

BRITISH MINING No.60

**THE  
GREENHOW  
MINES**

by

**M.C. GILL**



**A  
MONOGRAPH  
OF THE  
NORTHERN MINE RESEARCH SOCIETY  
MAY 1998**

To the late  
John Michael Dickinson  
(A founder member of the Northern Cavern & Mine Research Society)



ISSN 0309-2199

ISBN 0 901450 49 9

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Typeset in 10 point Times New Roman

by

N.M.R.S. Publications.

PRINTED

by

RYTON TYPING SERVICE

Ryton Street, Worksop,

Notts.

for the publishers

THE NORTHERN MINE RESEARCH SOCIETY  
KEIGHLEY, U.K.

*Cover illustration:*

*Men working in a fluorspar stope, Gillfield Level, c1935*

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## **PREFACE**

This monograph began as No.4 in the Individual Survey Series of the then Northern Cavern & Mine Research Society in 1970. A revised second edition of it appeared as British Mining No.21 in 1983 and there has been a steady demand for copies since that went out of print. This fully revised edition is intended to complement the Society's monographs on The Grassington Mines and The Wharfedale Mines, which are available as British Mining numbers 46 and 49 respectively.

Prospects for mining in the area remain low. The only lead ore and fluorspar being produced come from Coldstones Quarry, which continues to work its way through the veins on Coldstones. Yorke and California Levels were both submerged when the dam forming Grimwith Reservoir was raised. Many other mining sites have been robbed of stone and are quietly being reclaimed by nature. Gill Heads Mine has remained closed since the Wharfedale Mining Company stopped work there around 1982, and the University of Leeds, Department of Mining and Mineral Engineering, may be about to close its Field Station at the Gillfield Level.

The lead miners are long gone and now many of the fluorspar miners are also dead. Fred Walker, who retired from working fluorspar on Burhill, died in the 1980s. Michael Dickinson, the original author of the Greenhow Mining Field: An Historical Survey, also died in 1991.

Research into the area's extractive industries continues, however, and Geoffrey Blacker has written two important papers on the stone quarrying industry. He has also written, with Mary Barley and Steve Moorhouse, two papers on post-mediaeval iron production in Nidderdale. These were published in British Mining numbers 55, 57 and 59. Meanwhile, the best general history of the area is A History of Nidderdale, edited by Bernard Jennings and written by the Pateley Bridge Local History Tutorial Class.

The area's scenic and cultural value is widely recognised. The western half of the mining field is in the Yorkshire Dales National Park and in 1997 the eastern half became part of the Nidderdale Area of Outstanding Natural Beauty.

The author is grateful to the British Cave Research Association, for access to its Mining Records; the Trustees of the Chatsworth Settlement; the Museum of Yorkshire Dales Lead Mining at Earby; Geoffrey Blacker; the late Adrian Finch; Public Records Office; Mrs Dickinson for permission to use the W.T. Shaw MSS, in the Cumbria County Archives; Shirley Everett; Ian Spensley; Malcolm Street; Les Tyson; W.Y.A.S. Leeds; Robert Willan; and Hazel Martell for editing and the suggestion, and addition, of grammar!

## THE GREENHOW MINES

### INTRODUCTION

The Greenhow mining field includes the liberties of Appletreewick, Knaresborough Forest, Bewerley and Stonebeck Down. The small mines in Stonebeck Up, near Lofthouse, have also been included for completeness.

Greenhow Hill is in high moorland country between the rivers Nidd and Wharfe, some seven miles east of Grassington, in Yorkshire. A complex series of anticlines trending north-east to south-west reveal Carboniferous Limestone in a series of domal inliers, surrounded by Millstone Grits, and broken up by faulting. The North Craven fault enters the area from the south-west and runs along the south flank of the Greenhow Anticline. To the south of the fault, a series of smaller, north-east to south-west anticlines is centred around Appletreewick and Skyreholme. In the northern part of the area, the Bycliffe Vein system from Grassington Moor cuts through the Millstone Grits and has been productive in these measures at the Stoney Grooves and Merryfield Mines in Ashfold Gill. It has been suggested that the presence of strong permanent springs, where the lowest beds are exposed in Trollers Gill, indicates that here the beds (S) rest on a pre-carboniferous ridge.<sup>1</sup> The limestones of D1 age carried the most important ore shoots, mainly where they were underneath a cap of Millstone Grit Shales. The productive veins, generally speaking, run east to west, with a hade ranging from zero to forty-five degrees. Cross veins, trending north to south, shift the main veins laterally, sometimes up to 80 feet, and have not carried much workable ore, most of them being barren.

### MINERALISATION

Most of the ore was won from the uppermost 150 to 200 feet of limestone, immediately below the Yoredale Shales, but ore has also been found in strata which are geologically lower down in the series. Nevertheless, the vertical extent of any ore-zone so far discovered has been very limited.

These ore shoots are, in the main, formed at the junction of the cross veins with the main veins, where the vertical mineralisation is greater than its horizontal dimension. A 'ribbon' type ore shoot is found where the limestones are overlain by shales and in this case the horizontal range is the greatest.

In addition to vertical fissures, which can be classed as type 1 and 2, flats, type 3, have been worked in several places. A fourth type of deposit, known as a pipe, has also been discovered in three localities.

TYPE 1:- Steep fissure vein faulted by strata tension, which causes the vein to side step owing to the stress acting across the strike of the jointing system. This has caused the loss of many veins, the most noticeable example being Gill Heads Vein where the lower part has not been found. Other examples have been seen at the eastern end of Newcastle Rake, at Skip Shaft and also at South Dross Shaft on Wright Vein. At Newcastle Vein the step was also mineralised and formed a bed from one foot to four feet in thickness.



TYPE 2:- Vein where fissuring has preceded mineralisation, resulting in a horizontal side-step which has made exploration of the vein difficult. Har(d)gate End, North Rake and Inman Veins have been shown to be of this type.

In both the above types, the veins show a pattern of alternate wide and narrow lengths, the latter usually barren, owing to joints crossing the vein at an acute angle. Wing deposits similar to, but smaller than, those seen in the Millclose Mine in Derbyshire have been found on Wright Vein, Inman and Walton Veins. In the latter cases the deposits have been almost entirely of fluorspar and usually in the hanging wall of the vein.

TYPE 3:- Flattings (old spelling used), which are mineralised beds following the dip of the strata, and usually connected with a vertical vein. The Gill Flattening, near Stump Cross Caverns, takes the form of an inverted 'L' and has been worked from shafts and inclined drifts along the northern side of Dry (Mongoo) Gill. The vertical limb of the deposit has, in the past, been suggested to be the end of Hargate End, or Willie Waters, Vein. The flattening extends several hundred feet along the strike and has been proven over 200 feet from the outcrop to the vertical vein. Its thickness varies from a few inches to four feet and the ore is concentrated on the floor. Other flattings have been worked at Appletreewick, Nussey Knot, South Vein and in the 56 Fathom Level towards Derby Shaft.

TYPE 4:- Pipes where the prevalent gangue mineral, as in the flattings, is barytes, whereas the vertical veins carry, in the main, fluorspar and calcite. The ore is reported to have lain against the sides, covered with barytes, with a central core of clay, sometimes including a mix of the vein matrix. Pipes have been worked at the Pendleton Pipe, on Coldstones Hill; Gill Shaft, in Mongoo Gill; and the East and West Pipes in California Level. The latter are reputed to have yielded over 1000 tons of galena in twelve months, and the Gill Shaft Pipe is said to have produced £8000 in the 1800s.

The principal sulphide in the veins is galena, which occurs in coarse crystals, disseminated throughout the veins, or in a distinct rib up to two feet thick in a gangue of fluorspar, calcite and barytes in varying proportions. Silver does not generally exceed two ounces per ton of lead sulphide.

The fluorspar of the area is usually pale yellow, but colourless is also common. Pale mauve to deep purple varieties are found in the western veins around Burhill and Appletreewick. In Greenhow Rake, a green spar is found in massive crystals measuring up to six inches on the sides. Most specimens of green or colourless spar show specks of iron sulphide internally. In veins where spar occurs in large pockets, it is usually deposited in vertical layers or columns with strings of clay running through the mass. Quartz is not found in any of the veins and although some silica is associated with the fluorspar it is usually about 5% or below.

Massive calcite occurs in most veins in a columnar form not common elsewhere. When occurring on its own, it is pure white to light cream in

colour and has been mined for the building industry in the past. The crystals weather to dark brown, owing to the presence of iron. A pink variety is also found, mainly on Burhill. Barytes is usually present in all veins, being especially common in fluorspar veins near to the surface, where it appears as a thin selvedge on the vein walls. It is the predominant mineral of the Bycliffe system of veins in Ashfold Side, and is seen in quantity in all other veins which have been worked in millstone grits.

The zonal distribution of the minerals can be divided into four types, with, of course, graduations from one to another.

- |                                 |                                 |
|---------------------------------|---------------------------------|
| 1. Calcite - galena             | 3. Fluorspar - barytes - galena |
| 2. Fluorspar - calcite - galena | 4. Barytes - galena             |

Type 1 is only found at Appletreewick Mine. The area from Trollers Gill to Newcastle Vein on Burhill and north-east to include the Gill Heads Vein belongs to Type 2. From an examination of the tips, the Forest Moor Veins can probably be included in the latter type too. The Craven Moor and Cockhill Veins are all of Type 3, with the exception of Blackhill Vein in the immediate area of the portal up to Ashworth's Shaft where barytes is predominant. Also, it would appear from borehole samples that the Cockhill veins tend, in depth, towards Type 2.

Nussey Knot and the Grimwith veins fall into Type 4, as does, up to a point, the Bycliffe Vein, although, in view of recent assays, these would be better described as barytes - fluorspar - calcite.

#### ASSAYS OF GREENHOW MINE DUMPS

LOCATION	CaF <sub>2</sub>	Si	BaSo <sub>4</sub>	Pb	Source
Blue Joke Vein	47.2	34.1	1.9	-	P.
Cleaver Vein	90.0	1.5	2.9	-	P.
Galloway Gulfs	73.1	5.8	21.4	-	P.
	59.1	12.3	9.3	-	P.
	67.7	6.4	-	1.5	G.L.
	65.1	13.5	11.4	-	P.
Galloway Old Vein	62.1	12.6	18.8	-	P.
	65.2	6.2	-	4.5	G.L.
	50.7	2.8	4.6	0.6	D.S.M.
Greenhow Rake	65.2	6.2	-	4.5	G.L.
Greenhow Rake U/G	50.7	2.8	4.6	0.6	D.S.M.
Merryfield Mine	19.8	-	59.6	1.0	G.L.
Noways Vein	58.7	7.8	26.7	-	P.
Prosperous & Providence Mine	46.3	5.0	47.3	-	P.
	27.0	12.8	51.9	-	P.
	57.3	4.9	38.0	-	P.
	20.4	-	49.1	2.0	G.L.
	4.3	-	78.3	1.4	G.L.
Stoney Grooves - Low	4.3	-	78.3	1.4	G.L.
Stoney Grooves - High	2.9	-	68.5	5.6	G.L.
Waterhole Vein @ Adit	87.7	3.2	1.9	0.3	D.S.M.
Woods Old Shaft	-	6.4	59.5	-	P.

P. Private Source 1977.

G.L. Government Lab. 1942/3.

D.S.M. Dunford, Smith & Moore. Newcastle 1943.

1. Anderson, F.W. "The Lower Carboniferous of the Skyreholme Anticline" *Geological Magazine*, IXV (1928).

## HISTORY TO THE DISSOLUTION OF THE MONASTERIES

In February 1734, Mr Henry Smart Stevens sent a drawing of two ingots of lead to the Royal Society.<sup>1</sup> They had been found, buried two feet deep, on the side of a track at Hayshaw Bank near Dacre. Each ingot was 23¼ inches long by 5¾ inches wide, but one weighed 156 lbs and the other 155 lbs. Both were wedge shaped and were inscribed *Imp. Caes. Domitiano. Aug. Cos. VII*, which means that they were cast in Emperor Domitian's seventh term as Consul, or circa 81 A.D. The word *BRIG* also occurred on the reverse side. Upon analysis, these pigs contained 2 oz. 3.2 dwts per ton of silver, with a trace of gold and small amounts of copper and antimony.

Another ingot of lead, now lost, is said to have been found near Nussey Knott, circa 1860. It weighed about 88 lbs, and was inscribed with Trajan's name, dating it to between 98 and 117 A.D. Despite these clues that the Romans mined for lead on Greenhow, no evidence of their mining or smelting sites remains. Moreover, the lack of evidence for the next 1000 years or so suggests that lead mining remained fairly small scale.

After the Norman Conquest, lands in and around Nidderdale were granted to the de Mowbray family, and Roger, the first baron, made several grants, notably to the monastic houses of Byland and Fountains. The Chartulary of Fountains Abbey records a grant, c1151, from Roger, "*of all copper, iron, lead, and every kind of metal and stone in his forest of Niderdala in whatsoever place found, below ground or above ... in shafts, mines, and minerals*".<sup>2</sup> Along with other lands in this grant was the township of Bewerley, which includes Greenhow Hill. At about the same time, he granted the areas of Stonebeck Up and Stonebeck Down to Byland Abbey.<sup>3</sup> Its grant included "*iron ore and a 10th of my lead house, through all my Forest of Nidderdale*". The precise meaning of "*my lead house*" is not now known, but it suggests that some form of organised mining was being carried out. The wording of these grants is far from precise and, as he did not specify over which part of the forest of Nidderdale each abbey was to exercise its rights, it seems that Roger de Mowbray intended both Byland and Fountains to enjoy the mineral rights simultaneously, that is, in common.<sup>4</sup>

Of the three religious houses with estates in the area, Byland Abbey had the fewest opportunities for lead mining on its lands, unless they found the veins at Merryfield, Lolly Scar or Blayshaw Gill. At all three places, however, most of the veins are covered with barren shale or boulder clay. As early as 1362, the abbey leased its mines to William de Nessfield.<sup>5</sup> Bolton Priory came next (and will be dealt with below) and then Fountains, which was the largest and has the best preserved records.

In 1225, Fountains and Byland abbeys squabbled over their workings in what for a long time has been seen as a boundary dispute.<sup>6</sup> Careful reading of the following apportionment of the dispute suggests otherwise, however.<sup>7</sup>

*“Agreement in settlement of a dispute between Fountains and Byland respecting the mines of Nidredal .... The Abbot and Convent of Fountains grant to Byland two pits in Le Feldberg successively to be possessed forever, within the bounds of Fountains; and likewise for a term of seven years from the Day of the Purification B.M. 1225, two pits in Kaldstanes in common with them, so that the two houses shall divide all expenses and all mineral of those two pits except the King’s share, during that term, and at the end thereof Byland shall withdraw from these two pits at Kaldstanes whether they should have been thoroughly explored or not. Byland shall also have that pit at Kaldstanes jointly with Fountains in which they previously worked in common until the same pit shall have been explored according to the bounds of the mine, with suitable exit and entrance and right of carriage through the pastures and wood of Fountains by the proper ways. In consideration of this Byland has renounced all right, possession and use within any bounds belonging to Fountains by reason of certain charters, so that at the end of the term of seven years Byland shall claim nothing within the bounds belonging to Fountains beyond the two pits in Le Feldberg nor Fountains within the bounds of Byland”.*

Using place-name evidence, earlier writers had placed the disputed mines near Ashfold Side Beck, which was the common boundary of the two abbeys. Kaldstanes and Le Feldberg were translated as Low Coldstones and Heathfield respectively. The lack of mineralisation in this area is, however, a major flaw in their argument. Moreover, if the place-names are re-examined and *Kaldstanes* is taken to mean the summit of Coldstones and Le Feldberg, which means an unenclosed low hill, to be the summit of Greenhow, it has the advantage of agreeing with the mineralisation. It is likely that the two pits on Greenhow Hill were on Greenhow Rake, Primgap or Galloways Old Vein, whilst those at Coldstones were either on Sun Vein or Garnet Vein.

It is also clear that all five mines were within Fountains’ property, and Byland’s claimed right “*by reason of certain charters*” to mine lead ore there as well supports the idea that at least one party believed it was intended that they should enjoy the mineral rights simultaneously. When the seven years were up, Byland surrendered these claimed rights in return for being allowed to keep the two pits on Le Feldberg, thus apparently confining each abbey to its own estates. The use of the phrase “*bounds of the mine*” indicates that the workings were within defined areas, the size of which remains to be shown. The King’s share in the produce of pits at *Kaldstanes* was probably a remnant of earlier royal interests in the area.

It is likely that monks controlled some of the earliest mining, but used professional miners to do the work. For example, Brother Roger, who held Coldstonesfold and Lead House Ing, may have been the mining agent for Fountains Abbey. The 66s 8d [£3.33], for which he accounted in 1361, may have come from land rents or from selling produce to the miners.<sup>8</sup> Later, however,



specified lengths of vein, called meers, were let to miners and local yeomen. They worked at their own expense and paid a duty on any lead raised.<sup>9</sup>

The Black Death, which hit Nidderdale in 1349, may have killed between 45 and 50 per cent of the population. This obviously had an impact on church incomes through tithes, such as the one generally payable on all lead ore which would not pass through a mesh of one inch squares.<sup>10</sup> In 1351, therefore, the Archbishop of York decided that Bewerley and Dacre, which had been part of Kirkby Malzeard parish, should henceforth be part of Ripon parish.<sup>11</sup> This was a pragmatic move because the parishioners from the two townships were said to be:

*“living in a certain Beastlie manner to the perill of there solles ... Manie inhabitants with there wyfes, children and families do dwell ... farre distant from anie parish church, to which for the swellings of waters and other tempests greatlie in winter season some men cannot passe without greate difficultie and corporall danger ... which do till and sowe lands and bread cattell, and by there worke do get manie things and manifold of the ground, that is to saye, of iron digging, lead digging and stoness digging ...”*

When they bothered at all, rather than go to church at Kirkby Malzeard, the parishioners attended the Pateley Bridge Chapel, in Ripon parish, to which they paid no tithes. Confirming this order in 1352, the archbishop assigned *“all the great tithes of the said faithful ... their animals ... and especially of the yield of both iron mines and mines of any other sort”* to the prebend of Studley who had responsibility for that part of Ripon parish.

It is difficult to comprehend how demand for lead or iron could do anything but fall when faced with the huge death toll of the Black Death. Yet the foregoing suggests that the lead and iron mines were of enough consequence for the two parishes to seek clarification of where tithes were to be paid. It also suggests that the miners were, on the whole, working for themselves and were, therefore, tithed individually. If the mines had been worked directly by Fountains, then it would have been responsible for paying tithes.

In 1363 Fountains sent 168 pigs of lead, weighing 20 fothers, from its Nidderdale mines to Hull en route for Windsor. Assuming the fother to be the one later widely used in the area (22 cwts), then each pig weighed 293 lbs. This agrees with the weight of *great* pigs cast in Derbyshire, which weighed twice the weight of a little pig or piece.<sup>12</sup> Thomas de Musgrave, sheriff of York, gave account of lead ordered by the King for work at Windsor in 1365. There were 40 fothers, of which 24 were received at Coldstones, and 16 in York. The expenses of carriage were:<sup>13</sup>

*“Two waggons, each with 10 oxen, carrying 24 fothers of the said lead from Coldstones in Nidderdale, in the county of York, by high and rocky*

*mountains and muddy roads to Boroughbridge, about 20 leagues, namely 24 days each waggon with the men for taking it, 3 shillings per day, £7 4s 0d. And in portage and carriage of the said 24 fothers of lead from Boroughbridge both by land and water to the city of York, about 16 leagues, namely for each fother 2s 4d, 45 shillings. And payment to Adam Candeler of York for portage, boat hire, and carriage for the said 40 fothers of lead from the said city of York to London .... £26 13s 4d”*

Fountains may have neglected its lead mines between 1365 and 1390, however, because in the latter year the officers of the Honour of Kirkby Malzeard again claimed ownership and forced the abbot into leasing them. The matter was settled when Thomas de Mowbray confirmed the Abbey’s title.

The opinion of Nidderdale’s miners must have been held in some regard by 1427 because, at the Bishop of Durham’s request, two of them examined the prospects for reopening Harthope mine in Weardale.<sup>14</sup> Robert Colyer and William Bunch went there in February and again in March, and in April and May they worked for three weeks each at 3s 4d each. Two other miners worked overnight six times, which suggests that they were pumping out water. John Smyth of Wolsingham made five stones of iron into two picks and some wedges for use at Harthope, and a new softened leather tunic was supplied for Colyer. Also supplied was a nine-fathom-long plumb line, costing 21d [9p], which suggests that the old works were already quite deep.

The records also give some insight of monastic smelting technology. Most of it was done in bales, which were essentially wooden bonfires, built on a prominence to catch the wind. Alternating layers of wood and ore were piled in the bale and then the whole was covered by a layer of brushwood to help it burn. As the bale burnt, molten lead ran from it along a channel and into a hollow where it set into blocks of around 10 cwts. Little remains at many bales because they were often quarried by later smelters as a source of lead-rich slags. Beverley has a number of bale sites.

The Fountains’ accounts also refer to a “*smeltmlyn*” between 1446 and 1558. This has always been automatically linked with the hamlet of Smelt Houses, but that place belonged to the Archbishop of York, not Fountains Abbey. It may be, therefore, that the lead smelting site on the lower reaches of Smelt Maria Dyke is the mill referred to.<sup>15,16</sup> This was on Fountains’ land and agrees with an account for carriage of lead from Dacre to Warsill, where lead ore may have been smelted at a bale on ‘Baal Craggs’ and the slags treated in the smelt mill.<sup>17</sup> Both locations were convenient for use of the ‘Lead Wath’, or river crossing, whose name is preserved in the name of a nearby wood. The mill did not replace the Abbey’s bales, however, and in 1455, William Hudson, smith of Adfield, was paid for making a “*sufflatorium pro le bales*” (an iron tuyère?).<sup>18</sup> As late as 1542, Robert Elles was paid for the carriage of 22 pieces of lead from his bale to Boroughbridge.<sup>19</sup>

The mill appears to have been closed by 1527 when Fountains let its smelting to Marmaduke Bayne, of Bridgehouse in Nidderdale, gentleman, John Parkinson and William Lupton of Bishopside. They agreed to carry all the lead delivered to them at “*Greenhow Moor to the bale hills in the Bishopside, where they would burn it [smelt] at their own charge, not using Abbey wood unless paid for; to make one fother of lead from each 8 loads of ore*”. The term of the contract was to be at the will of the Abbot.<sup>20</sup>

The locations of the smelting works for Byland and Bolton abbeys are not known. The former’s may have been near Heathfield, while a stream called Smelting Sike, near Bolton Bridge, is a possible location of the latter’s works.

By the late 15<sup>th</sup> century the York merchants had formed a guild, eventually called the Merchant Adventurers, which was intent on engrossing lead trade from Boroughbridge and Hull. By 1498 it had set a scale of charges for weighing lead and in 1499 imposed a virtual monopoly on the trade by forbidding any lead coming from Swaledale, Wensleydale or Craven to be weighed at Boroughbridge or at any other place outside York.<sup>21,22</sup>

*“... all manner of men as well denycen and foreign that from this day forward shall bring any manner lead from Boroughbridge or any other place to this city by land or water to be wound and weighed at the common crane of this city shall from henceforth pay to the common well of this city for winding and weighing every fodder of lead 7d, of which 7d a penny shall be given unto the labourers for bringing of a fodder lead from the garret in to the scale there to be weighed; and from the scale into the crane garth and from the crane garth into the garret again, there to be struck.”*

*“... it was enacted that from this day forth no franchised man of this city in his own person nor non other for him or to his use or byhove by no manner lead coming from Swaledale, Wensleydale or Craven and weigh it at Boroughbridge nor at any other place outside this city ... on pain of forfeiture for every fodder lead so to be bought and weighed at Boroughbridge or at any other place out of this city contrary to this ordinance - 20s.”*

The Guild next tried to corner the market and, in 1502, complained to Marmaduke Huby, about his activities in the buying and selling of lead.<sup>23</sup>

*“To the Reverend Father in God, the Abbot of Fountains ... we understand that you occupy buying and selling lead and other merchandise as a free merchant, contrary to God’s laws and man’s, you being a spiritual man and of religion, and so your occupying is great damage and hurt to us merchants in these parts. Wherefore we will desire you to cease and leave such buying and selling of merchandise, so that we have no further causes to complain to my lord*