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CANADA TUNGSTEN MINING CORPORATION LTD.

ZAP, CONE, and BE MINERAL CLAIMS

Mayo M.D., Y.T.

Sheets 105-M-13 and 14 and 106-D-3 and 4

63° 53' to 64° 01'N. Lat.

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GEOLOGICAL, GEOCHEMICAL and GEOPHYSICAL REPORT

May - September, 1979

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by

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TABLE OF CONTENTS

		Page
GENERAL INTRODUCTION - ZAP, CONE AND BE CLAIMS		
1.1.0	TERMS OF REFERENCE AND SCOPE OF REPORT	2
1.2.0	LOCATION AND ACCESS	2
1.3.0	CLIMATE	3
1.4.0	TOPOGRAPHY AND VEGETATION	3
1.5.0	HISTORY	4
1.6.0	CLAIM STATUS	5
1.7.0	FIELD WORK (1979)	5
1.8.0	GEOLOGY	8
	1.8.1 Regional Geology	8
	1.8.2 Mineralization	14
	BIBLIOGRAPHY	24

Page

LIST OF TABLES

TABLE 1-3	Stratigraphy In The Keno Hill-Galena Hill Area	9

LIST OF FIGURES

FIGURE 1-1	Illustrates formation of a dilatant zone below schist capping. (Boyle, 1965)	16
FIGURE 1-2	Illustrates nature of a vein fault in various types of rocks. (Boyle, 1965)	17
FIGURE 1-3	Ideal oreshoot and surrounding halos illustrated by Ag, Zn, & Ca. Based on data from KENO #18 vein. (Tessari, 1979)	20
FIGURE 1-4	Use of an idealized model oreshoot in underground exploration KENO #18 vein. (Tessari, 1979)	21
FIGURE 1-5	Rearranged element profiles used to produce an idealized oreshoot model for the HUSKY vein. (Tessari, 1979)	22
FIGURE 1-6	Metal distribution patterns about an oreshoot. For the NO CASH DEPOSIT. (Tessari, 1979)	23

LIST OF MAPS

MAP 1-1	Claim Location Map	In Pocket
MAP 1-2	Regional Geological Compilation	"
MAP 1-3	Regional Geochemistry	"
MAP 1-4	South McQuesten River Valley Grid Map	"

TABLE OF CONTENTS

Page

CLAIM STATUS

2.1.0 WESTERN ZAP AND CONE CLAIMS 26

2.2.0 NORTH ZAP CLAIMS 34

2.3.0 BE CLAIMS 44

TABLE OF CONTENTS

		Page
WESTERN ZAP AND CONE CLAIM GROUPS		
3.1.0	INTRODUCTION	50
	3.1.1 Terms of Reference	50
	3.1.2 Scope of Report	50
	3.1.3 Location and Access	50
	3.1.4 History	51
	3.1.5 Claim Status	52
	3.1.6 Field Work	52
3.2.0	PREVIOUS GEOLOGICAL WORK	53
	3.2.1 Lower Schist Formation	54
	3.2.2 Central (Keno Hill) Quartzite Formation	54
	3.2.3 Upper Schist Formation	55
	3.2.4 Greenstone	55
	3.2.5 Rhyolite and Quartz-Feldspar Porphyry	56
3.3.0	LOCAL GEOLOGY	56
3.4.0	DETAILED GEOLOGY	57
	3.4.1 Galena Creek	57
	3.4.2 Airport Area	58
	3.4.3 Proctor Lake Area	59
3.5.0	GEOPHYSICS	60
	3.5.1 Seismic Survey	60
	3.5.2 Electromagnetic Survey	62
3.6.0	GEOCHEMISTRY	65
	3.6.1 Mercury Soil Geochemistry	67
	3.6.2 Lead-Zinc Soil Geochemistry	70

TABLE OF CONTENTS Cont....

		Page
3.7.0	SUMMARY AND CONCLUSIONS	71
3.8.0	RECOMMENDATIONS	72
	BIBLIOGRAPHY	74

APPENDICES

Appendix A	Hg Geochemical Analyses
Appendix B	Hg-Pb-Zn Geochemical Analyses of Western ZAP claims
Appendix C	C.F. Gleeson's Geochemical Report
Appendix D	Kenting Exploration Services Ltd. Report on Seismic Refraction Survey, Keno Hill Area, Yukon Territory
Appendix E	B. Chandra's Geophysical (Seismic Refraction) Report
Appendix F	G.E. White's Geophysical (Electromagnetic Report
Appendix G	Western ZAP Rock Assays

Page

LIST OF TABLES

TABLE 3.3	Hg Content of Ore Samples	68

LIST OF MAPS

MAP 1-1	Claim Location Map	In Pocket
MAP 3-2	Western ZAP, CONE, SIN Claim Group	"
MAP 3-3	Geology Plate One	"
MAP 3-4	Geology Plate Two	"
MAP 3-5	E.M. Maxmin Survey Plates 1-5	"
MAP 3-6	Hg Geochemistry	"
MAP 3-7	Pb, Zn Geochemistry	"
MAP 3-8	G.S.C. Silt Sediment Sample Locations	66
MAP 3-9	Mercury Soil Survey, SADIE-FRIENDSHIP Area.	In Pocket

TABLE OF CONTENTS

		Page
NORTH AND EASTERN ZAP CLAIM GROUP		77
4.1.0	INTRODUCTION	77
4.1.1	Scope of Report	77
4.1.2	Location and Access	77
4.1.3	Terrain	77
4.1.4	History	78
4.1.5	Claim Status	79
4.2.0	GEOLOGY	79
4.2.1	General Geology	79
4.2.2	Lower Schist	81
4.2.3	Central Quartzite	82
4.2.4	Upper Schist	82
4.2.5	Greenstone	84
4.2.6	Quartz-Feldspar Porphyry	84
4.2.7	Lamprophyre	85
4.3.0	STRUCTURAL GEOLOGY	87
4.4.0	GEOCHEMISTRY	89
4.4.1	Silver-Lead-Zinc	89
4.4.2	Tungsten-Molybdenum	90
4.5.0	MINERALIZATION	91
4.5.1	Tungsten	91
4.5.2	Silver	92
4.6.0	CONCLUSIONS AND RECOMMENDATIONS	92
	BIBLIOGRAPHY	97
	APPENDICES	
	Appendix A — Polished Sections	
	Appendix B — Rock Assays and Geochemistry	
	Appendix C — Bondar-Clegg & Company Ltd. Analysis Reports	
	Appendix D — Sample Data Forms	

LIST OF FIGURES

Figure		Page
4-1	Geology of the Northern and Eastern ZAP Claim Group	In Pocket
4-2	Lamprophyry Sill and Dyke East of Hex Creek	86
4-3	Geology East of UR Creek	In Pocket
4-4	Geochemistry of the Northern and Eastern ZAP Claim Group	"
4-5	Stream Sediment Geochemistry Near SHANGHAI Mine	"
4-6	Stream Sediment Geochemistry of Crystal Creek	"
4-7	Geochemistry of the Hanson Lake Intrusion	"
4-8	Kettle Lake Hydrology	96
4-9	Kettle Lake Location Map	In Pocket
4-10	Polished Section of Ore from SHANGHAI Mine	APPENDIX A

TABLE OF CONTENTS

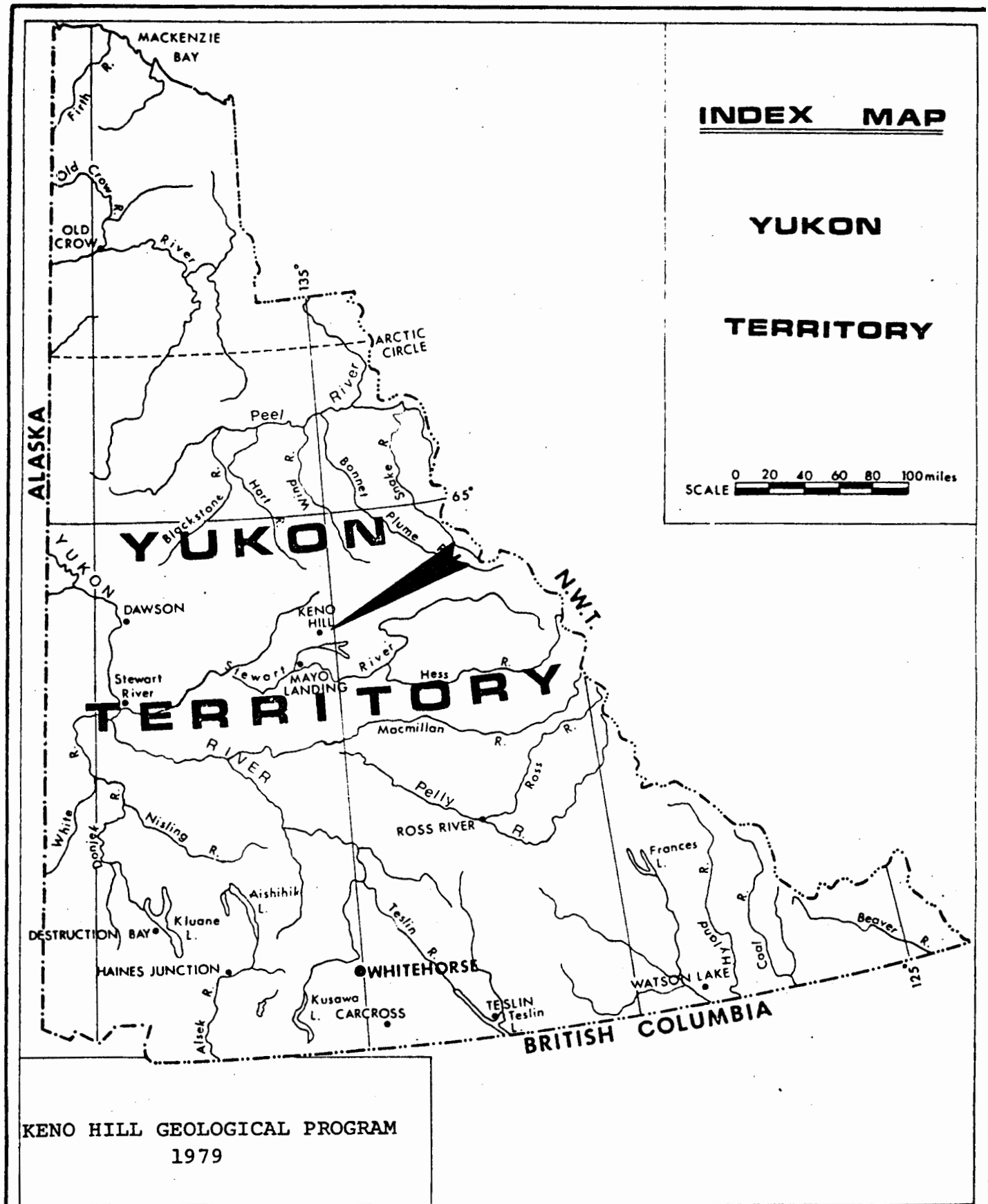
		Page
HANSON LAKE INTRUSTION, NORTHERN ZAP CLAIM GROUP		98
5.1.0	INTRODUCTION	98
5.2.0	GEOLOGY	98
	5.2.1 Alteration Assemblages	99
5.3.0	MINERALIZATION	100
5.4.0	CONCLUSIONS	102
5.5.0	RECOMMENDATIONS	102
	BIBLIOGRAPHY	104

LIST OF FIGURES

5-1	Geology of Hanson Lake Intrusion	In Pocket
4-7	Geochemistry of Hanson Lake Intrusion	"

TABLE OF CONTENTS

		Page
BE CLAIM GROUP		105
6.1.0	INTRODUCTION	105
	6.1.1 Terms of Reference	105
	6.1.2 Scope of Report	105
	6.1.3 Location & Access	105
	6.1.4 Topography & Vegetation	105
	6.1.5 Field Work	106
	6.1.6 Claim Status	106
6.2.0	GEOLOGY	106
	6.2.1 Regional Geology	106
	6.2.2 Lower Schist Formation	107
	6.2.3 Keno Hill (Central) Quartzite Formation	107
6.3.0	HISTORY AND DISCUSSION	108
	6.3.1 Northern BE Claims	108
	6.3.2 Eastern BE Claims	108
	6.3.3 Southern BE Claims	108
6.4.0	CONCLUSIONS AND RECOMMENDATIONS	110
	6.4.1 Northern BE Claims	110
	6.4.2 Eastern BE Claims	110
	6.4.3 Southern BE Claims	110
	APPENDIX 1 Survey Personnel	
	APPENDIX 2 Statement of Costs of Assessment Work Completed	



KENO HILL GEOLOGICAL PROGRAM
1979

1.0 INTRODUCTION

1.1 TERMS OF REFERENCE AND SCOPE OF REPORT

This report is prepared for Canada Tungsten Mining Corporation Limited as fulfillment of Bema Industries Limited obligations as outlined in the agreement between the two companies, dated 1979. Bema Industries Limited was engaged to carry out a geological evaluation of a large group of staked, optioned and recently purchased mineral claims and leases in the area of Keno Hill, Yukon Territory and to ensure tenure of mineral rights within these claim groups.

In particular, the report describes field work and laboratory study performed during 1979. The report also reviews such previously acquired information as is necessary to provide the context for the 1979 work, and discusses such concepts of future aspects of the project such as a major overburden rotary drilling program and underground and surface exploration for the 1980 field season. The basic program in outline form for 1980 is presented including cost estimates.

1.2 LOCATION AND ACCESS

The Keno Hill area is located in the Central Yukon, 35 miles northeast of Mayo and 220 miles due north of Whitehorse. Mining properties are accessible from Mayo, Elsa and Keno City by all weather roads. The project base camp was located on the Hanson Lake road adjacent to a small Kettle Lake.

A small fixed wing airstrip is located on the western section of the ZAP claim group. In addition daily air service to Whitehorse is available at Mayo.

Local resources are limited, the town of Elsa offering few amenities. Mayo, some 45 kilometers to the southwest by all-weather road, offers accomodation, general supplies and some services. Major suppliers are located in the city of Whitehorse.

1.3 CLIMATE

The climate is typical of the Central Yukon area with a mean annual temperature of -2°C. The low average temperature is about -10°C and the high average temperature is about 3°C. The temperatures from winter to summer range from lows of -55°C to highs of +30°C.

The average annual precipitation is about 15 inches with most of the rainfall occurring in May and June. Daily heavy thunder showers occur throughout the summer months.

Snow begins to accumulate as early as mid-September and is melted by mid-June at higher elevations. Up to 5 feet of snow may accumulate in the Keno and Galena Hills area.

1.4 TOPOGRAPHY AND VEGETATION

The main topographic feature of the project area is the 2-4 kilometer wide McQuesten River valley that trends east-west for the breadth of the ZAP and BE claim groups. Glacial till and river sediments overlying bedrock in the western section of the valley have been estimated to be up to 100 meters thick. The eastern portion of the ZAP and the northern BE claims are overlain by up to 200 meters of glacial till. The valley is dotted with post glacial Kettle lakes that vary from a tens of meters in size to major bodies such as Hanson Lake which is 4 kilometers in length. The vegetation on the valley floor consists of spruce groves, swamp grasses and large areas of buckbrush.

The slopes above the valley are timbered with mixed fir and spruce to an elevation of 1000 meters where it gives way to buckbrush and stunted spruce trees. Above 1500 meter elevation the ridges are barren except for lichens and alpine grasses. Slopes are generally steep to the north and east and more gentle to the south and west. Above 1500 meters vegetation is sparse, there are some outcrops and good exposures of float, below that elevation rock outcrops are rare. By far, the larger part of the property is covered by extensive drift-covered areas with little or not outcrop.

1.5 HISTORY

Mining and exploration has been actively carried on in the Galena Hill - Keno Hill area for some 60 years. Most of the old properties and workings are now owned by United Keno Hill Mines Ltd., which was organized in 1945 and has been in continuous production since that time, currently treating over 100,000 tons per year of Ag-Pb ore. The average recovered values per ton since 1946 has been 35 oz. Ag, 6% Pb and 4% Zn. Cadmium is also recovered. Silver recovery has averaged approximately 90%.

At the end of 1978, United Keno's ore reserves stood at 245,942 tons at an average grade of 30.7 oz. Ag and 4.9% Pb (Annual Report, 1978). These reserves are sufficient for over 2 years at current rates of production, substantially higher than the more normal one year's reserves. Reserve grade has declined steadily in recent years, reflecting both improved prices for lead and silver, and the Company's trend to lower cost, open pit mining of some vein systems.

Total production from the Keno Hill - Galena Hill area since its discovery in 1906 has been approximately 200 million oz. silver and over 500 million pounds of lead. Zinc and cadmium values have not always been recovered due to low prices and the remoteness of the area, resulting in high transportation charges to smelters.

MAJOR MINES, 1906-1978

Name	Prod. Ag. 000,000's oz.	Location
Hector-Calumet	94.6	Galena Hill
Elsa 5	27.5	Galena Hill
Husky	12.5	Galena Hill
Sadie-Ladue	12	Greenstones & No. 9
Silver King	10.3	Galena Hill
Lucky Queen	11	No. 9 Quartzite (?)
Keno 9	10.5	Keno Hill
Galkeno	3.6	Galena Hill
No Cash	3.3	Galena Hill
Keno 18	2	Keno Hill (?)
Bellekeno	0.9	Sourdough Hill
Dixie	0.5	Galena Hill
Townsite	0.3	Galena Hill
	189.0	

Of the some 200 million oz. produced from the camp, 95% is represented by the 13 mines above. Some 82% of the above total has been produced from Galena Hill and 17% from Keno Hill.

1.6.0 CLAIM STATUS

In February of 1979, Bema Industries Limited aquired, by staking, on behalf of Canada Tungsten Mining Corporation Limited some 910 claims in two contiguous groups adjoining to the northwest, north and east of the producing silver-lead properties of United Keno Hill Mines Ltd., near Elsa Y.T. These two groups consist of the ZAP and the BE crown granted mineral claims.

The geological program has more than adequately fulfilled the assessment requirements for all owned and optioned claim groups. On some claim groups sufficient work has been carried out to enable us to file for more than 1 year's assessment credit. Location of the claims are shown on PLATE 1-1, Mayo Mining Division:

Sheet 105-M-13	Mt. Haldane
Sheet 105-M-14	Keno Hill
Sheet 106-D-4	Dublin Gulch

1.7.0 FIELD WORK, 1979

The project geological staff utilized the first two months of the program to research the geological literature of the Keno Hill silver deposits. This data base enabled our staff to become familiar with the Keno Hill type mineralization prior to the commencement of their field work.

McElhanney Surveying was commissioned to prepare six (6) 1:5000 base maps from government high and low level air photos, including orthophoto mosaics for each map sheet. These maps provided topographic and ground control for geologic, geochemical and geophysical surveys and further development that result as exploration proceeds.

In the field, geological mapping, sampling and geochemical surveys were carried out utilizing the research data base.

A 30 kilometer base line was surveyed and cut along the axis of the McQuesten River Valley from Mt. Haldane to Ladue Lake. Two hundred and eighteen (218) kilometers of crosslines were compassed and cut with 150 meter spacing in the area of the western ZAP quartzite. Three hundred (300) meter and nine hundred (900) meter spacings were used in the eastern section. A Max-min EM survey was carried out on the cut grid from July 30 to September 8, 1979.

Kenting Geophysics was contracted to carry out a seismic refraction survey across the McQuesten River Valley to outline the depth of overburden overlying the Central Quartzite Formation. Where permafrost overlies the lower schist formation, the refraction index is insufficient to overcome the masking effect of the ice. Although this method is slow and therefore costly, in the areas of Central Quartzite Formation, it has enhanced the EM results in further defining the contacts of the quartzite.

During the mapping of the western ZAP claims a quartzite outcrop south of Proctor Lake was discovered with a 300 meter strike length. This find significantly altered the previous geological concept of the western ZAP claims; thus adding considerably to the economic potential of the western area.

A mercury geochemistry survey was carried out in the area of the western ZAP claims underlain by the Central Quartzite Formation. The deep overburden in the vicinity of the western ZAP quartzite precludes any other geochemical or geological tool that could directly delineate areas of metal enrichment.

Four hundred and fifty (450) stations were sampled with both the A and B soil horizons collected. These samples have been analyzed by Bondar-Clegg using a closed system atomic absorption method. The decision to carry out this mercury geochemistry survey was made on the basis of detailed methodological research which demonstrated that the Keno Hill sphalerite contains up to 25 ppm mercury. Considerable caution was used in the collection and drying of the samples. In addition, soils overlying economic silver, lead, zinc veins were profiled with positive mercury results.

A limited amount of preliminary geological mapping was begun on the BE claims. A number of gold-silver prospects were indicated in the literature search that are of interest. The Central Quartzite Formation has been shown to be similar to that in the western ZAP area.

Regional geological mapping has enhanced the understanding of the McQuesten River Valley geology and has enabled us to better outline the extent of the ground underlain by the Central Quartzite Formation. Mapping was done both on the north and south sides of the valley.

On the north side of the McQuesten River a vein fault and a fault breccia zone occur within the north limb of the McQuesten River Anticline. The fault breccia zone at UR Creek has been delineated by trenching and drilling by United Keno Hill Mines Ltd. and the vein fault has been mined at the Shanghai Mine. Both of these faults extend onto the ZAP claims.

The northern ZAP claims are underlain by an intrusion similar to the Dublin Gulch pluton. Tungsten mineralization occurs within a stockwork in an altered phase of this intrusion.

1.8.0 GEOLOGY

1.8.1 Regional Geology

Geology in the Keno Hill - Galena Hill area has been mapped by a number of geologists of the Geological Survey of Canada beginning with the earliest work of Ogilvie (1890). Fieldwork by Bostock (1938-41), McTaggart (1948-50), Kindle (1952-54), Boyle (1953-55) and Green (1962 and 1965) has provided a general picture for regional geology. From this work two basic opposing theories of structural geology have evolved. McTaggart (1960) interpreted the intensely deformed schist and greenstone units and pronounced local thickening in the Central Quartzite to be indicative of complex recumbent folding and low-angle faulting. Boyle (1965), alternatively, interpreted the local stratigraphic section to be a simple homocline implying that the apparent repetition of units and local thickening are sedimentary features. More recent stratigraphic studies by Tempelman-Kluit (1966) and Blusson (1978) are in disagreement with regard to the general age relationships of the various units present. Resolving the ambiguities of structure and age may lead to the discovery of ore.

Rocks of the Keno Hill - Galena Hill area belong to the Yukon Group which, until recently, was thought to be Precambrian in age. Tempelman-Kluit and Green have revised the stratigraphy of the area and have interpreted Mesozoic ages for the Lower Schist (Jurassic) and Central Quartzite (Lower Cretaceous) and a Precambrian age for the Upper Schist. Blusson, based on limited mapping, suggests that the Lower Schist and Central Quartzite resemble Canol-and Imperial-like strata of Upper Devonian to Mississippian age. Work in 1979 by Sinclair and Tessari support a Paleozoic age for the units based on radiometric dating of mid-Cretaceous regional metamorphism. TABLE 1-3 presents various interpretations of the stratigraphy of the Keno Hill - Galena Hill area.

Mapping on a regional scale was undertaken by Bema Industries Ltd. geologists in order to better understand regional trends of favourable stratigraphic units and structures. The area mapped is centred on the South McQuesten River Valley and extends from Mount Haldane in the west to Keno Hill in the east.

TABLE 1-3

STRATIGRAPHY IN THE KENO HILL - GALENA HILL AREA

		BOYLE (1965)	GREEN (1971)	BLUSSON (1978)	BEMA (1979)
MESOZOIC	CRETACEOUS	Quartz-Feldspar Porphyry Unit 11 Granodiorite Diorite, Granite Unit 10	Quartz Monzonite Granodiorite Unit 10 Greenstone, Keno Hill Quartzite Un8		Qz-Fp-Porphyry Un7 Lamprophyre Unit 6 Quartz Monzonite Grandiorite Unit 5
	JURASSIC		Lower Schist Unit 7		
	TRIASSIC	Greenstone Unit 9			Greenstone Unit 4
PALEOZOIC	PERMIAN				Upper Schist Un.3
	PENNSYLVANIAN				
	MISSISSIPPIAN			Central Quartzite	Central Quartzite Unit 2
	DEVONIAN			Lower Schist	Lower Schist Un.1
	SILURIAN	Pebbly Quartzite Unit 4			
	ORDOVICIAN	Upper Schist Unit 3			
	CAMBRIAN	Central Quartzite Unit 2			
PRECAMBRIAN	PROTEROZOIC	Lower Schist Unit 1	Grit Division Unit 3 Gritty Quartzite Unit Pcy Phyllitic Quartzite Un.2 Upper Schist Unit 1		

Work on the south side of Galena Hill and work adjacent to Lynx Dome define the north-south limits of mapping.

Mapping was conducted using the Geological Survey of Canada geological maps as base references and involved correctly positioning the important stratigraphic units with respect to Canada Tungsten Mining Corp. Ltd. properties. Particular attention was paid to the Central Quartzite Formation which is the major host of silver-lead-zinc lodes in the Keno Hill - Galena Hill camp. The map area was divided geographically into workable portions and each area mapped by one or more geologists. A geological compilation and an economic evaluation is presented in the various chapters of the following report.

The stratigraphic succession in the Keno Hill - Galena Hill area consists of the three main sedimentary units which have been intruded by several plutonic phases. In all portions of the map area the sedimentary sequence consists of a lower graphitic phyllite or schist unit which contains minor quartzite and quartz-sericite schist. This unit is called the Lower Schist Formation.

The Lower Schist Formation is conformably overlain by the Central Quartzite Formation which is predominately bedded quartzite of varying thickness intercalated with graphitic phyllite, argillite and schist. This sequence of interlayered quartzite and schist shows marked similarity in appearance to a turbidite sequence. Contacts between lamina are often very sharp and individual units are of uniform composition.

The Central Quartzite Formation is overlain by the Upper Schist Formation. As previously indicated, controversy exists as to the relationship of the Upper Schist to the other formations of this sequence. Mapping during the 1979 field season demonstrated that the contact between the Central Quartzite and Upper Schist Formations was both gradational and conformable. This conclusion is based on data collected from the south side of the McQuesten Valley west of Elsa, from the north side of the valley near UR and Poli Creeks and from the south of Lynx Dome.

In all locations, intercalated quartzite and

graphitic schist and/or argillite grade into graphitic schist. The contact has been defined as the point where schist comprises fifty percent or more of the stratigraphic section or where the first quartz-sericite schist appears. This interpretation fails however to distinguish between Green's Upper Schist division (Unit 1) on the south side of the McQuesten Valley and the Grit division (Unit 3) on the north side of the valley. Although no gritty rocks were observed south of the South McQuesten River, the Upper Schist in this location is in the same stratigraphic position as that on the north side. Further mapping to the south on Galena Hill is required before the absence of gritty rocks can be accepted.

The stratigraphic succession has been intruded by several plutonic phases. The relative ages of these plutons can be postulated on the basis of metamorphic grade and crosscutting relationships. The oldest intrusive rocks in the area are the greenstone sills. These gabbroic bodies are found throughout the stratigraphic section decreasing in order of abundance from the Lower Schist to the Upper Schist Formation. Greenstone has been observed on both sides of the valley in all stratigraphic units and as far north as Lynx Dome. These bodies often exhibit intense shearing which is likely synchronous with older pervasive regional metamorphism.

The second plutonic phase in the area is represented by the quartz monzonite to diorite stocks that lie along the hinge zone of the Mayo Lake Anticline. These intrusive rocks give potassium-argon model ages which range between 81 Ma and 109 Ma (Wanless et al 1966, 67, 71, 73, Armstrong 1978 cited by Tessari, 1979). These plutons include the Dublin Gulch Stock, the HIT Intrusion and the Hanson Lake Intrusion. Several other smaller stocks may be present beneath the drift covered McQuesten Valley. It is important to note that tungsten and tin mineralization is associated with many of the plutons.

Biotite lamprophyre sills and dykes or quartz-feldspar porphyry sills and dykes are the youngest intrusions in the district. These units have not been observed to show crosscutting relationships, therefcre relative ages cannot be determined. A lamprophyre sill and dyke was, however, observed to crosscut a greenstone body near Hex Creek. This relationship is apparently not reported by Boyle (1965).

At least three periods of structural deformation are thought to have occurred in the Keno Hill - Galena Hill area. The earliest event recognized involved large scale recumbent folding and low-angle faulting. Though largely obscured by later deformation these folds and faults are identified by many overturned minor folds and small scale thrust faults. Minor structures of this nature trend east-west and show northerly vergence. Where the hinge zones of large scale recumbent folds are thought to occur, rocks are intensely warped and sheared and contain massive, contorted quartz sweats. Recumbent folding and low-angle faulting may account for anomalous local thickening of some units in the Keno Hill area.

The second period of deformation comprises several subsequent events which have contributed largely to the present geometry of the stratigraphic units. The first of these events produced the broad, northwest-southeast trending fold known as the Mayo Lake Anticline. This structure and subsequent erosion has exposed a broad belt of Central Quartzite immediately north of Mayo Lake which dips under a cover of Upper Schist on the southwest flank. Near Keno Hill the quartzite narrows and the underlying Lower Schist occurs to the northeast. North of Keno Hill and in the McQuesten Valley only Lower Schist is exposed. On the ridge between the South McQuesten River and Lynx Creek, Lower Schist and Central Quartzite form the hinge and flanks of the anticline. Across Lynx Creek Central Quartzite lies in the hinge with Upper Schist on the flanks. To its terminus near Lynx Dome the anticline plunges gently and occurs entirely within the Upper Schist Formation.

The distribution of units on the Mayo Lake Anticline was altered somewhat by the subsidiary McQuesten River Anticline and the Lynx Creek Anticline. These subparallel structures trend northeast-southwest along their respective valleys and intersect the Mayo Lake Anticline at oblique angles. Both appear to plunge gently to the southwest. The affect of these anticlines on earlier features, particularly the Mayo Lake Anticline, is very pronounced. West of Keno Hill and west of the Hanson Lakes the affects of the Mayo Lake Anticline are largely obscured.

In the McQuesten Valley the Lower Schist Formation is the lowest unit exposed in the hinge area of the McQuesten River Anticline. Overlying the schist on the flanks of the McQuesten Valley is the Central

Quartzite Formation. Toward Mount Haldane to the southwest the Central Quartzite appears to converge in the hinge zone beneath the drift cover of the McQuesten Valley. On both sides of the valley the quartzite is overlain by the Upper Schist Formation.

The latest significant phase of deformation in the district was predominated by extensive fault development. It was not possible to determine if fault development was contemporaneous with folding so it is here treated as a separate phase of deformation. It is possible, however, that the development of faults is directly related to the earlier periods of fold development. There are two types of faults that are of interest, these are vein faults and cross faults. Each will be discussed separately below.

Vein faults are the most economically significant faults in the Keno Hill - Galena Hill area as they are often host to rich silver-lead loads. They occur throughout the district in all types of rocks but differ in their internal nature where cutting greenstone, quartzite, phyllite and schist. The regional pattern of the vein faults is complex and difficult to systematize. Nearly all strike northeasterly and dip to the southeast. In general, the principal vein faults, also called longitudinal faults constitute a series of parallel and subparallel faults which strike between N35°E and N80°E. Another less common set of vein faults are cross-over or transverse faults. These range in strike from north to N35°E.

The second major type of faults are cross faults. Cross faults have long been thought to be post-ore faults but in fact may have played a fundamental role in the localization of ore shoots. Franzen (1979) has found many of the United Keno Hill Mines Ltd. orebodies to be severed by low angle cross faults and has observed "floods of ore fluids backed up behind these faults." Cross faults generally strike northwesterly and dip at shallow angles or at 60° to the south west. It is important to note that there may be at least two sets of cross faults, an ore-related shallow dipping early set called precurser faults and a post-ore, steeply dipping later set.

1.8.2 Mineralization

The silver-bearing ore of the Keno Hill - Galena Hill area is composed principally of freibergite (silver-bearing tetrahedrite), galena (silver-bearing) and less commonly ruby silver (pyrargyrite-proustite) and native silver. In addition to silver, lead is recovered from galena and zinc and cadmium are recovered from sphalerite. Lesser amounts of other silver-bearing sulphosalts are present from which silver is obtained. The ore minerals are associated with an assemblage of gangue minerals which include quartz, siderite, pyrite and lesser amounts of arsenopyrite, chalcopyrite and barite. Where weathering has affected the vein limonite and wad (manganese and iron oxides) are present. In addition, other supergene minerals include anglesite, cerrusite, azurite, malachite and jarosite.

Silver is mined from restricted ore shoots which lie along mineralized vein faults. The ore shoots occur commonly within discontinuous freibergite-galena-sphalerite loads which pinch and swell irregularly along the strike of the vein. The loads are often very rich and commonly contain in excess of 200 ounces of silver per ton of ore for a particular ore shoot. From 1946 to 1978 the average ton of ore assayed 35 oz/ton silver, 6% lead and 4% zinc. At today's prices the average ton is valued at something like $800.00.

Vein faults occur in all rock types of the stratigraphy but differ in their internal nature depending upon the mechanical properties of the host rock. In most greenstones and all thick-bedded quartzites the vein faults are breccia zones or sheeted zones, or transitions between these two types. These range from a meter to 15 meters in width and can be traced with ease along strike and dip. The breccia zones are composed of rock fragments that are generally angular, but some are rounded indicating considerable attrition during fault movements. The sheeted-zone type consist of rectilinear slabs of quartzite or greenstones separated, in most occurrences, by small breccia or gouge-filled fractures from a few millimeters to centimeters wide. Vein faults are well developed in the competent quartzites and greenstones where they may be traced on surface, underground and from air photos for lengths of several hundred meters. Well developed vein faults generally terminate against cross faults or pinch out at schist contacts, however some veins appear to simply die out within the favourable rocks.

In the schists, phyllites, and thin-bedded quartzites the vein faults are represented by narrow fractures, slips, crenulated zones, or narrow breccia zones, rarely more than 30 centimeters wide, and contain some gouge and breccia. In many places the vein fault is difficult to trace because it is a simple fracture or slip a few centimeters or so wide along which the walls of schist or phyllite have been dragged, contorted, and mashed.

The change in the nature of the vein faults as they pass from one rock type to another is important. Vein faults that pass from greenstone into thick-bedded quartzite in most places show little change in character or in strike and dip. The passage of a vein fault from these rocks into schists, phyllites and thin-bedded quartzites is marked by a sharp reduction in the width of the fault zone and a gradual or total disappearance of breccia. Strikes and dips of individual fault and slip planes become erratic with a general tendency for these structures to branch and follow bedding planes and finally die out in a drag-folded or crenulated part of a bed. The vein and fault structures produced by a penetrating vein fault at the interface of competent and incompetent rocks are illustrated in FIGURES 1-1, 1-2 , (from Boyle, 1965).

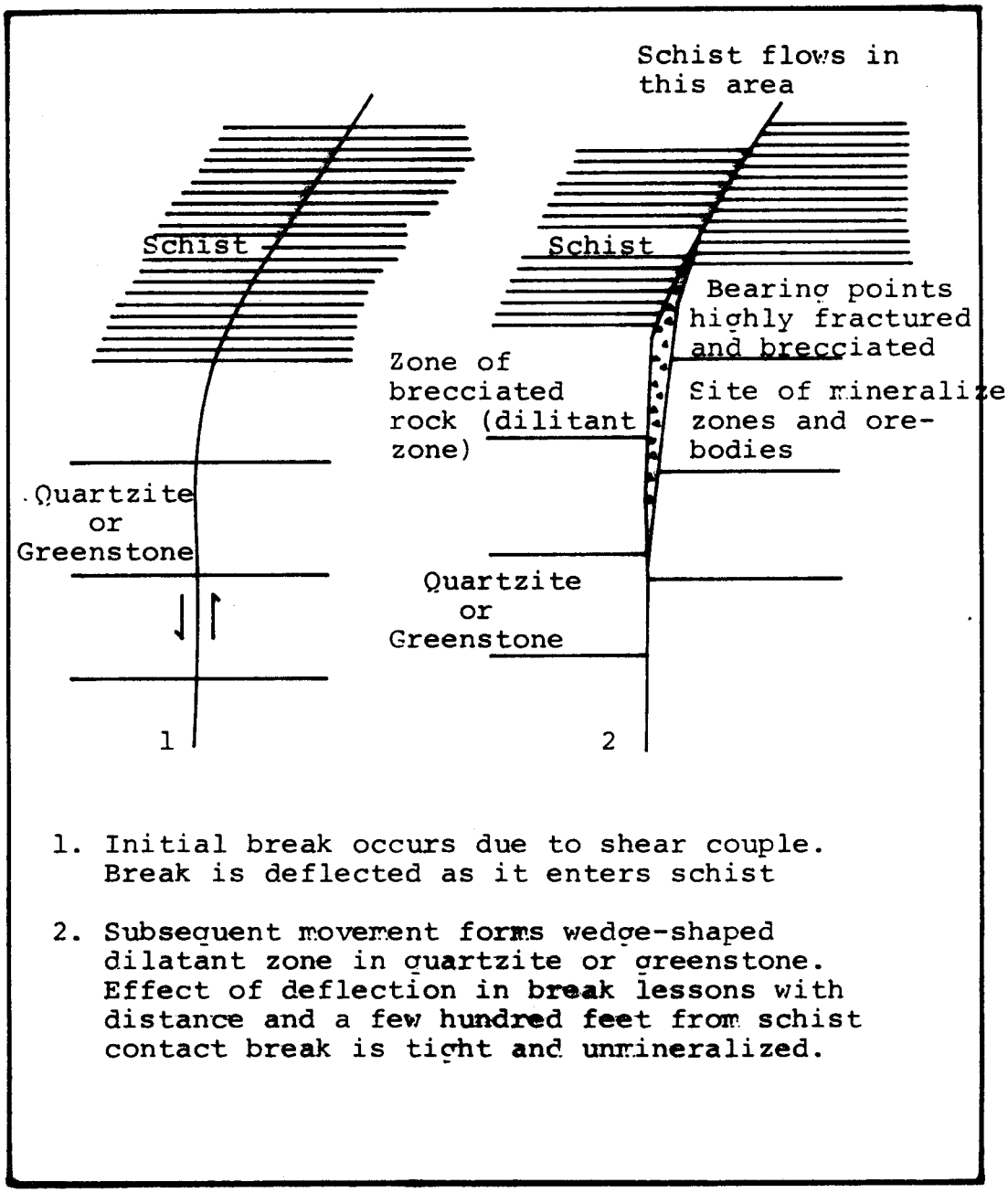
Not all vein faults contain economic concentrations of metals. In general only veins having high Ag:Pb ratios (ounces of silver per ton to % of lead) have been sought in the past. Silver to lead ratios vary throughout the camp but among the veins which have prcduced average ratios of ore range from 3:1 to 9:1.

J. Franzen (1979) of United Keno Hill Mines Ltd. has proposed a model for Ag:Pb ratios in the Keno Hill-Galena Hill camp. The model relates Ag:Pb ratios to properties of the hydrothermal system from which the ore minerals precipitated and to the stratigraphic position of the ore shoots. It suggests that vein faults are the result of stress developed on the McQuesten River Anticline and that the silver content of the hydrothermal solutions is related to the amount of Lower Schist section through which the solutions have passed. The concept can be explained using either a thick section containing low concentrations of silver or a restricted section geochemically rich in silver.

Franzen observed that deposits in the Lower Schist Formation have low Ag:Pb ratios and generally average

FIGURE 1-1

Sketches Illustrating Formation Of A Dilatant Zone Below Schist Capping. (From Boyle, 1965, pp.87)

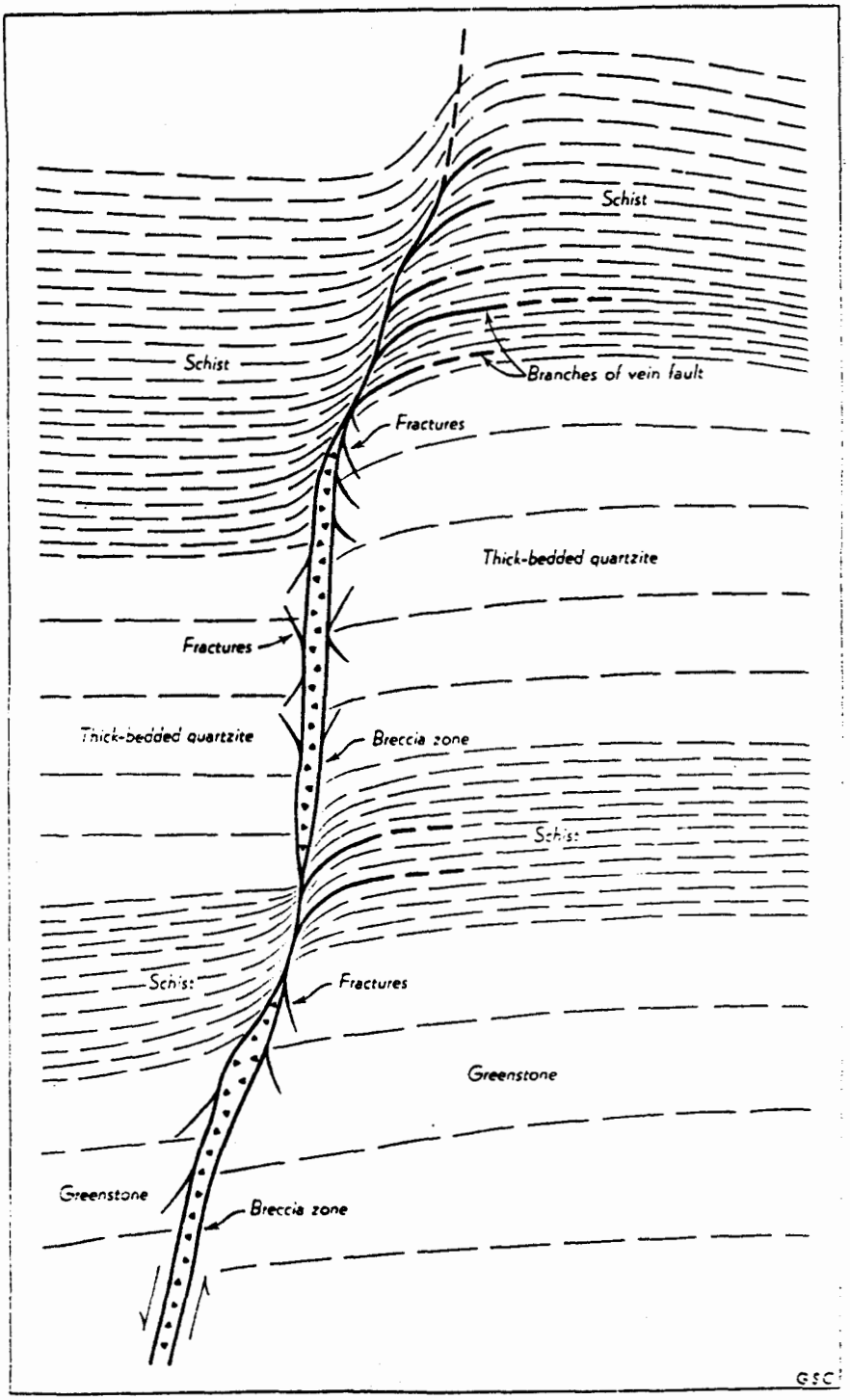


1. Initial break occurs due to shear couple. Break is deflected as it enters schist

2. Subsequent movement forms wedge-shaped dilatant zone in quartzite or greenstone. Effect of deflection in break lessons with distance and a few hundred feet from schist contact break is tight and unmineralized.

FIGURE 1-2

Sketch Illustrating The Nature Of A Vein Fault In Various Types Of Rocks (From Boyle, 1965)



about 1:1. Deposits located stratigraphically higher in the Central Quartzite Formation, have considerably higher Ag:Pb ratios. Franzen suggests that the ore solutions which formed the stratigraphically higher deposits travelled through a thicker section of Lower Schist and were therefore able to incorporate more silver into solution. Since silver is more soluble than lead the solutions would become relatively enriched in silver. As the temperature of the metalliferous solutions decrease metal loads would be precipitated in favourable structural situations.

The concepts of metal solubility and mineral stability has led Franzen to speculate on a regional metal ratio zonation pattern related to preferential precipitation of minerals from cooling hydrothermal fluids. This model relates Ag:Pb ratios to the distance of the fluid from the fluid source and the flow direction of the fluids. Franzen suggests that Ag:Pb ratios are a function of the thermodynamic properties of the silver and lead bearing minerals and the transporting solutions. Temperature is considered to be related to the distance of the fluid from the fluid source. Pressure is related to the lithostatic load and therefore the higher in the section the solution is the lower the lithostatic pressure acting on it. The precipitation of metals from solutions under the continuum of varying conditions should result in changes in metal ratios which reflect the direction of flow of hydrothermal fluids. This information may serve as a useful exploration concept; on a local scale to locate proximal ore shoots and on a regional scale to outline areas of prime economic potential over which to explore for veins.

A recent study by O.J. Tessari at the University of British Columbia was conducted to test the use of whole rock vein geochemistry as an exploration tool in the Keno Hill - Galena Hill camp. By sampling drift faces at closely spaced intervals and using statistical methods to correlate various whole rock chemical analyses Tessari developed a model for metal distribution patterns on the plane of a vein about an idealized ore shoot. The metal zones or halos include both metal abundance zones as well as relative metal abundance zones. Metal abundance zones closely equate to mineralogical zoning and are simply zones in which a particular metal is concentrated. By definition ore shoots are silver rich zones. A relative metal abundance zone is a zone in which the ratio of a metal (or a combination of metals), with respect to another metal, (or combination

of metals), varies systematically and reflects the proximity of an ore shoot. Several metals and several metal ratios were found to vary systematically about ore shoots and form idealized halos. The use of such a model in underground exploration is obvious.

As predicted by the metal ratio work of Franzen, Tessari found that not all veins in the camp fit the idealized model. These differences are geochemical and may be related to the hydrothermal system as discussed by Franzen (1979). Several idealized models were developed for the various vein types and are illustrated in FIGURES 1-3, 1-4, 1-5, 1-6.

The silver-lead-zinc mineralization in the Keno Hill - Galena Hill camp consists of freibergite-galena-sphalerite loads which occur in quartz-siderite veins in vein faults. Radiometric dating of stockwork material adjacent to the Husky and Keno veins indicates that the mineralizing event occurred about 87±2 Ma and is related to the mid-Cretaceous plutons in the area. Mineralogical relationships in the area are complex and their bearing on ore search is not clearly understood. Several concepts pertaining to metal zonation both on micro and macro scales, are apparent and require more research to obtain a complete understanding.

FIGURE 1-3

Ideal Oreshoot And Surrounding Halos. Illustrated By Ag, Zn And Ca Based On Data From KENO No. 18 vein (From Tessari, 1979)

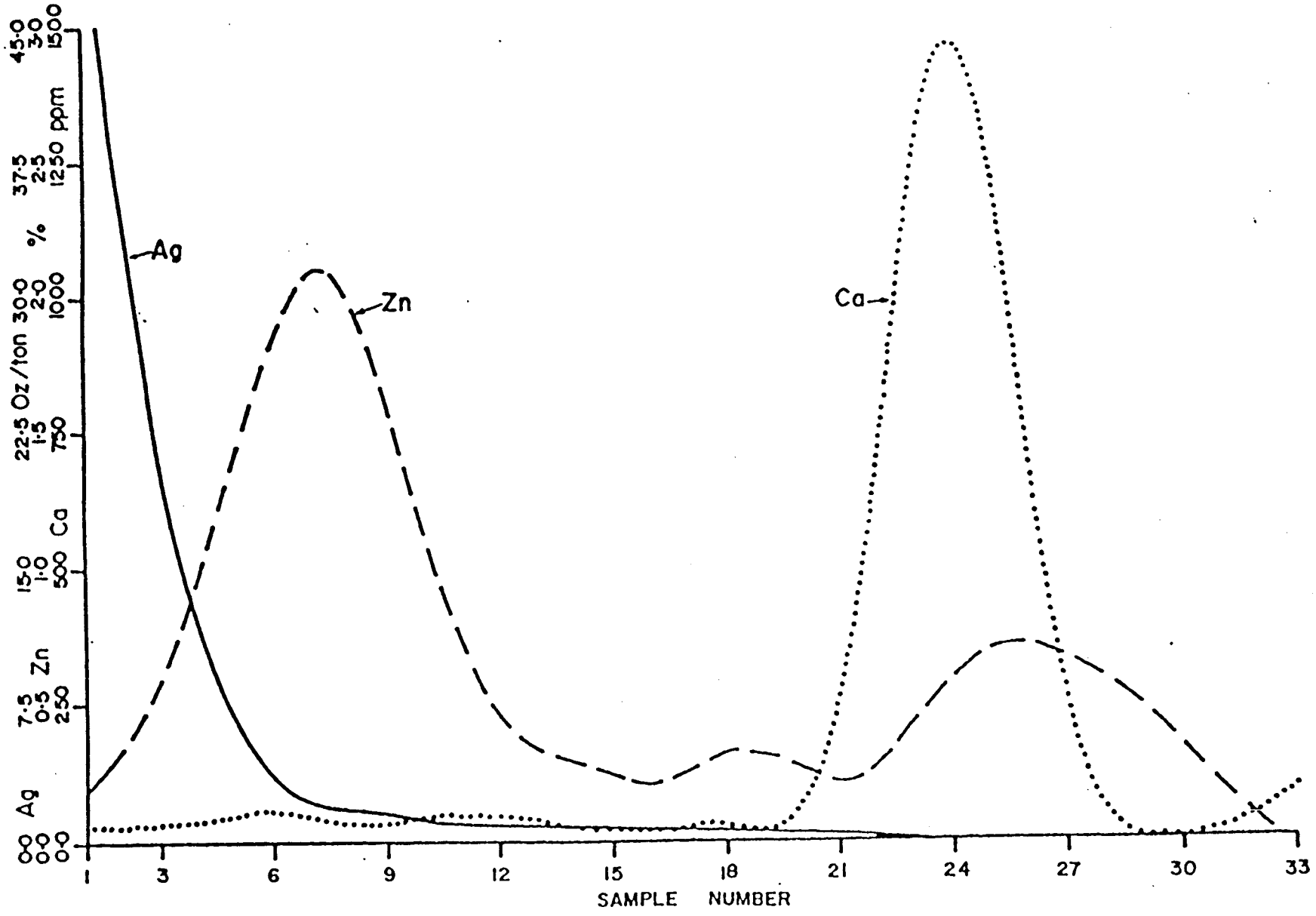


FIGURE 1-4

Use Of An Idealized Model Oreshoot In Underground Exploration
KENO No. 18 Vein (From Tessari, 1979)

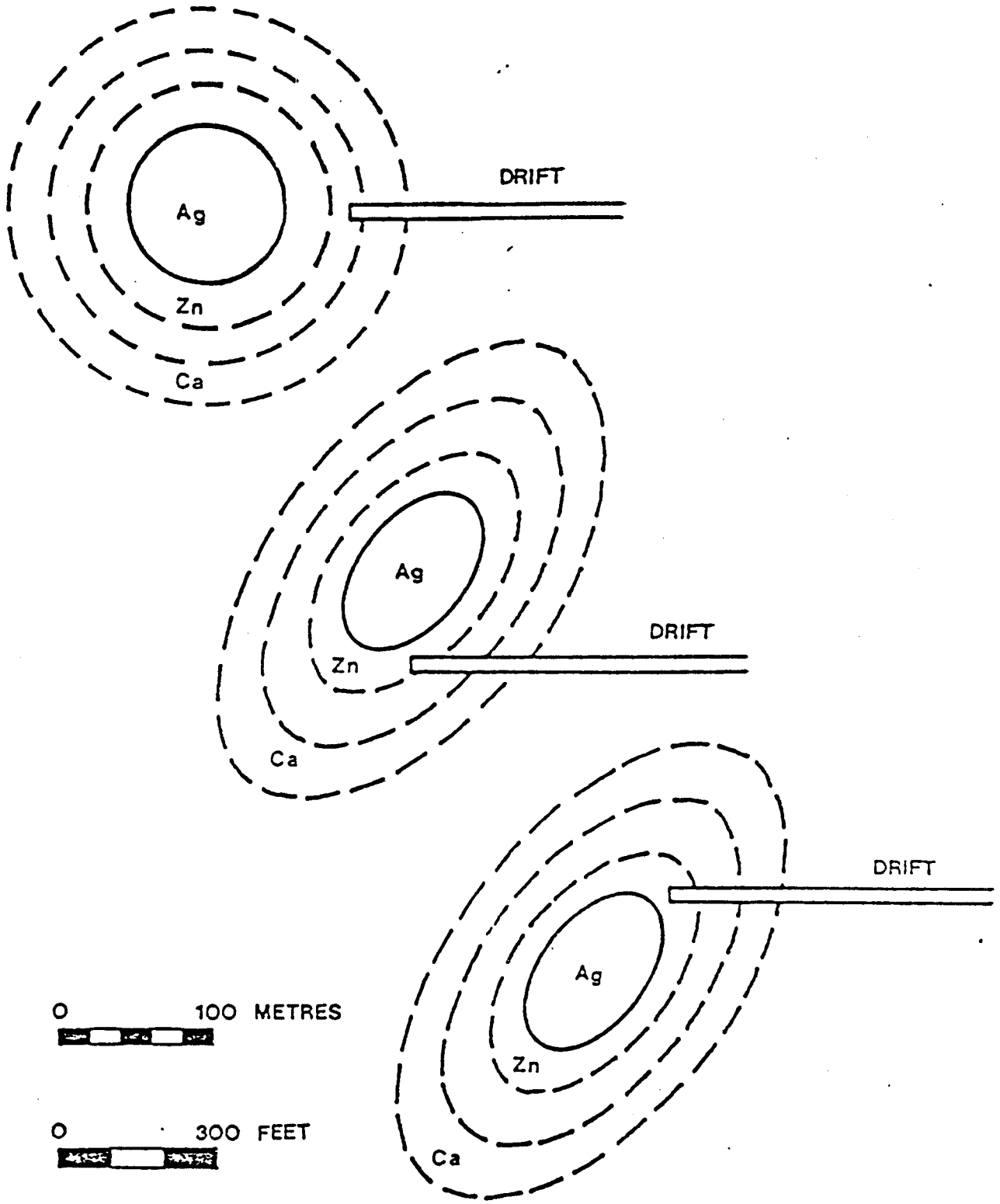


FIGURE 1-5

Rearranged Element Profiles Used To Produce An Idealized Oreshoot Model for The HUSKY Vein. (From Tessari, 1979)

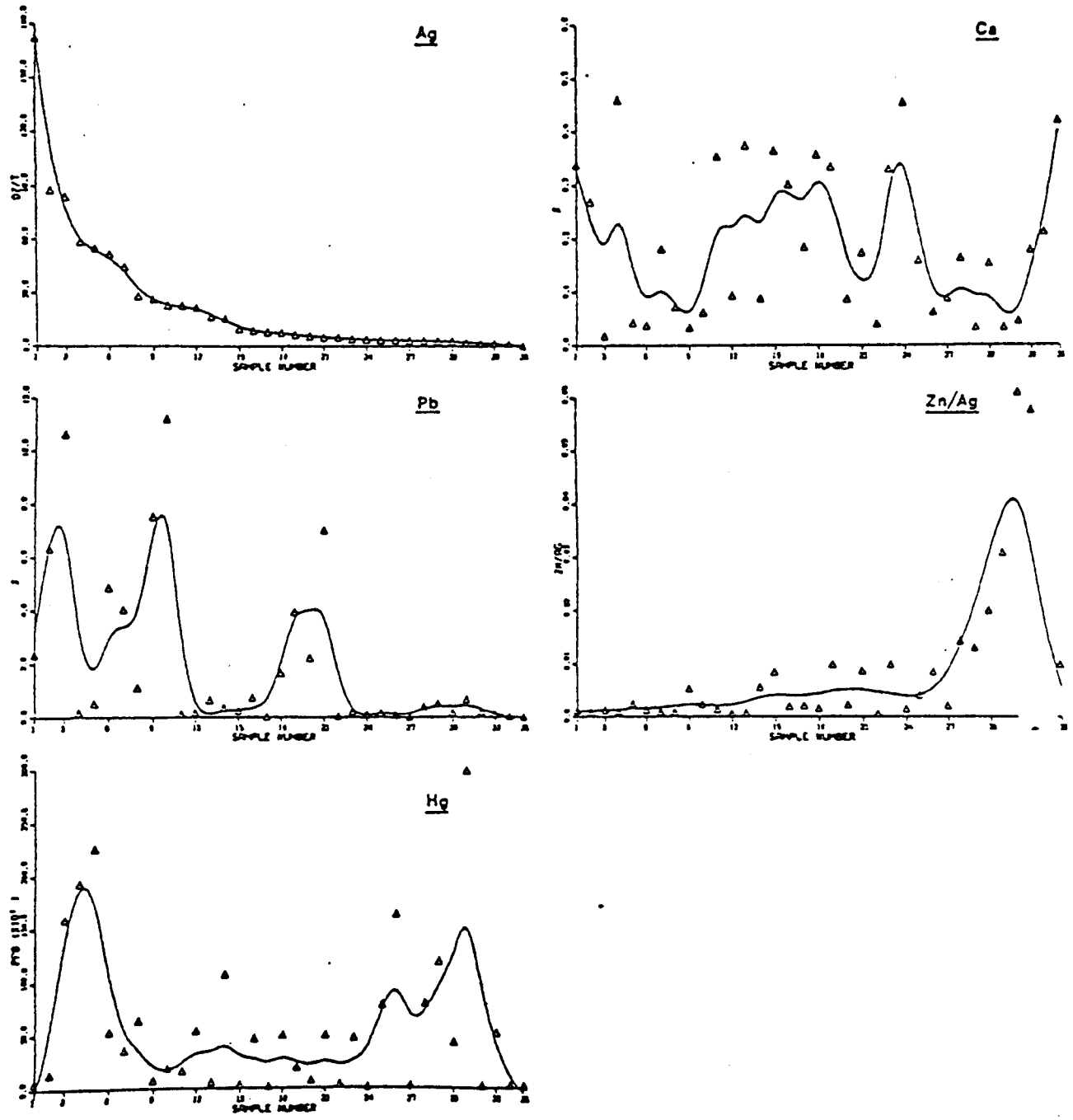
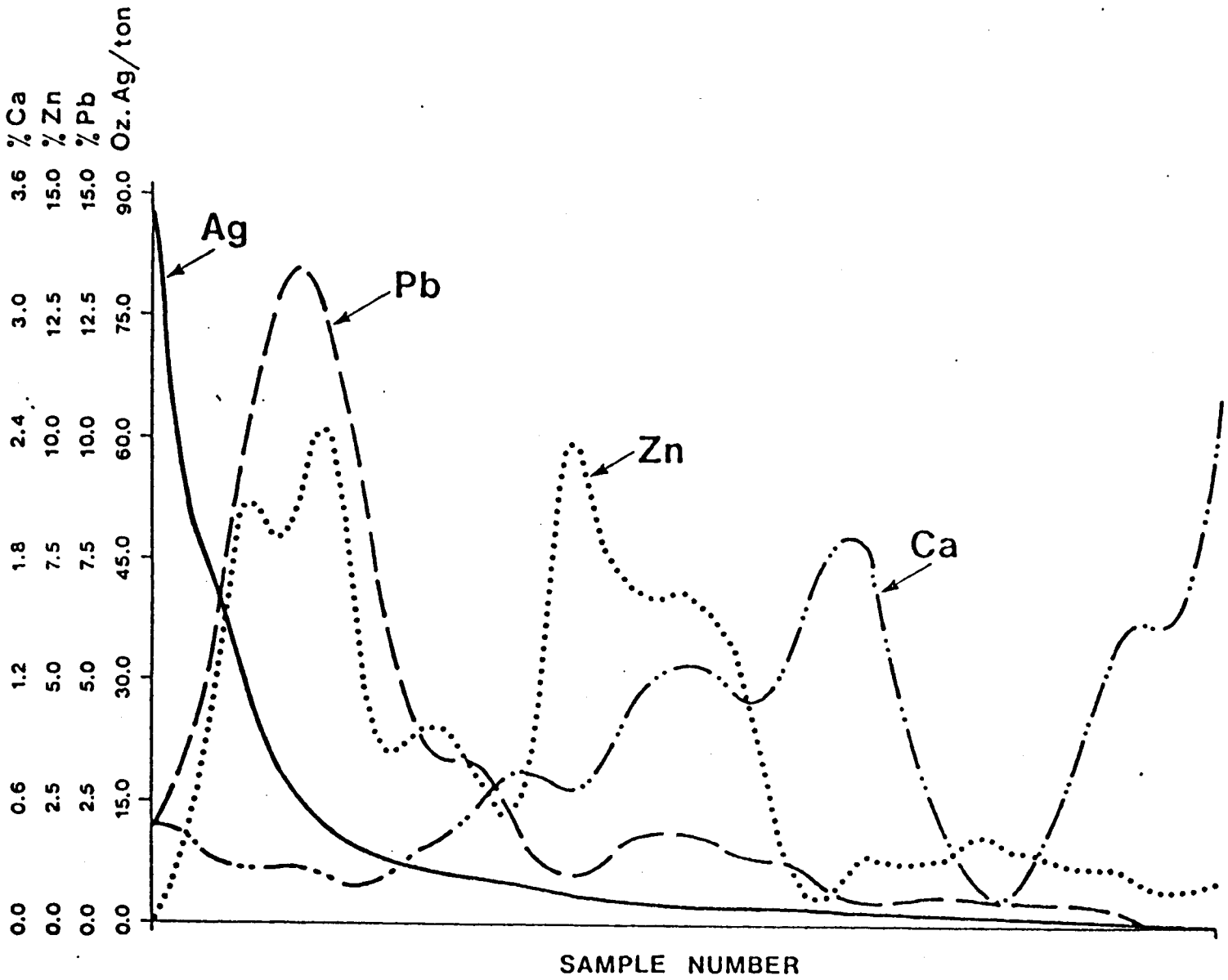


FIGURE 1-6

Metal Distribution Patterns About An Oreshoot. For The NO CASH Deposit.
(From Tessari, 1979)



BIBLIOGRAPHY

Blusson, S.L.	1978	Regional Geologic Setting of Lead-Zinc Deposits in Selwyn Basin, Yukon; Paper 78-1A, pp.77-80
Bostock, H.S.	1947	Mayo, Yukon Territory; G.S.C., Map 890A with descriptive notes
	1957	Yukon Territory (Selected field reports of the Geological Survey of Canada 1898 to 1933); G.S.C. Mem.284
Boyle, R.W.	1965	Geology, Geochemistry and Origin of the Lead-Zinc-Silver Deposits of the Keno Hill-Galena Hill Area, Yukon Territory; G.S.C., Bull III.
Franzen, J.	1979	Metal Ratio Zonation and Ore Control: A Model For The Keno Hill Silver Camp; (talk at Seventh Geoscience Forum Whitehorse, Yukon)
Green, L.H.	1971	Geology of Mayo Lake, Scougale Creeks and McQuesten Lake Map-Areas, Yukon Territory G.S.C., Memoir 357.
Kindle, E.D.	1962	Keno Hill, Yukon Territory, G.S.C. Map 1105A.
McTaggart, K.C.	1960	The Geology of Keno and Galena Hills, Yukon Territory; G.S.C., Bull.58.
Ogilvie, W.	1890	Exploration Survey of the Lewes, Tat-On-Duc, Porcupine, Bell, Trout, Peel, and MacKenzie Rivers; Dept.Interior, Ottawa, Ann.Rept. 1889, Queen's Printer.
Sinclair, A.J., Tessari, O.J.	1979	Vein Geochemistry, An Exploration Tool in the Keno Hill Camp, Yukon Territory (in press).
	1979	Age of Ag-Pb-Zn Mineralization - Keno-Galena Hills area, Yukon Territory (in press)
Tempelman-Kluit, D.J.	1964	Geology of the Haggart Creek-Dublin Gulch Area, Mayo District, Yukon Territory; unpublished M.A.Sc. thesis, U.B.C.

Tessari, O.J. 1978 Structural Analysis of Keno Hill-Galena Hill Area; unpublished paper for Geology 526.

1979 Model Ages and Applied Whole Rock Geochemistry of Ag-Pb-Zn veins, Keno Hill-Galena Hill Mining Camp, Yukon Territory; unpublished M.Sc. thesis, U.B.C.

Wanless, R.K., Stevens, R.D., Lachance, G.R., Edmonds, C.M. 1966 K-Ar Isotopic Ages, Report 7: Geol. Surv. Canada, Paper 66-17, pp. 44-48

1967 K-Ar Isotopic Ages, Report 8: Geol. Survey Canada, Paper 67-2A, pp.54-55.

Wanless, R.K., Stevens, R.D., Lachance, G.R., Delabio, R.N. 1971 Age Determinations and Geological Studies--K-Ar Isotoptic Ages, Report 10: Geol. Surv. Canada, Paper 71-2, pp.28-29.

1973 Age Determinations and Geological Studies-- K-Ar Isotopic Ages, Report 11: Geol. Surv. Canada, Paper 73-2 pp.27

2.1.0 CLAIM STATUS - WESTERN ZAP & CONE CLAIMS

CLAIM NAME	GRANT NOS.	EXPIRY DATE	OWNERSHIP
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Zap 1085F	YA41141	Sept.24,1980	Owned
Zap 1086F	YA41142	Sept.24,1980	Owned

CLAIM STATUS	GRANT NOS	EXPIRY DATE	OWNERSHIP
Cone 1	YA40094	June 15,1980	Owned
Cone 2	YA40095	June 15,1980	Owned
Cone 3	YA40096	June 15,1980	Owned
Cone 4	YA40097	June 15,1980	Owned
Cone 5	YA40098	June 15,1980	Owned
Cone 6	YA40099	June 15,1980	Owned
Cone 7	YA40100	June 15,1980	Owned
Cone 8	YA40101	June 15,1980	Owned
Cone 9	YA40102	June 15,1980	Owned
Cone 10	YA40103	June 15,1980	Owned
Cone 11	YA41044	Sept.24,1980	Owned
Cone 12	Ya41045	Sept.24,1980	Owned
Cone 13	YA41046	Sept.24,1980	Owned
Cone 14	YA41047	Sept.24,1980	Owned
Cone 15	YA41048	Sept.24,1980	Owned
Cone 16	YA41049	Sept.24,1980	Owned
Cone 17	YA41050	Sept.24,1980	Owned
Cone 18	YA41051	Sept.24,1980	Owned
Cone 19	YA41052	Sept.24,1980	Owned
Cone 20	YA41053	Sept.24,1980	Owned
Cone 21	YA41054	Sept.24,1980	Owned

2.2.0 CLAIM STATUS - NORTH ZAP CLAIMS

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 55	YA38394	March 2, 1980	Owned
56	YA38395	"	"
57	YA38396	"	"
58	YA38397	"	"
59	YA38398	"	"
60	YA38399	"	"
77	YA38416	"	"
78	YA38417	"	"
79	YA38418	"	"
80	YA38419	"	"
81	YA38420	"	"
82	YA38421	"	"
98	YA38437	"	"
99	YA38438	"	"
100	YA38439	"	"
101	YA38440	"	"
102	YA38441	"	"
141	YA38480	"	"
142	YA38481	"	"
155	YA38494	"	"
156	YA38495	"	"
157	YA38496	"	"
158	YA38497	"	"
198	YA38537	"	"
199	YA38538	"	"
200	YA38539	"	"
1043	YA41098	Sept.24, 1980	"
1044	YA41099	"	"
1047	YA41102	"	"
1048	YA41103	"	"
201	YA38540	March 2, 1980	"
202	YA38541	"	"
203	YA38542	"	"
204	YA38543	"	"
205	YA38544	"	"
206	YA38545	"	"
207	YA38546	"	"
208	YA38547	"	"
209	YA38548	"	"
210	YA38549	"	"
211	YA38550	"	"
212	YA38551	"	"
213	YA38552	"	"
214	YA38553	"	"

CLAIM STATUS - NORTH ZAP

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 215	YA38554	March 2, 1980	Owned
216	YA38555	"	"
217	YA38556	"	"
218	YA38557	"	"
219	YA38558	"	"
220	YA38559	"	"
221	YA38560	"	"
222	YA38561	"	"
223	YA38562	"	"
224	YA38563	"	"
225	YA38564	"	"
226	YA38565	"	"
227	YA38566	"	"
228	YA38567	"	"
229	YA38568	"	"
230	YA38569	"	"
231	YA38570	"	"
232	YA38571	"	"
233	YA38572	"	"
234	YA38573	"	"
235	YA38574	"	"
236	YA38575	"	"
237	YA38576	"	"
238	YA38577	"	"
239	YA38578	"	"
240	YA38579	"	"
241	YA38580	"	"
242	YA38581	"	"
243	YA38582	"	"
244	YA38583	"	"
245	YA38584	"	"
246	YA38585	"	"
247	YA38586	"	"
248	YA38587	"	"
249	YA38588	"	"
250	YA38589	"	"
251	YA38590	"	"
252	YA38591	"	"
253	YA38592	"	"
254	YA38593	"	"
255	YA38594	"	"
256	YA38595	"	"
257	YA38596	"	"
258	YA38597	"	"
259	YA38598	"	"
260	YA38599	"	"
261	YA38600	"	"

CLAIM STATUS - NORTH ZAP

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 262	YA38601	March 2, 1980	Owned
263	YA38602	"	"
264	YA38603	"	"
265	YA38604	"	"
266	YA38605	"	"
267	YA38606	"	"
268	YA38607	"	"
269	YA38608	"	"
270	YA38609	"	"
271	YA38610	"	"
272	YA38611	"	"
273	YA38612	"	"
274	YA38613	"	"
275	YA38614	"	"
276	YA38615	"	"
277	YA38616	"	"
278	YA38617	"	"
279	YA38618	"	"
280	YA38619	"	"
281	YA38620	"	"
282	YA38621	"	"
283	YA38622	"	"
284	YA38623	"	"
285	YA38624	"	"
286	YA38625	"	"
287	YA38626	"	"
288	YA38627	"	"
289	YA38628	"	"
290	YA38629	"	"
291	YA38630	"	"
292	YA38631	"	"
293	YA38632	"	"
294	YA38633	"	"
295	YA38634	"	"
296	YA38635	"	"
297	YA38636	"	"
298	YA38637	"	"
299	YA38638	"	"
300	YA38639	"	"
301	YA38640	"	"
302	YA38641	"	"
303	YA38642	"	"
304	YA38643	"	"
305	YA38644	"	"
306	YA38645	"	"
307	YA38646	"	"

CLAIM STATUS - NORTH ZAP

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 308	YA38647	March 2, 1980	Owned
309	YA38648	"	"
310	YA38649	"	"
311	YA38650	"	"
312	YA38651	"	"
313	YA38652	"	"
314	YA38653	"	"
315	YA38654	"	"
316	YA38655	"	"
317	YA38656	"	"
318	YA38657	"	"
319	YA38658	"	"
320	YA38659	"	"
321	YA38660	"	"
322	YA38661	"	"
323	YA38662	"	"
324	YA38663	"	"
325	YA38664	"	"
326	YA38665	"	"
327	YA38666	"	"
328	YA38667	"	"
329	YA38668	"	"
330	YA38669	"	"
331	YA38670	"	"
332	YA38671	"	"
333	YA38672	"	"
334	YA38673	"	"
335	YA38674	"	"
336	YA38675	"	"
337	YA38676	"	"
338	YA38677	"	"
339	YA38678	"	"
340	YA38679	"	"
341	YA38680	"	"
342	YA38681	"	"
343	YA38682	"	"
344	YA38683	"	"
345	YA38684	"	"
346	YA38685	"	"
347	YA38686	"	"
348	YA38687	"	"
349	YA38688	"	"
350	YA38689	"	"
351	YA38690	"	"
352	YA38691	"	"
353	YA38692	"	"
354	YA38693	"	"

CLAIM STATUS - NORTH ZAP

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 355	YA38694	March 2, 1980	Owned
356	YA38695	"	"
357	YA38696	"	"
358	YA38697	"	"
359	YA38698	"	"
360	YA38699	"	"
361	YA38700	"	"
362	YA38701	"	"
363	YA38702	"	"
364	YA38703	"	"
365	YA38704	"	"
366	YA38705	"	"
367	YA38706	"	"
368	YA38707	"	"
369	YA38708	"	"
370	YA38709	"	"
371	YA38710	"	"
372	YA38711	"	"
373	YA38712	"	"
374	YA38713	"	"
375	YA38714	"	"
376	YA38715	"	"
377	YA38716	"	"
378	YA38717	"	"
379	YA38718	"	"
380	YA38719	"	"
381	YA38720	"	"
382	YA38721	"	"
383	YA38722	"	"
384	YA38723	"	"
385	YA38724	"	"
386	YA38725	"	"
387	YA38726	"	"
388	YA38727	"	"
389	YA38728	"	"
390	YA38729	"	"
391	YA38730	"	"
392	YA38731	"	"
393	YA38732	"	"
394	YA38733	"	"
395	YA38734	"	"
396	YA38735	"	"
397	YA38736	"	"
398	YA38737	"	"
399	YA38738	"	"
400	YA38739	"	"
401	YA38740	"	"

CLAIM STATUS - NORTH ZAP

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 402	YA38741	March 2, 1980	Owned
403	YA38742	"	"
404	YA38743	"	"
405	YA38744	"	"
406	YA38745	"	"
407	YA38746	"	"
408	YA38747	"	"
409	YA38748	"	"
410	YA38749	"	"
411	YA38750	"	"
412	YA38751	"	"
413	YA38752	"	"
414	YA38753	"	"
415	YA38754	"	"
416	YA38755	"	"
417	YA38756	"	"
418	YA38757	"	"
419	YA38758	"	"
420	YA38759	"	"
421	YA38760	"	"
422	YA38761	"	"
423	YA38762	"	"
424	YA38763	"	"
425	YA38764	"	"
426	YA38765	"	"
427	YA38766	"	"
428	YA38767	"	"
429	YA38768	"	"
430	YA38769	"	"
431	YA38770	"	"
432	YA38771	"	"
433	YA38772	"	"
434	YA38773	"	"
435	YA38774	"	"
436	YA38775	"	"
437	YA38776	"	"
438	YA38777	"	"
439	YA38778	"	"
440	YA38779	"	"
441	YA38780	"	"
442	YA38781	"	"
443	YA38782	"	"
444	YA38783	"	"
445	YA38784	"	"
446	YA38785	"	"
447	YA38786	"	"
448	YA38787	"	"

CLAIM STATUS - NORTH ZAP

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 449	YA38788	March 2, 1980	Owned
450	YA38789	"	"
451	YA38790	"	"
452	YA38791	"	"
453	YA38792	"	"
454	YA38793	"	"
455	YA38794	"	"
456	YA38795	"	"
457	YA38796	"	"
458	YA38797	"	"
459	YA38798	"	"
460	YA38799	"	"
461	YA38800	"	"
462	YA38801	"	"
463	YA38802	"	"
464	YA38803	"	"
465	YA38804	"	"
466	YA38805	"	"
467	YA38806	"	"
468	YA38807	"	"
469	YA38808	"	"
470	YA38809	"	"
471	YA38810	"	"
472	YA38811	"	"
473	YA38812	"	"
474	YA38813	"	"
475	YA38814	"	"
476	YA38815	"	"
477	YA38816	"	"
478	YA38817	"	"
479	YA38818	"	"
480	YA38819	"	"
481	YA38820	"	"
482	YA38821	"	"
483	YA38822	"	"
484	YA38823	"	"
485	YA38824	"	"
486	YA38825	"	"
487	YA38826	"	"
488	YA38827	"	"
489	YA38828	"	"
490	YA38829	"	"
491	YA38830	"	"
492	YA38831	"	"
493	YA38832	"	"
494	YA38833	"	"
495	YA38834	"	"

CLAIM STATUS - NORTH ZAP

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 496	YA38835	March 2, 1980	Owned
497	YA38836	"	"
498	YA38837	"	"
499	YA38838	"	"
500	YA38839	"	"
501	YA38840	"	"
502	YA38841	"	"
503	YA38842	"	"
504	YA38843	"	"
505	YA38844	"	"
506	YA38845	"	"
507	YA38846	"	"
508	YA38847	"	"
509	YA38848	"	"
510	YA38849	"	"
511	YA38850	"	"
512	YA38851	"	"
513	YA38852	"	"
514	YA38853	"	"
515	YA38854	"	"
516	YA38855	"	"
517	YA38856	"	"
518	YA38857	"	"
519	YA38858	"	"
520	YA38859	"	"
521	YA38860	"	"
522	YA38861	"	"
523	YA38862	"	"
524	YA38863	"	"
525	YA38864	"	"
526	YA38865	"	"
527	YA38866	"	"
528	YA38867	"	"
529	YA38868	"	"
530	YA38869	"	"
531	YA38870	"	"
532	YA38871	"	"
533	YA38872	"	"
534	YA38873	"	"
535	YA38874	"	"
536	YA38875	"	"
537	YA38876	"	"
538	YA38877	"	"
539	YA38878	"	"
540	YA38879	"	"
541	YA38880	"	"
542	YA38881		

CLAIM STATUS - NORTH ZAP

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 543	YA38882	March 2, 1980	Owned
544	YA38883	"	"
545	YA38884	"	"
546	YA38885	"	"
547	YA38886	"	"
548	YA38887	"	"
549	YA38888	"	"
550	YA38889	"	"
551	YA38890	"	"
552	YA38891	"	"
553	YA38892	"	"
554	YA38893	"	"
555	YA38894	"	"
556	YA38895	"	"
557	YA38896	"	"
558	YA38897	"	"
559	YA38898	"	"
560	YA38899	"	"
561	YA38900	"	"
562	YA38901	"	"
563	YA38902	"	"
564	YA38903	"	"
565	YA38904	"	"
566	YA38905	"	"
567	YA38906	"	"
568	YA38907	"	"
569	YA38908	"	"
570	YA38909	"	"
571	YA38910	"	"
572	YA38911	"	"
573	YA38912	"	"
574	YA38913	"	"
575	YA38914	"	"
576	YA38915	"	"
577	YA38916	"	"
578	YA38917	"	"
579	YA38918	"	"
580	YA38919	"	"
581	YA38920	"	"
582	YA38921	"	"
583	YA38922	"	"
584	YA38923	"	"
585	YA38924	"	"
586	YA38925	"	"
587	YA38926	"	"
588	YA38927	"	"
589	YA38928	"	"

CLAIM STATUS - NORTH ZAP

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 590	YA38929	March 2, 1980	Owned
591	YA38930	"	"
592	YA38931	"	"
593	YA38932	"	"
594	YA38933	"	"
595	YA38934	"	"
596	YA38935	"	"
597	YA38936	"	"
598	YA38937	"	"
599	YA38938	"	"
600	YA38939	"	"
601	YA38940	"	"
602	YA38941	"	"
603	YA38942	"	"
604	YA38943	"	"
605	YA38944	"	"
606	YA38945	"	"
607	YA38946	"	"
608	YA38947	"	"
609	YA38948	"	"
610	YA38949	"	"
611	YA38950	"	"
612	YA38951	"	"
613	YA38952	"	"
614	YA38953	"	"
615	YA38954	"	"
616	YA38955	"	"
617	YA38956	"	"
618	YA38957	"	"
619	YA38958	"	"
620	YA38959	"	"
621	YA38960	"	"
622	YA38961	"	"
623	YA38962	"	"
624	YA38963	"	"
625	YA38964	"	"
626	YA38965	"	"
627	YA38966	"	"
1058F	YA41113	Sept.24,1980	"
1059F	YA41114	"	"
1060F	YA41115	"	"
1061F	YA41116	"	"
1062F	YA41117	"	"

CLAIM STATUS - NORTH AND WESTERN ZAP

CLAIM NAME	GRANT #'s	EXPIRY DATE	OWNERSHIP
ZAP 1052	YA41107	Sept.24,1980	Owned
1053	YA41108	"	"
1054	YA41109	"	"
1055	YA41110	"	"
1056	YA41111	"	"
1057	YA41112	"	"
1063F	YA41118	"	"
1064F	YA41119	"	"
1065F	YA41120	"	"
1066F	YA41121	"	"
1067F	YA41122	"	"
1068F	YA41123	"	"
1069F	YA41124	"	"
1070F	YA41125	"	"
1071F	YA41126	"	"
1072F	YA41127	"	"
1073F	YA41128	"	"
1074	YA41129	"	"
1075	YA41130	"	"
1076	YA41131	"	"
1077	YA41132	"	"
1078	YA41133	"	"
1079	YA41134	"	"
1080	YA41135	"	"
1081	YA41136	"	"
1082	YA41137	"	"
1083	YA41138	"	"

2.3.0 CLAIM STATUS - BE CLAIMS

CLAIM NAME	GRANT #	EXPIRY DATE	OWNERSHIP
BE 1	YA38967	March 2, 1980	Owned
BE 2	YA38968	"	"
BE 3	YA38969	"	"
BE 4	YA38970	"	"
BE 5	YA38971	"	"
BE 6	YA38972	"	"
BE 7	YA38973	"	"
BE 8	YA38974	"	"
BE 9	YA38975	"	"
BE 10	YA38976	"	"
BE 11	YA38977	"	"
BE 12	YA38978	"	"
BE 13	YA38979	"	"
BE 14	YA38980	"	"
BE 15	YA38981	"	"
BE 16	YA38982	"	"
BE 17	YA38983	"	"
BE 18	YA38984	"	"
BE 19	YA38985	"	"
BE 20	YA38986	"	"
BE 21	YA38987	"	"
BE 22	YA38988	"	"
BE 23	YA38989	"	"
BE 24	YA38990	"	"
BE 25	YA38991	"	"
BE 26	YA38992	"	"
BE 27	YA38993	"	"
BE 28	YA38994	"	"
BE 29	YA38995	"	"
BE 30	YA38996	"	"
BE 31	YA38997	"	"
BE 32	YA38998	"	"
BE 33	YA38999	"	"
BE 34	YA39000	"	"
BE 35	YA39001	"	"
BE 36	YA39002	"	"
BE 37	YA39003	"	"
BE 38	YA39004	"	"
BE 39	YA39005	"	"
BE 40	YA39006	"	"
BE 41	YA39007	"	"
BE 42	YA39008	"	"
BE 43	YA39009	"	"
BE 44	YA39010	"	"
BE 45	YA39011	"	"
BE 46	YA39012	"	"
BE 47	YA39013	"	"
BE 48	YA39014	"	"
BE 49	YA39015	"	"
BE 50	YA39016	"	"

CLAIM STATUS - BE Cont....

CLAIM NAME	GRANT #	EXPIRY DATE	OWNERSHIP
BE 51	YA39017	March 2, 1980	Owned
BE 52	YA39018	"	"
BE 53	YA39019	"	"
BE 54	YA39020	"	"
BE 55	YA39021	"	"
BE 56	YA39022	"	"
BE 57	YA39023	"	"
BE 58	YA39024	"	"
BE 59	YA39025	"	"
BE 60	YA39026	"	"
BE 61	YA39027	"	"
BE 62	YA39028	"	"
BE 63	YA39029	"	"
BE 64	YA39030	"	"
BE 65	YA39031	"	"
BE 66	YA39032	"	"
BE 67	YA39033	"	"
BE 68	YA39034	"	"
BE 69	YA39035	"	"
BE 70	YA39036	"	"
BE 71	YA39037	"	"
BE 72	YA39038	"	"
BE 73	YA39039	"	"
BE 74	YA39040	"	"
BE 75	YA39041	"	"
BE 76	YA39042	"	"
BE 77	YA39043	"	"
BE 78	YA39044	"	"
BE 79	YA39045	"	"
BE 80	YA39046	"	"
BE 81	YA39047	"	"
BE 82	YA39048	"	"
BE 83	YA39049	"	"
BE 84	YA39050	"	"
BE 85	YA39051	"	"
BE 86	YA39052	"	"
BE 87	YA39053	"	"
BE 88	YA39054	"	"
BE 89	YA39055	"	"
BE 90	YA39056	"	"
BE 91	YA39057	"	"
BE 92	YA39058	"	"
BE 93	YA39059	"	"
BE 94	YA39060	"	"
BE 95	YA39061	"	"
BE 96	YA39062	"	"
BE 97	YA39063	"	"
BE 98	YA39064	"	"
BE 99	YA39065	"	"
BE 100	YA39066	"	"

CLAIM STATUS - BE Cont...

CLAIM NAME	GRANT #	EXPIRY DATE	OWNERSHIP
BE 101	YA39067	March 2, 1980	Owned
BE 102	YA39068	"	"
BE 103	YA39069	"	"
BE 104	YA39070	"	"
BE 105	YA39071	"	"
BE 106	YA39072	"	"
BE 107	YA39073	"	"
BE 108	YA39074	"	"
BE 109	YA39075	"	"
BE 110	YA39076	"	"
BE 111	YA39077	"	"
BE 112	YA39078	"	"
BE 113	YA39079	"	"
BE 114	YA39080	"	"
BE 115	YA39081	"	"
BE 116	YA39082	"	"
BE 117	YA39083	"	"
BE 118	YA39084	"	"
BE 119	YA39085	"	"
BE 120	YA39086	"	"
BE 121	YA39087	"	"
BE 122	YA39088	"	"
BE 123	YA39089	"	"
BE 124	YA39090	"	"
BE 125	YA39091	"	"
BE 126	YA39092	"	"
BE 127	YA39093	"	"
BE 128	YA39094	"	"
BE 129	YA39095	"	"
BE 130	YA39096	"	"
BE 131	YA39097	"	"
BE 132	YA39098	"	"
BE 133	YA39099	"	"
BE 134	YA39100	"	"
BE 135	YA39101	"	"
BE 136	YA39102	"	"
BE 137	YA39103	"	"
BE 138	YA39104	"	"
BE 139	YA39105	"	"
BE 140	YA39106	"	"
BE 141	YA39107	"	"
BE 142	YA39108	"	"
BE 143	YA39109	"	"
BE 144	YA39110	"	"
BE 145	YA39111	"	"
BE 146	YA39112	"	"
BE 147	YA39113	"	"
BE 148	YA39114	"	"
BE 149	YA39115	"	"
BE 150	YA39116	"	"

CLAIM NAME	GRANT #	EXPIRY DATE	OWNERSHIP
BE 151	YA39117	"	"
BE 152	YA39118	"	"
BE 153	YA39119	"	"
BE 154	YA39120	"	"
BE 155	YA39121	"	"
BE 156	YA39122	"	"
BE 157	YA39123	"	"
BE 158	YA39124	"	"
BE 159	YA39125	"	"
BE 160	YA39126	"	"
BE 161	YA39127	"	"
BE 162	YA39128	"	"
BE 163	YA39129	"	"
BE 164	YA39130	"	"
BE 165	YA39131	"	"
BE 166	YA39132	"	"
BE 167	YA39133	"	"
BE 168	YA39134	"	"
BE 169	YA39135	"	"
BE 170	YA39136	"	"
BE 171	YA39137	"	"
BE 172	YA39138	"	"
BE 173	YA39139	"	"
BE 174	YA39140	"	"
BE 175	YA39141	"	"
BE 176	YA39142	"	"
BE 177	YA39143	"	"
BE 178	YA39144	"	"
BE 179	YA39145	"	"
BE 180	YA39146	"	"
BE 181	YA39147	"	"
BE 182	YA39148	"	"
BE 183	YA39149	"	"
BE 184	YA39150	"	"
BE 185	YA39151	"	"
BE 186	YA39152	"	"
BE 187	YA39153	"	"
BE 188	YA39154	"	"
BE 189	YA39155	"	"
BE 190	YA39156	"	"
BE 191	YA39157	"	"
BE 192	YA39158	"	"
BE 193	YA39159	"	"
BE 194	YA39160	"	"
BE 195	YA39161	"	"
BE 196	YA39162	"	"
BE 197	YA39163	"	"
BE 198	YA39164	"	"
BE 199	YA39165	"	"
BE 200	YA39166	"	"

CLAIM STATUS - BE Cont...

CLAIM NAME	GRANT #	EXPIRY DATE	OWNERSHIP
BE 201	YA39167	March 2, 1980	Owned
BE 202	YA39168	"	"
BE 203	YA39169	"	"
BE 204	YA39170	"	"
BE 205	YA39171	"	"
BE 206	YA39172	"	"
BE 207	YA39173	"	"
BE 208	YA39174	"	"
BE 209	YA39175	"	"
BE 210	YA39176	"	"
BE 211	YA39177	"	"
BE 212	YA39178	"	"
BE 213	YA39179	"	"
BE 214	YA39180	"	"
BE 215	YA39181	"	"
BE 216	YA39182	"	"
BE 217	YA39183	"	"
BE 218	YA39184	"	"
BE 219	YA39185	"	"
BE 220	YA39186	"	"
BE 221	YA39187	"	"
BE 222	YA39188	"	"
BE 223	YA39189	"	"
BE 224	YA39190	"	"
BE 225	YA39191	"	"
BE 226	YA39192	"	"
BE 227	YA39193	"	"
BE 228	YA39194	"	"
BE 229	YA39195	"	"
BE 230	YA39196	"	"
BE 231	YA39197	"	"
BE 232	YA39198	"	"
BE 233	YA39199	"	"
BE 234	YA39200	"	"
BE 235	YA39201	"	"
BE 236	YA39202	"	"
BE 237	YA39203	"	"
BE 238	YA39204	"	"
BE 239	YA39205	"	"
BE 240	YA39206	"	"
BE 241	YA39207	"	"
BE 242	YA39208	"	"
BE 243	YA39209	"	"
BE 244	YA39210	"	"
BE 245	YA39211	"	"
BE 246	YA39212	"	"
BE 247	YA39213	"	"
BE 248	YA39214	"	"
BE 249	YA39215	"	"
BE 250	YA39216	"	"

CLAIM NAME	GRANT #	EXPIRY DATE	OWNERSHIP
BE 251	YA39217	March 2, 1980	Owned
BE 252	YA39218	"	"
BE 253	YA39219	"	"
BE 254	YA39220	"	"
BE 255	YA39221	"	"
BE 256	YA39222	"	"
BE 257	YA39223	"	"
BE 258	YA39224	"	"
BE 259	YA39225	"	"
BE 260	YA39226	"	"
BE 261	YA39227	"	"
BE 262	YA39228	"	"
BE 263	YA39229	"	"
BE 264	YA39230	"	"
BE 265	YA39231	"	"
BE 266	YA39232	"	"
BE 267	YA39233	"	"
BE 268	YA39234	"	"
BE 269	YA39235	"	"
BE 270	YA39236	"	"
BE 271	YA39237	"	"
BE 272	YA39238	"	"
BE 273	YA39239	"	"
BE 274	YA39240	"	"
BE 275	YA39241	"	"
BE 276	YA39242	"	"
BE 277	YA39243	"	"
BE 278	YA39244	"	"
BE 279	YA39245	"	"
BE 281	YA39246	"	"
BE 282	YA39247	"	"
BE 283	YA39248	"	"
BE 284	YA39249	"	"

WESTERN ZAP AND CONE CLAIM GROUPS

3.1.0 INTRODUCTION

3.1.1 Terms of Reference

Bema Industries Ltd. has been contracted by Canada Tungsten Mining Corporation Limited to carry out a detailed geological assessment of the Western ZAP and CONE claims. The Western ZAP and CONE claims were staked by Bema Industries Ltd. in February 1979. This Assessment consists of data compiled from an indepth study of related prospecting, regional and detailed mapping, a geophysical survey and prospecting on adjacent and related claim groups. In addition, Bema Industries Ltd. has ensured tenure of mineral rights within these claim groups.

3.1.2 Scope of Report

Due to the scarcity of outcrops on the Western ZAP and CONE claim groups, much of the scope of this report will be to relate to these mineral claims to the south. In this manner, geological exploration to date has concentrated on tracing the contact between the Upper Schist Formation and the Central Quartzite Formation.

3.1.3 Location and Access

The Western ZAP and CONE claims are located in the central Yukon Territory approximately six (6) kilometers northwest of Elsa and two (2) kilometers east of Mount Haldane. The claims are located on the Yukon Territory map sheet 105-M-13 centering on latitude 63° 70' and longitude 135° 65'. The McQuesten River borders these claims to the north while United Keno Hill's townsite reservoir represents the eastern boundary.

Access to the claims is supplied by the Dublin Gulch road which intersects Highway 2 approximately six (6) kilometers west of Elsa. The road is of relatively good quality gravel and cuts through the center of the claims providing access to all areas. (Refer to MAP 1-1) (Refer to MAP 3-2)

3.1.4. History

Detailed information on the mining and exploration history of the area west of Galena Creek is not available. The sketchy history outlined below is borrowed mainly from a 1959 Assessment Report by A. Aho for Petcal Exploration Company Limited and from a paper published by R.E. Van Tassell on the overburden drilling program initiated by United Keno Hill Mines Limited in the mid-60's.

The first silver-lead discovery in the Keno Hill-Galena Hill district was made in Galena Creek in 1901. Mining of this Silver King vein began in 1913.

In the early 1950's the KPO and Leo claim groups were staked. These claims center on Thompson and Galena Creeks, respectively. In 1955 the Gerlitzki vein was discovered on the Leo claim group.

A follow-up resistivity and gravimeter survey along the Gerlitzki trend resulted in the discovery of an anomalous zone. Only one of four holes drilled penetrated the target. It intersected considerable pyrite but core recovery was extremely poor.

In 1959, United Keno Hill Mines Limited optioned the Leo claims. They undertook a program of exploring the Gerlitzki vein by stripping it for two hundred (200) meters west of the discovery outcrop. This was followed by nine or ten drill holes which failed to discover an orebody. Silver-lead ratios in grab and chip samples across the vein were approximately 9 oz. Ag. per 1% Pb.

In 1959, A. Aho optioned the Leo and KPO properties for Keno Extension Mines Limited. In addition, more claims were added to the KPO group. Keno Extension Mines Limited carried out a resistivity survey which located several northeast-trending anomalies thought to be related to vein faults. One hundred (100) soil geochemical samples were collected along lines west of the resistivity anomalies and as a result, a more extensive survey was recommended.

In 1962, Silver Titan Mines Limited conducted a Turam electromagnetic survey of more than thirty (30) line kilometers on their AA claim group which includes and lies south of Proctor Lake. From this survey they interpreted many north-trending faults and eastwest-trending EM anomalies but it is not known if Silver Titan drilled these anomalies.

In 1963, United Keno Hill Mines Limited began an extensive program of overburden drilling in the Galena Hill area. An examination of 1969 airphotos and surface drill chips in 1979 indicates that they extensively drilled the area below Highway 2 between Galena and Thompson Creeks, including northwest-trending "fences" of drill holes located north of the old Elsa airport.

In 1970, Seigel Associates Limited flew an aeromagnetic survey for Lacanex Mining Company Limited over the McQuesten River Valley. In the area of the ZAP mineral claims two long eastwest-trending negative anomalies were outlined.

One anomaly lies along the South McQuesten River and the second anomaly follows the eastwest-trending portion of Flat Creek. The latter anomaly ends east of Proctor Lake. Both anomalies were interpreted as being caused by elongate greenstone bodies (sills).

Seigel Associates Limited also interpreted two major faults in the Galena Creek area. One fault trends northeast across the middle of Galena Creek and the other fault is north-trending and lies approximately two (2) kilometers west of the first.

3.1.5 Claim Status

The Western ZAP and CONE claims are owned by Canada Tungsten Mining Corporation Limited and consist of 187 ZAP claims, 46 ZAP Fractional claims and 21 CONE claims. A list of these claims including the grant number and date of expiry may be found in section 2.1.0. The Western ZAP area is considered to be the area west of the Elsa water reservoir.

3.1.6 Field Work

The writer and M. Philpot spent thirteen days mapping the area between Galena Creek in the east and Proctor Lake in the west. In addition, M. Philpot mapped the trenches in the extreme west of the map area, and the writer, assisted by C. Orssich, mapped the Gerlitzki vein trench and overburden drill cuttings north of the Gerlitzki vein.

The purpose of this mapping was to establish a geological base map for interpreting an electromagnetic survey and a mercury soil geochemical program. Many traverses were designed to cross the Upper Schist-Central Quartzite contact. The outline of this contact led to an important estimate of the areal extent of the Central Quartzite that underlies the Western Zap and Cone Claims. The Central Quartzite is the favourable host for Ag-Pb-Zn veins on Galena and Keno Hills to the east.

It was also hoped that detailed mapping would indicate the presence of any major crossfaults offsetting the contact. Mapping by R.W. Boyle to the east at the Husky and Elsa Mines had previously shown that northwest-trending crossfaults are often associated with ENE and NE-trending economic vein faults.

Previous mapping by Bostock (1947) and Green (1971) had placed the Upper Schist-Central Quartzite contact in Galena Creek south of its location as mapped by McTaggart (1960) and Boyle (1965). Field work during 1979 was aimed, in part, at solving this discrepancy as the position of the contact would effect the estimated amount of the Central Quartzite Formation underlying the ZAP Claims.

3.2.0 PREVIOUS GEOLOGICAL WORK

The area between Galena Creek in the east and Proctor Lake in the west has been mapped by several generations of Geological Survey of Canada geologists. Geological maps and reports of the Mayo district have been produced by Keele (1906), Cairnes (1916), Cockfield (1920, 1923), Stockwell (1925), Bostock (1947, 1957), McTaggart (1950, 1960), Kindle (1955, 1962), Boyle (1956, 1957, 1965), and Green (1971).

All geologists in the past 35 years, except Green, have mapped an unbroken succession of metamorphic rocks which strike approximately eastwest and dip 20° - 30° to the south. This sequence of rock forms the south limb of the McQuesten River Anticline. It consists of three major formations which are from oldest to youngest the Lower Schist Formation, the Central Quartzite Formation, and the Upper Schist Formation (See MAP 3-3). Later intrusions include sills of greenstone and dykes and sills of rhyolite.

In disagreement with the above sequence, Green (1971) proposed a major regional thrust fault to separate younger Mesozoic Lower Schist Formation and Central Quartzite Formation from overlying Precambrian Upper Schist Formation. Previous workers had postulated that this entire stratigraphic package of Yukon Group rocks is Precambrian to Paleozoic in age.

All of the above geologists are in general agreement as to their descriptions of the Yukon Group rocks and younger greenstone (Mesozoic) and rhyolites (Tertiary). The following descriptions are summarized mainly from Green (1971):

3.2.1 Lower Schist Formation

The Lower Schist Formation consists of graphitic and sericitic schists and phyllites locally interbedded with thin-bedded quartzites. Phyllites consist mainly of a fine-grained mixture of quartz and sericite. Darker coloured phyllites contain more graphite than the lighter coloured phyllites. Accessory metamorphic minerals include biotite, staurolite, chloritoid, garnet, tourmaline, andalusite, and kyanite; ilmenite is also common.

Schists were found to consist mainly of graphite, quartz, sericite, carbonate minerals, feldspar and chlorite. Pyrite metacrysts are also common.

In thin-section, the quartzites are mainly quartz and muscovite or sericite with lesser amounts of graphite.

The above rocks show bedding foliation and/or secondary foliation which has destroyed the original bedding. Wrinkle lineations along bedding planes and slaty cleavage at an angle to the bedding are also common in phyllites and schists. Folding and "Gleitbrett" are also common in outcrop.

3.2.2 Central (Keno Hill) Quartzite Formation

The Central Quartzite Formation consists mainly of massive light to medium grey quartzite, which is often interbedded with one to three meter thick beds of graphitic phyllite. Some of the very fine-grained quartzites resemble recrystallized cherts.

In thin section, the quartzites consist mainly of elongated 0.05mm to 0.25mm quartz grains having a schistose mosaic texture. Intergrown with the quartz is sericite, up to 30% carbonate, and carbonaceous material. The abundance of the latter

material determines the colour of the quartzite; black quartzites contain abundant carbonaceous material. Accessory minerals are pyrite, leucoxene, tourmaline, zircon and apatite.

Locally, quartzites show 2mm to 10mm bands, varying from light to dark grey. Elsewhere, a crude foliation is developed by thin micaceous partings in beds. Veinlets of white quartz commonly crosscut bedding, and lenses of white quartz up to one meter long sometimes occur.

3.2.3 Upper Schist Formation

The Upper Schist Formation is composed of quartz-sericite and graphitic schists and thin to thick-bedded quartzites. Locally quartz-sericite and graphitic phyllite is abundant. There are also occasional limestone beds and lenses.

In the field and in thin section, Upper Schist Formation rocks are identical to Lower Schist Formation rocks. Phyllites and schists are composed mainly of various ratios of quartz, sericite and graphite, and quartzites are often impure.

Structurally, the rocks show evidence of having undergone some degree of deformation. This varies from platy foliation parallel with bedding to strong crumpling of individual beds. "Gleitbrett" folds are locally present.

3.2.4 Greenstone

Sills and lens-shaped bodies of altered diorite, gabbro and peridotite are found mainly in the Lower Schist Formation and to a lesser extent in the Central Quartzite Formation. Topographically, greenstones form resistant elongated hills and knobs such as the hill below the Mayo-Elsa Road and approximately one thousand (1000) meters west of Galena Creek.

In thin section, these grayish green to dark green altered rocks are mainly mixtures of many of the following minerals: Hornblende, actinolite, saussurite, plagioclase (An 10-50), chlorite, stilpnomelane, biotite, sericite, leucoxene, and carbonate minerals. Minerals sometimes present in lesser amounts include quartz, K-feldspar, ilmenite, magnetite, limonite, pyrite, and apatite.

Diabasic rock textures are common in many greenstone bodies. Borders of the larger bodies as well as all of the smaller bodies may have a schistose texture. Some greenstones are porphyritic as large amphibole crystals or saussurite may occur in a fine-grained groundmass.

3.2.5 Rhyolite and Quartz-Feldspar Porphyry

Buff rhyolites and quartz-feldspar porphyries form young, narrow (less than 5 meters) dykes and sills in the Galena Hill area. These tabular bodies are younger than the greenstones.

In thin section, phenocrysts of one or more of quartz, feldspar, muscovite, biotite and/or chlorite are set in a fine to medium grained groundmass of quartz, plagioclase, myrmekite, muscovite and/or chlorite. Accessory minerals are many of the following: apatite, sphene, epidote, carbonate, magnetite, hematite, zircon and/or pyrite. Pyrite may be locally abundant.

3.3.0 LOCAL GEOLOGY

Many significant outcrops were mapped in Galena Creek and in the area west to the airport (See MAPS 3-3, 3-4). This mapping included an important pair of overburden drill "fences" across the Central Quartzite north of the Gerlitzki vein.

Only in Galena Creek is the contact between Upper Schist and Central Quartzite fully exposed. To the west, this contact can be roughly traced WSW across Highway 2, then approximately three hundred and fifty (350) meters north of the highway at Thompson Creek.

In the area of Thompson Creek, the Central Quartzite - Upper Schist contact bends to an east-west strike. This trend is accurately determined by the presence of Upper Schist outcrops north of the airport and by Central Quartzite drill cuttings from a line of overburden drill holes six hundred and fifty (650) meters farther west (See MAP 3-4).

This apparent change in the strike of the contact near or at Thompson Creek may be interpreted as either a flexure in the contact or as a right lateral fault offset which shifts the contact north to the west of a hypothesized fault. There are several WNW-trending and north-trending airphoto linears in this

area. Since the WNW-trending Brefalt Creek fault near Elsa offsets the contact approximately 2500 feet in a horizontal direction, one or more of the WNW-trending linears would possibly be favourable structures along which fault-offsets may occur.

Between the area north of the airport and Shakey Lake, rock exposure is poor. However, two significant areas of outcrop west and northwest of Shakey Lake are important in the determination of the Central Quartzite - Upper Schist contact. Several trenches in Central Quartzite are approximately 1300 meters south of Proctor Lake and 1250 meters northwest of Shakey Lake. South and west of these trenches and just west of MAP 3-2, the north side of a large hill has been trenched which exposes limestones and schists of the Upper Schist Formation.

The Upper Schist - Central Quartzite contact cannot be determined accurately in the above area, but it is apparent that the contact lies farther north than an east-west extension of the contact from the area north of the airport. This suggests that the contact either curves north or that it is faulted north. If the latter is true, a long north-south airphoto linear east of Shakey Lake may be the surface expression of this fault. In addition, a shorter, curving airphoto linear lies to the west of Shakey Lake.

3.4.0 DETAILED GEOLOGY

3.4.1 Galena Creek

Massive, light to medium grey quartzite is characteristic of the area around the old Silver King Mine adit (See PHOTOGRAPH 3-1). Central Quartzite crops out along Galena Creek as far as two hundred and fifty (250) meters downstream from the adit and one hundred seventy-five (175) meters upstream. This section of quartzite includes sparse 5 centimeter to 1 meter thick interbeds of graphitic phyllite. Strikes of quartzite beds vary from 063° to 095° and dips are 28° to 77° to the south.

Approximately two hundred and sixty-five (265) meters upstream from the main road (lower road shown on MAP 3-4), the contact between the Central Quartzite and Upper Schist Formation can be determined on the left bank of the creek. An outcrop of apple green quartz-sericite schist and black graphitic schist is separated from Central Quartzite outcrop by approximately five (5) meters of soil and talus.

Although the contact is not fully exposed, there clearly is not enough room for a major thrust fault to be burried by the soil and talus. Such a possibility has been put forth by L.H. Green (1971) of the Geological Survey of Canada. Green, on the basis of regional mapping, has postulated a major thrust fault separating older Upper Schist from younger units such as the Central Quartzite. Clearly, Upper Schist conformably overlies the older Central Quartzite here in Galena Creek.

Excellent continuous exposures of mixed quartzite and schist lie along Galena Creek for up to four hundred (400) meters south of the contact. It is not possible to differentiate thin and medium bedded Upper Schist quartzite from Central Quartzite in any given outcrop; however, the presence of interbedded quartz boudin-bearing schist clearly places nearby quartzites as part of the Upper Schist Formation. Some quartzite interbed zones are exposed for up to 50 meters along the creek. These thick zones would make excellent competent host rochs for Ag-Pb-Zn veins; hence, the lower part of the Upper Schist in this area should not be discounted as not being host to ore-bearing veins.

A little farther upstream and just beyond an old road bridge, a sill of pyritic rhyolite lies on the right bank of Galena Creek. Where the sill should crop out on the left bank, there is an outcrop of limy schist; therefore, a fault trending approximately 320° must separate the two outcrops.

3.4.2 Airport Area

In the area seven hundred (700) meters west and north of the old Elsa airport, outcrops are abundant. The majority of exposures consist of light and medium grey quartzite and buff sericitic schist of the Upper Schist Formation. Occasional outcrops of phyllite and limestone occur. A conformable dyke or sill of rhyolite was mapped by Silver Titan Mines Limited within fifty (50) to one hundred (100) meters off the eastwest road which joins the southwest corner of the airport. The rocks strike eastwest to northeasterly and dips are shallow to moderate to the south.

Two samples of galena-bearing rock were collected from a seventeen (17) centimeter wide vein fault in the above-mentioned rhyolite. Sample 8848 assayed 73.5% Pb, 0.24% Zn, 0.10 oz/ton Au, and 8.04 oz/ton Ag whereas 8951 assayed 53.2% Pb and 155 oz/ton Ag.

Two small trenched areas east of the airport were mapped in detail. The larger area to the southwest is sericitic and graphitic phyllite with minor quartzite interbeds. One hundred and fifty (150) meters northeast, trenches cut medium bedded quartzite and interbedded phyllite of the Upper Schist Formation.

One trench in the larger area exposes what is interpreted as the top of a rhyolite dyke. The rhyolite is brecciated and fragments are locally cemented with wad, galena and sphalerite. Sample 8834 from the best mineralization assayed 3.25% Pb, 4.15% Zn, 0.010 oz./ton Au, and 2.89 oz/ton Ag.

3.4.3 Proctor Lake Area

Four (4) trenches expose fresh bedrock approximately thirteen hundred (1300) meters south of Proctor Lake and two hundred and fifty (250) meters south of the South McQuesten River Road. Several small outcrops of quartzite were also mapped east of the trenches.

Trenches expose a continuous section of medium to dark grey phyllitic and graphitic quartzite. The massive quartzite is interbedded with 1 to 3 meter thick beds of graphitic phyllite which accounts for approximately fifteen percent of the exposed bedrock. Bedding altitudes vary from 065° to 080° in strike and 30° to 35° in dip.

Locally, one centimeter thick quartz veins with a strike of 030° and a vertical dip cut the quartzite. Some of these veins contain pyrite and/or have pyritic selvages. Rock in this area is interpreted to be of the Central Quartzite Formation because the interbeds are phyllite, not schist, as found in the Upper Schist Formation. PHOTOGRAPH 3-2 shows some of the massive quartzite.

3.5.0 GEOPHYSICS

3.5.1 Seismic Survey

Introduction

From July 7th to July 19, 1979, a seismic refraction survey was carried out by Kenting Exploration Services Ltd. Two previously cut lines were surveyed: line 4 near the Bema Industries Ltd. camp south of Hanson Lakes and line 1 west of Shakey Lake in the Western ZAP claim area. In addition to these northwest-southeast-trending lines a test line was run over a major quartzite outcrop 1.2 kilometers northwest of Shakey Lake.

The survey was performed with a SIE RS-49 24 channel portable seismic system. In conjunction with this system a 32 channel camera was used to record the data in the field. Most geophone intervals used were 30 meter spacings.

The results of Kenting's work is found in the Appendix titled "Report on a Seismic Refraction Survey, Keno Hill Area, Yukon Territory."

As Bema Industries Ltd. was not satisfied with the outcome of Kenting's survey a private seismic consultant was hired to give an independent analysis of the data quality and reported results. Bo Chandra of B. Chandra and Associates Ltd. was retained to evaluate the survey and possibly reinterpret the seismic survey results. For this evaluation Kenting kindly sent the field seismic records to Bema.

Results Reported by Kenting Exploration Services Ltd.

Kenting Exploration Services Ltd. concludes that "for the Keno Hill area, it appears that the refraction method is of little use for defining bedrock depths. The reason for this is the presence of frozen surficial material of higher velocity than the underlying rock."

In addition, Kenting admits that "the quality of the refraction data obtained during the course of this survey is considered to be generally poor." They blame this on external factors such as wet weather and poor energy coupling from the use of large surface charges in frozen ground. In an effort to overcome

these difficulties, Kenting reshot 75% of the spreads.

Data from line 4 is interpreted as useless because of an interpreted velocity inversion. Data from the outcrop test indicated a fresh rock velocity of 8.84 m/msec. This velocity was obtained from poor quality data in which apparent bedrock velocities of 7.0 and 12.1 m/msec. were obtained. Data from line were also interpreted to suffer from velocity inversions; however, one interpretation of depth to bedrock was made. The depth calculated was 108 meters.

Survey Evaluation by B. Chandra

In the second of two reports submitted by B. Chandra (see reports in the Appendix), he concludes that "if the aim of the survey was to find the depth to the bedrock, the survey is a complete failure." The following problem areas are indicated by B. Chandra and Associates Ltd.:

(1) Poor quality of the field data is suggested in Fig. 4-3 of Kenting's report. Here, the velocities of the reversed profile are shown to differ drastically when they should normally vary by only up to 20%.

(2) Poor quality of field data is also suggested by the reporting of a velocity of 8.84 m/msec for quartzite. Velocities in the order of 4 to 6 m/msec would be acceptable.

(3) Only 4 records out of 52 have the shot time break on the seismic traces; hence, it is not possible to get depths to bedrock on 90% of the traces.

(4) It is not possible to get top layer velocity information from the seismic traces because the geophone separation was too large.

(5) The quality of the seismic records is very poor.

It should be noted that all of the above problem areas noted by Chandra suggest a combination of poor field procedure and/or faulty equipment.

Discussion and Conclusions

On seismic line 1, part of which is relatively close to the bedrock outcrop area, B. Chandra and Associates Ltd. say "it seems reasonable to assume

that bedrock depths are in the order of 10 to 15 meters." They roughly calculate a depth of 7.5 meters to bedrock on the outcrop test line where it is only 10 to 20 meters away from seismic line 1.

Chandra believes that true bedrock velocities were obtained in many of the seismic records of Kenting Exploration Services Ltd., therefore, a closer spacing of geophones combined with proper shot time records would probably result in a worthwhile seismic refraction survey.

3.5.2 Electromagnetic Survey

During the 1979 field season a horizontal loop electromagnetic (HEM) survey was conducted over the western ZAP and northern SIN claim groups. Donald B. Sutherland, M.A., P.Eng., consulting geophysicist, recommended the survey and the system used. Floyd Hussey for Tom Gledhill, P. Eng., performed the survey. The survey was conducted on cut and flagged grid lines and covered 218 kilometers. Work began on August 1st, 1979 and was completed on September 6th, 1979. The instrument and survey parameters are outlined below.

Instrument: APEX MAXMIN II

Coil Separation: X=150 meters on
L7+450 to L12+350
L28+200 to L30+000
L2+500 to L8+800 (on east baseline)

X=200 meters on
L12+500 to L27+300

Frequency: High Frequency
1777 Hertz on all lines

Low Frequency
888 Hertz on L8+500 to L9+725
444 Hertz on all other lines

Line Spacing: Approximately 150 meters between
L7+450 to L14+000
300 meters between
L14+000 to L16+700
900 meters between
L16+700 to L30+000 and
L2+500 to L8+800 (on east baseline).

The purpose of the HEM survey designed by Sutherland was to map conducting, graphitic stratigraphic horizons beneath the drift covered McQuesten Valley and to infer geological structures on the basis of this mapping. The conducting horizons are inferred to be graphitic phyllites and schists and are interbedded with resistive, thick bedded quartzite horizons. Material which was highly conductive but showed little variation in conductivity is interpreted to be the graphitic units of the Lower Schist. The interbedded graphitic units and thick bedded quartzite of the Central Quartzite Formation is recognized as a succession of both broad and narrow conductive zones alternating with broad resistive units. The Upper Schist unit is expressed as a broad, unvarying, resistive zone. The Upper Schist is predominantly composed of buff phyllite, phyllitic quartzite and quartz-sericite schist. The inferred geological contacts can be compared with the geophysical data by comparing MAP 3.3 and PLATE 1 of the geophysics plans. The technique of mapping used was to identify conductive stratigraphic intervals and attempt to correlate these across the surveyed area. Where the lateral continuity of conductive horizons are broken and an offset apparent, a fault was inferred to exist. Several north east trending faults have been interpreted from the data.

Glen E. White, B.Sc., P.Eng., consulting geophysicist was commissioned to review and analyze the field data. The data was plotted on a plan at a scale of 1:5000 (metric) and drafted for interpretation. From his analysis White suggests that in the area in which 150 meter line spacing was used (west of L14+000) the survey provided useful data for mapping purposes. The data from areas east of L14+000 is too sparse for detailed mapping and is of little use. However, from the data available it is apparent that the area east of L14+000 is underlain by Lower Schist. The area between L11+600 and L13+100 is of interest but the data for the area is of poor quality. Coil separation problems probably due to topography and conductive overburden appear to have effected the quality of the data.

Several areas of interest have been delineated by the HEM survey. At least three north-northeast trending fault structures are located in the area believed to be underlain by the Central Quartzite Formation. The most significant of these structures consists of a 750 meter wide zone in which complex faulting appears to be concentrated. This zone lies between L9+250 and L10+000 and between Proctor and Shakey Lakes. Another area of interest lies between L11+100 and L11+390. This inferred

fault appears to offset several conductors and may have minor parallel faults associated with it. It is of interest to note that both of the mentioned areas are associated with anomalous geochemistry. These areas warrant testing by overburden drilling.

In addition to structural information White studied in detail the most prominent conductor. This conductor strikes approximately east-west and trends slightly north of Shakey Lake. At Shakey Lake this unit is apparently 30 meters thick and occurs at a depth of 30 meters. It is considered to be a very strong conductor with a conductivity of approximately 4000 mhos. A conductor of this magnitude is likely composed of graphite or sulphides or a combination of both. Since this conductor is coincident with a strong positive magnetometer anomaly White suggests that the expression of this conductor is very similar to that of a graphite-pyrrotite massive sulphide body. East of the inferred fault east of Shakey Lake the conductor strikes about 100° and dips steeply to the north. Here the zone consists of two adjacent units separated by about 50 to 100 meters of stratigraphy. West of the fault the conductor is offset right laterally and passes north of Shakey Lake. The two conductors merge to form a thicker conductor that strikes about 100° and dips to the north at 60° to 70°. West of Shakey Lake the unit enters the faulted zone where it changes attitude and strikes 110° and dips vertically. West of the faulted zone the same conductor is again shifted right laterally but now shows a drastic change in strike. In this position the zone strikes approximately 080° to 090° and dips steeply to the south. The unit appears to be relatively thin here and is difficult to trace to the west. This zone must be considered to be a prime exploration target and warrants a drill test.

For more information on the HEM survey, see the section on conclusions and recommendations for Western ZAP and see the report of Glen E. White, B.Sc., P.Eng. in the Appendix of this report.

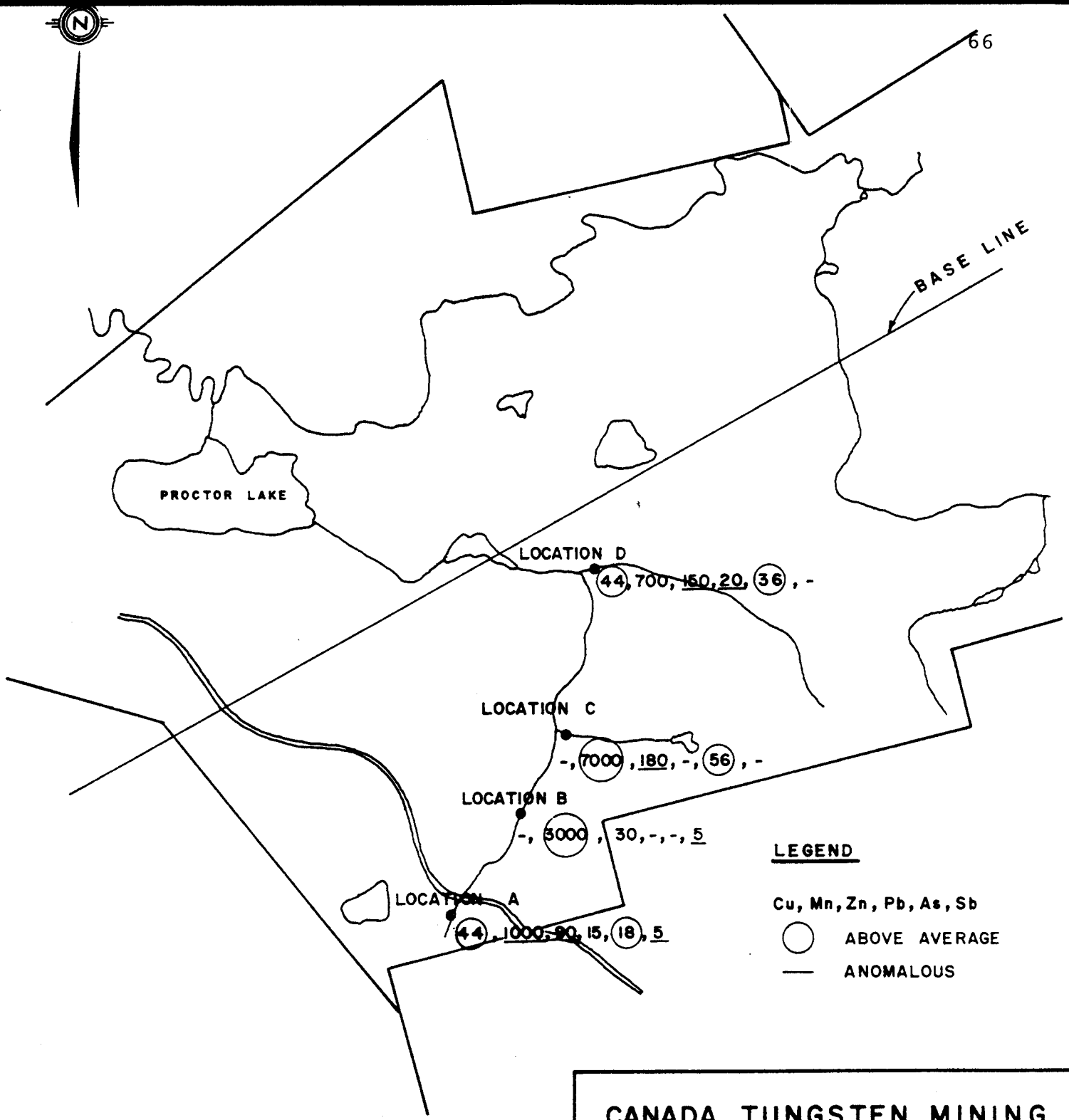
3.6.0 GEOCHEMISTRY

During 1964, Dr. C.F. Gleeson of the Geological Survey of Canada conducted a reconnaissance geochemical survey. Five thousand, nine hundred (5,900) samples of sediments and precipitates in the vicinity of springs where collected from the Keno Hill-Galena Hill area. Each sample was analyzed for nine different elements, these elements include silver, lead, zinc, manganese, arsenic, antimony , copper, molybdenum and tungsten. Water samples were taken at periodic intervals along each creek sampled. These were tested in the field for pH and cold extractable heavy metals, and in the laboratory for SO_4 and Cl anions. Altogether some seven hundred and thirty-nine (739) stream waters and one hundred and seventy-two (172) spring water samples were analyzed from the area.

Within or close to the Western ZAP claim boundary there are a total of thirteen (13) sediment and water sample sites. A spring water sample, located approximately one kilometer southeast of Shakey Lake and two hundred (200) meters south of the claim boundry, has a sulphate content of 663 ppm. The geometric mean of the sulphate content of the waters of the Keno Hill-Galena Hill area is 20.9 ppm; therefore this sample is considered highly anomalous. A small creek flowing northerly has its source three hundred (300) meters east of Shakey Lake. This creek and two tributaries. contain above average and anomalous sediment samples. (MAP NO. 3-8)

Location A has anomalous values in copper (Cu) 44 ppm, and arsenic (As) 18 ppm, and above average values in manganese (Mn) 1000 ppm, and antimony (Sb) 5 ppm. Location B has an anomalous value in Mn 3000 ppm and an above average value in Sb 5ppm. Location C has anomalous values in Mn 7000 ppm and As 56 ppm and an above average value in zinc (Zn) 180 ppm. Location D has anomalous values in Cu 44 ppm and As 36 ppm and above average values in Zn 150 ppm and lead (Pb) 20 ppm.

Gleeson suggested that the majority of high copper values are found in areas underlain by massive quartzite and phyllites which contain greenstone bodies. Above average lead-zinc values could be caused by pyrite-rich phyllites and schists or disseminations of sulphides associated with greenstones or perhaps



SCALE 1 : 31,680

CANADA TUNGSTEN MINING CORPORATION

WESTERN ZAP CLAIMS
G.S.C. SILT SEDIMENT SAMPLE LOCATIONS

DATE: DECEMBER 20, 1979.	JOB NO.: 79 - 09
REVISED BY:	FIG. NO.: 3 - 8

BEMA INDUSTRIES LTD.

an undiscovered silver-lead-zinc deposit . Highly anomalous arsenic values could be caused by a number of different mineralized occurrences. Gleeson states that most of the known lead-silver veins, gold-arseno-pyrite veins, arsenopyrite in porphyry sills and in contact metamorphic deposits have high arsenic values. Antimony values tend to correlate with arsenic values however arsenic is more dispersed than antimony. Manganese has the ability to adsorb and/or coprecipitate many of the described elements, therefore an enrichment of any of these elements may occur in stream sediments where the manganese content is high. This should not discourage any further work as manganiferous siderite is commonly associated with many veins in the Keno Hill-Galena Hill Area

3.6.1 MERCURY SOIL GEOCHEMISTRY

The writer recommended a mercury (Hg) geochemical survey be conducted over the Central Quartzite Formation within the McQuesten Valley, Proposed Exploration Program 1979. A preliminary program to test the feasibility of the use of mercury as a pathfinder for silver-lead-zinc vein faults was to be carried out prior to the McQuesten Valley Survey. In a report to Canada Tungsten, Mr. Alan R. Archer (1979) stated that "Mercury geochemistry seems unlikely to work because the Keno Hill vein mineralization has no associated mercury". In light of the ensuing controversy it was necessary to document that mercury geochemistry would indeed outline areas of mineralization. During the 1979 field program a preliminary mercury survey was conducted on various properties on Keno Hill and Galena Hill which consisted of determining the amount of mercury in ore samples and in different soil horizons over known veins. (TABLE 3.3) Ore samples were collected from various mine dumps and were analyzed for mercury by Bondar-Clegg & Co. Ltd. of North Vancouver.

High mercury values clearly demonstrated that mercury is associated with Keno Hill-Galena Hill vein type mineralization. Sphalerite, specifically the blackjack variety, is more likely to be associated with mercury than galena.

Different soil horizons were analyzed for mercury over known vein systems which include the LUCKY QUEEN,

TABLE 3.3

Hg CONTENT OF ORE SAMPLES

SAMPLE NUMBER	DESCRIPTION	Hg ASSAY VALUES (in ppb)
8834	minor galena and sphalerite sample from airport west of Elsa.	250
8835	(black-jack) sphalerite sample SILVER KING mine dump.	* G.T. 5000
8836	Galena-rich sample from SILVER KING mine dump.	1350
8837	(black-jack) spalerite and quartz sample from FORME mine dump.	* G.T. 5000
8838	galena sample from FORME mine dump.	520
8839	manganese oxide stained siderite sample from LADUE mine dump.	400
8840	sphalerite ± pyrite sample from south LADUE mine dump.	* G.T. 5000
8841	highly oxidezed vein sample, minor sphalerite and galena, from WERNEKE #1 claim	* G.T. 5000
8842	galena chips from MT. KENO vein.	* G.T. 5000

* G.T. - Greater Than

WERNEKE, LADUE SADIE-FRIENDSHIP, FORMO, MOUNT KENO and the airport. The LADUE SADIE-FRIENDSHIP survey best demonstrates the use of mercury geochemistry as an applicable exploration technique for finding buried orebodies. (MAP NO. 3-9) The mercury values decrease with depth and mercury values tend to be higher the closer the proximity to the vein system. These results have verified that Keno Hill-Galena Hill vein type mineralization can be traced in areas of overburden with the use of mercury geochemistry.(APPENDIX A)

In the 1979 Exploration Proposal the writer recommended that the B soil horizon should be analyzed for mercury, however, the preliminary survey demonstrated that the A soil horizon gave significantly higher mercury values than the B soil horizon, therefore the A horizon was sampled. A more comprehensive mercury-lead-zinc geochemical survey was conducted in the area of the Western ZAP claims, which are underlain by the Central Quartzite Formation. Four hundred and eighty (480) stations were sampled with both the A and B soil horizons collected at 50 meter intervals with lines spaced 150 meters apart. Samples approximately 230 grams in size were collected by mattock and auger. The soil interface between the A and B soil horizons is less than fifty (50) centimeters deep. An organic-rich sample was collected above the interface and an organic-free sample was collected below the interface. Samples were tagged, placed in Kraft paper bags and hung and carefully dried at a constant temperature in a drying tent. Samples were then sent to Bondar & Clegg Co. Ltd. of North Vancouver to be analyzed for mercury, lead and zinc. Organic-rich samples were screened to -80 mesh, extraction was by controlled aqua regia and mercury analysis by closed cell atomic absorption. Organic-free samples were re-dried and screened to -80 mesh. Extraction was by hot aqua regia and lead-zinc analysis by atomic absorption.

Results from the mercury survey were very positive. The geometric mean for the mercury value is 58 ppb, the threshold value is 75 ppb, and any values greater than 100 ppb are to be considered anomalous. The largest anomaly, is centered on line 10+000 and has a northerly trend. Adjacent and to the east of Shakey Lake there is an east-northeast trending anomaly; this anomaly continues for five hundred (500) meters before it is terminated by a four hundred (400) meter mercury low. The east-northeast anomaly continues to the north-east for more than five hundred (500) meters and is

open to the east. On line 12+050 there is a highly anomalous mercury value of 420 ppb. This anomaly is open to the east so no definite trend has been established. There are a few sporadic anomalous samples with no trends. There are no mercury anomalies to the west of the quartzite outcrop on line 9+250. (MAP NO. 3-6) (APPENDICES B & C)

3.6.2 LEAD-ZINC SOIL GEOCHEMISTRY

After the A horizon samples were analyzed the B soil horizon samples in areas of high mercury values were analyzed for lead and zinc. Subtle results from the lead-zinc survey tended to correlate with the burden Gleeson has suggested that background, threshold and anomalous values for lead-zinc should be lower than normal. The background value for the lead-zinc are 13 ppm and 50 ppm respectively, threshold values are 16 ppm and 100 ppm, and any values greater than 20 ppm and 150 ppm are to be considered anomalous. The most significant lead-zinc anomaly lies one hundred (100) meters north of the highest mercury anomaly. A prominent zinc anomaly supported by threshold values in lead trends east-west and is centered on line 11+000. A subtle lead anomaly supported by threshold values in zinc lies six hundred (600) meters west of Shakey Lake. Threshold values of both lead and zinc on line 11+600 coincide with part of the east-northeast trending mercury anomaly. (MAP NO. 3-7) (APPENDICES B & C)

3.7.0 SUMMARY AND CONCLUSIONS

Mapping south of the Western ZAP claim group has resulted in the projection of the Central Quartzite Formation into the area between Shakey and Proctor Lakes. The apparent thickness of this favourable zone is estimated to be 1500 meters with a strike of approximately 290 degrees and a 25 degree dip to the south.

This conclusion is supported by the presence of an outcrop that has been trenched 1.25 kilometers northwest of Shakey Lake which consists of massive gray quartzite interbedded with approximately 10% graphitic phyllite. The southern contact of the Central Quartzite Formation is projected through the northern part of the SIN claims. It is probably terminated to the west by the Haldane Creek fault, and to the north by the Flat Creek fault.

An apex Maxmin II horizontal loop electromagnetic over the Western ZAP claim group outlined several areas of interest and by mapping conducting graphitic stratigraphic horizons favourable geological structures were inferred. At least three major north-northeast-trending faults have been outlined. Of particular interest is a 750 meter wide area which lies between lines 9+250 and 10+000 in which faulting appears to be concentrated. Another structural break is indicated between lines 11+100 and 11+600. Each of these major structural breaks appear to be right lateral offsets which are typical of the Keno Hill - Galena Hill area.

Of special interest is a large WNW-trending electromagnetic conductor centered on the north side of Shakey Lake. This strong conductor dips steeply to the north. Coincident with the EM anomaly is a strong dipole aereomagnetic anomaly, Glenn E. White, consulting geophysicist, suggests that the coincident anomalies have a geophysical expression similar to that of a massive sulphide body. The depth of overburden in the area of the conductor is estimated to be approximately thirty meters, based on the Kenting seismic survey field charts. B. Chandra and Associates Ltd. suggest an overburden thickness of 10 to 15 meters in this area.

In the hope of locating major fault structures and undiscovered silver-lead-zinc vein faults, a 480 sample mercury-lead-zinc soil geochemical survey was carried out. This survey, covering part of the Western ZAP claim area, resulted in the discovery of four mercury and four lead-zinc anomalies.

Centered on line 10+00 there is a major northerly trending mercury anomaly which is 1500 merers long (open to the north and south) and up to 700 meters wide. This anomaly is coincident with a previously-mentioned EM structurally anomalous zone. There is no corresponding lead-zinc anomaly.

A small mercury anomaly lies northeast of Shakey Lake. This anomaly lies immediately north of the large WNW-trending coincident EM and magnetic anomalies. Lead and zinc samples are low in this area.

Approximately 500 meters ENE of the latter anomalies is an ENE-trending mercury geochemical anomaly which is 600 meters long (open to the ENE) and 150 meters wide. Weak coincident EM and lead-zinc anomalies are also found in this area.

An anomalous zone of mercury-lead-zinc is found along line 12+050. A silt sediment sample collected by the G.S.C. in 1964 from a creek draining this anomalous area assayed 7000 ppm Mn, 180 ppm Zn and 56 ppm As. This area is open to the east.

3.8.0 RECOMMENDATIONS

Four types of follow-up work are recommended:

(1) Soil and Silt Geochemistry

Follow-up mercury soil geochemistry should be done to the east in an attempt to locate new structures and the highly anomalous zone along line 12+050 should be closed off to the east. In addition, silts should be collected in this area and analyzed for Ag, Pb, Zn, Mn and As.

(2) Magnetometer Survey

A ground proton precision magnetometer survey should be conducted over the entire Western ZAP claim group. As faults are often detected in such surveys, ground magnetics may locate important vein faults and cross faults. In addition major greenstone bodies may be discovered.

(3) Follow-up EM Survey

Between lines 11+600 and 13+100 the EM data is considered by consultant, G.E. White to be of poor quality. Therefore, he suggests that this area should be resurveyed with a closer coil separation for better definition of anomalies.

(4) Overburden Drilling

The major exploration thrust in 1980 should be a program of overburden drilling to test the geologically, geochemically, and geophysically anomalous areas. These consist of three areas as follows:

(a) A line of south-dipping holes should be drilled into the WNW-trending EM conductor that has coincident airborne magnetic and mercury soil geochemical anomalies.

(b) North-south fences of holes should be drilled across the inferred zone of Central Quartzite where an area of faulting is EM-indicated between lines 9+250 and 10+000. This zone also is the site of a large, coincident mercury soil geochemical anomaly.

(c) Quartzite across the structural break between lines 11+100 and 11+600 should be drill tested.

Fence-drilling should be continued outwards (east and west) from the initial fences drilled with fill-in holes where sulphides are encountered by drilling. Prior to the overburden drilling program in 1980 a systematic method of handling and analyzing overburden and bedrock chips should be devised. In addition, optimum hole spacing, length of sample and the type of multi-element geochemical analysis required should be investigated. Considerable work has been done in this regard by Boyle, R.W., Gleeson, C.F., Tessari so that a comprehensive format can be devised quickly and efficiently.

BIBLIOGRAPHY

Aho, A.E., 1959 "LEO and KPO Properties on Galena Hill" Mayo Mining District, Yukon Territories.

Archer, A.R., 1979 Report on the Recommended Explcration Keno Hill District; Report written for Canada Tungsten Mining Corporation Limited.

Bostock, H.S., 1947 Mayo, Yukon Territory; G.S.C., Map 890 A with descriptive notes.

1957 Yukon Territory (Selected field reports of the Geological Survey of Canada 1898 to 1933); G.S.C. Mem 284.

Boyle, R.W., 1956 Geology and Geochemistry of Silver-Lead-Zinc Deposits of Keno Hill and Sourdough Hill, Yukon Territory; G.S.C. Paper 55-30.

1957a Lead-Zinc-Silver Lodes of the Keno Hill-Galena Hill Area, Yukon; Structural Geology of Canadian Ore Deposits, vol 2,pp 51-65

1957b The Geology and Geochemistry of the Silver-Lead-Zinc Deposits of Galena Hill Yukon Territory; G.S.C., Paper 57-1

1965 Geology, Geochemistry and Origin of the Lead-Zinc-Silver Deposits of the Keno Hill-Galena Hill Area, Yukon Territory; G.S.C., Bull III

Cairnes, D.D., 1916 Mayo Area; G.S.C. Sum.Rept.1915.pp.10-34

Cockfield, W.E.1920 Mayo Area; G.S.C. Sum.Rept.1919,pt B pp.3-7

1924a Geology and Ore Deposits of Keno Hill, Mayo District, Yukon. G.S.C. Sum.Rept.1923 pt.A,pp 1-24

Crosby, R.O., 1970 "Aero-magnetic Survey Keno Area, Yukon Territory on Behalf of Lacanex Mining Co. Ltd."

Esson, D.W., 1979 "Proposed Exploration Program for Keno Area Properties of Canada Tungsten Mining Corporation Limited"

Gleeson, C.F., 1966 (a) Lead Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 45-1965
(b) Silver Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 46-1965
(c) Zinc Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 47-1965
(d) Arsenic Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 48-1965
(e) Antimony Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 49-1965
(f) Copper Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 50-1965
(g) Molybdenum Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C. Map 51-1965
(h) Tungsten and Tin Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 52-1965
(i) Manganese Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 55-1965
(j) Regional and Residual Values for Cold Extractable Metal (CXM) in Surface and Spring Waters, Keno Hill Area, Yukon Territory
(k) Regional and Residual Values for Chloride in Surface and Spring Waters, Keno Hill Area, Yukon Territory
(l) Regional and Residual Values for Sulphate in Surface and Spring Waters, Keno Hill Area, Yukon Territory

Green, L.H., 1971 Geology of Mayo Lake, Scougale Creeks and McQuesten Lake Map-Areas, Yukon Territory G.S.C., Memoir 357

Keele, Joseph, 1906 The Upper Stewart River Region; G.S.C. Ann.Rept.,vol 16, pt.C, pp 5-23

Kindle, E.D., 1955 Keno Hill, Yukon Territory (map with marginal notes) G.S.C., Paper 55-12

1962 Keno Hill, Yukon Territory G.S.C. Map 1105A

McTaggart, K.C.1950 Keno and Galena Hills, Yukon Territory (preliminary maps with marginal notes); G.S.C., Paper 50-20

1960 The Geology of Keno and Galena Hills, Yukon Territory; G.S.C., Bull. 58

Nicholls, E.B.,1962 "A Geophysical (Turam Electromagnetic) Survey Conducted Over The A.A. Claims Group.

Stockwell, C.H.1926 Galena Hill, Mayo District Yukon; G.S.C. Su. Rept. 1925, pt.A, pp 1A-14A

Wilson, E.J., 1971 "A Geophysical Report on the ALBERTA and YUKON Claim Groups".

APPENDIX A

Hg GEOCHEMICAL ANALYSES

BONDAR-CLEGG & COMPANY LTD.

130 PEMBERTON AVE., NORTH VANCOUVER, B.C. PHONE: 985-0681 TELEX: 04-352667

Geochemical Lab Report

Extraction Controlled Aqua Regia

Method Closed Cell Atomic Absorption

Fraction Used

Report No. 29 - 1261 PROJECT: 79-09

From Bema Industries Ltd.

Date August 23, 19 79

SAMPLE NO.	Hg ppb				SAMPLE NO.				
01	135								
02	65								
03	110								
04	170								
05	50								
06	55								
07	30								
08	60								
09	25								
10	85								
11	50								
12	50								
13	45								
14	60								
15	1800								
16	2200								
17	90								
18	60								
19	>5000								
20	>5000								
21	3300								
22	650								
					cc Mayo, Yukon				

BONDAR-CLEGG & COMPANY LTD.
130 PEMBERTON AVE., NORTH VANCOUVER, B.C. PHONE: 985-0681 TELEX: 04-352667

Geochemical Lab Report

Extraction Controlled Aqua Regia — Report No. 79 - 1838 — PROJECT: 79-09

Method Closed Cell Atomic Absorption — From Bema Industries Ltd.

Fraction Used — Date September 26 19 79

SAMPLE NO.	Mo ppm				SAMPLE NO.				
8834	250								
8835	>5000								
8836	1350								
8837	>5000								
8838	520								
8839	400								
8840	>5000								
8841	>5000								
8842	>5000								
					cc Mayo, Yukon				

BONDAR-CLEGG & COMPANY LTD.
130 PEMBERTON AVE., NORTH VANCOUVER, B.C. PHONE: 985-0681 TELEX: 04-352667

Geochemical Lab Report

Extraction Controlled Aqua Regia
Method Closed Cell Atomic Absorption
Fraction Used

Report No. 29 - 1992 PROJECT: 79-09
From Bema Industries Ltd.
Date October 3 19 79

SAMPLE NO.	Hg ppb				SAMPLE NO.	Hg ppb			
23	190				W 4	55			
24	65								
25	115								
26	90								
27	110								
28	50								
29	110								
30	85								
FA	240				cc Mayo				
FB	85								
F2B	800								
F3B	50								
M 1	50								
M 2	40								
M 3	35								
M 4	25								
M 5	55								
M 6	50								
M 7	50								
LQ 1	55								
LQ 2	55								
LQ 3	60								
LQ 4	80								
LQT 2	45								
LQT 8	40								
MK 1	25								
MK 2	25								
W 1	30								
W 2	1300								
W 3	120								

BEMA INDUSTRIES LTD.
EXPLORATION DEPARTMENT

DATE _____ PROJECT _____
COLLECTOR _____ N.T.S. _____

ANALYST _____
METHOD _____

Sample No. Code: 73 S H L 23 (Year / Project / Collector / L - Silt, S - Soil, T - Rock, W - Water / Number)

SAMPLE DATA

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Values (ppm) Au	Ag	Cu	Mo	Pb	Zn	Hg		
23	CLAIM LADUE-SADIE-FRIENDS	soil	A	1-7 cm	5°	dark brwn	mixed fresh		39m NE of 6 and 5m SE							x		
24	CLAIM "	soil	A	2-7 cm	5°	dark brwn	and decomp		organic and silty, root bound just under moss -- location sample F							x		
25	CLAIM "	soil	A	2-4 cm	5°	med dk brwn	roots		16m SW of (6) organic rich, rootbound silty							x		
26	CLAIM "	soil	A	2-3 cm	5°	dk.brn			145 SW of (6), 17m SE, organic rich & somewhat silty							x		
27	CLAIM "	"	B/C	10-12 cm	L5°	med.dk brwn			less organic rich, and silty							x		
28	CLAIM "	"	A_1?	8-10 cm	L5°	grey brwn	(leached horizon)		less organic, and silt & clay-rich, (9)							x		
29	CLAIM "	"	A_o/A_{oo}	3-6 cm	L5°	dk brn			organic rich just above 28- more undecomposed roots							x		
30	CLAIM "	"	A (A_1?)	4-8 cm	L5°	med brwn	—		52m NW of stn 27m NE to 16 immature							x		
W-1	CLAIM WERNEKE #1	"	B/C	chip 10-25 m	0	grey brwn			immature soil horizon, containing angular to rnd rcks, matrix clayrch silt sand							x		
W-2	CLAIM "	"	B/C	30cm abv vn 15 bltp		grey brwn			sample taken frm NE wall of trench 2							x		
W-3	CLAIM "	"	A_o	7cm	5°	drk brwn			50% decompsd drk brwn org soil, silty							x		
W-4	CLAIM "	"	B/C	40cm		grey			0+50E, 0+50S clay rich 16m N of vein							x		
	CLAIM																	

BEMA INDUSTRIES LTD.
EXPLORATION DEPARTMENT

DATE July 14-79 PROJECT 79 09
COLLECTOR P N.T.S. 105 M-14

ANALYST Bondar Clegg
METHOD GA

Sample No. Code: 73 S H L 23 (Year / Project / Collector / Number) L - Silt, S - Soil, T - Rock, W - Water

SAMPLE DATA

Values (ppm)

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Au	Ag	Cu	Mo	Pb	Zn	Hg
79-09-P-S-01	CLAIM Sadie - Ladue		Ao	0-7cm	5%	dk br.			80% organic 10% clay 10% silt							
79-09-P-S-02	CLAIM S-L		A1	7-15cm		reddish brown			85% org 5% silt 10% cl							
79-09-P-S-03	CLAIM SL		B/C	15cm		grey brown			15% org 65% cl 10 st 5 pebbles 5 cobbles Float Massive grey qzt							
79-09-P-S-04	CLAIM S-L		B/C	17cm		dk br.			20 org 60 clay 15 silt 5 pibbles. Float-Massive qzt with veinlettes QF							
79-09-P-S-05	CLAIM S-L		B/C	15cm		gr. br. gray br.	Soil		20% org 60 clay 5 silt 5 peb. 10 cobbles FL Massive Qzt with & veinlettes greenstone upper part of ditch Des							
79-09-P-S-06	CLAIM S-L		B/C	9cm		gr. br.			10 less org 50 clay 15 st. 15 peb. 10 cobbles FL Massive qzt., thinly bedded Qzt, very weathered graphitic layers Des low grasses near clumps of buck brush							
79-09-P-S-07	CLAIM S-L		B/C	16cm		gr. br.	Immature		25 org 65 clay 10< silt 10< pebbles FL Qzt, Fe ox, barren grap partings Qzt-Massive-Mg ox. dk gr. Des low buck brush							
79-09-P-S-08	CLAIM SL		B/C	15cm		gr. br.			10< org 70 ± clay 10 silt 10 pebbles FL Quartzite barren Qvein Des - Zone lush grass and trees 4amprophyre dyke							
79-09-P-S-09	CLAIM SL		B/C	20cm		gr. br.	B/C		10 org 60 clay 20 st. 5 peb. 5 cob FL Qzt, qtz crystal, pyrite, Qzt vein barren Des Low buck brush							
79-09-P-S-10	CLAIM SL		Ao	06cm		dk br. black			65% org 20% clay 15% silt FL Qzt with Qveins - high Qzt content Massive Qzt Barren Qvein Des occasional buckbrush							
79-09-P-S-11	CLAIM SL		B/C	7cm		brown			15 org 5% sand 60 clay 10 pebbles 10 silt Des Very thin Ao/A1 profile along Cat track							
July 15, 79 79-09-P-S-12	CLAIM SL		B/C	15cm		dk br			20 org 60 clay 10 silt 10 pebbles + cobbles Float - Qzt, Barren Qvein area Moss and Evergreens							
	CLAIM SL		B/C	7cm		gr. br tinged Of			30 org 55 clay 10 silt FL Qzt. Pyrite. Fe ox veinlettes							

BEMA INDUSTRIES LTD.
EXPLORATION DEPARTMENT

DATE July 15/79 PROJECT 79 09
COLLECTOR P N.T.S. 105 M-14

ANALYST Bondar Clegg
METHOD CAA

Sample No. Code: 73 S H L 23 (Year, Project, Collector, Number; L - Silt, S - Soil, T - Rock, W - Water)

SAMPLE DATA

Values (ppm)

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Au	Ag	Cu	Mo	Pb	Zn	Hg
79-09-P-S-14	CLAIM Sadie / Ladue		B/C	10cm	0-5%	dk br/bk			25 org, 50 clay, 15 silt, 10 peb + cob. FL none. area moss, healthy evergreens							
79-09-P-S-15	CLAIM SL		tailings	25cm		dk gr			10 org, 20 clay, 10 silt, 30 peb + cobs. FL Qzt with Psheen graphitic PF grap. Fe ox Py. Qzt - lt gr. lens graphitic parting. Siderite, Sphalerite, Galena. Area TAILINGS PILE							
79-09-P-S-16	CLAIM SL		tailings	25cm		dk gr.			40 clay, 20 silt, 40 pebs + cob. Fl same as 15 above							
79-09-P-S-17	CLAIM SL		B(?)	10cm		cream brown			15 org, 50 clay, 15 sand, 10 silt, 10 peb. FL same as 15 above. area - short grass on cat trail. Could be over other tailings							
79-09-P-S-18	CLAIM SL		B/C	20cm		gr br.			20 org, 60 clay, 15 silt, 5 cobs 5 peb. FL none. area moss spongy, lots of buckbrush, pine trees							
79-09-P-S-19	CLAIM SL		Aoo?	0-4cm		dk/br orange/br			60 org, 15 clay, 15 sand, 10 silt							
79-09-P-S-20	CLAIM SL		Ao?	4-8cm		gr br.			60 org, 30 clay, 10 silt							
79-09-P-S-21	CLAIM SL		A1?	8-13cm		rich dk br.			80 org, 10 clay, 10 silt							
79-09-P-S-22	CLAIM SL		B/C	13cm		Khaki brown orange blotches			5 org, 65 clay, 15 sand, 10 silt. 10 pebbles, 10 cobbles. FL Qzt with black & Fe ox weather. Greenstone grap Qzt lens. area (cat track)							
	CLAIM															
	CLAIM															
	CLAIM															
	CLAIM															

NOTE: Most of the sample area has been disturbed by cat work done many years ago. This has disturbed the Aoo Ao A_1 horizon and now an immature A horizon is starting to be developed. The soil underneath is also very disturbed and a classical textlock soil horizon can't be assigned, ∴ B/C immature

BEMA INDUSTRIES LTD.

EXPLORATION DEPARTMENT

DATE Aug 30/79 PROJECT 79-09

COLLECTOR M. Philpot N.T.S. 105 M-13

ANALYST Bondar & Clegg

METHOD C.C.A.A.

Sample No. Code: 73 S H L 23 (Year / Project / Collector / Number; L - Silt, S - Soil, T - Rock, W - Water)

SAMPLE DATA

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Values (ppm) Au	Ag	Cu	Mo	Pb	Zn	Hg		
H-1	CLAIM DON? (airport)	soil	fault zone	4m	0	rusty purple			fault zone, tin/Mn rich oxides							x		
H-2	CLAIM DON?	"	glac. till	3.8m	0	grey			12-15cm abv flt & acr flt (well compctd) clay-snd, prly prtd, mstly rnded peb-bould							x		
H-3	CLAIM "	"	glac. till	2m	0	grey			2m abv flt, same desc. as above							x		
H-4	CLAIM "	"	B?	10-40 cm	0	buff			buff colored clay silt powder above glacial till							x		
H-5	CLAIM "	"	A_o-A_1		0	brwn			thn lyer of mature A horizon consting of brwn peaty root bound soil							x		
H-6	CLAIM "		A_o-A_1	0-10 cm	0	lght brwn			7m horiz distnce N from fault, poorly dev. soil							x		
H-7	CLAIM "	"	A_o-A_1	0-8 cm	0	lght brwn			25m "							x		
M.K-1	CLAIM MT. KENO	"	B/C	6m	25°	grey lght brwn			B 0+07N 8-10m O/B lrge ang rnded bldrs, in clay rch snd matrix glacial till							x		
M.K-2	CLAIM "	"	B/C	5m		lght brwn grey			9mN on B projection of vein shld be underneath							x		
	CLAIM								- - - - - - - - - - - - - -									
	CLAIM								- - - - - - - - - - - - - -									
	CLAIM								- - - - - - - - - - - - - -									
	CLAIM								- - - - - - - - - - - - - -									

BEMA INDUSTRIES LTD.

EXPLORATION DEPARTMENT

DATE Aug.31/79 PROJECT 79-09

COLLECTOR M. Philpot N.T.S. 105 M-14

ANALYST Bondar & Clegg

METHOD C.C.A.A.

Sample No. Code: 73 S H L 23 (Year / Project / Collector / Number; L - Silt, S - Soil, T - Rock, W - Water)

SAMPLE DATA

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Values (ppm) Au	Ag	Cu	Mo	Pb	Zn	Hg
F-A_1	CLAIM FORMO vein system	soil	A_1	0-10cm		grey brown			15m 58° from NW corner of upper Formo shaft							x
F-B	CLAIM "	"	B	10-40 cm		light buff yell.br			"							x
F-2B	CLAIM "	"	old A? peat layer	40-60 cm		brown			"							x
F-3B	CLAIM "	"	B	60-80 cm		lgt.buff brown			" above barren green-stone N5-8m from vein							x
L.Q. Tr-1	CLAIM Lucky Queen ?	"	?	0-10 cm	10°	med.br. & rock talus			50m 315° 150m 294° to Lucky Queen shaft							x
L.Q. Tr-8m	CLAIM "	"	?	0-40 cm	10°				in trench coarse, X'll galena vein 25 cm wide 030/65 SE							x
L.Q.-1	CLAIM "	"	A_1/B	10-15 cm	10°	med br abv rck talus			40 m S of L.Q. shaft							x
L.Q.-2	CLAIM "	"	A_1/B	"	10°	Qzite O.C.			10m E of L.Q.-1							x
L.Q.-3	CLAIM "	"	A_1/B	"	10°	"			20m E of L.Q.-1							x
L.Q.-4	CLAIM "	"	B/C			"										x
	CLAIM															
	CLAIM															
	CLAIM															

APPENDIX C

C.F. GLEESON'S GEOCHEMICAL REPORT

GEOCHEMICAL REPORT

ON WESTERN

ZAP CLAIMS

BY

C. F. GLEESON PhD, P.Eng.

January 2,1980

C.F. Gleeson & Assoc. Ltd.,
764 Belfast Road, Ottawa,
Ontario, Tel: 613-232-0796.

INTRODUCTION:

During the summer of 1979 some 412 humus samples (A_1 horizon) and 236 "B" horizon soil samples were taken over the southwestern portion of the Zap Claims. The former were analyzed geochemically for Hg and the latter were analyzed geochemically for Pb and Zn. In this report these results will be interpreted and discussed.

LOCATION:

The Zap claims are located in the South McQuesten River valley and extend from Haldane Creek northeast to Hanson Lakes. The property is bordered on the southeast by holdings of United Keno Hill Mines.

Highway 2 from Mayo, some 28 miles to the southwest comes within 1 mile of the southwest corner of the claims.

GEOLOGY:

During Pleistocene time ice spread over the area from the east, as a result glacial deposits floor principal valleys such as the South McQuesten River valley.

The area sampled is underlain mainly by thick-bedded quartzites of the Central Quartzite Formation, these are bordered on the south by quartzites and phyllites of the Upper Schist Formation and to the north by graphitic phyllite, phyllitic quartzite, thin bedded quartzite sericite schist and graphitic schist of the Lower Schist Formation. The latter formation may contain elongated lenses of greenstone.

Structurally a regional fault is assumed to trend east and northeast up the South McQuesten River valley. East of north trending faults to the west in Haldane Creek valley and to the east in Duncan Creek valley bound the claims. Vein faults that commonly host silver deposits in the area range in strike from 035T to 080T and most often dip southeast. Late northwest trending cross faults also have been mapped in the area.

GEOCHEMISTRY:

Field Procedure

Samples for mercury geochemical analysis were collected by shovel from the A_1 horizon. This horizon generally was black and organic-rich; most of the organic material was well humified although in places, up to 50% was poorly humified. Samples were also collected from the "B" horizon soils for Pb-Zn analyses.

Samples were dried in the field at 20°C and submitted to Bondar-Clegg and Co. Ltd., North Vancouver for analyses.

Analytical Techniques

For Hg 500mg of sample was cold digested in a concentrated acid mix (90% HNO_3 and 10% HCl) for 1 to 3 days. The test-tubes were subsequently placed in a hot water bath at 100°C, digested for ½ hour, removed from the bath and diluted to 100ml with metal free water. Reduction of Hg to its elemental state was accomplished by the addition of stannous sulphate. The evolved mercury vapour was then passed through an absorption cell of an atomic absorption spectrophotometer.

For Pb-Zn the same digestion was used and determinations were made by atomic absorption spectrophotometry.

DATA TREATMENT:

All results were plotted on the accompanying 1:5000 scale maps. Histograms and cumulative frequency curves were plotted for each element (Figures 1-3). Background values were established at the 50 percentile, the standard deviation was determined for each element by taking the half of the difference of the values at the 84 and 16 percentiles. In Table 1 the statistical parameters for each element have been summarized.

TABLE 1 - Statistical summary

Metal	Range	Mean	Std. Dev.	M+σ	M+2σ	M+3σ	Number of samples
Hg(ppb)	15-420	54	22	76	98	120	412
Pb(ppm)	3-32	12	3	15	18	21	236
Zn(ppm)	5-279	60	16	76	92	108	236

M = median value

σ = standard deviation

RESULTS:

Mercury

The dominant trends for Hg using the 75ppb contour are 300T to 340T and 045T to 070T. There are 4 of the former trends and 5 of the latter. In addition there is a weak 030T trend in the northwest part of the sampled area as defined by the 50ppb contour. These trends are interpreted to represent faults, the 045T-070T set are particularly important as they could reflect the presence of vein faults. The 300T-340T set probably represent late post-vein faults.

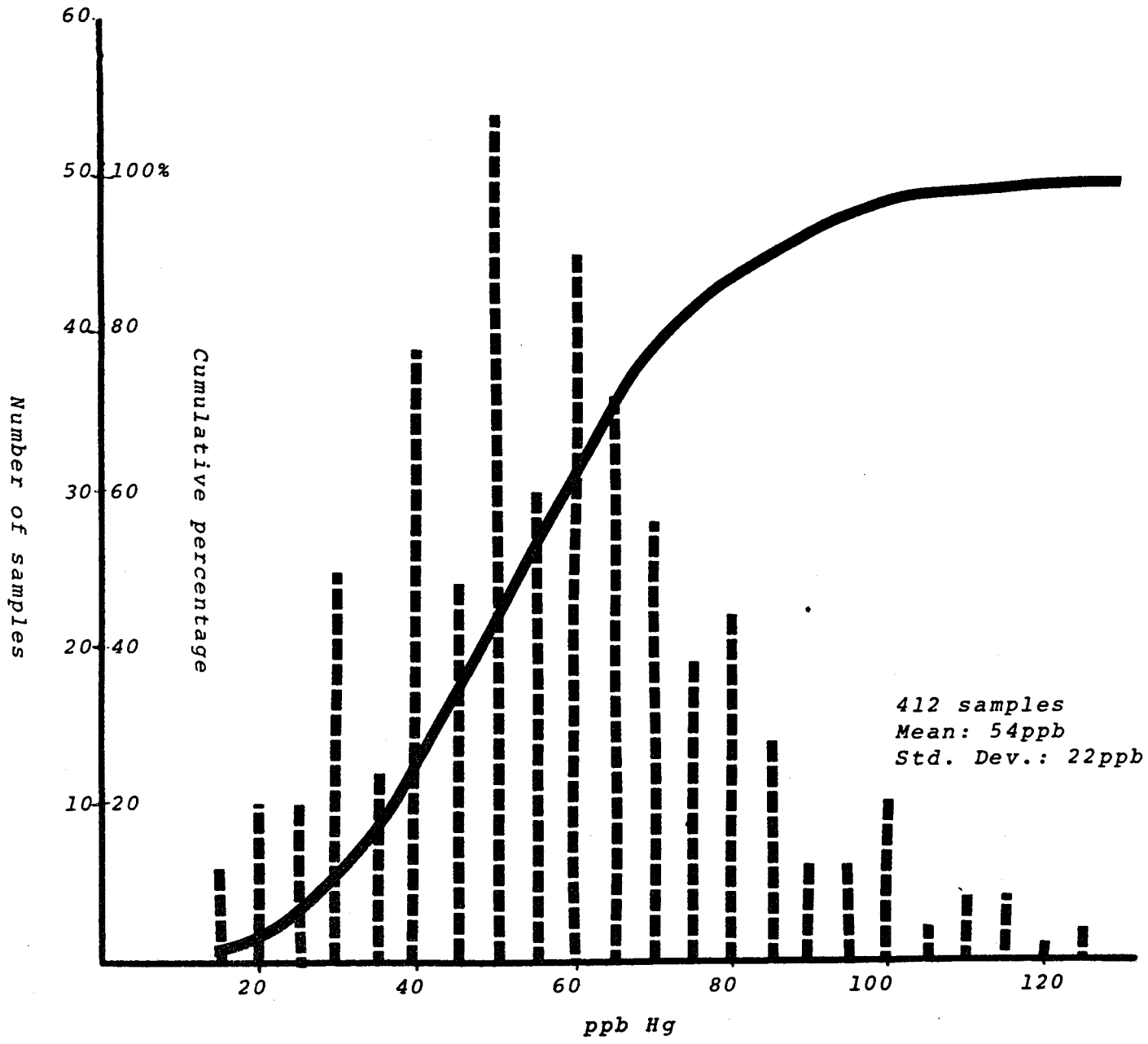
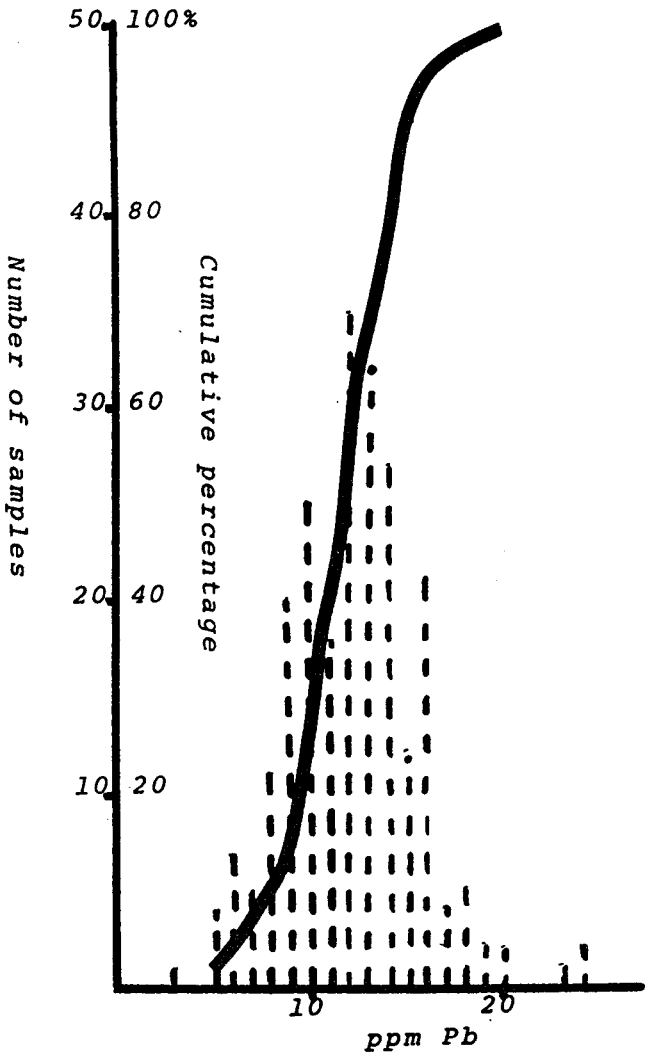


Figure 1 - Histogram and cumulative frequency plot for Hg in humus samples - Western Zap Claims



236 samples
Mean: 60ppm — 12ppm
Std. Dev.: 16

Figure 2 - Histogram and cumulative frequency curve for Pb in "B" horizon soil samples - Western Zap Claims

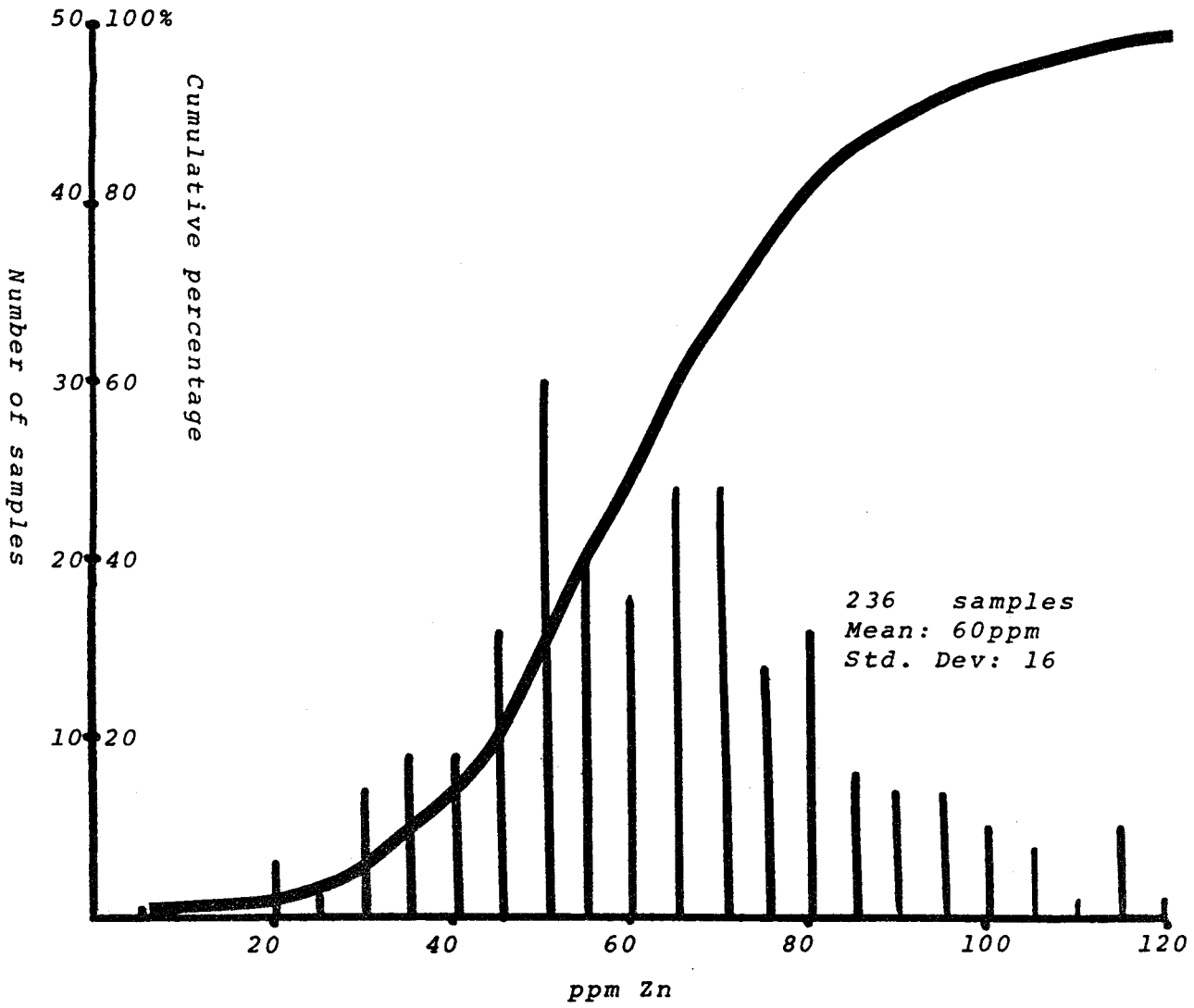


Figure 3 - Histogram and cumulative frequency curve for Zn in "B" horizon soil samples - Western Zap Claims

1. The highest Hg value of 420ppb is located near the south end of L12+050E. This is the last line sampled on the grid and hence sampling should be continued to the east. Hg values along this line vary from 40 to 420ppb and they appear to trend 330T however the attitude of this trend could change once sampling has been completed to the east.

2. Anomalous values ranging from 75 to 115ppb make up an anomaly near the north ends of L 11+750E to L11+ 600E. The lobate character of this zone define trends of 070T and 300T. A series of northeast and northwest airphoto lineaments are present in this area. This anomaly is also open to the east.

3. Another series of above normal Hg values (70-135ppb) trend 070T at the north end of L 11+000 - L 11+300. This anomaly is also open to the east.

4. Near the south ends of L 11+390 to L 11+600 "A" anomalous Hg values range from 75 to 145ppb. These anomalies trend 050T-070T but for the most part occur on the adjoining claims to the south. On L 11+390 a north trending lobe of the anomaly coincides with an air photo lineament.

5. Northwest of the above anomaly and northeast of Shakey Lake between L 10+720 and L 11 +000 Hg values vary from 75 to 120ppb. The southwest portion of the anomaly trends northeast and the northeast portion trends northwest.

6. In the west half of the sampled grid between L 8+850 and L 10 +450 there is a large Hg anomaly enclosing values varying from 75 to 125ppb. The central part of the anomaly trends 340T and appears to mark the northerly extension of the Haldane Creek fault. The central part of the anomaly is marked by a major 070T Hg trend that extends across the sampled grid and it could be a reflection of the fault zone underlying the South McQuesten River valley.

Lead and Zinc

Pb and Zn in "B" horizon soils are high at several places on the sampled grid. Dominant trends appear to be 070T -090T and 310T-350T.

1. Over the anomalous Hg zone on L12+050, Zn (69-160ppm) and Pb (24ppm) are above normal. As with the Hg the zone is open to the east. The trace of the 75ppm Zn contour indicates a trend of 070T for this anomaly.

2. To the northwest near the north ends of L11+300 to L11+750 anomalous Zn (76-145ppm) and Pb (15-20ppm) values form as irregularly shaped zone that is lobate to the northwest, east, and northeast. Hg is also anomalous here and several northwest and northeast air photo lineaments are present. The anomaly is open to the east and north.

3. At the north ends of L10+720 to L11+390 coincident anomalies in Zn (84-279ppm) and Pb (15-16ppm) occur in a zone that trends 080T; Hg is also above normal in this area. The anomalies are open to the north and east.

4. In the south part of the grid between L11+000 and L11+500 an anomalous Zn (85-119ppm)-Pb (15-32ppm) zone trends 350T and 070T. Hg is also above normal over parts of this anomaly. Off of the property at the south ends of L11+600 and L11+900 Zn (78-154ppm) and Pb (15-24ppm) are anomalous. Information is not sufficiently complete to establish a trend for Zn and Pb however a coincident Hg anomaly here has a northeasterly trend.

5. Low intensity anomalous Zn (75-119ppm)-Pb (15-18ppm) values occur in the central portion of the sampled grid between L10+720 and L11+000. The trend is 090T and coincides in part with a 070T Hg trend that probably marks the South Mc Questen River valley fault.

6. A weak Zn (79-105ppm)-Pb (15-16ppm) anomaly is present in the northwest part of the grid at the north ends of L10+000 to L10+450; Hg values are above normal (80ppb and 100ppm) where Zn is in excess of 100ppm. The Zn-Pb anomaly trends 010T and appears to lie within the Haldane Creek fault zone, it is open to the north.

SUMMARY AND RECOMMENDATIONS:

412 humus and "B" horizon soil samples were taken over the Central Quartzite Formation in the southwest part of the Zap Claims. Samples were taken at 100m interval on lines 50 to 200m apart. The humus samples were analyzed geochemically for Hg and 236 "B" horizon samples were analyzed geochemically for Pb and Zn.

Median values for Hg, Zn and Pb are 54ppb, 60ppm and 12ppm respectively. Values for Hg range from 15 to 420ppb, for Zn they range from 5 to 279ppm and for Pb they range from 3 to 32ppm. Major trends for Hg are 045T-070T and 300T-340T, the former correspond to the attitude of vein faults in the Galena Hill-Keno Hill area and the latter directions correspond to the attitudes of late cross faults. Hence it appears that Hg anomalies define fault zones in the Central Quartzite Formation. There are 6 anomalous Hg zones. Zn-Pb anomalies trend mainly 070T-090T and 310T-350T. There are 6 anomalous zones on the Zap claims, 4 of these near the north and east boundaries are open. Most of the Zn-Pb zones are coincident

with Hg in humus anomalies. The economic significance of these Pb-Zn-Hg anomalies is not known, however their attitudes and association with air photo lineaments suggest that they could be related to bedrock structures.

It is recommended that all humus samples be analyzed for Ag, Pb and Zn and all "B" horizon samples should be analyzed for Ag, Pb, Zn and Hg. this should give better anomaly definition and help establish the most suitable soil horizon for future surveys. To obtain closure on the anomalies the geochemical soil survey should be extended to the north and east. The depth of overburden is not known, if it is shallow the anomalies could be tested by trenching. However if this does not prove possible then they should be tested by overburden sampling at depth using a drill. Systematic sampling should be done from surface to bedrock, it is particularly important that the basal till atop bedrock is sampled. Most overburden drills are capable of drilling into rock and in each hole a meter of bedrock should be penetrated and sampled.

Respectfully submitted by,

C.F. Gleeson

C.F. Gleeson PhD, P.Eng.

CFG/mg
January 2,1980



APPENDIX D

KENTING EXPLORATION SERVICES LTD.

REPORT ON SEISMIC REFRACTION SURVEY

Keno Hill Area, Yukon Territory

REPORT ON A SEISMIC REFRACTION SURVEY, KENO HILL AREA YUKON TERRITORY

KENTING

REPORT ON A SEISMIC REFRACTION SURVEY, KENO HILL AREA YUKON TERRITORY 1979

for

BEMA INDUSTRIES LIMITED

by

KENTING EXPLORATION SERVICES LIMITED

J.B. Henry, M.Sc., P.Eng., P.Geoph.
Supervisor, Engineering Geophysics

P.D. Phillips, C.E.T., B.Sc.
Junior Geophysicist

KENTING

TABLE OF CONTENTS

1. INTRODUCTION

2. SURVEY OPERATIONS

2.1 Instrumentation
2.2 Survey Procedure
2.3 Production Summary

3. SEISMIC THEORY

3.1 Basic Considerations
3.2 Limitations of the Refraction Method

4. INTERPRETATION OF RESULTS

4.1 Data Quality
4.2 Data Reduction
4.3 Discussion of Data from Line 4
4.4 Interpretation of Line 1
4.4.1 Outcrop Test
4.4.2 Line Segment 18 + 00N - 8 + 10N
4.4.3 Line Segment 7 + 50N to 0 + 50N
4.4.4 Line Segment 0 + 50N = 12 + 00S

5. CONCLUSIONS

REFERENCES

LIST OF TABLES

2.1 Survey Equipment and Array Parameters

LIST OF FIGURES

Figure 2.1 Block Diagram of the Seismic System
Figure 3.1 Schematic of Refracted Waves and Resulting Time-Distance Diagram
Figure 3.2 Summary of Seismic Refraction Limitations
Figure 4.1 Flow Chart for Data Reduction and Interpretation
Figure 4.2 Time-Distance Diagram, Line 4
Figure 4.3 Time-Distance Profile Along Test Line Over Quartzite Outcrop
Figure 4.4 Time-Distance and Subsurface Profiles from Seismic Refraction Data, Seismic Line 1

1. INTRODUCTION

A seismic refraction survey was carried out by personnel of Kenting Exploration Services Limited for Bema Industries over mineral claims at Keno Hill, Yukon Territory. The purpose of the survey was to determine overburden thickness along traverses specified by Bema Industries.

The following sections provide a description of the overall method utilized to collect the field data, its reduction to a useable plot and finally, the interpretation of the compiled data. Further, sections pertaining to field methodology and instrumentation are included.

2. SURVEY OPERATIONS

2.1 Instrumentation

An SIE RS-49 24 channel portable seismic system was used in conjunction with a 32 channel camera to record the data in the field. System firing was controlled by an Input/Output blasting unit. Ancilliary equipment is listed in Table 2.1 along with data pertaining to charge size. A block diagram of the system is shown in Figure 2.1.

2.2 Survey Procedure

The first step in the procedure was to chain the seismic line at 30m intervals of slope distance and to record the chainage ties with existing 50m horizontal chainage. The seismic cable and geophones were then laid out and instruments set up at a convenient location. Once the pattern was shot, the instruments and cable were advanced along the line. The elevation of each geophone station was determined by theodolite.

2.3 Production Summary

The following table displays a breakdown of man days, number of charges used and survey production, during the course of the survey. These figures include time spent by field assistants provided by Bema in support of the operations.

SEISMIC LINE#	MAN DAYS	# OF CHARGES FIRED	PRODUCTION TOTAL
4	31	71	1.8 km
1	35	76	3.0 km

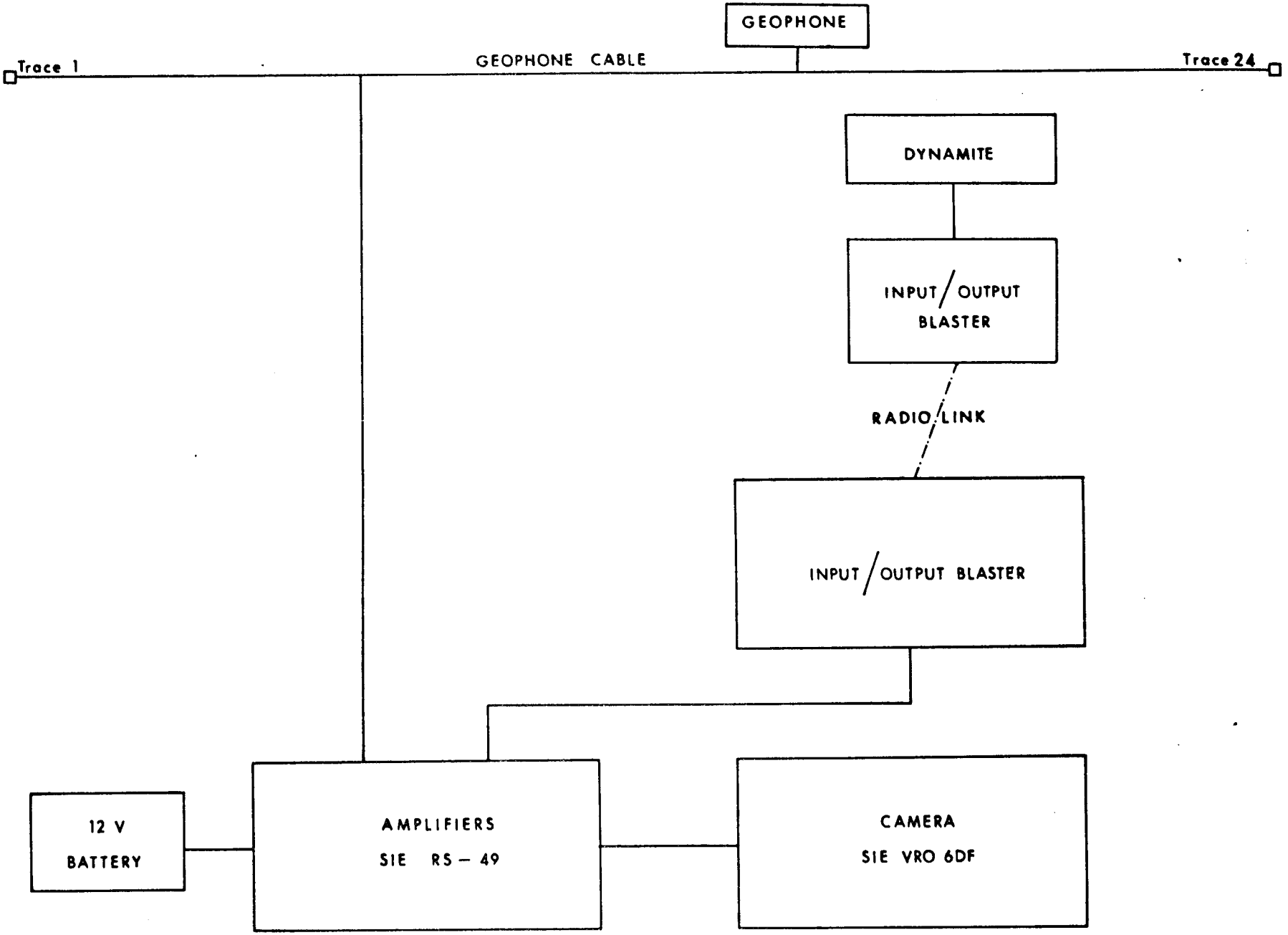


FIGURE: 2.1 BLOCK DIAGRAM OF THE SEISMIC SYSTEM

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TABLE 2.1 SURVEY EQUIPMENT AND ARRAY PARAMETERS

Amplifier	-	SIE Amplifier subsystem with OPA - 9 amplifiers
Camera	-	SIE Model VRO - 6DF
Geophones:		
Frequency	-	30 Hz
String	-	Single geophone
Geophone Interval	-	30m
Source Type:	-	Geofrac 70%
Size	-	1 - 50 kg
Depth	-	Surface
Drill	-	STHIL Model 4309 c/w 1.5m stem

3. SEISMIC THEORY

3.1 Basic Considerations

When a dynamite charge is set off in the ground, energy radiates spherically away from the shot point at the velocity of the ground V_1 as in Figure 3.1. Once the energy wavefront reaches the V_1 - V_2 interface the energy propagates along the interface and refracts the wavefront toward the surface, while at the same time, energy continues to travel downward seeking another interface.

Figure 3.1 presents the wavefront diagram for a single layer dippping bed situation. Wavefronts are numbered T_1, T_2, T_3 etc. to coincide with the position of the wavefront at .1, .2, and .3 seconds after zero time. If geophones were strung out along the line, the energy would impinge upon the geophones in such a way that the time-distance plot would appear as in Figure 3.1. It is the time-distance diagram that forms the basis for data reduction and interpretation.

Another valuable concept is that of the raypath, which by definition, is a line everywhere perpendicular to the wavefront. The advantage of the raypath concept is in the formulation of analytical expressions. For example, Snell's law states that when a ray travels into a medium of higher velocity the ray is bent away from the normal. Mathematically, this is expressed as;

$$\frac{\sin i_1}{\sin i_2} = \frac{V_1}{V_2}$$

For internal refraction, this formula reduces to;

$$\sin i_1 = \frac{V_1}{V_2}$$

$$\text{therefore} \qquad i = \text{Sin}^{-1} \frac{V_1}{V_2}$$

Angle i is shown in Figure 3.1

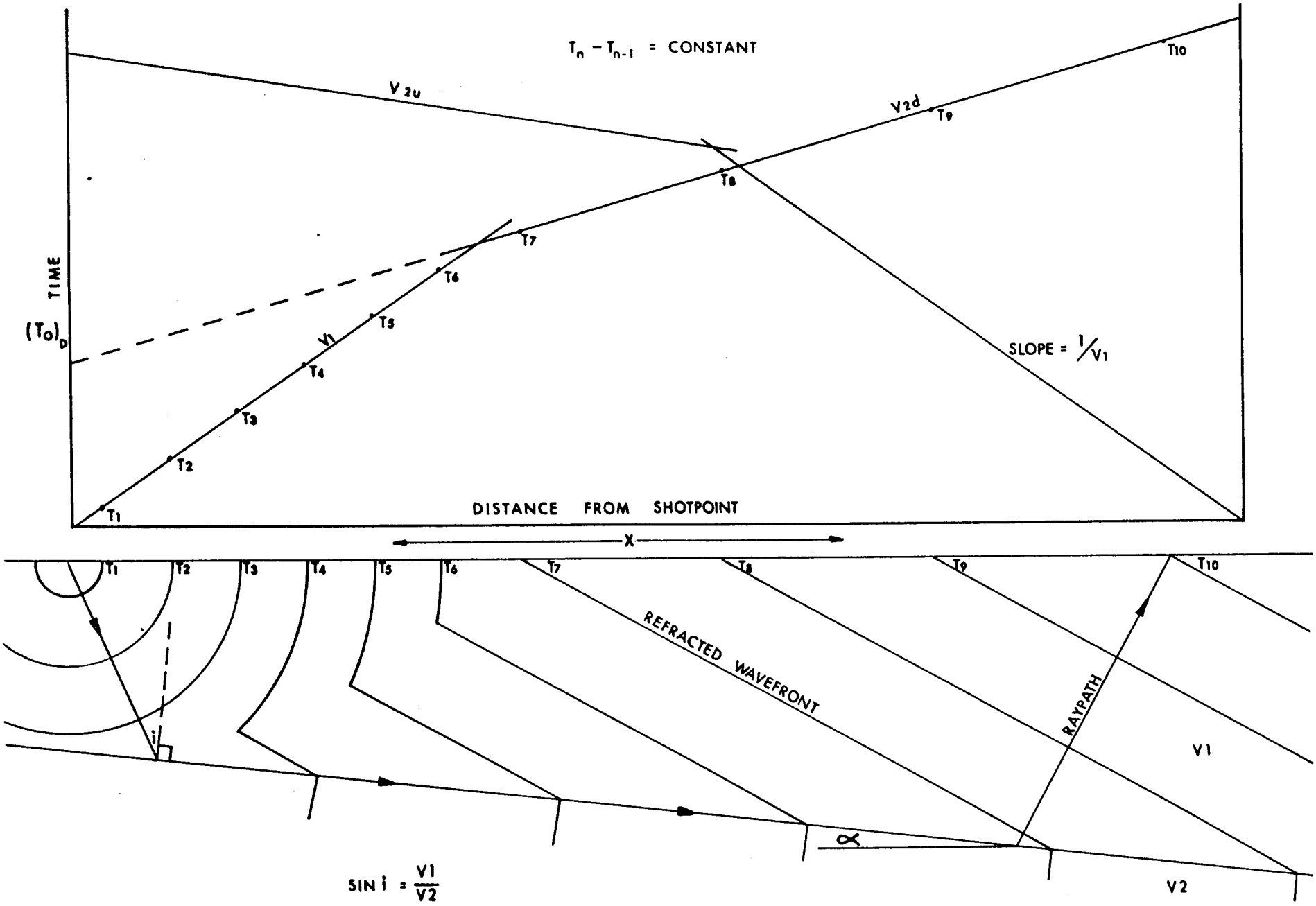

FIGURE: 3.1 Schematic of Refracted Waves & Resulting Time-Distance Diagram

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3.2 Limitations of the Refraction Method

As in any geophysical method, there are constraints inherent in the method and these must be kept in mind when using the seismic refraction technique. The more obvious restrictions are represented in Figure 3.2. The first two situations are characterized by velocity inversions in which a particular horizon has a higher velocity than the underlying material. If the high speed layer occurs at the surface, interpretation difficulties are further aggravated due to the masking of all lower velocity materials. This problem is likely the limiting factor on this prospect.

The third situation involves beds which tend not to generate a distinctive refraction at the surface. All three cases become more likely with increasing thickness of overburden. The third and fourth situations are due to the geometry of the surface and subsurface.

Despite the foregoing difficulties, the seismic refraction can prove a viable technique, especially where drill hole data is available and the field methods have been designed to anticipate and eliminate the various problems.

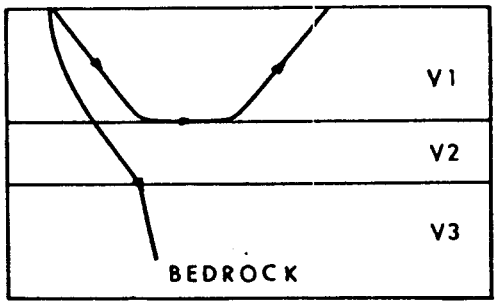
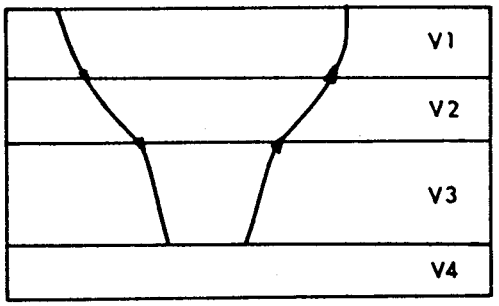
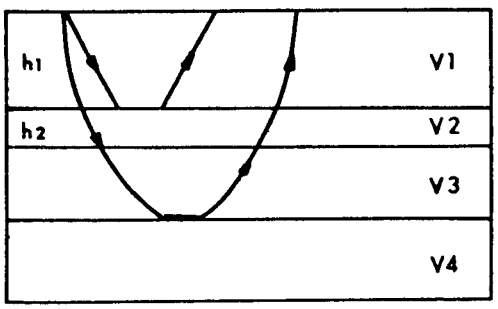
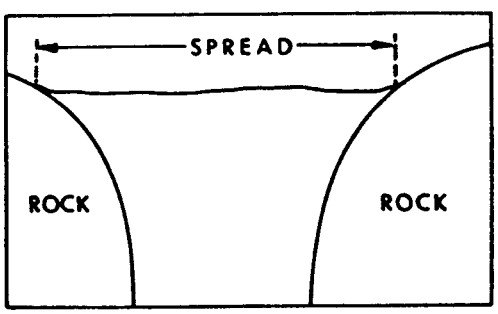
PHENOMENON	GEOMETRY	RESULT
1. HIGH SPEED LAYER VELOCITY INVERSION	 V1 < V2 > V3	1. RAY NOT DIRECTED UPWARDS 2. V2 PICKED AS ROCK AND DEPTH TOO SHALLOW
2. VELOCITY INVERSION	 V1 < V2 > V3 < V4	1. REFRACTOR AT V3 NOT SEEN 2. DEPTH TO V4 TOO GREAT
3. THIN BEDS HIDDEN LAYERS		1. REFRACTOR FROM V2 NOT SEEN 2. DEPTH CALCULATION TOO SHALLOW
4. GEOMETRIC RESTRICTIONS STEEP VALLEYS		1. SPREAD NOT LONG ENOUGH TO PICK UP REFRACTOR

FIGURE: 3.2 · SUMMARY OF SEISMIC REFRACTION LIMITATIONS

4. INTERPRETATION OF RESULTS

4.1 Data Quality

The quality of the refraction data obtained during the course of this survey is considered to be generally poor. Factors which acted to limit data quality include poor energy coupling, resulting from the use of surface charges, and moisture within the geophone cable. Large surface charges were required due to an inability to drill in frozen ground. Frequent rains caused excessive moisture during approximately 60% of the survey. Attempts made to improve data quality included redundant shooting of 75% of the spreads in order to obtain reproducible data.

4.2 Data Reduction

A flow chart for data reduction and interpretation is shown in Figure 4.1. The field records were hand picked for first breaks and a time-distance plot compiled. Representative time -distance data were transmitted via telephone to supervisory personnel in Calgary, so that immediate computer modeling could be provided.

The various method of interpretation available included the rigorous mathematical model of multi-layer dipping beds by Mota (1954), the "Plus-Minus" method of Hagedoorn (1959) and the wavefront techniques of Thornburgh (1930).

Seismic refraction studies performed by the Geologic Survey of Canada (Judge, 1976; Carson 1975) over permafrost have shown that ice velocity is extremely variable. Where the frozen material is composed of sand sized fractions, velocities are found to be in the range 1.8 - 2.4 m/mse. Higher velocities of 3.4 - 4.6 m/msec are noted for ice rich gravels and coarse sand (Carson, 1975). The attenuation of a signal over short

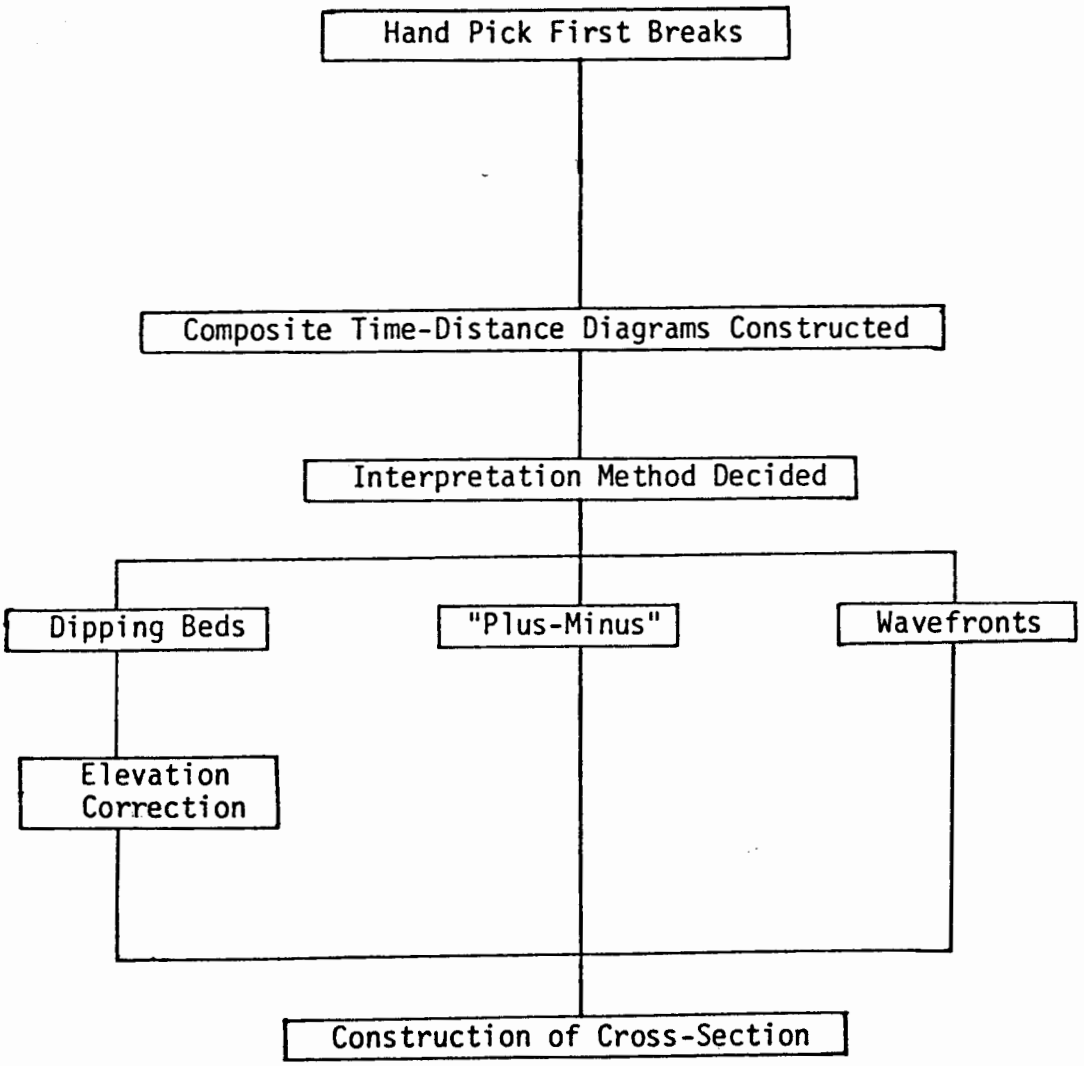


Figure 4.1 Flow Chart for Data Reduction and Interpretation

4.2 Data Reduction Cont'd.

distances for the shot point has been evidenced in the MacKenzie Bay area where the response tends to zero over 120m, or 1/6 of the toal spread length (Judge 1976).

4.3 Discussion of Data from Line 4

The time-distance for line 4 is given in Figure 4.2. The data is interpreted to represent surface energy and not refracted energy. A velocity inversion such as that displayed in phenomenon 1 Figure 3.2 is considered to be responsible for this situation. This inversion could be the result of the melting of overburden immediately below the frozen surficial material by groundwater or due to a velocity occuring within the bedrock which was lower than the frozen surficial material, or a combination of these circumstances.

4.4 Interpretation of Line 1

4.4.1 Outcrop Test

It was decided to move to line 1 due to the proximity of a quartzite outcrop. Outcrop represents a preferred starting point for a survey because it represents a known bedrock depth. Several shots were taken on the outcrop with the geophones strung adjacent to but not on the outcrop and the results presented in Figure 4.3.

If the lower velocities are considered to represent a weathered zone and the higher velocities fresh rock, then the fresh rock velocity would be 8.84 m/msec. (This was determined by averaging the 3.1 and 2.0 m/msec velocities and determining true velocity from the apparent bedrock velocities of 7.0 and 12.1 m/msec). The velocity appears to be rather high for quartzite but still a possible representative velocity.

4.4.2 Line Segment 18 + 00N - 8 + 10N

No bedrock refractor is interpreted as being in evidence throughout this segment. A velocity inversion similar to that encountered along Seismic Line 4 is ascribed to this portion of the line. Surficial velocities are displayed on Figure 4.4 and range from 4.4m/msec over the portion 18 + 00N through 10 + 50N to 3.1m/msec over the portion 10 + 50N through 8 + 10N.

4.4.3 Line Segment 7 + 50N to 0 + 50N

A refractor occurs over this portion of the line which exhibits an interpreted velocity of 6.2 m/msec. Its significance is underlined by the fact that it may represent a lower quartzite or a granitic material. The appearance of this refractor as a first arrival on the seismic record is considered to be the result of an attenuation of the signal within a thin zone of surface permafrost over a distance of some 400m from the shot point at 0 + 50N. In order to determine a depth to the surface of this medium a velocity of 1.4 m/msec, displayed at the front end of the shot at 7 + 50N, is attributed to the material lying underneath the permafrost and above the refractor from 7 + 50N to 0 + 50N. Projected velocities are plotted in Figure 4.2. First breaks on the refractor are displayed on the record from shot point 0 + 50N have been shifted peak to through on the waveform in order to allow agreement in forward/ reverse travel times. An additional projection of 1.4 m/msec has been made for the shot at 2 + 10N, which displays an apparent refractor velocity of 5.2 m/msec. An interpretation based upon this velocity display a true refractor of velocity 5.9 m/msec lying at a depth of 108m vertically under station 2 + 108m.

4.4.4 Line Segment 0 + 50N - 12 + 00S

The three velocities along this portion of the line display evidence of lateral velocity changes from a mean of 4.7 m/msec through 3.5 m/msec. These velocities are interpreted as direct arrivals and a velocity inversion is considered to mask the presence of bedrock along this portion of the line.

5. CONCLUSIONS

For the Keno Hill area, it appears that the refraction method is of little use for defining bedrock depths. The reason for this is the presence of frozen surficial material of higher velocity than the underlying rock. Although the test over the quartzite outcrop indicated a velocity higher than permafrost, it must be remembered that a weathered bedrock zone was also encountered. The weathered zone would produce a velocity inversion and delay the onset of the refracted event beyond the length of the geophone spread.

REFERENCES

Carson, J.M. et al (1975) — Marine Seismic Refraction Profiling Kay Point, Yukon Territory Geo. Sur. Canada Paper 75-1 Part B

Judge, A.S. et al (1976) — Anomalous Shallow Seismic Velocities in MacKenzie B, Northwest Territories Geo. Sur. Canada Paper, 76-1A

Hagedoorn, L.G. (1959) — The Plus-Minus Method of Interpreting Seismic Refraction Sections. Geophysical Prospecting, Vol. 7 O. 158

Mota, L. (1954) — Determination of Depths and Dips of Geologic Dipping Layers in Seismic Refraction. Geophysics, Vol. 19 p. 242

Redpath, B.B. (1973) — SEismic Refraction Exploration for Engineering Site Investigations. U.S. Dept. Comm. NTIS #AD - 768 - 710.

Telford, W.M. et al (1976) — Applied Geophysics. Cambridge University Press.

Thornburgh, H.R. (1930) — Wavefront Diagrams in Seismic Interpretation. Bull, A.A.P.G. Vol. 14, O. 185.

APPENDIX E

B. CHANDRA's GEOPHYSICAL (SEISMIC REFRACTION) REPORT

Report on the evaluation and the interpretation of the Seismic Refraction Survey, Keno Hill Area:

(1) The test line profile close to the outcrop (fig. 4.3) suggests that the bedrock is likely to be very shallow in this area. This assumption is supported by the following facts:

a) The outcrop along the test line is only approximately 60 meters away from LINE 1. Unless a fault is suspected, the bedrock is likely to be shallow close to the seismic LINE 1 (of the order of 10 to 20 meters).

b) At 113 meters location on fig. 4.3, the intercept time is approximately 4 msec. Since no shot time mark has been recorded on any of the records (plotted times are with respect to the time of arrivals at first geophone), this intercept time is likely to be in error by 1 or 2 msec. A 6 msec. of intercept time in a 2.5 km/sec of overburden gives bedrock depth of the order of 7.5 meters. The position of the geophone at 113 meter location on the test line appears to be only 10 to 20 meters away from the SEISMIC LINE 1. Therefore, it seems reasonable to assume that the bedrock dephs are of the order of 10 to 15 meters.

We feel that for that order of bedrock depths, the 30 meter spacing as used by Kenting personnel is far too large. In a normal situation, even the first geophone 30 meters away from the shot is not likely to get a direct wave through the top layer as a first arrival. If such a large spacing is used, it is normal procedure to run additional velocity spreads with 2 to 5 meters spacing. Unfortunately, this has not been done for this survey. We believe that the velocities shown on fig. 4.4 correspond to bedrock velocities.

(2) We have found that only 4 records out of 52 submitted to us have shot time break on the traces. Without the shot time break, it is not possible to get depths to the bedrock. Kenting personnel have plotted the arrival times with respect to the arrival at the first geophone. Thus in most cases, the first

first plotted point is 30 meters + the distance of the shot from the first geophone. We think that this is the main reason why lower velocities corresponding to the top layer have not been obtained in this survey. Since a knowledge of the shot time is required for the depth calculations, we think that this part of the equipment was not functional.

In the absence of a precise shot time, the refraction data are only of limited use. No depth calculations can be done but velocity information can be of use. However, from this survey, we donot even get velocity information of the top layer because the geophone separation was too large.

(3) We have tried to re-pick some of the records. We find that the quality of the records is extremely poor because

a) cross-talk problems

b) On most records after the first few geophones, the first arrivals are very doubtful. We are not convinced that they represent first refracted enegy. Obviously there were serious problems with energy penetration.

c) the first arrivals are up on some traces and down on others.

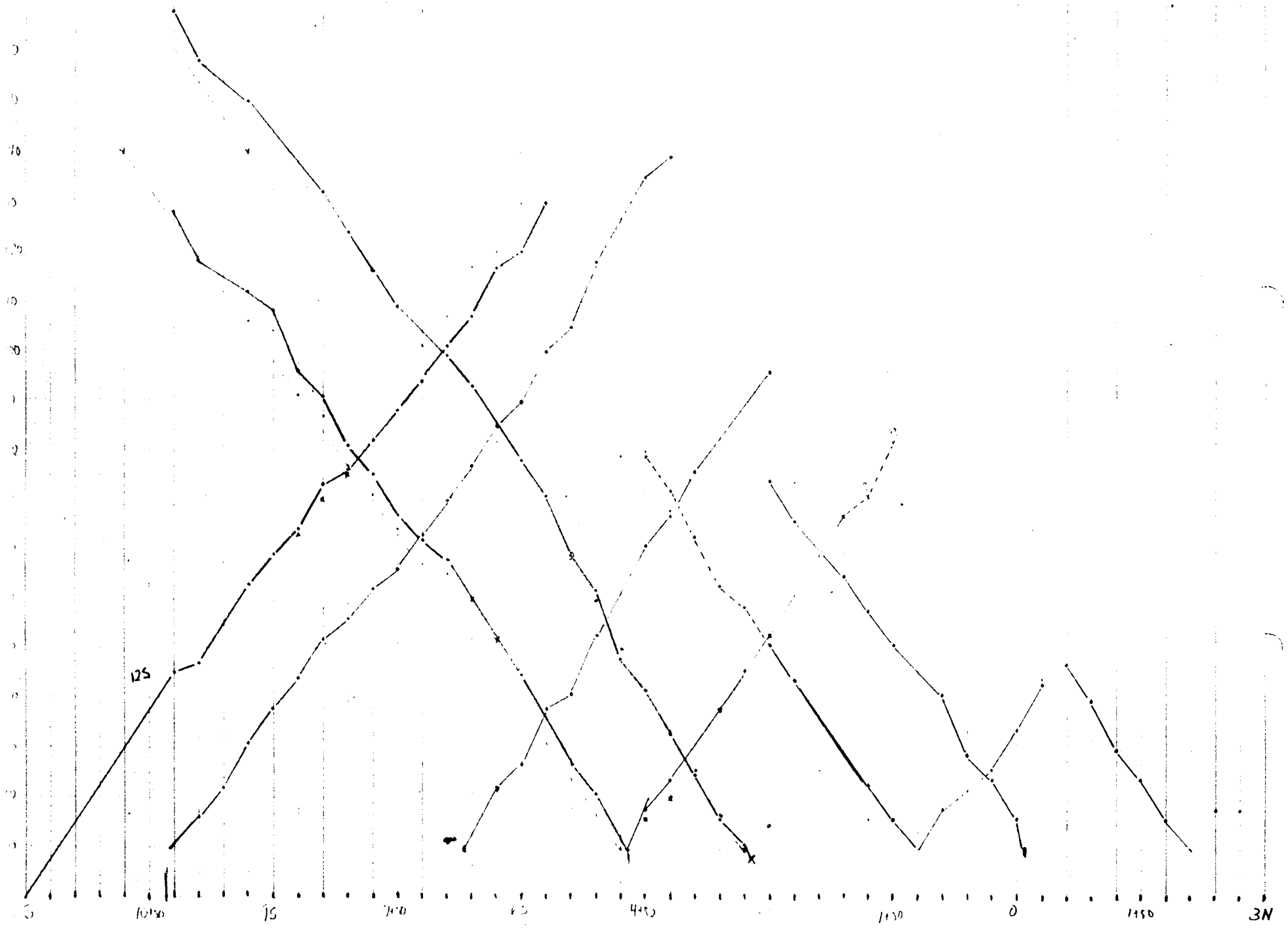
(4) No field records corresponding to fig. 4.2 were supplied to us and therefore, we cannot comment on the quality of the data on this line.

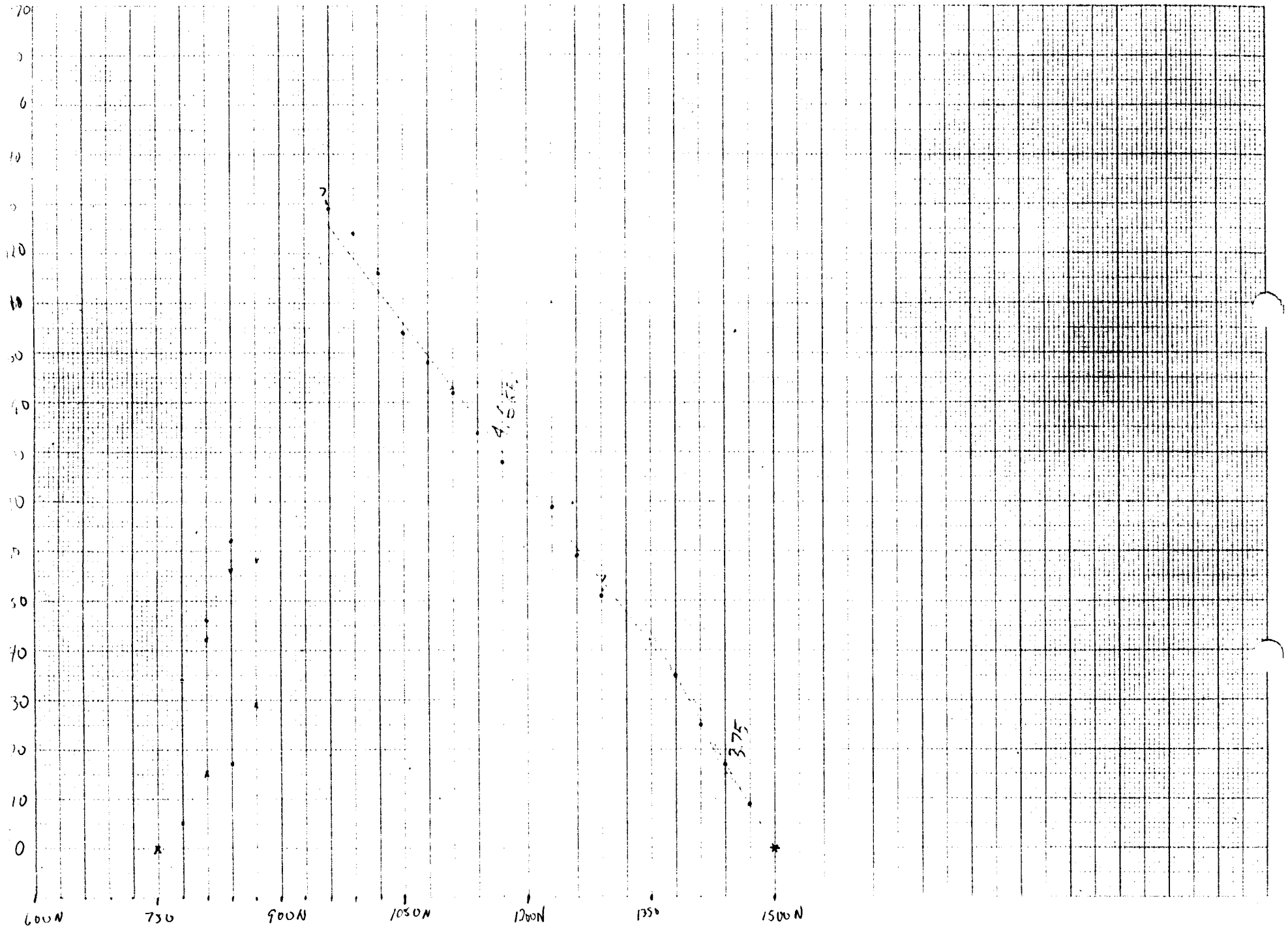
(5) From this report it is not clear if corrections for the change in elevations along the line were done. These are normally required for such surveys.

B. Chandra
Ph. D.

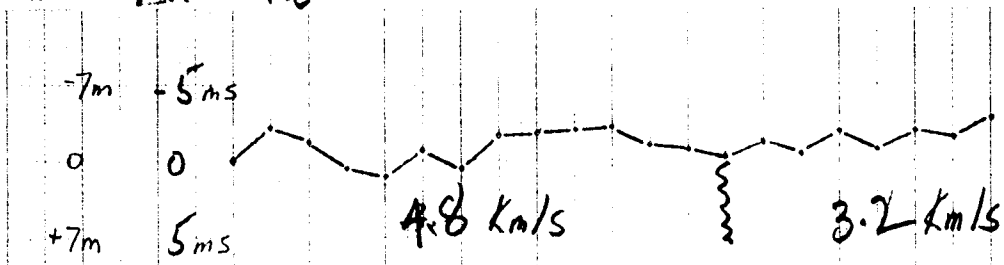
F. Maxwell
M.Sc.

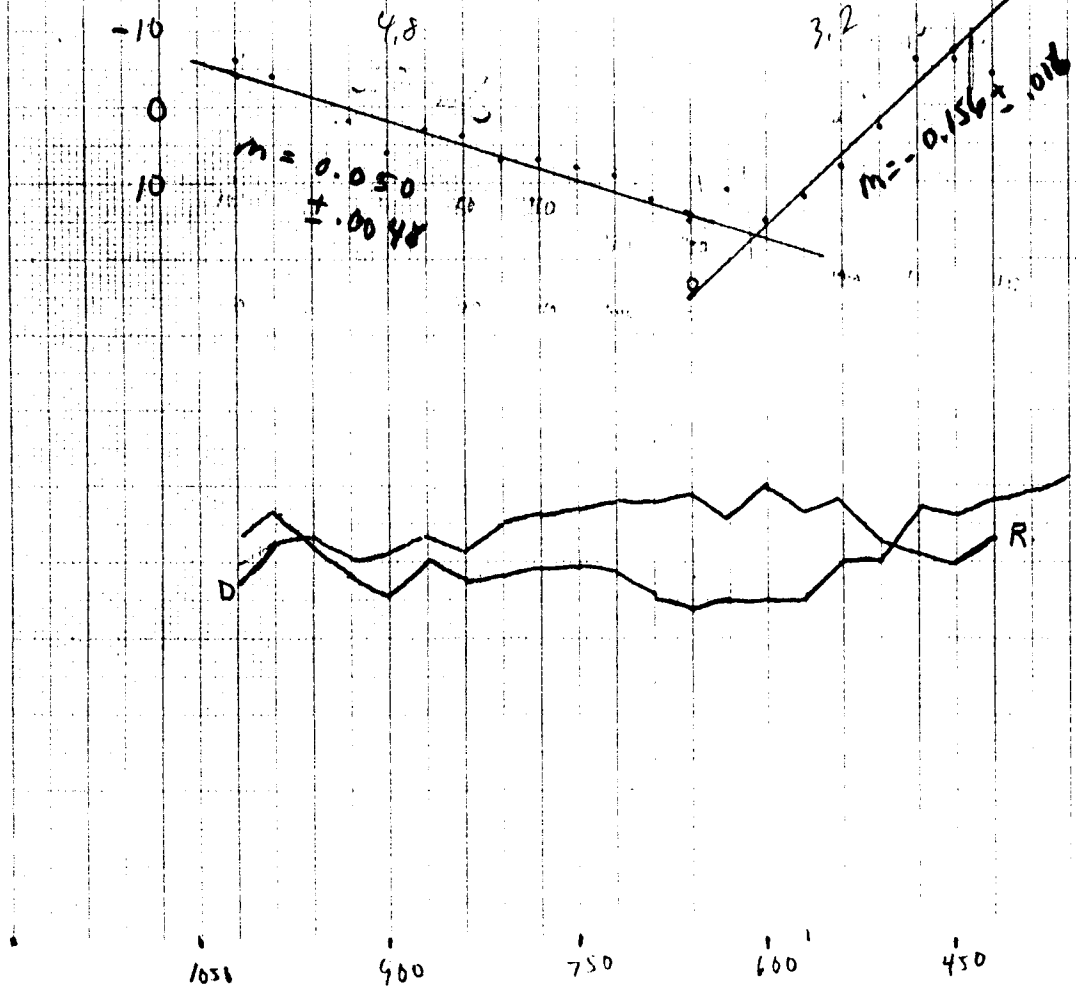
B. CHANDRA & ASSOC. LTD.
940 East 10th, Vancouver, B.C.

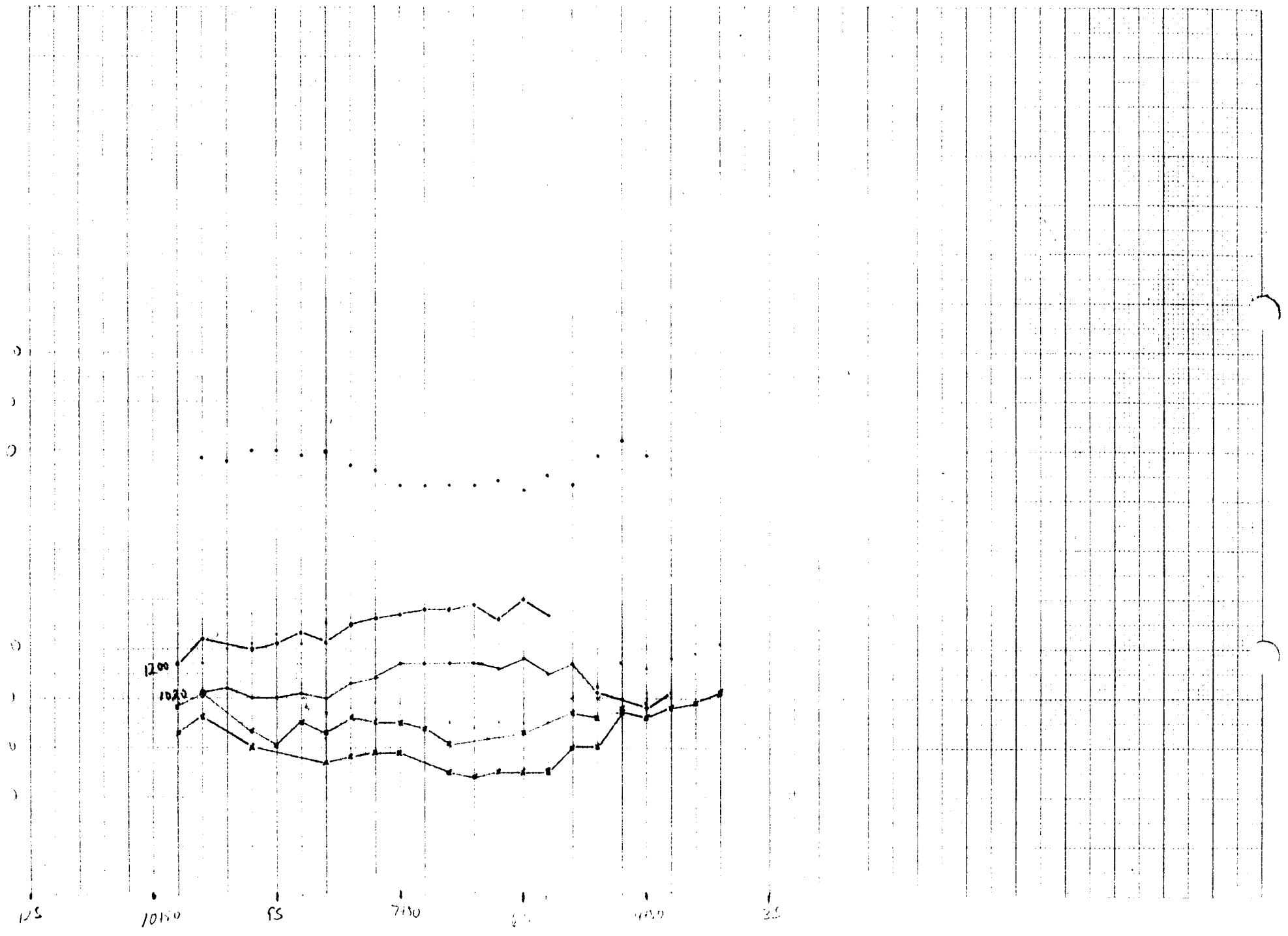

125
0
3N


600N
750
900N
1050N
1200N
1350
1500N
3.75

$$\frac{2}{V_m} = \frac{\Delta T}{\Delta X} + \frac{2}{V_a}$$






1200
1020

$\Sigma x^2 = 285$

$\Sigma Y = 2$

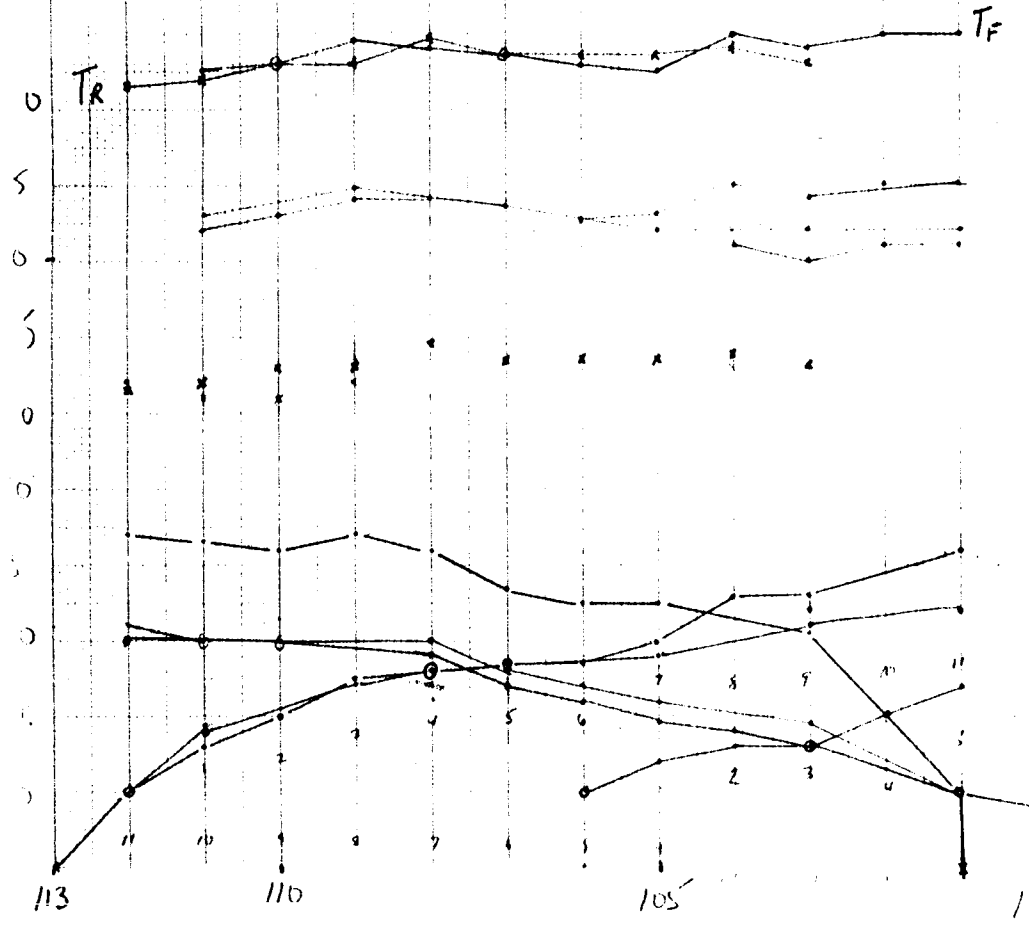
$\Sigma XY = 10$

$n = 9$

4 msec

10 meters approx

Velocity = 5 Km/s.



Quartzite Outcrop

CHANDRA AND ASSOCIATES LTD
ENGINEERING AND MINING GEOPHYSICS
940 East 10th Ave., Vancouver, B.C. V5T 2B2
Tel.: 879-1676

Mr. Terence M. Elliot
Bema Industries Ltd.
5780-203rd Street
Langley, B.C.
V3A - 1W3

Re: Seismic refraction survey, Keno Hill Area.

Dear Terry,

In accordance with your instructions, I submit the following observations and comments regarding the above report;

(1) In the fig. 4.3, the V_2 velocities of the reversed profile are shown to be 4.7 & 7.0 m/msec from left and 12.1 & 12.9m/msec for shots from right. Such drastic changes are not possible. The total times for forward and reversed profiles are in error by 20% or more. This suggests that either the field data or the data points are of poor quality.

(2) The average velocity of 8.84m/msec for quartzite is too high. The velocity is known to be within 4 to 6m/msec range, with higher value at some depth where the pressure effects become important. The frozen ground does not has any effect on bedrock velocity since ice has a velocity of about 3.6m/msec. The presence of ice increases velocities in loose surface soils and gravel, weathered and porous rocks etc.

(3) In the figure 4.4, the changes of the order of 100 to 150 msec represent velocity inversion as concluded by the report. One way to get around the inversion problem is to bury shots in the low velocity layer.

Between 12+00S and 0+00, the velocities between 4.4 and 5.6 m/msec have been encountered. These are too high for frozen surface material and normally be considered bedrock velocities. The interpretation due to the scatter of the data points is greatly influenced by how the average lines are drawn. If they are bedrock velocities then the bedrock is fairly shallow here. We suggest that you should obtain original field recods from Kenting Ltd. so that time picked can be checked before any detailed re-interpretation.

(4) I am enclosing a table showing seismic velocities in different

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Tel.: 874-9544

rock types. In soil, the velocity is generally in the range 2.0 to 3.5 m/msec when frozen. The velocity of the bedrock is not likely to change by frozen ground.

If you have any questions or you would like me to do any more work on it, please contact me.

Yours truly

B. Chandra

APPENDIX F

G.E. WHITE's GEOPHYSICAL (ELECTROMAGNETIC) REPORT

Glen E. White **GEOPHYSICAL CONSULTING & SERVICES LTD.**

9251 Beckwith Road, Richmond, British Columbia, V6X 1V7 Telephone: (604) 273-6962

January 3, 1980

Mr. Stan Bartlett, B.Sc.
Bema Industries Ltd.
5780 - 203rd. St.
Langley, B. C. V3A 1W3

MAX-MIN 2 E.M.
SURVEY
1979 Keno Hill Y.T.

The strongest and most horizontal loop Max-Min 2 responses were obtained over the area of Plate 1. Thus, this report refers to Plate 1. The uncorrected background response for this survey shows subtle changes which have been designated Resistive and Conductive. These resistive and conductive variations in response form an east-west trending zone which crosses Plate 1. Within this zone occur a number of strong electromagnetic responses. The strongest of these has been designated A-A'. A strong response is obtained from this conductor in both the high and low frequencies. In this area the low frequency response exceeds the high frequency response. The area is likely covered by conductive overburden. Calculations indicate a conductivity-thickness product of some 4000 mhos and a depth of 30 m. However, the quadrature responses for this survey are very low, likely indicating a low response meter on the receiver. This particular anomaly appears to lie along the flank of a small magnetic high obtained from an airborne magnetometer survey. This target may also contain massive sulphide mineralization as well as being a concentrated graphite conductor.

This conductor is particularly interesting in that it shows some definite offsetting around lines 9 + 725E and 9 + 812E. This offset pattern is mimicked on a much weaker scale on line 10 + 845E to 11 + 100E. It would also account for the apparent conductor shifts west of line 9 + 745E. A number of NW-SE fault zones have been drawn as inferred from the data.

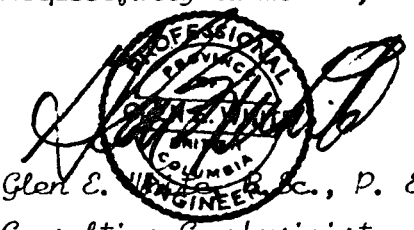
Glen E. White **GEOPHYSICAL CONSULTING & SERVICES LTD.**

9251 Beckwith Road, Richmond, British Columbia, V6X 1V7 Telephone: (604) 273-6962

January 3, 1980

In summary then, this survey was conducted with the purpose of assisting the geological interpretation by detecting graphite-bearing horizons. The survey would appear to have accomplished this purpose in that it has indirectly detected a number of fault zones and clearly shows a wide zone of electromagnetic conductors trending east-west across the survey area. A poorly controlled airborne magnetometer survey shows a number of magnetic low linears and a small ma gnetic high which appear to show an interesting correlation with the Max-Min 2 data. Thus, it is recommended that preliminary to any diamond drilling, a ground magnetometer survey utilizing a base recorder be conducted to assist in the geological interpretation and electromagnetometer conductor evaluation.

Respectfully submitted,



Glen E. White, B.Sc., P. Eng.
Consulting Geophysicist

APPENDIX G

WESTERN ZAP ROCK ASSAYS

APPENDIX G

WESTERN ZAP ROCK ASSAYS

SAMPLE NO.	SAMPLE DESCRIPTION	% Pb	% Zn	oz/ton Ag	oz/ton Au
8834	R.Hollway's lease at the Airport. 3mx1½m area of rhyolite bxa. with minor galena and sphalerite mineralization	3.25	4.15	2.89	0.010
8843	Massive pyrite-sphalerite from 2-15 cm.wide vein splay off Gerlitzki vein	0.04	41.00	6.94	0.020
8952	Gerlitzki vein sample	67.6		495.00	
8846	Pyrrhotite-bearing skarn from northerly-trending trench north of Elsa airport. W=0.02%				0.005
8847	Banded galena and sphalerite in skarnified quartzite and schist north of road west of Elsa airport.	4.00	8.70	5.11	0.005
8848	17cm.wide vein fault containing massive galena from trench in quartz porphyry north of road west of Elsa airport.	73.50	0.24	8.04	0.100

4.1.0 INTRODUCTION

4.1.1 Scope of Report

This is a preliminary geological report of work carried out in August and September of 1979. The work included geological mapping and stream sediment geochemistry. Much of the North and Eastern ZAP is covered by deep overburden and geological mapping on these claims was not possible. In an attempt to determine the geology underlying the claim group, geological mapping to the north of the claims was conducted.

4.1.2 Location and Access

The ZAP claim group is located in the McQuesten Valley, north of Elsa. The Northern ZAP is considered to be the area north of the South McQuesten River and the Eastern ZAP is the area east of the Elsa water reservoir. The area mapped lies on the northern slope of the McQuesten Valley and the area between Hanson and Ladue Lakes.

The main Mayo-Keno road passes on the north side of the valley and the South McQuesten River posing a distinct problem for access to the Northern ZAP. Access to the slopes north of the Western ZAP was obtained by truck, boat and helicopter. The Shanghai Mine Road is located five (5) kilometers north of the Keno-Mayo Road on the South McQuesten Road. The bridge crossing the South McQuesten River was in a state of disrepair and has recently been dismantled by the Yukon Department of Highways.

The South McQuesten River may be crossed by boat at the Elsa reservoir and on an old mine road four (4) kilometers north of the Mayo-Keno Road on the Hanson Lake Road.

The Hanson Lake Road passes along the base of the hill east of Hanson Lake. Hanson Lake may be crossed by boat or helicopter.

4.1.3 Terrain

The ZAP claim group lies between 600 and 1000 meters elevation with the majority lying below the 750 meter contour. The area geologically mapped lies between 650 and 1000 meters elevation. The majority of the ZAP claims are within the flat lying McQuesten Valley and are covered with deep glacial till overburden. The valley is sparsely forested by spruce and hemlock trees with swamps and small kettle lakes throughout. The major bodies of water are Hanson and Proctor Lakes.

North of the valley the terrain slopes south and southeast and grades average 10 to 20 percent. The grade decreases in the northeast ZAP to less than 5 percent. The slope is tree covered and an old burn area is located in the east-central ZAP.

Many small creeks drain into the South McQuesten River which meanders westerly. Drainage of the flat lying McQuesten Valley is poor.

4.1.4 History

No evidence of previous exploration occurs in the flat lying McQuesten Valley but on the slopes to the north trenching and drilling has been carried out.

An old shaft and hand winch in the northeast ZAP was located at the approximate contact of the Hanson Lake Intrusion and Lower Schist. Wooden buckets were used for hoisting and the operation appears to have been abandoned for at least 40 years.

Peso Silver, now Cima Mines, carried out an underground exploration program in the 1960's on what was known as the Shanghai Mine. Two adits and a shaft as well as a small mining settlement were located on Cima's RUEBEN claims. The size of the waste dump at the lower adit indicates the mine was of considerable size but the portal has caved. A considerable amount of trenching has been done higher in elevation from the adits. Several trenches are also located on the slope north of the central ZAP near UR Creek.

In December of 1950 sixteen (16) claims, CROWN 1-8 and ANKER 1-8 were staked to cover the quartzites east of a north-east striking lineament in the UR Creek area (A.E. Aho, 1961). In 1960 Aaro E. Aho and Cecil D. Poli prospected several air photo lineaments and staked 8 claims in August on the most prominent lineament. Several trenches were dug and in late September vein material was found. In 1961 Aho and Poli staked an additional 40 claims to cover the remainder of the Central Quartzite and sank several prospect pits on the main lineament. Minor fragments of anglesite and galena panned from ore trenches assayed 217 ounces per ton silver.

In the spring of 1962 R.E.G. Davis, R. Oddy and A.E. Aho prospected the area of Argent Creek where 250 ounce float had been reported (A. Aho, 1963). In October of 1962, 8 ARGENT claims were staked and geologically mapped by Dirk Tempelman-Kluit later in 1963.

Drilling appears to have been done recently on a breccia zone near UR Creek within the last 5 years. As the ground is held by United Keno Hill Mines, (the CH claims), it is surmised that they carried out the exploration work. It is worth noting that their exploration effort was confined to the Upper Schist on the high ground above the valley.

4.1.5 Claim Status

The northern and eastern ZAP claims consist of 481 ZAP units. The claims are owned by Canada Tungsten Mining Corporation Ltd. and lie east of the Elsa water reservoir. A list of the claims and the grant numbers is shown on TABLE 1. All claims expire on March 2, 1980.

4.2.0 GEOLOGY

4.2.1 General Geology

The area mapped in detail lies north of the South McQuesten River and continues north to the ridge top above the McQuesten River Valley. (FIGURE 4-1). It extends from Argent Creek in the west, east to Ladue Lake. Minor mapping has been conducted in the Skate Creek area which lies east of the Hanson Lake Intrusion and south of Lynx Creek.

In the McQuesten Valley overburden is thich and little outcrop is exposed. On the slope north of the valley, outcrops are scattered but are locally abundant. The three main stratigraphic units recognized in the Keno Hill-Galena Hill area are present as well as several intrusive phases. The purpose of mapping in this area was to obtain data from which inferences about the bedrock geology of the McQuesten Valley could be made.

Stratigraphy in the area appears to be doubly folded into two broad anticlines which intersect at an oblique angle. The oldest of these structures appears to be the Mayo Lake Anticline. The hinge zone of this structure trends north west from Mayo Lake, passes through the Hanson Lakes area, north of Skate

Creek on the ridge north of the valley, and terminates south of Lynx Dome. The effect of this deformation was to expose a conformable section of Lower Schist, Central Quartzite and Upper Schist in which younger units lie to the south west.

The younger period of deformation has produced the McQuesten River Anticline. This structure plunges down the valley toward the southwest and appears to overprint some of the effects of the Mayo Lake Anticline. From the hinge zone in the McQuesten Valley Lower Schist is apparently overlain by Central Quartzite and Upper Schist. However, due to deep overburden in the valley, only Upper Schist and minor Central Quartzite is exposed south of the Hanson Lakes.

West of the Hanson Lakes, in the core of the Mayo Lake Anticline, the Hanson Lake Intrusion crops out. On the north slope of the valley this unit is observed to intrude the Lower Schist. The outline of the pluton and host rocks can be inferred with confidence to the ridge top north of the valley. At this point structures appear to terminate at a strong topographical break. North-west of this break only minor mapping of limited outcrop has been conducted. Between Lynx Creek and the topographical discontinuity another intrusion occurs. This intrusion, named the HIT Intrusion, crops out as an elongated quartz monzonite stock and appears to penetrate Central Quartzite. The details of the relationship between these two plutons are not well understood.

On the north slope of the McQuesten Valley, north-east of the Hanson Lake Intrusion and south between the intrusion and Hex Creek, Lower Schist crops out. These exposures trend north west and are interpreted to lie within the hinge zone of the Mayo Lake Anticline. East of Ladue Lake, in the middle of the valley outcrops of Lower Schist are the only exposure of this unit in the hinge of the McQuesten River Anticline.

Between Hex Creek and Poli Creek northwest trending Central Quartzite is exposed in scattered outcrops and trenches. To the southwest, immediately north of the ZAP claim boundary, Central Quartzite swings to strike northeast. Mapping near UR Creek and the area adjacent to the west has defined the relationship between the Central Quartzite and Upper Schist. Where observed in outcrop and in trenches the contact between these units is gradational and conformable. It was difficult at times during mapping to recognize the contact. The

contact was therefore defined to occur where the first quartz-sericite schist of the Upper Schist was observed.

Near UR Creek only a few exposures of Central Quartzite were observed. These exposures suggest that the Central Quartzite swings from its northwest-southeast trend between Hex and Poli Creeks and projects out into the valley to trend northeast-southwest. If this interpretation is correct a considerable amount of quartzite is present in the valley below the drift cover.

West from UR Creek to Argent Creek only Upper Schist is exposed. The rocks here are considered to be on the north limb of the McQuesten River Anticline. Schists, phyllites and quartzites, cut by greenstone and acid sills and dykes, strike generally east-west and dip to the north. The Upper Schist has been mapped to the top of the ridge between the McQuesten Valley and Lynx Creek and occurs south of Skate Creek. On the ridge the structure of the unit is unresolved due to extensive drift cover. It is important to note that two significant occurrences of Ag-Pb-Zn occur in the Upper Schist. The most important occurrence is that of the Shanghai Mine on the RUEBEN claims. The second occurrence is the Ag-Pb-Zn showing at the Skate Creek prospect.

4.2.2 Lower Schist

Exposure of the Lower Schist Unit is poor due to its low resistance to erosion. Outcrops of Lower Schist occur east of Hex Creek and on the hill between Hanson and Ladue Lakes. East of Hex Creek the exposures Lower Schist generally occur where greenstone bodies within the schist have acted as resistant caps to erosion. The Lower Schist consists of phyllitic quartzite and siltstone, slaty phyllite, phyllite and schist.

Quartzite east of Hex Creek is brown-green, thin bedded, foliated phyllitic and is composed of sericite, chlorite and quartz. Dark grey, graphitic, phyllitic, thin bedded, foliated siltstone occurs interbedded with green-grey, slaty phyllite. The phyllitic siltstone is composed of quartz and graphite while the slaty phyllite is composed of sericite and quartz. Individual grains in the slaty phyllite are not visible. Yellow green quartz-sericite schist and phyllite and chlorite-sericite-quartz schist, which is a darker shade of

green, phyllite, which in places exhibits chevron folds, occurs east of Hanson Lake.

4.2.3 Central Quartzite Formation

Outcrops of Central Quartzite Formation are not abundant on the north side of the McQuesten Valley but angular float and felsenmeer occur throughout the area where this formation has been mapped. The largest outcrops of Central Quartzite occur on Hex Creek, approximately 500 meters up stream from the South McQuesten River.

At this location, medium grey, thick-bedded quartzite with two thin interbeds of graphitic schist and thin rusty, limey interbeds 3 centimeters in thickness, exhibit gentle small-scale folding with wavelengths of a few meters. Further upstream these rocks are overlain by about 8 meters of medium grey thick bedded quartzite that has a very uniform strike and dip.

Medium and light grey, massive quartzite that often has 1 centimeter bands of pure white quartzite parallel to bedding occurs as angular float in a series of trenches between Hex and Poli Creeks. These bands also occur in an outcrop of massive quartzite east of UR Creek. Medium grey, thick bedded massive quartzite crops out at the north end of the longest trench between Hex and Poli Creeks.

4.2.4 Upper Schist

The Upper Schist is exposed north of the entire western ZAP claims and consists of a series of interbedded quartzites, schists and minor limestone. Within this unit thick beds of quartzite occur that are similar in appearance to the Central Quartzite Formation.

Directly overlying the Central Quartzite Formation east of UR Creek, the Upper Schist consists of interbedded light, silver-green, quartz-sericite schist and black graphitic schist. Green quartz-sericite schist above the Central Quartzite has been used as a marker horizon for the base of the Upper Schist Formation. Above the interbedded graphitic and quartz-sericite schist, Central-type quartzite with quartz bands occur but is considered to be part of the Upper Schist. On

the north side of the north-east trending fault that crosses UR Creek, interbedded graphitic and quartz-sericite schist and quartzite are overlain by about 60 meters of gritty rocks. Near the base of this gritty member a medium-grey, quartz-graphite phyllite has up to 5 percent equant quartz 'eyes' that range from 0.5 to 4 millimeters in size. The quartz 'eyes' are white to light blue and occasionally blue to black in colour. The gritty phyllite occurs interbedded with quartzite. Near the top of this unit, gritty quartzite occurs interbedded with a silver sericite-quartzite phyllite. Further north and up section the lithology is predominated by quartz-sericite schist and phyllite.

A thick sequence of interbedded quartz-sericite schist and quartzite with minor limestone occurs on the SHANGHAI and RUEBEN claims. A.E. Aho (1961) suggests that the rocks on these claims lie 600 to 900 meters stratigraphically higher than the Upper Schist rocks just west of Hex Creek. Outcrops of quartzite are rather abundant in this area and consist of dark and medium grey quartzite with 1 centimeter quartz bands, dark grey, massive quartzite and minor light grey quartzite. A member of banded quartzite near the upper adit on the RUEBEN claim group appears to be approximately 75 meters in thickness. A dark grey, massive quartzite and banded quartzite unit with thin interbeds of graphitic schist crops out 600 meters northeast of the upper adit. This member is about 60 to 80 meters up section and appears to be 50 meters thick. A.E. Aho (1961) states that in this area three or more quartzite members 60 to 120 meters thick are separated by 60 to 120 meters of schists. In addition there are many thinner beds of quartzite interbedded within the schist that separate the thicker quartzite members.

West of Shanghai Creek interbedded graphitic and quartz-sericite schists and thin bedded phyllitic quartzites are overlain by gritty rocks similar to those near UR Creek. These rocks are considered to be near the bottom of the Upper Schist section.

Quartz-graphite schist with 2 millimeter quartz 'eyes' overlain by a thick bed of light green, slaty, quartz-sericite phyllite occurs 1.5 kilometers to the north of the RUEBEN claims. This gritty graphitic schist is similar in hand specimen to the gritty graphitic phyllite which occurs at UR Creek. This gritty phyllite may be the same sequence as found at UR Creek and is structurally repeated or may be a separate sequence higher in the section.

4.2.5 Greenstone

Greenstone occurs throughout the map area and outcrop exposure is good due to its resistance to erosion. Greenstone is the most competent rock type in the area and faults which cut these bodies produce wider dilatant zones for ore formation. Vein faults of many of the deposits on Keno Hill are hosted by greenstone.

In the Upper and Lower Schist, greenstone occurs as discontinuous lense-shaped bodies that vary in size from 3 meters to several hundred meters in length. In Central Quartzite they occur as continuous sills. The only sill observed in the Central Quartzite was 4 meters thick. Greenstone lenses are believed to be metamorphosed boudins of once continuous basic sills.

Foliation in the greenstones is developed in varying degrees due to shearing. K.C. McTaggart (1960) states that the thinner bodies are more sheared than the thicker bodies. Some of the thicker bodies are actually quite massive.

4.2.6 Quartz-Feldspar Porphyry: Rhyolite

Sills of quartz-feldspar porphyry occur in all three formations. Upper and Lower Schist as well as Central Quartzite, and are usually less than 3 meters thick.

On the hill east of Hanson Lake a sill of unknown thickness is a white coloured rock with 1 to 2 millimeter phenocrysts of feldspar and quartz. The ratio of quartz to feldspar phenocrysts is 3 to 1 and the phenocrysts make up to 30 percent of the rock. The matrix is white, fine grained and rhyolitic in composition.

An outcrop of granite porphyry occurs in the Central Quartzite but its size, strike and dip were not determined. This blue-grey fine to medium grained massive rock appears altered and is composed of quartz and feldspar.

A bleached porphyritic sill intrudes the Upper Schist east of UR Creek. In hand specimen it is white, porphyritic and its composition is 40 percent phenocrysts with the remainder being a fine grained sericitic matrix. In thin section the phenocrysts

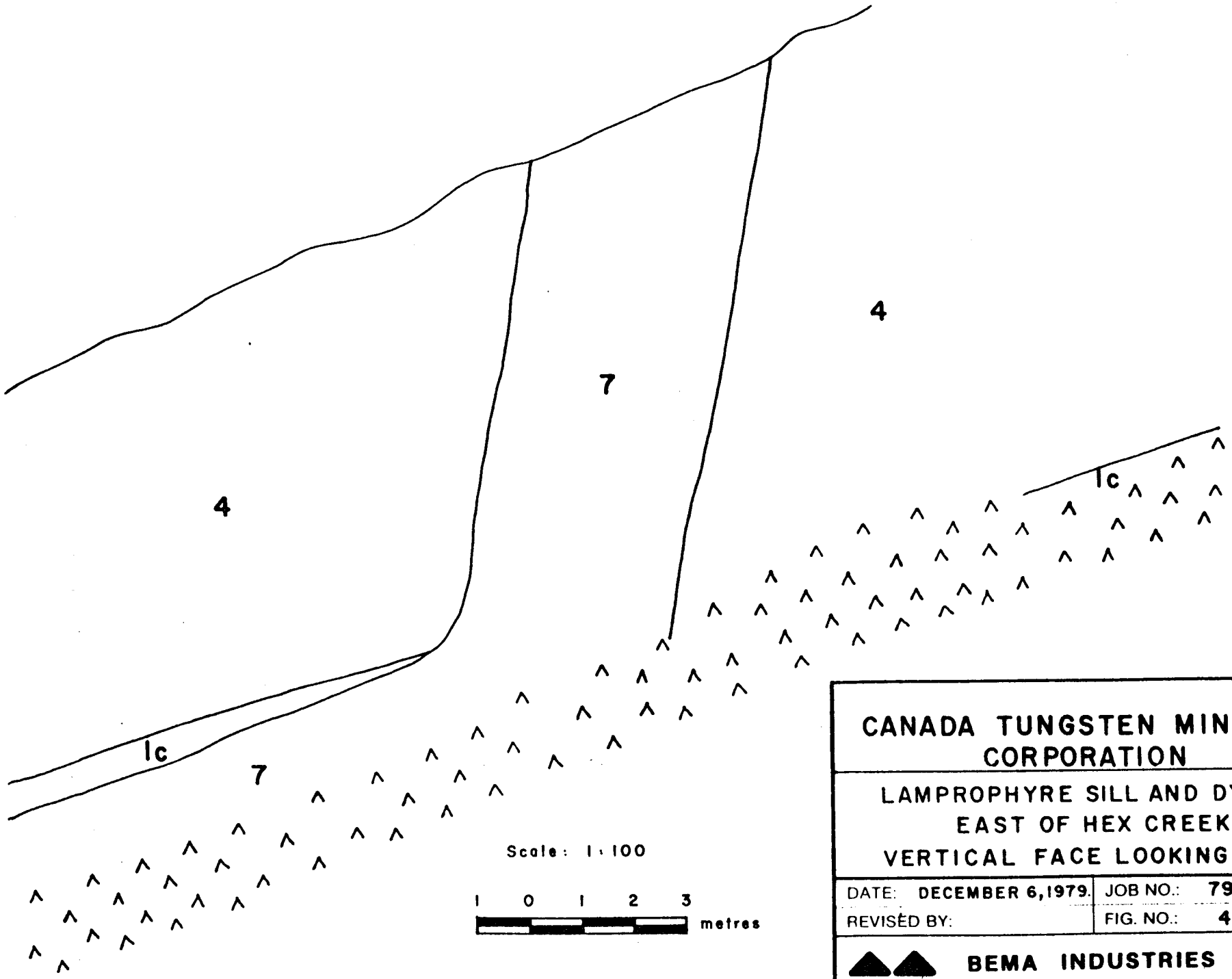
are composed of quartz and kaolinite pseudomorphs after feldspar. The kaolinite pseudomorphs have not been preserved and show up as holes in the slide. The phenocrysts are 2 to 4 millimeters across and are set in a fine grained matrix of quartz and sericite grains which are about 0.05 millimeters in size. Altered phenocrysts up to 1 millimeter are composed of sericite.

A yellow-brown, quartz-feldspar porphyry sill, 3 meters thick, occurs on the RUEBEN claim group and to the east. Phenocrysts are 1 to 5 millimeters in size and make up 25 percent of the porphyry. In thin section the rock exhibits a poikilitic texture with 0.1 millimeter crystals of sericite scattered throughout the matrix and in feldspar phenocrysts. Quartz, plagioclase and muscovite phenocrysts are 1 to 2 millimeters in size. Plagioclase phenocrysts vary from partially altered to almost completely replaced by sericite. Quartz phenocrysts have remained unaltered. A few of the larger muscovite phenocrysts have cores composed of a carbonate. Muscovite appears to replace carbonate. The matrix is a mozaic intergrowth of 0.05 to 0.1 millimeter quartz and plagioclase grains with minor calcite and sericite.

4.2.7 Lamprophyre

Lamprophyre sills and dikes occur on the SHANGHAI and RUEBEN claims and east of Hex Creek. This grey coloured rock consists of 0.2 to 1 centimeter phenocrysts of biotite set in a fine grained matrix of biotite, carbonates, feldspar, sericite and quartz. The composition is 30 percent biotite, 20 percent carbonates, 20 percent sericite, 20 percent feldspar and 10 percent quartz with the grain size 0.1 to 0.5 millimeters. The sericite appears to have replaced the carbonate minerals. The phenocrysts are not abundant and range from 3 to 15 percent. Small 2 to 4 centimeter zenoliths of quartzite occur sporadically in the lamprophyre sills.

Three parallel sills, ranging in thickness from 2 to 8 meters, intrude Upper Schist rocks on the SHANGHAI and RUEBEN claims. On a vertical rock face east of Hex Creek a lamprophyre sill in Lower Schist changes dip abruptly to a 4 meter wide dike that has intruded a body of greenstone; FIG.NO. 4-2. The age relationship of the lamprophyre with respect to quartz-feldspar porphyry sills is unknown as they are not seen cross-cutting.



CANADA TUNGSTEN MINING CORPORATION

LAMPROPHYRE SILL AND DYKE
EAST OF HEX CREEK
VERTICAL FACE LOOKING NW

DATE: DECEMBER 6,1979.	JOB NO.: 79 - 09
REVISED BY:	FIG. NO.: 4 - 2

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4.3.0 STRUCTURAL GEOLOGY

The general north-east strike, north-west dip of the rocks north of the western ZAP reflects the northern limb of the McQuesten River Anticline. North of the central ZAP the strike changes to the north-west and dips south-west. This appears to be the intersection of the McQuesten River Anticline with the Mayo Lake Anticline.

Several north-east striking faults offset the rocks on the north limb of the McQuesten River Anticline. A breccia zone 2 meters wide occurs in a trench near UR Creek; FIG.NO.4-3. A linear extends to the north-east several hundred meters and a parallel line of drill holes have been drilled 700 meters from the trench. This linear is assumed to be the surface expression of the breccia zone. A slickenslide in the breccia zone, indicates the last movement along the fault, striking 60 degrees and dipping 84 degrees to the south. The striations on this surface plunge 80 degrees to the east. The lithology on either side of the fault indicates that the west side is downthrown and the east side is upthrown. The reverse is indicated by an airborne magnetometer survey which suggests the east side is downthrown and the west upthrown. The breccia zone contains clasts of quartzite and schist and is cemented by siderite, limonite and pyrolucite.

Minor faults in a nearby T-shaped trench are believed to be associated with the breccia zone. Two parallel faults striking 330 degrees and dipping 35 degrees east have one centimeter of fault gouge on the hanging wall and a 7 to 8 centimeter quartz-galena vein on the footwall. Many slickenslides in the same trench have two major orientations which strike 030 degrees, dip 70 degrees south and strike 330 degrees and dip 82 degrees east. Siderite veins occur parallel to the slickenslides and in places the vein material itself has slickenslides. Fault contacts between greenstone and quartzite occur repeatedly throughout the trench.

To the west of UR Creek a fault is indicated by local changes in strike and dip and a change in lithology. The actual fault zone was not exposed but there is a weak linear feature striking north-east. The change in lithology across the fault indicates the west side is downthrown and the east upthrown.

Two parallel north-east trending faults are located to the west on the RUEBEN claims. The southerly of the two faults is indicated by local changes in dip and intense deformation of rocks near the fault. Deformed quartz "sweats" up to 30 centimeters thick and 2 meters long occur in a quartzite member of the Upper Schist. A fault is strongly suggested by increased deformation near a strong linear. The strike of the fault was not determined.

The northern most of the two veins has been mined at the SHANGHAI. Definitive literature is not available to date and access to the underground workings is prevented by caving at the portal. Differences in lithology on either side of the fault as well as a 20 centimeter zone of fault gouge are exposed in a number of trenches and a small shaft. Many fractures in the vicinity of the fault have been filled with siderite and black manganese oxides. The direction of movement along the fault was not determined.

The Upper and Lower Schists have minor and chevron folds and exhibit a schistosity or foliation that is usually parallel to bedding. Near the noses of minor folds, schistosity or foliation crosscuts bedding. "Gleitbrett" cleavages, noted by K.C. McTaggart (1960) at the south side of the valley, are also present north of the South McQuesten River.

The Central Quartzite has minor folds and a foliation that is parallel to bedding.

Greenstone occurs as discontinuous lense-shaped bodies and as continuous sills. The lense shaped bodies are considered to be boudins of once continuous sills (R.W. Boyle, 1965). They exhibit a foliation or schistosity which has greater intensity near the exterior of the large bodies and throughout the smaller ones.

Many of the minor structures associated with recumbent folding discussed by K.C. McTaggart (1960), are also present on the north side of the McQuesten Valley.

4.4.0 GEOCHEMISTRY

4.4.1 Silver-Lead-Zinc

Stream sediment samples were collected from various streams in the area and analyzed for silver, lead, zinc and tungsten; FIG.NO. 4-4. Original stream and spring sediment survey carried out in 1966 by C.F. Gleeson of the G.S.C. was used to determine the regional background levels. As in this survey, results of 0.5 ppm or greater silver, 35 ppm or greater lead, 110 ppm or greater zinc and 4 ppm or greater tungsten and molybdenum are considered anomalous. Detailed stream sediment surveys were carried out in two areas where the 1966 survey proved anomalous in silver, lead and zinc. Samples anomalous in tin and tungsten were collected over the Hanson Lake Intrusion where the 1966 survey had no detection of the elements. These samples were anomalous in molybdenum as well.

In 1966, 3 samples were collected from the creek that is adjacent to the SHANGHAI Mine. All three were anomalous with results averaging 92 ppm lead, 1016 ppm zinc and less than 0.5 ppm silver. A sample collected from the south bank of the South McQuesten River had 30 ppm silver, 2600 ppm lead and 4600 ppm zinc. In September of 1979 a detailed stream sediment follow-up survey was carried out and 10 out of 13 samples were anomalous in silver, lead and zinc with the highest sample having greater than 100 ppm silver, 9600 ppm lead and 8400 ppm zinc. Sample locations and results are illustrated on FIG.NO.4-5.

Two samples were collected from tributaries that flow into the South McQuesten River from the south, 8 samples from the south bank of the South McQuesten and 3 from the stream that is adjacent to the SHANGHAI Mine. The results were similar to those obtained in 1966. The sediments collected from the SHANGHAI Mine site were only slightly anomalous but in contrast all other samples gave higher results. Sediments anomalous in silver, lead and zinc collected from the south bank of the South McQuesten River indicate that groundwater flowing into the river through the southern bank has anomalous concentrations of these metals. The most anomalous sample was collected directly on trend with the airphoto linear believed to outline the vein fault at the SHANGHAI Mine. The samples collected from southern tributaries were far more anomalous than from

the northern tributary, even though the northern tributary flows over the waste dump of the SHANGHAI Mine. This detailed sediment survey indicates the presence of mineralization south of the South McQuesten River and it is possible that the vein mined at SHANGHAI extends south onto the northern ZAP claims.

Detailed stream sediment sampling was carried out on Crystal Creek where the 1966 survey indicates an anomalous sample. Seven samples were collected and all were anomalous. Sample results and locations are as illustrated on FIG.NO.4-6. It is possible that the anomalous concentrations of metals in the sediments are due to contamination from mining activity at the Silver Spring Mine or the Formo vein which are 2 and 3 kilometers respectively upstream. In contrast, anomalous concentrations in a sample from a small tributary are not likely due to contamination from mining activity and suggests a local source for the metals. Further stream sediment sampling is definitely warranted to determine the anomaly pattern and locate its possible source.

4.4.2 Tungsten-Tin-Molybdenum

Minus 80 mesh fraction analysis of sediments from dendritic stream system covering the western half of the Hanson Lake Intrusion had up to 18 ppm tungsten and 5ppm molybdenum. Powellite, scheelite and magnetite were noted in pan samples where some of the anomalous sediments were collected. The results of sediment samples and pan concentrate samples have been plotted on FIG.NO.4-7.

Minus 80 mesh tungsten and molybdenum anomalies overlap with the highest molybdenum values lying north and closer to the interior of the intrusion than the highest tungsten values. The highest tungsten values occur near the edge of the intrusion and over country rocks at the contact. Unfortunately, due to an error on the part of Bondar-Clegg and Company Limited, analysis of coarser sediment samples fractions was not possible as the coarse fractions were discarded.

The pan concentrate samples generally correlate with the sediment samples for tungsten but not for molybdenum. This can be expected as the molybdenum in sediments would be hydromorphically dispersed and absorbed into particles in the minus 80 mesh fractions. In pan

concentrates the molybdenum would be associated with the clastic, mechanically transported, grains of powellite. The tungsten in both the pan concentrate and stream sediment samples are due to clastic scheelite. It is for this reason that analysis of coarser mesh fractions of the sediment for tungsten would have been advantageous. Most of the clastic grains of scheelite observed in the pan samples were of the plus 80 mesh fraction.

A considerable amount of magnetite was noted in the pan concentrates and in general the magnetite concentration correlated with the tungsten. The source of the magnetite appears to be from within the intrusive and possibly from the country rock as well. A tin anomaly occurs in the pan concentrate collected at the mouth of the eastern most tributary flowing into the South McQuesten River. The pan concentrates appeared to have much more scheelite when lamped with an ultra-violet lamp than was indicated by analysis.

Coarse crystals of scheelite occur in a 4 centimeter quartz vein in the intrusion south of the South McQuesten River which assayed 0.08 percent tungsten. The area in which this mineralization was found did not have a definite drainage system and therefore sediment samples could not be collected. Limited prospecting with an ultra-violet lamp on the intrusive where anomalous stream sediment samples were collected did not reveal tungsten mineralization.

Samples anomalous in tungsten were collected on Poli and Hex Creeks and a tributary to Skate Creek. The stream beds are dominated by rounded granitic boulders which are believed to have originated from a number of small stocks which R.W. Boyle (1965) mapped at the head waters of these streams. One of the stocks crops out where sediment samples from the tributaries to Skate Creek were collected.

4.5.0 MINERALIZATION

4.5.1 Tungsten

A scheelite bearing quartz vein occurs in the southernmost outcrop of the Hanson Lake intrusion and assayed 0.08 percent tungsten. Scheelite and Powellite occurs in stream sediments in the area of

the intrusion as discussed in the section entitled 4.4.0 Geochemistry. Although a limited amount of prospecting with an ultraviolet lamp in the geochemically anomalous areas did not reveal mineralization, it is believed that the source of the scheelite and powellite is from a vein stockwork showing alteration zonation. For a detailed description of the mineralization in the Hanson Lake Intrusion see the report by S.C. Bartlett (1979) entitled Geology of the Hanson Lake Intrusion.

4.5.2 Silver

The fault breccia zone that crosses UR Creek, FIG.NO.4-3, was not mineralized and cemented by siderite, pyrolucite limonite and manganese oxides. It assayed 0.16 ounces of silver per ton, 0.04 percent lead and 0.10 percent zinc. Quartz veining in a nearby trench is believed to be related to the breccia zone and contains minor disseminations of galena. This zone assayed 0.91 ounces of silver per ton, 0.96 percent lead and 0.37 percent zinc. The veins are 7 and 8 centimeters thick and have 1 centimeter of fault gouge on the hanging wall. Two samples of galena, sphalerite and pyrite collected from the waste dump at the SHANGHAI Mine assayed 151.3 ounces of silver per ton and 63.2 percent lead, 49.6 ounces of silver per ton, 18.9 percent lead and 45.0 percent zinc. In addition, pyrite was noted on the waste dump.

Significant mineralization was not found exposed on the surface but vein stockwork near the fault contained siderite with black manganese oxide staining. Samples of two of these veins collected north-east of the main adit ran 1.5 ppm silver, 71ppm lead, 575 ppm zinc and 410 ppb gold, 11.0 ppm silver, 580 ppm lead and 625 ppm zinc. A description of two polished sections of ore samples from the SHANGHAI Mine are included in Appendix A.

4.6.0 CONCLUSIONS AND RECOMMENDATIONS

The Central Quartzite unit which is of prime interest because it hosts silver lodes, is inferred to underlie a large part of the north west ZAP claim group. Several faults north of the South McQuesten River project onto the claim group and two in particular warrant further exploration.

An unmineralized breccia zone at UR Creek is cemented by siderite, pyrolucite, limonite and quartz. Fractures associated with this structure have traces of galena and assayed 0.91 ounces per ton silver, 0.96 percent lead and 0.37 percent zinc, indicating that silver and lead are associated with the fault system. The breccia zone itself assayed only 0.16 onces per ton silver, 0.04 percent lead and 0.10 percent zinc. The potential of a silver lode within this fault zone is favourable.

A potential economic vein fault projects onto the north-west ZAP south of the SHANGHAI claim group. Two adits and a small shaft are located on this vein on the RUEBEN claims. No data was obtained concerning mining activities at the Shanghai Mine but two samples collected from the large waste dump at the lower adit assayed 49.6 ounces of silver per ton, 18.9 percent lead, 45.0 percent zinc. and 151.3 ounces per ton silver, 63.2 percent lead respectively. A detailed stream sediment survey carried out in this area gave a positive response and indicated mineralization south of the South McQuesten River. This mineralization appears to be on the extension of the Shanghai vein onto the ZAP claim group.

The two structures mentioned above are significant and warrant more detailed examination. Limited geophysical surveys to accurrately locate these structures combined with the overburden drill geochemistry method would provide enough data for a proper evaluation.

A VLF electromagnetic survey and a proton precession magnetometer survey are recommended to locate fault structures in the drift covered valley. These surveys should be conducted on small grids outlined over the area of the projected vein faults. Data collected at closely spaced stations along grid lines is required for an accurate interpretation. Both surveys may be conducted on the same grid.

The purpose of the VLF EM system is to map vein faults as conducting sheets. Gouge in the plane of the vein fault is more likely to serve as a conductor than lead-zinc sulphide material. It is important that the grid be oriented with cross lines at right angles to the trace of the vein fault. Proper orientation of the survey reduces the interference of conducting stratigraphy which may be present. Since the instrument is used to delineate vein faults, grid line spacing will

depend on the continuity of the vein fault. Widely spaced lines may be used initially and closely spaced lines as required. Both proposed vein faults are strongly developed structures and should be readily mappable.

A proton precession magnetometer survey is intended to delineate vein faults by mapping units of different magnetic susceptibility. Where units of contrasting magnetic susceptibility are moved into juxtaposition along faults the magnetometer survey will map adjacent positive and negative anomalies elongate along the trend of the fault. It is important that data be collected at closely spaced stations along closely spaced lines for greatest precision.

Stream sediments collected on Crystal Creek indicate possible local vein mineralization. The area is underlain by Lower Schist but greenstone is locally abundant. Upstream in the Lower Schist greenstone is found in close association with the Formo vein. The area anomalous in Ag-Pb-Zn should be closely prospected and mapped in detail. Further sediment sampling may help to define the source area.

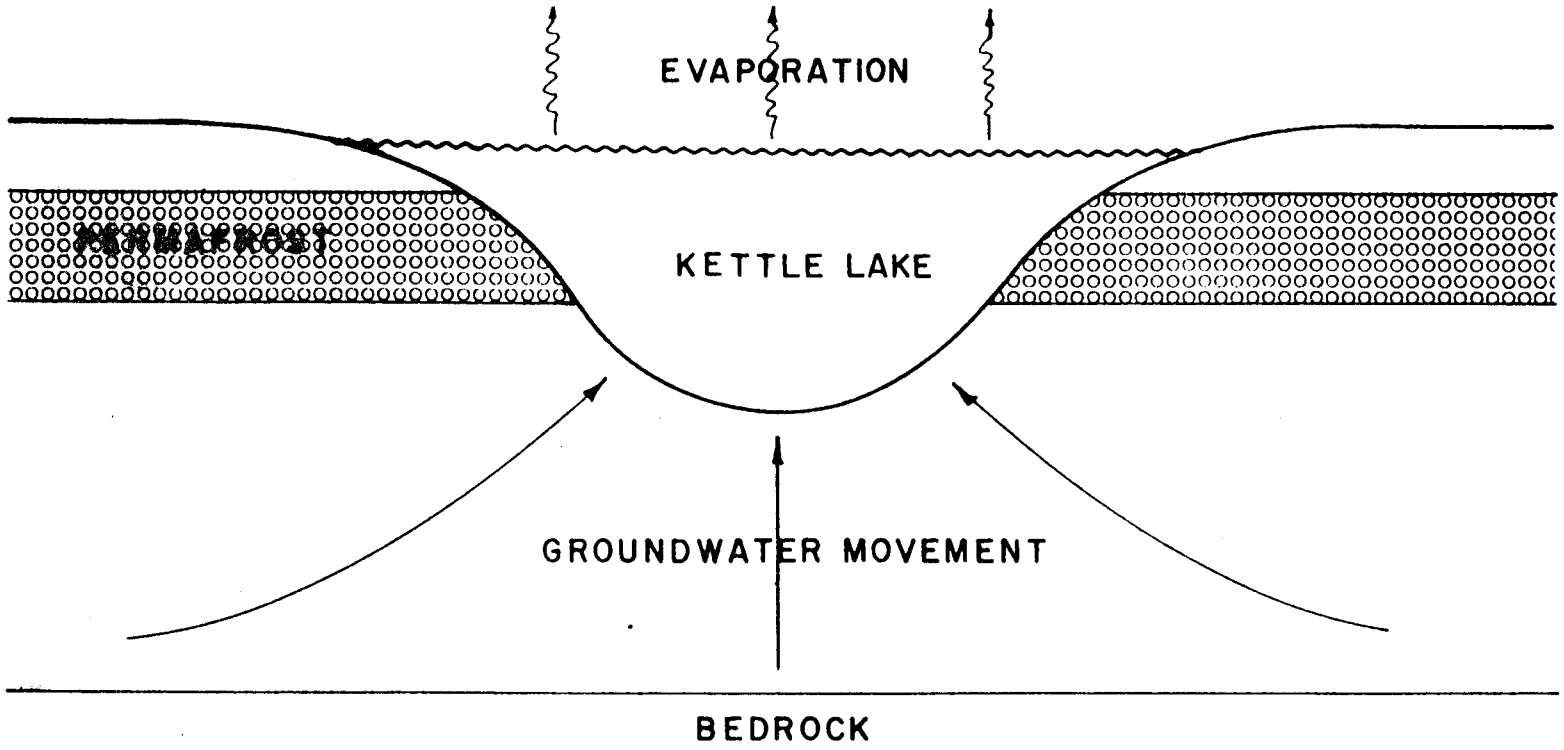
Further geochemical work in the form of kettle lake sediment sampling over the ZAP, BE and SIN claim groups is warranted in an attempt to locate further anomalous zones. Due to the flatness of the valley a dendritic drainage system has not been developed. Kettle lakes are a major area of evaporation to which ground water migrates, particularly the deepest area where permafrost has been penetrated. Metals dissolved in ground water concentrate in the sediments located in the deepest section of kettle lakes (S.B. Ballantyne, 1979). This is illustrated in FIG.NO.4-8.

FIG.NO.4-9 shows the distribution of kettle lakes on the ZAP, BE and SIN claim groups. There are approximately 190 kettle lakes on the ZAP claims, 25 on the BE and 45 on the SIN claims. Of these, the 45 accessible by the South McQuesten River and the 30 by road could be sampled by portaging with a canoe. Between 5 and 10 samples per day could be collected by canoe and would take two men approximately 10 days to complete. The remaining 115 kettle lakes could be sampled by helicopter. Assuming a sampling rate of 10 samples per hour by helicopter, approximately 20 hours of helicopter time would be required. Kettle lake

sediment sampling may indicate regions in which significant concentrations of metals occur. Follow up surveys in anomalous areas could delineate zones which could be tested by overburden drilling.

FIGURE 4-8

KETTLE LAKE HYDROLOGY



CANADA TUNGSTEN MINING CORPORATION	
KETTLE LAKE HYDROLOGY 96	
DATE: DECEMBER 6, 1979. REVISED BY:	JOB NO.: 79-09 FIG. NO.: 4-8
BEMA INDUSTRIES LTD.	

BIBLIOGRAPHY

Aho, A.E., 1961 — Report on the UR Silver-Lead Property, Mayo Mining District, Yukon Territory; Report written for Aho's own files as owner of the property.

Aho, A.E., 1963 — Report on ARGENT Group Claims, Mayo Mining District, Yukon Territory.

Ballantyne, S.B., 1979 — Personal Communication; Applied Geochemist, G.S.C.

Boyle, R.W., 1965 — Geology, Geochemistry and Origin of the Lead-Zinc-Silver Deposits of the Keno Hill-Galena Hill Area, Yukon Territory; G.S.C., Bull. III.

Gleeson, C.F., 1966 — (a) Lead Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 45-1965. (b) Silver Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 46-1965. (c) Zinc Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 47-1965. (d) Molybdenum Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 51-1965. (e) Tungsten and Tin Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 52-1965.

Green, L.H., 1971 — Geology of Mayo Lake, Scougale Creeks and McQuesten Lake Map-areas, Yukon Territory; G.S.C., Memoir 357.

McTaggart, K.C., 1960 — The Geology of Keno and Galena Hills, Yukon Territory; G.S.C., Bull. 58.

APPENDIX A

Polished sections of ore from Shanghai Mine waste dump.

Mineralogy

Section B

Pyrite	35%
Sphalerite	20%
Galena	15%
Chalcopyrite	1-2%
Unknown(tetrahedrite ?)	5%
Gangue	23%

Section C

Pyrite	50%
Sphalerite	12%
Galena	30%
Chalcopyrite	4%
Unknown(tetrahedrite ?)	4%
Gangue	---

Unknown mineral - A medium grey-yellow grey, nonpleocroic, isotropic mineral, associated with chalcopyrite. In hand specimen it is a dull grey mineral. No cleavages are developed; appears to have replaced chalcopyrite.

Textures

- Pyrite has been replaced by sphalerite, galena and chalcopyrite which occur in fractures in pyrite and as small blebs.

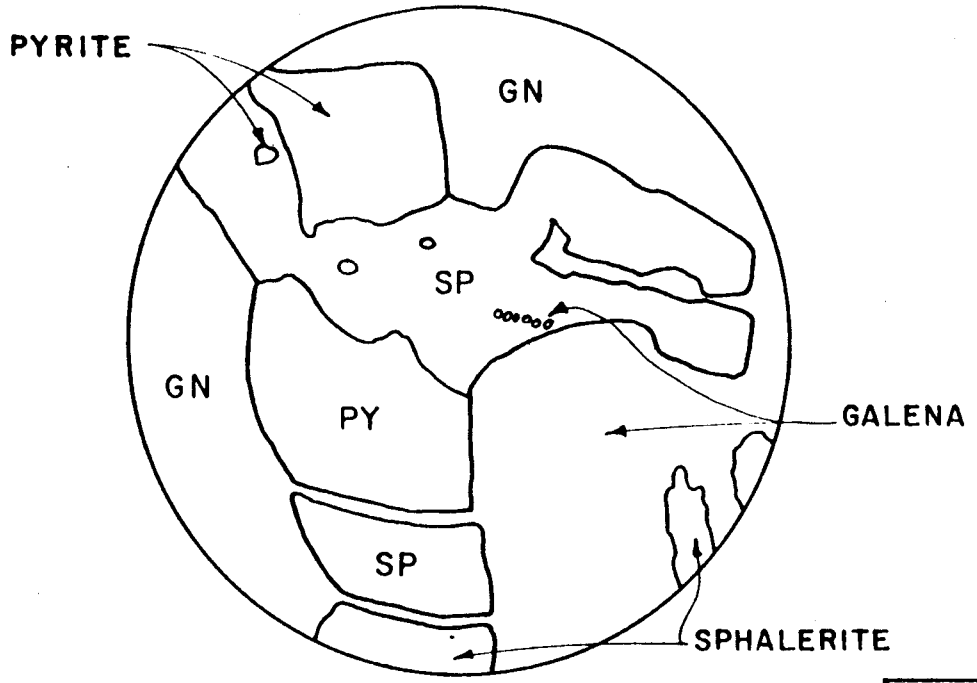
- Sphalerite replaces pyrite and has been replaced by galena and chalcopyrite. Sphalerite occurs in fractures in pyrite. Chalcopyrite and galena occur in fractures and small blebs in sphalerite.

- Galena replaces pyrite and sphalerite and has been replaced by chalcopyrite. Galena occurs in pyrite and sphalerite in fractures and small blebs. Chalcopyrite occurs in galena in fractures and small blebs.

- Chalcopyrite replaces galena, pyrite and sphalerite and an unknown mineral replaced chalcopyrite. Chalcopyrite occurs along fractures and small blebs in pyrite sphalerite and galena.

FIGURE 4-10: POLISHED SECTION OF ORE FROM SHANGHAI MINE

POLISHED SECTION C



CANADA TUNGSTEN MINING CORPORATION

POLISHED SECTION OF ORE FROM SHANGHAI MINE

DATE: DECEMBER 6, 1979.	JOB NO.: 79-09
REVISED BY:	FIG. NO.: 4-10

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APPENDIX B

ROCK ASSAYS AND GEOCHEMISTRY

Unless otherwise stated Au and Ag given in ounces per ton and others in percent.

Sample Number	Sample Description	Results					
		Au	Ag	Pb	Zn	W	Others
8901	Sphalerite, galena and pyrite vein; from Shanghai Mine waste dump.	0.002	51.9	18.9	45.0		
8902	Limonite, manganese oxide vein in quartzite; from RUEBEN claims.	L 5ppb	1.5ppm	71ppm	575ppm		N.D. Sb
8903	Siderite vein in greenstone; from RUEBEN claims.	410ppb	11.0ppm	580ppm	625ppm		
8904	70cm wide calcite-quartz vein in greenstone; from RUEBEN claims.	N.D.	1.0ppm	90ppm	25ppm		
8905	Quartz-galena vein located on footwall of fault; east of UR Creek.	0.002	0.91	0.96	0.37		
8906	Quartzite breccia zone cemented by siderite, pyrolucite, limonite; near UR Creek.	L0.002	0.16	0.04	0.10		
8907	4cm quartz vein in greenstone with a small pod containing malachite, pyrite and limonite; on hill east of Hanson Lake.	0.002	0.32	0.32	0.03		1.42% Cu
8914	4cm quartz vein in a biotite granodiorite outcrop with coarse crystals of scheelite	0.005				0.08	

Sample Number	Sample Description	Results Au	Ag	Pb	Zn	W	Others
8915	Walter Malicky's sample from W#1 claim; small quartz vein in rock and manganese oxides in small fractures; exact location unknown.	0.005	10.05	0.04	0.01		
8916	Banded sulfides from Skate Creek. Located between contact of limestone and buff phylitic quartzite. Mineral banding apparent. Sample from float in Trench #4.	0.03	5.99	6.25	4.94		
8917	15cm wide quartz-arsenopyrite vein found in talus slope among granitic boulders.	0.025					0.03% Sb 14.4% As
8918	5cm siderite calcite limonite manganese oxide vein with antimony bearing minerals. Found in greenstone, Strike 040°, dip 80°s.	0.002	L0.05	L0.01	L0.01		0.01% Sb
8919	Greenstone with fracture zone; fractures filled with black vitreous moneral and limonite; near Fortune Creek.	-	L0.05	L0.01	L0.01		0.060%Mn
8920	Large boulder with quartz-arsenopyrite vein on Fortune Creek.	0.002	1.10				
8954	Galena, pyrite and siderite from Shanghai mine dump.		151.3	63.2			

Sample Number	Sample Description	Results %				
		Total Fe	Sn	W	Mo	Mo S_2
1	Pan concentrate South McQuesten River at East Hanson Creek.	2.38	0.06	0.03	0.008	0.013
2.	Pan concentrate East Hanson Creek at South McQuesten River.	10.06	0.29	0.11	0.005	0.008
3.	Pan concentrate above South McQuesten River.	13.73	0.04	0.10	0.007	0.012
4.	Pan concentrate west fork of West Hanson Creek.	30.94	0.06	0.20	0.006	0.010
5.	Pan concentrate east fork at west fork on West Hanson Creek.	12.12	0.08	0.13	0.011	0.018
6.	Pan concentrate east trib. of east fork of West Hanson Creek.	1.78	L0.05	0.06	0.006	0.010
7.	Pan concentrate east fork of West Hanson Creek.	27.30	L0.05	0.13	0.011	0.018
8.	Pan concentrate East Hanson Creek.	32.96	L0.05	0.02	0.007	0.012

L Denotes Less Than

APPENDIX C

BONDAR-CLEGG & COMPANY LTD.

ANALYSIS REPORTS

BONDAR-CLEGG & COMPANY LTD.

136B INDUSTRIAL RD, WHITEHORSE, YUKON Y1A 2V1

PHONE: (403) 667-6523
TELEX: 036-8-460

Certificate of Analysis

TO Bema Industries
5780-203rd St.
Langley, B.C.

REPORT NO. A-49-112

DATE September 20, 1979

I hereby certify that the following are the results of analyses made by us upon the herein described ... rock ..... samples

MARKED		oz/ton Ag	% Cu	% Pb	% Zn					
~~8804~~		~~9.20~~		~~4.90~~						
~~8805~~		~~0.31~~								
~~8806~~		~~0.28~~								
~~8807~~		~~0.13~~		~~0.01~~						
~~8829~~		~~171.0~~		~~51.5~~						
~~8830~~		~~101.0~~		~~39.0~~						
~~8831~~		~~0.98~~								
~~8832~~		~~0.60~~								
~~8833~~		~~0.12~~								
8901		49.6		18.9	45.0					
8905		0.91		0.96	0.37					
8906		0.16		0.04	0.10					
8907		0.32	1.42	0.01	0.03					
~~8908~~		~~0.27~~		~~0.08~~	~~L 0.01~~					
~~8909~~		~~3.65~~		~~0.87~~	~~0.46~~					
~~8910~~		~~0.66~~		~~0.24~~	~~0.53~~					
~~8911~~		~~0.79~~		~~0.26~~	~~0.22~~					
~~8912~~		~~0.31~~		~~0.09~~	~~0.13~~					
~~8913~~		~~0.79~~		~~0.20~~	~~0.25~~					

NOTE: Au, Ag by fire assay to follow

Rejects retained two weeks
Pulps retained three months
unless otherwise arranged

BONDAR-CLEGG & COMPANY LTD.

Steven Simpson

BONDAR-CLEGG & COMPANY LTD.

136B INDUSTRIAL RD, WHITEHORSE, YUKON Y1A 4X1

PHONE: (403) 667-6523
TELEX: 036-8-460

Certificate of Analysis

TO Bema Industries Ltd.
2288 2nd Ave.
Whitehorse, Yukon

REPORT NO. A-49-138

DATE October 22, 1979

I hereby certify that the following are the results of analyses made by us upon the herein described rock samples

MARKED	oz/ton Au	oz/ton Ag	% Pb	% Zn	% Mn	% Sn
8914	0.005	-	-	-	-	
8915	0.005	L0.05	0.04	0.01	-	
8916	0.03	5.99	6.25	4.94	-	
8917	0.025	-	-	-	-	
8918	0.002	L0.05	L0.01	L0.01	-	
8919	-	L0.05	L0.01	L0.01	0.060	
8920	0.002	1.10	-	-	-	
8843	0.020	6.94	0.04	41.0	-	
8844	0.010	71.5	38.0	1.97	-	
8845	0.060	11.7	9.25	5.35	-	L0.01
8846	0.005	-	-	-	-	
8847	0.005	5.11	4.00	8.70	-	
8848	0.10	8.04	73.5	0.24		

L denotes less than

Sb, As, WO_3 to follow

BONDAR-CLEGG & COMPANY LTD.

Steven Simpson

NOTE:
Rejects retained two weeks
Pulps retained three months
unless otherwise arranged.

BONDAR-CLEGG & COMPANY LTD.

136B INDUSTRIAL RD, WHITEHORSE, YUKON Y1A 4X1

PHONE: (403) 667-6523
TELEX: 036-8-460

Certificate of Analysis

TO Bema Industries Ltd.
5780-203rd Street
Langley, B. C.
V3A 1W3

REPORT NO. A-49-138

DATE October 30, 1979

I hereby certify that the following are the results of analyses made by us upon the herein described rock samples

MARKED	% Sb	% As	% W
8914			0.08
8917	0.03	14.4	
8918	0.01		
~~8845~~			~~0.02~~
~~8846~~			~~0.02~~

BONDAR-CLEGG & COMPANY LTD.

Steven Simpson

NOTE:

Rejects retained two weeks
Pulps retained three months
unless otherwise arranged.

BONDAR-CLEGG & COMPANY LTD.

136B INDUSTRIAL RD, WHITEHORSE, YUKON Y1A 4Y2

PHONE: (403) 667-6523
TELEX: 036-8-460

Certificate of Analysis

Bema Industries Ltd.
Box 32
Mayo, Yukon

REPORT NO. A-49-41

DATE August 6, 1979

hereby certify that the following are the results of analyses made by us upon the herein described rock samples

MARKED		oz/ton Au	oz/ton Ag	% Pb correction
~~8941~~		~~0.005~~		
~~8942~~		~~L0.002~~		
~~8943~~		~~L0.002~~		
~~8945~~		~~0.022~~		
~~8960~~		~~0.005~~		
~~8953~~			~~644.9~~	
8954			151.3	63.2
~~8955~~			~~81.8~~	
~~8956~~			~~174.2~~	
~~8957~~			~~143.9~~	
~~8958~~			~~33.8~~	
~~8959~~			~~85.2~~	

Au & Ag done by fire assay

BONDAR-CLEGG & COMPANY LTD.

Steven Simpson

NOTE:
Rejects retained two weeks
Pulps retained three months
unless otherwise arranged.

o: Bema Industries Ltd.

AGE No. 1

REPORT NO. A29 - 57

DATE: November 16, 1979

BONDAR-CLEGG & COMPANY LTD.

5780 - 203rd Avenue
Langley, B.C. V3A 1W3

CERTIFICATE OF ASSAY

Samples submitted: November 5, 1979
Results completed: November 16, 1979

I hereby certify that the following are the results of assays made by us upon the herein described pan concentrate sample

MARKED	GOLD		SILVER		Fe_3O_4*	Sn	W	Mo				
	Ounces per Ton	Grams per Metric Ton	Ounces per Ton	Grams per Metric Ton	Percent	Percent	Percent	Percent	Percent	Percent	Percent	
1					2.38	0.06	0.03	0.008				
2					10.06	0.29	0.11	0.005				
3					13.73	0.04	0.10	0.007				
4					30.94	0.06	0.20	0.006				
5					12.12	0.08	0.13	0.011				
6					1.78	<0.05	0.06	0.006				
7					27.30	<0.05	0.13	0.011				
8					37.96	<0.05	0.02	0.007				

* Total Fe as Fe_3O_4 calculated

NOTE:
Rejects retained three weeks
Pulps retained three months
unless otherwise arranged.

Registered Assayer, Province of British Columbia

APPENDIX D

SAMPLE DATA FORMS

BEMA INDUSTRIES LTD.

EXPLORATION DEPARTMENT

DATE July,79 PROJECT 79-09

COLLECTOR Cyrill Orssich N.T.S.

ANALYST

METHOD

Sample No. Code: 73 S H L 23 (L - Silt, S - Soil, T - Rock, W - Water)

Year / Project / Collector / Number

SAMPLE DATA

Values (ppm)

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Au	Ag	Cu	Mo	Pb	Zn	W
C.O.#100	CLAIM LEM 11	spring sed					silty		Near contact between central qt zt and graphitic phyllite		0.4			14		
C.O.#101	CLAIM Lot 924 SILVER M.C.,	spring sed					silty		Lithology - Graphitic Phyllite with Rhyolite		0.3			17		
C.O.#102	CLAIM Lot 924 SILVER M.C.	spring sed					silty		porphyry intrusive Galena and found on fracture face		1.1			64		
C.O.#103	CLAIM Lot 924 SILVER M.C.	spring sed					silty		of the Rhyolite.		2.0			94		
C.O.#104	CLAIM Northern ZAP Air Photo 169	stream sed		6cm		dark brown	15% org 20% sand 65% silt	0.3m	small stream crossing cat trail		0.8			12	65	L2
C.O.#105	CLAIM Northern ZAP Air Photo 169	stream sed		9 cm		grey brown	60% sand 40% silt	1.2m	stream crossing cat trail		0.6			10	57	2
C.O.#106	CLAIM Northern ZAP Air Photo 236	stream sed		2cm		buff	slty cly wth 10-15% org.dbrs.	0.3m	Crosses cat trail; has tiny graphite + muscovite flakes		0.6			8	38	3
C.O.#107	CLAIM Northern ZAP Air Photo 236	stream sed		9 cm		brown	org.10% silt 90%	0.6m	phylite pebbles in stream		0.8			19	72	2
C.O.#108	CLAIM Northern ZAP Air photo #236	stream sed				brown	sandy silt		dry stream at bottom of quartzite felsenmer		0.6			10	58	2
C.O.#109	CLAIM Northern ZAP Air Photo 236	stream sed		15 cm		black	silt	1.8m			0.5			12	70	3
C.O.#110	CLAIM Northern ZAP Air Photo 236	stream sed		15 cm		grey brown	80% snd 20% slt	1.2m	flow moderate,		0.4			11	71	2
C.O.#111	CLAIM Northern ZAP Air Photo 236	stream sed		6 cm		dark brown	10% org 40% slt 50% snd	0.3m	small trib flowing in from west. slope steep but flow slow		0.6			13	80	2
C.O.#112	CLAIM Northern	stream		15 cm		grey	75% snd	1.8m	flow moderate, lots of granite boulders in creek.		0.6			10	60	3

BEMA INDUSTRIES LTD.

EXPLORATION DEPARTMENT

DATE Sept 1-Sept 7 PROJECT 79-09

COLLECTOR Cyrill Orssich N.T.S. Grid Zone 8V, sheet 105M

ANALYST

METHOD

Sample No. Code: 73 S H L 23 (Year / Project / Collector / L - Silt, S - Soil, T - Rock, W - Water / Number)

SAMPLE DATA

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Values (ppm) Au	Ag	Cu	Mo	Pb	Zn			
C.O.#113	CLAIM N.ZAP Air Photo 236	stream sed.		6 cm		dark brown	10% org 50% slt 40% snd	0.3m	tributary fork		0.4			12	83	3		
C.O.#114	CLAIM N.ZAP Air Photo 236	stream sed				tan-brown	20% slt clay 80% snd	1.2m	main stream, flow slow to moderate		0.6			12	70	14		
C.O.#115	CLAIM N.ZAP Air Photo 236	stream sed				dark brown	20% org 50% slt 30% snd		dry stream		0.6			16	90	L2		
C.O.#116	CLAIM N.ZAP Air Photo 236	stream sed		12 cm		grey brown	100% slt	1.5m	flow slow-moderate		0.4			13	69	10		
C.O.#117	CLAIM N.ZAP Air Photo 236	stream sed		0.6m		brown	20% snd 80% slt	9 cm	flow slow		0.3			12	78	6		
C.O.#118	CLAIM N.ZAP Air Photo 236	spring sod				grey	silt		sprng sed.on west bank ofmn stream. Intense iron staing on rocks; took H_2O smpl also		0.4			10	70	3		
C.O.#119	CLAIM ZAP AP#156	soil	B	13 cm		reddsh brwn	fine gr		located at greenstone outcrop wth qtz 1 calcite vn cont.malachite		0.5			12	91	3		
.O.#120	CLAIM ZAP AP#158	stream sed		9 cm		light brown	70% crs sand 30% slt	0.9m	flow moderate, panning reveals magnetite and scheelite. Mild red colouration in water		0.3		2	11	70	L2		
C.O.#121	CLAIM ZAP AP#158	stream sed		15 cm		light brown	80% crs sand 20% slt	1.5m	grain flowing quickly Pan #3 nearby has scheelite		0.2		2	8	50	3		
C.O.#122	CLAIM ZAP AP#158	stream sed		15 cm		tan brown	50% sand 50% silt	1.5m	stream flowing quickly		0.4		1	8	60	L2		
C.O.#123	CLAIM ZAP AP 158	stream sed		30 cm		tan brown	65% slt 35% snd	0.5m	slow flow		0.2		4	8	50	18		
C.O.#124	CLAIM ZAP AP#158	stream sed		30 cm		grey brown	50% slt 50% snd	0.9m	flow moderate-slow		0.3		2	6	50	6		
C.O.#125	CLAIM ZAP	stream sed		12 cm		brown black	50% org 50% mud	1.8m	flow slow, mildly stained red on stream bottom, very		0.2		3	5	56	3		

BEMA INDUSTRIES LTD.

EXPLORATION DEPARTMENT

DATE _____ PROJECT _____ ANALYST _____

COLLECTOR _____ N.T.S. _____ METHOD _____

Sample No. Code: 73 S H L 23 (Year / Project / Collector / Number) — L - Silt, S - Soil, T - Rock, W - Water

SAMPLE DATA

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Values (ppm) Au	Ag	Cu	Mo	Pb	Zn	W		
C.0.126	CLAIM ZAP AP# 158	stream sed		9 cm		tan brown	70% sand 30% silt	1.8m	flow moderate to slow		0.2		2	10	58	18		
C.0.127	CLAIM ZAP AP#158	stream sed		3 cm		tan brown	70% sand 30% silt	0.3m	flow slow		0.4		3	16	111	6		
C.0.128	CLAIM ZAP AP#158	stream sed		12 cm		light brown	90% silt 10% sand	1.2m	flow moderate-slow		0.2		4	11	70	3		
C.0.129	CLAIM N.E. ZAP AP#158	stream sed		9 cm		med brown	50% org. 45% sand 50% silt	0.9m	flow slow		0.2		1	9	91	3		
C.0.130	CLAIM N.E.ZAP AP# 158	stream sed		15 cm		dark brown	20% org 80% silt	0.3m	flow slow;silt can be shken free frm moss once smpl has dried		0.2			8	67	2		
C.0.131	CLAIM ZAP	line bottom		60 cm		white	silt		smells of sulfur Hanson Lake #1		0.4			4	5	3		
C.0.132	CLAIM ZAP	Lake bottom		60 cm		white	silt		Hanson Lake #2		0.2			5	13	L2		
C.0.133	CLAIM ZAP	Lake bottom		60 cm		white	silt		Hanson Lake #3		0.2			4	3	3		
C.0.134	CLAIM ZAP	stream sed		15 cm		dark brown	20% org 20% sand 60% silt	2.4m	Stream between 2 parts of Hanson Lakes		0.2			2	33	L2		
C.0.135	CLAIM NORTH OF ZAP	stream sed		12 cm		light brown	25% sand 75% silt	0.3m	flow slow-moderate		0.6			16	100	3		
C.0.136	CLAIM NORTH OF ZAP	STream sed		3 cm		tan brown	10% sand 90% silt	0.3m	flow slow		0.4			15	87	3		
C.0.137	CLAIM NORTH OF ZAP	STream sed.		15 cm		dk brwn gry	20% sand 20% org 60% silt	0.3m	flow moderate		0.4			12	83	L2		
C.0.138	CLAIM NORTH OF	Stream sed		30 cm		grey clay	50% clay + silt	0.9m	swamp area		0.4			13	81	L2		

BEMA INDUSTRIES LTD.

EXPLORATION DEPARTMENT

DATE Sept 16-17 PROJECT 79-09

COLLECTOR Cyrill Orssich N.T.S. Grid Zone 8V; sheet 105M

ANALYST

METHOD

Sample No. Code: 73 S H L 23 (Year / Project / Collector / Number) — L - Silt, S - Soil, T - Rock, W - Water

SAMPLE DATA

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Values (ppm) Au	Ag	Cu	Mo	Pb	Zn	W
C.O.139	CLAIM N.E.ZAP	stream sed		15 cm		dark brown	50% silt 50% org.	0.6m			0.4		3	8	80	L2
C.O.140	CLAIM N.E.ZAP	stream sed		15 cm		tan brown	70% silt 30% sand	1m	trib utary flowing in from west, flow moderate		0.2		3	8	59	4
C.O.141	CLAIM N.E.ZAP	stream sed		6 cm		tan brown	silt	1 m	flow slow, trib flowing in from west		0.3		5	9	68	3
C.O.142	CLAIM N.E.ZAP	stream sed		10 cm		brown	silt	0.6m	western stream above fork		0.2		4	11	79	L2
C.O.143	CLAIM N.E.ZAP	stream sed		12 cm		grey brown	silt	1m	Eastern stream above fork		0.2		3	6	52	3
C.O.144	CLAIM N.E.ZAP	stream sed		12 cm		grey	silt wth abundant organics	0.5m			0.2		5	8	63	3
C.O.145	CLAIM N.E.ZAP	stream sed		30 cm		brown	60% silt 40% sand	1.5m	main stream and flow rapid		0.2		5	12	90	2
C.O.146	CLAIM N.E.ZAP	stream sed		30 cm		brown	55% silt 45% sand	0.5m	tributary, flow rapid		0.2		2	12	62	3
C.O.147	CLAIM N.Cent ZAP East of U.R.Crk.	stream sed									0.3			16	52	L2
C.O.148	CLAIM N.Cent.ZAP East of U.R.Crk.	stream sed									0.4			42	79	3
C.O.149	CLAIM N.Cent.ZAP East of U.R.Crk	stream sed		3 cm		red-brn	70% org 30% silt	6 cm	seep with red stained bottom		0.2			14	60	2
C.O.150	CLAIM A.P.#A-21328-32	stream sed		10 cm	2-3°	med. brown	silt	0.6m	outcrop of buff phylitic qtz on one bank + intrusive on the other stream flows over contact		0.4		2	45	200	L2
	CLAIM	stream					40% org		silt can be shaken free of moss							

BEMA INDUSTRIES LTD.

EXPLORATION DEPARTMENT

DATE Sept 18-20 PROJECT 79-09

COLLECTOR Cyrill Orssich N.T.S. Grid Zone 8V, sheet 105M

ANALYST

METHOD

Sample No. Code: 73 S H L 23 (Year / Project / Collector / L - Silt, S - Soil, T - Rock, W - Water / Number)

SAMPLE DATA

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Values (ppm) Au	Ag	Cu	Mo	Pb	Zn			
C.0.152	CLAIM A.P.#A-21328-32	stream sed		9 cm		brown	20% moss + roots 80% silt	0.6 m	silt can be shaken free from moss once dry		0.4		2	16	77	6		
C.0.153	CLAIM A.P.#A-21328-29	stream sed		20 cm	L2°	med brown	75% snd 25% slt	0.9m	flow moderate		0.2		2	12	72	3		
C.0.154	CLAIM "	stream sed		6 cm	5°	brown grey	30% snd 70% slt	0.3m	flow slow-moderate		0.4		1	8	49	3		
C.0.155	CLAIM "	stream sed		9 cm	5°	grey	70% snd 15% slt 15% org	0.3m	flow slow		0.4		2	13	72	L2		
C.0.156	CLAIM "	stream sed		12 cm	6°	grey	60% slt 40% snd	0.5m	flow slow-mod		0.3		1	9	70	2		
C.0.157	CLAIM "	stream sed		15 cm	4°	brown	20% moss 20% sand 60% slt	0.5m	silt can be sep.from moss by shaking moss once dried		0.2		3	9	63	18		
C.0.158	CLAIM "	stream sed		6 cm	1°	med brwn	40% org 60% silt	1.5m	flw very slw and scheelite wld be dropped ∴ don't expt high results.		0.4		2	9	70	L2		
C.0.159	CLAIM "	stream sed		20 cm	2°	med brwn	20% org 60% slt 20% snd	0.9m	flw mod. some of the org.mat. can be separated after drying (roots etc)		0.2		2	8	65	4		
C.0.160	CLAIM N.ZAP " HEX CREEK	Stream sed		15 cm		grey	75% snd 25% slt	1.8m	flow moderate		0.2			15	70	4		
C.0.161	CLAIM "	stream sed		15 cm		brown	50% snd 50% slt	1.5m	flow moderate		0.3			14	68	6		
C.0.162	CLAIM "	stream sed		30 cm		brown	50% slt 50% sand	1.8 m	flow moderate		0.2			14	63	6		
C.0.163	CLAIM "	stream sed		15 cm		grey brwn	60% sand 40% silt	2.4 m	flow rapid, many granitic boulders in creek		0.2			13	54	3		
C.0.164	CLAIM "	stream sed		20 cm		brown	80% sand 20% silt	1.8 m	flow moderate		0.2			12	80	6		

BEMA INDUSTRIES LTD.

EXPLORATION DEPARTMENT

DATE Sept 20-24 PROJECT 79-09

COLLECTOR Cyrill Orssich N.T.S. Grid Zone 8V, sheet 105M

ANALYST

METHOD

Sample No. Code: 73 S H L 23 (Year / Project / Collector / L - Silt, S - Soil, T - Rock, W - Water / Number)

SAMPLE DATA

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Values (ppm) Au	Ag	Cu	Mo	Pb	Zn			
C.O.165	CLAIM East of HEX Creek	stream sed.		10 cm		dark brown	40% org 60% silt	30 cm	red staining on stream bottom		0.6			32	90	4		
C.O.166	CLAIM	"				grey brown		8 m	SAME COMMENT AS FOR C.O. 169-175		2.4			160	380	L2		
C.O.167	CLAIM	"							small trib flowing into Maqueston		28.0			1085	2325	3		
C.O.168	CLAIM	"							small trib flowing into Maqueston has red staining		23.5			1110	2000	3		
C.O.169	CLAIM	"				grey brown		8m	THESE SAMPLES WERE COLLECTED FROM THE SOUTH BANK OF THE MAQUESTEN RIVER FROM A DEPTH OF ABOUT 0.5m DUE TO HEAVY RAIN, NOTE TAKING WAS NOT POSSIBLE BUT MOST OF THE SAMPLES WERE 100% SILT AND BROWN. FLOW WAS MODERATE.									
C.O.170	CLAIM	"				"		"			25.5			1225	1930	L2		
C.O.171	CLAIM	"				"		"			20.0			795	1750	L2		
C.O.172	CLAIM	"				"		"			19.5			820	1490	L2		
C.O.173	CLAIM	"				"		"			24.0			1010	1890	L2		
C.O.174	CLAIM	"				"		"			6100			9600	8400	L2		
C.O.175	CLAIM	"				"		"			4.5			240	370	L2		
C.O.176	CLAIM	"		3 cm		Brown	contns sme org.	0.5m	SAMPLES 176-178 WERE TAKEN FROM A SMALL STREAM THAT FLOWS JUST EAST OF SHANGHIE MINE. FLOW SLOW.		0.6			24	190	L2		
C.O.177	CLAIM	"		6 cm		brown	50% sand 50% silt	0.6m			0.2			13	97	L2		

BEMA INDUSTRIES LTD.

EXPLORATION DEPARTMENT

DATE Sept 24 PROJECT 79-09

COLLECTOR Cyrill Orssich N.T.S. Grid Zone 8V, sheet 105M

ANALYST

METHOD

Sample No. Code: 73 S H L 23 (Year / Project / Collector / L - Silt, S - Soil, T - Rock, W - Water / Number)

SAMPLE DATA

Number	Location	Type	Horiz.	Depth	Slope	Color	Texture	Width	Remarks	Values (ppm) Au	Ag	Cu	Mo	Pb	Zn	W
C.O.178	CLAIM N.ZAP SHANGHIA	stream sed		12 cm		tan brown	30% snd 70% slt	1.5m	slow flow		0.6			26	148	4
C.O 179	CLAIM CENT.ZAP CRYSTAL CREEK	"							DUE TO HEAVY RAIN NOTE TAKING WAS NOT POSSIBLE FOR THESE		13.5			540	1550	3
C.O.180	CLAIM "	"							SAMPLES (179-185). ALL OF THE SAMPLES EXCEPT FOR 183 WERE GREY TO GREY BROWN AND WERE		10.5			685	1230	3
C.O.181	CLAIM "	"							GOOD SILT. NONE OF THE SAMPLES EXCEPT FOR 183 HAD ANY ORGANIC MATTER. FLOW MOD.		30.0			1150	1930	L2
C.O.182	CLAIM "	"							- - - - - - - - - - - - - -		40.0			680	1320	3
C.O.183	CLAIM "	"		6 cm		dark brown	10% org 90% slt	0.6m	dark brown, flw slow, trib.		18.5			900	720	3
C.O.184	CLAIM "	"							- - - - - - - - - - - - - -		5.4			238	1000	3
C.O.185	CLAIM "	"							- - - - - - - - - - - - - -		7.0			310	1220	3
C.O.186	CLAIM "	"		5 cm		brown	90% snd 10% slt	15 cm	seepage beside Hanson Lake road with red staining. Sample taken off road side.		0.7			28	80	3
	CLAIM								- - - - - - - - - - - - - -							
	CLAIM								- - - - - - - - - - - - - -							
	CLAIM								- - - - - - - - - - - - - -							
	CLAIM								- - - - - - - - - - - - - -							

HANSON LAKE INTRUSION, NORTHERN ZAP CLAIM GROUP

5.1.0 INTRODUCTION

Geological mapping and sampling was performed over the northeast portion of the ZAP claim block. The claims cover a medium-sized granitic intrusion which shows distinct stockwork alteration zonation. Geochemical surveys conducted in the area indicate that the intrusion may host significant W, Sn and Mo concentrations. From the ridge top west of the ZAP claims, the intrusion extends six (6) kilometers east almost to the Hanson Lakes in the South McQuesten River Valley. North to south, the body measures approximately four (4) kilometers. The pluton is considered to be one of a number of granitic intrusions which lie within the hinge zone of the Mayo Lake Anticline.

Mapping of the limited exposure was conducted using Federal Government low level 1" = 2000' aerial photographs. Twelve (12) mandays were allotted by Bema Industries Limited employees for traversing and sampling on the pluton. This report is the result of that work.

5.2.0 GEOLOGY

Boyle (1965) mapped the pluton to lie entirely within the Lower Schist unit except where resistant knobs protrude the thick cover of the South McQuesten River Valley. Mapping by Orssich, Elliott and Philpot in 1979 have confirmed Boyle's work. Where exposed, the contact is sharp with biotite hornfels developed in the thermal aureole of the pluton. Some disseminated sulphides, probably pyrrhotite, occur in these metamorphic rocks.

Based on field observations, the intrusion is a light-coloured, coarse-grained quartz monzonite. Some varieties are almost leucocratic. White k-feldspar, light-coloured plagioclase and quartz comprise the acid component of this rock. Some varieties are subporphyritic with large k-feldspar phenocrysts sometimes in excess of a centimeter in length. In thin section, the rock is composed of roughly equal proportions of k-feldspar, plagioclase, and quartz. Coarse euhedral or fine to medium subhedral biotite is the only other abundant mineral present and usually comprises less than 10% of the mode. Both triclinic and monoclinic k-feldspars and zoned and unzoned sodic plagioclases are present. Minor saussuritization of feldspars, especially of zoned plagioclase cores and minor chlorite alteration of biotite, occurs in the "unaltered" portions of the pluton.

Alteration zonation in the Hanson Lake Intrusion has only been observed to date in the western half of the pluton. Alteration minerals occur in and adjacent to stockwork veinlets which crosscut relatively unaltered quartz monzonite. The veinlets vary in size and concentration and also differ in mineralogy. Zones of veinlets bearing different mineralogies are distinct and can be mapped. At least eight (8) alteration assemblages have been observed and are listed below. These assemblages have been divided into two zones which consist of a higher temperature mineral assemblage which grades into a corresponding lower temperature assemblage.

5.2.1 Alteration Assemblages

1. Quartz veinlets - with apparently little or no alteration of wall rocks.

2. Quartz-sericite assemblage - quartz veinlets with bleached alteration envelopes containing quartz and sericite.

3. Quartz-actinolite assemblage - veinlets with actinolite selvages and quartz. Very minor sphene is usually present in narrow, bleached alteration envelopes.

4. Actinolite-sphene± biotite veinlets - coarse grained actinolite with minor amounts of fine to coarse grained sphene and late biotite.

5. Actinolite-chlorite veinlets - chloritization of actinolite accompanied by bleached alteration envelopes. Calcite may be present in the envelopes.

6. Siderite-limonite-quartz-sericite assemblage - coarse-grained siderite with crusts of limonite. Wall rock is extensively altered to quartz and sericite with carbonate, probably calcite.

7. Carbonate-chlorite assemblage - calcite veinlets with chlorite pseudomorphs after wall rock biotite.

8. Calcite veinlets - usually narrow and least abundant of all veinlet types.

These assemblages can be grouped into two zones. The zone boundary is gradational and is marked by the disappearance of actinolite toward the margin of the pluton and the appearance of carbonates. Chlorite alteration of actinolite is common and may represent overprinting by the lower temperature assemblages. The two recognized alteration zones of the Hanson Lake Intrusion are here labelled the Actinolite Zone and the Carbonate Zone. The Actinolite Zone lies toward the centre of the altered portion of the pluton and includes assemblages 1 through 5. Although assemblage 1 occurs in both zones, it is most common in the Actinolite Zone. Along the inferred southwestern contact of the intrusion the Carbonate Zone occurs. Assemblages 6 to 8 are found within this zone as well as a few quartz veinlets described as Assemblage 1.

5.3.0 MINERALIZATION

Geochemical surveys conducted in 1965 and 1979 suggest that the Hanson Lake Intrusion potentially hosts significant concentrations of W, Sn and Mo. Only a limited amount of work has been performed to date in the area which so far has produced one scheelite showing. The showing is located on a granitic bluff on the east side of a small kettle lake which lies approximately four hundred (400) meters east of the South McQuesten River, approximately twenty-two hundred (2200) meters due north of the most western extremity of the largest of the Hanson Lakes. This location is also eighteen hundred (1800) meters N70E of the point at which the road which dissects the pluton crosses the South McQuesten River. Here scheelite occurs in a quartz vein which cuts the granitic rocks in an area not mapped by the writer. A grab sample assayed 0.08%W(0.10% WO_3).

In addition to this showing, pan samples taken from various creeks in the area contained W, Sn and Mo minerals. Scheelite, powellite, and cassiterite occurred in pan concentrates from creeks which drain altered zones of the intrusion. These concentrates were assayed for W, Sn, Mo and total Fe.

Values for tungsten ranged from 0.20% W to 0.02% W. The peak value was obtained from the west fork of West Hanson Creek at its confluence with the east fork. The west fork of West Hanson Creek is believed to roughly follow the pluton - Lower Schist contact.

It is at this location that a peak value for W was obtained from silt samples analyzed for the -80 mesh fraction. This junction is located roughly three hundred and fifty (350) meters upstream from the point at which the road crosses West Hanson Creek before it enters the South McQuesten River. Other interesting values were obtained from sites which drained the altered portion of the pluton. Values of 0.13% W were obtained at sites from which peak Mo values were obtained. These sites are discussed below with molybdenum.

Molybdenum pan concentrates were assayed for Mo and have been converted to MoS_2 values. MoS_2 concentrations ranged from a low of 0.008% MoS_2 to a peak of 0.018% MoS_2. Two such peak values were obtained from the east fork of West Hanson Lake where it drains the altered portion of the pluton. One sample was obtained from the east fork at the same junction discussed above under tungsten. The other peak value was obtained three hundred (300) meters upstream from the previous site mentioned.

Tin assays gave a range between 0.29% Sn and trace amounts less than 0.05% Sn. The peak value for tin was obtained from a sample collected at the mouth of East Hanson Creek where it enters the South McQuesten River. This area was not mapped by the writer and, therefore, no comment can be made other than the fact that the sample site is within the area underlain by the Hanson Lake Intrusion.

5.4.0 CONCLUSION

The Hanson Lake Intrusion is a medium-sized quartz monzonite stock which shows two zones of stockwork alteration. In addition to fresh, unaltered quartz monzonite, a high temperature alteration assemblage named the Actinolite Zone and a low temperature assemblage named the Carbonate Zone have been mapped. Silt geochemistry surveys of 1965 and 1979 and pan concentrate analyses show a distinct positive correlation between areas anomalous in tungsten and molybdenum and areas in which stockwork mineralization has been mapped. No anomalous areas have been outlined where fresh, unaltered granitic rocks have been mapped.

5.5.0 RECOMMENDATIONS

Tungsten and tin occurs in the Hanson Lake Intrusion in the form of scheelite and cassiterite respectively. These minerals appear to be related to the stockwork alteration zones mapped within the pluton. To evaluate the economic potential of the pluton, an extensive rock chip sample survey is recommended. Outcrops cut by stockwork veinlets should be chip sampled over 3 meter lengths and analyzed for W, Sn and Mo. This survey should include outcrops on the West Hanson Creek drainage system and outcrops in the east near the scheelite showing east of the South McQuesten River.

If results obtained from the above survey are encouraging, a soil geochemistry survey is recommended. Since both scheelite and cassiterite are relatively stable in the weathering environment a conventional soil geochemistry survey would be of little use. When liberated during weathering these heavy minerals remain close to the bedrock-residual soil interface. The most reliable sampling procedure for tungsten and tin geochemistry purposes would be to analyze soils from the bedrock-residual soil interface. The deep overburden sampling system is designed to draw samples from this horizon. The recommended system is the Pionjar Shallow Overburden Drilling Method which is not to be confused with a reverse circulation drilling system. Overburden is likely less than 6 meters on the intrusive knobs interpreted from aerial photographs. On the flanks of the knobs and in the creek valleys between the knobs overburden is likely much deeper and

of material unfavourable for this sampling technique. Sampling would be conducted on grid coordinates over areas inferred from chip sampling to exhibit favourable potential. Samples should be analyzed for tungsten and tin.

BIBLIOGRAPHY

Boyle, R.W. 1965 Geology, Geochemistry and Origin of the Lead-Zinc-Silver Deposits of the Keno Hill-Galena Hill Area, Yukon Territory; G.S.C., Bull 111

Gleeson, C.F., 1966 (a) Molybdenum Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C. Map 51-1965

(b) Tungsten and Tin Content of Stream and Spring Sediments, Keno Hill Area, Yukon Territory; G.S.C., Map 52-1965

Green, L.H., 1971 Geology of Mayo Lake, Scougale Creeks and McQuesten Lake Map-Areas, Yukon Territory. G.S.C., Memoir 357

BE CLAIM GROUP

6.1.0 INTRODUCTION

6.1.1 Terms of Reference

Bema Industries Ltd. has been contracted by Canada Tungsten Mining Corporation Limited to carry out a geological evaluation of the BE Claim Group. The BE claims were staked by Bema Industries Ltd. in February 1979. This evaluation consists of data compiled from an indepth study of related prospecting, regional and detailed mapping, a geophysical survey and prospecting on adjacent and related claim groups. In addition, Bema Industries Ltd. has ensured tenure of mineral rights within these claim groups.

6.1.2 Scope of Report

Due to the scarcity of outcrops on the Northern BE claims and the remoteness of the Eastern and Southern BE claims that are accessible only by helicopter, this report is confined to a regional geologic description and compilation of previous exploration programs carried out by former owners with the major emphasis on the Southern BE claims.

6.1.3 Location and Access

The Northern BE Claim Group is located in the Ladue and Gambler Lake Valley and adjoin the ZAP Claim Group on the western boundary. The Eastern BE Claims cover Caribou Hill and the eastern slopes of Keno Hill. The southern portion of the BE Claims are located in McNiell and McMillan Gulch and the eastern slopes of Bunker Hill.

The BE Claim Group is not accessible by road and the majority of the claim group must be reached by helicopter or fixed wing aircraft. MAP 1-1

6.1.4 Topography and Vegetation

Gentle to moderate slopes are typical of the topography of this group of claims. The Northern BE claims are covered with thick buckbrush and spruce swamps. The eastern and southern portions of the claim group are in the most part all above tree line, over fifteen hundred (1500) meters in elevation. At lower elevations vegetation is much more dense consisting largely of buckbrush. Other BE claims in the area that lie below the tree line are vegetated by a mixture of black spruce and sparse buckbrush.

6.1.5 Field Work

Field work was restricted to geological traverses along claim lines in the southern and eastern areas and regional geologic mapping. The Eastern Baseline was extended into the Northern BE Claims and seven north south cross lines were cut in the Gambler Lake Valley. FIGURE 1-4. A Maxmin E.M. Survey was carried out on the cross lines. The reader is referred to the Geophysical section of the Western ZAP Claim Group Geological Evaluation in this report for a detailed account of this survey. FIGURE 3-5. Geologic mapping in the Gambler and Ladue Lake is severely hampered by the thick overburden cover and scarcity of outcrop.

6.1.6 Claim Status

The BE claims are owned by Canada Tungsten Mining Corporation Limited and consist of 283 Quartz Claims. A list of these claims including the grant number and date of expiry may be found on TABLE 1

6.2.0 GEOLOGY

6.2.1 Regional Geology

Area Distribution (See FIGURE 1-2) (TABLE 1-3)

The geology of the BE Claim Group has been described by Keale (1905), Bostock (1947), Kindle (1954), Boyle (1955), and Green (1965). The rocks underlying the BE Claims are very similar to those of the Keno Hill area and lie on the Western limb of the Mayo Lake Anticline which has an axis trending from Keno Hill South East to the eastern arm of Mayo Lake. Regional strike exhibits a swing from EW to NS while the regional dip remains relatively constant at from 10° to 30°.

The Ladue Lake and Gambler Lake Valley is underlain by the Lower Schist Formation consisting of phyllites and graphitic schist.

Rocks found on the BE Claims are predominantly Lower Schist and Keno Hill (Central) Quartzite formations. The contact between these rock units is approximately east-west and curves to the southeast across the eastern side of Keno Hill. The quartzite and schist formations are intruded by locally abundant greenstone sills. Rocks further to the south in the Bunker Hill-McNiell Gulch area are underlain by both quartzite and Upper Schist formations.

6.2.2 Lower Schist Formation

Outcrops of Lower Schist in the area of the BE Claims are of predominantly two rock types. The most abundant of these types is an apple green quartz-sericite schist which is strongly foliated and crenulated and exhibits many small drag-folds. Quartz boudins are likewise abundant ranging in thickness from one to five centimeters and from approximately five (5) to fifty (50) centimeters in width.

Dark gray to black graphitic schist is interbedded with the quartz-sericite schist. Interbeds vary from a few tens of centimeters to tens of meters in thickness. This strongly foliated and crenulated graphitic schist also contains an abundance of boudins ranging in size from small to large.

6.2.3 Keno Hill (Central) Quartzite Formation

Outcrops of Keno Hill Quartzite are predominantly massive beds thirty (30) centimeters to ten (10) meters in thickness. Interbeds of graphitic phyllite, phyllitic quartzite and phyllite are common. They vary from two (2) centimeters to one meter in thickness and constitute less than ten percent of any given sequence of Keno Hill Quartzite Formation.

In detail, the quartzite varies in colour from white to dark gray with intermediate colours being the most common. Light to dark gray bands ranging in size from one to five millimeters are at times visible. These bands are probably original sedimentary layers.

In many quartzite samples a phyllitic foliation is present. Platy minerals causing this foliation are fine to coarse grained golden muscovite and black graphite.

6.3.0 HISTORY AND DISCUSSION

6.3.1 Northern BE Claims

The Ladue-Gambler Lake Valley that underlies the Northern BE Claims has not been previously explored due to the deep overburden and lack of outcrop. To date mineralization has not been encountered on this portion of the BE Claim Group.

6.3.2 Eastern BE Claims

Numerous operators have intermittently held the ground encompassed by the Eastern BE Claims but the Keno Hill type Ag-Pb-Zn mineralized veins in this area have been found to be extremely narrow with low silver values. The close proximity to the Idaho General Mines optioned claims and the Faith silver-lead vein is of consequence.

6.3.3 Southern BE Claims

Numerous claims have been located in the past in the area of the Southern BE Claims and sporadic prospecting has been carried out for gold and silver. An adit was driven in the headwall of the McNiell Gulch in 1940 by C. Brefalt. In 1964 the Geological Survey of Canada carried out a stream sediment survey in the Keno Hill area including the streams draining the BE claims. United Keno Hill Mines Ltd. staked 276 claims in 1965-66 as a follow up to this survey. This survey produced 22 veins located in McNiel Gulch that produced encouraging values. An exploration shaft was sunk on the 21 vein and 404 tons of ore was blocked out grading 1.20 ounces/ton gold and 18.3 ounces/ton silver over an average width of one meter.

The McNiel Gulch's potential is best exemplified by the following summary taken from the "Report on the 1968 Exploration Program in the McNeill Gulch Area by G.S. Zimmer, United Keno Hill Mines Ltd."

McNeill Gulch:

1. Channel samples cut on a 2' interval over 72' horizontally and 20' down-dip on the 21 Vein have blocked out 404 tons or ore grading 1.20 oz/ton Au and 18.3 oz/ton Ag over an average width of 3.3'.

2. The 21 Vein is open at depth and to the NE, although a bedding fault intersection is expected to the NE which would also limit the depth.

3. Trenching on the 35 Vein exposed a structure 6.9' wide, but cut off on both ends by bedding faults after a 40' length.

4. The 35 Vein was channel sampled on a 2' interval for a 20' length and assayed 0.49 oz/ton Au and 17.9 oz/ton Ag over a 6.9' width.

5. Float, containing 40-60% jamesonite, assaying 1.28 oz/ton Au, 3.7 oz/ton Ag and 21.77% Pb was traced to the 28 Vein, possibly indicating an ore shoot similar to the 21 Vein.

6. The 23 Vein has an apparent length of 600', most of which is talus covered.

7. The 42 Vein was channel sampled on a 5' interval for 40' and returned 0.68 oz/ton Au over a 0.9' width with negligible Ag values.

8. Selected samples from heavy talus over the 49 Vein assayed 1.18 oz/ton Au - 2.0 oz/ton Ag and 1.78 oz/ton Au - 2.5 oz/ton Ag.

9 The area containing the 39, 40, 41, 42, 46, 47, 48, 49, 50 and 51 Veins are of interest because of the vein concentration, but the veins do not outcrop and heavy talus will hinder trenching.

10. The exact relationship of greenstones and veins is still unknown. Veins have been observed to cut the narrow schistose sills, but they are also found to be cut off by the massive sills and lenses.

11. Bedding faults have been observed to cut off the veins. Although the displacement on these low-angle faults is thought to be small, the variable mineralogy of the veins and their frequency of occurrence makes correlation and the consequent bedding fault displacement determination impossible.

12. As the bedding faults eliminate the possibility of projecting any of the veins to depth, the lack of targets precludes core drilling or collaring an adit on the basis of present information.

13. Topography requires that all trenching must be done by hand methods. While this type of operation produces the desired results, it is extremely time consuming. The most probable alternative is an extensive and expensive monitoring operation.

14. The area of McNeill covered by the 1968 program contains only 10% outcrop.

15. Gold values, though occasionally quite high, are very erratic which requires a close sample interval to properly evaluate the veins.

6.4.0 CONCLUSIONS AND RECOMMENDATIONS

6.4.1 Northern BE Claims

The Northern BE Claims at this time have a low priority due to the thick cover of overburden and the lack of known mineralization. The claims are inferred to be underlain by the Lower Schist Formation and therefore their potential for Keno Hill type silver veins would be limited to areas of greenstone lenses.

The claims should be geologically mapped and prospected with the aid of helicopter support with an emphasis on locating greenstone lenses that are crossed by air photo linaments. This survey should take a geologist and helper approximately two weeks to complete.

6.4.2 Eastern BE Claims

The Eastern BE Claims have some potential for silver-lead vein mineralization. The major veins that crosscut the Idaho General Mine's optioned claims, the Main Vein and the Comstock Vein may continue onto the BE Claim Group. Additional smaller veins are known including the Faith Vein and offer limited potential for economic mineralization. This area covered by the BE claims would be of definite interest if economic vein mineralization is encountered on the Idaho General Mine's claims. A geologist and assistant should geologically map and prospect the Eastern BE claims with an emphasis on areas underlain by Quartzite and where known veins project onto the claim group. Three weeks should be spent on this survey with the aid of helicopter support.

6.4.3 Southern BE Claims

A major exploration program by United Keno Hill Mines Ltd. has outlined twenty two (22) gold-silver veins in the McNeill Gulch area. The Southern BE Claims were staked over a number of these veins which offer an attractive exploration target. Exploration is hampered

by talus, overburden and steep slopes but conventional prospecting has deliniated zones of economic mineralization. A geologist and helper should geologically map and prospect the Southern BE claims. Detailed mapping and sampling of known veins followed by blasting and trenching on the steep slopes and cat trenching where practical should follow. A fly camp will be required in McNeill Gulch supported by helicopter. A two man crew in the early spring should survey all claim posts along the southern boundary including the recent staking in 1979 by United Keno Hill Mines Ltd. with immediate follow up staking of fractions on open ground that may lie between the two claim groups. Priority should be given to the claim surveying as 19 and 21 Veins lie on the southern boundary of the BE Claims. It would be expected that this program would be completed in eight to ten weeks.

SHEET 105-M-13

LATITUDE 63° 45' To 64° 00'
LONGITUDE 135° 30' To 136° 00'

MOUNT HALDANE

CANADA
DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
NORTHERN ADMINISTRATION AND LANDS BRANCH
MINING AND LANDS DIVISION

SCALE: 1/2 MILE To 1 INCH

FT. 1500 0 1500 3000 4500 6000 7500 9000 10500 FT.

ISSUED UNDER THE AUTHORITY OF THE MINISTER
OF
NORTHERN AFFAIRS AND NATIONAL RESOURCES

Department of Indian Affairs & Northern Development
Northern Natural Resources and Environment
MAR 3 1980
Property of Surveys, Mapping and Remote Sensing Sector
Surveys and Mapping Branch
Energy and Land Affairs

Magnetic North
N 33° 50' E

116-A-1	106-D-4	106-D-3
115-P-16	105-M-13	105-M-14
115-P-9	105-M-12	105-M-12

NOTICE

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	26 NOV. 74		
	2 NOV. 72		
	3 AUG. 72		
	27 AUG 68		
	29 July 68		
	18 Mar. 59	8 JAN. 80	10 FEB 80 8 FEB 80 25 JAN 80
WHITEHORSE	29 Oct. 58	12 MAR. 79	17 JAN 80

NOTE FOR PLACER CLAIMS SEE SHEET 105-M-13 PLACER

136° 00'
64° 00'
135° 30'
63° 45'
136° 00'
63° 45'
135° 30'

REX
SWEDE
SWEDE CREEK
HAGGART CREEK
LYNX CREEK
SNOWSHOE CREEK
GERLITZKI CR.
ARGENT CR.
McQUESTEN RIVER
SOUTH
ROSS RIVER
CONE CREEK
SHANGHAI CREEK
REUBEN
HAMBERS
ZAP
CH
HILL
SIN
IS
TER
CORK
JOUMBRA
MOUNT HALDANE
6032
AG
BP
AXE
SNOWDRIFT
WAYNE
DON
BUCONNO
KPO
MOM
MARY ANN
CLIMAX
COLLEEN
LEO
ORCHID
PINE TREE
LYNNE
WAL
SPRUCE
WILLIAMS CREEK
MONMEO
CHRISTAL CR.
ORKERY CREEK
FIELD CREEK
HALFWAY LAKES
MUD CREEK
ROARING FORK CREEK
MAYO RIVER
DUNCAN CR.
4010
MAYO
13 MI.
KENO HILL
11 MI.

105-M-13

SHEET 105M-14

LATITUDE 63° 45' To 64° 00'
LONGITUDE 135° 00' To 135° 30'

KENO HILL

CANADA

DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
NORTHERN ADMINISTRATION AND LANDS BRANCH
LANDS DIVISION

SCALE: 1/2 MILE To 1 INCH

FT. 1500 0 1500 3000 4500 6000 7500 9000 10800 FT.

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OF
NORTHERN AFFAIRS AND NATIONAL RESOURCES

NOTICE

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2 DEC. 71
18 MAY 71
26 FEB.
27 June 68
19 Feb 68
11 Dec 63
27 FEB 62
WHITEHORSE 25 April 57

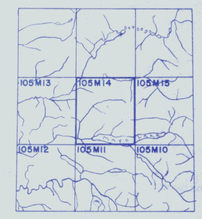
14 MAR. 79
31 Oct. 72
28 July 72

20 JUNE 79
19 JUNE 79
1 JUNE 79
8 MAY 79
26 APRIL 79
19 APRIL 79
26 MAR 79
22 MAR. 79

15 NOV 79
18 Oct 79
26 Oct 79
VIRUS 79
27 JULY 79
28 JULY 79
5 JULY 79
3 JULY 79

8 FEB. 80

Magnetic North
1954 AVE
N 33° 15' E



NOTE: FOR PLACER CLAIMS SEE SHEET 105 M-14 PLACER.

105-M-14

SHEET-106-D-3

LATITUDE 64°00' TO 64°15'
LONGITUDE 135°00' TO 135°30'

MC QUESTEN LAKE

DEPARTMENT OF RESOURCES AND DEVELOPMENT
DEVELOPMENT SERVICES BRANCH
LANDS DIVISION

SCALE ½ MILE TO 1 INCH

FEET 2000 0 2000 4000 6000 8000 10000 FEET

NOTICE

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	22 JAN.	1975
	22 SEPT.	1971
WHITEHORSE	2 JUNE	1965

24 Nov 75		27 DEC 76			
15 OCT 75		27 NOV 76			
3 OCT 75		28 SEPT 76			
24 SEPT 75		8 SEPT 76		24 OCT 74	
24 JUNE 75		31 JULY 76		16 OCT 74	
20 AUG 75		21 FEB 76		31 AUG 74	
24 JUNE 75		21 NOV 77		6 AUG 74	
		31 OCT 77		13 JULY 74	
	30 NOV 76	4 OCT 77		20 JUNE 74	
	26 OCT 76	19 AUG 77		11 JUNE 74	
	25 JULY 76	7 JULY 77		24 MAY 74	
	15 JUNE 76	15 JUNE 77		7 MAY 74	
	16 MAR 76	7 MAR 77		26 MAR 74	
	18 MAR 76	4 JAN 77		21 MAR 73	

106D-5	106D-6	106D-7
106D-4	106D-3	106D-2
105M-14	105M-15	105M-16

SHEET 106-D-4

LATITUDE 64° 00' To 64° 15'
LONGITUDE 135° 30' To 136° 00'

DUBLIN GULCH

CANADA
DEPARTMENT OF NORTHERN AFFAIRS AND NATIONAL RESOURCES
NORTHERN ADMINISTRATION AND LANDS BRANCH
MINING AND LANDS DIVISION

SCALE: 1/2 MILE To 1 INCH

FT. 1500 0 1500 3000 4500 6000 7500 9000 10500 FT.

ISSUED UNDER THE AUTHORITY OF THE MINISTER
OF
NORTHERN AFFAIRS AND NATIONAL RESOURCES

NOTICE

THIS MAP IS ISSUED AS A PRELIMINARY GUIDE FOR WHICH THE DEPARTMENT OF INDIAN AFFAIRS AND NORTHERN DEVELOPMENT WILL ACCEPT NO RESPONSIBILITY FOR ANY ERRORS, INACCURACIES OR OMISSIONS WHATSOEVER.

22 Aug. 72
30 June 70
WHITEHORSE 28 NOV. 58

Magnetic North
1964 - 15.5° E
1973 - 26.5° E
N 33° - 10' E

116-A-8	106-D-5	106-D-6
116-A-1	106-D-4	106-D-3
115-P-16	105-M-13	105-M-14

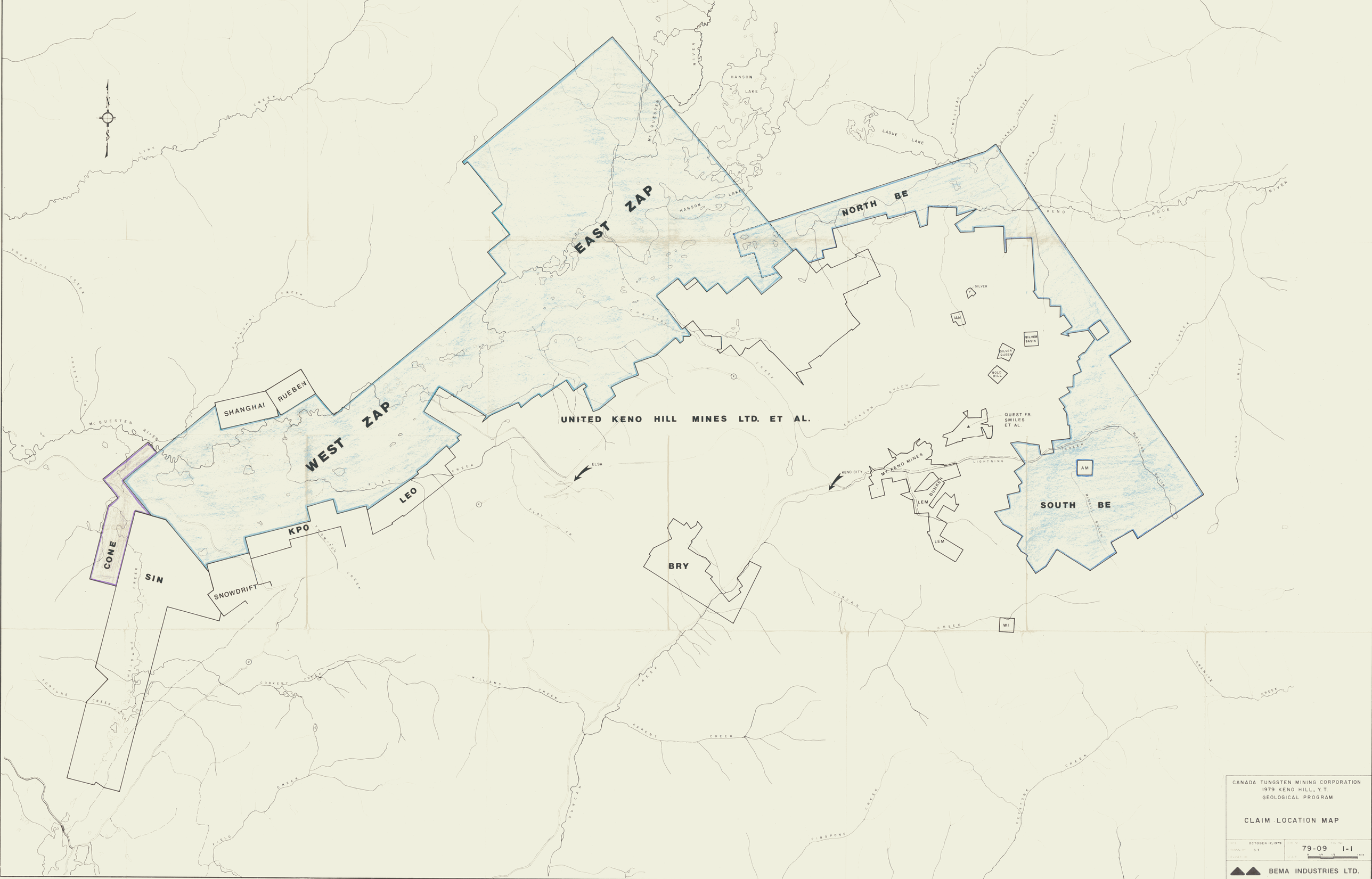
NOTE: FOR PLACER CLAIMS SEE SHEET 106D-4 PLACER.

4th Edition

136°00' 64°15' 55' 50' 45' 40' 35' 135°30' 64°15' 10' 5' 64°00' 55' 50' 45' 40' 35' 135°30'

EAGLE CREEK
EAGLE GLACIER
EAST MCQUESTEN
MCQUESTEN RIVER
LIME CREEK
CHRISTIE CREEK
HAGGART DOME
LYNX DOME
STEAMBOAT LAKE
EAGLE LAKE
JOHN
FAY
TAILINGS
RAISED PT.
JEFF
POTATO HILLS
MAR
ALEC
ALEX
LYNX
HIT
DOG
BOB
DUBLIN GULCH
SMOKY
DAVE
MIC
PESO
AMC
REX
ZAP
CH

106 D-4



CANADA TUNGSTEN MINING CORPORATION
1979 KENO HILL, Y.T.
GEOLOGICAL PROGRAM

CLAIM LOCATION MAP

DATE OCTOBER 17, 1979	DWG. NO. 79-09 FIG. NO. 1-1
DRAWN BY S.T.	SCALE 0 1/4 1/2 1 mile
REVISED BY	

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LEGEND

LITHOLOGIES

- 10 DRIFT
- 9 LAMPROPHYRE
- 8 QUARTZ-FELDSPAR PORPHYRY, RHYOLITE
- 7 GRANDIORITE, QUARTZ MONZONITE, MINOR GRANITE AND QUARTZ DIORITE
- 6 GREENSTONE
- 5 GRIT DIVISION: GRITTY QUARTZITE, ARGILLITE, PHYLLITIC, MINOR LIMESTONE AND CHERT
- 4 PHYLLITIC QUARTZITE, SCHIST; MINOR LIMESTONE.
- 3 UPPER SCHIST FORMATION: QUARTZ-MICA SCHIST, THIN-BEDDED QUARTZITE, PHYLLITE; MINOR LIMESTONE, GREENSTONE.
- 2 CENTRAL (KENO HILL) QUARTZITE FORMATION: MASSIVE QUARTZITE, THIN-BEDDED QUARTZITE, GRAPHITIC PHYLLITE.
- 1 LOWER SCHIST FORMATION: QUARTZ-MICA SCHIST, GRAPHITIC SCHIST, THIN-BEDDED QUARTZITE, PHYLLITE AND ARGILLITE; GREENSTONE.

SYMBOLS

- BEDDING-STRIKE 090°, DIP 45°
- BEDDING-VERTICAL
- FOLIATION
- FAULT
- POSSIBLE FAULT INDICATED BY AIR PHOTO LINEAR
- GEOLOGICAL CONTACT
- ROUGHLY ESTIMATED GEOLOGICAL CONTACT
- ANTICLINE AND SYNCLINE (OVERTURNED)
- ROAD, ALL-WEATHER
- CLAIM BOUNDARY
- VEIN FAULT

NOTE

GEOLOGY COMPILED FROM MAPS BY A.E. AHO AND D.J. TEMPELMAN-KLUIT (GEOLOGY OF THE BOB GROUP, MINERAL CLAIMS MAYO M.D. Y.T.), 1963, R.W. BOYLE (G.S.C. BULL 111), 1965 AND L.H. GREEN (G.S.C. MEMOIR 357), 1971. GEOLOGY MODIFIED FROM MAPPING BY S.C. BARTLETT, T.M. ELLIOTT, C. ORSSICH, AND M.D. PHILPOT IN 1979.

CANADA TUNGSTEN MINING CORPORATION
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GEOLOGICAL PROGRAM

REGIONAL GEOLOGIC COMPILATION

DATE	OCTOBER 17, 1979	JOB NO.	FIG. NO.
DRAWN	S.T.	79-09	1-2
CHECKED		SCALE	0 1/4 1/2 MILE

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Tag number	$Au^{(oz/ton)}$	$Ag^{(oz/ton)}$	Pb (%)
8901	.002	.52	
8954		160	.53

Tag number	$Au^{(oz/ton)}$	$Ag^{(oz/ton)}$	Pb (%)
8955		91	.21

Tag number	$Au^{(oz/ton)}$	$Ag^{(oz/ton)}$	Pb (%)
8804	.02	9.20	4.90
8805	.49	31	
8831	.002	98	
8968	.20	83	.23
8969	.41	64	.15
8970		9.78	2.71
8971	.05	82	.04
8972	.67		

Tag number	$Au^{(oz/ton)}$	$Ag^{(oz/ton)}$	Pb (%)
8962	12.9	4.65	
8963	59.9	30.0	
8961	42.0	20.0	

Tag number	$Au^{(oz/ton)}$	$Ag^{(oz/ton)}$	Pb (%)
8950	0.12	70	

Tag number	$Au^{(oz/ton)}$	Ag /ton	Pb (%)	Zn(%)
8830	.10	101.0	39.0	
8829	.002	117.0	51.5	
8908	.10	27	.08	.01
8801	.27	81	.28	
8802		6.60	2.48	
8909	.33	5.63	.87	.46
8913	.11	.79	.20	.25
8846	.005	14.40	5.25	41.00
8910	.13	.66	.24	.53
8911	.11	.79	.26	.22
8912	.06	.31	.09	.13
8957		143.9		
8974		25.6	11.45	40.0
8975	.08	105.0	2.53	34.8
8803		66.1	15.5	
8958		118		

Tag number	$Au^{(oz/ton)}$	$Ag^{(oz/ton)}$	Pb (%)
8882	0.02	173	.64

Tag number	$Au^{(oz/ton)}$	$Ag^{(oz/ton)}$	Pb (%)
8934	.65	.33	.24

Tag number	$Au^{(oz/ton)}$	Ag /ton	Pb (%)	Zn(%)
8964	.02	42.0	12.5	
8965	17.8	7.8	2.08	

Tag number	$Au^{(oz/ton)}$	$Ag^{(oz/ton)}$	Pb (%)
8858	0.10	185	.61
8956		190	.76

Tag number	$Au^{(oz/ton)}$	$Ag^{(oz/ton)}$	Pb (%)
8842	0.04	455	.53

Tag number	$Au^{(oz/ton)}$	$Ag^{(oz/ton)}$	Pb (%)
8951	.155	.53	

Tag number	$Au^{(PPM/ton)}$	$Ag^{(PPM/ton)}$	Pb(%)
8836	0.030	291	.14

Tag number	$Au^{(PPM/ton)}$	$Ag^{(PPM/ton)}$	Pb(%)
8953	650	25	

3/5
2/5
(27,30,4.05,0.13,0.18)
18/3
18/2
6,14,80 /12
/6
6,30,90 /4
6,12,75
8,9,72
18,645,1280
8,12,65
42,5600,3500
18,785,1570
50,192,4300
43,130,7600
125 PPM Zn
100 PPB Hg
100 PPB Hg
100 PPB Hg
30,22,79
9,20,85 PPM
9,80,21 PPM
6,49,—
9,42,—
4,9,72,—
30,78,—
5,79,—
11,818,220,PPM
12,635,268 PPM
10,50,85 PPM
40,212,275 PPM

HANSON LAKE
LADUE LAKE
KENO CITY
ELSA
MCQUESTEN RIVER
LYNX CREEK
SNOWSHOE CREEK
MARSHALL CREEK
ARGENT CREEK
FORTUNE CREEK
CORKERY CREEK
WILLIAMS CREEK
PARENT CREEK
DUNCAN CREEK
FIELD CREEK
FLAT CREEK
TAKHINI CREEK
MAYO LAKE
HOMESTEAD CREEK
BONANZA CREEK
KENO HILL
LADUE RIVER
FAITH CREEK
GRANITE CREEK
KEYSTONE CREEK
PINGPONG CREEK
ERICSSON CREEK
HUNKER CREEK
MISTAKE GULCH
MILLER CREEK
MAYO

GEOCHEMISTRY

SEDIMENTS
-80 MESH FRACTION , Ag, Pb, Zn PPM .

PAN CONCENTRATES
(Fe TOTAL, Sn, W, Mo)g/3 PERCENT

ROCK SAMPLE
TAG NUMBER , Au, Ag OZ/TON
Pb, Zn %

SYMBOLS

- x ROCK SAMPLE LOCATION
- ⊗ PAN SAMPLE LOCATION
- ● SEDIMENT SAMPLE LOCATION
- ○ OVERBURDEN SAMPLE LOCATION
- PPM / PPB SOIL ANOMALY

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ANOMALOUS GEOCHEMISTRY OF THE KENO HILL – GALENA HILL AREA

DATE OCTOBER 17, 1979
DRAWN BY S.T.
REVISED BY
JOB NO. 79-09
FIG NO. 1-3
SCALE 0 1/4 1/2 1 mile

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SOUTH McQUESTEN RIVER VALLEY
GRID MAP

DATE	OCTOBER 17, 1979	JOB NO.	FIG. NO.
DRAWN BY	S.T.	79-09	1-4
REVISED BY		SCALE	

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WESTERN ZAP, CONE, SIN CLAIM GROUP

DATE: OCTOBER 10, 1979	JOB NO: 79-09	FIG. NO: 3-2
DRAWN BY: S.T.		
REVISED BY:		

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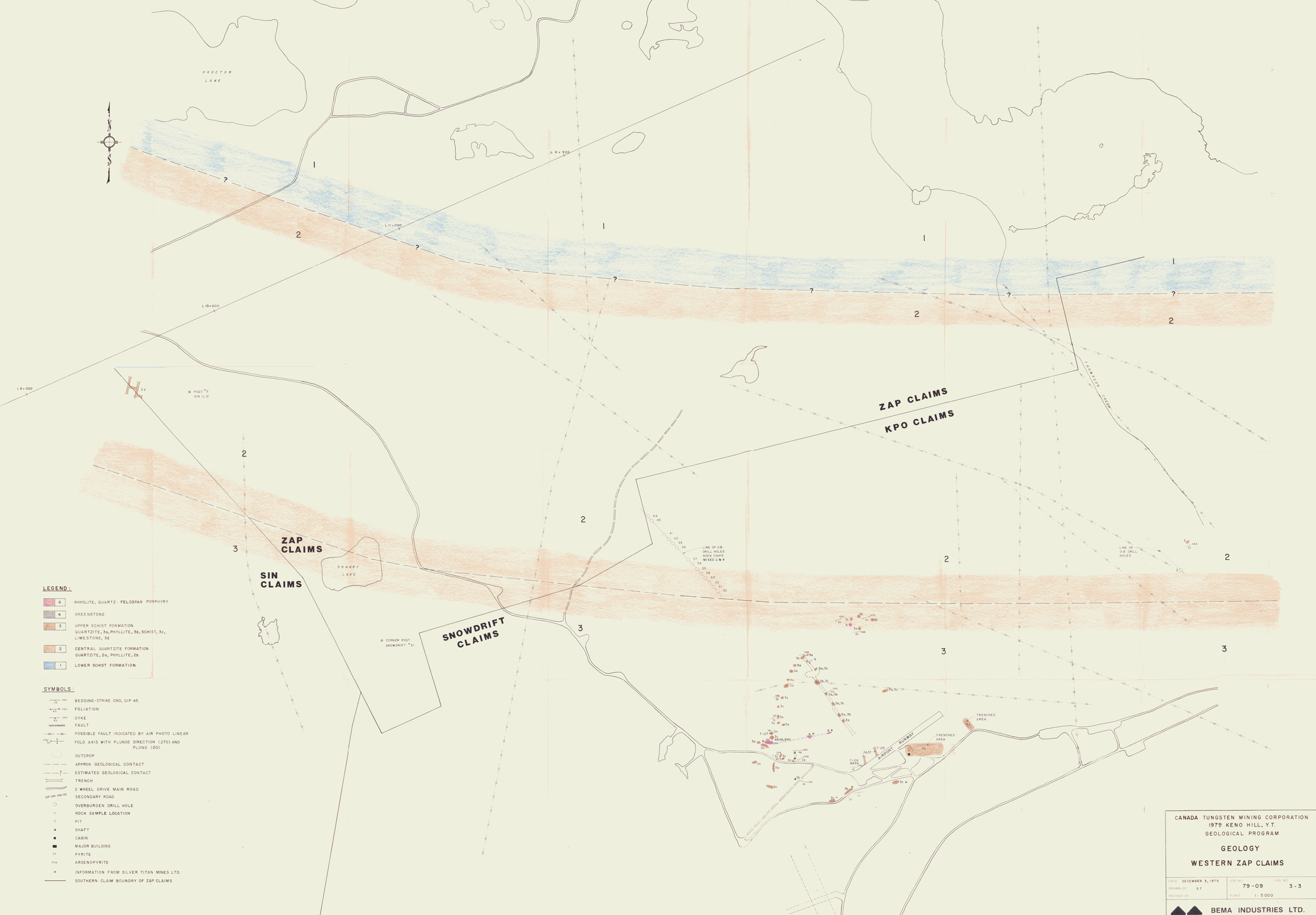

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GEOLOGICAL PROGRAM

GEOLOGY

WESTERN ZAP CLAIMS

DATE DECEMBER 3, 1979.	JOB NO. 79-09	FIG. NO. 3-3
DRAWN BY S.T.		
REVISED BY	SCALE 1:5000	

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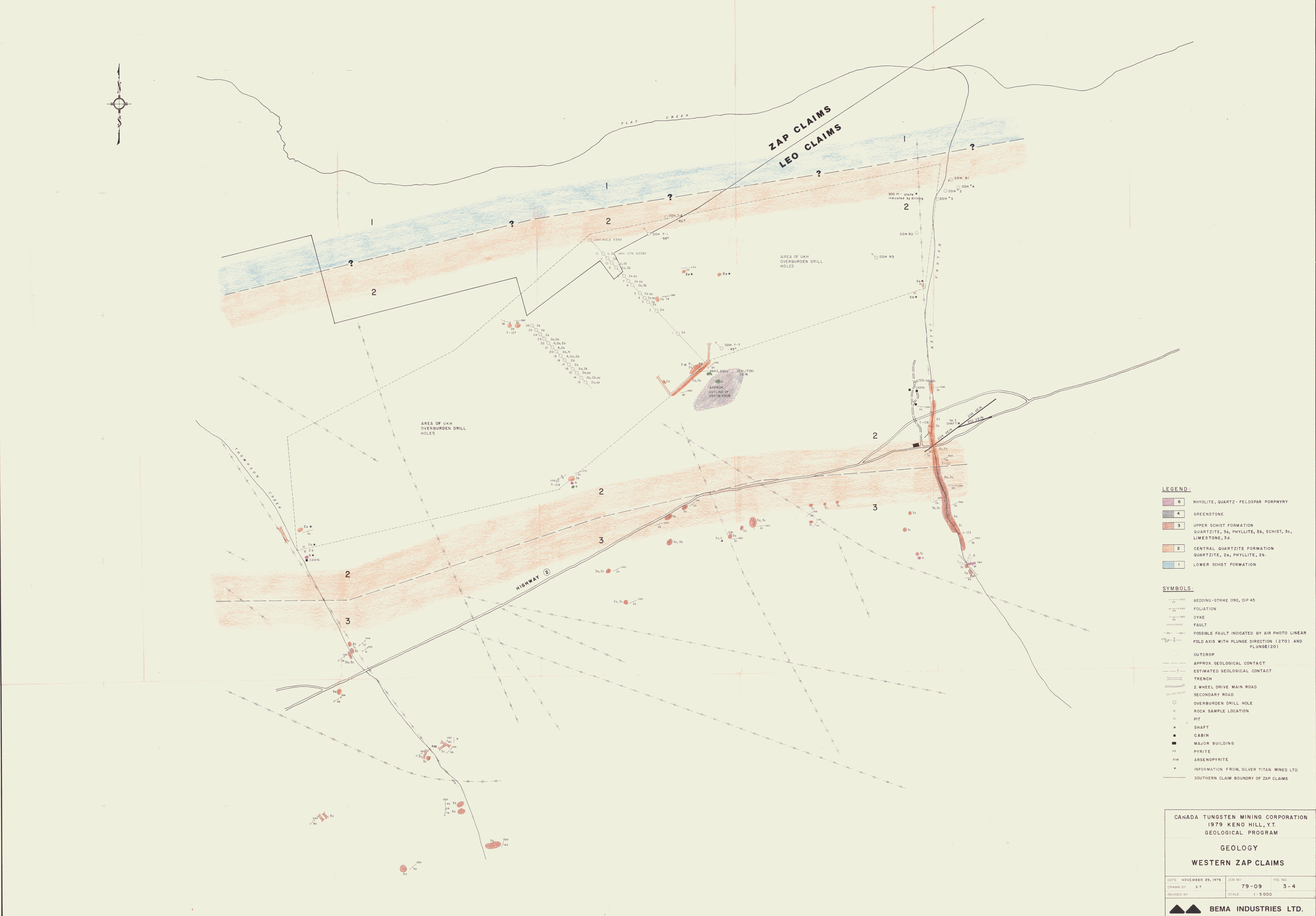

CANADA TUNGSTEN MINING CORPORATION
1979 KENO HILL, Y.T.
GEOLOGICAL PROGRAM

GEOLOGY

WESTERN ZAP CLAIMS

DATE: NOVEMBER 29, 1979	JOB NO: 79-09	FIG. NO: 3-4
DRAWN BY: S.T.		
REVISED BY:	SCALE: 1:5000	

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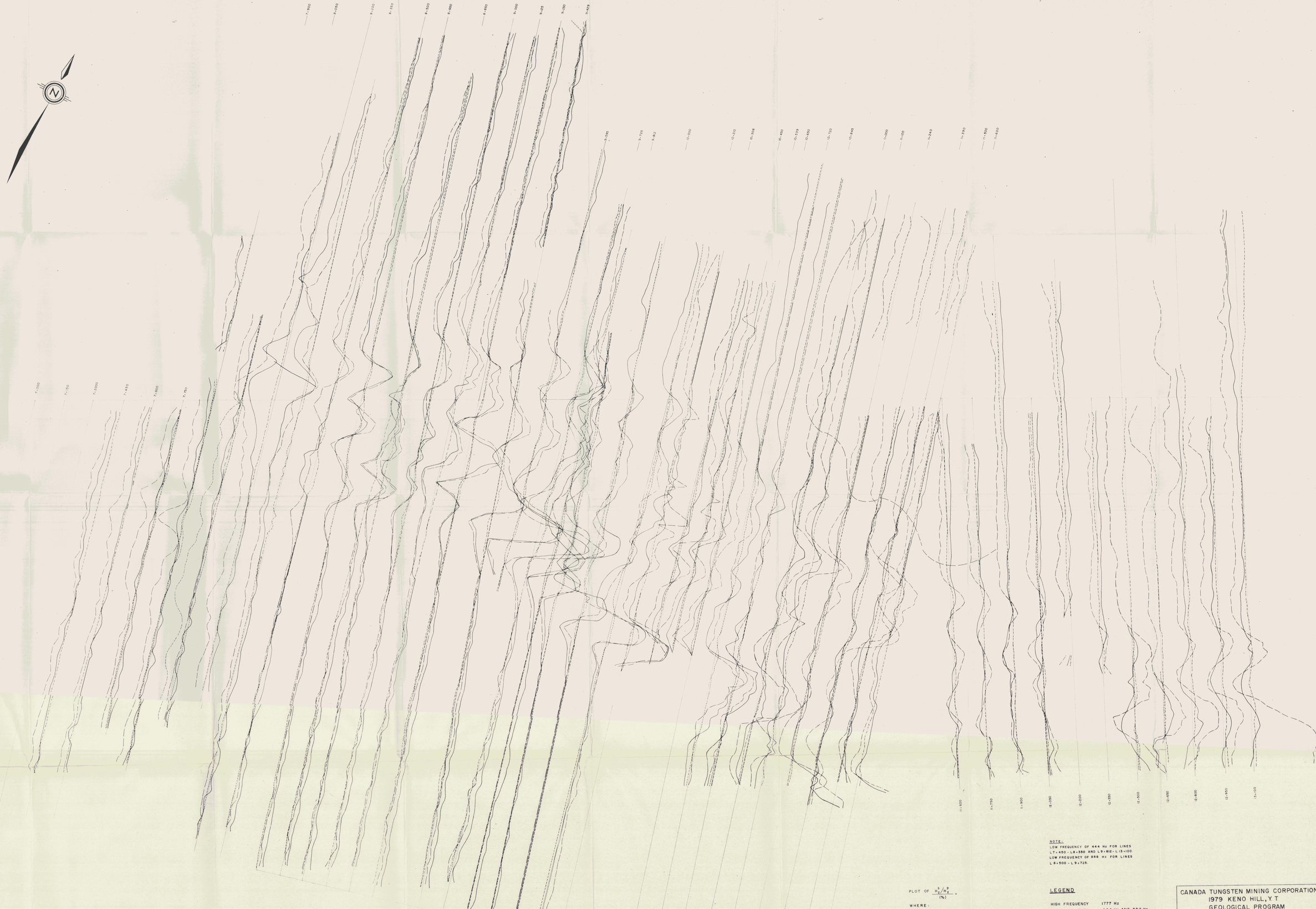


NOTE:
LOW FREQUENCY OF 444 Hz FOR LINES
L7+450 - L8+350 AND L9+812 - L13+100
LOW FREQUENCY OF 888 Hz FOR LINES
L8+500 - L9+725.

PLOT OF $\frac{H_z^s/H_z^p}{(\%)}$ x

WHERE:
H_z^s = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE SECONDARY FIELD.
H_z^p = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE PRIMARY FIELD.
1cm = 10 %

LEGEND

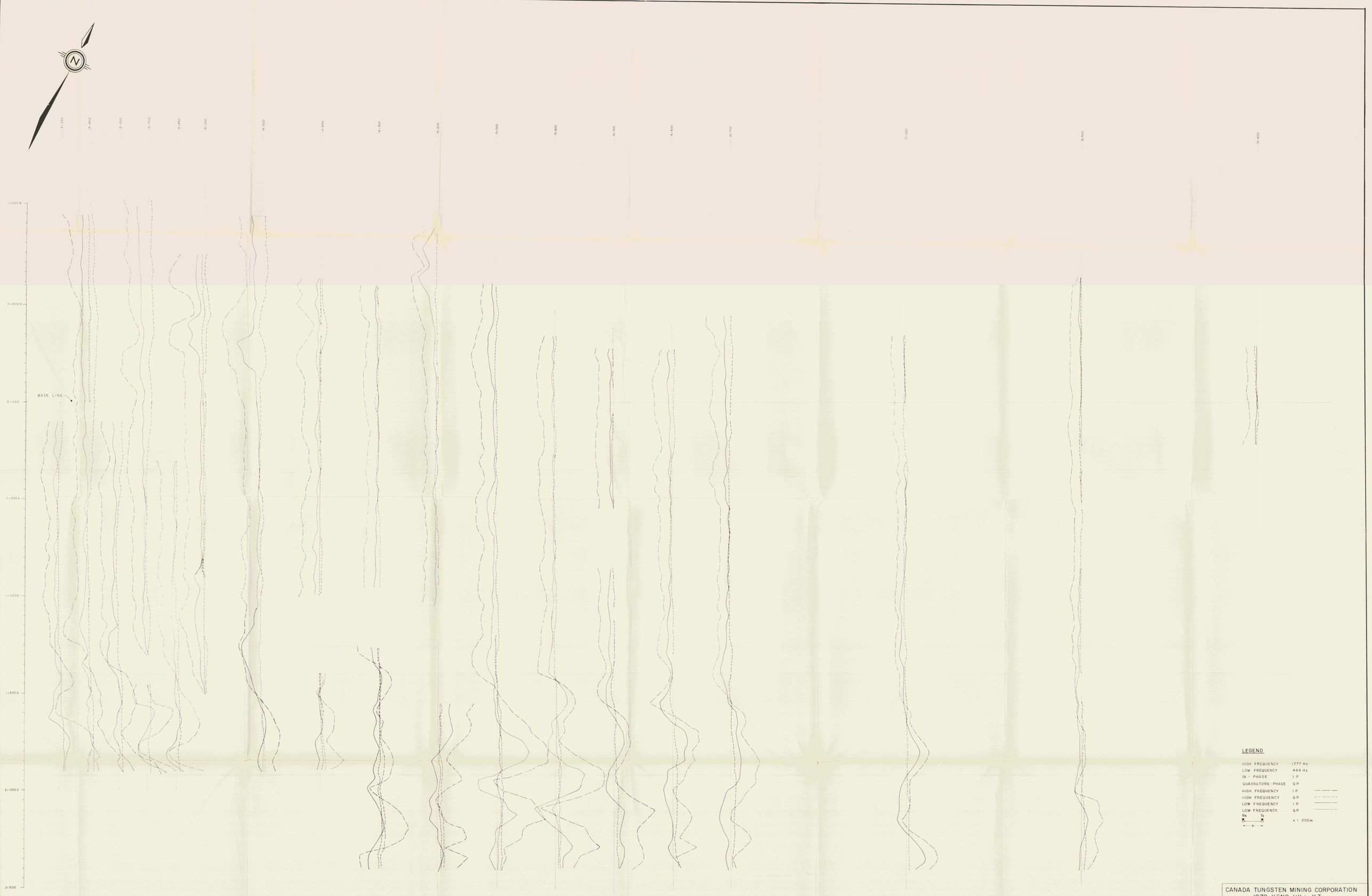
HIGH FREQUENCY	1777 Hz
LOW FREQUENCY	444 Hz AND 888 Hz
IN - PHASE	I.P.
QUADRATURE-PHASE	Q.P.
HIGH FREQUENCY	I.P. — — —
HIGH FREQUENCY	Q.P. - - - - -
LOW FREQUENCY	I.P. ———
LOW FREQUENCY	Q.P. - - - - -
Rx Tx	x = 150 m ON L12+350 AND ALL WEST
Rx Tx	x = 200 m ON L12+500 AND ALL EAST

CANADA TUNGSTEN MINING CORPORATION
1979 KENO HILL, Y.T.
GEOLOGICAL PROGRAM

MAXMIN II E.M. SURVEY

DATE	NOVEMBER 21, 1979	JOB NO.	FIG. NO.
DRAWN BY	S.T.	79-09	PLATE I.
REVISED BY		SCALE	1 : 5000

BEMA INDUSTRIES LTD.



LEGEND

HIGH FREQUENCY	1777 Hz
LOW FREQUENCY	444 Hz
IN - PHASE	I P
QUADRATURE-PHASE	Q P
HIGH FREQUENCY	I P
HIGH FREQUENCY	Q P
LOW FREQUENCY	I P
LOW FREQUENCY	Q P

Rx Tx x = 200m

PLOT OF $\frac{H_z^s / H_z^p}{(\%)}$ x

WHERE:

H_z^s = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE SECONDARY FIELD.

H_z^p = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE PRIMARY FIELD.

1cm = 10 %

CANADA TUNGSTEN MINING CORPORATION
1979 KENO HILL, Y.T.
GEOLOGICAL PROGRAM

MAXMIN II E. M. SURVEY

DATE: NOVEMBER 27, 1979	JOB NO: 79-09	FIG. NO: 3-5 PLATE 2.
DRAWN BY: S.T.	SCALE: 1 : 5000	
REVISED BY:		

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L 20+300

L 21+200

L 22+100

L 23+000

L 23+700

L 24+600

L 25+500

L 26+400

1+000 N

0+500 N

BASE LINE

0+000

NOT CUT

0+500 S

1+000 S

1+500 S

2+000 S

2+500 S

PLOT OF $\frac{H_z^s / H_z^p}{(\%)}$ =

WHERE:

H_z^s = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE SECONDARY FIELD.

H_z^p = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE PRIMARY FIELD.

1 cm = 10 %

LEGEND

HIGH FREQUENCY	1777 Hz	
LOW FREQUENCY	444 Hz	
IN - PHASE	I.P.	
QUADRATURE-PHASE	Q.P.	
HIGH FREQUENCY	I.P.	– – – –
HIGH FREQUENCY	Q.P.	– – – – – –
LOW FREQUENCY	I.P.	———
LOW FREQUENCY	Q.P.	———
Rx Tx	x = 200 m	

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MAXMIN II E.M. SURVEY

DATE: NOVEMBER 20, 1979	JOB NO: 79-09	FIG NO. 3-5 PLATE 3.
DRAWN BY: S.T.	SCALE: 1:5000	
REVISED BY:		

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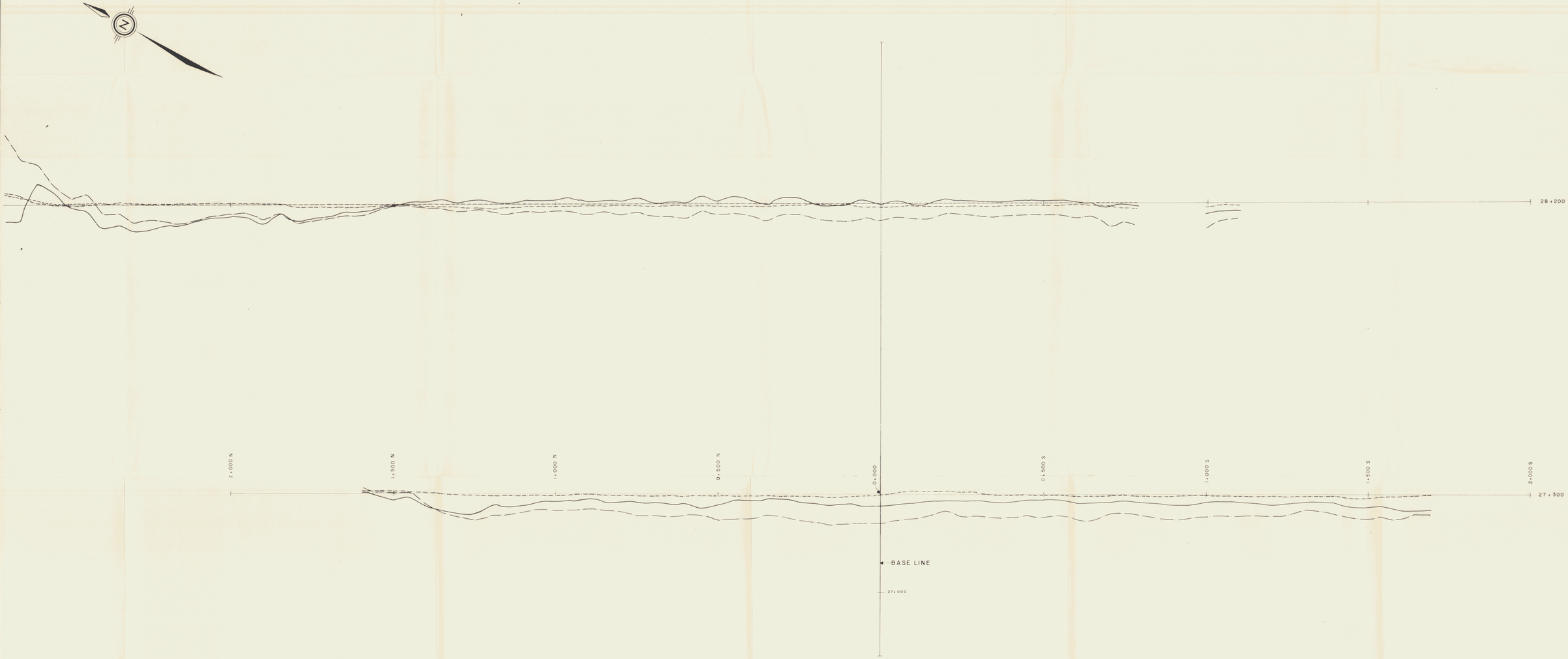
MAXMIN II E.M. SURVEY

DATE NOVEMBER 22, 1979	JOB NO. 79-09	FIG. NO. 3-5 PLATE 4.
DRAWN BY S.T.	SCALE 1:5 000	
REVISED BY:		

BEMA INDUSTRIES LTD.



PLOT OF $\frac{H_z^s / H_z^p}{(\%)}$ =

WHERE:

H_z^s = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE SECONDARY FIELD.

H_z^p = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE PRIMARY FIELD.

1cm = 10 %

LEGEND

HIGH FREQUENCY	1777 Hz
LOW FREQUENCY	444 Hz
IN - PHASE	I.P.
QUADRATURE-PHASE	Q.P.
HIGH FREQUENCY	I.P.
HIGH FREQUENCY	Q.P.
LOW FREQUENCY	I.P.
LOW FREQUENCY	Q.P.

Rx Tx

x

x = 200 m FOR L 27+300
x = 150 m FOR L 28+200

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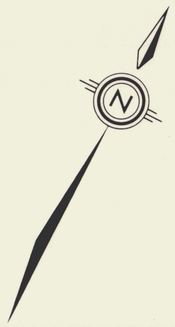
1979 KENO HILL, Y.T.
GEOLOGICAL PROGRAM

MAXMIN II E.M. SURVEY

DATE NOVEMBER 23, 1979.	JOB NO. 79-09	FIG NO. 3-5 PLATE 4A.
DRAWN BY S.T.	SCALE 1:5000	
REVISED BY		

BEMA INDUSTRIES LTD.





PLOT OF $\frac{H_z^s / H_z^p}{(\%)}$ =

WHERE:

H_z^s = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE SECONDARY FIELD.

H_z^p = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE PRIMARY FIELD.

1 cm = 10 %

LEGEND

HIGH FREQUENCY	1777 Hz	
LOW FREQUENCY	444 Hz	
IN - PHASE	I.P	
QUADRATURE-PHASE	Q.P	
HIGH FREQUENCY	I.P	— — —
HIGH FREQUENCY	Q.P	– – – –
LOW FREQUENCY	I.P	———
LOW FREQUENCY	Q.P	· · · · ·

Rx Tx x = 150 m

CANADA TUNGSTEN MINING CORPORATION
1979 KENO HILL, Y.T.
GEOLOGICAL PROGRAM

MAXMIN II E.M. SURVEY

DATE NOVEMBER 26, 1979.	JOB NO.	FIG. NO.	3-5
DRAWN BY S.T.	79-09	PLATE 5.	
REVISED BY	SCALE 1:5000		

BEMA INDUSTRIES LTD.

1 – 7 045T-070 T TRENDS

◇1 – ◇4 300T – 340T TRENDS

(I) 030T TRENDS

75 Hg CONTOUR (IN PPB)

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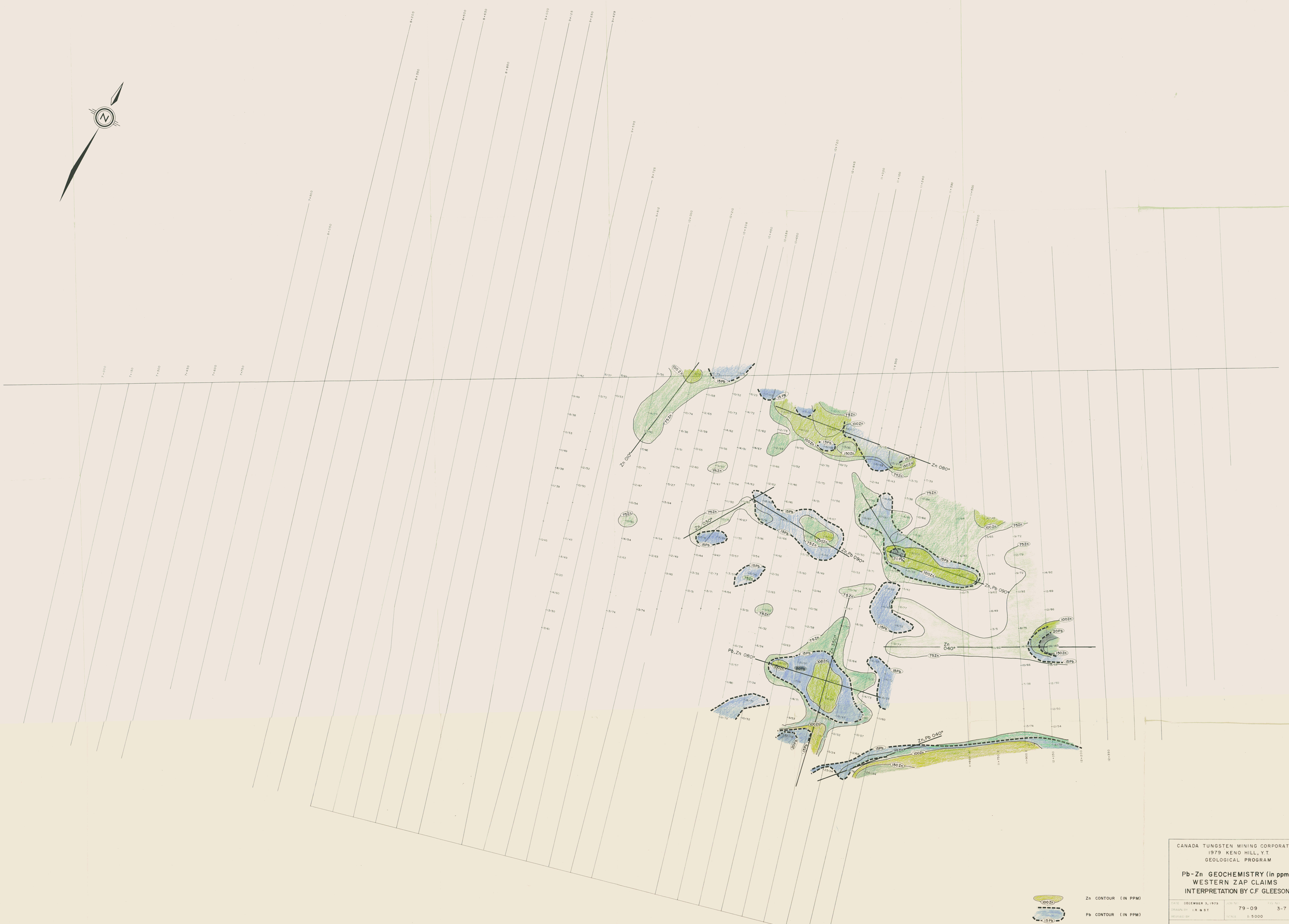
1979 KENO HILL, Y.T.
GEOLOGICAL PROGRAM

Hg GEOCHEMISTRY (in ppb.)
WESTERN ZAP CLAIMS
INTERPRETATION BY C.F GLEESON

DATE: DECEMBER 3, 1979.	JOB NO. 79-09	FIG. NO. 3-6
DRAWN BY: I.R. & S.T.		
REVISED BY:	SCALE: 1:5000	

BEMA INDUSTRIES LTD.

5007-S CEN



Zn CONTOUR (IN PPM)

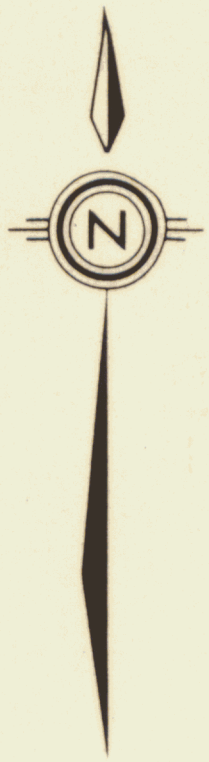
Pb CONTOUR (IN PPM)

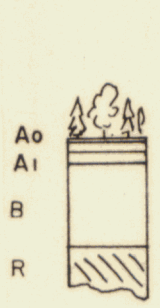
CANADA TUNGSTEN MINING CORPORATION
1979 KENO HILL, Y.T
GEOLOGICAL PROGRAM

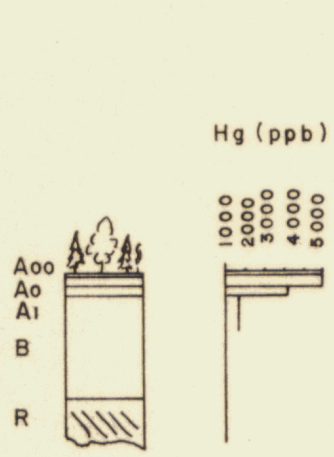
Pb-Zn GEOCHEMISTRY (in ppm.)
WESTERN ZAP CLAIMS
INTERPRETATION BY C.F GLEESON

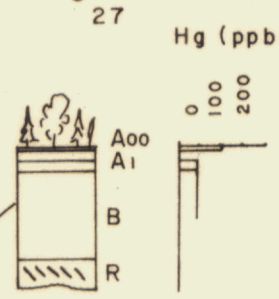
DATE DECEMBER 3, 1979	JOB No.	FIG. No.
DRAWN BY I.N & S.T.	79-09	3-7
DESIGNED BY	SCALE 1:5000	

BEMA INDUSTRIES LTD.









LEGEND

- SIDERITE-GALENA-SPHALERITE-QUARTZ LODES
- FAULT
- SHAFT
- SAMPLE SITE AND NUMBER

CANADA TUNGSTEN MINING CORPORATION

MERCURY SOIL SURVEY

SADIE-FRIENDSHIP MINE AREA

DATE: DECEMBER 21, 1979.	JOB NO.: 79-09
REVISED BY:	FIG. NO.: 3-9

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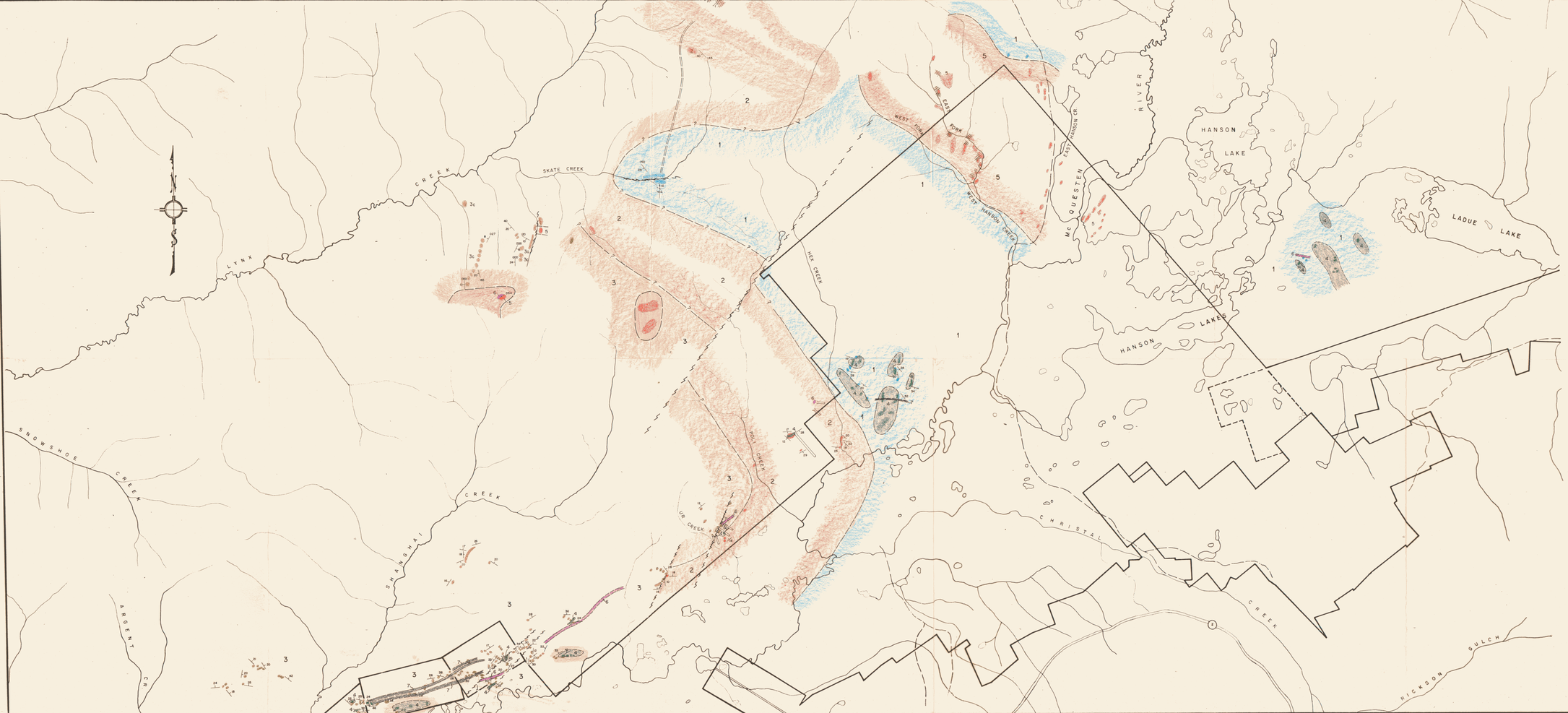

LEGEND

LITHOLOGIES

	7	LAMPROPHYRE
	6	RHYOLITE, QUARTZ - FELDSPAR PORPHYRY
	5	QUARTZ MONZONITE, GRANODIORITE, GRANITE, DIORITE
	4	GREENSTONE
	3	UPPER SCHIST FORMATION: Quartzite 3a, Phyllite 3b, Schist 3c, Limestone 3d.
	2	CENTRAL QUARTZITE FORMATION: Quartzite 2a, Phyllite 2b.
	1	LOWER SCHIST FORMATION

SYMBOLS

- OUTCROP – observed
- OUTCROP – indicated on air photo
- 090 / 45 — BEDDING – strike 090°, dip 45°
- 090 / 45 — FOLIATION – strike 090°, dip 45°
- GEOLOGICAL CONTACT – approximate
- GEOLOGICAL CONTACT – estimated
- 270° / 20 — FOLD AXIS – plunge direction 270°, plunge 20°
- ANTICLINE – normal overturned
- SYNCLINE – normal overturned
- FAULT – defined
- FAULT – inferred
- STOCKWORK
- ADIT
- TRENCH
- MAIN ROAD – 2 wheel drive
- SECONDARY ROAD – 4 x 4 or bulldozer
- CLAIM BOUNDARY

CANADA TUNGSTEN MINING CORPORATION
1979 KENO HILL, Y.T.
GEOLOGICAL PROGRAM

GEOLOGY OF THE NORTHERN AND EASTERN ZAP CLAIM GROUP

DATE:	JOB NO. 79-09	FIG. NO. 4-1
DRAWN BY:		
REVISED BY:	SCALE:	

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LEGEND:

LITHOLOGIES

7	LAMPROPHIRE
6	PHYOLITE, QUARTZ–FELDSPAR PORPHYRY
5	QUARTZ MONZONITE, GRANODIORITE, GRANITE, DIORITE
4	GREENSTONE
3	UPPER SCHIST FORMATION – QUARTZITE, 3a, PHYLLITE, 3b, SCHIST, 3c, LIMESTONE, 3d.
2	CENTRAL QUARTZITE FORMATION – QUARTZITE, 2a, PHYLLITE, 2b
1	LOWER SCHIST FORMATION

SYMBOLS

	OUTCROP – OBSERVED
090 / 45	BEDDING – STRIKE 090°, DIP 45°
	GEOLOGICAL CONTACT – APPROXIMATE
	FAULT – DEFINED
△	FLOAT
	TRENCH
	SECONDARY ROAD – 4x4 OR BULLDOZER TRAFFIC

SCALE 1:1000

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GEOLOGY EAST OF UR CREEK

DATE: DEC. 31, 1979	JOB NO.: 79-09
REVISED BY:	FIG. NO.: 4-3

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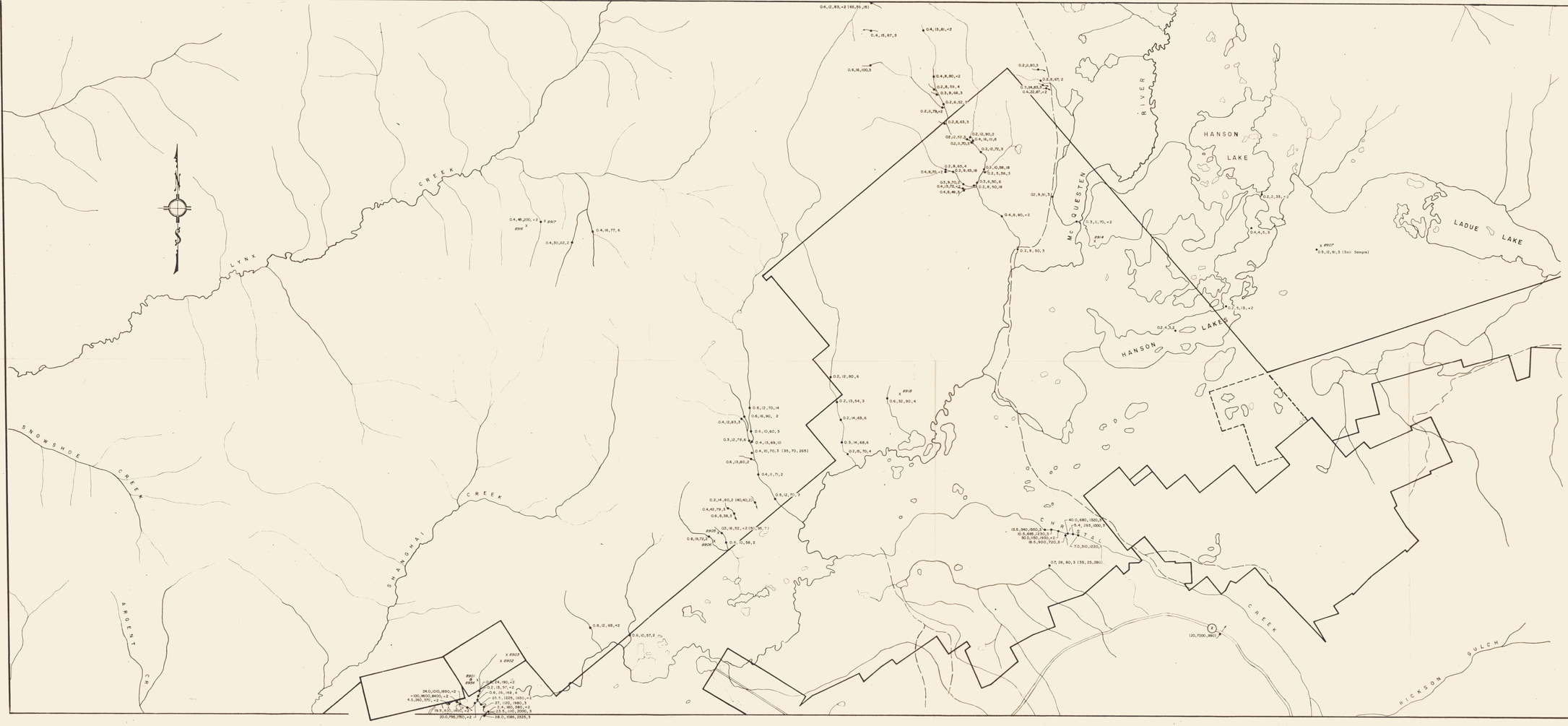

LEGEND

STREAM SEDIMENT SAMPLE SITE

X 8999 ROCK SAMPLE SITE – with assay tag number

VALUES GIVEN AS Ag, Pb, Zn, Sn in p.p.m.

BRACKETS ARE VALUES FROM G.S.C. SILT AND WATER SURVEY OF 1965 (Cu, Pb, Zn) in p.p.m.

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GEOCHEMISTRY OF THE NORTHERN AND EASTERN ZAP CLAIM GROUP

DATE		JOB NO. 79-09	FIG. NO. 4-4
DRAWN BY			
REVISED BY	-	SCALE	

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STREAM SEDIMENT GEOCHEMISTRY NEAR SHANGHAI MINE



LEGEND

- SEDIMENT SAMPLE SITE (Ag, Pb, Zn, W)
- BRIDGE
- MAJOR BUILDING
- CABIN
- SECONDARY ROAD - 4 / 4 OR BULLDOZER TRAFFIC
- STREAM - CONTINUOUS, INTERMITTENT
- ADIT

SCALE 1 : 5500

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STREAM SEDIMENT GEOCHEMISTRY NEAR SHANGHAI MINE

DATE	JANUARY 2, 1980	JOB NO.	79-09
REVISED BY:		FIG. NO.	4-5

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STREAM SEDIMENT GEOCHEMISTRY OF CRYSTAL CREEK



SCALE 1:5500

LEGEND

- SEDIMENT SAMPLE SITE (Ag, Pb, Zn, W)
- BRIDGE
- STREAM - CONTINUOUS, INTERMITTENT

CANADA TUNGSTEN MINING CORPORATION

STREAM SEDIMENT GEOCHEMISTRY OF CRYSTAL CREEK

DATE: DECEMBER 29, 1979.	JOB NO.: 79-09
REVISED BY:	FIG. NO.: 4-6

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LEGEND

LITHOLOGIES

- 6 — RHYOLITE, QUARTZ-FELDSPAR PORPHYRY
- 5 — QUARTZ MONZONITE, GRANODIORITE, GRANITE, DIORITE
- 4 — GREENSTONE
- 3 — UPPER SCHIST FORMATION
  QUARTZITE, 3a, PHYLLITE, 3b, SCHIST, 3c, LIMESTONE, 3d
- 2 — CENTRAL QUARTZITE FORMATION
  QUARTZITE, 2a, PHYLLITE, 2b
- 1 — LOWER SCHIST FORMATION

GEOCHEMISTRY

SEDIMENTS
-80 MESH FRACTION PPM W, Mo

PAN CONCENTRATES
PERCENT (Fe TOTAL, Sn, W, MoS_2)

ROCK SAMPLE
ASSAY NUMBER, VALUE % W

SYMBOLS

- ——— APPROX. GEOLOGICAL CONTACT
- × ROCK SAMPLE LOCATION
- ⊗ PAN SAMPLE SITE
- • SEDIMENT SAMPLE SITE

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GEOCHEMISTRY OF THE HANSON LAKE INTRUSION

DATE: DECEMBER 5, 1979.	JOB NO. 79-09	FIG. NO. 4-7
DRAWN BY: S.T.	SCALE: 1 : 10 000	
REVISED BY:		

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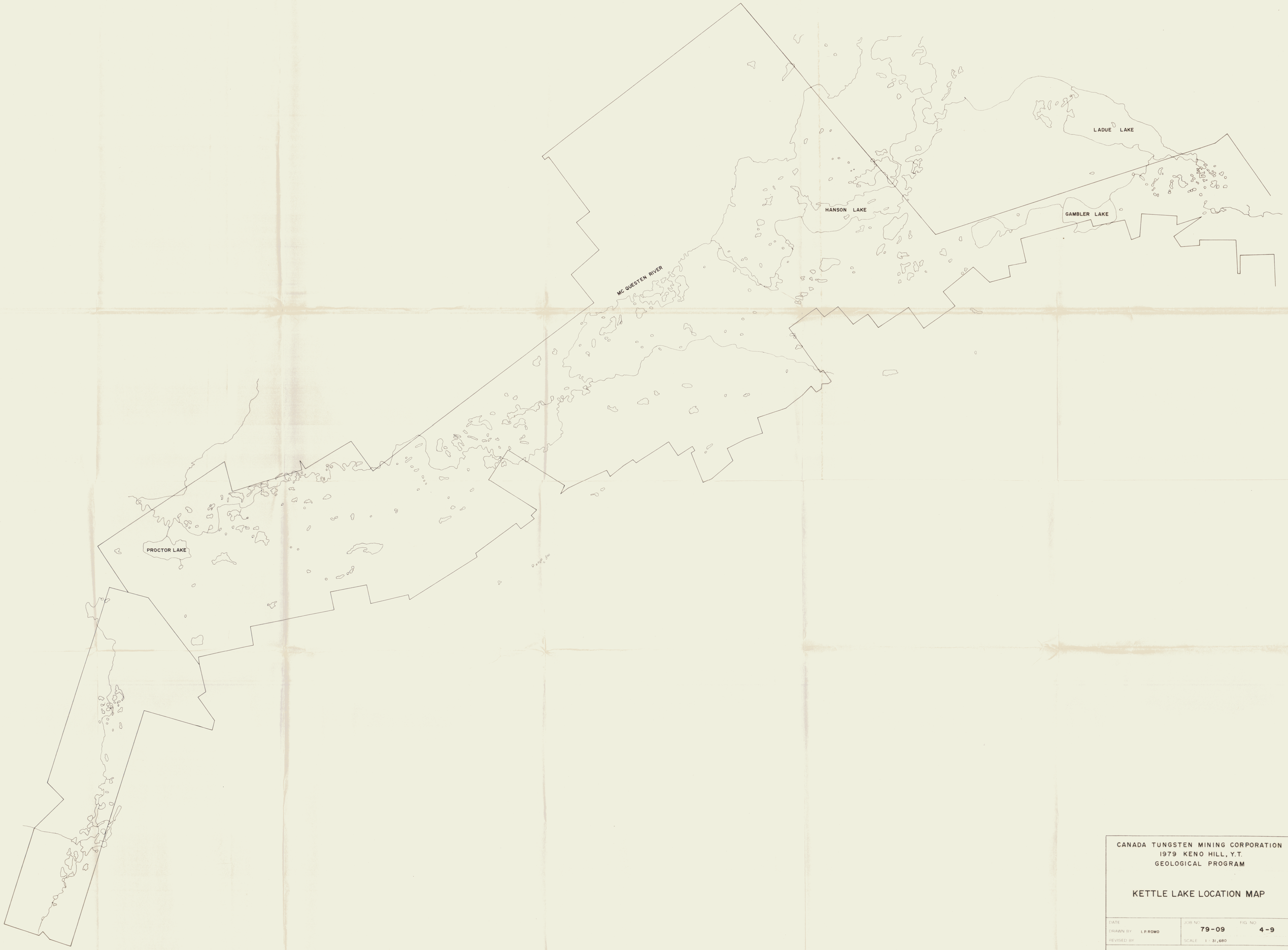

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GEOLOGICAL PROGRAM

KETTLE LAKE LOCATION MAP

DATE	JOB NO.	FIG. NO.
DRAWN BY L.P.ROMO	79-09	4-9
REVISED BY	SCALE 1 : 31,680	

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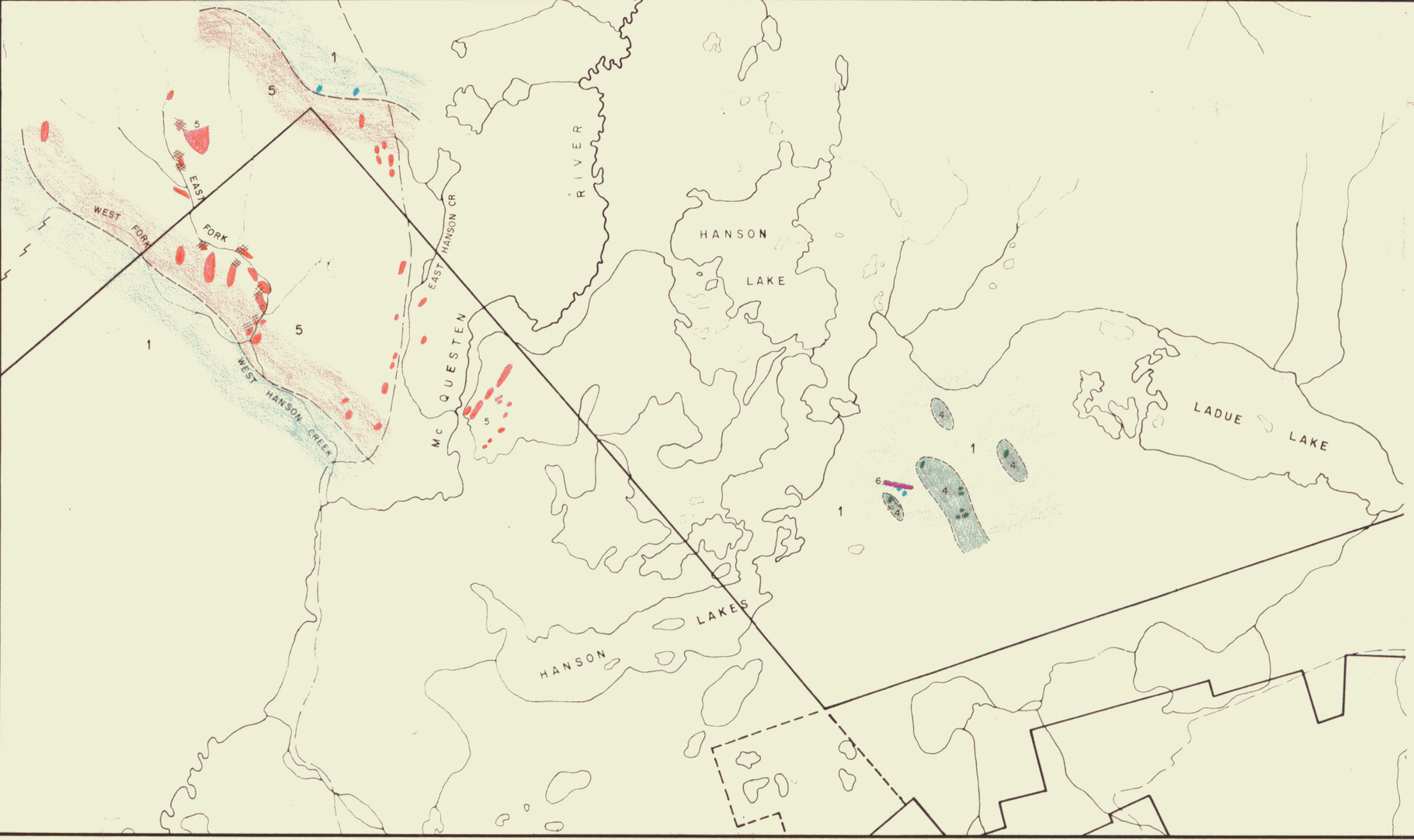

LEGEND

LITHOLOGIES

7	LAMPROPHYRE
6	RHYOLITE, QUARTZ - FELDSPAR PORPHYRY
5	QUARTZ MONZONITE, GRANODIORITE, GRANITE, DIORITE
4	GREENSTONE
3	UPPER SCHIST FORMATION : Quartzite 3a, Phyllite 3b, Schist 3c, Limestone 3d.
2	CENTRAL QUARTZITE FORMATION : Quartzite 2a, Phyllite 2b.
1	LOWER SCHIST FORMATION

SYMBOLS

OUTCROP – observed

090 / 45 FOLIATION – strike 090°, dip 45°

STOCKWORK

SECONDARY ROAD – 4x4 or bulldozer traffic

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GEOLOGY OF THE HANSON LAKE INTRUSION

DATE:	JOB NO: 79 - 09
REVISED BY:	FIG. NO: 5 - 1

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1+500N

1+000N

0+500N

0+000

0+500S

1+000S

1+500S

2+000S

2+500S

BASE LINE

A'

A

RESISTIVE CONDUCTIVE

EXCELLENT CONDUCTOR
Pd = 4000 mhos
depth 30m
dip 70° N

NOTE:
LOW FREQUENCY OF 444 Hz FOR LINES
L7+450 - L8+350 AND L9+812 - L13+100
LOW FREQUENCY OF 888 Hz FOR LINES
L8+500 - L9+725.

PLOT OF $\frac{H_z^s}{H_z^p}$ (%)

WHERE:

H_z^s = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE SECONDARY FIELD.

H_z^p = FIELD STRENGTH OF THE HORIZONTAL COMPONENT OF THE PRIMARY FIELD.

1 cm = 10 %

DATUM VARIATION

INFERRED FAULT

CONDUCTOR

LEGEND

HIGH FREQUENCY	1777 Hz
LOW FREQUENCY	444 Hz AND 888 Hz
IN - PHASE	I.P.
QUADRATURE-PHASE	Q.P.
HIGH FREQUENCY	I.P.
HIGH FREQUENCY	Q.P.
LOW FREQUENCY	I.P.
LOW FREQUENCY	Q.P.
Rx Tx	x = 150 m ON L12+350 AND ALL WEST
	x = 200 m ON L12+500 AND ALL EAST

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GLEN WHITE'S GEOPHYSICAL INTERPRETATION

DATE	NOVEMBER 21, 1979	DWG. NO.	FIG. NO.
DRAWN BY	S.T.		79-09
REVISED		SCALE	1 : 5000

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