CORDILLERAN SECTION
GEOLOGICAL ASSOCIATION OF CANADA

Exploration Talk Series Abstract
Presented February 3, 2015

Targeting concealed copper mineralization within porphyry-related alteration footprints: insights from the Superior District (Arizona) and the Timok-Srednogorie Belt (Serbia/Bulgaria)

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High-grade hypogene Cu or Cu-Au mineralization can occur in apical sectors of porphyry copper systems below or within their "roof" zones (deeply eroded lithocap environments). The Laramide-age porphyry belt of Southwest USA and the Upper Cretaceous porphyry belt of Eastern Europe have yielded two of the most prolific Cu and Cu-Au provinces in the world, host to numerous large, high-grade hypogene porphyry and high-sulphidation epithermal deposits, including significant modern discoveries (Resolution, 1996; Cukaru Peki, 2012). Preserved, outcropping, un-tested, deeply eroded lithocaps in these belts can comprise exploration opportunities for concealed Cu and Cu-Au deposits.

The upper and lateral parts of known porphyry copper systems in the Superior District (Arizona) and select porphyry systems from the Timok-Srednogorie Belt (Serbia/Bulgaria) are characterized by 1) Leached quartz-sericite-pyrite alteration with ppm-level anomalous copper (Superior East), 2) Quartz-sericite-pyrite alteration with structurally-controlled advanced argillic zones and high-sulphidation Cu mineralization (Resolution), 3) Quartz-sericite-pyrite alteration with structurally-controlled silica zones and high-sulphidation Au-Cu mineralization (Chelopech), 4) Structurally-controlled advanced argillic zones and high-sulphidation Cu ± Au mineralization (Magma, Bor and Cukaru Peki), 5) Skarn and marble alteration of limestone host rocks (Majdanpek and Resolution), and 6) Structurally-controlled base metal zones hosted in relatively fresh rocks peripheral to the porphyry center (Majdanpek and Resolution).

Exploration targets in porphyry copper belts where a deeply eroded lithocap is preserved can warrant drill-testing if there is reason to believe that sufficiently high grades may be present, hosted in either a porphyry zone, or a high-sulphidation epithermal zone. Such target environments include those located in proven clusters/trends/stratigraphy and/or favourable, reactive mafic volcanic or carbonate host rocks. Additional domains that can yield high hypogene grades include apical sectors of porphyry copper systems (inherent to this exploration model), as well as telescoped systems. Copper belts that are characterized by the presence of both porphyry and epithermal systems at similar erosion levels may indicate an increased likelihood of telescoping within a discrete deposit, or the possibility of a shorter distance between shallow quartz-sericite-pyrite/advanced argillic footprints, and deeper copper-bearing secondary biotite alteration domains.

Historic exploration campaigns have yet to adequately test outcropping "roof"-style alteration zones in Central Arizona and Serbia/Bulgaria. The Red Top, Copper King (Arizona), Coka Njalta, Susulajka (Serbia) and Zlatusha (Bulgaria) exploration-stage projects are characterized by alteration and mineralization styles consistent with the tops and sides of porphyry copper environments documented at known deposits in these areas. The presence of porphyry and epithermal systems at similar erosion levels, in addition to telescoping demonstrated within some of the known porphyry-epithermal deposits indicate excellent exploration potential for these districts.

Challenges involved with exploring these styles of targets include 1) The requirement of high grades for underground bulk-tonnage mining scenarios, 2) Cost of drilling deep holes to test targets, and 3) Difficulty in financing exploration drilling for targets that are characterized by distal porphyry-style alteration.