Mining History: The Bulletin of the Peak District Mines Historical Society. Volume 15 , No. 1, Summer 2002.

THE MOW COP TUNNEL AND TRAMWAYS OF THE NORTH STAFFORDSHIRES - CHESHIRE BORDER.

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Abstract: Two tramroads of the early 19th century were examined. A 380 yard-long tramway tunnel, constructed in 1832 which served the early coal pits of North Staffordshire, was re-excavated and entered for the first time in, probably, 120 years. No records are known to exist and no previous field research is known. This paper presents a record of features and artefacts found.

INTRODUCTION

Prior to the demise of the Chatterley Whitfield Mining Museum near Biddulph we (see acknowledgments) tried to establish a presentation of early mining in the Biddulph Valley, as the museum only represented the end of the story. A number of artefacts were recorded or recovered from the Victoria Colliery site nearby as the "lid" was removed by opencasting. These included notably, the Brindley Ford Colliery steam engine from the pit bottom engine house (see note by Barry Job, PDMHS *Newsletter* 68 of 1993). *In situ* evidence of early bell pits, and footrills in the steeply dipping seams and extant surface evidence of early transport systems was photographed. Amongst these remains was the 1803 tramway and the 1832 tramway and its Mow Cop Tunnel, which we decided to investigate further and attempt to gain access.

The coal seams of the Biddulph Valley are numerous, thick and of high quality. However, before the advent of steam power, the lack of roads, steep valley sides and insularity of the area limited the coal's sale to the local market.

THE 1803 TRAMROAD

A limited expansion of the coal market was achieved in 1803 by constructing a horse-drawn, "iron-railed" way, from Tower Hill and Stonetrough Collieries. This covered a distance of three miles, to Congleton Moss in Cheshire and supplied coal for domestic use and the developing textile industry. Efforts by various writers of industrial history to record the 'railed' way have contributed little beyond comment on the route and even this appears to have been confused with a raised section of probable pack horse route, a causey, through marshland, evidenced by coal spillage along the entire raised length. Waggon size and rail gauge were also under-estimated.

We examined a length of least-disturbed embankment and a number of isolated sleeper blocks were discovered *in situ*. Further excavation revealed a 45 feet section of stone sleepers. A simple peg and line survey through the sleeper block holes on both sides gives a gauge of four feet on blocks at three feet centres.

The rails of cast iron are known to have had an oval, 'fish bellied' section, each three feet long with flat seating-pads cast into the ends. Two semi-circular holes cast into the flange ends butted together thus forming a pair of holes to be spiked into the plugged stone blocks. Of approximately eleven thousand rails at three feet length required on the three mile length of track only one is known to date to have survived. This can be seen in the Chapel Museum at Mow Cop.

An incomplete waggon wheel of cast iron, recovered by the farmer Mr Potts, is of a concave rim type, i.e. U-shaped to match the oval rails.

THE 1832 TRAMROAD

A more cunning, technology-aided search, of the route is planned. By 1831, however, further expansion of the market was required as production capacity increased. Thus an agreement was reached in 1832, between the landowners and the lessees of Tower Hill and Stonetrough Collieries, to construct a new horse-drawn tramway. This would connect the mines to the recently completed Macclesfield Canal in Cheshire. This canal is some two miles from the collieries and on the opposite side of Mow Cop ridge.

The tramway construction involved the driving of a tunnel large enough to take horse-drawn, railed, waggons under the summit of the 1000 feet altitude, gritstone ridge, to join two gravity-brake inclines down to the canal wharf at Kent Green, Cheshire.

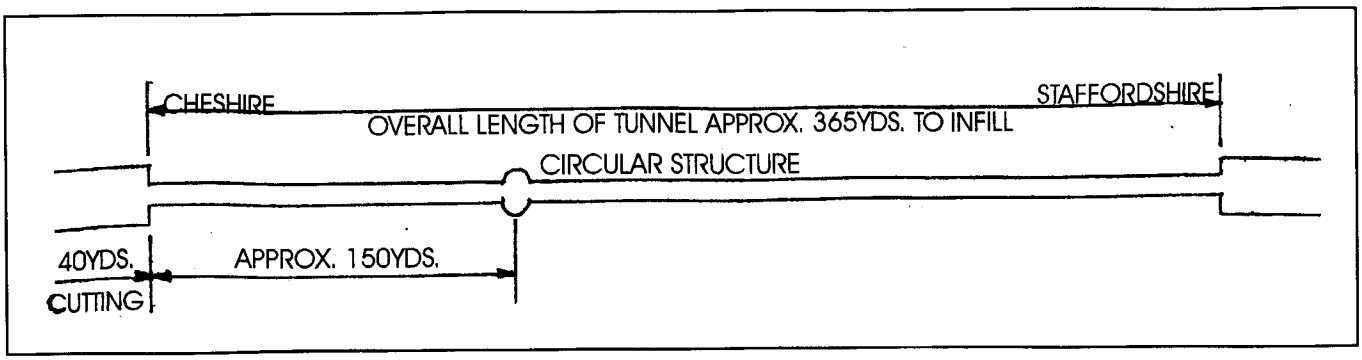
No records are known to exist of this 170 years old, long-lost subterranean mining feature and the paucity of local knowledge is probably due to later settlement by people from outside the area.

The pits served by the tramway are known to have been abandoned circa 1880 when production transferred to the rapidly expanding Victoria Pit, on the Biddulph section of the North Staffordshire Railway. It is therefore likely that the tramway and tunnel became redundant at this time. Rail salvage and infilling of the tunnel portals probably followed shortly afterwards, in order to surrender the land leases.

GAINING ACCESS

An inspection of the postulated position of the old portal area revealed limitations that precluded excavation on the east, Staffordshire, side. However, on the west side, it revealed a fenced off cutting, with an arched brickwork crown concealed in mud and accumulation of domestic detritus, with a strong outfall of water. Permission was granted by the owner, who lives above the portal, to excavate by hand, with limitations imposed by ourselves to protect the owner's property and privacy. Further inspection of the collapsed and in-filled portal revealed the tunnel to be full to within one foot of the crown with water, as expected.

A carefully controlled dewatering programme had to be undertaken to prevent inundation of the cottages below by some two thousand tons of brackish mine water. The old tunnel was then entered for the first time in probably 120 years via the excavated west portal.



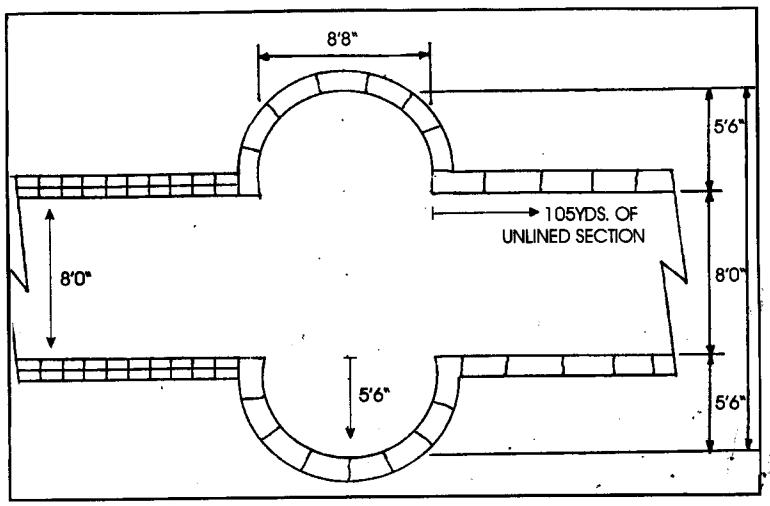


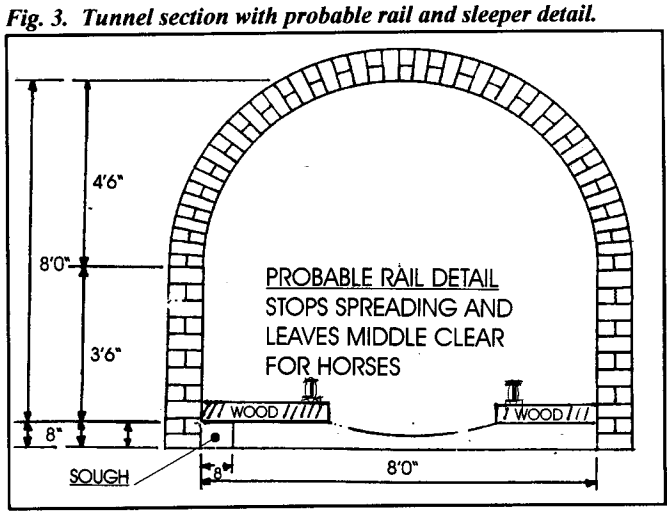
Fig. 1 (top). Sketch plan of Mow Cop tunnel.
Fig. 2 (above). Plan view of the circular structure.

DESCRIPTION OF THE TUNNEL

The double brick lining constructed through areas of instability, mostly 'drift', was found to be in good condition, except at the east end. The length of the tunnel to the stopping at the east portal is 366 yards, with a further 14 yards of stopping under the highway to the portal itself. Alignment is straight and accurate and the floor is graded at 1:150 to fall both ways from the approximate centre (Fig. 1).

Semi-circular brick lining supports the first 45 yards (Plate 1), a further 15 yards of side walls continue without arching into solid rock, no roof support being required. The lined section is approximately eight feet high and wide. This suggests that the side walls were built in 'advance'. The arching former was then placed on the side wall and released off wedges as the section advanced.

Fig. 3. Tunnel section with probable rail and sleeper detail.



Drain holes, six inches square were made in the lining twenty-four inches up from the floor and approximately five feet apart. Ochre, leaching from the drain holes, has deposited vivid yellow, red and orange, fan-shaped, colouration on the lining, as the iron oxides or hydroxides, migrated via the water. Leaching of the lime mortar, almost certainly burned at a small periclinal limestone inlier at nearby Astbury, has formed long stalactite straws from the roof. Further deposits form brightly coloured 'stal' formations and ochre beds in the unlined sections, curiously contorted, which were probably formed underwater. Black deposits leaching from bedding planes may be due to low amounts of iron or manganese, forms of colouration noted at this horizon in other areas. This extraordinary colouration prompted the video recording of the tunnel by Dave Webb and Ralph Johnson.

Approximately 30 yards in from the portal there is evidence of the tunnel level having been 'lost'. A gradual lowering of the roof lining has resulted in a one foot step up and a horizontal separation in the lining crown to re-establish the sole of the tunnel. This anomaly may be due to lack of supervision by the surveyor charged with the responsibility of the drivage.

Two further short lengths of lining exist through friable grey–white shale, probably seat earth with a dark marine-band, and shale top. A two-inch thick coal is also noted as the tunnel intersects the Chatsworth Grit possibly at the Ringinglow coal horizon with *Gastrioceras cancelatum*. The bedding plane at this point is near vertical, slickensided, and lets down a modest curtain of water across the tunnel. From here, a 170 yard unlined section is driven with gunpowder through solid, massive-bedded gritstone bisected by the Mow Cop fault (Plate2). Shot holes are evident throughout the unlined portion and are approximately 1¼ inches diameter drilled towards the east, indicative of the direction of driveage in this area. Further evidence to support this exists in the large, graded, inclined embankment below the west portal, which, by inference based on cost and convenience, came from the easterly driven heading. It is also possible that many of the estimated eight thousand stone sleeper blocks were also hewn from rock out of the tunnel.

Midway along the unlined section of tunnel a curious radial excavation exists, built into the walls from floor to roof with very neat substantial dressed dry stone lining (Fig. 2). This feature has been the subject of much speculation. It is held locally that a turning or stable existed in the tunnel, with an iron plate on the floor to allow the waggons to be turned around. However, the exact function of this important feature is uncertain and no *in situ* evidence exists to the contrary. In the

absence of a more prosaic explanation the above has to be considered at face value.

A number of short wooden sleepers were discovered which suggest the method used in laying the track in horse-drawn railway tunnels (see Fig 3). (A pair of these sleepers were deposited with the Chapel Museum at Mow Cop). Short sleepers extended from the tunnel walls at right-angles to the inside edge of the rails. The rails were fixed to the sleepers in the normal way with large dognails, at intervals of three feet assuming they were contemporary with the stone blocks revealed *in situ* on the tramway. This would have had the advantage of stopping rail-spread, while leaving the middle clear for the horses. However there is evidence of moderate to severe damage to the tunnel side walls at a height consistent with being rammed by loaded, derailed, waggons and it is possible the side sleepers were added later to avoid the frightful chaos that this would cause to both animal and driver in the confines of a dark wet tunnel.

At a point about twenty yards inbye of the blocked east portal, the tunnel crosses at right-angles under the highway. An unsubstantiated local report held that at this point a Sentinel steam lorry, loaded with stone from the nearby Castle Quarry (there is a large photograph of the fleet of the Sentinel steamers parked in the quarry to be seen in the Cheshire View public house at Mow Cop), collapsed through the road into an 'old working' circa 1930. We could not confirm this underground but the nature of the stopping gave cause for concern.

The potential for history repeating itself by one of today's 'Battleships of the road' presented us with a serious dilemma. This was resolved by using a precise radio location system operated by Ron Hammond and Ralph Johnson of Crewe Caving on surface and by Nigel Cooper and the writer of PDMHS underground. This confirmed that the road had indeed collapsed into the tunnel which had been backfilled to accommodate the contemporary traffic loadings of around 1930.

On completion of the tunnel phase of the

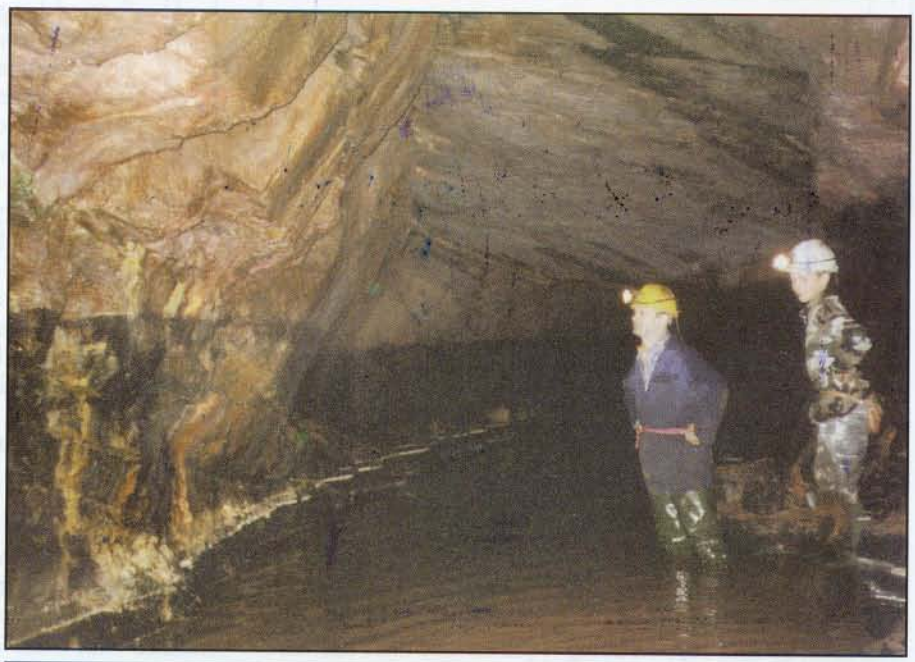


Plate 1. Brick-lined arch of the Mo Cop tunnel.
Plate 2. Chatsworth Grit exposed in tunnel section.
Plate 3. Three-rail section exposed on the incline.

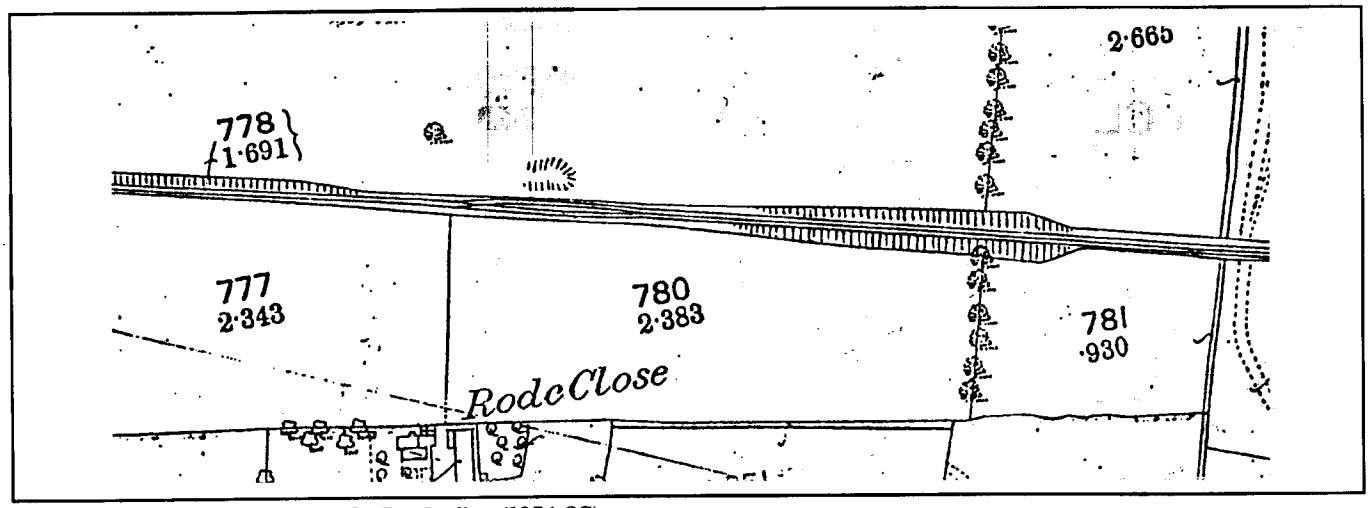


Fig. 4. Three-rail section of the Mo Cop Incline (1874 OS).

project our attention then concentrated on the outside tramways. No record of the type of rails or even the gauge-width was known and no obvious evidence could be seen by walking the route. The 1873 OS First edition map (Fig. 4) clearly shows not only the exact line but also the four, three and two rail system in use. The four rails are obvious where the waggons passed at the half way point on the brake inclines etc. as is the two rail horse-drawn section.

The three rail system is less self-evident. Loaded waggons on the down grade of the inclines provided the power to haul up the empties from the bottom. Above the half-way crossing-point the downward loads had to be separated from the upward moving rope to prevent the loaded waggons fouling the upward moving rope. This was achieved by the three rail system that operated above a point where the waggons passed on the inclines.

The only known complete and undisturbed section of the entire two mile long tramway was discovered quite by chance recently, as the author observed the farmer digging a land drain with a 'JCB' below the brow of the incline at the west end of the tunnel. Inspection revealed three large stone sleeper-blocks, each two feet square by a foot thick, excavated and placed at the side of the trench. The significance of this was explained to Mr Bibby the farmer who, to his everlasting credit, instantly volunteered to stop work. Further spadework by the author revealed three pairs of adjacent blocks *in situ*, that indicated the possibility of a whole section having survived. At this point local resident John Hancock volunteered his services. Thanks to his enthusiasm and penchant for spadework we have now unearthed a complete three-rail section, approximately 100 feet long by 12 feet wide (Plate 3).

The gauge appears to have been 4 feet 8 inches i.e. virtually standard. Every fifth sleeper block held a cast iron 'chair type joint', indicating a rolled wrought iron 'edge' type rail, 15 feet long by 3 inches wide at the base. It was secured to the stone blocks by two holes drilled to take wooden plugs. The rails were then nailed on to the plugged stone block with large dog-nails, in the normal way. Hopefully the bleak hillside now has a lasting monument to its early mining railways.

ACCIDENTS ON THE INCLINE

Long brake inclines of this period were not without their problems. A contemporary writer describes them as 'death traps'. Without visual communications and only primitive signaling, the dangers are obvious and, as evidenced from the following accounts from the *Woodcock School Log*, certainly occurred. The year is unknown but probably was just before closure.

(No date): *A child fell off the waggons on the brake and broke an arm.*

(June 2): *James Wilson was run over with the waggons this morning, he is badly hurt.*

(June 7): *James Wilson had his foot taken off.*

A fatality related to the incline between the Stonetrough and Towerhill collieries, at the beginning of the line was reported in the *Staffordshire Advertiser* (6/12/1856 - information supplied by John Hancock)

A few days ago Richard Sheldon was in the act of crossing a tram railway of the Towerhill and Stonetrough colliery, Mow Cop as three loaded waggons were being drawn up the incline. The unfortunate man became confused and appeared unable to move to left or right. Before the waggons could be stopped Sheldon was knocked down and so injured that he died on Saturday

CONCLUSIONS

Coal mining, once North Staffordshire's biggest industry, no longer exists in the area. The Chatterley Whitfield Mining Museum closed ten years ago though English Heritage are involved in the preservation of the site.

The old tunnel and a length of two hundred year old, inclined 'iron railed' way are the most tangible remains of the earlier phase of an industry that spanned over three centuries. The tunnel has now been sealed and left to nature. The excavated section of the 1832 tramway, however, though on private land, can be inspected with the owners permission.

ACKNOWLEDGMENTS

Sincere thanks for their assistance in this project are due to the following :- The late David Hopkins, Frank Kirkham, A. Bibby, Derek Wheelhouse, Nigel Cooper, John Hancock, Ron Hammond, Ralph Johnson and Dave Webb.

We are particularly indebted to Mr Bradbury the landowner for permission to dig up his land.

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