# SUMMARY REPORT

## FINNMARK PROJECT (N-81-2)

FOLLDAL VERK A/S - AMOCO NORWAY OIL COMPANY

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## SUMMARY a. CONCLUSION

This is the third year of a prospecting program what was conducted by Folldal Verk A/S in a joint venture with Amoco Norway Oil Company. The project is situated in northern Norway close to the town of Karasjok.

The mineral prospecting within the Karasjok-project started in 1981 with a program of regional soil geochemistry and airbrone geophysics. The 1982 program was structured primarily to follow up several geochemical anomalies associated with airborne EM - Mag. as well as numerous strong airborne EM - Mag. conductors not previously covered by the former geochemical survey. The activities included further 1400 meters of diamond drilling. The 1983 season concerned additional ground geophysics and geochemistry and complementary diamond drilling, totalling approximately 950 meters.

The project target was Au - Cu mineralization in association with archean volcanic rocks metamorphosed in middle greenschist to lower amphibolite facies. The series comprises metakomatiites occuring as flows and pyroclastics, basaltic to andesitic flows, banded iron formations (BIF) of different facies, intermediate to felsic metavolcanics and epiclastic metasediments (usually pelites) which often carry significant amounts of carbon.

Late state intrusivs are present as gabbro bodies and granite crops.

The rock unit is affected by extensive folding.

The area has been previously noted for placer gold occurences and stratiform Cu-(Au)-mineralization.

The thisayear geophysical program was concentrated in the northwestern and western parts of the project area. A number of 11 grids were established totalled approximately 92000 profile meters. The survey indicated numerous conductors. But thus far only one horizon is recommended for diamond drilling. A reconnaissance soil/humus sampling program subjected 6 grids located in the eastern part of the project area. The objective of this survey was to test some good promising airborne EM - Mag. anomalies for further consideration. The assay results as yet received will require no ground geophysical follow up for any of the areas.

The thisayear diamond drilling program contained 9 drill holes referred to 7 geophysical grids. The drilling targets were either combined geophysical/geochemical or unique geophysical anomalies occuring on last years or thisayears investigations areas. All the conductors, as determined by diamond drilling, have been graphite horizons. One interesting sulphide mineralization (pyrite) adjoined by a huge graphite layer was intersected by DDH HAN-83-04. Several drill holes contained sequences with indications of hydrothermal activity. The stratiform accumulation of pyrite or the brecciation of graghite material with subsequent cementation by chert or sulphides are the best examples for that. But unfortunately no crosscutting mineralization (vein type or stockwork features) or alteration halos were proved. A total of 131 samples of core material were assayed for Au, Ag, Cu, Pb and Zn. All assays have resulted in a negative gold response. Interesting but uneconomic copper and zinc values were detected for the drill holes GET-83-01, HAN-83-03 and HAN-83-04.

In order to cover some new promising areas, a total of 37 claims comprising 5 claim groups, were staked.

As a result of the three years activities nearly 1/2 of the main prospecting area is covered by geochemistry and or ground geophysics. A total of 22 geochemical grids and 33 geophysical grids have been established on the more promising targets (see DDH and Grid Location Map). A number of 22 holes (including stucked ones) with depth between 28,20 m and 154,40 m were put down in order to test some good looking anomalies. The drill holes are widely scattered throughout the main part of interest (Fig. 4).

Thus far no attractive Au or Au - Cu mineralization have been proved. But some of the drill holes intersected very promising sequences. Signs of submarine hydrothermal events are frequent throughout the holes. Masses of highly altered ultramafic volcanic material present as talk-chlorite -serpentine rock assemblages occured in DDH DAB-82-02. From at least two holes there were detected somewhat higher gold concentrations (0,8 ppm over 1 m in GMT-82-02, 0,5 ppm over 1 m in DAB-82-02.

At least one extremely high, but spotty Au anomaly (13-270 ppb in soils) what coincides with good values in Cu and Zn was picked up by a soil sampling program at Dabmutsuokkadas (Geochemical Grid Dabmutsuokkadas, 1981). The follow up geophysical survey indicated no conductive zone. That was why the location was not subjected by diamond drilling. But new data favour this specific area for further exploration. The occurence of a "granite" body was implied lately by the NGU after newly geological examinations. Some additional geophysical and geochemical data do support this assumption. The radiomatic survey of the airborne geophysics outlined a lenseshaped body of about 2 $km^2$ size located some 100 meters further west of the diamond drill locations at Dabmutsuokkadas. A geochemical survey of collecting stream sediments and stream morres undertaken by the NGU in 1981 (NGU-rapport 1846 A) detected regional heights of Ba (213 ppm by a back-

ground of 60 to 70 ppm) and Mo (2,8 ppm, background 0,3 ppm) for the Dabmutjåkka, what drainages the Dabmutsuokkadas area to the north. Both elements can be taken, at least in this environment, as indicators for felsic intrusions. The high Ba-content itselv might even point to an alkalic rocksuite, an even more favourable target for gold mineralization (gold, copper, molybdenite association). However, at least it is to referr to the fact, that the above mentioned gold anomaly is sited in the very nearea of the radiomatric structure.

Thus it is highly advised to reasses this area. A favourable prospecting methode for to outline anomalous zones will be for the first**a**till sampling program. Gold mineralization in connexion with felsic intrusions will probably not be picked up by a geophysical survey. The former used geochemical sampling of Bo and Ao horizon will too not necessarely result in a positive response. That is why much of the area is covered by an extensive layer of glacial overburden (average thickness 7 m , maximum at about 25 m). Anomalies can for example be masked by the presence of interbedded clayey or silty tills. Furthermore older geochemical halos may be cut off by younger till layers. Thus the basal,logment, till will be the only sampling environment for the successfully discovery of a hidden ore body. Overburden drilling as the main prospecting methode is practised within Finland by the Outokumpu Company. They operate normally with a combined percussion and diamond drill.

Additional works should also be related to a Z-fold structure within a banded iron formation occuring in the Njuovcut area. The region has already been part of an exploration program carried out by the NGU, what included trenching and diamond drilling. The activities were restricted on the discovery of iron ore connected with the banded iron formation. It has been emphasised by several workers, that gold mineralization often is concentrated along the hinge of Z-fold structures within banded iron formations.

## RECOMMANDATIONS

A short diamond drilling program amounting approximately 300 meters should thus far effect the Gårziroavvi-Grid. Two targets have been choosen from the geophysical and geochemical surveys.

Brief geological examinations combined with some prospecting will be restricted to the Siktavarri and the Gussoaivi-Grid.

Ground geophysical follow-up will be recommended for the Diljavarri, Lavzejakskaidi-, Askasjæggi- and Askasjæggi-Syd-Grid if interesting gold anomalies arise from the soil sampling program. To date, after receiving more than half of the results, no geophysical works are required.

The Dabmutsuokkadas area should be investigated by a till sampling program restricted for the first more or less to the high anomalous Au-spot of the 1981 geochemical grid Dabmutsuokkadas.

Folldal Verk A/S should come to an agreement with the NGU about an investigation of the diamond drill holes from the banded iron formations of the Karasjok greenstone belt. Thus far only a negligible quantity of samples were analyzed for Au and further significant elements. As it is known the NGU explored not even the Njuovcut area by diamond drilling. Carbonate and sulphide facies of BIF were intersected at Suolumaras and Gæssagiellas. Both facies are, according to several workers, promising Au carriers.

Thus far six claim groups (Magret Jávnaroavvi, Luossajarvarri, Daktejåkka, Bakkilvarri, Raitevarri, Ravutjåkka) totalling 54 claims should be dropped.

## INTRODUCTION

This is the third year of mineral prospecting in the Karasjok-project. During the first season a program of regional soil geochemistry and airborne geophysics were carried out. The follow up program of 1982 comprised ground geophysical surveys, reconnaissance and detailed geochemistry, minor geological mapping and diamond drilling. The thisayears prospecting included complementary ground geophysics, additional geochemistry and further diamond drilling. The works started in early March and continued to the beginning of October. A six weeks break of all activities was from the first of August to the 17th of September.

The project target is gold-copper mineralization associated with either banded iron formations (BIF) or altered ultramatic volcanics. Furthermore huge sections of keratophyrs or quartzkeratophyrs were part of prospecting. The project is centered in a greenstone belt of supposely archaen age. The district has been previously noted for placer gold occurences and stratabound (Cu-(Au)- and Fe-deposits.

The main area of interest is nearly totally covered by widely scattered soil-sampling. A number of 33 geophysical grids had been established on the more promising targets.

In 1983, after new results of airborne geophysics were available, the project area was extended towards the Finish border.

Besides Folldal Verk A/S - Amoco Norway Oil Company two other companies are involved in the Karasjok area prospecting for similar mineralizations. A/S Sydvaranger is holding claims in the western part of the project area, while Norsk Hydro concentrates its activities to the more eastern territories.

## LOCATION a. ACCESS

The Karasjok-project is located in Finnmark fylke, Northern Norway, centered at 69°15' N and 25°15' E (Fig. 1,2). The area is known as the FINNMARKSVIDDA, a tract of land of about 15.000 km$^2$, which comprises the norwegian part of the north scandinavian arctic peneplain.

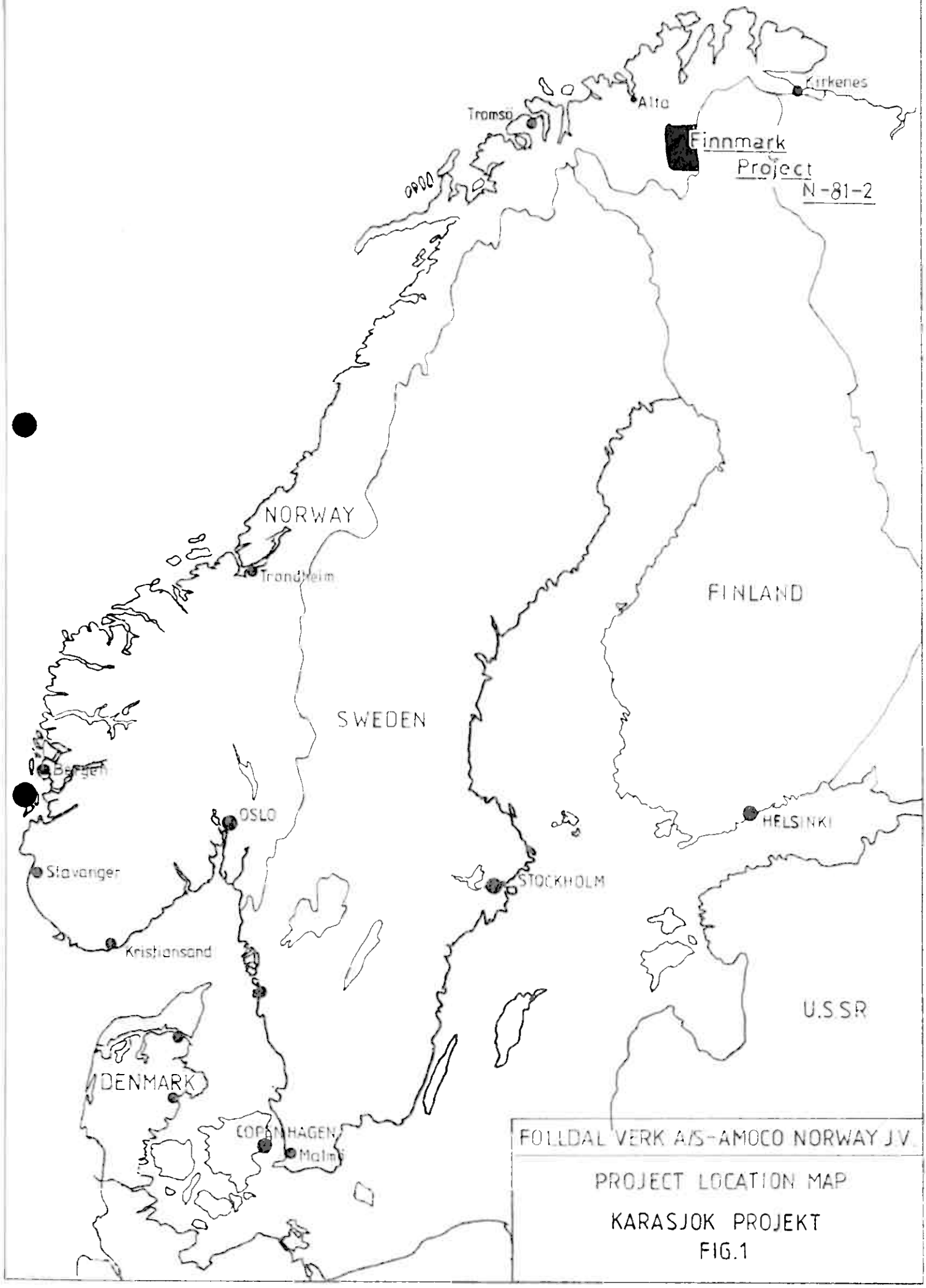
The project area lies in the eastern part of this region close to the town of Karasjok, which is situated at the Karasjåkka (Karajok-river) 18 km west from the Finnish border. The area is about square shaped and encloses 1600 km$^2$. It borders in the east to Finnland and extends from here for about 45 km westover. Its northern boundary is build by the W-E running rivers, Karasjåkka and Jesjåkka.

The town of Karasjok is the nearest supply center. It is served by paved highways from Lakselv, to the north, and Alta, to the northwest, approximately 75 km and 200 km distance respectively, and also from Karigasniemi, Finnland, to the east.

Both Lakselv and Alta are serviced by daily flights (propeller and jet) from Oslo and Trondheim. Helicopter service is available from Lakselv or Bardufoss, which are 70 km or 300 km by air. Fixed wing service (waterplane) is available from Alta or by chance from Karasjok itselv.

Only the northern parts of the project area are easy in access. Good paved and or gravel roads are running mostly along the sides of the main rivers (Karasjåkka, Jesjåkka, Anajåkka, Gåssjåkka). The interior can be reached either by snow-mobile in the wintertime or by tractor-trailer, helicopter, waterplane or by boat in the summer month.

The landscape of the district is formed by extense glacial erosion. There exists a very soft relief. It predominates small rolling hills and smooth mountain ridges surrounded by




FOLLDAL VERK A/S - AMOCO NORWAY J.V.

PROJECT LOCATION MAP

KARASJOK PROJEKT

FIG. 1

21°
71°
25°
30°
71°
69°
25°
MAGERØYA
HONNINGSVÅG
NORDKINN HALVØYA
Revsbotn
PORSANGER HALVØYA
SVÆRHOLT HALVØYA
Laksefjorden
Tanafjorden
SØRØYA
HAMMERFEST
KVALØYA
SEILAND
STJERNØYA
DIGERMULL HALVØYA
VARANGER PENINSULA
Porsangen
Kvænangen
LOPPA
Altafjorden
TANA DISTRICT
LAKSELV
Laksely
KVÆNANGEN
ALTA
Varangerfjorden
VADSØ
NORWAY
TROMS
NORDREISA DISTRICT
Reisaelv
Altaelv
Tanaelv
KIRKENES
SØR-VARANGER REGION
MASI
FINNMARKVIDDA
Iesjokka
KARASJOK
KARASJOK-PROJECT AREA
Karasjokka
Kautokeinoelv
KAUTOKEINO
Bavtajokka
Anarjokka
Paswikelva
FINLAND
SOVIET
FINLAND

# KARASJOK PROJECT

LOCATION MAP

Fig. 2

SCALE 1 : 1 000 000

F.D.P.R.

large flat marshy areas. Numerous mostly shallow lakes are widely scattered throughout the country. There is found a typical vegetation of the higher latitudes. It comprises cripple birches, juniper, dwarf-birches and shallow willow-trees and bushes. Pine-trees are restricted to the river valleys. The ground is covered by grass, several kinds of berries and mosses and different kinds of lichen.

The topography within the project area generally varies from 250 m to 500 m. The main elevation is the Iskuras mountain ridge, lying about 20 km south of Karasjok, with 642 m a.s.l..

The drainage of this area is undertaken by the main rivers: Karasjåkka, Jesjåkka, Bavtajåkka, Anajåkka and Gässjåkka. Their beds are in general wide - 40 m to 170 m - and u-shaped and filled with fluviatile and glacial material. The older river terraces are lying about 6 to 7 m above the nowadays run. Due to their very little fall - Karasjåkka: 90 m on a distance of 60 m (Baeivasgiedde: 218 m , Karasjok-church 125 m) - most rivers are navigable by engined riverboats.

## LAND STATUS

In 1983 five new claim groups with together 37 claims (each 500 m x 500 m) were staked by Folldal Verk A/S. After yielding dissappointing results from the grids, Gaessagiellas, Vuzzulcielgi, Rivkagialas, Dabmutsuokkadas, Madijavri, Gæssaroavvi and Lavvuvarri, those groups, totalling 152 claims, were dropped. Today Folldal Verk A/S is holding a total of 96 claims in 13 groups within the Karasjok-project area. These groups are as follows:

| Claim group | number of claims |
|---|---|
| GÆTKEVARRI | 3 |
| MAGRET JÅVNAROAVVI | 12 |
| LUOSSAJARVARRI | 10 |
| DAKTEJÅKKA | 4 |
| BAKKILVARRI | 5 |

| | |
|---|---|
| STORFOSSEN | 6 |
| HANNOAIVI | 10 |
| RAVUTCÅKKA | 9 |
| RAITEVARRI | 14 |
| OALGEJÅKKA | 4 |
| STUORRA DILJAVARRI | 8 |
| LAVZEJÅKSKAIDI | 4 |
| ASKASJÆGGI | 7 |

A/S Sydvaranger renewed in 1981 (staked 1982) their 15 claim groups amounting to 90 claims. They were staked for either Cu or Cu and Au.

Norsk Hydro got newly involved within the Karasjok-area. Two huge claim groups with together 232 claims occure at the Iskurasjåkka and the Gåssjåkka, both located in the eastern part of the project area. Additional claims were set up at Vuollusjåkka (16 claims) and at Basavzi (16 claims), covering the Sargejåkka, respectively Helligskogen placer gold occurences. Both claim groups are lying outside the Folidal Verk A/S - Amoco Norway Oil Com. J.V. working area.

The definate locations of all these claims can be taken from the Grid and DDH Location Map.

## HISTORY a. PREVIOUS EXPLORATION

The Karasjok-district has been noted for many years for the occurence of placer gold. A review of the more important prospects is found by BJØRLYKKE (1966).

There are at least two main areas from which numerous placer gold occurences are described. That is first the Bavtajåkka - Karasjåkka region, located in the southwest of Karasjok and second the Anajåkka - Gåssjåkka field, which occures close to the Finnish border. Both areas contain at least four alluvial gold prospects, where several years washing took place. These are here the Sargejåk field, the Kristiansens field, the Stor-

fossen field and the Baltos field and there Helligskogen, Skieccanjåkka, Gåssjåkka (old term Gorzzejåkka) and Anajåkka.

The placer gold occurences are made up of three different types (BJØRLYKKE, 1966). The first two ones are restricted to the old erosional river terraces, which often lie 6 m to 8 m above the present river level. These occurences are described as

1. preglacial placers which have not been affected by glacial erosion

   and

2. preglacial placers which are enclosed in glacial residues.

The third type is represented by postglacial gold concentrations in present river beds. This is only found at the Sargejåk- goldfield.

The estimated total gold production (washing periode from 1897 to 1938) of the Finnmarksvidda amounts to about 40 kg. The extrated gold consisted mainly of small plates of 1/2 to 1 mm in diameter. No gold dust had been reported. Besides that there were found some nuggets with up to 17 g in weight (Sargejåk-goldfield).

The general gold concentration estimated to 0,8 $g/m^3$. The highest concentration of more than 2 $g/m^3$ was discovered in the Sargajåk-goldfield. Somewhat higher values with even up to 8 $g/m^3$ were proved at the same location by moraine drilling carried out by A/S Nye-Alluvium in the late 1930's.

Native gold has been found by REUSCH (1903) in bolders of quartzite and sandstone near Bæivasgiedde and Skieccanjåkka. Gold was further mentioned found in quartz-veins in the Storfossen area (Bergarkiv-report 16239). From Finnland (Lappi-district) there have been reported gold-bearing pyrrhotite and siderite veins.

In 1961/62 some river terrasses in the nearea of Assebakte, Noaiddejavrret and Storfossen were tested for Au by Mag. - measurements and successive drilling. The works were carried out by USB/NGU (GM-rapport 313, 316). The results were negative in every respect.

A chalcopyrite - pyrite occurence, bearing some gold was discovered by A/S Sydvaranger at Raitevarri (ca. 40 km southwest of Karasjok) in 1967. The mineralisation was found by geochemical prospecting. A number of about 10 widely scattered drill holes with depth between 100 m and 300 m were brought down under the following exploration program. It turned out no attractive Cu-Au concentration. The mineralized zone of 50 m to 100 m in thickness, showed a Cu-content between 0,1% and 0,5 %. In addition came Au. - A number of 6 samples was taken in 1983 from different outcrops within the area. They were assayed for Cu, Zn, Ag and Au. The Cu-values ranged from 55 ppm to 1800 ppm, while Au varied between 23 ppb and 300 ppb (samples SV-1 to SV-6, 1983). - The mineralization is restricted to a dioritic gneiss/chlorite-mica gneiss (both terms by A/S Sydvaranger), supposely an intermediate volcanic tuff, and is part of a volcanic section mostly consisting of amphibolite gneisses, chlorite-garnet schists and graphite horizons.

From the concerning area there is reported a killing zone which was part of an extensive examination carried out by NGU in 1978. (NGU-rapport 1570, 1570 B and Bergarkiv-rapport 6748).

In 1956/57 an exploration program on magnetic iron-ore connected with banded iron formations was undertaken by USB/NGU at Suolumaras, Njuovcákka and Gæssagiellas. The works included as well ground geophysical measurements as diamond drilling. Altogether 12 holes with a total meterage of 1100 m were put down on the best looking anomalies. The iron content ranged between 22 % and 27 % within 10 m to 15 m of mineralization (TRØFTEN. 1957/62, WENNERVIRTA, 1968).

Sulfidmalm A/S conducted exploration in search for copper and nickel, mainly in the southern most part of the project area.

In the last three years the NGU started several new programs, regarding the project area. The activities comprised detailed geological mapping (1 : 50.000), Mag. - and VLF-measurements (Njuovcåkka, NGU-rapport 1750/38 B), a stream sediment survey (Bavtajåkka - Karasjåkka, NGU-rapport 1846 A) and further diamond drilling (Suolumaras a. Njuovcut).

## REGIONAL GEOLOGY

The Finnmarksvidda is underlain by precambrian rocks. The sequence represents a classical archaen basement with a gneiss-greenstone duality.

The gneiss/supracrustal belt assemblage builds up a tongue - shaped structure which is elongated in a N-S direction (Fig. 3). In central position lies a gneissdome. This complex represents the basis for the surrounding supracrustal rocks. It is dated back to 2800 Ma.

The onresting volcanic-sedimentary sequences are typical greenstone-belts of middle greenschist to lower amphibolite facies. Between the eastern and western belt distinct lithological differences do occure.

The Karasjok-project is situated in the eastern supracrustal belt, which mainly is built up of ultramafic and mafic volcanics. The formation runs about N-S and extends from Porsangerfjorden, in the north, to the southern corner of the Finnmarksvidda and from here further into Finnland, where it forms the Kittilä greenstone complex. The series displays several intermittent volcanic events. It comprises in general three units: an arenaceous basis (conglomerates and arenites), a volcanic - sedimentary pile and a more sedimentary completion part. The last two units are described as the "Karasjok

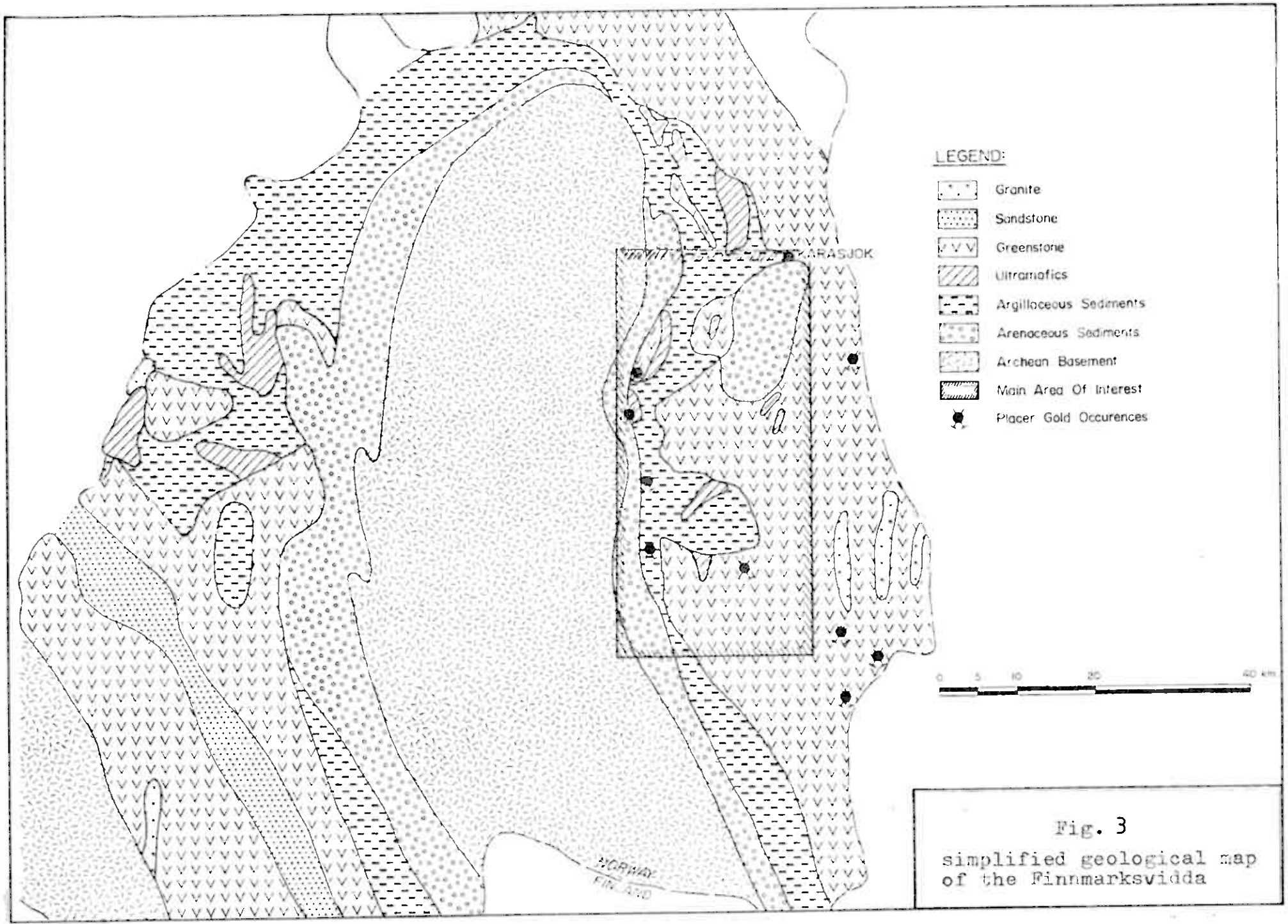



Fig. 3
simplified geological map
of the Finnmarksvidda

Greenstone Group", what belongs to the "West Inari Schist Zone" (RAITH et al., 1982).

A possible archean age of the schist zone as a whole is denoted by RAITH et al.(1982). Age determinations carried out by MERILAINEN (1976) on Zirkons of crosscutting albite diabases gave a U/Pb age of 2720 Ma (GAAL et al, 1978).

The Karasjok-project area is underlain by metamorphosed komatiite flows and pyroclastics, huge horizons of basalt flows, mafic agglomerates, sill type gabbros, minor intermediate to felsic volcanics (often as tuffs), banded iron formations (BIF) of oxide-, silicate - and carbonate facies and epiclastic sediments as psammites and pelites. The last ones often are rich in carbon. Intrusive rocks in the area are represented by gabbros and granites.

A general stratigraphy for the rock unit exposed is difficult to establish. The series shows along strike rapid changes in its lithology. The majority of epiclastic material, mostly occuring as quartzites, is concentrated in the northern part of the area, while in the south metamorphosed volcanic rocks predominate. Thus suggests different sedimentation environments, here a coast near marine shallow water and there a deep sea deposition area.

However, brief geological examinations from the Assebakvarri-Suolgajäkka region led to a stratigraphical model, regarding the northwestern area. There exist at least two major volcanic units, which are separated from each other by a thick quartzite horizon. The lower volcanic section comprises mafic volcanics, at present occuring as massive greenstones or tremolite-actinolite schists or chlorite-biotite schists, than intermediate to felsic volcanics (mica or actinolite bearing quartz - feldspar rocks, which sometimes carry garnets) and

epiclastic or mixed volcanic - epiclastic sediments. The last group is represented by garnet - biotite schists, slates, phyllites, greywackes and mica-rich quartzites. Furthermore there are occuring several graphite horizons. Ultramafic flows, metamorphosed to talk-serpentine-chlorite -olivine rock assemblages or banded iron formations do exist in minor amounts. The upper volcanic section is build up by the same rock-types but shows in the contrary a somewhat higher amount of mafic and ultramafic (flows and pyroclastics) volcanics.

The supracrustal series is affected by extreme large scale folding. A general strike direction is difficult to assign. It is obvious, that a N - S trend often appears in the areas lying close to the gneiss border. Further to the east NW -SE, NNE - SSW and E - W trends are the main striking directions.

The dip of the horizons is often towards the east. The dip-angles vary normally between $30^{o}$ and $45^{o}$. Sometimes they do reach higher values of about $60^{o}$ or even $85^{o}$. Nearly flat lying horizons are found in the southwestern and the north-western corners of the project area.

A prominent E - W striking fault, what runs along the Kara-sjåkka valley, borders the project area to the north.

## 1983 PROGRAM

The 1983 season for the Finnmark Project commenced in early March and ended in the middle of October. A six weeks break was from the first of August to the middle of September.

During this period detailed geophysical and geochemical surveys, geological mapping and prospecting and 1000 meters of diamond drilling were undertaken.

The different locations of as well the geophysical and the geochemical grids as the diamond drill holes can be taken from the Grid and DDH Location Map.

The ground geophysical survey was concentrated in the northwestern and the western parts of the project area. The targets were either good EM or corresponding EM-Mag conductors of the airborne geophysical survey or areas of anomalous gold outlined mainly by the last years geochemical program.

The survey was restricted to the first four month of prospecting. In that time eleven grids were established totalled approximately 92000 profile m. These grids are as follows:

| grid name | month established | total profile meterage |
|---|---|---|
| SKAIDI-Grid | 03/83 | 13 200 |
| DIVREJAVRI-Grid | 03/83 | 13 000 |
| RAITEVARRI-Grid | 04/83 | 10 000 |
| RAITEVARRI-Syd-Grid | 04/83 | 5 050 |
| GÅRZIROAVVI-Grid (Storfossen) | 05,06/83 | 11 800 |
| GÅVDAROAVVI-Grid | 05/83 | 3 600 |
| HANAS-PIER-LADDO Extension | 05/83 | 4 775 |
| GÅIKENJAVEVARRI-Grid | 06/83 | 8 900 |
| SIKTAVARRI-Grid | 06/83 | 2 500 |
| DAIGESVADDA-Grid | 06/83 | 8 800 |
| GUSSOAIVI-Grid | 06, 07/83 | 10 150 |

The geophysical grids were constructed using a 150 m x 25 m grid pattern. All readings were taken at 25 meter intervals.

The applied methods consisted of C.E.M. horizontal shoot-back (Crone Geophysics Ltd , Mississauga, Ontario, CAN), protonmagnetometer (GeoMetrics INC, California, USA) and VLF (St. Paulsen, Trondheim, Norway) surveys.

The C.E.M.-results were mostly of moderate to week EM-response. The magnetic background was determined to 52.800 $\gamma$ . On ano-

malous zones values with up to 59.800 % were detected. The VLF-survey picked up conductors well. This methode was in places more effective in outlining conductive zones than the C.E.M. system. Detailed geochemistry was used in conjuction with geophysical surveys on the grids Divrejavri, Raitevarri, Raitevarri-Syd and Gussoaivi. In order to cover the inter-space between Divrejavri and Raitevarri a unique geochemical grid, Raitevarri-Syd-Extension, was established. In fall 1983 a "reconnaissance" soil/humus sampling program was under-taken within 5 smaller Folldal Verk A/S properties located in the eastern part of the project area. Within these areas altogether six grids were established amounting 17 000 profile meters. These grids are as follows:

| grid name | month established | totale profile meterage |
|---|---|---|
| OALGEJÅKKA-Grid | 10/83 | 1 800 |
| DILLJAVARRI-Grid | 09/83 | 7 750 |
| LAVZEJÅKSKAIDI-Grid | 09/83 | 3 150 |
| ASKASJÅKKA-Grid | 09/83 | 165 |
| ASKASJÆGGI-Grid | 09/83 | 1 650 |
| ASKASJÆGGI-Syd-Grid | 09/83 | 2 500 |

The objective of this geochemical survey was, to test some good promising airborne EM-Mag anomalies accuring on just released airborne surveys (NGU) for further consideration.

The geochemical sampling was undertaken using a 150 x 25 m grid pattern. The grid Raitevarri-Syd-Extension was the only exception from the rule. Samples were here collected at a 50 m spacing.

The sample material consisted either of last years birchleaves (Divrejavri-Grid and Raitevarri group) or humus, Ao-horizon, or soils, Bo-horizon. The samples of organic matter were assayed exclusively for Au. The soils were analyzed for Cu, Pb, Zn, Ag and Au.

The diamond drilling program was started collarding the first drill hole at the 9th of June 1983. It was finished with the 23rd of July 1983. Within this period there were brought down a number of nine drill holes measuring depth between 58,00 m and 155,00 m. The totally drilled meterage amounts to 936,89 meters. There are 765,94 meters of core-material available.

The drilling targets were either combined geophysical/geochemical or unique geophysical anomalies occuring on last years or this years investigation areas. Always good corresponding EM-Mag. conductors were utilized.

The drilled grids are as follows:

| grid name | DDH |
|---|---|
| GÆTKEVARRI-Extension | GÆT-83-01 |
| HANAS-PIER-LADDO-Grid | HPL-83-01 |
| GÅIKENJAVRI-Grid | GÅI-83-01 |
| HANNOAIVI-Syd-Grid | HAN-83-01 |
| | HAN-83-02 |
| HANNOAIVI-Grid | HAN-83-03 |
| | HAN-83-04 |
| RAITEVARRI-Syd-Grid | RAT-83-01 |
| RAITEVARRI-Grid | RAT-83-02 |

The drilled conductors were in all cases graphitic horizons, which carried varing but unimportant amounts of sulphides mostly pyrrhotite and or pyrite. In HAN-83-04 a 2,50 m section of heavy pyrite mineralization (10-15 Vol.-%) occuring in a altered volcanic rock was found in addition to a graphite unit, what supposely was responsible for the EM and the VLF anomalies.

From the drill core 131 samples comprising in general 1 m to 2 m sections were taken. Thus 244,00 meters of core was assayed for Au, Cu, Zn and Pb. All assays have resulted in

a negative gold response. Interesting, but scattered copper and zinc (> 4000 ppm, DDH RAT-83-02, DDH-HAN-83-04) values have been detected in many holes, however, none was high enough to warrant further drilling.

All samples for geochemical analysis were shipped to X-Ray Laboratories, Don Mills, Ontario, CAN.

A brief geological examination took place in an area lying in between Assebakvarri, Sammalcákka, Gussoaivi and Suolgajákka. Furthermore several grids were investigated by their geology.

A number of 37 claims within 5 claim groups were staked to cover promising areas.

## STAFF a. ACCOMMODATION

While the field season altogether 10 local people were involved with the running project. A fast staff of four to five of them followed with the whole period, while the others had only short time jobs.

The workers carried out all of the instrumental works, the geochemical sampling and the splitting of core material. They further were assisting with the evaluation of results and with minor administrative works.

For the last three years Folldal Verk A/S had rented a house near downtown Karasjok, what was the residence and the field office for the project geologist. While the drilling operations at Hannoaivi and Raitevarri the involved people stayed in camps. The equipment was either owned by Folldal Verk A/S or was rented from the local Red Cross.

## GRID GEOPHYSICAL a. GEOCHEMICAL RESULTS

### 1. Grids from the Lower Volcanic Unit

#### 1.1 Skaidi-Grid

location: map JESJÅKKA, 2033 IV, coordinates:
418000 7697500, UTM grid, zone 35

baseline: strike direction: 150$^{g}$
length: 1500 m

profiles: 11
length: 1200 m

surveys : C.E.M., Mag., VLF

The Skaidi-Grid is established within the lower volcanic unit of the supracrustal rock assemblage (see Regional Geology). It lies very close to the gneiss border. The grid covers a moderate westnorthwest striking unique EM-conductor occuring on 5 lines of the airborne survey. The conductive zone is joined on its eastern side by several weak Mag.-anomalies, characterising supposely a sequence of mafic volcanics flows. However, the geology of the survey area is not defined. No outcrops occure within the grid area.

The ground geophysical follow up detected several anomalous zones, but with no coincidence between the Mag. and the C.E.M. - VLF results. The C.E.M. - VLF surveys outlined some very weak and wide conductors which can be traced throughout the hole grid area, mainly following the VLF-curves. Furthermore the VLF-results point out a very shallow dipping sequence for the eastern part of the grid area, while in the western part a more distinctive dip occures. fel.

The magnetic anomalies are by far restricted to the northern half part of the grid. They show a very irregular up and down, reaching minimum and maximum values of 52250 $\gamma$ and 54000 $\gamma$ respectively. Dårlig kvalitet på geofysikk, muligens unøyaktige avlesn. både mag og VLF.

The ground geophysical methods gave no indication for a Au - Cu mineralisation which should be verified by diamond drilling. Er vel ikke lett å fastslå på grunnlag av det utførte arbeide.

No further works are recommended.

1.2 Daigesvadda-Grid

location: map Jesjåkka, 2033 IV, coordinates: 424600 7699000, UTM grid, zone 35

baseline: strike direction: $0^g$, $180^g$
length: 450 m, 900 m

profiles: 4, 7
length: 800 m, 800 m

surveys : C.E.M., VLF, Mag., Biogeochemistry

A ground geophysical survey was placed overlapping the north-east part of the last years Geochemical Grid Daigasvadda to follow up some Au-indications(6 to 8 ppb) outlined by humus-geochemistry. The new established grid, Daigesvadda, is covering the southern end of a 5 km long, N - S striking conductor of moderate EM-response outlined by the airborne survey. It is flanked on its eastern side by a 2 km wide zone of higher Mag. The conductive zone was already part of exploration within the Aslat-Pier-Varri Grid which is located further to the north. The here occuring main EM-conductor was tested by one diamond drill hole, ASP-82-01. This hole intersected a sub-volcanic gabbro bordered by a 5 m thick sequence of metavolcanics and metasediments and a more than 50 m thick uniform greenstone horizon, supposely a metamorphosed basalt flow. Responsible for the C.E.M. - VLF response were several graphite slate layers which occured in the very nearea of the gabbro contact.

The ground geophysical program on the Daigesvadda Grid positively outlined one narrow anomalous zone what extends throughout the whole grid. Highest conductivity was picked up in the center part of the test area. It coincides with

very indistinct VLF-crossovers. A relatively high Mag., with up to 2400 $\gamma$ over background, is flanking the conductive horizon to the east side.

No further works should be done within this area.

1.3 Gårziroavvi-Grid

location: map Jesjåkka, 2033 IV, coordinates:
415500 7689000, UTM grid, zone 35
baseline: strike direction: 180$^g$
length: 2200 m
profiles: number of: 17
length: 400 m to 1200 m
surveys : C.E.M., VLF.,Mag.,biochemistry

The Gårziroavvi area is known by its placer gold occurence, what is located at the Karasjok-river some distance downstream Storfossen (Storfossen Goldfield). Quartz-veins rich in pyrrhotite, but without any gold (RX-STUR-01: 0,4 % Cu, traces Zn, Ag, Pb), are further described from several locations. Some of them were already part of exploration (Nicolaysen showing, 1905).

The area is mainly underlain by metavolcanic rocks belonging to the lower volcanic unit. It lies very close to the arenaceous bottom part of the supracrustal belt. A granite or granodiorite intrusion together with a subvolcanic gabbro body occure in the nearer southwest.

In 1982 a humus sampling program was carried out in the northern part of the Gårziroavvi-area. The Geochemical Grid Gårziroavvi was constructed over a series of moderate to good EM-conductors, at times coincident with weak to moderate Mags. of the airborne geophysics. These horizons belong to a 7 km long, about N - S running, anomalous zone, which in 1981 was already part of the geochemical program (soil sampling), situated at Dalabåkjavri. The latter survey came up with only

background values of gold. The 1982-program outlined some low order Au-anomalies (4 to 11 ppb), mainly restricted to the southern part of the test area.

The thisayears ground geophysical survey covers the more interesting zones of the last years geochemical program. Within the Gårziroavvi-Grid there were outlined two main conductive belts which can be traced over the whole area. The eastern zone contains mainly one horizon, what is characterized by a very strong EM-response and very rarely overlapping EM-Mag. results, both typical indications for graphite layers. The western belt shows a very irregular picture, regarding his geophysical data, what remains to the Gætkæ arri-Extension-Grid. Here a very close alternation of graphite horizons and volcanic tuffs, both mineralized by minor amounts of sulfides, were responsible for the wavy up and down especially of the C.E.M.-curves.

The western belt consists of two, sometimes even three EM-VLF conductors which seam to join into one horizon towards the northern part of the Grid. The conductors occure with mostly negative, but in places positive C.E.M.-results. A good coincidence between EM and Mag. happens to be very rarely (L 3+00S 2+75 V, L 3+00 N 0+00, L 4+50 N 1+50 V, L 10+50 N 1+00 V). The zone is indicated by anomalous Au in humus.

In the northern part of the grid the main conductor of the western belt is joined on his western side by a short coincident C.E.M. - VLF - Mag. anomaly, what can be traced over at least two lines. Of special interest is the location 3 + 25 V on the line 18 + 00 N, where a very strong, positive C.E.M. is overlapped by a weak Mag. of 300 $\gamma$ above background. This anomaly is placed directly on an old pyrrhotite, chalcopyrite showing.

men denne anomalien er meget dårlig oppfulgt på naboprofilene.

It is recommended diamond drilling be conducted on line 18 + 00 N, station 2 + 50 V with drilling grid west by - 45° to intersect the strong C.E.M. conductor at 3 + 25 V. A possible further drilling location will be at line 3 + 00 N at the station 0 + 75 E to test two overlapping EM - Mag. anomalies occuring at 0 + 00 and 1 + 25 V.

1.4 Siktavarri Grid

location: map Jesjåkka, 2033 IV, coordinates: 419500 7688300, UTM grid, zone 35

baseline: strike direction: $30^g$, $150^g$

length: 600 m, 450 m

profiles : 5, 3

length: 400 m, 400 m

surveys : C.E.M., Mag., VLF, Biogeochemistry

The Siktavarri-Grid is placed within the eastern part of the 1982 established Geochemical-Grid-Luossajarvarri. It covers the here occuring low order Au-anomalies detected by the humus sampling program.

The ground geophysical survey outlined as well for the southern as for the northern part of the test area strong anomalous zones. They are divided from each other by a very indistinct grid centerpart, what supposely represents a fold-zone. Thus a correlation between these two parts is not proved. But following the airborne survey there occures one strong EM-conductor having his bend point (change from a $150^g$ strike direction to nearly a N-S trend) within the grid area.

However, the southern zone contains mainly three moderate to strong coincident C.E.M. - VLF conductors, which only in places are accompanied by weak Mag.-anomalies ( L 4+50 S 50 N, L 3+00 S 1+00 N, L 1+50 S 1+75 N). The horizons are either dipping towards the northeast or are standing vertical (profils 3+00 S and 1+50 S).

A multiple conductive body is restricted to the two most northern lines of the test area. Its single horizons are nearly parallel aligned to the baseline of the grid. Their C.E.M.-results are very rarely overlapped by significant Mags ( L 6+00 N 1+00E).

Recommended is a geological examination of the test area.

## 1.5 Grids of the Divrejavri and Raitevarri Area

A number of four grids are established near the southern border of the A/S Sydvaranger claim group, Raitevarri, what encloses an uneconomic disseminated type Cu - Au mineralization occuring in felsic volcanic tuffs (see History a. Previous Exploration). The Raitevarri district is situated in the lower volcanic unit. The area is underlain by a series of metavolcanics and metasediments, containing ultramafic and mafic flows (serpentinites and amphibolites), intermediate to felsic tuffs (chlorite - garnet - mica schists, dioritic gneisses) and carbon-rich epiclastic sediments (graphite slates).

The airborne EM-survey regarding this area, outlined a horse-shoe shaped structure, opened to the west, which shows an ENE - WSW striking axial plane. Its northern limb runs about $150^{g}$, while the southern expression shows an E - W trend.

There occures mainly one prominent conductor of moderate to good EM - response. This horizon seems to be splitted into several shorter parts especially within the hinge zone of the horseshoe structure.

The thisayears ground geophysical and geochemical surveys were restricted as well to the southern limb as the hingezone.

1.5.1 Divrejavri-Grid

location : map Bæivasgiedde, 2033 III, Jesjåkka, 2033 IV, coordinates: 418400 7683500, UTM grid, zone 35

baseline : strike direction: 100$^g$

length: 1500 m

profiles : 11

length: 1200 m

surveys : C.E.M., Mag., VLF, Biogeochemistry

The Divrejavri-Grid is situated in the most western part of the southern conductive limb. The C.E.M. and VLF-surveys lined out three paralleling conductors with moderate, but locally strong EM-response and frequent extreme high positive and negative resultant Dip-angles, always characteristics of graphite horizons. No coincidence was found, regarding the C.E.M. and the Mag.-results.? se NV del av området.

The biogeochemical survey of collecting last years birchleaves and/or humus gave no indication for anomalous Au referred to this area.

No further works are recommanded.

1.5.2 Raitevarri-Grid a. Raitevarri-Syd-Grid

location: map Bæivasgiedde, 2033 III, Jesjåkka, 2033 IV, coordinates: 421000 7684500 UTM grid, zone 35

baseline : strike direction: 190$^g$, 180$^g$,
length: 1350 m / 1200 m

profiles : 10 / 9

length: 1000 m / 450 m

survey : C.E.M., VLF, Mag., Biogeochemistry

The grids are arranged over the more western part of the hinge zone of the horseshoe shaped structure.

Two weak conductors were detected, both by the C.E.M. and the VLF survey. They occure with no overlapping Mag.

However because of the very minor content in pyrrhotite of the nearby Cu - Au mineralization, Raitevarri, there were reasons to test each of the two conductors by diamond drilling. The first hole, RAT-83-01, was located at the point 0+75 W 1+00 S of the Raitevarri-Syd-Grid, while the second RAT-83-02, was drilled at line 10+50 N, station 0+75 E at the Raitevarri-Grid. Both holes intersected a volcanic sequence comprising thick series of intermediate to felsic tuffs (garnet bearing biotite-actinolite-quartz-plagioclase schists) and smaller amounts of mafic to ultramafic flows and spotty occurences of chert layers. The conductors were small horizons of graphitic to graphite slate. The assay results from core samples were negative in every respect. Recently graphitic slate analyzed.

No further works are recommended.

1.5.3 Geochemical Grid Raitevarri-Syd-Extension

location: map Bæivasgiedde, 2033 III, Jesjåkka, 2033 IV,
coordinates: 419750 7683750
UTM grid, zone 35

baseline: 100$^{g}$

length: 1200 m

profiles : 9

length: 700 m to 1200 m

survey : Biogeochemistry

This grid covers the interspace between the Divrejavri and Raitevarri survey areas. It was established in order to test the here occuring weak airborne anomalies for further consideration.

Only background values in Au (1 to 5 ppb) were detected from the collected last years birchleaves and humus.

No further works are recommended.

## 2. Grids from the Quartzite Interlayer

### 2.1 Gåvdaroaivi-Grid

location: map Jesjåkka, 2033 IV, coordinates:
426500 7694300, UTM grid, zone 35

baseline : $70^{g}$

length: 750 m

profiles: 6

length: 500 m to 750 m

surveys : C.E.M., VLF, Mag.,

The Gåvdaroaivi-Grid is located within a huge quartzite horizon, whose extension is proved for the northwestern part of the project area. The horizon rests as a very prominant layer on the lower volcanic unit. It is covered by a second volcanic sequence (see Regional Geology).

The grid was established over a short and very weak and isolated coincident Mag. - EM conductor of the airborne survey.

The ground geophysical examination gave no indication for any anomalous zone referring further follow up.

## 3. Grids of the Upper Volcanic Section

### 3.1 Gåikenjavevarri-Grid

location: map Jesjåkka, 2033 IV, coordinates:
427600 7691700, UTM grid, zone 35

baseline :strike direction: 165$^{g}$

length: 1300 m

profiles: 11

length: 800 m

surveys : C.E.M., VLF, Mag.

The Gåikenjavevarri-Grid is placed within the bottom part of the upper volcanic section, but in a somewhat higher position than the surrounding Suolgajåknjalbmi and Gåikenjavri Grids. The test area is underlain by amphibolites and chlorite -actinolite schists. An ultramafic body with a predomination. in pyroclastic material-lapilli - is present in the more eastern part of the grid. This rock type is in comparison with the ultramafic section occuring within the Bakkilvarri area.

The grid covers a very weak, but broad EM-zone which can be traced over 6 lines of the airborne survey. The conductor is flanked on both sides by either a very strong (east) or a moderate (west) Mag.-anomaly.

The ground geophysical examination was negative in every respect. The C.E.M.-survey was stopped before half of the grid was finished.

No further works are recommended.

3.2 Hanas-Pier-Laddo-Extension-Grid

location: map Jesjåkka, 2033 IV, coordinates:
428500 7698400 , UTM grid, zone 35

baseline: strike direction, 170$^g$

length: 750 m

profiles: 7

length: 800 m

surveys: C.E.M., VLF, Mag.,

The Hanas-Pier-Laddo area was already in 1982 part of a combined geophysical and geochemical program. The discovery of secondary Cu-mineralizations occuring as coatings on felsic tuff horizons in the nearer south of the former survey area, required an additional geophysical program, what was established with the Hanas-Pier-Laddo-Extension-Grid.

The newly geophysical survey gave no indication for any mineralization seated at this location. There were detected only these conductors which already had been outlined by the former program.

The assay results from collected rock samples, comprising a fresch felsic tuff (HPL-1-83) and a highly stressed gabbro (HPL-2-83),adjacent to the tuff horizon, were all discouraging.

No further works are recommended.

3.3 Gussoaivi-Grid

location: map Karasjok, 2033 I, Jesjåkka 2033 IV,
coordinates: 430300 7699300, UTM grid, zone 35

baseline: strike direction: 175$^g$

length: 2100 m

profiles: 15

length: 500 - 800 m

surveys: C.E.M., Mag., VLF, Geochemistry

The Gussoaivi-Grid is located on a good coincident EM-Mag. anomaly of the airborne geophysics. This is the prominent feature within the middelnorth of the project area.

The structure was part of extensive reconnaissance geochemistry and combined geophysical and geochemical surveys. Furthermore diamond drilling took place at different locations. The exploration program ended with negative results. The often occuring good EM-response of the ground geophysical survey was caused by graphitic layers.

The conductors belong to a well banded sequence composed of epiclastic pelitic metasediments and meta-tuffs, mostly of felsic to intermediate composition. This section rests either immediately or with a minor amphibolite (mafic flow) interlayer on the quartzite horizon. It is covered by a huge volcanic pile, comprising basalt flows (amphibolites, massive to schistose), sill gabbros (amphibolites) and ultramafic pyroclastics (serpentine-chlorite-olivine rocks).

The Gussoaivi-Grid is situated just south of the Gætkevarri-Extension-Grid. It was established in order to line out some interesting gold-copper anomalies extending from there further to the south.

The ground geophysical survey detected one EM-VLF conductor which is frequently overlapped or immediately flanked by either a strong (2000 $\gamma$ over background) or a moderate (900 $\gamma$ over background) Mag.. A very distinct EM-response is restricted to the most southern lines of the grid. Further to the north only weak undulations do indicate the conductive horizon.

A/S Sydvaranger did, about three years ago, some trenching over the southern strong anomaly. A brief check of the refilled cut brought to light some bits of graphite slate.

The southeastern part of the grid area is overlapped by the Geochemical Grid Gussoaivi, what was established in 1981. The survey resulted in a negative Au-response. Only some isolated low order anomalies (8 to 14 ppb Au) were detected. The

first assay results - about ½ are yet received - from the thisayears soil/humus sampling program indicated the same circumstances also for the other part of the grid.

The present situation argues against further activities regarding this work area.

3.4 Oalgejåkka-Grid

location: map IDDJAJAVRI, 2034 II, coordinates: 440700 7711700, UTM grid, zone 35

baseline: strike direction: 25$^{g}$
length: 6,75 m

profiles: 6
length: 300 m

surveys: Geochemistry, VLF

The Oalgejåkka-Grid lies about 4 km north of Karasjok in the very nearea of the highway 96 (Karasjok-Lakselv). It is the only survey area, what occures north of the prominent E-W fault, what terminates the main land of prospecting to the north.

The outcropping rock-sequence shows good analogies with the of the Gætkevarri region. It occures a well banded unit, mainly containing garnet-biotite schists and massive to laminated amphibolites, which rests immediately on a very distinct quartzite horizon (middle marker). This quartzite is at his hanging wall often reworked and further network like interfingered by mafic volcanics, now present as amphibolite-rich rock assemblages.

The test area covers an isolated coincident EM - Mag. anomaly, what is restricted to 4 lines of the airborne geophysics. The follow up ground VLF-survey detected a very strong, thinn conductor. The variations of the imaginary component and the Dip-angle within the cross-over points show all characteristics of a graphite layer.

Some trenching was done at different locations without finding the conductor.

The area is indicated for some higher Au by the humus sampling program. For a final decision, regarding further exploration, it should be taken in account, that the test area shows an unnormal thin (± 0 to 50 cm) alluvial cover. The, referred to the Karasjok project, relatively high Au-values will therefore not necessarely suggest a promising prospecting target. Therefore it is recommended more trenching or "deep sampling" before any further geophysical follow up.

## 4. Grids from the Eastern Amphibolite Region.

### 4.1 Diljavarri-Grid

location: map KARASJOK, 2033 I, corrdinates:
443400 7696300, UTM grid, zone 35

baseline: strike direction: 20$^{g}$
length: 1350 m

profils : 10

length: 400 m to 900 m

survey : Geochemistry, two line VLF

The Diljavarri-Grid lies about 10 km south of Karasjok. It is situated on the eastern slope of the Diljavarri mountain ridge. The grid covers an easterly dipping volcanic section, mostly, made up of ultramafic - komatiitic - flows and pyroclastics (lapillies). This formation is supposely underlain by the Iskuras-quartzite.

The test area covers two paralleling moderate to weak conductors of the airborne geophysics. Both can be traced over a distance of about 2 km. The horizons are flanked or even overlapped by moderate to strong Mags..

A brief VLF-survey outlined the two conductors well. The curves do indicate weak conductivities for both zones.

Additional ground geophysics should be carried out only if some higher gold values will be detected from the soil/humus material.

4.2 Lavzejåkskáidi-Grid

location: map KARASJOK, 2033 I, coordinates: 441700 7683500, UTM grid, zone 35.

baseline: strike direction: 30$^g$

length: 750 m

profiles :7

length: 450 m

survey : Geochemistry

The grid lies about 20 km south of Karasjok and 7 km west of the Anajåkka valley. The area is totally covered by an extensive layer of glacial overburden.

The target for the geochemical program was a moderate, isolated EM-conductor of the airborne survey, which frequently shows good coincidence with weak Mag.-anomalies.

The yet received assay results from the soil and humus material outlined some low order Au anomalies, what are restricted to two profiles of the grid. Values of 10 to 13 ppb Au in humus were detected both, for the most western and the most eastern station of the line 4+50 S. Some further low order Au anomalies (11 to 18 ppb in humus), adjoined by somewhat higher background values, are pointed out for the most northern profile (1+50 N). These anomalous zones show no continuation to the south.

By now, no further works are recommended.

## 4.3 Grids of the Arkasjæggi Region

The Arkasjæggi region lies about 40 km south of Karasjok. It is 5 km away from the Anajåkka valley. A total of three grids had been established within this area in order to test one disseminated pyrite occurence and two spotty airborne anomalies for further consideration.

### 4.3.1 Askasjåkka-Grid

location: map GALMATSKAIDI, 2033 II, coordinated: 443200 7668400, UTM grid, zone 35

baseline: strike direction: $380^g$

length: 100 m

profiles: 3

length: 55 m

surveys: Biogeochemistry, rock sampling

The Askasjåkka-Grid covers a pyrite mineralization, what was found by chance while the geological examinations of the Askasjæggi region. The zone is not indicated on the airborne geophysical survey.

The mineralization is bound to a series of quartz-feldspar-hornblende schists and gneisses, which are interlayered by cm to dm bands of feldspar bearing quartzites, what supposely are metamorphosed quartzkeratophyrs. The zone of mineralization is of 10 to 15 m thickness and extends at least for about 1,5 km. The pyrite occures as finest disseminations and reaches concentrations of 5 to 7 or even 10 Vol.-%.

The mineralization was tested by a very restricted humus sampling program. A total of 7 rock samples (ASK-1 to ASK-7) were taken in addition from different locations.

The humus results indicated some interesting but anyways low order (10 to 22 ppb) Au anomalies occuring on the western side of the grid. Most of the samples came from a very thinn (10 cm) overburden.

No further works are recommended.

4.3.2 Askasjæggi-Grid

location: map GALMATSKAIDI, 2033 II, coordinates:
443600 7668100, UTM grid, zone 35

baseline: strike direction: 360$^g$

length: 450 m

profiles: 4

length: 400 m

surveys: Geochemistry

This grid covers a 2 line conductor of moderate to good EM-response of the airborne geophysics. A very weak Mag. coincides with only on one station.

The conductor was located by a brief VLF-survey. A response was picked up only on the two center lines of the grid. The conductor was here indicated by high positive and negative resultant Dip-angles.

The first assay results from soil and humus material gave no indication for any Au, Cu, Zn-mineralization seated at this location. But a final decision about further activities should wait until all the results have been received.

4.3.3 Askasjæggi-Syd-Grid

location: map GALMATSKAIDI, 2033 II, coordinates:
443700 7666600, UTM grid, zone 35

baseline: strike direction: 15$^g$

length: 600 m

profiles: 5

length: 500 m

survey: Geochemistry

The Askasjæggi -Syd-Grid lies about 1 km south of the Askasjæggi -Grid. Both grids cover supposely the same lithological sequence.

The grid is established over a two lines EM-conductor of the airborne geophysical survey. It is indicated by a weak to moderate EM-Real component.

Additional geophysics are recommended in case of positive geochemical results detected from the soil or humus samples will be received.

## DIAMOND DRILLING PROGRAM 1983

The thisayears diamond drilling program in the Karasjok project area lasted for 6½ weeks. It started collarding the first drill hole at the 9th of June and was finished within the 23rd of July. In this period a number of nine holes were drilled totalling 936,89 meters.

The works were carried out by the norwegian drilling company TERRANOR A/S, Trondheim . The drilling operations were undertaken by two crews working in shifts, each for 12 hours a day. The equipment consisted out of a fully automated hydraulic rig with wireline, type DBH 700, manufactured by Diamond Boart, Belgium, what was attached to an aliminium constructed slade, a transport slade and a muskeg, Bombardier, CAN, with which the majority of the moves between the different DDH-locations was done. For normal coring there were used steel rods of 3 m length and a 46,1 mm (1.815') outer dimension. Casing was done by 56,1 mm (2,209') and 66,1 mm (2.602') rods. In very minor cases even a 76,1 mm dimension was applied.

The drilling operations took place in the western part of the project area. A number of three drill holes were put down in the tract between Gaetkevarre and Gåikenjavvi. This

area lies about 12 km west of Karasjok. It is easy in access by a gravel road, which runs along the southern side of the Karasjok-river. Drilling was restricted here to the grids Gætkevarri-Syd-Extension, DDH GÆT-83-01, Hanas-Pier-Laddo, DDH HAN-83-01 and Gáikenjavvi, DDH GÁI-83-01. The second area of activity was that of Hannoaivi which lies about 45 km by air, in a southwestern direction from Karasjok. To this location most of the equipment was flied in by helicopter. The muskeg itselv was driven in mainly using the available tractor roads. The drilling program at Hannoaivi concerned the Hannoaivi-Syd-Grid and the Hannoaivi-Grid. Four diamond drill holes, HAN-83-01 to HAN-83-04 were put down in order to test three different conductors. The thisayears last drilling activities were regarded to the Raitevarri area subjecting the Raitevarri-Syd-Grid, DDH RAT-83-01, and the Raitevarri-Grid, DDH RAT-83-02. These grids lie about 15 km north of Hannoaivi, thus about 30 km by air, in a westsouthwest direction from Karasjok. The transport of the drilling equipmont to this location was undertaken as well by helicopter as by muskeg.

The locations of the different diamond drill holes can be taken from the Grid and DDH Location Map. They are further outlined in Fig. 4.

In most of the cases drilling was done towards the western hemisphere. The drill angle remained constantly at - 45°.

The drilling targets were either good corresponding EM - Mag. or unique EM-conductors of the ground geophysical survey.

In all drill holes the geophysical conductors occured as graphite horizons. However, a significant sulphide mineralization adjoined by a graphite sequence was intersected with DDH HAN-83-04. Furthermore interesting but very restricted sulphide enrichments with locally up to 10 Vol.-%

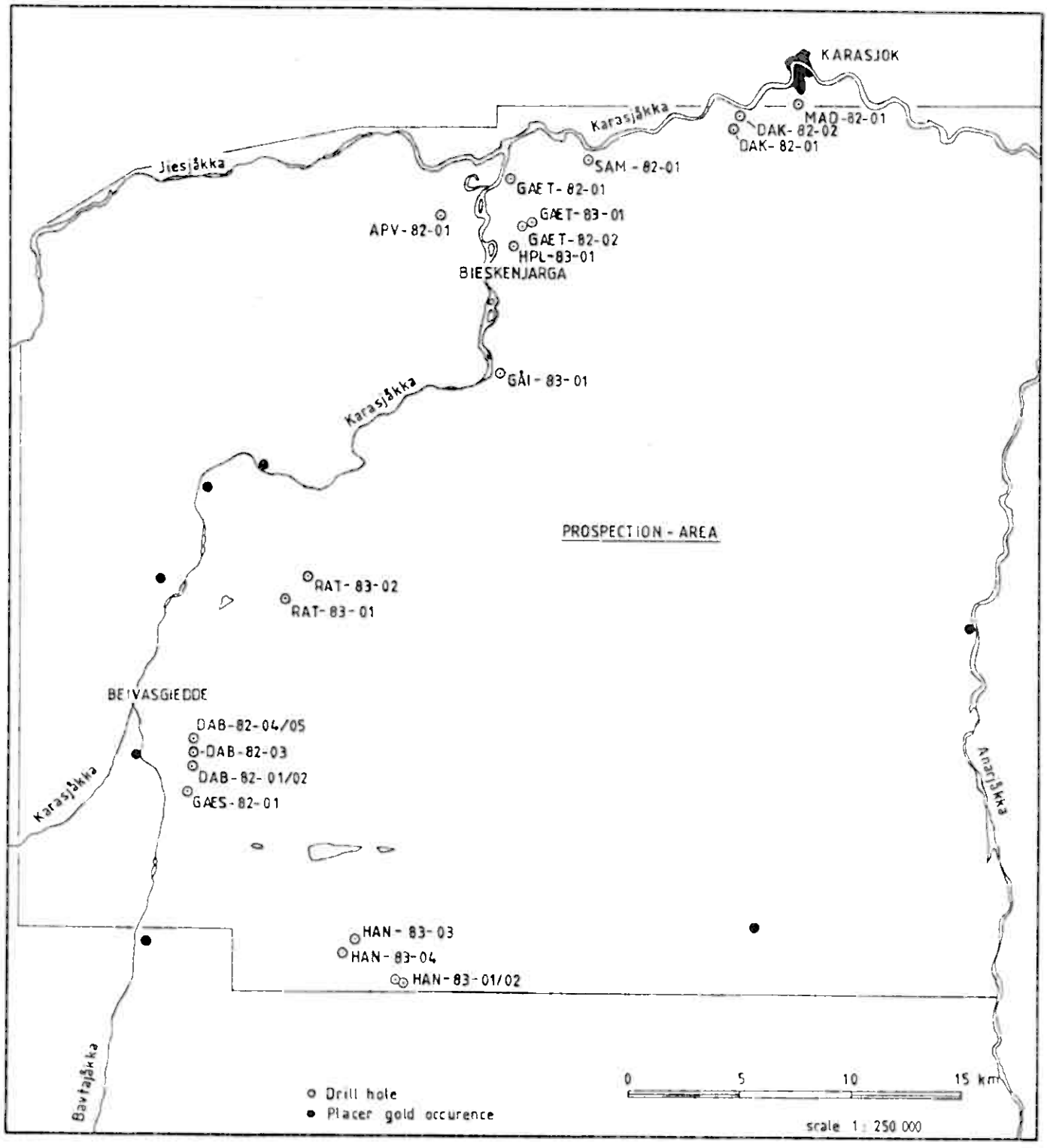



Fig. 4: Drillhole lacations within the Karasjok-project area.

## Raitivarri sydl:

Det samme gjelder her som i foregående områder, vanskelig å sammenligne VLF, CEM og mag, det e nærmest anomalier overalt unntatt når det gjelder geotkjemi. Borhull hadde grafit i flere soner og det synes ikke å være nødvendig med mer arbeide. Det ville kanskje være en tanke å analysere mer av borkjerne de man har sulfidmineraliseringer.

Extension

Humus program - fullstendig negativt.

## Gåvdaroavvi

Meget svake VLF og CEM anomalier som delvis følges av magnetiske anomalier.

Det utførte arbeid synes ikke å være tilstrekkelig for å vurdere området.

Andre målemetoder (IP ?) og jordprøver kunne kanskje hjelpe hvis geologien er positiv. Man bør ikke trekke konklusjon på så svakt grunnlag.

Karasjok prosjekt -83

Blad/Bilag 1

Dato 26.1.84

Signatur

Skardi:

Flere klare VLF-anomalier i feltet, disse kan spesielt i området S for S.L. korreleres med svake magnetiske anomalier. Forøvrig synes både VLF og M å bære preg av kanskje / muligens feilaktige avlesninger. f. eks. enkeltavlesninger som klart brytes med flere andre avlesninger ved siden av. Målingene er forøvrig vanskelige å tolke da geologisk informasjon mangler.
CEM gir lite informasjon her, muligens en svak sone ved bare 450 ø - 750 ø men korrelerer ikke med mag - VLF.
Geologien mangler.
Ikke lett å trekke noen konklusjon her.

Daigesvadda:

En CEM - VLF - Mag - anomali kan følges gjennom hele feltet, sonen synes å være godt ledende på de fleste profiler.
Målingene er ok. utført. Lengde og ledningsevne av sonen samsvarliggjør godt og synes ikke kostnadskrevende for videre oppfølging.

Kvasjok prosjekt -83

Blad/Bilag 2

Dato 26.1.84

Signatur

Gårziroaivi

Blad 1.

Et sammensurium av VLF-CEM-anomalier, stedvis sammenfallende ~~og~~ men i flere tilfeller uten korrelasjon. Det er grunn til å tvile på nøyaktigheten i arbeidet her, se f.eks. sterk CEM-anomali 300S/400 Ø til 450 N/350 Ø, denne kan knapt følges på VLF-kartet og plottes med forskjell på 21-30 m., årsak kan også være senderretning for VLF.

De to sterke smeuen som kan følges ~~fra~~ gjennom hele målområdet er sannsynligvis grafit. Derimot finnes flere svake VLF-anomalier (stedvis også med CEM) langs B.L. som kunne forfølgat en nærmere undersøkelse, om ikke for noe annet så for å "rydde" opp endel i de utførte målinger.

Blad 2.

Den vestlige grafittsone fra blad 1 fortsetter, i tillegg gir smeu i gmlt. skjerp meget sterk anomali på en

profil men er egentlig ikke fulgt opp på nabroprofilene, hvis noen av prøvene fra skjerpet er positive, bør denne sonen følges opp.

Sikkavarri

Meget rotete geofysikk, men hovedtrekkene kan sees som to parallelle CEM-anomalier gjennom feltets nordlige del, ellers er det merkelig dårlig overensstemmelse mellom CEM og VLF.
Synes vanskelig å utvide feltet ut fra de foreliggende data. Det må i alle tilfelle fastslås hva slags bergarter som finnes i området og hvilken sammenheng man har mellom geofysikk og geologi.

Divrejavri

VLF-målingene har gitt meget sterke anomalier i feltet, sannsynligvis fordi senderetningen har vært vinkelrett for dette feltet, anomaliene VLF og CEM følges også delvis av magnetiske soner.

Karasjok prosjekt

Blad/Bilag: 4
Dato: 26.1.84
Signatur:

Humusprøvetakingen har ikke gitt klare anomalier i forbindelse med EM-linene, enkeltprøver kan være anomale, men disse synes spredt til feldig utover. Geofysiske anomalier skyldes sannsynligvis grafit → god ledn.evne og lange soner.
Nye opplysninger trengs før å forsvare ytterligere arbeide her.

Raitivarri

VLF av liten verdi p.g.a. vanskelig senderetning. Forøvrig lite av positive tegn å se, ingen anomalier i humusprøver. Jeg kan ikke se noen grunn til å fortsette undersøkelser på denne måten i dette området, man har en mengde tvilsomme EM-anomalier, men kan ikke skille mellom disse ved hjelp av geofysikk eller geologi og dermed miste man egentlig muligheten for å trekke noen konklusjon.

Kåsasjok prosjekt

Blad/Bilag 6
Dato 26.1.84
Signatur

## Gåikenjavevarri

De to sydligste profilu har sammenfallende CEM - VLF og (600S) magnetiske anomalier. For meg virker det som om basisretn. er feil ut fra strukretning og målingene burde vært gjort mot S fra ONS og ikke mot N.

Ingen konklusjon.

Mangler geologi og geokjemi.

## Hanas-Fjel-Laddo ext.

Meget mygdelig geofysikk, mangler geokjem og geologisk info.

Ingen kommentar.

## Guessoaivvi

Sterke VLF-CEM-Mag-anomalier over gmlt. rösk m/ grafittskifer. En annen anomali går fra 750N/250-350N ut 1200N/ca. 3-L. Stemmer ikke overens VLF-CEM, men Magn. viser strukretn. Rel. god ledn.evne og derfor samsvar. grafit. Geokjemi negativ.

Ingen kommentar.

Kvarsjök projekt.

Blad/Bilag 7
Dato 26.1.84
Signatur

Oalgejåkka.

Meget sterk VLF-anomali gjennom hele området, bakgrunnsverdiene for Au i humus virker vesentlig høyere enn normalt, men følger ikke EM-sonen.

? vanskelig.

Siljavarri

Sterke VLF-anomalier på 2 profiler, mangler geokjem-resultat, mag og CEM.

Lavzejåkkaidi

Geokjemisk bart uten anomalier.

Askasjåkka.

Geokjemisk bart uten anomalier.

Askasjåkka II

Geokjemisk bart uten anomalier.

were detected in several other holes. But in general the mineralization did not exeed 3 Vol.-%.

The main sulphide was pyrrhotite. It was only in very minor cases overestimated by pyrite (DDH HAN-83-04). Chalcopyrite, sphalerite and arsenopyrite were the only other visuable sulphides. They were present only as minor constituents.

The sulphides occured mostly as finest disseminations or as mm spots and besides that sometimes as mm bands/lamina or flasers. Within distortion and brecciation zones they often were remobilized and filled crosscutting features.

A total of 131 samples each comprising 1 m to 2 m samples were taken from the core material. Thus totally 244,17 meters were assayed for Au, Ag, Cu, Zn and Pb. Only geochemical detection methods were required for the chemical analyses in this year. All assays resulted in a negative gold response. The highest Au-value detected from all holes was 60 ppb (DDH HAN-83-04). Some interesting but unconomic Cu and Zn enrichments of 1000 ppm respectively > 4000 ppm were proved in the diamond drill holes GÆT-83-01, HAN-83-03, and HAN-83-04. The silver and lead values remained constantly low. Highest concentrations with 4 ppm and 98 ppm respectively were reached within the drill holes HAN-83-03 and 04. Anyways the thisayears best looking diamond drill holes were HAN-83-03 and HAN-83-04, both located in the Hannoaivi -Grid. Only discouraging results were received from the drill holes GÁI-83-01, HPL-83-01, HAN-83-01 and 02 and RAT-83-01 and 02.

DRILLING DATA.

1. DDH GÆT-83-01

location: Gætkevarri-Extension-Grid
L 1+50 S 3+00 Ø

drilling: azimuth: $140^{g}$
angle: $-45^{\circ}$.

overburden: 14,00 m
total depth: 128,13 m
started: 23. June 1983
finished: 26. June 1983
samples: 34, covering 62,00 m

main sequences intersected:

14,00-49,80 m amphibolites (basalt flow)

49.80-73,40 m formation of metasediments and metavolcanics (mafic tuffs, minor basalt flows, banded chert, some felsic tuffs, carbon-rich pelites)

73,40-81,40 m: section of mafic metavolcanics (some basalt flows, predomination of mafic tuffs)

81,40-86,00 m: graphitic interval (carbon-rich pelites)

86,00-91,20 m: felsic metatuff

91,20-110,60 m: graphitic interval (carbon-rich pelites with minor felsic volcanic interlayers)

110,60- 123,03 m: metavolcanic and metasedimentary section (alternation of carbon-rich pelites and felsic tuffs)

123,03-128,13 m: plagioclase amphibolite (sill type gabbro)

2. DDH HPL-83-01

location: Hanas-Pier-Laddo-Grid
P 3+75 S 1+75 Ø
drilling: azimuth $266^g$
angle: $-45^o$
overburden: 12,80 m
total depth: 68,00 m
started: 12. June 1983
finished: 13. June 1983
samples: 13, covering 17,30 m

main sequences intersected:

12,80-47,20 m: mafic metavolcanics (basalt flows, mafic tuffs supposely intermixed by epiclastic material, minor ultramafic material)

47,20-61,82 m: graphitic interval (carbon-rich pelites, carbon-rich mafic tuffs, some ultramafic compounds)

61,82-68,00 m: quartzite unit ( reworked hanging wall, interfingered by altered ultramafic volcanics)

3. DDH GÅI-83-01

location: Gåikenjavvi-Grid
L 4+00 S 1+75 Ø

drilling: azimuth 250$^{g}$
angle: - 45$^{o}$

overburden: 19,70 m

total depth: 111,30 m

started: 15. June 1983

finished: 18. June 1983

samples: 5, covering 7,02 m

main sequences intersected:

17,70-28,75 m: graphite section (carbon-rich pelites)

28,75-35,35 m: mafic metavolcanics (basalt flows, mafic tuffs)

35,35-41,42 m: volcanic section (minor basalt flows, mafic tuffs, carbon-rich mafic tuffs, some carbon-rich pelites)

41,42-44,11 m: graphitic section ( carbon-rich pelites, minor mafic tuffs)

44,11-111,30 m: plagioclase amphibolite (subvolcanic gabbro)

4. DDH HAN-83-01

location: Hannoaivi-Syd-Grid
P 3+80 Ø 2+80 S

drilling: azimuth: 173$^{g}$
angle: - 45$^{o}$

overburden: 13,50 m
total depth: 57,70 m
started: 23. June 1982
finished: 26. June 1983
samples: 3, covering 5,50 m
general
remarks: this hole intersected no conductor, HAN-83-02 was drilled instead from the other side.

main sequences intersected:

13,50-45,95 m: plagioklase amphibolite (subvolcanic gabbro)
45,95-57,70 m: metakomatiite (ultramafic flow)

5. DDH HAN-83-02

location: Hannoaivi-Syd-Grid
P 4+60 Ø 3+75 S
drilling: azimuth: 376$^{g}$
angle: - 45$^{o}$
overburden: 24,70 m
total depth: 69,56 m
started: 26. June 1983
finished: 29. June 1983
samples: 4, covering 3,50 m

main sequences intersected:

24,70 m-48,60 m: mafic metavolcanics (mafic tuffs, pyroclastics-lapilli tuffs-, sill type gabbros, minor basalt flows)
48,60-48.82 m: banded chert
48.82-51,58 m: mafic metavolcanics (basalt flows)
51,58-52,42 m: graphite section ( carbon-rich pelite)
52,42-69,56 m: metakomatiite (ultramafic flow)

6. DDH HAN-83-03

location: Hannoaivi-Grid
P 3+00 Ø 2+25 N
drilling: azimuth: 230$^{g}$
angle: - 45$^{o}$
overburden: 12,00 m
total depth: 100,65 m
started: 30. June 1983
finished: 04. July 1983
samples : 17, covering 49,62 m

main sequences intersected:

12,00-44,74 m: section of mafic metavolcanics (sub-volcanic gabbro, mafic tuffs)
44,74-73,20 m: banded chert (silicate facies of BIF)
73,20-74,60 m: intermediate metavolcanic (intermediate tuff)
74,60-76,00 m: banded chert (silicate facies of BIF)
76,00-83,15 m: graphite horizon (reworked carbon-rich sediments, pyrrhotite- breccia, carbon-rich pelites)
83,15-100,65 m: banded chert (silicate facies of BIF).

7. DDH HAN-83-04

location: Hannoaivi-Grid
P 2+00 W 4+25 S
drilling: azimuth: 50$^{g}$
angle: - 45$^{o}$
overburden: 14,50 m
total depth: 144,15 m
started: 05. July 1983
finished: 08. July 1983
samples: 25, covering 46,07 m

main sequences intersected:

14,50-27,90 m: mafic and ultramafic metavolcanics (basalt flows, ultramafic flows and tuffs)

27,90-85,60 m: section of predominating intermediate metavolcanics (mostly intermediate tuffs, mafic lapilli tuffs, ultramafic flows and tuffs, mafic flows)

85,60-88,25 m: mafic and ultramafic metavolcanics (mafic and ultramafic tuffs, minor intermediate tuffs)

88,25-117,13 m: graphite interval (reworked carbon-rich sediments, carbon-rich pelites, intermediate to felsic tuff interlayers)

117,13-140,00 m: felsic metavolcanics (felsic-keratophyric, quartz-keratophyric-tuffs, banded pyrite ore)

140,00-144,15 m: plagioclase amphibolite (subvolcanic gabbro)

8. DDH RAT-83-01

location: Raitevarri-Syd-Grid
P 0+75 V 1+00 S

drilling: azimuth: $340^g$
angle: $-45^o$

overburden: 33,75 m

total depth: 102,55 m

started: 15. July 1983

finished: 18. July 1983

samples: 11, covering 13,50 m

main sequences intersected:

overburden graphite material

33,75-39,20 m: felsic metavolcanics (dacitic tuffs)

39,20-44,66 m: mafic and intermediate metavolcanics (alternation of basaltic and andesitic tuffs)

44,66-48,70 m: mafic metavolcanics (basaltic tuff)
48,70-61,90 m: mafic and felsic metavolcanics (basaltic and dacitic tuffs, ultramafic to mafic flows)
61,90-66,95 m: graphitic interval (carbon-rich pelites, reworked carbon-rich sediments, carbon-rich mafic tuff)
66,95-102.55 m: ultramafic to intermediate metavolcanics (ultramafic-komatiitic-flows, mafic flows and tuffs, intermediate-andesitic -tuffs, carbon-rich pelite)

9. DDH RAT-83-02

location: Raitevarri-Grid
L 10+50 N 0+75 Ø
drilling: azimuth: 224$^{g}$
angle: - 45$^{o}$
overburden: 16,00 m
total depth: 155,15 m
started: 19. July 1983
finished: 23. July 1983
samples: 19, covering 40,12 m

main sequences intersected:

16,00-20,43 m: intermediate metavolcanics ( andesitic tuffs)
20,43-40,00 m: mafic metavolcanics (basalt flows, basaltic tuffs)
40,00-79,50 m: intermediate to felsic metavolcanics (andesitic to quartzkeratophyric tuffs)
79,50-81,81 m: graphitic interval (carbon-rich pelites, reworked carbon-rich sediments, chert)
81,81-88,50 m: intermediate to felsic metavolcanics ( andesitic to quartzkeratophyric tuffs)
88,50-88,93 m: graphite horizon (reworked carbon-rich sediment)

88,93-101,30 m: mafic to felsic metavolcanics (basaltic and dacitic tuffs)

101,30-103,80 m: banded chert (silicate facies of BIF)

103,80-113,00 m: felsic metavolcanics (dacitic to quartzkeratophyric tuff)

113,00-155,13 m: mafic and minor ultramafic metavolcanics (komatiite flows, basaltic to andesitic flows and tuffs).

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