Bergvesenet

Postboks 3021, 7002 Trondheim

Rapportarkivet

Bergvesenet rapport nr	Intern Journal nr	Internt arkiv nr	Rapport lokalisering	Gradering
BV 2313				**Fortrolig**
Kommer fra ..arkiv Sulitjelma Bergverk A/S	Ekstern rapport nr "522121002"	Oversendt fra	Fortrolig pga	Fortrolig fra dato:

Tittel

Detailed geological mapping in the Gudrun area east of NySulitjelma. Geologi. Kartlegging.

Forfatter	Dato	Bedrift
HARRISON J D.	1974	Sulitjelma Gruber A/S

Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad

Fagområde	Dokument type	Forekomster
Råstofftype	Emneord	

Sammendrag

Kartlegging i området mellom Gudrun og NySulitjelma. Skildring av petrografi, (Furulundskiferen og Sulitjelma-amfibolitten) strukturer og mineraliseringer. To mineraliseringsnivå er undersøkt. Geologi. Kartlegging.

A/S Sulitjelma Gruber
Prospektering 1974
Prosjekt 7.402/E
Feltrapport

TSH/JDR/KH
4/11-1974

Detailed geological mapping in the Gudrun area to the east of Ny-Sulitjelma (EJ 213).

Contents

Enclosures:

Fig.1	Location Map 1:10.000
Fig.2	Geological Map 1:10.000
Fig.3	Structural Map 1:10.000
Fig.4	Structural Analyses
Fig.5	Key for the sections
Fig.6-9	Sections 1-4
Fig.10	Profile through Ore Breccia
	Air photos 3066 C3/C4 with outcrop overlays

Abstract:

Two levels of mineralisation were mapped near the base of the Sulitjelma Amphibolite in an area of generally regular northerly dip. The mineralisation is not thought to be of economic interest except possibly in the north-east of the area. Further work is recommended.

1. INTRODUCTION

The area is situated to the east of Ny-Sulitjelma on the south and west slopes of Gudrun. The area is covered by map-sheet EJ 213 and lies between northings 1017600 and 1019200, and between eastings 29500 and 32000.

Outcrop mapping of the area was carried out between 25th July and 8th August 1974 by C.Gallay (C.H.) and J.Harrison (G.B.).

Aerial photographs were available for most of the area and localities were initially recorded on these. Where photographs were not available localities were recorded on a 1:10.000 topographical map. All localities were later redrawn on a 1:10.000 map. The Geomap system was used for recording information from each locality. Locality numbers used were 700 to 790 and 800 to 917 (fig.1).

At the time the mapping was carried out considerable quantities of snow remained in the hollows.

The work was concentrated along two main horizons, which showed noticeably higher oxidation values than elsewhere.

For convenience the area is sub-divided into a northern and southern part, corresponding to the two horizons studied in detail (see fig.2).

Four profiles (three in detail across the northern area and one more general) were taken across the area. These are shown in the enclosures.

2. TOPOGRAPHY

The area lies in the altitude interval 650 m to 1020 m a.m.s.l. The ground falls steeply to the west and also to the south, where the Furulund schist outcrops in a cliff. The cover is thin and vegetation sparse, especially on the plateau in the north-east of the area. The softer rocks form stream-beds with quarternary deposits and are also favourable sites for the formation of thick snow patches, which hinders detailed mapping. The outcrop,then, is generally good and access problems were only encountered on the steep cliff of Furulund schist.

3. PETROGRAPHY

Two major units outcrop in the area: The Furulund Schist and The Sulitjelma Amphibolite (fig.2).

3.1 The Furulund Schist

The Furulund Schist consists of fine-grained micaceous schists with quartz, felspar and amphibole. Megacrysts of red garnet are common, and frequent layers of quartz boudins may be seen. Banding is distinct. Small pre-schistosity folds are seen. The schistosity is well developed everywhere.

The Furulund schists are visible in the south-east of the area, where they are intercalated with amphibolite. Topographically this softer material forms a valley, still containing considerable amounts of snow when the mapping was done in late July/early August. Outcrops of schist are found on each side of the valley and often show garnet megacrysts up to 5 mm diameter. In contrast, the outcrop of the schist in the extreme south of the area studied (section 2), forms a steep cliff of very good exposure.

3.2 The Sulitjelma Amphibolite

In the northern part the amphibolite consists mostly of a fine-g ained amphibolite, but coarse-grained zones, which appear to have a lenticular morphology, occur throughout the area. These coarse-grained bodies often display amphibole needles up to 2 cm long. The amphibolite is variable in character and may be massive, layered, schistose or brecciated. Megacrysts of felspar, amphibole and pyrite are present in places. The principal mineralogy is amphibole, felspar and quartz, sometimes with mica or chlorite. Quartz is present in boudins and veins.

In the southern part the amphibolite, usually fine-grained (but sometimes coarse), contains amphibole quartz and felspar with varying mica and chlorite. A very felspathic rock containing mostly felspar but also mica, quartz and chlorite is occasionally observed (e.g. localities 703 and 712). Quartz boudins are frequent. Careous weathering in places suggests the presence of significant carbonate.

In some localities (e.g. 710, 720, 766, 769) megacrysts of garnet are arranged in layers in the amphibolite. Small cubes of pyrite are sometimes observed (e.g. 723, 724, 739).

Thin brecciated bands with associated mineralisation occur within the amphibolite. These have been called "chlorite breccia" and are often very rich in chlorite in the matrix. The chlorite is very dark green and occurs in large "books". These breccia bands are frequently strongly oxidized and deeply weathered out.

In the north-east of the area a rock we have called "brecciated amphibolite" occurs (e.g. 850, 852, 860, 863). It consists of blocks of fine-grained amphibolite (up to 15 cm long and typically lens-shaped) set in a fine-grained matrix which is strongly weathered to a light brown colour. The lenses are orientated parallel to the structure. The matrix contains considerable quartz. The amphibolite (amphibole, felspar and quartz) shows no rusty weathering, but often contains small pyrite crystals (< 1%).

A brief reconnaissance to the east of the area (towards Otervann) shows this brecciated amphibolite to form bands up to 5 m thick, and the type appears to form the continuation of the mineralized chlorite breccia in the northern area.

4. STRUCTURE

The direction of dip remains constant over the whole area, banding and schistosity having been used to measure orientation. The structure dips to the north. In the northern part this dip ranges from 19° to 57° with an average of 37°. In the southern part dips vary from 12° to 88° with an average of 35°.

Strikes vary from 250^G to 334^G, and average 290^G in the northern part, while in the southern part they vary from 285^G to 364^G, with an average of 325^G.

Thus the dips and strikes suggest that the structure is very regular and contains no major discontinuities.

Orientations of fold axis were measured, exclusively in the Furulund Schist. Axial directions varied from 342^G to 392^G with an average of 360^G. Plunge varied from 8° to 32° with an average of 20°.

Note that strikes were measured on a 400^G scale and dips on a 360° scale. Structural observations are shown on fig.3 and analyses on fig.4.

5. MINERALISATION

In the southern area, which forms the continuation of the Ny-Sulitjelma ore horizon, there is little evidence of mineralisation. Localities 762, 764, 777, 778, 781, and 782 show oxidation to a considerable degree and are deeply weathered. All these localities are within the amphibolite unit, close to the contact with the Furulund schist. No pyrite or other sulphide was observed in these outcrops. Small quantities of pyrite megacrysts are present in places in the amphibolite on the south side of the valley.

No mineralisation was observed in the Furulund schists, although it must be repeated that some areas were snow-covered.

In the northern area there are two levels which show mineralisation, more strongly in the northern part of the two. Pyrite megacrysts occur in the amphibolite, especially just above the mineralised breccia horizons where crystals up to 1 cm occur. Elsewhere small pyrite cubes are common. The breccias themselves are strongly weathered and the finer-grained levels have a yellowish green weathering colour.

In the west two distinct horizons are seen, but towards the east the mineralisation becomes weaker and only one horizon is seen. It is not clear whether the lower horizon disappears or whether the two run together. As noted previously the continuation of the breccias to the east are in the form of brecciated amphibolite with no evidence of sulphide mineralisation. A detailed profile of the main mineralised horizon is given in the enclosures. This profile was taken at the point of maximum exposure of this horizon, and where it appears to be richest.

6. THE GEOMAP SYSTEM

The Geomap system was used to record information at all localities except in Section 2, (encl.2), which was a reconnaissance profile. The authors consider that the system has certain advantages in its standardisation procedures, but that the limitations of the range of observations and the necessity of using integral choices in describing geological features, are a danger to accurate and comprehensive observation, and that these limitations must not be allowed to hinder the field geologist's powers of observation and interpretation. It would be of no advantage to turn the field geologist into a computer programmer. By way of improvements, if the system is to be further used for mapping on this scale in the same formations, a revision of the program to adapt it to local conditions would be of great value, both in helping the field geologist and in improving the potential for later interpretation. For example it is difficult to map variations within an amphibolite when the program offers only one symbol for all amphibolites.

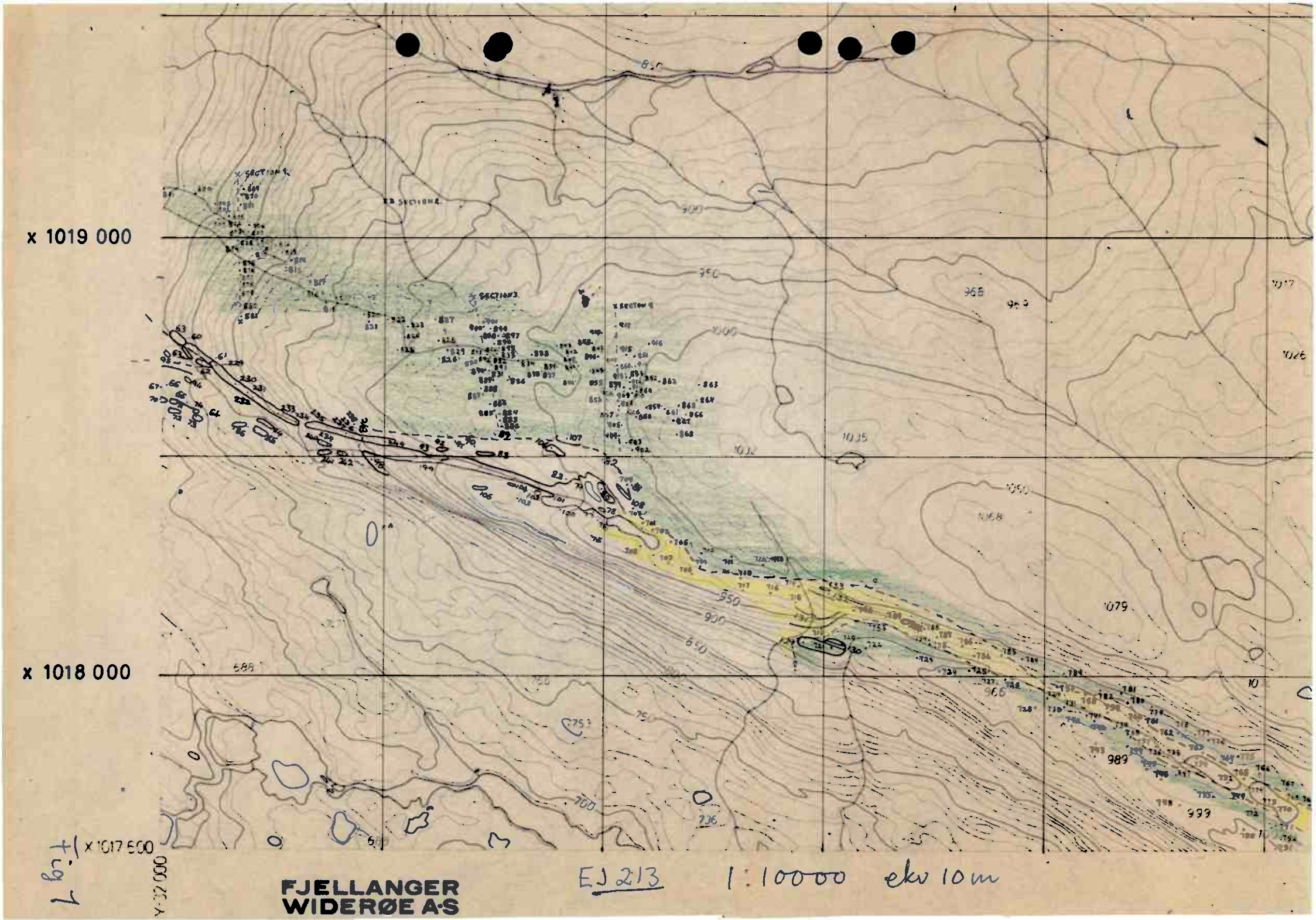
7. EXPLORATION

The mineralisation appears to die out to the east, and the only area of possible economic interest is in the north-west. A geochemical sampling program is, however, recommended for the whole area. The following three projects are also recommended:

1. A brief reconnaissance (perhaps for 2-3 days) of the area to the east as far as Otervann and the cliffs beyond. This would establish whether the mineralisation reappears or not. The river from Otervann to Lomi would present a good section for reconnaissance.

2. Detailed work in the southern area in the valley between localities 720 and 770 during September when the snow has melted. Again this would take about 2 days and would confirm or otherwise the lack of mineralisation in this valley.

3. The richest horizon in the north-west dips under drift where it passes into the valley of Gikenelv. Therefore a geophysical survey and possibly a shallow drilling program is recommended in this area.



FJELLANGER WIDERØE A·S

EJ 213 1:10000 ekv 10 m

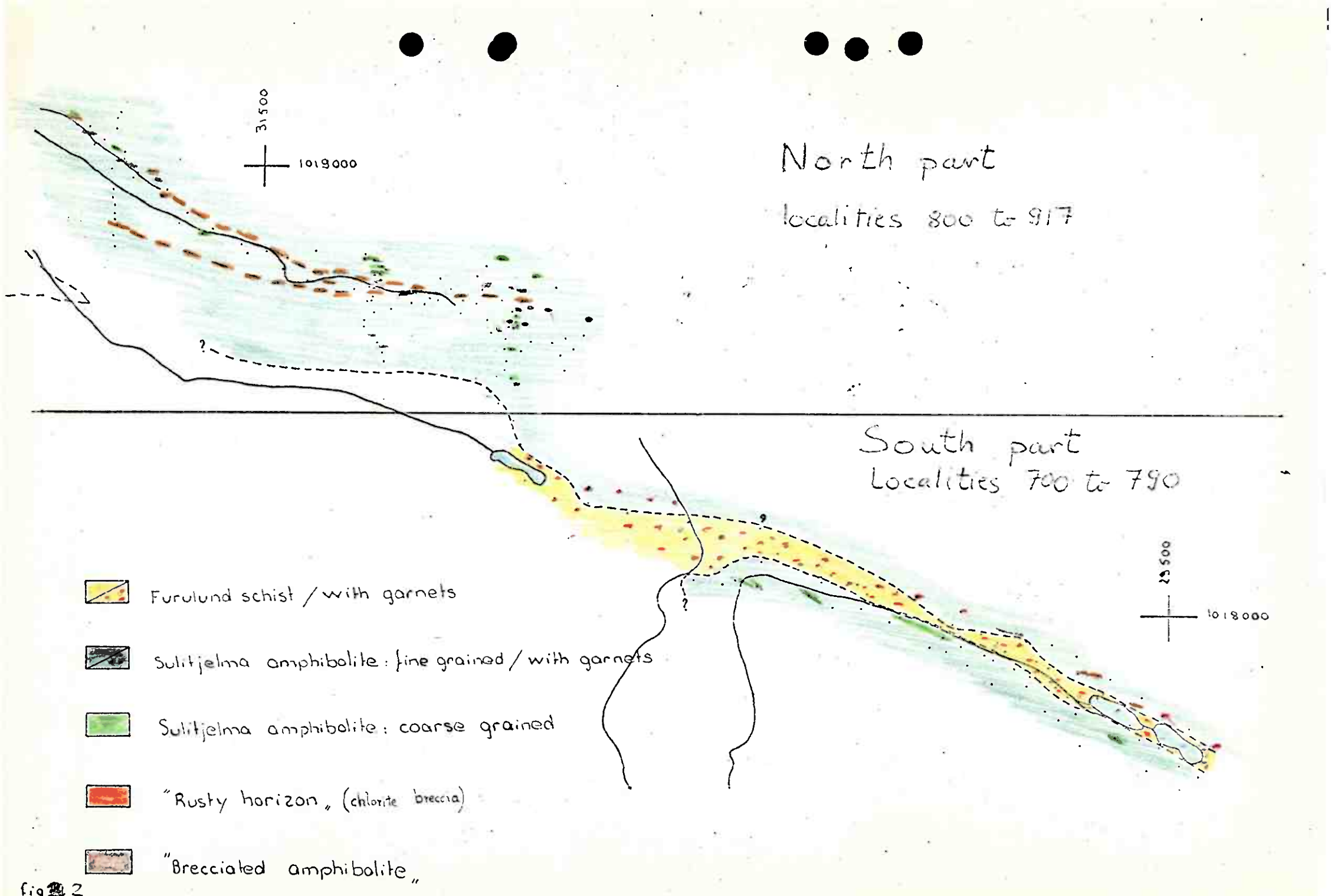


fig 2

1:10000

E3 213

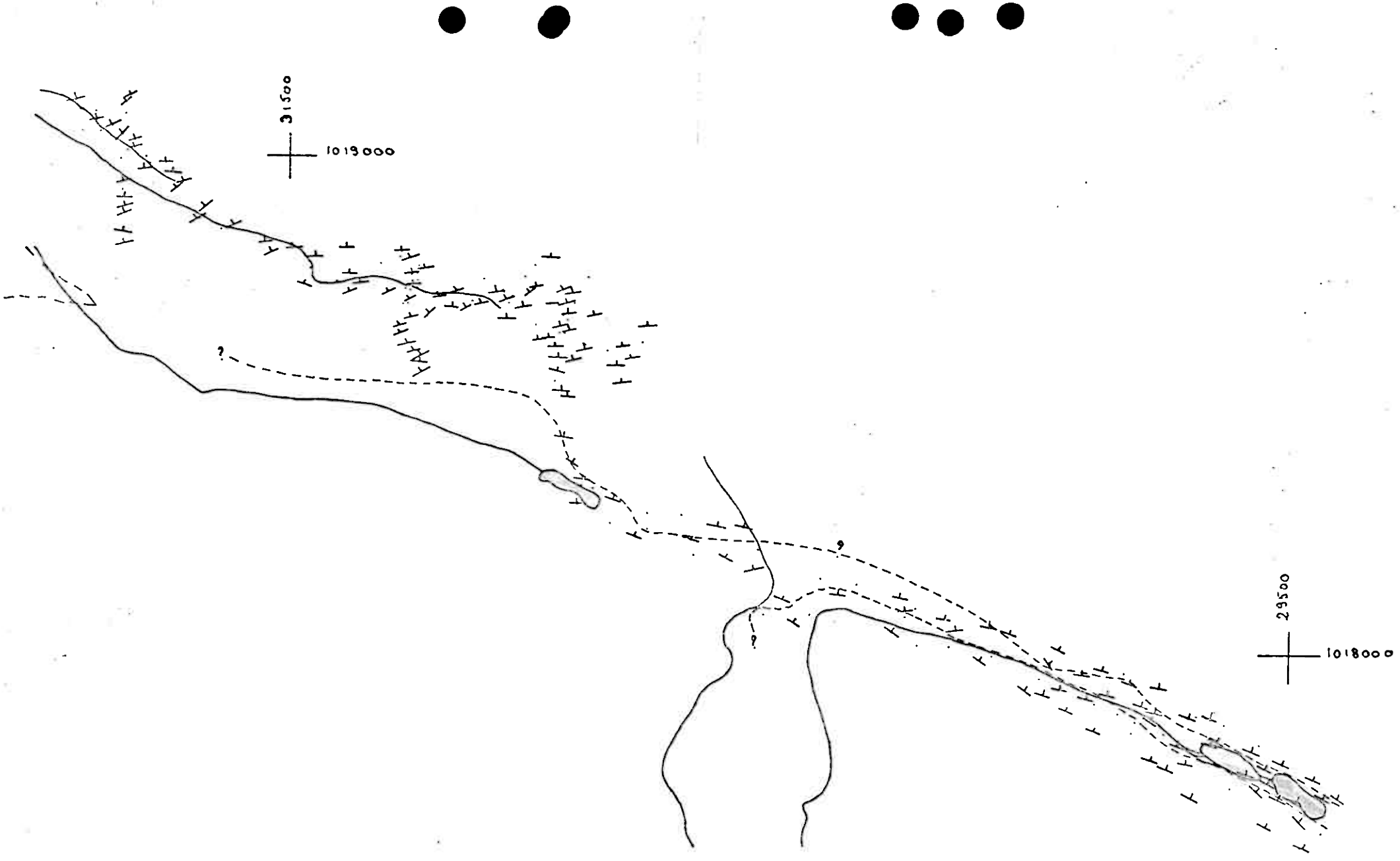


fig 3

1:10000 EJ 213

Dips

N - North part of the area
S - South part of the area.

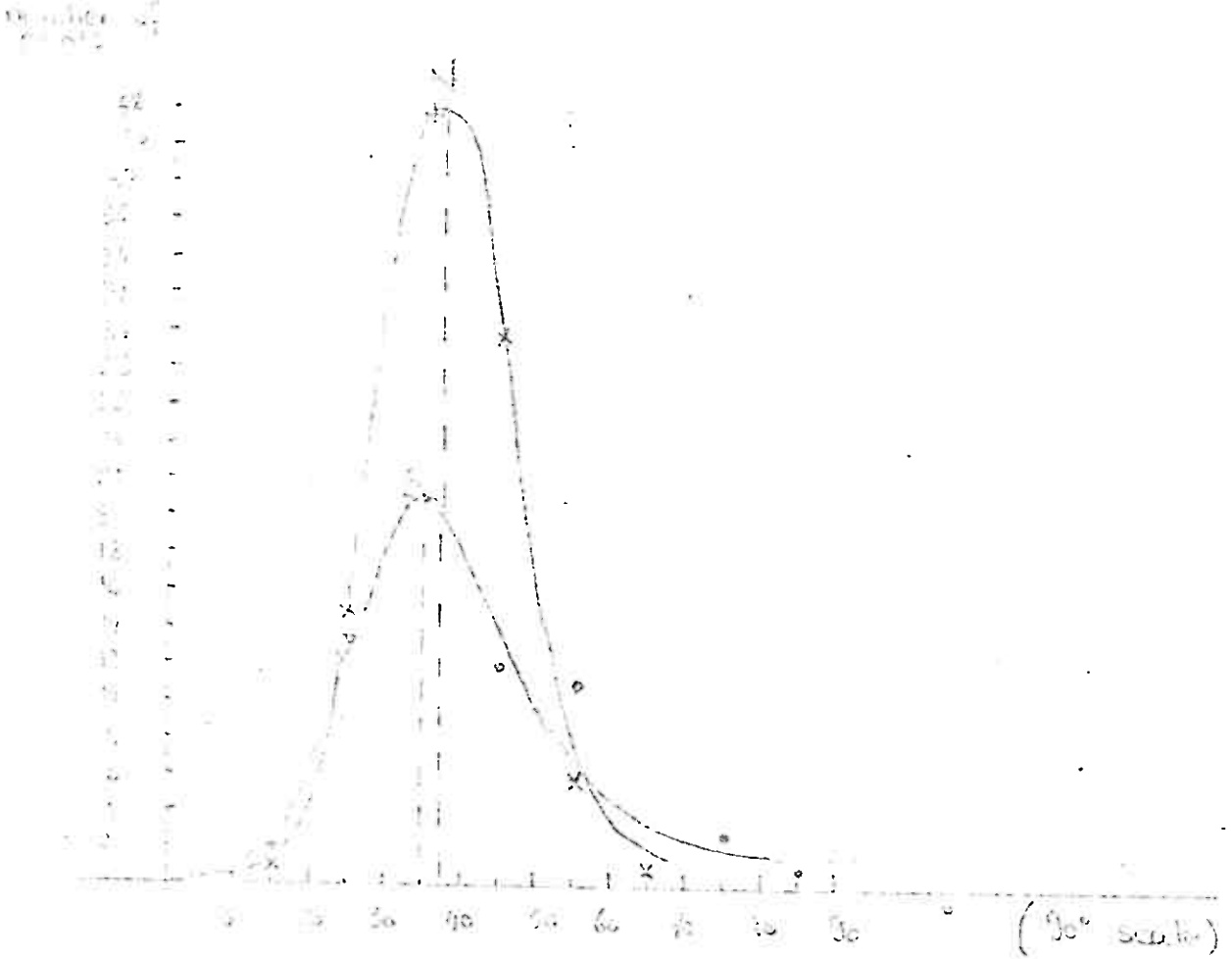


Fig 8A

Strikes

N = north pole of [illegible]

S = South pole of [illegible]

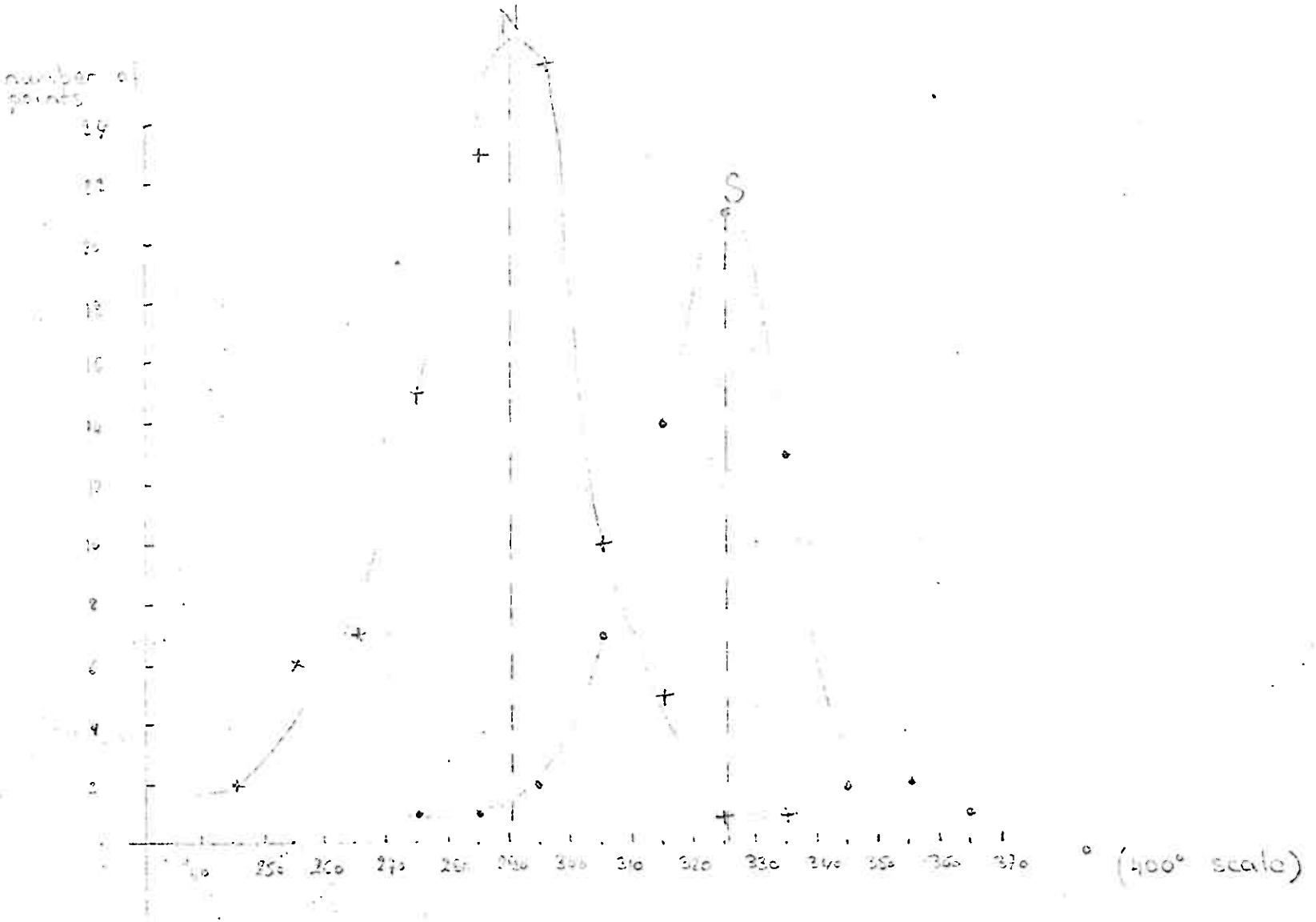


Fig 4B

KEY FOR PROFILES

Colours are 'Derwent' series (Cumberland Pencil Co.) Numbers are indicated in the boxes

AMPHIBOLITE

45	Massive amphibolite
51	Layered amphibolite
46	Schistose amphibolite
2	Amphibolite breccia - sulphide poor
15	Amphibolite breccia - sulphide rich

SCHIST

25	Amphibolitic schist
33	Mica schist

QUARTZITE

6	Quartzite

MEGACRYSTS

—	Amphibole
▱	Feldspar
▩	Pyrite 1 – 5 %
□	Pyrite < 1 %

OTHER PHASES

BI	Biotite
GL	Mica
KK	Chalcopyrite
KL	Chlorite

Fig 5.

Fig. 6.

SECTION 1

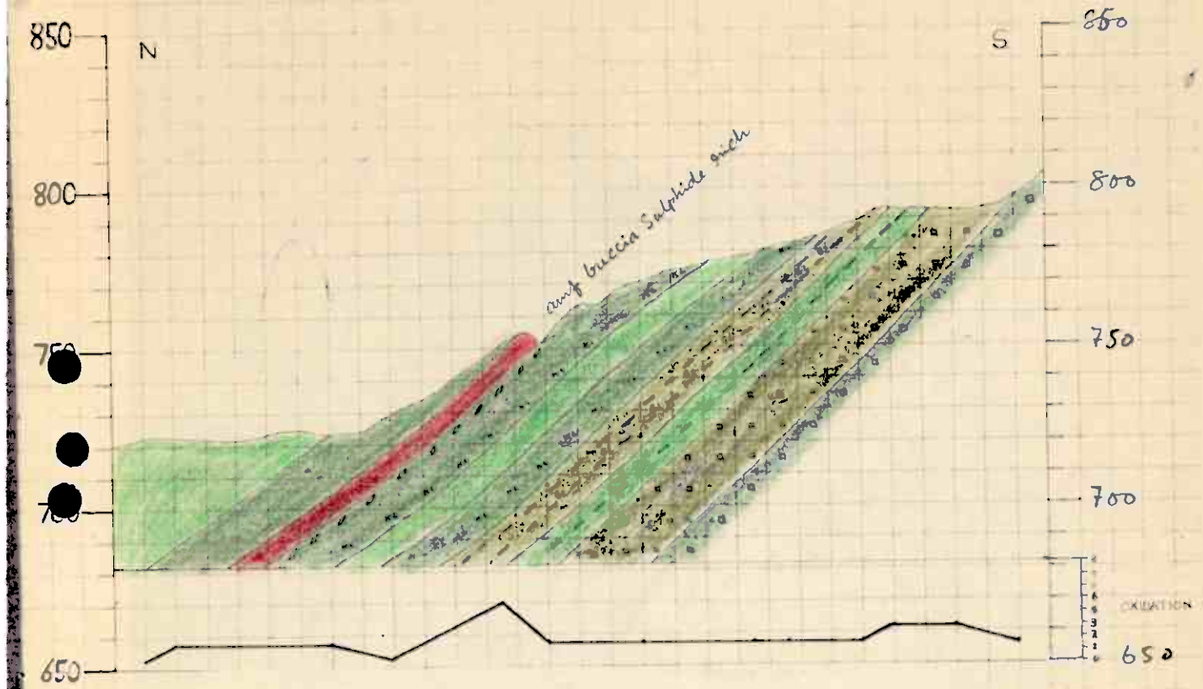


Fig7

SECTION 2

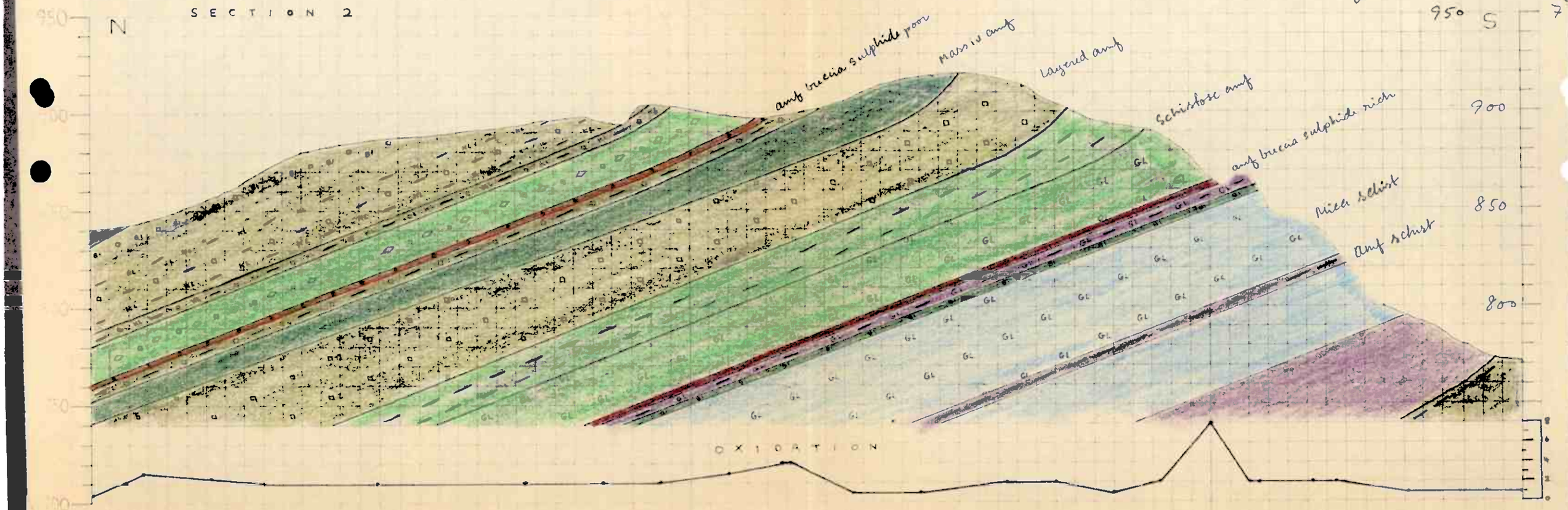


Fig. 8

SECTION 3.

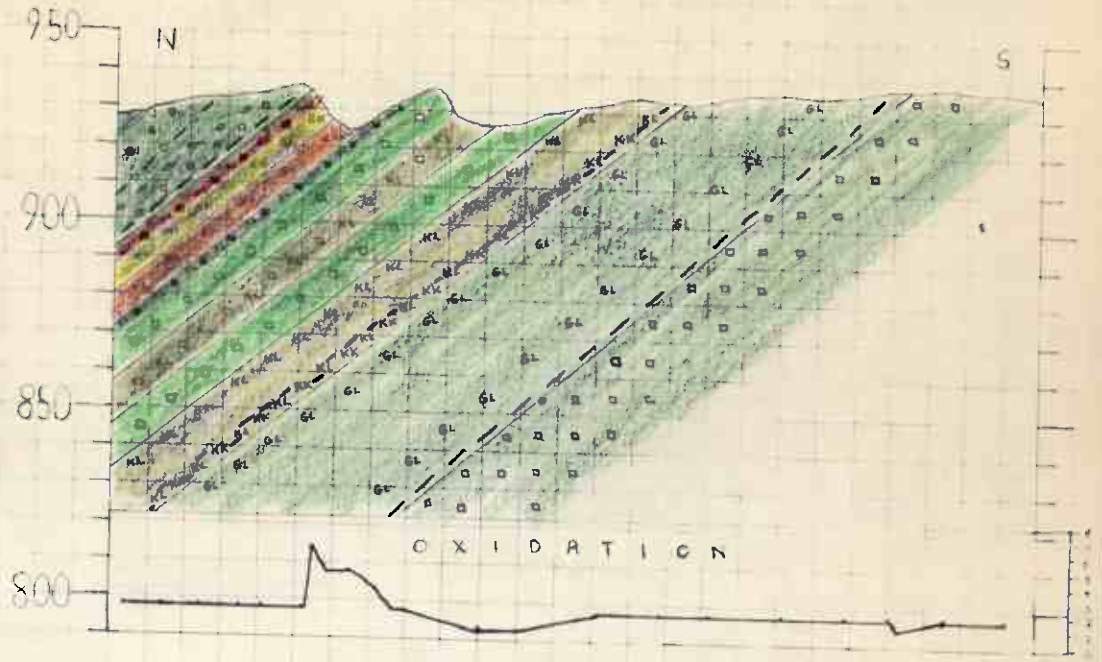
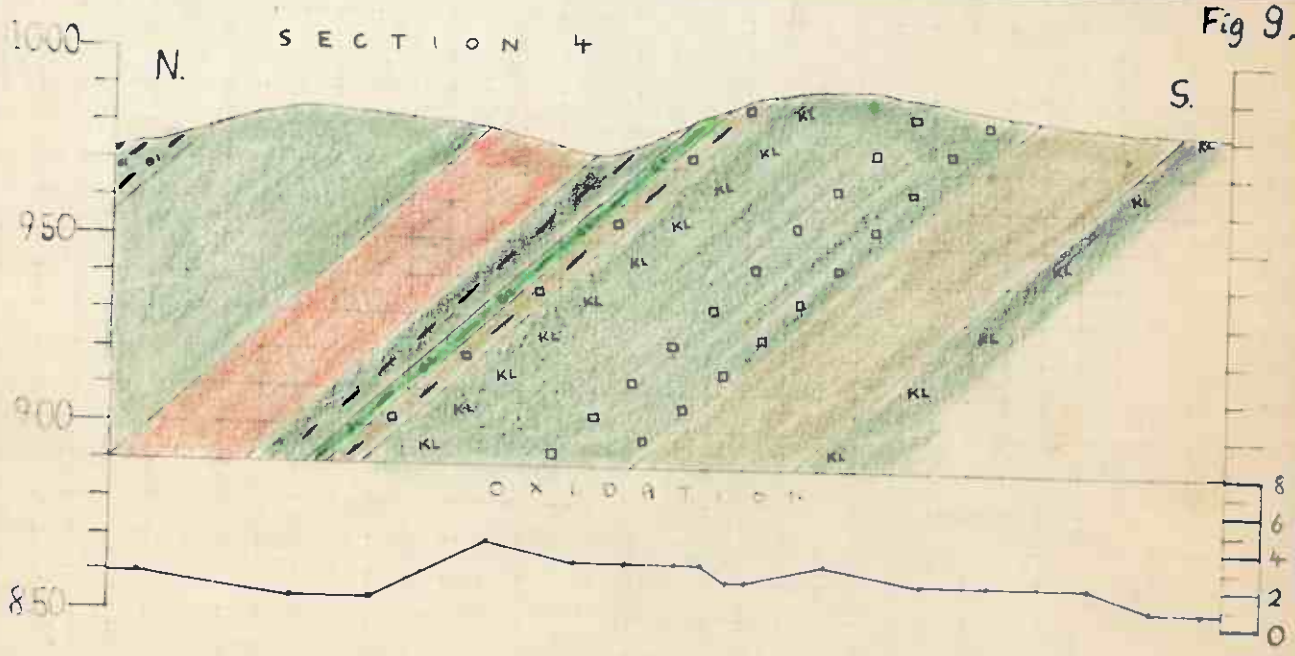


Fig 9.

SECTION 4



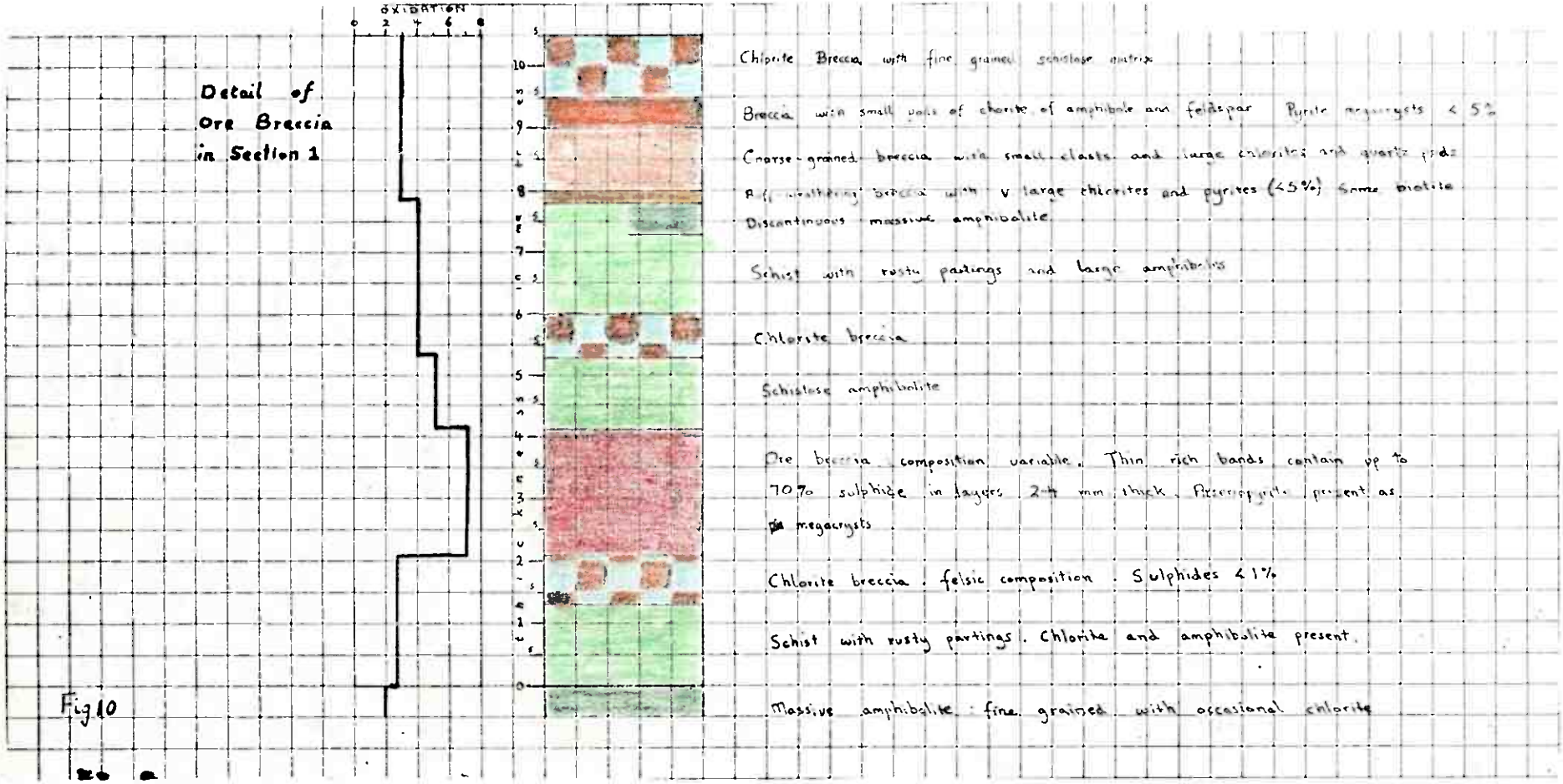

OXIDATION
0 2 4 6 8
Detail of Ore Breccia in Section 1
Chlorite Breccia with fine grained schistose matrix
Breccia with small pods of chorite of amphibole and feldspar Pyrite megacrysts < 5%
Coarse-grained breccia with small clasts and large chlorites and quartz grains
Highly weathering breccia with v large chlorites and pyrites (<5%) Some biotite
Discontinuous massive amphibolite
Schist with rusty partings and large amphiboles
Chlorite breccia
Schistose amphibolite
Ore breccia composition variable. Thin rich bands contain up to 70% sulphide in layers 2-4 mm thick. Arsenopyrite present as megacrysts
Chlorite breccia. felsic composition. Sulphides 4 1%
Schist with rusty partings. Chlorite and amphibolite present.
Massive amphibolite. fine grained with occasional chlorite

Fig 10

Fig. 10.

~~022 035~~
012 023

A/S Sulitjelma Gruber
Prospektering 1974
Prosjekt 7.402/E
Feltrapport

TSH/JDH/KH
4/11-1974

Detailed geological mapping in the Gudrun area to the east of Ny-Sulitjelma (EJ 213).

Contents

Enclosures:

Fig.1	Location Map 1:10.000
Fig.2	Geological Map 1:10.000
Fig.3	Structural Map 1:10.000
Fig.4	Structural Analyses
Fig.5	Key for the sections
Fig.6-9	Sections 1-4
Fig.10	Profile through Ore Breccia
	Air photos 3066 C3/C4 with outcrop overlays

Abstract:

Two levels of mineralisation were mapped near the base of the Sulitjelma Amphibolite in an area of generally regular northerly dip. The mineralisation is not thought to be of economic interest except possibly in the north-east of the area. Further work is recommended.

1. INTRODUCTION

The area is situated to the east of Ny-Sulitjelma on the south and west slopes of Gudrun. The area is covered by map-sheet BJ 213 and lies between northings 1017600 and 1019200, and between eastings 29500 and 32000.

Outcrop mapping of the area was carried out between 25th July and 8th August 1974 by C.Gallay (C.H.) and J.Harrison (G.B.).

Aerial photographs were available for most of the area and localities were initially recorded on these. Where photographs were not available localities were recorded on a 1:10.000 topographical map. All localities were later redrawn on a 1:10.000 map. The Geomap system was used for recording information from each locality. Locality numbers used were 700 to 790 and 800 to 917 (fig.1).

At the time the mapping was carried out considerable quantities of snow remained in the hollows.

The work was concentrated along two main horizons, which showed noticeably higher oxidation values than elsewhere.

For convenience the area is sub-divided into a northern and southern part, corresponding to the two horizons studied in detail (see fig.2).

Four profiles (three in detail across the northern area and one more general) were taken across the area. These are shown in the enclosures.

2. TOPOGRAPHY

The area lies in the altitude interval 650 m to 1020 m a.m.s.l. The ground falls steeply to the west and also to the south, where the Furulund schist outcrops in a cliff. The cover is thin and vegetation sparse, especially on the plateau in the north-east of the area. The softer rocks form stream-beds with quarternary deposits and are also favourable sites for the formation of thick snow patches, which hinders detailed mapping. The outcrop, then, is generally good and access problems were only encountered on the steep cliff of Furulund schist.

3. PETROGRAPHY

Two major units outcrop in the area: The Furulund Schist and The Sulitjelma Amphibolite (fig.2).

3.1 The Furulund Schist

The Furulund Schist consists of fine-grained micaceous schists with quartz, felspar and amphibole. Megacrysts of red garnet are common, and frequent layers of quartz boudins may be seen. Banding is distinct. Small pre-schistosity folds are seen. The schistosity is well developed everywhere.

The Furulund schists are visible in the south-east of the area, where they are intercalated with amphibolite. Topographically this softer material forms a valley, still containing considerable amounts of snow when the mapping was done in late July/early August. Outcrops of schist are found on each side of the valley and often show garnet megacrysts up to 5 mm diameter. In contrast, the outcrop of the schist in the extreme south of the area studied (section 2), forms a steep cliff of very good exposure.

3.2 The Sulitjelma Amphibolite

In the northern part the amphibolite consists mostly of a fine-g ained amphibolite, but coarse-grained zones, which appear to have a lenticular morphology, occur throughout the area. These coarse-grained bodies often display amphibole needles up to 2 cm long. The amphibolite is variable in character and may be massive, layered, schistose or brecciated. Megacrysts of felspar, amphibole and pyrite are present in places. The principal mineralogy is amphibole, felspar and quartz, sometimes with mica or chlorite. Quartz is present in boudins and veins.

In the southern part the amphibolite, usually fine-grained (but sometimes coarse), contains amphibole quartz and felspar with varying mica and chlorite. A very felspathic rock containing mostly felspar but also mica, quartz and chlorite is occasionally observed (e.g. localities 703 and 712). Quartz boudins are frequent. Careous weathering in places suggests the presence of significant carbonate.

In some localities (e.g. 710, 720, 766, 769) megacrysts of garnet are arranged in layers in the amphibolite. Small cubes of pyrite are sometimes observed (e.g. 723, 724, 739).

Thin brecciated bands with associated mineralisation occur within the amphibolite. These have been called "chlorite breccia" and are often very rich in chlorite in the matrix. The chlorite is very dark green and occurs in large "books". These breccia bands are frequently strongly oxidized and deeply weathered out.

In the north-east of the area a rock we have called "brecciated amphibolite" occurs (e.g. 850, 852, 860, 863). It consists of blocks of fine-grained amphibolite (up to 15 cm long and typically lens-shaped) set in a fine-grained matrix which is strongly weathered to a light brown colour. The lenses are orientated parallel to the structure. The matrix contains considerable quartz. The amphibolite (amphibole, felspar and quartz) shows no rusty weathering, but often contains small pyrite crystals (< 1%).

A brief reconnaissance to the east of the area (towards Otervann) shows this brecciated amphibolite to form bands up to 5 m thick, and the type appears to form the continuation of the mineralized chlorite breccia in the northern area.

4. STRUCTURE

The direction of dip remains constant over the whole area, banding and schistosity having been used to measure orientation. The structure dips to the north. In the northern part this dip ranges from 19° to 57° with an average of 37°. In the southern part dips vary from 12° to 88° with an average of 35°.

Strikes vary from 250^{G} to 334^{G}, and average 290^{G} in the northern part, while in the southern part they vary from 285^{G} to 364^{G}, with an average of 325^{G}.

Thus the dips and strikes suggest that the structure is very regular and contains no major discontinuities.

Orientations of fold axis were measured, exclusively in the Furulund Schist. Axial directions varied from 342^{G} to 392^{G} with an average of 360^{G}. Plunge varied from 8° to 32° with an average of 20°.

Note that strikes were measured on a 400^{G} scale and dips on a 360° scale. Structural observations are shown on fig.3 and analyses on fig.4.

5. MINERALISATION

In the southern area, which forms the continuation of the Ny-Sulitjelma ore horizon, there is little evidence of mineralisation. Localities 762, 764, 777, 778, 781, and 782 show oxidation to a considerable degree and are deeply weathered. All these localities are within the amphibolite unit, close to the contact with the Furulund schist. No pyrite or other sulphide was observed in these outcrops. Small quantities of pyrite megacrysts are present in places in the amphibolite on the south side of the valley.

No mineralisation was observed in the Furulund schists, although it must be repeated that some areas were snow-covered.

In the northern area there are two levels which show mineralisation, more strongly in the northern part of the two. Pyrite megacrysts occur in the amphibolite, especially just above the mineralised breccia horizons where crystals up to 1 cm occur. Elsewhere small pyrite cubes are common. The breccias themselves are strongly weathered and the finer-grained levels have a yellowish green weathering colour.

In the west two distinct horizons are seen, but towards the east the mineralisation becomes weaker and only one horizon is seen. It is not clear whether the lower horizon disappears or whether the two run together. As noted previously the continuation of the breccias to the east are in the form of brecciated amphibolite with no evidence of sulphide mineralisation. A detailed profile of the main mineralised horizon is given in the enclosures. This profile was taken at the point of maximum exposure of this horizon, and where it appears to be richest.

6. THE GEOMAP SYSTEM

The Geomap system was used to record information at all localities except in Section 2, (encl.2), which was a reconnaissance profile. The authors consider that the system has certain advantages in its standardisation procedures, but that the limitations of the range of observations and the necessity of using integral choices in describing geological features, are a danger to accurate and comprehensive observation, and that these limitations must not be allowed to hinder the field geologist's powers of observation and interpretation. It would be of no advantage to turn the field geologist into a computer programmer. By way of improvements, if the system is to be further used for mapping on this scale in the same formations, a revision of the program to adapt it to local conditions would be of great value, both in helping the field geologist and in improving the potential for later interpretation. For example it is difficult to map variations within an amphibolite when the program offers only one symbol for all amphibolites.

7. EXPLORATION

The mineralisation appears to die out to the east, and the only area of possible economic interest is in the north-west. A geochemical sampling program is, however, recommended for the whole area. The following three projects are also recommended:

1. A brief reconnaissance (perhaps for 2-3 days) of the area to the east as far as Otervann and the cliffs beyond. This would establish whether the mineralisation reappears or not. The river from Otervann to Lomi would present a good section for reconnaissance.

2. Detailed work in the southern area in the valley between localities 720 and 770 during September when the snow has melted. Again this would take about 2 days and would confirm or otherwise the lack of mineralisation in this valley.

3. The richest horizon in the north-west dips under drift where it passes into the valley of Gikenelv. Therefore a geophysical survey and possibly a shallow drilling program is recommended in this area.

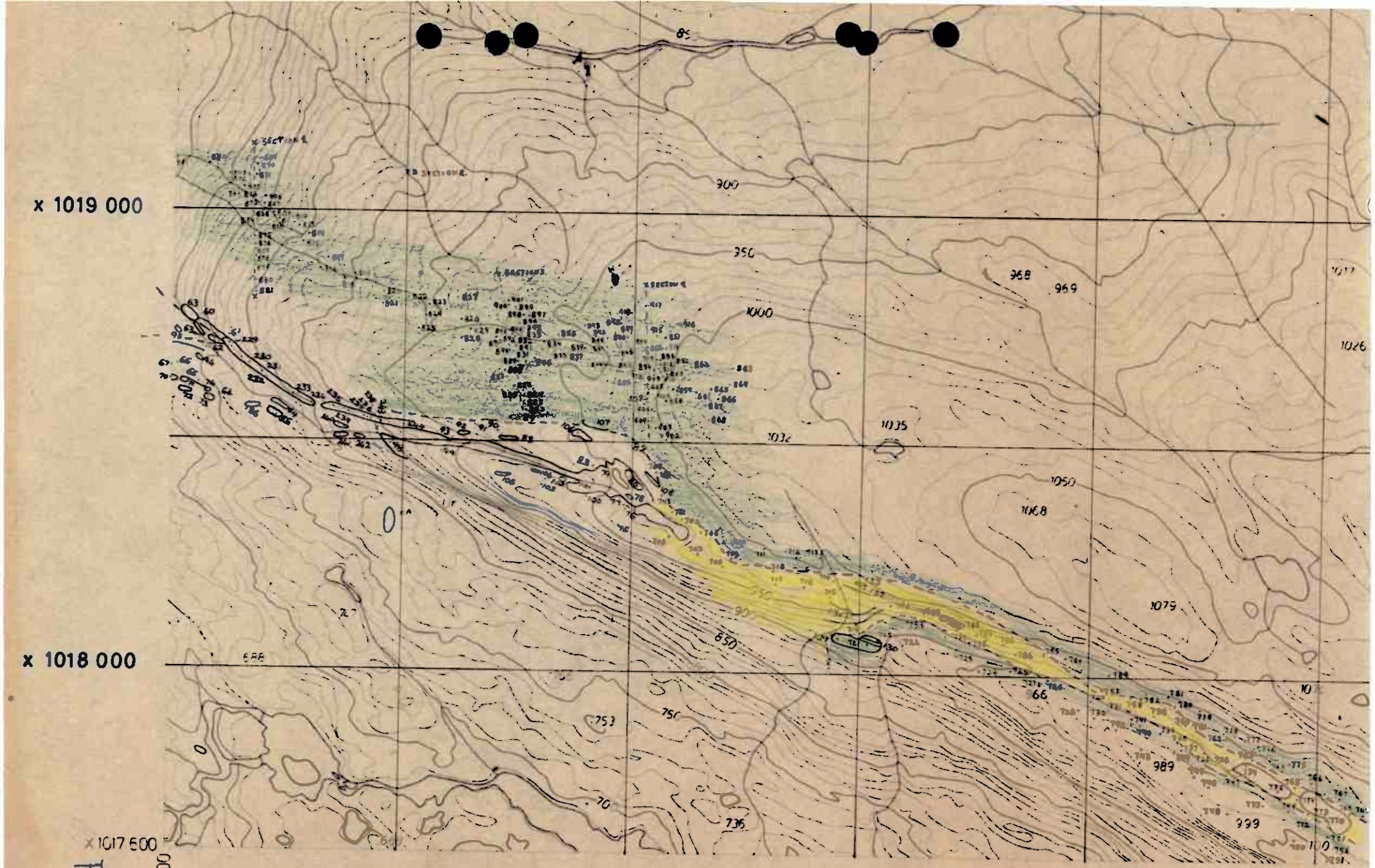


Fig 1

FJELLANGER WIDERØE A·S
INGENIØR- OG ARKITEKTFIRMA

EJ 213 1:10000 ekv 10m

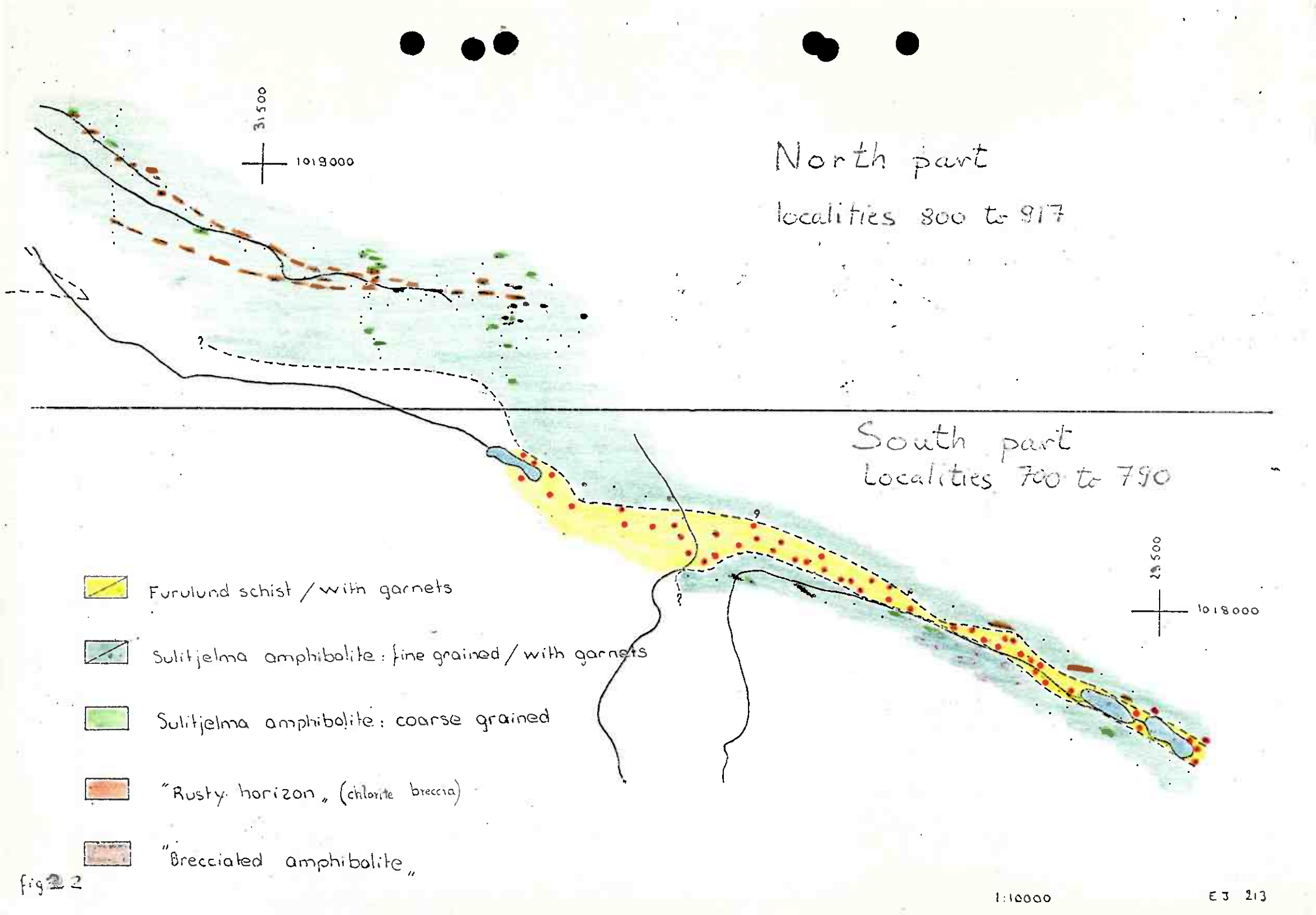


fig 2

1:10000

E 3 213

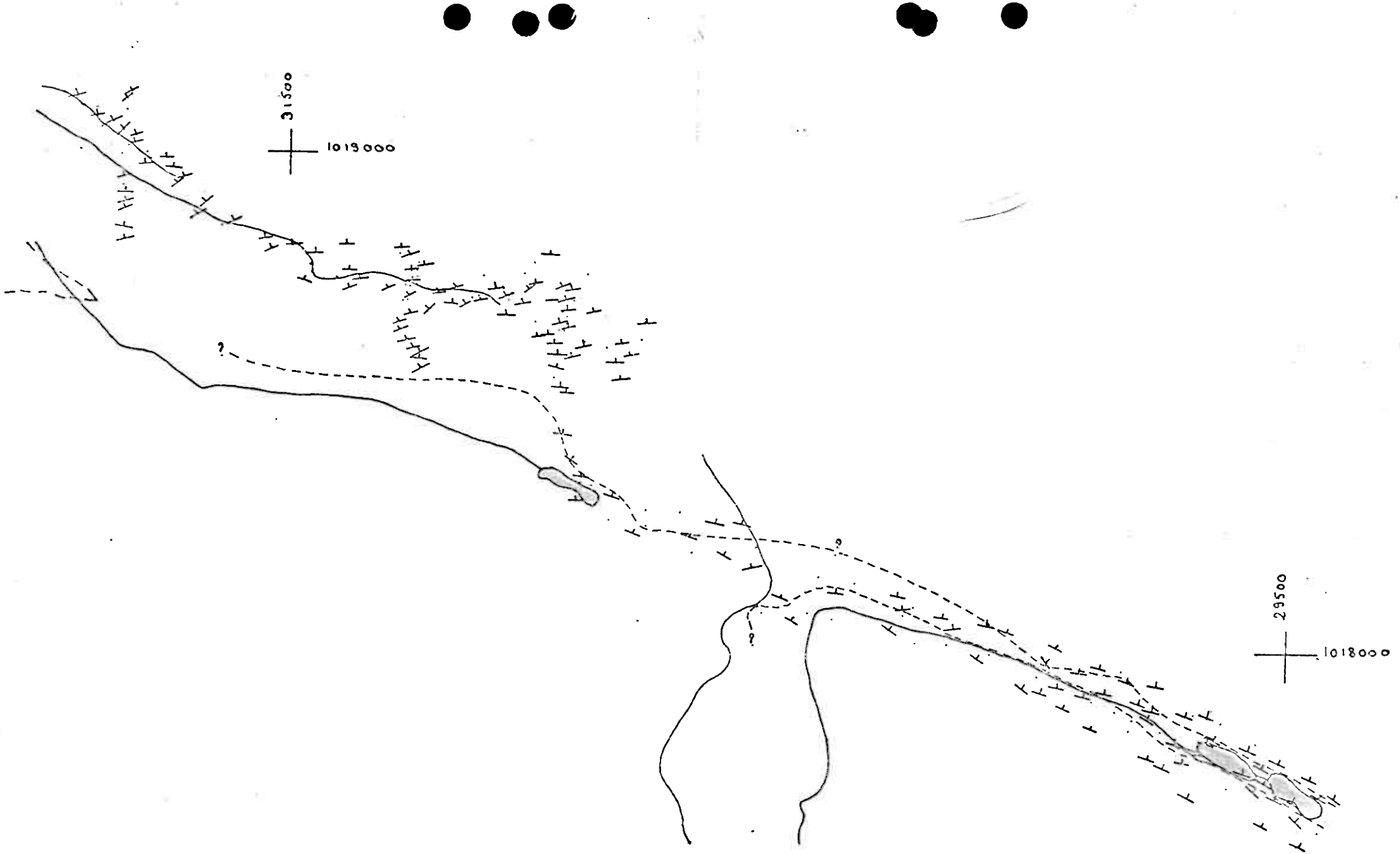


Fig 3

1:10000 EJ 213

Dip°

N - North part of the arm.
S - South part of the arm.

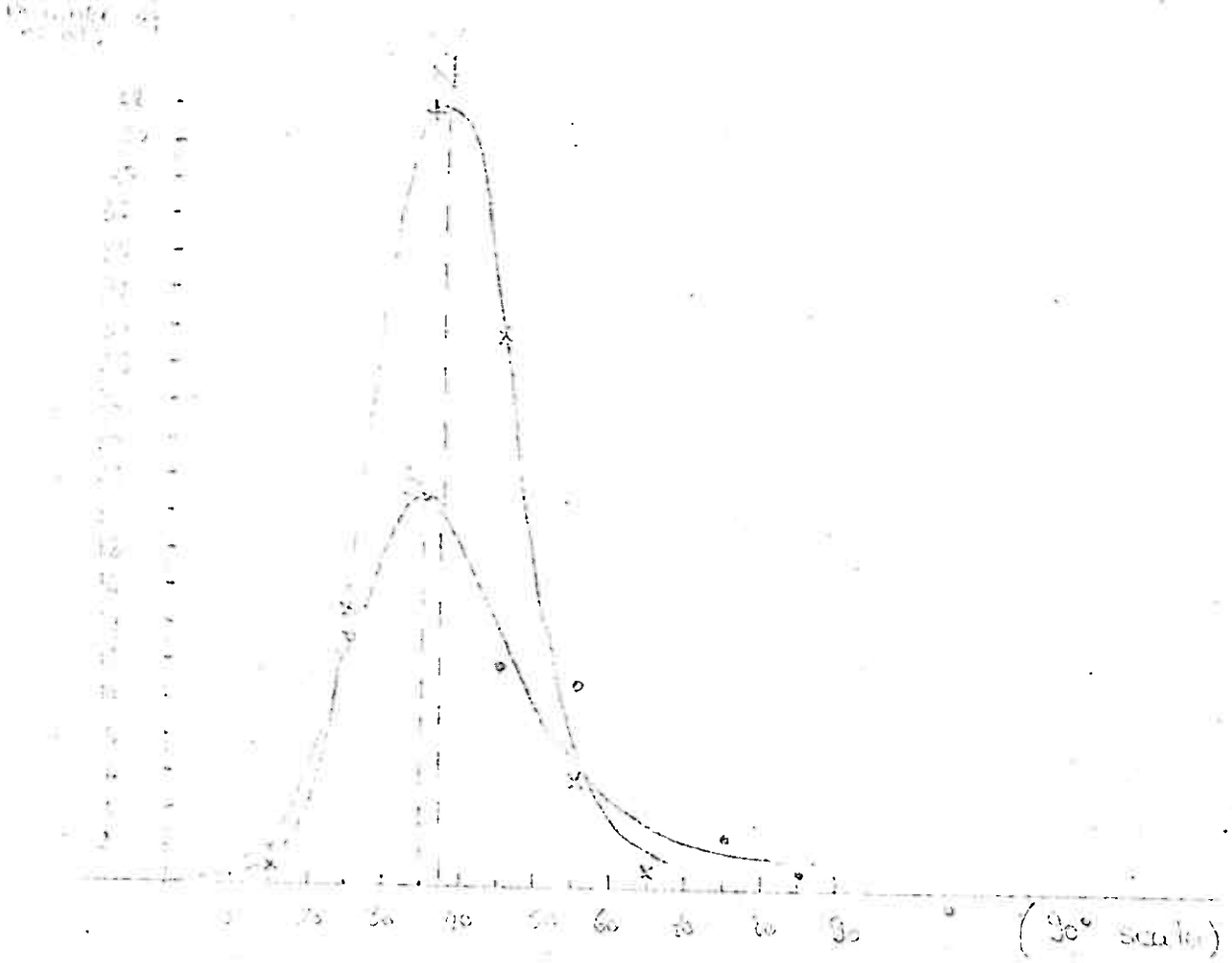


Fig 4A

Strikes

N = north pro

S = South pro

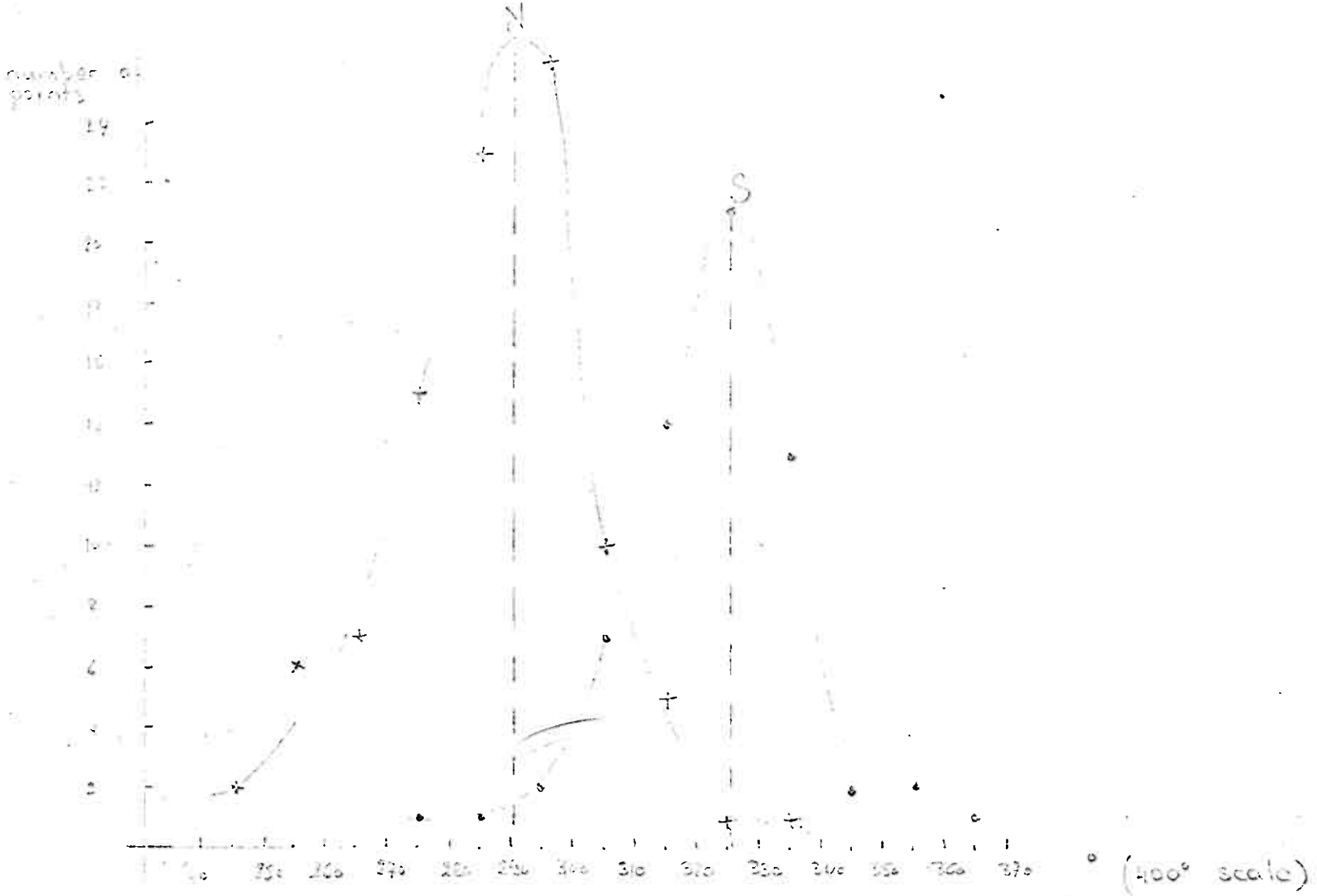


Fig 4B

KEY FOR PROFILES

Colours are 'Derwent' series (Cumberland Pencil Co.) Numbers are indicated in the boxes

AMPHIBOLITE

45 Massive amphibolite

51 Layered amphibolite

46 Schistose amphibolite

12 Amphibolite breccia - sulphide poor

12 Amphibolite breccia - sulphide rich

SCHIST

25 Amphibolitic schist

33 Mica schist

QUARTZITE

6 Quartzite

MEGACRYSTS

Amphibole

Feldspar

Pyrite 1 – 5 %

Pyrite < 1 %

OTHER PHASES

BI Biotite

GL Mica

KK Chalcopyrite

KL Chlorite

Fig 5.

Fig 687

SECTION 1

Fig 6.

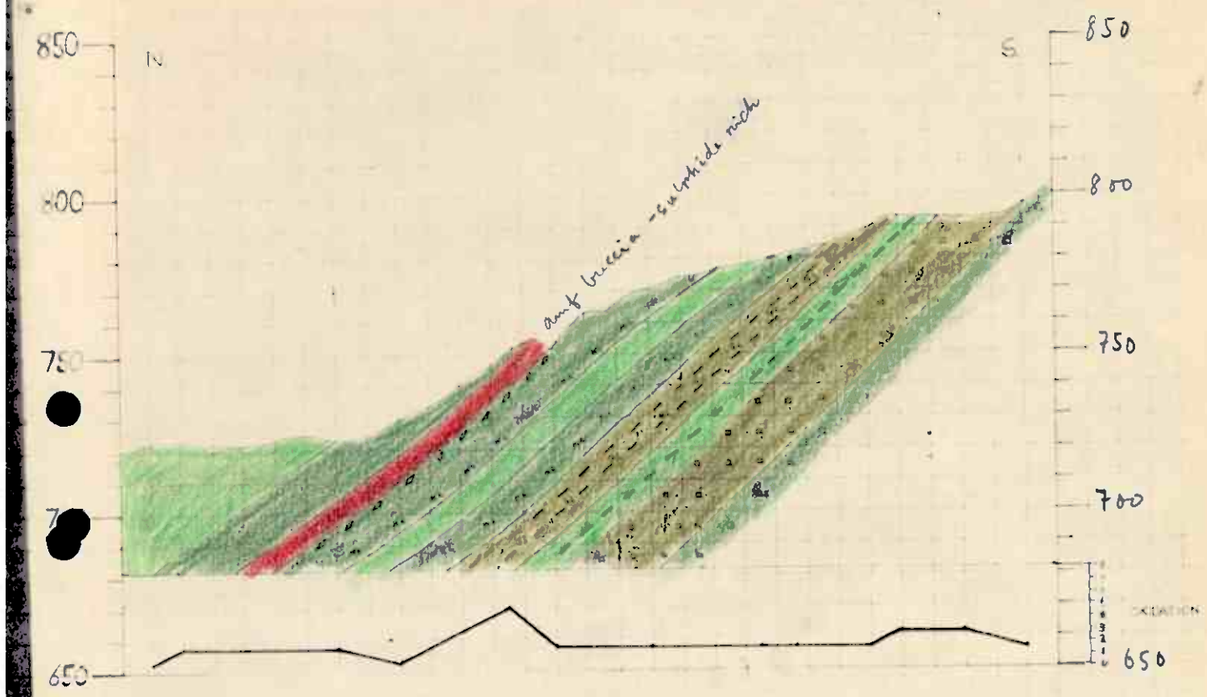


Fig7

SECTION 2

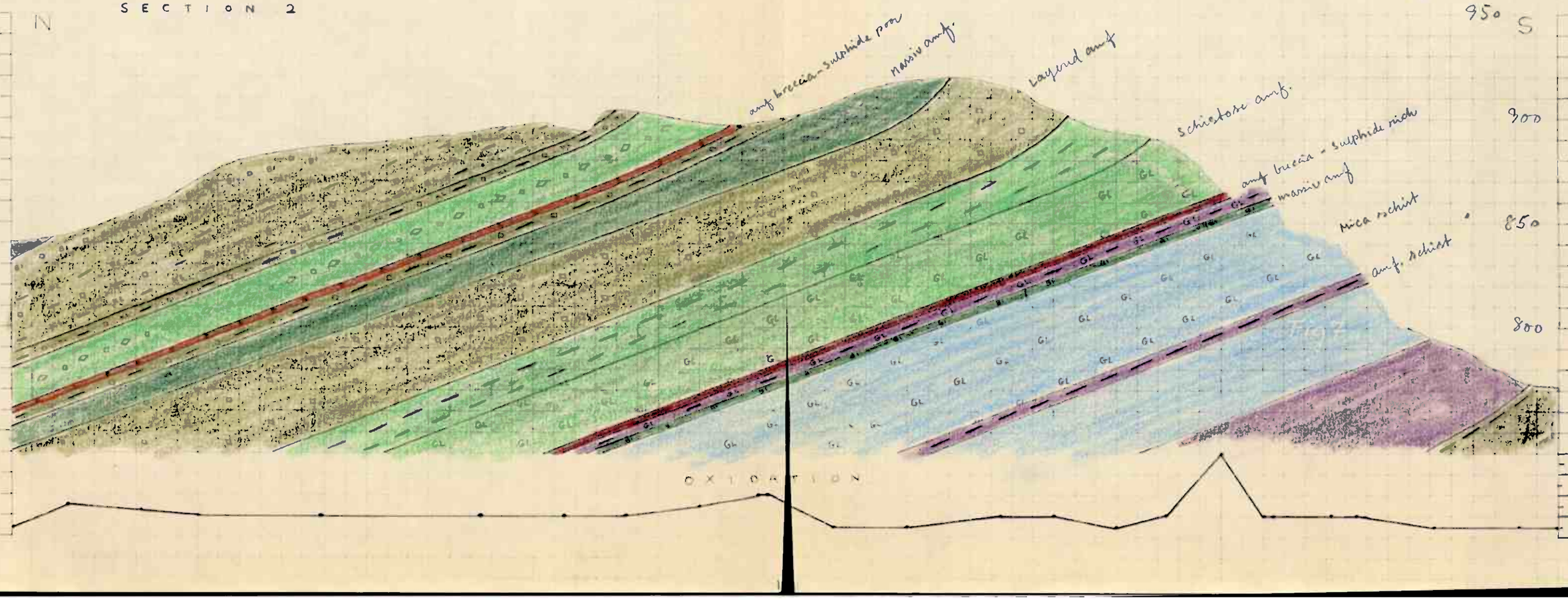
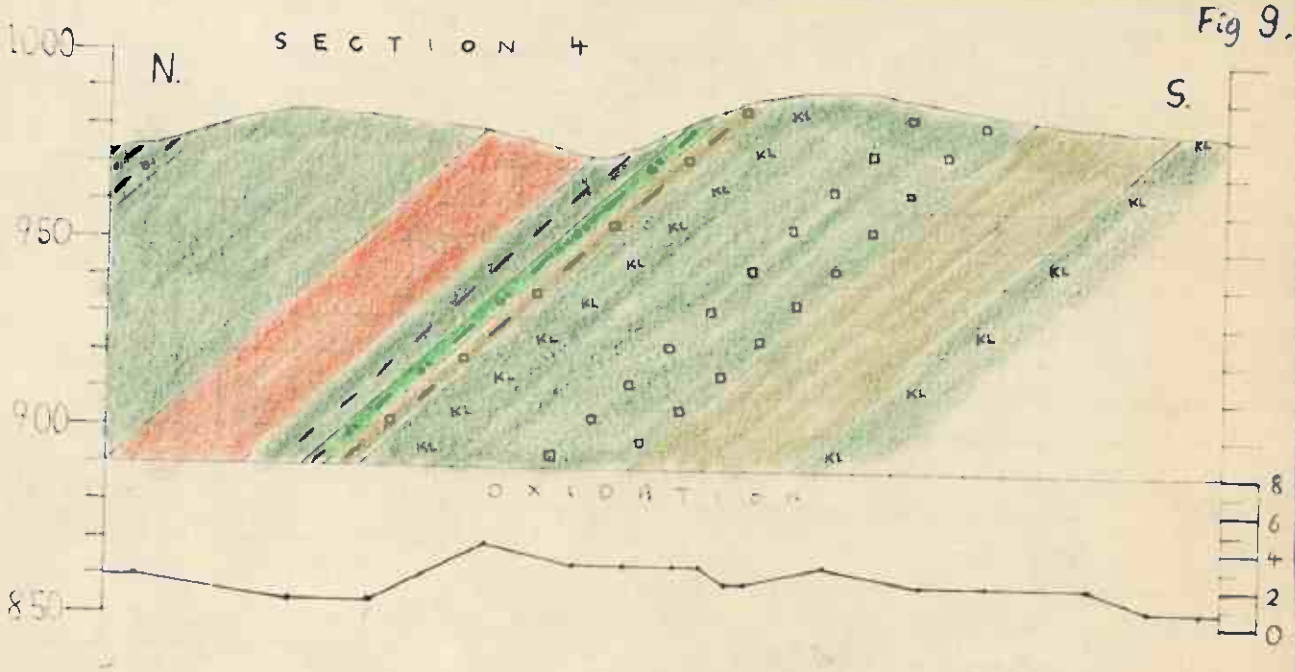


Fig. 8

SECTION 3.

Fig 9.

SECTION 4



Detail of Ore Breccia in Section 1

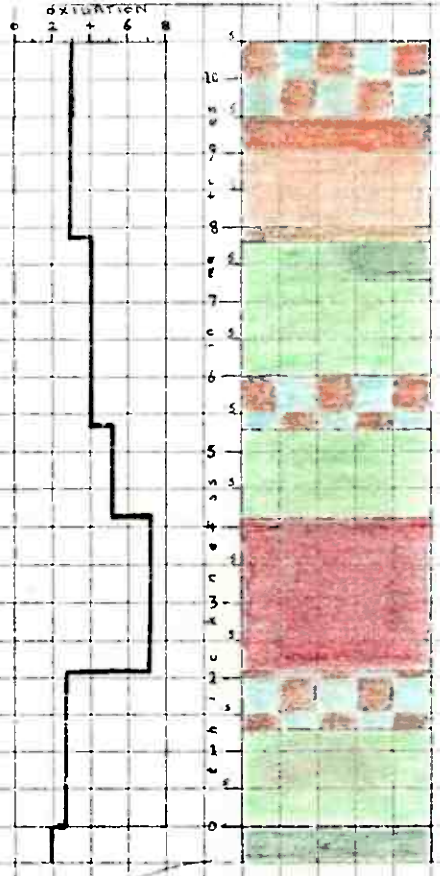


Fig 10

Chlorite Breccia with fine grained schistose matrix

Breccia with small pods of chlorite of amphibole and feldspar. Pyrite megacrysts < 5%

Coarse-grained breccia with small clasts and large chlorites and pyrite grains

Fine-grained breccia with v large chlorites and pyrites (45%). Some inclusions

Discontinuous massive amphibolite.

Schist with rusty partings and large amphibolites

Chlorite breccia.

Schistose amphibolite

Ore breccia composition variable. Thin rich bands contain up to 70% sulphide in layers 2-3 mm thick. Pyrite present as megacrysts.

Chlorite breccia. felsic composition. Sulphides < 1%

Schist with rusty partings. Chlorite and amphibolite present.

Massive amphibolite: fine grained with occasional chlorite

Fig. 10.

~~012.023~~
012.023

A/S Sulitjelma Gruber
Prospektering 1974
Prosjekt 7.402/E
Feltrapport

TSH/JDH/RH
4/11-1974

Detailed geological mapping in the Gudrun area to the east of Ny-Sulitjelma (EJ 213).

Contents

Enclosures:

Fig.1	Location Map 1:10.000
Fig.2	Geological Map 1:10.000
Fig.3	Structural Map 1:10.000
Fig.4	Structural Analyses
Fig.5	Key for the sections
Fig.6-9	Sections 1-4
Fig.10	Profile through Ore Breccia
	Air photos 3066 C3/C4 with outcrop overlays

Abstract:

Two levels of mineralisation were mapped near the base of the Sulitjelma Amphibolite in an area of generally regular northerly dip. The mineralisation is not thought to be of economic interest except possibly in the north-east of the area. Further work is recommended.

1. INTRODUCTION

The area is situated to the east of Ny-Sulitjelma on the south and west slopes of Gudrun. The area is covered by map-sheet 3J 213 and lies between northings 1017600 and 1019200, and between eastings 29500 and 32000.

Outcrop mapping of the area was carried out between 25th July and 8th August 1974 by C.Gallay (C.H.) and J.Harrison (G.B.).

Aerial photographs were available for most of the area and localities were initially recorded on these. Where photographs were not available localities were recorded on a 1:10.000 topographical map. All localities were later redrawn on a 1:10.000 map. The Geomap system was used for recording information from each locality. Locality numbers used were 700 to 790 and 800 to 917 (fig.1).

At the time the mapping was carried out considerable quantities of snow remained in the hollows.

The work was concentrated along two main horizons, which showed noticeably higher oxidation values than elsewhere.

For convenience the area is sub-divided into a northern and southern part, corresponding to the two horizons studied in detail (see fig.2).

Four profiles (three in detail across the northern area and one more general) were taken across the area. These are shown in the enclosures.

2. TOPOGRAPHY

The area lies in the altitude interval 650 m to 1020 m a.m.s.l. The ground falls steeply to the west and also to the south, where the Furulund schist outcrops in a cliff. The cover is thin and vegetation sparse, especially on the plateau in the north-east of the area. The softer rocks form stream-beds with quarternary deposits and are also favourable sites for the formation of thick snow patches, which hinders detailed mapping. The outcrop, then, is generally good and access problems were only encountered on the steep cliff of Furulund schist.

3. PETROGRAPHY

Two major units outcrop in the area: The Furulund Schist and The Sulitjelma Amphibolite (fig.2).

3.1 The Furulund Schist

The Furulund Schist consists of fine-grained micaceous schists with quartz, felspar and amphibole. Megacrysts of red garnet are common, and frequent layers of quartz boudins may be seen. Banding is distinct. Small pre-schistosity folds are seen. The schistosity is well developed everywhere.

The Furulund schists are visible in the south-east of the area, where they are intercalated with amphibolite. Topographically this softer material forms a valley, still containing considerable amounts of snow when the mapping was done in late July/early August. Outcrops of schist are found on each side of the valley and often show garnet megacrysts up to 5 mm diameter. In contrast, the outcrop of the schist in the extreme south of the area studied (section 2), forms a steep cliff of very good exposure.

3.2 The Sulitjelma Amphibolite

In the northern part the amphibolite consists mostly of a fine-grained amphibolite, but coarse-grained zones, which appear to have a lenticular morphology, occur throughout the area. These coarse-grained bodies often display amphibole needles up to 2 cm long. The amphibolite is variable in character and may be massive, layered, schistose or brecciated. Megacrysts of felspar, amphibole and pyrite are present in places. The principal mineralogy is amphibole, felspar and quartz, sometimes with mica or chlorite. Quartz is present in boudins and veins.

In the southern part the amphibolite, usually fine-grained (but sometimes coarse), contains amphibole quartz and felspar with varying mica and chlorite. A very felspathic rock containing mostly felspar but also mica, quartz and chlorite is occasionally observed (e.g. localities 703 and 712). Quartz boudins are frequent. Careous weathering in places suggests the presence of significant carbonate.

In some localities (e.g. 710, 720, 766, 769) megacrysts of garnet are arranged in layers in the amphibolite. Small cubes of pyrite are sometimes observed (e.g. 723, 724, 739).

Thin brecciated bands with associated mineralisation occur within the amphibolite. These have been called "chlorite breccia" and are often very rich in chlorite in the matrix. The chlorite is very dark green and occurs in large "books". These breccia bands are frequently strongly oxidized and deeply weathered out.

In the north-east of the area a rock we have called "brecciated amphibolite" occurs (e.g. 850, 852, 860, 863). It consists of blocks of fine-grained amphibolite (up to 15 cm long and typically lens-shaped) set in a fine-grained matrix which is strongly weathered to a light brown colour. The lenses are orientated parallel to the structure. The matrix contains considerable quartz. The amphibolite (amphibole, felspar and quartz) shows no rusty weathering, but often contains small pyrite crystals (< 1%).

A brief reconnaissance to the east of the area (towards Otervann) shows this brecciated amphibolite to form bands up to 5 m thick, and the type appears to form the continuation of the mineralized chlorite breccia in the northern area.

4. STRUCTURE

The direction of dip remains constant over the whole area, banding and schistosity having been used to measure orientation. The structure dips to the north. In the northern part this dip ranges from 19° to 57° with an average of 37°. In the southern part dips vary from 12° to 88° with an average of 35°.

Strikes vary from 250^{G} to 334^{G}, and average 290^{G} in the northern part, while in the southern part they vary from 285^{G} to 364^{G}, with an average of 325^{G}.

Thus the dips and strikes suggest that the structure is very regular and contains no major discontinuities.

Orientations of fold axis were measured, exclusively in the Furulund Schist. Axial directions varied from 342^{G} to 392^{G} with an average of 360^{G}. Plunge varied from 8° to 32° with an average of 20°.

Note that strikes were measured on a 400^{G} scale and dips on a 360° scale. Structural observations are shown on fig.3 and analyses on fig.4.

5. MINERALISATION

In the southern area, which forms the continuation of the Ny-Sulitjelma ore horizon, there is little evidence of mineralisation. Localities 762, 764, 777, 778, 781, and 782 show oxidation to a considerable degree and are deeply weathered. All these localities are within the amphibolite unit, close to the contact with the Furulund schist. No pyrite or other sulphide was observed in these outcrops. Small quantities of pyrite megacrysts are present in places in the amphibolite on the south side of the valley.

No mineralisation was observed in the Furulund schists, although it must be repeated that some areas were snow-covered.

In the northern area there are two levels which show mineralisation, more strongly in the northern part of the two. Pyrite megacrysts occur in the amphibolite, especially just above the mineralised breccia horizons 2 where crystals up to 1 cm occur. Elsewhere small pyrite cubes are common. The breccias themselves are strongly weathered and the finer-grained levels have a yellowish green weathering colour.

In the west two distinct horizons are seen, but towards the east the mineralisation becomes weaker and only one horizon is seen. It is not clear whether the lower horizon disappears or whether the two run together. As noted previously the continuation of the breccias to the east are in the form of brecciated amphibolite with no evidence of sulphide mineralisation. A detailed profile of the main mineralised horizon is given in the enclosures. This profile was taken at the point of maximum exposure of this horizon, and where it appears to be richest.

6. THE GEOMAP SYSTEM

The Geomap system was used to record information at all localities except in Section 2, (encl.2), which was a reconnaissance profile. The authors consider that the system has certain advantages in its standardisation procedures, but that the limitations of the range of observations and the necessity of using integral choices in describing geological features, are a danger to accurate and comprehensive observation, and that these limitations must not be allowed to hinder the field geologist's powers of observation and interpretation. It would be of no advantage to turn the field geologist into a computer programmer. By way of improvements, if the system is to be further used for mapping on this scale in the same formations, a revision of the program to adapt it to local conditions would be of great value, both in helping the field geologist and in improving the potential for later interpretation. For example it is difficult to map variations within an amphibolite when the program offers only one symbol for all amphibolites.

7. EXPLORATION

The mineralisation appears to die out to the east, and the only area of possible economic interest is in the north-west. A geochemical sampling program is, however, recommended for the whole area. The following three projects are also recommended:

1. A brief reconnaissance (perhaps for 2-3 days) of the area to the east as far as Otervann and the cliffs beyond. This would establish whether the mineralisation reappears or not. The river from Otervann to Lomi would present a good section for reconnaissance.

2. Detailed work in the southern area in the valley between localities 720 and 770 during September when the snow has melted. Again this would take about 2 days and would confirm or otherwise the lack of mineralisation in this valley.

3. The richest horizon in the north-west dips under drift where it passes into the valley of Gikenelv. Therefore a geophysical survey and possibly a shallow drilling program is recommended in this area.

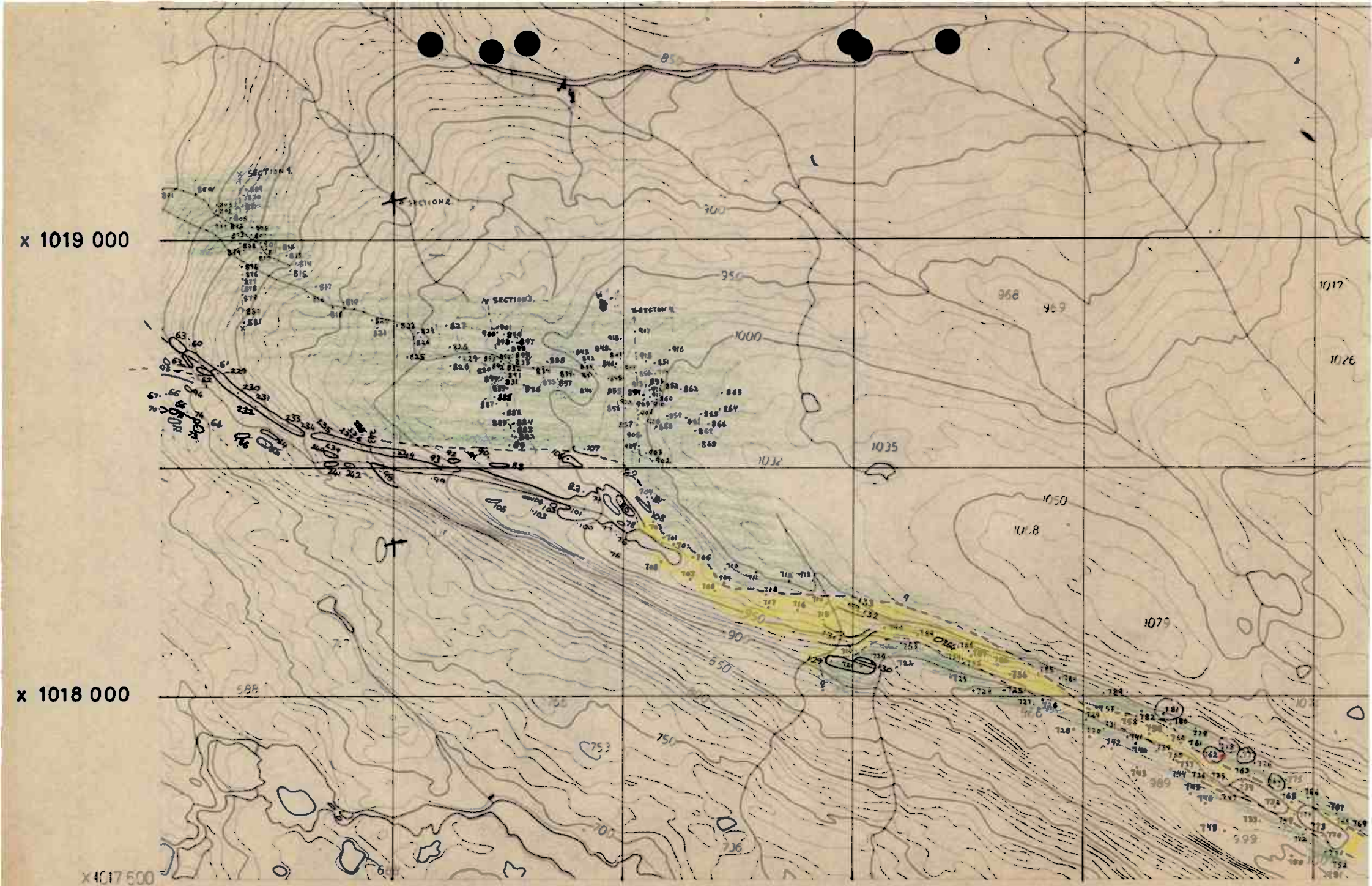


Fig 1 -

Ej 213 1:10000 ekv 10m

FJELLANGER WIDERØE A·S

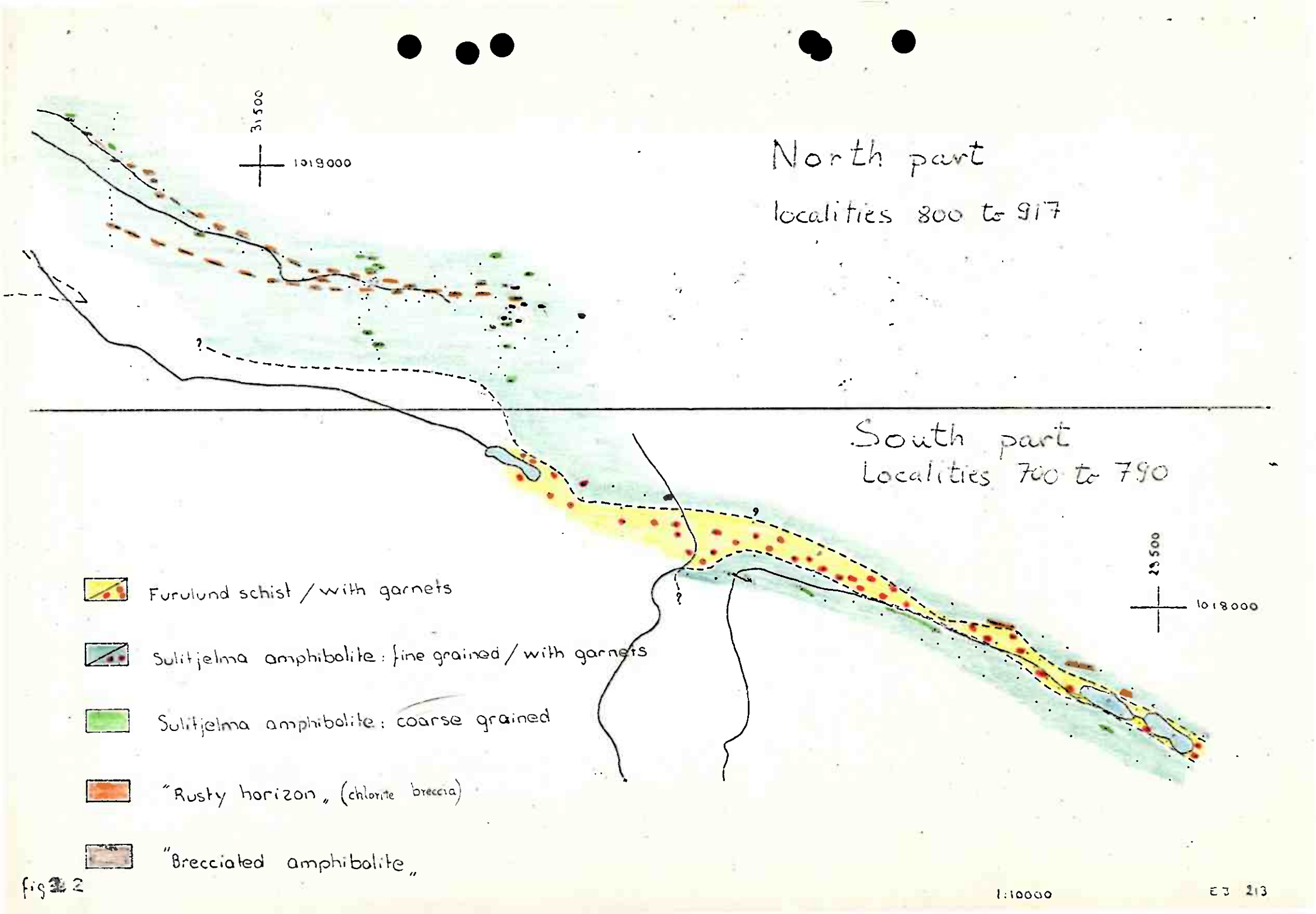


fig 2

1:10000

EJ 213

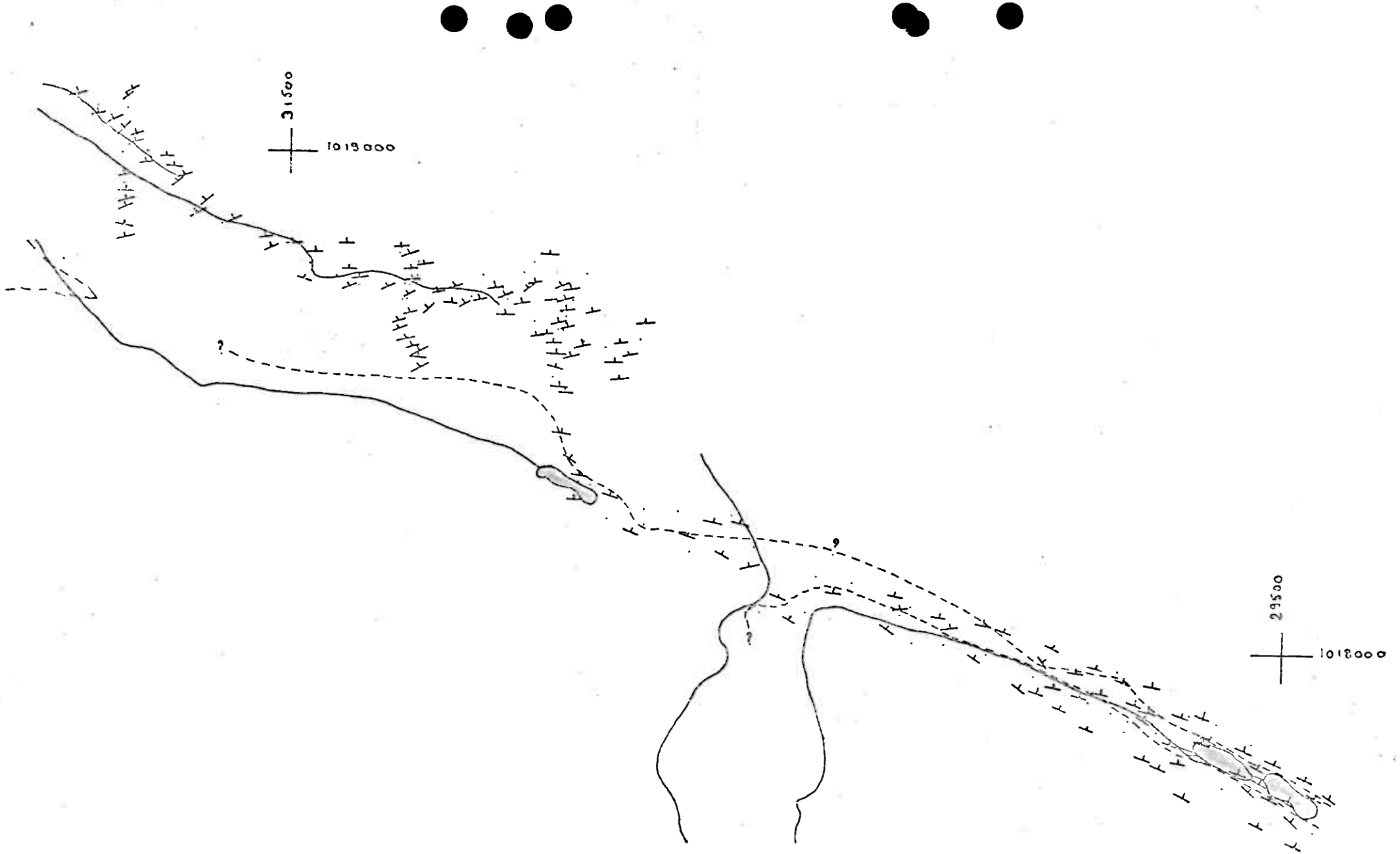


Fig 3

1:10000 EJ 213

Dips

N - North part of the curve ×
S - South part of the curve.

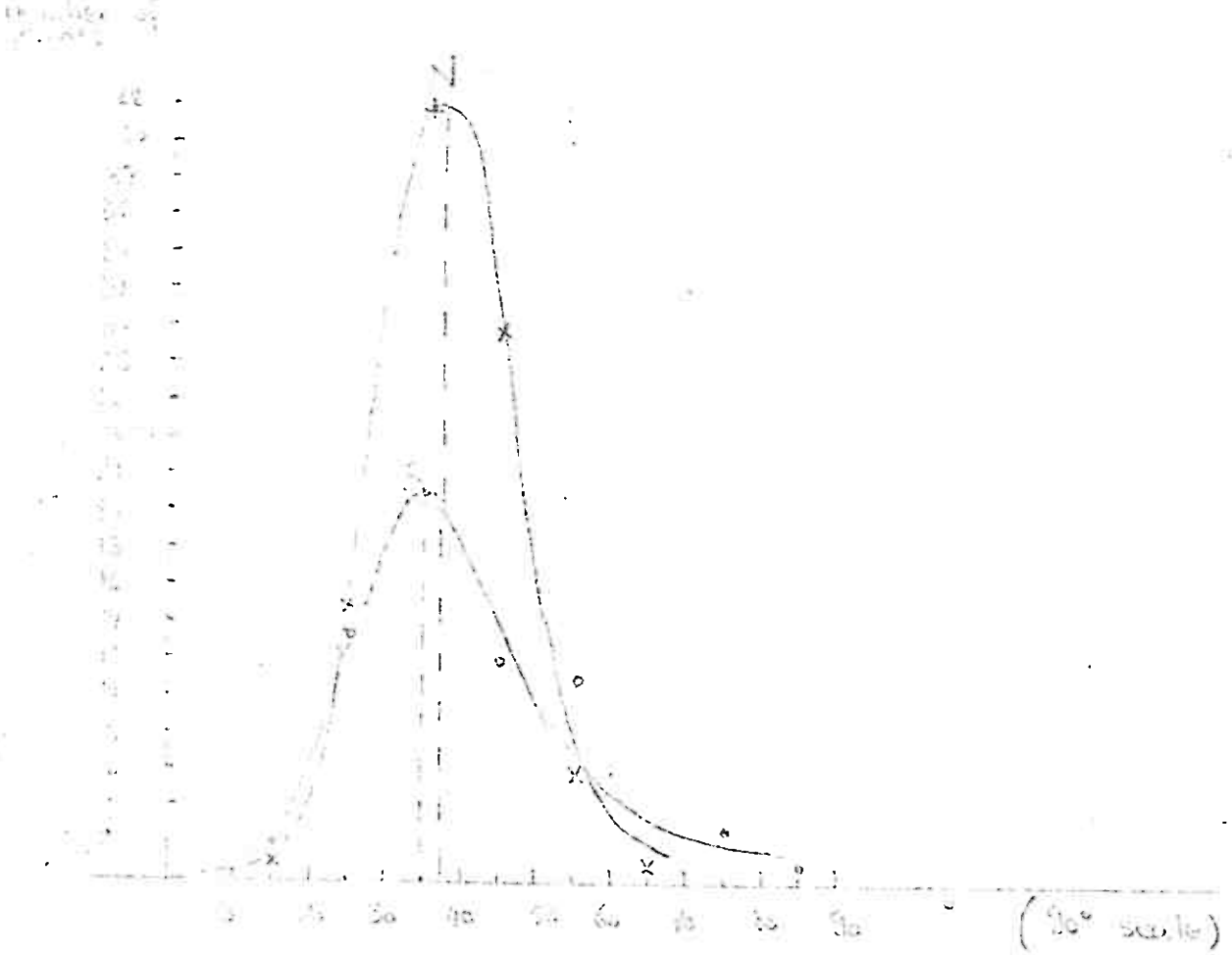


Fig 4A

Strikes

N = north pole

S = South pole

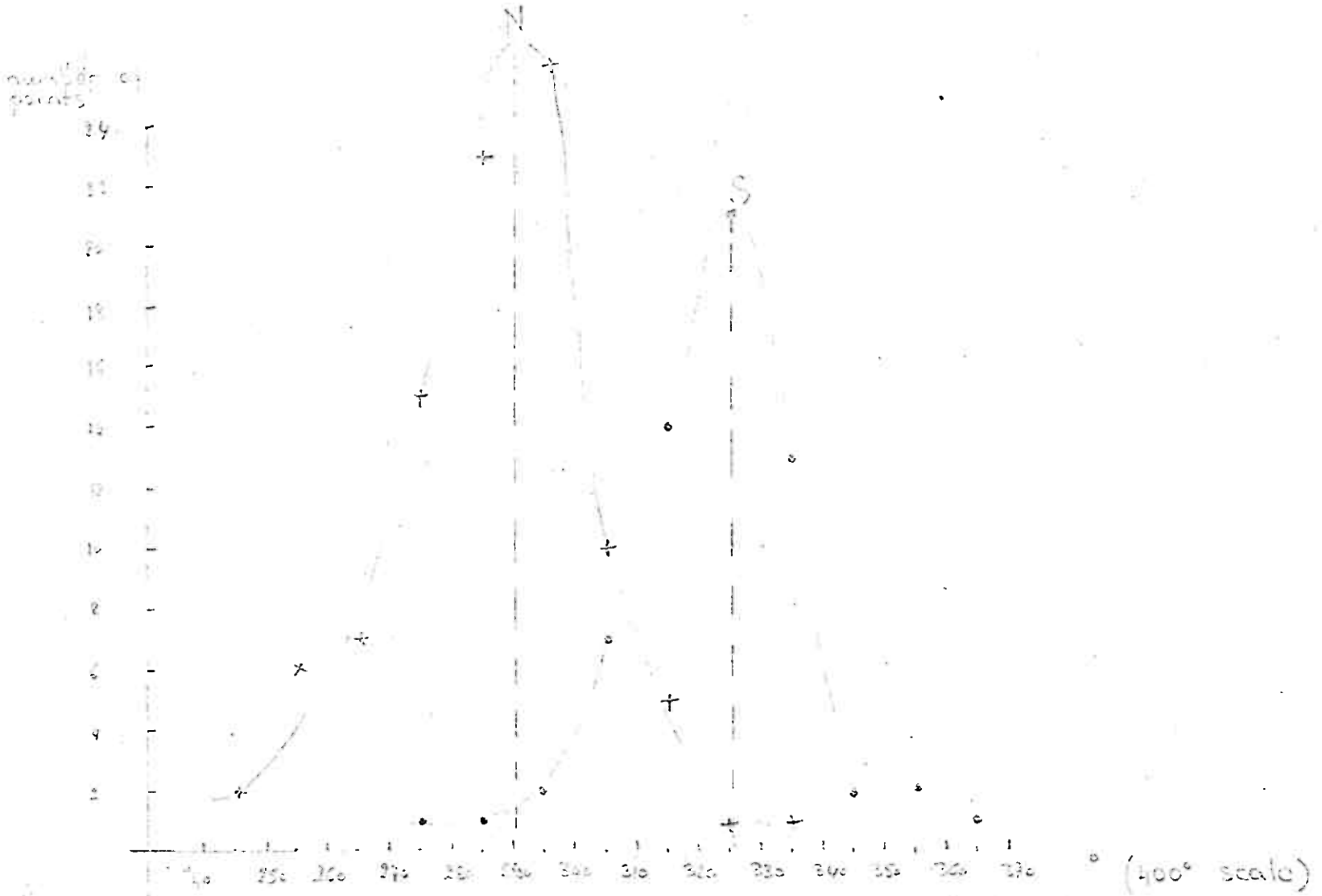


Fig 4B

KEY FOR PROFILES

Colours are 'Derwent' series (Cumberland Pencil Co.) Numbers are indicated in the boxes

AMPHIBOLITE

45 Massive amphibolite.

51 Layered amphibolite.

46 Schistose amphibolite

12 Amphibolite breccia - sulphide poor

13 Amphibolite breccia - sulphide rich.

SCHIST

25 Amphibolitic schist

33 Mica schist

QUARTZITE

6 Quartzite

MEGACRYSTS

— Amphibole

▱ Feldspar

▪ Pyrite 1 – 5 %

□ Pyrite < 1 %

OTHER PHASES

BI Biotite

GL Mica

KK Chalcopyrite

KL Chlorite

Fig 5.

Fig. 6.

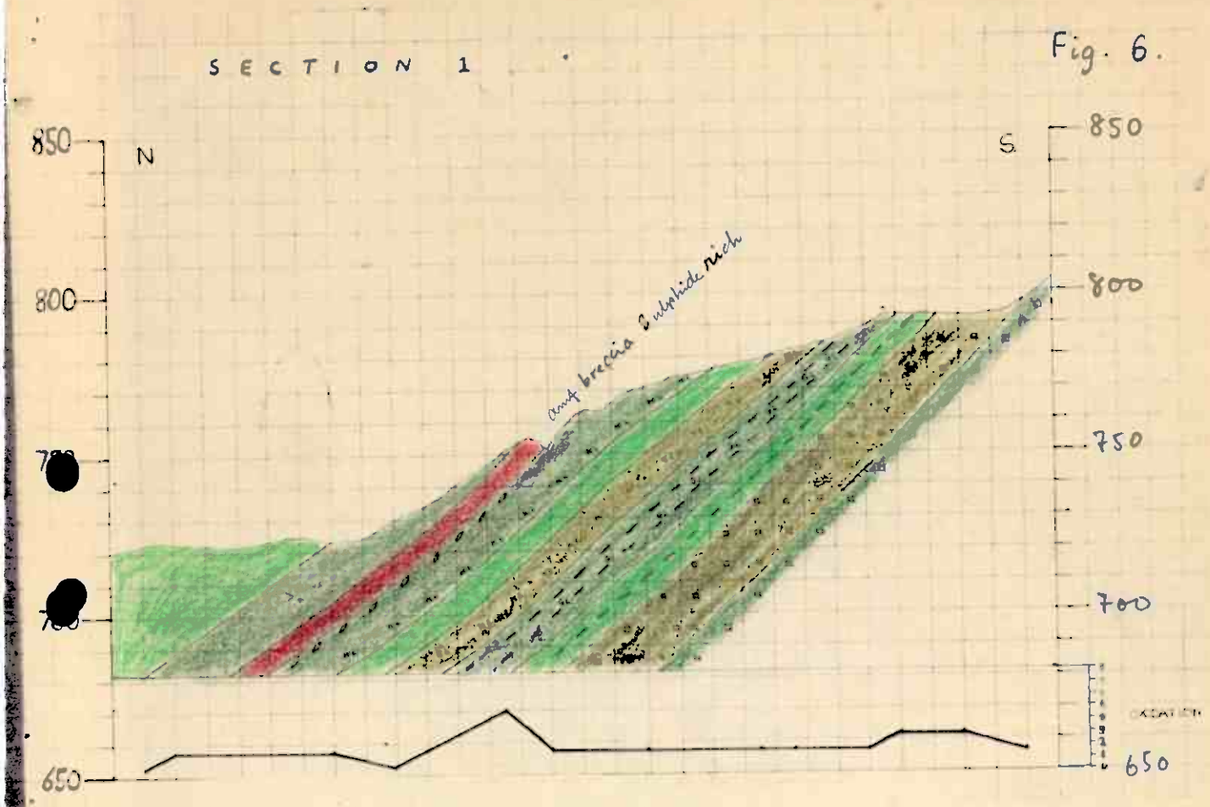

SECTION 1
N
S
850
800
750
700
650
amyt breccia sulphide rich

Fig7

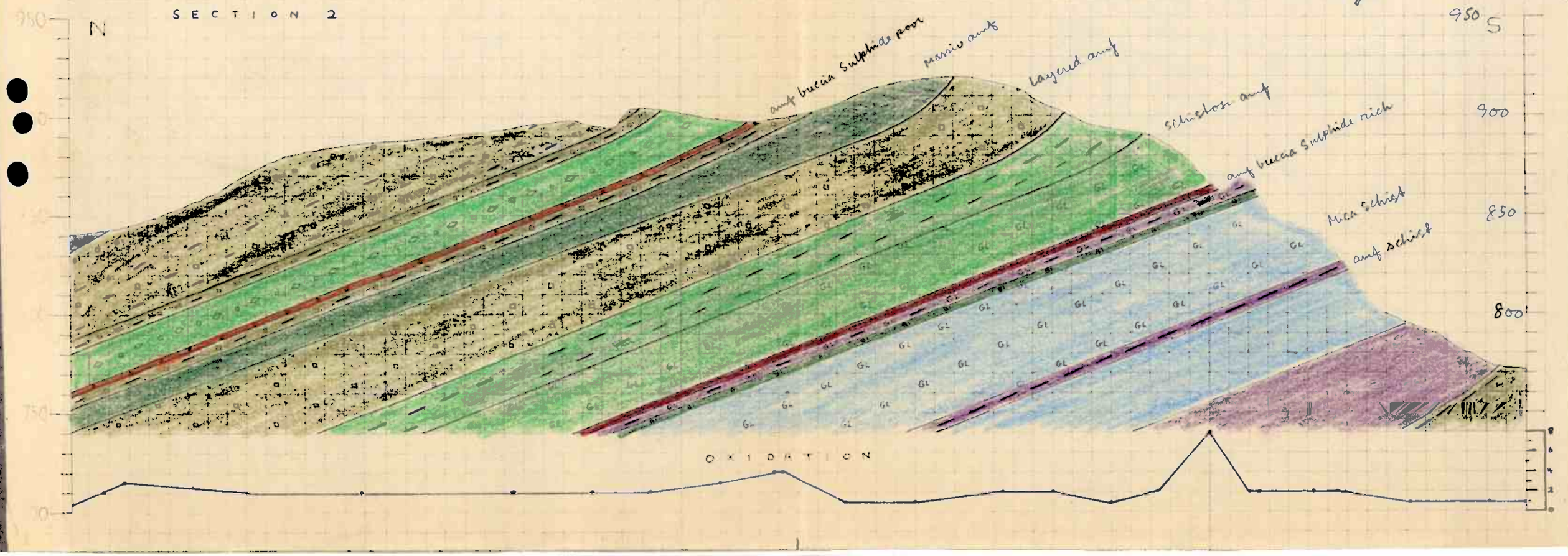

SECTION 2
N
S
950
900
850
800
750
amyt breccia sulphide poor
massive amyt
layered amyt
schistose amyt
amyt breccia sulphide rich
mica schist
amyt schist
GL
OXIDATION

Fig. 8

SECTION 3.

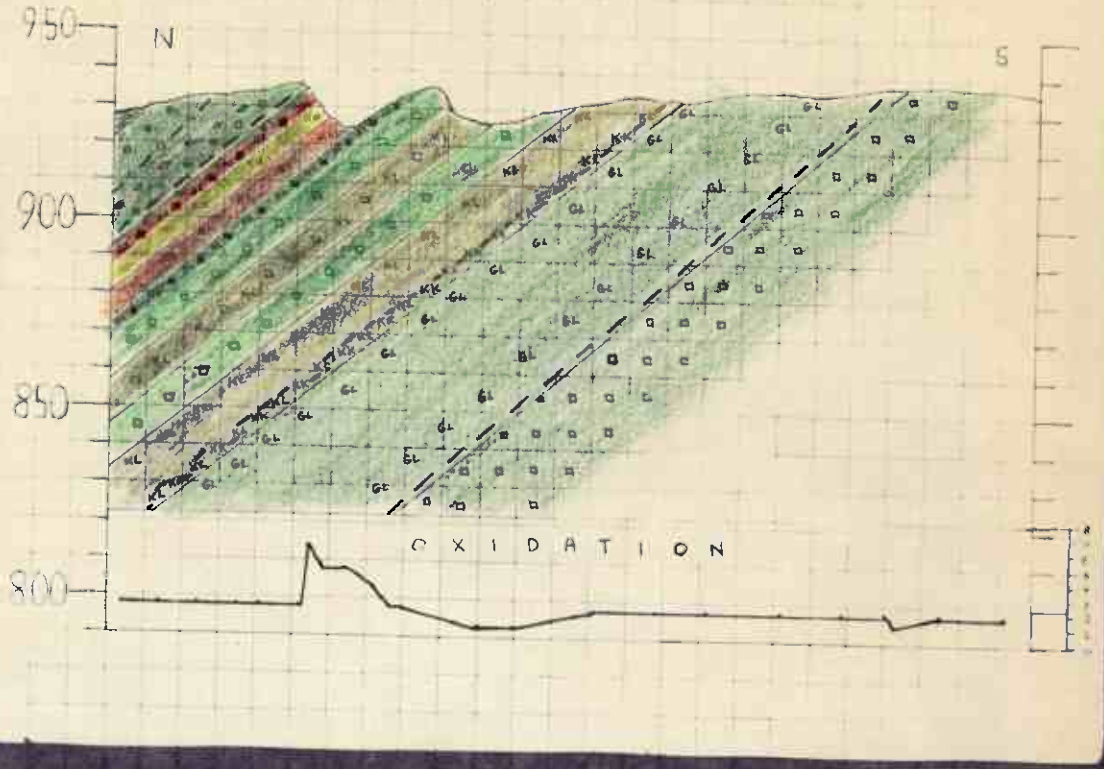
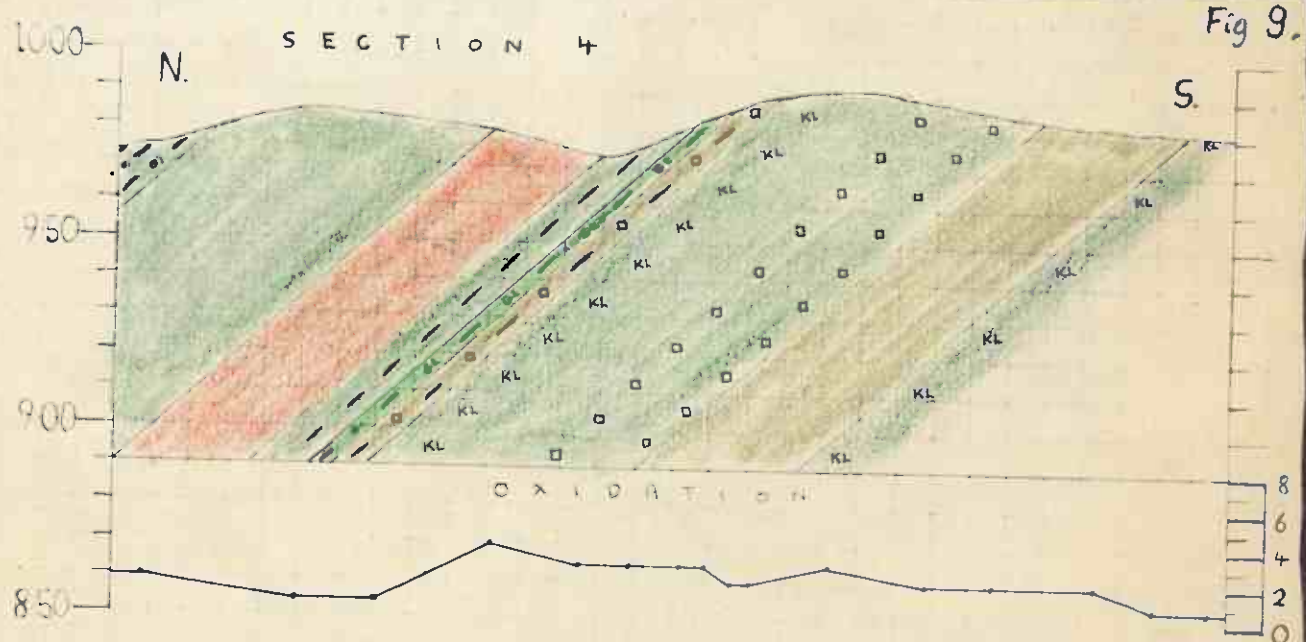
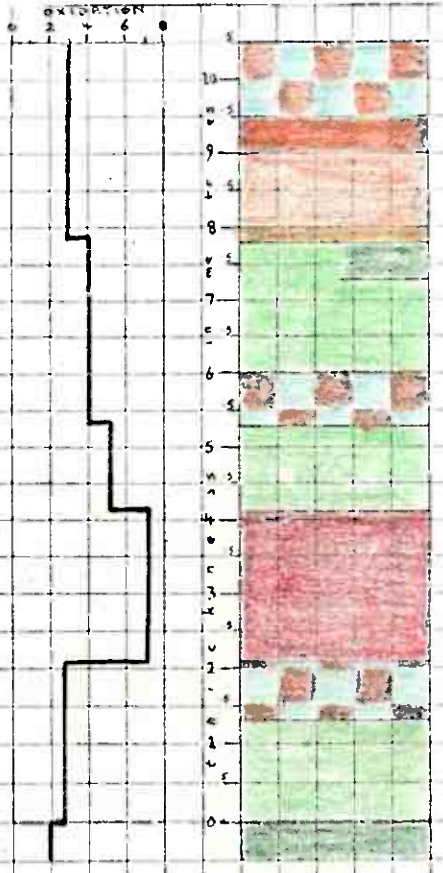


Fig 9.

SECTION 4



Detail of Ore Breccia in Section 1



Chlorite Breccia with fine grained schistose matrix

Breccia with small zones of chlorite of amphibole and feldspar. Pyrite megacrysts < 5%

Coarse-grained breccia with small clasts and large chlorites and quartz veins

Buff weathering breccia with v large chlorites and pyrites (45%). Some biotite.

Discontinuous massive amphibolite.

Schist with rusty partings and large amphiboles

Chloritic breccia

Schistose amphibolite

Ore breccia composition variable. Thin rich bands contain up to 70% sulphide in layers 2-3 mm thick. Pyrrhotite present as megacrysts

Chlorite breccia. felsic composition. Sulphides < 1%

Schist with rusty partings. Chlorite and amphibolite present

Massive amphibolite. fine grained with occasional chlorite

Fig 10

Fig. 10.