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Tittel

The Rombaken Gold-basemetal project, Northern Norway.
A participation offer.

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Sammendrag / innholdsfortegnelse

ARCO NORWAY MINERALER A/S

THE ROMBAKEN GOLD-BASEMETAL PROJECT, NORTH NORWAY

A Participation offer

Introduction:

The Rombaken gold-basemetal project is situated in Narvik kommune, North-Norway, see fig. 1. The distance from Narvik town and port is around 15-20 km, see fig. 2.

The mineralization is related to Proterozoic "greenstone belts" surrounded by granites of similar age belonging to the Rombaken-Skjomen Precambrian window, see fig. 3. High background values for basemetals, arsenic, silver and gold are known from these belts, and a number of rich mineralizations assaying 10-15 % combined Pb-Zn with around 100 ppm Ag have been encountered. Gold is generally not associated with the highest basemetal values and has at Varden East and Sildvikskaret been found to reach 1,54 and 2,1 ppm in bedrock samples. At Kjørsvatn in the southernmost part of the window, grabsamples of a gold-arsenic mineralization has given up to 10-15 ppm Au. This locality, however, is outside the ARCO properties.

ARCO Norway Mineraler A/S is a subsidiary company of ARCO Norway Inc. which in turn is wholly owned by the oil giant Atlantic Richfield Company of U.S.A.

The following presentation is made on behalf of ARCO Norway Mineraler A/S (ARCO) who is seeking a partner for the Rombaken project, on terms which is further specified below.

Rombaken - Why and How:

During the period 1983-84 ARCO conducted an extensive mineral exploration program in Norway; the Rombaken project being the result of a reconnaissance program early 1983.

As a result of this reconnaissance, Rombaken was given highest priority for a full scale exploration program to commence the same year. The result from this program, see below, was encouraging and the work was extended in 84, including airborne geophysics and diamond drilling.

Early 1985 The Atlantic Richfield Company closed down its mining and mineral exploration activities world wide, allowing for no further funding of the Rombaken project. ARCO, however, decided to maintain the mineral rights (Norwegian "mutinger") on its two

best properties, which was Grinder in Southeast Norway, and Rombaken. The intention was to find a partner(s) willing to continue funding of the exploration program.

In 1987 the US based East West Minerals Inc. a subsidiary of East West Mineral N.L. of Sydney, signed an Exploration Agreement with ARCO. During 1988 further work was carried out on the property with Resources Exploration Norway A/S (East West subsidiary) as operator and Geologiske Tjenester (GT) as contractor. A continuation of this program was due to start in June this year when East West suddenly terminated the agreement because of a heavy commitment in Canada.

However, half of the program for 1989 was going to be covered by a grant from the Norwegian Development Fund (DU) based on the 1988 expenditure. Hence, exploration was continued on Rombaken also this year with Geologiske Tjenester as a contractor for ARCO.

Land Status:

The mineral rights (Mutinger) on the Rombaken project has since 1983 been controlled by ARCO. The number of mutinger (each 0,25 km²) has gradually been decreased from its maximum of 938 in 1984 to 200 last year and 80 for 1989. Based on last seasons work application for another 10 has been lodged with Bergmestern i Nordland distrikt, see fig. 2.

Previous work:

A number of old workings within the window demonstrate that the different types of mineralization have been known for a long time. The area, however, has not been generally covered by modern exploration prior to ARCO's program 1983-84, but has been subject to general mapping and some more detailed investigation by the The Geological Survey of Norway (NGU).

NGU: The more important work by NGU is listed below, details are found in ARCO Report no. 84-670-19. Since this report was written two NGU reports of particular relevance have been issued. These are no. 86.167 and 86.193.

- Geological map 1:250.000
- Geological maps 1:100.000
- Aeromag map 1:250.000 Flown at 1500m altitude with 2000m linespacing
- A number of reports from different localities

ARCO: The work during 1983-84 was documented in a number of reports which have been summarized in two ARCO company reports, No. 84-670-19 for 1983 and No. 85-67-45, for 1984. The programmes included:

- Geological mapping in scale 1:50.000, 1:20.000 and 1:5.000
- Geochemical stream sediment sampling (800 samples), sample density approx. 1/km², and stream sediment heavy fraction sampling (168 samples)
- Rock sampling: Grid: 399 samples, others: 842 samples.
- Helicopter borne DIGHEM survey. 583 line km with 200m linespacing.
- Ground geophysics: GENIE EM and magnetics, 31 and 38 linekm respectively.
- Trenching, blasting and sampling
- Diamond drilling 13 holes totaling 1752 m

Most of the work, including mapping 1:5.000 and drilling, was confined to the western part the Haugfjellet "greenstone belt".

Resources Exploration: The fieldwork in 1988 was a follow up of the work on Haugfjellet in 1984 and mainly aimed at basemetal targets. The work which is reported in GT report no. 89-26-01 included:

- Further geological mapping in scale 1:20.000 and 1:5.000.
- Infill ground geophysics: VLF and magnetics.
- Rock sampling, totaling 100 samples.
- Diamonddrilling of 2 holes totaling 450 m.

DU-ARCO 1989: Since the original 1989 program was reduced it was decided to concentrate upon two of the best gold anomalies from previous efforts, Varden East and Hunddalen, see fig. 2. The following work, which is reported in GT report no. 89-28-01, included:

- Geological mapping in scale 1:5.000.
- Groundmagnetic survey.
- Chipsampling and detailed sampling by drilling and blasting of shallow trenches, totaling 204 samples.

Geology and mineralization:

A simplified geological map of the Rombaken - Skjomen Precambrian window is shown in fig. 3. On this map the old mineral shows are indicated as well as some characteristics for the different "greenstone belts".

These units are assumed deposited on an Archean crust in an intracratonic basin. Reactivation of Archean fractures extending into the overlying package caused formation of second and possibly third order basins with deposition of sedimentary breccias, fig. 6. These major fractures were probably acting as channel-ways for both volcanics and mineralized fluids as well as steering the main granitic intrusions which today constitute most of the window.

The age of the granitoids is around 17-1800 Ma. Metamorphism vary between green schist facies and lower amphibolite facies. The metamorphism and deformation are probably related both to Proterozoic and Caledonian events.

As shown on the maps fig. 2 and 3, the two property areas held by ARCO, north and south of Rombaksbotn respectively, belong to two different basins. Geologically the southern part with extensive andesitic flows belongs to a proximal deposition while Haugfjellet with dominans of finegrained sediments, tuffites and tuffs has a more distal character. The difference between the two areas is also supported by rock geochemistry and statistical treatment of the assay results, p. 7.

Mineralization: The most widespread and conspicuous mineralization found within the supracrustals is rust due to pyrite and pyrrhotite. The ironsulphides constitute from less than 1 % of fine dissemination to up to 25% as coarse dissemination, banding and stringers. This mineralization which can be hundreds of meters wide, and several km long, is mainly confined to the fine grained sedimentary, and felsic volcanoclastic units. JRC6
Generally these units show high background values in basemetal, silver and/or gold. The existence of iron sulphides rarely affects the general structure of the rocks, as bedding and/or cleavage, but may be associated with vein quartz. The richer zones and/or bands of basemetalminerals, however, are invariably rich in:

quartz +/- chlorite +/- carbonate +/- epidote

obliterating planear structures. Iron sulphides are present, but not abundant. Hence the Pb, Zn mineralization may be less rusty than the host rock.

Below we will present some relevant details from the two property areas, north and south of Rombaksbotn.

Haugfjellet-Varden East: Most of this area is shown in fig. 4 which demonstrates a number of lineaments, those with a northerly extension being partly or wholly intruded by granitic dykes.

THE WESTERN MOST PART, west of the first dyke which extend NNW-SSE, has the majority of Dighem and geochemical anomalies, and has attracted most of the work. The 1752 m of diamonddrilling in 1984 was carried out right in the NW corner of the map, fig. 4, revealing extensive low grade mineralization as :

DDH 9 13 m 0,74% Zn 0,25% Pb
DDH 12 17 m 0,6 " " 0,12" " and 12 m 0,65% Zn 0,26% Pb

A number of thin mineralized zones were sampled on the surface, the best one assayed:

2,18% Cu, 7,87% Pb, 19,4% Zn, 420 ppm Ag and 1,3 ppm Au

Statistical rock sampling from this area and further to the south, including the Varden formation, indicated the best basemetal targets to be associated with the latter formation.

Hence, the follow up work in 88 was concentrated here, including 2 diamondrill holes in the northern part of Varden formation, around 97000N. Drilling further south, including the brecciated closure of a possible synform, could not be done due to lack of funds.

This drilling did not produce any better results than the previous program, but a number of new thin, high grade mineralizations have been located within the Varden formation. These are generally around 0,5 m wide and associated with carbonate rich beds and/or shears. Typical samples assay:

6,8% Zn, 2,3% Pb, 109 ppm Ag, 0,1 ppm Au
10,2% " 2.2% " 40 ppm " -

The gold values in this part of Haugfjellet does not exceed 400 ppb, no particular pattern has been revealed. The elevated values do not necessarily follow the high basemetal values.

The gold potential for this part of Haugfjellet is regarded as limited, the potential for economic lead-zinc-silver is considerable and warrant further drilling.

THE VARDEN EAST area, see fig. 4, also produced a number of Dighem anomalies and stream sediment gold anomalies. A limited rock sampling program already in 1984 demonstrated a clear difference in gold background between the two areas, see Table 1.

Table 1.
Gold values from Westernmost part and Varden East.

	Au mean	Au 90%ile
Westernmost part, grid (n=323):	5 ppb	13 ppb
Varden East, lines (n=57) :	21 "	45 "

Only a small number of samples were collected at Varden East during 1988 program. All the same, the majority of samples assaying > 50 ppb Au came from this area. The last summers sampling program confirmed these results, see fig. 5, with assay results up to:

No. 8908243	2 m	1.24 ppm Au
"	263 grab	1,54 " "

From a total of 79 2 kg samples collected

21	>=	50 ppb Au
10	>	100 " "
2	>	1000 " "

The anomalous gold generally has an inconsitent relation with arsenic and basemetals, but show some association with elevated lead and/or zinc.

The sampling was mainly done within a unit of graphite schist, finegrained to cherty felsic rocks, with or without graphite, quart-biotite schist and quartzites. Ironsulphides in varying amounts occur throughout this unit which is part of an antiform with a steep plunge towards NNE, see fig. 5.

There appear to be a spatial relationship between this unit, elevated gold, and the major N-S shears as indicated by the western granitic dyke and the prominent shear zone around 19900 E.

Based on this model we believe there is a high potential for gold for almost a km south of the present Varden East grid, fig. 5, also supported by sample 239 chipped over a width of 15 m and assaying: 0,6 ppm Au

Seven new muting applications have been lodged to cover this ground, see fig. 2.

Hunddalen-Klubbvatnet-Fjellheimen area: This part south of Rombaksbotn, fig.6, contains two mineralized environments:
1. The "greenstone belt" lithologies and 2. The mineralized

shear in granites at NE Sildvikvatn.

"THE GREENSTONE BELT": Like the westernmost part of Haugfjellet also these lithologies show a high frequency of Dighem and stream sediment anomalies. Gold heavy fraction anomalies are noticeable, particularly around Klubbvatn. 2

The andesitic volcanics which appear as magnetic highs are partly bordered by Dighem anomalies. A similar magnetic-Dighem pattern occur along the NW part of the Fjellheimen plateau (undifferentiated), but the magnetic high is here due to magnetite breccias within a felsic unit, possibly meta dacites.

Basemetal mineralization is prominent in a number of workings E-NE of Fjellheimen. The one in the middle, fig.6, has been drilled by NGU showing:

3,3m	7,0% Zn,	0,5% Pb,	13ppm Ag	
grab	1,8" "	2,4" "	14 " "	0,1ppm Au

Grab sample from the workings 1 km to the NW assayed:

3,0% Zn, 3,3% Pb, 68ppm Ag, 0,1ppm Au

A medium strength three points Dighem anomaly occur along strike a further 4-800 m to the NW from the last working.

Further south, particularly from the Klubbvatn area grab samples from scree and outcrop assay up to:

1,1% Zn,	8,1% Pb,	260ppm Ag,	0,8ppm Au	1
11,7" "	2,1" "	56 " "		

A grabsample from a 3 m wide rusty unit at Blåisvatn assay:

11,1% Pb, 98ppm Ag, 1,1ppm Au

Compared to Haugfjellet, the rich basemetal mineralization carry higher gold values. An association gold-lead is indicated and supported by the statistical correlation coefficient:

	Klubbv.	Haugfjell
Pb-Au	0,73	0,25

A proper follow up of this highly mineralized belt has not yet been done and is believed warranted.

SILDVIKVATN: A quarry in the granite at the NE corner of Sildvikvatn, Fig. 6, has revealed shearing and quartz veining about NNW-SSE with visible fluorspar, fuchsite, chlorite, pyrite, galena and chalcopryrite. Two samples, from W of quartz vein contact, and the quartz vein assay:

1
1 m 0,75ppm Au, - 0,38% Pb, 46ppm Ag, 12,7% Fe
0,6" 1,89 " " , 0,17% Cu, 0,38" " ; 41 " " , 25,4" "

An earlier reconnaissance sample from the same quartz vein said to represent < 2 m, assayed:

2,1 ppm Au

Earlier streamsediment sampling gave a 5 ppm anomaly 1 km to the NW of this locality. A heavy fraction follow up sampling did not confirm this anomaly. On the other hand, a heavy fraction anomaly of 4 ppm Au was then found 3 km to the SE along Sildvikvatnet.

Three new muting applications have been lodged to cover this mineralization. Further work is recommended on this locality in particular, and on other gold anomalies within the granites in general.

Infrastructure:

Although rough topography in places, particularly in the southern part of the actual area, the maximum distance to road and/or railway line is 7 km. Narvik kommune has recently been strongly developed with regard to hydroelectric power and the town which is only 15-20 km from the project area has all modern facilities, including a harbour for shipment of the Kiruna iron ore, railway and airport.

Expenditure to date:

ARCO, 1983-84:	Nkr. 6.000.000,-
Resources Exploration Norway A/S, 1988:	Nkr. 1.200.000,-
DU-ARCO, 1989:	Nkr. 500.000,-

Exploration agreement terms:

Any company who wants to earn an interest in the Rombaken property is asked to negotiate an Exploration Agreement with ARCO Norway Mineraler A/S. ARCO wants a similar agreement as they had with East West, implying that a new company will have to spend:

Nkr. 4.750.000,- to earn a 50% interest

Part of the former agreement with Cost Contribution Table is found in Appendix 1, and a complete copy can be studied in our office.

Perusal of technical data:

Any part seriously considering such an agreement will, after signing a letter of confidentiality, have full access to all maps and reports related to the project and on file in this office.

Gold in Norway and the Nordic countries:

A few comments on this subject was given in an earlier report on the Grinder project, which we believe you have received.

Conclusion:

In spite of an attractive geological environment with a number of known mineralization, basemetals at Haugfjellet and Sildvik-skaret, and gold at Kjørivatnet, this Precambrian window has been highly neglected until the early 1980'ies.

Substantial work over a large area has since then focused in on ground with a high basemetal potential as well as outlining gold in bedrock, also in the northern part of the window.

We strongly recommend that these targets are further explored.

Boye Flood

Disc.3/Rombrap.22

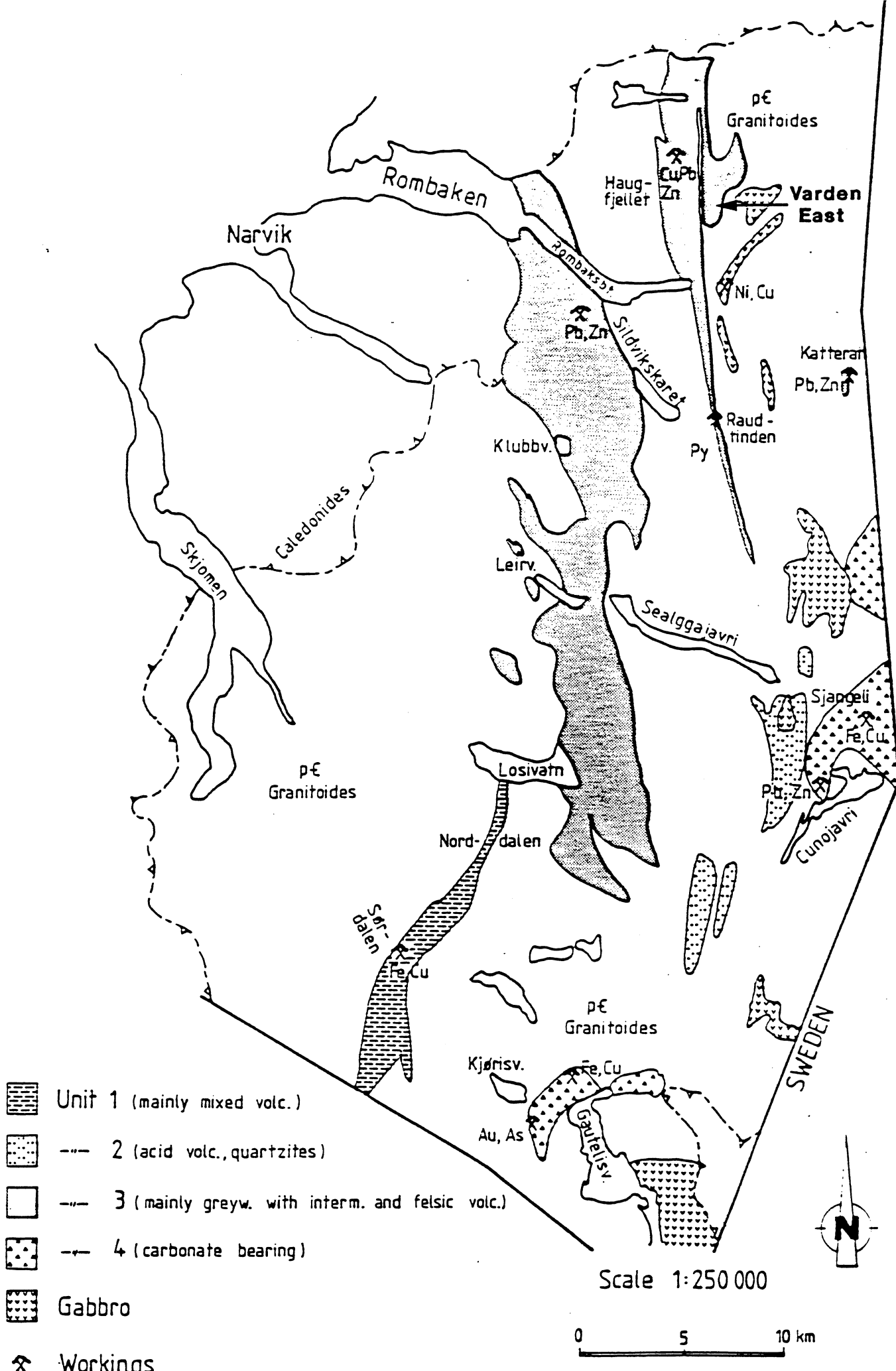








ROMBAKEN

Location and
Population Map

 ARCO Norway Mineraler A/S
Land Positions 1989

 Application granted 1989



-  Unit 1 (mainly mixed volc.)
-  2 (acid volc., quartzites)
-  3 (mainly greyw. with interm. and felsic volc.)
-  4 (carbonate bearing)
-  Gabbro
-  Workings

Scale 1:250 000

0 5 10 km

ROMBAKEN

GEOLOGICAL MAP **Fig. 3**

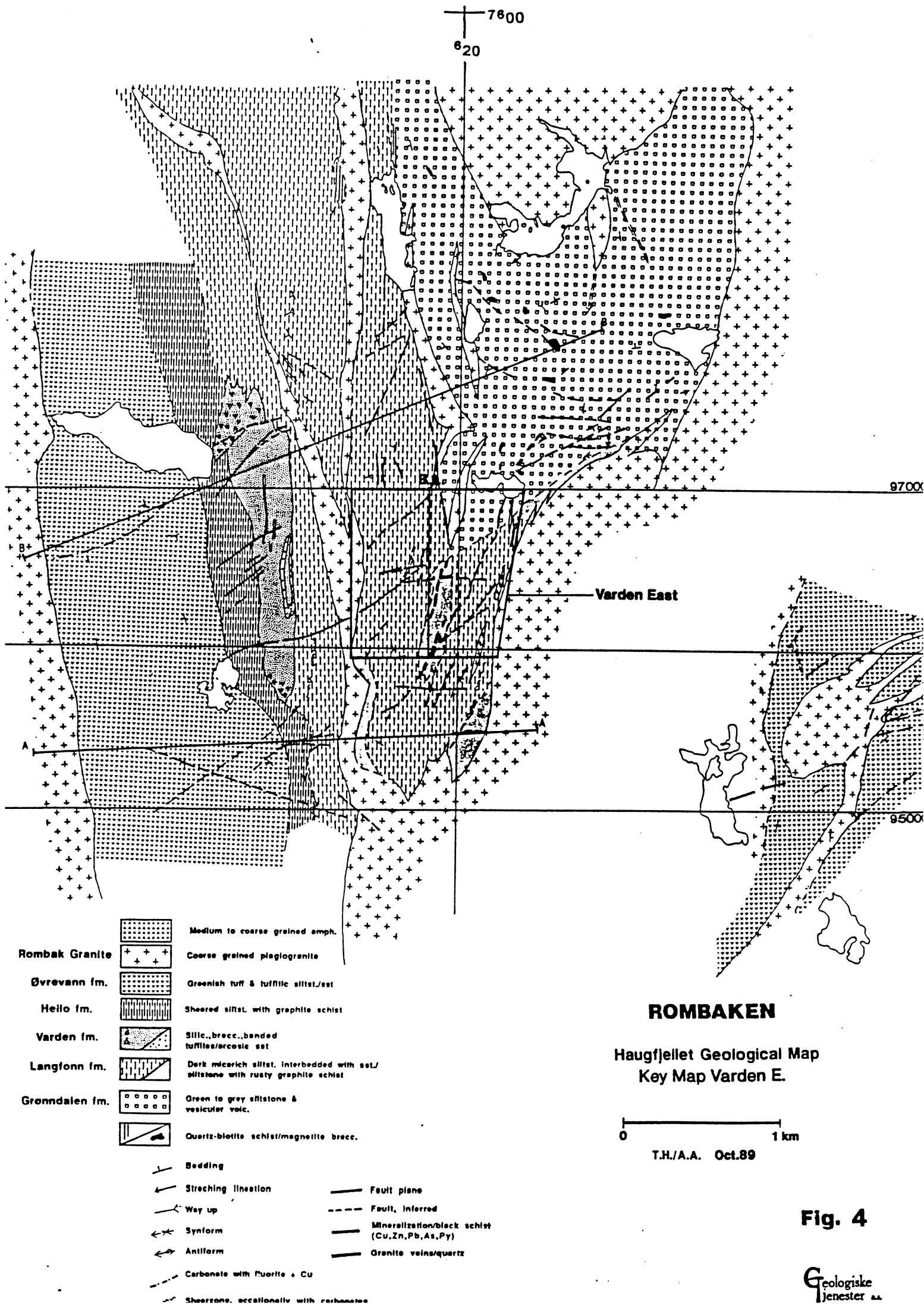


Fig. 4

GEOLOGICAL MAP

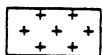


Caledonian Rocks

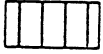
PROTEROZOIC WINDOW:



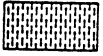
Gabbro



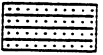
Granites



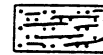
Supracrustals undiff.



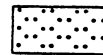
Dacite


Quartz-Dom Rocks-
Rusty/Garnet bearing

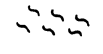

Andesitic Volcanics


Intraformational
Conglomerate


Black, Graphitic Shale



Graywackes



Shear Zone



Fault, showing dip



Schistosity, Cleavage



Strike and Dip of beds



Bedding top observed



Old workings



1984 trenches

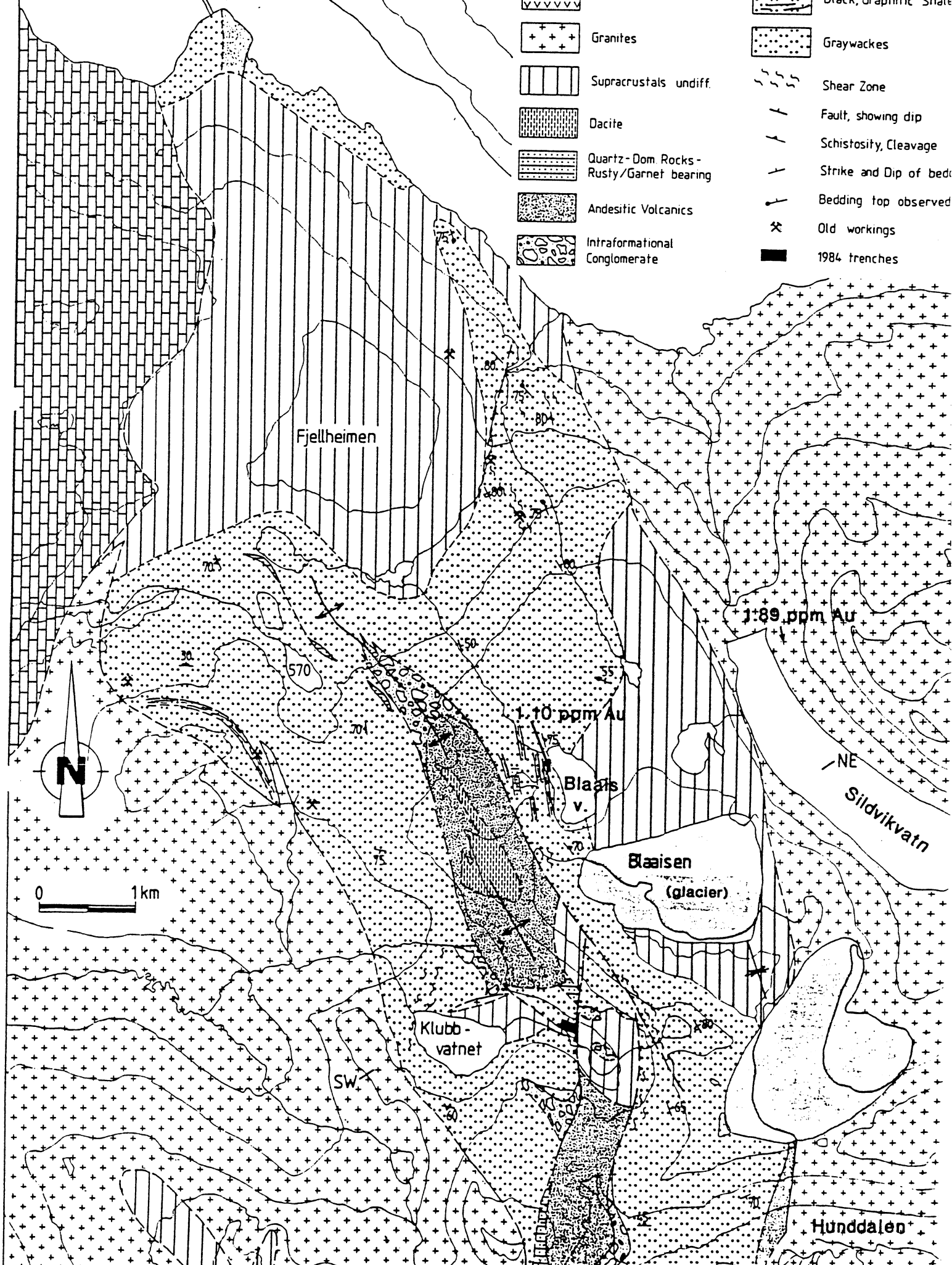


Fig. 6