

## **OUGS field visit to Bantymock opencast gypsum mine near Newark, Notts**

The following pictures record a field visit by the Open University Geological Society (OUGS East Midlands Branch) to the Bantymock opencast gypsum mine, near Newark, Nottinghamshire, on 18 May 2008. Bantymock Mine – more correctly a quarry – is owned and operated by BPB British Gypsum Ltd, and is located on the outskirts of Balderton, SK 815 495. Our guides were Dr Noel Worley, Chief Geologist, and Jeff Torr, Mine Manager. This quarry provides the best section in the UK of the Triassic-Jurassic boundary. All photographs, including those of gypsum samples collected during the visit, were taken by David Bate.

Bantymock Mine was opened in 1982 but had to be closed in 1993 when the availability of synthetic gypsum, produced as a by product from the desulphurisation of coal-fired power station flue gases (FGD), led to a diminishing demand for quarried gypsum. Extraction of gypsum was then moved to the Kilvington opencast mine, a few kilometres to the south, where the smaller thickness of overburden (about 7 m, compared with more than 25 m at Bantymock) allowed the gypsum to be extracted more cheaply. Kilvington had previously been worked by Blue Circle to provide for its cement manufacture, but competition from other sources of supply and closure of the railway caused the operation to cease in the late 1970s. British Gypsum acquired the Kilvington site in 1995 and began extracting gypsum the following year. The subsequent growth in demand for gypsum-based building materials, expected decline in the availability of FGD gypsum, and exhaustion of the reserves at Kilvington (closed December 2007), led to the re-opening of Bantymock, which commenced mining in October 2007.

Gypsum from Bantymock is mainly employed to make special plasters for industrial uses, including high quality moulds for ceramic ware, fine castings for metallurgical applications, and various adhesives. Other applications include orthodontic dentistry and surgical plasters. High-purity white gypsum is used in pharmaceuticals, food and confectionary, the brewing industry, and in the refining of sugar beet. High-grade gypsum and plasters are sold throughout the UK, Western Europe, the Far East, Africa and Australasia. Pink and grey gypsum derived from the thicker but less pure Cocks and Grey Rock Seams is used in the manufacture of building plasters.



**Photo 1:** View of north face of pit.

The highest worked gypsum (Cocks Seam) forms a string of pinkish nodular masses – some of which form monoliths up to 3 m thick – visible in the picture at the level of the hydraulic excavator. Overlying the red-brown Branscombe Mudstone Formation (previously the Cropwell Bishop Formation) in which the gypsum occurs, is the Blue Anchor Formation (grey-green dolomitic mudstone, 4–5 m thick), which marks the top of the Mercia Mudstone Group. This is overlain in turn by the Westbury Formation (a distinctive, fossiliferous black fissile mudstone) and Lilstock Formation (Cotham Member: grey mudstone), which together comprise the Penarth Group. The highest part of the sequence is occupied by the Triassic-Jurassic Barnstone Member (dark grey mudstone with thin beds of limestone), which forms the base of the Scunthorpe Mudstone Formation (Lias Group). The quarry face has been tiered, which partly accounts for the apparent sharpness between some of the units.



**Photo 2:** Similar view to previous picture, showing group about to examine the Cocks gypsum seam.



**Photo 3:** A closer view of Cocks Seam: note thin strings of secondary fibrous gypsum, or satin spa, above the principal seam.



**Photo 4:** View of advancing east face of pit, looking southward.

The two principal gypsum seams (Cocks and underlying Grey Rock) can be readily distinguished. The greyish mudstone of the Blue Anchor Formation, and black fissile mudstone of the Westbury Formation, are clearly visible above the mostly red-brown Branscombe Mudstone Formation.



**Photo 5:** Detail of east face of pit showing the full sequence of worked gypsum seams in the upper part of the Branscombe Mudstone Formation. Some 13 seams, which collectively form the Newark Gypsum, are said to be worked, although only 11 are individually named on the graphic log that was provided for our visit. The two thickest seams (Cocks and Grey Rock) appear as irregular, nodular horizons near the

top of the sequence. The Cocks Seam has an average thickness of 0.67 m, and the Grey Rock 0.75 m. The lower seams, 0.1–0.3 m thick, are of intense whiteness and of highest commercial value. The overall excavation depth at Bantymock is about 45 m.



**Photo 6:** Large hydraulic excavator



**Photo 7:** Dump truck



**Photo 8:** General view of crushing and screening plant. On the far right is the picking shed where hand sorting of lump ore is employed to remove obvious mudstone contamination for the production of best quality white gypsum. Further processing for the manufacture of high-grade gypsum products takes place at the nearby Jericho Works.



**Photo 9:** Pink alabastrine gypsum from Bantycok Mine. From the Middle Ages alabastrine gypsum was much used for the manufacture of religious figures, panels,

altarpieces and monumental effigies. Nottingham was a major centre for the production of carved alabasters, although most of the gypsum appears to have been sourced from Tutbury in Staffordshire and Chellaston Hill near Derby. The pink colouration is caused by the presence of haematite.



**Photo 10:** White alabastrine gypsum from Bantycok Mine.