

Structural Control on Polymetallic Mineralisation at South Mountain, Idaho

Michael Watkeys¹, John Wilton², Tyson Forbush³, Eric Jones³

¹University of KwaZulu-Natal, Durban, South Africa, ²BeMetals Corp., Vancouver, Canada, ³Thunder Mountain Gold Inc, Boise, USA

The South Mountain Mining District, Idaho contains at least 14 mineral deposits discovered in the 19th century. They are hosted in a deformed Palaeozoic-Mesozoic metasedimentary sequence capped by a Tertiary granite sill. Gold and copper were of initial interest but, taken overall, they comprise either Pb-Zn replacement veins and fissures or Zn-rich polymetallic bodies. Sillitoe (2019) classified the high grade zinc-silver-copper-gold mineralization as a carbonate replacement deposit. The area was mapped by Freeman (1982) who recognised that the mineralization was in pipe-like bodies subparallel to the host rock fold axes. Therefore, logically, he concluded that this was the control on their morphology and orientation.

In this study, attention was paid to brittle structures while detailed underground mapping was re-examined and supplemented, and combined with drill core data and Leapfrog 3D modelling. Through this, it became clear that, although the mineralization was pipe-like, the controlling structures were not the fold axes but the intersection lineation between a suite of ENE-trending dykes and N-S normal faults. Recognising this enabled prediction, at any locality, the length of mineralization within the reactive carbonate layer through the combination of the plunge & plunge direction of the intersection lineation, the thickness of the reactive layer and the dip & strike of that layer. Knowing the cross-sectional area of each pipe-like zone, it can be shown that there are distinct “high volume”, “medium volume” and “low volume” zones of mineralization.

The mineralization at South Mountain most likely occurred when the area passed over the Yellowstone hot spot. Mineralising fluids streaming up through the deformed metasedimentary sequence were probably partly arrested by the overlying granitic sill. The three different volumes of mineralization might be a consequence of variable arrest times or reflect the volume of mineralizing fluids passing up through different parts of the South Mountain area.