

# Stratigraphy of the Proterozoic Revett Formation and Its Control on Ag-Pb-Zn Vein Mineralization in the Coeur d'Alene District, Idaho

JEFFREY L. MAUK<sup>†</sup>

*Geology Department, University of Auckland, Private Bag 92019, Auckland, New Zealand*

AND BRIAN G. WHITE

*National Institute for Occupational Safety and Health (NIOSH), Spokane Research Laboratory,  
E. 315 Montgomery Avenue, Spokane, Washington 99207*

## Abstract

The Proterozoic Revett Formation hosts most of the mesothermal Ag-Pb-Zn vein ore in the Coeur d'Alene district of northern Idaho. Although it had long been recognized that stratigraphy plays a fundamental role in determining where veins produce ore, the stratigraphy of the Revett Formation and its relationships to veins remained poorly known for most of the first 100 yr of mining in this district.

In northern Idaho and western Montana, the Revett Formation contains informal lower, middle, and upper members. In the Coeur d'Alene district, most ore production south of the regionally significant Osburn fault came from the upper Revett Formation, and north of the fault, most production came from the upper and lower Revett Formation. Where vein structures intersect favorable strata, the veins contain rich ore; where vein structures cross unfavorable strata, they are poorly mineralized or barren. Quartzite is the most favorable host rock for base metal veins, and silicified blocky siltite is the most favorable host rock for silver veins. Both rock types are abundant in the Revett Formation, which accounts for the disproportionately large production from this unit. In the western portion of the Belt Supergroup, ore deposit types correlate with regional-scale thickness changes in the Revett Formation: sediment-hosted stratiform copper mineralization occurs in thin Revett Formation, whereas Coeur d'Alene veins occur in thick Revett Formation. Base metal veins in the Coeur d'Alene district occur in relatively thick, chemically reduced, relatively coarse grained Revett Formation, whereas silver veins occur in, or marginal to, areas with less thick, locally oxidized, relatively fine grained Revett Formation, demonstrating that district-scale metal zonation correlates with district-scale facies and thickness changes.

The upper, middle, and lower Revett Formation thicken considerably southward across the Osburn fault, with the upper Revett showing over an order of magnitude thickness increase. Changes in thickness of the Revett Formation across the Osburn fault reflect a major, down-to-the-south, crustal-scale fault that was active during sedimentation and was periodically reactivated during the structural and metallogenic history of the district. We suggest that this fault and changes in stratigraphic thickness helped control fluid flow within and beyond the Coeur d'Alene district during mineralization events. Stratigraphic thickness and facies changes in the Revett Formation are greatest and most abrupt in the Coeur d'Alene district, indicating that this area was structurally complex during sedimentation. Presumably, this early structural complexity also enhanced subsequent Ag-Pb-Zn mesothermal vein formation.

<sup>†</sup> Corresponding author: e-mail, J.Mauk@auckland.ac.nz