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Report

on

FOLLOW-UP GEOCHEMICAL SURVEYS
in the
TOODOGGONE RIVER AREA
LIARD & OMINECA MINING DIVISIONS
BRITISH COLUMBIA, CANADA

for

CORDILLERAN ENGINEERING LTD.

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August, 1968.

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INTRODUCTION

During the period of July 24 to July 30, 1968, the writer visited the Toodoggone Lake - Cordex Lake areas of northern British Columbia, in the company of Mr. J. W. Stollery of Cordilleran Engineering Ltd. Purpose of the visit was to examine and evaluate geochemical data obtained during the course of preliminary geochemical follow-up of some of the stream sediment anomalies obtained during the 1967 regional stream sediment survey.

Only the anomalous areas, where preliminary follow-up work to date has not fully explained the original anomalies, were examined. In all, five areas were examined --- these areas corresponding to Anomalies 1, 2, 8, 11 and 21 of the original regional survey.

The reader should refer to an earlier report by the writer on the "Results of Geochemical Surveys in the Toodoggone River Area, Liard & Omineca Mining Divisions, British Columbia, Canada" (February, 1968).

Acknowledgements

The writer wishes to thank Mr. J. W. Stollery and Mr. T. E. Kalnins for their valuable assistance in providing background information on the area, and for their assistance in the field.

SPINEL LAKE AREA - ANOMALY 1

Additional stream sediment sampling and prospecting was carried out in the vicinity of Warner Peak, approximately 7 miles south of Fox Lake in the East Sector of the map area, to complete the sample coverage in greater detail and to locate the source of weakly positive to anomalous copper concentrations in stream sediments noted during the 1967 survey.

The additional sampling served to confirm and check the original results and defined accurately the anomalous area. The preliminary follow-up prospecting located copper mineralization in the area and has thus explained the reason for the anomaly.

The best mineralization observed occurs almost exactly in the centre of the outlined anomalous area and coincides with the local height of land represented by Warner Peak. In addition to the above, lesser mineralization occurs elsewhere throughout the anomalous area but is of very low grade. Mineralization consists of chalcopyrite, pyrite, and malachite, with some minor bornite.

The mineralization occurs in an area where younger acid intrusives (granite - granodiorite) have intruded older sediments and metasediments of the Ingenika Group. Copper mineralization was observed in the granodiorite as well as in the quartzites and schists of the Ingenika Group and no readily apparent controls for mineralization are evident, although some local concentration of copper mineralization was noted in crests and troughs of tight folds within the Ingenika Group sediments and metasediments.

The location of the copper mineralization at the height of land in the centre of the anomalous area, together with lesser,

widespread, disseminations of copper mineralization, adequately explains the original anomalous copper concentrations in the stream sediments of streams draining the area.

In the opinion of the writer, this occurrence appears to be typical of the many small and uneconomic occurrences of copper mineralization associated with late Mesozoic intrusives in this area. In addition, this mineral occurrence is in a very remote and topographically rugged area of the province and present indications are that the extent and grade of mineralization is not sufficiently encouraging to justify any additional work.

SPINEL LAKE AREA - ANOMALY 2

Anomaly 2 represents positive to anomalous total heavy metals and zinc concentrations in stream sediments in an area centered approximately 4 miles southeast of Mt. Slocomb, at the south end of Spinel Lake. Additional stream sediment sampling and prospecting was carried out in this area to complete the original sparse sample coverage and to locate a mineralized source, if any, to explain the original anomaly.

Results of the follow-up sampling served to confirm the original anomaly but prospecting failed to turn up any possible mineralized source.

On examination of the anomalous area by the writer, it was noted that the anomaly was centered about a pronounced rusty area within metasediments of the Ingenika Group. A black coating of

manganese hydroxide was also evident on much of the outcrop in the area. Only minor pyrite mineralization was observed.

Since no trace of economic sulphides was found by prospectors and since the zinc concentrations are comparatively low, it is concluded that Anomaly 1 represents the selective release of somewhat higher than normal background amounts of zinc from the weathering sediments and metasediments of the Ingenika Group. A mineralized source of economic significance is not indicated.

PILLAR CLAIM GROUP - ANOMALY 8

The Pillar Claim Group, covering Anomaly 8 is located approximately 2 miles south of the Pillar on the south side of Jock Creek. Anomalous concentrations of copper, molybdenum, zinc and total heavy metals occur in the sediments of this anomalous area.

Preliminary follow-up work over this claim group consisted of an initial geochemical soil survey, prospecting and geological mapping. All samples collected during the initial soil survey were analyzed for copper and manganese. Results for copper indicated a broad, curved, anomalous area, parallel to the contours along the slope and at the base of a prominent hill centered over claim numbers 1, 3, 17 and 19. Manganese concentrations were comparatively low and do not suggest abnormal enrichment of copper in soils. A second copper anomaly of limited areal extent was noted in the southeastern part of the claim group (southeast corner of Claim No. 9). This anomaly coincides with a narrow, low grade zone of copper mineralization occupying a small shear zone in a pink monzanite. With the exception of the above mentioned copper mineralization and one small piece of galena noted in float, no

other economic sulphide mineralization has been found on this property.

In an attempt to explain the extensive anomalous copper concentrations in the soils, the writer examined the property with Mr. J. W. Stollery. A series of 9 rock samples and 8 soil samples were collected along a traverse line in a west to east direction across claims 3 and 8, to cut across the most highly anomalous copper in soils zone. In each case, a sample of the bedrock and the overlying soil was collected at each site to establish a relationship between metal concentration in soil and the underlying bedrock. An additional bedrock sample of the pink monzonite host rock was collected in the vicinity of known copper mineralization in the southeastern part of the claim group. All samples were tested for Hot HNO_3 -HCl extractable Cu, Pb, Zn, Mn, Ag and Mo. Results are indicated in Table 1.

From the results of Table 1, the following salient points should be noted:

- Metal concentrations in bedrock appear to be independent of pyrite content so that the pyrite itself is not likely the source of the high trace element concentrations.
- Metal concentrations appear to increase in the vicinity of alteration. Note high Ag content of PR-7 and increase in base metal concentrations with increase in epidote content of feldspar porhyry.
- Overall background values for Cu and Mo are above normal for similar rock types.
- Manganese concentrations in soils are normal but Fe^{+++} content is high as evident by extensive gossan zones.

TABLE 1

Sample No.	Metal Concentration - ppm						Remarks
	Cu	Pb	Zn	Mn	Ag	Mo	
PS-1	140	125	100	520	2.5	4	Light grey feldspar porphyry of andesitic composition, 2% pyrite, Elev. 5800'
PR-1	140	30	160	1000	1.0	2	
PS-2	200	175	200	860	2.5	14	Dark green fine-grained andesite, hornblende phenocrysts + some epidote, no sulphides, Elev. 5770'
PR-2	200	25	140	420	1.0	3	
PS-3	860	220	875	1500	7.0	12	Feldspar porphyry similar to PR-1, no pyrite, Elev. 5690'
PR-3	140	62	290	1050	1.0	3	
PS-4	520	160	880	1700	4.5	8	Feldspar porphyry similar to PR-1 + epidote. Greenish-gray, 1% pyrite, Elev. 5680'
PR-4	320	100	140	1100	2.0	2	
PS-5	560	210	685	1400	8.0	12	Dark green, fine grained andesite similar to PR-2, 1% pyrite, Elev. 5650'
PR-5	140	15	120	360	1.0	5	
PS-6	400	440	410	760	12	5	As for PR-5, Elev. 5550'
PR-6	200	15	230	400	1.0	5	
PS-7	320	520	310	460	9.5	7	Highly fractured & sheared dark green andesite, 1-2% pyrite. Altered to white SiO ₂ in shear zones - pyrite removed, Elev. 5430'
PR-7	560	110	220	1200	5.0	5	
PS-8	720	400	230	340	9.0	2	Light grey feldspar porphyry as for PR-1, 2% pyrite, Elev. 5160'
PR-8	500	50	130	520	3.5	3	
PR-9	80	22	40	70	0.6	1	Altered andesite (white SiO ₂ only) pyrite removed similar to alteration product near PR-7
PR-10	75	12	80	360	0.4	2	Pink monzanite host rock near Cu showing

Note: PR = Rock Sample
PS = Soil Sample

- Enrichment of soils with respect to bedrock for the elements is related to accumulation by ferric hydroxides, but is not an extreme operative process.

From the above, the results of this preliminary survey are inconclusive. Abnormal enrichment processes cannot satisfactorily explain the copper anomalies and the copper content of the widespread, disseminated pyrite cannot serve as the source of copper. Preliminary prospecting and mapping in addition, has not provided a mineralized source to explain this anomaly. On the other hand, the abnormally high background values for Cu, Ag, Mo and for Pb in the case of PR-4 and PR-7 are consistent with the possibility of proximity to a polymetallic mineral deposit, possibly related to alteration processes associated with intrusive activity at depth.

It is the writers opinion that this property warrants considerable additional work to further evaluate its economic potential. In addition to detailed geological mapping, it is suggested that geochemical soil sampling coverage be completed over areas previously missed and that all samples collected (previously and in the future) be tested for Cu, Pb, Zn, Ag, and Mo, followed by thorough diamond drilling.

SPARTAN CLAIM GROUP - ANOMALY 11

The Spartan Claim Group is located on the west side of the stream immediately east of Saunders Creek, approximately 3½ miles southwest of Toodoggone Lake. This claim group was staked to cover a strong copper, molybdenum, zinc and total heavy metals anomaly in the vicinity of a contact zone between volcanics and

acid intrusives on the west side of an inferred fault structure occupying the main valley draining the area.

Preliminary follow-up work on the Spartan Group has consisted of an initial geochemical soil survey on a 300' x 300' grid pattern, geological mapping and prospecting. All samples collected during the initial soil survey were tested for Cu, and total heavy metals in the field.

Initial results for the soil survey indicated a number of widely separated anomalous areas, however, no significant amounts of copper mineralization had been found during the course of mapping and prospecting to satisfactorily explain the anomalous concentrations of copper in soils and stream sediments in this area.

The writer subsequently visited the property with Mr. J. W. Stollery to examine some of the copper anomalies on the ground and to evaluate their significance. The first anomaly examined in the vicinity of line 139N - 6W was readily explained on "breaking rock" in the vicinity. The first outcrop examined consisted of a typical rusty-brown surface exposure which on being struck with a hammer showed abundant malachite as coatings along fracture and shear planes in a fine grained syenite. No evidence of copper mineralization is evident on surface, however, immediately below the surface, copper mineralization visually estimated to run between 1.0% - 2.0% copper was observed. This copper mineralization was observed to extend some 100 feet west and approximately 500 feet north of station 139N - 6W.

The anomaly in the vicinity of stations 151N - 6W and 154N - 9W is in an area of moderately heavy overburden cover in a stream valley and may consist of possible lateral moraine material containing Cu from a cirque further upstream (to the south) which appears to line up with the copper mineralization described above.

Anomalous copper concentrations in the valley bottom at line 30N are probably derived from (1); percolation of Cu - rich waters through fractures from topographically higher places on either side of the valley, or (2); slide material from cirques and gulleys to the west, where scattered high values for copper were noted.

In summary, the significance and source of stream sediment anomaly 11 has been adequately explained and additional work is now required to further delimit the extent of known copper mineralization in the vicinity of 139N - 6W.

It is recommended that soils surveys be completed over the remainder of the Spartan Claims preferably at a closer sample interval than the original 300' x 300' grid pattern. All samples should be tested for Cu, Pb, Zn, Ag and Mo. The extent of mineralization over claim number 19 (station 139N - 6W) should be delimited by sampling on a 100' x 100' pattern, followed by bulldozer trenching and stripping of anomalous areas. Thorough prospecting of the syenite intrusive should be carried out and special attention paid to "breaking rock" as all evidence of copper mineralization has been removed from the bedrock surface.

OPAL CLAIM GROUP - ANOMALY 21

The Opal Claim Group was staked to cover a sharply definitive molybdenum anomaly in sediments draining a large grey granite pluton. Subsequent examination of the anomalous area has indicated no apparent mineralized source and no evidence of the likelihood of a mineralized source. All rock in the area is fresh and unaltered. Background values for molybdenum in the granite while somewhat higher than normal, are not remarkably high when compared to the original concentrations of molybdenum in the stream sediments.

The source of the stream sediment anomaly remains unexplained. It is probably unlikely to result from a source of molybdenum mineralization and should be considered a poor prospect. No further work appears to be warranted on this property.

SUMMARY AND CONCLUSIONS

Five stream sediment anomalies outlined by regional stream sediment surveys during the 1967 field season were examined by the writer in an attempt to explain their source and assess their economic potential. These five areas were delimited on the basis of preliminary follow-up work which to date, had failed to adequately explain their source. These anomalies, corresponding to Anomalies 1, 2, 8, 11 and 21 of the original survey are summarized as follows:

Spinel Lake Area - Anomaly 1

This is a rather widespread but comparatively weak copper anomaly related to low grade copper mineralization occurring at

the height of land in the centre of the anomalous area. The extent and intensity of the copper anomaly can be explained by the observed mineralization. This mineral occurrence is considered to be, on the basis of mineralization observed in place and in float, to be of too low grade and areal extent to justify additional work in a such a remote and rugged area.

Spinel Lake Area - Anomaly 2

This is an extensive, weak, zinc-total heavy metals anomaly of a spurious nature. It is believed to reflect above background concentrations of zinc in manganese - rich sediments of the Ingenika Group. No further work is warranted on this anomaly.

Pillar Claim Group - Anomaly 8

Initial follow-up soil surveys over this property have confirmed the existence of a broad area anomalous in copper. Subsequent examination and sampling of the property by the writer has indicated that background values in soils and bedrock are abnormally high for Cu, Pb, Ag and Mo and that these higher than normal concentrations cannot be explained as being "false anomalies" but rather appear to be related to the proximity of the effects of alteration. While no economic sulphide mineralization was observed to explain the larger copper anomaly or the high background values, the geochemical indications are sufficiently promising of a possible polymetallic mineral deposit to warrant a thorough examination of this property.

Spartan Claim Group - Anomaly 11

This anomaly has been adequately explained as being derived from an area since found to contain what appears to be significant

copper mineralization. This property should be thoroughly examined.

Opal Claim Group - Anomaly 21

This property was staked to cover a distinct molybdenum stream sediment anomaly. The anomaly cannot be explained readily; however, examination of the property has indicated no reason to suspect a source of molybdenum mineralization. No additional work is warranted on this property.

From the following work carried out during the current field season, it appears from the results to date (and from competitors' activity) that the major exploration efforts should be directed to the area in the vicinity of and immediately to the south of Toodoggone Lake.

RECOMMENDATIONS

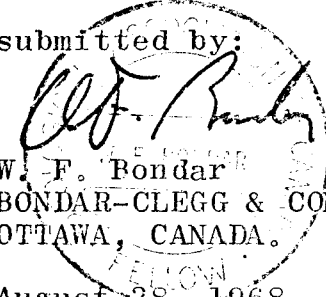
The major recommendation is of a general nature and is repetitive of an earlier recommendation that "the gossan area immediately south of Toodoggone Lake should be subjected to detailed geological examination in an attempt to establish structural and zonal relationships controlling economic mineralization in this area".

The following more specific recommendations regarding future work within this area are offered:

- i) All soil and stream sediment samples within and in proximity to this area south of Toodoggone Lake should be tested for Cu, Pb, Zn, Ag and Mo.

- ii) The Pillar Claim Group should be subjected to:
- a) detailed geological mapping;
 - b) additional geochemical sampling and analyses to give complete coverage of the property for Cu, Pb, Zn, Ag and Mo;
 - c) diamond drilling based on the results of a) and b) above.
- iii) The Spartan Calim Group geochemical soil sampling should be completed to give complete coverage for Cu, Pb, Zn, Ag and Mo. Extensions and subcropping limits of the known mineralization in the vicinity of line 139N - 6W, should be delimited by sampling and analyses for Cu-Mo on a 100' x 100' grid pattern, followed by bulldozer trenching and/or stripping and sampling.

submitted by:



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August 28, 1968.