Pool Park and South Minera Mines

[SJ 249 506], [SJ 253 501]

Introduction

These two closely adjacent sets of workings provide the opportunity to study mineralization in the southern part, or Minera Block, of the North-east Wales Orefield (Figure 5.74). Mineralization in this district differs significantly from that of the Halkyn Block (see Halkyn Mountain GCR site report, this chapter) in that quartz is a major gangue phase, accompanying, in large amounts, the more typical calcite. The textural and mineralogical resemblance of the mineralization to that in various Lower Palaeozoic-hosted lead-zinc orefields around Wales and the Welsh Borderland is a striking feature, and suggests that there may be strong genetic links, both in terms of the timing of the mineralization, as well as mode of emplacement.

Minera was formerly one of the most intensively mined districts of Wales. However, as in other old mining districts, many of the features seen on contemporary photographs have now disappeared. Reclamation works have removed a substantial amount of the mining waste at Minera itself, and many of the tips have been grassed over and planted with trees. The whole Minera district is still, however, of interest to the industrial archaeologist, and much excavation and restoration has been undertaken, including the conversion of the area around Meadow Shaft into a mining museum.

During the last four decades much underground exploration has taken place at Minera, both in the old mines themselves and in the cave systems, many of which were intersected during mining operations (Appleton, 1995). The range of passage forms, flowstone and dripstone formations and other features have led to the cave systems being given SSSI status. However, in view of current circumstances, the surface interest at Minera lies not in the main area, but to the south, on the high moorlands of Esclusham Mountain, which are crossed by a narrow mountain road from Minera to Llangollen. Here, extensive unvegetated mine tips remain essentially undisturbed, and vein material, strongly representative of the district as a whole and often in a fresh and unweathered state, occurs in great abundance.

Although there is evidence of Roman lead-mining elsewhere in north-east Wales, in the Minera district the first documented information dates from Medieval times. The Esclusham Mountain workings described here appear to be a relatively recent development; detailed production figures commence in 1860 (Burt *et al.,* 1992) and indicate that these mines were worked from that time through to the close of the 19th century.

Ore production from the South Minera and Pool Park mines was small in comparison to the Minera Mine itself, which produced, in the period between 1852 and 1913, when full records were kept, 134 630 tons of galena concentrates alone, and regularly returned over 5000 tons per year during the years 1861 to 1871 (Burt *et al.,* 1992). Minera was, however, one of the great British lead-zinc mines, comparable in status with Van Mine in central Wales, the Snainvaach Mine GCR site in southwest Shropshire, and Millclose Mine in Derbyshire. The mines on Esclusham Mountain were more typical of the area in productivity terms. South Minera produced, prior to amalgamation with Pool Park, 6 tons of galena concentrates in 1867 (yielding 30 oz of silver); between 1860 and 1874 Pool Park produced 1780 tons of galena (yielding 7276 oz of silver) and 128 tons of sphalerite. After the mines were amalgamated in 1877 they were worked as Minera Mountain until 1897, producing 301 tons of galena concentrates (yielding 1457 oz of silver) and 1098 tons of sphalerite (Burt *et al.,* 1992).

Description

The Pool Park (Figure 5.75) and South Minera mines worked two steeply dipping epigenetic fissure-veins, hosted at Pool Park entirely by limestones of the Minera Formation, of Dinantian age; and at South Minera by Minera Formation limestones, and sandstones of the overlying Cefn-y-Fedw Sandstone Formation, the latter being responsible for the relatively acidic soils that support the boggy heather moors of the uplands of Esclusham Mountain. Productive mineralization was confined to the limestones (Smith, 1921). The veins crops each other obliquely at Pool Park Mine.

The Pool Park vein trends 125° and downthrows to the south-west, while the South Minera vein trends 145° and downthrows to the north-east (Smith, 1921). This is in contrast to the veins in the remainder of the North-east Wales Orefield, where the predominant trend of the productive veins is approximately east–west (Smith, 1921).

Primary mineralization, examples of which are abundant in the mine tips, occurs as breccia cements and as crustiform-banded fissure-fills. The mineralization consists of coarse-grained, reddish sphalerite with galena, set in a matrix of 'stumpy' crystalline quartz, calcite and minor dolomite. Traces of chalcopyrite and fluorite have also been recorded from the Minera district (Smith, 1921). In paragenetic terms the mineralization is simple, with a well-defined depositional sequence. Early, clear, 'stumpy', crystalline quartz, locally associated with dolomite, coats rock fragments and partly encloses abundant euhedral, translucent, orange-red sphalerite. Later galena is also abundant, and is associated with still later abundant overgrowing calcite. This paragenesis is typical of the Minera district, from where many fine crystallized specimens of both the ore and gangue minerals are known, including a number of fine samples, collected around the turn of the century by the then Mines Inspector for North Wales, GJ. Williams, and passed to the National Museum of Wales in 1927.

Secondary minerals occur commonly, although they tend to be micro-crystalline. Smithsonite commonly forms partial, boxwork-like replacements of sphalerite crystals, and is accompanied by rarer hemimorphite. Hydrozincite stains on blocks of tip material are a conspicuous post-mining weathering product. These secondary minerals are all common throughout the Northeast Wales Orefield.

Interpretation

The Minera district is of particular interest within the overall context of the Carboniferous-hosted North-east Wales Orefield as the mineralization bears a distinct resemblance, both mineralogically and texturally, to some of the Lower Palaeozoic-hosted, late-stage mineralization worked in adjacent areas such as south-west Shropshire (Pattrick and Bowell, 1991; see Chapter 4), Central Wales (Mason, 1994, 1997; see this chapter), Llanrwst (Haggerty, 1995; Bevins and Mason, 1998), and Llangynog (Bevins and Mason, 1997).

These late-stage, Lower Palaeozoic-hosted vein assemblages are ascribed by the above authors as representatives of Variscan metallogenic processes operating on a regional scale. They have been cited by these authors variably as being either of Lower Carboniferous age, and possibly related to the episode of mineralization that resulted in the deposition of the Irish strati-form lead-zinc mineralization, or to the post-Carboniferous phase of mineralization during which the 'Pennine-type' orefields, including the North-east Wales Orefield, were formed. Importantly, certain of the late-stage Lower Palaeozoic-hosted vein assemblages have yielded Pb-Pb model isotopic ages which places them within the 'Pennine-type' orefield spread (Swainbank *et al.,* 1992). These include particular assemblages from the Central Wales Orefield, some of which are strikingly similar to the mineralization of the Minera district (see Nantiago Mine GCR site report, this chapter).

Although some of the shafts at Minera did penetrate the underlying Lower Palaeozoic strata, it appears, from available literature, that the economic mineralization died out at that interface. For example, Hall (1995) quoted an unidentified writer thus: '...when reaching the Silurian rocks, the vein closes up wedge-form, and to all appearances dies out'. The same point appears to be illustrated in mine sections in Smith (1921), where veins are shown to terminate at the base of the Carboniferous succession. Recent examination of a limited exposure of Lower Palaeozoic rocks deep underground at Minera confirmed that they contained only minor mineralization, despite being situated directly below a rich system of veins and replace$_r$ment flats.

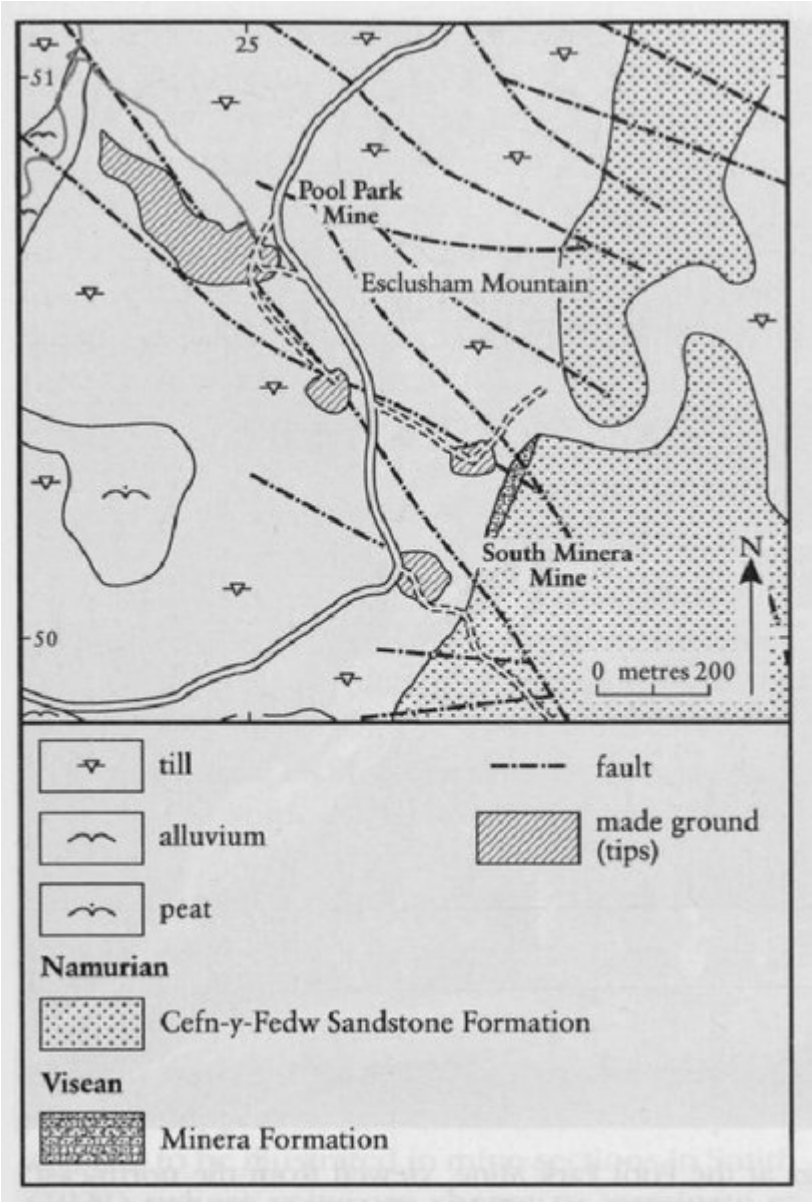
Although there thus appears to be no significant mineralization below the basal Carboniferous rocks, there are occurrences of fissure-vein mineralization in Lower Palaeozoic rocks in close proximity to the North-east Wales Orefield, of which the best example is the Pennant Mine GCR site. However, such occurrences are isolated. The most likely reasons for the relative lack of mineralization in sub-Carboniferous strata lie in the differing characteristics, in terms of geochemistry, rheology and permeability, of the Carboniferous succession compared to the underlying folded Lower Palaeozoic rocks, coupled with the greater effects of extensional tectonics on the relatively near-surface Carboniferous strata.

Some of the mineralogical features at Minera contrast strongly with those of the Halkyn Block. Fluorite and barite. frequent in the Halkyn Block, are virtually absent, with one or two very minor exceptions, at the Minera mines. In addition, dolomite is present at Minera in small but conspicuous amounts, yet has not been observed within the veins of the Halkyn Block. Finally, quartz is present at Minera, although its abundance here is not readily explained. Possibly, the Cefn-y-Fedw Sandstone Formation, which is particularly thick and markedly quartzitic in this area, contributed silica to the hydrothermal system through remobilization of detrital quartz. In the Halkyn Block, in contrast, the reverse is the case, and metasomatic quartz only locally replaces vein-wall carbonate rocks.

Conclusions

The Minera Block of the North-east Wales Orefield, typified by the Pool Park and South Minera Mines GCR site, exhibits notable mineralogical differences to the main part of the ore-field in the Halkyn Block, exemplified by the Halkyn Mountain GCR site. Mineralization at the Pool Park and South Minera Mines GCR site consists of a simple galena-sphalerite sulphide assemblage in a gangue of quartz, calcite and minor dolomite. The abundance of quartz at Minera, a relatively scarce mineral in the Halkyn Block, is a key feature, while the striking resemblance of the mineralization to that occurring in some of the Lower Palaeozoic-hosted orefields of the Welsh Caledonides is particularly notable. A detailed comparison of the mineralization at this site with that present in Lower Palaeozoic-hosted settings elsewhere in Wales is worthy of further study.

References



(Figure 5.74) Map of the Pool Park and South Minera Mines GCR site. After British Geological Survey 1:50 000 Sheet 121, Wrexham (1993b).

(Figure 5.75) Oblique aerial photograph of old workings at the Pool Park Mine, viewed from the north-east, showing old lead shafts, natural sink-holes, and a prominent leat system. (Photo: © Crown copyright: Royal Commission on the Ancient and Historical Monuments of Wales.)