SUMMARY REPORT

SPARAGMITE PROJECT (N-82-5)

FOLLDAL VERK A/S - AMOCO NORWAY OIL COMPANY

DECEMBER 1982

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Summary and Conclusions

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

The project area is located between the Folldal project area and the border between Norway and Sweden. The project target was sandstone-hosted Pb,Zn,Ag mineralization which occurs in basal quartzites of Eocambrian age. These quartzites, or sparagmites, extend throughout Norway and Sweden along the eastern edge of the Caledonian mountain system. They host several lead deposits in Sweden, including Laisvall and Vassbo. They occur near the contact of the sparagmites with the Precambrian basement.

The regional geochemical stream sediment survey was conducted during the summer 1982. It covered an area of approx. 1600 sq. km. The samples were taken close to the contact of the basal quartzites with the underlying Precambrian rocks, where Pb, Zn mineralization can be expected. The spacing between the sample locations was in general 400 m. Altogether 3201 samples were taken. The stream sediments were analyzed for Pb, Zn, Cu, and F.

Many interesting anomalies were detected. A large part is located in a favoured geological setting. Altogether 14 first priority areas were selected that should be followed up during the field season 1983. The most interesting anomalies were found on map sheet Tylldal, Holöydal, Brekken, and Hanestad. Detailed soil sampling and detailed ground geophysics (VLF/VLF-field strength) in combination with geological mapping should be conducted over the anomalous areas, starting with the first priority areas. Additional stream sediment sampling should be conducted in the northern part of map sheet Brekken to extend the project area to the north.

A Pb,Zn,Ag mineralization is located in the Gruvsjöen area, northeast of the town of Brekken. Several other mineralizations closeby were discovered during the fall 1982. A geochemical soil survey and a geophysical survey were conducted in this area. Several anomalies were detected. Three holes were drilled, all with negative

results. Ground geophysics (Mag, VLF) and soil sampling in combination with detailed geological mapping should be conducted to extend the grid further to the north. Detailed geological mapping should be conducted over the whole grid area. More diamond drilling will be necessary.

A copper occurence is located at Brydal, south of Tynset. The mineralization consists mainly of coatings of malachite within the sparagmites. The source of the secondary copper minerals is unknown. Analyses of rock samples show contents in Cu up to 0.56% and Ag up to 40ppm. One or two holes should be drilled at that mineralization.

1. Introduction

A regional stream sediment sampling program was conducted in southern Norway during the summer/fall 1982. The project target was sandstone-hosted Pb,Zn,Ag mineralization. Several occurences are known in this geological environment in Norway and several deposits, some currently in production, are known in Sweden. The program resulted in indicating numerous anomalous areas which will require follow-up work. One property with several Pb,Zn,Ag,Cu mineralizations was found.

2. Location and Access

The project area is centered at 62°15' lat. and 11°00' long. It is located between the Folldal project area and the border between Norway and Sweden approx. 250 km north of Oslo (Fig. 1). The main service supply centers are Tynset in the north of the central part and Röros in the northeastern part. The area is crossed by numerous small, often paved secondary roads. The railway line Oslo - Röros - Trondheim runs along the west and northwest sides of the area. The town of Röros is serviced daily by jet flights from Oslo and Trondheim.

3. Land Status

A total of 30 claims (each 500m x 500m) were staked in one claim group in October 1982 to cover the most interesting parts of the Gruvsjöen area. These claims are valid for seven years.

4. History and Previous Exploration

Very little information is available about previous work in the project area.

One small Pb,Zn,Ag mine is located west of Tufsingdal, about 30 km

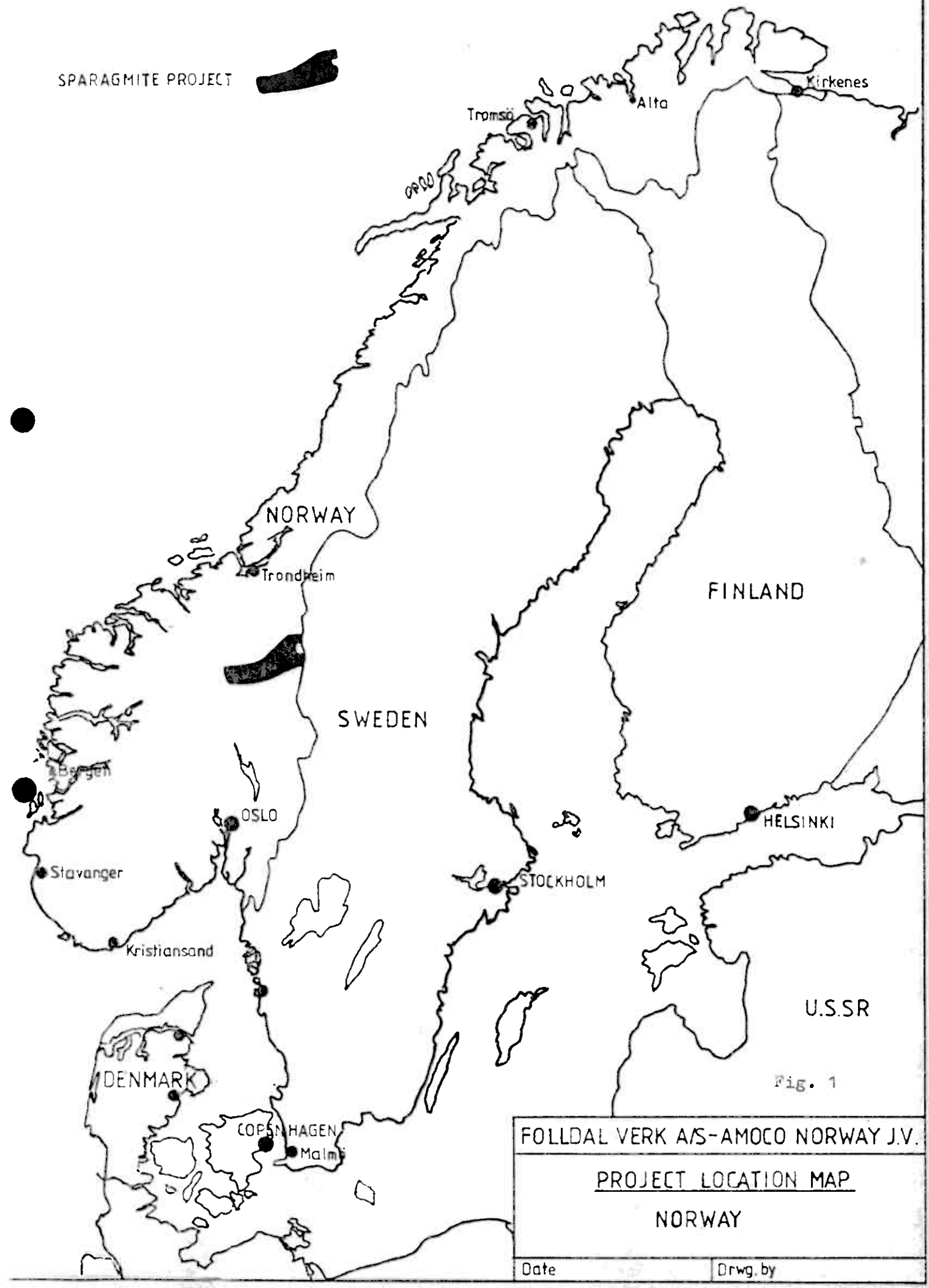


Fig. 1

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

PROJECT LOCATION MAP

NORWAY

Date	Drwg. by

southeast of the town of Os, in the central part of the project area. The mining activities date probably back to the beginning of this century.

Another Pb,Zn,Ag mineralization is located at the northeastern shore of the Gruvsjöen-lake, about 10 km northeast of the town of Brekken, in the northeast of the project area. Here a trench was made in about 1910. A few tons of ore were taken out and brought to Falun in Sweden where the ore was processed.

Another little trench can be found at a copper mineralization near Brydal, south of Tynset.

Most of the exploration for lead has apparently been concentrated along the south side of the project area, at the erosional contact of the Eocambrian sparagmites and the underlying Precambrian basement. The Geological Survey of Norway (NGU) has conducted most of the investigations in this area with a regional stream sediment program, follow-up soil sampling, and drilling between 1968 and the early 1970's. Several lead prospects were discovered as a result of this work but none of sufficient grade for commercial use.

5. Regional Geology

The Eocambrian sandstones and quartzites, or sparagmites, stretch along the eastern border of the Caledonian mountain system through Norway and Sweden (Fig. 2). They represent the initial detrital deposition in the early stages of development of the Caledonian geosyncline. The lead-zinc deposits, of wich the Laisvall and the Vassbo deposits in Sweden are at present in production, occur as stratabound lenses within the sandstones and quartzites, generally close to the contact with Precambrian basement and in particular along the flank of Precambrian paleohighs.

The Laisvall deposit is the largest of this type in Scandinavia. The mineralization consists of lead, zinc, fluorite, barite and silver. This deposit contained 80mm tons of 4.3% Pb, 0.6% Zn, and 9g/T Ag. The Vassbo deposit had initial reserves of 3mm tons of

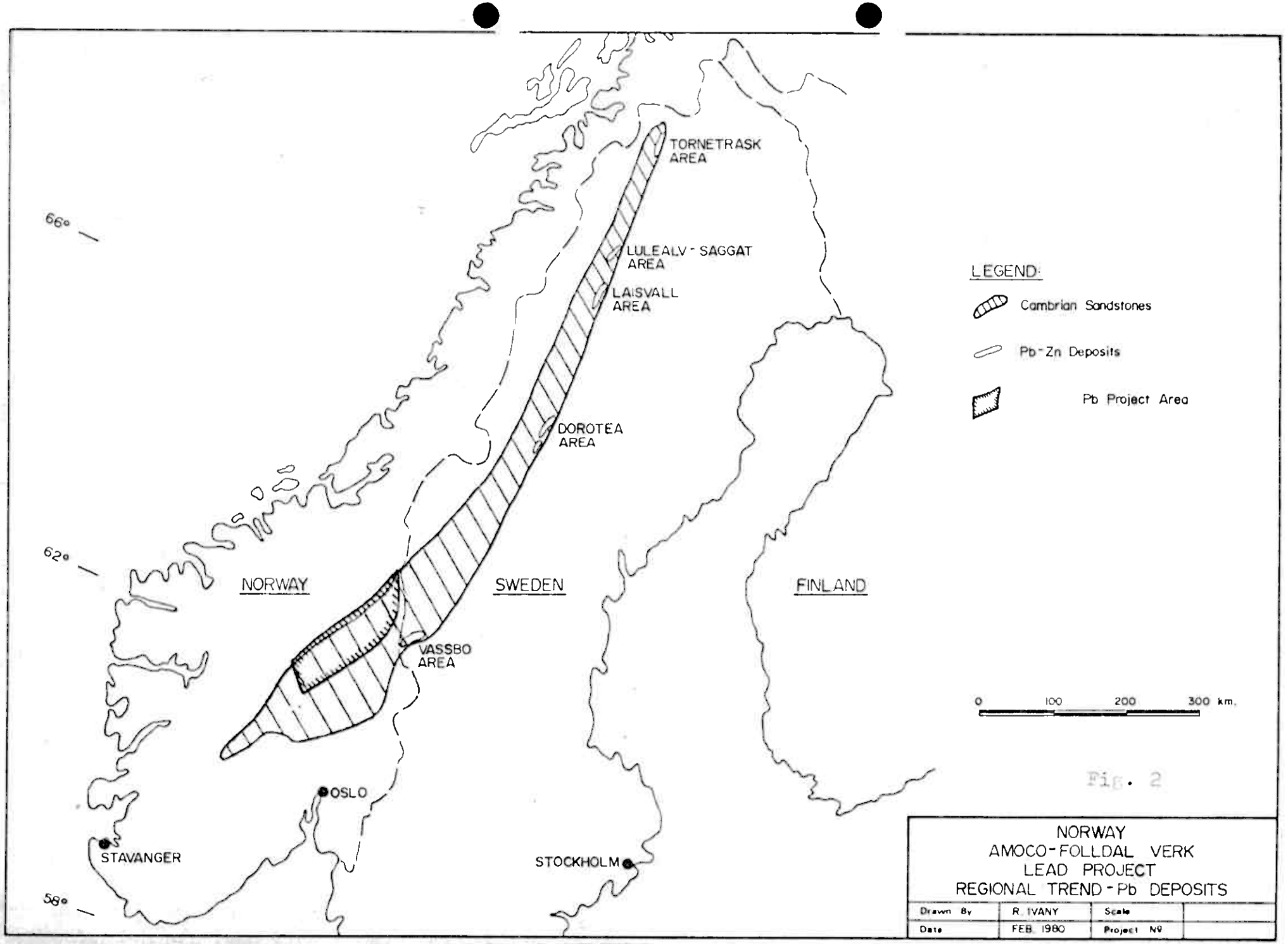
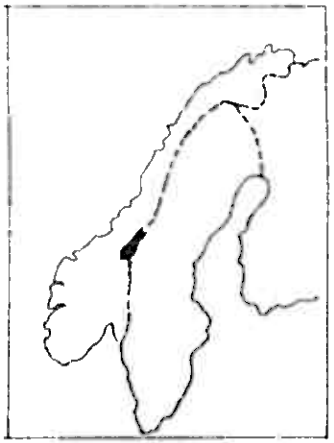


Fig. 2

NORWAY
AMOCO-FOLLDAL VERK
LEAD PROJECT
REGIONAL TREND - Pb DEPOSITS

Drawn By	R. IVANY	Scale	
Date	FEB. 1980	Project N°	



LEGEND:

- PRECAMBRIAN
- AUGEN GNEISS
- QUARTZITES & PHYLLITES
- CALEDONIAN VOLCANICS & SEDIMENTS

20 Km

Fig. 3

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

SPARAGMITE Pb
Project

Date	Drwg. by

5.7% Pb, 0.3% Zn, and 18g/T Ag.

Hydrocarbons have been noted in association with the sulfides and are one of the factors pointing to the similarity of deposition to oil field brines. It is assumed that the metal bearing solutions were low sulfur oil field brines which moved upslope from the Caledonian geosyncline until they came in contact with sulfur-rich solutions near the edge of the basin and around Precambrian paleo-highs. Another possible genesis is that the metal bearing fluids represent weathering solutions of the Precambrian basement. The solutions were trapped when they were running downslope at the margins of the paleohighs and the ore minerals were precipitated into the basal sequences soon after the deposition of the sparagmites.

The project area is situated in the southern part of the Eocambrian sandstone belt and is stretching over a length of 140 km parallel to the edge of the Caledonian mountains. A number of outcropping paleohighs that are formed by granites and porphyritic rocks, are exposed (Fig. 3). From the SW to the NE they are called: the "Atna-Window", the "Finstad-Window", and the "Vigelen-Window". In between these windows there are to be found several other outcrops of Precambrian basement. In many parts the basement is overlain by a thin layer of conglomerates or tillites which represent the basal sequence of the sparagmites. The sparagmite itself is mostly a light grey meta-arkose and is often interlayered with schists or black schists, and sometimes with limestones, too. The Augengneis, that is thought to be a mylonitized and recrystalized arkose, occurs close to the Caledonian thrust plane. All rocks were subjected to regional metamorphism. A large part of the project area is covered by moraine from the last glaciation period.

Pb,Zn mineralization can be found in two places within the project area. One small old Pb,Zn,Ag mine is located west of Tufsingdal, about 30 km southeast of the town of Os, in the central part of the project area. The mineralization is associated with black schists and quartzites and consists of pyrite, pyrrhotite, galena, sphalerite, and little chalcopyrite. The ore was mainly mined because of the silver content in the galena. Data about the tonnage are not available. Another Pb,Zn,Ag mineralization is located at the north-eastern shore of the Gruvsjöen-lake,about 10 km northeast of the

town of Brekken in the northeast of the project area. This occurence is indicated as "pyrite"-occurence on the regional geology map (NGU 1981). Here a trench was made that dates back to 1910. The mineralization consists of a silver-rich galena, sphalerite, pyrite, pyrrhotite, and little chalcopyrite. The associated rocks are light grey, quartzitic rocks and black schists. A copper mineralization can be found at Brydal, southeast of Tynset, where a 70m long zone within a sparagmite sequence is covered with secondary copper minerals.

Much of the outcrop area of the sparagmites is associated with thrusting and nappe structures, with movement from the northwest. Therefore not all of the exposure of these sandstones is in place and the contact with the Precambrian basement is often a thrust contact. If one of the above mentioned ore genesis models is valid, then the best area for exploration would be in autochtonous sediments around paleohighs, that means where the basal conglomerates or tillites are in contact with the granites. Both the Laisvall and the Vassbo deposits are described as occuring in autochtonous sediments on Precambrian paleohighs. This geological situation is the case in many locations within the project area.

6. Geochemical Stream Sediment Survey

6.1 Staff and Accomodation

Ten, mostly first years, geology students from the Technical High-school at Trondheim were hired for the stream sediment sampling. Most of the sampling was conducted between the middle of June and the middle of August during the school holidays. The project area was divided into five subareas. A sampling crew of two students was placed in the central part of these subareas, so that each student could reach his sampling locations by foot or car easily. The people were accomodated in cabins on camping sites.

6.2 Sampling Area

As mentioned above, the best area for exploration is near the contact of the basal sequences of the sparagmites and the Precambrian

basement. Therefore, the stream sediment sampling covered the areas around the Precambrian windows, overlapping the window about 500 m inside and about 3-4 km outside.

Altogether an area of approx. 1600 sq.km was covered and 3201 samples were taken (= 2samples/sq.km).

6.3 Sampling Procedure and Sample Preparation

The stream sediments were taken by hand in intervals of about 400 m along the streams. Only moved inorganic sediments were taken whereever possible from the middle of the streams. If a sample contained a little organic material, that fact was marked on the sample bags and on the geochemical sample data sheets. About 1 kg of one sample was filled into a kraftpaper bag. After that the samples were dried at about 60°C in drying cupboards and then sieved through nylon screens. The minus 180/um fraction (minus 80 mesh) was filled into small plastic bags and sent to X-RAY ASSAY LABORATORIES, Don Mills, Ontario, by air freight. The samples were analyzed for Cu, Zn, Pb, and F. F was analyzed because of the conjunction of fluorite with Pb and Zn in the known Swedish deposits and should be a guide in the exploration.

6.4 Statistical Treatment of Data

The statistical calculation of the analytical data was conducted by X-RAY ASSAY LABORATORIES, Don Mills, Ontario. Mean, standard deviations, and population frequencies were calculated. Relative frequency histograms and cumulative frequency curves were plotted.

For the determination of the threshold values, the 95th percentile was plotted into the cumulative frequency curves (see appendix). All analytical results that were above this value, were determined to be anomalous. That was for Pb > 60 ppm
Zn > 150 ppm
Cu > 16 ppm
F > 510 ppm.

7. Discussion of Anomalies with Recommendations for Follow-up Work

Numerous larger and minor anomalies were detected within the project area. Many of these are very interesting as they occur in a geological environment where sandstone-hosted mineralization can be expected.

Altogether 50 anomalies are recommended to be followed up. For 14 of these it is proposed to complete the follow-up investigations on a first priority basis and 17 on a high priority basis, whereas for 19 anomalies follow-up work should be conducted on a lower priority basis. It should be feasible to follow-up the 14 first priority areas during the field season 1983.

The criteria for priority level of the anomalies that should be followed up are as following: 1. The height of an anomaly, 2. if several anomalous elements are comprised in one sample, and 3., the most important criterion, the geological setting of an anomaly. If anomalous values were detected close to the contact of the Precambrian basement with overlying autochtonous sediments, which is indicated by occuring tillites or conglomerates, the anomaly was proposed to be followed up on a first or high priority basis.

In general, it is proposed to follow up the anomalies by "B" - horizon soil sampling. A grid should be established over the drainage areas of the anomalous streams with lines spaced at 100 m intervals and samples collected every 50 m. Geological mapping with associated prospecting should be conducted over the whole grid. A VLF/VLF-field strength survey and in one case a magnetometer survey are proposed to be conducted overeach area. The VLF should be sensitive enough to detect disseminated galena mineralization.

The geophysical work could be started in spring, whereas mapping and soil sampling should be done during the summer season. The soil sampling and the geophysical work could be done by ten first/second years geology students during the 2 month summerholiday season. The mapping could be completed by four 4th years geology students in the same period of time. This amount of staff would be necessary to cover the first priority areas. For these areas about 13000 samples

will be necessary to be taken. They should be analyzed for Pb, Zn, and Cu.

In particular the following anomalies were detected:

7.1 Map Sheet Brekken 1720 II

Anomaly 6 km southwest of Stöten:

A Pb,Zn,Cu,Ag anomaly was found about 6 km southwest of Stöten (Sample No. 4309, 4310, 4311, 4312). It is located near the western margin of the Vigelen-window inside the Eocambrian arkoses. The anomaly should be followed up by soil sampling, mapping, and VLF, as it is situated in a favoured geological environment. The investigations should be completed on a high priority basis.

Anomaly 6.5 km southwest of Stöten:

A Pb anomaly is located about 6.5 km southwest of Stöten (Sample No. 4301, 4302), about 1.5 km north of the anomaly described above. It is situated in the same geological environment. The anomaly could be followed up on a low priority basis.

The northern and central part of map sheet Brekken are characterized by a large number of Zn and Cu anomalies partly together with Pb and Ag. The rock types occuring mostly are the Augengneis, schists, black schists arkoses, and quartzites. As the area seems to be very rich in heavy metals it is hereby proposed to extend the regional geochemical stream sediment survey further to the north. This proposal is supported by the fact that several Pb,Zn mineralizations were discovered in the northern part of the map sheet, in the Gruvsjöen area, about 2.3 km southwest of Litlefjellet. For this work two students would be necessary for a period of at least four weeks as the area is not as easy accessible as others. It is proposed to cover 100 sq.km north of the present project area.

Several of the detected anomalies should be followed up:

Anomaly 2.25 km southwest of Litlefjellet:

A Pb,Zn,Cu anomaly was found 2.25 km southwest of Litlefjellet (Sample No. 1938). This anomaly is situated in the Gruvsjöen area (see The Gruvsjöen Property) and is already covered by a grid.

Anomalies 1.5 km, 2.3 km, and 2.6 km west of Litlefjellet:

1.5 km, 2.3 km, and 2.6 km west of Litlefjellet two Pb,Zn,Cu - and one Pb,Cu,Ag anomalies were found (Sample No. 1945, 1948, 1939). These are situated north of the grid that was established in the Gruvsjöen area. Therefore the grid should be extended further to the north to cover these anomalies. Subsequent soil sampling, detailed geological mapping and a VLF- and a magnetometer survey should be conducted. This work should be completed on a first priority basis.

Anomaly 4.5 km southeast of Finnflokampane:

A Pb,Zn,Cu,Ag anomaly was found 4.5 km southwest of Finnflokampane (Sample No. 3813). On the geological map it is indicated to be located inside the Augengneis. The anomaly should be followed up by soil sampling, mapping and VLF. The investigations should be completed on a high priority basis.

Anomaly 1.25 km southwest of Valldalshögda:

A Pb,Zn,Cu,Ag anomaly was detected 1.25 km southwest of Valldalshögda (Sample No. 4266). It is located inside arkoses. The anomaly should be followed up by soil sampling, mapping, and VLF. The work should be completed on a high priority basis.

Anomaly 3 km southwest of Valldals högda:

In a stream about 3 km southwest of Valldalshögda a quite wide Pb,Zn,Cu,Ag anomaly was found (Sample No. 2237-2243). In the upper part the stream drains the granites of the Vigelen-window whereas in the lower part it drains the overlying arkoses. It is proposed to establish a grid in the area where the stream crosses the geological contact between the granites and the arkoses. This is at about sample no. 2239. In this area the best anomalies can be observed. Subsequent soil sampling, mapping, and a VLF survey should be conducted. The work should be completed on a first priority basis.

Beside the anomalies described above, several Zn anomalies could be followed up on a lower priority basis. Interesting could be the area 4 km west of Valldalshögda, where Cu and Ag are anomalous, too.

7.2 Map Sheet 66a 1719 I

Anomaly about 4 km north of Steinfjellet:

Pb,Zn,Cu,Ag,F anomalies were detected in six different streams about 4 km north of Steinfjellet. The anomalies extend to the eastern part of map sheet Narbuvoll. They occur probably within Eocambrian sediments. The area is thickly (5-10 m) covered by overburden. For the first the anomaly should be followed up by a VLF survey. If this is successful, subsequent soil sampling could be conducted. The investigations should be completed on a high priority basis.

Anomaly 1.5 km northeast of Skoghaugen:

High anomalous values for Pb (210 ppm), Zn (1300 ppm), and Ag (12 ppm) were detected in one sample 1.5 km northwest of Skoghaugen (Sample No. 4190). The sample location is probably situated within the Eocambrian sediments. The anomaly should be followed up by soil sampling, mapping, and VLF. The investigations should be conducted on a first priority basis.

Anomaly 4 km northwest of Skogshaugen:

A Pb,Zn,Ag anomaly was detected 4 km northwest of Skogshaugen (Sample No. 4207). It is probably located within the Eocambrian Sediments. The anomaly should be followed up by soil sampling, mapping, and VLF on a high priority basis.

Anomaly 2 km west of Brennvola:

A Pb,Zn anomaly is located 2 km west of Brennvola (Sample No. 4225, 4226, 4227, 4228, 4229). It is probably located within Eocambrian sediments. It is proposed to follow up this anomaly by soil sampling, mapping, and VLF. The work should be conducted on a high priority basis.

Anomalies 3.5 km northwest of Sveinsvola:

Two Pb,Zn,Ag anomalies were detected 3.5 km northwest of Sveinsvola (Sample No. 4314, 3300). They are situated within Eocambrian arkoses not far from the contact to the Precambrian Vigelen-window. The two anomalies should be followed up on a high priority basis by soil sampling, mapping, and VLF.

A few scattered, weaker Pb- and one Pb,Zn anomalies can be found in the northwestern part of the map sheet. These don't seem to be interesting enough to be followed up. Two Zn anomalies in the southwestern part of the map sheet represent secondary dispersion trains of anomalies that are located on map sheet Narbuvoll.

7.3 Map Sheet Narbuvoll 1719 IV

In the southeastern part of map sheet Narbuvoll numerous anomalies for Zn and Cu can be observed. This is certainly due to a higher geochemical background in this area because of the occuring schists and black schists. However, some of the higher anomalies are proposed to be followed up , because of the fact that in this area the old Tufsingdalen Pb,Ag mine is located:

Anomaly 2 km east of Gråhögda:

About 2 km east of Gråhögda a Pb,Zn,Cu,Ag anomaly was detected (Sample No. 1896, 1897, 1898, 1900, 1901, 1902). It is located within arkoses and schists. It is proposed to follow up this anomaly by soil sampling, mapping, and VLF. The work should be completed on afirst priority basis.

Anomaly 4 km southeast of Gråhögda:

A Pb,Zn,Cu anomaly was detected 4 km southeast of Gråhögda (Sample No. 2737, 2738, 2739, 2740 etc.). In this area the Zn values are especially high. Several outcrops of black schists and quartzites can be observed along the stream. Outcrops of a tillite can be found in the upper part. The black schists are occasionally mineralized with pyrite. Some samples of the dark schists were taken and analyzed:

Sample No.	Pb	Zn	Cu	Ag	(ppm)
SP-R-19	350	1553	1474	6	
SP-R-20	97	426	269	1	
SP-R-21	94	222	138	2	
SP-R-22	98	335	274	1	
SP-R-23	297	1210	812	6	

The anomaly should be followed up on a first priority basis by soil sampling, mapping, and VLF.

Anomaly 3 km southeast of Gråhögda:

A Pb,Zn,Cu,Ag anomaly was found 3 km southeast of Gråhögda (Sample No. 1776). It is located in a schist/quartzite environment. The anomaly should be followed up on a high priority basis by soil sampling, mapping, and VLF.

Anomaly 1.6 km south of Gråhögda:

A Pb,Zn,Cu anomaly was found 1.6 km south of Gråhögda. This anomaly could be followed up on a lower priority basis.

Anomaly 1.4 km southwest of Gråhögda:

About 1.4 km southwest of Gråhögda a Pb,Zn,Ag anomaly was detected (Sample No.2757). This anomaly could be followed up on a lower priority basis.

Anomaly 1 km southwest of Engådalshögda:

About 1 km southwest of Engådalshögda a Pb,Cu,Ag anomaly was found (Sample No. 2847, 2848). It is located within arkoses. The anomaly could be followed up on a low priority basis.

Another Zn,Ag anomaly is located 4.5 km southwest of Sletthögda. This anomaly doesn't seem to be interesting enough to be followed up.

7.4 Map Sheet Elgå 1719 II

Anomaly 5.5 km west of Sushögda:

A Pb,Zn,Cu,Ag anomaly was detected 5.5 km west of Sushögda (Sample No. 4133, 4134). In addition to that, some Pb anomalies were found in a stream only a little further north (Sample No. 4070, 4071, 4072, 4073, 4066). In the drainage area of the streams conglomerates and a limestone breccia are indicated on the geological map. Exposures of Precambrian basement are close to that, too. Because of the favoured geological situation and the relative strong anomaly it is proposed to follow up this anomaly by soil sampling, mapping, and a VLF survey on a first priority basis.

Anomaly 5 km southwest of Elgåhogna:

A Pb,Zn,Cu,Ag anomaly is located 5 km southwest of Elgåhogna (Sample No. 4048, 4042, 4043, 4045). It is situated very close to the contact of the Eocambrian sediments with the Precambrian granites. This area is thickly covered with moraine and only a few outcrops can be observed in the western part of the anomalous area. Some soil samples were taken on the banks of the streams to find out from wich direction the metals come into the water, without positive results, however. The anomaly must be followed up anyway, as it is a good anomaly with a combination of several elements in the samples. Soil sampling, mapping (if possible), and a VLF survey are proposed. The investigations should be completed on a first priority basis.

Anomaly 4 km southwest of Sushögda:

A Pb,Zn,Cu anomaly was found 4 km southwest of Sushögda (Sample No. 4140, 4141, 4142, 4144). It is located inside arkoses, close to the Precambrian granites. The anomaly should be followed up by soil sampling, mapping, and VLF on a high priority basis.

Anomaly 4 km northwest of Sorkvola:

A Pb,Zn,Ag anomaly was found in one sample (No. 2136) 4 km northwest of Sorkvola. A few hundred meters north of this sample location some outcrops of conglomerates occur. Some soil samples on the bank of the stream were taken to find out from wich side the anomaly is coming in. No anomalous values could be found in the samples. Because of the nearly occuring conglomerates it is proposed to follow up this anomaly by establishing a small grid with subsequent soil sampling, mapping, and VLF. The work should be completed on a high priority basis.

Anomaly 6.5 km northwest of Sorkvola:

Pb,Zn,Ag anomalies were found 6.5 km northwest of Sorkvola (Sample No. 4110, 4111, 4121). It is situated in a good geological setting with arkoses and conglomerates and should be followed up by soil sampling, mapping, and VLF. The investigations should be completed on a high priority basis.

Anomaly 8.25 km northwest of Sorkvola:

About 8.25 km northwest of Sorkvola a Pb,Zn anomaly was found (Sample No. 2122, 2123). It is located close to conglomerates and a detrital breccia. The anomaly should be followed up by soil sampling, mapping,and VLF on a high priority basis.

Anomaly 5 km north of Gutulivola:

Several anomalous samples for Zn,Ag and one for Pb were detected about 5 km north of Gutulivola. The anomalous area is probably situated in Eocambrian arkoses. It is a large marsh area. It is proposed to follow up this anomaly on a low priority basis by a VLF survey, as soil sampling will probably not be possible.

Some small scattered Pb anomalies are located 1.5 km northwest of Digerhogna, 1.75 km northeast of Digerhogna and 4 km northeast of Sorkvola.

7.5 Map Sheet Holöydal 1719 II

Anomaly 3.5 km southwest of Elgpiggen:

Anomalies for Pb,Zn, and Ag were detected 3.5 km southwest of Elgpiggen (Sample No. 205, 206, 207, 211). The anomalous area is situated in the striking continuation of the large anomaly on map sheet Tylldal. The geological setting is similar, close to the contact Precambrian basement/Eocambrian sediments. Outcrops of tillites occur in this area. A grid should be established over this area in continuation to that on map sheet Tylldal. Subsequent soil sampling, mapping, and a VLF survey will be necessary. The work should be completed on a first priority basis.

Anomaly 1.5 km northeast of Brurhögda:

A high anomaly for Pb was found 1.5 km northeast of Brurhögda (Sample No. 2628, 2629, 2630, 2663, 2665). The anomalous area is situated at the northeastern end of the Finstad-window, where tillites and conglomerates overlie the Precambrian granites. As the anomaly is located in a favoured geological setting, it should be followed up by mapping and a geochemical and a geophysical survey. The investigations should be completed on a first priority basis.

Anomaly 2.5 km southeast of Gråhögda:

A Pb,Ag anomaly was found in sample no. 2647, 2.5 km southeast of Gråhögda. It is located inside arkoses. The anomaly could be followed up on a low priority basis.

Anomaly 4.5 km southeast of Gråhögda:

A Pb anomaly is located 4.5 km southeast of Gråhögda within arkoses (Sample No. 1506). As no other anomalous elements were detected, the anomaly should only be followed up on a low priority basis.

Anomaly 6 km north of Glofökkampen:

A Pb,Zn anomaly is located 6 km north of Glofökkampen (Sample No. 2606, 2612, 2610). It is situated inside arkoses. As the anomaly is not as high and in no favoured geological setting, it should be followed up on a low priority basis.

Anomaly 4 km west of Kvernvikhögda:

About 4 km west of Kvernvikhögda a Pb,Zn anomaly was found that is situated inside arkoses (Sample No. 1531). As it is only one anomalous sample and not situated in a favoured geological setting, the anomaly should be followed up on a low priority basis.

Anomaly 2 km southeast of Store Glophögda:

A Zn anomaly is located 2 km southeast of Store Glophögda (Sample No. 1605, 1569, 1597, 1593, 1594). It occurs close to tillites that are exposed here. As the anomaly is quite wide and situated in a good geological setting, it is proposed to follow up this anomaly by soil sampling, mapping, and a VLF survey on a high priority basis.

Beside the anomalies described above, severa weaker Cu anomalies were found. These are located 3 km southeast of Svartdalhögda and 4.5 km northeast of Sålekinntoppen. As the only anomalous element is Cu and the anomalies are quite weak, they should not be followed up for the first.

7.6 Map Sheet Tylldal 1619 II

Anomaly northeast of Langkletten:

This anomaly will have the highest priority for follow-up work in the next field season. The anomalous area extends over a distance of about 8 km northeast of Langkletten and stretches up to the western edge of map sheet Holöydal. The highest values were detected for Cu, partly more than 40 times higher than the background. Very high values for Pb, Zn, and Ag were detected, too. The geological setting of this anomaly looks very promising: It extends along the eastern margin of the Finstad-window along the contact with the basal Eocambrian sediments. Tillites are exposed in the area, too, so that it is highly probable that the sediments are autochtonous. During geological mapping by Folldal Verk in 1976, a minor Cu mineralization with bornite was found in a small one of the rarely occuring outcrops. It is proposed to establish a large grid from 4.5 km to 10 km northeast of Langkletten with subsequent soil sampling and a VLF survey. The lines should be long enough to be sure that the most interesting geological units are covered. This should be assured by detailed geological mapping. The work should be completed on a first priority basis.

Anomaly 1.75 km east of Klettsaeterklettan (Sample No. 720):

This anomaly could be a continuation of the anomaly described above (northeast of Langkletten) as it is situated in the striking continuation of the geological units. Anomalous values for Pb, Zn, and Ag were detected. A smaller grid should be established over this area with subsequent mapping, soil sampling, and VLF. This should be completed on a first priority basis.

Anomaly 4 km south of Klettsaeterklettan:

A Pb, Zn, Ag anomaly was detected about 4 km south of Klettsaeterklettan. The anomalous values of the elements can't be found altogether in the samples. Anomalous Zn can be found more downstream, whereas Ag shows anomalous values more upstream. A Pb anomaly is located in the center. The geological setting is a favoured one as the anomalous area is situated only a few hundred meters away from

the contact to the rocks with the Finstad-window. This anomaly should be followed up on a high priority basis.

Anomaly 3 km east of Langhöa:

A very high Pb,Zn,Ag,Cu anomaly was detected about 3 km east of Langhöa (Sample No. 334). The anomaly is located at the northern margin of the Finstad-window close to the contact with the sediments. This anomaly must be followed up on a first priority basis by soil sampling, VLF, and geological mapping.

Anomaly 2.4 km southwest of Langhöa:

2.4 km southwest of Langhöa a Zn,Ag anomaly was found (Sample No. 812). It is located within arkoses, about 2.5 km north of the Finstad-window. This anomaly could be followed up on a lower priority basis.

Anomaly 2.5 km southeast of Langhöa:

A Pb anomaly is situated 2.5 km southeast of Langhöa within arkoses. The anomaly could be followed up on a lower priority basis.

A small copper anomaly, about 4 km southwest of Langhöa, and several other anomalies for F were detected in streams draining the western margin of the Finstad-window. These anomalies probably originate from a higher content in fluorine in the granites of the Precambrian basement.

7.7 Map Sheet Alvdal 1619 III

Anomaly 5 km northeast of Högkuven:

About 5 km northeast of Högkuven a Pb,Zn,Ag anomaly was detected (Sample No. 575, 576, 579, 580). The values are very high in Ag (4.5-6.0 ppm). The anomalous area is located within light grey arkoses. Numerous quartz veins within the sandstones and partly a strong enrichment in hematite can be observed. No mineralization could be observed in the area. Some samples of the arkoses that were rich in hematite were taken. The analytical results show some elevated values for Pb but low Ag values:

Sample No.	Pb	Zn	Cu	Ag (ppm)
SP-R-38	145	31	57	1
SP-R-39	80	41	63	2
SP-R-40	167	36	39	1
SP-R-41	85	37	53	1

This area should be followed up on a first priority basis by soil sampling, VLF, and mapping.

Anomaly 2 km northwest of Blåvola:

One anomalous sample was found 2 km northwest of Blåvola (Sample No. 1039). The values for Pb and Ag are highly anomalous. The sample location is situated within the sparagmites. It is proposed to follow up this anomaly on a high priority basis by soil sampling, VLF, and mapping.

Anomaly 3 km southwest of Blåvola:

About 3 km southwest of Blåvola anomalous values for Cu and F were detected (Sample No. 159, 160, 161, 162). The anomalous area is located very close to the contact Precambrian basement/ Eocambrian sediments. Closeby outcrops of tillites can be found. This anomaly should be followed up on a lower priority basis, because of the lack of higher values for Pb and Zn.

Another small weak Cu anomaly is located 5.5 km west of Blåvola (Sample No. 121).

7.8 Map Sheet Hanestad 1918 IV

Anomalies around Nordisaethervola:

This is the largest Pb anomaly which was detected in the whole project area. Together with Pb, several anomalies for Zn,Ag,Cu, and F were detected, too. The anomalous area covers the northwestern part of map sheet Hanestad and extends to the southwestern edge of map sheet Tylldal, the southeastern edge of map sheet Alvdal, and the northeastern edge of map sheet Sollia. The highest value in one sample was 1200 ppm Pb (Sample No. 18). After receiving of the analytical results from this area, subsequent geological mapping and prospecting was conducted, but no Pb,Zn mineralization was found. Within the granites some samples with

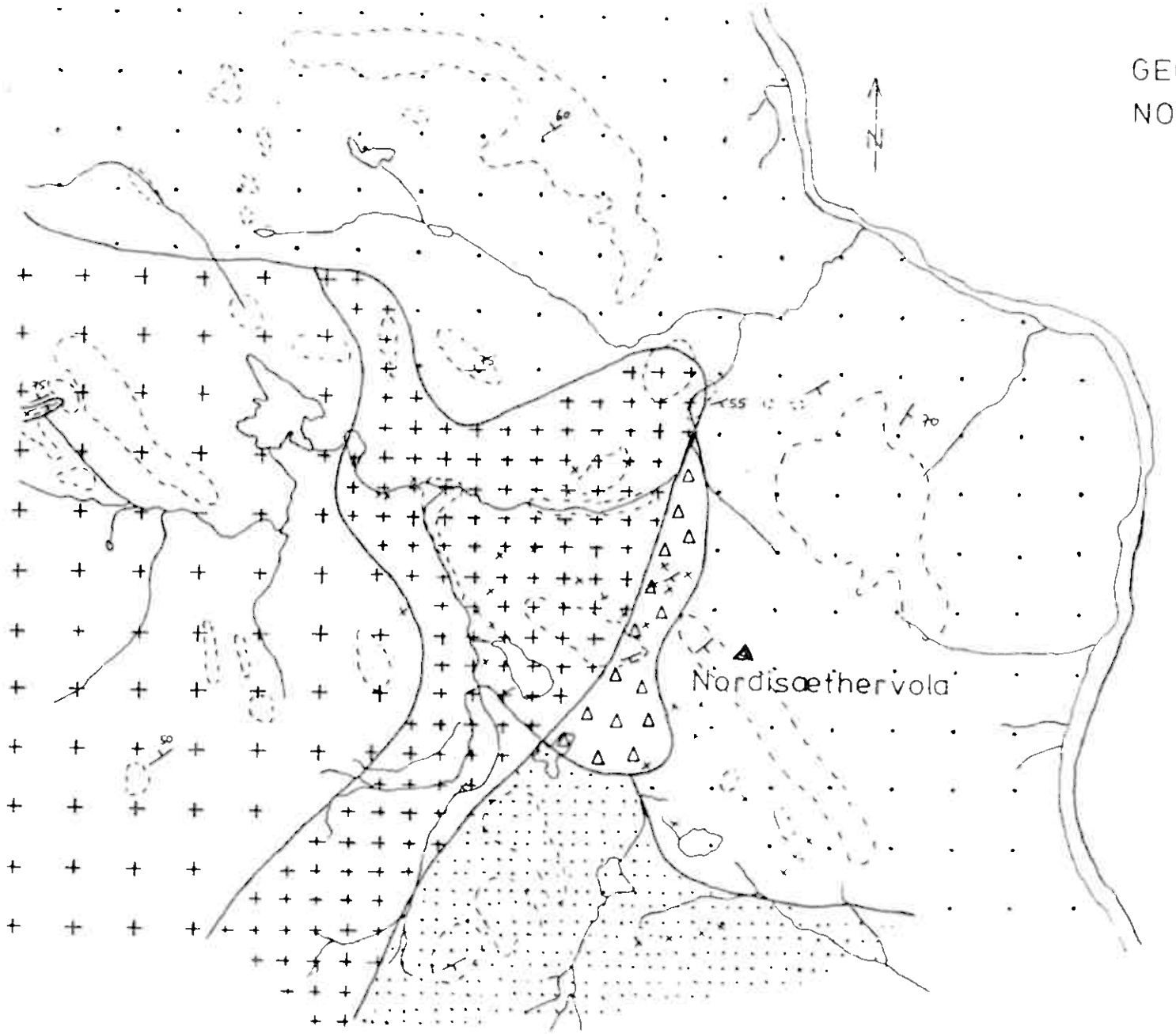

GEOLOGY MAP OF THE
NORDISAETHERVOLA AREA
N
Nordisaethervola
Fine grained
Quartzitic Rock
Meta - Arkose
Tillite
Greenschist
Quartz porphyry
Granite
Strike with Dipangel
Outcrop
Scale 1 : 50 000

Fig. 4

Pyrite and fluorite could be observed. The geological map (Fig. 4) shows that the anomalous area is situated close to the contact of Precambrian basement with overlying Eocambrian sandstones. A tillite forms the base of the sediments. A part of the anomalies can be found within the outcrop area of the Precambrian basement rocks. This could be due to boulders that were moved to these places by glacial activities. The reason that the anomaly is so widespread could arouse the suspicion that the anomaly is caused due to a high background of Pb within this area. The high Pb values could be formed by the weathering of the feldspars in the arkoses. Indeed, analytical results of some rock samples of these arkoses show an elevated content of lead:

Sample No.	Pb	Zn (ppm)
At-82-10	85	185
At-82-11	80	149
At-82-12	94	118
At-82-13	81	138
At-82-15	92	117

But still, higher Pb values are accompagnied ba anomalous Zn and Ag values and the anomalies are situated in a favoured geological setting in which Pb,Zn mineralization can be expected. If the anomalies are caused by covered mineralization, this could be found out by soil sampling in combination with a VLF survey. Therefore it is proposed to establish three or four grids to cover most of the anomalous area and to conduct a geochemical soil survey, a geophysical VLF survey, and further geological mapping. This work should be completed on a first priority basis.

Anomaly 9.5 km southeast of Nordisaetervola:

Another Pb,Zn,Ag,F anomaly (Sample No. 1268, 1269, 1270, 1271, 1273) was detected 9.5 km southeast of Nordisaethervola, in the next valley towards the east. Here the Ag values are especially high. The anomaly is situated not far from a tillite that outcrops about 2 km further to the north. So the area is in a favoured geological setting. Therefore it is proposed to follow up this anomaly by soil sampling, mapping, and a VLF survey on a high priority basis.

Anomalies 9 and 11.5 km southeast of Nordisaethervola:

Several smaller Cu anomalies are located 9 km and 11.5 km respectively southeast of Nordisaethervola Sample No. 383, 399, 400,414). These scattered anomalies should at first not be followed up because of missing coincidence of other anomalous elements.

7.9 Map Sheet Sollia 1818 I

Anomaly 3.7 km southeast of Gråhögda:

A high pn,Zn,Ag anomaly is located 3.7 km southeast of Gråhögda (Sample No. 3129). Further downstream two anomalous samples in Pb were found (Sample No. 3184, 3665). The anomaly is situated very close to the southern border of the Atna-window. As the anomaly is so high and situated in a good geological setting, the anomaly must be followed up by soil sampling, mapping, and a VLF survey. The work should be completed on a high priority basis.

Anomalies northeast and west of Sölnsjöskrabbane:

Several samples that are anomalous in Cu were found northeast and west of Sölnsjöskabbane. They are located near the northern border of the Atna-window. Beside Cu no other elements had anomalous values. Three of the samples that drain the same area (Sample No. 644, 179, 180) have relative high values. The drainage area of these three samples could be followed up on a lower priority basis.

Anomalies north and northeast of Storkletten:

Several slight anomalous samples in Cu and Zn have been found in the area north and northeast of Storkletten. The anomalies are quite scattered and show no definite trend. They could be followed up by prospecting on a low priority basis.

Some scattered Zn anomalies were detected about 3 km southeast and east of Gravåsane and two Pb anomalies 4 km and 6 km respectively northwest of Storkletten.

7.10 Map Sheet Atnsjöen 1818 IV

Anomalies around Gråhögda:

Around Gråhögda, in the southern part of map sheet Atnsjöen, numerous minor anomalies were detected, mainly for Cu, but some

for Pb,Zn, and Ag. The area is located within quartzites, black shales, and conglomerates, about 6 km southwest of the Atna-window. About 2.5 km southeast of Gråhögda some outcrops of Precambrian basement can be found, too. It is proposed to follow up two of these anomalies, where a combination of at least two anomalous elements in one sample was detected. These are:
Anomaly 3.2 km south of Gråhögda (Sample No. 3030, Cu,Pb anomaly);
Anomaly 2 km northwest of Gråhögda (Sample No. 3552, Cu,Zn anomaly).
These anomalies should be followed up on a low priority basis.

Anomaly 3.6 km southeast of Midtvola:

About 3.6 km southeast of Midtvola a Pb,Cu anomaly was detected (Sample No. 3500). The anomaly is located within quartzites, close to the contact with the Precambrian rocks of the Atna-window. The anomaly should be followed up on a low priority basis.

Anomaly 2.75 km north of Finnsjövola:

A Pb,Ag anomaly was found 2.75 km north of Finnsjövola (Sample No. 3595). It is located within the rocks of the Atna-window, close to the contact with the overlying sediments. The drainage of the stream, however, comes from the south, draining the area of the geological contact. The anomaly should be followed up on a low priority basis.

Another smaller Pb anomaly is located 1.2 km east of Store Sölnkletten (Sample No. 3729) in the northern part of the map sheet. No anomalous for other elements occur in this sample.

8. The Gruvsjöen Property

The Gruvsjöen property is located about 10 km northeast of the town of Brekken, 2.5 km southwest of Litlefjellet, on the northeastern and eastern banks of the Gruvsjöen-lake.

The geology is characterized by a sequence of flat lying, grey schists, light grey quartzitic rocks, and graphitic schists. The rocks are situated in the core of a larger anticline structure. They are overlain in the east by the Augengneis. The general strike is NW-SE.

In the central part of this area a trench can be found (UTM coord. 5 48 660, 69 53 310) that dates back to about 1910. Some tons of ore were taken out and brought to Falun, where the ore was processed. The mineralization is indicated on NGU's geological map as "pyrite-occurence".

In fact the mineralization consists of galena, sphalerite, pyrrhotite, pyrite, and little chalcopyrite. Some ore samples were taken and analyzed as follows (in ppm):

Sample No.	Pb	Zn	Cu	Ag	Au
SP-R-15	15300	439	68	61	
SP-R-16	25400	481	137	103	
SP-R-17	69100	580	129	161	
SP-R-29	35122	43	83	165	NIL
SP-R-30	56665	7183	610	278	NIL
SP-R-31	189	152	1454	7	NIL
SP-R-32	1325	22799	2703	5	NIL
SP-R-33	1587	79	211	10	0.25
SP-R-34	43402	64	82	227	NIL
SP-R-45	pure galena sample			5350	0.1

During the fall of 1982 several other smaller showings were discovered:

Grid coordinate	Sample No.	Pb	Zn	Cu	Ag (ppm)
350S/350V	SP-R-26	726	28499	380	3
750S/125V	SP-R-42				
200N/ 20V	SP-R-27	3649	236	115	18
400S/350V	GR-82-1	no analysis			

All showings contain galena or sphalerite respectively as ore minerals. The mineralizationsat 200N/20V and 750S/125V are hosted in brownish weathering, light quartzitic rocks, whereas these at 350S/350V and 400S/350V can be found in grey schists. On the western side of the lake several boulders with rich Pb,Zn,Cu ore were found. The direction of the ice movement was from the west to southwest, so that the boulders could come from the easren side of the lake or from the lake itself. Beside the showings several zones with strongly rusty weathering rocks and numerous gossans can be found within the area. A very strong gossan is located at 300S/100V.

A geochemical soil survey with lines at 100 m intervalls and "B" horizon soil samples collected every 50 m was conducted, as well as a geophysical VLF/VLF-field strength survey with measurements every 25 m.

Several high geochemical anomalies for Pb and Zn were detected. The most interesting zone is close to the northeastern bank of the lake, north of the trench, on lines 100N to 500N. Another anomalous zone is located between 300S and 900S in the western part of the grid. Due to this anomaly the showings at 750S/125V and 350S/350V were found. Beside these, several others, more scattered Pb anomalies are present.

The anomalies of the VLF survey follow a main trend through the area from the north to the south. This is probably due to a thick horizon of graphite schists. Several other smaller trends were detected, too. The anomalies of the VLF-field strength survey are centered at the northeastern bank of the lake, north of the trench, where most of the anomalies of the geochemical soil survey were found. This anomalous area was covered by a magnetometer- and CEM shoot back survey. The most interesting results were obtained on line 300N. Two combinated EM, Mag, geochem. anomalies were detected.

Two vertical holes (Bh 1, Bh 2) were drilled at 300N/175V and 280N/100V, both with negative results. Both holes were drilled through a sequence of light quartzites interlayered with thick horizons of graphite schists that contained some pyrrhotite. A third hole (Bh 3) was drilled under the trench at 0NS/20Ø to find out the extension of the mineralization in depth. The result of this hole was negative, too. After that, the drilling had to be stopped because of the cold weather.

The future work on this property should comprise more geophysical work (Mag, VLF) during the early spring season 1983. The grid should be extended over the lake and further to the north, where other anomalies were detected by the regional stream sediment survey. The magnetometer survey will be of importance as the ore in the trench and the well mineralized boulders on the western side of the lake contained an amount of pyrrhotite. If the Mag/EM survey will bring good results on the lake itself, a hole should be drilled there in the early spring. Further work during the spring/ summer season should comprise more soil sampling in the northern extension of the grid and detailed geological mapping over the whole grid area. The most interesting diamond drilling at the present stage of information would be in the area 300S-400S/350V

and near the strong gossan at 300S/100V, where a VLF anomaly was detected, too. At least 400 m diamond drilling will be necessary.

9. Copper Mineralzation at Brydal

The mineralization is situated near Brydal, about 15 km southeast of the town of Tynset (UTM coord. 6 05 250, 68 96 050). It is located inside the sparagmites not far from the Precambrian basement that is exposed 1.5 km further south. Here the sparagmite is a slightly conglomeratic , light grey arkose. The mineralization consists mostly of coatings of malachite and several other secondary copper minerals on a steep wall of rock. Very seldom, some very small spots of sulfides can be seen. The coated zone is exposed over a length of about 70 m and a height of about 10 m. The area around the mineralization is thickly covered by overburden. On the top of the wall of rock an old small trench can be found. Some rock samples of the mineralized zone were taken and analyzed as follows (values in ppm):

Sample No.	Cu	Zn	Pb	Ag
SP-R-2	667	137	87	1
SP-R-3	243	189	89	5
SP-R-4	1743	7450	1000	16
SP-R-5	1241	205	86	16
SP-R-6	194	207	88	1
SP-R-7	198	323	90	6
SP-R-8	3862	140	74	32
SP-R-9	3465	193	81	23
SP-R-10	529	283	104	4
SP-R-11	5588	163	143	40
SP-R-12	186	145	84	7
SP-R-13	1316	346	88	9
BRY-R-6 (trench)	1420	81	183	13

A systematic sampling from the top to the base of the mineralized sequence gave the following results (values in ppm):

	Sample No.	Cu	Zn	Pb	Ag
top	BRY-R-1	154	106	82	1
	BRY-R-2	814	230	84	12
	BRY-R-3	882	78	255	11
	BRY-R-4	1357	60	154	8
base	BRY-R-5	2193	95	172	8

A VLF survey was conducted over the area without the detection of any anomaly.

The primary source of the secondary mineralization is unknown and can probably only be found out by diamond drilling above the mineralization. Therefore one or two holes should be drilled near the trench, above the mineralized zone. Some polished sections of the rocks will be studied, too.

10. Summary of Recommended Program

Follow-up Work:

It is proposed to follow up anomalies that were indicated by the regional stream sediment survey. The first priority areas should be followed up during the field season 1983 and, if possible, some of the high priority areas, too.

Grids should be established over the drainage areas of the anomalous stream sediment samples with subsequent soil sampling, a VLF/VLF-field strength survey, and geological mapping. 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 Pb, Zn, and Cu. The areas for wich follow-up work on a first priority basis is proposed, are:

Map Sheet Brekken: - Anomalies 1.5, 2.3, and 2.6 km west of Litlefjellet
- Anomaly 3 km southwest of Valldalshögda

Map Sheet Röa: - Anomaly 1.5 km northwest of Skoghaugen

Map Sheet Narbuvoll: - Anomaly 2 km east of Gråhögda
- Anomaly 4 km southeast of Gråhögda

Map Sheet Elgå: - Anomaly 5.5 km west of Sushögda
- Anomaly 5 km west of Elgåhogna

Map SheetHolöydal: - Anomaly 3.5 km southwest of Elgpiggen
- Anomaly 1.5 km northeast of Brurhögda

Map Sheet Tylldal: - Anomaly northeast of Langkletten
- Anomaly 1.75 km east of Klettsaeterklettan
- Anomaly 3 km east of Langhöa

Map Sheet Alvdal: - Anomaly 5 km northeast of Högkuven

Map Sheet Hanestad: - Anomalies around Nordisaethervola

For the soil sampling and the VLF survey 10 students for a period of 2 month will be necessary. The mapping can be completed by 4 students in the same period of time.

Regional Stream Sediment Survey:

It is proposed to extend the regional stream sediment survey further to the north of the project area. 100 sq.km can be covered by 2 students within 4 weeks.

Gruvsjöen Property:

It is proposed to extend the already established grid over the Gruvsjöen-lake and further to the north. A VLF survey should be conducted in these areas and soil sampling in the northern part. This work would include the follow-up work on the anomalies 1.5, 2.3, and 2.6 km west of Litlefjellet. The whole grid area should be covered by a magnetometer survey and detailed geological mapping. 400 m of diamond drilling are proposed.

Copper Mineralization at Brydal:

150 m of diamond drilling are proposed.

APPENDICES

X-RAY ASSAY LABORATORIES HISTOGRAM

FØLLDAL VERK PROJECT N-82-5 22-NØV-82

PB PPM

POINTS 3169
MEAN 19.92

FREQUENCY INTERVAL 20.00
STANDARD DEVIATION 22.86

MINIMUM VALUE 1.00
MAXIMUM VALUE 1200.00

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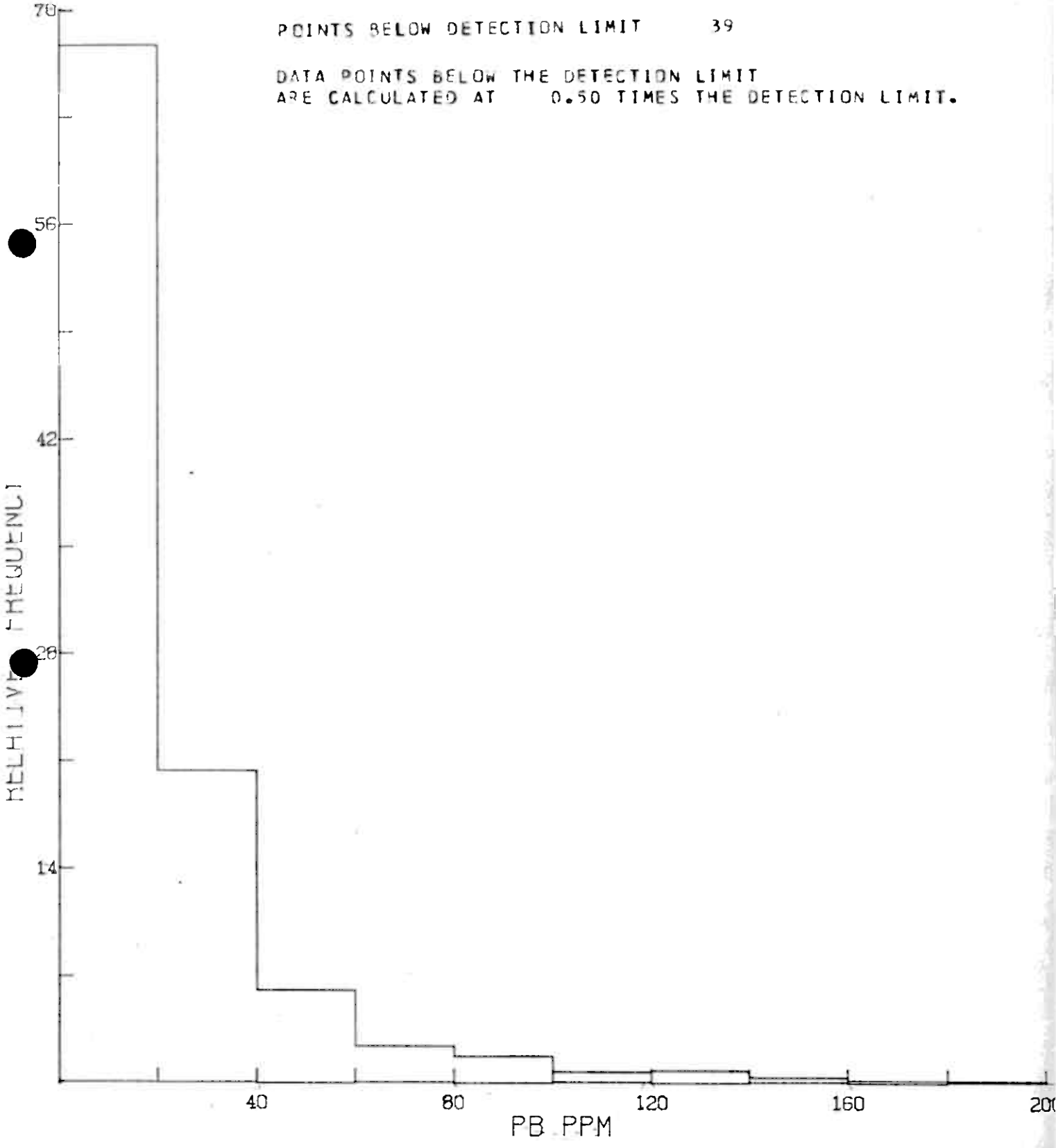


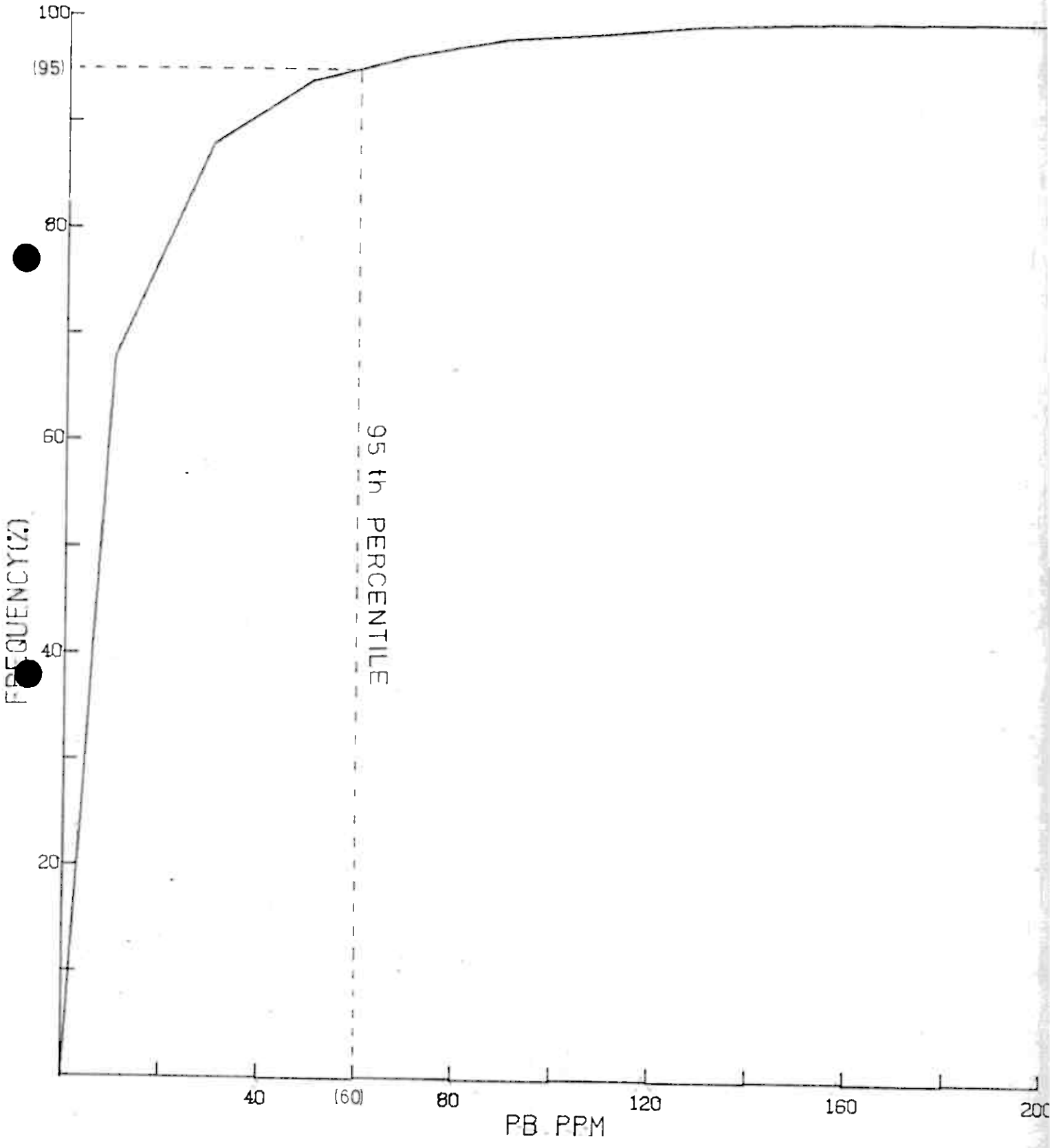
X-RAY ASSAY LABORATORIES CUMULATIVE FREQUENCY

FØLLDAL VERK PRØJECT N-82-5 22-NØV-82

PB PPM

PØINTS 3169
MEAN 19.92

FREQUENCY INTERVAL 20.00
STANDARD DEVIATION 22.66



X-RAY ASSAY LABORATORIES HISTOGRAM

FOLLDAL VERK PROJECT N-82-5 22-NOV-82

ZN_PPM

POINTS 3160
MEAN 42.84

FREQUENCY INTERVAL 50.00
STANDARD DEVIATION 62.31

MINIMUM VALUE 0.25
MAXIMUM VALUE 1600.00

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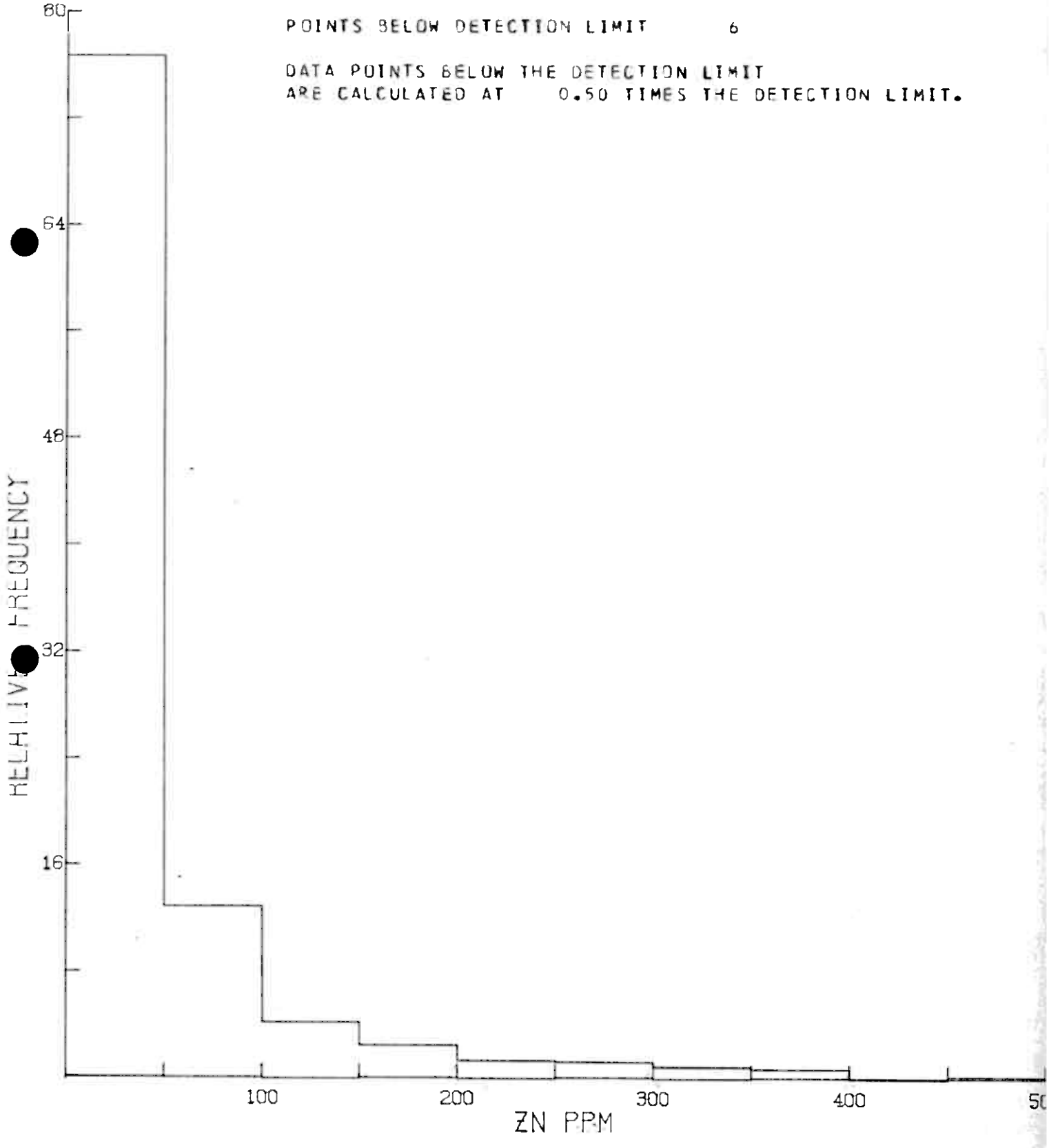


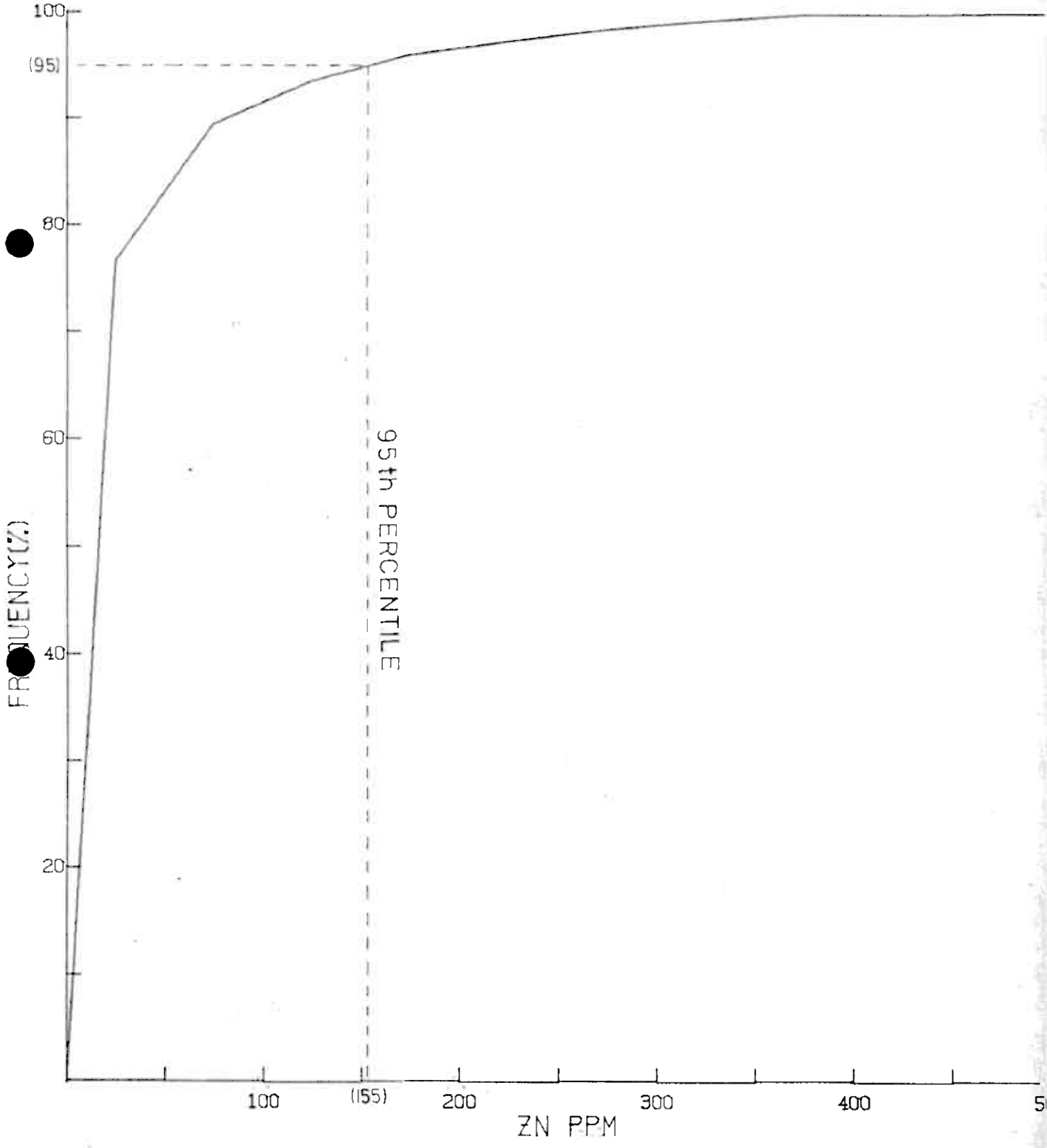
X-RAY ASSAY LABORATORIES CUMULATIVE FREQUENCY

FØLLDAL VERK PRØJECT N-82-5 22-NØV-82

ZN PPM

POINTS 3160
MEAN 42.84

FREQUENCY INTERVAL 50.00
STANDARD DEVIATION 62.91



X-RAY ASSAY LABORATORIES HISTOGRAM

FOLLDAL VERK PROJECT N-82-5 22-NOV-82

AG PPM

POINTS 3198
MEAN 0.37

FREQUENCY INTERVAL 0.50
STANDARD DEVIATION 0.38

MINIMUM VALUE 0.25
MAXIMUM VALUE 13.00

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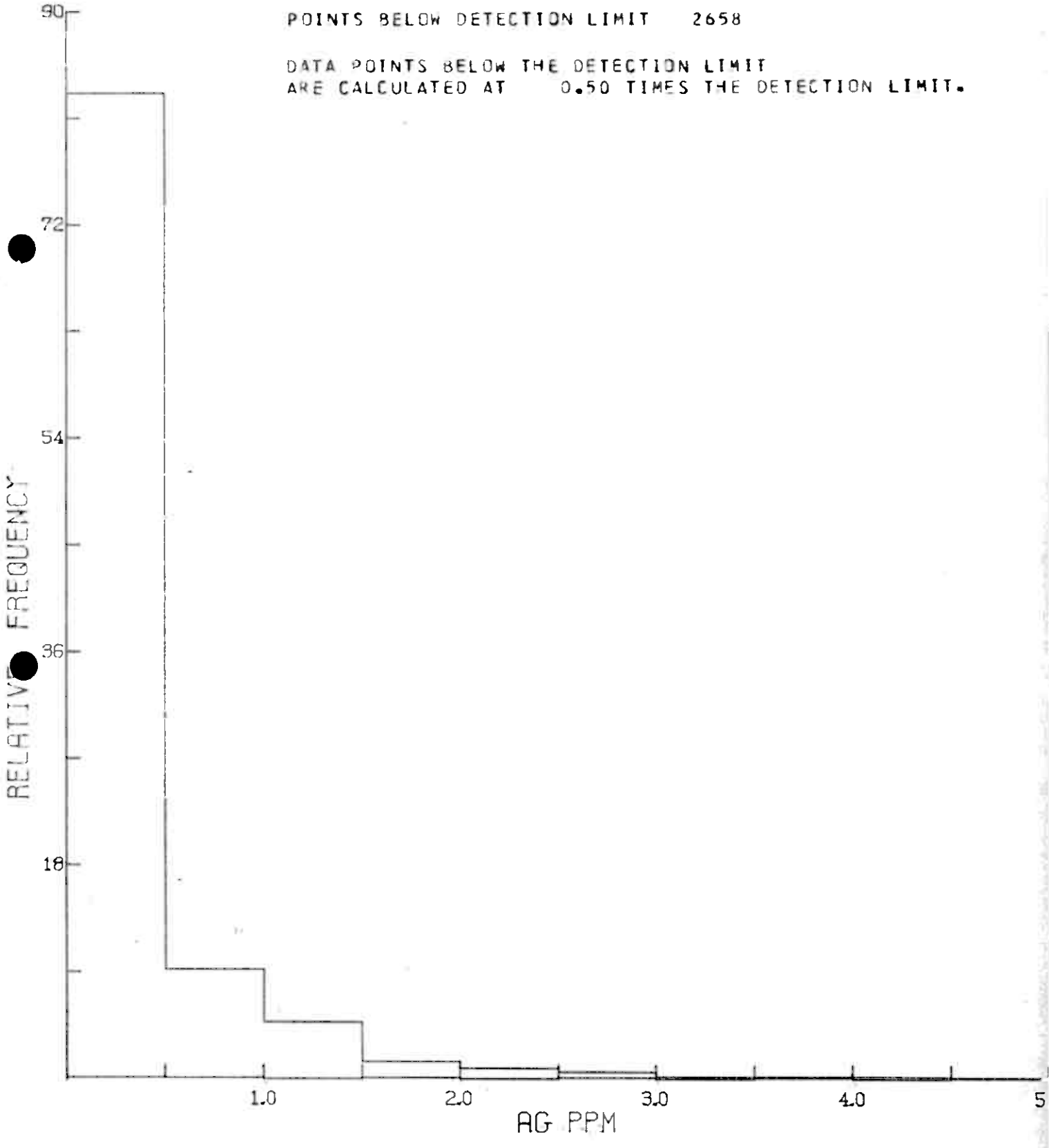


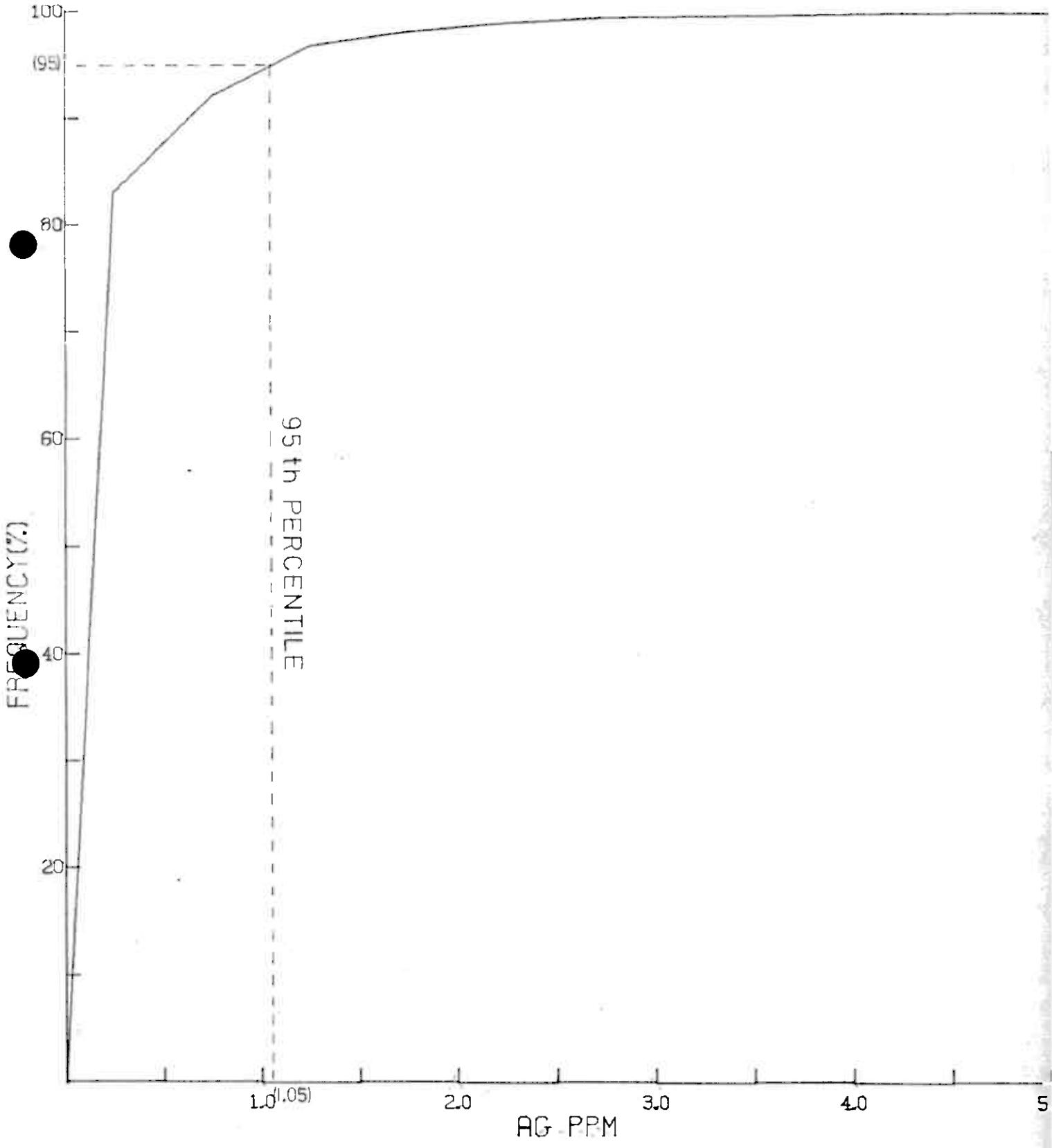
X-RAY ASSAY LABORATORIES CUMULATIVE FREQUENCY

FØLLDAL VERK PROJECT N-82-5 22-NØV-82

AG PPM

PØINTS 3198
MEAN 0.37

FREQUENCY INTERVAL 0.50
STANDARD DEVIATION 0.38



X-RAY ASSAY LABORATORIES HISTOGRAM
FOLLDAL VERK PROJECT N-82-5 22-NOV-82
CU PPM

POINTS 3182
MEAN 6.09

FREQUENCY INTERVAL 5.00
STANDARD DEVIATION 6.12

MINIMUM VALUE 0.25
MAXIMUM VALUE 260.00

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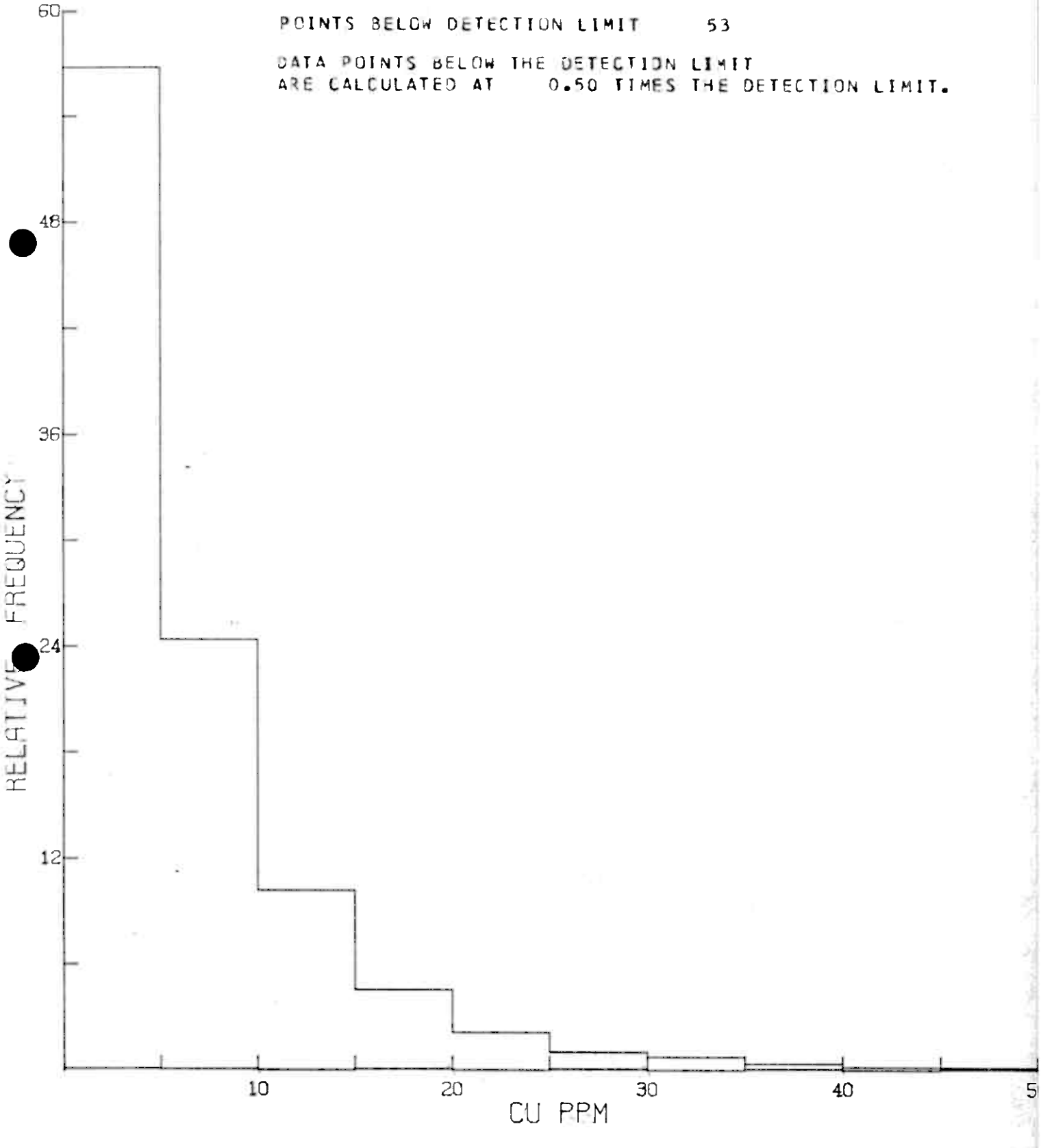
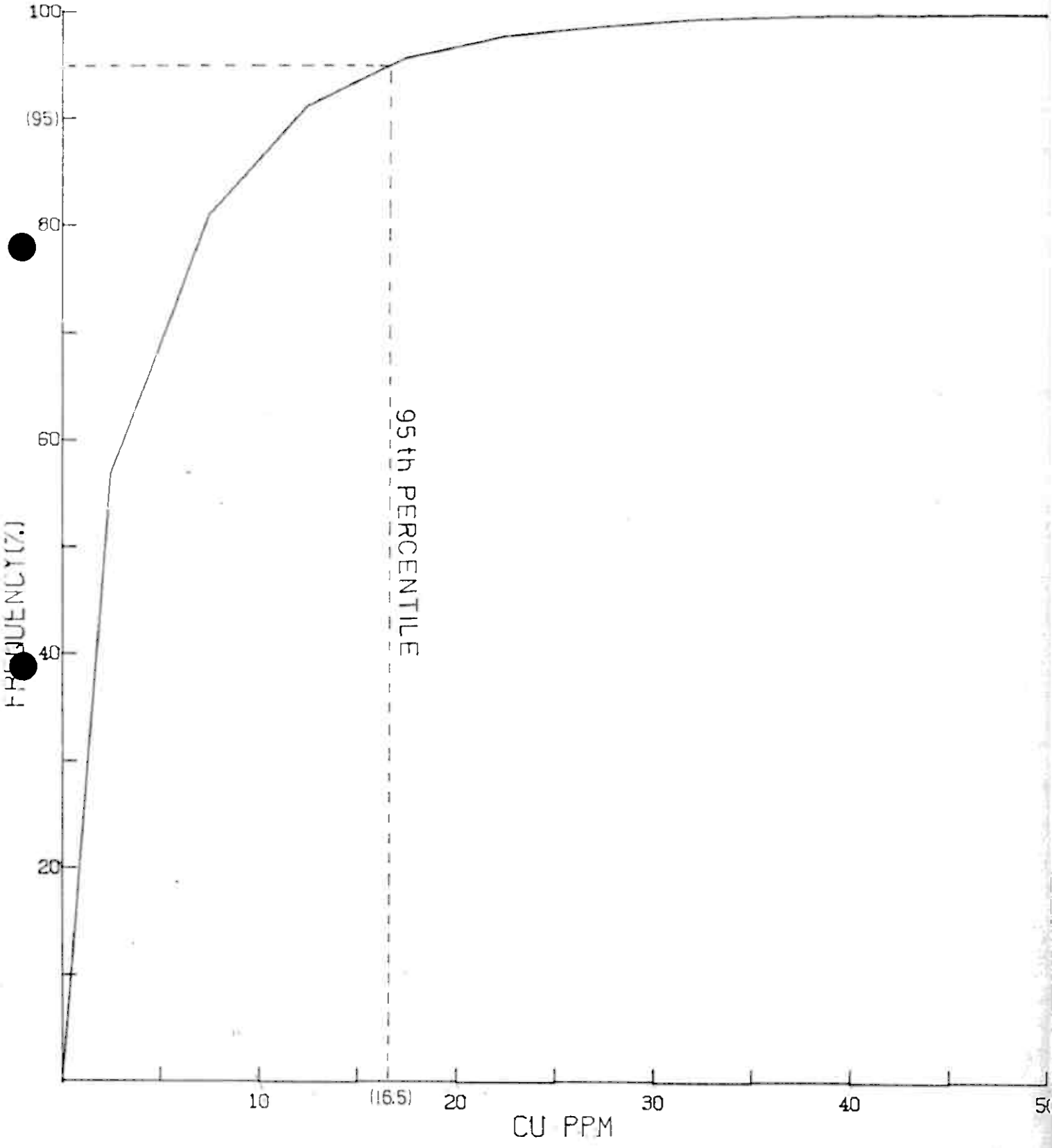


X-RAY ASSAY LABORATORIES CUMULATIVE FREQUENCY
FØLLDAL VERK PROJECT N-82-5 22-NØV-82
CU PPM

POINTS 3182
MEAN 6.09

FREQUENCY INTERVAL 5.00
STANDARD DEVIATION 6.12



X-RAY ASSAY LABORATORIES HISTOGRAM
FOLLDAL VERK PROJECT N-82-5 22-NOV-82
F PPM

POINTS 1054
MEAN 302.41

FREQUENCY INTERVAL 100.00
STANDARD DEVIATION 116.43

MINIMUM VALUE 130.00
MAXIMUM VALUE 2700.00

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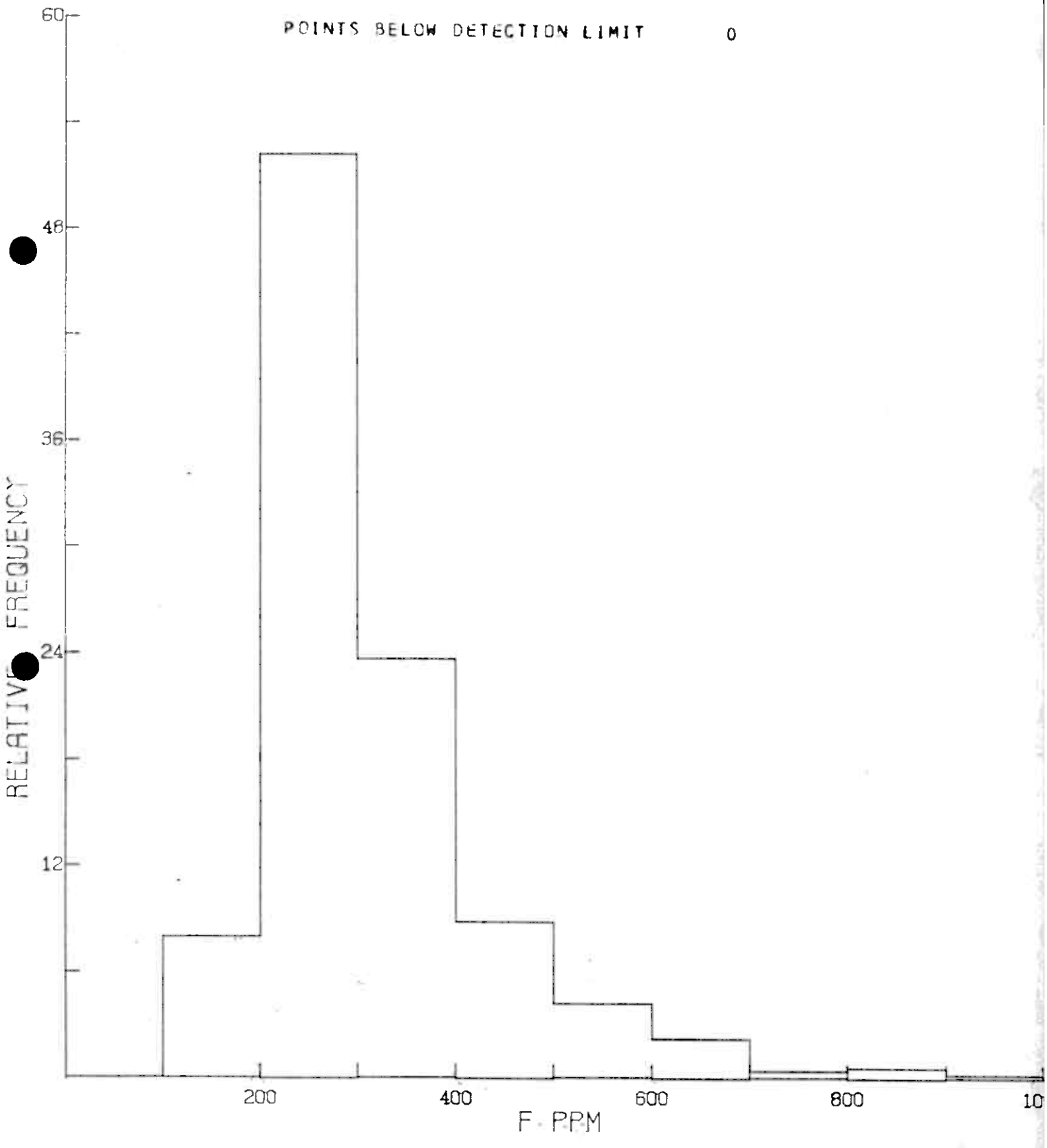


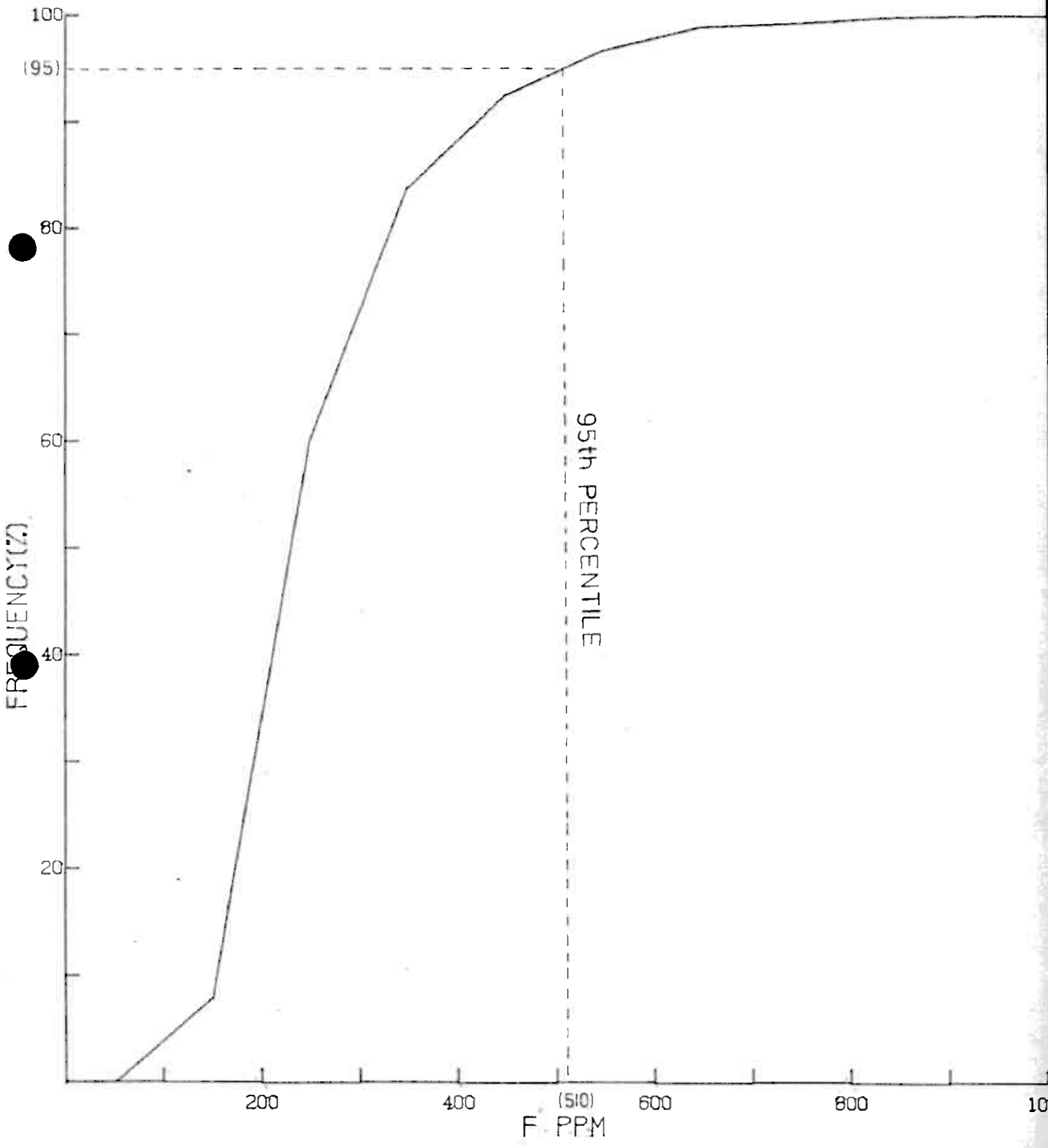
X-RAY ASSAY LABORATORIES CUMULATIVE FREQUENCY

FØLLDAL VERK PROJECT N-82-5 22-NØV-82

F PPM

POINTS 1054
MEAN 302.41

FREQUENCY INTERVAL 100.00
STANDARD DEVIATION 116.43



DIAMOND DRILL LOG

FOLLDAL VERK A/S

D.D.H. No.	1	Azimuth	vertical	Started	9/10/82
Property	Gruvsjøen	Angle	vertical	Finished	12/10/82
Co-ord.	300N/175V	Depth	69.40m	Logged by	Krause

Directional surveys

Depth	Azim.	Dip.	Depth	Azim.	Dip.

From	To	Description	Interval From	Interval To	Assays Cu	Mo	Pb	Zn	Au	Ag
		a = angel of bedding to core axis								
0	2.40	Overburden								
2.40	5.80	Graphite Powder								
		no core available,								
5.80	7.10	Graphite Schists								
		well bedded rock, mm to cm thick layers of graphitic material, quartz rich rock, a = 90°.								
7.10	21.70	Light-grey Quartzite								
		very fine grained, well bedded rock with mm-thick layers, some chlorite layers between 8.40-9.70, thickness of chlorite layers in mm range. Mineralization: The quartzite contains grains of pyrite up to 2 mm in size, sometimes the pyrite is also parallel to the bedding with a thickness of a few mm. Sphalerite occurs at 15.00 and 15.15 with a thickness of some mm. The grains are up to 1 cm thick. At 16.25 is a 2 cm thick aggregate of sphalerite. At 16.20: 0.5 cm pyrite. a=90° in the upper area. From about 15.40 a=45°, at 16.00 a=75°, from 16.20 a=90°, 17.20: a=80°, 18.00: a=70°, 19.50: a=90°, 20.00: a=80°.								
21.70	22.90	Graphite								
		very pure graphite, no bedding, contains schlieren of pyrrhotite up to 1 cm in size. At 22.30 about 15 cm thick hydrothermal quartz.								
22.90	24.10	Light-grey Quartzite								
		as 7.10-21.70, a=85°								

DIAMOND DRILL LOG

FOLLDAL VERK A/S

From	To	Description	DDH No. 1	Interval From	Interval To	Assays Cu	Mo	Pb	Zn	Au	Ag
24.10	24.40	Quartzite									
		contains cm-thick beds of graphitic material, little pyrrhotite, a=85°									
24.40	29.20	Light-grey Quartzite									
		as 7.10-21.70 but without pyrite, a=80°									
29.20	66.60	Graphite Schists									
		The graphite schist contains very pure graphite specially at 54.50-57.10 and 60.70-66.60. At 58.50 hydrothermal quartz can be found and two quartzitic layers at 63.80 and 65.20-65.40. The graphite schists are well bedded with mm thick layers of light carbonate. Mineralization: 29.20-29.40:1 cm thick aggregates of pyrite. Throughout the whole sequence mm-thick layers of of pyrite, parallel and not parallel to the bedding can be found. The content of sulfides is always alittle higher near quartz schlieren. Here pyrrhotite is common, too. In these places can be observed very small grains of chalcopyrite and sphalerite e.g. at 53.50. 29.20:a=90°, 29.20-53.00:a=80-90°, 53.00-63.80: a=70°, 63.80-66.60:a=90°. The base of this series is formed by some coarse quartz-carbonate schlieren.									
66.60	69.40	Light Quartzite									
		Well bedded rock with numerous veins and crack - fillings of chlorite. The rocks are brecciated at 68.10-68.20. a=80°.									

DIAMOND DRILL LOG

FOLLDAL VERK A/S

PAGE

D.D.H. No.	2	Azimuth	vertical	Started	13/10/82
Property	Gruvsjøen	Angle	vertical	Finished	14/10/82
Co-ord.	280N/100V	Depth	42.80m	Logged by	Krause

Directional surveys

Depth	Azim.	Dip.	Depth	Azim.	Dip.

From	To	Description	Interval From	Interval To	Assays Cu	Mo	Pb	Zn	Au	Ag
		a = angel of bedding to core axis								
0	3.00	Overburden								
3.00	3.05	Quartzite								
		Well bedded quartzite with 1-3mm thick layers of graphitic material, a=90°								
3.05	8.50	Quartzite								
		Light-grey well bedded quartzite, contains up to 1cm thick layers of clay-rich material Mineralization: The quartzite contains numerous thin (1mm) thick layers with pyrite, at 5.40: a crack with 3 mm thick pyrite crystals, at 8.50: a o.5 cm thick aggregate of spalerite to 4.00: a=90°, 4.00-8.50: a=70-75°,								
8.50	14.60	Graphite Schists								
		These graphite schists have a very high content of graphite. They are not well bedded and contain schlieren of hydrothermal quartz. Mineralization: Pyrrhotite can be found in up to 0.5 cm thick schlieren.								
14.60	42.80	Dark Graphitic schist								
		dark, well bedded schist, contains numerous layers of graphitic material that are mm thick, in some parts the graphite gets very pure, in these parts it contains several schlieren of hydrothermal quartz, Mineralization: in graphite richer parts little pyrrhotite can be found through the whole sequence is a=80°.								

DIAMOND DRILL LOG

FOLLDAL VERK A/S

PAGE

D.D.H. No.	3	Azimuth	SW (240^g)	Started	15/10/82
Property	Gruvsjøen	Angle	70°	Finished	19/10/82
Co-ord.	ONS/20Ø	Depth	50.50m	Logged by	Krause

Directional surveys					
Depth	Azim.	Dip.	Depth	Azim.	Dip.

From	To	Description	Interval From	Interval To	Assays Cu	Mo	Pb	Zn	Au	Ag
		a = angel of bedding to core axis								
0	1.00	Overburden								
1.00	22.30	Quartzite								
		Light grey, not very well bedded quartzite, contains many 2-3 mm thick quartz schlieren, numerous joints and cracks can be found, the planes of the cracks are brownish weathering, through the whole sequence is a=70-80°.								
22.30	50.50	Brecciated Quartzite								
		The quartzitic rocks are very intensively faulted and brecciated. Angular quartz boulders up to 1 cm in size can often be observed. The numerous cracks are filled with chlorite. The chlorite contend in the brecciated parts is sometimes more than 50%. In most places no bedding can be observed. The chlorite can be sometimes found in 0.5 cm thick layers, too. a-70-80°. Between 27.80 and 30.00 the quartzite is not so strongly brecciated and is similar to that at 1.00-22.30.								
		In the whole core almost no ore-minerals can be found. Very rarely one can see a small grain of sphalerite or pyrite.								