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## YORKSHIRE SMELTING MILLS,

### PART 2: THE SOUTHERN DALES AND LANCASHIRE.

by Michael C. Gill

#### SYNOPSIS

*This paper discusses lead smelting sites in the southern part of the Dales and north-east Lancashire, encompassing Wharfedale, Nidderdale, Airedale, Craven and Rossendale. It follows a paper on similar sites in Wensleydale, Swaledale, Arkengarthdale and their tributaries. This latter paper, as intended, has already stimulated debate, with two responses from members published in the Society's Newsletters.<sup>1,2,3</sup>*

The first paper drew attention to significant faults in the locations of some Swaledale smelting mills, but this is not a problem in the Southern area. Nevertheless, one is soon faced with a series of confusing and contradictory statements on dates. In an attempt to resolve matters, therefore, this paper re-examines the evidence for each site and presents an outline of its history to complement other works.

Most lead smelting remains in the region concerned have deteriorated significantly since the 1930s. Fortunately, however, the Earby Mine Research Group and the Crosshills Naturalist Society have repaired the chimneys at Cononley, Malham and Grassington. The Yorkshire Dales National Park has also worked on the Grassington chimney and is preparing a programme of consolidation for the Cupola mill. The Lumb Clough and Buckden High smelt mills have also been excavated by the Northern Mine Research Society.<sup>4,5</sup>

There have been a number of studies of the Dales' lead smelting industry, but the principal one, by Robert Clough, was primarily an architectural survey of Yorkshire smelt mills.<sup>6</sup> Most of Clough's surveys were done in the late 1940s and the early 1950s, when many mills were fairly complete, but Clough's drawings lack the precision required for modern archaeological records. Moreover, because little or no work had been done on the history of lead mining and smelting at the time of his survey, Clough's text has many deficiencies. Nevertheless, for all its faults, his book remains the only comprehensive survey of Yorkshire's smelt mills. The most important paper on the area was by Dr Raistrick who, for the first time, attempted to establish a chronology for mills in Upper Wharfedale.<sup>7</sup> The other studies included notes on the mills within the context of the mines and are of varying value.<sup>8,9,10,11,12</sup>

#### EARLY SMELTING SITES

Although no one has undertaken a survey of bale smelting sites to parallel that by Lawrence Barker for Swaledale and Arkengarthdale, the following table and notes show that bales were used.<sup>13</sup>

**DISTRIBUTION OF BALE AS A PLACE NAME ELEMENT**

<b>NAME</b>	<b>PARISH</b>	<b>GRID REF.</b>
Baxenden Bale	Baxenden	Unknown
Bale Hill	Rimington	SD832440
Bale New Plantation	Martons Both	SD891499
Tag Bale	Hebden	SE053668
Bale Bank	Bewerley	SE139653
Baal Craggs	Dacre	SE163618
Bale Hill	Low Bishopside	SE174658

The first three sites on the above table are in places not normally associated with lead mining. Nevertheless, lead miners at Baxenden, near Accrington, were smelting at an unknown bale site in 1304.<sup>14</sup> The Bale Hill near Tory Log Clough served workings either at Skeleron or on a nearby fault. Bale New Plantation is near to the A59, at West Marton. This site, however, is not near any known source of lead ore.

Tag Bale is near the outcrop of the Bycliffe Vein at Groove Gill, in Hebden, but it was once considered to be at the boundary of the Grassington liberty.<sup>15</sup>

Greenhow Hill was the principal centre of early mining in the southern dales. Like most of the dales, this area's mines were dominated by Monastic interests from the 12th to the mid-16th century. Unlike the northern area, however, where smelt mills are unknown before the late 16th century, there was one near Greenhow in the mid 15th century.<sup>16</sup>

**SMELT HOUSES**

Smelt Houses

SE192643

In the period 1446-58 Fountains Abbey accounts refer to a '*smelmyln*', which was probably at Smelt Houses, near Pateley Bridge. It did not replace the Abbey's bales, however, and in 1455 William Hudson was paid for making a "*sufflatorium pro le bales*" (an iron tuyère?).<sup>17,18</sup> The mill appears to have been closed by 1527 when Fountains agreed with Marmaduke Bayne & Co. to smelt at its Bishopside bales. As late as 1542, Robert Elles was paid for the carriage of 22 pieces of lead from his bale to Boroughbridge.<sup>19</sup>

**BISHOPSIDE BALE**

Low Bishopside

SE174658

A field in the south-east corner of Bishopside is called Bale Hill, and in September 1527 the abbot of Fountains made an agreement with Marmaduke Bayn of Bridgehouse, and John Parkinson and William Lupton of Bishopside, to carry all the lead delivered to them at "*Greenhow Moor to the bale hills in the Bishopside, where they would burn (smelt) it 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>

**BAAL CRAGS**

Dacre

SE163618

As well as the place name, this is one of the few sites with field evidence of a bale smelting site. The former is supported by the occurrence of the element 'Black' (Black Hill, Nanny Black Hill and Black Sike), which is felt by some to be another indicator of locations used for smelting. The nearest mining was at Mineral Farm, about 2.5 km to the south-east but, if the bale was monastic, the ore could have come from Beverley.

**BALE BANK**

Beverley

SE138653

The place name evidence, with the elements 'Bale' and 'Black' (Bale Bank and Black Pasture), supported by historic evidence that lead was collected from Coldstones, is a good indication of a monastic smelting site here.

**BEAMSLEY MILL (Putative)**

Beamsley

SE088525

It is not known where the Priors of Bolton smelted their ore, but the stream called Smelting Sike, near Bolton Bridge, is a possible location.

**LANCASHIRE**

**ANGLEZARKE MILL (Putative)**

Anglezarke

SD623190

When Sir Thomas Standish let his mines to Sir Henry Houghton in 1721, the lease contained provision for the construction of a smelting mill at a place called Wharf, in Anglezarke.<sup>21</sup> No trace of a mill has been found, but its intended position is assumed to have been on the Warth Brook, which flows near White Coppice.

**DUNNOCKSHAW CUPOLA MILL**

Cupola Clough

SD804284

The Clitheroe Mining Company built this small mill, which had a reverberatory furnace, near the head of Great Clough. Kerr notes that "*The Cupola was begun in June, 1755, and finished in the following November, at a cost of £61.36 for the mason work, stone and lime being provided by the company, and a further expenditure of £3.17, apparently for appliances, making a total of £64.53*".<sup>22</sup> Besides smelting its own ores, it is recorded that the company purchased ore from mines at Bowland, Rivington (Anglezarke) and Brennand.

The precise nature of this mill has been the subject of some speculation, with claims that it was equipped with a horizontal flue and distant chimney. In support of his argument in favour of a long chimney, Kerr invoked local tradition and noted that "*this furnace was built in the bottom of an almost inaccessible cwm*" and, of the chimney, that "*the flames issuing from it were seen at some distance in different directions*". Further, and also by tradition, he noted "*that for a wagger a man crept up it, from bottom to top, and died from the effects of vapours inhaled during his progress*". In reviewing this argument, examination of the area at the head of Great Clough has

failed to reveal any traces of such a flue which, if it had been built in 1755, would have been truly innovative.<sup>23</sup>

The Clitheroe Mining Company was wound up in 1766, but some of its old shareholders floated a new company in December 1768. No details of the new company's activities are known, but it may have kept the mill open until it too was wound up in February 1775.

### **THIEVELEY OLD MILL**

Holme Chapel

SD873277

This mill, which began work in early 1629, was built by Raffe Highley & partners at a cost of "*twelve pounds and some odd money*".<sup>24</sup> In December 1630, however, the Council of the Duchy of Lancaster rescinded the agreements made with Highley & partners and ordered them to quit the works and be given £150 in compensation for their charges. These included the smelt mill, which was to be taken into the King's use.

Because the hearth was blown by foot-bellows, this mill was a constant source of problems and gave a very poor return on the ore smelted. In one case 2 tons of ore gave only 6.5 cwt of metal, which was a yield of only 16 per cent at a time when at least 50 per cent was expected.<sup>25</sup> The mill had been converted into a store for lead ore by autumn 1631.

### **THIEVELEY NEW MILL**

Holme Chapel

SD878280

Built by Richard Towneley, to serve the King's mine at Thieveley, this mill was reported as "*now beginning to smelt*" in December 1632. It closed with the mines in the spring of 1635.

## **BOWLAND & RIBBLESDALE**

### **SYKES MILL**

Bowland Forest High

SE641511

The history and precise location of this mill, at Smelt Mill Clough, near Sykes, are unknown. Smelt Mill Clough is shown on the Tithe Map for the Upper Division of Bowland, dated 1841.<sup>26</sup> It has been suggested that the site of the mill was later occupied by a group of cottages. On both the tithe map and the first edition of the Ordnance Survey 1/10560 sheet, however, these houses, known as Smelt Mill Cottages, are not marked, nor is any reference made to them in the schedule attached to the tithe map.

The mill is clearly an old one, therefore, and there is some, admittedly tenuous, evidence for smelting in the early 17th century, when Bevis Bulmer was working the King's Silver Mines on Brunghill Moor, near Newton. Although we know little of his operations, it is probably safe to surmise that a blanket lease was held by the Company of Mines Royal and, as such, Bulmer may have worked at Sykes, Brennand and Ashnott. It is not known if Bulmer had a smelt mill on his mines, but, in 1630, Charles

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Coare, the smelter at Thieveley Mine, was from Bashall Eaves, which is on the edge of Bowland Forest.<sup>27</sup>

### NEWTON FELL MILL

Newton

SD712484

This mill, which served the Brennand Mine, stood alongside the Clitheroe to Newton Road, near Walloper Well, and was built by the Duchess of Buccleuch, in 1814. It probably had a single ore-hearth, and maybe a slag-hearth, which vented into a short horizontal flue. The mill was not working in 1835, when we learn that “*There is a lead mine (Ashnott?) within the manor, from which a considerable quantity of ore has been obtained, but is not now wrought, in consequence of the depreciation in the value of lead. There is also a smelt mill near the mine, with an overshot waterwheel, and the requisite apparatus for smelting ore, and which mill etc. belongs to the Lord of the Manor*”.<sup>28</sup> At the time, the liberty belonged to Edward Peregrine Towneley, whose family had purchased the Lordship of the Manor from the Duchess of Buccleuch. The mill, which had closed in the slump of 1830-31, was recorded as a dwelling (Smelt Mill Cottage) in the censuses of 1841 and 1851. The censuses of 1861, 1871 and 1881 make no mention of either the cottage or the mill.

### SKELHORN MILL

Rimington

SD815449

This is a small mill on the north bank of Ings Beck. It was probably built in the early 1820s and closed in the slump of 1830-31. The mill’s flue ran for a short distance up the hillside to a chimney, which stood on the edge of the valley near to the west end of Skeleron Wood. The 1850 Ordnance Survey map shows it as an “*old smelting house*”.

## AIREDALE

### MALHAM COPPER MILL

Malham

SD912633

In the late 1670s, lead ore from Dewbottom, on Malham Moor, was smelted at John Lambert’s smelt mill.<sup>29</sup> Lambert was the mineral lord for Malham and, because neither of the other mills in the immediate area, at Kettlewell and Grassington, belonged to him, it is likely that his mill was also in Malham. This is confirmed by Hurlley who, in 1786, noted a ruined smelt mill and that copper smelters, working for the Lambert family, had lived in Janet’s Cave. This must also have been in the 17th century because the Lamberts disposed of their estates in 1699.<sup>30</sup>

Dr Raistrick proposed two possible sites for the mill. The first, and most likely site, is downstream from Janet’s Cave, in Wedber Wood where he noted traces of masonry. The second was the site of the 19th century lead mill, on Dean Moor.<sup>31</sup>

### MALHAM LEAD MILL

Malham

SD883661

This was a small mill, probably with a single ore-hearth and a slag-hearth, which served mines on Pikedaw and Malham Moors. According to Dr Raistrick, it was built

by Lord Ribblesdale c1815, but lead ore from Malham was also smelted at Grassington between 1747 and 1840. The mill may have worked to around 1875.

### **MALHAM CALAMINE HOUSE - OLD**

Malham

SD874640

After 1787, the Pikedaw mines also produced significant amounts of calamine, which was roasted before being sold to brass manufacturers. The first such furnace was built 350 metres south-west of Twin Bottom Scar, around 1787.

### **MALHAM CALAMINE HOUSE - NEW**

Malham

SD900630

This was built at the head of Malham village, around 1800, to replace the Old Calamine House near the mines. A new furnace was built in 1812.

### **CONONLEY**

Cononley

SD983465

This mill was built by the Duke of Devonshire c1840 to serve his mines on Cononley and Glusburn Moors. It closed in 1871. Any ore raised at the Cononley mine before 1840 or after 1871 was smelted at Grassington. In the 18th century, ore from the Glusburn mines was smelted at Lumb Clough mill, in Sutton.

Clough claimed that Cononley mill had two ore-hearths and a roasting furnace, but, in 1987, Gill questioned this and proposed that it only had one ore-hearth and a slag-hearth.<sup>32</sup> Whilst reviewing the evidence for this paper, however, even this latest interpretation came under doubt. It now appears that what Clough had described as a roasting furnace was, in fact, a reverberatory (smelting) furnace.

The evidence for this, whilst circumstantial, is as follows. Besides accounting for work at the slag-hearth, the mine ledgers only ever refer to work at, or on, a furnace. For example, in March 1851 the furnace was repaired. In November 1852, the smelters were paid for '*making furnace bottom*' and '*running bottom*'.<sup>33</sup> These terms are all more readily associated with a reverberatory furnace than an ore-hearth. Moreover, the only fuel bought by the mine was coal. Some of this was for the steam engine, but the rest must have been used in the smelt mill. Whilst coal was often blended with the other fuel burnt in ore-hearths, it is unlikely that it was used exclusively.

A double flue runs for 120 metres up the hill to a condenser where it unites and continues for 255 metres to the site of the original chimney. Around 1852 the flue was connected via Joy's Level and its air shaft, to the present chimney near the summit of the Gib. This arrangement is unique, although in 1860 it was proposed extend the flue from the Kettlewell mill in a similar way through the Cam Level and up the Old Gin Shaft to a new chimney.<sup>34</sup> This was never done.

The Cononley flue was periodically flushed by damming a boggy area to the south-east of the chimney with a low earth wall. The course of a leat from the dam to the chimney can be seen. In the 1960s, members of the Crosshills Naturalists Society and

the Earby Mine Research Group repaired the chimney. The rather plain exterior hides a cunning method of achieving the required taper whilst maintaining strength; from its interior, one can see that the stonework has been corbelled.

### **LUMB CLOUGH MILL**

Sutton in Craven

SE008429

This was a single ore-hearth mill, which served mines on Glusburn Moor. The mill was excavated by members of the Northern Cavern & Mine Research Society in 1973, and reports were published in *British Mining*.<sup>35,36</sup> Historical data for this mill is scant, but its excavators placed its building after 1666 and most probably between 1728 and 1746.

The mill was built against the embankment of a small reservoir. This supplied water to the wheel which drove the bellows. Two keeper stones, for the ore-hearth, can still be seen, as can the wheel pit. A stone-lined chop kiln, for making chop-wood, is built into a nearby banking.

## **WHARFEDALE**

### **BUCKDEN HIGH MILL**

Buckden

SD954781

Sometimes also called the Out Moor Mill, this mill had one ore-hearth, which was also used for smelting slag. In January 1697/8, a lease of the Blew Groves Mine, on Buckden Gavel, stipulated that the ore was to be smelted at the Earl of Burlington's Grassington (Low) mill.<sup>37</sup> Nevertheless, Buckden High Mill was built very soon afterwards. It was in a very inconvenient place and appears to have given problems because it was rebuilt in 1704/5 and was closed by 1717, when smelting was transferred to the Buckden Low Mill. Between September 1732 and September 1733, some of the hearth stones were taken from the High to the Low Mill. The former was then described as "*the Old Mill, on the Out Moor*". It must be stressed that this mill served mines near the boundary with Bishopdale and not the nearby level, which was not driven until 1804.

Buckden High Mill was excavated by members of the Northern Cavern & Mine Research Society in 1974, and a report was published in *British Mining*.<sup>38</sup> Objects found (including a hearth bottom and side stone, both of iron, and a gritstone pipe-stone) are on display at the Earby Mines Museum.

### **BUCKDEN LOW MILL**

Buckden

SD933768

This mill was built by July 1704, by the Earl of Burlington and, after the High Mill was closed, was usually called the Birks Mill. As was usual around this time, the mill's single ore-hearth was also used as a slag-hearth. In 1743, for example, David Popplewell was paid for pulling down an ore-hearth and setting up a slag-hearth.<sup>39</sup> It was the only mill in the Starbotton and Buckden (sometimes called Langstrothdale) Liberty during the rest of the 18th century, and smelted ores from small mines on Springs Cam, Buckden Gavel, and what became Wharfedale mine.



In May 1741, Solomon Bean, the Grassington Barmaster, and Stephen Barrat went to Swaledale to see a stamping mill.<sup>40</sup> The AD Mines did not have stamps then, and so this was probably the one near Moulds High smelt mill, at NY989019, which served the Arkengarthdale mines. Later the following year, a stamp mill was built at the Birks Mill, where it crushed slags.<sup>41</sup>

Production in the Buckden liberty received a boost when the Buckden Gavel Level, begun from the gill above the High Mill in 1804, found good ore. Nevertheless, in 1814, the Duke of Devonshire's agents conducted a trial between the Grassington Cupola and the Birks Mill, which had an ore-hearth.<sup>42</sup> This was to settle which of the two *'made the better produce in lead and also the expense in smelting and carriage of the ore from the mine to each place and the lead to Skipton from each place'*. No allowance was made for the cost of running either smelt mill or for their depreciation. Two parcels of otherwise identical ore, each about 10 tonnes, were weighed and smelted and the results were as follows:-

Birks (Buckden Low) Smelt Mill (ore/slag-hearth)  
produced 72.8 per cent at a cost of £2.53 per tonne.

Grassington Cupola (reverberatory)  
produced 75.5 per cent at a cost of £2.67 per tonne.

The results were contradictory, showing the cupola to be about 3.6% more efficient but, owing to the haulage costs, 5.5% more expensive. If the latter charge had been identical, however, then the cupola would have produced lead at £1.95 per tonne, which was a considerable saving. The agents ignored the difference in haulage costs, however, and closed Birks Mill almost immediately, concentrating all smelting at Grassington.

The site of the mill is now occupied by a shooting hut, but slags are still visible. A cast iron pipe-stone, recovered by the N.C.M.R.S., is on display at the Earby Mines Museum.

## STARBOTTON CUPOLA

Starbotton

SD955750

According to Dr Raistrick, the Starbotton mill had one ore-hearth and a slag-hearth, and smelted from 1815 to 1877.<sup>43</sup> An exhaustive search of the Duchy of Devonshire's archives, by the present writer, has, however, found nothing to support this view and much to contradict it.

After the closure of the Birks Mill in 1814, all the ore from Buckden and Starbotton was smelted at Grassington Cupola until 1843, when the Starbotton Smelting Company built its mill at Starbotton.<sup>44</sup> This mill had a reverberatory furnace and a slag-hearth and it smelted ore mostly from the Buckden and Starbotton Gavel mines. It did not work continuously, having an annual smelting regime lasting about two months between late October and May in most years. The last recorded smelting was done in early June 1862.<sup>45</sup>

The Starbotton mill is unique amongst the southern area's mills because it was built and run by a private smelting company, rather than the Mineral Lord or a mining company. This was more the rule in Derbyshire. Moreover, it was only the fourth, and last, Yorkshire lead mill which relied solely on cupola furnaces.<sup>46</sup>

Apart from the waterwheel pit, which is built into the side of the stream, on a bend just below a waterfall, little remains at the mill. According to the Ordnance Survey, it was about 6 metres by 17 metres and had an enclosure of 14 metres by 46 metres.

The flue, which is about 600 mm square in cross-section, runs up the side of the gill and, until soon after 1857, terminated at a chimney on the edge of the gill, near Starbotton Cam Road, about 106 metres from the mill.<sup>47</sup> The flue was then extended and now runs for some 330 metres to a chimney in Cam Pasture, overlooking the gill. The chimney is square in plan and steps in from 4.3 metres square at the base, to 3.6 metres in the middle, to 3.4 metres at the top. It was about 8 metres high and is surrounded by a small, walled enclosure. The inside of the chimney is circular and tapers from 1.8 to 0.6 metres diameter.

### **KETTLEWELL**

Kettlewell

SD975728

This was the longest lived smelting site in Yorkshire, having worked for over 218 years. The first mill was built by the Trust Lords of Kettlewell before 1669.<sup>48</sup> By 1831, the mill was in a poor state and it was resolved to build a flue. Clough suggests that nothing was done, but it is likely that the flue, which terminated at a chimney near the enclosure wall about 20 metres behind the mill, was built then.

The mill was inefficient and was giving further problems with pollution by 1860, when the Trust Lords proposed to modernise it and build a much longer flue. A combined turf house and office was built onto the north end of the mill in 1862, but it was not until 1868 that a new slag-hearth and roasting furnace, similar to those used at the Cobscar mill, were built by Messrs Brown of Low Row. The flue was also extended at this time, but the original plan, to extend it to the entrance of Cam Level and build a chimney on the top of Old Gin Shaft, was not carried out. Instead, the flue ran for 680 metres to a chimney alongside the Top Mere Road.

Contrary to Clough's suggestion, however, the mill's single ore-hearth was not built in 1868 and there is no evidence that it looked like those used at Keld Heads Mill. The original hearth would have been against the partition wall, near the centre of the mill, and it was probably moved onto the back wall when the flue was built c1831. Both the ore-hearth and the slag-hearth were blown by a waterwheel-powered fan. The roasting furnace was a small cupola, worked from one side only, like that at the Surrender Mill in Swaledale. Unlike the latter, however, which had its own vertical chimney, the fumes were ducted into the flue system.<sup>49</sup>

The mill closed in 1887, but was kept in good condition until 1942, when it was blown up by the army.<sup>50</sup> The chimney, however, was blown down by a gale in February 1893,

when the local newspaper reported that it had been built by Mr Airey, of Preston Under Scar, about 25 years before.<sup>51</sup>

### **KILNSEY MILL**

Kilnsey

SD973677

Kilnsey mill belonged to the Tennent family, of Chapel House, who were the Mineral Lords of Kilnsey and also joint Lords, with the Grassington Mineral Lord, of the Hawskwick Liberty. The mill was working by August 1729, when the Grassington Barmaster recorded the “*carriage of 7 loads of coal to Kilnsey smelt mill at 4d per load*”.<sup>52</sup> The first edition of the Ordnance Survey 1/10560 sheet, published in 1851, still shows it as a smelt mill but smelting apparently stopped around 1827.<sup>53</sup> Mining had not stopped, however, and parcels of ore from the Kilnsey Liberty were smelted at Grassington between 1831 and 1853, at Starbotton from 1852 to 1862, and at Kettlewell in 1872.

### **THE GRASSINGTON SMELT MILLS**

There were four smelt mills at Grassington but, until the present writer described their history, their number and chronology have been confused.<sup>54</sup>

### **LOW MILL**

Grassington

SE006633

This, the first of Grassington’s smelt mills, was built in 1605 by the Earl of Cumberland. It stood on the north bank of the River Wharfe, opposite Linton church, and underwent many alterations. For example, a second ore-hearth was added in 1741, a third in 1754, and a second waterwheel, for driving the bellows, was built in 1761.<sup>55</sup>

Each hearth, or pair of hearths, had its own chimney which, like the one at the Marrick High Mill in Swaledale, probably extended about 4 metres above the roof. This was a common arrangement until the end of the 18th century, but it caused serious pollution problems on adjoining land.<sup>56</sup>

From October 1792, smelting was switched from the Low Mill to the new Cupola Mill on the moor. A stockpile of ore still remained at the Low Mill, however, and it was not until the 7th February 1793 that the last smelting was done there.

### **HIGH MILL**

Grassington

SE025866

This mill dates from 1637 and was also built by the Earl of Cumberland.<sup>57</sup> It was near the Moor Gate, at Coalgrovebeck, but, though more convenient for the mines, its elevated and exposed location made it susceptible to loss of waterpower through frost or drought.

The mill, which had a single ore-hearth, was closed by 1650 and there is no mention of it in 1692, when the Burlington accounts begin. All that remains of it now is the outfall from the waterwheel and a scatter of slags.

## MOOR MILL

Grassington

SE025663

The Coalgrovebeck Company built this mill, which began smelting in October 1756, but the Mineral Lord had purchased it for £208 0s 8d by September 1758.<sup>58</sup> Judging from the tonnages it handled, the mill only ever had one ore-hearth.

Unlike the Low Mill, which had hitherto only burned wood, the Moor Mill began by burning peat, which was stored in two adjacent peat houses. Owing to a dispute with the freeholders, who claimed ownership of the soil, however, the use of peat at the Moor Mill was discontinued in the spring of 1768.<sup>59</sup>

Because the Cupola Mill was built alongside the Moor Mill, the latter did not have to run down its stock of ore. Instead, the last concentrate was smelted there on September 7th, 1792, and work was transferred to the Cupola a month later. The Moor Mill was incorporated in the Cupola complex.

## CUPOLA MILL

Grassington

SE025663

The history and development of this mill, which began smelting on October 2nd 1792, was discussed in British Mining No.46. Nevertheless, even this model may be subject to some revision because of questions raised by a detailed survey of the site commissioned by the Yorkshire Dales National Park in the autumn of 1992. The preliminary findings of this survey, by the Archæological Unit of the University of Lancaster, whilst agreeing with much of Gill's model, suggest that some structural phases within the mill may have been in the reverse order.<sup>60</sup>

The outline of Gill's model is as follows: The cupola was built with two furnaces and a very short flue leading to a chimney immediately behind the mill. The present flue system, which has a combined length of around 1.8 Km, was built in four stages between 1840 and 1855.

From 1792 until 1826, the mill had two furnaces. Late in 1825 or early 1826, a third furnace was added. No.1 furnace was shut down at the end of August 1830. The remaining pair were still called No.2 and No.3, however, until at least 1855.

The slag mill appears to have been the former Moor Mill which took advantage of the latter's waterwheel for driving its blowing mechanism. The mill had a normal slag-hearth until 1858 when Yorkshire's only known example of a Castillian, or Spanish, slag-hearth was built.<sup>61,62,63</sup>

The history of the mill's last twenty years or so are a blank because the ledgers from 1856 to May 1882, when the Cupola closed, are missing. Nevertheless, it is unlikely that any more major changes were made at the Cupola Mill.

## HEBDEN

### HEBDEN MILL

Hebden

Unknown

Smelting accounts in the Chatsworth archives refer to a mill at Hebden between

1722 and 1732.<sup>64</sup> From 1737, however, ore from mines in the Hebden liberty was smelted at Grassington. The two most likely sites for the mill are either near the junction of Bolton Gill and Hebden Gill, or on the west bank of Gate Up Gill, near Old Prosperous Mine.

### **BOLTON GILL MILL**

Hebden

SE025641

This mill was built by the Hebden Moor Mining Company and, despite its name, it was at Hole Bottom, in Hebden Gill. It first appears in the Hebden Barmaster's accounts for 1858, but it only had a very short life and most of the ore continued to be smelted at the Grassington Cupola.<sup>65</sup> In 1872, slags belonging to the Hebden mines, from the latter mill, were smelted at Kettlewell.

There are few visible remains of the mill, which had a yard at the east side. A very short flue, from the single ore-hearth, ran up the hillside to a chimney.<sup>66</sup> The mill's water supply came from near the portal of Longshaw Level in a line of 400 mm diameter salt-glazed pipes. The latter can be traced along the gill side, with a very shallow fall to a point about 23 metres above the smelt mill. Such a high fall onto a waterwheel is unlikely and it is possible that a pelton wheel was used to drive the fan which blew the hearth.

## **NIDDERDALE**

### **DACRE BANKS MILL**

Dacre Banks

SE197623

Thomas Grainge draws attention to the possible site of an early mill near Dacre Banks Church, presumably on Smelt Maria Dyke.<sup>67</sup> He claims that it was "*a bale of more than ordinary size*", but this is very unlikely because it is near the valley bottom. It is also unlikely to have been a smelting, where slag was smelted, because the site "*was found to contain so much unfused ore that it was removed and smelted again with profit*".

### **FOREST MILL**

Thornthwaite with Padside

SE128604

In 1757, the Duke of Devonshire became farmer of the Duchy of Lancaster's minerals in the Forest of Knaresborough. Mines were opened at Pockstones and Black Rigg and, in 1762, the Duke built the Forest Mill, incorrectly called Hoodstorth Mill by some, to serve them.

This early phase of mining may have been directly overseen from Chatsworth, but the liberty's later history is linked with that of Grassington. The Earl of Burlington owned the minerals in the latter place and, when he died, they passed, through his daughter, to his grandson, the Duke of Devonshire's eldest son, the Marquis of Hartington. Precisely when the Forest mines came under the control of the Grassington Barmaster is not clear, but it was probably in 1770, when the Marquis became Duke.

Following the reorganisation of mining at Grassington in the 1770s, the Forest Mill was judged to be inconvenient and it was neglected. The miners complained and asked to be allowed to smelt at White's Mill.<sup>68</sup> This would have meant a loss of control, however, and so the Forest Mill was closed in 1789 and smelting was transferred to the Grassington Low Mill.

### **PROCTOR'S MILL**

Bewerley

Unknown

Sir Stephen Proctor built a smelt mill on Bewerley Riggs in 1606. Its location is unknown, but it is likely to have been the site later used for White's mill.

### **WHITE'S MILL**

Bewerley

SE152651

Little now remains of this mill, which belonged to the White family of Walling Wells, who were the chief Mineral Lords of Bewerley Liberty. Richard Taylor became owner of the minerals on Bewerley Common before 1678 and they passed to Thomas White, who married Taylor's daughter, in 1698.

White's Mill, on the banks of the Sish Wash in the grounds of Eagle Hall, may be on the site of Proctor's Mill. White was working the mines by 1699 and one of his mill accounts, for c1707, has survived. This shows that the mill had an ore- and a slag-hearth, and that lead was shipped to York via Milby, on the River Ouse.<sup>69</sup>

The mill is shown on Thomas Jeffrey's 1773 map of Yorkshire, and it is also on a map prepared for the sale of Eagle Hall Estate in April 1814.<sup>70</sup> Although details of the mining leases were included in the sale catalogue, the minerals were reserved. Nevertheless, it is likely that, if White's Mill was not already closed, the purchasers of Eagle Hall had it closed soon after the sale.

### **GILLFIELD OR SUNSIDE MILL**

Bewerley

SE115648

This mill, which is shown on a plan dated 1789, was built by Overend & Co., who were lessees of the Coldstones mines from November 1782.<sup>71</sup> According to Jennings, the mill was still working in 1818, but Moss's plan of the area, dated 1800, does not show it.<sup>72</sup> Many factors, however, point to Gillfield Mill having closed by the end of the 18th century.

For example, the mill's water supply came from Thornhill Level and was supplemented by the intermittent flow of Sand Gill Beck. This supply was greatly diminished when Gillfield Level reached the Waterhole Vein and took the water off lower than the mill. Moreover, Coldstones and Cockhill Mines had many partners in common and, by 1800, the principal shareholder of both mines was Edward Cleaver. It remains to be proved, but it is likely that this, and the cross-interest of shareholders, led to the transfer of smelting to the nearby Cockhill Mill.

### **COCKHILL MILL**

Bewerley

SE115649

This compact mill, which was built by Cleaver & Co., who leased the mine around

1782, worked until the 1890s. It is usually shown with two ore-hearths and a roasting furnace. Nevertheless, one of the hearths must either have been a slag-hearth, or have been capable of being converted to one. Each hearth had its own flue, which ran to two chimneys on the hill, about 40 and 60 metres respectively, behind the mill. The further one, shown on a plan dated August 1804, was in ruins by 1905. The chimney nearer the mill had become unstable and was demolished in 1959.<sup>73,74</sup>

Two plans of Cockhill Mill have been published. The first, by Robert Clough, was measured in the 1950s, and the second, by G.M. & R.J. Davies, was surveyed in 1966.<sup>75</sup> The reader's attention is drawn to significant variations in these interpretations of the site.

### **PROVIDENCE MILL**

Bewerley

SE117651

Like Cockhill, this mill had two hearths, each with its own short flue leading to a separate chimney. Its history is problematical, however, and Jennings' suggestion that this may have been the mill which Sir John Ingleby was given permission to use "*the south end of*" in 1785, is not supported by its absence from Moss's plan of 1800. Moreover, the flues appear to be an integral part of the mill and 1785 is early for such a feature. It is likely, therefore, that Ingleby was to use White's Mill, near Eagle Hall gateway.

The mill's name suggests that it was built to serve the Providence Mine, but there is a problem with that argument, too. From 1793 to c1817, the adjoining Prosperous and Providence Mines were leased to John Wood who appears to have worked them together and smelted at Prosperous Mill.

The mill may, therefore, have been built c1814 as a replacement for White's Mill, to smelt ore from small mines at Toft Riggs, Stoney Grooves and the Hardcastle Moor - Ravenstones Allotment areas. It may also have been used by the Perseverance Mining Company, which worked between 1825 and 1830. It probably closed in the slump of 1830-31 and was still not working in 1839, when the agent's reports make no mention of it.<sup>76</sup> The mill may have been reopened in 1859 by the Nidderdale Lead Mining Company Ltd to smelt its ore until 1863, when it took over Prosperous and Providence Mine and Mill.

### **PROSPEROUS MILL**

Bewerley

SE120661

This mill is also not shown on Moss's plan and was, therefore, probably built by John Wood around 1814, when White's Mill closed. Wood's lease had passed to John Horner by 1816/17, when the Smelt Mill Shaft was sunk.<sup>77</sup>

The latter shaft housed three waterwheels between the surface and Wonderful Level. The top or 'smelters' wheel was 6 metres in diameter and was used to power the bellows and, at a later date, the adjacent dressing mill. The second wheel was 11 metres in diameter, and the third was 9 metres in diameter and had been installed early in the winter of 1842/43. Both were used for pumping.

## YORKSHIRE SMELTING MILLS - PART 2

The mill was still working in 1874, when the right to use it was included in the lease of the Ransgill Mining Company Ltd.<sup>78</sup> Likewise, in 1887, the Bewerley United Lead and Barytes Mining Company Ltd was given permission to smelt ore from its Merryfield mine there.<sup>79</sup> That company folded in June 1889 and the mill probably stopped work then.

The furnace arches of the mill were very similar to those at the Cockhill Mill, except that they were on stone, not iron, columns. The double flue, from the two hearths, soon united and led, via a beehive-shaped condenser, to a chimney about 165 metres from the mill. The roasting furnace had its own flue, about 25 metres long, to a separate chimney.

### **MERRYFIELD MILL**

Stonebeck Down

SE114663

This mill was at the NW end of Merryfield Plantation, and water for its bellows wheel came from a reservoir, which can still be traced, immediately to the west. It served the Merryfield Mines, which were revitalised when Yorke's and Storey's Levels were begun in 1752 and c1785 respectively. The Craven Cross Mine, in Appletreewick, also proved rich in the 1780s.

It is not known when the mill was built, and Thomas Jeffery's 1773 map shows no mills on Ashfold Beck, even though at least one was working. In 1815, however, John Yorke gave the new lessees of the Old Merryfield mines permission for the occasional use of the upper end of the old smelt mill upon the commons and wastes within the Manor of Ramsgill.<sup>80</sup> That was clearly the Merryfield Mill and by 1849, when the first edition of the Ordnance Survey 1/10560 sheet was surveyed, it was in ruins. The same lease also refers to a new smelt mill and stipulates that the lessees should keep it in perfect working order and repair. This can only have been what became Heathfield Old Mill.

It is impossible to date the building of Merryfield Mill reliably but, contrary to the date of 1818, given in British Mining No.21, it was clearly pre-19th century. Moreover, in the absence of evidence to the contrary, it is likely that it was built to smelt ore from the adjoining mine around the middle of the 18th century.

### **HEATHFIELD MILL**

Stonebeck Down

SE143664

The Yorkes have been Mineral Lords of Appletreewick, in Wharfedale, and Stonebeck Up and Down, in Nidderdale, since the 16th century. They never had a mill in Appletreewick, however, and after 1598-99 ore raised there was taken over Greenhow to a mill in Nidderdale. By 1638, the latter mill was described as being at Heathfield but, as will become clear, its precise site and chronology have still to be resolved.

### **HEATHFIELD (OLD) MILL**

Stonebeck Down

SE143664

This mill was on the side of Ashfold Beck, a few metres to the south-west of the New Mill, which is now the office for a caravan site. As noted above, it was described as



a new mill in 1815 but, once again, we can only guess when it was built. It was still working in 1849, when the first edition of the Ordnance Survey 1/10560 sheet was surveyed, and it is shown without a flue and distant chimney. This suggests that it was built at the close of the 18th century, because mills built soon after that date usually had a flue. Nevertheless, this evidence must be treated with caution because the same map also shows the Cockhill and Providence Mills without flues when, as shown above, they almost certainly had them. Bearing in mind the known rise in output from the Appletreewick and Stonebeck Down liberties in the last twenty years or so of the 18th century, however, it is reasonable to propose a date of around 1790.

The old mill was probably built on, or near, the site of the 17th century mill and when it was pulled down (c1855), a stone lead mould was found inverted under the foundation. The cavity in which the piece was cast was about 762 mm long by 150 mm broad, narrowing suddenly at each end to something like a handle.

### **HEATHFIELD (NEW) MILL**

Stonebeck Down

SE143664

This mill was built by John Yorke in 1855 to replace the Old Mill. It was kept open to smelt ore from the Lolly Scar and Blayshaw Gill Mines and closed soon after 1909, making it the last of the Yorkshire Dales' smelt mills.

Grainge states that it had two roasting furnaces and four smelting hearths, and that the smelting hearths were blown by a waterwheel-powered fan. The lead was cast into pieces of 112 lbs. A detailed drawing of the Heathfield Mill has been published in Clough's second volume on Lead Smelting Mills. By 1907/8, however, the mill had a slag-hearth, two ore-hearths and two reverberatory roasting furnaces.<sup>81</sup> Two roasting furnaces appear excessive for this mill and it may be that one of them was used for improving or softening pig lead before it was sent to the local rolling mills.

The hearths were blown by a double cylindered blowing machine, driven by a waterwheel. The fumes from each hearth were ducted from the building and forced through a condenser by two fans. The latter were driven by a thirty-foot diameter waterwheel, which also drove small pumps for lifting water into the condenser. On leaving the latter, the fume went up a flue around 2 Km long.

### **SCRIVEN MILL**

Scriven (Nr Knaresborough)

SE349583

Nothing is known about this mill, though "Smelt Field", "Smelt Pond" and "Smelt Bridge" are marked on a map of the Knaresborough area, just off Scriven Lane.<sup>82</sup> It may, of course, have been used for iron smelting.

### **ACKNOWLEDGEMENTS**

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REFERENCES

ABBREVIATIONS

- BCRA = British Cave Research Association.  
 Bolton MSS = Duchy of Devonshire's  
 archives at Bolton Abbey  
 Chatsworth MSS = Duchy of Devonshire's  
 archives at Chatsworth  
 LCRO = Lancashire County Record Office, Preston  
 NYCRO = North Yorkshire County Record  
 Office, Northallerton  
 PRO = Public Record Office, Kew.  
 SCL = Sheffield City Library  
 YAS = Yorkshire Archaeological Society.

1. Gill, M.C. "Yorkshire Smelting Mills, Part 1: The Northern Dales" *British Mining*, No.45 (1992), pp.111-150
2. Cranstone, D. *NMRS Newsletter*, February 1993.
3. Myers, J.O. *NMRS Newsletter*, May 1993.
4. Dickinson, J.M., Gill, M.C. & Martell, H.M. "Lumb Clough Lead Smelting Mill" *British Mining*, No.1 (1975), pp.1-10.
5. Dickinson, J.M. "Buckden Out Moor Smelt Mill" *British Mining*, No.8 (1978), pp.38-39.
6. Clough, R.T. *The Lead Smelting Mills of the Yorkshire Dales: Their Architectural Character, Construction, and place in the European Tradition* (Keighley: The Author, 1962).
7. Raistrick, A. "Notes on Wharfedale Smelt Mills" *Memoirs of the Northern Cavern and Mine Research Society*, (October 1969), pp.15-22
8. Jennings, B. (Ed.) *A History of Nidderdale* (Huddersfield, Advertiser Press Ltd, 1967).
9. Raistrick, A. *Lead Mining in the Mid-Pennines: The Mines of Nidderdale, Wharfedale, Airedale, Ribblesdale and Bowland* (Truro: Bradford Barton, 1973)
10. NMRS Records *The Mines of Grassington Moor and Wharfedale* (Sheffield: Northern Mine Research Society, British Mining No.13, 1980)
11. Dickinson, J.M. & Gill, M.C. *The Greenhow Lead Mining Field: A Historical Survey* (Sheffield: Northern Mine Research Society, British Mining No.21, 1983)
12. Gill, M.C. *The Yorkshire and Lancashire Lead Mines: A study of Lead Mining in the South Craven and Rossendale Districts* (Sheffield: Northern Mine Research Society, British Mining

No.33, 1987)

13. Barker, J.L. "Bale Hills in Swaledale and Arken-garthdale" *British Mining*, No.8 (1978), pp.49-54
14. Lyons, P.A. "Two Compoti of the Lancashire and Cheshire Manors of Henry De Lacy, Earl of Lincoln, XXIV and XXXIII Edward I" *Chetham Society*, Old Series CXII, 1884
15. SCL OD.1242: Plan of grants on Grassington Out Moor, by S. Brailsford, 1781. (NMRS Records Survey No. B/M322)
16. Gill, M.C. "Yorkshire Lead Mining - Before 1700" *British Mining*, No.37 (1988), pp.46-62
17. Mems. Fountains 3.
18. Mems. Fountains Accounts of Adam Swynton. 3, 205-6.
19. Mems. Fountains 1, p.402f.
20. Y.A.S. MSS. Fountains Lease Book.
21. LCRO DX/931. Lease from Thomas Standish to Henry Houghton - 09/03/1721
22. Kerr, J. "On the Lead Mining Districts of Stansfield, Holme Chapel, Rossendale, and Great Hambleton" *Manchester Geological Society, Transactions No.13*, 1875, pp.344-360
23. Before the introduction of long flues leading to remote chimneys, the chimneys at British lead smelting mills were directly above the furnaces. Bishop Watson proposed the use of flues for collecting sulphur in the 1770s. Their true value was a providential discovery, however, resulting from the need to move the chimney of the Upper Cupola at Middleton Dale, Derbyshire, onto the side of a hill, to avoid contamination of some adjoining pastures by the lead fume. Nevertheless, the uptake of even this simple innovation was not rapid and the majority of flues built before the 1840s were under 150 metres long. After that date, condensers were added and flue lengths greatly increased. Those at the Allendale Mill in Northumberland, for example, eventually reached 3.7 kms in length.
24. France, R.S. *The Thieveley Lead Mines 1629-1635* (Lancashire & Cheshire Record Society, No.102, 1951)
25. Gill, M.C. *The Grassington Mines* (Keighley: Northern Mine Research Society, British Mining No.46, 1993)

26. LCRO. Tithe Map for the Upper Division of Bowland.
27. France. Thieveley, 1951, p.13
28. LCRO. PR3035/4/3
29. Clwyd Record Office. Lowther MSS DD/L.63 - 30/04/1679, An Accompt of ye disbursement as touching ye lead mynes since ye first of March 77.
30. Hurtle, T. *A Concise account of some Natural Curiosities in the Environs of Malham in Craven, Yorkshire* (London, 1786)
31. Raistrick, A. *Mines & Miners on Malham Moor* (Littleborough: George Kelsall, 1983)
32. Gill *Yorkshire and Lancashire*, 1987
33. Bolton MSS Grassington and Cononley Mines Costs.
34. NMRS Records: Transcript of Messrs Craig & Marshall's report to the Trust Lords of Kettlewell - 21/09/1860.
35. Dickinson et al Lumb Clough, 1975
36. Gill *Yorkshire and Lancashire*, 1987
37. NMRS Records: Photocopy of a lease of the Blew Groves Mine, on Buckden Gavel - 11/01/1697/98.
38. Dickinson "Buckden Mill", 1978
39. Raistrick MSS Buckden (Falshaw MSS) R/B 1-33: Accounts for 29/09/1743-25/03/1744.
40. Bolton MSS Grassington Mines Dues 1735-1743/Grants 1735-53.
41. Raistrick MSS Buckden (Falshaw MSS) R/B 1-33: Accounts for 22/09/1742-29/09/1743.
42. Bolton MSS Cupola a/c 1792-1825; Buckden & Starbotton 1815-1826: Birks Mill vs Cupola - September 1814.
43. Raistrick "Wharfedale Smelt Mills", 1969
44. Bolton MSS Smelting House Costs 1838 to 1858 and Duty at Buckden and Starbotton and Knaresborough Liberties
45. Bolton MSS Starbotton Smelting House (Accounts) 1850 to 1862
46. Marrick, Grassington, Cononley(?) and Starbotton.
47. Ordnance Survey. 1st Edition 1/10560 sheet, surveyed 1857-58.
48. NYCRO: R/Q/R/ 9/49 - Lease to Smithson and Swale.
49. NMRS Records: Transcripts of letters and specifications for the proposed alterations to the Kettlewell smelt mill. From BCRA Records.
50. Raistrick MSS: Account of Lead Smelted at Kettlewell Smelting Mill (October 1859 to October 1887). Photocopy in NMRS Records.
51. Craven Herald & Pioneer, 17/02/1893, page 4 column 2.
52. Chatsworth MSS Smelt Mill Costs and Sales Sheet - 1729
53. Bolton MSS Cupola Account: Dues at the air furnace, 1792-1799; Air Furnace and Smelting Works, 1799-1825; and Buckden & Starbotton, 1815-1825. Smelting Duty 1826 to 1839 at Buckden and Starbotton and Knaresborough and Glusburn Liberties.
54. Gill *Grassington Mines*, 1993
55. Bolton MSS Pearts' Book, 1743-1753
56. National Library of Wales Powis MSS 3082 or British Library Egerton MSS, 1,941 f2. I am indebted to Alan Williams for this reference.
57. Spence, R.T. "Mining and Smelting in Yorkshire by the Cliffords, Earls of Cumberland, in the Tudor and Early Stuart Period" *Yorkshire Archaeological Journal*, Vol.64, 1992, pp.157-183.
58. Bolton MSS Disbursements by Stephen Peart upon the Smelt Mill Account at Grassington - 23/09/1758 to 01/01/1759.
59. Chatsworth MSS 04/02/1774: Freeholders' petition.
60. Trueman, M.R.G., Krupa, M. and Isaac, S.M. Grassington Moor Lead Smelting Mill, North Yorkshire - Archaeological Survey. Unpublished survey by the Lancaster University Archaeological Unit for the Yorkshire Dales National Park, March 1993.
61. The Spanish slag-hearth is described by Willies, L. Lead: Ore Preparation and Smelting - In Day, J. & Tylecote, R.F. *The Industrial Revolution in Metals* (London, The Institute of Metals, 1991)
62. Moissenet, L.V. "Traitement de la Galène au Four Gallois" *Annales des Mines*, Ser 6, tome 1, 1862, pp.445-494, plates X & XI.

## YORKSHIRE SMELTING MILLS - PART 2

63. Martell, H.M. & Gill, M.C. "Lead Smelting in Welsh Furnaces at Pontesford, Shropshire" *Bulletin of the Peak District Mines Historical Society*, Vol.11 No.6 (Winter 1992), pp.297-312. A translation of Moissenet's paper.
64. Chatsworth MSS Smelt Mill Costs and Sales Sheet - 1729
65. NMRS Records: Photocopy of: The Hebden Barmasters' Book
66. NMRS Records: B/M 109. Plan of the Hebden Mines in 1866.
67. Grainge, W. *Nidderdale* (Pateley Bridge, 1863) p.75
68. Chatsworth MSS
69. West Yorkshire Archive Service, Sheepscar, Leeds. Acc 1310 (White's Account Book) and NH2185.
70. NMRS Records: A/M696. A plan of lands at Bewerley belonging to Sir Thomas White. Copy of plan B4 at the West Yorkshire Archive Service, Sheepscar, Leeds.
71. SCL Bar D820 Overend & others against Mawson & others. A plan of part of the mineral field called Gill Field otherwise Coldstones Field in the township of Bewerley, in the County of York, 18th July 1789. T. Saul, at 4 chains to 1 inch.
72. NMRS Records: A/M 319. Plan of the Mining Ground within the Manor of Bewerley the property of Thomas Woollaston White. Made October 1800 by John Moss Jnr.
73. NMRS Records: A/M138. Plan of Cockhill Mine, August 1804.
74. Dickinson & Gill *Greenhow Mines*, 1983. For photograph.
75. Jennings *Nidderdale*, 1967.
76. NMRS Records: Copies of Michael Collins' reports to the Mineral Lords
77. Bolton MSS: notes setting out the case for Yorke vs White. Copy in NMRS Records.
78. PRO (Kew). BT31/1973/8385
79. PRO (Kew). BT31/3963/25153
80. NMRS Records: Copy of lease of Old Merryfield lead mines, in Heathfield in the Manor of Ramsgill; John Yorke to Messrs Atkinson & Co.; Term 21 years; dated 24/08/1815
81. Brears, P.C.D. "Mines, Smelt Mills and Works: Descriptions by an Edwardian Traveller" *British Mining*, No.23 (1983), pp.5-19.
82. NYCRO: MIC 2015/395/Frame 181 - M25 Knaresborough 1851

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**YORKSHIRE SMELT MILLS**  
**PART 2: THE SOUTHERN DALES**  
**LIST OF THE MILLS DESCRIBED**

NAME	WORKING FROM	LIFE TO	APPROX. FLUE LENGTH	NATIONAL GRID REFERENCE
Anglezarke (Putative)	c1721	?	-	SD623190
Dunnockshaw	Nov.1755	1775?	-	SD804284
Thieveley Old	Spring 1629	Feb.1631	-	SD873277
Thieveley New	Dec.1632	Spring 1635	-	SD878280
Sykesearly	C17th		-	SE641511
Newton Fell	1814	c1830	140 m	SD712484
Skelhorn	c1822	c1830	110 m	SD815449
Malham (Copper/Lead)	c1677	early C18th	-	SD912633
Malham (Lead)	c1815	c1875	90 m	SD883661
Calamine House - Old	c1787	c1800	-	SD874640
Calamine House - New	c1800	?	-	SD900630
Cononley	1840	1871	700 m	SD983465
Lumb Clough	c1728?	c1746	-	SE008429
Buckden High	1698	1717	-	SD954781
Buckden Low	1704	1814	-	SD933768
Starbotton Cupola	c1843	June 1862	330 m	SD955750
Kettlewell	pre 1669	1887	680 m	SD975728
Kilnsey	1729	1827?	-	SD973677
Grassington Low	1605	Feb.1793	-	SE006633
Grassington High	1637	c1650	-	SE025664
Moor	Oct.1756	Sept.1792	-	SE025663
Cupola	Oct.1792	May 1882	1.57 km	SE025663
Hebden	1722	1732	-	SE Unknown
Bolton Gill	1858	1860?	12 m	SE025641
Beamsley (Putative)	C16th	?	-	SE088525
Smelt Houses	1446?	1458?	-	SE192643
Dacre Banks	C17th?		-	SE197623
Forest	1762	1789	-	SE128604
White's (Proctor's?)	1606?	c1814?	-	SE152651
Gillfield	c1783	pre 1800	-	SE115648
Cockhill	c1783	c1890	60 m	SE115649
Providence	c1814	c1830	15 m	SE117651
Prosperous	c1814	1889?	160 m	SE120661
Merryfield	mid C18th	c1830	-	SE114663
Heathfield	1599	?	-	SE143664
Heathfield (old)	c1790	c1855	-	SE143664
Heathfield (new)	1855	c1909	2 km	SE143664
Scriven	C17th?		-	SE349583

- denotes no flue