Lee RG, Hart CJR, Hollings P, Gleeson SA, 2018, Exploration footprint of the Highland Valley porphyry copper deposit, Abstract, Society of Economic Geology, Keystone, USA

The Highland Valley Copper district located within the center of the late Triassic Guichon Creek batholith, British Columbia, contains multiple porphyry copper centers providing a unique opportunity to define individual and regional footprints related to the hydrothermal system that produced the deposits. Extensive field mapping, sampling, and processing of geophysical data sets were conducted over a 40 km x 30 km area to develop new geologic, structural, and alteration maps of the region as well as a 3-D model to visualize the footprint of the Highland Valley Copper. Over 1,000 rock samples were collected and analyzed for major and trace element chemistry, feldspar staining, short-wave infrared and hyperspectral imaging, petrophysical properties, stable and radiogenic isotopic signature, and accessory mineral chemical composition to define features proximally and distally associated with the deposit. In addition to hard-rock sampling, over 400 soil, till, and vegetation samples were collected to define the surface response to the deposit. Multiple techniques were used to evaluate the surficial chemical response, including aqua regia, sequential leaching, hydrocarbon analysis, indicator mineral abundance and chemical composition for fingerprinting, and spectral imaging. New alteration mineral assemblages were defined using the extensive petrologic and lithochemical data, including quartz-potassium feldspar-biotite-sulfide-mica adjacent to the deposits and assemblages of albite-white mica-epidote-calcite-tourmaline-prehnite distal from the main mineralized centers. The presence and absence of these key mineral assemblages define the Highland Valley Copper footprint up to 12 km from the center of the system. Over 15 distinct petrologic, lithochemical, and geophysical gradients were identified in the district that can be used as vectors toward the Highland Valley Copper deposit. This study has produced one of the largest composite databases of geological information related to a mineralized copper deposit in the world.

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