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Report

of a

GEOCHEMICAL SURVEY

on the

COPPERADO PROPERTY

Copperado: 3½ miles northeast of Nicola

50° 120° S. W.

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Toluma Mining and Development Co. Ltd.
1040 West Georgia Street
Vancouver 5, B. C.

Survey carried out from:

July 24, 1961 to November 2, 1961.
June 12, 1962 to June 25, 1962.

92I/2E

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A GEOCHEMICAL SURVEY OF THE COPPERADO MINE

INTRODUCTION

This is a report of a geochemical survey made on the Copperado property of Toluma Mining and Development Co. Ltd. near Nicola, B. C.

LOCATION

The Copperado property is located in the Nicola Mining Divison, 3½ miles northeast of the village of Nicola, (50° 120° S.W.). The property is reached by 7½ miles of gravel and dirt road branching off the Merritt-Kamloops highway at Nicola. The property is on the eastern slope of Clapperton Creek at elevations from 3400 to 4900 feet above sea- level.

PROPERTY

The property consists of one crown-granted mineral claim, Turlight L.4841 and 65 claims and fractions held by location, these latter being:

A 1 to A 12	inclusive
B 1	
B 4	
B 6 to B 14	inclusive
J 5 to J 7	inclusive
J 9	
J 22 to J 27	inclusive
TM 1 to TM 16	inclusive
P 60 to P 67	inclusive
R 56 to R 59	inclusive
R 68 to R 71	inclusive

HISTORY

Early work on the property was done in the late 1920's and in 1929 an inclined shaft was sunk some 60 feet in a copper-mineralized quartz vein located on the Turlight claim. In 1947 the property was acquired by Guichon Mines Ltd., who then optioned it to Anaconda Mining Company. Anaconda diamond drilled the shaft area from the surface, and then dropped the option.

In the early 1950's, the shaft was deepened to 465 feet, and some 700 to 800 feet of lateral work done on five levels from the shaft. Also in the early 1950's, some diamond drilling was done from the surface on what are known as the Northwest showings, some 6000 feet northwesterly from the shaft.

In 1956 the property was optioned to Western Copperado Mining Corporation, who carried out a program of geological mapping, geophysical surveying, surface and underground diamond drilling. The claims were surveyed and baselines and grid lines established for use in geological mapping and geophysical surveying. After spending nearly $200,000 on the property, Western Copperado dropped their option.

The property was optioned by Toluma Mining and Development Co. Ltd. in September, 1960. During the first seven months of 1961 an extensive program of stripping, trenching, and diamond drilling was carried out, mainly on the Northwest showings. In all, 43,889 cubic yards of surface stripping, 2,783 cubic yards of trenching in rock, and 3,235 feet of diamond drilling was done. Toluma acquired full title to the property in November, 1961.

It is estimated that, from the time of the original staking until the end of July, 1961, approximately $450,000 had been spent on the property. No commercial ore-body had been found.

GEOLOGY

The Copperado property is located at the southwest corner of the Central Nicola batholith; the northeast and east claims are underlain by granite of the batholith. Along the west and southwest boundaries of the property, the claims are underlain by rocks of the Nicola group, andesites in the few exposures on the property. The greater part of the property, lying between the granite and the andesite, in underlain by granodiorite. This granodiorite generally has a gneissic texture, but varies locally from a medium grained granodiorite with no foliation to a highly foliated and in places metamorphosed gneiss. The foliation generally has a north south trend, dipping steeply to the west, but this can vary locally to any attitude.

No copper mineralization has been observed in the granite, nor in the limited exposures of the Nicola group. Copper mineralization found to date has been in of associated with quartz veins. The quartz veins generally strike from north to northwest but vary greatly in dip, although the trend is an easterly dip. The quartz veins vary from a maximum observed width on the surface of 5 feet down to veinlets of an inch or less. Maximum observed strike length is approximately 150 feet. Principle copper mineralization in the quartz veins is bornite and chalcopyrite, with minor chalcocite and some malachite.

Aplite dykes, generally associated with quartz veins, are found in certain areas, generally in the eastern section of the granodiorite close to the granite contact.

Feldspar porphyry dykes with a northerly strike have been mapped in a few places within the property.

In the follow- up work to the geochemical survey, a narrow quartz porphyry dyke with copper mineralization along each contact has been exposed.

PURPOSE OF THE GEOCHEMICAL SURVEY

As mentioned previously, to the end of July, 1961, approximately $450,000 had been spent on the property ($100,000 by this Company) mostly in the Shaft and Northwest areas, and no commercial ore-body had been found.

Although part of the property had been mapped geologically in 1957, no copy of the map was in the possession of the Company.

A considerable part of the property, varying in estimate from 70 to 90 percent of the total area, is covered by overburden, varying up to a known depth of 30 feet (from diamond drill records). Current estimate is that 80 percent of the underlying rocks are masked by overburden.

At the end of July, 1961, the following program was decided upon:

1. Acquire copies of the 1957 geological map.

2. Extend the geological mapping to cover all areas of the property underlain by granodiorite and andesite.

3. Make a geochemical survey of the areas under 2.

4. Make a geophysical survey of all geochemically positive areas.

5. Strip and/or diamond drill any anomalies located by the geophysical survey.

Items 1 to 4 of this program have been carried out, and item 5 is now underway.

The purpose of the geochemical survey was to test the large area of the property underlain by granodiorite and Nicola group rocks, and 80 percent covered by overburden, for copper.

GEOCHEMICAL METHOD USED IN THE SURVEY

The Rubeanic Acid Field Test for Copper in Soils and Sediments, as described by H.V. Warren and R.E. Delavault in the November, 1958, issue of Mining Engineering, was the method used in this geochemical survey.

Equipment and supplies were supplied by Eldrico Geophysical Sales Ltd., Vancouver, B. C.

SURVEY PROCEDURE

Control Grid

The first requirement in a survey of this type is a method of locating the points at which samples are to be taken, so that the assay results may be accurately located on a map, and so that checks and further tests can be made of the ground as may be required.

In 1956 a grid had been laid out covering a major part of the property. This grid consisted of four parallel baselines,with grid or cross lines at right angles to the baselines.

The baselines bear north 32½ degrees west and are approximately 2000 feet apart. The baselines are designated as B, C, D, and E. Baseline B is approximately along the west boundary of the property, baseline C is parellel to B and 2000 feet northeasterly, D is a further 2000 feet northeasterly, and E is 2050 feet northeasterly of D.

The grid lines run approximately at right angles to the baselines and are spaced at about 300 foot intervals. The zero grid line is at the south boundary of the property, and the grid lines are numbered progressively to the north. Thus grid line 33N is approximately 3300 feet northerly of the south boundary. The grid lines are marked on the ground by stakes at 100 foot intervals.

To survey the area required by this survey, the grid lines from 15N to 66N inclusive were extended 2000 feet to the east of baseline E. This was done partly last fall and completed this spring.

Sampling

It was decided to take samples on a 100 foot square grid, rather than the 100 x 300 grid as laid out. To do this, a team of three samplers was hired and trained. One man acted as sample leader, the other two as samplers.

Each man was equipped with a prospector's pick (later changed to an ordinary garden trowel), a haversack, a supply of small paper bags (#3 hardware) and a pencil.

The leader would follow the staked grid line. The samplers would travel parallel to the staked line and 100 feet distant, one to each side. At each grid stake, the leader would line each sampler in, determining that each was on a line at right angles to the grid line, and 100 feet distant therefrom. Initially the 100 foot distance was measured, but this was discontinued when it was determined that estimating could give a margin of error of not over ± 10 feet, even in precipitous terrain. This was checked at regular intervals by the writer.

The sample was taken as follows:

All humus, needles, and other organic material was cleared away, using the pick and later the trowel, down to fresh inorganic soil. The sample was taken at 3 to 4 inches below this point. A small handful, later a part trowel, of soil was taken, eliminating roots, rocks and pebbles as much as possible. The soil was placed in the paper bag, the bag marked as to location, and the bag folded three times and then stored in the haversack. The samplers were checked regularily as to sampling procedure by the writer.

Each sampler could cover 6000 to 10,000 feet of line, taking 60 to 100 samples per day, depending on the topography, type of ground, and temperature. Normal procedure in hot weather was to take samples in the morning and do the assaying in the afternoon. Samples were not taken during or immediately after rainstorms, due to deterioration of the paper bags, with consequent loss of the samples.

Assaying

The samplers also did the assaying, after having received adequate training.

Standard assaying procedure was as follows:

A piece of filter paper, ¼ of a 9 cm. filter paper, was placed on the bottom of a 50 ml. beaker, and on this was placed a strip of rubeanic acid paper (3/8" x 1½") at one end of which was marked the location of the sample to be assayed.

A 9 cm. filter paper, folded to fit the beaker and to give as sharp a point to the tip as possible, was placed in the beaker so that the tip was just touching the rubeanic acid paper, being certain that the sharp tip of the filter paper was not crushed.

A one quarter teaspoon measuring spoon was used to measure the amount of soil to be assayed. About one teaspoon of soil was placed on a small square of onion skin paper, roots, pebbles and course material were sorted out, and a level ¼ teaspoon of the remaining fine material measured and placed in a small test tube. To this was added sufficient acetic acid-acetate solution to give a thick slurry. The test tube was capped with a polyethylene stopper, and the mixture shaken for 15 seconds, it then being poured into the filter paper.

While the solution was filtering through onto the rubeanic acid paper, another assay was started, using a second set of equipment. It was found by experience that each assayer could handle two assays at a time without difficulty, but that nothing was gained by trying to run three or more at a time.

When the solution had all filtered through, the filter paper was removed and discarded. The rubeanic acid paper was removed and placed to dry. The filter paper square was removed from the beaker, and the beaker wiped dry with a clean cloth. The test tube was thoroughly washed in a pail of warm water, rinsed in a second pail, and placed on a dowel to dry. The beaker and test tube were now ready for reuse.

The balance of the sample was stored until the assay result had been observed and recorded by the writer. If the reaction was slurred due to too much pressure on the filter tip, or if too little or too much solution had been used, then the assay was re-run. Samples were disposed of after the results had been approved by the writer.

Checking the Results

In addition to the regular checking by the writer of the sampling and assaying procedure, the writer took check samples of all major positive areas and assayed them himself. In only one case was there a serious discrepancy, and the reason for this was determined. In all other areas a reasonable check was made.

A complete check, by a different crew, and working in the spring rather than the fall, was made of the Southeast Area, outlined in orange on the geochemical map. The second survey checked the first almost exactly; much closer than had been anticipated.

Plotting and Mapping the Results

When the rubeanic acid paper had dried, the reaction spot was punched out, using a hand punch which gave a ¼ inch circular punch-out. This punch-out was then pasted at the correct location on a map at scale 1" = 300 feet. As this paste-up map was one-of-a-kind and could not be duplicated, an interpretation was made and recorded on the map, "Geochemical Survey".

INTERPRETATION OF THE PASTE-UP MAP

The copper in the filtered solution reacts with the rubeanic acid in the rubeanic acid paper, giving a blue-black spot. The larger the spot and the intenser the color, the more copper was present in the soil sample.

Most all soils contain some copper. At Copperado, using a ¼ teaspoon of soil per assay, this minimum or background copper gave a very faint blue spot. In the area covered by the survey, positive copper reaction spots were had up to 3/16 inch diameter and an intense blue-black.

In interpreting the paste-up map, five strengths or ratings were assigned, designated on the geochemical map by solid circles of varying size. These circles are approximately the size of the actual spots on the paste-up map. The five strengths are shown on the geochemical map as follows:

Background
Strength 1
Strength 2
Strength 3
Strength 4

In plotting, background was not plotted on the map, to avoid possible confusion and loss of comparison.

No tests were run to determine the actual copper content of the soil, it being considered that the recorded rubeanic reactions showed, by comparison, the relatively higher copper content of the soil in the more positive areas. However, using the information recorded in the previously mentioned paper by Messrs. Warren and Delavault, it is estimated that samples of strength 4 in this report contain from 15 to 20 times the copper content of the background.

AREA COVERED, TIME TAKEN, AND COST OF THE SURVEY

The area outlined in green on the geochemical map was geochemically surveyed, samples being taken at the intersection points of a 100 foot square grid. The work was started on July 24, 1961, postponed due to weather conditions on November 2, 1961, resumed on June 12, 1962 and completed on June 25, 1962, all dates inclusive. The area outside the green outline showing geochemical results was done prior to July 24, 1961, under the supervision of another engineer, and was not included in this report.

In calculating the cost of the survey for assessment purposes, all costs prior to August 7, 1961 were eliminated. The costs as shown for assessment purposes were the actual labour costs of the survey from August 7, 1961 to November 2, 1961, and from June 12, 1962 to June 25, 1962, all dates inclusive. Time spent in writing this report was not included.

Cost

The following table lists the names of employees, total wages paid during the periods of the survey, and amount of wages charged to the geochemical survey:

Employee	Rate of Pay	Total Shifts	Total Wages	Shifts on Geochemical	Wages on Geochemical
(August 7, 1961 to November 2, 1961 inclusive)					
C. Hagel	$375/mo.	61½	$ 977.21	23½	$ 373.50
E. Brandt	375/mo.	69½	1092.50	51	802.50
B. Hausman	325/mo.	11	138.33	11	138.33
B. Hagel	325/mo.	16½	208.81	16½	208.81
A. Hendrick	325/mo.	32	448.75	25	350.75
R. Mason	325/mo.	18	247.50	13	178.75
(June 12-25, 1962 inclusive)					
A. Chupa	$14/day	9	$126.00	8	$112.00
J. Lorenz	$14/day	9	126.00	9	126.00
J. Kerr	$14/day	9	126.00	7	98.00
(Supervision)					
W.B. Montgomery	$30/day	90	$2700.00	34	$1020.00
Dr. A.C. Skerl			N/C		N/C
		325½	$6191.10	198	$3408.64

OBSERVATIONS AND DISCUSSION

Referring to the Geochemical Map, the area outlined in green is that covered by this report. The areas outlined in red are those that gave the strongest geochemical reactions. Areas outlined in orange have been tested by the self-potential geophysical method.

Northwest Area

The northwest area has numerous small quartz veins (see the geological map), most of which contain some copper in the form of chalcopyrite. It is considered that these copper bearing quartz veins are the cause of the positive geochemical reactions in this area.

Southwest Area

This area is along a small creek having its source in the upper end of the southeast area. Overburden in this area is known to be 30 feet and more in depth. Positive copper reactions were found in samples from the creek bed right up to its source. It is believed that the positive reactions in the southwest area are due to float brought down from above.

P-60 and A-5

The geochemical reactions in these two areas are believed to be due to mineralization in observed quartz veins. Geophysical reactions were weak.

Southeast Area

The strongest and most widespread geochemical reactions found on the property are those in the southeast area.

Original geological mapping of the area on a scale of 1" = 300' disclosed a small number of minor quartz veins containing some copper mineralization. Remapping on a scale of 1" = 100' disclosed a further small number of narrow veinlets, some of which contained copper mineralization. However, the number of veins and the amount of mineralization were inadequate to account for the strength of the geochemical reactions, in comparison to the northwest area.

There was the possibility that the mineralization had been brought in from elsewhere, by glacial or other action. Inasmuch as the positive geochemical reactions, with one exception which can be accounted for by topgraphy, are over the underlying granodiorites, and the boundaries of the geochemical anomalies match, reasonably well, the contact of the granite and the granodiorite, it is believed that the geochemical reactions are due to mineralization contained in the underlying granodiorite, either in quartz veins or in the granodiorite itself.

It was decided to test the area using the self-potential geophysical method. This was done and disclosed several weak geophysical anomalies. About half of these could be accounted for by mineralization in quartz veins. The decision was made to strip the areas of favourable geochemical-geophysical reactions; this program has just been completed.

Two zones of heavy shearing and alteration of the granodiorite, containing minor amounts of chalcopyrite, bornite, molybdenite have been uncovered, under from 5 to 15 feet of overburden. Further testing of these zones is currently under way.

CONCLUSIONS

The geochemical survey of the Copperado property has disclosed fairly widespread areas of positive copper reaction. Testing of these areas has shown that most of the reactions are due to narrow quartz veins containing small amounts of copper mineralization. However two zones containing minor mineralization, under 5 to 15 feet of overburden, are of considerable interest.

The geochemical survey can be called a success, inasmuch as it gave positive reactions at all localities where copper mineralization was known to exist, and disclosed some that had previously been unknown.

The work on which this report is based was under the direct and continuous supervision of the writer; the findings and conclusions are those of the writer. Dr. A.C. Skerl, P·Eng. was Consulting Geologist to the Company at the time the work was being done, and his suggestions and recommendations were followed in carrying out the work.

Merritt, B. C.
August 1, 1962.

W.B. Montgomery
W.B. Montgomery P.Eng.

TOLUMA MINING & DEVELOPMENT CO. LTD. (NPL)

COPPERADO MINE

MERRITT B.C.

SURFACE GEOLOGY

BY: SHIELDS MINING SURVEYS — A.R. ALLEN — W.B. MONTGOMERY

JAN. 1962
JULY 1962

SCALE 1" = 300'

100 200 300 600

W.B. Montgomery

LEGEND

- GRANITE
- GRANODIORITE
- VOLCANICS
- FELDSPAR PORPHYRY
- d DIORITE
- a APLITE
- Q.V. QUARTZ VEINS

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M1

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Mines and Petroleum Resources
ASSESSMENT REPORT
NO. 425 MAP 1

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TM 11
TM 9
TM 7
TM 5
TM 3
TM 12
TM 10
TM 8
TM 6
TM 4
J9
J27
J26
J25
J24
J23
J22
TM 1
TM 2
B11
TALUS
SOUTHEAST AREA
R71
B12
B13
B9
A12
A10
A8
A6
A4
A2
R70
R69
BL.'E'
BL.'D'
A11
A9
A7
A5
A3
A1
B10
B7
R68
P67
P61
P65
P63
L4841
SHAFT
R59
R57
B8
NORTH WEST AREA
BL.'C'
SOUTHWEST AREA
B6
P60
B1
P62
P64
R56
R58
J7
B4
B14
J6
J5
BL.'B'
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COPPERADO MINE
MERRITT B.C.
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JAN. 1962
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SCALE 1" = 300'
100 200 300 600
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LEGEND
RUBEANIC ACID TEST REACTIONS
BACKGROUND
STRENGTH 1
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