American Mineralogist, Volume 94, pages 1063–1066, 2009

Letter

Mineralogy of mine waste at the Vermont Asbestos Group mine, Belvidere Mountain, Vermont

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Abstract

Samples from the surfaces of waste piles at the Vermont Asbestos Group mine in northern Vermont were studied to determine their mineralogy, particularly the presence and morphology of amphiboles. Analyses included powder X-ray diffraction (XRD), optical microscopy, scanning electron microscopy (SEM), electron probe microanalysis (EPMA), and Raman spectroscopy. Minerals identified by XRD were serpentine-group minerals, magnetite, chlorite, quartz, olivine, pyroxene, and brucite; locally, mica and carbonates were also present. Raman spectroscopy distinguished antigorite and chrysotile, which could not be differentiated using XRD. Long-count, short-range XRD scans of the (110) amphibole peak showed trace amounts of amphibole in most samples. Examination of amphiboles in tailings by optical microscopy, SEM, and EPMA revealed non-fibrous amphiboles compositionally classified as edenite, magnesiohornblende, magnesiokatophorite, and pargasite. No fibrous amphibole was found in the tailings, although fibrous tremolite was identified in a sample of host rock. Knowledge of the mineralogy at the site may lead to better understanding of potential implications for human health and aid in designing a remediation plan.

Keywords: Asbestos, chrysotile, amphibole, mine waste, Raman spectroscopy