“Bingtale and Fathomtale - Lead Miners’ Earnings in 19th Century Allendale”

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February 2016

Abstract

This paper uses the records of the Beaumont-Blackett lead mining concerns in Allendale to examine the earnings for lead miners in this part of the Northern Pennines for the late 1850’s and early 1860’s. The paper matches two parts of the historical record, the Bargain books and Beaumont-Blackett’s quarterly financial accounts to give a more complete picture of the earnings of this group of workers than has previously been achieved. The paper shows that the distribution of earnings for lead miners has a distinct structure in comparison to coal miners and suggests some motivations for lead miners working decisions. One conclusion that may be drawn is that they were, in essence, prospectors.

1 I would like to acknowledge the help of staff at both the Northumberland and Durham Record offices, and also at the North of England Mining Institute in Newcastle upon Tyne. Particular thanks go to Mrs Liz Bregazzi at the Durham Record Office and Jennifer Kelly and Simon Brookes at the North of England Mining Institute. Ian Forbes and Jessica Finnilä gave significant help in interpretation of the available historical records. I would also like to acknowledge correspondence and discussions with Professor Bernard Jennings. The paper was given at the 2012 Economic History Society Conference at Oxford, I would like to thank participants of the session there as well as seminar audiences at Aberdeen, Glasgow, Flinders, Durham, Lancaster, Maastricht and Newcastle especially Les Reinhorn, Hang Sun and Colin Wren. Comments from Sascha Becker and Jed DeVaro were also helpful in my thinking. I would also like to acknowledge the hospitality of the Department of Economics and Finance at the University of Durham. Contact: Tim Barmby, Dept of Economics, Business School, University of Aberdeen, Old Aberdeen Scotland AB24 3QY, tim.barmby@abdn.ac.uk
I Introduction

Lead mining was an important industry in the Northern Pennines all through the 18th century and for most of the 19th century. Numerous aspects of the way the industry was organised are of interest to the economic historian. This paper mainly focuses on one of these, namely the form of the contract between the miners and the mine owners and asks whether more can’t be deduced from existing historical records to give a clearer picture of individual worker’s earnings than has so far been achieved, and also whether improved data on earnings can be used to examine other aspects of the contract setting observed at the time.

Lead had been mined in the Northern Pennines since Roman times but started to grow in the latter part of the 17th century and into the 18th century as the pace of economic activity started to pick up. The two largest commercial concerns involved in the lead mining activities in this area during this time were the London Lead Company and the Beaumont-Blacketts’

Figure 1 Map of Alston Moor and Allendale

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2 Burt (1984) analyses the industry in different parts of the country, in Wales, Derbyshire, and Northumberland, Honeyman (1982) also looks at aspects lead mining in Derbyshire, while Hunt (1970) and Raistrick and Jennings (1965) concentrate more on the Northern Pennines
The London Lead Company concentrated most of its activity in the Alston Moor area to the west while the Beaumont-Blacketts' were more in evidence in Allendale, Weardale and Northumberland to the east. This study uses records from the second of these concerns and focuses on the mines at the head of the east Allen river at Allenheads, Coalcleugh, (both marked on this map) and also Swinhope and Killhope.

II Bingtale, Fathomtale and other Contracts

The main form of lead mining contract in the Northern Pennines was termed a “bingtale” contract. This was essentially a piece rate contract. Groups of miners, often 4 or 6, would make a bargain with the mine owners to dig in a particular part of the mine, for a quarter. The contract would specify a particular price to be paid to the miners for each bing of ore raised and dressed. The ore was Galena (lead sulphite) which contains around 80% lead. A bing was 8 cwt (hundredweight), or 0.4 of a ton. Dressing was the process by which waste material would be separated from ore so that the ore would be ready for smelting. The miners would be responsible themselves for paying for this to be done.
There were other types of contracts used in the work in the mines, fathomtale contracts were bargains made for digging a fathom (6 feet), for instance in driving a level, that is a passageway in the mine in which the gang might encounter ore, but where the purpose was to gain access to sources of ore and to make drainage for the mine, the contract would quote a particular rate per distance. Sometimes the bargains would be types of hybrid contracts which would give a separate rate for distance and for ore raised.

Some authors suggest that there was some movement from bingtale to fathomtale over the evolution of the industry\(^3\), and this was due to the objective of trying to make workers earnings less variable. This issue of the variability of earnings and also due to the fact that the contracts were settled intermittently seems to have been behind the practice of making advances to workers. In the mid to late 19th century the Beaumont-Blackett company would advance 40s (£2) to each worker each month, but this would need to be paid back when the bargains were settled\(^4\). If the group of workers had had an unsuccessful bargain and not found sufficient ore, then potentially they could end up in debt to the mine owners.

The piece rate nature of both Bingtale and Fathomtale contracts, are likely to do with the monitoring problem for underground working, especially as the payment for many of the more easily observable tasks were made on wage contracts, or Daytale work in the parlance of the time and place.

Occasionally workers in the Northern Pennines would contract to be paid on the amount of lead actually smelted, these types of contracts were called Tontale contracts, but as far as the author is aware these contracts were only used for recovering lead from the residue produced by the washing process. Here the percentage of lead would be more variable, whereas the percentage of lead in Galena ore was essentially fixed. It is this fact which most likely explains the different way of contracting.

III The Historical Records Pertaining to these Contracts

\(^3\) Hunt (1970) and Raistrick and Jennings (1965) give some discussion of this
\(^4\) Hunt (1970)
Bingtale contracts would be recorded in Bargain (or sometimes letting or setting) books, and looked like:-

Figure 2: A Bargain from the Allenheads mine in 1861 (Northumberland Record Office Document NRO/672/E/2A/10) Reproduced with permission of Viscount Allendale

This record was made on March the 30th 1861 and shows that Robson Whaley and 3 other miners, Joseph Bell, John Seaton and William Armstrong contracting to drive a “forehead” west in “four fathoms limestone” in Old Vein in Allenheads Lead mine at 168/- per fathom until the 30th of June. The contract also specifies that they will be paid 44/- per bing of ore raised. It also specifies the days and hours they would work. Specification of hours and days only came latter on the in the 19th century, mainly at the instigation of Thomas Sopwith who was the chief agent of the Beaumont concerns between 1845 and 1871.

The number of miners in each gang was very often an even number, this is likely to do with the technology of the mining the harder rock at this time, to blast rock away a long metal chisel called a “jumper” would be driven into the rock, one member of the gang holding it and rotating it, to avoid sticking, in between strikes at the other end by the other member of the gang with a hammer. Odd numbers in a gang are not unknown it is likely that these miners would concern themselves with softer deposits. Half partners are also occasionally seen and this is where miners would take their sons, or younger family members down the mine. Although Robson Whatley was the first named member of this gang of

5 Old vein was among the oldest veins worked at Allenheads mine, see Fairbairn R A (2000)

6 Sopwith (1833)
workers and his name appears in the financial accounts as being in receipt of the gang’s earnings, for distribution note that John Seaton signs the bargain. This give added support to the assumption, which is made throughout the study, is that these 4 men are equal partners in the venture and that the proceeds from such would be equally split.

IV Earnings of Miners

Much of the discussion of earnings in the literature suggest that it is very difficult to form an accurate picture of the earnings of individual workers.

“The accounts of the Blackett/Beaumont mines give only some indication of the miners’ general prosperity; there are no specific figures for annual earnings. The surviving accounts are the general accounts of the costs and production at each mine. No wage books or their equivalents survive. Thus it is recorded that ‘_____ and partners’ raised so much ore at such and such a price during a quarter, but that the partnership’s expenses – washing, drawing, candles, etc. – are not recorded, and the same partnership may appear elsewhere in the accounts for specific dead work or days’ labour performed. It is thus hopeless to attempt to work out from these figures the actual year’s earnings of an individual partnership.” 7

One of the primary purposes of this paper is to argue that this might be too pessimistic an outlook and that we might well be able to form some view of not just partnership’s earnings but the earnings of individual miners themselves by matching the original bargain to records of subsequent payments made on the bargain. To start the discussion for this assertion Figure 3 gives a segment of the Beaumont/Blackett accounts for the June quarter of 1861 recording specifically payments made for ore raised for Old Vein in the Allenheads mine under the contract in Figure 2. As Hunt observed above there is clear information on the physical amount of ore raised, the rate of pay and the amount paid out. So Robson Whaley and his gang received £24/15s for the 11 bings 2 cwt of ore which he and his partnership raised.

7 Hunt (1970) p 73
Figure 3a Segment of the Beaumont/Blackett accounts for the June quarter of 1861 (NRO/672/E/3A/5) Showing Bingtale payments to Robson Whaley as detailed in the contract in Figure 2 Reproduced with permission of Viscount Allendale

Note that Christopher Philipson appears twice in these accounts. This is not because his gang had two bargains but rather he is being paid for output from the first quarter of this year. Bingtale work was only paid every 6 months, and the first and second quarter bargain will appear in the accounts as two separate items only when the price of the bargain changed, as it did here for Philipson’s gang from 30/- to 40/-. The other amounts are the joint amounts for the two quarters, so for example the bargain rate for Whaley’s gang was 44/- in both quarters, and they raised 11 bings 2 cwts over the two quarters.\(^8\)

In the same accounts the amount paid for the fathomtale part of Whaley’s gang’s contract can be found

Figure 3b Fathomtale earnings made to Robson Whaley in the second quarter of 1861 (NRO/672/E/3A/5) Reproduced with permission of Viscount Allendale

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\(^8\) Note also that in the extreme left hand margin there is a number. This column is not labelled, which is unusual as the record keeping of these mine clerks is often exemplary. By tracking back to the original bargain for which this is the payment this is shown to be the number in the gang. It doesn’t appear to be universal practice to note this information in the margin and appears just to be an idiosyncrasy of this clerk. In earlier bargain books this doesn’t seem to be common
For the Beaumont Blackett concerns this matching, while routine in the main, is feasible and enables the researcher to deduce some aspects of the pay of these workers\(^9\).

As has been mentioned the groups of miners were responsible for a variety of other costs of extraction, the main cost would have been dressing the ore, but also candles, blasting powder, drawing of the ore from within the mine to the dressing floor, which would usually be immediately adjacent to mine entrance. Information on these other costs are relatively rare but Bernard Jennings’ 1959 MA thesis from Leeds\(^{10}\) contains a table, reported in Appendix 1 records the monetary costs of deductions from miners’ pay for the first 5 months of working Friarfold vein off St Francis level in A. D. Company’s mine in Swaledale in 1878\(^{11}\), on the assumption that the quantity of candles used, and the cost of tools will be a function of the number in the gang, the costs of drawing and washing will be a function of the number of bings of ore raised and the cost of dynamite will be a function of the number of miners in the gang and the amount of ore raised, regressions are computed to predict the deductions for miners in Allendale. These deductions are then taken out of the gross amount received by the miners gang to give a net amount. These regressions are also reported in Appendix 1.

The data is organised by gang and quarter. The histogram below gives the distribution of monthly average earnings (the average being computed within the gang) of 234 miners who worked in 66 gangs in Allendale between 1858-61. Occasionally we will see a gang only working 2 or 3 quarters in the year, but we observe 249 quarters of data over the period. As mentioned the numbers of miners in the gangs were almost always an even number of the 66 gangs 18 have 2 members, 46 have 4, 1 has 6 and 1 has 8. The histogram gives some other interesting indications; while the mean earnings (£3/10/-) is roughly comparable with previous work. It does seem, however, that a small number of gangs are achieving reasonably high earnings for the period. This right skewness in the data is of some importance to our story.

Figure 4 Net pay per month of Allendale Lead Miners in 1858-61

\(^9\) This process of matching can be made significantly more difficult if a company give up a lease, see Barmby (2013).

\(^{10}\) This thesis has been digitised and is available at the Brotherton Library

http://digital.library.leeds.ac.uk/1844/

\(^{11}\) Although the period which the deductions are observed is later than the earnings period for Allendale, this will if anything overstate these costs
The numbers in brackets above the bins is the number of quarters in which this mean net monthly pay was observed (remember the miners were only paid their bingtale earnings each six months, and their fathomtale each quarter). Looking back at Figure 2 we see that some contracts had both Bingtale and Fathomtale elements, in fact 45% were composite contracts, as in Figure 2, 53% were pure Bingtale contracts but only 2% were pure Fathomtale contracts.

To get an idea of how these earnings compare to general wage levels at this time a craftsman’s daily wage would be around 56d, which would give a monthly earnings of £4/13/4\(^{12}\), coal miners earnings in the early 1860’s would be around £4\(^{13}\). Lead miners were therefore not well paid on average, but it does appear that there was significant variability for workers over the quarters between 1858 and 1861. To get a more relevant comparison, perhaps, the mean fortnightly pay at the Townley Colliery at Ryton, on the south bank of the Tyne, 36 miles from Allenheads was just over £2 working full time, and also the standard deviation was smaller. So this raises a question; if there was higher, less variable pay just down the valley why go down a lead mine? There might be other compensations; lead mining presented less immediate risk of injury, as trapped gas would not be present in a lead

\(^{12}\) Phelps-Brown and Hopkins (1981)
\(^{13}\) Feinstein (1981)
mine so there was no risk of explosions. Lead miners would also often have small holdings as well which would supply goods to supplement the household budget. However the more obvious difference in the structure of earnings is the noticable right skew of lead miners earnings, and while the high variance has often been emphasised as this had a downside, insomuch as miners could end up in debt to the mine owners. The high variance coupled with the positive skew also had an upside namely that relatively high payments are not so insignificantly rare. In this sample 19 out of the 249 quarters (7% of the time) the average earnings within the gang were above £6. In Townley Colliery the maximum fortnightly pay was £2/16/10 for mining coal; even if that maximum was replicated in a second fortnightly period it would come to less than £6. It seems therefore that there was a possibility of a bigger payoff in the lead mines.

Table 1: Some comparison of earnings between lead and coal miners

<table>
<thead>
<tr>
<th>Earnings</th>
<th>Allendale Lead Mines</th>
<th>Townley Colliery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>£3.33</td>
<td>£3.98</td>
</tr>
<tr>
<td>Third Quartile</td>
<td>£4.35</td>
<td>£4.28</td>
</tr>
<tr>
<td>Ninth Decile</td>
<td>£5.82</td>
<td>£4.70</td>
</tr>
<tr>
<td>95% point</td>
<td>£6.85</td>
<td>£4.88</td>
</tr>
</tbody>
</table>

Table 1 attempts to set out the difference more clearly by comparing the higher percentage points. It can be seen that while the median earnings for lead miners compared to coal is around 15% lower the 95% point is 49% higher. Although maybe not as glamorous as gold mining lead does have some of the characteristics gold prospecting; although the returns are not as certain if you do hit lucky the payoff could be reasonably high.

V Were Bargain Rates Successfully Set to Equalise Mean Earnings?

In this section we pay some attention to the setting of bargain rates. In 1861 the lowest bargain rate was 15/- and the highest was 70/-, 70/- seems to be an outlier as the next largest was 50/- as can be seen from the histogram below. Also in the histogram below the 4 pure fathomtale bargains; where the bargain rate was by definition zero are excluded. Here the geology of the situation may be important if bargain rates were set relative to the difficulty of
the working\textsuperscript{14}. Miners working on a difficult vein might not produce as much weight of ore but might end up, on average at least, earning the same. This was not in any way a social object of the mine owners\textsuperscript{15}, simply since the bargain rates had to be set such that workers would be willing to take up the bargains\textsuperscript{16}.

Figure 5 Histogram of Bargain rates in Allendale in 1861

It is interesting to contrast the method of contracting observed in coal mining at the same period, where the miners would be randomly allocated a location to dig on the coal seam by the method of “cavilling”\textsuperscript{17} and contracts would be longer. Here it seems very likely that since the miners had at least as good information as the mine owners the process of the frequent renegotiation of the bargain rate and the freedom of the group of miners to decline to take up a bargain was a device designed to extract the potentially better information that the miners held\textsuperscript{18}.

\textsuperscript{14} Hunt (1970) and Raistrick and Jennings (1965)
\textsuperscript{15} I acknowledge correspondence with Professor B Jennings regarding this point
\textsuperscript{16} Burt and Kippen (2001) discuss rational choice by miners over contracts in the context of Cornish metal miners
\textsuperscript{17} Daunton M J (1981).
\textsuperscript{18} It is intriguing line of thought to reflect how much the miners were using their knowledge of geology in making decision over bargains. Thomas Sopwith, who was the main agent of the Beaumont/Blackett concerns in the early to mid-part of the 19\textsuperscript{th} century gives suggestive examples; Sopwith (1833) p 120-3 writes about a number of experienced miners making substantial fortunes (Utrick Walton and the brothers John and Jacob Wilson). In this discussion Sopwith acknowledges the uncertainty inherent in mining but observes “… it strikingly appears how much practical judgement and experience may be exercised in reducing that uncertainty to a great degree….”
In the Northern Pennines, it seems that the mine agents would propose a rate for a particular section of the mine. The bargains would very accurately describe the area of work, terms such as “between William’s sump to Henry’s rise” \(^{19}\) will be seen written in the bargain indicating a clear internal map of the mine and way of describing locations.

There is little evidence on the exact workings of these negotiations; around setting day you will see most bargains start up on the quarter day, but sometimes bargains will be a dated a day or so later. We may deduce that these were bargains whose rates were not set high enough to attract takers but that the firm still wanted to proceed with and so revised the price so as to attract takers\(^{20}\).

The idea that the bargain rate would be set to equalise earnings can potentially be examined with this data. The following two graphs attempt to do this by examining the relationship between earnings and the piece-rate for both bingtale and fathomtale work using non-parametric regression (so as not to impose linearity on the relationship). If the rate was set so as to equalise earnings then the line would not be differentiable from a horizontal line.

Figure 6(a) Earnings from Bingtale vs Rate

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\(^{19}\) A level was a horizontal corridor driven within a mine; an adit a level which would exit the mine giving drainage as well as access. A shaft would come from the surface a sump is essentially a shaft but dug down from a level within the mine and a rise digging upwards from level within the mine, likely following a vein of ore.

\(^{20}\) I am grateful to Ian Forbes for drawing my attention to the following entries in Thomas Sopwith’s diary for 1845 “Saturday 4th October. At Allenheads where I let the bargains, as is termed for the East Allendale miners. This occupies the greater part of the day and was followed by a dinner at the inn at which all the inspectors and chief clerks etc were usually present and which I was expected to preside” and then on “Monday 6th October. This is called placing day, in the local conversation of Allenheads miners. Some workmen when offered a “bargain” or contract to work for three months and if no agreement is come to, they remain “out” or unemployed. Occasionally there is not employment for the entire body of miners and those who are not required are also “out”. The object of “placing day” is to reconsider the contract prices and to endeavour to find occupation for all the workmen resident in the district”
Figure 6(b) Earnings from Fathomtale vs Rate
Taken together the main message of these two figure suggest two things. Firstly, taking into account the confidence intervals, over a significant range of rates, both for bingtale and fathomtale, some support for the idea that earnings are equalised can be seen. This fits in with the idea that miners had some discretion over whether they took bargains, as you wouldn’t observe bargains being taken that the miners’ didn’t think worth their while. However, in both cases, for higher rates this seems to break down, but interestingly though in different ways. For bingtale contracts higher priced bargains seem worse, whereas for fathomtale higher priced bargains seem better.

One possibility is that workers are trading off, in some way, the expected mean pay against the expected variability. If we can take the width of the confidence interval in the above diagrams to give some measure of variability then both diagrams make sense in a conventional economic way. The workers need to be compensated for higher risk, so for bingtale lower priced bargains have both higher variance and higher mean earnings, and conversely for higher priced bargains. The same mean variance trade-off could be argued to exist for fathomtale except that it is higher priced bargains which have the higher variance. If this line of reasoning is followed than the question needs to be posed, if these workers exhibit...
a degree of risk aversion in trading off mean against variance in their acceptance of bargains then why don’t they move the few miles down the road and become coal miners. There they would get higher mean pay and lower variance in their pay. This would certainly be preferable if they only cared about mean and variance. The assertion here is that they also were aware of the (positive) skewness of earnings, which presented them with the not insignificant probability of a substantial pay off, in terms of their behaviour they like high mean, lower variance, and higher positive skewness. In essence they were prospectors.

If miners are contracting over both types of work, as we have seen they often are, it would present the opportunity for a sort of self insurance, if they had a high priced bingtale then they would also seek a high priced fathomtale contract to compensate. Put another way for insurance accepted bingtale and fathomtale rates should be positively correlated. However if they are seeking to maximise expected earnings higher fathomtale rates should be associated with lower bingtale rates; a negative correlation. Given the variance in the earnings distributions we have observed in figure 4 maybe it is this latter situation which we should expect, and indeed regressing bingtale rate on fathomtale rate for those contracts in which both types of work are contracted for gives a significant negative coefficient.

Figure 7 Plot of Bargaintale against Fathomtale rates
VI Did some workers earn persistently higher wages?

Returning now to think about the structure of the histogram in figure 4. The unit of observation is the average monthly net earnings of miners within the groups observed. The present range of the data is between 1858 and 1861; for some groups we observe their earnings continuously for each quarter other groups we see less. The author is presently building up a database of earnings, by the matching of bargains to subsequent payments as has already been described.

We can imagine the path of miners as they move through time contributing to this histogram. If the process by which their earnings are determined is random, some bargains pay well, other do not, and there is no way of telling, then they will move about the histogram over time, sometimes being in the upper tail sometimes the lower, dependent on whether they have have had a lucky draw or an unlucky draw.

If on the other hand, the (small amount) of discretion they are given over which bargain they take allows them to use some knowledge of geology to make good decisions, then you wouldn’t see them jumping about the histogram, you would see some persistence in their earnings and some groups would be able to make earnings in the upper part of the distribution quarter after quarter.

This can be examined by regressing current earnings against earnings in previous quarters as

\[
\text{Netpay}_t = 0.0348 + 0.3254 \text{Netpay}_{t-1}
\]

(5.38)

Netpay in the above equation is in terms of deviation from the median, £3.19 (mean is £3.33, remember the distribution is skewed. The positive and significant estimated coefficient indicates that those earning above the median tend to continue to do so and visa-versa.

VII Some Concluding Thoughts

The research reported here I think represents, at least in some respects, a new approach to the economic history of the Northern Pennine Lead miners. The historical records, and the linking of the initial bargains with the subsequent payments is a process
sufficiently effective so as to enable the researcher to construct quite detailed information for individual miners over time. It is certainly the case that carefully matching of the written bargains with the subsequent payments could be done for quite extensive periods of time especially in this latter part of the 19th century.

The present literature is rather ambivalent regarding the variability of payments under Bingtale contracts, ascribing its persistence to the inherent dispositions of workers towards risk, and maybe over emphasising the downside when workers ended up in debt to the miner owners. It seems at least plausible that a contract which persisted for more than 200 years is likely to have offered at least some benefit to both sides. The available data can, I believe, support a more thorough examination of performance of the contracts and supplement the view already current.

I have shown that, for around 1861 at least, the variability of the earnings of miners in the area around the head of the river Allen valley was quite high, with some evidence of a positive skew. The analysis presented supports the assertion that these workers were able to balance risks of different kinds, in terms of the mean, variance and skewness of the earnings distribution\(^\text{21}\), and did so skillfully to control the latent probabilities determining their pay evidenced by some lead miners certainly making more money than comparable coal miners.

More research is always possible, the question of how the bargain rate was set, the extent to which workers were able to use their skill and knowledge to generate persistently higher earnings for themselves, and effectively earn a return on the human capital embodied in their understanding of geology, are certainly amongst these, but the results presented here represent a new perspective on the work decisions of these group of workers in the 19th century.

\(^{21}\) See Ekern (1980) and Chiu and Eeckhoudt (2010) for technical details of how higher degrees of risk can be modelled for decision making.
Appendix 1: Costs of candles, dynamite, drawing, washing and tools for the first five months of mining at St Francis Level 1878. data from Table 3 Chapter X, p 280. B Jennings (1959)

Regressions of other costs on number and bings raised; N=22,

<table>
<thead>
<tr>
<th>Variable (mean - £)</th>
<th>Constant</th>
<th>Number (‘t’)</th>
<th>Bings (‘t’)</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candles (0.98)</td>
<td>0.1198</td>
<td>0.1267 (1.42)</td>
<td>0.09</td>
<td>0.09</td>
</tr>
<tr>
<td>Dynamite (3.9)</td>
<td>-1.2175</td>
<td>0.2327 (0.74)</td>
<td>0.1743 (2.97)</td>
<td>0.62</td>
</tr>
<tr>
<td>Drawing (2.99)</td>
<td>0.8354</td>
<td></td>
<td>0.1067 (6.28)</td>
<td>0.66</td>
</tr>
<tr>
<td>Washing (2.05)</td>
<td>0.0268</td>
<td></td>
<td>0.0997 (51.66)</td>
<td>0.99</td>
</tr>
<tr>
<td>Tools (0.14)</td>
<td>0.0787</td>
<td>0.0093 (0.47)</td>
<td></td>
<td>0.01</td>
</tr>
</tbody>
</table>
Archive Sources

Primary archive sources used are held in the Beaumont/Blackett papers at the Northumberland Record Office at Woodhorn.

NRO 672/E/2A/10 Bargain Books for Allendale 1858-1865
NRO 672/E/4/A/1 Quarterly Accounts 1861-1878 WB Lead Mines Allendale

North of England Institute of Mining and Mechanical Engineering

NEIMME/Wks/67/20/1-Wks61/20/3 Townley Colliery No.6 Pay March 1862

Footnote References

Barmby T (2013) “Records Reunited: Kilhope Bargain Books from 1847/8” Friends of Kilhope Newsletter Number 81
Sopwith T (1833) An Account of the Mining Districts of Alston Moor, Weardale and Teesdale Reprinted by Davis Books Newcastle 1984