The Golconda Mine Orebody

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Golconda Mine lies a kilometre north of the village of Carsington, and 2 km east of Brassington. Although very little is known about the early history of the mine, there are various names and dates left by the miners of long ago. One, very prominent in a post-mineralisation cavern reached through the mine, reads "I. Rawlinson, September 29, 1796".

Golconda closed in 1913, when it is recorded that only two men were working undergound (Burt et al, 1981). It was then reopened in 1915 by the Hopton Mining Company to extract baryte, with galena as a insignificant by-product. It is estimated that during the following 30 years more than 75,000 tonnes of baryte were produced.

Country rock at Golconda is the Carboniferous limestone, but this has been subjected to dolomitization that cuts through the horizontal stratigraphy, by as much as 35 metres. Some of the ore zones follow this, which gave rise to winch-hauled inclines throughout the mine. Within the dolomitized limestone the beds are, in places, separated by green clay wayboards; these are thought to be have been formed by volcanic dust, and are generally 40-200 mm thick. Orebodies have also developed on the upper surfaces of some of the wayboards. Silica sands have been washed down fissures into the cavernous limestone; of possible Tertiary age, these are mainly composed of material derived from a former Triassic cover and are now preserved as Pocket Deposits in surface solution hollows, some as much as 58 metres deep (Yorke, 1954).

Aurichalcite and hemimorphite, 50 mm high.

Photographs on the back cover

Upper left: Cluster of secondary acicular baryte crystals about 20 mm long.

Upper right: Hemimorphite crystals encrusting nodular baryte; 110 mm across.

Middle left: Scalenohedron of calcite 30 mm long, on baryte.

Middle right: Botryoidal form of aurichalcite, 50 mm across.

Lower left: Crystals of hemimorphite and cerussite encrusting galena, 60 mm across.

Lower right: Octahedral crystals of galena with a patina of iron oxides, 80 mm across.

Eight categories of mineral associations have been recognised within the Golconda orebodies (Ford and King, 1965):

1. Undisturbed Layered Ores are horizontal alternating layers of barite, galena, dolomite sand and crystalline calcite. Some of these exhibit ten layers within 150 mm, between a green clay below and a dolomite roof.

2. Cavity Linings are common and consist of barite 25-50 mm thick, locally carrying small galena values.

3. Collapsed Cavity Linings are common, especially in the deep 70 Fathom (126 m) levels. Excessively thick and heavy baryte cavity linings have fallen from the roof and walls into the cavities, where they have been cemented by a later deposit of calcite.

4. Late Cavity Linings. Any spaces left between the top of the collapses and the roof of the cavity have been infilled with a final deposition of large calcite scalenohedron crystals.

5. Vertical Scrins. Only one scrin has been seen cutting through a fill of detrital baryte fragments within limonite-cemented sand layers within a solution cavity; it continues into the unaltered limestone below, indicating a mechanism of solution and infill that was a continuous process. There are several scrin-type features that are mineralised joints in the roof of the cavities, but these only extend upwards into the dolomite.

6. Metasomatic Replacement of the dolomite by baryte is uncertain. It is now thought that the baryte has infilled small cavities in the dolomite that were caused by the disaggregation of the limestone, thereby giving a false appearance of metasomatism.

7. Secondary Oxidation Products are numerous and very complex.

8. Placer Deposits occur in post-mineralization solution cavities, many of which are filled with sand that has migrated down from the overlying Tertiary Pocket Deposits. These sand fills locally carry small amounts of galena, although some sites have yielded large blocks of galena, one of which weighed nearly 70 kg (Ford and King, 1965).

It is postulated that mineral emplacement was by precipitation from downward or laterally migrating solutions, and, although the original sulphides are syngenetic, the orebodies are better classified as epigenetic (Ford and King, 1965).

The Secondary Minerals

The primary galena crystallised in the octahedral and cubo-octahedral forms. It is usually encrusted with the oxidation products of the zinc sulphide, sphalerite, which has been completely oxidised, and is not seen anywhere in the orebody. The surfaces of the galena crystals commonly exhibit a patina of orange-brown iron oxide that is a result of the oxidation of the iron component within the sphalerite. The lead carbonate and sulphate, cerussite and anglesite, are relatively rare oxidation minerals, although cerussite pseudomorphs after anglesite crystals have been recorded (Ford and Jones 2007).

Zinc is now only represented by its silicate and carbonate, hemimorphite and smithsonite. Hemimorphite is the dominant secondary mineral within the orebody; groups of sheaf-life crystals form drusy surfaces in cavities, and locally form botryoidal surfaces. Colour varies from highly lustrous transparent crystals, through to yellow, green and dark brown. Smithsonite forms small botryoidal, pale green crusts coating galena crystals; it is a rare mineral in the orebody, usually seen only within an undisturbed layered ore sequence.

Aurichalcite, a carbonate-hydroxide of zinc and copper, is locally common in areas of the mine where small deposits of the copper sulphide, chalcopyrite, are seen in a partially oxidised state. Commonly the colour varies from pale to dark green, in crusts with a velvety texture. It also occurs as delicate acicular crystals forming tufts of feathery incrustations. A mammilary form, pale blue with a pearly texture, has been found in the area known to the miners as “Bonsall Man’s Roof”. In the same area a small quantity of secondary baryte occurs, forming as white ribbons down the mine walls, and locally coating sand grains in shallow water on the floors to form cave pearls.

References

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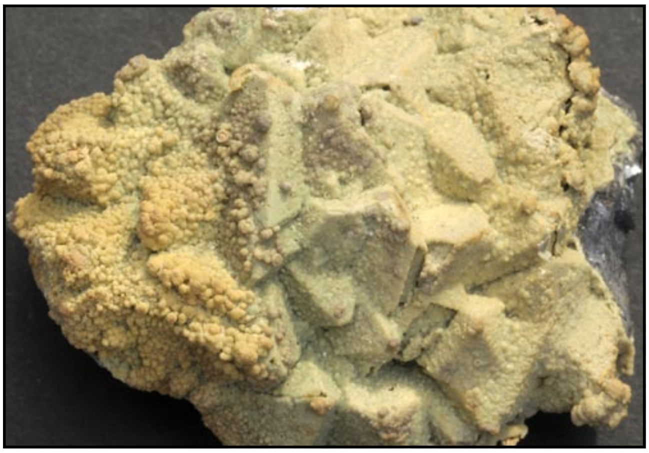

Very pale green smithsonite encrusting galena crystals, 50 mm across.

Fine crystals of hemimorphite overlying the patina of iron oxide, derived from original sphalerite, that coats larger crystals of galena, forming a block 100 mm across.

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