

Paper Number: 2855

Elongated mineral particles in iron and gold mines? An exploratory study from Quebec, Canada

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The recent demonstration that workers exposed to elongated mineral particles (EMPs) of the amphibole group (tremolite, actinolite, grunerite, anthophyllite, crocidolite, riebeckite) in iron (and possibly gold mines) in the USA had a higher risk of mesothelioma, prompted us to assess the presence of such particles in iron and gold mines of Quebec, Canada. Our exploratory study consisted of three phases. The first was to review the literature to compare and contrast the geological characteristics of iron and gold mines for which health problems have been reported in the USA with that of Quebec's. This review also helped us target lithological units surrounding iron and gold mines that contain one of the problematic amphibole and to select the individual mines from which we requested specimens. The second phase was to conduct a systematic petrographic (macro- and microscopic) study of the obtained specimens and of samples of our collections consisting of specimens from eight mines (seven that are now closed, one in operation; seven gold and one iron mines). The third was to precisely identify the mineral species of the various solid-solutions (e.g. tremolite-actinolite) and collect geometric information with a scanning electron microprobe. Our literature review indicated that tremolite, actinolite and \pm anthophyllite, and that grunerite and \pm anthophyllite are expected minerals in host rocks of gold and iron mines, respectively. Our petrographic study confirmed these expectations by revealing the presence of amphibole-EMPs in lithological units surrounding several iron and gold mines (both closed and in operation). The industry should thus be aware of the potential presence of amphibole-EMPs on their sites and conduct tests to ascertain that their workers are not exposed to airborne particles

