3053

REPORT ON

GEOCHEMICAL SOIL SURVEY

of the

T.C. EXPLORATIONS LIMITED PROPERTY

Highland Valley, British Columbia Kamloops Mining Division.

921/6E

Under Option to and Work Done by or on Behalf of THE KEEVIL MINING GROUP LIMITED

By

A. I. Betmanis, B.A.Sc., P. Eng (Ont.)B. W. Smee, B.Sc.

Claims:	LAKE and SNO Groups
Location:	ll miles East of Spences Bridge Latitude 50°24' N; Longitude 121°06' W
Dates:	June 19, 1970 to July 20, 1970.



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INTRODUCTION

The following report is based on a geochemical soil survey done by Barringer Research Ltd. for Teck Corporation Limited on a property consisting of 80 claims and fractions in the Pimainus Lake area of the Highland Valley, British Columbia. The property is owned by T. C. Explorations Limited, and is under option to the Keevil Mining Group Ltd. Geophysical Engineering and Surveys Limited supervised the survey on behalf of the Keevil Mining Group Ltd.

Soil samples were collected on a pre-cut grid, and analysed for copper and molybdenum for the purpose of detecting anomalous mineralization of the two metals in the underlying bedrock. The samples were analysed by atomic absorption spectrophotometer at the Seymour Laboratories in Vancouver.

The body of the report was made by Barringer Research Ltd. It was reviewed by Geophysical Engineering and Surveys Limited, and a discussion of the results of the survey was added based on related work on the property.

B. W. Smee supervised the survey for Barringer Research Limited, and A. I. Betmanis of Geophysical Engineering and Surveys Limited supervised the work on behalf of the Keevil Mining Group Limited.

LOCATION AND ACCESS

The T. C. Explorations Limited claims are located in the Pimainus Lake area, Highland Valley, in the Kamloops Mining Division. They are centered around latitude 50[°]24'N and longitude 121[°]06'W.

Access to the claims can be made either from Ashcroft, just off the Trans-Canada highway, or from highway 8, south of Spences Bridge. Access via Ashcroft is by the Highland Valley paved highway to the Valley Copper property, followed by four miles of graded gravel road to the Alwin Mining Company camp. From there a good 4 WD road is followed for 7 miles past Calling Lake. Access via Spences Bridge is by 14 miles of highway 8 south of Spences Bridge, followed by 11 miles of 2 WD summer road through the Soldatquo Indian Reserve to Pimainus Lake.

CLAIMS

Eighty contiguous claims and fractions are held under option. They have been divided into the LAKE and SNO groups; each group consisting of 40 claims. Work certificates are being applied for all of the LAKE group, and for 27 claims of the SNO group. Details of the specific claims are given in Appendix I.



APRIL 17, 1971

DISCUSSION

The soils were systematically sampled and revealed several small isolated anomalies, both in copper and molybdenum. In view of the somewhat erratic nature of the anomalies, additional work was done subsequent to the geochemical survey which assisted in the interpretation of the values. Part of this work, namely a seismic survey to determine depth of overburden, has been reported in "Geological and Geophysical Surveys of the T. C. Explorations Ltd Property" by G. D. Ulrich and A. I. Betmanis, dated December 10, 1970. The mentioned report has been filed for assessment work credits. Trenching on line 40N between 8W and 2E has also assisted in the interpretation of geochemical data.

The seismic survey showed appreciable changes in depth of overburden over relatively short horizontal distances. The shallowest depth recorded in an area without outcrop exposures was 5 feet, and the deepest depth in the same area was recorded as 47 feet. Many of the readings taken were in the plus 20 feet range. Thus it can be gathered that significant transported glacial overburden covers the underlying rock to mask anomalous mineralization in the bedrock. The 'peaks' in mineralized bedrock covered by shallow overburden would give rise to relatively erratic geochemical expression in soils.

The trenching encountered a hard cemented clayey till layer between one and two feet thick interbedded in the overburden. In one area where malachite staining was noted below the layer, it was found that the cemented till layer had acted as a damper to the

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upward migration of mineralization, and no traces of malachite could be found above the layer. It can be assumed that this cemented till layer occurs in other parts of the property, and would also mask mineralized bedrock so that an erratic, if any, geochemical expression would be obtained in the soils.

Based on the above observations, it appears that greater emphasis should be placed on small anomalies, or apparently erratic values, than is generally done, since they may be the only surface geochemical indication of a larger underlying mineralized zone.

> Respectfully submitted, GEOPHYSICAL ENGINEERING & SURVEYS LIMITED

OFESSIONA SC. P. Eng A. I. Betmanis, B OLINCE OF ONTE

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REPORT OF SURVEY BY BARRINGER RESEARCH LTD.

INTRODUCTION

A geochemical soil survey was carried out for Teck Corporation on the T.C. Exploration Property in the Highland Valley, British Columbia, by Barringer Research Limited between June 19 and July 20, 1970. The T.C. Exploration property is located near Pimainus Lake, 10 miles east of Spences Bridge. (Dwg. No. 4-128-5).

The northern portion of the property is gently rolling. A series of swamps borders the east. The soil on the higher ground is usually a highly silicious, well drained regosol which was sampled at a depth of 10 inches. The southern portion of the property lies on the north facing slope of Spaist Mountain. The soils are generally well drained, but a bog exists near the centre of the property. Outcrops are frequent on the northern portion of the property, but decrease in number as Pimainus Lake is approached. Outcrop is again prevalent near the top of Spaist Mountain. The T.C. Exploration Property lies totally within the The major geologic feature is the contact between the Guichon Batholith. Skeena and Bethsaida Phases which runs north northwest through the centre of the property. The contacts between the Hybrid, Chataway and Quartz Feldspar Porphyry are also present. Mineralization consits of bornite and chalcopyrite associated with quartz veins. A series of mineralized veins has been noted on the northern portion of the property, extending from 45N to 100N and striking almost north-south.

The sample collection was performed by R. Ficek and L. Rasminsky of Toronto and G. Rowe of Vancouver. The samples were taken on a 500 x 100 foot grid which had been cut prior to sample collection. In many cases, especially on the southern portion of the property, lines had to be paced and compassed on a correct bearing. All samples were sent to Seymour Laboratory Limited of Vancouver, where the analysis of total copper and molybdenum was performed by J. Chatten.

The method of analysis consisted of air drying the samples after arrival, sifting

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to an -80 mesh size fraction, and digesting 0.5 gms. of the -80 mesh size fraction for three hours in 85% perchloric and 15% nitric acid. The samples were then run by atomic absorption for copper and molybdenum. This method is adequate for copper if internal standards are used. There are no internal soil standards used for molybdenum and no inter-element or matrix changes are allowed for. This deficiency is reflected in the variability of the results from batch to batch and from analyst to analyst. The perchloric-nitric digestion does not dissolve all molybdenite and it is not a true total analysis.

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RESULTS

The median, standard deviation, threshold and anomalous values for copper and molybdenum are as follows:-

	Copper	Molybdenum	
	(ppm)	(ppm)	
Median	51	2	
Standard Deviation	25	. 15	
Background	0-100	0-5	
Threshold	100	5	
3rd Order Anomalous	101-200	6-10	
2nd Order Anomalous	201-300	11-15	
lst Order Anomalous	>300	>15	

1. Copper (Dwg. Nos. 4-128-6A & B)

a) North Portion of the Property

There are two main zones of copper mineralization on the north portion of the property which roughly reflect the two drainage systems. The first anomaly extends, in a broken fashion, from 10N to 80N and from the base line to slightly west of the base line. The strength and shape of the anomaly suggests that small amounts of copper mineralization are responsible for the large copper values, and downhill movement, groundwater and stream flooding are responsible for the spread of the anomaly. During mapping, bornite and chalcopyrite were outlined in a quartz vein system which extended from 45N to 75N. This system is outlined exactly by the geochemical anomalies and can be traced from between 35N and 40N up to the 420 ppm value on line 85N. The zone does not appear to have significant width and may be due to one or two parallel quartz vein systems. Grab samples of rock taken to establish background copper concentrations in

the rock showed spotty values in this area, which would indicate disseminated mineralization. The soils indicate that this mineralization is of minor importance.

The second anomalous zone lies in the drainage system on the west portion of the property. In this area are the contacts between the Chataway, Guichon, Skeena and Hybrid ^{Phases}. There is no copper mineralization mapped in the area. The anomalies seem to be controlled mainly by drainage, but spot highs near the ends of lines 30N and 50N indicate possible mineralization. These two highs lie in the Hybrid Variety near grab samples which when analysed for copper, gave 223 ppm and 660 ppm. A grab sample of Chataway variety contained 270 ppm. This wide dispersion of anomalous rock samples suggests disseminated mineralization which does not have a grade high enough to be of importance.

b) South Portion of Property

There are three main zones of copper anomalies on the south portion of the T.C. Exploration property. The first and strongest starts near the peak of Spaist Mountain and runs downhill in a finger-like dispersion. This anomaly lies close to the contact between the Bethsaida and Skeena phases, and in the Bethsaida rock. The strength of the values implies mineralization of minor width and strike roughly parallel to the contact. Mapping showed a mineralized quartz vein on line 35S at 49E. The geochemistry extends this mineralization from probably 30S to 45S and beyond. Once again, there does not appear to be sufficient width to suggest an economic potential.

The second anomaly is related to traces of copper mineralization found in the Hybrid Phase about 5W and on line 15S. This anomaly extends uphill from the mineralization and reaches a peak on line 25S, before it leaves the property. This anomaly is indicative of disseminated mineralization and may be related to the spot anomalies in the Hybrid Phase on the north protion of the property.

The third anomaly lies on line 5S at 90E to the line's end. The form indicates probable mineral origin enhanced by organic accumulation.

2. Molybdenum (Dwg. Nos. 4-128-7A &B)

There does not appear to be any extensive molybdenum mineralization on the T.C. Exploration Property. Minor spot values above 10 ppm may indicate molybdenite specks, but without more than one sample in an area, one cannot assign any importance to the values.

RECOMMENDATIONS

1. On the first anomaly mentioned in the northern section of the property, fill-in samples should be taken on 200' lines and 50 foot sample spacings for the length of the anomaly. These results should pin-point the location of the mineralization and guide any further work, such as trenching, in the area.

2. The anomaly associated with the Hybrid should have 200 foot lines placed across the contact and should run from the anomaly to the south of Pimainus Lake up to the property's edge in the north. Rock samples of the Hybrid phase should be taken on a grid basis in order to establish a true background copper concentration for this rock type.

3. The quartz vein system on Spaist Mountain should have samples taken perpendicular to the projected strike on 200 foot lines and 50 foot spacings. This would determine both true width and a cut-off point for the system. A target for trenching would also be produced.

BARRINGER RESEARCH LIMITED

Bw Anne

B. W. Smee Geochemist

CLAIMS

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<u>Claim</u>	Record_Number	Expiry Date	Title
LAKE GROUP			
*LAKE 1 - 10	42080 -89	April 17/71	T.C.Ex.
*SPOT 1, 2	43904, 05	June 27/72	T.C.Ex.
*LAKEN 2, 4, 9, 11-16	46701, 73, 78, 80-85	April 30/71	T.C.Ex.
*PLES #2 Fr.	64991	July 10/71	H.T. James
*PLES #3 Fr.	64993	July 10/71	H.T. James
*PM 1, 3, 5, 7, 8, 14	46036, 38, 40, 42, 43, 49	April 30/71	T.C. Ex.
*IL 4, 6	46057, 59	April 30/71	T.C. Ex.
*PIM 7 - 10	42106 - 09	April 17/ 7 1	T.C. Ex.
*PIM 12 - 16	42111- 15	April 17/71	T.C. Ex.
SNO GROUP			
SNO 1 - 9	61949 - 57	Dec. 12/72	T. C.Ex.
*PIM 11, 17 - 20	42110, 16 - 19	April 17/71	T. C.Ex.
*PM 2, 4, 6, 9-13, 15,	46037, 39, 41, 44-48,50,	April 30/71	т. С. Ех.
*OVERSIGHT 1 2	46052 53	April 30/71	т. С. Ех.
*TL 3 5	46056, 58	April 30/71	T. C. Ex.
11. #1 FR., #2 Fr.	60811, 12	Sept. 29/73	T. C. Ex.
*PLES #] Fr.	64992	July 10/71	H.T. James
*LAKEN 1. 3. 5-8. 10	46070, 72, 74-77, 79	April 30/71	T. C. Ex.
PTM #1 Fr., #2 Fr.	60809. 10	Sept. 29/73	T. C. Ex.
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* Certificates of work based on geochemical surveys are being applied to these claims only.

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CERTIFICATE

I, BARRY W. SMEE, of the City of Vancouver in the Province of British Columbia hereby certify:

- THAT I am a geochemist employed by Barringer Research Limited, 1198 W. Pender, Vancouver, British Columbia.
- 2. THAT I am a graduate of the University of Alberta with the degree of BSc. in geology and chemistry.
- 3. THAT I am an Associate Member of the Society of Exploration Geochemists.
- 4. THAT I have held a responsible position in the field of geochemistry for at least one year.

Dated at Vancouver, British Columbia

BW Ame

B. W. SMEE

CERTIFICATE

- I, Andris Betmanis do hereby certify that:
- I am a geologist with residence at Suite 512, 1550 Duchess Avenue, West Vancouver, British Columbia.
- 2. I am a graduate of the University of Toronto with the degree of B.A.Sc. in Applied Geology in 1965.
- 3. I am a Professional Engineer registered in the Province of Ontario.
- From graduation to present I have been employed as a geologist with Geophysical Engineering and Surveys Limited.
- Between June and July 1970 I supervised the geochemical work on the property on behalf of Geophysical Engineering and Surveys Limited.

nFESSIO Andris Betma s **A. I.** B ŭ April 17, 19 INCEOF

PERSONNEL AND DATES

Name and Address	Position	Employed: From - To	Days
A. I. Betmanis 141½ Riverside Drive, North Vancouver, B.C.	Geologist	June 15/70 - April 17/71	3
B. W. Smee, 1198 W. Pender Street, Vancouver 1, B.C.	Geochemist	June 15/70 - Nov.20/70	5
R. Ficek 1198 W. Pender Street, Vancouver 1, B.C.	Sampler	June 18/70 - July 21/70	27
L. Raminsky 1198 W. Pender Street, Vancouver 1, B.C.	Assis tant .	June 18/70 - July 21/70	27
G. Rowe 1198 W. Pender Street, Vancouver 1. B.C.	Assistant	June 18/70 - July 21/70	27

Declared before me at the Cety Vancouad , in the bf.

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Province of Eritish Columbia, this 29

'day of lepcie 1971, A.D.

A Commissioner for taking Affidavits within British Columbia or A Notary Fublic in and for the Province of British Columbia, fill

SUB-MINING RECORDER

COST OF SURVEY

Barringer Research Limited

Sample collection, sorting and analysing: report preparation	\$ 7,769.28
Supervision: B. W. Smee	670.13
Geophysical Engineering & Surveys Ltd.	
Supervision ; A. I. Betmanis	173.00
TOTAL	\$ 8.612.41

The above costs are property-related costs only and do not include preliminary compilation of previous data, administration costs, transportation to and from Vancouver and other costs not normally applicable for assessment credits.

Declared hefore me at the City Declared hefore me at the City province of Drillsh Columbia, this 29 'day of applie 1971, A.D.

Jule Auraen Commissioner for taking Affidavits within British Columbia or A Notary Fublic in and for the Province of British Columbia,

SUB-MINING RECORDER

AFFIDAVIT RE: COST OF SURVEY

I, Andris I. Betmanis, B.A.Sc., P. Eng. (Ont.) of 512 - 1550 Duchess Avenue in the Municipality of West Vancouver in the Province of British Columbia, DO SOLEMNLY DECLARE that the geochemical survey of 80 located mineral claims and fractional mineral claims owned by T. C. Explorations Limited of Vancouver, B.C. and under option to the Keevil Mining Group Limited was conducted during the field season of 1970, is described by this report and the field data was obtained at a total propertyrelated cost of at least \$8,612.41.

AND I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the "Canada Evidence Act".

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DECLARED before me at the City of Vancouver, in the Province of British Columbia, this day of April, A.D. 1971.

A, I. Betmanis

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APPENDIX VI

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AFFIDAVIT RE: COST OF SURVEY

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APPENDIX V

COST OF SURVEY

APPENDIX IV

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PERSONNEL AND DATES

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APPENDIX III

AUTHORS' CERTIFICATES

APPENDIX II

ANALYTICAL PROCEDURES

ANALYTICAL PROCEDURE USED TO DETERMINE TOTAL COPPER AND MOLYBDENUM IN GEOCHEMICAL SAMPLES USING ATOMIC ABSORPTION SPECTROPHOTOMETER

1. Sample Preparation

- (a) Geochemical soil samples were received at Seymour Laboratory in paper bags.
- (b) The wet samples were dried in an oven at 110° C.
- (c) The dried samples were sifted, using 80-mesh sieve. The plus 80mesh fraction was rejected, and the minus 80-mesh fraction was transferred into a new bag for analysis.

2. Method of Analysis

- (a) 0.5 gm. of the minus 80-mesh samples were weighed out into test tubes.
- (b) 2 ml. of perchloric nitric acid mixture (85% H ClO₄ + 15\% HNO₃) were added to the samples in test tubes.
- (c) The samples with acid mixture were digested on a sand bath at 160° C for three hours.
- (d) At the end of the digestion period test tubes were removed from the sand bath and cooled for fifteen minutes.
- (e) The volume in each test tube was made up to 10 ml. with de-mineralized water. For the samples being analysed for molybdenum, 1 ml. of 1000 p.p.m. Aluminum Chloride was added in each test tube before adding demineralized water.
- (f) The mixture in the test tubes was capped and shaken vigorously, and then allowed to settle.
- (g) The samples were aspirated in atomic absorption spectrophotometer with proper parameters. The concentration of each element was determined by comparing with a set of known standards.

APPENDIX I

CLAIMS



3053 N1 · TO ACCOMPANY "REPORT ON GEOCHEMICAL SOIL SURVEY OF THE T.C. EXPLORATIONS LIMITED PROPERTY" HIGHLAND VALLEY, BRITISH COLUMBIA ----- KAMLOOPS MINING DIVISION DATED: APRIL 17, 1971 BY A.I. BETMANIS BASE P.ENG. (ONT.) AND B.W. SMEE BSE INDEX Work undertaken b Δ BARRINGER RESEARCH LTD, Toronto, Canada.







555 3053 M-5 TO ACCOMPANY "REPORT ON GEOCHEMICAL SOIL SURVEY OF THE T.C. EXPLORATIONS LIMITED PROPERTY" HIGHLAND VALLEY, BRITISH COLUMBIA ------ KAMLOOPS MINING DIVISION DATED: APRIL 17, 1971 BY A.I. BETMANIS BASC P.ENG. (ONT.) AND B.W. SMEE BSC INDEX Work undertaken by Α FBARRINGER RESEARCH LTD, Toronto, Canada.



HIGHLAND VALLEY, BRITISH COLUMBIA ----- KAMLOOPS MINING DIVISION DATED: APRIL 17, 1971

