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SUMMARY

Exploration on the Ball Creek property in 1989 confirmed the presence of porphyry copper-gold mineralization on the property.

Soil geochemistry outlined a broad area of significantly anomalous copper and gold lying upon and around a molybdenum rich core. Silver, lead and zinc geochemistry provide a halo around the copper-gold zone similar to the metal pattern recognized around several classical porphyry copper-gold deposits such as Battle Mountain in Nevada.

Geological mapping, complemented by results from magnetic surveys and Induced Polarization surveys defined an alteration pattern which fits the general Lowell and Guilbert model for porphyry copper deposits. The geochemical metal zonation also fits the porphyry model of alteration and metallogeny.

All previous drilling was performed in the central potassic alteration zone of the deposit. Much of the drill core was anomalous in gold, with several drill holes intersecting zones averaging greater than 0.1 grams/tonne gold. A 137 metre section of drill hole 73-2 averaged 0.37 grams/tonne gold. The potassic alteration zone is not the optimum zonation for potential gold concentration in a porphyry system. Better gold values are commonly enhanced either on the inner flanks of the phyllic zone or in the propylitic zone. The high gold values for core in the potassic zone are a favourable sign that the other parts of the porphyry deposit could carry economic levels of gold mineralization.

A program of diamond drilling to check the copper and gold content of the rocks in the zone between the potassic and phyllic zones is proposed. This program should confirm that copper and gold occurs in economic grades and amounts on the property.

SUMMARY

The Ball Creek property has been explored on and off since 1929. Between 1972 and 1975, Great Plains Development Company of Canada Ltd. performed an extensive exploration and diamond drilling program. The property is presently owned by Chevron Minerals Ltd. and is being optioned to Placer Dome Exploration Ltd.

During the summer of 1989, Placer Dome conducted an intensive exploration program which included the following: soil and rock sampling, geophysics (magnetometer, VLF-EM and induced polarization surveys) and geological mapping. The drill core from 1973 and 1975 was also re-logged and re-sampled. The geological mapping, soil sampling, magnetometer and I.P. surveys all defined an area of mineralization which appears to be a porphyry Cu-Au deposit. The geology and alteration patterns, plus the geochemical metal zonation, all fit the general Lowell and Guilbert model for porphyry Cu deposits.

> "All previous drilling was performed in the central potassic alteration zone except for three holes, which were drilled on the boundary between the potassic and phyllic zones. Much of the drill core was anomalous in gold, with several drill holes intersecting zones averaging greater than 0.1 grams/tonne gold. A 137 metre section of drill hole 73-2 averaged 0.37 grams/tonne gold. The potassic alteration zone is not the optimum zonation for potential gold concentration in a porphyry system. Better gold values are commonly enhanced either on the inner flanks of the phyllic zone or in the propylitic zone. The high gold values for core in the potassic zone are a favourable sign that the other parts of the porphyry deposit could carry economic levels of gold mineralization." (J. Kowalchuk and R. Turna, 1990).

The alteration-mineralization relationships described in the above paragraph, were the basis for planning the 1990 diamond drilling program. In August and September of 1990, diamond drilling was performed on select targets in the phyllic and propylitic alteration zones. These drill holes failed to intersect any significant values in copper or gold. There is, however, still a large area of the deposit which has not been tested by diamond drilling.

Additional drilling is recommended to test in greater detail, the area between the potassic alteration core and the phyllic alteration zone. This area has the potential to contain a very large tonnage of economic mineralization.

Additional geological mapping and sampling are recommended in the Cliff Zone. This area returned some very promising Au, Ag, Cu, Pb, Zn and As signatures from the 1989 soil sampling survey.

Geological mapping, rock sampling and soil sampling are recommended for the area between the Trachyte Knob and the Ball Creek valley.

Geological mapping, rock and soil sampling are also suggested for the Goat Zone.

5.0 CONCLUSIONS AND RECOMMENDATIONS

"The various exploration techniques utilized in 1989 supported each other in describing a classical porphyry copper hydrothermal event. The geological mapping outlined a roughly concentric set of alteration assemblages, starting with a central potassic zone, then a patchy phyllic zone and finally an extensive propylitic zone. Soil geochemistry located a molybdenum anomaly over the central potassic zone, anomalous gold and copper covering the area within the potassic and phyllic zones and anomalous lead-zinc-silver in the outlying propylitic zone. Magnetics mapped the high magnetite content of the potassic zone and the accompanying magnetite depletion over the phyllic zone. Induced polarization mapped the high chargeability over the potassic and phyllic zones. The sericitic alteration of the phyllic zone was shown by the low resistivity." (J. Kowalchuk and R. Turna, 1990)

"The 1989 program also confirmed the conceptual idea that the Ball Creek deposit could be a gold bearing copper porphyry. The potential deposit has dimensions of 1500 by 1000 meters. Gold geochemistry in both soils and drill core from 1989 showed the anomalous precious metal content of this deposit." (J. Kowalchuk and R. Turna, 1990)

The 1990 drilling program was designed to test optimum targets in the phyllic and propylitic alteration halos. This drilling unfortunately failed to produce any significant results. The four drill holes were essentially drilled through weakly mineralized faults and/or dykes. The target area of this deposit, however, is extremely large. The four short holes drilled in 1990 were not sufficient to test the true potential of this deposit. A moderate sized drill program is recommended for 1991 in an effort to locate a large zone of economic mineralization. Most of this drilling should be concentrated along the boundary between the potassic and phyllic alteration zones as outlined in Figure 13, since this is commonly where the highest grade mineralization is found in porphyry copper-gold deposits.

The Cliff Zone was only partially mapped and sampled in 1989. The soil sampling returned some very promising Au, Ag, Cu, Pb, Zn and As signatures. Follow up mapping and sampling of this zone is recommended for 1991.

In 1989, soil line 800 W extended along the northeast end of the Trachyte Knob, and from there, continued southeast down into the Ball Creek Valley. The portion of this line between Trachyte Knob and Ball Creek returned anomalous values in Au, Ag, Cu, Pb, Zn and As. This area has not been previously mapped or rock sampled. Geological mapping, rock sampling and more soil sampling are recommended in this area for 1991.

(d) Individual drill hole observations

The following generalizations have been noted for each of the 1990 drill holes:

DDS-12:

- Phyllic alteration: intense to weak.
- Propylitic alteration: intense.
- Clay alteration: occurs locally and is weak to moderate.
- Pyrite mineralization: intense (5-10%) to moderate (trace-3%).
- Magnetite mineralization: occurs locally and is moderate.
- Galena, sphalerite and molybdenite mineralization: occurs locally and is weak.
- Structure: the major fault which occurs in the andesite breccia between 44.76-56.94 m, is possibly the down dip extension of the Cliff Zone Fault.

DDS-13:

- Phyllic alteration: weak.
- Propylitic alteration: moderate.
- Clay alteration: intense to moderate.
- Pyrite mineralization: intense (5-10%) to moderate (1-4%).
- Structure: major fault zones occur between 4.57-20.68 m, 24.29-28.85 m and 54.41-58.02 m. These faults are likely down dip expressions of the Barren Fault and/or North Arm Fault Zones.

DDS-14:

- Phyllic alteration: weak.
- Propylitic alteration: moderate.
- Pyrite mineralization: intense (5-6%).
- Structure: major faults occur between 19.79-35.20 m and 83.65-88.09 m.

DDS-15:

- Phyllic alteration: intense to moderate.
- Propylitic alteration: intense to moderate.
- Clay alteration: occurs locally and is intense to moderate.

- Silicification: occurs locally and is intense.
- Pyrite mineralization: moderate (1-3%) to weak (trace to 0.4%).
- Magnetic mineralization: occurs locally and is moderate to weak.
- Structure: major faults occur between 36.66-38.66 m, 51.51-55.32 m and 59.21-61.87 m.

4.6 Recommendations for Future Diamond Drilling

Figure 13 on page 30 forms the basis for the following discussion. This figure was taken from a section of figure 5 centered around the Camp Zone, and it has been photo-reduced to 75% of its original size. The purpose of this diagram was to further interpret the alteration within and surrounding the Camp Zone, and thereby select the best areas for future drilling.

The potassic alteration sone is outlined on Figure 13 by a square grid pattern. This zone was delineated by two methods. First, the zone was outlined by a strong magnetic high because it contains alot of magnetite. Secondly, the zone was delineated based on visual observations of secondary potassium feldspar in drill core, and surface outcrops.

Two induced polarization zones have been outlined on Figure 13. The first zone is represented by a line which shows the outer limits of high chargeability. This line is based on a cutoff of -14 millivolts/volt at the fourth separation level (120 meters maximum depth). The zone of high chargeability represents a high sulphide content (most likely disseminated in nature). The sulphides likely consist of pyrite, with lesser chalcopyrite and molybdenite. The second zone is depicted by a line which outlines the outer limits of high resistivity. This line is based on a cutoff of 1000 ohm-meters at the fourth separation level (120 meters maximum depth). This zone of high resistivity likely indicates a broad zone of silicification (due to the addition of quartz from either the phyllic alteration, or from the emplacement of quartz stockwork). The high chargeability readings associated with low resistivities immediately west of the potassic alteration zone (proposed drilling area #4), is probably due to increased sulphide mineralization (P. Walcott, 1989). This zone has been assigned the lowest priority of all four drilling areas, because the increase in sulphides is believed to be indicating a pyrite shell.

The outer limits of high gold and copper geochemistry, have been eutlined by two lines on Figure 13. These lines are based on cutoffs of 80 ppb gold and 130 ppm copper. In theory, these outer limits should correspond to the outer boundary of the phyllic alteration zone. If down slope soil creep is accounted for, the anomalous gold and copper geochemistry boundaries correlate well with the outer phyllic zone boundaries. The phyllic zone is actually very patchy, so the outer boundary which has been drawn on Figure 13 based on geological mapping, should only be considered approximate.

Four areas of proposed drilling have been outlined on Figure 13. These areas have been listed in order of priority, with area #1 being the highest, and area #4 being the lowest. Basically, these areas are concentrated around selected parts of the inner phyllic zone, within andesitic rocks (map unit 2). According to porphyry copper deposit models, an ore shell or zone of higher grade mineralization should be located on the inner flanks of the phyllic zone. An attempt was also made to place the proposed drilling areas where chargeability, resistivity and gold and copper geochemistry are all high. Proposed area #1 extends outside of the anomalous gold and copper geochemistry boundary, to account for downslope soil creep. A gap has been left between areas #1 and #3, because this portion has already been tested by drill holes 75-1 and 75-2. Area #3 has been assigned a lower priority, as it is located outside of the chargeability high. As mentioned above, proposed area #4 has been given the lowest priority, because the high chargeability and low resistivity responses are thought to be indicative of a pyrite shell.