

SN, W, MO, and U mineralization in the Appalachian-Hercynian Fold Belt: A regional metallogenic comparison

A.K. Chatterjee - Nova Scotia Department of Mines and Energy

Important Sn, W, Mo, and U mineralization in the Meguma Zone is spatially and probably genetically related to the emplacement of the granitoid rocks of Devonian-Carboniferous age. The mineralization is enclosed either in the granitoid rocks (intrabatholithic) or in the metamorphic rocks of the aureoles (peribatholithic). Similar geological situations are also found in the Hercynian province of western Europe. For regional comparisons examples are selected from the Iberian Meseta (Alto-Altenterjo, Fe, Morille and Galicia), the Armorican Massif (Mortagne), the Massif Central (Marnac, Peny, Hyverneresse and Montredon-Labessonnie) and the Bohemian Massif (Pechtelsgrun, Freiberg, Cinovec, Pribram and Jachymov).

The intrabatholithic mineralization varies in form from a linear type with vein infillings or sheet-like bodies to a columnar type in the greisenized granite. The enclosing granites generally have a leucocratic mineral composition and a special association of accessory minerals, among which cassiterite, helvite, uraninite, topaz, tourmaline, garnet, dark micas of siderophyllite-protolithionite composition and fluorite are most important. Geochemically the granites are characterized by higher SiO₂ and K₂O contents, lower contents of TiO₂, Fe₂O₃, MgO, and CaO, and a strong increase in Rb, Sn, U, Li, Be and

F when compared with normal granites. Often the columnar type of mineralization is represented by the presence of vascular rocks (episyenites) of various compositions. The enclosing granites are also characterized by late-magmatic autometasomatic and post-magmatic metasomatism leading to muscovitization, albitization and greisenization.

The peribatholithic mineralization occurs as impregnations, as replacement veins and as net-vein stringers in shear zones in the pelitic rocks within the metamorphic aureole of the specialized/fertile granites. Characteristically, the Sn-W-Mo mineralization occurs in oxide-silicate-sulphide association (e.g. cassiterite-wolframite-hematite-malayite sulphides of Cu, Zn and Ag), whereas the uranium mineralization is essentially in the form of silicate-phosphate-sulphide-association (e.g. coffinite-autunite-saleeite-phosphuranylite - pyrite - chalcocite). Geochemically the enclosing pelitic rocks are characterized by increased levels of Cu, Zn, Sn, U, Li, and F when compared with the average Paleozoic shale.

Based on geological, mineralogical, geochemical and regional metallogenesis, it is concluded that the granitoid rocks in the Appalachian-Hercynian tectonic province have acted as metallogenetic, and many features may be used in the search for both surface and hidden deposits of endogenous type.