



GEOLOGICAL, GEOCHEMICAL AND  
GEOPHYSICAL REPORT  
ON THE  
MOUNT KENO LEASES

GEOLOGICAL, GEOCHEMICAL AND GEOPHYSICAL REPORT  
ON THE  
MOUNT KENO LEASES

Mayo Mining Division

N.T.S.: 105 M/14

63°55' Latitude; 135°15' Longitude

Located Approximately 2.5 kilometres Northeast of  
Keno Hill Townsite, Yukon Territory

Owned by:

MOUNT KENO MINES LIMITED  
Ste. 605 - 80 Richmond St. West  
Toronto, Ontario M5H 2B1

Optioned by:

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December, 1980

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## SUMMARY

The Mount Keno leases consist of twenty-five mineral claims owned by Mount Keno Mines Limited and under option by Canada Tungsten Mining Corporation Limited. Bema Industries Ltd. was contracted by Canada Tungsten Mining Corporation Limited to complete a geological evaluation of the property. These claims are located in the Mayo Mining District, 2.5 kilometres northeast of Keno Hill townsite.

The Mount Keno mineral claims are underlain by the Central Quartzite formation which consists of grey to white massive quartzite with intercalated beds of graphitic phyllite. The rocks generally strike easterly and dip between 15° and 45° south. Quartzites and phyllites have been intruded by a series of greenstone sills which appear to be more numerous within the western portion of the claims.

A number of northeasterly trending vein faults traverse the claims and have been explored sporadically since the 1920's. These veins include the Runer, Hogan and O'Neil veins, two of which, the Runer and the Hogan veins, have been explored extensively by underground workings. The Runer vein is 0.3 metres wide, strikes north 30° east and dips 40° west. It was explored on the 3900' level and produced 680 tons of ore averaging 295 oz/ton silver and 35% lead. Potential ore depends on locating extensions of the Runer vein fault to the north, south and downdip within other quartzite beds. The Hogan vein is up to 3 metres wide, strikes north 20° east and dips 60° to 80° southeasterly. It was explored on the 3300' level by Amco Explorations and on the 3800' level by Ankeno Mines Ltd. but no ore was mined. Mineralization consists of massive siderite with very minor galena and sphalerite. The potential for ore lodes exists within the downdip extension of the vein and at the intersection of cross faults. The O'Neil vein is approximately 0.3 metres wide, strikes 03° azimuth and dips 61° west. Fifty tons of high grade ore averaging 375 oz/ton silver and 80% lead have been hand cobbled from two shafts during 1979 and 1980 by Mr. Barry O'Neil. The O'Neil vein is outlined by a strong lead, zinc, silver soil geochemical anomaly (#1) from which the vein can be projected north and south of the present workings. It is thought that this vein fault has the best possibility for hosting mineable ore lodes; either along its north, south or downdip extensions.

A 'B' horizon soil geochemical survey was conducted over the claims on a grid with line spacings of 50 metres and samples taken at 50 metre intervals. A total of nine lead, silver, zinc anomalies were outlined, seven of which require further investigation.

Two hundred metres east of the O'Neil vein a north-south trending silver, lead, zinc, manganese and copper soil geochemical anomaly #2 has been outlined. Prospecting during the 1980 season in this area located quartzite and greenstone float which contains manganese and siderite as fracture fillings. There is good potential in this area for locating a vein fault similar to the O'Neil vein.

An orientation Vector Pulse Electromagnetometer Survey was performed over the O'Neil vein but a strong graphitic conductor was encountered which masked the response from the galena vein mineralization. This system is not effective in an environment with graphitic conductors.

It is recommended that:

- 1) Geological mapping (1:2,500 scale), prospecting and soil geochemical sampling be completed over the remaining mineral claims consisting of the Don Fraction, Bunker, Bunker No. 1, Rock and Tarm Fractions.
- 2) Bulldozer trenching, geological mapping and prospecting be conducted over the seven geochemical soil anomalies as outlined in Table III. Soil anomalies #1 and #2 located near the O'Neil vein are considered top priority for bulldozer trenching. See Figure A.
- 3) Approximately 1000 metres of diamond drilling to be done to test the following targets:
  - a) northerly extension of the Runer vein;
  - b) downdip extension of the Runer vein in a lower quartzite bed;
  - c) possible intersection of Runer and O'Neil veins;
  - d) downdip and southerly extension of the O'Neil vein;
  - e) follow up drilling as required on targets defined by bulldozer trenching.

If there is encouragement from diamond drilling in the area near the O'Neil and Runer veins, an underground exploration program would be the next exploration stage.

- 4) An orientation geophysical resistivity survey be conducted over the O'Neil and Runer veins.

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ON THE  
MOUNT KENO LEASES

1.0 INTRODUCTION

The twenty-five Mount Keno mineral claims are owned by Mount Keno Mines Limited and are under option by Canada Tungsten Mining Corporation Limited. Bema Industries Ltd. was contracted by Canada Tungsten Mining Corporation Limited to carry out a geological investigation of the property. Exploration work was done during the period of August 18 to September 26, 1980 by a crew that varied from one to six persons and consisted of grid preparation, a geochemical soil survey, an orientation Vector Pulse Electromagnetometer survey, minor bulldozer trenching and geological mapping and prospecting.

Exploration work in 1980 was carried out over all but the Don Fraction, Tarm Fraction, Bunker, Bunker No. 1 and Rock claims.

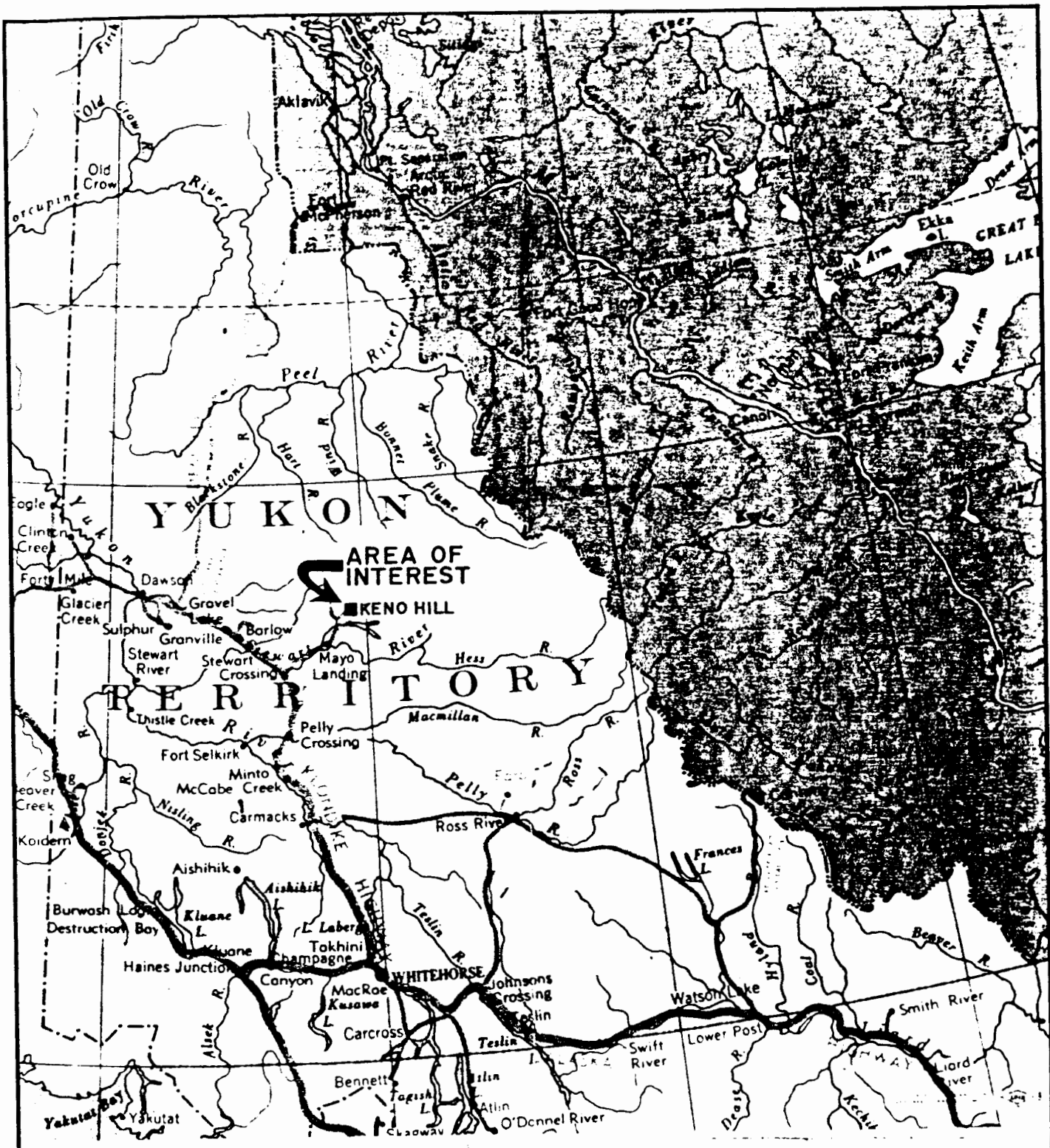
The purpose of the exploration program on the Mount Keno leases is to locate a high grade silver-lead vein.

This report describes the results of this season's work and makes recommendations for further exploration work.

1.1 LOCATION AND ACCESS

The Mount Keno leases, located approximately 2.5 kilometres northeast of the Keno Hill townsite are situated within the Mayo Mining District on N.T.S. map sheet 105 M/14 and centered at latitude 63°55' and longitude 135°15'. They are positioned on the south slope of Keno Hill and extend across Lightning Creek to the north slopes of Sourdough and Bunker Hills. See Figures 1 and 2.

An all-weather road traverses the southern slope of Keno Hill and bisects the northern portion of the claim block. Other roads branching off this main road provide a network of access over the property.



CANADA TUNGSTEN MINING CORPORATION  
 KENO HILL Y.T.  
 1980 GEOLOGICAL EXPLORATION PROGRAMME

MOUNT KENO LEASES  
 KEY MAP

092043

DATE: FEBRUARY 1981

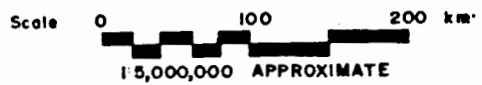
JOB NO.: 80-09-N

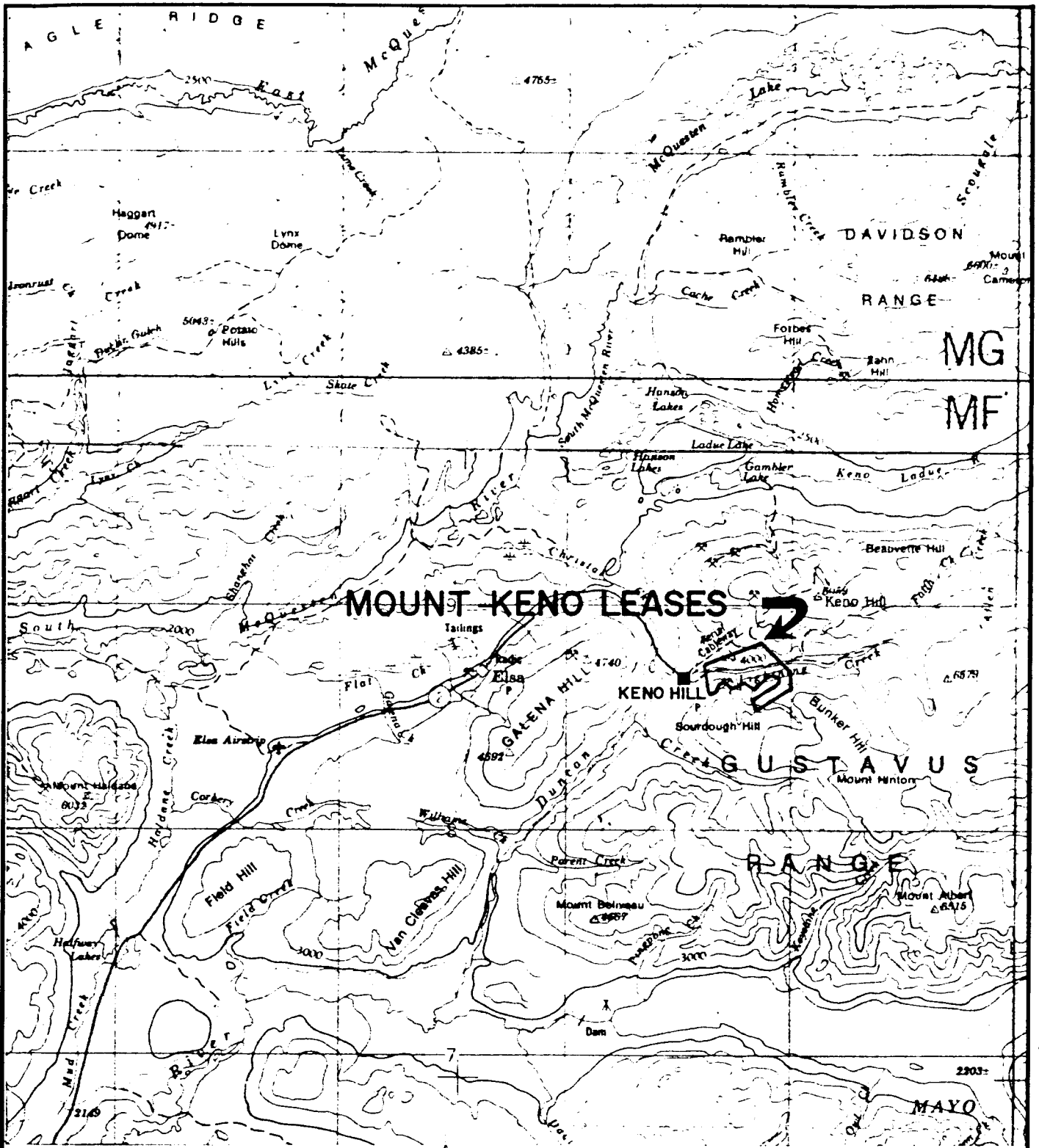
REVISED BY:

FIG. NO.: 1



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**MOUNT KENO LEASES**

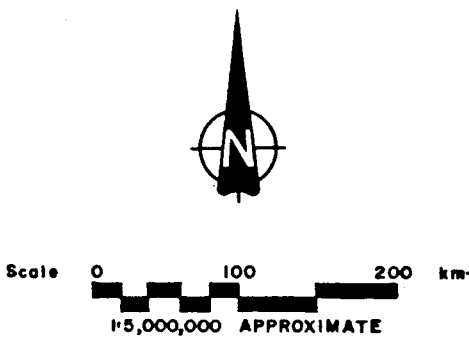
CANADA TUNGSTEN MINING CORPORATION  
**KENO HILL Y.T.**  
 1980 GEOLOGICAL EXPLORATION PROGRAMME

**MOUNT KENO LEASES  
 REGIONAL PLAN**

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DATE: FEBRUARY 1981	JOB NO.: 80-09-N
REVISED BY:	FIG. NO.: 2

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## 1.2 CLAIM STATUS

The Mount Keno claims consist of twenty-five (25) mineral claims and fractions which are owned by Mount Keno Mines Limited.

These mineral leases are listed in the following table outlining their status and expiry date.

TABLE I  
CLAIM STATUS

<u>Claim Name</u>	<u>Lease No.</u>	<u>Lot Number</u>	<u>Expiry Date</u>
Jib No. 2 Fraction	1375	773	Nov. 2, 1985
Fox Fraction	1376	749	Nov. 2, 1985
Tarm Fraction	1377	781	Nov. 2, 1985
Grouse Fraction	1378	864	Nov. 2, 1985
Don Fraction	1379	863	Nov. 2, 1985
Dude	1380	772	Nov. 2, 1985
Quail Fraction	1381	771	Nov. 2, 1985
Rock	1382	896	Nov. 2, 1985
Bunker	1383	915	Nov. 2, 1985
Daisy Fraction	1384	468	Nov. 2, 1985
Bunker No. 1	1385	916	Nov. 2, 1985
Agram Fraction	1386	866	Nov. 2, 1985
Evy Fraction	1387	899	Nov. 2, 1985
Willow	1388	765	Nov. 2, 1985
Thunderbird	1389	766	Nov. 2, 1985
Fox	1390	768	Nov. 2, 1985
Greta	1391	769	Nov. 2, 1985

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Claim Name	Lease No.	Lot Number	Expiry Date
Quail	1392	770	Nov. 2, 1985
Evy	1393	767	Nov. 2, 1985
David	1394	455	Nov. 2, 1985
Wildcat	1395	762	Nov. 2, 1985
Balto	1396	763	Nov. 2, 1985
Sunrise	1397	764	Nov. 2, 1985
Soloman	1398	456	Nov. 2, 1985
Sol	1399	467	Nov. 2, 1985

### 1.3 HISTORY

The Mount Keno leases have an extended history of exploration and mining starting in the 1920's to present day with Mr. Barry O'Neil's high grade mining operation.

Between 1920 and 1930 a thirty-three (33) metre adit was driven on what is now known as the Runer vein. Production during this period consisted of a few tons of hand cobbled ore.

The claims were restaked in September, 1946 by E.W. Runer who sank two (2) shafts. These claims were optioned in October, 1950 by Canadian Exploration Limited who conducted a program of limited bulldozer trenching. In January, 1951 the claim group was sold to Mount Keno Mines Limited.

During August, 1951 Mount Keno Mines Limited commenced underground exploration on the Runer vein. A crosscut adit, the 3900' level, was driven to intersect the Runer vein thirty-three (33) metres vertically below surface. The vein fault was intersected and eighty-one (81) tons of high grade ore averaging 480.5 oz/ton silver and 75.6% lead were sacked for shipping. In 1952, Mount Keno Mines Limited optioned the claims to Amco Exploration Incorporated (AMAX Incorporated). Between 1952 and 1953, Amco Exploration Incorporated, conducted extensive

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underground drifting and exploration in three areas: 1) Runer vein (3900' level); 2) Runer vein extension (3800' level) and 3) Hogan vein (3300' level).

Amco Explorations Incorporated was interested only in a large scale mining operation and decided to terminate their option after negative results from underground exploration. Their joint venture agreement with Mount Keno Mines Limited was terminated September 18, 1953.

In 1954 Mr. J.J. Hogan of Silden Mines Ltd., optioned the property from Mount Keno Mines Limited. Mr. Hogan was given an option to mine the high grade ore on a royalty basis and completed thirty-three (33) metres of crosscutting and twenty-six (26) metres of drifting in an adit above the 3900' level to intersect the Runer vein. From this work Mr. Hogan extracted one hundred and thirty-three (133) tons of ore averaging 525.5 oz/ton silver and 45.5% lead. An additional eighty-eight (88) tons of concentrate from the milling of one thousand, one hundred and sixty-two (1162) tons of ore from the dump was added to his total tonnage. The concentrate assayed 435 oz/ton silver and 31% lead.

During the early sixties Mount Keno Mines Limited optioned the claims to Mr. J. O'Neil. He shipped eleven (11) tons of ore averaging 513.7 oz/ton silver and 69.8% lead from a new adit located above the 3900' level. United Keno Mines Limited optioned the property from 1964 to 1974 and conducted a soil geochemical survey.

On August 24, 1979 Mount Keno Mines Limited optioned their 25 claims to Canada Tungsten Mining Corporation Limited. Mr. O'Neil was allowed to continue a small high grading operation through the terms of this agreement. Mr. O'Neil is presently working a vein system which is located fifty metres east of the 3800' level adit. In 1979 he made a 25 ton shipment of high grade ore, to the Trail smelter, averaging 375 oz/ton silver and 80% lead.

In September, 1979 Bema Industries Ltd. as agents for Canada Tungsten Mining Corporation Limited completed geological evaluation of the property which concentrated on the area near the workings of the Runer, O'Neil vein systems.

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### 1.5 PRESENT WORK

The 1980 exploration program conducted by Bema Industries Ltd. on the Mount Keno leases consisted of surveying, grid establishment, geological mapping and prospecting, soil sampling and bulldozer trenching.

The surveys are summarized below:

- 1) Grid Establishment
  - a) Survey and cut baseline - 2.5 kilometres
  - b) Compass and flagged crosslines - 34.8 kilometres
- 2) Soil sampling - 668 samples
- 3) Geological Mapping
  - a) 1:5,000 scale - 22 kilometres north of Lightning Creek.
  - b) 1:1,000 scale - old workings and trenches
  - c) 1:50 scale - Barry O'Neil's vein.
- 4) Vector Pulse Electromagnetic Survey - 1,725 metres
- 5) Bulldozer Trenching - 1 trench (130 metres long)

#### Grid Establishment and Soil Sampling

A 2.5 kilometre baseline trending  $58^{\circ}34'$  azimuth was cut and surveyed and served as control for the establishment of the Mount Keno grid. See Appendix I for baseline survey data. The

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baseline (10+00N) was surveyed into survey point 1L 769, 2L 766, which is located on the lease boundary between the Thunderbird mineral claim and the Greta mineral claim and also to Thompson and Jensen survey point 834 which ties the grid into the orthophoto coverage. Compass and topofil crosslines trending 150° azimuth were established at 50 metre intervals across the baseline. Each crossline originated from a picketed station on the baseline and was corrected for slope. Stations along crosslines were flagged every 50 metres and 'B' horizon soil samples taken at each station.

### Geological Mapping

Geological mapping was done on various scales depending on the amount of detailed geological information. The following scales were used: 1) 1:5,000 - property geology; 2) 1:1,000 - in areas with underground workings and trenches; and 3) 1:50 - on Barry O'Neil's vein. The soil geochemical grid and the orthophoto maps were used as control for the geological mapping at 1:5,000 scale. The 1:5,000 scale property geology map was enlarged to 1:2,500 scale for drafting. Because there is less than 1% outcrop throughout most of the claims, great emphasis was placed on boulder mapping.

### 1.6 PHYSIOGRAPHY

The Mount Keno leases lie on the northwest flank of the Gustavus Range which is a subdivision of the Yukon Plateau. Straddling Lightning Creek, the claims are positioned on the south slope of Keno Hill and extend to the north slopes of Sourdough and Bunker Hills. They range in elevation from 990 metres to 1350 metres.

The moderate to steeply dipping slopes are sparsely vegetated by aspen, spruce and buckbrush. Overburden is almost continuous over the claims (up to 10 metres deep) with approximately 1% rock exposure.

TABLE II

## TABLE of FORMATIONS

ERA	PERIOD	MILLIONS of YEARS	BOYLE, R·W 1965	GREEN, L·H· 1971 TEMPELMAN - KLUIT 1970	BLUSSON, S·L· 1978	BEMA 1980
CENOZOIC	TERTIARY	65		Quartz-Feldspar Porphyry		
MESOZOIC		* 87		Greenstone		Granodiorite
	CRETACEOUS	136	Quartz-Feldspar Porphyry Biotite Lamprophyre	Keno Hill Quartzite fm		Quartz-Feldspar Porphyry Biotite Lamprophyre
			Greenstone			Greenstone Keno Hill Quartzite fm
	JURASSIC	190		Lower Schist fm		Lower Schist fm
MESOZOIC	TRIASSIC	225				
PALEOZOIC	PERMIAN	280				
	CARBONIFEROUS	345			Central Quartzite	
					Lower Schist	
	DEVONIAN	395				
	SILURIAN	430				
	ORDOVICIAN	500				
PALEOZOIC	CAMBRIAN	570				
PRECAMBRIAN		4600	Upper Schist fm Central Quartzite fm Lower Schist fm	Upper Schist fm		? Upper Schist fm

NOTE • AGE of MINERALIZATION  
SINCLAIR et al, 1980

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## 2.0 GENERAL GEOLOGY

The Keno Hill - Galena Hill area containing the Mount Keno leases is located at the northwestern end of the Selwyn Basin. The Selwyn Basin is a Pb-Zn-Ag bearing province which covers central Yukon, western N.W.T. and north central B.C. The basin is bounded to the east, in the MacKenzie Mountains by a marginal carbonate shelf facies. To the west, the basinal shale facies gives way to the carbonate shelf complex of the Pelly-Cassiar Fold Belt or terminates abruptly against the Tintina Trench. The Tintina Trench, which passes 100 kilometres south of Keno Hill, contains a strike-slip fault with 450 kilometres of right lateral displacement (Tempelman-Kluit, 1970).

The rocks underlying the Keno Hill - Galena Hill area are predominantly metasediments of the Yukon Group. Until recently the Yukon Group was thought to be of Precambrian age. Boyle (1965) considered the section to be a simple homocline of metasediments of probable Precambrian age. Tempelman-Kluit (1970) and Green (1971) have interpreted Mesozoic ages for the Lower Schist (Jurassic) and Central Quartzite (Lower Cretaceous) formations and a Precambrian age for the allochthonous Upper Schist formation. Blusson (1978) suggested that the Lower Schist and Central Quartzite formations resemble the Upper Devonian to Mississippian Canol and Imperial formations.

The Lower Schist formation consists predominantly of graphitic schists with minor intercalated chlorite-sericite schist and thin bedded quartzite conformably overlain by the Central Quartzite formation.

The Central Quartzite formation consists of thick and thin bedded quartzite with intercalated graphitic phyllite, argillite and schist.

The Upper Schist Formation overlies the Central Quartzite formation. The nature of the contact between Central Quartzite and Upper Schist is controversial. It is considered to be conformable by Boyle, 1965; or a thrust fault by Green, 1971. The Upper Schist formation consists primarily of quartz-mica schists, graphitic schists and thin bedded quartzites with minor limestone lenses.

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This stratigraphic sequence has been intruded by several plutonic phases. The oldest of these are the greenstone sills. These sills, originally diorite to gabbro in composition, were deformed into lens-shaped "boudins". These boudins are discontinuous but tend to align, en echelon, in certain stratigraphic horizons.

The second plutonic phase in the area is the granitic rocks which have intruded along the hinge zone of the Mayo Lake anticline. These intrusions range between quartz monzonite to diorite in composition and give ages between 81 million years and 109 million years (Wanless, et.al., 1966, 67, 71, 73; Armstrong, 1978; cited by Tessari, 1979).

The youngest intrusions in the area are dykes and sills of biotite lamprophyre and quartz-feldspar porphyry. As these units have not been observed in a crosscutting relationship, their relative ages cannot be ascertained.

In the Keno Hill - Galena Hill area there have been at least two periods of structural deformation (Green, 1971). The oldest period of deformation produced isoclinal and recumbent folding with extensive bedding plane movement. Rocks involved in this earliest deformation developed a strong foliation and retained a few original sedimentary structures. Many of the greenstones have been intensely foliated which indicates that they were intruded prior to this period of deformation. Also others, including some of the larger greenstone sills were probably intruded during this period of deformation (Green, 1971). The intensity of this early deformation is indicated by the boudinage of pre-existing greenstone sills. It has also been hypothesized by Green and others that it was during this period of deformation that the Upper Schist formation was thrust over the Central Quartzite and Lower Schist formations.

The second period of deformation superimposed open folds and a pervasive wrinkle lineation on the already deformed rocks. The broad northwest trending, southeast plunging Mayo Lake anticline formed during this later period of deformation. Later, but during this second period of deformation, two subsidiary anticlines, the McQuesten River and Lynx Creek anticlines, formed (Tessari, 1978). These sub-parallel structures trend

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northeast-southwest and plunge to the west. The Keno Hill - Galena Hill area is on the southern limb of the McQuesten River anticline.

Granitic rocks intruded these rocks after the second period of deformation was ended.

Vein faults and cross faults can both be shown to post-date the younger deformation because they contain fragments of lineated phyllites (Green, 1971). It is clearly evident that cross faults post-date vein faults as many vein faults are offset by cross faults. Several periods of movement in the vein faults is indicated by brecciation of ore minerals. The relative ages of the vein and cross faults to the period of mineralization is controversial. This is an extremely significant relationship as 95% of the district's silver production is from deposits associated with cross faults. Boyle (1965) considers that the cross faults are post-mineralization and the presence of cross faults in nearly every mine is incidental. Franzen (1979) on the other hand, states that the cross faults are pre-mineralization and acted as barriers to ore solutions thereby having a damming effect on mineralizing solutions and creating ore pods.

Ore contained in vein faults generally consists of galena and sphalerite in a quartz-siderite-pyrite gangue. The silver-bearing ore consists of galena, freibergite, pyrargyrite and native silver. Lead is recovered from the galena and zinc and cadmium are recovered from the sphalerite.

## 2.1 PROPERTY GEOLOGY

The Mount Keno leases are underlain by the Central Quartzite formation (2) and Greenstone (4). The Central Quartzite is composed of massive grey to white coloured quartzite and graphitic phyllite. The property is located near the junction of the southern limb of the McQuesten Anticline and the northeastern limb of the Mayo Lake Anticline. The Central Quartzite formation attains its greatest thickness in the vicinity of Mount Keno leases, extending across an area over 3 kilometres wide at this point.

A large percentage of the property is overlain by glacial material from one to ten metres thick. North of Lightning Creek

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spotty outcrops indicate that the topographic slope of the property is the same as the dip slope of the quartzite formation. Thick quartzite beds trend east-west and dip  $15^{\circ}$  to  $50^{\circ}$  to the south. Old and new workings indicate that the quartzites are interbedded with undulating beds of graphitic phyllites and have been intruded by greenstone bodies. See Figure 3.

The above rock formations have been transected by a series of vein faults known as the Hogan, Runer and O'Neil veins. Cross faults striking northwesterly have broken the veins into segments and displaced them laterally.

## 2.2 LITHOLOGY

### Unit 2a - Quartzite

Quartzites are exposed throughout the map area in various trenches, adits and isolated outcrops. The quartzites are usually massive competent rocks which vary in colour from dark and light grey to white. A weak foliation noticeable by sericitic partings is present. Bull quartz veins are present throughout the quartzite unit, and appear to be more numerous near known veins.

Ore mined from the Runer and O'Neil veins occurs where the structure cuts quartzite (Unit 2a) or greenstone (Unit 4).

### Unit 2c - Graphitic Phyllite

Graphitic phyllite occurs as thin interbeds within the quartzite unit 2a, but because of its easily weathered nature, phyllite seldom crops out. Where graphitic phyllite has been encountered in underground workings, it hosts many low angle, unmineralized, bedding plane faults which contain 5 to 8 centimetres of gouge.

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#### Unit 4 - Greenstone

Greenstone is poorly exposed on surface within the western part of the claim area. It is light to dark green in colour, medium grained and moderately foliated. Chlorite and feldspar are the principal minerals and it could, in places, be better described as a chlorite schist. Where greenstone has been cut by underground workings, it varies in thickness from 1.0 to 7.5 metres.

Where observed with quartzites and phyllites, greenstone contacts are conformable. Foliation generally strikes east, dips 25° to 45° south and subparallels transposed bedding. The favoured explanation for the origin of the greenstone is that they were emplaced as sills during the formation of the pervasive foliation. The sills have been since modified by shearing and folding to form boudins.

Greenstone occurs in the footwall of the O'Neil vein where it is strongly chloritized and limonitic.

#### 2.3 GEOLOGY, STRUCTURE AND MINERALIZATION - UNDERGROUND WORKINGS

Because of the poor outcrop exposure on the Mount Keno claims, the Runer, Hogan and O'Neil veins, cannot be traced on surface. Sparse vein float located during early exploration by prospectors initiated all underground explorations. These workings have subsequently either caved in or are unsafe to explore. All the information in the following sections of the geology, structure and mineralization of the various underground workings has been compiled from monthly reports and maps from Mount Keno Mines Ltd. and AMCO (Amax). The following underground exploration workings will be discussed: 1) 3900' level (Runer vein); 2) 3800' level; 3) 3300' level (Hogan vein) and 4) the O'Neil shafts (O'Neil vein). See Figure 4.

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### 3900' Level (Runer Vein)

During 1951 Mount Keno Mines Limited completed 132 metres of crosscutting and 47 metres of drifting on the 3900' level. A geological plan of the crosscut illustrates that prominent massive quartzites are interbedded with thin beds of schist. See Figure 5. The metasediments strike  $096^{\circ}$  azimuth, dip  $30^{\circ}$  south and have been intruded by four conformable greenstone bodies. A series of low angle bedding plane faults are present along the length of the crosscut. They commonly have 1 to 15 centimetres of gouge and in one location a thin breccia zone occurs along a greenstone contact. In two locations there are a series of fractures crosscutting the bedding within quartzite which strike approximately north  $40^{\circ}$  east and dip northwesterly. One set of these fractures is filled with siderite and the other by fault gouge and although they appear to be insignificant in the crosscut level intersections their projections may swell into a prominent vein structure along strike, especially at the intersection of a cross fault. One hundred and thirty-two metres (132) from the adit entrance a major vein structure was intersected (the Runer vein). The vein strikes north  $30^{\circ}$  east in a sinusoidal manner and dips  $40^{\circ}$  northwesterly. Mineralization consists of massive galena, limonite, sphalerite, freibergite, pyrite, anglesite and cerussite. The vein averaged 385.4 oz/ton silver and 15% lead over a length of 33 metres and an average width of 0.29 metres. During 1951 eighty-one (81) tons of high grade ore averaging 480.5 oz/ton and 75.6% lead were sacked for shipping.

Geology and structure in the hanging wall differs sharply from that in the footwall, indicating some form of displacement. The strike and dip of the schist beds in the hanging wall and footwall are  $126^{\circ}$  azimuth and  $31^{\circ}$  southeast respectively. Rotation of the beds during faulting or the presence of a small anticline could explain why the vein fault is dipping to the northwest instead of southeast as is common in the Keno Hill area. The vein is confined to one quartzite horizon and is terminated above and below, against schist. To the northeast the vein is abruptly terminated by a northwesterly striking cross fault. The northern extension of the vein has not been located. The vein was followed to the southwest in the 3901 drift. Massive galena occurred in the zone with an approximate width of 0.3 metre over a length of 7.2 metres. The mineralization weakened, although the structure was still strong. The

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drift was discontinued because the ground became very badly broken and progress would be very slow and dangerous. The greatest extent of the vein may be along the plunge of the anticlinal structure or at the intersection of another quartzite bed downdip.

High grade ore was extracted from two winzes, 3901 to a depth of 30 metres, 3902 to a depth of 40 metres and 3 raises 3901R to 3903R. From January 1, 1952 to April 30, 1952 a total of 292 tons of ore was mined which averaged 72.8 oz/ton silver and 3.2% lead.

The heading of drift was changed to north 48° west from the point where mineralization was faulted off. The drift was continued for approximately 114 metres and cut mainly dark to medium grey coloured quartzite and minor interbeds of graphitic phyllite.

#### 3800' Level

During June, 1952 a new adit (3800' level) was initiated as a prospecting venture by AMCO Explorations Incorporated, largely on the basis of the strong shearing located near the adit entrance. The objective was to intersect the Runer vein 30 metres below the 3900' level.

A narrow vein fault zone striking north-south with siderite occurring along fracture planes up to 0.6 centimetre in thickness was followed within very competent banded quartzite. At 23.5 metres from the adit entrance the fault widened to 0.6 metre and a band of massive galena was found along the west wall. A sample of this material assayed 284 oz/ton of silver and approximately 4 tons of ore was mined from this area. Although the 3800' level drift was continued 88 metres to the north, the downward projection of the ore shoot encountered on the 3900' level was never reached. If both drifts were on the same vein structure either a cross fault exists between the two levels or the vein rotates to a different orientation. Another possibility is that the vein structure encountered on the 3800' level is not the same as that found on the 3900' level.

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Because of the lack of success on the 3800' level emphasis was shifted to the 3300' level where a "new vein" had been discovered.

#### 3300' Level (Hogan Vein)

The Hogan vein is traced on the 3300' level of the Mount Keno property and on the 3800' level where it was investigated by Ankeno Mines Ltd. The vein strikes north 20° east and dips 60° to 80° southeasterly. Five hundred and thirty-five (535) metres of drifting and ninety (90) metres of crosscuts were driven by AMCO Explorations Incorporated. Six hundred and ninety-three (693) metres of underground diamond drilling were completed, but the results were inconclusive because of poor core recovery. The Hogan vein structure is 2.8 metres wide and mineralization consists predominantly of massive coarse siderite with irregular lenses of massive pyrite, minor sphalerite and galena. Fragments of brecciated and comminuted quartzite, graphitic schist and greenstone are also found in the zone. The hanging wall of the fault has moved northeasterly approximately 30 metres relative to the footwall. Along its exposed length, the vein fault is cut by two northwest-striking cross faults that dip 45° southwesterly and, to the west, offset the southern extension of the vein.

#### O'Neil Vein

The O'Neil vein is exposed in two small shafts dug during 1979 and 1980. The most northerly shaft, completed during 1979, exposes a vein striking north-south and dipping 68° to the west. The footwall is composed of highly chloritized and limonitic greenstone while the hanging wall is composed of a series of interbedded quartzite and graphitic phyllite. The contact between the greenstone and the sediments trends 122° and dips 26° to the south. The vein fault consists of massive galena mineralization and limonitic fault gouge. The massive galena lode lenses out along strike into fault gouge 0.18 metre wide. The southern portion was not exposed because of caving. See Figure 6.

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Mr. O'Neil shipped approximately twenty-five tons of ore averaging 375 oz/ton silver and 80% lead in 1979 from the northerly shaft. During the spring of 1980 Mr. O'Neil built a new shelter and began digging a shaft seven (7) metres to the south of the previous shaft. In September 1980 the shaft had been timbered to one (1) metre depth and excavated to five (5) metres.

The vein fault which strikes  $03^{\circ}$  azimuth and dips steeply to the west at  $61^{\circ}$  consists predominantly of massive galena. The hanging wall consists of interbedded quartzites and graphitic phyllites which overlie a greenstone body; the footwall consists of chloritic greenstone. The contact between the greenstone and sediments is similar to that of the previous shaft.

Dimensions of the vein lode mined are: 1) true thickness of 0.38 metre; 2) strike length of 2.8 metres and 3) dip length of 3.8 metres. The lode pinches out to the north into fault gouge and remains consistent in dimensions to the south and down-dip. See Figure 6.

To date Mr. O'Neil has mined twenty-five tons of high grade ore from the southerly shaft.

Between September 16 and September 20, 1980, four days were spent trenching with a D-8 bulldozer in an area south of Mr. O'Neil's shafts. The purpose of this trench was to explore for the south extension of the O'Neil vein. See Figure 7.

A trench 110 metres long exposed 14 metres of massive, light grey quartzite and graphitic phyllite. Although no vein was located, boulders found in the overlying till contained manganese staining and limonite. One boulder contained a trace of arsenopyrite.

### Production

A summary of production from all veins on the Mount Keno leases is given below. Most of the ore was hand cobbled.

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Vein	Company	Date	Production (Tons)	Ag oz/ton	Pb %
Runer	Local prospectors	1920-1950	75	200	50
Runer (3900' Level)	Mount Keno Mines Ltd.	1951	81	480.5	75.6
Runer (3900' Level)	Mount Keno Mines Ltd.	1952	292	72.8	3.2
3800' Level	Mount Keno Mines Ltd.	1952	4	284	
Runer (above 3900' Level)	Silden Mines Ltd.	1954	221	525.5	45.5
Runer	Mr. J.B. O'Neil	1960's	11	513.7	69.8
O'Neil	Mr. J.B. O'Neil	1979	25	375	80
O'Neil	Mr. J.B. O'Neil	1980	28.5	?	?
TOTAL PRODUCTION AND AVERAGE GRADE			737.5	295.8	35.3
RUNER VEIN PRODUCTION AND AVERAGE GRADE			680	289.7	31.81
3800' LEVEL PRODUCTION AND AVERAGE GRADE			4	284	?
O'NEIL VEIN PRODUCTION AND AVERAGE GRADE			53.5	375	80

(Total dollar value for silver mined to date using \$20.00/ounce Canadian is \$4.36 million.)

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### 3.0 GEOCHEMICAL SURVEY

#### Geochemical Soil Survey

A 2.5 kilometre baseline trending  $58^{\circ}34'$  was cut and surveyed as control for a geochemical grid. Crosslines were established at 50 metre intervals along the baseline at  $150^{\circ}$  azimuth. Soil samples were collected every 50 metres along all crosslines during the establishment of the Mount Keno grid. A total of 668 samples were collected from the 'B' horizon, using a mattock, and placed in Kraft paper bags. The samples were air dried and shipped to Bondar-Clegg & Company Ltd. for analysis by standard atomic absorption techniques. All samples were analysed for lead, zinc, silver and copper. Samples taken from the area which hosts the Runer and O'Neil veins were analysed for manganese and mercury to serve as an orientation survey.

A total of 68 soil samples were lost during shipment to Bondar-Clegg & Company Ltd. The lines which were affected include 6+250E, 6+300E, 6+350E, 6+500E and 6+550E. These lines will be resampled during the 1981 field season.

#### Geochemical Analytical Procedure

A 1.0 gm portion of the sample is digested in concentrated perchloric-nitric acid ( $\text{HClO}_4 - \text{HNO}_3$ ) for approximately 2 hours. The digested sample is cooled and made up to 25 mls with distilled water. The solution is mixed and Pb, Ag, Cu, Zn and Mn determined by atomic absorption techniques.

### 3.1 STATISTICAL ANALYSIS

#### Soil Geochemistry

The soil geochemical values for lead, silver, zinc, copper, manganese and mercury were evaluated statistically,

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plotted in plan form and contoured using the following contour intervals: 1) mean + 0; 2) mean + 2a; 3) mean + 3a; 4) 2x(mean + 3a); where 'a' is equal to the standard deviation. This statistical data is shown in Table III. See Appendix II for description of statistical procedures and graphical analysis and for contour maps, see Figures 8.1 to 8.6.

TABLE III

GEOCHEMICAL STATISTICAL RESULTS

	Mean	M + a Trend Value	M + 2a Threshold	M + 3a
Lead	13	23	33	43
Silver	0.3	0.6	0.9	1.2
Zinc	50	73	96	119
Copper	13	21	28	36
Manganese	231	343	454	566
Mercury	37	68	76	152

All values in ppm

Mean = M

Standard Deviation = a

Trend = M + a

Threshold = M + 2a

Possibly Anomalous =  $>M + 2a$   $<M + 3a$

Probably Anomalous =  $>M + 3a$

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### Soil Geochemical Interpretation

Lead, silver, zinc and manganese soil geochemistry reflect vein mineralization as is evident by the presence of strong linear features over known veins. Lead and silver show the strongest correlation while copper and mercury give little indication of linear structures.

Nine soil geochemical anomalies have been defined, of which seven appear to be related to vein mineralization. See Table IV for their descriptions and interpretations. Also refer to Figure A for their locations.

The most significant anomaly (#1) is located in the western part of the grid. It is a strong northerly trending linear zone with coincident anomalous values of lead, silver, zinc and manganese values. High values obtained are 860 ppm Pb, 7.6 ppm Ag, 780 ppm Mn and 99 ppm Zn. Anomaly #1 coincides with the surface projection of the O'Neil vein. A similar northerly trending linear anomaly (#2) is located 200 metres to the east. The two above anomalies are linked together near their centres to form an H-shape as shown on the silver contour plan. See Figure 8.3. This link in the geochemical anomalies could be an indication of a cross fault. The northerly part of anomaly #1 is offset laterally to the right. A cross fault is known to exist in this area because one occurs in the 3900' level crosscut where it offsets the northern part of the Runer vein. See Figure 5.

Anomaly #3 is coincident with the Hogan vein. The highest values are found on or near the waste dump (i.e. 182 ppm Pb, 2.2 ppm Ag).

Other anomalies are described in Table IV.

### 3.2 ROCK GEOCHEMISTRY

A total of 16 rock samples, which were taken from various dumps, pits, veins and float material, were sent to Bondar-Clegg & Company Ltd. for either assay or geochemical analysis. Rock samples that contained visible sulphide mineralization

TABLE IV - SOIL GEOCHEMICAL ANOMALIES

ANOMALY (In Order of Priority)	LOCATION	DIMENSIONS (metres)	ANOMALOUS ELEMENTS	CONCLUSIONS	RECOMMENDATIONS
1	East grid area.	600 x 50	Strong Ag, Pb, Mn weak Zn trend	A northerly trending linear anomaly, coinci- dent with the O'Neil vein.	Trenching is required to test this anomaly to the south and north. Diamond drilling will also be required to test the O'Neil vein along the length of this anomaly.
2	East grid area 200 metres east of #1	600 x 50	Strong Ag, Pb, Zn, Mn weak Cu	A northerly trending linear anomaly, which appears to reflect a mineralized vein fault. Has not been worked on in the past.	Trenching and diamond drilling if necessary should be used to test this anomaly. MnO <sub>2</sub> and siderite have been located within quartzite float in this area.
3	West-central grid area. Straddles Lightning Creek.	250 x 50	Strong Ag, Pb, Zn weak Cu	A north 20° east trend- ing linear anomaly coincident with the Hogan vein.	The Hogan vein has been tested by underground and crosscuts. No ore was located during exploration. Trenching is required near the cross fault near L6+250E, 10+300N.
4	East-central grid area. Southwest of O'Neil vein.	205 x 50	Moderately strong Pb, Ag.	A northerly trending linear anomaly, which may outline vein min- eralization.	Trenching is required to test this anomaly.
5	Central grid area, south of Lightning Creek.	300 x 25	Weak Ag	Northerly trending anomaly. Could be the south extension of the O'Neil or Runer veins.	Geological mapping and prospect- ing are required before trench- ing is considered.

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TABLE IV - SOIL GEOCHEMICAL ANOMALIES

ANOMALY (In Order of Priority)	LOCATION	DIMENSIONS (metres)	ANOMALOUS ELEMENTS	CONCLUSIONS	RECOMMENDATIONS
6	East-central grid area. South of Lightning Creek.	250 x 50	Strong Pb, Ag, Zn	A northerly trending linear anomaly which appears to be the south extension of the Ankeno vein.	Trenching is required to test this anomaly.
7	Extreme western part of grid.	300 x 50	Strong Pb, spotty Ag high weak Cu	Anomaly becomes stronger upslope near claim boundary. In part it appears due to downslope migration.	Geological mapping and prospecting are required before trenching is considered.
8	West-central grid area. South of Lightning Creek.	300 x 150	Strong Ag, Pb, Zn, Cu	A wide northerly trending anomaly, probably caused by downslope migration from Belkeno veins.	Geological mapping and prospecting should be done in this area before trenching is considered. Soil sampling in the area to the east will have to be done because samples were lost during shipping to Bondar-Clegg.
9	Central grid area.	100 x 25	Strong Ag, Pb, Zn	Anomaly appears to be associated with the drainage system.	Area to west requires soil sample. Same reason as above.

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TABLE V - ROCK GEOCHEMISTRY

SAMPLE NUMBER	ASSAY ROCK GEOCHEMISTRY				ROCK GEOCHEM				LOCATION & COMMENTS
	oz/ton		%		ppm				
	Au	Ag	Pb	Zn	Au	Ag	Pb	Zn	
28551	0.002	325.0	7.20	0.08					From 1980 shaft - O'Neil vein. Massive galena.
28555						G100	15420	4440	From dump near adit above 3900' level adit entrance. L7+240E, 9+940N - Wad and limonite breccia.
28556						G100	1136	1179	From shaft located at L7+220E, 9+970N Wad and limonite from vein material on dump.
28557	0.005	140.0	7.80	0.04					From dump near 3900' level entrance. Galena in brecciated, altered rock - Runer vein.
28558	0.002	440.0	45.0	0.08					Location as for 28557. Massive galena occurred as fracture fillings with wad, limonite and siderite.
28559	0.002	47.7	16.5	0.02					Location - L7+290E, 9+990N. Taken from dump near shaft which explored the near surface portion of the Runer vein. Massive galena, with wad and limonite.
28560						G100	252	362	Location as for 28559. Sample contained wad with limonite.

TABLE V - ROCK GEOCHEMISTRY

SAMPLE NUMBER	ASSAY ROCK GEOCHEMISTRY				ROCK GEOCHEM				LOCATION & COMMENTS
	oz/ton		%		ppm				
	Au	Ag	Pb	Zn	Au	Ag	Pb	Zn	
28561						55	424	631	Location - L7+250E, 9+740N Quartzite boulder containing manganese and limonite staining and minor siderite.
28562						16	158	241	Location - L7+250E, 9+700N Quartzite float containing manganese and limonite staining.
28563						G100	G20000	5950	Sample of fault gouge taken from the east wall of the O'Neil shaft (1980). Not shipped as ore.
12386						6	397	281	Taken from old trench located at L6+250E, 10+200N. Vein breccia within a quartzite also contains MnO <sub>2</sub> and limonite.
12387						8	293	979	Massive siderite with limonite taken from the Hogan vein dump.
12388						0.1	21	73	Greenstone with MnO <sub>2</sub> and breccia found on the Hogan vein dump.
12409						0.3	15	53	Location - L6+400E, 10+100N Quartzite with redish limonite.
12410						16	24	27	Location as for 12409. Vuggy quartz vein with limonite.

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TABLE V - ROCK GEOCHEMISTRY

SAMPLE NUMBER	ASSAY ROCK GEOCHEMISTRY				ROCK GEOCHEM				LOCATION & COMMENTS
	oz/ton		%		ppm				
	Au	Ag	Pb	Zn	Au	Ag	Pb	Zn	
12411						3.8	5	16	Location - L6+400E, 10+050N Strong limonite on fracture with MnO <sub>2</sub> in quartzite float.

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were assayed for Au, Ag, Pb and Zn while samples that did not contain visible sulphide mineralization were geochemically analysed for Ag, Pb and Zn. See Table V for the results of these analyses. All results have been plotted on the Geology maps, 1:2,500 scale, Figure 3, or 1:500 scale, Figure 4.

For samples taken from dumps near the Runer vein it is interesting to note that the system contains very little gold, (.002 oz/ton), and zinc, (0.04%).

Samples, 258561 and 258562, contain anomalous amounts of silver, lead and zinc minerals (55 ppm Ag in sample 258561 is equivalent to 1.7 oz/ton silver). These samples are very significant because they were found in the south part of soil geochemical anomaly #2.

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#### 4.0 VECTOR PULSE ELECTROMAGNETOMETER ORIENTATION SURVEY

From September 22 to September 26, 1980 a Vector Pulse Electromagnetic Survey was conducted over the O'Neil vein on the Mount Keno property. The O'Neil vein, as observed in the 1980 shaft excavated by Mr. Barry O'Neil during 1980, is a zone of massive galena approximately 0.3 metre wide, which strikes approximately north-south and dips 70° to the west. The purpose of the survey was to try to detect this zone of massive galena mineralization within the quartzite-phyllite environment. The geophysical survey was conducted by Glen E. White of Geophysical Consulting & Services Ltd.

##### Instrumentation Survey

The VPEM survey uses the Crone pulse electromagnetometer system which utilizes a mobile point source receiver coupled to a fixed transmitter. The primary current wave is passed through a large 150 metre square transmitter loop using a sequence, on 10.8 milliseconds and off 10.8 milliseconds with a 1.4 millisecond ramp shut off. This current wave form pattern is transmitted to the receiver via a C.B. radio where eight delay channels of the secondary field are measured after the current is shut off at intervals of 0.15 milliseconds, 0.30 milliseconds, 0.55 milliseconds, 0.99 milliseconds, 1.45 milliseconds, 2.40 milliseconds and 6.4 milliseconds. Readings are then obtained of the vertical and horizontal secondary fields.

##### Survey Configuration

Three lines trending east-west (perpendicular to the vein) were laid out 50 metres apart and with stations at 25 metre intervals. Two opposing loops were set out on either side of the vein.

##### Results and Interpretation

A broad conductive response was obtained from the horizontal component as well as a migrating vertical component

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crossover for loop A. These features are indicative of a shallow dipping, strongly conductive graphitic unit.

Loop B indicates a conductor at 750E and a small conductor at 1050N on line 825E from loop A.

The strong lithologic conductor response from the graphic phyllite monopolized the secondary field and masked the response from the small lenses of massive galena mineralization. It was concluded that this size of deposit has too low a conductivity width product to be detected in the conductive graphitic environment. See report by Glen White Consultants in Appendix III for a detailed discussion of results.

## 5.0 CONCLUSIONS

1. The Mount Keno leases are underlain by the Central Quartzite formation which includes quartzite and graphitic phyllite. The units have been intruded by greenstone sills (Unit 4).
2. The above units are cut by a number of vein faults which have been sporadically explored since the 1920's. These veins include the Runer, Hogan and O'Neil veins.
3. The Runer vein has been explored by underground workings on the 3000' level. This vein is approximately 0.3 metres wide, has a strike and dip of north 20° east and 40° west respectively. A total of approximately 680 tons of ore averaging 290 oz/ton silver and 35% lead has been mined.

Because the ground around the Runer vein has been mechanically disturbed, there is no surface expression either as a vein float, or by soil geochemistry. The best possibility for finding economic ore lodes are to explore for the veins' northerly, southerly and downdip extensions. The southerly projection of the vein in the area near its intersection with the northerly projection of the O'Neil vein is given high priority for follow up exploration.

4. The Hogan vein has been explored by underground adits, crosscuts, and diamond drilling on the 3300' and 3800' levels. Although the Hogan vein is a strong break, up to 3 metres wide, vein mineralization consisted mainly of massive siderite and very little galena or sphalerite. The downdip extension of the vein and the northerly extension of the vein at the intersection of a cross fault located near L6+250E and 10+300N have yet to be explored. The potential of both these areas is very good. There is no evidence that the Hogan vein exists as is indicated from surface geological mapping, however, an airphoto lineament exists within the same approximate location and as well it is reflected by anomalous lead, silver and zinc soil geochemistry.

5. The O'Neil vein is approximately 0.3 metre wide and has a strike and dip of  $03^{\circ}$  azimuth and  $61^{\circ}$  west respectively. Mr. Barry O'Neil mined approximately 50 tons of high grade silver ore averaging 375 oz/ton silver and 80% lead from two shafts during 1979 and 1980. Because of the excellent geochemical soil response (anomaly #1) and the amount of high grade ore already mined, it is thought that the O'Neil vein has the best possibility of hosting mineable ore lodes.

The vein can be projected to the north and south via soil geochemistry. To the north the vein can be projected 200 metres until a cross fault offsets it 50 metres laterally southeast. It can be projected approximately 200 metres further to the north past this cross fault. Excellent areas for location of ore lodes would be near the intersection of the vein fault and this cross fault. The vein appears to be cross faulted away 50 metres south of the present shafts, although two other soil anomalies could be its surface reflection in this area.

6. Silver and lead soil geochemistry is very useful for delineating vein faults. Zinc and manganese soil geochemistry is not as effective as the above two but manganese may be useful in delineating fault projections. Copper geochemistry appears to be of little use in delineating vein faults.

A total of nine geochemical anomalies have been delineated, some of which require further follow up work. Anomaly #1 and anomaly #2 are considered top priority for further work (see Table III for conclusions on soil anomalies #3 to #9).

7. The Vector Pulse Electromagnetometer orientation survey has encountered a strong graphic conductor which masked the response from the small lense of massive galena mineralization found in the O'Neil vein. The system is not effective in a graphitic environment.

## 6.0 RECOMMENDATIONS

1. Bulldozer trenching, geological mapping and prospecting are recommended to further investigate the seven significant geochemical soil anomalies. Bulldozer trenching on anomalies #1 and #2 are considered top priority for follow-up, because of their obvious association with vein faults. See Table III.
2. Additional geological mapping (1:2,500 scale) and geochemical soil sampling are required in areas not covered in the 1980 season.
3. Approximately 3,000 feet of diamond drilling is recommended to test the following target areas:
  - a) northerly extension of the Runer vein;
  - b) downdip extension of the Runer vein in a lower quartzite;
  - c) possible intersection of the Runer and O'Neil veins;
  - d) downdip and southerly extension of the O'Neil vein;
  - e) follow up drilling of geochemical anomalies to be investigated by 1981 bulldozer trenching.
4. Orientation resistivity survey is recommended to test the response over the O'Neil and Runer veins.

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**LEGEND**

**SYMBOLS**

**GEOLOGICAL BOUNDARY**

- defined
- approximate
- assumed
- LIMIT of GEOLOGICAL MAPPING

**OUTCROP**

- defined
- approximate
- assumed

**FAULTS**

- defined
- approximate
- assumed

**VEIN STRUCTURE**

- defined
- approximate
- assumed

**BEDDING**

- horizontal
- vertical
- inclined
- overturned

**FOLIATION**

- horizontal
- vertical
- inclined
- unknown

**ANTICLINE**

- defined
- approximate
- overturned

**SYNCLINE**

- defined
- approximate
- overturned

**JOINTING**

- weak
- moderate
- strong
- weak
- moderate
- strong

**MINOR FOLDS**

- style & direction
- minor

**GLACIAL STRIAE**

- direction known
- movement known

**LINEAMENT**

- defined

**LITHOLOGY**

**DRIFT**

- 8

**LAMPROPHYRE**

- 7

**QUARTZ-FELDSPAR PORPHYRY**

- 6

**GRANITIC ROCKS**

- 5

**GREENSTONE**

- 4

**UPPER SCHIST FORMATION**

- 3
- 3a
- 3b
- 3c
- 3d
- 3e

**CENTRAL QUARTZITE FORMATION**

- 2
- 2a
- 2b
- 2c

**LOWER SCHIST FORMATION**

- 1
- 1a
- 1b
- 1c
- 1d
- 1e
- 1f
- 1g

**SHAFT**

- defined
- abandoned

**RAISE**

- defined
- abandoned

**WINZE**

- defined
- abandoned

**ADIT or TUNNEL**

- defined
- abandoned

**QUARRY or MINE**

- defined
- abandoned

**TRENCH**

- defined
- abandoned

**PIT**

- defined
- abandoned

**GRAVEL PIT**

- defined
- abandoned

**DUMP or TAILINGS**

- defined
- abandoned

**DON & NUMBER**

- location
- location
- location

**CHIP SAMPLE**

- location

**ROCK SAMPLE**

- location

**FLAG**

- location

**SURVEY STATION**

- location

**TRIANGULATION POINT**

- location

**CLAIM POST**

- location

**CLAIM BOUNDARY**

- location

**ROAD**

- location

**CAT TRAIL**

- location

**CABIN**

- location

**SPRING**

- location

Contour interval - ppm  
(Threshold values)

Pb — 33  
Ag — 0.9  
Zn — 0.6

Soil Anomaly Priority No - 2



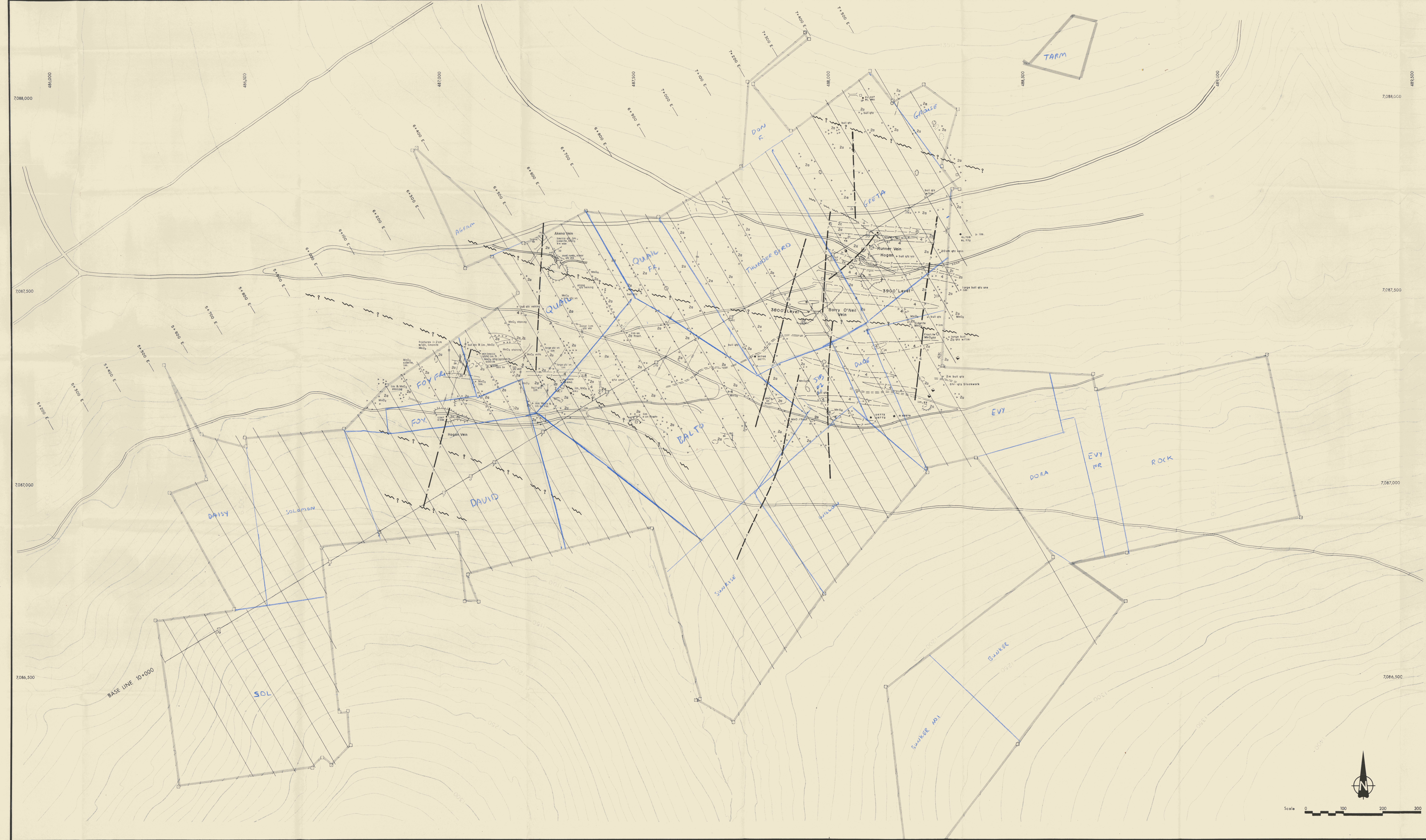
Scale 0 100 200 300 Metres

**CANADA TUNGSTEN MINING CORPORATION**  
**KENO HILL Y.T.**  
 1980 GEOLOGICAL EXPLORATION PROGRAMME

MOUNT KENO LEASES  
**SUMMARY OF EXPLORATION**  
 80-09-3

DATE: FEBRUARY 1981 JOB NO: 80-09-N FIG NO: A  
 DRAWN BY: dbb / C.L. SCALE: 1:2500 METRES  
 REVISED BY:

**BEMA INDUSTRIES LTD.**



**LEGEND**

<b>SYMBOLS</b>	<b>SHAFT</b>
<b>GEOLOGICAL BOUNDARY</b>	RAISE
— defined	WRENZE
- - - approximate	ADIT or TUNNEL
--- LIMIT of GEOLOGICAL MAPPING	covered
	QUARRY or MINE
	active
	abandoned
	TRENCH
	closed end
	open end
<b>OUTCROP</b>	
— covered	
— FELSSENER	
— TALUS	
— FAULTS	
— defined	
— assumed	
— VEIN STRUCTURE	
— defined	
— approximate	
— assumed	
<b>BEDDING</b>	
— horizontal	
— vertical	
— inclined	
— overturned	
<b>FOLIATION</b>	
— horizontal	
— vertical	
— inclined	
— unknown	
<b>ANTICLINE</b>	
— defined	
— approximate	
— overturned	
<b>SYNCLINE</b>	
— defined	
— approximate	
— overturned	
<b>JOINTING</b>	
— weak	
— vertical	
— moderate	
— strong	
— inclined	
— moderate	
— strong	
<b>MINOR FOLDS</b>	
— style & direction	
<b>GLACIAL STRIAE</b>	
— movement known	
— movement known	
<b>LITHOMAT</b>	
<b>LITHOLOGY</b>	
<b>DRIFT</b>	
8	
<b>LAMPORPHYRE</b>	
7	
<b>QUARTZ-FELDSPAR PORPHYRY</b>	
6	
<b>GRANITIC ROCKS</b>	
5	
<b>GREENSTONE</b>	
4	
<b>UPPER SCHIST FORMATION</b>	
3	
3a	Quartz-sericite schist
3b	Quartz-chlorite sericite schist
3c	Thin-bedded quartzite
3d	Phyllite, graphic phyllite
3e	Limestone
<b>CENTRAL QUARTZITE FORMATION</b>	
2	
2a	Massive quartzite
2b	Thin-bedded quartzite
2c	Graphic phyllite
<b>LOWER SCHIST FORMATION</b>	
1	
1a	Thin-bedded quartzite
1b	Quartz-chlorite sericite schist
1c	Graphic schist
1d	Phyllite and argillite
1e	Quartz-sericite schist
1f	Massive quartzite - No. 9

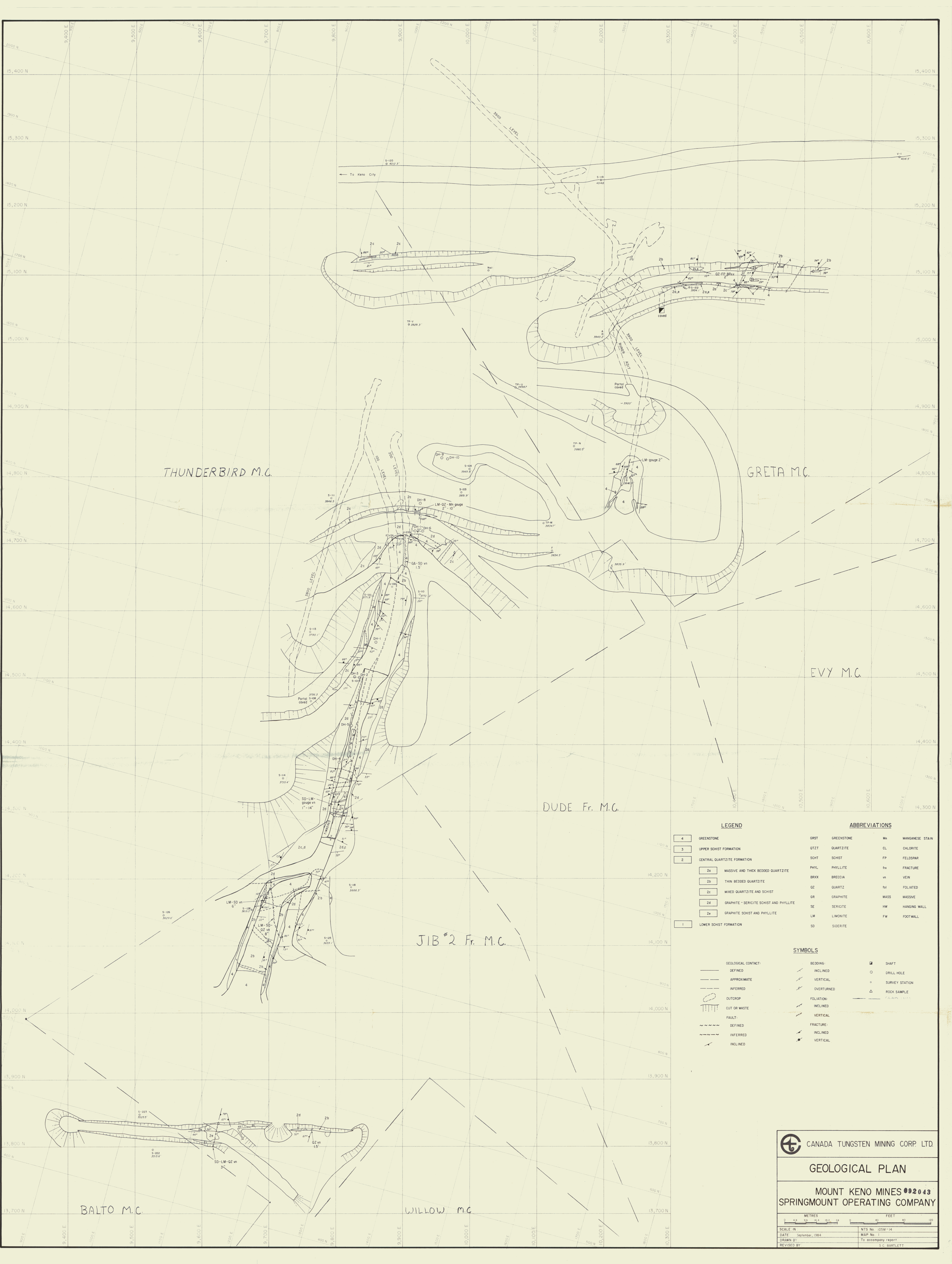
CANADA TUNGSTEN MINING CORPORATION  
**KENO HILL Y-T**  
 1980 GEOLOGICAL EXPLORATION PROGRAMME

MOUNT KENO LEASES  
**GEOLOGY**  
 000043

DATE: FEBRUARY 1981  
 DRAWN BY: dmb  
 REVISIONS BY:

JOB NO: 80-09-N  
 SCALE: 1:2500  
 FIG NO: 3  
 METRES

**BEMA INDUSTRIES LTD.**



THUNDERBIRD M.C.

GRETA M.C.

EVY M.C.

DUDE Fr. M.C.

JIB #2 Fr. M.C.

BALTO M.C.

WILLOW M.C.

**LEGEND**

4	GREENSTONE	GRST	GREENSTONE	Mn	MANGANESE STAIN
3	UPPER SCHIST FORMATION	QTZT	QUARTZITE	CL	CHLORITE
2	CENTRAL QUARTZITE FORMATION	SCHT	SCHIST	FP	FELDSPAR
2a	MASSIVE AND THICK BEDDED QUARTZITE	PHYL	PHYLLITE	fr	FRACTURE
2b	THIN BEDDED QUARTZITE	BRXX	BRECCIA	vn	VEIN
2c	MIXED QUARTZITE AND SCHIST	OZ	QUARTZ	fol	FOLIATED
2d	GRAPHITE - SERICITE SCHIST AND PHYLLITE	GR	GRAPHITE	MASS	MASSIVE
2e	GRAPHITE SCHIST AND PHYLLITE	SE	SERICITE	HW	HANGING WALL
1	LOWER SCHIST FORMATION	LM	LIMONITE	FW	FOOTWALL
		SD	SIDERITE		

**SYMBOLS**

—	GEOLOGICAL CONTACT:	—	BEDDINGS:	□	SHAFT
---	DEFINED	—	INCLINED	○	DRILL HOLE
- - -	APPROXIMATE	—	VERTICAL	+	SURVEY STATION
...	INFERRED	—	OVERTURNED	△	ROCK SAMPLE
▬	OUTCROP	—	FOLIATION:	—	CLAMP LINE
▬	CUT OR WASTE	—	INCLINED		
▬	FAULT:	—	VERTICAL		
▬	DEFINED	—	FRACTURE:		
▬	INFERRED	—	INCLINED		
▬	INCLINED	—	VERTICAL		

**CANADA TUNGSTEN MINING CORP. LTD.**

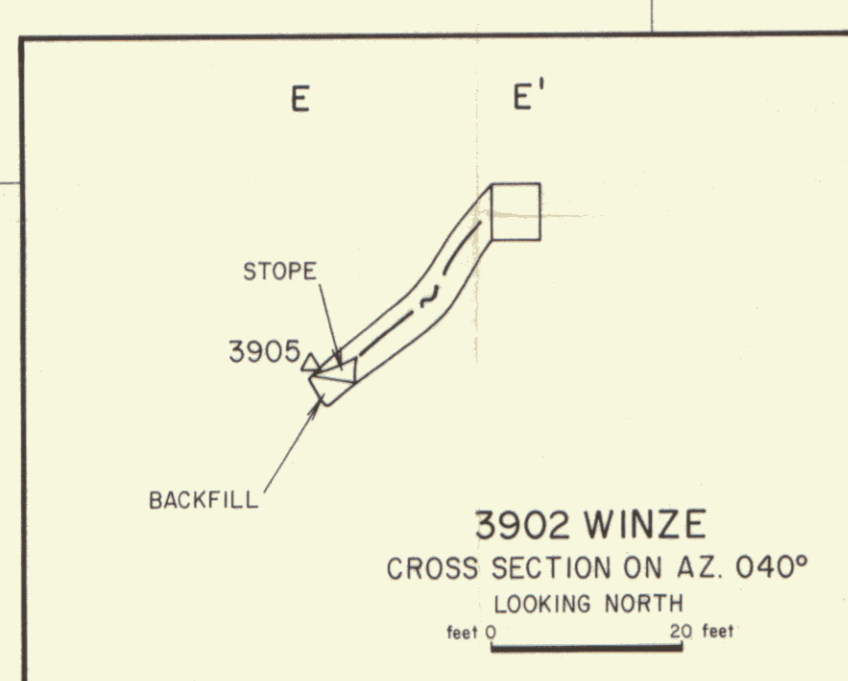
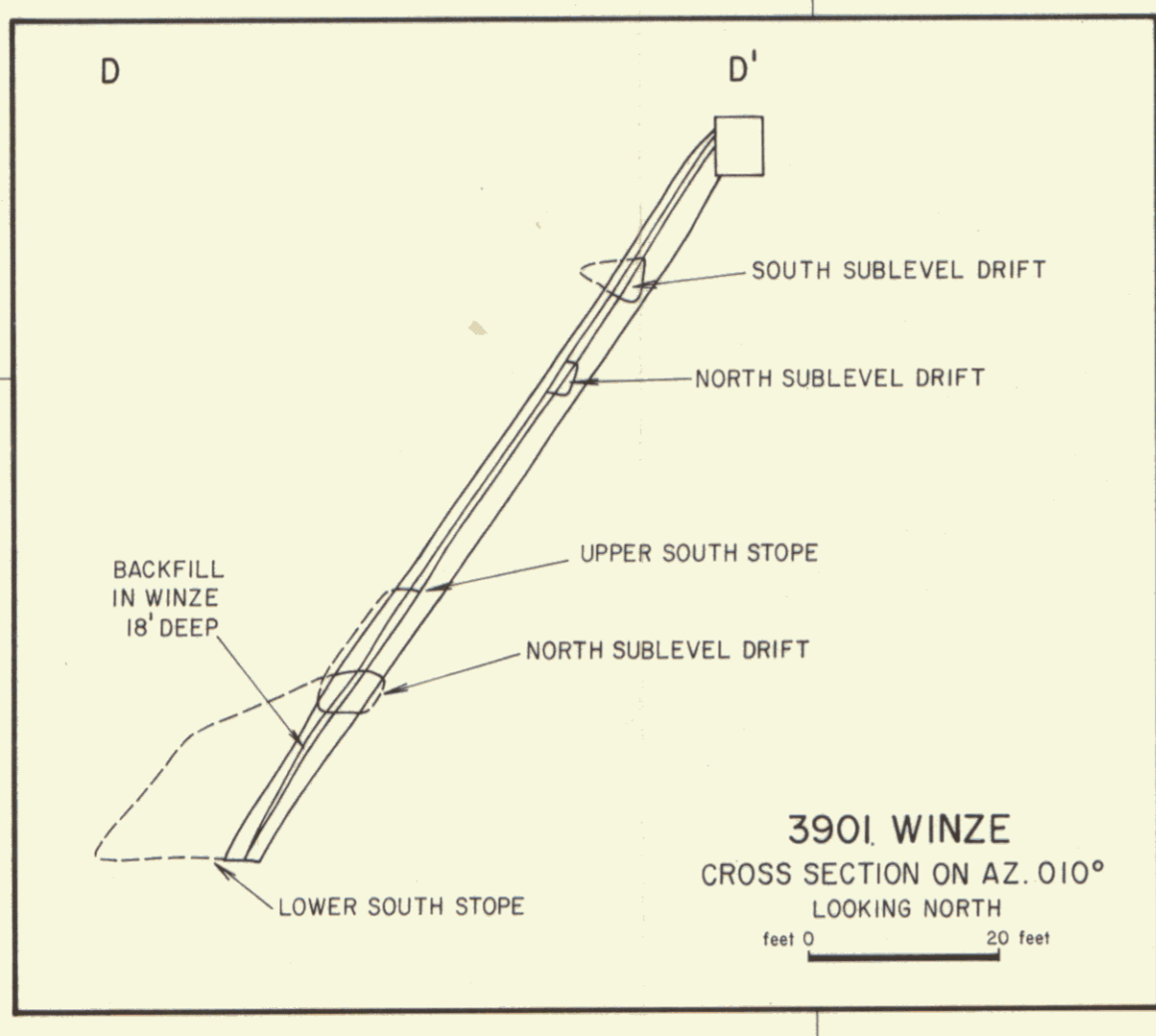
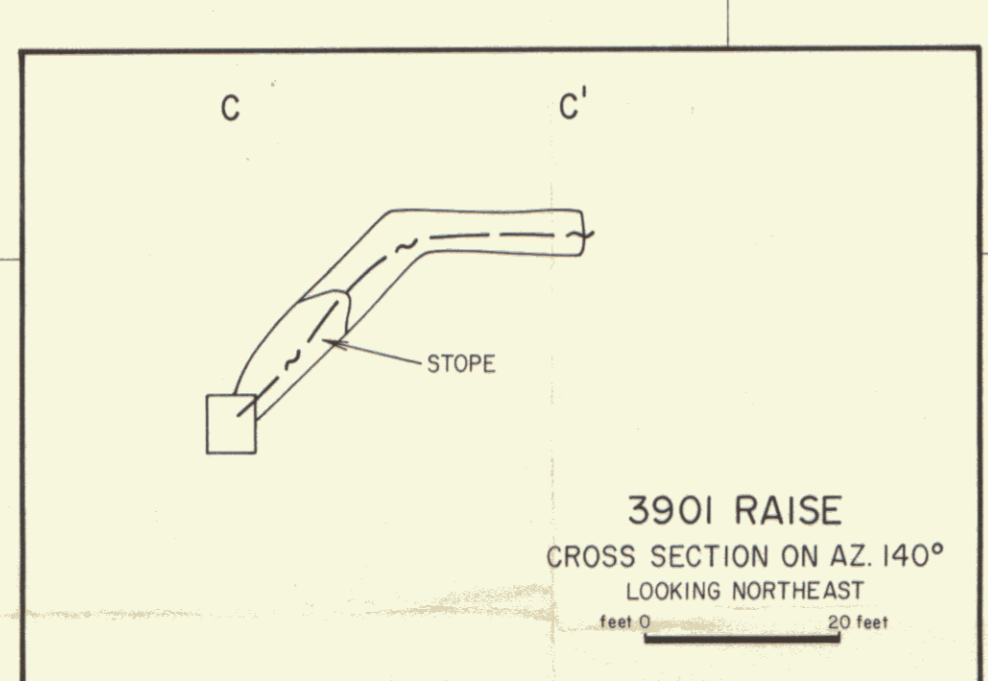
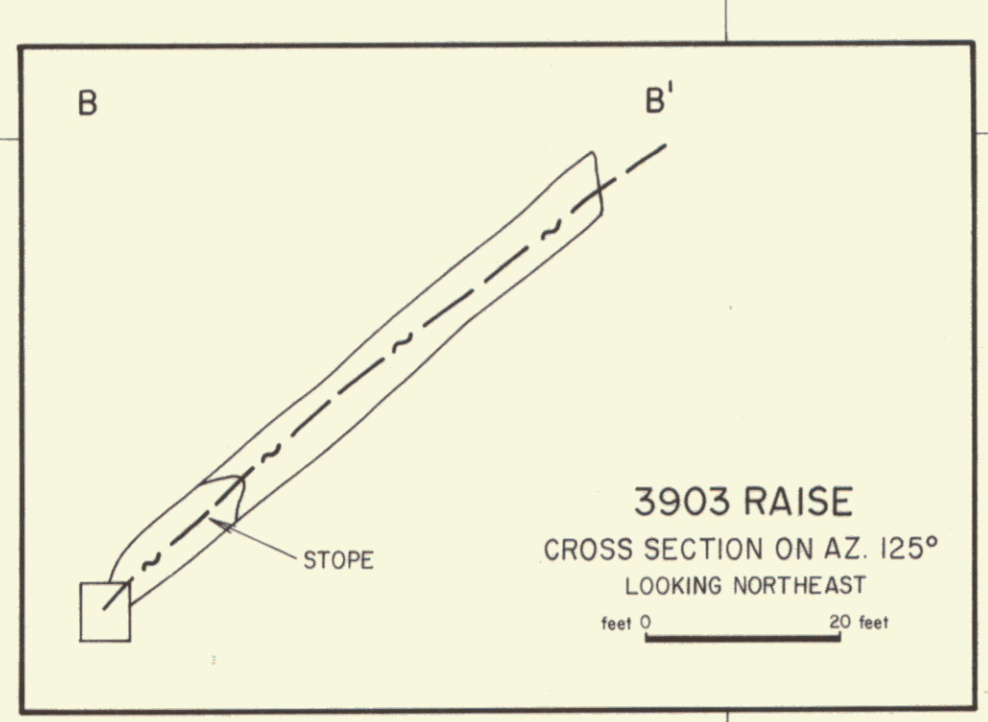
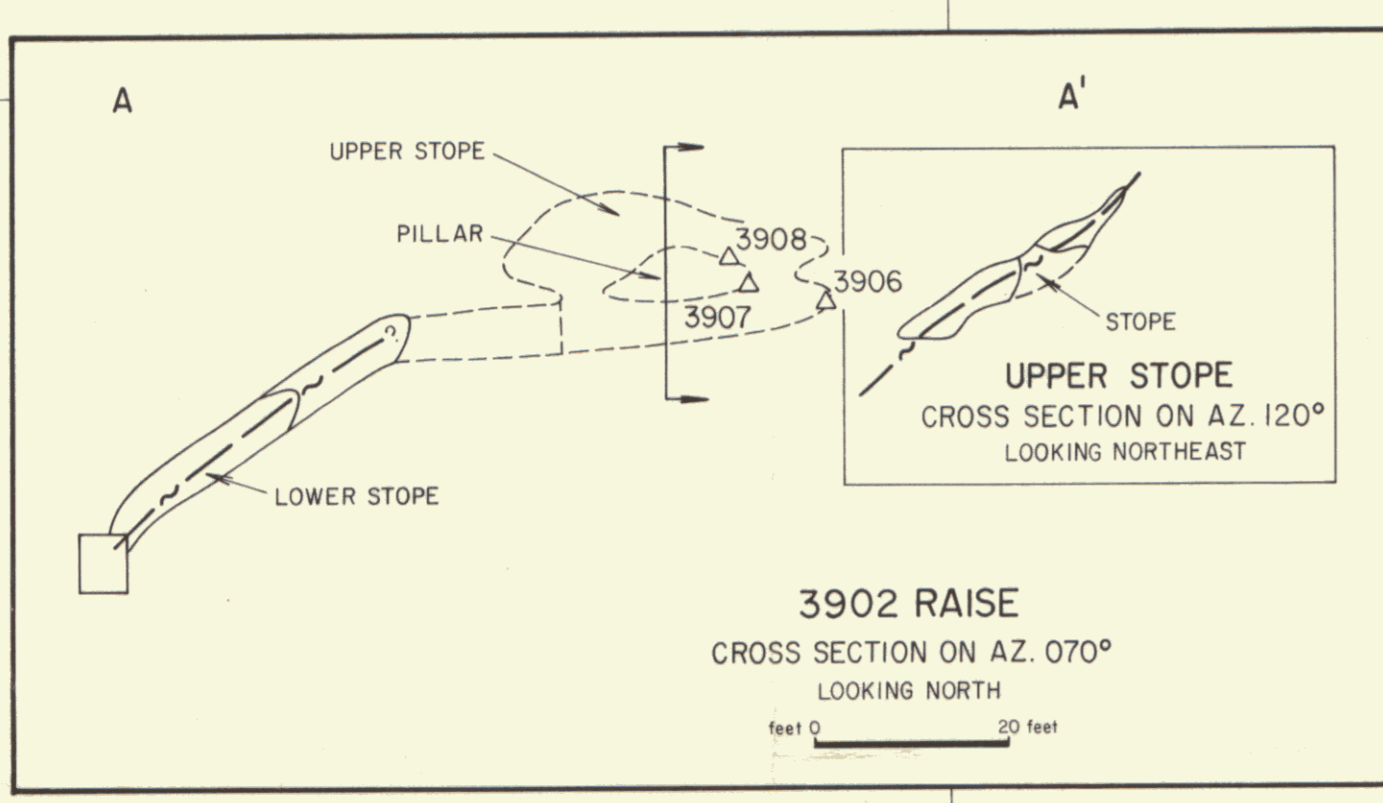
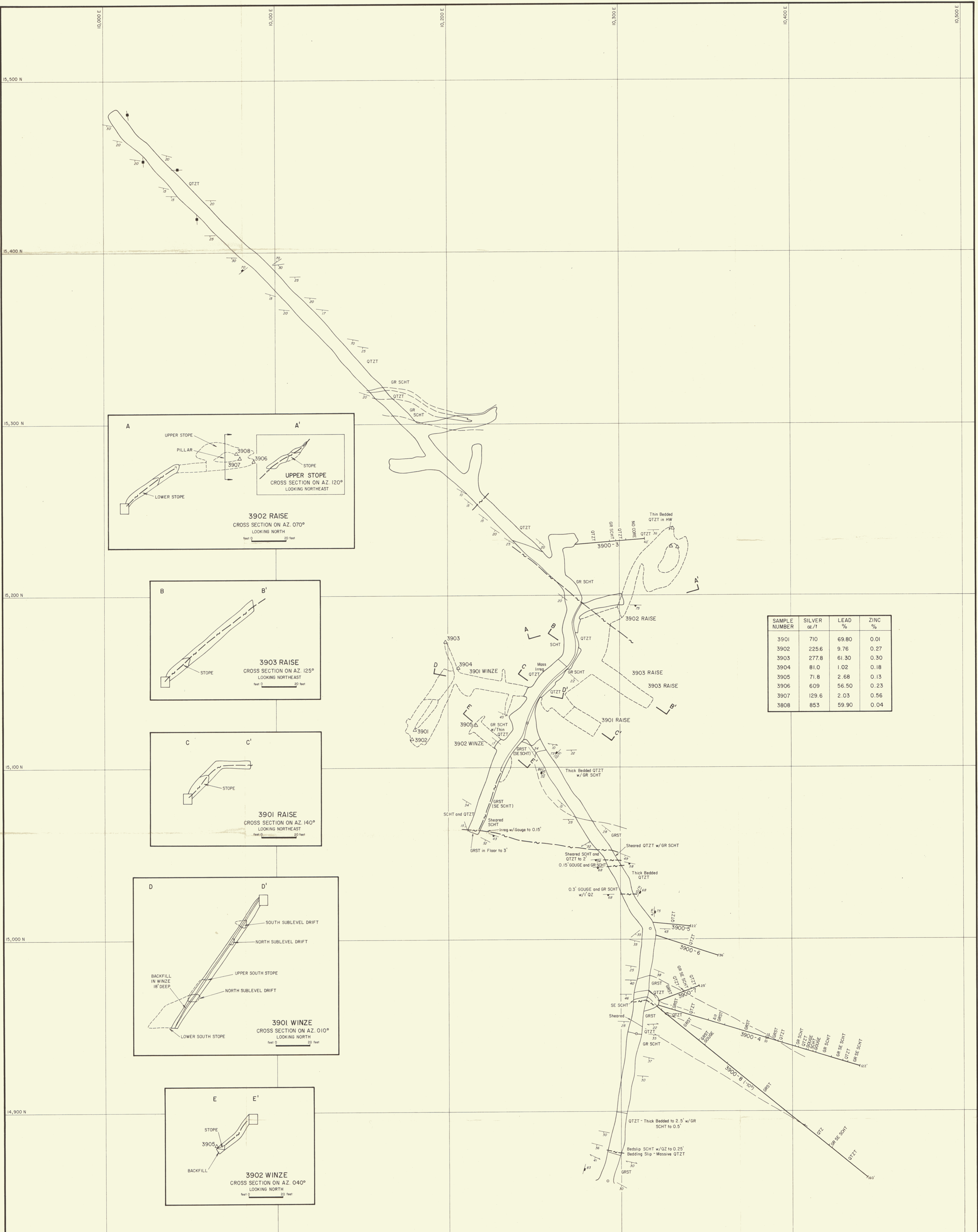
**GEOLOGICAL PLAN**

**MOUNT KENO MINES 002043**  
**SPRINGMOUNT OPERATING COMPANY**

SCALE: 1" = 100M  
 DATE: September, 1984  
 DRAWN BY: [Name]  
 REVISED BY: [Name]

NTS No. 005M-14  
 MAP No. 1  
 To accompany report  
 S. C. BARTLETT

METRES: 0 4.8 9.6 14.4 19.2 24 28.8 33.6 38.4 43.2 48  
 FEET: 0 16 32 48 64 80 96 112 128



SAMPLE NUMBER	SILVER oz./T	LEAD %	ZINC %
3901	710	69.80	0.01
3902	225.6	9.76	0.27
3903	277.8	61.30	0.30
3904	81.0	1.02	0.18
3905	71.8	2.68	0.13
3906	609	56.50	0.23
3907	129.6	2.03	0.56
3808	853	59.90	0.04

**LEGEND**

- 4 GREENSTONE
- 3 UPPER SCHIST FORMATION
- 2 CENTRAL QUARTZITE FORMATION
  - 2a MASSIVE AND THICK BEDDED QUARTZITE
  - 2b THIN BEDDED QUARTZITE
  - 2c MIXED QUARTZITE AND SCHIST
  - 2d GRAPHITE - SERICITE SCHIST AND PHYLITE
  - 2e GRAPHITE SCHIST AND PHYLITE
- 1 LOWER SCHIST FORMATION

- GEOLOGICAL CONTACT:**
- DEFINED
  - - - APPROXIMATE
  - · - · - INFERRED
  - OUTCROP
  - ▨ CUT OR WASTE
  - ▬ FAULT:
    - DEFINED
    - - - APPROXIMATE
    - · - · - INFERRED
  - ▬ INCLINED

**SYMBOLS**

- BEDDING:**
- ▬ INCLINED
  - ▬ VERTICAL
  - ▬ OVERTURNED
- FOLIATION:**
- ▬ INCLINED
  - ▬ VERTICAL
- FRACTURE:**
- ▬ INCLINED
  - ▬ VERTICAL

- ▬ SHAFT
- DRILL HOLE
- SURVEY STATION
- △ ROCK SAMPLE

**ABBREVIATIONS**

- |      |            |     |                 |
|------|------------|-----|-----------------|
| GRST | GREENSTONE | Mn  | MANGANESE STAIN |
| QTZT | QUARTZITE  | CL  | CHLORITE        |
| SCHT | SCHIST     | FP  | FELDSPAR        |
| PHYL | PHYLITE    | frx | FRACTURE        |
| BRXX | BRECCIA    | vn  | VEIN            |
| OZ   | QUARTZ     | fol | FOLIATED        |
| GR   | GRAPHITE   | MSS | MASSIVE         |
| SE   | SERICITE   | HAW | HANGING WALL    |
| LM   | LIMONITE   | FW  | FOOTWALL        |
| SD   | SIDERITE   |     |                 |

CANADA TUNGSTEN MINING CORP. LTD.

## 3900 LEVEL MINE GEOLOGY

**MOUNT KENO MINES  
SPRINGMOUNT OPERATING COMPANY**

SCALE: 1" = 20'

DATE: September, 1984

DRAWN BY: [Name]

REVISED FROM: 1963 WORKINGS

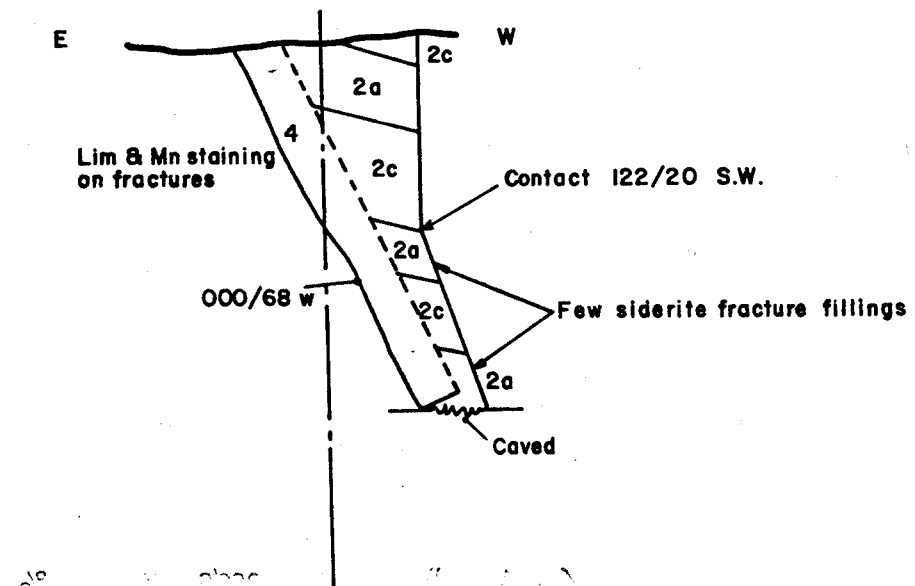
NTS No. 105M-14

MAP No. [Number]

To accompany report.

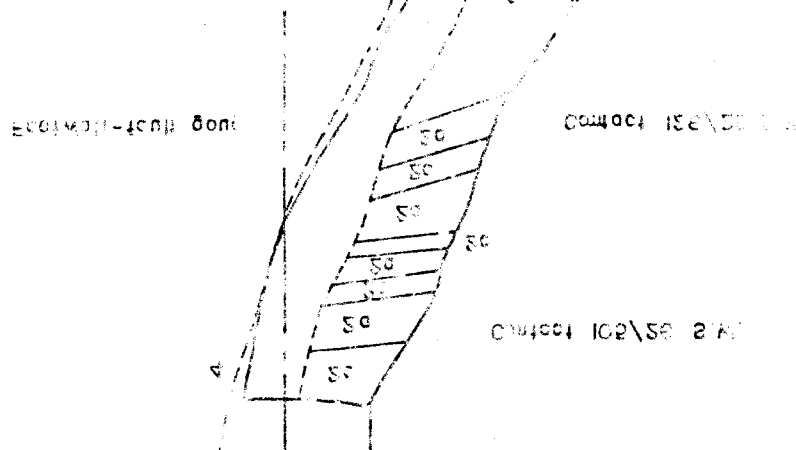
S.C. BARTLETT

LOOKING SOUTH




1979 Shaft

Vein pinches to north into fault gouge and minor galena N 0.18m.



LOOKING NORTH

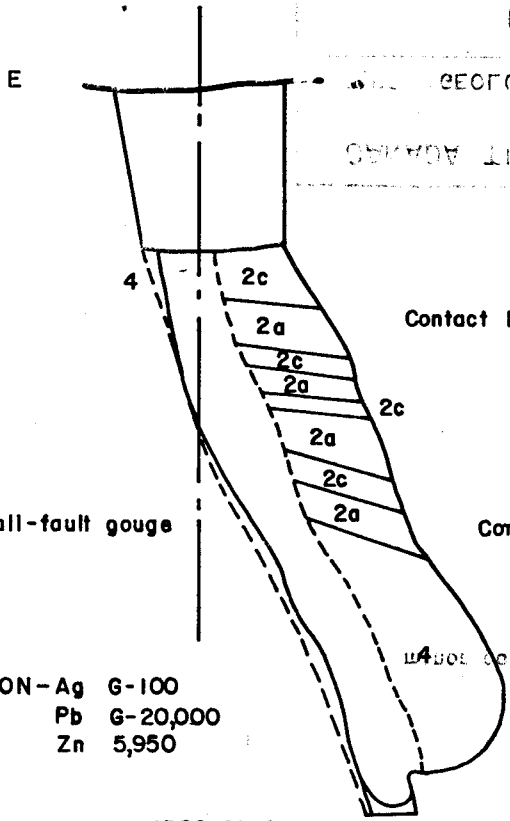


CANADA TUNGSTEN MINING CORPORATION	
KENO HILL Y.T.	
1980 GEOLOGICAL EXPLORATION PROGRAMME	
MOUNT KENO LEASES	
GEOLOGY 092043	
O'NEIL SHAFTS 1979	
DATE FEBRUARY 1981	JOB NO. 80-09-N
REVISED BY	FIG. NO. 6-1
 <b>BEMA INDUSTRIES LTD.</b>	

Scale 0 1 2 3 Metres



LOOKING SOUTH



FootWall-fault gouge

Contact 105/26 S.W.

Contact 126/28 S.W.

**28,563** Oz/TON - Ag 6-100  
 % Pb 6-20,000  
 Zn 5,950

1980 Shaft

**28,551** Oz/TON - Au 0.002  
 % Ag 325.0  
 Pb 7.20  
 Zn 0.08

Vein in middle of shaft

CANADA TUNGSTEN MINING CORPORATION  
 KENO HILL Y.T.  
 1980 GEOLOGICAL EXPLORATION PROGRAMME

MOUNT KENO LEASES  
**GEOLOGY 092043**  
 O'NEIL SHAFTS 1980

DATE FEBRUARY 1981

JOB NO: 80-09-N

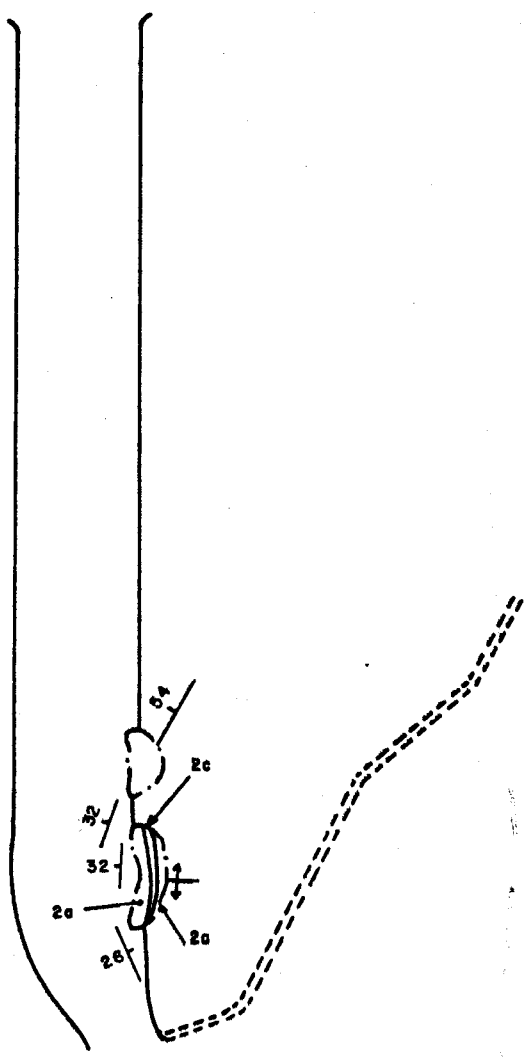
REVISED BY


FIG NO.: 6.2

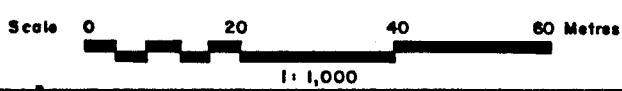
Scale 0 1 2 3 Metres  
 1:50

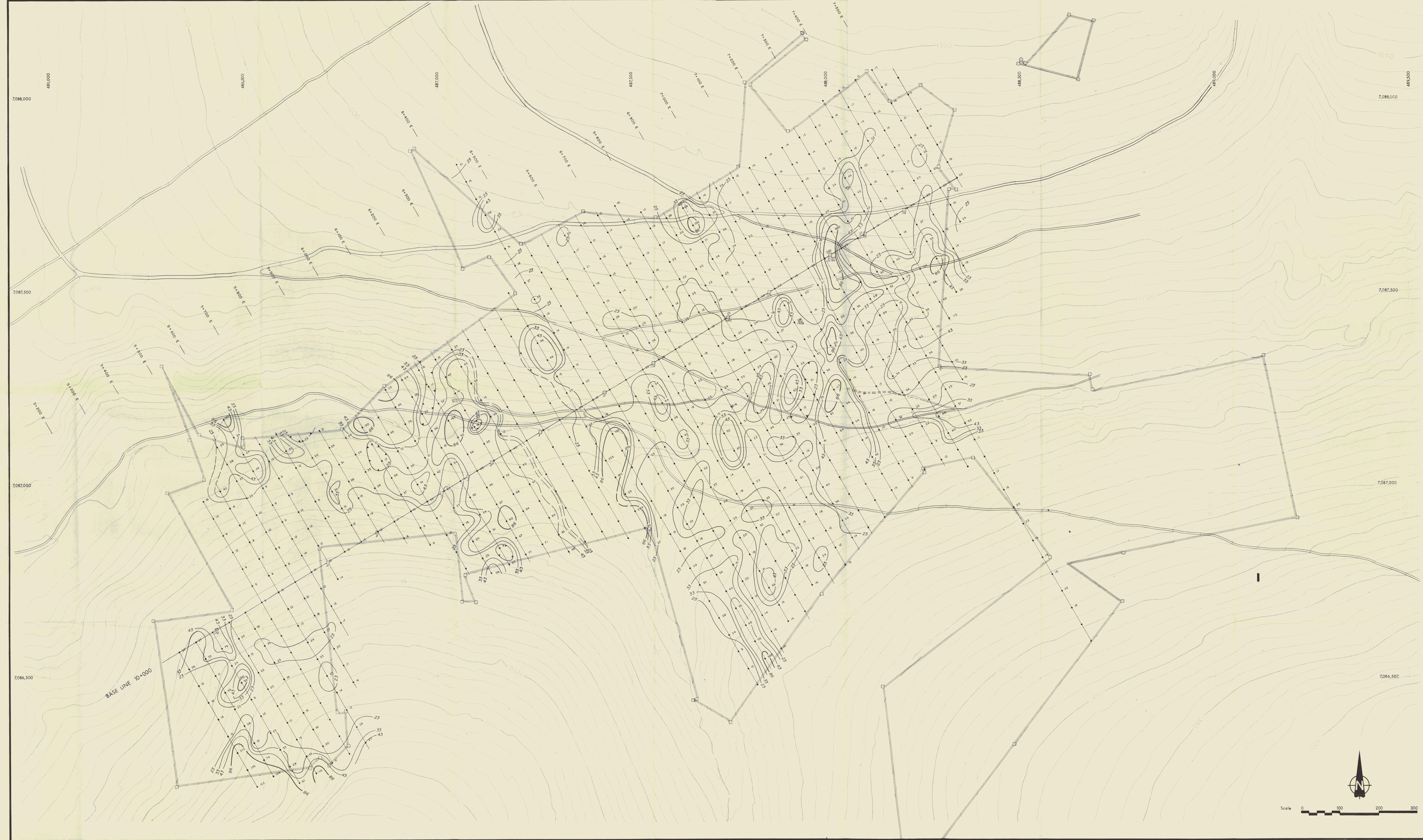


**BEMA INDUSTRIES LTD.**



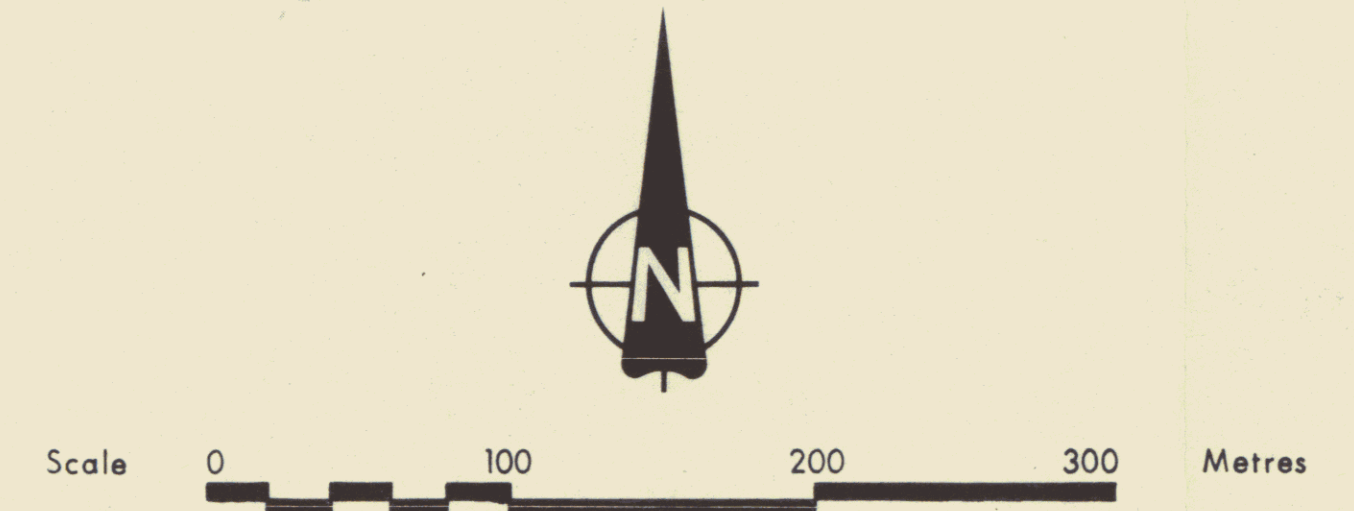
CANADA TUNGSTEN MINING CORPORATION KENO HILL Y.T. 1980 GEOLOGICAL EXPLORATION PROGRAMME	
MOUNT KENO LEASES <b>092043</b> GEOLOGY TRENCH, 80-1	
DATE <i>FEBRUARY 1981</i>	JOB NO. <b>80-09-N</b>
REVISED BY	FIG. NO. <b>7</b>
 <b>BEMA INDUSTRIES LTD.</b>	





**LEGEND**

CONTOUR INTERVAL - ppm	—	MEAN + 2σ
	—	MEAN + 2σ + 33
	—	MEAN + 3σ + 43
	—	2(MEAN + 3σ) + 86
STANDARD DEVIATION	—	σ
MEAN	—	15
TREND	—	23
THRESHOLD	—	33
POSSIBLY ANOMOLOUS	—	34-43
PROBABLY ANOMOLOUS	—	> 43



CANADA TUNGSTEN MINING CORPORATION  
**KENO HILL Y.T.**  
 1980 GEOLOGICAL EXPLORATION PROGRAMME

MOUNT KENO LEASES  
**SOIL GEOCHEMISTRY**  
**Pb**

DATE: FEBRUARY 1981  
 DRAWN BY: *dnb*  
 REVISED BY:

JOB NO: 80-09-N  
 SCALE: 1:2500  
 FIG NO: 8-1  
 METRES

**BEMA INDUSTRIES LTD.**



**LEGEND**

CONTOUR INTERVAL - ppm — MEAN+σ=73  
 — MEAN+2σ=96  
 — MEAN+3σ=119  
 — 2(MEAN+3σ)=238

STANDARD DEVIATION — σ  
 MEAN — 50  
 TREND — 73  
 THRESHOLD — 96  
 POSSIBLY ANOMOLOUS — 97-119  
 PROBABLY ANOMOLOUS — > 119



Scale 0 100 200 300 Metres

CANADA TUNGSTEN MINING CORPORATION  
**KENO HILL Y.T.**  
 1980 GEOLOGICAL EXPLORATION PROGRAMME  
 MOUNT KENO LEASES  
**SOIL GEOCHEMISTRY**  
 Zn  
 802043  
 DATE FEBRUARY 1981 JOB NO. 80-09-N FIG. NO. 8-2  
 DRAWN BY *dmb* SCALE 1:2500 METRES  
 REVISED BY  
**BEMA INDUSTRIES LTD.**



**LEGEND**

CONTOUR INTERVAL - ppm	-	MEAN + σ = 0.6
	-	MEAN + 2σ = 0.9
	-	MEAN + 3σ = 1.2
	-	2(MEAN + 3σ) = 2.4
STANDARD DEVIATION	-	σ
MEAN	-	0.3
TREND	-	0.6
THRESHOLD	-	0.9
POSSIBLY ANOMOLOUS	-	1.0-1.2
PROBABLY ANOMOLOUS	-	> 1.2

CANADA TUNGSTEN MINING CORPORATION  
**KENO HILL Y.T.**  
 1980 GEOLOGICAL EXPLORATION PROGRAMME

MOUNT KENO LEASES  
**SOIL GEOCHEMISTRY**  
**Ag**  
 092043

DATE: FEBRUARY 1981  
 DRAWN BY: dnb  
 REVISED BY:

JOB NO: 80-09-N  
 SCALE: 1:2500

FIG NO: 8-3  
 METRES

**BEMA INDUSTRIES LTD.**





**LEGEND**

CONTOUR INTERVAL-ppm	—	MEAN + 2σ
	—	MEAN + 2σ + 28
	—	MEAN + 3σ + 36
	—	2(MEAN + 3σ) + 72
STANDARD DEVIATION	—	σ
MEAN	—	13
TREND	—	21
THRESHOLD	—	28
POSSIBLY ANOMOLOUS	—	29-36
PROBABLY ANOMOLOUS	—	> 36

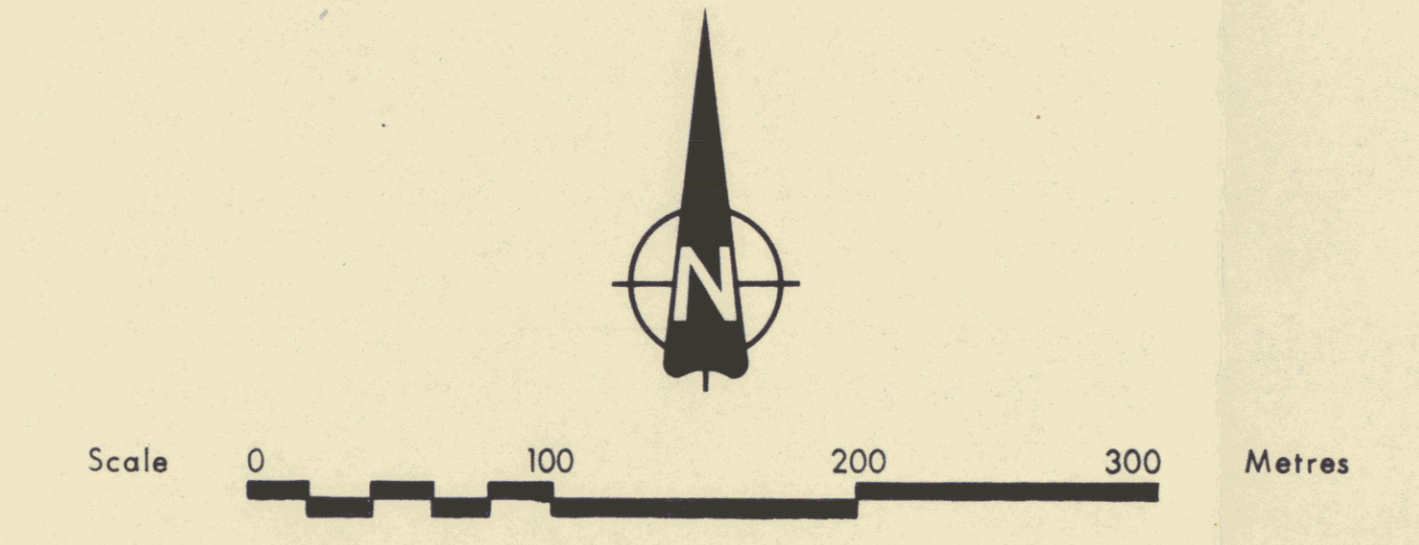
CANADA TUNGSTEN MINING CORPORATION  
**KENO HILL Y-T**  
 1980 GEOLOGICAL EXPLORATION PROGRAMME  
 MOUNT KENO LEASES  
**SOIL GEOCHEMISTRY**  
 092043 **Cu**

DATE: FEBRUARY 1981  
 DRAWN BY: *dnb*  
 REVISED BY:

JOB NO: **80-09-N**  
 SCALE: 1:2500 METRES

FIG. NO: **8-4**

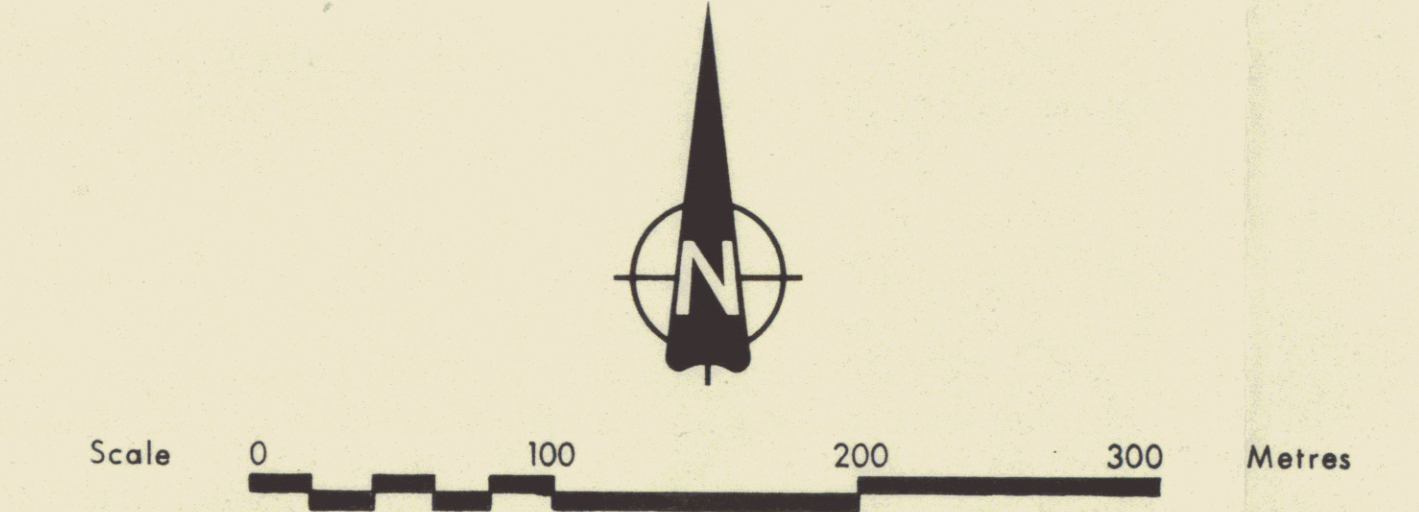
**BEMA INDUSTRIES LTD.**





**LEGEND**

CONTOUR INTERVAL—ppm	—	MEAN+σ+51
	—	MEAN+2σ+65
	—	MEAN+3σ+79
	—	2(MEAN+3σ)+158
STANDARD DEVIATION	—	σ
MEAN	—	37
TREND	—	51
THRESHOLD	—	65
POSSIBLY ANOMOLOUS	—	66-79
PROBABLY ANOMOLOUS	—	> 79



CANADA TUNGSTEN MINING CORPORATION  
**KENO HILL Y.T.**  
 1980 GEOLOGICAL EXPLORATION PROGRAMME

MOUNT KENO LEASES  
**SOIL GEOCHEMISTRY**  
**Hg**

092043

DATE: FEBRUARY 1981	JOB NO: 80-09-N	FIG. NO: 8-5
DRAWN BY: dnb	SCALE: 1:2500	METRES
REVISED BY:		

**BEMA INDUSTRIES LTD.**



**LEGEND**

CONTOUR INTERVAL - ppm	MEAN + 2σ = 454
	MEAN + 3σ = 566
	2(MEAN + 3σ) = 1132
STANDARD DEVIATION	σ
MEAN	231
TREND	343
THRESHOLD	454
POSSIBLY ANOMOLOUS	455-566
PROBABLY ANOMOLOUS	> 566

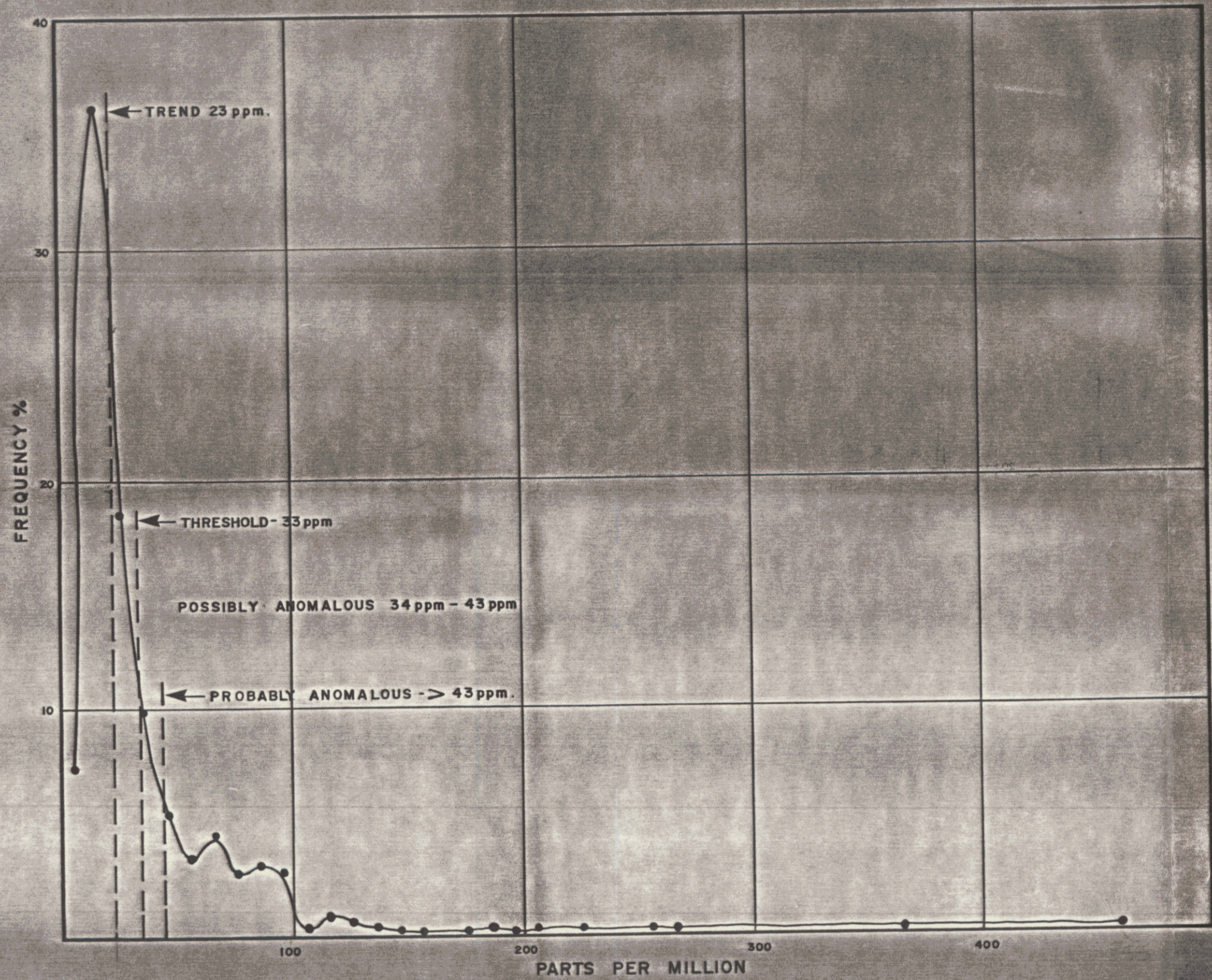


CANADA TUNGSTEN MINING CORPORATION  
**KENO HILL Y.T.**  
 1980 GEOLOGICAL EXPLORATION PROGRAMME

MOUNT KENO LEASES  
**SOIL GEOCHEMISTRY**  
 092043 Mn

DATE: FEBRUARY 1981 JOB NO: 80-09-N FIG NO: 8-6  
 DRAWN BY: ddb SCALE: 1:2500 METRES  
 REVISED BY:

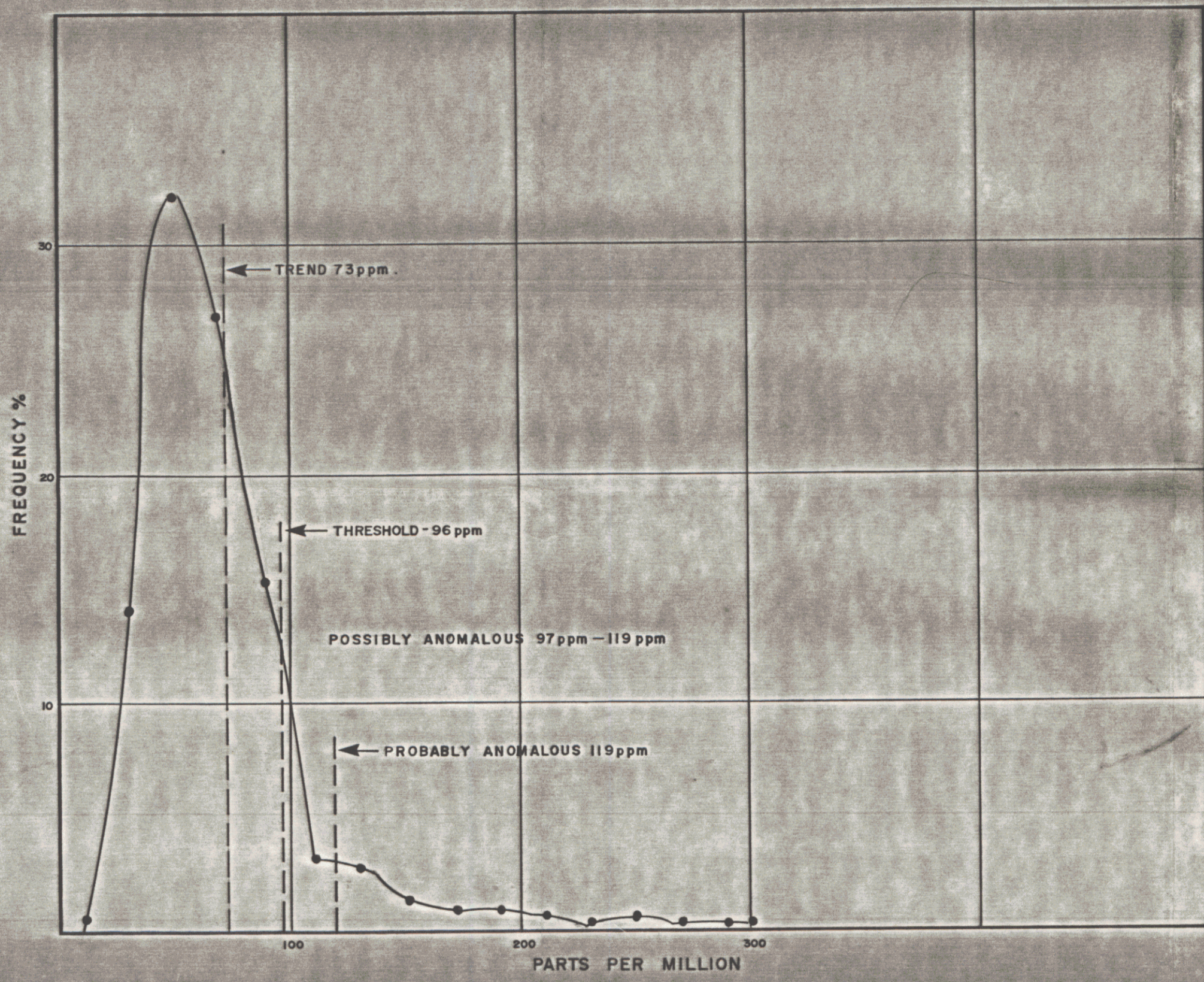
**BEMA INDUSTRIES LTD.**



Pb

092043 Pb  
FREQUENCY CURVE  
from  
'B' HORIZON SOIL SAMPLES

MOUNT KENO  
Fig-9-1



092043

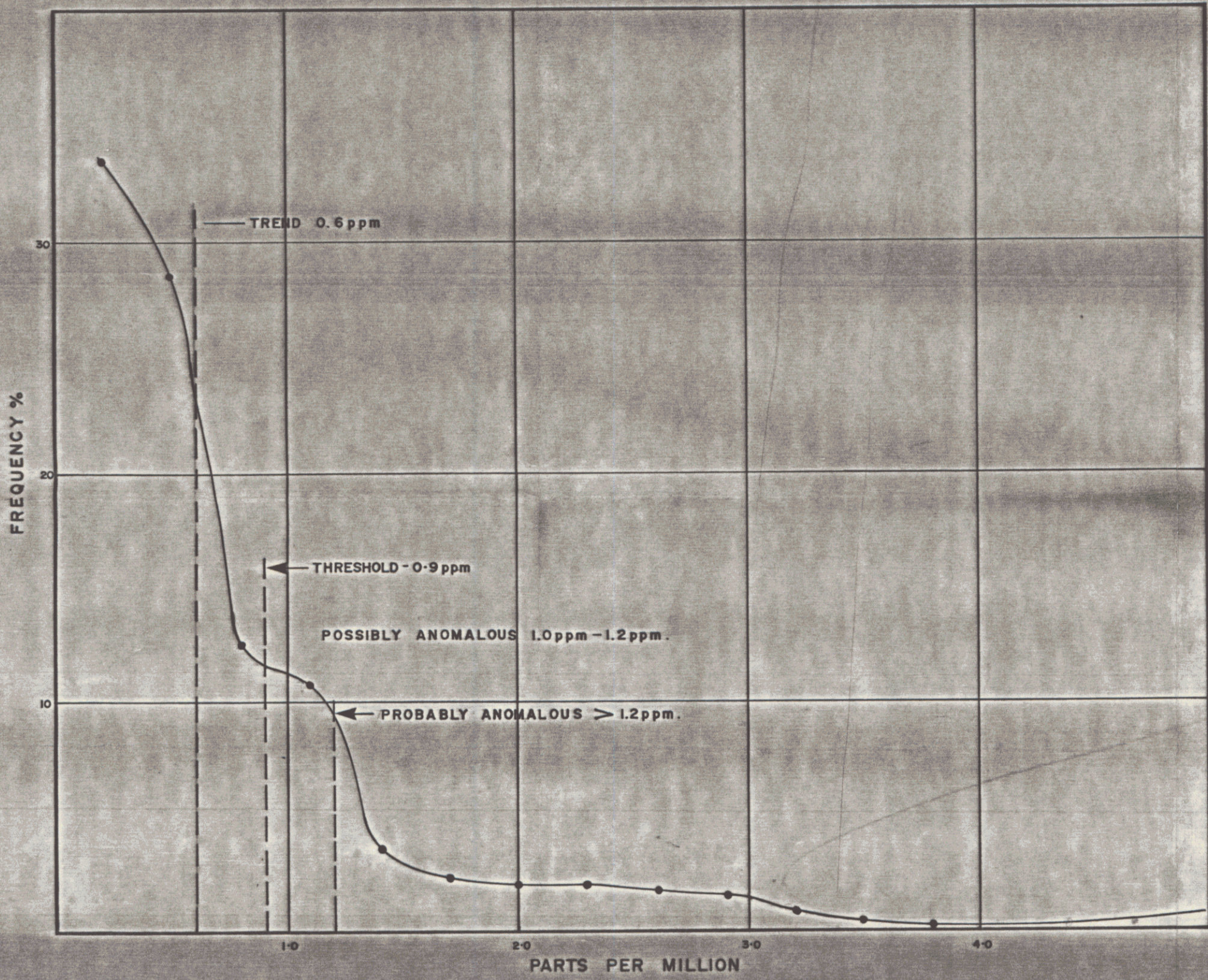
Zn

**FREQUENCY CURVE**  
 from  
**'B' HORIZON SOIL SAMPLES**

MOUNT KENO  
 Fig-9-2

MT. KENO

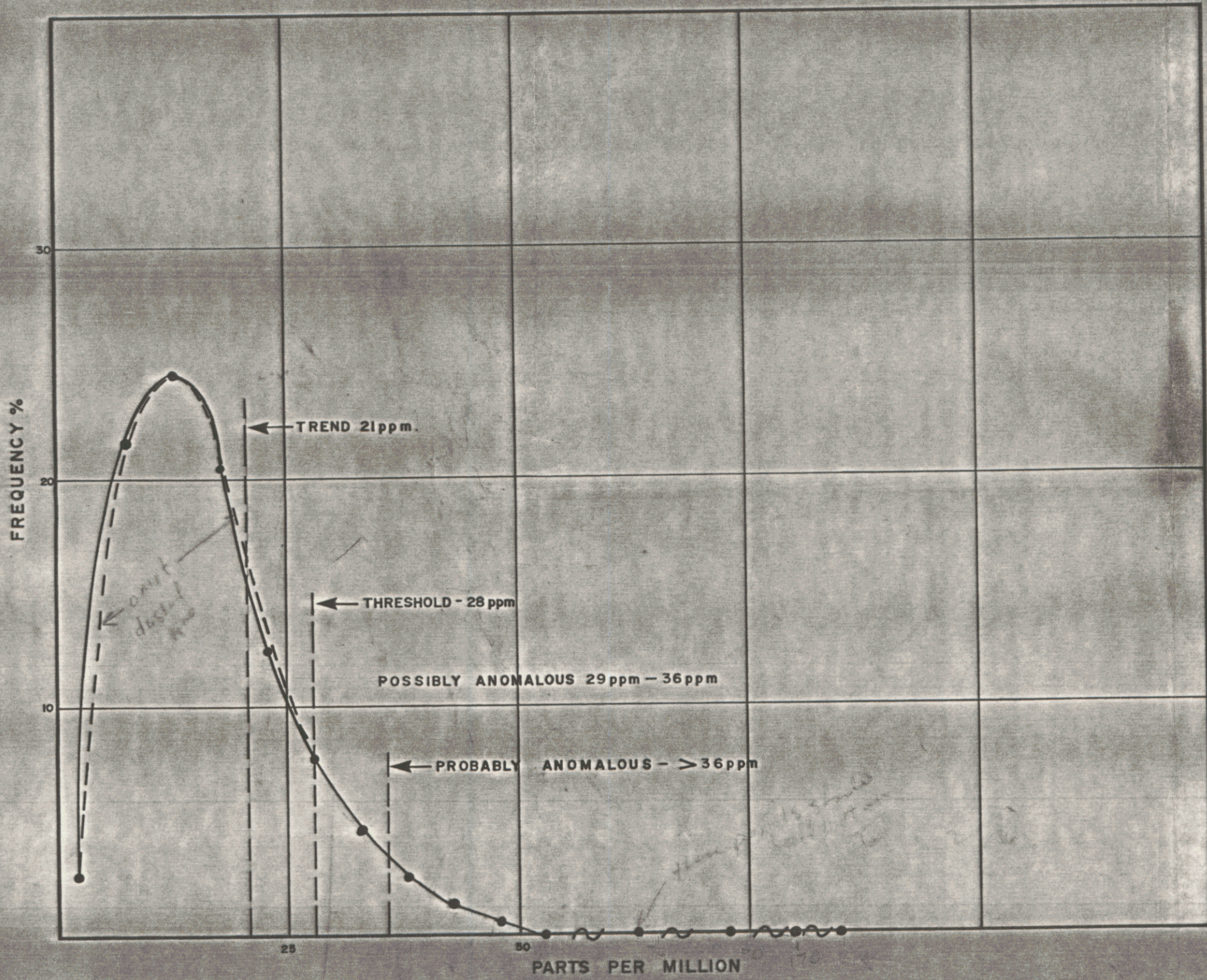
Ag



092043

Ag  
**FREQUENCY CURVE**  
from  
**'B' HORIZON SOIL SAMPLES**

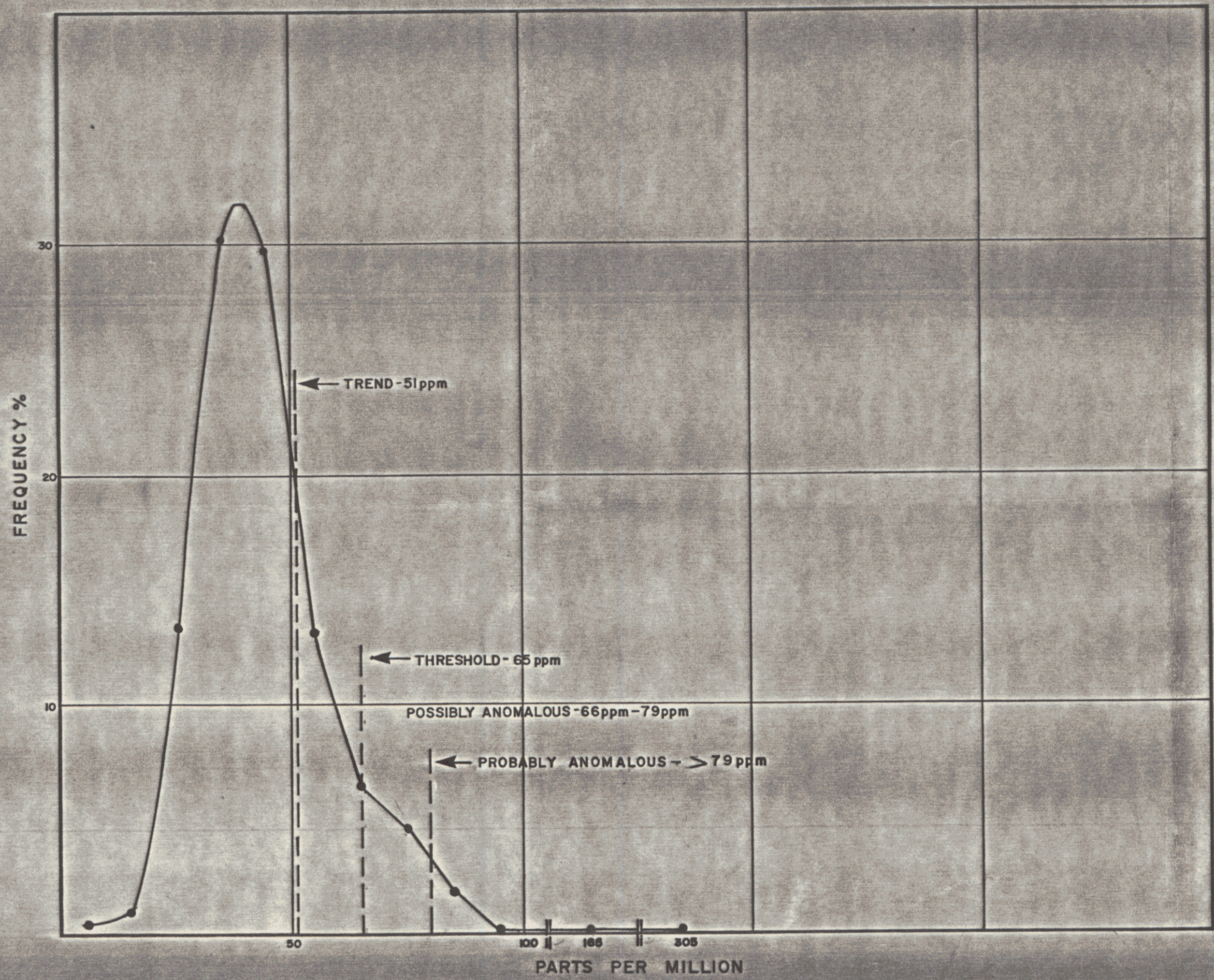
MOUNT KENO  
Fig-9-3



092043

**Cu**  
**FREQUENCY CURVE,**  
*from*  
**'B' HORIZON SOIL SAMPLES**

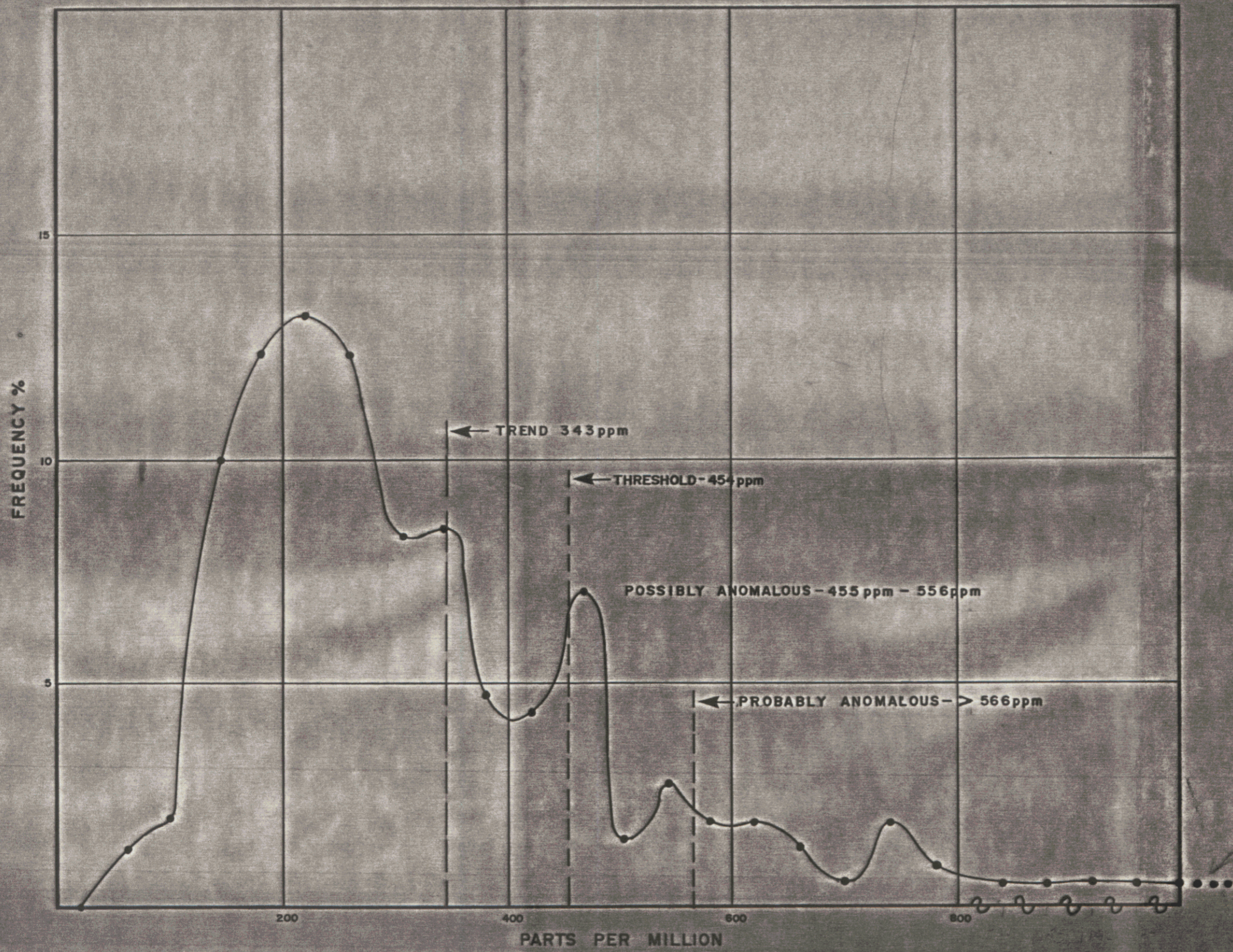
MOUNT KENO  
 Fig-9.4



092043

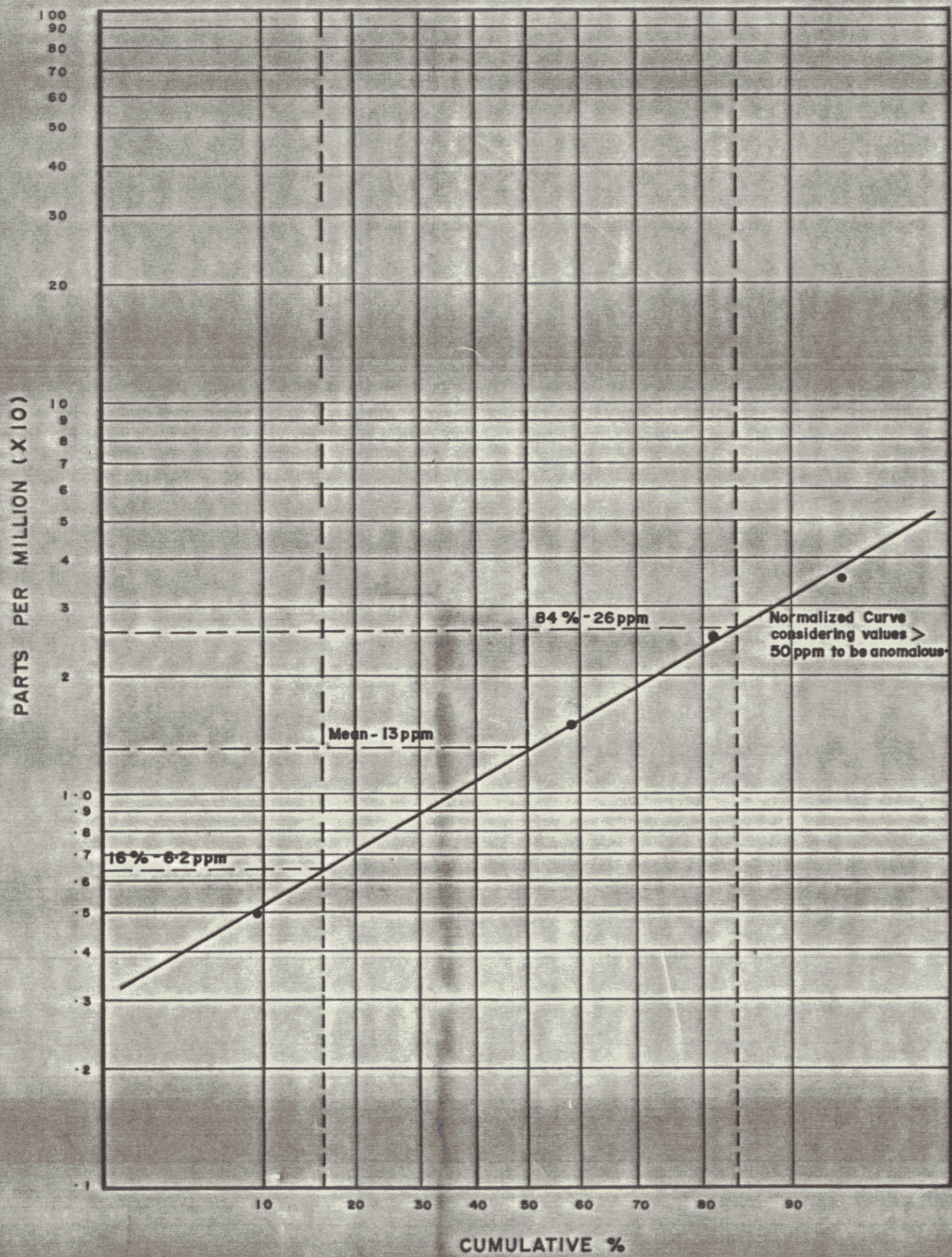
**Hg**  
**FREQUENCY CURVE**  
 from  
**'B' HORIZON SOIL SAMPLES**

MOUNT KENO  
 Fig-9-5



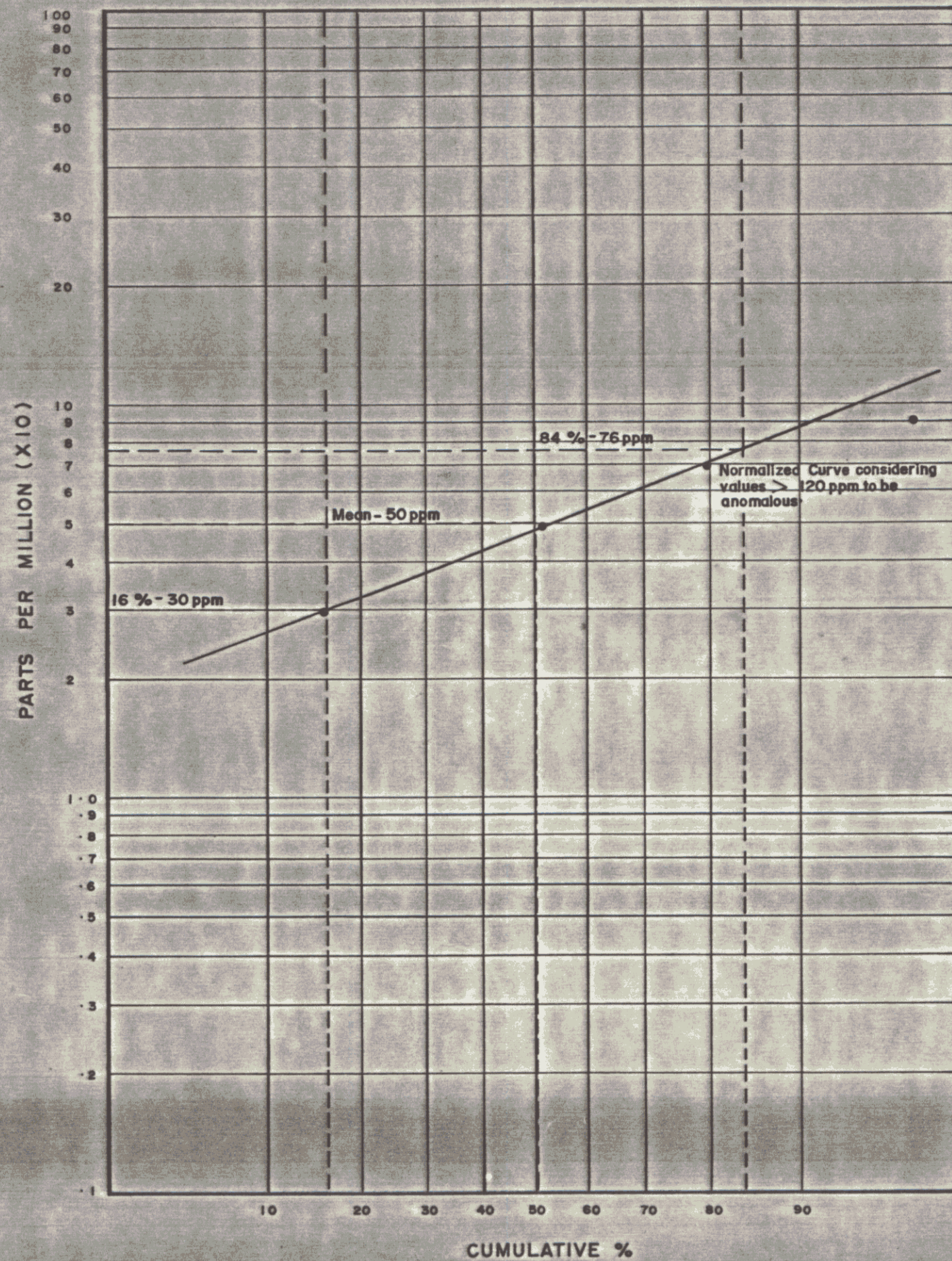
092043

Mn  
**FREQUENCY CURVE**  
 from  
**'B' HORIZON SOIL SAMPLES**  
 MOUNT KENO  
 Fig-9-6



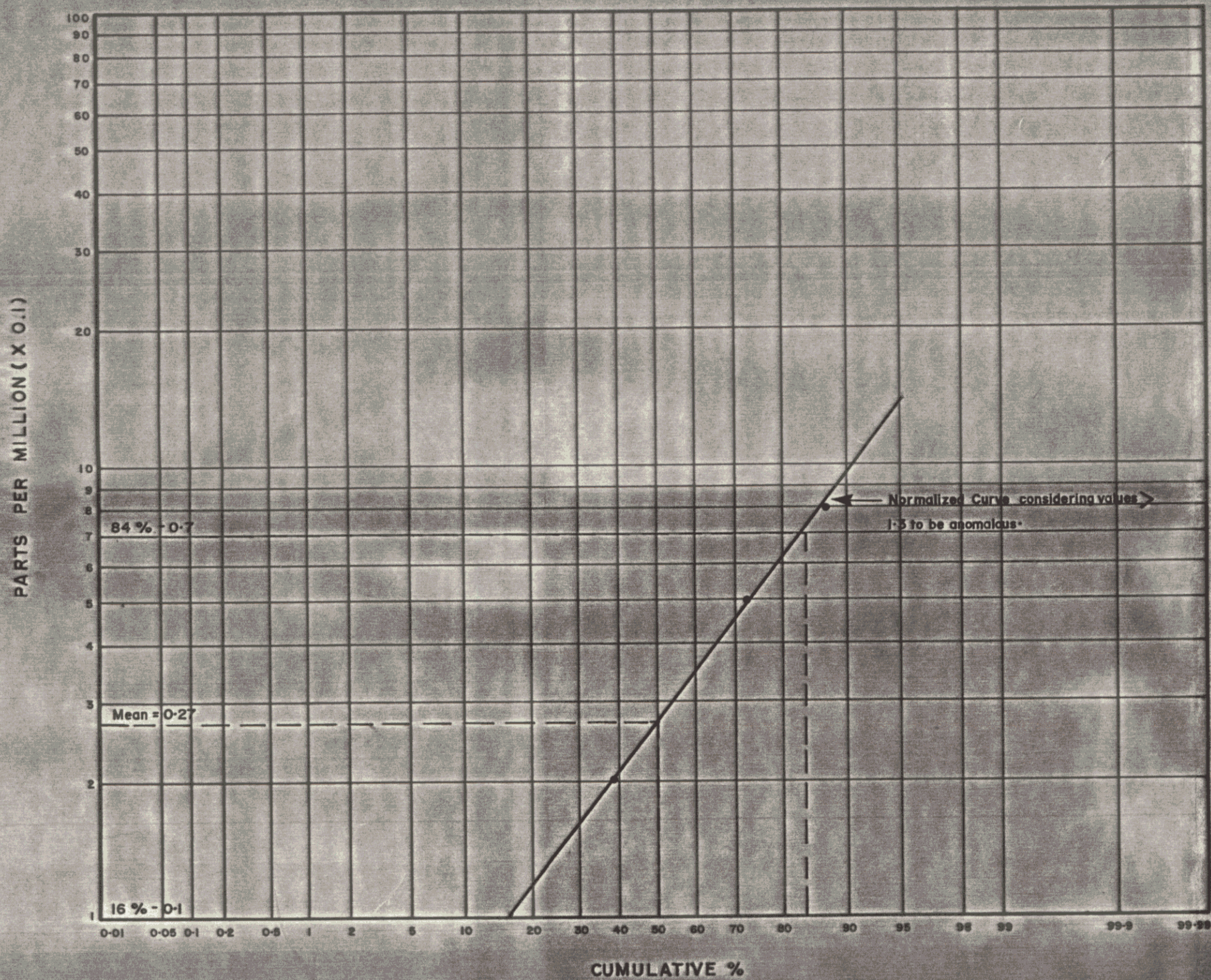
092043  
**Pb**  
 CUMULATIVE FREQUENCY CURVE  
 from  
 'B' HORIZON SOIL SAMPLES

MOUNT KENO  
 Fig-10-1



092043  
**Zn**  
**CUMULATIVE FREQUENCY CURVE**  
 from  
**'B' HORIZON SOIL SAMPLES**

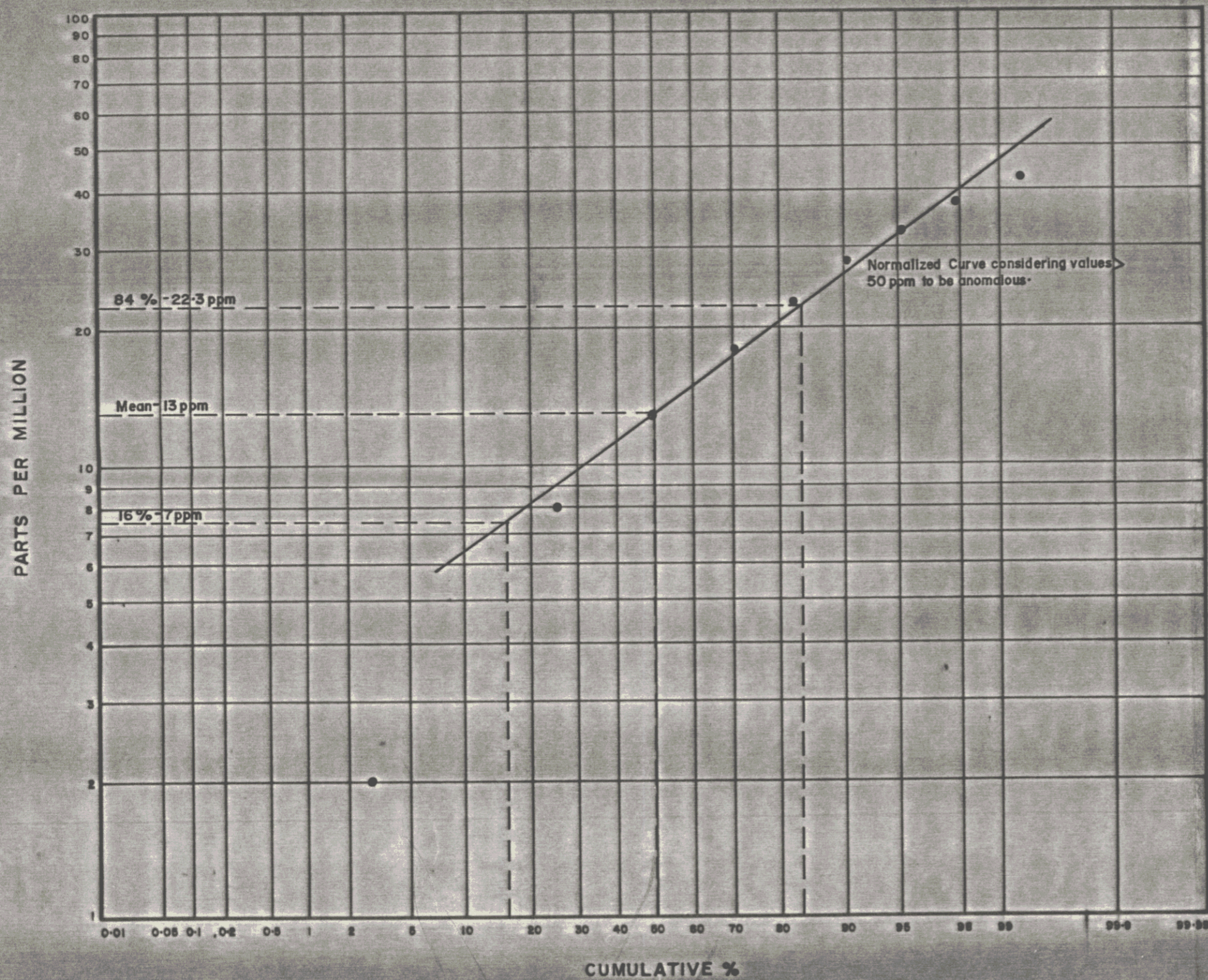
MOUNT KENO  
 Fig. 10-2



092043

Ag  
 CUMULATIVE FREQUENCY CURVE  
 from  
 'B' HORIZON SOIL SAMPLES

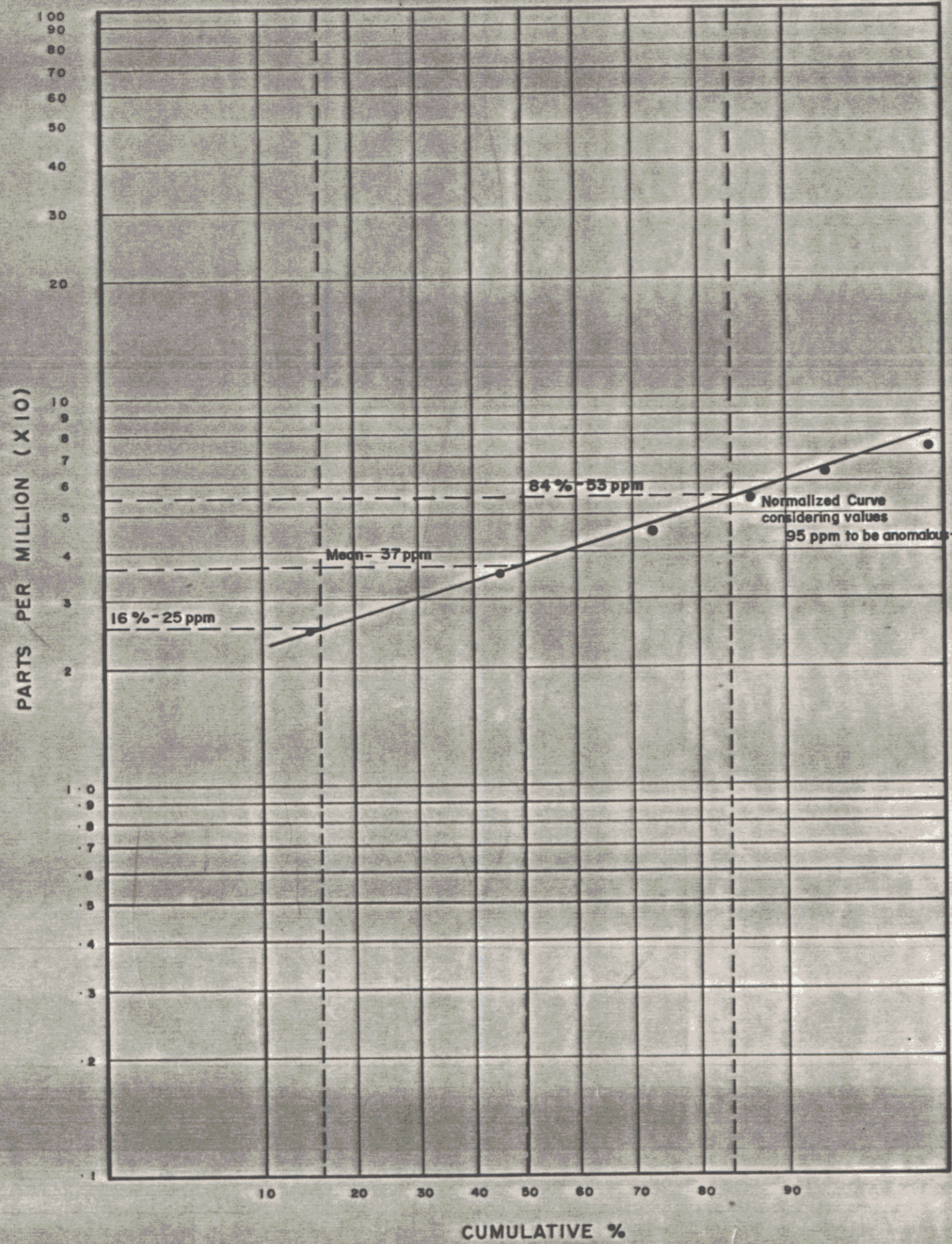
MOUNT KENO  
 Fig-10-3



092043

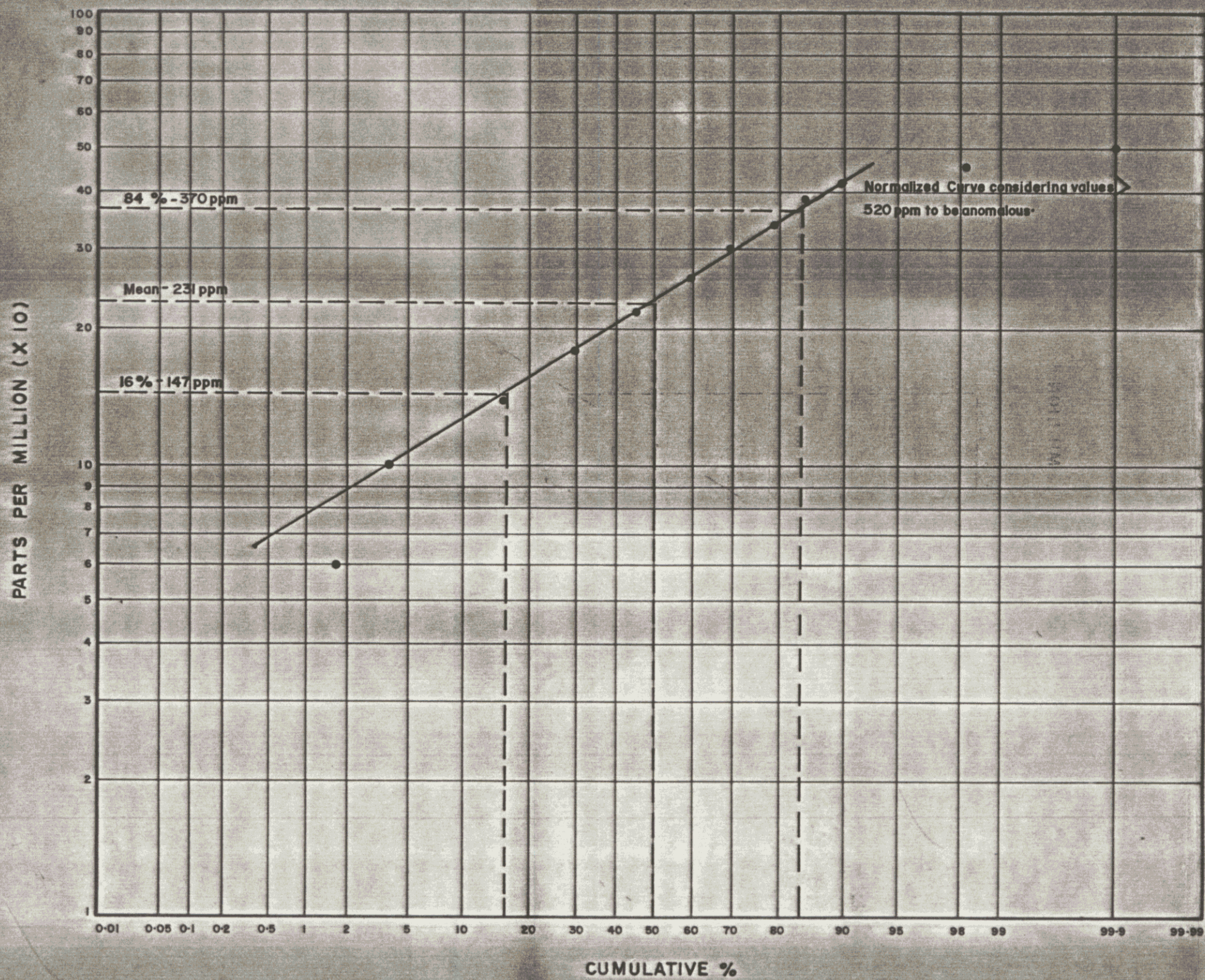
**Cu**  
**CUMULATIVE FREQUENCY CURVE**  
*from*  
**'B' HORIZON SOIL SAMPLES**

MOUNT KENO  
 Fig-10-4



092043 Hg  
 CUMULATIVE FREQUENCY CURVE  
 from  
 'B' HORIZON SOIL SAMPLES

MOUNT KENO  
 Fig-10-5



092043 Mn  
 CUMULATIVE FREQUENCY CURVE  
 from  
 'B' HORIZON SOIL SAMPLES

MOUNT KENO  
 Fig-10-6

APPENDIX I

SURVEY DATA

APPENDIX I

MOUNT KENO BASELINE SURVEY STATIONS

STATION	INTERVAL	GRID COORDINATES (10+000N)	UTM NORTH COORDINATES	UTM EAST COORDINATES
175	108.59	7+500E	7087834.37	488239.57
174	117.85	7+391.41E	7087708.60	488203.17
173	106.21	7+273.56E	7087647.14	488102.61
JSM 1L 769 2L 766	182.10	7+167.35E	7087591.75	488011.99
176	126.89	6+985.25E	7087496.78	487856.61
Nail	224.50	6+858.36E	7087430.61	487748.35
179 (Nail)	147.25	6+633.86E	7087313.53	487556.79
D	194.70	6+486.61E	7087236.74	487431.15
E	147.21	6+291.91E	7087135.20	487265.02
F	70.62	6+144.70E	7087058.43	487139.42
G	80.28	6+074.08E	7087021.60	487079.16
J	195.15	5+993.80E	7086979.74	487010.66
B	148.77	5+798.65E	7086877.97	486844.15
A	334.28	5+649.88E	7086800.38	486717.21
178		5+315.60E	7086626.05	486431.99
834			7087422.43	487934.43

NOTE: Baseline is at 58°34' (UTM)

APPENDIX II

STATISTICAL ANALYSIS

## STATISTICAL PROCEDURE

Statistical evaluation of the Mount Keno soil geochemistry was done primarily by a graphical method which was outlined by consulting geochemist, C.F. Gleeson. This method, which is described below, attempts to normalize the data by separating out most of the anomalous values from background values.

### Procedure:

- 1) Draw frequency curve. See Figures 9.1 to 9.6 for Pb, Zn, Ag, Cu, Hg and Mn respectively.
- 2) Make a split where anomalous values appear to start.
- 3) Recalculate frequency for samples below anomalous line.
- 4) Make accumulative frequency log plot for normalized population. See Figures 10.1 to 10.6 for Pb, Zn, Ag, Cu, Hg and Mn respectively.
- 5) From the accumulative frequency log plot acquire the following information:
  - a) mean value at 50%;
  - b) value at 84%;
  - c) value at 16%.
- 6) To get an average of standard deviation, subtract value at 84% from the value at 16%; this is equal to 2x the standard deviation, therefore:

$$\begin{array}{r} \text{value at 84\%} \\ - \text{value at 16\%} \\ \hline 2a \text{ (or 2x standard} \\ \text{deviation)} \end{array}$$

$$\text{and } a = \frac{2a}{2}$$

.... / 2

The following procedure has been adopted to establish threshold and anomalous values (where M = mean and a = standard deviation).

$M + a =$  trend value

$M + 2a =$  threshold value

$>M + 2a < M + 3a =$  possibly anomalous

$>M + 3a =$  probably anomalous

For presentation of the geochemical soil data contour intervals are: 1)  $M + a$ ; 2)  $2M + 2a$ ; 3)  $M + 3a$ ; and 4)  $2x(M + 3a)$ .

The frequency and accumulative frequency curves for silver, lead, zinc, copper, manganese and mercury are shown in Figures 9.1 to 9.6 respectively. The statistical results are statistically reliable because the population size was greater than 500 values for silver, lead, zinc and copper and greater than 200 values for manganese and mercury. The results of the statistics are tabulated below:

All values in ppm

	Mean	Mean + a	Mean + 2a	Mean + 3a
lead	13	23	33	43
silver	0.3	0.6	0.9	1.2
zinc	50	73	96	119
copper	13	21	28	36
manganese	231	343	454	566
mercury	37	68	76	152

092043

MOUNT KENO Zn VALUES FROM SOIL SAMPLES

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 20	10	4	0.67	0.67
21 - 40	30	83	13.86	14.53
41 - 60	50	192	32.05	46.58
61 - 80	70	160	26.71	73.29
81 - 100	90	91	15.19	88.48
101 - 120	110	19	3.17	91.65
121 - 140	130	17	2.84	94.49
141 - 160	150	8	1.34	95.83
161 - 180	170	5	0.83	96.66
181 - 200	190	5	0.83	97.49
201 - 220	210	4	0.67	98.16
221 - 240	230	2	0.33	98.49
241 - 260	250	4	0.67	99.16
261 - 280	270	2	0.33	99.49
281 - 300	290	1	0.17	99.66
> 300	-	2	0.33	99.99
		599		

MOUNT KENO Zn VALUES FOR SOIL SAMPLES

-considering values at least >120 ppm to be anomalous

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 20	10	4	.73	.73
21 - 40	30	83	15.12	15.85
41 - 60	50	192	34.97	50.82
61 - 80	70	160	29.14	79.96
81 - 100	90	91	16.58	96.54
101 - 120	110	19	3.46	100.00
		<hr/> 549		

MOUNT KENO Cu VALUES FOR SOIL SAMPLES

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 5	2	17	2.85	2.85
6 - 10	8	129	21.61	24.46
10 - 15	13	146	24.45	48.91
16 - 20	18	122	20.44	69.35
21 - 25	23	74	12.40	81.75
26 - 30	28	47	7.87	89.62
31 - 35	33	28	4.69	94.31
36 - 40	38	16	2.68	96.99
41 - 45	43	9	1.51	98.50
46 - 50	48	4	0.67	99.17
51 - 55	53	1	0.16	99.33
66 - 70	68	1	0.16	99.49
86 - 90	88	1	0.16	99.65
169	-	1	0.16	99.81
204	-	1	0.16	99.97
		<hr/> 597		

092049

MOUNT KENO Cu VALUES FOR SOIL SAMPLES

-considering values at least >50 ppm to be anomalous

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 5	2	17	2.87	2.87
6 - 10	8	129	21.79	24.66
11 - 15	13	146	24.66	49.32
16 - 20	18	122	20.61	69.93
21 - 25	23	74	12.50	82.43
26 - 30	28	47	7.94	90.37
31 - 35	33	28	4.73	95.10
36 - 40	38	16	2.70	97.80
41 - 45	43	9	1.52	99.32
46 - 50	48	4	0.68	100.00
		<hr/> 592		

MOUNT KENO Mn VALUES FROM SOIL SAMPLES

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 40	20	-	-	-
41 - 80	60	3	1.40	1.40
81 - 120	100	4	1.90	3.30
121 - 160	140	21	9.90	13.20
161 - 200	180	26	12.30	25.50
201 - 240	220	28	13.20	38.70
241 - 280	260	26	12.30	51.00
281 - 320	300	17	8.00	59.00
321 - 360	340	18	8.50	67.50
361 - 400	380	10	4.70	72.20
401 - 440	420	9	4.20	76.40
441 - 480	460	15	7.10	83.50
481 - 520	500	3	1.40	84.90
521 - 560	540	6	2.80	87.70
561 - 600	580	4	1.90	89.60
601 - 640	620	4	1.90	91.50
641 - 680	660	3	1.40	92.90
681 - 720	700	1	0.50	93.40
721 - 760	740	4	1.90	95.30
761 - 800	780	2	0.90	96.20
921 - 960	940	1	0.50	96.70
1055	-	1	0.50	97.20
1140	-	1	0.50	97.70
1220	-	1	0.50	98.20
1320	-	1	0.50	98.70
1570	-	1	0.50	99.20
2000	-	1	0.50	99.70
2400	-	1	0.50	100.20
		212		

MOUNT KENO Mn VALUES FOR SOIL SAMPLES

-considering values at least >500 ppm to be anomalous

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 40	20	-	-	-
41 - 80	60	3	1.70	1.70
81 - 120	100	4	2.20	3.90
121 - 160	140	21	11.70	15.60
161 - 200	180	26	14.40	30.00
201 - 240	220	28	15.50	45.50
241 - 280	260	26	14.40	59.90
281 - 320	300	17	9.40	69.30
321 - 360	340	18	10.00	79.30
361 - 400	380	10	5.60	84.90
401 - 440	420	9	5.00	89.90
441 - 480	460	15	8.30	98.20
481 - 520	500	3	1.70	99.90
		<hr/> 180		

MOUJNT KENO Hg VALUES FOR SOIL SAMPLES

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 10	5	1	0.47	0.47
11 - 20	15	2	0.94	1.41
21 - 30	25	28	13.15	14.56
31 - 40	35	64	30.05	44.61
41 - 50	45	59	27.70	72.31
51 - 60	55	28	13.15	85.46
61 - 70	65	14	6.57	92.03
71 - 80	75	10	4.69	96.72
81 - 90	85	4	1.88	98.60
91 - 100	95	1	0.47	99.07
161 - 170	165	1	0.47	99.54
301 - 310	305	1	0.47	100.01
		<hr/> 213		

MOUNT KENO Hg VALUES FOR SOIL SAMPLES

-considering values at least >100 ppm to be anomalous

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 10	5	1	0.47	0.47
11 - 20	15	2	0.95	1.42
21 - 30	25	28	13.27	14.69
31 - 40	35	64	30.33	45.02
41 - 50	45	59	27.96	72.98
51 - 60	55	28	13.27	86.25
61 - 70	65	14	6.64	92.89
71 - 80	75	10	4.74	97.63
81 - 90	85	4	1.90	99.53
91 - 100	95	1	0.47	100.00
		<hr/> 211		

MOUNT KENO Ag VALUES FOR SOIL SAMPLES

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 0.3	0.2	194	32.94	32.94
0.4 - 0.6	0.5	166	28.18	61.12
0.7 - 0.9	0.8	76	12.90	74.02
1.0 - 1.2	1.1	63	10.70	84.72
1.3 - 1.5	1.4	20	3.40	88.12
1.6 - 1.8	1.7	13	2.21	90.33
1.9 - 2.1	2.0	11	1.87	92.20
2.2 - 2.4	2.3	12	2.04	94.24
2.5 - 2.7	2.6	9	1.53	95.77
2.8 - 3.0	2.9	9	1.53	97.30
3.1 - 3.3	3.2	3	0.51	97.81
3.4 - 3.6	3.5	2	0.34	98.15
3.7 - 3.9	3.8	1	0.17	98.32
4.0 - 4.2	4.1	3	0.51	98.83
4.3 - 4.5	4.4	1	0.17	99.00
4.6 - 4.8	4.7	1	0.17	99.17
4.9 - 5.1	5.0	-	-	-
>5.1	-	5	0.85	100.02
		<hr/> 589		

MOUNT KENO Ag VALUES FOR SOIL SAMPLES

-Considering values at least  $>1.2$  to be anomalous

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 0.3	0.2	194	38.88	38.88
0.4 - 0.6	0.5	166	33.27	72.15
0.7 - 0.9	0.8	76	15.23	87.38
1.0 - 1.2	1.1	63	12.63	100.00
		<hr/> 499		

MOUNT KENO Pb VALUES FOR SOIL SAMPLES

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 10	5	44	7.38	7.38
11 - 20	15	239	40.10	47.48
21 - 30	25	109	18.29	65.77
31 - 40	35	58	9.73	75.50
41 - 50	45	32	5.37	80.87
51 - 60	55	20	3.36	84.23
61 - 70	65	27	4.53	88.76
71 - 80	75	16	2.68	91.44
81 - 90	85	18	3.02	94.46
91 - 100	95	13	2.81	97.27
101 - 110	105	1	0.17	97.44
111 - 120	115	4	0.67	98.11
121 - 130	125	3	0.50	98.61
131 - 140	135	2	0.34	98.95
141 - 150	145	1	0.17	99.12
151 - 160	155	1	0.17	99.29
161 - 170	165	-	-	-
171 - 180	175	1	0.17	99.46
181 - 190	185	2	0.34	99.80
191 - 200	195	1	0.17	99.97
201 - 210	205	2	0.34	100.31
211 - 220	215	-	-	-
221 - 230	225	2	0.34	100.65
231 - 240	235	-	-	-
241 - 250	245	-	-	-
251 - 260	255	1	0.17	100.82
261 - 270	265	1	0.17	100.99
271 - 280	275	-	-	-
281 - 290	285	-	-	-
291 - 300	295	-	-	-
361 - 370	365	1	0.17	101.16
851 - 860	855	1	0.17	101.33

MOUNT KENO Pb VALUES FOR SOIL SAMPLES

-considering values at least >50 ppm to be anomalous

SAMPLE INTERVAL	MIDPOINT	FREQUENCY	FREQUENCY %	CUMMULATIVE %
0 - 10	5	44	9.12	9.12
11 - 20	15	239	49.60	58.72
21 - 30	25	109	22.61	81.33
31 - 40	35	58	12.03	93.36
41 - 50	45	32	6.64	100.00
		<hr/> 482		

APPENDIX III

VECTOR PULSE ELECTROMAGNETOMETER TEST SURVEY -  
Mount Keno Property, by Glen E. White, B.Sc., P.Eng.

BEMA Industries Ltd.

VEECTOR PULSE ELECTROMAGNETOMETER  
TEST SURVEY

Keno Hill property Yukon  
N.T.S. 105 M/14

AUTHORS: Glen E. White, B.Sc., P.Eng.

DATE OF WORK: September 22 - 26, 1980

*Glen E. White*

GEOPHYSICAL CONSULTING & SERVICES LTD.

092043

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Illustrations

- Figure 1            -Loop Location and Conductor Trends
- Figures 2-13      -VPEM Component Plots
- Figures 14-19    -VPEM Vector Sections

INTRODUCTION

The vector pulse electromagnetometer system was tested on the Keno Hill project from September 22 - 26, 1980. The purpose of the survey was to try and detect a zone of small lenses of massive galena mineralization.

This project was undertaken by Glen E. White Geophysical Consulting & Services Ltd. on behalf of Bema Industries Ltd.

## VECTOR PULSE ELECTROMAGNETOMETER SURVEY

The pulse electromagnetometer system is a time domain E.M. system which can be used in the borehole mode, standard horizontal loop mode or deep penetrating vector mode.

The primary field for the horizontal loop survey is obtained from a transmit loop 9 meters in diameter laid out horizontally on the ground and energized by a pulse of 20 amps at 24 volts with an on-off time of 10.8 ms. The receiver coil is generally spaced 25 - 100 m from the transmitter loop. Both are moved simultaneously from station to station. The secondary field signal from the receiver coil is sampled and averaged for 11 seconds and then stored for readout. Eight samples of the secondary field are obtained with increasing window widths during the primary field off time. Time synchronization is by radio link or cable.

The eight channels of secondary field information are equivalent to a wide spectrum of frequencies from approximately  $2\text{KHz}$  to  $16\text{Hz}$  which allows for determination of overburden effects and penetration of conductive overburden. Since the time derivative of the secondary field is measured directly during the primary field off time, the pulse method is relatively free of geometrical restrictions, such as topography interference and coil alignment.

The primary field for the vector EM technique is obtained from a LSL (Large Scale Loop) of 150 m (492 ft.) per side which is energized with a current of 25 amps at 24 volts. A resultant vector can be obtained by vector addition of the horizontal and vertical components of the secondary field. A right angle to this resultant points to the eddy current position. See Appendix for diagrams. Additionally, detailed conductor information can be obtained from the analysis of the individual component information.

### DISCUSSION OF RESULTS

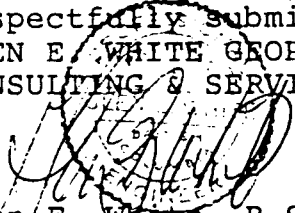
Two opposing loops were set up, loops 'A' and 'B' as shown on Figure 1. The vertical and horizontal component profiles are shown on Figures 2 - 13. The vertical component should give a positive to negative crossover moving towards the loop and the horizontal component a basin-like response. Figure 2, the horizontal component for loop 'A' line 950N shows a broad conductive response which extends into the very low frequency of approximately 20 c.p.s. in channel 8. Figure 3 gives a migrating vertical component crossover. These features indicate a shallow dipping graphitic lithologic unit which is strongly conductive.

The vector section for this line shows pronounced vector foci which migrate with respect to the secondary current position as it moves away from the loop with respect to time. A shallow dip to the east is suggested. Loop 'B' indicates a conductor at 750E since the vertical component for channels 1 - 3 tend to cross over at the same position. The positions of AV and RV<sub>5</sub> are fairly close which might indicate a general position of a conductor edge. A small conductor is indicated by the later channels at 825E on line 1050N from loop 'A'.

CONCLUSIONS

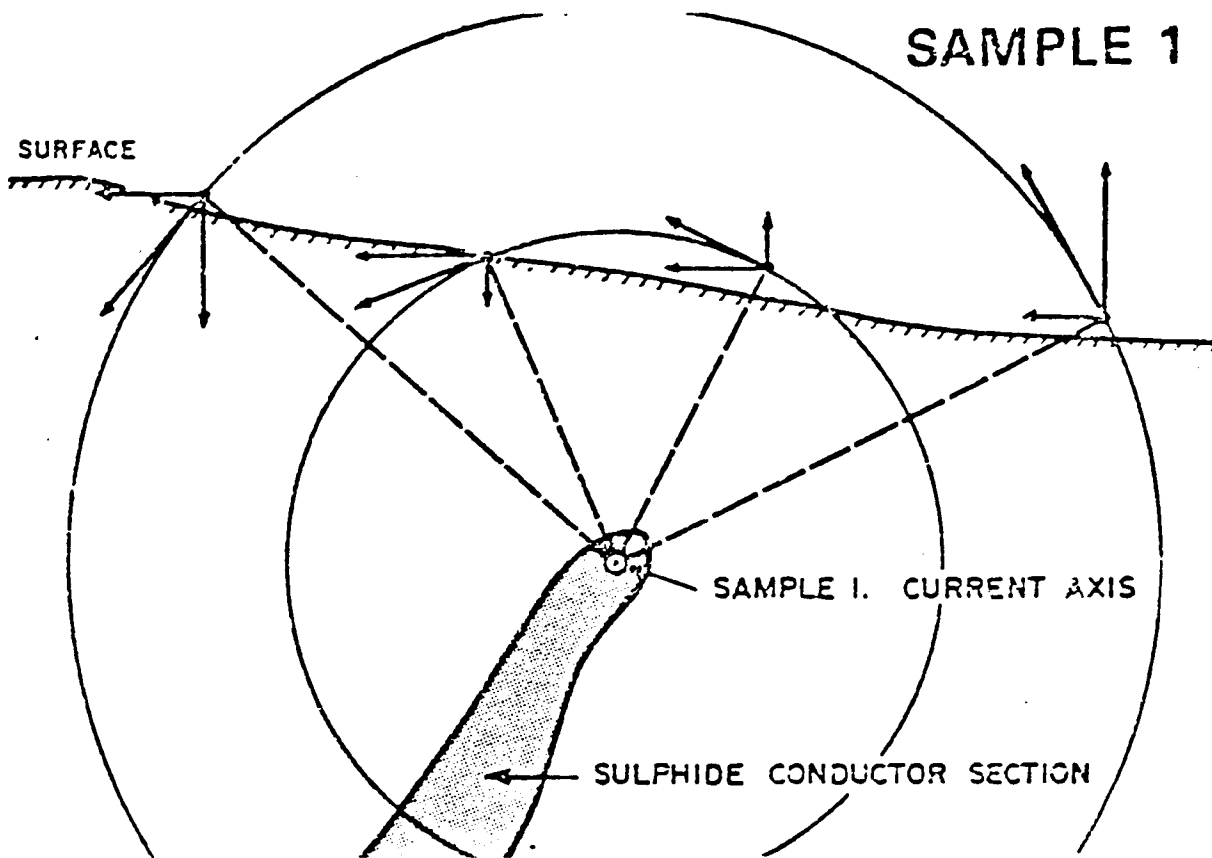
The test vector pulse survey on the Keno Hill project showed a strong lithologic conductor response which monopolized the secondary field signal. It would appear that the reported lenses of galena mineralization were of too low a conductivity width product to be detected in the conductive graphitic environment.

Respectfully submitted,  
GLEN E. WHITE GEOPHYSICAL  
CONSULTING & SERVICES LTD.

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

# SAMPLE 1

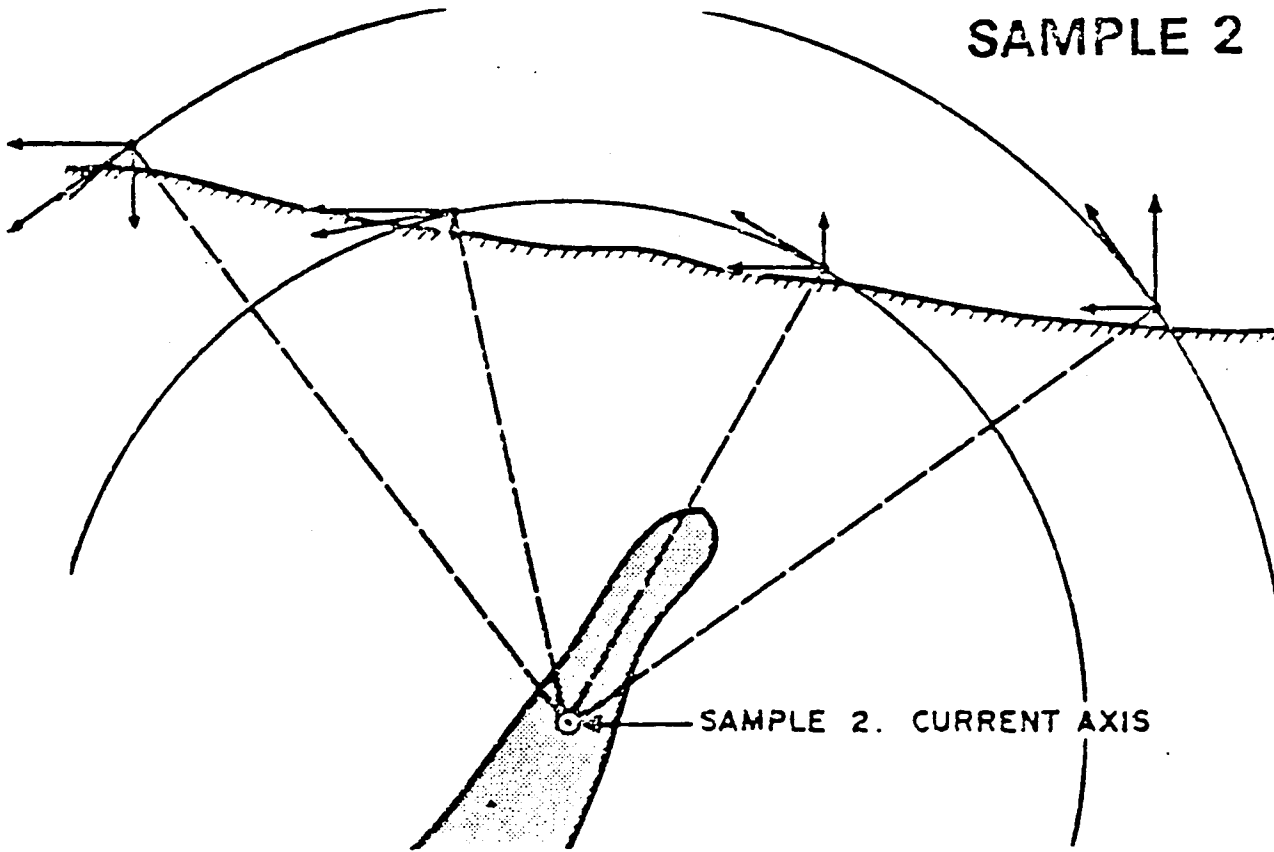
SURFACE



SAMPLE 1. CURRENT AXIS

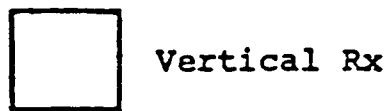
SULPHIDE CONDUCTOR SECTION

# SAMPLE 2

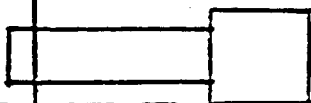


SAMPLE 2. CURRENT AXIS

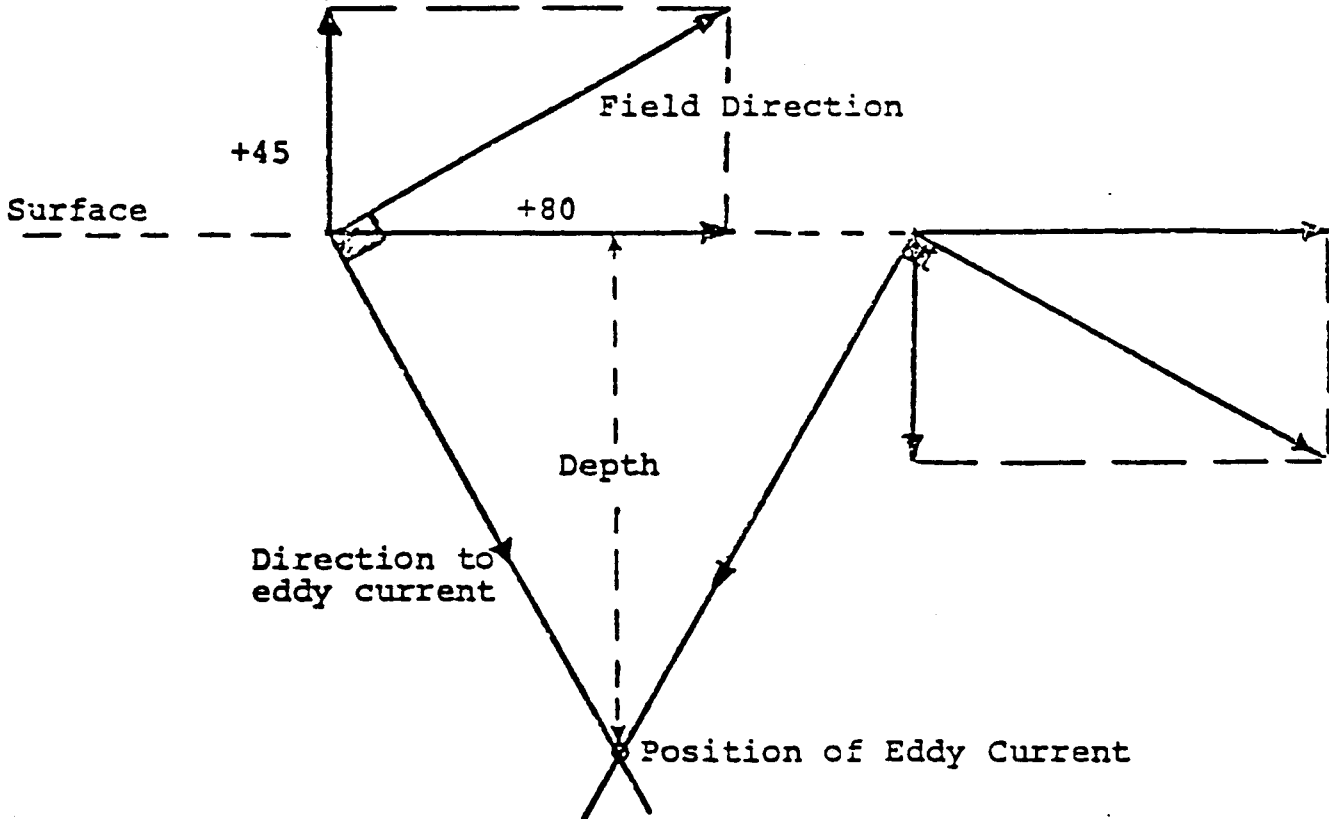
## Location of the Current Path in the Conductor



Vertical Rx



Horizontal Rx



+45

Field Direction

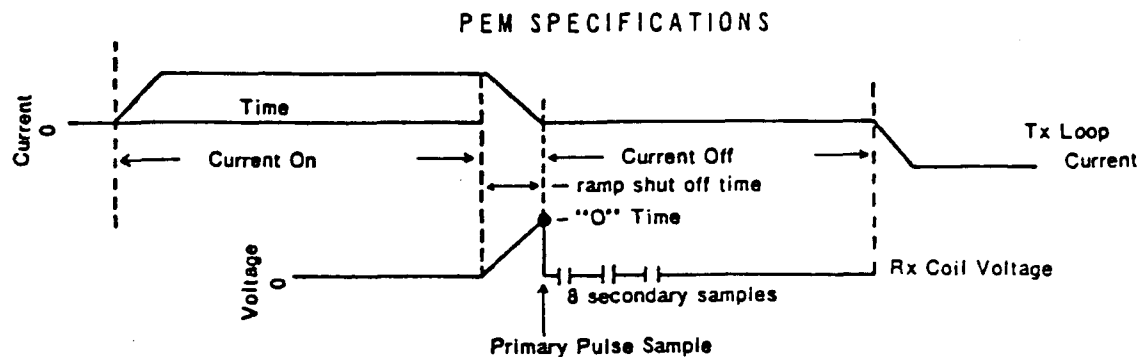
Surface

+80

Depth

Direction to eddy current

Position of Eddy Current



Current Off time: 9.4 ms  
 Current on time: 10.8 ms  
 Current shut off (ramp) time: 1.4 ms  
 Sample times (zero to centre of sample): .15ms, .45ms, .85ms, 1.45ms, 2.45ms, 3.75ms, 5.85ms, 8.85ms.

Sample width: 100  $\mu$ s  
 Zero time set at drop off point of primary pulse

**TRANSMITTER** - Transmitter power and loop size may be increased to obtain increased penetration. Weight, portability and power capabilities of the control instrument are the limiting factors. The standard transmitter is designed to be carried by two men.

Loop diameter	- minimum 4 meters (13 feet)
Loop current	- 15 to 20 amps
Loop applied voltage	- 24 volts
Loop output	- minimum 4500 amps x meter <sup>2</sup>
Loop weight	- 11.8 kilos (26 lb)
Control unit weight	- 10 kilos (22 lb)
Control unit dimensions	- 20.5cm x 25.5cm x 36.5cm (8" x 10" x 14.5")
Battery supply weight	- 18.1 kilos (40 lb)
Battery supply	- 2 of 12 volt, 14 to 20 ampere hour
Timing control	by radio synchronization

#### RECEIVER

- Receive coil dimensions: 55cm x 15cm (22" x 6")
- Receive coil weight: 4.5 kilos (10 lb)
- Preamplifier in coil
- Preamplifier batteries: 2 of 9 volt
- Receive coil tripod mounted
- Receiver measuring instrument dimensions: 28cm x 18cm x 21.5cm (11" x 7" x 9")
- Receiver measuring instrument weight: 6.3 kilos (14 lb)
- Timing control by radio synchronization
- Primary sample width: 100  $\mu$ s
- Primary sample can be swept through primary pulse by means of a time calibrated pot
- Zero time set at primary pulse drop-off
- Secondary samples (eight of them) width: 100  $\mu$ s
- Secondary samples time (zero to middle of sample): (1) .15ms (2) .45ms (3) .85ms (4) 1.45ms (5) 2.45ms (6) 3.75ms (7) 5.85ms (8) 8.85ms
- Automatic sampling for 5 seconds then all samples automatically stored
- Sample read out by means of meter
- Continuous sampling possible by switching function switch to "Continuous"
- Noise can be monitored by switching function switch to "Noise"
- Battery supply: 24 volt rechargeable, 2 of 12 volt Gel GC 12-15

STATEMENT OF QUALIFICATIONS

NAME: WHITE, Glen E., P.Eng.

PROFESSION: Geophysicist

EDUCATION: B.Sc. Geophysics - Geology  
University of British Columbia

PROFESSIONAL ASSOCIATIONS: Registered Professional Engineer,  
Province of British Columbia

Associate member of Society of Exploration Geophysicists.

Past President of B.C. Society of Mining Geophysicists

EXPERIENCE: Pre-Graduate experience in Geology -  
Geochemistry - Geophysics with Anaconda  
American Brass

Two years Mining Geophysicist with Sulmac  
Exploration Ltd. and Airborne Geophysics  
with Spartan Air Services Ltd.

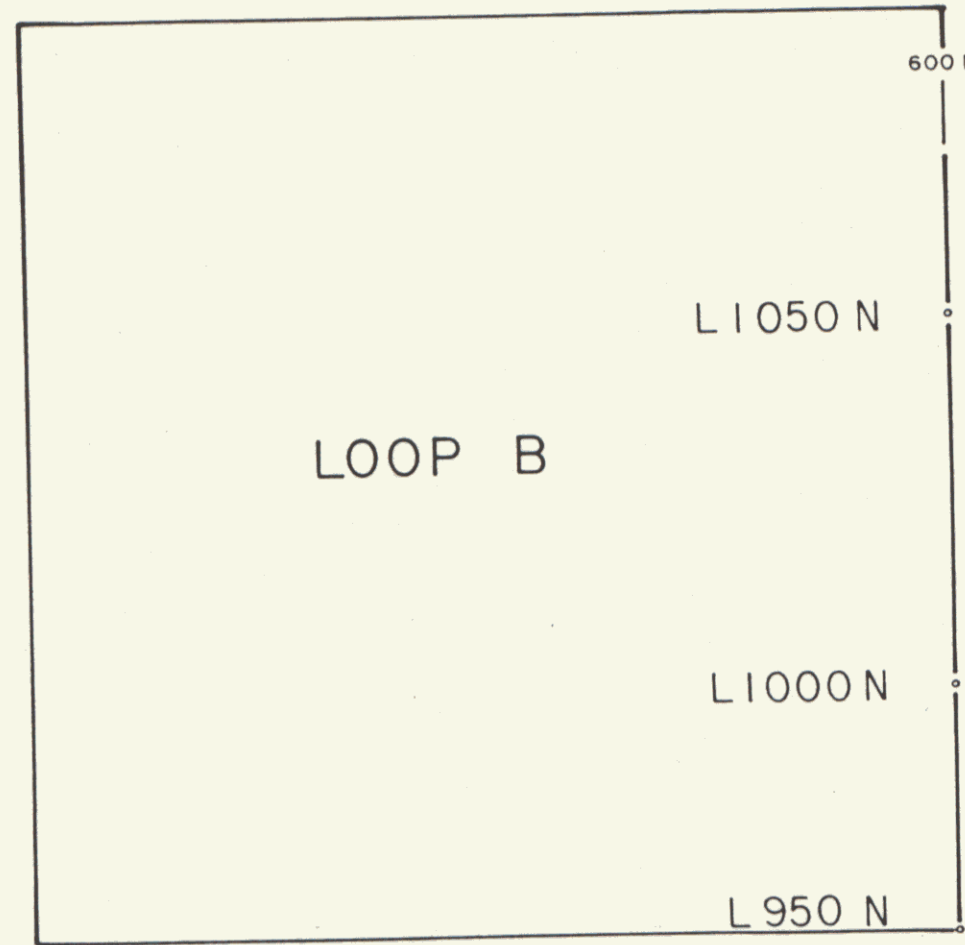
One year Mining Geophysicist and Technical  
Sales Manager in the Pacific north-west  
for W. P. McGill and Associates

Two years Mining Geophysicist and super-  
visor Airborne and Ground Geophysical  
Divisions with Geo-X Surveys Ltd.

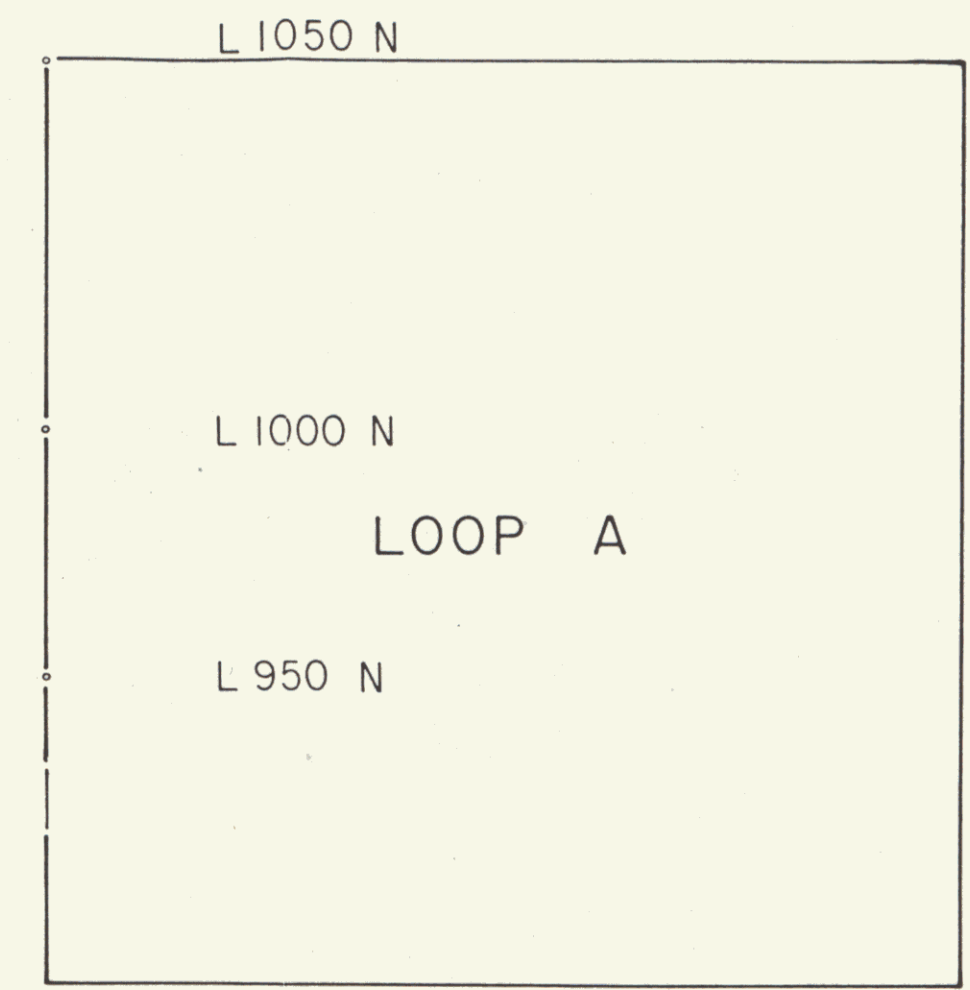
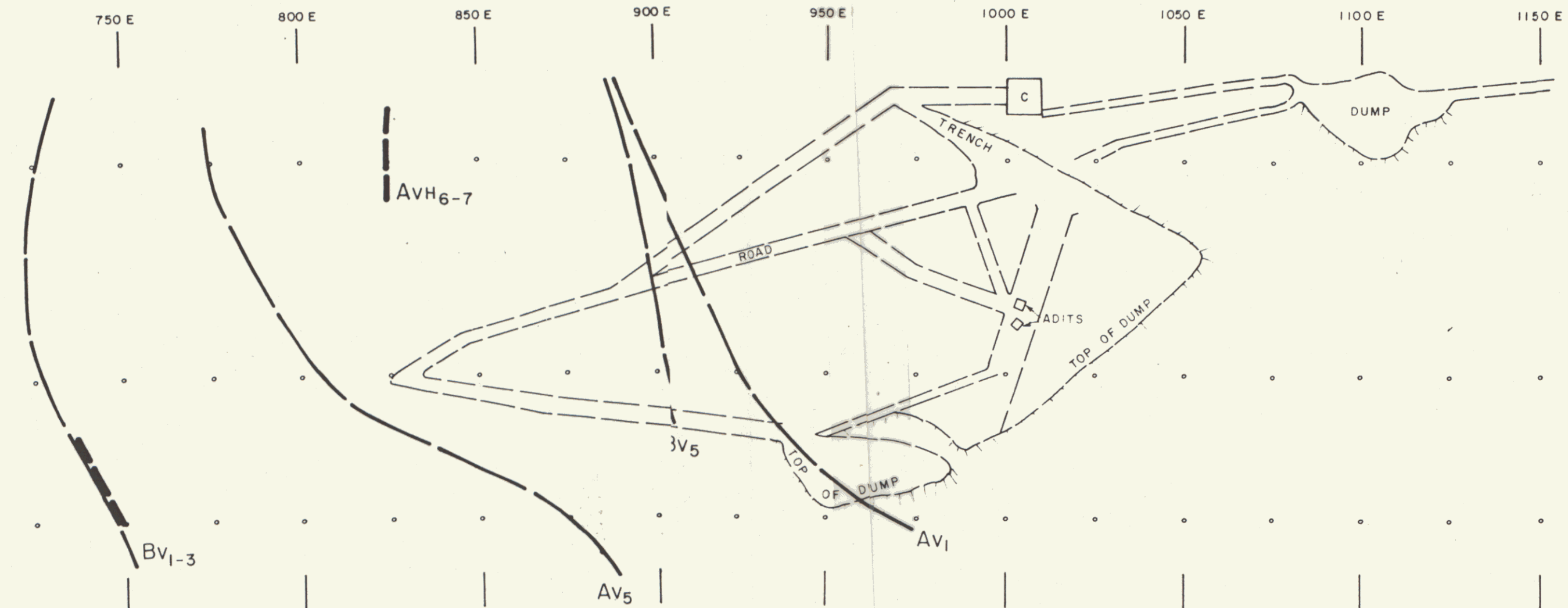
Two years Chief Geophysicist Tri-Con  
Exploration Surveys Ltd.

Ten years Consulting Geophysicist

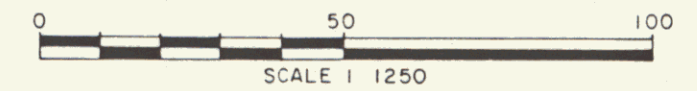
Active experience in all Geologic provinces  
of Canada



LOOP B



LOOP A



NTS 105-M-14

- VP EM CONDUCTIVE TRENDS
- Loop
- Component
- Channel
- Possible localized conductor

INSTUMENT Crone Pulse E.M.

**BEMA INDUSTRIES LTD.**  
KENO HILL TEST LINES

VECTOR PULSE **092043**  
ELECTROMAGNETOMETER SURVEY

*Glen E. White*  
geophysical consulting  
B  
services ltd.

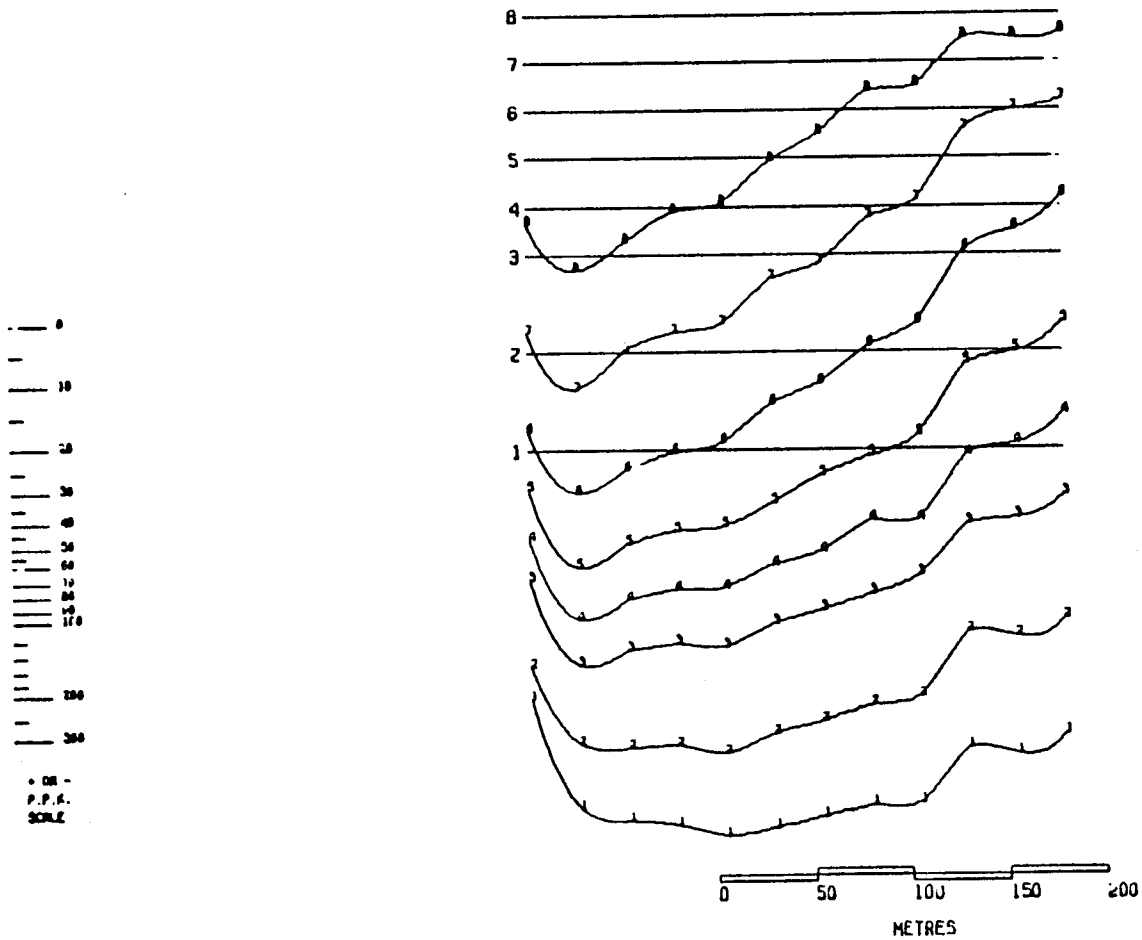
INTERPRETED BY:	G.E.W.
DRAWN BY:	r.w.r.
CHECKED BY:	
DATE:	OCTOBER 13, 1980
FIG No:	1

540520

092043

800E  
825E  
850E  
875E  
900E  
925E  
950E  
975E  
1000 E  
1025 E  
1050 E  
1075 E

LOOPA



NUMBER IN THE LINE = CHANNEL NUMBER

INSTRUMENT: CRONE P.E.M.

BFMA INDUSTRIES LTD.  
KEND HILL  
VECTOR PULSE ELECTROMAGNETOMETER  
HORIZONTAL COMPONENT  
LINE 950N A

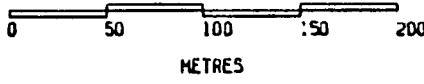
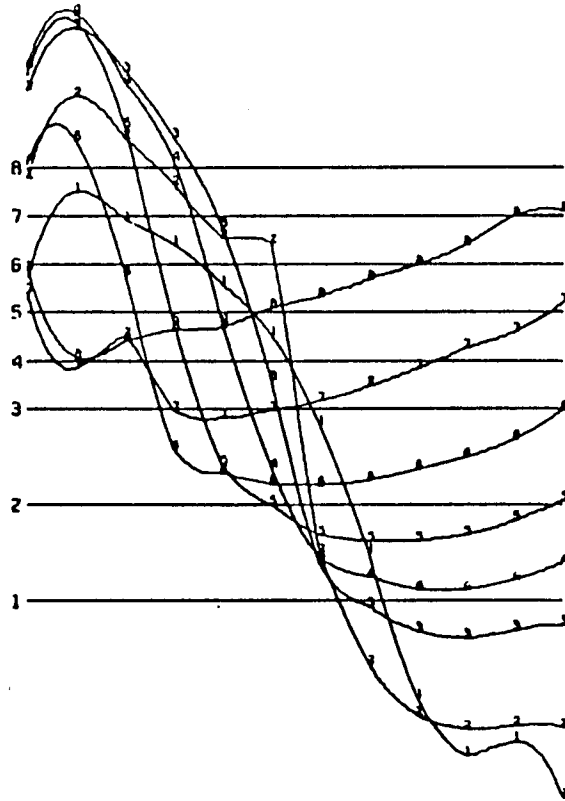
GLEN E. WHITE  
GEOPHYSICAL CONSULTING  
& SERVICES LTD.

N.T.S. 105M/14  
DATE: 22 OCT. 1960  
FIG. NO: 2

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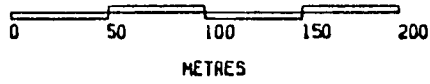
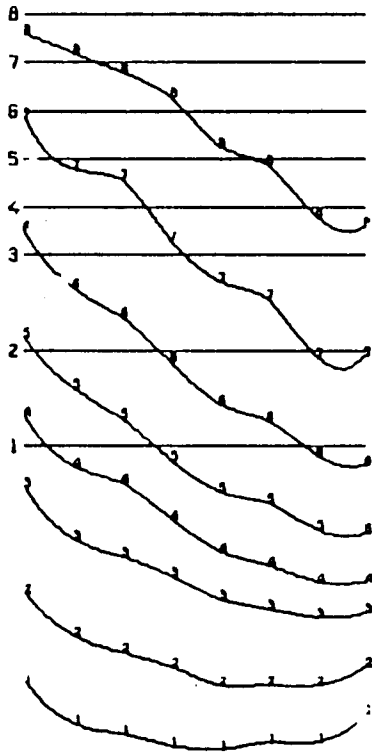
NUMBER IN THE LINE = CHANNEL NUMBER

INSTRUMENT: CRONE P.E.M.

BEMA INDUSTRIES LTD.	
KENO HILL	
VECTOR PULSE ELECTROMAGNETOMETER	
VERTICAL COMPONENT	
LINE 950N	A
GLEN E. WHITE	
GEOPHYSICAL CONSULTING & SERVICES LTD.	
N.T.S. 105M/14	
DATE 23 OCT. 1968	
FIG. NO. 3	

LOOPa

67SE 70DE 72SE 75DE 77SE 80DE 82SE 85DE



NUMBER IN THE LINE = CHANNEL NUMBER

INSTRUMENT: CRONE P.E.M.

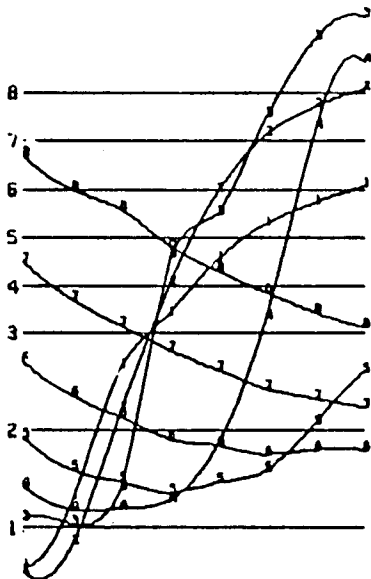
<p>BEMA INDUSTRIES LTD. KEND HILL</p> <p>VECTOR PULSE ELECTROMAGNETOMETER HORIZONTAL COMPONENT LINE 950N B</p>	
<p>GLEN E. WHITE GEOPHYSICAL CONSULTING &amp; SERVICES LTD.</p>	<p>N.T.S. 105M/14 DATE 22 OCT. 1969 FIG. NO. 4</p>

092088

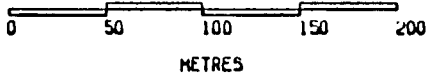
092043

L30PB

67SE 710E 72SE 750E 77SE 800E 82SE 850E



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NUMBER IN THE LINE = CHANNEL NUMBER

INSTRUMENT: CRONE P.E.M.

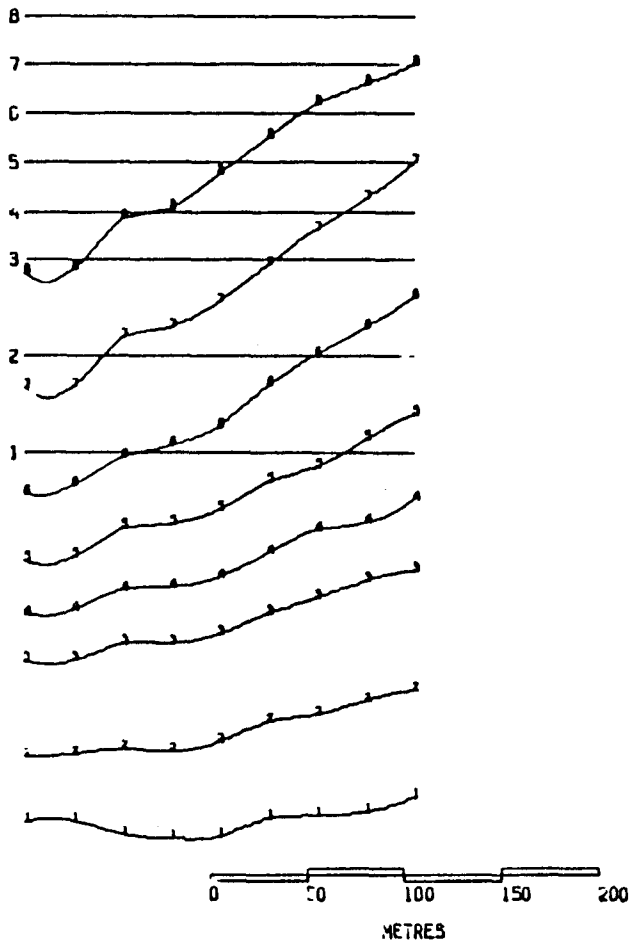
SEMA INDUSTRIES LTD.  
 KEND HILL  
 VECTOR PULSE ELECTROMAGNETMETER  
 VERTICAL COMPONENT  
 LINE 950N B

GLEN E. WHITE  
 GEOPHYSICAL CONSULTING  
 & SERVICES LTD.

N.T.S. 105M/14  
 DATE 27 OCT. 1960  
 FIG.NO: 5

800E  
 825E  
 850E  
 875E  
 900E  
 925E  
 950E  
 975E  
 1000E

LOOPRA



NUMBER IN THE LINE = CHANNEL NUMBER

INSTRUMENT: CRONE P.E.M.

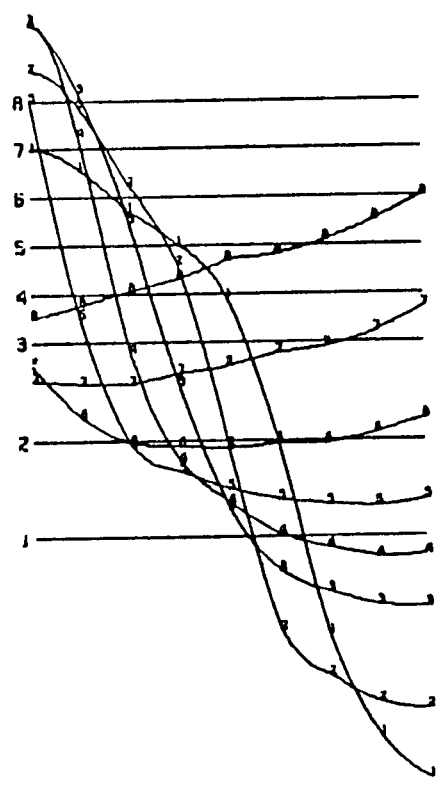
<b>BEMA INDUSTRIES LTD.</b> KEND HILL VECTOR PULSE ELECTROMAGNETOMETER HORIZONTAL COMPONENT LINE 1003N A	
<b>GLEN E. WHITE</b> GEOPHYSICAL CONSULTING & SERVICES LTD.	N.T.S. 105M. 14 DATE 22 OCT. 1966 FIG. NO: 6

092039

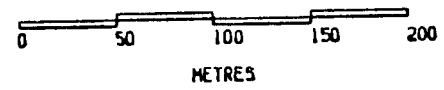
092039<sup>43</sup>

810E  
 815E  
 820E  
 825E  
 830E  
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 840E  
 845E  
 850E  
 1000 E

LOOPA



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NUMBER IN THE LINE = CHANNEL NUMBER

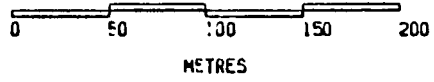
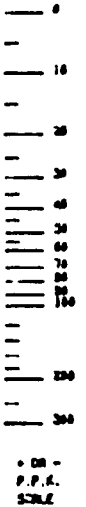
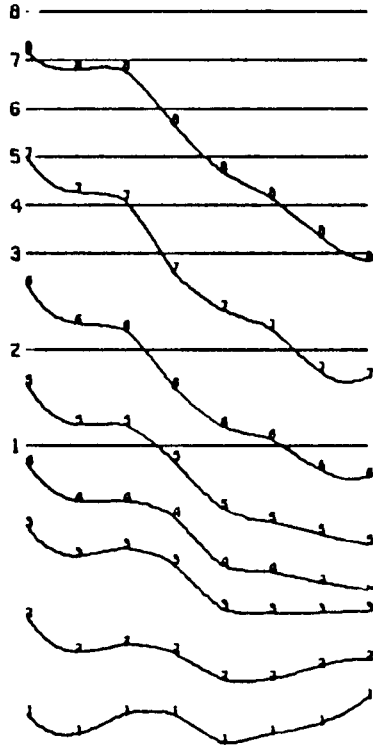
INSTRUMENT: CRONE P.E.M.

BEMA INDUSTRIES LTD. KEND HILL VECTOR PULSE ELECTROMAGNETOMETER VERTICAL COMPONENT LINE 1000N A	
GLEN E. WHITE GEOPHYSICAL CONSULTING & SERVICES LTD.	N.T.S. 105M/24 DATE 22 OCT. 1963 FIG. NO: 7

092043

LOOPB

72SE 750E 77SE 800E 82SE 850E 87SE 900E



NUMBER IN THE LINE = CHANNEL NUMBER

INSTRUMENT: CRONE P.E.M.

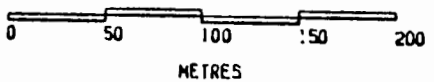
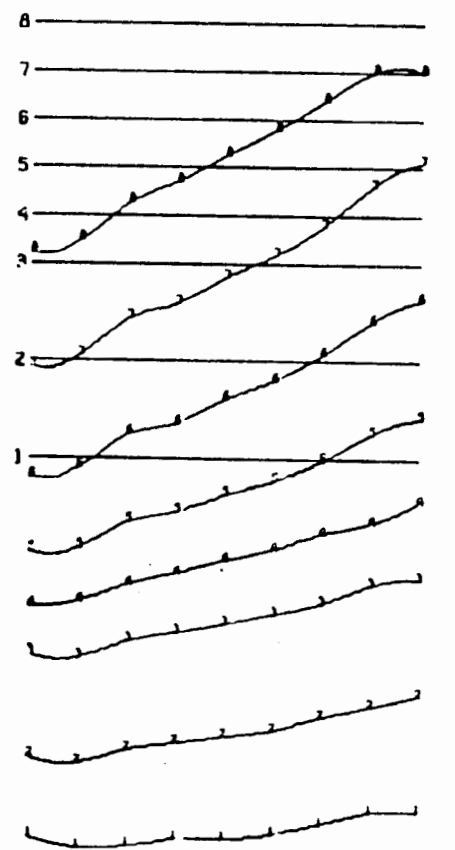
<b>BFMA INDUSTRIES LTD.</b> KENO HILL VECTOR PULSE ELECTROMAGNETOMETER HORIZONTAL COMPONENT LINE 1000N B	
<b>GLEN F. WHITE</b> GEOPHYSICAL CONSULTING & SERVICES LTD.	N.T.S. 105M/14 DATE 22 OCT. 1966 FIG. NO: 8

43



1000 E  
 975E  
 950E  
 925E  
 900E  
 875E  
 850E  
 825E  
 800E  
 775E  
 750E  
 725E  
 700E

LODPA



NUMBER IN THE LINE = CHANNEL NUMBER

INSTRUMENT: CRONE P.E.M.

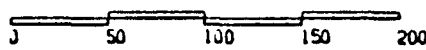
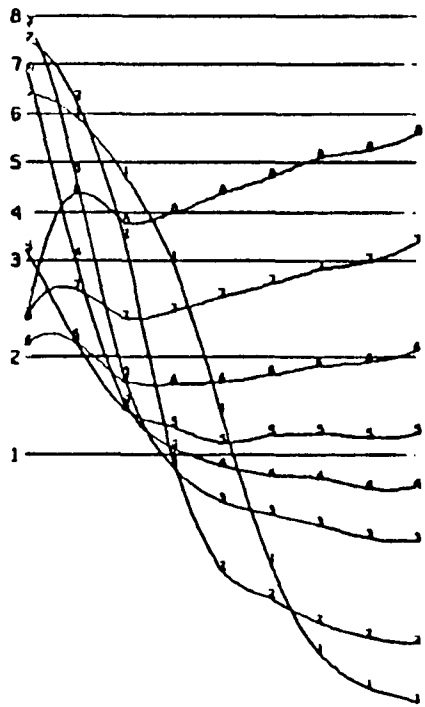
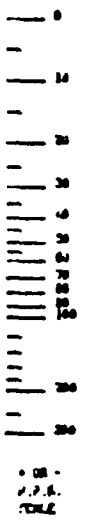
BEMA INDUSTRIES LTD. KENO HILL VECTOR PULSE ELECTROMAGNETOMETER HORIZONTAL COMPONENT LINE 1050N A	
GLEN E. WHITE GEOPHYSICAL CONSULTING & SERVICES LTD.	N.T.S. 1051/14 DATE 22 OCT. 1968 FIG. NO: 10

092043

092043

811E 825E 850E 875E 900E 925E 950E 975E 1000 E

LOOPA



METRES

NUMBER IN THE LINE = CHANNEL NUMBER

INSTRUMENT: CRONE P.E.M.

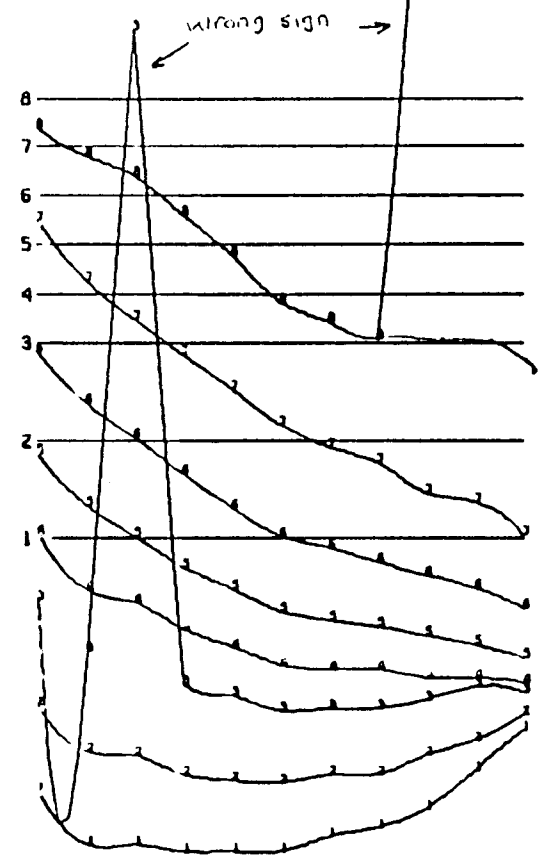
BEMA INDUSTRIES LTD.	
KEND HILL	
VECTOR PULSE ELECTROMAGNETOMETER	
VERTICAL COMPONENT	
LINE 1050N	R
GLEN E. WHITE	
GEOPHYSICAL CONSULTING & SERVICES LTD.	
N.T.S. 105N/14	DATE 22 OCT. 1968
FIG. NO: 11	

092043

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LOOP B

70SE 72SE 75SE 77SE 80SE 82SE 85SE 87SE 90SE 92SE 95SE



NUMBER IN THE LINE = CHANNEL NUMBER

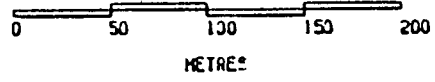
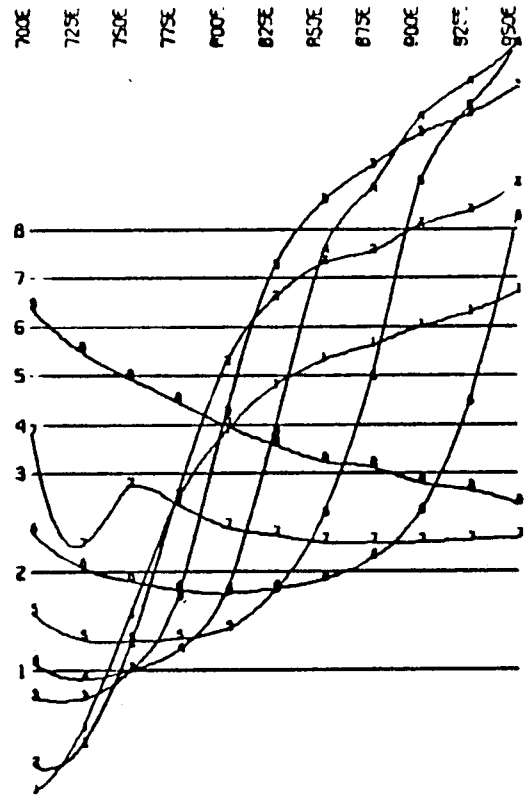
INSTRUMENT: CRONE P.E.M.

BEMA INDUSTRIES LTD.	
KEND HILL	
VECTOR PULSE ELECTROMAGNETOMETER	
HORIZONTAL COMPONENT	
LINE 1050N	B
GLEN E. WHITE	
GEOPHYSICAL CONSULTING & SERVICES LTD.	
N.T.S. 1:500/14	FIG. NO: 12
DATE 22 OCT. 1966	

092048

Vertical scale markings on the left side of the graph, including a '10' mark.

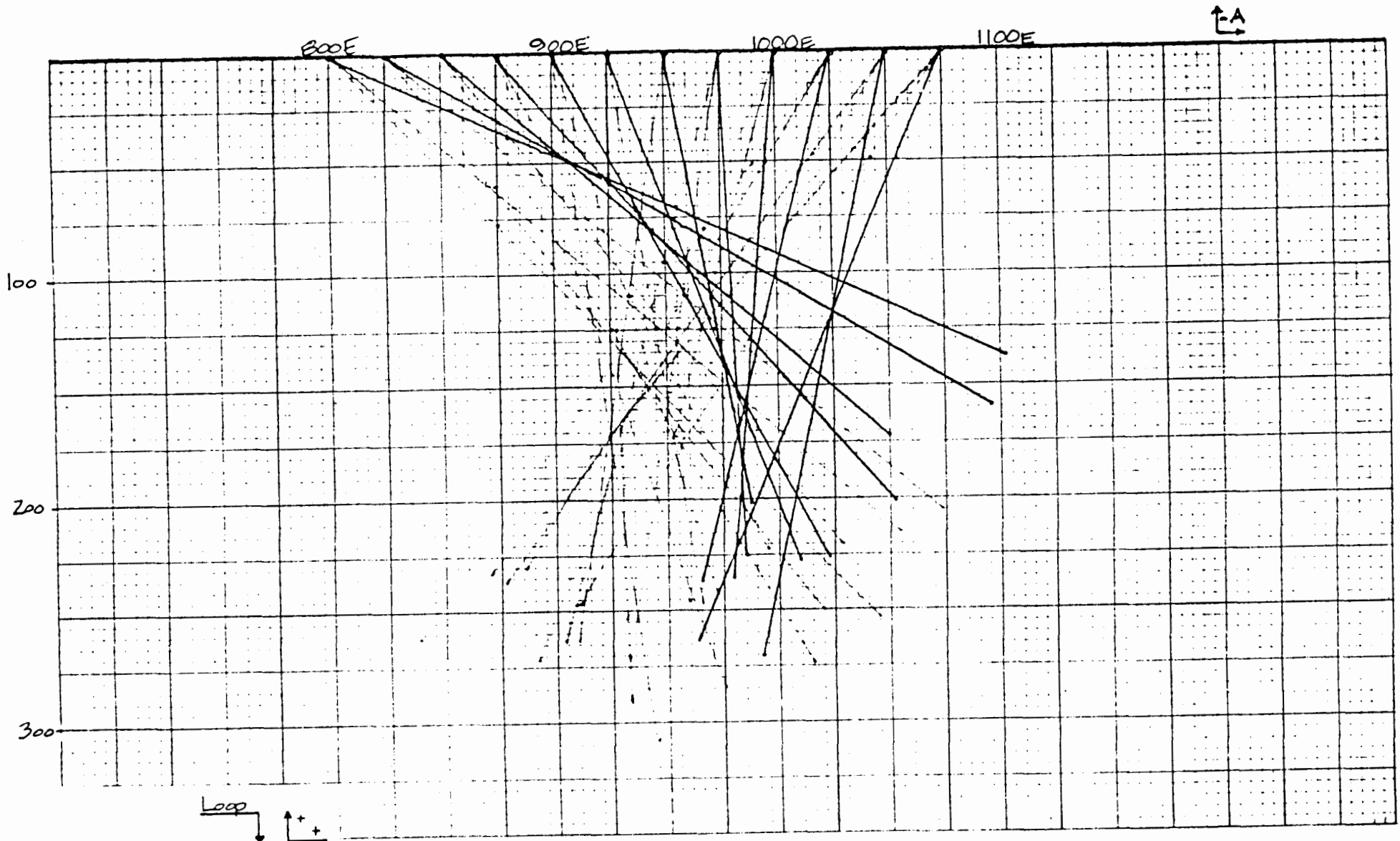
LOOP 8



NUMBER IN THE LINE = CHANNEL NUMBER

INSTRUMENT: CRONE P.E.M.

BEMA INDUSTRIES LTD.	
KEND HILL	
VECTOR PULSE ELECTROMAGNETOMETER	
VERTICAL COMPONENT	
LINE 1050N	9
GLEN E. WHITE	
GEOPHYSICAL CONSULTING & SERVICES LTD.	N.T.S. 105N/14
	DATE 22 OCT. 1960
	FIG. NO: 13



092043

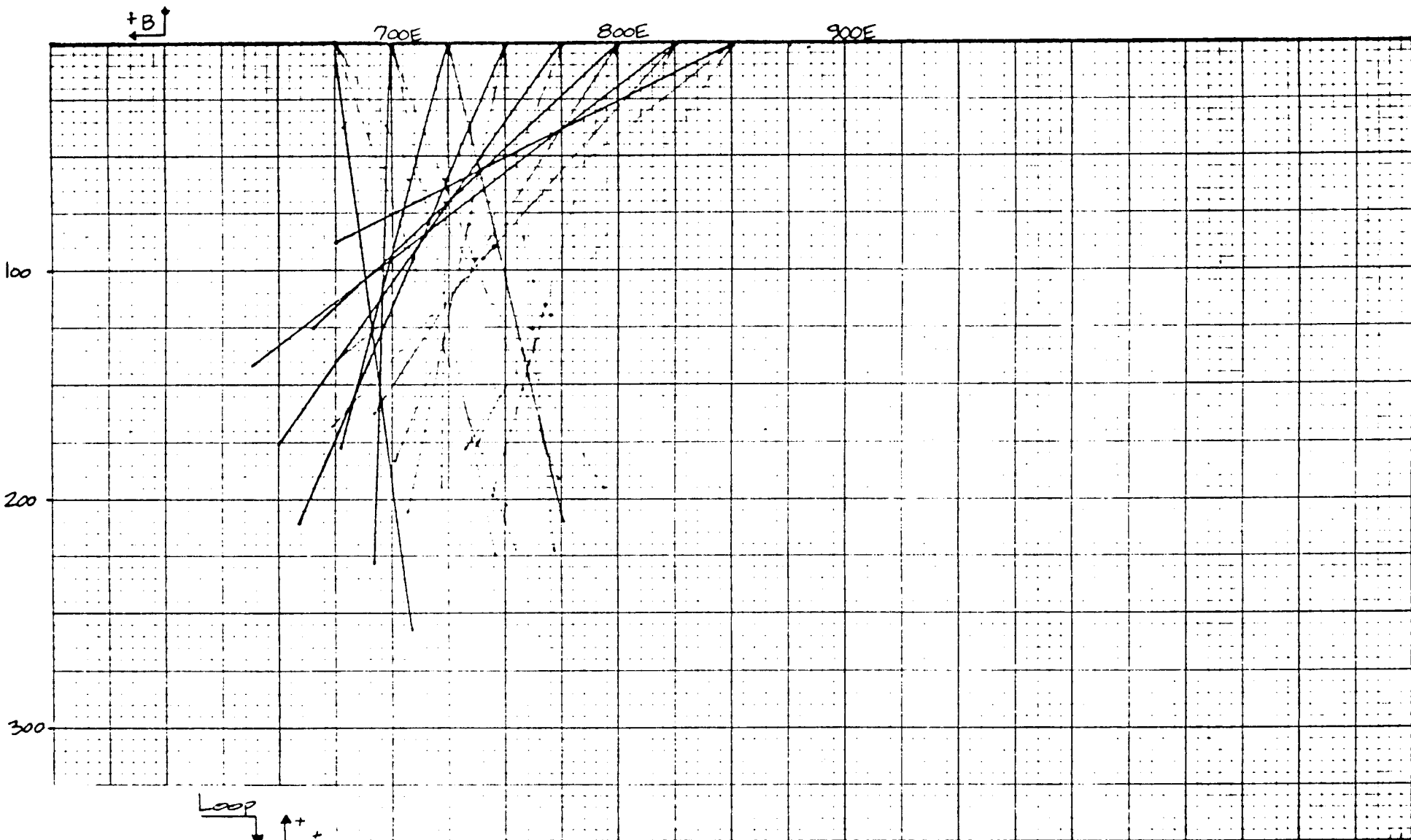
CHANNEL 1 ———  
 CHANNEL 2 - - - -  
 CHANNEL 3 ———

1cm = 25m

BEMA INDUSTRIES LTD.

LINE 950N LOOP - 'A'

DATE SEPT. 80



CHANNEL 1 ———  
 CHANNEL 2 - - - -  
 CHANNEL 3 ·····

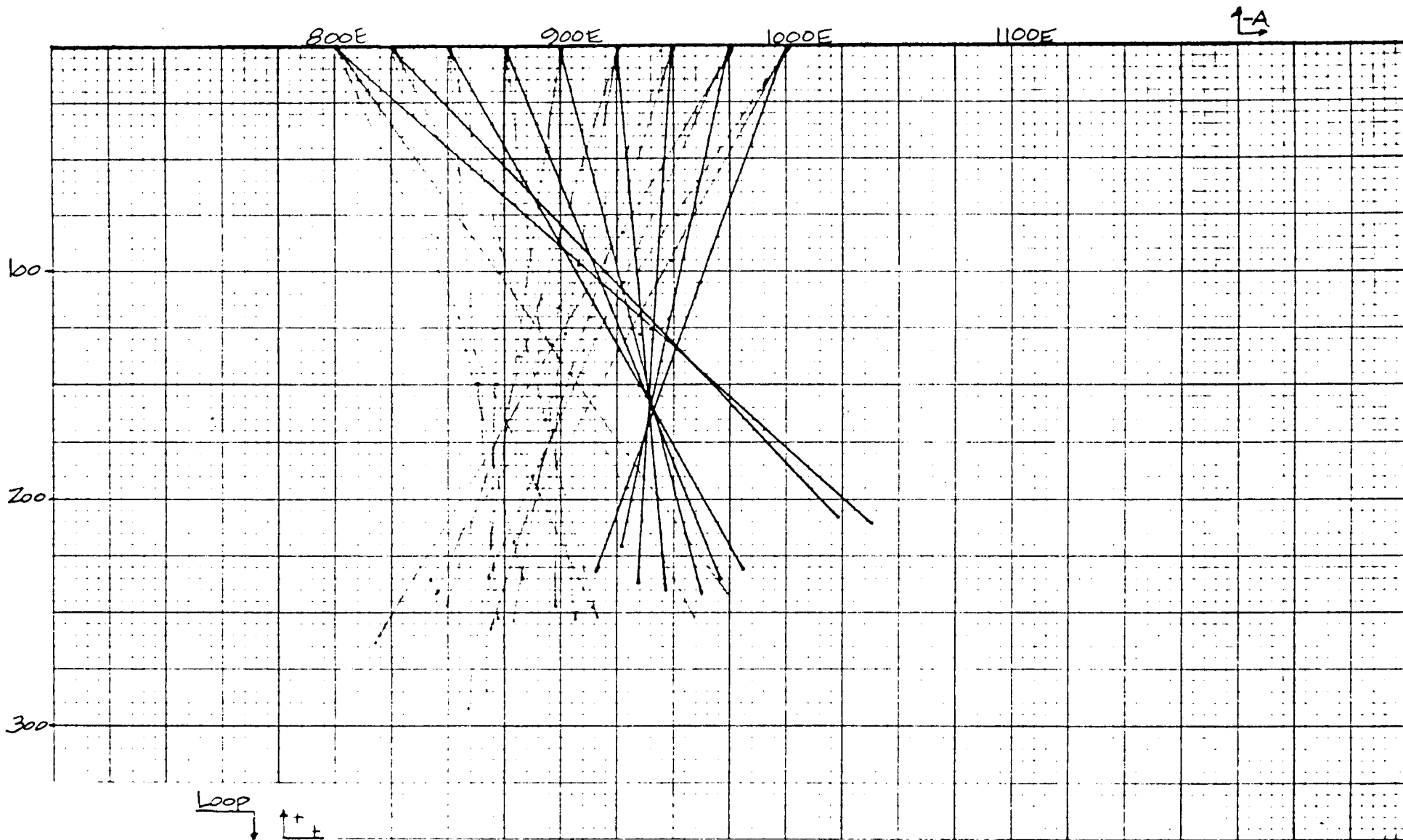
BEMA INDUSTRIES LTD.

1cm = 25m

LINE 950N LOOP +B'

DATE SEPT. 80

092043



092043

CHANNEL 1 ———  
 CHANNEL 2 - - - -  
 CHANNEL 3 ·····

1cm = 25m

BEMA INDUSTRIES LTD.

LINE 1000N LOOP-'A'

DATE SEPT. 80



CHANNEL 1  
 CHANNEL 2  
 CHANNEL 3



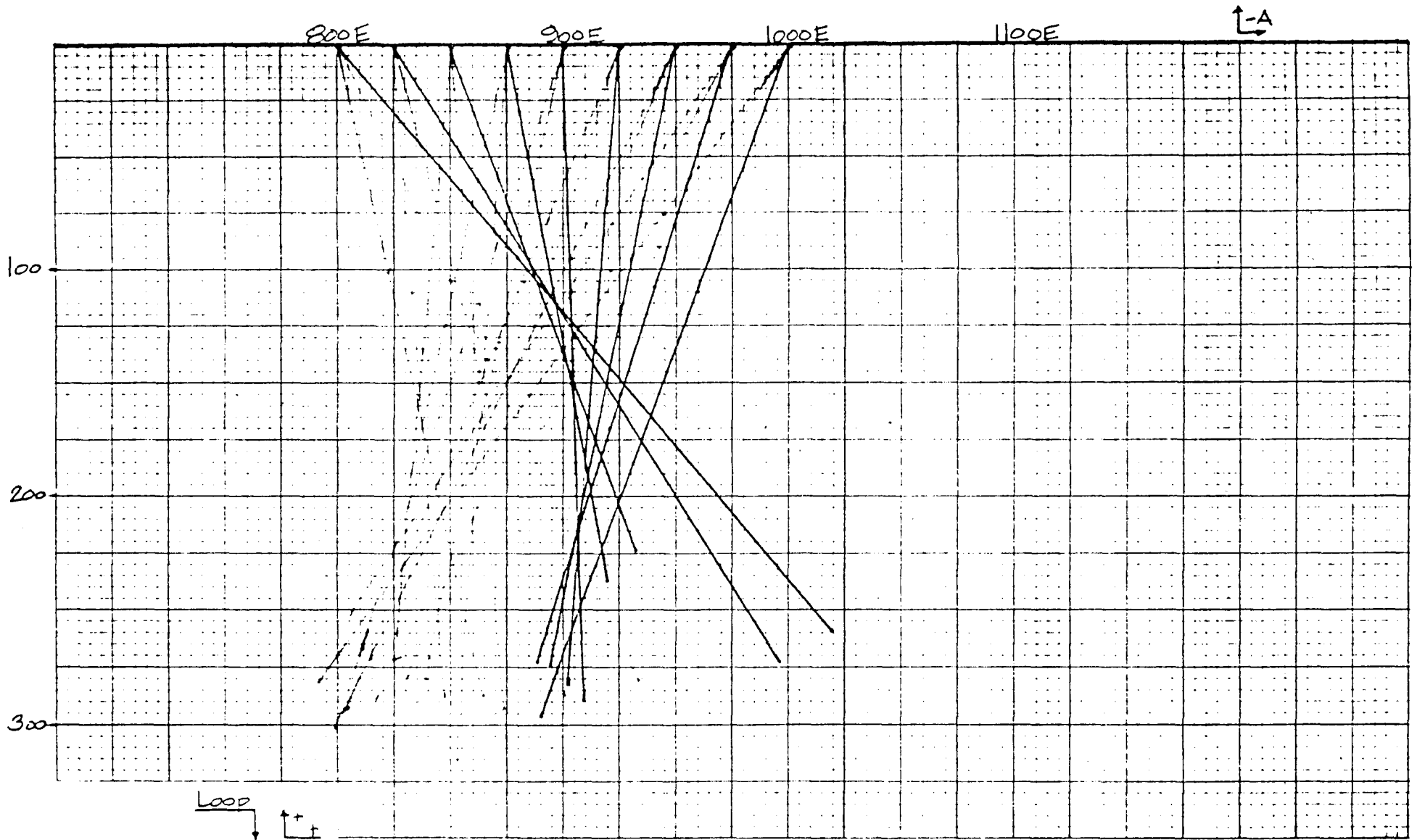
1cm = 25 m

BEMA INDUSTRIES LTD.

LINE 1000N LOOP +B'

DATE SEPT. 80

092043



082048

CHANNEL 1  
CHANNEL 2  
CHANNEL 3

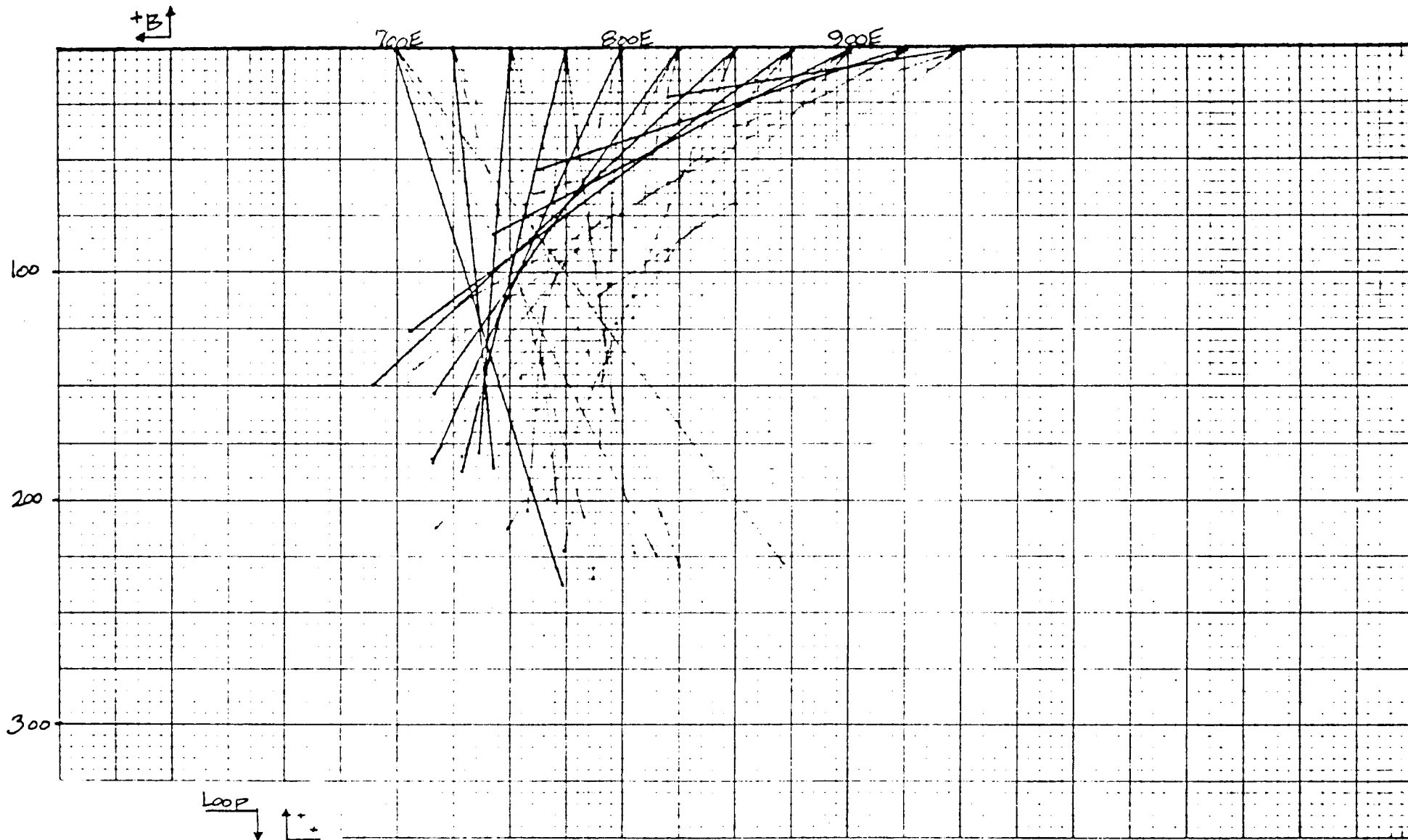
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- - -  
- · -

BEMA INDUSTRIES LTD.

1cm = 25 m

LINE 1050N LOOP -A'

DATE SEPT. 80



092143

- CHANNEL 1      ———
- CHANNEL 2      - - -
- CHANNEL 3      - - -

1cm = 25m

BEMA INDUSTRIES LTD.

LINE 1050N LOOP '+B'

DATE SEPT. 80

CHANNEL	1	2	3	4	5	6	7	8	N.F.		
LINE	STAT	LCOP	A								
950N	800E	VER:	172	177	161	129	75	21	-16	-21	0.93
		HOR:	-81	-150	-166	-177	-177	-161	-102	-58	
950N	825E	VER:	384	375	288	211	123	26	-34	-48	0.52
		HOR:	-230	-307	-365	-375	-365	-288	-173	-90	
950N	850E	VER:	294	256	192	110	46	-2	-25	-41	0.78
		HOR:	-256	-320	-320	-314	-294	-230	-121	-69	
950N	875E	VER:	234	166	104	54	-2	-46	-50	-37	0.96
		HOR:	-270	-312	-302	-286	-260	-197	-102	-52	
950N	900E	VER:	160	100	45	8	-34	-58	-54	-36	1.00
		HOR:	-300	-340	-310	-280	-250	-180	-95	-48	
950N	925E	VER:	100	96	6	-22	-50	-64	-50	-30	1.00
		HOR:	-275	-230	-250	-225	-200	-125	-62	-32	
950N	950E	VER:	43	-10	-35	-52	-66	-65	-46	-27	1.00
		HOR:	-250	-250	-220	-200	-155	-104	-54	-25	
950N	975E	VER:	10	-36	-52	-62	-70	-62	-40	-23	1.00
		HOR:	-225	-215	-190	-150	-130	-74	-35	-16	
950N	1000E	VER:	-20	-58	-66	-70	-70	-56	-34	-20	1.00
		HOR:	-220	-200	-160	-150	-108	-60	-30	-15	
950N	1025E	VER:	-34	-66	-70	-70	-66	-50	-28	-16	1.00
		HOR:	-130	-110	-100	-82	-56	-30	-14	-5	
950N	1050E	VER:	-30	-64	-65	-64	-58	-42	-24	-10	1.00
		HOR:	-140	-115	-94	-74	-50	-25	-10	-5	
950N	1075E	VER:	-50	-65	-62	-55	-48	-32	-18	-9	1.00
		HOR:	-115	-98	-76	-56	-38	-18	-8	-4	

LINE	STAT	LCOP	A								
1000N	800E	VER:	303	258	164	103	32	-39	-71	-62	0.56
		HOR:	-267	-357	-357	-357	-339	-285	-167	-89	
1000N	825E	VER:	250	184	86	36	-15	-63	-73	-55	0.76
		HOR:	-263	-348	-355	-342	-328	-203	-164	-86	
1000N	850E	VER:	170	87	25	-12	-52	-80	-73	-48	1.00
		HOR:	-300	-330	-300	-280	-250	-200	-104	-53	
1000N	875E	VER:	125	42	-9	-38	-66	-82	-66	-43	1.00
		HOR:	-310	-340	-300	-275	-240	-180	-94	-48	
1000N	900E	VER:	76	-1	-38	-56	-78	-84	-62	-36	1.00
		HOR:	-304	-310	-275	-250	-210	-150	-74	-35	
1000N	925E	VER:	20	-48	-68	-76	-86	-80	-55	-34	1.00
		HOR:	-255	-255	-225	-200	-160	-102	-52	-25	
1000N	950E	VER:	-20	-73	-83	-86	-90	-80	-52	-30	1.00
		HOR:	-250	-240	-195	-160	-140	-77	-37	-18	
1000N	975E	VER:	-52	-94	-94	-94	-92	-73	-45	-25	1.00
		HOR:	-240	-210	-165	-150	-108	-60	-28	-14	
1000N	1000E	VER:	-78	-100	-96	-92	-86	-64	-36	-20	1.00
		HOR:	-210	-190	-150	-120	-85	-45	-20	-10	

LINE	STAT	LCOP	A								
1050N	800E	VER:	230	153	73	30	-18	-70	-84	-138	0.65
		HOR:	-276	-323	-307	-307	-292	-230	-132	-70	

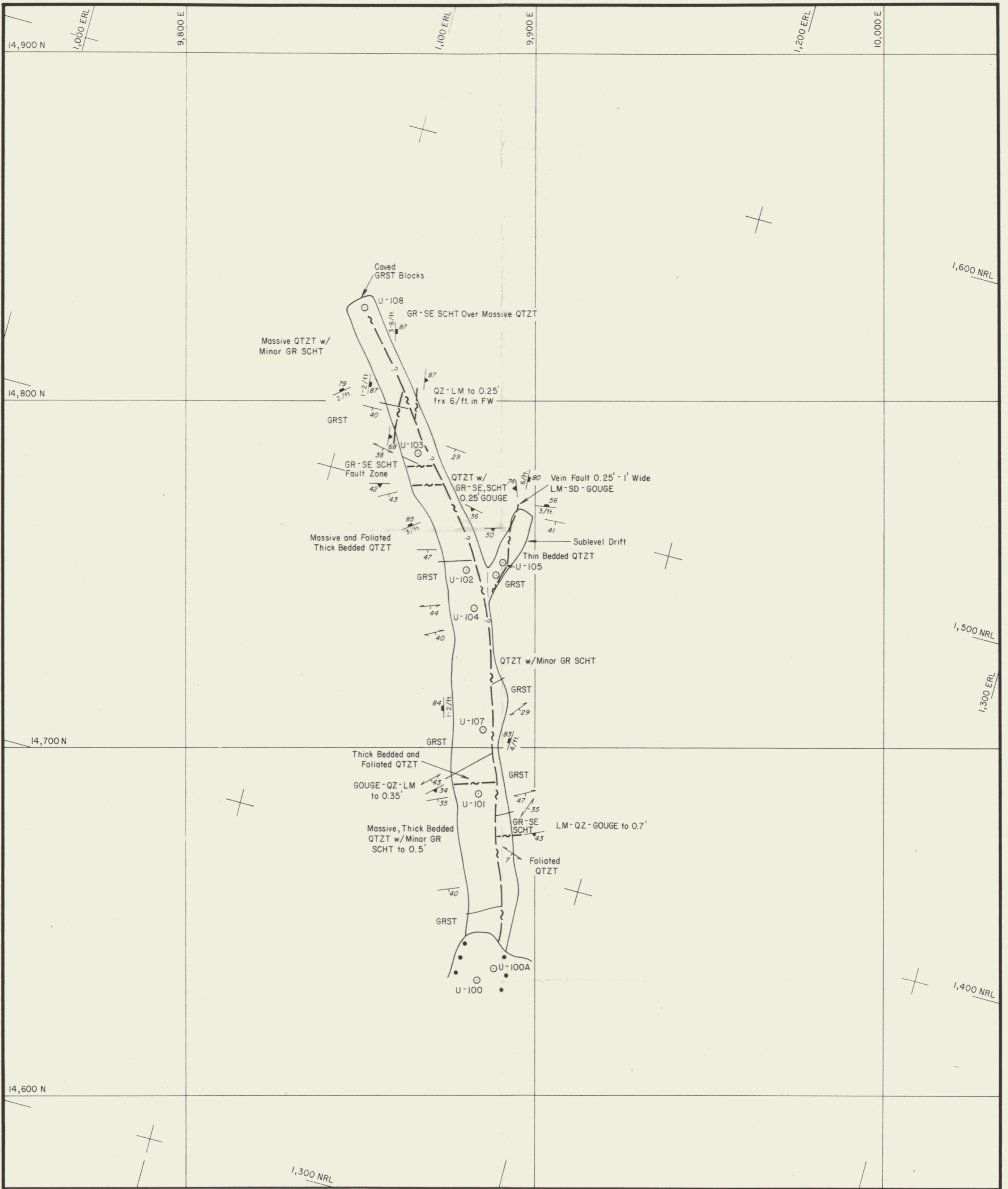
CHANNEL	1	2	3	4	5	6	7	8	N.F.		
LINE	STAT	LCCP	A								
1050N	825E	VER:	188	89	18	-9	-42	-68	-65	-42	0.85
		HOR:	-305	-341	-317	-294	-282	-211	-117	-63	
1050N	850E	VER:	110	25	-24	-48	-80	-98	-86	-55	1.00
		HCR:	-300	-300	-270	-250	-220	-155	-82	-44	
1050N	875E	VER:	50	-20	-55	-72	-94	-100	-80	-50	1.00
		HOR:	-280	-280	-250	-225	-200	-140	-72	-36	
1050N	900E	VER:	9	-58	-76	-86	-110	-98	-70	-42	1.00
		HCR:	-280	-265	-230	-200	-170	-112	-56	-29	
1050N	925E	VER:	-22	-75	-86	-94	-102	-92	-62	-36	1.00
		HOR:	-265	-250	-210	-180	-150	-94	-46	-22	
1050N	950E	VER:	-50	-94	-95	-96	-100	-85	-54	-30	1.00
		HCR:	-240	-220	-190	-155	-125	-74	-35	-15	
1050N	975E	VER:	-70	-108	-107	-106	-104	-82	-50	-28	1.00
		HCR:	-215	-200	-160	-140	-98	-54	-24	-10	
1050N	1000E	VER:	-80	-115	-110	-104	-100	-74	-42	-24	1.00
		HOR:	-215	-180	-150	-115	-84	-44	-19	-10	

LINE	STAT	LCCP	B								
950N	850E	VER:	200	200	160	67	-29	-94	-100	-74	1.00
		HOR:	-100	-160	-240	-280	-280	-230	-130	-60	
950N	825E	VER:	170	170	130	36	-47	-94	-92	-64	1.00
		HOR:	-130	-190	-250	-280	-270	-210	-130	-54	
950N	800E	VER:	140	130	63	-7	-73	-98	-84	-53	1.00
		HOR:	-130	-190	-230	-240	-210	-150	-75	-33	
950N	775E	VER:	100	77	25	-36	-81	-90	-70	-43	1.00
		HOR:	-140	-190	-210	-210	-190	-130	-64	-28	
950N	750E	VER:	59	32	16	-61	-89	-85	-58	-34	1.00
		HCR:	-135	-160	-170	-155	-140	-87	-43	-17	
950N	725E	VER:	36	4	-35	-65	-80	-69	-46	-24	1.00
		HCR:	-120	-140	-140	-110	-94	-57	-24	-12	
950N	700E	VER:	6	-23	-48	-66	-72	-57	-36	-20	1.00
		HCR:	-110	-120	-120	-94	-71	-43	-22	-3	
950N	675E	VER:	-8	-30	-46	-53	-53	-41	-25	-13	1.00
		HOR:	-74	-80	-73	-58	-44	-25	-11	-4	

LINE	STAT	LCCP	B								
1000N	900E	VER:	200	200	175	100	3	-73	-104	-78	1.00
		HOR:	-86	-150	-235	-300	-310	-260	-160	-84	
1000N	875E	VER:	160	160	125	48	-36	-94	-100	-73	1.00
		HOR:	-110	-160	-240	-280	-280	-240	-150	-66	
1000N	850E	VER:	125	120	64	-5	-74	-106	-94	-60	1.00
		HOR:	-120	-180	-240	-255	-250	-180	-100	-46	
1000N	825E	VER:	100	81	27	-36	-90	-105	-90	-49	1.00
		HCR:	-130	-180	-230	-240	-220	-160	-84	-36	
1000N	800E	VER:	75	48	-5	-60	-100	-100	-74	-43	1.00
		HOR:	-100	-140	-150	-150	-140	-110	-58	-23	
1000N	775E	VER:	39	9	-36	-74	-96	-87	-57	-32	1.00
		HOR:	-100	-130	-130	-130	-100	-64	-30	-12	

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CHANNEL			1	2	3	4	5	6	7	8	N.F.
1000N	750E	VER:	14	-16	-51	-77	-88	-75	-47	-25	1.00
		HCR:	-120	-140	-140	-130	-100	-61	-28	-12	
1000N	725E	VER:	-4	-33	-56	-72	-75	-59	-36	-18	1.00
		HCR:	-100	-100	-105	-92	-69	-42	-20	-8	
LINE	STAT		LOOP	B							
1050N	950E	VER:	264	294	294	279	176	22	-91	-105	0.68
		HCR:	-48	-102	-205	-294	-367	-367	-294	161	
1050N	925E	VER:	217	228	228	195	97	-16	-93	-92	0.92
		HCR:	-70	-130	-195	-282	-326	-304	-217	119	
1050N	900E	VER:	190	200	190	140	48	-46	-95	-86	1.00
		HCR:	-100	-150	-220	-280	-300	-270	-200	100	
1050N	875E	VER:	160	155	140	72	-1	-70	-95	-74	1.00
		HCR:	-120	-180	-240	-260	-275	-240	-150	-75	
1050N	850E	VER:	140	140	100	40	-30	-85	-95	-70	1.00
		HCR:	-130	-180	-240	-260	-260	-210	-130	-64	
1050N	825E	VER:	110	100	54	-2	-60	-92	-88	-60	1.00
		HCR:	-150	-195	-245	-250	-240	-190	-106	-54	
1050N	800E	VER:	72	55	12	-38	-84	-96	-82	-50	1.00
		HCR:	-150	-190	-210	-210	-195	-145	-76	-35	
1050N	775E	VER:	38	15	-26	-65	-92	-92	-66	-40	1.00
		HCR:	-150	-180	-190	-180	-160	-106	-55	-24	
1050N	750E	VER:	11	-15	-50	-78	-94	-85	-56	-32	1.00
		HCR:	-140	-150	150	-140	-120	-76	-40	-16	
1050N	725E	VER:	-12	-40	-65	-85	-92	-75	-98	-25	1.00
		HCR:	-140	-145	-140	-125	-90	-55	-28	-12	
1050N	700E	VER:	-25	-48	-64	-72	-72	-54	-34	-16	1.00
		HCR:	-85	-93	-87	-74	-56	-34	-15	-6	



**SYMBOLS**

	GEOLOGICAL CONTACT: DEFINED		BEDDING: INCLINED		SHAFT
	APPROXIMATE		VERTICAL		DRILL HOLE
	INFERRED		OVERTURNED		SURVEY STATION
	OUTCROP		FOLIATION: INCLINED		ROCK SAMPLE
	CUT OR WASTE		VERTICAL		
	FAULT: DEFINED		FRACTURE: INCLINED		
	APPROXIMATE		VERTICAL		
	INFERRED				
	INCLINED				

**ABBREVIATIONS**

GRST	GREENSTONE	Mn	MANGANESE STAIN
QTZT	QUARTZITE	CL	CHLORITE
SCHT	SCHIST	FP	FELDSPAR
PHYL	PHYLLITE	frx	FRACTURE
BRXX	BRECCIA	vn	VEIN
OZ	QUARTZ	fol	FOLIATED
GR	GRAPHITE	MASS	MASSIVE
SE	SERICITE	HW	HANGING WALL
LM	LIMONITE	FW	FOOT WALL
SD	SIDERITE		

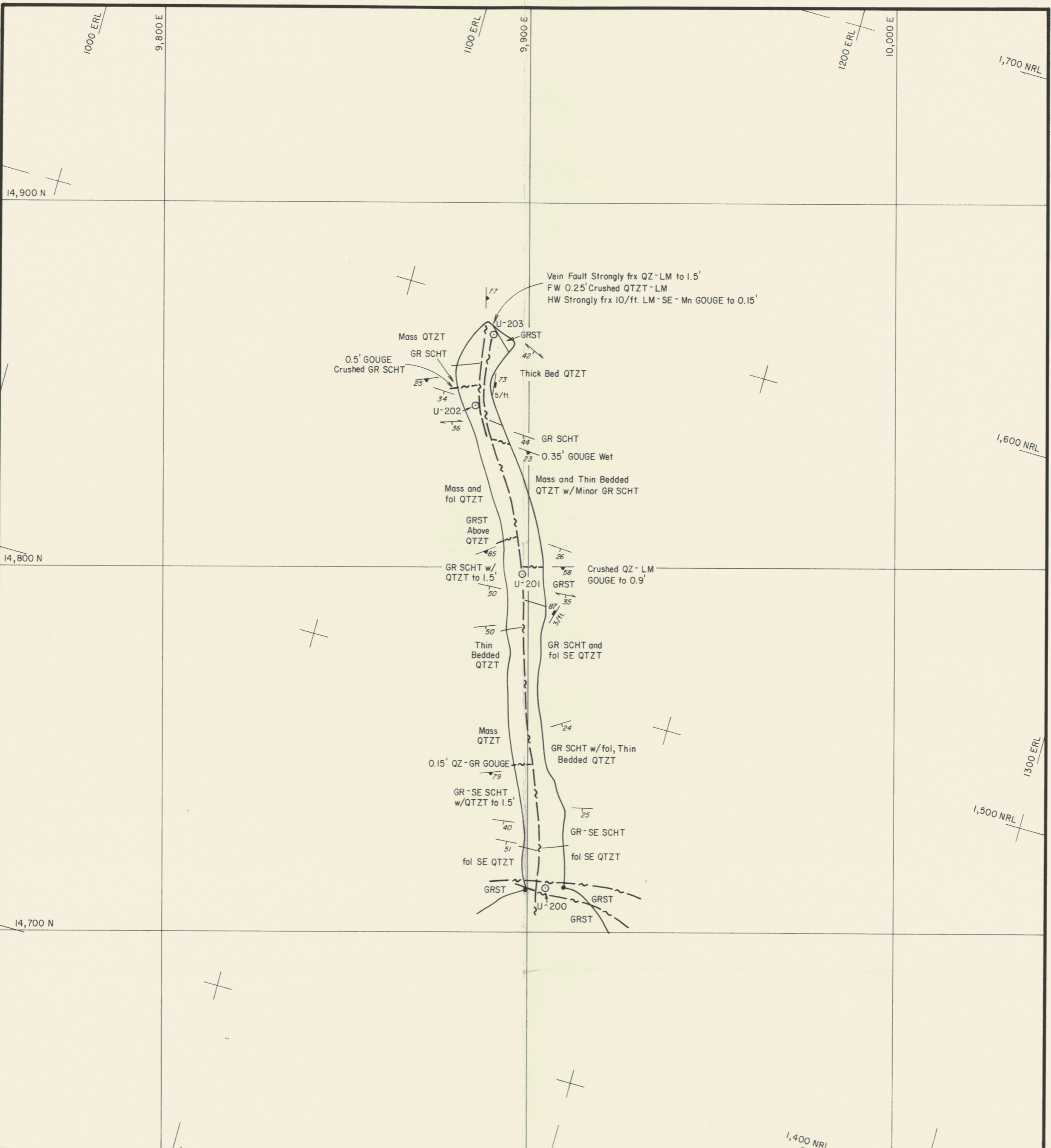
CANADA TUNGSTEN MINING CORP. LTD.

**100 LEVEL ADIT GEOLOGY**

**MOUNT KENO MINES  
SPRINGMOUNT OPERATING COMPANY**

0 2.4 4.8 7.2 METRES      0 10 20 40 FEET

SCALE IN:      NTS No. 105M-14  
 DATE: September, 1984      MAP No.  
 DRAWN BY:      To accompany report:  
 REVISED BY:      S.C. BARTLETT



**SYMBOLS**

	GEOLOGICAL CONTACT: DEFINED		BEDDING: INCLINED		SHAFT
	APPROXIMATE		VERTICAL		DRILL HOLE
	INFERRED		OVERTURNED		SURVEY STATION
	OUTCROP		FOLIATION: INCLINED		ROCK SAMPLE
	CUT OR WASTE		VERTICAL		
	FAULT: DEFINED		FRACTURE: INCLINED		
	APPROXIMATE		VERTICAL		
	INFERRED				
	INCLINED				

**ABBREVIATIONS**

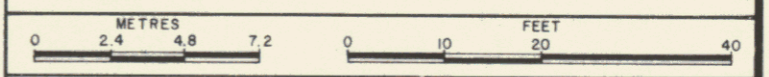
GRST	GREENSTONE	Mn	MANGANESE STAIN
QTZT	QUARTZITE	CL	CHLORITE
SCHT	SCHIST	FP	FELDSPAR
PHYL	PHYLLITE	frx	FRACTURE
BRXX	BRECCIA	vn	VEIN
QZ	QUARTZ	fol	FOLIATED
GR	GRAPHITE	MASS	MASSIVE
SE	SERICITE	HW	HANGING WALL
LM	LIMONITE	FW	FOOTWALL
SD	SIDERITE		



CANADA TUNGSTEN MINING CORP. LTD.

**200 LEVEL ADIT GEOLOGY**

**092043 MOUNT KENO MINES  
SPRINGMOUNT OPERATING COMPANY**



SCALE IN:	NTS No. 105M-14
DATE: September, 1984	MAP No.
DRAWN BY:	To accompany report:
REVISED BY:	S. C. BARTLETT