

# GEOCHEMISTRY AND ORIGINS OF MISSISSIPPI VALLEY TYPE MINERALIZING FLUIDS OF THE OZARK PLATEAU

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## ABSTRACT

The compositions of fluid inclusions hosted in ore and gangue minerals from Mississippi Valley-type (MVT) Pb-Zn-Ba deposits of the Ozark Plateau region were measured to develop a regional hydro-geochemical conceptual model for ore emplacement. This model may explain the diverse compositions of fluids involved in mineral precipitation, the ore precipitation mechanism, and the temporal change in composition of fluids invading the ore districts. The conceptual model additionally provides evidence for what factors may have controlled deposit size, stratigraphic location, and Zn/Pb ratio.

Available evidence indicates that sulfide mineral precipitation in the Ozark Plateau MVT districts most likely occurred primarily as a result of the introduction of sulfide into a Pb- and Zn-rich ore fluid. The lack of continuity in high Pb concentrations in fluid inclusions in sulfide and nonsulfide minerals from across the mineral parageneses suggests that the ore fluids either entered the districts intermittently or had variable metal contents over time.

Reaction path and binary mixing models were developed to investigate possible evolutionary histories that could produce a fluid with a composition similar to the average composition of Ozark MVT ore fluids. The reaction path models considered reaction between evaporatively concentrated seawater and granite. These models demonstrated no modern or ancient evaporatively concentrated seawater reacting with granite can fully produce observed Ozark MVT fluid compositions. Binary mixing models considered mixing between evaporatively concentrated seawater and a halite dissolution brine. To produce the average composition of Ozark MVT ore fluids through mixing, the halite dissolution brine must have had a salinity close to that of Ozark MVT fluids, have been Na- dominant, and had low Cl/Br ratios.