

T. R. TOUGH &amp; ASSOCIATES LTD.

CONSULTING GEOLOGISTS  
302 - 475 HOWE STREET,  
VANCOUVER 1, B. C.

520748

GEOLOGICAL REPORT  
on the  
BIG TIMOTHY MOUNTAIN PROPERTY  
Cariboo Mining Division  
British Columbia

EXETER MINES LTD (NPL)

February 18, 1971

Vancouver, B. C.

Thomas R. Tough, P.

Consulting Geologist

## TABLE OF CONTENTS

	Page
SUMMARY	
CONCLUSIONS	
RECOMMENDATIONS	
INTRODUCTION	1
PROPERTY	1
OWNERSHIP	2
LOCATION AND ACCESS	2
TOPOGRAPHY	3
WATER, CLIMATE AND POWER	3
HISTORY	3
PRESENT WORK	4
GENERAL GEOLOGY	4
LOCAL GEOLOGY	4
STRUCTURE	6
MINERAL OCCURRENCES	6
GEOPHYSICAL AND GEOCHEMICAL SURVEYS	8
EXPLORATION AND DEVELOPMENT PROGRAMMES	9
ESTIMATE OF COSTS OF EXPLORATION AND DEVELOPMENT PROGRAMS	10

## MAPS

	Scale
Location Map	1" = 150 miles
J. E. M. Test on Road	1" = 400 feet
J. E. M. Survey Plan (Sheet 1)	1" = 400 feet
VLF -EM Survey Plan (Sheet 2)	1" = 400 feet
VLF - EM Traser Filter Contour Map (Sheet 3)	1" = 400 feet
Geochemistry - Soil Sampling Silver - (Sheet 4)	1" = 400 feet
Geochemistry - Soil Sampling Copper - (Sheet 5)	1" = 400' feet
Geological Map	1" = 400 feet
Claim Location Map	1" = 6000 feet

## T. A. TOWN &amp; ASSOCIATES LTD.

CONSULTING GEOLOGISTS

302 - 475 HOWE STREET,  
VANCOUVER 1, B. C.SUMMARY

The Big Timothy Mountain property, owned by Exeter Mines Ltd (N. P. L.), consists of 62 contiguous mineral claims located approximately 35 air miles northeast of 100 Mile House, B. C., and is accessible by road and trail or by helicopter. The property adjoins the producing molybdenum property of Noranda Mines Ltd., Brynnor Mines (Boss Mountain Division).

The topography is not precipitous with elevation varying from 5,500 feet to 7,000 feet. The slopes are relatively gentle with a large portion of the claims covering alpine meadows.

Water is available for all phases of exploration, development and domestic use.

Railroad facilities are available in 100 Mile House and hydroelectric power would be available if future requirements warrant. Diesel electric power will be necessary for initial phases.

Year-round logging and mining operations are carried on in the general area which experiences relatively long winters with moderate to heavy snowfall. Summers are pleasant with moderate rainfall.

Timber is available on the lower slopes of the property but above treeline, which is at 6,000 feet, only sparse patches of stunted balsam occur. Lumber is

available from several local sawmills.

A limited amount of exploratory work was carried out on the property prior to 1920 which consisted of trenching, driving of short drifts, and the sinking of a shallow shaft. During 1969 and 1970 Exeter Mines Ltd carried out programs of prospecting, geological mapping, soil sampling and geophysical surveys.

The various phases of the Jurassic-Cretaceous igneous rocks which underlie the claims are mineralized in limited areas. The mineralization is related to quartz veins and breccias associated with shearing and faulting. The shearing and faulting appear to exhibit a radial pattern and may form large breccia zones in the areas of their intersection.

The porphyritic phases of the diorite contain disseminated chalcopyrite and pyrite which may be indicative of a possible porphyry-type copper deposit.

The structures and geological relations are similar in character to the molybdenite occurrences on the Noranda-Brynnor Mines property two miles to the south.

With proper preparation, work could be carried out on a yearly basis.

Sulphides of iron, copper, lead and zinc occur on the property in veins, breccia zones, and as disseminations in porphyritic diorite. Molybdenite has been observed in float on the property.

There are no records of previous production from the property.

## CONCLUSIONS

From the results of geological mapping, soil sampling and an electromagnetic survey it is concluded that the property warrants further exploration to test and determine the causes of both geochemical and geophysical anomalies that have been outlined on the claims.

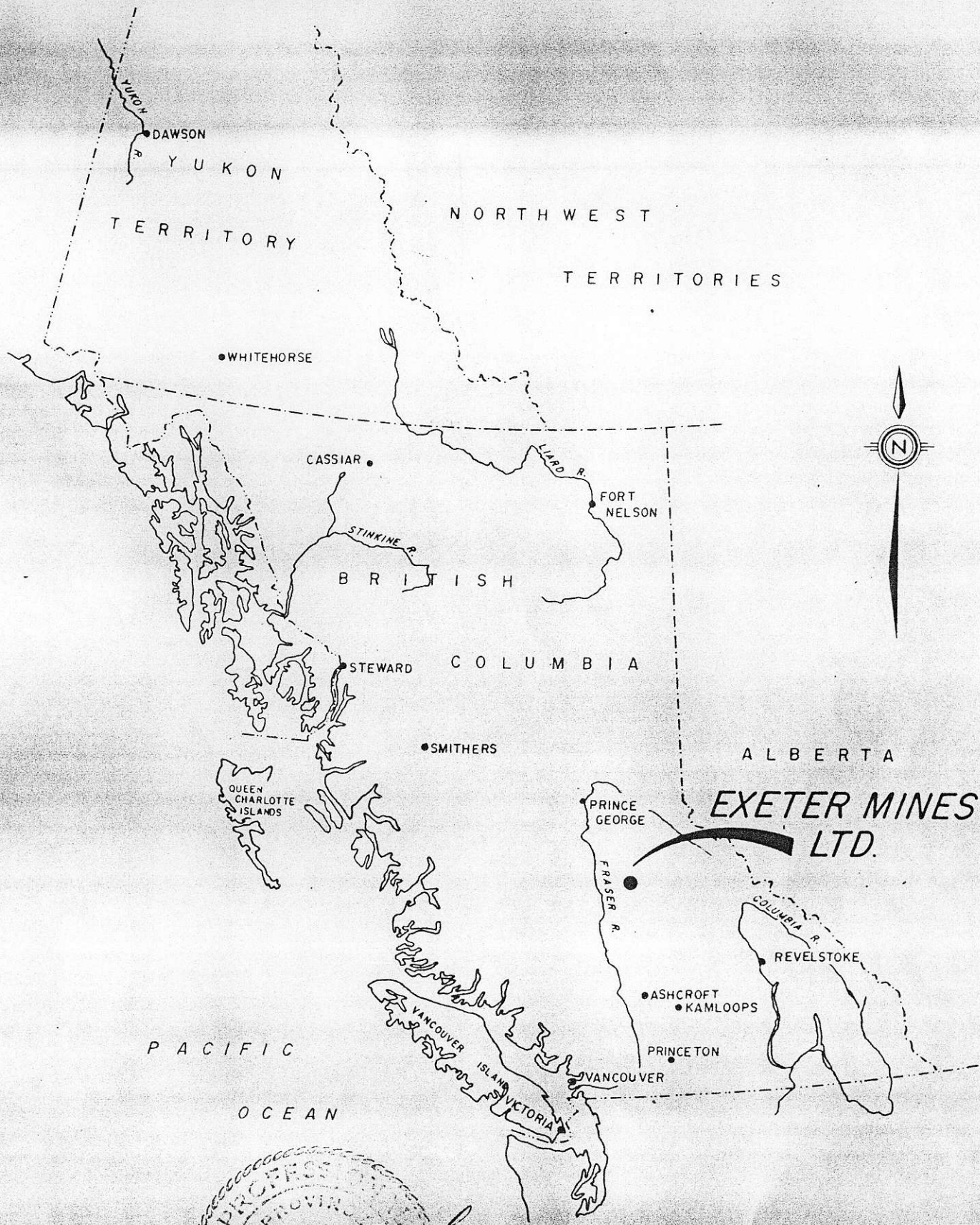
## RECOMMENDATIONS

It is recommended that a more detailed geochemical survey and geological survey be carried out on the property in conjunction with bulldozer trenching of the recently discovered geophysical and geochemical anomalies. Diamond drilling should be done on the anomalies where correlation exists between the geochemical and geophysical anomalies and mineralization. Approximately five miles of access roads should be constructed to provide access to all areas of interest on the property.

It is also recommended that Exeter Mines Ltd (N. P. L.) allocate the sum of \$50,000.00 to implement and execute the recommended exploration and development programs.

Respectfully submitted,

Thomas R. Tough, P. Eng.,



**EXETER MINES LTD.**



T. TOUGH & ASSOCIATES LTD  
**EXETER MINES LTD. (N.P.L.)**

**LOCATION MAP**

CARIBOO M.D., B.C.  
 SCALE: 1" = 150 miles

INTRODUCTION

The following report is based on information obtained by the writer during trips to the property in 1968 and 1969 during which time the property was mapped geologically in conjunction with a limited amount of soil sampling. During the 1970 field season a geological survey was carried out by Allan Engineering and an electromagnetic and geochemical survey was completed over most of the claim area. The latter surveys were under the direction of the writer.

The purpose of the report is to assess the recently completed programs and to propose further exploration programs as a follow up to test the geophysical and geochemical anomalies and to further test known mineralized occurrences.

PROPERTY

The Big Timothy Mountain property consists of 62 contiguous mineral claims held by location. The claims are staked in accordance with the British Columbia Mineral Act and are as follows:

<u>Claim Name</u>	<u>Record Number</u>	<u>Expiry Date</u>
Silver Boss # 1, 2 incl.	47858-9 incl.	Oct 4, 1971
Silver Boss # 3-6 incl.	47860-3 incl.	Oct 4, 1972
Silver Boss # 7	47864	Oct 4, 1971
Silver Boss # 8	47865	Oct 4, 1972
Silver Boss # 9-18 incl.	47866-75 incl.	Oct 4, 1971
Silver Boss # 19	47876	Oct 4, 1972
Silver Boss # 20	47877	Oct 4, 1971
Silver Boss # 21	47878	Oct 4, 1972
Silver Boss # 22	47879	Oct 4, 1971
Silver Boss # 23	47880	Oct 4, 1972
Silver Boss # 24	47881	Oct 4, 1971



<u>Claim Name</u>	<u>Record Number</u>	<u>Expiry Date</u>
Gus # 1 - 14 incl.	52738-51 incl.	June 30, 1972
SB # 25 - 29 incl.	52792 - 6 incl.	July 9, 1971
SB # 30	52797	July 9, 1972
SB # 31-32 incl.	52798 - 9 incl.	July 9, 1971
SB # 33	52800	July 9, 1972
SB # 34-36 incl.	52801-3 incl.	July 9, 1971
SB # 37-40 incl.	52804-7 incl.	July 9, 1971
SB # 41	52808	July 9, 1972
SB # 42	52809	July 9, 1971
SB # 43	52810	July 9, 1972
SB # 44	52811	July 9, 1971
SB # 45-48 incl.	52812-5 incl.	July 9, 1972

The claims adjoin the producing mine of Noranda Mines Ltd., Brynnor Mines (Boss Mountain Division), to the north.

#### OWNERSHIP

The claims are owned by Exeter Mines Ltd (N. P. L.) of Vancouver, British Columbia.

#### LOCATION AND ACCESS (52° 120° SW)

The Big Timothy Mountain property is on the plateau-like summit and upper flanks of Big Timothy (Takomkane) Mountain approximately 35 air miles northeast of 100 Mile House, in the Cariboo Mining Division, south-central British Columbia.

It is reached by 75 miles of gravel road east from Forest Grove to Hendrix Lake and along the mine access road of Brynnor Mine (Boss Mountain Division) to the surface exposure of their main ore body. A trail, about 2 miles in length, leads northward up Molybdenite Creek to the property. An old road built by Noranda Mines passes close to the Gus claims.

Partial access is by logging roads to the west slope of Big Timothy Mountain via Murphy Lake.

Helicopter service is available from Williams Lake, B. C.

#### TOPOGRAPHY

Elevations on the property vary from 5,500' to 7,000' with timberline around 6,000'. Sparse patches of stunted balsam fir occur above this elevation. The topography is fairly gentle and rolling with the majority of the claims covering alpine meadows.

#### WATER, CLIMATE AND POWER

Sufficient water is available for all phases of exploration and development. Winters are long with fairly heavy snow fall. Summer months are short and cool with moderate rainfall. Hydroelectric power would be available in the area, but for the initial development stages diesel-electric power will be necessary.

#### HISTORY

Prior to 1920 several trenches, pits, a shaft, and three adits were dug along shear zones in quartz diorite and these reveal mineralization in the form of pyrite, chalcopyrite, bornite, galena, and sphalerite in a gangue of quartz.

In the region of basaltic laval flows a few shallow trenches were cut in occurrences of olivine in an effort to develop an economic deposit of semi-precious peridot.

During the summer months of 1969 Exeter Mines Ltd. carried out a limited program of soil sampling, geological mapping and prospecting.

### PRESENT WORK

From June 19th to June 27th, 1970 Allen Engineering conducted a geological survey of the claims. The field party consisted of E. M. Wilson, P. Eng., H. M. Meixner, geologist, Clifford Gunn, prospector and J. G. Wilson, geological assistant.

The 1970 field program also included road building, an electromagnetic survey and a geochemical survey. During mid-June 1971 a geochemical survey was carried out over the Gus #1-14 claims. The geophysical and geochemical surveys were conducted by Geotronics Surveys Ltd., of Vancouver, B.C.

### GENERAL GEOLOGY

The geology of the area is shown on Map 1-1963 Quesnel Lake (East Half) of the Geological Survey of Canada. The area is mainly overlain by Paleozoic rocks of the Midas formation which is comprised of metamorphosed sediments. The Snowshoe formation, consisting of metasediments, rests on the Midas formation. Volcanic rocks of Triassic Age occur above the Snowshoe formation. Intrusive rocks of Jurassic to Cretaceous Age occur in several places within the map area. Much of the area is covered with glacial drift and alluvium.

### LOCAL GEOLOGY

The property is underlain by a batholith which is comprised of hornblende-biotite granodiorite, hornblende-quartz diorite, hornblende-biotite monzonite, hornblende-quartz monzonite and hornblende-biotite syenite. The mafic minerals are green to black hornblende or biotite and magnetite.

Light grey fine-to-medium grained hornblende-biotite monzonite and hornblende-quartz monzonite underlie the Silver Boss 1 - 24 and SB 25-36 claims. The rocks grade into irregular patches of granodiorite and quartz diorite.

The SB 37 - 48 claims are underlain by fine-to-medium grained diorite. A well defined contact exists between the diorite and monzonite-granodiorite. The contact strikes southeasterly. The diorite is almost entirely coarse-grained and biotite-rich.

On portions of Gus 1, 3, 11 and 13 claims the diorite is coarse-grained whereas in areas on Gus 1, 2, 4 and 14 claims the diorite is coarse-grained and porphyritic. Phenocrysts of feldspar up to 1 1/2 inches in length were observed. Sparsely disseminated chalcopyrite was evident in the porphyritic phases of the diorite.

The intrusives have been highly fractured, faulted, and intruded by irregular dykes and veins. Locally there has been brecciation. The breccia contains fragments of quartz diorite, felsite, and andesite with quartz forming a large portion of the matrix. Chalcopyrite and bornite were noted disseminated within the rock fragments, around the periphery of the fragments, and as masses within the matrix.

Most of the shear zones strike between north and east and dip steeply. The thicker zones trend eastward and dip moderately to the north. Quartz veins occupy some of the shears and similar occurrences have been identified in the Brynnor Mine.

Felsite, aplite, and andesitic dykes cut the intrusives and have a north-westerly to westerly trend and are essentially vertical. The aplite is possibly a late injection of the quartz diorite proper. The felsites weather to buff or light brown. The dykes follow fractures and fault zones. Pyrite and chalcopyrite were noted in the aplite dykes and chalcopyrite and bornite occur disseminated in some of the andesite dykes.

The Takomkane basalts lie on the upper portions of the property and cover a limited area. The peak of the mountain is marked by two cinder cones with

a breached crater. The flows are small and extend southwest from the crater. The lavas are dark brown, fine-grained, holocrystalline, with a somewhat trachytic texture and amydules. They are composed of magnetite, augite, olivine, and plagioclase and contain irregular shaped bodies of olivine crystals. The contact between the lava and quartz diorite strikes N 10° E and dips 60° to the west. In places the lava occurs in pillow-shaped masses with concentric layering, and as ropy and amygdaloidal flows. No ash beds were observed and the basalt appears to have been extruded with no evidence of explosive action. The flow contain fragments of quartz diorite near their base.

#### STRUCTURE

North and west of the basalt flows there are a series of faults and shears. The strongest fault strikes easterly and dips steeply to the south. It has been traced for over a mile across the property. Some parallel but weaker structures occur to the south. A set of northeasterly striking tension faults also occur. Another strong fault strikes across the property at 010°. The faulting and shearing appears to have a radiating pattern and converge near the northwest end of the basalt flows.

Jointing is well developed north and west of the basalt flows. They trend 065° with a dip of 60° southeast, and 330° and dip at 40° southwest.

#### MINERAL OCCURRENCES

The intrusives are cut by a number of parallel and branching quartz veins striking N45° E and dipping steeply to the southeast. The veins have been opened up at intervals along a zone of sheared quartz diorite for a length of about 700 feet. The sheared zone is 25-35 feet wide. The minerals occurring in the veins are pyrite, chalcopyrite, bornite, galena and sphalerite in a gangue of quartz. The mineralization extends into the wall

rocks of the zone.

A series of grab samples taken by Mr. W. J. Ryan prior to 1920 ran as follows:

LOCATION	Au	Ag	Cu	Pb	Zn
	—	oz/ton	%	%	%
shaft	\$ 7	20.00	2.0	25.0	20.0
north of shaft	\$44	30.00	22.0		
50' north of shaft	\$17	28.0	18.5		
basic dyke, rim edge	\$10	7.5	5.0		
1500' east and 900' below edge	\$ 5	2.0			
same, across 4' shear	\$10	4.0			

In 1964 a grab sample from the shaft dump was sent by Mr. C. E. Gunn for assay by the Department of Mines and Petroleum Resources in Victoria, B. C. ~~It assayed 0.07 oz Au/ton,~~ 12.20 oz Ag/ton, 5.31% Cu, 0.10% Pb and 0.01% Zn.

In 1966 the same party sent a second specimen for assay which ran ~~0.06 oz Au/ton,~~ 11.00 oz Ag/ton, 5.36% Cu, 0.12% Pb, 0.01% Zn and 0.02% Bi.

Samples taken during 1966 by J. C. Hamm of Duval Corporation ran as follows:

LOCATION	Au	Ag	Cu	Pb	Zn	Mo
	oz/ton	oz/ton	%	%	%	%
at junction of shears	0.01	0.70	0.39	0.15	tr	0.005
shaft dump	0.02	17.0	3.02	tr	tr	0.005
float below rim	0.02	0.20	0.16			
dyke material below rim	0.02	0.40	2.02			
unaltered wall rock from shaft area	tr	tr	0.43			

3. A grab sample taken by the writer in 1968 from the shaft area assayed ~~10.28 oz Au/ton, 6.76 oz Ag/ton~~ and 6.50% Cu.

The southern extremity of the main shear is transected by another shear striking E-W and dipping steeply to the north. Pyrite, chalcopyrite and galena occur as fissure fillings in the veins and disseminated through broken quartz diorite. Pyrite and chalcopyrite were noted as fracture fillings along the E-W shear.

A number of shear zones from 5 to 50 feet in width occur on the northeast rim of the ridge and strike down the slope. Some of the shears, where exposed, contain mineralized breccia.

Bornite and chalcopyrite occur as disseminations in andesitic dykes which also fill some of the shear zones or with quartz and altered quartz diorite.

In one locality on the plateau molybdenite occurrences were noted in quartz veins in float.

Disseminated chalcopyrite and pyrite occur in porphyritic diorite on the boundary between Gus 1 and 2 claims about 900 feet from the initial posts. There has not been any work done in this area to date thus the extent and grade of the mineralization is presently unknown.

#### GEOPHYSICAL AND GEOCHEMICAL SURVEYS

During the period between August 14th and October 9th, 1970 Geotronics Surveys Ltd conducted an electromagnetic survey over 35.5 line miles on the property. In conjunction with the above survey a limited amount of soil samples were collected over selected portions of the claims.

Several anomalies were located using a VLF high frequency electro-magnetometer and may indicate faulting, shearing, contacts or breccia zones, some which do indicate associated sulphide mineralization and others that may. Some correlation exists between certain E-M anomalies and geochemical anomalies.

A statistical study was also made of the geochemical results.

Complete reports covering details of survey procedures and interpretation of results by David G. Mark, B.Sc., Geophysicist are appended to this report. (Appendix "A")

#### EXPLORATION AND DEVELOPMENT PROGRAMMES

The results of the electromagnetic and geochemical surveys warrant that more detailed exploration be carried out on the property.

Prime consideration should be given to the exploration of the geophysical and geochemical anomalies to determine their significance. Wherever feasible the anomalous zones should be trenched. A good portion of the trenching could be undertaken in conjunction with the construction of access roads to various portions of the property. Trenches should be mapped and sampled.

A more complete geochemical survey should be carried out over the property to locate unknown mineral occurrences and to further outline the known anomalous zones.

All indicative areas should be prospected and mapped in detail and where possible, sampled.



Diamond drilling should be carried out along most of the significant electromagnetic anomalies and on areas of geochemical anomalies. The diamond drilling should be done at such a time that the anomalies cannot be further explored by surface methods.

ESTIMATE OF COSTS OF EXPLORATION AND DEVELOPMENT PROGRAMS

Road Construction and trenching	\$ 7,000.00
Diamond Drilling, 2000 feet @ \$14/foot	28,000.00
Engineering and Supervision	5,000.00
Head Office, Legal, Administration	5,000.00
Contingencies	5,000.00
	<u>\$ 50,000.00</u>

It is estimated that the above programs should take approximately 6 months to complete.

Respectfully submitted,

Thomas R. Tough, P. Eng.,

TRT:vsa

February, 1971

CERTIFICATE

I, Thomas R. Tough, of the City of Vancouver, in the Province of British Columbia, do hereby certify:

That I am a Consulting Geologist and an associate with T. R. Tough & Associates Ltd., with offices at 302-475 Howe Street, Vancouver 1, B.C.

I further certify that:

1. I am a graduate of the University of British Columbia (1965) and hold a B. Sc. degree in Geology.
2. I have been practising in my profession for the past five years and have been active in the mining industry for the past twelve years.
3. I am registered with the Association of Professional Engineers of British Columbia.
4. The information for the accompanying report was obtained from personal examinations of the property and from material submitted by Geotronics Surveys Ltd pertaining to the surveys carried out by that firm during 1970 and 1971 under my direction. Data also was obtained from Allan Geological Engineering who carried out a geological mapping survey of the property in 1970.
5. I have no direct or indirect interest whatsoever in the property described herein, nor in the securities of Exeter Mines Ltd (N. P. L.) and do not expect to receive any interest therein.

Thomas R. Tough, P. Eng.,  
Consulting Geologist

February, 1971