A MODEL OF BEEVER MINE AT GRASSINGTON

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In 1844 Stephen Eddy, the Duke of Devonshire's principal Mining Agent in Yorkshire, published a paper entitled "Account of the Grassington Lead Mines, illustrating a Model of the Mine" in the Transactions of the British Association (Eddy, 1844). According to Eddy "The portion of the mine modelled represents the richest piece of ground as yet opened in these mines, and includes two extensive fault veins, together with a piece of ground from which some very rich slickensides have been obtained. All the ore found near the slickensides is much more refractory in the furnace, and of less produce than that raised at a distance from it. The gritstone between the two veins from the points where the slickensides commenced is also quite altered in its character and appearance.".

Eddy returned to the subject of slickensides in 1858 when he wrote a longer paper "*On the Lead Mining Districts of Yorkshire*" (Eddy, 1858). They had apparently been the subject of recent correspondence in the columns of the *Mining Journal* and Eddy sought to correct an assertion, citing his experience to the contrary at Grassington, that slickensides had never been met with in Gritstone.

His model, which had been exhibited (presumably at a meeting of the British Association) at the request of the Duke, was thought to have been the one recently rediscovered at Chatsworth¹. An examination of it by the author, however, shows that, while being of the same general area around Beevers Shaft at Yarnbury, this is in fact a second model (Eddy, 1846).

Eddy tells us that the first model was at a scale of one inch to five fathoms and, by giving the vertical depth and the lateral lengths of ground covered by it, this allows us to calculate that it was 700 mm long by 406 mm deep by 355 mm high.

The second model, at a scale of one inch to ten fathoms, is in the form of a wooden block 570 mm long by 400 mm deep by 350 mm high. This splits into four sub-blocks, two of which are 570 mm long by 300 mm deep by 175 mm high and cover the area west of the crosscut driven south from Beevers Engine Shaft. The other two, 570 mm long by 100 mm deep by 175 mm high, cover the area to the east of it. On these blocks, the course of the veins is shown in gold and that of the workings in black. The geology is shown by using coloured veneers to represent the strata, which are:-

Alluvial Shale Top Gritstone Shale and coal Bearing Gritstone Shale Hard Gritstone Shale Limestone

Lifting the top two blocks off reveals a plan of the workings and veins at the Day (Duke's) Level. On this plan the geology at that horizon is given, showing how the beds, which dip gently northeastwards, are disrupted by a number of fault veins, each with a throw of a few feet. Workings at this horizon are lightly cut into the top surface of the bottom blocks and are cut more deeply into the underside of the top blocks. By incorporating the geology, it also reminds us that when a level crosses a bed with a shallow dip the apparent thickness of the latter is much greater than its true thickness.

The vertical faces of the blocks act as transverse sections of the strata. These show the way in which beds near a fault are disturbed by its shearing action, with those on the downthrow side of the fault being bent upwards and those on the upthrow side being bent downwards. This effect can often reverse the direction of dip locally. The veins depicted (Fault, South, New, Crosscut and Simpson's) are, like most others in the area, all fault veins.

The typically barren beds of shale are named using inlaid gold lettering, whereas the bearing beds, of Gritstone, have black lettering. Interestingly, Limestone is also shown in gold, which no doubt reflects Eddy's comment that "It is well known that most of the lead veins in this formation [carboniferous strata] in England are principally valuable when passing through the limestone bed, but to this general rule the Grassington Mines form an exception".

The crosscut south from Beevers began high up in the Bearing Grit, but, owing to the beds rising to the south-west, it was near its base when it cut Simpson's and New Veins. The latter veins have very small throws, while Fault Vein, which is thought to be an extension of New Rake, throws the strata down about 110 feet to the south. This meant that the crosscut was again high up in the Bearing Grit which here was, if anything, now dipping slightly to the south-west. In other words, continued driving would soon take the crosscut above the Bearing Grit and render it of little value. This trial was discontinued until 1869, when James Ray Eddy, Stephen's son, sank an engine shaft on the edge of Grassington Mire and drove the crosscut through to it for drainage and ventilation. It failed to find workable veins, however, and worked stopped in 1879 (Gill, 1976 and 1993).

CONCLUSION

Surveyors at metal mines often use models to depict the complex layout of the workings in three dimensions. A particularly impressive example of such a model can be seen at the Geevor Tin Mine Museum, in Cornwall. Eddy's model is much simpler, but, as well as showing the workings, it demonstrates the geological structure of the area in detail. It would have been a useful aid to explaining the three-dimensional layout of a mine and its relationship with the geology to novices.

An interesting item appears in the accounts for Yarnbury in February 1851, when the Midland Railway Company was paid £3 6s 8d for "carriage of box to exhibition" (Chatsworth MSS). This was followed in June by the payment of £14 0s 0d to "Messrs Eddy and Mason for expenses to the Exhibition". It may be, therefore, that the second model was made for the Great Exhibition at Crystal Palace, which was opened by Queen Victoria on May 1st 1851. The Grassington Mines also provided a "section of a lead vein" for the exhibition, however, and it is just as likely that this was inside the box².

¹ Thanks are due to Jim Rieuwerts, for drawing my attention to the model's existence, and to Stuart Band, the Archivist at Chatsworth, for making it available for inspection.

² This is now at the Natural History Museum, London, but a photograph of it can be seen in Dunham, K.C. & Wilson, A.A. (1985) *Geology of the Northern Pennine Orefield Vol.2 Stainmore to Craven* (London: HMSO), plate 1.

Whatever the case, and despite its now rather battered appearance, one can see that the model of Beever Mine, when new, was an impressive piece of marquetry.

References

Published

Eddy, S. 1844 Account of the Grassington Lead Mines, illustrating a Model of the Mine. *Transactions British Association*, pp.52-53. Eddy was in charge of the Grassington lead mines from 1833 to 1861.

Eddy, S. 1846 Observations on the geology of the Grassington Mines, near Skipton, Yorkshire, accompanied by a model of its stratification. Royal Geological Society of Cornwall, Vol.VI, pp.186-189.

www.pointins.com Eddy, S. 1858 On the Lead Mining Districts of Yorkshire. *Report of the British Association*, pp.167-174. See: Gill, M.C. (1993) *The Grassington Mines*. Keighley: British Mining No.46, pp.57-58.

Gill, M.C. 1976 Mire Shaft. British Mining No.3, p.5, Keighley

Gill, M.C. 1993 The Grassington Mines. British Mining No.46, p.59. Keighley

Manuscript

Chatsworth MSS (Bolton): Rough – Cononley Mine, Yarnbury, Smelting House, Coalgrove Beck Mine 1851-1853.

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