lators want about risk. They can only help shape professional judgment and common sense.

SESSION 12 - PLAZA EAST
Geology III — Massive Sulphide Deposits of Western North America
TIM BARRETT, The University of British Columbia, Chairperson

Paper No. 57 — 1:45
The Myra Falls Kuroko-type Cu-Zn-Pb-Au-Ag Massive Sulphide Deposits, Vancouver Island, Southern British Columbia
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The Myra Falls deposits occur 90 kilometres from Campbell River, in Palaeozoic Sicker Group rocks of the Wrangellia allochthonous terrane. The H-W orebody and adjacent North Lens have geological reserves of 12.5Mt grading 1.9% copper, 0.5% lead, 6.3% zinc, 2.1g/t gold and 45.6g/t silver. The Price andesite forms the footwall and consists of at least 300 metres of massive to pillowed flows and flow breccias. This unit is overlain by the H-W horizon, which comprises 50 to 100 metres of felsic subaqueous volcaniclastic and pyroclastic beds, lesser interbedded black mudstones, and, near the North Lens, a quartz-feldspar-porphyritic rhyolite unit up to 50 metres thick. Zircon U-Pb dating of H-W rhyolite yielded an age of 370_6Ma.

The massive sulphide lenses are underlain by a strongly altered and pyritized feeder zone that extends 25 to 50 metres into the footwall. Above the feeder zone, massive pyrite grades stratigraphically up into massive pyrite with several per cent disseminated chalcopyrite. This is typically overlain by an interval of semi-massive to disseminated polymetallic sulphides alternating with mass flow units of felsic debris. This upper interval of mineralization tends to be dominated by sphalerite, galena, tennantite and barite.

The mafic footwall has low incompatible trace element contents (with Zr/Y = 3-5), low TiO_2 (0.8-0.9%), and slightly evolved REE signatures $[La/Yb]_n$ = 2-4)), all indicative of an island-arc tholeiitic series. By contrast, the felsic hanging wall rocks have a more evolved mildly calc-alkaline affinity (Zr/Y = 5-7, $[La/Yb]_n$ = 4-8). Two main alteration trends in Al_2O_3 vs. TiO_2 and Al_2O_3 vs. Zr space result from alteration of rhyolite and mafic precursors with limited compositional ranges in their immobile element ratios. Calculated mass changes for the upper mafic footwall and lower hanging wall at both deposits reveal large additions of potassium, and near-total loss of calcium and sodium, but only minor magnesium addition.

The geological evolution of the host stratigraphy at the H-W deposit involves: (a) formation of a widespread mafic volcanic basement; (b) massive to semi-massive sulphide mineralization of various styles, with local baritic to cherty intervals; (c) emplacement of massive felsic domes and shallow sills, with lateral accumulation of felsic volcaniclastic mass flow deposits in local mudstone basins; and (d) synsedimentary emplacement of mafic sills and flows of tholeiitic affinity into the felsic hanging wall sequence.

Paper No. 58 — 2:15
The Tulsequah Chief Kuroko-type Cu-Zn-Pb-Au-Ag Massive Sulphide Deposit, Vancouver Island, Northern British Columbia
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The Tulsequah Chief volcanogenic massive sulphide deposit is located on the Tulsequah River 100 kilometres south of Atlin. Reserve estimates for all classes are 9.34Mt grading 1.41% copper, 1.23% lead, 6.65% zinc, 2.54g/t gold and 105.6g/t silver.

Mineralization occurs primarily as a series of closely spaced lenses within felsic volcaniclastic mass flows of the lower hanging wall. Several facies of mineralization are present, although the spatial relationships are partly obscured by folding. The pyrite facies consists mainly of massive pyrite with a low base metal content. The zinc facies is composed of semi-massive pale yellow sphalerite, pyrite, galena, chalcopyrite and tetrahedrite, with barite, quartz and sericite-altered lithic fragments. The copper facies is mainly composed of massive pyrite with up to several per cent disseminated chalcopyrite. Baritic and cherty facies also occur. The felsic host rocks are dominantly altered to sericite-silica-pyrite. Stringer mineralization in the mafic footwall is common and comprises thin, anastomosing, quartz veins with dark red sphalerite and chalcopyrite. The uppermost footwall mafic flows are commonly strongly amygdaloidal with an alteration assemblage of sericitic, biotite, quartz, cordierite and pyrite.

The mafic footwall has low incompatible trace element contents (Zr/Y = 3-5), low TiO_2 (0.8-0.9%), and transitional REE signatures ($[La/Yb]_n$ = 2-4) indicative of an island arc tholeiitic series. By contrast the hanging wall felsic rocks have a mildly calc-alkaline affinity (Zr/Y=5-7, $[La/Yb]_n$ = 4-8). Two main alteration trends in both Al_2O_3-TiO_2 and Al_2O_3-Zr space are the result of alteration of mafic and felsic rocks with limited initial composition ranges. Mass change calculations for both the upper footwall and lower hanging wall indicate large additions of potassium, and near total loss of calcium and sodium with only minor magnesium additions. The overall stratigraphic setting of the mineralization, the average metal grades and the sericite-rich alteration are all similar to those of the H-W and Battle orebodies of the Myra Falls camp on Vancouver Island.