

GEOLOGY, MINERALOGY AND LITHOGEOCHEMISTRY OF THE KEMESS SOUTH GOLD-COPPER PORPHYRY DEPOSIT, NORTH-CENTRAL BRITISH COLUMBIA

D.C. Harris¹, S.B. Ballantyne¹, R.B.K. Shives¹, R.G. Balma¹,
C.M. Rebagliati², D.J. Copeland², and G.R. Cope²

Detailed mineralogical study (SEM, microprobe and XRD), lithogeochemical analysis (whole rock, trace element) and on site drill core magnetic susceptibility measurements have been completed for drill hole sections through the newly discovered Kemess South Au-Cu porphyry system. The co-operative research has focused on the detailed examination of this unique deposit because it contains lag, oxide, supergene, transition, hypogene and "exotic" mineralized zones. Late stage movement of copper and gold formed the exotic mineralized zone in adjacent Tertiary-Cretaceous basin sediments that unconformably overlie intrusive hosted supergene and hypogene mineralized zones. The supergene zone accounts for approximately 20% of the total mineral reserve and ore minerals comprise native copper, rare chalcocite and rare native gold in a hematite-rich gangue. Hypogene zone minerals consist of pyrite, ± magnetite-hematite, chalcopyrite, minor to trace bornite, chalcocite, molybdenite and rare native gold occurring in quartz feldspar stockworks or sulphide veins and disseminations within a zone of sericite-chlorite alteration.

As confirmed by XRD determinations, the oxide-supergene zone is characterized by hematite-limonite, kaolinite-illite-sericite and little chlorite. In the upper portions of the oxide zone, copper has moved downward to be enriched in the supergene blanket, but gold concentrations remain relatively unchanged and are similar to those in the higher grade hypogene intrusion. Whole rock potassium concentrations in oxide, supergene and hypogene units are generally higher than sodium contents, but rarely exceed 4.5% K₂O. In the hypogene units, total sulphur is generally less than 2% and total iron may reach concentrations of over 10% due to the presence of magnetite-hematite. In the top higher grade intrusion, magnetite is widely distributed whereas in the bottom lower grade intrusion, magnetite is restricted to rare stringers. This difference of magnetite distribution can be defined by magnetic susceptibility measurements of drill core pieces in the field and helps to distinguish the two intrusive units.

Mineral inventory exclusive of exotic mineralization is 250 million tonnes at an average grade of 0.62g gold (0.018 oz/ton) and 0.22% copper. The Kemess South discovery is important in that it is the first deposit in British Columbia that contains a lag, oxide, supergene, transition and hypogene zones together with a late stage movement of copper and gold to form the "exotic" zone in overlying sediments. The presence of the exotic-supergene mineralization adjacent to and/or above underlying Au-Cu porphyry systems may be useful as an indicator of other "blind" or buried Au-Cu porphyry systems in British Columbia. Exotic and/or supergene blanket mineralization may be incorporated into glacial debris with the hypogene porphyry ores being preserved from glaciation or erosion.

¹ Mineral Resources Division, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0E8

² El Condor Resources Limited