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INTERN RAPPORT

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RAPPORT VEDRØRENDE:

SLINGRAM AND MAGNETIC SURVEYS IN FOUR AREAS SOUTHWEST OF KAUTOKEINO IN THE MOBIL (SUPERIOR)-SYDVARANGER JOINT VENTURE AREA

RESYMÉ:

In 1985 NGU flew a geophysical helicopter survey near Kautokeino as a part of their "Finnmarks-program". The survey area is within the Kautokeino/Masi joint venture area. In April 1986 four areas were surveyed on the ground with slingram and magnetics as follow-up work of the helicopter survey. The targets for follow-up work were selected by using experiences from Bidjovagge-type mineralizations in the northern part of the Kautokeino Greenstone Belt.

The ground geophysics indicates a good potential for Bidjovagge-type mineralization in two areas (no. 77 and 79) and a potential for sulphide mineralization of undeterminated type in one area (no. 76).

All areas should be followed up by geological mapping and boulder tracing as first steps.

FORDELING

OSLO:

1	Arkiv
1	R. Hagen
1	T. Kjølseth

KIRKENES:

1	Adm. direktør

ANDRE:

1	Bergmester
1	Mobil
1	Sulfidmalm
1	A. Bjørlykke

KOMMENTAR:

Contents

Introduction

In 1985 Norges geologiske undersøkelse (NGU) flew a geophysical helicopter survey over an area of about 1900 sq. km northeast and southwest of Kautokeino. The survey was a part of NGU's "Finnmarksprogram". The survey report is not yet completed, but preliminary maps were made available to ASPRO in March, 1986.

The surveyed area is within the Kautokeino/Masi joint venture area, and it was decided to do a limited amount of follow-up work. The main target in the Kautokeino greenstone belt is copper-gold deposits of Bidjovagge type. The following criteria were used in the selection of anomalies for follow-up work:

1. Greenstones and particularly diabase sills are important lithologies in Bidjovagge type ore environment. (Previous geological mapping, gravity maps and magnetic maps were used to outline areas containing these rocks).

2. Bidjovagge type mineralization is associated with graphitic horizons.

3. The mineralization is located at breaks in long graphitic horizons or at shorter conductors close to and parallel with the main horizon.

4. Alteration of country rocks may create a complex magnetic pattern close to mineralization.

By using these criteria 8 areas were given priority for ground follow-up work. The selected areas were described in a short memorandum (Appendix 1). Five areas were given priority for follow-up work on snow-covered ground. Of the remaining areas two are close to the road, and can more easily be surveyed in the summertime. One area was surveyed by NGU in 1984.

In late April four targets were surveyed by a three man team (T. Kjølseth, T. Anderson and L. Nessvold. Difficult snow conditions due to mild weather made it impossible to reach the fifth area.

The four surveyed areas are situated about 20 km southwest of Kautokeino. The general area is shown in Fig. 1. The location of each target area is shown in Fig. 2. The base lines are marked with broken lines.

Survey results

Each area was surveyed with the Apex Max Min II EM system. Measurements were made with the coils in the horizontal mode at 222 Hz and 1777 Hz. A Scintrex MP VII proton magnetometer with a precision of about 1 nT was used for the magnetic measurements. Results are presented as stacked magnetic profiles and an EM interpretation. Depth, dip and thickness of the EM conductor have been estimated on selected profiles. Some dip indications based on the magnetic curves have also been added.

AREA 76.

Two conductors with a northwest strike can be followed through the area (Fig. 3). The eastern conductor has got a weak magnetic correlation, but the highest magnetic values are found between the conductors. Magnetic anomalies are irregular and cannot always be followed from one profile to another. The general dip of the area is towards northeast. Both EM and magnetics indicate a relatively shallow overburden, at places less than 10 m.

The two EM-conductors continue out of the surveyed area, but the corresponding helicopter anomalies can be found only on one flight line and the zones must have a limited extent.

The most interesting aspect of Area 76 is that the conductors are weak and most likely do not represent graphite. The magnetic correlation of the eastern zone may indicate pyrrhotite. In the Gulf joint venture an anomaly very similar to the eastern zone was drilled in 1985 (Area 63). The drilling showed that the anomaly was caused by pyrrhotite veinlets and dissemination in a tuffite. No precious metals, base metals or alloy metals were associated with the pyrrhotite in Area 63.

In spite of this further follow-up work is recommended in Area 76. Pyrrhotite zones may contain gold (Detour Lake type) and other sulphides may be interesting in themselves or carry gold. It should be noted that the anomalies of Area 76 are quite different from the anomalies caused by the extensive cherty, often graphitic, pyrrhotite zones of Area 68 (report no. 1684) and of the Baharavdujavri Area (1985 diamond drilling, report under preparation).

AREA 77.

Area 77 is situated on the western limb of a possible anticline (Appendix 1). The easternmost EM-conductor (Fig. 4) is a part of a long zone which is associated with a magnetic high on the western side. To the west of the long conductor three short conductive zones have been distinguished. The eastern short conductor is non-magnetic and becomes weaker towards north. The middle zone is associated with a very small magnetic anomaly (pyrrhotite ?) and is weakening towards south. The westernmost conductor has been found only on survey line 100 N and show a strong magnetic correlation which indicates magnetite in the conductor.

The dip of the three short conductors is towards east. The long eastern conductor is steeply dipping. On the southern profiles there is a contradiction between dip indications from EM and magnetics. Relatively thin overburden is indicated in parts of the survey area.

Area 77 deserves the highest priority for follow-up work. The main target is the short strike length conductor complex. The postion of this complex compared to the long eastern conductor fits with the pattern seen at the copper-gold mineraliztion of Area 43 in the Gulf joint venture area. The highly magnetic short conductor may also represent a potential for a massive sulphide body.

AREA 78.

Area 78 occupies a position which may correspond to the eastern limb of the anticline. The area contains one single, non-magnetic conductor (Fig. 5). A certain thickness of the conductive zone is indicated on profiles 100 N and 200 N. The general dip of the area is towards east.

There are positive magnetic anomalies to the east and to the far west of the conductor. The eastern magnetic high is very weak on the profiles containing the central parts of the conductor.

The large depth estimates of lines 0 and 350 N may represent an edge-effect at the termination of the conductor rather than a thick overburden. The magnetic profiles show thin overburden in the whole area.

The features of interest of Area 78 are the thickening of the central parts of the conductor combined with the weakening of the eastern magnetic high. Further follow-up work is recommended, but the geophysical results alone do not justify diamond drilling.

In Fig. 5 an offset of the EM conductor on line 100 N has been corrected compared with the coordinates on the field cards. The correction is based on the relative postion of EM and magnetics. Line 100 N should be resurveyed before an eventual drilling of the conductor.

AREA 79.

Area 79 contains four parallel conductive zones (Fig. 6). The three westernmost zones are non-magnetic. Apart from some variations in thickness the zones are regular. The three zones extend out of the surveyed area. An easterly dip is indicated by the magnetics for the zone at 200 W. The easternmost zone is more complex and splits into two parallel conductors towards south. A westerly dip is indicated for this zone. A positive correlation

between EM and magnetics is seen on lines 100 N and 0. A magnetic high east of the complex EM conductor cannot clearly be correlated from profile to profile.

The overburden is thick in most of the area. Only the south-eastern part show a shallow depth.

By using the Bidjovagge-type model the three western conductors of Area 78 are of little interest. In addition the depth estimates of the western part of the area show that follow-up work will require heavey equipment and will be expensive. The eastern, complex zone with a changing magnetic pattern is a good target that deserves follow-up work.

Recommendations

All surveyed areas should be followed up by detailed geological mapping and boulder tracing. Special care should be taken in the parts were the geophysics indicates a thin overburden. The mapping should mainly be done in the grid areas, but outcrops outside should also be investigated. It is important to establish stratigraphy and possible signs of alterations in each area.

The combined results of geology and geophysics should determine the next step in the follow-up work. The geophysical results alone classifies Areas 77 and 79 as diamond drilling targets.

Of the original 8 selected areas, 3 has not been surveyed on the ground (Areas 80 to 82). These areas should be surveyed and covered by geological mapping. Area 83 which has been surveyed by the NGU should also be covered by geological mapping.

All areas described in this report have been claimed, and it is recommended to keep the claims until further follow-up work has been completed.

Conclusions

1. NGU's geophysical helicopter survey has provided new exploration data in the area south of Kautokeino.

2. The helicopter survey contains information that can be used in the selection of new targets by a Bidjovagge-type geophysical model.

3. The detailed features of the helicopter anomalies have been refound by the slingram and magnetic ground surveys.

4. Geophysical helicopter surveyes combined with an elaborate geophysical model is the most effective method to produce good exploration targets in the Kautokeino greenstone belt.

Stabekk, 16.06.86.

Ragnar Hagen

Tore Kjølseth

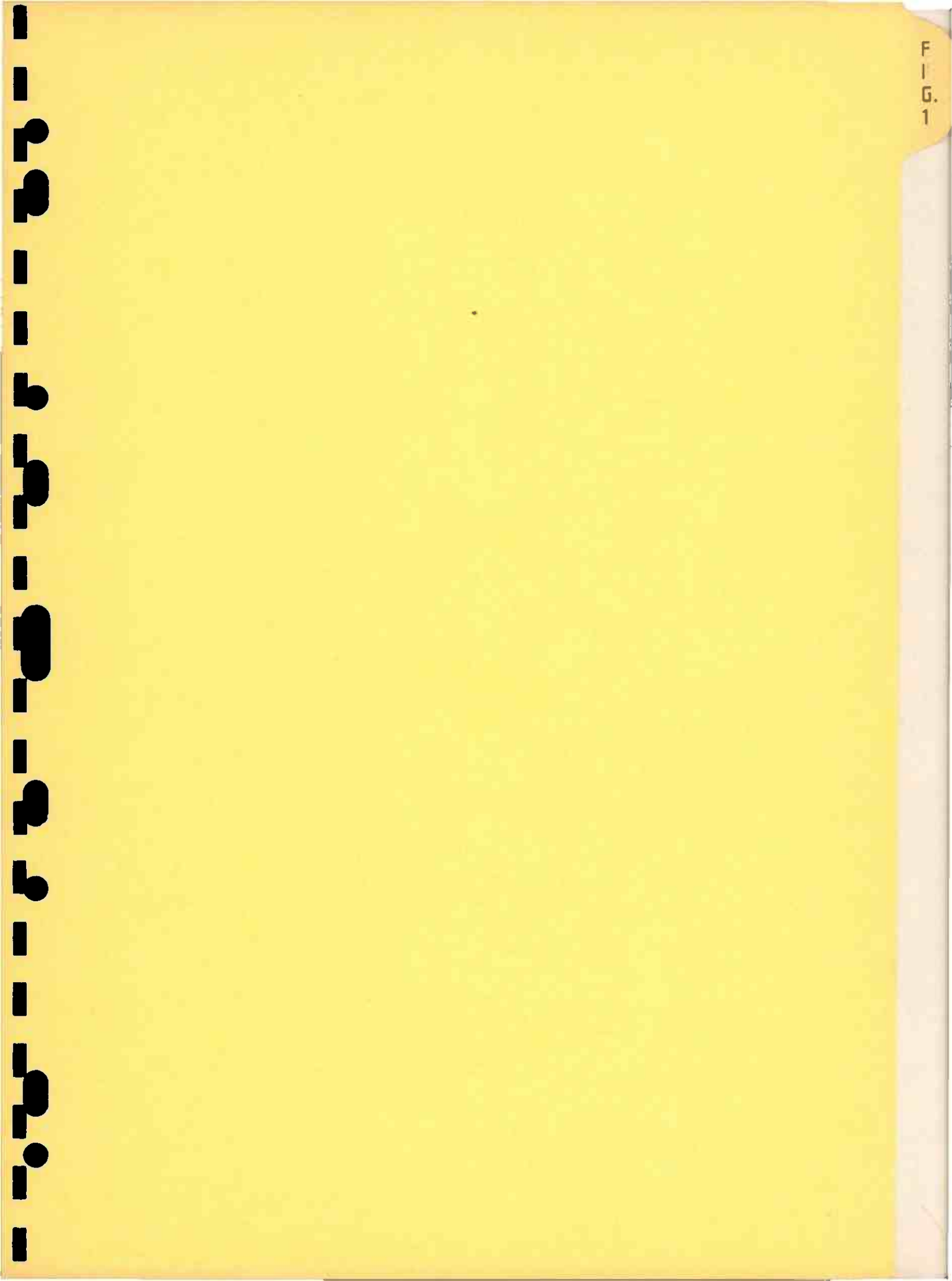
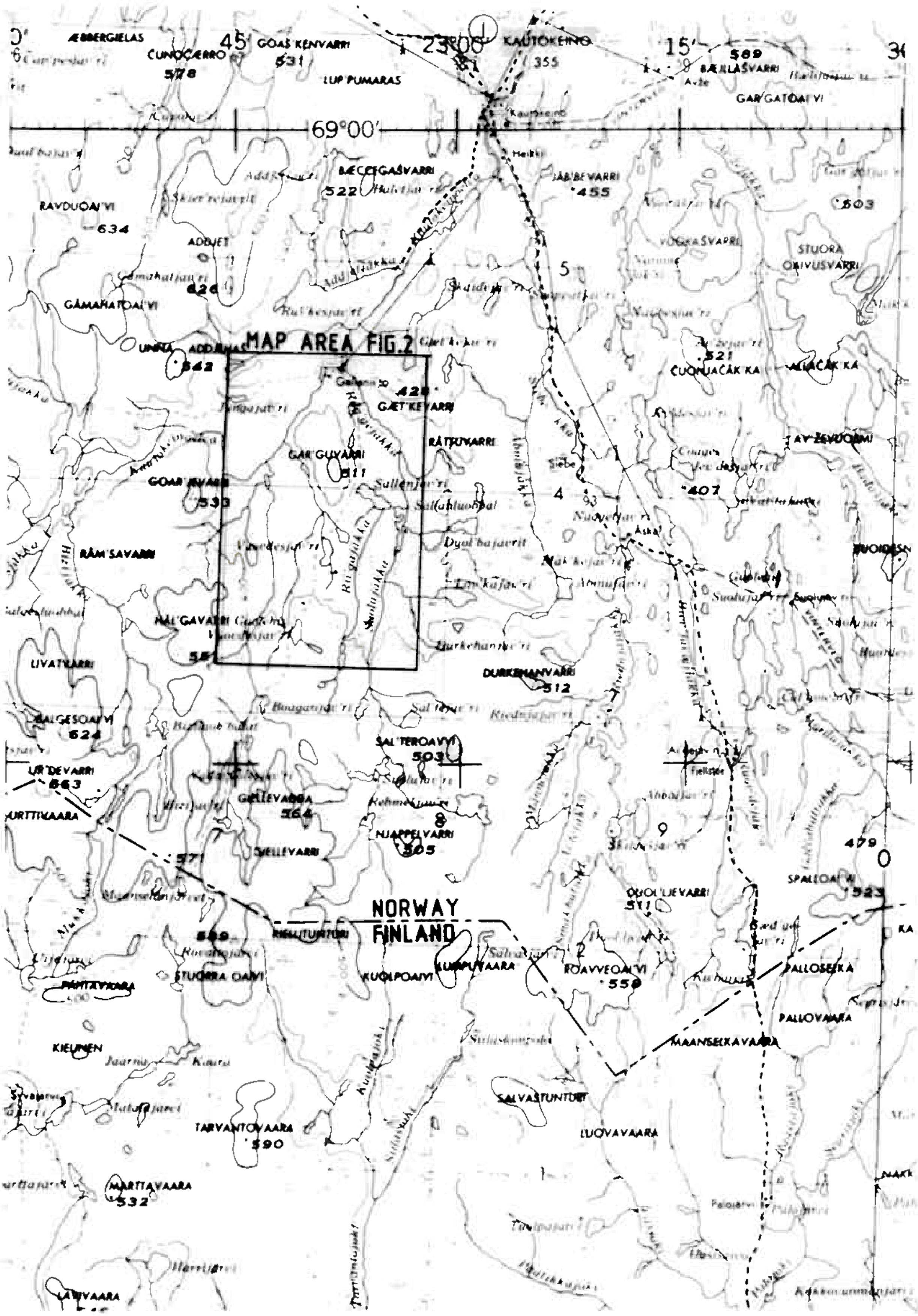


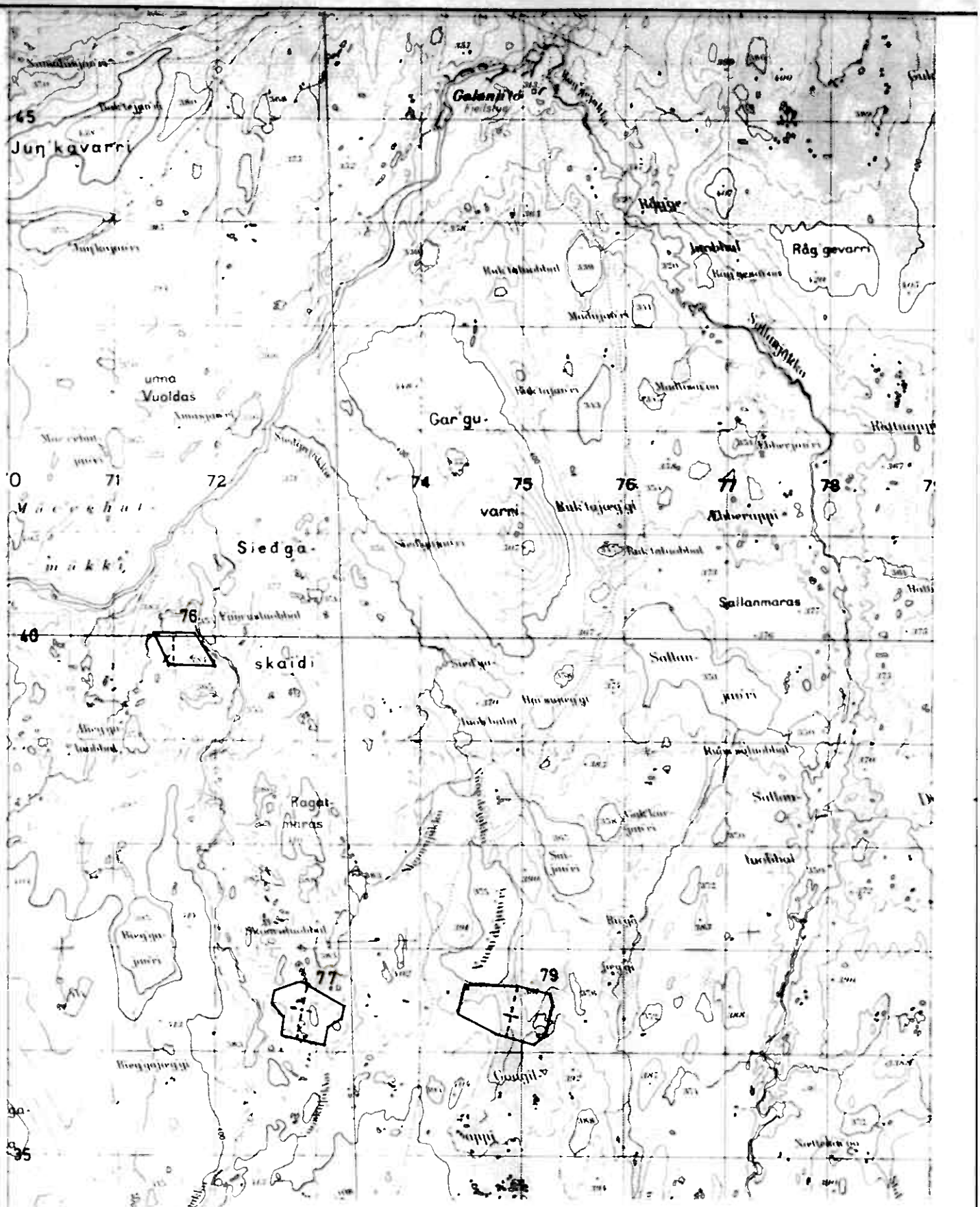
FIG. 1



0 5 10km

Location map HEM follow up work	M 1:250000
	Målt:
	Tegn: RH 5/86
	Trace: HB 6/86
PROSPEKTERING A/S	Fig. 1.

FIG. 2



Target areas
76-79

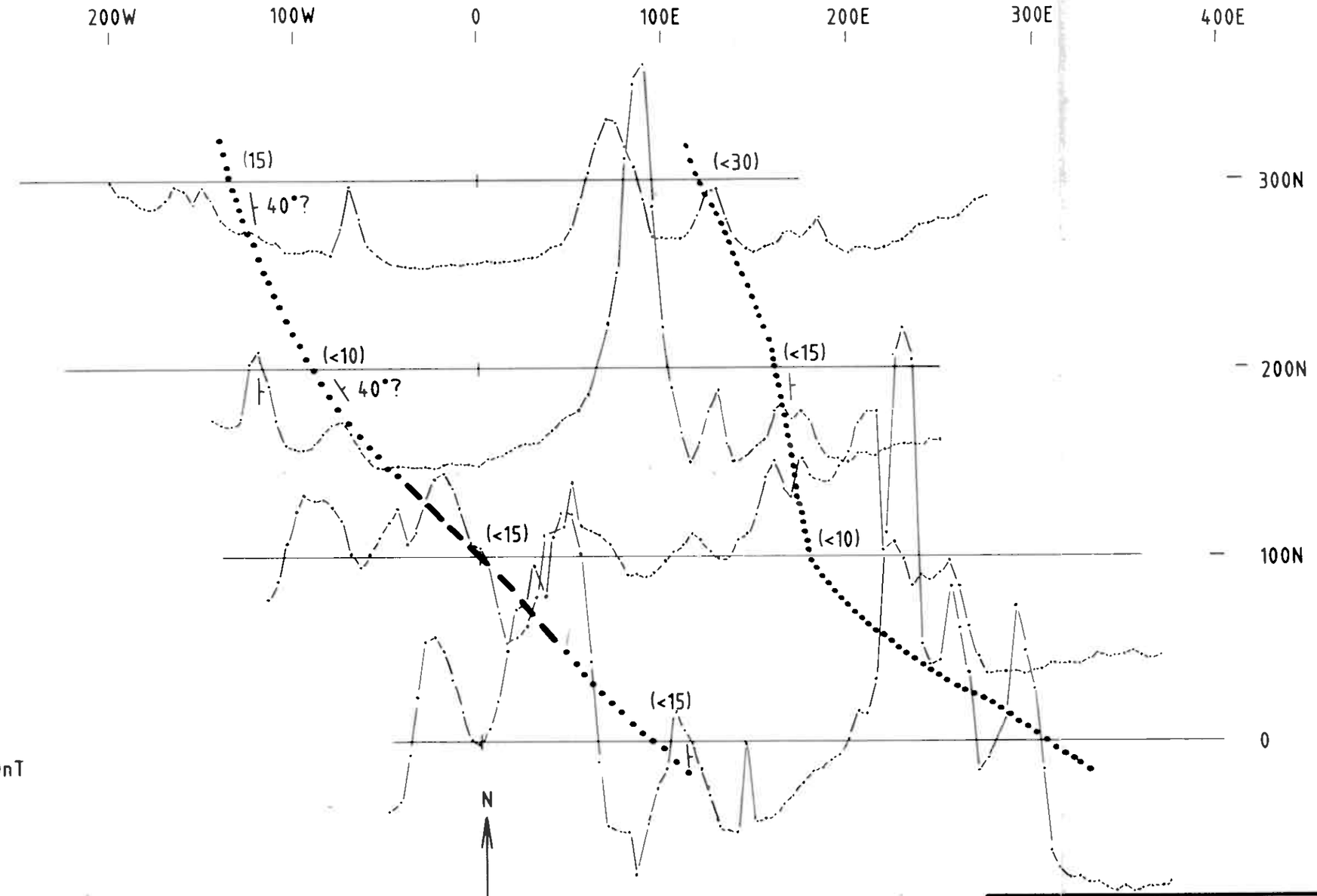
M
1:50 000

Målt: TK 4/86
Tegn: RH 5/86
Trace: HB 6/86

PROSPEKTERING A/S

Fig. 2

FIG. 3



LEGEND:

Mag. tot. field (1cm.=500nT
profile line= 53 000nT

Strong EM conductor

Weak EM conductor

Dip of conductor

(10) Depth (m) to top of conductor

10 Conductor thickness (m)

Area 76
Ground geophysics

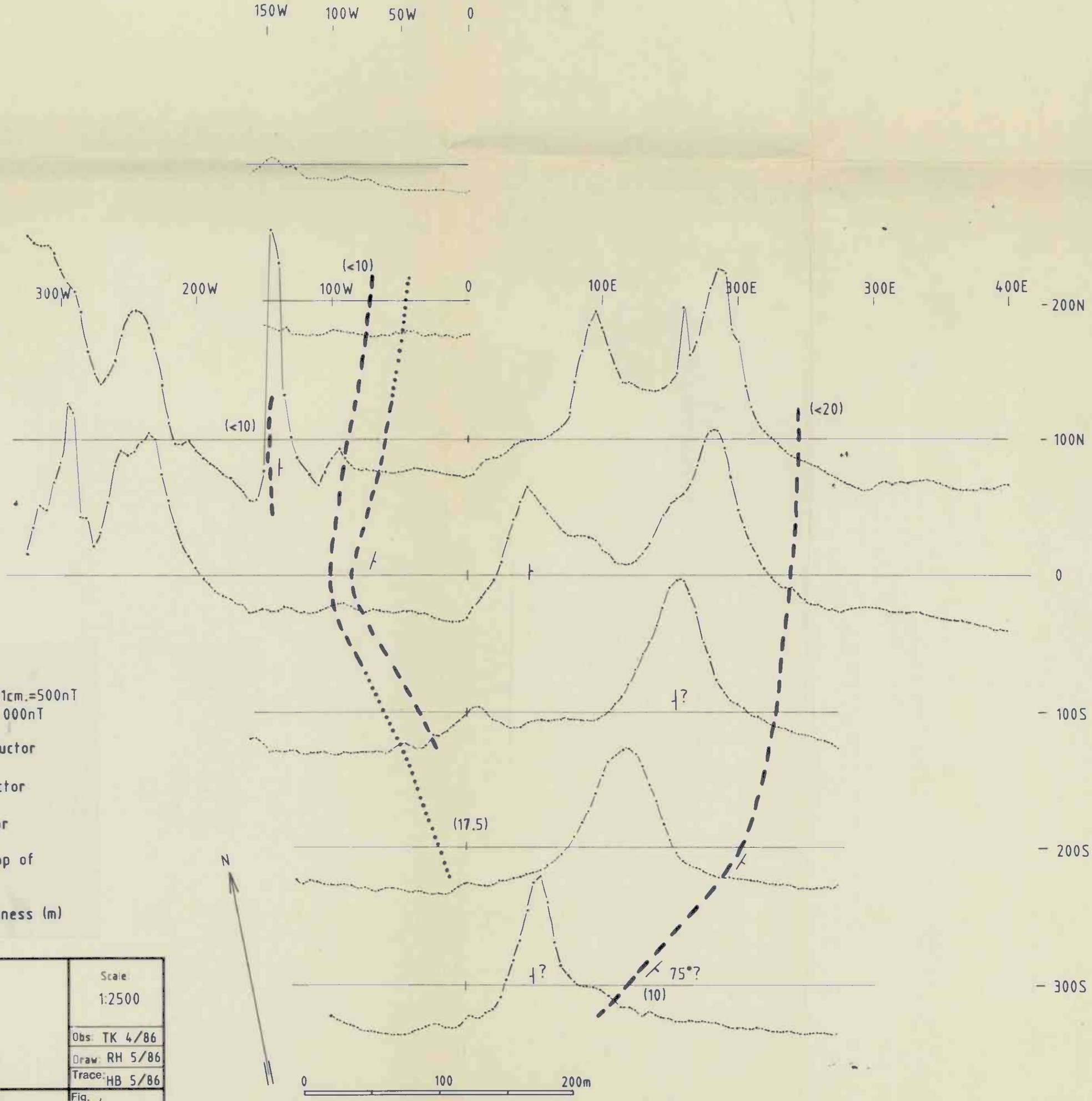
Scale: 1:2500

Obs: TK 4/86
Draw: RH 5/86
Trace: HB 5/86

PROSPEKTERING A/S

Fig. 3

FIG. 4



LEGEND:

Mag. tot. field (1cm.=500nT profile line= 53 000nT

Strong EM conductor

Weak EM conductor

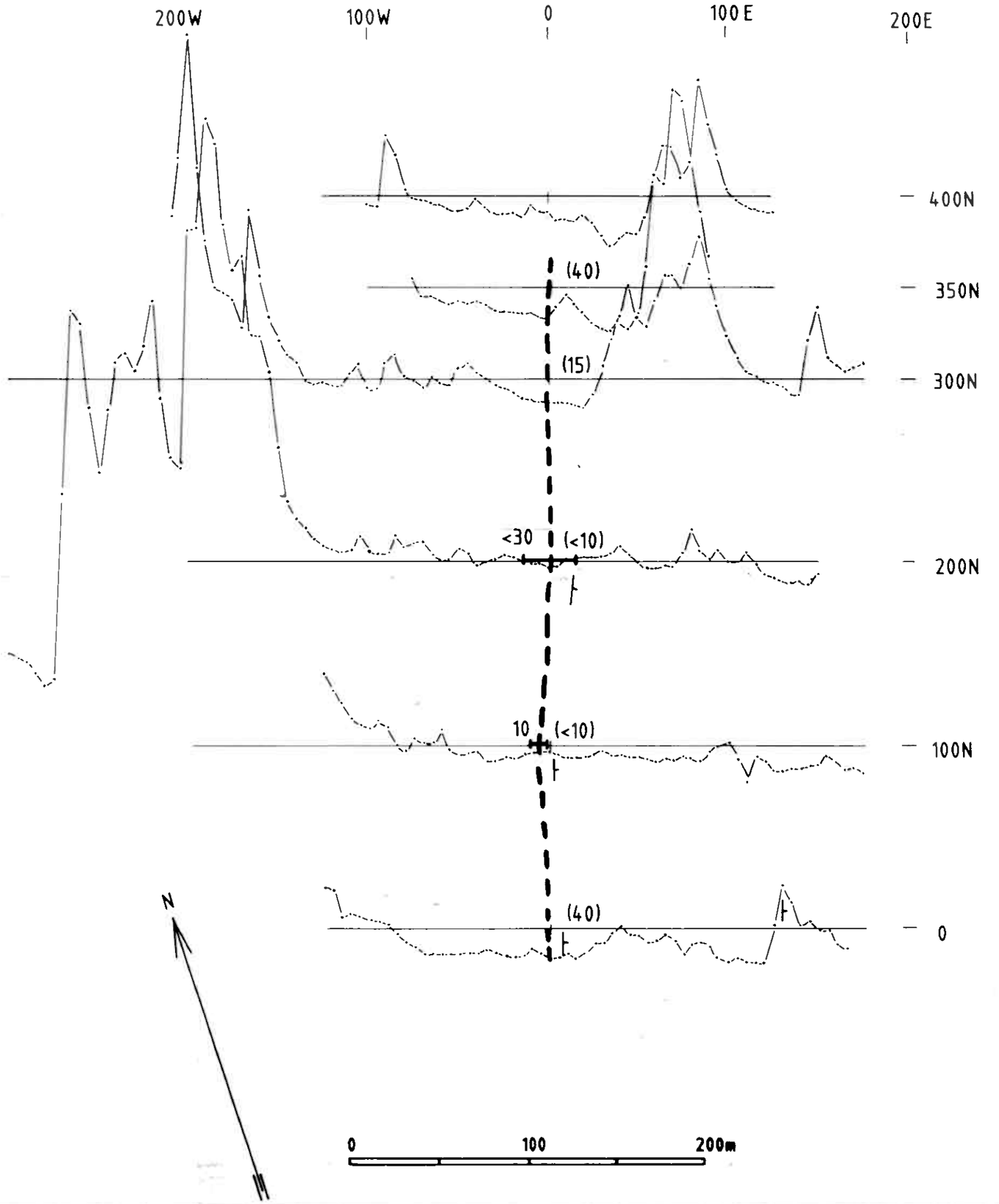
Dip of conductor

(10) Depth (m) to top of conductor

10 Conductor thickness (m)

Area 77 Ground geophysics	Scale: 1:2500
	Obs: TK 4/86
	Draw: RH 5/86
	Trace: HB 5/86
PROSPEKTERING A/S	Fig. 4

FIG. 5



LEGEND:

Mag. tot. field (1cm.=500nT profile line= 53 000nT

Strong EM conductor

Weak EM conductor

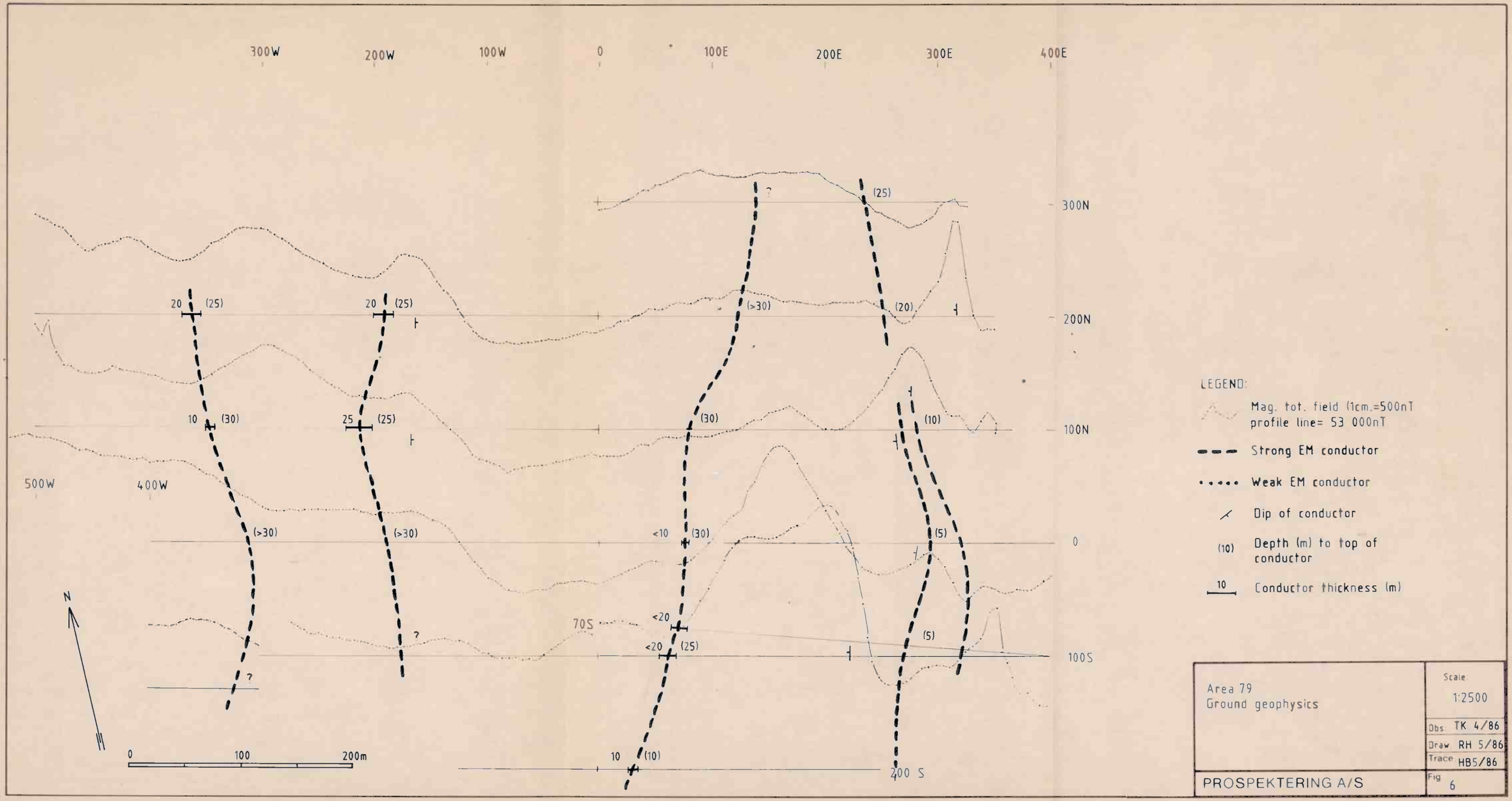
Dip of conductor

(10) Depth (m) to top of conductor

10 Conductor thickness (m)

Area 78 Ground geophysics	Scale: 1:2500
	Obs: TK 4/86
	Draw: RH 5/86
	Trace: MB 5/86
PROSPEKTERING A/S	Fig. 5

FIG. 6

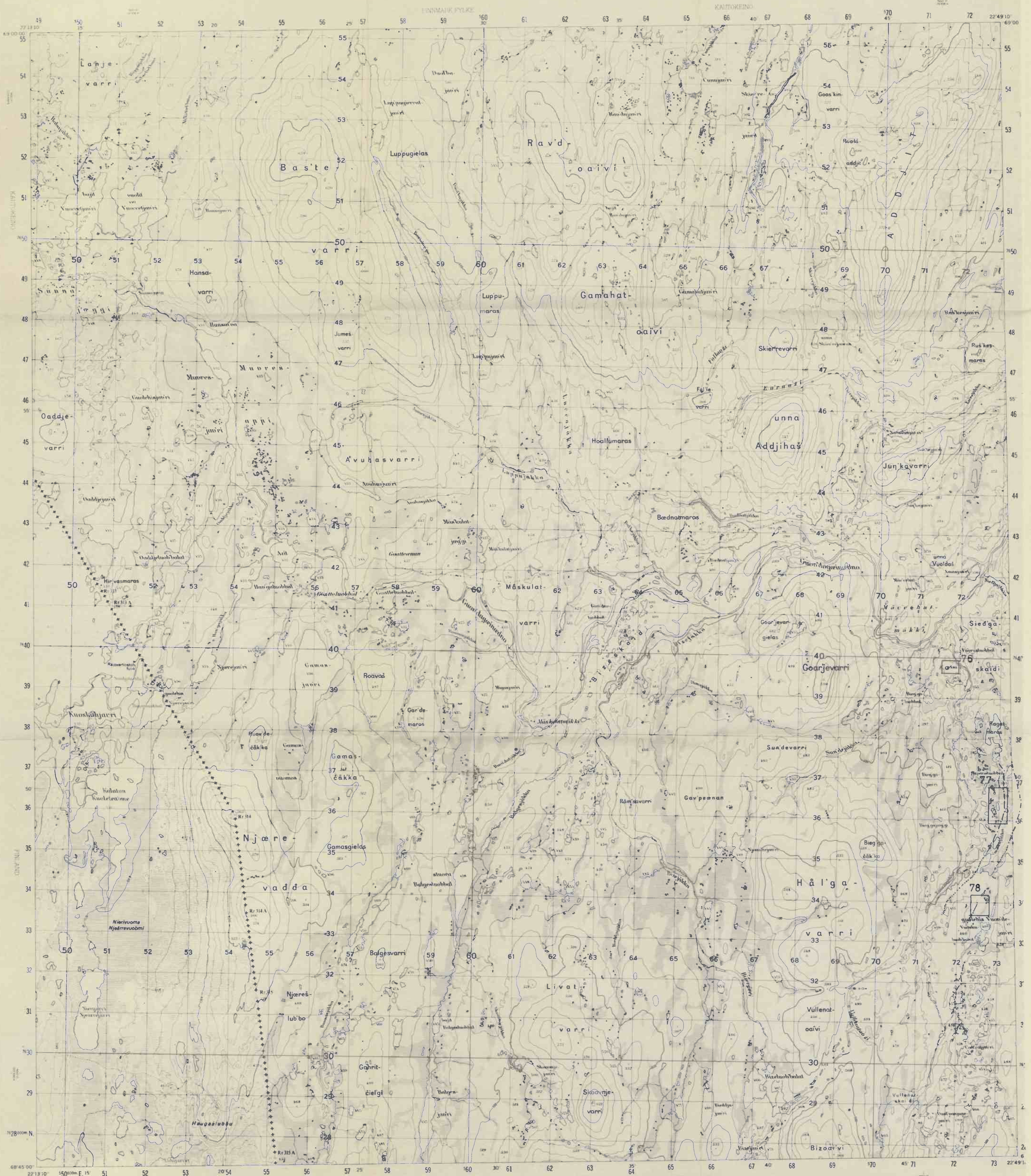

300W
200W
100W
0
100E
200E
300E
400E
300N
200N
100N
0
100S
200 S
500W
400W
70S
20 (25)
20 (25)
10 (30)
25 (25)
(>30)
(>30)
(25)
?
(>30)
(20)
(30)
(10)
<10 (30)
(5)
<20
<20 (25)
(5)
10 (10)
N
0 100 200m
LEGEND:
Mag. tot. field (1cm.=500nT profile line= 53 000nT
Strong EM conductor
Weak EM conductor
Dip of conductor
(10) Depth (m) to top of conductor
10 Conductor thickness (m)
Area 79
Ground geophysics
Scale 1:2500
Obs. TK 4/86
Draw. RH 5/86
Trace HB5/86
PROSPEKTERING A/S
Fig. 6

APP. 1

NORGE - NORWAY 1:50000

ADDJIT

1832 IV



M711
Edition 2 — NOR

Målestokk, Scale 1:50 000

1 ½ 0 1 2 3 4 5 Kilometers

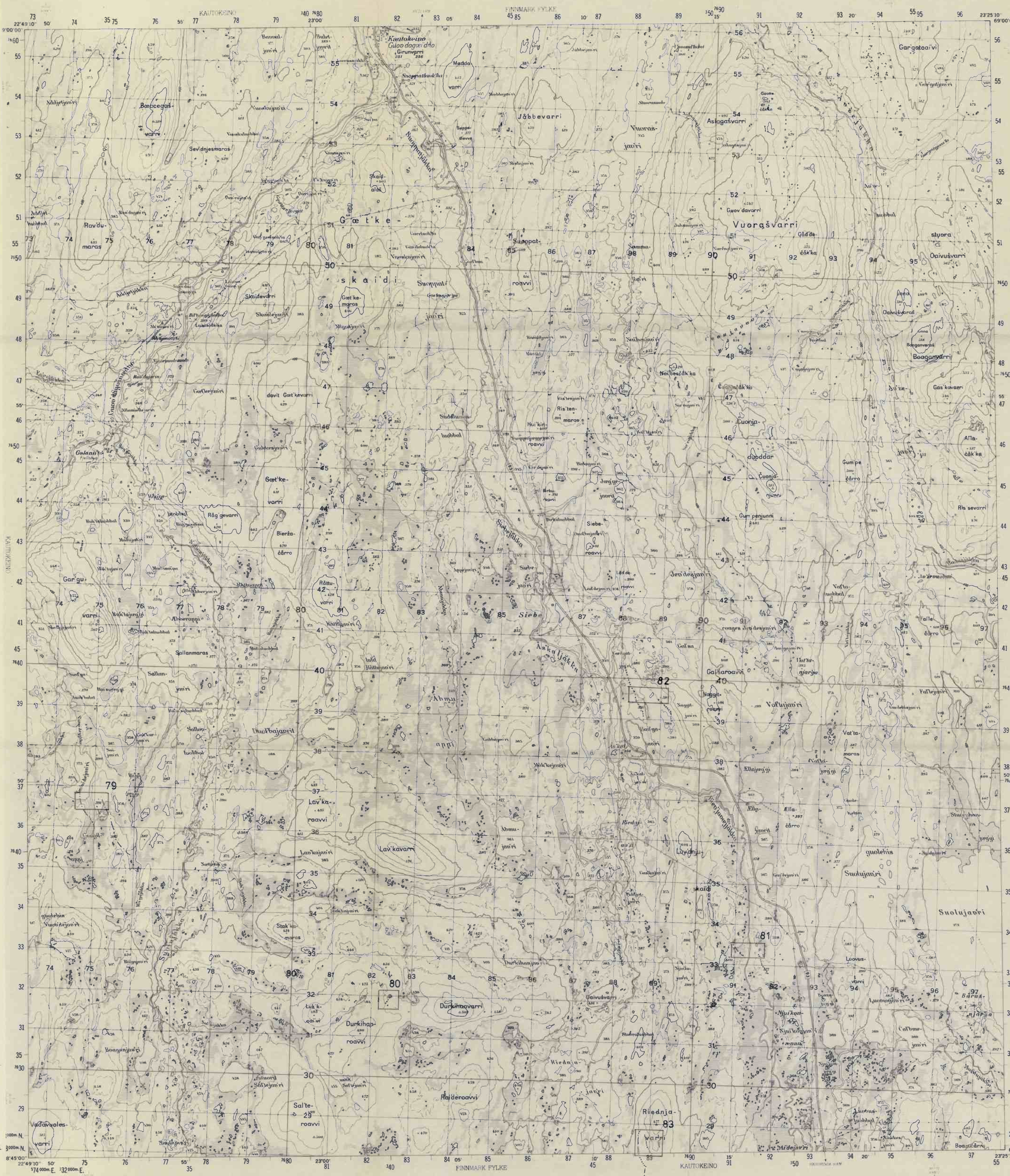
Utgitt av Norges geografiske oppmåling 1977. Syntart 1975
Finsk område er gjengitt fra nedfotograferte finske topografiske kart i M 1:20000

NORGE – NORWAY 1:50000

SIEBE

1832 I

Serie M711



Utgitt av Norges geografiske oppmåling 1977 Synfart 1975

M711

Målestokk, Scale 1:50 000

TRYKT I NORGES GEOGRAFISKE OPPMÅLING 8-77

OPPFØLGING AV ELEKTROMAGNETISKE HELIKOPTERMÅLINGER SYD FOR KAUTOKEINO I 1986.

Områdene er priortert på grunnlag av NGU's helikoptermålinger syd for Kautokeino i 1985. På vedlagte kartblader, Siebe og Addjit er områdene og helikopteranomaler i områdene avmerket.

Nr. 76.
Anomalien opptrer på bare en flylinje og reell og imaginær er ikke helt sammenfallende. Anomalien skyldes muligens støy, men skiller seg klart ut og gis prioritet. I første omgang måles med profilretning Ø-V (om ingen respons: N-S) med spoleavst. 50 m.

Nr. 77 og 78.
Disse områdene kan representere vest- og østflanken av en antiklinal - lavt stratigrafisk nivå - Bidjovagge??. I nr. 77 opptrer en kortere leder vest for hovedsonen. I nr. 78 avgrenses lederen mot nord. I begge områdene måles Ø-V profiler og det er muligens nødvendig å bruke 100 m spoleavst.

Nr. 79.
Anomalien representerer et "urolig" område i fortsettelsen av det nordlige Riednjajavri-strøket (ikke område 69). Flere parallelle soner finnes. Det måles Ø-V profiler med 50 m spoleavst.

Nr. 80.
Helikoptermålingene viser en kort leder med usikkert strøk. Anomalien kan ikke korreleres direkte med de lange lederene i Ø-V retning. Målingene utføres med 50 m spoleavst., i første omgang i Ø-V retning.

Nr. 81.
Lederen kan representere en "43-posisjon" men dette er meget usikkert og i første omgang gis ikke området for høy prioritet. Sammenhengen mellom to ledere undersøkes. Det måles NØ-SV profiler med 50 m ? spoleavst.

Nr. 82.
Nivået av denne sonen er usikkert. Området måles også for å finne sammenhengen mellom to konvergerende soner. Profilene legges i NØ-SV retning med 50 m spoleavst. Lav prioritet.

Områdene 81 og 82 prioriteres lavt i første omgang også på grunn av lett tilgjengelighet på sommerføre.

Nr. 83.
En interessant utvikling av den sydlige fortsettelsen av Riednja-javri-strøket. Prioritet og opplegg avventes til resultatene av NGU's bakkemålinger foreligger.

Stabekk, 14.04.86.
Ragnar Hagen
Ragnar Hagen.

SIEBE

CARAJAVRI-SERIEN

K Leirskifere (∼ Kautokeino-kgl.)

0 Diabas/Gabbro

STUORAJAVRISERIEN

1 Generelt

1a Tufitter/leirskifere

1b Basalt

MASI-SERIEN

2 Generelt

2a Qz-glimmer (Mu/fuksitt) -skifere/gneiser)

2b Kvartsitt

AVZZEJAVRI-SERIEN

3 Generelt

3a Middels-/grovk.amf. (metagabbro)

3b Tufitter

3c Metabasalter/Komatiitter (2 / 1)

3d Qz- fsp- bio (± gnt) skifere med urene kvart

BAHARAVDUJAVRI-SERIEN

4 Generelt

4a Tufitter

4b Metabasalter/komatiitter

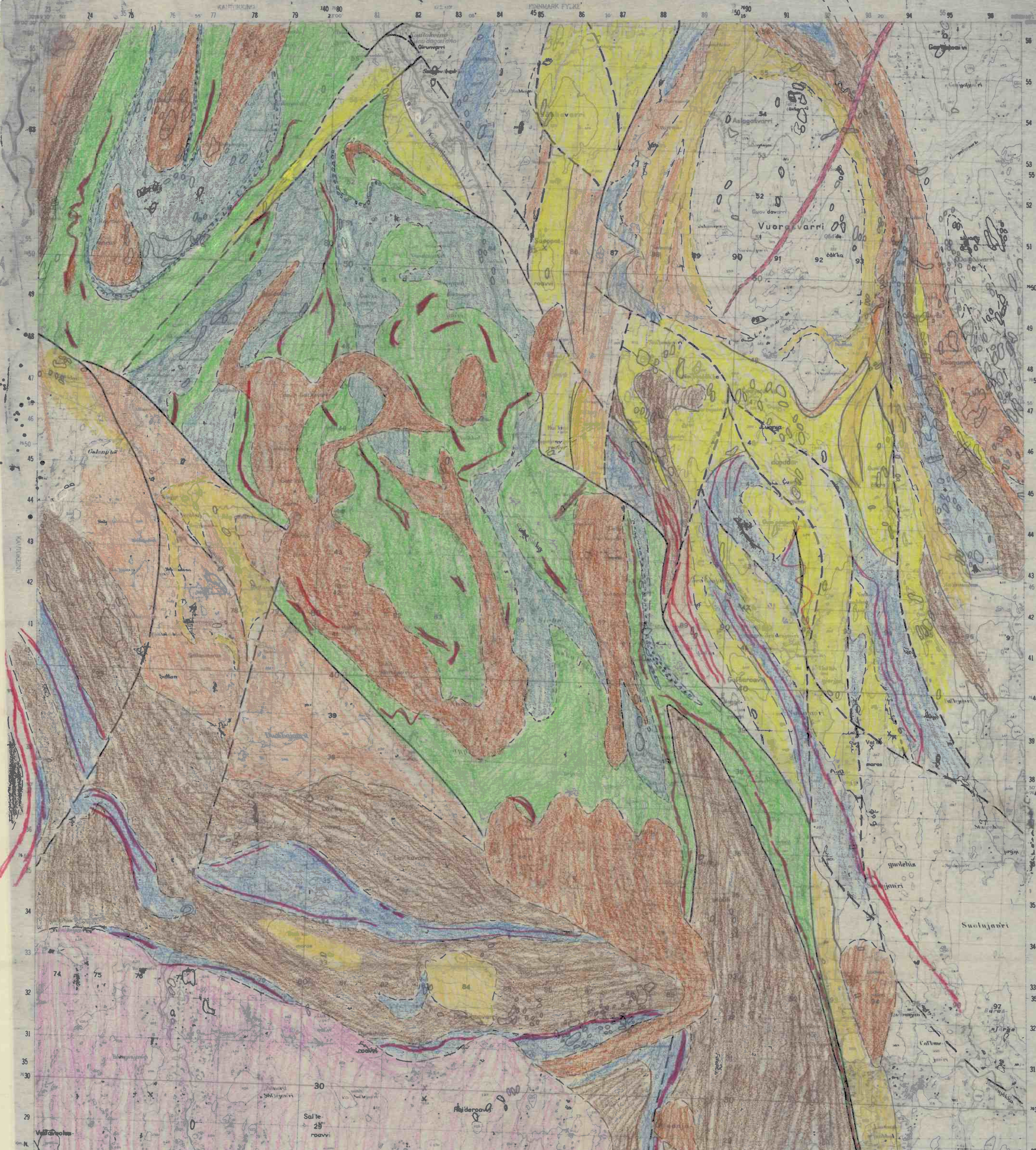
INTRUSIVER (granittiske)

5 Unge granitter/-dioritter (1700 my.)

6 Ab- karb. -bergart.

[redacted]

SIEBE



Utgitt av Norges geografiske oppmåling 1977. Synfart 1975.
Published by Norges geografiske oppmåling 1977. Field checked 1975.

M711
Edition 2 — NOR

Målestokk, Scale 1: 50 000

1000 500 0 1000 2000 3000 4000 5000 Yards

5 Kilometers

3 Statute Miles

3 Nautical Miles

Grense Boundaries
Riks med røys og merke International with marker
Fylke Kommune County District
Sokn Statsallmenning Parish Crown land
Kirke/Kirkje Kapell Gravplass Church Chapel Cemetery
Skole forsamlingshus Hotell o. l. School meeting house Hotel etc.
Våningshus Hytte koie House Cabin
Sæter Bu, gjeat. Fanta Chalet Shanty boatshed

Veg Roads — Fast dekke Hard surface — Grusdekke Loose or light surface
Motorveg Dual highway
Riksveg Vegnummer Europaveg Riksveg State road Route marker Europe State road
Fylkesveg County road
Kommunal veg District road

EKVIDISTANSE 20 METER
Tellekurver 100 m
Mellomkurver 10 m
Høgd i meter over gjennomsnitts sjønivå
Djupn i meter under springfjære
EUROPEISK DATUM
KONFORM SYLINDERPROJEKSJON
Tal i SVART for rutelinje i UTM sone 34
Tal i BLÅTT for rutemaske i UTM sone 35

CONTOUR INTERVAL 20 METERS
Index contours 100 meters
Supplementary contours 10 meters
Vertical Datum Mean Sea Level
Soundings in meters below Spring Low Water
EUROPEAN DATUM
TRANSVERSE MERCATOR PROJECTION
BLACK numbered lines indicate the UTM grid, zone 34
BLUE numbered ticks indicate the UTM grid, zone 35

MAGNETISK NORD
MAGNETIC NORTH
1975 2° 35' (MILS)
1990 2½° 45'

SÁDNILISTO - ORDLISTE
GLOSSARY