

CEMENTATION, HYDROTHERMAL ALTERATION, AND Zn-Pb MINERALIZATION OF
CARBONATE BRECCIAS IN THE IRISH MIDLANDS:
TEXTURAL EVIDENCE FROM THE COOLEEN ZONE, NEAR SILVERMINES, COUNTY TIPPERARY

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Abstract

The main host rocks for Zn-Pb mineralization in the southern Irish Midlands are black dolomite matrix breccias that occur within the Mississippian Waulsortian Limestone Formation. Despite the significance of these breccias, their origin is poorly understood, and their genetic relationship to economic mineralization is uncertain. Detailed studies of black dolomite matrix breccias have been carried out in the Cooleen zone, a subeconomic satellite of the Silvermines deposit, County Tipperary. The Cooleen zone is only weakly mineralized, preserving early cementation and alteration phases that elsewhere were destroyed during ore formation. Observations at Cooleen indicate that the breccias formed initially as limestone debris-flow slump deposits in response to fault movement. Reworked clasts of sulfide and dolomitized limestone in the breccias indicate that mineralization and dolomitization processes were active at shallow burial depths. Hydrothermal fluids exploiting fault conduits preferentially dolomitized relatively permeable breccia units, resulting in the visual enhancement of breccia textures via in-situ dissolution and replacement. These dolomitized breccias form the primary host rock for later replacive massive sulfide. White dolomite and calcite stockwork veins postdate the limestone and dolomite breccias and may be partly synchronous with the massive sulfide. Breccia deposits in the Cooleen zone had a positive relief on the sea floor and the lack of a topographic trap for H₂S-rich brines may be the primary reason why the mineralization is subeconomic. Fault activity waned before the deposition of supra-Waulsortian lithologies. This, together with the lack of hydrothermal alteration in the upper Waulsortian, suggests that the mineralizing event within the Cooleen zone terminated before the deposition of the Waulsortian Limestone was complete. Dolomitization and sulfide precipitation formed part of a diachronous, prograding mineralizing system and we suggest that mineralization is early diagenetic, forming in the late Courceyan, ~352 to 355 Ma.