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GEOCARE

PRELIMINARY GEOLOGICAL INVESTIGATION OF THE GJEDDE LAKE GOLD PROSPECT, PASVIK NORWAY

Prepared for:
Kenor AS
Fr. Nansens Plass 2
0116 Oslo

Prepared by:
Geocare AS
Veritasveien 2
N-1322 Høvik

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Sammendrag:
The Gjedde Lake gold prospect is located in the Pasvik region of eastern Finnmark county, Norway. In 1993 disseminated gold was discovered within sulfide-bearing quartzite outcrops and blocks along the shore of the informally named *Gjedde Lake*. Geologically the quartzites are included in the Langvannet Formation Group of the Early Proterozoic Pasvik Greenstone belt. The quartzite is located along the southern contact of a presumed graphitic schist which has been mapped based on airborne geophysical measurements. Rock chip samples of sulfide-bearing (pyrite, pyrrhotite, arsenopyrite, and minor chalcopyrite) quartzite from the discovery outcrop contained up to 10 ppm gold. Quartz-arsenopyrite-carbonate veins located in the same discovery area contained very low concentrations of gold. Additional rock-chip sampling identified anomalous gold and arsenic concentrations in similar sulfide-bearing quartzites 100 meters west, 450 meters east and 50 meters north from this area. Subtle carbonate alteration may be present in the surrounding schists and amphibolites. Outside of the Gjedde Lake area the quartzite is magnetite-bearing. A epigentic model is preferred for the formation of the gold mineralization at Gjedde Lake. In this epigenetic model hot solutions moved upwards along fractures carrying gold as sulfide complexes and reacted with the magnetite in the quartzites to produce sulfides and precipitate the gold. Quartz-arsenopyrite-carbonate veins may represent the conduits which carried the gold-bearing solutions. A geophysical investigation over the Gjedde Lake area was conducted by NGU. The geophysical magnetic investigation showed that anomalous magnetic lows existed over the sulfide-bearing quartzites that contained gold. Results for the RP, SP, and VLF investigations did not clearly indicate areas of mineralization; IP anomalies running in-between the areas with sulfide-bearing outcrops were however identified. Discrepancies between the geophysical trend and measured bedding strike may indicate the presence of north to northeast trending faults.
It is recommended that additional exploration at Gjedde Lake be conducted with limited drilling, geochemical deep soil sampling, and detailed mapping.

Emneord: evaluation report, gold, Pasvik, sulfidization, geophysics

For GEOCARE AS

David Ettner

Anne Gunn Rike

Adresse: GEOCARE AS Veritasveien 2 1322 Høvik

Telefon: 67 57 84 50

Telefaks: 67 57 82 01

Foretaksnr: 957424953 I MVA

Introduction

Recently greenstone belt-hosted gold deposits have been discovered and exploited on the northern Baltic Shield. These gold deposits include the Pahtohavre deposit in Sweden, the Saattopora and Pahtavaara deposits in Finland, and the Bidjovagge deposit in Norway (Figure 1). In 1993 an outcrop with gold up to 10 ppm was discovered by Victor Melezhik of NGU in the Pasvik greenstone belt in eastern Finnmark county of Norway. The gold was found as disseminations in sulfide-bearing quartzites with associated quartz-arsenopyrite-carbonate veins along the shore of the informally named *Gjedde Lake*.

Kenor AS claimed the area and contracted geologists from Geocare AS to conduct geological recconnasaince and sampling, and NGU to conduct geopyhsical investigations. During the follow-up investigation by Geocare AS additional anomalous concentrations of gold were discovered within an elongated area approximately 550 meters long and 60 meters wide. The gold appeared to occur where magnetite in quartzite host rocks had been replaced by sulfides. The geophysical investigation showed negative magnetic anomolies where sulfide-bearing quartzites were found and weak IP anomalies between the area with observed sulfide-bearing quartzites. There is significant potential for discovering additional gold mineralization and therefore limited exploration drilling, deep soil geochemical sampling, and additional geophysical magnetometry are recommended for the next phase of exploration.

Location

The gold prospect is situated in the Sør-Varanger district, eastern Finnmark County, where Norway borders Finland and Russia (Figure 1). The prospect is situated 190 meters above sea level in a hilly to marsh-lake terrain. A paved road and high voltage power line pass within 3.5 km of the prospect. The international airport and deep harbor port at Kirkenes, Norway, is located 75 km north along the paved road.

The *Gjedde Lake* gold prospect is located at the un-named lake three kilometers south of Oksfjellet (Soadnoai'vi) as shown on the Vaggatem 1:50 000 topographic map (Blad 2333 I). The site is best reach by walking from the abandoned garbage dump near where Grandalen meets highway 885.

Regional Geology

Tectonostratigraphy

The Pasvik area is dominantly composed of a basement of Archean granitic gneisses that were transected by the Early Proterozoic Pasvik greenstone belt. The Pasvik greenstone belt represents a western segment of a regional greenstone belt that stretches discontinuously from the eastern Kola peninsula to the Polmak area of Finnmark (Figure 2). Aside from the Pasvik greenstone belt, the Polmak, Pechenga, Imandra-Varzuga, and Ust' Ponoy greenstone belts are mapped along this stretch. The contact between the Polmak and Pasvik greenstone belts was intersected in Finland by a younger granitic batholith. Aside from the well known nickelcobalt-copper deposits in the Pechenga greenstone belt, no other metals are being actively exploited from these greenstone belts. Gold occurrences were previously unknown in the Pasvik region but have been found within the Kola peninsula greenstone belts (pers. comm. V. Melezhik, 1995).

The Pasvik greenstone belt is composed of a sedimentary - volcanic rock assemblage of basaltic and andesitic volcanic rocks, sandstones, siltstones, blacks shales, and minor dolostones of the Petsamo Supergroup (Figure 3) (Siedlecka et al., 1985; Lieungh, 1988a, 1988b; and Melezhik, 1994). The Petsamo Supergroup was divided into two groups: the Pasvik Group and the overlying Langvannet Group. Generally, the basaltic volcanic rocks and black shales of the Pasvik Group were suggested to have been deposited in an early to transitional intracontinental rift (2.4 to 1.9 ma), followed by depostition of andesitic volcanic rocks and sediments of the Langvannet Group in a collision-related phase of the same rift (1.9 to 1.8 ma) (Melezhik and Sturt, 1994).

The Langvannet Group, in which the *Gjedde Lake* gold prospect is hosted (Figure 3), is generally comprised of a basal black shale which was overlain by andesitic volcanic rocks and volcanoclastics. Within the andesitic assemblage there are minor interbeds of (presumed) graphitic schists and magnetite-bearing quartzites. The (presumed) graphitic schists were previously mapped by airborne geophysical surveys (Lieungh, 1988a and 1988b).

Structures

The rocks of the Pasvik greenstone belt dip in a generally southerly direction. Low angle thrusts faults were mapped along the southern contact of the greenstone belt (Lieungh, 1988a and 1988b). The regional structure of the Pasvik greenstone belt is dominated by a northern synform and a southern antiform which folds both the bedding and low angle faults (Lieungh, 1988a and 1988b). Additional tight folds were mapped in the Langvannet Group near Skogfoss (Lieungh, 1988a) which suggested that a fault or fold slip-surface may have existed between the Pasvik and Langvannet groups. This contact is also described by Melezhik et al. (1994) as a tectonic contact.

A series of northeast-trending, in addition to some northwest-trending, high angle faults were mapped intersecting the hinges and limbs of the antiform and synform (Lieungh, 1988a and 1988b, Melezhik et al., 1994). One northeast-trend high angle fault extending southward to the northeast corner on *Gjedde Lake* was mapped by Melezhik (1995).

Gjedde Lake Geological and Geophysical Investigations

There is prior to 1995 no publish record of gold occurrences in the Pasvik region of Norway, although nickel, copper, and iron deposit are known (Juve et al., 1985). The recent discovery of gold at the informally named *Gjedde Lake* has resulted in limited reconnaissance sampling and geophysical investigations of the area.

Recent work at *Gjedde Lake* has been conducted in three phases:

- Phase one was the discovery of the gold occurrence and follow-up field work (1993-1994) by Victor Melezhik at NGU (Melezhik, 1995).
- Phase two was the additional reconnaissance and rock-chip sampling by David Ettner at Geocare AS during July and August, 1995.
- Phase three was the geophysical measurements by Torleif Lauritsen at NGU during August, 1995, (Lauritsen, 1995).

Gjedde Lake Geology

The area surrounding *Gjedde Lake* is low lying and rather swampy with generally limited exposure. *Gjedde Lake* is aligned with a geophysical anomaly interpreted to be a graphitic schist unit (Figure 4). The geophysical anomaly extends 2.5 kilometers further southwest and several kilometers east to the Russian border (Figure 4). Scattered outcrops and blocks of quartzites, calcite-plagioclase-hornblende schist, and amphibolite were found along the southern shore of *Gjedde Lake*. The soil cover did not appear to be thick and the blocks are assumed to be sub-outcrop rather than transported because of their close proximity to outcrops of the same lithology. The measured strike of the units ranges between N60W (Melezhik, 1985) to N80E (Lieungh, 1988b). The dip of the units varies between 20°S (Lieungh, 1988b) and 50°S.

The discovery outcrop and blocks are located along the southern shore of *Gjedde Lake* (Figure 5a) and was mapped in detail by Melezhik (1995). The discovery blocks were composed of both quartzite with disseminated sulfides and quartz-carbonate veins containing coarse arsenopyrite crystals. The quartzites were medium grained dominated by quartz (80-95%) with subordinate actinolite (3-10%) and minor calcite, graphite, and plagioclase (Melezhik, 1995). The quartzites were foliated in places where sulfides were present (Figure 5b). The disseminated sulfides comprised up to 5 -10% in the quartzites, and included pyrite, pyrrhotite, chalcopyrite, and arsenopyrite, with minor amounts of magnetite was also observed (Melezhik, 1995). Gold crystals 35-65 microns occurred as disseminations on the surfaces of sulfide grains (Melezhik, 1995).

The quartz veins cross-cutting the quartzite were observed to be up to one meter thick. These veins also contained carbonate, arsenopyrite, and minor amounts of pyrrhotite and chalcopyrite. The quartz was generally milky and fine to very coarse crystalline. This range in quartz crystal size may represent brecciation along shear planes. Although milky quartz veins are rather common in the Pasvik greenstone belt, these particular quartz-carbonate veins with arsenopyrite mineralization were only observed at the discovery area.

Geochemical analysis of the quartzites and the quartz-carbonate veins showed anomalous values of both gold and arsenic (Table x). The highest gold value of 9.63 ppm was found in a block of sulfide-bearing quartzite. Follow-up sampling during the second phase confirmed the presence of anomalously high gold contents in the quartzite. Of the 41 samples collected from *the Gjedde Lake* area ten samples contained between 10 and 1.0 ppm gold, five samples contained between 0.1 and 1.0 ppm gold, and 12 samples contained between 0.01 and 0.1 ppm gold (Table 1, Figure 6). Arsenic values in gold samples ranged between non-detection values to 31500 ppm (Table 1, Figure 7). As indicated by Melezhik (1985) there was no clear correlation between gold and arsenic values alothough samples with high gold values generally had high arsenic concentrations (Figure 8). Selected geochemical analyses are shown in Table 1 and in the Appendix are presented the complete geochemical analyses from both rock-chip sampling rounds by NGU and Geocare AS.

The amphibolite and schist lithologies did not exhibit signs of significant alterations. Carbonate observed in the amphibolite and the calcite-plagioclase-hornblende schist may however represent subtle alteration.

In respect to the discovery area, the anomalous gold-bearing blocks were found 100 meters west along strike, 450 meters east along strike, and 50 meters northward on the island in *Gjedde Lake* during the second phase of this investigation (Figure 6). This indicates a potential gold mineralized strike length of at least 550 meters with a width of 50 meters.

Also, during the second phase of this investigation, the quartzite was walked along the southern edge of the geophysical anomaly for 2.5 kilometers along the western extent, and approximately 3 kilometers on the eastern extent (Figure 4). The in outcrop or in blocks quartzite observed during this transverse was magnetite-bearing with some hematite. The magnetite occurred as dark bands and lenses which were strongly magnetic (Figure 9). The quartzite may be therefore considered as an iron formation. Geochemical samples of magnetite-bearing quartzite contained very low levels of gold and arsenic.

It is interpreted that the magnetite in the quartzites at the *Gjedde Lake* gold prospect was replaced by sulfides, including pyrite, pyrrhotite, chalcopyrite, and arsenopyrite as a sulfidization reaction during gold mineralization. Based on the mapping of magnetite-bearing blocks and outcrops, a potential sulfidized surface trend up to 1500 meters long may extend along the quartzite.

Gjedde Lake Geophysics

During the phase three investigation at *Gjedde Lake*, IP (Induced Polarization), RP (Resistivity Potential), SP (Self Potential), magnetometry (total field measurements) and VLF (Very Low Frequency) measurements were conducted along 15 north trending profiles (spaced at 50 meters intervals) (Lauritsen, 1985). The investigation focused on the area along the southern contact of the (presumed) graphitic schist where the quartzite was assumed to be located. A total of 3,700 meters of profiles were investigated.

Based on the fact that the mineralized quartzite was sulfide-bearing, and the magnetite-bearing quartzites gold-barren it was assumed that the geophysical investigation would be able to determine the extent of mineralization. A combination of IP, RP, and SP was expected to show areas of weak sulfide impregnation. VLF measurements were also expected to indicate good conductors, such as the (presumed) graphite schist, sulfide-bearing quartzite, or faults. Magnetic anomalies without VLF anomalies were expected to indicate the presence of magnetite, while a magnetic anomaly with a VLF anomaly was expected to show the presence of pyrrhotite. Breaks in a magnetic anomaly were also expected to indicate a potential zone of sulfidization of the magnetite-bearing quartzite.

Results of the IP, RP, and SP Measurements

The presence of the highly conductive unit presumed to be graphitic schist posed problems for the IP, RP, and SP measurements. The interpreted contact to the (presumed) graphite schist was fairly well defined because of its high conductivity.

The IP measurements showed a series of weak anomalies, and a few moderate to very weak anomalies which are interpreted to run parallel to the (presumed) graphitic schist contact (Figure 10). The SP measurements showed a gradual increase toward the (presumed) graphitic schist contact and minor conductors south of the contact. There were very few correlations between the SP and the IP anomalies indicating only very weak sulfide mineralization. The profile which was placed over the discovery area showed no anomalies.

Results of the VLF and Magnetometry Measurements

The VLF measurements indicated an anomaly just south of the (presumed) graphitic schist contact as indicated by the RP measurements. This was interpreted to be the result of the shallow dip of the (presumed) graphitic schist (Figure 11). No other VLF anomalies were found where the quartzite was presumed to trend.

The magnetometry measurements showed both positive and negative anomalies along the southern edge of the (presumed) graphitic schist (Figure 11). Negative anomalies were found in the discovery outcrop area and the eastern edge of *Gjedde Lake* where sulfide-bearing quartzite blocks with anomalous gold were also discovered during the second phase of the investigation. Moderately positive magnetic anomalies were found both in-between the two negative anomalies and to the west of the discovery area.

Interpretation of Geophysical Anomalies based on Geological Observations

The combination of geological data (such as the observed occurrence of sulfide-bearing blocks and bedding strikes and dips) and the geophysical measurements provide some important observations for the exploration of gold mineralized sulfide-bearing quartzites at *Gjedde Lake*.

In comparing the occurrence of sulfide-bearing quartzite with the geophysical information the following two general statements may be made:

- Weak IP anomalies were found stretching in-between where sulfide-bearing quartzite were observed (Figure 10).
- Negative magnetic anomalies occurred found where sulfide-bearing quartzite were observed (Figure 11).

The area stretching between the sites with observed sulfide-bearing quartzite blocks has a moderately positive magnetic anomaly and a fairly continuous weak IP anomaly. This may be the result of either magnetite-bearing or pyrrhotite-bearing quartzites. The presence of a VLF anomaly over the area may suggest the presence of pyrrhotite-bearing quartzites.

Similarly, the area west of the discovery has a moderately positive magnetic anomaly and a moderate IP anomaly indicating a potential for either magnetite-bearing or pyrrhotite-bearing quartzites.

Strike and dip measurements of the bedding are inconsistent with the interpreted trend of the (presumed) graphitic schist based on geophysics. The interpreted trend of the graphitic schist was approximately N80E dipping shallowly southward. Strike and dip measurements by Lieungh (1988b) just south of *Gjedde Lake* were approximately N50E 39S and N80E 20S. Strike and dip measurements collected by Melezhik (1995) were approximately N60W 50S and N65W 40S. One measurement near the discovery area collected during the second phase was N67E 50S. If these measurements are correct then the structural nature of the area was complicated by faulting or folding. For example, a series of north to northeast trending faults may explain the northwest strike of bedding and the offsets of northeast trending geophysical.

Detailed mapping of the *Gjedde Lake* area would help to understand the structural situation. Recognition of faults through the quartzite may give an explanation for the localization of sulfide and gold mineralization in the quartzite. Also, the recognition of faults may provide exploration targets for more intense mineralization.

Suggested Genetic Model of Gold Mineralization

Exhalative Model

A submarine exhalative genetic model was suggested by Melezhik (1995) to explain the presence of gold and sulfides in an altered *cherty quartzite*. The geochemistry of the quartzite was shown to be similar to cherts based on the ratio of iron and magnesium to titanium (Melezhik, 1995). This model suggested that the gold was precipitated from a sulfur and silica-rich solution in an anoxic ocean floor environment.

Epigenetic Model

The genetic model preferred by Geocare AS after field investigations during the second phase of this study is a epigenetic model. In the epigenetic model, hydrothermal solutions carried gold upwards along conduits, such as fault zones, and precipitated gold in a reactive host rocks. This model suggests that gold was transported as a sulfur complex (such a $Au(HS)_2^-$) in hot (ca. 300°C) reducing H_2O-CO_2 solutions along fractures. The precipitation mechanism is presumed to be the sulfidization reaction between the sulfur-rich reducing solution and the magnetite in the quartzite. In this reaction, the sulfur is effectively removed from solution and the gold therefore precipitates with the sulfides. Ore deposits of this type include pyritic gold deposits in iron formations in Western Australia (Phillips et al., 1984).

Alteration associated with this type of process is typified by carbonatization of the host rocks (Kerrich, 1983). Carbonate has been observed in the amphibolites and schists near the discovery area at *Gjedde Lake* and may be an alteration product. Additionally, these type of systems may enrich the country rock with elements such as arsenic, boron, copper, lithium, lead and antimony (Kerrich, 1983).

The quartz-arsenopyrite-carbonate veins can also be related to the epigenetic model. As the system cooled quartz would dominantly precipitate. Cooling is however considered to be a poor precipitation mechanism for gold with respect to the formation of economic deposits. Quartz veins developed according to this model would be low in gold, such as those observed at *Gjedde Lake*.

For an economic gold deposit of this type to form three main factors had to have been fulfilled:

1. The presence of large quantities of gold-bearing solutions
2. Conduits to transport large quantities of gold bearing solutions
3. Reactive host rocks that are structurally prepared (i.e. fractured or faulted) or permeable enough to allow large quantities of rock to be altered.

Conclusions

Recent geological investigations have confirmed the presence of gold mineralization at *Gjedde Lake* in the Pasvik region of Finnmark County.

Gold mineralization appears to be the result of a fluid reaction with magnetite-bearing quartzites which resulted in the sulfidization of the magnetite to pyrite and pyrrhotite. Sulfidization allowed the gold to precipitate because sulfur was removed from the gold bisulfide complexes. Quartz-arsenopyrite-carbonate veins probably represent the fluid conduits, and although the veins have anomalous gold values, gold was not effectively concentrated because no sulfidization reactions occurred within the veins.

The potential for an economic gold deposit at *Gjedde Lake* may be dependent on whether the quartzites had been sufficiently structurally prepared so that large volumes of gold-bearing fluids could react with sufficient quantities of magnetite-bearing quartzites. This possibility was increased if the quartzite was indeed offset by a series of northeast trending faults or the quartzite itself lies along a shear zone.

Rock chip sampling during the 1995 field season extended the area of known mineralization to a potential zone measuring 550 meters long and up to 50 meters wide. Gold concentrations from samples were variable along the surface and were highest in the discovery area. Geophysical investigations did not show a continuous geophysical anomaly between the areas with observed sulfide-bearing quartzites. Rather, the geophysical investigation indicates that the sulfide-bearing zone is discontinuous or disrupted by faults.

Recommended Work

Follow-up work at *Gjedde Lake* should focus on determining the extent of gold mineralization. A three step program is recommended for the next phase of exploration. These steps are:

1. The drilling of two or three bore holes
2. Deep soil geochemistry sampling and mapping
3. Continued magnetometry survey

Two to three bore holes are suggested to test areas where surface sampling and geophysics indicated the presence of sulfide-bearing quartzite (Figure 12). Each hole is recommended to be approximately 100 meters long. Drilling during the spring of 1996 where the drill rig may be brought in by snow sled would be a preferable method than drilling during the summer because of transport problems. Examination of drill core that has intersected the same horizon from the Skjellbekken (Skal'zujåkka), and possibly archived at NGU Data Center, Løkken, may provide important background information on the thickness and character of the quartzite.

If the drilling gives positive results then the second recommended step would be to determine the extent of potential mineralization along the trend of the quartzite. Considering the lack of significant outcrops and fairly shallow soils it is recommended that deep soil geochemical samples be collected along a grid covering the area where no magnetite-bearing quartzite has been observed. Spacing along this grid could be approximately 50 meters. This would entail approximately 120 samples.

Detailed mapping of the area would help to determine if the area has faults which are potential exploration targets.

In addition to determining the potential for sulfide zones in the quartzite, a magnetometric survey over the soil sampling grid could identify the magnetic lows. This survey could be conducted with a proton magnetometer carried along the grid. Additional geophysical studies such as IP, RP, SP, and VLF did not provide clear results and therefore are not recommended for further investigation during this phase of evaluation.

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Table 1: Selected Geochemical Anayses from Gjedde Lake rock chip sampling (Geocare and NGU)

Gjedde Lake Geochemical Analyses

Sample	Lithology	Au ppm	As ppm	Cu ppm	Pb (ppm)	Sb (ppm)	Li (ppm)	Zr (ppm)
GJ95-001	sulf-qtzt	0,75	6621	21	14	22	<2	n/a
GJ95-002	sulf-qtzt	0,45	283	10	9	22	<2	n/a
GJ95-003	sulf-schist	0,01	66	174	20	32	3	n/a
GJ95-004	hema-qtzt	0,25	148	18	12	20	<2	n/a
GJ95-005	hema-qtzt	0,02	205	10	28	25	<2	n/a
GJ95-006	hema-qtzt	0,03	281	6	9	22	<2	n/a
GJ95-007	sulf-amph	<0,01	28	40	16	28	24	n/a
GJ95-009	hema-qtzt	<0,01	9	222	7	19	<2	n/a
GJ95-010	hema-qtzt	0,02	14	55	<5	18	<2	n/a
GJ95-011	sulf-qtzt	2,57	17403	56	14	29	<2	n/a
GJ95-012	qtzt	<0,01	88	77	9	26	<2	n/a
GJ95-013	qtzt	<0,01	154	54	11	26	13	n/a
GJ95-014	sulf-qtzt	0,22	23	305	10	26	<2	n/a
GJ95-015	sulf-qtzt	<0,01	31	235	9	23	3	n/a
GJ95-016	hema-qtzt	<0,01	21	9	10	23	<2	n/a
GJ95-101	sulf-qtzt	6,02	43	166	12	25	<2	n/a
GJ95-102	sulf-qtzt	1,44	2713	7	13	23	<2	n/a
GJ95-103	sulf-bio-sch	0,01	151	65	12	26	19	n/a
GJ95-104	sulf-qtzt	<0,01	35	28	10	21	<2	n/a
GJ95-107	sulf-gneiss	<0,01	24	5	17	17	3	n/a
GJ95-108	bio-schist	<0,01	30	62	14	25	16	n/a
GJ95-109	sulf-qtzt	<0,01	25	452	11	26	<2	n/a
SP-30	sulf-qtzt	9,63	8	n/a	--	n/a	n/a	7
93/6-1	sulf-qtzt	9,1	15	n/a	--	n/a	n/a	--
93/1	sulf-qtzt	4,74	13	n/a	--	n/a	n/a	6
93/6	sulf-qtzt	4,49	5842	n/a	--	n/a	n/a	6
93/3	sulf-qtzt	1,25	--	n/a	--	n/a	n/a	7
93/4	sulf-qtzt	1,2	48	n/a	--	n/a	n/a	6
93/5	sulf-qtzt	1	--	n/a	--	n/a	n/a	6
SP-33	sulf-qtzt	0,44	31500	n/a	--	n/a	n/a	6
93/2	qtzt	0,02	11	n/a	--	n/a	n/a	8
93/12	qtzt	--	--	n/a	--	n/a	n/a	--
93/7	amph-qtzt	0,02	18	n/a	--	n/a	n/a	9
SP-31	vein	0,04	--	n/a	--	n/a	n/a	6
SP-31A	vein	0,02	414	n/a	--	n/a	n/a	--
93/13	mag-qtzt	0,01	--	n/a	--	n/a	n/a	9
93/14	mag-qtzt	0,04	--	n/a	--	n/a	n/a	6
SP-34	schist	0,01	63	n/a	--	n/a	n/a	97
93/20	schist	--	--	n/a	--	n/a	n/a	217

Note: <0,01 and -- indicate values below detection limit
n/a indicate that analysis was not conducted

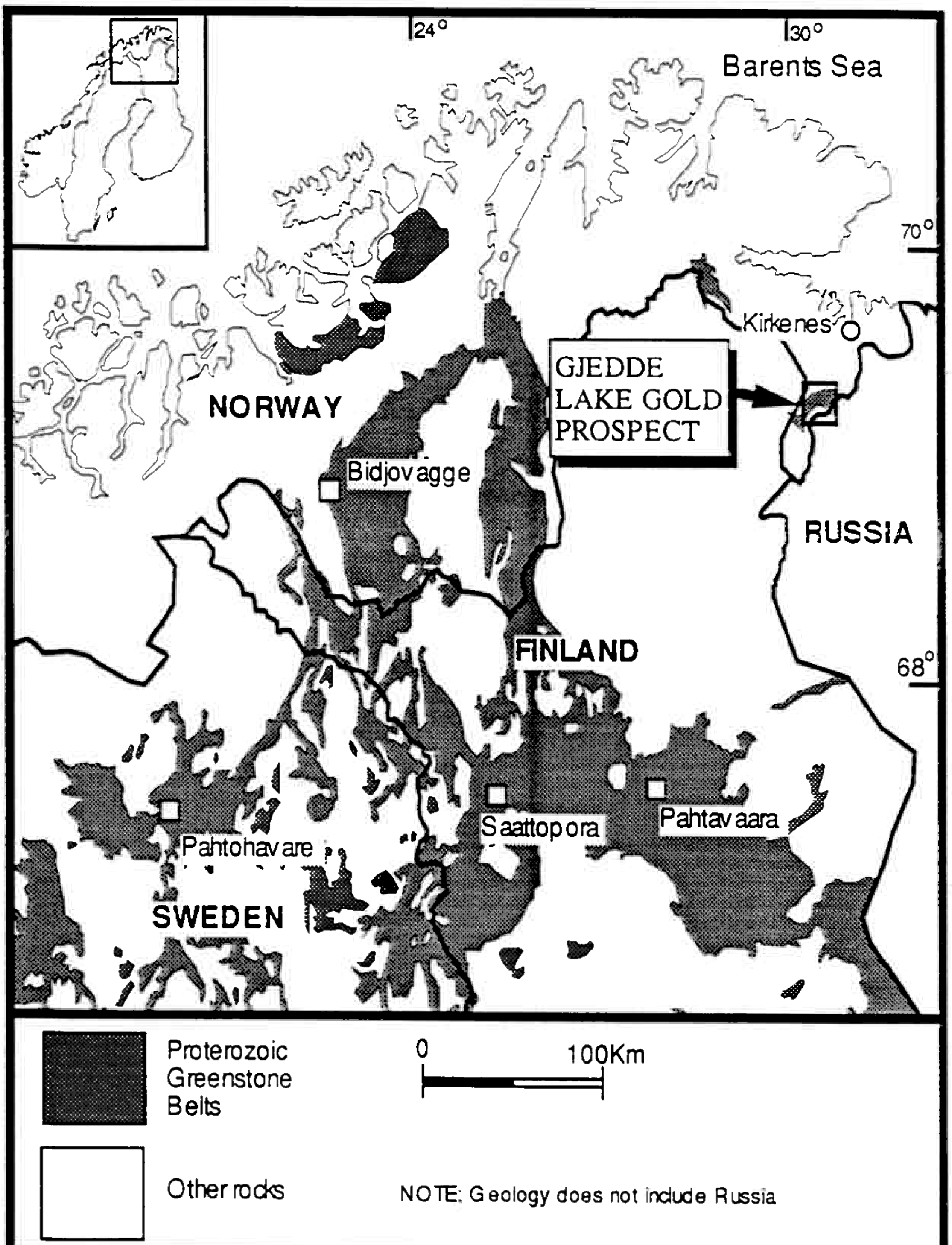


Figure 1. Proterozoic greenstone belts on the northern Baltic shield and the general location of the Gjedde Lake gold prospect (after Krill et al., 1988).

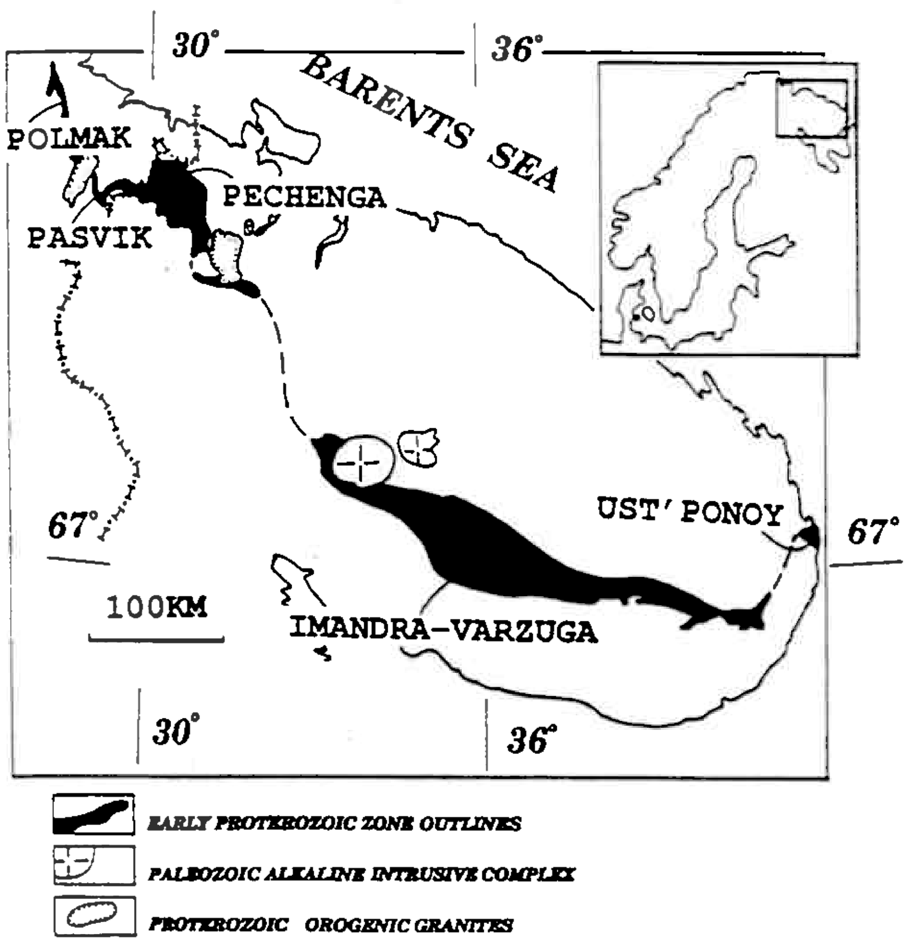


Figure 2. Greenstones of the Pasvik Kola Region.
Reproduced from Melezhik et al, 1994.

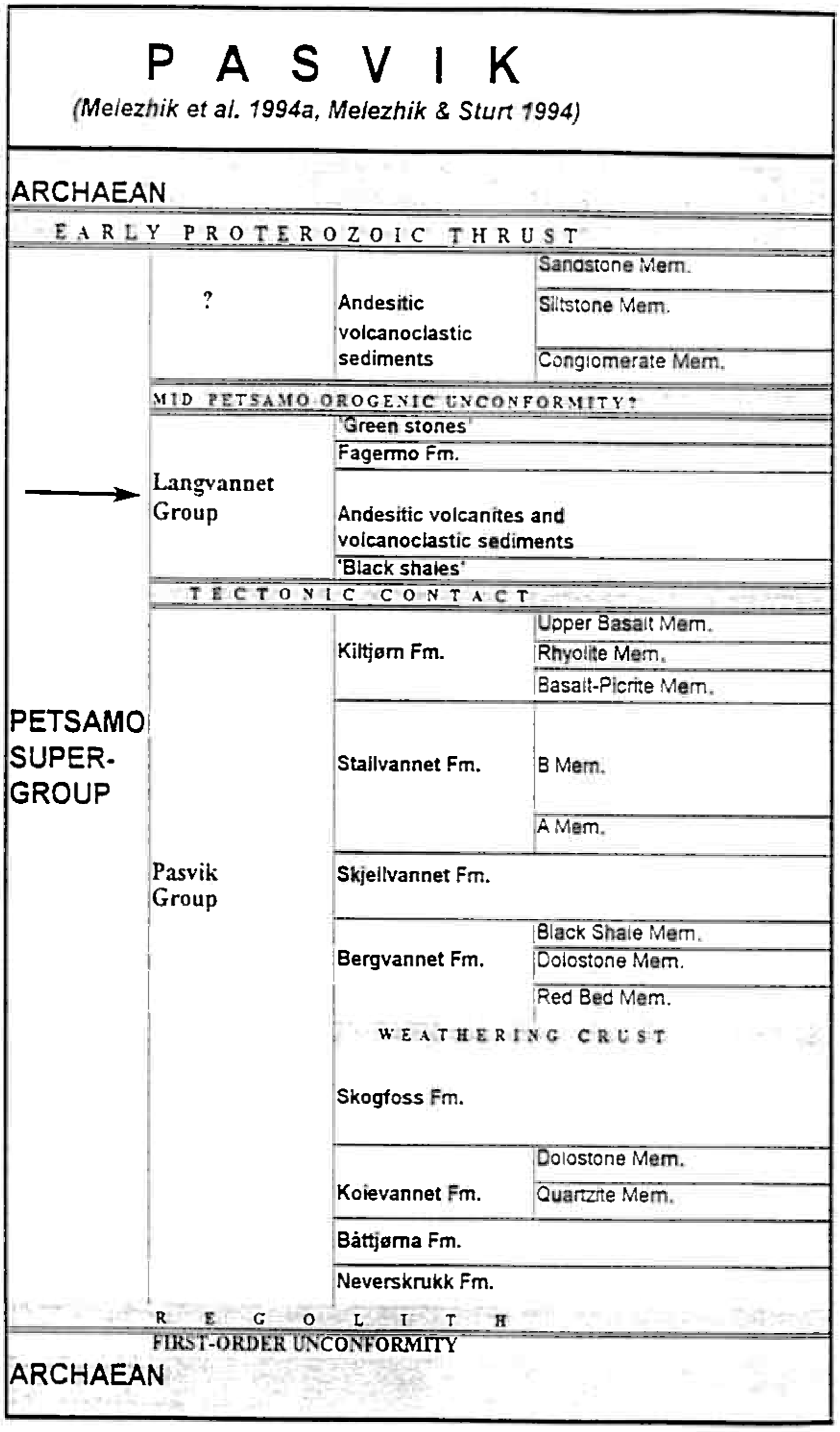
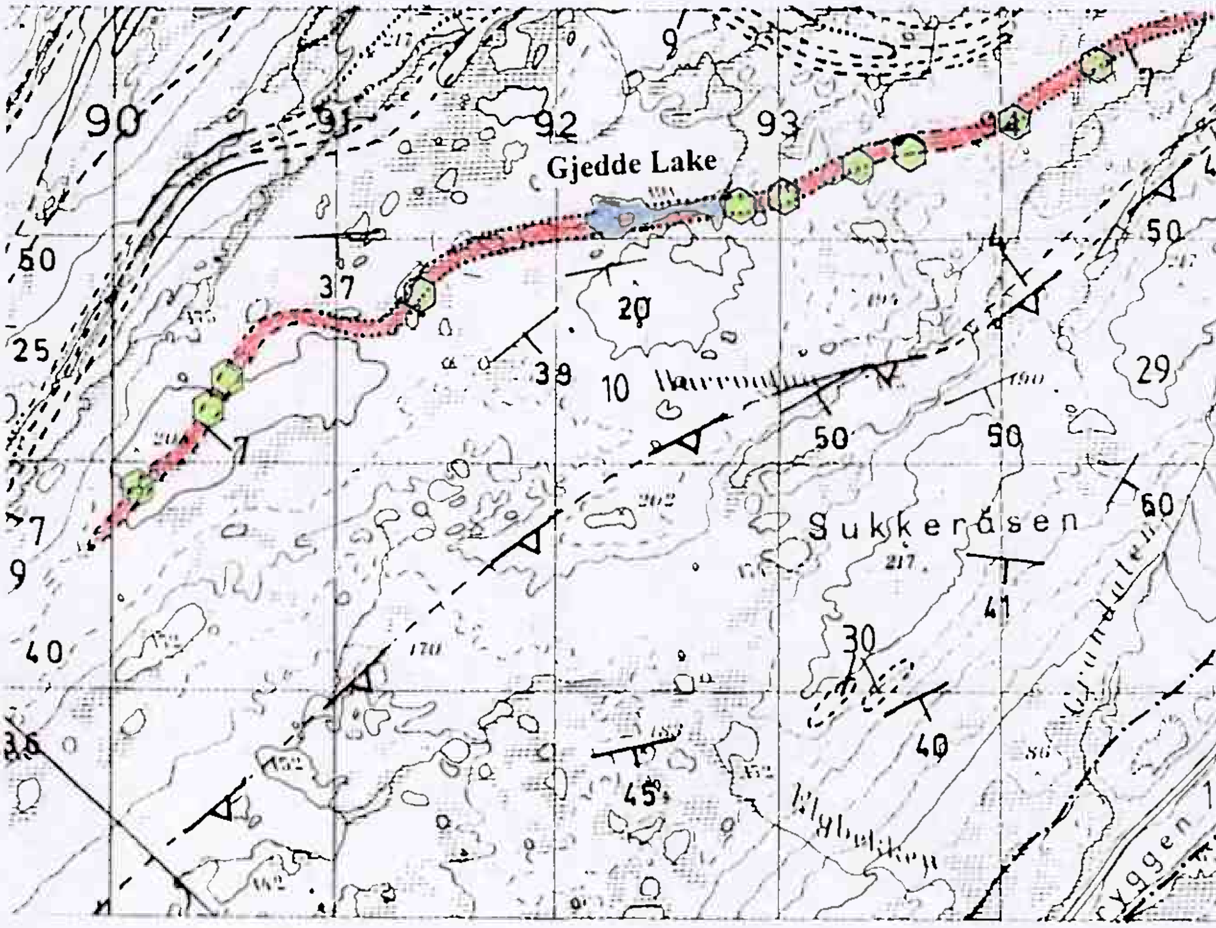


Figure 3. Lithographic subdivision of the Pasvik Greenstone Belt (from Melezhik, 1995). The arrow indicates the approximate location of the Gjedde Lake occurence.

GEOCARE



1000 meters

Areas where outcrops or blocks of magnetite-bearing quartzite were found.

Supposed graphitic schist along the geophysical anomoly

Figure 4. Geologic map of the Gjedde Lake area with graphitic schist (geophysical anomaly) and location of magnetite-bearing blocks (after Lieungh, 1988b).

Figure 5a: Gjedde Lake with discovery blocks along the shore in foreground.

Figure 5b: Folliated sulfide-bearing quartzite.

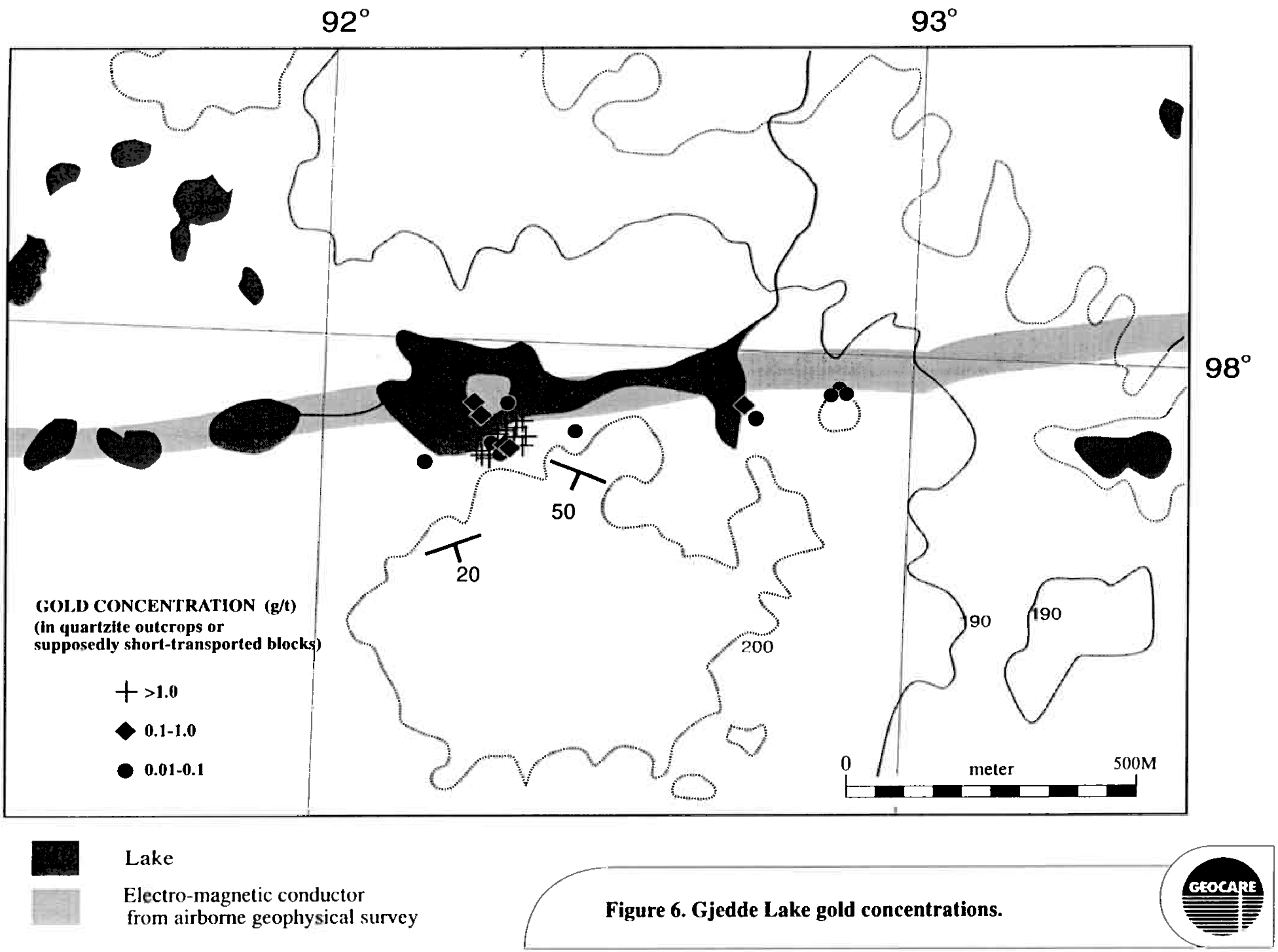


Figure 6. Gjedde Lake gold concentrations.

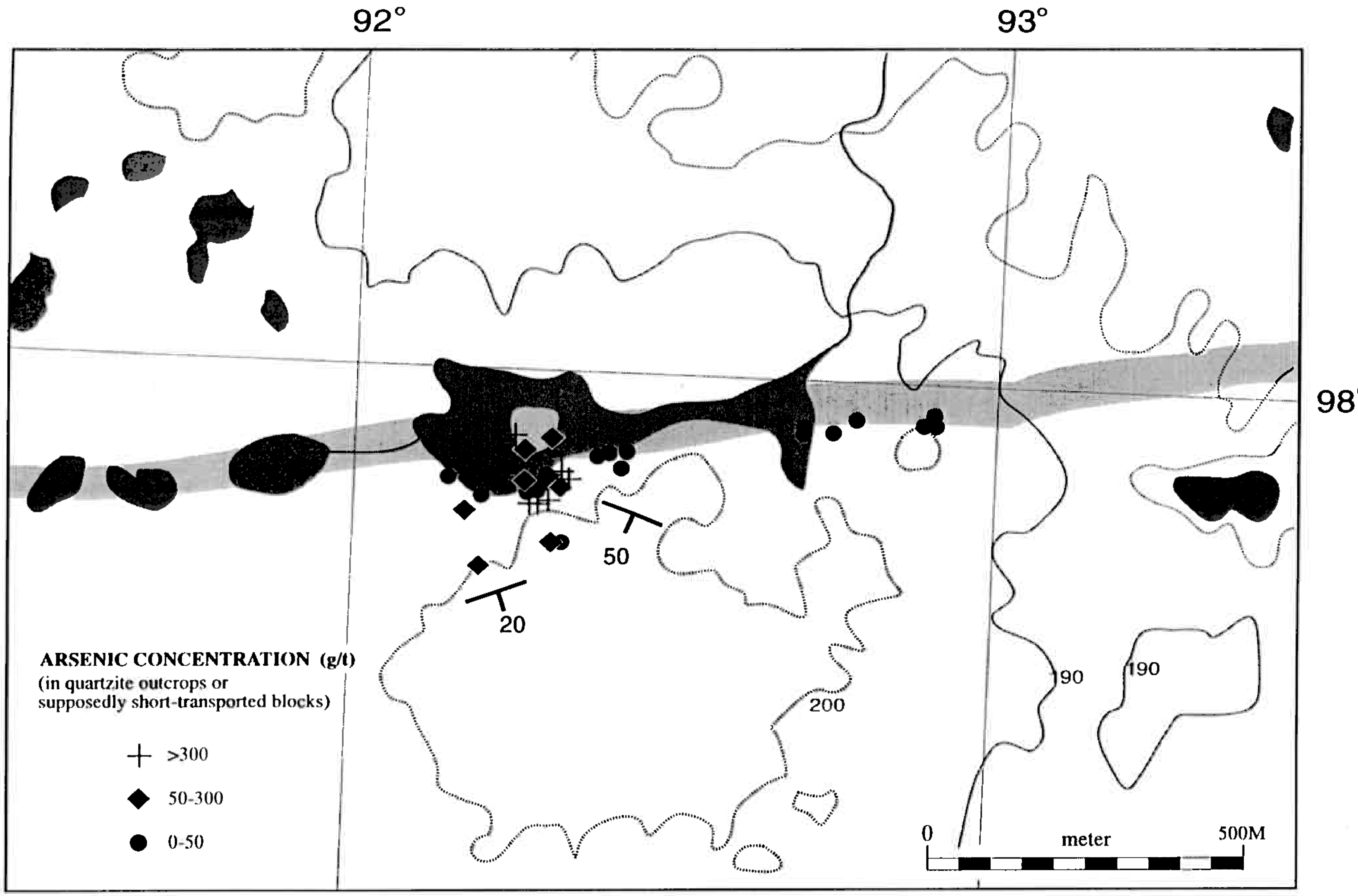


Figure 7. Gjedde Lake arsenic concentrations.

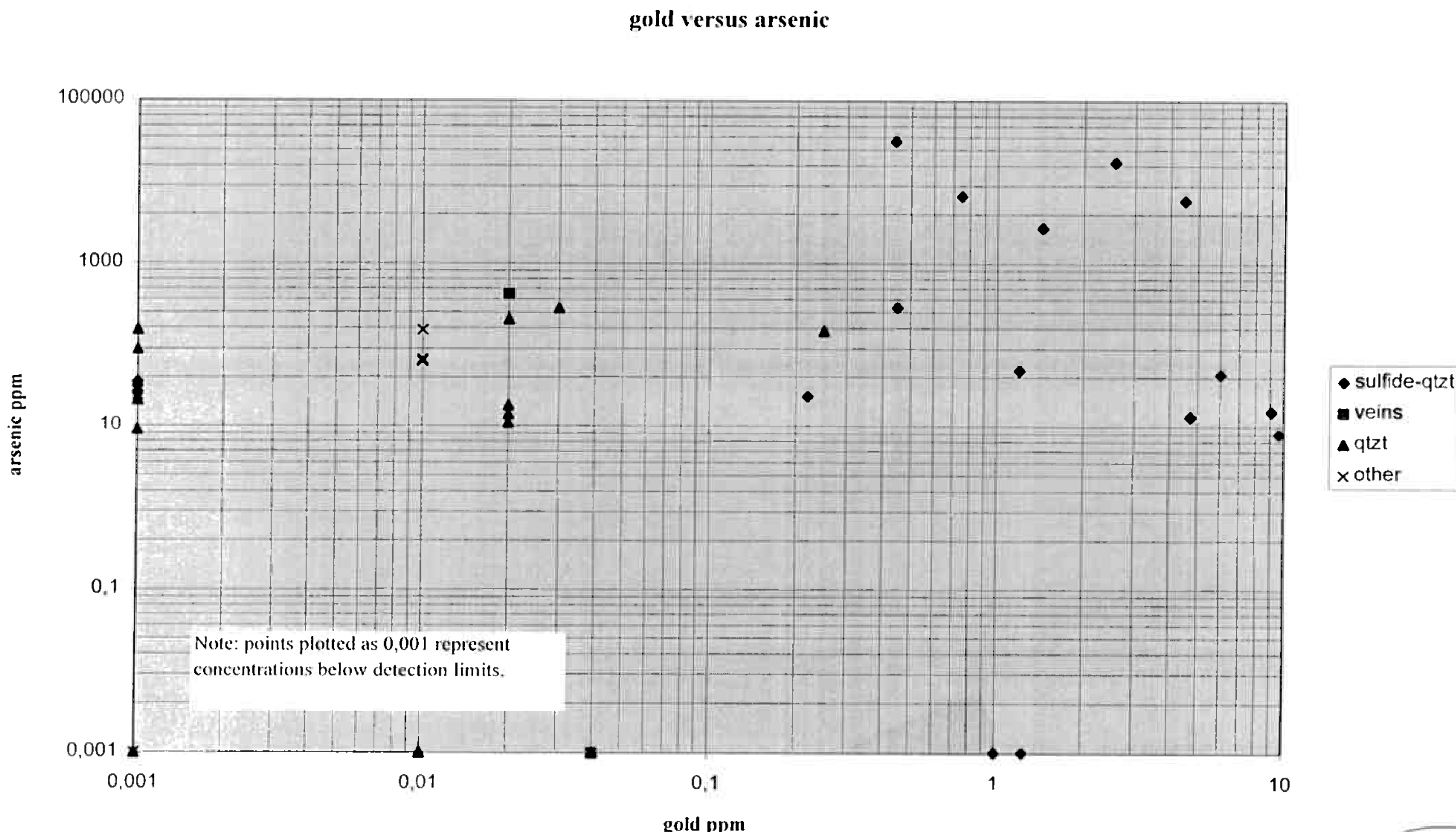


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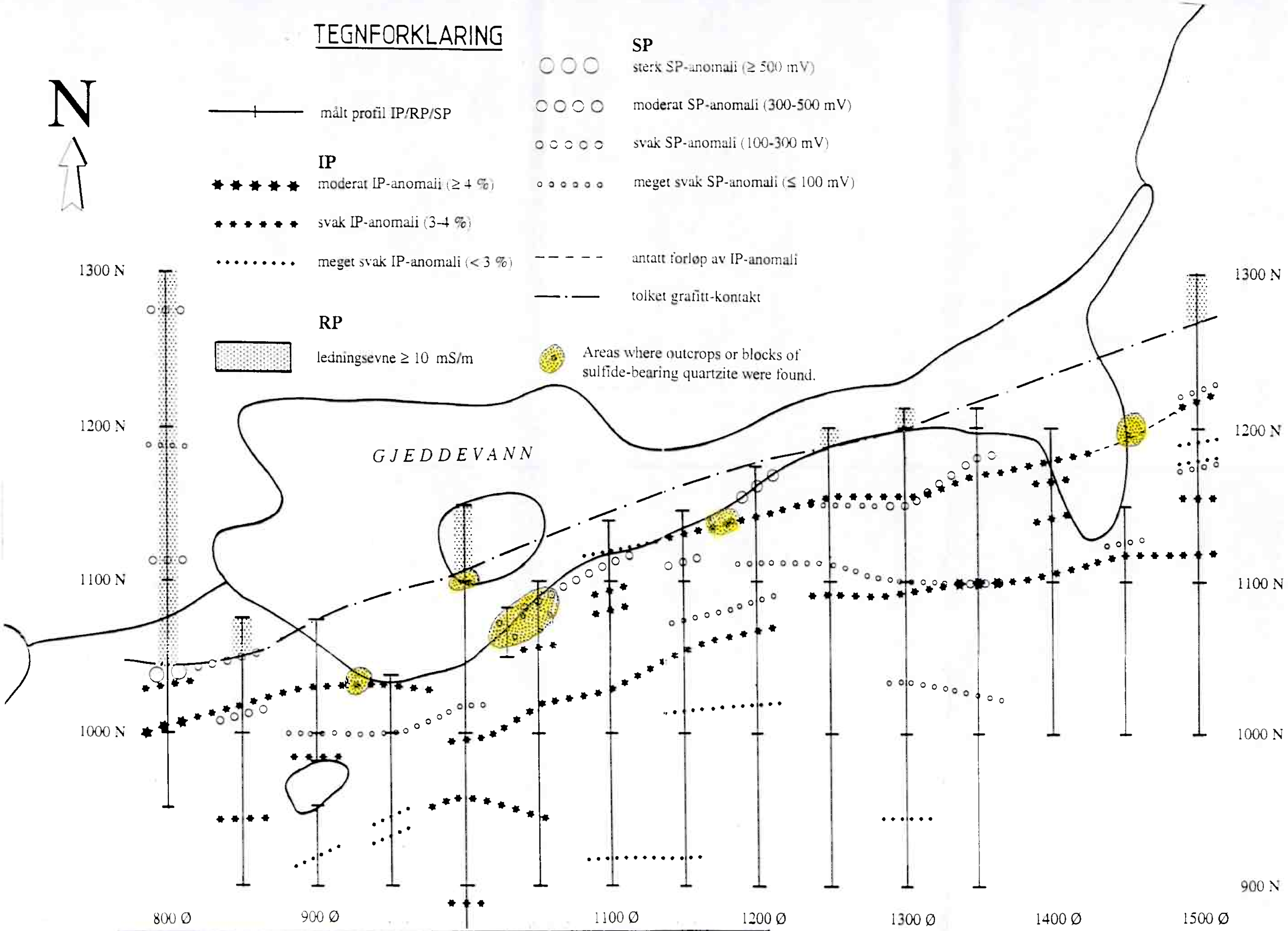
Figure 8. Gold versus arsenic values from Gjedde Lake from NGU and Geocare rock-chip sampling.

Figure 9a: Magnetite-bearing quartzite with dark magnetite bands.

Figure 9b: Folliated magnetite-bearing quartzite with dark magnetite bands.



KENOR A/S GEOFYSISK TOLKINGSKART, IP/RP/SP **GJEDDEVANN, PASVIK** SØR-VARANGER, FINNMARK	MÅLESTOKK 1: 2 500	MÅLT T.L./T.S. TEGN T.L. TRAC KFR	AUG. 1995 SEPT. 1995
NORGES GEOLOGISKE UNDERSØKELSE TRONDHEIM	TEGNING NR 95.119-06	KARTBLAD NR 2333 I	

Figure 10: NGU IP, RP, and SP interpretation map with sulfide-bearing quartzite outcrops and blocks.

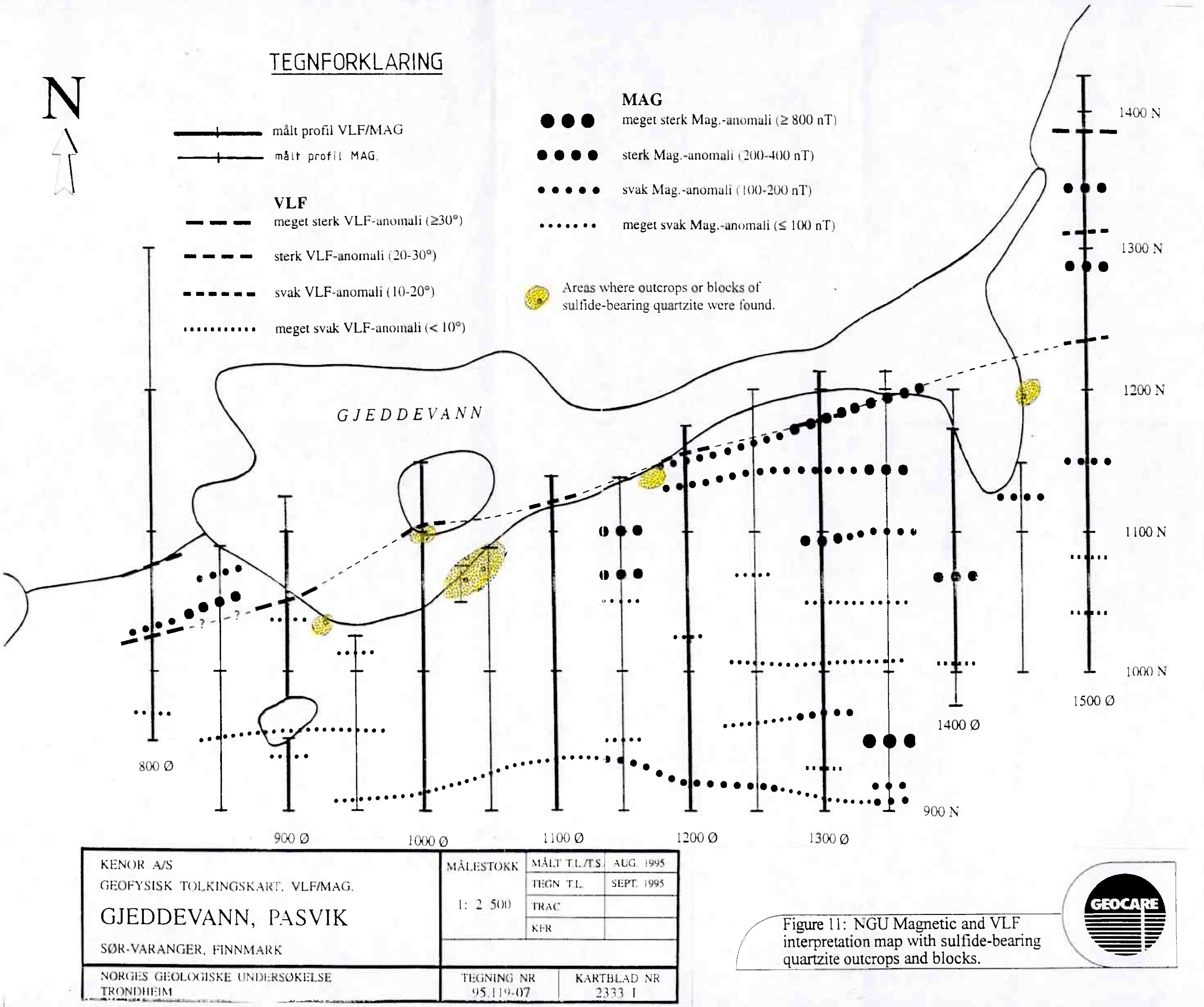


Figure 11: NGU Magnetic and VLF interpretation map with sulfide-bearing quartzite outcrops and blocks.

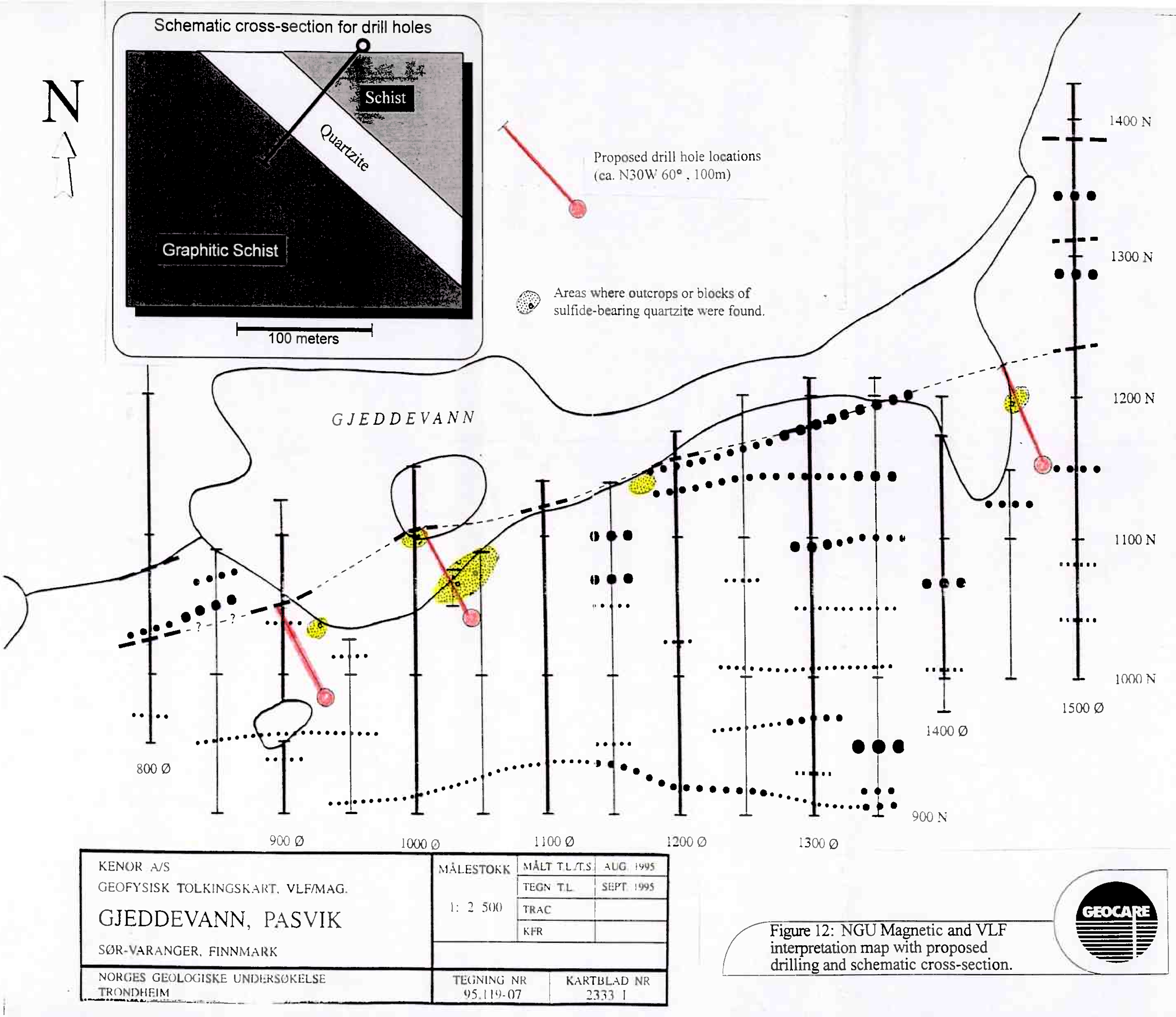


Figure 12: NGU Magnetic and VLF interpretation map with proposed drilling and schematic cross-section.

Appendix

Anamet Batch Number 95/912

Sample Number	Au(g/t)	Ag(ppm)	%Al	As(ppm)	Ba(ppm)	Be(ppm)	Bi(ppm)	%Ca	Cd(ppm)	Co(ppm)	Cr(ppm)	Cu(ppm)
GJ95-001	0.75	0.1	0.09	6621	62	<1	<0.5	0.18	<1	<5	93	21
GJ95-002	0.15	<0.1	0.05	283	54	<1	<0.5	0.07	<1	<5	83	10
GJ95-003	0.01	0.3	2.62	66	69	<1	4.0	2.31	<1	30	80	174
GJ95-004	0.25	<0.1	0.07	148	78	<1	<0.5	0.06	<1	<5	103	18
GJ95-005	0.02	<0.1	0.05	205	63	<1	1.3	1.45	<1	<5	65	10
GJ95-006	0.03	<0.1	0.05	281	63	<1	1.6	0.25	<1	<5	93	6
GJ95-007	<0.01	<0.1	6.29	28	80	1	4.2	3.30	<1	32	35	40
GJ95-008	<0.01	0.1	8.80	20	137	1	1.1	1.67	<1	35	56	207
GJ95-009	<0.01	<0.1	0.33	9	52	1	1.6	0.26	<1	5	119	222
GJ95-010	0.02	<0.1	0.04	14	43	<1	<0.5	0.04	<1	<5	171	55
GJ95-011	2.57	0.3	0.05	17403	66	<1	<0.5	0.04	<1	5	89	56
GJ95-012	<0.01	<0.1	0.94	88	66	<1	0.8	0.57	<1	45	76	77
GJ95-013	<0.01	<0.1	7.37	154	86	1	6.5	3.24	<1	6	73	54
GJ95-014	0.22	<0.1	0.16	23	67	<1	1.3	1.08	<1	7	102	305
GJ95-015	<0.01	<0.1	0.98	31	64	<1	3.1	1.24	<1	6	165	235
GJ95-016	<0.01	<0.1	0.04	21	62	<1	1.5	0.19	<1	<5	81	9
GJ95-101	6.02	0.8	0.16	43	72	<1	0.5	0.05	<1	5	112	166
GJ95-102	1.41	<0.1	0.18	2713	68	<1	1.5	0.25	<1	<5	79	7
GJ95-103	0.01	0.1	5.81	151	83	2	4.3	1.82	<1	29	64	65
GJ95-104	<0.01	<0.1	0.11	35	58	<1	3.3	3.70	<1	5	82	28
GJ95-105	<0.01	<0.1	5.99	11	760	1	<0.5	0.60	<1	<5	14	8
GJ95-106	<0.01	<0.1	0.48	12	77	<1	1.6	0.58	<1	<5	84	5
GJ95-107	<0.01	<0.1	6.44	24	225	2	<0.5	1.04	<1	<5	29	5
GJ95-108	<0.01	0.1	6.52	30	107	1	4.7	6.04	<1	30	98	62
GJ95-109	<0.01	0.2	0.97	25	71	<1	2.6	0.80	<1	15	120	452

Anamet Batch Number 95/912

Sample Number	%Fe	Ga(ppm)	%K	Li(ppm)	%Mg	Mn(ppm)	Mo(ppm)	%Na	Ni(ppm)	%P	Pb(ppm)	%S
GJ95-001	4.05	<5	<0.01	<2	0.40	218	16	0.02	<5	0.05	14	0.49
GJ95-002	3.67	<5	<0.01	<2	0.39	189	22	0.01	<5	0.04	9	0.08
GJ95-003	7.82	<5	0.04	3	2.25	3080	14	0.15	78	0.35	20	2.60
GJ95-004	5.51	<5	<0.01	<2	0.65	334	22	0.01	<5	0.05	12	0.08
GJ95-005	6.74	<5	<0.01	<2	1.11	496	13	0.02	<5	0.18	28	0.10
GJ95-006	3.73	<5	<0.01	<2	0.49	168	22	0.01	<5	0.05	9	0.06
GJ95-007	9.90	7	0.12	24	2.25	1297	6	2.19	9	0.35	16	0.72
GJ95-008	6.37	<5	0.18	18	0.18	1012	8	4.66	28	0.24	16	0.31
GJ95-009	2.92	<5	<0.01	<2	0.14	98	20	0.06	<5	0.05	7	1.03
GJ95-010	2.10	<5	<0.01	<2	<0.01	31	19	0.01	6	0.02	<5	0.10
GJ95-011	6.84	<5	<0.01	<2	0.35	109	17	0.01	<5	0.05	14	0.88
GJ95-012	5.99	<5	<0.01	<2	0.87	794	22	0.12	<5	0.11	9	0.07
GJ95-013	7.37	10	0.02	13	2.87	1098	7	2.81	78	0.33	11	0.12
GJ95-014	5.10	<5	<0.01	<2	0.42	692	15	0.03	5	0.13	10	1.02
GJ95-015	4.85	<5	<0.01	3	1.07	651	24	0.10	8	0.15	9	0.56
GJ95-016	5.72	<5	<0.01	<2	0.24	612	16	0.01	<5	0.05	10	0.30
GJ95-101	4.88	<5	<0.01	<2	0.34	179	17	0.01	5	0.04	12	1.54
GJ95-102	3.45	<5	<0.01	<2	0.37	182	19	0.01	<5	0.05	13	0.14
GJ95-103	9.62	5	0.05	19	2.03	1140	8	2.36	8	0.27	12	0.77
GJ95-104	3.80	<5	<0.01	<2	0.57	451	15	0.04	5	0.27	10	0.26
GJ95-105	0.48	12	4.85	4	0.06	146	7	1.64	<5	0.07	39	0.07
GJ95-106	3.93	<5	<0.01	<2	0.21	1209	14	0.01	<5	0.09	11	0.05
GJ95-107	1.44	6	0.63	3	0.18	269	16	3.48	<5	0.14	17	0.05
GJ95-108	10.15	9	0.09	16	2.70	1729	8	1.55	29	0.45	14	0.27
GJ95-109	6.04	<5	<0.01	<2	0.81	631	16	0.10	6	0.13	11	1.29

Anamet Batch Number 95/912

Sample Number	Sb(ppm)	Sc(ppm)	Sr(ppm)	%Ti	V(ppm)	Zn(ppm)
GJ95-001	22	<1	<10	<0.01	6	30
GJ95-002	22	<1	<10	<0.01	9	33
GJ95-003	32	5	17	0.07	60	161
GJ95-004	20	1	<10	<0.01	17	48
GJ95-005	25	1	21	<0.01	12	66
GJ95-006	22	<1	<10	<0.01	9	20
GJ95-007	28	47	147	0.86	214	104
GJ95-008	22	5	606	1.26	81	45
GJ95-009	19	<1	<10	<0.01	34	15
GJ95-010	18	<1	<10	<0.01	12	41
GJ95-011	29	<1	<10	<0.01	7	26
GJ95-012	26	3	10	<0.01	54	211
GJ95-013	26	41	69	0.64	122	87
GJ95-014	26	1	24	<0.01	16	24
GJ95-015	23	6	21	<0.01	45	39
GJ95-016	23	<1	<10	<0.01	5	19
GJ95-101	25	<1	<10	<0.01	14	36
GJ95-102	23	<1	<10	<0.01	14	30
GJ95-103	26	43	110	0.76	392	111
GJ95-104	21	2	34	<0.01	21	25
GJ95-105	10	1	179	0.01	9	26
GJ95-106	21	2	18	<0.01	14	52
GJ95-107	17	8	174	0.17	23	49
GJ95-108	25	50	76	0.92	118	92
GJ95-109	26	5	<10	<0.01	46	40