ARCHER, CATHRO
& ASSOCIATES (1981) LIMITED
CONSULTING GEOLOGICAL ENGINEERS

1016-510 WEST HASTINGS STREET
VANCOUVER, B.C. V6B 1L8
(604) 688-2568

REPORT ON
GEOLOGICAL, GEOCHEMICAL AND PETROGRAPHICAL SURVEYS
CONDUCTED SEPTEMBER 7 TO SEPTEMBER 14, 1982

MARG TARGET

TUDL 1-32 CLAIMS - YA76768-YA76799

MAYO MINING DISTRICT, YUKON TERRITORY

CLAIM SHEET 106D/1

LATITUDE 64°01'N; LONGITUDE 13~~3~~6°28'W

DECEMBER, 1982

R.J. CATHRO, B.A.Sc., P.Eng.
and C.A. MAIN, B.Sc.

091452

BOX 4127, 3125 THIRD AVENUE, WHITEHORSE, Y.T. Y1A 3S9
(403) 667-4415

This report has been examined by the Geological Evaluation Unit under Section 53 (4) Yukon Quartz Mining Act and is allowed as representation work in the amount of $ 3,200 .

P. Watson

for Regional Manager, Exploration and Geological Services for Commissioner of Yukon Territory.

TABLE OF CONTENTS

APPENDICIES

LIST OF FIGURES

SUMMARY AND RECOMMENDATIONS

The ZX-Sentinel Joint Venture (ZXJV) was formed in early 1982 by Chevron Canada Limited, Enterprise Exploration Limited and SMD Mining Co. Ltd. to explore for sedimentary exhalative (sedex) deposits within Selwyn Basin. At the end of the season, the Marg Target was staked as the TUDL claims and explored briefly.

The Marg Target, situated 35 km ENE of Elsa, Y.T. in the Keno Hill silver camp consists of a soil geochemical anomaly with strong values in lead, zinc, copper, silver and gold. The anomalous pattern is discontinuous within a zone that is roughly 1200 m long and up to 300 m wide and is generally conformable with the trend of an underlying pyritic and graphitic sericite schist, calcareous chlorite schist, and quartz-sericite schist assemblage. Most of the geochemical response may be caused by hydromorphic dispersion.

Only a few small fragments of pyritic mineralization have been found in spite of thorough prospecting. These are remarkable, however, because they give very high assays even though only traces of common lead and zinc minerals have been recognized in them. They also contain the supergene copper sulphide, covellite. Assays of three specimens averaged 12.8% Cu, 8.0% Pb, 2.2% Zn, 160.1 g/t Ag and 2.3 g/t Au.

The best rocks were apparently quite pyritic prior to weathering, although they do not display prominent limonitic soil or residual rock gossans. This target escaped the latest Pleistocene glacial scouring and may be intensely weathered to a considerable depth.

The geochemical and mineralogical evidence suggests that the Marg Target is neither galena vein mineralization of the Keno Hill-type nor typical sedex mineralization. The base metal and precious metal content of the mineralized specimens and the geological setting all suggest that the Marg geochemical anomaly is more likely caused by weathering of a volcanogenic massive sulphide deposit. The source of the anomaly should be located and sampled using a combination of detailed mapping, geophysical surveys, bulldozer trenching and drilling.

Respectfully submitted,

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGICAL
ENGINEER

R.J. Cathro, B.S.C., P.Eng.

C.A. Main, B.Sc.

INTRODUCTION

The Marg Target is located near the Keno Hill silver camp, as shown on Figure 1 on the following page. It is a strong lead-zinc-copper anomaly in soil that was explored with geochemical sampling and hand trenching between 1965-67 and has been idle since. It was re-evaluated by ZXJV to determine if it might represent the weathered expression of a sedex deposit. The brief 1982 program consisted of cleaning out old hand trenches, collecting additional samples for petrographic examination and sampling, mapping and prospecting.

HISTORY

The Marg Target was first staked in early 1965 by Canadian Superior Exploration Ltd. as the Jack claims to cover a stream sediment anomaly of 300 ppm lead, 2400 ppm zinc and 240 ppm copper discovered by the GSC's Operation Keno in 1964 (GSC maps 45, 47 and 50-1965). During 1965, Canadian Superior explored with prospecting, soil sampling and hand trenching and added the Marg and Heather claims. In 1966, United Keno Hill Mines Ltd. (UKHM) entered a joint venture with Canadian Superior and performed additional prospecting, grid geochemistry and hand trenching. Archer, Cathro & Associates Ltd. conducted a brief program on the property on behalf of Canadian Superior in 1967, at which time the previous grid sampling was rechecked and additional hand trenches were dug. All work between 1965 and 1967 was performed with the objective of locating Keno Hill-type galena veins with high silver content. The target was subsequently staked as the Flash claims in 1977 by Mountaineer Mines Ltd. and Welcome North Mines Ltd. but has received no additional exploration work since 1967.

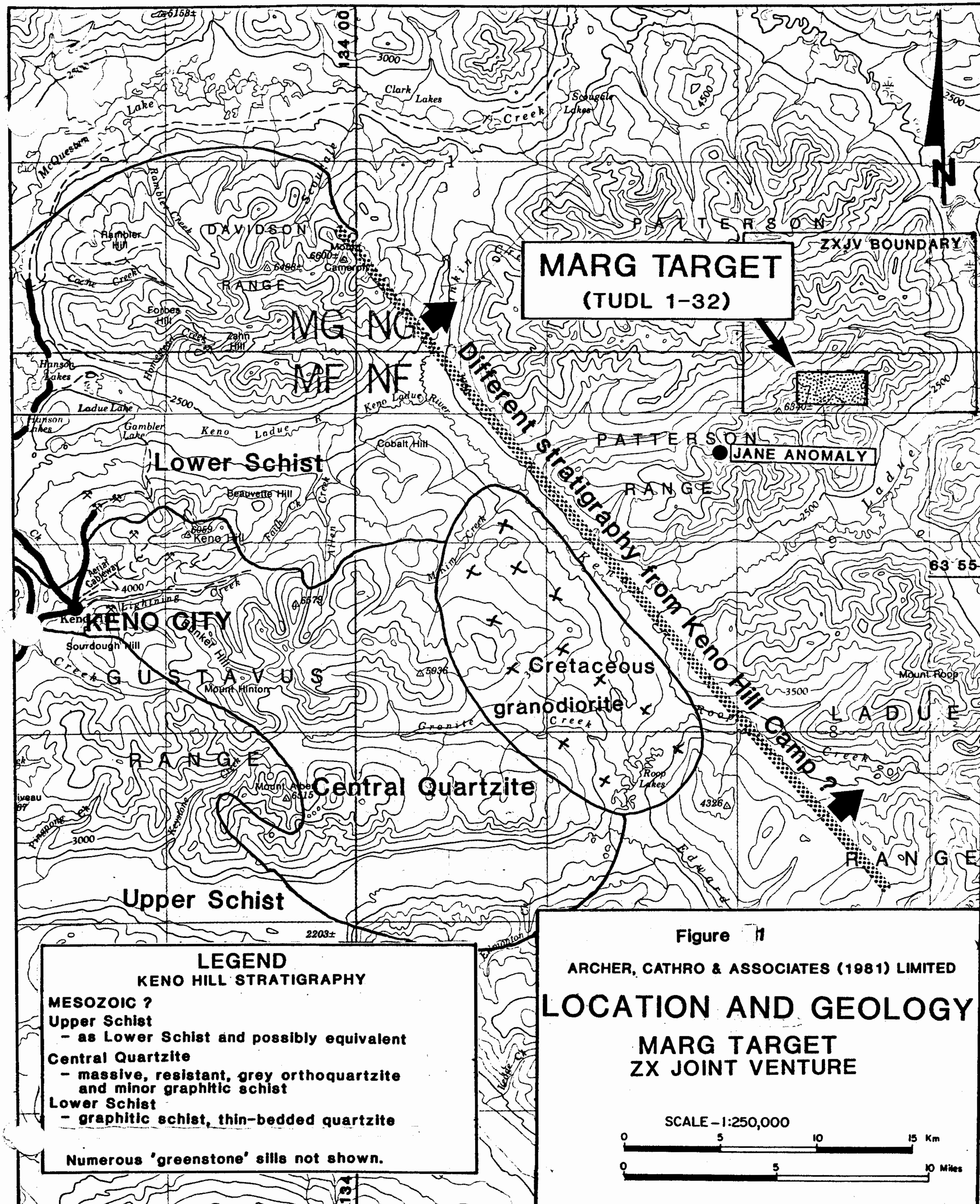
The early work consisted primarily of grid sampling centred on a transported gossan about 1.5 km upstream from the GSC silt sample site. Lead and zinc soil response was highly anomalous but copper and silver content were not analyzed. Initial efforts to determine if the lead anomalies were derived from veins failed to uncover any galena, although a single 5 mm fragment of fine-grained sulphide panned from overburden was found to contain 40 percent sphalerite and 20 percent chalcopyrite in polished section. Because lead soil geochemistry had proven so effective for locating galena veins in the Keno Hill camp, the conclusion drawn from the 1965-67 work was that no Keno Hill-type veins were present and that no further work was justified.

PROPERTY, LOCATION AND ACCESS

The property consists of 32 contiguous claims recorded in the name of Archer, Cathro & Associates (1981) Limited at the Mayo Mining Recorder's office as follows:

Claim Name	No. of Claims	Mining District	Sheet	Grant Numbers	Expiry Date
Tudl 1-32	32	Mayo	106D/1	YA76768-YA76799	Sept. 14/83

The Marg Target is located at latitude 64°01'N and longitude 13~~5~~4°28'W between the Keno Ladue River on the south and the Beaver River on the north, both of which are tributaries of Stewart River. It is situated 32 km ENE of the settlement of Keno City, which is 466 road km from Whitehorse, Y.T. Barry Lake (ZXJV name) 5 km west of the property is accessible by float plane from Mayo, 79 km to the southwest. Access in 1982 was by helicopter from a basecamp in Keno City.



To accompany report dated DEC 82

REGIONAL GEOLOGY

The Marg Target lies along the south margin of the rugged Patterson Range, which locally reaches elevations in excess of 2000 m. The grid area is situated at about 1400 m, just below treeline, on a more recessive slope with moderate relief. It lies above the level of Pleistocene valley glaciation and has apparently not been glacially scoured.

The Keno Hill camp has been mapped in varying detail by a number of GSC geologists, including Keele (1904), Cairnes (1915), Cockfield (1921-2), Stockwell (1926), Bostock (1938-42), Roddick and Green (1957), Boyle (1956-7), McTaggart (1960), and others. Blusson has recently mapped the rocks to the east in NTS areas 105N and 106C and Tempelman-Kluit has reinterpreted the Keno Hill stratigraphy in the Tombstone Mountains, 200 km to the west (Bulletin 180).

Most of this mapping has been confined to Keno and Galena hills, with heavy emphasis on the Central Quartzite that hosts the bulk of the silver-lead veins. The underlying Lower Schist and upper Hanging Wall Schist are less well mapped because they are more recessive and have not been productive as hosts to mineralization. Neither the Keno Hill camp nor the area to the east have been remapped to correlate them with other metasedimentary terranes in central Yukon or interpret them within current plate collision models.

Central Quartzite

Where unmetamorphosed in the Tombstone Mountains near Dawson, this unit consists of over 600 m of uniform, massive, grey, thick-bedded and fine-grained, submature orthoquartzites with minor black slate horizons. The unit is easily traced due to its resistant, ridge-forming nature and can be followed for over

300 km along strike to the east into the Keno Hill camp where metamorphism and deformation have destroyed original texture and completely indurated the rock with quartz. This well healed and competent unit hosts the most important Keno Hill veins, which are localized in brittle fractures. The quartzite and the underlying Lower Schist were assigned Cretaceous and Jurassic age, respectively, by Tempelman-Kluit but his interpretation is controversial when applied to the Keno Hill camp.

Lower Schist

In the Tombstone Mountains, the Lower Schist is a recessive unit composed of over 300 m of black, carbonaceous, pyritic, siliceous, fissile, silty slate, phyllitic slate, feldspathic greywacke and lesser brownish, calcareous siltstone with minor basal conglomerate. This unit occurs parallel with and appears to underlie Central Quartzite along the belt to the Keno Hill camp, where it is metamorphosed to graphitic schist, thin-bedded quartzite, quartz-mica schist, phyllite, calcareous schist and minor quartzite.

Regional mapping infers that the belt of Central Quartzite and Lower Schist extends into the Marg Project Area. In 1977, Stu Blusson of the GSC assigned an upper Devonian age to formations located to the northeast that resemble units near the Marg Target. There is some difficulty with Blusson's interpretation since he did not map near the Marg Target itself and his interpretation conflicts with other opinions about the age of the Keno Hill rocks. If Blusson is correct, it suggests a similarity between the Lower Schist and the Lower Earn Group that hosts the Macmillan Pass sedex mineralization. The 1982 program was designed to investigate this possibility.

GEOLOGY - MARG TARGET

GSC regional maps show that the Marg Target is underlain by a quartzite sequence that was interpreted as the Central Quartzite. The brief examination in 1982 of five short regional traverses suggest, instead, that rocks in the immediate Marg Project Area appear more correlative with the Lower Schist. For this reason, no attempt has been made on Figure 1 (following page 3) to identify the regional lithologies near the Marg Target.

The local geology of the Marg Target is shown on Figures 2 and 5 (in pocket). At least three mappable rock units form an apparently conformable panel that strikes about N60°~~W~~E and dips 40° to the southeast. These units have been traced at least 15 km along strike to the southwest but their continuity to the northeast of the Marg Target is unknown. All three units contain quartzite, chlorite schist, graphitic sericite schist and calcareous rocks, including minor limestones. The major units can be distinguished on the basis of lithology, weathering characteristics and colour. These three rock units are called the "Quartzite Unit, "Chlorite Unit" and "Graphite Unit" reflecting the predominent rock type. Selected rock specimens from these units have been studied petrographically and the reports are shown in Appendix A. The detailed descriptions generally agree with hand specimen identification. Although all rocks are altered to lower greenschist facies and their provenance is uncertain, there is a strong suggestion of igneous textures in the chlorite schist, indicating they were derived from intermediate volcanics, and of a pyroclastic component in the sediments. Current investigations suggest that the graphitic schists associated with the Marg anomaly are probably the metamorphosed and deformed equivalents of a tuffaceous, carbonaceous shale within a volcanic assemblage. The three units are described in more detail below.

Quartzite Unit

This uppermost unit consists of brown weathering, moderately resistant, slightly calcareous, graphitic quartzite. It contains interbedded graphitic schists, thin- and thick-bedded phyllitic quartzite, minor clean quartzite and limestone, and minor chloritic schists. No thick sequences of clean orthoquartzite were seen that are comparable to the Central Quartzite although such rocks do occur across Barry Creek to the northwest of the property. This unit is a scarp-former that caps the rugged ranges lying south and west of the Marg Project Area. The top of this unit was not seen.

Chlorite Unit

This unit is about 200 m thick and lies beneath the Quartzite Unit. The nature of its upper and lower contact is unknown and it may be gradational into the adjacent units. It consists of tan weathering, recessive, partly calcareous, chloritic schist which is sometimes graphitic and often rusty and pyritic. Minor graphitic schist and rare limestone horizons and conformable resistant gabbro sills are present in this unit. No volcanic features or characteristics were noted in hand specimens; however, the abundance of chlorite and relic quartz-eyes suggests the original rocks were flows or pyroclastic sediments of possibly intermediate composition.

Graphite Unit

This unit lies beneath the Chlorite Unit but the contact is not well defined. It consists of black weathering, very recessive, pyritic-graphitic-sericite schist and contains abundant interdigitated calcareous, pyritic, chloritic schist and at least one bed of pyritic, feldspathic quartzite. The graphitic sericite schist appears to host the Marg mineralization, possibly at the contact with pyritic quartzite beds. One gabbro sill is well exposed beneath the horizon of mineralization and a bed of massive chlorite overlying the favourable horizon is probably a metagabbro. Gabbro is not as prevalent as in the overlying Chlorite Unit.

MINERALIZATION

A trace of base metal sulphides was located on the Marg Target during the Archer, Cathro trenching program in 1967 following unsuccessful trenching by Canadian Superior and UKHM in 1965 and 1966. The 1967 hand trenches were located at the uphill edge of the anomalies, assuming them to be hydromorphic or gravitational dispersions from an upslope source. Samples from these trenches were systematically panned and the heavy mineral separates were inspected and assayed. The only sulphides recognized in the concentrates was a euhedral pseudocubic variety of pyrite common in the country rock that ranges up to 1 cm in size. However, geochemical analyses from some panning concentrates returned values of up to 5500 ppm Pb and 60 ppm Ag.

During the winter of 1967-68, a fragment from one of the concentrates, an unusually fine-grained 5 mm specimen, was studied at the University of British Columbia by C.A. Main and found to contain about 40 percent sphalerite, 20 percent chalcopyrite and a trace of covellite, chalcocite, pyrargyrite and tetrahedrite. This specimen was from the bottom of Trench L (see Figure 5, in pocket). It was concluded that the mineral assemblage in this specimen is typical of volcanogenic massive sulphide deposits.

The 1982 program was designed to locate more mineralization and to determine if the host rocks have a high potential for hosting stratabound mineralization. Trench L and other trenches were cleaned out and panned at one metre intervals but no additional fragments of fine-grained sulphides were found other than common euhedral cubes. Even so, geochemical analysis of these panning concentrates returned values of over 1% Pb and over 100 ppm Ag (there was insufficient sample for a more accurate assay) and up to 1850 ppm Cu and 2600 Zn.

While inspecting other old trenches, three small fragments of massive sulphide were found at Trench B, about 80 m north of Trench L. These three specimens, which range up to 10 cm in length, are composed of fine-grained pyrite within a gangue of carbonate and foliated graphite. The pyrite has a black tarnish that was at first assumed to be caused by manganese staining. Surprisingly, assays of these specimens averaged (and ranged up to) 12.80% (14.40%) Cu, 8.00% (9.02%) Pb, 2.24% (3.32%) Zn, 160.1 ppm (169.4 ppm) Ag, and 2270 ppb (2570 ppb) Au. Analyses for additional elements returned an average of about 0.2% As, 0.02% Sb, 0.02% Ba, 70 ppm Sn, 5 ppm Te and less than 5 ppm Mn. The metal content of these specimens is quite different from typical Keno Hill mineralization which has much lower copper and gold content and a much higher silver-lead ratio. Similarly typical sedex mineralization would be expected to have much lower copper, gold and silver content.

Polished thin sections from these specimens showed them to be composed of crumbly, weathered euhedral pyrite (about 20%) and chalcopyrite (15%) with lesser amounts of covellite (6%), sphalerite (±.5%) and galena (tr). The latter two minerals are mainly found as inclusions in the pyrite and the covellite is found as intergrowths within the gangue and secondary minerals such as limonite or plumbojarosite.

The only copper stain observed on the property occurred on specimen GGG, which assayed 5200 ppm Cu. It consisted of a resistant, malachite-stained, massive chloritic rock, probably a metagabbro. In spite of extensive examination of hand specimens and polished sections, no lead or zinc minerals have been recognized that would explain the high assays.

These mineralized float specimens appear to be local in origin. Trench B is actually a series of four small (1 by 2 m) pits dug by Canadian Superior in 1965 and by UKHM in 1966. UKHM reported in its 1966 Report (see Appendix B) that "an 8 inch break of manganese and gouge was exposed in trench B, and returned an assay of 4.64 oz/ton Ag". There is no record of analyses for copper, lead or zinc. Other float in Trench B consists of pyritic and graphitic sericite schist and pyritic feldspathic quartzite. Trenches B and L are directly across strike from each other and, since the rocks dip about 40° to the southeast, their stratigraphic position is about 60 m apart.

Most of the grid area is underlain by graphitic sericite schists and related rocks that are part of the regional Marg Graphite Unit. Most rocks in the grid area, including graphitic schists, minor interbedded quartzites, chloritic schists and even some intruded gabbro sills, are pyritic to some degree. Although pyrite is generally preserved only in the more siliceous units, open vugs and boxwork are present in all rocks, usually with cubic shapes. The average pyrite content was probably at least 5 percent if all the cubic boxwork was after pyrite. The high pyritic content seems characteristic of the Graphite Unit. In contrast, graphitic schists occurring stratigraphically higher in the section in the Marg Quartzite Unit are much less pyritic.

Cansu Creek, which crosses the grid and trends roughly across the regional strike, passes about 100 m east of Trench B and L. This creek is precipitating an intense exotic ferricrete gossan that appears to have an upstream limit at the upper contact of the pyritic Graphite Unit. Several other gossanous seeps are also located 700 m along strike to the west. Copp Creek, the next major drainage to the west, also flows across the strike of the Graphite Unit but contains no exotic gossan. This suggests that either the pyritic content of the unit has changed, the geochemistry of this creek and Cansu Creek are quite different or that the pyritic schist has been faulted away and is not present.

Although the Marg Target shows strong evidence that it is a weathered sulphide zone, it does not display the usual weathering characteristics such as brown limonite soils and residual gossan staining. A linear vegetation kill zone near Trench B is the only feature, other than the ferricrete spring gossan, that is present.

GEOCHEMISTRY

The Keno Hill district was regionally stream sampled by the GSC in 1964 (Operation Keno, maps 45 to 56-1965) and in 1977 (Open File 518). Stream sediment samples from the mouth of Cansu Creek were anomalous in both surveys, with values of 300/284 ppm Pb, 2400/2300 ppm Zn, and 230/1200 ppm Cu in 1964 and 1977, respectively.

In 1966, UKHM established a grid on the Marg claims covering an area 1200 m (4000 ft) long by 450 m (1500 ft) wide and centred on the ferricrete gossan about 1.5 km upstream from the mouth of Cansu Creek. Soil samples were collected on 30 m (200 ft) centres with fill-in sampling every 9 m (25 ft) within anomalous areas. Analyses for lead and zinc only were performed by UKHM at its own laboratory at Elsa using a colourimetric (dithizone) determination of a hot aqua regia extraction of a fraction screened to approximately minus 10 mesh. Samples which were collected across the grid in 1967 and 1982 by Archer, Cathro were assayed at Chemex Labs using the analytical techniques described previously in this report and the results reconfirmed the magnitude of the original anomalies.

The UKHM geochemical results are highly anomalous, with an irregular distribution of values that range up to 15,000 ppm Pb and commonly exceed 500 ppm. Zinc values range up to 2400 ppm Zn and commonly exceed 400 ppm Zn. Although individual clusters of anomalous values form patterns that might suggest linear (vein) sources, they collectively occupy an area the length of the grid (1200 m) by some 300 m wide that trends east or east-northeast, conformable with the general strike of the country rocks. At least part of the irregular pattern of anomalous samples is caused by patches of glacial till that prevented sampling of residual soils.

UKHM also soil sampled a grid on its W and WV claims to the west (see Figure 5, in pocket), the results of which are available as assessment reports. Two small areas on the WV grid were anomalous in lead, zinc and copper. The approximate position of these anomalies is shown on Figure 6, accurate to within 50 m. UKHM also reported that zinc anomalies occurred along Barry Valley. This may represent an expression of the faulted offset of the Marg Graphite Unit,

The approximate position of one line of the 1966 grid was resampled in 1982 to reconfirm the position and magnitude of lead and zinc anomalies and to gain additional information on other elements. The results are shown on Figures 5 to 7, in pocket. These samples returned anomalous values up to 2050 ppm Pb and 1500 ppm Zn but the highest values are not exactly coincident with the UKHM anomalies, perhaps due to differences in location or analytical technique. The samples also returned anomalous values of up to 1500 ppm Cu, 33.0 ppm Ag, 35 ppb Au and 2650 ppm Ba, which were generally not coincident with the lead or zinc anomalies. The range of anomaly location suggests either a pattern of lateral zoning or differences in intensity of leaching and hydromorphic dispersion.

ZXJV sampled Cansu Creek at roughly 200 m intervals and obtained strongly anomalous values of up to 1180 ppm Pb, 2750 ppm Zn and 4400 ppm Cu. Silver and gold values were only up to 0.6 ppm Ag and 6 ppb Au. Recent placer claims have been staked 3 km downstream from the junction of Cansu and Copp Creeks but the extent of work is unknown.

CONCLUSIONS

The Marg Target consists of a soil geochemical anomaly with strong values in lead, zinc, copper, silver and gold. The anomalous pattern is discontinuous within a zone that is roughly 1200 m long and up to 300 m wide and generally conformable with the trend of an underlying pyritic graphitic sericite schist, calcareous chlorite schist, and quartz-sericite schist assemblage. At least part of the irregular nature of the anomaly may be caused by patches of blanketing glacial till or scree that prevented proper soil sampling, or by drainage complications that affected hydromorphic dispersion. Most of the geochemical response is evidently caused by hydromorphic dispersion.

In spite of thorough prospecting, only a few small fragments of mineralization have been found. These are remarkable because only traces of common lead or zinc minerals have been recognized in them even though they return high assays. They also have an unusually high copper content and contain supergene sulphides such as covellite. The copper and gold content is much higher than would be expected from typical Keno Hill or sedex mineralization.

The rock units associated with the Marg Target were apparently quite pyritic prior to weathering, as evidenced by the presence of leached vugs, boxwork and ferricrete spring precipitates. However, these rocks do not display the typical prominent limonitic soil or residual rock gossans usually associated with the weathering of pyritic zones in the northern Cordillera. In addition, the unusual mineralogy of the weathered sulphide specimens confirms that this target has weathered much differently than other occurrences in the region. Since this location escaped the latest Pleistocene glacial scouring, it seems reasonable to assume that the weathering is not only intense but may have proceeded to a considerable depth.

The geochemical and mineralogical evidence suggests that the Marg Target is not associated with either galena vein mineralization of the Keno Hill-type nor with typical sedex mineralization. The base metal and precious metal content of the mineralized specimens and the geological setting all suggest that the Marg geochemical anomaly is caused by the deep weathering of a volcanogenic massive sulphide deposit.

APPENDIX A - PETROGRAPHIC DESCRIPTIONS

VP

Vancouver Petrographics Ltd.

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph. D. Geologist

P.O. BOX 39
8887 NASH STREET
FORT LANGLEY, B.C.
VOX 1JO

PHONE (604) 888-1323

J.K. Mortensen,
November 19, 1982.

Mr. S. Main,
Archer, Cathro, and Associates (1981) Ltd.,
510 West Hastings St.,
Vancouver, B.C.

Dear Sir:

Enclosed are petrographic descriptions for 13 thin sections and 9 polished thin sections from samples that you submitted to us recently. The results of the examinations are summarized below:

Thin Sections:

Sample No. 25635, ~~45~~ 75, 59, 76: quartz-muscovite schist. All but No. 25676 are carbonaceous, and therefore definitely sedimentary in origin.

Sample No. 25664: quartz-plagioclase (± mafic) porphyritic metavolcanic.

Sample No. 25640: metamorphosed quartz porphyry or bimodal quartz grit.

Sample No. 25637, 672, 709, 712: quartz-chlorite-muscovite schist. Samples 25637, 709, and 712 contain abundant carbonate or carbonaceous material, and are definitely metasediments. Compositionally the rocks may contain a volcanic component, but no relict igneous textures are preserved.

Sample No. 25701: impure carbonaceous marble.

Sample No. 25639: metamorphosed hornblende diorite.

Sample No. 25702: altered albite-pyrite-siderite-chalcedony vein assemblage.

VP

Vancouver Petrographics Ltd.

JAMES VINNELL, Manager
JOHN G. PAYNE, Ph. D. Geologist

P.O. BOX 39
8887 NASH STREET
FORT LANGLEY, B.C.
VOX 1JO

PHONE (604) 888-1323

Polished Thin Sections:

Sample No. 25655, 714: quartz-muscovite schist with variable amounts of pyrite. Well banded; derived from a banded pyritic rock.

Sample No. 25710: pyritic quartz-chlorite-muscovite schist. Much limonite after pyrite. Well banded. Appears to have been a cherty rock originally (tuffaceous pyritic chert?)

Sample No. 25685, 698, 706: quartz-muscovite schist with abundant limonite after primary pyrite. Trace amount of galena and sphalerite.

Sample No. 25688: quartz-chlorite-muscovite schist with abundant limonite after pyrite.

Sample No. 25686: mainly limonite and sulfides (pyrite, chalcopyrite, galena, sphalerite, and covellite). Covellite is present as a supergene sulfide enrichment.

Sample No. 25641: metamorphosed medium-grained mafic to intermediate composition igneous rock.

If you have further questions concerning these specimens, please contact me at 228-2804.

Yours truly,

J. K. Mortensen
Vancouver Petrographics

Sample No. 25635

mode:	quartz	65-70%
	muscovite	30-35%
	opaques	6-8%

The rock is a carbonaceous quartz-muscovite phyllite. It consists of very finely recrystallized quartz with abundant schistose muscovite-rich bands. A vague compositional layering, defined by relative amounts of quartz, muscovite, and opaque minerals, is present in the rock, parallel to the main foliation. The opaques are fine-grained carbonaceous material.

The early foliation is deformed into microlithon structures related to two distinct crenulation cleavages that cut the early fabric at a high angle.

Sample No. 28637

mode:	quartz	30-35%
	chlorite	30-35%
	carbonate	15-20%
	muscovite	6-8%
	plagioclase	4-5%
	limonite	4-5%
	opaques	1%

The rock is a fine-grained quartz-chlorite-carbonate-muscovite schist. There is a well-developed compositional layering on a scale of 2 to 10 mm that parallels the metamorphic foliation defined by chlorite and muscovite alignment. Most of the rock consists of a fine-grained mass of felted chlorite and minor muscovite, plus carbonate and scattered quartz grains. This material is traversed by bands of recrystallized quartz and plagioclase (albite) with minor muscovite.

Limonite occurs throughout the section, along grain boundaries and as irregular structureless masses. It is commonly associated with opaque grains, at least some of which are pyrite, but also occurs separate from the opaques.

The high chlorite content of the rock suggests that it may be derived from a volcanic parent, or from a sediment with a significant volcaniclastic component.

Sample No. 25639

mode:		
	actinolite	40-45%
	epidote	40-45%
	chlorite	6-8%
	sphene	2-3%
	hornblende	1-2%
	quartz	1-2%
	apatite	trace
	limonite	trace
	zircon	trace
	opaques	trace

The rock is a very strongly altered, medium-grained equigranular igneous rock. The only relict minerals present are pale brown pleochroic hornblende and rare apatite prisms. The remainder of the specimen consists of roughly aligned pale green, slightly pleochroic actinolite with minor intergrown chlorite, and finely crystalline masses of epidote and minor quartz. Primary hornblendes are overgrown and partly replaced by actinolite. The epidote masses appear to be pseudomorphing primary plagioclase. Sphene occurs as irregular masses to 2 mm in diameter that commonly surround opaque minerals. The opaques are probably primary ilmenite, and the sphene is an alteration of it. Rare pleochroic halos are visible in some of the actinolite around very small irregular high relief grains that are probably zircon.

The specimen originated as an intermediate or mafic medium-grained igneous rock, probably a hornblende diorite. It has been metamorphosed at middle greenschist facies.

Sample No. 25640

mode:	quartz	60-65%
	muscovite	30-35%
	limonite	2-3%
	plagioclase	trace
	opaques	1-2%

The rock is a quartz-muscovite schist. Compositional layering on a scale of 1 to 2 mm is pronounced (defined by relative proportions of quartz and muscovite) with a well-developed metamorphic foliation parallel to it. A second crenulation cleavage is visible at a high angle to the layering.

The majority of the rock consists of very finely-recrystallized quartz, commonly with muscovite along grain boundaries, interbanded with limonite-stained muscovite schist. Anhedral, strongly strained quartz grains to 3 mm in diameter occur throughout the quartz-rich bands, and make up roughly 15% of the rock. The grains show incipient recrystallization locally along their borders.

Limonite occurs as irregular masses, and also as partial replacements of euhedral pyrite grains and grain aggregates to 3 mm in diameter.

The rock appears to be derived from a quartz grit, although in view of its bulk composition and the recrystallized nature of the quartz eyes, a felsic volcanic protolith is not impossible.

Sample No. 25641

mode:

chlorite		25-30%
stilpnomelane		25-30%
sphene		12-15%
apatite		4-5%
quartz		4-5%
limonite		4-5%
epidote		2-3%
muscovite		1%
opaques -	ilmenite	12-15%
	chalcopyrite	2-3%
	pyrite	1%
	hematite(?)	trace

The rock consists mainly of a felted mass of pleochroic green chlorite and brown stilpnomelane with irregular patches of recrystallized quartz and scattered grains of epidote, muscovite, and limonite. In this are set fractured euhedral crystals of apatite to 3 mm in length, and corroded, elongate, commonly bent ilmenite laths to 4 mm in length. There is a vague compositional layering in the section, defined by the abundance of ilmenite. In the ilmenite-rich bands (up to 30% ilmenite) the laths are roughly aligned; in the remainder of the section the laths are randomly oriented. A narrow rim of leucoxene surrounds each ilmenite grain as an alteration product.

Chalcopyrite occurs as irregular grains and scattered grain aggregates to 0.3 mm in diameter throughout the rock. It also occurs as very finely-disseminated grains in the leucoxene rims on some of the ilmenite grains. Irregular clusters of fine pyrite grains to 0.4 mm in diameter are present throughout the section. These occur within masses of limonite, which presumably represent pseudomorphs after partially or wholly altered single pyrite grains.

The origin of the rock is uncertain. It is unfoliated, but the mineral assemblage indicates that it has been recrystallized at middle greenschist facies. Some of the chlorite masses preserve subhedral outlines, indicating that they are pseudomorphing primary olivine. It is probably taht the sample was originally a medium-grained igneous rock. The abundance of ilmenite and its apparent alignment remains problematical. The rock was metamorphosed at greenschist facies. The origin of the sulfides, whether primary or introduced at some later time, is uncertain.

Sample No. 25659

mode:	quartz	75-80%
	muscovite	20-25%
	limonite	1%
	chlorite	trace
	opaques	2-3%

The rock is a very strongly foliated carbonaceous quartz-muscovite schist. It consists primarily of finely recrystallized quartz with scattered aligned muscovite flakes and narrow discontinuous bands of fine-grained muscovite. Average grain size of the quartz is about 0.1 mm. Elongate laths and irregular grain aggregates of opaque minerals (mainly carbonaceous material) to 1 mm in length occur in quartz-rich bands, commonly associated with fine anhedral grains of limonite.

A weak crenulation cleavage cuts the compositional layering and early-formed fabric at a low angle (less than 10 degrees) and locally deforms the muscovite bands into microlithon structures.

The rock originated as a carbonaceous sediment.

Sample No. 25664

mode:		
	quartz	65-70%
	muscovite	15-20%
	K-feldspar	4-5%
	chlorite	4-5%
	sphene	1%
	limonite	trace
	opaques	1-2%

The rock is a very fine-grained quartz-feldspar-muscovite-chlorite phyllite with abundant quartz and plagioclase eyes. The quartz eyes are 0.1 to 2 mm in diameter, and are typically rounded to sub-rounded. They are strongly strained, and show incipient recrystallization along their borders. The plagiocalse is albite, and forms stubby anhedral to subhedral grains to 1 mm in diameter that are strongly sericitized. Fine-grained elongate intergrowths of sphene and opaques to 1 mm in length occur throughout the section. These are alteration products of primary ilmenite laths.

The groundmass of the rock consists of a very fine-grained schistose mass of quartz, K-feldspar, chlorite, and limonite. Chlorite also occurs as elongate fine-grained, felted masses that are probably alteration of coarse-grained primary mafic minerals. The foliation defined by alignment of mica and chlorite flakes wraps around the quartz and feldspar eyes. Only one foliation is present in the section.

The protolith for the sample is felsic volcanic (quartz-feldspar-mafic(?) porphyry) or possibly a crystal tuff.

Sample No. 25665

mode:	quartz	75-80%
	muscovite	18-20%
	limonite	1-2%
	pyrite	2-3%

The rock is a pyritic, fine-grained quartz-muscovite schist. It displays a pronounced compositional layering (defined by the relative abundance of quartz and muscovite), with a well-developed metamorphic foliation parallel to it (defined by the alignment of mica) The quartz is wholly recrystallized with an average grain size of 0.1-0.2 mm. Muscovite occurs as narrow, very elongate blades to 0.4 mm long. Limonite is present along grain boundaries, particularly in the mica-rich bands.

The only opaque mineral present is pyrite. It occurs as euhedral grains and grain aggregates to 2 mm in diameter. It tends to be concentrated in individual bands, but is distributed rather erratically in the bands, never making up more than 20% of any single band.

The compositional layering and main foliation are strongly deformed by a later crenulation cleavage that is developed at a high angle to the early fabric. No new growth of minerals is associated with the crenulation cleavage.

Sample No. 25672

mode:	chlorite	45-50%
	muscovite	20-25%
	quartz	12-15%
	limonite	12-15%
	opaques	1-2%

The rock is a strongly altered fine-grained chlorite-muscovite-quartz phyllite. There is a vague compositional layering on a scale of 1 - 2 mm, defined by relative proporations of chlorite and limonite. The specimen consists mainly of a fine-grained, weakly schistose, felted mass of brownish chlorite and muscovite with scattered grains of partly recrystallized quartz. Limonite occurs as scattered irregular masses throughout the rock, presumably as an alteration of fine-grained pyrite. It also occurs as rims on euhedral pyrite porphyroblasts to 0.5 mm in diameter.

The composition of the rock suggests derivation from a volcanic or volcaniclastic protolith.

Sample No 256~~45~~75

mode:	quartz	50-55%
	opaques	40-45%
	muscovite	3-4%

The rock is a very complexly deformed, fine-grained, carbonaceous, micaceous quartzite. There is a vague compositional layering visible in hand sample, but in thin section this is seen to be the net result of intense deformation of what may have been primary layering. The deformed layering is between quartz-rich bands and carbonaceous bands. The quartz-rich bands are very finely recrystallized (average grain size less than 0.1 mm) and fine muscovite flakes commonly occur along grain boundaries.

The nature of the deformation is uncertain. Lithon structures are locally developed that would suggest that the most pronounced compositional layering in the rock (parallel to the length of the section) is a second-phase deformation fabric. Also, muscovite flakes are locally bent around these lithon structures. It appears that the rock was relatively incompetent due to the abundant carbonaceous material, and the superimposed deformation events produced the complex patterns seen in the section.

The rock originated as a highly carbonaceous quartzose sediment, either as a siltstone or an impure chert.

Sample No. 25676

mode:	quartz	65-70%
	muscovite	30-35%
	chlorite	trace
	limonite	trace
	opaques	1%

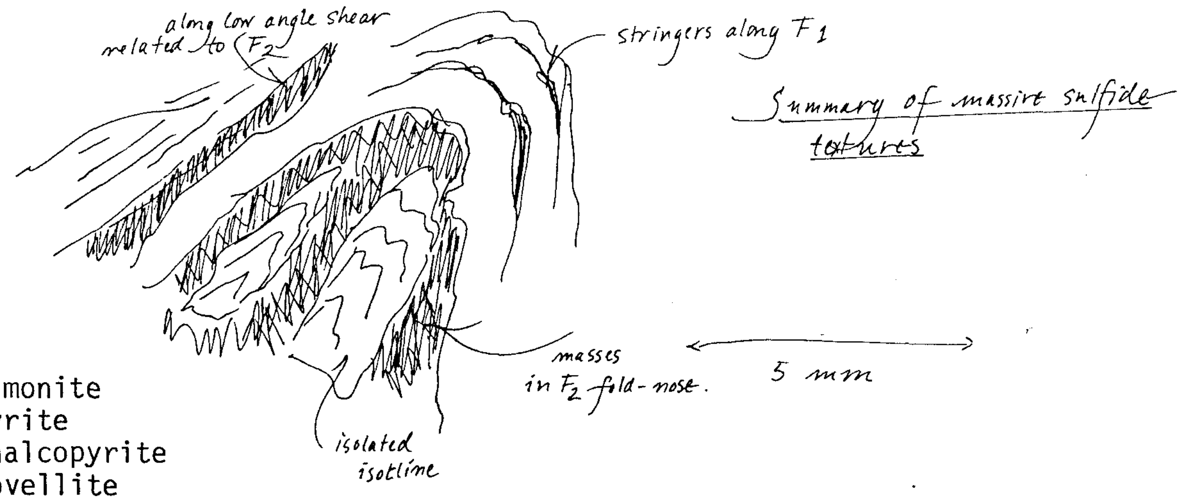
The rock is a very strongly foliated fine-grained quartz-muscovite schist. It consists of very finely recrystallized quartz with discontinuous fine-grained interbands to 1 mm thick of aligned muscovite flakes. Trace amounts of limonite occurs as scattered grains throughout the rock. Some of these show euhedral outlines, and are pseudomorphs after primary pyrite. Euhedral pyrite grains to 1 mm in diameter are also present. These grains commonly display narrow quartz (and rare chlorite) pressure shadows.

The rock originated either as a felsic volcanic or volcaniclastic or as a sediment with a volcanic component.

25681 : Massive sulfide in quartz-muscovite schist

This rock is dominated by a strongly limonitized massive sulfide, composed of pyrite, chalcopyrite (partly weathered to covellite), and minor galena and sphalerite. The silicate matrix is less abundant. It is a quartz-muscovite schist with a very strong schistosity which is itself isoclinally folded on thin section scale. Quartz occurs in subpolygonal lensoid segregations; in one instance individual quartz grains are flattened parallel to the F_2 axial plane of a minor fold.

The relationship between the massive sulfide and its host rock is complex. Cross-cutting/replacement textures are evident : the massive sulfide isolates fragments of schist, which are not rotated and still exhibit continuity with each other. In one area, sulfide stringers occur along the F_1 schistosity and are, apparently, folded along with it. In another instance massive sulfide has migrated into the nose of an F_2 fold, where it fills shears between tightly appressed, probably rootless isoclines. Thus, although the massive sulfide was mobilized into textural settings that indicate it to be later than the host rock, it is not in a fracture-controlled, vein environment. The textures could be explained by remobilization of primary sulfides during strong deformation.



Mode

55%	limonite
15	pyrite
6	chalcopyrite
4	covellite
.5	sphalerite
tr	galena
15	muscovite
5	quartz

Limonite forms extensive reflective to earthy pseudomorphs after sulfides, and stains the schist. It may contain a variety of secondary products indistinguishable optically.

Pyrite forms spongey cubes surrounded by limonite.

Chalcopyrite blobs range up to .5 mm across, both interstitial to and enclosed in pyrite.

Bright blue covellite is intergrown with limonite. Its abundance varies strongly from place to place in the massive sulfide, perhaps in response to original chalcopyrite concentrations.

Small sphalerite grains were seen next to chalcopyrite and also enclosed in pyrite grains.

A few galena grains are enclosed in either sphalerite or pyrite. The largest is .1 mm in diameter; the average is .01 mm.

Muscovite forms masses of strongly oriented plates which wrap around the noses of the second-phase isoclines. A transposed schistosity along F_2 is not evident, although the massive sulfide obscures much of the silicate fabric.

Quartz shows strictly metamorphic, not vein textures. It occurs in lensoid segregations within the muscovite schistosity.

Sample No. 25684

mode:	quartz	45-50%
	muscovite	50-55%
	limonite	1-2%
	opaques - sphalerite	trace
	galena	trace

The rock is a doubly-foliated quartz-muscovite schist. Compositional layering on a scale of 0.1-1.0 cm is well-developed, and is defined by gradations between quartz-rich and muscovite-rich rock. The main foliation is parallel to compositional layering. A second, weak, crenulation cleavage produces small lithon structures that deform the early micas and the compositional layering. The quartz-rich bands are completely recrystallized, and fine, randomly-oriented muscovite flakes are commonly present along grain boundaries.

Limonite occurs as finely-disseminated, irregular masses scattered throughout the rock, and along cleavages and fracture surfaces.

Traces of sphalerite and galena occur as fine anhedral grains in a narrow undeformed quartz stringer that traverses the section.

Sample No. 25686

mode:			
	limonite		40-45%
	quartz		2-3%
	muscovite		1-2%
	opaques -	pyrite	20-25%
		covellite	12-15%
		chalcopyrite	10-12%
		galena	trace
		sphalerite	trace

The rock consists mainly of sulfide minerals and alteration products of them. The non-opaques present are quartz, muscovite, and limonite. The quartz occurs as wholly recrystallized irregular masses to 1.5 mm in diameter, and as narrow corss-cutting stringers. The muscovite forms irregular masses of randomly oriented blades, generally associated with the quartz. Limonite makes up the matrix of the rock, occurring as structureless masses surrounding the sulfide and silicate grains.

There is a vague compositional layering visible (on a scale of 0.2 -0.5 mm), defined by relative proportions of sulfide minerals present. Pyrite is the most abundant sulfide phase, occurring as partly corroded euhedral remnants within masses of structureless limonite. Pyrite makes up as much as 40% (by volume) of the rock in the more pyrite-rich bands. The pyrite grains commonly contain small silicate inclusions, and have probably been recrystallized during metamorphism.

Chalcopyrite occurs as large irregular masses that partly surround the pyrite, and as rare anhedral inclusions in some of the pyrite cubes. It forms an irregular intergrowth with sphalerite and galena in one very restricted portion of the section. Chalcopyrite makes up about 30% of one band in the section.

Covellite occurs throughout the section as narrow idiomorphic grains within the limonite. It tends to be concentrated in the more sulfide-rich bands, and is an alteration product of the chalcopyrite, presumably formed at the same time as the limonite (possibly as a supergene enrichment zone).

Sample No. 25688

mode:	quartz	70-75%
	muscovite	15-20%
	chlorite	10-12%
	limonite	2-3%
	opaques - pyrite	1%
	sphalerite	trace

The rock is a fine-grained quartz-muscovite-chlorite schist. It consists mainly of completely recrystallized polygonal quartz, commonly with narrow muscovite flakes along grain boundaries. Average grain size of the quartz is 0.1-0.2 mm. A well-developed foliation is defined by wispy masses of aligned muscovite and pale green chlorite. A second crenulation cleavage cuts the rock at a very low angle to the early cleavage, and produces small lithon structures that are visible in some of the mica masses.

Limonite occurs as finely disseminated irregular masses throughout the rock, and, less commonly, as pseudomorphs after euhedral pyrite grains to 0.2 mm in diameter. Corroded grains of relict pyrite are present within some of the limonite pseudomorphs.

Irregular sphalerite grains occur within a narrow band of limonite that is sub-parallel to the main foliation. This band appears to be along a crenulation cleavage plane, and it is uncertain what the original relationship was between the pyrite and sphalerite.

Sample No. 25698

mode:	quartz	65-70%
	muscovite	30-35%
	limonite	3-4%
	zircon	trace
	opaques - pyrite	trace
	galena	trace
	sphalerite	trace

The rock is a doubly-foliated quartz-muscovite schist. Well-developed compositional layering is present, defined by the relative proportions of quartz and muscovite. The dominant foliation of the rock, resulting from the alignment of coarse-grained muscovite, parallels this layering. The quartz-rich bands are wholly recrystallized, with an average grain size of about 0.1 mm. Fine blades of randomly-oriented muscovite are common along quartz grain boundaries. The muscovite-rich bands are up to 2 mm wide. A single subhedral zircon grain is present within one of the muscovite-rich bands.

Limonite occurs along grain boundaries in the muscovite-rich bands, and as scattered euhedral pseudomorphs after pyrite. Rare irregular relict pyrite grains up to 0.5 mm in diameter are locally present with structureless masses of limonite. Very rare, scattered, anhedral grains of sphalerite and galena also occur in masses of limonite.

Sample No. 25701

mode:

	carbonate	70-75%
	quartz	20-25%
	muscovite	4-5%
	K-feldspar	2-3%
	limonite	1%
	opaques	1%

The rock is a schistose impure marble (calcite-quartz-muscovite schist). It displays a pronounced compositional layering (defined by relative proportions of carbonate, quartz, and muscovite), and a well-developed metamorphic foliation resulting from aligned muscovite flakes that is parallel to the layering.

The specimen consists predominantly of irregular grains of carbonate (average grain size about 0.8 mm) with abundant anhedral grains and grain aggregates of quartz and scattered muscovite flakes. The quartz aggregates are commonly elongate parallel to compositional layering in the rock. The amount of quartz present varies considerably between bands, ranging from 1 to 95%. Minor amounts of K-feldspar occur as anhedral grains within the quartz-rich bands.

The majority of the muscovite present occurs as oriented elongate blades to 0.5 mm in length. Very fine-grained muscovite is also present as irregular felted masses within the quartz-rich bands. These masses are probably alteration products of primary feldspar.

Limonite occurs as scattered fine grains along foliation planes. Scattered euhedral pyrite grains to 2 mm in diameter occur throughout the rock. These are post-kinematic porphyroblasts; the foliation is not deformed around them, and locally trails of quartz grains continue through the pyrite cubes. Very fine-grained opaques (probably carbonaceous material) also occur as narrow foliaform wisps and lenses.

Sample No. 25702

mode:	plagioclase (albite)	70-75%
	limonite	20-25%
	quartz (chalcedony)	4-5%
	opaques (pyrite)	2-3%

The rock consists mainly of coarse-grained albite, surrounded by minor chalcedony and coarse, cellular masses of limonite. The plagioclase grains are strongly strained and are locally shattered. The masses of limonite in most cases preserve relict cleavage traces, indicating that it is an alteration of primary siderite. Some of the limonite, however, contains small corroded grains of pyrite to 1 mm in diameter. It is therefore probably in part an alteration of primary pyrite.

The rock is derived from a coarse-grained feldspar-siderite-pyrite vein assemblage.

Sample No. 25706

mode:	limonite	85-90%
	quartz	8-10%
	muscovite	2-3%
	epidote	1-2%
	opaques - pyrite	trace
	galena	trace
	sphalerite	trace

The rock consists mainly of limonite and displays a pronounced compositional banding, defined by interlayering of relatively quartz-rich and quartz-poor bands. The composition of individual bands ranges from 100% limonite to as much as 60% quartz. Banding is on a scale of 1 mm or less.

Quartz is completely recrystallized to grains less than 0.1 mm in diameter, with even finer-grained, randomly-oriented stubby muscovite flakes, and euhedral epidote grains. The section is cut by a quartz approximately 1.5 mm wide that is filled with relatively coarse-qrained quartz (average grain size 1 mm) with limonite along grain boundaries. The grain boundaries are sutured, and the grains are strongly strained, but not recrystallized.

Trace amounts of anhedral pyrite, galena, and sphalerite occur within masses of limonite.

Sample No. 25709

mode:	chlorite	35-40%
	muscovite	30-35%
	quartz	15-20%
	limonite	12-15%
	opaques	2-3%

The rock is a carbonaceous chlorite-muscovite-quartz schist. It is compositionally homogeneous, and consists mainly of a strongly foliated mass of fine-grained chlorite and muscovite with scattered grains and grain aggregates of finely recrystallized quartz. Fine-grained carbonaceous material occurs in small masses of recrystallized quartz that are elongate parallel to the main foliation. Limonite occurs as irregular structureless masses to 0.5 mm in diameter, and as subhedral to euhedral pseudomorphs after primary pyrite.

A second foliation is also visible in the section. It is a weak crenulation cleavage that cuts the earlier fabric at a high angle and deforms it into microlithon structures.

The presence of carbonaceous material indicates that the rock originated as a sediment. Its composition, however, suggests that there was a substantial component of volcanic material in the protolith.

Sample No. 25710

mode:		
	quartz	60-65%
	chlorite	20-25%
	limonite	12-15%
	muscovite	2-3%
	pyrite	1%

The rock is an altered, slightly pyritic, fine-grained quartz-chlorite-muscovite schist. It consists mainly of quartz, chlorite, and limonite. There is a very vague compositional layering visible, defined partly by variation in the grain size of the quartz between individual bands. The variation in grain size in the quartz is rather erratically distributed throughout the section. The coarser-grained portions are completely recrystallized, and have an average grain size of 0.1-0.2 mm, whereas the finer-grained portions have an average grain size of less than 0.01 mm. It appears that the rock started out very fine-grained (probably cherty) and is partially recrystallized. The chlorite formes stubby, randomly-oriented blades to about 0.2 mm long.

Limonite occurs as irregular masses that locally make up as much as 40% of the rock, and also as regular masses up to 0.5 mm in diameter with euhedral (cubic) outlines. These are pseudomorphs after euhedral pyrite porphyroblasts. Pyrite is still present as partly eroded relicts within some of the pyrite masses. No other opaque minerals are present in the section.

A weak metamorphic foliation (defined by aligned muscovite blades) is developed parallel to the compositional layering. This early fabric is deformed into an open fold with a wavelength of about 5 cm in the section. No fabric associated with the fold is visible.

Sample No. 25712

mode:		
	quartz	60-65%
	chlorite	15-20%
	muscovite	10-12%
	plagioclase	4-5%
	limonite	1-2%
	opaques	2-3%

The rock is a fine-grained, carbonaceous, quartz-chlorite-muscovite schist. Compositional banding on a scale fo 1 to 4 mm is well-developed, defined by relative proportions of quartz, chlorite, and muscovite. Bands of intergrown polygonal quartz with minor plagioclase (albite) and randomly oriented muscovite flakes are separated by bands of aligned chlorite and muscovite with subordinate amounts of quartz and fine-grained opaques (probably carbonaceous material). The quartz grains are commonly strained, and twinning in the plagioclase is bent. A cluster of subhedral sphene grains occurs within one quartz-rich band.

Limonite occurs as scattered grains throughout the rock, some of which are pseudomorphs after primary pyrite cubes.

The rock shows two metamorphic foliations. The major and earliest foliation is defined by alignment of muscovite and chlorite blades, and is parallel to compositional layering. The second foliation is a crenulation cleavage that occurs at a very low angle (less than 15 degrees) to the early fabric. It deforms the early fabric and compositional layering, but is not associated with any significant recrystallization, other than incipient polygonization of the quartz.

The presence of carbonaceous material in the rock indicates that it had a sedimentary protolith, and the abundance of muscovite and chlorite may suggests a significant volcaniclastic component.

Sample No. 25714

mode:		
	limonite	70-75%
	quartz	20-25%
	muscovite	2-3%
	epidote	1-2%
	pyrite	trace

The specimen is well-banded on a scale of 1-2 mm, with the banding defined by, variations in limonite content (from 10-95% limonite). Most of the rock is structureless limonite with rare, anhedral, very fine-grained pyrite grains (less than 0.02 mm in diameter). The remainder of the rock is a fine-grained, wholly recrystallized mass of quartz with stubby to elongate, randomly-oriented muscovite blades to 0.15 mm long, and a scattering of extremely fine-grained epidote.

About 4-5% of the area of the section consists of holes with idiomorphic outlines. These are a boxwork after pyrite cubes to 1 mm in diameter.

APPENDIX B - UKHM 1966 REPORT ON MARG TARGET

Oct 1966

by R.E. VAN TASSELL

Contents

FIGURES IN POCKETS

SUMMARY

The following surface work was proposed for the 1966 season:

1. Establish a grid over a portion of the Jack, Marg and Heather claims;
2. Explore by prospecting, geochemistry and hand trenching;
3. Investigate an isolated anomaly at the head of a cirque face on the Jane group.

The following surface work was done in 1966:

1. Jack, Marg and Heather Claims
   Two grids were established over parts of the claim groups and these grids were prospected and soil sampled. A total of 9 trenches were blasted over geochemical highs.
2. Jane Group
   Reconnaissance prospecting was done in the vicinity of the original soil anomaly found in 1965.

RESULTS

A. Jack, Marg and Heather Claims

Area 1 Prospecting revealed an assemblage of rocks similar to those found in the Keno Hill area, e.g. quartzites, thin-bedded quartzites, graphite schist and greenstone. Limonitic conglomerate typical of the Patterson Range was found. Soil sampling revealed a strong, irregular lead anomaly. A corresponding but more widespread zinc anomaly was found. A total of 9 trenches were blasted over geochemical highs. One trench revealed an 8" break of manganese and gouge which assayed 4.64 oz. Ag/ton. It is felt that these anomalies do not reflect vein structures.

Area 2 Soil sampling in Area 2 gave negative results.

B. Jane Group

Prospecting revealed a northeast trending fault with breccia which assayed trace Silver. Geochemical analysis of rock samples did not reveal any anomalous trends. It is felt that this anomaly does not reflect a vein structure.

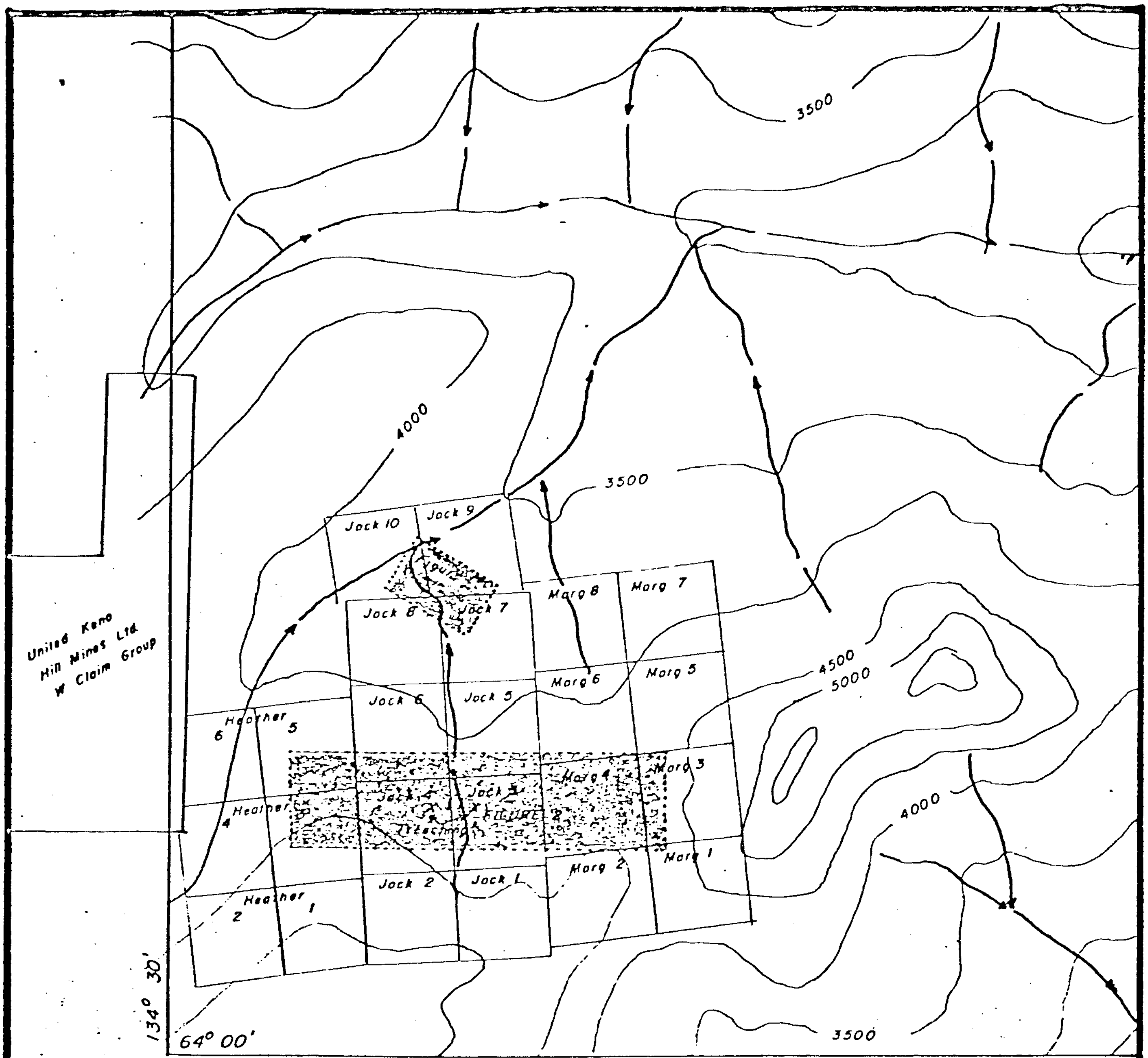
RECOMMENDATIONS

It is recommended that:

1. No further work be done on the Jack, Marg, Heather and Jane claim groups.

2. That United Keno Hill Mines Limited drop their 50% working agreement with Canadian Superior Exploration Limited on the Jack, Marg, Heather and Jane claim groups.

Robert E. Van Tassell,
Chief Exploration Geologist.



Scale 1 inch = 1/2 mile

AREA WORKED

on the

HEATHER, JACK and MARG Claims

Patterson Range — Signe Creek

Staking Sheet 106D-1

AUGUST 1966

R. E. Van Tassell

DETAILS OF 1966 EXPLORATION PROGRAM

INTRODUCTION

During the field season of 1965, Canadian Superior Exploration and United Keno Hill Mines Limited, working on a 50-50 basis, examined the Jack and Jane mineral claims in the Patterson Range, some 30 miles northeast of Calumet.

Following anomalous results on the Jack Group, 2 additional claim groups were staked in late August and early September; the Marg 1-8 to the east and the Heather 1-6 to the west.

A three-man crew spent 24 days linecutting, prospecting, and soil sampling 21.79 line miles. Following results from soil sampling, a two-man crew spent 16 days hand trenching.

Very capable work was performed by Rodney Peterson, Wesley Presunka and John Armstrong, all summer students.

LINE CUTTING

Area 1, the southern-most grid (see location map), had 18.46 line miles cut. An east-west baseline was cut and crosslines were cut at 100 ft. intervals at right angles to the baseline. Each crossline was picketed every 100 ft. and marked with the station location.

Area 2, to the north, had 1500 feet of baseline cut. Crosslines were run by compass and stations marked with seismic tape.

PROSPECTING

A. JACK, MARG AND HEATHER CLAIMS

Only area 1 was prospected and mapped on a scale of 1" = 100 ft. The area mapped contains less than 5% outcrop.

Poor development of outcrops due to creep, solifluction and frost heaving makes accurate strike and dip determination difficult.

Mapping revealed an assemblage of rock types striking in a N44E direction with an average dip of 44 southeast.

Rock types mapped in the area were: limonitic conglomerate, ferricrete? quartzite, thin-bedded quartzite, graphitic schist and greenstone. These rocks, belonging to the Yukon Group, closely resemble those found in the Keno Hill area.

(a) Limonitic Conglomerate - An iron rust colored rock which has been formed by the cementing of surface debris by limonite.

(b) Quartzite - Typically blue-grey to grey and occuring in beds from a few feet to 10 feet thick. For the most part it consists of well defined bands containing abundant quartz stringers and traces of pyrite.

(c) Thin-Bedded Quartzite - Usually as above but dark grey depending on the abundance of graphitic schist.

(d) Graphitic Schist - Black and highly foliated with local crenulations. Contains abundant quartz as stringers and bulbous masses. The schist contains abundant pyrite. Weathers to a crumbly mass and rarely forms good outcrops.

(e) Greenstone - Medium to coarse grained and dark green in color, schistose in parts.

Mineralisation

No significant mineralisation was noted in the area except abundant pyrite in all rock types.

Abundant breccia was found in the central portion of the grid area but assay results returned only trace Silver.

Trenching revealed an 8" vein of manganese and gouge in schist which returned 4.64 oz. Ag/ton.

B. JANE GROUP

Prospecting revealed a northeast trending fault just south of the Jane anomaly. This fault contains much breccia. Assay results from this area returned trace Ag. No significant mineralization was found in the area.

GEOCHEMISTRY

A. JACK, MARG AND HEATHER CLAIMS

A total of 1,695 soil samples were taken from Area 1 and Area 2. These were analyzed for lead and zinc, employing the hot aqua regia method.

In Area 1, areas showing anomalous results from Mr. C. Wheatley's survey of 1965 were sampled on 25 foot intervals for closer definition. The remainder of the grid was sampled on 100 foot intervals.

LAB PROCEDURE FOR CHEMICAL ANALYSIS OF SOIL SAMPLES FOR LEAD AND ZINC

i General - The initial laboratory techniques and methods of analysis were set up by Dr. R. E. Delevault of the University of British Columbia, during a three week visit early in 1964. He felt that the techniques as set up were those best applicable to the particular conditions of the area.

ii Sampling

1. Place approximately 200 grams of the soil sample on a clean sheet of paper and allow to dry thoroughly.

2. When soil has dried, mix thoroughly and crush.

3. With a one gram scoop select a sample which possesses as little organic matter as possible and disregard any rock fragments larger than 1 mm (a one mm mesh sieve may be used).

4. Place the one gram soil sample in a small aluminum cup (made from aluminum foil) and tag.

iii Digestion

1. Place the one gram (well crushed) soil sample into a 22 x 175 mm test tube, add one ml. of aqua regia and heat gently (about an hour) in the fume hood until the aqua regia has evaporated.

2. Allow the sample residue to cool for 10 or 15 minutes.

3. Add 1 ml. of dilute hydrochloric acid ($1HCL:10H_2O$) to the residue and gently heat (approximately 15 minutes) until the soil is just moist.

4. Dilute to 20 mls. with demineralized water and shake well.

iv Lead Test

1. To an aliquot of the sample solution add 5-10 milligrams of ascorbic acid, wait a few minutes, then add ½ ml. of the potassium cyanide solution, and 1 ml. of ammonium citrate buffer solution. Wait at least two minutes if much iron is present.

2. Add ½ or 1 ml. of dithizone working solution (dithizone dissolved in chloroform).

3. Shake and compare with the standards unless the color is the pink color of the pure complex. In such case, add more dithizone until a mixed color persists and match to the

standards. The amount contained in a matching standard must, of course, be multiplied by the total number of ½ mls. of dithizone used.

4. Prepare a series of standards. They should have the following range: γ's lead, 0, 0.2, 0.5, 0.8, 1, 1.5, 2, 3, 4, 5, 8 mls. of ds. 1 ml. ½ ml, ½ ml, 1 ml, 1 ml, 2 ml, 2 ml, 3 ml, 3 ml, 4 ml. For higher amounts than 8γ per ml, add dithizone and shake until color for 8 is reached, then there are 2γ per ml. used. These standards will keep for about 4 hours at normal room temperatures.

v <u>Zinc Test</u>

1. Make a series of nine standards by diluting the 100γ /ml. stock solution to 1γ /ml. solution. The zinc standards should be 0γ, 0.2γ, 0.5γ, 0.6γ, 0.8γ, 1γ. Add the reagents for the test described below. These standards will keep for about 1½ hours at normal room temperatures.

2. To an aliquot of the unknown sample solution add 5-10 milligrams of ascorbic acid, wait a few minutes, and then add 2 mls. of the sodium-acetate buffer solution, and 2 mls. of the dithizone working solution. (Dithizone dissolved in toluéne - 10 milligrams/liter.)

3. Shake from 30 to 40 seconds and compare to standards.

INTERPRETATION OF RESULTS

In contouring lead, background was initially held at 50 parts per million (p.p.m.) and zinc at 100 p.p.m. Lead has proven in all work to be the best indicator, whereas zinc values occasionally reflect the lead but in some cases they are erratic and widespread making zinc interpretations very difficult. It must be remembered that zinc is very mobile and travels great distances as compared to lead.

In the case of the Jack, Heather and Marg claims, interpretation is based primarily on the lead plot.

<u>Area 1</u> - A numberoof rock samples were taken throughout the grid area and analyzed geochemically to determine if some rock types were contributing to the high anomalies. Following are the results:-

Line No.	Station	Rock Type	Pb p.p.m.	Zn p.p.m.
28+00 W	5+00 S	Gossan	7	640
5+20 W	3+00 S	Limonitic Congl.	7	480
10+00 W	3+00 S	Graphite Schist	24	810
10+00 W	3+00 S	Graphite Schist	129	320
19+60 E	0+50 S	Graphite Schist	16	80
19+65 E	0+45 S	Quartzite	34	96
12+50 E	4+10 N	Breccia	7	130
7+75 E	1+75 N	Breccia	7	240
10+50 W	4+00 S	Quartzite	7	130
10+00 W	0+15 S	Chloritic quartzite	3	80
3+75 W	0+75 N	Quartzite float	10	20
7+00 W	3+00 N	Greenstone	13	32

Geochemistry - continued

It can be seen from these samples that geochemical results are variable, but graphitic schist, limonitic conglomerate, iron stained gossan and breccia carry high zinc values. Some schist shows anomalous lead. However, the values are by no comparison as high as the anomaly found.

A. Jack Group, Area No. 1

The eastern end of the grid area is devoid of lead anomalies with the exception of one minor high at 23E-Baseline. There are minor low zinc values which may reflect rock types.

The major anomaly of interest lies at 3W to 25W, Baseline to 10S, a length of 2200 ft. The lead anomaly is reflected by the zinc, but the zinc is more widespread. The more widespread zinc to the east and northeast may reflect graphitic schist.

The lead anomaly lies in a general east-west direction. Within the anomaly there are many high trends with no definite orientation. Past work in the Keno Hill area over known veins has shown a sharp well-defined anomaly. It is felt that the anomaly on the Jack Claims does not reflect a typical vein structure.

As the anomaly was widespread it was impossible to expose it in cross section, this being possible only by mechanical means.

The follow-up work consisted of hand trenching over highly anomalous peaks. Three trenches were placed on the highest peak in the anomaly, two were abandoned due to water and trench 'D' did not reach bedrock at 10 ft. Soil samples taken at the bottom of trench 'D' showed 3,200 and 10,000 p.p.m. lead and 400 and 1,000 p.p.m. zinc.

This portion of the anomaly lies over and probably reflects surface drainage; it is also coincident with the limonitic conglomerate. Trench 'G' in the same area did not hit bedrock.

(B)

Trenches A, B, C and H exposed graphitic schist, thin-bedded quartzite and greenstone. An 8" break of manganese and gouge was exposed in trench B, and returned an assay of 4.64 oz. Ag/ton.

From past work in the Patterson Range, United Keno Hill Mines has found:

1. Backgrounds for Pb and Zn are higher than the Keno Hill-Galena Hill area. This is a reflection of:

   a. Stratigraphy, e.g. graphitic schist apparently carries high percentages of Pb, Zn and Fe (note also work by Boyle - G.S.C. Bulletin 111).

   b. Strong geochemical leaching effects are more predominate, often due to a high degree of shattering in and lateral secretion of graphitic schist.

2. Fe rich metasediments are often leached with resultant surficial limonitic conglomerates, these often being widespread.

3. Widespread erratic anomalies are typical in the Patterson Range due to one or more of the above - thereby making geochemical interpretation difficult.

It is felt that the anomaly present on the Jack Claim group is not due to vein structures, rather, a combination of the above.

Area No. 2

Soil sampling revealed several small isolated anomalies which lie in close proximity to Signe Creek.

B. Jane Group

Geochemical analysis of rock samples from the immediate area revealed a low background. An average of the samples indicates lead as 16 p.p.m. and zinc as 53 p.p.m., which is much lower than the Jane anomaly.

A sample from the fault striking northeast and lying just south and upslope from the Jane anomaly ran 64,000 p.p.m. zinc with no visible mineral. It is felt that this anomaly warrants no further investigation (see U.K.H.M. notes on geochemical interpretation, Jack Claims).

2 118 - 36 ... 1261 36 . 21

TRENCHING

Two men spent 18 days hand trenching the latter part of July and early September. Nine trenches were dug for a total of 265 cu. yds. as follows:

Trench	Location	Length	Width	Depth	Cu.Yds.
A	9+00 W-3+50 S	32'	6'	3'	21
B	10+00 W-2+75 S	22'	6'	3')	51
		11'	15'	6')	
C	17+00 W-2+50 S	16'	9'	6'	32
D	4+00 W-4+00 S	18'	8'	10'	53
E	4+00 W-4+50 S	35'	8'	3'	31
F	4+00 W-5+00 S	10'	8'	2'	6
G	5+50 W-5+25 S	19'	10'	6'	42
H	17+00 W-5+00 S	37'	9'	3'	29
					265

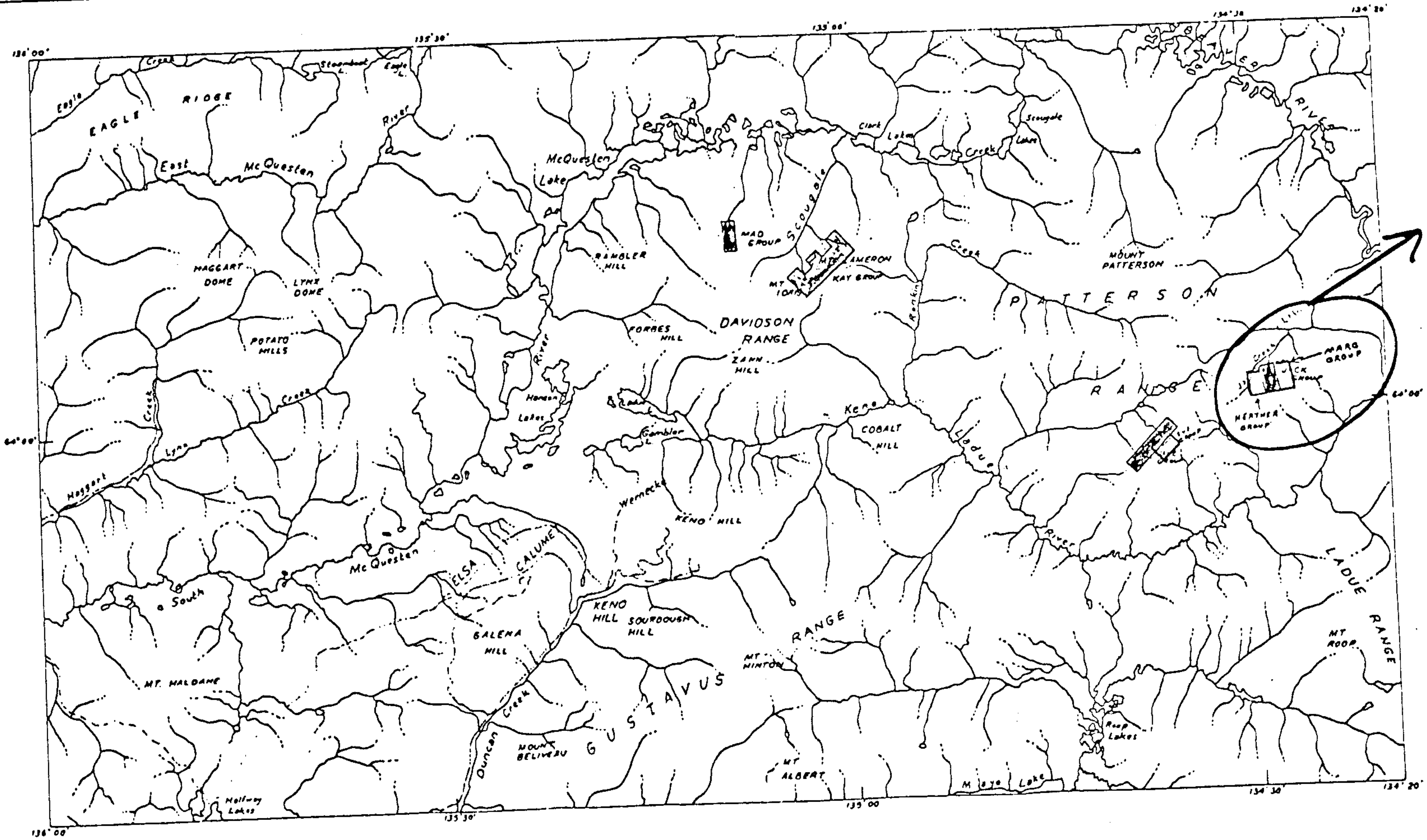
The above work has been recorded at the Mayo Mining Recorder's Office as 265 cu. yds. by drilling and blasting at $25.00 per cu.yd. = $6,625.00 or 66 claim years.

Present Status of Jack, Marg and Heather Claims

Claim Name	Grant No.	Staked	Expiry Date
Jack 1 to 8	84070-84077	2-4-65	5-4-70
Jack 9 & 10	84599-84600	4-9-65	9-9-68
Marg 1 to 6	84629-84634	30-8-65	9-9-69
Marg 7 & 8	84635-84636	30-8-65	9-9-68
Heather 1 to 4	84637-84640	4-9-65	9-9-69
Heather 5 & 6	84641-84642	4-9-65	9-9-68

COST OF PROGRAM

Food and Supplies	$ 372.00
Salaries	
Soil sampling and line cutting 2 men 48 days @ $12.10	580.80
1 party chief helped with trenching 45 days @ $470/month	687.26
	$ 1,268.06
Soil Analysis 1,695 samples @ $1.00 per sample	$ 1,695.00
Helicopter Charter A total of 23 hrs. 30 mins. @ $135.00/hr. includes gas and oil	$ 3,172.50
Trenching	
Powder, caps, fuse, thermolite and thermolite connectors	325.96
1 prospector 180 hrs. @ $2.89 per hour plus overtime	734.08
	$ 1,060.04
Recording Office - Mayo	
2 grouping certificates	10.00
66 claim years of assessment @ $5.00/year	330.00
	$ 340.00
Supervision and Office Work Planning and drafting of work	$ 470.00
TOTAL	$ 8,377.60



N.T.S.

LEGEND

▬	Claims Recorded in April 1965.
⌐⌐	Claims " - September 1965.
----	Main Road.
- -	Winter Road - Track.

CANADIAN SUPERIOR EXPLORATION LIMITED

KENO PROJECT

LOCATION MAP

October 1965	C. J. V. W.	DWG. 1

APPENDIX C - ARCHER, CATHRO 1967 REPORT ON MARG TARGET

REPORT

ON

I967 EXPLORATION PROGRAM
JACK, MARG, HEATHER CLAIMS, YUKON

FOR

CANADIAN SUPERIOR EXPLORATION LTD.

December 28, I967

Alan R. Archer Consultant Vancouver, B.C.

CONTENTS

FIGURES IN TEXT

APPENDIX

(I)

SUMMARY

A program of trenching and geochemical sampling was performed during 1967 by Archer, Cathro and Asssociates Ltd. on property owned by Canadian Superior Exploration Ltd. in the Mayo District, Yukon. The primary purpose was to locate the source of extensive lead geochemical anomalies found on the property by soil sampling in previous years. This source was found to be mainly lead rich disseminated pyrite in the country rocks. No evidence of ore mineralization was found on the claims and no further work is recommended.

INTRODUCTION

This report describes a surface exploration program performed in 1967 under the writer's supervision on property owned by Canadian Superior Exploration Limited in the Mayo Mining District, Yukon Territory. Direct reference is made to maps and text of the October 1966 report by R.E. VanTassell titled "Keno Project 1966, Canadian Superior Exploration Limited and United Keno Hill Mines Limited".

PROPERTY

The property consists of 24 unpatented contiguous claims situated about 31 air miles east of Elsa, Yukon Territory. The claims are registered at Mayo, Yukon Territory, as follows -

Claim Name	Grant No.	Expiry Date
Jack 1 - 8	84070 - 84077	April 5, 1970
Jack 9 - 10	84599 - 84600	September 9, 1968
Marg 1 - 6	84629 - 84634	September 9, 1969
Marg 7 - 8	84635 - 84636	September 9, 1968
Heather 1 - 4	84637 - 84640	September 9, 1969
Heather 5 - 6	84641 - 84642	September 9, 1968

All work performed during 1967 was done on the Jack 3 and 4 and Marg 4 claims.

1967 EXPLORATION PROGRAM

Purpose

The writer studied Mr. VanTassell's 1966 report during

May 1967 and made an independent interpretation of the field data, On the basis of this evaluation further exploration was recommended with the purpose being to:-

(1) locate, by trenching, the mineralization responsible for one or more of the soil anomalies

(2) obtain fresh specimens of mineralization either in place or as float, to determine silver to lead ratio

(3) evaluate the soil anomalies in their relationship to topography and geological setting.

The reader is referred to the June 1, 1967 report by the writer titled "Proposed Exploration Program, Jack Claims, Patterson Range, Yukon Territory" for details of the above mentioned interpretation of field data, recommended exploration and proposed budget.

Logistics

A three man crew consisting of a miner, geochemist and student helper were mobilized to Keno City by truck from Whitehorse and from there to the property by helicopter on August 8, 1967. The writer accompanied the crew to the property and spent a full day examining local geology and surface conditions. The crew was equipped with an Atlas Copco Cobra Drill, powder and fuse for trenching purposes. A portable radio-phone was set up at base-camp for communications to the writer's office in Whitehorse.

On August 18, the writer accompanied by Mr. C. Wheatley, geologist with Canadian Superior, visited the crew by helicopter from Mayo. The new trenches were examined and a mutual decision to terminate exploration efforts was made. The crew and camp equippment were mobilized to Mayo with the helicopter on the evening of the same day.

Geology and Geomorphology

The geological setting is well illustrated and described in Mr. VanTassell's report. Rock units are similar to, and in fact indistinguishable from, those in the Keno Hill district. All units contain pyrite as an accessary mineral with greatest concentration (up to 5%) in the graphite schist. The graphite schist and quartzites shown on Figure IA of Mr. VanTassell's report tend to blend from one to another along strike rather than forming distinct separable units. The lineaments shown on the same figure do not, in the writer's opinion, exist. Lineaments actually observed by the writer are shown on Figure 5 accompaning this report.

The property occurs in a relativelly heavily glaciated terrain as opposed to the unglaciated conditions in the Keno Hill district. Signe Creek, which bisects the property, originates in a cirque valley immediately south of the camp shown on Figure 5. A terminal morraine formed by the Alpine glacier that once occupied this cirque forms the steep hill immediately morth of the camp on the right side of the creek. There are no other significant glacial deposits on the property.

Outcrop is abundant except in the morraine area. Overburden cover is thin and is composed almost entirely of "in situ" fragments of country rock broken and decomposed by frost action along the bedding planes. The quartzites tend to form resistant outcropping ridges and the schistose rocks thinly overburden covered depressions. Vegetation is sparce with black spruce and buck brush scattered on a generally grassy slope. There has been insufficient time since glaciation for development of a soil profile.

Trenching

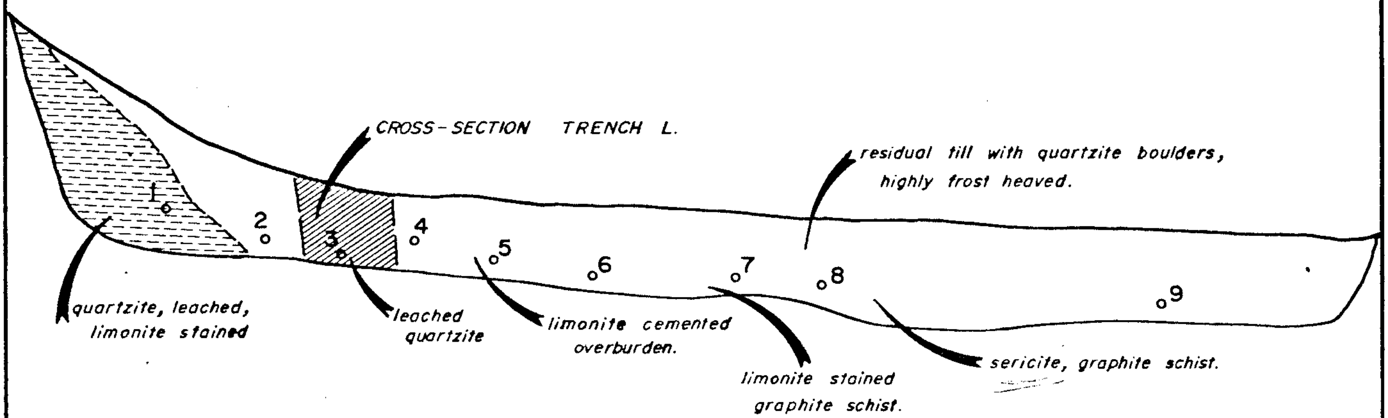
Five trenches and one pit were excavated. Their location is shown on Figure 5 and details of each are illustrated on Figure I to 4 that follow in the text. Trench H, K, L and Pit J were dug to examine a quartzite-schist contact that was geochemically positive and thought to possibly represent a fault contact. Trenches M and N were cut at the base of the terminal morraine to further study a metal positive transported limonite gossan. The total volume of material removed in all trenches is estimated at 95 cubic yards.

No evidence of vein-faults or vein or gangue mineralization was found in any of the trenches. Residual overburden was panned in search of fime particles of galena or other ore minerals but the only sulfide found was pyrite. Results of geochemical analysis of samples from the trenches is shown on Figure I to 4 and are discussed further under the heading of Interpretation and Conclusions.

Geochemistry

All samples were sent to Chemex Labs Ltd., North Vancouver, where they were analysed for lead and silver by atomic absorption spectrometry of a hot nitric-perchloric acid extrac-

TRENCH K.
(facing north)



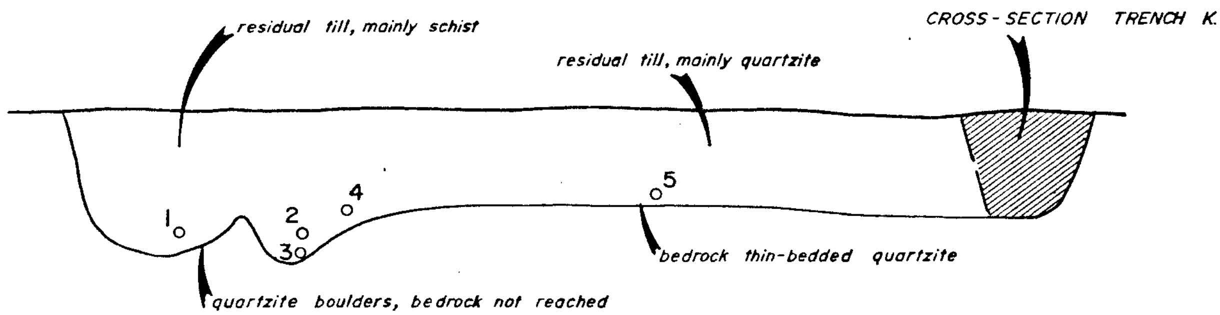
SAMPLE No.	LEAD (ppm)	SILVER (ppm)	DESCRIPTION.
1	5850	30	Rock sample, limonite stained quartzite
2	475	2	Panning concentrate, overburden.
3	1060	19	Rock sample, leached quartzite
4	4080	33	Soil sample
5	5500	60	Panning concentrate, overburden.
6	5675	21	Panning concentrate, overburden.
7	4800	88	Panning concentrate from bedrock schist.
8	1940	5	Panning concentrate from schist fragments
9	3080	9	Panning concentrate, overburden

NOTE: *Trench K averages 4 ft. in width, total volume about 20 yd^3. The quartzite and schists contain up to 5 % pyrite.*

Feet. 0 5 10 Feet.

FIGURE 1

TRENCH L.
(facing west)



SAMPLE No.	LEAD (ppm)	SILVER (ppm)	DESCRIPTON
1	1440	17	Panning concentrate, overburden
2	2400	7	Panning concentrate, overburden.
3	3940	62	Small fragment pure pyrite.
4	1700	4	Panning concentrate, overburden.
5	2720	5	Panning concentrate, overburden.

NOTE: *Trench L. averages 4 ft. in width, total volume about 14yd.^{3}*

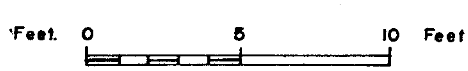
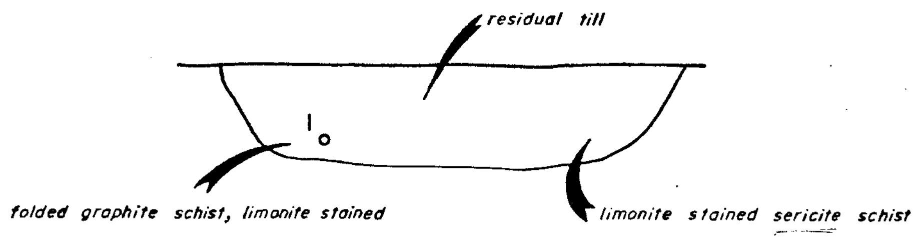
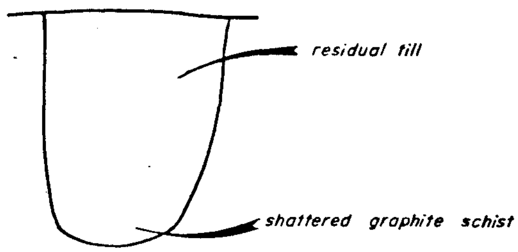


FIGURE 2

TRENCH H.
(looking west)



PIT J.
(looking west)

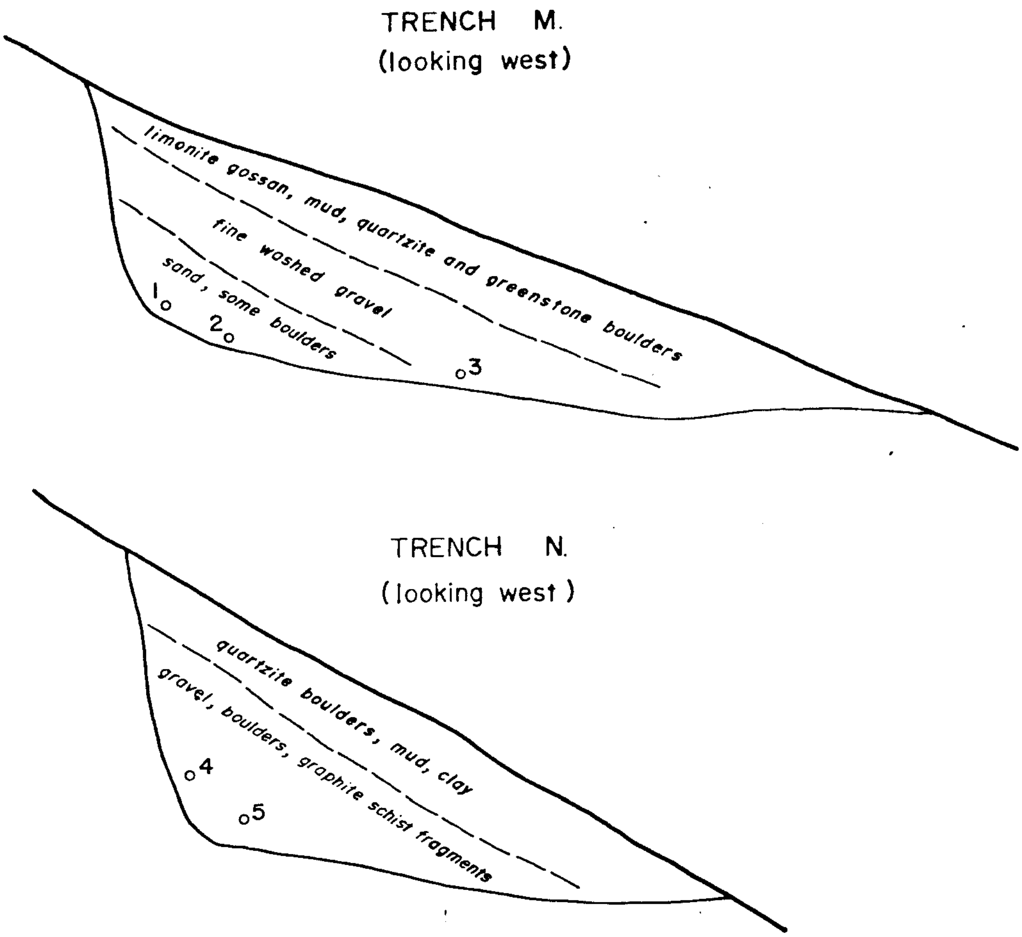


SAMPLE No.	LEAD (ppm)	SILVER (ppm)	DESCRIPTION
1	2400	7	Rock sample limonite stained graphite schist.

NOTE: - *Trench H. average width 3ft., total volume about 4yd.*^{3}

- *Pit J average width 7ft., total volume about 10yd.*^{3}

FIGURE 3



SAMPLE No.	LEAD (ppm)	SILVER (ppm)	DESCRIPTION
1	2600	2	All are panning
2	2040	0·5	concentrates of
3	2440	1	overburden.
4	685	0·5	
5	2600	7	

NOTE: *No bedrock found in either trench. Trench M. averages 6 ft. wide with total volume about 27 yd^3 and Trench N. averages 6 ft. wide with total volume about 20 yd^3*

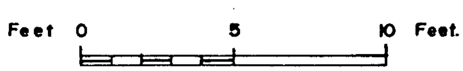


FIGURE 4

tion, Five of the more anomalous samples were later reassayed geochemically for gold but returned only background values.

Soil anomalies outlined by U,K,H,M, in 1966 were spot checked and II rock samples were taken over the area shown on Figure 5, Soil samples, panning concentrate samples and rock samples were also taken from the trenches.

INTERPRETATION AND CONCLUSIONS

The soil anomalies are directly related to ground water seepage and are most intense where the seepage is greatest. This is well illustrated on Figure 5 where seepages are plotted in relation to the soil anomalies,

Rocks in the area are geochemically positive both for lead and silver. Quartzite in Trench K assayed 5850 p.p.m. lead and 30 p.p.m. silver while graphite schist assayed high as 5880 p.p.m. lead and 88 p.p.m. silver. The source of the lead and silver is primarily the disseminated pyrite in the rocks. Panning samples from all trenches consisted almost entirely of fine crystals of pyrite and all returned high assays for silver and lead. A small fragment of pure pyrite assayed 3940 p.p.m. lead and 62 p.p.m. silver or the equivalent of .39% lead and I.8 oz. of silver/ton.

Lead rich limonite gossans are produced by decomposition of the pyrite and these gossans are most extensive where ground water percolation occurs. The high lead values in the soil anomalies are contained in both limonite and residual undercomposed pyrite. The silver values are generally low in the limonite and high in the pyrit probably because silver is more soluable than lead and has not been precipitated from the ground water.

Considering the very youthful character of the overburden and the intense mixing by frost action it is inconceivable that mineralized vein zones of any consequence could exist without showing large quantities of fresh float on surface. Even in the much older soils in Keno Hill fresh vein mineralization can be found in abundance in panning concentrates from the overburden.

No further work is justified on the property and even the minimal expense of recording assessment on the claims is not recommended.

Respectfully submitted,

Archer, Cathro and Associates Ltd.,

Alan R. Archer

Alan R. Archer, B.A.Sc P.Eng.

PROFESSIONAL
PROVINCE OF
A. R. ARCHER
BRITISH COLUMBIA
ENGINEER

A.R.A:m.a.

ARCHER, CATHRO
AND ASSOCIATES LTD.
CONSULTING GEOLOGICAL ENGINEERS

CASCA BUILDING, WHITEHORSE, Y.T. 667-4113 BENTALL CENTRE, VANCOUVER, B.C. 688-3022 OR 522-1562

770 ONE BENTALL CENTRE
505 BURRARD ST.
VANCOUVER 1, B.C.

December 28, I967.

CERTIFICATE

I, Alan R. Archer, with business address in Vancouver, British Columbia, and Whitehorse, Yukon Territory, and residential address in South Burnaby, British Columbia, do hereby declare that:

(I) I am a consulting geological engineer.

(2) I am a graduate of the University of British Columbia, I957.

(3) I am a registered professional engineer in the Yukon Territory and British Columbia.

(4) From I957 to I966 I was engaged in mining and mineral exploration as a geological engineer for a number of companies. I was chief geologist for United Keno Hill Mines Ltd. when I retired in I966 to practice as a consulting geological engineer.

(5) I have personally studied all maps and data referred to in this report and am thoroughly familiar with the Keno Hill District.

(6) I have no interest, nor do I expect to receive any, either directly or indirectly, in any properties or companies referred to in this report.

Alan R. Archer, B.A.Sc., P. Eng.

PROFESSIONAL ENGINEER
PROVINCE OF BRITISH COLUMBIA
A. R. ARCHER

File - Canadian Superior

April 18, 1969

Mr. Ray DuJardin,
Canadian Superior Exploration,
1111 West Hastings Street,
Vancouver 1, B.C.

Dear Mr. DuJardin:

Earlier in the year I requested the use of some information on your Patterson Range property for my seminar paper "Silver Deposits in Yukon". I have since felt it more prudent to refrain from comment on this property other than to note briefly the position of the showing. My change in attitude comes after considerable deliberation on the general geology of the area. I will finish my paper in several weeks at which time I will send you a copy.

After considering the regional geological trends and studying the Anvil deposit I am struck by the many similar characteristics between the Patterson Range property and the Anvil replacement deposits. (Note the enclosed portion of Dr. Aho's paper).

1) I feel the "greenstones" which occur as discontinuous lenses within the Lower Cambrian phyllites and quartzites, both at Keno Hill and in the Patterson Range, are remnants of a submarine extrusive event which is connected with the metallic sulphide content of these formations. Similar greenstones are found in the schists near the Anvil deposit. This evidence is circumstantial but leads me to suspect that the Keno Hill deposits are possibly remobilized mineralization from an ancient massive body in the schist and further that such bodies still exist in less strongly deformed parts of this formation.

.....2

2) The McQuesten anticline is an important factor. It is possible the older phyllites and quartzites exposed to the north are even more favourable for deposition.

3) The doming of the Patterson Range is especially evident by the anomalous radial drainage and should be studied by aerial photogrammetry.

4) The geochem patterns are grossly linear (parallel to bedding) across the hillside. Limonite forms abruptly in the creek below this lineation although the country rock does not change in geology or pyrite content.

I have only recently felt that there was anything more than a theoretical possibility of a massive body on your property. Certainly we have shown that a vein deposit such as Keno Hill does not exist. I happened to re-examine a piece of pyrite in our files which was the only mineralization found on the property other than common pseudo-cubic pyrite found disseminated in the country rock. This specimen (sample 3, trench L) about 1/4 inch by 1/4 inch, was very fine grained and appeared to be pyrite in the hand specimen. In a polish section a modal count gave:

pyrite	20%
chalcopyrite	20%
Sphalerite.	40%
gangue	20% (carbonate)

Only a poor polish could be attained since the sample was fine grained and crumbly. Covellite, chalcocite, pyragarite, and tetrahedrite were suspected. This sample ran 3940 ppm Pb and 62 ppm Ag. (And 1650 ppb Au). CM

I do not discount that the geochemical anomalies may be a facter of such mineralization only poorly concentrated in the schists. More evidence of an alteration envelope (eg - sericite schist?) or some evidence of float would make evaluation much simpler.

I feel you should be aware of the possibility of such a deposit. I now feel that the property warrants at least a cursory investigation in this regard.

Yours truly,

ARCHER, CATHRO & ASSOCIATES LTD.

Charles A. Main

C.A. Main

CAM:sh

APPENDIX D - STATEMENT OF QUALIFICATIONS

STATEMENT OF QUALIFICATIONS

I, Robert J. Cathro, with business addresses in Whitehorse, Yukon Territory and Vancouver, British Columbia, and residential address in West Vancouver, British Columbia, do hereby declare:

1. I am a 1959 graduate of the University of British Columbia in geological engineering.
2. I have been engaged in geological engineering for over twenty years, the past seventeen of which have been as a consultant.
3. I am a registered professional engineer in British Columbia and in Yukon Territory.
4. I have supervised the work described in this report.

Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGICAL
ENGINEER

Robert J. Cathro, B.A.Sc., P.Eng.

STATEMENT OF QUALIFICATIONS

I, Charles A. Main, geologist, with business addresses in Whitehorse, Yukon Territory and Vancouver, British Columbia and residential address in Vancouver, British Columbia, hereby certify that:

1. I graduated from the University of British Columbia in 1971 with a B.Sc. majoring in Geological Sciences and Chemistry.
2. I have been actively engaged as a geologist in mineral exploration since 1971 and as a partner of Archer, Cathro & Associates (1981) Limited since June 1, 1981.
3. I have personally participated in or supervised the field work reported herein and have interpreted all data resulting from this work.

Charles A. Main

Charles A. Main, B.Sc.

Indian and Northern Affairs Canada / Affaires indiennes et du Nord Canada

TRANSMITTAL FORM

M.R. File No. ____
R.M.M.R. File No. ____
Date Fwd. 20 June 83

FROM: Mining Recorder at .... MAYO ....

TO: Regional Manager, Mineral Rights at Whitehorse, Y.T.

Office of the Regional Man...
JUN 23 1983

FOR ACTION ARE:

☐ NEW APPL'N for PLACER LEASE to PROSPECT : Name:

☐ RENEWAL APPL'N PLACER LEASE to PROSPECT : Name: Lease No. ....

☐ AFFIDAVIT of EXPENDITURE on PLACER LEASE. Name: Lease No. ....

☐ SECURITY DEPOSIT

☐ FINANCIAL ABILITY

☐ ASSINGMENT of PLACER LEASE No. ....
From: To:

☐ GROUPING APPL'N UNDER SEC. 52(2) PLACER MINING ACT.
Owner:

☐ DIAMOND DILL LOGS:
Claims: Claim sheet no.:

☒ QUARTZ ASSESSMENT ~~REPORT~~ STATEMENT OF EXPENDITURE.
Claims: Claim sheet no.:
TUDL 1-32.

Type of report: GEOLOGICAL, GEOCHEMICAL + PETROGRAPHICAL SURVEY

Submitted by: ARCHER CATHRO & ASSOC.

Cls. work performed on

$ Req. for ren. application

(REQUESTED BY TELEX PAT WATSON GEOLOGY SEC.)

[signature]
Signature

REPLY ACTION. Date Ret.

091452

Canada

Signature

ARCHER, CATHRO
& ASSOCIATES (1981) LIMITED
CONSULTING GEOLOGICAL ENGINEERS

1016-510 WEST HASTINGS STREET
VANCOUVER, B.C. V6B 1L8

(604) 688-2568

RECEIVED
24 MAY 1983
MINING RECORDER
MAYO, Y.T.
I.A. & N.D.

AFFIDAVIT

I, Marilyn Cooke of Vancouver, B.C. make oath and say:

that to the best of my knowledge the attached Statement of Expenditures for exploration work on the Tudl 1-32 mineral claims on Claim Sheet 106D/1 is accurate.

Marilyn Cooke
Marilyn Cooke

Sworn before me at Vancouver, B.C.

this 12th day of

May, 1983

G. R. C.
A.R. Archer, Notary, Yukon Territory

BOX 4127, 3125 THIRD AVENUE, WHITEHORSE, Y.T. Y1A 3S9 (403) 667-4415

Statement of Expenditures
Tudl 1-32 Mineral Claims
Report Preparation October-December, 1982

Labour

C.A. Main (geologist) - December 1-3, 6-10,
13, 14 (10 days @ $2,400.00) $2,400.00

Expenses

Petrographic Reports, Vancouver Petrographic Ltd. 926.00

TOTAL - $3,326.00

Vancouver Petrographics Ltd

8887 NASH STREET — P.O. BOX 39 — FORT LANGLEY, B.C. V0X 1J0
Telephone (604) 888-1323

Nº 3628

INVOICE

Customer Order No. __________
Customer Charge Code __________
Ordered By: __________

FOR

Archer Cathro & Associates Ltd
510 W. Hastings Street
Vancouver, B.C.

QUANTITY	DESCRIPTION	COST
	THIN SECTIONS	
	POLISHED THIN SECTIONS	
	POLISHED ORE MOUNTS	
	GROUND & LABELLED THIN SECTION REJECT SLICES	
	POLISHED MINERAL GRAIN MOUNTS	
	MINERAL GRAIN THIN SECTIONS	
	MINERAL GRAIN POLISHED THIN SECTIONS 24	
	THIN SECTION K-SPAR STAINS	
	ROCK K-SPAR STAINS	
	CERAMIC PULVERIZER PLATES LAPPED	
	PETROGRAPHIC REPORT on 13 t.s. @ $38.00 ea.	$494.00
	on 9 p.t.s.@ $48.00 ea.	432.00
	FED. TAX	
	PROV. TAX	
	SHIPPING	
	TOTAL	✓$926.00

[signature] #35

Receiving Date Nov 7,1982

Shipping Date Nov 22,1982

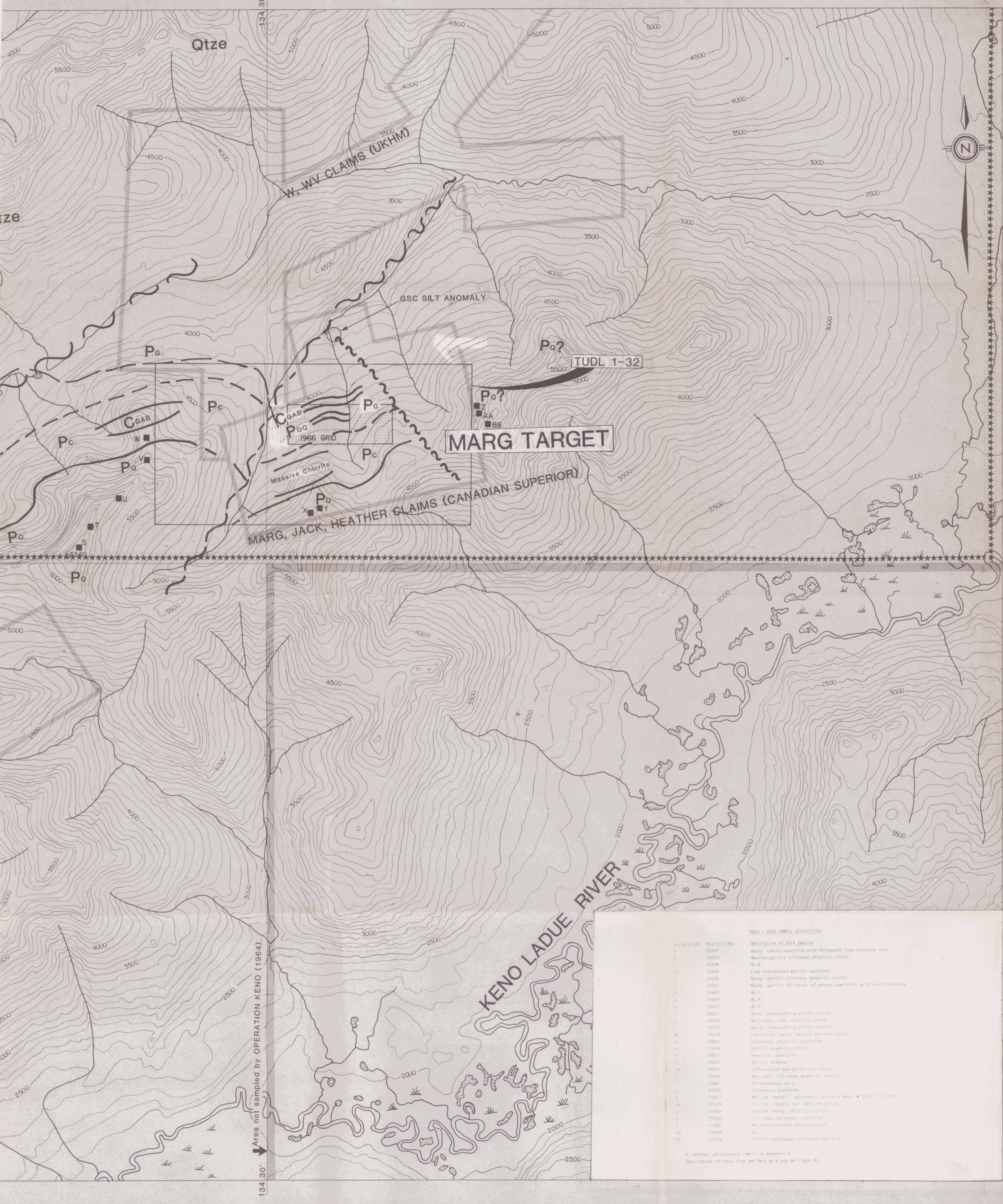
Via __________

In Account With

Project - ZX ~~JOINT~~ VENTURE
Date -- DEC 31, 1982

RECEIVED 24 MAY 1983 MINING RECORDER MAYO, Y.T. I.A. & N.D.

			Total
MANAGEMENT			
DEC.		A	3000.00
LABOUR			
Supervisory			
M.P. Phillips – 2 hrs prepare and file land use permits in Nov.		B	75.00
Field			
Z. REBIC – DEC 1-31 @ $2400/mo + 14 DAYS SUMMER OVERTIME	3520.00		
C. MAIN – DEC 1-31 @ $3400/mo	3400.00	B	
J. CATHRO – 8/18 of 1125 in Dec	500.00		
			7420.00
Casual plus 50 %		B	3710.00
S. Archer; 4 hrs @ $12.75/hr			51.00
		B	
EXPENSES			
Accounting	500.00	C3	
Drafting, 33 hrs. at 22/ /hr.	726.00	C1	
Xerox copies, 1958 copies at 25 √/copy	489.50	C1	
Petty cash 2.65 C2, $100 postage + 59.17 C2	161.82	C2	
Telephone 9.88 + 0 + 4.06	13.94	C2	
Computer pages used Oct to Dec/82 – 100 @ .50	50.00	C2	
M. Phillips expenses	3.07	C2	
C.P. Aid fort	25.00	B3	1...
			16,225.3
CREDIT			
2 DAYS OF SUMMER OVERTIME CREDIT FOR R. CARNE (AT 1/30 MONTHLY SALARY)	(340.00)		(340.00)
Total			15,885.3



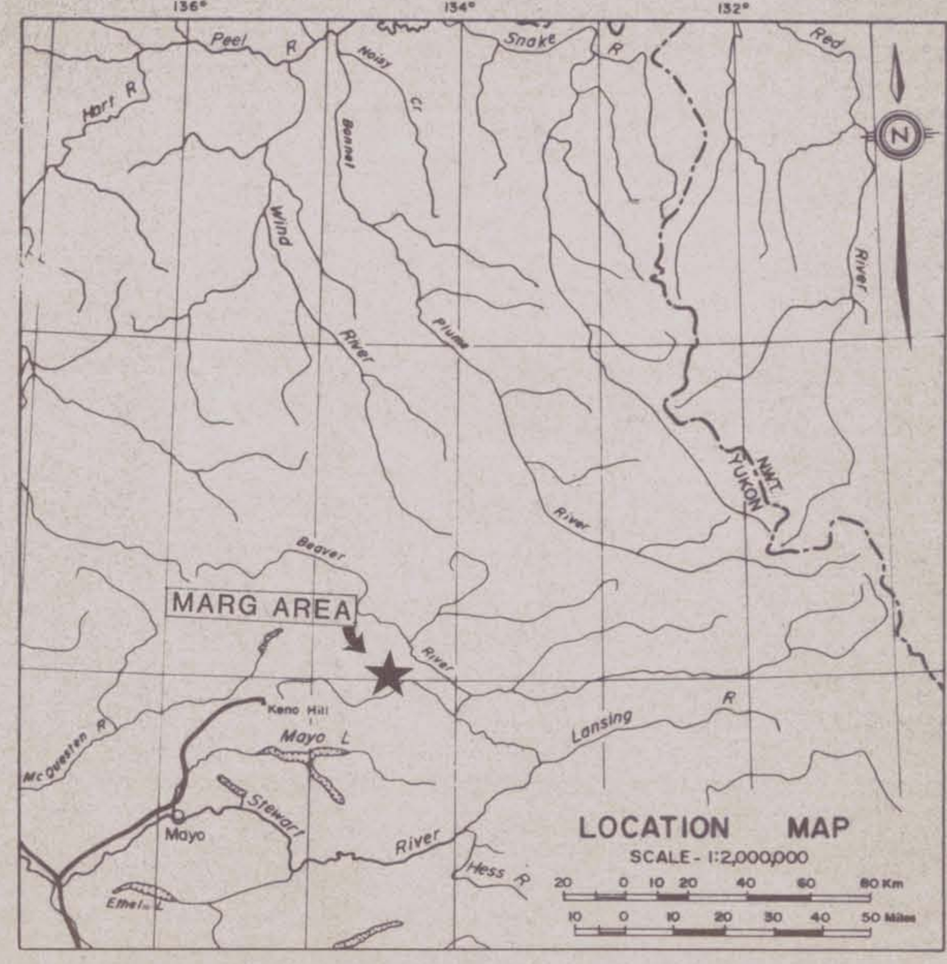


TABLE - ROCK SAMPLE DESCRIPTION

Designation	Analysis No.	Description of Rock Samples
A	25642	Rusty cherty quartzite with infrequent limy sandstone beds.
B	25643	Massive pyritic siliceous chloritic schist.
C	25644	As B.
D	25645	Limy crossbedded pyritic sandstone.
E	25646	Rusty pyritic siliceous graphitic schist.
F	25647	Rusty pyritic siliceous calcareous quartzite, with quartz veining.
G	25648	As F.
H	25649	As F.
I	25650	As F.
J	25651	Rusty crenulated graphitic schist.
K	25652	Resistant limy chlorite schist.
L	25653	Rusty crenulated graphitic schist.
M	25654	Crenulated rusty talcose sericite schist.
N	25655	Calcareous chloritic quartzite.
O	25656	Pyritic graphitic schist.
P	25657	Hematitic quartzite.
Q	25658	Pyritic diabase.
R*	25659	Carbonaceous quartz-sericite schist.
S	25660	Resistant siliceous graphitic schist.
T	25661	Thick-bedded, as S.
U	25662	Calcareous quartzite.
V	25663	Massive pyritic calcareous siliceous beds in graphitic schist.
W*	25664	Fissile 'quartz eye' sericite schist.
X	25665	Talcose rusty, chloritic schist.
Y	25666	Siliceous calcareous quartzite.
Z	25667	Manganese stained amorphous rock.
AA	25668	As Z.
BB	25669	Pyritic calcareous siliceous quartzite.

* denotes petrographic report in appendix 3.

Description of rocks from the Marg grid are on Figure 45.

LEGEND

AGE UNKNOWN

Pq — QUARTZITE UNIT
Brown weathering, moderately resistant, slighly calcareous, graphitic quartzite. Contains interbedded graphitic schists, thin and thick bedded phyllitic quartzite, minor clean quartzite and limestone, and minor chloritic schists.

Pc — CHLORITIC UNIT
Tan weathering, recessive, partly calcareous chloritic schist, often with some graphite and often rusty and pyritic. Contains graphitic schists and rare limestone. Conformable with massive, resistant chloritic beds(metaggabros) and gabbro sills (Cgab).

Pg — GRAPHITIC UNIT
Black weathering, very recessive pyritic graphitic sericite schist. Contains abundant interdigitated calcareous, pyritic, chloritic schist and at least one bed of pyritic, feldspathic quartzite (Pgq).

AGE AND RELATIONSHIP UNKNOWN

Qtze — Massive, featureless clean quartzite, very thick.

Pq? — As Pq, with abundant 'cherty' quartzite and chloritic quartzite.

Previous claims, no longer valid.

■ E — Rock sample site (see figures 43 and 44)

Figure 2

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

REGIONAL GEOLOGY

MARG TARGET
TUDL CLAIMS

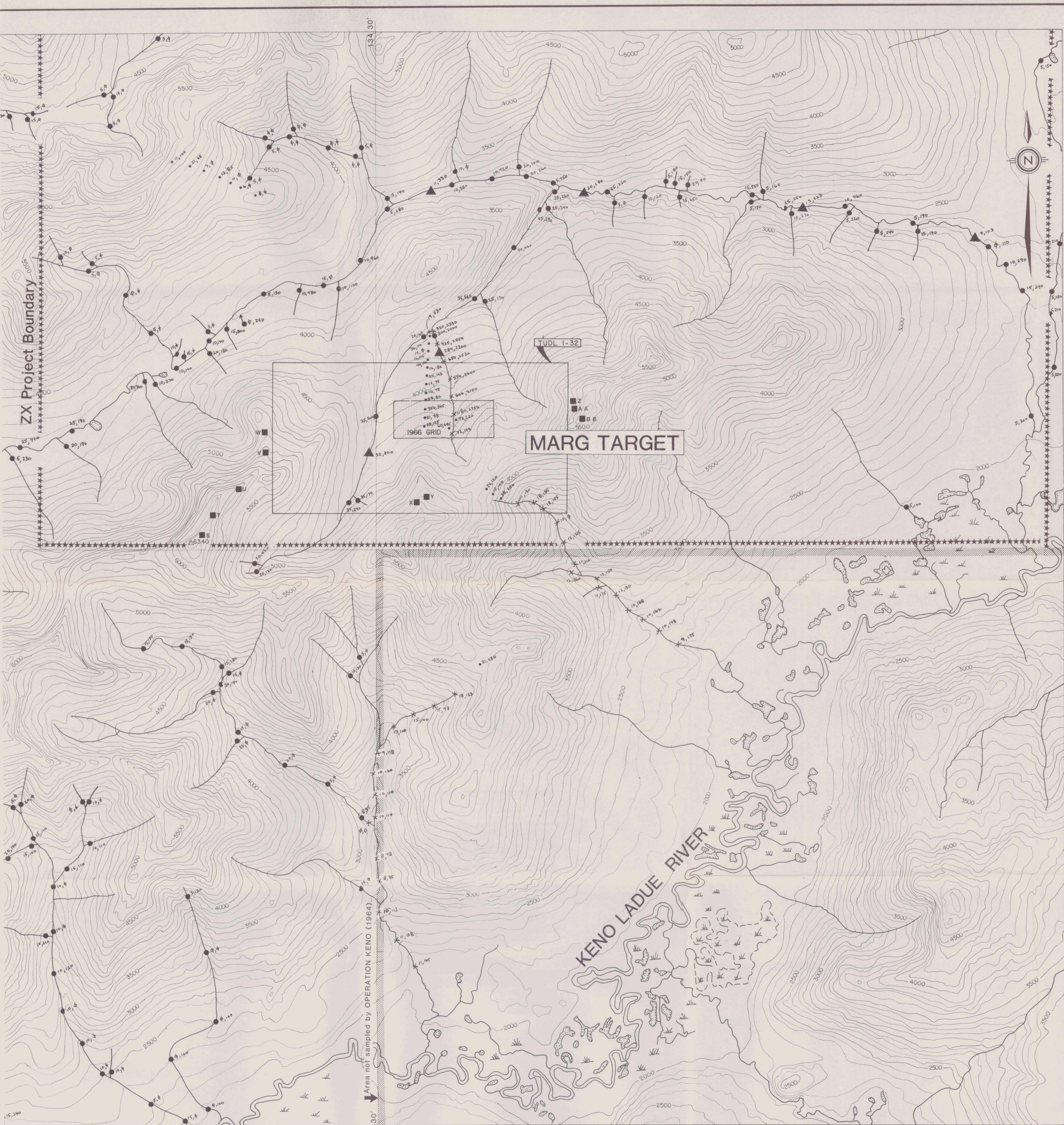
ZX JOINT VENTURE

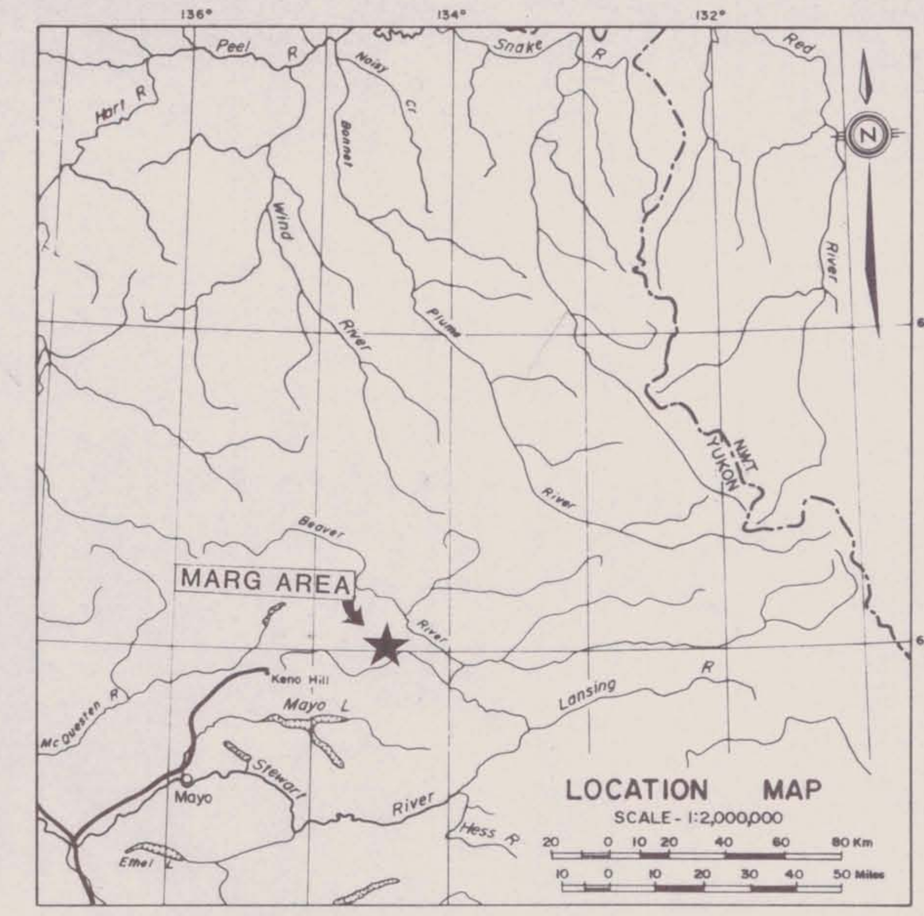
Association of Professional Engineers of the Yukon Territory — R. J. CATHRO — GEOLOGICAL ENGINEER

SCALE - 1:20,000
500 0 500 1000 1500 Metres
1/2 1/4 0 1/4 1/2 1 Miles

091452

To accompany report dated DEC 1982





LEGEND

● 14,620 Silt sample site, GSC Operation Keno (1964)

▲ 11, 210 Silt sample site, GSC Open File 518 (1977)

X, • 42, 540 Silt, soil sample site, Archer Cathro (1982)

— values are in Lead (ppm) and Zinc (ppm)

ϕ represents a value of less than 5 ppm Lead, or 90 ppm Zinc.

■P Rock sample site (see Table)

TABLE - LEAD AND ZINC ANALYSES

Designation	Analysis No.	Lead (ppm)	Zinc (ppm)
A	25642	8	118
B	25643	7	156
C	25644	2	335
D	25645	6	194
E	25646	7	750
F	25647	5	61
G	25648	1	290
H	25649	1	290
I	25650	10	360
J	25651	9	88
K	25652	8	125
L	25653	5	146
M	25654	2	69
N	25655	9	45
O	25656	15	290
P	25657	4	70
Q	25658	3	330
R*	25659	14	2050
S	25660	6	148
T	25661	6	78
U	25662	1	197
V	25663	1	119
W*	25664	30	61
X	25665	32	35
Y	25666	19	42
Z	25667	1	[illegible]
AA	25668	2	125
BB	25669	5	99

Figure 3

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

REGIONAL Pb AND Zn GEOCHEMISTRY

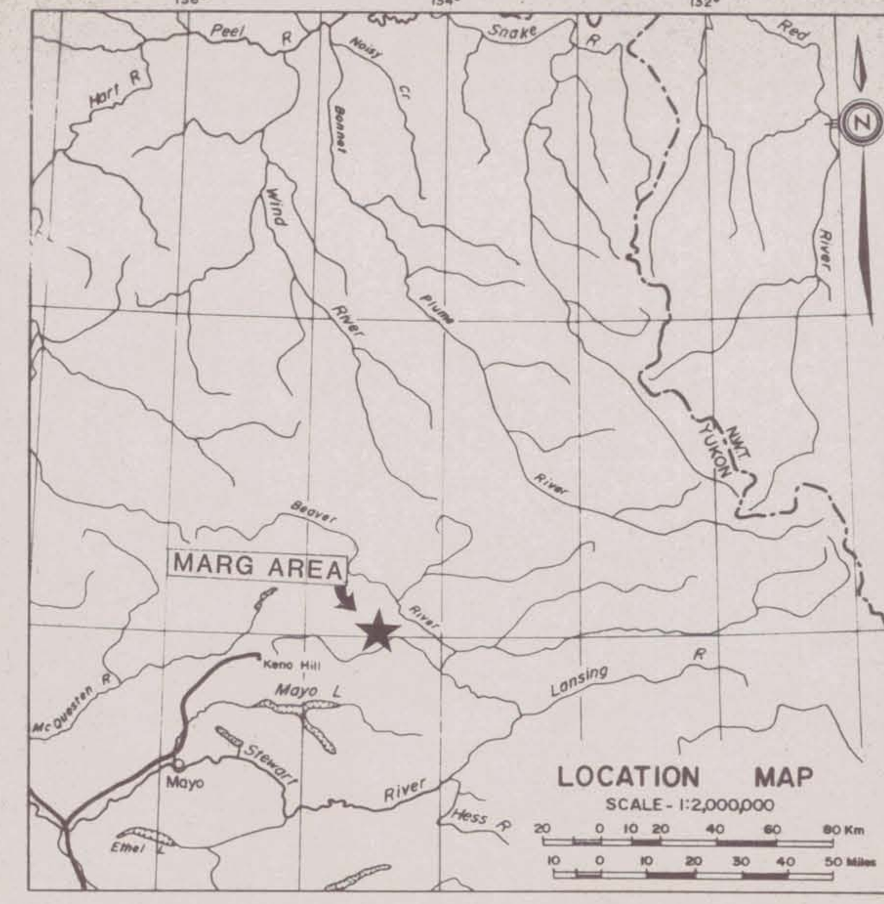
MARG TARGET
TUDL CLAIMS

091452

ZX JOINT VENTURE

SCALE - 1:20,000

To accompany report dated DEC 1982



LEGEND

- ● 42, 0.5 Silt sample site, GSC Operation Keno (1964)
- ▲ 42, 1.0 Silt sample site, GSC Open File 518 (1977)
- X, 30, 0.5 (20) Silt, Soil sample site, Archer Cathro (1982)

Values in Copper (ppm), Silver (ppm), and Gold (ppb)

ϕ represents a value of less than 20 ppm Copper, less than 0.5 ppm Silver, or less than 10 ppb Gold.

■ F Rock sample site (see Table)

TABLE - COPPER, SILVER AND GOLD ANALYSES

Designation	Analysis No.	Copper (ppm)	Silver (ppm)	Gold (ppb)
A	25642	70	0.1	1
B	25643	176	0.1	1
C	25644	102	0.1	1
D	25645	205	0.1	2
E	25646	95	0.8	5
F	25647	15	0.2	4
G	25648	161	0.1	5
H	25649	540	1.2	8
I	25650	44	0.1	2
J	25651	21	0.4	3
K	25652	116	0.1	6
L	25653	10	0.1	2
M	25654	14	0.2	1
N	25655	4	0.2	2
O	25656	112	2.0	2
P	25657	14	0.4	2
Q	25658	310	0.3	12
R*	25659	94	0.6	7
S	25660	40	0.1	1
T	25661	12	0.2	2
U	25662	193	0.2	1
V	25663	62	0.3	3
W*	25664	7	0.1	1
X	25665	9	0.1	15
Y	25666	8	0.1	1
Z	25667	300	0.1	16
AA	25668	290	0.2	7
BB	25669	50	0.2	4

Figure 4

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

REGIONAL Cu, Ag AND Au GEOCHEMISTRY

MARG TARGET
TUDL CLAIMS

ZX JOINT VENTURE

Association of Professional Engineers of the Yukon Territory
R. J. CATHRO
GEOLOGICAL ENGINEER

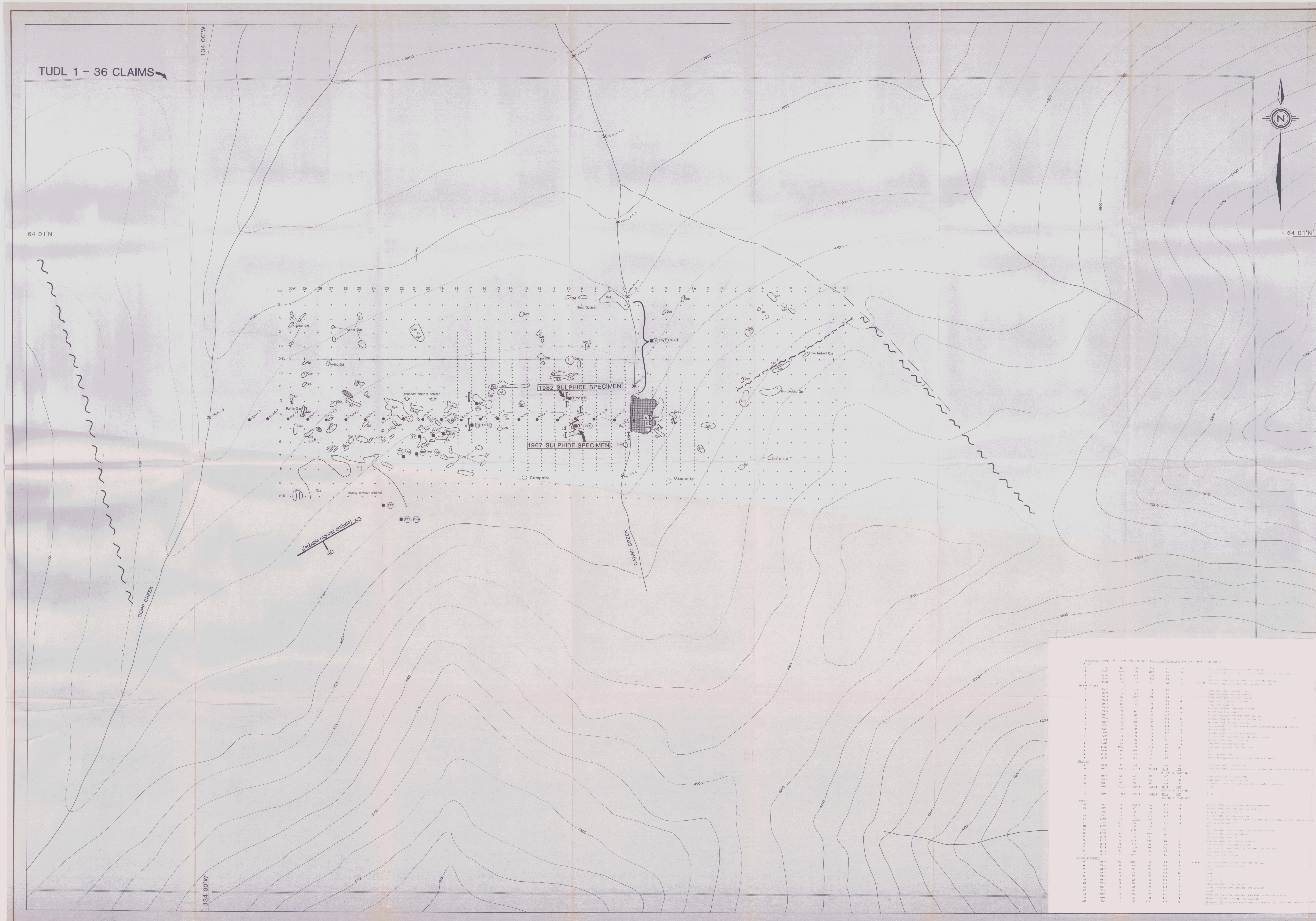
091452

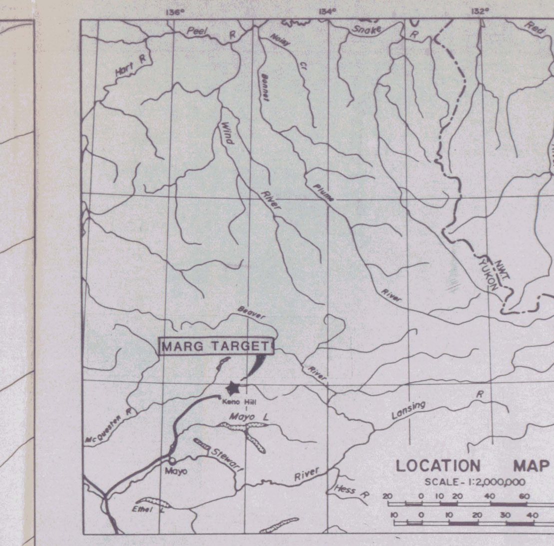
SCALE - 1:20,000

500 0 500 1000 1500 Metres

1/2 1/4 0 1/4 1/2 1 Miles

To accompany report dated DEC 82





GEOLOGY LEGEND

Geology by UKHM, 1966, with (comments) by Archer Cathro

- Gos — Ferricrete, exotic transported gossan
- Qze — 'Quartzite'
- Gph — 'Graphite Schist'
- Gst — 'Greenstone'

Note – geology is more complex than shown
- numerous calcareous chloritic and quartz/sericitic laminae not shown
- no geological contacts are postulated

GEOCHEMICAL LEGEND

- Soil sample site, UKHM 1966
  - lead, zinc data shown on figures 46 and 47
  - no data for copper, silver or gold
- Soil, silt sample site, Archer Cathro 1982
  - copper and silver in ppm
  - gold in ppb
- Rock sample site, Archer Cathro 1982
  - specimens of talus in trenches or of outcrop
  - for data see table
- Hand trenches, max. 1 m depth
  - Canadian Superior 1965,
  - UKHM 1966, or
  - Archer Cathro 1967 and 1982

Designation	Analysis No.	Lead (ppm)	Zinc (ppm)	Copper (ppm)	Silver (ppm)	Gold (ppb)	Other	Description
CREEK FLOAT:								
A	25687	505	395	750	1.2	18		Rusty vuggy thin-bedded quartz graphite schist.
B	25688	2500	390	3500	7.4	70		Foliated quartz-chlorite-sericite schist, contains barite, trace sphalerite.
C	25689	415	475	520	1.4	17		As A.
D	25690	425	167	470	1.8	18		Grey thin-bedded graphitic quartzite with quartz veining.
E	25691	36	73.	134	0.9	6	1.22 % Ba	Siliceous crenulated pyritic (+5%) graphitic quartzite.
TRENCHES I,J,K,L:								
F	25670	11	113	18	0.1	5		Foliated siliceous graphite schist.
G	25671	4	49	6	0.1	1		Rusty thin-bedded sericitic quartzite.
H	25672	950	2150	1250	15.4	9		Rusty quartz-chlorite-sericite schist.
I	25673	850	325	73	0.9	32		Rusty sucrosic graphitic quartzite.
J	25674	405	73	88	0.2	2		Vuggy graphite schist.
K	25675	142	17	25	0.6	74		Foliated quartz-sericite-graphite schist.
L	25676	22	149	83	0.4	3		Foliated quartz sericite schist.
M	25677	11	365	53	0.2	5		Pyritic gritty quartzite with quartz banding.
N	25678	67	1050	400	0.2	10		Weathered limonitic feldspathic quartzite (?).
O	25679	420	990	265	0.4	5		Weathered limonitic metagabbro (?).
P	25692	127	79	39	0.3	2		Rusty graphite schist with euhedral pyrite to 5mm and coarse quartz inclusions.
Q	25693	42	119	28	0.4	16		Gritty graphite schist.
R	25694	260	35	116	0.2	10		Foliated graphitic quartz-sericite schist.
S	25695	113	24	28	0.1	6		Bull quartz in vuggy quartz-sericite-chlorite schist.
T	25696	28	128	73	0.1	5		Massive pyritic sucrosic quartzite.
U	25697	88	555	145	0.2	6		Crenulated rusty graphite schist.
V	25698	1950	73	125	2.5	207		Crenulated vuggy quartz sericite schist.
W	25699	46	400	79	0.1	7		As T.
X	25700	41	48	26	0.2	6		Gritty graphite schist.
Y	25701	33	425	77	0.1	8		Pyritic thin-bedded schistose siliceous sideritic marble.
TRENCH B:								
Z	25680	43	68	39	0.2	40		Thin-bedded quartz graphite schist.
AA	25681	7.54 %	3.31 %	14.40 %	161.1 (4.70 oz/T)	1860 (0.054 oz/T)		Rusty fine-grained massive sulphide with covellite tarnish and minor visable chalcopyrite.
BB	25682	196	235	350	0.5	6		Rusty pyritic calcareous quartzite.
CC	25683	500	775	1000	1.8	13		Rusty massive feldspathic quartzite.
DD	25684	270	260	415	0.9	23		Foliated quartz muscovite schist with trace sphalerite and galena.
EE	25685	9.02 %	1.99 %	13.80 %	169.4 (4.94 oz/T)	2570 (0.075 oz/T)		As AA.
FF	25686	7.45 %	1.43 %	10.20 %	149.5 (4.36 oz/T)	2380 (0.069 oz/T)		As AA.
TRENCH H:								
GG	25702	143	2.08 %	1950	0.2	1		Vein (?), limonitic albite-siderite-pyrite assemblage.
HH	25703	99	305	69	0.6	24		Vuggy graphite schist with coarse quartz blebs.
II	25704	25	1100	158	0.3	2		As GG, with coarse bull quartz.
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Figure 5

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

GEOLOGY AND Cu, Ag, AND Au GEOCHEMISTRY

MARG TARGET

TUDL CLAIMS

091452

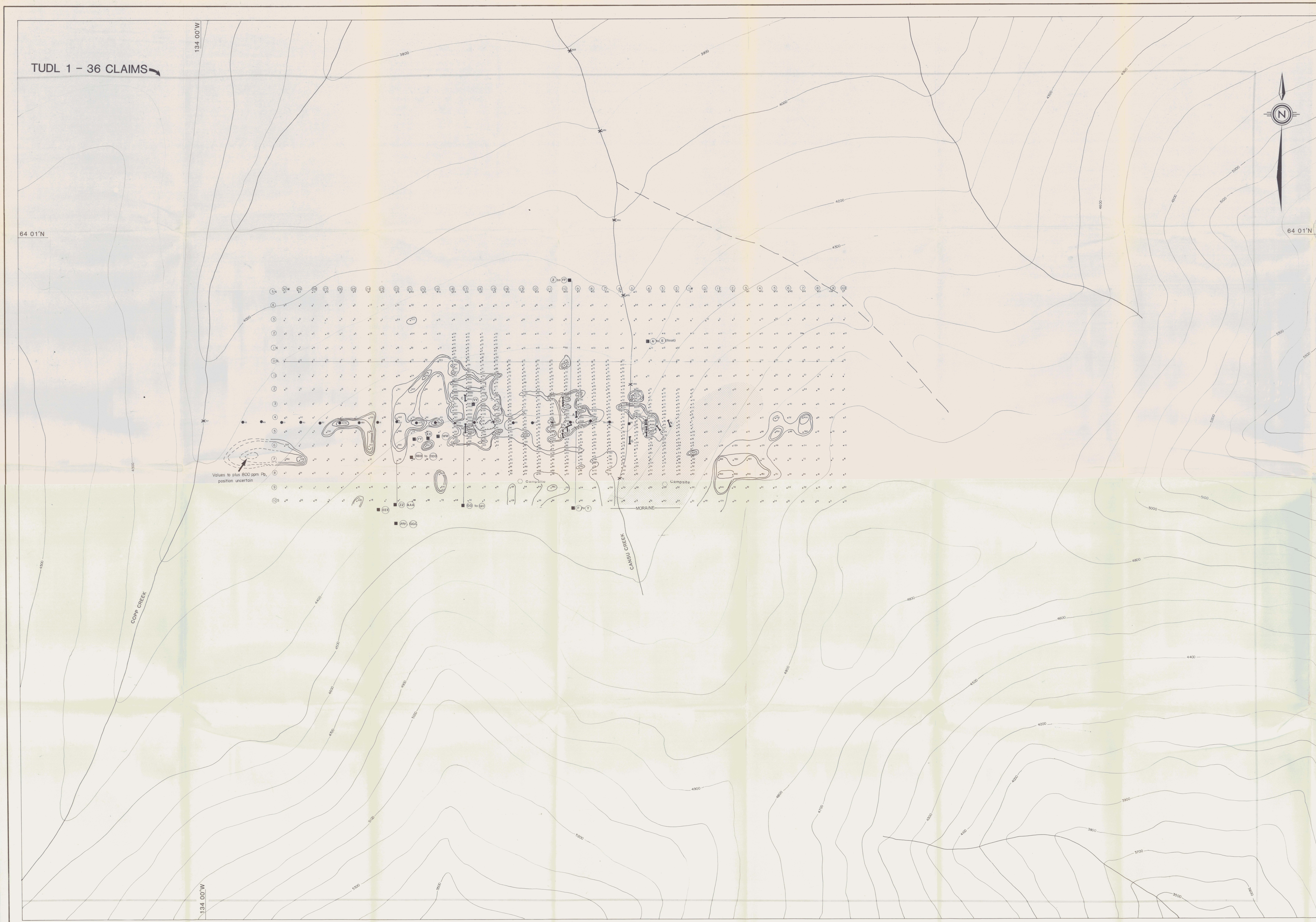
SCALE – 1:2,000

40 20 0 20 40 60 80 100 Meters

40 20 0 20 40 60 80 100 Yards

R. J. CATHRO — GEOLOGICAL ENGINEER — Association of Professional Engineers of the Yukon Territory

To accompany report dated DEC 82



LEGEND

plus 800 ppm Pb

plus 400 ppm Pb

plus 200 ppm Pb

plus 100 ppm Pb

Soil sample, UKHM 1965

Soil, silt sample, Archer Cathro 1982

Hand trench, Canadian Superior 1965, UKHM 1966, or Archer Cathro 1967

Rock sample site (see Table)

Designation	Analysis No.	Lead (ppm)
CREEK FLOAT:		
A	25687	505
B	25688	2500
C	25689	415
D	25690	425
E	25691	36
TRENCHES I,J,K,L:		
F	25670	11
G	25671	4
H	25672	950
I	25673	850
J	25674	405
K	25675	142
L	25676	22
M	25677	11
N	25678	67
O	25679	420
P	25692	127
Q	25693	42
R	25694	260
S	25695	113
T	25696	28
U	25697	88
V	25698	1950
W	25699	46
X	25700	41
Y	25701	33
TRENCH B:		
Z	25680	43
AA	25681	7.54 %
BB	25682	196
CC	25683	500
DD	25684	270
EE	25685	9.02 %
FF	25686	7.45 %
TRENCH H:		
GG	25702	143
HH	25703	99
II	25704	25
JJ	25705	3
KK	25706	90
LL	25707	255
MM	25708	24
NN	25709	14
OO	25710	45
PP	25711	40
QQ	25712	58
RR	25713	38
SS	25714	400
TT	25715	47
UU	25716	21
OUTCROP OR SUBCROP:		
VV	25630	240
WW	25631	49
XX	25632	20
YY	25633	146
ZZ	25634	9
AAA	25635	38
BBB	25636	17
CCC	25637	16
DDD	25638	10
EEE	25639	10
FFF	25640	11
GGG	25641	1

091452

Figure 6

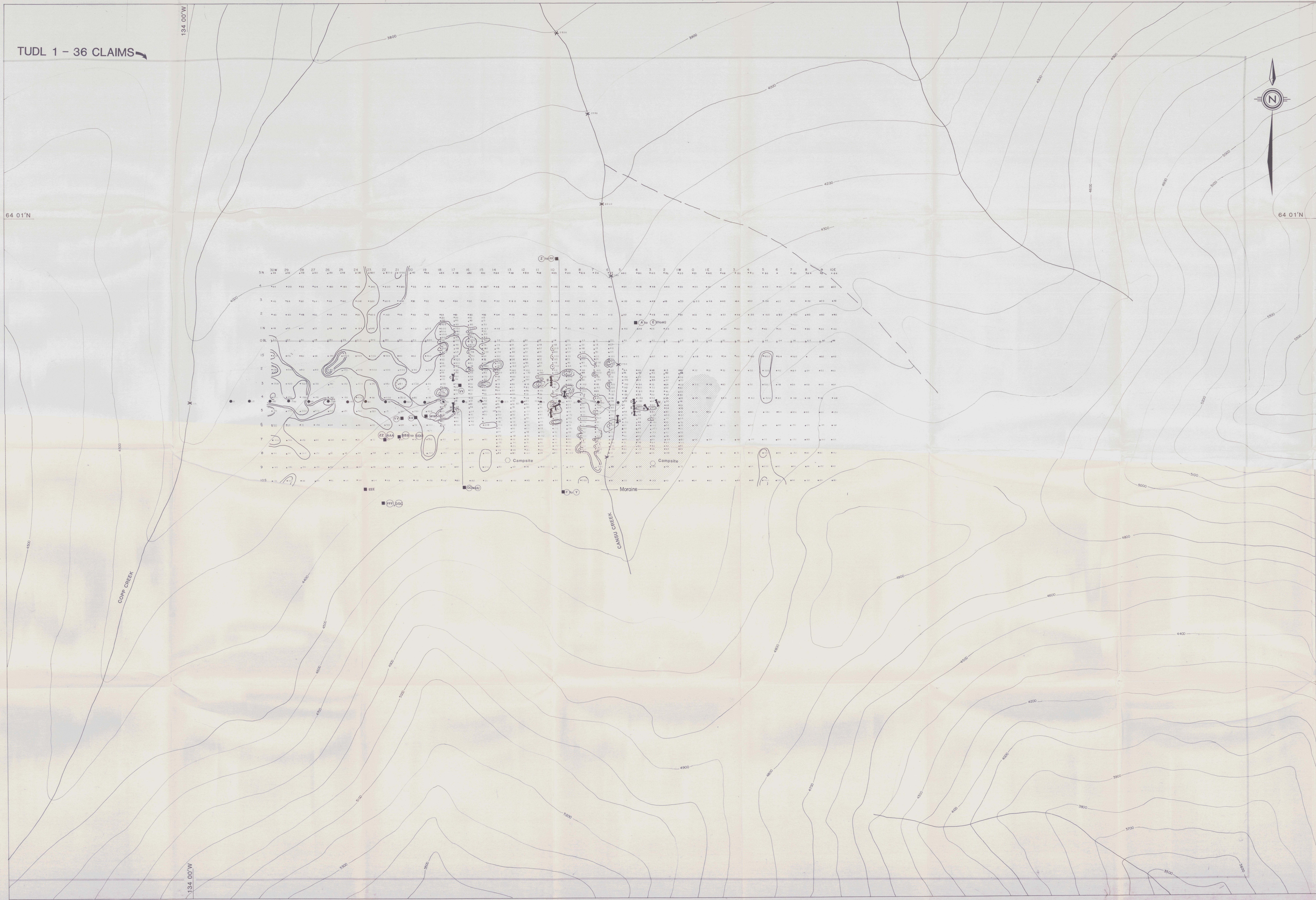
ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

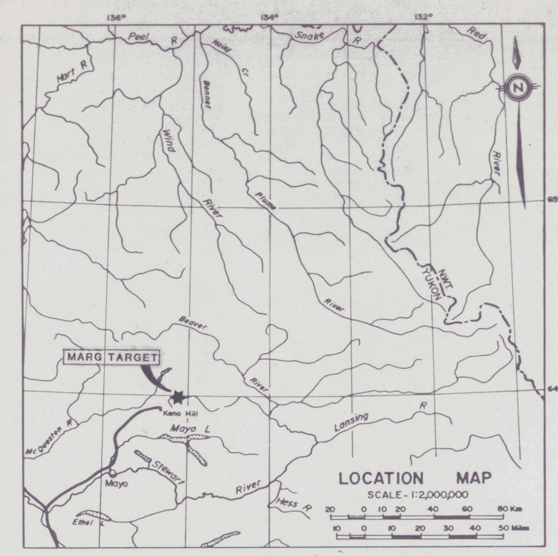
LEAD GEOCHEMISTRY

MARG TARGET
TUDL CLAIMS

SCALE 1:2,000

DEC 82





LEGEND

plus 1600 ppm Zn

plus 800 ppm Zn

plus 400 ppm Zn

plus 200 ppm Zn

Soil sample, UKHM 1966

Soil, silt sample, Archer Cathro 1982

Hand trench, Canadian Superior 1965
UKHM 1966
(or) Archer Cathro 1982

NN Rock sample site (see Table)

Designation	Analysis No.	Zinc (ppm)
CREEK FLOAT:		
A	25687	395
B	25688	390
C	25689	475
D	25690	167
E	25691	73
TRENCHES I,J,K,L:		
F	25670	113
G	25671	49
H	25672	2150
I	25673	325
J	25674	73
K	25675	17
L	25676	149
M	25677	365
N	25678	1050
O	25679	990
P	25692	79
Q	25693	119
R	25694	35
S	25695	24
T	25696	128
U	25697	555
V	25698	73
W	25699	400
X	25700	48
Y	25701	425
TRENCH B:		
Z	25680	68
AA	25681	3.31 %
BB	25682	235
CC	25683	775
DD	25684	260
EE	25685	1.99 %
FF	25686	1.43 %
TRENCH H:		
GG	25702	2.08 %
HH	25703	305
II	25704	1100
JJ	25705	270
KK	25706	1.56 %
LL	25707	600
MM	25708	345
NN	25709	2100
OO	25710	2.00 %
PP	25711	62
QQ	25712	1150
RR	25713	110
SS	25714	1.54 %
TT	25715	80
UU	25716	1080
OUTCROP OR SUBCROP:		
VV	25630	1500
WW	25631	810
XX	25632	605
YY	25633	375
ZZ	25634	215
AAA	25635	320
BBB	25636	210
CCC	25637	295
DDD	25638	210
EEE	25639	184
FFF	25640	87
GGG	25641	245

Figure 7

091452

ARCHER, CATHRO & ASSOCIATES (1981) LIMITED

ZINC GEOCHEMISTRY

MARG TARGET
TUDL CLAIMS

SCALE - 1:2,000
40 20 0 20 40 60 80 100 Miles
40 20 0 20 40 60 80 100 Yards