British Mining No.33

THE YORKSHIRE AND LANCASHIRE LEAD MINES

A study of Lead Mining in the South Craven and Rossendale Districts

by

M.C. GILL

NB
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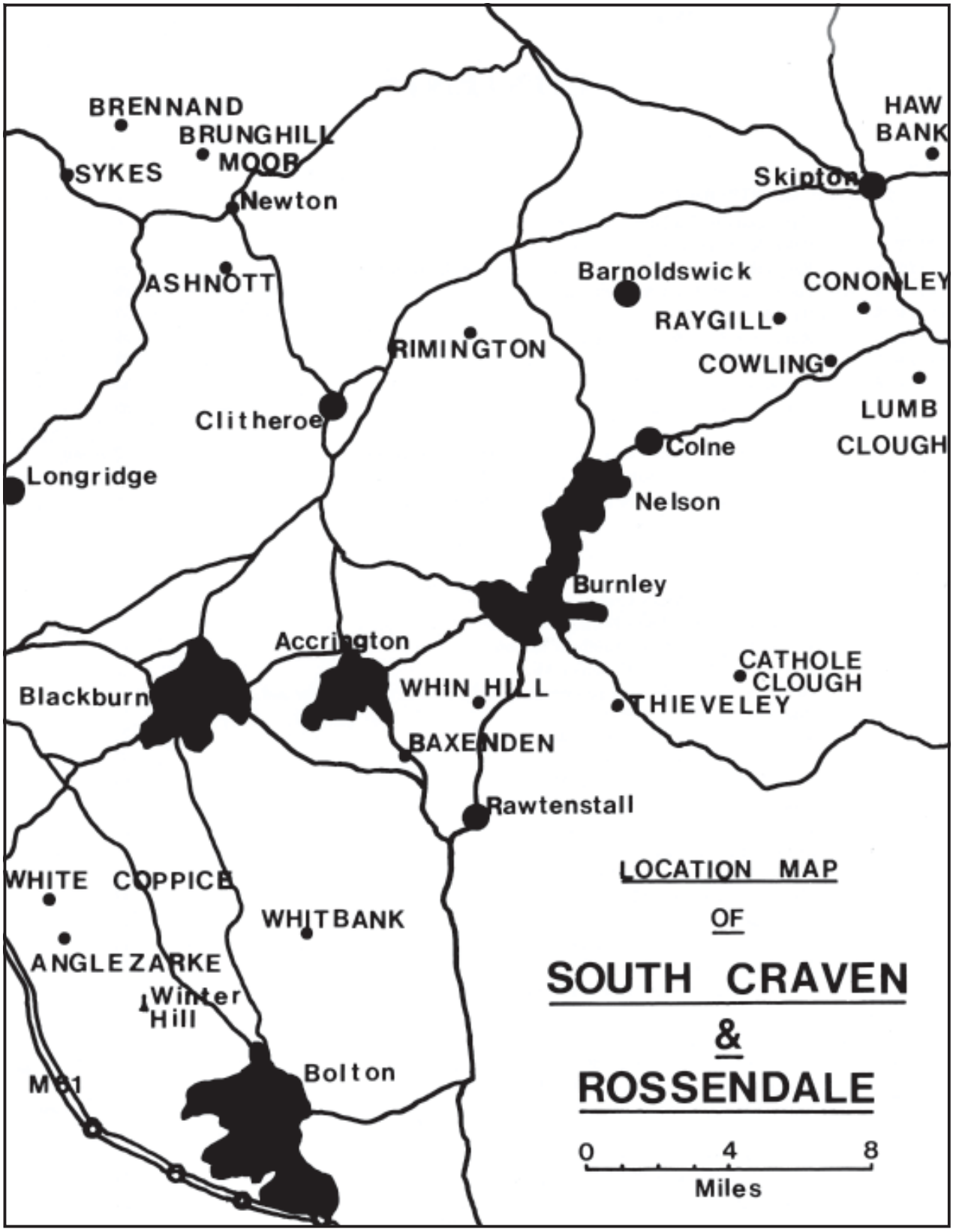


Fig.1. Location map of South Craven and Rossendale

PREFACE

It is the intention of this monograph to encompass those small mining fields which lie on the south-western periphery of the ones dealt with in the Grassington and Greenhow volumes; British Mining's 13 and 21 respectively. Although various authors have already written about specific mines in this large area, there has been a need for a comprehensive statement of present knowledge. The earlier writers of particular note are: R.S. France having covered Thieveley; I.A. Williamson on Rimington, Anglezarke and Thieveley; and A.E. Cannell the mines in the Forest of Bowland. Many readers will quickly realise that, in geographical terms, the title does not strictly correlate with the areas described. It does, however, serve to indicate the general area in question, and the author trusts that he will be forgiven any territorial excesses.

By contrast with Wharfedale, Swaledale etc none of the areas covered are obvious locations of lead mining, they are rather more easily recognised for their associations with agriculture or the cotton spinning and textile industries; which flourished (sometimes) between the eighteenth and twentieth centuries. Adding to this obscurity, the mines at Thieveley and Anglezarke are also on the immediate edge of the Lancashire Coalfield. Even including the relatively large mine at Cononley, it must be stressed that lead mining did not make a significant contribution to the employment prospects, or enduring prosperity, of any of the districts in which it was attempted.

The author's interest in lead mining germinated during the late 1950s when, as a young boy, a greatly anticipated Sunday afternoon walk, with his father, took in the Cononley Mine. The mines of Grassington Moor and Greenhow were soon added to the itinerary and, very quickly, the mild interest became a grand obsession! Much of the fieldwork at Cononley was undertaken during the 1960s and that led to a fascination with surveying and, eventually to employment with the National Coal Board and qualification as a Mining Surveyor.

As for many others, the 1980s opened with redundancy – a true "Gottsgaab" – and the opportunity to change direction, by taking a BSc in Archaeological Sciences, at the University of Bradford. A significant debt is due to the lecturers, at Bradford, for introducing the various proponents of "the New Archaeology" and confirming the view that much of the work done in the name of Industrial Archaeology, and the debate associated with it, is sterile. At present, the author is engaged in researching, and writing a thesis on, the Mines of Grassington and Wharfedale, for the degree of Master of Philosophy in Economic History, at the University of Exeter.

A BRIEF GEOLOGICAL INTRODUCTION

For those readers wishing to familiarise themselves thoroughly with the geology of this large part of north-west England, their attention is drawn to the following Memoirs of the British Geological Survey: Clitheroe (68),

Bradford & Skipton (69) and the Burnley Coalfield. The following brief notes are simply intended to clarify the principal nature of the country rocks associated with the mines.

The first mines under consideration are those associated with the part of the Aire Valley near Skipton, in Yorkshire. Here, a series of anticlines, known collectively as the Ribblesdale Fold Belt, has brought members of the Chatburn Limestone group to the surface. All of the folds trend roughly south-west to north-east, and their outcrops are interspersed by grits, flags, mudstones and shales of Namurian age.

The Lothersdale Anticline is the most southerly one of interest here, because it forms a large exposure of Chatburn Limestone at the Raygill area of Lothersale. Here, the mineralisation was predominantly barytes, with some calcite, fluorspar and galena. At its north-eastern end, at the Park Head Quarry, an exposure of Draughton Limestone has been worked. Here too, some mineralisation, associated with the Glusburn Fault, was found. The latter, which runs roughly east to west, was found to be mineralised for much of its length and produced lead ore, for about three-quarters of a mile on either side of the boundary between the townships of Cononley and Glusburn. At this point, the fault traversed beds of shale and sandstone, which made the mine unique in that it produced so much ore from beds found to be unremunerative elsewhere. The Cononley Mine was also the most southerly producer, of any significance, in the mid-Pennine orefield.

The mines at Hawbank Quarry (Skipton Rock), Rimington, Brennand, Sykes, Brunghill Moor and Moor End are also in limestone anticlines of the Ribblesdale Fold Belt. The Sykes Mine, however, worked a deposit which had formed in a limestone reef knoll.

In the Burnley – Accrington – Anglezarke area, all of the mineralisation occurs in the sandstones and shales of the upper Namurian and lower Coal Measures. [5]

THE CONONLEY - GLUSBURN LEAD MINE

Main Vein	SD94.979642
South Vein	SD94.983458
Coal Vein	SD94.979463
Gib Vein	SD94.986461

The Cononley mine is situated on Gib hill, between the villages, and lordships, of Glusburn and Cononley, and was by far the most important of those covered in this survey. One major reason for the site having the best preserved remains is the stabilisation work undertaken by members of the Earby Mines Research Group and the Crosshills Naturalists Society. Appendix "B" consists of a gazetteer of all the sites at Cononley, and reference to the various plans included with the text, as well as O.S. Sheet SD94, will direct readers to them.

The 16th to 18th Centuries

The Priors of Bolton held the rights to minerals on Cononley Moor until the dissolution when, in 1542, the manor of Cononley reverted to the Crown.[1] Very quickly afterwards it was granted to Henry Clifford, Earl of Cumberland, and remained in that family until the seventeenth century, when, upon the marriage of Elizabeth Clifford, daughter and heiress of Henry the last Earl of Cumberland, the manor was included with those of her husband; Richard Boyle, the first Earl of Burlington. Because Richard survived his son, Charles, Lord Clifford of Londesborough, title to the estates passed, on his death to his grandson Charles, the second Earl of Burlington. The latter died before Richard, his son, gained the age of majority and the mining interests, at least, were administered by his mother, the dowager Countess, and Lord Carleton. This Earl, who was famed for his high taste and beautiful architecture, had three daughters, one of which, Charlotte, married William the Duke of Devonshire. It was their son, another William, who was the grandson and heir to the Burlington estates and despite sales of land, the mineral rights still rest with the Devonshire estates. In spite of the split Lordship, the boundary of which cuts obliquely across the main ore shoot, the mine was worked as one by the Duke of Devonshire during the 19th century and, unless stated otherwise, will be referred to hereafter as Cononley Mine.

It is not clear when mining first commenced at Cononley, but a note in the Dissolution Rental of Bolton Priory, 1538-9, tells us that for the "*Manor of Kildwick with village of Cononley. For any profit coming from the issue of lead mines in and upon the moor at Cononley during the time of this account he does not answer because no such lead was found there*".[2] This at least suggests a knowledge that lead was present, but to what degree this can be taken as evidence for earlier exploitation is pure conjecture.

In September 1589, Lady Margaret Clifford, Countess of Cumberland, had entered into a partnership with one Richard Cavendish of London, to take a 21 years lease on 100 acres on Gib Moor, at Glusburn.[3] The precise area

involved is not known but, because the Cumberland's owned the adjoining liberty of Cononley, we are forced to conclude that it was on the line of the Main Vein, between Mason's and Garforth's Shafts. Nothing else is recorded of this venture, but it is unlikely that the lease was renewed, because Cavendish died in 1600 and the Countess became estranged from her husband and went to live in Clerkenwell.[4]

We have to wait until November 20th 1666, for the next sign of activity; which was in the Glusburn liberty. At that time, a lease was agreed between William Garforth, holder of Steeton and Anthony Garforth of Steeton, Gent, lessors, and:-[5]

	Share		
John Carre	(3/12)	of Waltham in Derbyshire,	Gent;
William Garforth	(3/12)	of Warleywise, Cowling, Yorkshire,	Gent;
William Garforth	(2/12)	the younger, of Steeton,	Gent;
Peter Alocke	(2/12)	of Burnsall, Yorkshire,	Yeoman;
Henry Hudson	(2/12)	of Glusburn,	Yeoman.

This gave them the right to mine for lead and coal in the demesnes, moors and wastes of Steeton, Eastburn and Glusburn, with permission to build a smelt mill in some prominent position. The rent for the mill was to be 20s per year in English Money. The lease ran for twenty years, with a ground rent of 5s per year and a royalty of 1/13th part of any ore and coal raised. Again, it is not known what work this partnership did. The smelt mill does not appear to have been built (see Lumb Clough Mill) and it is unclear where the mine's ore, if any, was smelted. The most probable site of any mining was on the Main Vein between Garforth's and Mason's Shafts. That some work was being done, at this time is suggested by comments in a discussion on the origin of metallic ores, in which the author claims that he had obtained samples of Ghurr (a mineral juice) from two miles away.[6,7] Because Webster lived at Kildwick, it is highly likely that his source was the Main Vein, on Glusburn Moor. [6]

Other evidence of mining activity is found in a copy of the reckoning for the Scheleron Mine (probably Skelterton, on Cracoe Green), for the period between the 12th April and the 22nd May 1739, includes the following note, by Joshua Stansfield, "*Spent when I went to Glusborn to seek 2 miners .. 1 shilling*".[8] Also, on November 16th, 1742, we have the, oft repeated, reference to the marriage of Richard Braithwaite, of Sutton, Steward of the lead mines, and Ann Smith, of Crosshills, widow. The note, supposedly appended to the entry, which tell us that "*the lead mines have long since ceased to be worked*" has hitherto proved to be misleading. An examination of the Registers, at Kildwick Church (Dickinson pers. com.), confirmed that the marriage is recorded, but failed to reveal the addition! Further research has proved that this reference originated in the "*History of Kildwick Church*", by E.W. Brereton, published in 1909, and is that author's observation.[9]

An assortment of entries in the Kildwick Parish registers also indicate that the mines were working between 1728 and 1746 although these dates are to some extent misleading as entries are in Latin before 1718 and trades are not always given. Thus 1728 cannot be taken as a truly reliable *terminus pre-quem.* The later date is probably a more reliable measure of activity in the Glusburn Liberty, though the reason for closure is not clear. The price of lead at this time appears to have been relatively stable and one is forced to surmise that the water table had been reached and/or the vein was poor. This would agree with Eddy's comment that "*The workers were stopped in their progress by the combined drawbacks of too much water and too little lead ore. In one place, however, on the crown of the hill, eastwards, and near to Mason's Shaft, they* (t'old man) *got down to the depth of our Upper Adit Level, or 24 fathoms from the surface at that point. Here, the vein was poor.*".[10]

During the eighteenth century, the Carleton Liberty, which included Cononley, was placed under the supervision of the Grassington Barmaster. This was an officer who, in some form or other, would be familiar to most mining fields but at Grassington, at least, his duties had diverged from those theoretically attributed to such a post in Derbyshire. His function was as the Earl of Burlington's representative "*in the field*", and besides being responsible for measuring and booking meers of ground to the miners, his other tasks included the superintendence of the smelt mill, by the River Wharfe, and the collection of duty lead as it was smelted. Barmote Courts were only held infrequently at Grassington and, as the result of a series of lengthy legal disputes, were discontinued altogether after 1762. Because the Earl's lead mines at Grassington were already well established, it made sense to use the same regulatory arrangements to supervise outlying liberties. The first references to work are to be found in the ledger which gives details of grants made by Messrs Stephen and William Peart, Barmasters of Grassington, and are as follows:[11]

17/1/1744 Measured to John Thornton, 2 meers of ground on Cononley Moor. That is 1 meer on either side of the trench where he had discovered some ore. 17/1/1744 Measured to Emanuel Simpson, 4 meers of ground on Cononley Moor. Viz. 3 meers adjoyning on the east, and 1 meer on the west, to Thornton's ground. N.B. Emanuel Simpson has surrendered his odd meer (on ye west) to John Thornton and his partners. 3/3/1744 Measured to the Rev. James Carr, Mr Lupton Topham and partners, 6 meers of ground on Cononley Moor. Viz. 1 meer adjoyning on the east to Emanuel Simpson's ground, and 5 meers adjoining on the west, to ye odd meer which Emanuel Simpson has surrendered.

Regrettably, none of the grants give sufficient detail for us to detect the location in question; if, however, one compares the 12 meers with the known extent of Gib Vein, there is a reasonable coincidence. Also, at this period,

there are no entries in the Grassington smelting accounts for Cononley ore, which also agrees with the poor nature of Gib Vein, where seen.

In the second half of the eighteenth century, apart from whatever may have been occurring in Glusburn, the principal activity in the Carleton Liberty was restricted to the area around Park Head Quarry; where the limestone outcrops. In April 1774, George Bradley, the Grassington Barmaster, wrote to the Duke of Devonshire's mineral agent that the "*Carlton Liberty is likely to get some lead and tho the vein is not yet so promising as may be wished, tho if it continues expect you will have more applications for mining allotments in that liberty*.".[12] In June, of the same year, Bradley noted that Mr Swire, of Cononley, and his partners were only working in the quarry and were likely to do so for some years. Despite this optimism, the venture met with little success and only four small parcels of ore were smelted at Grassington; after which, there is no further record of activity until the 1820s.

		Tons	Pieces	
12/4/1774	Mr Swires – Carlton Liberty	0	16	paid £2 0s 5d duty.
11/8/1774	Mr Swires – Carlton Liberty	6	3	paid 1 ton duty.
23/1/1775	Mr Swires – Carlton Liberty	4	1	paid 14 pieces duty.
4/9/1775	Mr Swires – Carlton Liberty	0	12	paid 2 pieces duty.
13/9/1783	Mr Swires – Carlton Slags	0	14	paid 2 pieces duty.
		12	6	[7]

The 19th Century

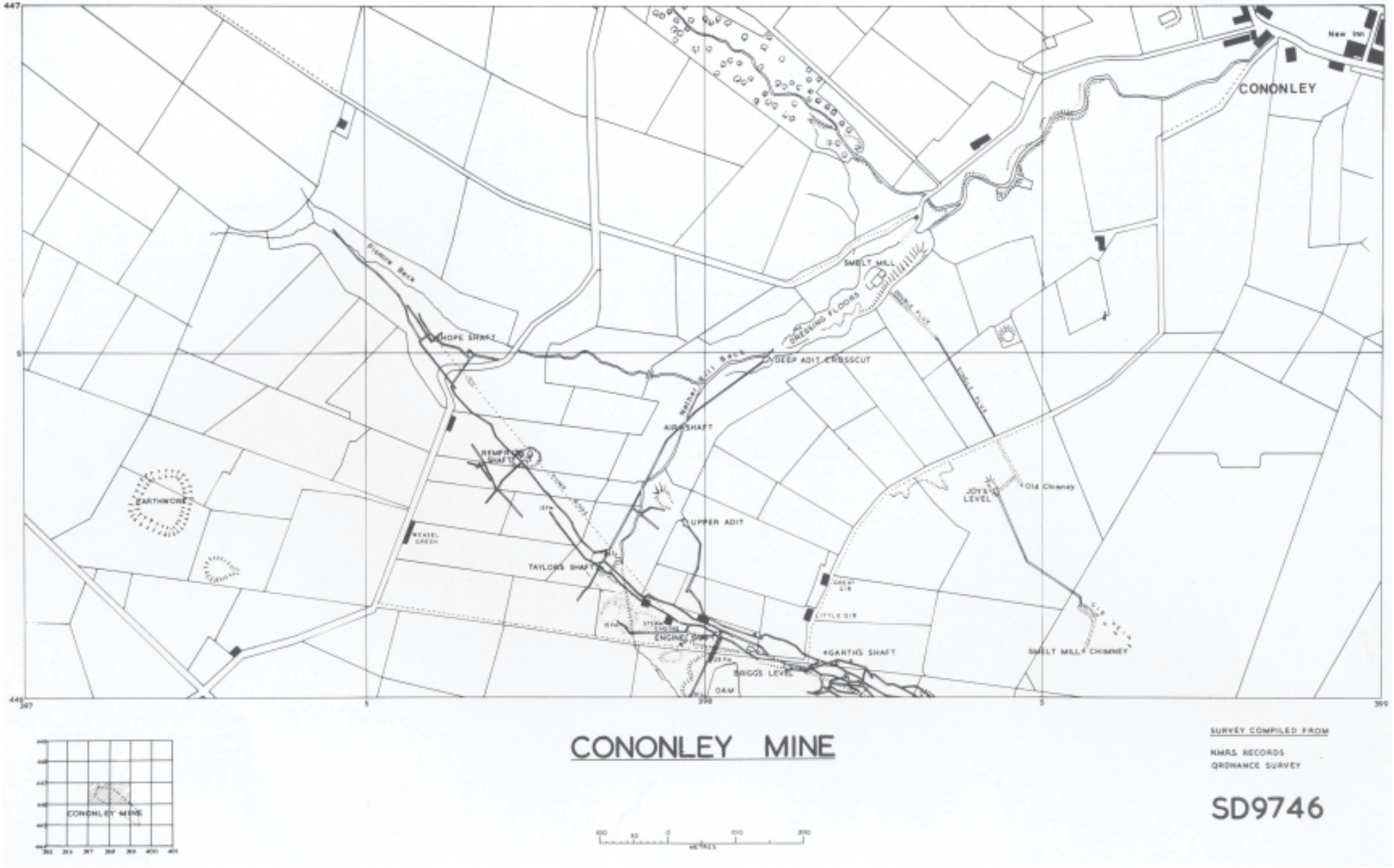
The next period for which we have evidence, is that of the Napoleonic Wars, when, in 1803, the Craven Muster Roll was produced under an Act of Geo. III which required returns of all men between the ages of 17 and 55 years, together with their ranks and occupations, whether married and with children, and whether willing to serve as volunteer.[13] This shows that no miners were living in the villages surrounding the mines and that textiles and agriculture were the principal forms of employment. This lack of activity is interesting because it appears at a time when the price of lead was rising rapidly to levels greatly in excess of the norm, and not to be approached again until the Crimean War of 1854-56. This may be a reflection of a view that the mine was worthless, or that the Duke of Devonshire was concentrating his efforts on the established fields of Grassington and Upper Wharfedale.

DATE	**TAKER**	**MINE**	**Cwts Ore**	**Pcs**
27/11/1820	James Garth	Glusburn Moor	185	111
9/5/1825	Walter Hall & Co.	Garforth Liberty	80	39
7-12/6/1826	Walter Hall & Co.	Glusburn Moor	212.5	131
28-30/8/1827	Walter Hall & Co.	Garforth Liberty	85	54
30/8-15/9/1827	Walter Hall & Co.	Glusburn Moor	526	259
15-21/10/1828	John Gill	Glusburn	204.5	133
24-28/4/1829	George Waters & Co.	Garforth Liberty	215	122
23/1/1838	John Newbould	Glusburn	10.5	7

When John Taylor took over the management of the Duchy's mineral affairs in 1818, he instructed the then Barmaster, Joseph Mason, that he was going "*to encourage adventure in all parts of the several mining fields, by liberal grants and fair duties to be regulated by the circumstances*".[14] Whilst this was chiefly aimed at revitalising the Grassington mines, which had been increasingly moribund for a number of years, its effect was soon felt at Cononley. In 1820, James Garth and partners made an agreement with Taylor and Mason that they should take the mine and have their first 20 tons free of duty as an encouragement to their making a fair trial. There are records of only one parcel of ore being smelted and this supports the assertion that Garth "*tried the vein in the 1820s, but lost his money*".[15] Certainly, there is a shaft, about 140 metres to the east of Engine Shaft, marked as Garth's Old Shaft on the working plan of the mine.

PLATE I. Cononley engine house and shaft, c1905.

By 1825, Messrs Hall & Co. of Newcastle were working both the Glusburn and Cononley ground and raising some ore. This was a company of lead merchants with experience of mining in Arkengarthdale and the Derwent Mines, it was also working on the Bycliffe Vein at Grassington. Its interest in the Duke's mines was no doubt a product of the Taylor paradigm and his determination to attract experienced adventurers. It was Hall & Co. which, subsequent to 1830, began the Deep Adit Crosscut from a point in Nethergill, about 200 metres to the SW of the smelt mill, with the intention of draining the mine to an average depth of some 45 fathoms in the Glusburn ends and 25 fathoms in the west ends.[10] After driving some 165 metres, through disturbed ground, to a point which is now just inbye of the shallow air shaft, these gentlemen gave up and the work was continued on behalf of the Duke of Devonshire. In view of the expertise shown by the Halls elsewhere, it is likely that this abandonment was prompted by the disastrous fall in lead prices in the early 1830s rather than any problems posed by the disturbed

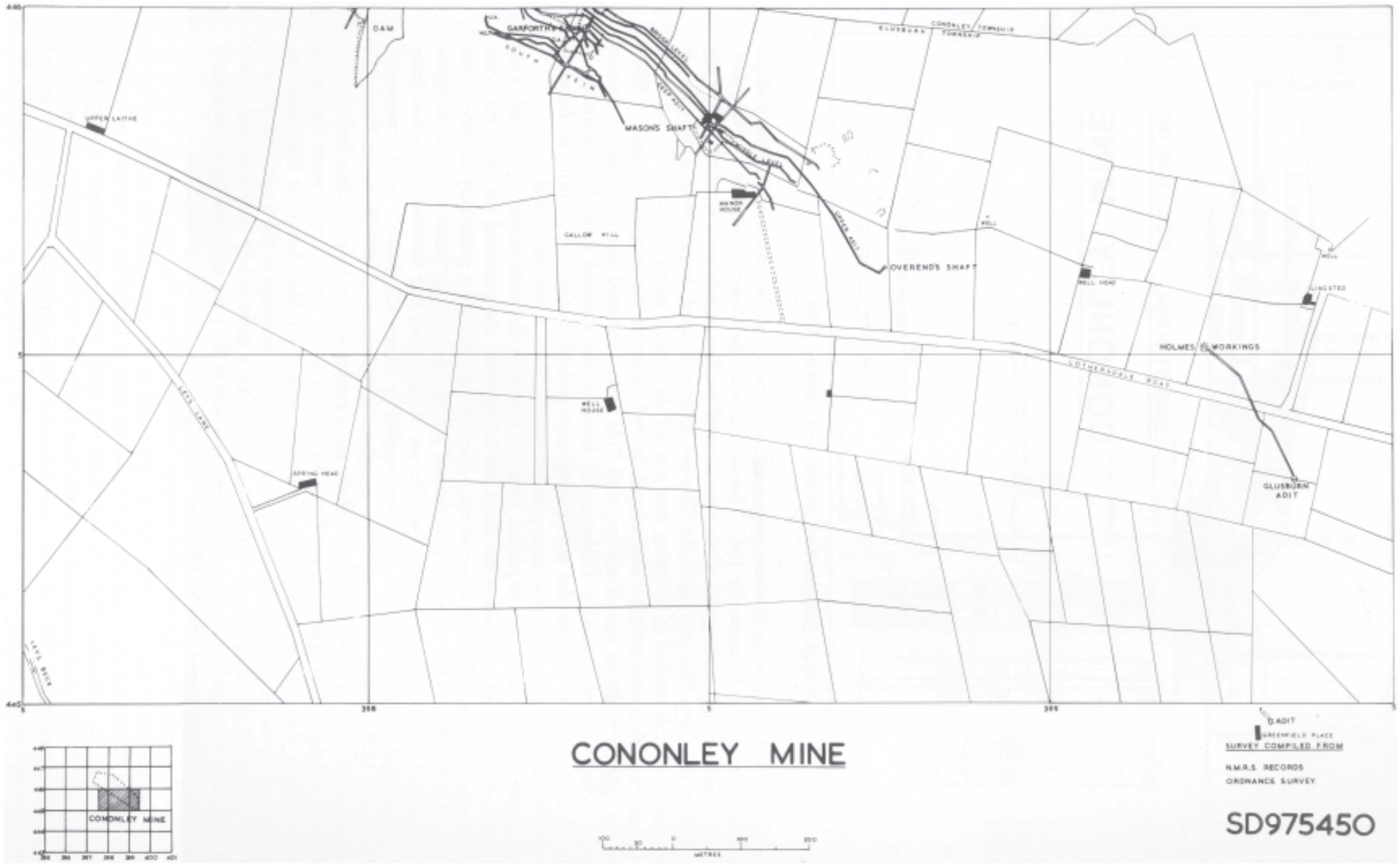


CONONLEY MINE

SURVEY COMPILED FROM

NMRS RECORDS
ORDNANCE SURVEY

SD9746



CONONLEY MINE

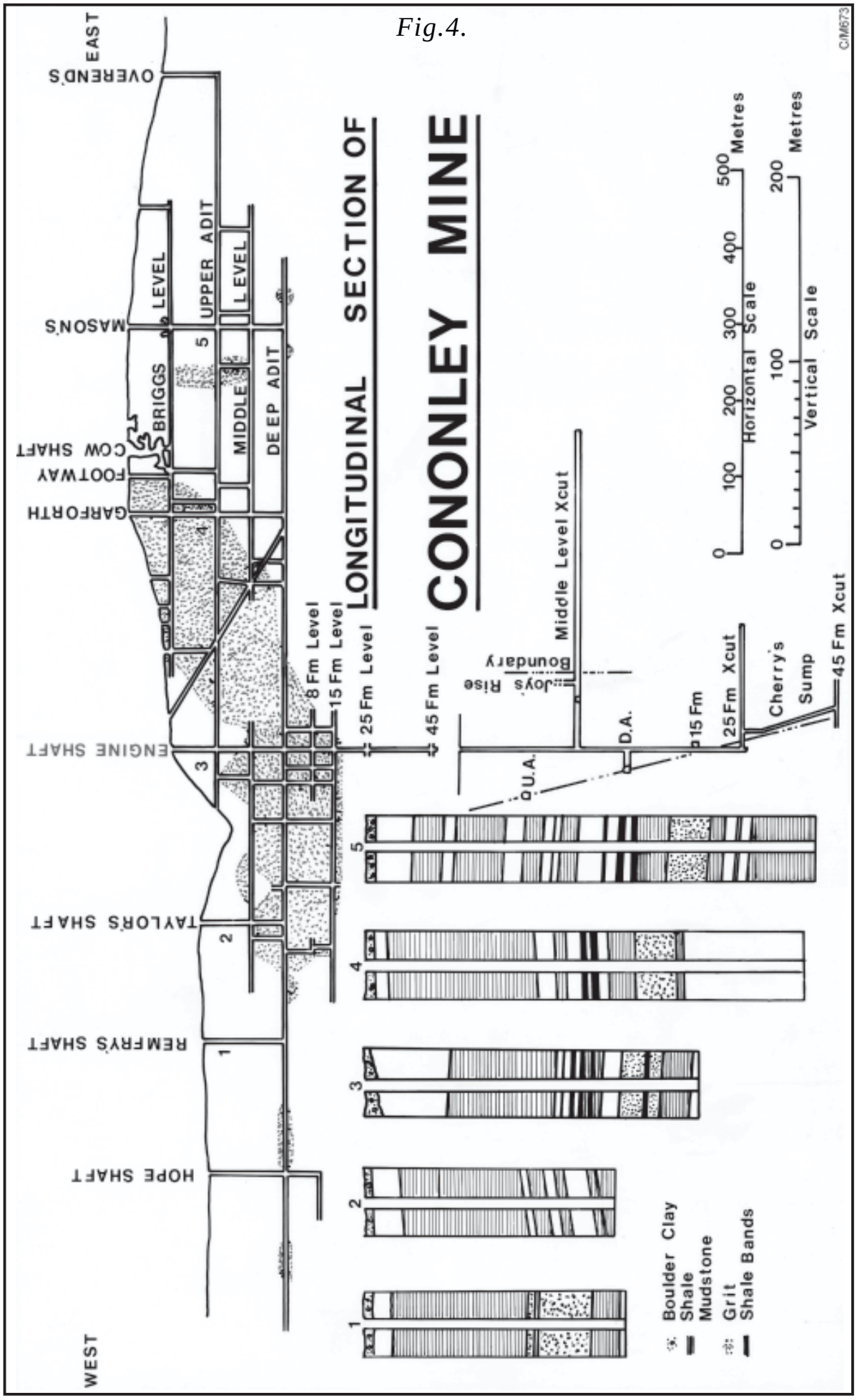
geology.[16] The adit then stood until July 1836, when George Gill & Co. took a bargain "*to clear a heap of stuff from the mouth of the Deep Level, at Glusburn Moor*", for 14 shillings. Driving recommenced in the summer of that year when the first bargain was let, at the rate of £2.38/fm (£1.30/m), to Stephen Monday and partners who held it until completion some 26 months later. To reach the Main Vein involved driving some 200 metres, which took 17 months, and a further 66 metres southwards, as a crosscut, presumably looking for the South Vein. Because the work proceeded fairly steadily it is possible to give the rate of advance, which was 2.4 metres per week, with some reality. The section driven by the Duke's miners cost £264.22 to reach the vein (plus rails, timbers etc.) and a further £136.25 to the present forehead.

The Deep Adit Crosscut, which had intersected the Main Vein after a total driveage of 375 metres from the portal, had also cut a string, known as Coal Vein, at 283 metres. The trial on this vein runs SE and is parallel to the Main Vein for some 15 metres to a junction with what appears to be one of the E – W strings. Coal Vein was then driven on for a further 37 metres and the E – W string for 55 metres. Although the first work on this vein was in September 1837, the principal trial was conducted in the mid 1850s, both foreheads being dated June 1855 on the mine plan.

It would perhaps serve the reader well to digress a little here, and discuss the general nature of the two principal veins at Cononley, for which we are particularly fortunate in having J.R. Eddy's description to provide enhancement. The Main Vein has a general direction of N 51° W, varying from N 64° W in the ore-bearing part of the lode to N 46° W in the poor ends of the mine. In the latter the hade is 20° to the south-west and in the former about [8] 10°. The miners expected that the two veins would unite in depth, and that the South Vein, which had a hade of 6° to the north-east, might prove to be a valuable feeder of the old vein. Because both veins failed in depth, however, this junction was never seen. Below the Deep Adit, the best part of the vein produced lead ore down to the 8 fathom level, and a little to the 15 fathom level, but, to all intents and purposes, the vein failed at the depth of 15 fathoms or a total depth from surface at the Engine Shaft of 50 fathoms.

Between the Deep and Upper Adits, the Main Vein varied in width from a mere joint to about 1.7 metres. Whilst in the bearing-length, above the latter, it increased in some parts to 6 metres wide or more; yielding ore, in one place, close to the surface clay. The lateral extent of the bearing ground was quite short and the whole of the vein driven on east and west proved unremunerative, though not entirely barren. That part of the ground in the productive section of the mine, where it was bounded by the Main and South Veins, was found to be crossed by several strings which left the Main Vein from its south side. Eddy felt that they "*robbed it*" (of ore-bearing capacity) and, because they lacked the strength to reach the South Vein, to the east of the Upper Adit Crosscut South, from Garforth's Shaft, they failed to enrich

Fig.4.


LONGITUDINAL SECTION OF CONONLEY MINE
EAST
WEST
OVEREND'S
MASON'S
BRIGGS
COW SHAFT
FOOTWAY
GARFORTH
ENGINE SHAFT
TAYLOR'S SHAFT
REMFRY'S SHAFT
HOPE SHAFT
UPPER ADIT LEVEL
MIDDLE LEVEL
DEEP ADIT
8 Fm Level
15 Fm Level
25 Fm Level
45 Fm Level
Joys Rise
Boundary
Middle Level Xcut
D.A.
U.A.
15 Fm
25 Fm Xcut
Cherry's Sump
45 Fm Xcut
Horizontal Scale
0 100 200 300 400 500 Metres
Vertical Scale
0 100 200 Metres
Boulder Clay
Shale
Mudstone
Grit
Shale Bands
C/M673

that. The principal gangue mineral was barytes, which was often intersected by slants of clay and caused problems for the miners whilst stoping. In one part of the ground, over Briggs Level, the vein-stuff was practically stratified and the matrix came away in beds, which varied in thickness from 0.3 to 1 metre. Eddy records that the ore was not often found in solid masses, but was disseminated amongst the barytes, which made it difficult to separate from the impurities. This requirement for more advanced dressing techniques may go some way towards explaining why earlier adventurers had met with failure. It must also be remembered that the dressing floors on the Grassington Mines, which had been established by Captain John Barratt, between 1825 and 1835, were a model of innovation. The introduction of mechanised brake-sieves there had been described as being "*admirably accomplished by Captain Barratt, at Grassington, where several are worked by one small water-wheel, and the effect is excellent, and the expense of the process is so much reduced, that very poor work is now returning with profit, that would not have paid upon the old plan*".[17] Even with these improvements, because of the intimate mix with the barytes and some iron pyrites, the physical nature of the ore, when prepared for the furnace, made it most refractory for smelting.

The South Vein does not outcrop and no shafts are known to have been sunk onto it, all working being via crosscuts from the Main Vein. It has very little throw and regular cheeks, with a hade of about 6° NE, or towards the Main Vein. Eddy tells us that whilst the two veins should converge towards the west, the junction was not seen because of a fault, ranging westwards, with a substantial down throw to the north. The ore in the South Vein was of a different nature from that in the Main, generally being loose in the vein with little matrix, and that generally a friable carbonate of lime, with loose, dry, earthy mineral. The ore was also of a higher quality than that from the Main Vein but, owing to the limited extent of the oreshoot, it was deficient. The bearing ground was limited from the Deep to a little above the Upper Adit, in all about 18 fathoms vertically and much less longitudinally than the Main Vein.

The early 1840s were a busy time at Cononley Mine but the smelting ledger covering the period 1836-58 is missing. It is, however, possible to make reasonable estimates of certain dates from the available fragments of evidence; in cost books, duty ledgers and on the mine plan. The first of the regular sales of Cononley lead was in September 1840 and, unlike previous parcels, it was not smelted at Grassington; it is, therefore, reasonable to propose the period of 1839/40 as that in which the smelting mill in Nethergill was built. [9]

Precisely when the Duke took the lease of the Glusburn ground remains to be proved, but examination of the available evidence allows a reasonable estimate to be made. By 1843, Thomas Garforth, the Mineral Lord, was receiving duty payments for lead raised there; reference to the graph of the mine's overall production indicates a rapid take-off during 1843-44. A survey mark in the Deep

Adit, just inside the Glusburn Liberty, is dated August 1842. If allowance is made for development work, we are justified in favouring that year for the Duke's taking the lease. The surface of the Glusburn section of the mine apparently remained undeveloped, in 1848, when the surveying for the first 1 : 10560 sheets was done. At that time there was no sign of activity, with "*old shafts*" indicated near to the future position of Mason's Shaft and a stone quarry at Garforth's. Underground, however, the advanced state of the workings in the area of Garforth's Shaft, by 1847/8, suggests that shaft sinking most probably began there in 1848. By February 1849, we have the first bargains being let there for stoping in the Middle Vein, above the Middle Level.

PLATE II. Inclined plane, Cononley Mine.

The Inclined Plane (gradient 28%) was a very important means of exploiting the main orebody, the South Vein and the rest of the Glusburn ground. The location of the portal and its alignment also permitted the use of the steam engine for hauling development waste and ore to a central site; where the ore received a preliminary dressing at the steam-powered crusher.[18] As was the established practice at the major shafts on the Grassington Mines, the tubs were hauled to the surface on a wire rope. The use of such ropes was favoured by Stephen Eddy and, as with Grassington at that time, they were supplied by Messrs R.J. Newall.[19] Work commenced on driving the Incline late in 1848, or early 1849, and it was completed in the winter of 1851/2. At the Deep Adit horizon it was some 22 metres from the foot of Garforth's Shaft, and a passing loop and plat (loading facility) were installed. By July 1849, a branch of the Upper Adit was being driven west in the South Vein towards the Incline Plane (N.B. not the true South Vein, but an outflier from the hanging wall of the Main Vein). At this connection a footway and hopper were constructed to permit the haulage of mineral, from workings in the South Vein and part of the Main Vein. The ground on the hanging wall of this part of the vein is a particularly dead shale and, where seen, required heavy timbering. A similar hopper and footway were also built at the point where the incline intersected the Main Vein, to connect with, and serve, the Middle Level workings.

Briggs (Top) Level was also driven from the centralised complex, referred to above, but was described by Eddy as "*a superficial adit, begun at the surface east of Engine Shaft and continued to the east end of the mine*" and left at that. It is not shown by the Ordnance Survey, and the earliest dialling mark is June 1853; at the point where the level re-enters Glusburn ground. In September 1855, the Top Level was being driven east in Briggs' Pasture, from which its name is presumably derived. As it progressed eastwards from Garforth's, the level broke into a long length of old workings and a short crosscut and it was stated that "*here, our predecessor had cut his ground with picks only, and every shift or day's-work could be accurately told by observation of the side of the level*".[10] By 1858, it was still being driven towards Mason's Shaft and was in the very wide part of the Main Vein, from Garforth's eastwards. Here, Briggs Level has been driven as two near parallel headings and examination of the outcrop reveals indications of a large horse in the vein at this point. [12]

The level was also continued eastwards from a short crosscut, driven north, from Mason's Shaft, in 1859. It is on this drift that there is note of an "*old man level*", at a point which agrees with a well grassed heap on the surface. Driving was continuing in 1861, and Briggs Level terminated some 160 metres east of Mason's Shaft, at a shaft, which was some 9 fathoms deep. In 1862 a report to the Kinnaird Commission tells us that "*Dakin's pitch was working on the back of Biggs* (sic) *Level. The pitch being 15 feet wide and 7 feet high, worked by three men*". Also, that "*James Stoddart's sinking was 2.5 fathoms below Bigg's* (sic) *Level; 2 men working*".[20] Neither pitch was marked on the working plan but, judging from the width of Dakin's pitch, it was quite near to Garforth's Shaft.

The Upper Adit was some 20 fathoms higher than the Deep Adit and was driven as a crosscut nearly due south for some 130 metres to its intersection with the Main Vein. This line would also have cut the more persistent of the various strings known to run close to the north, or foot, wall of the Main Vein. An examination of the level, however, revealed no significant trace of mineralisation. The start date of this adit remains to be established, but its relatively inaccessible location, when compared with the efficient layout at the Engine Shaft complex, suggests that it was prior to direct working by the Duchy. The advanced state of the Upper Adit workings in the South Vein also provides some evidence which favours an early date. When considering the foregoing, it must also be remembered that in the late 1820s, Walter Hall & Co. were producing lead from both liberties; it is therefore perhaps not unreasonable to propose that this company was responsible for driving the early sections of the Upper Adit.

The adit was the highest major horizon for development of the mine in the Glusburn ground, extending from the Main Vein into the South Vein and the branch vein, which crosses between them, near Garforth's. In 1858 it was still being driven forward on the Main Vein and eventually terminated some

330 metres east of Mason's Shaft at Overend's Shaft. It appears that the latter was one of a group of "old shafts", shewn on the 1847 O.S. Sheet, which was reopened. The only reference to it, in the tribute book, is the letting of a bargain, in July 1864, for a "*pitch in the north part of the Main Vein over the Upper Adit, to extend from the shaft in Overend's Pasture*". When considered with the layout of the other shafts near to Overend's, their patterning suggests that the vein was starting to split up as it went eastwards. Today, there is little indication of mining at this site, although a section produced by the British Barytes Ltd about 1930, indicates that the shaft was "*29.3 metres deep with 5.2 metres of debris at the bottom*".[21]

PLATE III. The smelt mill chimney.

More crosscuts, at the Upper Adit horizon, were driven south west at both Mason's and Garforth's Shafts and, at the former, some 58 metres of ground were tried without success and abandoned by 1858. At Garforth's, the Upper Adit Crosscut proved and developed the South Vein and, when stopped in 1847, it had extended a further 48 metres into barren ground. Westwards, the extent of the South Vein oreshoot at the Upper Adit crosscut horizon was proved by 1848, and the Deep Adit and Middle Level were then brought up. To the east of the crosscut, however, development was delayed until the late 1850s when the Middle Level, on the NW-SW cross vein, had reached its junction with the South Vein. The Middle Level was driven the full length of that part of the South Vein worked near Garforth's Shaft and, to the west of the crosscut, it appears to have been driven in tandem with the Deep Adit; presumably to provide a ventilation system.

The Middle Level, a purely internal drift, was commenced from a rise and driven eastwards to a point 144 metres SE of Mason's Shaft; where development ceased in 1855.[10] It was near to Mason's that the deepest part of the early workings were cut into, by the Middle Level, at a depth of about 37 fathoms from surface. Also in this area, a long crosscut was driven to the SW in an effort to locate the South Vein, but was abandoned in 1857 without