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Paper No. 46 — 2:00 p.m.

Mt. Milligan - Alkalic Intrusive Related Porphyry Cu-Au Deposits.

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The Mt. Milligan alkalic porphyry copper-gold deposits, located 145 km northwest of Prince George in central British Columbia, have a combined drill inferred geological inventory in the order of 250 million tonnes. Gold comprises approximately 60% of the dollar value.

A cluster of monzonite porphyry stocks intrude Lake Triassic Takla Group alkalic volcanic strata. At the Mt. Milligan deposit, disseminated and fracture-controlled auriferous bornite, chalcopyrite and pyrite are preferentially hosted by potassium metasomatized latite and trachyte units adjacent to the equidimensional, inward dipping MBX stock. A juxtaposed pyritic gold deposit in propylitized volcanics occurs in the hanging and foot walls of a sinuous low angle fault, which near the MBS stock is occupied by a thick monzonite dyke. In areas of strong gold mineralization albization is sometimes superimposed on earlier potassic and propylitic alteration assemblages. Discontinuous intrusion breccias occur in the outer margin of the MBX stock and throughout the Southern Star Stock. Stockworks of potassium feldspar and quartz veinlets developed within pervasively potassic altered segments of the monzonite and intrusion breccias. Gold concentrations in the monzonites are elevated where volcanic clasts are abundant. Around the dyke-like Southern Star Stock potassic and propylitic alteration within the enclosing andesites is less well developed and is primarily fracture controlled. Gold and silver-bearing polymetallic base metal-calcite-quartz-orthoclase veins occupy faults peripheral to three of the monzonite plutons.

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Paper No. 62 — 9:00

Exploring for Cu-Au Porphyry Deposits in the Quesnel Trough: Unraveling the Quaternary Blanket.

P. BOBROWSKY, J. GRAVEL, P. MATYSEK, D. KERR and S. SIBBICK, Geological Survey Branch, Ministry of Energy, Mines and Petroleum Resources, Victoria, British Columbia

Complex Quaternary geologic histories have long hindered exploration in many areas of high mineral potential such as the Quesnel Trough. Multiple glacial and non-glacial cycles and the concomitant association of sediments including tills, debris flows deposits, outwash gravels, lake deposits and colluvium mask underlying mineral occurrences and complicate the surficial expression of the sub- and outcropping mineralized zones.

A drift prospecting study at Mt. Milligan, a Cu-Au porphyry deposit, illustrates the successful results obtained from an integrative program based on surficial mapping, boulder tracing and geochemical sampling. For instance, at Mt. Milligan, Au and Cu anomalies in soil are shown to be functionally dependent on the type of underlying parent material. In general, ribbon-shaped anomalies are observed over till, whereas fan-shaped forms occur in outwash gravel. Amorphous-shaped anomalies are found in colluvium. Anomalies in till and outwash deposits parallel paleo-flow direction, but in colluvium patterns are gravity dependent. Successful exploration strategies require accurate interpretation and understanding of the types and genesis of surficial materials in conjunction with geochemical data.

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Paper No. 63 — 9:30

The Mt. Milligan Porphyry System: A Structural and Genetic Approach.
MICHAEL W. HARRIS, Consultant to Placer Dome Inc.

The Mt. Milligan alkaline porphyry system contains an estimate of geological gold-copper deposits within a 1.9 km long hydrothermal system. Reserves indicates the presence of at least 417 Mt grading 0.49 g/t Au and 0.221% Cu.

The system is centred on a dyke-like monzonite intrusion with annular shells of K-silicate and propylitic alteration. Strong gold-copper mineralization is roughly coincident with the position of the K-silicate envelope.

The entire system has been rotated in post-mineralization times to lie at an inclination of roughly 25 degrees to the west, and has been subjected to considerable extensional tectonism.

Paper No. 64 — 10:00

Patterns of Alteration and Mineralization at the Mt. Milligan Deposit.
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C.M. REBAGLIATI, Rebagliati Geological Consulting Limited, Vancouver,
British Columbia

Statistical data and geometry of alteration and mineralization were obtained by examining drill hole intersections at the 1000 m elevation and along the 9600 cross section of the deposit.

Alteration and mineralization assemblages at Mt. Milligan are either potassic or propylitic. Potassic alteration with chalcopyrite is concentrated around the contacts of the monzonitic intrusions. Gold and copper are concentrated in the potassic assemblage in association with hydrothermal biotite, bornite, and to a lesser degree, magnetite. Propylitic alteration is widespread and characterized by epidote with varying amounts of calcite, chlorite, albite and pyrite. It is peripheral to the potassic alteration. Zoning is consistent with previously described models for alkaline porphyry deposits. Detailed patterns of alteration and metal zoning are complex where alteration assemblages overprint each other.