

# Bergvesenet

Postboks 3021, 7002 Trondheim

## Rapportarkivet

Bergvesenet rapport nr <b>BV 2226</b>	Intern Journal nr	Internt arkiv nr	Rapport lokalisering	Gradering <b>Fortrolig</b>
Kommer fra ..arkiv Sulitjelma Bergverk A/S	Ekstern rapport nr "522220011"	Oversendt fra	Fortrolig pga	Fortrolig fra dato:
Tittel Report on preliminary investigation for Cu - mineralisation in Siso area.				
Forfatter BADKAR R N.		Dato 1972	Bedrift Sulitjelma Gruber A/S	
Kommune	Fylke	Bergdistrikt	1: 50 000 kartblad	1: 250 000 kartblad
Fagområde	Dokument type	Forekomster		
Råstofftype	Emneord			
Sammendrag Detaljerte undersøkelser i 'inhomogene skifre~ pga. funn av Cu - rike blokker nord for Sisovann. Skifrene består av metavulkanitter, amfibolitt og metasediment. Cu - minerslisering i metavulkansk aske, og representer trolig amygdaloidale fyllinger. Mineralseringen følger ikke distinkte horisonter i bergarten. Større geokjemisk prøvetakingsprogram er utført, men med darlig resultat. (felt - test). Sisovann kopper.				

REPORT ON PRELIMINARY GEOLOGICAL INVESTIGATION  
FOR CU-MINERALISATION IN SISO AREA

R. N. Bedkar

Contents

1. Introduction
2. Area of work
3. Method of work
4. Geology and Petrology
5. Structure
6. Cu-mineralisation
7. Note on traverse south of Sisovann
8. Concluding remarks
9. List of Samples
10. Bergartsundersøkelse ved Sisovann v/P. K. Brastad

## 1. Introduction

In a road cutting north of Sisovann several specimens of copper-ore analysing upto 4 % Cu were found within a zone previously mapped as "inhomogeneous schist" (Larsen & Birkland 1965, P. Bøe 1967). The best ores were found among the blasted-out blocks of rocks and in hand specimens they consist of stringes of bornite and covellite (0.5 - 2 mm) within a poorly banded, crenulated, fine, micaceous rock. The aim of the present work was to investigate the nature and extent of this mineralisation and to establish possible geological control for any further work.

## 2. Area of work

Much of the work was confined to the zone of "inhomogeneous schist" north of Sisovann, covering about 2 km due north (roughly along the strike). One day was spent on a traverse south of Sisovann to investigate the "inhomogeneous schist" previously mapped.

## 3. Method of work

In some of the specimens from the road cutting the copper minerals are invisible to the naked eye, while the term "inhomogeneous schist" is vague and general in meaning. Therefore, it has been tried in the present work to find out possible geological and mineralogical guides to copper mineralisation in the area, along with making a geological sketch map, dividing the rocks on a field-petrographic basis.

P. K. Brastad has systematically collected samples from the probable zone of Cu-mineralisation, and tested them for Cu with dithiozone. His report is given separately. He also accompanied on the traverse south of Sisovann.

The base map used is photogrammetrically prepared toposheet on a scale of 1:10 000.

## 4. Geology and Petrology

The rocks of the area may be grouped as follows:

	Biotite-garnet schists
"Inhomogenous Schist"	Volcanic agglomerate
	Mainly amphibolitic rocks
	Mainly meta volcanic ash
	Mainly meta arkosic rocks



- 4.1 Meta-arkoses: In the east are scattered exposures of fine, biotite-garnet-quartz-felspathic gneisses with bands (1 - 5 m) rich in biotite. The biotite rich bands weather to rusty brown.
- 4.2 Metavolcanic ash: Towards west the arkosic rocks grade into a finegrained, blue-gray metavolcanic ash containing scattered prisms of hornblende, occasionally in a garbon pattern. It is within these rocks the Cu-mineralisation is supposed to be localised and is described later (section 6).
- 4.3 Amphibolitic Sequence: Further west are amphibolites, amphibolite breccia, with thin bands of metavolcanic ash (10 cm - 10 m), biotite rich schistose bands with magnetite octaheetra, pyritous rusty horizon, near the lake (954) are some exposnres of rocks resembling meta-amygdaloidal basalts.
- 4.4 Volcanic agglomerate: Apparantly overlying the amphibolitic sequence is a thin horizon (5 - 10 m) of volcanic agglomerate containing volcanic fragments (1 - 5 cm) in a rusty politic matrix. The horizon is discontinous, but apparantly marks the boundary between the volcanic sequence of the east from the sedimentary sequence in the west.
- 4.5 Biotite-garnet schists: In the west of the area are extensive sequence of biotite-garnet schists containing rusty zones of pyritous quartz-felspathic rock (granophyric ?) and thin zones of rusty graphitic schist. The rusty zones are 2 - 10 m thick.

## 5. Structure

The general strike is roughly N-S with steep westerly dips of the foliation is vertical, and the area forms the western part of a larger N-S trending anticline mapped earlier (P. Bøe 1967). Within the area the rocks show much folding on a smaller scale, and in the north the amphibolites swing round the volcanic ash in an anticlinal closure, while the ash itself shows mush folding in this region, producing much complicated outcrop pattern than shown on the map.

A correct and complete picture of the structure of the area is difficult to envisage from the present work.

#### 6. Cu-mineralisation

The Cu-ores found in the road cutting are from the rock described as metavolcanic ash. This rock is blue-gray fine grained, foliated with scattered amphiboles and occasionally garnet and biotite. The specimens containing the ore (found among the blasted-out blocks) are more micaceous, and contain small flakes of muscovite, it is irregularly banded, the ores appearing to confine to the dark-micaceous layers. Such specimens also show a slightly porous structure.

The places where Cu-ore was found "in situ" were along the road cutting in small streaks, or indicated by faint coating of malachite/chrysocolla. Brastad has reported large grains (2 - 10 mm) of Cu-ore (bornite-covellite) in quartz veins traversing the ash bed around the road-cutting near to the lake).

The only other place of Cu-ore "in situ" is at the head of the left fork of the main N-S stream traversing the ash formation. It consisted of a small pocket (3 x 5 cm) of fine (1 - 2 mm) bornite-covellite and a large crystal of bornite (5 mm) (Locality 82 in Brastad's map).

In addition these Brastad has found for other localities where the rocks gave positive test to Cu - but contained no visible Cu-ore.

It seems clear from our work that there is no consistent horizon of Cu-mineralisation in the area. Although the recorded Cu-occurrences were within the ash beds, their distribution is irregular. The Cu-ores probably represent some kind of amygdaloidal fillings, but this inference is not conclusive.

#### 7. Note on the traverse south of Sisovann

Larsen & Birklands map is fairly correct in general, and the "inhomogeneous schist" consist of amphibolites, biotite and garnet rich band and very thin (10 - 20 cm) ash intercalations, but contain no indications of Cu-ore.

## 8. Concluding Remarks

There seems to be no consistent zone of Cu-mineralisation in the area, nor it is possible to assess a regular pattern to the Cu-anomalies in the rocks. But such, apparently amygdaloidal filling deposits are known to be economical, if found in greater quantities, as the ores are of very good quality. Areas around the region where similar volcanic sequences are known may be explored geo-chemically in the future.

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## 9. List of Samples

RB 172/1,2-3 and 4. Rocks from the metaarkosic sequence.

RB 172/5                      Meta-ash rock 400 m, west of main stream on the road cutting.

6                              Meta-ash rock on the edge of Sisovann, 100 m south of sample 5.

7                              Meta-ash rock 500 m north of sample 5, near the amphibolite contact.

8                              Meta-ash rock north of point 886 on the "Z" shaped lake.

9                              Meta-ash rock near the amphibolite contact east of Lake 936.

10                             Meta-ash, 300 m north along east fork of the main stream.

11                             Meta-volcanic ash near the main anticlinal closure.

12 & 13                      Rocks near the locality 82 in Brastad's map. (near where little Cu-ore was found in situ).

14                             A sample from the amphibolitic sequence (meta-amygdaloidal basalt?).

15 & 16                      Sampler of biotiteschist.

17 & 18                      Pyrite-bearing rocks at the contact of amphibolitic and biotite schist sequence, from the road cutting.



- 19, 20 & 21 Rocks from rusty horizons in the biotite-schist.  
 22 Rusty graphitic schist from the biotite schist sequence.

#### 10. Bergartsundersøkelser ved Sisovann

130 nummererte og et mindre antall unummererte prøver er testet for å finne ut om de inneholder koppermineraler.

Ingen av de unummererte, og bare et mindre antall nummererte har gitt positiv test.

Kobbermineraler i bergarten er enten påvist kjemisk eller også observert ved de tall som har ring rundt seg på kartet.

Positive kjemiske tester gir følgende bergartsprøver:

21  
 27  
 27  
 82  
 83  
 103  
 115  
 116  
 117

Kobbermineraler er observert ved følgende steder i kvartssåren:

22 Bergartsprøve medfølger. Prøven er spesielt kobbermalmerik.  
 23  
 24  
 25  
 X

Dessuten medfølger prøve 70, hvor det går en smalere sone med ubetydelig pyrittisering. Kobbermineraler ser ut til å være til stede absessorisk blandt pyritten, men kjemisk test gir dog negativ resultat.



Lithogone test for Cu in rocks

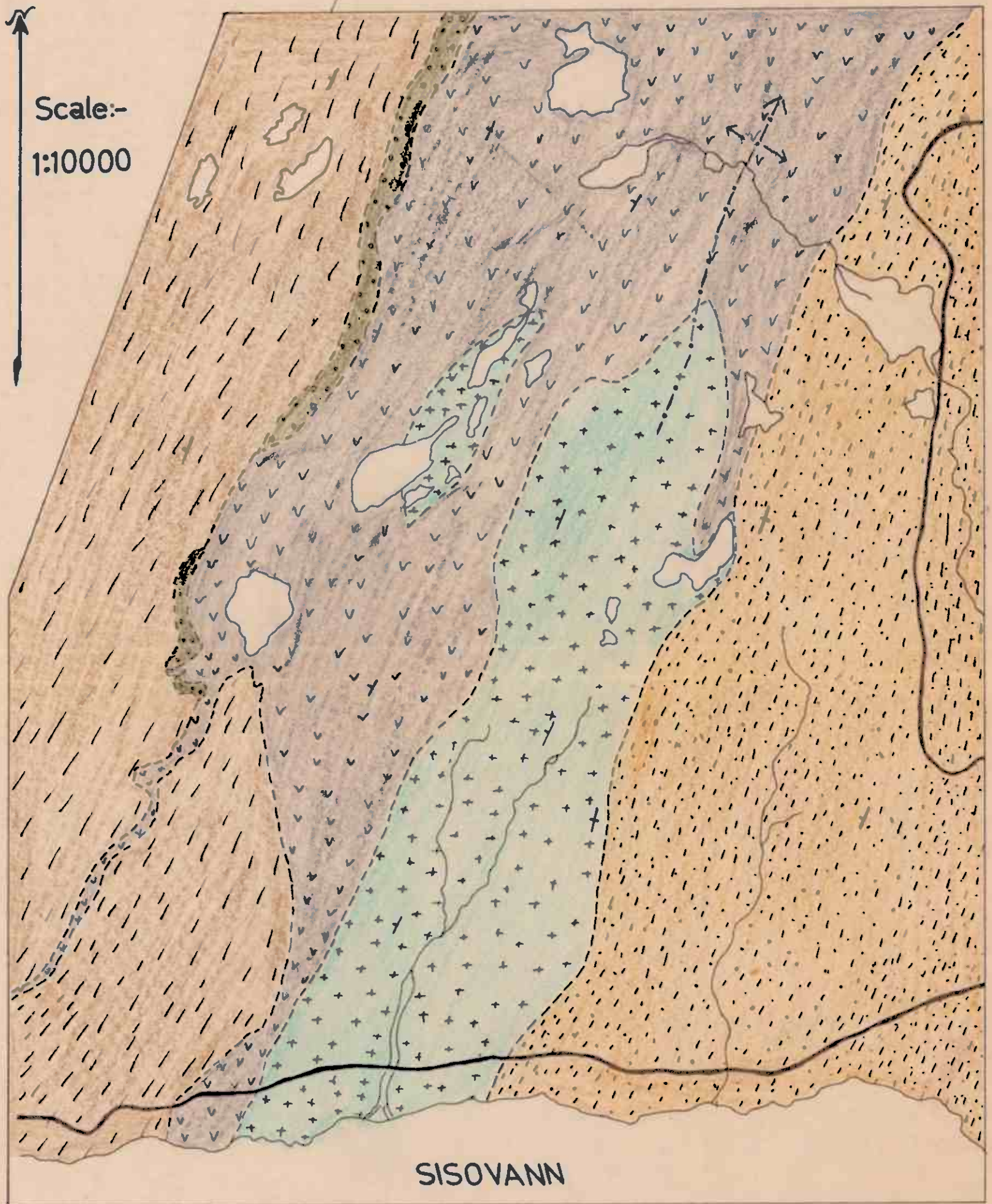
□ Sample localities

⊙ Positive for Cu

P. K. Brastad (1972)



# GEOLOGICAL MAP NORTH OF SISOVANN



- |  |                                    |                               |                   |  |            |              |           |
|--|------------------------------------|-------------------------------|-------------------|--|------------|--------------|-----------|
| 56   | 50                                 | 69                            | 41                | 59                                       | /          | +            | —         |
| Biotite-schist with rusty graphitic bands with pebbles in matrix | Agglomerate with pebbles in matrix | Amphibolite with volcanic ash | Meta-volcanic ash | Meta-arkose sequence with rusty boulders | Dip 40-80° | Dip Vertical | Fold axis |

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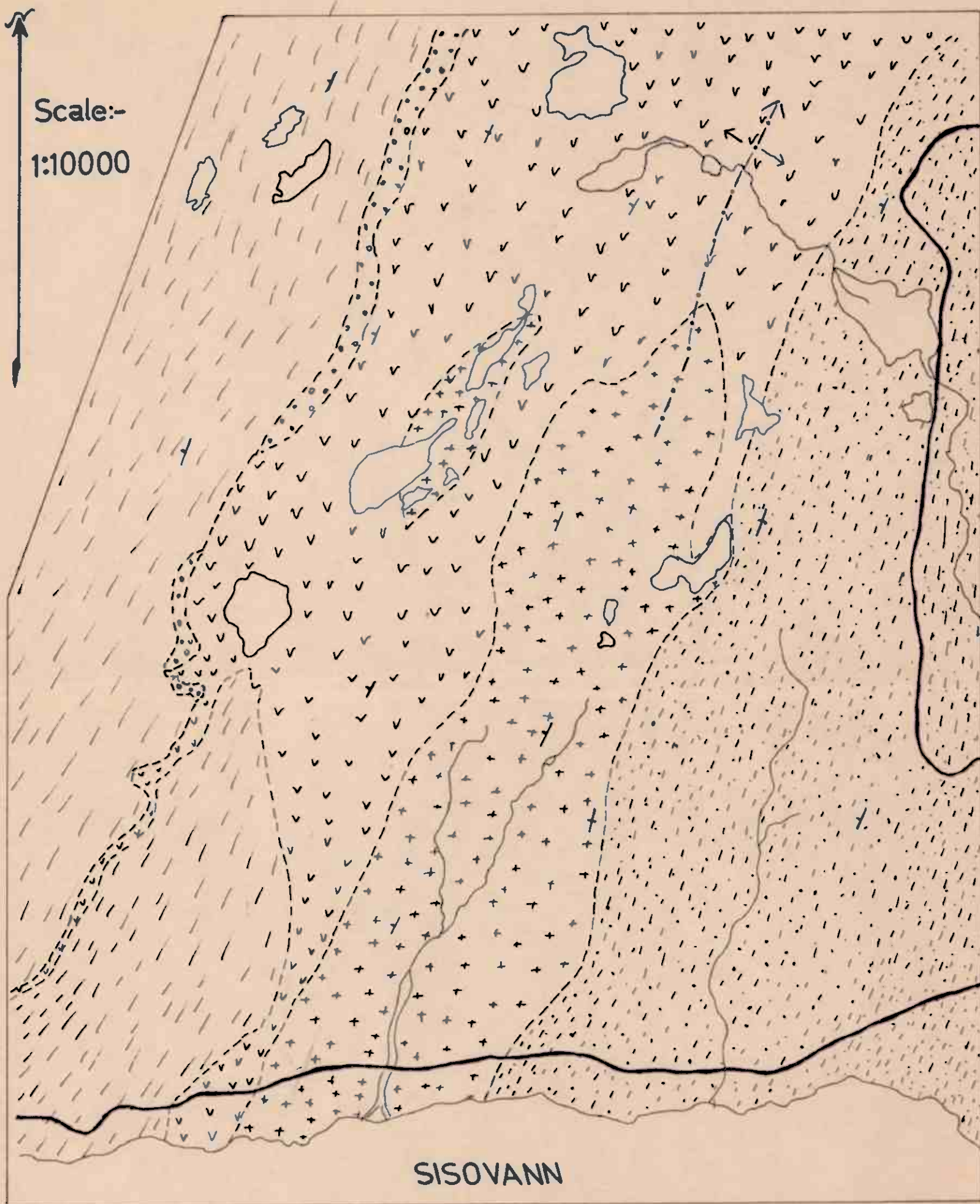
24

25

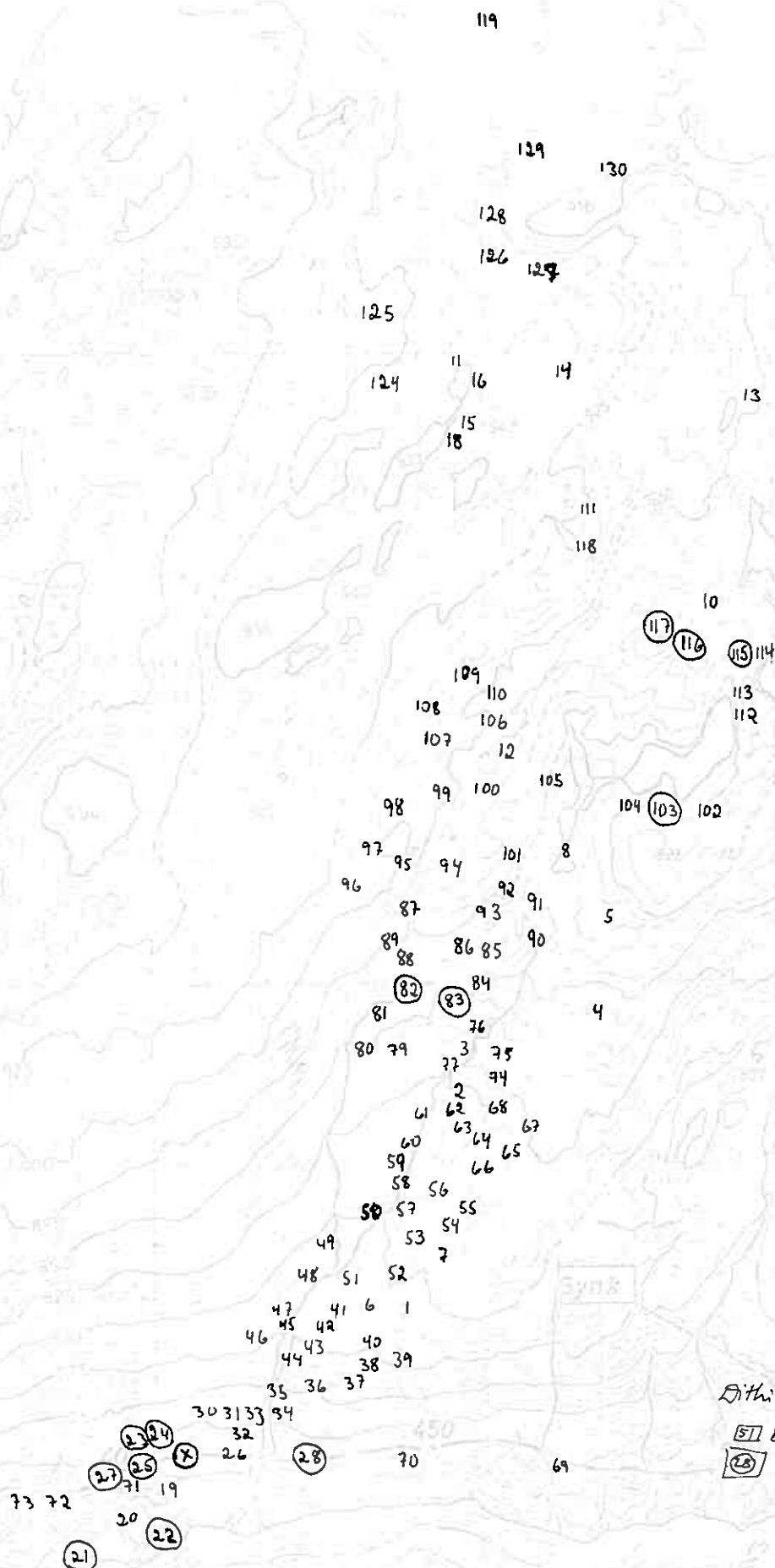
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|---|-----------------------------------|-------------------------|----------------------|--|---------------|-----------------|--------------|
|   |                                   |                         |                      |  |               |                 |              |
| Biotite-schist with<br>rusty graphitic bands with pelitic<br>matrix | Agglomerate<br>volcanic<br>matrix | Amphibolite<br>volcanic | Meta-volcanic<br>ash | Meta-sedimentary<br>sequence with<br>rusty bands | Dip<br>40-50° | Dip<br>Vertical | Fold<br>axis |



Dithionite test for Cu in rocks.

[57] Sample localities

[28] Positive for Cu

P. K. Brastad (1972)

Sisovann

Nalastengsei