David Rhys - Twin Zone, Snip Mine

ABSTRACT

The Snip mine consists of an auriferous southwest-dipping shear vein system in a north-dipping Triassic greywacke-siltstone sequence altered with abundant veinlet and pervasive biotite. The deposit, termed the Twin zone, is the largest of numerous shear veins in the mine workings. It contains just under 30 tonnes of gold.

The Twin zone is composed of four ore types that are mineralogical end members of two distinctive styles of mineralisation. They are: (i) carbonate and (ii) chlorite-biotite ore consisting of laminated schistose veins of calcite, chlorite, biotite and pyrite, which display textures indicative of an origin, at least partially by, wall rock replacement; and (iii) dilatant quartz veins and (iv) dilatant pyrite-pyrrhotite sulphide veins. Alteration comprises pale calcite-K-feldspar-silica envelopes surrounding black biotite envelopes adjacent to the veins. A post-ore biotite-altered mafic dyke intrudes the zone.

Geologic relations in the Snip mine indicate that the mineralised veins were emplaced progressively in a dynamic tectonic environment characterised by semi-brittle deformation. Numerous kinematic features in the zone record normally-directed simple shear parallel to a westerly plunging elongation lineation. Deformation was heterogeneous and confined mainly to the shear veins. Galena Pb-Pb isotopic signatures suggest an Early Jurassic age for the veins. Abundant shallow easterly-dipping quartz-calcite extension veins formed during a later, probably Tertiary, event.

The Red Bluff porphyry, an elongate K-feldspar megacrystic plagioclase porphyritic quartz diorite to tonalite stock, intrudes the greywacke sequence 300-800 metres northeast of the Twin zone. Two successive, intense hydrothermal events are centred on the porphyry and are associated with subeconomic Au and Cu concentrations. These are: (i) early quartz-magnetite-sericite-K-feldspar-biotite (potassic) alteration associated with abundant quartz-magnetite-hematite veins, overprinted by (ii) sericite-pyrite-quartz (phyllic) alteration characterised by pyrite veining. Intrusion, semi-brittle deformation, and

Tina Roth - Eskay Creek, 21A Zone

ABSTRACT

The Eskay Creek deposit is an unusual high-grade precious and base metal volcanogenic massive sulphide and sulphosalt deposit hosted in volcanic and sedimentary rocks of the Lower to Middle Jurassic Hazelton Group. This deposit consists of several zones distinguished by differing ore mineralogies and grades. Published geological reserves for the deposit are 4.3 million tonnes grading 28.8 grams per tonne gold and 1 027 grams per tonne silver. The 21A zone, the focus of this study, contains an estimated 0.97 million tonnes grading 9.6 grams per tonne gold and 127 grams per tonne silver.

The lowermost stratigraphic units in the Eskay Creek 21A zone are marine sedimentary and volcanic rocks. Stockwork and disseminated mineralization occur in an overlying flow banded and brecciated rhyolite that forms the footwall to probable stratiform sulphide mineralization hosted in contact argillite. The argillite is overlain by a thick sequence of massive to pillowed and brecciated basalt, intercalated with argillite and turbidite. The units related directly to mineralization apparently were generated in an extensional rifted arc environment. From lithogeochemical analyses, the overlying basalts reflect a back-arc environment of formation.

Alteration in the 21A zone, most intense in the footwall rhyolite, is characterized by varying mineral abundances in an assemblage of quartz - sericite - pyrite ± potassium feldspar ± chlorite. Alteration (determined by petrography, X-ray diffraction, transmitted electron microscope and lithogeochemistry) progresses from early devitrification through silicification, potassic alteration and sericitization (dominantly illite) to pervasive replacement of rhyolite by clinochlore. Increasing hydrothermal alteration is traced geochemically, mainly in the mobility of silica, potassium and magnesium. The most intense alteration in the footwall rhyolite, is a chloritic pipe defined by a discontinuous stockwork that underlies apparently stratiform mineralization. The overlying basalt sequence is not markedly altered.

Mineralization within the 21A zone consists of a small, semi-massive, probably stratiform, stibnite-realgar rich lens in a small defineable basin which is underlain by stockwork and disseminated sulphides in the rhyolite that is described above. An overall vertical zonation was observed in sulphides and distribution of metals. Veinlets in the rhyolite contain mainly sphalerite - galena - pyrite - tetrahedrite ± chalcopyrite. Chalcopyrite occurs mainly in the lower part of the rhyolite. Near the upper contact, intensely altered rhyolite contains disseminated arsenopyrite and stibnite. Stratiform semi-massive mineralization in the contact argillite consists dominantly of realgar, stibnite, arsenopyrite and cinnabar; few intervals contain base metal rich sulphides. Assay distribution within the rhyolite also varies vertically. Gold and silver increases with proximity to the upper contact of the rhyolite. Highest gold grades are in the semi-massive sulphides. Highest silver grades are in the 50 metres immediately below the top of the rhyolite.