MVT minerals of the Midwestern United States

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Mississippi Valley-Type (MVT) Deposits

What are MVT deposits? They are mineral deposits with common characteristics that were first recognized as such in the United States. Midwestern MVT deposits are hosted in shallow-water carbonate rocks of Paleozoic age, mostly in dolomitized areas; each mining district is located on a geological dome or arch where mineralization is typically confined to certain stratigraphic rock units. The host rocks of MVT deposits contain fresh formation water, whereas saline waters are present in adjacent basins. The mineralogy is simple, consisting of sphalerite, galena, fluorite and barite with quartz and carbonates, such as calcite, plus traces of asphaltic material. Deposition took place in open spaces at low (100°-200° C) temperature. Geologists have now classified other deposits and mining districts in other parts of the world as belonging to this type.

MVT deposits in the midwestern United States have long been the source of many fine crystallized calcite specimens. Other minerals common to these deposits are galena, sphalerite, fluorite and barite and minor amounts of chalcopyrite, pyrite, marcasite and quartz. The association of sphalerite or galena produces a preservative environment, because when these two sulfide minerals oxidize, they form sulfates without production of sulfuric acid (Eriksson, 1995). However, when iron sulfides predominate, post-mining oxidation may damage calcite and other minerals.

There are five classic MVT locations in the midcontinent region of the United States.

Upper Mississippi Valley Zinc-Lead District

This formerly important district is located in the southwestern corner of Wisconsin, and extends to Galena, Illinois, and Dubuque, Iowa. Operations for lead were recorded from as early as 1658, and a map from 1687 shows lead mines near the town of Galena. This district has the longest recorded production history of any mining area in the United States (Lasmanis, 1989). Following a decline in lead production, a zinc mining boom began, peaking in 1916 because of World War I demand. During the life of the district, more than 280 mines were developed in orebodies located in limestones of Middle Ordovician age; most were in shallow deposits. By 1979 the last remaining mine at Shullsburg, Wisconsin was closed and allowed to flood.

Many beautiful carbonate and sulfide crystal groups were recovered from these mines, but unfortunately matrix specimens from the district are difficult to preserve because over time the associated marcasite breaks down, releasing sulfuric acid.

Illinois-Kentucky Fluorspar Districts

The MVT deposits located in southern Illinois and northwestern Kentucky have been one of the most important sources for fluorine and minor amounts of lead, zinc and barium. It has been reported that as early as 1819 galena was mined near Cave in Rock, Illinois, and in 1875 former President Andrew Jackson began mining galena across the Ohio River in Kentucky (Lasmanis, 1989). The early development of lead mining in the Rosiclare district led to the discovery of large vein systems that later became the nation's major source for fluorite.

Mineralization is localized in stratiform orebodies and in veins, or fissure fillings, of faults that cut through the Mississippian-age limestones in the Rosiclare district, the Cave in Rock district and

the adjacent Harris Creek district. The primary ore is fluorspar. In this deposit world-class fluorite crystals occur in association with beautiful carbonate, sulfide and sulfate minerals.

Alas, in 1998 for economic reasons, the mines were closed with millions of tons of proven ore in reserve. The shafts have been capped and structures removed; it is unlikely that these mines will open again in my lifetime.

Tri-State District

This district is named for its location at the junction of three states. In Missouri, the district contains the Granby, Joplin and Webb City fields. The extensive Picher field is located in Oklahoma and Kansas. Mining began in 1848, and in the mid-1860s during the U.S. Civil War period, both Union and Confederate armies mined the deposits for lead. Zinc mining began at Granby in 1870, and production peaked in 1916 during World War I. In 1957 all operations were closed. Specimen collecting continued for years thereafter, until water reached even the highest mine levels.

Nearly all the ore deposits were localized in limestones of Mississippian age that were heavily faulted and altered by dolomitization and by the introduction of silica, which formed chert. The openings in which mineralization took place were enormous in size, and it was not uncommon to find simple scalenohedra of calcite more than a meter in length. Although nearly every museum and many private collections contain specimens of galena, dolomite and calcite from this district, most of the crystals have been affected by corrosive fluids and, in later years, by the oxidation of iron sulfides.

Viburnum Trend District

The largest MVT mining districts in the world are in southeastern Missouri, where the Old Lead Belt district near Bonne Terre was exploited as early as 1719 from near-surface galena deposits, followed by development of underground workings in 1864. By 1945 reserves in this mining district were seriously depleted, and the last operation was closed in 1972. Open space within the rock was limited, and few specimens of note were preserved.

In 1955, to the west of the Old Lead Belt district and on the other side of the Ozark Dome, a blind drilling program in the Viburnum area resulted in the discovery of the northern extent of the Viburnum Trend district. Soon thereafter, at a place called Sweetwater, the southern end of the district was located, more than 50 miles away. The huge ore deposits of this district are located in dolomites and limestones of Upper Cretaceous age. Mineralization is concentrated in reef complexes and collapse breccias; the best crystals are found in the open-space fillings in breccia zones. Unlike the Old Lead Belt deposits, every mine in the Viburnum Trend has encountered zones where minerals have space to crystallize (Lasmanis, 1989). Viburnum Trend mines have produced world-class lustrous, twinned galena crystals and beautiful calcite crystals, some of which are twinned. Barite, fluorite, sphalerite and iron sulfides occur in minor quantities in this district.

Central Tennessee District

This district is located east of Nashville in Smith County, Tennessee, and extends to the northeast and southwest along the axis of the Cincinnati Arch. At the surface, more than thirty shallow prospects are known from the time of early settlement (Lasmanis, 1989). In 1967, a drilling program near Elmwood discovered the orebody in a dolomite of Middle Ordovician age.

Mineralization in this district is localized in collapse breccias related to the paleokarst surface of the dolomite. In open spaces within the breccia, the principle ore mineral, sphalerite, crystallizes with fluorite, barite and stunning transparent to golden-orange scalenohedra of

calcite. Calcite crystals to 50 cm in length are known, although most average 20 to 25 cm. These superb crystals are often twinned on {0001} and could be the best from any mining district in the world.

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