

# **WATERGROVE MINE, FOOLOW, DERBYSHIRE: EXCAVATING A 1794-95 NEWCOMEN ENGINE HOUSE AND A HISTORY OF THE MINE**

## **APPENDICES**

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The following appendices provide supplementary information to the account of the Watergrove Mine archaeological excavations and historical assessment published in Mining History 20.2 in Spring 2018.

### **Appendix 1: Watergrove Mine - Excavating the 1794-95 Newcomen Engine House**

This Appendix gives supplementary data for Chapter 3 of the paper in Mining History.

#### **Engine House**

In the south-east corner of the building, in the bottom corner of the robber trench for the eastern engine house wall, in a soft earthen backfill derived from erosion of the natural face to the east side, there was the skeleton of a medium sized dog, lying in a foetal position. In front of this, but not certainly associated, was a crude drystone wall (4:13), standing 0.70m high and sitting on a dark-brown soil above the thick mortar layer from the engine house demolition. One possible interpretation is that the wall was added to seal a pet grave; another is that it was placed here by the farmer to try to arrest erosion of the steep slope.

#### **Western Boiler Plinth and Flue**

While the boiler plinth was clearly butted against the engine house, the one surviving part of plinth structure here, to the south-east, had a faced wall with two surviving courses, rather than comprising core material; this was presumably for strength.

The inner diameter of the arc of stonework supporting the boiler is 3.65m (12ft), with a central point offset eastwards from that for the boiler plinth stonework by 0.37m (1.2ft). The boiler base itself must have been slightly greater in diameter at *c.* 3.95m (13ft). It may well be that above, the boiler side sloped outwards to a maximum diameter, at the point where the domed boiler top started. Thus, the maximum diameter of the boiler was probably in the range of 14ft (4.25m) to 15ft (4.50m). If only one course of stones of the support was missing, this would put the base of the boiler at its outer edge *c.* 1.55m above the floor of the ash pit, and *c.* 1.00m above the top of the 'stoking floor' wall at the eastern end of the ash pit. The bottom of the boiler is likely to have been domed with this higher at its centre than edges.

While the bulk of the boiler plinth is constructed of limestone blocks, slabs and irregularly-shaped pieces, all bonded with lime mortar, the area immediately below the flue around the boiler, and extending northwards through the south-eastern quadrant where the flue base had

been removed, comprised limestone chatter. This had a flat top where mortar up to 0.02m thick was laid when the stones of the flue base were built. This chatter layer, which has stone mostly of *c.* 100 x 50 x 20mm size, with a few noticeably larger, is at least 0.30-0.35m thick and extends down to run behind the boiler-base support wall. The chatter was not present in the south-western quadrant; all here was limestone rubble.

### **Western Ash Pit and Retained Path**

Both walls of the ash pit were well built with lime mortar and their bases rested on bedding stones, mostly smaller but varying in size and including two hand-made bricks and a small sandstone block, all placed on the shale bedrock and used to create a level line from which to start laying the regular courses.

The three top blocks forming the eastern side of the ash pit's eastern threshold wall were of a cream coloured limestone, with rounded corners, rather than the grey stone normal to the site, suggesting this stone was especially imported, perhaps for its hard-wearing properties.

The stones used for the paving in the ash pit bottom were also cream coloured and here also had brown staining, presumably derived from the chemicals in the coal/cinders. Nearby, the eastern side of the erosion hollow at the eastern end of the ash pit was the shallower of the two sides and followed the bedding of the shale, while the west side was steeper and cut the bedding, as if hand-rakes were used for clearing the cinders that rode up because the paving was still in place immediately to the west.

The red layer in the ash pit was up to *c.* 0.40m thick to the east and reduced to nearly nothing about two-thirds along the pit, but then thickened again further west in intermittent patches in the emptying path, particularly to the south side. The dark-grey cinders layer beneath was thin to the east end, up to 0.17m deep slightly further west but, as with the other layer, virtually disappeared at about two-thirds along the ash pit. However from here it again started to thicken but was different in that it was more compacted and had a clean level top, as if trampled. It gradually rose westwards, was 0.10m thick over the 'stopping plank', and was 0.33-0.37m thick at the western end of the excavation trench.

At the western end of the trench, the flanking drystone walls of the emptying path, which retained dumped material to either side, was mostly built of small limestone slabs. The wall to the south side (4:31; 5:7), which was offset, reduced the width of the path to 1.40m, was 0.37m high and had four courses, the top one being a large slab. The curving wall to the north was 0.47m high with six courses at its west end, but had been reduced to three courses further east (4:32).

### **Ash Pit Drain**

The drain had a levelled earthen floor, dropping very gently westwards, comprising the red layer infilling the ash pit, at *c.* 0.30m above its original floor to the west and *c.* 0.40-0.50m to the east. Within the drain there was thin layer of brown silt. All the drain roof slabs were angled so that the south side of the drain was a little higher than that to the north. At the easternmost end there was no drain side, with its roof slabs ends resting directly on the top of the ash pit 'red-soil' infill. There were also two hand-made red bricks placed against the slabs.

## **Western Chimney Base**

The western face of the chimney base is set hard against a vertical side to the foundation pit, with small vertically-set packing stones between the two. The chimney footings step upwards southwards, with the bedrock visible as a stripe inside the northern face where the basal course of stonework has been removed. Above here a total of six courses remained rising to the southern edge, which is now only one course high because of the rise in the underlying rock. The whole is built of limestones and lime mortar, with sturdy horizontally-laid slabs forming the outer face to three sides. The core has smaller less regular stones with some parts of the interstices not filled with mortar. While the lower courses are butted to the boiler plinth, the upper two are part of the same build, showing that the butt is the product of the sequence of initiation of building these structures rather than there being a significant chronological distinction between the two features.

## **Paved Access Path**

The carefully laid, flat-topped, original paving comprised close-fitting but irregularly-shaped limestone slabs, with small stones used to infill gaps at the sides. This paved path was 1.75m wide by the building, reducing to 0.95m further west. Throughout it was laid on a prepared surface, where the natural clay had been truncated to form a flat horizon. As the paved path approached that from the ash pit it was 1.19m wide and the paving had been robbed to expose a supporting plinth below. At the end there was a c. 0.35m step down into the ash pit path. To the west side a 0.12-0.25m wide and 0.08m deep channel may have been a drain to take rainwater runoff.

The infill above the paving was different to the east against the doorway into the engine house, compared with that nearby to the west of the offshut, in that in the former area there was no shale layer and the soil included fragments of lime mortar. This mortar is uncertainly explained and either indicates something nearby had already been demolished, or more probably that mortar had been spilled during initial building on the site and this had broken up when the soil upon which it sat was moved.

To the east, up to three courses of the northern retaining wall remained, built of small limestone slabs and 0.24m high, with natural clay behind; against the doorway into the building this retaining wall clearly only had an outer face, while the other side of this wall was butted tightly to the edge of vertical-sided cut into the natural shale. Further west only three slabs from the wall's basal course remained. To the far west, close to the step down, the remaining wall was again up to three courses high from the pavement upwards, again with natural clay behind.

## **Northern Tip**

The upper parts of the tip, derived from levelling the northern terrace, mainly comprised a thick layer of dark- to mid-brown silty-clay with a few small pieces of mortar, chert and limestone. There were occasional thin lenses of redeposited clay and mineral sand. In one area the silty-clay layer overlay a mottled mid-brown sandy layer with small stones, in parts also mixed with larger stones. This deposit appeared to be set against the retaining wall of the original paved path, placed at a time when this was still intact, creating a break in stratigraphy between the main part of the tip to the north and the fill placed over the path to the south.

To the west of the offshut, underlying the layers just described, was the layer of redeposited shale with more brown soil beneath, both described under 'Paved Access Path'.

The small fragments of mortar encountered throughout are interpreted as from patches of spilt mortar from the initial engine house build, which broke up as the topsoil was moved. The tip layers with small amounts of mortar are very different from the engine house demolition layers, which here were clearly overlying the northern tip on its lower slope to the west and contained much mortar and broken stone.

In the area immediately north of the offshut the stratigraphy had been truncated, for here there was a foundation trench with a rubble fill (see Offshut).

### **North-Eastern Ash Pit and Associated Boiler Support Walls**

The ash pit walls were built with limestone slabs and blocks, but the faces had a stalagmitic coating covering detail. While the four sides seemed to be part of an integrated build, it was hard to determine if there were any butt joints. At the north and east the stonework of the pit walls fitted tightly into the sides of the hole, while to the south there was a narrow gap filled with small stones.

The main lower fill of the ash pit comprised a brick-red sandy silty-clay which derived from the erosion of the natural soils beyond the walled sides to north and east. It had fragments of coal, reddened sandstone blocks, a few pieces of limestones, several hand-made bricks that included buff-coloured fire bricks and ordinary red ones, and pieces of mortar. This layer contained a complete small firebar and a corroded cast-iron 'roller' or 'drum', a broken cast-iron linking rod, a shovel blade, a bucket handle, and various other objects (see below - Small Finds Group A). Beneath the red fill there was a dark grey deposit, mainly comprising fire-pit cinders and clinker, with some hand-made bricks, again including both buff- and red-coloured types. This dark deposit was thickest to the north-east corner at 0.40m deep, was 0.23m thick at the north-west corner and reduced to nothing southwards at 0.6m from the southern wall; this material, which contained bricks derived from dismantling the last boiler, was what had been left when it was abandoned, with the thicker area to the north missed when the ash pit had been last emptied.

The earthen floor at the south-east corner of the eastern and southern walls comprised a rich orange-brown sandy gravel which was in parts was friable rather than compacted, suggesting it was not much walked over.

### **North-Eastern Boiler Plinth**

A short distance outside the eastern part of the plinth there is a cut in the natural clay soil, which may well be the edge of the foundation trench for the structure although it does not run concentric to the outer face. This was 0.36-0.38m deep and the lower 0.10-0.15m of fill between here and the wall comprised soil mixed with small stones. Above this, in the wider section of the feature, there was a layer of un-mortared irregular limestone pieces, with an old topsoil above; these layers may well be original backfill added after the plinth was built. Under the bottom fill, in two small patches, there were horizontal skims of mortar (removed pre-planning); this mortar may well have been spilt as the plinth was built, rather than being part of the mortar floor that survived further to the north-west.

The remaining piece of the plinth to the south, which has mortar on its upper face associated with the removed course above, is set on a soft pale orange-brown sand that runs north-eastwards where the plinth has been fully robbed and also runs under the slabs of the upper coal hopper. This was undoubtedly introduced as a bedding deposit from which to build off and shows that both the plinth and coal hopper are contemporary with each other. Running

north for 1.8m from the two remaining fragments of southern plinth face, there was a surviving basal part of the plinth core west of the step up in the natural. This comprised small to medium sized pieces of limestone of all shapes, set in lime mortar in intermittent crude coursing. The natural clay in the cut at the step up was 0.40m thick, beneath which was shale bedrock.

### **North-Eastern Chimney Base**

Abutting the north face of the chimney, near its north-east corner, was a small cluster of tight-fitting stones of uncertain interpretation, comprising a one-stone thick layer, with a fewer naturally-placed stones below, lying within in a dark brown soil. The chimney base to the west side was set in a shallow foundation trench, close fitting to its vertical edge, cut into the dark humic topsoil here. It may be that this trench was wider to the north and the stones are in the backfill of the foundation trench.

### **North Eastern Shovelling Floor**

The floor has several lines of bricks laid end to end, in two patches running with somewhat different alignments. The bricks are a red colour, hand-made and of a type consistent with the later-18<sup>th</sup> or early-19<sup>th</sup> century. The sandstone blocks intermixed with the bricks are of a stone of moderate coarseness and all have a very noticeable red-tinge which is usually indicative of heat alteration with local sandstones. The bricks increase in frequency with proximity to the postulated boiler stoking point and this may be purposeful, placed here because their ability to withstand heat without deterioration when compared with the sandstone blocks also used in the floor. The whole was carefully laid, to have a smooth flush top surface. The western part is more regularly laid, whereas to the east bricks and stone block are more randomly placed. Throughout, there was no mortar in the interstices but only mineral soil. The surface of the floor had a patchy thin skim of what appeared to be lime mortar coating the stones, bricks and soil in interstices. However it was unclear whether this was an original feature and thus an extension of the mortar floor immediately to the north, or if it was a secondary deposit, explained by re-cementation of lime brought down the profile in solution, derived from the significant amounts of broken pieces of lime mortar in the demolition layer above the floor. There was no coal dust layer on the shovelling floor. While this opens the possibility of the floor being for a purpose un-associated with the boiler, other factors don't support this and presumably the floor was swept clear after last used, perhaps in advance of building a new boiler support above it.

Extending to the east side of the ash pit, underlying the North-Eastern Boiler Plinth and only visible in a narrow strip where the boiler support but not the stones directly beneath had eroded away, was part of the same shovelling floor. However, here the floor comprising just stone slabs with no bricks, with these laid in two courses, presumably so that a common level with the northern area was achieved. All stones appeared to be heat altered with crumbly edges and corners.

At the central area of the remaining shovelling floor, it had been laid directly on natural clay. Here and intensifying southwards towards the ash pit where the floor had eroded away, this soil had burnt to a brick-red colour because of intense heat; the postulated waggon-boiler fire-box was close by. To the west and south-east, the floor rested on a layer of irregularly-shaped limestones placed on the natural clay. These two areas are both places where footings to structures are likely to have been set somewhat deeper; those to the west are interpreted as part of the raft for the chimney base, while those to south-east are associated with support for the ash pit wall.

## **North-Eastern Mortar Floor, Walls and Plinth**

The central floor comprised lime mortar that, where well preserved, was 0.10m to 0.15m thick and abutted the shovelling floor edge to the south. It contained a few small sandstone pieces up to 0.10m x 0.05m across. Small sherds of two broken stoneware vessels and a piece of red lead putty lay on the floor surface (see below - Small Finds Group D). How far the floor extended in the area south of the square plinth is unclear. The natural soil here rose slightly eastwards and may have been outside the building. It is tempting to see the eastern edge of the building as aligned with a point just east of the western edge of the square plinth, but this is conjectural.

The square plinth measured 2.15m across each side, and what remained comprised a single remaining course of limestone blocks and slabs bonded with lime mortar that was sitting in the 0.07m to 0.12m deep square bedding 'trench'. The irregular central raised area was *c.* 0.05m high. To the south, the backfill of the feature that had been added once the stone structure was demolished comprised the basal part of the loose mineral gravel heaped in this area. Further north there was demolition rubble, some of which had become re-cemented due to the amount of broken lime mortar.

The northern cut-edge sited west of the plinth was 0.10-0.025m deep, while the combined depth of this with the plinth pit was 0.47m-0.52m. It was cut into natural topsoil, comprising a mid-brown compacted sandy loam, the surface of which had scattered fragments of rotted wood.

The flat soil surface found inside the postulated building did not extend beyond the features at the western edge; here there was a low heap of mid-brown friable sandy soil containing small pieces of mineral, limestone, coal and mortar which was deposited while the site was in use, with a dark humic topsoil beneath that dropped away irregularly in a series of shallow steps, perhaps to be interpreted as spade cuts made when this area was being prepared for building. The cut at the western edge of the 'building' was 0.13m to 0.06m deep and there was the same dark topsoil exposed at its base; we do not know whether this soil also ran eastwards under the mortar floor, as this was left unexcavated. The patch of stones with mortar in the western feature comprised a one-course layer of irregular limestones in mortar, consistent with a footing deposit for a wall, and while this interpretation seems likely, there was no wall face to confirm this interpretation. The linear spread of mortar outside the western vertical line, was up to 0.10m thick at the face and rapidly sloped away to nothing westwards.

## **Lower Coal Hopper**

A small area at the bottom of the coal hopper had been robbed away. The hopper floor, which is 1.80m wide, came to the engine house wall at 0.70m above the earthen floor inside the building. The floor was at least 2.40m long in plan, rising to the east to a point where it seems to have been robbed to build the upper coal hopper, although this interpretation remains unproven because the paving of the upper hopper was not removed to fully investigate. It is likely that the removed part of the lower hopper floor became steeper and curved up to the east, matching the design to the north side, and its original top may well have been at the horizon of the original large working area beyond the excavation to the upslope side, at either *c.* 2.30m above the bottom of the chute, matching the truncated natural soils immediately to the east, or a further 0.20m higher matching the remnant of cobble floor to the north-east.

## **Upper Coal Hopper**

To the west, the lower half of the fill above the whole the lower coal hopper floor comprised limestone slabs and irregular blocks of a wide variety of sizes up to c. 400mm across; amongst these was a large discarded stone weight (see below - Small Finds Group C). There was little soil in the interstices except in upper and western parts where it had trickled in from above. In the area between the hopper's south wall and the wall at the southern end of the postulated 'wagon boiler', which was built on top of the lower fill of the old hopper, there was a rubble layer with soil; this was uneven and had small patches of spilt mortar from building the adjacent wall just mentioned. Above this fill there was a loose dark-brown, mineral-rich, soil with limestones and a small number of pieces of broken mortar. This extended upwards to the base of the bedding sand for the upper hopper pavement. The intervals of time between the deposition of these fills was not clear.

In a small area where fill was visible under the upper coal hopper paving immediately east of the two 'wagon boiler walls', there was a further shallow area of rubble making up the ground for the paving and its underlying sand. This fill had a variety of limestone blocks and slabs, with a tendency for them to be placed horizontally, with pale-brown sand in the interstices that had dropped to fill these when the bedding sand above was laid.

The bedding sand immediately under the paving was present in all parts inspected and was up to 0.10m thick. The slabs themselves were mostly 0.06m to 0.12m thick. The coal deposit on the upper coal hopper floor was tested for hammerscale with negative result. The layer contained a clog heel iron (see below - Small Finds Group B).

## **Cobble Floor**

The stones used to make the cobble floor were small limestone setts placed on edge and mostly 0.05-0.10m deep, nearly all set leaning westwards, carefully placed to create a top horizontal surface. The setts were bedded in a layer of soft, pale yellow-brown sand, which in turn was laid on a levelled surface at the natural clay subsoil. While the present north-west edge of the cobbling was the product of erosion removing the hardstanding to the downslope side, to the south the floor stopped at a sharp straight edge, with a vertical face 0.15-0.20m deep to the base of the bedding sand, with the stones arranged in such a way as to show the floor abutted the line, rather than the cobble surface being cut through (although a few loose stone found nearby to the south may suggest the opposite interpretation, that the floor had been modified). That the edge was sharp shows that when the timber here was removed, the area was quickly backfilled with the loose mineral gravel found here and overlying the cobbling. In the area running south from the site of the timber for up to 2.8m there was a thin skim of sand, about 0.01m thick, above the natural horizon, suggesting the paving (or another structure) once extended here.

## **Offshut**

The offshut was slightly asymmetric in plan and internally measured 2.35m by 1.40m. The ruined wall, which has inner and outer faces, was 0.50m thick and still stood up to just over 1.00m high to the north. Given its flimsy nature, it was clearly only a one storey offshut, which was originally abutted to the engine house wall. The wall was for the most part built of limestone slabs and blocks, with smaller irregular infill and lime mortar, but to the east end it included three reused heat-altered sandstone blocks similar to those nearby to the north-east in the shovelling floor above. The west end incorporated a piece of sandstone masonry with a heat-altered and sooted surface. At the western end of the offshut the doorway was 0.95m wide. One limestone threshold slab remained, which was 0.15m high. This had a square slot,

0.01m deep and 0.08m across, chiselled into the upper face, made to hold one side of the doorframe. Rising for 0.13m on the butt end of the offshut wall there were vestiges of lime mortar used to secure the timber in place.

The internal floor of the offshut was divided into two parts. Inside the entrance there were four limestone slabs, with two smaller pieces of stone infill, and soil in all interstices. The rest of the room had small limestone slabs set on end, laid close together to produce a flat pitched surface. Overlaying the large limestone slabs were three thin sandstone slabs, only about 0.02m thick, forming a part of an 'upper floor' surface; their purpose was unclear.

Set against the outside wall of the building, within a flat earthen floor, was an elongated pit, which measured 1.18m by 0.17/0.11m and was 0.11m deep. This had almost certainly held a horizontal timber beam which was placed here at the time the earthen floor was made and presumably was later purposefully removed; that the pit had very sharp sides indicated the void was rapidly backfilled with the adjacent heap-material containing demolition rubble. The earthen floor of the pit comprised a course and compacted grey mineral gravel, with fragments of mortar.

To the north side of the building, outside it there is a linear cut into the clay natural of the slope, which was about 0.75m wide, near-vertical sided and extending down to the bottom of the basal course of the building. This may have been made when the offshut was built, although an interpretation as an earlier feature associated with the building of the earlier ash pit approach passage side and a plinth for the chimney that stood here seems more likely. After the offshut was built, the new or reopened cut was backfilled with a dark-brown compacted soil near the base, and a stony fill above of small, irregularly-shaped, limestone blocks and slabs. Against the wall and above the stones, there was a pale-brown mineral gravel which appeared to be a later introduction, perhaps brought downslope by rainwater from the tailings heap at the north-east corner of the trench.

### **Demolition Layers and Post-Abandonment Deposits**

Upper parts of the demolition layers across the engine house and western boiler plinth comprised many loose stones in soil. In the engine house this deposit overlay a distinctive white coloured layer made up of broken mortar and very small pieces of limestone that is described further above under 'Engine House'.

Demolition deposits associated with the north-eastern structures was dominated by a grey-brown to grey-yellow mineral soil/gravel with limestones, reddened gritstones and hand-made bricks. Some areas were paler in colour and had many mortar pieces. At the northern edge of the trench the number of stones and bricks diminished significantly. Similarly, over the upper coal hopper to the south-east there was a pale brown soil with much broken mortar, the latter making up about half of the material in the layer, with pieces of this in the 5mm-10mm size range. Also present were a few very small pieces of limestone, presumably from the core of the walls or derived from dressing the mortar off the demolition rubble.

At west end of western ash pit, overlying the laid deposits already described in the section on this feature, there were thick tip layers of mixed dark grey-brown soil, in part with a clay content, with some small stones and broken mortar. In one area there was a redeposited clay layer, with a basal layer of decomposed demolition mortar. Not enough of these deposits were available for detailed study to make a successful interpretation.

The ore dressing layer to the north-east corner was a calcite-dominated, dark-grey-brown, mineral gravel, mostly of 2-3mm size but with some pieces up to 10mm, and some small stones. The larger mineral heap nearby to the south was up to c. 1.00m high and comprised a very-loose, mid-brown, mineral gravel, mostly made-up of crushed calcite, but mixed with some barytes and fluorspar, with flecks of galena, and small limestones up to 25mm across. This heap was highest in the area east of the remnant of boiler support, with its edges fading to nothing coming westwards at about 1.5m into the trench, while further south it ended where it abutted the boiler plinth. The high part of the mound extended southwards over the remnant of cobble floor, but beyond here the tip diminished in height and by the time the southern edge of the trench was reached there was only a thin dark brown soil layer over the natural topsoil, which contained a few stones and some calcite and crushed limestone.

### Small-Finds

A variety of small-finds were retained during the excavations, which are briefly described here in two tables, the first listing objects found in stratified contexts, the second where they came from the general demolition debris. In the case of the general demolition layers, only finds that were regarded as potentially dating to the time when the engine house was in use were kept. Other finds that were undiagnostic in character, and commonly comprising amorphous rusted iron fragments, were also not saved.

**Table 13: Small-finds made in stratified contexts.**

| <i>Group</i> | <i>Short Context Description</i>   | <i>Find Descriptions</i>   |
|--------------|--|--|
| A            | Burnt soil layer in the North-East Ash Pit, redeposited here soon after the boiler and the upper pit sides were removed in Phase 5 and the surrounding soil to the north and east sides collapsed into the pit. The finds may well belong to Phases 2/3. | <p>Just north of the centre of the pit was an intact fire bar (Fig. 11). This has a fish-bellied shape with square lugs at either end, with a total length of 750mm. The main part of the bar is 660mm long and strongly tapered in cross-section; at the centre it is 110mm deep, with a width of 48mm at the straight top and only 6mm at the base. The lugs are each 70mm wide and 45mm long.</p> <p>At the beginning of the emptying passage was a broken cast-iron 'roller' or 'drum' on an intact axle (Fig. 12). The iron axle is made from square-section bar, 28mm across, with the two 75mm long ends which protrude from the drum made circular in cross-section. The drum was originally a total 445mm long, with a main section of 145mm diameter and c. 390mm length, with 18-20mm thick flanged end plates with diameters of 280mm, both with a chamfered edge.</p> <p>There was also part of a sturdy cast-iron linking rod, 57mm by 15mm in cross-section, with a ring-end which is 29mm thick (Fig. 12). This was recovered from the spoil heap but was associated with the distinctive red soil from the ash pit; it is similar to another found in the northern tip.</p> <p>In the fill of the pit there was also: a badly-corroded, round-ended, shovel blade, which measured 280mm across and 260mm long: the end of a thin iron bar with oval looped end for use as a retaining clip or handle: an curved iron handle made in 32mm by 3mm flat bar that is 330mm long with D-shaped holes at either end which is probably from a bucket: part of a sturdy tapered square-sectioned bar with enlarged end lug: a broken piece of thin cast iron plate: and a large, broken, iron chain link. Three sherds of blue and white pottery were also found in the fill, as was a sandstone roofing tile with securing hole.</p> |

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|---|---|--|
|   |   | There were several hand-made fire bricks that were buff-coloured, mostly broken, one of which had a damaged surface with concretions resulting from intense heat. They each measured c. 245mm x 110-120mm x 65mm.  |
| B | On the surface of the coal layer on the paving of the Phase 3 Upper Coal Hopper and Stoking Area.   | The only find was a clog heel iron, which measures 78mm across and is 72mm long, with one corroded nail, one visible nail hole, and the others hidden by corrosion (Fig. 12).  |
| C | Within the rubble fill above the Lower Coal Hopper, introduced in advance of building Phase 2 structures above.   | The only find was a large irregularly-shaped but broken sandstone slab, with one face and the original side worn, and the other face fresh, with a large hourglass perforation 'pecked' with a chisel (Fig. 12). This was presumably a broken floor slab, re-used as a weight, perhaps for something such as a tarpaulin.  |
| D | On the Phase 2/3 North-Eastern Mortar Floor, presumably dropped when this was in use or shortly afterwards.   | Two sherds of thin-walled stoneware, each from a different small vessel. One is straight sided with slightly-everted plain rim, with dark-brown glaze, presumably from a beaker. The other is a curved body sherd with a mid-brown glaze. Also a piece of red-lead putty.  |
| E | In the lower part of the Northern Tip over the Paved Access Path, added at the instigation of building Phase 2 structures to the north-east, with all finds within 2m of the north-west corner of the engine house. | The finds included a broken, sturdy, cast-iron linking rod, 47mm by 15mm in cross-section, with ring-end which is 29mm thick (Fig. 12); similar to another found in the north-east ash pit. There was also a large iron wedge that is 205mm long and has a rectangular maximum cross-section of 23mm by 18mm: a large door-hinge pin in a sturdy 175mm long spike: a ball of bent lead window flashing; a large iron bar measuring 137mm by 68mm and 26mm thick, with the two long sides chamfered, and with a central 30mm circular hole: a broken large bolt: a large rivet with square head; two 'washer-like' perforated circular iron plates with screw holes, one 83mm diameter with a 45mm central hole, the other 87mm across with 25mm central hole: the semi-circular end of a thin iron plate of c. 100mm diameter, with two iron washers with rust fastening it to a second corroded thin plate: a c. 210mm long iron bar of 24mm by 4mm cross-section with a single circular screw or bolt hole at either end: and a large asymmetric iron ring, which looks to be for hanging a pipe of c. 65mm diameter from a bar or bolt. |
| F | In the late Phase 1 cinder layer in the Western Ash Pit, within the erosion pit near its eastern end.   | A near-complete but badly-corroded and heat-damaged fire bar with one remaining end lug, now c. 860mm long and originally at least 900mm (Fig. 11). It has had its depth reduced, and the sides are covered in thick rust deposits.  |

**Table 14: Small-finds made in the demolition layers, topsoil and spoil heap.**

| <i>Group</i> | <i>Short Context Description</i>   | <i>Find Description</i>  |
|--------------|--|--|
| G            | The topsoil and Phase 5 demolition layer in and around the engine house and offshut. | <p>Finds included an amount of blacksmith-made ironwork, the diagnostic pieces that were likely to be associated with the mine structures were two large bolts, one with a square shank and head; a large washer: three large nails; three spikes, two with right-angled 'hooks' at one end: a rivet head: and a small chain. There was also a broken piece of a large circular cast-iron plate, which is 29mm thick and has a rectangular fastening hole (Fig. 12). A part of a similar object of slightly smaller diameter came from the demolition rubble over the west boiler plinth; both may be pipe flanges.</p> <p>There were also a small number of pot sherds from 18<sup>th</sup> and 19<sup>th</sup> century vessels, including blue and white glazed wares, a large earthenware bowl with dark-brown interior glaze, and a smaller stoneware vessel with white interior glaze and</p> |

|   |  |  |
|---|--|--|
|   |  | <p>brown exterior one with a regular pattern of small white spots.</p> <p>In addition there were a small number of broken sandstone roofing slates.</p>  |
| H | Phase 5 demolition layer to the north-west of the engine house | <p>Blacksmith-made ironwork included a large nail, a spike with a right-angled hooked end, and a long broken pin with a looped end.</p> <p>Pot sherds from 18<sup>th</sup> and 19<sup>th</sup> century vessels included several from a stoneware bowl with pale brown glaze, and others from a large earthenware bowl with dark-brown interior glaze.</p>  |
| I | Phase 5 demolition layer in the north-eastern part of the site | <p>Blacksmith-made ironwork included a single large nail.</p> <p>There was also a small fine-ware sherd with white glaze and grey 'moss-like' pattern. Other finds included two pieces of a small diameter earthenware drain pipe and two broken sandstone roofing slates, one with a securing hole.</p>   |
| J | Phase 5 demolition layer in the south-eastern part of the site | <p>Found above the north-east corner of the floor of the upper coal hopper and stoking area, near what is thought to be its original position, there was a discarded, damaged, iron fire box door. This had a second iron plate attached as a repair to cover a hole where the original door has burned through (Fig. 12). This door is made of 10mm thick iron plate and is trapezoidal in shape, measuring 380mm at the hinge side and 410mm at the other; it is 340mm deep. Two sturdy hinges are each attached with three large rivets; both hinges have a circular end for the hinge pins or bar, while at the other they are raised to hold a 'locking' bar. The irregularly-shaped sheet used for the repair is fastened by six rivets.</p> <p>There were also three broken fire bars (Fig. 11). Half a relatively small bar was found just east of the fire door, above the eastern side of the upper coal hopper near its north-eastern corner. This may have been of the same length as the bar found in north-east ash pit, but it is of a different design. It is bowed rather than fish-bellied, is strongly trapezoidal in cross-section and 105mm in depth at the end, with a broad asymmetric end lug. A short section of a large bar with trapezoidal cross-section and 130mm depth at the end with rectangular end lug, was found west of the fire box door above where the upper coal hopper paving had been removed. A short central piece of a small slightly-bowed bar with trapezoidal cross-section was found just south of the upper coal hopper not far from its south-western corner.</p> <p>Blacksmith-made ironwork included a large nail, a large bolt head, an iron spike, a small tapered iron plate with central perforation, two flat iron bar fragments, and a fragment of 34mm thick cast-plate with two straight edges. There was also a fragment of lead window flashing. A broken piece of a cast flat plate with circular chamfered edge of c. 300mm diameter or a little less, and 18mm thickness, may be part of the end of the broken 'roller' or 'drum' found in the fill of the north-east ash pit.</p> |
| K | Phase 5 demolition layer over the West Boiler Plinth           | <p>Finds included a broken end from a large heat-damaged fire bar, which is trapezoidal and c. 115mm deep at the end, with rectangular end lug (Fig. 11).</p>  |

|   |   |  |
|---|---|--|
|   |   | <p>There was also a broken piece of a large circular cast-iron plate, which is 29mm thick, has one area on the side where a thick section at right-angles may have broken off, and has a rectangular fastening hole (Fig 12). A part of a similar object of slightly larger diameter came from the demolition rubble over the engine house; both may be pipe flanges. There was also a fragment of a large cast-iron pipe and a small broken piece of flat-bar with a large rivet and hole for a second.</p> <p>Resting on the robbed surface of the base of the northern half of the plinth there was a triangular-shaped iron fastening plate with three rivets and a possible fourth hidden by corrosion deposits, traces of wood adhering, and a handle on the other side (Fig. 12). Another find was a scoop-like iron object with hollowed blade and handle (Fig. 12). The purpose of these objects is unknown. There was also discarded bent lead flashing from windows and probably roof.</p> <p>Near the engine house, and presumably from this, there was a coarse-sandstone arching stone with tapered sides 208-10mm high, 112mm and 83mm wide, and 255mm long, from an arch that was c. 0.9m (3ft) across and presumably at the head of a window or small door.</p> |
| L | Phase 5 demolition layer over the ash pit of the West Boiler Plinth | Finds included a broken, heat-damaged, fire bar with small cross-section (Fig. 11), a large cotter pin with round head (Fig. 12) and a broken piece of a large diameter cast-iron pipe with a flange.  |
| M | Un-stratified   | Finds from the spoil heap included a George III 1775 halfpenny and a broken central-section of a large fire bar, with 130mm deep trapezoidal cross-section, derived from material in the western part of the site that was removed by machine (Fig. 11).   |

## Appendix 2: Pre 1770s Mining and Sough Driving at Watergrove – Additional Texts

This Appendix gives supplementary data for Chapter 7 of the paper in Mining History.

### The Mine Proprietors and Agents (John Barnatt and Dave Williams)

There were eight investors in the venture to drive the sough. Five were ‘*gentlemen*’, Thomas Middleton and James Mower of Eyam, John Nodder of Sheffield, Thomas Tipping of Edensor and Jonathan Oxley of Leam. The other three were Thomas Mower, ‘*yeoman*’, James Brightmore, ‘*baker*’ and William Marsden ‘*grocer*’, all three from Grindleford Bridge (Sheffield Archives, Oakes Deeds 1170).

In Apr. 1748 the Watergrove proprietors were named in an agreement to extend their mining from the wastes and commons and enter enclosed land in Foolow that were part of ‘*Ancient Ffreehold lands*’ exempt from Mining Customs (DRO, Bag. C 725a/b). They were:

- ‘*William Soresby, Gent of Chesterfield*’
- ‘*John Redfearne, Gent of Sheffield*’
- ‘*Richard Dalton, Merchant of Sheffield*’
- ‘*William Shipstone of Swanwick, carpenter and husbandman*’
- ‘*Reginald Turner of Foolow, miner*’

Soresby was the major shareholder by 1748. Of the others, John Redfearne was described as an ‘*attorney*’ in 1748 and was later a trustee for the estate of William Soresby (senior) following his death in 1749 (John Hunter *pers. comm.*); in the 1760s, when Redfearne went bankrupt twice, the London Magazine named him as a ‘*scrivener*’, while in 1775 he went bankrupt again and this time was described in the London Gazette as a ‘*scrivener, dealer and chapman*’. Richard Dalton lived in Banner Cross in Sheffield, and was related to the Soresby family by marriage (having married Mary Bright of Sheffield, whose sister Barbara married one of the sons of William Soresby (senior)). He was a shipping agent from Bawtry and York who had dealings in lead, timber and other items (Hopkinson 1958, p. 11; Hey 1980, pp. 96, 113, 116; John Hunter *pers. comm.*). Shipstone and Turner were local men who presumably had made only small investments in the mine.

In 1746 Soresby had sold 3/24 of Watergrove to William Doughty of Newhall Grange near Thurcroft in Yorkshire (described in the parish register as a ‘*Yeoman*’ farmer), but it appears no payment was made until 1749 (D504 B/L 57). The same book records that in Aug. 1748 Soresby sold 1/24 of Watergrove Mine and Sweet Bothams Mine, to Salmon Ashton an attorney living in Doncaster, for £210. In October of the same year another 1/48 was sold to Edward Maye of Doncaster for only £60. Despite these sales, these must have been a small part of his investment in Watergrove Mine, for Soresby’s grandson was still a joint mine owner over ten years later (his son having pre-deceased Soresby senior).

The 1758 information was given when the old founder at Earnslow Vein was freed (DRO D2090/1 Eyam and Stoney Middleton Barmasters Book). Whether Joseph Redfern was an obscure relative of John Redfern, or the forename John was wrongly entered as Joseph, is not known.

In 1763 the Proprietors of Eyam Dale Sough were (DRO, Bag. C 431a):

- ‘*Mr Clay’s Collection (18/48)*  
*Mr Clay 16/48*  
*John Redfearne 2/48*
- *Barker and Wilkinson’s collection (18/48)*  
*Barker and Wilkinson 2.5/48*  
*William Milns Esq 3/48*  
*Rev Mr Monroe 3/48*  
*Mr Brian Hodgson 2/48*  
*Lord Jonathan Murray 2/48*  
*Mr Cartledge 1/48*  
*Mr Jonathan Wall (junior) 0.5/48*  
*William Doughty 4/48*
- *John Hurst collection (7/48)*  
*William Milnes Esq 3/48*  
*Mr Monroe 3/48*  
*John Spencer Esq. 1/48*
- *John Twigg Esq collection (5/48)*  
*John Wall Senior 2/48*  
*John Twigg Esq 2/48*  
*Stephen Gamble 0.5/48*  
*Thomas Wingfield 0.5/48*

Of Barker and Wilkinson’s shareholders, the Rev. Thomas Monroe was married to one of the two sisters of William Soresby (junior) and controlled the Soresby shares inherited by his wife in 1760 when William died (John Hunter *pers. comm.*). One of the William Milns/Milnes, not be confused with a namesake noted above for the 1720s-30s, was of Aldercarr and one of the Milnes family of Chesterfield; he was married to the second sister of William Soresby (junior). The other William Milns/Milnes in the 1763 list of shareholder was probably the William of the Ashover family who lived from 1721 to 1782 and married Dorothy, the sister of Nicholas Twigg (John Hunter *pers. comm.*).

Of the other minor shareholders, Brian Hodgson was proprietor of the Old Hall at Buxton and was one of the Duke of Devonshire’s agents. John Spencer was from Canon Hall in West Yorkshire and was the ironmaster of Barnby Furnace, who had interests in several Derbyshire lead mines. Lord Jonathan Murray was the son of the first Duke of Athol and was the son-in-law of Richard Dalton and it is very likely he had inherited the latter’s Watergrove shares when he died, possibly in around 1750 (John Hunter *pers. comm.*). Stephen Gamble was a merchant and ropemaker from Chesterfield (Gould 1977, p. 238). William Doughty and John Wall (senior) have been noted above.

Later Rev Mr Gresley took 1/48 and Mr Young the other 1/48 of the shares of John Wall (senior). William Wyatt (probably the great-grandfather of the William Wyatt who became agent in 1836) took Thomas Wingfield’s share.

### **The Watergrove Possessions in 1764-65 and Subsequent Freeings**

The Jan. 1764 list of Watergrove possessions the Barmaster inspected were described as follows (DRO D2090/1):

- *First from the side of the streaks on the common - 15 pairs*
- *From Mr Moorwoods fence to farnley rake new vein - 21 pair*

- *In a little rake on the back of the last – 3 pair*
- *From the Dirty rake to the red Engine through farnley ground – 43 pair*
- *Up Ludlam vein – 15 pair*
- *From Brushfield ground and to the Myers - 46 pair*
- *From the Fire Engine by Sweet Bothams and up towards burnt heath – 23 pair*
- *In Wilson old Work at dale head – 3 pair*
- *From dale head by Edw<sup>d</sup> Hill fences – 4 pair*

An entry for Sept. 1765 records that the possessions were looked at again because Adam Dowson had come to the mine as agent; the following were now also entered:

- *In a cross vein by Sweet Bothams 11 pair*
- *In a nether cross vein by Sweet Bothams – 11 pair*
- *By red engine at Dale Head in a cross vein – 5 pair*
- *In a cross vein on Burnt Heath – 5 pair*
- *Upon Burnt Heath Robert Drabble Ground – 13 pair*

In the same Barmaster book the following freeings for Watergrove are also recorded. In Jan. 1766 the Barmaster ‘sett 24 pair of possessions Eastwardly as takers at Edward hill in his old vein allowing him a mine and a shaft from his riderpoint on the north side the turnpike road and 2 pair of possessions for folley Engine Vein on the same side the road; also sett 8 pair of possessions as takers at Edward Hill Eastwardly in his new vein on the south side of the turnpike road allowing him a mere and shaft from the rather point in that vein.’ In Feb. 1766 the Barmaster viewed the west end of the Edward Hill stoves in Watergrove’s north vein here and 7 meers westwardly between the north and south veins that were going west onto Widow Makinson’s land, and also a cross vein here going south from the north corner of this land.

In Mar. 1766 14 pair of stoves were freed as takers at the southward end of Matthew Furness Cross Vein.

In Sept. 1766 the Barmaster ‘viewed 10 pair of possessions standing on a sough scrin at Watergrove and also 8 pair of possessions and crossed for one standing as takers from the new engine on the Burnt Heath in the Water grove title all westwardly.’

In Apr. 1768 came ‘two dishes of ore the one to free an old founder meer in the old Engine Great Lodge Vein at the above said sough or mine as and in an old vein or rake and the other dish of ore to free the same meer as a new founder in an new vein as further workmanship may make it to appear. NB the founder stake is to be seen in the north west corner of Mr Galliard field.’

In Oct. 1769 they gave ‘one dish of ore to free an old founder meer in an old vein or rake at the above said sough. NB the founder stake is to be seen in the drain of the common at Northfield Head.’

## Appendix 3: Mining by the Watergrove Proprietors 1770s-1830s – Additional Texts

This Appendix gives supplementary data for Chapter 8 of the paper in Mining History.

### The Watergrove Possessions in 1782

The list of the Watergrove possessions for 5<sup>th</sup> Oct. 1782 totals at least 493 meers, with the entry number 23 measurement missing, perhaps 23 meers, making 512 meers total (DRO, Bag. C 587/27). They comprise:

*No. 1 From the West End of Brushfield Ground to the door in Captain Carliell's field below his new Building - 51 Meers*

*No. 2 From the East End of Brushfield Ground on the Great Rake to the Stockins side – 15 Meers*

*No. 3 On the Well Shaft scrin – 5 Meers*

*No. 4 On the White Rake in the dale – 4 Meers*

*No. 5 From Hills Coal Flatts by Mare Hole towards Burnt Heath – 18 Meers*

*No. 6 From Farnley Fence by Burnt Heath Engine Shaft South West to Hassop Gate – 24 Meers*

*No. 7 From the Green Shaft South Eastward Cross White Rake up the Moor – 32 Meers*

*No. 4 On a run on the Backside of a Coe in the dale – 4 Meers*

*No. 8 From Dicky [or Dirty] Rake thro. Farnley Ground to Red Engine – 43 Meers*

*No. 9 Up Ludlam Vein – 15 Meers*

*No. 10 From Fire Engine by Sweet Bottoms up Burnt Heath – 42 Meers*

*Wilson's Old Work at Dale Head included in the run from Brushfield Ground West*

*No. 11 By Edward Hill fence – 5 Meers*

*No. 12 By Red Engine at Dale Head towards Mires – 30 Meers*

*No. 13 On a Cross by Sweet Bottoms – 11 Meers*

*No. 14 On another Cross by Ditto. – 12 Meers*

*No. 15 From Green Shaft Southward from new Machine – 24 Meers*

*No. 16 From Do. Southeast – 21 Meers*

*No. 17 From Do. Northward – 14 Meers*

*No. 18 On a run on Burnt Heath – Rowland's Old Work – 8 Meers*

*No. 19 On a run from the dale side near Farnley Fence ranging southward on the Moor – 11 Meers*

*No. 20 On the White Rake from Lousley Field Fence ranging towards Farnley – 17 Meers*

*No. 21 On a cross at Mires Head from the corner of Hays Garden – 10 Meers*

*No. 22 On the Coe Nabs ranging eastwardly thro' the north part of Garlick Close – 37 Meers*

*No. 23 In Garlick Close ranging North eastward & [TORN] more south than the above – [TORN – by a process of elimination perhaps 23 Meers]*

*No. 24 On a range from the double ditch near Lousley southward and on the west side the road to Longstone – 65 Meers*

*No. 25 Takers at Edward Hills Ground eastw<sup>d</sup> to the corner of Farnley – 12 Meers*

*No. 26 On Casual – 9 Meers*

*No. 27 On Never fear the north ridge – 20 Meers*

*No. 28 On the west of Well Shaft, run ranging North Eastwards – 4 Meers*

The review of possessions of 27 July 1786 added the following entries (using the same numbering):

*No. 4 Included in Wilsson Water Groove Poss<sup>ns</sup> to Brushfield Gate*

*No. 15 A run from New Machine South West across Warmdale Mouth – 12 Meers*

*No. 29 On the Moor stakes West of Fire House – 7 Meers*

Correlating the 1782 possessions with those recorded at earlier dates in some cases can be done with reasonable certainty for 1764-66 for numbers 1, 8, 9, 10, 11, 13, 14 and 18. It is thought that No. 15, and possibly No. 16, are the main pipe.

### **Later Freeings and Acquisitions**

The new freeings from the 1780s probably included the main pipe at Watergrove Mine in Ashford Northside Liberty as follows: In Sept. 1788 *they gave two dishes of Ore to free A Founder meer of ground in an old or new vein flat or pipe as it shall prove by further workmanship*. In June 1793 a dish was given for first taker meer. Similarly, in Oct. 1796 a dish freed a ‘*First taker meer next to the Lords Meer*’, while in Oct. 1796 a second taker meer was freed and in July 1799 a third taker meer was freed (DRO, Bag. C 448; Bag. C 422).

Elsewhere in Ashford Northside Liberty, in May 1803 the Watergrove partners freed ‘*One pair of possessions for a Founder Meer of Ground on an old vein called or known by the name of Casual which said mine formerly belong<sup>d</sup> to John Eaton*’ together with 19 meers westwardly and eight meers eastwardly. In 1805 the Watergrove proprietors paid £5 for ‘*10 Meers of Ground in White Rake Vein*’ and 5s for ‘*3 Meers of Ground in a Vein in Middleton Dale*’ (DRO, Bag. C 423). In 1806 the proprietors also bought ‘*Back of the Ridge or White Rake*’ in Ashford Northside Liberty from George Wyatt for five pounds (DRO, Bag. C 448). In May 1811 they bought ‘*Coleflatts Mine*’ for 10s 6d from the executors of the late Mr. White of Tideswell (DRO, Bag. C 587/27; Bag. C 423).

In Eyam Liberty the freed meers comprise one entry is for providing two dishes to free a meer in a pipe or vein at Watergrove in July 1799, while in June 1801 they gave one dish for a second 2<sup>nd</sup> meer ‘*in an old pipe*’ and in Dec. 1806 one dish was given for third meer. In addition, in Dec. 1818 the mine gave two dishes to free a founder meer east from the ‘*new shaft*’ (Chatsworth BC/193).

### **The Watergrove Proprietors (John Barnatt and Dave Williams)**

In 1771 the shareholders were (DRO, Bag. C 431a):

- Barker and Wilkinson 2.5/48
- William Milns Esq 6/48
- Rev Mr Monroe 6/48
- Mr Brian Hodgson 2/48
- Lord Jonathan Murrey 2/48
- Mr Cartledge 1/48
- Mr Jonathan Wall (junior) 0.5/48
- Messrs Doughty 4/48

Compared with 1763, both Milns and Monroe had increased their numbers of shares, each from three to six.

By 1783 the Barker and Wilkinson collection had increased from 18 to 20 shares (acquired in 1771) Compared with 1763, the Clay collection had increased from 18 shares to 24, Twigg and Co had lost 2 shares, the John Hurst collection of 7 shares had been dispersed, while Richard White's one share was a new item; he may be the same Richard White 'lead merchant' of Grindlow documented in the Oakes Deeds in the 1770s (John Hunter, *pers. comm.*).

In 1784 Mr Winchester was named on behalf of Twigg and Co; Humphrey Winchester was one of the partners in this company and was also involved in business with Joseph Clay (John Hunter *pers. comm.*). This 3/48 was again listed under Mr Winchester in 1787 but from the next year Sykes, Milnes and Co are listed for these shares. This was a partnership between William Milnes (junior, 1764-1814), the son of William Milnes (senior) of Ashover, and Mr. Sykes. (John Hunter *pers. comm.*).

In 1792 Mr Clay increased his share to 25/48, taking one share from Barker and Wilkinson, while in 1793 he took another six shares from them giving him a total of 31 shares.

In 1802 Barker and Wilkinson let George Bustard Greaves have a further share, and in 1807 he took a further two shares from this company, which by then was named as 'George Barker and Co' after the partnership with Isaac Wilkinson was dissolved in 1806. Greaves took yet two more shares from them in 1809. Mr White does not appear in the accounts after 1795 and his 1/48 is not accounted for until 1809 when this was listed for the first time under Major Shuttleworth of Hathersage Hall. The Major was the nephew of John Spencer (John Hunter, *pers. comm.*) and he had perhaps inherited his shares, although why they came via Richard White is not clear.

In 1816 George Barker (by then of Darley Hall) reduced his shares to 6/48 with two shares going to Shuttleworth who died early in 1831, after which his executors paid calls on the Watergrove shares. In 1824 Sykes Milnes and Co became Messrs William and Charles Milnes. Charles of Stubbin Edge Hall and operator of Stone Edge Smelter was the youngest brother of William (1785-1866) and they were both grandsons of William Milnes (senior). Charles was born in 1800 and was presumably brought into the business when he came of age; in his adult years he lived at Wood End, Matlock (John Hunter, *pers. comm.*).

As an example of the complexity behind the four collections, in late-1816 the Barmaster gave George Barker a 1/12 share belonging to Broughton Benjamin Steade Esq. after he had failed to pay the call on them; Barker must have been previously acting for him. As soon as these shares were given to Barker he sold them to Major Shuttleworth (Chatsworth, BC/193; DRO, Bag. C 448).

### **Staff, Craftsmen and Miners (John Barnatt and Dave Williams)**

The following blacksmiths and carpenters are recorded (but this list is far from complete, because it includes only those instances where the trade is given in account entries; in other instance just the name is given and tasks remain unidentified). Parish registers give the same names in various local places, as added in parenthesis in the list below.

### **Blacksmiths**

- John Froggatt 1783-1806 (Stoney Middleton, Foolow and/or Eyam)
- John Siddal 1786
- Thomas Froggatt 1809-34 (Eyam)
- George Barton 1821 (Eyam)

### **Carpenters**

- John Newton 1783-86 (Foolow)
- Jos. Newbold 1783-84 (Stoney Middleton)
- Anthony Nall 1786-92 (Eyam)
- Thomas Somerset 1792-1811 (Wardlow Mires and/or Bradwell)
- Thomas Drabble 1798 (Tideswell)
- Jonathan Drabble 1804-06 (Foolow)
- Abraham Hall 1805
- Nathan Somerset 1817-26 (Wardlow Mires)

### **The Mine Infrastructure – Shafts**

From 1783 details of shaft sinkings are gained from the mine accounts (DRO, Bag. C 422-424):

- Middle Engine Shaft (named New Water Engine in 1788) was sunk at a cost of c. £227 in later-1785 to earlier-1786 and taken down to a sump; 219ft (67m) of sinking and lacing are recorded, with the lodge sunk a further 52ft (16m) in late-1786 and earlier-1787 for £128. 4. 0. A plan of 1788 shows that this shaft was met by an ‘*under level*’ coming from the pipe to the shaft lodge, from where water was pumped up to the sough (Barber 1788). The engine shaft may have had a climbing shaft associated and/or had a ‘*climbing way*’ in the shaft. This shaft had an underground ‘*water engine*’ for pumping.
- Emanuel Engine Shaft was sunk from late-1788 to earlier-1790 at a cost of £379 and was probably 270ft (82m) deep, with its base about 50-55ft (15-18m) below sough level. It had a lodge and two dams put in place, with ‘*Shooting room for the Cistern and Barrels to Work*’ suggesting one function of the shaft was to bring water up to sough level using barrels. A 138ft (42m) deep ‘*climbing gate*’ was made, presumably in the shaft rather than in a separate shaft as today no second shaft is visible at surface. Emmanuel Shaft may have had an underground ‘*machine*’, probably for pumping.
- The shaft for the 1794-95 Newcomen pumping engine was sunk in 1793-94 at a cost of c. £300-350. A sinking depth of only 181ft (55m) is clearly indicated in the account book, but more is recorded as taking place without depths being given in the accounts. In 1967 the shaft was plumbed to a depth of 274ft (83.5m), of which 77ft (23.5m) was below sough level; the mine section of 1834 shown the shaft here descended through the base of the pipe workings at about 75ft (23m) below sough to a sump bottom at c. 95ft (29m). The uppermost 30ft (9m) of the shaft was through shale. It contained ‘*staying and lacing*’, a ‘*climbing gate*’ and had ‘*dams*’ in the shaft. At an unspecified location at the mine an engine race was created in late-1793 or the first half of 1794; this may have been at this shaft and, if so, the horse engine was presumably specifically for bringing up sinking dirt.
- A shaft (presumably Sludge Shaft) was sunk in later-1801 to earlier-1802 for c. £208 and it was 222ft (68m) deep; the uppermost 36ft (11m) was through shale. In the same period they made an engine race, presumably here. The shaft’s relatively low cost

may indicate it was of relatively small diameter. It had an accompanying climbing shaft which was at least 126ft (38m) deep but other non-specific entries in the book suggest it may have been sunk for 216ft (66m). Kirkham (1967) speculated that Sludge Shaft received its name because it was used to bring material to surface when the sough was 'sludged' (i.e. cleaned) so that this did not become choked. However, this is unlikely to be the case as an exploration of the sough by Nash in 1967 showed the shaft did not link to this drainage level. Thus, if sludge (i.e. cave sediments) were brought up they were from the pipeworkings.

- An engine shaft (presumably Road Shaft) was sunk in later-1809 to later-1810 at a cost of c. £255; much was done on weekly rates with no sinking measurements given so its overall depth is not known (except that it was well over 114ft (35m)). There is no record of a climbing shaft, even though one exists today; thus, this features is either later in date, or it was Sludge Shaft that was sunk in 1809-10, while Road Shaft dates to 1801-02.
- Forefield Shaft was created in earlier-1815 to earlier-1816, by 'Sinking and Boring', at a cost of c. £328; it had bundings and timbering. Again much was done on weekly rates so its depth is not known (except that it was well over 132ft (40m)); in 1967 it was plumbed to a depth of 275ft (84m).

In addition to the main shafts listed above, there are a few inexpensive shaft-related sinkings recorded. In the accounts for 1790-91 they were 'Making Room for a Sump Head', 'Sinking a Sump' and 'a new shaft upon the level'. In 1795-96 they were 'Making a Climbing Gate into the Pipe'. In 1811, 1817 and 1819 no details given for further sinking except the cost. All are likely to be internal winzes between pipe and levels, or deepening of pre-existing shafts, or were located in the northern parts of the mine above sough level.

In 1787, as a one off, several men were employed for around four months 'Ridding Hillock' and 'Washing Deads', with £64. 11. 8 spent. While this large hillock was clearly at an engine shaft where ore had previously been brought to surface, it is unstated which and why this it was removed. Perhaps the most likely shaft with no hillock today which seems to have been redundant by 1787 is Ashford Shaft, where drawing had probably ceased in 1784. However, the possibility that it was the Old Founder to the north, which again today has no hillock, cannot be discounted (Green and Hancock shafts still have disturbed hillocks, and the Old Water Engine and Middle Engine shafts were still in use).

## **The Mine Infrastructure – Levels**

Looked at in detail, the accounts document driving levels as follows:

- By the date the detailed accounts start, in Mid-1783, they were working in the pipe below the main sough level, for there is reference made to 'driving in the Deep Level', and 'in the under level' where they were using a churn pump' (DRO, Bag. C 422). In the winter of 1783/84 they were 'taking up the under level to Ashford Forefield' and 'taking up the under level into the Hard End'. In 1784-85 they were 'Driving the under Level from the Horse Lodge to the South East Spring'. These last references must have been in or close to the south-east branch of the pipe.
- In 1783 they were 'making a Dam in the Lime Door', while in 1783-84 they were 'getting Lime door through'. In 1801 they were 'Driving a Lime Gate' for 37ft (11m) at a cost of £43. 15. 0, and £1 1. 0 was 'Given Men when they got thro' at Lime Door'. What the lime door was is obscure.
- Further driving includes 'Driving through the vein in the Forefield' in 1785 for something like 150ft (46m) in Eyam Liberty and 'Driving the Forefield' for 81ft

(25m) in Ashford Northside Liberty. Barber's plan of the workings drawn in 1788 shows that there were two main branches to the pipe in its central section, a south-eastern one going to Ashford Shaft and a south-western one running close to the Middle Engine Shaft and Emanuel shaft beyond (Barber 1788). These branches are first explicitly referred to in the accounts in 1784, when they were '*Following the South East spring*' and '*Driving after the southwest spring*', but both branches are likely to have been first found in the late-1770s or slightly later. The driving to the south-west continued to be documented through 1785 and may well be at an '*under level*' or in the pipe itself. Whether the pipe and under-level were at different depths from each other at this date is unclear.

- Other references to driving levels in the 1780s may well comprise extending the main sough but this is rarely stated explicitly, but as we know it went to the Middle Engine (New Water Engine) shaft sunk in 1785-86, it may be there was significant drivage towards here in the 1783-6 period; '*Taking up the Horse Level*' for 168ft (51m) in the first half of 1786 may perhaps be part of this work.
- In 1787-88 they were '*Driving main Level*' (428.5ft (131m)) and also '*Driving under Level*' (51ft (16m)), suggesting both the main sough and a lower level were again being worked upon. Given that the Middle Engine was not set up as a working shaft until this date, it may well be that the shaft here was only linked to the main sough at this time, particularly as a 1788 plan only shows the main sough as extending as far as this shaft so the drivage was not beyond it (Barber 1788). This plan also shows an '*under level*' leading from the shaft base back to the pipe.

Levels continued to be driven from 1789 onwards, with regular but intermittent extensions made to the main sough in the winter months, and to an under-level and in the pipe itself in the summer half of the years:

- A further '*Main Level*' drivage in 1789-90 took the main sough forward a further 282ft (86m), and in 1790 they were '*Shooting out the sole of the Level to the Engine [shaft]*' at Emanuel.
- From 1791 to 1792 only short lengths of possible driving of the main sough are recorded (84ft (26m)), and no '*under level*' is mentioned.
- In contrast, in Nov. 1793 to May 1794 they drove the '*Main Level*' for 360ft (110m) while for the rest of the year they extended the main sough for a further 51ft (16m). Presumably the long distance driven was to bring the main sough close to where the new pumping shaft was being sunk, with the Newcomen engine erected here in 1794-5.
- Driving in 1795 took place but where this was is not specified, except for the unlocated 66ft (20m) in '*Dam Level*' and 54ft (16m) '*Driving and Rising to find the Pipe*' that must have been low in the workings.
- After two bad years for ore production while the Newcomen engine was being prepared in 1794 and 1795, men were paid for '*trying the forefield*' in 1796. Also in this year they were driving '*Driving Lime Door under Level*' and '*Driving under Level*' for a total of 26ft (8m). In addition, they were driving into '*Hurler Hole*' and to '*Wood Hole*' which were presumably parts of the pipe.
- In the second half of 1797 they extended the '*Main Level*' by 60ft (18m).
- In 1798 the '*under level*' was extended by 30ft in the summer and they were also '*Driving Forefield*' for 96ft (29m). Late in the year and into early-1799 the '*Main Level*' was driven a further 90ft (27m).

- In the summer of 1799 they drove in the ‘*South Forefield*’ for 42ft (13m), while in the summer of 1800 they went a further 64.5ft (20m) at the ‘*Forefield*’.
- Early in 1801 they resumed driving the ‘*Main Level*’ for a further 120ft (37m), while in the summer they drove in the forefield for 102ft (31m) and extended ‘*Main Level*’ by a further 36ft (11m).
- In 1802 no extensions to levels were made, while in the summer of 1803, for reasons unknown, they lowered the sump at ‘*Manuel*’ and drove a level here for 60ft (18m).
- In the winter of 1803/04 they were driving for a further 114ft (35m) at the ‘*South Level*’ and ‘*Main Level*’, both probably the same place. In autumn 1804 they were ‘*driving forward*’, presumably below the main sough level.
- In the summer of 1805 they drove 36ft (11m) in the ‘*South Forefield*’ and 48ft (15m) in the ‘*under Level*’. In the winter of 1805/06 they drove 9ft (3m) in the un-located ‘*South Skirt*’. This is the last time an under-level is recorded; presumably henceforward the pipe had dropped to the same horizon and no passage beneath it to take water back to a pumping shaft was required.
- Rieuwerts has argued that the main sough was not extended after 1805, based on local information (Rieuwerts 2007, p. 129); however, the validity or otherwise of this memory is far from clear as some of the account entries from 1806 onwards appear to be at the main sough and this was certainly linked to Forefield Shaft sunk in 1815-16.
- In the winter of 1806/07 they drove 78ft (24m) in the ‘*Level*’, while in winter 1807/08 it was extended 99ft (30m), with a further 138ft (42m) in Spring and Summer 1808 (whether this, and subsequent entries for 1809-19, was at the main sough level or the bottom level is unclear).
- In Autumn 1809 and through 1809 they drove at least a further 24ft (7m) in the level, but not all distances are given as it is likely to be more than double that just stated.
- In 1810 they were driving 48ft (15m) in the ‘*Engine Level*’ and the same distance in the ‘*Upper Level*’ to the new shaft.
- In the winters of 1810/11 and 1811/12 they were driving in the ‘*Mean Level*’ (Main Level?) or ‘*Level*’, but distances are not given.
- Distances of 54ft+ (16m+) are given for 1812, 21ft (6m) for 1812/13 and 48ft+ (15m+) for 1813, all at the ‘*Main Level*’ or ‘*Level*’.
- The winter 1813/14 drivage distances in the ‘*Level*’ are again not given. In the summer half of 1814 there was 39ft (12m) driven, while in winter 1814/15 it was extended 66ft (20m).
- After a break whilst the Forefield Shaft was sunk, in summer 1816 the ‘*Level*’ was extended 36ft (11m); given that the main sough does not appear to continue beyond Forefield Shaft this drivage is likely to have been at a lower level.
- Further extensions to the ‘*Level*’ were made in summer 1817, and in the second half of 1818 through to the second half of 1819, but distances are not given; again the drivage is likely to have been at a deep level.

### **The Mine Infrastructure – The Pond**

No categorical record of the creation or use of the first pond is found in the 1783-1834 mine accounts, but it is perhaps likely to have been created in this period as it would serve no purpose until Emanuel and then the Newcomen Engine Shaft were sunk from 1788 onwards. When the 1793-94 engine shaft was being created they paid £22. 1. 6 for ‘*Cutting Dam*’ at 3d per yard for 1766 yards (i.e. cubic yards), while in the second half of 1794 a second payment of £15. 0. 0 was made for cutting ‘*900 Solid Yards*’, a third payment of £3. 7. 6 and ‘*Walling round the dam*’ for £2. 15. 0 followed in the next accounting period for late-1794 to late-

1795. In the same period they were '*Driving the Dam Level*' for 66ft (20m) at £46. 4. 0, but where and what this was is unclear. As there are no other entries in the accounts from 1788 onwards for making a surface pond or dam, these payments may well be for creating the surface pond downslope of the shaft and, if so, it dates to 1794-95; this said, in the same period people were being paid smaller amounts for '*Making Dams in Shaft*', but this payment was not in cubic yards.

With regard to an overflow drain to Wardlow Mires, in 1795-96 they were '*Making a Dam in Mires*' for £1 1. 0. In the same period, and again in 1798, men were paid for '*Cutting Water Course in the Mires*'. Earlier, in 1783, a workman was paid £1 8. 1<sup>1</sup>/<sub>2</sub> for '*Trenching at Wardlow Mires for a new Watercourse*'.

### **The Mine Infrastructure –Horse Gins**

The entries listed below give further but uncertainly located horse gin evidence to consider:

- In 1783 an engine race was walled and repaired, but the location is not given.
- Similarly, in 1783-84 there are four entries for repairing one or more engine races, but more interestingly someone was paid for '*thatching the engine*', indicating a second and earlier example at the mine of what was presumably a roofed horse engine that was installed before the 1785-86 Middle Engine example.
- Other un-located races were repaired in 1785, 1787-88, 1788-89, 1792-93 and 1801.
- In 1784 they were drawing and striking at '*Far*' and '*Near*' shafts, water is mentioned in one pertinent entry and perhaps by implication the other entries were for ore. Which shafts being referred to is obscure, but candidates are Ashford Shaft, Old Water Engine Shaft, and less probably Hancock Shaft or Green Shaft.
- Similarly in 1788-89 they were drawing at the '*Water Engine*' and '*Gear Engine*'; again it does not state whether the drawing was for ore or water, nor whether this was from surface or underground. The '*Water Engine*' is either the Old or New Water Engine Shafts and the '*Gear Engine*' would again be at one of these two shafts (see next entry).
- In 1789-90 they were driving at three engines at a date when Emanuel Shaft was completed and one of the engines was presumably here. The other two are named the '*Middle*' and '*Upper*' engines. The former was almost certainly the '*New Water Engine Shaft*' which was often later referred to as Middle Engine, while the latter must have been further east. While Ashford Shaft cannot be fully discounted, no ore came from here after 1784 so it is likely that the '*Upper Engine*' was at the Old Water Engine Shaft. At least two of the engines were used for bringing out ore, for one entry was for '*Driving Gear Engines*' in the plural.
- In 1791-92 they were driving horses at '*Middle Engine*' and '*Nether Engine*'; this is likely to have been at Middle Engine Shaft and Emanuel Shaft.

### **The Mine Infrastructure – Sundry Buildings**

The coes and other small buildings at unknown locations noted in the mine accounts are as follows:

- In 1783, as well as the firehouse, they paid for materials for two '*coes*', one '*orehouse*' and one '*shifting house*'.
- In 1784 they were walling a '*new stable and cart house*' (costed with another job for a total of £3. 9. 4), and a slater was paid (£1. 15. 9).
- In 1784-85 a '*coe*' was built for £2. 2. 0.

- In 1785-86 another 'coe' was built for £2. 2. 0, perhaps at the Middle Engine Shaft as this was completed at this time.
- In 1787-88 two 'coes' and three 'orehouses' were built and thatched for a total of £9. 5. 6.
- In 1789-90 they built a 'coe' and two 'orehouses' for a total of £2. 0. 6. This took place when Emanuel Shaft was being sunk and one or more of these small buildings were perhaps built here.
- In 1790-91 they built a 'coe' for 10s 6d; this again was perhaps at Emanuel Shaft.
- In 1792-93 a 'coe' was built (with other work for a total of £1. 3. 6).
- In 1794-94 they paid £4. 0. 0 for '*Paving and Covering a large Coe*'.
- In 1795-96 another 'coe' was built (with other work for a total of £3. 3. 0).
- In 1799 they built a '*Shift House*' for 18s 0d.
- In 1801 a 'coe' was built for £4. 4. 0 at the Middle Engine Shaft when its surface plant was remodelled.
- Later in 1801 they were '*Making road to the Ore Houses*'.
- In 1801 they built a 'coe' for £1. 1. 0. This took place when Sludge Shaft was being sunk and it may well have been here. A small building existed here when mapped in the later-19<sup>th</sup> century and remains today. However, an 1818 map of Eyam parish (anon. 1818) shows no buildings to the north side of the road, thus unless the map maker omitted small 'outbuildings' as irrelevant to the map's purpose, then this building is later in date.
- In 1802 they were '*Walling and Covg. Coes*' for £4. 0. 0.
- In 1804 they built another 'coe' for £1. 1. 0; this appears to have been at Smithy Shaft in the north-eastern part of the mine.
- In 1811 they paid for '*Making a Coe and Bing*' for £2. 2. 0.

Several further details of 'ore houses' built in 1783, 1788, 1790 and 1800 at unspecified locations at Watergrove Mine are documented (DRO D7675/WHC/4). Recorded details are:

Aug. 26th 1783.

- '*Thomas Young for Getting Stone & Coorsing the Water Grove Ore House*'. £1. 1. 0.
- '*John Newton for Wood & Carpenter Work for the Water Grove Ore House*'. 15/-.
- '*Mr. Bird for a Stock Lock for Water Grove Ore House*'. 2/-.

June 8th 1788.

- '*Expenses of the Water Grove New Ore House*' Thomas Bright and two men named John Wain for '*Walling & getting stone*'. 7/6d.
- '*Wm. Sheldon for a Lock*'. 2/8d.
- '*William Furniss for Paving the Botham, liming the Walls, Covering the Roufe*'. 4/6d.

June 24th 1790.

- '*Benj. Wyatt for Building an Ore House at Water Grove*'. £1. 0. 0

Jan. 24th 1800.

- '*Anthony Hancock for Building an Ore House at Water Grove*'. 12/-.

## **An Integrated Operation?**

Other specific work at different parts of the Watergrove pipe and vein is occasionally mentioned:

- In 1784-85 they were '*Upon trial in North End*' and sinking and walling in the '*Well Shaft*' which was near the sough tail.
- In 1786 they sank 115.5ft (35m) at '*Smithy Shaft*'.
- In 1787-88 work was again done '*in North End*'.
- In the same period they did a small amount of work '*Making a Cart Gate from Green Shaft to the Old South Side Forefield*'.
- In 1790-91 they '*Driving East in the Vein at Earnslow*' for 30ft (9m) and were '*Raising Roof at Shaft Foot*'. In 1792 they continued driving in the vein, going a further 36ft (11m) and they raised 82 loads 2 dishes of ore from here.
- In 1792 they also were '*Getting through out of Hill's Grove into the Level*'.
- In winter 1783/84 miners drove 138ft (42m), some north-west on trial, at '*Warmsdale*' which is mentioned in a list of 1786 possessions as south-west of the '*New Machine*' that is thought to have been located at Green Shaft (DRO, Bag. C 587/27).
- In 1794-95 they were driving an unspecified but relatively short distance in the un-located '*Day Level*' (the name perhaps suggesting this was perhaps the sough near its tail).
- In 1795-96 they raised 2 load 5<sup>1</sup>/<sub>2</sub> dishes of ore from '*Green Shaft*'.
- In 1803-04 they were '*Opening and Repairing North End Level*', while in 1804-05 they were '*On Trial in North End & Repairing Level*'.
- In 1804 they were '*Repairing Green Shaft Climbing Gate*'.
- In 1804 they were also '*Sinking Smithy Shaft*', presumably below sough level.
- In 1808 they drove 36ft (11m) in '*Brushfield Vein*'.
- In winter 1814/15 they were again driving in the un-located '*Day Level*' worked previously in 1794; again the distance is unlikely to be great given the low cost. In one instance they were driving '*round the shaft*'.

Away from the Watergrove Mine itself the only references made in the accounts are:

- Miners drove 116ft (35m) and sank 6ft (2m) in 1784-85 miners at the un-located '*Nab Vein*'. In 1786 they were '*Driving the main Level in Nab Vein*' for 48ft and '*Driving in Nab Vein*' for 150ft (46m). In 1787-88 they went '*In Nabb Vein after the Spring*' for 18ft (5m).
- In 1809 they were '*Making Trial in Farnley Vein*'.

## **Appendix 4: The William Wyatt Years at Watergrove 1835-1854**

This Appendix gives supplementary data for Chapter 9 of the paper in Mining History.

### **The Watergrove Proprietors and Mine Possessions (John Barnatt with Dave Williams)**

This section gives supplementary information on shareholders.

From late-1836, Benjamin Wyatt's shares, held on behalf of what had been Barkers smelting company, were henceforward listed under William and Robert Wyatt who had taken over the business after their father died in that year. In 1836 William Wyatt bought shares from a Thomas Brunt of Bakewell Moor for £29 (DRO, Bag. C 450; D504 B/L 18).

The only change by 1839 was that the three shares held by Major Shuttleworth's executors were now listed under Mr Holdsworth. However, presumably he was associated with the Shuttleworth family for later, from 1839 to 1853, these shares with listed as belonging to J. S. A. Shuttleworth of Hathersage Hall.

In 1839 George Greaves lived at Elmsall Lodge, Pontefract (DRO, Bag. C 654/477) and later was at Banner Cross in Sheffield and Ford Hall near Chapel en le Frith. Colonel Joseph Edward Greaves-Elmsall lived at Woodlands near Doncaster and Henry Greaves was at Hesley Hall also near Doncaster. By 1840 at latest all four Greaves brothers, George, Joseph-Edward, Henry and John probably had shares in Watergrove for they were all invited to a shareholder meeting (DRO, Bag. C 654/504).

In 1853 the shareholders are listed in more detail:

- Exors. Of the late Colonel Elmsall            14/48
- Geo. Greaves Esq.                                9/48
- Wm. Wyatt                                         3/48
- J.S.A. Shuttleworth, Esq.                     3/48
- Robt. Hall, Esq.                                2/48
- Jno. Sampson, Esq.                            1/48
- Messrs. Milnes and Friends                16/48

From this it can be seen the Greaves family had retained an interest in the mine, but presumably handed over the collection to Wyatt. The York Herald had reported the death of Colonel Joseph Edward Greaves-Elmsall in July 1851. The executors of Colonel Elmsall, his brothers George and Henry, were still acting for his widow in 1853.

In an entry in the accounts for the first half of 1841, Robert Wyatt is paid by the Watergrove shareholders, for reasons unknown, a total of £23. 3. 9 for calls on 15/48 shares in '*Hopeful Mine in Hucklow*' (D1289 B/L 399).

## **Staff, Craftsmen and Miners (John Barnatt and Dave Williams)**

The blacksmiths and carpenters are recorded as follows:

### ***Blacksmiths***

- Benjamin Drabble 1835-44 (Eyam)
- William Barnes (senior) 1835-36, 1839-42, 1845-47, 1849, 1851 (Eyam)
- William Swindell 1836
- Robert White 1836 (Eyam)
- George Moseley 1837 (Eyam)
- Jonathan Bramwell 1839 (presumably Monyash)
- Richard Green 1842-44
- Thomas Bramwell 1846-47 (Monyash)
- William Barnes (junior) 1847, 1849 (Eyam – son of William senior)
- Thomas Barnes 1849 (Eyam – son of William senior)

### ***Carpenters***

- Nathan Somerset 1836-47 (Wardlow Mires)
- Robert Heathcote 1840 (lodging with Somerset at Wardlow Mires)
- Robert Somerset 1840 (presumably Wardlow Mires)
- Isaac Hill 1840 (Litton)

As with earlier tradesmen, the same names appear in local parish registers and census returns for various local places, and these are added in parenthesis in the list above. Benjamin Drabble, William Barnes and Richard Green were also blacksmiths for High Rake.

## **Developing the 1830s-40s Mine Infrastructure - The New Pumping Engine, Boilers, Pitwork and Associated Buildings**

***Erection and installation at Water Groove:*** The details of installation are as follows:

**1835-36:** In the second half of 1835 they started ‘*Cutting out the foundation for the New Engine House*’ for £3. 17. 7 and also ‘*forming and cutting out*’ a new reservoir (DRO, Bag. C 587/27, July 8<sup>th</sup> 1835 to Dec. 31<sup>st</sup> 1835 reckoning). In the first quarter of 1836 they continued with this work and cut a drain around the dam, with the reservoir being finished in the second quarter; the whole cost £222. 12. 6 (D1289 B/L 399). In the third quarter workmen were paid for ‘*Laying the Metal Pipes to carry the House Water from the new Reservoir to the Engine*’ and also for ‘*Driving in the Shale to meet the holes which pass thro’ the Ashlar Bed for the Screw Bolts to hold done the Engine Bed Plate*’ (and other work), with the total coming to £29. 4. 4. The shale gate, which ran from the side of the new engine shaft being sunk, had been started in 1835 when men were paid £6. 14. 2 for ‘*Driving a Shale Gate under the Engine House to fasten the Long Bolts which pass through the Bed Plate*’ (DRO, Bag. C 587/27, July 8<sup>th</sup> 1835 to Dec. 31<sup>st</sup> 1835 reckoning), with a further £2. 6. 8 paid for this in the first quarter of 1846 (DRO, D1289 B/L 399).

Meanwhile, in 1836 further preparations to build the engine house had commenced, with Thomas and William Morton paid £300 on account for ‘*masonry*’, while three men were paid a total of £4. 13. 6 to continue cutting the foundations (DRO, D1289 B/L 399). £7. 15. 10 was paid for carriage of 3782 cubic feet of ‘*Ashlar Stone for Engine Bed*’ and £49. 19. 6 for carriage of ‘*Timber, Stone, Bricks, etc.*’. Wyatt’s papers record that a ‘*Mason’s Crane*’ was rented from the Duke of Devonshire in July 1846 for £4. 10. 0 (DRO, Bag. C 553; 554). In

Sept. 1846 William Wyatt wrote that the boilers were not quite ready, that they would have to line the chimney with fire bricks and that *'The Engine House will have to be about 32 feet high inside so that I have considered not to make a room over the Boiler House as it w<sup>d</sup> be a monstrous pile of building to carry it the same height all through.'* (DRO, Bag. C 654/421). In the last quarter of 1836 they paid for lime (£10. 4. 0), Roman Cement (19. 0), oak timber (£92. 12. 2), larch timber (£30 7. 6), an oak beam (£21. 7.8), planks, iron etc. (£16. 10. 0), and fire bricks (£43. 15. 7) (D1289 B/L 399). In March the *'engine beam'* oak timber was fetched from Chatsworth using four horses, while bricks from Dore were transported in the same month (DRO, Bag. C 553). William and Robert Wyatt were paid £69. 18. 0 for *'Carriage of Timber, Stones, Lime, Boilers from Manchester, etc. etc.'* (D1289 B/L 399). Expenses of £9. 11. 0 were paid for a person to go to Manchester four times *'when fetching the Boilers'*, which is thought to have been in Oct. 1836. A further £14. 10. 1 was paid for sawing. One formality to resolve was the lack of space on the Company's ground for the new engine house; the minute book records for 29 June *'That an application be made to Mr Smith to grant a lease of the ground necessary for the Steam Engine and other buildings with power assigned to the Proprietors to remove any buildings etc making reasonable compensation for any damage done in so doing'* (DRO, Bag. C 518).

**1837:** In the first quarter of 1837 *'sundry persons'* were paid at total of £63. 0. 2 for *'getting Stone, Walling round the Reservoir, cutting Foundation for the New Chimney, etc.'* (and other non-related work). The Morton's had another £140 on account and the mine proprietors paid £20. 0. 0 for slate. In the second quarter, amongst a long list of jobs for sundry workmen, were included *'getting Limestone and Labourer's work when fitting up the Boilers, preparing a Quarry upon Eyam Moor for getting fire stone to line the inside of the Chimney'*. A final bill of £15. 1. 8 was paid for slate, and they paid £17. 15. 4 for *'Slating the Engine and Boiler House'*. William and Robert Wyatt were paid £73. 8. 6 for team work. In a letter written from Fairbairn's in Feb. 1837, listing parts ready for collection, it was reported that the cylinder was in the process of having its last boring, and recommending that boiler installation be started (DRO, Bag. C 587/30).

In the summer of 1837 they turned their attention to preparing to install the engine, and to erecting other buildings. The minute book records for 27 June that *'That two cottages be erected at the mine for the use of the resident Engineer and also an Office for the Agent the same to be finished in a Comfortable manner.'* Also *'That a new Blacksmiths Shop be built of such size as the Agent may think necessary for the proper work to be carried on therein'* (DRO, Bag. C 518). Wage work included *'Cutting out Foundation for Blacksmith's Shop, New House, etc., Fitting up and Removing an old Capstan to unload the Engine, etc.'* They also set up four new boilers for £25, 18. 5, paid £9. 15. 0 for brick and clay, and £3. 0. 8 for paint. The Morton's had a further £100 on account. J. H. Barrow of the Staveley Iron Works was paid £502. 0. 0 for *'castings'* (D1289 B/L 399).

In the last quarter labourers were paid £2 10. 2 for *'cutting out the cellars for the Cottages, etc.'*, while £17. 10. 8 was paid for *'Toll Barrs and Expenses to and from Manchester three times fetching Beams and Cylinder'*. Raw materials and tasks included bricks and clay (£4. 11. 9), lime (£15. 10. 6), slate (£7. 14. 0), iron hoops for engine (18s 6d), sawing (£12. 9. 8), and carpentry (£45. 18. 0). The Morton's were paid the final part of their engine and boiler house contract, of £45 17. 6, making a total of £546. 15. 6. In addition, they were paid Masons wage work of £30. 15. 8, presumably for new building additional to that work where the payment was settled, presumably at the mine office or cottages, while a slater was paid £2. 6. 0.

The invoice for £546. 15. 6 From Morton's survives (DRO, Bag. C 587/27). The engine house and boiler house cost £239. 2. 0, with limestone arches and ashlar under the boilers amongst the details itemised. The chimney cost £273. 10. 6, while the smithy cost only £27. 10. 3. They also cut eight circular '*pinholes in the Engine Bed*' for £6. 4. 0, presumably for the fastening down bolts.

**1838:** The Water Grove Mines Company minute book records in Dec. 1837 '*That the Bankers do write to Mr Fairbairn to request him to commence erecting the Engine in the first week of March next and to inform him that the Proprietors of the Water Groove will at that time remit him .... Fifteen Hundred Pounds in part payment for the Engine*' (DRO, Bag. C 518). The steam engine must have been delivered satisfactorily in the first quarter of 1848, for William Fairbairn was paid a first instalment of £1,500. The Morton's were advanced £100 on further building and G. H. Barrow was paid £3. 10. 5 for '*pulley wheels and steps*' (D1289 B/L 399).

In the second quarter engine installation was going forward, with three men paid £17. 4. 7 for '*assisting engineers*' and other work. The Morton's were paid £107. 3. 10 for building at the cottages, and providing ridging stone for £3. 14. 0, while Booker and Co provided '*slate for cottages*' for £14. 17. 6. Other work by the Morton's included '*Assisting the Engineers Cutting out part of the Ashlar Work for Beam end, Condensor Pipe and Seating the Bed Plate, Setting the Ashlar in House Water Well and other Wage Work*' for £23. 0. 0, and for getting and dressing stone for the house-water well for £13. 0. 8.

In the third quarter William Fairbairn received a further £1,033, Barrow's were paid £164 for '*pump trees and sundry other castings*', timber was supplied for a model of the capstan at £7. 7. 0, and another £6. 15. 0 was paid for slate.

In the last quarter, workmen were paid £61. 17. 0 for '*Making a new Water Course to take the House Water from the Engine into the Reservoir, Walling, Covering, Puddling the same*' (and other work). Materials and tasks, presumably for various building and installation jobs, included '*stone and paviours*' (£15. 17. 0), more building and stone by Morton's (£58. 10. 10), plastering (£13. 18. 1), lime (£7. 8. 6), sawing (£8. 14. 6), puddling (£5. 11. 0), red lead (£1. 9. 9) and lath nails (19s 0d). Robert Hall, a plumber, glazier and painter, was paid £100. Barrows were paid £80 on account for more castings.

**1839:** At the beginning of 1839 the Company turned its attention to installing the pitwork. The minute book for 2 Jan. 1839 records that they resolved '*That the Mr Barker and Mr Wyatt do make enquiry for a competent person to undertake the fixing of the Pitt Work and the mine*' (DRO, Bag. C 518). In the first quarter of 1839 there was £2. 9. 0 spent on bricks, while in the spring 14s 9d was paid to the proprietors of the Alport Mines for '*Carriage of Capstan Patterns to Foundry*'. In the summer the balance of Barrow's account for casting was settled, include that already paid, for a total of £363. 17. 11; an invoice for £322. 19. 11 of this total survives (DRO, Bag. C 587/27) and shows that it was for two lifts of pumps delivered in July-Aug. 1839. Specific items listed here including two plungers, two stuffing boxes, two H-pieces, nineteen clacks and clack doors and four wind bores. In the same period workmen were paid £122. 6. 9 for '*putting in Way Gate, Stempling and Lace Boarding the Engine Shaft, Assisting to fix up the Shear Legs, Capstans etc., Putting in new Bundings and Fixing the Pitt Work*'. All did not go smoothly, for in the last quarter they paid workmen £291. 5. 11 for '*repairing damages done by the breaking of the Capstan, Replacing the Pitt*

*Work and completing the same, Fitting the Plungers, making new Bundings, Jointing and Putting in the Pitt, the Dry Rods, Stays and Linings for ditto, fixing pieces to each Lift and Launder to carry the Water into the Cistern and also into the Level*. The Butterley Iron Works provided ‘one pair of capstan pulleys’ for £5. 10. 6 and 14s 6d was spent of ‘Pointing Ridging Stones’. An invoice dated 15 June 1839 survives for two capstan ropes costing £155. 2. 0 (DRO, Bag. C 587/27); they were supplied by Spyace & Coopers of Hull, delivered via the Canal Wharf, Sheffield. The £572 balance of Fairbairn’s account was paid, making a total of £3,005.

In addition to the main engine house structures detailed above, we know there were sheerlegs above the shaft and two capstans already here in the 1850s when the mine was being proposed for sale; while one capstan and the sheerlegs are noted above as erected in 1839, perhaps both capstans were installed then, for two sets or ropes were purchased. A ‘Capstan Race’ was removed in 1857 (DRO Bag. 559)

In Nov. 1839 George Greave wrote to William Wyatt, saying that James Barker had mentioned that he ‘hopes all may be ready for starting the Engine by the 22<sup>nd</sup> when – as he remarks – there will be nearly a full moon – I am very happy to hear of your favourable progress’ ‘I perfectly approve of the Miners & men generally having a treat on the occasion of starting the engine – which they well deserve’ ‘also order dinner for the Proprietors – at Middleton or elsewhere’ (DRO, Bag. C 654/477). However, he wrote again on the 16<sup>th</sup> Dec. saying that Mr Smith of Fairbairns was ‘premature in his application for money – in as much as the Engine has not hitherto been declared ‘to be at work’. No doubt it was started on the 22<sup>nd</sup> of Nov but the start was such a palpable failure that I imagine, judging from my own feelings, that every proprietor must have been disgusted. With the conduct of Mr Fairbairn & Mr Smith we have all great reaction to be dissatisfied. Whether the Engine can be said – by competent judges – to be really and properly at work, with the probability of continuing permanently so – then - & not till then, is Mr Fairbairn entitled to the outstanding sum of money, in one month’ (DRO, Bag. C 654/481).

**1840:** In early-1840 further payments were made of £6. 16. 0 for ‘plastering engine house’, perhaps a late submission of invoice for work the year before. Hadfield and Sanderson of Sheffield were paid £8. 4. 0 for ‘anvil, vice, etc.’ presumably for the new smithy built in 1837 and this was perhaps another late payment as the first potential evidence we have for use of the Smithy is summer 1839 when two people were paid for ‘labouring in Smith’s Shop’, while a ‘Smith’s Trough’ was bought for 18s 4d. Barrow’s were paid £35. 8. 7 for more castings, and William Morton £25. 12. 1 for masonry, but what this small building job was is not specified. In the second quarter 10s 6d was paid for ‘slating’ and Jonathan Morton supplied ‘ashlar stone, etc.’ for £4. 3. 8. In the last quarter of 1840 and the first of 1841 a different family of masons, the Brightmore’s, were paid £41. 6. 10 for work unspecified, ‘slate and paviours’ worth £14. 7. 8, were purchased, whilst another for £5. 2. 0 ‘carriage of slate flags, lime, ashes, etc.’ and one for £ 4. 11. 8. For ‘sheet lead and glaziers work’ were paid. Shortly afterwards a slater was paid £3. 18. 0.

A delivery note from Fairbairn dated May 1840 for two pistons and one rod, was for the pitwork, as indicated by a letter by Trethewy ‘I would recommend to have 2in Iron 8 or 10ft [2.4-3.0m] up from the Pistons, and there fix on a small bar with a weight in it to force down the pistons, but above that Place Iron of an inch and quarter [0.03m], or three eights (0.04m) will be quite sufficient – the Rod should be stayed in several places’. An accompanying sketch shows the rod as 150ft (45m) long and decreasing in thickness in four increments,

from 2 inch (0.05m) to  $1\frac{3}{8}$  inch (0.04m) (DRO, Bag. C 654/496). A bill for £80. 0. 0 was paid in the first quarter of 1841 which included 'Cylinder, Pistons, Pipe, door and Frame, etc.' (D1289 B/L 399); the door is discussed below. This ended installation and although it was presumably thought to have addressed the problems encountered late in 1839, these had to be revisited in 1841-42 as detailed below.

### **Developing the 1830s-40s Mine Infrastructure – Shafts**

Further details on Fairbairn Engine are that in 1836 a 'clay bunding' was placed in the shaft to turn water down a shale gate, presumably the one documented as driven from the Forefield Shaft, together with another bunding for temporary winding and what may have been permanent lacing, ladders and platforms between each. Barrels were used for drawing up sinking deads and water. The total cost of sinking was in excess of £650. In the first quarter of 1836 a road was driven to the shaft, presumably in advance of engine house building work and subsequent engine installation.

In early-1839 they completed the Fairbairn engine shaft when making ready to use the engine after drawing water out of the mine, with men paid '*putting in a Bunding across the Shaft at 25 fathom deep [46m], fixing a Turn for two men and setting a Cistern – Fixing a second Bunding a setting a Large Cistern across the shaft at 35 fathom [64m] deep to catch the water that comes at the broken Ground, Wedging and Plugging up the Points, Setting Timber and Planks in front of the same and making two Dams of Barrow Lime and Gravel, Puddling the same in front of the Wedges, etc., etc. Fixing a third Bunding at 42 fathom deep [78m] to Protect the men whilst the Blasts are going and as a temporary standing for the ladders or Way Gate*', '*drawing water from the large Cistern up to the top Cistern in Level*' and '*Persons sinking Lodge 16 yards [15m] deeper*'.

### **Developing the 1830s-40s Mine Infrastructure – Levels, Doors and Drains**

In 1837, as part of the process of clearing the old sough from its tail to the forefield, they drove 50ft (15m) '*in the Yearnslow Vein above the roof of the Level to try to let off the water*', while in 1838 they also drove a short new section of passage '*around the broken Ground*' (D1289 B/L 399).

In the first half of 1840 men were paid for '*Stripping and Enlarging the Level from the Old Water Engine towards the North End of the Pipe to make room to put in new Launderers*' and for '*laying down Iron Rails and making Waggon Road to the Middle Water Engine, taking up some broken Ground Stripping and Enlarging the Level, driving across the Lum and making a New Level on the North Side of the Old one*' and then '*Stripping and Enlarging the Level towards the North End of the Pipe to make room to put in the New Launderers, Removing the Deads and Rubbish out of the same, etc*'.

In the Spring of 1840, miners were on bargain at 40 fathoms depth to drive towards the pipe, for 31ft (9m) south-east, 7ft (2m) east and 34ft (10m) west; this was presumably to link the new pumping shaft to the workings at a point well above the shaft base. In the last quarter of the year they were '*Drawing out Sludge, Repairing the Way Gates and Preparing to get a road into the Forefield of the Old Works – Also Opening and Repairing the Pitt sunk upon the Pipe beyond the Forefield in Order to get a Communication through the broken Ground to meet the Rise out of the 48 Fathom Level and make a clear passage for the Water*'.

When installing the 1840-41 metal door, in the first quarter of 1840 men were paid '*Persons in the New Shaft putting in Bundings, fixing Falling Pipes to carry the Water down when let*

*off, Driving across towards the Pipe Six Yards, Blasting out Room and Making Preparation to fix up the Metal Frame and Door above the Valve and Laying Pipe* followed in the next by *'Cutting the Rock and Blasting out Room to fix up the Metal Frame and Door above the Laying Pipe and Valve, driving under the Forefield Shaft and Rising upwards out of the 48 Fathom Level.'* In the third quarter they were *'fixing up the Metal Door and Frame, cutting room for the Laying Pipe in 48 Fathom Level, assisting Masons to put in the Ashlar work, fixing the Pipe and Valve, Jointing and Hanging the Rods to raise the Valve. Driving the 48 Fathom Level Westwardly, rising up to Tap the Water'*, while in the fourth quarter they were *'Cleaning and Sludging out the Lodge, Making a new Bunding across the Engine Shaft and Driving a Cross Cutt to meet the Rise under the Old Pitt to let off the Water again'*. In the first half of 1841 they were *'driving New Crosscutt forward to Meet the Rise under the Old Pitt to let off the Water again, Blasting out Room, Cutting the Rock to receive the Metal Frame and Door above the Laying Pipe, and Driving new Gate to the Striking House, Putting in the Laying Pipe, assisting the Masons'* then *'driving the New Crosscutt forward to meet the Rise Boring Holes to draw off the Water, Opening and Repairing the old Engine Shaft, Sinking the Same, this to meet the Rise, Drawing Sludge'*.

The date when the drain to Wardlow Mires was made is open to question. Kirkham was told that the drain westwards was dug when the steam engine was installed (Kirkham 1967), but a water run off may also have been needed earlier and evidence for a drain associated with the 1790s pond has been discussed above. This said, as also noted above, an intended *'Water Course'* was surveyed in 1834, while later Wyatt approached the Earl of Newburgh at Hassop Hall in Oct. 1840 regarding permission to dig a drain over his land. This, and that new pitwork that was installed at the pumping shaft in 1841-42, may well both be associated with bringing pumped water to surface as and when required. Unfortunately, the location of the drain proposed in 1840 is not made clear, the letter noting only *'land to be taken by them in making the Water Course through your Lordships Property. The heavy Rains which have fallen the last few days have increased the Water in the Mine so that the Engine cannot lift it consequently the poor men are now thrown out of employment.'* (DRO, Bag. C 654/508).

Returning to the underground *'Adit Level'* and its development and maintenance, in 1844 workmen were *'Sludging Gates. Driving Westwardly in the Pipe Leading to take up the Water that courses in the Forefield, Making a Clay Dam and Trying to Sink down to the Sole of the Pipe'*. In the same year they were *'Clearing Sludge and Dirt out of Old Workings in East End, Walling, Arching, etc.'* and then *'Walling, Arching and Scouring some broken Ground in the Old Workings Eastward in the Pipe'* followed by *'Driving a Waggon Gate in Forefield East, to enable us to prove the Soles of the Ancient Works'* and then *'Under Stopping Out Ground, Driving a Gate South East to prove the skirt of the Pipe, and also Driving another Gate Northwardly to a Branch of the Pipe laying there'*.

In 1845 workmen were *'fixing a Bunding over the Lodge, fixing Timber to guard the Pit Work from Injury while Blasting room at the Shaft Foot – Driving the Deep Level from Pumps to Lodge Foot in a Westwardly direction'*.

The account books show that by late in 1846 work on the second metal door was being undertaken, for they were *'Cutting Out Room at Bottom of the Engine Shaft for a Striking House, and Preparing for the Valve and Laying Pipe near Iron Door to be Inserted in Mouth of Entrance of the Deep Level from Pump Feet'* followed early in in 1847 by *'Cutting out Room for the New Laying Pipe, Valve, and Metal Door, at the Entrance of Deep Level,*

*Assisting the Masons to Fix in the Ashlar Wall round the Laying Pipe, Fixing the Door'* (D1289 B/L 399).

### **Developing the 1830s-40s Mine Infrastructure – Sundry Buildings**

The 1841 Census returns show that the heads of three households living at the row of three cottages were James Trethewy '*engineer*', Samuel Turner '*lead miner*' and Peter Harrison '*lead miner*'; all had wives and children. Turner as well as Trethewy was involved in looking after the engine and Harrison features prominently in the mine accounts through the 1840s, usually as the first named in the list of miners paid. In 1847 he was described as '*Pittman*'. He was also a well-paid worker at High Rake Mine (Barnatt 2011, p. 97). We know that Samuel Trethewy came to the mine early in 1841 and his brother James left the mine a couple of months after Samuel started; Samuel took up residence in one of the cottages. In contrast, Peter Harrison was still in residence in 1871. We do not know who if anyone was in residence in the other two cottages in 1851, Samuel had left the mine in 1849, but in 1861 and 1871, census returns show they were lived in by Joseph Morton and William Turner, both describing themselves as lead miners.

## Appendix 5: The Final Years at Watergrove - 1851 Onwards

This Appendix gives supplementary data for Chapter 10 of the paper in Mining History.

### Victory Level

**Shareholders:** When the Water Grove United Mining Company was set up the original 24 Watergrove Mine shares were subdivided by 48 to make 1152 shares (Nash Collection, Water Grove United Mining Company's 1857-67 minute book). The shareholders comprised:

- John Pitt, John Fordham, Joseph Smith, William Hobson, Robert Mitchell and John Elliot, all on behalf of the Eyam Mining Company – 648 shares
- John Greaves, the Rocks, Matlock – 216 shares
- William and Charles Milnes, Woodend, near Matlock – 56 shares
- Robert Hall, Crescent, Manchester -28 shares
- John Sampson, Low Pavement, Chesterfield – 24 shares
- John Spencer Ashton Shuttleworth, Hathersage Hall – 72 shares
- William Pole Thornhill, Stanton Hall – 16 shares
- William Wyatt, Foolow – 72 shares

From this it can be seen that well over a third of the shares were retained by the shareholders of the old Water Grove Mines Company, It was those shares which in 1853 were listed as belonging to the executors of Colonel Elmsall, and those of the consortium of Messrs Milnes and friends, which were acquired by the Eyam Mining Company, while the Henry Greaves' own shares seem to have been passed to John Greaves his brother. John, who had lived in Matlock since 1837 at the latest, died in 1859 and his shares passed to his widow Louisa Jane (John Hunter *pers. comm.*).

In 1863 it was noted that Eyam Mining Company still held '*the greater part of the shares*' but several other Water Grove United Mining Company shareholders had not paid their calls (Chatsworth BC 387/12). In December that year four shareholders forfeited their shares as they were no longer willing to pay calls; these were William Pole Thornhill (16 shares), Samuel Furness of Eyam (6 shares), John Turner (junior) of Haycliffe (2 shares) and Francis Cocker of Eyam (7 shares). William Wyatt had died in 1858 and the last three of the shareholders just listed, who were not involved in 1857, may have purchased some of his shares.

The notice of the final AGM in Feb. 1872 lists the shareholders as:

- Eyam Mining Company
- Thomas Eyre, Castleton
- Mrs Louisa Jane Greaves, The Rocks, Matlock
- Robert Hall, Higher Ardwick, Manchester
- Archibald Macfarlane, Castleblugney, Ireland
- S. J. A. Shuttleworth, Hathersage Hall
- John Sampson, 50 Dudley St, Chorlton Road, Manchester
- James Skimmings, Castleblugney, Ireland
- John Slinn, Eyam

## Appendix 6: Ore Output, Income, Profit and Loss at Watergrove Mine 1763-1853 (Dave Williams and John Barnatt)

These figures are derived from the mine accounts (DRO, Bag. C 422-34; 431a; 587/27; D 1289 B/L 399).

| <i>Reckoning Period (End Date)</i> | <i>Length of Period in Weeks</i> | <i>Production Unspecified Liberty (Loads and Dishes)</i> |   | <i>Production Eyam (Loads and Dishes)</i> |   | <i>Production Ashford Northside (Loads and Dishes)</i> |   | <i>Income</i>                         | <i>Profit</i>                           | <i>Loss</i>                             |
|------------------------------------|----------------------------------|--|---|---|---|--|---|---------------------------------------|---|---|
|                                    |                                  |  |   |   |   |  |   |                                       |   |   |
| Apr. 2 1763                        | 13                               | 17   | 3 | -   | - | -  | - | £34. 13. 4                            | -                                       | £116. 11. 4                             |
| July 2 1763                        | 13                               | 29   | 3 | -   | - | -  | - | £55. 14. 8                            | -                                       | £113. 12. 6                             |
| Oct. 1 1763                        | 13                               | 133  | 3 | -   | - | -  | - | £240. 0. 0                            | -                                       | £76. 14. 9                              |
| Dec. 31 1763                       | 13                               | 126  | 6 | -   | - | -  | - | £221. 13. 4                           | -                                       | £9. 14. 10                              |
| Mar. 31 1764                       | 13                               | 61   | 3 | -   | - | -  | - | £110. 8. 0                            | -                                       | £104. 2. 2                              |
| June 30 1764                       | 13                               | 32   | 0 | -   | - | -  | - | £57. 12. 0                            | -                                       | £223. 8. 5                              |
| Aug. 12 1764                       | 6                                | 0  | 0 | -   | - | -  | - | -                                     | -                                       | £87. 14. 3                              |
| Nov. 10 1764                       | 13                               | 14   | 6 | -   | - | -  | - | £23. 2. 0                             | -                                       | £113. 9. 11                             |
| Dec. 29 1794                       | 7                                | 10   | 6 | -   | - | -  | - | £16. 16. 0                            | -                                       | £74. 19. 9                              |
| May 11 1765                        | 19                               | 52   | 3 | -   | - | -  | - | £86. 7. 0                             | -                                       | £109. 1. 3 <sup>1</sup> / <sub>2</sub>  |
| Sept. 14 1765                      | 18                               | 37   | 8 | -   | - | -  | - | £62. 10. 4                            | -                                       | £181. 11. 8 <sup>3</sup> / <sub>4</sub> |
| Dec. 21 1765                       | 14                               | 21   | 1 | -   | - | -  | - | £33. 3. 8                             | -                                       | £168. 2. 0                              |
| Feb. 1 1766                        | 6                                | 0  | 0 | -   | - | -  | - | -                                     | -                                       | £40. 11. 11                             |
| Mar. 25 1766                       | 8                                | 36   | 3 | -   | - | -  | - | £61. 15. 4                            | -                                       | £69. 8. 0                               |
| June 24 1766                       | 13                               | 30   | 6 | -   | - | -  | - | £55. 4. 0                             | -                                       | £45. 7. 4 <sup>1</sup> / <sub>2</sub>   |
| Sept. 30 1766                      | 14                               | 4  | 0 | -   | - | -  | - | £7. 4. 0                              | -                                       | £67. 6. 4 <sup>1</sup> / <sub>2</sub>   |
| Dec. 30 1766                       | 13                               | 12   | 0 | -   | - | -  | - | £21. 12. 0                            | -                                       | £93. 9. 8 <sup>1</sup> / <sub>2</sub>   |
| Mar. 31 1767                       | 13                               | 0  | 0 | -   | - | -  | - | -                                     | -                                       | £45. 10. 10 <sup>1</sup> / <sub>2</sub> |
| July 8 1767                        | 14                               | 10   | 0 | -   | - | -  | - | £18. 0. 0                             | -                                       | £54. 1. 10                              |
| Oct. 6 1767                        | 13                               | 0  | 0 | -   | - | -  | - | -                                     | -                                       | £80. 13. 8                              |
| Dec. 31 1767                       | 12                               | 0  | 0 | -   | - | -  | - | -                                     | -                                       | £64. 6. 8                               |
| Apr. 7 1768                        | 14                               | 16   | 0 | -   | - | -  | - | £94. 2. 4 <sup>1</sup> / <sub>2</sub> | -                                       | £63. 6. 4 <sup>1</sup> / <sub>2</sub>   |
| July 7 1768                        | 13                               | 0  | 0 | -   | - | -  | - | -                                     | -                                       | £87. 7. 4 <sup>3</sup> / <sub>4</sub>   |
| Oct. 13 1768                       | 14                               | 0  | 0 | -   | - | -  | - | -                                     | -                                       | £39. 11. 11                             |
| Jan. 11 1769                       | 12                               | 0  | 0 | -   | - | -  | - | -                                     | -                                       | £97. 17. 0                              |
| Apr. 12 1769                       | 13                               | 11   | 8 | -   | - | -  | - | £19. 12. 4                            | -                                       | £67. 18. 10                             |
| July 12 1769                       | 13                               | 0  | 0 | -   | - | -  | - | -                                     | -                                       | £40. 8. 3                               |
| Oct. 12 1769                       | 13                               | 17   | 3 | -   | - | -  | - | £28. 12. 00                           | -                                       | £18. 0. 4                               |
| Jan. 10 1770                       | 13                               | 9  | 3 | -   | - | -  | - | £15. 8. 0                             | -                                       | £22. 9. 10 <sup>1</sup> / <sub>2</sub>  |
| Apr. 14 1770                       | 14                               | 32   | 0 | -   | - | -  | - | £54. 8. 0                             | -                                       | £10. 18. 11                             |
| July 14 1770                       | 13                               | 16   | 0 | -   | - | -  | - | £27. 4. 0                             | -                                       | £33. 5. 3                               |
| Oct. 13 1770                       | 13                               | 4  | 6 | -   | - | -  | - | £7. 18. 8                             | -                                       | £69. 4. 5                               |
| Jan. 12 1771                       | 13                               | 0  | 0 | -   | - | -  | - | -                                     | -                                       | £78. 16. 0 <sup>3</sup> / <sub>4</sub>  |
| May 4 1771                         | 16                               | 42   | 6 | -   | - | -  | - | £75. 4. 8                             | -                                       | £117. 15. 4                             |
| June 22 1771                       | 7                                | 116  | 0 | -   | - | -  | - | £200. 14. 0                           | £56. 9. 12                              | -                                       |
| Aug. 17 1771                       | 8                                | 184  | 0 | -   | - | -  | - | £312. 14. 8                           | £35. 9. 5 <sup>1</sup> / <sub>2</sub>   | -                                       |
| Oct. 19 1771                       | 9                                | 156  | 0 | -   | - | -  | - | £287. 1. 4                            | £36. 2. 7                               | -                                       |
| Dec. 14 1771                       | 8                                | 324  | 0 | -   | - | -  | - | £598. 16. 0                           | £177. 2. 11 <sup>1</sup> / <sub>2</sub> | -                                       |
| Mar. 28 1772                       | 13                               | 610  | 6 | -   | - | -  | - | £990. 14. 8                           | £345. 7. 11 <sup>1</sup> / <sub>2</sub> | -                                       |

|               |    |       |   |       |   |     |   |   |  |             |
|---------------|----|-------|---|-------|---|-----|---|---|--|-------------|
| June 6 1772   | 10 | 470   | 6 | -     | - | -   | - | £826. 5. 4                              | £216. 6. 5 <sup>1</sup> / <sub>2</sub>   | -           |
| Aug. 15 1772  | 10 | 603   | 3 | -     | - | -   | - | £1,006. 0. 0                            | £230. 14. 6                              | -           |
| Oct. 24 1772  | 10 | 538   | 6 | -     | - | -   | - | £901. 12. 0                             | £254. 4. 1                               | -           |
| Jan. 9 1773   | 11 | 649   | 3 | -     | - | -   | - | £1,092. 16. 0                           | £280. 2. 7                               | -           |
| Apr. 3 1773   | 12 | 730   | 6 | -     | - | -   | - | £1,198. 8. 0                            | £256. 0. 1                               | -           |
| June 12 1773  | 10 | 849   | 3 | -     | - | -   | - | £1,337. 0. 8                            | £344. 7. 5 <sup>1</sup> / <sub>2</sub>   | -           |
| Aug. 14 1773  | 9  | 636   | 0 | -     | - | -   | - | £994. 0. 1                              | £253. 12. 0                              | -           |
| Nov. 6 1773   | 12 | 631   | 3 | -     | - | -   | - | £972. 7. 0                              | £272. 8. 3                               | -           |
| Feb. 19 1774  | 15 | 929   | 3 | -     | - | -   | - | £1,493. 13. 6                           | £429. 10. 4                              | -           |
| Apr. 30 1774  | 10 | 765   | 3 | -     | - | -   | - | £1,201. 10. 8                           | £364. 19. 9                              | -           |
| July 23 1774  | 12 | 738   | 6 | -     | - | -   | - | £1,154. 16. 0                           | £331. 3. 8                               | -           |
| Oct. 15 1774  | 12 | 728   | 0 | -     | - | -   | - | £1,156. 6. 8                            | £326. 8. 11                              | -           |
| Dec. 24 1774  | 10 | 636   | 0 | -     | - | -   | - | £1,027. 19. 4                           | £296. 16. 8                              | -           |
| Mar. 25 1775  | 13 | 674   | 0 | -     | - | -   | - | £1,117. 16. 4                           | £222. 18. 8                              | -           |
| June 17 1775  | 12 | 507   | 3 | -     | - | -   | - | £837. 3. 0                              | £137. 14. 5                              | -           |
| Sept. 30 1775 | 15 | 629   | 3 | -     | - | -   | - | £933. 6. 0                              | £126. 18. 3                              | -           |
| Dec. 30 1775  | 13 | 705   | 0 | -     | - | -   | - | £1,166. 12. 0                           | £276. 12. 2                              | -           |
| Apr. 13 1776  | 15 | 525   | 3 | -     | - | -   | - | £874. 5. 4                              | £91. 7. 9                                | -           |
| Aug. 3 1776   | 16 | 769   | 3 | -     | - | -   | - | £1,255. 0. 0                            | £147. 18. 2                              | -           |
| Nov. 30 1776  | 17 | 406   | 6 | -     | - | -   | - | £747. 4. 0                              | £7. 1. 6                                 | -           |
| Dec. 31 1776  | 4  | 52    | 0 | -     | - | -   | - | -                                       | -  | £246. 9. 5  |
| Apr. 12 1777  | 14 | 670   | 0 | -     | - | -   | - | £1,102. 12. 0                           | £92. 10. 2 <sup>1</sup> / <sub>2</sub>   | -           |
| June 28 1777  | 11 | 638   | 0 | -     | - | -   | - | £1,048. 17. 4                           | £201. 19. 0                              | -           |
| Oct. 18 1777  | 16 | 504   | 0 | -     | - | -   | - | £823. 13. 4                             | £68. 5. 5                                | -           |
| Jan. 17 1778  | 13 | 592   | 6 | -     | - | -   | - | £982. 6. 8                              | £141. 16. 4                              | -           |
| Apr. 4 1778   | 11 | 435   | 3 | -     | - | -   | - | £709. 3. 4                              | £188. 6. 9                               | -           |
| July 4 1778   | 13 | 234   | 6 | -     | - | -   | - | £383. 1. 6                              | -  | £70. 3. 6   |
| Oct. 3 1778   | 13 | 200   | 3 | -     | - | -   | - | £313. 17. 6 <sup>1</sup> / <sub>2</sub> | -  | £50. 14. 2  |
| Jan. 2 1779   | 13 | 340   | 0 | -     | - | -   | - | £550. 4. 0                              | £101. 14. 7                              | -           |
| Apr. 3 1779   | 13 | 566   | 6 | -     | - | -   | - | £888. 8. 8                              | £246. 15. 10                             | -           |
| July 2 1779   | 12 | 833   | 3 | -     | - | -   | - | £1,454. 12. 8                           | £581. 8. 2                               | -           |
| Oct. 2 1779   | 13 | 488   | 0 | -     | - | -   | - | £754. 14. 0                             | £240. 0. 9 <sup>1</sup> / <sub>2</sub>   | -           |
| Jan. 1 1780   | 13 | 404   | 6 | -     | - | -   | - | £611. 12. 8                             | £91. 3. 1                                | -           |
| Apr. 1 1780   | 13 | 757   | 3 | -     | - | -   | - | £1,137. 0. 8                            | £329. 1. 8 <sup>1</sup> / <sub>2</sub>   | -           |
| July 1 1780   | 13 | 516   | 6 | -     | - | -   | - | £766. 9. 4                              | £142. 12. 11 <sup>1</sup> / <sub>2</sub> | -           |
| Sept. 30 1780 | 13 | 536   | 6 | -     | - | -   | - | £811. 10. 0                             | £163. 5. 7 <sup>1</sup> / <sub>2</sub>   | -           |
| Dec. 30 1780  | 13 | 633   | 3 | -     | - | -   | - | £1,008. 9. 4                            | £289. 16. 6                              | -           |
| Apr. 28 1781  | 17 | 805   | 3 | -     | - | -   | - | £1,352. 16. 0                           | £511. 12. 6 <sup>1</sup> / <sub>2</sub>  | -           |
| June 30 1781  | 9  | 753   | 3 | -     | - | -   | - | £1,322. 3. 4                            | £603. 5. 3 <sup>1</sup> / <sub>2</sub>   | -           |
| Sept. 29 1781 | 13 | 1,252 | 0 | -     | - | -   | - | £2,265. 18. 8                           | £1,225. 18. 0                            | -           |
| Dec. 29. 1781 | 13 | 724   | 6 | -     | - | -   | - | £1,376. 2. 0                            | £606. 6. 5 <sup>1</sup> / <sub>2</sub>   | -           |
| Mar. 30 1782  | 13 | 773   | 3 | -     | - | -   | - | £1,520. 16. 8                           | £548. 16. 7 <sup>1</sup> / <sub>2</sub>  | -           |
| Nov. 9 1782   | 31 | 475   | 3 | -     | - | -   | - | £1,045. 14. 8                           | -  | £613. 3. 5  |
| Dec. 31 1782  | 7  | 233   | 3 | -     | - | -   | - | £466. 16. 0                             | £64. 7. 9 <sup>1</sup> / <sub>2</sub>    | -           |
| July 12 1783  | 27 | 1,151 | 3 | -     | - | -   | - | £2,901. 0. 8                            | £824. 6. 4 <sup>1</sup> / <sub>2</sub>   | -           |
| Oct. 11 1783  | 13 | -     | - | 1,365 | 3 | 106 | 0 | £1,864. 5. 7                            | £1,629. 12. 5                            | -           |
| Apr. 23 1784  | 28 | 889   | 3 | -     | - | -   | - | £1,562.3. 6                             | £416. 13. 10                             | -           |
| Aug. 14 1784  | 16 | 768   | 6 | -     | - | -   | - | £1,245. 9. 6                            | £400. 4. 1                               | -           |
| May 28 1785   | 41 | 2,590 | 0 | -     | - | -   | - | £3,600. 0. 0                            | £1,937. 2. 3 <sup>1</sup> / <sub>2</sub> | -           |
| Dec. 3 1785   | 27 | 1,324 | 0 | -     | - | -   | - | £2,040. 17. 1                           | £632. 16. 11                             | -           |
| Sept. 30 1786 | 43 | -     | - | 988   | 0 | 0   | 0 | £1,838. 4. 4                            | £182. 13. 0                              | -           |
| Dec. 16 1786  | 11 | -     | - | 61    | 3 | 0   | 0 | £447. 1. 2 <sup>1</sup> / <sub>2</sub>  | -  | £327. 12. 2 |

|               |    |    |   |       |   |     |   |                |              |               |
|---------------|----|----|---|-------|---|-----|---|----------------|--------------|---------------|
| Aug. 4 1787   | 33 | -  | - | 514   | 6 | 0   | 0 | £1,740. 10. 0  | -            | £510. 13. 3   |
| Oct. 11 1788  | 62 | -  | - | 2,871 | 3 | 4   | 6 | £4,461. 16. 7  | £3,581. 5. 1 | -             |
| Nov. 7 1789   | 56 | -  | - | 434   | 0 | 222 | 6 | £2,090. 14. 8  | -            | £610. 0. 0    |
| Aug. 14 1790  | 40 | -  | - | 132   | 0 | 537 | 3 | £1,904. 6. 5   | -            | £439. 13. 4   |
| Dec. 3 1791   | 68 | -  | - | 42    | 6 | 13  | 3 | £1,282. 14. 7  | -            | £1,202. 9. 3  |
| Dec. 1 1792   | 52 | -  | - | 202   | 0 | 0   | 0 | £1,153. 6. 4   | -            | £756. 3. 0    |
| Nov. 16 1793  | 50 | -  | - | 572   | 0 | 714 | 0 | £2,297. 11. 10 | £305. 5. 0   | -             |
| May 17 1794   | 26 | 38 | 6 | -     | - | -   | - | £542. 6. 1     | -            | £474. 6. 1    |
| Dec. 13 1794  | 30 | 22 | 6 | -     | - | -   | - | £999. 12. 0    | -            | £973. 10. 0   |
| Nov. 28 1795  | 50 | -  | - | 18    | 6 | 0   | 0 | £1,669. 5. 5   | -            | £1,635. 18. 9 |
| Nov. 12 1796  | 50 | -  | - | 470   | 0 | 980 | 0 | £2,166. 13. 3  | £928. 6. 9   | -             |
| June 24 1797  | 32 | 18 | 0 | -     | - | -   | - | £250. 16. 6    | -            | £218. 8. 6    |
| Sept. 30 1797 | 14 | 0  | 0 | -     | - | -   | - | £195. 1. 5     | -            | £195. 1. 5    |
| Dec. 30 1797  | 13 | 10 | 6 | -     | - | -   | - | £56. 16. 7½    | -            | £43. 0. 7½    |
| Mar. 24 1798  | 12 | -  | - | 22    | 6 | 0   | 0 | £84. 10. 6     | -            | £48. 15. 6    |
| June 23 1798  | 13 | -  | - | 148   | 0 | 453 | 3 | £640. 17. 1    | £508. 14. 11 | -             |
| Sept. 22 1798 | 13 | -  | - | 302   | 0 | 498 | 0 | £1,182. 18. 11 | £200. 16. 7  | -             |
| Dec. 22 1798  | 13 | 26 | 6 | -     | - | -   | - | £85. 17. 9     | -            | £42. 1. 9     |
| Mar. 23 1799  | 13 | -  | - | 28    | 0 | 0   | 0 | £89. 19. 5     | -            | £37. 12. 5    |
| June 22 1799  | 13 | -  | - | 16    | 0 | 6   | 6 | £117. 14. 7    | -            | £72. 7. 11    |
| Sept. 21 1799 | 13 | -  | - | 211   | 3 | 106 | 0 | £626. 15. 2    | £58. 6. 2    | -             |
| Dec. 21 1799  | 13 | -  | - | 14    | 6 | 0   | 0 | £66. 3. 0      | -            | £33. 10. 4    |
| Mar. 22 1800  | 13 | -  | - | 15    | 3 | 0   | 0 | £76. 0. 8      | -            | £41. 18. 4    |
| June 21 1800  | 13 | -  | - | 9     | 3 | 8   | 0 | £104. 10. 0    | -            | £70. 15. 0    |
| Aug. 9 1800   | 7  | -  | - | 388   | 6 | 142 | 0 | £825. 7. 10    | £508. 2. 2   | -             |
| Oct. 4 1800   | 8  | -  | - | 225   | 3 | 161 | 3 | £638. 8. 8     | £322. 16. 8  | -             |
| Dec. 20 1800  | 11 | -  | - | 26    | 6 | 0   | 0 | £82. 8. 4      | -            | £28. 16. 4    |
| Mar. 21 1801  | 13 | -  | - | 16    | 0 | 5   | 3 | £93. 1. 1      | -            | £48. 5. 1     |
| May 9 1801    | 7  | -  | - | 9     | 3 | 9   | 3 | £58. 15. 4     | -            | £24. 15. 4    |
| June 27 1801  | 7  | -  | - | 205   | 3 | 254 | 6 | £781. 16. 3    | £411. 2. 5   | -             |
| Aug. 22 1801  | 7  | -  | - | 124   | 0 | 363 | 3 | £810. 15. 3½   | £477. 8. 8½  | -             |
| Sept. 19 1801 | 4  | -  | - | 82    | 0 | 66  | 6 | £258. 5. 0     | £134. 1. 4   | -             |
| Oct. 24 1801  | 5  | -  | - | 6     | 0 | 10  | 6 | £98. 17. 7½    | -            | £63. 6. 1½    |
| Dec. 19 1801  | 8  | -  | - | 5     | 3 | 0   | 0 | £106. 7. 9     | -            | £93. 11. 1    |
| Mar. 20 1802  | 13 | -  | - | 13    | 3 | 0   | 0 | £115. 15. 5½   | -            | £90. 2. 1½    |
| May 8 1802    | 7  | -  | - | 0     | 0 | 5   | 3 | £106. 12. 1    | -            | £94. 4. 1     |
| Aug. 21 1802  | 15 | -  | - | 42    | 0 | 37  | 3 | £538. 12. 0    | -            | £294. 13. 0   |
| Oct. 23 1802  | 9  | -  | - | 316   | 0 | 24  | 0 | £523. 17. 0    | £666. 3. 0   | -             |
| Dec. 18 1802  | 8  | -  | - | 44    | 6 | 0   | 0 | £119. 11. 10½  | £6. 5. 1½    | -             |
| Mar. 26 1803  | 14 | -  | - | 46    | 0 | 0   | 0 | £164. 10. 7    | £7. 19. 5    | -             |
| Jun 18 1803   | 12 | -  | - | 48    | 0 | 0   | 0 | £284. 0. 5     | -            | £110. 0. 5    |
| Nov. 26 1803  | 23 | -  | - | 936   | 0 | 150 | 9 | £2,246. 3. 10½ | £1,280. 7. 0 | -             |
| Mar. 17 1804  | 16 | -  | - | 48    | 6 | 6   | 6 | £209. 9. 3     | -            | £53. 9. 3     |
| May 26 1804   | 10 | -  | - | 60    | 0 | 0   | 0 | £184. 7. 0     | -            | £10. 15. 0    |
| Sept. 8 1804  | 15 | -  | - | 149   | 3 | 18  | 6 | £516. 14. 1    | £26. 1. 11   | -             |
| Nov. 10 1804  | 9  | -  | - | 177   | 3 | 74  | 6 | £652. 14. 3    | £148. 19. 1  | -             |
| Mar. 2 1805   | 16 | -  | - | 41    | 3 | 4   | 0 | £202. 19. 7½   | -            | £52. 8. 11½   |
| May 11 1805   | 10 | -  | - | 14    | 6 | 0   | 0 | £154. 9. 7     | -            | £111. 19. 7   |
| Oct. 19 1805  | 23 | -  | - | 254   | 0 | 360 | 6 | £1,795. 1. 1   | £870. 18. 3  | -             |
| Dec. 21 1805  | 9  | -  | - | 186   | 6 | 124 | 0 | £820. 18. 6½   | £530. 9. 5½  | -             |
| Jan. 25 1806  | 5  | -  | - | 78    | 0 | 41  | 3 | £270. 16. 2    | £223. 4. 6   | -             |

|               |    |   |   |       |   |     |   |                |               |               |
|---------------|----|---|---|-------|---|-----|---|----------------|---------------|---------------|
| Apr. 26 1806  | 13 | - | - | 33    | 3 | 30  | 6 | £221. 1. 4     | -             | £13. 12. 0    |
| July 5 1806   | 10 | - | - | 20    | 0 | 13  | 3 | £213. 10. 6    | -             | £106. 11. 10  |
| Dec.13 1806   | 23 | - | - | 1,126 | 0 | 105 | 3 | £2,549. 2. 7   | £2,897. 12. 8 | -             |
| Apr. 11 1807  | 17 | - | - | 50    | 0 | 5   | 3 | £358. 19. 0½   | -             | £160. 13. 0½  |
| July 18 1807  | 14 | - | - | 22    | 9 | 0   | 0 | £311. 10. 11   | -             | £251. 18. 11  |
| Oct. 24 1807  | 14 | - | - | 14    | 0 | 20  | 0 | £643. 11. 8    | -             | £541. 11. 8   |
| Jan. 23 1808  | 13 | - | - | 6     | 6 | 0   | 0 | £150. 5. 8     | -             | £137. 5. 8    |
| Apr. 23 1808  | 13 | - | - | 8     | 0 | 0   | 0 | £161. 15. 5    | -             | £141. 15. 5   |
| July 23 1808  | 13 | - | - | 0     | 0 | 0   | 0 | £120. 0. 0     | -             | £120. 0. 0    |
| Oct. 22 1808  | 13 | - | - | 2     | 0 | 0   | 0 | £154. 3. 1½    | -             | £147. 3. 1½   |
| Dec. 31 1808  | 10 | - | - | 16    | 0 | 0   | 0 | £139. 3. 7     | -             | £75. 3. 7     |
| Apr 1 1809    | 13 | - | - | 16    | 0 | 0   | 0 | £168. 15. 8    | -             | £109. 11. 8   |
| July 22 1809  | 16 | - | - | 9     | 3 | 0   | 0 | £179. 10. 3    | -             | £147. 15. 7   |
| Nov. 4 1809   | 15 | - | - | 14    | 6 | 0   | 0 | £247. 7. 2½    | -             | £197. 9. 10½  |
| Feb. 3 1810   | 13 | - | - | 6     | 6 | 0   | 0 | £176. 19. 8    | -             | £154. 6. 4    |
| May 5 1810    | 13 | - | - | 22    | 6 | 0   | 0 | £246. 8. 9     | -             | £171. 16. 1   |
| Nov. 10 1810  | 27 | - | - | 680   | 0 | 9   | 3 | £1,884. 7. 2½  | £685. 12. 10  | -             |
| Feb. 9 1811   | 13 | - | - | 22    | 6 | 0   | 0 | £92. 10. 1     | -             | £31. 16. 9    |
| May 11 1811   | 13 | - | - | 32    | 6 | 0   | 0 | £135. 16. 4    | -             | £57. 16. 4    |
| Nov. 9 1811   | 26 | - | - | 592   | 6 | 8   | 0 | £1,446. 9. 0   | £250. 5. 0    | -             |
| Feb. 8 1812   | 13 | - | - | 23    | 3 | 0   | 0 | £123. 1. 1     | -             | £71. 14. 5    |
| May 9 1812    | 13 | - | - | 12    | 0 | 0   | 0 | £147. 16. 2    | -             | £119. 9. 6    |
| Aug. 8 1812   | 13 | - | - | 4     | 0 | 0   | 0 | £100. 12. 10   | -             | £88. 4. 10    |
| Nov. 7 1812   | 13 | - | - | 2     | 6 | 0   | 0 | £150. 8. 11    | -             | £142. 11. 7   |
| Feb. 6 1813   | 13 | - | - | 0     | 0 | 0   | 0 | £99. 14. 8½    | -             | £99. 14. 8½   |
| May 8 1813    | 13 | - | - | 3     | 3 | 0   | 0 | £95. 4. 6      | -             | £86. 11. 2    |
| Aug. 7 1813   | 13 | - | - | 1     | 3 | 0   | 0 | £99. 2. 2      | -             | £95. 2. 2     |
| Nov. 6 1813   | 13 | - | - | 0     | 0 | 12  | 0 | £462. 2. 6½    | -             | £424. 6. 6½   |
| Feb. 5 1814   | 13 | - | - | 0     | 0 | 0   | 0 | £88. 11. 0     | -             | £88. 11. 0    |
| May 7 1814    | 13 | - | - | 2     | 6 | 0   | 0 | £103. 4. 1     | -             | £94. 8. 1     |
| Aug. 6 1814   | 13 | - | - | 0     | 0 | 0   | 0 | £123. 7. 2½    | -             | £123. 7. 2½   |
| Nov. 5 1814   | 13 | - | - | 0     | 0 | 14  | 0 | £588. 7. 4     | -             | £546. 7. 4    |
| Feb. 4 1815   | 13 | - | - | 0     | 0 | 0   | 0 | £94. 12. 3     | -             | £94. 12. 3    |
| May 6 1815    | 13 | - | - | 1     | 3 | 0   | 0 | £98. 13. 5     | -             | £94. 13. 5    |
| Aug. 5 1815   | 13 | - | - | 0     | 0 | 0   | 0 | £112. 14. 6    | -             | £112. 14. 6   |
| Nov. 4 1815   | 13 | - | - | 0     | 0 | 0   | 0 | £163. 18. 8    | -             | £147. 3. 5    |
| Mar. 23 1816  | 20 | - | - | 0     | 0 | 0   | 0 | £186. 14. 9    | -             | £186. 14. 9   |
| June 22 1816  | 13 | - | - | 0     | 0 | 0   | 0 | £115. 10. 4    | -             | £115. 10. 4   |
| Sept. 21 1816 | 13 | - | - | 2     | 0 | 0   | 0 | £88. 6. 2      | -             | £84. 14. 2    |
| Dec. 21 1816  | 13 | - | - | 8     | 0 | 0   | 0 | £68. 13. 1     | -             | £54. 5. 1     |
| Mar. 22 1817  | 13 | - | - | 12    | 0 | 0   | 0 | £78. 4. 3      | -             | £57. 16. 3    |
| June 21 1817  | 13 | - | - | 34    | 0 | 0   | 0 | £111. 18. 11   | -             | £53. 2. 11    |
| Sept. 20 1817 | 13 | - | - | 17    | 3 | 0   | 0 | £85. 18. 2     | -             | £58. 6. 2     |
| Dec. 20 1817  | 13 | - | - | 12    | 0 | 0   | 0 | £83. 11. 3     | -             | £51. 19. 3    |
| Mar. 21 1818  | 13 | - | - | 10    | 0 | 0   | 0 | £77. 9. 7      | -             | £50. 9. 7     |
| June 20 1818  | 13 | - | - | 13    | 3 | 0   | 0 | £89. 17. 7     | -             | £53. 17. 7    |
| Dec.12 1818   | 25 | - | - | 9     | 3 | 20  | 0 | £1,029. 13. 1  | -             | £937. 5. 1    |
| Mar. 27 1819  | 15 | - | - | 9     | 3 | 0   | 0 | £88. 6. 5      | -             | £64. 6. 5     |
| Dec. 11 1819  | 37 | - | - | 50    | 6 | 60  | 0 | £1,318. 12. 10 | -             | £1,027. 0. 10 |
| Mar. 25 1820  | 15 | - | - | 6     | 0 | 0   | 0 | £73. 3. 0      | -             | £62. 19. 0    |

|               |    |   |   |   |   |   |   |             |   |             |
|---------------|----|---|---|---|---|---|---|-------------|---|-------------|
| June 24 1820  | 13 | - | - | 2 | 6 | 0 | 0 | £61. 7. 2   | - | £55. 7. 2   |
| Sept. 23 1820 | 13 | - | - | 0 | 6 | 0 | 0 | £61. 0. 5   | - | £59. 10. 5  |
| Dec. 30 1820  | 14 | - | - | 0 | 0 | 0 | 0 | £52. 12. 6  | - | £52. 12. 6  |
| Mar. 31 1821  | 13 | - | - | 4 | 0 | 0 | 0 | £55. 9. 8   | - | £47. 5. 8   |
| June 30 1821  | 13 | - | - | 2 | 6 | 0 | 0 | £41. 11. 6  | - | £34. 11. 6  |
| Sept. 29 1821 | 13 | - | - | 9 | 3 | 0 | 0 | £83. 12. 3  | - | £55. 12. 3  |
| Dec. 29 1821  | 13 | - | - | 0 | 0 | 0 | 0 | £71. 1. 8   | - | £71. 1. 8   |
| Mar. 30 1822  | 13 | - | - | 6 | 6 | 0 | 0 | £81. 8. 11  | - | £69. 0. 11  |
| June 29 1822  | 13 | - | - | 9 | 3 | 0 | 0 | £81. 15. 6  | - | £59. 7. 6   |
| Sept. 28 1822 | 13 | - | - | 0 | 0 | 0 | 0 | £56. 7. 5   | - | £56. 7. 5   |
| Dec. 28 1822  | 13 | - | - | 0 | 0 | 0 | 0 | £52. 0. 4   | - | £52. 0. 4   |
| Mar. 29 1823  | 13 | - | - | 0 | 0 | 0 | 0 | £49. 17. 1  | - | £49. 17. 1  |
| June 28 1823  | 13 | - | - | 0 | 0 | 0 | 0 | £57. 15. 2  | - | £57. 15. 2  |
| Sept. 27 1823 | 13 | - | - | 0 | 0 | 0 | 0 | £56. 3. 3   | - | £56. 3. 3   |
| Dec. 27 1823  | 13 | - | - | 0 | 0 | 0 | 0 | £53. 8-3d   | - | £45. 9. 3   |
| Mar. 27 1824  | 13 | - | - | 0 | 0 | 0 | 0 | £49. 11. 1  | - | £49. 11. 1  |
| June 26 1824  | 13 | - | - | 0 | 0 | 0 | 0 | £49. 4. 0   | - | £49. 4. 0   |
| Sept. 25 1824 | 13 | - | - | 0 | 0 | 0 | 0 | £48. 3. 6   | - | £48. 3. 6   |
| Jan. 1 1825   | 14 | - | - | 0 | 0 | 0 | 0 | £52. 3. 8   | - | £41. 16. 8  |
| Apr. 2 1825   | 13 | - | - | 0 | 0 | 0 | 0 | £45. 0. 0   | - | £45. 0. 0   |
| July 2 1825   | 13 | - | - | 0 | 0 | 0 | 0 | £45. 19. 0  | - | £45. 19. 0  |
| Oct. 1 1825   | 13 | - | - | 0 | 0 | 0 | 0 | £53. 7. 11  | - | £53. 7. 11  |
| Dec. 31 1825  | 13 | - | - | 0 | 0 | 0 | 0 | £48. 9. 5   | - | £39. 14. 5  |
| Apr. 1 1826   | 13 | - | - | 0 | 0 | 0 | 0 | £45. 15. 0  | - | £45. 15. 0  |
| July 1 1826   | 13 | - | - | 0 | 0 | 0 | 0 | £52. 6. 9   | - | £52. 6. 9   |
| Sept. 30 1826 | 13 | - | - | 0 | 0 | 0 | 0 | £50. 16. 4  | - | £50. 16. 4  |
| Dec. 30 1826  | 13 | - | - | 0 | 0 | 0 | 0 | £55. 2. 2   | - | £55. 2. 2   |
| Mar. 31 1827  | 13 | - | - | 0 | 0 | 0 | 0 | £46. 11. 6  | - | £46. 11. 6  |
| June 30 1827  | 13 | - | - | 0 | 0 | 0 | 0 | £49. 8. 7   | - | £49. 8. 7   |
| Sept. 29 1827 | 13 | - | - | 0 | 0 | 0 | 0 | £52. 5. 8   | - | £52. 5. 8   |
| Dec. 29 1827  | 13 | - | - | 0 | 0 | 0 | 0 | £47. 12. 10 | - | £47. 12. 10 |
| Mar. 29 1828  | 13 | - | - | 0 | 0 | 0 | 0 | £43. 19. 8  | - | £43. 19. 8  |
| June 28 1828  | 13 | - | - | 0 | 0 | 0 | 0 | £51. 11. 4  | - | £51. 11. 4  |
| Sept. 27 1828 | 13 | 5 | 3 | - | - | - | - | £54. 14. 6  | - | £45. 2. 6   |
| Dec. 20 1828  | 12 | - | - | 0 | 0 | 0 | 0 | £47. 8. 7   | - | £47. 8. 7   |
| Mar. 28 1828  | 14 | - | - | 0 | 0 | 0 | 0 | £29. 18. 9  | - | £29. 18. 9  |
| June 27 1829  | 13 | - | - | 0 | 0 | 0 | 0 | £25. 9. 0   | - | £25. 9. 0   |
| Sept. 26 1829 | 13 | - | - | 0 | 0 | 0 | 0 | £28. 12. 0  | - | £28. 12. 0  |
| Dec. 26 1829  | 13 | - | - | 0 | 0 | 0 | 0 | £25. 17. 4  | - | £25. 17. 4  |
| Mar. 27 1830  | 13 | - | - | 0 | 0 | 0 | 0 | £25. 9. 0   | - | £25. 9. 0   |
| June 26 1830  | 13 | - | - | 0 | 0 | 0 | 0 | £25. 13. 0  | - | £25. 13. 0  |
| Sept. 25 1830 | 13 | - | - | 0 | 0 | 0 | 0 | £25. 12. 0  | - | £25. 12. 0  |
| Dec. 25 1830  | 13 | - | - | 0 | 0 | 0 | 0 | £22. 8. 0   | - | £22. 8. 0   |
| Mar. 26 1831  | 13 | - | - | 0 | 0 | 0 | 0 | £22. 3. 0   | - | £22. 3. 0   |
| June 25 1831  | 13 | - | - | 0 | 0 | 0 | 0 | £22. 3. 0   | - | £22. 3. 0   |
| Sept. 24 1831 | 13 | - | - | 0 | 0 | 0 | 0 | £22. 10. 0  | - | £22. 10. 0  |
| Dec. 31 1831  | 14 | - | - | 0 | 0 | 0 | 0 | £23. 18. 0  | - | £23. 18. 0  |
| Mar. 31 1832  | 13 | - | - | 0 | 0 | 0 | 0 | £22. 10. 8  | - | £22. 10. 8  |
| June 30 1832  | 13 | - | - | 0 | 0 | 0 | 0 | £22. 15. 0  | - | £22. 15. 0  |
| Sept. 29 1832 | 13 | - | - | 0 | 0 | 0 | 0 | £22. 6. 0   | - | £22. 6. 0   |

|               |    |   |   |     |   |   |   |                |               |                |
|---------------|----|---|---|-----|---|---|---|----------------|---------------|----------------|
| Dec. 29 1832  | 13 | - | - | 0   | 0 | 0 | 0 | £22. 10. 0     | -             | £22. 10. 0     |
| Mar. 30 1833  | 13 | - | - | 0   | 0 | 0 | 0 | £22. 12. 0     | -             | £22. 12. 0     |
| June 29 1833  | 13 | - | - | 0   | 0 | 0 | 0 | £22. 6. 0      | -             | £22. 6. 0      |
| Sept. 28 1833 | 13 | - | - | 0   | 0 | 0 | 0 | £22. 13. 0     | -             | £22. 13. 0     |
| Dec. 28 1833  | 13 | - | - | 0   | 0 | 0 | 0 | £22. 6. 0      | -             | £22. 6. 0      |
| Mar. 29 1834  | 13 | - | - | 0   | 0 | 0 | 0 | £22. 12. 0     | -             | £22. 12. 0     |
| June 28 1834  | 13 | - | - | 0   | 0 | 0 | 0 | £30. 4. 8      | -             | £30. 4. 8      |
| Sept. 27 1834 | 13 | - | - | 0   | 0 | 0 | 0 | £29. 12. 0     | -             | £29. 12. 0     |
| Dec. 27 1834  | 13 | - | - | 0   | 0 | 0 | 0 | £21. 13. 4     | -             | £21. 13. 4     |
| Mar. 28 1835  | 13 | - | - | 0   | 0 | 0 | 0 | £24. 5. 8      | -             | £24. 5. 8      |
| June 27 1835  | 13 | - | - | 0   | 0 | 0 | 0 | £22. 6. 0      | -             | £22. 6. 0      |
| Dec 31 1835   | 25 | - | - | 0   | 0 | 0 | 0 | £970. 1. 9     | -             | £970. 1. 9     |
| Mar. 25 1836  | 12 | - | - | 0   | 0 | 0 | 0 | £533. 17. 1    | -             | £533. 17. 1    |
| June 25 1836  | 16 | - | - | 0   | 0 | 0 | 0 | £1,158. 18. 9  | -             | £1,158. 18. 9  |
| Sept. 24 1836 | 13 | - | - | 0   | 0 | 0 | 0 | £715. 19. 3    | -             | £715. 19. 3    |
| Dec. 24 1836  | 13 | - | - | 0   | 0 | 0 | 0 | £687. 7. 1     | -             | £687. 7. 1     |
| Mar. 25 1837  | 13 | - | - | 0   | 0 | 0 | 0 | £522. 14. 9    | -             | £522. 14. 9    |
| June 24 1837  | 13 | - | - | 0   | 0 | 0 | 0 | £558. 9. 6     | -             | £558. 9. 6     |
| Sept. 25 1837 | 13 | - | - | 0   | 0 | 0 | 0 | £911. 14. 7    | -             | £911. 14. 7    |
| Dec. 25 1837  | 13 | - | - | 0   | 0 | 0 | 0 | £498. 18. 8    | -             | £498. 18. 8    |
| Mar. 25 1838  | 13 | - | - | 0   | 0 | 0 | 0 | £2,000. 14. 2  | -             | £2,000. 14. 2  |
| June 24 1838  | 13 | - | - | 0   | 0 | 0 | 0 | £755. 14. 0    | -             | £655. 14. 0    |
| Sept. 29 1838 | 14 | - | - | 0   | 0 | 0 | 0 | £1,643. 2. 11  | -             | £1,643. 2. 11  |
| Dec. 29 1838  | 13 | - | - | 0   | 0 | 0 | 0 | £691. 5. 5     | -             | £691. 5. 5     |
| Mar. 30 1839  | 13 | - | - | 0   | 0 | 0 | 0 | £571. 0. 10    | -             | £571. 0. 10    |
| June 29 1839  | 13 | - | - | 0   | 0 | 0 | 0 | £1,109. 0. 9   | -             | £1,109. 0. 9   |
| Sept. 29 1839 | 13 | - | - | 0   | 0 | 0 | 0 | £1,348. 15. 10 | -             | £1,348. 15. 10 |
| Dec. 28 1839  | 13 | - | - | 0   | 0 | 0 | 0 | £1,496. 3. 7   | -             | £1,496. 3. 7   |
| Mar. 28 1840  | 13 | - | - | 0   | 0 | 0 | 0 | £699. 1. 0     | -             | £699. 1. 0     |
| June 27 1840  | 13 | - | - | 0   | 0 | 0 | 0 | £516. 3. 0     | -             | £516. 3. 0     |
| Sept. 26 1840 | 13 | - | - | 0   | 0 | 0 | 0 | £392. 0. 3     | -             | £392. 0. 3     |
| Dec. 26 1840  | 13 | - | - | 0   | 0 | 0 | 0 | £614. 2. 9     | -             | £614. 2. 9     |
| Mar. 27 1841  | 13 | - | - | 0   | 0 | 0 | 0 | £470. 1. 9     | -             | £470. 1. 9     |
| June 26 1841  | 13 | - | - | 0   | 0 | 0 | 0 | £496. 19. 5    | -             | £496. 19. 5    |
| Oct. 9 1841   | 15 | - | - | 0   | 0 | 0 | 0 | £388. 7. 2     | -             | £388. 7. 2     |
| Feb. 26 1842  | 20 | - | - | 192 | 0 | 0 | 0 | £616. 1. 8     | -             | £89. 5. 8      |
| July 2 1842   | 18 | - | - | 468 | 0 | 0 | 0 | £1,653. 1. 0   | £70. 11. 5    | -              |
| Oct. 15 1842  | 15 | - | - | 828 | 6 | 0 | 0 | £1,194. 9. 11  |               | -              |
| Jan. 14 1843  | 13 | - | - | 522 | 0 | 0 | 0 | £730. 16. 4    | £1,152. 12. 8 | -              |
| Apr. 15 1843  | 13 | - | - | 0   | 0 | 0 | 0 | £2098. 6. 1    | £185. 17. 3   | -              |
| July 15 1843  | 13 | - | - | 324 | 0 | 0 | 0 |                |               |                |
| Oct. 14 1843  | 13 | - | - | 576 | 0 | 0 | 0 |                |               |                |
| Jan. 13 1844  | 13 | - | - | 125 | 3 | 0 | 0 |                |               |                |
| July 13 1844  | 26 | - | - | 384 | 0 | 0 | 0 | £706 9. 5      | £95. 9. 5     | -              |
| Oct. 12 1844  | 13 | - | - | 530 | 0 | 0 | 0 | £1228. 15. 1   | £102. 7. 10   | -              |
| Jan. 25 1845  | 14 | - | - | 650 | 0 | 0 | 0 | £982. 5. 5     | £546. 10. 7   | -              |
| May 10 1845   | 15 | - | - | 350 | 6 | 0 | 0 | £703-2-4d      | £34. 4. 2     | -              |
| Apr. 11 1846  | 49 | - | - | 735 | 3 | 0 | 0 | £1645-0-4d     | £295. 1. 8    | -              |
| July 20 1846  | 14 | - | - | 522 | 6 | 0 | 0 | £3888-2-10d    | £990. 17. 10  | -              |
| Oct. 17 1846  | 12 | - | - | 622 | 0 | 0 | 0 |                |               |                |



## Appendix 7: Men Employed at Watergrove Mine 1783-1853

The figures given here, which are derived from the mine accounts (DRO, Bag. C 422-24; 587/27; D 1289 B/L 399), are approximate and represent minimum numbers, in that with underground work in particular some account entries are for 'companies' of men, with numbers in each left unstated; where entries make reference to 'companies' these are placed in parenthesis. In 1788, 1796, 1804-07 and 1810-11, incomplete information on the numbers of men in 'companies' is given and they can include up to 22 men but are mostly under 10 men (in no cases are women named as part of companies, although we know that some worked at the mine). However, distinctions are sometimes hard to draw, especially with ore bargains, where sometimes what is clearly work by a 'company' rather than one individual, given the amount, paid is simply listed under a person's name. With some work at surface, work by 'companies' may also apply, but where specified this is for short-term casual work.

Another big uncertainty in the quoted figures, results from much of the work at the mine being on a casual basis, with people employed as and when needed. A distinction is drawn here between regular employment and casual work as this is necessary to get some handle on numbers of people working at any given period of time. For this a division was drawn arbitrarily between those working for half or more of the days in the accounting period (based on a six day week) and others for less than half. With bargains, the duration of time taken within an accounting period cannot be assessed. When the engine was in use for less than half a reckoning period, then the drivers and assistants are placed in the column for 'Surface on Wages' rather than under 'Engine Driving'.

With the distinction drawn between underground and surface work, while the account entries are often clear cut, in other cases assumptions have to be made. For example, '*drawing water*' or '*drawing deads*' is given here as surface work, although the possibility that these tasks were at the top of an internal winze or underground engine cannot be discounted. Although '*carting*' may have been underground, this is assumed to be at surface. Similarly with short periods of work, where all that is given is a name, this is listed under surface work (because it has to go somewhere). With ore bargains it is assumed that it is extraction underground, unless it was belland or hillock ore that was produced. Similarly, from 1836 onwards, an uncertainty arises as underground and surface tasks are often listed together, with no way of distinguishing between the two; these are placed underground. Another complication comes with raising ore and processing belland. From when productive mining restarted in winter 1841/42, all or a significant proportion of this was normally done on wage work rather than on bargain as previously; this is indicated in Table 15 by using a cross rather than a dash.

Despite the uncertainties, significant trends can be seen, with a distinction drawn between periods when there were a large number of men at the mine (placed in bold), and others where it was only ticking over due to water in the lower workings, or in the 1820s-30s when the mine was on care and maintenance (not bold).

The following table gives People in Work at Watergrove Mine 1783-54.

| Reckoning Period (End Date) | Length of Period in Weeks | People in Regular Work (Companies and Individuals) |                      |                  | People on Bargains (Companies and Individuals) |                      |                         | Total Regular and Bargain | People on Casual/Intermittent Work |                  |
|-----------------------------|---------------------------|--|----------------------|------------------|--|----------------------|-------------------------|---------------------------|------------------------------------|------------------|
|                             |                           | Mine Attendance, Engine Drivers, Blacksmiths       | Underground on Wages | Surface on Wages | Underground Ore Extraction                     | Underground Deadwork | Hillock Ore and Belland |                           | Underground on Wages               | Surface on Wages |
| <b>Oct. 11 1783</b>         | <b>13</b>                 | <b>2</b>   | <b>2</b>             | <b>-</b>         | <b>58</b>                                      | <b>(14)</b>          | <b>4</b>                | <b>80+</b>                | <b>11</b>                          | <b>(35)</b>      |
| <b>Apr. 23 1784</b>         | <b>28</b>                 | <b>2</b>   | <b>2</b>             | <b>1</b>         | <b>48</b>                                      | <b>(10)</b>          | <b>1</b>                | <b>64+</b>                | <b>(3)</b>                         | <b>(26)</b>      |
| <b>Aug. 14 1784</b>         | <b>16</b>                 | <b>2</b>   | <b>(4)</b>           | <b>3</b>         | <b>36</b>                                      | <b>(7)</b>           | <b>1</b>                | <b>53+</b>                | <b>(20)</b>                        | <b>(17)</b>      |
| <b>May 28 1785</b>          | <b>41</b>                 | <b>2</b>   | <b>3</b>             | <b>4</b>         | <b>46</b>                                      | <b>(8)</b>           | <b>2</b>                | <b>65+</b>                | <b>(30)</b>                        | <b>(18)</b>      |
| <b>Dec. 3 1785</b>          | <b>27</b>                 | <b>2</b>   | <b>6</b>             | <b>2</b>         | <b>51</b>                                      | <b>(12)</b>          | <b>3</b>                | <b>75+</b>                | <b>(8)</b>                         | <b>(28)</b>      |
| <b>Sept. 30 1786</b>        | <b>43</b>                 | <b>2</b>   | <b>2</b>             | <b>2</b>         | <b>42</b>                                      | <b>(9)</b>           | <b>4</b>                | <b>61+</b>                | <b>(39)</b>                        | <b>(9)</b>       |
| <b>Dec. 16 1786</b>         | <b>11</b>                 | <b>2</b>   | <b>2</b>             | <b>1</b>         | <b>14</b>                                      | <b>(6)</b>           | <b>2</b>                | <b>27+</b>                | <b>(10)</b>                        | <b>6</b>         |
| <b>Aug. 4 1787</b>          | <b>33</b>                 | <b>2</b>   | <b>3</b>             | <b>1</b>         | <b>29</b>                                      | <b>(9)</b>           | <b>3</b>                | <b>47+</b>                | <b>(6)</b>                         | <b>51</b>        |
| <b>Oct. 11 1788</b>         | <b>62</b>                 | <b>2</b>   | <b>4</b>             | <b>-</b>         | <b>(47)</b>                                    | <b>(7)</b>           | <b>5</b>                | <b>65+</b>                | <b>(29)</b>                        | <b>(25)</b>      |
| <b>Nov. 7 1789</b>          | <b>56</b>                 | <b>2</b>   | <b>3</b>             | <b>1</b>         | <b>(33)</b>                                    | <b>(8)</b>           | <b>5</b>                | <b>52+</b>                | <b>(21)</b>                        | <b>22</b>        |
| <b>Aug. 14 1790</b>         | <b>40</b>                 | <b>2</b>   | <b>4</b>             | <b>-</b>         | <b>26</b>                                      | <b>(6)</b>           | <b>3</b>                | <b>41+</b>                | <b>(35)</b>                        | <b>(14)</b>      |
| <b>Dec. 3 1791</b>          | <b>68</b>                 | <b>2</b>   | <b>3</b>             | <b>1</b>         | <b>4</b>                                       | <b>(7)</b>           | <b>3</b>                | <b>20+</b>                | <b>(8)</b>                         | <b>(17)</b>      |
| <b>Dec. 1 1792</b>          | <b>52</b>                 | <b>2</b>   | <b>3</b>             | <b>1</b>         | <b>(19)</b>                                    | <b>(5)</b>           | <b>4</b>                | <b>34+</b>                | <b>25</b>                          | <b>(6)</b>       |
| <b>Nov. 16 1793</b>         | <b>50</b>                 | <b>2</b>   | <b>2</b>             | <b>1</b>         | <b>(40)</b>                                    | <b>(10)</b>          | <b>4</b>                | <b>59+</b>                | <b>(54)</b>                        | <b>(3)</b>       |
| <b>May 17 1794</b>          | <b>26</b>                 | <b>2</b>   | <b>1</b>             | <b>-</b>         | <b>4</b>                                       | <b>(2)</b>           | <b>1</b>                | <b>10+</b>                | <b>1</b>                           | <b>(12)</b>      |
| <b>Dec. 13 1794</b>         | <b>30</b>                 | <b>1</b>   | <b>3</b>             | <b>1</b>         | <b>4</b>                                       | <b>(9)</b>           | <b>1</b>                | <b>19+</b>                | <b>2</b>                           | <b>(14)</b>      |
| <b>Nov. 28 1795</b>         | <b>50</b>                 | <b>1</b>   | <b>2</b>             | <b>1</b>         | <b>2</b>                                       | <b>(7)</b>           | <b>1</b>                | <b>14+</b>                | <b>13</b>                          | <b>(21)</b>      |
| <b>Nov. 12 1796</b>         | <b>50</b>                 | <b>2</b>   | <b>2</b>             | <b>(1)</b>       | <b>(38)</b>                                    | <b>(9)</b>           | <b>1</b>                | <b>53+</b>                | <b>(48)</b>                        | <b>(13)</b>      |
| June 24 1797                | 32                        | 1  | 1                    | 3                | 6  | (1)                  | -                       | 12+                       | 3                                  | 6                |
| Sept. 30 1797               | 14                        | 1  | 1                    | 8                | -  | (1)                  | -                       | 11+                       | 1                                  | 5                |
| Dec. 30 1797                | 13                        | 1  | 4                    | -                | 2  | (1)                  | 1                       | 9+                        | -                                  | -                |
| Mar. 24 1798                | 12                        | 1  | 4                    | -                | 4  | -                    | 1                       | 10+                       | -                                  | -                |
| <b>June 23 1798</b>         | <b>13</b>                 | <b>3</b>   | <b>2</b>             | <b>(1)</b>       | <b>12</b>                                      | <b>(3)</b>           | <b>1</b>                | <b>22+</b>                | <b>(21)</b>                        | <b>5</b>         |
| <b>Sept. 22 1798</b>        | <b>13</b>                 | <b>3</b>   | <b>4</b>             | <b>1</b>         | <b>(33)</b>                                    | <b>(4)</b>           | <b>2</b>                | <b>47+</b>                | <b>(5)</b>                         | <b>6</b>         |
| Dec. 22 1798                | 13                        | 1  | -                    | 1                | 7  | (1)                  | 1                       | 11+                       | 5                                  | (1)              |
| Mar. 23 1799                | 13                        | 1  | -                    | -                | (5)  | (1)                  | 1                       | 8+                        | -                                  | -                |
| June 22 1799                | 13                        | 1  | 4                    | -                | 7  | (1)                  | -                       | 13+                       | 2                                  | 5                |
| <b>Sept. 21 1799</b>        | <b>13</b>                 | <b>1</b>   | <b>5</b>             | <b>-</b>         | <b>(27)</b>                                    | <b>(4)</b>           | <b>1</b>                | <b>38+</b>                | <b>(16)</b>                        | <b>9</b>         |
| Dec. 21 1799                | 13                        | 1  | 5                    | -                | 8  | (1)                  | -                       | 15+                       | -                                  | 1                |
| Mar. 22 1800                | 13                        | 1  | 5                    | -                | 3  | (1)                  | 1                       | 11+                       | -                                  | -                |
| June 21 1800                | 13                        | 1  | 7                    | -                | 4  | (1)                  | 1                       | 14+                       | 2                                  | 4                |
| <b>Aug. 9 1800</b>          | <b>7</b>                  | <b>3</b>   | <b>5</b>             | <b>2</b>         | <b>21</b>                                      | <b>(4)</b>           | <b>1</b>                | <b>36+</b>                | <b>3</b>                           | <b>2</b>         |
| <b>Oct. 4 1800</b>          | <b>13</b>                 | <b>3</b>   | <b>6</b>             | <b>2</b>         | <b>23</b>                                      | <b>(4)</b>           | <b>1</b>                | <b>39+</b>                | <b>(1)</b>                         | <b>(6)</b>       |
| Dec. 20 1800                | 11                        | 1  | -                    | -                | 8  | (1)                  | 1                       | 11+                       | -                                  | -                |
| Mar. 21 1801                | 13                        | 1  | -                    | -                | 6  | (1)                  | 1                       | 9+                        | -                                  | -                |
| May 9 1801                  | 7                         | 1  | -                    | -                | 4  | (1)                  | 1                       | 7+                        | (1)                                | -                |
| <b>June 27 1801</b>         | <b>7</b>                  | <b>3</b>   | <b>4</b>             | <b>2</b>         | <b>18</b>                                      | <b>(5)</b>           | <b>1</b>                | <b>33+</b>                | <b>(1)</b>                         | <b>3</b>         |
| <b>Aug. 22 1801</b>         | <b>7</b>                  | <b>3</b>   | <b>4</b>             | <b>1</b>         | <b>23</b>                                      | <b>(7)</b>           | <b>1</b>                | <b>39+</b>                | <b>5</b>                           | <b>(2)</b>       |
| <b>Sept. 19 1801</b>        | <b>4</b>                  | <b>3</b>   | <b>10</b>            | <b>2</b>         | <b>18</b>                                      | <b>(6)</b>           | <b>1</b>                | <b>40+</b>                | <b>(1)</b>                         | <b>1</b>         |
| Oct. 24 1801                | 5                         | 1  | -                    | -                | 5  | (1)                  | 1                       | 8+                        | -                                  | (1)              |
| Dec. 19 1801                | 8                         | 1  | -                    | -                | 3  | (1)                  | -                       | 5+                        | -                                  | 1                |
| Mar. 20 1802                | 13                        | 1  | -                    | -                | 4  | (1)                  | 1                       | 7+                        | 4                                  | -                |
| May 8 1802                  | 7                         | 1  | -                    | -                | 2  | (1)                  | 1                       | 5+                        | (1)                                | 1                |
| <b>Aug. 21 1802</b>         | <b>15</b>                 | <b>1</b>   | <b>(3)</b>           | <b>-</b>         | <b>12</b>                                      | <b>(6)</b>           | <b>-</b>                | <b>22+</b>                | <b>(8)</b>                         | <b>7</b>         |

|                     |           |          |             |            |             |            |          |            |             |            |
|---------------------|-----------|----------|-------------|------------|-------------|------------|----------|------------|-------------|------------|
| <b>Oct. 23 1802</b> | <b>9</b>  | <b>4</b> | <b>4</b>    | <b>2</b>   | <b>16</b>   | <b>(4)</b> | <b>1</b> | <b>31+</b> | <b>8</b>    | <b>(8)</b> |
| Dec. 18 1802        | 8         | 1        | -           | -          | 3           | (1)        | 1        | 6+         | -           | -          |
| Mar. 26 1803        | 14        | 1        | -           | -          | 4           | (1)        | -        | 6+         | -           | 1          |
| <b>June 18 1803</b> | <b>12</b> | <b>1</b> | <b>(11)</b> | <b>(2)</b> | <b>2</b>    | <b>-</b>   | <b>-</b> | <b>16+</b> | <b>2</b>    | <b>(9)</b> |
| <b>Nov. 26 1803</b> | <b>23</b> | <b>3</b> | <b>9</b>    | <b>1</b>   | <b>21</b>   | <b>(5)</b> | <b>1</b> | <b>40+</b> | <b>13</b>   | <b>3</b>   |
| Mar. 17 1804        | 16        | 1        | -           | -          | 6           | (2)        | 1        | 10+        | -           | -          |
| May 26 1804         | 10        | 1        | 6           | -          | 6           | (1)        | 1        | 15+        | -           | 1          |
| <b>Sept. 8 1804</b> | <b>15</b> | <b>1</b> | <b>10</b>   | <b>-</b>   | <b>14</b>   | <b>-</b>   | <b>-</b> | <b>25+</b> | <b>(4)</b>  | <b>5</b>   |
| <b>Nov. 10 1804</b> | <b>9</b>  | <b>4</b> | <b>6</b>    | <b>1</b>   | <b>8</b>    | <b>(3)</b> | <b>1</b> | <b>23+</b> | <b>(3)</b>  | <b>(3)</b> |
| Mar. 2 1805         | 16        | 1        | (2)         | 1          | 4           | -          | 1        | 9+         | -           | -          |
| May 11 1805         | 10        | 1        | (4)         | -          | 4           | (3)        | 1        | 13+        | -           | -          |
| <b>Oct. 19 1805</b> | <b>23</b> | <b>4</b> | <b>10</b>   | <b>-</b>   | <b>(22)</b> | <b>(7)</b> | <b>1</b> | <b>44+</b> | <b>(4)</b>  | <b>(2)</b> |
| <b>Dec. 21 1805</b> | <b>9</b>  | <b>4</b> | <b>14</b>   | <b>1</b>   | <b>(7)</b>  | <b>(2)</b> | <b>-</b> | <b>28+</b> | <b>(2)</b>  | <b>(2)</b> |
| <b>Jan. 25 1806</b> | <b>5</b>  | <b>1</b> | <b>(4)</b>  | <b>1</b>   | <b>22</b>   | <b>(2)</b> | <b>1</b> | <b>31+</b> | <b>(3)</b>  | <b>2</b>   |
| Apr. 26 1806        | 13        | 1        | (3)         | 1          | 8           | -          | 1        | 14+        | -           | 1          |
| July 5 1806         | 10        | 1        | (4)         | -          | 10          | -          | 1        | 16+        | -           | -          |
| <b>Dec.13 1806</b>  | <b>23</b> | <b>4</b> | <b>11</b>   | <b>1</b>   | <b>(19)</b> | <b>5</b>   | <b>1</b> | <b>40+</b> | <b>(8)</b>  | <b>(1)</b> |
| Apr. 11 1807        | 17        | 1        | (5)         | 1          | 7           | (1)        | 1        | 15+        | -           | -          |
| July 18 1807        | 14        | 1        | 10          | -          | 5           | (1)        | 1        | 18+        | (2)         | -          |
| <b>Oct. 24 1807</b> | <b>14</b> | <b>4</b> | <b>(8)</b>  | <b>2</b>   | <b>11</b>   | <b>-</b>   | <b>-</b> | <b>25+</b> | <b>1</b>    | <b>(2)</b> |
| Jan. 23 1808        | 13        | 1        | 1           | 1          | 2           | (3)        | 1        | 9+         | -           | 1          |
| Apr. 23 1808        | 13        | 1        | 2           | 2          | -           | (1)        | -        | 6+         | 1           | (2)        |
| July 23 1808        | 13        | 1        | 4           | 1          | -           | (1)        | -        | 7+         | (1)         | 3          |
| Oct. 22 1808        | 13        | 1        | 9           | 2          | 1           | (1)        | 1        | 15+        | -           | (2)        |
| Dec. 31 1808        | 10        | 1        | 9           | 2          | 3           | (1)        | -        | 16+        | -           | -          |
| Apr. 1 1809         | 13        | 1        | 5           | 1          | 2           | (1)        | -        | 10+        | 6           | -          |
| July 22 1809        | 16        | 1        | 11          | -          | 2           | -          | -        | 14+        | 7           | -          |
| Nov. 4 1809         | 15        | 1        | (5)         | 1          | 2           | (1)        | -        | 10+        | -           | (1)        |
| Feb. 3 1810         | 13        | 1        | 9           | (5)        | 2           | -          | -        | 17+        | -           | -          |
| May 5 1810          | 13        | 1        | 9           | 6          | 4           | (2)        | 1        | 23+        | -           | 2          |
| <b>Nov. 10 1810</b> | <b>27</b> | <b>4</b> | <b>(7)</b>  | <b>2</b>   | <b>(13)</b> | <b>(2)</b> | <b>2</b> | <b>30+</b> | <b>(13)</b> | <b>(2)</b> |
| Feb. 9 1811         | 13        | 1        | 5           | -          | 3           | -          | 1        | 10+        | -           | -          |
| May 11 1811         | 13        | 1        | 5           | -          | (8)         | -          | 1        | 15+        | (1)         | -          |
| <b>Nov. 9 1811</b>  | <b>26</b> | <b>4</b> | <b>7</b>    | <b>3</b>   | <b>(15)</b> | <b>(1)</b> | <b>1</b> | <b>31+</b> | <b>(16)</b> | <b>(3)</b> |
| Feb. 8 1812         | 13        | 1        | 1           | -          | 1           | (1)        | 2        | 6+         | 6           | -          |
| May 9 1812          | 13        | 1        | 4           | -          | 2           | (1)        | 1        | 9+         | (2)         | 1          |
| Aug. 8 1812         | 13        | 1        | 7           | -          | 1           | (1)        | 1        | 11+        | -           | 1          |
| Nov. 7 1812         | 13        | 1        | 8           | -          | 1           | -          | -        | 10+        | -           | (7)        |
| Feb. 6 1813         | 13        | 1        | 1           | -          | -           | (3)        | -        | 5+         | 4           | 3          |
| May 8 1813          | 13        | 1        | 1           | 1          | 1           | (3)        | 1        | 8+         | 4           | 1          |
| Aug. 7 1813         | 13        | 1        | 6           | -          | 1           | 1          | -        | 9+         | 1           | 3          |
| <b>Nov. 6 1813</b>  | <b>13</b> | <b>4</b> | <b>(9)</b>  | <b>3</b>   | <b>1</b>    | <b>-</b>   | <b>-</b> | <b>17+</b> | <b>2</b>    | <b>(3)</b> |
| Feb. 5 1814         | 13        | 1        | (9)         | -          | -           | (1)        | -        | 11+        | -           | -          |
| May 7 1814          | 13        | 1        | 4           | -          | 1           | (1)        | -        | 7+         | -           | 1          |
| Aug. 6 1814         | 13        | 1        | 4           | -          | -           | -          | -        | 5          | (2)         | (7)        |
| Nov. 5 1814         | 13        | 1        | (10)        | 1          | 1           | -          | -        | 13+        | (1)         | (1)        |
| Feb. 4 1815         | 13        | 1        | 5           | -          | -           | (1)        | -        | 7+         | 6           | -          |
| May 6 1815          | 13        | 1        | 1           | -          | 1           | (2)        | -        | 5+         | 2           | -          |
| Aug. 5 1815         | 13        | 1        | 12          | -          | -           | -          | -        | 13         | -           | -          |
| Nov. 4 1815         | 13        | 1        | 3           | 2          | -           | (2)        | -        | 8+         | 9           | (1)        |

|                     |           |          |          |          |          |          |          |            |             |             |
|---------------------|-----------|----------|----------|----------|----------|----------|----------|------------|-------------|-------------|
| Mar. 23 1816        | 20        | 1        | 3        | -        | -        | (1)      | -        | 5+         | 2           | -           |
| June 22 1816        | 13        | 1        | 9        | 2        | -        | -        | -        | 12+        | -           | -           |
| Sept. 21 1816       | 13        | 1        | 5        | -        | 3        | (1)      | -        | 10+        | -           | (1)         |
| Dec. 21 1816        | 13        | 1        | 5        | -        | 4        | -        | -        | 10+        | -           | -           |
| Mar. 22 1817        | 13        | 1        | 5        | -        | 3        | -        | 2        | 11+        | -           | (1)         |
| June 21 1817        | 13        | 1        | 5        | -        | 6        | -        | 2        | 14+        | -           | 1           |
| Sept. 20 1817       | 13        | 1        | 5        | -        | 6        | -        | 2        | 14+        | -           | -           |
| Dec. 20 1817        | 13        | 1        | 5        | -        | 3        | -        | 1        | 10+        | -           | -           |
| Mar. 21 1818        | 13        | 1        | 5        | -        | 3        | -        | -        | 9+         | -           | 1           |
| June 20 1818        | 13        | 1        | 5        | -        | 4        | -        | -        | 10+        | -           | -           |
| <b>Dec.12 1818</b>  | <b>25</b> | <b>2</b> | <b>3</b> | <b>2</b> | <b>1</b> | <b>-</b> | <b>-</b> | <b>8+</b>  | <b>(14)</b> | <b>(7)</b>  |
| Mar. 27 1819        | 15        | 1        | 5        | -        | 3        | -        | 1        | 10+        | -           | -           |
| <b>Dec. 11 1819</b> | <b>37</b> | <b>2</b> | <b>5</b> | <b>-</b> | <b>9</b> | <b>-</b> | <b>2</b> | <b>18+</b> | <b>(8)</b>  | <b>(17)</b> |
| Mar. 25 1820        | 15        | 1        | 5        | -        | 3        | -        | -        | 9+         | 6           | -           |
| June 24 1820        | 13        | 1        | 6        | -        | 3        | -        | -        | 10+        | 3           | -           |
| Sept. 23 1820       | 13        | 1        | 5        | -        | 1        | -        | -        | 7+         | -           | 1           |
| Dec. 30 1820        | 14        | 1        | 5        | -        | -        | (1)      | -        | 7+         | -           | -           |
| Mar. 31 1821        | 13        | 1        | 4        | -        | 1        | -        | 1        | 7+         | -           | 0           |
| June 30 1821        | 13        | 1        | 5        | -        | 2        | -        | -        | 8+         | -           | 1           |
| Sept. 29 1821       | 13        | 1        | 6        | -        | 3        | (1)      | -        | 11+        | -           | 2           |
| Dec. 29 1821        | 13        | 1        | 6        | -        | -        | -        | -        | 7          | -           | -           |
| Mar. 30 1822        | 13        | 1        | 6        | -        | 1        | -        | 1        | 9+         | 1           | 1           |
| June 29 1822        | 13        | 1        | 6        | -        | 2        | -        | -        | 9+         | 1           | 1           |
| Sept. 28 1822       | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Dec. 28 1822        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Mar. 29 1823        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| June 28 1823        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Sept. 27 1823       | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Dec. 27 1823        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Mar. 27 1824        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| June 26 1824        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Sept. 25 1824       | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Jan. 1 1825         | 14        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Apr. 2 1825         | 13        | 1        | 4        | -        | -        | -        | -        | 5          | -           | -           |
| July 2 1825         | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Oct. 1 1825         | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Dec. 31 1825        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Apr. 1 1826         | 13        | 1        | 4        | -        | -        | -        | -        | 5          | 1           | -           |
| July 1 1826         | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Sept. 30 1826       | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Dec. 30 1826        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Mar. 31 1827        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| June 30 1827        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Sept. 29 1827       | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Dec. 29 1827        | 13        | 1        | 4        | -        | -        | -        | -        | 5          | 1           | -           |
| Mar. 29 1828        | 13        | 1        | 4        | -        | -        | -        | -        | 5          | -           | -           |
| June 28 1828        | 13        | 1        | 5        | -        | -        | -        | -        | 6          | -           | -           |
| Sept. 27 1828       | 13        | 1        | 5        | -        | 1        | -        | -        | 7+         | -           | -           |
| Dec. 20 1828        | 12        | 1        | 5        | -        | -        | -        | -        | 6          | -           | 1           |
| Mar. 28 1828        | 14        | 1        | 4        | -        | -        | -        | -        | 5          | -           | -           |

|                      |           |          |           |           |          |            |          |            |             |            |
|----------------------|-----------|----------|-----------|-----------|----------|------------|----------|------------|-------------|------------|
| June 27 1829         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Sept. 26 1829        | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Dec. 26 1829         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Mar. 27 1830         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| June 26 1830         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Sept. 25 1830        | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Dec. 25 1830         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Mar. 26 1831         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| June 25 1831         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Sept. 24 1831        | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Dec. 31 1831         | 14        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Mar. 31 1832         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| June 30 1832         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Sept. 29 1832        | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Dec. 29 1832         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Mar. 30 1833         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| June 29 1833         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Sept. 28 1833        | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Dec. 28 1833         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Mar. 29 1834         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| June 28 1834         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| Sept. 27 1834        | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| June 27 1835         | 13        | 1        | 2         | -         | -        | -          | -        | 3          | -           | -          |
| <b>Dec 31 1835</b>   | <b>25</b> | <b>1</b> | <b>-</b>  | <b>9</b>  | <b>-</b> | <b>(3)</b> | <b>-</b> | <b>13+</b> | <b>-</b>    | <b>64</b>  |
| <b>Mar. 25 1836</b>  | <b>12</b> | <b>2</b> | <b>3</b>  | <b>-</b>  | <b>-</b> | <b>(2)</b> | <b>-</b> | <b>7+</b>  | <b>43</b>   | <b>(8)</b> |
| <b>June 25 1836</b>  | <b>16</b> | <b>1</b> | <b>14</b> | <b>-</b>  | <b>-</b> | <b>(1)</b> | <b>1</b> | <b>16+</b> | <b>35</b>   | <b>5</b>   |
| <b>Sept. 24 1836</b> | <b>13</b> | <b>2</b> | <b>14</b> | <b>-</b>  | <b>-</b> | <b>(1)</b> | <b>-</b> | <b>17+</b> | <b>(24)</b> | <b>3</b>   |
| <b>Dec. 24 1836</b>  | <b>13</b> | <b>2</b> | <b>9</b>  | <b>-</b>  | <b>-</b> | <b>(1)</b> | <b>-</b> | <b>12+</b> | <b>19</b>   | <b>-</b>   |
| <b>Mar. 25 1837</b>  | <b>13</b> | <b>2</b> | <b>7</b>  | <b>-</b>  | <b>-</b> | <b>(1)</b> | <b>-</b> | <b>10+</b> | <b>17</b>   | <b>-</b>   |
| <b>June 24 1837</b>  | <b>13</b> | <b>2</b> | <b>6</b>  | <b>-</b>  | <b>-</b> | <b>(1)</b> | <b>-</b> | <b>9+</b>  | <b>23</b>   | <b>2</b>   |
| <b>Sept. 25 1837</b> | <b>13</b> | <b>2</b> | <b>3</b>  | <b>-</b>  | <b>-</b> | <b>(2)</b> | <b>-</b> | <b>7+</b>  | <b>19</b>   | <b>13</b>  |
| <b>Dec. 25 1837</b>  | <b>13</b> | <b>2</b> | <b>12</b> | <b>-</b>  | <b>-</b> | <b>(4)</b> | <b>-</b> | <b>18+</b> | <b>23</b>   | <b>-</b>   |
| <b>Mar. 25 1838</b>  | <b>13</b> | <b>2</b> | <b>19</b> | <b>-</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>21</b>  | <b>20</b>   | <b>-</b>   |
| <b>June 24 1838</b>  | <b>13</b> | <b>2</b> | <b>23</b> | <b>3</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>28</b>  | <b>7</b>    | <b>5</b>   |
| <b>Sept. 29 1838</b> | <b>14</b> | <b>2</b> | <b>16</b> | <b>-</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>18</b>  | <b>18</b>   | <b>-</b>   |
| <b>Dec. 29 1838</b>  | <b>13</b> | <b>2</b> | <b>10</b> | <b>12</b> | <b>-</b> | <b>-</b>   | <b>-</b> | <b>24</b>  | <b>10</b>   | <b>3</b>   |
| <b>Mar. 30 1839</b>  | <b>13</b> | <b>2</b> | <b>29</b> | <b>-</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>31</b>  | <b>18</b>   | <b>-</b>   |
| <b>June 29 1839</b>  | <b>13</b> | <b>2</b> | <b>42</b> | <b>6</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>50</b>  | <b>11</b>   | <b>1</b>   |
| <b>Sept. 29 1839</b> | <b>13</b> | <b>2</b> | <b>43</b> | <b>2</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>47</b>  | <b>16</b>   | <b>1</b>   |
| <b>Dec. 28 1839</b>  | <b>13</b> | <b>3</b> | <b>41</b> | <b>-</b>  | <b>-</b> | <b>(2)</b> | <b>-</b> | <b>46+</b> | <b>7</b>    | <b>3</b>   |
| <b>Mar. 28 1840</b>  | <b>13</b> | <b>3</b> | <b>32</b> | <b>-</b>  | <b>-</b> | <b>(1)</b> | <b>-</b> | <b>36+</b> | <b>19</b>   | <b>3</b>   |
| <b>June 27 1840</b>  | <b>13</b> | <b>3</b> | <b>35</b> | <b>-</b>  | <b>-</b> | <b>(1)</b> | <b>-</b> | <b>39+</b> | <b>5</b>    | <b>-</b>   |
| <b>Sept. 26 1840</b> | <b>13</b> | <b>4</b> | <b>22</b> | <b>-</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>26</b>  | <b>2</b>    | <b>4</b>   |
| <b>Dec. 26 1840</b>  | <b>13</b> | <b>3</b> | <b>39</b> | <b>-</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>42</b>  | <b>2</b>    | <b>-</b>   |
| <b>Mar. 27 1841</b>  | <b>13</b> | <b>5</b> | <b>10</b> | <b>3</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>18</b>  | <b>1</b>    | <b>1</b>   |
| <b>June 26 1841</b>  | <b>13</b> | <b>4</b> | <b>11</b> | <b>-</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>15</b>  | <b>30</b>   | <b>1</b>   |
| <b>Oct. 9 1841</b>   | <b>15</b> | <b>4</b> | <b>9</b>  | <b>-</b>  | <b>-</b> | <b>-</b>   | <b>-</b> | <b>13</b>  | <b>50</b>   | <b>-</b>   |
| <b>Feb. 26 1842</b>  | <b>20</b> | <b>4</b> | <b>7</b>  | <b>-</b>  | <b>X</b> | <b>-</b>   | <b>X</b> | <b>11</b>  | <b>27</b>   | <b>3</b>   |
| <b>July 2 1842</b>   | <b>18</b> | <b>3</b> | <b>28</b> | <b>26</b> | <b>X</b> | <b>-</b>   | <b>X</b> | <b>57</b>  | <b>33</b>   | <b>29</b>  |
| <b>Oct. 15 1842</b>  | <b>15</b> | <b>5</b> | <b>68</b> | <b>2</b>  | <b>X</b> | <b>(1)</b> | <b>X</b> | <b>76+</b> | <b>(40)</b> | <b>-</b>   |

|                      |           |          |           |            |              |          |          |             |            |          |
|----------------------|-----------|----------|-----------|------------|--------------|----------|----------|-------------|------------|----------|
| <b>Jan. 14 1843</b>  | <b>13</b> | <b>3</b> | <b>29</b> | <b>(1)</b> | <b>(4)/X</b> | <b>-</b> | <b>X</b> | <b>37+</b>  | <b>49</b>  | <b>1</b> |
| <b>Apr. 15 1843</b>  | <b>13</b> | <b>3</b> | <b>32</b> | <b>1</b>   | <b>X</b>     | <b>-</b> | <b>X</b> | <b>36</b>   | <b>12</b>  | <b>1</b> |
| <b>July 15 1843</b>  | <b>13</b> | <b>3</b> | <b>17</b> | <b>-</b>   | <b>X</b>     | <b>-</b> | <b>X</b> | <b>20</b>   | <b>37</b>  | <b>2</b> |
| <b>Oct. 14 1843</b>  | <b>13</b> | <b>4</b> | <b>64</b> | <b>-</b>   | <b>X</b>     | <b>-</b> | <b>X</b> | <b>68</b>   | <b>12</b>  | <b>-</b> |
| <b>Jan. 13 1844</b>  | <b>13</b> | <b>2</b> | <b>-</b>  | <b>-</b>   | <b>X</b>     | <b>-</b> | <b>X</b> | <b>2</b>    | <b>60</b>  | <b>2</b> |
| <b>July 13 1844</b>  | <b>26</b> | <b>3</b> | <b>1</b>  | <b>-</b>   | <b>X</b>     | <b>-</b> | <b>X</b> | <b>4</b>    | <b>92</b>  | <b>6</b> |
| <b>Oct. 12 1844</b>  | <b>13</b> | <b>4</b> | <b>40</b> | <b>21</b>  | <b>X</b>     | <b>-</b> | <b>X</b> | <b>65</b>   | <b>15</b>  | <b>-</b> |
| <b>Jan. 25 1845</b>  | <b>14</b> | <b>3</b> | <b>5</b>  | <b>18</b>  | <b>(6)/X</b> | <b>-</b> | <b>X</b> | <b>32+</b>  | <b>66</b>  | <b>3</b> |
| <b>May 10 1845</b>   | <b>15</b> | <b>2</b> | <b>11</b> | <b>2</b>   | <b>X</b>     | <b>-</b> | <b>X</b> | <b>15</b>   | <b>13</b>  | <b>2</b> |
| <b>Oct. 30 1845</b>  | <b>26</b> | <b>2</b> | <b>7</b>  | <b>2</b>   | <b>(8)/X</b> | <b>-</b> |          | <b>19+</b>  | <b>101</b> | <b>5</b> |
| <b>Apr. 11 1846</b>  | <b>23</b> | <b>2</b> | <b>2</b>  | <b>-</b>   | <b>X</b>     | <b>-</b> | <b>X</b> | <b>4</b>    | <b>46</b>  | <b>1</b> |
| <b>July 20 1846</b>  | <b>14</b> | <b>4</b> | <b>44</b> | <b>1</b>   | <b>(4)/X</b> | <b>-</b> | <b>X</b> | <b>53+</b>  | <b>46</b>  | <b>-</b> |
| <b>Oct. 17 1846</b>  | <b>12</b> | <b>4</b> | <b>61</b> | <b>1</b>   | <b>(6)/X</b> | <b>-</b> | <b>X</b> | <b>72+</b>  | <b>38</b>  | <b>-</b> |
| <b>Jan. 9 1847</b>   | <b>12</b> | <b>4</b> | <b>21</b> | <b>1</b>   | <b>(9)</b>   | <b>-</b> | <b>X</b> | <b>35+</b>  | <b>8</b>   | <b>1</b> |
| <b>May 8 1847</b>    | <b>17</b> | <b>3</b> | <b>19</b> | <b>1</b>   | <b>X</b>     | <b>-</b> | <b>X</b> | <b>23</b>   | <b>12</b>  | <b>1</b> |
| <b>Sept. 10 1847</b> | <b>18</b> | <b>5</b> | <b>98</b> | <b>2</b>   | <b>(2)/X</b> |          |          | <b>107+</b> | <b>18</b>  | <b>3</b> |
| <b>Jan. 1 1848</b>   | <b>16</b> | <b>2</b> | <b>5</b>  | <b>1</b>   | <b>(1)/X</b> | <b>-</b> | <b>X</b> | <b>9+</b>   | <b>115</b> | <b>2</b> |
| <b>Jan. 1 1849</b>   | <b>52</b> | <b>2</b> | <b>-</b>  | <b>-</b>   | <b>X</b>     | <b>-</b> | <b>X</b> | <b>2</b>    | <b>90</b>  | <b>1</b> |
| <b>Jan. 1 1850</b>   | <b>52</b> | <b>2</b> | <b>-</b>  | <b>-</b>   | <b>X</b>     | <b>-</b> | <b>X</b> | <b>2</b>    | <b>99</b>  | <b>4</b> |
| Jan. 1 1851          | 52        | 1        | -         | -          | -            | -        | X        | 1           | -          | 13       |
| Jan. 14 1854         | 158       | -        | -         | -          | -            | -        | -        | 0           | -          | 55       |