

ORE DRESSING IN THE MANIFOLD VALLEY, STAFFORDSHIRE

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Abstract: Very little has been written previously on this topic, owing to a paucity of evidence. The authors' recently acquired collection of North Staffordshire ore field documents has opened up the subject. This paper looks at ore dressing at the Ecton and Dale Mines and its effect upon the environment, particularly the River Manifold. Traditionally considered to be little more than a convenient source of water for power, domestic water and even fish for the mine manager's tea, it was also a useful place to dump mineral waste and dirty water in huge quantities. This practice eventually led to the case of Roscoe v The New Dale Mining Co Ltd and the closure of the mine in 1873.

ECTON AND THE BURGOPYNE MINES, ECTON

These two mines were worked separately until 1851, when the Ecton Mountain Mining Company took out a lease of the two royalties on Ecton Hill for the first time since the Duke of Devonshire finished operations in the Clayton Mine in 1822. Until 1804, the Ecton ore was dressed at the side of the river and thereafter on the hillside after the newly driven Salt's Level communicated with the Ecton drawing shaft.

Water was supplied from the Fish Pond via a gritstone launder, or water channel, which had been used since 1784 to provide power for the Ecton slag mill, situated in front of Birch's Level at the road side near to the Clayton Mine entrance. This seems to have closed in 1826 and thereafter, the water was used on the dressing floor (and by four cottages at East Ecton). The water was collected chiefly from Chadwick Mine, flowing directly from the sough tail into the reservoir. Ore was raised up the Ecton drawing shaft and waggoned out along Salt's Level onto the hillside and along to the dressing floor.

This site did not remain the sole dressing floor, for a Stamps Yard was built at Swainsley shortly after the appointment of John Taylor as the Duke's Mining Agent in 1818.

The Burgoyne ore had a separate dressing floor, on the flat ground between Clayton and Birch's Levels. It was the practice to throw the finely ground waste material into the river and turn the waste water into the river too. The occupier of Wetton Mill Farm related that there were times when the river water was too cloudy to drink and supplies had to be obtained from the adjacent Hoo Brook.

The only description of any length of eighteenth century ore dressing in the valley is that of William Efford in 1769, published in the Gentleman's Magazine. It is likely that the process he described prevailed until the Stamps Yard was built, although the numbers employed would have diminished as ore output fell. Efford reported

The ore, when conveyed out by the boys is thrown together in a heap, and two men with large hammers, or sledges are employed to break it into small pieces. This done, it is carried in small hand-barrows by little boys, to a place under a shed, erected on purpose to be picked and sorted, and is then laid by in different parcels, best, second and worse; this operation is performed by little girls from eight to twelve years of age, who are surprisngly quick at the work, separating the various kinds with astonishing dexterity.

From this place, the ore is carried to another large and convenient shed, where about fifty women sit back to back, on benches, to buck or beat it with flat hammers, still keeping every particular sort separate from each other. The ore, now reduced to a small sand, is again removed to the buddles, for washing, where an old experienced Cornishman has the superintendancy of it, as a great deal of the finest ore would be lost, if this operation is not properly performed. Here then it is curiously washed and cleansed, and afterwards exposed for sale in the open air, in various heaps, ticketed according to the different qualities and quantities".

In 1772, Ecton employed 90 ore dressers and as ore output increased, this rose. Incredibly, there were 116 workers dressing copper ore and a similar number dressing lead ore in 1784. Viscount Torrington visited Ecton in 1789 and found that there were many children still employed pounding the ore to earn 6d a day, with women washing the ore (Andrews, 1954).

The Stamps Yard was situated by Stamps Bridge at Swainsley and consisted of two heads of stamps worked by a waterwheel. Water was brought through a covered launder or leat. A weir was built across the river opposite the Clayton adit entrance to provide sufficient head of water. The start of the launder may still be seen in the river bank, although it has been blocked by stone. It is likely that the wastes would be dumped into the river below this weir from the Burgoyne dressing floor, especially as the volume was significant at times.

Benjamin Yates in a Deposition re the Dale Mine case stated

I worked for about seven years on the [Ecton] dressing floors which were then very extensive, one part of them adjoined the river and all the thick muddy water ran into the river and all refuse eg waste sand and mud was thrown direct into the river". He also stated "I also remember the Ecton Stamps being erected about fifty years ago and I was one of the first employed there, I remember tenting the stamps during the night in my turn, for the Stamps were worked night and day for several years. All the waste was thrown into the river.

Yates has started work at the mine when about 12 years old (i.e. in 1811). Many of the Deposition papers (referred below as DP) emphasise the river dumping and it should be borne in mind that they had been called on behalf of the Dale Mine defence. Intriguingly, he goes on to state that

at R. Niness's request, I went to show him where an arched tunnel ran through the Ecton Mine hillocks and which was quite buried. I

particularly well remembered it through having passed through it hundreds of times in my youth and when working on the Ecton dressing floors. Richard Ninness was then Agent at both Ecton and Dale Mines.

This tunnel was found during the excavation of the tips and ran in a north - south direction along the extent of the tips (pers. comm. the late John Bonsall of Apes Tor Cottage, Ecton). What on earth was it constructed for? It seems reasonable to suppose that it connected the mine manager's house at the road side with the dressing floor. Such extravagance seems unlikely when the mines were being worked by the cost book companies. It is also unlikely to have been built before the construction of the hillside dressing floor in 1804. As the Stamps Yard was built in 1818, presumably the tunnel was built between these dates. It seems possible that it was built to protect a supply of water to the house from the Fish Pond launder or to provide a covered way for the manager to reach the dressing floor from the house. Yet a further use could have been to keep men at work when the mine was failing and there was insufficient work for the large numbers of contractors working at the mine. The tips eventually hid the tunnel completely and it became forgotten until found during the removal of the waste. A photograph of the mine tips being removed has recently been published (Porter 1997). There is a distinct line running up through the tips towards the dressing floor. Was this the tunnel or the site of it following its removal?

Evidence that the Ecton dressing floor was retained after construction of the Stamps Yard comes from Andrew Barker (DP - depositions - see below) who worked at the Dale Mine from 1847. However prior to that he had worked at Ecton, principally between 1832 and 1847 "sometimes at the Old Ecton Mine floor and sometimes at the Ecton Stamps". James Barker stated (DP) that ores dressed or cleaned at the Stamps were all buddled or washed at Ecton Mine old floors previous to it being waggoned or carted to the Stamps. Water from the Ecton old dressing floor ran direct into the river". It therefore seems reasonable to suppose that the old hillside dressing floor retained this function during the life of the Stamps Yard. A railed tramway was constructed to convey ore to Swainsley. It is shown on Staley's plan of the hillside dated 1820 and kept at Chatsworth. The tramway ran down the side of the road, past Ecton Lea. Hence the above reference to "wagons" as well as carts.

John Taylor brought John Goldsworthy to Ecton and he supervised the erection of the Stamps and the reclamation of ore from the tips. He continued to work at Ecton after the Duke ceased work and his son told John Millward of Longnor (described (DP) as being a Surveyor and aged 81 years), that the Captain had cleared £10,000 out of working the Ecton mine tips over a ten year period. He had even recovered copper and lead slimes from the bed of the river. Mr Samuel Fynney described (DP) as being 85 years of age and a "farmer and landed proprietor", stated that "during the time Mr Goldsworthy worked the Ecton Stamps, I have seen such quantities of refuse wheeled into the river that you could walk across the river on the refuse". A graphic account of Goldsworthy's activity in reclamation is provided by Benjamin Yates. He remembered that just upriver from Ecton Lea (DP) that

... two men (Richard Rowe and John Simmonds) about 56 or 57 years ago, getting a large quantity of copper out of the river. I was one who assisted to weigh one of the parcels of copper which they had got from the bed of the river and which weighed about 30 tons and they dressed it in the field at the riverside. They dressed more than one parcel which they got out of the river but I helped to weigh only one parcel. It had all washed down to where it had been retrieved from the Ecton and Clayton Mine dressing floors. On the same day as we were weighing this copper ore, there was an eclipse of the sun and it went dark.

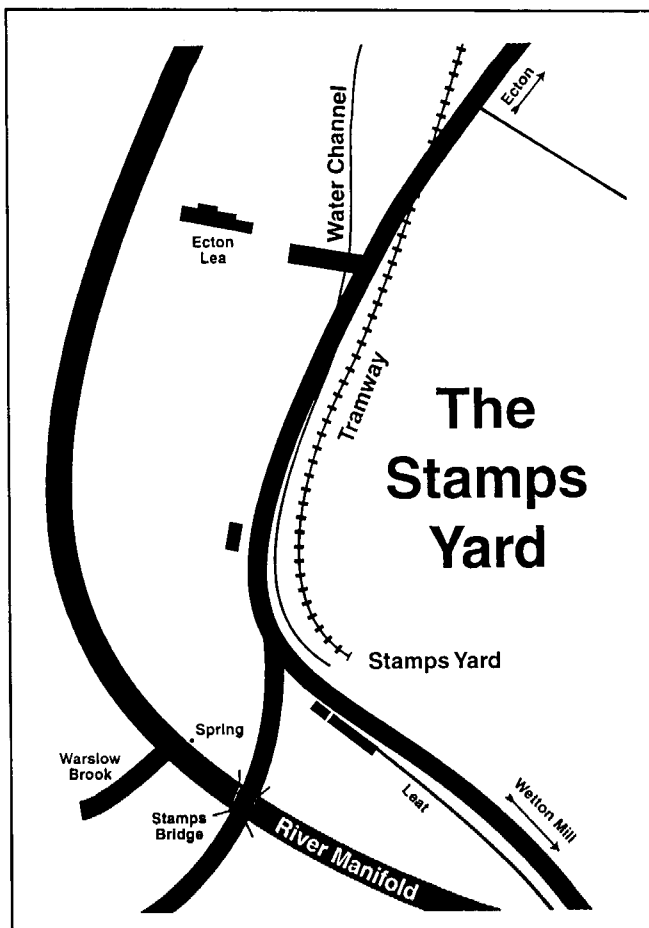


Fig. 1. The stamps yard.

There is an error here in his recollections. The actual date must have been 1836. There was no total eclipse of the sun in this country between 1724 and 1927 but there was an annular eclipse on the 15th May 1836. It covered the area between Whitehaven to Darlington and northwards to Perth. Its effect at Ecton would have produced at least a 90% eclipse and possibly slightly more (pers. comm. Dr David Harper, Royal Greenwich Observatory, Cambridge). It would have turned daylight to almost night time, as was correctly reported by Ben Yates. There was no previous 19th century eclipse like this.

The accounts of the Whiston Smelter record no purchase of Ecton copper ore between May and September, 1836 when 42 tons of "stamp ore" valued at £255.15.11d (£255.80p) was purchased along with 8 tons of "crop ore". Clearly a total of 42 tons was extracted from the river during the summer of 1836. It is not recorded whether any lead slimes were also recovered, but this is likely.

Shortly after the copper slimes were recovered from the river, Melville Attwood and his father-in-law, Edward Forbes, took a lease of the Ecton Mine. The Ecton history by Robey and Porter indicated that Attwood did not return from Brazil until 1839 but Forbes was negotiating leases earlier than this (Porter and Kirkham 1998). During this time, James Barker was the Ecton surface manager, living at Ecton Lea. There are two semi-detached cottages there and he lived in the one farthest away from the river. Barker let all the surface bargains or contracts and his son, also called James, took the management of the Stamps Yard for about seven years in partnership with William Stubbs of Butterton (i.e. for the whole of the time of the Forbes/Attwood period. Among the men they employed were William Harrison, Charles Brindley, John Cantrell, Thomas Ferns,

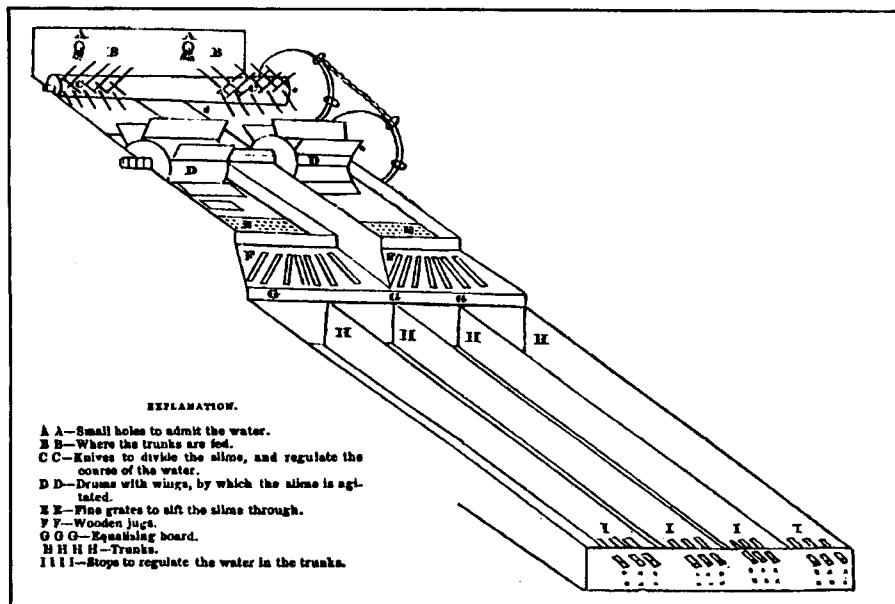


Fig. 2. Ecton trunking buddle.

James Adams, John Adams, Isaac Gould, Robert Brindley, Thomas Stubbs, James Gould, Elias Mather, Isaac Yates and others - many surnames which survive in the area to this day.

At the Stamps Yard there were fifteen heads of stamps, nine on one side of the water wheel and six on the other. James Barker Jnr stated (DP) that other machinery at the Stamps Yard included a grinder with two pairs of rollers, six hutches or jig tubs, six trunking buddles, three patching buddles, two tie buddles, two washing-up buddles, and one tossing machine. The dirty water from all the machinery was turned into the mill race which ran from the wheel to the River Manifold. This culvert or race was stated to be "four score yards in length" confirming Staley's plan of 1820 which shows the race running parallel to the road to the end of the field.

An advert was placed in the *Mining Journal* in April 1841 for the Ecton trunking buddle. A description with it was signed "A", (for Attwood). It consisted of an elongated trough in which the slimes were agitated by a rotary motion from the waterwheel. After being placed in the upper end of the trough, the shovelfulls of slimes were broken up by knives protruding from an axle. They were then flushed by water down to baffles, described as being "wings on a drum". The water then ran into four channels or trunks where the slimes settled in typical fashion of a buddle, i.e. the heavier ore dropped to the bottom near the top of the trunk with the lighter gangue material, which was unwanted, travelling further down. Wooden plugs were used to control the height of the water in the trunks. The names of some of the buddles mentioned above are previously unknown but the tossing machine may be another name for a dolly tub where the water was agitated in a barrel after fine slimes had been added.

All the refuse was wheeled into the river, such that you could walk across quite easily. It was left for the winter floods to wash it away. Interestingly, James Barker added that if Melville Attwood

wanted a dish of trout he frequently stopped the water from going over the wheel which worked all the machinery at the said Stamps dressing floors and out of the culvert or water course I have seen considerable quantities of fish taken.

The Stamps Yard was included in the sale of the lease of plant and machinery in 1866. It is unknown when it was last used, but

Mather's early work was at Waterbank Mine and he erected dressing plant on the mine, using water from a surface reservoir, probably using mine water pumped up the engine shaft above the adit level, similar to the system used at the Dale Mine. The erection of Swainsley Hall in 1867 by Mr Roscoe surely would not have taken place if the activity outlined above was still happening, even if it was on a reduced scale.

Despite the battle he was prepared to have with the Dale Mine, Roscoe seemed reluctant to do the same with the Duke of Devonshire. Even so, one cannot imagine him putting up with the dumping of refuse in the river opposite his house or listening to the clank of the machinery all day and potentially all night when he was on holiday (he lived and worked in London). He wouldn't have built his house there.

Between the Wars, an article appeared in the Leek newspaper stating that a Leek chemist had descended the swallet at Wetton Mill (presumably the solution cavity filled with domestic rubbish in the 1960s at the end of the field adjacent to Wetton Mill Farm). He had found a lake big enough to take a boat. It contained blind fish and had a sandy beach. This latter feature seemed hard to explain until one remembers the crushed refuse carried away by the River Manifold.

The Childrens' Employment Commission Report of 1842 refers to the mines at Ecton and Dale. There were no children employed in the mines, only in dressing. Evidence, taken by Samuel Scriven from one of the boys, Melville Attwood and George Buckley of the Dale Mine is given in full:

James Twigg, aged 16, Examined March 5:
I am a dresser of copper and lead; that I sift it and clean it with water. There are seventeen of us doing the same sort of work; the mill at which we work is a quarter of a mile from the mine; none of us ever work in the mine; there is no boy under eighteen there; they have men. James Barker, the mill man or master, looks after the waterwheel: we do not interfere with it. We all come to work at seven in the morning and go home at six; we are allowed half an hour for breakfast, and take it in the smithy; we go to dinner in the smithy at twelve o'clock, and take an hour; we go home to supper; I can read a letter, and write; I go to school; I used to go the school; there was a school at the mine once, but there is not now because there is a better (sic) at Warslow. We all work by the day, and get 6s. a-week. We have no night work. After March we get our wages raised to 7s. The work agrees with us all very well. I would rather be a miner than a farmer. I have been a miner or dresser six years about.

At the stamping-mill I examined 11 of these boys, and found them all able to read fluently, having learnt at the Methodist Sunday-school; their employment was similar in kind and degree.

Melville Attwood, aged 25, Examined March 5:
I rent the mine which you have explored with me of his Grace the Duke of Devonshire. I have not more than fifty or sixty hands now at work, including the boys which you have examined at the stamping-mill; these boys, with some few men, work by day wage, the rest are tributors, who work by the ton, or rather so much in the pound. The hours of work are light, from seven to six; the meals will take them an hour and a half. We have no mines of any consequence in the immediate neighbourhood. All the boys can read, some can write; they received their education in the dissenting schools in the parish; we have no church school nearer

Whetton (sic). Upon the whole I look upon them as lads of very good character. I have had no occasion to question their honesty or sobriety; there is nothing in the nature of their employment detrimental to their health, as they all work above ground. I have two steam engines, and one water-mill outside, and one large waterwheel in the mine; none of the boys are allowed to work at them or near them. I never hear any complaints from the boys as to the work; indeed they all appear to strive which should do best, as I give to the best bridler every now and then a book (the Young Man's Companion, or something else,) as a reward; and also the same prize to the best vanner. I regret the want of church accommodation and a resident minister for this parish of upwards of six hundred persons, and think that if the fact was represented to his Grace he would be sure to have one. Signed M Attwood.

Mr George Buckley, aged 60, Examined March 17:
 I have been the agent of the North Staffordshire Mining Company four years and a half; we have 18 men employed below and on the bank; there are only two boys under 18 years of age engaged, and these are dressers of ore; neither of them can read or write; one has no parents, the other only a mother; there wages are 8d per day; they are occasional labourers. There are no other mines in this neighbourhood now in work, except Mr Attwood's, the Ecton Mine; there are no coal mines either, or any other description of work in which children are engaged in any numbers nearer than Cheadle or Leek. Signed George Buckley.

There is an appendix to the report which contains additional comments as follows:

The only lead or copper mines to be found of any consequence in this part of the county are those of Ecton, belonging to his Grace, the Duke of Devon (sic); of the North Staffs Mining Co, close by; and at Deep Dale, near Grindon. To the first of these, I was accompanied by the Rev. C Westlake, of Leek, which I descended. Its enormous magnitude and depth (1500 ft) rendered it a formidable undertaking; however it was accomplished with some effort, but save the satisfaction it gave me, to no purpose, as no young persons were to be found. On returning to the surface, I visited the stamping mill and there examined about 20 lads whose respective ages varied from 10-18, who with two exceptions could read and write; all attended when the weather would permit, the Sunday schools of one or other of the immediate parishes, there being no church, chapel or school nearer than Butterton or Wetton (2 miles). All these boys were healthy, happy and contented; their hours of work (which is that of sifting and cleansing the metallic ore) were regular, from six to six*; the time for meals 2 hours*, which they always had and their wages paid by the week, amounting to 7s, they never work overtime or are employed at night.

In the North Staffs Co's works there are only 20 men and no boys. In the Deep Dale only four old men and no boys.

*This evidence conflicts with that of James Twigg, which seems more reliable. James Roland, a mine surveyor of Warslow, stated (DP) that the Dale Mine dressing floor also started work at 7am. The mines were clearly following the trend and had stopped employing women in the dressing process. There was also a move to reduce the number of boys so employed (see Willies 1975). Mechanisation was helping this but the water-powered equipment of the Stamps Yard was an exception in the Peak District ore field. It tended to be more primitive elsewhere on the whole.

Although a new dressing floor was being prepared at Ecton in 1862, no other details of this are known nor any other significant further detail on dressing at Ecton prior to the involvement of Colin Mather in 1866. He was known as "Cast-Iron Colin" and was a well known innovative engineer. He brought fresh capital and new ideas with Waterbank Mine being central to his activities. The mine lease was advertised for sale in June 1866. The cost book for September 1866 stated that

the Waterbank steam engine was brought from Manchester and

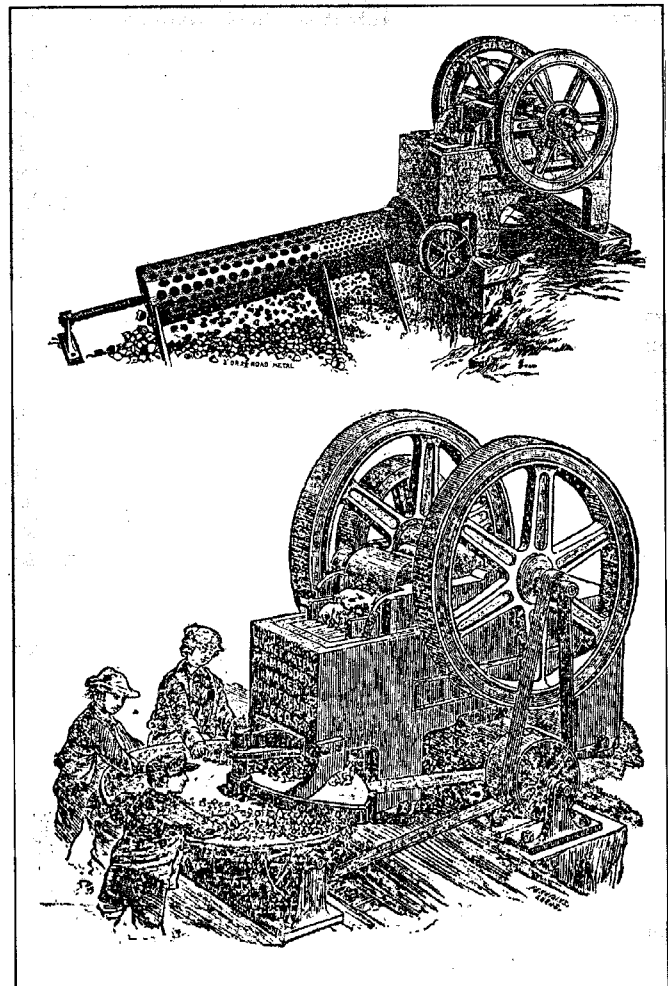


Fig. 3. Two illustrations from the Mining Journal of the Blake-Marsden Crusher.

delivered at Waterbank on Tuesday 25th Sept 1866. The boiler seated - Engine and all its appendages was erected - and was started to work on the Tuesday following, the 2nd Oct., by Colin Mather Esq of the Salford Iron Works and at his sole expense.

In October, men were employed in constructing the engine reservoir at Waterbank including carting clay to seal it.

Among the equipment erected at the mine was Mather's patent revolving buddle, which was powered by the engine referred to. The purchase by the mine of a stone crusher (cost £80) and a spiral cylinder (£25) was also made. There was a large ore crusher (no doubt the one just mentioned) and Marsden's Patent Ore Breaker. Presumably the large lumps were reduced to fit the ore breaker and the buddle used for separating the fine ore particles or slimes as they were known. Mather's patent was issued in 1867 (No 2568) - for a "machine for washing ores, grain, wool, and other mineral, vegetable and animal substances". The illustration attached to it is clearly shown as being sited at Waterbank, although it does not say so.

The machine consisted of a hollow cylinder open at both ends and placed in a slanting position. The interior consisted of a worm and buckets or lifters. The ore was fed in at the bottom end of the cylinder and was worked upwards by the means of a circulatory screw. The screw and buckets agitated the ore and it was washed by water which was fed in at the top end. The cylinder top was perforated in order to separate the smaller pieces of ore from the larger lumps which would be repassed through the crusher.

In 1868, a note appeared in the Mining Journal regarding

Mather's patent washing-up buddle which presumably was the same machine. Written by "RN" - probably Richard Niness of the Dale Mine - he stated that the machine was eight feet long and four feet in diameter and would effect a saving in washing alone of 60%. Mather claimed that the invention used less water which would be an important factor on Ecton Hill where all the water for dressing had to be pumped up the engine shaft. Presumably the buddle and the ore breaker would have remained at the mine until work finished in 1874.

Marsden's Patent Ore Breakers (more correctly Blake's, manufactured by Marsden, who sold them under his own name - see Fig. 2) was well known in the mining and quarrying industry. Two are preserved on the edge of the Peak District - at Cheddleton Flint Mill near Leek and at Teggs Nose Country Park near Macclesfield Forest (in an old gritstone quarry). The patent registered by E.W. Blake was in America, for no patent was registered in this country either in Blake's or Marsden's name. Henry Marsden spent some time in New York and then went to the adjoining state of Connecticut, where Blake lived, in 1850.

Marsden introduced the machine to the UK market in 1855. Over 10,000 were manufactured at the Soho Foundry, Meadow Lane, Leeds and many were exported. It won several gold and silver medals at various exhibitions. Coincidentally, one of the testimonials used by Marsden in his advertisements was from Thos. Goldsworthy and Sons of the Ecton Emery Works in Manchester. In December 1871, R.B. Goldsworthy stated (DP) that he worked at the Ecton Emery Works and that he was the "grandson of the late John Goldsworthy of the Ecton Mine".

The Science Museum has a half scale model of the ore breaker and the description attached to it states that it was "introduced by E.W. Blake of Newhaven, Connecticut in 1858" (not 1855). The machine was capable of running at 250 rev per minute and according to size, break from 4 to 13 tons of rock to a size of a 2 inch cube.

For a full account of the activities of Colin Mather at Ecton, including the Company he floated together with that of the Ecton Co Ltd (see below), see Porter, 1999.

The Ecton Co Ltd commenced operations in 1883, following the closure of the previous company's activities in 1874. It was 1885 before the Company started breaking ore and the need for a dressing floor was required. The equipment was second-hand and came from Cornwall. It was delivered by train to Hartington Station, taking nine railway wagons in transit. A skipway was installed in the Clayton Mine shaft so that the ore waggons could be brought up the shaft and then wheeled out of the adit, a distance of some 1600 feet. An incline was built with timber up the hillside over the Duke's gravel pit to reach the dressing floor on the same horizon as the launder from the Fish Pond at Back Ecton. A two storey engine house was erected containing the hauling engine with the reception area for the waggons on the upper floor. A further incline was built on the north side of the building so that the waggons could be taken down to the dressing floor.

On the latter, an open-fronted shed was erected for the jig tubs in front of the launder. It would appear that there were three jig tubs situated in front of the holes still to be seen in the remaining back wall of the building. There were also two circular buddles. Ground ore was shovelled onto the cone shaped area in the middle and water poured over it. The lighter gangue travelled furthest from the middle, eventually collecting in the trough at the outer edge where it was shovelled out and thrown away. The heaviest

ore was concentrated at the top of the slope. The material in the middle was rebuddled to avoid being lost. Brushes were suspended from rotating arms to keep the surface smooth. After the mine closed, the wooden boards which covered the base were removed and used to build a hen cote at Lanehouse Farm, Butterton. This survived until the 1960's. It was most unusual for the boards were broadly triangular shaped.

The crusher was hand operated. It had a hopper on the top and the ore was fed through this onto rollers. It remained on the dressing floor until about the time of the Great War. Most of the machinery, however, was sold to Mill Close Mine when the mine closed (pers. comm. the late J. Bonsall of Apes Tor, Ecton). The site of the buddles can just about be made out, but the trees planted in about 1960 are growing across the site. For a description of the surviving features on the hillside, see Porter, 1969.

THE DALE MINE

The Dale Mine is situated opposite the Ecton Mine, on the Warslow side of the valley. The royalty was owned by the Harpur-Crewe family who owned the nearby Warslow Hall and at one time had a significant estate in the Staffordshire Moorlands. The mine worked lead ore from an inclined pipe-working. It also had an adit nearly a mile long. It stretches to Warslow Hall and is marked as such on a plan in the Kirkham/Porter Collection. It is held locally that the adit finally reached a position below the gates of Warslow Hall.

The tradition that the mine closed because of pollution problems has persisted down to this day despite a lack of evidence to support this. Mrs Vera Barber and her brother, John Greenhough, the grandchildren of Capt Richard Niness of Warslow advised that their mother had said that the case had made her father (i.e. Capt Niness) a ruined man, yet he seems to have gone on to run the Peak Forest Mining Company after the Dale Mine closed. (pers. comm. to L Porter, June 1971).

This situation changed in mid 1997 when the authors were offered, and acquired, a substantial quantity of legal documents. A large quantity of them concerned the case of Roscoe v The New Dale Mine Ltd and Richard Niness. They give a good insight into the mine and also to ore dressing in the valley. They also put flesh on the bones of historical facts, for the personalities of the litigants and the many miners who made depositions on behalf of the mine show through. Many aspects of life in the valley are brought out once more, often details of the kind that would otherwise have been lost for ever. Detail from the Depositions are referred to below by the reference (DP). All are dated from the period October 1871-January 1872.

Detail on the activities of Richard Niness has already received attention (Porter 1971). However this was published before the meeting with Niness's grandchildren who were able to shed a little bit more light on him. He came from near Camborne in Cornwall (? from Chasewater). It is now known that he came to the Manifold Valley in 1847 or earlier, working initially at Ecton, and also from 1847 at the Dale Mine.

The family bible records that he married Kate Hunt at St Edwards Parish Church, Leek, Staffs on 29th July 1849 (her actual name was Katherine de Vere Hunt and she was Irish). The Dale Mine proprietors took a lease of the New York Mine at Upper Elkstones and he went to live there. He was certainly there in January 1850 and the first four of his nine children were born at

"Elkstones" according to the family bible. The first, also called Richard, was born on 16th July 1850 and the fourth on 4th February 1854. Presumably he moved back to Warslow when operations ended at New York in 1855 and work started at the Dale Mine ahead of the Dale Mining Co Ltd being registered on the 29th October 1857. Three of his sons, William, Bertram and (?) John, emigrated to South Africa to work for Cecil Rhodes.

Richard Roscoe was a London solicitor, of 23, Regents Park Road, married to Honora, a grand daughter of John Taylor, the Duke of Devonshire's mineral agent. She had been coming to Ecton to stay at the cottage her grandfather used as a residence on his occasional visits to Ecton. She could remember ore being dressed at Ecton in 1851.

Roscoe had purchased the Swainsley land on 26th March 1866. It consisted of Swainsley Cottage and 29 acres of land. His house was built in one of the fields called Upper Sun Dole. Swainsley was only used in the summer and Roscoe had taken fishing rights from the Duke of Devonshire in 1868. This had been on the east bank of the river only. Despite this, Roscoe had erected weirs across the river upstream from Swainsley without the permission of Sir John Harpur Crewe, who owned the west bank and its fishing rights. William Turner, gamekeeper to Sir John, stated (DP) that fish in the river had been "scanty" since a big flood in the autumn of 1868 which had killed "an awful lot of fish". The crux of Roscoe's case was that the River Manifold was a valuable fishing river which was being polluted by the waste water running from the Dale Mine dressing floor.

The latter was a "workshop" under the Workshop Regulation Act, 1867. It had therefore been inspected regularly since 1869 by Robert Farrow, a sanitary inspector from Leek. He stated (DP) that the pumping engine lifted the mine water to the adit (at a rate of 84852 gallons every twelve hours) and an additional 30267 gallons to the dressing floor over the same period of time, giving a total of 115,119 gallons per half day flowing over the gauges (presumably installed under the Act) and reaching the river either via the adit or the dressing floor. Mr Farrow reported that the water, after use on the dressing floor, flowed 33 feet through a catchpit 16 feet long, 1'4" wide and from there to a second catchpit and then onto a third both being 28 feet long and 7'6" wide.

Other water from another part of the dressing floor went through the 2nd and 3rd catchpits before all water left the floor for the culvert which flowed into the ditch which ran down the south side of the road to reach the river by Dale Bridge. This road, incidentally, was turnpiked which must have been to the annoyance of the Ecton Miners.

Prior to the dressing floor being moved to its final position at the Top of the Dale, ore was dressed close to the No 1 Engine Shaft. A culvert was made in about 1854 from the old floor, according to Niness. It was made from stone and was about nine inches square, being required to take water from a five-inch lift, or pumping pipe. This floor closed in 1863 when the new floor opened, the old Cornish-style engine house being destroyed by explosives to provide stone for the new engine house. The catchpits mentioned above were installed at that time. They are probably the first to have been used in the valley to try and effectively cleanse the water, although a "small wooden box" acted as a catchpit on the old floor.

The "old" floor had certainly been in existence in 1847, when Niness arrived at the Dale Mine, with water being pumped to the surface for this purpose. Prior to 1847, water was brought to the

mine by a lead from the stream which feeds the ponds at Warslow Hall. The water was used both by the dressing floor and for a hydraulic pumping engine (letter from Niness dated 13/1/1872). A set of stone built "filter beds" can be seen clearly on the hillside at the site of the old floor. If water was cleansed by the small box mentioned above, was this part of the buddling system?

The new dressing floor came into operation in November 1863. There was a crushing house which contained a "double rolled crusher" worked by a rotary engine. In 1872 the head dresser was James Barker. In 1863 he had assisted in the erection of the new floor, in making the hutches or jig tubs, buddles or catchpits "for the precipitation of the light minerals of both lead and blende ore". The first sampling of ore had taken place in March 1864 and the lot of 68 tons was purchased by Messrs Wass and Sons. A nice point was that Mr Wass was so impressed by the way the ore had been cleaned, he gave James Barker a sovereign to treat himself and the other ore dressers. Barker stated (DP) that for five or six years, they broke 40-60 tons of lead ore and from 40-50 tons of zinc blende per month. The lead ore had gone to Wass and Co and possibly the blende too. Although this yield had been achieved in 1864-65, the statistics prepared for the Court case defence show a different story (see Table 1).

Supporting the Plaintiff was Richard Naylor, who lived at the cottage closest to the river at Ecton Lea. What had turned him against the Dale Mine and Niness isn't known. He seems to have been an unlikely accomplice for Roscoe; he was well known as a fish poacher and had been arrested by the Warslow Constable for Sunday poaching of conies (rabbits) and fined £5 for it. He poached the River Manifold with Ben Twigge, a saddler and farmer of Ecton. He probably lived at East Ecton where the Twigges are known to have had a saddlery in the outbuilding of the right hand cottage close to the East Ecton shaft. Naylor married two of Twigge's sisters - Mary Anne and later, Maria. Apparently one of the places to poach the best fish was just below where the Dale Mine water reached the river, i.e. just below Dale Bridge.

The defence case rested on the mine being able to prove continuous use for over 20 years. The case was heard in 1871 and went in favour of the mine, but Roscoe appealed. His barrister, incidentally, was his brother-in-law. One would have thought that it would have been an open and shut case. Refuse had for years been thrown into the river not only by the two Ecton Mine dressing floors, but also from the Botstone Mine at Wetton Mill, let alone the water from the Dale Mine and the dirty water from Ecton and the Swainsley Stamps. Even if not continually, one would have thought that the legal right had been established beyond reasonable doubt. Even Naylor allowed his farm animals to walk into the river from his farmyard. All the effluent from the yard drained into the river and this section of it was where Roscoe fished!

However while preparing for the appeal, the defence Counsel realised that despite the miners' depositions, it could not be proved that the Dale Mine had used the river for a continual period of 20 years. Five witnesses claimed this in affidavits, but three of them admitted under cross examination that in fact this was not the case. In fact it appeared that between 1847 and 1854, the mine had not been used below adit. Moreover if George Buckley's operations in the 1840's had drained water to the river, the mine could not prove that he had a right to do it. The amount of water being discharged had increased to about 170 gallons a minute, with some 60 gallons being pumped to the dressing floor and Counsel did not believe that they could convince the Court to believe that there was no fouling of the river. Roscoe's action

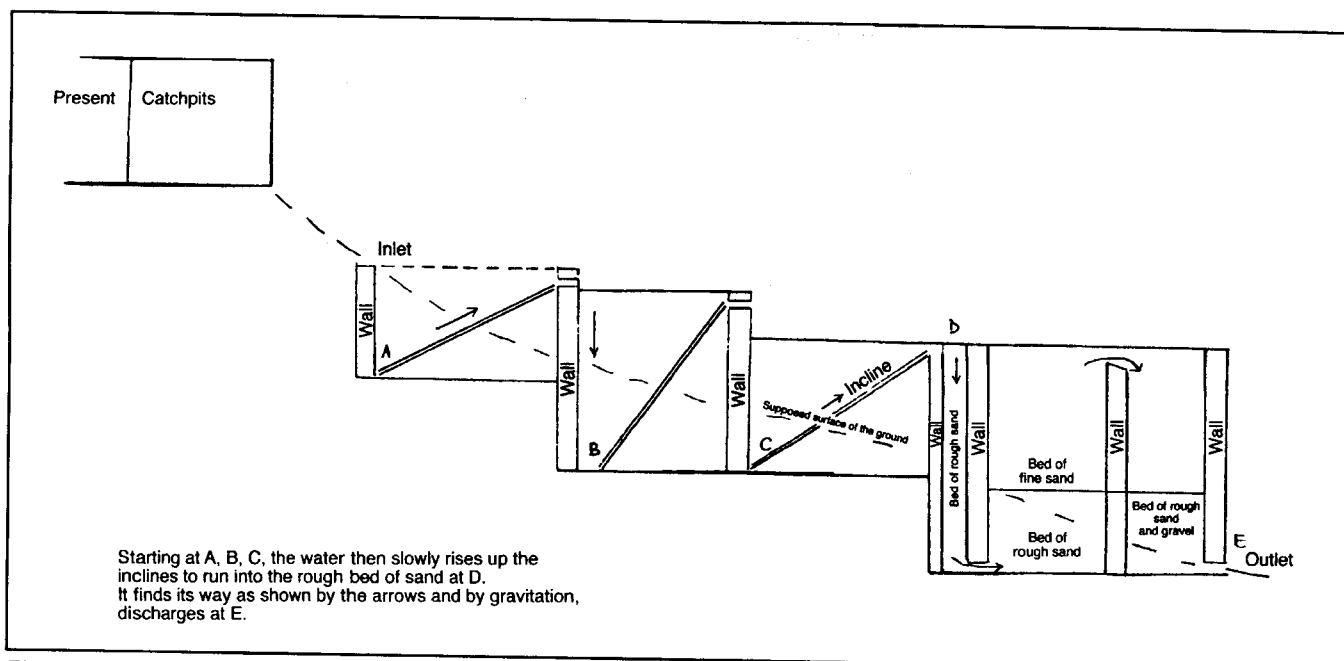


Fig. 4. John Wheatcroft's plan of January 1873, showing the proposal for the new filter system.

stated that the pollution was injurious to his fish and cattle.

Under the circumstances, the defence Counsel was of the opinion that they would fail. Consequently, he consented to Roscoe taking an injunction on his own (Roscoe) giving the mine two months (until 1st April 1873) to construct catchpits to cleanse the water adequately and paying his taxed costs in two halves: 50% when taxed and the other on 1st April 1873. The catch pits were duly made but they were not finished until September 1873. However a further document indicates that a case was down for hearing in Chancery on 2nd December 1873, "that R Ninness may stand committed to Stafford Jail for breach of the injunction granted on the 14th December 1872 to restrain the defendants, the New Dale Mine Ltd from discharging sludge or refuse or foul water into the River Manifold". The fouling took place on several occasions in the first two weeks of November 1873.

Mrs Vera Barber and her brother indicated that "Dick Naylor told my grandfather on his (Naylor's) deathbed that he had stirred up the Dale water" (pers. comm. 17/6/1971). This was 26 years before Naylor's involvement was discovered. It would appear that the fouling of the river in November 1873 was Naylor's doing. It certainly seems to have coincided with the closure of the mine for the final time although there is a story that the mine closed after men were brought out following an explosion. This has yet to be substantiated. It will be noted that Naylor wasted no time following the completion of the catchpits.

In fact it is more than likely that the story is true. A plan deposited at the Derbyshire Record Office by Vera Barber and belonging to Richard Ninness shows the new catchpits together with a filter bed. The plan is dated 4th January 1873 and described as being "John Wheatcroft's plan". It is reasonable to assume that this new arrangement was implemented. It would be difficult to imagine dirty water reaching the river on several dates within two weeks if this arrangement was operating. However if Naylor was going up the adit to stir up the water, then the pollution could have happened despite the best intentions of the mine. The new arrangement is shown in Fig. 4.

Whether Ninness went to jail isn't clear. A further case was heard in February, 1874 when some of the miners brought an action in the County Court against the mine - presumably over unpaid

wages. It seems likely therefore that the mine closed at the end of 1873 - possibly with the manager in jail. If so, it would have been a sad conclusion to the mine.

What also is not clear is the anger created by the loss of jobs at the Dale Mine. There had been an altercation at Naylor's house before the appeal when a group of miners went to see him to express their concern at the prospect of losing their job. Ninness also had written to his solicitor to say that he was concerned at the threats Naylor was making. The latter kept firearms at Ecton Lea and Ninness was clearly concerned for his life at one point. Roscoe continued to spend his summers at Swainsley. It was sold around 1890 to Sir Thomas Wardle of Leek (pers. comm. Mr Stuart Worthington, a descendant). It was Sir Thomas who extended the house in the 1890's on the west side. It was later extended to the east in around 1910.

Finally, Vera Barber said that she remembered her mother saying that the women on the Dale Mine dressing floor used to sing "Green grow the rushes oh" as they worked. It brings a human touch to an inherently "dry" subject! The Dale Mine tips are now nearly none existent. They were removed to provide the foundation of the "new" road from Warslow Brook to the village. The "new" engine shaft is situated in a small croft near to the house at Dale Farm. It should be avoided at all costs. The shaft is about nine feet in diameter and 600 feet deep. Its precise location can only be indicated in general terms and the nature of the covering is unknown.

BOTSTONE MINE, WETTON MILL

Little is known about this mine, but it was working in the 1830's and in the following decade. The mine closed around 1850 and the equipment advertised for sale. This included a waterwheel operated by the River Manifold. Presumably it powered the dressing floor machinery situated on the top of the tips close to the river, where the latter may still be seen. The drive would presumably have been worked via a vertical spindle, similar to the one illustrating Willies' 1975 article and formerly working at Eyam. The main shaft was still open when the Light Railway closed in 1934. It was surrounded by a circular wall and may be seen on the cine film made of the railway just before it closed.

This shaft was subsequently filled in and was situated beneath the lay-by which may be seen opposite the tips.

BINCLIFF MINE NEAR CASTERN

These mines are situated downstream from Beeston Tor. There are a considerable number of shafts and levels and some are probably quite old. All are situated on the Wetton side of the valley.

Very little is known about this group of mines in general, let alone the dressing which took place there. The biggest problem was the shortage of water. Even river water was scarce other than in winter owing to the river flowing underground at Wetton Mill. A report in the *Mining Journal* in November 1854 stated that "as soon as we can get water we shall attend to the dressing". The same source in April 1853 stated that the only means to get water out of the mine was by bucket and windlass. Therefore all the water for dressing had to be drawn out of the mine. This wasn't so bad if it was being removed for drainage purposes anyway, but it wasn't much use if you were breaking ore in the middle of a dry period.

Prospective shareholders in this venture had already suffered at the attempts of the proprietors to dupe them over water. In April 1853, the Company, known as the North Staffordshire Consols, placed an advert in the *Mining Journal* stating that "because of the unlimited supply of inexpensive water power" [from the River Manifold] considerable financial benefits would be likely to accrue. The advert also referred to the intention to erect a "powerful waterwheel on the River Manifold. This stream will afford an unlimited and never failing supply of water power by which the stamping and dressing of the ores can be most economically carried on". The river must be dry at Bincliff for more than half of the year and this misrepresentation was disgraceful.

Details of wages at this time are given in the only history of the mine published to date (Porter and Robey, 1974). The ore dressers in April 1855 received 15/- (75p) per week and the boys (a maximum of four) received 4/- to 5/- (20p-25p per week). This was similar to payments for boys at the Dale Mine in 1842 but behind what was being paid by Melville Attwood at the Ecton Stamps. The payments to the men was comparable to payments at Ecton.

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Lindsey Porter.

Len Kirkham

APPENDIX: Dale and Ecton mines ore sales statistics

Note: 21 cwt to the ton was used at times, but these are calculated at 20 cwt per ton

Dale Mine ore sales

Lead ore	Value
ton-cwt-qtr	£ - s - d.
1857 27-10-0	348-7-3
1858 25-01-1	371-15-0
1859	798-07-5
1860	3218-14-7
1861 333-15-0	3564-03-10
1862 70-2-0	524-16-3
1863 nil	nil
1864 567-4-3	5106-18-11
1865	4357-08-2
1866 401-06-2	2682-14-0
1867 173-03-0	946-06-3
1868 99-04-3	682-16-11
1869 25-17-0	67-04-2
1870 156-14-0	1012-19-1
1871 to Octobe	1314-14-10
Total 1879-18-1	£24995-16-8

Ecton Mine ore sales

value	Copper	value	Lead	value	Zinc	£ - s - d
ton-cwt-qtr	ton-cwt-qtr	£ - s - d	ton-cwt-qtr	£ - s - d	£ - s - d	£ - s - d
1826 29-02-1	170-12-10	(plus mixed Cu and Pb	22-14-1	£57-09-11)		
1827 237-10-2	1494-14-7					
1828 218-0-0	1299-15-4					
1829 210-07-3	1280-11-8					
1830 211-09-2	1656-15-9					
1831 111-03-3	889-04-10					
1832 93-20-03	831-09-11					
1833 71-13-2	391-05-1					
1834 102-17-0	792-13-11					
1835 71-02-2	658-17-4					
1836 92-06-3	666-18-7					
1837 67-03-0	529-14-4					
1838 68-20-3	461-07-3					
1839	21-13-2	95-11-9				
1840 233-10-0	1022-17-7	14-12-0	102-04-0			
1841 122-20-0	780-12-1	17-19-1	155-00-1	113-13-0	268-09-2	
1842 242-18-0	1376-09-6	7-02-0	43-01-4	348-13-0	938-09-10	
1843 375-13-1	2094-11-3			554-04-2	1433-16-3	
1844 252-20-1	913-10-4	18-04-1	91-18-3	127-19-2	252-06-2	
1845 55-09-3	581-01-8			1-10-0	2-05-0	
1846 56-18-1	525-03-5	11-12-0	63-16-0	41-10-2	72-13-4*	
1847 50-18-1	268-15-3	8-00-0	58-00-1			
1848 18-20-1	81-11-10	1-01-0	5-07-7	*possibly due to		
Attwood				and 1845 figures		
1849 21-05-0	164-06-8	6-11-1	37-07-11			
1850 8-02-0	49-18-9					

Summary Totals

1826-38	1608 tons	£11152				
1839-45	1283 tons	£6769	80 tons	£488	1146 tons	£2895
1846-48	115 tons	£810	21 tons	£127	41 tons	£73
1848-50	41 tons	£279	7 tons	£37		

Ecton Mountain Mining Co

value	Copper	value	Lead	value	Zinc	£ - s - d
ton-cwt-qtr	ton-cwt-qtr	£ - s - d	ton-cwt-qtr	£ - s - d	£ - s - d	£ - s - d
1851 96-00-0	777-00-0	01-17-3	11-12-1			
1852 56-19-3	560-00-1	23-04-1	210-14-7			
1853 51-01-1	532-07-8	31-09-0	317-18-3			
1854 49-19-2	506-11-4	15-19-3	141-12-2			
1855 29-00-0	328-04-11	11-19-0	129-13-0			
1856 15-02-0	151-04-0	17-08-0	173-17-7			
1857 9-08-3	115-16-6	5-06-3	44-12-2			
Total	301 tons	£1971	137 tons	£1030		

Ecton Consolidated Mining Co.

Copper	value	Lead	value	Zinc	£ - s - d
ton-cwt-qtr	£ - s - d	ton-cwt-qtr	£ - s - d	ton-cwt-qtr	£ - s - d
1858	10-14-0	68-17-0			
1859 3-12-2	38-18-2	0-05-0	2-05-0		
1860 8-16-0	101-12-0				
1861 10-05-2	63-05-6	7-19-0	74-07-1		
Total 23 tons	£204	19 tons	£145		

New Ecton Mining Co.

value	Copper	value	Lead	value	Zinc	£ - s - d
ton-cwt-qtr	ton-cwt-qtr	£ - s - d	ton-cwt-qtr	£ - s - d	£ - s - d	£ - s - d
1862						
1863 16-11-0	126-16-2					
1864 11-06-2	126-16-2					
1865 3-08-1	18-01-10	11-14-0	121-02-10			
1866		1-18-2	19-06-3	4-10-0	18-00-0	
Total	31 tons	£263	20 tons	£200	4-10-0	18-00-0

Colin Mather

value	Copper	value	Lead	value	Zinc	£ - s - d
ton-cwt-qtr	ton-cwt-qtr	£ - s - d	ton-cwt-qtr	£ - s - d	£ - s - d	£ - s - d
1866 4-0-2	16-08-0	1-14-3	17-16-2			
1867 18-04-1	92-01-3	33-08-3	318-11-3			
Total	22 tons	£108	35 tons	£336		

Ecton, Clayton and Waterbank Mining Co.

value	Copper	value	Lead	value	Zinc	£ - s - d
ton-cwt-qtr	ton-cwt-qtr	£ - s - d	ton-cwt-qtr	£ - s - d	£ - s - d	£ - s - d
1868 14-16-3	99-01-5	58-12-3	544-03-9			
(in 1868 some £250 of lead ore may be attributable to Colin Mather's company)						
1869						
1870 1-15-0*	10-17-8	20-00-0	27-12-6			
1871	47-00-0	304-11-8				
1872 2-00-2*	13-14-8	52-00-0	382-10-9			
1873 1-05-0*	8-00-10	see 1872	11-08-1*			
1874 0-10-0	2-00-4	2-15-0	18-19-3			
(* denotes approximate)						
Total	20 tons	£134	180 tons	£1289		

Ecton Co. Ltd.

value	Copper	value	Lead	value	Zinc	£ - s - d
ton-cwt-qtr	ton-cwt-qtr	£ - s - d	ton-cwt-qtr	£ - s - d	£ - s - d	£ - s - d
1883 to 1885						
1886 85-00-00*265*	25-00	112-10-0*	150-00-0*			
1887 ?	?		120-00-0			
1888 65-00-0*	290-00-0					
Total	150 tons	£555	25 tons	£112	270 tons	£1000*

* denotes approximate

Grand Total 1851-58

Copper	547 tons	£3235	Lead	416 tons	£3112	Zinc	274 tons	£1018*
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* denotes approximate