ROUNDUP '96 886997 TGS → RED CHRIS

08:50 Jurassic Arc Metallogeny
Dani J. Alldrick, British Columbia Geological Survey

Early Jurassic rocks contain nearly one-quarter of all metallic mineral occurrences in British Columbia, but constitute only seven percent of the bedrock area and one per cent of the stratigraphic record. Deposits include three of the four largest gold-silver mining districts in BC, some of the world's largest porphyry copper and copper-gold systems, plus gold skarns and high-grade precious-metal VMS orebodies. This great abundance and wide variety of Early Jurassic mineral deposits is attributed to the geologic and tectonic setting - andesitic to locally alkaline stratovolcanoes in an island arc environment.

Ore deposits represent the entire spectrum of island-arc-related deposit types and include newly recognized deposit types. Industry activity and coordinated multi-agency studies in several mining camps has led to revised exploration techniques and improved deposit models for application to ongoing exploration programs targeted on deposits of this prolific metallogenic epoch.

Similar Jurassic age rocks are preserved around the perimeter of the Pacific Ocean. Deposit models and exploration expertise developed from decades of Canadian exploration and research work can be applied throughout the Pacific Rim.

09:10 The Red-Chris Project Copper-Gold Deposits
Wayne Roberts, Doug Blanchflower and John Brock, American Bullion Minerals Ltd.*

The Red Chris property, located 18 kilometres southeast of Iskut in northern British Columbia, contains a large copper-gold porphyry mineralizing system that is hosted within a 5 kilometre long stock and adjacent volcaniclastic rocks.

Exploration conducted by the American Bullion (80%) - Teck (20%) joint venture during 1994/95 has defined three deposits within a 3 kilometre length of the Red stock. A total of 244 drill holes in approximately 75,000 metres of drilling has now been completed. The Red Chris deposit is the single largest deposit being 1.7 kilometres in length, 200 to 800 metres wide and open beyond a depth of 400 metres. Both the smaller Gully and Far West zones in the Yellow Chris area remain open for expansion.

Preliminary resource calculations by American Bullion indicate the Red Chris and Gully deposits have a combined geological resource in excess of 300 million tonnes containing over 3 billion pounds of copper and 3.8 million ounces of gold using a 0.3 percent copper cut-off. Detailed reserve calculations and a pre-feasibility study will be completed by independent engineers, Fluor Daniel Wright.

The Red Chris mineralizing system contains both hybrid alkalic and calc-alkalic porphyry copper characteristics. The host Red stock is predominantly a hypabyssal plagioclase-hornblende porphyry intrusion of monzodioritic to quartz dioritic composition. The emplacement of the intrusion and its subsequent pervasive alteration, sulphide mineralization and late-stage dykes are controlled by reactivated, east-northeasterly faulting. The entire stock appears to have a pervasive quartz-sericite-pyrite alteration overprint. Unique to the mineralization is an association with a quartz-ankerite-sericite-kaolinite alteration assemblage. Both gypsum and carbonate stockwork veining occurs peripheral to the copper-gold mineralization.

Chalcopyrite and less bornite occur as disseminations and fracture fillings associated with well-developed quartz-sulphide vein stockwork zones which are spatially related to east-northeasterly subvertical faulting that coincides with the axis of the elongate Red stock. Microscopic gold grains are intimately associated with the copper sulphides. Copper versus gold grade ratios (percent copper versus grams per tonne gold) of the mineralization change laterally in a westward direction from 1:0.8 to 1:4. This westward transition of copper-gold ratios is coincident with increased pyritization, decreased bornite mineralization and a dominate phyllic alteration facies. The varying copper-gold grades in the three deposits will allow for flexibility of metal head grades in a future mining scenario.

09:30 Regional Setting of the Red-Chris Deposit
Chris H. Ash, British Columbia Geological Survey

The Red-Chris copper-gold porphyry deposit is hosted by Mesozoic Stikinian volcanic arc rocks at the northwestern margin of the Bowser Basin. The geology in the deposit area comprises a sequence of Upper Triassic and possibly Lower Jurassic feldspathic volcanic wacke and siltstone with lesser, discontinuous intervals of augite-phyric mafic volcanic rocks. This stratigraphic succession is locally intruded by an extensive, variably mineralized suite of Early Jurassic hornblende quartz diorite to monzonite high-level dikes and stocks, including the Red stock which hosts the deposit. The age of this suite has been constrained by U-Pb isotopic dating at 198-200 Ma[1].

Sedimentary and volcanic rocks hosting the deposit are overlain to the southwest by a well preserved Lower Jurassic, southwest-facing, bimodal basalt-rhyolite succession. This is characterized by a lower sequence of Pliensbachian*, layered, massive

and pillowed flows and breccias of augite-phyric mafic volcanic rocks with lesser volcanic sediments and an upper layered rhyolitic volcanic flow or flow dome that varies upward from massive to banded to brecciated. Preliminary U-Pb isotopic data[1] suggests that the rhyolitic volcanic rocks are Toarcian (ca. 181 Ma) in age. To the southwest, in the Kinaskan Lake area, similar bimodal volcanic rocks are overlain by a thick sequence of related Lower Jurassic epiclastic rocks with intervals of laminated black siltstone. The Lower Jurassic bimodal volcanic succession forms part of the uppermost Hazelton Group that is intermittently exposed around the northern margin of the Bowser Basin. Stratigraphic similarities to the Eskay Creek area are evident, suggesting potential locally for Eskay Creek styles of gold mineralization.

The dominant style of mineralization throughout the project area consists of chalcopyrite and bornite as disseminations in fracture-controlled quartz stockworks in and around Early Jurassic intermediate and felsic plutonism. In most instances copper mineralization is dominant, and associated with elevated concentrations of gold and silver. On the basis of alteration type and lithological association, two distinct styles of copper-gold mineralization have been recognized in the project area:

- The first type, which includes the Red Chris, is characterized by intense quartz-ankerite-sericite alteration associated with hornblende quartz diorite to monzonite intrusions surrounded by broad ankerite alteration halos. These alteration halos are permeated by ankerite and are characterized by discrete veins or vein breccias within broadly fractured zones with associated pervasive carbonatization of surrounding host rocks.
- The second type is dominant in the northern half of the project area. It is characterized by pervasive pyritization and silicification associated with rhyolite/felsite dikes and stocks that intrude and alter andesite volcaniclastic host rocks. Ankerite is not present in this type but broader epidote alteration halos are typical.

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[1] Age dating conducted by Richard Friedman, Department of Geological Sciences, University of British Columbia.

* Age determination based on ammonites from sedimentary interval. Identified by Howard Tipper of the Geological Survey of Canada, Vancouver.

09:50 Subvolcanic Cu-Au-Ag: Transitions from Porphyry to Epithermal Environments–the Search in B.C. for another El Indio

Andre Panteleyev, British Columbia Geological Survey

Intrusion-related and subvolcanic hydrothermal systems with advanced argillic alteration, and high-sulphidation epithermal mineralization, are known from around the Pacific rim, for example, El Indio, Chile, Lepanto, Philippines and Goldfield, Nevada. Mineralization, including bonanza deposits, is generally confined to small zones within larger advanced argillic alteration zones. In exploration it is critical to distinguish between similar-looking, mineralized and barren alteration. The differences result from genetic processes that give rise to the distinctive acid-leached alteration. Favourable, potentially mineralized, alteration systems are derived from hydrothermal fluids dominated by magmatic-source liquids. In contrast, the vapour-dominated (boiling) hydrothermal systems consisting largely of heated groundwater and acidic gas condensates, are barren. An additional complication is that acid-leached alteration also forms from pyritic rocks in the weathering (supergene) environment.

Few occurrences have been described in B.C.; recently we examined 15 areas where indicator minerals had been reported. All have advanced argillic alteration and a number contain characteristic quartz-alunite and enargite mineralization. Three alteration styles are recognized: advanced argillic overprinting porphyry copper mineralization; quartz-alunite acid sulphate; and aluminous (pyrophyllite-bearing) shear zones. A related environment–a subvolcanic 'transitional' setting between the tops of porphyry copper deposits and their surface expression as crater lakes or solfateras–offers additional exploration potential.

10:10 Genesis of the Eskay Creek Deposit, Northwestern British Columbia

Ron Britten, Tina Roth, Dave Kuran, Andrew Kaip, and Peter Lewis, Homestake Canada Inc.*

Eskay Creek is an unusual, gold-, silver-, antimony- and mercury-rich volcanogenic massive sulphide deposit, located in northwestern British Columbia 950 km north of Vancouver. Prime Resources owns a 100% interest in the Deposit and Homestake Mining Company owns about 51% of Prime's shares. Probable mineable reserves as of January 1995, and excluding the recently discovered NEX zone, are 1.09 million tonnes of 65.5 gpt Au, 2930 gpt Ag, 5.6% Zn, 3.0% Pb and 0.77% Cu. Mining is by cut and fill, and ore is crushed, blended and direct shipped to smelters in Quebec and Japan. 1995 production is estimated at 350,000 ounces of Au equivalent.

The Eskay deposit is hosted in calc-alkaline to tholeiitic, arc-related volcanic, intrusive and sedimentary rocks of the Lower to Middle Jurassic Hazelton Group. Basal sedimentary and andesitic volcaniclastic strata are overlain successively by alternating