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THE BAY MINE
A Study in Mining History by W.S. Harvey and G. Downs-Rose

INTRODUCTION

The Bay Mine at Wanlockhead, Dumfriesshire, is one of a number of now derelict mines in an area which once was Scotland's most important centre of lead mining.

To present as complete a picture as is possible in writing this history of the mine the authors have sought to combine evidence from two sources - historical research and industrial archaeology. This dual approach was necessary because of the paucity of information concerning surface operations and machinery in the Wanlockhead mining records. The Bay Mine is typical of the mines and works of the area generally in that such records as have survived pay scant attention to the vital processes of pumping, winding, and ore preparation, and surface remains are hidden as a result of weathering and decay.

The need to clear the Bay Mine site in order to carry out a full field study of the remains of buildings and their foundations suggested itself to the authors during their earlier studies in the history of the Wanlockhead mines. In 1971 preliminary work done at the site showed that enough was left of building remains to justify a systematic programme of excavation in order to fill some of the gaps in the written records.

Permission to undertake a full investigation of the site was given by the Buccleuch Estates Limited and the problem of carrying out the excavation work was overcome with the help of the Department of Extra Mural and Adult Education in the University of Glasgow. That Department's much valued co-operation, besides making this particular piece of field work possible, has enabled an industrial archaeological approach within a wider study of the history of the mining area to develop systematically and at a pace otherwise less practicable.

The annual Summer Schools in Industrial Archaeology at Wanlockhead, which began in 1972, bring together students from widely varied backgrounds, and carefully balance coursework elements in both the classroom and the field. [1]

While the evidence forthcoming from archaeology did not fully compensate for shortcomings in the written accounts, it did open up new lines of thought about the minehead operations which in the absence of such evidence would not have been apparent. Studies of the layout of the surface machinery at the Bay Mine were extended by applying engineering criteria appropriate to the particular period under consideration, thus providing quantitive data about the amount of energy available on site, so permitting tentative comparisons to be made between operations carried on during two separate

periods of mining. This application is a tool of historical investigation which, while obviously requiring discretion in use, warrants further consideration by industrial archaeologists.

THE MINING GROUNDS

The ore veins of the Leadhills and Wanlockhead mining grounds, NGR NS 8814, lie in the Ordovician greywackes of the Southern Uplands. Although they cover a relatively small area, these mining grounds contain more than seventy veins, and about one-fifth of these were extensively worked for more than two and a half centuries. The workings in the Glencrieff vein at Wanlockhead and the Brow vein at Leadhills were of the greatest depth, each reaching about 440 metres below adit. The worked ores were galena and some zinc blende, and calcite and barytes were the common gangue materials.[1] FIG. 1.

The villages of Leadhills and Wanlockhead are on the northern slopes of the Lowther Hills. Each is at the head of a valley and each is at about 500 metres altitude. It is country of bare moorland lying between the fertile valleys of the Clyde and the Nith, and even today the villages are isolated, though when the mines were working transport of the ore was responsible for a good rail link to the Caledonian line at Elvanfoot from 1901 , and in earlier times the ore carts linked the villages with Edinburgh and the port of Leith where the ore was shipped to the continent.

Although rainfall is high neither valley has sufficient catchment area at its head to provide a constant flow of water in the streams. This insufficiency of water for driving pumping machinery was exacerbated by geological conditions which allowed the surface water to flow down faults and crush zones into the mine workings. The pumping problems which dogged successive mining companies were summed up in a report on the Wanlockhead mines in the eighteenth century when the agent wrote: "*The workings must always be precarious and uncertain* [2] *because the great rains and snows in the winter time so swell the springs that the engines cannot manage them, while in the summer season the water is so scanty it is not enough to turn the wheels*".[2] It was a situation which greatly hindered profitable operations, and one which made reliable and economic pumping the key to their realisation.

The Wanlockhead mining fields have fewer veins than those of Leadhills, but the production from both fields in their heyday was very similar. The principal veins at Wanlockhead are roughly parallel on a NNE-SSW axis, and these veins are crossed diagonally here and there by branch veins or strings. The Bay, or Charles vein, is one of these and it joins the end of the Straitsteps vein to the adjacent Old Glencrieff vein.

The Straightsteps vein was one of the earliest to be worked. On the 1st Edition of the 6" Geological Survey it is shown as extending from the Mossy

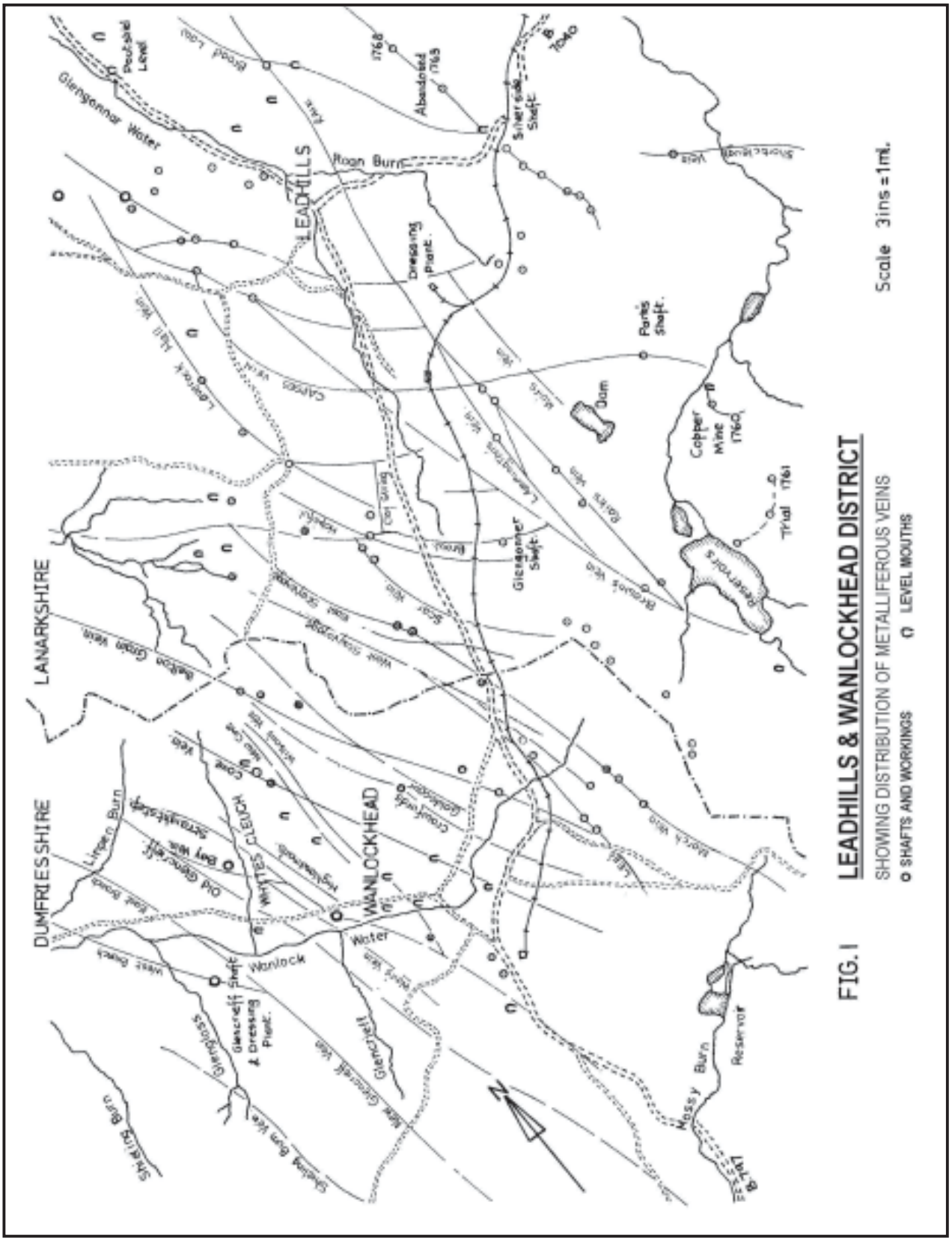
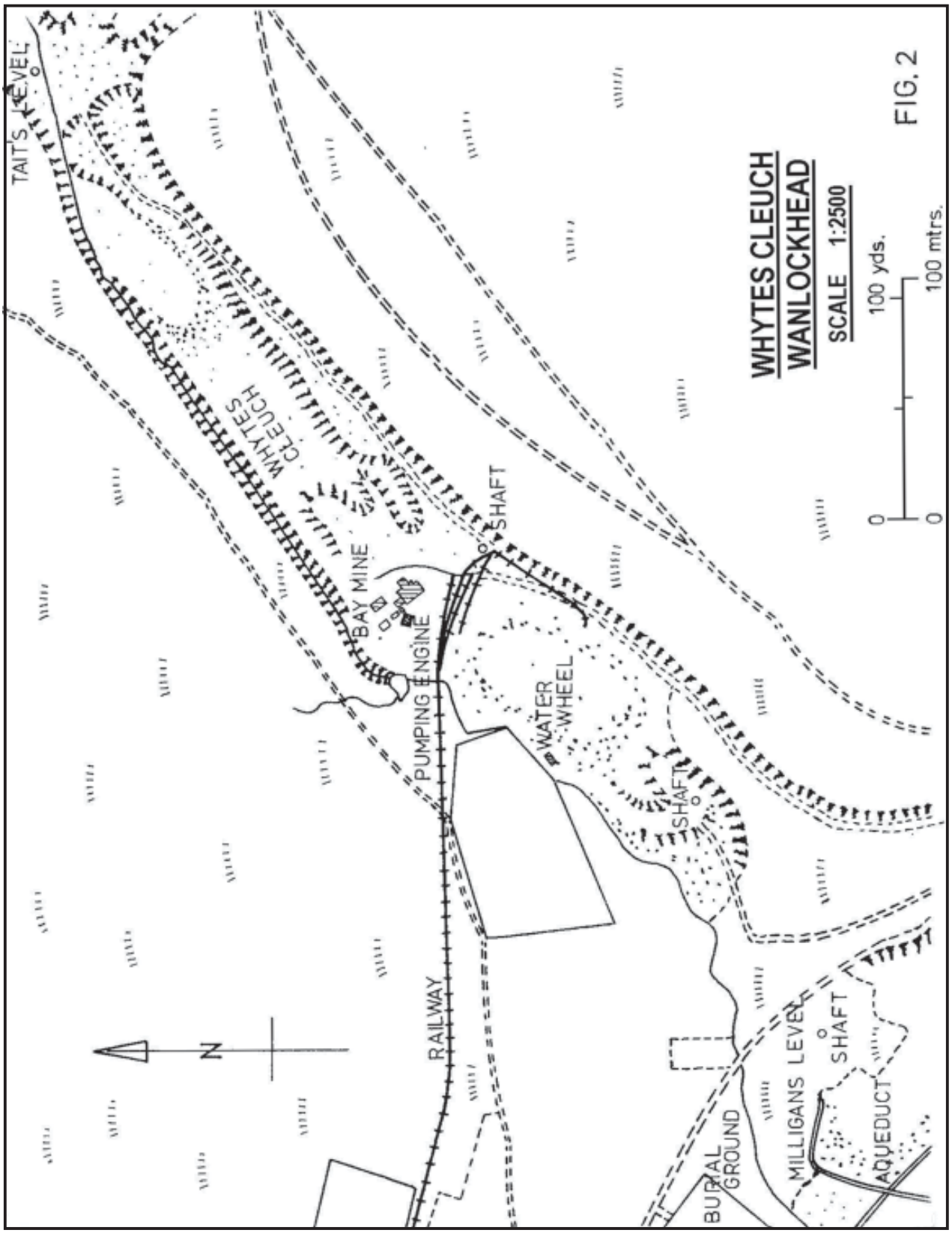


FIG. 1

Burn in the South to the Limpen Burn in the North, a distance of about 2.5 Km. On this map the Day vein is called by its old name, "*Charles String*", and is only shown as a branch, leaving the Straitsteps vein in the Dod Hill.

The revised survey, published in 1921, marks the main vein as "*Straitsteps or Margret's vein*", and the branch as the "*Bay vein*". But this map shows the



Bay vein as more than just a branch, for it is linked with another line of mineralisation called Weir's vein. Part of the Bay vein could therefore be seen as a continuation of the latter. However, the various mine reports link the Bay and the Straitsteps veins, and its workings joined the latter system.

THE BAY MINE

The Bay vein was worked from a mine in a little valley to the NE of the Wanlock Burn and called Whyte's Cleuch. It is bounded by the Dod Hill, 537 M and Limpen Rig, 508M, and is about 900 M long. Many of the ore veins cross the valley and it has always been an important centre of mining operations. FIG 2.

There are now no outcrops in the valley, but evidence of the veins and their minerals may be found in the spoil heaps. The following have been recorded:

Galena,	Zinc Blende,	Calcite,	Barytes,	Ankerite,
Haematite,	Linarite,	Vanadite,	Smithsonite,	Malachite,
Azurite,	Pyromorphite,	Cerusite, [3]	Leadhilite	Anglesite.[3]

The Bay mine is towards the bottom of the valley at an altitude of 381 M. Two shafts, one for pumping and one for winding, reach the adit, known as Milligan's Level, about 33 M below the surface. The top of the winding shaft has fallen in, leaving a crater in loose ground. The pumping shaft is intact and capped with concrete.

The 25" OS Map, 1898 Revision, shows that there were once sidings of a mineral tramway on flat ground beside the mine, and the line of this tramway can still be followed along the sides of Limpen Rig and Sowen Dod to the old smelter beyond the cottages at Meadowfoot. Near the top of this tramway is a ruined reservoir, and from it the line of a leat can be traced along the side of the valley to a point where it once took water from the Whyte's Cleuch Burn and also from an adit, Tait's Level. Tait's was once an important day level into the higher workings in Cove and Beltongrain veins. Above the leat, a later water system of earthenware pipes and wooden troughs carried water from the Whyte's Cleuch and Limpen Burns to a small cistern near the minehead.

The sinking of the Bay Mine shafts was begun in 1789, but this first phase of mining operations lasted only ten years. Sometime in the 1860's the mine was re-opened and work continued there until the present century, probably until 1914. Certainly, by the 1920 Is the mine was disused, the machinery being scrapped during the 1930's when the Wanlockhead mines were run down and closed.

In 1954 a consortium of companies began to drain the Wantockhead mines and subsequently worked the New Glencrieff mine for a short time. They attempted to de-water the Bay mine, and the pitwork, including the remains of a water pressure engine, was taken out. The contractors, Messrs. Mowlem Limited, erected a massive headgear over the old pumping shaft and to support this, and the winding engine, they dug out some of the surface structures and laid concrete rafts. When these efforts proved abortive the

headgear was dismantled and the site remained undisturbed until the authors began their fieldwork in 1971.

EARLY MINING

The earliest documentary record of mining in the district is the grant of mining rights on Crawford Moor to the monks of Newbattle in 1239 and which refers to a lead mine on Glengonnar Water. The Romans built a road through nearby Dalveen Pass and evidence of a lead furnace was found at the Flavian fort at Dalswinton in 1954[4] and it is tempting to suppose that lead may have been mined locally during the Roman occupation. Also, finds of pre-historic ornaments of gold in Galloway and Clydesdale offer possibilities, but documentary [4] references do not occur until the reign of James IV in the first decade of the sixteenth century.

A number of expeditions were promoted during the reigns of James V and VI under the charge of English and foreign adventurers, meeting with varying success, although as much as £100,000 sterling value of gold is reputed to have been collected in the space of three years. From 1562 there are increasing references to lead mining when its economic importance overtook that of gold.

A search for gold and lead took place along the Wanlock valley during this time, but the earliest references to operations in Whyte's Cleuch come in correspondence between George Bowes and the Lord Chamberlain and other nobles in 1604.[5] With an initial capital of £300 from the Exchequer, Bowes prospected the "*Wanlock Water and the hills and cleuchs thereabouts*" with great energy. But indifferent luck, reluctant workmen and the inadequacy of canvas tents in so hostile a climate brought failure. Much of his effort, latterly at his own expense, was spent hushing and trenching that part of the Wanlock valley which appears to have been called Whyte's Meadow where the burn is flanked by 'Glangrese' (probably Glenglass) to the South and Whyte's Cleuch to the north. That earlier gold washing had been carried out there is evident from the opposition and secrecy met by Bowes from descendants of gold washers who were by his time crofting in the valley.

Bowes reported his search for a mineral vein in Whyte's Cleuch, which was probably Old Glencrieff vein, and he wrote of an adit or level driven by him in search of it. One can only speculate that Bowes' adit may have been the origin of the important drainage level now known as Milligan's which was slowly driven eastwards to cut all the vein systems and has its mouth near the old graveyard beside the Wanlock burn. However, it is more than likely that by Bowes' time the surface outcrop of both Old Glencrieff and Straitsteps veins had been discovered.

The earliest systematic working of the north end of Straitsteps vein was carried out by Sir James Stansfield between 1675 and 1681, and a partnership led by Matthew Wilson in 1691, to 1710 worked the vein above level from Whyte's Cleuch through the Dod Hill to Wanlock Water.

A reference to work below level on the northern end of Straitsteps vein is given in a 1799 report which was written when the Charles vein was abandoned after ten years of mining on it.[6] The report records that where the vein crossed Milligan's level ore was found in the sole [5] by men who were employed in re-timbering the level at that place. "*A former company had ... erected a water engine by means of which they had mined to a depth of a few fathoms*". The site of this mining is shown on a plan of the mining liberties of 1766 with a note to the effect that this was the first pumping engine to be built at Wanlockhead.

The southern workings on the Straitsteps vein were under the basin of the Wanlock Burn and were particularly vulnerable to flooding. In an effort to deal with this, the Quaker Company, which held a number of leases at Wanlockhead between 1710 and 1756, erected two 'bab-gins'. These were water-wheel pumping engines which used wooden beams to connect the pump spears to the wheel cranks. This was a good engineering layout and it allowed the wheel to be placed further away from the open shaft. According to the eighteenth century mining engineer Robert Bald, these pumps were introduced into Scotland by the mining engineer George Sorrocold c.1710,[7] but the fact that the Quaker Company had built up a considerable fund of experience in their English mines may mean that the Wanlockhead pumps were an independent development.

To provide sufficient water for these engines, Messrs. Ronald Crawford and Company, who succeeded to the mines' lease in 1756, were forced to bring in water from outside the Wanlock catchment area by driving a water tunnel under the Mennock Hass.[8] The tunnel was driven between 1763 and 1774 and its line was no doubt chosen deliberately to follow part of the southern end of the Straitsteps vein system. In 1768, the pickmen driving the northern end of the water crosscut met ore in what they called the Margret vein, being in fact a continuation of the Straitsteps mineralisation. A trial of the new vein showed promise of a good ore body below the crosscut and Gilbert Meason, the managing partner faced a new problem: the chance of a profitable venture but without available water for turning the traditional pumps.

Gilbert Meason was the son of an Orkney trader. He had come to Wanlockhead after managing a successful merchant house in Leith, and was perhaps unfettered by traditional mining concepts. His thoughts turned to the new steam engine, and, after meeting Watt in Edinburgh in 1776, he set out for Birmingham in the following year to visit the Soho works, and to order one of Boulton & Watt's engines. This had a cylinder 36" in diameter and was set to work in 1779, being the second Watt engine to work on any Scottish mine.

Meason's decision was a turning point in the development of pumping at Wanlockhead. Steam engines were to be the major source of pumping power there for the next fifty years, and it was the Watt [6] engine which probably