characterized by quartz-sericite-dolomite-pyrite with pyrite-quartz veins common in the footwall.

## Volcanic Setting of the H-W Massive Sulfide Deposit, Myra Falls, Southern British Columbia

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The Myra Falls deposits occur on Vancouver Island, in Paleozoic Sicker Group rocks of the Wrangellia terrane. The H-W orebody has total past production and current reserves of 13.7 million tonnes grading 1.9% copper, 0.35% lead, 4.0% zinc, 1.9 [illegible]old, and 30.9 g/t silver (Pearson, 1993). The stratigraphic footwall to the [illegible]dy consists of >300 metres of mainly massive to pillowed mafic flows of [illegible]tic andesite composition and island-arc tholeiitic affinity. Directly under the [illegible]dy, a strong sericite-quartz-pyrite alteration zone interpreted as the main feeder [illegible] extends 25-50 metres into the footwall. Calculated mass changes in this zone [illegible]al very large additions of K, near total loss of Ca and Na, and variable changes [illegible]Si. Whole rock $\delta^{18}O$ values and fluid inclusion data indicate data indicate that [illegible]peratures in the feeder pipe were ~150-250°C.

[illegible]ove the H-W orebody are 50-100 metres of subaqueous felsic volcaniclastic mass [illegible]ws and pyroclastic beds, and intercalated black mudstones, collectively known as [illegible]e H-W interval. Felsic rocks in this interval are of transitional to mildly calc-[illegible]kaline affinity. Tholeiitic mafic sills commonly intrude the H-W interval, producing widespread peperitic textures and disruption of bedding, indicating intrusion into unconsolidated sediments.

Directly above the H-W deposit, a thick sequence of black mudstone accumulated with episodic introduction of felsic mass flows. However, in the direction of the North Lens, a small deposit located several hundred metres laterally away from the H-W orebody, the proportion of felsic mass flows increases until massive rhyolites are encountered. These relations suggest that the H-W deposit may have attained its large size in part because only mudstones were accumulating in this area of the basin. By contrast, deposition of the North Lens orebody was arrested by the extrusion of massive rhyolites and associated flanking felsic debris.

## The Tulsequah Chief and Big Bull Volcanogenic Massive Sulphide Deposits, Northern British Columbia

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The Devono-Mississippian Tulsequah Chief and associated nearby Big Bull volcanogenic massive sulphide deposits are in the Stikine Terrane about 100 kilometers southwest of Atlin, BC. At the Tulsequah Chief deposit, the stratigraphically lowest unit is composed of basalts and basaltic andesites rocks which form

the footwall to the mineralization. This unit is overlain by a package of rhyodacitic flows, sills and coarse grained volpcaniclastic material, which is intruded by a thick, relatively coarse-grained mafic sill. The upper felsic unit is overlain by mafic flows, sills and volcaniclastic sediments.

The host stratigraphy at Big Bull is similar to that at Tulsequah Chief, with a mafic footwall sequence overlain by felsic volcanic rocks that host mineralization. The felsic rocks are overlain by mafic tuffs and intruded sills respectively. At Big Bull the felsic volcanic rocks comprise fine grained and finely laminated tuffs, without recogniza flows or sills, suggesting a more distal setting than the Tulsequah Chief deposit. both deposits the host felsic volcanic rocks are variably altered to a quartz-sericite a pyrite assemblage.

At both the Tulsequah Chief and Big Bull deposits mineralization occurs primarily a a series of closely spaced sulphide lenses within felsic volcanic rocks. Several facies of mineralization are present, but 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 tetrahedite, with barite, quartz and sericite-altered lithic fragments. The copper facies is composed of massive pyrite which hosts up to several percent disseminated chalcopyrite. Baritic and cherty facies also occur. At the Big Bull deposit a massive manganese and iron oxide chemical sediment is recognized. This likely occurs stratigraphically above the massive sulphide mineralization, and may represent low temperature hydrothermal discharge that occurred after the main phase of hydrothermal activity.

## Regional Studies by MDRU's VMS Project

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As part of our investigations of VMS deposits in volcanic terranes that differ in age, tectonic setting, geochemistry, and mineralization, we are making reconnaissance studies of the Niblack prospect in southern Alaska, the Ecstall deposit in west- central British Columbia, the Lockwood prospect in northern Washington state, and the Canatuan deposit in the Philippines. The Niblack prospect, within the Alexander Cordilleran terrane, contains Cu-Zn sulphide intersections plus manganiferous zones within a sequence of felsic flows and fragmental to pyroclastic units, with lesser mafic volcanic rocks. Stratigraphic similarities exist with the Kutcho Creek deposit in northern BC, although the latter is probably much younger. The Ecstall deposit comprises a massive Cu-bearing pyrite-rich lens hosted by metamorphosed and strongly foliated felsic to mafic schists forming a pendant of unknown age within the Coastal Plutonic Belt. The Lockwood prospect occurs within mafic volcanic rocks, and includes massive py-sph-cp intersections as well as sulphide clasts within mafic breccias. This prospect, of inferred Jurassic age, is possibly correlative with part of the Harrison Terrane in southern BC. The Canatuan deposit in southwestern

Philippines lies within regional mafic-ultramafic rocks thought to represent part of a Mesozoic ophiolite. Sheets of massive sulphides up to several metres thick are hosted by quartz-sericite-pyrite and chloritic schists. Lateritic weathering has produced a Au-Ag-enriched goethitic gossan above the massive sulfides, which themselves have been enriched in Cu by supergene processes.

Our studies in the able areas provide comparative stratigraphic and geochemical data on new VMS settings that will supplement our detailed database on volcanic stratigraphy, geochemistry, age relations, and mineralization at Tulsequah Chief, Myra Falls, Seneca, Anyox, Granduc, and Eskay Creek.

## Geophysical Characteristics of the Myra Falls Deposits, B.C.

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Multisensor borehole geophysical measurements were made in ten drillholes at the Myra Falls mining operations of Westmin Resources Limited on Vancouver Island, B.C. This work was part of a three-year multidisciplinary research project under the Industrial Partners Program. The geophysical logging objectives were to determine the geophysical signature of the deposit and host rocks, to establish an in situ physical rock property database that will facilitate the development of geophysical methods for discovering new ore bodies on the camp and to map features that control groundwater movement in support of hydrogeological/hydrogeochemical investigations. Most of the drillholes logged were at the Trumpeter zone which is one of several occurrences of polymetallic (Cu-Zn-Pb) volcanogenic massive sulphides hosted by felsic volcanics.

Borehole geophysical logs provided information regarding the lithology, alteration, sulphide distribution, fracturing, porosity, and permeable zones. Of the twelve logs recorded, natural gamma ray, density, SGG ratio and magnetic susceptibility logs give distinct signatures in different volcanic rocks whereas SP, density and SGG ratio logs accurately delineate sulphide mineralization. Density, resistivity and full wave sonic logs appear to be the best indications of fractures and high porosity and permeable zones whereas, temperature logs locate groundwater flow zones.

## Geology and Mineralization in the Yahk-Creston Area, Southeastern British Columbia (82F/1,2)

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The Yahk-Creston area lies 60 km south of the Sullivan mine, one of the world's largest massive sulphide deposits and is underlain primarily by the Aldridge Formation. Mineral occurrences include: Pb-Zn-Ag veins and disseminations at the Star prospect; an unusual iron deposit along a north-trending fault; and stratabound Zn-Ba mineralization at Wilds Creek (Leg) hosted in highly deformed upper Purcell strata. This is one of several occurrences along the western margin of the Purcell