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May 2006

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Abstract

This report presents the results from the Boremap logging of telescopic drilled borehole KFM06C. The borehole is located north of Bolundsfjärden, in the northeastern part of Forsmark site investigation area, and plunges 60° towards NNE. The main purpose for the location of this borehole was to define the northeastern margin of the tectonic lens that largely coincides with the site investigation area. The full length of KFM06C is 1,000.43 metres. The BIPS-image usable for mapping covers the interval 102.13–996.91 metres after length adjustment. The lowermost metres of the drill core were mapped in Boremap without any complementary BIPS-image. All intersected structures and lithologies have been documented in detail by integrating information from the drill core and the BIPS-image.

KFM06C is drilled from the tectonic lens into a wide belt of aplitic metagranite. The boundary between the two domains is gradual at a borehole length of about 410 metres (i.e. a true depth of 340–350 metres). Above this level, the borehole is dominated by medium-grained metagranite with subordinate occurrences of pegmatitic granite and metadiorite/quartz metadiorite. The aplitic metagranite that predominates below 410 metres length has been variably affected by intense albitization. This alteration has locally rendered the recognition of the protolith almost impossible, and some of the affected intervals are inferred to be the medium-grained metagranite, especially in the lowermost 100 metres of the borehole. Other rock units that form continuous occurrences of volumetric importance within the belt of aplitic metagranite include pegmatitic granite and fine- to finely medium-grained metagranitoids. In addition, there is a noteworthy occurrence of amphibolite associated with an intermediate, fine-grained rock inferred to be metavolcanic. Virtually all rocks in the borehole have experienced Svecofennian metamorphism under amphibolite facies conditions.

Structurally, KFM06C is characterised by composite L-S fabrics, with a predominance of linear mineral fabrics in the medium-grained metagranite, and a slight predominance of tectonic foliation in the aplitic metagranite that occurs below 410 metres length. Totally 20 narrow zones of more intense ductile and brittle-ductile deformation have been registered in KFM06C. A concentration of deformation zones is found at 220.5–229.4 metres length.

The total number of fractures registered *outside crush zones and sealed networks* during the boremap-logging of KFM06C amounts to 4,457. Of these are 1,122 open, 74 partly open and 3,261 sealed. In addition, there are 294 sealed networks, nine crush zones, nine breccias and three cataclasites registered in the mapped interval. The total length of all sealed networks amount to 106.4 metres (i.e. about 12% of the mapped interval). All nine crush zones occur in the upper 540 metres of the borehole. Chlorite and calcite are the most frequent fracture filling minerals within KFM06C. A typical mineral assemblage, commonly found in fractures inferred to be sealed, consists of hematite stained adularia together with calcite, chlorite, and locally pyrite and quartz. Other minerals preferably found in the sealed fractures are prehnite, laumontite, epidote and biotite. Minerals largely restricted to open fractures include clay minerals, asphaltite down to ca 124 metres borehole length, sericite, fluorite and Fe-hydroxide. Pyrite occurs in both sealed and open fractures.

Sammanfattning

Föreliggande rapport redovisar resultaten från boremapkarteringen av teleskopborrhål KFM06C. Borrhålet är beläget norr om Bolundsfjärden, i norra delen av undersökningsområde Forsmark, och stupar 60° mot NNO. Det huvudsakliga syftet med borrhålets placering var att definiera den nordöstra begränsningen av den tektoniska lins som i hög grad sammanfaller med undersökningsområdet. Den totala längden av KFM06C är 1 000,43 meter och den BIPS-bild som är användbar för kartering täcker intervallet 102,13–996,91 meter, efter längdjustering. De understa 3,3 metrarna av borrhålet är karterade med Boremap utan kompletterande BIPS-bild. Alla strukturer och litologier i det Boremapkarterade intervallet har dokumenterats i detalj genom att integrera information från borrkärnorna och BIPS-bilderna.

KFM06C har borrats från den tektoniska linsen in i ett brett stråk av aplitisk metagranit. Gränsen mellan de två bergartsdomänerna är gradvis och uppträder på en borrhålslängd av ungefär 410 meter. Över denna nivå domineras borrhålet av medelkornig metaganit med underordnade förekomster av pegmatitisk granit och metadiorit/kvartsmetadiorit. Den aplitiska graniten, som dominerar under 410 meters längd, har i varierande utsträckning genomgått albitisering. Ställvis är det nära nog omöjligt att urskilja ursprungsbergarten och vissa omvandlade delar uppvisar texturalla likheter med den medelkorniga metagraniten, speciellt i de understa 100 metrarna av borrhålet. Andra bergarter av volymmässig betydelse i stråket med aplitisk metagranit inkluderar pegmatitisk granit och fin- till fint medelkorniga metagranitoider. Dessutom finns en anmärkningsvärd förekomst av amfibolit associerad med en intermediär, finkornig bergart som bedömts vara av vulkaniskt ursprung. Största delen av berggrunden i området har genomgått Svekofennisk amfibolitfacies-metamorfos.

KFM06C karaktäriseras vidare av en sammansatt L-S-struktur, med en dominerande mineralstänglighet i den medelkorniga metagraniten och en något förhärskande foliationskomponent i den aplitiska metagraniten som uppträder under 410 meters längd. Totalt har 20 mindre zoner med plastisk och spröd-plastisk deformation har registrerats i KFM06C, med en koncentration mellan 220,5 och 229,4 meters längd.

Det totala antalet sprickor som registrerats och inte ingår i krosszoner eller läkta spricknätverk vid boremapkarteringen av KFM06C, uppgår till 4 457. Av dessa är 1 122 öppna, 74 partiellt öppna och 3 261 läkta. Dessutom har 294 läkta spricknätverk, nio krosszoner, nio breccior och tre kataklsiter registrerats i det karterade intervallet. Den totala längden av de läkta spricknätverken uppgår till 106,4 meter (dvs. ungefär 12 % av det karterade intervallet). Alla nio krosszoner uppträder i de övre 540 metrarna av borrhålet. Klorit och kalcit är de överlägset vanligaste sprickmineralen i KFM06C. En typisk mineralassociation, som vanligtvis uppträder i sprickor som bedömts vara läkta, utgörs av hematitimpregnerad adularia tillsammans med kalcit och klorit, samt lokalt pyrit och kvarts. Andra mineral som främst påträffats i läkta sprickor är prehnit, laumontit, epidot och biotit. Mineral som till största delen är begränsade till öppna sprickor är lermineral, bergbeck förekommer ner till 124 meters borrhålslängd, sericit, fluorit och järnhydroxid. Pyrit är vanligt förekommande både i läkta och öppna sprickor.

Contents

1 Introduction

Since 2002, SKB investigates two potential sites at Forsmark and Oskarshamn, for a deep repository in the Swedish Precambrian basement. In order to characterise the bedrock down to a depth of about 1 km in the central part of the Forsmark site investigation area, three deep telescopic boreholes, denoted KFM01A, KFM02A and KFM03A, were drilled. Each borehole starts with 100 metres of percussion drilling, followed by core drilling down to about 1,000 metres depth (cf SKB MD 620.004). After completion of these initial drillings, SKB launched a more extensive, complementary drilling programme, aiming to solve more specific geological issues. Hitherto, six additional telescopic boreholes have been drilled (KFM04A–KFM08A and KFM06C). An important aspect is to define the northeastern margin of the tectonic lens, which largely coincides with the boundary of the site investigation area. To obtain such information, borehole KFM06C was drilled north of Bolundsfjärden with 60° inclination towards NNE (26°) (Figure 1-1). The borehole has a total length of about 1,000 metres.

The drilling activities in KFM06C were finished 29 June 2005, and the geological logging of the borehole started 12 September and ended 24 November 2005.

A detailed geological logging of the drill cores obtained through the drilling programs is essential for subsequent sampling and borehole investigations, and consequently, for the three-dimensional modelling of the site geology. For this purpose, the so-called Boremap system has been developed. The system integrates results from geological drill core logging, or alternatively, the drill cuttings, when a core is not available, with information from BIPS-logging (Borehole Image Processing System) and calculates the absolute position and orientation of fractures and various planar lithological features (SKB MD 143.006 and 146.005).

This document reports the results gained by the geological logging of KFM06C, which is one of the activities performed within the site investigation at Forsmark. The work was carried out in accordance with activity plan AP PF 400-05-079. In Table 1-1 controlling documents for performing this activity are listed. Both activity plan and method descriptions are SKB's internal controlling documents.

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

Activity plan	Number	Version
Boremapkartering av teleskopborrhål KFM06C	AP PF 400-05-079	1.0
Method documents	**Number**	**Version**
Metodbeskrivning för Boremap-kartering	SKB MD 143.006	2.0
Nomenklatur vid Boremap-kartering	SKB MD 143.008	1.0
Mätsystembeskrivning för Boremapkartering, Boremap v 3.0	SKB MD 146.005	1.0

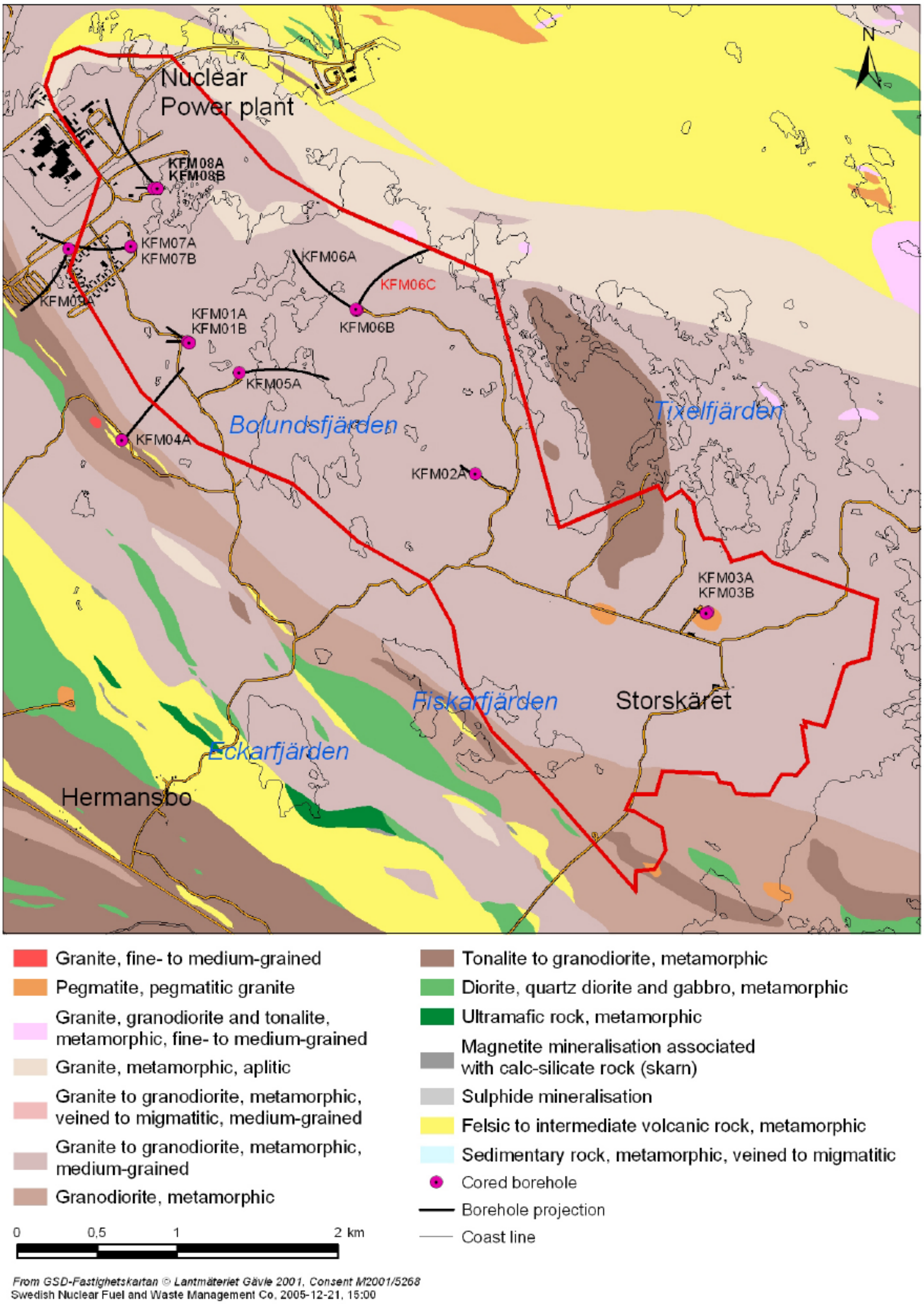

***Figure 1-1.** Generalized geological map over Forsmark site investigation area and the projection of KFM06C in relation to other cored boreholes from the drilling programme.*

2 Objective and scope

Borehole KFM06C starts with percussion drilling (Ø = 251 mm) to a length of 100.40 metres, followed by core drilling at Ø = 86 mm to a length of 102.08 metres, and at Ø = 77 mm down to full borehole length at 1,000.43 metres. The diameters of the two drill cores are 70 and 51 mm, respectively, under ideal conditions. The soil cover is approximately 1.9 metres. Material from the percussion-drilled part is *not* included in the mapping engagement. The BIPS-image usable for geological logging covers the length interval 102.10–992.15 metres (after adjustment 102.13–996.91 metres). Thus, remaining part of the drill core, from 996.92 to 1,000.43 metres (1,000.22 metres after adjustment), was mapped by Boremap without any complementary BIPS-image.

The aim of the geological borehole logging is to obtain a detailed documentation of *all* structures and lithologies in the interval that was core drilled at Ø = 77 mm. These data will serve as a platform for forthcoming analyses of the drill cores, aimed at investigating geological, petrophysical and mechanical aspects of the rock volume, as well as site descriptive three-dimensional modelling.

3 Equipment

3.1 Description of equipment/interpretation tools

All BIPS-based mapping was performed in Boremap v 3.6. This software contains the bedrock and mineral standard used by the Geological Survey of Sweden (SGU) for geological mapping of the surface at the Forsmark site investigation area, to enable correlation with the surface geology. Additional software used during the course of the geological logging of the core was BIPS Viewer v 1.10 and Microsoft Access. The final data presentation was made by Geoplot and WellCAD v 3.2.

The following equipment was used to facilitate the core logging: folding rule, concentrated hydrochloric acid diluted with three parts of water, unglazed porcelain plate, knife, hand lens, paintbrush and tap water.

4 Execution

4.1 General

During the core logging, the 900 metres drill core obtained from the interval 102.08–1,000.43 metres of KFM06C 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 of KFM06C was preceded by an overview mapping made by Kenneth Åkerström. No thin-sections were available from the drill cores, and all lithological descriptions are based on ocular inspection. Most of the mapping was done by two geologists at a time, forming a core logging team. One of the geologists did the core logging while the other registered the information in Boremap.

The core logging of KFM06C was performed in Boremap v 3.6 according to activity plan AP PF 400-05-079 (SKB internal document) following the SKB method description/instruction for Boremap mapping, SKB MD 143.006 (v 2.0) and 143.008 (v 1.0). A WellCAD summary of the mapping is presented in Appendix 1.

4.2 Preparations

The length registered in the BIPS-image deviates from the true borehole length with increasing depth, and the difference at the bottom of KFM06C is about 5 metres. It was, therefore, necessary to adjust the length in KFM06C with reference to groove millings cut into the borehole wall at every 50 metres, with the deepest slot at a length of 960 metres. The precise level of each reference mark can be found in SKB's database SICADA (Appendix 4). However, the adjusted length is still not completely identical with the one given in the drill core boxes, as the core recovery may yield erroneous lengths. The difference may locally exceed 2 dm.

Data necessary for calculations of absolute orientation of structures in the borehole includes borehole diameter, azimuth and inclination, and these data were imported directly from SKB's database SICADA (Appendices 2 and 3).

4.3 Data handling

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

In order to avoid that some broken fractures had not been registered, the number of broken fractures in the drill core was regularly checked against the number of registered fractures. The quality routines include also daily controls of the mapping by detailed examination of Boremap generated variable/summary reports and WellCad log to match. The final quality check of the mapping was done by a routine in the Boremap software. The primary data were subsequently exported to the SKB database SICADA, where they are traceable by the activity plan number.

4.4 Analyses and interpretations

A major flaw in Boremap system is the lack of distinction between fractures that intersect the whole borehole ('infinite fractures') and those that end within the drill core ('finite fractures'). The latter category includes fractures that (1) are slightly curved and run more or less parallel with the borehole axis, (2) ends in other fractures, (3) splays from other fractures and (4) ends in the drill core. For modelling purposes, it was decided to separate those fractures that intersect the central borehole axis from those that never reach the centre. Fractures limited to less than half of the borehole are, therefore, marked by '#' in the attached comments.

Another problem with the core logging system is related to 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 is caused by the occurrence of suspension from drilling, brownish black coating from the drilling rods on the borehole walls and/or disturbances in the movement of the BIPS-camera (see Section 4.5). However, even in the most perfect BIPS-image, it is sometimes difficult to distinguish a thin fracture, sealed by a low contrast mineral. All fractures observed in the drill core, but not recognized in the BIPS-image, have been registered as 'not visible in BIPS' in Boremap, to prevent them from being used in forthcoming fracture orientation analysis. If possible, they are still oriented relative to other structures with known orientations. Fractures supposed to be induced by the drilling activities fall within this category. Obviously drilling-induced fractures are not included in the mapping.

The resolution of the BIPS-image does generally make it possible to estimate the width of fractures with an error of ± 0.5 mm. Thus, reliable measurements of fracture widths/apertures less than 1 millimetre are possible to obtain in the drill core. The minimum width/aperture given is therefore 0.5 mm, in accordance with the nomenclature for Boremap mapping (SKB MD 143.008; v 1.0).

The fracture mapping focuses on the division into broken and unbroken fractures, depending on whether they are parting the core or not. Broken fractures include both open fractures and originally sealed fractures, which were broken during the drilling or the following treatment of the core. To decide if a fracture was open, partly 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', on the basis of the weathering of the fracture surface and fit of the fracture planes. The criteria for this classification are given in SKB method description for Boremap mapping, SKB MD 143.006 (v 2.0).

Up to four infilling minerals can be registered in the database for each fracture. As far as possible, they are given in order of decreasing abundance in the fracture. Additional minerals (i.e. five or more), which occur in a few fractures, are noted in the attached comment. However, it must be emphasized that this provides no information of the volumetric amount of individual minerals. In a fracture with two minerals, the mineral registered as 'second mineral' may range from sub-microscopic staining up to amounts equal to that of the mineral registered as 'first mineral'. Hematite, for example, occur consistently as extremely thin coatings or impurities in other fracture minerals, such as adularia and laumontite.

4.5 Nonconformities

Several fractures within KFM06C are sealed by laumontite (Ca-zeolite). These fractures occur as both broken and unbroken, but dehydration of laumontite tends to produce volumetric changes, and the sealing will eventually crackle and break the drill core. Thus, laumontite-bearing fractures suspected to have been sealed originally are registered as unbroken.

Some fracture filling minerals are more conspicuous than other. For example, the distinct red tinting shown by sub-microscopic hematite reveals extremely low concentrations of the mineral. Also the use of diluted hydrochloric acid for identification of calcite makes it possible to detect amounts that are macroscopically invisible. The amount of fractures filled with other less conspicuous minerals may, on the other hand, be underestimated. Pyrite, which typically forms up to millimetre-sized, isolated, idiomorphic crystals, might for example be underrepresented in unbroken fractures.

As in previous cored boreholes, the mapping of KFM06C was locally hampered by suspended drill cuttings, brownish black coatings on the borehole wall as well as over exposure and poor contrast in the BIPS-image. The most crucial quality-reducing factor is the dark coating. It is frequent below 510 metres in the borehole, and ubiquitous in the interval between 733 and 971 metres, where it locally obscures more than half of the borehole wall. Typically, it occurs a spiral pattern or a single band along the borehole axis. This coating phenomenon is obviously drill induced, and the explanation proposed is that the coatings originate from metal fragments abraded from the drill rods. Another, more local problem, is mottling of the BIPS-image. Such mottled intervals occur at four levels: 201.64–202.14, 230.58–232.16, 269.25–271.80, 284.45–286.68 metres (adjusted length). Geological features (e.g. fractures) depicted in these mottled intervals are typically distorted and sometimes difficult to distinguish /see Figure 4-1 in Petersson et al. 2005e/. The mottling is obviously a result of disturbances in the normally constant movement of the BIPS-camera.

Drill induced crushes have been noted at 284.66–285.11, 398.95–399.07, 698.85–699.21 metres of KFM6C. Several pieces of the crushed material in the uppermost interval have fracture coating. These fractures were registered as broken fractures.

Both during the mapping and the subsequent work with the mapping data, we noted a few inexplicable errors in the database. These were all corrected, though there might still be unnoticed errors. We disclaim the responsibility for all such errors caused by the short-comings in the software.

5 Results

5.1 Lithology

Borehole KFM06C is located in the northeastern part of the site investigation area and plunges 60° northeastward, towards the ductile, high-strain belt, which is equivalent to rock domain 32 /cf SKB 2004/ and defines the northeastern margin of the tectonic lens of less intense ductile strain (i.e. rock domain 29). The boundary between the two domains is gradual at a borehole length of about 410 metres (i.e. a true depth of 340–350 metres). The distinction between the two domains in KFM06C is rather based on textural and lithological arguments than on the structural character of the rock. The upper 410 metres of the borehole, within rock domain 29, are dominated by medium-grained metagranite (rock code 101057) with subordinate occurrences of pegmatitic granite (rock code 101061), metadiorite/quartz metadiorite (rock code 101033), amphibolite (rock code 102017) and fine- to finely medium-grained granite (rock code 111058). The remaining part of KFM06C consists mainly of aplitic metagranite (rock code 101058), which has been variably affected by intense albitization. This alteration has locally rendered the recognition of the protolith almost impossible, and some of the affected intervals are inferred to be medium-grained metagranite (rock code 101057), especially in the lowermost 100 metres of the borehole. Other rock units that form continuous occurrences of volumetric importance in this part of the borehole (i.e. below 410 metres) include pegmatitic granite (rock code 101061) and fine- to finely medium-grained metagranitoids (rock code 101051) of granodioritic composition. Another noteworthy occurrence, which extends from 745 to 796 metres length, consists of amphibolite associated with an intermediate, fine-grained rock inferred to be metavolcanic. In addition, there are a number of minor occurrences within the borehole, none exceeding a few metres in length. Except for a few late veins or dykes, all rocks have experienced Svecofennian metamorphism under amphibolite facies conditions.

The medium-grained metagranite(-granodiorite) (rock code 101057) is similar with the predominant variety of metagranite-granodiorite in the other deep boreholes located in rock domain 29. It is typically granitic with a tendency to be slightly granodioritic. Texturally, the rock is rather equigranular with elongated quartz aggregates, alternating with feldspar-dominated aggregates and thin streaks of biotite. The colour of the rock ranges from greyish red to grey. However, completely grey varieties, lacking the reddish tint, are sparse and typically associated with metadiorites/metagabbros (e.g. at 220.3–225.8 metres length) and amphibolites. Minor sections variably speckled by fine-grained, whitish plagioclase occur sporadically throughout the borehole. Microscopic examination of similar rocks from KFM01A and KFM03A suggests that the feature is a result of retrograde sericitization /Petersson et al. 2004c/. The metagranite(-granodiorite) in the lowermost 100 metres of the borehole are generally more fine-grained and apparently affected by albitization, which obliterates much of the original magmatic texture.

Aplitic metagranite (rock code 101058) is generally restricted to the lower 600 metres of the borehole. There are, however, a few minor occurrences above that level, but only one of them at 307.7–309.5 metres exceeds one metre in length. The rock is typically equigranular and greyish red to reddish grey in colour. A significant amount is variably bleached and characterized by flecks of stretched aggregates of ferromagnesian minerals (Figure 5-1). The overall appearance of this rock variety is highly reminiscent of the albitized rock in the lower parts of KFM06A, KFM08A and outcrops along the northeastern margin of the investigation site /cf Petersson et al. 2005abd/. Bleached and/or biotite flecked intervals were, therefore, mapped as 'albitized'. However, defining the relative intensity of the albitization by ocular inspection is more difficult, but the majority has been mapped as 'weak' to 'medium'. The alteration is evidently pre- or syn-metamorphic with no apparent relationship to existing brittle structures. Thus, some late veins and dykes of pegmatitic granite (rock code 101061) and fine- to finely medium-grained granitoids (rock code 101051) appear unaffected by the alteration.

Amphibolites (rock code 102017) and metadiorites/quartz metadiorites (rock code 101033) occupy almost 9% of the mapped interval of KFM06C. However, about half of the total rock volume is concentrated into a more or less continuous amphibolite body at 745.0–785.5 metres. Metadiorites/quartz diorites constitute about 20% of the rocks in this group. Except for one occurrence at 467.4–469.8 metres, all metadiorites/quartz metadiorites are restricted to a length interval between 225 and 261.5 metres. Generally, the amphibolites are fine-grained, equigranular with a large proportion of biotite. Occurrences mapped as metadiorites/quartz metadiorites, on the other hand, are typically slightly porphyritic, quartz-bearing, less hornblende-rich and have a slightly coarser grain-size relative to the amphibolites. Extensions and contacts of both the amphibolites and the metadiorites/quartz metadiorites are more or less parallel with the tectonic fabric, and some occurrences are surrounded by up to one decimetre wide rims of whitish, leucogranitic material, similar to the whitened, 'albite rock' described above. Disseminations of pyrite and/or pyrrhotite are macroscopically visible in some of the occurrences.

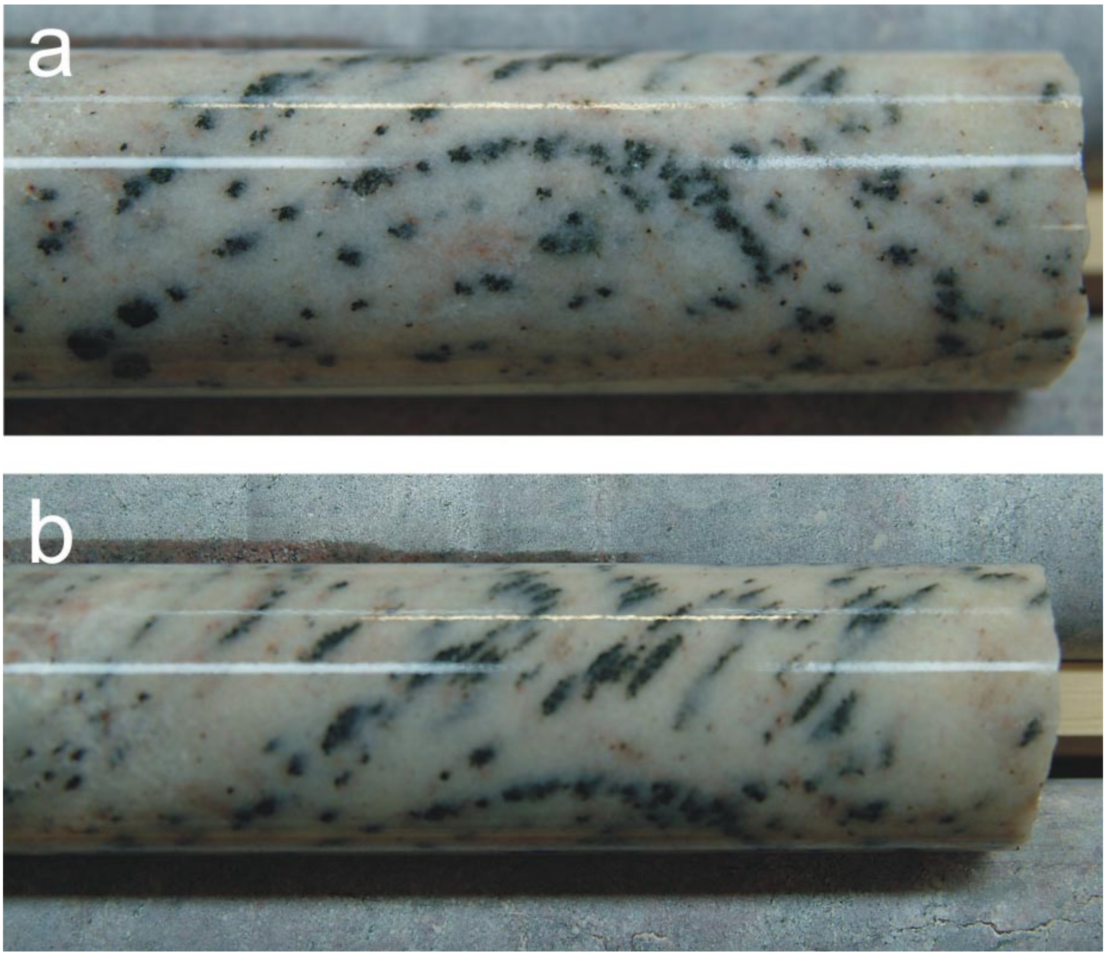

Figure 5-1. *Photographs showing an albitized section of aplitic metagranite (rock code 101058) at 889.35–889.66 metres length. The characteristic flecks of biotite are here arranged in well-defined linear structures, which in turn describe a fold structure; (b) is rotated about 90° relative to (a) and shows that lineation is parallel with the inferred foldaxis. Photos by Alf Sevastik.*

Fine- to finely medium-grained metagranitoids (rock code 101051) of mostly granodioritic composition occupy about 8% of KFM06C. Major occurrences of these rocks are restricted to the intervals at 474–623 and 812–885 metres. Occurrences outside the intervals are scarce and are typically less than one metre wide. Some of these rocks show a slightly feldspar porphyritic texture, though the majority is equigranular. The mineral fabric is commonly linear and external contacts are typically discordant to the tectonic foliation in the wall rock.

Dykes, veins and segregations of pegmatite, pegmatitic granite, aplite and leucogranitic material are frequent throughout the borehole. Most occurrences are some decimetre or less, but several pegmatites/pegmatitic granites reach up to a few metres in width. The pegmatitic granites are generally texturally heterogeneous, often with a highly variable grain-size, and some occurrences include intervals of finely medium-grained, equigranular granite. Rather coarse magnetite, and subordinately hematite, has been identified in some pegmatites. A few pegmatites also contain accessory amounts of sulphides, such as pyrite, and some probable garnet. Despite the textural variability and temporal span within this unit, most of these rocks were grouped as 'pegmatite, pegmatitic granite' (rock code 101061). Rocks related to the pegmatitic material, such as fine to finely medium-grained leucogranite (111058) and some minor aplites, constitute about 2% of the mapped interval. Some of the leucogranites are highly reminiscent of the more granitic varieties of the abovementioned fine- to finely medium-grained metagranitoids (rock code 101051). A distinctive criterion apart from their late-tectonic character is, however, their anomalously high natural gamma radiation. The aplites (rock code 1062), on the other hand, were distinguished from the previously described aplitic metagranite (rock code 101058) by the fact that they are more massive. Quartz-dominated segregations or veins were coded as 8021.

Occurrences of a fine-grained, intermediate rock of inferred volcanic origin (rock code 103076) are restricted to three intervals of KFM06C: 120–127, 644–708 and 785–797 metres. The latter interval consists of a single, continuous occurrence intimately associated with the lower contact of a 40 metres long amphibolite. Other occurrences range up to 1.7 metres in length. The rock is generally equigranular, dark grey in colour and all contacts are parallel with the tectonic fabric. All occurrences are structureless, and except for the grain-size, there is no textural or structural macroscopic feature that unambiguously points towards a volcanic origin of the rocks.

Some minor occurrences of skarn-like material (rock code 108019) sporadically occurs below 444 metres length in KFM06C. These are mainly concentrated into two length intervals: 727–739 and 814–816.5 metres. Occurrences outside these intervals are found at the following lengths: 444.82–444.95, 674.20–674.21 and 993.94–993.97 metres. They are all vaguely defined and distinguished by their visible content of epidote and/or prehnite. Other components are feldspars, quartz, magnetite and probable garnet. None of the occurrences exceed seven decimetres in core-length, though the majority is less than one decimetre in length. All of them occur in intervals, variably affected by albitization.

In addition, there are a few minor occurrences of granite, granodiorite, tonalite and quartz diorite in KFM06C. None of them appears to fit into the bedrock nomenclature defined by SKB ('Regler för bergarters benämningar vid platsundersökningarna i Simpevarp och Forsmark', v 1.0). Instead they were coded as 1058 (unspecified granite), 1056 (unspecified granodiorite), 1053 (unspecified tonalite) and 1038 (unspecified quartz diorite). A 1.2 cm wide occurrence of massive magnetite, coded as 109014, occurs at 859.35–859.36 metres length.

5.2 Ductile structures

The rocks in KFM06C are characterized by composite L-S fabrics, with a predominance of linear mineral fabrics in the medium-grained metagranite (rock code 101057), and a slight predominance of tectonic foliation in the aplitic metagranite (rock code 101058) that occurs below 410 metres length. However, the relative intensity of the two components is locally highly variable. The intensity of the deformational fabric is mostly weak to medium, and more rarely faint. It must, however, be emphasized that the distinctness of a fabric does not necessarily reflect the intensity of the strain. The fact that a rock may appear massive does not necessarily implicate that they actually are unaffected by strain. It is, for example, often difficult to distinguish tectonic fabric visually in the pegmatites and some of the fine-grained mafic rocks. Some rocks have also undergone varying degrees of post-kinematic recrystallization.

The structural orientation in KFM06C is rather constant throughout the borehole. Most registered foliations are striking ESE and dip moderately to steeply towards the south. None of the linear fabrics have been possible to register with the present methodology, but the general impression is that they are gently to moderately dipping.

Totally 20 narrow zones of more intense ductile and brittle-ductile deformation have been registered in KFM06C. Fourteen of them are registered as ductile shear zones, five as brittle-ductile shear zones and one as mylonite. The latter is distinguished from the shear zones by the fact that the protolith is unidentifiable. A concentration of ductile deformation zones is found at 220.5–229.4 metres length. The remaining zones occur rather sporadically throughout the borehole. Except for one 1.4 metre borehole intercept at 223.60–225.02 metres, they are all less than a few decimetres in width. The protolith in the zones seems mainly to be a highly deformed and grain-size reduced variety of the metagranite (rock code 101057), but also younger rock units such as the pegmatitic granite (rock code 101061) and fine- to finely medium-grained granite (rock code 111058) have been affected. Most ductile shear zones strike roughly N–S south and dip moderately to steeply towards the south (i.e. more or less parallel with the local tectonic foliation).

5.3 Alteration

Except for the pre-/syn-metamorphic albitization as discussed in Section 5.1, the most common alteration encountered in KFM06C is varying degrees of oxidation or red pigmentation of feldspars by sub-microscopic hematite. It is generally associated with more intensely fractured intervals, especially in the uppermost 85 metres of the borehole. More than 40% of the mapped interval of KFM06C has been affected by oxidation. Normally this oxidation is faint to weak in intensity, and more rarely medium to strong. Another frequent, but volumetrically trivial alteration, is epidotization. It is mainly found to be related to the aplitic metagranite (rock code 101058) and the skarn-like occurrences (rock code 108019) in the lower half of the borehole. Similar to the albitization, it appears to be associated with the regional metamorphism. Individual occurrences are generally less than a few decimetres wide.

Other types of alterations within KFM06C include chloritization, argillization, a greenish yellow alteration mapped as 'sassuritization' in Boremap and an occurrence of quartz dissulotion. Totally ten intervals of chloritization have been registered KFM06C. They are not restricted to any specific rock unit and none of them are wider than a few decimetres. Clay dominated or argillic alteration is limited to two shorter intervals at 416.47–416.68 and 430.02–430.04 metres length. The greenish yellow alteration has affected some minor occurrences of felsic rocks that occur between 754.0 and 756.3 metres within an amphibolite. The mineralogy of this alteration is presently unknown. An interval of vuggy, syenitic rock at 451.46–452.22 metres length is more or less identical to the rock found in borehole KFM02A /Möller et al. 2003, Petersson et al. 2003a/, and according to the IUGS recommendations /Le Maitre 2002/ it should be denoted 'episyenite' as it apparently was formed by hydrothermal processes involving the selective removal of quartz. The occurrence was, therefore, mapped as 'quartz dissolution', though other types of alteration have also affected it.

5.4 Fractures

5.4.1 Fracture frequencies and orientations

The total number of open (broken fractures with aperture > 0), partly open (unbroken fractures with aperture > 0) and sealed fractures (broken and unbroken fractures with aperture = 0) registered *outside crush zones and sealed networks* during the boremap-logging of KFM06C amounts to 4,457, i.e. about 5.0 fractures/metres. Of these are 1,122 open, 74 partly open and 3,261 sealed. It should be emphasized that there is a certain degree of uncertainty in whether a fracture actually is open or sealed.

In addition, there are 294 sealed networks, nine breccias and three cataclasites registered in the mapped interval. The distinction between breccia/cataclasite and sealed network is not straight forward, but normally zones with none or minor rotation of individual rock fragments has been mapped as sealed network. Breccias and cataclasites, on the other hand, are distinguished by their volumetric content of matrix; occurrences with more than 90% matrix have been mapped as cataclasites. The total length of all sealed networks in KFM06C amount to 106.4 metres (i.e. about 12% of the mapped interval). The piece length (i.e. the distance between individual fractures) within these networks is typically about 2.5 cm, but ranges up to 6 cm. This makes more than 4,000 additional sealed fractures in the mapped interval of the borehole. Breccias and cataclasites occur sporadically throughout the borehole, and individual occurrences range up to 44 cm in width. However, most of them are less than one decimetre wide. Except for the registered breccia and cataclasite zones, fractures with measurable displacements, indicating that they have been initiated or reactivated as shear fractures, are found at 15 levels in KFM06C.

Totally 9 crush zones have been observed in KFM06C. Four of them are concentrated in a rather short interval at 534.8–537.7 metres. The remaining five zones occur in the upper 400 metres of the borehole. Except for a four decimetres wide zone at 537.34–537.74 metres, they are all one decimetre or less in width. The five uppermost zones are sub-horizontal to gently dipping, whereas the zones in the interval at 534.8–537.7 metres strike roughly ESE and dip moderately towards the south.

Throughout the borehole, the frequency of open and sealed fractures varies rather coherently, with an increased number of open fractures in intervals with concentrations of sealed fractures (Appendix 1). There are several intervals with anomalously high fracture frequencies throughout the borehole, though few of them are especially well-defined, and all are dominated by sealed fractures, many included in sealed fracture networks. Most of them occur below 410 metres length, within the interval dominated by the aplitic metagranite. There are, however, at least two anomalous intervals in the medium-grained metagranite, above 410 metres length: ca 102–170 and 360–400 metres length.

It is reasonable to expect that mechanical discontinuities, such as lithological contacts, should be the locus of fracture formation more frequently than within a homogeneous rock. For this reason we have noted the proportion of fractured amphibolite contacts. About 42% of the contacts in the mapped interval of KFM06C are fractured. This can be compared with other cored boreholes from the Forsmark drilling programme, in which 22–35% of the contacts are fractured /Petersson et al. 2003ab, 2004ab, 2005bcd/.

Inferred core discing occurs at the following lengths along KFM06C: 114.37–114.52, 258.22, 424.83–425.04, 425.05–425.08, 523.40–523.44, 658.76–658.81, 659.11, 706.03, 738.86–738.93, 866.04–866.16, 998.84–999.15 metres. Some intervals include also what appears to be initial core discing that not actually breaks the core. None of the intervals exceed 31 cm in width, and the typical dimension of individual discs range between 7 and 15 mm. The fractures are all planar to slightly saddle-shaped.

5.4.2 Fracture mineralogy

Chlorite and/or calcite are found in about 72% of the total number of the registered fractures in KFM06C. Other infilling minerals, in order of decreasing abundance, include adularia, sub-microscopic hematite, quartz, clay minerals, pyrite, prehnite, laumontite, epidote, biotite, asphalt, sericite, sulphides, fluorite, iron hydroxide, magnetite, fibrous serpentine, white feldspar, zeolite and muscovite. In addition, there are three fractures with unknown mineral filling. Analyses by XRD of similar material from the previously mapped cored boreholes in the area have revealed that most such filling are mineral mixtures, or in some cases, feldspars, apophyllite or analcime /Sandström et al. 2004/. There are also 293 fractures that are virtually free from visible mineral coatings. These are mostly open, though there are also sealed fractures with no *visible* mineral sealing.

The various clay minerals are more or less restricted to open fractures. Most fractures with clay minerals are found in the upper half of the borehole. Clay minerals registered in fractures at greater depths are typically corrensite and illite, often intimately associated with chlorite. Other minerals preferably found in open fractures are asphalt, sericite, fluorite, Fe-hydroxide, unspecified sulphides. Most of them are restricted to rather short intervals at shallow levels: asphaltite above 124 metres length, Fe-hydroxide to 143.0–143.8 metres length, fluorite to 161.9–162.3 and 217.1 metres length, and sericite to 287.2–366.3 metres length. However a fracture with Fe-hydroxide is also registered at 635.55 metres length.

Pyrite is frequent in both sealed and open fractures. The presence of other sulphides, including chalcopyrite, galena, pyrrhotite and 'unspecified sulphides', are rare and restricted to twelve fractures. Minerals mapped as unspecified sulphides include pyrite, chalcopyrite and/or pyrrhotite.

All other minerals, as well as oxidized walls, are preferentially associated with fractures inferred to be sealed. A typical mineral assemblage, commonly found both in individual fractures and sealed fracture networks consists of adularia stained by hematite together with calcite, chlorite, and locally pyrite and quartz. However, the exact assemblage varies locally. Laumontite, which is known to be frequent in some of the other deep boreholes in the area (e.g. KFM01A, KFM04A and KFM07A), has been registered in about 2% of the fractures and 4% of the sealed fracture networks. Several of these fractures occur in the length interval 170–340 metres of KFM06C. A number of very thin (<< 1 mm), sealed fractures are typically only revealed by their oxidized walls. Several of these thin fractures are sealed by a mineral inferred to be hematite, but it might well be hematite-stained laumontite or adularia. This interpretation is based on the fact the hematite within KFM06C typically occurs in two main varieties: (1) thin, reddish coatings, preferentially found in flat lying fractures, and (2) staining of various silicates, such as adularia and laumontite.

Another, less common, but yet characteristic assemblage mainly found in the sealed fractures is epidote + calcite + chlorite ± quartz ± adularia. Prehnite are with few exceptions limited to thin, sealed fractures found within amphibolites and related rocks. Some of the light greenish mineral mapped as prehnite might well be adularia. Biotite is found in fractures inferred to be late-, rather than post-metamorphic. These fractures are typically mono-mineralic or includes minor amounts of pyrite and/or secondary chlorite.

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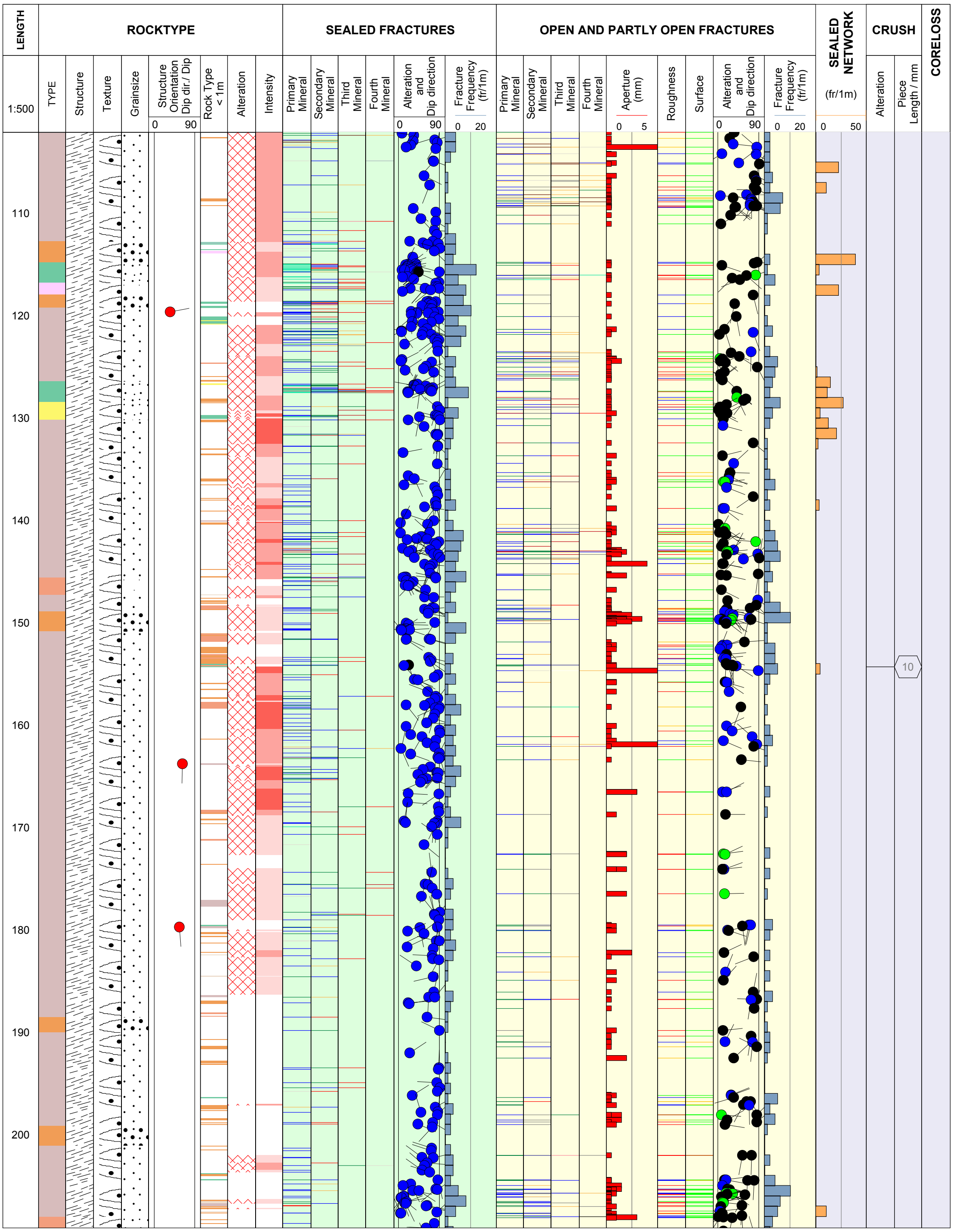
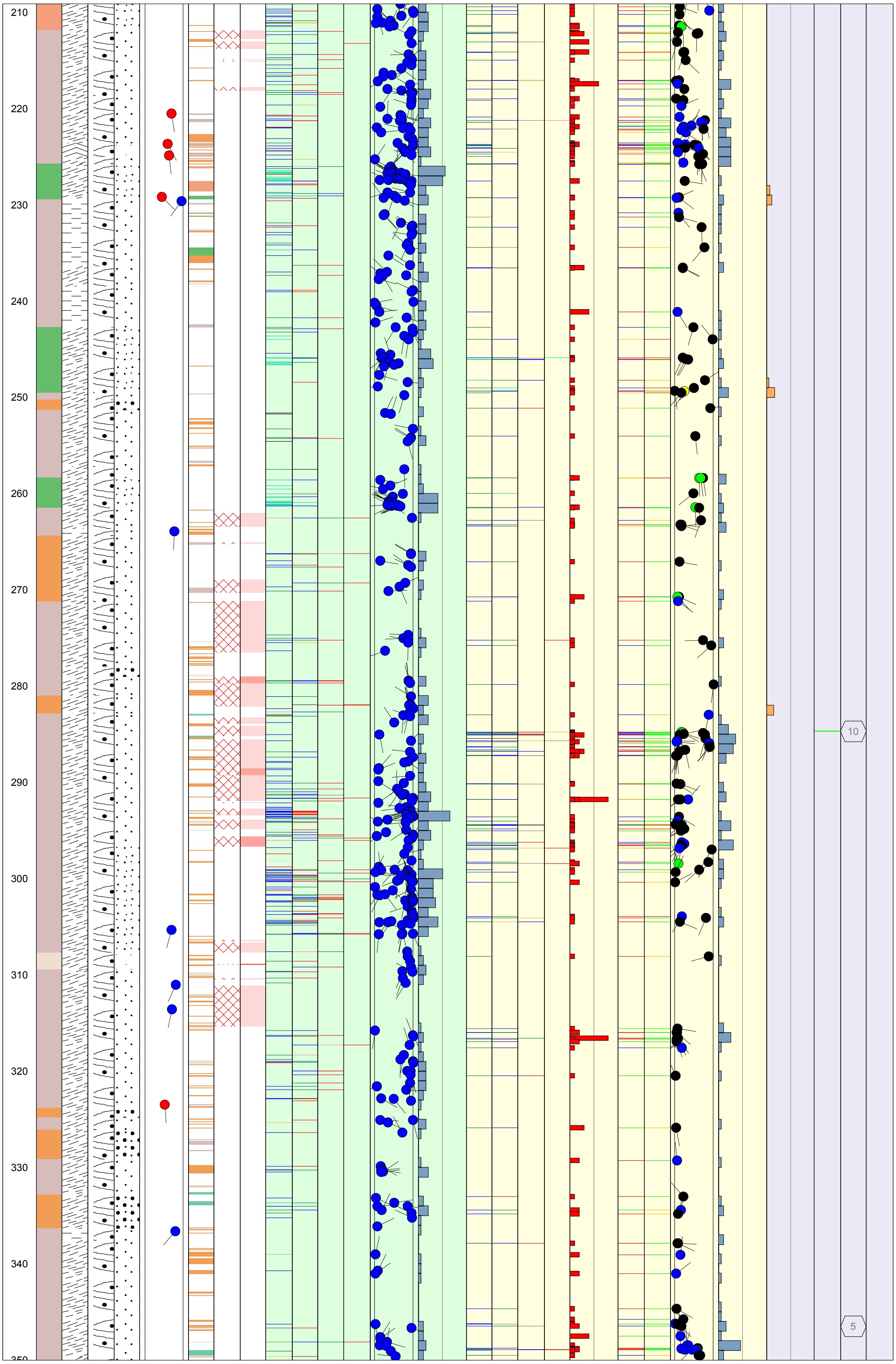
Appendix 1

WellCAD image

Title GEOLOGY IN KFM06C **Appendix: 1**

Site	FORSMARK	**Coordinate System**	RT90-RHB70
Borehole	KFM06C	**Northing [m]**	6699740.95
Diameter [mm]	77	**Easting [m]**	1632437.04
Length [m]	1000.430	**Elevation [m.a.s.l.]**	4.08
Bearing [°]		**Drilling Start Date**	2005-03-09 08:30:00
Inclination [°]		**Drilling Stop Date**	2005-06-30 13:44:00
Date of coremapping	2005-08-29 08:00:00	**Plot Date**	2005-12-21 00:27:17
Rocktype data from	p_rock	**Signed data**	





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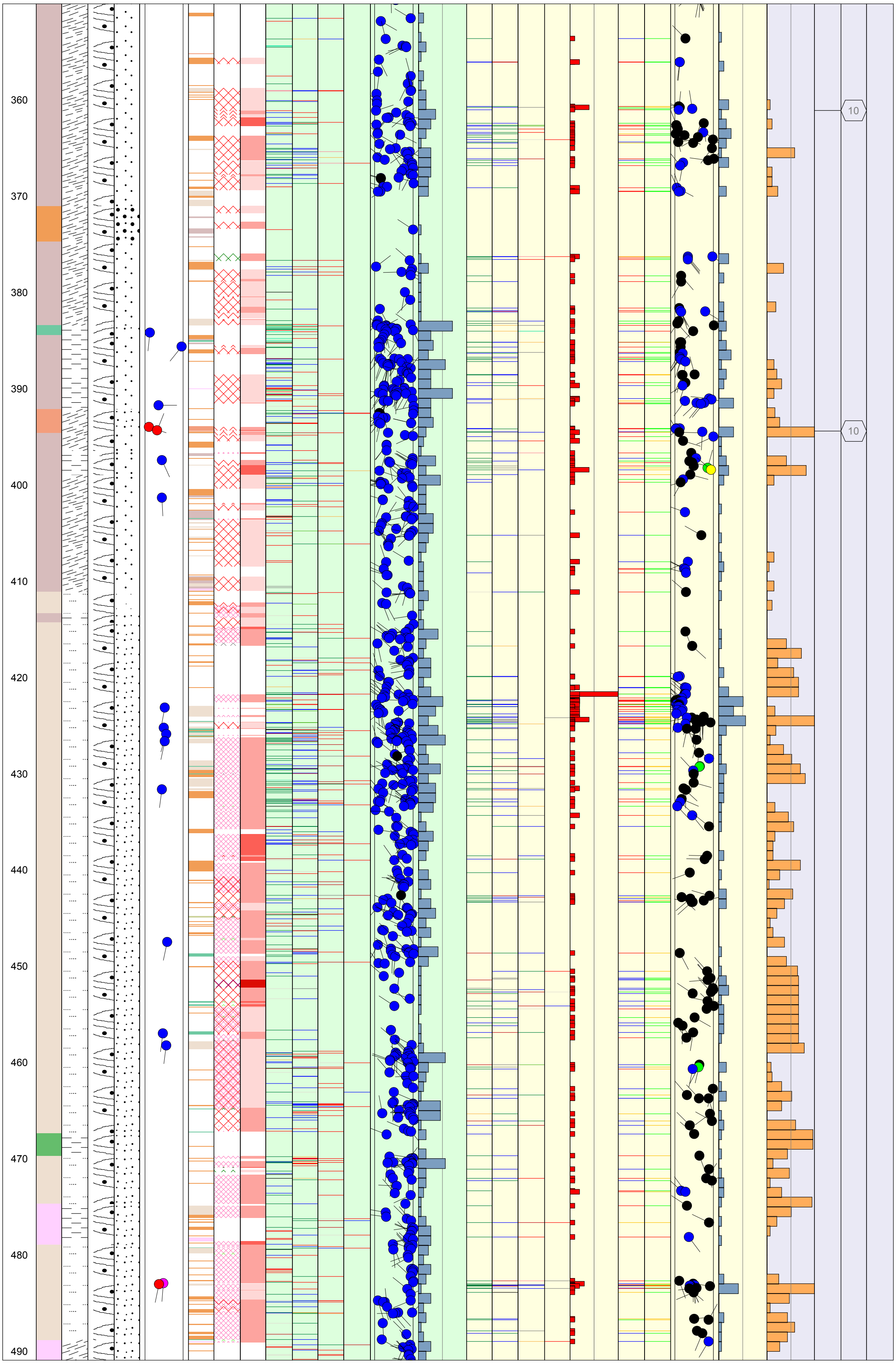
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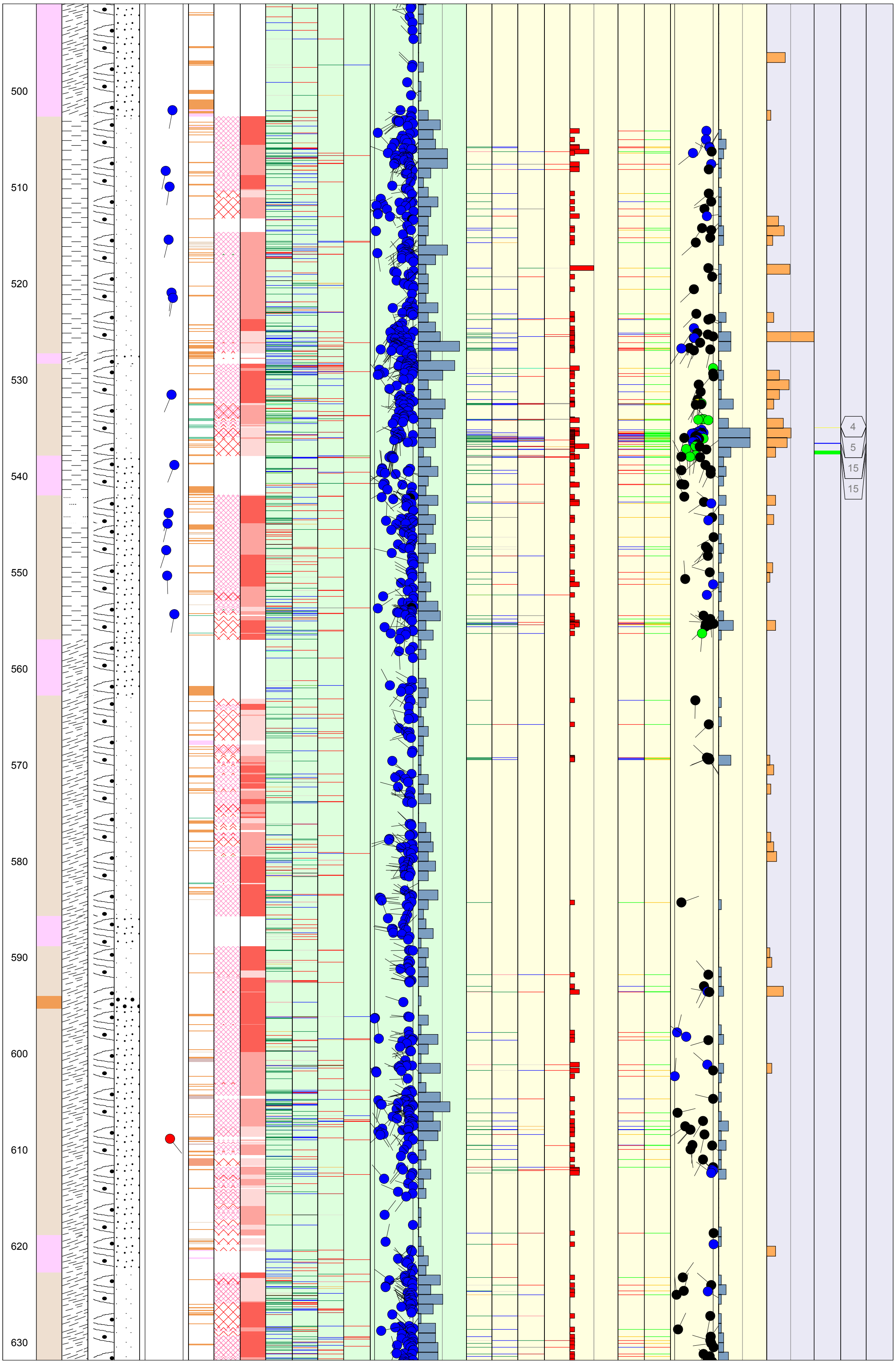
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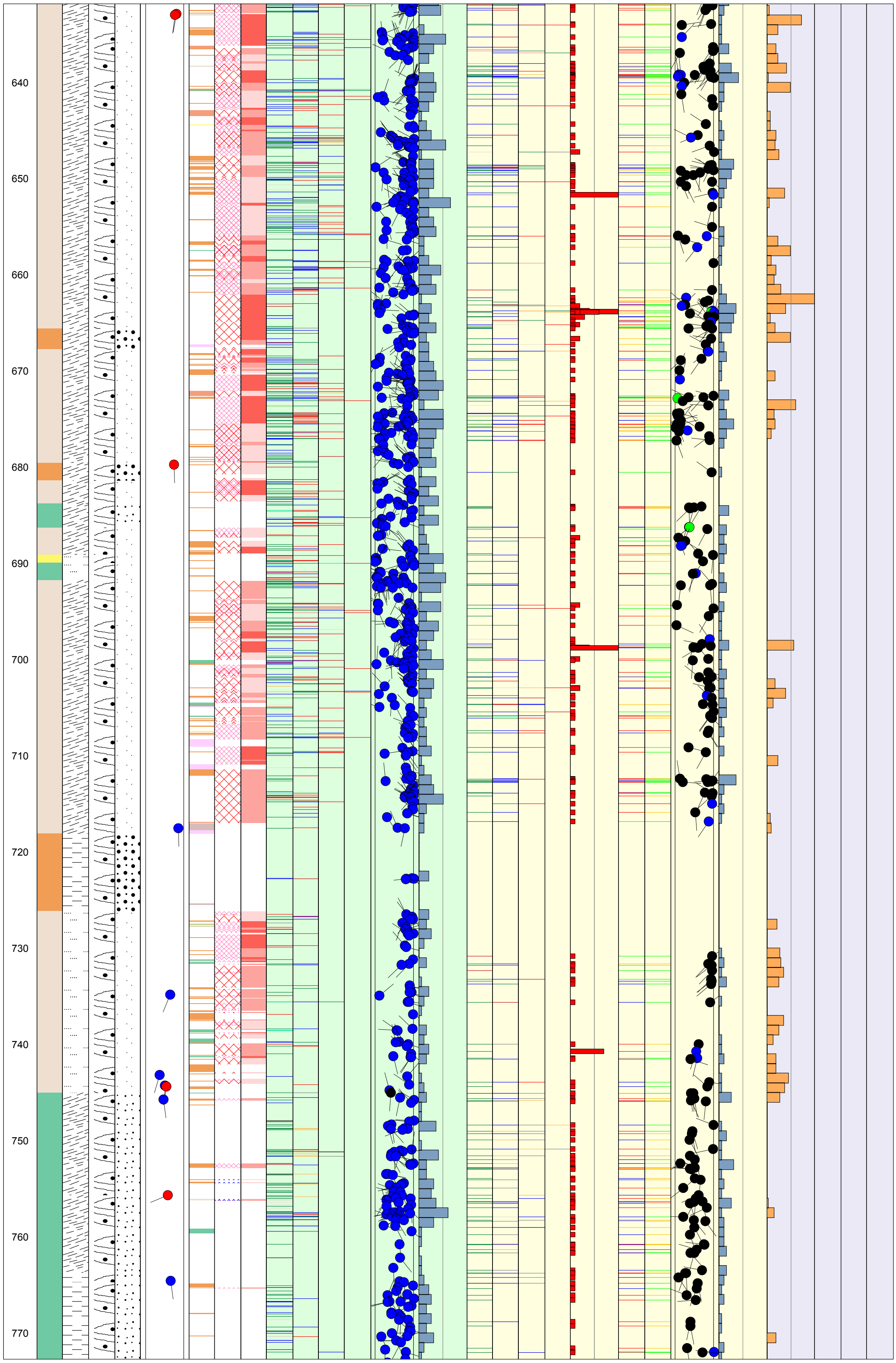
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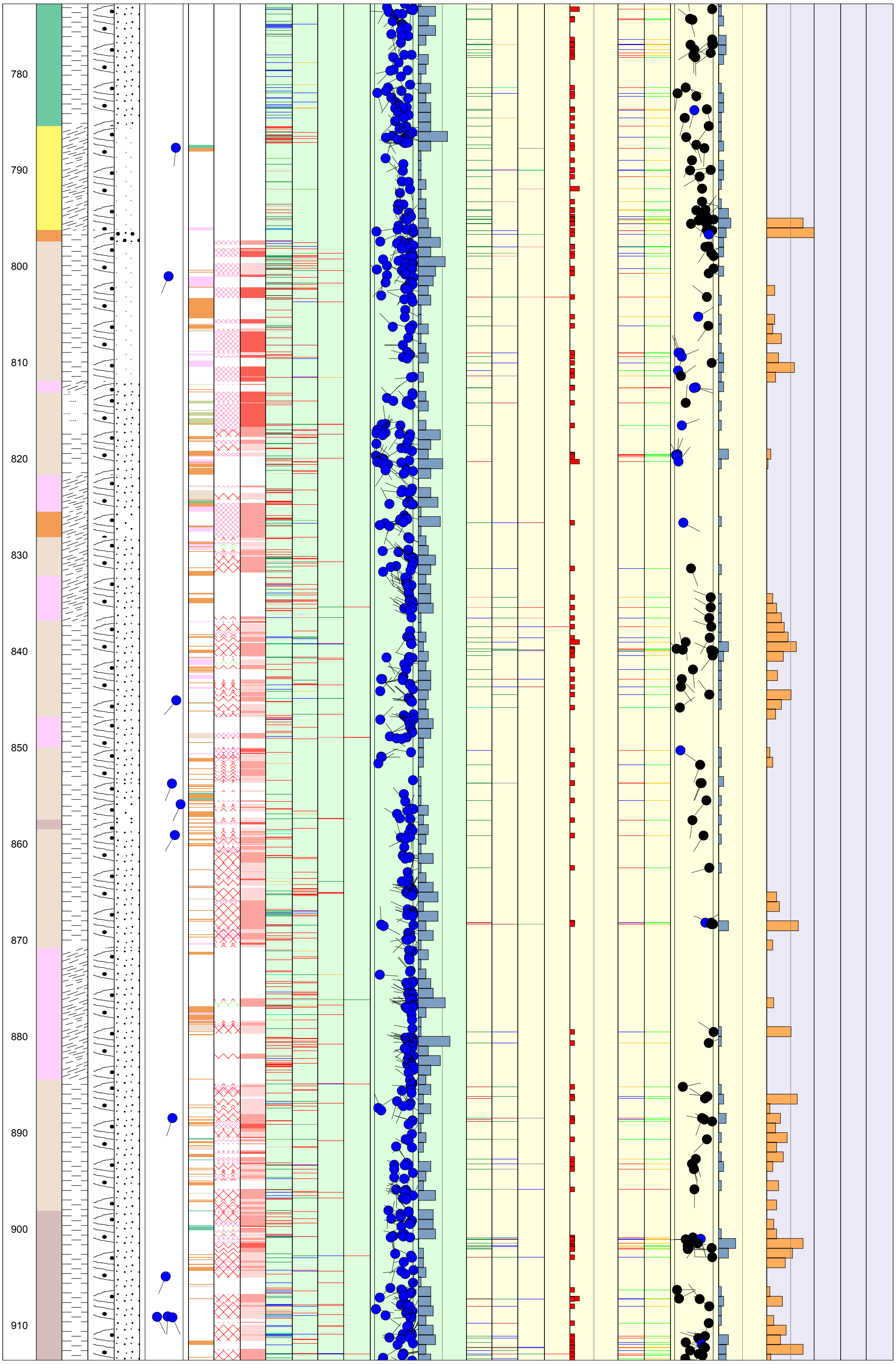
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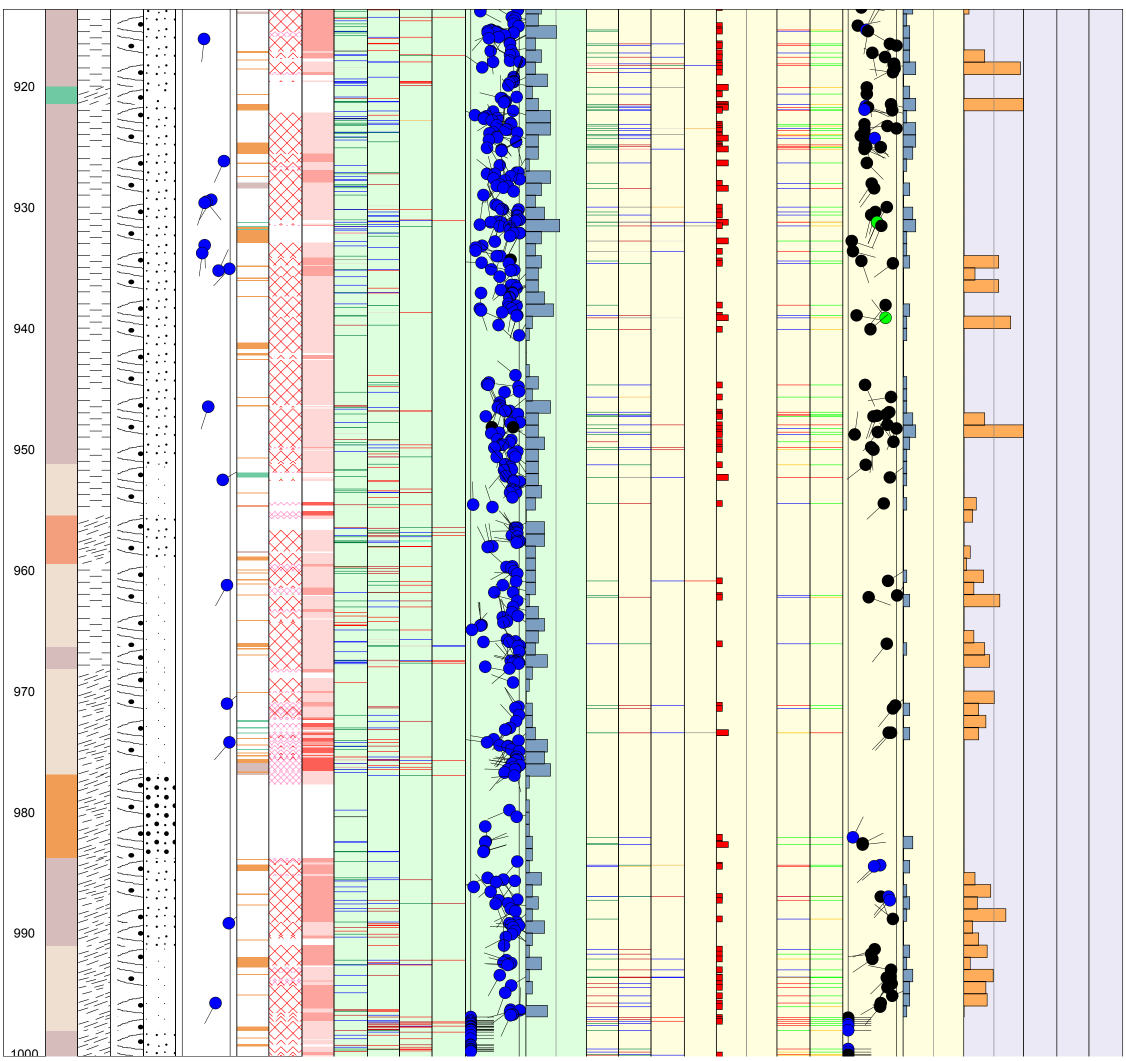
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1000

Appendix 2

Borehole diameters

Hole Diam T – Drilling: borehole diameter

KFM06C, 2005-04-27 14:30:00 – 2005-06-30 13:44:00 (100.400–1,000.430 m).

Sub secup (m)	Sub seclow (m)	Hole diam (m)	Comment
100.400	102.080	0.086	
102.080	1000.430	0.077	

Printout from SICADA 2005-10-12 16:50:52.

Appendix 3

Downhole deviation measurements

Maxibor T – Borehole deviation: Maxibor

KFM06C, 2005-08-02 11:01:00 – 2005-08-02 20:19:00 (3.000–978.000 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
3.00	6699742.30	1632437.69	–1.48	RT90-RHB70	–60.12	26.06	0.0000	0.0000	0.0000	
6.00	6699743.65	1632438.34	1.12	RT90-RHB70	–60.01	25.86	1.4900	0.0000	0.0000	
9.00	6699744.99	1632439.00	3.72	RT90-RHB70	–60.03	25.91	2.9900	-0.0100	0.0100	
12.00	6699746.34	1632439.65	6.31	RT90-RHB70	–60.07	26.14	4.4900	-0.0100	0.0100	
15.00	6699747.69	1632440.31	8.91	RT90-RHB70	–60.00	26.49	5.9900	-0.0100	0.0100	
18.00	6699749.03	1632440.98	11.51	RT90-RHB70	–59.87	26.65	7.4900	0.0000	0.0200	
21.00	6699750.38	1632441.66	14.11	RT90-RHB70	–59.82	26.71	9.0000	0.0200	0.0300	
24.00	6699751.72	1632442.33	16.70	RT90-RHB70	–59.75	26.71	10.5000	0.0400	0.0500	
27.00	6699753.07	1632443.01	19.29	RT90-RHB70	–59.67	26.82	12.0100	0.0500	0.0700	
30.00	6699754.42	1632443.70	21.88	RT90-RHB70	–59.61	27.06	13.5300	0.0700	0.0900	
33.00	6699755.78	1632444.39	24.47	RT90-RHB70	–59.56	27.19	15.0500	0.1000	0.1200	
36.00	6699757.13	1632445.08	27.06	RT90-RHB70	–59.54	27.24	16.5700	0.1300	0.1500	
39.00	6699758.48	1632445.78	29.64	RT90-RHB70	–59.49	27.23	18.0900	0.1600	0.1800	
42.00	6699759.83	1632446.47	32.23	RT90-RHB70	–59.43	27.21	19.6100	0.1900	0.2100	
45.00	6699761.19	1632447.17	34.81	RT90-RHB70	–59.42	27.20	21.1400	0.2200	0.2500	
48.00	6699762.55	1632447.87	37.39	RT90-RHB70	–59.35	27.21	22.6600	0.2500	0.2800	
51.00	6699763.91	1632448.57	39.97	RT90-RHB70	–59.25	27.33	24.1900	0.2800	0.3200	
54.00	6699765.27	1632449.27	42.55	RT90-RHB70	–59.10	27.42	25.7200	0.3200	0.3700	
57.00	6699766.64	1632449.98	45.12	RT90-RHB70	–58.97	27.52	27.2600	0.3500	0.4200	

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
60.00	6699768.01	1632450.70	47.70	RT90-RHB70	–58.79	27.44	28.8100	0.3900	0.4800	
63.00	6699769.39	1632451.41	50.26	RT90-RHB70	–58.58	27.29	30.3600	0.4300	0.5500	
66.00	6699770.78	1632452.13	52.82	RT90-RHB70	–58.49	27.30	31.9300	0.4600	0.6300	
69.00	6699772.17	1632452.85	55.38	RT90-RHB70	–58.46	27.41	33.5000	0.5000	0.7100	
72.00	6699773.57	1632453.57	57.94	RT90-RHB70	–58.41	27.49	35.0600	0.5300	0.8000	
75.00	6699774.96	1632454.30	60.49	RT90-RHB70	–58.30	27.58	36.6400	0.5700	0.8900	
78.00	6699776.36	1632455.03	63.04	RT90-RHB70	–58.22	27.62	38.2100	0.6100	0.9800	
81.00	6699777.76	1632455.76	65.59	RT90-RHB70	–58.30	27.51	39.7900	0.6600	1.0800	
84.00	6699779.16	1632456.49	68.15	RT90-RHB70	–58.28	27.25	41.3700	0.7000	1.1800	
87.00	6699780.56	1632457.21	70.70	RT90-RHB70	–58.19	27.13	42.9400	0.7300	1.2700	
90.00	6699781.97	1632457.93	73.25	RT90-RHB70	–58.15	27.21	44.5200	0.7600	1.3800	
93.00	6699783.37	1632458.66	75.80	RT90-RHB70	–58.05	27.24	46.1100	0.7900	1.4800	
96.00	6699784.79	1632459.38	78.34	RT90-RHB70	–58.01	27.23	47.6900	0.8200	1.5900	
99.00	6699786.20	1632460.11	80.89	RT90-RHB70	–58.24	27.04	49.2800	0.8600	1.7000	
102.00	6699787.61	1632460.83	83.44	RT90-RHB70	–58.56	26.73	50.8600	0.8800	1.8000	
105.00	6699789.00	1632461.53	86.00	RT90-RHB70	–58.53	26.71	52.4300	0.9000	1.8800	
108.00	6699790.40	1632462.23	88.56	RT90-RHB70	–58.43	26.94	53.9900	0.9200	1.9600	
111.00	6699791.80	1632462.95	91.11	RT90-RHB70	–58.36	27.18	55.5600	0.9400	2.0500	
114.00	6699793.20	1632463.67	93.67	RT90-RHB70	–58.34	27.31	57.1400	0.9700	2.1400	
117.00	6699794.60	1632464.39	96.22	RT90-RHB70	–58.31	27.36	58.7100	1.0100	2.2300	
120.00	6699796.00	1632465.11	98.77	RT90-RHB70	–58.22	27.44	60.2900	1.0400	2.3300	
123.00	6699797.40	1632465.84	101.32	RT90-RHB70	–58.12	27.63	61.8700	1.0800	2.4300	
126.00	6699798.81	1632466.58	103.87	RT90-RHB70	–58.00	27.83	63.4500	1.1300	2.5300	
129.00	6699800.21	1632467.32	106.41	RT90-RHB70	–57.90	28.02	65.0400	1.1700	2.6400	
132.00	6699801.62	1632468.07	108.95	RT90-RHB70	–57.75	28.17	66.6300	1.2300	2.7600	
135.00	6699803.03	1632468.82	111.49	RT90-RHB70	–57.63	28.37	68.2300	1.2900	2.8800	

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
138.00	6699804.44	1632469.59	114.03	RT90-RHB70	–57.52	28.62	69.8400	1.3500	3.0100	
141.00	6699805.86	1632470.36	116.56	RT90-RHB70	–57.42	28.85	71.4500	1.4200	3.1400	
144.00	6699807.27	1632471.14	119.08	RT90-RHB70	–57.33	29.09	73.0600	1.5000	3.2800	
147.00	6699808.69	1632471.92	121.61	RT90-RHB70	–57.26	29.33	74.6800	1.5900	3.4300	
150.00	6699810.10	1632472.72	124.13	RT90-RHB70	–57.18	29.60	76.3000	1.6800	3.5800	
153.00	6699811.52	1632473.52	126.65	RT90-RHB70	–57.14	29.83	77.9200	1.7800	3.7300	
156.00	6699812.93	1632474.33	129.17	RT90-RHB70	–57.12	30.06	79.5500	1.8900	3.8800	
159.00	6699814.34	1632475.15	131.69	RT90-RHB70	–57.07	30.24	81.1700	2.0000	4.0300	
162.00	6699815.75	1632475.97	134.21	RT90-RHB70	–57.02	30.33	82.8000	2.1200	4.1900	
165.00	6699817.16	1632476.79	136.73	RT90-RHB70	–56.97	30.40	84.4300	2.2400	4.3500	
168.00	6699818.57	1632477.62	139.24	RT90-RHB70	–56.90	30.47	86.0600	2.3600	4.5100	
171.00	6699819.98	1632478.45	141.76	RT90-RHB70	–56.80	30.67	87.6900	2.4900	4.6700	
174.00	6699821.39	1632479.29	144.27	RT90-RHB70	–56.69	30.83	89.3300	2.6200	4.8400	
177.00	6699822.81	1632480.13	146.77	RT90-RHB70	–56.61	31.03	90.9700	2.7600	5.0200	
180.00	6699824.22	1632480.98	149.28	RT90-RHB70	–56.53	31.23	92.6100	2.9000	5.1900	
183.00	6699825.64	1632481.84	151.78	RT90-RHB70	–56.45	31.45	94.2600	3.0500	5.3800	
186.00	6699827.05	1632482.71	154.28	RT90-RHB70	–56.37	31.68	95.9100	3.2100	5.5600	
189.00	6699828.47	1632483.58	156.78	RT90-RHB70	–56.31	31.88	97.5700	3.3700	5.7500	
192.00	6699829.88	1632484.46	159.28	RT90-RHB70	–56.27	32.11	99.2200	3.5400	5.9400	
195.00	6699831.29	1632485.34	161.77	RT90-RHB70	–56.19	32.34	100.8800	3.7100	6.1400	
198.00	6699832.70	1632486.24	164.26	RT90-RHB70	–56.10	32.55	102.5400	3.9000	6.3300	
201.00	6699834.11	1632487.14	166.75	RT90-RHB70	–55.98	32.79	104.2000	4.0900	6.5300	
204.00	6699835.52	1632488.05	169.24	RT90-RHB70	–55.84	33.00	105.8700	4.2800	6.7400	
207.00	6699836.93	1632488.96	171.72	RT90-RHB70	–55.74	33.21	107.5400	4.4900	6.9500	
210.00	6699838.35	1632489.89	174.20	RT90-RHB70	–55.63	33.44	109.2100	4.7000	7.1700	
213.00	6699839.76	1632490.82	176.68	RT90-RHB70	–55.56	33.58	110.8900	4.9100	7.4000	

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
216.00	6699841.17	1632491.76	179.15	RT90-RHB70	–55.54	33.75	112.5800	5.1300	7.6200	
219.00	6699842.59	1632492.70	181.62	RT90-RHB70	–55.53	33.97	114.2600	5.3600	7.8500	
222.00	6699843.99	1632493.65	184.10	RT90-RHB70	–55.52	34.18	115.9400	5.6000	8.0700	
225.00	6699845.40	1632494.61	186.57	RT90-RHB70	–55.50	34.43	117.6200	5.8400	8.3000	
228.00	6699846.80	1632495.57	189.04	RT90-RHB70	–55.48	34.66	119.3000	6.0800	8.5300	
231.00	6699848.20	1632496.53	191.52	RT90-RHB70	–55.45	34.88	120.9800	6.3400	8.7500	
234.00	6699849.59	1632497.51	193.99	RT90-RHB70	–55.41	35.09	122.6600	6.6000	8.9800	
237.00	6699850.99	1632498.49	196.46	RT90-RHB70	–55.37	35.27	124.3500	6.8600	9.2100	
240.00	6699852.38	1632499.47	198.92	RT90-RHB70	–55.32	35.43	126.0300	7.1400	9.4400	
243.00	6699853.77	1632500.46	201.39	RT90-RHB70	–55.28	35.61	127.7100	7.4200	9.6700	
246.00	6699855.16	1632501.46	203.86	RT90-RHB70	–55.23	35.79	129.4000	7.7000	9.9000	
249.00	6699856.55	1632502.46	206.32	RT90-RHB70	–55.20	35.96	131.0800	7.9900	10.1300	
252.00	6699857.93	1632503.46	208.78	RT90-RHB70	–55.17	36.15	132.7700	8.2800	10.3700	
255.00	6699859.32	1632504.47	211.25	RT90-RHB70	–55.14	36.36	134.4600	8.5800	10.6100	
258.00	6699860.70	1632505.49	213.71	RT90-RHB70	–55.10	36.58	136.1500	8.8900	10.8400	
261.00	6699862.08	1632506.51	216.17	RT90-RHB70	–55.08	36.77	137.8300	9.2000	11.0800	
264.00	6699863.45	1632507.54	218.63	RT90-RHB70	–55.05	36.97	139.5200	9.5200	11.3200	
267.00	6699864.83	1632508.57	221.09	RT90-RHB70	–55.00	37.14	141.2100	9.8500	11.5600	
270.00	6699866.20	1632509.61	223.55	RT90-RHB70	–54.92	37.26	142.9000	10.1800	11.8000	
273.00	6699867.57	1632510.66	226.00	RT90-RHB70	–54.86	37.38	144.5900	10.5100	12.0400	
276.00	6699868.94	1632511.70	228.45	RT90-RHB70	–54.84	37.48	146.2800	10.8500	12.2800	
279.00	6699870.31	1632512.76	230.91	RT90-RHB70	–54.86	37.57	147.9700	11.1900	12.5300	
282.00	6699871.68	1632513.81	233.36	RT90-RHB70	–54.86	37.75	149.6700	11.5400	12.7800	
285.00	6699873.05	1632514.87	235.81	RT90-RHB70	–54.83	37.86	151.3600	11.8900	13.0200	
288.00	6699874.41	1632515.93	238.27	RT90-RHB70	–54.77	37.99	153.0500	12.2400	13.2600	
291.00	6699875.77	1632516.99	240.72	RT90-RHB70	–54.72	38.17	154.7400	12.6000	13.5100	

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
294.00	6699877.14	1632518.06	243.17	RT90-RHB70	–54.66	38.39	156.4400	12.9600	13.7600	
297.00	6699878.50	1632519.14	245.61	RT90-RHB70	–54.58	38.63	158.1300	13.3300	14.0100	
300.00	6699879.85	1632520.23	248.06	RT90-RHB70	–54.51	38.88	159.8300	13.7100	14.2700	
303.00	6699881.21	1632521.32	250.50	RT90-RHB70	–54.43	39.08	161.5300	14.1000	14.5200	
306.00	6699882.57	1632522.42	252.94	RT90-RHB70	–54.34	39.24	163.2300	14.4900	14.7800	
309.00	6699883.92	1632523.52	255.38	RT90-RHB70	–54.24	39.44	164.9300	14.8900	15.0400	
312.00	6699885.27	1632524.64	257.81	RT90-RHB70	–54.13	39.68	166.6400	15.2900	15.3100	
315.00	6699886.63	1632525.76	260.24	RT90-RHB70	–54.05	39.93	168.3400	15.7100	15.5800	
318.00	6699887.98	1632526.89	262.67	RT90-RHB70	–53.96	40.19	170.0500	16.1300	15.8500	
321.00	6699889.33	1632528.03	265.10	RT90-RHB70	–53.86	40.37	171.7700	16.5600	16.1300	
324.00	6699890.67	1632529.18	267.52	RT90-RHB70	–53.82	40.49	173.4800	17.0000	16.4100	
327.00	6699892.02	1632530.33	269.94	RT90-RHB70	–53.75	40.69	175.2000	17.4400	16.6900	
330.00	6699893.37	1632531.48	272.36	RT90-RHB70	–53.66	40.89	176.9100	17.8900	16.9700	
333.00	6699894.71	1632532.65	274.78	RT90-RHB70	–53.56	41.05	178.6300	18.3400	17.2600	
336.00	6699896.05	1632533.82	277.19	RT90-RHB70	–53.45	41.24	180.3500	18.8000	17.5500	
339.00	6699897.40	1632534.99	279.60	RT90-RHB70	–53.34	41.40	182.0800	19.2700	17.8400	
342.00	6699898.74	1632536.18	282.01	RT90-RHB70	–53.24	41.48	183.8000	19.7400	18.1400	
345.00	6699900.08	1632537.37	284.41	RT90-RHB70	–53.16	41.57	185.5300	20.2200	18.4400	
348.00	6699901.43	1632538.56	286.81	RT90-RHB70	–53.09	41.76	187.2700	20.7000	18.7500	
351.00	6699902.77	1632539.76	289.21	RT90-RHB70	–53.04	41.94	189.0000	21.1900	19.0600	
354.00	6699904.12	1632540.97	291.61	RT90-RHB70	–52.99	42.14	190.7400	21.6800	19.3700	
357.00	6699905.46	1632542.18	294.00	RT90-RHB70	–52.94	42.37	192.4700	22.1800	19.6800	
360.00	6699906.79	1632543.40	296.40	RT90-RHB70	–52.91	42.62	194.2100	22.6900	19.9900	
363.00	6699908.12	1632544.62	298.79	RT90-RHB70	–52.87	42.86	195.9400	23.2100	20.3000	
366.00	6699909.45	1632545.85	301.18	RT90-RHB70	–52.81	43.10	197.6800	23.7300	20.6100	
369.00	6699910.77	1632547.09	303.57	RT90-RHB70	–52.76	43.28	199.4100	24.2600	20.9300	

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372.00	6699912.10	1632548.34	305.96	RT90-RHB70	–52.70	43.48	201.1400	24.8000	21.2400	
375.00	6699913.42	1632549.59	308.35	RT90-RHB70	–52.64	43.68	202.8800	25.3400	21.5600	
378.00	6699914.73	1632550.85	310.73	RT90-RHB70	–52.60	43.89	204.6100	25.8900	21.8700	
381.00	6699916.04	1632552.11	313.12	RT90-RHB70	–52.55	44.12	206.3500	26.4500	22.1900	
384.00	6699917.35	1632553.38	315.50	RT90-RHB70	–52.50	44.32	208.0800	27.0100	22.5100	
387.00	6699918.66	1632554.65	317.88	RT90-RHB70	–52.48	44.54	209.8200	27.5900	22.8200	
390.00	6699919.96	1632555.94	320.26	RT90-RHB70	–52.42	44.82	211.5500	28.1700	23.1400	
393.00	6699921.26	1632557.23	322.63	RT90-RHB70	–52.35	45.09	213.2800	28.7500	23.4600	
396.00	6699922.55	1632558.52	325.01	RT90-RHB70	–52.26	45.31	215.0100	29.3500	23.7800	
399.00	6699923.85	1632559.83	327.38	RT90-RHB70	–52.12	45.48	216.7500	29.9600	24.1000	
402.00	6699925.14	1632561.14	329.75	RT90-RHB70	–52.00	45.64	218.4800	30.5700	24.4300	
405.00	6699926.43	1632562.46	332.11	RT90-RHB70	–51.89	45.81	220.2200	31.1900	24.7600	
408.00	6699927.72	1632563.79	334.47	RT90-RHB70	–51.80	46.02	221.9700	31.8100	25.0900	
411.00	6699929.01	1632565.13	336.83	RT90-RHB70	–51.72	46.21	223.7100	32.4500	25.4300	
414.00	6699930.29	1632566.47	339.19	RT90-RHB70	–51.64	46.39	225.4600	33.0900	25.7700	
417.00	6699931.58	1632567.82	341.54	RT90-RHB70	–51.58	46.57	227.2000	33.7300	26.1100	
420.00	6699932.86	1632569.17	343.89	RT90-RHB70	–51.52	46.74	228.9500	34.3900	26.4500	
423.00	6699934.14	1632570.53	346.24	RT90-RHB70	–51.47	46.90	230.6900	35.0500	26.8000	
426.00	6699935.42	1632571.89	348.58	RT90-RHB70	–51.45	47.05	232.4400	35.7100	27.1400	
429.00	6699936.69	1632573.26	350.93	RT90-RHB70	–51.39	47.19	234.1900	36.3800	27.4900	
432.00	6699937.96	1632574.63	353.28	RT90-RHB70	–51.27	47.37	235.9300	37.0600	27.8300	
435.00	6699939.23	1632576.02	355.62	RT90-RHB70	–51.20	47.57	237.6800	37.7400	28.1800	
438.00	6699940.50	1632577.40	357.95	RT90-RHB70	–51.15	47.81	239.4300	38.4300	28.5400	
441.00	6699941.77	1632578.80	360.29	RT90-RHB70	–51.14	48.01	241.1800	39.1200	28.8900	
444.00	6699943.02	1632580.20	362.63	RT90-RHB70	–51.11	48.23	242.9200	39.8300	29.2400	
447.00	6699944.28	1632581.60	364.96	RT90-RHB70	–51.02	48.40	244.6700	40.5400	29.5900	

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450.00	6699945.53	1632583.01	367.29	RT90-RHB70	–50.95	48.56	246.4100	41.2500	29.9400	
453.00	6699946.78	1632584.43	369.62	RT90-RHB70	–50.87	48.77	248.1600	41.9800	30.2900	
456.00	6699948.03	1632585.85	371.95	RT90-RHB70	–50.80	48.96	249.9100	42.7100	30.6500	
459.00	6699949.28	1632587.28	374.27	RT90-RHB70	–50.72	49.20	251.6500	43.4500	31.0000	
462.00	6699950.52	1632588.72	376.60	RT90-RHB70	–50.65	49.43	253.4000	44.1900	31.3600	
465.00	6699951.75	1632590.17	378.92	RT90-RHB70	–50.64	49.64	255.1500	44.9500	31.7200	
468.00	6699952.99	1632591.62	381.24	RT90-RHB70	–50.64	49.82	256.8900	45.7100	32.0800	
471.00	6699954.21	1632593.07	383.56	RT90-RHB70	–50.65	50.00	258.6300	46.4700	32.4300	
474.00	6699955.44	1632594.53	385.88	RT90-RHB70	–50.65	50.21	260.3700	47.2500	32.7800	
477.00	6699956.65	1632595.99	388.20	RT90-RHB70	–50.61	50.44	262.1100	48.0200	33.1300	
480.00	6699957.87	1632597.46	390.51	RT90-RHB70	–50.59	50.64	263.8400	48.8100	33.4800	
483.00	6699959.07	1632598.93	392.83	RT90-RHB70	–50.55	50.87	265.5700	49.6000	33.8300	
486.00	6699960.28	1632600.41	395.15	RT90-RHB70	–50.53	51.05	267.3000	50.4000	34.1700	
489.00	6699961.48	1632601.89	397.46	RT90-RHB70	–50.49	51.27	269.0300	51.2100	34.5200	
492.00	6699962.67	1632603.38	399.78	RT90-RHB70	–50.46	51.46	270.7600	52.0200	34.8600	
495.00	6699963.86	1632604.87	402.09	RT90-RHB70	–50.42	51.64	272.4800	52.8400	35.2100	
498.00	6699965.05	1632606.37	404.40	RT90-RHB70	–50.39	51.80	274.2100	53.6700	35.5500	
501.00	6699966.23	1632607.88	406.72	RT90-RHB70	–50.37	51.98	275.9300	54.5000	35.8900	
504.00	6699967.41	1632609.38	409.03	RT90-RHB70	–50.35	52.16	277.6500	55.3300	36.2300	
507.00	6699968.58	1632610.89	411.34	RT90-RHB70	–50.34	52.36	279.3700	56.1700	36.5700	
510.00	6699969.75	1632612.41	413.65	RT90-RHB70	–50.31	52.56	281.0900	57.0200	36.9100	
513.00	6699970.92	1632613.93	415.95	RT90-RHB70	–50.30	52.75	282.8000	57.8800	37.2500	
516.00	6699972.08	1632615.46	418.26	RT90-RHB70	–50.28	52.99	284.5100	58.7400	37.5800	
519.00	6699973.23	1632616.99	420.57	RT90-RHB70	–50.24	53.25	286.2200	59.6100	37.9100	
522.00	6699974.38	1632618.53	422.88	RT90-RHB70	–50.16	53.50	287.9300	60.4800	38.2500	
525.00	6699975.52	1632620.07	425.18	RT90-RHB70	–50.10	53.75	289.6300	61.3700	38.5800	

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528.00	6699976.66	1632621.62	427.48	RT90-RHB70	–50.07	53.99	291.3400	62.2600	38.9100	
531.00	6699977.79	1632623.18	429.78	RT90-RHB70	–50.06	54.22	293.0400	63.1600	39.2400	
534.00	6699978.92	1632624.74	432.08	RT90-RHB70	–50.04	54.44	294.7400	64.0700	39.5600	
537.00	6699980.04	1632626.31	434.38	RT90-RHB70	–50.00	54.64	296.4300	64.9900	39.8900	
540.00	6699981.15	1632627.88	436.68	RT90-RHB70	–49.94	54.82	298.1300	65.9100	40.2100	
543.00	6699982.27	1632629.46	438.98	RT90-RHB70	–49.91	55.02	299.8200	66.8400	40.5400	
546.00	6699983.37	1632631.04	441.27	RT90-RHB70	–49.87	55.20	301.5100	67.7800	40.8600	
549.00	6699984.48	1632632.63	443.56	RT90-RHB70	–49.84	55.42	303.2000	68.7200	41.1800	
552.00	6699985.57	1632634.22	445.86	RT90-RHB70	–49.83	55.60	304.8900	69.6700	41.5000	
555.00	6699986.67	1632635.82	448.15	RT90-RHB70	–49.82	55.79	306.5700	70.6200	41.8200	
558.00	6699987.76	1632637.42	450.44	RT90-RHB70	–49.81	55.95	308.2500	71.5800	42.1300	
561.00	6699988.84	1632639.03	452.73	RT90-RHB70	–49.79	56.10	309.9300	72.5400	42.4500	
564.00	6699989.92	1632640.63	455.02	RT90-RHB70	–49.77	56.25	311.6100	73.5100	42.7600	
567.00	6699991.00	1632642.24	457.31	RT90-RHB70	–49.72	56.39	313.2800	74.4900	43.0700	
570.00	6699992.07	1632643.86	459.60	RT90-RHB70	–49.63	56.52	314.9500	75.4700	43.3800	
573.00	6699993.14	1632645.48	461.89	RT90-RHB70	–49.56	56.70	316.6300	76.4500	43.6900	
576.00	6699994.21	1632647.11	464.17	RT90-RHB70	–49.47	56.87	318.3000	77.4400	44.0100	
579.00	6699995.28	1632648.74	466.45	RT90-RHB70	–49.36	57.05	319.9800	78.4400	44.3300	
582.00	6699996.34	1632650.38	468.73	RT90-RHB70	–49.25	57.23	321.6500	79.4500	44.6400	
585.00	6699997.40	1632652.03	471.00	RT90-RHB70	–49.18	57.41	323.3300	80.4600	44.9600	
588.00	6699998.45	1632653.68	473.27	RT90-RHB70	–49.15	57.62	325.0000	81.4800	45.2800	
591.00	6699999.51	1632655.34	475.54	RT90-RHB70	–49.12	57.81	326.6800	82.5100	45.6000	
594.00	6700000.55	1632657.00	477.81	RT90-RHB70	–49.09	57.95	328.3500	83.5400	45.9200	
597.00	6700001.59	1632658.66	480.08	RT90-RHB70	–49.05	58.04	330.0100	84.5800	46.2400	
600.00	6700002.63	1632660.33	482.34	RT90-RHB70	–49.02	58.14	331.6800	85.6200	46.5600	
603.00	6700003.67	1632662.00	484.61	RT90-RHB70	–48.96	58.28	333.3500	86.6700	46.8700	

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
606.00	6700004.71	1632663.68	486.87	RT90-RHB70	–48.91	58.41	335.0100	87.7200	47.1900	
609.00	6700005.74	1632665.36	489.13	RT90-RHB70	–48.88	58.56	336.6800	88.7700	47.5100	
612.00	6700006.77	1632667.04	491.39	RT90-RHB70	–48.84	58.71	338.3400	89.8300	47.8300	
615.00	6700007.80	1632668.73	493.65	RT90-RHB70	–48.79	58.85	340.0100	90.9000	48.1400	
618.00	6700008.82	1632670.42	495.91	RT90-RHB70	–48.74	58.94	341.6700	91.9700	48.4600	
621.00	6700009.84	1632672.11	498.16	RT90-RHB70	–48.68	59.02	343.3300	93.0400	48.7800	
624.00	6700010.86	1632673.81	500.41	RT90-RHB70	–48.64	59.08	344.9900	94.1200	49.0900	
627.00	6700011.88	1632675.51	502.67	RT90-RHB70	–48.61	59.17	346.6500	95.2000	49.4100	
630.00	6700012.89	1632677.22	504.92	RT90-RHB70	–48.57	59.31	348.3200	96.2800	49.7300	
633.00	6700013.91	1632678.92	507.17	RT90-RHB70	–48.52	59.47	349.9800	97.3700	50.0500	
636.00	6700014.92	1632680.64	509.41	RT90-RHB70	–48.47	59.61	351.6400	98.4600	50.3700	
639.00	6700015.92	1632682.35	511.66	RT90-RHB70	–48.42	59.79	353.2900	99.5600	50.6900	
642.00	6700016.92	1632684.07	513.90	RT90-RHB70	–48.37	59.93	354.9500	100.6700	51.0100	
645.00	6700017.92	1632685.80	516.15	RT90-RHB70	–48.32	60.04	356.6000	101.7800	51.3300	
648.00	6700018.92	1632687.52	518.39	RT90-RHB70	–48.28	60.13	358.2600	102.8900	51.6400	
651.00	6700019.91	1632689.26	520.63	RT90-RHB70	–48.27	60.26	359.9100	104.0100	51.9600	
654.00	6700020.90	1632690.99	522.86	RT90-RHB70	–48.25	60.42	361.5600	105.1300	52.2800	
657.00	6700021.89	1632692.73	525.10	RT90-RHB70	–48.22	60.56	363.2100	106.2600	52.5900	
660.00	6700022.87	1632694.47	527.34	RT90-RHB70	–48.18	60.68	364.8600	107.3900	52.9100	
663.00	6700023.85	1632696.21	529.58	RT90-RHB70	–48.14	60.81	366.5100	108.5300	53.2200	
666.00	6700024.83	1632697.96	531.81	RT90-RHB70	–48.12	60.95	368.1500	109.6700	53.5300	
669.00	6700025.80	1632699.71	534.04	RT90-RHB70	–48.11	61.09	369.7900	110.8200	53.8500	
672.00	6700026.77	1632701.46	536.28	RT90-RHB70	–48.11	61.23	371.4300	111.9700	54.1600	
675.00	6700027.73	1632703.22	538.51	RT90-RHB70	–48.11	61.35	373.0700	113.1200	54.4600	
678.00	6700028.69	1632704.98	540.74	RT90-RHB70	–48.10	61.48	374.7100	114.2800	54.7700	
681.00	6700029.65	1632706.74	542.98	RT90-RHB70	–48.07	61.61	376.3400	115.4400	55.0700	

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
684.00	6700030.60	1632708.50	545.21	RT90-RHB70	–48.05	61.71	377.9700	116.6100	55.3700	
687.00	6700031.55	1632710.27	547.44	RT90-RHB70	–48.04	61.81	379.6000	117.7700	55.6800	
690.00	6700032.50	1632712.04	549.67	RT90-RHB70	–48.03	61.93	381.2300	118.9500	55.9800	
693.00	6700033.45	1632713.81	551.90	RT90-RHB70	–48.00	62.04	382.8500	120.1200	56.2700	
696.00	6700034.39	1632715.58	554.13	RT90-RHB70	–47.98	62.15	384.4800	121.3000	56.5700	
699.00	6700035.33	1632717.35	556.36	RT90-RHB70	–47.96	62.27	386.1000	122.4800	56.8700	
702.00	6700036.26	1632719.13	558.59	RT90-RHB70	–47.97	62.36	387.7200	123.6700	57.1600	
705.00	6700037.19	1632720.91	560.82	RT90-RHB70	–47.98	62.44	389.3400	124.8600	57.4600	
708.00	6700038.12	1632722.69	563.04	RT90-RHB70	–47.98	62.55	390.9600	126.0500	57.7500	
711.00	6700039.05	1632724.47	565.27	RT90-RHB70	–47.96	62.69	392.5700	127.2400	58.0400	
714.00	6700039.97	1632726.26	567.50	RT90-RHB70	–47.91	62.81	394.1800	128.4400	58.3300	
717.00	6700040.89	1632728.05	569.73	RT90-RHB70	–47.84	62.96	395.8000	129.6500	58.6100	
720.00	6700041.80	1632729.84	571.95	RT90-RHB70	–47.79	63.09	397.4100	130.8500	58.9000	
723.00	6700042.71	1632731.64	574.17	RT90-RHB70	–47.76	63.22	399.0200	132.0700	59.1900	
726.00	6700043.62	1632733.44	576.39	RT90-RHB70	–47.72	63.35	400.6200	133.2900	59.4800	
729.00	6700044.53	1632735.24	578.61	RT90-RHB70	–47.69	63.46	402.2300	134.5100	59.7600	
732.00	6700045.43	1632737.05	580.83	RT90-RHB70	–47.68	63.57	403.8300	135.7400	60.0500	
735.00	6700046.33	1632738.86	583.05	RT90-RHB70	–47.67	63.67	405.4400	136.9600	60.3300	
738.00	6700047.23	1632740.67	585.27	RT90-RHB70	–47.65	63.76	407.0400	138.2000	60.6200	
741.00	6700048.12	1632742.48	587.49	RT90-RHB70	–47.63	63.84	408.6300	139.4300	60.9000	
744.00	6700049.01	1632744.30	589.70	RT90-RHB70	–47.62	63.95	410.2300	140.6700	61.1800	
747.00	6700049.90	1632746.11	591.92	RT90-RHB70	–47.60	64.04	411.8300	141.9100	61.4600	
750.00	6700050.78	1632747.93	594.13	RT90-RHB70	–47.58	64.11	413.4200	143.1600	61.7400	
753.00	6700051.67	1632749.75	596.35	RT90-RHB70	–47.61	64.17	415.0200	144.4100	62.0200	
756.00	6700052.55	1632751.57	598.56	RT90-RHB70	–47.69	64.16	416.6100	145.6500	62.2900	
759.00	6700053.43	1632753.39	600.78	RT90-RHB70	–47.77	64.05	418.2000	146.9000	62.5700	

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
762.00	6700054.31	1632755.20	603.00	RT90-RHB70	–47.81	63.91	419.7900	148.1400	62.8400	
765.00	6700055.20	1632757.01	605.23	RT90-RHB70	–47.80	63.83	421.3800	149.3800	63.1100	
768.00	6700056.09	1632758.82	607.45	RT90-RHB70	–47.85	63.73	422.9700	150.6100	63.3800	
771.00	6700056.98	1632760.63	609.67	RT90-RHB70	–47.89	63.67	424.5600	151.8400	63.6600	
774.00	6700057.87	1632762.43	611.90	RT90-RHB70	–47.92	63.65	426.1600	153.0700	63.9300	
777.00	6700058.76	1632764.23	614.12	RT90-RHB70	–47.93	63.61	427.7500	154.3000	64.2000	
780.00	6700059.66	1632766.03	616.35	RT90-RHB70	–47.98	63.57	429.3500	155.5200	64.4800	
783.00	6700060.55	1632767.83	618.58	RT90-RHB70	–48.03	63.57	430.9400	156.7400	64.7500	
786.00	6700061.44	1632769.63	620.81	RT90-RHB70	–48.06	63.58	432.5300	157.9600	65.0200	
789.00	6700062.33	1632771.42	623.04	RT90-RHB70	–48.09	63.57	434.1200	159.1900	65.2800	
792.00	6700063.23	1632773.22	625.27	RT90-RHB70	–48.12	63.61	435.7100	160.4100	65.5500	
795.00	6700064.12	1632775.01	627.51	RT90-RHB70	–48.11	63.66	437.3000	161.6300	65.8100	
798.00	6700065.01	1632776.81	629.74	RT90-RHB70	–48.08	63.76	438.8900	162.8500	66.0800	
801.00	6700065.89	1632778.60	631.97	RT90-RHB70	–48.02	63.88	440.4700	164.0700	66.3400	
804.00	6700066.78	1632780.41	634.20	RT90-RHB70	–47.95	63.96	442.0600	165.3000	66.6000	
807.00	6700067.66	1632782.21	636.43	RT90-RHB70	–47.87	64.02	443.6400	166.5400	66.8700	
810.00	6700068.54	1632784.02	638.66	RT90-RHB70	–47.78	64.10	445.2300	167.7800	67.1400	
813.00	6700069.42	1632785.83	640.88	RT90-RHB70	–47.69	64.17	446.8200	169.0200	67.4100	
816.00	6700070.30	1632787.65	643.10	RT90-RHB70	–47.62	64.26	448.4100	170.2600	67.6800	
819.00	6700071.18	1632789.47	645.31	RT90-RHB70	–47.57	64.40	449.9900	171.5100	67.9500	
822.00	6700072.05	1632791.30	647.53	RT90-RHB70	–47.52	64.56	451.5800	172.7700	68.2300	
825.00	6700072.92	1632793.13	649.74	RT90-RHB70	–47.48	64.69	453.1700	174.0300	68.5000	
828.00	6700073.79	1632794.96	651.95	RT90-RHB70	–47.45	64.83	454.7500	175.3000	68.7700	
831.00	6700074.65	1632796.80	654.16	RT90-RHB70	–47.43	64.97	456.3300	176.5700	69.0400	
834.00	6700075.51	1632798.64	656.37	RT90-RHB70	–47.41	65.11	457.9100	177.8400	69.3100	
837.00	6700076.37	1632800.48	658.58	RT90-RHB70	–47.38	65.27	459.4900	179.1200	69.5800	

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
840.00	6700077.22	1632802.32	660.79	RT90-RHB70	–47.34	65.44	461.0600	180.4100	69.8400	
843.00	6700078.06	1632804.17	662.99	RT90-RHB70	–47.30	65.53	462.6400	181.6900	70.1100	
846.00	6700078.90	1632806.02	665.20	RT90-RHB70	–47.23	65.59	464.2100	182.9900	70.3700	
849.00	6700079.74	1632807.88	667.40	RT90-RHB70	–47.14	65.65	465.7800	184.2800	70.6300	
852.00	6700080.59	1632809.74	669.60	RT90-RHB70	–47.07	65.75	467.3500	185.5900	70.9000	
855.00	6700081.42	1632811.60	671.80	RT90-RHB70	–47.02	65.85	468.9200	186.8900	71.1700	
858.00	6700082.26	1632813.47	673.99	RT90-RHB70	–46.96	65.94	470.4900	188.2000	71.4400	
861.00	6700083.10	1632815.34	676.18	RT90-RHB70	–46.93	66.04	472.0600	189.5100	71.7100	
864.00	6700083.93	1632817.21	678.37	RT90-RHB70	–46.90	66.16	473.6300	190.8300	71.9800	
867.00	6700084.76	1632819.08	680.56	RT90-RHB70	–46.84	66.30	475.2000	192.1500	72.2500	
870.00	6700085.58	1632820.96	682.75	RT90-RHB70	–46.77	66.43	476.7700	193.4700	72.5200	
873.00	6700086.40	1632822.85	684.94	RT90-RHB70	–46.72	66.52	478.3400	194.8000	72.7800	
876.00	6700087.22	1632824.73	687.12	RT90-RHB70	–46.68	66.63	479.9000	196.1400	73.0500	
879.00	6700088.04	1632826.62	689.31	RT90-RHB70	–46.66	66.76	481.4600	197.4800	73.3200	
882.00	6700088.85	1632828.51	691.49	RT90-RHB70	–46.63	66.92	483.0200	198.8200	73.5900	
885.00	6700089.66	1632830.41	693.67	RT90-RHB70	–46.59	67.09	484.5800	200.1700	73.8500	
888.00	6700090.46	1632832.31	695.85	RT90-RHB70	–46.54	67.25	486.1400	201.5200	74.1200	
891.00	6700091.26	1632834.21	698.02	RT90-RHB70	–46.47	67.41	487.6900	202.8800	74.3800	
894.00	6700092.05	1632836.12	700.20	RT90-RHB70	–46.43	67.59	489.2400	204.2400	74.6400	
897.00	6700092.84	1632838.03	702.37	RT90-RHB70	–46.40	67.77	490.7900	205.6200	74.9000	
900.00	6700093.62	1632839.95	704.55	RT90-RHB70	–46.34	67.91	492.3300	206.9900	75.1600	
903.00	6700094.40	1632841.86	706.72	RT90-RHB70	–46.28	68.03	493.8800	208.3700	75.4100	
906.00	6700095.18	1632843.79	708.88	RT90-RHB70	–46.26	68.19	495.4200	209.7600	75.6700	
909.00	6700095.95	1632845.71	711.05	RT90-RHB70	–46.23	68.34	496.9600	211.1500	75.9200	
912.00	6700096.72	1632847.64	713.22	RT90-RHB70	–46.20	68.48	498.4900	212.5500	76.1700	
915.00	6700097.48	1632849.57	715.38	RT90-RHB70	–46.13	68.62	500.0300	213.9500	76.4300	

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
918.00	6700098.23	1632851.51	717.55	RT90-RHB70	–46.05	68.74	501.5600	215.3500	76.6800	
921.00	6700098.99	1632853.45	719.71	RT90-RHB70	–45.98	68.83	503.0900	216.7700	76.9300	
924.00	6700099.74	1632855.39	721.86	RT90-RHB70	–45.95	68.94	504.6200	218.1800	77.1800	
927.00	6700100.49	1632857.34	724.02	RT90-RHB70	–45.88	69.09	506.1500	219.6000	77.4300	
930.00	6700101.24	1632859.29	726.17	RT90-RHB70	–45.82	69.23	507.6700	221.0300	77.6800	
933.00	6700101.98	1632861.25	728.33	RT90-RHB70	–45.77	69.38	509.2000	222.4600	77.9300	
936.00	6700102.72	1632863.20	730.47	RT90-RHB70	–45.73	69.53	510.7200	223.8900	78.1800	
939.00	6700103.45	1632865.17	732.62	RT90-RHB70	–45.68	69.69	512.2400	225.3300	78.4300	
942.00	6700104.18	1632867.13	734.77	RT90-RHB70	–45.62	69.85	513.7600	226.7800	78.6700	
945.00	6700104.90	1632869.10	736.91	RT90-RHB70	–45.55	70.02	515.2700	228.2300	78.9200	
948.00	6700105.62	1632871.08	739.05	RT90-RHB70	–45.49	70.21	516.7900	229.6900	79.1600	
951.00	6700106.33	1632873.06	741.19	RT90-RHB70	–45.42	70.36	518.3000	231.1500	79.4100	
954.00	6700107.04	1632875.04	743.33	RT90-RHB70	–45.35	70.49	519.8000	232.6200	79.6500	
957.00	6700107.74	1632877.03	745.46	RT90-RHB70	–45.26	70.64	521.3100	234.1000	79.8900	
960.00	6700108.44	1632879.02	747.60	RT90-RHB70	–45.15	70.79	522.8100	235.5800	80.1300	
963.00	6700109.14	1632881.02	749.72	RT90-RHB70	–45.05	70.95	524.3200	237.0700	80.3800	
966.00	6700109.83	1632883.02	751.85	RT90-RHB70	–44.96	71.09	525.8200	238.5700	80.6200	
969.00	6700110.52	1632885.03	753.97	RT90-RHB70	–44.88	71.25	527.3200	240.0700	80.8700	
972.00	6700111.20	1632887.04	756.08	RT90-RHB70	–44.80	71.42	528.8200	241.5800	81.1100	
978.00	6700112.55	1632891.09	760.30	RT90-RHB70	–44.68	71.67	531.8000	244.6200	81.6000	

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Length reference marks

Reference Mark T – Reference mark in drillhole

KFM06C, 2005-06-27 19:00:00 – 2005-06-28 06:00:00 (150.000–960.000 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
150.00	400.00	250	350	28.0	1	Ja		
200.00	400.00	250	350	30.0	1	Ja		
250.00	400.00	250	350	30.0	0	Ja		
300.00	400.00	250	350	30.0	0	Ja		
350.00	400.00	250	400	30.0	0	Ja		
400.00	400.00	300	400	30.0	1	Ja		
447.00	400.00	400	500	30.0	1	Ja		
500.00	400.00	400	550	35.0	0	Ja		
550.00	400.00	400	550	35.0	0	Ja		
600.00	400.00	400	550	35.0	0	Ja		
652.00	400.00	400	600	35.0	1	Ja		
700.00	400.00	400	600	40.0	0	Ja		
750.00	400.00	400	600	40.0	0	Ja		
800.00	400.00	450	600	40.0	1	Ja		
850.00	400.00	400	600	40.0	1	Ja		
898.00	400.00	400	600	40.0	0	Ja		
960.00	400.00	400	600	40.0	0	Ja		

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