Metallogeny of the Jacquet River area, northern New Brunswick

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Post-Acadian (Lower Devonian) extensional tectonics resulted in the development of a large half-graben structure infilled by sedimentary and mafic to felsic volcanic and volcanoclastic rocks. The basement to the graben is floored by folded Silurian (and locally) Ordovician metasedimentary rocks. The volcanic rocks were brought to the surface along extensional fractures in proximity to the main graben fault zones. Small felsic domes (flows and agglomerates) were extruded into a subaerial to very shallow marine environment along these graben structures. Mafic volcanism produced extensive flows and tuffs capping the rhyolite domes and filling the floor of the half-graben structure. The mafic flows interfinger with overlying calcareous shales and limestones and are succeeded in turn by a second generation of felsic volcanism.

The half-graben structure is bordered by several reverse faults in the western part of the half-graben and a number of extensional fractures developed to the east in proximity to a monoclinal fold (down-warp) along the hinge zone of the half-graben. These contrasting structures are reflected in differing styles of base-metal mineralization across the half-graben.

Base-metal-bearing fluids appear to have been introduced during the late stages of the first period of felsic volcanism. Along the western margin of the half-graben, epithermal base-metal sulphides (primarily Pb, Zn, Ag, and minor Cu) occur within quartz-carbonate vein-stockworks and breccia (agglomerate) matrices. Minor banded, massive lenses of sulphides in the agglomerates and tuffs indicate that the metalliferous brines reached surface. The banded sulphides were preserved from rapid oxidation by a quick capping of mafic volcanic flows. Along the eastern margin of the half-graben, metalliferous brines permeated the hinge zone of the half-graben along the extensional fractures developed during the down-warping. Minor contemporaneous felsic and mafic dykes are also associated with this zone. Base metals occur in wide extensional quartz veins and in stratabound skarn (manto) deposits where fluids and dykes have intersected Silurian limestones. Continuing epithermal activity during the extrusion of the mafic volcanic rocks produced minor mineralization and alteration (e.g., celadonite) within the mafic flows. A second minor epithermal event at the end of the mafic volcanism resulted in deposition of Cu-Ba-bearing veins in the mafic flows and Cu disseminations and veinlets within the uppermost flow-top breccias and intercalated sedimentary rocks.