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Råstofftype Malm/metall	Emneord Ni Cu Co Fe Zn S Cr			
Sammendrag				

A/S SULFIDMALM

Report

from

A combined geological- geochemical reconnaissance near Tronfjell in the Tynset-Alvdal area, Hedmark county, Norway.

August 3rd-8th, 1970

By: E. Overwien

A/S SULFIDMALM
INTER-OFFICE MEMORANDUM

Date : 1. juli , 1971
To : R. Jahnsen
cc :
From : J.B. Gammon
Subject :

Mottatt - 5 JUL 1971		Beh.	Ark.
Autor.	✓		
Kir. og/			
Skjenn.			
Innsl.			
Bekl.			
Saksbearb.			
2			

Tronfjell rekognosering - august 1970

Vennligst finn vedlagt Overwiens rapport angående den geologiske og bekkesediment geokjemiske rekognosering som ble foretatt av ham og Jacobsen sist sommer.

De vil bemerke at de gjenfant en gammel nikkel forekomst og fikke noen interessante anomali soner fra den geokjemiske rekognosering. På side 13-14 trekker Overwien opp hovedlinjene for det "follow up" program som begynte den 8. juni.



Vedl.

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1. Geological observations						Scale 1:25,000
2. Stream sediments from Tronfjell area	Ni.	"	"	"	"	"
3. " " " " "	Co.	W	"	"	"	"
4. " " " " "	Cu.	"	"	"	"	"
5. " " " " "	Zn.	"	"	"	"	"

1. INTRODUCTION

The report deals with a geological and geochemical reconnaissance in the Tronfjell area between Alvdal and Tynset in Hedmark county of Norway, and took place August 3-8 1970 under excellent weather conditions. The work was carried out on behalf of A/S Sulfidmalm by Jan Jacobsen and E. Overviken from the Nikkelverk in Kristiansand, the former mainly collecting stream sediments and the latter mainly carrying out geological reconnaissance and investigating some of the old mines and prospects in the area.

Tronfjell, which is a 1666 m high mountain, consisting of gabbro and with its top approximately 1200 m above the surrounding valleys, is a dominant and famous topographic feature in the scenery in this part of the country. It is situated approximately 30 km E of the Folldal mines and 50 km SW of the old mining town of Røros.

Some old copper mines are known to be located some distance up the mountain sides. By comparison with maps of mines and prospects seen in files at NGU in Trondheim, and available geological maps, one gets the impression that some of the mines are situated in gabbro close to the contact with the surrounding meta-supracrustals. It was therefore decided to carry out a reconnaissance in the area.

2. COMMUNICATIONS etc.

Access to the area which is situated 250 km N of Oslo and 50 km SW of Røros is excellent. One of the railroads Oslo-Trondheim passes through Østerdalen on the west side of the mountain as does a main road. To the east one of the main roads runs between the same towns, and there is also a road which leads to a TV and FM transmitter on top of the mountain. The area investigated is covered by the AMS maps 1819 II Tyldal and 1819 III Alvdal.

Accommodation is usually available, except for the main tourist season.

The travelling from Kristiansand to Alvdal and Tynset took place with the writer's own VW 1300.

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2. PREVIOUS INVESTIGATIONS

a) Geology

The most recent publication from this area followed by a geological map in scale 1: 100.000 is

NGU 175 TYNSET by P. Holmsen and G. Holmsen (1950). It covers the eastern part of the area of interest, while the western is described and accompanied by a map in scale 1:100.000 in

NGU 145 FOLDAL by Wolmer Marlow (1935). Other publications of interest referred to by P. And G. Holmsen are:

A.E. Tønnebohn: Några notiser om Sälakinnen och dess närmaste omgivning. G.F.F. bd. 14, 1, 1892 and Grunddragen af Det centrale Skandinaviens bergbyggnad, 1896.

P. Holmsen: NGU 158. Geologiske og petrografiske undersøkelser i området Tynset-Femunden, 1943.

At the moment a mapping program in the eastern part of the Trondheim region of the Caledonides between Foldal and Røros is being carried out by geologists and students from the University of Oslo under guidance of Professor Jens A.W. Bugge. The program is mainly based on thesis works (hovedfagsoppgave) and is sponsored by Foldal Verk A/S, A/S Røros Kobberværk and Killingdal Grubeselskap. In the Alvdal-Tynset area mapping has been concentrated to the west side of the river Gløma to follow the main greenstone belt which is the most favourable hostrock for Cu-Zn mineralization, in this area.

A German geologist has recently taken a Ph.D. degree on Tronfjell (probably sponsored by Foldal Verk as well) and it will probably be published within the next few years.

Two years ago a geologist from NGU collected samples from the various deposits around Tronfjell in order to complete the ore collection and carry out some mineralogical work.

b) Mining and Exploration

Mining activity started around 1780 on the copper deposits west of Tronsvangen on the southwest slope of the Tronfjell Massif. The main production started around 1880 when several other deposits near Gamle Tron Mine were discovered, of which St. Knut's Mine and Tjæremyr Mine were the most important.

The only information available at the A/S Sulfidmalm file on these deposits are reports by the Minister of Mines during the period 1887-1907 which have been copied from the Mining file of NGU in Trondheim. According to the reports, the mines had been developed to a depth of 40 m. Between 1885 and 1893 St. Knut's Mine produced 721,7 t of hand sorted ore with 8% Cu, which was shipped to the

smelter at Røros.

The other deposits: Tronslie, Håbet, Tronshvelvet and Ny Trond were probably discovered and mined around the First World War. Of these Tronshvelvet is said to have had the largest production which the others after the writer's judgement hardly exceeded the development stage.

In 1969 NGU carried out an IP survey for Follidal Verk A/S around St. Knut's Mine, and during our reconnaissance in August 1970 a Turan survey was taking place in the same area. An older grid net with pickets were also seen to the north-east of Tronslien Mine.

4. OWNERSHIP

Until August 1970 only two points near Tronfjell were staked (muted). Follidal verk A/S has one point at Ny Tron Mine and one by Tronsvangen (probably St. Knut's Mine).

On the 7th September 1970 A/S Sulfidmalm staked (annelde) 5 points near Vesle Tron on the north side of the Tronfjell massif where there are indications on nickeliferous pyrrhotite mineralization.

5. GEOLOGICAL SETTING

Tronfjell is located in the southern part of the central Caledonian mountain belt of Norway called the Trondheim region (Tronheimsfeltet). The local geological formation of probably Ordovician age is to the south and east underlain by low metamorphic Eocambrian rocks (Sparagmites).

According to P. Holmsen who mapped the area during the beginning of the second World War, Eocambrian arcoses and tillites are locally resting concordantly upon the underlying Precambrian rocks mainly consisting of granites with inclusions of various basic rocks. Allocthonous above these formations follow strongly foliated sparagmites, augen gneisses, phyllites with quartz-mica schists and amphibolites. The latter formation is believed to have been overthrust the former from NW, where the central part of the Caledonian range is located. The amphibolites greenstones are mainly believed to be partly of intrusive and partly of extrusive origin.

Tronfjell is an isolated gabbroic phacolite or plug with a diameter of approximately 5 kms. It is surrounded by quartz-mica

schists and mainly foliated amphibolites with inward dips of 30° - 60°.

According to Holmsen, the contact rocks have a higher degree of metamorphism than other rocks in the vicinity, giving an impression of a gabbro massif surrounded by a contact zone. Garnetiferous mica schists are observed near Tronkalven.

Holmsen describes the Tronfjell massif as a partly differentiated gabbroic phacolite with local variations from peridotite and anorthosite to common gabbro - the latter being the dominant rock type. He states that dunites occur as small bodies as well as in irregular dykes within the gabbro. Anorthosite has only been observed in boulders.

The most common rock types are olivinegabbro and normal gabbro with monocline pyroxene, the latter differing from the former by absence of olivine. There also occur small amounts of a type containing both monocline and rhombic pyroxene without olivine.

Most of the massif is fairly fresh, but Holmsen also mentions smaller parts of altered gabbros and olivine gabbros, which he describes as saussurite gabbros. Smaller massifs and dykes of similar altered gabbros occur within the surrounding foliated rock, especially on the north and east side. The Sulfidmalm reconnaissance concentrated mainly on tracing the approximate contact of the massif and not so much on the petrology. The exposed parts of ultramafics seen within it, were maximum 40 m long and 20 m wide with the contacts covered. Only oxides and no sulphides were observed macroscopically in the locally heavily serpentinized bodies. Minor bodies near the contact of the massif N of Tronsvangen have been quarried for talc.

The writer got the impression that the gabbroic rocks are getting more finegrained as well as more tectonized near the contacts of the main massif. Accessory sulphides were observed locally near the contacts, but also in the interior parts of the massif.

A distinct structural feature runs NW-SE along the north-east side of the Tronfjell massif. It shows up very clearly on the aerial photographs, and outcrops of a mylonitic rock were observed along it. A few prospect pits are sunk in a nickeliferous pyrrhotite mineralization a few hundred metres NE of it, and the area also contains anomalous Ni and Co values in the stream sediments.

6. Mineralization

All the mineralized zones seen in the area occur within the country rocks of the massif from a few hundred metres to 1500 metres from the supposed contact.

A. Old mines near Tronsvangen to the south of the massif

Gamle Tron Mine, St. Knut Mine and Tjaremyr Mine are all located within a phyllonitic variety of the quartz-sericite schist approximately 1500 m to the south of the Tronfjell massif. The old workings were visited during the nights since mapping and a Turan survey were carried out by a crew from Folldal Verk during the day.

St. Knut Mine is located along an intensely folded and sheared zone which is mineralized with mainly pyrrhotite and chalcopyrite as massiv pods, veins and stringers. Quartz and carbonate are gangue minerals. The zone which seemed to be at least 2 m wide strikes approximately EW and dips up to 27° towards N. Fold axis plunges up to 30° towards W. Two shafts and one trench were observed.

Gamle Tron Mine is located along a weaker and parallel and similar structure approximately 100 m NW of the former. Strike and dip directions seem to be more consistent and the dip is steeper - up to 55° .

Tjaremyr Mine is situated approximately 500 m W of the two other mines and probably along the same structure as St. Knut Mine. A 75 - 100 m long trench, 3-4 m wide, follows an irregular mineralized shear zone or breccia striking E-W and dipping 50° N. The area between the mines are covered by swamps. Nearly 100 m further west in an area with no outcrops a vertical shaft is sunk. A mineralized sample from the surrounding on dump assayed:

	Ni %	Co %	Cu %	Fe %	Zn %	S %
Pr. 41	0.008	0.018	6,88	25,1	1,44	1 17,0

An apparently narrow pit with minor mineralized blocks around is sunk approximately 100 m S-SE of the shaft and could be St. Thomas mine.

A working called St. Olaf Mine was not located, but is supposed to be situated some 500 m E-SE of St. Knut Mine. If it is associated to the same structure, we here have an irregular mineralized zone which can be followed for at least 1100 m along the strike direction.

B. Tronslien Mine

is located in greenstone-amphibolite in the steep slope S of Nordkletten approximately 700 m N of the formerly mentioned mines and the same distance from the contact of the massif.

Between a massive and a more foliated variety of the greenstone there is situated an up to 5 m wide strongly schistose zone, striking N 75 W and dipping up to 65° towards N. Along a strike length of 25 m several parallel 1 - 10 cm wide and apparently concordant lenses of dominantly massive pyrite and minor pyrrhotite and chalcopyrite were observed within this zone.

Two samples from the dump near an at least 30 m inclined shaft assayed:

	Ni %	Co %	Cu %	Fe %	Zn %	S %
Pr. 14 a	0.011	0.008	1,10	26,4	1,76	16,8
Pr. 14 b	0,026	0,006	0,13	35,3	11,3	32,0

About 40 m below the top of the shaft there is an adit which probably is contacted to the shaft.

75 m W of the mineralization near the top of the shaft the same schistose zone becomes mineralized again, mainly by pyrite. The width is up to 2 m of breccia ore. Dip is around 30° and small open folds plunging ≈ 20° towards N can be seen.

Rust can be seen in an inaccessible slope along the strike direction more than 100 m further to the west.

C. Ny Tron Mine

is located within greenstone-amphibolite near Grøtåa (a stream) on the east side of the main gabbro massif approximately 700 m from the contact. Below a fairly massive and mediumgrained variety of the greenstone follows a 2 m wide rustzone along a schistose and sheared variety with strike SW-NE and dip 30° towards NW. An adit is driven into the tectonized zone following the strike direction. Below the massive variety of the greenstone follows a 30 cm wide quartz vein, a somewhat thinner zone of massive sulphides - mainly pyrrhotite with minor chalcopyrite and the rest of the sheared zone with local disseminations of sulphides. The footwall rock is a finegrained, foliated greenstone-amphibolite.

An ore sample from the dump assayed:

	Ni %	Co %	Cu %	Fe %	Zn %	S %
Pr. 23	0,008	0,056	0,32	31,2	0,013	15,0

An other similar adit is located approximately 50 m to the SW and 25 m above, and some minor blasting has taken place in the zone 100 m further in the same direction where it seems to fade out. To the NE the mineralization is covered by overburden.

D) Vesletron Nickel Showing

On the 950 m high mountain of Vesletron (vesle = small) located below Tronfjell and to the NE, some old pits have been sunk along a mineralized zone of sulphides. No records have as yet been found on these workings. Few outcrops in the vicinity of the showing made it difficult to get a clear picture of the local geology. Very little time was spent examining the zone, but samples were collected (mainly from the dumps) and later assayed at the Nikkelverk. The pyrrhotite mineralization turned out to be nickeliferous.

The main pit (a) which is at least 5 m deep, is sunk in an approximately 5 m wide rust zone which seems to strike N 55° E and dip 45° to the east (E). The host rock is a fine-medium grained meta gabbroic rock, partly massive and partly foliated together with light and sheistose rocks of a more acid composition. Greenstones also seem to be present.

The mineralization consisted of massive pyrrhotite with some chalcopyrite as well as dissemination of mainly pyrrhotite in the meta gabbroic rock.

Approximately 85 m to the west of pit(a) there is situated a rusty outcrop and 185 m to the west a similar outcrop where minor blasting has taken place. Further to the west no outcrops are to be seen before reaching the strong NW-SE lineament with mylonitic rocks previously mentioned.

20 m to the east of pit(a) some blasting has been carried out in a rusty outcrop and another 20 m to the east an approximately 5 m wide inclined shaft or pit is sunk to probably very limited depth in a similar mineralized outcrop as (a). Further to the east and north the area is covered. This gives an approximate strike length of the zone of more than 200 m.

To the SW of the mentioned lineament the main massif rises very steeply. Outcrops in some stream valleys consist of mediumgrained gabbroic rocks with inclusions of folded graphite bearing schists with minor pyrite and pyrrhotite. It is not clear at the moment whether these gabbroic rocks represent the bearded phase of the main massif, nor is it clear whether the basic rocks at the Vesletron Ni Showing has any relationship to the Trefjell gabbro. Further work is needed to solve this important question.

A thin section of a sample of massive sulphides collected from a pit (c) \approx 40 m to the east contained approximately:

55 % Plagioclase (andesine)	37 % An, sericitized.
35 % Amphibole (actinolite ?)	
<5 % Zeisite	
2 % Opaques (sulphides)	
accessories Titanite	

The rock which is altered and tectonized can be classified as a meta diorite.

A polished section of a sample from the same pit, containing approximately 80% of massive sulphides with silicate inclusions had the following composition:

Minerals	Est. % by vol.	Grain size (mm)	
		Max.	Average
Pyrrhotite	40	0,2	0,07
Bravoite? 3/4	75	0,15	0,06
Pentlandite 1/4			
Chalcopyrite	2	0,07	
Magnetite	Accessory		

The silicate inclusions which look elongated hardly contain any sulphides.

The pentlandite occurs as separate interstitial grains in clusters irregularly distributed throughout the pyrrhotite masse. There is hardly any flamelike pentlandite to see. Approximately 57% of the pentlandite is altered to bravoite (?).

The average grain size of the pentlandite, 0,06 mm, corresponds to approximately 270 mesh (Taylor).

The following samples were analysed:

	Ni%	Co%	Cu%	Fe%	S%	S-asp. Ni.100 NI	Ni.100 po+pn+pp	Ni.100 po+ pn
Massive sulph. Pr.57a fr.pit a).	1,18	0,19	0,37	54,7	30,0	24,9	2,42	2,48
Massive sulph. Pr.57c from pit c)	0,88	0,14	0,81	34,8	18,0	19,5	2,95	3,20
Dissem. sulph. c II in meta gabbroic rock	0,18	0,018	0,11	9,6	2,4	17,6	3,41	3,73

The S/Ni ratio is not very exciting, but indicates a better ratio for the disseminated type of mineralization.

B) Other locations with minor sulphides

- a) Stream SW of Vesletron Ni Showing This locality is already described. An analysed sample containing 1,7% S showed 0,011% Ni and 0,030% Cu.
- b) Grøtåa on E side of Tronfjell A rust zone, probably up to 50 m wide, striking approximately E-W and dipping 55° to the north; situated some distance away from the main massif in the stream called Grøtåa. A well foliated finegrained mica-amphibole bearing quartzrich rock with more darker amphibolitic bands is partly schistose and sheared. Specks and fine dissemination of pyrrhotite (up to 2-3%) and minor chalcopyrite were noted. A sample assaying 0,74% S contained 0,013% Ni and 0,025% Cu.
- c) Stream on N side of Tronfjell S of Aumåsen Approximately 500 m N of the supposed gabbro contact an up to 100 m wide rust zone, striking N 72° E and dipping 70° to the south was located in a stream. Richer parts of the zone contains up to 2% of mainly pyrite and some chalcopyrite over widths of maximum 5 metres.

The sulphide dissemination occurs in various rock types (meta gabbro - greenstones and quartzites). A sample assaying 0,78% S contained 0,023 % Ni and 0,06 % Cu.
- d) Contact SE side of massif near Sørkletten Amphibolite very close to the gabbro contact contains minor amounts of disseminated pyrrhotite. A sample assaying 0,74% S contained 0,005% Ni and 0,033 % Cu.

- e) Mineralized blocks Some blocks of gabbroic composition containing minor pyrrhotite dissemination were located near the ultramafic body on the SW side of the massif. A sample assaying 0,96 % S contained 0,065 % Ni and 0,98 % Cu.

A sample of massive pyrrhotite-chalcopyrite was discovered in the westernmost N-S running stream W of Tronsvangen. The locality is midway between St. Knut Mine and the gabbro contact to the north. The sample looks like ore samples from the mines S of Tronsvangen and possibly derives from these.

- g) Chromite mineralization Within the serpentinite located on the NW side of Tronfjell minor erratic schlieren of chromite were discovered. Most of the ultramafic body is barren.

According to the existing geological maps a chromite showing is supposed to be situated further to the NE, but it was not possible to locate in the field. Possibly this is the same showing described above or it is the rust zone c) found in the stream further to the NE.

- h) Deposits not located Håbet prospect W of Midtkletten on the SW side of the massif was not located, nor was Trønshvelvet copper deposit E of Flat-Tron on the SE side. From the mountains E of Tysla, dumps were seen in the mountain side across the valley. These are probably related to the latter deposit.

- i) Some blocks found in the same stream close to the talc quarries and the gabbro contact further to the north, were classified in the field as massive amphibolite (meta-gabbro ?) with minor pyrrhotite dissemination.

A sample assayed:

	Ni%	Co%	Cu%	Fe%	Zn%	S%
Pr. 5 - Mineralized block	0,008	0,006	0,038	9,5	0,88	2,4

7) STREAM SEDIMENT SURVEY

a) Introduction

140 samples were collected in the streams surrounding the Tronfjell massif. In the steep mountain side, especially on the west side of Tronfjell, it is extremely difficult to collect the desirable material. Possibly parts of the collected samples consist of

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the finer portion of till washed into the stream from the surrounding banks. This should be taken into consideration when interpreting the results.

The sample bags were taken to Kristiansand dried, sieved to - 80 mesh, sent to the laboratory, to be analysed for total Ni, Co, Cu and Zn by atomic absorption. The frequency distribution was calculated together with accumulative frequency. Without having any data from the area, the following classifications were used:

1. $\geq 90\%$ accumulative frequency ($\leq 1\%$): Possibly anomalous
2. $\geq 95\%$ " " " : Probably "
3. $\geq 98\%$ " " " : Anomalous.

The values are plotted on drainage maps in scale 1: 25.000 and the various categories of anomalous streams drawn with coloured pencils.

b) Results

Three areas are interpreted as anomalous. The very high Cu-Zn anomalies downstream the mines S of Tronsvangen must be caused by contamination and will not be discussed here.

1. Vesletron - Aumisen area N side of Tronfjell.

The area shows anomalous Ni and Co values, and Vesletron nickel showing is also located here. The results indicates anomalous streams to the south of the main showing. It is somewhat surprising that Cu values are not higher, since the mineralized zone contains a fair amount of chalcopyrite. It is worth noting that the small stream believed to drain the known showing does not show anomalous values of Ni and Co. This fact makes one believe that there are other sources than the known Vesletron nickel showing to cause the high Ni-Co values. Dr. R. Sand has pointed out that the area coincides with the NW-SE striking lineament with mylonitic rocks. On the other hand anomalies occur upstreams from the tectonic zone as well.

2. Tronsvangen - Midtkletten area Sw side of Tronfjell,

The area, and especially the main westernmost stream by which a block of massive sulphides was found, shows anomalous values of Ni, Co, Cu and Zn. Nickel values are very high.

Minor bodies of soapstone and serpentinite occur in the area, but might not explain the high Ni values which also occur upstreams from the known occurrences. A track or path used by tourists between Tronsvangen and the top of the mountain goes nearby. Possible contamination should not be disregarded. Steel wire

were noticed in a small stream draining the westernmost soap-stone quarry.

1. Grøtås area E side of Tronfjell

The area shows anomalous Cu - Zn values in several samples. Some of these occur upstreams from the mineralized zone in the stream and Nytrøen Mine.

The main road from Tronsvangen to the television station on top of Tronfjell is very close to the uppermost part of Grøtås. Possible contamination should be taken into consideration.

4. Area E of Tyula in Tyldal

Only a few samples were collected in this area which makes it difficult to assess the results. Outcrops of phyllites were noticed.

Hellbredsåen (åen = the stream) shows some anomalous Zn values. Several "seters" (seter = summer farm) are located along the stream as well as several "seterroads". Contamination must be taken into consideration.

5. Area between areas 1 and 2 W side of Tronfjell

The whole west side of the massif gives comparatively high values of all 4 elements, which makes one suspect there might be a relationship between areas 1 and 2.

8) SUMMARY AND CONCLUSION

The reconnaissance has shown that the known sulphide deposits located in the Tronfjell area between Tynset and Alvdal are not situated inside or along the contact of the main gabbro massif. The sulphide showings visited, all seem to be associated with tectonic zones (shears, breccias) within the surrounding foliated meta supracrustals (amphibolite - greenstones and quartz-mica schists).

Based on analyses of samples collected from the sulphide showings visited, the deposits can be divided in 3 groups:

1. Cu - Zn mineralization (Sw side of massif)
2. Cu " " (SE " " ")
3. Ni - Cu " " (NE " " ")

The stream sediment survey does not confirm this zoning clearly, but gives some indications.

The deposits near Tronsvangen SW of the massif which must have produced several thousand tons of ore, turned out to be the most interesting from an economic point of view. In a heavily covered area mining has taken place at various localities in a Cu-Zn mineralized tectonic zone along a strike length of more than 1 km. Follidal Verk is investigating this deposit at the moment. The Ni-Cu showing at Vesletron to the NE of the massif is an interesting discovery although the relationship to the main gabbro is unclear. Rust has been noticed over a strike length of more than 200 m in this covered area. Three samples from the dumps assayed 0,13 %, 0,88 % and 1,18% Ni with sulphur-nickel ratios of 17,6, 19,5 and 24,9.

The stream sediment survey in this area has proved anomalous Ni-Co values in the drainage system. The same is the case in some streams N of Tronsvangen which also contain high Zn and Cu values. The Grøtåa area on the E side of the massif has given several anomalous Cu-Zn samples.

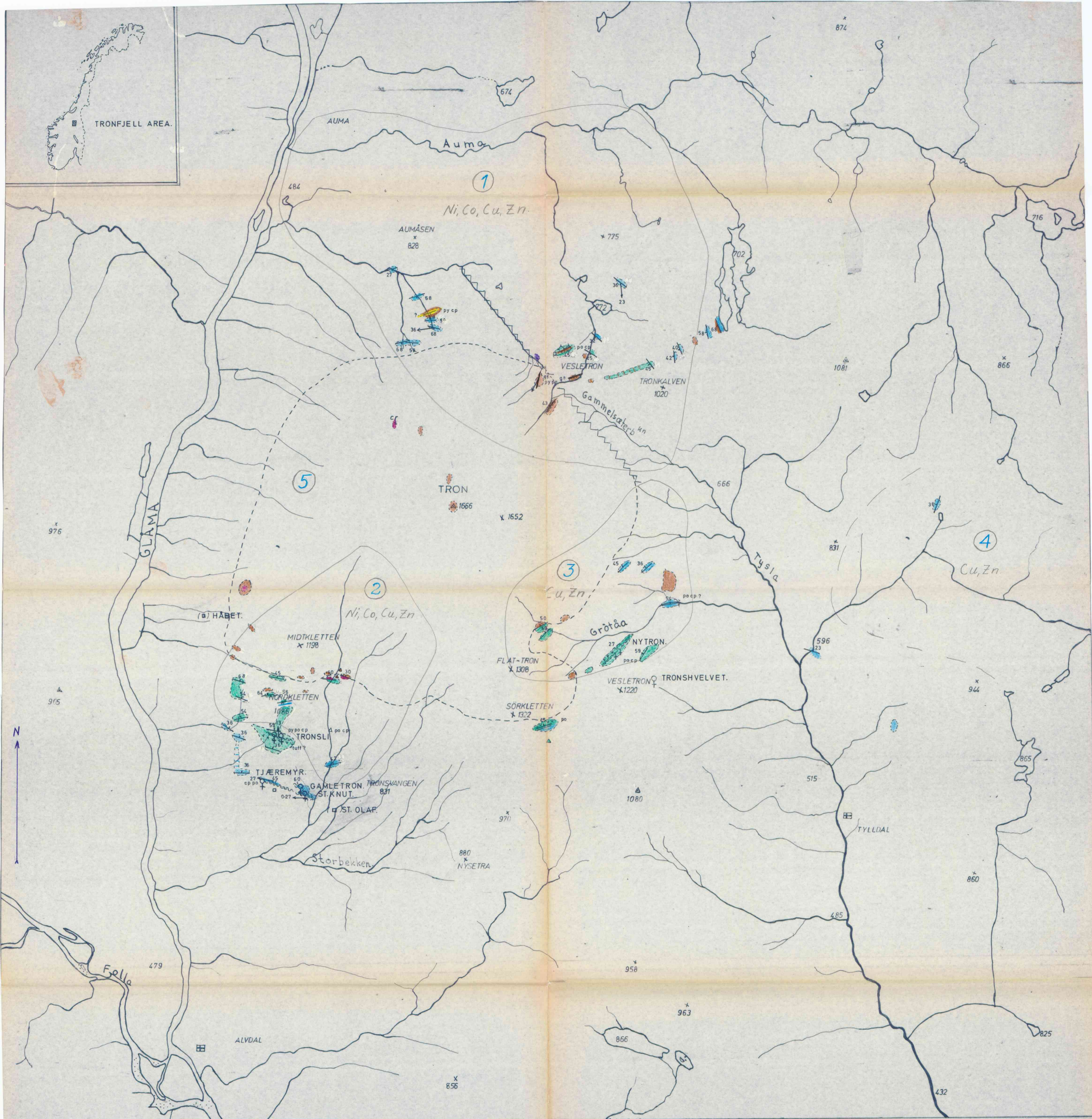
Based on the results from last year's reconnaissance the following follow up work is recommended:

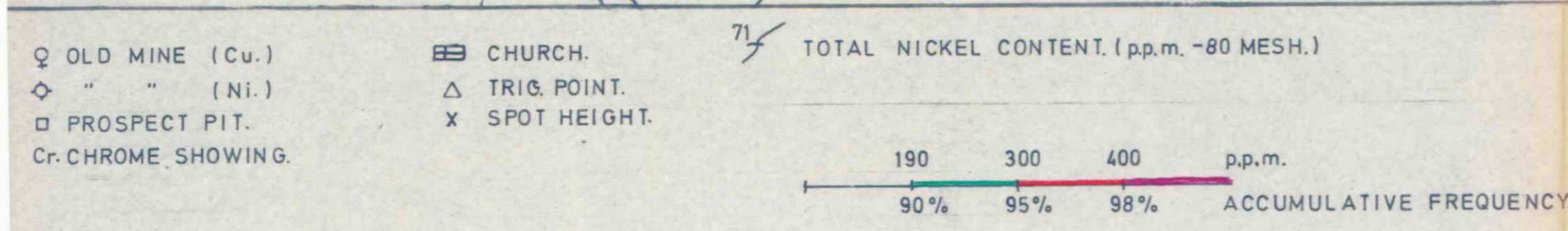
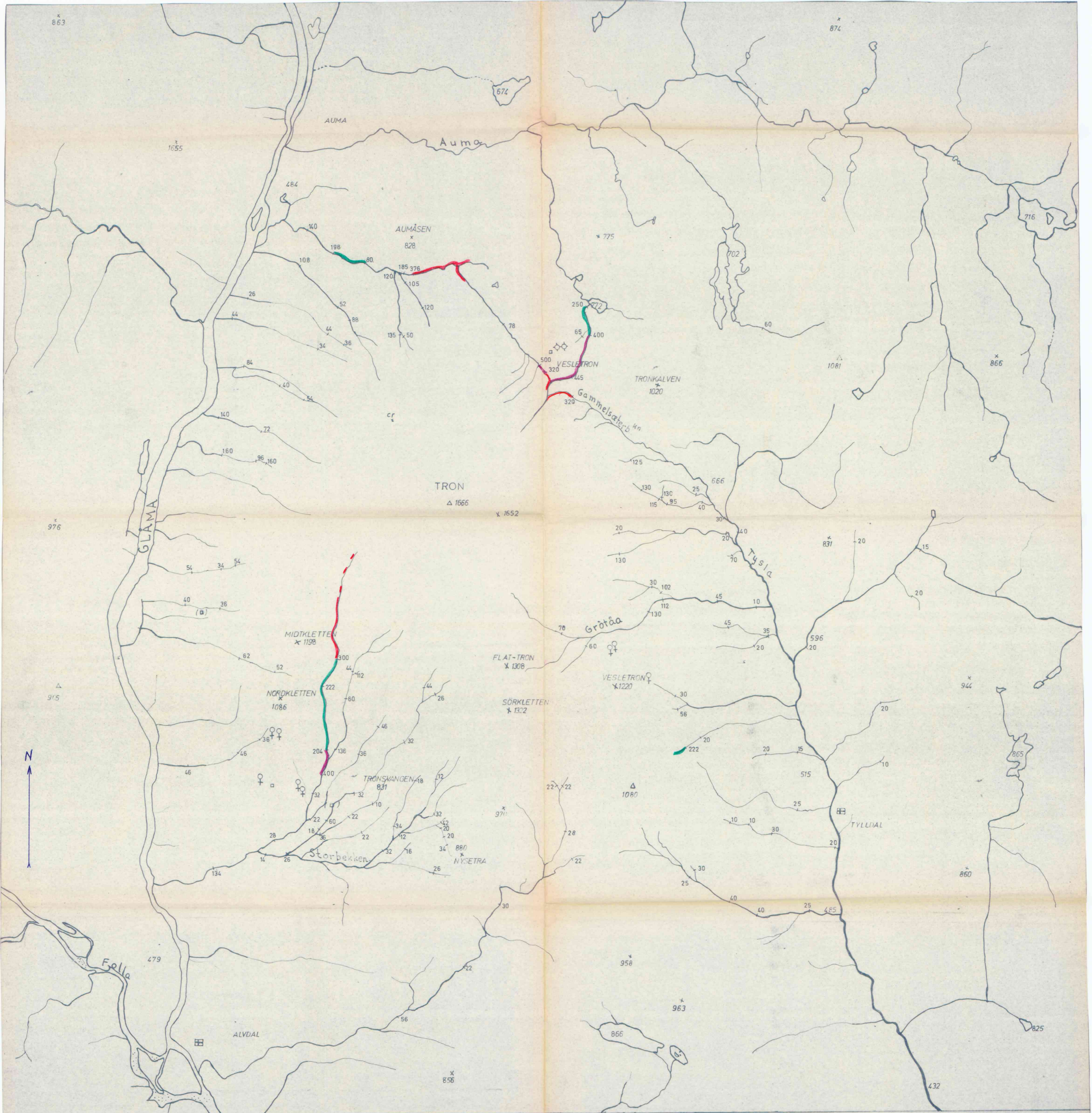
I Vesletron Ni Showing

Special attention will be given to the contact zone, the possibility of layering within the main massif, as well as the possibility of a relationship between it and the altered basic bodies and dykes in the surrounding foliated rocks. Samples from the main massif will be collected for a possible rock geochem. study.

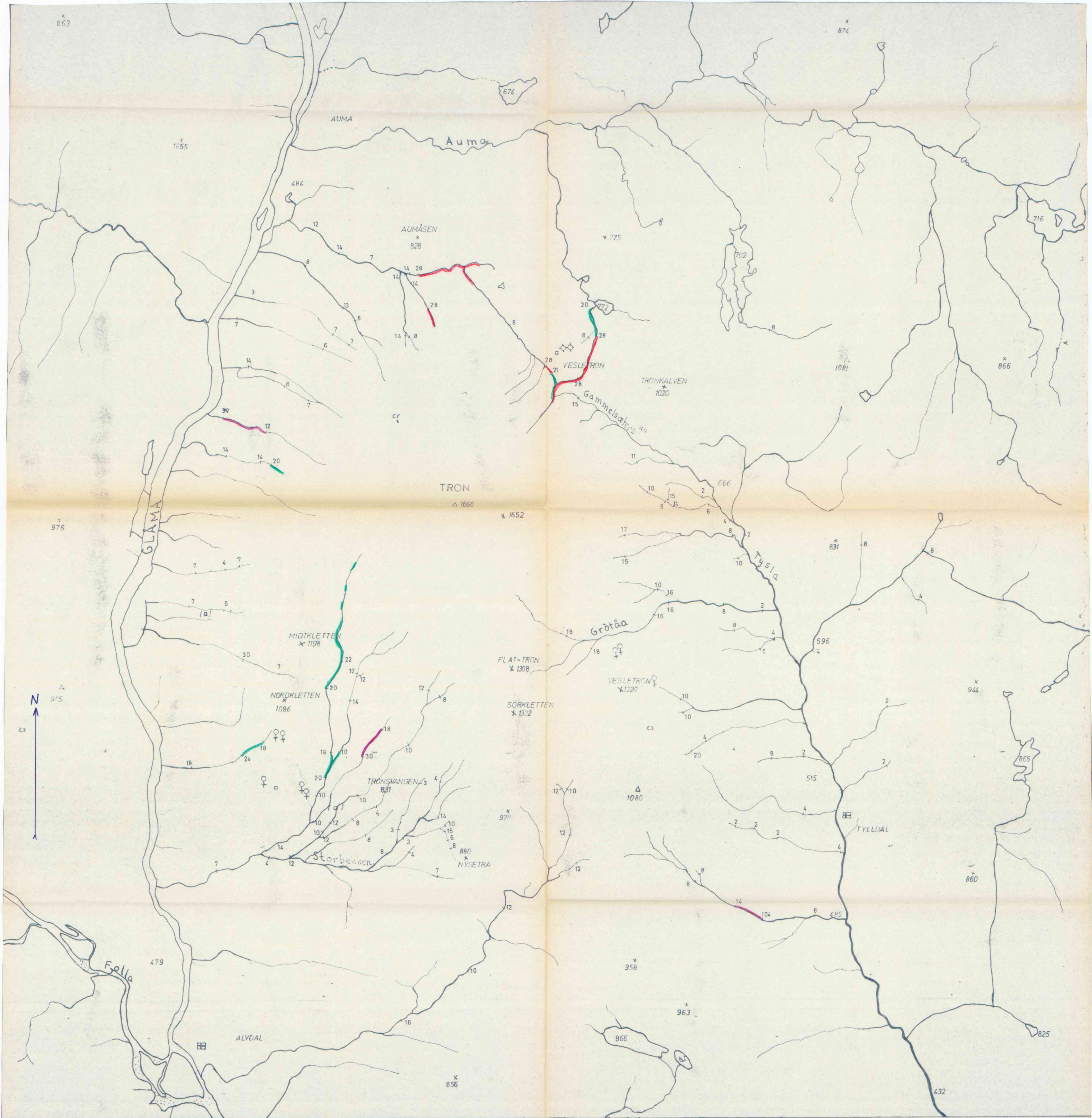
Regional geochem. survey

Stream sediment sampling will be carried out for each 250 m along the drainage system, in an at least 300 km² large area to the east - and north east of Tronfjell. The area is bounded by the localities Alvdaal - Tynset - Telneset - Brydal - Finstad-sjøen - Tyldal - Alvdaal; and contains zones of amphibolites-greenstones.





STREAM SEDIMENTS FROM TRONFJELL AREA. HEDMARK, NORWAY.	(Ni.)		SCALE	OBS: E.O.-JJ	AUG. 70
			1:25 000	DRAW: JJ	AUG. 70
				TRAC: JJ	NOV. 70
A/S SULFIDMALM KRISTIANSAND S.			2	MAP SHEETS	
				1619 II AND III	



♀ OLD MINE (Cu.)
 ♂ " " (Ni.)
 □ PROSPECT PIT.
 Cr. CHROME SHOWING.
 CHURCH.
 △ TRIG. POINT.
 X SPOT HEIGHT.
 TOTAL COBALT CONTENT. (p.p.m. - 80 MESH.)
 20 27 30 p.p.m.
 90% 95% 98% ACCUMULATIVE FREQUENCY.

STREAM SEDIMENTS FROM TRONFJELL AREA. HEDMARK, NORWAY.	(Co.)	SCALE	OBS: E.O.-JJ	AUG. 70
		1:25 000	DRAW: JJ	AUG. 70
			TRAC: JJ	NOV. 70
A/S SULFIDMALM KRISTIANSAND S.		3	MAP SHEETS 1619 II and III	



<p>♀ OLD MINE (Cu.).</p> <p>♂ " " (Ni)</p> <p>□ PROSPECT PIT</p> <p>Cr CHROME SHOWING</p>	<p>⊞ CHURCH.</p> <p>△ TRIG. POINT</p> <p>x SPOT HEIGHT</p>	<p>74 TOTAL ZINC CONTENT (p.p.m. - 80 MESH.)</p> <p>80 90 160 p.p.m.</p> <p>90% 95% 98% ACCUMULATIVE FREQUENCY.</p>	<p>STREAM SEDIMENTS FROM TRONFJELL AREA. (Zn.)</p> <p>HEDMARK, NORWAY.</p>	<p>SCALE 1:25 000</p>	<p>OBS: EO-JI AUG. 70</p> <p>DRAW: JI AUG. 70</p> <p>TRAC: JI NOV. 70</p>	<p>A/S SULFIDMÅL KRISTIANSAND S.</p>	<p>5</p>	<p>MAP SHEETS 1619 II AND III</p>
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