Mineralogical and Geochemical Characterization of Particulate Matter

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Routine analysis of high volume air filters (Hivol) is important for monitoring levels of dust created at mining operations and maintaining compliance of regulatory standards. Conventional methods of analysis, such as chemical assay, are unable to rigorously differentiate between phases containing the same elements and may result in ambiguity when identifying sources of dust. Quantitative Evaluation of Materials by Scanning Electron Microscope (QEMSCAN) has been used to successfully characterize particulate matter in PM_{10} (particulate matter <10μm) hivol air samples collected near several Glencore Ni operations. Analysis of bulk materials that are regularly handled at the operations provides a direct comparison between the particulate matter and the source materials. Speciation of phases and an apportionment of Ni contributed from each source can be calculated based on this information. When used in combination with the corresponding PM_{10} data, geochemical and isotope characterization (e.g. S, and Pb) of source materials and particulate matter offers potential to further speciate Ni within the $PM_{2.5}$ (Particulate Matter <2.5 μm) fraction of dust. The results of the analysis have assisted personnel in developing strategies to limit the dust reaching communities that border Glencore operations.