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## Report on investigations at Straumsheia, Aust-Agder

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| F Nixon | 1971 | Sulfidmalm A/S |

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| Bygland | Aust-Agder | Trondheimske | 15132 15124 | Sauda Mandal |

| Fagområde | Dokument type | Forekomster |
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| Geologi geokjemi | Rapport | Amalie gruve, Gamle gruve, Bærvann skj, Boketjern skj, |
| **Råstofftype** | **Emneord** | |
| Malm/metall | Cu | |

Sammendrag

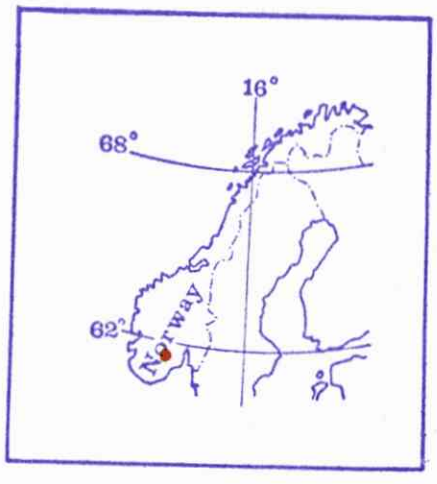
FOR FALCONBRIDGE NIKKELVERK A/S

A/S SULFIDMALM
PROJECT 905.9.

# REPORT ON INVESTIGATIONS AT STRAUMSHEIMA, AUST-AGDER, NØRWAY

1971

F. NIXON.



## INTRODUCTION

This report deals with a geological and geochemical reconnaissance in the Straumsheia area of Aust Agder county, Southern Norway. Old copper showings were known in the area and the potential of these was the subject of the investigation.

## LOCATION

The Straumsheia area is situated in Valle community in Aust Agder county approximately 15 km east of the main Setesdal valley (see fig. 1). The area is a swampy and lakerich plateau, 7-800 m above sea level and surrounded by higher mountains which reach heights of upto 1000 m.

## CREW

The investigations were carried out by Jacobsen and Nixon of Sulfidmalm with 3 student helpers during the period 23/7 - 6/8 1971.

## PREVIOUS INVESTIGATIONS

The copper deposits at Straumsheia have been known for over 250 years. The last investigations in the area were undertaken by Evje-Nikkelverk in 1910. Since that date only the occasional mineralogist has visited the place.

## OWNERSHIP

In September 1970 Sulfidmalm claimed nine points in this general area, all these points being associated with known showings. No other parties have points in the area.

## WORK CARRIED OUT

The investigations consisted of localizing the old showings and carrying out detailed geological investigations over these. Regional geological mapping and prospecting was carried out over an area of approximately 25 $km^2$ (scale 1:15,000). An orientation geochemical stream sediment sampling program was also carried out.

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## GEOLOGY OF THE AREA

The area is situated within the Pre-Cambrian of southern Norway.

The main rock types in the area are amphibolites and quartzites which strike in a north-south direction and dip towards the east. The dip in the amphibolites appears somewhat steeper than in the quartzites ( 70-90° against 40-60°).

The quartzite has a wide distribution and towards the east and west of the area goes over into more gneissic rock types (granitic gneiss and partly migmatitic rocks). These quartzites are impure and contain a little biotite or phlogopite, felspar and often large quantities of epidote.

The main amphibolite body is located as a wide zone in the centre of the area, however, smaller amphibolite bodies and lenses are also located in the quartzite.

The amphibolite and quartzite seem everywhere to be concordant.

The amphibolite is medium to fine grained and consists mainly of hornblende and a little plagioclase. In certain localities the hornblende has been replaced by biotite and epidote. At several places in the amphibolite near the contact with pegmatites, one can see small lenses of secondary minerals such as garnet, fluorspar and green and red epidote.

Both the quartzites and the amphibolites are cut by granitic material which is more or less parallel with the foliation. Pure quartz veins are most common in the quartzite, whereas pegmatites are most common in the amphibolite. The pegmatites can be seen to be discordant. These pegmatites vary a little in composition but are dominantly plagioclase rich with minor amounts of quartz and mica. A green muscovite which has partly gone over to chlorite is the most frequent mica mineral.

The general foliation is north-south. The rocks are second order folded and the area as a whole is cut by tectonic lines which have an east-west orientation.

## MINERALIZATION

Both the old prospects that were located and new mineralizations found were located in pegmatites which lie in amphibolites. The copper minerals are chalcocite, bornite and malcachite, chalcocite

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being the most frequent, usually occuring as coarse lumps and coarse dissemination. Grab samples can give very high copper assays, but the average content of individual pegmatites must be exceedingly small.

The style of the mineralization varies and follows no definite pattern, it can be along joints, as random dissemination or in some cases associated with fractures.

Of the more than 200 pegmatite bodies that were investigated in this area, coppermineralization was only located in twelve. In these twelve showings the size of the mineralization varied with the size of the pegmatite: - the larger the pegmatite, the smaller the mineralization.

No copper mineralization was found in the amphibolite or quartzite.

INDIVIDUAL SHOWINGS (fig. 2)

1) Amalie Grube

The largest showing in the area lying on the top of a small amphibolite ridge to the east of Ramvann. Here the copper bearing pegmatite has been followed by trenching and pitting over a length of 200 m. Three or four parallel pegmatite dykes have been worked, none of these pegmatites exceeds more than 50 cm in width. The mineralization is very sporadic and usually the chalcocite occurs as small schlieren parallel with the walls of the pegmatite. A channel sample over the best visible zone in the mine assayed at 6 % Cu and 2 ppm Au over a width of 32 cm.

2) Gamle Gruve

This old showing lies at the Northwest end of Stavsvann on a high amphibolite ridge. The pegmatite has been worked in the form of a shallow open fpit with two small shallow shafts. The pegmatite is approximately 15 m wide and has been worked over a strike length of approximately 60 m. Only in two places was Cu mineralization seen in situ as small 2 cm wide veins of chalcocite with a little bornite.

A sample of pure hand picked chalcocite from the dumps gave on assay of 73,7E% Cu and 570 ppm Ag. This is a high silver content.

Five rock samples of amphibolite taken over a range of 12 m from the pegmatite contact gave the following Cu values:

| | | | |
|---|---|---|---|
| A | 0,18 % Cu | D | 0,815% Cu |
| B | 0,815% " | E | 0,019% ". |
| C | 0,025% " | | |

The location of these sample points can be seen in fig. 4.

3) Bærvann skjerp

This is a small prospect northwest of Bærvann, situated in a very small irregular pegmatite which lies in a very epidote-rich amphibolite. The pegmatite has the form of a small pocket in the amphibolite and its maximum length is 5 m and maximum width 4m. Quartzitic rocks are located 5 m to the west.

The ore mineral is chalcocite with secondary malachite and occurs as a fairly regular impregnation, a grab sample gave 2,8% Cu, 35 ppm Ag and 0,15 ppm Au.

4) Boketjern Prospect

A small prospect, 6 m long, 2 m wide in pegmatite in amphibolite. The pegmatite has a north/south strike and is slightly discordant with the amphibolite. Quartzitic rocks outcrop approximately 10 m to the east. A rich grab sample gave on assay 5% Cu and 4,7%ppm Ag. Samples taken in the surrounding rocks gave the following results:

| Sample No.: | Location: | % Cu |
|---|---|---|
| 0955 A 71 | Amphibolite 1 m west of prospect | 0,033 |
| 0955 B 71 | " 2,5m " " | 0,021 |
| 0955 C 71 | " 4 m " " | 0,015 |

5) Other showings

In all seven other showings were discovered. Again all these showings consisted of chalcocite associated with pegmatites, and all of very limited extent.

GEOCHEMISTRY

54 stream sediment samples were collected from the streams in the area of interest, these samples being wet sieved in the field. The samples were analysed for Cu, Mo, Zn, Pb. The Mo, Zn, Pb values were very low and no interpretation of the Mo data has been attempted. The frequency distribution of Cu was calculated, the results being shown in table 1.

Table 2 shows frequency distribution of zinc and table 3 frequency distribution of Pb.

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TABLE 1

Frequency distribution of Cu in stream sediments:

| ppm | f | % f | % f |
|---|---|---|---|
| 2 - 4 | 27 | 50 | 50 |
| 5 - 7 | 14 | 26 | 76 |
| 8 -10 | 7 | 12,9 | 88,9 |
| 11-13 | | | |
| 14-16 | | | |
| 17-19 | 2 | 3,7 | 92,6 |
| 20-22 | | | |
| 23-25 | 2 | 3,7 | 96,3 |
| 26-28 | 1 | 1,9 | 98,2 |
| over 29 | 1 | 1,9 | 100,1 |
| | 54 | 100,1 | |

On the basis of this data the following classification was used:

1. 88,9 % f: Possibly anomalous
2. 95 % f: Probably anomalous
3. 98 % f: Anomalous.

As can be seen from the plotted data (fig 5 A) the 6 "anomalous" values occur as isolated one sample anomalies and do not indicate any definite anomalous areas. The highest value obtained, 42 ppm, is located down drainage of the Gamle Gruve.

TABLE 2

Frequency distribution of Zn in stream sediments:

| ppm | f | % f | % f |
|---|---|---|---|
| 1 - 5 | | | |
| 6 -10 | 8 | 9,2 | 19,2 |
| 11-15 | 11 | 20,4 | 29,6 |
| 16-20 | 18 | 14,8 | 44,4 |
| 21-25 | 12 | 22,2 | 66,6 |
| 26-30 | 10 | 18,9 | 85,1 |
| 31-35 | 6 | 11,2 | 96,3 |
| 36-40 | | | |
| 41-45 | 2 | 3,7 | 100 |
| 46-50 | | | |
| | 54 | 100,- | |

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TABLE 3

Frequency distribution of Pb in stream sediments:

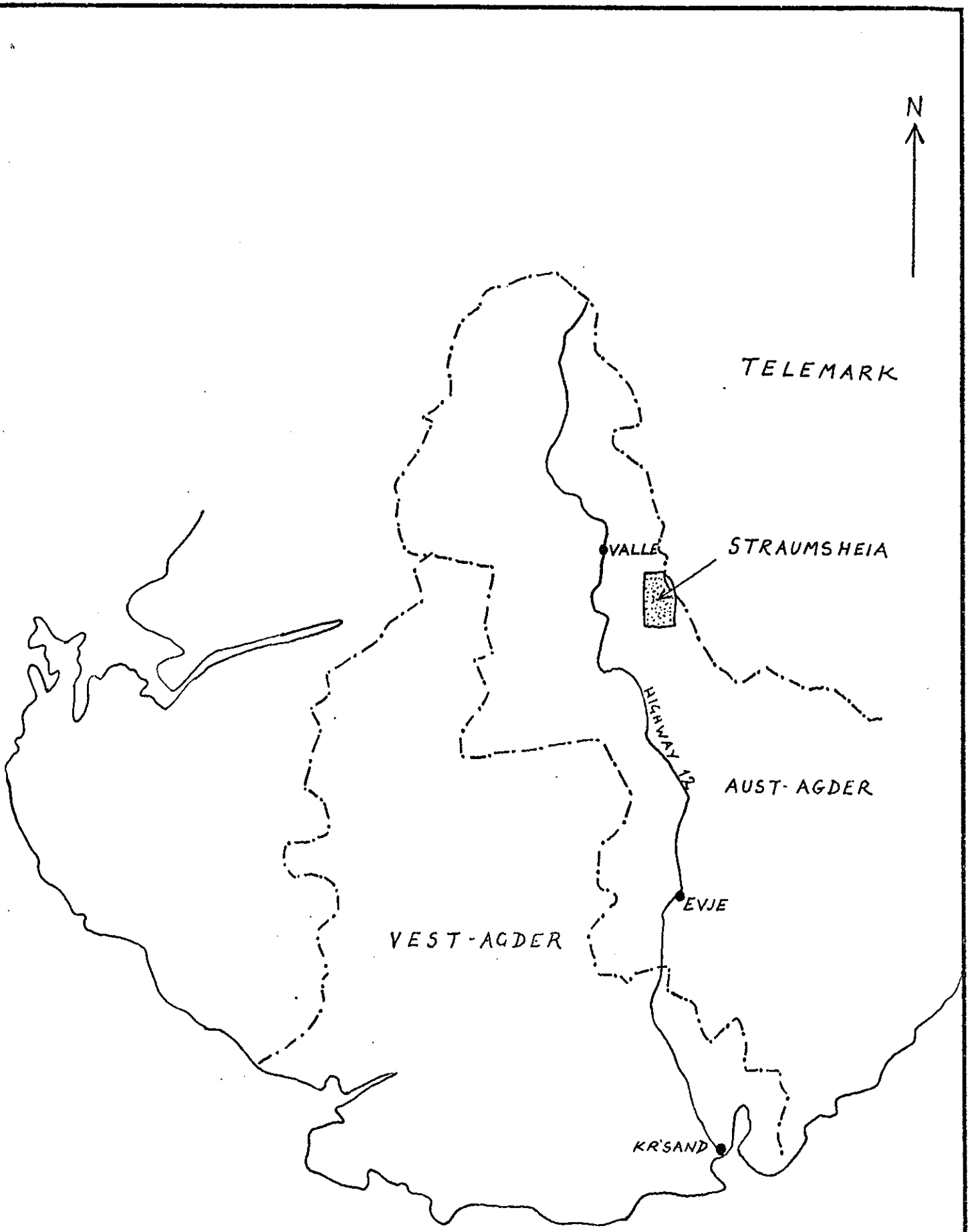
| ppm | f | %f | % f |
|---|---|---|---|
| 1 - 5 | | | |
| 6 - 10 | 9 | 16,7 | 16,7 |
| 11- 15 | 16 | 29,8 | 46,5 |
| 16- 20 | 15 | 27,8 | 74,3 |
| 21- 25 | 3 | 5,55 | 79,8 |
| 26- 30 | 7 | 12,9 | 92,7 |
| 31- 35 | | | |
| 36- 40 | 3 | 5,55 | 98,2 |
| 41- 45 | | | |
| 46- 50 | 1 | 1,9 | 100,1 |
| | 54 | 100,1 | |

## CONCLUSIONS AND RECOMMENDATIONS

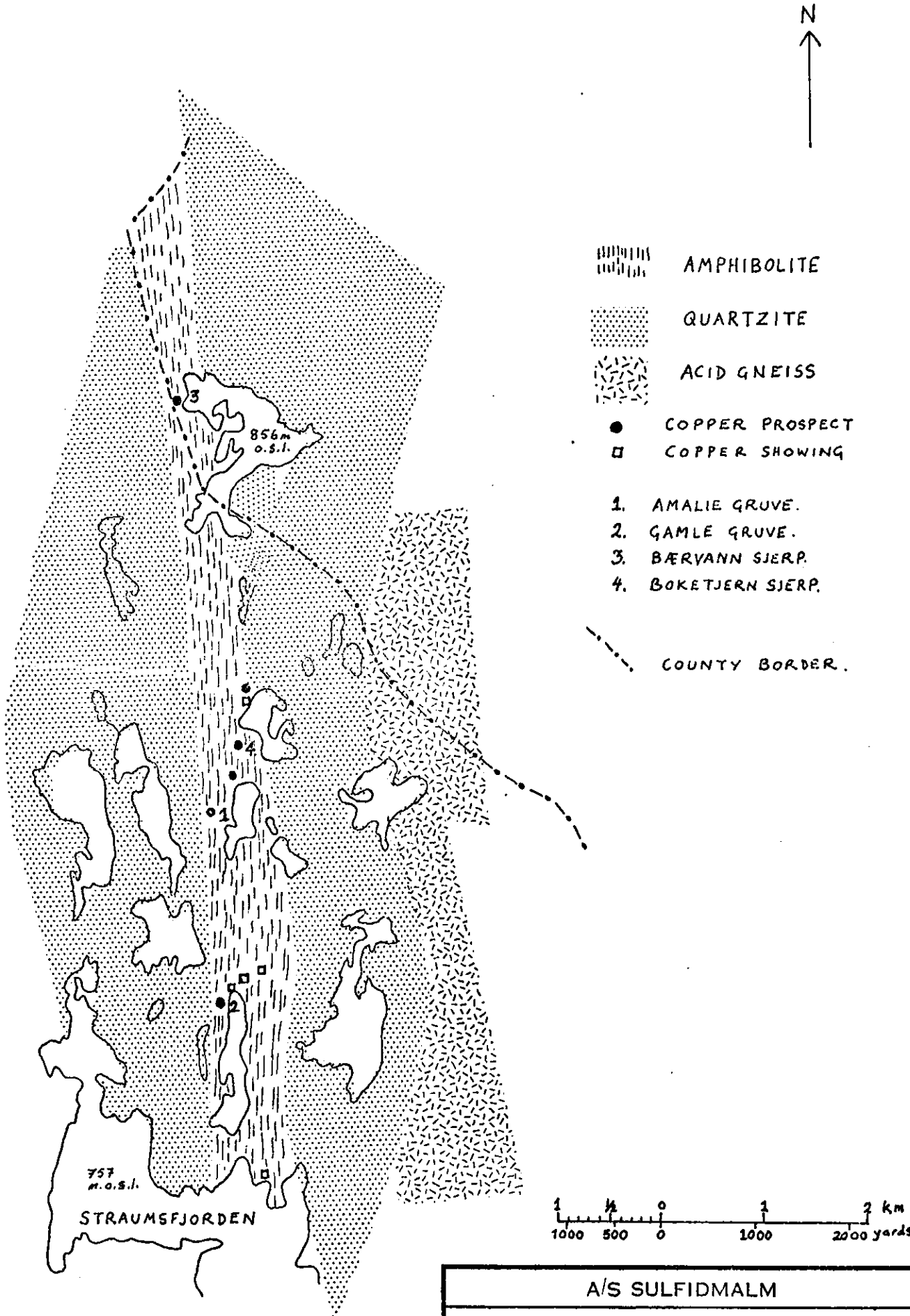
Small high gradee copper deposits are associated with pegmatite veins that are situated in amphibolitic rocks. The small amount of ore material and their limited mode of occurrence does not give any justification for economic explpitation of these deposits.

No further work is recommended.

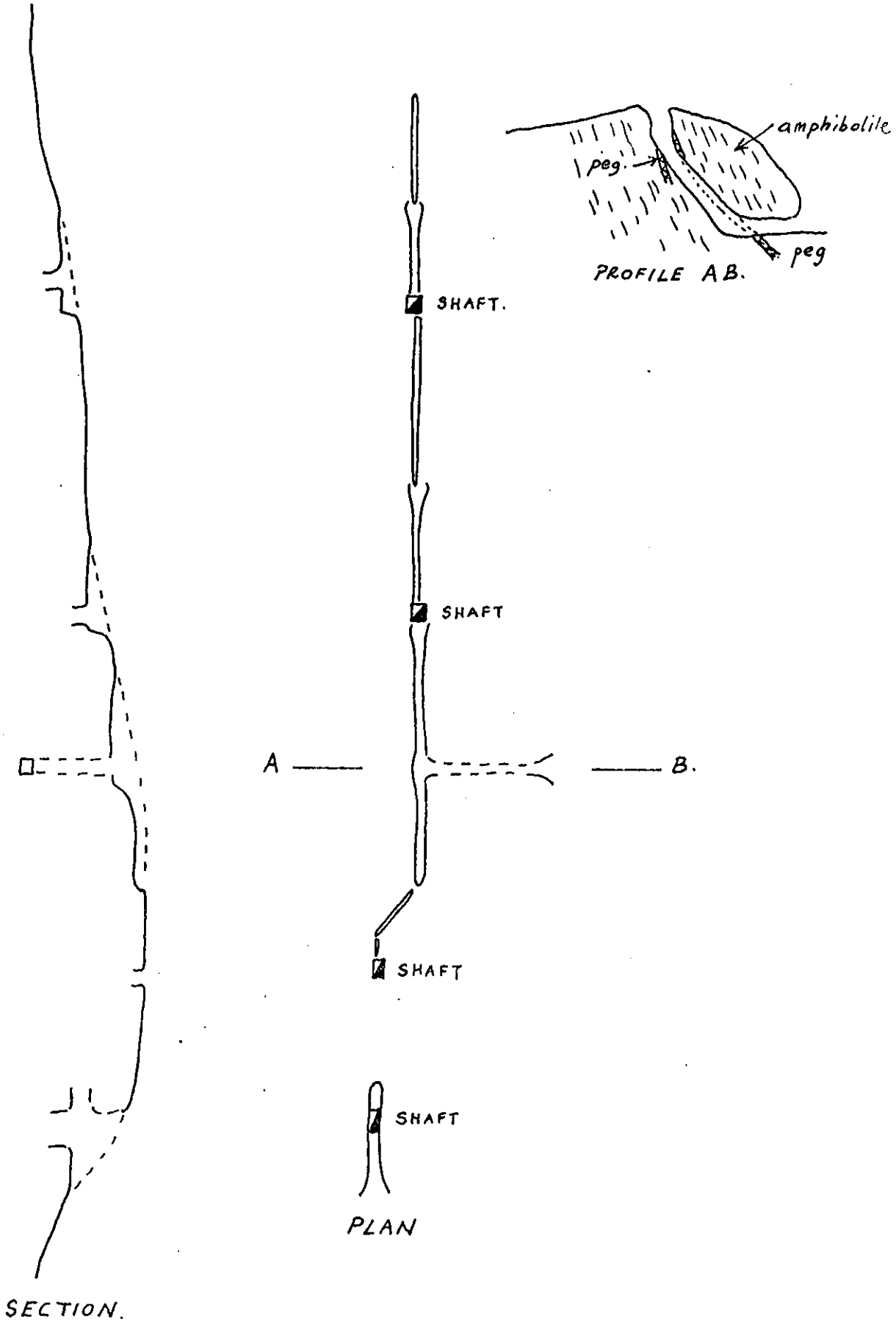
JRG pp F. Nixon



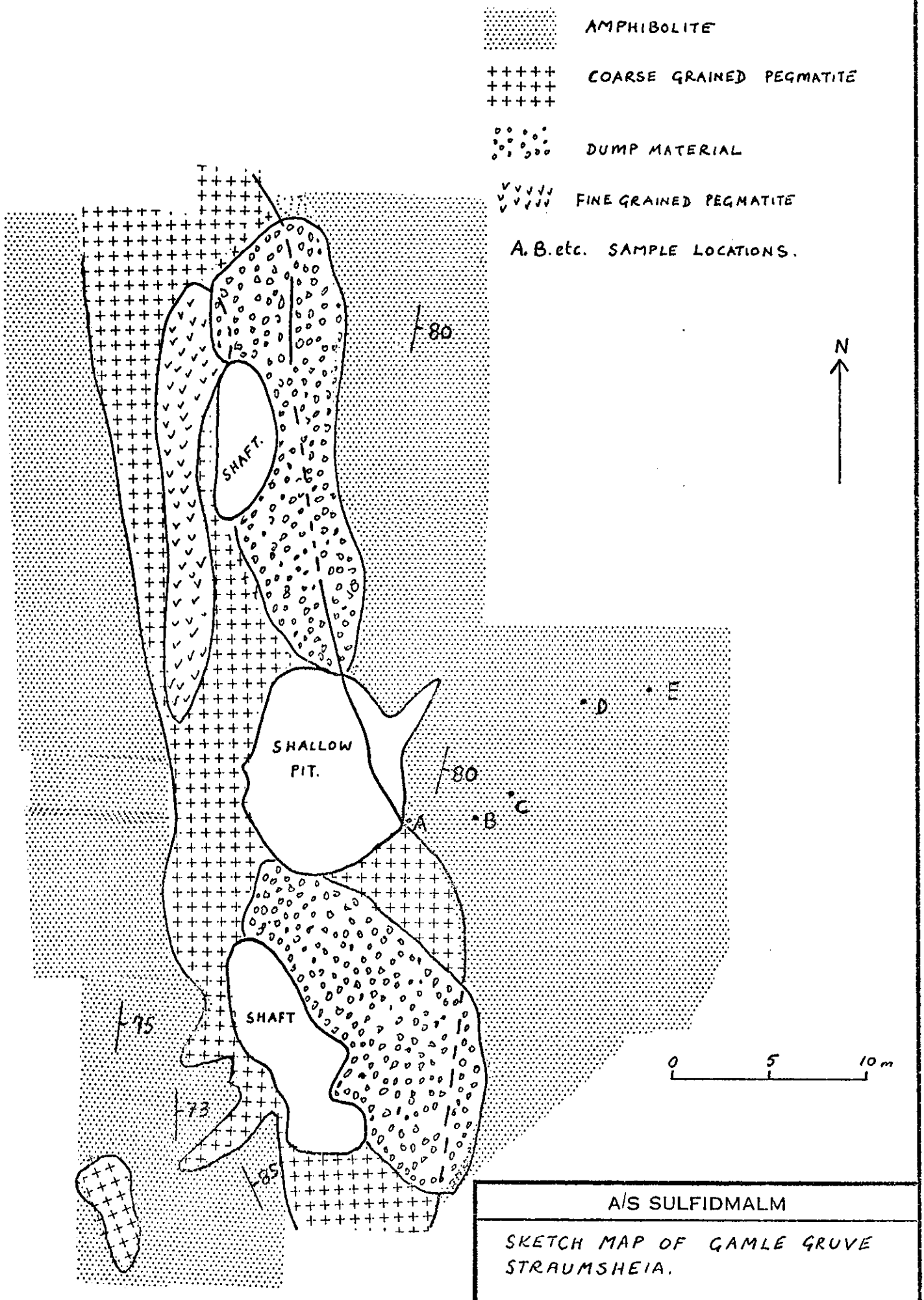

| A/S SULFIDMALM | |
|---|---|
| LOCATION MAP<br>STRAUMSHEIA<br>AUST AGDER NORWAY<br>FIG. 1. | |
| SCALE 1:1 mill | DRAWN F.N. |
| DATE OCT. 1971 | TRACED F.N. |




| A/S SULFIDMALM | |
|---|---|
| GEOLOGICAL SKETCH MAP FROM STRAUMSHEIA SHOWING MAIN ROCK TYPES AND COPPER SHOWINGS. FIG. 2. | |
| SCALE 1 : 50,000 | DRAWN F. N. |
| DATE OCT. 71. | TRACED F. N. |




| A/S SULFIDMALM | |
|---|---|
| SKETCH MAP OF WORKINGS AT AMALIE GRUVE STRAUMSHEIA<br>FIG. 3. | |
| SCALE H = 1:1000. V = 1:500 | DRAWN F. N. |
| DATE OCT. 91. | TRACED F. N. |

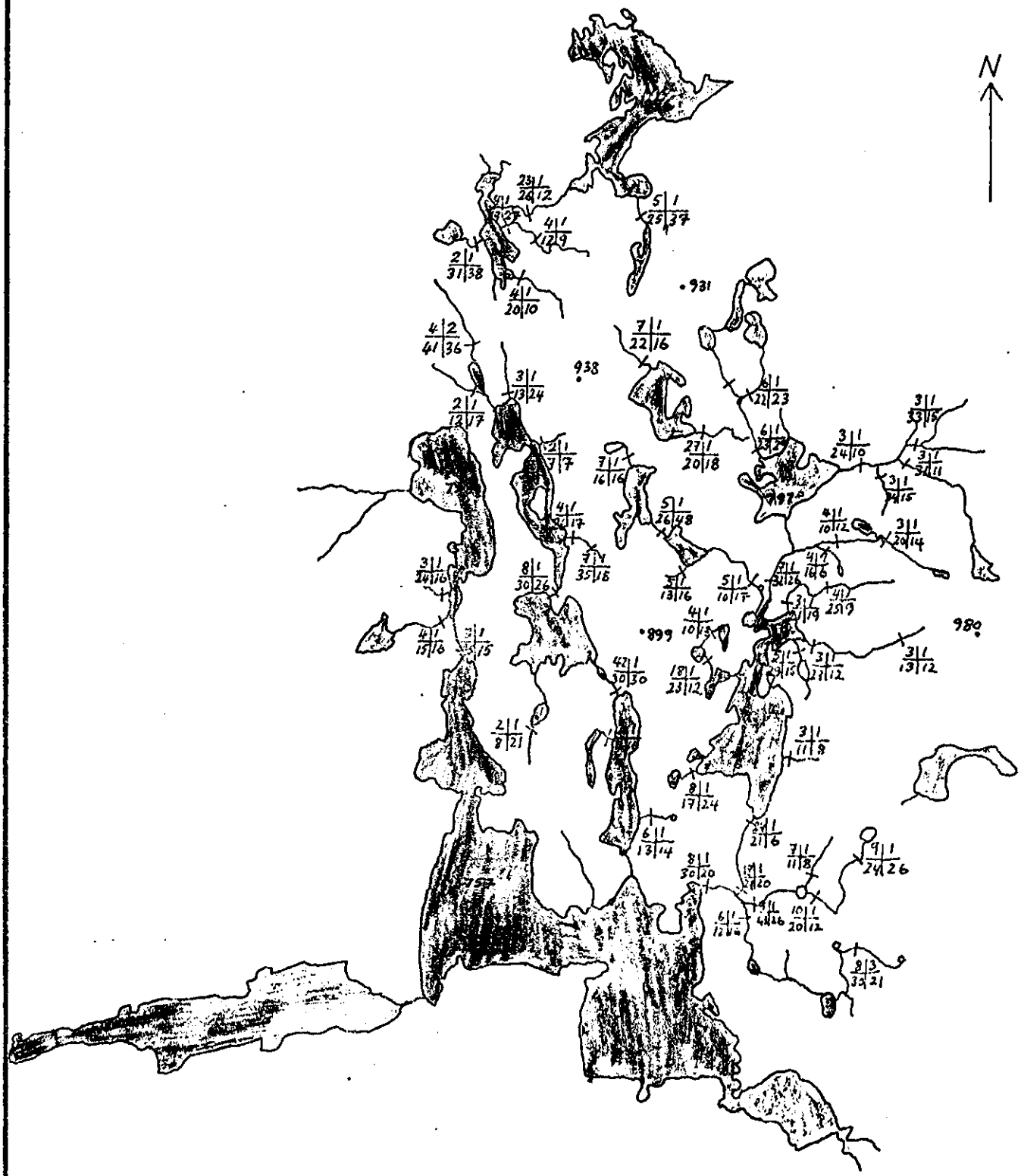



A/S SULFIDMALM

SKETCH MAP OF GAMLE GRUVE STRAUMSHEIA.

FIG. 4.

| | |
|---|---|
| SCALE 1 : 250 | DRAWN F.N |
| DATE OCT. 71. | TRACED F.N |




SAMPLE LOCATION

Cu | Mo
Zn | Pb  RESULTS IN P.P.M.

STREAM SEDIMENTS.

SAMPLED F.N. 1971

ASSAYED FOR Cu. Mo. Pb. Zn.

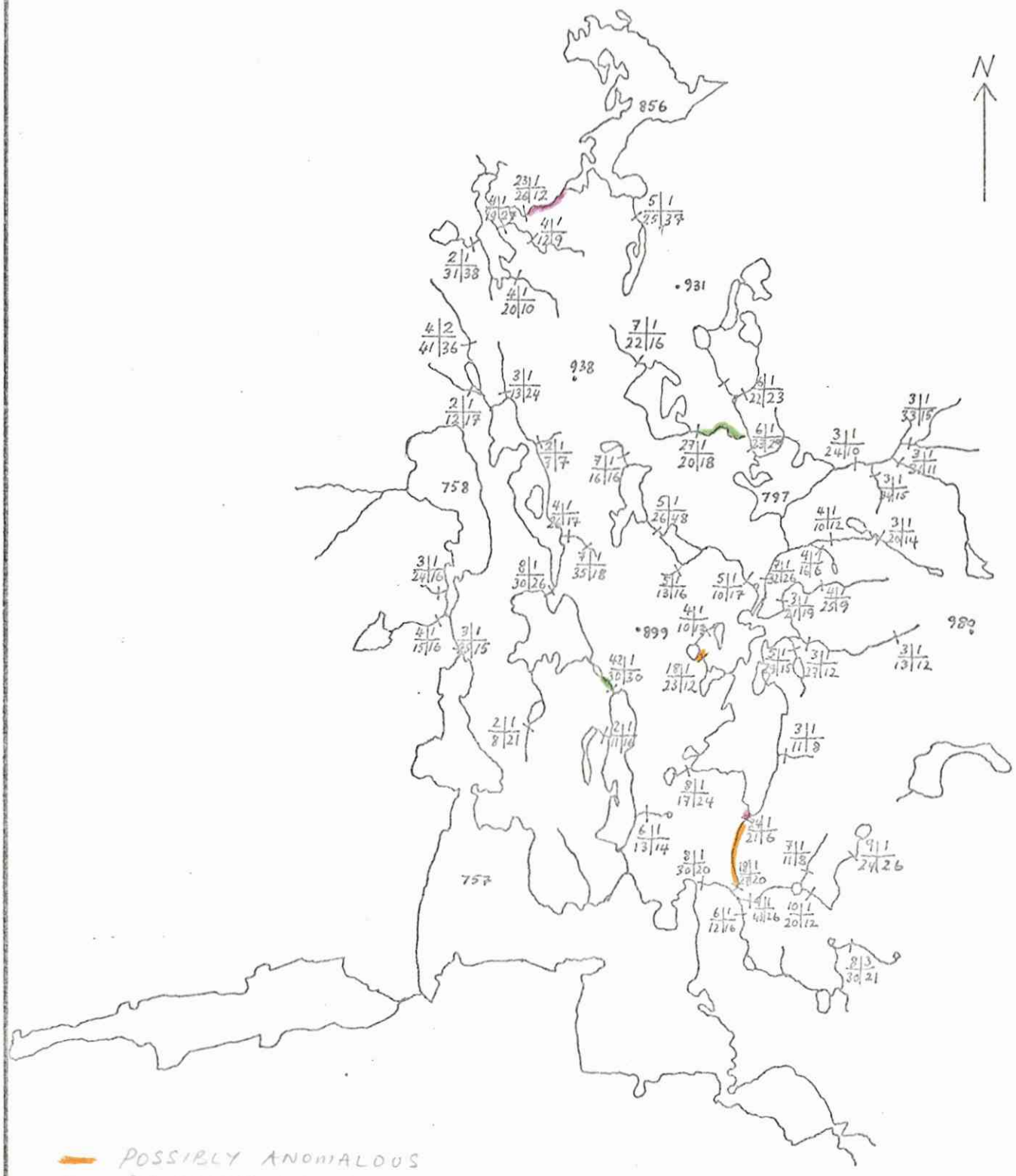
ASSAYED BY VANCOUVER

WET SIEVE -80 MESH.

A/S SULFIDMALM

FIG. 5

| | |
|---|---|
| SCALE 1:50,000 | DRAWN F.N |
| DATE OCT. '71. | TRACED F.N |




SAMPLE LOCATION

Cu | Mo
Zn | Pb  RESULTS IN P.P.M.

STREAM SEDIMENTS.

SAMPLED F.N. 1971

ASSAYED FOR Cu. Mo. Pb. Zn.

ASSAYED BY VANCOUVER

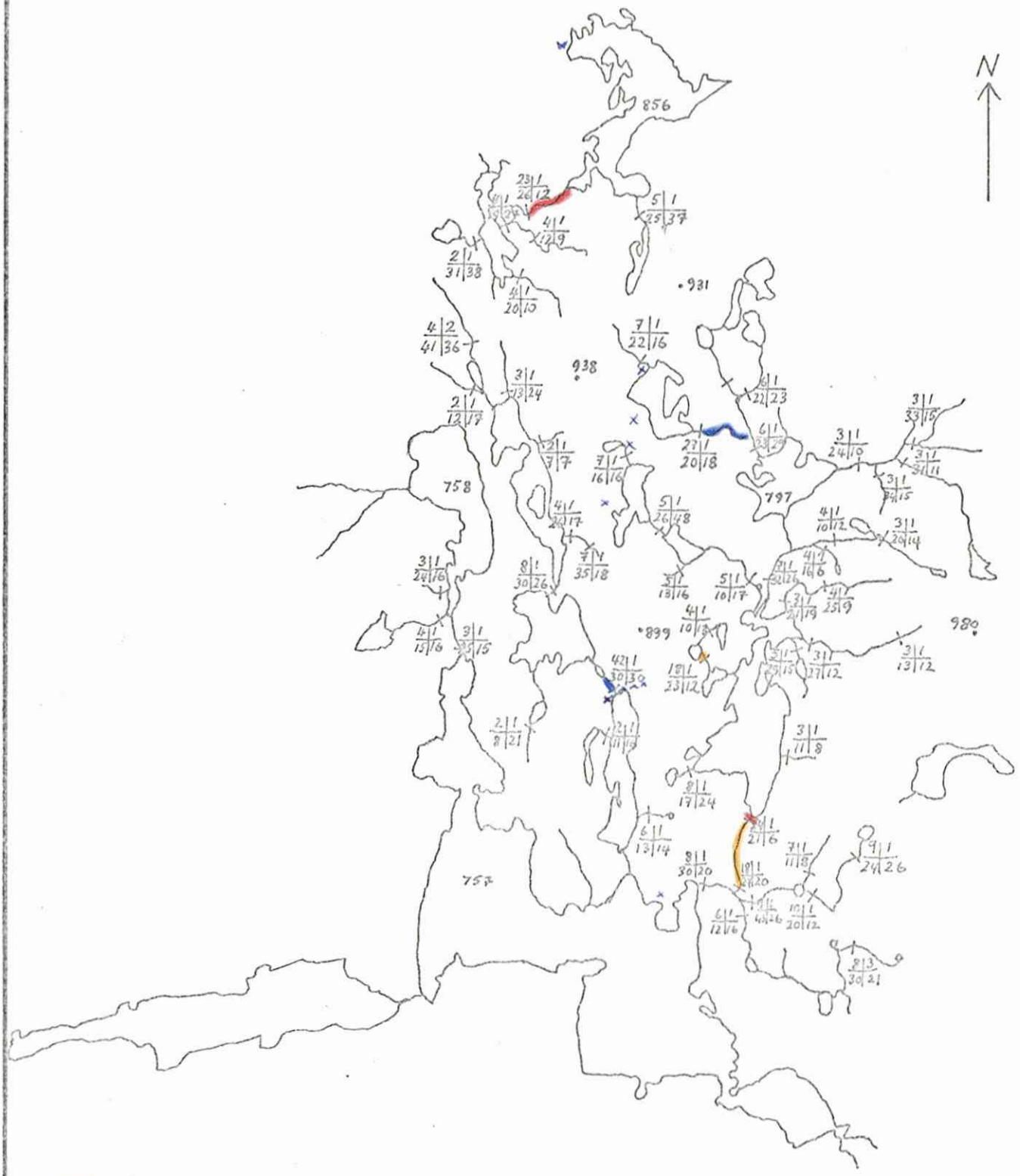
WET SIEVE -80 MESH.

# A/S SULFIDMALM

ANOMALOUS COPPER VALUES IN STREAM SEDIMENTS FROM STRAUMSHEIA

FIG. 5A

| | |
|---|---|
| SCALE 1:50,000 | DRAWN F.N |
| DATE OCT. 71. | TRACED F.N |




POSSIBLY ANOMALOUS
PROBABLY ANOMALOUS
ANOMALOUS

SAMPLE LOCATION

Cu | Mo
Zn | Pb  RESULTS IN P.P.M.

STREAM SEDIMENTS.
SAMPLED F.N. 1971
ASSAYED FOR Cu. Mo. Pb. Zn.
ASSAYED BY VANCOUVER
WET SIEVE -80 MESH.

A/S SULFIDMALM

ANOMALOUS COPPER VALUES IN STREAM SEDIMENTS FROM STRAUMSHEIA.

FIG. 5A

| | |
|---|---|
| SCALE 1:50,000 | DRAWN F.N |
| DATE OCT. 71. | TRACED F.N |