Bergvesenet

Postboks 3021, 7002 Trondheim

Rapportarkivet

Bergvesenet rapport nr	Intern Journal nr	Internt arkiv nr	Rapport lokalisering	Gradering
BV 2020				**Fortrolig**
Kommer fra ..arkiv Sulitjelma Bergverk A/S	Ekstern rapport nr "522240007"	Oversendt fra	Fortrolig pga	Fortrolig fra dato:

Tittel

Fieldwork report on the area from Misvær to Breivik.

Forfatter	Dato	Bedrift
COLE & LANGLEY	1970	Sulitjelma Gruber A/S

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

Fagområde	Dokument type	Forekomster
Råstofftype	Emneord	

Sammendrag

Området mellom Misvær og Breivik er undersokt pa grunnlag av geokjemisk provetaking av bekkesediment. Det var pavist nikkel i disse provene. Serpentinitt -kroppene ble spesielt undersokt, cln sulfider kun pavist ved Utviklia og naer Breivikelva. Trolig for smatt til a ha okonomisk interesse.

FIELDWORK REPORT ON THE AREA FROM MISVAER TO BREIVIK

AUGUST 1970
K.M. Langley
D. Cole

Aim of the work

The mapping was undertaking as a follow up to a geochemical stream reconaissance survey for nickel. This survey showed that the streams contained a detectable quantity of nickel. This element is most likely to be associated with any ultrabasic bodies in the area. Thus particular attention was paid to the serpentinites in this area.

Summary

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Only the serpentinite body east of Utviklien (coordinates 049 566) contained localised ore, mainly pyrrhotite with minor chalcopyrite and pyrite.

Pyrrhotite was also found in a 20 cm band of chloritic schist near the river of Breivik.

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3) Areas of special interest

a) The "ore serpentinite" east of Utviklien (049 566)

i) Summary of the "ore serpentinite"
ii) Description of the old trial prospects

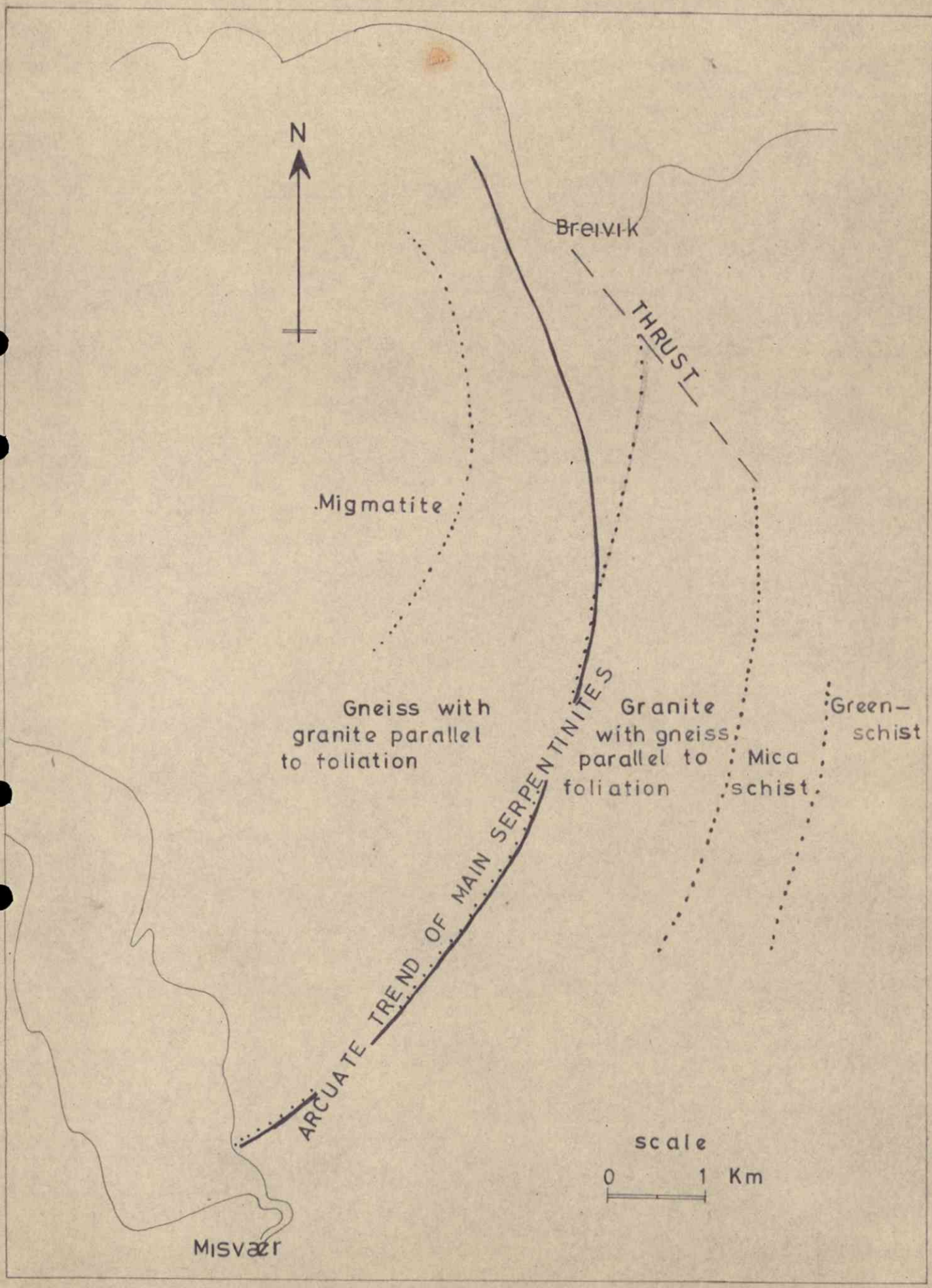
b) The 20 cm "ore zone" (loc 142 coordinates 065 543)

c) Old trial prospects in the serpentinite north-east of lake 463 (cordinates 053 433)

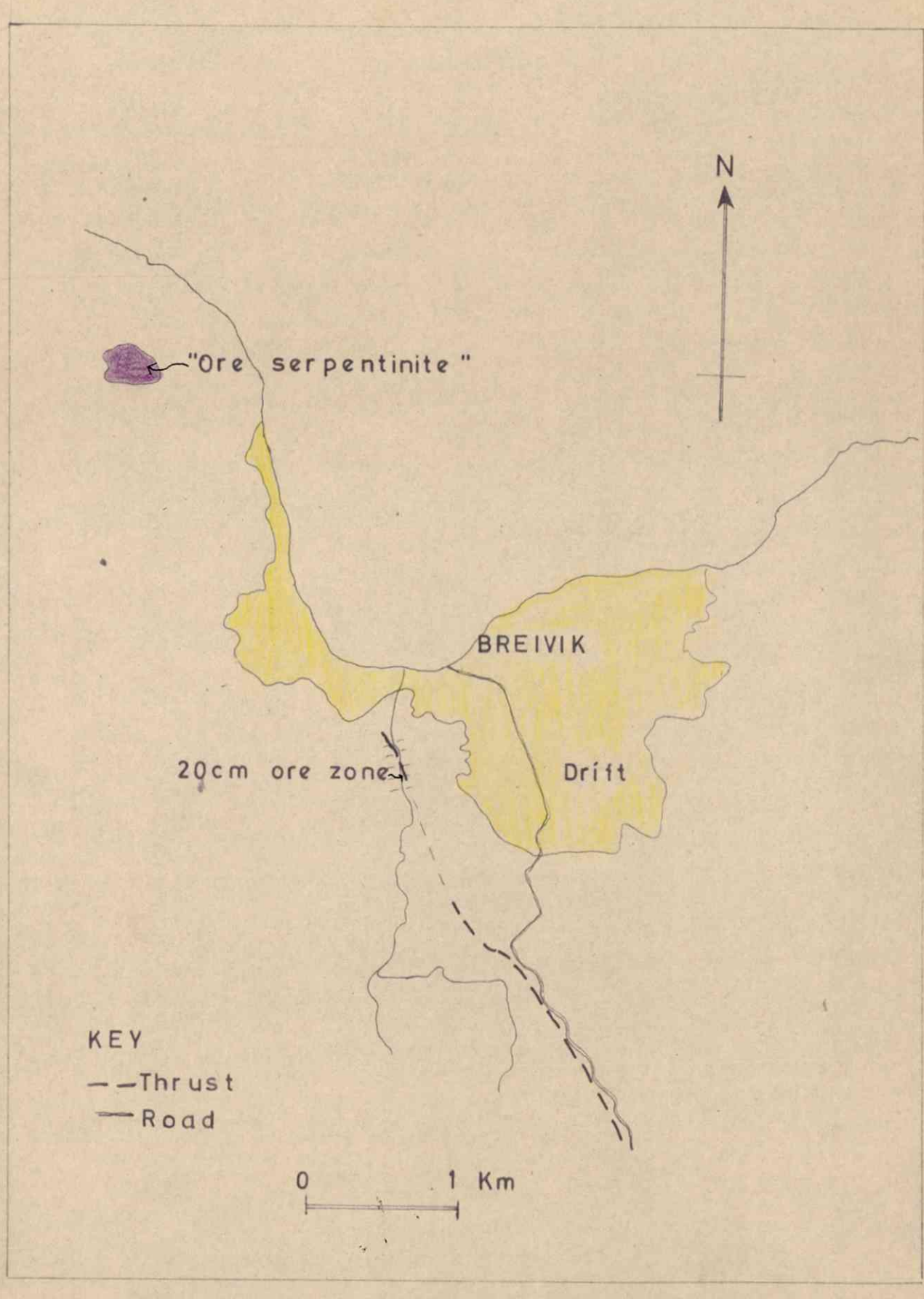
4) List of specimens

i) Serpentinites
ii) Granite, gneiss and schist
iii) Ores

SKETCH DIAGRAM TO SHOW THE GENERAL STRUCTURE OF THE MISVÆR - BREIVIK AREA FIG 1

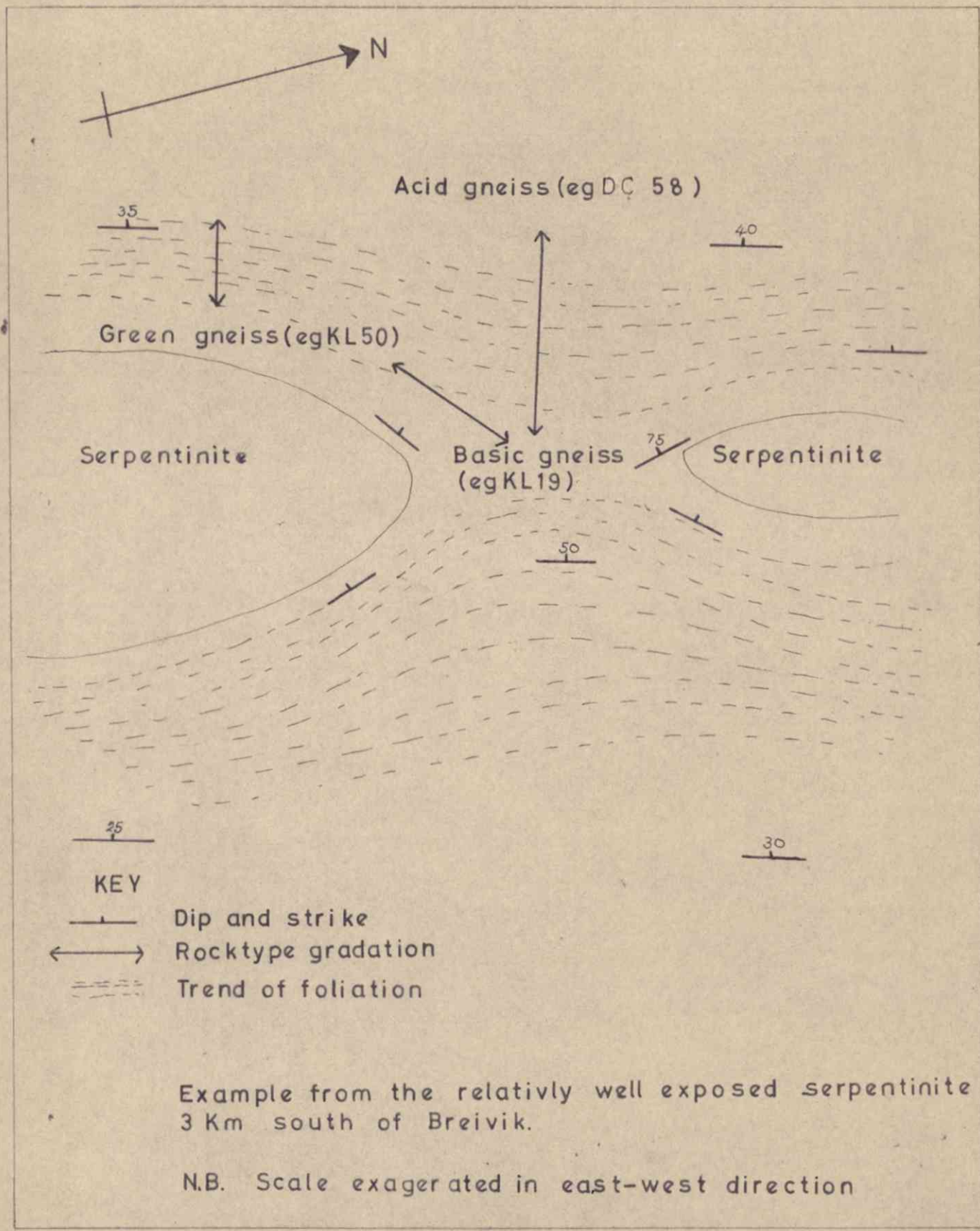


MAP SHOWING THE MAIN FEATURES OF THE AREA AROUND BREIVIK FIG 2



SKETCH DIAGRAM TO SHOW THE GENERAL FEATURES OF THE SERPENTINITE CONTACTS

FIG 3



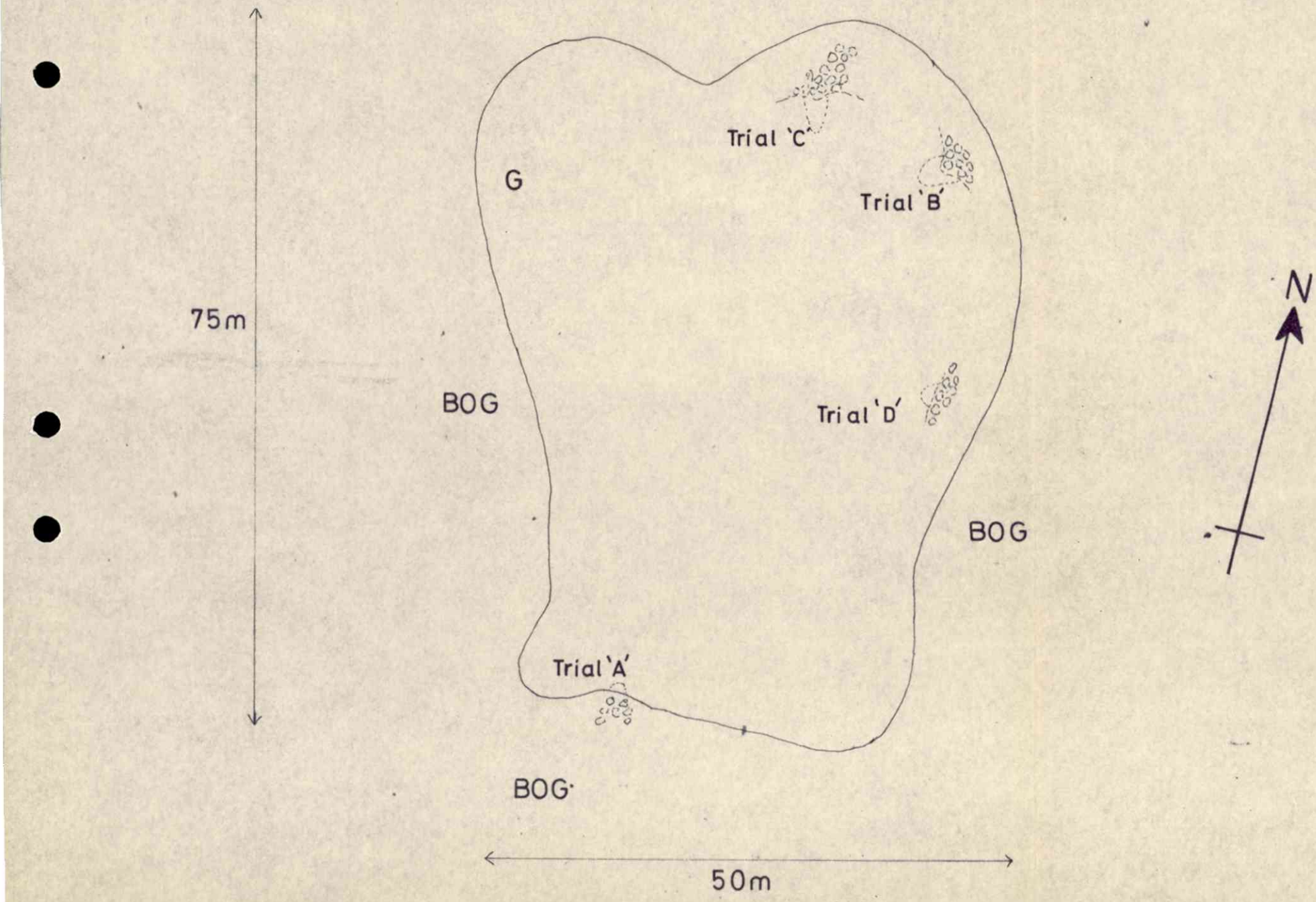
Example from the relativly well exposed serpentinite 3 Km south of Breivik.

N.B. Scale exagerated in east-west direction

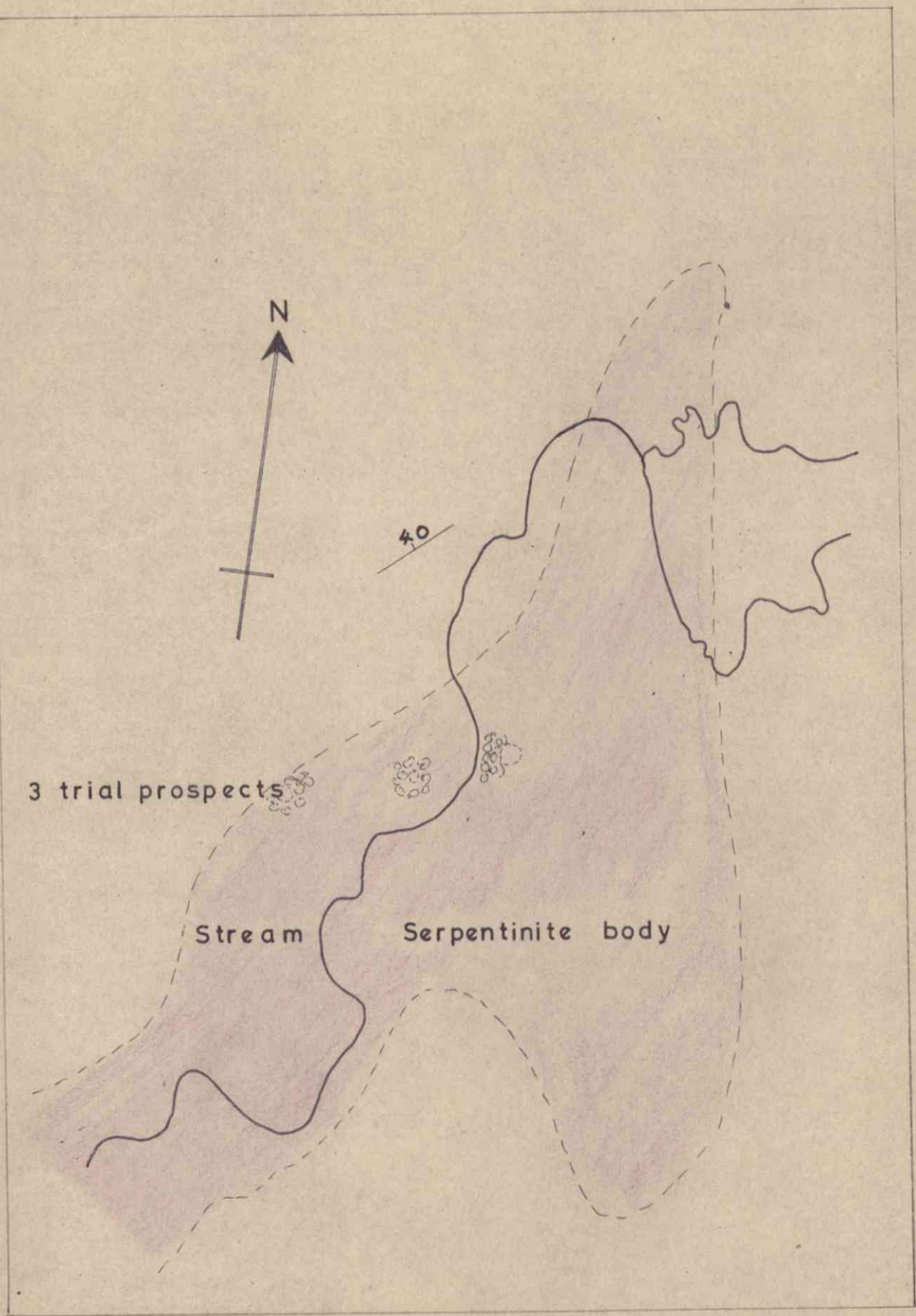
SKETCH DIAGRAM OF "ORE" SERPENTINITE NORTH WEST OF UTVIKLIEN

049,566

FIG 4



SKETCH MAP TO SHOW THE OLD TRIAL PROSPECTS NORTH EAST OF LAKE 463 (053 483) FIG 5



1. The area in general

a) The maps

The region covered is represented on AMS series map sheet 2029 II, scale 1:50 000.

The area east of Misvaer as far as Stomudalen was mapped on to arial photographs 1420, numbers A2 to A8. (Scale aprox. 1:12 000).

Arial photographs 3601, numbers A9 to A13, B10 to B15, C17 to C28 and D12 to D15 cover the entire area. These unfortunately were flown too late to be used in the field.

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The areas immediately arround Misvaer and Breivik are gently sloping drift covered agrecultural lands. Steep, well wooded slopes enclose this land on all but the fjord sides of both villages. Bogs and vegetation which is dense in places is present on the uplands between the two villages. Only the high gneissic region is well exposed.

Vegetation, however, tended to be less dense, on the characteristically steep sided serpentinite bodies. Unfortunately the contacts between the serpentinites and the other rocks were almost invariably hidden by marshy ground.

c) The rocks

i) The serpentinites

Most of the serpentinites are present in the arcvate zone from Misvaer to Breivik. (This is diagram-atically illustrated on Fig. 1). The outcrop is not continuous but is certainly more extensive than the 1910 reconaissance map by Rekstad, J. (1929) suggests.

Other small lenses of serpentinite locally are present away from the trend of the main bodies.

ii) The granite and gneiss

Granite lenses present in the gneiss always are parallel to the main trend of the foliation. The two rock types tend to be gradational rather than to have marked contacts.

As topographic height is gained to the north and west of the "serpentinite arc" the gneiss with granite lenses, merges into migmatite. On this region folds, many of which are horizontal in attitude, and ptigmatic veins are abundant.

To the south and east of the serpentinite arc, granite is the most common rock type. This prossesses a faint mineral lineation (see specimen KL4) gradational lenses of gneiss are present locally.

No where does the trend of the granite contact cut the main foliation of the other rock types.

iii) Schist
These occur as lenses in the gneiss following the main foliation direction. Contacts between gneiss and schist are gradational i.e. the schists become gneissose and the gneiss becomes schistose.

Schists form the dominant rock type to the east of the mapped area.

2. The structure of the area

a) Structural summary

The strike of the main foliation of the rocks follow the same general arcuate pattern indicated by the trend of the serpentinite bodies.

All foliation planes dip into the arc i.e. dipping to the north at Misvaer, and to the west at Breivik. It is a general feature that dips are steeper on the inside of the serpentinite arc than they are to the south and east of the arc.

On the area south east of Breivik a brecciated fault zone, with a well defined fault scarp which trends north-west can be traced. The trends of the foliation planes in the vacinity become rather, and not unexpectedly, erratic.

The presence of a thrust was also noted in the river section south of Breivik. This thrust is on the same trend as the above noted fault scarp (see Fig. 2). Absolute confirmation that it is continuity between the two faults is rendered impossible by the large quantity of glacial drift in the vacinity.

b) Structure of the serpentinite bodies

I) Serpentinites following the arcuate trend.

Fig. 3 diagramatically illustrates the structural relationship between the serpentinites and the nearby rocks as seen 3 kms south of Breivik where exposure was relatively good.

The following general features where noted about the serpentinites which follow the arcvate trend.

Serpentinite bodies are more extensive than suggested by the 1910 map.

Bodies vary in size from lenses 10 m long up to 3 kms long.

Basic gneiss and green gneiss is common near the serpentinite contacts.

Foliation planes very near (say within 5 m) the bodies tend to bend round the bodies. The dips of the foliation planes locally become much steeper near the ends of the bodies or lenses.

ii) Serpentinites away from the "arc"
Numerous small lenses of serpentinite were encountened of the trend of the main bodies. (i.e. at coordinates 079 508, 054 490 and 080 480).

The long axes of the lenses were always parallel to the main foliation of the surrounding rocks.

3. Areas of special interest

a) The "ore serpentinite" east of Utviklien (049 566)

i) Summary of the "ore serpentinite"
This serpentinite is at the northern end of the large north/south trending mass of serpentinite, but it is separated from the main body by a zone of green gneiss (specimens KL 50) no less than 6 m wide, and a 5 m wide bog. Its possition as seen on arial photograph C28, 3601, is shown on Fig. 2.

The body has four old trial prospects (trials A,B,C and D). The relative possitions of these are shown on Fig. 4.

Other than in the immediate vacinity of these holes the serpentinite showed exactly the same characteristics as all the other "barren" serpentinites, i.e. the outcrop features were the same, and away from the old trial prospects the rock weathered its characteristic fawn colour.

ii) Description of the olf trial prospects
Trial A is a shallow prospect hole at bog level. Approximately 4 cubic meters of rock have been removed by blasting from the 1 m wide ore zone (specimen KL 52).

Above this ore zone a red haematitic gossen is present in the serpentinite.

Trial B is a 2 m wide passage very near the top of the serpentinite body. The ore zone is apparantly as wide as the passage. This has been driven down at an angle of 45° for 3 m. The bottom of the hole is full of water. This trial contains what is probably the richest ore.

All dump material (KL 63) is coated by ~~geo~~ oet hite. This iron rich skin of weathering suggests that quite a time has elapsed since the original trial was dug.

Trial C is driven horizontally at a level 3 m below the level of trial B for a distance of 6 m. The inner end of the hole is barren of ore. It is noted that the barren region of this trial is also a dry region, wheras the walls were wet where ore specimen KL 66 was removed.

The thickness of the ore zone in this prospect hole could not be determined.

Trial D is 10 m above the bog on the east side of the serpentinite body. It is a small horizontal 2 m deep hole containing an ore zone ½ m wide.

The ores from the different trials are described in part 3 of the specimen list.

b) The 20 cm "ore zone" (loc 142, coordinates 065 543)

This "ore zone" is a 20 cm wide band of chloritic schist containing pyrrhotite. It was found on the east side of the river, 20 m south of the thrust zone (see Fig. 2). The lateral extent of the bed can not be determined due to the presence of the river and the thrust.

c) Old trial prospects in the serpentinite north-east of lake 463 (coordinates 053 483)

The relative possitions of the 3 old trials in this region are indicated on the sketch map fig. 5.

Instead of the usual fawn weathering serpentinite, the serpentinite in the vacinity of the 3 trials is unusual in that it weathers a shiny red/brown colour and tends to be heavier than the average serpentinite.

Careful examination of the rock in this area revealled no detectable ore minerals.

LIST OF SPECIMENS FROM THE MISVAER - BREIVIK AREA

Part i) Serpentinites

Ref. no.	Loc. no.	Coordinates	Locality	Rock type	Rock description/comments
KL 1	8	003/462	Høgset	Serpentinite	Fine grained basic green rock tending to a dunite peridotite
DC 98	108	059/495	West of Stormud	Serpentinite	As KL 1 but slightly coarser grained
KL 21	120	060/518	SW of Gaardsv	Serpentinite	Typical specimen showing the typical fawn coloured weathered surface
KL 59	149	049/566	NW of Utviklien	Serpentinite	This rock consists almost entirely of fibrous talc crystals
DC 67	126	053/483	Old trial prospect NE og lake 463	Serpentinite	Very heavy rock typical of the prospects showing the shiny red/brown weathered surface probably due to the presence of goethite. Orange regions locally present are due to the presence of limonite.

Part ii) Granites, gneiss and schist

KL 4		003/467	Klette	Granite	Typical Misvaer granite - a medium granied quartz biotite, muscovite granite showing a slight foliation
DC 58	38	030/470	Hæiløv	Acid gneiss	Well foliated medium grained quartz mica gneiss with characteristic iron stains
KL 19		060/512		Basic gneiss	Foliated fine grained dark grey gneiss
KL 7	53	045/475	S of lake 463	Gneiss	Medium grained green gneiss characteristic of the serpentinite/gneiss contacts
KL 50	149	049/566	Just south of the ore serpentinite at Utviklien	Gneiss	Green gneiss of KL7, but may contain small fibrous serpentinite crystals. It is a gradational rock
DC 59	47	034/468	SW of Høiløv	Gneissose schist	Fine grained intermediate biotite rock with garnet porphyroblasts (size variation 8 mm to 4 mms diameter) Iron stains are also present

Ref. no.	Loc. no.	Coordinated	Locality	Rock type	Rock description/comments
DC 52	23	015/466	NNW of Misvaer	Schist	Medium grained garnet mica schiat
DC 100	112	045/502	WNW of Stomud	Schist	Fine grained mica schist slightly gneissose in places
KL 24	123	083/494	NE og Storud	Schist	Greenschist showing well crenulated micas on the foliation planes
KL 35	142	065/544	River S of Breivik	Schist	Chloritic schist with pyrrhotite

Part iii) Ore Specimens

All specimens come from the "ore serpentinite" north-west of Utviklien 049 566

KL 52	Trial A	Black heavy specimen with fine black fibrous mineral possibly tourmaline. Yellow fine grained specs possibly chalcopyrite are also present
KL 63	Trial B	The rock is solid ore consisting in order of abundance - pyrite, pyrrhotite, chalcopyrite and minor bornite
KL 62	Trial B	Serpentinite can still be seen with talc. Pyrrhotite is present
KL 65	Trial C	The rock is almost solid ore containing pyrrhotite, pyrite, chalcopyrite and minor bornite (NB from dump)
KL 66	Trial C	The rock has pyrrhotite, pyrite chalcopyrite and minor bornite (spec from wall of Trial no 6)
KL 67	Trial D	The serpentinite contains disseminated pyrrhotite and pyrite
KL 56	East side of body 6	Red brown shiny weathering grey serpentinite from a region that looks like a gossen

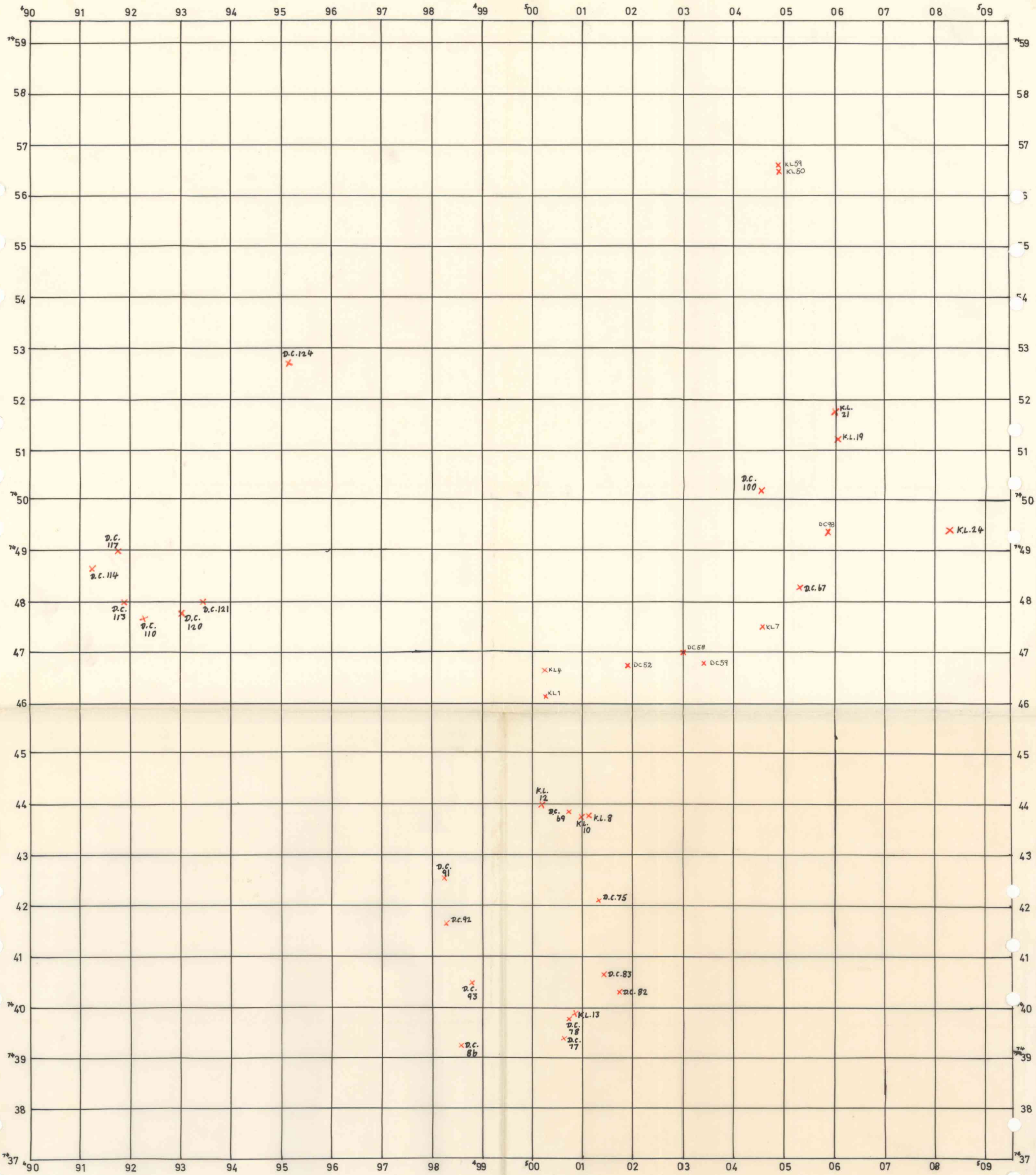
GEOLOGY COVERED BY ARIEL PHOTOGRAPHS EAST OF MISVÆR

scale
0 1 km

key
- SERPENTINITE
- GRANITE
- GNEISS
- DRIFT
- PROSPECT
- STREAM
- ROAD

SKJERSTAD

SHEET 2029 II



OVERLAY MAP SHOWING LOCATION OF SPECIMENS OBTAINED FROM

THE GABBROS, SERPENTINITES AND MARGINAL ROCK-TYPES IN THE MISVAER AREA

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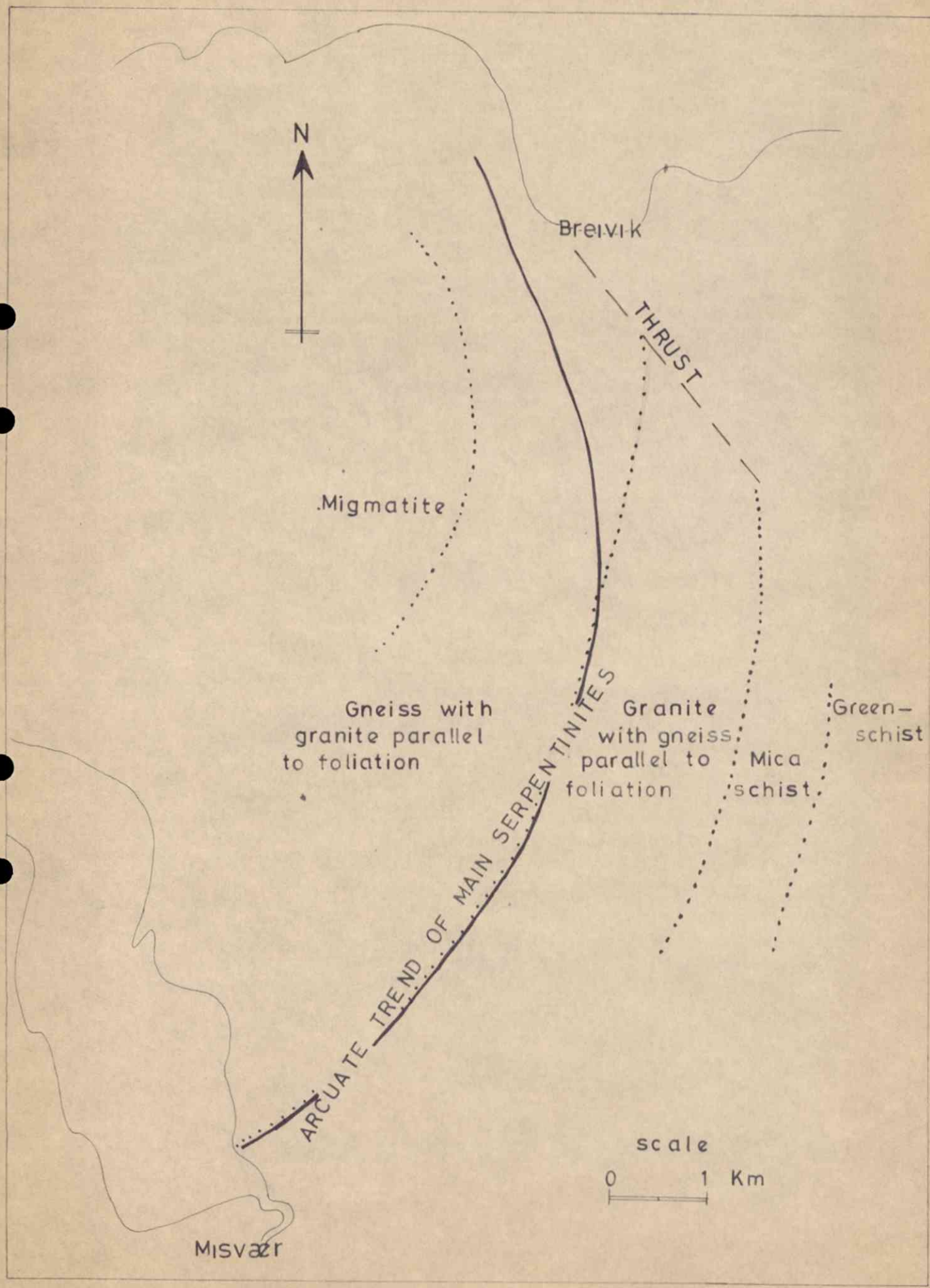

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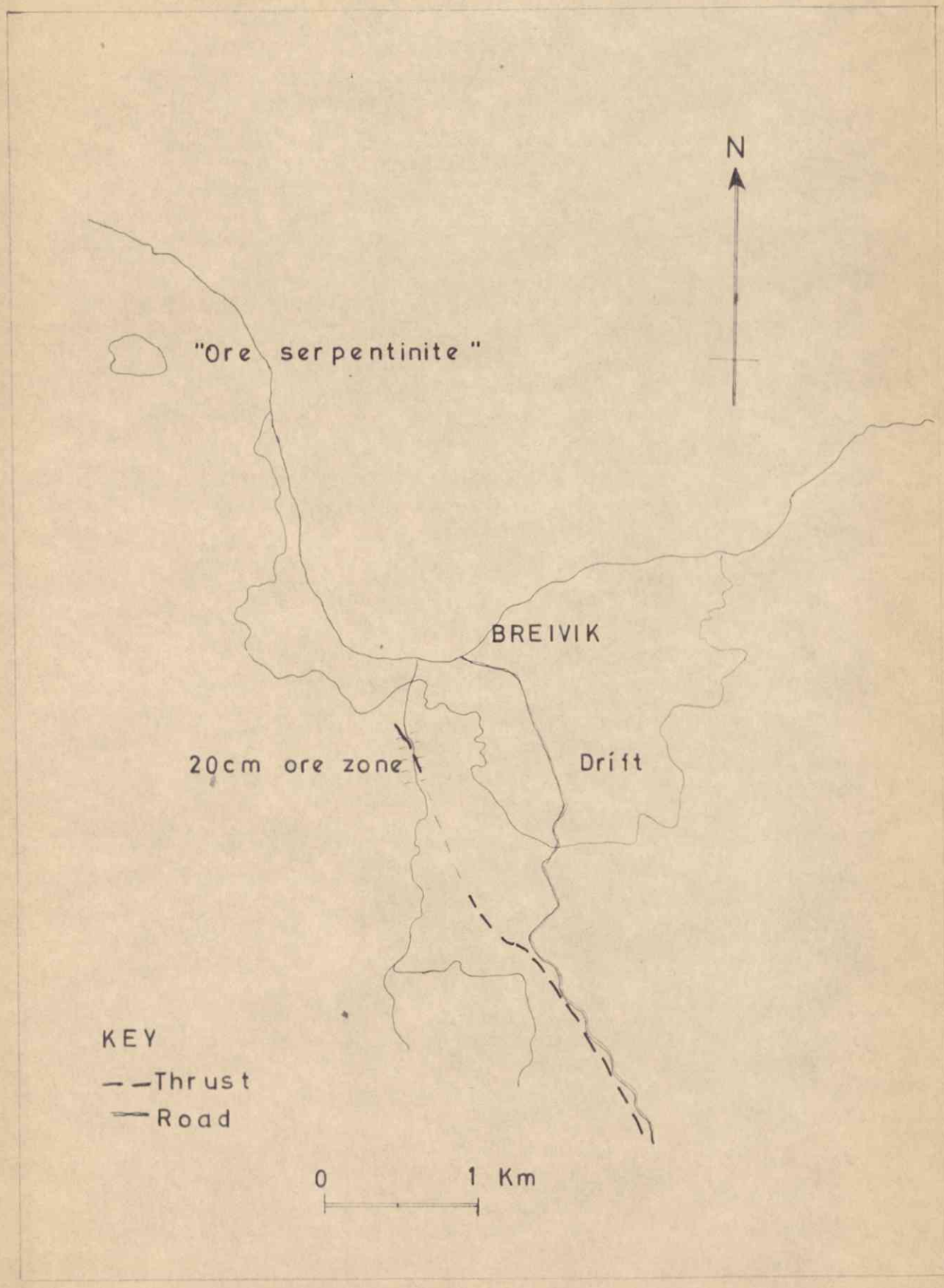

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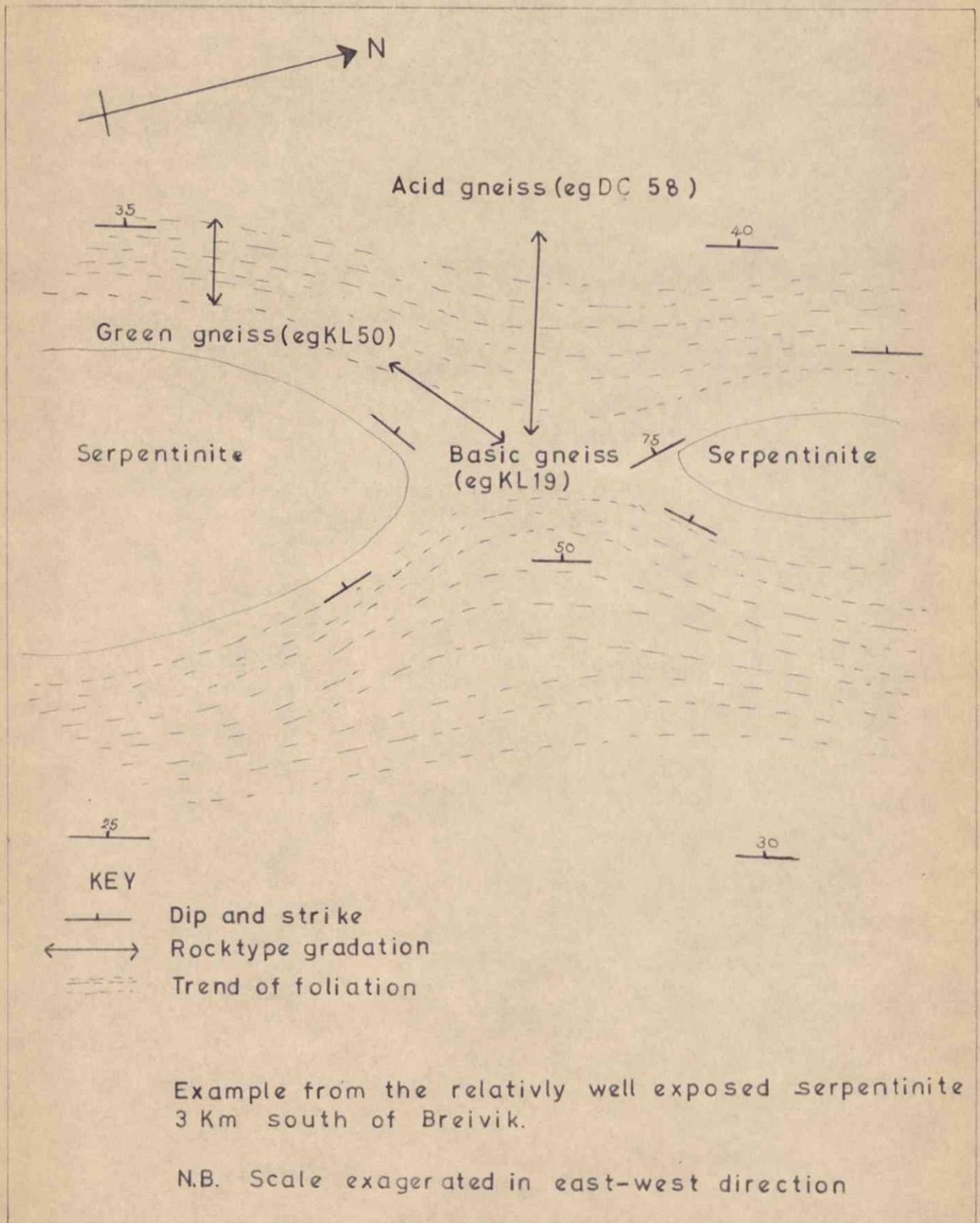
FIG 3



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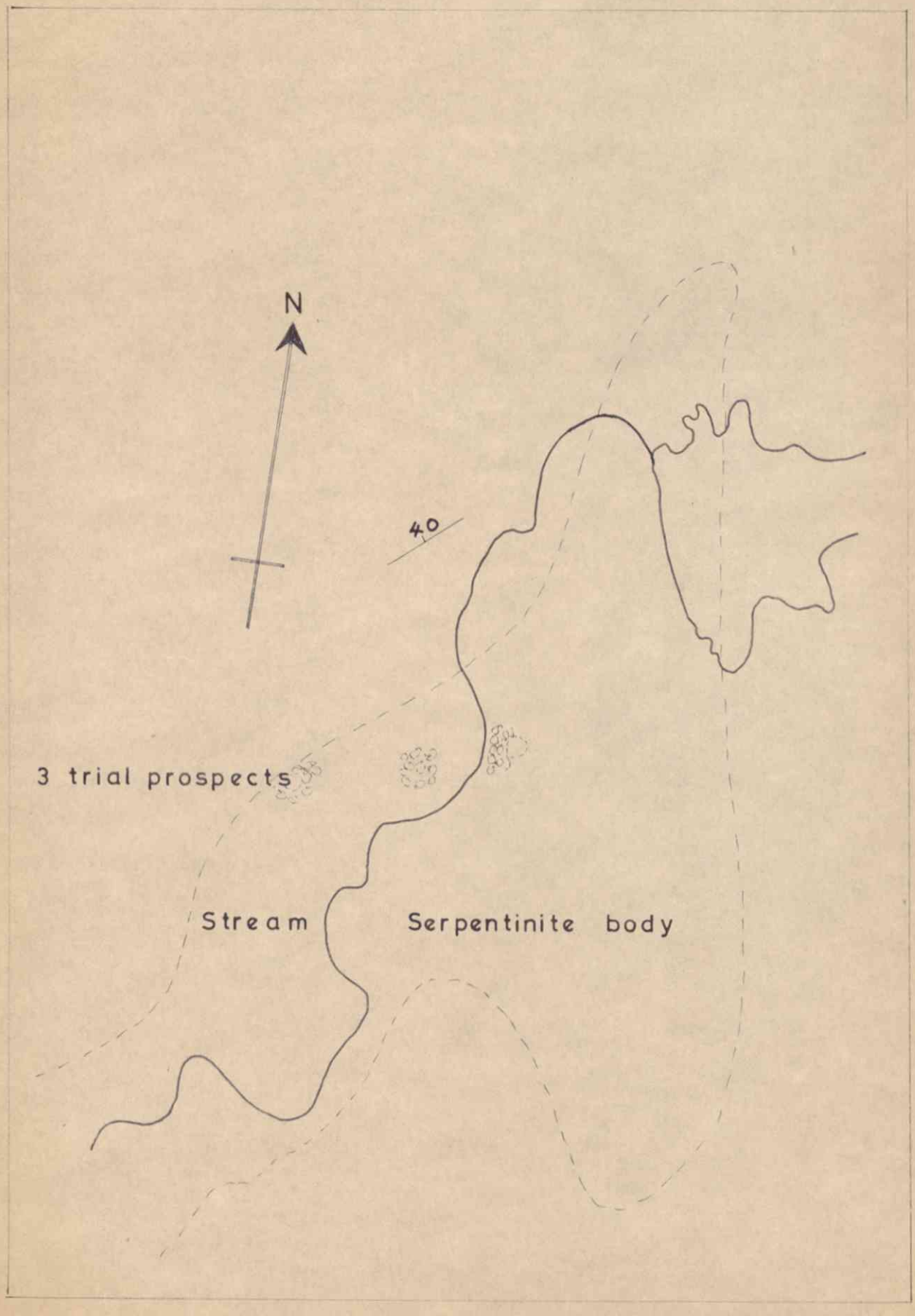

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Part iii) Ore Specimens

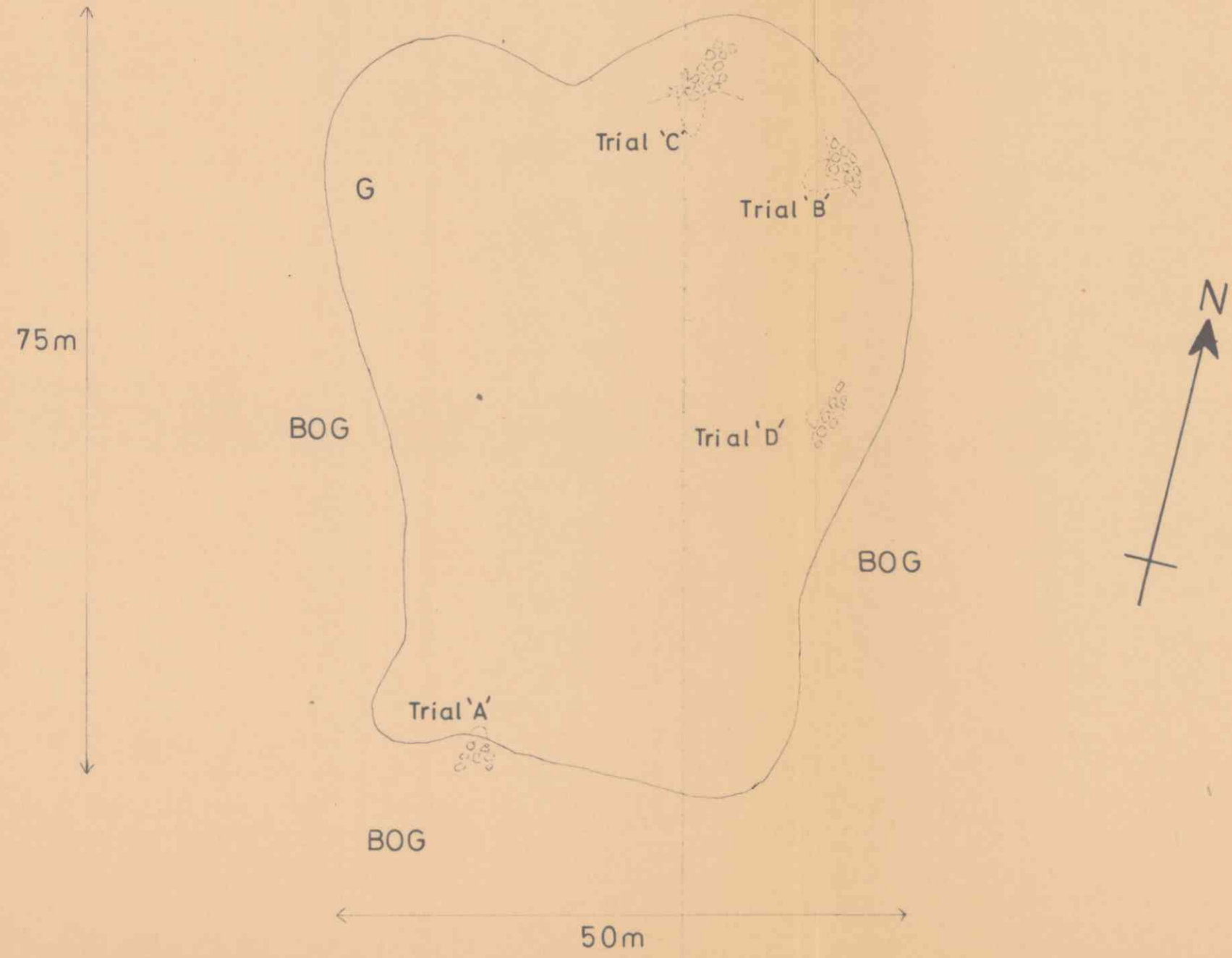
All specimens come from the "ore serpentinite" north-west of Utviklien 049 566

KL 52	Trial A	Black heavy specimen with fine black fibrous mineral possibly tourmaline. Yellow fine grained specs possibly chalcopyrite are also present
KL 63	Trial B	The rock is solid ore consisting in order of abundance - pyrite, pyrrhotite, chalcopyrite and minor bornite
KL 62	Trial B	Serpentinite can still be seen with talc. Pyrrhotite is present
KL 65	Trial C	The rock is almost solid ore containing pyrrhotite, pyrite, chalcopyrite and minor bornite (NB from dump)
KL 66	Trial C	The rock has pyrrhotite, pyrite chalcopyrite and minor bornite (spec from wall of Trial no 6)
KL 67	Trial D	The serpentinite contains disseminated pyrrhotite and pyrite
KL 56	East side of body G	Red brown shiny weathering grey serpentinite from a region that looks like a gossen

SKETCH DIAGRAM OF "ORE" SERPENTINITE NORTH WEST OF UTVIKLIEN

049,566

FIG 4



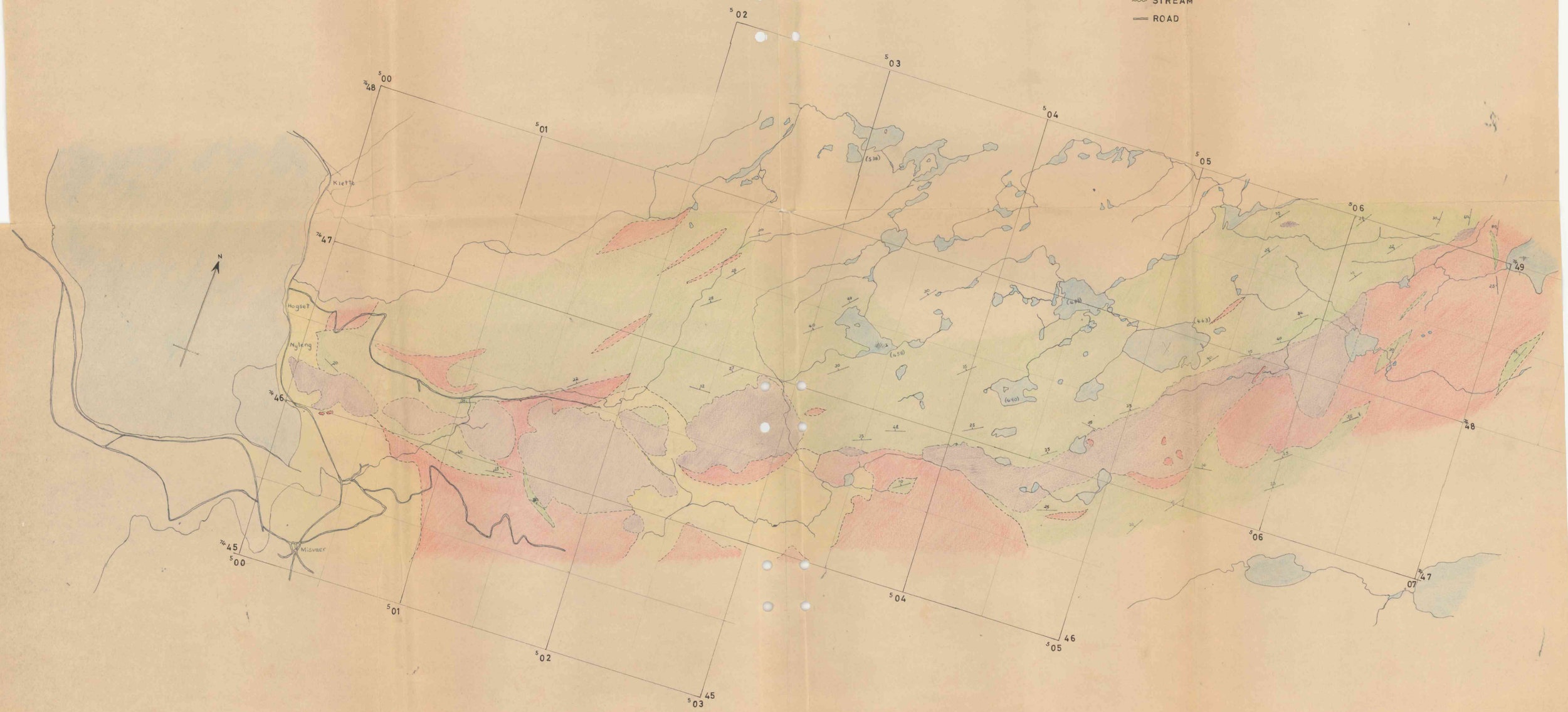
GEOLOGY COVERED BY ARIEL PHOTOGRAPHS EAST OF MISVÆR

scale

0 1 Km

key

- SERPENTINITE
- GRANITE
- GNEISS
- DRIFT
- PROSPECT
- STREAM
- ROAD



LEGEND FOR 1:50,000 MAP SHEET 2029 11

COLE AND LANGLEY, (July 23 – Sept 7, 1970)

"DERWENT" NO.

25	25	Serpentinite
61	41	Gabbro
15	21	Granite
46	56	Gneiss
37	37	Marble
9	6	Quartzite
6	62	Grey Mica-schist
51	44	Greenschist
44	44	Conglomerate
3	1	Drift
	63	Hornblendegneis

Certain Lithological Boundaries

Uncertain Lithological Boundaries

50 Strike of Foliation with Amount of Dip

Ore Bodies

NORWAY-NORGE 1:50,000

FIRST EDITION—AMS

SKJERSTAD

SHEET 2029 II

AMS SERIES M711

AMS M711 (GSGS 4246)
First Edition–AMS

Prepared by the Army Map Service (AM), Corps of Engineers, U. S. Army, Washingtn, D. C. Copied in 1952 from Norge 1:50,000, Norges Geografiske Oppmaling, Sheet K 13, 194. Sheet size changed and planimetric detail partially revised.

Målestokk, Scale 1:50,000

1 ½ 0 1 2 3 Miles

1000 500 0 1000 2000 3000 4000 Meters

1000 500 0 1000 2000 3000 4000 Yards

EKVIDISTANSE, CONTOUR INTERVAL 30 METERS

TRANSVERSE MERCATORPROJECTION

HORIZONTAL DATUM: EUROPEAN DATUM

BLACK NUMBERED LINES INDICATE THE 1,000 METER UNIVERSAL TRANSVERSE MERCATOR GRID, ZONE 33. INTERNATIONAL SPHEROID

RUTENETT UTM SONE 33. SORTE TALL

THE LAST THREE DIGITS OF THE GRID NUMBERS AREOMITTED

TALLENE ANGIR KM.

HEIGHTS AND DEPTHS IN METERS

USERS NOTING ERRORS OR OMISSIONS ON THIS MAP ARE URGED TO MARK HEREON AND FORWARD DIRECTLY TO COMMANDING OFFICER, ARMY MAP SERVICE, WASHINGTON, D. C. MAPS SO FORWARDED WILL BE RETURNED OR REPLACED IF DESIRED.

LEGEND—TEIKNTYDING

International boundary with marker — Riksgrense, grenseröys, -merke

Province boundary — Fylkesgrense

District, town boundary — Heradsgrense, bygrense

Parish boundary — Soknegrense

Crown lands boundary — Statsålmenningsgrense

Main road; Route number—Hovudveg, vegnummer — 50

Secondary road—Bygdeveg

Private road—God privat köyreveg

Cart road—Kjerreveg

Winter road; Track—Vinterveg. Lite synleg stig (ferdaveg)

Path, distinct—Klövveg, gangveg, tydeleg tråkka stig

Path with markers—Vardesett stig og blåmerkt skogsveg

Telephone or telegraph line; Station — Telefon-telegraflinje, stasjon

Power transmission line; Power station, transformer station — Elektrisk leidning, kraft el. transformatorst.

Rocks: Awash; Sunken—Båe i sjömalet. Båe under vatnet

Sandy foreshore flat—Havstrand med fjöre og slaggrunnslinje

Marsh—Myr

Coniferous woods—Barskog

Deciduous woods—Lauvskog

Railroad, double track; Statis; Halt — Jarnveg (tvisporal), stasjn, stoppested

Railroad, single track; Caretkers house — Jarnveg (einsporal), vaktbus

Railroad, narrow gauge, elect tramway — Tertiær jarnveg, elektrisk porveg

Railroad under construction — Jarnveg som er i bygging

Streetcar line — Trallebane, hestejarnveg

Aerial cableway—Togbane (aubane)

Church; Parish, chapel—Hovdkyrkje. Soknekyrkje. Kapell

Cemeteries—Kyrkjegard

Factory, power station, etc.; III — Större fabrikk, drift, kraftvk, mylne o.l.

Brickworks; Small mill; Sawill — Teglverk; Mylne (mölle), iern; Sag

Mine, mining claim; Quarry—Gruve, skjerp; Steinbrot

Wireless telegraph station—Tråds stasjon

Airfield; Parade ground—Flyløss. Eksismo

Horizontal control points—Trigonometrisk punkt

Lighthouse, light; Beacon; Airnavigation light — Fyr, lykt. Sjömerke. Luftfy

Fishers or hunters cabin, cattl camp, etc. — Fiskarbu, skyttarbu, felægr o.l.

Farms; Farm, mountain pastue—Gard, småbruk, plass, sæter

Cottage, school, hotel, meetinghouse, tourist shelter, inn, sports-hunters cabin, small farm, small power station, mill, etc. — Villa, skole, hotell, bedehus, turisthytte, gjestgjevarhus, sports-jakthytte, mindre bruk, lite kraftverk, mölle o.l.

RUTETILVISING (KARTREFERENSE), NAERMESTE 100 m.			SONEOMRÅDE GRID ZONE DESIGNATION: 33W	TO GIVE A STANDARD REFERENCE ON THIS SHEET TO NEAREST 100 METERS		
Eksempel: BJORNAALIEN			100 KM RUTE 100,000 M. SQUARE IDENTIFICATION	SAMPLE POINT: BJORNAALIEN		
km aust	01, 1		VQ WQ	1. Locate first VERTICAL grid line to LEFT of point and read LARGE figures labeling the line either in the top or bottom margin, or on the line itself: Estimate tenths from grid line to point:	01	1
km nord		35, 2	500	2. Locate first HORIZONTAL grid line BELOW point and read LARGE figures labeling the line either in the left or right margin, or on the line itself: Estimate tenths from grid line to point:	35	2
BJORNAALIEN	011352			SAMPLE REFERENCE:	011352	
Merk at komma sloyfes og at 100 km tallene-de små tallene 5 aust og 67 nord-IKKE skal tas meo. Ved meldinger utover 100 km eller hvis mere enn ett rutenett er merket på kartet, skal også 100 km ruten angis:				If reporting beyond 100,000 meters or if sheet bears an overlapping grid, prefix 100,000 Meter Square Identification, as:	WQ011352	
BJORNAALIEN	WQ011352		IGNORE the SMALLER figures of any grid number; these are for finding the full coordinates. Use ONLY the LARGER figures of the grid number; example: 7432000			
Ved meldinger utover 9° nord, syd eller 18° aust, vest. skal også soneområde angris:				If reporting beyond 9°N-S or 18°E-W, prefix Grid Zone Designation, as:	33WWQ011352	
BJORNAALIEN 33WWQ011352						

INDEX TO ADJOINING SHEETS
ISOGONIC INFORMATION 1951

2029 IV	2029 I	2129 IV
2029 III	2029 II	2129 III
2028 IV	2028 I	2128 IV

GN
1°00′ OR 18 MILS
0°02′ OR 1 MIL

APPROXIMATE MEAN DECLINATION 1952 FOR CENTER OF SHEET
ANNUAL MAGNETIC CHANGE 8′ EASTERLY

Use diagram only to obtain numerical values. To determine magnetic north line, connect the pivot point "P" on the south edge of the map with the value of the angle between GRID NORTH and MAGNETIC NORTH, as plotted on the degree scale at the north edge of the map.

MISVISING 1952 I GRADER OG MINUTTER, OG I STREKER ÅRLIG FORANDRING 8 ELLER 2.4‴ AUST.

Diagrammet gir bare tallverdiene. Retningen for Magnetisk Nord bestemmes ved å forbinde pivotpunktet "P" i söndre rammekant, med det punkt på skalaen i nordre rammekant, som svarer til misvisingen regnet i forhold til RUTENETT NORD (GN).

TRYKT I NORGES GEOGRAFISKE OPPMÅLING 5·65

GLOSSARY–FORKORTELSER

Bh	bedehs	meetinghouse	ned	nedre	lower
bg	berg	mountain, rock	n	nordre	northern
Bvs	brannaktstasjon	fire station	nt	nut	peak
bk	bekk	brook, creek	PÅ	postapneri	post office
DS	dampskipsstoppested	port	Pgd	prestegard	vicarage
Ek Vk	elektrisitetsverk	power station	RS	redningsstasjon	rescue station
el	elv	river	San	sanatorium	sanatorium
f	fabrikk	factory	Sph	sportshytte	sports cabin
F	fiskebu	fishers cabin	skj	skjær	rock, skerry
fj	fjell	mountain	Sk	skole	schoolhouse
fd	fjord	fiord	Sb	skytterbu	hunters hut
fs	foss	waterfall	st	store	great
Fl	felægr	cattle camp	str	straum	stream, current
gd, g	gard	farm	sd	sund	sound
hg	haug	hill, hillock	sr	sæter	mountain-pasture
hd	höyde, högd, hovd	hill	sl	stöl	shieling
hmr	hamar	crag	s	söndre	southern
hl	holme	islet	TS	telegrafstasjon	telegraph station
in, ind	indre	inner	td	tind	peak, pinnacle
Jh	jakthytte	hunters cabin	tj	tjern, tjörn	lakelet, pool
Kp	kamp	hill, hilltop	Th	turisthytte	tourists shelter
Kpl	kapell	chapel	Tk	tömmerkoie	lumber shanty
Knp	knapp	peak	UH	Ungdomshus	meetinghouse
Knt	knatt	peak	vn	vann, vatn	lake (lakelet)
Kl	kolle	knoll	v	vestre	western
L	låve, löe	barn	Vk	verk	factory, works
ld	land	land	Vb	vokterbolig	caretakers house
Ldh	landhandel	shop	Vl	voll	plain, meadow
l	lille, lisle	little	Yt	ytre	outer
LS	losstasjon	pilot station	ö	östre, austre	eastern
M	meieri	dairy	öv	övre	upper
m	mellom, midtre	middle			

SKJERSTAD, NORWAY

FIELD NOTES ON THE GEOLOGY OF THE GABBRO SOUTH OF MISVAER

COLE AND LANGLEY, AUGUST, 1970

TUESDAY, AUGUST 4th

LOCALITY 75 $^{5}010\ ^{74}442$ 500 m. S.W. of Misvaer.

Rock-type — Coarse-grained, white, mica-granite.

This outcrops in a small quarry and on the eastern slope of a stream valley. The outcrops are extensive.

LOCALITY 76 $^{5}010\ ^{74}438$ 400 m. south of (75).

Rock-type — Coarse, dark-grey, hornblende-biotite. gabbro.

This outcrops on the western slope of stream valley and is extensive. Granite outcrops at the base of this slope with a serpentinite body 100 m X 15 m at the contact. The gabbro also forms a body 300 m X 50 m that outcrops in the stream section. On the eastern slope of stream valley, granite outcrops are extensive, with a band of grey, basic, micaceous gneiss 100 m X 40 m within this granite.

SPECIMEN K.L. 10 Coarse, grey, hornblende-biotite, gabbro.

SPECIMEN D.C. 69 Coarse, dark-green, crystalline serpentinite.

SPECIMEN K.L. 8 Medium, pinkish-white, mica-granite.

LOCALITY 77 $^{5}008\ ^{74}426$ 1200 m south of 76.

Rock-type - Gabbro c.f. K.L. 10.

This outcrops intermittently in forested areas at the base of a NE — SW escarpment. Extensive screes are present at the base of this escarpment. The screes are mainly composed of gabbro, but local

concentrations of pyrite and chalcopyrite, disseminated, are present in aplite veins in the gabbro.
On the slope above the screes, gabbro is the main rock-type, but with aplite veins, and local concentrations of biotite. A gneissic band, 50 cm. thick, is also present within the gabbro.

TRAVERSE FROM 77 N.E. TO MISVAER-SKAR ROAD.

Rock-type – Gabbro c.f. K.L. 10.

This outcrops intermittently over a forested area.

WEDNESDAY, AUGUST 5th

TRAVERSE SOUTH ALONG MISVAER – SKAR ROAD.

Glacial Moraine present for 500m both sides of road.

500m S.W. Misvaer.

Rock-type – Grey, banded, basic gneiss

This outcrops along road-side for 50m. Dip of foliation planes W 20 N at 35°.

SPECIMEN K.L. 12 Grey, banded, basic gneiss.

1 km. south of Misvaer.

Rock-type – Gabbro c.f. K.L. 10 with local concentrations of biotite.

This outcrops intermittently along road-side, south for further 3 km. to Skar.

LOCALITY 78 $^{4}993$ $^{74}411$ On river-section 500m west of Skar.

Rock-type – Coarse gabbro c.f. K.L. 10 but with more biotite present

This outcrops in river-section for at least 500m. down-stream north of 78.

LOCALITY 79 $^{S}006$ $^{74}412$ 400m N.E., upslope from Stolpe.

Rock-type – Gabbro c.f. K.L.10.

This gabbro forms extensive outcrops on slope of hill N.E. of Stolpe. A N–S ~~zone~~ band of coarse, white, quartzite approx. 30m. wide outcrops on this slope near 79, within the gabbro.

LOCALITY 80 $^{S}013$ $^{74}417$ 1 km. N.E. of 79, east of main slope.

Rock-type – Gabbro c.f. K.L.10

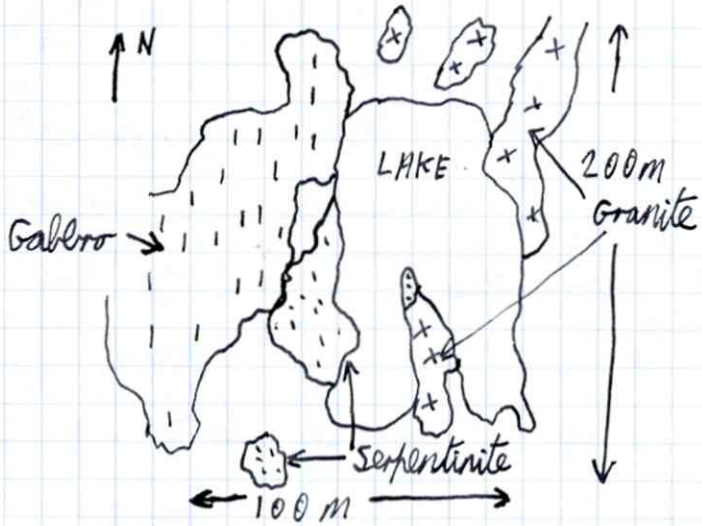
This is separated to the east, from coarse, mica-granite c.f. K.L. 8, by a band of vegetation approx. 20m wide. The granite is locally hornblende-rich.

LOCALITY 81 $^{S}016$ $^{74}422$ 600m N.E. of 80.

Rock-type – Light green serpentinite with pyrite crystals.

This serpentinite forms a lensed-shape body trending NE-SW, 150m x 30m, separating gabbro, c.f. K.L 10, to the N.W. from granite, c.f. K.L. 8, to the S.E. The gabbro is slightly foliated near the serpentinite contact.

PLAN OF OUTCROPS



SPECIMEN D.C. 75 Fine, light green serpentinite with pyrite crystals.

300m NE 81.

Rock-type ~~[illegible]~~ Granite, c.f. K.L.8.

A body of gabbro 200m x 40m outcrops within this granite.

LOCALITY 82 ^{5}012 ^{74}426 400m east of 77 above NE-SW escarpment.

Rock-type – Gabbro c.f. K.L.10 with more biotite.

This outcrops extensively above ~~escarpment~~ escarpment.

THURSDAY, AUGUST 6th

LOCALITY 83 ^{5}005 ^{74}394 500m south of Brekke on stream-section.

Rock-type – Dark grey, extremely foliated, mica-schist.

Dip of foliation planes W 40 N at 45°. The schist is locally crenulated and continues outcropping S.E. upstream for at least 100m.

SPECIMEN D.C. 77 Dark-grey, crenulated mica-schist.

500m. north of 77, at Brekke, greenish-grey, banded gneiss, c.f. K.L. 12, outcrops along road-side, with gabbro c.f. K.L. 10, outcropping ~~on~~ on hillside N.E. of Brekke.

Dip of foliation planes in gneiss W 40 N at 45°.

TRAVERSE N.E. ~~By~~ FROM 83 UP SOUTH SLOPE OF VIKDALEN VALLEY

Mica-schist outcrops intermittently for 400m. N.E. 83, with quartz lenticles present.

400m N.E. 83.

Body of serpentinite, c.f. D.C. 75, 30m x 5m present.

Further east, outcrops of greenschist are present.

SPECIMEN D.C. 78 Greenschist with weathered pyrite crystals.

This continues east for 200m., with bands of quartz-chlorite gneiss locally. Dip of foliation planes W 50 N at 35°.

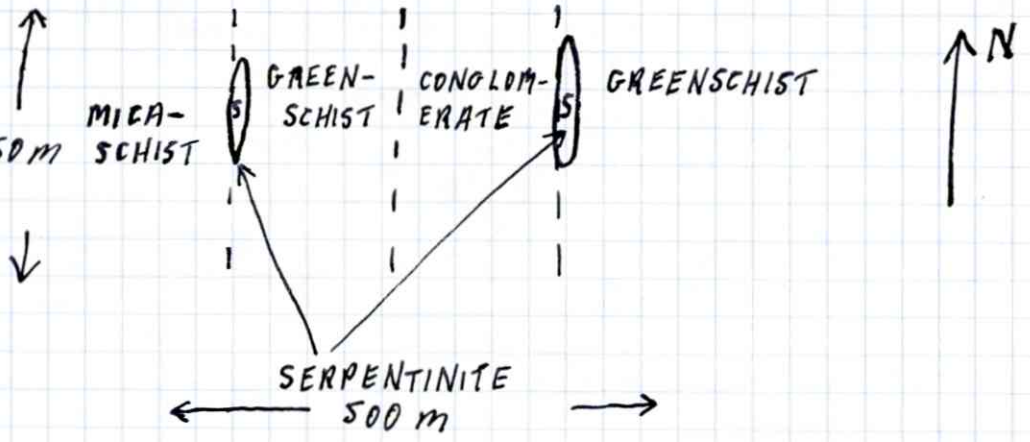
600m N.E. 83

Extensive outcrops of stretched conglomerate, with pebbles up to 1m. long, occur. The pebbles are largely of quartzite with some dolomite, in a greenschist matrix.

3. This conglomerate continues for 200m. further east.
SPECIMEN K.L. 13 Stretched conglomerate with quartzite and dolomite pebbles in a greenschist matrix.

800m. ENE 83.
Body of serpentinite with weathered pyrite crystals, c.f. D.C. 75, 5m X 20m outcrops, with greenschist c.f. D.C. 78 further east.

E-W PROFILE ALONG SOUTH SLOPE OF VIKDALEN VALLEY.



LOCALITY 84 ^{5}015 ^{74}399 1500m east of Brekke on south slope of Vikdalen.
Rock-type — Stretched conglomerate c.f. K.L. 13

200m N.W. 84.
Outcrops of greenschist c.f. D.C. 78 occur as far as Vikdalen stream. Dip of foliation planes NORTH at 20°.

LOCALITY 85 ^{5}018 ^{74}403 300m N.E. of 84 on Vikdalen stream
Rock-type — Banded, quartz-chlorite, gneiss with pyrite crystals locally. This outcrops in stream section and for 100m further north. Dip of foliation planes W 70 N at 40°.
Stretched conglomerate outcrops south of stream.
SPECIMEN D.C. 82 Banded, quartz-chlorite gneiss with pyrite crystals.
100m. north of 85.
Rock-type — Greenschist c.f. D.C. 78 with garnet crystals.

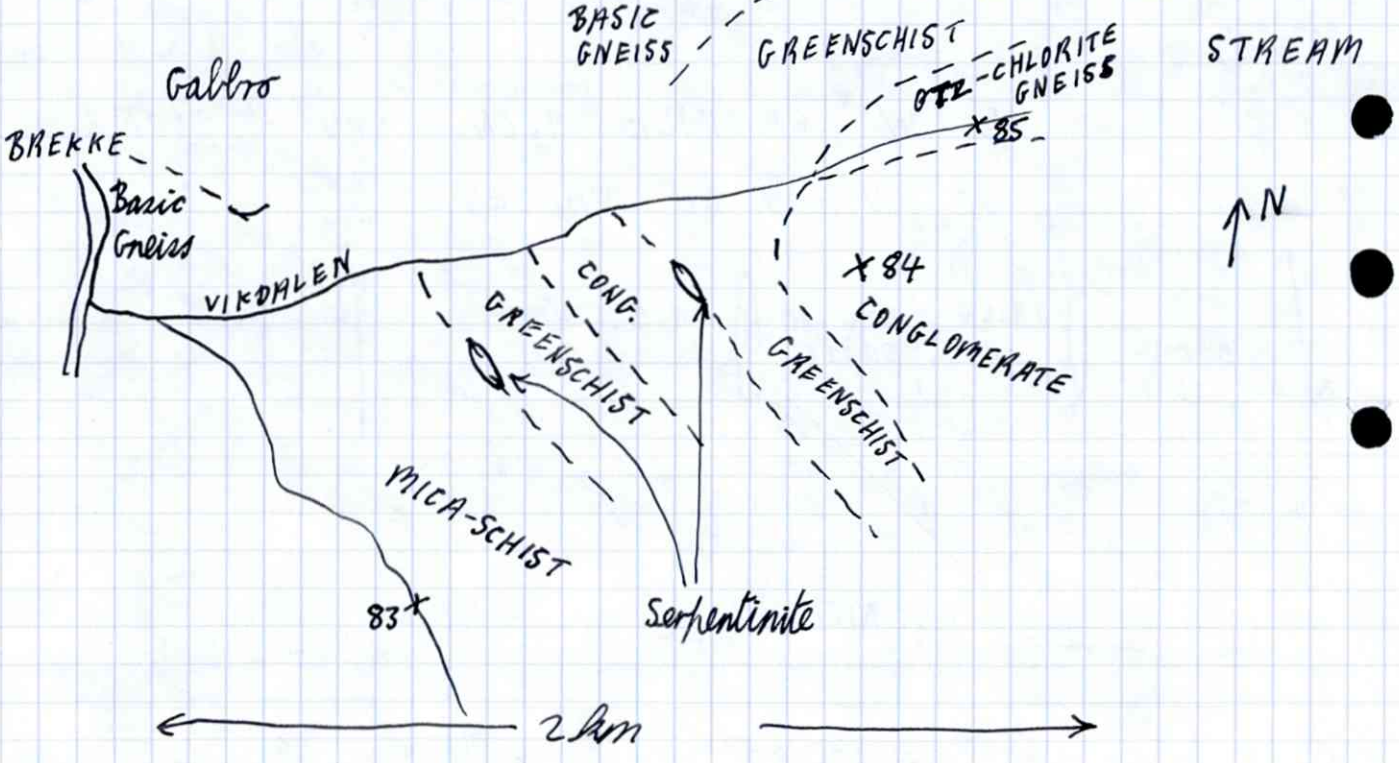
This outcrops intermittently for 200 m. northwards. Dip of foliation planes N10E at 15°.

300 m north of 85.

Rock-type — Basic gneiss c.f. K.L. 12. This continues outcropping northwards.

GEOLOGY

PLAN OF ~~OUTCROPS~~ IN AREA OF VIKDALEN



LOCALITY 86 5015 7407 400 m N.E. of 85.

Rock-type — Quartz-microdiorite. This forms a band approx 30m wide separating gabbro c.f. K.L. 10 to the west, from basic gneiss c.f. K.L. 12, to the east. This band trends N.S.

Dip of foliation planes in gneiss WEST at 40°.

SPECIMEN D.C. 83 Grey, quartz-biotite, microdiorite with aplite vein.

FRIDAY, AUGUST 7th

LOCALITY 87 4997 7397 1 km. N.W. 83.

Rock-type — Basic gneiss c.f. K.L. 12. with granitic veins and quartz lenticles. This forms extensive outcrops to South of road.

Dip of foliation planes W 30 N at 50°.

LOCALITY 88 $^{4}986$ $^{74}394$ 1 km. west of 87.

Rock-type — Yellowish-orange banded micaceous quartzite. This forms a N–S band at least 100m long and 30m wide. To east and west, outcrops of granite c.f. K.L.8 occur. The granite is locally coarse with some hornblende-granite.

SPECIMEN D.C. 86 Yellowish-orange, banded, micaceous, quartzite.

TRAVERSE NORTH FROM 88.

Outcrops of medium, mica-granite, c.f. K.L.8, with quartzite bands occur for 2 km. northwards.

LOCALITY 89 $^{4}987$ $^{74}412$ 1 km west of 78 on track.

Rock-type — Basic gneiss, c.f. K.L.12. This forms outcrop east of track. Dip of foliation planes W10°N at 65°.

200m west of 89.

Outcrops of granite, c.f. K.L.8, occur, with a N-S band of quartzite, c.f. D.C.86, 20m wide.

TRAVERSE NORTH ALONG TRACK FROM 89

100m north of 89.

Rock-type — Microdiorite with lenses of quartz, c.f. D.C 83.

Further north, gabbro, c.f. K.L.10, outcrops on track, as far as Karlöl, 1500m. north of 89.

SUNDAY, AUGUST 9th.

LOCALITY 90 $^{4}999$ $^{74}438$ North slope of hill 284m. 1 km. S.W. Mizlaer.

Rock-type — Dark biotite gabbro, c.f. K.L.10. Glacial moraine occurs north at base of hill.

100m N.W. 90

Rock-type — Basic gneiss, c.f. K.L.12. Dip of foliation planes W10S at 15°.

Basic gneiss outcrops southwards for 400m. along eastern crest of hill 284m. Dip of foliation planes WEST at 40°.

LOCALITY 91 $^{4}996$ $^{74}435$ 400m S.W. of 90. near summit of hill 284

Rock-type — Basic gneiss c.f. K.L. 12 containing garnet crystals locally. Dip of foliation planes W 30 S at 45°.

100m S. 91

Rock-type — Mica-granite c.f. K.L. 8. This forms a body 50m X 20m within the basic gneiss, with a gradation into granite-gneiss at the contact zone.

200m S. 91

Rock-type — Gabbro c.f. K.L. 10. This forms extensive outcrops south of hill 284m.

LOCALITY 92 $^{4}994$ $^{74}433$ 200m. S.W. 91.

Rock-type — Basic gneiss c.f. K.L. 12, with folded quartz veins. Dip of foliation planes W 25 S at 45°.

200m S. 92.

Rock-type — Gabbro, c.f. K.L. 10. This outcrops southwards along western slope of hill 284m..

TRAVERSE WEST ~~PROBABLY~~ TO LAKSELVEN RIVER.

Outcrops of basic gneiss occur down slope of river valley, to west of gabbro outcrops. Dip of foliation planes WEST at 50°.

LOCALITY 93 $^{4}991$ $^{74}427$ 1km S.W. 92 on river section.

Rock-type — Gabbro, c.f. K.L. 10. This forms small outcrop within moraine, with further outcrops south, upstream for 300m. Basic gneiss, c.f. K.L. 12, outcrops 100m. north, downstream, for at least 500m further north. Glacial moraine obscures gabbro / gneiss contact. Dip of foliation planes in gneiss WEST at 55°.

50m N.W. 93.

Rock-type – Basic gneiss. This forms small outcrop within glacial moraine.

MONDAY, AUGUST 10th

LOCALITY 94 $^{4}985$ $^{74}426$ 400m west of 93.

Rock-type – Gabbro c.f. K.L. 10. This forms small outcrops that continue north along hill-slope for 100m. Further north, and west of 94, outcrops of medium, hornblende-tourmaline granite occur with numerous weathered blocks.

SPECIMEN D.C. 91 Medium-grained, hornblende-tourmaline, granite.

Microdiorite, c.f. D.C. 83 outcrops in a N-S band 10m wide, west of 94, between the gabbro and granite.

300m west of 94.

Rock-type – Basic micaceous gneiss, c.f. K.L. 12. This outcrops extensively on hillside.

LOCALITY 95 $^{4}982$ $^{74}422$ 400m S.W. 94.

Rock-type – Banded, micaceous, quartzite c.f. D.C. 86. This forms N-S band, 10m wide, with granite to west, and moraine to east. Dip of foliation planes in quartzite W10N at 50°.

500m S. 95. in stream section.

Rock-type – Banded quartzite c.f. D.C. 86. This forms N-S band 10m wide. Massive, greyish-white, crystalline marble outcrops east, downstream in band 5m. wide.

SPECIMEN D.C. 92 Greyish-white, coarse, crystalline, marble.

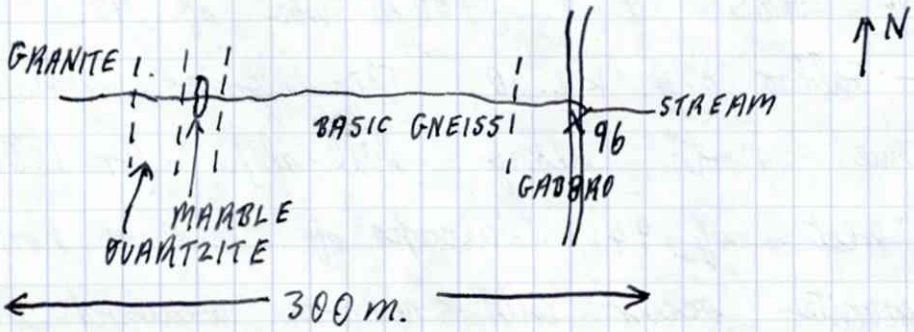
LOCALITY 96 $^{4}983$ $^{74}418$ 400m north of 89 in stream section.

Rock-type – Gabbro, c.f. K.L. 10. This outcrops for 30m west upstream. Basic gneiss outcrops further west for 100m. Dip of foliation planes WEST at 45°.

200m. W. (96).

Rock-type – Marble, c.f. D.C. 92. This forms land 5m. wide in stream. Contacts between different rock-types not clearly seen.

E-W PROFILE ALONG STREAM-SECTION.



TRAVERSE SOUTH ALONG TRACK FROM 89.

100m. S. 89.

Rock-type – Gabbro c.f. K.L. 10.

200m. S. 89.

Rock-type – Coarse-grained hornblende-granite with chlorite and flecks of pyrrhotite. This forms outcrop east of track, 30m x 5m.

SPECIMEN D.C. 93 Coarse, hornblende-granite with chlorite and disseminated pyrrhotite.

Further south, outcrops of microdiorite, c.f. D.C. 83, occur east of track.

LOCALITY 97 4990 74408. 500m S.W. 78.

Rock-type – Fine-grained gabbro, c.f. K.L. 10. This forms intermittent outcrops on hill west of lake 153 m..

LOCALITY 98 4997 74400 300m. north of 87 at Ned.

Rock-type – Coarse gabbro, c.f. K.L. 10, with some quartz veins. This occurs in small outcrops near stream and track at Ned. South of stream, basic gneiss, c.f. K.L. 12, forms outcrop 10m x 20m.. Dip of foliation planes W 40 N at 40°. Glacial moraine is present further south as far as 87.