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Exploring for Cu-Au Alkalic Porphyry Deposits from the Fringes

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The Iron Mask Batholith (IMB) from the late Triassic to early Jurassic period has many mineralized centers such as New Afton, Copper King, and Ajax, which feature alkalic porphyry-type deposits and calc-alkaline stocks like the Nora molybdenum porphyry mineralization. Exploring the IMB district is difficult because of the diverse magma composition and deposit characteristics. However, it provides a unique opportunity to analyze and contrast the properties of alkalic and calc-alkalic porphyry deposits. The research effort seeks to analyze district-scale intrusions, factors influencing orebody placement, and distant alteration by detailed fieldwork, mineralogical analysis, and geochemical techniques. Initial results show similar footprints for New Afton and Copper King with an epidote, chlorite, prehnite, white mica chalcopyrite-rich inner zone surrounded by a pyrite, chlorite, epidote-calcite outer zone. Element distribution in New Afton shows a concentric zonation grading outward from a depleted Zn center to anomalous Te-Cu-Ag and finally Sb and As. On the other hand, the calc-alkalic Nora deposit shows a more extensive footprint with an inner white mica zone, grading outward to a chlorite zone and, finally, an extensive epidote-calcite outer zone. Although Nora presents a much broader footprint, element zonation is similar, with a depleted Zn inner halo, to a Mo center, grading to Cu, and finally an extensive Sb halo. Mineral chemistry in the distal Ajax samples showed encouraging results for chlorite and epidote chemistry in the area, characterizing areas interpreted in other studies as distal and proximal to porphyry centers. Future work on vertical zonation, mineral chemistry, and vein characterization is expected to help define the footprints of the studied deposits.