ANOMALOUS AS-ENRICHMENT IN GERSDORFFITE IN A REALGAR-RICH ENVIRONMENT: LOJANE, MACEDONIA

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The abandoned Sb–As–Cr mine near Lojane (HIESSLEITNER, 1951; GRAFENAUER, 1977) in northeast Macedonia is a substantial source of arsenic and antimony pollution. The mine and flotation dumps present one of the major environmental problems for Macedonia and are considered a very serious human health risk given high concentration of arsenic-rich wastes (ALDERTON *et al.*, 2014 and references therein).

During a detailed mineralogical study of realgar-stibnite and chromite ore assemblages and their secondary alteration products (collected on ore and waste dumps) by SEM-EDS, EPMA, Raman spectroscopy, single-crystal and powder XRD, we detected a larger number of phases not previously recorded for the deposit (e.g. annabergite, arsenic (or arsenolamprite), baryte, chalcopyrite, coffinite, duranusite, galena, gersdorffite, gypsum, hydroxylapatite, laurite, maucherite(?), millerite, naldrettite(?), parkerite(?), pentlandite, picropharmacolite, pyrrhotite, roméite-group minerals, scorodite, senarmontite, siderite, sphalerite, ullmannite, valentinite, violarite and an unidentified Bi-As-S-Cl-(O?) phase), as well as partly amorphous, small-grained arsenates of Ca, Fe, Sb, Ni etc., including probable arseniosiderite. Grains of chromite-group species are scattered throughout the As-Sb mineralisation.

Nearly all of the observed sulphides contain trace to minor amounts of As, reflecting the As-rich environment. Rounded, commonly finely zoned (concentric or patchy) gersdorffite aggregates up to 20 μm occur in realgar, stibnite and quartz. They often show an anomalous composition with strong As-enrichment and S-depletion and a clear negative correlation between As and S. Only minor Co and Fe contents were measured. Patchy small areas in some aggregates are strongly enriched in Sb, representing As-rich ullmannite.

The previously unrecognised occurrence of several Ni(-As) minerals (apart from already reported Ni-bearing pyrite and vaesite, both also observed in our studies), adds another, albeit small, toxic component to the environmental pollution.

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