Towards delimiting the secondary detrital footprint through thick stratigraphic sediment cover at the Highland Valley Copper Mine Area, South-central British Columbia

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Highland Valley Copper (HVC) is a large porphyry copper system located in southwest British Columbia, and is partially covered by more than 200 meters of transported regolith. Indicator minerals and geochemical tracers have recently been identified at the surface and traced back to their shallow mineralized sources at HVC and other sites in the region. However, in areas where the mineralization is overlain by a thick unconsolidated cover, little is known about the detrital footprint dispersion from deeper sources. The thick stratified cover also complicates geophysical mapping of the bedrock properties. The first step towards understanding detrital dispersion through the stratified cover is to establish the stratigraphic framework and determine provenance of the main units within the transported regolith. Ten drilled cores through the sediment cover have been logged and interpreted through facies analysis and stratigraphic correlation in order to refine and extend the three-dimensional sediment stratigraphy at HVC. A seismic P-wave reflection survey has also been completed at one borehole in order to extend the stratigraphy outward from the log at that location. The lithologies of the pebbles have been categorized to establish provenance, especially of the glacial sediment units. Results thus far indicate that most of the deposited sediments originate from the Guichon Creek batholith that hosts the underlying mineralization. A significant proportion of material also originated from north of the batholith, from tertiary and Triassic country rock. These units are currently being analyzed for indicator minerals and geochemical pathfinders. The main indicator minerals considered include visible gold, pyrite, jarosite, chalcopyrite, andradite, Mn-epidote and rutile and related geochemical pathfinders include copper, molybdenum, gold, tin, silver, arsenic, barium, zinc, antimony, tellurium, bismuth and sodium. In addition, thirty-five samples from different units have been analyzed for their density, porosity, magnetic susceptibility, resistivity, and chargeability in order to determine the thick cover's effect on geophysical surveys. While results continue to be analyzed in this project, it appears that sediment provenance can be established and that local lithologies occur in all glacial sediment units, which is promising for mapping the detrital footprint at depth in the study area. NSERC-CMIC Footprints Exploration Project Contribution #177.