Portway Gravel Pits, Derbyshire

[SK 128 812]

Introduction

The excavation at Portway Gravel Pits has exposed a chaotic blocky infill of a hollow in the Carboniferous Limestone, adjacent to a mineral vein system, which was formed as a result of the collapse of a solution cavity some distance below the surface (Figure 4.23) and (Figure 4.24).

Description

Many of the blocks within the subsidence feature show excellent examples of pipe-vein mineralization. Examination of the blocks shows that ancient cavities in the rock were lined with barite which developed in multiple layers, showing a variety of forms and colours. This form of barite consists of finely crystalline layers of varying shades of yellow and red, with the youngest layer often showing euhedral barite crystal forms. Yellow fluorite occurs interbanded with the barite, and the centres of the cavities often show large corroded calcite crystals in the form of scalenohedra. Juxtaposed with the barite blocks are blocks of quartz rock, reflecting metasomatic replacement of the limestone, and the available evidence suggests that this replacement occurred at an earlier stage than the bulk of the mineralization.

The precise age of the collapse structure is difficult to determine, but is at least partly Pleistocene in age, as loess clays, which blanket the deposit, have also penetrated downwards and form the final infill of barite-lined cavities.

The site lies on mineral veins that form part of the Dirtlow Rake system (Stevenson and Gaunt, 1971), one of the major lead-bearing veins in north Derbyshire (Figure 4.24). Galena, calcite, barite and fluorite are reported to occur here. The country rock is of the Asbian Bee Low Limestone Formation, which is characteristically composed of massive limestones with occasional coral bands (Stevenson and Gaunt, 1971).

In detail, the geology of the site is complex. Ford (1967b) described the site at a time when barite mining was active, exploiting the Old Wham Vein, and compares his observations with those made by Arnold-Bemrose in 1898. The fact that the quartz rock encloses coral fossils and is mineralized, containing fluorite and barite, suggests that it is the product of alteration of the limestone as a consequence of mineralization. Ford (1967b) noted that the quartz rock is cut by (and hence pre-dates) at least some of the faulting associated with Dirtlow Rake.

Interpretation

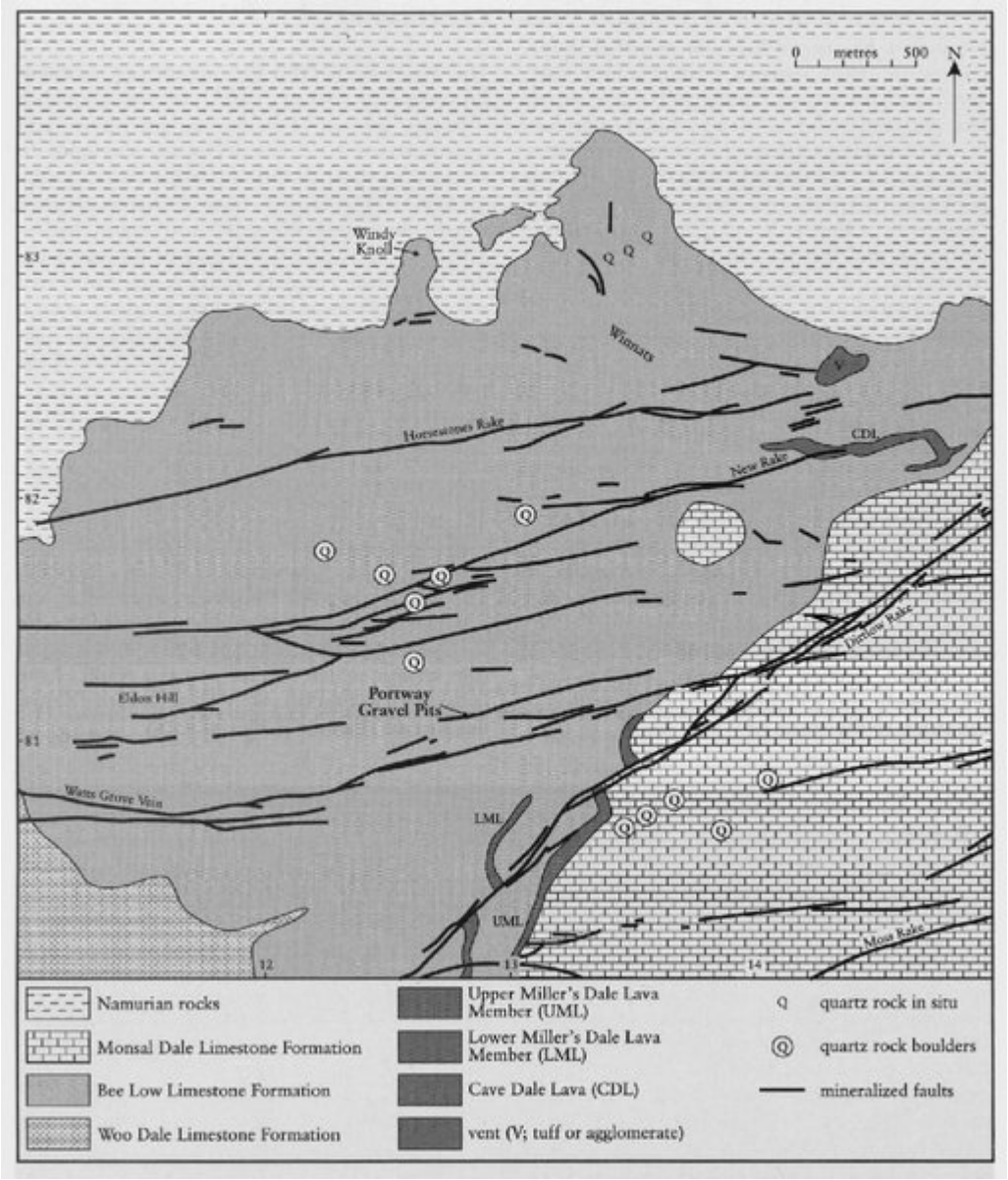
In the Pleistocene, collapse of a cavern within the Old Wham Vein occurred. The resulting collapse feature is of the order of 30 m in diameter and at least 4 m deep, with vertical limestone walls, and is filled with blocks of limestone and quartz rock. Ford described a soil sequence at the top of the faces exposed in the 1960s, which includes a loess (Pigott, 1962). Although at the same stratigraphical level as the solution features of south Derbyshire (e.g. Kirkham's Silica Sandpits, see GCR site report, this chapter) there are differences; the host rock at Portway is limestone, not dolomite, and the pit lacks the fill of refractory sands and clays that typically occur in the pits of southern Derbyshire. On the basis that erratics are lacking, Ford (1967b) suggested that the Portway feature may represent an unglaciated enclave, not covered by flowing ice.

Conclusions

In addition to the occurrence there of barite in various forms, the Portway Gravel Pits GCR site provides evidence of Pleistocene landscape development in the South Pennines, with solution-related collapse features that preserve a lithologically distinct quartz rock.

References

(Figure 4.23) Portway Gravel Pits. (Photo: J. Aumonier.)



(Figure 4.24) Geological map of the Portway Gravel Pits GCR site. After Ford (1967b).