Lead Mining in 18th Century Ashover

by

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During the 18th century, Ashover was one of the most highly developed lead mining areas in Derbyshire. Its most famous mine, the Gregory Mine, proved to be after the turn of the century, one of the richest in the county and one of the most profitable. Fortunately, sufficient material has survived the hazards of time to enable the rise and decline of the industry to be depicted with unusual detail.

The first major mining operation in 18th-century Ashover was the construction at some date prior to 1706 of a drainage sough, almost a mile in length, extending from the base of the hills which limit the Ashover valley to the west at Cockwell to the River Amber at Woolley Moor. This was financed by Richard Taylor, Esq., Thos. White of Walden Wells, Richard Biorbidge of Mansfield, apothecary, Arthur Woodis of Ashover, yeoman, and William Hodgkinson of Overton, merchant. This sough unwatered what was known as the Gregory Vein, as it lay beneath land owned by the Gregory family,

who lived at Ravensnest, on a shelf of land high up above the valley. A company called the Nether Sough Company was formed to exploit this vein. This operated from August, 1734, to June, 1737, and mined 936 loads of ore during these years. When the extreme limit of the workings — termed by lead miners the forefield slope — was reached, it was approximately up to where Ravensnest House is situated. The mine was then abandoned until 1758, in the belief that the ore was not worth mining. A branch sough was then cut out of the main Gregory Sough to develop a new mine known as Overton Mine.

From a letter book of Isaac Bonne, who acted as treasurer to this mining syndicate in addition to his other activities as agent to the Overton Hall Estate at Ashover, secretary of two turnpike trusts and a grocer's business, it is possible to gain an insight into the development of this mine. Before mining actually began, manager and miners made a bargain as to the extraction of the ore, and as Bonne wrote to his correspondent, Robert Banks Hodgkinson, "when the works are worse the Miner has so much more per ton for getting". A letter — the third in the sequence — dated October 23rd, 1756, describes the process: "George Allen (the manager) has let sundry works on copes as follows the Gardenside Vein at £3. 18s. per ton to the Miner for getting drawing and making it ready to weigh, the other vein where most of the Ore has been raised for two years past (but almost cut out) is let at 60s. per ton. Four or five other places which has stood for bad some time past is let at £5 and £5. 4s. a ton."

The hazardous nature of lead mining from the standpoint of the owners is shown in these letters. In June, 1757, Bonne writes: "Since my last Sir two Miners from Matlock has discovered a good work at Overton; George (Allen) let 'em a place called Porto Bello pipe which has stood a many years — as these men — picked the ore left in the sides — there work mended opening like an Oven Mouth: — It was Garlanded all about with Ore and Spar. The Hearth was laid with Two Ribbs resembling Two Pavors." When the miners' time was up, the pipe was let at £3. 10s. per ton but the February, 1758,

letter notes that "it is not as good as it was." The next monthly letter brought news of yet another disappointment. For a considerable time, miners working what were thought to be two parallel veins had been able to hear each other's operations. Eventually the two headings met, proving there was but a single vein. Then too the usual troubles with drainage were encountered. The Overton section of the sough became blocked in December, 1757, and the process of cleaning it out proved an expensive one as it was impossible to discover the exact point at which it was blocked except by drilling shafts from above. It was not until July, 1758, that the water began to flow again and it was December before the workings were completely drained.

There is nothing in the letters referring to the dressing of the ore, beyond the fact that the process had been badly hindered by frost in February, 1757. The ore was then sold to Mr. Twigg of Holme, who leased a cupola furnace on Hodgkinson's land at Kelstedge, generally after long negotiations as to price, as Bonne's letters indicate that the lead trade was in a poor state, stock being high and prices consequently low. Little information has been discovered as to the smelting side of the industry in Ashover. The Overton Hall deeds, however, show that a smelting mill was in existence at Kelstedge in 1702. They also include an agreement whereby John Barber of Kelstedge undertook to sell its site to a group comprising the main lead mining interests in Ashover — Samuel Haslam, the manager in 1740, of the first Overton Mine; Joseph Banks of Revesby Abbey, Lincolnshire, a relative of the Hodgkinsons of Overton, Henry Thornhill and Nicholas Twigg, both of whom were well known lead merchants. The group had evidently been compelled to take this action as a result of a lawsuit in the Court of Common Pleas, in which the defendants had been accused of making "large fires and smelting great quantities of lead and thereby diverse poisonous stinking and unwholesome smells, Smoak and Vapours proceeded, whereby the petitioner and his family are greatly distressed his grass and corn spoiled". Every three months Bonne made a reckoning of output and profits and forwarded

Hodgkinson's share of the mine profits to his bankers, Snow and Denne near Temple Bar, London. This financial transaction was comparatively easy in Ashover, as Bonne was able to purchase bills drawn on the Quaker Lead Company of London and other merchant houses interested in the Derbyshire lead trade.

Despite their frequent protests about the unhappy state of the lead trade, Hodgkinson and Bonne were eager to extend their lead mining operations. Their next venture, Brimstone Dike Mine, down the hill, nearer the Amber, was unsuccessful, lead not being found at all. Next, they were compelled by force of circumstances to turn their attention to the Gregory Mine. The drainage rights from the Overton Mine to the sough constructed *c.* 1706 were only secure for the lifetime of Mr. Gregory senior, and his son openly admitted that he expected large financial concessions from Hodgkinson and Bonne if this privilege was to be continued after the death of his father. Bonne's reaction to this problem was a bold one — that of taking over the lease of the Gregory Mine, then in the hands of Mr. Hayes of Mansfield, who had a 65 years' lease of the mine dated 1720. As a result a new partnership was set up to finance the venture. The largest shareholder was Isaac Wilkinson of Chesterfield, lead smelter and merchant, who held a quarter of the total capital; the Banks-Hodgkinson family held twelve out of the forty - four shares; Isaac Bonne took up another four; two shares each were held by the Haslam family previously mentioned, by the Bourne family which provided the parish with its parsons for so long, by Samuel Kirk who was mine manager in 1769 and by the Twigge smelting concern of Kelstedge. Other shareholders were the Rev. Francis Gisborne of Staveley who took up three shares, Wm. Williamet, mine overseer, with one share and John Gratton, a Quaker timber merchant of Wingerworth, who also only held one share. As the original Gregory shaft was choked up, another had to be sunk. A new pumping engine was installed, but the last letter referring to the Gregory Mine, dated June 30th, 1759, declares that in view of the low price of ore, it had been decided not to incur the heavy expense of unwatering the mine.

Continuing, Bonne writes: "There is so little mining in Derbyshire at this time that if the turnpikes did not employ abundance of labour I cannot think which way they (the miners) could have got Subsistance for their Family." This note of poverty and unemployment is continuous throughout the whole series of letters. In November, 1756, Bonne complains of the high cost of food, pointing out that farmers were naturally holding on to their harvest in the hope of ever rising prices. In the following March, Bonne writes: "Corn continues very high and am afraid will till a good crop is at hand the last Years proving deficient more than what was expected till it was thrashed." Another cause of discontent, Bonne declares, was that the Duke of Devonshire was raising the rents of his tenants. The match which fired the explosion was the Militia Act. Writing to Hodgkinson on August 22nd, 1757, Bonne states: "We have a deal of uneasiness in this County about the Militia. All the Constables Sir are ordered to bring in a List of the inhabitants liable to serve as last Monday, but a great number of people got together and prevented 'em doing any business. On Wednesday they were at Bakewell raised a great clamour against the Duke of Devonshire and threatened Chatsworth but when they came there and met with great plenty of meat and drink their resentment dropt, then some of 'em said his Grace's liquor was not as good as they expected. On Thursday another Hundd was ordered to meet at Brassington instead of Ashborne thinking to be more quiet but all the Towns rose round about and Seized the Constables as they came in took all their papers and burned 'em. The Gentlemen hearing did not enter the town except Fitzherbert who came late. They did no other damage but said they were willing to Serve his Majesty but would be paid for it." In his next letter — undated, but probably August 29th — Bonne continues on this topic: "I have heard little of the Militia Sir Since my last so hope there will be no more disturbance; The Duke raising his Tenants at this unlucky Juncture has been the greatest cause of what has been; it begun at Chesterfield and Chiefly by his Tenants who seem'd very ripe for mischief. It happen'd Sir that that

Day Mr Heathcoat was letting one of the Dukes Farms by auction wh put the mob in a greater Hurry but Happily all ended in Words. Most people look upon auctioneering as a very bad precedent and many of the Dukes friends speak cooly of him." In a postscript to the same letter, however, he writes that a notice had been placed on the door of Ashover Church to the effect that the Lord Lieutenant was to be in Chesterfield on Militia business and that all the Ashover miners had gone there to protest against embodiment in the Militia. In his next letter dated September 5th, 1757, he gives the latest gossip on the subject of the Militia Act. "It is imagined from the following acct that the Duke of Devon: is not easy about it. Last Wednesday Sir as Wm Milnes was going to Eyam he overtook one F. Mason, an overseer at Eyam Edge Mines, who buys Candles of him and who said he was Just then come from the Duke that his Grace the day before ordered Mr Barker to send from 5 or 6 of the best kind of the Mob from Eyam that Mr Barker wrote to him (Mason) desiring he would — come down —. His Grace asked him many questions about the people rising, said himself was against the Militia Act That his Ancestors had always endeavoured to serve the Nation in General and Derbyshire in particular — That he was sorry they had conceived so ill an opinion of him who strove to tread in the Steps of his Forefathers as much as he could." Bonne then asserts that the Duke tried to probe into the deeper cause of the riots, but Mason refused to give further information on the ground that "their country was not Tenants to him" for which Mason "was heartily cursed by his Neighbours for his complaisance to the Duke". Finally the abandonment of the whole project and "the finest harvest this year that ever was known" with its effect on food prices led to the restoration of content.

Between 1758 and 1762 the new Gregory Mine syndicate spent £429 in capital development before the mine produced any ore. In the latter year 214 tons were mined. A memorandum written by Jno. Milnes of the Butts, Ashover, early in the 19th century and based upon sources now lost states " About the year 1763 two shafts

were sunk at a little distance from each other, one for a water shaft, the other for a Gear Shaft, these shafts were nearly opposite a House occupied by Stephen Thompson afterwards one of these shafts was made the climbing shaft, this shaft was used as the climbing road as long as the Mine was kept in work." Probably as the labour force was concentrated on shaft sinking actual production of ore was low in quantity — 84 tons, sold in equal quantities to Twigge and Company and to Messrs. Wilkinson and Company at £8. 10s. per ton. Incidentally, this became the future sales policy of the group, the twelfth formerly allocated to the Quaker Company who ran a smelting plant at Bowers Mill in Ashover no longer being sold to their agent, Joseph Whitfield.

With the completion of this work, output at Gregory Mine rapidly increased. In 1765 it was 383 tons, 609 tons in the next year and in 1767 it topped the 1,000 tons mark. In 1768, so the memorandum continues, "the Gear or Drawing Shaft on the Hill side was sunk. In the same year the first Steam Engine, called the Old Engine, below the Hill was erected and lifted the water to the sough in one of the shafts sunk in or about 1763 by means of Slide rods, there was a good deal of Ore got before the Engine was set to work by means of hand pumping and drawing water by Horses." Evidently the water problem had become serious as may be deduced from a comparison of the two following accounts: —

Oct. 1761. One horse drwg water 18d per shift.
July 1765. 4 Sets of Horses 3 ea. set, drawg water 37/6 per Week ea. Set.

To solve the problem the partnership bought a Newcomen engine from Mill Close Mine. This was erected at Gregory by Thomas Southern of Winster. This engine had been built by Darby of Coalbrookedale in 1748 and was a 42-inch cylinder engine of approximately 47-h.p.[1] The Gregory Mine plan, now in the possession of the Clay Cross Company, shows that it operated a pump of 12-inch diameter, the engine making a stroke of

[1] Mill Close Mine Derbyshire 1720-80 by A. Raistrick Vol.X. Proceedings of the University of Durham Philosophical Society. A drawing of this engine, formerly in the hands of the Gregory family, is now kept in the village school.

six feet, lifting the water sixty yards. Milnes declares that it burned 26 tons of coal a week and that "6 or 7 strokes a minute would draw the regular fading of water." Whether this installation laid bare any richer ores it is impossible, using the available evidence, to say, but 118 tons of ore mined in the Gregory vein some distance from the drawing shaft on the hillside was extracted in August, 1769, by Henry Ludlam and Co. at a cope of 13/4 a ton — "this was the lowest cope ever given for getting Ore in Gregory Mine" — and other quantities were mined at copes of 14/- and 16/- a ton.

An account book, described as "Gregory Mine Reckoning Book with Accounts from April 1770 to ditto 1775", was kept by William Milnes. This gives the mine account for Lady Day and Michaelmas quarters during those years. According to a note inside this book, the Midsummer and Christmas quarter accounts were kept by J. Twigg. These accounts are known to have been in existence in 1917,[2] but unfortunately they have not been located. However, the Milnes' set of accounts gives a wealth of information about lead mining in the Ashover area. During these years the Gregory Mine attained its zenith. Probably the almost fabulous profits in relation to the capital employed were due to the junction of the Overton and the Gregory veins. The quarter ending April 4th, 1772, was as Milnes noted, "the most profitable reckoning ever made during the time that Gregory Mine was kept in work." Production of ore was 875 tons and profit the huge amount of £5,592. A note appended to the map is to the effect that two companies of miners, each 19 strong got 711 tons of ore at a cope of 16/-. According to Milnes the ore was "of the best sort" and sold at £7. 17s. 6d. a ton. For the whole year 1772, total profit amounted to £15,024. Labour, of course, received no share of this fantastic profit, shift wages being 1/4 a day. Profits indeed had been mounting since the first quarter of 1770, when 220 tons were sold at a profit of £708. Even after the decline of profits had begun, many quarters up to the first of 1775 showed profits of over £2,000 and outputs of 450-600 tons of

[2] Notes on an old Colliery Pumping Engine (1791) p.7. by W. T. Anderson.

ore. One interesting fact about the payments of dividends is that several were paid direct to Wilkinson who evidently placed them to the credit of the shareholders in his Chesterfield bank.

The actual mining of the ore was in the hands of four companies, generally making two contracts with the mine owners in each 14-week period. Belland and pippin were each dressed by teams working on contract. Driving headings, too, was a contract job. Only one instance of female labour can be found in this set of accounts — Jane Hole carrying timber. It is obvious from a comparison of the names in the reckonings with the Poor Law certificates now kept in the parish chest, that a large number of the miners were not natives of Ashover. Indeed, since 1700 there had been a continuous migration from the adjacent lead mining areas, particularly from Bonsall into Ashover, supplemented by migrants in smaller numbers from the parishes to the east — Brampton and Wingerworth. In 1758, the year the Gregory Mine was reopened, the settlement certificates record the arrival of eight newcomers to the village and as the certificates in the parish chest almost entirely relate to married men with families, it is probable that there may have been in addition some unrecorded immigration of single men. In addition to the direct labour it afforded to miners, Gregory Mine employed indirectly a large number of persons — coopers, builders, carpenters and blacksmiths. Payments were made to ten men for carting coal; the amounts of coal purchased over a 14-week period ending September 28th, 1771, show the huge appetite of the Newcomen engine — 136 tons from Ainmore, 105 tons from Swanwick, 19 tons from Tibshelf, and 63 tons from Grassmoor. Purchases of timber too were heavy for the stemples, fails and bunnings essential in lead mining. It is also noteworthy that timber underground rails were in use for haulage.

There is a gap in the series of Gregory Mine Account Books 1775-82. However, a note as to the profits made during these years has been found amongst the Overton Estate records in the hands of the Clay Cross Company. This shows that between 1775 and 1778 the partnership

made a profit of over £40,000. A levy of £600 had to be made in 1779 and the next year showed a loss of £725. However, the mine in 1781 was once more profitable.

This gap in the history of the mine can be partly filled by material drawn from a series of letters in the Boulton and Watt Collection. On May 3rd, 1779, Robert Banks Hodgkinson wrote to Boulton and Watt at their Soho Works to the effect that a friend, Sir Harbord Harbord, had described to him the new separate condenser engine recently developed by the firm and wished to be given particulars of it. The next letter came from the mine manager and engineer at Ashover: —

Mr William Milnes Ashover Derbyshire.
May 29 1779. Left by Francis Thompson at Soho.

Mr Watt.

Sir,

Please to send to Mr William Milnes at Ashover in Derbyshire Your Proposals for Building a fire Engine the Depth of the Mine is 304 Yards Deep and is to lift a pump of 13 Inches 90 Yards deep in the bottom, and house water 50. They only desire to know your proposals for erecting.

Weather you would send Men or Let their Engineer Build for you and also where the Castings is to Come from because their is a Good foundry in Chesterfield and that is near to them for Carriage and how much money you think it Will Cost for they must have one this summer.

I am, Sir Your hble St
Frs Tompson.

In the meantime, Boulton and Watt had written to Thomas Southern to ask him to communicate with Hodgkinson as to the merits of their engine. Southern did as requested, pointing out to Hodgkinson that he had inspected a recent Watt engine on the Navigation Canal at Birmingham, eulogising its high standard of workmanship and its power and making the point that its coal consumption, a quarter of that of the common engine, more than compensated for its much higher first cost. Evidently, there was a division of opinion amongst the directorate of the Gregory Mine as to whether they should buy a Watt or a Newcomen engine. Thompson was pressing hard for the adoption of the latter type, arguing

that experience at Yatestoop with which he was closely connected as engineer, showed its suitability for pumping purposes in lead mining. Southern obviously had no high opinion of Thompson's professional ability, finding him entirely ignorant of the principles on which the Watt engine operated, even after a visit to Soho — "and tho' another person accompanied him both came back nearly as Ignorant as when they Sett off". Southern, with his knowledge of the psychology of the Derbyshire lead miner, warned Watt not to try to hasten matters, but to let events take their course as "I saw Tompson since — who says they are at a stand at Gregory's engine and he expects some plan will be adopted quickly". There is little doubt that there was a serious water problem at Gregory Mine by this time as the Boulton and Watt Collection shows that the old Newcomen engine was working a minimum of 17 or 18 hours a day, making 9 to 10 strokes a minute in summer and 12 in winter. Hodgkinson, however, seems to have been the dominating figure in the partnership, and after he had visited Ashover in August, it was decided to order a Watt engine. On September 11th, 1779, Soho placed its terms before Hodgkinson. They proposed that they should supply "Plans, Drawings and Directions of all sorts for erecting and repairing and working" an engine with a 45-inch cylinder "capable of making an 8 feet stroke in ye cylinder" to be built at the expense of the Gregory Mine Partners. The engine was to be guaranteed not to consume more than 255 lbs. of coal per hour working at the rate of 9 strokes per minute and to be able "to work a pump of 13 inches Diameter and 90 yards high at the rate of 10 strokes of 6 Feet long each in one minute — and shall be able to give the necessary motion to 214 yards of dry rods." As was the usual Soho practice, Boulton and Watt were to be paid a premium quarterly for each 10,000 strokes, counted automatically by a meter on the engine. Boulton and Watt were to have power to remove enginemen who could not work the engine to their satisfaction.

Once the contract had been signed, Thompson was able to push on with his share of the work. The haystack boiler

was constructed on a plan furnished by Watt; a great beam of oak 25 feet long averaging over 30 inches in width and thickness was purchased from the Duke of Portland and slabbed to size; a massive engine house, sunk down 13 ft. in the ground to ensure solidity was constructed and work on the shaft 304 yards deep hastened on. Soho on its part was as usual lethargic in delivery of the components, so that Milnes wrote in July of the following year complaining that they were "not getting forward with setting up the Engine on Account of losing the benefit of this summer Season, for the place where it stands is very cold and bleak. Men will scarcely abide to work at it in the winter time". Probably as a result of this letter, Watt himself visited Ashover in August. However, by September the cylinder and bottom had been erected, but in the next month trouble arose over a missing piston rod which Watt had dispatched via Liverpool and the Grand Trunk Canal to Shardlow and which had not yet arrived at Ashover — a commentary on 18th-century methods of transport. The beam was put up in November, and in the same month Thompson sent drawings of the steam pipe and board models for elbows and angles to the foundry in Chesterfield to be completed. In the following March the condenser was put in, two balance beams installed in the shaft and presumably soon afterwards the engine was started up, as a premium of £67. 8s. 9d. for 1,348,750 strokes was paid — once again by a series of bills — in September. Incidentally, Watt supplied the engine man, John Stratford, a young man of 22, who had just completed his apprenticeship at Soho. The new engine proved a great success using in the first quarter 100 tons of coal as against the 350 of the atmospheric engine. Milnes wrote to Watt in November, 1783, to say "The engine still continues to work exceeding well and the more we see of it the more we admire and esteem it". Indeed for some time there was a proposal to convert the Newcomen engine to a separate condenser engine, but it was continually put off and the scheme was eventually dropped.

Although none of the account books of the Nether Sough Company has been found, it is possible to obtain

from some of Milnes' papers details which supplement the information already obtained from Bonne's letters. In 1759 the mine produced 536 tons of ore. The next three years saw a continuous decline, probably connected with drainage difficulties, as Milnes records that up to 1758 "there was little, if any, hand pumping or Drawing Water by Horses before the Year 1758", whereas by 1762 the charge for horses drawing water was £6. 8s. per week. This problem increased in seriousness over the next few years, and in 1766 Milnes notes that 12 horses, 8 or 9 rag pumps and about 30 pumpers, some working double shifts were employed. However, output 1764-6 improved, almost aggregating 2,000 tons, 95 per cent. of which was sold to be smelted by Twigg and Thornhill and 5 per cent. by Messrs. Wilkinson. The water problem, however, was too much for the syndicate, as Milnes declares "In Jan 1767, pumping by Hand and drawing Water by Horses was given up, the forefield Slope in Overton Vein was then about the Rocky Part in Overton Part". Output consequently fell and less than 300 tons of ore were mined 1767-72. An attempt was made 1772-5 unsuccessfully to work the Overton Vein from Gregory Mine, but all work here was shut down in 1777 as obviously the small amount of ore did not repay the cost of production.

After 1782 a new series of mine accounts is available for the Cockwell Mine. Milnes writes: "In the year 1772 a new partnership was formed and Cockwell Mine was again set to work." This new syndicate was again dominated by Banks and his uncle, R. B. Hodgkinson, who between them owned a third share, and by Twigg, Winchester and Co., the lead smelters, who held a further seventeen shares out of a total of forty-eight. Other odd shares were held by Ashover families, Bournes, Allens, Kirkes, Thompsons, Haslams and Gregories, with a few shares in the hands of outsiders such as Lawyer Manley, Gladwin of Stubbing Court and Gratton the timber merchant of Wingerworth. Barker and Wilkinson contracted to smelt a third of the ore, the remaining portion being sold to the Kelstedge cupola, a situation which lasted until 1788 when Twigg's share was transferred

to Sykes, Milnes and Co. Milnes' memorandum continues, "In 1774 a water wheel was erected to lift the water into Gregory Sough. The lift was 27 yards, the pump 9 inch diameter, . . . After Michmas 1778 Robt Banks Hodgkinson agreed that Overton Mine should be consolidated with cockwell Mine. Ore got before this time 146 tons 10 cwt. Loss to this time £1,965. 7s. 3d. but very little ore got in the Veins about Cockwell." One reason for the financial loss sustained was the expense of driving new levels in the search for ore. In describing the operations of this period Milnes writes that "a level was driven Northwards in a vein called the great rake, till it met with the Toadstone, in which stratum it was continued to an Old Shaft in Birks pasture, afterwards called the blue hillocks, this shaft was then sunk down to the level and afterwards it was sunk 24 yards in the Toadstone below the Level, when the 2nd Stratum of Limestone was discovered." However, the whole project was abandoned on meeting considerable quantities of water. Meanwhile in cutting back the Gregory Vein to the New Engine Shaft of that mine, the Chimney Vein had been discovered, and as it was on the north side of Gregory Vein it was worked by the Cockwell and Overton Mines Partnership. The low copes for ore in the opening reckoning — for the 13 weeks ending September 27th, 1783 — show the comparative ease with which this new vein could be worked: —

		Tons	cwts.				£	s.	d.
William Twigg & Co.	Gettg Ore.	18	10	@ £3	15	0	69	7	6
,,	,,	11	1	@ £3	10	0	38	13	6
George Mather & Co.	,,	17	2	@ £2	10	0	42	15	0
,,	,,	20	6	@ £2	5	0	45	13	6

The last two quarters of this year showed a profit of £1,344; the next year with an output of 907 tons made a profit of 3,497; 1785 saw production increased to 1,190 tons with a corresponding increase in profits to £5,387; 1786 witnessed both a fall in output and in profit to 538 tons and to £1,587; the next year saw a slight recovery to 619 tons and to £2,571 profit. Probably profits over the next three years, approximately at the 1787 figure,

might have been much larger if the attempts made at discovering new veins had not proved abortive. The level in the Toadstone previously mentioned was driven further northwards in the attempt to locate the Second Limestone. Here, a shaft was sunk in 1785 through and below this level, but it proved impossible to discover a new vein. Another level was then driven from the bottom of this shaft 150 yards south-eastwards, but again, despite more boring and driving across, the Second Limestone was not found. Milnes then continues in his memorandum: "The next plan was to return to the Blue Hillock Shaft and about 20 Yards North of this shaft a rising gate out of the level was driven eastward about 18 yards and there a Turn was sunk about 26 Yards in depth which reached the 2nd. Limestone and then about 2 Yards in the Limestone was sunk and that height driven off about 6 yards eastwards, but no vein was discovered."

Woodhead Mine had, in the meantime, been opened by a partnership almost entirely owned by the Gregory family. The accounts for this mine are unfortunately fragmentary. In 1784, it produced 80 tons of ore, but the next year was not so successful, output falling to 71 tons. The next year was even worse, the mine only producing 34 tons. The accounts for 1787 and 1788 are missing, but those for 1789 show that only 16 tons were mined.

During these years, Gregory Mine had been declining both in output and profits, though the real depreciation had been somewhat masked by a rise in lead ore prices towards the end of the period — output which in 1783 had been 1,249 tons had declined gradually to 970 tons in 1788 and profits had dropped in a similar fashion from £4,192 to £2,472. Working costs had risen as the mine had penetrated further under the escarpment towards Holestonegate Road, the miners having to descend the climbing shaft and then walk over half a mile to the face. Similarly, ore had to be brought back to the gear shaft, hauled to the surface and be dressed on a site nearby, water for which was provided by sinking a shaft above the gear shaft. Moreover, the profits of Gregory Mine had been inflated by an agreement made in 1785

with the proprietors of Cockwell Mines, whereby "in consideration of the two Fire Engines which belong to Gregory's Partnership — it was agreed and thought reasonable to allow the Proprietors — 7/- per ton as a composition for all ore that is got — and drawn up Gregorys or Overton shaft" — a contract which brought in £238 in 1789.

In 1789, Gregory Mine became from the standpoint of the partners, a liability. The first quarter of that year showed the usual profit, but a decline in production from 228 tons to 76 tons in the second quarter turned this profit of £811 into a loss of £158. It is apparent from the accounts that the vein had become much thinner and that heavy expenditure had been incurred in driving the level forward to find richer ore. To meet this changed situation, the lord's cope was lowered to an eighteenth, but even so the whole year's working showed a loss of £45, which by the following June had grown to £308. The partnership met the changed situation by a levy of £12. 10s. on each share, which brought in £550 to finance the mine. It was also decided to sink another shaft called the forefield shaft 258 yards west of New Engine Shaft, with the motive of cutting down underground haulage costs and of opening up new veins of ore, the majority of copes now being in the region of £6 a ton. This shaft was for that period a difficult task, as 60 fathoms of gritstone, 73 of shale and 19 of limestone had to be penetrated, so that it was not completed until 1795 at a cost of £5,000. These years were however for the shareholders, a period of unrelieved gloom, output continually falling and losses growing, together with frequent levies of additional capital to finance the sinking of the forefield shaft. Of course, in the case of Hodgkinson and the Bournes, these losses were somewhat mitigated by the payment to them of a large share of the lord's cope.

One of the few letters in the Twigg Collection written at the end of the century, refers to this collapse of Ashover lead mining. This is an undated letter from John Twigg to his uncle at Paisley. It can, however, be dated by its reference to the death of R. B. Hodgkinson and to the impending war to the year 1793. John Twigg writes:

"The proprietors of Westedge Mine is just going to erect an Engine as they find it quite impossible to give it a fair tryal without. Fallhill Mine is in arrears of upwards of £ — this mine is overdone with water the mine has been drowned out for near two months Gregory's Cockwell Mine still keeps going the wrong way, so you may judge what situation we are in Ashover." Information about Westedge is unfortunately small, but this mine appears to have been started at this time, as the following statement occurs in an account book kept by the Rev. L. Bourne: —

1792 5th of FEBRUARY

Paid Mr John Milnes of Ashover for my 12 th share of the first assessement made for defraying the expenses of Westedge Mine				£20
July 30	Paid to a	second	assessement	... £20
Oct. 13	,,	third	,,	... £20
Dec. 31	,,	fourth	,,	... £40
1793 April 24	,,	fifth	,,	... £20

Another mine in difficulties was Ravenstor. This had been refinanced by a new partnership in which the chief shareholders were the Gregory family, the Banks — Hodgkinson group, the lead smelting firms of Barker and Wilkinson and Sykes, Milnes and Co., the odd shares being held by other Ashover families. The mine must have been from their standpoint a complete failure, as the sales of ore to Sykes, Milnes and Co. were minute — in 1792 they totalled only four tons. By May 3rd, 1794, Ravenstor had lost £77 in addition to £360 of invested capital. Cockwell too made its first loss in the September quarter of 1793. The subsequent years were disastrous as a profit was only made in a single year (1799) — and that was but £9. Production fell slowly but surely from 182 tons to 37 between 1794 and 1800. Working was concentrated in the Chimney Vein east of Holestone Road but this became "divided by riders or flown into strings". A cross vein was discovered several fathoms below the top of the limestone and was followed in a rising direction until it disappeared on reaching the shale. As a result it was decided to abandon Cockwell

and to concentrate on Overton. Although a profit was made 1802-3, compared with those of former years it was miserable in amount — £213.

When the sinking of the forefield shaft at Gregory Mine had been completed, Francis Thompson erected a whimsy engine. The material for this was supplied by local firms — the boiler plates came from Charles Hurt's Morley Park plant, castings from Smith's Griffin Foundry at Brampton and other material from Butler's furnace at Wingerworth. Despite this introduction of steam haulage, the discovery of a new vein on the south side of Gregory Vein and the working of the old hillocks for ore, Gregory Mine remained a failure — during the March quarter of 1798, Henry Ludlam and Co. produced 52 tons of ore at a cope of only £3. 10s., but nevertheless the shareholders had to make good a loss of £127. Naturally an attempt was made to mend this by driving new levels, by driving in the old forefield vein and by deepening the whimsey shaft and then opening up new levels. As a result, despite a great increase in the price of lead to £17 a ton, heavy losses were incurred and frequent levies had to be made on shareholders.

It was the hard fate of Boulton and Watt to receive little but enmity from the mineowners they so much benefitted. With the decline in the fortunes of Gregory Mine recrimination set in between Soho and the Milnes, the latter accusing Watt of falsifying deliberately the readings of the engine counter. When Watt investigated the matter he found that the Thompson brothers had been interfering with the engine, so diminishing its efficiency — as it was reported to Soho "Tompson's brother works at new engine and makes all the mischief he can. Frank Tompson took off ye cylinder head & advised it long ago". The cylinder head had even been filled with horse manure to check steam leakage. The engine too was being overworked, pumping night and day, as the old Newcomen engine was not drawing all the water, some of which was running back to be pumped again by the Watt engine. The purchases of coal from Swanwick in the December quarter 1791 reflect the seriousness of

the situation as the old engine during these months consumed 400 tons of coal and the Watt engine 300 tons. The inevitable result was that the engine worked badly and Stratford had, to quote Milnes, "an uncommon slavish life" until the purchase of a new cylinder from Wilkinson of Bersham installed by engineers from Soho made the engine once more efficient. The quarrel was embittered by Stratford's demand for a higher wage than 12/- per week and a house in return for the overtime he had put in, but in December, 1792, Milnes made a long overdue payment of the premium to Watt. Good relations were resumed but it is noticeable that on the expiration of Watt's patent in 1800 a Thompson replaced Stratford at the New Engine.

Several meetings of the partners were held, a new manager was advertised for and consultants were called in, but no policy was decided upon. The end of Gregory Mine came in 1803 when the spring supplying the Watt engine failed, so stopping the engine, allowing the water to rise.

At Christmas, 1803, Milnes notes that a new partnership was formed to work both Gregory and Overton Mines. In this were all the former shareholders, newcomers being Bache Thornhill and Richard Arkwright. Expenditure was concentrated at Overton where two new shafts were sunk, many new headings driven, many turns sunk and much driving across carried out.

The steam engines at Gregory Mine were but little worked during the next three years, probably because the forefield vein now in process of extraction in the direction of Carolina, west of the scarp face, had narrowed down to four or five feet in width and was, to quote Milnes, "chiefly filled with dog tooth spar with no regular carriage of ore". Probably another discouraging factor was that the vein dipped rapidly as it was mined further to the west and although little water was actually met with near the forefield shaft, the fact that the workings were below the level of the Derwent at Matlock Bridge may have presaged drainage trouble in the future. In any case, cope in this vein had risen to £12 a ton and as output was small — 46 tons in 1805 — the small

profits realised in that and the following year were only due to the fact that lead was selling at the exceptionally high price of £40 per Hull fodder. Milnes is very condemnatory of the standard of management during these years, accusing it of being lacking in geological knowledge and of not working to any definite plan of development. Finally, in 1807 all the mines were shut down, apparently because the partners could not agree to any plan of keeping them clear of water. There is a strong tradition in Ashover that it was one of the Wilkinson interest of Chesterfield who was finally responsible for the peremptory stoppage of mining operations. However, all the engines were dismantled, the whimsey being sold to Woolley and the two others to Westedge. A cope book belonging to the Bourne family shows that this mine was extremely profitable in the winter and spring quarters 1806-7, but the mine closed down on Lady Day 1808, as a result so local tradition asserts, of a bitter quarrel between the two brothers Milnes. So ended the great era of Ashover lead mining. Lead smelting continued at the Stanage cupola of Sykes, Milnes and Co. but the Chesterfield-Stockwith Canal statistics show the great decline of activity even in this sphere. At the turn of the century, 1367 tons of lead were transported on this canal. By 1820 lead shipments had declined to a mere 58 tons. The available statistics end at 1826, but these show comparatively little recovery in lead traffic, 105 tons being carried in that year.

The collapse of the Ashover lead mining industry could not occur without baneful economic effects. Some indication of this may be studied in the Poor Law Accounts. Between 1790 and 1808 the amount paid out by the Overseers doubled; before Waterloo it had doubled again. This continual increase continued until 1820, when no less than seven times the 1790 figure was expended. The situation became so serious financially that although the statutory overseers were still elected, the totally illegal office of permanent overseer was created and William Basset was selected for it at a salary of £25 a year. His accounts are full of payments to men and girls "out of employ". The vicious Speenhamland system

of making up wages was also adopted, Basset often making payments on the ground "his wages very small". Work on the roads was used as a method of dealing with the able bodied poor and the Vestry passed a resolution that "any person being out of work and wanting relief from the parish to be employed on the Highways as much as possible". An equally pernicious system, the roundsman system, was also in use in Ashover. In 1817, the Vestry ordered that paupers should be taken off the roads and that they should be employed by farmers, the parish paying them a wage of 3/- each, together with an additional 1/9 for a wife and each child. Although a note attached to this declares that "this order was never acted upon", in fact Basset's accounts show that paupers were employed compulsorily by farmers at the rate of 1/2 a day without victuals. Basset, too, spent a very considerable time trying to find work for the unemployed — his expense account shows him visiting the Strutt mill at Milford, Unwin's mill at Sutton, Litton, Cressbrook and Holloway mills in this search.

The economic effects of this collapse of the staple industry took a long time to work themselves out. Even as late as 1841, when the "workhouse test" was introduced by the recently formed Chesterfield Union, it is obvious that pauperism was a more obstinate problem in Ashover than in the other villages of that Union. As a high percentage of the expenditure was on old people, it is highly probable that there was a good deal of emigration from the village, a supposition supported by the fact that the census of 1831 shows that there were more uninhabited houses in Ashover than in any other place of comparable size in the neighbourhood.