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Tyee Lake Resources Ltd.

811953

TELKWA RIVER COPPER PROPERTY

Telkwa, B.C.



August 28, 1972

DOLMAGE CAMPBELL & ASSOCIATES LTD. VANCOUVER, CANADA

TYEE LAKE RESOURCES LTD. (N.P.L.)

1950 - 1055 WEST HASTINGS, VANCOUVER, B.C.

TELEPHONE

687-9076

September 21, 1972

Dr. J.G. Simpson, Cyprus Exploration Limited, 1101 - 510 West Hastings St., Vancouver, B.C.

Dear Dr. Simpson:

Re: Telkwa River Copper Property

Please find enclosed a copy of a report on the Telkwa River Copper property prepared by Dr. D.D. Campbell of Dolmage Campbell & Associates.

If you are interested in this property we would be pleased to discuss a possible joint venture agreement.

Yours very truly,

TYEE LAKE RESOURCES LTD. (NPL)

Hiro Ogata, President

HO:1h enclosure



DOLMAGE CAMPBELL & ASSOCIATES LTD.

CONSULTING GEOLOGICAL & MINING ENGINEERS 1000 GUINNESS TOWER VANCOUVER I, B.C.

Tyee Lake Resources Ltd.

TELKWA RIVER COPPER PROPERTY

Telkwa, B. C.

August 28, 1972

Douglas D. Campbell

Consultant

Vancouver, Canada

DOLMAGE CAMPBELL & ASSOCIATES LTD.

TABLE OF CONTENTS

• · ·			Page
SUMMA	1		
INTRO	DUCTION		3
	Property History References		3 3 4
GEOLC	GICAL SETTING		5
	Regional Property		5 6
ECONO	DMIC GEOLOGY		8
	Regional Property	•	8 8
	Area I Area II Area III Area IV Other areas		9 9 10 10 11
CONCLUSIONS			12
	Strata – bound deposits Porphyry–type deposits Recommended program		12 13 14

LIST OF ILLUSTRATIONS

Figure 1	Location map - $1" = 120$ miles	Following page 14
Figure 2	Geological setting - 1 " = 20 miles	Following page 14
Figure 3	Geochemical surveys - 1" = 500 ft.	In pocket
Figure 4	Area 11 – 1 " = 200 ft.	Following page 14

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-1-

SUMMARY & RECOMMENDATIONS

The Telkwa River Copper Property, owned by Tyee Lake Resources Ltd. consists of 20 mineral claims in one block located 30 miles southwest of Smithers, British Columbia, at the headwaters of the Telkwa River. The property covers the peak and west flank of Mt. Janssens and is accessible by helicopter from a road 14 miles to the northeast.

Exploration of the property was done in 1965 - 67 by Phelps Dodge Corp. of Canada Ltd. and consisted of geological mapping, stream silt sampling and reconnaissance diamond drilling. Work done in 1972 by Tyee Lake Resources Ltd. consisted of reconnaissance soil sampling.

The property is underlain by volcanic tuffs and breccias of the Hazelton Group. Immediately west of the property these rocks have been intruded by the Howson Batholith, an outlier of the Coast Range Batholith. Probably because of this intrusive the volcanic rocks along the southwestern margin of the property have been intensely feldspathized.

<u>Copper mineralization</u> occurs as disseminated bornite and chalcopyrite, generally with considerable pyrite, in several large areas on the property within the matrix of the tuffs and breccias. The occurrences farthest from the intrusive contact appear to be limited in size and are probably strata-bound deposits within favoured pyroclastic beds. The occurrences along the west side of the property, near the contact of the Howson Batholith, are more disperse and are possibly porphyry-copper type deposits.

RECOMMENDATIONS:

Because of the favourable geological setting and the widespread occurrences of disseminated copper mineralization on this property the writer concludes that the property warrants further exploration to investigate the possibility of commercial copper deposits existing either as relatively small tonnage but high grade strata-bound deposits, similar to those found on the Zymoetz River 20 miles - 2 -

to the west, or as large tonnage porphyry-copper type deposits, similar to Schaft Creek which is in the same type of geological setting.

Reconnaissance diamond drilling is recommended to investigate the soil anomaly as well as an area of widespread good grade copper mineralization near the west side of the property, (Area II).

Reconnaissance soil sampling is recommended on and beyond the west wide of the property toward the intrusive contact.

The cost for the recommended exploration program is estimated to be approximately \$45,000.

-3-

INTRODUCTION

PROPERTY: (Figs. 1 - 2)

The Telkwa River Copper Property is comprised of one block of 20 full sized mineral claims named Tel 29 – 38 and Tel 51 – 90.

The claims are located in the Telkwa Range of mountains 30 miles southwest of the town of Smithers in west central British Columbia at the headwaters of the Telkwa River (54° 28' N, 127° 40' W). The property extends from the canyon of the Telkwa River, elevation 2750 feet, to the top of Mt. Janssens, elevation 5800 feet, and is forested at lower elevations and alpine above about 4000 feet elevation.

Access to the property is by helicopter either from Smithers or from the end of a road that follows the Telkwa River southwest from Telkwa to a point 14 airmiles northeast of the property.

HISTORY:

Copper showings were discovered in the area in 1964 by a prospectorgeologist for Phelps Dodge Corporation of Canada Ltd. who subsequently staked 72 claims and held the property until 1970. During the 1965-66-67 field seasons Phelps Dodge geologically mapped the claims, silt sampled the watershed, trenched and sampled exposed showings and performed limited reconnaissance diamond drilling in two areas of mineralization.

The original Phelps Dodge block was restaked in 1971 for Tyee Lake Resources Ltd. Subsequently 52 claims were dropped and the property now consists of the 20 northernmost claims of the original block.

During the summer of 1972 the property was examined on two occasions by Mr. R. B. Findlay, project geologist for Dolmage Campbell & Associates Ltd., and once by Mr. C. R. Saunders, associate of the same company, after examination of available data and instructions by the writer as consultant to Tyee Lake Resources Ltd. During these visits a number of reconnaissance lines of geochemical soil samples were run in an overburden covered portion of the property. The results of this sampling, together with Mr. Saunders' assessment of the on-site geology and the writer's assessment of the work done on the property, formed the basis for the recommendations contained in this report.

-4-

REFERENCES:

Of the large amount of information made available to Dolmage Campbell & Associates Ltd. by Tyee Lake Resources Ltd. for the compilation of this report, the following have supplied most of the data used:

- L. M. Applegate: Summary Report, I and E Telkwa Canyon, 1967; Phelps Dodge Corporation of Canada Ltd., January 2, 1968.
- 2/ Phelps Dodge Corporation of Canada Ltd., Various maps and drill logs, 1966.
- 3/ J. R. Woodcock, Consultant: Letter re: Telkwa Canyon Property (TEL Claims), February 23, 1971.
- 4/ A. Nevin: Telkwa River Copper Property (TEL 1 72 Claims) September 9, 1971.

GEOLOGICAL SETTING

(A) REGIONAL:

The Telkwa River property is underlain by volcanic rocks of the Hazelton Group of Jurassic age. Immediately west of the property, across the Telkwa River, the glacier-capped mountains are underlain by the Howson Batholith, which is an outlier of the Coast Range Batholith whose eastern contact lies 20 miles due west of the Telkwa River property, (Fig. 2). The Howson Batholith is 10 miles in width and 40 miles in length in a north-south direction and is comprised of acid to alkaline intrusive rocks. It is of interest that the geological setting of the Telkwa River property, near the eastern contact of a granitic intrusive body in Hazelton Group volcanic rocks, is identical to that on the Zymoetz (Copper) River 15 miles to the west on the eastern contact of apophyses from the main batholith and that copper mineralization occurs in identical habit at both localities. This similarity of occurrences is discussed in detail under Economic Geology.

It has been found during the extensive exploration around intrusive bodies along this portion of the east contact of the Coast Range Batholith (Zymoetz, Goosly, Berg, etc.), that the intrusive contacts are steeply dipping and that outlying stocks of intrusive have the three dimensional form of plugs or cylinders. For this reason it is not advisable to anticipate the existence of intrusive bodies at shallow depths below the surface simply because a known intrusive contact occurs a short distance away on the surface. This is not to say that such intrusive bodies may not occur but in all likelihood they will be separate plugs or stocks and not shallow extensions of a nearby body. In this case it is distinctive of such occurrences along the east contact of the Coast Batholith that the volcanic rocks covering the top of a shallow stock are invariably recrystallized and locally intensely altered by potash metasomatism, with the result that these are variously granitized to medium crystalline intrusive-looking rocks. This feature is important to appreciate if exploration targets are set up on the premise of buried intrusives.

Structure: The Hazelton Group volcanic rocks in this region are generally gently to steeply eastward dipping and are only folded where they are adjacent to intrusive contacts. Throughout the Tyee property the volcanics strike northerly and dip gently to the east; however, as the contact of the Howson Batholith, which lies on the west side of the Telkwa River is approached the dips of the volcanics steepen sharply to the west.

No faults are confirmed in the area but since good bedrock exposures are not common the existence of faults cannot be ruled out. Judging from data from other similar geological settings along the east margin of the Coast Batholith there are probably one or more steep, major faults trending northward near the contact of the Howson Batholith but since this area is largely overburden-covered (valley bottom) the existence of such faults will require subsurface exploration to confirm.

One low-dipping fault has been reported by Phelps Dodge to occur near the Telkwa River in Area II, at the west edge of the property; however, this is not confirmed. Also, various topographic lineaments in the area suggest the possible existence of faults or shear zones.

(B) PROPERTY:

The entire Telkwa River Copper Property was geologically mapped on a scale of one inch = 200 feet by staff geologists of Phelps Dodge Corporation in 1966 and 1967. The results of this geology have been checked locally in the field by Mr. Saunders of Dolmage Campbell & Associates Ltd. and have been found to be generally correct although the specific identification of some rock types and the projection of some rock units are open to question.

The property area is underlain by layered volcanic rocks, generally andesitic in composition, that are predominantly pyroclastic in origin. The most widespread rocks mapped by the Phelps Dodge geologists are tuffs and agglomerates. Lesser rock types include cherts, breccias, metasediments and intrusive syenite and "diorite" dikes.

At the western edge of the property a number of steeply-dipping northnorthwest-trending zones mapped as "chert breccia" and "breccia with epidote" appear to be possible altered shear or fault zones since they cut across the strike and dip of the volcanics.

This type of volcanic pile, comprised predominantly of pyroclastics, tuffs and breccias, is identical to the Hazelton Group rocks exposed along the Zymoetz and Clore rivers on the west side of the Howson Batholith and is similar to the Hazelton rocks at the Berg deposit 45 miles to the south, (Fig.2). Dr. Nevin has described the volcanics on the property as "dacite tuffs and flows" together with "feldspar-rich rocks of trachy-andesite composition" (locally porphyritic). The latter types of rock occur in the southwestern portion of the property and are suspected by the writer to be feldspathized (granitized) volcanics near the contact with the Howson Batholith. Dr. Nevin's observation that the rock "appears to be a dioritic or syenite,...." also agrees with the writer's observation of the granitized Hazelton volcanic rocks near the batholith contact on the Zymoetz River 20 miles to the west.

- 7 -

- 8 -

ECONOMIC GEOLOGY

REGIONAL:

The eastern margin of the Coast Range Batholith forms the western boundary of a northwest-trending belt in British Columbia that is a copper (molybdenum)-rich province. In the general vicinity of the Telkwa River Copper Property a major porphyry-type copper deposit has been proven at the Berg Deposit, 45 miles to the south, a number of smaller copper deposits on the Zymoetz River, 20 miles to the west; and a major copper-silver deposit at Goosly Lake about 45 miles to the southeast. Major molybdenum deposits have been proven at Endako and Smithers as well. The writer has had first hand experience with most of these deposits and is therefore familiar with the geological features of each.

When the geological setting of the Telkwa River Copper Property is compared to those existing in the above-listed deposits it is evident that it has features suggesting that it could be a favourable host for two type of deposits, namely; (1) large tonnage porphyry copper type near the contact of the Howson Batholith, and (2) smaller tonnage, higher grade, copper replacement within particular beds of volcanic rocks. The reasons for this conclusion are discussed below.

PROPERTY:

Copper mineralization is exposed in four general areas explored by Phelps Dodge, three of which are on the property. The mineralization occurs as malachite, chalcopyrite and bornite disseminated in and veining the volcanic rocks. In addition, most of the streams on the property return local silt samples that are anomalous in copper. The four areas of copper occurrences have been designated as Areas I to IV by Dr. Nevin and these designations are retained for this report. These four areas are actually the only four areas of good, sizable outcrop that exist on or near the property, three, (I, II and IV), along the canyon of the Telkwa River to the west and south, and the fourth, (III), along the three ridges of Mt. Janssens at the northeast corner of the property. All of the intervening ground is covered with overburden consisting of forest, swamp, grassy skree or talus. The dominant rock types in all four of these areas are bedded tuffs, breccias and agglomerates. In Area I, off the south edge of the property, the best mineralized rock is a feldspar-rich andesitic rock that may be a granitized volcanice. In all four areas pyritization is locally evident and is coincident with the copper mineralization everywhere except in Area IV.

The areas of copper mineralization are discussed individually below:

<u>AREA 1:</u> Area I is a relatively small exposure on the north side of the river canyon and along the river at the southwest corner of the present property, (Fig. 3). Copper sulphides occur in pyritized pyroclastic rock in sub-commercial amounts as disseminations and stains and in somewhat greater amounts as quartzchalcopyrite stringers. No work has been done in this area but the mineralization would appear to be related to the intrusive contact to the west.

AREA 11: Area 11 is about 2000 feet north of Area 1, also along the north side of the river canyon, on a steep slope of outcrop and talus. The most interesting part of this area is the north end where a length of 1000 feet is more or less continuously mineralized with copper stain and leached chalocpyrite in pyritized tuffs, (Fig. 3). In thin section examination Dr. Nevin found the rock here to be altered by silification, potash feldspathization and epidotization, as well as by the pyritization. This type of alteration in these rocks is very common near intrusive contacts where the intrusive has been accompanied by extensive metasomatism; it is not necessarily indicative of hydrothermal activity.

The mineralized portion of Area II is the most westerly portion, nearest the Howson Batholith, and is apparently not primarily controlled by the bedding of the volcanics.

The mineralized section of Area II was trenched and probed by 104 feet of pack-sack drill holes by Phelps Dodge Corp. The trenches have now been obliterated by skree slides and there are only summary assay records, with no locations, of the drill holes; however, the available data is of significant interest. As shown on Figure 4, all of the four trenches returned interesting copper values across significant lengths of sampled trench, especially when it is considered that the surface material is leached and oxidized. The best surface sample results were obtained from Trenches # 2 and # 3 which returned 0.48% Cu across 70 feet and 0.56% Cu across 55 feet respectively. The two trenches are very nearly at right - 10 -

angles to one another and are 200 feet apart. Also, the weighted average of the samples from all of the trenches and the pack sack drill holes, (whose core recovery was very low), is 0.33% Cu which, considering that it comprises a sampling of an outcrop measuring approximately 600 x 300 feet in area over a vertical interval of about 200 feet, is of considerable interest for additional investigation. The only practical method for definitive testing of this showing is by diamond drilling, either from the top of the canyon or from the riverbed.

<u>AREA III:</u> Area III is on the peak of Mt. Janssens near the southeast corner of the property, (Fig. 3.). Copper mineralization is exposed in locally pyritized dacitic tuffs for a length of about 250 feet along the bedding. One trench on this showing returned 0.41% Cu along 20 feet.

Extensive outcrops along the ridges to the north (2500 ft.) to the south east (1100 ft.), and to the northwest (1800 ft.) expose unaltered, unmineralized rock; therefore, it appears that the mineralization in this showing is a limited occurrence restricted to a particularly favourable stratum in the volcanics that has been largely removed by erosion.

AREA IV: This area is a large cupriferous gossan that lies astride the Telkwa River canyon south of the present property about 2000 feet southeast of Area I, (Fig. 3). The area was mapped in detail by Phelps Dodge and was explored by four diamond drill holes and numerous trenches. Two holes, # 1 and # 2, were only 85 and 70 in length respectively, but the other two, # 3 and # 4, were 1313 and 968 feet. Core recovery ranged from 10 to 60 percent, with the recovered core being badly broken due to close fracturing of the rock. According to the logs of Phelps Dodge all of the holes traversed westerly dipping layers of rocks described as "diorite", "syenite" and "feldspar porphyry". From the writer's experience with a similar geological setting 20 miles west on the Zymoetz River such descriptions suggest feldspathized or granitized Hazelton Group volcanic rocks.

The most interesting feature of Area IV, according to the mapping by Phelps Dodge, is the fact that most of the surface trenches from which the best copper samples were obtained are located on the outcrops of a band of "feldspar porphyry" which trend northward across the river canyon. This suggests that the copper mineralization at this location may be the strata controlled type. It is also of interest that the highest silt sample assays from the river occur where this particular stratum crosses the river, (Fig. 3). - 11 -

In view of the fact that the samples from the surface trenches in Area I are generally low in copper and that the two drill holes that crossed the southern extension of the mineralized band did not intersect any copper values of note, the area is not considered of enough interest to include in the property at this time.

OTHER AREAS: Approximately 80 percent of the present Telkwa River Copper Property is covered by overburden, mostly on the mountain slope between Area III, on the peak, and Area I and II, in the river canyon. In an endeavour to assess the exploration potential of this overburden-covered central portion of the property Tyee Lake Resources Ltd. authorized a reconnaissance soil survey on it in the summer of 1972, the results of which are shown in Figure 3. As shown in Figure 3, an elongate north-trending copper anomalous area was detected by this survey on the lower mountain slope midway between Area II and Area III. The surface anomaly is about 1000 feet in length and 400 feet in width and is parallel to the trend of the bedding of the volcanics. It is of interest that, allowing for topography and the dip of the bedding, this anomaly can be readily projected to join with the mineralized bed in Area I. From its slope, size and attitude it is suggested that the soil anomaly represents a mineralized stratum of favourable volcanics. The rock float in the vicinity is tuff and agglomerate but none of it is mineralized with copper.

CONCLUSIONS

The exposures of mineralized volcanics in Areas I and II, together with the 1972 geochemical anomaly, suggest that possibility of the occurrence of strata-bound copper deposits on the Telkwa River Copper property. In addition, the exposures of copper mineralization in Area II, together with the nearby contact with granitic intrusives (Howson Batholith) to the west, suggest the possibility of the occurrence of a porphyry-type copper deposit west of the Telkwa River, possibly off the property. The available data obtained from the property to date are of a reconnaissance nature and are inadequate to assess the specific likelihood of the above types of deposit occurring on the property; however, it is the writer's opinion that they are sufficiently encouraging to warrant further exploration of the property.

STRATA-BOUND DEPOSITS:

In recent years the writer has directed the drill exploration of two properties on the Zymoetz River west of the Telkwa River Copper property. These properties are located near the east contact of the Coast Range Batholith and are underlain by Hazelton Group pyroclastic volcanic rocks which are identical to those underlying the Telkwa River property. On the Zymoetz properties the copper mineralization occurs as bornite and chalcopyrite disseminated in the interstices of breccias and tuffs. Grades of these deposits are lowest in the granitized or feldspathized volcanics nearest the intrusive contact although the mineralization is more widespread in these rocks than in the unrecrystallized volcanics further from the contact. On one of the Zymoetz properties at least two strata-bound copper deposits have been well defined by drilling and surface sampling. Both of these deposits occur within specific beds of tuff-breccia, about 30 feet thick, close to major faults. The deposits as defined are about 100,000 tons is size and have grades ranging from 1.5 to 2.5% Cu.

It is probable that the Area III mineralization on the Telkwa River property, on top of the mountain, represents such a strata-bound deposit, however, because of its location on the top of the ridge its tonnage potential is too limited to warrant further work at this time.

It is possible that the 1972 soil anomaly on the property also reflects a strata-bound deposit since it is parallel to the trend of the volcanic layers in this

- 12 -

area. The surface size is appreciable enough to indicate the existence of a possible large tonnage deposit. It is considered that this anomaly warrants investigation by at least three wireline diamond drill holes, preferably drilled steeply west dipping from the uphill side of the anomaly on the presumption that the deposit will dip shallowly into the hill with the strata. If the results of this drilling are encouraging then the favourable bed should be further explored to the north and south along strike as well as into the mountain down-dip.

PORPHYRY-TYPE DEPOSITS:

Several major porphyry-type copper deposits have been developed in recent years within volcanic rocks along the margins of the Coast Range Batholith. The most noteworthy of these are the Utah deposit on Vancouver Island and the Schaft Creek deposit near Telegraph Creek. In such deposits the major copper mineralization is within faulted, fractured and altered volcanic rocks adjacent to steep intrusive contacts but generally beyond the zone of intensely feldspathized (granitized) volcanics.

In the case of the Telkwa River Copper property a similar geological setting to the above examples of porphyry-type deposits exists along the western margin of the property at and west of the Telkwa River. The copper mineralization that has been trenched and drilled in Area II does not appear to be strata-bound and occurs within intensely fractured and faulted volcanics, suggesting a more pervasive type of deposit. With this possibility in mind it is felt that the western border of the property, along and west of the Telkwa River, warrants further exploration. Rugged, overburden covered topography in this area hampers exploration so that the most readily accomplished and most useful methods would appear to be wireline, deep diamond drilling of Area II and reconnaissance soil sampling and a magnetometer survey west of the river to pick up the intrusive contact and any indication of copper mineralization in that area.

The writer does not feel that other possible targets on or near the property warrant further work at this time; however, should a commercial deposit be discovered in the area recommended for exploration then any secondary targets in the vicinity should be investigated further.

RECOMMENDED PROGRAM:

The following program is recommended as a first stage in the investigation of the plausibility of the above-described mineral targets:

- 14 -

	•		Cost estimate
(1)	Diamond drilling		
	(a) Soil anomaly - 900 ft. BQ wireline		\$ 7,200.
	(b) Area II – 1100 ft. BQ wireline		8,800.
(2)	Soil sampling west of river		6,000.
	Geology, engineering and report		2,500.
(4)	Camp, administration and overhead		6,000.
(5)	Transportation & communication		·
	(helicopter support)		10,000.
(6)	Contingencies (10%)		4,500.
		Total	\$45,000.

If results from the above program warrant a second stage of investigation then consideration should be given to extending the road into the property and mounting a reconnaissance exploration program around the periphery of the rest of the Howson Batholith.

Respectfully submitted, DOLMAGE CAMPBELL & ASSO LTD. CRATF MPREI Douglas D. Campbell, P.En







		CONCLUTANTS			
AAGE-CAMPBELL & ASSOCIATES CONSULTANTS VANCOUVER, CANADA					
TYEE LAKE RESOURCES LTD. VANCOUVER, CANADA					
WA RIVER COPPER PROPERTY					
AREA II – TRENCHES					
I" = 200'	SEPT., 1972	FIG. 4			
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