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Sammendrag

A reconnaissance geochemical stream sediment survey was conducted in northern Norway. The program was conducted by Folldal Verk A/S in a joint venture with Amoco Norway Oil Company.

The project area is located on the island of Ringvassøy, about 35 km north of Tromsø. The project target was gold in massive sulfides and gold-quartz deposits in a volcanic environment. The area is located in a greenstone belt that is situated in the caledonian mountain system that extends throughout Norway. The district has been previously known for both, massive sulfide and gold-quartz mineralization.

The regional geochemical stream sediment survey was conducted during the summer 1982. It covered an area of approx. 300 sq. km. The samples were taken over the whole outcrop area of the greenstone belt. The spacing between the sample locations was in general 400 m. Altogether 375 samples were taken. The stream sediments were analysed for Au, Ag, Cu, Zn, Pb and Co.

Several interesting anomalies, mostly for Au, were detected. Apart from these, some anomalies for Cu, Zn and Pb could be found, too. Ag and Co dont seem to be present in notable amounts. Altogether 6 high priority areas were selected that should be followed up durinf the field season 1983. Detailed geological mapping , soil sampling and geophysics (MAG, CEM-shoot back, VLF) are proposed for follow-up work.

2 duplikat (det ene mangler appendix).

SUMMARY REPORT 1982

RINGVASSÖY PROJECT (N-82-3)

FOLLDAL VERK A/S - AMOCO NORWAY OIL COMPANY

JANUARY 1983

Prepared by: Dr. Michael Krause

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Summary and Conclusions

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Introduction

A regional stream sediment survey was conducted on the island of Ringvassøy in northern Norway during the summer 1982. It covered an area of approx. 300 sq.km. The project target was gold in massive sulfide deposits and gold-quartz deposits in a volcanic environment. The program was conducted within a district that had been previously noted for both, massive sulfide and quartz-gold mineralization. The program resulted in indicating several anomalous areas that will warrant follow-up work.

Location and Access

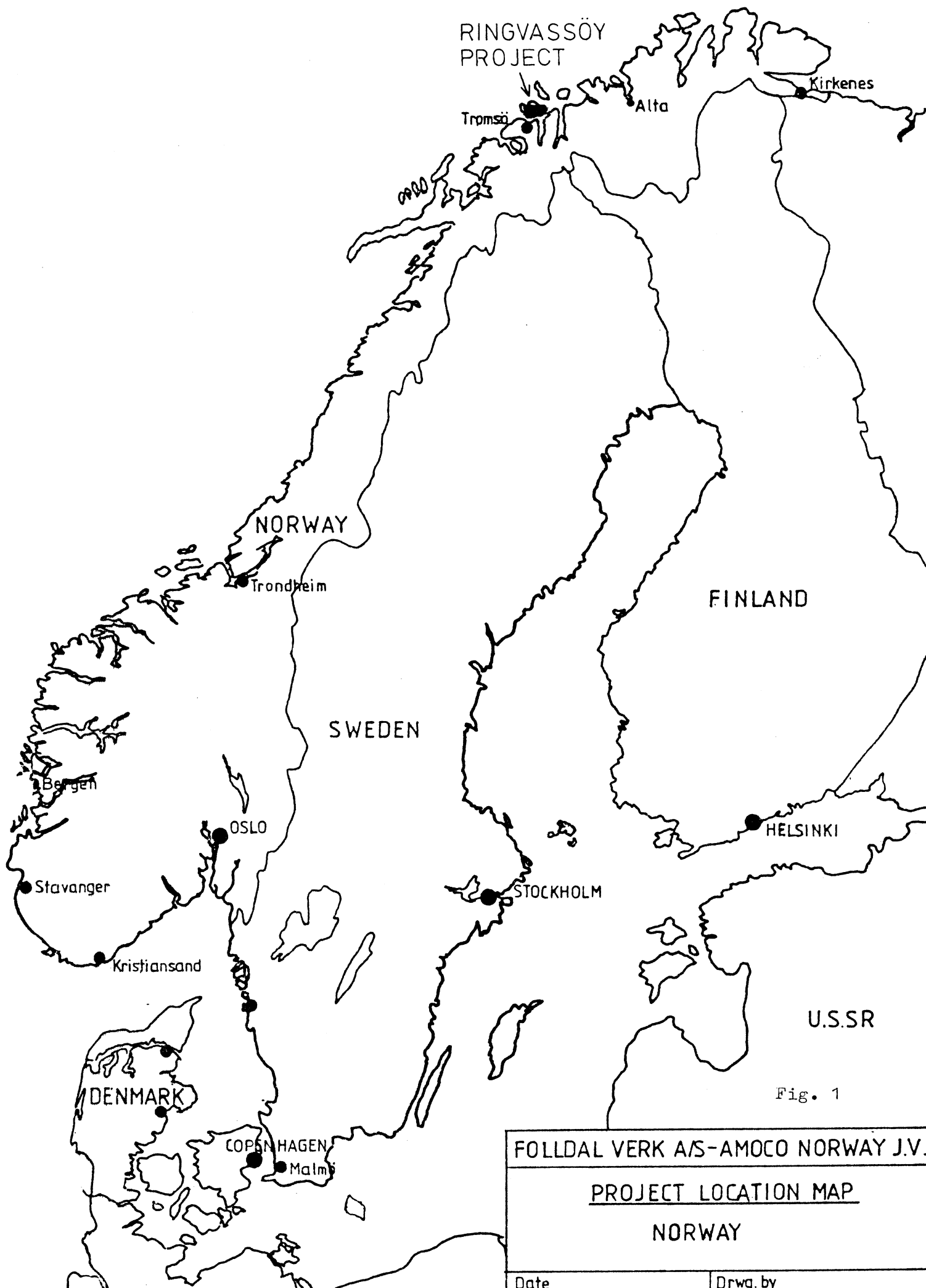
The project area is situated in Northern Norway, on the island of Ringvassøy, about 35 km north of Tromsø (Fig. 1). It is centered at 70°00' lat. and 19°15' long. The main service supply center is Tromsø. A paved road in the southeastern part runs along the coast and an unpaved secondary road from the southeast to the northwest through the project area. The ferry from Skulgammen connects the island with the mainland in about hourly intervals during the daytime. The town of Tromsø is serviced daily by jet flights from Oslo and Trondheim.

Land Status

No claims are currently held by Folldal Verk A/S within the project area.

History and Previous Exploration

The island of Ringvassøy is bearing numerous sulfide mineralizations that have been subject for mining and exploration since the last century. In the beginning the search for ore was concentrated on the sulfur content in the sulfides, later on copper and zinc, and on gold in recent time. The mineralizations are located in a belt of greenstones of possibly Precambrian age.



The first occurrences were discovered during the middle of the last century and have been investigated until the present time. The exploration comprised geological investigations, sampling, trenching, tunneling, EM surveys, and diamond drilling.

The Gamnes sulfide occurrence was mined by GAMNES COPPER & SULPHUR CO. LTD. from 1907 to 1909. Data about tonnages are not available. EM surveys and diamond drilling were conducted at Gamaksli, a mineralization consisting mainly of pyrite and pyrrhotite without notable contents of copper, zinc, or other metals. Four holes were drilled in about 1935 with a length of 430 m altogether by A/S RINGVASSÖY GRUVER. Many mineralizations of this type are known spread over the area that were investigated in this time by the company by sampling, trenching, and tunneling. The Gamnes occurrence was drilled by EOS-PROSPECT in 1966/67 (seven holes with a length 385 m altogether. FOLLDAL VERK A/S did a little geological mapping, sampling, and prospecting by two geologists in 1974. A stream sediment survey was conducted by RIO FINEX before 1976. Some data of this survey are available but it is unknown if the samples were analyzed for gold. In 1974-76 geological mapping was conducted by the UNIVERSITY OF TROMSÖ. None of the results were available until now. In 1976 the Geological Survey of Norway (NGU) conducted work at the Skogsnes and Nondagsdalen prospects that are Cu-sulfide mineralizations with a little Co. The investigations comprised soil sampling, a VLF survey and geological mapping. A geological map over a part of the area was edited in 1980 by NGU. This report contains some results of detailed investigations on gold-bearing quartz veins, too. Reconnaissance mapping was conducted in 1979 by NGU. Until now no maps were available.

Regional Geology and Mineralizations

Very little information is available about the geology of Ringvassøy. Only in recent years reconnaissance mapping was started by NGU.

The project area covers a greenstone belt that is situated within the Caledonian mountain system that extends throughout the length of Norway. The age of the greenstones was first thought to be

Caledonian. Newer investigators, however, assume a Precambrian age. These mafic volcanics are often interlayered by thick sequences of felsic volcanics and volcanoclastics or "keratophyrs". Several gabbros and quartz-diorites intrude the volcanic sequence. The general strike direction is E-W with varying dip directions due to complex folding during the Caledonian orogenesis. The greenstones are bordered by a granitic gneiss of Precambrian age. The contact is probably a thrust contact. A large part of the area is covered by overburden from the last glaciation period.

Numerous mineralizations are located within the volcanic belt. Apart from the occurrences described below, numerous other smaller sulfide mineralizations can be observed all over the area. The most important ones can be found on the map "Ore Occurrences". The mineralizations can be divided into three different types:

1. Sulphide mineralizations without Cu or Zn:

Numerous of these mineralizations can be found on Ringvassøy. These include the following prospects: Skogsfjord, Raudtuva, Båthaug, Gamakslí, Persilnajordet, Tennvassbruna, Leirbogdalen, Lavinatind, Raudbergtuva, Solvatnet, Dáfjord, and Grunnfjord (north). The mineralizations were mainly investigated by A/S Ringvassøy Gruver in the 1930ies by trenching and tunneling, and partly by EM surveys and diamond drilling. The mineralizations consist of pyrite and pyrrhotite. Sometimes the thickness of the sulfides exceeds 1 m. The sulfides are bound on keratophyrs that are interlayered with the greenstones. In a few prospects, graphitic schists are reported, too. Numerous analyses of ore samples are reported, without the detection of notable contents of Cu, Zn, Ag, or Au. A mineralization that is bound on keratophyrs, too, is located at Hårskoltan. Sphalerite, arsenopyrite, and pyrite are reported.

2. Sulfide mineralization with Cu and Zn:

This type of mineralization is represented by the Gamnes occurrence. The ore was mined in the beginning of this century. It is located at the contact of a gabbro with the greenstones where different ore zones could be localized. The ore consists of pyrite, pyrrhotite, chalcopyrite, and sphalerite. The main ore zone is impregnated over a width of 2-2.5m.

3. Quartz veins mineralized with Cu, Sb, As, Ag, and Au:

The mineralizations occur in quartz veins or lenses within the greenstones.

On Sördalshögda several mineralized quartz veins can be found. The veins are small, less than 1 m thick and less than 10 m long. The quartz is brownish weathering. In one place a trench can be found. Occasionally visible gold can be observed. The highest reported analytical values (from 1936) were 40 ppm Au and 52 ppm Ag. Beside the gold, tellurobismuthite is reported. The most common ore minerals are chalcopyrite and pyrite.

West of Grunnfjord a Sb-As mineralization can be found. The ore minerals are bound on mobilized quartz lenses within the greenstones. The mineralized zone can be observed over a length of about 700 m. EOS-Prospect did some trenching and an EM survey at this occurrence in 1967. The occurring minerals are berthierite, stibnite, kermesite, arsenopyrite, pyrite, and pyrrhotite. Notable contents of gold were not reported.

The mineralizations at Skognes and Nondagsdalen are quartz veins that contain chalcopyrite, pyrite, and pyrrhotite. NGU conducted some investigations as soil sampling and a VLF survey at these occurrences in 1976. The average content of the ore is about 1 % Cu. Some samples contained Co contents up to 0.16 %. The mineralizations are small occurrences. They are located close to the border of the greenstones to the granitic gneisses. The host rocks of the quartz veins are described as gneisses with some amphibolitic layers.

Geochemical Stream Sediment Survey

The sampling was conducted by four students during a period of four weeks from mid July to mid August. The people were accommodated in the Skogsfjordvatn school in the central part of the project area, so that the sampling area could be reached by car or foot easily.

The whole outcrop area of the greenstone belt was covered by sampling. Altogether an area of approx. 300 sq.km was covered and 375 samples were taken (= 1.25 samples/sq.km).

The stream sediments were taken by hand at intervals of about 400 m along the streams. Only active inorganic sediments were taken from the middle of the streams wherever possible. If a sample contained a little organic material, that fact was marked on the sample bags and on the geochemical sample data sheets. The samples were sieved wet in the field as relatively large quantities of material are required for Au analyses. By this method it was ascertained that enough material was obtained. The minus 180 μ m fraction (minus 80 mesh) was filled into small kraftpaper bags, air dried, and sent to X-Ray Assay Laboratories, Don Mills, Ontario, by air freight. The samples were analyzed for Au, Ag, Cu, Pb, Zn, and Co.

Discussion of Anomalies with Recommendations for Follow-up Work

Several anomalies were detected within the project area. They comprise several Au anomalies, but some interesting anomalies for Cu, Zn, and Pb, too. Co doesn't seem to be present in larger amounts. The Ag values are very low and no anomaly was detected for this element. With 3 exeptions none of these anomalies is caused by already known occurences.

Altogether 11 anomalies are recommended to be followed up. For 6 of these it is proposed to complete the follow-up investigations on a high priority basis, whereas for 5 anomalies the work should be completed on a low priority basis. The follow-up work should comprise:

- establishing a grid over the drainage area of the anomalous streams

- "B" horizon soil sampling with lines spaced at 100 m intervals and samples collected every 50 m
- detailed geological mapping within each grid area
- a magnetometer survey
- a CEM shoot back survey
- a VLF survey.

The work on the first priority areas could be completed by 4 students in July/August during a 2 months period. It will be necessary to take about 2500 soil samples, that should be analyzed for Au, As, and Cu and additionally for Zn and Pb at the Kärvikdalen anomaly.

In particular the following anomalies were detected:

Anomaly in the Lower Leirbogdalen (Sample No. 200, 212, 218, 219, 202, 221, 222, 204, 206, 239, 238):

In the lower Leirbogdalen, northwest and northeast of Tverrfjellet, a large Au anomaly was detected. In the western part of the anomaly the high Au contents apparently come in from the north into the valley. Here a large grid should be established to cover the drainage areas of the side streams that come from the north. Another grid should be established in the eastern part of the anomaly, in the area of sample no. 238 that showed a content of 1900 ppb Au. The anomaly should be followed up on a high priority basis.

Anomaly 2 km west of Tennvassbruna (Sample No. 258, 259, 263, 260, 261):

A gold anomaly was detected 2 km west of Tennvassbruna. Very close to that the Gamaksli prospect is located. The anomaly is probably not caused by this occurrence, as only sample no. 258 could lie in the drainage area of this mineralization. It is proposed to establish a grid in the upper part of the main anomalous stream, between sample no. 259 and 260. The work should be completed on a high priority basis.

Anomaly 1.5 km northeast of Röran (Sample No. 86, 90, 92, 93):

A gold anomaly was found 1.5 km northeast of Röran with values up to 500 ppb Au. A grid should be established along the border of the lake to cover the drainage areas of the three anomalous streams. The anomaly should be followed up on a high priority basis.

Anomaly 700 m southwest of Rundvasshögda (Sample No. 53):

700 m southwest of Rundvasshögda an Au anomaly (310 ppb) was

detected. Together with Au, anomalous values for Cu and Pb were found in this area. The follow-up work should be completed on a high priority basis.

Anomaly 1.5 km northwest of Sördalshögda (Sample No. 36):

An Au anomaly (500 ppb) was found 1.5 km northwest of Sördalshögda. In this area several anomalous samples for Cu and Zn can be found, too. The anomaly should be followed up on a high priority basis.

Anomaly in Kårvikdalen:

A weaker Au anomaly was detected in Kårvikdalen. The anomaly is located close to, or within the granitic gneisses. Detailed geological information was not available, however. In addition to Au, the anomaly shows very high values in Zn (up to 770 ppm) and Pb. Therefore it is proposed to complete the follow-up work on a high priority basis.

Apart from the anomalies described above, several other interesting Au anomalies were detected that could be followed up. The following anomalies are proposed to be followed up on a low priority basis:

- 1.4 km west of Högkollen (200 ppb Au)
- 750 m south of Högkollen (Au/Co anomaly)
- 4 km southeast of Röran (190 ppb Au)
- 2.5 km west of Soltindvatnet
- 3.25 km west of Härskoltan

Another gold anomaly is located close to the gold-bearing quartz veins on Sördalshögda and is probably caused by these.

A Cu, Zn, Co anomaly is located 2.5 km east of Tverrfjellet. This anomaly is probably caused by the Lavinatind prospect.

The old Gamnes mines cause a wide Cu, Zn anomaly.

Apart from all the anomalies described above several other, weaker anomalies were detected that don't seem to be interesting enough to be followed up.

Summary of Recommended Program

It is proposed to follow up anomalies that were indicated by the regional stream sediment survey. The high priority areas should be followed up during the summer 1983.

Grids should be established over the drainage areas of the anomalous streams. Subsequent soil sampling, detailed geological mapping, and a magnetometer, CEM shoot back, and VLF survey should be conducted. The soil sampling should comprise "B" horizon soil sampling with lines at 100 m intervals and samples collected every 50 m. The samples should be analyzed for Au, As, and Cu, and additionally for Zn and Pb at the Kär^ovikdalen anomaly.

The areas that should be followed up on a high priority basis are:

- Anomaly in the Lower Leirbogdalen
- Anomaly 2 km west of Tennvassbruna
- Anomaly 1.5 km northeast of Röran
- Anomaly 700 m southwest of Rundvasshögda
- Anomaly 1.5 km northwest of Sördalshögda
- Anomaly in the Kär^ovikdalen

The work could be completed by 4 students during July/August in a 2 months period. It will be necessary to take about 2500 soil samples.

APPENDIX

Analytical Results of Ore Samples

Tennvassbruna:

Sample No.	Au (ppb)	Ag (ppm)	Cu (ppm)	Zn (ppm)	Pb (ppm)
TANN VAN 1	66	0.5	170	20	4
TANN VAN 2	81	0.5	42	15	2
TANN VAN 3	68	1.0	300	41	2

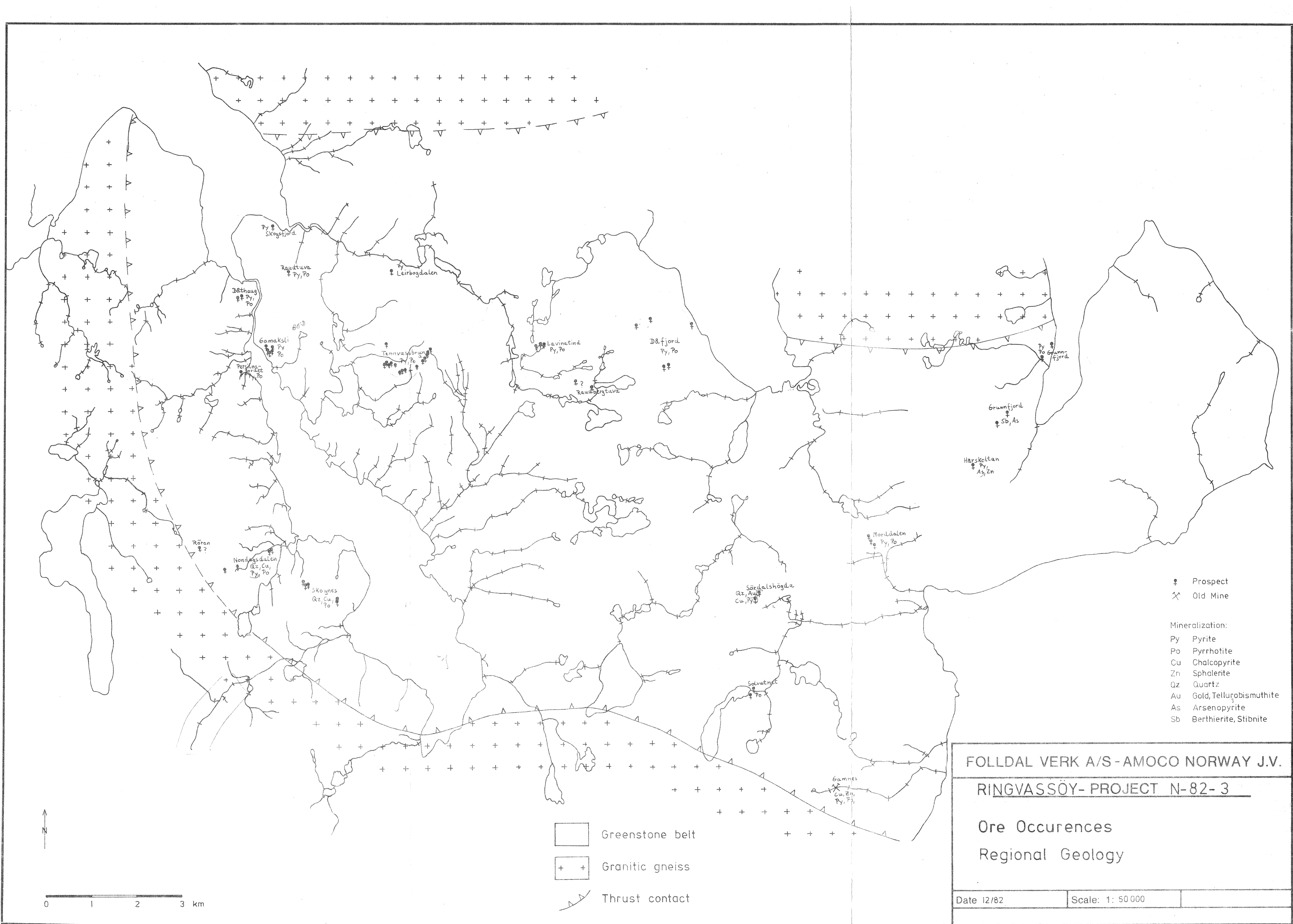
Sördalshögda:

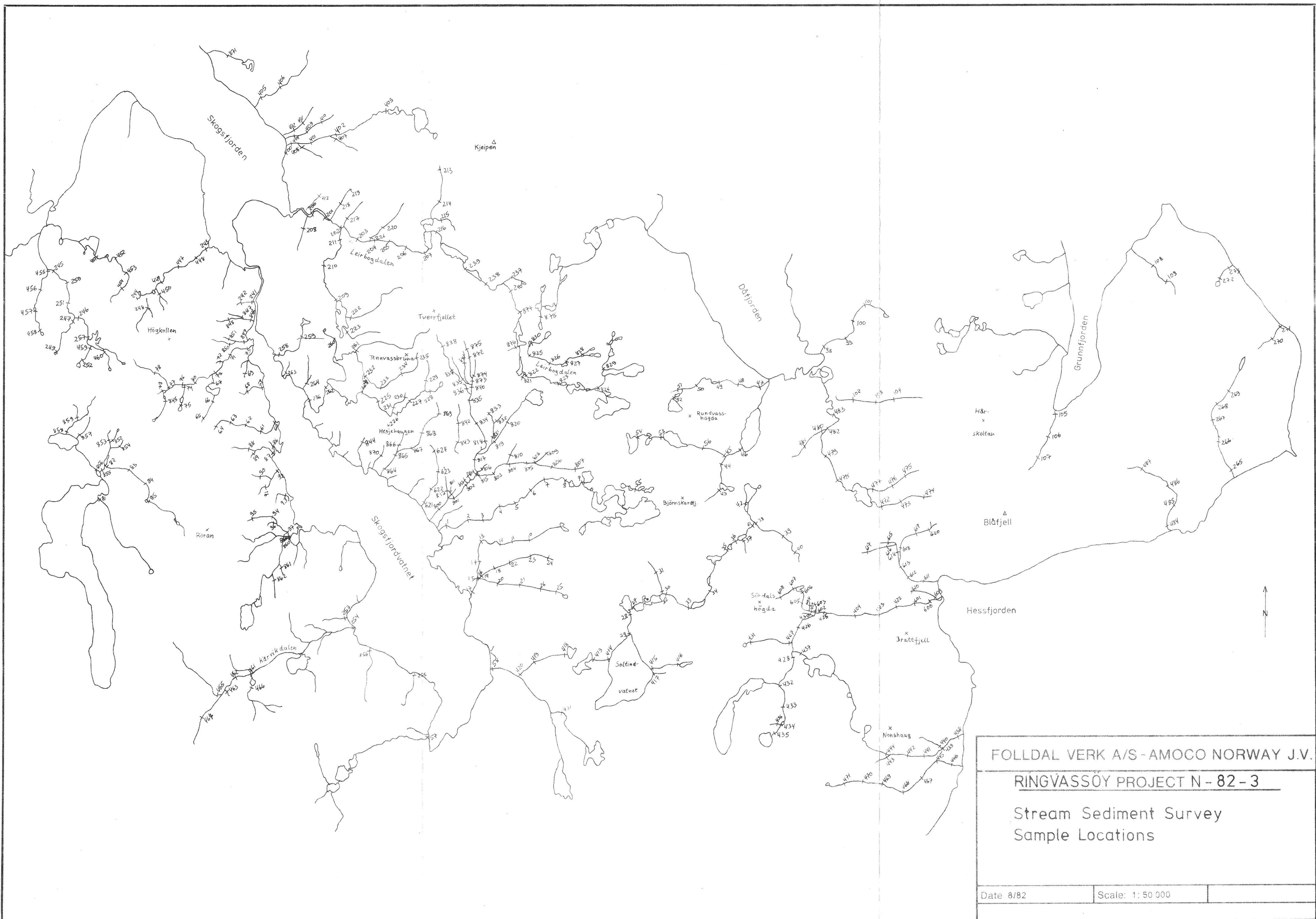
Sample No.	Au (ppb)	Ag (ppm)	Cu (ppm)	Zn (ppm)	Pb (ppm)
STORHOY ROAD 1	2	0.5	52	44	8
STORHOY 1	9	0.5	22	51	18
STORHOY 2	32	1.0	110	70	18
STORHOY 3	12560	8.5	4000	32	2
STORHOY 4	40	1.0	2500	140	10

Sample No. STORHOY ROAD 1 was taken beside the road on the west side of Sördalshögda.

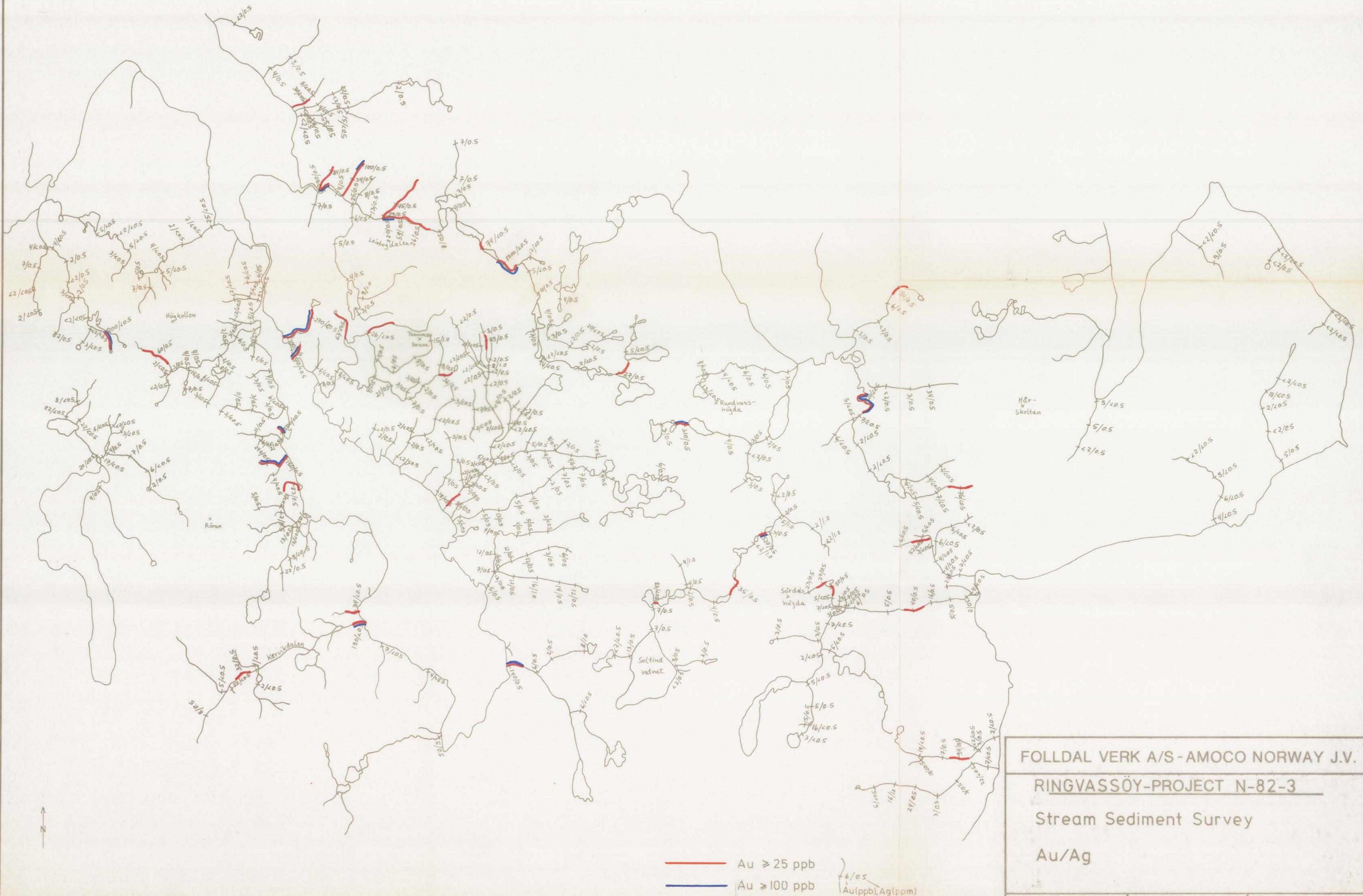
Gamaksli (collected along side of road at Gamaksli area):

Sample No.	Au (ppb)	Ag (ppm)	Cu (ppm)	Zn (ppm)	Pb (ppm)
SKFJ.V. 1	10	0.5	260	300	12





FOLLIDAL VERK A/S - AMOCO NORWAY J.V.		
RINGVASSØY PROJECT N - 82 - 3		
Stream Sediment Survey Sample Locations		
Date 8/82	Scale: 1: 50 000	



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

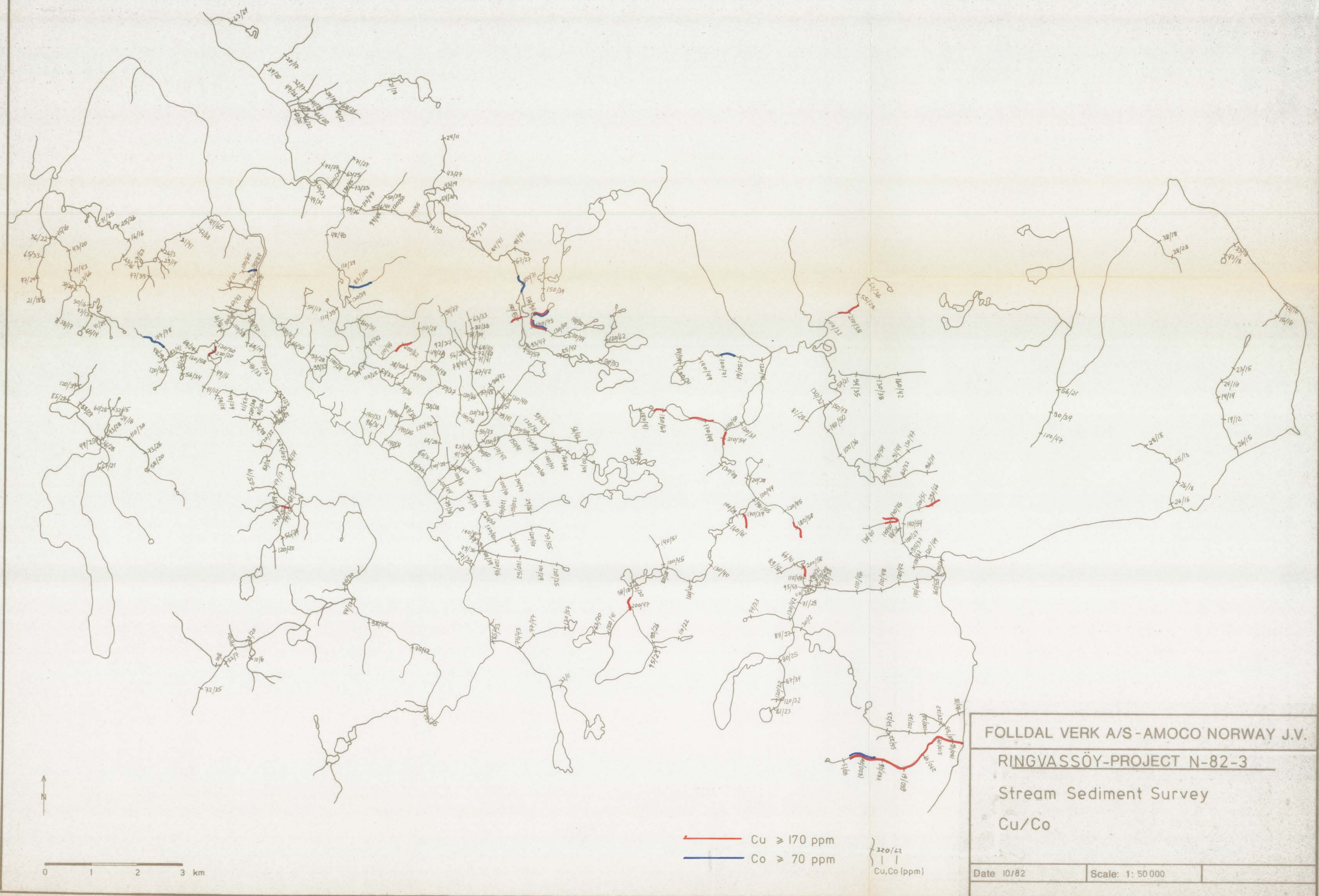
RINGVASSÖY-PROJECT N-82-3

Stream Sediment Survey

Au/Ag

Date 10/82

Scale: 1: 50 000



FOLLDAL VERK A/S - AMOCO NORWAY J.V.	
RINGVASSÖY-PROJECT N-82-3	
Stream Sediment Survey	
Cu/Co	
Date 10/82	Scale: 1: 50 000

— Cu ≥ 170 ppm
— Co ≥ 70 ppm

320/62
|
|
Cu,Co (ppm)

