

# Volcanology and geochemistry study of mafic to intermediate volcanic rocks of the Blake River Group between lakes McDiarmid and Hébécourt, Abitibi Subprovince

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## Abstract

The volcanic sequence that makes up the Hébécourt Formation is stratigraphically positioned in the lower part of the Blake River Group. It mainly consists, on a regional scale, of submarine tholeiitic basalts with thin bands of rhyolite. This unit has been relatively underexplored until now for base metals, compared with other parts of the Blake River Group. The study area, located between lakes McDiarmid and Hébécourt, is considered favourable for volcanogenic massive sulphide exploration, as it encompasses: 1) a high concentration of felsic volcanic rocks relative to the rest of the Hébécourt Formation; 2) proximal volcanic facies and possibly synvolcanic faults; 3) Zn-Cu drill intercepts and hydrothermal alteration zones; and 4) sulphide-rich laminated volcano-sedimentary horizons. In addition, recent U-Pb geochronology data indicate that felsic rocks of the Hébécourt Formation within the study area are the same age as the host rocks of the major Horne and Quemont ore deposits located near Rouyn-Noranda.

The Master's project underway at INRS aims to clarify the stratigraphy, geochemistry, and physical volcanology of volcanic rocks in this area, in order to locate effusive centres and synvolcanic faults that may be present. Links are established between these important structures and alteration, known mineral occurrences, and a study of sulphide-rich laminated horizons, to achieve a better characterization of the hydrothermal system. Over the past two field seasons, most outcrops in the study area were visited and twelve of the most recent drill holes were described in detail.

Within the study area, the Hébécourt Formation comprises five tholeiitic volcanic units: three have mafic to intermediate compositions (Aht1, Aht2 and Aht5) and two are felsic (Aht4 and Aht6). Unit Aht1 is the most abundant and consists of massive to pillowed basalts. Unit Aht2 is represented by variolitic basaltic andesites intercalated with rocks of the previous unit. Units Aht1 and Aht2 are interpreted as representing a lava plain. They are overlain by rhyolitic unit Aht4, which has a true thickness of about 495 m. This rhyolite varies from massive to brecciated and hosts Zn-Cu occurrences in its eastern part. It is partially overlain by a variolitic basaltic andesite unit (Aht5) reaching 210 m in stratigraphic thickness. Facies variations observed on outcrops and in four drill holes that cross the entire unit suggest the unit's effusive centre is located in the eastern part, to the south of mineral occurrences hosted in the stratigraphically underlying rhyolite (Aht4). Finally, another thinner and less extensive rhyolite unit (Aht6) constitutes the top of the Hébécourt Formation, which is overlain by the Renault-Dufresnoy Formation. This preliminary report mainly describes the volcanology and geochemistry of mafic to intermediate volcanic rocks within the study area.

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