

The hydrothermal activity and host rock alteration of 2.7Ga VMS deposit in Potter mine, Abitibi greenstone belt.

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Volcanogenic massive sulfide (VMS) deposits are formed near the seafloor, where high temperature fluid in hydrothermal system contacts with seawater. Potter Mine, in Abitibi greenstone belt, is the one where sulfides were mined from a VMS deposit. A thin komatiite (lower komatiitic unit) underlays the ore deposit's host rock, mostly hyaloclastite or lappilli stones from tholeiitic basalt. Black shales are often interbedded in those hyaloclastite. Ores are found as disseminated sulfides and/or sulfide veins in hyaloclastite or sediments. Stratified ores are also seen. Those are overlain by upper komatiite sequence. The feature of host rock, its mineralization near the deposit and origin of organic matter associated with ores are still unknown, since no research related to the host rocks mineral and organic carbon has been performed. In this report, the chemical composition measurement of host rock minerals and organic carbon analysis at the drill core samples near the sulfide deposit were performed. By surface geological survey, the evidence of hydrothermal altered komatiite (lower komatiitic unit) was not found in Potter mine. On the other hand, serpentinization of upper komatiite was significant just above ore location. This may suggest continuous hydrothermal activities from ore deposition age to post-ore deposition age. But there is no evidence that if lower komatiite was involved in hydrothermal circulation. The result suggests that ores were composed of chalcopyrite, sphalerite and pyrrhotite mainly. Pyrrhotite and sphalerite were precipitated in non-equilibrium condition. Hyaloclastite and black shales contain different altered minerals; talc is more abundant in hyaloclastite and black shale contains more Fe-rich chlorite. Carbon isotope compositions of organic matter suggest a methanotrophic biological activity during the sulfide mineralization, in addition to thermogenic degradation of organic matter. In addition to these results, evidence of carbonate mineralization accompanied with hydrothermal activity was observed in some samples, which indicates the rise in pH. Thus, This mineralization feature should be difference between Potter mine and other VMS deposits.

Keywords: volcanogenic massive sulfide deposits, Abitibi greenstone Belt, komatiite, methanotroph, hydrothermal alteration