P-03-116

Forsmark site investigation

Boremap mapping of telescopic drilled borehole KFM03A and core drilled borehole KFM03B

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November 2003

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Contents

1 Introduction

Since 2002, SKB investigates two potential sites for a deep repository in the Swedish Precambrian basement. In order to characterise the rock mass down to a depth of about 1 km at one of these sites, the Forsmark test site area, SKB has initiated a drilling program starting with three deep telescopic boreholes (Figure 1-1). Each borehole starts with 100 m of percussion drilling, and is followed by core drilling down to about 1000 m depth.

A detailed mapping of the material obtained through the drilling program is essential for more specific sampling and for three-dimensional modelling of the site geology. For the purpose, the so-called Boremap system has been developed. The system integrates information from drill core mapping, or alternatively, the drill cuttings when a core is not available, with results from BIPS-logging (Borehole Image Processing System) and calculates the absolute position and orientation of fractures and various lithological features /1/.

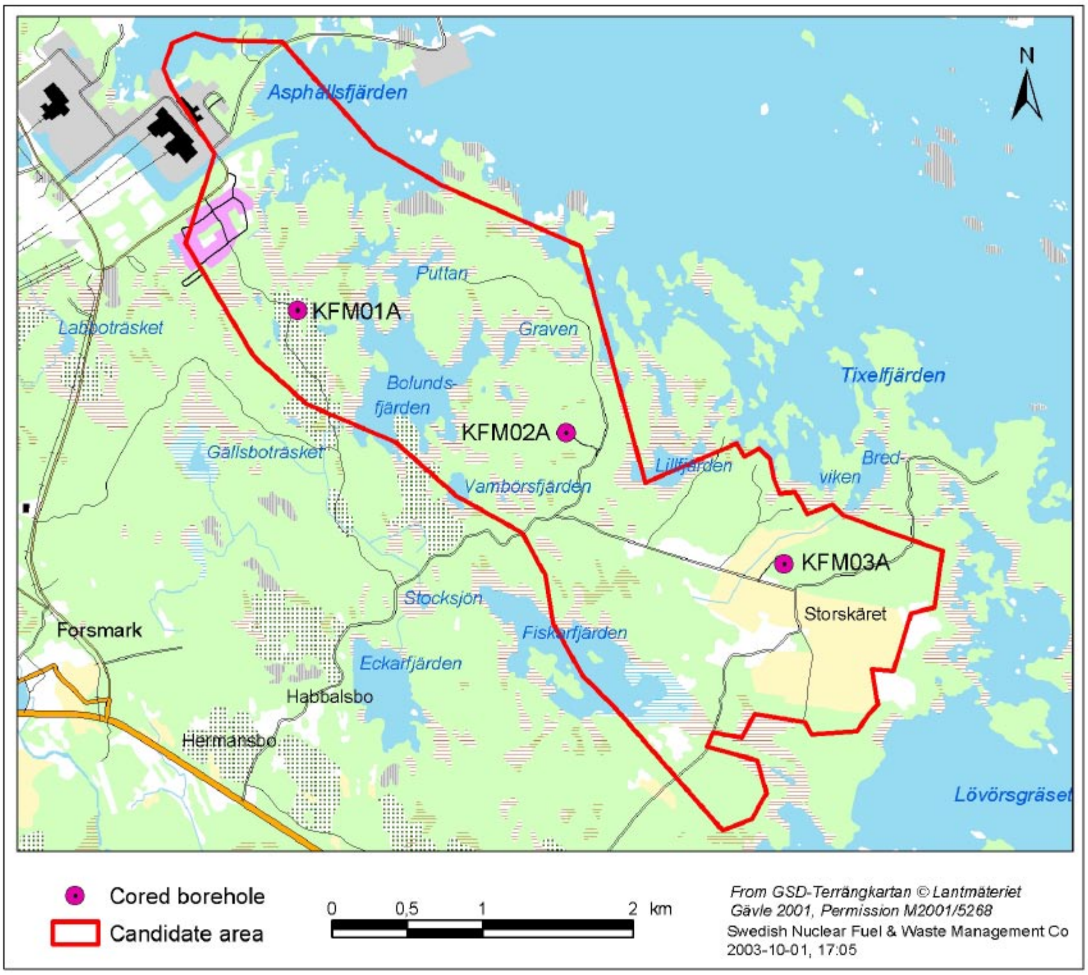


Figure 1-1. *Location of telescopic drilled borehole KFM03A in the Forsmark test site area.*

The third of these deep telescopic boreholes, KFM03A, was finished in the middle of June 2003. To obtain a drill core for the upper 100 m of the third drill site (DS3), an additional borehole, KFM03B, was drilled adjacent to KFM03A.

This report presents the results from the Boremap-mapping of KFM03A and KFM03B. It also gives a brief discussion of the results in a larger context, relative to the data from borehole KFM01A, KFM02A and the surface geology.

2 Objective and scope

The aim of the mapping activities is to obtain a detailed documentation of *all* structures and lithologies intersected by telescopic borehole KFM03A and KFM03B. This in turn will serve as a platform for forthcoming analyses of the drill core, aimed at investigating geological, petrophysical and mechanical aspects of the rock volume, as well as site descriptive modelling.

3 Equipment

3.1 Description of equipment

All BIPS-based mapping was performed in Boremap v 3.2. This software contains the bedrock and mineral standard used by the Geological Survey of Sweden (SGU) for surface mapping at the Forsmark investigation site to enable correlation with the surface geology. Additional software used during the course of the mapping was BIPS Viewer v 1.10 and Microsoft Access. The final data presentation was made by Dips v 5.050 and WellCAD v 3.2.

The following equipment was used to facilitate the core mapping: folding rule, hydrochloric acid, knife, hand lens, paintbrush and tap water.

4 Execution

Telescopic borehole KFM03A starts with 100 m of percussion drilling (ϕ = 254 mm), followed by core drilling (ϕ = 77 mm) down to 1001.5 m depth. The drill core is 51 mm in diameter. The drill core from borehole KFM03B covers an interval from 0.78 to 101.54 m depth. However, a usable BIPS-image is only available for the interval 5.82–97.60 m /2/. The soil cover at DS3 is about 1 m.

The BIPS-image from the upper, percussion drilled part of KFM03A covers an interval between 11.96 and 99.92 m depth, though only the interval 11.96–36.70 m is usable for mapping. Drill cuttings were collected at 1 m intervals between 1.65 and 100.30 m depth.

During the mapping, the 1000 m drill core obtained from the interval 0.8–1001.5 m was available in its full length on roller tables in the core-mapping accommodation at Forsmark (the Llentab hall, near the SKB/SFR-office). The BIPS-based mapping was preceded by an overview mapping and initial separation of induced and natural fractures. The Swedish Geological Survey (SGU) provided reference samples from the surface mapping. No thin-sections were available from the drill cores, and all lithological descriptions are based on ocular inspection.

The mapping of KFM03A and KFM03B was performed in Boremap v 3.2 according to activity plan AP PF 400-03-54 (SKB internal controlling document) following the SKB method description for Boremap mapping, SKB MD 143.006 (v 1.0), with the exception that no geophysical logs were available.

4.1 Preparations

The length registered in the BIPS-image deviates from the true borehole length with increasing depth, and the difference at the bottom of the borehole is about 5 m. It was, therefore, necessary to adjust the length with reference to groove millings cut into the borehole wall at every 50 m. The exact level of each reference mark can be found in SKB's database SICADA (Appendix 4). Unfortunately, there are no slots at the 950 and 1000 m levels, and the correction had to rely on values obtained through linear extrapolation. However, the adjusted length is still not completely identical with the one given at the drill core, as the core recovery may yield erroneous lengths. The difference above about 800 m depth is less than two decimetres. Below that level the difference may reach up to almost 3 dm. After adjustment, the BIPS-image from the cored interval of KFM03A covers a length interval between 102.00 and 999.72 m. No length adjustments was done in the BIPS-images for KFM03B and the upper, percussion drilled 100 m of KFM03A, as the deviation from the true length is considered to be negligible (i.e. less than 0.5 m) at such shallow depths.

Data necessary for calculations of absolute orientation of structures in the borehole includes borehole diameter, azimuth and inclination, and these data were collected from SKB's database SICADA (Appendices 2 and 3). Corrections for the borehole deviation were done at every twelfth metre.

Drill cuttings were collected each metre in the upper, percussion drilled 100 m. Each sample container hosts three such samples. Where lithological differences were distinguishable between the three samples a separation was made; otherwise the content was mixed to obtain a homogeneous 3 m interval sample. The data from the mapping of the drill cuttings are stored in SKB's database SICADA (Appendix 5).

4.2 Data handling

To obtain the best possible data security, the mapping was performed on the SKB intranet, with regular back-ups on the local drive.

The mapping was quality checked by a routine in the Boremap software before it was archived. The data were subsequently exported to the SKB database SICADA and stored under field note no Forsmark 161.

4.3 Analyses and interpretation

The Boremap system has obviously some limitations, since all geological features must be represented by intersecting planar surfaces. Non-planar structures, such as small scale folding, linear objects (e.g. mineral lineation) and curved fractures can, therefore, not be correctly documented. The major problem is curved structures (e.g. fractures), which run almost parallel with the borehole axis. During the mapping sessions of KFM03A and KFM03B, such features were approximated by fitting the plane after one of their ends in the borehole. The fact that the structure did not actually intersect the borehole is only noted in the attached comments.

Another problem in the system is geological features (mainly fractures) that can be observed only in the drill core. This problem usually arises from poor resolution in the BIPS-image, which in the present case often was caused by the presence of brownish black coating on the borehole walls. However, even in the most perfect BIPS-image, it is sometimes difficult to distinguish a thin fracture sealed by some low contrast mineral. All fractures and lithological contacts observed in the drill core from KFM03A and KFM03B, but not in the BIPS-image, have been registered perpendicular to the borehole axis, regardless of their actual orientation. Almost all fractures suspected to be induced by the drilling fall within this category. Obviously drill induced fractures are not included mapped. To prevent fractures from this group to be used in forthcoming fracture orientation analysis, they were registered as "not visible in BIPS", an alternative that has become possible in v 3.2 of Boremap.

Even if reliable measurements of fracture widths/apertures less than 1 mm would be possible in the drill core, it is well beyond the BIPS-image resolution. For that reason, the minimum width/aperture given is 1 mm.

All fractures in the percussion drilled 100 m were mapped as "natural fractures". Except for calcite, it was not possible to distinguish individual infilling minerals in the BIPS-image for this interval, and the vast majority of the filling was mapped as "unknown mineral".

Fractures in intervals with core loss, are registered only if they are visible in the BIPS-image. However, it has not been possible to give any feature details, such as roughness and mineral filling, for these fractures. Thus, the only reliable information is fracture orientation, width and aperture. There are three intervals with core loss: 127.16–127.98, 398.38–398.52 and 398.73–398.83 m depth.

As in KFM01A and KFM02A, the mapping was hampered by the occurrence of brownish black coatings on the borehole walls, as mentioned above. However, the coating is often more conspicuous here than in the two previous boreholes. In the worst cases it obscures almost 60% of the borehole wall. The coating occurs sporadically throughout the core-drilled interval of the borehole, and typically forms a spiral pattern along the borehole axis with a pitch ratio of about 12–13 cm (Figure 4-1). This phenomenon is obviously drill induced, although the mechanism behind it is not fully understood. One plausible explanation is that the coatings originate from metal fragments abraded from the drill pipes, and that the spiral pattern is a consequence of wobbling of the pipe string in the borehole.

Another aggravating feature, also noted by Eva-Lena Tullborg (Terralogica AB), is that several fracture planes within the drill cores, especially those with near-horizontal orientations, are affected by drill induced grinding. Soft mineral coatings, such as calcite, chlorite and clay minerals, are thus occasionally flushed away or grinded down. The registered information for such fractures is of course defective, or even misleading.

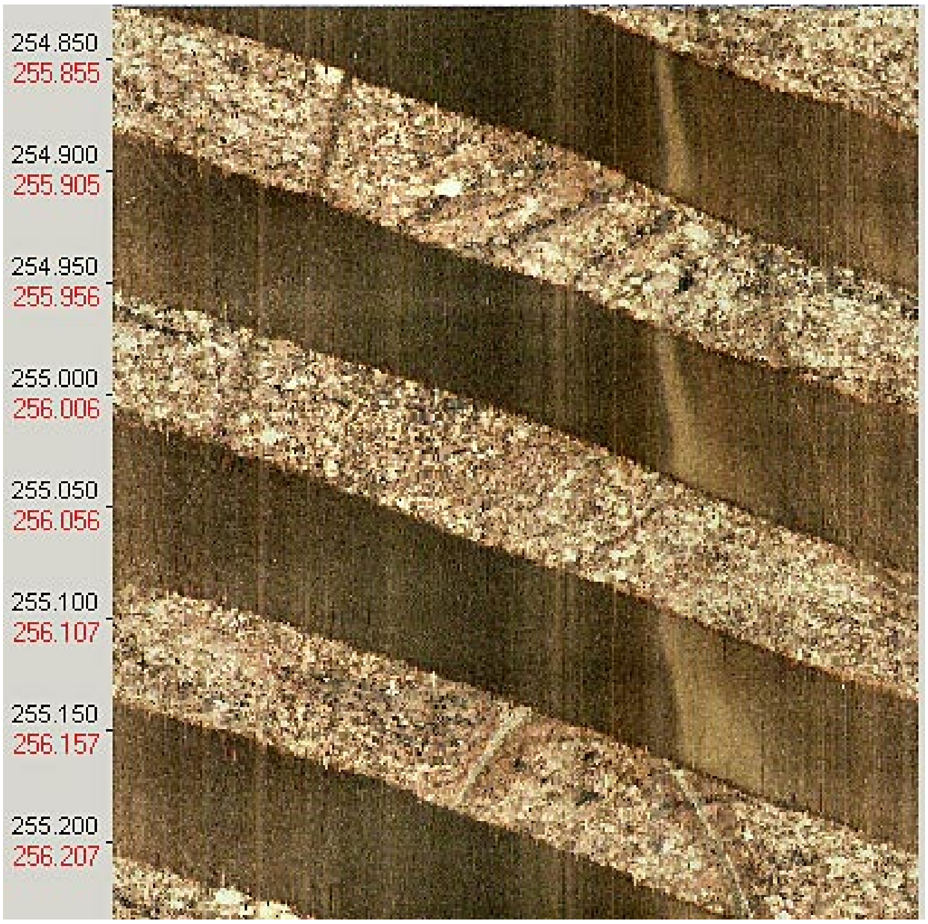


Figure 4-1. *BIPS-image from the length interval 255.83–256.24 m of borehole KFM03A, illustrating the distinct spiral pattern of brownish coating at the borehole wall.*

5 Results

5.1 Core lithology

The volumetrically most important rock type, which occupies about 63% of the total length of KFM03A and KFM03B, is a medium-grained metagranite (rock code 101057) with a tendency to be slightly granodioritic. Most conspicuous, however, is an intrusive of medium-grained metatonalite (rock code 101054) surrounded by a more fine-grained variety of metatonalite (rock code 101051). Together with a few major occurrences of pegmatite/pegmatitic granite, this intrusive extends from 220 to about 400 m depth. Major occurrences of pegmatite/pegmatitic granite are otherwise limited to the upper 100 m, i.e. borehole KFM03B in which they occupy almost 40% of the total length. Other rock units, none exceeding a few metres in length, include amphibolites, fine-grained granites and minor dykes or veins of pegmatite, aplite and leucogranite. Except for some late veins or dykes, all rocks have experienced Svecofennian metamorphism under amphibolite facies conditions.

The medium-grained metagranite(-granodiorite) (rock code 101057) is equigranular and typically greyish red to grey in colour. Completely grey varieties, lacking the reddish tint, are sparse and typically restricted to contact zones with amphibolites. However, an almost 30 m long interval of grey metagranite-granodiorite occurs just above 600 m depth. Several intervals, and especially the last hundred metres of borehole KFM03A, are variably speckled by fine-grained, whitish to brick red plagioclase. The fact that the plagioclase is randomly oriented and overgrowth the mineral fabric suggest that this feature is related to static recrystallization.

The occurrence of medium-grained metatonalite (-granodiorite) (rock code 101054) is limited to an interval between 228–296 m depth and comprise less than 4% of the cored interval of KFM03A. It is grey in colour and equigranular with an estimated content of mafic phases up to about 25 vol %. This rock is strongly associated with a fine to finely medium-grained, rather mafic metatonalite-granodiorite (rock code 101051), which is restricted to the interval 220–399 m, comprising almost 10% of the cored interval of KFM03A. The contacts between the two varieties are both sharp intrusive and gradual.

Other fine-grained, equigranular granitoids are a subordinate component in both borehole KFM03A and KFM03B, comprising less than 2% of the total length. Most rocks in this group are of inferred granitic composition and none exceed a few metres in length. All these rocks are coded as 101051, though petrographical variations and different degree of fabric development indicate that it is a composite group, which includes more than one generation.

Dykes, veins and patches of pegmatite, pegmatitic granite, aplite and leucogranitic material are frequent throughout the boreholes, and the rock group occupies almost 20% of the total drill core length. A majority of the rocks in this group exhibit a weak to faint tectonic fabric, although there are several examples of discordant and, what seems to be, massive pegmatites. However, it must be emphasized that it often was difficult to distinguish tectonic fabric visually in the pegmatitic rocks, but the fact that they appear massive does not necessarily mean that they actually are post-kinematic. Most occurrences are some decimetre or less, but several pegmatites/pegmatitic granites exceed one metre and four reaches lengths between 11 and 18 m. The pegmatitic granites are generally texturally heterogeneous, often with a highly variable grain-size. Some of the more extensive occurrences include intervals of medium-grained, equigranular granite. Minor occurrences of leucogranite and pegmatitic granite are typically irregular with blurred or indistinct contacts toward the surrounding metagranite-granodiorite. Rather coarse hematite has been identified in several pegmatites and some slightly pegmatitic leucogranites at 316–326 m depth contain molybdenite. Despite the textural variability and temporal span within this unit, these rocks were grouped as "pegmatite, pegmatitic granite" (101061) or "fine- to medium-grained granite" (111058). Also quartz veins and a few pegmatitic veins of quartz–biotite were coded as 101061.

Amphibolites (rock code 102017) occupy about 4.5% of the cored interval in KFM03A and 12% in KFM03B. Their extension and contacts are more or less parallel with the tectonic foliation. The majority is fine grained, equigranular with a large proportion of biotite. However, there are a few anomalous occurrences, including hornblende glomeroporphyric and medium-grained, equigranular varieties often with more fine-grained margins. In addition, there is a fine-grained, biotite-rich rock of inferred tonalitic to quartz dioritic composition, which is coded as amphibolite (102017). None of these occurrences exceed a 1–2 dm in length.

Five minor occurrences of fine-grained, skarn-like material, coded as "calc-silicate rock" (108019), occur in the depth interval 430–439 m. Another noteworthy feature is a fine- to medium-grained, biotite-rich metagranodiorite (rock code 101056) that occurs at 944.6–945.2 m depth.

5.2 Alteration

The presence of hydrothermally altered rocks is rather scarce in both KFM03A and KFM03B relative to borehole KFM01A and KFM02A. The most common alteration encountered is varying degrees of oxidation or red discolouration of feldspars, which occupies about 7% of the total length. With few exceptions it is associated with more intensely fractured intervals, and individual occurrences range up to a few metres in width. Other types of alterations within KFM03A include chloritization, which is more or less restricted to minor amphibolite occurrences, and two short intervals affected by muscovitization at 712.9–713.1 m and 723.7–724.0 m depth.

5.3 Ductile structures

Borehole KFM03A and KFM03B are characterised by composite L-S fabrics, usually with a predominance of linear mineral fabric. Down to a depth of about 850 m, the mineral lineation plunges gently to moderately towards SE, whereas the planar mineral fabric strikes between about NE and E-W and dips 18–51° towards SE or south (Figure 5-1). Beneath that depth, the mineral fabrics become more heterogeneous and less well-defined, possible due to recrystallization. Some intervals are almost massive. Also the structural trend changes beneath about 880 m depth, and the mineral fabrics become roughly parallel with the borehole axis.

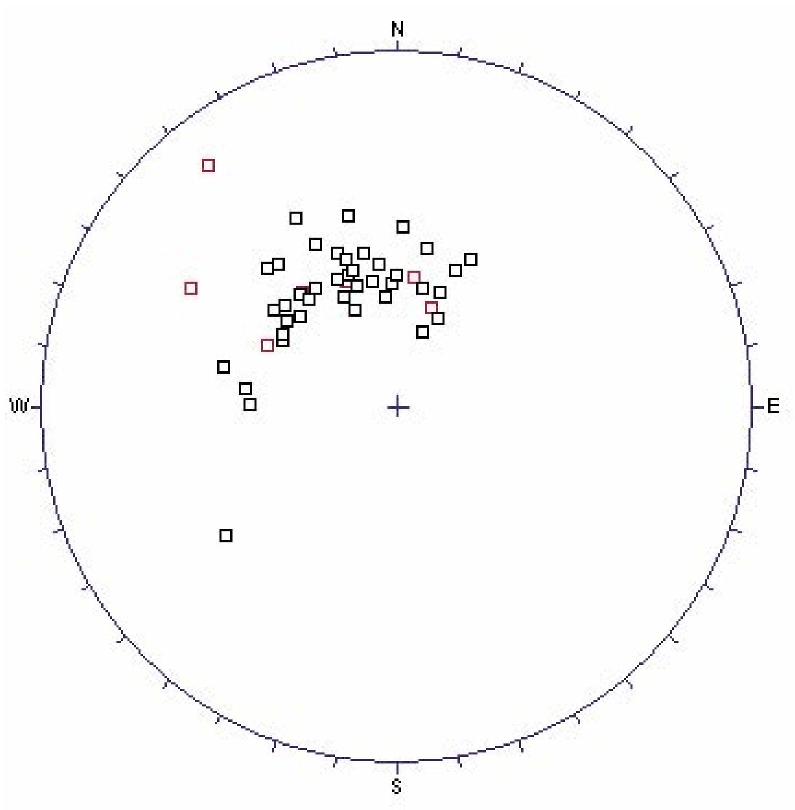


Figure 5-1. *Lower hemisphere equal-area stereographic projection showing poles to ductile foliation planes (black squares) and minor shear zones (red squares) intersected by borehole KFM03A and KFM03B.*

Minor zones of more intense ductile deformation, typically only a few centimetres wide, occur between 433 and 765 m depth in borehole KFM03A. Some reaches up to 1–2 dm in width. Only one such zone was observed within KFM03B. The rock in these zones seems to consist of a highly deformed and grain-size reduced variety of the normally medium-grained metagranite-granodiorite, and several zones are intimately associated with occurrences of amphibolite. Except for one steeply dipping zone at 581.77–581.78 m depth, they are all more or less parallel with the tectonic foliation (Figure 5-1).

5.4 Fractures

The subsequent presentation of fracture data from KFM03A centres on the division into broken and unbroken fractures, depending on whether they parting the core. The broken fractures include both open fractures and originally sealed fractures, which were broken during the drilling procedure. To decide if a fracture actually was open or sealed in the rock volume (i.e. in situ), SKB has developed a confidence classification expressed at three levels, “possible”, “probable” and “certain”, based on the weathering and fit of the fracture planes (see SKB MD 143.006, v 2.0). However, it must be emphasized that the criteria for this classification was stipulated *after* the mapping of KFM03A. A further division of the broken fractures into “open” or “sealed” based on the confidence classification is, therefore, doubtful.

5.4.1 Fracture frequencies and orientation

The total number of broken (parting the core) and unbroken (not parting the core) fractures registered within borehole KFM03A and KFM03B amounts to 1873, i.e. approximately the same as for KFM01A and KFM02A, which yielded fracture frequencies of 1.7 and 2.4 fractures/m, respectively /3, 4/. However, the fractures are more evenly distributed within KFM03A and KFM03B, and the conspicuous concentration of fractures within the upper 300 m, which characterise the previous two telescopic boreholes, is absent here. Generally, the frequency of broken and unbroken fractures varies rather coherently, with an increased number of broken fractures in intervals with concentrations of unbroken fractures. There are, however, exceptions, as illustrated by a more highly fractured interval between 356 and 394 m depth, which only include a few unbroken fractures. None of the fractures encountered in KFM03B and only nine of those found in KFM03A have measurable displacements, indicating that they were initiated or reactivated as shear fractures. Six of them exhibit a reverse sense of movement, whereas the remaining three is displaced normally. The offset is typically 2–5 cm (Figure 5-2), and all but one fault dips between 61 and 78°. No strike-slip component was observed.

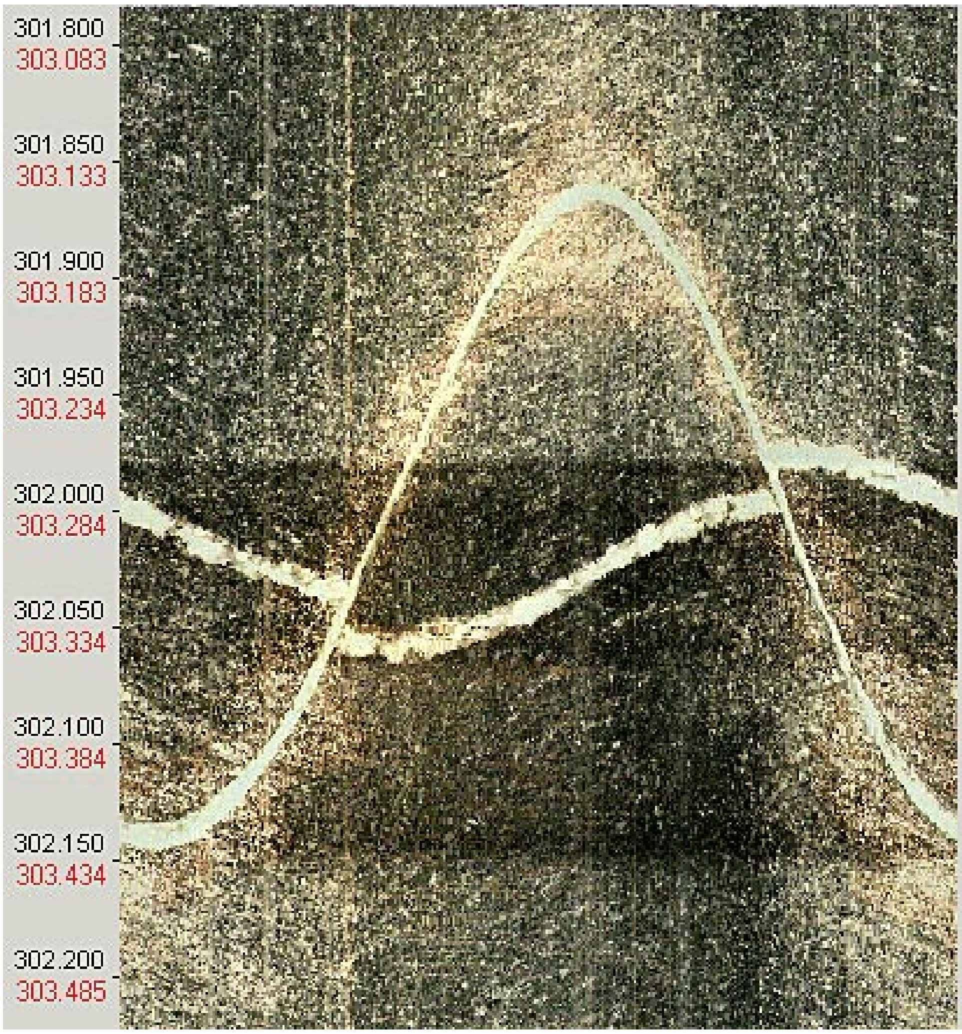
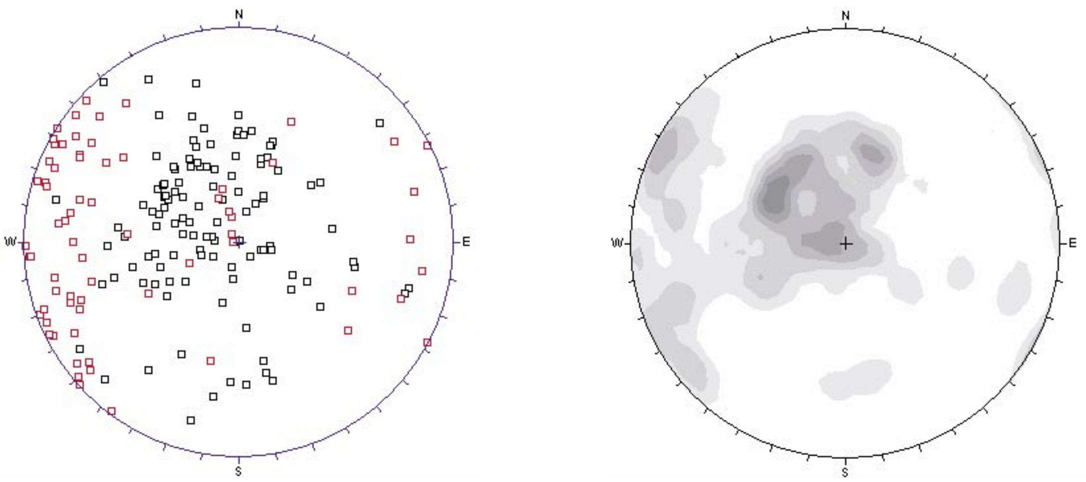


Figure 5-2. *BIPS-image from about 303.07–303.50 m depth in borehole KFM03A, showing a vein of pegmatitic granite, which has been reversely displaced along a calcite–prehnite sealed fracture with oxidized walls. Fracture orientation N12°E/79°E.*

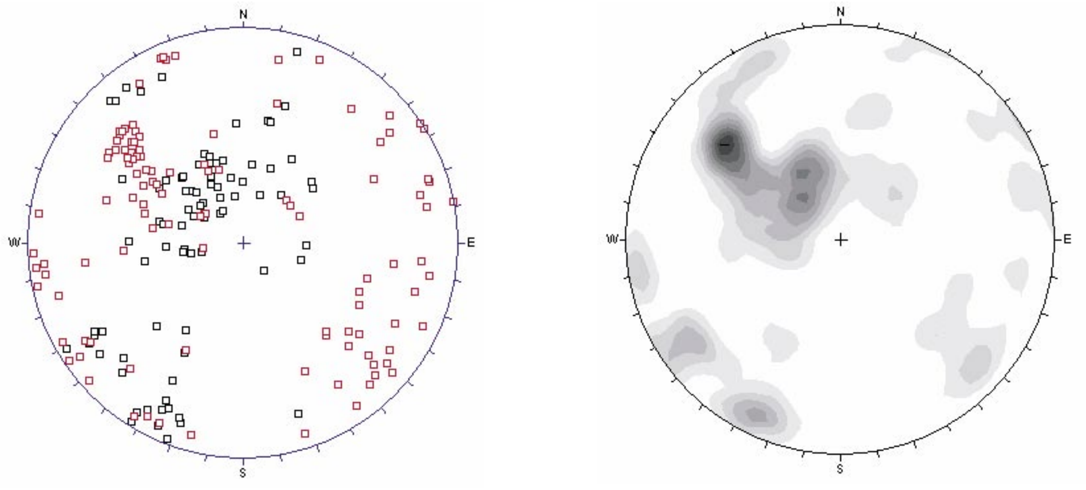
The fracture orientations vary considerably throughout both KFM03A and KFM03B, though the stereographic projections in Figure 5-3 reveal one interesting feature: unbroken fractures are generally steeper than broken fractures. This phenomenon might, at least partly, be a drill related artefact. However, several of the near-horizontal to gently dipping broken fractures seem slightly altered and/or hydraulically open in the BIPS-image, but their aperture is normally less than a few millimetres. Most steep to vertical, and hence unbroken, fractures form a rather well defined group striking N–S to NE. The majority of these fractures dip towards east or SE, though there are also some with dips towards west or NE. With some minor variations in the orientation, this group is represented throughout the boreholes. A number of very thin (<<1 mm) fractures, often revealed by its oxidized walls and with en echelon character, belong to this group.

Litholological contacts obviously act as mechanical discontinuities in the rock. It is reasonable to expect that such competence contrasts should be the locus of fracture formation. For this reason we have noted the proportion of fractured amphibolite contacts: about 30% of the contacts in the cored interval of KFM03A, and slightly more than 50% of those in KFM03B, is fractured. Less than 5% of these fractures are sealed. This can be compared with the fracture frequency in KFM01A and KFM02A, which is around 10% and 35%, respectively /3, 4/. However, the number for KFM01A is probably somewhat low as the proportion of fractured contacts is a reconstruction, estimated from the Access database when the drill core no longer was available.

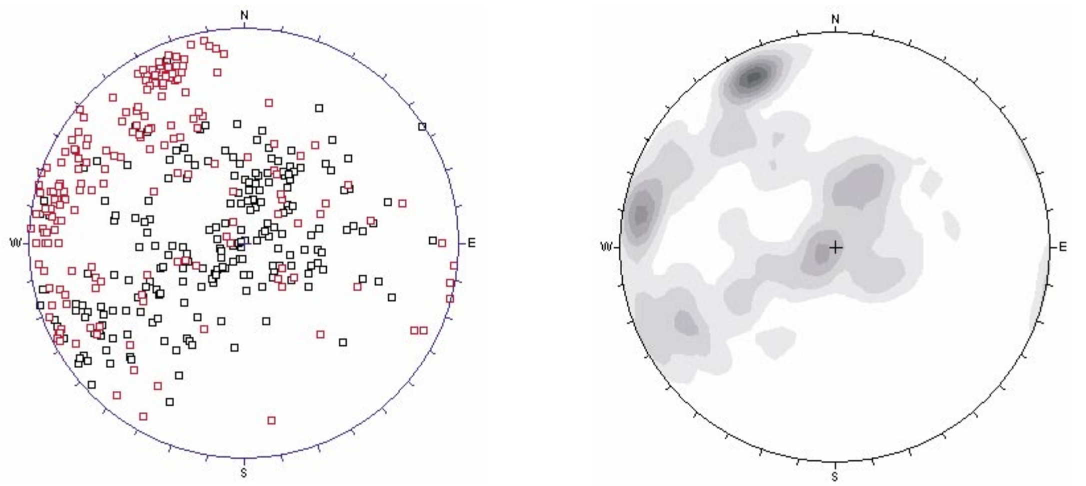
A major crush zone occurs at 64.78–65.68 m depth of KFM03B. Three additional zones, none exceeding one decimetre in width, are restricted to a narrow interval between 378.5 and 388.5 m depth in KFM03A. Breccia zones, however, are virtually absent in KFM03A.



a) 0 – 100 m n=189



b) 100 – 200 m n=195



c) 200 – 400 m n=402

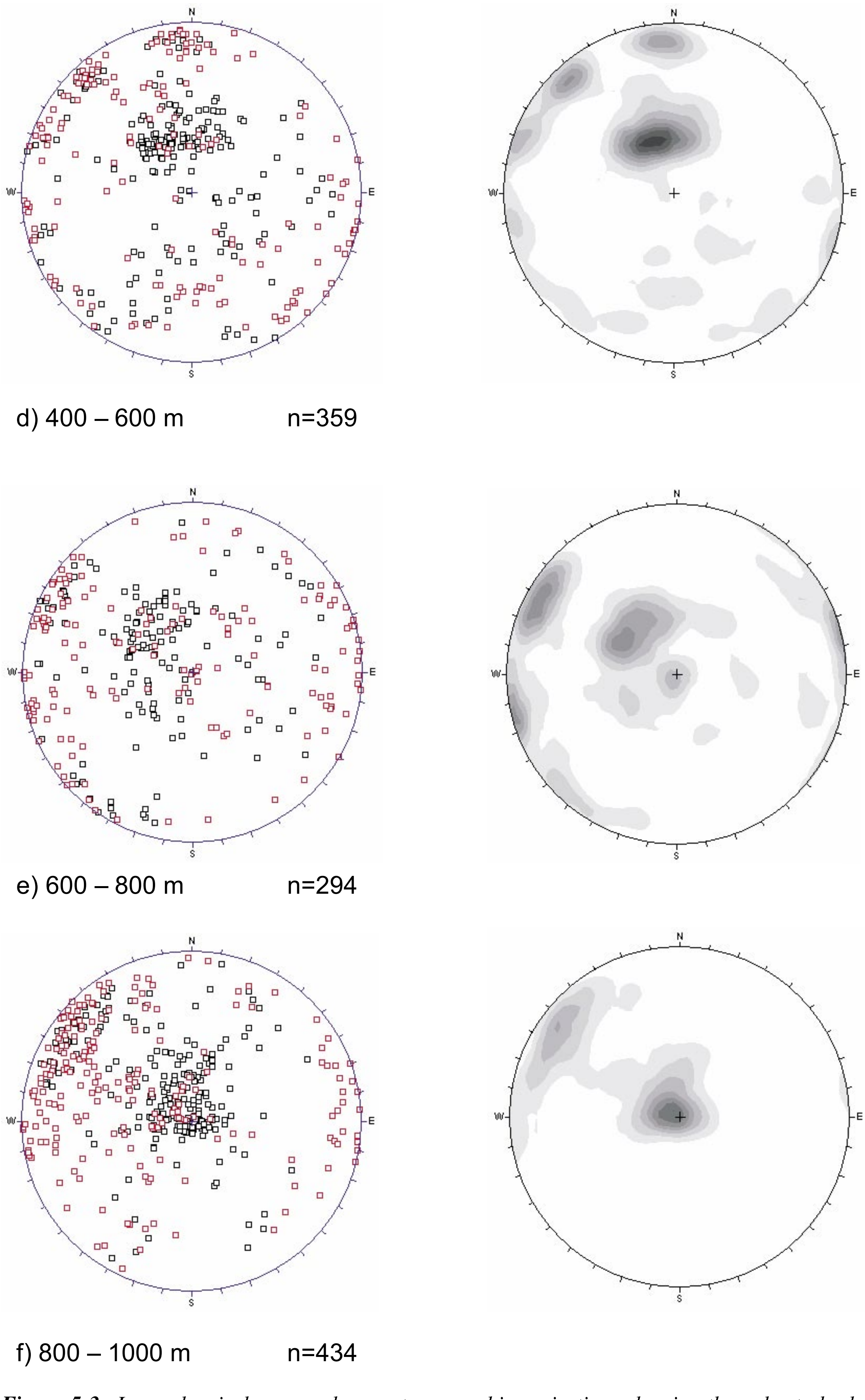
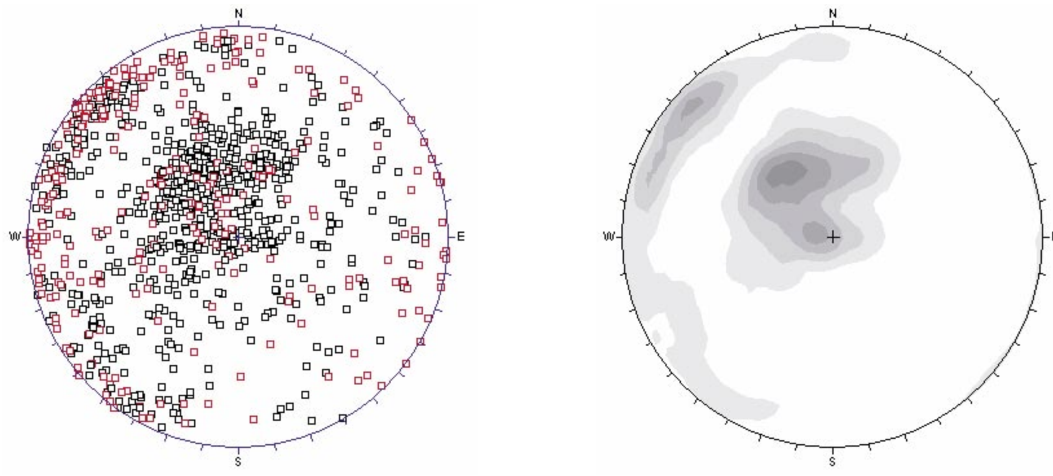


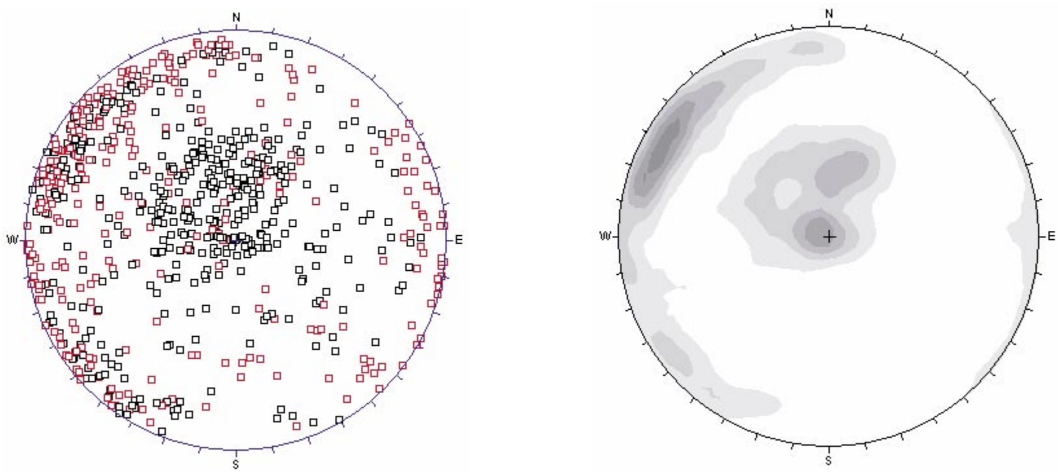
Figure 5-3. *Lower hemisphere equal-area stereographic projections showing the poles to broken (black squares) and unbroken (red squares) fractures within borehole KFM03B and KFM03A: a) 0–100 m depth, b) 100–200 m depth, c) 200–400 m depth, d) 400–600 m depth, e) 600–800 m depth, and f) 800–1000 m depth.*

5.4.2 Fracture mineralogy

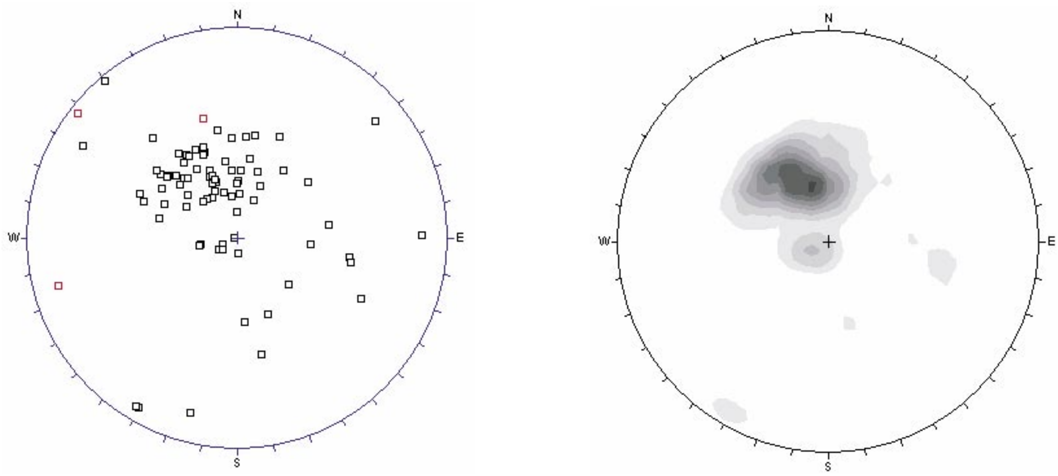
More than half of the total number of fractures in KFM03B and the cored interval of KFM03A are filled by chlorite and/or calcite. These minerals are not restricted to any specific fracture population, but are highly overrepresented within more gently dipping fractures (Figure 5-4a and b). Another large fracture group, generally limited to the broken fractures, are virtually free from visible mineral coatings. Other infilling minerals, in order of decreasing abundance, include prehnite, hematite, quartz, undifferentiated clay minerals, laumontite, feldspars, pyrite, epidote and biotite. Of these minerals, the finely crystalline coatings inferred to be clay minerals is more or less restricted to broken fractures (Figure 5-4c), often in close association with chlorite and/or calcite. All other minerals, as well as the presence of oxidized walls, are preferentially associated with unbroken fractures (Figure 5-4d, e, f and g). Fractures sealed by prehnite, laumontite, and to some extent hematite and epidote, exhibit typically oxidized walls. Several of the fractures with oxidized walls are very thin (<<1 mm) and exhibit en echelon character. As in both KFM01A and KFM02A, laumontite is mainly found in fractures striking to the NE, and dipping steeply toward SE (Figure 5-4g). These fractures are both broken and unbroken, but the mapping of borehole KFM01A showed that laumontite tends to expand, and eventually crackle in the drill core /3/. Thus, some laumontite-bearing fractures mapped as broken may in fact represent originally unbroken fractures.



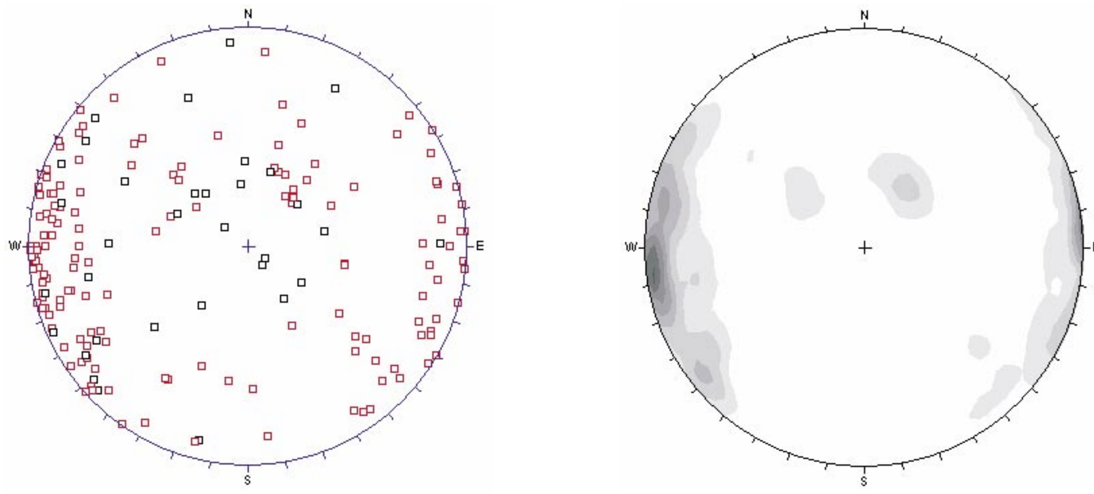
a) Chlorite n=991



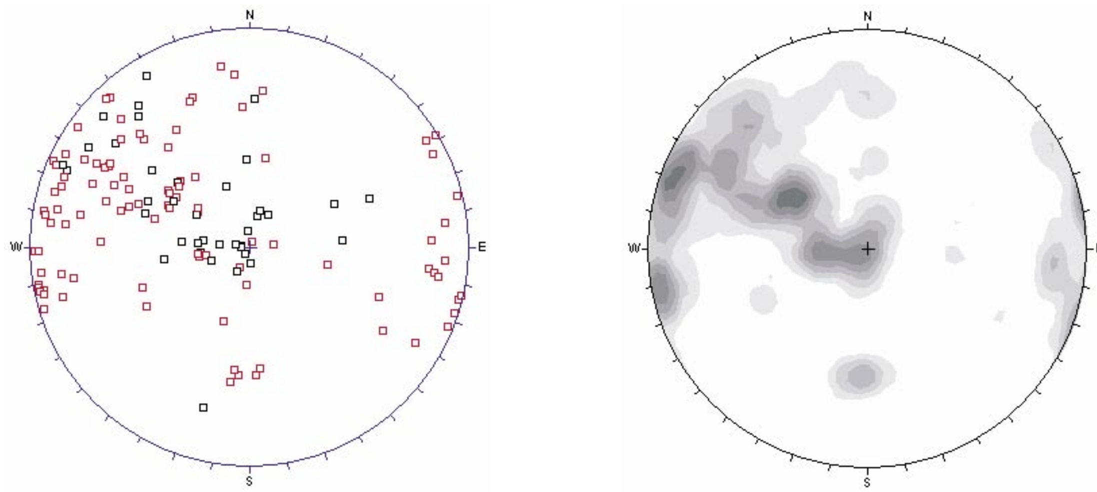
b) Calcite n=762



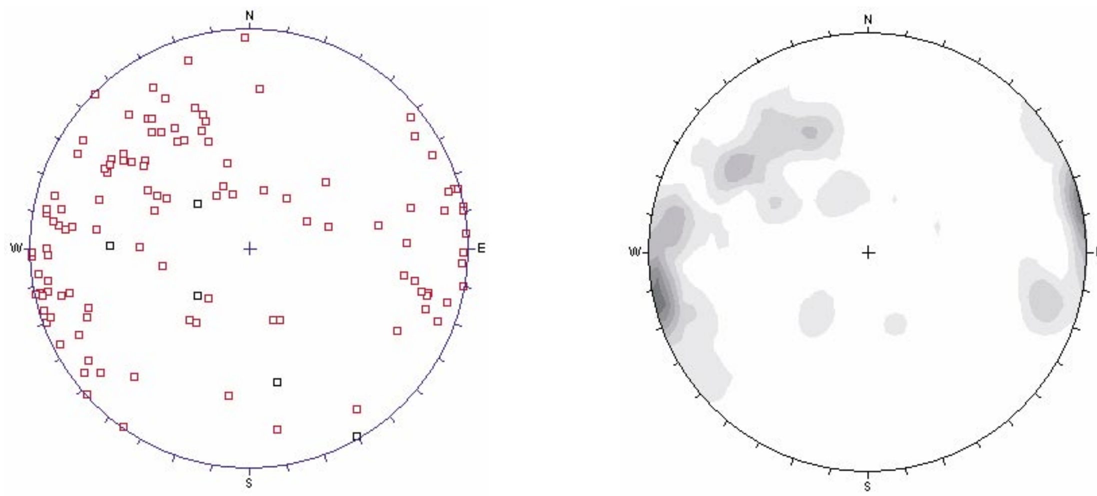
c) Clay minerals n=82



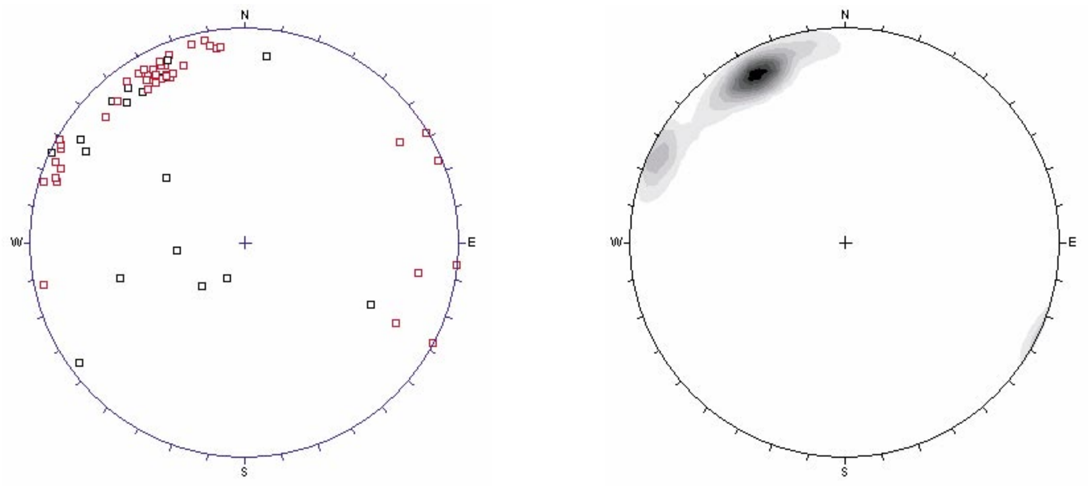
d) Prehnite n=183



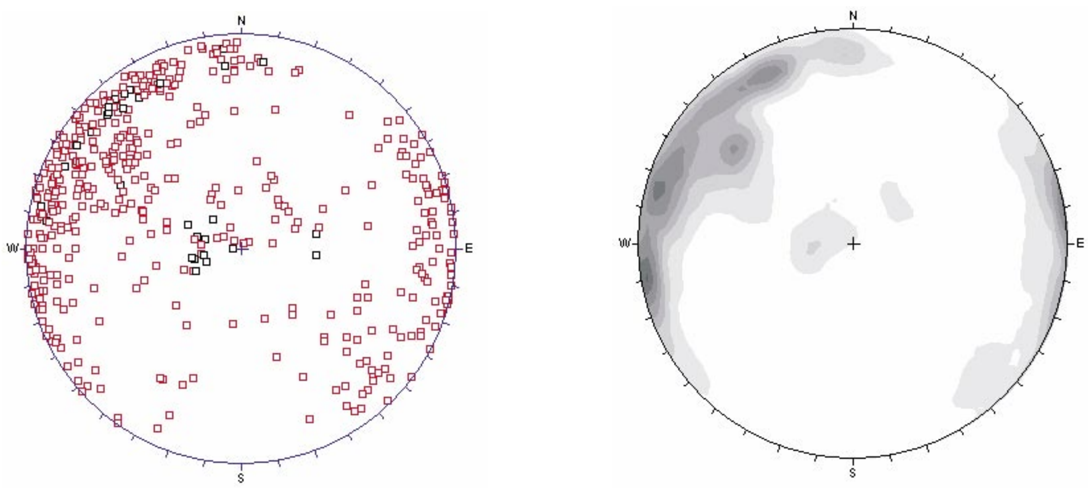
e) Hematite n=139



f) Quartz n=118



g) Laumontite n=63



h) Oxidized walls n=491

Figure 5-4. *Lower hemisphere equal-area stereographic projections showing the poles to broken (black squares) and unbroken (red squares) fractures filled with: a) chlorite, b) calcite, c) clay minerals, d) prehnite, e) hematite, f) quartz, g) laumontite and h) surrounded by oxidized walls.*

5.5 Discussion

The lithology of both KFM03A and KFM03B corresponds generally well with the surface geology in the area /5/. The high content of pegmatitic material (>40%) characterising KFM03B is also what might be expected from the detailed mapping of the drill site by Jenny Andersson (SGU). However, the pegmatite content estimated from the drill cuttings of KFM03A is only about 10% (Appendix 5). This might be due to heterogeneous distribution of the pegmatitic material in the rock mass, or more likely, an underestimation of the pegmatite content in the drill cuttings. A noteworthy feature is the medium-grained metatonalite(-granodiorite) at 228–296 m depth. Petrographical similarities strongly suggest that this occurrence is the subsurface equivalence of the metatonalite intrusion exposed close to the lake Lillfjärden. The close association with the more fine-grained metatonalite variety was also observed during the surface mapping /5/, though the subsurface occurrence seems to be much more extensive, at least in the southern part of the intrusion.

Also the ductile features, with the predominant mineral lineation plunging gently to moderately towards SE, are in close agreement with the surface structural trend in the area /6/. Both the orientation of the stretching lineation and the more weakly defined tectonic foliation confirm the presence of an inferred fold structure with concave geometry towards the SE /6/.

Unlike KFM01A and KFM02A, there is no conspicuous fracture zone in borehole KFM03A. There are, however, a few representatives of the sub-vertical, NE striking fracture set, sealed by laumontite and chlorite, which prevails in KFM01A (cf Figure 5-4g). The often extremely thin fractures with oxidized walls and en echelon character, which are typical for KFM03A, are on the other hand more rare in KFM01A and KFM02A. As all three boreholes have approximately the same orientation, these differences suggest that the distribution and intensity of various fracture sets is highly variable within the area. The variability in the infilling materials among the steep, NE trending fracture group tends, moreover, to indicate both that these fractures belong to several generations and that at least some sets were poorly interconnected over kilometre-scale distances. The steep NW-set known from the area /6/, especially around reactor 3 and close to SFR /7/, are highly underrepresented in all three boreholes. The most apparent explanation to this is the orientation of the boreholes, plunging steeply towards NW.

A noteworthy feature is that some sections of the drill core exhibit a slight turning with pitch ratio similar to that of the spiral pattern of brownish black coating on the borehole walls. This did not influence the actual mapping, though it might be suspected that also the borehole is turned, and consequently, that the borehole diameter is variable. This in turn may give rise to somewhat erroneous orientations of fractures, structures and lithological contacts as the Boremap system bases such calculations partly upon the borehole diameter.

6 References

/1/ **Stråhle A, 2003.** Introduktion för boremapkartering. Svensk Kärnbränslehantering AB, 58 pp.

/2/ **Mattsson H, Thunehed H, Isaksson H, 2004.** Interpretation of petrophysical data from from the cored boreholes KFM01A, KFM02A, KFM03A and KFM04A. SKB P-04-XX. Svensk Kärnbränslehantering AB, XX pp.

/3/ **Petersson J, Wängnerud A, 2003.** Boremap mapping of telescopic drilled borehole KFM01A. SKB P-03-23, Svensk Kärnbränslehantering AB, 97 pp.

/4/ **Petersson J, Wängnerud A, Stråhle A, 2003.** Boremap mapping of telescopic drilled borehole KFM02A. SKB P-03-98, Svensk Kärnbränslehantering AB, xx pp.

/5/ **Stephens M B, Bergman T, Andersson J, Hermansson T, Wahlgren C-H, Albrecht L, Mikko H, 2003.** Bedrock mapping – Forsmark: Stage 1 (2002) – Outcrop data including fracture data. SKB P-03-09, Svensk Kärnbränslehantering AB, 23 pp.

/6/ **Stephens M B, Lunqvist S, Ekström M, Bergman T, Andersson J, 2003.** Rock types, their petrographic and geochemical characteristics, and a structural analysis of the bedrock based on stage 1 (2002) surface data. SKB P-03-75. Svensk Kärnbränslehantering AB, 50 pp.

/7/ **Carlsson A, Christiansson R, 1987.** Geology and tectonics at Forsmark. SKB Progress Report SFR 87-04, Svensk Kärnbränslehantering AB, 91 pp.

Appendix 1

WellCAD images

Title Geological legend for boreholes KFM03A and KFM03B

Site	FORSMARK
Borehole	KFM03A and KFM03B
Plot Date	2004-06-15 21:05:36

ROCKTYPE FORSMARK

- Granite, fine- to medium-grained
- Pegmatite, pegmatitic granite
- Granitoid, metamorphic
- Granite, granodiorite and tonalite, metamorphic, fine- to medium-grained
- Granite, metamorphic, aplitic
- Granite to granodiorite, metamorphic, medium-grained
- Granodiorite, metamorphic
- Tonalite to granodiorite, metamorphic
- Diorite, quarts diorite and gabbro, metamorphic
- Ultramafic rock, metamorphic
- Amphibolite
- Calc-silicate rock (skarn)
- Magnetite mineralization associated with calc-silicate rock (skarn)
- Sulphide mineralization
- Felsic to intermediate volcanic rock, metamorphic
- Mafic volcanic rock, metamorphic
- Sedimentary rock, metamorphic

ROCK ALTERATION

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

MINERAL

- Biotite
- Epidote
- Hematite
- Calcite
- Chlorite
- Quartz
- Red Feldspar
- Muscovite
- Unknown
- Pyrite
- Clay Minerals
- Laumontite
- Prehnite
- Iron Hydroxide

STRUCTURE

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

TEXTURE

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

GRAINSIZE

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

STRUCTURE ORIENTATION

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

INTENSITY

- No intensity
- Faint
- Weak
- Medium
- Strong

ROUGHNESS

- Planar
- Undulating
- Stepped
- Irregular

SURFACE

- Rough
- Smooth
- Slickensided

CRUSH ALTERATION

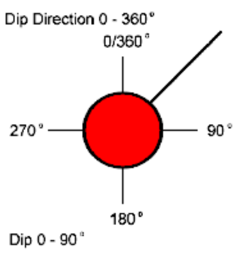
- Slightly Altered
- Moderately Altered
- Highly Altered
- Completley Altered
- Gouge
- Fresh

FRACTURE ALTERATION

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

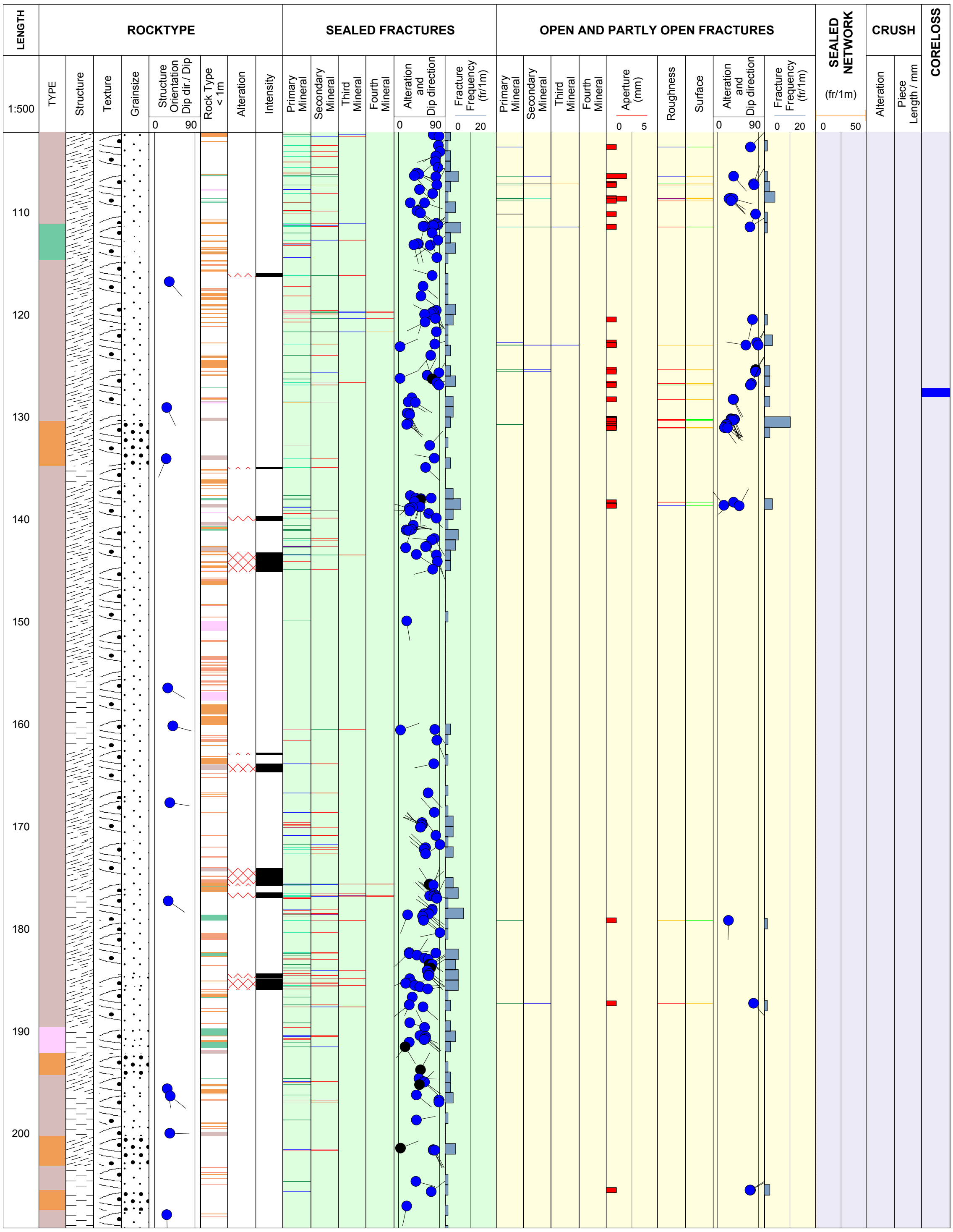
FRACTURE DIRECTION

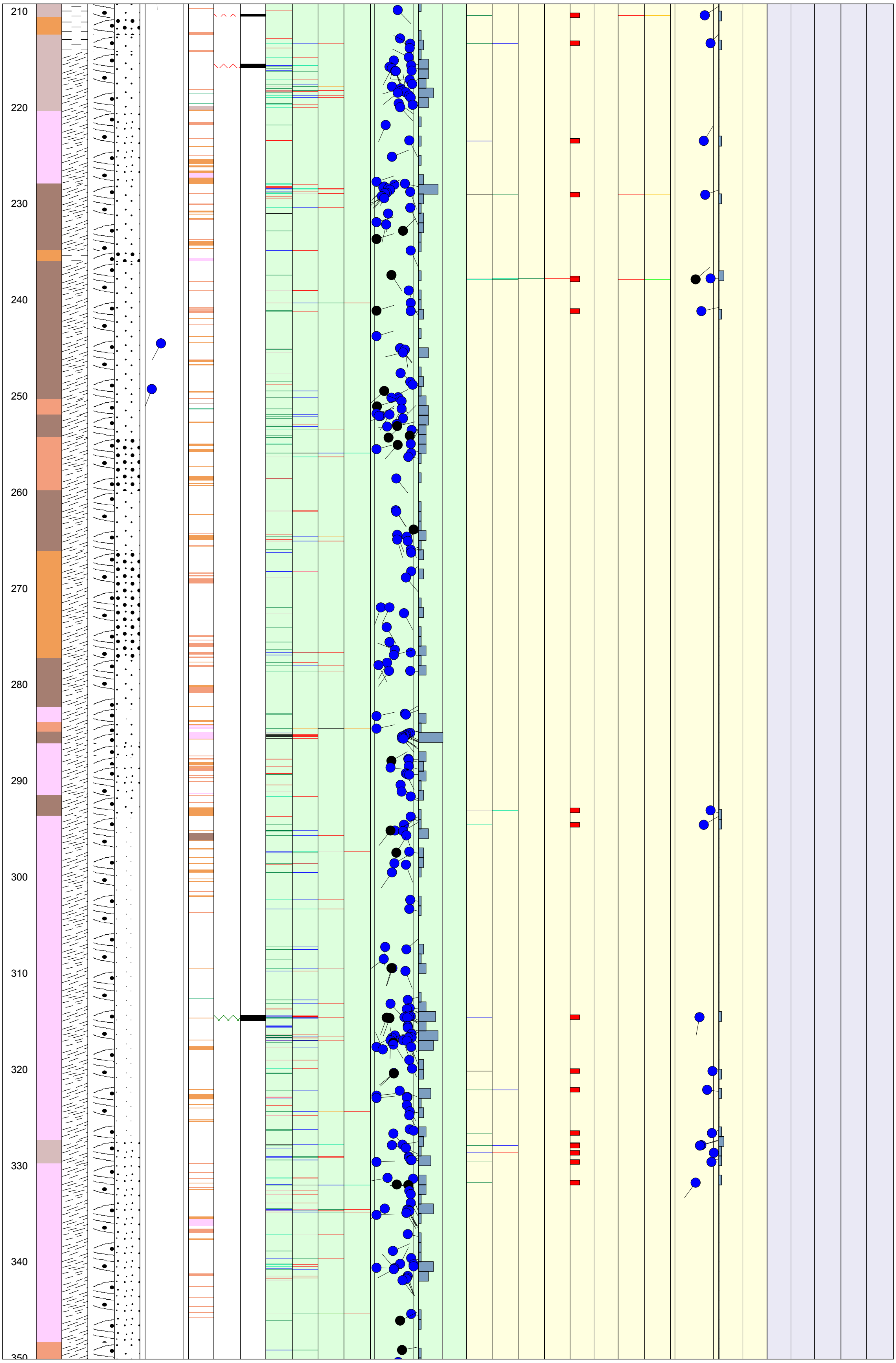
STRUKTURE ORIENTATION



Title **Geological mapping of the core borehole KFM03A at Forsmark**

Site	FORSMARK	**Coordinate System**	RT90-RHB70
Borehole	KFM03A	**Northing [m]**	6697852.10
Diameter [mm]	77	**Easting [m]**	1634630.74
Length [m]	1001.190	**Elevation [m.a.s.l.]**	8.29
Bearing [°]	271.52	**Drilling Start Date**	2003-03-18 09:10:00
Inclination [°]	-85.74	**Drilling Stop Date**	2003-06-23 16:15:00
Date of mapping	2004-06-08 18:54:00	**Plot Date**	2004-06-15 21:05:36
Rocktype data from	p_rock_XXXXX	**Fracture data from**	p_fract_core

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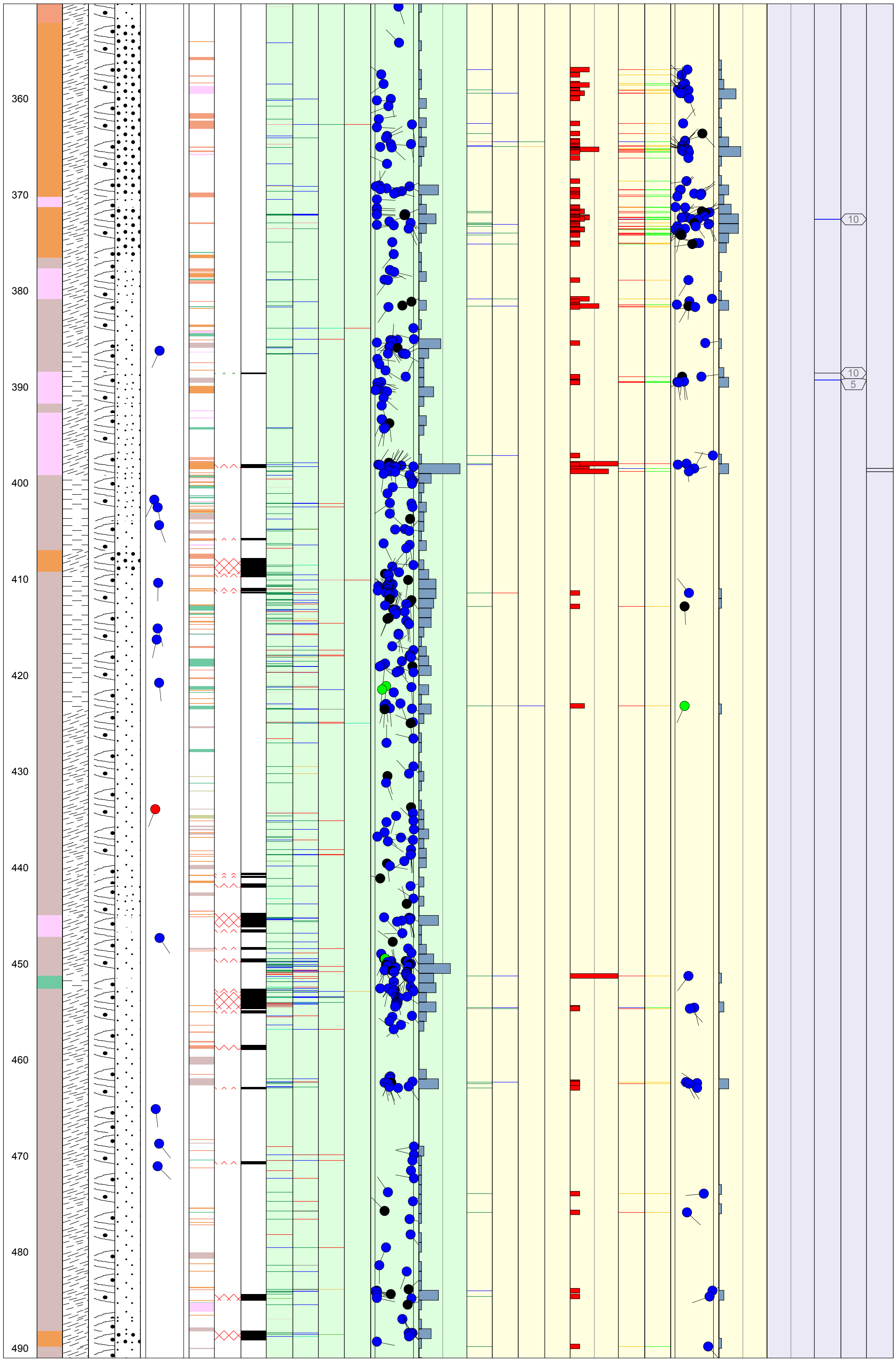
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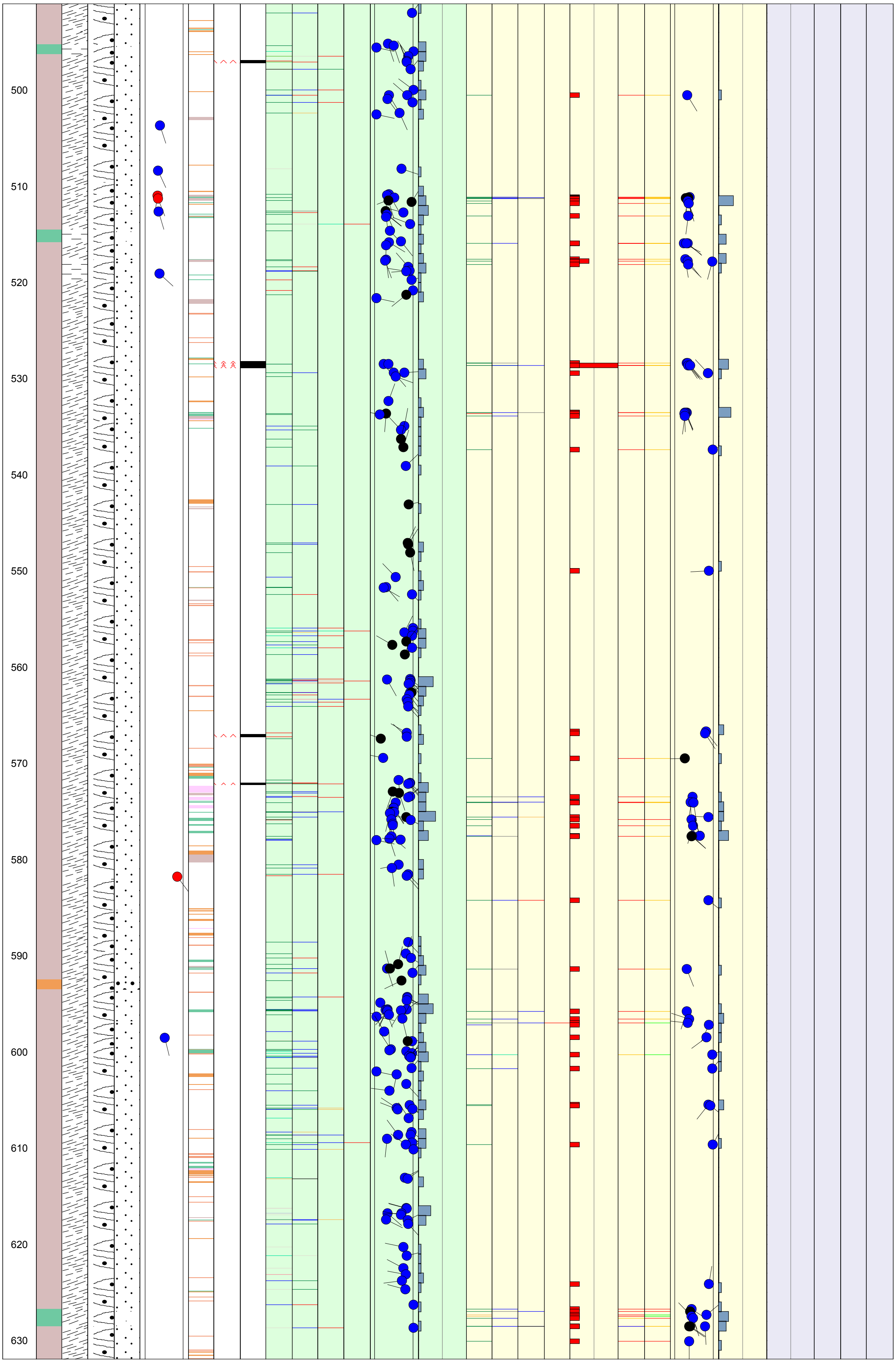
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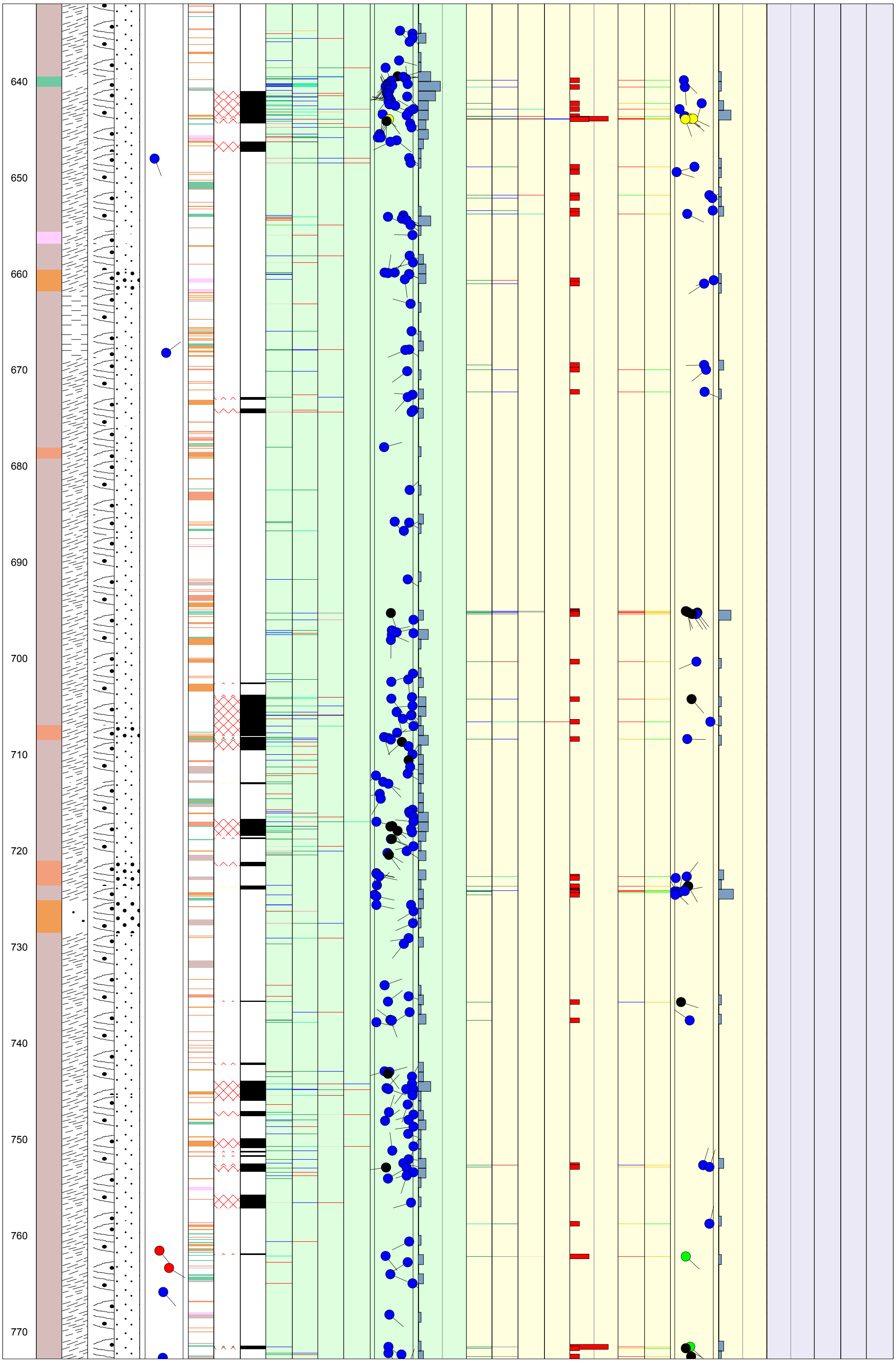

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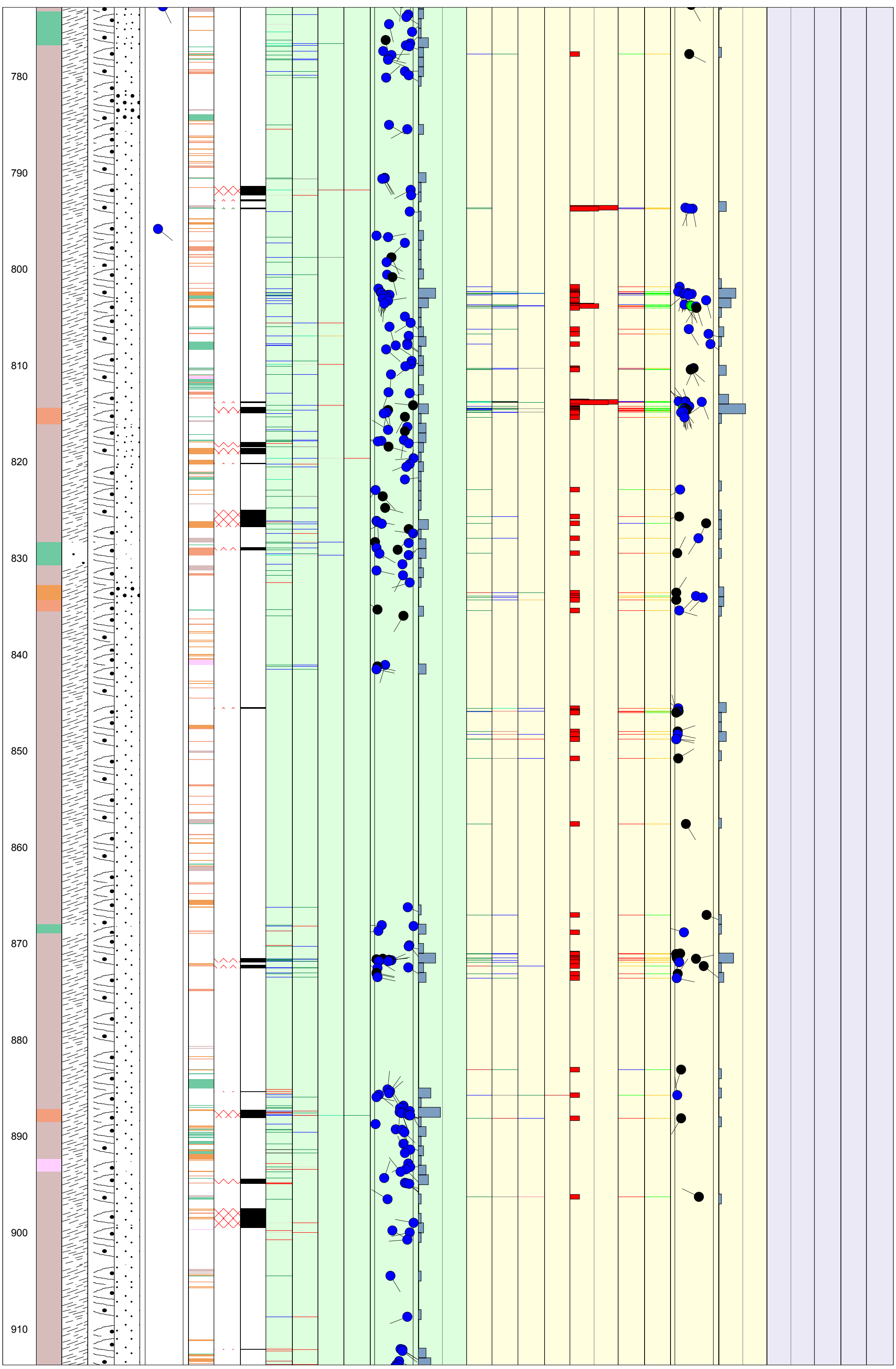
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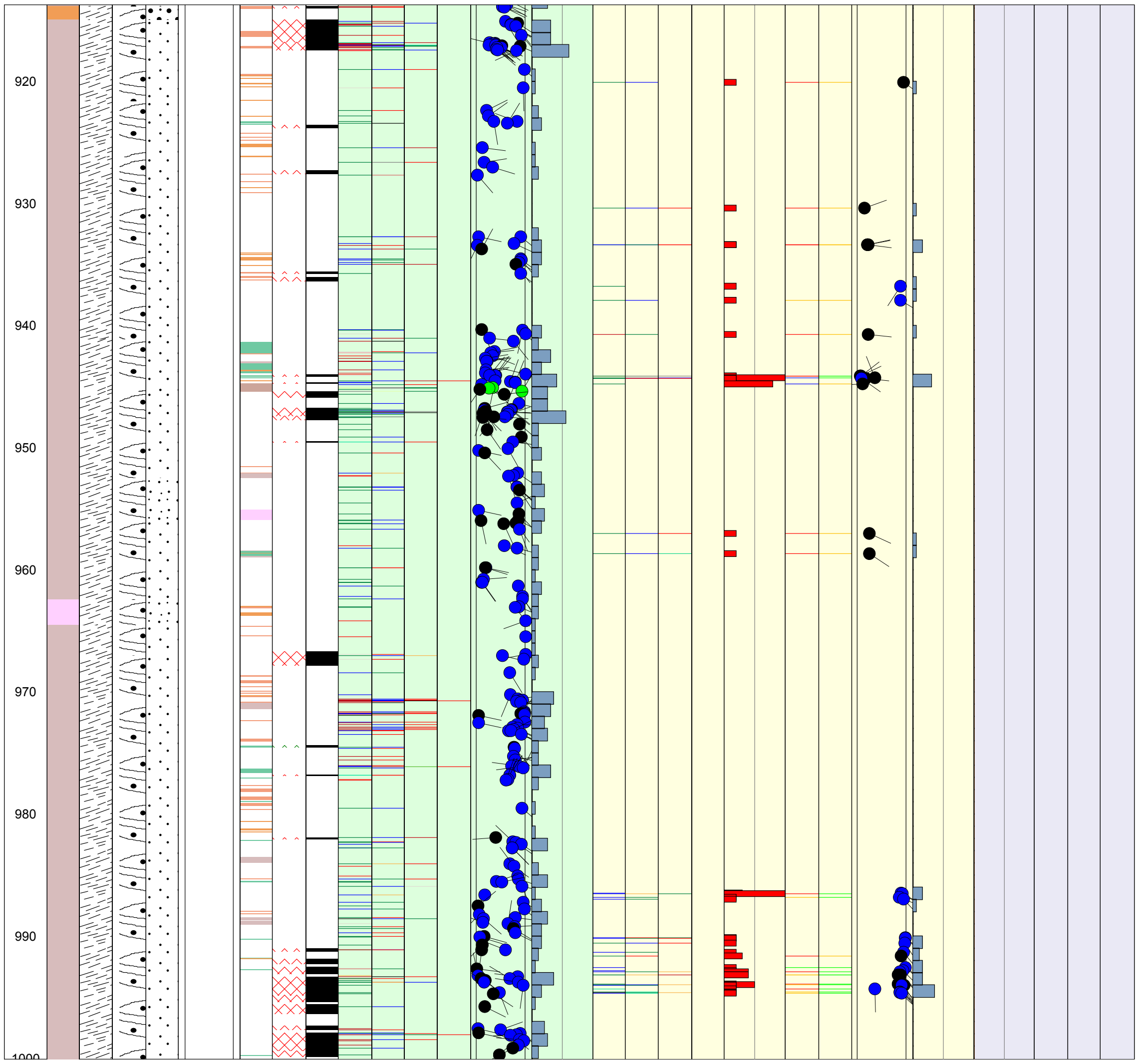
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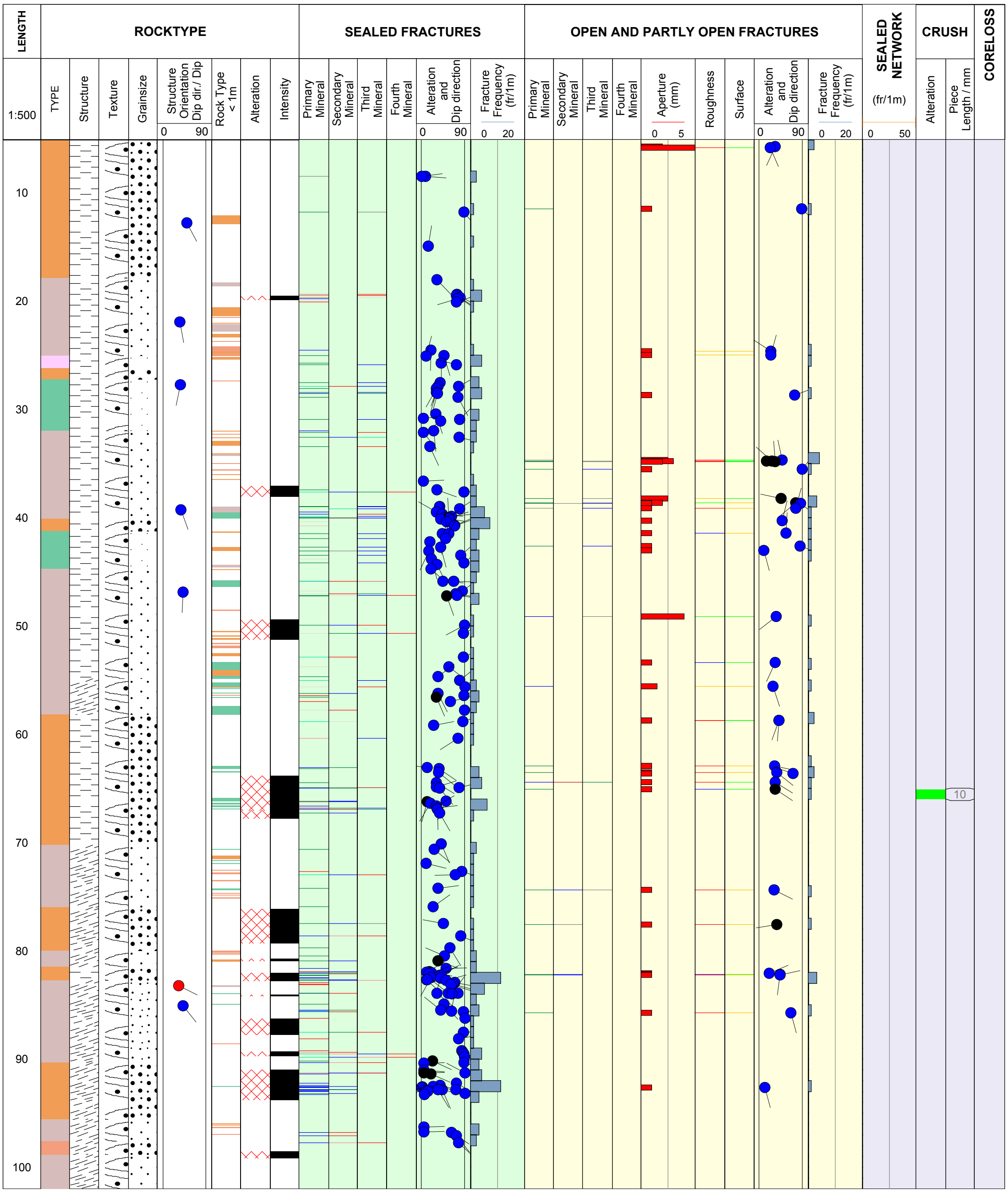
Title Geological mapping of the core drilled borehole KFM03B at Forsmark

Site	FORSMARK	**Coordinate System**	RT90-RHB70
Borehole	KFM03B	**Northing [m]**	6697844.20
Diameter [mm]	77	**Easting [m]**	1634618.68
Length [m]	101.540	**Elevation [m.a.s.l.]**	8.47
Bearing [°]	264.49	**Drilling Start Date**	2003-06-29 09:30:00
Inclination [°]	-85.29	**Drilling Stop Date**	2003-07-02 14:05:00
Date of mapping	2004-03-15 18:03:00	**Plot Date**	2004-06-21 21:01:58
Rocktype data from	p_rock_XXXXX	**Fracture data from**	p_fract_core



Appendix 2

Borehole diameter

Hole Diam T - Drilling: Borehole diameter

KFM03A, 2003-04-16 11:33:00 - 2003-06-23 16:15:00 (100.340 - 1001.190 m)

Sub Secup (m)	Sub Seclow (m)	Hole Diam (m)	Comment
100.340	102.050	0.086	
102.050	1001.190	0.077	

Printout from SICADA 2004-03-25 10:20:55.

KFM03B, 2003-06-29 09:30:00 - 2003-07-02 14:05:00 (0.000 - 101.540 m)

Sub Secup (m)	Sub Seclow (m)	Hole Diam (m)	Comment
0.000	0.780	0.116	
0.780	5.000	0.101	
5.000	5.140	0.086	
5.140	101.540	0.077	

Printout from SICADA 2004-03-25 10:22:16.

Appendix 3

Downhole deviation measurements

Maxibor T - Borehole deviation: Maxibor

KFM03A, 2003-06-24 08:00:00 - 2003-06-24 12:00:00 (0.000 - 996.000 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	6694630.737	1637852.096	8.285	RT90-RHB70	85.7500	271.5200	0.0000	0.0000	0.0000	
3.00	6694630.515	1637852.102	5.293	RT90-RHB70	85.8000	270.2000	0.2220	0.0000	0.0000	
6.00	6694630.295	1637852.103	2.301	RT90-RHB70	85.8400	269.1100	0.4420	-0.0050	-0.0030	
9.00	6694630.077	1637852.099	-0.691	RT90-RHB70	85.9100	268.0500	0.6600	-0.0140	-0.0080	
12.00	6694629.863	1637852.092	-3.683	RT90-RHB70	86.0100	267.4000	0.8730	-0.0270	-0.0170	
15.00	6694629.655	1637852.083	-6.676	RT90-RHB70	86.0200	266.5900	1.0810	-0.0420	-0.0310	
18.00	6694629.447	1637852.070	-9.669	RT90-RHB70	85.9900	265.5900	1.2890	-0.0600	-0.0460	
21.00	6694629.238	1637852.054	-12.661	RT90-RHB70	85.9800	264.4400	1.4970	-0.0820	-0.0610	
24.00	6694629.029	1637852.034	-15.654	RT90-RHB70	86.0200	262.8100	1.7060	-0.1080	-0.0740	
27.00	6694628.822	1637852.008	-18.647	RT90-RHB70	86.1000	260.8000	1.9120	-0.1390	-0.0910	
30.00	6694628.621	1637851.975	-21.640	RT90-RHB70	86.1700	259.6300	2.1120	-0.1770	-0.1130	
33.00	6694628.423	1637851.939	-24.633	RT90-RHB70	86.2000	259.2800	2.3090	-0.2190	-0.1390	
36.00	6694628.228	1637851.902	-27.626	RT90-RHB70	86.2000	258.4700	2.5030	-0.2610	-0.1670	
39.00	6694628.034	1637851.862	-30.620	RT90-RHB70	86.1900	256.8200	2.6960	-0.3060	-0.1970	
42.00	6694627.839	1637851.817	-33.613	RT90-RHB70	86.1500	255.3600	2.8890	-0.3560	-0.2260	
45.00	6694627.645	1637851.766	-36.606	RT90-RHB70	86.1400	254.4400	3.0820	-0.4120	-0.2550	
48.00	6694627.450	1637851.712	-39.600	RT90-RHB70	86.1400	254.0400	3.2760	-0.4720	-0.2850	
51.00	6694627.256	1637851.656	-42.593	RT90-RHB70	86.1000	253.5800	3.4680	-0.5320	-0.3140	
54.00	6694627.060	1637851.598	-45.586	RT90-RHB70	86.0500	252.6100	3.6630	-0.5950	-0.3430	
57.00	6694626.863	1637851.537	-48.579	RT90-RHB70	86.0400	252.1500	3.8580	-0.6620	-0.3700	
60.00	6694626.666	1637851.473	-51.572	RT90-RHB70	86.0300	252.2400	4.0530	-0.7310	-0.3970	
63.00	6694626.468	1637851.410	-54.564	RT90-RHB70	86.0100	251.5200	4.2500	-0.8000	-0.4230	
66.00	6694626.270	1637851.344	-57.557	RT90-RHB70	86.0400	250.6100	4.4460	-0.8710	-0.4500	
69.00	6694626.074	1637851.275	-60.550	RT90-RHB70	86.0700	249.9300	4.6390	-0.9450	-0.4790	
72.00	6694625.881	1637851.204	-63.543	RT90-RHB70	86.0500	248.5500	4.8300	-1.0210	-0.5100	
75.00	6694625.689	1637851.129	-66.536	RT90-RHB70	86.0400	246.8200	5.0210	-1.1010	-0.5420	
78.00	6694625.499	1637851.047	-69.529	RT90-RHB70	86.0600	245.5300	5.2090	-1.1880	-0.5770	
81.00	6694625.311	1637850.962	-72.522	RT90-RHB70	86.0600	244.4900	5.3940	-1.2780	-0.6140	
84.00	6694625.125	1637850.873	-75.514	RT90-RHB70	86.0200	243.4400	5.5780	-1.3720	-0.6520	
87.00	6694624.938	1637850.780	-78.507	RT90-RHB70	85.9800	242.8300	5.7620	-1.4700	-0.6910	
90.00	6694624.751	1637850.684	-81.500	RT90-RHB70	85.9700	243.5100	5.9460	-1.5710	-0.7290	
93.00	6694624.563	1637850.590	-84.492	RT90-RHB70	85.9900	244.1500	6.1320	-1.6700	-0.7650	
96.00	6694624.374	1637850.498	-87.485	RT90-RHB70	86.0300	245.4700	6.3180	-1.7660	-0.8020	

99.00	6694624.185	1637850.412	-90.478	RT90-RHB70	86.0700	246.2000	6.5050	-1.8580	-0.8370
102.00	6694623.997	1637850.329	-93.471	RT90-RHB70	86.1100	246.3900	6.6910	-1.9460	-0.8740
105.00	6694623.810	1637850.247	-96.464	RT90-RHB70	86.0900	246.6400	6.8750	-2.0320	-0.9120
108.00	6694623.622	1637850.166	-99.457	RT90-RHB70	86.0600	246.7700	7.0610	-2.1180	-0.9490
111.00	6694623.432	1637850.085	-102.450	RT90-RHB70	86.0000	246.7600	7.2490	-2.2050	-0.9840
114.00	6694623.240	1637850.002	-105.442	RT90-RHB70	85.9700	246.5300	7.4390	-2.2920	-1.0160
117.00	6694623.046	1637849.918	-108.435	RT90-RHB70	85.9900	246.3100	7.6300	-2.3820	-1.0470
120.00	6694622.854	1637849.834	-111.428	RT90-RHB70	85.9400	246.3600	7.8200	-2.4710	-1.0800
123.00	6694622.659	1637849.749	-114.420	RT90-RHB70	85.8900	246.1300	8.0120	-2.5610	-1.1100
126.00	6694622.463	1637849.662	-117.412	RT90-RHB70	85.8700	245.5000	8.2060	-2.6530	-1.1380
129.00	6694622.266	1637849.572	-120.405	RT90-RHB70	85.8500	245.7700	8.4010	-2.7480	-1.1660
132.00	6694622.068	1637849.483	-123.397	RT90-RHB70	85.8300	245.6600	8.5960	-2.8430	-1.1940
135.00	6694621.870	1637849.393	-126.389	RT90-RHB70	85.7900	245.6400	8.7930	-2.9380	-1.2200
138.00	6694621.669	1637849.302	-129.381	RT90-RHB70	85.7900	245.7700	8.9910	-3.0340	-1.2440
141.00	6694621.468	1637849.212	-132.373	RT90-RHB70	85.7800	246.0700	9.1890	-3.1300	-1.2680
144.00	6694621.266	1637849.122	-135.364	RT90-RHB70	85.7600	245.9600	9.3880	-3.2240	-1.2910
147.00	6694621.064	1637849.032	-138.356	RT90-RHB70	85.7400	245.6900	9.5880	-3.3200	-1.3140
150.00	6694620.861	1637848.940	-141.348	RT90-RHB70	85.7600	246.0300	9.7890	-3.4170	-1.3360
153.00	6694620.658	1637848.850	-144.340	RT90-RHB70	85.7400	246.1400	9.9890	-3.5130	-1.3580
156.00	6694620.454	1637848.760	-147.332	RT90-RHB70	85.7500	246.9700	10.1900	-3.6080	-1.3790
159.00	6694620.250	1637848.673	-150.323	RT90-RHB70	85.6900	247.0000	10.3920	-3.7000	-1.3990
162.00	6694620.042	1637848.585	-153.315	RT90-RHB70	85.6500	247.4200	10.5980	-3.7940	-1.4160
165.00	6694619.832	1637848.498	-156.306	RT90-RHB70	85.6200	247.1700	10.8050	-3.8870	-1.4310
168.00	6694619.621	1637848.409	-159.297	RT90-RHB70	85.5900	247.1700	11.0140	-3.9810	-1.4450
171.00	6694619.408	1637848.319	-162.289	RT90-RHB70	85.6100	246.7700	11.2240	-4.0770	-1.4570
174.00	6694619.198	1637848.229	-165.280	RT90-RHB70	85.5800	247.1200	11.4320	-4.1730	-1.4710
177.00	6694618.985	1637848.139	-168.271	RT90-RHB70	85.5800	247.7000	11.6430	-4.2680	-1.4830
180.00	6694618.771	1637848.051	-171.262	RT90-RHB70	85.5900	247.7100	11.8540	-4.3620	-1.4940
183.00	6694618.557	1637847.964	-174.253	RT90-RHB70	85.6100	247.7600	12.0650	-4.4550	-1.5060
186.00	6694618.345	1637847.877	-177.244	RT90-RHB70	85.6200	247.8800	12.2760	-4.5470	-1.5180
189.00	6694618.132	1637847.790	-180.235	RT90-RHB70	85.6100	248.5100	12.4860	-4.6390	-1.5300
192.00	6694617.919	1637847.706	-183.227	RT90-RHB70	85.5700	249.1200	12.6970	-4.7290	-1.5410
195.00	6694617.702	1637847.624	-186.218	RT90-RHB70	85.5600	249.0100	12.9120	-4.8170	-1.5490
198.00	6694617.485	1637847.540	-189.209	RT90-RHB70	85.5700	249.3900	13.1260	-4.9060	-1.5570
201.00	6694617.268	1637847.459	-192.200	RT90-RHB70	85.6000	249.8300	13.3410	-4.9940	-1.5650
204.00	6694617.052	1637847.379	-195.191	RT90-RHB70	85.6000	250.4900	13.5550	-5.0790	-1.5730
207.00	6694616.835	1637847.303	-198.182	RT90-RHB70	85.5700	250.6700	13.7700	-5.1610	-1.5810
210.00	6694616.616	1637847.226	-201.173	RT90-RHB70	85.5600	250.6200	13.9860	-5.2440	-1.5870
213.00	6694616.397	1637847.149	-204.164	RT90-RHB70	85.5900	250.9200	14.2030	-5.3270	-1.5920
216.00	6694616.179	1637847.073	-207.155	RT90-RHB70	85.5900	251.1500	14.4190	-5.4080	-1.5990
219.00	6694615.961	1637846.999	-210.146	RT90-RHB70	85.5900	251.7400	14.6350	-5.4880	-1.6050
222.00	6694615.742	1637846.927	-213.137	RT90-RHB70	85.5700	252.1700	14.8520	-5.5660	-1.6100
225.00	6694615.521	1637846.856	-216.128	RT90-RHB70	85.5600	252.7800	15.0710	-5.6430	-1.6140

228.00	6694615.300	1637846.787	-219.119	RT90-RHB70	85.5500	252.6400	15.2910	-5.7180	-1.6160
231.00	6694615.078	1637846.717	-222.110	RT90-RHB70	85.5600	252.9700	15.5110	-5.7930	-1.6190
234.00	6694614.856	1637846.649	-225.101	RT90-RHB70	85.5800	253.2000	15.7310	-5.8670	-1.6210
237.00	6694614.634	1637846.583	-228.092	RT90-RHB70	85.5500	253.7200	15.9510	-5.9400	-1.6240
240.00	6694614.411	1637846.517	-231.083	RT90-RHB70	85.5400	253.6100	16.1720	-6.0110	-1.6250
243.00	6694614.187	1637846.451	-234.074	RT90-RHB70	85.5600	254.1100	16.3940	-6.0830	-1.6250
246.00	6694613.963	1637846.388	-237.065	RT90-RHB70	85.5500	254.6000	16.6160	-6.1520	-1.6260
249.00	6694613.739	1637846.326	-240.056	RT90-RHB70	85.5300	254.7500	16.8390	-6.2200	-1.6260
252.00	6694613.513	1637846.264	-243.047	RT90-RHB70	85.5400	254.9600	17.0630	-6.2870	-1.6240
255.00	6694613.288	1637846.204	-246.038	RT90-RHB70	85.5600	255.1100	17.2870	-6.3540	-1.6230
258.00	6694613.063	1637846.144	-249.029	RT90-RHB70	85.5500	255.8700	17.5090	-6.4190	-1.6230
261.00	6694612.838	1637846.087	-252.020	RT90-RHB70	85.5400	256.2300	17.7330	-6.4820	-1.6210
264.00	6694612.611	1637846.032	-255.011	RT90-RHB70	85.5300	256.2400	17.9580	-6.5440	-1.6180
267.00	6694612.384	1637845.976	-258.002	RT90-RHB70	85.5100	256.4100	18.1840	-6.6050	-1.6150
270.00	6694612.156	1637845.921	-260.993	RT90-RHB70	85.4600	256.5100	18.4100	-6.6670	-1.6110
273.00	6694611.925	1637845.866	-263.983	RT90-RHB70	85.4500	257.0300	18.6400	-6.7280	-1.6040
276.00	6694611.693	1637845.812	-266.974	RT90-RHB70	85.4000	257.5100	18.8700	-6.7880	-1.5960
279.00	6694611.458	1637845.760	-269.964	RT90-RHB70	85.3800	257.7900	19.1030	-6.8460	-1.5850
282.00	6694611.222	1637845.709	-272.954	RT90-RHB70	85.4000	258.2200	19.3380	-6.9030	-1.5730
285.00	6694610.987	1637845.660	-275.945	RT90-RHB70	85.3800	258.7300	19.5720	-6.9590	-1.5620
288.00	6694610.750	1637845.613	-278.935	RT90-RHB70	85.3300	259.2300	19.8080	-7.0120	-1.5480
291.00	6694610.510	1637845.567	-281.925	RT90-RHB70	85.3100	260.0400	20.0460	-7.0640	-1.5320
294.00	6694610.269	1637845.525	-284.915	RT90-RHB70	85.2700	260.7000	20.2860	-7.1130	-1.5140
297.00	6694610.025	1637845.485	-287.905	RT90-RHB70	85.2600	261.3800	20.5290	-7.1590	-1.4940
300.00	6694609.780	1637845.448	-290.895	RT90-RHB70	85.2300	261.6100	20.7730	-7.2030	-1.4730
303.00	6694609.533	1637845.412	-293.884	RT90-RHB70	85.1900	261.8500	21.0190	-7.2460	-1.4490
306.00	6694609.284	1637845.376	-296.874	RT90-RHB70	85.2100	262.0600	21.2670	-7.2880	-1.4240
309.00	6694609.036	1637845.341	-299.863	RT90-RHB70	85.2400	262.7900	21.5140	-7.3290	-1.3990
312.00	6694608.789	1637845.310	-302.853	RT90-RHB70	85.2200	263.4800	21.7600	-7.3670	-1.3760
315.00	6694608.541	1637845.282	-305.842	RT90-RHB70	85.1900	264.9200	22.0070	-7.4020	-1.3500
318.00	6694608.290	1637845.259	-308.832	RT90-RHB70	85.1700	265.7600	22.2570	-7.4310	-1.3230
321.00	6694608.038	1637845.241	-311.821	RT90-RHB70	85.1000	266.7000	22.5080	-7.4560	-1.2940
324.00	6694607.783	1637845.226	-314.810	RT90-RHB70	85.0700	267.4800	22.7640	-7.4780	-1.2610
327.00	6694607.525	1637845.215	-317.799	RT90-RHB70	85.0700	267.8700	23.0210	-7.4960	-1.2260
330.00	6694607.267	1637845.205	-320.788	RT90-RHB70	85.0900	268.2200	23.2780	-7.5120	-1.1910
333.00	6694607.010	1637845.197	-323.777	RT90-RHB70	85.0900	269.3200	23.5350	-7.5270	-1.1570
336.00	6694606.754	1637845.194	-326.766	RT90-RHB70	85.0800	270.2000	23.7910	-7.5370	-1.1230
339.00	6694606.497	1637845.195	-329.755	RT90-RHB70	85.0500	271.0100	24.0480	-7.5430	-1.0880
342.00	6694606.238	1637845.200	-332.744	RT90-RHB70	85.0000	271.2600	24.3070	-7.5450	-1.0520
345.00	6694605.977	1637845.205	-335.732	RT90-RHB70	84.9500	271.4700	24.5680	-7.5460	-1.0130
348.00	6694605.712	1637845.212	-338.721	RT90-RHB70	84.9100	271.6300	24.8330	-7.5470	-0.9710
351.00	6694605.447	1637845.220	-341.709	RT90-RHB70	84.9300	271.9700	25.0990	-7.5460	-0.9270
354.00	6694605.182	1637845.229	-344.697	RT90-RHB70	84.9300	272.1900	25.3640	-7.5440	-0.8850

357.00	6694604.917	1637845.239	-347.685	RT90-RHB70	84.9100	272.5900	25.6290	-7.5410	-0.8420
360.00	6694604.651	1637845.251	-350.674	RT90-RHB70	84.9100	272.9900	25.8950	-7.5360	-0.7980
363.00	6694604.385	1637845.265	-353.662	RT90-RHB70	84.8900	273.5900	26.1610	-7.5290	-0.7540
366.00	6694604.118	1637845.282	-356.650	RT90-RHB70	84.8600	273.8100	26.4280	-7.5200	-0.7100
369.00	6694603.850	1637845.299	-359.638	RT90-RHB70	84.8700	274.0900	26.6970	-7.5090	-0.6630
372.00	6694603.583	1637845.319	-362.626	RT90-RHB70	84.9000	274.2100	26.9650	-7.4970	-0.6180
375.00	6694603.316	1637845.338	-365.614	RT90-RHB70	84.9100	274.8600	27.2310	-7.4840	-0.5740
378.00	6694603.051	1637845.361	-368.602	RT90-RHB70	84.8900	275.5800	27.4970	-7.4690	-0.5300
381.00	6694602.785	1637845.387	-371.590	RT90-RHB70	84.8600	275.7100	27.7640	-7.4500	-0.4860
384.00	6694602.518	1637845.413	-374.578	RT90-RHB70	84.8500	276.1200	28.0320	-7.4300	-0.4400
387.00	6694602.250	1637845.442	-377.566	RT90-RHB70	84.8000	277.0400	28.3000	-7.4090	-0.3940
390.00	6694601.980	1637845.475	-380.553	RT90-RHB70	84.8000	277.4900	28.5710	-7.3830	-0.3460
393.00	6694601.711	1637845.511	-383.541	RT90-RHB70	84.7700	277.7400	28.8410	-7.3540	-0.2980
396.00	6694601.440	1637845.548	-386.529	RT90-RHB70	84.7800	278.4000	29.1130	-7.3250	-0.2480
399.00	6694601.170	1637845.588	-389.516	RT90-RHB70	84.8000	278.2800	29.3840	-7.2920	-0.2000
402.00	6694600.901	1637845.627	-392.504	RT90-RHB70	84.8200	278.9600	29.6540	-7.2600	-0.1520
405.00	6694600.633	1637845.669	-395.492	RT90-RHB70	84.7800	279.2400	29.9230	-7.2250	-0.1050
408.00	6694600.364	1637845.713	-398.479	RT90-RHB70	84.7600	279.3700	30.1930	-7.1880	-0.0570
411.00	6694600.093	1637845.757	-401.467	RT90-RHB70	84.7400	280.4900	30.4640	-7.1510	-0.0080
414.00	6694599.823	1637845.807	-404.454	RT90-RHB70	84.7200	280.3800	30.7360	-7.1080	0.0410
417.00	6694599.551	1637845.857	-407.441	RT90-RHB70	84.6600	280.6400	31.0090	-7.0660	0.0910
420.00	6694599.277	1637845.909	-410.428	RT90-RHB70	84.6500	280.7400	31.2850	-7.0210	0.1450
423.00	6694599.002	1637845.961	-413.415	RT90-RHB70	84.6100	280.6500	31.5610	-6.9770	0.1990
426.00	6694598.725	1637846.013	-416.402	RT90-RHB70	84.5900	280.8100	31.8390	-6.9320	0.2550
429.00	6694598.447	1637846.066	-419.389	RT90-RHB70	84.6000	280.4100	32.1180	-6.8860	0.3120
432.00	6694598.169	1637846.117	-422.375	RT90-RHB70	84.6100	280.2500	32.3970	-6.8430	0.3680
435.00	6694597.892	1637846.167	-425.362	RT90-RHB70	84.5800	280.7800	32.6760	-6.8000	0.4250
438.00	6694597.614	1637846.220	-428.349	RT90-RHB70	84.6200	280.7800	32.9550	-6.7540	0.4820
441.00	6694597.337	1637846.273	-431.335	RT90-RHB70	84.6000	281.1400	33.2330	-6.7090	0.5370
444.00	6694597.060	1637846.327	-434.322	RT90-RHB70	84.6300	281.2200	33.5120	-6.6620	0.5940
447.00	6694596.785	1637846.382	-437.309	RT90-RHB70	84.6300	281.2800	33.7880	-6.6150	0.6480
450.00	6694596.509	1637846.437	-440.296	RT90-RHB70	84.6600	281.4000	34.0650	-6.5670	0.7030
453.00	6694596.236	1637846.492	-443.283	RT90-RHB70	84.6800	281.7100	34.3400	-6.5190	0.7550
456.00	6694595.963	1637846.549	-446.270	RT90-RHB70	84.7000	282.2500	34.6140	-6.4700	0.8070
459.00	6694595.692	1637846.607	-449.257	RT90-RHB70	84.7000	282.2600	34.8860	-6.4180	0.8570
462.00	6694595.422	1637846.666	-452.244	RT90-RHB70	84.7100	282.6300	35.1580	-6.3670	0.9070
465.00	6694595.152	1637846.727	-455.231	RT90-RHB70	84.6600	282.9000	35.4300	-6.3130	0.9560
468.00	6694594.880	1637846.789	-458.218	RT90-RHB70	84.6300	283.0500	35.7040	-6.2580	1.0070
471.00	6694594.606	1637846.852	-461.205	RT90-RHB70	84.5800	283.0500	35.9790	-6.2020	1.0600
474.00	6694594.330	1637846.916	-464.192	RT90-RHB70	84.5500	282.9600	36.2570	-6.1460	1.1160
477.00	6694594.052	1637846.980	-467.178	RT90-RHB70	84.5200	282.6200	36.5360	-6.0890	1.1730
480.00	6694593.773	1637847.043	-470.164	RT90-RHB70	84.5100	282.7200	36.8170	-6.0340	1.2320
483.00	6694593.492	1637847.106	-473.151	RT90-RHB70	84.4900	282.4300	37.0990	-5.9780	1.2910

486.00	6694593.211	1637847.168	-476.137	RT90-RHB70	84.4900	282.0500	37.3810	-5.9240	1.3520
489.00	6694592.930	1637847.228	-479.123	RT90-RHB70	84.5000	281.9000	37.6650	-5.8710	1.4130
492.00	6694592.648	1637847.288	-482.109	RT90-RHB70	84.5000	281.7300	37.9470	-5.8190	1.4730
495.00	6694592.367	1637847.346	-485.095	RT90-RHB70	84.4900	281.4600	38.2310	-5.7680	1.5340
498.00	6694592.084	1637847.403	-488.081	RT90-RHB70	84.4800	281.3100	38.5140	-5.7190	1.5960
501.00	6694591.801	1637847.460	-491.067	RT90-RHB70	84.4500	280.9100	38.7990	-5.6700	1.6580
504.00	6694591.516	1637847.515	-494.053	RT90-RHB70	84.4500	281.0200	39.0850	-5.6220	1.7220
507.00	6694591.231	1637847.570	-497.039	RT90-RHB70	84.4300	281.3300	39.3720	-5.5740	1.7860
510.00	6694590.946	1637847.627	-500.025	RT90-RHB70	84.4200	281.9600	39.6580	-5.5250	1.8510
513.00	6694590.660	1637847.688	-503.011	RT90-RHB70	84.3800	282.3100	39.9450	-5.4720	1.9150
516.00	6694590.374	1637847.750	-505.997	RT90-RHB70	84.3800	282.7000	40.2340	-5.4170	1.9820
519.00	6694590.087	1637847.815	-508.982	RT90-RHB70	84.3700	283.0100	40.5220	-5.3600	2.0480
522.00	6694589.800	1637847.881	-511.968	RT90-RHB70	84.3800	283.4600	40.8100	-5.3010	2.1140
525.00	6694589.514	1637847.950	-514.953	RT90-RHB70	84.3800	283.8700	41.0980	-5.2410	2.1790
528.00	6694589.229	1637848.020	-517.939	RT90-RHB70	84.3800	284.3700	41.3850	-5.1780	2.2440
531.00	6694588.945	1637848.093	-520.924	RT90-RHB70	84.3700	284.8200	41.6710	-5.1120	2.3080
534.00	6694588.660	1637848.168	-523.910	RT90-RHB70	84.3700	285.3400	41.9580	-5.0450	2.3720
537.00	6694588.376	1637848.246	-526.895	RT90-RHB70	84.3300	285.5000	42.2440	-4.9740	2.4360
540.00	6694588.090	1637848.326	-529.881	RT90-RHB70	84.3100	285.5100	42.5320	-4.9030	2.5020
543.00	6694587.803	1637848.405	-532.866	RT90-RHB70	84.2700	286.0300	42.8200	-4.8310	2.5680
546.00	6694587.516	1637848.488	-535.851	RT90-RHB70	84.2600	286.1700	43.1100	-4.7560	2.6360
549.00	6694587.227	1637848.571	-538.836	RT90-RHB70	84.2500	286.7100	43.4010	-4.6800	2.7040
552.00	6694586.939	1637848.658	-541.821	RT90-RHB70	84.2100	287.0100	43.6910	-4.6010	2.7720
555.00	6694586.650	1637848.746	-544.805	RT90-RHB70	84.1900	287.5000	43.9820	-4.5200	2.8420
558.00	6694586.360	1637848.838	-547.790	RT90-RHB70	84.2000	287.8000	44.2740	-4.4370	2.9120
561.00	6694586.072	1637848.930	-550.775	RT90-RHB70	84.2000	288.3300	44.5650	-4.3520	2.9800
564.00	6694585.784	1637849.026	-553.759	RT90-RHB70	84.2000	288.4900	44.8550	-4.2640	3.0480
567.00	6694585.497	1637849.122	-556.744	RT90-RHB70	84.2100	288.9300	45.1450	-4.1760	3.1160
570.00	6694585.210	1637849.220	-559.729	RT90-RHB70	84.2000	289.0300	45.4340	-4.0850	3.1830
573.00	6694584.924	1637849.319	-562.713	RT90-RHB70	84.2000	289.3700	45.7230	-3.9940	3.2500
576.00	6694584.638	1637849.419	-565.698	RT90-RHB70	84.2000	289.6200	46.0120	-3.9010	3.3160
579.00	6694584.352	1637849.521	-568.683	RT90-RHB70	84.2000	289.9600	46.3000	-3.8070	3.3820
582.00	6694584.067	1637849.625	-571.667	RT90-RHB70	84.1900	290.2000	46.5880	-3.7110	3.4480
585.00	6694583.782	1637849.730	-574.652	RT90-RHB70	84.1900	290.4500	46.8760	-3.6140	3.5140
588.00	6694583.497	1637849.836	-577.636	RT90-RHB70	84.1900	290.6500	47.1630	-3.5150	3.5790
591.00	6694583.213	1637849.943	-580.621	RT90-RHB70	84.1800	290.9700	47.4500	-3.4150	3.6440
594.00	6694582.928	1637850.052	-583.605	RT90-RHB70	84.1800	291.4300	47.7370	-3.3140	3.7090
597.00	6694582.645	1637850.163	-586.590	RT90-RHB70	84.1900	291.7800	48.0240	-3.2100	3.7730
600.00	6694582.363	1637850.276	-589.575	RT90-RHB70	84.1900	291.9700	48.3080	-3.1050	3.8360
603.00	6694582.081	1637850.390	-592.559	RT90-RHB70	84.2000	291.9000	48.5930	-2.9990	3.8980
606.00	6694581.800	1637850.503	-595.544	RT90-RHB70	84.1800	292.0500	48.8770	-2.8940	3.9600
609.00	6694581.518	1637850.617	-598.528	RT90-RHB70	84.1600	291.9500	49.1620	-2.7870	4.0230
612.00	6694581.235	1637850.731	-601.513	RT90-RHB70	84.1600	291.7800	49.4480	-2.6810	4.0860

615.00	6694580.952	1637850.844	-604.497	RT90-RHB70	84.1300	291.7700	49.7340	-2.5750	4.1510
618.00	6694580.667	1637850.958	-607.482	RT90-RHB70	84.1200	291.5400	50.0220	-2.4690	4.2160
621.00	6694580.382	1637851.071	-610.466	RT90-RHB70	84.1000	291.5500	50.3100	-2.3640	4.2830
624.00	6694580.095	1637851.184	-613.450	RT90-RHB70	84.0800	291.4500	50.6000	-2.2580	4.3500
627.00	6694579.807	1637851.297	-616.434	RT90-RHB70	84.0600	291.4400	50.8910	-2.1530	4.4190
630.00	6694579.518	1637851.410	-619.418	RT90-RHB70	84.0600	291.4200	51.1830	-2.0470	4.4890
633.00	6694579.229	1637851.524	-622.402	RT90-RHB70	84.0400	291.4300	51.4750	-1.9410	4.5590
636.00	6694578.939	1637851.638	-625.385	RT90-RHB70	84.0300	291.2100	51.7680	-1.8350	4.6290
639.00	6694578.648	1637851.750	-628.369	RT90-RHB70	84.0300	291.3300	52.0610	-1.7300	4.7010
642.00	6694578.357	1637851.864	-631.353	RT90-RHB70	84.0000	291.5700	52.3550	-1.6240	4.7720
645.00	6694578.066	1637851.979	-634.336	RT90-RHB70	83.9500	292.2100	52.6500	-1.5170	4.8450
648.00	6694577.773	1637852.099	-637.320	RT90-RHB70	83.8700	292.5500	52.9460	-1.4050	4.9190
651.00	6694577.477	1637852.222	-640.303	RT90-RHB70	83.8100	292.4400	53.2440	-1.2900	4.9960
654.00	6694577.178	1637852.345	-643.285	RT90-RHB70	83.7800	292.3900	53.5460	-1.1750	5.0760
657.00	6694576.878	1637852.469	-646.267	RT90-RHB70	83.7600	292.1800	53.8500	-1.0590	5.1580
660.00	6694576.576	1637852.592	-649.250	RT90-RHB70	83.7400	291.7500	54.1550	-0.9440	5.2410
663.00	6694576.272	1637852.713	-652.232	RT90-RHB70	83.7400	291.5600	54.4620	-0.8310	5.3250
666.00	6694575.968	1637852.833	-655.214	RT90-RHB70	83.7300	291.2300	54.7690	-0.7190	5.4110
669.00	6694575.662	1637852.952	-658.196	RT90-RHB70	83.7200	290.8800	55.0780	-0.6080	5.4970
672.00	6694575.356	1637853.069	-661.178	RT90-RHB70	83.7200	290.6300	55.3880	-0.4990	5.5850
675.00	6694575.049	1637853.185	-664.160	RT90-RHB70	83.7200	290.2400	55.6980	-0.3920	5.6730
678.00	6694574.741	1637853.298	-667.142	RT90-RHB70	83.7500	289.7100	56.0080	-0.2870	5.7620
681.00	6694574.433	1637853.408	-670.124	RT90-RHB70	83.7600	289.5800	56.3190	-0.1850	5.8500
684.00	6694574.126	1637853.517	-673.106	RT90-RHB70	83.7500	289.4900	56.6280	-0.0840	5.9380
687.00	6694573.819	1637853.626	-676.089	RT90-RHB70	83.7200	289.4900	56.9390	0.0170	6.0260
690.00	6694573.509	1637853.736	-679.071	RT90-RHB70	83.6900	289.5000	57.2510	0.1180	6.1160
693.00	6694573.198	1637853.846	-682.052	RT90-RHB70	83.6600	289.6000	57.5650	0.2200	6.2080
696.00	6694572.887	1637853.957	-685.034	RT90-RHB70	83.6500	289.6800	57.8790	0.3230	6.3010
699.00	6694572.574	1637854.069	-688.016	RT90-RHB70	83.6200	290.0000	58.1950	0.4260	6.3940
702.00	6694572.261	1637854.183	-690.997	RT90-RHB70	83.6100	290.1900	58.5110	0.5320	6.4880
705.00	6694571.947	1637854.298	-693.978	RT90-RHB70	83.6000	290.4000	58.8270	0.6380	6.5820
708.00	6694571.634	1637854.415	-696.960	RT90-RHB70	83.6000	290.6100	59.1440	0.7470	6.6770
711.00	6694571.321	1637854.532	-699.941	RT90-RHB70	83.6000	290.9300	59.4590	0.8560	6.7710
714.00	6694571.009	1637854.652	-702.922	RT90-RHB70	83.6200	291.1900	59.7750	0.9670	6.8640
717.00	6694570.698	1637854.772	-705.904	RT90-RHB70	83.6500	291.5200	60.0890	1.0790	6.9560
720.00	6694570.390	1637854.894	-708.885	RT90-RHB70	83.6700	291.7800	60.4000	1.1930	7.0460
723.00	6694570.082	1637855.017	-711.867	RT90-RHB70	83.7100	292.1400	60.7110	1.3070	7.1340
726.00	6694569.778	1637855.140	-714.849	RT90-RHB70	83.7300	292.4400	61.0180	1.4230	7.2200
729.00	6694569.476	1637855.265	-717.831	RT90-RHB70	83.7500	292.6500	61.3240	1.5400	7.3030
732.00	6694569.174	1637855.391	-720.813	RT90-RHB70	83.7900	292.8000	61.6290	1.6570	7.3860
735.00	6694568.875	1637855.517	-723.796	RT90-RHB70	83.8300	292.9500	61.9310	1.7750	7.4670
738.00	6694568.578	1637855.643	-726.778	RT90-RHB70	83.8500	293.0700	62.2320	1.8930	7.5450
741.00	6694568.282	1637855.769	-729.761	RT90-RHB70	83.8700	293.1100	62.5300	2.0110	7.6220

744.00	6694567.988	1637855.894	-732.744	RT90-RHB70	83.9000	293.0900	62.8280	2.1290	7.6970
747.00	6694567.694	1637856.019	-735.727	RT90-RHB70	83.9100	293.0700	63.1250	2.2460	7.7720
750.00	6694567.402	1637856.144	-738.710	RT90-RHB70	83.9200	292.9700	63.4210	2.3630	7.8460
753.00	6694567.109	1637856.268	-741.693	RT90-RHB70	83.9600	292.9000	63.7160	2.4790	7.9190
756.00	6694566.818	1637856.391	-744.677	RT90-RHB70	83.9800	292.8800	64.0100	2.5940	7.9910
759.00	6694566.529	1637856.513	-747.660	RT90-RHB70	84.0100	292.8500	64.3030	2.7090	8.0620
762.00	6694566.240	1637856.635	-750.644	RT90-RHB70	84.0200	293.4400	64.5940	2.8220	8.1310
765.00	6694565.953	1637856.759	-753.627	RT90-RHB70	84.0000	293.9400	64.8850	2.9390	8.1990
768.00	6694565.667	1637856.886	-756.611	RT90-RHB70	83.9800	294.4900	65.1740	3.0590	8.2670
771.00	6694565.381	1637857.017	-759.594	RT90-RHB70	83.9500	294.9900	65.4640	3.1810	8.3350
774.00	6694565.094	1637857.150	-762.578	RT90-RHB70	83.9200	295.1200	65.7540	3.3070	8.4020
777.00	6694564.806	1637857.285	-765.561	RT90-RHB70	83.8800	295.0900	66.0450	3.4350	8.4720
780.00	6694564.517	1637857.421	-768.544	RT90-RHB70	83.8600	294.8800	66.3380	3.5620	8.5430
783.00	6694564.226	1637857.556	-771.526	RT90-RHB70	83.8500	294.6200	66.6330	3.6890	8.6150
786.00	6694563.934	1637857.689	-774.509	RT90-RHB70	83.8600	294.4400	66.9280	3.8150	8.6880
789.00	6694563.642	1637857.822	-777.492	RT90-RHB70	83.8600	294.2800	67.2240	3.9400	8.7620
792.00	6694563.349	1637857.954	-780.475	RT90-RHB70	83.8400	294.1300	67.5200	4.0650	8.8360
795.00	6694563.055	1637858.086	-783.457	RT90-RHB70	83.8000	294.0000	67.8170	4.1880	8.9120
798.00	6694562.759	1637858.217	-786.440	RT90-RHB70	83.7600	294.0600	68.1170	4.3120	8.9890
801.00	6694562.461	1637858.350	-789.422	RT90-RHB70	83.7100	294.2900	68.4180	4.4370	9.0680
804.00	6694562.162	1637858.486	-792.404	RT90-RHB70	83.6600	294.6300	68.7210	4.5640	9.1490
807.00	6694561.860	1637858.624	-795.386	RT90-RHB70	83.6000	294.9500	69.0260	4.6940	9.2320
810.00	6694561.557	1637858.765	-798.367	RT90-RHB70	83.5500	295.1900	69.3320	4.8270	9.3170
813.00	6694561.253	1637858.908	-801.348	RT90-RHB70	83.5300	295.3300	69.6410	4.9630	9.4030
816.00	6694560.947	1637859.053	-804.329	RT90-RHB70	83.4900	295.3400	69.9500	5.0990	9.4910
819.00	6694560.640	1637859.198	-807.310	RT90-RHB70	83.4500	295.3200	70.2610	5.2360	9.5800
822.00	6694560.330	1637859.345	-810.290	RT90-RHB70	83.4200	295.4200	70.5750	5.3740	9.6710
825.00	6694560.020	1637859.492	-813.270	RT90-RHB70	83.3800	295.5700	70.8890	5.5140	9.7640
828.00	6694559.708	1637859.642	-816.250	RT90-RHB70	83.3400	295.6300	71.2050	5.6550	9.8580
831.00	6694559.394	1637859.792	-819.230	RT90-RHB70	83.3100	295.8400	71.5220	5.7970	9.9530
834.00	6694559.080	1637859.944	-822.210	RT90-RHB70	83.2800	295.8800	71.8410	5.9410	10.0500
837.00	6694558.764	1637860.097	-825.189	RT90-RHB70	83.2600	296.0900	72.1600	6.0850	10.1480
840.00	6694558.448	1637860.252	-828.168	RT90-RHB70	83.2500	296.1900	72.4800	6.2320	10.2460
843.00	6694558.131	1637860.408	-831.147	RT90-RHB70	83.2500	296.3800	72.8010	6.3790	10.3450
846.00	6694557.815	1637860.565	-834.127	RT90-RHB70	83.2600	296.5700	73.1210	6.5270	10.4430
849.00	6694557.500	1637860.722	-837.106	RT90-RHB70	83.2700	296.9400	73.4400	6.6760	10.5400
852.00	6694557.187	1637860.881	-840.085	RT90-RHB70	83.2800	296.9600	73.7580	6.8270	10.6360
855.00	6694556.874	1637861.041	-843.065	RT90-RHB70	83.3100	296.8700	74.0750	6.9780	10.7310
858.00	6694556.562	1637861.199	-846.044	RT90-RHB70	83.3300	296.7600	74.3910	7.1280	10.8250
861.00	6694556.251	1637861.356	-849.024	RT90-RHB70	83.3500	296.7400	74.7060	7.2760	10.9190
864.00	6694555.941	1637861.512	-852.004	RT90-RHB70	83.3300	296.6100	75.0200	7.4240	11.0110
867.00	6694555.629	1637861.668	-854.983	RT90-RHB70	83.3000	296.4700	75.3360	7.5720	11.1050
870.00	6694555.316	1637861.824	-857.963	RT90-RHB70	83.2700	296.5400	75.6530	7.7200	11.2000

873.00	6694555.001	1637861.981	-860.942	RT90-RHB70	83.2300	296.5200	75.9720	7.8680	11.2970
876.00	6694554.685	1637862.139	-863.921	RT90-RHB70	83.1900	296.4000	76.2920	8.0180	11.3960
879.00	6694554.366	1637862.297	-866.900	RT90-RHB70	83.1600	296.3000	76.6150	8.1670	11.4970
882.00	6694554.045	1637862.456	-869.879	RT90-RHB70	83.1000	296.2400	76.9400	8.3170	11.6000
885.00	6694553.722	1637862.615	-872.857	RT90-RHB70	83.0700	296.4500	77.2670	8.4680	11.7050
888.00	6694553.398	1637862.776	-875.835	RT90-RHB70	83.0200	296.7500	77.5960	8.6200	11.8120
891.00	6694553.072	1637862.940	-878.813	RT90-RHB70	82.9900	297.2000	77.9250	8.7760	11.9200
894.00	6694552.747	1637863.108	-881.790	RT90-RHB70	82.9800	297.7600	78.2560	8.9350	12.0280
897.00	6694552.422	1637863.278	-884.768	RT90-RHB70	83.0400	298.0700	78.5840	9.0970	12.1350
900.00	6694552.101	1637863.450	-887.746	RT90-RHB70	83.0700	298.2300	78.9100	9.2590	12.2390
903.00	6694551.782	1637863.621	-890.724	RT90-RHB70	83.1000	298.3400	79.2330	9.4220	12.3410
906.00	6694551.465	1637863.792	-893.702	RT90-RHB70	83.1400	298.1700	79.5550	9.5850	12.4410
909.00	6694551.149	1637863.961	-896.681	RT90-RHB70	83.1700	298.1800	79.8750	9.7450	12.5390
912.00	6694550.835	1637864.130	-899.659	RT90-RHB70	83.2000	298.3400	80.1940	9.9050	12.6360
915.00	6694550.522	1637864.298	-902.638	RT90-RHB70	83.2200	298.3600	80.5110	10.0660	12.7310
918.00	6694550.211	1637864.466	-905.617	RT90-RHB70	83.2400	298.3300	80.8270	10.2250	12.8250
921.00	6694549.900	1637864.634	-908.596	RT90-RHB70	83.2700	298.2200	81.1420	10.3850	12.9190
924.00	6694549.590	1637864.800	-911.576	RT90-RHB70	83.2800	298.2100	81.4560	10.5420	13.0110
927.00	6694549.281	1637864.966	-914.555	RT90-RHB70	83.2700	298.2200	81.7700	10.7000	13.1030
930.00	6694548.971	1637865.132	-917.535	RT90-RHB70	83.2700	297.9000	82.0840	10.8580	13.1950
933.00	6694548.660	1637865.297	-920.514	RT90-RHB70	83.2600	297.6500	82.3990	11.0140	13.2880
936.00	6694548.348	1637865.460	-923.493	RT90-RHB70	83.2400	297.4800	82.7150	11.1690	13.3820
939.00	6694548.035	1637865.623	-926.472	RT90-RHB70	83.2000	297.2400	83.0330	11.3240	13.4780
942.00	6694547.719	1637865.786	-929.451	RT90-RHB70	83.1400	296.9900	83.3520	11.4780	13.5760
945.00	6694547.400	1637865.949	-932.430	RT90-RHB70	83.0700	296.8000	83.6760	11.6320	13.6780
948.00	6694547.077	1637866.112	-935.408	RT90-RHB70	83.0200	296.7000	84.0030	11.7870	13.7840
951.00	6694546.751	1637866.275	-938.386	RT90-RHB70	82.9900	296.6800	84.3330	11.9420	13.8920
954.00	6694546.424	1637866.440	-941.363	RT90-RHB70	82.9500	296.8500	84.6640	12.0970	14.0010
957.00	6694546.095	1637866.606	-944.340	RT90-RHB70	82.9000	297.2000	84.9970	12.2550	14.1130
960.00	6694545.766	1637866.776	-947.317	RT90-RHB70	82.8500	297.6000	85.3310	12.4160	14.2250
963.00	6694545.435	1637866.949	-950.294	RT90-RHB70	82.8000	298.0200	85.6670	12.5800	14.3390
966.00	6694545.103	1637867.125	-953.270	RT90-RHB70	82.7600	298.4200	86.0040	12.7480	14.4540
969.00	6694544.770	1637867.305	-956.246	RT90-RHB70	82.7300	298.5900	86.3410	12.9190	14.5690
972.00	6694544.437	1637867.487	-959.222	RT90-RHB70	82.6900	299.0100	86.6790	13.0920	14.6860
975.00	6694544.103	1637867.672	-962.198	RT90-RHB70	82.6600	299.5100	87.0180	13.2680	14.8030
978.00	6694543.769	1637867.861	-965.173	RT90-RHB70	82.6700	300.0100	87.3560	13.4470	14.9200
981.00	6694543.438	1637868.052	-968.149	RT90-RHB70	82.6800	300.3300	87.6920	13.6300	15.0340
984.00	6694543.108	1637868.246	-971.124	RT90-RHB70	82.6900	300.4400	88.0270	13.8140	15.1480
987.00	6694542.779	1637868.439	-974.100	RT90-RHB70	82.7000	300.4400	88.3610	13.9990	15.2600
990.00	6694542.450	1637868.632	-977.076	RT90-RHB70	82.7200	300.5900	88.6950	14.1830	15.3720
996.00	6694541.797	1637869.018	-983.028	RT90-RHB70	82.7400	300.6500	89.3580	14.5520	15.5920

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Maxibor T - Borehole deviation: Maxibor

KFM03B, 2003-07-02 15:30:00 - 2003-07-02 17:30:00 (0.000 - 101.540 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	1634618.681	6697844.200	-8.468	RT90-RHB70	-85.3000	264.4900	0.0000	0.0000	0.0000	
3.00	1634618.436	6697844.176	-5.478	RT90-RHB70	-85.2700	264.7300	0.2460	0.0000	0.0000	
6.00	1634618.190	6697844.154	-2.488	RT90-RHB70	-85.2300	265.0000	0.4930	0.0010	0.0020	
9.00	1634617.942	6697844.132	0.501	RT90-RHB70	-85.2000	265.3100	0.7420	0.0030	0.0050	
12.00	1634617.692	6697844.111	3.491	RT90-RHB70	-85.1900	265.4300	0.9930	0.0070	0.0110	
15.00	1634617.441	6697844.091	6.480	RT90-RHB70	-85.1900	265.5700	1.2450	0.0110	0.0170	
18.00	1634617.190	6697844.072	9.470	RT90-RHB70	-85.1600	266.0200	1.4970	0.0160	0.0230	
21.00	1634616.937	6697844.054	12.459	RT90-RHB70	-85.1300	266.2900	1.7500	0.0230	0.0300	
24.00	1634616.683	6697844.038	15.448	RT90-RHB70	-85.1300	266.5100	2.0040	0.0310	0.0390	
27.00	1634616.429	6697844.022	18.437	RT90-RHB70	-85.1300	266.7300	2.2590	0.0400	0.0480	
30.00	1634616.174	6697844.008	21.426	RT90-RHB70	-85.1200	267.0600	2.5140	0.0500	0.0570	
33.00	1634615.919	6697843.995	24.416	RT90-RHB70	-85.1000	267.4300	2.7690	0.0610	0.0660	
36.00	1634615.663	6697843.983	27.405	RT90-RHB70	-85.0800	267.5400	3.0240	0.0740	0.0770	
39.00	1634615.407	6697843.972	30.394	RT90-RHB70	-85.0300	267.5600	3.2810	0.0880	0.0880	
42.00	1634615.147	6697843.961	33.382	RT90-RHB70	-85.0000	267.7000	3.5410	0.1020	0.1020	
45.00	1634614.886	6697843.951	36.371	RT90-RHB70	-84.9800	268.0300	3.8020	0.1160	0.1170	
48.00	1634614.623	6697843.942	39.359	RT90-RHB70	-84.9200	268.1300	4.0640	0.1330	0.1340	
51.00	1634614.358	6697843.933	42.348	RT90-RHB70	-84.9000	268.1700	4.3290	0.1500	0.1530	
54.00	1634614.091	6697843.924	45.336	RT90-RHB70	-84.8600	268.2900	4.5950	0.1670	0.1740	
57.00	1634613.823	6697843.916	48.324	RT90-RHB70	-84.8500	268.2100	4.8630	0.1840	0.1960	
60.00	1634613.554	6697843.908	51.312	RT90-RHB70	-84.8200	268.2500	5.1320	0.2020	0.2190	
63.00	1634613.283	6697843.900	54.299	RT90-RHB70	-84.7900	268.5100	5.4020	0.2200	0.2440	
66.00	1634613.010	6697843.893	57.287	RT90-RHB70	-84.7700	268.6500	5.6740	0.2390	0.2700	
69.00	1634612.737	6697843.886	60.274	RT90-RHB70	-84.7600	268.7800	5.9470	0.2590	0.2980	
72.00	1634612.163	6697843.880	63.262	RT90-RHB70	-84.7400	269.0000	6.2200	0.2790	0.3260	
75.00	1634612.188	6697843.876	66.249	RT90-RHB70	-84.7500	269.0100	6.4940	0.3010	0.3540	
78.00	1634611.913	6697843.871	69.237	RT90-RHB70	-84.7100	268.9300	6.7680	0.3230	0.3820	
81.00	1634611.636	6697843.866	72.224	RT90-RHB70	-84.6800	268.8300	7.0440	0.3440	0.4130	
84.00	1634611.358	6697843.860	75.211	RT90-RHB70	-84.6500	268.8400	7.3220	0.3650	0.4450	
87.00	1634611.078	6697843.854	78.198	RT90-RHB70	-84.6300	268.8500	7.6010	0.3860	0.4780	
90.00	1634610.798	6697843.849	81.185	RT90-RHB70	-84.6100	268.6900	7.8810	0.4080	0.5130	
96.00	1634610.231	6697843.836	87.158	RT90-RHB70	-84.5700	268.7400	8.4450	0.4500	0.5860	

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Appendix 4

Length reference marks

Reference Mark T - Reference mark in drillhole

KFM03A, 2003-06-11 11:00:00 - 2003-06-11 23:00:00 (110.000 - 900.000 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	300	600	32.0	130	Ja		OK klar signal
150.00	400.00	300	650	35.0	140	Ja		OK klar signal
200.00	400.00	380	650	38.0	150	Ja		OK klar signal
250.00	400.00	420	700	32.0	190	Ja		OK klar signal
300.00	400.00	300	600	32.0	165	Ja		OK klar signal
350.00	400.00	320	600	42.0	150	Ja		OK klar signal
403.00	400.00	350	600	39.0	150	Ja		OK klar signal
453.00	400.00	320	850	44.0	165	Ja		OK klar signal
500.00	400.00	400	950	45.0	180	Ja		OK klar signal
550.00	400.00	400	960	45.0	200	Ja		OK klar signal
600.00	400.00	400	1000	46.0	210	Ja		OK klar signal
650.00	400.00	450	1000	49.0	190	Ja		OK klar signal
700.00	400.00	450	1000	50.0	180	Ja		OK klar signal
750.00	400.00	550	800	49.0	150	Ja		OK klar och tydlig
800.00	400.00	400	900	50.0	165	Ja		OK lite diffus signal
850.00	400.00	500	800	50.0	150	Ja		OK lite diffus signal
900.00	400.00	500	800	50.0	180	Ja		OK lite diffus signal

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Appendix 5

Mapping of drill cuttings

Drill cuttings							Date: 2003-08-15	Sign.: Jesper Petersson			
				Untreated drill cuttings sample				Washed and sieved drill cuttings sample			
Hole	From		To	Lightn.	Chrom.	Hue	Grainsize	Lightn.	Chrom.	Hue	Grainsize
KFM03A	1.65	-	3	100; Light	80; Greyish	2; Red	6; Fine-to medium grained	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)
KFM03A	3	-	5	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)
KFM03A	5	-	6	200; Dark	80; Greyish	9; Black	6; Fine-to medium grained	200; Dark	10; Pinkish	8; Grey	6; Fine-to medium grained
KFM03A	6	-	8	200; Dark	80; Greyish	9; Black	2; Fine-grained (<1 mm)	200; Dark		8; Grey	2; Fine-grained (<1 mm)
KFM03A	8	-	9	100; Light		8; Grey	9; Medium-grained (1-5 mm)	100; Light		8; Grey	9; Medium-grained (1-5 mm)
KFM03A	9	-	12	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)
KFM03A	12	-	13	100; Light		8; Grey	6; Fine-to medium grained	100; Light	10; Pinkish	8; Grey	6; Fine-to medium grained
KFM03A	13	-	15	100; Light		8; Grey	9; Medium-grained (1-5 mm)	100; Light	10; Pinkish	8; Grey	8; Medium to coarse grained
KFM03A	15	-	18	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	8; Medium to coarse grained
KFM03A	18	-	21	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	8; Medium to coarse grained
KFM03A	21	-	23			8; Grey	6; Fine-to medium grained		10; Pinkish	8; Grey	6; Fine-to medium grained
KFM03A	23	-	24	200; Dark	80; Greyish	9; Black	2; Fine-grained (<1 mm)	200; Dark		8; Grey	2; Fine-grained (<1 mm)
KFM03A	24	-	27		80; Greyish	2; Red	6; Fine-to medium grained		20; Reddish	8; Grey	6; Fine-to medium grained
KFM03A	27	-	30		20; Reddish	8; Grey	9; Medium-grained (1-5 mm)	100; Light	20; Reddish	8; Grey	6; Fine-to medium grained
KFM03A	30	-	33	100; Light	20; Reddish	8; Grey	9; Medium-grained (1-5 mm)	100; Light	20; Reddish	8; Grey	6; Fine-to medium grained
KFM03A	33	-	36	100; Light	20; Reddish	8; Grey	9; Medium-grained (1-5 mm)	100; Light	20; Reddish	8; Grey	6; Fine-to medium grained
KFM03A	36	-	37	100; Light	20; Reddish	8; Grey	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	1; Pink	8; Medium to coarse grained
KFM03A	37	-	39	100; Light	80; Greyish	2; Red	8; Medium to coarse grained	100; Light	80; Greyish	2; Red	8; Medium to coarse grained
KFM03A	39	-	42	100; Light	20; Reddish	8; Grey	9; Medium-grained (1-5 mm)	100; Light	20; Reddish	8; Grey	9; Medium-grained (1-5 mm)
KFM03A	42	-	45	100; Light	20; Reddish	8; Grey	6; Fine-to medium grained	100; Light	20; Reddish	8; Grey	9; Medium-grained (1-5 mm)
KFM03A	45	-	48	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)
KFM03A	48	-	51	100; Light	20; Reddish	8; Grey	6; Fine-to medium grained	100; Light	20; Reddish	8; Grey	6; Fine-to medium grained
KFM03A	51	-	54	100; Light	20; Reddish	8; Grey	9; Medium-grained (1-5 mm)	100; Light	20; Reddish	8; Grey	8; Medium to coarse grained
KFM03A	54	-	55	200; Dark	80; Greyish	9; Black	2; Fine-grained (<1 mm)	200; Dark		8; Grey	6; Fine-to medium grained
KFM03A	55	-	56	100; Light	10; Pinkish	8; Grey	9; Medium-grained (1-5 mm)	100; Light	10; Pinkish	7; White	8; Medium to coarse grained
KFM03A	56	-	57	100; Light		8; Grey	9; Medium-grained (1-5 mm)			8; Grey	6; Fine-to medium grained
KFM03A	57	-	58			8; Grey	6; Fine-to medium grained			8; Grey	6; Fine-to medium grained
KFM03A	58	-	60			8; Grey	9; Medium-grained (1-5 mm)	100; Light		8; Grey	9; Medium-grained (1-5 mm)
KFM03A	60	-	63	200; Dark	80; Greyish	9; Black	6; Fine-to medium grained			8; Grey	6; Fine-to medium grained
KFM03A	63	-	66	200; Dark		9; Black	2; Fine-grained (<1 mm)	200; Dark		8; Grey	2; Fine-grained (<1 mm)
KFM03A	66	-	68	200; Dark	20; Reddish	8; Grey	6; Fine-to medium grained	200; Dark		8; Grey	6; Fine-to medium grained
KFM03A	68	-	69	100; Light	20; Reddish	8; Grey	6; Fine-to medium grained	100; Light	10; Pinkish	8; Grey	6; Fine-to medium grained
KFM03A	69	-	70		20; Reddish	8; Grey	6; Fine-to medium grained		20; Reddish	8; Grey	6; Fine-to medium grained
KFM03A	70	-	71	200; Dark	80; Greyish	9; Black	2; Fine-grained (<1 mm)		10; Pinkish	8; Grey	6; Fine-to medium grained
KFM03A	71	-	72		20; Reddish	8; Grey	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	6; Fine-to medium grained
KFM03A	72	-	75	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	8; Medium to coarse grained
KFM03A	75	-	78	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)
KFM03A	78	-	81	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)
KFM03A	81	-	84	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)
KFM03A	84	-	87	100; Light	80; Greyish	2; Red	8; Medium to coarse grained	100; Light	80; Greyish	2; Red	8; Medium to coarse grained
KFM03A	87	-	89	100; Light	20; Reddish	8; Grey	9; Medium-grained (1-5 mm)	100; Light	20; Reddish	8; Grey	6; Fine-to medium grained
KFM03A	89	-	90	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	6; Fine-to medium grained
KFM03A	90	-	92	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)	100; Light	80; Greyish	2; Red	9; Medium-grained (1-5 mm)
KFM03A	92	-	93	100; Light		2; Red	9; Medium-grained (1-5 mm)	100; Light		2; Red	8; Medium to coarse grained
KFM03A	93	-	94	100; Light	80; Greyish	2; Red	6; Fine-to medium grained		80; Greyish	2; Red	6; Fine-to medium grained
KFM03A	94	-	95	100; Light	20; Reddish	8; Grey	8; Medium to coarse grained	100; Light	10; Pinkish	8; Grey	8; Medium to coarse grained
KFM03A	95	-	96	200; Dark	80; Greyish	9; Black	2; Fine-grained (<1 mm)	200; Dark		8; Grey	2; Fine-grained (<1 mm)
KFM03A	96	-	97		80; Greyish	2; Red	6; Fine-to medium grained	200; Dark	80; Greyish	2; Red	6; Fine-to medium grained
KFM03A	97	-	98	200; Dark	80; Greyish	2; Red	6; Fine-to medium grained	200; Dark	20; Reddish	8; Grey	6; Fine-to medium grained
KFM03A	98	-	99		80; Greyish	2; Red	6; Fine-to medium grained		80; Greyish	2; Red	9; Medium-grained (1-5 mm)
KFM03A	99	-	100.30	100; Light	20; Reddish	8; Grey	9; Medium-grained (1-5 mm)	100; Light		8; Grey	8; Medium to coarse grained

Drill cuttings

Hole	From		To	Rock type A	Rock type B	Min-1
KFM03A	1.65	-	3	101057; Granite to granodiorite, metamorphic, medium grained, medium grained		32; Potash Feldspar
KFM03A	3	-	5	101057; Granite to granodiorite, metamorphic, medium grained, medium grained		32; Potash Feldspar
KFM03A	5	-	6	102017; Amphibolite	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	49; Plagioclase
KFM03A	6	-	8	102017; Amphibolite		49; Plagioclase
KFM03A	8	-	9	101056; Granodiorite, metamorphic		49; Plagioclase
KFM03A	9	-	12	101057; Granite to granodiorite, metamorphic, medium grained, medium grained		32; Potash Feldspar
KFM03A	12	-	13	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	36; Quartz
KFM03A	13	-	15	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	101061; Pegmatite, pegmatitic granite	32; Potash Feldspar
KFM03A	15	-	18	101057; Granite to granodiorite, metamorphic, medium grained, medium grained		32; Potash Feldspar
KFM03A	18	-	21	101057; Granite to granodiorite, metamorphic, medium grained, medium grained		32; Potash Feldspar
KFM03A	21	-	23	102017; Amphibolite	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	49; Plagioclase
KFM03A	23	-	24	102017; Amphibolite		49; Plagioclase
KFM03A	24	-	27	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	27	-	30	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	30	-	33	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	33	-	36	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	36	-	37	101061; Pegmatite, pegmatitic granite	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	32; Potash Feldspar
KFM03A	37	-	39	101061; Pegmatite, pegmatitic granite	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	32; Potash Feldspar
KFM03A	39	-	42	101057; Granite to granodiorite, metamorphic, medium grained, medium grained		32; Potash Feldspar
KFM03A	42	-	45	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	45	-	48	101057; Granite to granodiorite, metamorphic, medium grained, medium grained		32; Potash Feldspar
KFM03A	48	-	51	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	51	-	54	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	101061; Pegmatite, pegmatitic granite	32; Potash Feldspar
KFM03A	54	-	55	102017; Amphibolite	101061; Pegmatite, pegmatitic granite	49; Plagioclase
KFM03A	55	-	56	101061; Pegmatite, pegmatitic granite		32; Potash Feldspar
KFM03A	56	-	57	101056; Granodiorite, metamorphic	102017; Amphibolite	49; Plagioclase
KFM03A	57	-	58	101056; Granodiorite, metamorphic	102017; Amphibolite	49; Plagioclase
KFM03A	58	-	60	101056; Granodiorite, metamorphic	102017; Amphibolite	36; Quartz
KFM03A	60	-	63	102017; Amphibolite	101061; Pegmatite, pegmatitic granite	49; Plagioclase
KFM03A	63	-	66	102017; Amphibolite		49; Plagioclase
KFM03A	66	-	68	102017; Amphibolite	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	49; Plagioclase
KFM03A	68	-	69	101061; Pegmatite, pegmatitic granite	102017; Amphibolite	32; Potash Feldspar
KFM03A	69	-	70	102017; Amphibolite	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	49; Plagioclase
KFM03A	70	-	71	102017; Amphibolite	101061; Pegmatite, pegmatitic granite	49; Plagioclase
KFM03A	71	-	72	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	72	-	75	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	101061; Pegmatite, pegmatitic granite	32; Potash Feldspar
KFM03A	75	-	78	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	78	-	81	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	101061; Pegmatite, pegmatitic granite	32; Potash Feldspar
KFM03A	81	-	84	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	84	-	87	101061; Pegmatite, pegmatitic granite	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	32; Potash Feldspar
KFM03A	87	-	89	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	89	-	90	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	90	-	92	101057; Granite to granodiorite, metamorphic, medium grained, medium grained		32; Potash Feldspar
KFM03A	92	-	93	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	101061; Pegmatite, pegmatitic granite	32; Potash Feldspar
KFM03A	93	-	94	101057; Granite to granodiorite, metamorphic, medium grained, medium grained		32; Potash Feldspar
KFM03A	94	-	95	101061; Pegmatite, pegmatitic granite	102017; Amphibolite	32; Potash Feldspar
KFM03A	95	-	96	102017; Amphibolite	101061; Pegmatite, pegmatitic granite	49; Plagioclase
KFM03A	96	-	97	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	102017; Amphibolite	32; Potash Feldspar
KFM03A	97	-	98	102017; Amphibolite	101057; Granite to granodiorite, metamorphic, medium grained, medium grained	49; Plagioclase
KFM03A	98	-	99	101057; Granite to granodiorite, metamorphic, medium grained, medium grained		32; Potash Feldspar
KFM03A	99	-	100.30	101056; Granodiorite, metamorphic	101061; Pegmatite, pegmatitic granite	36; Quartz

Drill cuttings

Hole	From		To	Min-2	Min-3	Min-4	Min-5	Distr.	Comment
KFM03A	1.65	-	3	36; Quartz	49; Plagioclase	10; Biotite			
KFM03A	3	-	5	36; Quartz	49; Plagioclase	10; Biotite			Several grains with red fracture sealing; probably feldspar
KFM03A	5	-	6	28; Hornblende	10; Biotite	32; Potash Feldspar	36; Quartz	80; 80/20	15-20 vol% of 101057
KFM03A	6	-	8	28; Hornblende	10; Biotite				
KFM03A	8	-	9	36; Quartz	32; Potash Feldspar	10; Biotite			
KFM03A	9	-	12	36; Quartz	49; Plagioclase	10; Biotite			
KFM03A	12	-	13	32; Potash Feldspar	49; Plagioclase	10; Biotite	28; Hornblende	90; 90/10	10-15 vol% of amphibolite & ca. 10 vol% white leucogranite
KFM03A	13	-	15	36; Quartz	49; Plagioclase	10; Biotite		90; 90/10	
KFM03A	15	-	18	36; Quartz	49; Plagioclase	10; Biotite			
KFM03A	18	-	21	36; Quartz	49; Plagioclase	10; Biotite			
KFM03A	21	-	23	28; Hornblende	32; Potash Feldspar	10; Biotite	36; Quartz	80; 80/20	~10 vol% white, fine to medium grained leucogranite
KFM03A	23	-	24	10; Biotite	28; Hornblende	36; Quartz	32; Potash Feldspar		<5 vol%
KFM03A	24	-	27	49; Plagioclase	36; Quartz	28; Hornblende	10; Biotite	80; 80/20	20-25 vol% amphibolite
KFM03A	27	-	30	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende	90; 90/10	
KFM03A	30	-	33	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende	90; 90/10	~5 vol% amphibolite
KFM03A	33	-	36	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende	90; 90/10	~5 vol% amphibolite
KFM03A	36	-	37	36; Quartz	49; Plagioclase	10; Biotite		80; 80/20	
KFM03A	37	-	39	36; Quartz	49; Plagioclase	10; Biotite		90; 90/10	
KFM03A	39	-	42	36; Quartz	49; Plagioclase	10; Biotite		90; 90/10	~10 vol% leucogranite
KFM03A	42	-	45	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende		<5 vol% amphibolite
KFM03A	45	-	48	36; Quartz	49; Plagioclase	10; Biotite			
KFM03A	48	-	51	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende	90; 90/10	
KFM03A	51	-	54	36; Quartz	49; Plagioclase	10; Biotite		90; 90/10	5-10 vol% pegmatitic granite
KFM03A	54	-	55	28; Hornblende	10; Biotite	32; Potash Feldspar	36; Quartz	90; 90/10	
KFM03A	55	-	56	36; Quartz	49; Plagioclase	10; Biotite			
KFM03A	56	-	57	36; Quartz	10; Biotite	32; Potash Feldspar	28; Hornblende	70; 70/30	
KFM03A	57	-	58	36; Quartz	10; Biotite	32; Potash Feldspar	28; Hornblende	60; 60/40	
KFM03A	58	-	60	49; Plagioclase	32; Potash Feldspar	10; Biotite	28; Hornblende		<5 vol% amphibolite
KFM03A	60	-	63	10; Biotite	28; Hornblende	32; Potash Feldspar	36; Quartz	60; 60/40	Fine to coarse grained
KFM03A	63	-	66	28; Hornblende	10; Biotite	36; Quartz			<5 vol% coarse quartz
KFM03A	66	-	68	28; Hornblende	10; Biotite	32; Potash Feldspar	36; Quartz	90; 90/10	<5 vol% pegmatitic granite
KFM03A	68	-	69	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende	90; 90/10	Fine to coarse grained
KFM03A	69	-	70	10; Biotite	32; Potash Feldspar	36; Quartz	28; Hornblende	50; 50/50	
KFM03A	70	-	71	10; Biotite	32; Potash Feldspar	36; Quartz	28; Hornblende	50; 50/50	Fine to coarse grained
KFM03A	71	-	72	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende	90; 90/10	5-10 vol% amphibolite
KFM03A	72	-	75	36; Quartz	49; Plagioclase	10; Biotite		80; 80/20	
KFM03A	75	-	78	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende		<5 vol% amphibolite & < 5 vol% pegmatitic granite
KFM03A	78	-	81	36; Quartz	49; Plagioclase	10; Biotite		90; 90/10	
KFM03A	81	-	84	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende		<5 vol% amphibolite & < 5 vol% pegmatitic granite
KFM03A	84	-	87	36; Quartz	49; Plagioclase	10; Biotite		80; 80/20	
KFM03A	87	-	89	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende	90; 90/10	5-10 vol% amphibolite
KFM03A	89	-	90	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende	90; 90/10	~5 vol% amphibolite
KFM03A	90	-	92	36; Quartz	49; Plagioclase	10; Biotite			
KFM03A	92	-	93	36; Quartz	49; Plagioclase	10; Biotite		70; 70/30	
KFM03A	93	-	94	36; Quartz	49; Plagioclase	10; Biotite			Weakly oxidized material
KFM03A	94	-	95	36; Quartz	49; Plagioclase	10; Biotite	28; Hornblende		<5 vol% amphibolite
KFM03A	95	-	96	28; Hornblende	10; Biotite	32; Potash Feldspar	36; Quartz		<5 vol% pegmatitic granite
KFM03A	96	-	97	49; Plagioclase	36; Quartz	10; Biotite	28; Hornblende	70; 70/30	Possibly some pegmatitic granite
KFM03A	97	-	98	10; Biotite	32; Potash Feldspar	10; Biotite	36; Quartz	70; 70/30	Also some pegmatitic granite
KFM03A	98	-	99	36; Quartz	49; Plagioclase	10; Biotite			Weakly oxidized material
KFM03A	99	-	100.30	49; Plagioclase	32; Potash Feldspar	10; Biotite		80; 80/20	Also some oxidized grains; possibly conatmination from the 98-99 sample