

Tungsten mineralisation and intrusive rocks at Lienzer Schlossberg, East Tyrol

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Tungsten showings were re-investigated in the Schlossberg area at Lienz within the framework of the GBA Forschungspartnerschaften Mineralrohstoffe (MRI) "W Alps" project. Three types of scheelite mineralization can be distinguished: (1) Scheelite in deformed quartz veins or quartz-rich rocks in the Thurntal Complex. (2) Scheelite in late quartz veins and joints in plutonic rocks of the Edenwald intrusion. (3) Scheelite associated with sulphide-dominated skarn mineralisation. Pyrrhotite rich massive sulphide ores with minor disseminated scheelite are exposed in the former Schlossberg open pit. These skarn ores are associated with thin lenses of marble and calc-silicate rocks within metapelitic hornfels developed in the contact aureole of the km-sized composite Edenwald intrusion. Skarn mineralisation includes a prograde anhydrous high temperature stage with grossular, vesuvianite, diopside-hedenbergite, wollastonite, plagioclase and accessory scheelite and a retrograde stage with hydrous low temperature phases. In the latter, actinolite, biotite, epidote, quartz and scheelite are associated with pyrrhotite and chalcopyrite and late calcite. The skarn mineralisation shows similarities to reduced, magmatic tungsten skarns. The Edenwald intrusion consists of diorites, tonalites, granodiorites and granites and belongs to the Periadriatic intrusions of Oligocene age. The igneous rocks are magnesian, calc-alkalic and span metaluminous to peraluminous compositions. Mafic micro-enclaves containing orthopyroxene, clinopyroxene and plagioclase are preserved in the darker varieties and may indicate involvement of mantle-derived melts. Diorite and tonalite formed during the main magmatic stage. Increase in water content of the melt is indicated by crystallization of biotite and hornblende. Pyroxene in the mafic micro-enclaves was transformed into cummingtonite and actinolite/hornblende during this stage. The third magmatic stage includes strongly fractionated, porphyritic granodioritic to granitic rocks that were mainly emplaced as dykes. In contrast to petrographically and chemically similar intrusions (e.g., Rieserferner) the Edenwald intrusion is enriched in tungsten due to (post-) magmatic hydrothermal processes making it unique among the Periadriatic intrusions.