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Rapportarkivet

Bergvesenet rapport nr BV 468	Intern Journal nr	Internt arkiv nr	Rapport lokalisering Trondheim	Gradering Åpen
Kommer fra ..arkiv Falconbridge	Ekstern rapport nr Sul 210-72-13	Oversendt fra Sulfidmalm A/S	Fortrolig pga	Fortrolig fra dato:
Tittel Stream sediment geochemistry Tynset-Tyldal area				
Forfatter R Hovland		Dato 1971	Bedrift Sulfidmalm A/S	
Kommune Tynset Tolga	Fylke Hedmark	Bergdistrikt Østlandske	1: 50 000 kartblad 16191	1: 250 000 kartblad Røros
Fagområde Geokjemi	Dokument type Rapport	Forekomster Vesle Tron gruve, Tufsingdal gruve		
Råstofftype Malm/metall	Emneord Ni Cu Zn Pb			
Sammendrag				

A/S SULFIDMALM

INTER-OFFICE MEMORANDUM

Date: 20th March, 1973

To: Falconbridge Nikkelverk A/S

cc: A. M. Clarke, D. R. Lochhead,
I. Elliot

From: J. B. Gammon

Subject :

905-13, Tynset-Tyllidal area, Trondheim area, Report no. 210-72-13.

Please find attached Hovlands interpretation of assay results on stream sediment samples collected by Sulfidmalm in 1971. By the use of a "G Factor" (see p. 8 of report) he has been able to clearly define two areas with different predominating elements. Some of these anomalies have already been followed up and will be reported on shortly while other remain to be looked at during the 1973 season.

[Signature]

MOTTATT 20

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ADM. DIR.	<i>[Handwritten signature]</i>	FORSKN./UTV.	
TEKNISK DIR.		EL. LYSEAVD.	
PERSONALDIR.		M.L. AVD.	
ADM. SJEF		R. & SM. AVD.	
KJØP. AVD.		EL. TEKN. AVD.	
HOLD. K. AVD.		INSTF. AVD.	
POST. AVD.		REVISJON AVD.	

Nilsen.

FOR FALCONBRIDGE NIKKELVERK A/S

A/S SULFIDMALM

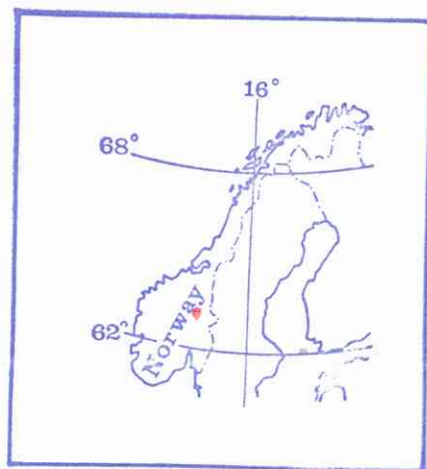
PROJECT 905-13

STREAM SEDIMENT GEOCHEMISTRY

TYNSET - TYLLDAL AREA, SUMMER 1971.

by

R. HOVLAND



BV 468

Report no. 210-72-13

INTRODUCTION.

This report presents the results of stream sediment sampling in the Tynset-Tyllidal Area in the Trondheim-Region, 1:50.000 topographic mapsheets 1619 I and 1619 II.

The sampling work was done during the summer 1971 by E. Overwien and four assistants. 840 samples were taken, and wet-sieves were used to collect the -80 mesh material. The samples were analysed for Ni, Cu, Pb and Zn by F.N.L., Vancouver.

The following maps are attached

210.72.13-01	Stream Sediments - Nickel
210.72.13-02	Stream Sediments - Copper
210.72.13-03	Stream sediments - Zinc
210.72.13-04	Stream sediments - Lead
210.72.13-05	Gen. Geology, Regional trend.

GEOLOGY.

The Tynset-Tyllidal area lays in the south-eastern part of the Trondheim-Region. Here, the Cambro-Silurian sediments overlie the rocks of the Sparagmite complex. The Cambro-Silurian sediments consist mainly of micaschists and hornblende schists. Among these schists one can find beds of leucocratic quartz-feldspar rocks and of more massive greenstones, apparently rocks of volcanic origin. Beds of limestone also occur frequently within the schists. The general strike in the area is NW, and the dip is 10-50° towards NE. A geological map of this area, was produced by NGU in 1948.

The map 210.72.13-05 shows the general geology in the sampled area, based on the mentioned geological map.

The Trondheim-Region is the main mining district in Norway with respect to sulphide-ores. Near the sampled area, one has two operating mines, A/S Follidal Verk and Røros Verk A/S, and a great number of old mines and claims.

Even if the geology in our area is similar to the geology around the mentioned mines, no ore-mineralization has ever been found in the sampled area. One of the reasons for the lacking of known deposits, could well be the heavy over-burden in this area.

TREATMENT OF DATA.

The maps 210.72.13-01 to 04 show the location of samples taken and the assay results for the different elements. The frequency distribution for each element appears from the tables below.

Table A - Frequency distribution of Ni.

<u>ppm</u>	<u>f</u>	<u>% f</u>	<u>Σ % f</u>
<5	110	13.1	.
5-9	212	25.2	38.3
10-14	236	28.1	66.4
15-19	141	16.8	83.2
20-24	68	8.1	91.3
25-29	34	4.0	95.3
30-39	22	2.6	97.9
40-49	9	1.1	99.0
≥ 50	8	1.0	100.0
	840	100.0	

Based on this, the Ni-content is regarded significant as follows:

- ≤ 24 ppm - possibly anomalous (90%)
- ≤ 30 ppm - probably anomalous (95%)
- ≤ 40 ppm - anomalous (98%)

Table B - Frequency distribution of Cu.

<u>ppm</u>	<u>f</u>	<u>% f</u>	<u>Σ % f</u>
< 5	157	18.7	18.7
5-9	244	29.0	47.7
10-14	201	23.9	71.6
15-19	97	11.5	83.1
20-24	51	6.1	89.2
25-29	33	3.9	93.1
30-39	28	3.3	96.4
40-49	10	1.2	97.6
≥ 50	19	2.3	99.9
	840	99.9	

Based on this, the Cu-content is regarded significant as follows:

≥ 25 ppm - possible anomalous (90%)
 ≥ 35 " - probably anomalous (95%)
 ≥ 50 " - anomalous (98%)

Table C - Frequency distribution of Zn.

<u>ppm</u>	<u>f</u>	<u>% f</u>	<u>Σ % f</u>
< 20	99	11.8	11.8
20-39	204	24.3	36.1
40-59	196	23.3	59.4
60-79	132	15.7	75.1
80-99	76	9.0	84.1
100-119	39	4.6	88.7
120-149	42	5.0	93.7
150-199	33	3.9	97.6
200-299	11	1.3	98.9
> 300	8	1.0	99.9
	840	99.9	

Based on this, the Zn-content is regarded significant as follows:

≥ 125 ppm - possible anomalous (90%)
 ≥ 160 ppm - probably anomalous (95%)
 ≥ 200 ppm - anomalous (98%)

Table D - Frequency distribution of Pb.

<u>ppm</u>	<u>f</u>	<u>% f</u>	<u>$\leq$ % f</u>
<5	72	8.6	8.6
5-9	232	27.6	36.2
10-14	276	32.9	69.1
15-19	120	14.3	83.4
20-24	66	7.8	91.2
25-29	38	4.5	95.7
30-39	12	1.4	97.1
40-49	7	0.8	97.9
≥ 50	17	2.0	99.9
	840	99.9	

Based on this, the Pb-content is regarded significant as follows:

≥ 24 ppm - possible anomalous (90%)
 ≥ 30 ppm - probably anomalous (95%)
 ≥ 50 ppm - anomalous (98%)

DISCUSSION OF RESULTS.

The highest assayed values were 80 ppm Ni, 165 ppm Cu, 430 ppm Zn and 142 ppm Pb. 50% of the samples show less than 12 ppm Ni, 10 ppm Cu, 50 ppm Zn and 12 ppm Pb. These figures are (for Ni and Cu) very similar to the figures A/S Folldal Verk got with their stream sediments sampling in the old mining area to the north of our area. In our area we have, however, considerably higher zinc and lead values.

The sampled area is divided into squares, and the following table on the maps shows the number of anomalous values within the different squares.

Table E - Anomalous values.

square	Ni			Cu			Zn			Pb			Total			
	Po.A	Pr.A	A	Po.A	Pr.A	A	Po.A	Pr.A	A	Po.A	Pr.A	A	Po.A	Pr.A	A	T
A	4	1	1		2		6	3	3	2			12	6	4	22
B	3		1		1								3	1	1	5
C	1						4		1	3			8		1	9
D		1	1				2	1		2	1		4	3	1	8
E				1									1			1
F	5	3	3	3	2	4				1			9	5	7	21
G	2			3	2	1	2		5	1		3	8	2	9	19
H	3	1		3	1								6	2		8
I	3			1			1	1		1	1	1	6	2	1	9
J								1			1			2		2
K				4		5		2		3	2	1	7	4	6	17
L	2	4	2	3	2	1				1			6	6	3	15
M	4	3	3	2	1	1	3	3		3			12	7	4	23
N	2				1		5	5	2		3	2	7	9	4	20
O				1	4	3	1	2	1		1	1	2	7	5	14
P																
Q																
R				2									2			2
S	7	7	8	8	6	1	5			4	5		24	18	9	51
T		1		1	1		2	1	2				3	3	2	8

square	Ni			Cu			Zn			Pb			Total			
	Po.A	Pr.A	A	Po.A	Pr.A	A	Po.A	Pr.A	A	Po.A	Pr.A	A	Po.A	Pr.A	A	T
U				2		1			1	1	2		3	2	2	7
V					3			1	1		1	2		5	3	8
W																
X	1	1	1				1		1	2	1		4	2	2	8
Y				5	1	2	5	5	2	7	4	3	17	10	7	34
Z	1			1			4			3			9			9
Æ										1		1	1		1	2
Ø							1			3	2		4	2		6
A				1									1			1

The known deposits in the north-eastern part of the mapsheets have an oremineralization consisting of pyrite (py), pyrrhotite (po) and chalcopyrite (cp). At Vesle-Tron, the pyrrhotite was Ni-bearing.

Within the sampled area, one has found zones with impregnations of pyrite, pyrrhotite and chalcopyrite. East of the sampled area, one has an old mine, Tufsingdal grube, with a mineralization of sphalerite (sp) and galena (g).

If one looks at the total sum of anomalous values for each square and takes the distribution of these values for each element, one can suspect that different ore-minerals are the reason for the anomalies (table F).

Table F - Distribution of the anomalous values for each element.

square	total no.	Ni-val %	Cu-val %	Zn-val %	Pb-val %	Geology	Possible ore-min.	G-Factor
A	22	27	9	55	9	fyllite/ sparagm.	sp, po	- 28
B	5	80	20	0	0	fyllite	po, cp	+ 100
C	9	11	0	56	33	fyllite	sp, gl	- 78
D	8	25	0	37,5	37,5	fyllite/ sparagm.	sp, gl	- 50
E	1	0	100	0	0	fyllite	cp	+ 100
F	21	52	43	0	5	fyllite	po, cp	+ 90
G	19	10	32	37	21	fyllite	sp, cp	- 16
H	8	50	50	0	0	fyllite	po, cp	+ 100
I	9	33	11	23	33	fyllite/ sparagm.	po, gl	+ 12
J	2	0	0	50	50	fyllite/ sparagm.	sp, gl	+ 100
K	17	0	53	12	35	h.bl.sch./ sparagm.	cp, gl	- 6
L	15	53	40	0	7	fyllite	po, cp	- 86
M	23	43	18	26	13	fyllite	po, sp	- 12
N	20	10	5	60	25	fyllite	sp, gl	+ 70
O	14	0	57	29	14	h.bl.schist/ sparagm.	cp, sp	- 14
R	2	0	2	0	0	fyllite/ h.bl.schist	cp	- 100
S	51	43	30	10	17	fyllite	po, cp	- 46
T	8	12	25	63	0	fyllite	sp, cp	+ 16
U	7	0	43	14	43	h.bl.schist/ sparagm.	cp, gl	+ 14
V	8	0	38	24	38	granite/ sparagm.	cp, gl	+ 24
X	8	38	0	24	38	fyllite/ sparagm.	po, gl	+ 24
Y	34	0	24	35	41	fyllite/ sparagm.	sp, gl	+ 52
Z	9	11	11	45	33	fyllite/ sparagm.	sp, gl	+ 56
Æ	2	0	0	0	100	granite/ sparagm.	gl	+ 100
Ø	6	0	0	17	83	sparagm.	gl	+ 100
Å	1	0	100	0	0	granite/ sparagm.	cp	- 100

The distribution of the anomalous values shows clearly that one has two main zones in the area, a western one where Ni, Cu dominates and an eastern one where Zn,Pb dominates. The attached map 210.72.13-05 shows these zones. The contour-lines separating the squares are based on the calculated values in the final column of table F where one has "Factor G" which is set as equal to:

$$G = \frac{(Ni_a + Cu_a) - (Zn_a + Pb_a)}{T_a} \times 100$$

where Ni_a = number of anomalous Ni values/square

Cu_a = " " " Cu " "

Zn_a = " " " Zn " "

Pb_a = " " " Pb " "

T_a = total number of anomalies/square.

Within the Zn,Pb zone there is a local zone where the Ni,Cu factor seems to dominate. The reason for this is the high number of Cu-anomalies in this area. No Ni-anomalies were observed here. Together with these Cu-anomalies, there are also a high number of Pb-anomalies. This zone lays almost on the border between fyllite and sparagmite/granite.

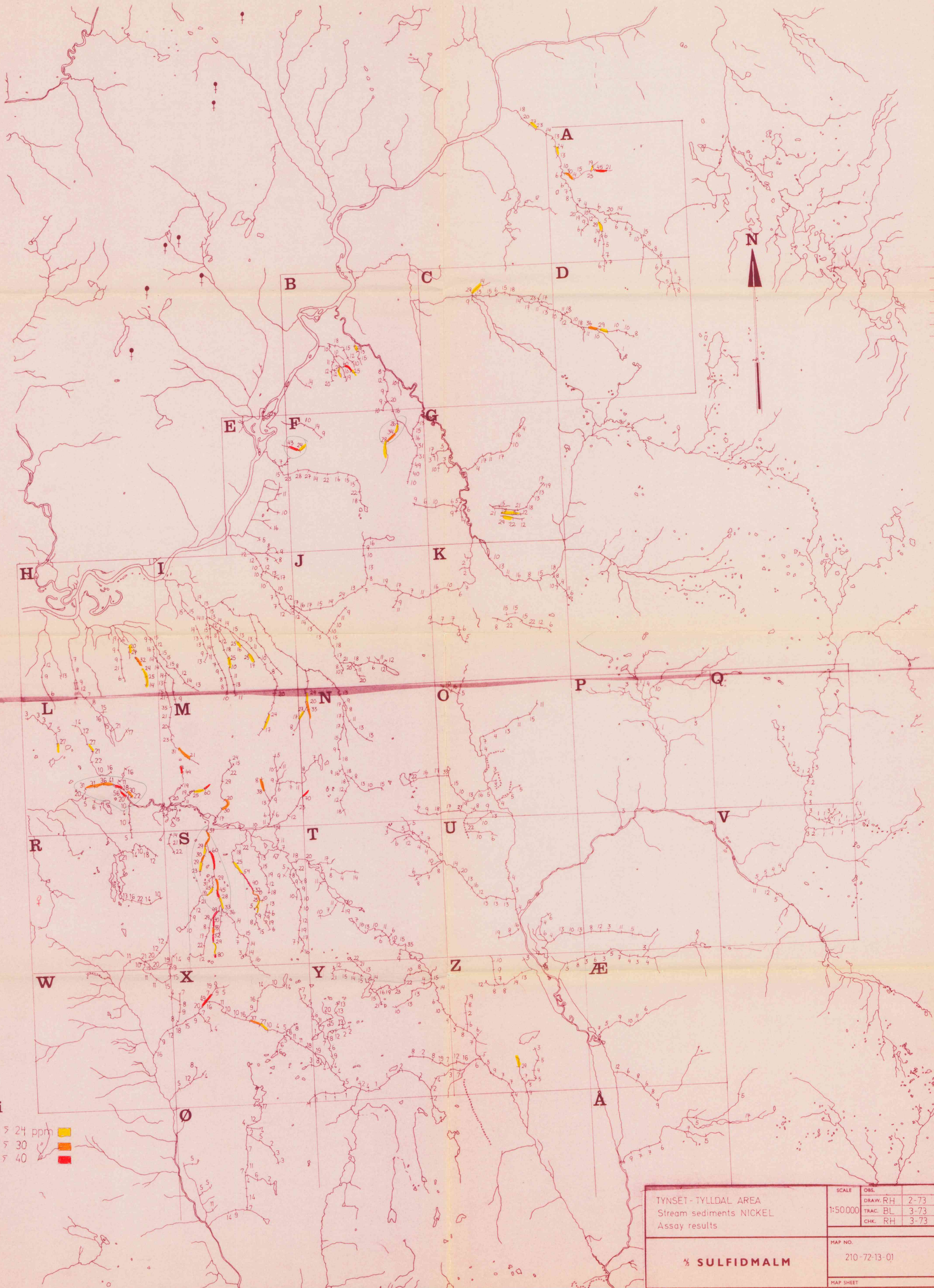
The sampled area, and therefore the Ni,Cu zone, is limited by the river Glomma. On the north-western side of Glomma, one has known deposits of pyrite, pyrrhotite and chalcopryrite. One has, therefore, reason to believe that the anomalies within the Ni,Cu zone could be caused by similar mineralization. Vesle-Tron claim, containing chalcopryrite and Ni-bearing pyrrhotite, also lays in the south-western part of our Ni,Cu zone. The Zn,Pb zone is associated with rocks which appear to underlie those rocks associated with the Ni-Cu anomalies. Most of the Zn,Pb anomalies occur near the border between hornblende-schists-fyllites and sparagmites-granites. The Tufsingdalen Zn, Pb, Ag-mine, east of our area, lies in the same geological position. In the basal conglomerate between sparagmite and the precambrian granite, one has Pb and Cu-anomalies which can be caused by a similar mineralization in the conglomerate.

CONCLUSIONS - RECOMMENDATIONS.

1. The Ni-Cu anomalies within the Ni,Cu zone can be caused by similar mineralizations to that northwest of Glomma and at Vesle-Tron. The squares F, M and S seem to be the most promising for follow-up work with geological mapping, soil sampling and geophysics. Stream-sediments should also be sampled along streams near Glomma north-east of our area.
2. The Zn-Pb anomalies within the Zn-Pb zone can be caused by mineralizations similar to Tufsingdalen mine. The squares G, K and Y seem to be the most promising for follow-up work similar to that recommended above. Stream-sediments should be sampled east of our area where the geological map shows border-zones between fyllite-hornblendeschists and sparagmites.

In the summer of 1972, follow-up work was done in square G. The results will be presented in a separate report.

3. The Pb-, Cu-anomalies associated with the basal-conglomerate in squares V and E could be caused by Pb,Cu mineralization in the conglomerate similar to that known several other places in Norway and Sweden, along the border between Precambrian and Focambrian rocks. Follow-up work including geological mapping, soil sampling and geophysics should be done around these anomalies. Stream sediments should also be sampled in areas east of ours where the geological map shows other zones of basal conglomerate.



Ni
poss. > 24 ppm
prob. > 30
an. > 40

TYNSET - TYLLDAL AREA
Stream sediments NICKEL
Assay results

1/2 SULFIDMALM

SCALE	OBS.	
1:50,000	DRAW. RH	2-73
	TRAC. BL	3-73
	CHK. RH	3-73
MAP NO.		
210-72-13-01		
MAP SHEET		

KEY

Geology

- TRONDHEMITE
- TRONFJELL GABBRO
- HORNBLende SCHISTS AND DIABAS
- FYLLITE (RØROS GROUP)
- SPARGMITE
- EOCAMBRIAN
- QUARTS CONGLOMERATE
- PRECAMBRIAN
- GRANITE
- OLD MINE, OR CLAIM

Geochemistry

- Ni/Cu zone
- Pb/Zn zone
- 28 G-factor
- Border between zones
- $G = \frac{(Ni_4 + Cu_4) - (Zn_4 + Pb_4)}{100}$
- Ni_4 = number of anomalous Ni values/square
- Cu_4 = " " " "
- Zn_4 = " " " "
- Pb_4 = " " " "
- T_4 = total number of anomalies/square

N



TYNSET-TYLLDAL AREA
Geological map-Regional trend

% SULFIDMALM

SCALE	OBS.	
1:50000	DRAW. RH	
	TRAC. BL	3-73
	CHK. RH	3-73

MAP NO.
210-72-13-05

MAP SHEET