

## **The Composition and Morphology of Amphiboles from the Rainy Creek Complex, Near Libby, Montana**

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### **ABSTRACT**

Thirty samples of amphibole-rich rock from the largest mined vermiculite deposit in the world in the Rainy Creek alkaline-ultramafic complex near Libby, Montana, were collected and analyzed. The amphibole-rich rock is the suspected cause of an abnormally high number of asbestos-related diseases reported in the residents of Libby, and in former mine and mill workers. The amphibole-rich samples were analyzed to determine composition and morphology of both fibrous and non-fibrous amphiboles. Sampling was carried out across the accessible portions of the deposit to obtain as complete a representation of the distribution of amphibole types as possible. The range of amphibole compositions, determined from electron probe microanalysis and X-ray diffraction analysis, indicates the presence of winchite, richterite, tremolite, and magnesioriebeckite. The amphiboles from Vermiculite Mountain show nearly complete solid solution between these end-member compositions. Magnesio-arfvedsonite and edenite may also be present in low abundance. An evaluation of the textural characteristics of the amphiboles shows the material to include a complete range of morphologies from prismatic crystals to asbestiform fibers. The morphology of the majority of the material is intermediate between these two varieties. All of the amphiboles, with the possible exception of magnesioriebeckite, can occur in fibrous or asbestiform habit. The Vermiculite Mountain amphiboles, even when originally present as massive material, can produce abundant, extremely fine fibers by gentle abrasion or crushing.