

DISPERSION OF SOME MINOR
ELEMENTS IN THE VICINITY OF CASINO OREBODY

INTRODUCTION

Purpose of the present orientation survey was to obtain more information on geochemical expression of the Casino orebody, particularly regarding the following aspects:

1. Relationship of metal content in waters and stream sediments.
2. Variations in cold-extractable Cu and THM (Total Heavy Metals).
3. Fluctuations in metal content of water with time.
4. Vertical variations of metals in soil profiles.
5. Comparison of anomalies over ore body with those outside ore zone.

Samples collected were analyzed in Vancouver Geochem Laboratories for the following constituents:

- (a) Soils and sediments - Cu, Pb, Zn, Mo, Ag, As, Fe and Mn.
- (b) Waters - Cu, Zn, Mo, Fe, F.

Soils and sediments were decomposed using an acid oxidizing attack and concentrations of all elements sought, except As, determined by atomic absorption technique. As, Cu and THM were analyzed colourimetrically.

Cu, Zn and Fe in water were determined by atomic absorption technique, Mo colourimetrically, and F by a selective ion meter.

Locations of samples is shown in Figure 1.

DISCUSSION OF RESULTS

Stream Sediments and Waters

Results for total Cu generally conform to those previously obtained by Archer and Cathro (1970). Cold-extractable Cu generally follows the variations in total Cu. However, if 4 ppm and 50 ppm are adopted as thresholds for cx Cu and total Cu, respectively, it would appear that most copper-high samples give a better contrast in cx Cu than in total Cu (Figure 2). It is of interest to note that THM in many samples is lower than cx Cu, and seems to reflect variations of Zn rather than Cu (see analytical sheets). Therefore, in field prospecting for Cu, preference should be given to the cold-extractable Cu field kits.

Mo anomaly in stream sediments has a very high contrast. If a threshold of 6 ppm Mo is assumed, the highs near ore body amount up to 30 times threshold. Although Mo at some sample sites gives better contrast than Cu, it seems that Cu gives relatively longer dispersion trains in drainage (See Figure 4 and Figure 5 in Archer and Cathro, 1970). This can be explained by several factors, such as strong hydromorphic dispersion of copper in certain directions, selective absorption of metals on stream sediments, or a primary geochemical zoning in which Cu extends farther outwards from the deposit than Mo.

All water samples collected, with the exception of one, had Mo content below 2 ppb, even in the immediate vicinity of mineralization. Water flowing from the Drill Hole P-32 carried 40 ppb Mo and less than 50 ppb Cu.

Water from the limonite-depositing Taylor Creek showed marked fluctuations in its Cu content even within an interval of a week (see Table I). Dilution effect after rain is clearly pronounced. Very low Mo content is due either to the ground water flowing through a zone depleted in Mo, or solubility

of this metal being depressed by high amount of Fe dissolved.

TABLE I
Content of Cu, Mo and Fe in Taylor Creek,
Casino Silver Property
(Values in ppb)

<u>No.</u>	<u>Date</u>	<u>Cu</u>	<u>Mo</u>	<u>Fe</u>	<u>Remarks</u>
-	1969	2010	no data	no data	See Archer & Cathro 1970
CS-31	July, 1970	950	< 2	1920	
CG-1	Aug. 3, 1970	1300	< 2	6600	Recent rain after dry spell
CG-2	Aug. 11, 1970	270	< 2	3700	After 2 days of heavy rain
CG-3	Aug. 15, 1970	400	< 2	2300	
CG-4	Aug. 18, 1970	300	2	1800	

Note: Samples marked by CG were collected by
C. Godwin of Brameda Resources Ltd.

The 120 ppm Cu found in sediments of Taylor Creek is not exceptionally high considering at least seasonal strong enrichment of Cu in water. Mo, on the other hand, seems to become more readily scavenged than Cu (stream sediment carries 20 ppm Mo in contrast to less than 2 ppb in water). It should be borne in mind that most of the sediment in this creek consists of limonite, and there is no doubt that anomalies are essentially hydromorphic.

Arsenic is anomalous in all stream sediments at a level of 4-5 times threshold of 5 ppm.

Zinc is below 100 ppm in all samples except one taken from Canadian Creek. Pb gives several high values without indicating any pattern of distribution and apparently does not correlate with any of the other elements sought.

Manganese content is rather low, but a slight relative enrichment was noted in the samples from Canadian Creek and one of its tributaries (see the sample sites on Figure 1).

Silver values range from 0.5 - 6 ppm. Threshold for this metal is difficult to estimate due to analytical limitations at low concentration levels, which considerably reduces its value as geochemical indicator.

There does not seem to be any simple relation between Fe and any of the elements sought. High Cu in waters is usually accompanied by high Fe. However, a limonite-depositing water from a drill hole carried less than 50 ppb Cu. Similarly, water from a spring in the northern part of the area had as much Fe as Taylor Creek, but Cu was undetectable.

Fluorine was low in all waters except one flowing from a drill hole.

Soils

Depth variations observed in soil profiles are illustrated in Figures 3, 4 and 5.

Vertical section I is situated in a gently sloping marshy area west of the main Casino anomaly. Both total and cx Cu constantly increase toward bedrock. The same trend is followed by Fe. Mo and As, although anomalous, follow a more irregular pattern, but Mo variations follow very closely those of Mn. This soil, strongly anomalous in both Cu and Mo, was underlain by a granitic rock carrying 150 ppm Cu and 17 ppm Mo (See Figure 3).

Section II was sampled near the eastern margin of the main Casino anomaly, also on a poorly drained ground. Both Cu

and cx Cu have a trend of downward increase, with very strong enrichment close to the bedrock. Molybdenum follows Cu and also to some extent Mn. A steady increase with depth is displayed by Fe, and to a lesser degree by As (Figure 4).

A comparison of Sections I and II does not show much difference in any constituent at the routine sampling depth of 18-24 inches, but both Cu and Mo do differ in their rate of increase with depth. This is believed to be largely an expression of the more mineralized bedrock below Section II (over 2000 ppm Cu and 100 ppm MoS_2 , according to Archer and Cathro, 1970).

Section III consists of poorly developed soil on a steep, well drained slope over bedrock carrying over 2000 ppm Cu and over 100 ppm MoS_2 . Cu is anomalous at 2-3 times threshold without much change with depth. No anomaly was detected in cx Cu. Molybdenum and arsenic are highly anomalous with a tendency of increase with depth. Mn shows a slight enrichment in the upper part of the section, whereas Fe does not vary appreciably (See Figure 5).

CONCLUSIONS

Results of the orientation surveys on Casino Silver Property indicate the following:

1. Cu anomalies in stream sediments are well expressed, particularly in the southerly drainage and extend for several miles from the source. Archer and Cathro* (1970) state that the stream sediments from Casino Creek and Canadian Creek carried several miles from the deposit as much as 440 ppm and 104 ppm Cu respectively.

* Archer, A.R., and Main, C.A. - Casino, Yukon - A Geochemical Discovery of an Unglaciaded Arizona-Type porphyry. Geoch. Explor. Symp., Toronto, 1970

These values, similar or higher than those found closer to the main anomaly, probably indicate more mineralization along drainage, rather than a dispersion from the Casino orebody itself.

Mo dispersion trains in stream sediments are well expressed in the vicinity of the orebody, but decay in contrast faster than those of Cu. Values within the range of 4-6 ppm Mo are difficult to interpret due to a poor analytical precision for this metal at low concentration levels.

Most samples give a geochemical contrast in cold-extractable copper better or equal to that for total Cu.

2. Mo content of water, even close to the orebody, is very low. Copper anomalies in water occur only in part of the drainage, and their contrast is strongly dependent on rainfall. Results obtained do not indicate any advantage of water survey over stream sediment survey.
3. Anomalies in both stream sediments and soils can be enhanced under conditions of impeded drainage, particularly for cold-extractable Cu. Rate of Cu increase with depth within upper 4 ft. of residual soil may be indicative of the concentrations in underlying bedrock.
4. Low-contrast total Cu anomalies, poor in cx Cu, on well drained slopes may be more significant than stronger anomalies on foothills. High level of Mo and As, increasing with depth, may be a favourable indication.

SUGGESTIONS FOR FURTHER WORK

Routine drainage surveys within the Dawson Range should be limited to stream sediment sampling. Water analysis may be undertaken to solve some local dispersion problems (e.g. SO_4 as indicator of sulphides in bedrock), but does not seem to offer any advantage over other geochemical methods.

Cold-extractable Cu field kits should be used extensively both in reconnaissance and follow-up work. THM kits are useful in geochemical prospecting for Pb and Zn rather than Cu.

In evaluating soil anomalies, attention should be paid to depth variations in soil related to topography and drainage.

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