

Episyenitization in an Archean Intrusion Associated Gold Setting, Boston Creek Area, Abitibi Greenstone Belt

L Arteaga¹, D Kontak¹, H Gibson¹

¹ Department of Earth Sciences, Laurentian University, Sudbury, Ontario

Episyenitization refers to an alteration process mainly consisting of quartz dissolution accompanied by Na and/or K metasomatism with variable mobility of additional elements and is generally observed in granitic intrusions. This process produces quartz-poor and albite-rich rocks with development of dissolution cavities and enhanced permeability which together facilitate movement of later fluids and the precipitation of a wide range of secondary minerals. Episyenites are frequently observed in association with U mineralization in different locations, for example Canada (Saskatchewan and NWT), Europe (Variscan granitoid belt, Bohemian Massif and France Central Massif), Brazil and Guyana, as well as Sn mineralization in Brazil and Au-Mo occurrences in the Taschereau area of Quebec. Although the mineralogical and geochemical changes are well documented, the range of temperature where the quartz dissolution occurs and the nature of the alteration fluids are not equally well understood. In this study, an example of episyenitization associated with Au-Cu-Mo mineralization is documented in the Archean quartz-monzodioritic intrusions of the Boston Creek area, Ontario (Abitibi Greenstone Belt (AGB)). The alteration process has removed 15- 20% of quartz and 5-10% of biotite from the precursor granitoid host with subsequent albitization of the primary plagioclase and/or K-feldspar. The leached zones vary from decimeters to several meters thickness in drill core and seem to be controlled by fracture or fault zones. The dissolution cavities are lined by different alteration minerals including: albite, chlorite, epidote, titanite, calcite and sulfides. A detailed description of the episyenites is presented based on petrographic and SEM observations whereas geochemical characterization in progress will define the modified geochemical signatures of major and trace elements generated by the metasomatic process. The episyenite alteration is separated into two different mineralization episodes: 1) an early event characterized by quartz veining and visible gold precipitation; and 2) a later event represented by disseminated pyrite, chalcopyrite, molybdenite and tellurides. The possibility to date the gold mineralizing event using hydrothermal titanite extracted from the cavities is in progress. The results of this study indicate that secondary alkali enrichment along with a pervasive hematitic alteration of calc-alkaline intrusive bodies such as tonalites is maybe a more common feature than appreciated across the AGB and if not recognized will give the wrong interpretation about alkaline magmatism in the area. In addition, the vuggy textures in the episyenites and their spatial association with structures provide a possible pathway for fluids and an excellent host rock for metal deposition.