P-06-176

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Geological single-hole interpretation of KLX08

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Keywords: Geophysics, Rock unit, Borehole, Deformation zone, Fractures, Alteration.

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

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

Abstract

This report contains geological single-hole interpretation of the cored borehole KLX08 at Laxemar. The interpretation combines the geological core mapping, interpreted geophysical logs and borehole radar measurements to identify rock units and possible deformation zones occur in the borehole.

Three rock units are indicated in KLX08 (RU1–RU3). In general KLX08 is dominated by Ävrö granite (501044), a mixture of Ävrö granite (501044) and diorite/gabbro (501033), and the lower part of the borehole is dominated by quartz monzodiorite (501036). Subordinate rock types comprise sparse occurrences of fine-grained diorite-gabbro (505102), fine-grained granite (511058), fine-grained dioritoid (501030), some pegmatite (501061), and granite (501058). Ten possible deformation zones are identified in KLX08 (DZ1–DZ10).

Sammanfattning

Denna rapport behandlar geologisk enhålstolkning av kärnborrhål KLX08 i Laxemar. Den geologiska enhålstolkningen syftar till att utifrån den geologiska karteringen, tolkade geofysiska loggar och borrhålsradarmätningar identifiera olika litologiska enheters fördelning i borrhålen samt möjliga deformationszoners läge och utbredning.

Tre litologiska enheter (RU1–RU3) har identifierats i KLX08. Generellt sett domineras borrhålet av Ävrögranit (501044), en blandning mellan Ävrögranit (501044) och diorit/gabbro (501033), medan nedre delen av borrhålet domineras av kvartsmonzodiorit (501036). Finkornig diorite-gabbro (505102), finkornig granit (511058), finkornig dioritoid (501030), pegmatit (501061), och granit (501058) förekommer som underordnade bergarter. Tio möjliga deformationszoner har identifierats i KLX08 (DZ1–DZ10).

Contents

1 Introduction

Much of the primary geological and geophysical borehole data stored in the SKB database SICADA need to be integrated and synthesized before they can be used for modeling in the 3D-CAD system Rock Visualization System (RVS). The end result of this procedure is a geological single-hole interpretation, which consists of integrated series of different loggings and accompanying descriptive documents (SKB MD 810.003, SKB internal controlling document).

This document reports the results gained by the geological single-hole interpretation of the cored borehole KLX08 at Laxemar (Figure 1-1), which is one of the activities performed within the site investigation at Oskarshamn. The work was carried out in accordance with Activity Plan AP PS 400-05-098. The controlling documents for performing this activity are listed in Table 1-1. Both Activity Plan and Method Description are SKB's internal controlling documents. Rock type nomenclature that has been used is shown in Table 1-2.

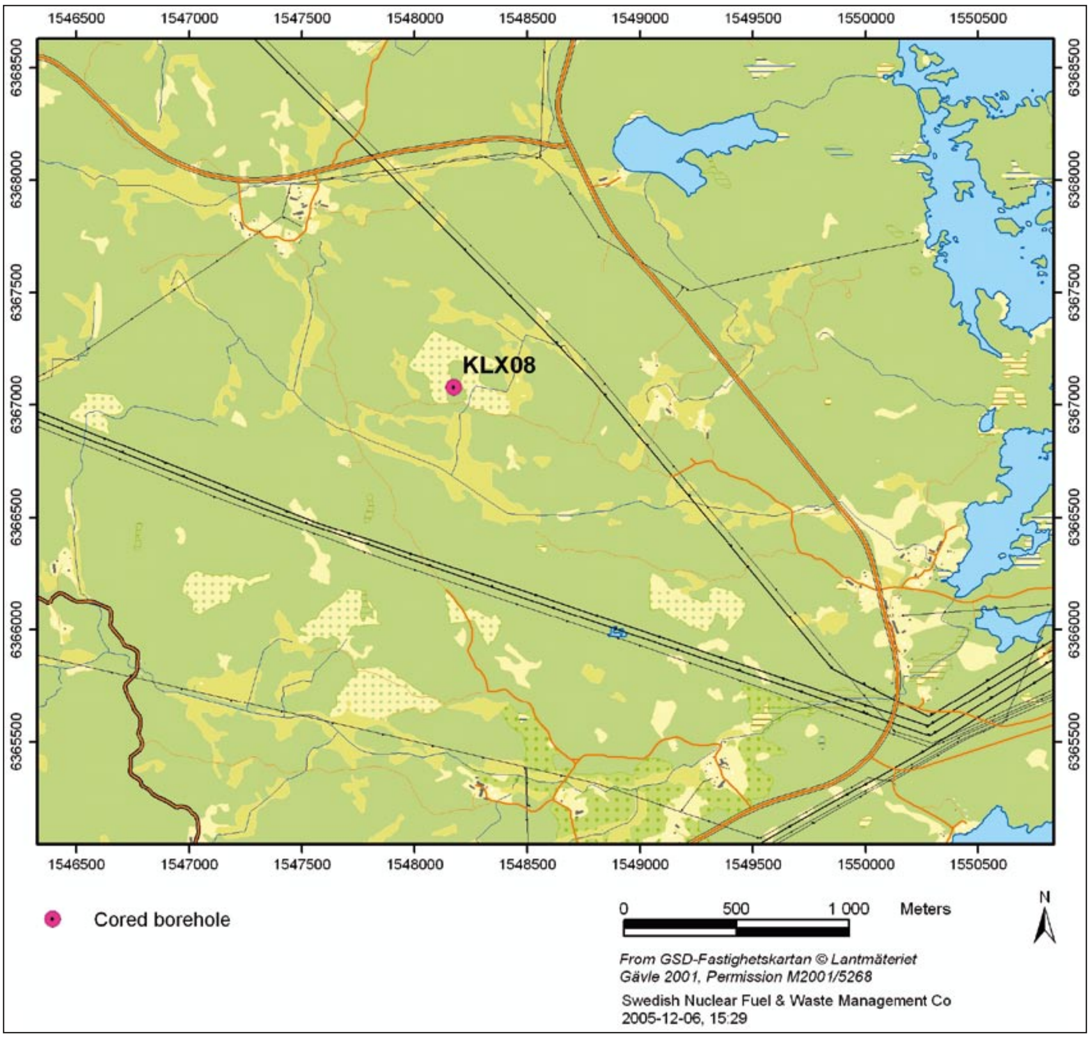


Figure 1-1. *Map showing the position of the cored borehole KLX08.*

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

Activity Plan	Number	Version
Geologisk enhålstolkning av KLX08	AP PS 400-05-098	1.0
Method Description	**Number**	**Version**
Metodbeskrivning för geologisk enhålstolkning	SKB MD 810.003	3.0

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

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

2 Objective and scope

A geological single-hole interpretation is carried out in order to identify and to describe briefly the characteristics of major rock units and possible deformation zones within a borehole. The work involves an integrated interpretation of data from the geological mapping of the borehole (Boremap), different borehole geophysical logs and borehole radar data. The geological mapping of the cored boreholes involves a documentation of the character of the bedrock in the drill core. This work component is carried out in combination with an inspection of the oriented image of the borehole walls that is obtained with the help of the *B*orehole *I*mage *P*rocessing *S*ystem (BIPS). The interpretations of the borehole geophysical and radar logs are available when the single-hole interpretation is performed. The result from the geological single-hole interpretation is presented in a WellCad plot.

3 Data used for the geological single-hole interpretation

The following data have been used in the single-hole interpretation of the borehole KLX08:

- Boremap data (including BIPS and geological mapping data) /1/.
- Generalized geophysical logs and their interpretation /2/.
- Radar data and their interpretation /3/.

As a basis for the geological single-hole interpretation a combined WellCad plot consisting of the above mentioned data sets were used. An example of a WellCad plot used during the geological single-hole interpretation is shown in Figure 3-1. The plot consists of nine main columns and several subordinate columns. These include nine main:

1: Length along the borehole

2: Boremap data

2.1: Rock type

2.2: Rock type < 1 m

2.3: Rock type structure

2.4: Rock structure intensity

2.5: Rock type texture

2.6: Rock type grain size

2.7: Structure orientation

2.8: Rock alteration

2.9: Rock alteration intensity

2.10: Crush

3: Generalized geophysical data

3.1: Silicate density

3.2: Magnetic susceptibility

3.3: Natural gamma radiation

3.4: Estimated fracture frequency

4: Unbroken fractures

4.1: Primary mineral

4.2: Secondary mineral

4.3: Third mineral

4.4: Fourth mineral

4.5: Alteration, dip direction

5: Broken fractures

5.1: Primary mineral

5.2: Secondary mineral

5.3: Third mineral

- 5.4: Fourth mineral
- 5.5: Aperture (mm)
- 5.6: Roughness
- 5.7: Surface
- 5.8: Slickenside
- 5.9: Alteration, dip direction

6: Crush zones

- 6.1: Piece (mm)
- 6.2: Sealed network
- 6.3: Core loss

7: Fracture frequency

- 7.1: Sealed fractures
- 7.2: Open fractures

8: BIPS

9: Length along the borehole

The geophysical logs are described below:

Magnetic susceptibility: The rock has been classified into sections of low, medium, high, and very high magnetic susceptibility. The susceptibility is strongly connected to the magnetite content in the different rock types.

Natural gamma radiation: The rock has been classified into sections of low, medium, and high natural gamma radiation. Low radiation may indicate mafic rock types and high radiation may indicate younger, fine-grained granite or pegmatite.

Possible alteration: This parameter has not been used in the geological single-hole interpretation in the area.

Silicate density: This parameter indicates the density of the rock after subtraction of the magnetic component. It provides general information on the mineral composition of the rock types, and serves as a support during classification of rock types.

Estimated fracture frequency: This parameter provides an estimate of the fracture frequency along 5 m sections, calculated from short and long normal resistivity, SPR, sonic as well as focused resistivity 140 and 300. The estimated fracture frequency is based on a statistical connection after a comparison has been made between the geophysical logs and the mapped fracture frequency. The log provides an indication of sections with low and high fracture frequencies.

Close inspection of the borehole radar data was carried out during the interpretation process, especially during the identification of possible deformation zones. The occurrence and orientation of radar anomalies within the possible deformation zones are commented upon in the text that describes these zones.

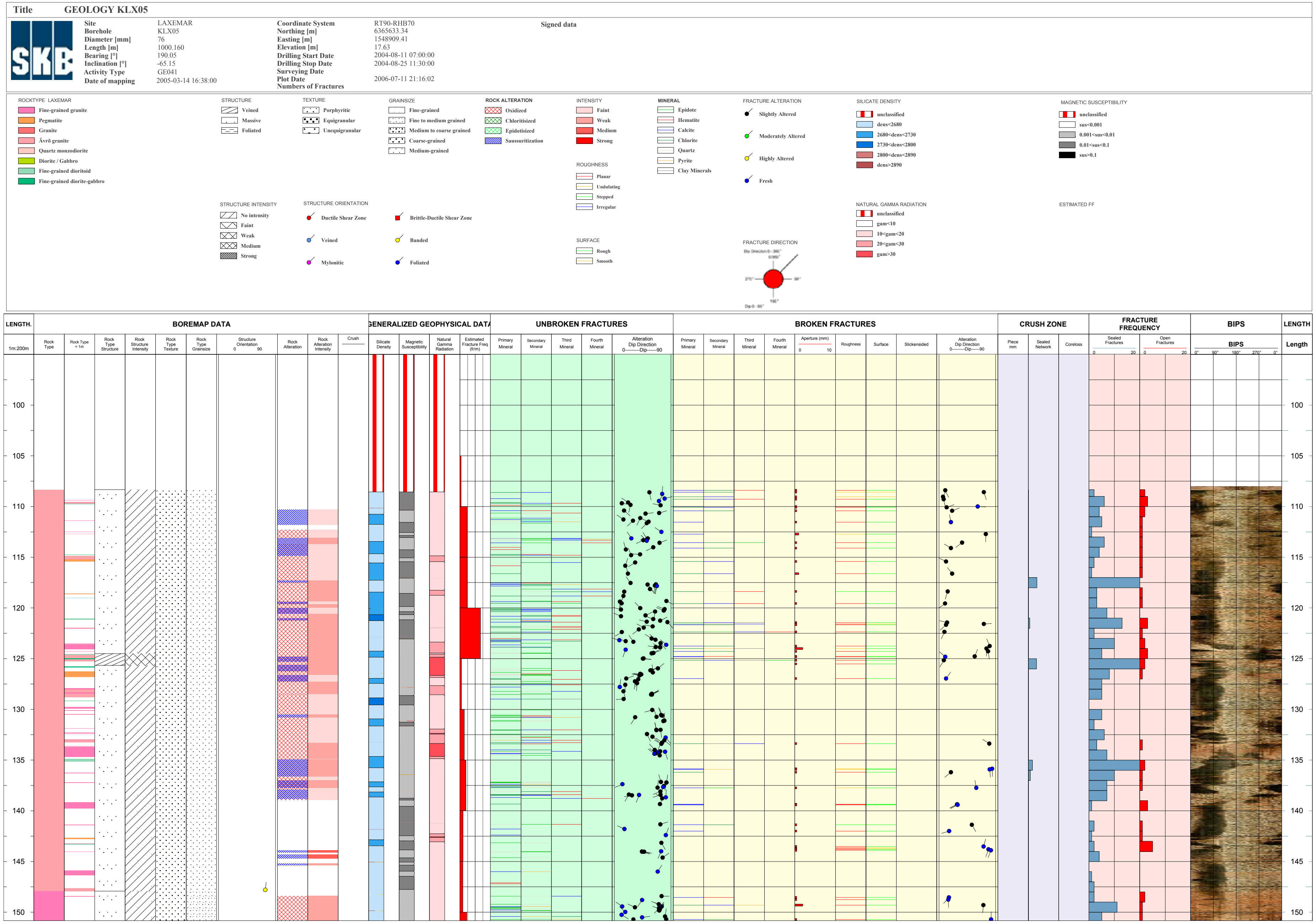


Figure 3-1. *Example of WellCad plot (from borehole KLX05 in Laxemar) used as a basis for the single-hole interpretation.*

4 Execution

4.1 General

The geological single-hole interpretation has been carried out by a group of geoscientists consisting of both geologists and geophysicists. All data to be used (see above) are visualized side by side in a borehole document extracted from the software WellCad. The working procedure is summarized in Figure 4-1 and in the text below.

The first step in the working procedure is to study all types of data (rock type, rock alteration, silicate density, natural gamma radiation, etc) related to the character of the rock type and to merge sections of similar rock types, or sections where one rock type is very dominant, into rock units (minimum length of c. 5 m). Each rock unit is defined in terms of the borehole length interval and provided with a brief description for inclusion in the WellCad plot. The confidence level in the interpretation of a rock unit is made on the following basis: 3 = high, 2 = medium and 1 = low.

The second step in the working procedure is to identify deformation zones by visual inspection of the results of the geological mapping (fracture frequency, fracture mineral, aperture, alteration, etc) in combination with the geophysical logging and radar data. The section of each identified deformation zone is defined in terms of the borehole length interval and provided with a brief description for inclusion in the WellCad plot. The confidence level in the interpretation of a deformation zone is made on the following basis: 3 = high, 2 = medium and 1 = low.

Inspection of BIPS images is carried out wherever it is judged necessary during the working procedure. Furthermore, following definition of rock units and deformation zones, with their respective confidence estimates, the drill cores are inspected in order to check the selection of the boundaries between these geological entities. If judged necessary, the location of these boundaries is adjusted.

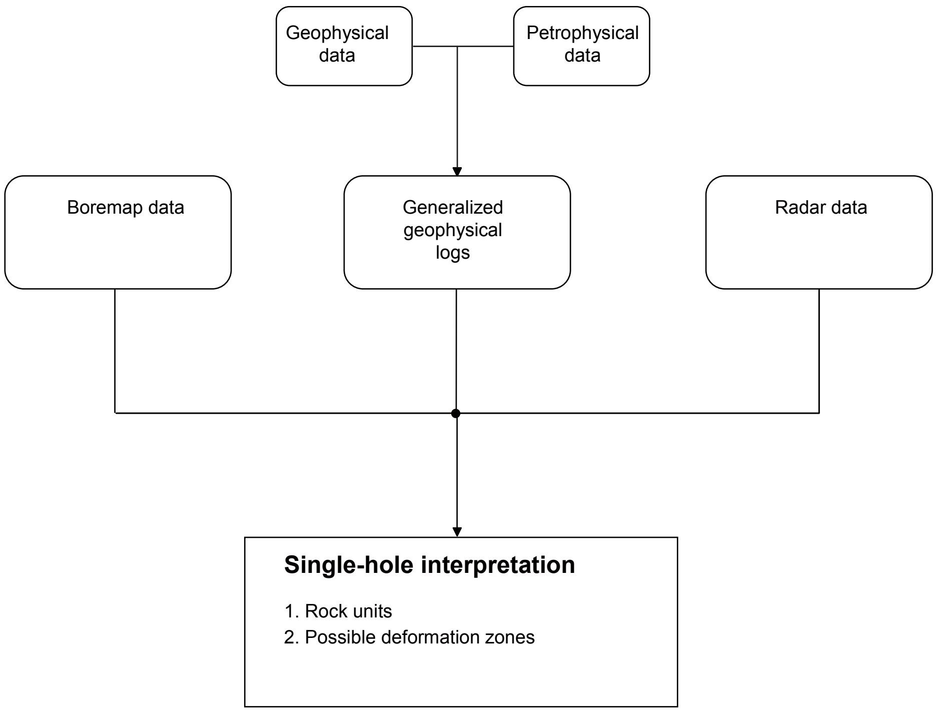


Figure 4-1. *Schematic block-scheme of single-hole interpretation.*

Deformation zones that are brittle in character have been identified primarily on the basis of the frequency of fractures, according to the recommendations in /4/. Both the transitional part, with a fracture frequency in the range 4–9 fractures/m, and the cored part, with a fracture frequency > 9 fractures/m, have been included in each zone (Figure 4-2). The frequencies of open and sealed fractures have been assessed in the identification procedure, and the character of the zone has been described accordingly. Partly open fractures are included together with open fractures in the brief description of each zone. The presence of bedrock alteration, the occurrence and, locally, inferred orientation of radar reflectors, the resistivity, SPR, P-wave velocity, caliper and magnetic susceptibility logs have all assisted in the identification of the zones.

Since the frequency of fractures is of key importance for the definition of the possible deformation zones, a moving average plot for this parameter is shown for the cored borehole KLX08 (Figure 4-3). A 5 m window and 1 m steps have been used in the calculation procedure. The moving averages for open fractures alone, the total number of open fractures (open, partly open and crush), the sealed fractures alone, and the total number of sealed fractures (sealed and sealed fracture network) are shown in this diagram.

The occurrence and orientation of radar anomalies within the possible deformation zones are used during the identification of possible deformation zones. An overview of the borehole radar measurement in KLX08 is shown in Figure 4-4.

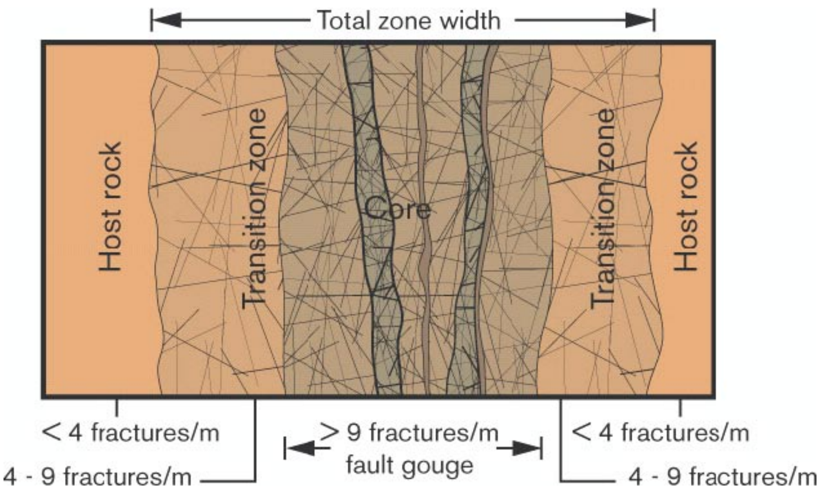


Figure 4-2. *Terminology for brittle deformation zones (after /4/).*

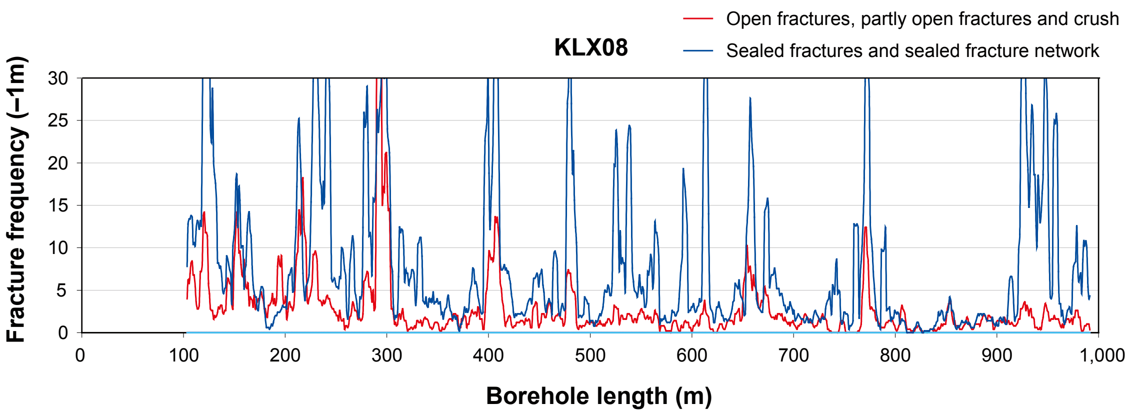


Figure 4-3. *Fracture frequency plot for KLX08. Moving average with a 5 m window and 1 m steps.*

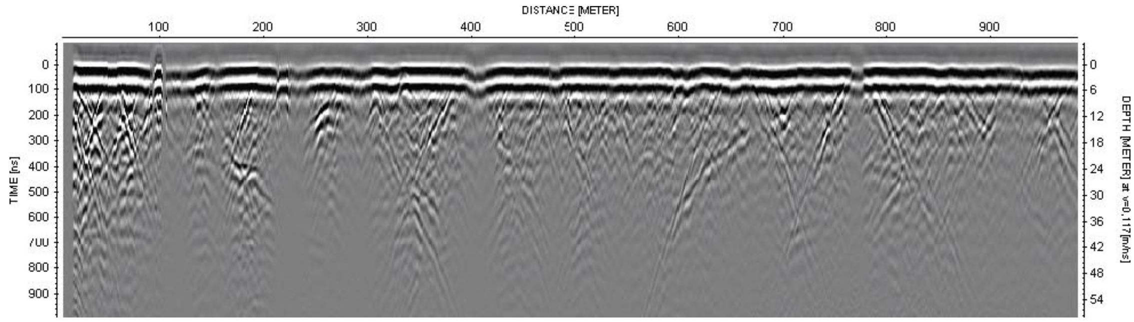


Figure 4-4. *Overview (20 MHz data) of the borehole radar measurement in KLX08.*

4.2 Nonconformities

In some cases alternative orientations for oriented radar reflectors are presented. One of the alternatives is considered to be correct, but due to uncertainty in the interpretation of radar data, a decision concerning which of the alternatives that represent the true orientation cannot be made.

Orientations from directional radar are presented as strike/dip using the right-hand rule.

5 Results

The detailed results of the single-hole interpretation are presented as print-outs from the software WellCad (Appendix 1 for KLX08).

5.1 KLX08

Rock units

The borehole can be divided into three rock units:

RU1: 100.87–587.42 m

Totally dominated by Ävrö granite (501044). Subordinate rock types comprise sparse occurrences of fine-grained diorite-gabbro (505102), fine-grained granite (511058), fine-grained dioritoid (501030) and a few very thin sections of pegmatite (501061) and granite (501058). In the section c. 100–142 m the Ävrö granite has a density in the range 2,700–2,730 kg/m^3, the magnetic susceptibility is c. 0.030–0.040 SI and the natural gamma radiation is generally < 20 μR/h. In the remaining part of the rock unit the density is 2,650–2,680 kg/m^3, the magnetic susceptibility is c. 0.025 SI and the natural gamma radiation is generally > 20 μR/h. Scattered minor sections are foliated. Confidence level = 3.

RU2: 587.42 –923.56 m

Mixture of Ävrö granite (501044) and diorite/gabbro (501033), though Ävrö granite dominates. The rock classified as diorite to gabbro has a density in the range 2,790–2,860 kg/m^3 which is significantly lower than a typical value for gabbro. This indicates that the composition rather is dioritic. Subordinate rock types comprise sparse occurrences of fine-grained granite (511058), some pegmatite (501061) and very thin sections of granite (501058). Scattered sections are foliated. Confidence level = 3.

RU3: 923.56–991.86 m

Totally dominated by quartz monzodiorite (501036). Subordinate rock types comprise sparse occurrences of Ävrö granite (501044), fine-grained granite (511058) and pegmatite (501061). The quartz monzodiorite has a density in the range 2,750–2,800 kg/m^3. Scattered sections are foliated. Confidence level = 3.

Possible deformation zones

Ten deformation zones have been recognised in KLX08:

DZ1: 100–131 m

Inhomogeneous brittle deformation zone characterized by primarily faint to weak red staining and increased frequency of sealed and open fractures. Crush zones at 109.09–109.23, 118.90–118.96 and 121.57–122.06 m. Three oriented and ten non-oriented radar reflectors occur in the section. Oriented reflectors occur at 105.4 m with the orientation 307/67, at 119.9 m with the orientation 051/35, and at 122.9 m with the orientation 088/18. Angle to borehole axis of non-oriented reflectors varies between 28 and 75°. Decreased radar amplitude between 105 and 125 m.

Anomalies in the geophysical logs generally coincide with the crush zones. They comprise narrow low resistivity and caliper anomalies, distinct low p-wave velocity anomalies and partly decreased magnetic susceptibility. Confidence level = 3.

DZ2: 150.32–159 m

Inhomogeneous brittle deformation zone characterized by faint to weak red staining and increased frequency of sealed and open fractures. Six non-oriented radar reflectors occur in the section. Angle to borehole axis varies between 53 and 76°. Decreased radar amplitude between 150 and 160 m. Geophysical loggings indicate general decrease in bulk resistivity and magnetic susceptibility. Several distinct caliper and low p-wave velocity anomalies. Confidence level = 3.

DZ3: 211.50–220 m

Inhomogeneous brittle deformation zone characterized by faint to weak red staining and increased frequency of sealed and open fractures. Crush zones at 215.79–215.91, 218.29–219.15 m. Four non-oriented radar reflectors occur in the section. Angle to borehole axis varies between 55 and 63°. Decreased radar amplitude between 210 and 220 m. Geophysical loggings indicate general decrease in bulk resistivity and magnetic susceptibility. The section 217–220 m is characterized by distinct low resistivity and caliper anomaly. Confidence level = 3.

DZ4: 224.50–242 m

Section characterized by high frequency of sealed fractures. Scattered cm-wide cataclasites. Weak to medium red staining and weak to medium saussuritization (229.5–233 m). Four non-oriented and two oriented radar reflectors are identified in the section. Oriented reflectors occur at 230.2 m with the orientation 236/30 and at 242.4 m with the orientation 303/71. The angle to borehole axis of non-oriented reflectors varies between 36 and 56°. Decreased radar amplitude between 230 and 240 m. Geophysical loggings indicate general decrease in bulk resistivity and magnetic susceptibility. Single fracture indicated by caliper and sonic loggings at 229.7 m. Confidence level = 3.

DZ5: 291–302 m

Section characterized by crush zones at 291.53–291.56, 291.73–292.47, 296.66–296.95, 297.36–297.45 and 300.69–301.26 m. Weak red staining. Five non-oriented and two oriented radar reflectors are identified in the section. Oriented reflectors occur at 290.2 m (outside the DZ5-section) with the orientation 076/08 and at 300.0 m with the orientation 338/37. The angle to borehole axis of non-oriented reflectors varies between 55 and 61°, except for one reflector having the angle 9° to borehole axis. One strong and persistent reflector that intersects the borehole at 400 m with the angle 25–31°, can be traced at least 40 m away from the borehole. Decreased radar amplitude between 290–300 m. Geophysical loggings indicate general decrease in bulk resistivity, magnetic susceptibility and low p-wave velocity including several caliper anomalies along the entire section. Confidence level = 3.

DZ6: 396–416 m

Inhomogeneous brittle deformation zone characterized by red staining and increased frequency of sealed and open fractures. The section 403.9–416 m is characterized by weak to medium red staining and saussuritization. Crush zone at 408.03–408.38 m. Seven non-oriented and one oriented radar reflector are identified in the section. Oriented reflector occurs at 400.2 m with the orientation 296/89. The angle to borehole axis of non-oriented reflectors varies between 25 and 65°. Decreased radar amplitude between 395 and 415 m. Geophysical loggings indicate general decrease in bulk resistivity, magnetic susceptibility and low p-wave velocity including several caliper anomalies along the entire section. Confidence level = 3.

DZ7: 478–486 m

Inhomogeneous brittle deformation zone characterized by weak to medium red staining and saussuritization, and increased frequency of sealed and open fractures. Scattered cm-wide cataclasites. One dm-wide brecciated zone. Crush zones at 478.44–478.59 m and 483.67–483.76 m. Six non-oriented and one oriented radar reflector are identified in the section. Oriented reflector occurs at 479.9 m with the orientation 289/59. The angle to borehole axis varies between 30 and 63°. Decreased radar amplitude between 480 and 485 m. Geophysical loggings indicate a few distinct anomalies of low resistivity, low p-wave velocity and low magnetic susceptibility. Confidence level = 3.

DZ8 536.5–540 m

Inhomogeneous brittle deformation zone characterized by weak red staining and scattered cm-wide cataclasites. The section 538–539.1 m is characterized by sealed network and cataclasite. Two non-oriented and one oriented radar reflector are identified in the section. Oriented reflector occurs at 537.6 m with the orientation 308/63. The angle to borehole axis of non-oriented reflectors is 51° and 49°. Decreased radar amplitude at 540 m. There is a significant decrease in p-wave velocity in the interval 537–544 m and decreased magnetic susceptibility in interval 536–539 m. At c. 538 m there is one distinct low resistivity anomaly. Confidence level = 3.

DZ9: 769–778 m

Inhomogeneous brittle deformation zone characterized by faint to weak red staining and saussuritization, and cataclasite. Crush zones at 769.50–769.56 m, 770.98–771.01 m, 771.58–771.59 m and 771.93–772.07 m. Six non-oriented and one oriented radar reflector are identified in the section. Oriented reflector occurs at 773.4 m with the orientation 223/55. The angle to borehole axis of non-oriented reflectors varies between 30 and 42°. One strong and persistent reflector that intersects the borehole at 775 m with the angle 30°, can be traced at least 40 m away from the borehole. Decreased radar amplitude between 765 and 780 m. The entire section is characterized by low magnetic susceptibility and in the interval c. 760–785 m there is a general decrease in the bulk resistivity. At approximately 772.5 m there are distinct but narrow low resistivity, low p-wave velocity and caliper anomalies. Confidence level = 3.

DZ10: 925–940 m

Increased frequency of sealed fractures. Weak to medium red staining and saussuritization. Scattered sections of sealed network at 925.27–926.12, 926.78–927.23, 928.63–928.95, 933.46–933.53, 935.66–936.26, 938.66–938.73 m. Twelve non-oriented radar reflector are identified in the section. The angle to borehole axis varies between 21 and 63°. Decreased radar amplitude between 925 and 950 m. No indications of significant geophysical anomalies. Confidence level = 2.

6 Comments

The result from the geological single-hole interpretation of KLX08 is presented in a WellCad plot (Appendix 1). The WellCad plot consists of the following columns:

In data Boremap	1:	Depth (Length along the borehole)
	2:	Rock type
	3:	Rock alteration
	4:	Frequency of sealed fractures
	5:	Frequency of open and partly open fractures
	6:	Crush zones
In data Geophysics	7:	Silicate density
	8:	Magnetic susceptibility
	9:	Natural gamma radiation
	10:	Estimated fracture frequency
Interpretations	11:	Description: Rock unit
	12:	Stereogram for sealed fractures in rock unit (blue symbols)
	13:	Stereogram for open and partly open fractures in rock unit (red symbols)
	14:	Description: Possible deformation zone
	15:	Stereogram for sealed fractures in possible deformation zone (blue symbols)
	16:	Stereogram for open and partly open fractures in possible deformation zone (red symbols)

7 References

/1/ **Dahlin P, Ehrenborg J, 2005.** Oskarshamn site investigation. Boremap mapping of core drilled borehole KLX08, SKB P-06-42, Svensk Kärnbränslehantering AB.

/2/ **Mattsson H, Keisu P, 2005.** Oskarshamn site investigation. Interpretation of geophysical borehole measurements from KLX08, HLX30, HLX31 and HLX33. SKB P-06-65, Svensk Kärnbränslehantering AB.

/3/ **Gustafsson J, Gustafsson C, 2005.** Oskarshamn site investigation. RAMAC, BIPS and deviation logging in boreholes KLX08, HLX30 and HLX33. SKB P-05-240, Svensk Kärnbränslehantering AB.

/4/ **Munier R ,Stenberg L, Stanfors R, Milnes A G, Hermanson J, Triumf CA, 2003.** Geological site descriptive model. A strategy for the model development during site investigations. SKB report R-03-07, Svensk Kärnbränslehantering AB.

Appendix 1

Geological single-hole interpretation of KLX08

Title	SINGLE HOLE INTERPRETATION KLX08					
Site	LAXEMAR	Inclination [°]	-60.50	Elevation [m.a.s.l.]	24.24	Signed data
Borehole	KLX08	Date of mapping	2005-10-11 09:01:00	Drilling Start Date	2005-01-12 14:00:00	
Diameter [mm]	76	Coordinate System	RT90-RHB70	Drilling Stop Date	2005-01-24 18:30:00	
Length [m]	1000.410	Northing [m]	6367078.28	Surveying Date		
Bearing [°]	199.17	Easting [m]	1548176.76	Plot Date	2007-10-14 22:03:05	

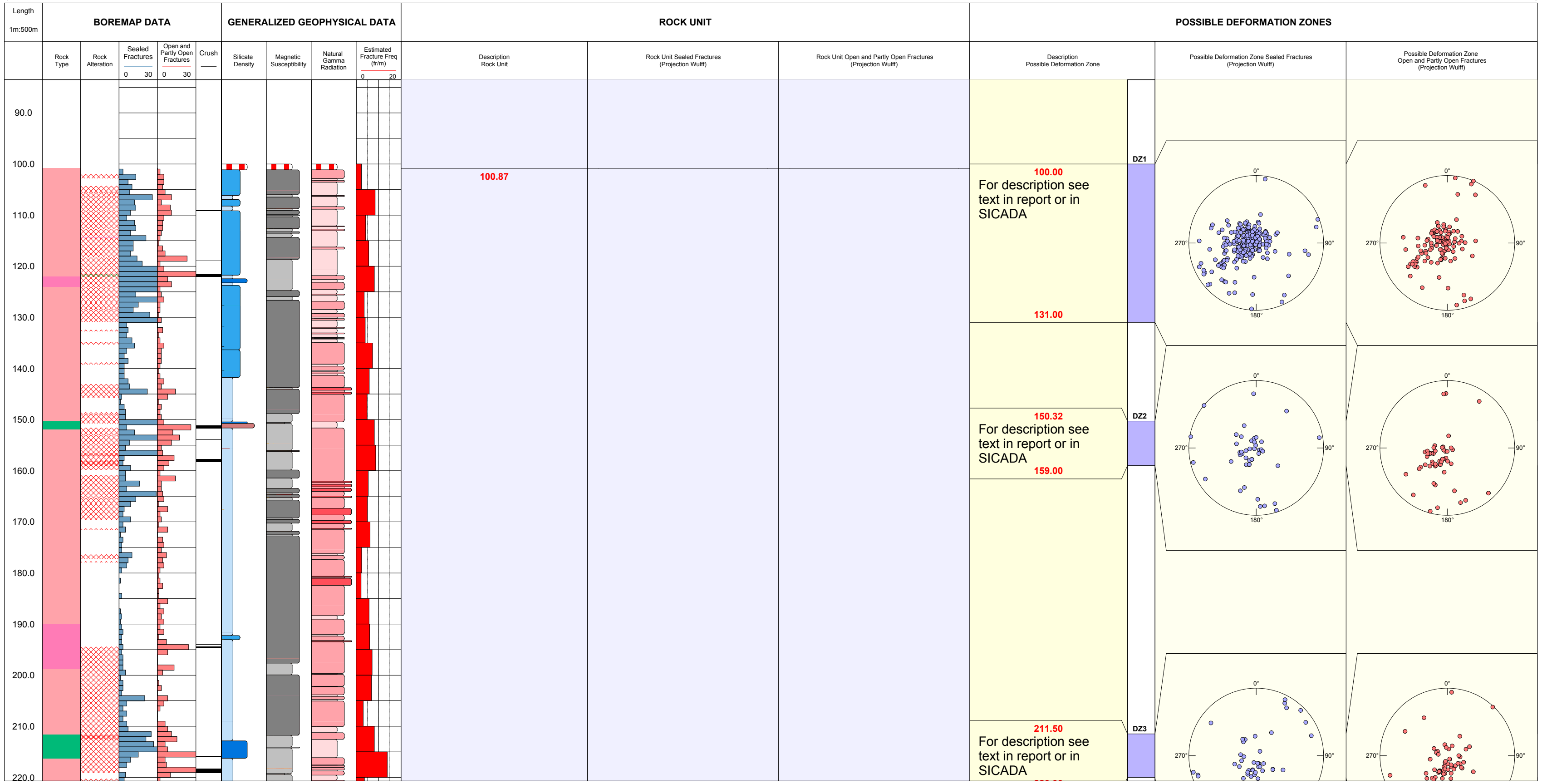
ROCKTYPE LAXEMAR
- Fine-grained granite
- Ävrö granite
- Quartz monzodiorite
- Diorite / Gabbro
- Fine-grained dioritoid
- Fine-grained diorite-gabbro

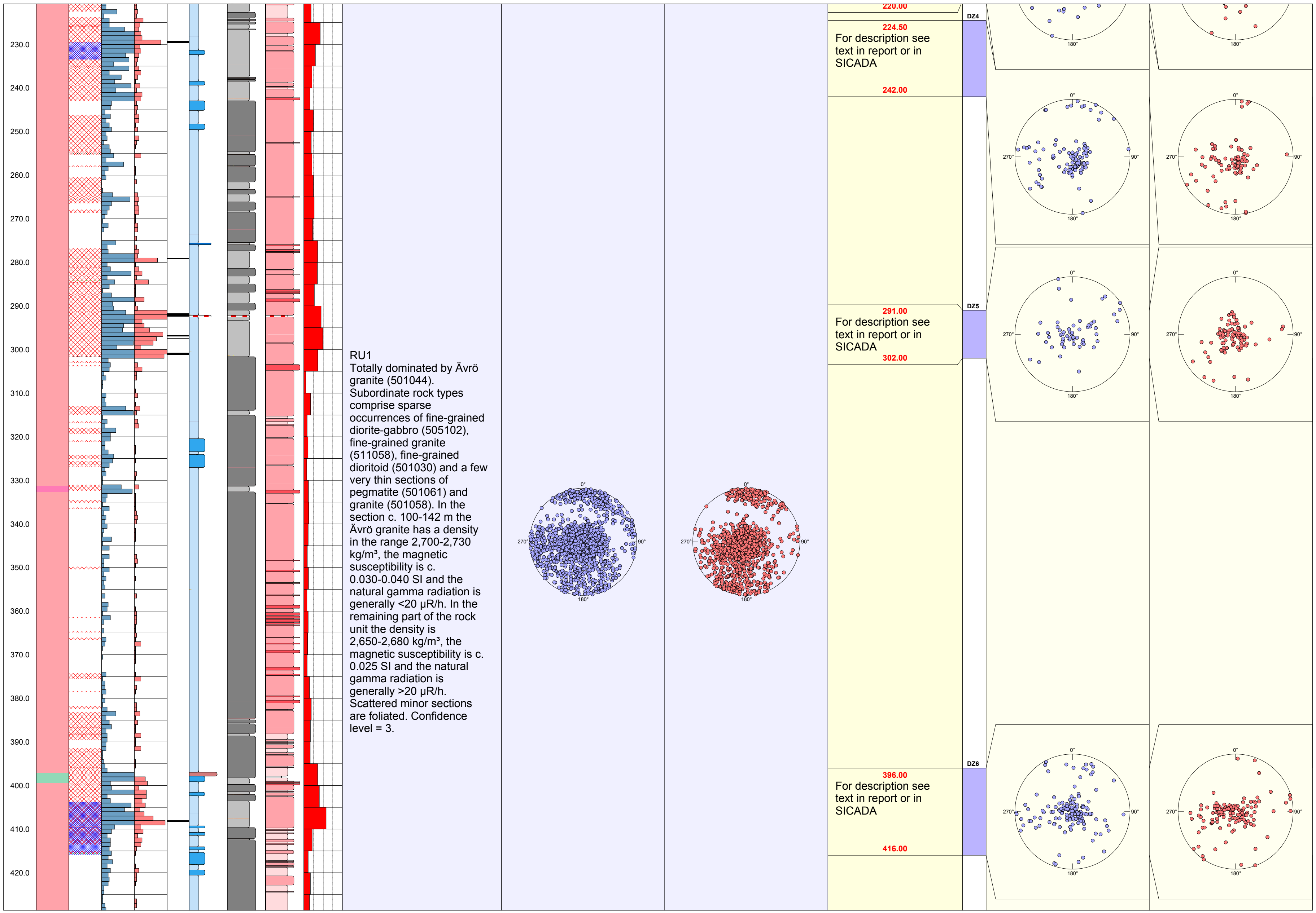
ROCK ALTERATION
- Oxidized
- Chloritisized
- Epidotisized
- Silicification
- Argillization
- Albitization
- Saussuritization

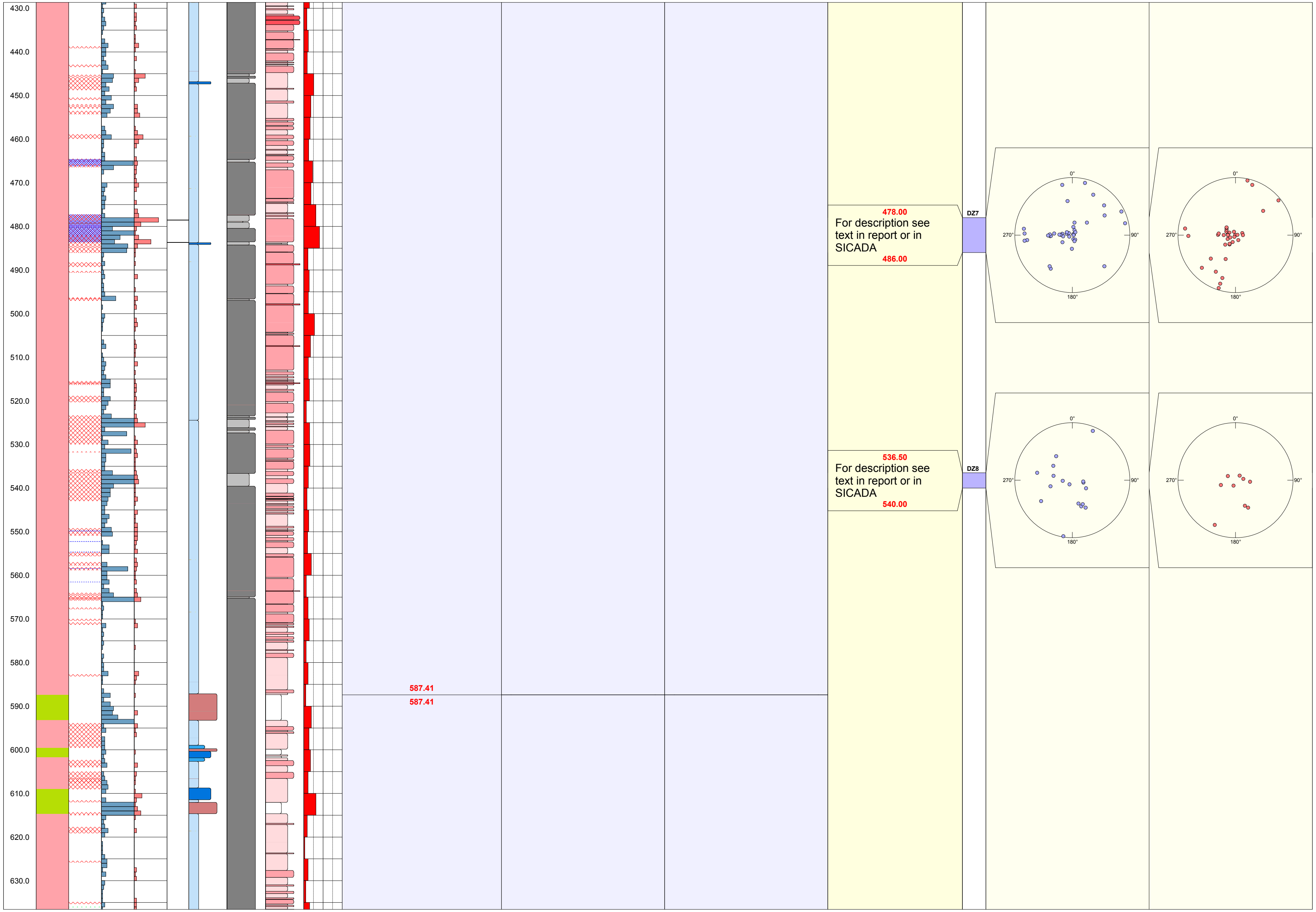
SILICATE DENSITY
- unclassified
- dens<2680
- 2680<dens<2730
- 2730<dens<2800
- 2800<dens<2890
- dens>2890

SUSCEPTIBILITET
- unclassified
- sus<0.001
- 0.001<sus<0.01
- 0.01<sus<0.1

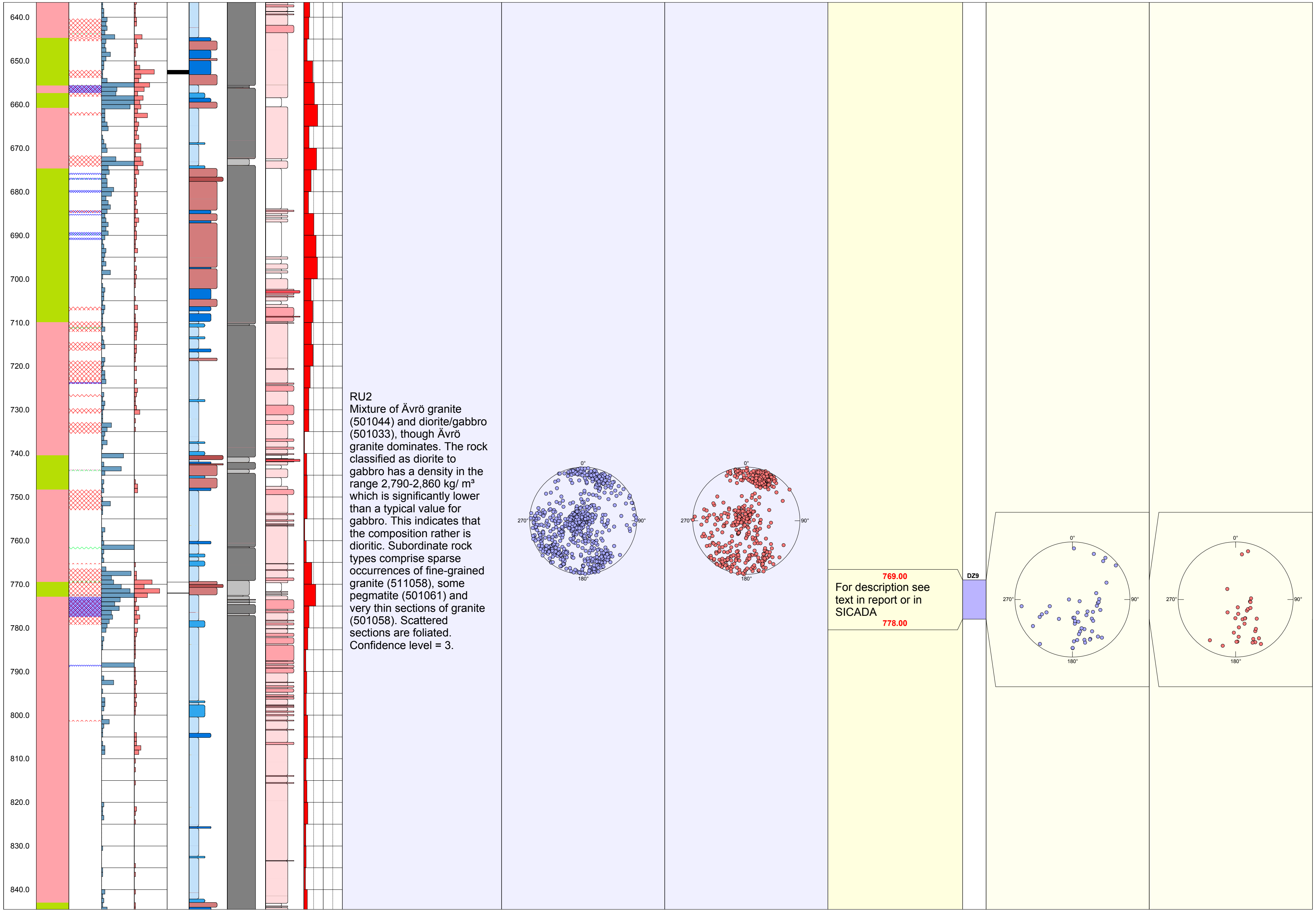
NATURAL GAMMA
- unclassified
- gam<10
- 10<gam<20
- 20<gam<30
- gam>30

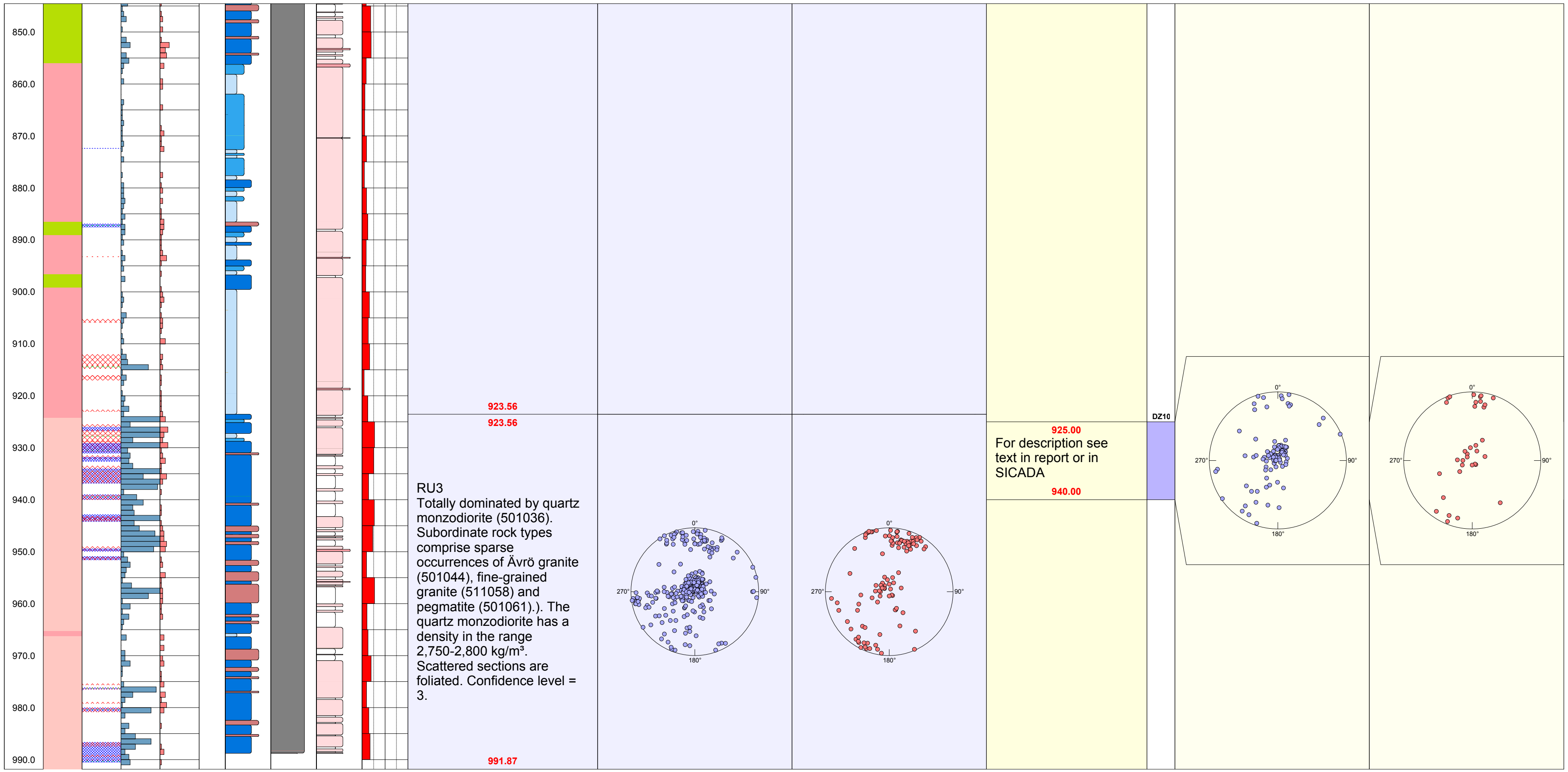



230.0
240.0
250.0
260.0
270.0
280.0
290.0
300.0
310.0
320.0
330.0
340.0
350.0
360.0
370.0
380.0
390.0
400.0
410.0
420.0
RU1
Totally dominated by Ävrö granite (501044). Subordinate rock types comprise sparse occurrences of fine-grained diorite-gabbro (505102), fine-grained granite (511058), fine-grained dioritoid (501030) and a few very thin sections of pegmatite (501061) and granite (501058). In the section c. 100-142 m the Ävrö granite has a density in the range 2,700-2,730 kg/m³, the magnetic susceptibility is c. 0.030-0.040 SI and the natural gamma radiation is generally <20 μR/h. In the remaining part of the rock unit the density is 2,650-2,680 kg/m³, the magnetic susceptibility is c. 0.025 SI and the natural gamma radiation is generally >20 μR/h. Scattered minor sections are foliated. Confidence level = 3.
0°
90°
180°
270°
220.00
DZ4
224.50
For description see text in report or in SICADA
242.00
DZ5
291.00
For description see text in report or in SICADA
302.00
DZ6
396.00
For description see text in report or in SICADA
416.00



430.0
440.0
450.0
460.0
470.0
480.0
490.0
500.0
510.0
520.0
530.0
540.0
550.0
560.0
570.0
580.0
590.0
600.0
610.0
620.0
630.0
587.41
587.41
478.00
For description see text in report or in SICADA
486.00
DZ7
536.50
For description see text in report or in SICADA
540.00
DZ8
0°
90°
180°
270°


640.0
650.0
660.0
670.0
680.0
690.0
700.0
710.0
720.0
730.0
740.0
750.0
760.0
770.0
780.0
790.0
800.0
810.0
820.0
830.0
840.0
RU2
Mixture of Ävrö granite (501044) and diorite/gabbro (501033), though Ävrö granite dominates. The rock classified as diorite to gabbro has a density in the range 2,790-2,860 kg/ m³ which is significantly lower than a typical value for gabbro. This indicates that the composition rather is dioritic. Subordinate rock types comprise sparse occurrences of fine-grained granite (511058), some pegmatite (501061) and very thin sections of granite (501058). Scattered sections are foliated. Confidence level = 3.
0°
90°
180°
270°
769.00
For description see text in report or in SICADA
778.00
DZ9


850.0
860.0
870.0
880.0
890.0
900.0
910.0
920.0
930.0
940.0
950.0
960.0
970.0
980.0
990.0
923.56
923.56
RU3
Totally dominated by quartz monzodiorite (501036). Subordinate rock types comprise sparse occurrences of Ävrö granite (501044), fine-grained granite (511058) and pegmatite (501061).). The quartz monzodiorite has a density in the range 2,750-2,800 kg/m³. Scattered sections are foliated. Confidence level = 3.
991.87
0°
90°
180°
270°
925.00
For description see text in report or in SICADA
940.00
DZ10