

Study of Tellurides and Their Formation in the VMS Deposits of Matagami, QC, Canada

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Tellurides and their formation in volcanogenic massive sulfide (VMS) deposits are not well understood and little research has been done on them. In this study we examined massive and semi-massive ore samples from the Perseverance and McLeod mine, two zinc-rich VMS deposits in the Matagami mining camp in the Abitibi Greenstone Belt (Quebec, Canada). VMS deposits are known to contain trace tellurides, however, the Matagami region seems to have a higher concentration of these minerals than typical VMS deposits. This project investigates the modal and compositional variations of the tellurides in the Perseverance and McLeod mines and how they relate to associated base metal sulfides (pyrite, sphalerite, pyrrhotite and chalcopyrite) and magnetite. Detailed petrography of twenty drill core samples was performed and tellurides were identified in thirteen of them, eleven of which are from Perseverance. There is a much higher abundance and variety of tellurides at Perseverance than McLeod. Investigations with a Scanning Electron Microscope (SEM) revealed that the most common telluride at Perseverance was altaite [PbTe], followed by rare hessite [Ag₂Te], mattagamite [CoTe₂] and frobergite [FeTe₂]. One sample from McLeod contained trace tellurobismuthite [Bi₂Te₃]. The tellurides occur as small blebs and composite grains in all sulfide assemblages but also in magnetite. The mineral compositions and abundances will be compared to the whole rock budget of tellurium (Te) to assess how much of it is bound in tellurides and how much occurs as a trace element in sulfides, such as pyrite. Using this information we can try to predict the equilibrium mineral assemblages by using existing fugacity diagrams, and hope to shed some light on the origin of the tellurides.