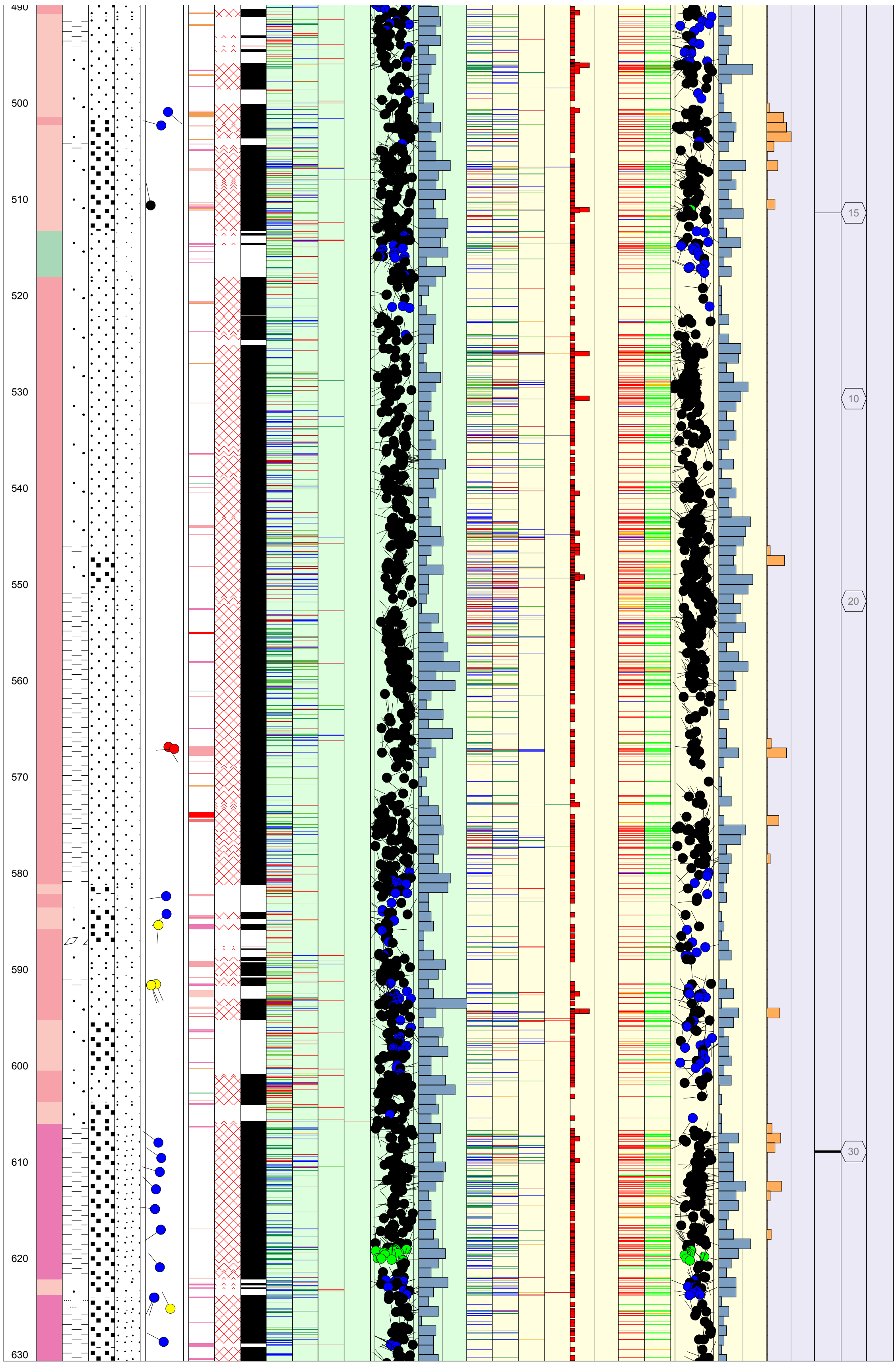
470
480
20
15
40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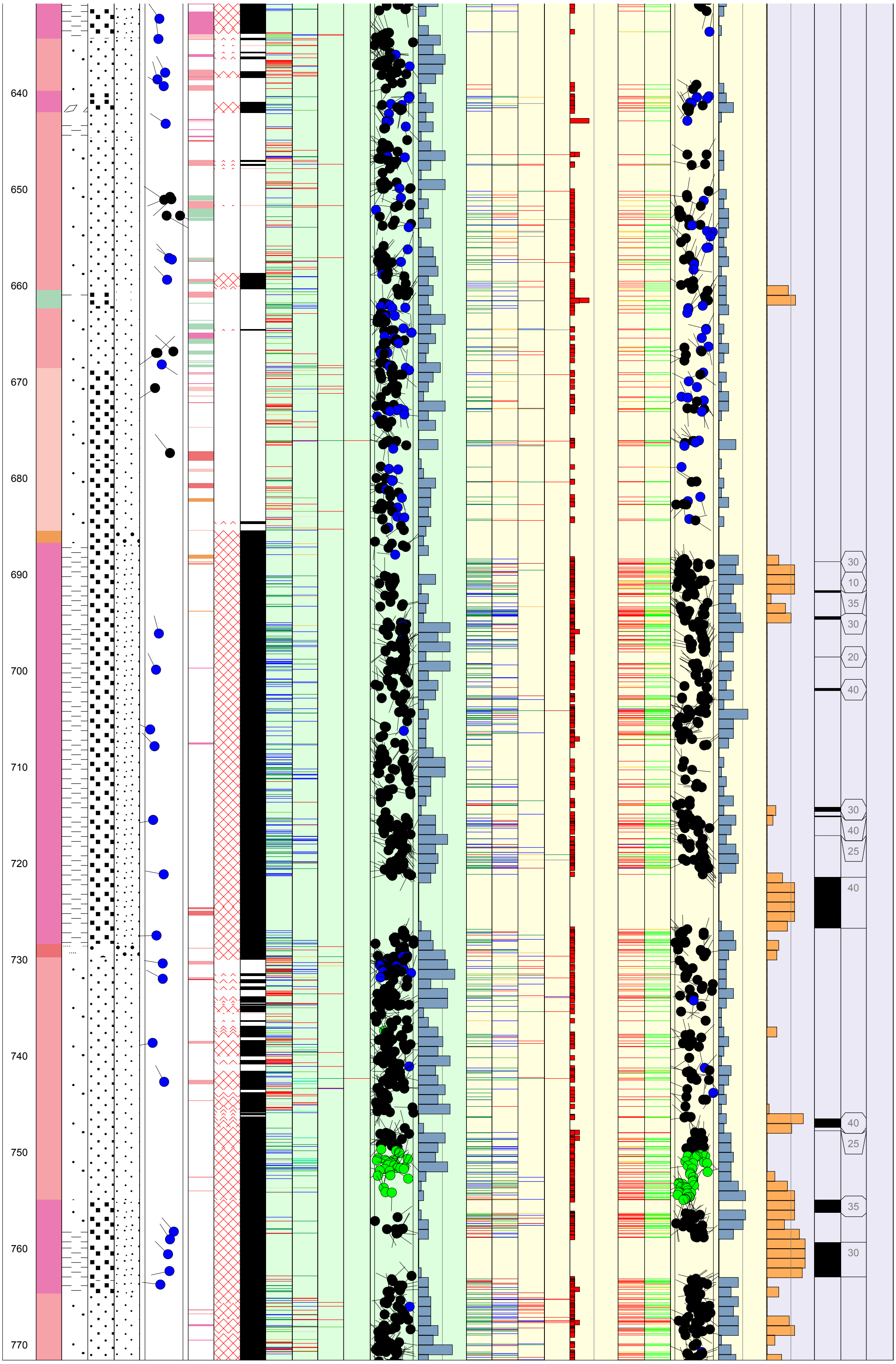
610
620
630
15
10
20
30


640
650
660
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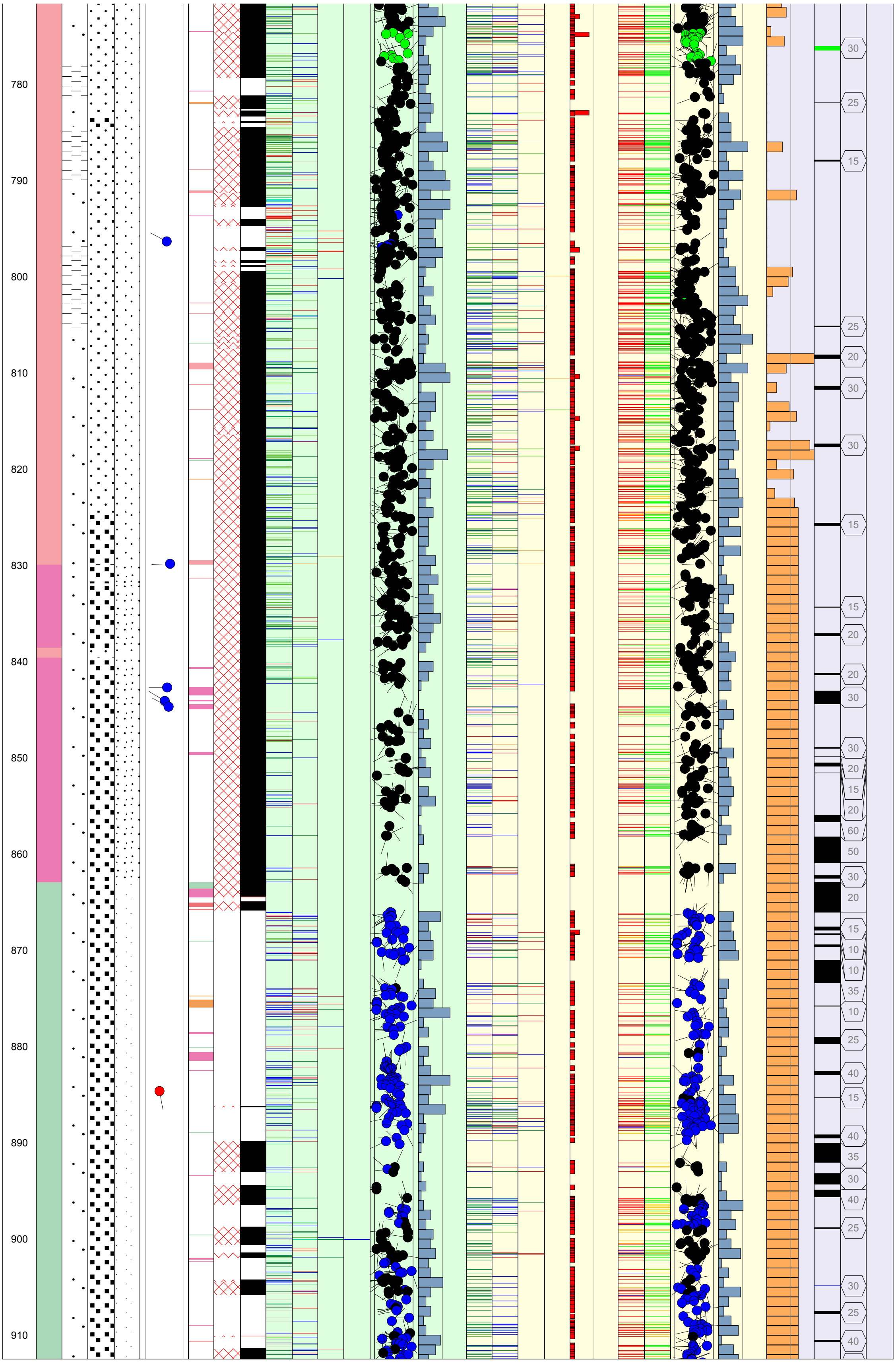
25
35
30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870
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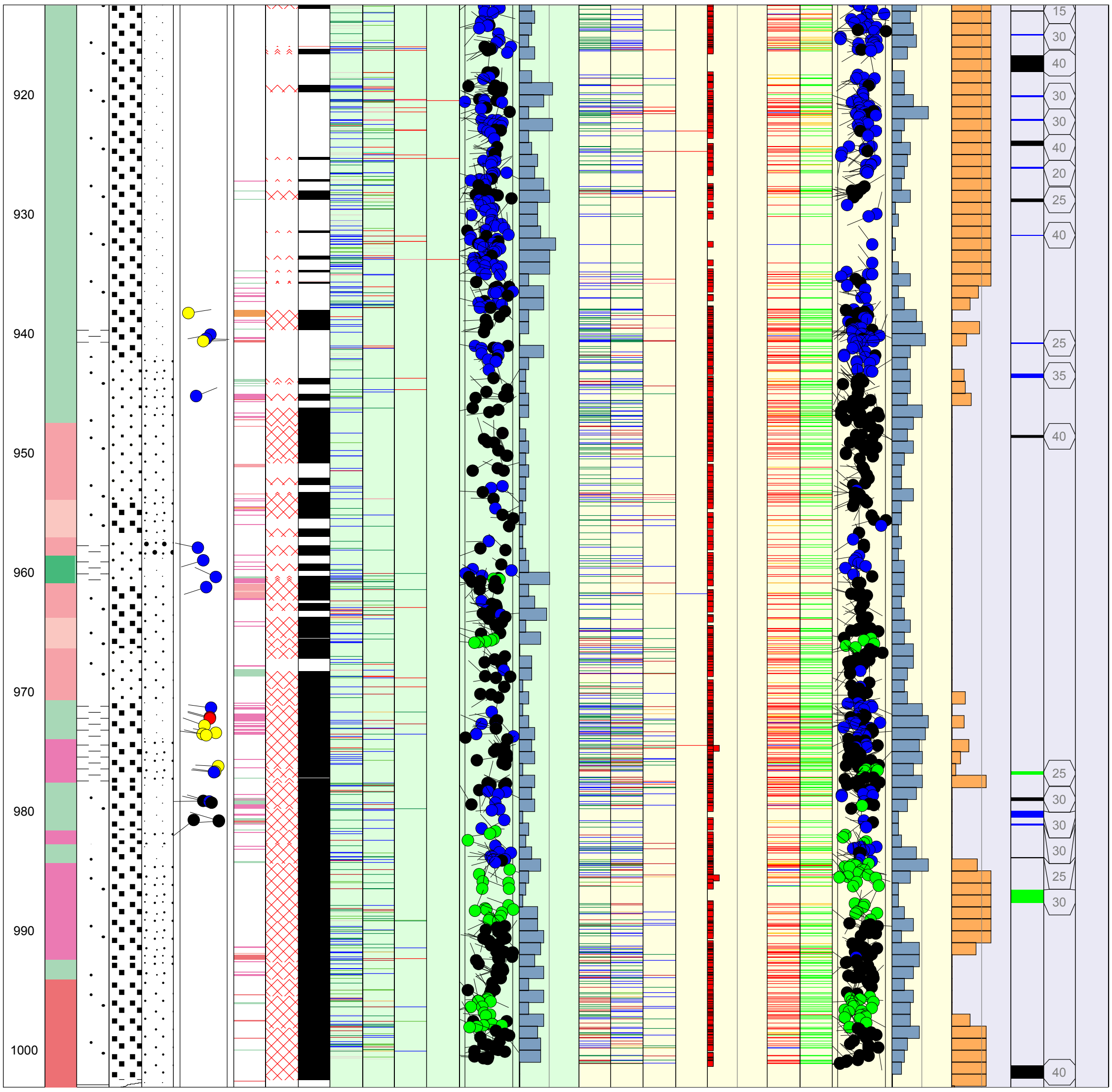
890
900
910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950
960
970
980
990
1000
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40
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30
40
20
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25
35
40
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30
30
30
25
30
40

# Appendix 8

## In data: Borehole length and diameter for KAV04A and KAV04B

## Hole Diam T - Drilling: Borehole diameter

### KAV04A, 2003-12-10 13:55:00 - 2004-05-03 14:53:00 (99.550 - 1004.000 m)

| Sub Secup (m) | Sub Seclow (m) | Hole Diam (m) | Comment |
|---|---|---|---|
| 99.550 | 100.950 | 0.086 | T-86 |
| 100.950 | 1004.000 | 0.076 | Corac N 3/50 |

Printout from SICADA 2004-05-26 18:35:07.

## Hole Diam T - Drilling: Borehole diameter

### KAV04B, 2004-05-12 07:20:00 - 2004-05-12 07:31:00 (0.000 - 101.030 m)

| Sub Secup (m) | Sub Seclow (m) | Hole Diam (m) | Comment |
|---|---|---|---|
| 0.000 | 11.520 | 0.096 | HQ (rymning) |
| 11.520 | 101.030 | 0.076 | N/3 |

Printout from SICADA 2004-05-26 18:50:27.

## Appendix 9

# In data: Deviation data for KAV04A and KAV04B

## Maxibor T - Borehole deviation: Maxibor

### KAV04A, 2004-04-30 08:00:00 - 2004-04-30 13:00:00 (0.000 - 1000.000 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 | 6366795.76 | 1552475.00 | -10.35 | RT90-RHB70 | -84.91 | 77.03 | 0.0000 | 0.0000 | 0.0000 | |
| 3.00 | 6366795.82 | 1552475.26 | -7.36 | RT90-RHB70 | -84.96 | 76.19 | 0.2700 | 0.0000 | 0.0000 | |
| 6.00 | 6366795.88 | 1552475.52 | -4.37 | RT90-RHB70 | -85.05 | 75.87 | 0.5300 | 0.0000 | 0.0000 | |
| 9.00 | 6366795.95 | 1552475.77 | -1.38 | RT90-RHB70 | -85.21 | 75.10 | 0.7900 | -0.0100 | -0.0100 | |
| 12.00 | 6366796.01 | 1552476.01 | 1.60 | RT90-RHB70 | -85.33 | 74.08 | 1.0400 | -0.0200 | -0.0300 | |
| 15.00 | 6366796.08 | 1552476.24 | 4.59 | RT90-RHB70 | -85.39 | 73.14 | 1.2800 | -0.0300 | -0.0500 | |
| 18.00 | 6366796.15 | 1552476.47 | 7.59 | RT90-RHB70 | -85.40 | 72.41 | 1.5200 | -0.0500 | -0.0700 | |
| 21.00 | 6366796.22 | 1552476.70 | 10.58 | RT90-RHB70 | -85.35 | 71.82 | 1.7600 | -0.0700 | -0.1000 | |
| 24.00 | 6366796.30 | 1552476.93 | 13.57 | RT90-RHB70 | -85.30 | 71.50 | 2.0100 | -0.0900 | -0.1200 | |
| 27.00 | 6366796.37 | 1552477.17 | 16.56 | RT90-RHB70 | -85.32 | 71.37 | 2.2500 | -0.1100 | -0.1500 | |
| 30.00 | 6366796.45 | 1552477.40 | 19.55 | RT90-RHB70 | -85.37 | 70.92 | 2.4900 | -0.1400 | -0.1700 | |
| 33.00 | 6366796.53 | 1552477.63 | 22.54 | RT90-RHB70 | -85.45 | 70.28 | 2.7300 | -0.1600 | -0.1900 | |
| 36.00 | 6366796.61 | 1552477.85 | 25.53 | RT90-RHB70 | -85.51 | 69.67 | 2.9700 | -0.1900 | -0.2200 | |
| 39.00 | 6366796.69 | 1552478.07 | 28.52 | RT90-RHB70 | -85.56 | 69.64 | 3.2000 | -0.2200 | -0.2600 | |
| 42.00 | 6366796.77 | 1552478.29 | 31.51 | RT90-RHB70 | -85.59 | 69.53 | 3.4300 | -0.2500 | -0.2900 | |
| 45.00 | 6366796.85 | 1552478.51 | 34.50 | RT90-RHB70 | -85.60 | 69.37 | 3.6600 | -0.2800 | -0.3300 | |
| 48.00 | 6366796.94 | 1552478.72 | 37.49 | RT90-RHB70 | -85.60 | 68.98 | 3.8900 | -0.3100 | -0.3700 | |
| 51.00 | 6366797.02 | 1552478.94 | 40.48 | RT90-RHB70 | -85.59 | 68.57 | 4.1200 | -0.3400 | -0.4100 | |
| 54.00 | 6366797.10 | 1552479.15 | 43.47 | RT90-RHB70 | -85.57 | 68.40 | 4.3500 | -0.3800 | -0.4500 | |
| 57.00 | 6366797.19 | 1552479.37 | 46.46 | RT90-RHB70 | -85.56 | 67.90 | 4.5800 | -0.4100 | -0.4800 | |
| 60.00 | 6366797.28 | 1552479.58 | 49.45 | RT90-RHB70 | -85.56 | 67.10 | 4.8000 | -0.4500 | -0.5200 | |
| 63.00 | 6366797.37 | 1552479.80 | 52.45 | RT90-RHB70 | -85.59 | 65.99 | 5.0300 | -0.4900 | -0.5600 | |
| 66.00 | 6366797.46 | 1552480.01 | 55.44 | RT90-RHB70 | -85.58 | 64.70 | 5.2600 | -0.5300 | -0.6000 | |
| 69.00 | 6366797.56 | 1552480.22 | 58.43 | RT90-RHB70 | -85.59 | 64.04 | 5.4900 | -0.5800 | -0.6400 | |
| 72.00 | 6366797.66 | 1552480.42 | 61.42 | RT90-RHB70 | -85.60 | 63.24 | 5.7100 | -0.6300 | -0.6800 | |
| 75.00 | 6366797.76 | 1552480.63 | 64.41 | RT90-RHB70 | -85.63 | 63.12 | 5.9300 | -0.6900 | -0.7200 | |
| 78.00 | 6366797.87 | 1552480.83 | 67.40 | RT90-RHB70 | -85.62 | 63.01 | 6.1600 | -0.7400 | -0.7700 | |
| 81.00 | 6366797.97 | 1552481.04 | 70.39 | RT90-RHB70 | -85.61 | 62.98 | 6.3800 | -0.8000 | -0.8100 | |
| 84.00 | 6366798.07 | 1552481.24 | 73.38 | RT90-RHB70 | -85.62 | 63.07 | 6.6000 | -0.8500 | -0.8500 | |
| 87.00 | 6366798.18 | 1552481.44 | 76.38 | RT90-RHB70 | -85.65 | 63.29 | 6.8200 | -0.9100 | -0.9000 | |
| 90.00 | 6366798.28 | 1552481.65 | 79.37 | RT90-RHB70 | -85.68 | 63.54 | 7.0400 | -0.9600 | -0.9400 | |
| 93.00 | 6366798.38 | 1552481.85 | 82.36 | RT90-RHB70 | -85.67 | 63.48 | 7.2600 | -1.0200 | -0.9900 | |
| 96.00 | 6366798.48 | 1552482.05 | 85.35 | RT90-RHB70 | -85.63 | 63.44 | 7.4800 | -1.0700 | -1.0400 | |
| 99.00 | 6366798.58 | 1552482.26 | 88.34 | RT90-RHB70 | -85.59 | 63.31 | 7.7100 | -1.1200 | -1.0800 | |
| 102.00 | 6366798.69 | 1552482.46 | 91.33 | RT90-RHB70 | -85.60 | 63.00 | 7.9300 | -1.1800 | -1.1200 | |
| 105.00 | 6366798.79 | 1552482.67 | 94.32 | RT90-RHB70 | -85.62 | 62.77 | 8.1500 | -1.2300 | -1.1700 | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 108.00 | 6366798.90 | 1552482.87 | 97.31 | RT90-RHB70 | -85.65 | 62.61 | 8.3800 | -1.2900 | -1.2100 |
| 111.00 | 6366799.00 | 1552483.07 | 100.31 | RT90-RHB70 | -85.69 | 62.46 | 8.6000 | -1.3500 | -1.2600 |
| 114.00 | 6366799.11 | 1552483.27 | 103.30 | RT90-RHB70 | -85.71 | 62.45 | 8.8100 | -1.4000 | -1.3000 |
| 117.00 | 6366799.21 | 1552483.47 | 106.29 | RT90-RHB70 | -85.73 | 62.38 | 9.0300 | -1.4600 | -1.3500 |
| 120.00 | 6366799.31 | 1552483.67 | 109.28 | RT90-RHB70 | -85.75 | 62.14 | 9.2500 | -1.5200 | -1.4000 |
| 123.00 | 6366799.42 | 1552483.87 | 112.27 | RT90-RHB70 | -85.76 | 62.16 | 9.4600 | -1.5700 | -1.4500 |
| 126.00 | 6366799.52 | 1552484.06 | 115.26 | RT90-RHB70 | -85.75 | 62.17 | 9.6800 | -1.6300 | -1.5100 |
| 129.00 | 6366799.62 | 1552484.26 | 118.26 | RT90-RHB70 | -85.74 | 62.06 | 9.8900 | -1.6900 | -1.5600 |
| 132.00 | 6366799.73 | 1552484.46 | 121.25 | RT90-RHB70 | -85.73 | 61.80 | 10.1100 | -1.7400 | -1.6100 |
| 135.00 | 6366799.83 | 1552484.65 | 124.24 | RT90-RHB70 | -85.73 | 61.82 | 10.3200 | -1.8000 | -1.6600 |
| 138.00 | 6366799.94 | 1552484.85 | 127.23 | RT90-RHB70 | -85.73 | 61.63 | 10.5400 | -1.8600 | -1.7100 |
| 141.00 | 6366800.05 | 1552485.05 | 130.22 | RT90-RHB70 | -85.73 | 61.71 | 10.7500 | -1.9200 | -1.7600 |
| 144.00 | 6366800.15 | 1552485.24 | 133.21 | RT90-RHB70 | -85.75 | 61.93 | 10.9700 | -1.9800 | -1.8100 |
| 147.00 | 6366800.26 | 1552485.44 | 136.21 | RT90-RHB70 | -85.79 | 62.27 | 11.1800 | -2.0400 | -1.8600 |
| 150.00 | 6366800.36 | 1552485.63 | 139.20 | RT90-RHB70 | -85.81 | 62.50 | 11.4000 | -2.0900 | -1.9200 |
| 153.00 | 6366800.46 | 1552485.83 | 142.19 | RT90-RHB70 | -85.82 | 62.73 | 11.6100 | -2.1500 | -1.9700 |
| 156.00 | 6366800.56 | 1552486.02 | 145.18 | RT90-RHB70 | -85.81 | 62.98 | 11.8200 | -2.2000 | -2.0300 |
| 159.00 | 6366800.66 | 1552486.22 | 148.17 | RT90-RHB70 | -85.82 | 63.09 | 12.0300 | -2.2600 | -2.0800 |
| 162.00 | 6366800.76 | 1552486.41 | 151.17 | RT90-RHB70 | -85.79 | 63.00 | 12.2400 | -2.3100 | -2.1300 |
| 165.00 | 6366800.86 | 1552486.61 | 154.16 | RT90-RHB70 | -85.78 | 62.66 | 12.4600 | -2.3600 | -2.1900 |
| 168.00 | 6366800.96 | 1552486.81 | 157.15 | RT90-RHB70 | -85.76 | 62.52 | 12.6700 | -2.4200 | -2.2400 |
| 171.00 | 6366801.06 | 1552487.00 | 160.14 | RT90-RHB70 | -85.75 | 62.48 | 12.8900 | -2.4700 | -2.2900 |
| 174.00 | 6366801.16 | 1552487.20 | 163.13 | RT90-RHB70 | -85.76 | 62.53 | 13.1000 | -2.5300 | -2.3400 |
| 177.00 | 6366801.27 | 1552487.40 | 166.12 | RT90-RHB70 | -85.75 | 62.65 | 13.3200 | -2.5800 | -2.3900 |
| 180.00 | 6366801.37 | 1552487.59 | 169.12 | RT90-RHB70 | -85.74 | 62.61 | 13.5300 | -2.6400 | -2.4400 |
| 183.00 | 6366801.47 | 1552487.79 | 172.11 | RT90-RHB70 | -85.72 | 62.58 | 13.7500 | -2.7000 | -2.4900 |
| 186.00 | 6366801.58 | 1552487.99 | 175.10 | RT90-RHB70 | -85.71 | 62.67 | 13.9600 | -2.7500 | -2.5400 |
| 189.00 | 6366801.68 | 1552488.19 | 178.09 | RT90-RHB70 | -85.70 | 63.00 | 14.1800 | -2.8100 | -2.5900 |
| 192.00 | 6366801.78 | 1552488.39 | 181.08 | RT90-RHB70 | -85.70 | 63.64 | 14.4000 | -2.8600 | -2.6400 |
| 195.00 | 6366801.88 | 1552488.59 | 184.07 | RT90-RHB70 | -85.69 | 63.79 | 14.6200 | -2.9100 | -2.6900 |
| 198.00 | 6366801.98 | 1552488.79 | 187.07 | RT90-RHB70 | -85.69 | 63.85 | 14.8400 | -2.9700 | -2.7400 |
| 201.00 | 6366802.08 | 1552489.00 | 190.06 | RT90-RHB70 | -85.69 | 63.90 | 15.0600 | -3.0200 | -2.7800 |
| 204.00 | 6366802.18 | 1552489.20 | 193.05 | RT90-RHB70 | -85.71 | 63.89 | 15.2800 | -3.0700 | -2.8300 |
| 207.00 | 6366802.28 | 1552489.40 | 196.04 | RT90-RHB70 | -85.72 | 63.99 | 15.5000 | -3.1200 | -2.8800 |
| 210.00 | 6366802.38 | 1552489.60 | 199.03 | RT90-RHB70 | -85.72 | 64.16 | 15.7100 | -3.1700 | -2.9200 |
| 213.00 | 6366802.47 | 1552489.80 | 202.02 | RT90-RHB70 | -85.71 | 64.06 | 15.9300 | -3.2200 | -2.9700 |
| 216.00 | 6366802.57 | 1552490.01 | 205.02 | RT90-RHB70 | -85.70 | 63.85 | 16.1500 | -3.2700 | -3.0200 |
| 219.00 | 6366802.67 | 1552490.21 | 208.01 | RT90-RHB70 | -85.71 | 63.77 | 16.3700 | -3.3200 | -3.0700 |
| 222.00 | 6366802.77 | 1552490.41 | 211.00 | RT90-RHB70 | -85.69 | 63.88 | 16.5900 | -3.3700 | -3.1100 |
| 225.00 | 6366802.87 | 1552490.61 | 213.99 | RT90-RHB70 | -85.65 | 64.10 | 16.8100 | -3.4200 | -3.1600 |
| 228.00 | 6366802.97 | 1552490.82 | 216.98 | RT90-RHB70 | -85.66 | 64.01 | 17.0300 | -3.4700 | -3.2100 |
| 231.00 | 6366803.07 | 1552491.02 | 219.97 | RT90-RHB70 | -85.68 | 63.82 | 17.2500 | -3.5300 | -3.2500 |
| 234.00 | 6366803.17 | 1552491.22 | 222.96 | RT90-RHB70 | -85.67 | 63.65 | 17.4700 | -3.5800 | -3.3000 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 237.00 | 6366803.27 | 1552491.43 | 225.96 | RT90-RHB70 | -85.67 | 63.44 | 17.6900 | -3.6300 | -3.3400 |
| 240.00 | 6366803.37 | 1552491.63 | 228.95 | RT90-RHB70 | -85.68 | 63.34 | 17.9100 | -3.6800 | -3.3900 |
| 243.00 | 6366803.47 | 1552491.83 | 231.94 | RT90-RHB70 | -85.69 | 63.29 | 18.1300 | -3.7400 | -3.4400 |
| 246.00 | 6366803.57 | 1552492.03 | 234.93 | RT90-RHB70 | -85.72 | 63.46 | 18.3500 | -3.7900 | -3.4800 |
| 249.00 | 6366803.67 | 1552492.23 | 237.92 | RT90-RHB70 | -85.78 | 64.12 | 18.5700 | -3.8400 | -3.5300 |
| 252.00 | 6366803.77 | 1552492.43 | 240.91 | RT90-RHB70 | -85.81 | 64.34 | 18.7800 | -3.8900 | -3.5800 |
| 255.00 | 6366803.86 | 1552492.63 | 243.91 | RT90-RHB70 | -85.80 | 64.57 | 19.0000 | -3.9400 | -3.6400 |
| 258.00 | 6366803.96 | 1552492.83 | 246.90 | RT90-RHB70 | -85.80 | 64.79 | 19.2100 | -3.9900 | -3.6900 |
| 261.00 | 6366804.05 | 1552493.03 | 249.89 | RT90-RHB70 | -85.79 | 64.87 | 19.4300 | -4.0300 | -3.7400 |
| 264.00 | 6366804.14 | 1552493.22 | 252.88 | RT90-RHB70 | -85.80 | 64.69 | 19.6400 | -4.0800 | -3.7900 |
| 267.00 | 6366804.24 | 1552493.42 | 255.87 | RT90-RHB70 | -85.80 | 64.48 | 19.8600 | -4.1300 | -3.8400 |
| 270.00 | 6366804.33 | 1552493.62 | 258.87 | RT90-RHB70 | -85.79 | 64.64 | 20.0700 | -4.1800 | -3.8900 |
| 273.00 | 6366804.43 | 1552493.82 | 261.86 | RT90-RHB70 | -85.78 | 64.69 | 20.2900 | -4.2200 | -3.9400 |
| 276.00 | 6366804.52 | 1552494.02 | 264.85 | RT90-RHB70 | -85.79 | 64.80 | 20.5000 | -4.2700 | -4.0000 |
| 279.00 | 6366804.62 | 1552494.22 | 267.84 | RT90-RHB70 | -85.78 | 65.01 | 20.7200 | -4.3200 | -4.0500 |
| 282.00 | 6366804.71 | 1552494.42 | 270.83 | RT90-RHB70 | -85.79 | 64.90 | 20.9300 | -4.3600 | -4.1000 |
| 285.00 | 6366804.80 | 1552494.62 | 273.83 | RT90-RHB70 | -85.80 | 64.86 | 21.1500 | -4.4100 | -4.1500 |
| 288.00 | 6366804.90 | 1552494.82 | 276.82 | RT90-RHB70 | -85.80 | 64.74 | 21.3600 | -4.4500 | -4.2000 |
| 291.00 | 6366804.99 | 1552495.02 | 279.81 | RT90-RHB70 | -85.82 | 64.57 | 21.5800 | -4.5000 | -4.2500 |
| 294.00 | 6366805.08 | 1552495.21 | 282.80 | RT90-RHB70 | -85.85 | 64.41 | 21.7900 | -4.5500 | -4.3000 |
| 297.00 | 6366805.18 | 1552495.41 | 285.79 | RT90-RHB70 | -85.87 | 64.40 | 22.0000 | -4.6000 | -4.3600 |
| 300.00 | 6366805.27 | 1552495.61 | 288.79 | RT90-RHB70 | -85.86 | 64.50 | 22.2100 | -4.6400 | -4.4100 |
| 303.00 | 6366805.36 | 1552495.80 | 291.78 | RT90-RHB70 | -85.85 | 64.39 | 22.4300 | -4.6900 | -4.4700 |
| 306.00 | 6366805.46 | 1552496.00 | 294.77 | RT90-RHB70 | -85.86 | 64.53 | 22.6400 | -4.7400 | -4.5200 |
| 309.00 | 6366805.55 | 1552496.19 | 297.76 | RT90-RHB70 | -85.84 | 64.57 | 22.8500 | -4.7800 | -4.5800 |
| 312.00 | 6366805.64 | 1552496.39 | 300.75 | RT90-RHB70 | -85.85 | 64.64 | 23.0600 | -4.8300 | -4.6300 |
| 315.00 | 6366805.74 | 1552496.58 | 303.75 | RT90-RHB70 | -85.86 | 65.22 | 23.2700 | -4.8800 | -4.6900 |
| 318.00 | 6366805.83 | 1552496.78 | 306.74 | RT90-RHB70 | -85.87 | 65.51 | 23.4900 | -4.9200 | -4.7400 |
| 321.00 | 6366805.92 | 1552496.98 | 309.73 | RT90-RHB70 | -85.86 | 65.48 | 23.7000 | -4.9700 | -4.7900 |
| 324.00 | 6366806.01 | 1552497.17 | 312.72 | RT90-RHB70 | -85.87 | 65.40 | 23.9100 | -5.0100 | -4.8500 |
| 327.00 | 6366806.10 | 1552497.37 | 315.71 | RT90-RHB70 | -85.88 | 65.79 | 24.1200 | -5.0500 | -4.9000 |
| 330.00 | 6366806.19 | 1552497.57 | 318.71 | RT90-RHB70 | -85.90 | 65.92 | 24.3300 | -5.0900 | -4.9600 |
| 333.00 | 6366806.27 | 1552497.76 | 321.70 | RT90-RHB70 | -85.90 | 66.23 | 24.5400 | -5.1400 | -5.0100 |
| 336.00 | 6366806.36 | 1552497.96 | 324.69 | RT90-RHB70 | -85.89 | 66.38 | 24.7500 | -5.1800 | -5.0700 |
| 339.00 | 6366806.45 | 1552498.16 | 327.68 | RT90-RHB70 | -85.89 | 66.60 | 24.9600 | -5.2200 | -5.1200 |
| 342.00 | 6366806.53 | 1552498.35 | 330.68 | RT90-RHB70 | -85.90 | 66.83 | 25.1800 | -5.2600 | -5.1800 |
| 345.00 | 6366806.62 | 1552498.55 | 333.67 | RT90-RHB70 | -85.88 | 66.82 | 25.3900 | -5.2900 | -5.2300 |
| 348.00 | 6366806.70 | 1552498.75 | 336.66 | RT90-RHB70 | -85.86 | 66.77 | 25.6000 | -5.3300 | -5.2900 |
| 351.00 | 6366806.79 | 1552498.95 | 339.65 | RT90-RHB70 | -85.87 | 66.62 | 25.8100 | -5.3700 | -5.3400 |
| 354.00 | 6366806.87 | 1552499.15 | 342.65 | RT90-RHB70 | -85.85 | 66.61 | 26.0300 | -5.4100 | -5.4000 |
| 357.00 | 6366806.96 | 1552499.35 | 345.64 | RT90-RHB70 | -85.85 | 66.83 | 26.2400 | -5.4500 | -5.4500 |
| 360.00 | 6366807.04 | 1552499.55 | 348.63 | RT90-RHB70 | -85.86 | 66.88 | 26.4500 | -5.4900 | -5.5000 |
| 363.00 | 6366807.13 | 1552499.75 | 351.62 | RT90-RHB70 | -85.82 | 66.98 | 26.6700 | -5.5200 | -5.5500 |

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|---|---|---|---|---|---|---|---|---|---|
| 366.00 | 6366807.21 | 1552499.95 | 354.61 | RT90-RHB70 | -85.83 | 66.93 | 26.8800 | -5.5600 | -5.6000 |
| 369.00 | 6366807.30 | 1552500.15 | 357.61 | RT90-RHB70 | -85.84 | 67.18 | 27.1000 | -5.6000 | -5.6600 |
| 372.00 | 6366807.38 | 1552500.35 | 360.60 | RT90-RHB70 | -85.84 | 67.16 | 27.3100 | -5.6400 | -5.7100 |
| 375.00 | 6366807.47 | 1552500.55 | 363.59 | RT90-RHB70 | -85.84 | 66.86 | 27.5200 | -5.6800 | -5.7600 |
| 378.00 | 6366807.55 | 1552500.75 | 366.58 | RT90-RHB70 | -85.85 | 66.80 | 27.7400 | -5.7100 | -5.8100 |
| 381.00 | 6366807.64 | 1552500.95 | 369.57 | RT90-RHB70 | -85.88 | 66.77 | 27.9500 | -5.7500 | -5.8600 |
| 384.00 | 6366807.73 | 1552501.15 | 372.57 | RT90-RHB70 | -85.90 | 66.81 | 28.1700 | -5.7900 | -5.9200 |
| 387.00 | 6366807.81 | 1552501.34 | 375.56 | RT90-RHB70 | -85.94 | 67.10 | 28.3800 | -5.8300 | -5.9700 |
| 390.00 | 6366807.89 | 1552501.54 | 378.55 | RT90-RHB70 | -85.97 | 67.39 | 28.5900 | -5.8700 | -6.0300 |
| 393.00 | 6366807.97 | 1552501.73 | 381.54 | RT90-RHB70 | -85.97 | 67.60 | 28.7900 | -5.9000 | -6.0900 |
| 396.00 | 6366808.05 | 1552501.93 | 384.54 | RT90-RHB70 | -85.97 | 67.61 | 29.0000 | -5.9400 | -6.1500 |
| 399.00 | 6366808.13 | 1552502.12 | 387.53 | RT90-RHB70 | -85.97 | 67.58 | 29.2100 | -5.9700 | -6.2100 |
| 402.00 | 6366808.21 | 1552502.32 | 390.52 | RT90-RHB70 | -85.94 | 67.39 | 29.4200 | -6.0000 | -6.2600 |
| 405.00 | 6366808.30 | 1552502.51 | 393.51 | RT90-RHB70 | -85.91 | 67.44 | 29.6300 | -6.0400 | -6.3200 |
| 408.00 | 6366808.38 | 1552502.71 | 396.51 | RT90-RHB70 | -85.89 | 67.44 | 29.8400 | -6.0800 | -6.3800 |
| 411.00 | 6366808.46 | 1552502.91 | 399.50 | RT90-RHB70 | -85.86 | 67.48 | 30.0500 | -6.1100 | -6.4300 |
| 414.00 | 6366808.54 | 1552503.11 | 402.49 | RT90-RHB70 | -85.83 | 67.59 | 30.2600 | -6.1500 | -6.4800 |
| 417.00 | 6366808.63 | 1552503.31 | 405.48 | RT90-RHB70 | -85.81 | 67.66 | 30.4800 | -6.1800 | -6.5400 |
| 420.00 | 6366808.71 | 1552503.51 | 408.47 | RT90-RHB70 | -85.81 | 67.69 | 30.6900 | -6.2200 | -6.5900 |
| 423.00 | 6366808.79 | 1552503.72 | 411.47 | RT90-RHB70 | -85.78 | 67.61 | 30.9100 | -6.2500 | -6.6400 |
| 426.00 | 6366808.88 | 1552503.92 | 414.46 | RT90-RHB70 | -85.75 | 67.72 | 31.1300 | -6.2900 | -6.6800 |
| 429.00 | 6366808.96 | 1552504.13 | 417.45 | RT90-RHB70 | -85.71 | 67.94 | 31.3500 | -6.3300 | -6.7300 |
| 432.00 | 6366809.05 | 1552504.34 | 420.44 | RT90-RHB70 | -85.67 | 67.99 | 31.5700 | -6.3600 | -6.7800 |
| 435.00 | 6366809.13 | 1552504.55 | 423.43 | RT90-RHB70 | -85.65 | 68.09 | 31.7900 | -6.4000 | -6.8200 |
| 438.00 | 6366809.22 | 1552504.76 | 426.42 | RT90-RHB70 | -85.64 | 68.06 | 32.0200 | -6.4300 | -6.8600 |
| 441.00 | 6366809.30 | 1552504.97 | 429.42 | RT90-RHB70 | -85.65 | 67.77 | 32.2400 | -6.4700 | -6.9000 |
| 444.00 | 6366809.39 | 1552505.18 | 432.41 | RT90-RHB70 | -85.70 | 67.72 | 32.4700 | -6.5100 | -6.9400 |
| 447.00 | 6366809.47 | 1552505.39 | 435.40 | RT90-RHB70 | -85.73 | 67.91 | 32.6900 | -6.5400 | -6.9900 |
| 450.00 | 6366809.56 | 1552505.59 | 438.39 | RT90-RHB70 | -85.74 | 68.82 | 32.9100 | -6.5800 | -7.0300 |
| 453.00 | 6366809.64 | 1552505.80 | 441.38 | RT90-RHB70 | -85.69 | 70.29 | 33.1300 | -6.6100 | -7.0800 |
| 456.00 | 6366809.71 | 1552506.01 | 444.37 | RT90-RHB70 | -85.67 | 70.85 | 33.3500 | -6.6400 | -7.1200 |
| 459.00 | 6366809.79 | 1552506.23 | 447.37 | RT90-RHB70 | -85.67 | 70.90 | 33.5800 | -6.6600 | -7.1600 |
| 462.00 | 6366809.86 | 1552506.44 | 450.36 | RT90-RHB70 | -85.65 | 71.22 | 33.8000 | -6.6800 | -7.2000 |
| 465.00 | 6366809.93 | 1552506.66 | 453.35 | RT90-RHB70 | -85.60 | 71.34 | 34.0300 | -6.7100 | -7.2400 |
| 468.00 | 6366810.01 | 1552506.88 | 456.34 | RT90-RHB70 | -85.57 | 71.20 | 34.2600 | -6.7300 | -7.2800 |
| 471.00 | 6366810.08 | 1552507.09 | 459.33 | RT90-RHB70 | -85.53 | 71.01 | 34.4900 | -6.7500 | -7.3200 |
| 474.00 | 6366810.16 | 1552507.32 | 462.32 | RT90-RHB70 | -85.50 | 71.16 | 34.7200 | -6.7800 | -7.3500 |
| 477.00 | 6366810.23 | 1552507.54 | 465.31 | RT90-RHB70 | -85.50 | 71.67 | 34.9600 | -6.8000 | -7.3800 |
| 480.00 | 6366810.31 | 1552507.76 | 468.30 | RT90-RHB70 | -85.47 | 71.97 | 35.1900 | -6.8200 | -7.4100 |
| 483.00 | 6366810.38 | 1552507.99 | 471.29 | RT90-RHB70 | -85.45 | 72.19 | 35.4300 | -6.8500 | -7.4400 |
| 486.00 | 6366810.45 | 1552508.21 | 474.28 | RT90-RHB70 | -85.45 | 72.43 | 35.6600 | -6.8700 | -7.4700 |
| 489.00 | 6366810.53 | 1552508.44 | 477.27 | RT90-RHB70 | -85.46 | 72.68 | 35.9000 | -6.8800 | -7.5000 |
| 492.00 | 6366810.60 | 1552508.67 | 480.27 | RT90-RHB70 | -85.47 | 72.33 | 36.1400 | -6.9000 | -7.5300 |

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|---|---|---|---|---|---|---|---|---|---|
| 495.00 | 6366810.67 | 1552508.89 | 483.26 | RT90-RHB70 | -85.49 | 72.14 | 36.3700 | -6.9200 | -7.5600 |
| 498.00 | 6366810.74 | 1552509.12 | 486.25 | RT90-RHB70 | -85.49 | 72.22 | 36.6100 | -6.9400 | -7.5900 |
| 501.00 | 6366810.81 | 1552509.34 | 489.24 | RT90-RHB70 | -85.46 | 72.20 | 36.8400 | -6.9600 | -7.6200 |
| 504.00 | 6366810.89 | 1552509.57 | 492.23 | RT90-RHB70 | -85.42 | 72.15 | 37.0800 | -6.9800 | -7.6500 |
| 507.00 | 6366810.96 | 1552509.80 | 495.22 | RT90-RHB70 | -85.40 | 72.26 | 37.3200 | -7.0000 | -7.6800 |
| 510.00 | 6366811.03 | 1552510.03 | 498.21 | RT90-RHB70 | -85.41 | 72.36 | 37.5600 | -7.0200 | -7.7100 |
| 513.00 | 6366811.11 | 1552510.25 | 501.20 | RT90-RHB70 | -85.38 | 72.33 | 37.8000 | -7.0400 | -7.7400 |
| 516.00 | 6366811.18 | 1552510.48 | 504.19 | RT90-RHB70 | -85.38 | 72.41 | 38.0400 | -7.0600 | -7.7600 |
| 519.00 | 6366811.25 | 1552510.71 | 507.18 | RT90-RHB70 | -85.38 | 72.56 | 38.2800 | -7.0800 | -7.7900 |
| 522.00 | 6366811.32 | 1552510.95 | 510.17 | RT90-RHB70 | -85.38 | 72.90 | 38.5200 | -7.1000 | -7.8100 |
| 525.00 | 6366811.40 | 1552511.18 | 513.16 | RT90-RHB70 | -85.40 | 73.59 | 38.7600 | -7.1200 | -7.8400 |
| 528.00 | 6366811.46 | 1552511.41 | 516.15 | RT90-RHB70 | -85.40 | 73.87 | 39.0000 | -7.1300 | -7.8600 |
| 531.00 | 6366811.53 | 1552511.64 | 519.14 | RT90-RHB70 | -85.41 | 74.13 | 39.2400 | -7.1400 | -7.8900 |
| 534.00 | 6366811.60 | 1552511.87 | 522.13 | RT90-RHB70 | -85.43 | 74.20 | 39.4800 | -7.1600 | -7.9200 |
| 537.00 | 6366811.66 | 1552512.10 | 525.12 | RT90-RHB70 | -85.43 | 74.18 | 39.7200 | -7.1700 | -7.9400 |
| 540.00 | 6366811.73 | 1552512.33 | 528.11 | RT90-RHB70 | -85.42 | 74.20 | 39.9600 | -7.1800 | -7.9700 |
| 543.00 | 6366811.79 | 1552512.56 | 531.10 | RT90-RHB70 | -85.43 | 74.43 | 40.2000 | -7.1900 | -8.0000 |
| 546.00 | 6366811.86 | 1552512.79 | 534.09 | RT90-RHB70 | -85.41 | 74.57 | 40.4400 | -7.2000 | -8.0200 |
| 549.00 | 6366811.92 | 1552513.02 | 537.08 | RT90-RHB70 | -85.39 | 74.76 | 40.6800 | -7.2100 | -8.0500 |
| 552.00 | 6366811.98 | 1552513.25 | 540.07 | RT90-RHB70 | -85.39 | 75.17 | 40.9200 | -7.2200 | -8.0800 |
| 555.00 | 6366812.04 | 1552513.49 | 543.06 | RT90-RHB70 | -85.38 | 75.66 | 41.1600 | -7.2300 | -8.1000 |
| 558.00 | 6366812.10 | 1552513.72 | 546.05 | RT90-RHB70 | -85.37 | 75.99 | 41.4000 | -7.2400 | -8.1300 |
| 561.00 | 6366812.16 | 1552513.96 | 549.04 | RT90-RHB70 | -85.37 | 76.07 | 41.6400 | -7.2400 | -8.1500 |
| 564.00 | 6366812.22 | 1552514.19 | 552.03 | RT90-RHB70 | -85.36 | 76.44 | 41.8900 | -7.2500 | -8.1800 |
| 567.00 | 6366812.28 | 1552514.43 | 555.02 | RT90-RHB70 | -85.35 | 76.42 | 42.1300 | -7.2500 | -8.2000 |
| 570.00 | 6366812.33 | 1552514.66 | 558.01 | RT90-RHB70 | -85.36 | 76.23 | 42.3700 | -7.2500 | -8.2200 |
| 573.00 | 6366812.39 | 1552514.90 | 561.00 | RT90-RHB70 | -85.38 | 76.03 | 42.6100 | -7.2500 | -8.2500 |
| 576.00 | 6366812.45 | 1552515.13 | 564.00 | RT90-RHB70 | -85.37 | 76.31 | 42.8600 | -7.2600 | -8.2700 |
| 579.00 | 6366812.51 | 1552515.37 | 566.99 | RT90-RHB70 | -85.36 | 76.42 | 43.1000 | -7.2600 | -8.2900 |
| 582.00 | 6366812.57 | 1552515.60 | 569.98 | RT90-RHB70 | -85.38 | 76.47 | 43.3400 | -7.2600 | -8.3200 |
| 585.00 | 6366812.62 | 1552515.84 | 572.97 | RT90-RHB70 | -85.36 | 76.33 | 43.5800 | -7.2700 | -8.3400 |
| 588.00 | 6366812.68 | 1552516.08 | 575.96 | RT90-RHB70 | -85.34 | 76.43 | 43.8200 | -7.2700 | -8.3700 |
| 591.00 | 6366812.74 | 1552516.31 | 578.95 | RT90-RHB70 | -85.33 | 76.61 | 44.0700 | -7.2700 | -8.3900 |
| 594.00 | 6366812.79 | 1552516.55 | 581.94 | RT90-RHB70 | -85.31 | 76.48 | 44.3100 | -7.2700 | -8.4100 |
| 597.00 | 6366812.85 | 1552516.79 | 584.93 | RT90-RHB70 | -85.31 | 76.28 | 44.5600 | -7.2800 | -8.4300 |
| 600.00 | 6366812.91 | 1552517.03 | 587.92 | RT90-RHB70 | -85.31 | 76.42 | 44.8000 | -7.2800 | -8.4500 |
| 603.00 | 6366812.97 | 1552517.26 | 590.91 | RT90-RHB70 | -85.30 | 77.02 | 45.0500 | -7.2800 | -8.4700 |
| 606.00 | 6366813.02 | 1552517.50 | 593.90 | RT90-RHB70 | -85.30 | 77.07 | 45.2900 | -7.2800 | -8.4900 |
| 609.00 | 6366813.08 | 1552517.74 | 596.89 | RT90-RHB70 | -85.28 | 77.50 | 45.5400 | -7.2800 | -8.5100 |
| 612.00 | 6366813.13 | 1552517.98 | 599.88 | RT90-RHB70 | -85.27 | 77.62 | 45.7900 | -7.2800 | -8.5300 |
| 615.00 | 6366813.18 | 1552518.23 | 602.87 | RT90-RHB70 | -85.25 | 77.73 | 46.0300 | -7.2800 | -8.5500 |
| 618.00 | 6366813.24 | 1552518.47 | 605.86 | RT90-RHB70 | -85.22 | 77.85 | 46.2800 | -7.2700 | -8.5700 |
| 621.00 | 6366813.29 | 1552518.71 | 608.84 | RT90-RHB70 | -85.19 | 77.97 | 46.5300 | -7.2700 | -8.5900 |

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|---|---|---|---|---|---|---|---|---|---|
| 624.00 | 6366813.34 | 1552518.96 | 611.83 | RT90-RHB70 | -85.18 | 78.27 | 46.7800 | -7.2700 | -8.6000 |
| 627.00 | 6366813.39 | 1552519.21 | 614.82 | RT90-RHB70 | -85.18 | 78.63 | 47.0400 | -7.2600 | -8.6200 |
| 630.00 | 6366813.44 | 1552519.45 | 617.81 | RT90-RHB70 | -85.18 | 78.96 | 47.2900 | -7.2500 | -8.6300 |
| 633.00 | 6366813.49 | 1552519.70 | 620.80 | RT90-RHB70 | -85.17 | 79.20 | 47.5400 | -7.2400 | -8.6400 |
| 636.00 | 6366813.54 | 1552519.95 | 623.79 | RT90-RHB70 | -85.15 | 79.44 | 47.7900 | -7.2400 | -8.6600 |
| 639.00 | 6366813.58 | 1552520.20 | 626.78 | RT90-RHB70 | -85.15 | 79.47 | 48.0500 | -7.2200 | -8.6700 |
| 642.00 | 6366813.63 | 1552520.45 | 629.77 | RT90-RHB70 | -85.15 | 79.45 | 48.3000 | -7.2100 | -8.6800 |
| 645.00 | 6366813.68 | 1552520.70 | 632.76 | RT90-RHB70 | -85.15 | 79.26 | 48.5500 | -7.2000 | -8.7000 |
| 648.00 | 6366813.72 | 1552520.95 | 635.75 | RT90-RHB70 | -85.17 | 79.17 | 48.8100 | -7.1900 | -8.7100 |
| 651.00 | 6366813.77 | 1552521.19 | 638.74 | RT90-RHB70 | -85.18 | 79.24 | 49.0600 | -7.1800 | -8.7200 |
| 654.00 | 6366813.82 | 1552521.44 | 641.73 | RT90-RHB70 | -85.17 | 78.98 | 49.3100 | -7.1700 | -8.7400 |
| 657.00 | 6366813.87 | 1552521.69 | 644.72 | RT90-RHB70 | -85.15 | 78.80 | 49.5600 | -7.1700 | -8.7500 |
| 660.00 | 6366813.92 | 1552521.94 | 647.71 | RT90-RHB70 | -85.13 | 78.66 | 49.8200 | -7.1600 | -8.7600 |
| 663.00 | 6366813.97 | 1552522.19 | 650.70 | RT90-RHB70 | -85.13 | 78.41 | 50.0700 | -7.1500 | -8.7800 |
| 666.00 | 6366814.02 | 1552522.44 | 653.68 | RT90-RHB70 | -85.14 | 78.28 | 50.3200 | -7.1400 | -8.7900 |
| 669.00 | 6366814.07 | 1552522.69 | 656.67 | RT90-RHB70 | -85.16 | 78.12 | 50.5800 | -7.1400 | -8.8000 |
| 672.00 | 6366814.12 | 1552522.93 | 659.66 | RT90-RHB70 | -85.18 | 77.81 | 50.8300 | -7.1300 | -8.8100 |
| 675.00 | 6366814.17 | 1552523.18 | 662.65 | RT90-RHB70 | -85.20 | 77.64 | 51.0800 | -7.1300 | -8.8300 |
| 678.00 | 6366814.23 | 1552523.43 | 665.64 | RT90-RHB70 | -85.21 | 77.60 | 51.3400 | -7.1300 | -8.8400 |
| 681.00 | 6366814.28 | 1552523.67 | 668.63 | RT90-RHB70 | -85.20 | 77.57 | 51.5900 | -7.1300 | -8.8600 |
| 684.00 | 6366814.34 | 1552523.92 | 671.62 | RT90-RHB70 | -85.19 | 77.70 | 51.8400 | -7.1200 | -8.8700 |
| 687.00 | 6366814.39 | 1552524.16 | 674.61 | RT90-RHB70 | -85.17 | 77.88 | 52.0900 | -7.1200 | -8.8900 |
| 690.00 | 6366814.44 | 1552524.41 | 677.60 | RT90-RHB70 | -85.16 | 78.13 | 52.3400 | -7.1200 | -8.9000 |
| 693.00 | 6366814.49 | 1552524.66 | 680.59 | RT90-RHB70 | -85.15 | 78.38 | 52.5900 | -7.1100 | -8.9100 |
| 696.00 | 6366814.55 | 1552524.90 | 683.58 | RT90-RHB70 | -85.15 | 78.50 | 52.8500 | -7.1100 | -8.9300 |
| 699.00 | 6366814.60 | 1552525.15 | 686.57 | RT90-RHB70 | -85.16 | 78.61 | 53.1000 | -7.1000 | -8.9400 |
| 702.00 | 6366814.65 | 1552525.40 | 689.56 | RT90-RHB70 | -85.16 | 78.71 | 53.3500 | -7.0900 | -8.9500 |
| 705.00 | 6366814.70 | 1552525.65 | 692.55 | RT90-RHB70 | -85.16 | 78.71 | 53.6100 | -7.0800 | -8.9700 |
| 708.00 | 6366814.74 | 1552525.90 | 695.54 | RT90-RHB70 | -85.18 | 79.05 | 53.8600 | -7.0800 | -8.9800 |
| 711.00 | 6366814.79 | 1552526.14 | 698.52 | RT90-RHB70 | -85.19 | 79.55 | 54.1100 | -7.0700 | -8.9900 |
| 714.00 | 6366814.84 | 1552526.39 | 701.51 | RT90-RHB70 | -85.22 | 79.71 | 54.3600 | -7.0600 | -9.0100 |
| 717.00 | 6366814.88 | 1552526.64 | 704.50 | RT90-RHB70 | -85.24 | 80.28 | 54.6100 | -7.0500 | -9.0300 |
| 720.00 | 6366814.93 | 1552526.88 | 707.49 | RT90-RHB70 | -85.25 | 80.82 | 54.8600 | -7.0300 | -9.0400 |
| 723.00 | 6366814.96 | 1552527.13 | 710.48 | RT90-RHB70 | -85.23 | 81.18 | 55.1100 | -7.0100 | -9.0600 |
| 726.00 | 6366815.00 | 1552527.38 | 713.47 | RT90-RHB70 | -85.21 | 81.15 | 55.3600 | -7.0000 | -9.0800 |
| 729.00 | 6366815.04 | 1552527.62 | 716.46 | RT90-RHB70 | -85.20 | 81.13 | 55.6100 | -6.9800 | -9.0900 |
| 732.00 | 6366815.08 | 1552527.87 | 719.45 | RT90-RHB70 | -85.19 | 81.34 | 55.8600 | -6.9600 | -9.1100 |
| 735.00 | 6366815.12 | 1552528.12 | 722.44 | RT90-RHB70 | -85.19 | 81.57 | 56.1100 | -6.9400 | -9.1300 |
| 738.00 | 6366815.15 | 1552528.37 | 725.43 | RT90-RHB70 | -85.20 | 81.39 | 56.3600 | -6.9200 | -9.1400 |
| 741.00 | 6366815.19 | 1552528.62 | 728.42 | RT90-RHB70 | -85.18 | 81.72 | 56.6100 | -6.9000 | -9.1600 |
| 744.00 | 6366815.23 | 1552528.87 | 731.41 | RT90-RHB70 | -85.18 | 82.17 | 56.8600 | -6.8800 | -9.1700 |
| 747.00 | 6366815.26 | 1552529.12 | 734.40 | RT90-RHB70 | -85.16 | 82.32 | 57.1100 | -6.8600 | -9.1900 |
| 750.00 | 6366815.30 | 1552529.37 | 737.39 | RT90-RHB70 | -85.15 | 82.23 | 57.3600 | -6.8400 | -9.2000 |

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|---|---|---|---|---|---|---|---|---|---|
| 753.00 | 6366815.33 | 1552529.62 | 740.38 | RT90-RHB70 | -85.14 | 82.05 | 57.6200 | -6.8100 | -9.2100 |
| 756.00 | 6366815.37 | 1552529.87 | 743.37 | RT90-RHB70 | -85.11 | 82.43 | 57.8700 | -6.7900 | -9.2300 |
| 759.00 | 6366815.40 | 1552530.12 | 746.36 | RT90-RHB70 | -85.09 | 82.17 | 58.1300 | -6.7700 | -9.2400 |
| 762.00 | 6366815.44 | 1552530.38 | 749.34 | RT90-RHB70 | -85.10 | 81.87 | 58.3800 | -6.7400 | -9.2500 |
| 765.00 | 6366815.47 | 1552530.63 | 752.33 | RT90-RHB70 | -85.11 | 82.01 | 58.6400 | -6.7200 | -9.2600 |
| 768.00 | 6366815.51 | 1552530.88 | 755.32 | RT90-RHB70 | -85.12 | 82.03 | 58.8900 | -6.7000 | -9.2700 |
| 771.00 | 6366815.54 | 1552531.14 | 758.31 | RT90-RHB70 | -85.08 | 82.11 | 59.1500 | -6.6800 | -9.2800 |
| 774.00 | 6366815.58 | 1552531.39 | 761.30 | RT90-RHB70 | -85.05 | 82.04 | 59.4000 | -6.6600 | -9.2900 |
| 777.00 | 6366815.61 | 1552531.65 | 764.29 | RT90-RHB70 | -85.01 | 82.14 | 59.6600 | -6.6300 | -9.3000 |
| 780.00 | 6366815.65 | 1552531.91 | 767.28 | RT90-RHB70 | -84.97 | 82.14 | 59.9200 | -6.6100 | -9.3100 |
| 783.00 | 6366815.69 | 1552532.17 | 770.27 | RT90-RHB70 | -84.95 | 81.97 | 60.1800 | -6.5900 | -9.3100 |
| 786.00 | 6366815.72 | 1552532.43 | 773.26 | RT90-RHB70 | -84.94 | 81.88 | 60.4400 | -6.5600 | -9.3200 |
| 789.00 | 6366815.76 | 1552532.69 | 776.24 | RT90-RHB70 | -84.93 | 81.61 | 60.7100 | -6.5400 | -9.3200 |
| 792.00 | 6366815.80 | 1552532.95 | 779.23 | RT90-RHB70 | -84.93 | 81.54 | 60.9700 | -6.5200 | -9.3200 |
| 795.00 | 6366815.84 | 1552533.21 | 782.22 | RT90-RHB70 | -84.96 | 81.73 | 61.2400 | -6.5000 | -9.3200 |
| 798.00 | 6366815.88 | 1552533.48 | 785.21 | RT90-RHB70 | -84.95 | 81.94 | 61.5000 | -6.4800 | -9.3300 |
| 801.00 | 6366815.91 | 1552533.74 | 788.20 | RT90-RHB70 | -84.95 | 82.19 | 61.7600 | -6.4500 | -9.3300 |
| 804.00 | 6366815.95 | 1552534.00 | 791.19 | RT90-RHB70 | -84.94 | 82.23 | 62.0200 | -6.4300 | -9.3300 |
| 807.00 | 6366815.98 | 1552534.26 | 794.17 | RT90-RHB70 | -84.91 | 82.34 | 62.2900 | -6.4100 | -9.3400 |
| 810.00 | 6366816.02 | 1552534.52 | 797.16 | RT90-RHB70 | -84.89 | 82.43 | 62.5500 | -6.3800 | -9.3400 |
| 813.00 | 6366816.05 | 1552534.79 | 800.15 | RT90-RHB70 | -84.86 | 82.61 | 62.8200 | -6.3600 | -9.3400 |
| 816.00 | 6366816.09 | 1552535.06 | 803.14 | RT90-RHB70 | -84.87 | 83.10 | 63.0900 | -6.3300 | -9.3400 |
| 819.00 | 6366816.12 | 1552535.32 | 806.13 | RT90-RHB70 | -84.86 | 83.67 | 63.3500 | -6.3000 | -9.3300 |
| 822.00 | 6366816.15 | 1552535.59 | 809.11 | RT90-RHB70 | -84.85 | 83.77 | 63.6200 | -6.2700 | -9.3300 |
| 825.00 | 6366816.18 | 1552535.86 | 812.10 | RT90-RHB70 | -84.83 | 83.61 | 63.8900 | -6.2400 | -9.3300 |
| 828.00 | 6366816.21 | 1552536.13 | 815.09 | RT90-RHB70 | -84.82 | 83.75 | 64.1600 | -6.2100 | -9.3300 |
| 831.00 | 6366816.24 | 1552536.40 | 818.08 | RT90-RHB70 | -84.79 | 83.88 | 64.4300 | -6.1800 | -9.3300 |
| 834.00 | 6366816.27 | 1552536.67 | 821.06 | RT90-RHB70 | -84.76 | 84.01 | 64.7000 | -6.1500 | -9.3200 |
| 837.00 | 6366816.30 | 1552536.94 | 824.05 | RT90-RHB70 | -84.76 | 84.05 | 64.9700 | -6.1100 | -9.3200 |
| 840.00 | 6366816.33 | 1552537.21 | 827.04 | RT90-RHB70 | -84.75 | 83.99 | 65.2400 | -6.0800 | -9.3100 |
| 843.00 | 6366816.35 | 1552537.48 | 830.03 | RT90-RHB70 | -84.74 | 84.05 | 65.5100 | -6.0500 | -9.3000 |
| 846.00 | 6366816.38 | 1552537.76 | 833.01 | RT90-RHB70 | -84.74 | 84.37 | 65.7900 | -6.0100 | -9.3000 |
| 849.00 | 6366816.41 | 1552538.03 | 836.00 | RT90-RHB70 | -84.75 | 84.86 | 66.0600 | -5.9800 | -9.2900 |
| 852.00 | 6366816.43 | 1552538.30 | 838.99 | RT90-RHB70 | -84.74 | 84.99 | 66.3300 | -5.9400 | -9.2900 |
| 855.00 | 6366816.46 | 1552538.58 | 841.98 | RT90-RHB70 | -84.69 | 84.94 | 66.6000 | -5.9000 | -9.2800 |
| 858.00 | 6366816.48 | 1552538.86 | 844.96 | RT90-RHB70 | -84.69 | 84.83 | 66.8800 | -5.8600 | -9.2700 |
| 861.00 | 6366816.51 | 1552539.13 | 847.95 | RT90-RHB70 | -84.69 | 84.17 | 67.1500 | -5.8200 | -9.2600 |
| 864.00 | 6366816.54 | 1552539.41 | 850.94 | RT90-RHB70 | -84.67 | 84.05 | 67.4300 | -5.7900 | -9.2500 |
| 867.00 | 6366816.57 | 1552539.69 | 853.92 | RT90-RHB70 | -84.68 | 84.18 | 67.7000 | -5.7600 | -9.2400 |
| 870.00 | 6366816.59 | 1552539.96 | 856.91 | RT90-RHB70 | -84.74 | 84.11 | 67.9800 | -5.7200 | -9.2300 |
| 873.00 | 6366816.62 | 1552540.24 | 859.90 | RT90-RHB70 | -84.83 | 84.02 | 68.2500 | -5.6900 | -9.2200 |
| 876.00 | 6366816.65 | 1552540.50 | 862.89 | RT90-RHB70 | -84.85 | 83.99 | 68.5200 | -5.6500 | -9.2200 |
| 879.00 | 6366816.68 | 1552540.77 | 865.87 | RT90-RHB70 | -84.86 | 84.19 | 68.7900 | -5.6200 | -9.2200 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 882.00 | 6366816.71 | 1552541.04 | 868.86 | RT90-RHB70 | -84.85 | 84.82 | 69.0600 | -5.5900 | -9.2200 |
| 885.00 | 6366816.73 | 1552541.31 | 871.85 | RT90-RHB70 | -84.85 | 85.48 | 69.3200 | -5.5500 | -9.2200 |
| 888.00 | 6366816.75 | 1552541.58 | 874.84 | RT90-RHB70 | -84.88 | 86.35 | 69.5900 | -5.5100 | -9.2200 |
| 891.00 | 6366816.77 | 1552541.84 | 877.83 | RT90-RHB70 | -84.92 | 87.09 | 69.8500 | -5.4700 | -9.2200 |
| 894.00 | 6366816.78 | 1552542.11 | 880.81 | RT90-RHB70 | -84.97 | 87.50 | 70.1200 | -5.4200 | -9.2300 |
| 897.00 | 6366816.79 | 1552542.37 | 883.80 | RT90-RHB70 | -85.01 | 87.75 | 70.3700 | -5.3800 | -9.2300 |
| 900.00 | 6366816.80 | 1552542.63 | 886.79 | RT90-RHB70 | -85.11 | 87.80 | 70.6300 | -5.3300 | -9.2400 |
| 903.00 | 6366816.81 | 1552542.89 | 889.78 | RT90-RHB70 | -85.14 | 87.60 | 70.8800 | -5.2800 | -9.2600 |
| 906.00 | 6366816.82 | 1552543.14 | 892.77 | RT90-RHB70 | -85.14 | 87.60 | 71.1300 | -5.2300 | -9.2800 |
| 909.00 | 6366816.83 | 1552543.40 | 895.76 | RT90-RHB70 | -85.11 | 87.45 | 71.3800 | -5.1900 | -9.2900 |
| 912.00 | 6366816.85 | 1552543.65 | 898.75 | RT90-RHB70 | -85.08 | 87.55 | 71.6300 | -5.1400 | -9.3100 |
| 915.00 | 6366816.86 | 1552543.91 | 901.74 | RT90-RHB70 | -85.08 | 87.89 | 71.8900 | -5.0900 | -9.3200 |
| 918.00 | 6366816.87 | 1552544.17 | 904.73 | RT90-RHB70 | -85.10 | 88.22 | 72.1400 | -5.0400 | -9.3300 |
| 921.00 | 6366816.87 | 1552544.42 | 907.72 | RT90-RHB70 | -85.09 | 88.60 | 72.3900 | -4.9900 | -9.3500 |
| 924.00 | 6366816.88 | 1552544.68 | 910.70 | RT90-RHB70 | -85.05 | 88.43 | 72.6400 | -4.9400 | -9.3600 |
| 927.00 | 6366816.89 | 1552544.94 | 913.69 | RT90-RHB70 | -85.05 | 88.10 | 72.8900 | -4.8900 | -9.3800 |
| 930.00 | 6366816.90 | 1552545.20 | 916.68 | RT90-RHB70 | -85.07 | 88.22 | 73.1500 | -4.8400 | -9.3900 |
| 933.00 | 6366816.90 | 1552545.45 | 919.67 | RT90-RHB70 | -85.08 | 88.61 | 73.4000 | -4.7900 | -9.4000 |
| 936.00 | 6366816.91 | 1552545.71 | 922.66 | RT90-RHB70 | -85.09 | 88.92 | 73.6500 | -4.7400 | -9.4100 |
| 939.00 | 6366816.91 | 1552545.97 | 925.65 | RT90-RHB70 | -85.11 | 89.30 | 73.9000 | -4.6900 | -9.4300 |
| 942.00 | 6366816.92 | 1552546.22 | 928.64 | RT90-RHB70 | -85.11 | 89.70 | 74.1500 | -4.6300 | -9.4500 |
| 945.00 | 6366816.92 | 1552546.48 | 931.63 | RT90-RHB70 | -85.11 | 89.60 | 74.4000 | -4.5800 | -9.4600 |
| 948.00 | 6366816.92 | 1552546.73 | 934.62 | RT90-RHB70 | -85.11 | 89.19 | 74.6500 | -4.5200 | -9.4800 |
| 951.00 | 6366816.92 | 1552546.99 | 937.61 | RT90-RHB70 | -85.13 | 88.69 | 74.9000 | -4.4700 | -9.5000 |
| 954.00 | 6366816.93 | 1552547.24 | 940.59 | RT90-RHB70 | -85.11 | 88.05 | 75.1500 | -4.4200 | -9.5100 |
| 957.00 | 6366816.94 | 1552547.50 | 943.58 | RT90-RHB70 | -85.11 | 87.77 | 75.4000 | -4.3700 | -9.5300 |
| 960.00 | 6366816.95 | 1552547.76 | 946.57 | RT90-RHB70 | -85.19 | 87.63 | 75.6600 | -4.3200 | -9.5400 |
| 963.00 | 6366816.96 | 1552548.01 | 949.56 | RT90-RHB70 | -85.38 | 87.23 | 75.9000 | -4.2700 | -9.5600 |
| 966.00 | 6366816.97 | 1552548.25 | 952.55 | RT90-RHB70 | -85.54 | 86.32 | 76.1400 | -4.2300 | -9.5900 |
| 969.00 | 6366816.99 | 1552548.48 | 955.54 | RT90-RHB70 | -85.57 | 85.73 | 76.3700 | -4.1900 | -9.6200 |
| 972.00 | 6366817.00 | 1552548.71 | 958.53 | RT90-RHB70 | -85.56 | 85.78 | 76.6000 | -4.1600 | -9.6600 |
| 975.00 | 6366817.02 | 1552548.94 | 961.53 | RT90-RHB70 | -85.55 | 85.88 | 76.8300 | -4.1200 | -9.7000 |
| 978.00 | 6366817.04 | 1552549.18 | 964.52 | RT90-RHB70 | -85.55 | 86.50 | 77.0600 | -4.0900 | -9.7300 |
| 981.00 | 6366817.05 | 1552549.41 | 967.51 | RT90-RHB70 | -85.54 | 86.91 | 77.2900 | -4.0500 | -9.7700 |
| 984.00 | 6366817.06 | 1552549.64 | 970.50 | RT90-RHB70 | -85.54 | 87.19 | 77.5200 | -4.0100 | -9.8100 |
| 987.00 | 6366817.08 | 1552549.87 | 973.49 | RT90-RHB70 | -85.54 | 87.10 | 77.7500 | -3.9700 | -9.8400 |
| 990.00 | 6366817.09 | 1552550.11 | 976.48 | RT90-RHB70 | -85.52 | 87.25 | 77.9800 | -3.9300 | -9.8800 |
| 996.00 | 6366817.11 | 1552550.58 | 982.46 | RT90-RHB70 | -85.50 | 87.22 | 78.4400 | -3.8400 | -9.9500 |

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## Appendix 10

# In data: Reference marks for length adjustments for KAV04A and KAV04B

## Reference Mark T - Reference mark in drillhole

### KAV04A, 2004-05-01 13:00:00 - 2004-05-05 10:30:00 (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 | 290 | -1000 | 32.0 | 138 | Yes | | |
| 150.00 | 400.00 | 260 | -1000 | 32.0 | 198 | Yes | | |
| 200.00 | 400.00 | 260 | -1000 | 40.0 | 240 | Yes | | |
| 250.00 | 400.00 | 260 | -1000 | 45.0 | 360 | Yes | | |
| 300.00 | 400.00 | 240 | -1000 | 45.0 | 240 | Yes | | |
| 350.00 | 400.00 | 240 | -1000 | 46.0 | 360 | Yes | | |
| 400.00 | 400.00 | 240 | -1000 | 38.0 | 138 | Yes | | |
| 451.00 | 400.00 | 260 | -1000 | 42.0 | 198 | Yes | | |
| 500.00 | 400.00 | 260 | -1000 | 44.0 | 258 | Yes | | |
| 550.00 | 400.00 | 260 | -1000 | 48.0 | 360 | Yes | | |
| 600.00 | 400.00 | 260 | -1000 | 46.0 | 183 | Yes | | |
| 650.00 | 400.00 | 240 | -1000 | 48.0 | 252 | Yes | | |
| 700.00 | 400.00 | 260 | -1000 | | | Yes | | Inget tryckfall, spår? Ja |
| 750.00 | 400.00 | 280 | -1000 | 50.0 | 310 | Yes | | |
| 800.00 | 400.00 | 260 | -1000 | 50.0 | 256 | Yes | | |
| 846.00 | 400.00 | 260 | -1000 | 48.0 | 186 | Yes | | |
| 900.00 | 400.00 | 240 | -1000 | 45.0 | 207 | Yes | | |
| 950.00 | 400.00 | 240 | -1000 | 38.0 | 210 | Yes | | |

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