GEOCHEMICAL METHODS USED AT THE TRISIDE PROPERTY HIGHLAND VALLEY, B. C.

An Essay Submitted during the Third Year
of the Course in Applied Science,
Department of Geological Engineering, at the
University of British Columbia

Alexander Cameron Ogilvy

November, 1957

2335 Agronomy Place
Vancouver 8, B. C.

November 1, 1957

Dr. H. C. Gunning
Dean, Faculty of Applied Science
University of British Columbia
Vancouver, B. C.

Dear Dr. Gunning,

I hereby submit an essay entitled Geochemical Methods Used at the Triside Property, Highland Valley, B. C., in accordance with the requirements set forth in the Calendar of the University of British Columbia (1957-58) for the completion of the third year in the course leading to the degree of Bachelor of Applied Science (Geological Engineering).

Yours respectfully,

ACOgilvy

A. C. Ogilvy

CONTENTS

	Page
Acknowledgements	ii
Introduction	1
Location and Accessibility	1
Objectives and Methods of Exploration	1
Purpose and Scope of Essay	2
Topography and Surface Features	2
Geological Exploration	4
General Geology	4
Method of Mapping	4
1. Reconnaissance	4
2. Detailed Mapping	5
Geochemical Method	5
Rubeanic-Acid Method	5
Extent of Sampling	6
Control	6
Extraction of Sample	6
Assaying Equipment	7
Assaying Technique	7
Interpretation of Assays	8
Testing Anomolies	8
Conclusions	9

ACKNOWLEDGEMENTS

The material for this essay was gathered during the 1956 field season while the writer was employed by Dr. Christopher Riley, P. Eng., consultant geologist for Triside Mining Corporation Limited, at the Highland Valley property of that company. The writer wishes to acknowledge the helpful guidance of Dr. Riley, and of Dr. R. Dellevault, geochemist at the University of British Columbia, geochemical consultant for Triside during that period, and originator of the simplified rubeanic-acid geochemical method as an aid to copper prospecting, used in the exploration of the property. In particular, grateful acknowledgement is made to Dr. Riley for his kind permission to draw freely from the writer's report on the Triside property.

GEOCHEMICAL METHODS USED AT THE TRISIDE PROPERTY HIGHLAND VALLEY, B. C.

Introduction

Location and Accessibility

Before the amalgamation of Triside Mining Corporation Limited with Trojan Exploration early in 1957, Triside's Highland Valley property consisted of 63 claims, in three blocks, situated about 30 miles south-east of Ashcroft, B. C., and lying entirely within the Kamloops Mining Division. The area is accessible from Ashcroft via the Highland Valley (Ashcroft-Merritt) Road, and either the Jackson Mines or North Lodge roads. Access roads have been built into two of the Triside properties.

Objectives and Methods of Exploration

Interest in the property was stimulated mainly by its proximity to known copper deposits in the nearby Trojan and Jackson Mines claims. The Object of the program was to find, by surface methods, whether these mineral deposits extended into the Triside property. It was proposed to make a geological map of the property to delimit the Tertiary volcanic capping, locate and map outcrops in the favorable older rocks, and apply geological exploration methods to an intensive prospecting of the outcrops. At the same time, it was realized that the relative paucity of outcrops would make

it advisable to supplement the geological exploration with another method. It was noted that geochemical methods had proved effective in several Highland Valley properties, as well as considerably more economical than most geophysical methods, and thus a geochemical survey was proposed. The Dellevault rubeanic-acid method was chosen because of its extreme economy and its inherent advantages in exploration specifically for copper. On completion of the geological and geochemical surveys, it was proposed to engage bulldozers to strip the overburden in favorable localities and test the anomolies.

Purpose and Scope of Essay

The purpose of this essay is to discuss the geochemical method used. The scope of the essay includes a brief description of the topography and geology as they affected the geochemical survey, and a summary of the physical work, in that it was a necessary consequence, viz. to test the geochemical anomolies.

Topography and Surface Features

The topography of the area may be described as rolling, the elevation in the whole property ranging from 4500 to 6500 ft. Thus all groups are below treeline, and covered for the most part by immature jackpine forests with considerable windfall, the latter apparently due to disease rather than fire. No large stands of timber were observed.

The drainage pattern varies locally. Few streams showed any surface water by mid-summer, and no sizable streams cross the area.

Although the area was glaciated in Pleistocene times, the glaciers were comparitively inactive. No striae were observed and the float was mainly residual.

The Southeast group lies on the top and eastern slope of the southern ridge of Boze Hill, and descends easterly in a series of steps from a maximum elevation of about 5500 ft for approximately 1000 ft. The descent is broken by a number of north-south ridges and gullies. The southerly draining gullies are generally less than 100 ft deep, and along their banks most of the outcrop of the area is exposed. To the north they are generally filled with boulders, whereas further south they are somewhat shallower and broader, and enclose swampy ground. The higher parts to the west are poorly drained, and irregular swamps are encountered. Rarely do the gullies contain visible streams.

The origin of the gullies appears to be two-fold. They are thought to be north-striking zones of weakness and possible shear zones, and alteration of the rocks is largely confined to them. Secondly, they appear to parallel the direction of ice-flow in Pleistocene times, as evidenced by kame terraces at their borders and glacial scouring at the north ends of many of the outcrops. No glacial striae were observed. The southerly direction of ice flow would explain the tendency of the boulders to reflect the rock type beneath, as the contact between the Tertiary volcanics and Jurassic intrusives is, roughly, parallel to the gullies.

The Southwest group lies on a gentle western slope between elevation 5500 and 6000 ft (approx.) The drainage is not well marked, although seepage on the road is generally westerly. A stream flows westerly along the north boundary of the property, then southerly along the western border,

although here it has gone underground. It has cut a gully 40 ft deep, exposing bedrock almost continuously throughout its length.

Geological Exploration

General Geology

There are two main rock types in the area: Jurassic intrusives of the Guichon Creek Batholith, capped by Tertiary volcanics. The intrusive rocks consist mainly of grey biotitic quartz-diorite, locally metamorphosed and rarely slightly brecciated. Zones of alteration, faults and shear zones strike approximately north-south. The volcanic rocks, which are post-mineralization in age, are restricted to the higher elevations, and form a capping up to 400 ft in thickness.

Method of Mapping

1. Reconnaissance

It was proposed to make a reconnaissance survey for the purpose of delineating the volcanics, so that detailed geological exploration could conveniently be restricted to the intrusives. First the Triside properties were plotted on the G.S.C. maps of the area, and the rock types located roughly. Next, geological reconnaissance traverses were made along the location lines, generally corroborating the findings from the G.S.C. maps. Finally, traverses were made in the vicinity of the supposed intrusive-volcanic contacts to limit the extent of the intrusives more accurately.

By this reconnaissance, it was found that the entire Northwest Group, the northwest half of the Southeast Group and all but the western part of the Southwest Group are overlain by Tertiary volcanics.

2. Detailed Mapping

It was decided to map the intrusive rock at a scale of 300 ft to the inch so as to utilize the maps of the stadia survey of the location lines made by Mr. D. Sloan, P. Eng., in March, 1956. Concurrently with the soil sampling program, geological traverses were run on compass-and-pace lines 300 ft apart. The lines were tied in at both ends with the permanent stations of the stadia survey.

Geochemical Method

Rubeanic Acid Method

The geochemical method used was that developed by Dr. Dellevault of the University of British Columbia, and is essentially a simplification of the rubeanic-acid method for analyzing soil for copper, introduced by the U.S.G.S.

In this method, copper affixes itself to the rubeanic acid molecule. An acetic acid-acetate buffer solution ensures the correct pH value. It also acts as a solvent, dissolving the copper ions from the soil and transporting them to the rubeanic acid in the prepared paper. The resulting compound (copper rubeanate) is dark green, and shows vividly on the pale orange reagent paper. Since the reagent and buffer are in excess, the copper is the limiting factor, and the amount of color (size and intensity of the copper rubeanate spot) is proportional to the copper content of the fixed quantity of soil. Since relative copper contents are sought, no effort is made to determine the absolute copper content of the soil.

Extent of Sampling

All of the property underlain by intrusive rocks was sampled. Samples were taken, concurrently with the geological survey, at 150 ft centres on lines 300 ft apart, except in the Jan 9, 11, 13 and 15 mineral claims, where the interval was 100 ft on 200 ft lines. Anomolies were checked by taking samples at 50 ft intervals on 100 ft lines. In all, 1492 samples were taken over a total of 28 miles.

Control

The samples were taken on compass-and-pace lines. Control was gained by typing-in all lines at both ends to the nearest permanent station on the cut-lines of the Sloan stadia survey. Compass lines were blazed and chained along the eastern border of the Southeast group and the western border of the Southwest group to tie into. All compass-and-pace lines were 1500 ft long or less, except lines Ja, Jb, Jc, and Jd, which were 3000 ft long.

Extraction of Sample

Samples were taken by means of a garden trowel, which is free of copper. The operation consisted of digging through the grass and other vegetation to a depth of 2 or 3 in., and discarding the topsoil. Then the trowel was inserted in the hole at about 45 deg, and some of the soil at a depth of 3 or 4 in. was secured. The loaded trowel was inserted in a plastic bag, through which, to avoid contamination, the soil was sorted by hand. The pebbles and coarse sand were separated out, leaving 2 or 3 cu in. of soil. The bag was labeled, rolled up, secured by an elastic band and placed in the knapsack.

Assaying Equipment

The following equipment and materials were used. Expendable items are calculated on the basis of per 1000 soil samples.

beakers, 50 ml, pyrex	6	
test tubes, 15 ml, pyrex	36	
corks (test tube size)	12	
½-teaspoon measure, plastic	1	
¼-teaspoon " "	1	
rubeanic-acid paper	100	ft
acetate buffer solution	1	gal
filter papers, no. 1, 9 cm	1000	
onionskin paper (8½ X 11")	100	sheets
paper towels		
water, distilled or free of copper		

Assaying Technique

Normally two men, A and B, were engaged in assaying the soil on an assembly-line basis. The six beakers were laid out in a row, each with a test tube in front of it. Man A opened the plastic bag and read the label number to Man B, who wrote it on a strip of rubeanic-acid-processed paper, 1 in. long, and placed it in the bottom of the beaker. B then folded a 9 cm filter paper (cut to 8 cm diam) into a sharp-pointed funnel, and inserted it in the beaker such that the point was directly over and touching the centre of the rubeanic strip.

Meanwhile A extracted ¼ teaspoon (packed, slightly rounded) of soil from the plastic bag, and dumped it onto a 2 in. square of onionskin paper. He then rolled it cigarette fashion, to separate the coarser grains, which he removed to one side with the ¼-teaspoon. If a significant amount of material had been removed (more than 10%), an equivalent amount of soil was added to replace it. Then, using the onion skin paper as a chute, the soil sample was loaded into the test tube and handed to B, whereupon A replaced the label in

the sample bag, rolled it up again, cleaned the spoon with a paper towel and opened the next sample.

Meanwhile B added ½ teaspoon of acetic acid-acetate reagent to the sample in the test tube, covered the tube with the previously used square of onionskin paper, and inserted the cork. He then shook the mixture vigorously (100 strokes), and poured the mixture into the filter paper.

Then A removed the filter paper from the next beaker, removed the sample paper, and dried out the beaker with a clean paper towel, thus completing the cycle.

Interpretation of Assays

The assays (i.e. the rubeanic papers bearing the spots) were oriented on sheets of papers to correlate with the map, and glued down with cellulose tape. To aid in detection of anomolies, the samples were then graded, values of 0 to 6 being assigned proportional to the amount of color (size and intensity) of the spot. To correlate color and intensity, the same sample was assayed several times, with filter points of varying degrees of sharpness, the blunter the point, the larger the spot and the less intense the color.

Testing Anomolies

Two major geochemical anomolies and a number of minor ones were found. In the Southwest Group, a large anomoly covered much of E. D. 17, 18, 19 and 20 mineral claims. In the southeasterly part of the Southeast Group good soil assays were obtained over three claims. These anomolies

were checked by reducing the sample interval, as previously stated. Access roads, some four miles in combined length, were built into these areas.

Areas in which favorable soil assays had been obtained were prospected intensively. Where there is no outcrop, trenches were laid out for the purpose of stripping the overburden to observe the bedrock.

Factors considered in the location of the trenches were as follows:

1. Downhill migration of ions
2. Enrichment of soil by stream-introduced ions
3. Enrichment of soil by decayed vegetation
4. North-south parallel gullies suggesting zones of weakness and possible shear zones
5. General strike of the rocks

Two TD 14A tractors, operated by Kilarney Development Limited, were engaged to strip the soil. 14 trenches, with a combined volume of 443,000 cu ft, were excavated.

No significant mineralization was observed.

Conclusions

The Dellevault rubeanic-acid method is a cheap, simple and effective geochemical aid in prospecting for copper, and can advantageously be applied as a supplement to a geological examination of a copper prospect.

Matter 13/25 English 29/40

Presentation 15/35 Total 57

A disappointing essay in which little time has been spent. The writer could have made this into a much more acceptable presentation with comparatively little effort. The reason or reasons for the conclusion escape me entirely! Signs of haste and lack of care.