

2062

091154

FROM

R.G. HILKER - Box 4008 - WHITEHORSE - Y.T.

DEPARTMENT

MR. VERN JOHANSON

DATE

DEC. 2/1976

SUBJECT

WATSON LAKE MINING
RECORDER - Box 269Tintina Silver Mines
Assessment Work.S
E
N
D
T
O

MESSAGE

Please find enclosed receipt for \$174,000.00 for the Tintina Silver Mines assessment work. This was originally applied for \$150,000.00, so there is an excess of receipts. Also, enclosed are the drill sheets, and drill collar location plans. The diamond drill core is stored in Ross Finer in standard core boxes with lids on each box.

Yours truly
R. Hilker

105-6-3

EAGLE 2, 10, 35, 37, 42, 43

1976



USE LOWER PORTION FOR REPLY

REPLY FROM

DATE

TINTINA SILVER MINES LIMITED
1976 DIAMOND DRILL PROGRAMME
GEOLOGICAL REPORT

EAGLE CLAIM GROUP - SHEET 105-G-3

R. G. HILKER, P.ENG.

. November 4, 1976



**R. G. HILKER
LIMITED**

CONSULTING GEOLOGIST . . . PROFESSIONAL ENGINEER

P.O. Box 4008, WHITEHORSE
YUKON TERRITORY, CANADA
"LAND OF THE MIDNIGHT SUN"

GEOLOGICAL REPORT

on the

1976 DIAMOND DRILL PROGRAMME

EAGLE CLAIM GROUP

Latitude $61^{\circ}08'$

Longitude $131^{\circ}10'$

WATSON LAKE MINING DIVISION
YUKON TERRITORY
NTS SHEET 105-G-3

for

TINTINA SILVER MINES LIMITED
TORONTO, ONTARIO

by

R. G. HILKER, P.ENG.,
R. G. HILKER LIMITED
WHITEHORSE, YUKON TERRITORY

November 4, 1976

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- Plan 2 - Diamond Drill Hole Sections of T76-3 and T76-4; scale 1" = 40'.
- Plan 3 - Diamond Drill Hole Sections of T76-5; scale 1" = 40'.
- Plan 4 - Diamond Drill Hole Location Plan - 1976 West Slope Grid; scale 1" = 100'.
- Plan 5 - Diamond Drill Hole Sections of T76-6, T76-7 and T76-8; scale 1" = 40'.
- Plan 6 - Diamond Drill Hole Sections of T76-9, T76-10 and T76-11; scale 1" = 40'.
- Plan 7 - 1976 Composite Plan and Location - 1976 Diamond Drill Holes and Line Grids; scale 1" = 200'.
- Geophysics Plan 1 - Horizontal Electromagnetic EM-17 Survey - 1975 Line Grid, covers 1975 EM-5 and EM-6 Zones; scales: Hor. 1" = 200'; Vert. 1" = 20⁰.
- Geophysics Plan 2 - Horizontal Electromagnetics EM-17 Survey on 1974 "A" Line Grid - covers 1975 EM-1 Zone; scales: Hor. 1" = 200'; Vert. 1" = 20⁰.

INTRODUCTION

In the early part of the summer of 1961, Nels Hals, a prospector for Conwest Exploration, discovered a surface showing of silver-lead-zinc mineralization within a cirque in the southern part of the St. Cyr mountain range. The Eagle claim group was staked to cover the showing and a surface exploration programme commenced immediately. As a consequence of this work, the decision was made to explore the most promising showings by means of an underground adit, which was collared in January 1962. During the following summer, detailed geological mapping was conducted by Dr. W. W. Moorehouse over the claim group.

The underground exploration programme failed to intersect significant mineralization in 1962, and all work on the property was ceased. Tintina Silver Mines Ltd. was reorganized by a Toronto group of mining businessmen and Conwest Exploration ceased its involvement with the company. In 1968 a geochemical survey was conducted over the Eagle claim group for the purpose of assessment work.

A total of twenty-six (26) showings have been outlined over the property, many with very high grades of silver, lead and zinc mineralization. The initial 1962 exploration programme tested only a very limited number of the showings and a surface diamond drilling programme was planned by the directors of Tintina Silver Mines to more fully investigate the size and continuity of the mineralized showings.

In 1974, a diamond drilling programme was concentrated in the area of the initial discovery showings - the A Zone - where little follow-up work had been conducted in the earlier programmes. It was soon appreciated that the mineralization in this area is stratiform, within a single limestone horizon, and localized within a drag fold. Other showings tested suggested that most mineralization in the area was originally stratiform, but subsequent structural activity had resulted in remobilization of the sulfides in some cases. Exploration drilling in the A Zone area was limited to a 300-foot strike length due to the irregular topography. A

diamond drilling programme, utilizing a Longyear BBS-1 wireline drill and a portable Morex EX-drill, was carried out during the months of June, July and August of 1974. During this programme, a total of 10,322 feet of BQ core and 1,577 feet of EX core were drilled, testing ten of the surface showings in the main cirque area. In conjunction with the drill programme work, a small amount of surface exploration, including trenching and geochemical soil and rock chip sampling, was completed. The diamond drilling was conducted on sections surveyed from three baselines, established from a transit survey. The drilling was done at an elevation of 5,000 to 5,500 feet in a north-facing cirque.

In 1975, Tintina Silver Mines Ltd. conducted a surface exploration programme on the Eagle mineral claim group. The programme consisted of establishing a linegrid, geological mapping, soil sampling survey and an electromagnetic EM-16 and magnetic geophysical survey. The exploration programme was designed to define stratigraphy over the central part of the property, to locate conductors near mineralized showings in favourable limestone stratigraphy, and to determine the potential of limestone along the strike from the A Zone to host more extensive silver-lead-zinc mineralization.

The 1975 linegrid was started by establishing the West Slope baseline; it is 6,300 feet in length with 25 north-south cross-lines, ranging from 1,000 feet to 2,000 feet in length, and totalling 125,900 feet. This grid extends from the A Zone showings to the north and west over all the West Slope showings, including the Number 10 Zone and the West Mountain showings. Cross-lines are spaced 200 feet in areas of most interesting geology and 400 feet in other areas. The Northeast baseline is an extension of the West Slope grid to the northeast in Caribou Creek area. The east-west baseline extends for 2,900 feet, with 400 foot spaced cross-lines totalling 22,800 feet. The East Slope baseline follows an azimuth of 150° along the lower part of the East Slope for 3,500 feet. Cross-lines, spaced every 200 feet, are more or less perpendicular to the Slope. The Slope is

extremely steep, averaging 45° , and cross-lines were chained parallel to the Slope and as high on the Slope as the difficult terrain permitted. The cross-lines total 20,800 feet. The East Boundary grid is a reconnaissance grid with baseline, azimuth 85° , extending 4,100 feet from the East Slope baseline to beyond the East Boundary showing. Four cross-lines, spaced at 800 feet, extend a total of 9,000 feet.

During the 1975 Geochemical Survey, a total of 1,879 soil samples were collected over the central portion of the Eagle claim group. Samples were collected from the upper C soil horizon, at depths of 10 to 12 inches where possible. On upper slopes, soils are usually extremely thin and consist of relatively unaltered, finely abraded rock grit fragments. Samples were collected on a 100 x 400 foot grid spacing. This spacing was decreased to 100 x 200 feet over areas of obvious geological interest.

The geochemical lead-silver-zinc survey indicated seven anomalous areas, which were named: Zone A and Zone B - West Mountain area; Zone C - West Slope; Zone D and Zone E - Anticline Axis; Zone F - East Slope; Zone G - East Slope and East Boundary grid area. The geochemical anomalies occur near surface showings and on the flanks of the electromagnetic conductors EM-1, EM-2, EM-3 and EM-4. Zone F and Zone G indicate an extension of Zone A (1974 A-Grid ore zone) to the East Slope.

During 1975, an electromagnetic survey was conducted, using a Geonics EM-16 instrument, on part of the linegrid. The survey was made over most of the 1975 West Half Grid Sheet and on a few lines near the 1974 A-Grid drilling area of the 1975 East Half Grid Sheet. A total of 18 line-miles of EM-16 survey was conducted from July 16 to August 14.

The electromagnetic EM-16 survey indicated nine conductive zones, and these were named as: EM-1, EM-2, EM-3, EM-4, EM-5, EM-6, EM-7, EM-8 and EM-9. Magnetic anomalies occur on or adjacent to the EM conductors and are probably caused by pyrrhotite and minor magnetite. The galena and sphal-

terite mineralization on the surface showings and 1974 diamond drilling was associated with pyrrhotite.

The 1975 geology, geophysical and geochemical exploration surveys delineated several zones for diamond drilling on the Eagle claim group. Electromagnetic conductors, magnetic anomalies and geochemical highs correlate with surface lead-silver-zinc mineralized showings on or near host beds of Upper and Lower Limestone.

Tintina Silver Mines Ltd. conducted a diamond drill programme on the Eagle claim group from June 29 to August 29, 1976. The drill programme was conducted to check areas where electromagnetic conductors occurred near surface sulphide mineralization within the Upper and Lower Limestone units. The West Slope, Saddle and Ice Creek Flats areas were systematically drilled on the Eagle claims. During the drill programme, 4,036 feet of BQ diamond drilling was completed at eleven drill sites.

LOCATION AND ACCESS

The Eagle claim group of Tintina Silver Mines Ltd. is situated in the southern St. Cyr Range of the Pelly Mountains, at the headwaters of the Liard River, in the southeastern Yukon Territory - NTS Sheet 105-G-3. The property is approximately 110 miles northwest of Watson Lake, 140 miles east of Whitehorse and 75 miles southeast of Ross River (see Figures 1 and 2).

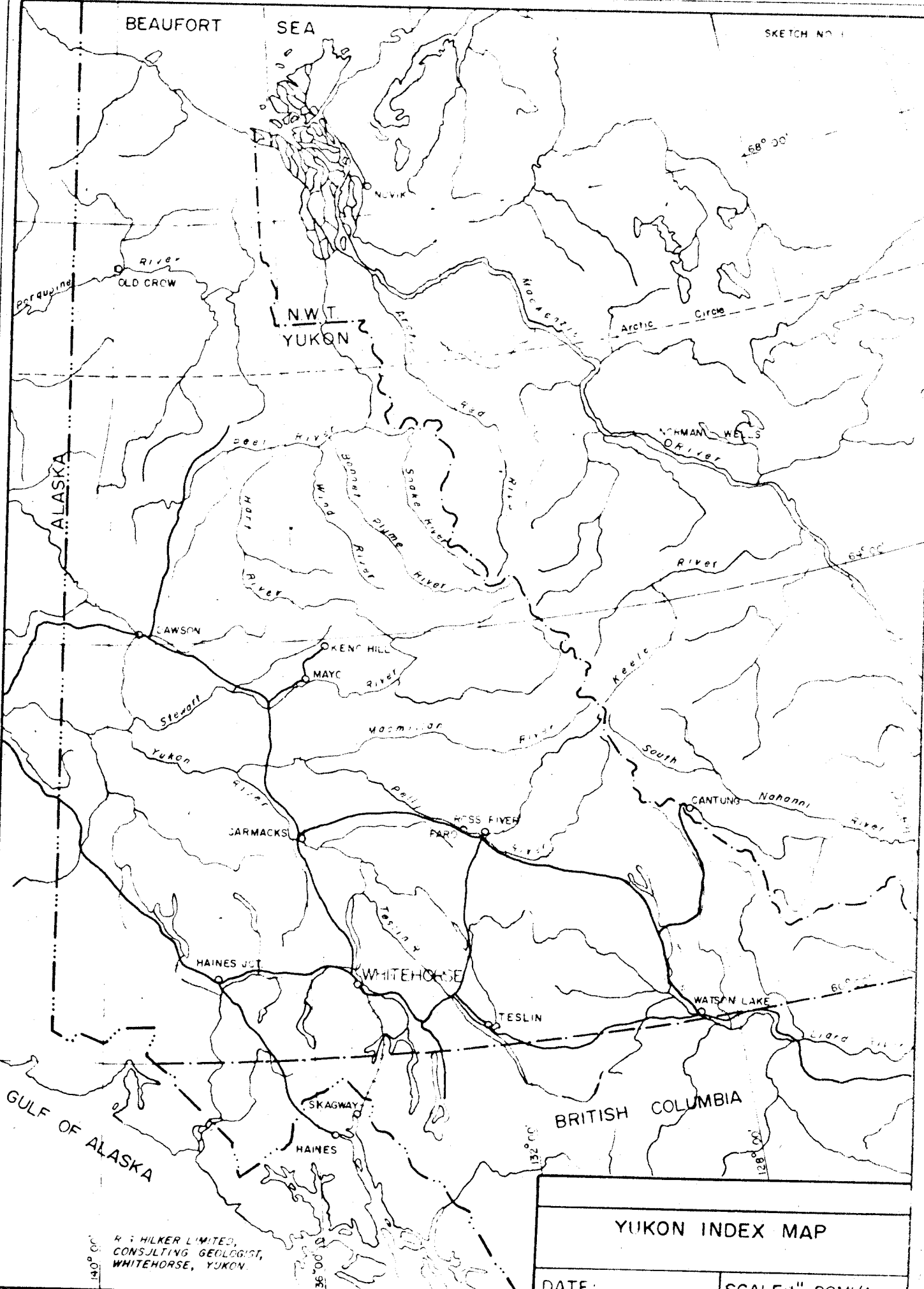
An airstrip, presently in useable condition, was built five miles southwest of the property to service the 1961/62 exploration programme. A winter road was also constructed, 110 miles in length, from Mile 790 on the Alaska Highway to the property.

For the present programme, access was truck from Whitehorse to Ross River and by aircraft from Ross River to the campsite. The camp and drill equipment was mobilized and demobilized using a Twin Otter and Single Otter fixed wing aircraft between Ross River and the airstrip and a Terr-Air Bell 206-B Jet Ranger helicopter between the airstrip and camp. The Jet Ranger was used directly from Ross River for the periodical camp supply trips and was supported by a Cessna 206 fixed wing aircraft.

The best road access to the property would be an all-weather road from the Campbell Highway. At present, a tractor trail exists from the Highway, approximately 35 miles southeast of the town of Ross River, to the Hoole River, a distance of about 25 miles. This trail would require up-grading, and its extension to the property would entail another 25 miles of road (see Figure 2).

BEAUFORT SEA

SKETCH NO. 1



ALASKA

N.W.T. YUKON

Arctic Circle

GULF OF ALASKA

BRITISH COLUMBIA

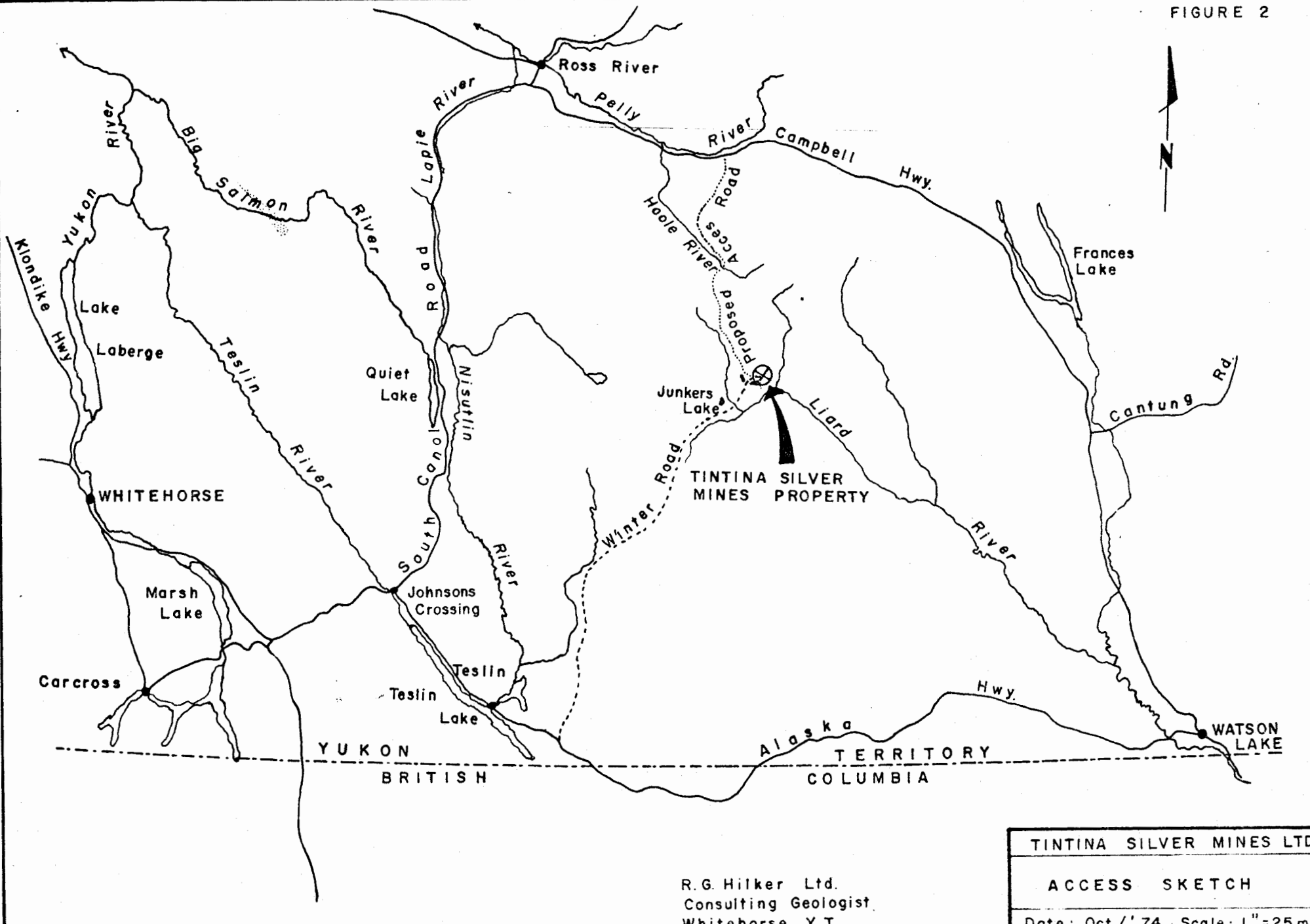
R. J. HILKER LIMITED,
CONSULTING GEOLOGIST,
WHITEHORSE, YUKON

YUKON INDEX MAP

DATE:

SCALE: 1" = 80 MI. (Approx)

FIGURE 2



TINTINA SILVER MINES LTD.
ACCESS SKETCH
Date: Oct./'74 Scale: 1"=25 mi

R.G. Hilker Ltd.
 Consulting Geologist.
 Whitehorse, Y.T.

CLAIMS

The Eagle claim group of Tintina Silver Mines Ltd. consists of a total of 102 continuous claims; the group is located in the Watson Lake Mining District, Yukon Territory, on NTS Sheet 105-G-3, and centred at 131°10' west longitude and 61°08' north latitude. The following is a list of these claims and their anniversary dates:

TABLE I
Status and Lapse Dates - Eagle Claim Group

<u>Claim Name</u>	<u>Grant Number</u>	<u>Anniversary Date</u>
Eagle 1 - 8	76323 - 76330	July 15, 1984
Eagle 9 - 16	76331 - 76338	July 15, 1984
Eagle 17 - 24	76339 - 76346	July 15, 1984
Eagle 25 - 32	76347 - 76354	July 15, 1984
Eagle 33 - 40	76355 - 76362	July 15, 1984
Eagle 41 - 48	76363 - 76370	July 15, 1984
Eagle 49 - 50	76371 - 76372	July 15, 1984
Eagle 57 - 58	76379 - 76380	July 15, 1984
Eagle 66	76414	July 15, 1984
Eagle 73 - 74	76421 - 76422	July 15, 1984
Eagle 77 - 78	76425 - 76426	July 15, 1984
Eagle 81 - 85	76429 - 76433	July 15, 1984
Eagle 115 - 122	76463 - 76470	July 15, 1984
Eagle 123 - 138	Y83391 - Y83406	September 23, 1982
Eagle 139 - 154	Y93630 - Y93629	September 3, 1981

Note

Assessment work and filing fees for the Eagle claim group were filed in September and October 1976 in the Watson Lake Mining Recorder's Office. The Certificates of Work, Form D, have not been issued at the date of this report.

CLAIMS (CONT)

The Cec, Ross and Paul Yukon Mineral claim groups of Tintina Silver Mines Ltd. were staked on the east, west and south boundaries of the Eagle claim group. The forementioned claims are transferred from the stakers' names to Tintina Silver Mines Ltd.

The Cec, Ross and Paul claims groups are located in the Watson Lake Mining District of the Yukon Territory, on NTS Sheet 105-G-3, and following is a list of the claims and anniversary dates:

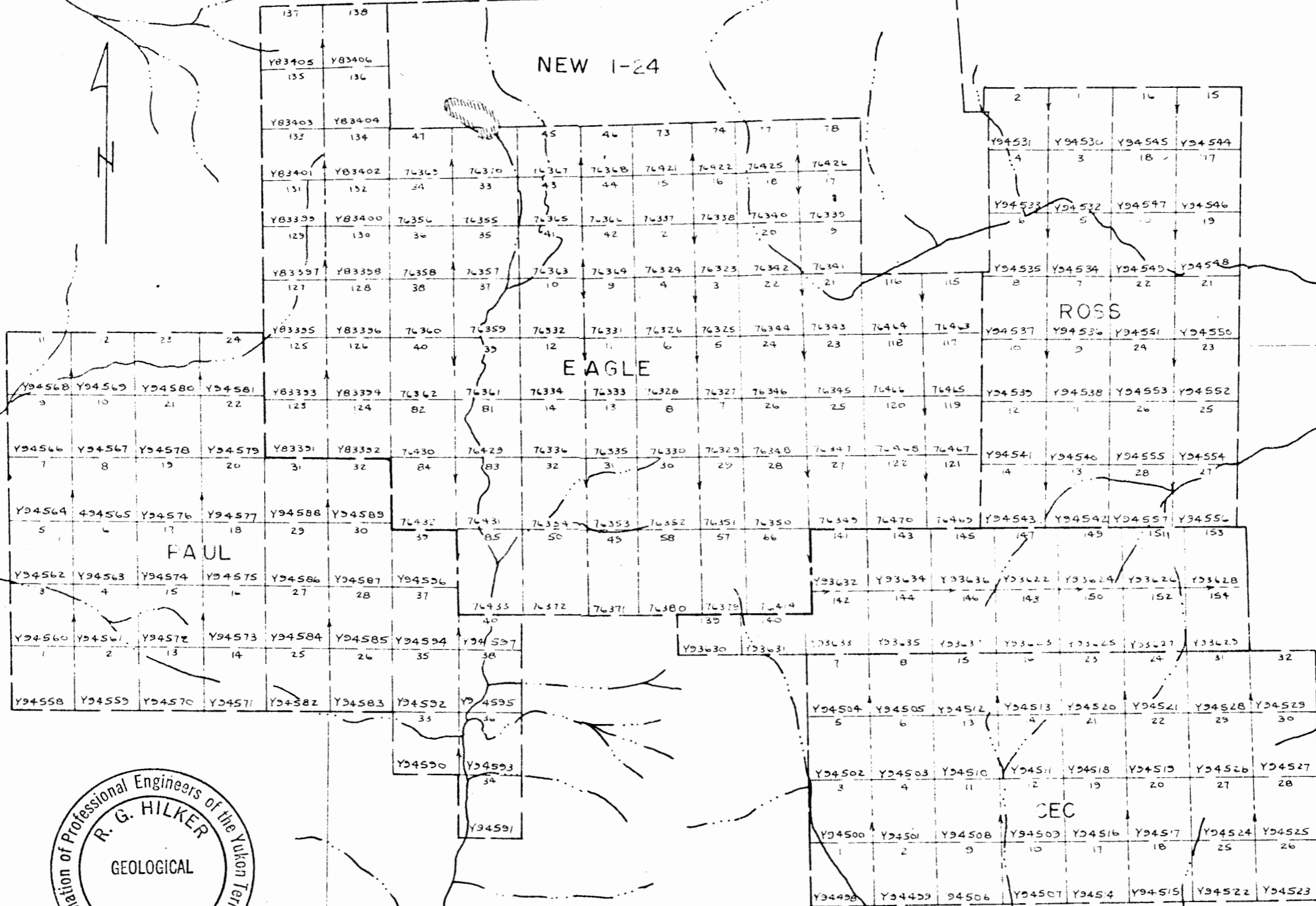
TABLE I (CONT)

Status and Lapse Dates - Cec, Ross and Paul Claim Groups

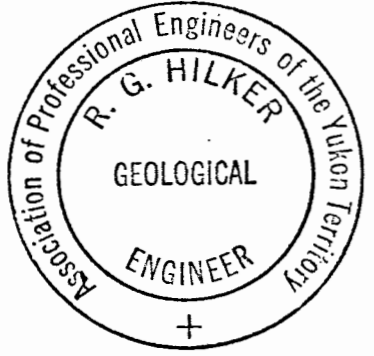
<u>Claim Name</u>	<u>Grant Number</u>	<u>Anniversary Date</u>
Cec 1 - 8	Y94498 - Y94505	May 3, 1978
Cec 9 - 16	Y94506 - Y94513	May 3, 1978
Cec 17 - 24	Y94514 - Y94521	May 3, 1978
Cec 25 - 32	Y94522 - Y94529	May 3, 1978
Ross 1 - 8	Y94530 - Y94537	May 3, 1982
Ross 9 - 16	Y94538 - Y94545	May 3, 1982
Ross 17 - 24	Y94546 - Y94553	May 3, 1982
Ross 25 - 28	Y94554 - Y94557	May 3, 1982
Paul 1 - 8	Y94558 - Y94565	May 3, 1982
Paul 9 - 16	Y94566 - Y94573	May 3, 1982
Paul 17 - 24	Y94574 - Y94581	May 3, 1982
Paul 25 - 32	Y94582 - Y94589	May 3, 1982
Paul 33 - 40	Y94590 - Y94597	May 3, 1982

Note

Assessment work and filing fees for the Cec, Ross and Paul claim groups were filed in October 1976 in the Watson Lake Mining Recorder's Office. The Certificates of Work, Form D, have not been issued at the date of this report.



61°08'



R.G. HILKER LTD.
 CONSULTING GEOLOGIST
 WHITEHORSE, Y.T.

131912

NTS SHEET 105-G-3

TINTINA SILVER MINES LTD.	
CLAIM LOCATION PLAN	
DATE APRIL 1, 1976	SCALE 1" = 1/2 mile

CLAIMS (CONT)

The Pat 1-24 claim group was staked on September 18, 1976 in the Junker Lake Flats. The Pat 1-24 mineral claims were recorded in the Watson Lake Mining Recorder's Office on October 4, 1976; the Form - Certificate of Claim - has not been issued at the date of this report.

The Pat claim group is located in the Watson Lake Mining District of the Yukon Territory, on NTS Sheet 105-G-3, and following is a list of the claims and their anniversary dates and registered owners:

TABLE I (CONT)

Status and Lapse Dates of the Pat Claim Group

<u>Claim Name</u>	<u>Grant Number</u>	<u>Anniversary Date</u>	<u>Registered Owner</u>
Pat 1 - 8	YA11354-YA11361	October 4, 1977	John Rolls
Pat 9 - 16	YA11362-YA11369	October 4, 1977	Jerry Bryde
Pat 17 - 24	YA11370-YA11377	October 4, 1977	Donald Marsh

Note

Signed "Transfer of Mining Claims" forms from the stakers to Tintina Silver Mines Ltd. are held in the office of R. G. Hilker Ltd. until the transfers can be registered in the Watson Lake Mining Recorder's Office.

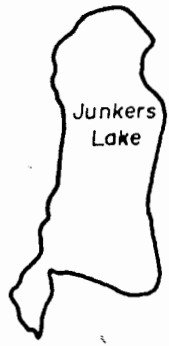
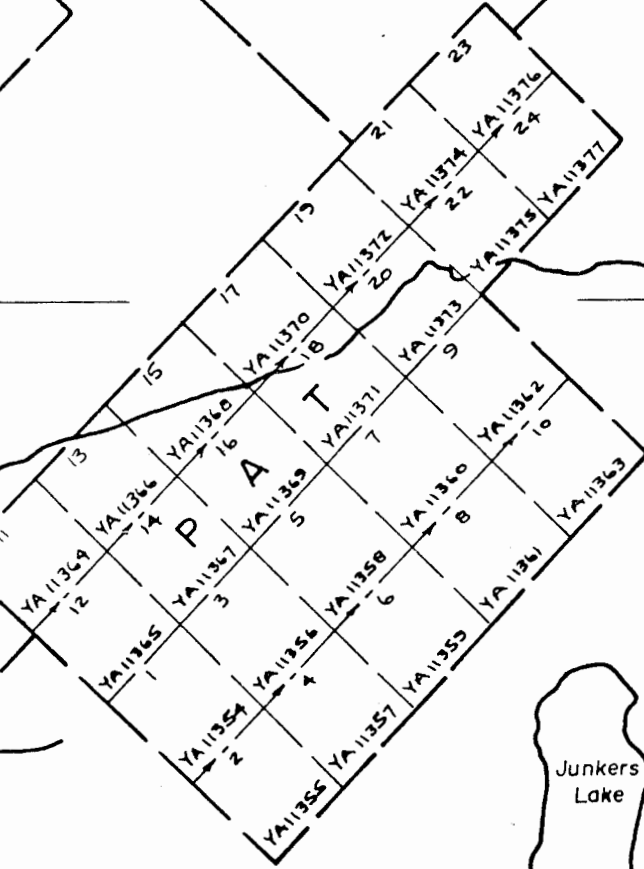
131°25'

BOW 49-66
HUDSON BAY EXPL.

BOW
67-70

61°03'

BOW 71-79
HUDSON BAY EXPL.



BOW
80-169

BOW 110-118
HUDSON BAY EXPL.

N.T.S. SHEET 105-G-3

TINTINA SILVER MINES LIMITED

PAT 1-24 CLAIM GROUP
WATSON LAKE MINING DISTRICT

DATE: OCTOBER 1976

SCALE: 1" = 1/2 mile

R. G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y. T.

BIBLIOGRAPHY

The following publications and private reports were referred to in the preparation of this report:

1. Geology of Finlayson Lake, Yukon Territory - Map 8 - 1960 - Sheet 105-G - Scale 1 inch = 4 miles. By J. D. Wheeler, 1958, 1959; L. H. Green and J. A. Roddick, 1959 - Geological Survey of Canada.
2. Geophysics Paper 7006-G - Finlayson Lake, Yukon Territory - Airborne Magnetics - 1 inch = 4 miles. Department of Mines and Technical Surveys.
3. Physiography of the Canadian Cordilliers, with Special Reference to the Area North of the Fifty-Fifth Parallel. By H. S. Bostock - G.S.C. Memoir 247.
4. Report of Work on Eagle Claims, Yukon Territory. By P. R. Heenan, P.Eng. - May 10, 1962.
5. Geological Report on Tintina Silver Mines Limited. By W. W. Moorehouse, Ph.D. - April 19, 1963.
6. Report on Tintina Silver Mines Limited's Eagle Claims in the Yukon Territory. By K. J. Christie, B.Sc., P.Eng. - March 1968.
7. 1968 Exploration Programme - Eagle Property and Area - Tintina Silver Mines Limited. By A. R. Archer - October 25, 1968.
8. Report on the Eagle Claims - Tintina Silver Mines Limited - Yukon Territory. By W. G. Hainsworth, P.Eng. - November 8, 1973.
9. Geology Report on the 1974 Diamond Drill Programme. By G. G. Carlson, P.Eng. and R. G. Hilker, P.Eng. - October 17, 1974.
10. "Western Miner" pp. 22-28, February 1969 - Lower Cambrian Strata and Base Metals. By H. Gabrielse - 1969.
11. 1975 Exploration Programme - Eagle Claim Group. By R. G. Hilker, P.Eng. - May 1, 1975.
12. 1975 Exploration Programme - Geological, Geophysical and Geochemical Report - on the Eagle Claim Group. By R. G. Hilker, P.Eng. and G. G. Carlson, P.Eng. - November 1, 1975.

GEOLOGY

REGIONAL GEOLOGY

The Eagle claims are located at the southern end of the St. Cyr mountain range, within the Pelly Mountains. This range trends northwest and is bounded on the southwest by the Nisutlin Plateau and on the northeast by the Tintina valley, a strong, northwest-trending fault zone which is a continuation of the Rocky Mountain Trench. The claims are within a mountainous terrain, elevations ranging from 4,000 feet to peak 7,393 feet just north of the claim group.

Reconnaissance mapping by the Geological Survey of Canada has shown the mountains in this area to consist of folded and faulted sediments, of early Paleozoic age, which have been intruded by Jurassic and/or Cretaceous granitic rocks. The geology in the vicinity of the claim group is shown on Figure 3.

The oldest rock in the area, Unit 1, is a sequence of Lower Cambrian quartzite, phyllite and limestone. This unit, and in particular the limestone, forms the host rocks for the Tintina Silver property mineralization. These rocks are overlain, often on southwesterly-dipping thrust planes, by Unit 2, a thick sequence of Middle and Upper Cambrian (?) phyllites, with some interbedded dolomite, greenstone and chert. Adjacent to granitic intrusive bodies, this rock is frequently altered to hornfels (Unit 2a).

Overlying Unit 2, mainly to the northwest of the property, is a middle Paleozoic sequence of thick bedded dolomite, with minor chert and sandy and silty dolomite, and overlain locally by slate, shale, chert and minor greywacke (Unit 4). These rocks have been intruded by granitic rocks (Unit 5), mainly biotite granodiorite.

A roughly circular granodiorite plug, approximately 1½ miles in

diameter, forms the northern boundary of the property and cuts rocks of both Units 1 and 2.

Pleistocene glaciation has covered the entire area, moving towards the northwest, and subsequent alpine glaciation has sculpted the mountains, determining the present topography. Unit 12, unconsolidated glacial and alluvial deposits, fill the valleys and cover most slopes to between 4,000 and 5,000 feet elevation.

Structure in the area is dominated by the northwest striking Tintina Fault. The most important feature in the area of the Eagle claims is an anticlinal structure which trends parallel to the Tintina Fault. Small-scale folding associated with this structure is abundant, as is small-scale cross faulting. Age relations between the various sedimentary units are often uncertain due to the thrust faulting from the southwest, as many of the major contacts are thrust fault planes.

LEGEND

- Fault
- Outline of Outcrop Area
- Geological Contact

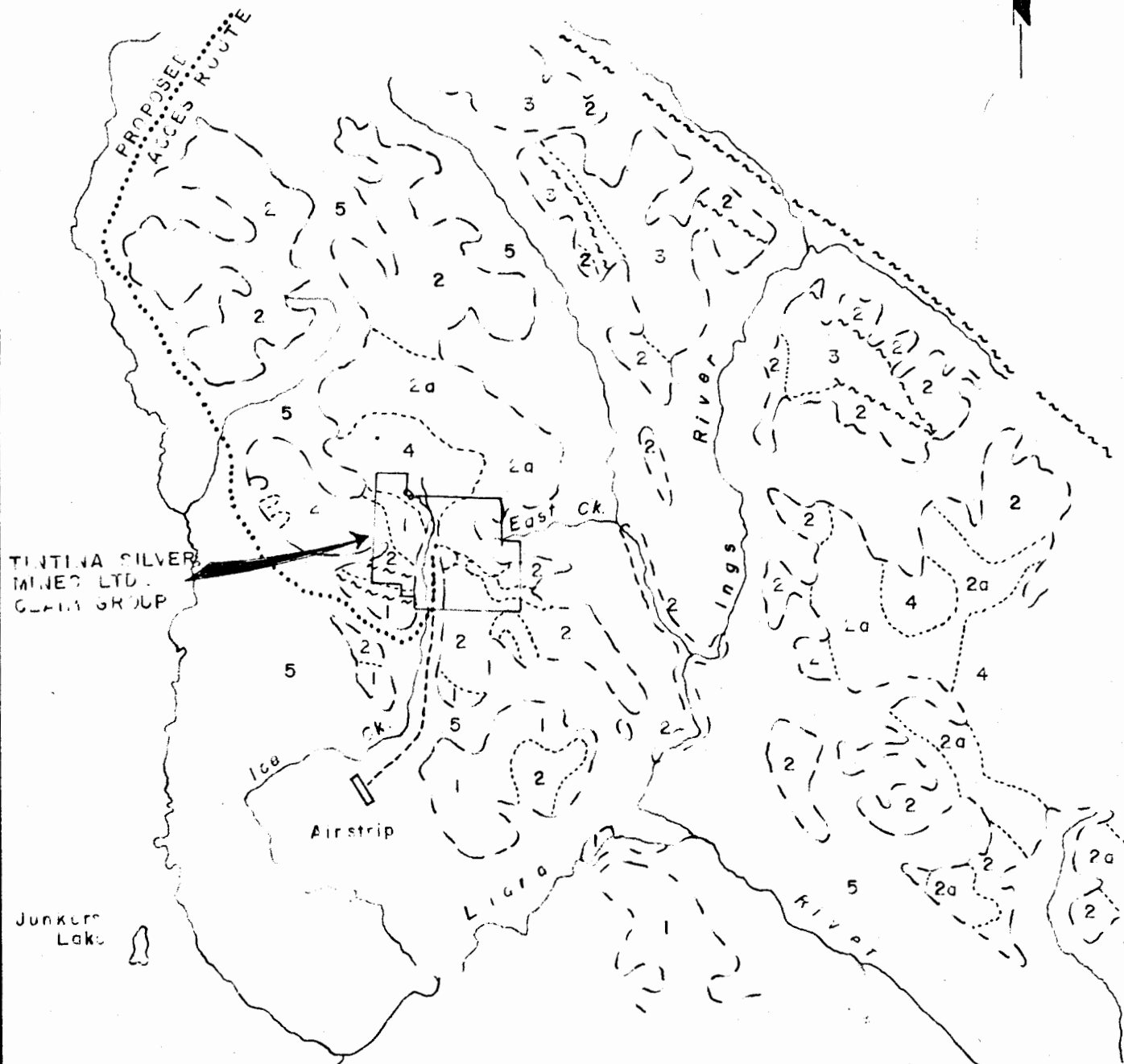


TABLE OF FORMATIONS

- QUATERNARY**
 [5] Unconsolidated glacial and alluvial deposits
- MESOZOIC**
 Jurassic and/or Cretaceous
 [4] Biotite Granodiorite, Quartz Monzonite
- PALEOZOIC**
 Silurian and Devonian
 [3] Dolomite, Chert, Quartzite, Slate, Shale
 Middle and Upper Cambrian
 [2] Phillite, Dolomite, Greenstone, Chert
 2a - altered to Hornfels
- Lower Cambrian
 [1] Quartzite, Phillite, Limestone

R.G. Hilker Ltd.
 Consulting Geologist
 Whitehorse, Y.T.

NTS SHEET 105 - G - 3

TINTINA SILVER MINES LTD.	
REGIONAL GEOLOGY SKETCH	
DATE: Oct/'74	SCALE: 1" = 3 mi

REGIONAL GEOLOGY (CONT)

TABLE II
TABLE OF FORMATIONS

CENOZOIC

Quaternary

5 Unconsolidated glacial and alluvial deposits

MESOZOIC

Jurassic and/or Cretaceous

4 Biotite granodiorite; quartz monzonite

PALEOZOIC

Silurian and Devonian

3 Dolomite; chert, quartzite, slate, shale

Middle and Upper Cambrian

2 Phyllite; dolomite, greenstone, chert

Lower Cambrian

1 Quartzite, phyllite, limestone

After J. O. Wheeler - Map 8 - 1960

CLAIM GEOLOGY AND STRATIGRAPHY

The geology within the Eagle claim group has been described in detail by Moorehouse, and reference should be made to his accounts of the property for an excellent discussion of petrology, structure and stratigraphy. The importance of both structure and stratigraphy as mineralization controls was recognized during the 1974 drilling programme. As a result of this work, combined with the present mapping programme, these features have been mapped in greater detail, particularly along the main synclinal axis and adjacent to known mineralization. The following account of the geology and the accompanying claim geology map (see pocket) are derived from the present work, from the 1974 drilling programme and from initial accounts of the claim geology by Moorehouse.

The host rocks for the mineralization are within the Lower Cambrian Unit 1 on the Regional Geology Sketch (Figure 4), and here named the Tintina Series. The Tintina Series consist of a basal argillite and limestone member, the Lower Argillite (Unit 1) overlain successively by the Lower Limestone (Unit 2), Middle Argillite (Unit 3), Upper Limestone (Unit 4), Black Argillite (Unit 5) and Argillaceous Limestone (Unit 6). The entire section has been intruded by a quartz monzonite porphyry plug (Unit 7) in the northern part of the property. It is roughly elliptical in shape, elongated in a northwest/southeast direction, and of probable Cretaceous age. Three types of dikes are observed in the area. Many narrow, fine grained aplitic granite dikes and apophyses are localized in the contact area of the main quartz monzonite intrusive. Two medium grained diorite dikes (Unit 8), from 50 to 100 feet in width, have been mapped in the West Slope area; one further exists in the upper cirque area. Lamprophyre dikes (Unit 9), which appear to be often localized in fault zones, are concentrated mainly on the East Slope and in the cirque area. They are mical lamprophyres, often with abundant fine to very large inclusions of granite.

CLAIM GEOLOGY AND STRATIGRAPHY (CONT)

TABLE III
EAGLE CLAIMS - TABLE OF FORMATIONS

MESOZOIC

- Jurassic and/or Cretaceous
- 9 Lamprophyre
- 8 Diorite
- 7 Quartz monzonite

PALEOZOIC

Cambrian

TINTINA SERIES

- 6 Argillaceous Limestone - lime phyllite, silty limestone, thin to thick bedded, thick unit
- 5 Black Argillite - 10% pyrite and pyrrhotite, black colour, carbonaceous, weathers rusty colour
- 4 Upper Limestone - mottled due to stringers and patches of white calcite, minor argillite; host rock for silver, galena and sphalerite sulfides; irregularly drag-folded
- 3 Middle Argillite - gray-to-brown colour, light coloured siliceous bands with tuff appearance, Pyrrhotite and pyrite
- 2 Lower Limestone - locally argillaceous, strongly sheared, breccia appearance; fossils (?) - white rings and cylindrical shapes, reef structure (?)
- 1 Lower Argillite - limey bands, brownish-purple colour, minor pyrrhotite
- S Sulfide Zone - silver, lead and zinc sulfide, mainly galena, sphalerite and tetrahedrite, from trace amounts to massive mineralization

By G. G. Carlson, Geologist, R. G. Hilker Limited.

CLAIM GEOLOGY AND STRATIGRAPHY (CONT)

The following is a description of each of the rock units listed in the foregoing Table of Formations - Table III:

Lower Argillite - Unit 1

The oldest rocks recognized within the Eagle claim group, forming the basal member of the Tintina Series; they are a relatively thick sequence of argillaceous rocks with some interbedded limestone. The base of this unit is not exposed in the area mapped, so the total thickness is unknown. The lowermost observed portion of this unit consists of greater than 100 feet of siliceous and thinly banded argillite, exposed at the base of West Mountain. This is overlain by approximately 200 feet of a very distinctively banded sequence of thinly interbedded limestone and argillite, exposed on the West Slope above the campsite, within Ice Creek, and also on the side of West Mountain, draped over the intrusive contact. Higher in the section, the proportion of argillite increases to over 75% and the widely interspaced limestone beds thicken to 3 to 5 feet. This upper portion of Unit 1 totals approximately 50 to 100 feet. The argillite is brown-to-purplish-brown in colour and is less siliceous than that occurring lower in the unit. The limestone typically contains thin streaks of argillite.

Lower Limestone - Unit 2

This limestone is similar to the limestone within the underlying Unit 1 except that it is thick enough to be recognized as a separate unit and locally it is less argillaceous. Thickness of this unit varies from 5 to 10 feet in the West Mountain area to 25 to 50 feet on the West and East Slope areas, 100 feet in the adit and 1974 drilling D Grid area to a maximum of 250 feet locally on the side of West Mountain. Although a certain degree of sedimentary thickening and thinning is likely, the most extreme thickness variations are apparently due mostly to subsequent structural

deformation. This effect is most noticeable in the West Mountain area, where the limestone thickens to 250 feet within a large drag fold, while on the limbs of this fold it has thinned to as little as 10 feet.

Deformation within this unit has resulted in the development of log-shaped boudins of limestone within the argillaceous limestone, frequently with a breccia appearance. Locally within the limestone are zones rich in white rings and cylindrical bodies described by Moorehouse as possibly being Archeocyathids, seeming to suggest that this limestone may be a reef structure of Lower Cambrian age.

Unit 2 hosts known sulfide mineralization in the nose area of the Moorehouse Anticline in the number 5, 6 and 7 zone areas and within drag folds on the limb of the anticline in the number 10 zone and in the number 12, 13 and 14 zones (see also Mineral Deposits).

Middle Argillite - Unit 3

This argillite member, separating the two main limestone units, has been well documented in outcrop and in drill holes, in particular in the 1974 A Grid drilling. Its thickness is again quite variable, ranging from less than 50 feet to over 150 feet.

It is foliated grey-to-brown-coloured rock, with some limey sections, rich in pyrrhotite, pyrite and locally arsenopyrite, and frequently with abundant secondary quartz in stringers and patches. Lighter-coloured massive siliceous bands, up to 3 feet thick, have a tuffaceous appearance. Contacts between these quartzitic sections and the argillite and also between the argillite and overlying limestone, Unit 4, are very characteristic in that they usually consist of approximately six inches of a very fine-grained, light-coloured shaley layer and an associated band of massive pyrrhotite, usually less than one inch thick but locally two to three inches in thickness.

Adjacent to the intrusive, this unit has been altered to hornfels. A combination of this alteration and intense structural deformation in this area makes the distinction of this argillite from overlying argillites extremely difficult.

Upper Limestone - Unit 4

This limestone exhibits a mottled texture, similar to that of Unit 2 but it is much more homogeneous, with only minor argillite content. It is not so thick as Unit 2, and the variable thickness is indicated in the drill sections from Grid A. This local thickness variability is due to folding and probable associated faulting. Strong internal deformation is evident in the drill core. Sedimentary thinning, both to the north and the south, is also apparent and thicknesses encountered vary from less than 10 feet to over 50 feet.

The mottled texture is due to secondary stringers and patches of white calcite and, to a lesser extent, quartz. At least two, and possibly more, ages of calcite stringers are observed. Unit 4 is the most important host for silver-lead-zinc sulfide mineralization noted to date on the property. It is a helpful marker horizon for geological mapping, separating two usually distinctive argillite units. Exposure is good in the A Grid, adit and East Slope areas, while on the West Slope it is largely obscured by overburden cover, and contacts in some areas have been inferred from the geophysical surveys. On West Mountain and on the west side of Hornfels Ridge, very tight folding has resulted in almost complete obliteration of this unit. It is observed only in narrow, discontinuous bands, subparallel to the main fold axial plane.

On the East Sloper, the Upper Limestone often appears as a double horizon, separated by Black Argillite which is typically the overlying rock. This duplication could be due to folding or faulting, but its persistence in these areas suggests that, locally, the Upper Limestone actually includes two distinct sedimentary layers.

Black Argillite - Unit 5

Overlying the Upper Limestone is a black, graphitic, sulfide-rich argillite which is visibly the most conspicuous rock unit in the area due to its colour and rusty, readily-weathered appearance. Shearing has disrupted most primary features in the rock, and cleavage is strongly developed. Pyrite and pyrrhotite are present, forming up to 10% of the rock, and a distinct H₂S odour is detectable when drilling through this unit. Secondary quartz stringers and patches are usually present and are typically oriented obliquely to the main foliation or cleavage.

Moorehouse has observed that the Black Argillite has been a very active structural zone. It appears to have provided (the locus of) most of the major thrust faulting, and its lower contact with Unit 4 is frequently marked by quartz veins. Its spatial distribution is quite irregular due to this structural deformation. Thrusting of younger sediments from the southwest appears to have scraped much of this argillite off the southeast limb of the Moorehouse Anticline; thicknesses are greater on the northeast limb. In areas of most extreme structural deformation, on West Mountain and the west side of Hornfels Ridge, very tight folding of this unit and Units 3 and 4 has resulted in an apparent interbedding of the Black and Middle Argillites and, as previously mentioned, often the complete disappearance of the Upper Limestone due to remobilization.

Argillaceous Limestone - Unit 5

This is an extremely thick unit of bedded and strongly sheared and folded argillaceous limestone and is the youngest rock unit observed in the central area of the claim group. It is thin-to-thick bedded, with a strong cleavage which cuts the bedding, and it varies in composition from very limey argillite and locally limestone beds to thin bedded, platy siltstone. To the south it is overlain by the Peak Limestone, consisting of massive limestone and dolomite with argillite.

All rocks are affected to greater or lesser degrees within the contact metamorphic aureole surrounding the intrusives. The limestones are recrystallized and locally, particularly the thin limestone or limey argillite bands within the argillite units, silicate skarns are developed, containing garnet, diopside, plagioclase, epidote and sometimes scapolite, vesuvianite and iron sulfides. The argillites are altered to hornfels, which is usually fine-grained but often contains abundant coarse cordierite. Unit 6, the Argillaceous Limestone, is relatively unmetamorphosed in this area, with rounded grains of scapolite being the only prominent metamorphic mineral recognized by Moorehouse. Within a few tens of feet of the contact, garnet, epidote and diopside skarns are developed in the limey layers.

STRUCTURAL GEOLOGY

Structure within the claim group is dominated by a northwest/southeast-trending anticline, the Moorehouse Anticline, and a parallel syncline to the northeast. This major folding is complicated by an undulating fold pattern in the fold crests, drag folding along the flanks and abundant small-scale cross faults. Further complication is introduced by large-scale, low angle thrust faulting, dipping towards the southwest.

Deformational style is variable within the area mapped. The main zone of thrusting within the Tintina Series is within the Black Argillite unit or along the contact between Units 5 and 6. Displacement along this zone is not extreme, and in many cases contacts between the black argillite and overlying argillaceous limestone are conformable. The black argillite has been extremely mobile within this zone, due to folding and shearing, and appears to have been scraped off the nose area of the anticlines and pushed into the synclinal trough.

Folding in elevated areas, particularly in the West Mountain area and on the west side of Hornfels Ridge, is extremely tight. The Upper Limestone has apparently been squeezed and remobilized to the extent that it cannot be traced as an individual horizon, and it is observed only in discontinuous bands which are subparallel to the fold axial planes. The black and grey argillites of Units 5 and 3 appear to be interbedded on a scale of one to several feet due to repetitions caused by folding. The intensive nature of this deformation may be due to the proximity of either the thrust zone or the intrusive contact, or a combination of the two. Similar deformation on a slightly less intensive scale is observed in the northern part of the East Slope. This area is not particularly near to the thrust plane; the intrusive may be near, although it is not exposed. Heat, as expressed by the Hornfels Zone, may be the more important factor in determining the degree of structural deformation.

In the main showing area of the A Grid and on the East and West

Slope areas the folding is of a more open nature and the Upper Limestone is remobilized only slightly towards the nose of the drag folds and remains continuous on the limbs.

During the present mapping programme, measurements were made of bedding where it could be distinguished, foliation or cleavage, lineation axes and major joints and fractures. These have been plotted on stereographic projections as poles to the various planes and, in the case of lineations, as the axes themselves (see Detail Geology Plan - East Half). Measurements from the West Mountain, West Slope and East Slope areas have been differentiated by different symbols on the sketches.

The poles to bedding planes show a wide scatter from all areas of measurement. Two great circles have been drawn which include the general trend of the data and suggest a fold axis with an azimuth of 127° and a plunge of 10° to 20° . Lineation axes, presumed to represent fold axes (the intersection of bedding and cleavage planes), show a fairly good cluster, with an average azimuth of approximately 130° , plunging to 20° to 25° . A small number are reversed, with an azimuth of approximately 310° and a plunge of 5° to 25° .

Cleavage and foliation planes observed in outcrop were almost always subparallel to any axial planes of small-scale folding present in the outcrop. Variation in strike is not extreme, averaging 125° to 130° . Dip is quite variable, from 45° to 90° southwest and averaging approximately 70° southwest.

The results of this work indicate that deformation is relatively homogeneous within the claim group. Initial folding may have been tilted and squeezed somewhat by a second deformational event involving overthrusting from the southwest, but there is little evidence of any secondary folding. The strike of the present axial plane averages 125° to 130° , with an average dip of approximately 70° to the southwest. The fold axis plunges 10° to 20° to the southeast.

Poles to joint and fracture planes show a wide scatter but are concentrated in the southeast quadrant and, to a lesser extent, in the northwest quadrant. The average strike is approximately 40° with dips ranging from about 30° northwest to 60° southeast, averaging 70° northwest. These planes in general parallel the cross faults which are extremely abundant throughout the area. Most of these faults are of a very small scale, with displacements ranging from a few inches to several feet. Maximum displacement on the largest of these is not expected to exceed 100 to 200 feet.

The Moorehouse Anticline plunges to the southeast at 10° to 20° . However, from the northwest to the southeast there is relatively little decrease in the elevation of the anticline nose. A small number of lineation plunge reversals, to the northwest, were noted locally. Indeed, Moorehouse noted a correlation between these and the sulfide zones; however, they are not extreme enough to account for the constant elevation. It is suggested that, although horizontal movement is noted along many of the cross faults, the major component of movement is actually vertical, with the southeast side moving up.

Interpretation of the sequence of events in the structural history of the property appears to be significant in the study of the localization of sulfide mineralization. The earliest recognized deformation was the major folding event which dominates the structural pattern observed presently. Later low-to-moderate angle thrusting from the southwest modified this fold pattern somewhat by tilting the fold axial plane slightly and distorting and compressing the small-scale fold pattern, particularly in the vicinity of thrust surfaces. During this time, the Black Argillite, Unit 5, and the Upper Limestone, Unit 4, were very tightly folded in some areas, resulting in the complete disruption of the stratigraphic sequence and localization of the limestone into discontinuous lenses.

Intrusion of the quartz monzonite plug was essentially passive. The only observed distortion of sediments adjacent to the contact is in the

area of Ice Lake, where they have been gently warped up over the intrusive contact. Cross faulting may have been active at this time, or possibly earlier.

Cross-cutting relations between the quartz monzonite, diorite and lamprophyre were not observed. The lamprophyre is relatively young, generally postdating the faulting when it occupies fault planes.

1976 DIAMOND DRILL PROGRAMME

The drill equipment and camp gear were moved to the Eagle claims West Slope campsite on June 14th through June 17th. A Trans North Turbo Air "Twin Otter" fixed wing aircraft flew all the field equipment from the Ross River airstrip to the Tintina airstrip. On June 16th, pilot Dick Zutter airlifted the gear from the Tintina airstrip to the campsite in a Jet Ranger 206-B helicopter. The helicopter work consisted of 49 trips with sling loads between 800 and 1,000 pounds per trip.

During the initial move into the property, three tents were assembled and the campsite established. There was approximately 75% snow-cover on the West Slope in mid-June. A watchman remained at the campsite until June 29th, when the drill crew and geology staff mobilized to the property. The contract diamond drill crew consisted of two drillers, two helpers, tractor operator and a cook. The drill crew commenced drilling on the first hole July 1st and worked two twelve-hour shifts. The diamond drill contractor was Arctic Diamond Drilling, of Whitehorse. The equipment was demobilized from the property and returned to Ross River on August 29th, September 13th and September 16th-19th. A B.C. Yukon "Single Otter" fixed wing aircraft was utilized to demobilize the equipment from the Tintina airstrip to Ross River.

Geology supervision of the drill programme was done by G.G. Carlson and R.G. Hilker during the period May through November. A geologist and two core grabbers were on the property during the entire field programme to supervise the drilling, locate new drill set-ups, survey drill hole collars, log core and split the drill core for assay. Three tractor trenches were dug on the West Slope near the Upper Limestone and Argillite contact with the 1010 John Deere tractor. Supervision of the field work, data processing and report writing was done by R.G. Hilker.

All the drill moves on holes T76-1 through T76-9, or nine drill set-ups, were made by a "Jet-Ranger" helicopter. The distance of drill moves and terrain slope restricted moving by tractor or winching. The fifth man on the drill crew operated the 1010 John Deere tractor and pre-built the drill set-

ups. The last two drill moves were made utilizing the John Deere tractor. The terrain on the final set-up at collar T76-11 permitted the drill to be dismantled to sling-load weights and airlift directly to the airstrip.

The drill core was logged on the property and all core with visible mineralization was split for assay. Split samples were shipped to Whitehorse for assay at the Whitehorse Assay Office. Samples were assayed for silver, lead, zinc and copper.

Originals of all plans, section, report and assay certificates are on file in the office of R. G. Hilker Limited, 8 Northern Metallic Building, Whitehorse, Yukon Territory. All the diamond drill core from the Eagle claim group drill programme was transported from the property to Ross River and placed in outside storage at the Terr-Air helicopter base; it was all placed in good-quality core boxes with a plywood lid on each individual box. The core boxes were placed in a rectangular unsorted pile and covered with a canvas tarpaulin for storage in Ross River.

TABLE IV - 1976 DIAMOND DRILL HOLE SUMMARY

<u>DDH-Collar</u>	<u>Conductor and/or Showing Zone</u>	<u>Hole Length (Feet)</u>	<u>Dates of Drilling</u>	
			<u>From</u>	<u>To</u>
T76-1	Zone EM-2 #10 Showing	417	July 1	- July 5
T76-2	Zone EM-2 #11n Showing	242	July 6	- July 8
T76-3	Zone EM-2 #11 Showing	343	July 9	- July 11
T76-4	Zone EM-2 #12 Showing	338	July 12	- July 14
T76-5	Zone EM-2 #13-14 Showings	350	July 15	- July 17
T76-6	Zone EM-1	698	July 18	- July 24
T76-7	Sidehill Showing	221	July 25	- July 27
T76-8	Zone EM-1 Extension A-Grid	284	July 28	- July 31
T76-9	Zone EM-6 Ice Creek Valley	197	August 1	- August 6
T76-10	Zone EM-6 Ice Creek Valley	418	August 7	- August 19
T76-11	Zone EM-5 Campsite Area	528	August 20	- August 27
TOTAL BQ DIAMOND DRILLING FOOTAGE:		<u>4,036</u>	June 29	- August 29

INTERPRETATION - 1976 EAGLE CLAIM DRILL HOLES

The 1975 exploration programme delineated several electromagnetic conductors, magnetic anomalies and geochemistry trends in areas of favourable stratigraphy and sulphide showings. The electromagnetic conductors were significant in relation to the magnetic relief, geological structural and stratigraphy location to proven ore in the A-Grid area and to the mineralized surface showings. The 1976 drill programme, on the Tintina Silver Mines' Eagle claim group, was designed to check the favourable stratigraphy and conductive zones for lead/silver/zinc sulphide mineralization.

West Slope and Zone EM-2

The West Slope zone is located on the axis of the Moorehouse Anticline and the Lower Limestone - Unit 2. The limestone bed strikes northwest between #10 showing through #11n, 11, 12, 13, 14 and 15 showings. There were five drill holes located to intersect the West Slope zone, commencing on the south end at hole T76-1 upslope from #10 showing, T76-2 at #11n showing, T76-3 at #11 showing, T76-4 at #12 showing and T76-5 at #13 and #14 showings. A total of 1,690 feet of drilling was completed in the five holes in a strike length of 18+00 feet on the West Slope zone (see Table 4 and Drill Hole Location Plans). The Lower Limestone Unit 2 was intersected and delineated to the Lower Argillite Unit 1 contact in all of the five drill holes. No economic sulphide mineralization was intersected in the five exploratory drill holes, with the exception of 3.5 feet of Pb/Zn/Ag values in hole T76-2. No further drilling is necessary to further check the West Slope zone.

There is a possibility for Pb/Zn/Ag mineralization to occur between the #10 showing zone and the "Saddle Showing" zone to the southeast of hole T76-1, and within the Lower Limestone host bed over a 400 foot strike length.

Saddle Area and Zone EM-1

The EM-1 zone is located in the Saddle area above Cascade Creek and west

of the 1974 Pb/Zn/Ag ore "A-Zone". Three drill holes - T76-6, T76-7 and T76-8 - were drilled in the Saddle area and located on EM-16 and EM-17 electromagnetic conductors. In hole T76-6 a considerable thickness of argillaceous limestone (Unit 6) and Black Argillite (Unit 5) overlays a narrow band of Unit 4, Upper Limestone. The argillaceous beds are pyritic, contain pyrrhotite and are graphitic; they are therefore conductive, as indicated by the electromagnetic surveys. No sulphide mineralization was intersected in the Upper Limestone (Unit 4) bed. Hole T76-7 was collared in the Black Argillite which contains up to 5% pyrite and, in parts, 10-15% pyrite. One ten-foot sample contained 0.84 oz/T Ag, 0.01 oz/T Au, 0.03% Pb, 0.12% Zn and 0.03% Cu. The Upper Limestone Unit 4 bed was intersected in hole T76-7 but no sulphide mineralization was found to occur. Hole T76-8 was collared in Argillaceous Limestone, Unit 6, on the hanging wall side of a fault zone, 1+64 feet northwest of hole 74-A13, A Zone. The hole 74-A13 was the most westerly located drill hole on the 1974 A Zone drilling. Hole T76-8 was collared about 105 feet vertical distance higher than hole 74-A13 (see Diamond Drill Hole Section 6+42E - Plan #5). Hole T76-8 intersected a fault zone at 278 feet and abandoned at 284 feet. The fault was intersected in hole 74-A13 and dips westerly at about 40-45^o to the position where the fault zone was first drilled in hole T76-8. The Pb/Zn/Ag mineralization was drilled below the fault zone in hole 74-A13. Therefore, if the sulphide mineralization continues west of the 1974 "A Zone", the sulphides will occur below the westerly-dipping fault zone and below the end of drill hole T76-8. Further drilling is recommended in the area of hole T76-8 and west on the 1974 A-Grid. Any future holes in the area of hole T76-8 will cut 250-350 feet of argillaceous limestone and black argillite and the fault zone prior to intersecting the Upper Limestone Unit 4 mineralized horizon. It is possible that the "A Zone" mineralization is displaced northward on the footwall side of the fault. Drag folding, in the western extension of the "A Zone" sulphide mineralization, could also be expected.

Ice Creek Flats and Zones EM-5/EM-6

The electromagnetic zones EM-5 and EM-6 were checked with a Geonics EM-17

survey on July 23rd, 1976 to further delineate the conductive area (see Geophysics Plan #1). Correlation between the EM-17 and EM-16 surveys was excellent and three drill holes, T76-9, T76-10 and T76-11, were collared to check the overburden-covered conductive zones. The position of the magnetic anomalies on zone EM-6 and the two electromagnetic survey conductors were taken into consideration in the location of the collars of holes T76-9 and T76-10. Considerable glacial debris overburden, from 40 to 60 feet in thickness, was intersected in the three drill holes. The overburden was difficult to penetrate as the glacial debris varied from sand, gravel and boulders to felsenmeer-sized granite rocks. The overburden drilling on holes T76-10 and T76-11 was conducted using a mud set-up method.

Holes T76-9 was collared in Black Argillite Unit 5 which contained from 1 to 20% and a high of 20-70% pyrite and pyrrhotite. The black argillite in this area is graphitic and very conductive due to the composition of the rock and high sulphide content. Therefore, the electromagnetic conductors and the magnetic anomaly located on L46+00W is caused by the abundant pyrrhotite content in a graphitic black argillite (see Section 46+00W, Plan #6). No further drilling in this area is necessary on the electromagnetic conductors. However, the Lower Limestone Unit 2 was not intersected in the hole T76-9 and was the anticipated source bed for the conductive mineralization.

Hole T76-10 was collared in the Black Argillite Unit 5 and contained 5-20% pyrrhotite. The Upper Limestone Unit 4 bed was intersected and the lower part of the bed hosted 5-20% pyrrhotite. A 45-foot bed of quartzite was intersected below the Upper Limestone and the drill hole then cut into the Middle Argillite (Unit 3). The EM-17 surface conductor is directly over the Upper Argillite and Upper Limestone beds which contain 5-20% pyrrhotite sulphide mineralization. The abundant pyrrhotite in Units 4 and 5 is the cause of the EM-16 and EM-17 electromagnetic conductors on line 44+00W (see Section 44+00W, Plan #6).

Hole T76-11 was located to drill an EM-17 electromagnetic conductor on the southern edge of an EM-16 conductor. The drill hole intersected five beds in the Tintina Series and confirmed that the sequence of beds continues into the overburden-covered Ice Creek Valley. The hole T76-11 drilling also confirmed

the EM-16 electromagnetic conductor interpretation of north/south cross-faulting across the bedded Tintina Series and five-bed sequence exposed on surface near line 14+00W and 15+00S, as geologically mapped (see 1976 Composite Plan #7). The collar of hole T76-11 was located to intersect the electromagnetic conductors and the Upper Limestone Unit 4 and Lower Limestone Unit 2 exposed in a cliff face 800 feet to the east. The EM-17 conductor is located over the Black Argillite Unit 5 bed which contains 5% pyrrhotite. The black argillite, graphitic material and sulphide mineralization is the source of the EM-17 and southern part of the EM-16 conductors. The EM-16 conductors in zone EM-5 also delineated the contacts between Black Argillite Unit 5, Upper Limestone Unit 4, Middle Argillite Unit 3 and possibly the contact between the Lower Limestone Unit 2 (see Section 24+00W, Plan #6). No economic sulphide mineralization was found in the drill core of hole T76-11; however, the hole technically gave valuable geological information concerning the Tintina Series sequence of beds in an overburden-covered area.

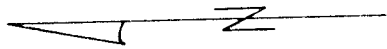
Holes T76-9, T76-10 and T76-11 were very successful with respect to the cause of overburden-covered electromagnetic conductors, magnetic anomalies and the location of Upper and Lower Limestone beds. In other parts of the property, the Upper and Lower Limestone beds host Pb/Zn/Ag sulphide mineralization.

1975 Electromagnetic Zone EM-8

The 1975 Zone EM-8 conductor is located in a thick overburdened area in the Ice Creek Valley, south of the 1976 drilling. During the 1976 drill programme field season, the thrust faulting of the Ls Peak Limestone was noted on ridges south of West Mountain and northwest of zone EM-8 in the Ice Creek Valley. It is prognosticated that the Peak Limestone thrust fault continues through the Ice Creek Valley and the contact is delineated by the EM-16 electromagnetic conductor on zone EM-8 (see Composite Plan #7).

TRACTOR TRENCHING

Three tractor trenches were dug 3+00 feet upslope and east of #10 showing on the Eagle 42 claim. The trenches were located on a 1975 geochemistry anomaly and near the Upper Limestone Unit 4 bed, as located on the geology map. The trenches exposed Upper Argillite Unit 5 and a narrow quartzite bed in Trench #1 and limestone bed in Trench #2. The main Upper Limestone Unit 4 is probably located below the trenches, downslope (see Sketch 5 - following page)..



1975 BASELINE

EAGLE 2

76324

1+00S 2+00S 3+00S 4+00S 5+00S 6+00S
LB+00W

CLAIMLINE

TRENCH #1
200' x 10' x 5'

TRENCH #2
100' x 10' x 5'

TRENCH #3
150' x 10' x 4'

EAGLE 42

76364

approx. 4+50 ft.

3+00 ft.

LEGEND

CAMBRIAN

TINTINA SERIES

5 UA - Upper argillite

QTZ - Quartz vein
mnr galena

4 LS - Limestone

#10
SHOWING

#1ln
SHOWING

R. G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

SHEET 105-G-3

TINTINA SILVER MINES LTD.

TRACTOR TRENCHES
ON EAGLE 42 CLAIM - AUGUST 1976

DATE: AUGUST 16, 1976

SCALE: 1" = 100 feet

CONCLUSIONS AND RECOMMENDATIONS

The 1976 diamond drill programme on the Tintina Silver Mines Limited Eagle claim group totalled 4,036 feet and checked a widely-spaced area in three major zones on the property. The following conclusions were derived from the results of the core observed in the drilling programme:

1. West Slope and Zone EM-2: A total of 1,690 feet of drilling was completed in five holes along a strike length of 1,800 feet. No economic sulphide mineralization was intersected in the Lower Limestone Unit 2 in drill holes T76-1, T76-2, T76-3, T76-4 and T76-5. There is a possibility that Pb/Zn/Ag mineralization occurs in the Lower Limestone southeast of #10 showing and hole T76-1 in a strike length of 400 feet.
2. Saddle Area and Zone EM-1: Three drill holes (T76-6, T76-7 and T76-8) were completed in the Saddle area. The Upper Limestone Unit 4 bed was intersected in holes T76-6 and T76-7 with no economic sulphides present. Hole T76-8 was abandoned in the hanging wall side of a fault zone. A westerly extension of the 1974 Pb/Zn/Ag ore mineralization may possibly occur below the 40-45% dipping fault zone. A northward displacement and drag folding of the A Zone sulphides can be expected. Further drilling in the area of hole T76-8 is recommended.
3. Ice Creek Flats: (a) Zone EM-6: Two drill holes, T76-9 and T76-10, were drilled in a deep overburden area and located on electromagnetic conductors and a magnetic anomaly. Hole T76-9 drill hole showed that the electromagnetic conductors and magnetic anomaly were caused by graphitic black argillite and abundant (1-20% and 20-70%) pyrrhotite. Hole T76-10 intersected graphitic black argillite and upper limestone which contained abundant (5-20%) pyrrhotite. The electromagnetic conductors and magnetic anomaly near the collar of hole T76-10 was caused by the graphite rocks and pyrrhotite. No further drilling is necessary on zone EM-6.

(b) Zone EM-5: Hole T76-11 was located to drill electromagnetic conductors and the westward extension of the Upper and Lower

Limestone beds. The drill hole confirmed the presence of five beds in the Tintina Series and intersected the Upper and Lower Limestone. The electromagnetic conductors were caused by graphitic black argillite and 5% pyrrhotite.

Valuable geological information was collected from drill holes T76-9, T76-10 and T76-11 in respect of the location of key Upper and Lower Limestone beds in the Tintina Series sequence in a thick overburden valley area.

All eleven holes drilled during the 1976 field season were located to intersect either the key sulphide mineralized Upper or Lower Limestone beds, with supporting electromagnetic conductors and magnetic anomaly drill targets. The systematic sequence of holes T76-1 through T76-11 evaluated 1,800 feet strike length of favourable host rock and surface mineralized Pb/Zn/Ag showings. Holes T76-6 and T76-7 confirmed the absence of drag folding and barren sulphides in the Upper Limestone in the Saddle area. Hole T76-8 was abandoned and unconvulsive, as the footwall side of the fault zone was not penetrated to check for a westward continuation of the 1974 A Zone. Holes T76-9, 10 and 11 geologically evaluated a strike length of 2,400 feet.

FUTURE PROGRAMME CONCLUSIONS

Further geological surface exploration work and diamond drilling is recommended for the Eagle claim group in the following areas:

1. A Zone: A westward extension of the A Zone mineralization below the fault zone intersected in hole T76-8 is possible. Drilling over the A-Grid has proven the existence of relatively continuous and high grade silver-lead-zinc mineralization within the Upper Limestone (Unit 4) and associated with an irregular drag fold on the northeastern limb of the main anticline. The deposit is exposed on the floor of a lower cirque and, due to steep mountainous terrain on either end of the deposit, exploration by drilling was limited to a 300 foot strike length during the 1974 programme. The A-Grid mineralization appears to strike northwest and southeast under the east ridge. Further drilling and geological mapping is recommended west of the 1974 "A Zone".
2. East Slope Area: The 1974 A-Grid diamond drilling has proven the existence of sulphide mineralization along a 300 foot strike length and therefore the potential of the Upper Limestone unit as a favourable host rock to deposition of economic mineralization has been established. The A-Grid deposit drilling along a strike length of 300 feet has indicated possible mineralization extension 1,500 feet to the southeast, within the Upper Limestone Unit 4 horizon. The A-Grid delineated sulphide galena/sphalerite mineralization within the favourable horizon of the Upper Limestone unit. The Upper Limestone has been shown to contain economic galena/sphalerite with silver mineralization and is the most important rock unit on the Eagle claims to search for further mineralization. The Upper Limestone is thought to dip under the east ridge and therefore the mineralization may continue from the A-Grid area for at least 1,500 feet to the southeast. Therefore, further exploration should be continued along the 1,500 foot strike length to the southeast of the A-Grid mineralization within the favourable and key horizon of the Upper Limestone.

(a) Zone F Anomaly - East Slope: A very strong Ag/Pb/Zn anomaly is expressed on the north end of the East Slope grid, due east of the A Zone. The extreme northern end of this anomaly is within talus beneath the fall showing and may be a downslope reflection of this or A Zone mineralization. However, high metal concentrations south of L2+00S to L8+00S appear to reflect some form of mineralization on the slope above the baseline. This area has not been intensively prospected due to the steep terrain. It is possible that sulphide mineralization is exposed on the slope and the anomaly is due to mechanical dispersion, or sulphides are not exposed and the anomalous metal values may be chemically dispersed along fracture zones from mineralization beneath the East Ridge, such as an A Zone extension to the east.

(b) Zone G Anomaly - East Slope: This anomaly, centred on L24+00S, is very similar to the Zone F anomaly. The slope is more accessible here, although the extent of overburden cover is greater. No sulphide mineralization, aside from minor pyrite, has been observed in this area, although fairly high silver/lead/zinc geochemical values occur on the East Slope area.

A detailed rock geochemistry survey should be conducted in both the Zone F and Zone G anomaly areas to determine if the anomalies are the result of a metal-rich rock unit or possibly a strata-bound sulphide accumulation within the limestones. Upper Limestone beds outcrop on the East Slope, and further geological, geochemical and geophysical surveys are recommended for the area.

3. East Boundary Zone: The East Boundary zone is strongly indicative of underlying mineralization in one of the limestone units. The geology, extrapolated from the A-Grid and observed in the eastern area of the claim group, and the strong geochemical anomaly east of the East Slope area as defined by the 1968 survey, suggest that the area between the A-Grid and the East Boundary zone holds more potential than has yet been recognized. In the 1975 geochemical survey, scattered, moderately-anomalous metal content in the soils is very significant. Upper Limestone beds strike

into this area and there is a potential for sulphide mineralization similar to that encountered in the A Zone. A detailed linegrid should be established in the area and a systematic geochemical soil sampling survey conducted.

An East Boundary showing consists of sulphide mineralization in quartz veins within the Argillaceous Limestone (Unit 6). Assays of two grab samples are shown below:

Sample #	Description	Au (oz/T)	Ag (oz/T)	Pb (oz/T)	Zn (%)	Cu (%)
3643	Grab sample, mainly visible copper mineralization	Tr	3.16	1.25	0.24	0.38
3644	Grab sample, galena and sphalerite - iron-rich	0.04	9.42	21.6	3.60	0.30

The importance of this mineralized showing is that it suggests the possibility of underlying mineralization in limestone. It is roughly on strike with the A-Grid deposit and, although the Upper Limestone is not exposed here, favourable drag fold structures are evident, trending through the area. Further geological surveys are recommended for the East Boundary area.

4. Number 8 Showing: Results of the 1974 programme show that, in parts, this deposit contains fairly high grade intersections and the Number 8 mineralized zone should be considered for future exploration. The shortcomings of the 1974 drilling should be taken into account in this evaluation and the deposit considered as a potential target for an expanded exploration programme on the Number 8 showing. The Number 8 showing should be drilled with BQ diameter core and a heavy drill used to permit deeper penetration and better core recovery. The Number 8 zone represents a target area of interest for further exploration and is located in the key Upper Limestone bed. Further exploration work and diamond drilling is recommended on this showing (#8).

1974 drilling in the B-Grid area on the Number 8 showing was hampered by

the steep terrain, the small size of the drill being used and by permafrost which was encountered in all the holes. Although core recovery was relatively good, the maximum depth of each hole was limited, and as a result the mineralized zone was intersected only by a very small margin.

Results of the drilling are shown at 1 inch = 20 feet (B-Grid Diamond Drill Hole Section - 1974) and also on individual sections at 1 inch = 20 feet.

EXPENDITURE RECOMMENDATIONS

The following expenditures are recommended to fully evaluate the potential of the westward extension of the A Zone, the eastward extension of the A Zone into the East Slope area, and to conduct surface exploration in the East Boundary area and on the #8 showing:

Stage 1

Linegrid - 30 linemiles -----		\$ 4,500.00
Geology Mapping -----		3,000.00
Geochemical Survey -----		7,500.00
Soil Sampling	\$3,000.00	
Determinations - 1500 @ \$3.00	<u>4,500.00</u>	
Electromagnetic Survey -----		3,000.00
Magnetics Survey -----		3,000.00
Trenching and Prospecting -----		2,500.00
Camp Supplies -----		5,000.00
Camp Rental -----		2,000.00
Geological Equipment -----		1,000.00
Vehicle Transportation -----		2,500.00
Flying Costs -----		8,500.00
Fixed Wing	\$1,500.00	
Helicopter - 20 hours @ \$350.00	<u>7,000.00</u>	
Geological Supervision -----		4,000.00
TOTAL COSTS - STAGE 1 -----		<u><u>\$46,500.00</u></u>

Stage 2

Diamond drilling is recommended in select areas; therefore, 5,000 feet -----		<u><u>\$150,000.00</u></u>
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R. G. Hilker, P.Eng.

CERTIFICATION

I, ROBERT G. HILKER, of 6 Tutshi Road in the City of Whitehorse in the Yukon Territory, DO HEREBY CERTIFY:

1. THAT I am a Consulting Geologist, with an office located at 8 Northern Metallic Building (postal address: P.O. Box 4008), in the City of Whitehorse in the Yukon Territory;
2. THAT I am a graduate of the Michigan Technological University located at Houghton, Michigan, U.S.A., where I obtained a Bachelor of Science degree in Geological Engineering (Exploration Option) in 1962;
3. THAT I am a registered member in good standing of The Association of Professional Engineers of the Yukon Territory, a Fellow of the Geological Association of Canada, and am registered with The Association of Professional Engineers of British Columbia;
4. THAT I have practised my profession as an engineer and geologist for the past fourteen (14) years;
5. THAT I personally supervised the 1976 field work and report preparation on the drilling exploration programme on the Eagle claim group located on N.T.S. Sheet 105-G-3 in the Junkers Lake and Ings River, area of the Yukon Territory, during the period May through November 4th, 1976;
6. THAT I have no direct or indirect interests in any of the mineral claims or in any of the securities held by Tintina Silver Mines Limited, nor do I expect to receive any.

DATED this 4th day of November, 1976, at the City of Whitehorse in the Yukon Territory:

R. G. Hilker, P.Eng.

APPENDIX

ASSAY CALCULATION DATA

E July 28/76

HOLE NO. T76-7

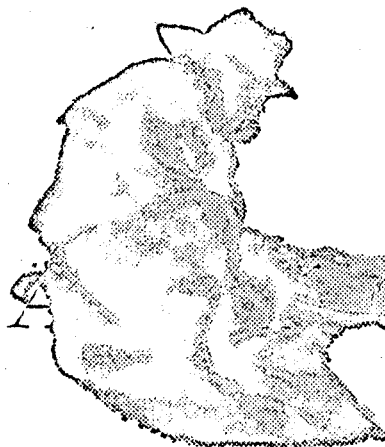
FOOTAGE		ASSAY DATA							
From	To	Sample No.	Width	Ag ^{oz.} /T	Pb %	Zn %	Ag x Ft.	Pb x Ft.	Zn x Ft.
66	69.5	4243	3.5	—	—	—	.06	.03	
106	116	4244	10.0	0.84	0.03	0.12	.01	.03	
141	147.5	4245	7.5	0.09	—	—	Tr	.03	

34.5	40.5	4241	6.0	0.18	—	—	.005	.03	

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DATE. July 14, 1976

FILE NO. 9594 - 13



CERTIFICATE

WHITEHORSE ASSAY OFFICE LTD.
BOX 4518 WHITEHORSE Y. T.
PHONE 667 2694 Y1A 2R3

SAMPLE RECEIVED FROM

TINTINA SILVER MINES LIMITED

SAMPLE NO.	GOLD Oz. Per Ton	SILVER Oz. Per Ton	LEAD	ZINC	COPPER			
4228	--	--	--	TR	.01			
4229	--	--	--	TR	.01			
4230	TR	--	--	.02	.01			
4231	--	.06	.02	TR	.03			
4232	--	TR	.02	TR	.02			
4233	--	.68	.50	.05	.02			
4234	--	TR	.03	TR	--			
4235	--	.15	.05	.01	.03			
4236	--	.88	.25	.23	.09			
4237	TR	--	--	--	.01			
4238	--	6.18	2.48	14.77	--			
4239	--	4.09	1.99	1.36	--			
4240	.01	.08	--	--	.03			

ASSAYER.

[Handwritten signature]

GEO. SPALDING

DATE. OCTOBER 6, 1976

FILE NO. 9803 - 5

ASSAY CERTIFICATE

WHITEHORSE ASSAY OFFICE LTD.
BOX 4518 WHITEHORSE Y. T.
PHONE 667 2694 Y1A 2R8

SAMPLE RECEIVED FROM

TINTINA SILVER MINES

SAMPLE NO.	GOLD Oz. Per Ton	SILVER Oz. Per Ton	W03 TUNGSTEN					
4248			.005					
4351			TR					
4353			TR					
4357			TR					
4358			TR					

ASSAYER.

L. Hoyland for

REG. 1971/12

DATE. OCTOBER 5, 1976

LE NO. 9802-6

ASSAY CERTIFICATE

WHITEHORSE ASSAY OFFICE LTD.
BOX 4518 WHITEHORSE Y. T.
PHONE 667 2694 Y1A 2R3

SAMPLE RECEIVED FROM

TINTINA SILVER MINES LIMITED

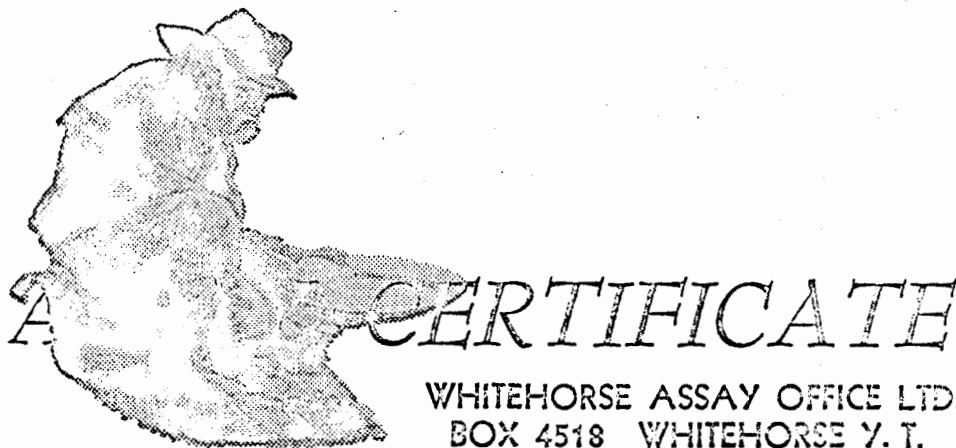
SAMPLE NO.	GOLD Oz. Per Ton	SILVER Oz. Per Ton	LEAD	ZINC	COPPER			
4242	-	.03	-	-	.02			
4243	.06	-	-	-	.03			
4244	.01	.84	.03	.12	.03			
4245	TR	.04	-	-	.03			
4246	-	-	-	-	.03			
4247	-	-	-	-	.02			

ASSAYER.

K. Heyland CH. SPALDING

DATE. July 26, 1976

SAMPLE NO. 9617 - 1



CERTIFICATE

WHITEHORSE ASSAY OFFICE LTD.
BOX 4518 WHITEHORSE Y. T.
PHONE 667 2694 Y1A 2R3

SAMPLE RECEIVED FROM

TINTINA SILVER MINES LIMITED

SAMPLE NO.	GOLD Oz. Per Ton	SILVER Oz. Per Ton	COPPER					
4241	.005	.18	.02					

ASSAYER.

L. Hayward

RED STAMP



GEOLOGY LEGEND

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TINTINA SILVER

TABLE OF FORMATIONS. (Grid A) (Provisional)

3

BLACK ARGILLITE

- dense, fine grained, very black argillite, with normally 5-10% pyrite and pyrrhotite. Although one foliation is dominant, two or more distinct foliations are sometimes observed. The rock is sometimes banded parallel to the dominant foliation, with alternating thin grey and black bands, which may represent original bedding. Quartz stringers and patches are usually present. They are usually oblique to the dominant foliation. Tension cracks between stringers, and at right angles to them, may also be filled with quartz and result in a unique 'tiger stripe' pattern.

Sulfides occur finely disseminated throughout the rock, in narrow veinlets, and sometimes with the secondary quartz. Pyrite or pyrrhotite may occur individually, or they may occur together.

The black argillite is very rusty and highly broken on surface. In drift holes it is usually highly fractured near surface, but rather competent with depth.

12

LOWER LIMESTONE

This is the 'orange weathering' limestone of Moorhouse. It is usually brecciated and beamed with calcite stringers. Colour varies from light to medium grey. The breccia is indicated by fragments, from 1 to 2 inches in diameter with irregular serrated edges and separated by thin seams of black probably carbonaceous material.

Calcite stringers are white and of at least 2 ages. Pre-tectonic stringers are quite distorted and appear as irregular, white

patches. Post-factonic stringers are also irregular but are not deformed. They occur often as a breccia matrix pattern.

Except in zones of important sulfide mineralization, sulfides are very rarely observed in this unit.

The lower limestone Unit is host to the Pb-Zn-Ag mineralization over the A Grid. In the vicinity of sulfide mineralization, in particular near the rock intercessions, on LBT50E, silicification is very evident and tremolite is present throughout. Chlorite is developed locally, and also possibly fluorite is present in small amounts.

S

SULFIDE ZONE

The dominant sulfides are galena and sphalerite. Locally, pyrrhotite and freibergite are also observed. Chalcopyrite and arsenopyrite may be present in trace amounts. The sulfides occur in stringers and patches, in a very similar location to the calcite stringers. A vague zonation has been observed, from galena-rich mineralization at the top(?) near the black argillite to sphalerite-rich towards the bottom(?). The sphalerite zone is equally more extensive. Sphalerite, pyrrhotite, freibergite, chalcopyrite and pyrite are typically associated with the galena zone while galena may or may not be associated with the sphalerite zone.

Sphalerite occurs in two distinct varieties; one iron-rich and black and the other iron deficient(?) and a yellow brown colour. Frequently a patch of yellow-brown sphalerite is rimmed with the black variety, and possibly also small amounts of galena. In other instances, the yellow-brown and black varieties are interbedded, in intervals of 2 to 5 inches.

1

GREY ARGILLITE

This is the basal rock unit in the series, encountered in the grid area, and in fact appears to be the oldest rock in the entire mineralized area, as mapped by Moorehouse. It is highly variable, in particular in the area of the upper contact, where it is interlayered with a grey-brown siliceous rock which has the appearance of a fine grained stann.

This quartzitic rock and the argillaceous rock are locally interbedded on a 1 or 2 inch scale. Pyrrhotite is present throughout the unit, in quantities averaging 3 to 7 percent, and very locally, in narrow bands, 50 to 75 percent.

Contacts between limestone and argillite and often between quartzitic rock and argillite are often marked by a pyrrhotite-rich band. The pyrrhotite also occurs as finely disseminated, in fine stringers and associated with secondary quartz in stringers and patches.

Arsenopyrite, in amount from 1 to 30 percent, is sparsely locally, often associated with quartz stringers. It occurs disseminated throughout the rock and in the stringers. Pyrrhotite is associated.

C. Carter

July 8, 1944.

NOTE ON B-GRID (No. 8 ZONE) GEOLOGY + DRILLING.

Drilling on the B-grid is severely hampered by the steep slope and loose rock. In addition, permafrost has been encountered at relatively shallow depths. Each morning, the hole must be reamed to the previous day's footage before drilling can commence. Calcium chloride does not alleviate the situation. Since not more than 50 to 70 feet can be expected per shift, the holes are being spotted so that total depth for each hole is within the 100 to 150 foot range, and thus each hole should be completed in two shifts. At present, the drillers on the Moxex are restricted to a 10 hour shift. A 12 hour shift might be more practical.

Core recovery is excellent; near 100% below the broken surface rock. The argillaceous limestone is quite good for drilling, although penetration rates are not fast. Small quartz veins, 4 to 6 inches in thickness, are the greatest cause of blocking. A switch to the thinner-walled 1EX bit might improve penetration rates and decrease the blocking effect of the quartz.

Geology in the B-grid area is very similar to that encountered in the A-grid, except that the sequence is reversed. The uppermost rocks are

a grey argillite which grades into argillaceous limestone. This limestone, in drill core, is identical to the Unit 2 lower limestone except that it displays a more prominent foliation which is almost as strong as the platy cleavage observed in the argillites. One hole only, 74-B3, bottomed in black argillite identical to that observed on Grid A. (Units) Further, the sulfide zonation appears also to be reversed, with the ~~pyrite~~ sphalerite-rich zone on the top and the galena-rich zone on the bottom. Evidence is admittedly incomplete at the present time. However, one might suspect perhaps a regional syncline, with axial plane dipping at a shallow angle to the southwest, resulting in the overturned sequence in zone no. 8.

Mineralization encountered in the drilling appears to be quite continuous, being intersected in all holes but one to date, but grades in some of the sections may be somewhat lower than those encountered in the A-Grid high grade zones. Assaying may improve this observation.

C. Carlson

July 8, 1974

GEOCHEMICAL SURVEY

During the 1974 summer exploration programme, an extensive geochemical orientation survey was carried out (see Carlson and Hilker, 1974). The results of this survey indicated that strong geochemical anomalies would be generally restricted in size, due probably to post-glacial mechanical dispersion in areas of thin or nonexistent overburden cover or in areas of previous tractor trenching, and that more deeply buried mineralization would produce a very low profile anomaly. The test pit analysis indicated that optimum sample depth is approximately one foot, and that a multi-element determination, namely for Ag, Pb and Zn, would provide optimum anomaly definition.

During the 1975 survey, a total of 1,879 soil samples were collected over the central portion of the Eagle claim group. Samples were collected from the upper C soil horizon, at depths of 10 to 12 inches where possible. On upper slopes, soils are usually extremely thin and consist of relatively unaltered, finely abraded rock grit fragments. Samples were collected on a 100 x 400 foot grid spacing. This spacing was decreased to 100 x 200 foot over areas of obvious geological interest.

Approximately 300 gm. of sample material was collected in kraft paper sample bags. At each sample station, soil composition, colour and water content, vegetation cover and slope grade and direction were noted. At camp, samples were hung for partial drying. The pH of each sample was determined using a LaMotte Morgan colour-metric pH testing kit, to the nearest 0.2 pH unit. Samples were shipped to the Barringer Research Laboratory in Whitehorse, where they were analyzed for Ag, Pb and Zn.

TABLE 3

Summary of Statistics

	<u>Raw Data (p.p.m.)</u>			<u>Log 10 Data</u>		
	Ag	Pb	Zn	Ag	Pb	Zn
\bar{x} - Mean	2.4	58.3	229.7	0.29 (1.95)	1.59 (38.9)	2.11
S - Standard Deviation	3.5	118.8	615.3	0.27	0.32	0.40
Minimum	0.2	5	15	-0.70	0.70	0.18
Maximum	84	2400	20500	1.92	3.38	4.31
Range	83.8	2395	20485	2.62	2.68	4.14

TABLE 3 (Cont'd)

CONTOUR VALUES *

S - Standard Deviation

\bar{x} - Mean

$\bar{x} + 1S$ = Mean + one standard deviation

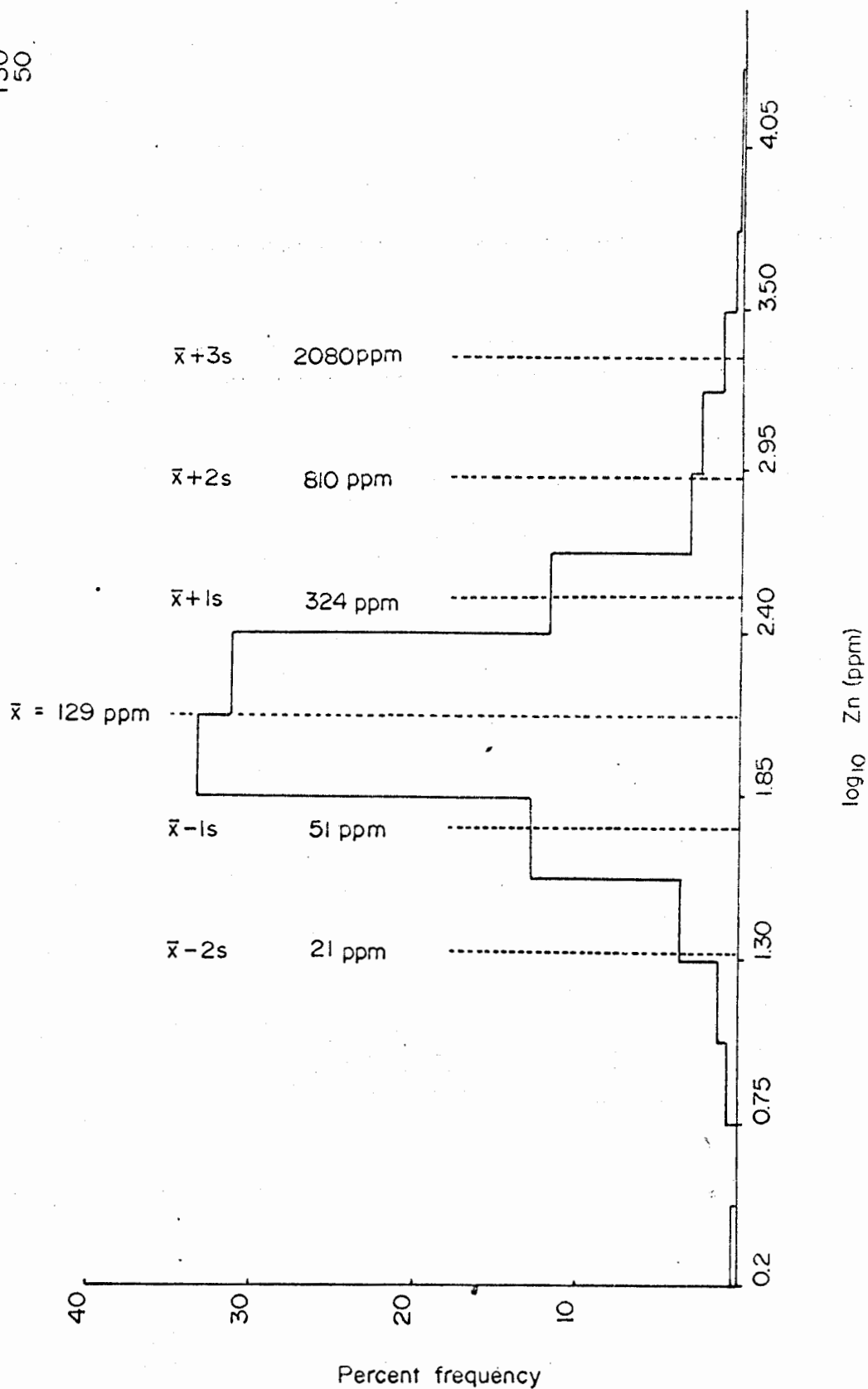
$\bar{x} + 2S$ = Mean + two standard deviations

$\bar{x} + 3S$ = Mean + three standard deviations

	Ag-Silver	Pb-Lead	Zn-Zinc
$\bar{x} + 1S$.29 - 2.0 ppm	1.59 - 40 ppm	2.11 - 130 ppm
$\bar{x} + 2S$.55 - 3.5	1.91 - 80	2.51 - 325
$\bar{x} + 3S$.81 - 6.5	2.23 - 170	2.91 - 800
	1.07 - 12.0	2.55 - 350	3.31 - 2000

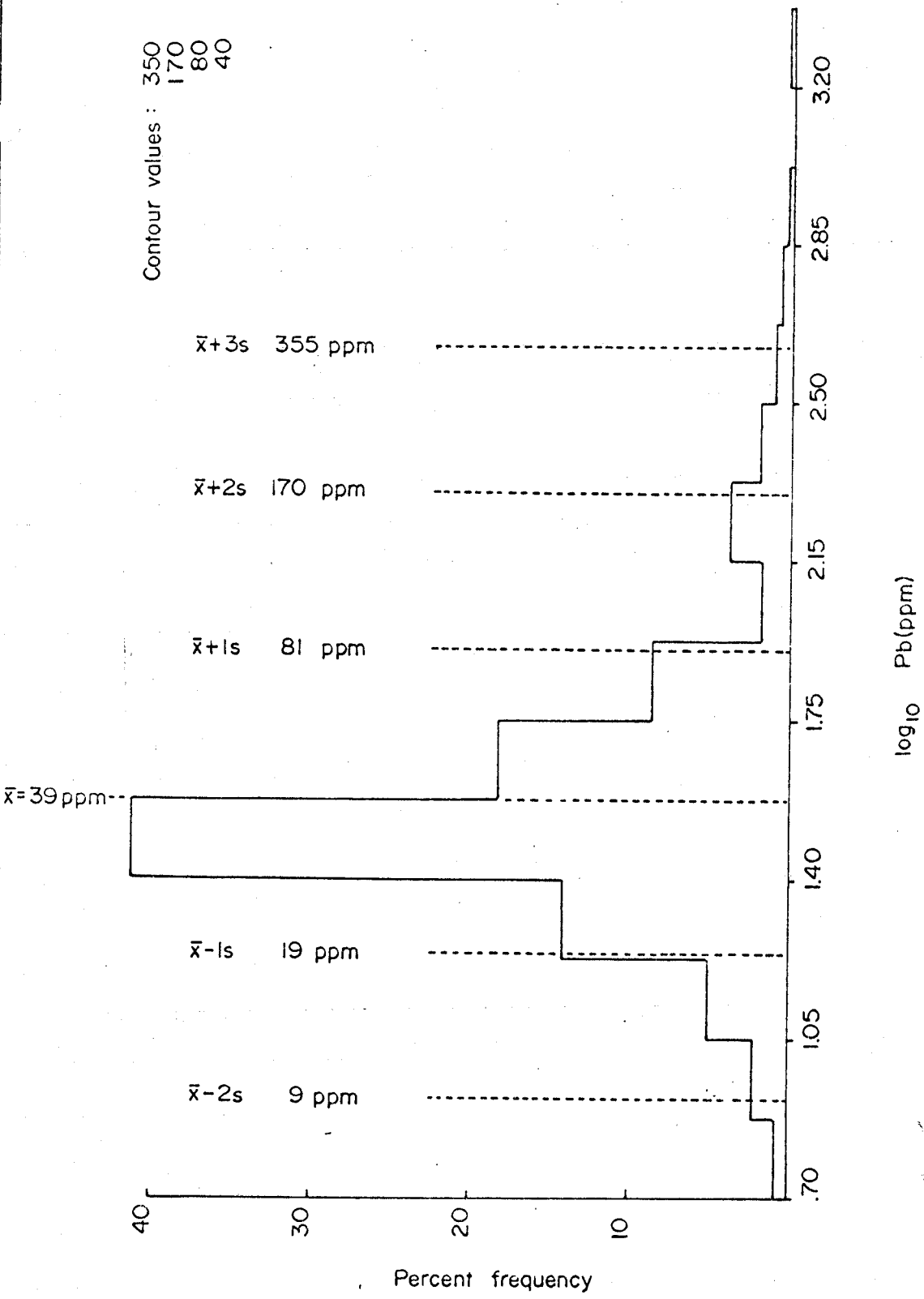
* NOTE: antilogs are rounded to approximate numbers.

Contour values: 2000
800
325
130
50



R.G.HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

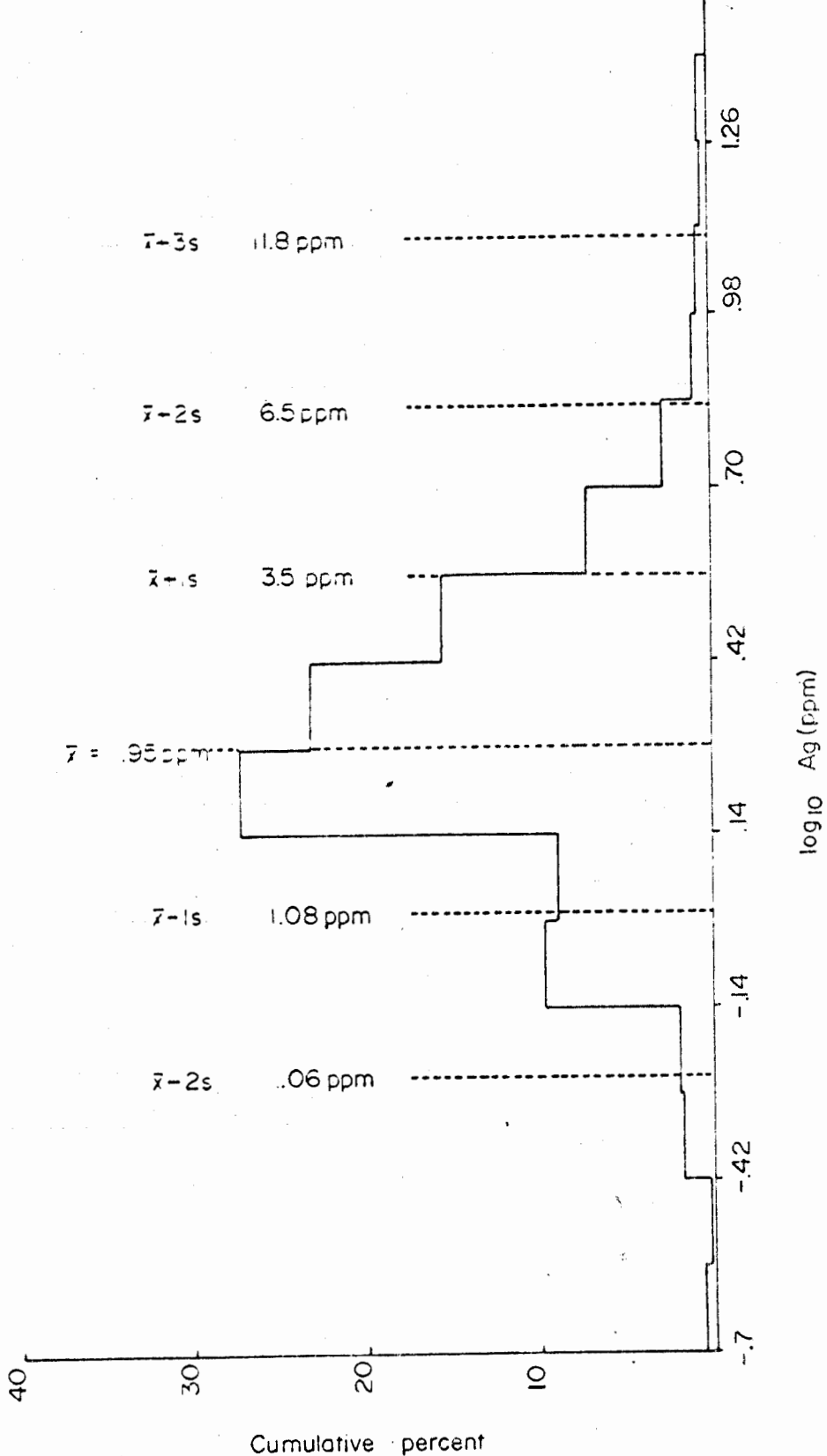
TINTINA SILVER MINES LTD.	
HISTOGRAM - ZINC	
DATE: NOVEMBER 1975	SCALE AS SHOWN



R.G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y. T.

TINTINA SILVER MINES LTD.	
HISTOGRAM - LEAD	
DATE: NOVEMBER 1975	SCALE AS SHOWN

Contour values: 2.0
3.5
6.5
12.0



R.G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.

TINTINA SILVER MINES LTD.	
HISTOGRAM - SILVER	
DATE: NOVEMBER 1975	SCALE AS SHOWN

In order to aid interpretation of the data, a statistical analysis has been carried out, calculating the mean and standard deviation of the metal concentrations and of the base 10 logarithmus of the metal concentrations. These statistics are summarized in Table-3. Histograms of the log 10 metal distributions have been plotted on the Geochemical Survey Plans, East Half. All sample determinations have been plotted and contoured on these plans, at a scale of 1" = 200 ft. Contour values of \bar{x} (mean), $x+1S$ (one standard deviation, $\bar{x} + 2S$ and $\bar{x} + 3S$ have been used for each metal. Since the distribution of the metals approaches lognormality, the logarithmic mean and standard deviation values were used in these contour value definitions.

pH

The pH of each soil sample, as determined colourmetrically using a Lamotte-Morgan pH testing kit, has been plotted on the Geochemical Survey plans. The average pH value is over 7 and many values are higher than 8 due to the pervasive presence of carbonate in the area. The effect of this is to reduce the chemical mobility of most metals, including Ag, Pb and Zn, and hence to reduce the size and intensity of secondary dispersion haloes.

Zone A anomaly

The presence of the A Zone is strongly reflected on L8+00E; 9+00S to 16+00S. This anomaly provides an indication of the strong but very localized geochemical response to significant sulfide mineralization exposed on surface. Maximum metal concentrations in the soils here are 22 ppm Ag, 640 ppm Pb and 4200 ppm Zn. The anomaly is only very weakly expressed on L4+00E, where the sulfide mineralization is masked beneath Black Argillite (Unit 5) and Argillaceous Limestone (Unit 6). The anomaly occurs in the area of 1974 - A Grid diamond drilling on showings #1 thru #4.

Zone B Anomaly - West Mountain Area

The major anomalous values are localized downslope from the number 17 Ag/Pb/Zn showing, which consists of scattered surface mineralization, some of which is high grade. The extent of strongly anomalous metal values suggest that extensive mineralization is not exposed on surface except above L54+00W in the vicinity of #17 showing. This implies that Ag/Pb/Zn mineralization is localized stratigraphically above mapped limestones, and is of the shear (number 8 showing) type. The anomaly in the vicinity of the #18 showing, a small pod of massive sulfides in the Lower Limestone, Unit-2, is relatively weak.

Zone C Anomaly - West Slope

The Ag, Pb, and Zn anomalies form a generally arcuate pattern which conforms to the mapped exposure of the Upper Limestone, Unit 4, on the limbs and through the nose of the Moorehouse Anticline. This unit defines the maximum upslope extent of anomalous metal values south of the baseline. The anomaly outlines mineralization in the Sidehill Showing and Showings #10 and #11.

Within this anomaly area, the highest metal concentrations in the soils are associated with the known showings and are presumed to be enhanced because of the disturbed surface around these showings. Weaker anomalies follow downslope routes of mechanical dispersion below the showings.

Two areas of particular interest in this area have been defined. One of these is upslope from the #10 showing, in the vicinity of 2+00S on L10+00W, and the other is a broad area from the vicinity of the Sidehill showing at 5+00W; 12+00S, approximately along the south limb of the Moorehouse Anticline to 28+00W; 20+00S and beyond.

The anomaly above the #10 showing indicated sulfide mineralization in this area and it therefore appears that the Upper Limestone (Unit 4) is mineralized as well as the Lower Limestone (unit 2), as exposed in the #10 and #11 showings within this drag fold structure. This possibility is further enhanced by a profile of deep soil samples (18") collected at 25-foot intervals across the presumed location of the Upper Limestone in the nose area of the drag fold. The sampling was from 8+00W to 12+25W along an east-west line at 1+00S, as plotted in Figure 4, overburden thickness is 5 to 8 feet in depth. Strongly anomalous metal values, to 310 ppm Pb, 2500 ppm Zn and 7.8 ppm Ag occur over or just downslope from the presumed location of the Upper Limestone, Unit 4.

Zone D Anomaly

The Zone C Anomaly is of lower intensity but may be of equal significance, as Zone-C. Overburden thicknesses are greater here and bedrock is not exposed. The mobility of the three metals is known to be low throughout the area. Some mechanical migration from upslope mineralization from the Sidehill Showing is to be expected. Yet the extent of these anomalies, discontinuously for over 3,000-feet from the Sidehill Zone into the Ice Creek Valley, suggests a strong possibility that further sulfide mineralization occurs along this trend and may in fact be localized in the Upper or Lower Limestones, perhaps in drag fold structures similar to those observed on the north limb of the Moorehouse Anticline.

Zone E Anomaly - Anticline Axis

Anomalies in the vicinity of the number 12, 13, 14 and 15 showings are quite intense and appear to reflect the known sulfide occurrences. Although these surface sulfide zones are of limited extent, as presently defined, they do occur within the Lower Limestone Unit C in a favourable structural environment. The overlying Upper

Limestone is poorly exposed in the area and it is possible that a soil geochemical expression of any mineralization within this unit is masked due to overburden cover. Scattered moderately anomalous Ag and Pb values and a broad, low intensity Zn anomaly east and north of the number 14 showing may be indicative of this type of mineralization. The anomaly trends in a northwest direction near the Moorehouse Anticline axis and is a continuation of Zone C.

Strong Ag, Pb and Zn anomalies are observed from 25+00N to 3+00N between lines 18+00W and 22+00W. These are apparently associated with small patches of mineralization within hornfelses, adjacent to the intrusive contact. However, beds of Upper and Lower Limestone are truncated by the intrusive near the hornfelses contact. The only sulfides observed in this area to date include minor pyrite. The highly contorted nature of the metasediments in this area is similar to that observed in the Zone B West Mountain area. Further surface exploration in those areas of Lower Limestone beds may outline sulfide mineralization and should be considered a priority area for additional survey.

Zone F Anomaly - East Slope

A very strong Ag/Pb/Zn anomaly is expressed on the north end of the East Slope grid, due east of the A Zone. The extreme northern end of this anomaly is within talus beneath the Fall showing and may be a downslope reflection of this or A Zone mineralization. However, high metal concentrations south of L2+00S, to L8+00S, appear to reflect some form of mineralization on the slope above the baseline. This area has not been intensively prospected due to the steep terrain. It is possible that sulfide mineralization is exposed on the slope, and the anomaly is due to mechanical dispersion, or sulfides are not exposed and the anomalous metal values may be chemically dispersed along fracture zones from mineralization beneath the East Ridge, such as an A Zone extension to the east.

Zone G Anomaly - East Slope

This anomaly, centered on L24+00S, is very similar to the Zone F anomaly. The slope is more accessible here, although the extent of overburden cover is greater. No sulfide mineralization, aside from minor pyrite, has been observed in this area, although fairly high silver/lead/zinc geochemical values occur on the East Slope area.

An intensive rock geochemistry survey should be conducted in both the Zone F and Zone G anomaly areas to determine if the anomalies are the result of a metal-rich rock unit or possibly a stratabound sulfide accumulation within the limestones.

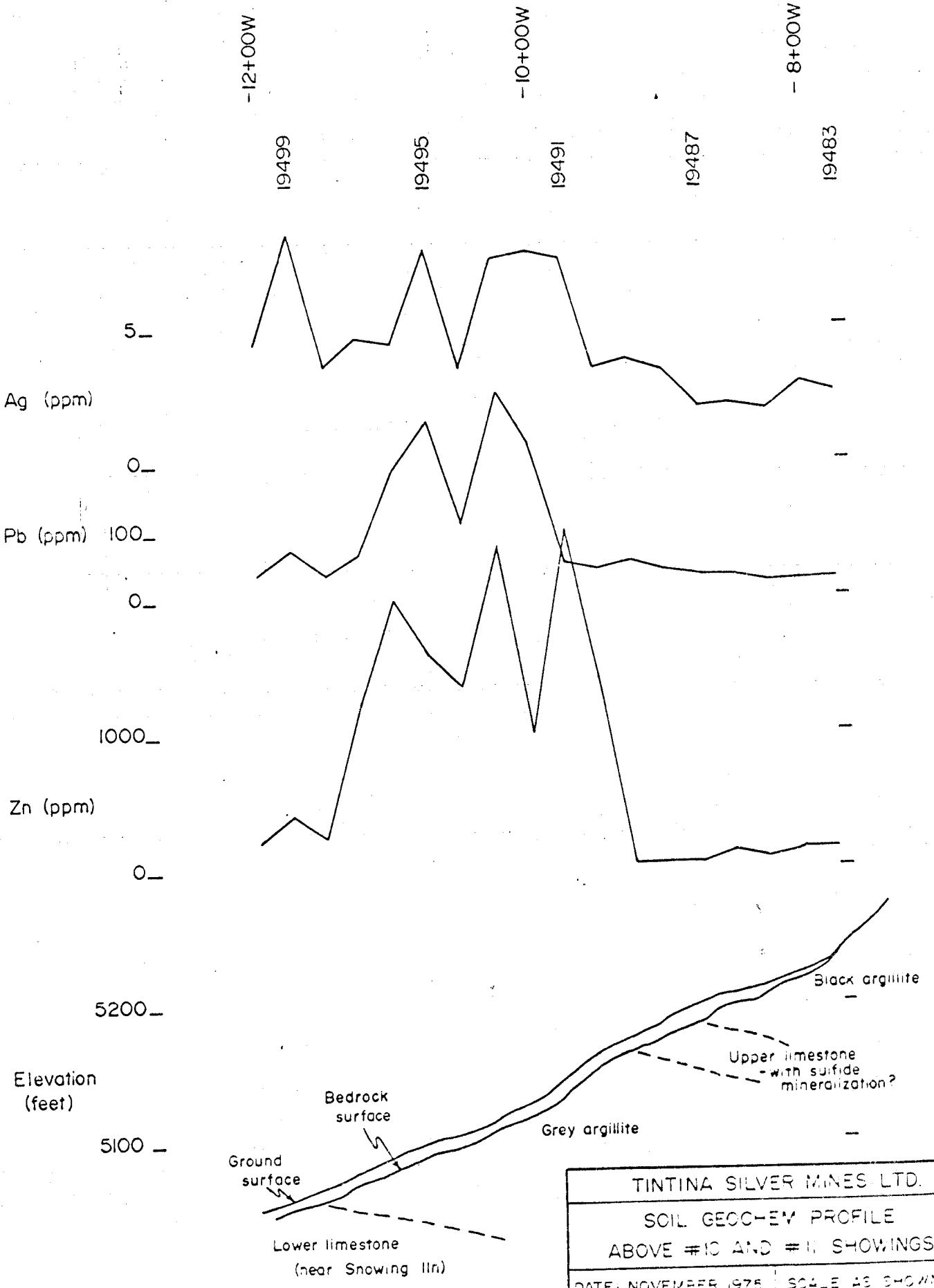
East Boundary Grid Area

Although no strong anomalies were detected on this grid, results are extremely interesting. A thick overburden cover is present on all but L24+00E north of the baseline. Therefore, scattered, moderately anomalous metal contents in the soils may be very significant, especially considering the broad line spacing. Favourable geology strikes into this area, and there is a potential for sulfide mineralization similar to that encountered in the A Zone. A detailed linegrid should be established in the area and a systematic geochemical soil sampling survey be conducted.

GEOCHEMICAL SURVEY CONCLUSIONS

The most significant anomaly encountered during the 1975 geochemical programme is that located in the vicinity of 2+00S on 18+00W above the #10 and #11 showings (Zone C). This anomaly suggests the strong possibility that the Upper Limestone (Unit 4) contains sulfide mineralization directly above and in the same drag fold as the sulfides exposed in the trenches of the #10 Zone, within the Lower Limestone (Unit 2).

L1+50S



-12+00W

-10+00W

-8+00W

19499

19495

19491

19487

19483

Ag (ppm)

Pb (ppm)

Zn (ppm)

Elevation (feet)

Ground surface

Bedrock surface

Lower limestone (near Showing 11n)

Grey argillite

Upper limestone - with sulfide mineralization?

Black argillite

TINTINA SILVER MINES LTD.

SOIL GEOCHEM PROFILE
ABOVE #10 AND #11 SHOWINGS

DATE: NOVEMBER 1975 SCALE AS SHOWN

Of similar importance, however, is the occurrence of low profile anomalies on both the limbs and axis of the Moorehouse Anticline on Zone D and Zone E over the presumed subcropping of the Upper and Lower Limestones, in overburden covered areas. The potential for hidden sulfide deposits, particularly on the south limb and axis of the anticline, is enhanced by this data.

Two areas of very strongly anomalous metal concentrations on Zone F and Zone G on the East Slope are yet unexplained. They may reflect sulfide concentrations within limestone which are not exposed on surface or have not yet been observed, or they may represent local areas of abnormally high trace metal concentrations in one of the rock units, such as the Black Argillite.

Scattered anomalies on the East Boundary grid, in an area of thick overburden cover, may be caused by underlying sulfide mineralization. The limestones strike into this area from the East Slope, and folding is evident. The East Boundary Zone indicates that the grid is within the general area of sulfide mineralization and should have further survey work conducted over a detailed line-grid.

GEOPHYSICAL SURVEY

Electromagnetic Survey

During the 1975 Tintina Silver exploration programme, an electromagnetic survey was conducted using a Geonics EM-16 instrument, on part of the linegrid. The survey was made over most of the 1975 West Half Grid Sheet and on a few lines near the 1974 A-Grid drilling area of the 1975 East Half Grid Sheet. A total of 18 linemiles of EM-16 survey was conducted from July 16 through August 14 by R. G. Hilker and Chris Hughes, operating the instrument.

The EM-16 electromagnetic instrument operates on a power source from VLF (very Low frequencies) transmitting stations maintained by the U. S. Navy. The antenna current, from the VLF stations, is vertical and therefore creates a concentric horizontal magnetic field that is transmitted an infinite distance from the source. If the transmitted or primary magnetic field radiates over a buried conductive body, a secondary electromagnetic field occurs, that radiates from the conductor. The secondary field, over a buried conductor, has a vertical component that the EM-16 receiver measures. The receiver has two input coils that are on a vertical and horizontal axis. The instrument reads a tilt-angle that is calibrated in percentage in relation to the vertical axis. The second coil signal is parallel to the primary field and is a measured percentage signal that is shifted by 90° .

A transmitting station is selected that gives a field approximately at right angles to the strike of conductive metallic ore zones or geological structures. During the 1975 electromagnetic EM-16 survey Station NPG - Seattle, Washington was used that operates on a Frequency of 18.6 kHz.

Readings observed during the EM-16 survey were plotted in profile at the field camp daily, at a scale of Horizontal 1" = 200 ft. and Vertical 1" = 20⁰. Interpretation of the electromagnetic survey was made by R. G. Hilker and the results of the interpreted conductors

were plotted on plan at 1" = 200 feet. The aforementioned composite plan also shows the occurrence of magnetic and geochemical lead/silver/zinc anomalies in relation to the electromagnetic conductors.

The following is a brief discussion of the interpreted conductors indicated on the EM-16 survey profiles.

The EM-16 survey indicated nine conductive zones and are named as; EM-1, EM-2, EM-3, EM-4, EM-5, EM-6, EM-7, EM-8 and EM-9. It should be noted by the reader that the zinc mineral sphalerite is a non-conductor.

Zone EM-1

The conductors over the 1974 A-Grid ore zones are extremely erratic (line 8+00E at about 12-14+00S). Considerable lead, silver and zinc has been proven in the Tintina showings 1-2-3 and 4 areas. The mineral zone appears to be faulted and offset about 250 feet north and is described as a "weak conductor" that crosses L4+00E, L0+00E and L4+00W and is terminated along an inferred fault near the Sidehill zone Showing. The EM-1 conductor axis is interpreted to be on the north side of the conductive zone and to dip about 25-35° north. The conductor warrants continuation of the 1974 A-Grid drilling, north to L4+00W. Diamond drill holes should be located to drill vertical and to the south into and across the EM-1 conductive axis and zone. The conductor is located on the northeast limb of the Moorehouse Anticline.

A 1,200 gamm magnetic high is located on the north end of EM-1 near the inferred fault. Considerable magnetic relief occurs that ranges between 100, 300 and 800 gammas on the north and south sides of Zone EM-1 and the ore zone adjacent to surface showings 1 thru 4.

Zone EM-2

The EM-2 conductive zone crosses the survey linegrid at a 45° angle between mineralized Showings 10, 11, 11h, 12, 13, 14 and 15. The conductive zone is indicated on the profiles as distorted broad

conductor. The zone is probably distorted due to readings taken on the linegrid that are not at 90° to the Seattle transmitting station used for the survey. The ideal linegrid is located perpendicular to geological conductive zones and survey crosslines are selected approximately along the lines of the transmitted primary magnetic field. The EM-2 zone was interpreted to occur on the south side of a very large and broad in-phase negative. The conductive zone corresponds to the location of Unit 2 - Lower Limestone and the lead/silver/zinc mineral Showings #10 thru #15. Additional electromagnetic survey work should be done on a linegrid perpendicular to the zone and perhaps using the Hawaii transmitting station. The EM-16 instrument readings indicated a fairly good response over Showing #10, but all readings south of #10 on L10+00W is so distorted that they are meaningless. However, geology mapping in 1975 has suggested that the Lower Limestone Unit-4 starts to bend near Showings #11n, 11 and 10 and to strike due south along L10+00W. The limestone in Unit-4 again bends westward at about 14+00S on L12+00W and appears to strike westerly along conductive zones EM-4, EM-5 and EM-6. The EM-2 conductive zone interpretation possibly indicates mineral conductivity along or near geology contacts between the Lower Limestone Unit-2 and the Lower Argillite - 1h hornfels and the Middle Argillite - Unit 3.

The area between zone EM-2, Showing #10, the Lower Limestone along L10+00W and Zone EM-4 is a key and critical section to the understanding and interpretation of the continuation of proven ore in Showings #1 thru #4 and along Zone EM-1. The area along L10+00W is the point of intersection and change in direction of Zone EM-2 near Showing #10, the truncation of Zone EM-1 and Zone EM-4 and the south strike of the Lower Limestone across the northwest strike of the Moorehouse Anticline. The aforementioned features and problems are of prime interest because of a possible large tonnage lead/silver/zinc mineralized occurrence in the area of geological and geophysical change.

Zone EM-3

The axis of the conductor EM-3 is interpreted to occur on the north side of a broad and distorted large in-phase negative. The conductor axis roughly corresponds to the Upper Limestone, Unit-4 and the Black Argillite, Unit-5, contact. Distortion is probably due to the same conditions of linegrid orientation and transmitter station location, as described in the discussion of Zone EM-2. It is noted that the same geological features of the Upper Limestone, Unit-4, occur with a south strike on the southwest limb of the northwest bearing Moorehouse Anticline. The area along L8+00W and the Sidehill Showing is of considerable interest for reasons of similar conditions of geology change adjacent to L10+00W.

Zone EM-4

The axis of conductor EM-4 is interpreted to occur on the north side, at about 15+00S of lines 16+00W, 14+00W, and 12+00W. The conductor is inferred on lines 10+00W, 8+00W and 6+00W. The east end of the conductor is terminated on an inferred fault zone through the Sidehill Showing and the same feature that Zone EM-1 abutts against. The conductive zone dips north at about 25 - 35^o and is described as medium strength. The Zone EM-4 is located on the south limb of the Moorehouse Anticline and is offset 200 feet south of Zone EM-5. The 1975 geology mapping indicates that the west end of conductor EM-4 is located on the Lower Limestone, Unit-2, and contact of the Lower Argillite, Unit-1.

Zone EM-5

The conductive EM-5 Zone is located between L36+00W thru L18+00W (21+00 feet long) at 10+50S to 14+00S. The conductor axis is interpreted to occur on the north side and dips fairly gently at 20°. Zone EM-5 is about 400 feet wide and is a strong conductor. The conductive zone is located on the south limb of the Moorehouse Anticline south of the campsite clearing. From this point west the terrain drops from the mountain side to the Creek Valley. The mountain side, at L18+00W and 15+00S, is scree covered to about L22+00W. From L24+00W and L28+00W the conductive zone has a mixture of scree and overburden cover. The area of lines 32+00W and 36+00W probably has fairly thick valley clay overburden cover with willow vegetation. The west end of Zone EM-5 terminates along an inferred fault and is offset 400 feet from Zone EM-6. The last outcrop of Lower Limestone, Unit-2 occurs at L16+00W and the strike of the bed is aligned with the west bearing Zone EM-5.

Zone EM-6

The axis of Zone EM-6 is interpreted to be on the north side of a strong conductor between L48+00W and L40+00W and to be about 10+00 feet long. The conductor is about 500 feet wide, dips 20 - 25° north, and is located in the valley bottom near the creek. A 500 gamma magnetic anomaly occurs over the conductor on L46+00W between 12+00S and 15+00S. The magnetic anomaly has a 600 foot long axis and stretches between L48+00W and L44+00W. The magnetic high is probably situated on the upper part of a tabular shaped conductive body that dips 20 - 25° north.

Zone EM-7

The conductive zone extends between L32+00W and L20+00W with a north dip axis at about 23+00S. Zone EM-7 is a weak conductor that lays between two 100 gamma magnetic highs that are located on the north and south sides of the zone. A third 100 gamma magnetic high lays on the north end of the conductor. EM-7 is situated on the side of a mountain between L20+00W and L28+00W and into the valley floor at L32+00W. The conductor occurs partially between two strong conductive zones; and are Zones EM-5 and EM-6 to the north and Zone EM-8 and EM-9 to the south.

Zone EM-8

Zone EM-8 is considered to be a strong conductor that dips 30° with an axis located on the north side. The conductor is situated in the creek valley between L28+00W and L36+00W, with a strike length of about 10+00 feet. A 300 gamma magnetic high lays on the south side of Zone EM-8, between L40+00W and L32+00W. A second magnetic high of 100 gammas is located on the northwest end of the conductor. The south magnetic high is possibly caused by a north dipping tabular conductor with the upper end nearest to surface. No electromagnetic conductors were found to occur on L40+00W at 27+00W and therefore EM-8 is terminated on the west end and does not continue westward to EM-9. The electromagnetic survey suggests a major structural feature in the valley floor adjacent to L40+00W. The feature is probably a block fault between two mountains and further indicated by the creek drainage system.

Zone EM-9

Zone EM-9 is probably a continuation of EM-8 that abutts on an inferred fault near L40+00W. The conductor dips 30 - 45° to the north and is located between L48+00W and L44+00W at about 24+00S.

The axis is interpreted to be on the north side of the zone. A 200 gamma magnetic high is situated on L48+00W on the south side of the conductor. The magnetic high suggests a response from the upper end nearest surface of a tabular north dipping conductive body.

ELECTROMAGNETIC CONCLUSIONS AND RECOMMENDATIONS

The 1975 electromagnetic survey has indicated nine conductive zones that are plotted and located on the Composite Plan. The writer considers the nine delineated EM-16 electromagnetic conductors to be very significant in relationship to magnetic relief, geological structural and stratigraphy location to proven ore in the A-Grid area, and the several mineralized surface showings. The following paragraphs are a brief summary and recommendation of further exploration on the EM-16 electromagnetic conductors.

1. Zone EM-1 - The west end of the ore zone delineated in the 1974 A-Grid area appears to be offset 250 feet north by a fault. However, the electromagnetic survey indicates a conductor to continue another 800 feet further west. The west end of EM-1 is terminated on an inferred fault that is located near the Sidehill Showing. The conductor has considerable magnetic relief, above background, on both sides and ends. It is recommended that further diamond drilling be done on the north axis of conductor EM-1. Diamond drill holes should be located to drill vertical and at 45° south.
2. Zone EM-2 and EM-3 - The conductive zone is of prime exploration interest due to major geology and geophysical change and features. In the area of Showing #10, a major structural feature causes the westward strike of zone EM-1 conductor to pivot to the northwest to zone EM-2 and to offset south to Zones EM-4, EM-5 and EM-6. It is possible that the axis of the Moorehouse Anticline occurs along the

northwest strike direction of the Lower Limestone, Unit 2, between the Sidehill zone and surface mineral showings #10 thru #15. Conductive Zone EM-1 would therefore intersect the axis of the Moorehouse Anticline at a 45° angle, on the northeast limb. Conductive Zone EM-4 would be located on the southwest limb of the anticline.

It is therefore postulated that the axis of the Moorehouse Anticline is located parallel to the Lower Limestone, Unit-4, bed and conductor EM-3. It is further noted that the northwest strike direction of the Moorehouse Anticline along the Lower Limestone bed and EM-3 is aligned to the southwest, with the previously located axis of the anticline along Unit 2 and mineral showings #5 thru #7. Detailed geology mapping during the summer of 1975 confirmed that the Upper Limestone, Unit 2, continued southeast to Showing #10. All further geological, geophysical and geochemical interpretation will be based on the location of the Moorehouse Anticline axis between the Sidehill Showing in a northwest direction along the Upper Limestone, Unit-2, and mineral showings #10 thru #15.

3. Zone EM-4 - The conductor is considered to be situated on the southwest limb of the Moorehouse Anticline and to be partially within Unit-2 of the Lower Limestone. Diamond drilling is recommended as indicated on the Composite Plan.
4. Zones EM-5 and EM-6 - The conductor zone has been traced for 31+00 feet in length. The axis is interpreted to be on the north side of a strong conductor. A 300 gamma anomaly is located on the west end of EM-6. The zone is aligned west of the last surface outcrops of Lower Limestone, Unit-2. Several

diamond drill holes are recommended along the length of zones EM-5 and EM-6.

5. Zone EM-7 - The conductor is "weak", but extends for a distance of 14+00 feet in an east-west direction. The zone would warrant diamond drilling to check for sulphide mineralization.

6. Zones EM-8 and EM-9 - The zone delineates a strong conductor that has a 30-45^o dip north. The zone extends for about 20+00 feet and is discontinuous between EM-8 and EM-9. The south side of the conductor is adjacent to a 200 and 300 gamma magnetic high. The magnetic feature is possibly caused by the upper end, nearest surface, of a tabular conductive body. Several diamond drill holes are warranted along and across the Zone to check for economic sulphide mineralization.

MAGNETIC SURVEY

A total of 31 linemiles of magnetic survey was conducted on the West half of the 1975 linegrid using a Scintrex MF-2 Flux-gate Magnetometer. Magnetometer readings were taken on 24.75 line-miles of grid system at 2+00 feet and 4+00 feet spaced crosslines and 1+00 feet stations. The aforementioned survey was plotted on plan at 1" = 200 feet. A detailed survey was conducted at 50 feet spaced crosslines and stations and was plotted at a scale of 1" = 50 feet. All magnetometer readings were correlated to a common base control station that was assigned 1,000 gammas. A diurnal correction was applied in calculating the individual station readings when required. A maximum time period of one to two hours was allowed between instrument check readings at the base control station. Mr. R. G. Moffat conducted the field instrument readings and was under the supervision of R. G. Hilker.

1975 Magnetic Survey - West Half Sheet

The magnetic survey on the West Half of the 1975 linegrid has a magnetic background of less than 1100 gammas and contains magnetic highs of 100 to 400 gammas. In isolated areas a few anomalies are 600 to 1200 gammas above background. The range of 100 to 400 gammas suggests that pyrrhotite is the source of the magnetic anomalies. In a few scattered areas of 600 to 1200 gamma anomalies, some magnetite is probably associated with pyrrhotite.

A northwest trend of magnetic highs occur on the northeast limb of the Moorehouse Anticline and the axis of a syncline. Further to the north, a second northwest trending group of magnetic highs occur near a bed of Lower Limestone, Unit-2. Both of the magnetic features are possibly caused by pyrrhotite contained in the Unit-5 Black Argillite and Hornfels in contact with the Lower Limestone Unit-2. Magnetic highs occur on the edges of five electromagnetic conductors. The magnetic highs are located mainly on the south side of Zones EM-1, EM-6, EM-7, EM-8 and EM-9. The high magnetic relief is plotted on the Composite Plan showing the geology and geophysical surveys data. The magnetic highs associated near the south limits of the electromagnetic conductors are interpreted to be caused by the upper ends of dipping tabular bodies near the surface. The 100 to 300 gamma highs, near the EM conductors, are possibly caused by the sulphide mineral pyrrhotite. The magnetic data is extremely valuable when correlated with the electromagnetic data, as the magnetic highs further confirm the presence of sulphide mineralization. The magnetic highs, also located on the northeast side of the Moorehouse Anticline, bound the electromagnetic conductors in Zones EM-3 and EM-4. Therefore, the magnetic survey has delineated and further confirmed the Moorehouse Anticline structural feature and indicated sulphide mineralization near the electromagnetic conductive zones.

The detailed magnetic survey was conducted north and south of the linegrid baseline between L16+00W and L6+00W. The magnetic contours outline and confirms the Moorehouse Anticline trend that occurs on the West Half Sheet survey. The magnetic highs range from 100 to 300 gammas.

CONCLUSIONS AND RECOMMENDATIONS

The 1975 geology, geophysical and geochemical exploration surveys have delineated several zones for diamond drilling on the Eagle claim group. Electromagnetic conductors, magnetic anomalies and geochemical highs correlate with surface lead/silver/zinc mineralized showings on or near host beds of Upper and Lower Limestone.

It is postulated that the axis of the Moorehouse Anticline is located parallel to the Lower Limestone Unit-4 and conductor EM-3 (see Composite Plan) and is based on geology mapping and electromagnetic survey interpretation.

The electromagnetic EM-16 survey has indicated nine conductive zones and are named as; EM-1, EM-2, EM-3, EM-4, EM-5, EM-6, EM-7, EM-8, EM-9 and are plotted on the Composite Plan. Magnetic anomalies occur on or adjacent to the EM conductors and are probably caused by pyrrhotite and minor magnetite. The galena and sphallerite mineralization on the surface showings and 1974 diamond drilling is associated with pyrrhotite.

The geochemical lead/silver/zinc survey has indicated seven anomalous areas and are named as; Zone-A, Zone-B, West Mountain area, Zone-C, West Slope, Zone-D, Zone E, Anticline Axis, Zone-F, East Slope, Zone G, East Slope and East Boundary Grid Area. The geochemical anomalies occur near surface showings and on the flanks of the electromagnetic conductors EM-1, EM-2, EM-3 and EM-4 (see Composite Plan Overlay). The Zone-F and Zone-G indicates an extension of Zone-A (1974 A-Grid Ore Zone) to the East Slope.

The 1975 exploration programme results, when correlated together, indicates an excellent possibility of widespread economic lead/silver/zinc mineralization on the Tintina Silver Mines Eagle claim group.

Appendix - A
to the application of
Tintina Silver Mines Ltd.
executed on

GEOLOGICAL REPORT

ON

TINTINA SILVER MINES LIMITED

BY

W. W. MOORHOUSE, Ph. D.

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MAP 5 - TINTINA SILVER MINES LIMITED showing - Boundaries of Areas within which Strikes and Dips Analysed - and Areas of Northwest Plunge of Lination.

Scale 1 inch = 200 feet

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Showing Sections Through A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P.

Scale 1 inch = 100 feet

MAP 7 - CROSS SECTIONS of TINTINA SILVER MINES LIMITED LOOKING NW

Showing Sections Through 0 + 00', 4 + 00', 8 + 00',

12 + 00', 16 + 00'

Scale 1 inch = 100 feet

MAP 8 - CROSS SECTIONS of TINTINA SILVER MINES LIMITED LOOKING NW

Showing Sections Through 20 + 00', 24 + 00', 28 + 00'

32 + 00', 36 + 00', 40 + 00'

Scale 1 inch = 100 feet

GEOLOGICAL REPORT

TINTINA SILVER MINES LIMITED

BY

W. W. MOORHOUSE

Conclusions:

Silver-lead-zinc mineralization occurs in the following forms on the property of Tintina Silver Mines Ltd.:

1. as patches, lenses and disseminations of erratic distribution in limestone at or near the overlying contact with argillite.
2. in narrow shear zones, locally silicified, in the limestone.
3. as lenses, streaks and disseminations in highly sheared argillaceous limestone, for the most part just above major planes of thrust movement.
4. in sheared, re-crystallized limestone, sometimes with quartz veins, silicification or silication.
5. as narrow, generally low-grade quartz veins in sheared argillite.

The mineralization is so erratic that sampling is a very serious problem. It is probable that in zones such as zone 8, the only way to obtain a true picture of the grade would be by bulk sampling.

The nature of the mineralization is such that no estimate of ore dimensions and grade is possible. However, one cannot help being impressed by the number and variety of occurrences of mineralization in the area mapped. It certainly cannot be stated that possibilities of the property have been fully investigated. Unfortunately, there are no clear indications of suitable targets for further work, and isolation and expense of exploration make "wild-cat" investigations unattractive.

DEVELOPMENT PROPOSALS:

The property has not been fully prospected. It is recommended that a prospecting party should be put to work, with particular attention to the following features:-

1) The approximate course of the dislocation or thrust zone underlying the argillaceous limestone unit should be traced out wherever it is exposed on the property, to see if there is a repetition of conditions such as are found on zone 8 and on the West Mountain zone.

2) The outcrops of the limestone bands which are mineralized in zones 1, 2, 3, 4, 5, 6 and 7 should be carefully examined on the East slope, Facet ridge, and in the valley between them, for signs of mineralization.

3) The hornfels areas around the granitic intrusion should be prospected for scheelite. None has so far been discovered in lapping specimens collected, but the conditions seem favourable for this type of mineralization.

If in the future, a major program of exploration is contemplated, the following projects merit consideration:-

1. The "Mineral fault" appears to have served as a control of mineralization, and drilling into the fault, particularly to intersect the lower limestone horizon, is recommended.
2. Bulk sampling, and the sinking of a deep pit from surface on zone 8 would give a better picture of the true grade and attitude of this zone.

3. Shallow drilling in the vicinity of zone 13 deserves consideration, although the mineral occurrences in this area are apparently very erratic and generally of small dimensions.
4. An EM survey of the mineralized area proved unprofitable. The wide distribution of mineralized float makes it seem unlikely that geochemical methods would provide suitable targets for further exploration. It is possible that a self-potential survey along favourable structures might provide more useful information.

W. W. Moorhouse

GEOLOGY OF TINTINA SILVER MINES LTD.

LOCATION and ACCESS:

The property of Tintina Silver Mines Ltd. comprises a total of 302 claims, located in the St. Cyr Range, Yukon, 130 miles east - northeast of Whitehorse. Access is provided by plane to lakes in the vicinity, and during the summer of 1962 an airstrip was maintained six miles south of the camp. Equipment for the mining and drilling operations of 1962 was brought in along a winter road from the Alaska Highway, some 110 miles to the south.

PURPOSE of the GEOLOGICAL PROGRAM:

The program, of which this report is the result, was primarily to determine the geological setting of the silver-lead-zinc deposits already known on the Tintina Silver Mines Ltd. property, as an aid to the development program. The mapping was continued after the suspension of underground development and diamond drilling, to produce a reasonably complete picture of the geology of the mine area, and to determine if anything further could be learned about the localization and distribution of mineralization. Some interesting features developed out of this mapping (on a scale of 100' to the inch), although, as is to be expected, a number of important questions remain unanswered.

METHODS and CONDITIONS OF SURVEY:

Picket lines in the main mineralized area and northwest of the main area were used as a base for geological mapping. Picket lines in the south area were 100 feet apart; in the northwest grid they were 200 feet apart. Alternate picket lines (i.e. 400 feet apart) were extended to the northeast beyond the second grid, to permit mapping of the hornfels area. Areas outside of the picket lines were mapped by chain and compass. No

reliable contour maps were available for this detail of mapping, consequently the contours given are strictly diagrammatic, based upon an unreliable altimeter and elevations calculated from chain and compass measurements. The contours on the 500 foot to the inch sketch map are however from the form lines of the aero map.

Because of the high altitude and latitude, snow persisted everywhere but on south-facing slopes until well into July, and drifts still survived in sheltered hollows until mid-August. This seriously restricted the accessible areas, particularly in the cirque in which the underground work was done, until the summer was nearly half over. Also, as the snow disappeared, it was found necessary to recheck certain parts of the area, to map outcrops which had been covered during the initial work.

ACKNOWLEDGEMENTS:

The progress of the work was made possible by the co-operation and assistance of P. H. Heenan and Art Ashton. Messrs. W. G. Hainsworth and Al Crocker provided information and assistance as required. I am grateful to Paul Hammond for the opportunity of working in this interesting area, and for many favours during the summer and since.

REGIONAL GEOLOGY:

The area has been mapped only in a reconnaissance way by the Geological Survey. It is located southwest of the Tintina fault, which is regarded as continuation into the Yukon of the Rocky Mountain Trench. The terrain is mountainous, the mountains consisting of folded and faulted sediments, believed to be of early Paleozoic, possibly Precambrian age in part, which have been intruded by granitic rocks.

In the vicinity of Tintina Silver Mines Ltd., the geology (and topography) is dominated by a granodiorite plug, which is exposed in a

series of high peaks just north of the camp. It has an east-west extent of about $1\frac{1}{2}$ miles, and a north-south width of about a mile, on the crests. In the valley it extends south for half a mile, probably more, beyond the contact exposed on the crests. The plug is surrounded by rusty hornfels for a horizontal width of at least $\frac{1}{2}$ mile. To the south, the hornfels grade into less intensely metamorphosed argillites and limestones. A thick mass of argillaceous limestone appears to have been thrust over metamorphosed and unmetamorphosed rocks. Reference to the regional sketch map shows that the argillaceous limestone forms the peak of the West Mt., the crest of Cornice Ridge, the top of Facet Ridge, and Hornfels Ridge, up to the granite contact. The ridge and crest of Ramp Mountain is also probably of the same material, although it was not traversed. To the south, at Panthouse Peak on Cornice Ridge, and on West Mountain, the argillaceous limestone is overlain by a massive limestone (Peak Limestone) and dolomite, probably with a thrust contact. On Cornice Ridge the Peak limestone is separated from the argillaceous limestone by green and pink, platy shales.

The main structure appears to be anticlinal, the main area of mineralization being located near the crest of the structure. The structure is much complicated by minor folds and many faults, and is somewhat modified by the thrust mass to the southwest. The anticlinal structure appears in the cliff face south of the East Ridge, and on the west face of Facet ridge.

GEOLOGY OF THE MINE AREA

STRATIGRAPHY:

In working out the stratigraphy of the area, it is necessary to confine our attention to the rocks south of the hornfels zone. Within the hornfels zone itself, as we shall see, the formations are so distorted

and smeared out that the stratigraphic sequence is no longer evident.

The formations at the bottom of the section consist primarily of brown to purplish-brown argillite, which contains locally thin layers of argillaceous limestone and log-shaped boudins of similar material. Since the bottom of this unit is not known, we can only say that it appears to be at least 300 feet thick.

This unit is succeeded by a limestone bed, which in the cirque and in the adit, is a streaky, often sheared and fractured grey limestone, mottled with white. It weathers with a yellowish-brown colour, which becomes more obvious towards the head of the cirque. This appears to result from an increase in the amount of argillaceous and ferruginous material in the limestone, for here the mottled grey limestone appears to form lenses several feet in long diameter, enclosed in sheared argillaceous limestone. Fossils, usually appearing as white rings and conical bodies within the massive grey mottled parts of the limestone band, appear to be Archeocyathids, and seem to suggest that this phase of the limestone is of reef origin and of Lower Cambrian age. On the east-facing slope of the ridge east of the cirque, the limestone outcrops repeatedly, due to small minor folds. Similar, massive grey mottled limestone again occurs, but it is associated with laminated argillaceous limestone which is in the outcrop rather difficult to distinguish from some of the brown argillites. To the northwest, near the granite contact, the limestone becomes strongly recrystallized, locally with a scattering of garnets in it. In the mine area, this limestone unit has a thickness of approximately 100 feet, based upon one drill hole. To the east the bed thins drastically to between 25 and 50 feet. It is suggested that this variation is due to sedimentary thinning of the

bed, but reduction of thickness by shearing cannot be excluded. In its northernmost exposure, this bed has thickened to about 250 feet. This may be due to folding, which cannot be detected because of the massive, recrystallized nature of the limestone here, but it seems more likely to be a consequence of localized thickening by recrystallization flow.

The lower limestone unit is overlain by another argillite band, which appears to be roughly 100 feet thick in the vicinity of the adit, but to the north thickens to 150 feet. In the eastern section, on the other hand, it appears to have thinned, like the limestone, ranging from 10 to 50 feet. For the most part this is a grey to brown argillite, schistose, with obscure bedding which is only observable on the weathered surface. Locally, for instance west of zones 5 and 6, it contains black sections, which are spotted with dark, altered cordierite grains. An outcrop just north of zone 6 is strongly seams with narrow ($\frac{1}{4}$ to $\frac{1}{2}$ inch) veinlets of quartz, and is bleached to a grey, altered-looking rock. North of the adit, it is greyish in colour, and contains widely disseminated arsenopyrite. West of zone 6, it is cut by a number of narrow quartz veins, a few inches to 2 feet wide, striking roughly east-west, and dipping south, mineralized erratically with galena, sphalerite, pyrite, chalcopyrite, and sulphosalts. In the north section, between the Sidehill zone and zone 11, the argillite is massive, brown, with a fibre rather than a schistosity. Still further north, the argillite grades into hornfels.

The argillite is followed by a second limestone unit. Like the lower one, in the mineralized area it is a grey, mottled limestone, rather spiny on the weathered surface due to particles and streaks of quartz, probably secondary. This limestone differs from the lower one, however, in the absence of the yellow-weathering, argillaceous phase. It appears to be 30 to 50 feet thick in the mineralized area; one drill hole, S-1,

suggests an even greater thickness. To the east and north it thins considerably; this is very obvious in the southeast corner of the map-area, where it changes within 200 feet or so from 15 feet to 2 feet, and then increases again further to the south. The change of thickness in this area at least appears to be a primary sedimentary feature. The failure of this limestone bed to outcrop in the cirque east of zone 7 may be attributed to poor outcrop, as the slope in this area is covered with argillite talus, or it may actually have pinched out. To the north of the camp, this upper limestone band appears to be around 15 feet thick.

Overlying the upper limestone is a black, carbonaceous, highly sheared argillite. This outcrops on the ridge which forms the east side of the cirque, but is everywhere covered by talus on the west side. Its thickness appears to be very variable, probably for structural reasons. From the structural sections it would seem to be between one and two hundred feet thick. The very much greater thickness in the northern part of the map is thought to be largely a consequence of repeated folding. Bedding is rarely if ever visible in the black argillite. Foliation is everywhere strongly developed, not infrequently in two directions. Many outcrops, presumably on the crests of folds, are characterized by pencil structure in the argillite, caused by bedding-cleavage or cleavage-cleavage intersections. The black argillite appears to have been a very active structural zone, as most of the thrust faults have been observed, or inferred within it. The contacts with the underlying limestone are marked in many places by quartz lenses and veins. On the East Ridge at the south side of the detailed maps, the black and grey argillites appear to be irregularly mixed, possibly due to faulting.

Above the black argillite lies a strongly bedded, dark grey unit of argillaceous limestone. The beds vary from a few inches to a foot or so

thick, and they are intersected by one or more cleavages, and strongly folded into small anticlines and synclines with wave-lengths of a few tens of feet. No estimate can be made of the thickness of this unit, as the folding is so complex, and no younger formation occurs within the area mapped in detail.

The major thrust mass which overlooks the cirque on the west on Cornice Ridge, appears to be composed of the same material, and it seems reasonable to consider the two occurrences of argillaceous limestone as the same unit. If this is the case, the unit changes in character somewhat as we go up in the section, becoming more platy and yellow weathering. To the south it is overlain by variegated argillites and massive limestones and dolomites (Peak limestone). It is only possible to say that the unit is at least several hundred feet thick.

The hornfelses of the contact metamorphic aureole around the granitic stock (actually a quartz monzonite) are extremely varied in character. The most prevalent are purplish-brown to black hornfelses, many of which contain a large amount of cordierite. Among these are coarse, foliated cordierite rocks, which differ little in character from the normal hornfelses, except for the abundance and grain-size of the cordierite. Bands of white to green line silicate hornfelses, containing plagioclase, diopside, garnet, zoisite, locally scapolite and vesuvianite, and usually some iron sulphides, occur as thin seams and as bands up to several feet wide in the normal hornfelses. Bands composed almost entirely of garnet, or garnet and vesuvianite, also are interbedded with the hornfelses, usually in association with the line silicate zones, and with limestone layers. The limestones in the hornfels area vary from a few inches to 180 feet thick. The thin layers are fine-grained, grey to black, and appear to be parallel to the steep, nearly vertical foliation and bedding of the hornfelses. Near the north end of the mapped area, just south of the intrusive contact, however, there are

numerous patches and distorted masses of limestone in the hornfels, which appear to be rather gently dipping, for the most part. The thick limestone bands show intense folding in some outcrops. West of the hornfels zone, the black argillites have locally developed crystals of andalusite and cordierite (now altered). As mentioned above, the limestone units have been strongly recrystallized, and the argillites between and below the limestones are also hornfelses, some with coarse cordierites up to $\frac{1}{2}$ to $\frac{1}{4}$ inch long, producing a rock which weathers like the dalmatianite of the Noranda area. Green streaks of lime silicate hornfels are also present in them. The most puzzling feature of the hornfels zone is the absence of metamorphism of the argillaceous limestones where they overlie it. Rounded grains of scapolite are the only prominent metamorphic mineral occurring in them, although on the West Mountain, across from the camp, above the small cirque lake, a few dikes cut the argillaceous limestone above the thrust zone, and there zones of green diopside rock appear on their contacts. These evidences of metamorphism are limited, and for the most part this unit is relatively unaffected by contact metamorphism.

There are many dikes in the area, of three types. In the hornfels zone, near the intrusive stock, dikes of light coloured granite, from a few inches to several feet thick occur. A few of these appear to have steep dips, but many of them have a marked dip to the north. A wide diorite dike, with an irregular strike, cuts the thinly bedded hornfelses, with thin limy interbeds, just behind the camp. A similar dike, which may be connected with it, although there are no outcrops joining them, outcrops on the face of Hornfels Ridge, in the hornfels zone to the northeast, and appears to occupy a fault which has displaced the limestone band. A somewhat more basic diorite outcrops west of zone 6, and may be traced south to the top of the cirque head. Most abundant of all are the lamprophyres. These vary in character

from dikes which resemble altered diabase or basalt to typical mica lamprophyres (minettes). They range in thickness from a few inches to 25 feet, and strike in almost all possible directions. Many of these dikes contain rounded pebbles of granite, some of which reach the size of boulders 3 feet in diameter. In others the granites have largely disintegrated, but are represented by corroded grains of quartz and feldspar, which give the weathered outcrop of the dike a sandy appearance. Some of the dikes appear to occupy fault zones, although they are, with one exception, apparently younger than the main faulting.

Quartz and carbonate veins are widely developed. Lenses or veins of quartz-carbonate up to 100 feet wide (apparent width) cut the argillaceous limestone on the crest of the ridge which forms the southwest limit of the map area. There are several such veins and lenses in this thrust block, and the float from these bodies, which weathers yellow (presumably the carbonate is ankeritic), colours the slopes of this ridge. There is virtually no mineralization visible in these veins. Similar coarse-grained, yellow weathering carbonate, with quartz, occurs in the argillaceous limestones, near their contact with the black argillite, at the south side of the map area, on East Ridge on the east side of the cirque. Veins of pure quartz up to 6 or 8 feet wide occur here also, and one lens of quartz, associated with one of these large veins, is patchily mineralized with chalcopyrite, sulphosalts, etc. There is an abundance of carbonate veins and stringers, some with a little chalcopyrite and copper stain, in the base of the thrust block of argillaceous limestone, just northeast of the Crest zone. Many shatter zones, shear zones, and some faults, are seamed with carbonate and/or quartz.

STRUCTURE:

The dominant structure in the Tintina Silver Mines area is anticlinal. The adit, and the mineralized zones 1, 2, 3, 4, 5, 6, 7, 8 and various subsidiary zones, occur in the limestones in the undulating crest of this structure. The anticline is complicated by the thrust block of argillaceous limestone which has been thrust over it from the southwest, and on the east by a series of minor folds, each of which itself appears to be complicated by still smaller folds. The complex fold pattern has been rendered still more obscure by cross-faults and by suspected thrusts, which can be observed in the outcrop locally, but which have to be inferred, for the most part, from anomalous relationships of the various units. To the north, the crest of the anticline, or a parallel one, is visible on the slope above the road from the camp to the adit. The structure can be followed to the northwest corner of the map area, but only the east limb remains, the west limb being hidden in the drift of the broad valley to the west of camp. The anticline may reappear to the west, in hornfels on the West Mountain, but the structure here may be the effect of granitic stock, which crosses the valley at this point.

THE CROSS-SECTIONS:

A series of cross-sections has been prepared to illustrate the fold patterns. These cross-sections are drawn in a direction parallel to the cross-lines of the north grid (#2), and are spaced at intervals of 400 feet along the base line. South of the base-line # 2, on grid # 1 (south grid), the sections are drawn in the same direction, and are spaced at 500 foot intervals, with partial sections, showing the cirque basin, and East Slope, spaced at 250 feet from them. Thus for the area of greatest complication there are effectively sections every 250 feet. The sections have been drawn on a scale of 100 feet to the inch, and are all drawn looking north.

For Grid # 2 there is a large amount of conjecture in the sections as drawn. Several features have to be explained. One is the very marked contrast in structure between the hornfels zone surrounding the granitic stock, and the lower area to the west. This will be referred to in more detail on a following page. Another is the broad extent of black argillite and hornfels derived therefrom which lies between the hornfels zone and the main limestone unit. In drawing the sections, it has been assumed that the width of the black argillite is due to repeated small folds in the underlying limestones, which maintain the limestone at a relatively shallow depth. The same effect might be produced by the presence of the granite at shallow depth. The metamorphism of the hornfels and the presence of a few granite dikes in the black argillite and limestone support this possibility.

The displacement of the limestone outcrop to the north at lines 30 and 34 west have been interpreted as minor folds, although there is no evidence in the outcrop of the crests of these folds. It is possible that the limestones have been faulted rather than folded.

The minor fold at zones 11 and 11n is pretty well documented, as the crest appears to be exposed. The main anticline, as noted above, is exposed in the slope above the road to the adit. Only the flat west limb of the structure, in the lower limestone, is identifiable with certainty. The east limb appears to be represented by a very narrow band of sheared limestone, and by a right angled flexure in the hornfels-thin limestone outcrop just southeast of the camp. If this is just a minor crumple, and not the anticlinal limb, then the latter must have been obscured by faulting. I think the interpretation shown in the sections is probably the correct one.

Sections 8 + 00 and 4 + 00 N. show the first appearance of the major thrust. This is shown at the extreme left side of the section, and as a shallow plate at the base line. The latter has been introduced because

of the almost complete disappearance of the black argillite between the limestone units and the argillaceous limestone to the east, and because of the highly contorted and carbonate-veined character of the argillaceous limestone in the assumed remnant of the thrust plate. It will also be noticed that at the extreme right of 36 + 00, 32 + 00 and 28 + 00 W., on Hornfels Ridge, the beginning of another segment of the thrust-mass on the summit is shown. There is very little evidence of faulting here, except for the strong shearing of the rocks, and the sharp discontinuity in apparent intensity of metamorphism. There is a marked change in attitude as well as lithology, although this is not very marked at the contact itself. This is thought to be the continuation of the fault block on West Mountain, across the valley; if it is the continuation of the block west of the cirque (mentioned above), there has been upwarping of the block (nearly 1000 feet), which I believe is the case.

The relationship between the hornfels block and the rocks (hornfelsed and unmetamorphosed alike) to the west and south is obscure. In a few sections, the contact appears to be occupied by a fault, and this may be the situation throughout. There is however, little direct evidence to support this view. The structure of the hornfels body will be discussed more fully later.

Apart from the appearance of the southwest thrust block, sections O + 00 W and AB are similar to those to the north. In CD I have carried the same structure through, but it is cut off by the east-dipping thrust fault, which also appears at the east side of AB, but now as a steep-dipping structure. This anomalous structure is discussed under "faulting". In the sections southeast from AB, the two limestone units appear nearly horizontal, slightly warped. Section CD shows two minor anticlines on the east-dipping flank of the structure, before it is cut off by a fault. The fault appears

to outcrop on the nose of the east ridge, being occupied by a quartz vein, and brings the black argillite against a syncline of argillaceous limestone. Another syncline of argillaceous limestone lies just to the east, and to accommodate this, a rather large anticline in the black argillite and limestones (unexposed here) has been shown as tapering out between them. The limestones and brown argillite (rather hornfelsic) outcrop at the base of the east slope on this section. On section EF a second thrust fault has been introduced below the above one, to account for the thickness of the black slate in this area. In section GH these two faults appear to come together, and the lower one is thought to be occupied by a dike or sheet of lamprophyre, which outcrops here. In the same section another fault (presumably thrust) appears near the crest of the east slope; it appears as a crush zone in argillite one or two feet wide, which can be traced for some distance in outcrop. It is assumed to be a thrust fault, again. Complicated folding is apparent in the limestones below the lower faults in this section, and the same pattern continues to the end of the series of sections. A syncline of argillaceous limestone appears at the crest of the ridge on EF, and thickens to an immense outcrop which continues out of the map area.

In KL the thrust faults begin to merge into one. In section MN the structure in the vicinity of the thrust is very complicated, due to a number of faults, some of considerable magnitude, but the direction of strike does not lend itself to representation on the section. In OP two new faults appear, one near the base of the east slope, the other a steep fault which is nearly in the plane of the section, marking the contact between the black argillite and argillaceous limestone for a part of its course.

BEDDING, CLEAVAGE and LINEATION:

Over 1000 measurements of bedding, cleavage, and lineation were made during the mapping. These have been plotted on stereographic diagrams. In order to compare the structures in the various parts of the map area, it was divided up into several areas, the East Slope Area, the Adit Area, the Thrust Block Area, the Saddle Area, and the Hornfels Area.

In the Adit Area, covering the cirque basin south of the Mineral Fault, the bedding planes were not easily observed. In a few outcrops of the intermediate argillite, vague traces of bedding could be observed, due largely to the weathering out of carbonate grains. In the limestones, bedding is usually obscure, except where, in a few outcrops, thin layers of argillite outlined it, or where the argillite limestone contact could be observed, or where there was reason to believe that the argillite had been barely stripped from the limestone surface by erosion. This surface has a curious corrugated, wash-board appearance. Bedding in the black argillites was never observable with certainty. Plotting the bedding on the stereogram gives a peculiar double girdle, probably due to warping of the fold axis. The striking feature is the essential continuity of the girdle of points, a feature to be expected in view of the broad, open character of the fold.

Foliation in the Adit Area shows a strong concentration (indicating predominant southwest dips) in the northeast quadrant, which is expectable with the strong overturning to the east. The reverse northeasterly dips which are noticeable, are probably due to the effects of faulting and possibly, of refraction of the cleavage at contacts. The dominant plunges are to the east, but there are a considerable number to the west. The significance of the westerly plunges is discussed under mineralization. The lineation in this area consists of bedding-cleavage intersections, plunges of small folds, etc.

In the Saddle area, north of the Mineral Fault, the bedding poles are not distributed in a continuous girdle. There is a complete absence of intermediate northeast dips. There are many southwest to horizontal dips, and many steep northeast dips. Since many if not most of the bedding measurements were taken on the argillaceous limestone member, the moderately overturned small wave-length folds, with southwest dipping and near vertical limbs, result in this distribution of bedding poles. The cleavage pattern for this area is nearly the same as that for the Adit area. There is a small displacement of the cleavage maximum to the north here, and the only north dipping cleavages were found in black argillites. In general the black argillites have more irregular cleavage directions than the other units. An interesting feature of the argillaceous limestones in the Saddle area is the local occurrence of siliceous seams along the cleavage planes. These have been interpreted as "old cleavage", but in this area, there is no indication of a significant difference between these and the cleavages which lack these fillings. No significance can therefore be attributed to the "old cleavage" in this area.

In the East Slope area, bedding, particularly in the limestones, shows more scatter than in the Adit or Saddle areas. Probably the numerous faults in this area account for this scatter. There appears to be a small gap in the girdle of bedding poles near zero dips. This is possibly due to the relatively small number of dips measured, but it is also no doubt a consequence of the fact that on the crests of folds such as those illustrated on the sections, flat dips are not characteristic, rather the crestal areas appear to be made up of many small compressed folds. The foliation poles have a similar distribution to the Adit and Saddle areas, and like the latter, most of the northeasterly dips are in black argillite. Lineations are similar in their distribution to the Adit area.

The bedding in the thrust block for the most part dips gently southwest, although there are some moderate to steep northeasterly dips,

corresponding to the noses of the folds. The folding is strongly overturned, and although major structures are not visible Cornice Ridge, on the face of West Mountain, tight recumbent folds can be seen in the argillaceous limestone, confirming the type of folding represented in the cross sections diagrammatically and the evidence of the stereographic plot of the dips. The foliation, although in the same general direction as in the other areas, has a considerably shallower dip to the southwest, which is to be expected in the thrust block. So-called "old cleavages" were distinguished where possible from the general cleavage, and in this block show a considerably greater spread than does the general cleavage. This is taken to mean that the "old cleavage" has been displaced or even folded during the thrust movement. There is a considerably greater spread in the direction of the lineations in this block (and in the Saddle area) than in any of the other areas; in both it is conceivable that the variations result from differential movements on the thrust planes.

The Hornfels area displays a drastic difference in the distribution of bedding and foliation. Here both are restricted to steep dips, indifferently north and south. Thus, we have here a very different structural picture than in the rest of the map area. It is inferred that this is due to flow of the rocks, imposed on them during metamorphism and intrusion by the quartz monzonite. Where gentler dips occur, it seems probable that they are underlain by relatively flat intrusive contacts.

FAULTING

Faulting is responsible for much of the complication of the structure, and this is not made easy by the difficulty of identifying and tracing even major structures for any distance. Talus and drift cover many areas where major faults are suspected. and therefore the picture here presented is by no means complete

THE MAIN THRUST:

This structure does not definitely outcrop on the Cornice Ridge, although it does appear on Hornfels Ridge and on the face of West Mountain. It is believed to be visible near the end of the drive under the # 8 zone, where there are two main shears, intensely crushed, in black argillite, and probably many more minor shears. These shears, 3 feet apart, drilling from the end of the drive, indicate a variable dip 17° southwest, or less. There is, however, reason to suspect that the plane of the fault is considerably steeper than this (as it is on West Mountain), although locally it appears to flatten and even dip gently north, as for instance beneath the patch of the sole of the fault shown in the saddle. The rocks here are intensely veined with carbonate, shattered, and contorted. Locally shattering and veining is visible in the argillaceous limestone along the foot of the cliff east of # 8 zone. The presumed fault over the hornfels zone, however, does not show such contortion, only shearing is evident. On West Mountain also, where the contact is visible, it is tight, although there is some contortion in the argillaceous limestones and underlying argillites.

There is not any marked stratigraphic anomaly associated with this thrust on Cornice Ridge, or on West Mountain, for the argillaceous limestone lies mostly on the black argillite, which is believed to underly it in the normal stratigraphic sequence. The contact with the hornfels is necessarily stratigraphically discordant. It is therefore thought that though the movement of this thrust may have been considerable, it has been largely restricted to the black argillite, where it has behaved as a glide surface. It is tempting to attribute this fault to the lateral displacement of the underlying formations caused by the intrusion of the quartz monzonite body; this hypothesis could be tested only by a regional study which was not possible in the present investigation.

OTHER THRUST FAULTS:

Another intensely sheared zone in black argillite is found underground, at station 1-14, where the argillite overlies the main limestone unit. The fault consists of several feet of intensely crushed, crumbly, carbonaceous material, and has a variable dip, probably about 25°, if it has the relationship suggested in the cross-section.

A series of branching thrust faults have been inferred from the geological relationships on the East slope. One of these faults, at least, can be seen in the outcrop, as mentioned earlier; others are occupied by lamprophyre, quartz veins, and silicified zones; two are also required by the disappearance of certain units, or unusual and otherwise inexplicable thicknesses of others. It should be emphasized that it is not known that these are thrust faults; where the fault appears in outcrop, it has a rough east-west strike and a southerly dip of 40°, which is not inconsistent with a thrust movement. Otherwise the dip and direction of movement has simply been inferred from the properties of the Main thrust.

THE LIBERAL FAULT:

This very interesting structure appears to be a thrust fault at least on its westward extension. It was inferred from the abrupt change in structure between the limestones and black argillites exposed in the vicinity of zones 1, 2, 3 and 4, and the cliff of argillaceous limestone and black argillite just to the northwest. It is thought that there may have been a vertical movement of perhaps 300 feet, but this is sheer guess-work. There is considerable distortion and much carbonate veining in the argillaceous limestone near the fault. Its dip is unknown but is thought to be at least 40°. The fault appears to follow the creek downhill to the east. Where it is exposed in the creek bed, on the East slope, it is not particularly prominent, but consists of a brecciated zone perhaps 5 feet wide, healed with carbonate.

In this area, a measured dip of 67° to the east was obtained, and a lateral displacement of only 14 feet in the argillaceous limestones - black argillite contact was determined. It is thought likely that as the fault curves to the south the displacement increases and becomes more characteristically a thrust fault. It may be a hinge fault, for downhill to the east the displacement appears to increase and to be in the opposite sense from the movement in the adit area. I suspect that this fault, which dips in the wrong direction for a thrust fault, if it has been formed at the same time and under the same stresses as the Main thrust, resulted from the resistance of the relatively thick limestone units in the Adit area. These warped only slightly, instead of folding incompetently. To the north of the fault, the limestones may have been thinner, and become more strongly deformed due to the intrusion of the quartz monzonite plug. This, of course, is only a theory; but we do know that the limestones vary rapidly in thickness, and this mechanism would account for the presumed direction of movement, opposed to that of the main thrusting. The apparent change in direction and amount of movement as it is followed downhill to the northeast, is probably due to the thinning, and more intense folding of the limestone beds to the east.

The extension of the Mineral fault to the south is not known, disappearing, as it does beneath talus from the Cornice ridge. Minor faults and stress joints in the south face of the ridge (# 8 zone cliff), which strike south to southeast and dip east may represent the continuation of the fault, but they do not appear to continue across the ridge.

The Mineral fault is an interesting structure in that mineralized zones 1, 2, 3 and 4 occur close to it, in the supposed hanging wall, zone 9 occurs in the footwall, and the Fall zone occurs in the fault itself. Also of interest is the behaviour of two large lamprophyre dikes which strike into the fault zone. Here they splay out into a number of narrow, irregular

dikes, apparently because of shattering along the fault. It seems necessary to conclude that they are younger than the fault, like the mineralization.

MINERALIZATION AT FAULTS

Present faults are recognizable in most parts of the map-area. They are most abundantly observed in the East Slope area, probably because of the good exposure and more rapid lithological changes. A stereographic plot of strikes and dips indicates considerable variation but a majority of these faults appear to strike northeasterly and dip south. The displacement in the majority of these structures is only a few feet, more if measurable. The movement on these structures is variable; in some the east side appears to have moved west. In some, changes in thickness across the faults suggests that vertical movements are considerable.

MINERALIZATION

There are several types of mineralization in the area. The mineralization which was the object of development during the spring and summer of 1922 was silver-lead-zinc consisting predominantly of sphalerite and galena. Pyrite is erratic in its occurrence, and chalcopyrite rather rare. Silver is thought to be chiefly in the form of freibergite. The mineralization is in part in massive lenses and streaks, in part in vein-like streaky disseminations. The country rock in this type of mineralization is one of the limestones or the argillaceous limestones.

Quartz stringers and lenses, usually striking roughly east-west, and dipping south, occur in the circles south of zone 6. The quartz is irregularly mineralized with galena, sphalerite, pyrite, chalcopyrite, and freibergite. They vary from an inch or two to 2 feet thick, and unfortunately carry only low values in silver. The stringers at # 7 zone, and related

streaks of mineralization to the west, strike in the same direction as the quartz veins, but are in limestone, while the quartz veins are in argillite. Disseminated mineralization was intersected in one drill hole in the limestone. Similar, erratically mineralized quartz veins, one a lens up to 5 feet wide, occur on the east boundary of the claim group. Good values are obtained from well mineralized samples, but chip samples across the wide vein gave only low assays.

A little chalcopyrite occurs locally in carbonate and quartz-carbonate veins associated, apparently, with the sole of the thrust block. Veinlets up to 4 inches thick, heavily mineralized with chalcopyrite also occur west and below the quartz veins on the east boundary of the claim group. None of these appears to have any economic significance.

A vein heavily mineralized with arsenopyrite occurs in brown hornfels northeast of mineralized zone 13. This mineralization does not appear to contain values of interest. Disseminated arsenopyrite is widely distributed in the brown intermediate argillite west and north of the adit. Samples of this were assayed, but contained negligible amounts of gold.

Near the contact of the quartz monzonite, limestone bands and patches in argillite are rimmed with pyrrhotite, which is generally quite massive. Pockets and disseminations of pyrrhotite are widespread in hornfels and lime-silicate bands, but they appear to lack economically interesting minerals such as chalcopyrite or scheelite.

The mineralization may also be classified on the basis of structure and country rock, as follows:

1. lenses, pods, and disseminations in the upper and lower limestone units, at the contact with overlying argillite (either black argillite or the brown intermediate argillite). Includes zones 1, 2, 3, 4, 5 and F, 11,

11n, Sidehill, and possibly 6.

2. streaks and disseminations along shears in the two limestone units (zones 7, 9a, 5b, 6 (in part), 6c, 12, 13, 15) and in argillaceous limestone (zones 9, Fall) associated with the Mineral fault.
3. lenses, bands, streaks and disseminations in sheared and fractured, *generally south* ~~generally~~ dipping thrust fault zones in the argillaceous *limestone* in zones (e.g. 7 8, Cornice, Ridge, and West Mountain zone).
4. fracture fillings, usually narrow, but locally widening into blebs up to 2 feet in diameter, in the upper limestone unit (7 7 zone)
5. narrow quartz veins or rationally mineralized, as described above (at least in circle, in argillite and argillaceous limestone, and at east boundary of property).

The direction of mineralized zones (excluding zones 1, 2, 3, 4, and 5) were plotted on a stereographic net. They have a similar distribution to fault directions, which is not really surprising since all the examples measured occur in sheared, fractured, or faulted structures.

DETAILS OF INDIVIDUAL MINERALIZED ZONES:

Zones 1 and 2:

Mineralization occurs in the upper limestone unit, just west of *the contact* with black argillite. Massive sphalerite and galena is *exposed* in a rock trench on this zone. Surface sampling in the fall of 1921 was restricted to packback drilling. Assays from this drilling were *generally* ~~generally~~ low, except for a few short high-grade sections. In the summer of 1923, 4 vertical holes were drilled through the mineralized section. Assay results, as reported by Hinshaw, again were generally low, but there was one high-grade section 1 foot thick. There is some silicification

or silication at the contact of the limestone and argillite.

Zone 3:

The mineralization occurs in limestone, around its curving contact with a small syncline of overlying black argillite. Assays of 40 to 50 oz. Ag. were obtained over widths up to 7 feet in three trenches in the 1961 program. No further work was done on these showings during the summer of 1962.

Zone 4:

Three trenches were put down on mineralization in limestone on the north side of the same syncline of black argillite in 1961. Three packback drill holes were also drilled at that time. Except for two short sections, values were generally lower than in zone 3. Two packback holes, 15 and 17, drilled close together, intersected interesting values, up to 92.7 oz. Ag., at a depth of about 20 feet. Limestones bordering the argillite south of # 4 zone are unmineralized. Thus the prospects of finding mineralization in commercial quantities beneath the black argillite capping, do not seem particularly promising.

Zone 5:

This zone is a crescent shaped mineralized area, in the lower limestone unit; apparently just below the overlying argillite, which outcrops just to the east of the east side of the crescent. Best assays and widths were obtained from a trench at the center of the crescent. As Minworth has reported, the zone does not appear to extend much below the outcrop.

Zone 5a:

A mineralized section was encountered underground in the 101 and 102 crosscuts. In the latter, the mineralization was unusual in its siliceous character, and in the relatively high silver, and low lead

and zinc. On surface, a discovery of float lead to the uncovering by trenching of about two feet of sulphides and mineralized quartz, striking in a proximately the same direction as the 5a underground.

Zone 5b:

A shear zone along the side of the limestone outcrop was revealed by trenching to be at least 2 feet wide. It was mineralized with galena and sphalerite. Similar mineralization was found about 25 feet to the south, in a cleft between limestone outcrops. The shear strikes about 110° and dips about 70° S.

Zone 6:

This mineralization again is located in limestone at the contact with the overlying argillite. As mentioned by Hainsworth, drilling from underground indicates that this contact is quite flat. The situation is complicated by the presence of a vein or lens of quartz, $1\frac{1}{2}$ to 3 feet thick. Since the vein was not encountered underground, it is probably only a lens. Some good values were obtained from this mineralized zone (up to 174.9 oz. Ag.), in 1901.

Zone 6a:

This zone was discovered during mapping in 1902. It has been exposed by trenches over a length of about 70 feet, direction about 100° . At the west end, 2 feet of heavy galena and sphalerite are exposed on the edge of the outcrop. Intermittent occurrences of mineral were found to the middle of the zone, where scattered lenses of sphalerite and galena occur over a width of at least $5\frac{1}{2}$ feet in sheared, argillaceous limestone. At the east end of the shear, a trench revealed about 2 feet of weathered sphalerite and galena.

Zone 7:

This consists of two parallel seams of sulphide in the lower limestone unit, for the most part a few inches wide, but locally widening out to 1 foot. The strike of the seams is 76° to 78° and the dip is vertical or steep south. High assays, up to 149 oz. Ag., were obtained in 1961 from narrow widths (up to 6 inches) on this zone. Similar narrow seams, with local expansion into pods a foot or two thick, occur on the same outcrop as # 7, to the west.

Zone 8:

The # 8 zone differs from all those hitherto described in its location in the highly contorted argillaceous limestone above the thrust on the cornice ridge. The mineralized zone strikes about 140° , has an undetermined dip, probably less than 40° to the southwest, and an exposed length of nearly 400 feet. The mineralization is very irregular, consisting of streaks and lenses of massive sphalerite and galena, from a few inches to 2 feet or so wide, apparently cutting across the schistosity, and streaks and disseminated zones parallel to the schistosity. There is a few mineralized quartz veins, one with chalcopryite. Widths range from a few inches to as much as 20 feet, but in the larger widths, bands essentially unmineralized occur within the zone. Measurements of strike of individual lenses and streaks range from 75° to 165° and dips from 29° or to steep south. It is unlikely that these represent the strike and dip of the zone as a whole.

The irregular distribution of the mineralization makes the problem of sampling a difficult one. A further difficulty is that since the true dip of the zone is not known, the true width is also not certain. It seems that the only way in which an accurate idea might be obtained would be to bulk sample the zone, by means of a number of surface pits. One of these could be sunk to a sufficient depth to get some idea of the attitude of the

zone as a whole.

Zone 9:

This rather short zone is found on the footwall of the Mineral fault, in argillaceous limestone. A width of 8 feet of siliceous mineralization is exposed in one of the trenches. Good values were obtained in two of the trenches on this zone in 1961. Another zone, possibly an extension of # 9, was uncovered in 1962 about 50 feet to the south. It strikes about 125° and has an exposed length of 29 feet. A chip sample, of sphalerite and galena, over 1.3 feet yielded 8.2 oz. Ag., 12.2% Pb., and 7.9% Zn. on assay.

Zone 10:

This small exposure of mineralization is believed to be in the upper limestone unit. It may be in a large boulder.

Zone 11:

This is a rather irregularly mineralized area in limestone and contact metamorphosed limestone, where the contact of limestone and argillite is transected by a diorite dike.

Zone 11a:

Along the contact between the brown intermediate argillite and the limestone, apparently folded into a small anticline, a quartz vein nearly 30 feet long and a little over a foot thick, together with silicified limestone, is mineralized with galena, sphalerite and pyrrhotite.

Zone 12:

This is a vein-like series of lenses of massive sulphides, striking at 65° . Some disseminated sulphide occurs in the limestone walls, and in contact silicates along a pegmatite dike, which cuts across the zone. Maximum width of mineralization is about $2\frac{1}{2}$ feet, exposed length

Cornice Zone:

This is located in talus between 5900 and 6000' on the Cornice ridge. It is difficult to know the trend or dimensions of this mineralization because of the heavy talus and the presence of permanently frozen gossan. There are lenses of massive sulphides and streaks and patches of sphalerite, in shattered argillaceous limestones. A chip sample over 2.1' gave 68.8 oz. Ag., 40.8% Pb. and 19.8% Zn., while a grab sample of heavy sulphide gave 28.8 oz. Ag., 51.4% Pb. and 17.7% Zn.

Fall Zone:

This is located on the East Slope, in the bed of the creek, in a breccia zone on the Mineral Fault. The sphalerite occurs in seams and fractures in the argillaceous limestone. The mineralized zone appears to have a length of about 120 feet, although most of it is inaccessible because of the steepness of the slope. A grab sample from the bottom of this zone gave 37.0 oz. Ag., 20% Pb. and 38.9% Zn.

Ridge Zone:

Trenching in the vicinity of a prominent occurrence of mineralized float, revealed argillaceous limestone, much fractured, and seamed with sphalerite veinlets. A chip sample over 1.6 feet in this zone gave 12.3 oz. Ag., 12.1% Pb. and 13.3% Zn. The mineralization does not appear to be very extensive, although the outcrop is heavily mantled with talus here, so that clear exposures are few.

Sidehill Zone:

This zone was opened up in 1961, and the trench reveals a 3 foot lens of heavy sulphides, apparently in the upper limestone unit. A 3-foot chip sample of this showing gave 10 oz. Ag., 6.2% Pb. and 26.2% Zn. Outcrop extends for 60 feet southwest of the showing, but no further mineralization appears in it.

West Mountain Zone:

This zone was discovered late in August 1962. It is well exposed on virtually bare rock on the mountain side, easily and safely accessible when the snow is gone. The mineralization is rather irregularly and erratically distributed over an area at least 400 feet long and up to 100 feet wide at its western end. It is located at the contact (believed to be a thrust fault) of argillaceous limestone and black argillite, in this respect strongly reminiscent of the # 8 zone. It appears to be located at a warp in the thrust plane. The mineralization is varied in character; some is associated with silicified material. Some very striking mineralization contains pyrrhotite. Eleven chip and grab samples were taken from various lenses and bands of ore. Silver assays were generally low, the best being 14.7 oz. from 2.8 feet of massive galena and sphalerite. The longest chip sample taken, over 42 feet, gave 2,00 oz. Ag. A chip sample over 3.1 feet of massive sulphides gave 9.22 oz. Other assays were less than this. The most significant consideration regarding this mineralized zone is the similarity to the # 8 zone, indicating that the base of the thrust block of argillaceous limestone is a favourable location for mineralization.

QUARTZ VEINS AT HEAD OF CURVE:

There are 10 or 11 veins in this category, mineralized with galena, sphalerite, pyrite, sulphosalts, and locally, chalcopyrite. They range in thickness from an inch or two to 2 feet, averaging perhaps 6 inches. They strike in a general east-west direction, and dip to the south. All are located in argillite above the lower limestone unit, except one lens to the southeast, which is in argillaceous limestone of the thrust block. For the most part assays from these veins were disappointing. The best was from a vein containing massive galena, of which only a few feet are exposed, viz. 79.0 oz., with 52.42 Pb., over 5 1/2".

VEINS ON THE EAST BOUNDARY:

These veins were visited by helicopter with Nels Hals. The main showing consists of two lenses of quartz, one 3 feet wide and 9½ feet long, striking 93° and dipping 70° south, and another, 9½ feet north of this, 5 feet thick and 19 feet long, striking at 95° to 115° and dipping 54° S. A streak of heavy sulphide mineralization extends north along the hillside for a few feet, from the west end of the lens. A chip sample over 5.8 feet of the large lens gave only 0.46 oz. Ag. and a trace of gold, although it contained well-mineralized streaks. A grab sample of the well-mineralized streak to the north gave 17 oz. Ag. and .06 oz. Au. Another vein (possibly a boulder) outcrops to the east, across a small stream.

THE CONTROLS OF MINERALIZATION

There does not appear to be any well-defined zoning in the mineralization so far discovered. It is true that the West Mountain zone, so similar otherwise to the # 8 zone, appears to have much lower silver values than the latter, and it is much closer to the quartz monzonite intrusive. On the other hand, the mineralization in zone 13 seems to carry just as much silver as zones much farther from the granite. It occurs in recrystallized and silicated limestone, enclosed in hornfelses, suggesting that the quartz monzonite is not far away.

The main structural environments of mineralization have already been summarized. Two structures seem to be associated with a majority of the mineralized zones; one of these is the Mineral fault. Close to it are zones 1, 2, 3 and 4, and possibly zone F. Zone 9 and the Fall Zone appear to be actually in it. It is tempting, then, to regard this structure as a major line of movement of mineralization. For this reason, in any future program of development, the intersection of this fault, particularly with the lower limestone unit, should be probed by drilling.

The other important structure is the thrust fault or dislocation at the base of the overthrust argillaceous limestone. In this structure, or close to it, are the # 8 zones, the Ridge zone, and the West Mountain zone. The Cornice zone occurs some distance above the sole of the Thrust, but it is impossible to deduce the shape of this sole, and it may be much closer to the thrust plane than is evident from the surface geology or suggested in the cross-sections. It seems likely, from the fracturing and strong folding along this thrust, that irregular zones have been made accessible to mineralizing solutions in this way. Since the overthrust argillaceous limestones are extensive, it appears that a considerable length of favourable contact remains to be prospected. Unfortunately, much of this contact is obscured by drift and slide-rock, so that the task of finding more mineralization is not likely to be an easy one.

Other mineralized zones appear to be related to minor shears in the limestone units; among these are 5a, 5b, 6a, and 7. Except for 5a, underground none of these appear to offer any prospect for profitable development.

The mineralization in zones 10, 11, 11n, 12, 13 and 15 seems to be patchy and erratic. In zone 13, to be sure, a fair width of mineralization appears to be exposed, but it appears to peter out in both directions on the outcrop; overburden is thick and hampers prospecting. Prospects do not look good for this section, as there appear to be no pointers to a target area.

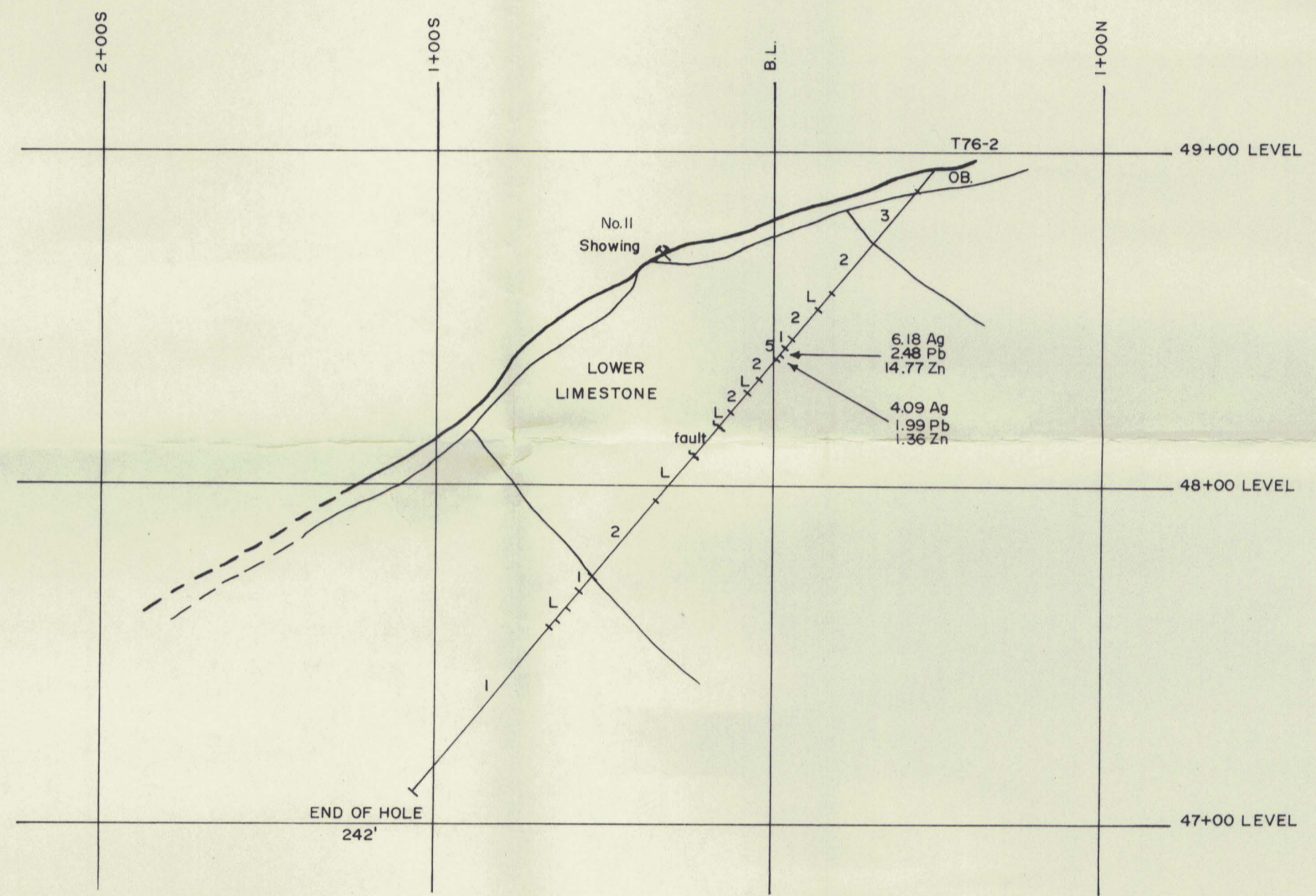
One feature which seems to be shared by a number of mineralized occurrences is the local reversal of plunge of lineation. These reversals are found particularly along zone # 8, but there are also some indication of reversals near # 3, # 4, # 5, # 6, # 7 and # 9 zones, and the ridge, sidehill, and Cornice zones. Zones 11, 11n and 12 on the other hand, are characterized by normal easterly plunges. In addition to this, there is some suggestion that there is a flattening and even slight recurving of the

thrust-fault surface just below the mineralized zone on West Mountain, although the plunge of minor folds above the zone appear to be to the east. There are one or two places where reverse plunges were observed, and no mineralization is known to exist. It is possible that such places might warrant further investigation.

Toronto, Ontario.
April 19, 1963.

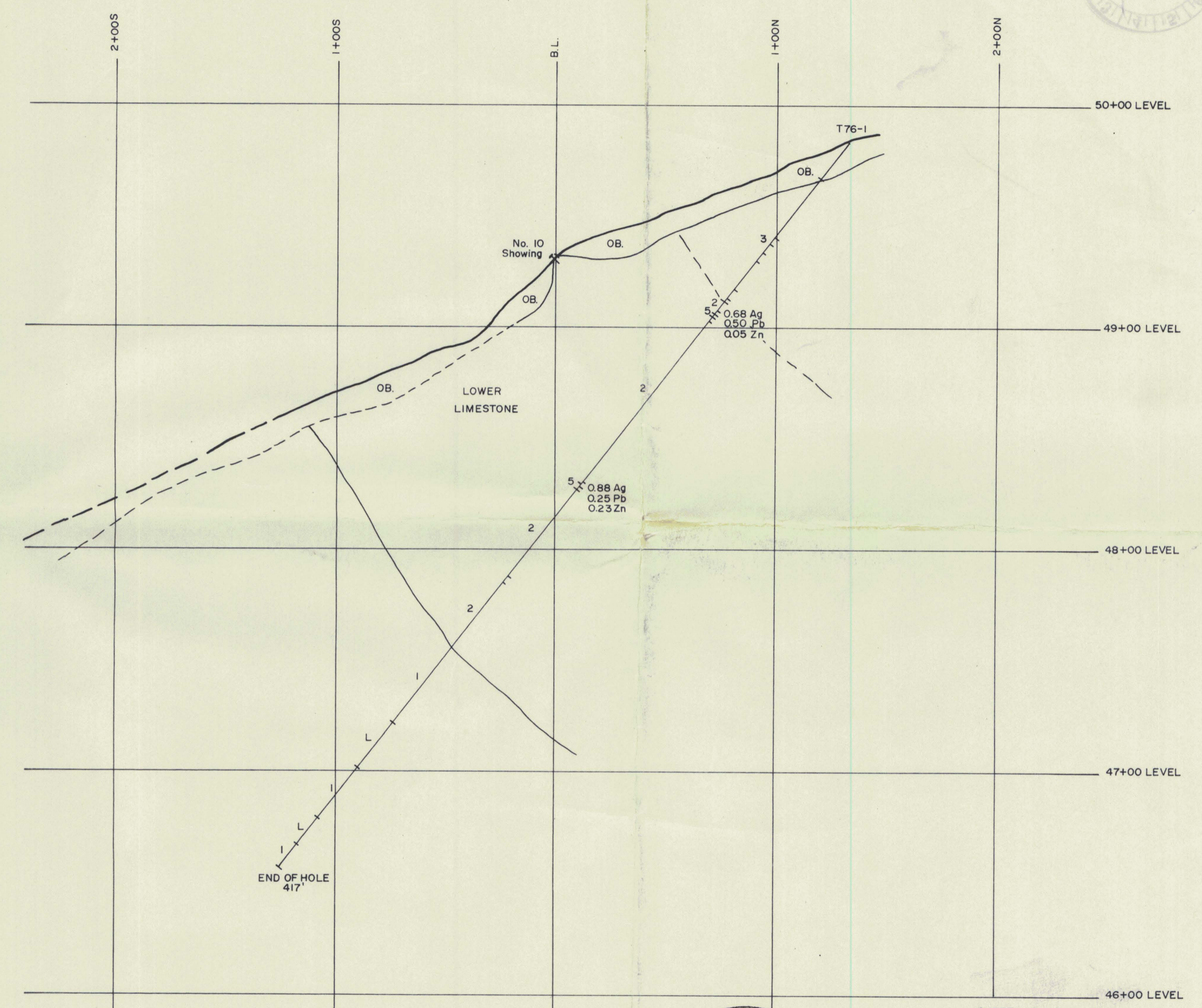
W. W. Moorhouse, Ph. D.

SECTION 12+00W



PLAN NO. 1

SECTION 9+81W



GEOLOGY LEGEND

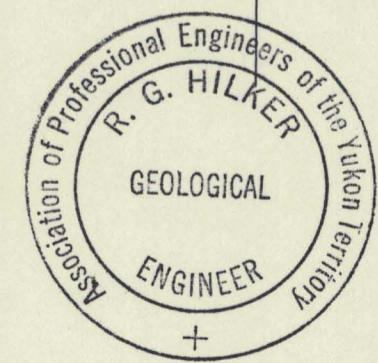
PALEOZOIC

CAMBRIAN

TINTINA SERIES

- 5 Argillaceous limestone, lime phyllite, hornfels
- 4 Upper limestone
- 3 Middle argillite, hornfels
- 2 Lower limestone
- 1 Lower argillite, hornfels
- A Argillite - undifferentiated
- L Limestone - undifferentiated

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WHITEHORSE, Y. T.



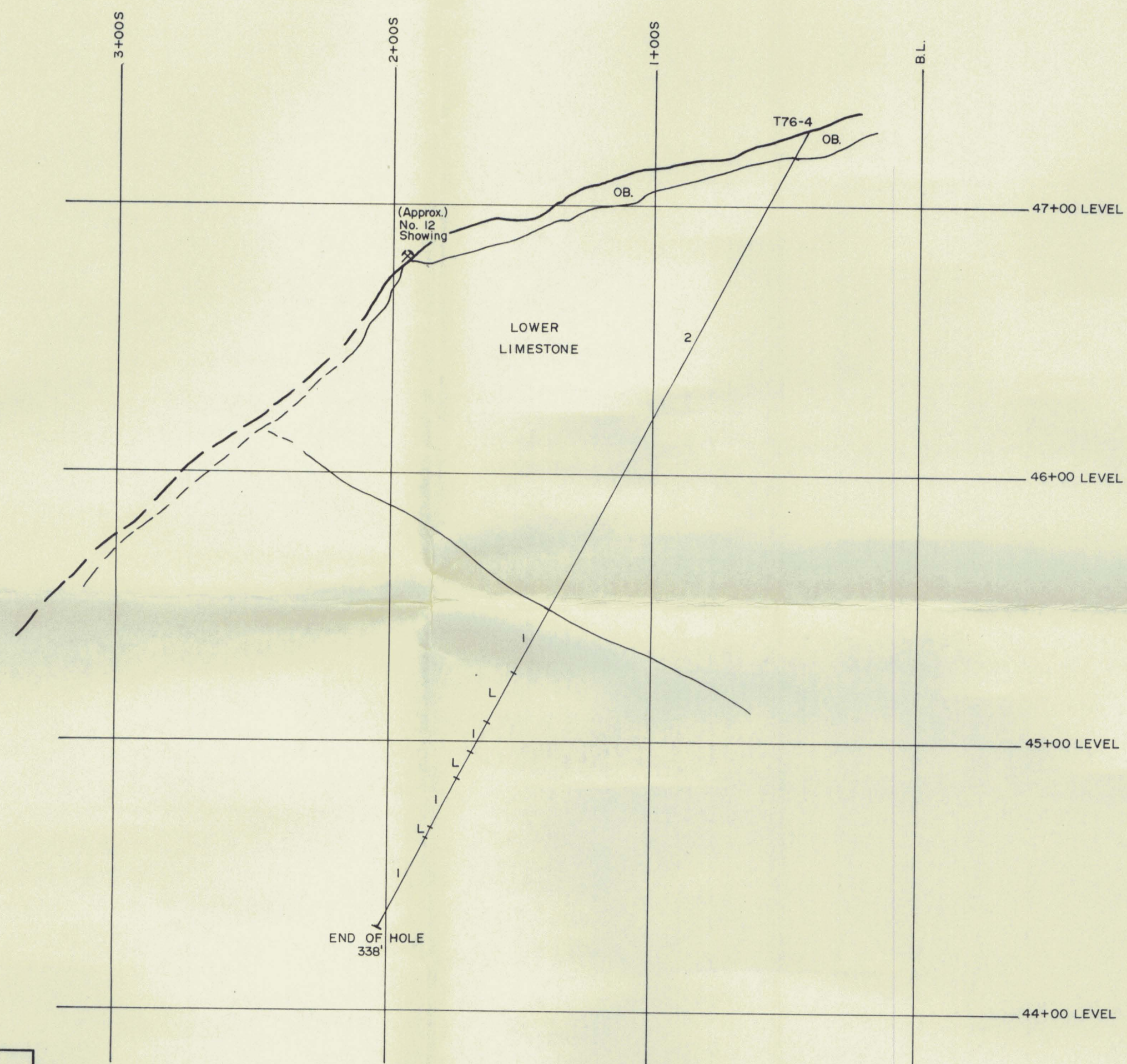
SHEET 105-G-3

TINTINA SILVER MINES LIMITED

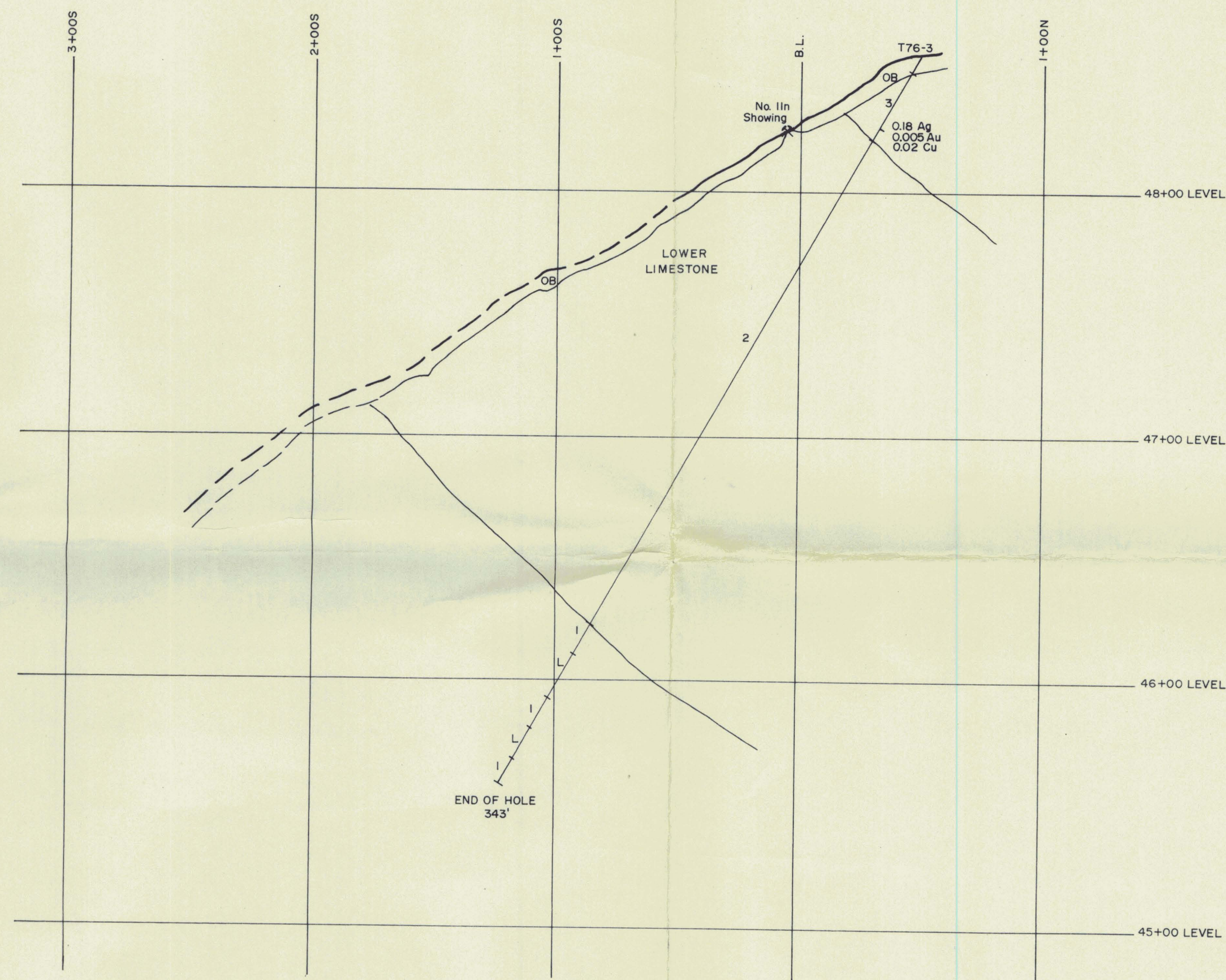
DIAMOND DRILL HOLES
T76-1 & T76-2
1976 WEST SLOPE GRID

DATE: JULY 1976	SCALE: 1" = 40 feet
EAGLE # 42	DWG: R.G.H. & G.G.C.

SECTION 20+65 W



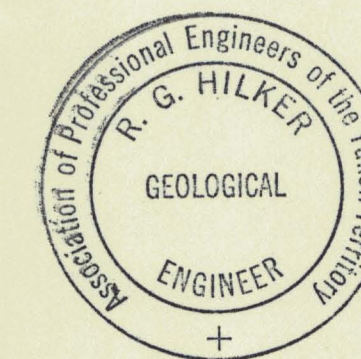
SECTION 13+67 W



GEOLOGY LEGEND

- PALEOZOIC
- CAMBRIAN
- TINTINA SERIES
- 6 Argillaceous limestone, lime phyllite, hornfels
 - 5 Black argillite, hornfels
 - 4 Upper limestone
 - 3 Middle argillite, hornfels
 - 2 Lower limestone
 - 1 Lower argillite, hornfels
 - A Argillite - undifferentiated
 - L Limestone - undifferentiated

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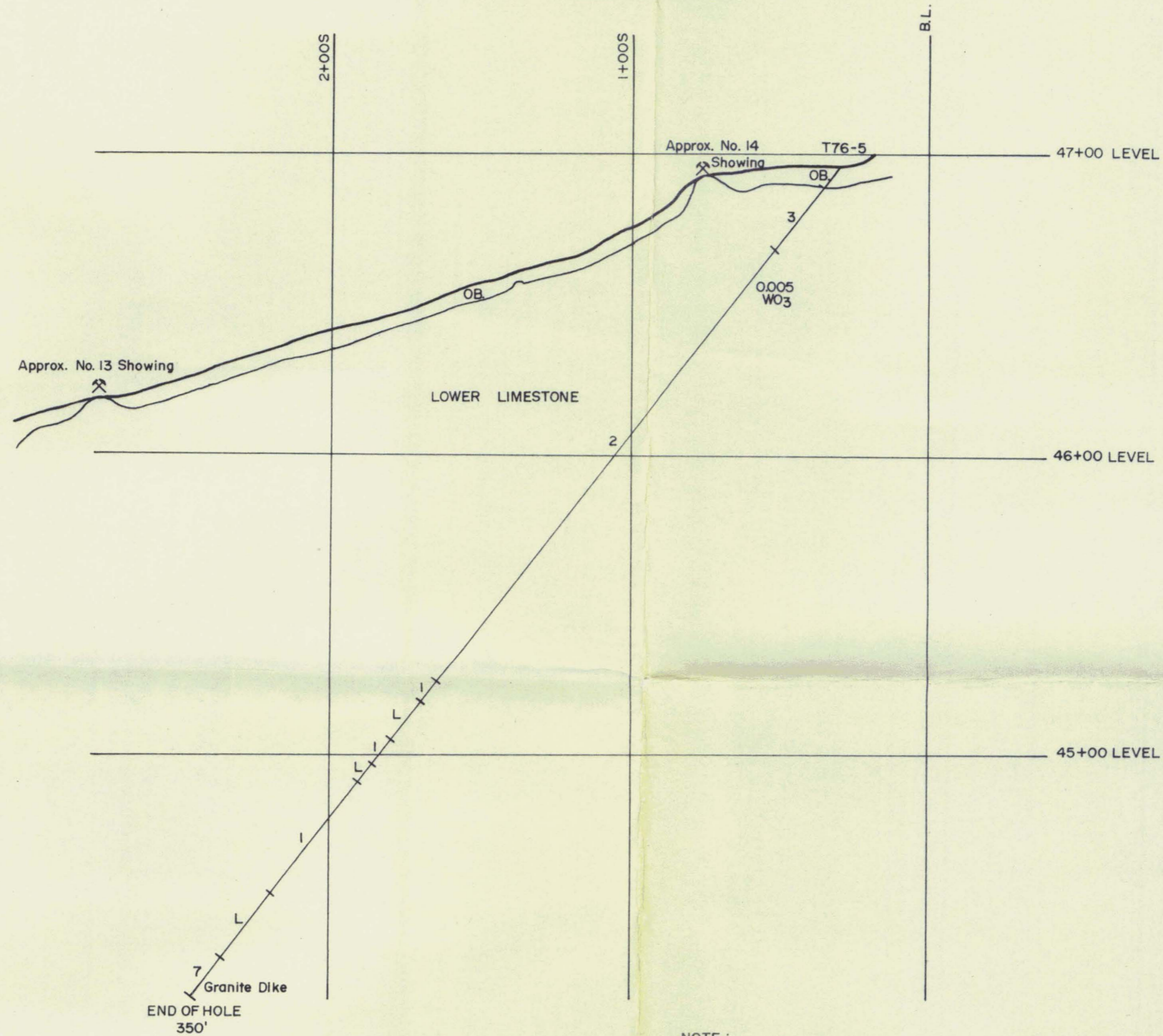
SHEET 105-G-3

TINTINA SILVER MINES LIMITED

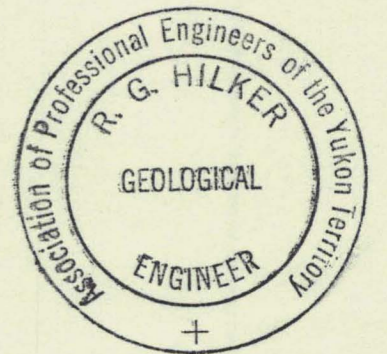
DIAMOND DRILL HOLES
T76-3 & T76-4
1976 WEST SLOPE GRID

DATE: JULY 1976	SCALE: 1" = 40 feet
EAGLE # 42 & 43	DWG: R.G.H. & G.G.C.

SECTION 28+00W



NOTE: DRILL CORE FROM T76-5 CHECKED FOR TUNGSTEN



SHEET 105-G-3

TINTINA SILVER MINES LIMITED

DIAMOND DRILL HOLE

T76-5

1976 WEST SLOPE GRID

DATE: JULY 1976

SCALE: 1" = 40 feet

EAGLE #43

DWG.: R.G.H. & G.G.C.

GEOLOGY LEGEND

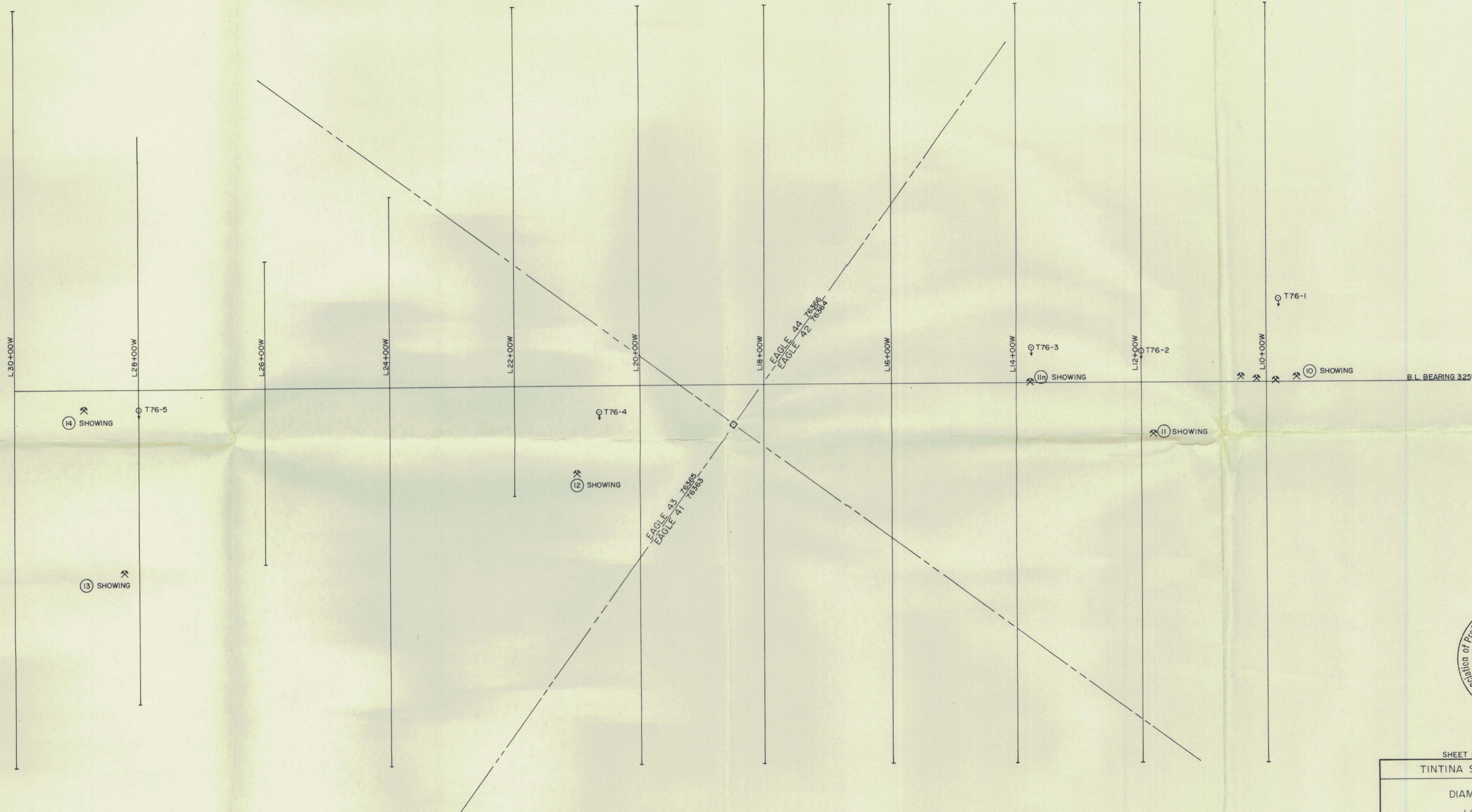
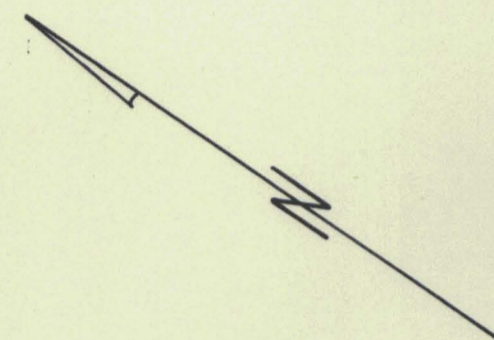
PALEOZOIC

CAMBRIAN

TINTINA SERIES

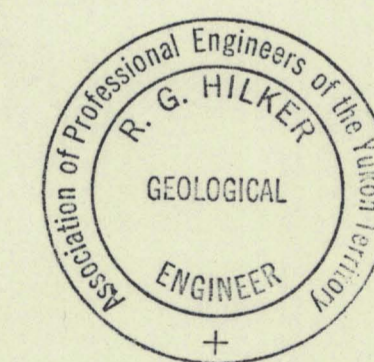
- 6 Argillaceous limestone, lime phyllite, hornfels
- 5 Black argillite, hornfels
- 4 Upper limestone
- 3 Middle argillite, hornfels
- 2 Lower limestone
- 1 Lower argillite, hornfels
- A Argillite - undifferentiated
- L Limestone - undifferentiated

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LEGEND

- ⊗ 10 Sulfide surface showing
- T76-1 Diamond drill hole collar



SHEET 105-G-3

TINTINA SILVER MINES LIMITED.

DIAMOND DRILL HOLE
LOCATION PLAN
1976 WEST SLOPE GRID

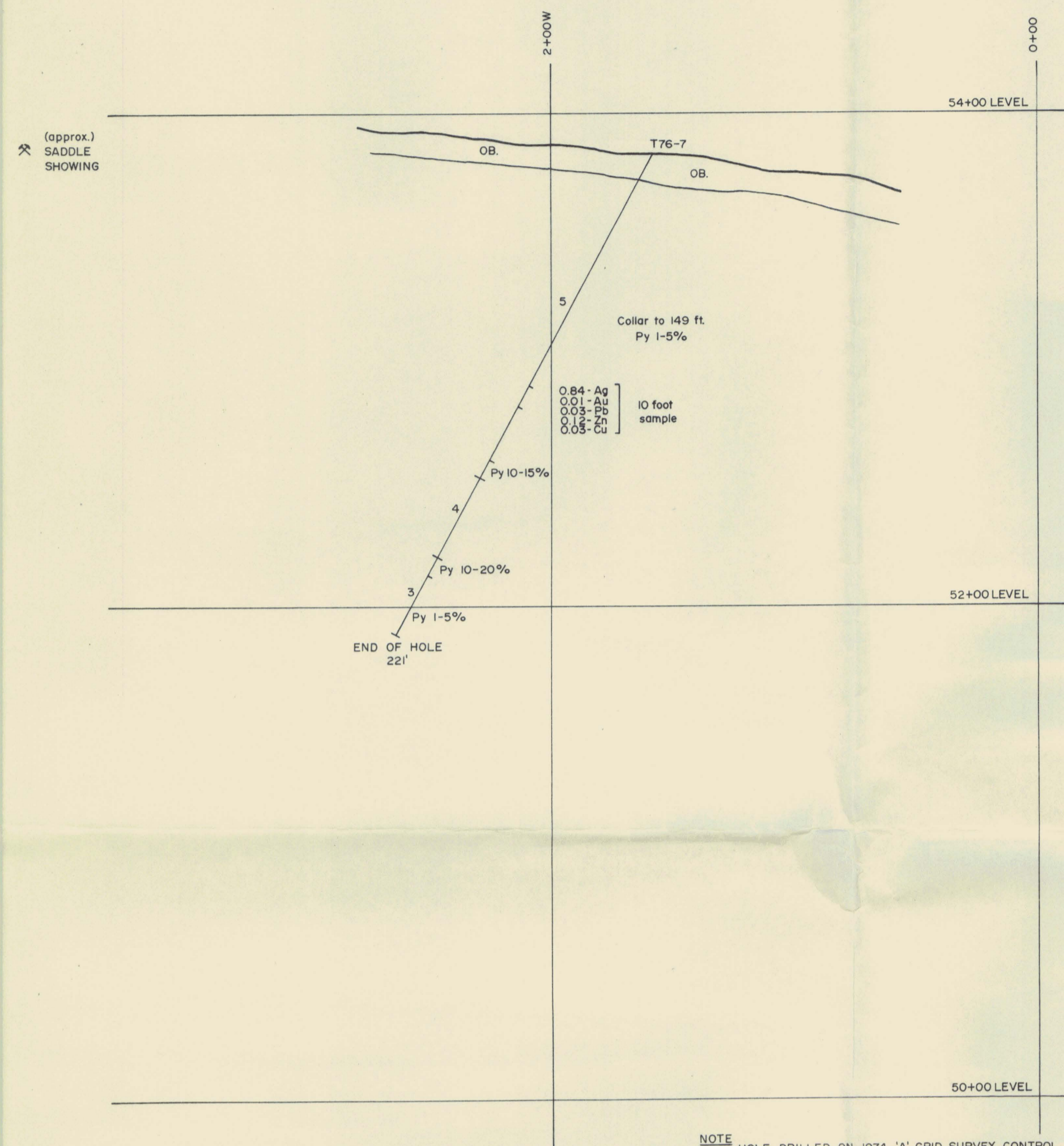
DATE: JULY 12, 1976

SCALE: 1" = 100 feet

EAGLE # 42 & 43

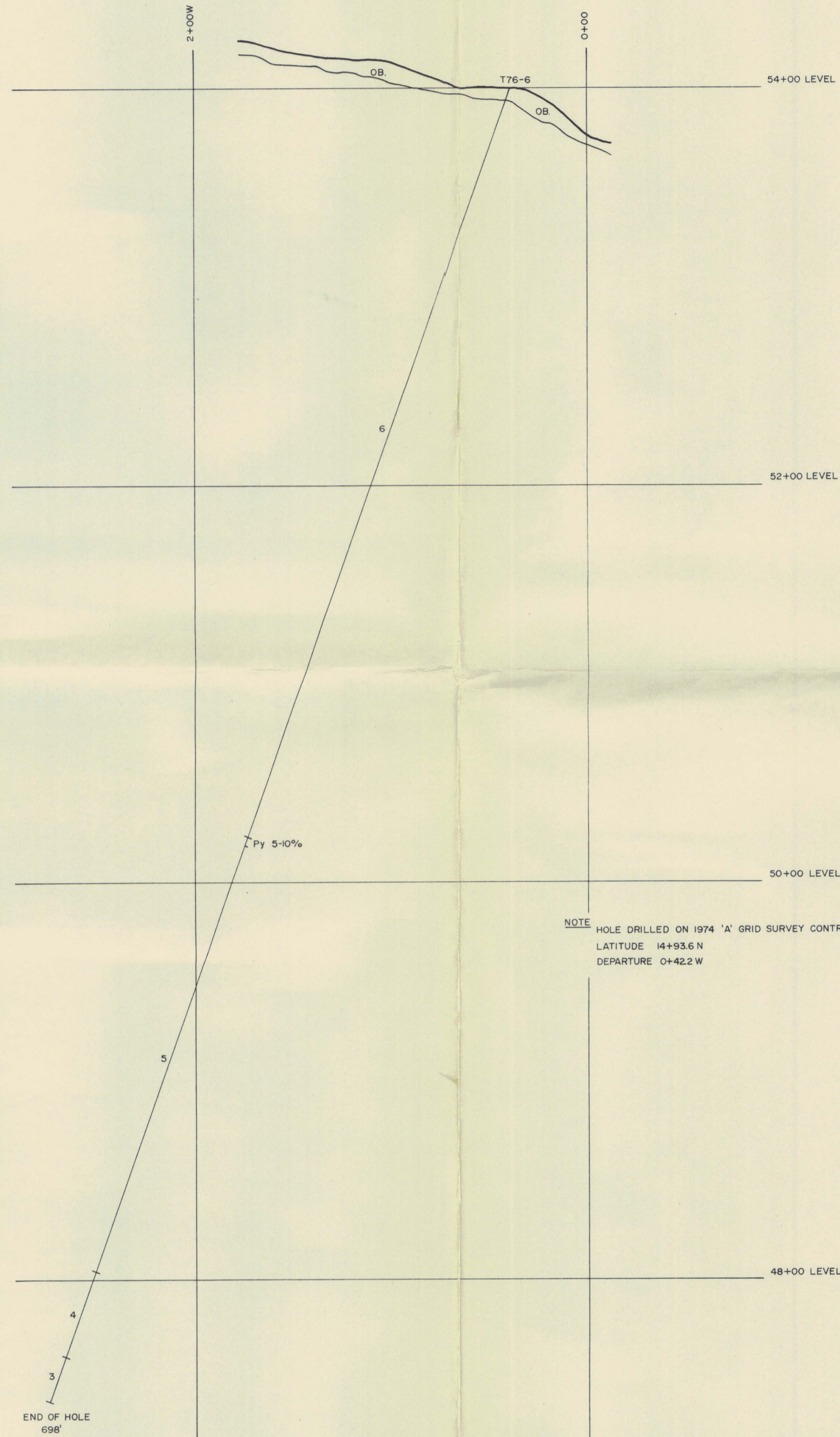
DWG: R.G.H.

SECTION 1+60W



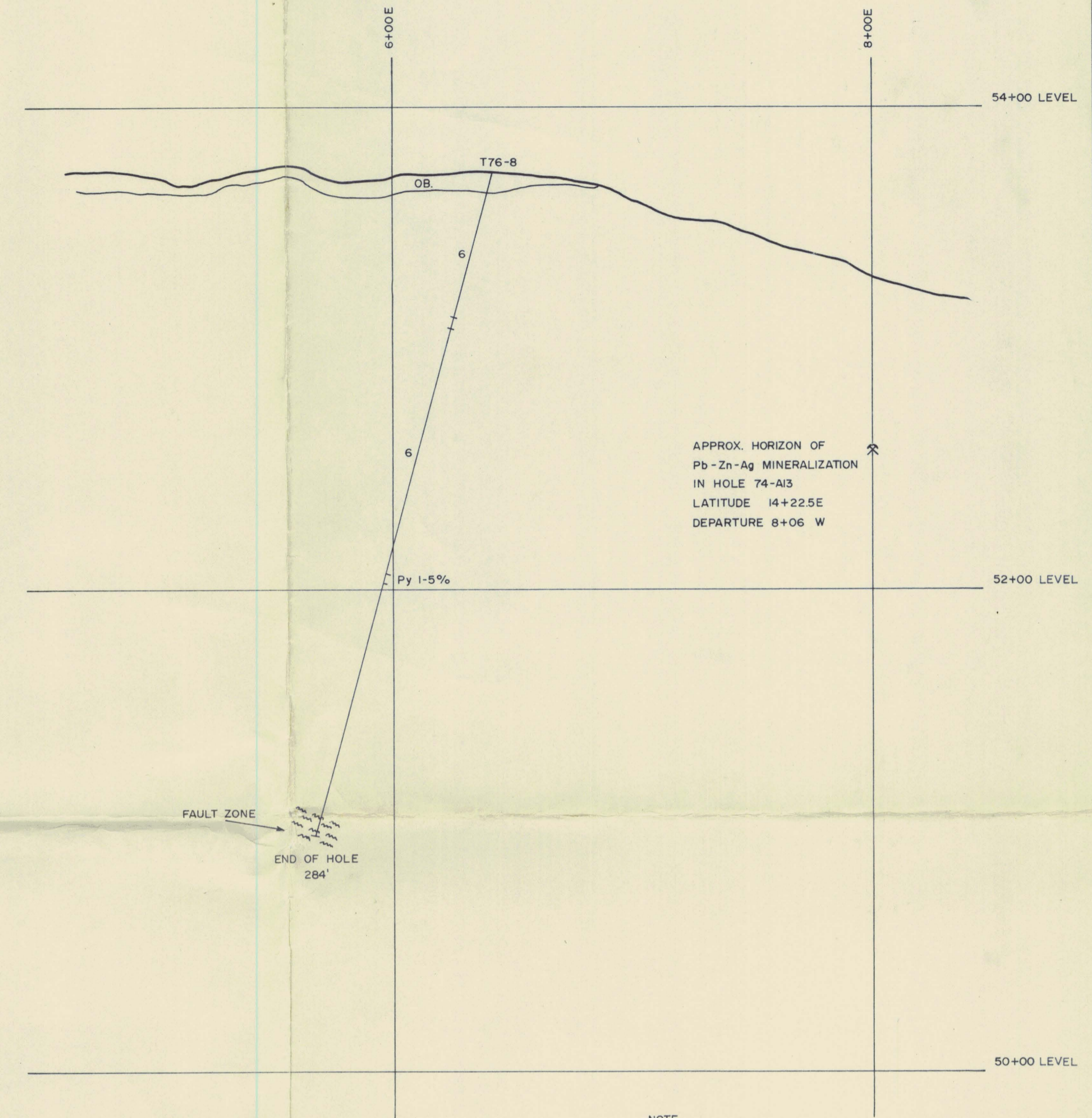
NOTE
HOLE DRILLED ON 1974 'A' GRID SURVEY CONTROL
LATITUDE 10+21.0N
DEPARTURE 1+60.4W

SECTION 0+42W



NOTE
HOLE DRILLED ON 1974 'A' GRID SURVEY CONTROL
LATITUDE 14+93.6N
DEPARTURE 0+42.2W

SECTION 6+42E



NOTE
HOLE DRILLED ON 1974 'A' GRID SURVEY CONTROL
LATITUDE 14+68.6N
DEPARTURE 6+42.4E

APPROX. HORIZON OF
Pb-Zn-Ag MINERALIZATION
IN HOLE 74-A13
LATITUDE 14+22.5E
DEPARTURE 8+06 W

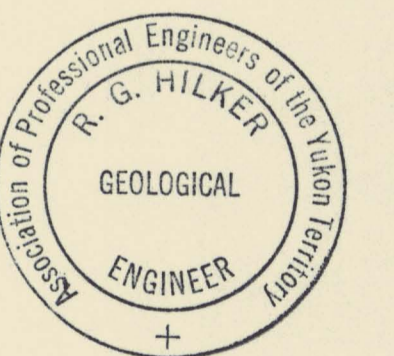
LEGEND

Py - Pyrite

GEOLOGY LEGEND

- PALEOZOIC
CAMBRIAN
TINTINA SERIES
- ⊞ Argillaceous limestone, lime phyllite, hornfels
 - ⊞ Black argillite, hornfels
 - ⊞ Upper limestone
 - ⊞ Middle argillite, hornfels
 - ⊞ Lower limestone
 - ⊞ Lower argillite, hornfels
 - ⊞ Argillite - undifferentiated
 - ⊞ Limestone - undifferentiated

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SHEET 105-G-3

TINTINA SILVER MINES LIMITED

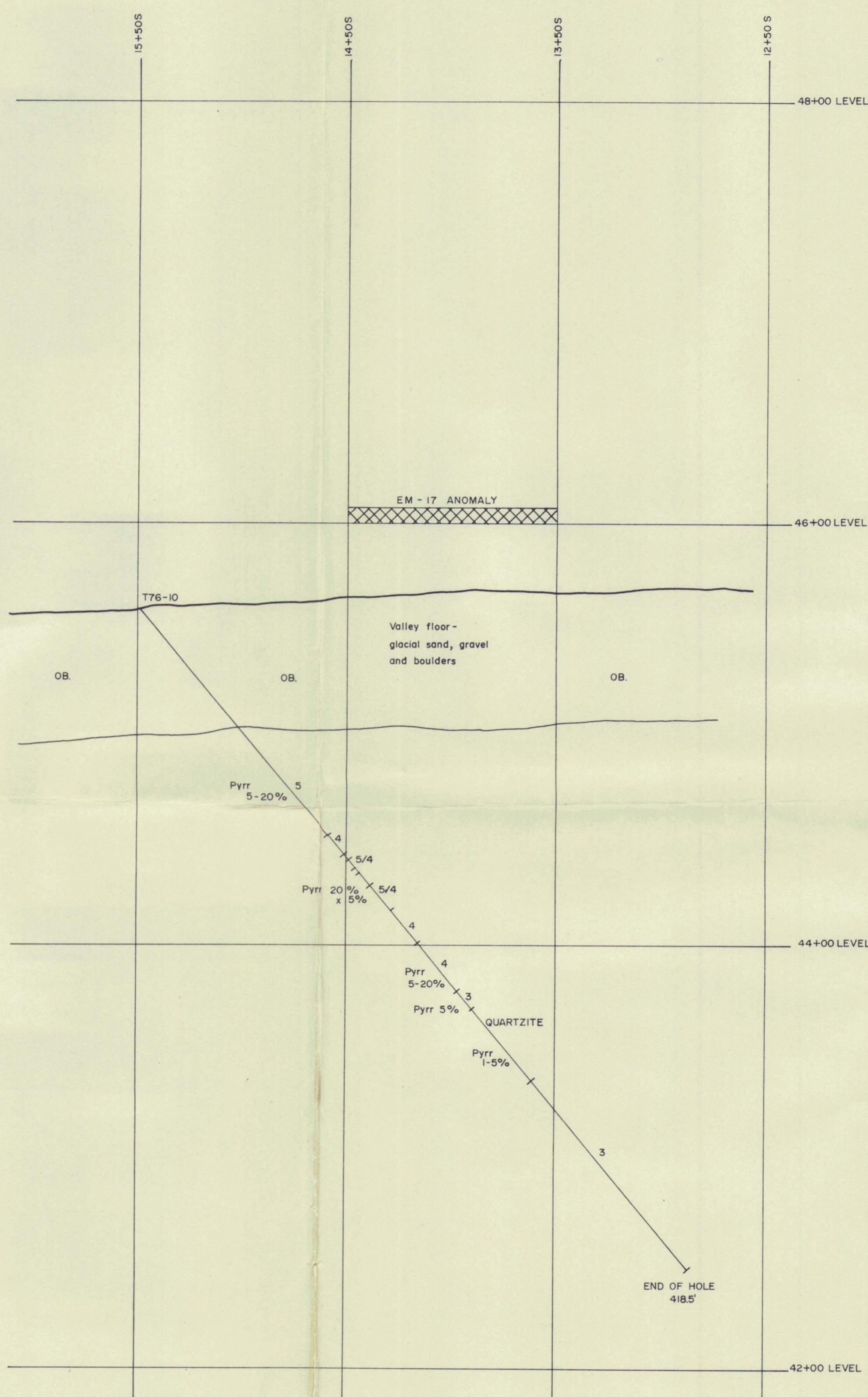
DIAMOND DRILL HOLES
T76-6, T76-7 & T76-8
1974 'A' LINEGRID

DATE: JULY 1976	SCALE: 1" = 40 feet
EAGLE # 2	DWG: R.G.H.

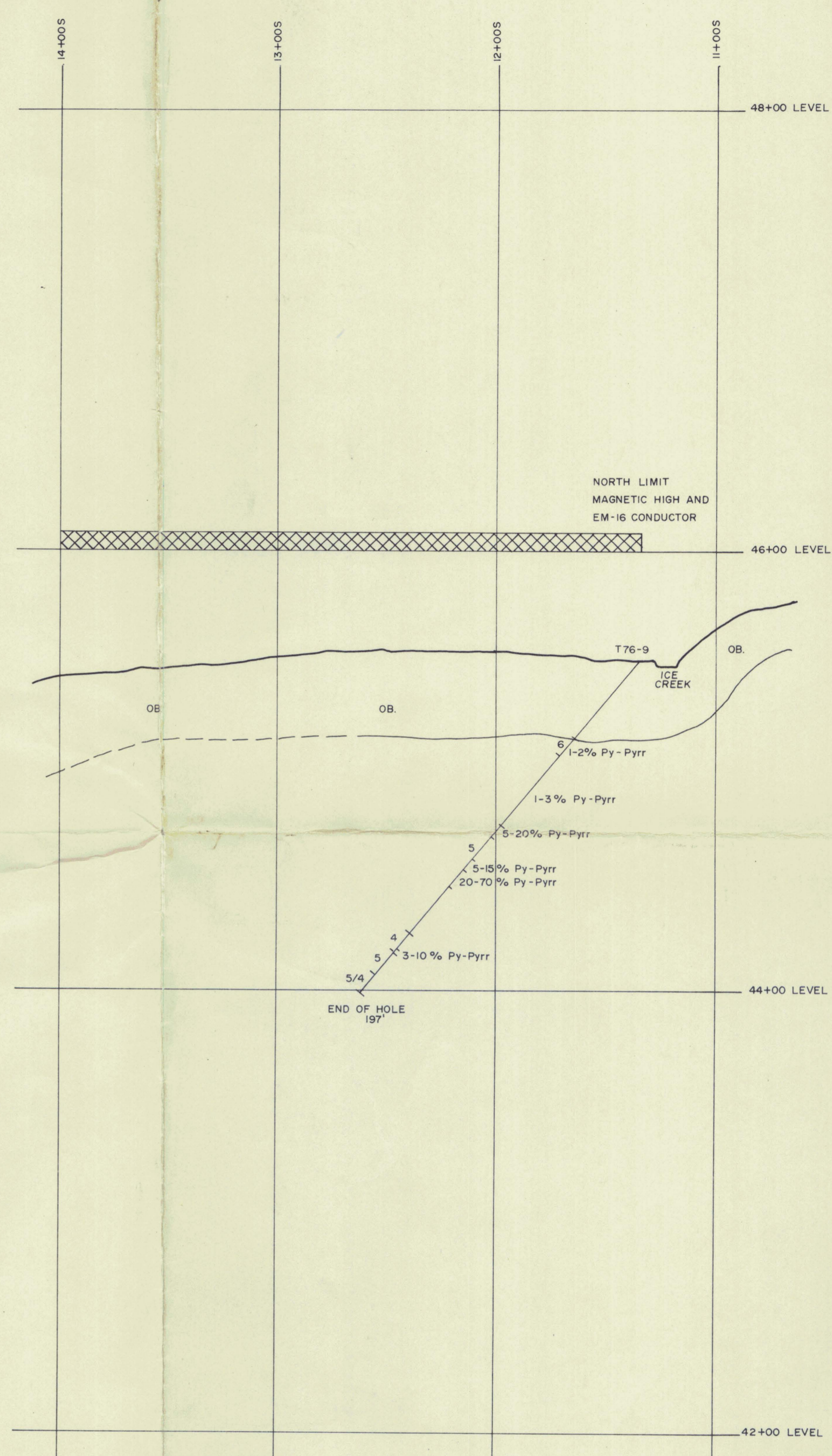
SECTION 24+00 W



SECTION 44+00 W



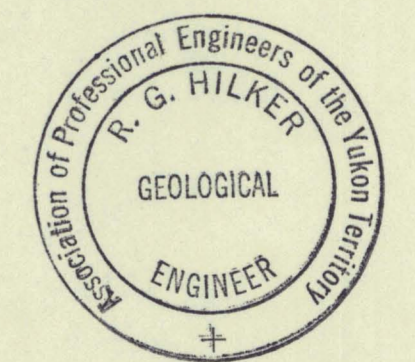
SECTION 46+00 W



LEGEND	
Py	Pyrite
Pyrr	Pyrrhotite

GEOLOGY LEGEND	
PALEOZOIC	
CAMBRIAN	
TINTINA SERIES	
[Symbol]	Argillaceous limestone, lime phyllite, hornfels
[Symbol]	Black argillite, hornfels
[Symbol]	Upper limestone
[Symbol]	Middle argillite, hornfels
[Symbol]	Lower limestone
[Symbol]	Lower argillite, hornfels
[Symbol]	Argillite - undifferentiated
[Symbol]	Limestone - undifferentiated

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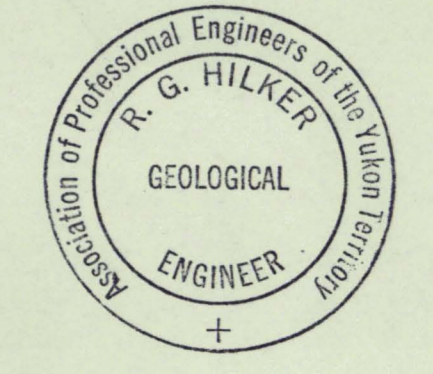
SHEET 105-G-3	
TINTINA SILVER MINES LIMITED	
DIAMOND DRILL HOLES	
T76-9, T76-10 & T76-11	
1975 GRID SYSTEM	
DATE: JULY 1976	SCALE: 1" = 40 feet
EAGLE 10, 35 & 37	DWG: R.G.H.

(in tons) Drill Sections + Plans D.P.H. EAGLE 21035/37, 4243 105-G-3 1976



GEOLOGICAL LEGEND	
MESOZOIC	
Jurassic and/or Cretaceous	
9	Lamprophyre
8	Diorite
7	Quartz monzonite
PALEOZOIC	
Cambrian	
TINTINA SERIES	
6	Argillaceous limestone, limshyillite
5	Black argillite, 5h-hornfels
4	Upper limestone
3	Middle argillite, 3h-hornfels
2	Lower limestone
1	Lower argillite, lh-hornfels
S	Sulfide zone; Pb, Zn, Ag sulfides
LEGEND	
---	Geological contact - mapped
- - -	- inferred
~ ~ ~	Fault
∩	Syncline
∪	Anticline
⊗	Showing Pb, Ag, Zn mineralization
⊙	DDH Collar and direction of drilling
MAGNETICS	
○	Magnetic contours
- - -	- background approximately 1100 gammas
---	EM-17 Electromagnetic conductor
□	Claim post, claim line
~ ~ ~	Creek

R. G. HILKER LTD.
CONSULTING GEOLOGIST
WHITEHORSE, Y.T.



TINTINA SILVER MINES LIMITED
1976 COMPOSITE PLAN SHOWING:
GEOLOGY
MAGNETIC ANOMALIES
ELECTROMAGNETIC CONDUCTORS
MOOREHOUSE ANTICLINE AXIS
LOCATION 1976 DIAMOND DRILL HOLES
LINE GRIDS
DATE: JULY/AUGUST 1976 SCALE: 1" = 200 feet DWG: R.G.H. & M.L.S.
N.T.S. SHEET 105-G-3 WATSON LAKE MINING DISTRICT