

REPORT ON

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BAL, TC, FJ, AND RI GROUP OF CLAIRS

FOR

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TCHENTLO LAKE MINES LTD.

(Lat. 55° 12"N. Long. 125° 05"W)

Chinoc dining Division

by

A.J. Sinclair, F. Eng.

January 25, 1971

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REPORT OR

BAL, TC, PJ AND HI GROUP OF CLAIRS

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TCHENTLO LAKE MINES LTD.

SUMMARY

- Bal group, owned by Tchentlo Lake Mines Ltd., Prince George, B.C., is on the north shore to Tchentlo Lake, Omineca mining division.
- 2. Known mineral showings are in jointed dioritic rocks of the Hogem batholith near its southwestern margin. Joints are filled to widths of about one-quarter inch mainly with pyrite and quartz, and to a lesser extent with molybdenite and chalcopyrite. Scattered outcrops of mineralized diorite are abundant on Bal 4 claim. In addition, small knolls of mineralized diorite occur on Bal 1, 2, 3, 6, 11 and 12 claims.
- 3. A soil geochemical survey carried out in the summers of 1969 and 1970 indicates a large area anomalous in Cu and Mo values encompassing Bal 4 claim and extending into HI 27 claim. A somewhat smaller anomaly covering the southeastern half of Bal 6 claim is open to the west.
- 4. The main mineralized area, Bal 4 claim and HI 27 fraction, is centred on a zone of maximum fracture density.

- 5. The property has potential for the discovery of a large tonnage-low grade molybdenum-copper deposit and further detailed exploration is warranted. Such exploration should include detailed geological mapping, ground I.P. survey, ground magnetometer survey and 3000 feet of diamond drilling.
- 6. An exploration program including the foregoing work should be carried out in 2 phases with total estimated expenditures being 2100,000.00, not including normal operating overhead of the company. Phase I should consist of geological mapping, ground magnetometer and I.P. surveys for a total cost of \$40,000.00. Phase II would consist principally of diamond drilling and related work such as alteration mapping, sampling and assaying and would total \$60,000.00

INTRODUCTION

Bal, TC, PJ and HI group of claims (hereinafter referred to as Bal group), owned by Tchentlo Lake Mines Ltd. of Prince George, B.C., consists of 58 claims and 7 fractions as listed in Table I. The claims are in the central interior of British Columbia in Omineca Mining Division, on the north shore of Tchentlo Lake, about 60 miles northwest of Fort St. James (figure 1). The claims group is centred more-or-less at latitude 55° 12'N and longitude 125° 05'W.

Access is via float plane or helicopter from Fort St. James or Smithers. A helicopter pad exists on the property. Float planes can approach shore without difficulty and a short rough bulldozed trail leads from the shore to several areas of surface workings. An alternate access route via water and passable only during high water in the Spring is from Chuchi Lake on the east.

Nolybdenum-copper showings occur on the claims about 1000 to 1500 feet north of Tohentlo Lake on a gently sloping, hummocky surface about 100 to 200 feet above lake level. Tchentlo Lake surface is about 2600 feet above mean sea level. The claims in large part cover an old burn with much deadfall and low brush cover. Shall spruce and alder swamps

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are common between knolls.

Prior to recent work by the principals of Tchentlo Lake Mines there had been no formally recorded exploration work on the Bel Showings. During the summers of 1969 and 1970 Tchentlo Lake Mines conducted an investigation of the claims that included line cutting of a grid over most of the group, a soil geochemical survey, limited rock geochemistry, geological mapping, and limited bulldozer trenching and stripping. The work was supervised by Mr. C. Campbell in 1969 and Mr. #. Rigler in 1970. During the same period the HI claims listed in Table I were examined by NBC Syndicate who carried out geological mapping, a soil geochemical survey and both ground E.M. and magnetometer surveys. These HI claims submequently were obtained by Tchentlo Lake Mines and incorporated into Bel group.

The purpose of this report is to analyze work done to date on Bal group and, if warranted, to outline further exploration work and costs.

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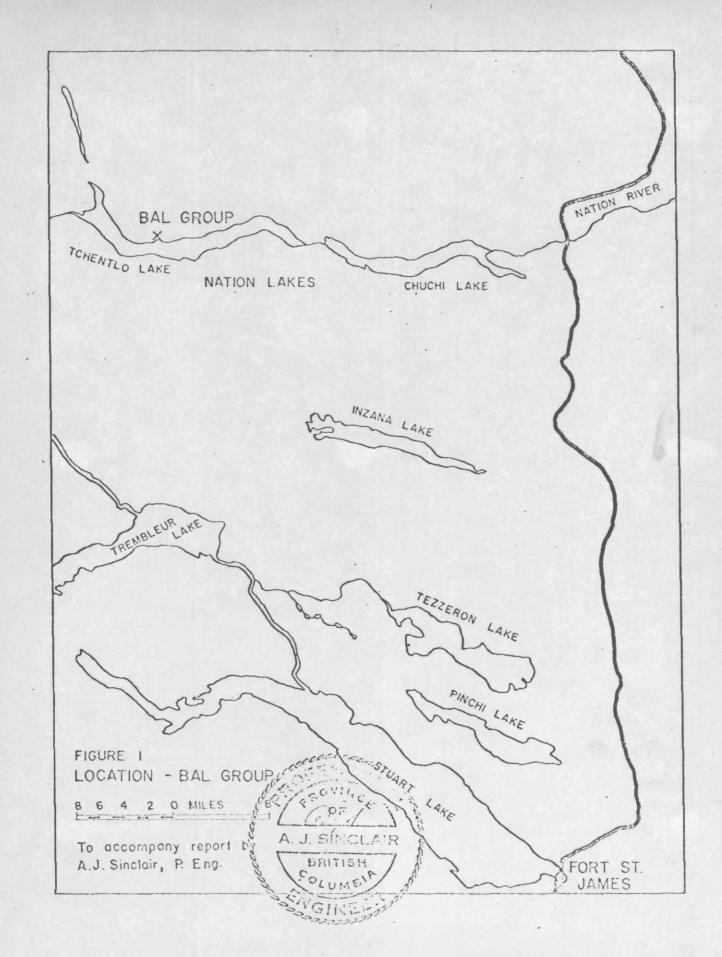


TABLE I

CLAIMS INCORPORATED INTO BAL GROUP

Claims	Total
Bal 1-16 inclusive	16
TC 1-10 inclusive	10
FJ 1-20 inclusive	20
HI 1-10 inclusive	10
HI 29 and HI 30	2 53

Fractions

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Bal A1-A5 1	nclusive			5	
HI 27 and H	11 28	•	-	2 7	
TOTAL		•		65	

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GENERAL GEOLOGY AND PETROGRAPHY

Bal group of claims is underlain by dioritic rocks of the Hogen batholith, presumably of Upper Jurassic or Lower Grataceous age (Armstrong, 1949). The rock is a medium-grained montonite or diorite containing abundant hornblande, plagioclass and potesh feldspar, and may correspond in part to a marginal symmo-diorite phase of the batholith as named by Armstrong. Mineral showings on Bal group are located near the southwestern margin of the batholith. Figure 2 shows the geology in the vicinity of the showings.

A detailed petrographic study was wade of a suite of specimens collected at rock only sample sites. Sample locations are shown in figure 2.

On the scale of a thin section the rock composition ranges from hornblends-biotite monsomite to hornblends-biotite diorite depending on the relative proportions of plagioclass and K-feldspar. Table II lists the minerals observed and gives an approximate idea of their relative abundances.

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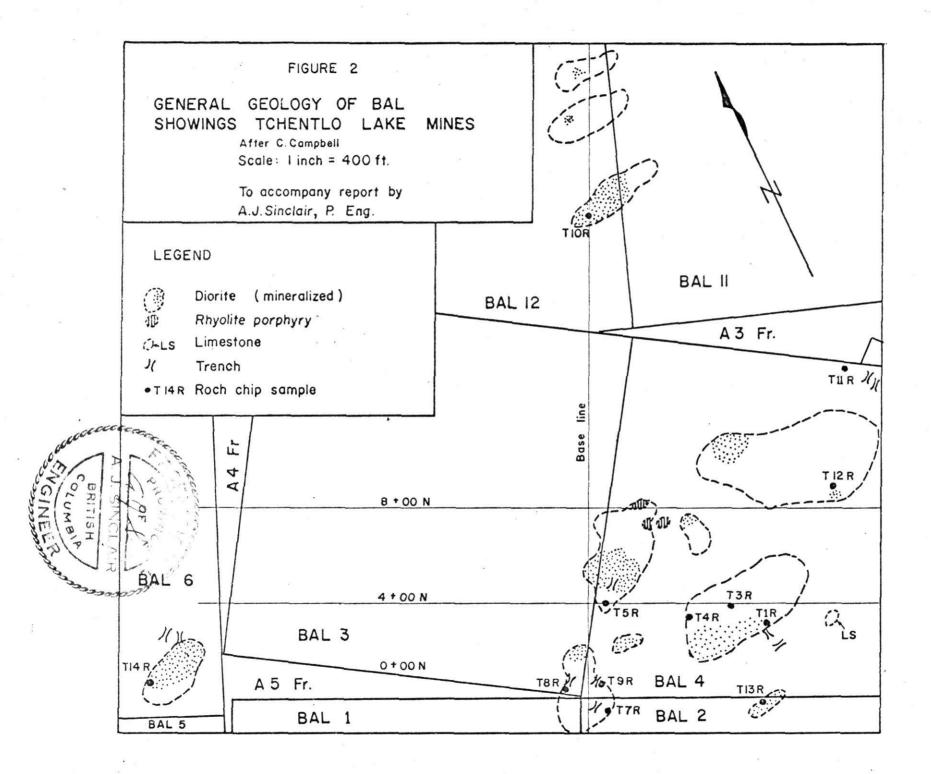


TABLE II

MINERALOGY OF HOST ROCK OF BAL MINERAL SHOWINGS

Kineral.	Approx. Range as Fergentare
Plagioclase (Andesine)	35-60
K-feldspar (myrmekitic)	10-40
Augite	0-4
Hornblende	15-20
Biotite	3-6
Apatite	1-3
Sphene	Tr-2
Negnetite and/or Timenite	2-4
	· ·
Uralite	0-4
Chlorita	1-2
Sericite	0-2
Calcite -	0-2
Epidote	Trace
Quartz (in veinlets)	0-2
Limonite (stain)	Variable

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The rocks are in general medium-grained with the most abundant grain size for essential minerals normally in the range 1 to 2 mm. Grains are mostly anhedral and rarely subhedral.

Nafic minerals account for about 25% of the rock, hornblende being by far the most abundant. Hornblende forms stubby, anhedral laths 1 to 2 mm. in length, that are commonly poixilitic, containing small inclusions of feldspar, opsous minerals, spatite, sphene, biotite and, in places, rounded cores of augite. Augite is not present in every specimen but where found has been replaced either by hornblende or uralite. Biotite occurs as fine-grained masses intermixed with hornblende or as larger books up to 1 mm. diameter.

Plagioclase is the most abundant mineral and is andesine in composition. It occurs as laths 0.5 to 2 mm. long with no obvious preferred orientation. It is twinned according to the albite law and shows vague normal soning. K-feldspar is myrmskitic (with vermicular intergrowths of quarts) and occurs almost exclusively, interstitial to plagioclase.

Primary accessory minerals include apatite, sphere and opaque minerals. It is probable that these opaque minerals are either ilmenite or titaniferous magnetite based on the close association they have with sphere. Moreover, the hand specimens are magnetic. Apatite occurs as fairly large,

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stubby, anhedral prisms up to 0.6 mm. long, generally associated with mafic minerals. Sphene forms discrete, small anhedral grains as well as rins or partial rims about anhedral, opaque grains.

Hydrothermal alteration has been slight to moderately intensive. Myrmekitic K-feldspar is generally very fresh in appearance as is most of the plagioclase. Locally, plagioclase has been replaced extensively by sericite and/or calcite. Similarily, K-foldspar has been sericitized extensively here and there. Epidote (pistacite) occurs in very minor amounts as a replacement of plagioclass along the edge of quartz-pyrite veinlets. Biotite, and to a lesser degree hornblends, have been chloritized locally. Chlorite, in part, occurs as highly irregular replacement masses of both biotite and hornblende along the edges of quartz-pyrite veinlets. Augits is replaced locally be felted masses of uralitic amphibole. Fine-grained, mosaic quarts and annedral pyrite forz thin veinlets formed by open space filling. However, local replacement of wallrock by both these minerals has occurred. Similarly, molybdenite and chalcopyrite are not restricted to veinlets. Chalcopyrite, in particular, occurs as small anhedral grains in patches of mafic minerals. For the most part alteration has not been sufficiently intense to destroy the original textures of the rock.

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MINERALIZATION

Mineralization is locallized almost exclusively in 2 or 3 joint sets that appear to maintain fairly uniform orientations within an outcrop but differ in orientations over distances of about 100 feet or more. Pyrite and quarts are the two most abundant materials filling joints with lesser amounts of molybdenite and chalcopyrite. The resulting veinlets generally range in width from thin smears to about onequarter inch. Not uncommonly smoky quarts occurs in somewhat thicker veins up to about one inch in width. In general, where veins are less than one-quarter inch in width pyrite forms a high proportion of vein filling material and can be present in excess of quarts. Frequency of veinlets has not been studied in detail but parallel veinlets are commonly separated by 2 to 4 inches of host rock.

Polished section examination of selected speciment shows that molybdenite is most abundant along vein margins as flakes approximately parallel to vein walls. In places this relationship is obvious macroscopically. Chalcopyrite occurs as rare, small, anhedral grains interstitial to quartz and pyrite. A few minute anhedral blebs of chalcopyrite were observed associated with pyrite in patches of altered mafic minerals.

seathering has been extensive, principally due to the abundance of pyrite. Even seepingly fresh specimens show

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evidence in polished sections of limonitization of pyrite. Limonite is everywhere abundant and small amounts of a yellow, secondary, earthy material, probably ferrimolybdite, are present locally. Malachite is also present but is rare.

Twelve rock chip samples were taken by Wr. Colin Campbell and analyzed for Cu. No and Ag by Wancouver Geochemical Laboratories Ltd. Locations of these samples are shown in figure 2 (hand specimens from the sam. localities were used for petrographic studies). Arithmetic means for No. Cu and Ag are 210 ppm, 348 ppm and 1.4 ppm respectively. Analytical results are listed in Appendix I.

Fresent showings are not amenable to meaningful detailed sampling because of the extensively weathered nature of the exposures. Surface work carried out to date and including abundant bulldozer trenching and stripping has not been successful in exposing in sh mineralized rock. Three grab samples taken by the writer from pits on Bal 4 claim give assay results shown in Table III. Sample descriptions and locations are given in Appendix II.

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ASSAY RESULTS OF THREE GRAB SAMPLES FROM BAL 4 CLAIM

Sample No.	Cu (\$)	Mo (%)	Ag (oz/ton)	Au (or/ton)
DX-1	0.14	0.15	0.6	nil
DX-2	0.09	0.125	0.1	nil
DX-5	0.07	0.02	0.1	n1 1

* Assays by Coast Eldridge Engineers, Vancouver

** Sample locations and descriptions given in Appendix

QEOCHEMISTRY

Seven hundred and forty three soil samples were collected at intervals of 200 feet along grid lines covering the entire property. In most cases the D-A grid lines are spaced at 800 feet but in a few places where more detail was required line spacing was 400 feet. For purposes of statistical treatment the data have been divided into 3 groups based on analytical batches. Group 1 data are those 1970 results obtained east of and including two short morth-south base lines at 4800 E and 5600 E. Group 2 represents 1970 data west of the two short N-S base lines. Group 3 is 1969 data from more-or-less the same general area as Group 2 data. Table IV list means and standard deviations of arithmetic and logarithmic data for all groups.

Cumulative probability plots for these data are shown in figures 3, 4 and 5 (cf. Lepeltier, 1969). These cumulative plots indicate several important points:

> (1) Curves for Cu in Groups 2 and 3, representing samples taken from the same general area in 1970 and 1969 respectively, show the existence of 2 populations with the lower inflection in both curves at 50 ppr.

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This value is taken as the threshold separating lower background values from higher anomalous values.

(2) Tine data in figure 5 show that only a single population (i.s. background) is present.

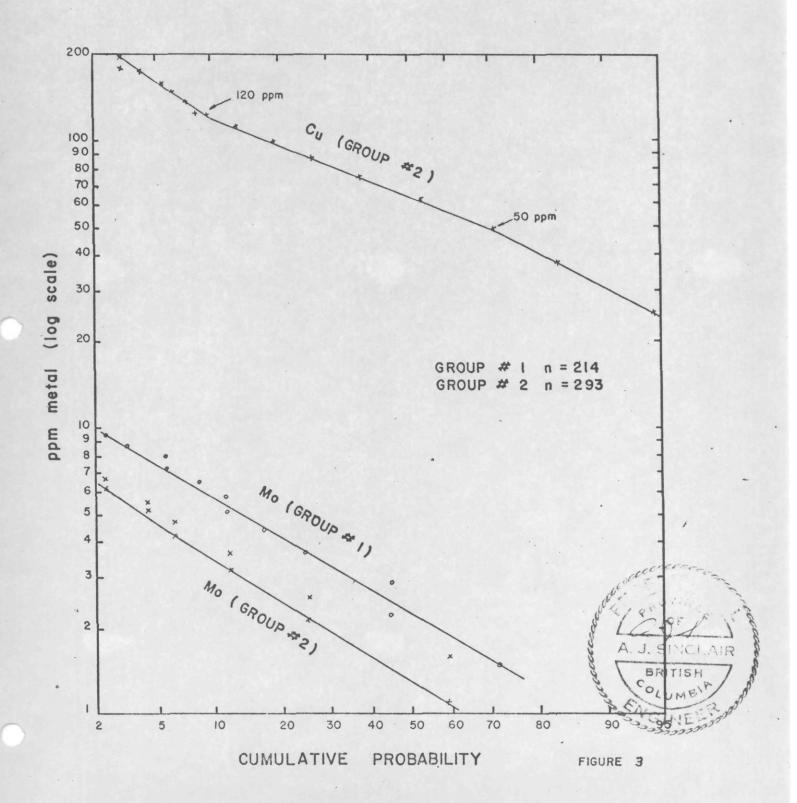
(3) For Group 3 he data (figure 5) values of 6 pps and above are considered anomalous whereas lower values represent background.

(4) Differences in the cumulative probability plots of Cu for Group 1 on the one hand, and Groups 2 and 3 on the other hand, indicate differing background populations across the property, approximately from west to east. Higher background values exist on the east side than on the west suggesting a regional trend that may correlate with known, apparently gradational, variations in rock type.

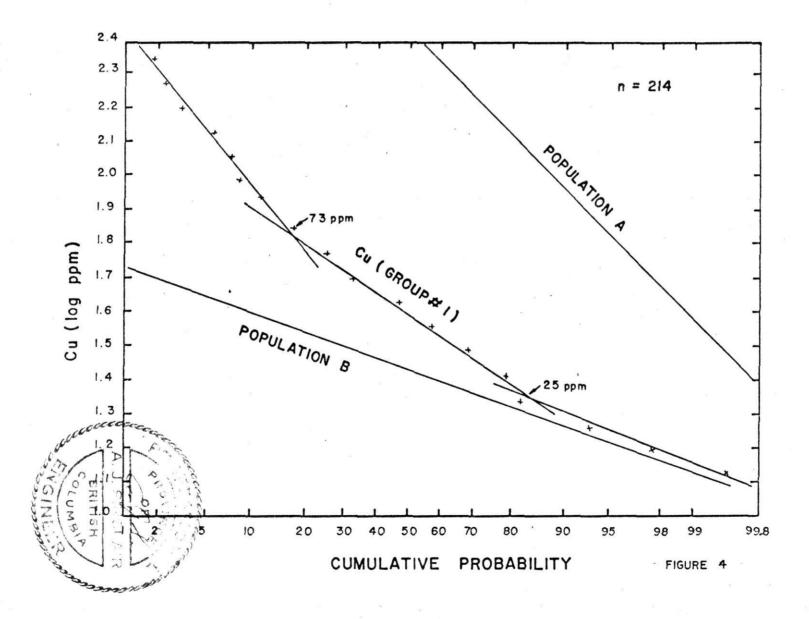
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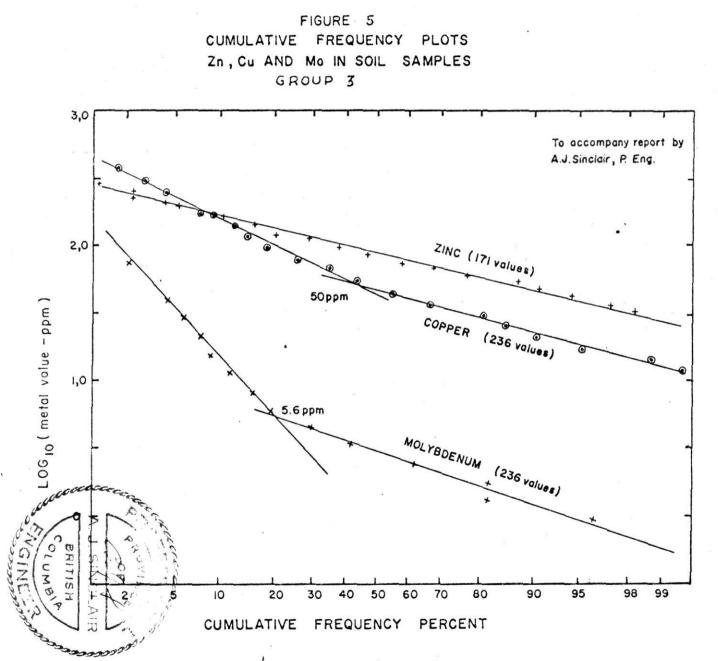
Group	Netal	M	Arith X	metic B	Loge	rithm x +8	ic x s
1	Cu	214	62	159	43	83	22
-	Mo	214	2.9	2.9	0.8	3.0	0.02
2	Cu	293	74	50	57	235	14
	No	293	2.1	2.0	0.9	1.7	0.05
3	Cu	235	78	106	55	116	26
í	Xo	236	9.3	32	3.3	12	0.9
	Zn	171	98 .	59	36	140	53

ARITHMETIC AND GEOMETRIC MEANS AND STANDARD DEVIATIONS FOR THREE GROUPS OF SOIL GEOCHEMICAL RESULTS



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Geographic plots of the soil geochemical data show two relatively large areas with high concentrations of anomalous values of both Cu and Mo. Virtually all samples taken from Bal 4 claim are anomalous in these two elements and the anomaly extends to the east through HI 27 fraction. Numerous small pits and trenches dug on the claims during 1969 indicate extensive quartz-pyrite-molybdenite-chalcopyrite mineralization of the type described previously. Bulldoner trenching and stripping tring 1970 was designed to examine this anomalous some in detail but bedrock could not be reached because of relatively thick overburden. The anomaly covers an area at least 1500 feet by 2000 feet.

A second area of anomalous values includes the southern and eastern parts of Bal 6 claim. No further work has been carried out on this anomalous some apart from aimor trenching to investigate weathered exposures of diorite mineralized with quartz-pyrite veinlets containing small amounts of nolybdenite and chalcopyrite. A third area includes much of claims TC 1 and TC 2 where soil samples are anomalous in Cu but only a few of which are also anomalous in Mo. This latter area has not been investigated further.

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The remainder of the claims group contains scattered samples with anomalous Cu and/or No values, but not in sufficiently large groupings that specific targets can be outlined for further detailed exploration. However, it should be borne in mind that throughout the remainder of the claims group line spacing for geochemical sampling was 800 feet.

The 3 anomalous areas described above can be assigned relative priorities for further work on the basis of size, related mineralization, and the number of elements for which the areas are anomalous. In decreasing order of importance the relative priorities are (1) bal 4 and HI 27, (2) Bal 6, and (3) TC 1 and TC 2.

FRACTURE DEMSITY ANALYSIS

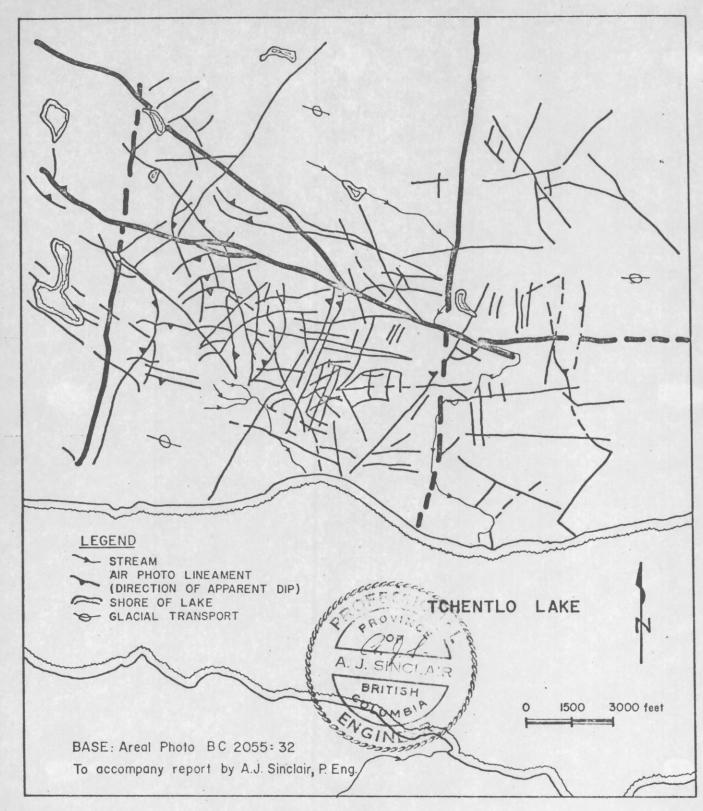
A fracture density study of the claims group was undertaken on the basis of the observed joint control of mineralisation (Sinclair, 1970a). Lineaments were marked on aerial photographs by stereo viewing and results were plotted using aerial photo BC 2055:32 as a base (figure 6). For ease of interpretation these data were contoured using a constant area cell placed at 1000 feet centres. The number of fractures in each counting area was assigned to the centre of the area and results were hand contoured (figure 7). A some with a pronounced fracture density high was found that centred on Bal 4 claim and coincided exactly with the top priority soil geochemical

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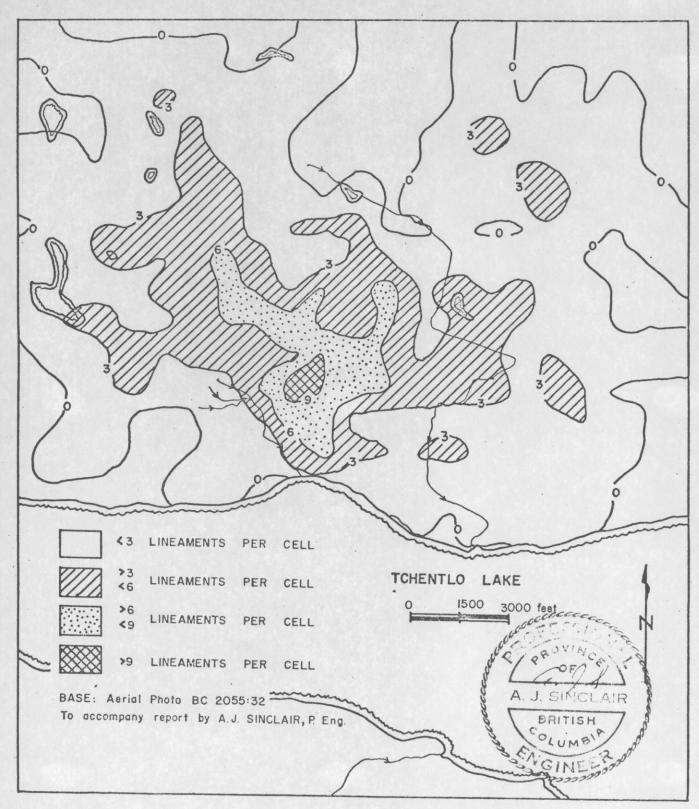
anomaly. The two remaining soil geochamical anomalies are located along the west and morth sides respectively of the fracture density high.

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FIGURE 6







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RECONNENDATIONS

To recapitulate briefly, the results of an extensive soil geochemical program, and hand and bulldoser trenching and stripping, indicate several areas of interest for detailed exploration on Bal group of claims. The numerous indications of molybdenum-copper mineralization on Bal 4 claim is of particular interest because it coincides with a much larger area outlined by soils anomalous in both Gu and No contents. Moreover, superimposed on the same area is a pronounced fracture density maximum. The claims group, therefore, appears to offer potential for the discovery of a large tonnage-low grade Mo-Cu deposit and is worthy of further detailed exploration. Further exploration should include the following:

> 1. The entire claims group should be covered by an I.P. survey along grid lines separated by 800 feet. Hore detail at grid line separations of 400 feet should be obtained over and about Sal 4 and Bal 6 claims and other areas indicated by the survey itself. This survey should be completed prior to any other detailed work.

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- 2. A magnetometer survey over the existing grid would prove useful in evaluating the complex structure in the general vicinity of Bal 4 claim. It would also provide an indirect means of mapping the eastern part of the claims where more basic plutonic rocks are known to occur, some of which contain small amounts of macroscopically visible chalcopyrite (at 40+00 N, 48+00 E for example).
- 3. Bal 4 and HI 27 claims should be examined in some detail by diamond drilling. Vertical holes might initially be spaced at centres spaced 1000 feet apart with closer drilling as the program proceeds. Core should be split and assayed for Cu, Kc and Ag.
- 4. The foregoing program should be carried out under the supervision of an experienced geologist in two phases. Phase I should include detailed geological mapping with special reference to lithologic variations, alteration zoning, ore-mineral coming and fracture density studies, and ground magnetometer and I.P. surveys.

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ESTIMATED EXPENDITURES

Phase I

1.	I.P. Survey 20 line miles at 3550.00	\$ 11,000.00
2.	Ground Magnetometer Survey 30 line miles at \$150.00	4,500.00
3.	Personnel Geologist - 6 months at \$1000.00 Geological Assistant - 6 months at \$500.00	6,000.00 3,000.00
4.	Camp Gear Tents, cooking gear, canoe vehicle rental	5,000.00
5.	Food 360 man-days at \$6.00	2,160.00
6.	Consulting	3,340.00
7.	Contingencies	5,000.00
	TOTAL ESTIMATED EXPENDITURES	\$ 40,000.00

Phase II

1.	Diamond Drilling 3000 feet at \$15.00	45,000.00
2.	Supervisory Personnel Geologist	4,000.00
3.	Assay Costs	3,500.00
4.	Consulting	1,500.00
5.	Contingencies	6,000.00
	TOTAL ESTIMATED EXPENDITURES	3 60.000.00

CONCLUSIONS

Bal group contains several areas of known quartspyrite-molybdenite-calcopyrite mineralization. The largest of these, Bal 4 claip, coincides with (1) an area about 1500 feet by 2000 feet indicated by a soil geochemical survey to be anomalous in Gu and Mo, and (2) a zone of high fracture density as determined from analysis of merial photographs. Mineralized areas are extensively fractured and are characterized by wallrock that is moderately altered, particularly by chloritization of mafic minerals and sericitization of plagioclass. Potential exists for the discovery of a large tonnage-low grade molybdenum-copper deposit and detailed exploration is warranted. In addition to the target area centred on Bal 4 claip, other anomalous zones have been indicated which warrant further examination.

Further exploration should include extended geological mapping, ground geophysical surveys (I.P. and magnetometer) as Phase I and 3000 feet of drilling as Phase II. Costs of Phase I and Phase II are estimated as \$40,000.00 and \$60,000.00 respectively.

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A.J. Sinclair, P. Eng. January 25, 1971

APPENDIX I

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ROCK GEOCHEMISTRY RESULTS

Sample		ppr		
		Mo	Cu	Ag
71	R	56	. 220	1.0
T 3	R	164	420	1.0
T 4	R .	18	250	1.5
25	R	75	260	2.0
27	R	218	640	1.5
5 2	R	2,120	770	1.0
T 9	R	314	480	1.5
7 10	R	10	170	1.0
7 11	R	370	460	1.5
7 12	R	1.4	280	15
T 13	R	145	285	1.5
114	R	21	250	1.5
MEAN	VALUES	210	• 348	1.4

* Rock geochemical analyses by C. Chun and L. Nicol of Vancouver Geochemical Laboratories Ltd., using Techtron AA4 and AA5 units with mitrous oxide and acatylene fuel for Mo, and acatylene and air fuel for Cu and Ag.

APPENDIA TI

Description of grab samples assayed for Cu. No. Au and Ag by Coast Eldridge Professional Services, Vancouver.

DX-1: From pit about 800 feet north of DX-5 (described below). Consists of fresh, coarse-grained diorite, extensively mineralized with pyrite, containing moderately abundant polybdenite here and there and rare visible chalcopyrite.

> Assay results: Ou - 0.14%, No - 0.16%, Ag - 0.6 or/ton, Au - n11

DX-2: From large pit hear claims post common to Bal 1 to Bal 4 inclusive. Consists of three relatively fresh specimens of coarse-grained horablende diorite containing abundant pyrite along joints, with small amounts of visible molybdenite in some joints. No chalcopyrite was seen in the specimen. Assay results: Cu - 0.09%, No - 0.125%, Ag - 0.1 or/ton.

ay results: Gu = 0.09%, Mo = 0.125%, Ag = 0.1 02/ton Au = mil

DX-5: Prom pit about 700 feet east of claim post common to Bal 1 to Bal 4 inclusive. Consists of 2 large (fistsize) specimens of fresh, coarse-grained, hornblende diorite, extensively mineralized, with pyrite and very minor amounts of visible molybdenite and chalcopyrite.

> Assay results: Cu = 0.07%, No = 0.02\%, As = 0.1 os/ton, Au = nil.

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CERTIFICATE

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I, Alastair J. Sinclair, of the city of Vancouver, province of British Columbia, hereby cartify:

- 1. That I am a Geological Engineer residing at 5869 Dunbar St., Vancouver 13, B.C.
- That I obtained a B.A.Sc. degree in Applied Goology from the University of Toronto in 1957, an H.A.Sc. degree in Geological Engineering from the University of Toronto in 1958, and a Ph.D. in Geology from the University of Splitish Columbia in 1964.
- 5. That I am a registered Professional Engineer in the Province of Ontario in the Mining Division, and in the Province of British Columbia in the Geology Branch.
- 4. That I have practised my profession for thirteen years.
- 5. That I have no interest directly or indirectly, nor do I expect to have any direct or indirect interest in the properties or securities of Tchentlo Lake Hines Ltd., or any affiliated companies.
- That the accompanying report is based on visits to the Bal group in 1969 and 1970, and personal analysis of various data obtained under the supervision of Mr. Colin Campbell and Mr. Wm. Rigler.

Dated at Vancouver in the Province of British Columbia this 25th day of January, 1971.

A.J. Sincl

