Title: Characterization of Libby, MT amphibole (LA) elongated particles for toxicology studies: Field Collection, sample preparation, dose characterization, and particle counting methods using SEM/EDS

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Since 1999, the US EPA and USGS have been studying the chemistry, mineralogy, and morphology of the amphiboles from the Rainy Creek Complex of Libby, MT (LA), following an increased incidence of lung and pleural diseases. LA material collected in 2000 (LA2000) was described in Meeker, et.al., 2003. Concurrently with the development of the Libby Action Plan, which provides guidance for continuing operations for the Libby Superfund project, in vitro and in vivo toxicological studies were conducted on rats. Additional material to support these studies was collected from the mine site and characterized by XRD, ICP-AES and -MS, EPMA, and SEM/EDS in 2007. A mixture of 3 samples collected in 2007 (LA2007) was determined to contain similar amphibole mineral compositions to that of LA2000. Both LA2000 and LA2007 materials were water elutriated to provide rat-respirable size fractions for exposures. Fibrosity, length, width, aspect ration, morphology, and mineralogy of over 1000 particles of the elutriated LA2000 material were recorded. In addition, each amphibole particle was characterized as containing Na, K, or both in an effort to quickly bin the amphiboles based on mineralogy. These findings were compared to the same data collected (minus Na, K) for an RTI Amosite, which was also elutriated and analyzed using the same methods. Counting rules and data collection methods may be helpful to additional researchers interested in the mineralogy and/or toxicological properties of respirable amphibole particles. Information on chemistry, mineralogy, and morphology of amphibole particles could help elucidate the most appropriate parameters for expressing dose, assist with correlation of adverse health effects, investigate the toxicological dose-response relationship, and eventually inform field collection techniques and analytical methodology.