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DERBYSHIRE AND NOTTINGHAMSHIRE PITS IN 1842

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Abstract: The famous Children in Mines report of 1842 contains a wealth of information for the Nottinghamshire and Derbyshire Coalfield about the technology in use at a period just as great changes, notably the railways, were being introduced. Old methods can be contrasted with the "New Plan" introduced (from Yorkshire) by Oakes of Riddings and Stephenson at Clay Cross and Tupton. It is possible that these changes would have eliminated many of the social abuses noted in the report within a few years for the majority of coal produced without the intervention of the 1844 Coal Mining Act.

INTRODUCTION

The Report of the Commissioners to the Children's Employment Commission of 1842 in the Parliamentary Papers is a major national resource not just about the conditions children and young people were exposed to in coal mining and other related industries, but also for the methods of working of the mines themselves. In both technical and social aspects it has the particular value of presenting what amounts to a "snapshot" of the industry over a very small time period - it took only some two years from commencement to publication, in three very substantial volumes. It has, naturally enough, been particularly used by historians to illustrate the appalling conditions under which children worked, and small sections of it, especially the illustrations, have been repeatedly used.

The Derbyshire section (which included substantial numbers of Nottinghamshire pits) of the Report was compiled by J.M. Fellows, who travelled with a secretary throughout the coalfield recording comments by surgeons, teachers, owners, agents, butties (contractors), miners and children and their families. The result of his enquiries was a huge body of evidence from which Fellows restricted himself, as directed, to a summary of the social aspects. It is not intended to examine these here, except where necessary to illustrate a technical point, since they are best read in the original together with the minutes of evidence. This article will, instead, examine the technical features of both coal and ironstone mining as far as is possible, in 1840-42, which are scattered about the report in such a way as to make it difficult to appreciate them. Although done for individual mines, this does not, previously, seem to have been done across the whole of the field. It is the first major survey of mining in the County since that by John Farey, in his *Agriculture and Minerals of Derbyshire* (1811).

1842

The "snapshot" was taken at a particularly good "moment" in the area's history of economic development. Apart from those with associated iron production, pits before then were generally restricted to landsale (to immediate local markets using horse and cart transport) or to the river and canal systems and their associated tramways. In the south of the area, the old field around Denby was linked by a tramway to the Derby Canal and via it to the Trent. Shipley was served by the Nutbrook Canal. Tramways linked mines at and west of Ripley such as Pentrich and Morley Park, to the Cromford Canal, whilst close to Ripley a complex of tramways had been developed by the (originally Fletcher's) Ripley Colliery and the Butterley Company to link all its mining areas to the Canal which actually ran under its works. For a time, these works had a shaft and water balance system operating in the works yard to an underground wharf in the canal tunnel. Upstream the canal served the mills at Cromford and the lead mines and smelting works of that area and, via the Cromford and High Peak Railway, took lead, stone and lime across the Peak. Downstream the canal ran via the Erewash valley towards Heanor and Langley Mill, serving parts of the Nottinghamshire field such as Pinxton, Kirkby, Eastwood and Watnall as well as Derbyshire *en route* to the Trent. The Trent had a very substantial market, both up and downstream at Burton and Newark respectively and via the Soar into Leicestershire. Further north the Chesterfield Canal was served by a series of tramroads, along which coal was moved towards Worksop and Hull, though the higher Pennine foothills to the west of Chesterfield remained dependent on simple carts and landsale, from what, anyway, were pretty thin seams of the Lower Coal Measures. But despite the growth in the coal industry and the iron industry (Renishaw, Staveley, Duckmanton, Chesterfield, Butterley and Stanton especially) that the canal-based systems had generated, the area had been effectively cut off from the major markets, either by local production as in Yorkshire, or in the case of London, by seasale and coastwise transport, notably from the all powerful Durham coalfield via the Tyne and Wear.

The coming of the railway was to change that. The Birmingham to Leeds Railway, engineered by George Stephenson, opened in 1840 and connections were almost immediately available from Birmingham to London. At Clay Cross George Stephenson and his associates began coal mining and ironmaking soon after, on an unusually substantial scale for the County. Others were quick to realise the potential of greater production, such as George Barrow at Staveley, through which the line ran, whilst the less well served at Riddings and Butterley adopted new methods for their own internal use for ironmaking, and possibly to counter possible threats from newcomers and in anticipation of branches quickly serving them also.

SCOPE OF THE REPORT

The Report does not cover all the mines and ironworks of the field. Those employing only adults were of no direct interest, others were missed - even where referred to in the report. Some were reluctant or refused to give information: "extremely saucy" said Fellows of a miner and young lad, and others were on their Whitsuntide holiday when the Commissioner called. Probably most, if not all of the larger mines were included, since they invariably employed children so that any bias is likely to be towards the omission of smaller mines. The information gathered is not entirely uniform - the north of the field, done last, seems decidedly skimpily covered as compared to further south. There were also disagreements in the evidence given. Some owners

appeared to have been decidedly vague about their mines and perhaps anxious to present things in a better light - especially matters of ventilation and safety - than their workpeople. One should also be aware of any tendency towards exaggeration, especially as regards weights being hauled or wound, or distances: these are always well rounded and it not difficult to envisage young persons being somewhat prone to emphasise the difficulties of their work and the efforts they were capable of. It is thus sometimes necessary to make a judgement as to the most likely account - for instance over shaft depths where adult enginemen can perhaps be more relied on than young miners.

The chief objective of the survey was, obviously, the employment of children and young people (women were not employed in the field and no young girls underground though the occasional one worked at surface) and their working, social, educational, health and home conditions which do not largely concern us here. However, the Commissioner also wanted to know the depth, construction and state of shafts; how they were wound (especially how men and boys were wound); the state of the waggon gates and size of banks, thickness of seam and roof heights; method of hauling corves, waggons etc. and who or what animals did what; how, and how well, the pit was ventilated. Evidence was particularly taken of how accidents occured. The information is scattered within the section of report for each owners' pits and is sometimes difficult to accurately place to the appropriate pit or shaft. Despite most pits having engines, little information is given about either the engine or of the engine shaft if not used for winding. There is virtually no detail of shafts used for pumping. Engines were used, however, even when they were not mentioned in the text. It seems more likely that use of gins or wallows (jack rolls - hand winches) was detailed as being, by then something of a relic feature. This information is listed, more or less uniformly, in the tables which follow. In what emerges there is nothing that is fundamentally new for the history of the mining industry. What it does show, however, is the contemporary development of Derbyshire and Nottinghamshire's coal industry and, to a lesser extent, the ironstone mining industry on the eve of the railway revolution, which does not appear to have been examined in detail previously.

PREVIOUS DESCRIPTIONS OF COAL MINING

The most substantial account of coal mining prior to 1842 in the Nottinghamshire and Derbyshire Coalfield was that by Farey (1811). Although the number of pits was hardly different, there had been a substantial increase in output since then, largely by the increase in size of pits and by some improvement in methods, notably in the application of steam power for winding and pumping. Most pits had a steam winder, often carrying out pumping as well since most pits were deeper than the water drainage soughs still important in 1811. Farey's descriptions of shafts and raising coal, of corves and waggons for moving coal, of the method of bank working and of ventilation had, for the great bulk of pits, hardly changed, though it is possible that conditions, especially in respect to wages and employment of young people may have deteriorated. Where changes had taken place - in the use of the safety lamp especially, one or more of which was usually owned and nearly as usually unused - they were slow to be taken up, probably because of the huge investment needed to adapt an existing pit to new systems and, perhaps in part, because the prevailing use of butties or sub-contractors and a plentiful labour force of children for them to employ gave little incentive until either old methods proved impossible, or, as was happening in 1842, a huge demand for coal could be foreseen and was probably already being experienced. Change came both from established larger proprietors, notably ironmakers, and from new entrants, notably George Stephenson. Their methods, apparently imported from Barnsley first by Oakes of Riddings became known as the New Plan, System or Principle, and was largely implemented on new sinkings.

THE COAL SEAMS

The coal seams exploited in the field were relatively few. The major coal desired was the Hard, or Top Hard, as it became known, outcropping east and west of Ripley, through Riddings, Swanwick and Alfreton and east of Chesterfield. It was as thin as two feet in places, usually in the south of the field, and as much as four or five feet in the north. It had a very long history of exploitation and it was normally necessary to sink to some depth to reach it by 1842. Adjacent shafts, often connected for ventilation, frequently exploited the Soft Coal, of similar thickness but lesser quality for, for example, steam raising and distant markets, was found about 30 feet above the Hard. At Ripley the Hard was largely fully exploited and there the Buttlerley company had two pits exploiting the Waterloo, the name perhaps indicating the date of its first large scale exploitation. At Denby the thick Kilburn seam was important. Further north George Stephenson and Co. had begun exploiting the Threequarter Coal, (so called from its thickness) at Tupton a little prior to 1842, perhaps for its good furnace properties. Although others are largely unmentioned, the pits west of Chesterfield, as at Brampton, were working thin Lower Coal Measure seams, even below two feet, by simple methods which would only have sufficed for a purely local market. No specific ironstone "rakes" are mentioned, though it should be possible to deduce the likely horizons of the nodular "stones" from position and shaft depths. Only a very few cases are mentioned of both coal and ironstone being worked from the same pit, at Riddings and Butterley, though this must have been fairly frequent utilising existing infrastructure. About 160 shafts were reported actually raising coal (i.e. not including engine, standing, old or wind shafts) which must be something of an underestimate, whilst there were some 50 for ironstone, almost certainly a gross underestimate since most were small and some ironmaking areas had none reported. Only one openwork, for ironstone, was indicated, in Codnor Park.

The seam thickness was probably the most important determinant of working conditions. In the majority of cases the banks, jenny and waggon gates (see below) were in-seam, i.e. exactly the height of the seam thickness, typically about 3 feet 6 inches, a little thicker in the north of the field. Because of poor roof-quality of some overlying bind, it was sometimes advisable to leave coal in the roof: some 10 inches were left of a 4 feet 10 inches seam at Handley Wood (Staveley Coal Co.) Waterloo Pit for instance. Conversely it was sometimes possible to remove either roof or floor material to provide higher gates. This was particularly true of the newer pits, such as Greenhill at Riddings, where both the Soft and Furnace pits had roofs higher than the seam thickness, and at George Stephenson's Tupton and No. 1 Main pits where roof heights of 5 ft 6 inches seem to have been considered necessary and were achieved by working into the roof. Occasionally, as at Brampton where thin seam working was the norm, two seams could be worked together: at Jonathan Bennet's pit, 11 and 16 inch seams with intervening dirt were worked together to give a roof height of five feet, in contrast to his other pit where it was not considered economic to raise the roof above the 2 feet seam thickness.

The other major geological controls with impact on mining methods were faulting and folding. Very little was reported in

1842 on faulting, except that "sulphur" became a nuisance when one was crossed, though they must have been major obstacles. There is more, if only implied, about the effect of folding and inclination of seams. There are comments about use of "ladders" in the banks down which corves were lowered, indicating substantial inclinations, at Denby, and similarly in the use of gigs (gravity worked inclines with a rope over a pulley) around Ripley. The areas intensively worked from an early period and continuing to be worked also were much influenced by the rise in the beds which otherwise dip broadly to the east, on an axis running north from Denby, through just east of Ripley, Riddings, Swanwick and Alfreton, and just east of Chesterfield: the rise causes the seams to effectively have two or even three outcrops and thus repeated areas of comparatively shallow working. At Ripley the development of drainage levels, first a sough and then the underground section of the Cromford Canal, was followed by deeper pumped levels driven along the axis of the syncline under the town. Working could thus proceed on either side up-dip, which was an important factor in the important mid-19th century position of mining there.

SHAFTS AND WINDING COAL AND PEOPLE

The Report has details of 162 shafts, which can only be a small proportion of those then being worked, especially of the shallower shafts. Nevertheless it is still a very substantial sample and probably reasonably representative of what was being done.

The deepest shaft in the field was at Shipley, to the there named Deep Hard reaching that seam at 250 yards, with other shafts of 237 and 240 yards reaching the Bright Soft and second Bright Soft. Only one "Hard" shaft was listed below 100 yards depth: others had presumably long been abandoned except as wind shafts. Most of the very shallow shafts - below say 20 yards - were for ironstone and must be very heavily underweighted in the sample. About a third of shafts were under 50 yards deep, two thirds below 100 yards, but only seven were around 200 yards or deeper. Nearly all over about 30 yards depth, and many under, used a steam engine for winding - mostly between 8 and 20 hp, usually 10 or 12. Horse gins were relatively few (but many others may have been unlisted), for coal mostly less than 30 yards - the deepest shaft with one was 60 yards at Riddings for ironstone. Ironstone, however, was frequently worked from short-lived closely spaced shafts or pits using horse gins or even wallows (hand windlasses). A few shallow shafts for coal near Brampton had horse gins and a very few there worked coal by wallow. Shallow ironstone pits were also worked several at a time using a single steam engine: Appleby and Co. used a steam engine for six at Tapton only 22½ yards deep. Like those noted for a later date by Barry Job (1992) near Chesterfield, the engine was probably fitted with a multi-rope drum, planed down to the appropriate diameters.

Shaft construction varied. Often it is not mentioned - Fellows did not go down. Small ironstone pits were frequently unlined - or like one at Tapton had only the top six feet secured by timber. This was not unusual at an earlier date and an accident in 1855 was reported at the Hartshay Colliery as due to the unlined rough walls of the shaft [1]. A very few were reported lined with rough

Depths of shafts noted in the report

1-20 yards	-	8	141-160 yards	-	5
21-40	-	29	161-180	-	9
41-60	-	30	181-200	-	4
61-80	-	25	200-220	-	0
81-100	-	19	221-240	-	2
101-120	-	17	241-260	-	1
121-140	-	13			

stones and bind (shale). Most shafts had a brick lining, probably special radius "shaft bricks" placed single skin, end on around the shaft. Many of these were set without lime i.e. without mortar (as were rough stone lined shafts) and very susceptible to being pulled out by a passing load. At the Brinsley No. 2 Hard Coal shaft of 158½ yards, several bricks were pulled out "yesterday" whilst men were being lowered, despite a man having been killed in the same shaft "recently". To lessen this a few shafts, especially at Butterley, had a metal top securing the bricks, though there one shaft was described by Fellows as having the top 2 or 3 courses in a falling state. There is one instance of a shaft being lined with metal (probably cast iron) for six or seven yards. Most newer and deeper shafts were, however, laid, or being laid, in lime for greater security. There was no information about shaft widths in the report, but perhaps five to eight feet or wider in newer and deeper pits might be expected. The top of the shaft was usually largely unprotected, some entirely so. Underwood had no guard at all and at the Waller Pit at Brampton a nine year old boy had recently been killed by falling down the unguarded shaft whilst playing during his dinner hour. At Greasley's New London pit a boy slipped on ice and fell down the shaft. It was still in a bad and unguarded state. Several deaths had taken place whilst getting on to the rope (perhaps into a sling - see Simonin 1868 p214) or into the box to be lowered. The few well-guarded shafts drew approving comment from Fellows, and a particularly good feature of the New Plan was a cover which went over the shaft during unloading. Formerly the load, five or six hundredweight to as much as two tons was normal, seems usually to have been hooked and drawn to the side of the open shaft by the banksman, often aided by a young boy.

Because many shafts were still looked on as having a short potential life, the buildings around were few. The most usual feature was a cabin, for men to change and shelter from the weather before descent. These ranged from little more than a "pile of bricks" to a well built change-house with running water for miners to wash. Shelter was sometimes also available from the engine and boilerhouse, though often this was some considerable distance away. Engine houses would use a deep shaft of perhaps much older date whilst winding engines were frequently at an earlier location some distance from the current winding shaft. One engineman said he was too far away to observe how many boys went on the rope to descend. North and Co.'s New pit at Newthorpe Common had a 240 yard chain and a 250 yard flat rope for a 90 yard deep shaft, possibly indicating a distant winding house. Deeper, more permanent shafts usually had engines and other facilities such as the office nearby.

Apart from the horsepower and that infrequently, nothing was said of the winding engine and boiler. In view of the questions about accidents this might indicate a better degree of boiler safety and

[1] The shaft was described by the Inspector of Mines as "114 yards deep, neither perpendicular nor straight, portions destitute of any lining and irregular and unstable". This had caused the stays and conductors to be displaced, jamming one side of the cage, which tipped a boy out, killing him (Report of the Inspectors of Mines for 1855 (1856) *Mr Morton's Report for the District of Nottinghamshire, Yorkshire and Derbyshire*. p.75-76).

mechanical failure than might be expected. Many were probably vertical types, operating with a beam and connecting on to the flywheel and/or drum, but horizontal types were emerging by 1840. Most probably operated more or less in balance, descending and ascending together. Most frequently this was done by the engine serving two shafts, frequently the Hard and Soft Coal shafts. This would normally have meant two different diameters on the drum to cope with different depths. A very few shafts had "double tackle" meaning simultaneous ascent and descent in the same shaft. Normally a chain was used, probably the flat-chain type wound on a narrow coil-drum, giving a good starting torque. For man-riding the use of the chain was deplored though still sometimes done in 1842. Instead a round rope (less good) or (platted?) flat rope was kept and put on specially. Flat ropes were being installed for all purposes at progressive pits by 1842, used for winding both workpeople and coal, the form making it possible to replace the flat chain directly. Only one pit used a wire rope, Appleby and Co's Comber No. 4 Pit had it installed a fortnight before the Commissioner's visit on a 112 yard deep shaft. The engineman did not like it, probably, at that date, with good reason. Ropes were often in poor condition. Staveley Netherthorpe had a man killed by a rope break during sinking and at the Brampton No. 2 Waller Pit two boys at once were let down on a rope "no thicker than a well-rope". At the Butterley Co's Codnor Hard Coal Pit, three men and a boy had been killed by the rope breaking: working in the pit of a large company, even if they were directly reponsible for the rope, was no certain protecction.

Many companies or proprietors gave instructions over the number of men or boys allowed to go down on the chains or on the rope, though at Butterley no regard was taken as to number. George Stephenson restricted it to two, had written instructions and a 10 shilling fine for any engineman not complying. Others made a verbal order for no more than four boys. Six or eight was quite common: "four in the top hook, four in the bottom" and up to 15 was claimed by boys questioned at Butterley. They sat in one or more loops, hands clasped on the far side of the rope: "letting go for an instant would lead to a fall". It was not uncommon for several to stand in the chain hook and in one case a boy, out of bravado, used to travel holding the chain with his hands only. He was later killed, though not from this cause. Many incidents must have been initiated by this form of foolishness but the root problem was probably the lack of enforcement and the advantage to a buttie getting his day-workers down in the shortest possible time (or the converse - to the men and boys getting out of the pit).

Those in charge of winding were often surprisingly young, a tendency perhaps owing to the custom previously and, occasionally, still, of using very young children (6 or 7 upwards) to drive the gin horse, presumably in response to orders from their father or other person working at the shaft mouth. These were few in number, most frequently still used at ironstone pits. At Newlands, belonging to the Butterley Company, Ann Wardle, aged fourteen, drove the gin horse which she preferred to her previous work of lacemaking. Nearby a fourteen year old boy, George Jackson, had been sole manager, the engineman, of the 14 hp engine for above a year. At Coal Aston, the youngest engineman recorded was John Edwards, aged eleven who had had care of the engine for a year and a half. Sometimes his father was with him, but not often. At Swanwick inattention by a young boy engineman led to two lads being drawn over the pulley, severely injuring them, whilst at Marehay No. 1 the engine boy wandered off whilst two men and two boys were descending by his 22 hp engine: reversal of the engine, perhaps as the rope reached its extremity, caused them to be wound up and over the pulleys causing one death and two severe injuries: he was imprisoned six weeks at Derby but freed after the trial. He was dismissed. At both pits an adult had taken over the duties. It is not clear if the duties of the engineman included the stoking, probably not on larger engines at least. Engines were shut down at night so that the enginemen had particuarly long hours, arriving early and leaving late. 5 am to 10 pm is cited.

A further danger in the shaft was from falling objects. Good discipline was sometimes forced at the top of the shaft ; for example, no-one was allowed to approach when winding people. Many pits had a bonnet, an umbrella-shaped piece of iron put on the rope to deflect falling objects. More often it was only used in heavy rain or a wet shaft. At John Ray's pit at Kilburne shaft maintenance was done from a box with bonnet affixed. Most often the bonnet was not used even if available, whilst with double-tackle shafts it was considered too likely to be caught in the hook or load coming past.

Attaching the coal was done at the bottom of the shaft by a hanger-on, often a young boy at small mines, or a man assisted by a boy. Both were of course particularly vulnerable to falling coal. The coal usually arrived in corves - hazel wicker boxes on wooden runners, sometimes wheels, loaded at the working face and brought as a sledge or more usually on a wheeled waggon to under the shaft mouth. Some pits restricted the corve loads to 1½ to 3 hundredweights but commonly it held six or seven hundredweight of coal, and more was often loaded on it at the shaft bottom using hoops of iron called garlands to hold the coal in place. Up to two tons has been suggested for large coal as a single load, advantageous to the men paid by the ton delivered to surface despite the difficulties this must have created for the shaftsman at the top. The winding rope or chain was fitted with a large ring to which chains in the form of a loop, or fitted with hooks, were attached and could be slung under the load.

THE UNDERGROUND WORKINGS

Development of the underground workings was first carried out by the headers, often the same men as the sinkers. who often worked in two 12 hour shifts. The work was normally let by the yard, the headers - only a few men - and six to eight boys drawing the spoil out in relays in what generally must have been especially atrocious and dangerous conditions. Indeed, one of the very few instances where a Davy lamp was actually and regularly claimed as used was in heading. Heading was necessary to extend existing gates and to drive wind gates or "soughs" into old workings or to old shafts, or increasingly to link the two closely-spaced shafts of pits on the "New Plan". In older pits the length of gates seem to have been due mainly to the period of working, being extended as necessary. In the newer pits, development of long gates was part of the initial development, essential for the ventilation system.

Where possible the gates were probably self-supporting, implying narrowness but development of waggon ways by 1842 was near universal and these were wide enough to require well-timbering. At Babbington the roof was supported by timber every two yards and between each set of timbers another support of loose coal was built against the wall - it was apt to give way if knocked by a waggon. There is little information otherwise about the gates and support, but several claimed, as did the clerk to the Butterley Co.'s Kirkby Portland colliery, that every precaution was taken "to well wood the pit". Nearly all pits of reasonable size employed a man or men at night, usually assisted by children, to repair the waggon roads and keep open the wind soughs etc. We may wonder how effective this was, when the child helper was often selected from one who had already done a twelve hour day shift.

In nearly, if not all, the pits coal was worked by the bank method: a forerunner of the modern longwall, the face was made up of a number of stints or working places which were advanced by first "holing" the coal using a pick to cut a deep slot underneath - the youth or man lying in a prone position and temporarily supporting the undercut coal by wooden "spraggs". This complete, the spraggs were removed and the coal was then wedged down (or blown down with blackpowder), broken as necessary and loaded by the "loader" on to a corve. Waste coal and bind (shale, usually from overhead) was used to support the roof behind the working area, with wood as needed and passages, jenny gates (the access either side of the working face or bank and leading to the main or working gate), were left in the solid coal either side of the working, connected by "doorways" to the bank, for access back to the main waggon ways. The width of the bank depended on what would largely be self-supporting - a matter of trial and error in the first place: eight or ten stints of two yards were mentioned, suggesting a bank width of 16 or twenty yards, though this much increased at least after 1842. The length of advance could be very substantial - over 100 yards was common, depending on such factors as ventilation, roof height and accessibility, or the boundary of the lease or ownership. Usually the seam was followed fully or slightly up dip, the actual direction partly defined by the cleat or joints in the coal. Thus the bank itself, and the jenny gates either side of the bank, would incline down more or less steeply back to the waggon gate, so gravity normally assisted movement of the corves. It is difficult to imagine boys and/or a couple of small asses otherwise moving sledge loads of several, even six or seven, hundredweights.

However, moving the loaded corve into the gate was clearly difficult and it was here that young boys so often received cuffs and worse, especially when tired, for their inability to set the corve moving. In higher seams, or where the bind roof was removed (because it was loose or for fill for the waste or gob) it was possible sometimes to use an ass or pony. Many boys used the belt which went around their waists and was hooked by a chain to the corve to pull it, whilst another, usually younger boy pushed. Sometimes a hook (a hook-ended length of iron rod) was used to pull but more often this was just to pull up empty corves. This belt often caused much pain and "galls like a horse under its collar", and boys referred to themselves as "ass-lads".

Out of the working area of the bank, the corve, or sometimes a wheeled box, could usually be pulled more easily. Indeed in steeply dipping seams it might be necessary to hold it back and pits near Denby were fitted with "ladders" in the gates to make this possible. Sometimes a "gig" or "gigger" was used, passing a rope around a pulley so the full corve down dragged an empty one up. Asses, donkeys and ponies all helped both here and in the waggon gate, though it was often necessary to assist the ass by the belt used for drawing, or, at the least to guide the corve or waggon, or lift it back on the rails, by a boy "going between", that is between the ass and the corve. Smaller boys led the ass or pony and encouraged it with an "ass-stick" (as they themselves were so often encouraged by the men). At the waggon gate the corves were frequently slid on to a waggon - a flat with wheels running on planks or, usually still in 1842, wooden rails, with iron rails coming into use. There is no mention of the use of a small crane for lifting corves on to the flats, as in other areas of the country, but it is likely they were used. The gate was often almost level, perhaps with a slight inclination to the shaft to help rid it of water and ease the work. The work here was usually slightly less hard since the waggons were wheeled: at Brinsley the work of drawing the waggon was known as ganging. Gates were usually some tens of yards long, but older and larger mines could be 200-300 even 500 yards or more, often with very difficult travelling conditions "up to the calves in mud", so a dry waggon gate was almost luxurious. Bruising, trapping or other injury was common and collisions with timber or stone supports seem to have led often to falls of wall or roof of more or less serious consequence. In a few places the waggon gate, perhaps by a roll in the strata, or a fault, had adverse gradients. At Ripley steeply dipping strata led to use of chain and pulley gigs for short distances in gates, as at Marehay, whilst at Kilburne and elsewhere the last part of the gate was "gigged" by the chain from the winding engine. The greater number of boys used in the mines from about 8 to 13 or more years of age were used in this way and, by many, it was considered impossible to work the pit without them. Providentially, it was also considered as being the best way to bring-up the best colliers.

VENTILATION

Asphyxiating and explosive gases were a major problem, certainly far from being solved in 1842. Black damp - carbon dioxide (with an excess of nitrogen too) was almost ubiquitous and a large sample of the pits listed had to stop work for lesser or greater periods because of it. It caused men and boys to feel hot and sweaty, "heavy in the gut" and get headaches, though recovery was usual within an hour or so on reaching surface. Several recent deaths were reported in 1842, including men being lowered to work in the shaft being overcome and falling out of the barrel (see Simonin (1868:212) for an illustration of just such an accident). Conditions were worse when atmospheric temperatures were similar to those underground "when the north wind blew" or "when the beans come into flower" were two symptoms mentioned for this, this last indicating, probably, the weather depressions of early summer. Rising water in several mines also shut off air flows, probably since the ways were flooded (air was commonly taken in via the pumping shaft, along the water gate, returning via the waggon ways, or *vice versa*). Wildfire - firedamp or methane - was also normally present and ignitions were frequent, sometimes causing severe burns and prolonged recovery time and, quite frequently, death from burns (or, possibly from what we now know, from after-damp, carbon monoxide). Sulphur, probably hydrogen sulphide (stink damp sometimes) also occurred, mentioned in the report as when a fault was breached and lasting for some months. Colliers "lived" with these manifestations, viewing them as unavoidable nuisances. In one case the miner was blamed for having "held his candle too high", despite being warned.

The Davy safety lamp, and its variants such as the Upton and Rogeet lamps which one mine owner preferred, had been developed to allow work in gassy conditions. Apart from its use in headings there is no indication whatever that the lamps were normally used in this way - only the candle receives a mention. Most pits had a Davy which was available to the miners, though sometimes it was kept a quarter mile or even a mile away from the pit at the counting house or office. It was very rarely used for its ostensible purpose, to test for gases. Indeed one pit had a man go through the workings first with a candle for this purpose, though otherwise there is no mention of the gruesome task of the penitent or fireman deliberately igniting gases before work could take place.

At George Stephenson's pits, which probably were well-ventilated, no Davy (lamp) was kept. Perhaps Fellows asked the wrong question, in view of Stephenson's development of a safety lamp!

Apart from improving ventilation, very little that was effective

could be done about these gases. In sinking shafts the owner provided, as well as a wallow or horse gin, a fan and wooden pipes to provide air, as also was done in heading out. In most cases air circulated naturally, normally from an old shaft or a specially sunk wind shaft and via old banks or a "wind sough" driven for the purpose. The more recent pits seem either to have sunk pairs of winding shafts connected to each other for ventilation, or linked the winding shaft to the engine shaft. Two shafts close together were referred to as the best practice, which would seem to indicate that better systems of routing the ventilation underground were coming into practice. Fire baskets were used, hung in an old shaft to draw the damp in a few cases, as in the low workings around Brampton. Some pits used a chimney with or without a furnace or cupola to help it draw. At his No. 1 Main, George Stephenson introduced a furnace at the bottom of the shaft, the first in the field, with very successful results.

In the usual ventilation system air passed down the waggon gate to or from the air source and the pit shaft, depending on atmospheric or forced ventilation conditions. A door placed in the waggon gate between the two jenny gates forced the air to pass through the bank and across the working area. Old banks and openings were closed for maximum directional effect. In some cases the air was forced through two or even three banks in series which must have both reduced air quality and quantity. This was probably less critical at the smaller traditional mine so typical in Derbyshire with only one or two small banks. Though not indicated, the sinking of pairs of shafts and the multiplicity of long waggon gates at some newer pits is an indicator of "district systems" or "splitting the air", whereby the airflow was operated in parallel ensuring larger quantities and fresher air to each area of working or district. One stated virtue of the New Plan mines was they did away for the need for young children (the very young children operated the air doors to let waggons pass), indicating that the doors were no longer (so much at least) needed in the waggon ways.

THE NEW PLAN

A Butterley header preparing a pit on the "New Plan" described it as the same as used at Messrs Oakes (at nearby Riddings) and at the pits of Barnsley. In essence this was a sytem of integrating the transport of coal in the mine from coal face to pit top in a wheeled box or tub, together, with improvements to the mine layout and ventilation system. The latter possibly involved air underpasses to avoid the too frequent use of air doors and larger shafts and gates. Fellows noted the coal was raised at Riddings' Greenhill Lane Pit in a very superior way, about four times faster than by the usual method. Coal, after breaking, was placed by the loader direct into a wheeled iron box run on iron rails placed right up to the loading place. These rails were extended by the loaders as necessary and the wheeled box or tub was easily shoved to an agreed point from where it was easily pushed by boys - all aged over 13 - to under the pit mouth. There it was run into a cradle by two men and raised to surface. In the shaft the cradle was steadied by guides (conductors), two wooden rails placed either side of the shaft to form a groove. At the shaft top a cover ran over the shaft on to which the cradle was lowered and the box wheeled off. Edward Fletcher, agent to the Riddings mines said that the system enabled twice the number of loaders to work and nearly all the asses and very young children had been done away with. Amongst other advantages were that the boxes - the agent still termed them corves - were filled to a regular weight, say five or six hundredweight, whereas before sometimes as much as 15 cwt was frequently hung on which, "oppressed the engine and often occasioned accidents". Because of this, a 12 hp engine could work as well as a 14 hp previously. The coal was also got much cleaner (less broken in transit?). It was also a great advantage in letting the men down into the mine: they went down four or five at a time in a box in the cradle. Although all his life he had been used to chains, Fletcher reported, he scarcely felt himself safe in them since he has used this method. Riddings had used the new system for a year and was preparing two more shafts on the same plan. At Butterley the same results were anticipated on the new sinking there. No boys were employed less than sixteen and near a hundred men were expected to be taken on.

Stephenson was clearly also working on this system, which in its main elements was probably only novel to Derbyshire. His pits too used "rolleyways" with waggons passing from loader to shaft mouth. The waggons were open at each end which would reduce loading of small coal and slack and contained six or seven hundredweight in each (his gates were about five feet high - those at Riddings were four feet) which could be pushed by boys of 13 to 16 years old, occasionally assisted by an ass. He also used wicker baskets run on the waggons. When asked, Stephenson replied his system could be used in any economic coal seam (he was mainly referring to height), but might not be worthwhile in the smaller mines in the south of the county. But the system was better both for the men and cheaper for the owners, though the differences in cost if work was properly carried out could be much.

There was clearly more to the New Plan than the easily seen benefits. Increased flows of waggons and longer gates meant either passing places or wider gates - desirable anyway for ventilation. No very young children meant air doors were no longer used in the gates so that the ventilation system, as at Stephenson's No. 1 Main with its undeground furnace, was clearly of the split type with the mine divided into ventilation districts. Furnace Pit and the New Main Coal, both at Riddings, had seven and six waggon roads respectively (older pits had but one), presumably developed as much for ventilation as access, perhaps radiating out from the shaft pillar as seen in later mine plans. Shafts also would require to be larger and it is possible that to employ more loaders also required larger banks and holers etc. The New Plan is the most significant feature in Fellow's report showing the elements of the future and rapid growth which was to take place in the next decades.

MANAGEMENT

In his replies to Fellow's queries, Stephenson stated his "decided objection" to the system of butties "so much despised in this county" and also, he believed connected to the tommy shops which were (he said) so injurious to the men. Their men worked in small companies of four and were paid each fortnight in cash. There were no "second" (i.e. middle) men, they were directly employed or contracted by the owner. Apart from its social implications his comments introduce the fact that the management system was also a very important element in how mines operated, and that this could also, and, he was implying, needed, to be changed everywhere. The ostensible reason for this, the abuse by the butties, whilst real enough in itself, could have been tackled in other ways by a determined management. However, to use the New Plan, it was necessary, anyway, to use new management methods which forced the changes.

Most mining areas had some variant of the butty system, whereby the work, of a single place or task in a mine, or of the whole mine, was let to a sub-contractor at a tendered or agreed price either

based on distance headed or tonnage of saleable coal produced. It was a convenience which, especially in small mines, the task of underground management was largely avoided by the owner though a bailiff or agent was necessary to see conditions were met and that the mine was developed according to some proper plan for its long-term future.

In Derbyshire and the adjacent Nottinghamshire mines most companies used the butty system. In general, though there were minor variants, the company sank the shaft, made headings, airways, water gates (usually under contract to a header) and provided wood and tools, including the ropes and engines - everything required in fact to put and keep the pit in work. They normally had agents or ground bailiffs and an "underlooker" to oversee the field who accepted the responsibility for safety with more or less enthusiasm, and appointed men to look after the condition of gates, windways etc., which was usually done at night. Though never mentioned this would have included the engine and engineman. The actual work of getting coal to the point of landing it and stacking was let to a butty. This was sometimes by ticket, i.e. by tender, usually reserving the right not to be bound to take the lowest tender, sometimes to "their old butties", probably, as at Ripley, at a price suggested by the agent, which was normally taken. In turn the butty subcontracted the work to men and boys: holers, who undercut the coal by the stint, hammerers, blowers and loaders normally by the ton, wooders sometimes likewise, otherwise by the day. Ass boys etc. and waggon boys and hangers on, and children on air doors were paid by the day or fractions of the day. Repairs to tools seem to have been the responsibity of the butty - probably limited to corve repairs, tool sharpening etc. So far as the owners and their agents were concerned, the entire responsibility for all these was entirely the butty's: at most a few were prepared to "deliver a lecture" if abuse was reported. Barber, Walker and Co. at Eastwood were prepared where a butty had made a bad bargain, to make the sum up, "sooner than the children be oppressed". But generally there was no common viewpoint that owners were responsible for work or for working conditions.

Not all companies relied on butties. John and Charles Mold at Ripley had not employed butties for twenty years. They believe the butties imposed on both men and children under them. Instead they paid the men for the stint, others by the ton, and the children by the ton, directly. Other companies employed an overlooker who let out work much as a butty, though it was claimed that, not being under the same economic pressure, both men and children were less oppressively treated. Butterley used both overlookers and butties. There was no comment as to whether one system worked better than the other.

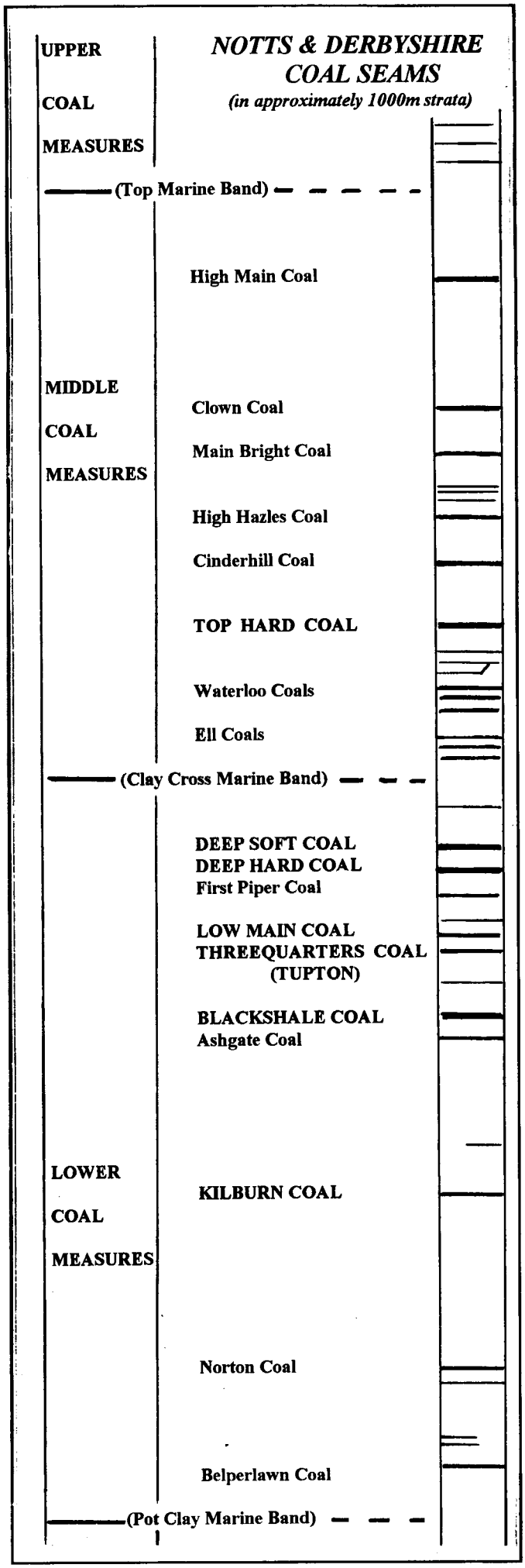
Pits under the New Plan did things differently. Butties tended to be done away with. At Riddings a stallman was responsible for getting the coals and loading them and getting a young man to push them 20 or 30 yards to a point where the company took over. The stallman employed all those necessary to do this. From that point, more or less at the jenny gate, the company engaged children, waggoners and banksmen on their own account, paying them monthly with regular subsistence money (i.e. a sum on account). At Stephenson's Tupton pits holing, loading and "putting" (the latter imported term was explained as getting the coal to the bottom of the shaft) were all let separately by the ton. Presumably, as Stephenson claimed, to small groups of men. Woodmen and roadmen and boys who pushed empty rolleys, and the hanger-on were paid by the day. At the Main the whole job of getting was let by the ton, others by the day. At the Threequarter pit all work except holing was paid by the day.

THE ECONOMICS OF POOR WORKING CONDITIONS

Work for young people in the mines was undoubtedly harsh, and there was much thoughtlessly routine ill treatment as well as especially bad cases of bullying. Fellows, however, considered the cases of bullying were exceptional and pointed out that over half the children he interviewed said they preferred the pit to the land or to the school and, he might have added, to stockingmaking and lacework. In the context of the time, the deficiencies of social and working conditions in the pits was less obvious when seen alongside the low pay and unemployment in other occupations, and the boredom and almost equally unhealthy work and life in towns, and in agriculture. Nearly all questioned (except for the butties who usually had themselves begun at a very tender age) had thought the work for the very young was too hard, the 12-14 hours, even more, too long for a working day, and the obvious dangers of too many descending on inadequate ropes too dangerous. The early start in the pit, at six or seven years, sometimes earlier, deprived them of education and the long hours prevented them acquiring it later. The injuries, poor health and early onset of the appearance of old age counted for much less than the better food most collier families enjoyed and it is by no means certain that all colliers, looking around them, would have said that pitworking was, "the hardest work under heaven" (said by a Nottinghamshire collier in a memorable phrase to Fellows). It is undoubtedly true too that butties abused their position, imposing use of their own or a commissioned tommy shop for food purchases with costs higher than those of the nearby town, and that paying out in (their) ale house after several hours of drinking on the slate was damaging for the families. But these are problems which were common at the time in a wide range of industries and could have been tackled either by the owners, or, as later happened, by legislation. The alternative of direct employment or replacement of the butty by paid overlooker was always available and frequently enough done to make it clear it was feasible. There is no doubt that the owners, if they wished, were in a position to enforce change, and their failure to do so, indicates, at least to that time, that the management system, for them, worked reasonably well.

Reading of the poor, even atrocious working conditions and often extremely long hours, aside from the horror we might feel, as many informed contemporaries felt, we might reasonably consider how in fact its diseconomies did not overwhelm the economies. Even at the time wages, even for young boys, were much higher than the rural norm. Whatever the motivation a good beating with an ass stick could induce in boy or animal, there was certainly still a limit to what they could lift or move which was clearly often exceeded, and either made movement of material extremely slow, or required another to leave their ostensible employment to assist. In a similar way the very long hours which young boys worked must have caused a serious deterioration in their efficiency as the hours passed: they were reported as falling asleep at the pit top or by the roadside, were carried home by their fathers, slept all day on a Sunday.

The main ameliorating factor was, probably, that the pits rarely worked continuously. Once current orders were fulfilled, then men and boys were laid off. Many pits rarely worked a full week, and demand during summer must have caused many pits to shut down for extended periods. There were thus substantial periods, not necessarily of idleness, since seasonal work in agriculture must often have been available in summer, but of a more varied life and time for recovery. It seems likely, even when at work, that the chance to take a break, even to sleep was often taken. Once away from the the corporal, who "looked after" the ass drivers at some mines, i.e. kept them working, or away from the men who were on



piece work at their stints, there must have been many opportunities for a rest, many an enforced stop when another's waggon came off the rails, many a time when overloading of the winder caused a back-up. And no doubt there were minor acts of sabotage and customary practices which were tolerated if not taken to unreasonable levels. These are not the things that a mines' commissioner (or employer) would be told about.

The traditional way of mining in the area was changing in 1842. Railways were breaking down the local and national monopolies which protected both employers and employed from their inefficiencies, providing both the threat of competition and the opportunity of expansion. Access to the London market meant efficient pits could work continuously, at least through the winter months. Ironmakers had new outlets and could partially stabilise demand over the year. Much greater efficiency was necessary in the larger, highly capitalised pits. The old practices were thus not only socially and physically undesirable, but economically damaging to the new requirements. Thus to the realisation of the deplorable conditions which miners worked under came the added realisation by owners that the old way of doing things was economically damaging. Things had to, and demonstrably in 1842 were, changing. The 1844 Act and the growing power of the Mines Inspectorate in the years which followed were important at the economic margin of production, but for the majority of production, in the pits being already developed on the "New Plan", the poor working conditions, excessively long hours and social abuses in what might be described as a form of "undeveloped over-exploitation" of the workforce was bound to rapidly diminish anyway.

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Lynn Willies.

* Note: The Derbyshire and Nottinghamshire section of the 1842 Report by J.M. Fellows is to be republished by Pick's Publishing in association with Peak District Mines Historical Society (1998 134pp.).

Appendix: Summary of technical details in the 1842 Report

Field/place/pit/owner	Shaft depth	Winding sys.	gate length/ht	Bank leng./ht	Haulage	Ventilation	Other comments
Radford (Notts) Pit. Lord Middleton	63 yards	9 hp + other	250yds/ 4ft: 6	/4ft 6	Belt/waggon	Old sh. ½ mile. Bad - pit hot	No Davy (lamp). Gate branches at 60-70 yds.
Wollaton (Nofts) Lord Middleton	100 yards	6 + 8 hp Bonnet	150yds /3 ft 6	70 yds /3ft 6	Belt/waggon /asses	Old sh. 400 yd	Bank worked in two stints of 75 yds. Vent not good. Pit always tried by man going down with naked light. Less than ½ ton on corves.
Trowell (Notts) Lord Middleton)	112 yards	Chain/flat rope/bonnet	150yds / 3ft 6	/3ft 6	Belt/waggon asses	Old sh. 300 yd. Good.	Davy never wanted.
Ilkeston. Sam and Thos Potter. Workhouse Pit Bowswell Plewitt Ilkeston Bath	 130 yards 130 yards 60 yards	Chain + flat	 / 4ft 1 / 3ft 6 / 3ft 6	 60 + 160 yds 50 +100+100	Waggons + asses corves - no wheels	Chmy 500yds & each other 1 or 2 old sh. Chmy 150yds	Stronger tackle for winding men. No bonnets. Worst vented Corves brought to mouth. Often black damp.
Shipley. E.M. Mundy Esq. Waterloo Bright Soft Second Bright Soft Deep Hard (Bath) Coppice Thorps Field	 100 yards 237 yards 240 yards 250 yards 40 yards 33 yards	No bonnets Engines "only 1½ inch rope"	 / 3 ft 6 / 4 ft / 3 ft 6 / 3 ft 6 / 5 ft / 3 ft	 100yds 90yds 200yds		Davy's used 50yds eng. sh soughs at same level 50yds eng. sh chy. 4-500yds Furnace and chy at 30yds.	"All well winded". Two 12 hour shifts at soft coal pits "12 and 13 let up and down, known 19". Corves 15, even 20 cwt. "Rope old and bad and nearly cut through"
Stanton-by-Dale. Marshall Barber and Wright Marshall & Co iron pits	20 yards horse gin	Engine pumps and draws	No waggon road	5yds / 4ft	One ass	Water shaft close by	Worked two months only. No bonnet or Davy. 8 yr old driver
Stoneyford, Codnor. James C. Royston - Hard Soft	 93 yards 73 yards	Both by steam engine. No rope Bonnet now making.		20yds / 4ft 90yds /3ft 2	Waggons, belt, asses	From engine shaft and pit not at work	No Davy despite wildfire accidents. 110 under 13 years. Shaft death. 29" coal but 4 feet gate. 3-10cwt in corves. Extremely wet. (9 yr old thought bank was 200yards). No rope, chain turned around.
West Hallam. Francis Newdigate. Hard Soft	Laid in lime 103 yards 74 yards	Engine. Flat rope, no chains	180 yds/5 ft	/3ft 6 350 yds (in two roads?)	Waggons, belt asses ponies	"Very good". 2 sh. 300yd old sh. 400 yd	Bonnet and Davy not used but had them for twenty years. 9 feet seam with 5 feet headroom. Gobbing fires from slack. Dry (?).
Dale Abbey. Lord Stanhope.	50 yards	Engine		20 yds/5ft	Belt, asses.	Wind shaft and old coal shaft	Worked by 5 butties on own account. Nearly worked out.

Smalley. Evans, Allen and Thornley.	80 yards	18 hp pumps and winds. No bonnet.		40 yds/6ft	Waggons - boy and belt boy	Old shaft 17 yds off. Well winded.	Other shaft deepening. Seam 54in then 12in dun, then 36 in. soft coal. Intended the shafts to vent each other. Boys paid by ton. 6-10 cwt in waggons. No Davy. No butties - but overseer. 4-6 boys on (flat) rope "would hold no more".
Loscoe. Goodwin and Griffin. Hard Soft	126 yards 106 yards	Engine, flat rope , no bonnet	Boys + asses waggons/ corves /3ft 6	40+40yds /3ft 6		Well, from each other and engine sh.	Tried by Davy lamp each morning. Wind blows out candles. 8-10 boys were drawn at once (but 13 that morning). Frequent wildfire explosions. 5-6 cwt on each corve.
Bagthorpe. Kirby Fenton Esq. Williamsons Cresswells	Laid in lime 126 yards 78 yards	15 hp. No bonnet. Rope to let people down. 10 hp. Flat rp., no bonnet.	Boys, asses and waggons 250 + 250 yds /3ft 6 100 +100 /3ft 4	20+65+200 yds. 40+30+40 yds.		From each other.	Rope lets down 4-8 boys at a time (enginemen claimed less). Safety lamps available - seldom used. About 5 cwt on each corve on the bank worked by asses. 60 waggons a day. The enginemen claimed 17 and 12 HP engines. Not much wildfire, but major explosion previously.
Eastwood. Barber Walker and Co. working 2 shafts Beggarlee 2 shafts Watnall -Trough Lane Middle Wharf Underwood 1 shaft Strelley. Robinette Greasley or Moor Green - Willow Lane Pit Cossal 1 shaft Brinsley No 2 Hard Coal Hopkins Pit Newthorpelodge (lodge) No. 2 No 3. Lord Melborne's Pit	 104 yards 142yds. In 134yds. lime 134yds. 14yds 19 yds. In lime 158½ yards 91(94) yards Lime 100 (106) yds 23 yards	 flat rope flat rope engine 20 hp - used flat ropes 14 hp. rope for men Flat rope for men Rope for boys engine - no bonnet or rope	 200yds /4ft /4ft /4ft. 500yds 250yds 3 of 150 yds /4ft 110 yds each way.Branches off. /3ft 6	 100 + 110yds 100 + 30yds. 110+110 +110 yds. 12 yds. /3ft 8	Boys and belts asses and waggons. Ponies + wagg Ass. ponies and waggons Horses +wagg. (and asses). Boy and ass Ponies +wagg belt used to guide corve horse + wagg No waggon road. Corves brought to mouth by asses and boy with belt.	Generally well. From each other and old a ¼ mile off old sh. 700yds Sh 200 yds off Old sh 400 yds and pump sh. 8 yds further By engine shaft only Sh. 50 yds off.	Pits let variously to a steaver, butties or by ticket. William Wardle- "hardest work under heaven". No bonnets or safety lamps. Willow Lane Pit mentioned. 13 year old "wears belt but only used it to put the waggon on the rails". 5cwt on each corve. Corve fell off waggon - 9 cwt of coals. Chain never used for lowering men or boys - only four at once. Bonnet used only when raining. No Davy. Pit not guarded, not laid in lime. 14 yards of shaft lined with metal. Only pit Fellows had seen well guarded. Bonnet not always used. Brick killed man in shaft recently. Belts used if waggons run off roads. Bricks in shaft very loose. Many bricks fell "yesterday" but bonnet saved them-always used! Six go down at once by rope. No bonnet. "Never seen Davy lamp" Seam only 3 feet. Butty claimed 1 yd 5 inches.. No bonnets. Davy lamp trimmed but rarely used. Chains not hooked, but have a noose - considered much safer. 6-7 cwt in each corve. Seam only 3 feet thick. Waggon way "now broken up" so corves brough direct to pit mouth - 6-7, even 10 cwt on each corve. No Davy.

Babbington . North and Co. Roughs Williamson's Soft Coal Henry Hunts Hard Coal Williamsons Hard Coal	Walls in lime. 50-60yds 70yds 101yds 158yds	No bonnets 8 hp. No rope. rope	/3ft 3 /3ft 3 /2ft 6-8 /2ft 6-8	/3ft 3		Ventilated from each other - up to 400-500 yards	No Davy lamps. The work is weighed in all these pits. Engineman had no watch and guessed the time. One pit standing because of the black damp "and often does so". "if the men do not look after the rope, no one does".
Greasley. North and Co. Little London Pit (may be same as) New London Pit Un-named William Lane Pit	60yds. No lime 64 yds 200 yds	) No bonnet.) No rope) No bonnet	/3ft 6 /5ft /above 1½ yds		Waggons drawn men and boys Ponies and asses and waggons	Sh. 100yds off Old shaft From engine shaft	No Davy lamp. 8 or 9 let down at a time " no business to be above three" espite accident (boy slipped on ice and fell down shaft) shaft left in bad and unguarded state. (Confusion here in the report. One pit is 70 yards . . . ventilated from an old shaft the water is pumped from. Possibly Little London.
Newthorpe Common. North & Co. Old Pit Cottage Pit (the above may be same) New Pit	70 yds 40 yds 80-90 yds. Uses flat rope 240 or 250 yards long	Rope for men No bonnet. Chains only Engine pumps and raises at Old and New pits	/3ft 8 /3ft 4	150 yds		Unworked shaft 30yds another shaft Windway at shaft just sunk but not at work 30 yds away.	No safety lamp, bonnets or Davy lamp. New shaft laid in lime. Seam 2 ft 4 ins. Worked 1 ft 4 in below. Chain claimed nearly 240 yards long
Nuttall or Awsworth. North & Co. Hutchby' Soft Coal Twiggers Pit	50 yds No lime 50 yds	No bonnets	150 yds /3 ft 6		Asses and boys and waggons	Old shaft and from "Twiggers" from "Hutchbies"	Seam 3 feet. No Bonnets Works two seams - Hard about 3 feet including a foot soft and, Soft 3 feet.
Awsworth. North & Co. Flying Nancy Pit	60 yds		200 yds /3 ft (soft coal - 100 yds.				10-12 cwt on each corve average
Kirkby Portland. Butterley Co. No. 2 No. 4 No. 5	All in lime 180 yds 140 yds 180 yds	25 hp.) Engine of) 20 hp. Rope used	500 yds /4ft 6 400 yds /4ft 6 2 by 200 yds /4ft 6	2 by 30 yds 2 by 30 yds 2 by 40-50 yd	Asses, mules and ponies drawing waggons	Wind soughs to shaft ¼ mile off To Nos. 5 + 2 To no.4	Nos. 1 and 4 were "run out" and "worked out". No.4 pumped, and draws both shafts and the gang waggons. Nos. 6 and 7 are not yet worked. 6-12 cwt on a corve. 10 go down at a time, no chains or bonnet. Lamp available if wanted (¼ mile off at office). Have seen 15 go down, often eight, with four on the top hook, four on the bottom. No regard is paid to number on rope.

Heanor. Butterley Co. (Pump and) Soft Shaft Hard Shaft	47yds 46ds	No lime No bonnet. Flat rope - no chain.	280yds/3ft 3 30yds /3ft 3 80 and 20yds	4 by 60yds 2 by 30 +40 yds.	Waggons drawn by boys	Engine pit 17 yds Old shaft 400 yds and a new shaft 200 yds	Soft seam 3 ft. Hard seam 2 ft 10 ins. "Too much wind" . Pit formerly on fire. Davy lamp kept Stopped 20-30 times a year when wind stopped by water.
Butterley Park. Butterley Co. Butterley Park No. 1 No. 2 No. 3 No. 4 Ironstone No. 1 No. 2 Tanners Field Ironstone No.1 No. 2 Unknown No. 1 No. 2 Waterloo Gin Pit Bolty Pit Waterloo Field No. 2 and 5. High Holborn Iron Pits No. 5 No. 6	Not lime 80-90yds 170yds 160yds 100yds 110yds 190 yds) in 190 yds) lime 30 yds 35 yds 25 + 20 yds 160 yds 93 yds No lime, but fitted with an iron rim.	8 hp. works 1 and 10 20 hp. works 2 and 3 Flat rope, and bonnet at No.2. 8 hp. works Nos. 1 +2. Bonnet at No. 2. 20 hp pumps and winds Horse gin Horse gin Engine 20 hp works Nos. 5 and 6 No bonnet. Flat ropes only.	60yds 2 waggonway 3 totalling 140 yds 2 by 100 yds / 4 ft 120 yds /5 ft	4 banks 3 banks 34 and 46 yds 4 banks 2 banks total 160 yards and 1 by 30 and 3 by 40 yds not worked out. 3 by 100-150 yds	waggons, boys by belt waggons and asses Waggons by belt waggons drawn by young men Asses and boys Waggons and ponies and boys	Winded on banks of two coal pits	Some confusion over iron and coal numbering of shafts. No bonnets. No. 3 working at 112 yds No. 2 a very wet shaft. No Davy - no wildfire or blackdamp. At No.1 the waggons are worked by the engine for 70 yards Not yet fully at work - designed on the "New Principl"e. Superior and well fitted at top. No Davy despite severe wildfire at No. 1. Seam ¾ yard. Shaft better guarded since gin driver thrown down. Let down two at a time. No accident whatever. Davy lamp in office a mile off. At No. 5 ironstone worked at 132 yards. No coal at present, at No. 6 ironstone at 81 yards. Banks up to calves in mud and water. No. 5 pretty well guarded when not in use by a cover fitting close over.
Newlands. Butterley Co. Coal shaft Ironstone No. 1 Ironstone No. 8 No. 9	110 yds 18 yds Shaft bad	12 hp with flat rope and always a bonnet Horse gin Horse gin		2 by 28 yds 1 yd 6 in	Waggons and asses Waggons and gigging		

Summercotes. Butterley Iron pits Upper Lower New Shaft (Coal)	 38 yds 27 yds in lime	 Horse gin Horse gin		18 and 37 yds both /4 ft 2 total 72 yds	No corves but iron boxes with wheels fixed under shoved by boys	From each other and a wind shaft. Fire basket often used.	Not headed - on New Plan.
Codnor and Ormonde. Butterley Hard Coal No. 7 Another, Soft Ironstone No. 1 No. 2 Unknown Ironstone Tissingtons Pit George Davis Pit John Waplingtons Pit William Radcliff' Pit Another Pit (coal?) No. 1 No. 2	 (coal?)70-80 yds. 100 yds Not in lime 70 yds 80 yds Not in lime 90 yds 42 yds 38 yds 22 yds 14 yds 179 yds 160 yds	 20 hp Flat rope Flat rope, no chain 20 hp. Horse gin Horse gin Horse gin Horse gin	 300 yds none 14 yds 30 yds 80 yds /3ft 6 50 yds	2 by 100 yds / 3 ft 4 2 by 60 and one 80 yds / 1 yd 5 80 yds /3 ft 6 80 yds /3 ft 6 80 and 32 yds	Waggons, ponies and asses Men Pony and boy Waggons and boys Boys and corves	Wind shaft 250 yds and wind sough and banks Each other and old shaft Engine+ other shaft 200 yds Old shaft 2 old shafts winded by old banks	3 pits for coal at work and 10 for iron as well as an open one. Davy kept in counthouse - never used. Shaft not guarded. Bricks at top loose notwithstanding the iron rim. Ditto the Soft pit. Soft Pit has inclined plane - corves drawn down and up with assistance of boys with belts. 3 men and boy killed by rope breaking. No safety lamp Being headed. 12 hour shifts.
Ripley and Hartshay. C.V. Hunter Esq. No. 1 No. 2 No. 3 No. 4	 145 yds 114 yds 65 yds to soft and 95 to hard 66 yds Not in lime	No rope 21 hp works 1 and 2 360 yds	100 and 70 yds /4 ft /4 60 yds / 4ft 6 / 4ft 6	2 by 50 and one 70 yds 3 total 100 yds	 Waggons and boys Half drawn by engine and boys w/o belt and half by asses.	old banks from 1 to 2	No Davy nor use for one. No. 1 working at 114 yards. Bonnets at 1 and 3. No. not at work. Hard coal being worked. 4 feet thick but foot left in roof.
Oakerthorpe. Benj. Strelley Esq.	30 yd. Lined with rough stone without lime.	9 hp pumps only Round rope for men +boys let down by gin. No bonnet	100 yds	12,20, 100 yd	Waggons, asses or boys		No Davy lamp. 32 stints, 2 yds each day. No butties. 3 cwt on each corve now, but when coal is large, as much as 10-12 cwt.

Kilburne. John Ray. No. 8 No. 10	110 yds. In lime 60 yds.Partly laid in lime	12 hp. Chain. Men let down with flat rope and bonnet.. 8 HP. No rope or bonnet	40 and 60 yds 500 yds - 90' of which gigged by the engine.	18 and 60 yds /4 ft +	Waggons, Asses and pony Ponies and mules Both by boys w/o belt Boys with no belts	From No.7, old workings and the engine pit	Have Davy lamps and Upton and Rogeets, which are considered superior. Bonnet with box attached used to repair the shaft.
Ripley and Morley. J. & C. Mold. No. 1 Soft No. 2 Hard Morley Park Deep Pit Basset Pit Ripley Hard Coal	 175 yds 136 yds 163 yds 130 yds 115 yds	 22 hp. works 1 + 2. Chains not ropes. With bonnet.	 6-700 yds 200 yds	 /4ft 130 yds /4ft /3ft 9 /3ft 9 12 and 40 yds /3ft 6	 Waggons - pony or asses	 By pit 150 yds off	 Not worked with butties for 20 years. Engine accident at No. 1 - drew men over pulley. 5 or 6 let up and down by chain. No rope but, "they ought to have". No Davy lamp. Have bonnet but it does not fit shaft and is not used.
New Birchwood. Humphrey Goodwin. Balguy Shady Landsale	80 yds 60 yds 60 yds	engine works both shafts. Flat ropes, no bonnets +horse gin	50 yds 80 yds 90 yds	2 by 100 yds all /4 ft 2 by 60 yds 60 yds	Waggons shoved by boys Boys and asses	By old shaft	Have Davy but never used except in heading. Two men had fallen down shafts.
Marehay. Samuel Woolley No. 1. No. 2.	170 yds part in lime 180 yds	20 hp. Rope, no chain and no bonnet	2 by 300 yds 2 by 250 yds	 2 by 80 and 2 by 30	Waggons drawn by pony and boys, part by gigging.	By old coal pit through banks Winded from engine pit	Top 8-10 yds not laid in lime. Gigging here indicates pulling by pulley and chains. Safety lamp at hand but not often wanted. Mr Woolley also referred to Old Hard (130 yds), New Hard (115 yds) and Soft Shafts (95 yds): Location not Marehay.
Alfreton. Old Birchwood [Old Hard] Hard Shaft Soft Shaft	120 yds. Laid in large rough stones	10 hp. chain but rope to let down men. No bonnet because of double tackle 12 HP works both shafts. Uses flat rope and bonnet	7 or 8 waggonways of upwards of 200 yds each		Horses, mules, asses, boys on different stints		

Pinxton (Notts) John Coke Eaq. Pinxton No. 1 No. 9 Sleights No.2 No. 3 Carnfield No. 1 (soft) No. 2 (hard)	No lime 70 yds 70 yds in lime 130 yds 114 yds (122?)yds 112 yds 130 yds	No bonnets. Flat ropes 14hp. 8 hp. hp. not known. No chain 20 hp. 30 hp. works both shafts. No bonnet	55 yds 90 yds 225 yds 440 and 40 yds. /4 ft one road 220 yds	60 + 100 yds /3ft 9 146 + 142 yds 2 by 130 yds, 37½ and 142 yds /3 ft 2 by 40 yds and another by 40 yds /3ft 6 176 + 242 yds /3 ft 9 2 by 55 yds. /3 ft	mules and asses Asses Asses Gig and boys using belts boys by belt	Described as well winded Shaft 300 yds old engine shaft 300 yds.	Davy lamp a mile off at the office, at Carnfield: not used No. 9 or Ben Moror's Pit For 24 yds on the waggonway there is a gig stint, where loaded draw empties up. Not above 3-4 cwt on corves. 10 or 12 lowered at a time - only 6 if all men
Denby. Robert Holden, Esq. No. 4 Kilburne Coal No. 6 Kilburne No. 13 Salterwood College Pit Mare Close Soft Coal No.2 Horse Pasture Pit, Soft Salterwood No. 12 Hard Short Soft	84 yds - upper part laid in lime 54 yds not in lime 31 yds not in lime. 20½ yds. part bricked 60 yds 70 yds not in lime 66½ yds	8-10 hp. 11 or 12 hp. no bonnet Horse gin Horse gin and round rope	16 yds railed and 140 yds laddered 130 yds, mainly laddered 19 yd /3 ft 3 to 6 ft 30 yds. 155 yds /3ft 6 37 yds / 3ft 8 82 yds /4ft partly laddered one gate /4ft	70 yds. /3ft 6 45 yds. /3ft 6 14 yds 2 by 16 yds 2 by 59 yds 128 yds 61 yds 2 by 50 yds	Waggons drawn by young men corves by men and belt waggons and youths Ass Drawn by youths + belts ditto Asses	Windshaft 200 yards off By old banks ditto Old shaft 100yds Old shaft Old shaft Old shaft Wind shaft	Nos. 1,2,3 are worked out and No. 4 standing. But No. 1 described as 60 yds, with flat rope 1 bank and seam of 1 yd 10 ins. Stopped by blackdamp. Corves drawn up and down ladders by lads with belts. If the descents were railed the weight of the corves would overwhelm the drawers. 2ft 9 ins seam Worked only a few days. Seam 3 ft 4 ins. Note: at Salterwood (Denby ShortSsoft): half a ton on each corve and 20 yards to draw it. 14 gang waggon loads is considered a day's work. More than two tons in each.
Pentridge (Pentrich). Haslam & Co.	70 yds	8hp.. Have rope but do not use. Bonnet seldom used.	160 yds /3 ft 8	50 and 70 yds	Asses and boys with belts	Old shaft 100 yds and old banks and wind soughs	3 new shafts sinking: 110, 115 yds and one not finished. Have Davy lamp.

Swanick and Summercotes. J.P. Morewood Esq. Swanwick Landsale Crabtree Summercotes (soft coal)	 20 yds. not in lime 35 yds 42 yds	 one- horse gin two-horse gin 8 hp. engine	 100 yds / 5 ft two 50 yds /3ft 9	 20 + 25 yds 25 + 50 yds 100 + 20 yds	 Boys by the belt Boys but one stint by a pony	 Wind pit and each other From engine shaft	7 feet seam - 5 feet got only. Fellows said 2 horse gin using round rope and no bonnet or Davy.
Riddings. Oakes and Co. Greenhill Lane Hard Coal Pit Greenhill Lane Soft Coal Pit Furnace Pit New Main Coal Coal and Ironstone Ridding Ironstone Pits	 100 yds 100 yds New Plan 50 yds 100 yds New Plan 52 yds 60 yds	 Flat ropes at all pits. No chains Soft and Furnace pit had same engine 14 hp. Engine horse gin	 131 + 133 yds / 3 ft 6 271, 266, 245, 245 yds /4ft 6 220, 332, /4 ft 116, 151, 171, 252, 209, 249 yds. /4ft 6 55 yds	 110 yds workings are 152 yards 20, 72, 40, 37, 35, 45, 53 yds 20, 40, 37, 35, 45, 43 yds 118 yds 2 by 30 yds	 Asses in 1 gate waggons in other shoved Drawn by boys except ass on one stint Drawn by boys Boys pushing		Davy lamps but no occasion to use. Boy descending in box - foot caught box and flung him down shaft. Own fault. Seam 3 ft 10 ins. Seam 3 ft 10 ins. Seam 3 feet usable. 4 or 5 let down on cradle On old plan, new being adopted.
Clay Cross. Geoge Stephenson & Co. Tupton Pits (linked) No. 1 Main Three Quarter Pits	Laid in lime 35 yds 35 yds 108 yds 2 by 40 yds 2 by 35 yds	Flat rope -2 at a time. Flat rope, no bonnet Flat ropes	2 by 300 and 50 yds /5ft 6 one /5ft 6 two /4 ft two /4 ft	3 by 40, 47, 22 yds 1 bank in 10 stalls two two	Rolleyways or waggons - ass or pushed by boys. Wicker baskets on wheels not attached, partly gigged, partly ponies and youths	Winded from old shaft Furnace at bottom of shaft	seam 4 ft 6 ins. Waggons from the loader to the pit mouth, open ended and 6-7 cwt each. No Davy. Seam 4 ft 10 ins. Seam 27 inches. No Davy. Sump 16 feet below base of shaft - drowning occured. No Butties.
Tupton. Coke and Chambers.	116 yds.	Flat rope but use chains	330, 150 yds. /5 ft	4 by 15 and 3 by 12 yds	One by horses, one by men.	Via engine shaft and a furnace.	Field working six months

Brampton. J.G. Baines Esq.	32 yds 32 yds	Horse gin Horse gin	Barrow road 30 yds	28 yds. / 2 ft.	Corves and barrows dragged by young boys.		Seam is 20 inches. Corves or barrows about 1¾ cwt - four boys get 40 corves of coal and 20 of slack for a day's work (7 to 5 with an hour for dinner). 3 or 4 other pits in the neighbourhood were worked by wallows, with similar methods of working.
Brampton. Jonathan Bennett. No. 1	29 yds	Horse gin		3 by 45 and 50 yds /2 ft	Corves w/o wheels. 1¾ cwt. each. Boys with belt	Old shafts - fire basket frequently used.	Would not pay to raise the roof.
No. 2	20 yds	Horse gin	50 yds barrowway / 5 ft	two	Barrows drawn by hook by men	Old shaft	Two seams 11 and 16 inches taken together
No. 1 Wallow Pit No. 2 Wallow Pit	20yds	Wallow	2 barrowways 60 and 40 yds	two /2 ft			Two let up and down at once using rope "no thicker than a well rope". Work 7 to 7 with hour for dinner. No protection to shaft top. Nine year old boy (gin driver) fell down shaft playing at lunch. Fellows note: There are several ironpits worked by wallow 14 yds deep, owned by Barrow of Staveley and Appleby and Co.
Tapton. John Limb. Lower Pit Upper Pit	35 yds 31 yds not in lime	Horse gin Horse gin round rope	200 yds 10 yds /4 ft	70 yds		Winded from each other.	
Tapton. Appleby and Co. Ironstone pits - 8 by wallow 6 by engine	22 yds, top 6 ft secured by timber. 22½ yds	wallow				Well winded from each other.	
Staveley. G.H. Barrow Esq. Netherthorpe	90 yds	12 hp. Flat rope, no chain. No bonnet.	3 by 60 yds.	50, 40, 30 yds /4 ft 6	Man and boy to each in waggonways, pony in the banks.	Well winded from engine shaft.	Man klled by rope breaking during sinking. Agent said "cannot say well winded - thank God no very serious accident has occured". Garlands mentioned. No Davy
Staveley Upper Ground	46 yds		200 yds	100 yds /4 ft 6	Horses.	Windshaft	
Handley Wood (Waterloo)	70 yds		400, 600 yds	2 by 50 yds. /4 ft	Horses	Draft pit	Seam 4 ft 10 ins.
Middle Pit (Waterloo)	45 yds	two-horse gin engine	200 yds	90 yds /4 ft		Winded from Handley Wd	
New Thorpe Pit	95 yds	engine	130, 150, over 200 yds.	17, 50, 36 yds	Two of the banks are ironed and waggons drawn by men. On the other corves drawn by horses.		Note. Several iron pits at Handley Wood and other places chiefly worked by wallows and gins.

Coal Aston. Rhodes and Co.	73 yds.	11 hp. Boxes drawn up shaft in cradle. Flat rope, no bonnet.		6 banks 17 to 18 yds each	No corves. Shoved in boxes with wheels.	From engine shaft.	Seam 4 feet. No Davy.
Duckmanton. Benj. Smith & Son.	82 yds	10 hp. uses round rope for men	300 yds	100 yds /5 ft	No rails. Corves not on wheels. Horse	Shaft ¾ mile	20 ironstone pits and three coal pits Man killed six months before when fell from chains. Works three shifts or sets of eight hours. Gunpowder smoke mentioned. Fellows noted: 3 pits were not visited, worked only by the day., most by wallowsbut two worked by gin horses and one by an engine. Ironstone pits are all near each other and several communicate. Most worked by wallows, others by a 4 HP engine and about 20 yards deep.
Renishaw. Appleby and Co. Cottam No. 1. No. 2 Comber No. 4 No. 5	Not in lime 68 yds. 73 yds 112 yds 96	Use bonnets in wet and winter. Flat ropes. wire rope	400 yds 2 by 600 yds nearly 1500 yds of roads 350 + 200 yds	35 + 25 yds /4ft 6 96 + 20 yds / 4ft 6 80, 65, 20 yds. /4ft 6 70, 80 yds	Men and ponies on board gates	Winded from each other Down 4 and up 5 by means of furnac.e	Seam 5 feet. Have Davy lamps Seam 5 feet. Had wire rope at No. 4 for fortnight and did not like it.
Eckington. George Wells Mosborough No. 1 No. 2 Eckington	 50 yds 47 yds 46 yds 45 yds	No bonnets Let up and down by round rope.	200 yds / 4 ft /4 ft		Corves on bank by pony guided by boy with hook.		Seam 3 ft 8 ins. Have Davy, never use.
Mosborough. Richard Swallow.	54 yds.	Shaft worked with rods to steady boxes. Machinery covers top of shaft with platform and boxes caught by hook. Flat rope, no chain.	2 by 200 yds	4 by 13 yds. / 4 ft		Down engine shaft	One waggon gate not in use.

Dronfield William Booker & Co. Ox Close No. 1 No. 2	53 yds. Guides fitted 61 yds.	worked on New Plan, as Riddings. Round rope and let down in box.	200 yds	4 banks or stints /7 ft	Waggons on wheels drawn by men. Loaders bring up rails	1 and 2 from each other and the engine shaft	Self-closing cover now grated to allow ventilation. Otherwise as for No. 1
Stubley Dronfield. John Grey Waterfall. Sommerwood Dronfield Woodhouse	50 yds 50 yds	Gin horse Gin horse	100 yds	3 by 6 yds /7 ft 6 yds. / 7 ft	Waggons pulled by hook by boys.	Old pit	
Dronfield. Samuel Lucas	45 yds 40 yds	Engine Horse gin	two	two /4 ft	Pushed by boys		
Heath. Henry Godwin	2 of 30 yds	Horse gins					Small and reliant on landsale.
Denby. Pattison and Co.	24 yds, laid with rough stone and bind.	8 hp. No rope or bonnet	10 yds	Just begun.	Drawn men and youths.	Wind shaft 100 yds off.	No lamp. Just begun
Meerbrook. Charles Hurt Esq.	Drift		600 yds		Asses.		Served adjacent lead works only.