

SUMMARY REPORT

FINNMARK PROJECT (N-81-2)

FOLLDAL VERK A/S - AMOCO NORWAY OIL COMPANY

APRIL 1982

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3089

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## SUMMARY AND CONCLUSION

A program of regional soil geochemistry, prospecting, and airborne geophysics was conducted in the Karasjok area of northern Norway during the summer of 1981. The project target was gold-copper mineralization in a geological setting of ultramafic volcanics and iron formations. The program was conducted by Folldal Verk A/S in a joint venture with Amoco Norway Oil Company.

The regional geochemical survey began in August, prior to the airborne survey. The first grids were established based on the locations of known occurrences of iron formations in close contact with ultramafic volcanics. Several grids were also completed in September after the airborne survey, following up strong airborne EM-mag anomalies.

A wide sample spacing was employed as it was a "reconnaissance" project. Samples were collected on line spacing varying from 200 to 300m intervals, with samples collected at 50m and 100m intervals respectively. The objective of the geochemical program was therefore not to definitively outline zones, but rather to detect the occurrence of anomalous gold even if only in widely scattered samples. In this way priorities could be assigned to the geophysical anomalies.

Much of the area is covered by an extensive layer of glacial overburden of quite variable thickness. As a result the geochemical program resulted in generally low order anomalies. The absence of geochemical expression should not therefore eliminate the geophysical anomalies from further consideration, but the presence of anomalous values shall be used in assigning target priorities.

The best geochemical target indicated was on the Dabmutsookkadas Grid, where the end of one of the lines returned values of 13-270 ppb Au, with anomalous Cu and Zn. These samples cover a portion of a strong associated EM-mag anomaly outlined by the government survey.

In addition scattered geochemical anomalies associated with airborne EM-mag anomalies were indicated on Madiijavri, Daktejåkka, Gætkevarri, Aslat-Pier Varri, Njuvcut, and Gæssaroavvi Grids.

The airborne survey indicated numerous strong EM-mag anomalies which should be followed up. A total of 156 claims in 15 groups were taken to cover some of the better targets.

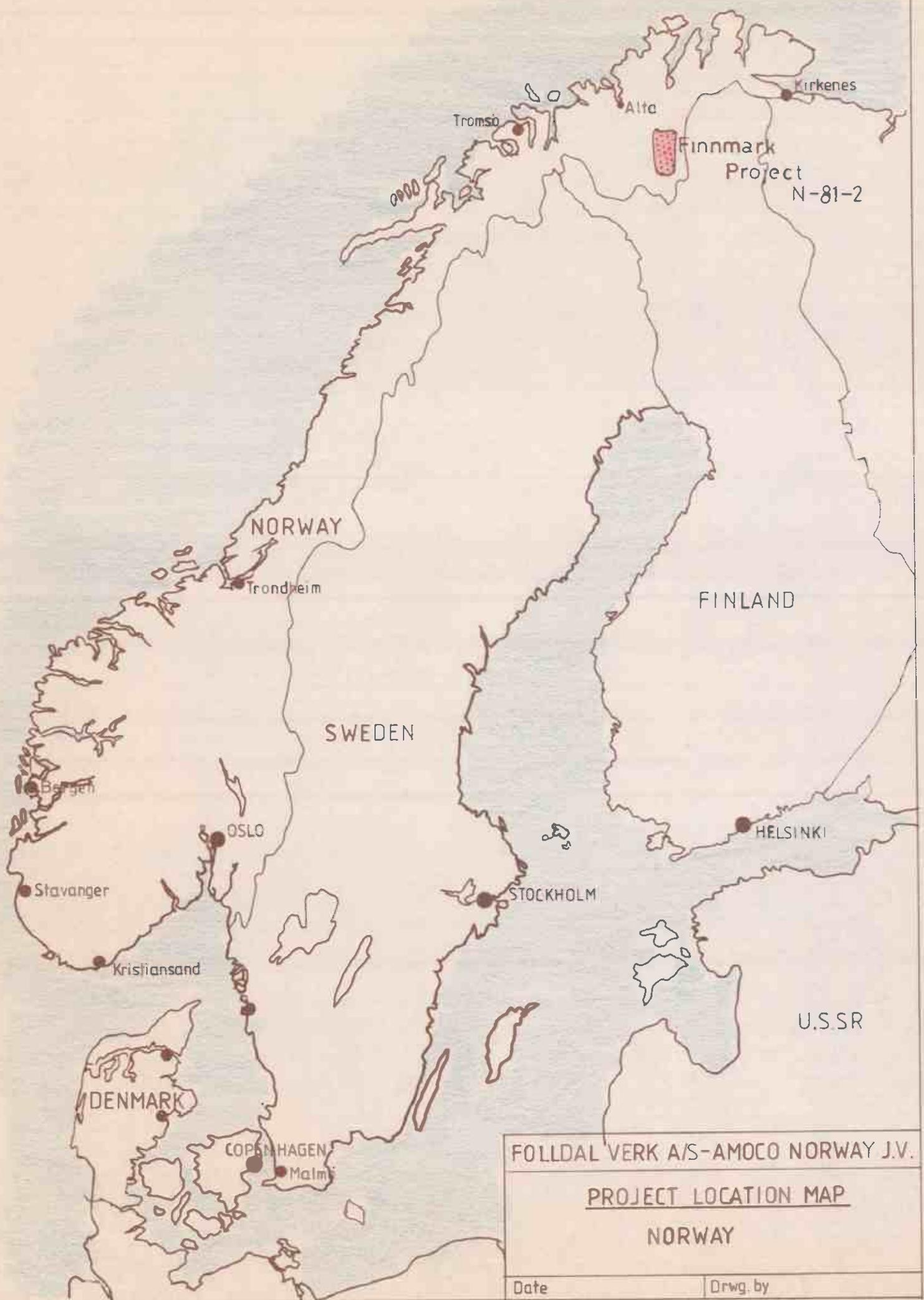
#### RECOMMENDATIONS

Detailed ground geophysics (EM-mag, VLF) should be completed over the better EM-mag targets indicated by the airborne survey, with intial work being done on those with anomalous geochemistry associated. Humus sampling should be completed over these anomalies and over as many of the other airborne anomalies as possible.

Ground geophysics should begin in the area in mid-March, with diamond drilling of the targets to begin in June-July.

#### INTRODUCTION

A regional program of soil geochemistry and airborne geophysics was conducted in the Karasjok area of northern Norway during the summer of 1981. The project target was gold-copper mineralization in association with iron formations in an ultramafic-mafic volcanic environment. The program was centered on a district which had been previously noted for placer gold occurrences.



The geochemical program resulted in indicating several areas anomalous in Au-Cu while the airborne survey indicated numerous strong EM-mag anomalies which will require ground follow-up.

#### LOCATION AND ACCESS

The project is located in Finnmark, northern Norway, centered at lat. 69 degr. 20 mins., long. 25 degr. 15 mins. The town of Karasjok which is located in the northeast corner of the project area is the nearest supply center. Good gravel roads extend into the north half of the area along both sides of the Karasjok River from Karasjok. A power line extends into the north central part of the area also. The town of Karasjok is serviced by paved highway from Lakselv and Alta, approx. 50km and 170km distance respectively. Both Alta and Lakselv are serviced by jet flights from Oslo and Trondheim.

Fixed wing and helicopter service is available from Alta which is 110 km by air from the project.

Many of the airborne anomalies could be reached by road and skidoo in late winter to spring. Several areas are also accessible by boat along the Karasjok River. The south part of the project area will require helicopter support, however.

#### LAND STATUS

A total of 156 claims (each 500m x 500m) were staked in 15 claim groups in September 1981 and February 1982 to cover the better looking airborne EM-mag anomalies. These claims are valid for seven years.

JOINT VENTURE AGREEMENT

A "Heads of Agreement" dated June 01, 1981 established a joint venture for exploration and development of mineral deposits in the Folldal area of Norway between Amoco Norway Oil Company and Folldal Verk A/S. Grass roots exploration in other areas of Norway was included in this agreement as an "exhibit". A separate "Heads of Agreement" covering grass roots exploration has since been drawn up. This agreement establishes a 50/50 joint venture over a six year period from 1981 to 1986, subject to withdrawal by either party after September 01, 1983. Withdrawal would be effected by providing a written notice prior to December 01 of any year after that date, effective the following January 01.

Funding of the joint venture is as follows:

|      | <u>NKR</u>       |
|------|------------------|
| 1981 | 1,000.000        |
| 1982 | 2,000.000        |
| 1983 | 2,500.000        |
| 1984 | 2,500.000        |
| 1985 | 3,000.000        |
| 1986 | <u>4,000.000</u> |
|      | 15,000.000       |

| TOTAL NKR<br>EXPENDITURES  | AMOCO<br>FUNDING OBLIGATION | FOLLDAL VERK<br>FUNDING OBLIGATION |
|----------------------------|-----------------------------|------------------------------------|
| 0-1.000.000                | 100%                        | 0%                                 |
| 1-5.000.000                | 80%                         | 20%                                |
| 5-15.000.000               | 65%                         | 35%                                |
| Greater than<br>15.000.000 | 50%                         | 50%                                |

Folldal Verk is the designated operator of the joint venture.

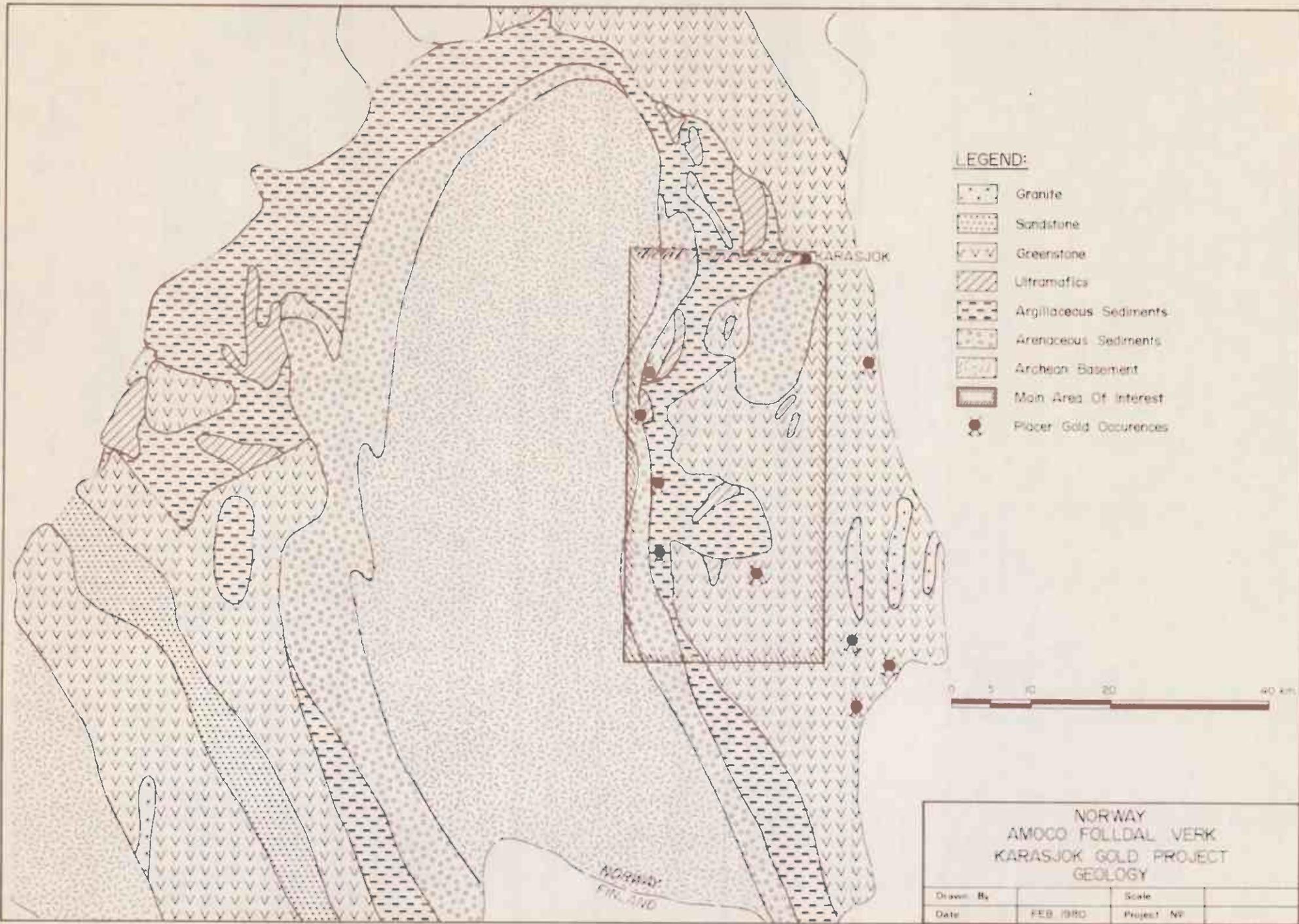
## HISTORY AND PREVIOUS EXPLORATION

The area has been noted for many years for the occurrence of placer gold with most of the occurrences concentrated in the ultramafic rich portion of the volcanic pile. The first alluvial gold was found in the area by a mine inspector in 1866 in the Nitusjokka river near Karasjok. Most of the gold occurs in old erosion river terraces which often lie 6-8 meters above the present river level. Small plates of silver containing antimony have been noted in many of the placer gold occurrences, along with small quantities of platinum arsenides and sulfides. Native gold has been found in quartzitic boulders near Beivassgiedde and Skiecamjokka.

Considerable drilling has been conducted in the southern part of the area, primarily investigating the iron formations. Much of this work has been done by Sydvaranger. In addition Sulfidmalm (Falconbridge) has apparently conducted exploration in search of copper nickel, mainly in the southern most part of the area. One claim group held by Sydvaranger occurs on the south edge of our airborne survey and is reported as a "Cu-Au" occurrence. No other information is available on it.

## REGIONAL GEOLOGY

Finnmarksvidda is underlain by Pre-Cambrian rocks of Sveko-karelian age (1600-2100 my). The sequence consists of a central basement dome of gneiss and granite, overlain by a basal conglomerate and arenite, mica schists, ultramafic lavas, quartz banded iron formations, and finally amphibolites. The iron formations occur on the hanging wall of ultramafics, with a sulfide rich seam commonly occurring along the contact. The iron-quartzite horizon is generally from 10-20m thick, and is overlain by sulfide-rich black shales. The iron formations contain magnetite and hematite, averaging 22-27% Fe and 2-8% Mn. The ultramafics are olivene rich and are variably altered to talc and serpentine.



**LEGEND:**

-  Granite
-  Sandstone
-  Greenstone
-  Ultramafics
-  Argillaceous Sediments
-  Arenaceous Sediments
-  Archean Basement
-  Main Area Of Interest
-  Placer Gold Occurrences



|  |          |            |  |
|--|----------|------------|--|
| <p>NORWAY<br/>AMOCO FOLLDAL VERK<br/>KARASJOK GOLD PROJECT<br/>GEOLOGY</p> |          |            |  |
| Drawn By   |          | Scale      |  |
| Date   | FEB 1980 | Project No |  |

Several late stage gabbroic and diabasic bodies occur throughout the sequence.

#### 1981 PROGRAM

The summer program was primarily a regional soil geochemical program coupled with an airborne EM-mag survey. The soil sampling began prior to the airborne survey and was directed towards covering those areas of known ultramafic-iron formation contacts. Following completion of the airborne survey eight areas of airborne EM-mag anomalies were covered by soil sampling.

The airborne survey was flown by the Norwegian Geological Survey (NGU) and totalled approximately 2000 line km. Line spacing was 250m. The survey was successful in outlining numerous strong EM-mag anomalies; a total of 156 claims in 15 groups have been staked to date to cover some of these areas.

In addition to the survey flown for Folldal-Amoco, the results of a survey flown by the government the previous season have now been released. This survey adjoined our survey on the south side and covered the areas in which our initial geochemical work was conducted. Numerous strong anomalies were outlined by the survey, one of which occurs in the area of one of our better Au-Cu-Zn anomalies.

#### GRID GEOCHEMICAL RESULTS

1. Vuollevooppevarri (N-81-2-B)

A grid was established on this airborne anomaly with lines spaced at 200m intervals and "B" horizon soil samples collected every 50m. The anomaly is located in

a valley and no outcrop was observed. The airborne anomaly is primarily an EM, with magnetics restricted to both ends of the anomaly. No geochemical anomalies were identified and additional ground geophysics should be completed on a low priority basis.

2. Madiijavri Grid (N-81-2-C)

This is a strong, isolated airborne EM-mag anomaly. It occurs on only one flight line and is adjacent to an area of high magnetics which is probably an ultramafic. The area is totally covered. A small grid with lines at 200m intervals and samples every 50m was established. Three samples were anomalous in Au, two of them being adjacent samples.

Detailed ground geophysics should be completed to define the Em-mag anomaly.

3. Daktejåkka Grid (N-81-2-D)

This is a very strong airborne EM-mag zone in an area of heavy overburden cover. It forms an offset portion of a long regional conductive zone. A geochemical grid with lines at 200m intervals and samples every 50m resulted in one copper zone being indicated at one end of the grid on two lines, with several low order gold values scattered across the grid. These scattered values are contourable across two lines in most cases. Detailed ground geophysics should be completed on a first priority basis.

4. Jægilvarri-Bakkiljakka Grids (N-81-2-E)

A long grid with lines at 200m intervals and samples at 50m was established over a multiple EM-mag regional conductor flanking a large ultramafic body. Some portions of this anomaly have very strong magnetics possibly indicating a mixed magnetite-sulfide zone. The geochemical survey did not reveal any significant Au anomalies, but several samples from lines I-J were anomalous in arsenic. As the area is along the side of a valley and completely covered, ground geophysics should still be conducted on the stronger portion of the anomaly.

5. Sammalcåkka Grid (N-81-2-F)

This is a one flight line EM-mag anomaly in an area of high magnetics, flanking a large ultramafic body. The area is totally covered. A small grid was established with generally negative results. Ground geophysics should be completed on the anomaly however, as it is a strong relatively isolated anomaly.

6. Gussoaivi Grid (N-81-2-C)

This grid covers two separate EM-mag anomalies near a large ultramafic body. The area is totally covered. The geochem survey was essentially negative. Ground geophysics is probably not warranted on these.

7. Gætkevarri Grid (N-81-2-H)

This airborne EM-mag anomaly occurs flanking a large ultramafic body, near an area of talc alteration. The anomaly is completely covered. The soil survey was completed on 200m line spacing, samples every 50m. Several samples were anomalous in gold and copper, with the best gold values occurring on three adjacent lines with values of 15-56ppb. The copper values were separate from the gold values, and range from 120-260ppm. Ground geophysics should be completed over this area.

8. Aslat-Pier Varri Grid (N-81-2-I)

This airborne anomaly occurs in the base of a valley and is totally covered. The soil survey returned several scattered gold values ranging from 10-78 ppb. The best copper values occur on the end of the grid, with two values 50m apart being 110 and 450 ppm. These have anomalous Zn, Au and Pb associated.

Ground geophysics should be completed over the grid area.

9. Dalabakjavri Grid N-81-2-M)

This grid was established to sample an area of reported iron formation in contact with ultramafics. This was outside of our airborne survey area but was covered by the previous NGU survey. Scattered anomalous values were returned.

The airborne survey indicated a strong EM-mag anomaly on the west side of the grid. Further humus sampling may be warranted in the vicinity of the airborne anomaly prior to any geophysics.

10. Suolumaras Grid (N-81-2-N)

This grid consisted of lines spaced at 300m and samples every 100m. It was located in an area of known iron formation which had been drilled previously. Outcrops noted on the grid were ultramafics and amphibolites, quartz banded iron formation, and sulfide rich graphitic shales. Assays of these sulfide rich rocks revealed copper values of 240-1300 ppm, Zn of 110-140 ppm, and gold from 9-20 ppb.

Although several samples anomalous in gold were returned the lack of any untested EM-mag targets would indicate that no further work should be completed on the grid.

11. Njuovcut Grid (N-81-2-0)

A grid with lines spaced at 300m intervals and samples every 100m was completed in this area of known iron formation. Several airborne EM-mag anomalies occur on and near the grid, mostly in marshy areas. One anomaly occurs near the base line at the east end of the grid however, and several samples over this one returned low values in gold.

Ground geophysics should be conducted over each of these geophysical anomalies.

12. Gæssajavri Grid (N-81-2-P)

A large grid extending 10km along strike was established over this area of ultramafics, with lines every 300m and samples at 100m intervals. Several airborne anomalies were covered by the grid. Several low order anomalous values were recorded from the central part of the grid between lines L and Q corresponding to one of the airborne anomalies. Ground geophysics should be completed over this area of the grid.

13. Dabmutsuokkadas Grid (N-81-2-Q)

This grid was located over an area of indicated ultramafics. The airborne survey outlined multiple-regional conductors in the area, with a portion of one EM-mag anomaly crossing the NW corner of our grid. Several samples at the end of one of the lines which crossed part of this anomaly were quite strongly anomalous in

Au, Cu, and Zn. Gold values ranged from 13-270 ppb, Zn from 190-270 ppm, and Cu from 50-110 ppm. This anomaly should be followed up with ground geophysics on a first priority basis.

14. Gæssaroavi Grid (N-81-2-R)

This grid is really an extension on the west end of the Gæssajavri grid and covers several airborne anomalies. The soil survey indicated a small Au anomaly in the central part of the grid corresponding to the airborne anomaly. This area should be covered with ground geophysics.

15. Hannoaiivi Grid (N-81-2-S)

This grid of 300m line spacing did not detect any anomalies of significance.

Two isolated airborne anomalies were indicated south of this grid area, one on the south end of lines A-E, and the other approximately two kilometers from the south east end of the grid. Both of these should be followed up with ground geophysics and humus sampling.

SUMMARY OF RECOMMENDED PROGRAM

Ground geophysics should be completed on the following anomalies to define drill targets on a first priority basis:

- (i) Madiijavri (N-81-2-C)
- (ii) Daktejåkka (N-81-2-D)
- (iii) Gætkevarri (N-81-2-H)
- (iv) Aslat-Pier Varri (N-81-2-I)
- (v) Dabmutsuokkadas (N-81-2-Q)

Ground geophysics should also be completed on selected portions of the following areas:

- (i) Jægilvarri-Bakkiljakka (N-81-2-E)
- (ii) Sammalcåkka (N-81-2-F)
- (iii) Gussoaivi (N-81-2-G)
- (iv) Njuovcut (N-81-2-O)
- (v) Gæssajavri (N-81-2-P)
- (vi) Gæssaroavi (N-81-2-R)
- (vii) Anomalies south of Hannoaivi Grid (N-81-2-S)

In addition humus sampling and ground geophysics should be completed on the claim groups which have not had any work to date:

- (1) Stuorra Fossen (N-81-2-L)
- (2) Marget Javna Roavvi (N-81-2-J)
- (3) Luossajarvarri (N-81-2-K)
- (4) Lavvugarri

Reconnaissance humus sampling over the airborne anomalies in areas not covered by any of the above should be completed over several selected areas to determine if ground geophysics is warranted.

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