

Clay A. Wilcox, III, University Of Kentucky, David C. Harris, and James A. Drahozal, Kentucky Geological Survey, University Of Kentucky

Origin and Geochemistry of Hydrothermal Dolostone Bodies in Central Kentucky

Isolated dolostone bodies in Upper and Middle Ordovician limestone strata of central Kentucky are analogs for subsurface Trenton-Black River dolostone reservoirs in the Appalachian basin. They are composed of coarsely crystalline and saddle-shaped dolomite, are spatially related to mapped faults, and are interpreted as products of hydrothermal fluids. Although 33 separate dolostone bodies are identified in central Kentucky, sample collection and mapping for this study was limited to two localities. Transmitted light and cathodoluminescent petrography reveal at least three types of dolomite. Dolomite I is euhedral to subhedral, rhombohedral-shaped, nonferroan, luminescent, and appears to replace fine grained matrix and grains. In contrast, dolomite II is anhedral, ferroan, nonluminescent, and appears to replace calcite cement and grains. Although not present in every sample, dolomite III is ferroan, saddle-shaped, nonluminescent, and precipitated in fractures and vugs. Cathodoluminescence has also revealed a relative diagenetic sequence for the dolomite. Dolomite I is believed to be the first generation. Since dolomite II and III are nonluminescent, a relative timing is uncertain. In limited samples, late-stage, zoned, calcite is present and thought to be the latest diagenetic event, as evidenced by cross-cutting relationships and luminescent patterns. Electron microprobe analysis of dolomite crystals is ongoing to quantify strontium, calcium, manganese, magnesium, and iron concentrations. Dolomite II and III contain a relative abundance of iron, whereas dolomite I has significantly lesser amounts. None of the dolomites have significant amounts of manganese or strontium. Elemental counts for late-stage calcite are variable with respect to iron and manganese and could explain the multiple zones seen in the late-stage calcite.