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GEOLOGICAL SECTIONS of Holyfield, Hudgill Cross Vein, and Silver Band. LEAD MINES, in Alston Moor and Teesdale

By T. Sopwith,
Land and Mine Surveyor.

To JOHN TAYLOR Esq., F.R.S., F.G.S., &c., Member of the Royal Academy of Brussels and other Foreign Societies, the following SECTIONS OF MINES are respectfully inscribed, By his Obedient and Obliged Servant, THOMAS SOPWITH, Loaning House, near Alston, October, 1829.

I. **HOLYFIELD LEAD MINE**, in the Manor of Alston Moor, belonging to the Commissioners and Governors of Greenwich Hospital, with a section of the strata from the High Slate Sill to Nattrass Gill Hazel, both inclusive. Surveyed by J. Dickinson and T. Sopwith, and engraved by T. Sopwith.

II. **HUDGILL CROSS VEIN LEAD MINE**, in the Manor of Alston Moor, belonging to the Commissioners and Governors of Greenwich Hospital, with a section of the strata from the Surface to the Scar Limestone. Surveyed by J. Dickinson and T. Sopwith, and engraved by T. Sopwith.

III. **SILVER BAND LEAD MINE**, in the Manor and Royalty of Lune, in the North Riding of Yorkshire, belonging to the Devisees in Trust under the will and Codicils of the Right Hon. John Bowes, Earl of Strathmore, deceased, with a Section of the Strata incumbent on the Basaltic Rock, called the Whin Sill. Surveyed and engraved by T. Sopwith.

GEOLOGICAL SECTIONS, &c. &c.

GEOLOGICAL Plans and Sections of Mines have, from a variety of causes, been much less generally attended to, than their importance and utility demand. Not only do they afford very material assistance in the actual prosecution of the works, but are further valuable from the minute and accurate Geological information necessarily blended with them. By supplying numerous records of established facts, in the disposition and changes of strata, the position of veins, and their productiveness under various circumstances, they become admiral data for the study of a science, in which a knowledge of facts, and a patient investigation of practical results, are the only sources from which any important discoveries can be derived.

The celebrated Werner, in his Theory of Veins, after describing the manner in which Mining Plans should be constructed, and commenting on the advantages of having

such Plans and Geognostic descriptions of every Mining district, says - “Such a collection, the pan and description of the district, form together a complete instructive whole. If our ancestors had left us such documents for two centuries past, or even for half a century, what advantage would it not have been of to us? From what doubts would it not relieve us? With what anxiety do we not turn over the leaves of ancient chronicles in search of information, often very imperfect, obscure, and uncertain? With what pleasure do we not receive the least sketch or plan of some ancient mine? With what pains do we not rake up the old heaps of rubbish brought out of old excavations, [20] to discover pieces which may afford us some idea of the substances which were formerly worked out? Yet between these documents, and those which we might obtain in the way pointed out in the preceding paragraphs, there is as much difference as between night and day. Would it not be an obligation, a duty, for us to collect and leave to future generations as much instruction and knowledge as possible on the labours carried on in our mines, whether it be in those that are still worked, or in those which have been given up?”

In the Lead Mining districts, the utility of such records is increased by the non-residence of a large portion of the shareholders of mines, who, without the assistance of plans, and regular details, can only form very imperfect ideas of the nature and objects of the different works in progress. These, in general, have had little or no opportunity of becoming conversant with such details, and are therefore naturally indifferent to the advantages which may be derived from them. To many of these it is anticipated the plans now published will prove very acceptable, by affording both a general idea of the nature of mining, and of the manner in which its operations are rendered intelligible, by means of plans and sections. And though such shareholders must necessarily place great reliance on the skill and integrity of their resident agents, and cannot from occasional opportunities, acquire the knowledge of mining affairs requisite to the immediate direction of them; yet, in conducting such expensive speculations as Mining, it is highly desirable that the operations should be as far as possible made intelligible to all who take any interest in them. Such a general knowledge as would enable them to understand the nature of the works, and the objects contemplated in any suggested undertaking, would be much more satisfactory than the entire dependence on others, induced by the want of means to form an opinion for themselves.

The object of these plans is to furnish a clear and intelligible representation of the works carrying forward at the respective mines, and of the various strata in which they are situated. By such plans of mines, accompanied with the correspondence of an Agent or Resident shareholder, the other proprietors, however distant, may at once perceive in what direction the works are proceeding, in what situations the veins are mostly found to be productive, and what are the most likely places for prosecuting new trials, both with reference to the intersection of veins, and the strata in which they may be conveniently tried.

HOLYFIELD MINE is situated on the west side of the mountain of Middle Fell, about a mile south of Alston. The strata correspond very nearly with those of the celebrated Mine of Hudgill Burn, which is on the eastern declavity of the same

mountain. The section exhibits a profile of the surface, with the various strata. Of these, the most important is the Great Limestone, in which the workings are chiefly situated. Annexed to the section is a horizontal or ground plan, shewing the course of the levels, and situation of the various shafts, sumps and rises, with the bearing of the Veins. The extension of forty yards on each side, is the boundary usually assigned in leases of Veins in this Manor. This Mine, from its vicinity to the town of Alston - the easiness of access to the workings, and the obliging permission so readily granted by the resident owners, has been frequently visited by strangers, who usually derive much gratification from so novel an excursion. It is due also to the Miners also to state, that their civilities and attentions greatly lessen any fatigue or danger that may be supposed to attend an adventure “thus far into the bowels of the land.”

HUDGILL CROSS VEIN LEAD MINE is situated at the eastern base of Middle Fell, near the river Nent, and about a mile and a half from Alston. The section exhibits the effect produced on the strata, by the intersection of veins, which, in the interior of this mine, is very strikingly developed.

The district in which SILVER BAND MINE is situated, is highly interesting to the Geologist, from its abounding with the stratified range of Basaltic rock, which forms so striking a feature on the scenery of Teesdale, and immediately above which, on the summit of Cronkley Scars, the Silver Band Company are now carrying forward their principal operations. These consist of levels driven along the course of three veins, named Silver Band Vein, Old Band Vein and West Vein, in all of which workings have been prosecuted with energy, attended in the two former with partial, and in the latter with considerable success, consider [22] ing the thinness of the strata in which the Veins are chiefly found to be productive. The principle level is begun, and both it and the other levels for the most part driven in a soft freestone or hazle, which here occupies the position of the Tyne Bottom Plate in Forster’s Section of the strata. Immediately above this Hazle, lies a stratum of Limestone, three yards thick, which corresponds in position to the Single Post Limestone of Alston Moor, and on the underside of the same Hazle, is another bed of limestone, varying in thickness from four to five yards, which, being separated from the Whin Sill, or Basaltic Rock, only by a thin whetstone bed, may be designated the Whin Top Limestone. (This stratum corresponds to the Tyne Bottom Limestone of Alston Moor, — a name derived from the circumstance of its forming the bed of the River Tyne for nearly four miles in that manor, but which, from its local nature, is perhaps less descriptive of the situation of the stratum in other districts than that which is here suggested.) These strata are all underlaid by the Great Whin Sill, which bassetts in fine columnar precipices in the adjoining vale of the river Tees. Its thickness is variable, but at a little distance from the mine is ascertained to be about twenty fathoms.

The section represents the relative position and inclination of these strata, with the principal subterraneous workings, for gaining access to those parts which are productive of lead ore, which, in this, as in most of the neighbouring mines, are chiefly where the cheeks or sides of the vein are formed by limestone strata. It also exhibits the nature of the hade, or underlay of veins, and the peculiar effect produced by them on the strata, which Miners call the Throw of Veins.

The following brief notices of the objects named on the sections are added for the use of those who are not familiar with the local terms used in Mining, and which often occur in the correspondence of the Agents of Mines with non-resident proprietors.

Veins are commonly named from the Estate of Tenement through which they pass, and neighbouring veins are often called North, Middle, or Sun Veins, according to their situation – the latter term is commonly used by Miners for South. Cross Veins traverse the country in nearly a North and South direction, and are so called for distinction from other veins, the greater number of which have their bearing nearly East and West.

The Hade of Veins is their leaning from the perpendicular, which varies much in different veins, and even in the same vein, being greatest in soft, and least in hard strata.

The Throw of Veins is the disruption of the adjoining strata by which they have been raised or depressed on one cheek or side of the vein from the range of the corresponding strata on the other side; and it is a general, but not invariable feature, that veins hade or incline with their bottom to that side on which the strata are lower.

Small veins are commonly called Strings, and frequently accompany or diverge from larger veins.

Flats are cavernous parts of the strata, occurring chiefly in Limestone, in which ore and other mineral substances are sometimes found to extend in a horizontal direction on One or both sides of the vein, accompanied by numerous Leads or small fissures, strings, &c. passing obliquely, or, to use a very common Mining Term, Swinning through the vein.

Levels are horizontal passages by which access is gained to the workings of the Mine — those which form the principal entrance, and communication in the interior, have wood or iron railways, and are called Horse Levels; when made for drainage they are called Water levels. When levels occur on a plan having different randoms, that is, are on different horizontal planes, they are distinguished by different colours.

Drifts are similar horizontal passages, either in the vein, or driven for discovery of Veins, and ventilating the Mine, &c. Cross-cuts are short drifts from the principal level to the vein. The extreme end of any level, drift, crosscut, or working in the vein, or so far as it has proceeded, is called the Forehead.

A Shaft is a pit dug from the surface — a Rise is an upright working commenced from a level, drift, or cross-cut, and worked upwards — a Sump is exactly the reverse, being a shaft or pit worked downward, and commenced, not from the surface, but

from some part of the interior of the Mine. Rises and Sump, are usually named after some of the miners who worked them.

The Boundary of Veins leased in this manor varies in length, and in breadth I commonly extends forty yards on each side of the Vein.

Lead Ore, either pure, or intermixed with other mineral substances, as it comes from the Mine, is called Bouse, and is deposited in places called Bouse Teams; the refuse excavations form what are called Dead Heaps. The Bouse is afterwards broken into small pieces, either on knocking stones, by manual labour, or in the Crushing Mill by a waterwheel: it then undergoes various processes in water at the Washing Floors, and the refuse of these operations is laid into Cutting Heaps. The sediment that escapes with the stream is collected in Slime Pits, and the ore contained in this sediment is afterwards separated from it by washing. The whole of the ore obtained, after being properly prepared by these various processes, is laid in depots, called Bing Steads (one word), from whence it is removed to the Smelting-House.

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