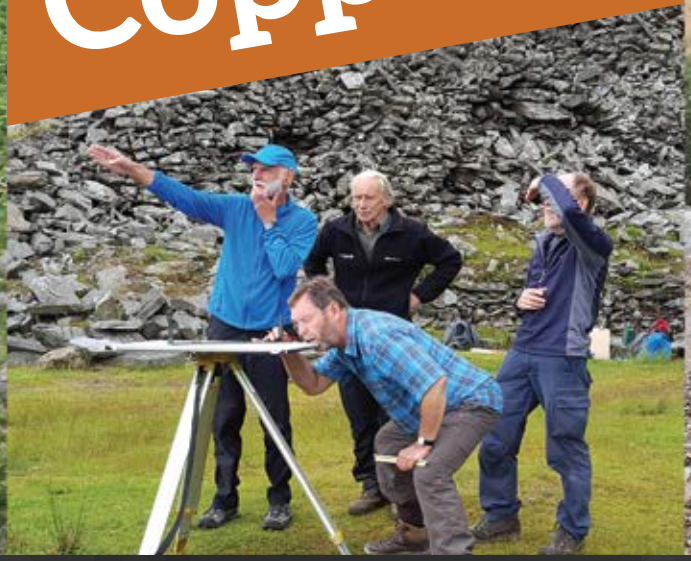
Coniston Copper



MINE AND MILL

The history and archaeology of Tilberthwaite Mine, Coniston

TILBERTHWAITE & PENNY RIGG, A TIMELINE

1500 - 1599

1534
- Henry VIII splits with the Roman Catholic Church

1538-1540
- Dissolution of the monasteries

1558
- Elizabeth I is crowned

1591
- First Shakespeare play performed

1599
- Company of Mines Royal starts work at Tilberthwaite mine (then known as the Three Kings Mine); copper ore taken by pack horse to Keswick for smelting

1600 - 1699

1600-1603
- Report by Company of Mines Royal recommends closure of Tilberthwaite Mine

1605
- Gunpowder Plot

1641-1651
- Civil War

1685
- Mines Royal Act ends royal monopoly on copper mining and opens industry to private investment

1690
- Tilberthwaite Mine (now known as Gillhead Mine) working again; water-powered stamps mill on site

1700 - 1749

1707
- Act of Union between England and Scotland

1714
- George I is crowned

1717
- Sir William Pennington grants lease of copper mines in the Manor of Tilberthwaite to Nehemiah Champion and James Gorton for a term of 21 years

1727
- George II is crowned

1730
- Champion and Gilbert leave Tilberthwaite Mine

1746
- The Jacobites are crushed at Culloden

1748
- Thomas Gorsuch working Tilberthwaite (Gillhead) Mine

1750 - 1799

1756
- The Macclesfield Copper Company takes out a lease on the Coniston copper mines, including parts of the Tilberthwaite Mine within the Manor of Coniston

1759
- Anthony Tissington, a Derbyshire mining entrepreneur, takes a 15 year lease on the mine from Sir John Pennington

1760
- Three miners working at Tilberthwaite on behalf of Tissington
- George is III crowned

1771
- Richard Arkwright introduces water powered loom

1776
- American Declaration of Independence

1795
- Macclesfield Copper Company gives up its lease

1799
- George Wilson and William Mitchell working the mine

MINE AND MILL

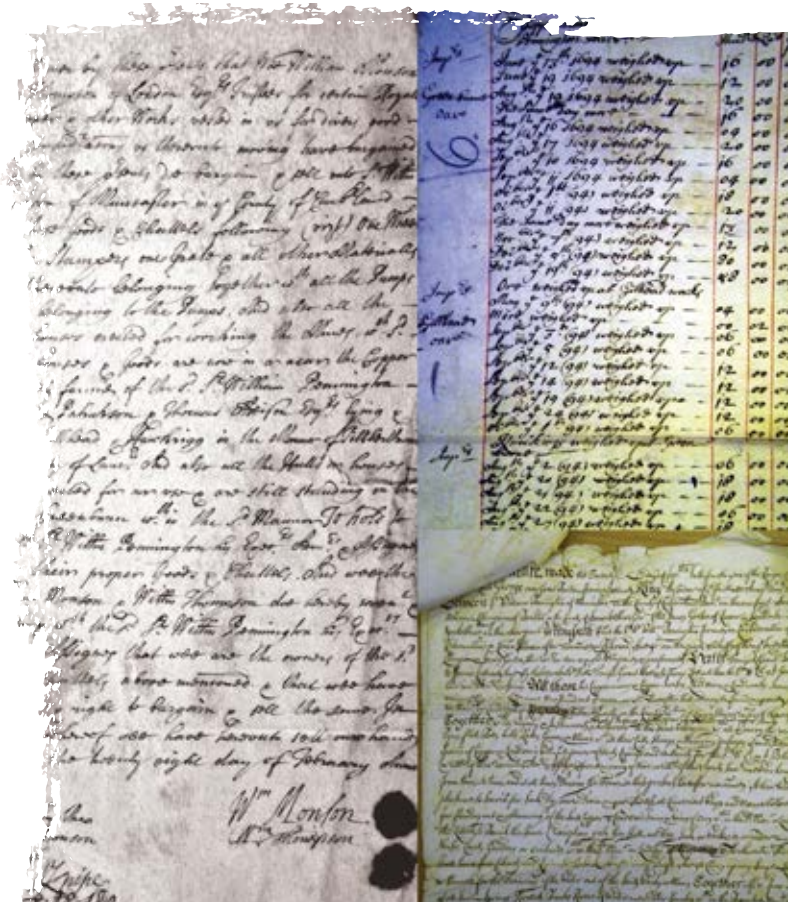
The history and archaeology of Tilberthwaite Mine, Coniston

Introduction

In a valley high up on the flanks of Wetherlam are the remains of an old mine. To the west is the dark bulk of Hen Crag and Wetherlam itself. To the north is Birk Fell and to the east is Blake Rigg. A stream, the Muckle Beck, runs through the site and on down to the south, through Muckle Gill, to join Tilberthwaite Gill. There is not much to be seen: the ruins of two buildings, a few brownish coloured spoil heaps, what was once a dam, the lines of some water leats, some fearful looking holes in the ground and the remains of a fence line that once must have passed through the site. This is Tilberthwaite Copper Mine.

The object of this booklet is to provide an account of how the mine evolved over the centuries, drawing on historical records and on an interpretation of the archaeological remains. During 2016 and 2017, archaeological and building surveys were undertaken of the surface remains at Tilberthwaite Mine, and the associated Penny Rigg Copper Mill, by local volunteers. A small excavation was also undertaken at Penny Rigg to help interpret the remains. The work, supervised by Northern Archaeological Associates, was commissioned by the Lake District National Park Authority as part of the Heritage Lottery funded 'Coniston Copper' project, a two-year scheme aimed at engaging local people in the history and conservation of the area's nationally important mining heritage.

The history of mining in the Coniston fells, including Tilberthwaite, has been well documented by others, especially the members of the Cumbria Amenity Trust Mining History Society (CATMHS), in particular Eric Holland in his book Coniston Copper: A History. However, these accounts have tended to embrace all copper mines in the Coniston area. While much of the history of the Tilberthwaite Mine is bound up with that of other mines in the area, in particular the development of copper mining in Copper Mines Valley, there is sufficient evidence of the, at times eventful, history of the mine to justify singling it out on its own. The following booklet summarises the results of this desk-based research and is intended to complement the archaeology and help in its interpretation.



An early prospection trench at Tilberthwaite Mine.

The Elizabethan years

The earliest known working of Tilberthwaite Mine probably dates from the very end of the 16th century. Until 1689, the Crown enjoyed a monopoly over minerals. Elizabeth I and her ministers were keen to exploit this and the Society of Mines Royal was set up in 1564 to search for and exploit gold, silver, copper and quicksilver within, amongst others, the counties of Cumberland, Lancashire and Westmorland. The level of interest in the venture was reflected in the 24 shareholders, who included a number of notable people, such as William Cecil, at that time Secretary to the Queen, and Robert Dudley, Earl of Leicester and the Queen's favourite.

The company invited a group of mining experts from Bavaria and the Tyrol, led by Daniel Hechstetter, to oversee the search for, extraction and smelting of copper and other ores in the three counties. In the early years of the Society, mining in the north was concentrated amongst the mountains and valleys around Keswick and it was not until the end of the century that work began in the Coniston area. It seems likely that Tilberthwaite was opened around the same time. Work focused on the Three Kings Mine, which was described in a report in 1693 as:

> *"being three works, and were wrought above forty fathoms apiece, the seam being above fourteen inches of very good ore, but a little troubled with water, having no sump to draw it away".*

Ore from the mine would have been taken by packhorse to the smelter at Keswick. The Three Kings Mine appears to have been the name given to the old open workings above and in Muckle Gill, the north-eastern extension of Tilberthwaite Gill, but just where in Muckle Gill is a matter for debate.

However, pessimistic forecasts about the prospects of the northern mines led to the appointment of a Commission in 1600 to enquire into the position. The commissioners viewed the mines at both Coniston and Tilberthwaite and noted that the latter was being carried on at a loss, in part because of the problem of draining the workings. They recommended that the mine should be abandoned. This recommendation appears to have been adopted, since there is no record of any further activity at Tilberthwaite until towards the end of the 17th century.

Early private investment

The Mines Royal Act of 1689 ended the royal monopoly on certain minerals, including copper, and the mineral rights were transferred to the owner of the land. This opened the door to private investment in mining and the first developments in the Coniston

area following the repeal of the royal monopoly may well have taken place at Tilberthwaite.

A document of sale in the CATMHS archives, dated 28th February 1690, refers to the sale of equipment and buildings:

" in or near the Copper Mines lately farmed of the said Sir William Pennington by Richard Patrickson and Thomas Anison Esqs lying and being at Gillhead and Hawkrigg in the Manor of Tilberthwaite…"

The Pennington family of Muncaster held the Manor of Tilberthwaite and Little Langdale, which lay on the east and north-east side of Muckle Gill. The Hawkrigg Mine lies to the north east of, and is separate from, Tilberthwaite Mine, but the mention of Gillhead is interesting. It is likely that Gillhead was the name given to the early workings in Muckle Gill. The names Gillhead or Muckle Gillhead seem to have been in use for the Tilberthwaite Mine until the second half of the 18th century.

The workings at Gillhead and Hawkrigg were evidently more than mere trials because the document of sale refers to:

"…One Wheel & all the Stampers ore Grate and all other Materials then & thereunto belonging together with all the Pumps and troughs belong to the Pumps And all the Huts and houses erected for working the Mines…"

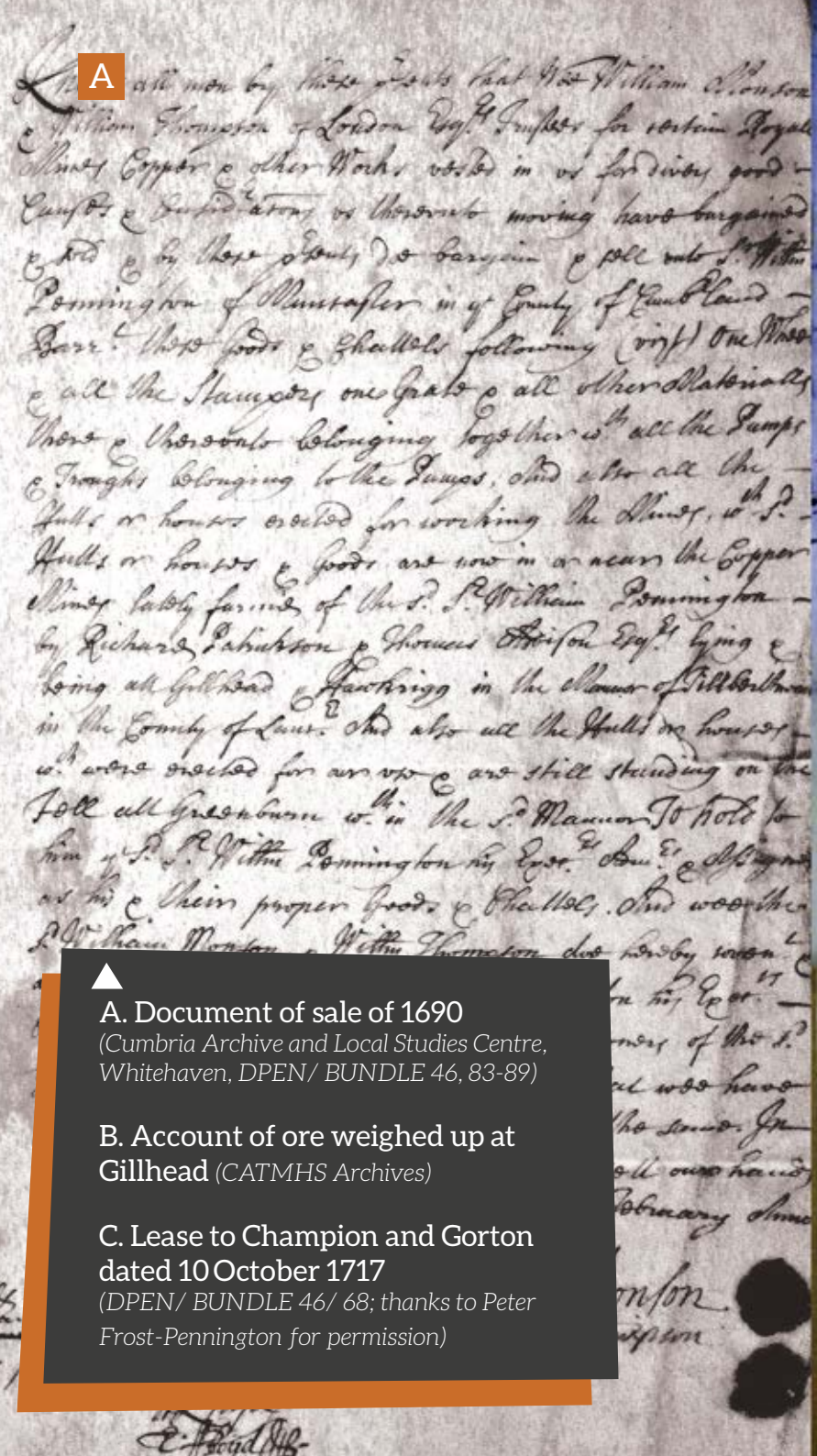
There is no doubt that work continued at Gillhead on the Muncaster royalty after the sale of the equipment. The Cumbria Archives in Whitehaven holds copies of accounts that detail monies received by Sir William Pennington from George Couperthwaite for ore weighed at Gillhead between 1694 and 1701.

The early 18th century

By the beginning of the 18th century, the mines on the Muncaster estate appear to have been at a standstill. However, on 10th October 1717, Sir William Pennington granted a lease of copper and other mines in the Manor of Tilberthwaite to Nehemiah Champion and James Gorton for a term of 21 years. It seems likely that the focus of interest was the Tilberthwaite Mine. It is not known how long Champion and Gorton were active. There is a letter in the Cumbria Archives at Whitehaven dated 14th August 1721 from William Pennington to Joseph Pennington referring to a boundary dispute with Sir William Fleming that was reported to him by:

"Mr Mitford who is one of those concerned in the farming of my mines in Langdale and Tilberthwaite"

The le Fleming family held the Manor of Coniston lying to the west and south west of Muckle Gill. As the copper veins at Tilberthwaite lay on either side of the beck, and in the case of the principal copper vein at Tilberthwaite, the North Lode, actually crossed the beck, the division of the mineral rights between the two estates caused some difficulties over the years. It has been suggested that Champion and Gorton had left Tilberthwaite by 1730.



A

B

C

A. Document of sale of 1690
(Cumbria Archive and Local Studies Centre, Whitehaven, DPEN/ BUNDLE 46, 83-89)

B. Account of ore weighed up at Gillhead *(CATMHS Archives)*

C. Lease to Champion and Gorton dated 10 October 1717
(DPEN/ BUNDLE 46/ 68; thanks to Peter Frost-Pennington for permission)

Charles Roe & Anthony Tissington

Following this, there seems to have been a period of inactivity at Tilberthwaite until 1747, at which time Sir John Pennington entered into negotiations with Thomas Gorsuch for a mining lease relating to the Manor of Tilberthwaite. The cover of the draft lease states that it was a lease of "Tilberthwaite Copper and Lead Mines". However, evidence suggests that the focus of the lessee's interest was Greenburn in the Little Langdale Valley (sometimes confusingly referred to as Tilberthwaite).

Gorsuch encountered problems at Greenburn and the lease may have been vacated for want of working as early as 1749. However, in a letter from the agent for the Muncaster Estate to Sir John Pennington, dated 20th November 1748, the former stated that the Bailiff of Langdale had told him that work was to begin at Gillhead. Mining leases at the time commonly granted rights to mine at large within a manor. Therefore, switching between sites was not uncommon. Whether anything came of this is unknown.

Meanwhile, activity was taking place within the Manor of Coniston. By 1756, Sir William Fleming had signed a 21 years lease on the copper mines in the Manor of Coniston with Charles Roe and Rowland Atkinson. Charles Roe was an industrialist who had copper mining interests in Cheshire and later in Wales. Roe's company, the Macclesfield Copper Co, was active on the Coniston royalty and, while his interest focused for the most part on the Bonsor Vein in Copper Mines Valley, it seems he was also working at Tilberthwaite. The lease was extended for a further 26 years in 1778. By 1781, Charles' son William had taken over the company, which proceeded to enlarge its sphere of activity. It entered into an option with Lord Pennington for the Pennington royalty "except certain parcels of ground under lease to Wilson". It is possible that the rights leased to Wilson may have related to the Tilberthwaite Mine, although there is no record of such a lease. However, work on the Bonsor Vein in Copper Mines Valley proved unprofitable, partly as a result of the market being flooded with cheap copper, and in 1795 the Macclesfield Copper Co released their interest in the le Fleming lease. For some time afterwards, mining on the le Fleming royalty seems to have been at a standstill.

◀ Lease to Anthony Tissington dated 1759
(Cumbria Archive and Local Studies Centre, Whitehaven, D/PEN BUNDLE 46/82; thanks to Peter Frost-Pennington for permission)

Portraint of Anthony Tissington
(www.artwarefineart.com)

In September 1759, after a period of intermittent activity on the Muncaster royalty, Anthony Tissington acquired mining rights at Tilberthwaite for a term of 15 years from Sir John Pennington. Tissington was a mining entrepreneur who had mining interests in Derbyshire, Yorkshire, Durham and Scotland, as well as the Lake District. In January 1760, there was reference to three miners working at Gillhead on behalf of Tissington for a fortnight but to little effect. However, by June of that year, the Bailiff of Langdale reported that there had been no miners at work in any part of the Manor of Tilberthwaite for some time. Nevertheless, Tissington was interested in continuing and it seems he switched his interest to Hawkrigg and Greenburn.

There may have been a further boundary dispute between the le Fleming and Muncaster estates around this time. In a letter to Sir John Pennington dated 26th November 1774, Joseph Herbert, his agent, reported that:

" Woodward told me that he had received orders on Thursday last from old Jackson to set two men to work at Gillhead and he assured me that these men should begin there on Monday or Tuesday next. I gave John Dixon a copy of…dated 2nd November 1682 which so plainly shewed…Gillhead and Muckle Gillhead being one and the same place is within the liberty of your Honour's Royalty of Tilberthwaite that I think no dispute can arise betwixt Sir William Fleming and your Honour about it ".

In 1799, a draft lease of the Muncaster royalty was drawn up between (1) Sir John Pennington and (2) George Wilson and William Mitchell, and it seems likely they were working at Tilberthwaite Mine in the early part of the 19th century. How long they were there is unknown.

An 1815 report on the condition of agriculture in the County of Lancashire refers to the mine at Muckle Gill and stated that it had been established for about five years. Just who had been working the mine during that period is unclear. Interest seems to have been triggered by the demand for copper from the Royal Navy to protect the hulls of ships. The report refers to two veins

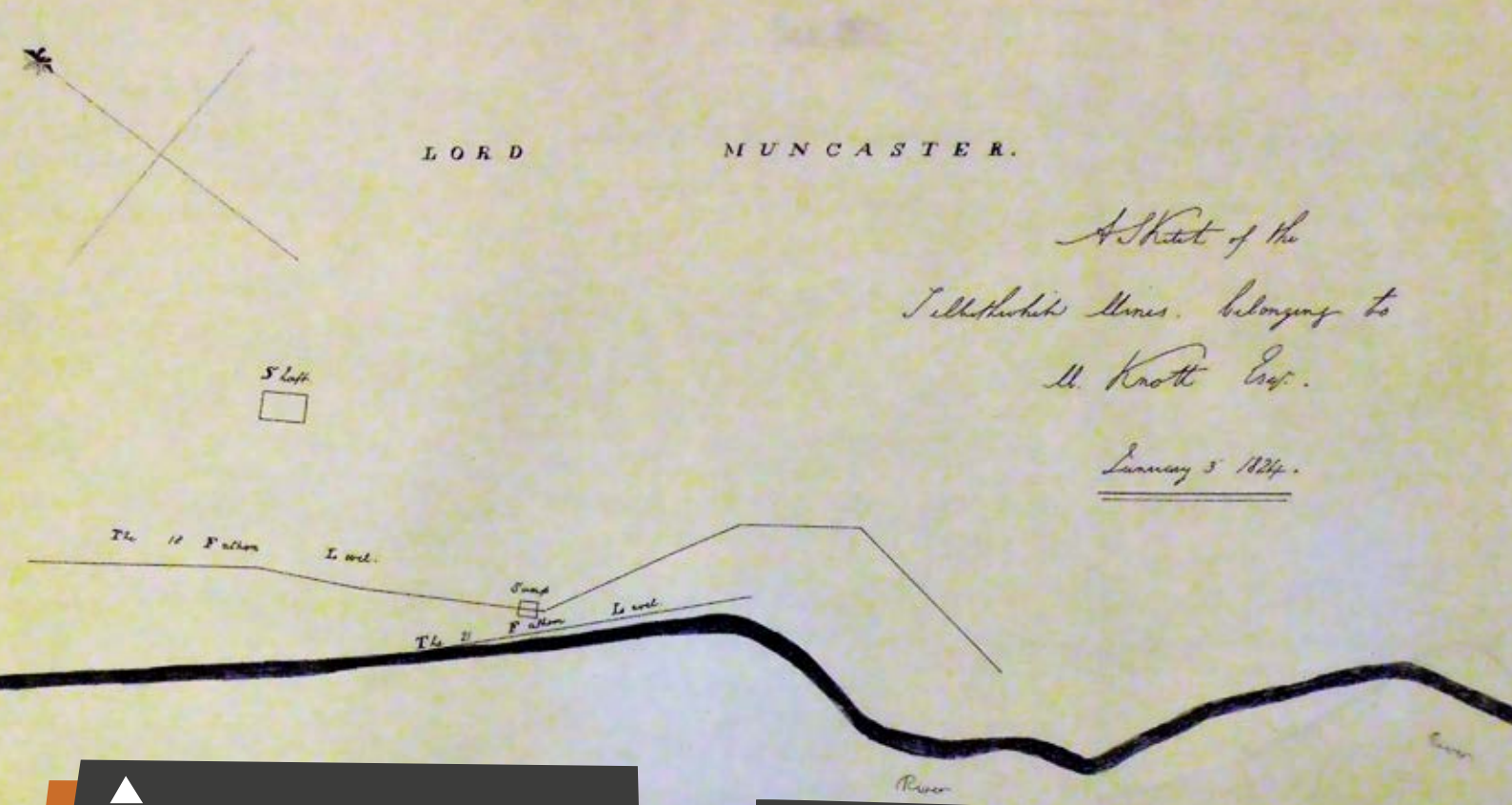
The main workings on North Lode.

of metal being worked on the Muncaster royalty from a shaft that had been driven to a depth of about 30 yards. The incursion of water seems to have been a problem and was being taken off the shaft in large buckets, to the extent of 30-40 buckets a morning, by a water-powered lifting-pump. The mine was yielding about two and a half tons of ore per week, which was sorted by hand and processed on site using a water-powered stamp mill before being sent to Cheadle in Staffordshire for smelting. Some 12-15 men were employed underground, mainly using picks and hand drills, while another 8-10 men worked at the surface.

The Barratt years

In 1823, John Barratt, an experienced mine manager who was to have a major impact in the Coniston area, appeared on the scene. He was employed at the time by John Taylor, mine agent to the Duke of Devonshire, as the manager of the lead mines at Grassington in Yorkshire. The CATMHS archives have one of Barratt's letter books. After visiting the mines in Copper Mines Valley, Barratt was impressed with their potential and wrote to Lady le Fleming in August 1823 expressing an interest, subject to discussing the matter with Taylor. This was followed on 14th September 1824 by a lease of copper mines in the Manor of Coniston between (1) Lady le Fleming and (2) John Taylor and William Richardson for a period of 21 years. This began a period of increased production and prosperity in Copper Mines Valley.

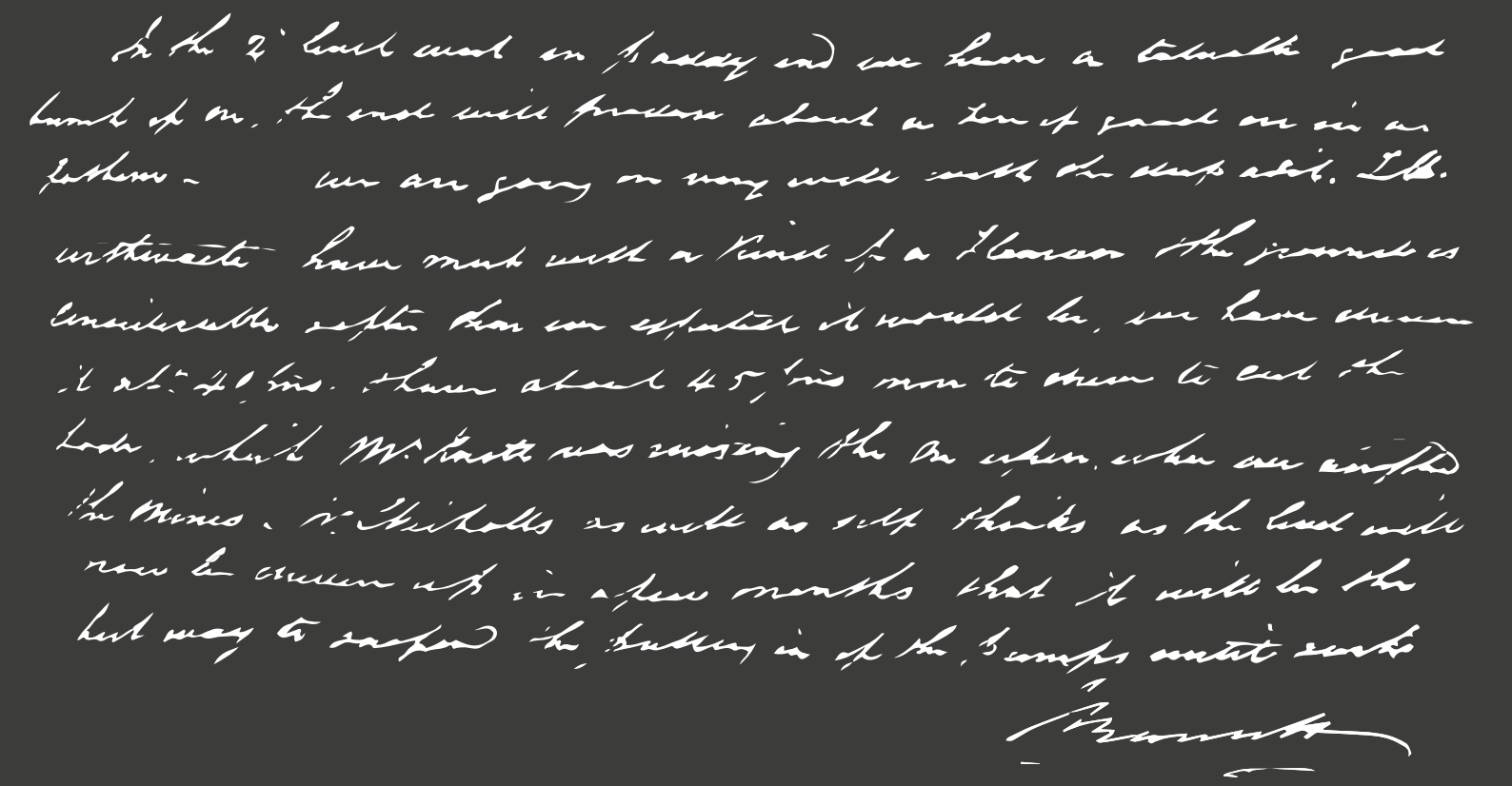
Interestingly, "those parts of the lordship of Coniston now occupied and held by Michael Knott as tenant" were excepted from the 1824 lease. Michael Knott's involvement in mining in the Coniston area is a little obscure. At some point he seems to have taken a lease of the Tilberthwaite Mine from the Muncaster estate and the reference in the lease of September 1824 to "parts of the lordship of Coniston" would suggest that he also leased part of the le Fleming royalty. The Cumbria Archives in Kendal has a scaled plan dated 3rd January 1824, which purports to show "A sketch of the Tilberthwaite Mines belonging to M Knott Esqr". The sketch shows two levels, both on the north-east side of the beck in the Muncaster royalty.



▲ ‘Sketch of Tilberthwaite mines belonging to Mr Knott, 1824’ *(Cumbria Archive and Local Studies Centre, Kendal WDB 35/2/848)*

On 31st November 1823, Barratt wrote to Taylor reporting the outcome of a meeting with Knott and Jackson (the agent for the le Fleming estate), stating that Knott would like to make “some kind of arrangement with you respecting his mines…”. Subsequently, in a further letter to Taylor dated 15th August 1824, Barratt reported that Mr Knott:

“ would like to turn the management of his mines over to you. He also says he should have no objection to consolidate his mines with the Coniston & he would be content with a holding of 1/8th share in the whole of the concern…Mr Knott’s mines will in my opinion make a good concern & will not cost much to put them in a regular course of working. I have myself seen good bunches of ore & which is now under water…”



It seems that Taylor acted on this advice because on 3rd September 1824, in another letter, Barratt noted: "I am glad you have accepted Mr Knott's which I believe to be a good one". For the next forty years, the future of the Tilberthwaite Mine was very much bound with Copper Mines Valley.

While production was forging ahead in Copper Mines Valley, work was now also taking place at Tilberthwaite. On 17th December 1824, Barratt reported to Taylor that:

" the ground in the adit at Tilberthwaite is favourable, the end is going at £2 per fathom, have about 5 fathoms to go to cut Spedding's Lode. The shallow adit south upon Spedding's Lode is poor and the lode has a most unpromising appearance. I have therefore stopped it ".

However, by 17th February 1825, the news was not so good:

" Tilberthwaite have met with a kind of ***floucan*** *[an area of soft clay] and the ground is considerably softer than we expected it would be. We have driven it about 40 fathoms and have about 45 fathoms more to cut the lode, which Mr Knott was raising the ore upon when we accepted the mines".*

The level referred to that was being driven to cut the lode seems likely to be a reference to the Deep or Waterfall Level, which was undertaken at some point to drain the deepening workings at Tilberthwaite Mine. This eventually intersected the North Lode, the principal vein of the mine, at a depth of 145' below the surface. However, the awkward access down to the waterfall (in places requiring a scramble) would

suggest that it was not used for transporting ore from the mine. Until the Horse Crag Level was opened around 1860, ore would have been raised to the surface via one of the shafts. An undated plan in the CATMHS archives shows the level. The entrance to Shallow Adit is also marked and three shafts are noted on the North Lode: the Old Drawing Shaft, the New Shaft and the Footway Shaft.

On 14th February 1826, Knott and Taylor entered into a new 21 year lease with Lord Muncaster, which covered copper mines in the Manor of Little Langdale and Tilberthwaite. Around this time, there was a meeting on site to mark out the boundary between the Muncaster and le Fleming royalties with a view to preventing further disputes, and a fence installed between the two.

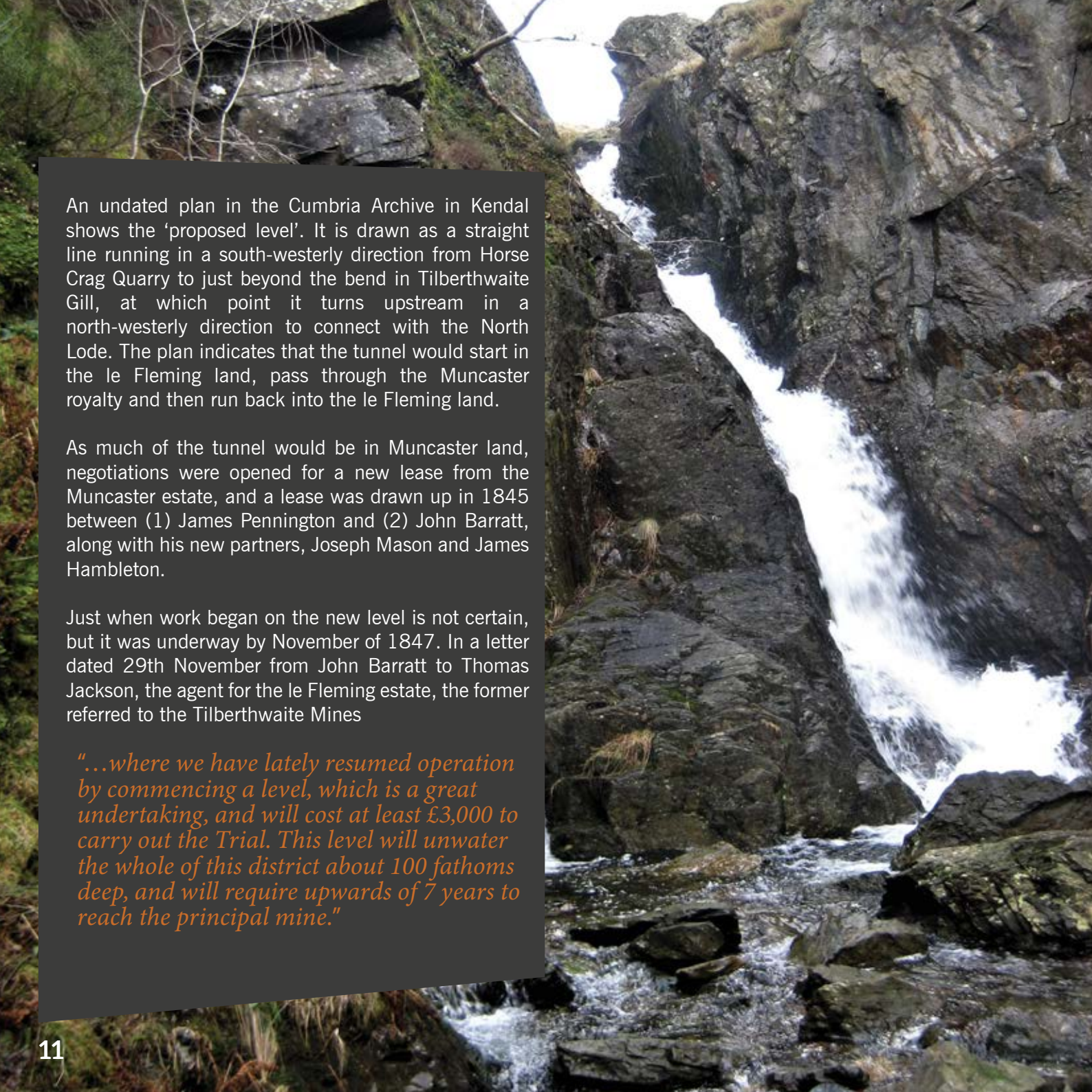
Work progressed at Tilberthwaite and, on 1st January of 1830, Barratt wrote again to Taylor to say that the prospects at Coniston were "much the same as when you were there, except Tilberthwaite where there was a little improvement in the bottoms of the North Lode. The bunch of ore for about 4 fathoms in length would produce about 2 tons of ore per fathom".

In 1833, Taylor and Knott began negotiations with le Fleming's agent with a view to surrendering their leases in both Coniston Copper Mines and the Tilberthwaite Mine in return for a new one for 21 years. A draft lease was prepared for the Coniston royalty, although it excepted certain parts that were now being worked by Matthew Spedding. It is not clear exactly where Spedding was working, but it seems likely that it was on what was referred to in the correspondence of December 1824 (above) as 'Spedding's Lode'. This lies in the Coniston royalty and runs north-west from the Muckle Beck from a point near the entrance to the Waterfall Level.

Michael Knott died before the lease could be executed, and the lease was eventually entered into for a period of 21 years on 1st October 1834 between (1) Lady le Fleming and (2) John Taylor, Richard Gaunt and John Barratt. Barratt had acquired Knott's shares in the enterprise and was now a partner.

The Horse Crag Level

In 1841, John Taylor withdrew from the venture and sold some of his shares to Barratt. Sometime around the middle of the decade, Barratt conceived an ambitious plan for resolving drainage problems at the Tilberthwaite Mine inherent in the continued deepening of the North Lode. At the same time he facilitated access for the miners and the transport of material out of the mine. This involved driving a new level some 3200 feet (975m) from Horse Crag Quarry, just to the west of the road along the Tilberthwaite valley, to intersect with a group of veins some 550 feet (168m) below the surface. In particular the North Lode, the principal vein in the group. The new level would drain the mine and the intention was that the ore would be brought out through the level to a new dressing mill, to be constructed near the entrance to the level at Penny Rigg, rather than being taken by packhorse to the Bonsor dressing mill in Copper Mines Valley.



An undated plan in the Cumbria Archive in Kendal shows the 'proposed level'. It is drawn as a straight line running in a south-westerly direction from Horse Crag Quarry to just beyond the bend in Tilberthwaite Gill, at which point it turns upstream in a north-westerly direction to connect with the North Lode. The plan indicates that the tunnel would start in the le Fleming land, pass through the Muncaster royalty and then run back into the le Fleming land.

As much of the tunnel would be in Muncaster land, negotiations were opened for a new lease from the Muncaster estate, and a lease was drawn up in 1845 between (1) James Pennington and (2) John Barratt, along with his new partners, Joseph Mason and James Hambleton.

Just when work began on the new level is not certain, but it was underway by November of 1847. In a letter dated 29th November from John Barratt to Thomas Jackson, the agent for the le Fleming estate, the former referred to the Tilberthwaite Mines

"…where we have lately resumed operation by commencing a level, which is a great undertaking, and will cost at least £3,000 to carry out the Trial. This level will unwater the whole of this district about 100 fathoms deep, and will require upwards of 7 years to reach the principal mine."

Tilberthwaite Mine 1867 showing Horse Crag Level and the Penny Rigg Mill
(CATMHS Archives)

The level was driven using gunpowder—black powder—for blasting, and the notebook of materials makes frequent reference to the ordering of barrels of gunpowder between 1865 and 1868. Mechanised drilling was in its infancy at this stage and much of the tunnel would have been blasted using hand driven shot holes. Two miners were required to drill; one holding and turning the drill, while the other struck it with an iron hammer. The resulting shot holes were then filled with gunpowder and fired with a straw fuse.

Given the investment being made, a new lease was also sought from the le Fleming estate and was signed on 1st August 1849 by the Company for a term of 30 years and the lease for part of the Muncaster royalty was also renewed in 1853.

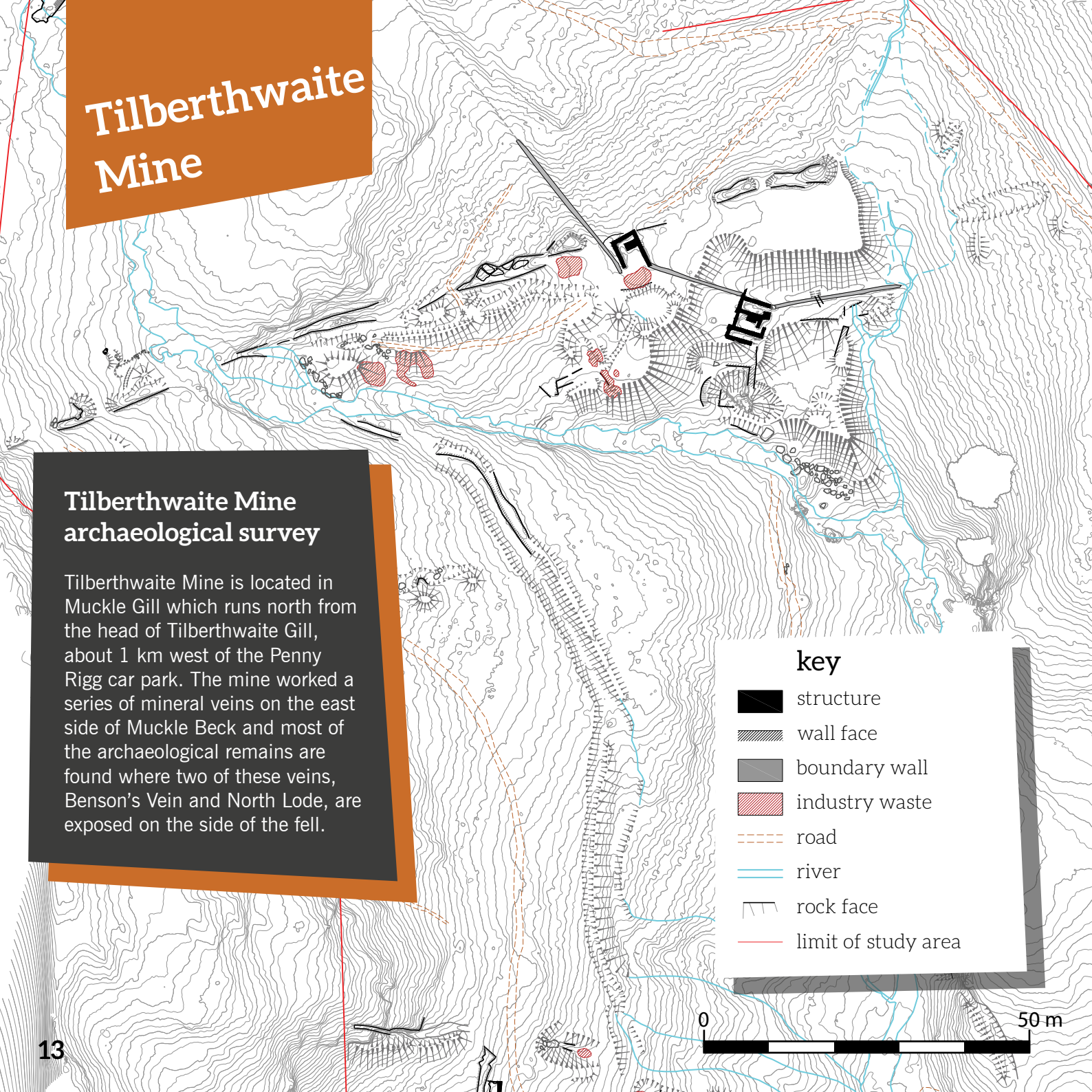
In the event, it took 10 years rather than seven to complete the level and at a cost considerably in excess of £3,000, but it is probable that it was operational sometime around 1860. Barratt appears to have delayed construction of the new mill at Penny Rigg pending completion of the level; he may have wished to trial the new level before committing himself to the expenditure involved in the new dressing plant.

In 1864, the lease for the Muncaster royalty was renewed for a term of 21 years. Construction of the new mill at Penny Rigg probably began soon after the new lease was signed. There is documentary evidence to suggest that the building was well under way by September 1865 and that it was probably completed sometime in 1867 or 1868. The completion of the level and the opening of the mill would have rendered the surface operation at Muckle Gill redundant. The water wheel and stamps would have been dismantled and removed. The dam at Dry Cove, which ensured a steady supply of water to the processing plant, would have been breached and the smithy/office and the copper shed were allowed to fall into disrepair.

Tilberthwaite Mine

Tilberthwaite Mine archaeological survey

Tilberthwaite Mine is located in Muckle Gill which runs north from the head of Tilberthwaite Gill, about 1 km west of the Penny Rigg car park. The mine worked a series of mineral veins on the east side of Muckle Beck and most of the archaeological remains are found where two of these veins, Benson's Vein and North Lode, are exposed on the side of the fell.



Benson's Vein

Benson's Vein begins by the footbridge at the top of Tilberthwaite Gill and is marked by a line of spoil tips, hollows and open pits, which run west along the hillside for just over 130m. These surface workings probably belong to the earliest period of mining in the late 16th and 17th centuries. The vein, which is vertical and contains the copper mineral chalcopyrite mixed with quartz and broken rock, was mined by excavating a number of narrow opencast pits. Working by hand with picks, chisels and crowbars, the early miners followed the vein down until they reached the water table, at which point the working was abandoned and a new opencast started further along the vein. The vein varied in richness—the miners described it as 'bunchy'—and the poorer sections are marked on the surface by areas of unworked ground between the opencasts.

Once it had been taken to the surface, the material extracted by the miners had to be processed or

A. Opencast workings on Benson's Vein

B. Ruins of ore dressing sheds by the beck, Benson's Vein

C. Mortar stone, Benson's Vein ▶

'dressed' by hand to separate the copper ore from the waste rock and quartz. Most of the opencasts along Benson's Vein have small, flat topped tips to one side where the ore was dressed in the open air. But close to the beck are the ruins of one or two stone sheds where the ore was dressed under cover. Another small cabin, associated with a heap of finely crushed mineralised rock, is built against a rock outcrop further up the hillside. Within these buildings are rectangular stone blocks, some 20cm by 30cm in size, with shallow circular depressions on one or both faces. Known as mortar stones, they were used as anvils for crushing the ore with flat-faced iron hammers. Mortar stones have been found at other early copper mines in the Lake District, notably Back Strings and Red Dell at Coniston, and at Dale Head and Long Work in the Newlands Valley; all these sites were worked by the Company of Mines Royal during the 16th century.

There is some evidence for later reworking of Benson's Vein. By the side of the beck, a horizontal tunnel or level has been driven onto the lowest part of the vein. It runs under the bottom of the opencasts and by lowering the water table allowed mining to be carried out to a greater depth. We do not know the date of this level, but it is likely to have been made during the later 17th or 18th centuries. There was also some reworking in the opencasts at this time and shot holes on the rock face of the largest pit show where the sides have been blasted with gunpowder to examine the mineral vein. Gunpowder only came into general use for mining during the mid-18th century.

The North Lode

Some 160m upstream of Benson's Vein is North Lode, the largest mineral vein at Tilberthwaite Mine. It has been worked and reworked over three hundred years and remains of many different periods of mining can still be identified. One of the earliest pieces of evidence is found close to where the vein crosses the beck. Here, on the west bank, the survey volunteers discovered a boulder used as a mortar stone, some low heaps of finely broken stone and the grass-covered outline of a buddle or trough where the crushed material was washed to separate ore and waste; this small hand dressing floor, probably the same age as those on Benson's Vein, must have processed material raised from one of the now flooded opencast workings that can be seen running up the lower slopes of Steel Rigg. It is important as one of the few complete examples in the region of a 16th-17th century dressing floor.

The opencast workings east of the beck probably also date from the 16th and 17th centuries but later mining, especially spoil dumping, has buried much of the evidence for earlier activity. Close to the east side of the beck is the most dramatic of the North Lode opencasts; a narrow excavation that is 22m long, 1.5m wide and at least 10m deep. This began as a shallow excavation but, at some point in the 18th century, a shaft was sunk at one end to connect with deeper underground workings. A Victorian mine plan marks this as a 'drawing' shaft where ore was hauled to the surface, probably using a horse-powered winding engine or 'horse gin'. Between the opencasts and the beck are a series of spoil tips from different periods of mining.

◀ A. The workings on North Lode with the ruins of the smithy and stamp mill.

The main shaft on North Lode, and also the principal shaft for the whole mine, lies further east at the far end of the line of opencasts. By the early years of the 19th century, this shaft had reached a depth of around 30m and joined underground with another deep shaft on a side vein by the beck known as Shaft Lode. At this period, both North and Shaft Lodes were drained by a waterwheel-powered bucket pump. Waterfall Level, the drainage adit driven from the waterfall at the head of Tlberthwaite Ghyll in the 1840s, allowed these two shafts to reach even deeper parts of the vein and by the time Horse Crag Level finally met North Lode in the 1860s the main shaft was 160m (525 feet) deep. The massive spoil tip at the east end of the North Lode opencasts is made up of waste rock raised to the surface from the main shaft and gives some indication of the size and extent of the mine workings below. Some idea of the condition the miners worked in can be gleaned from this report on the mine made in 1815:

"In getting and preparing the ore, twelve or fifteen men are employed under the ground, and eight or ten above. The former work in companies, being down about six hours in the day. The tools made use of are chiefly picks and jumpers, which are tempered very hard. In sinking the shafts and driving the levels, they are paid according to the nature of the strata that are to be wrought through."

▲ B. Boulder used as mortar stone, North Lode.

◀ C. Opencast and drawing shaft, North Lode

Smithy and stamp mill

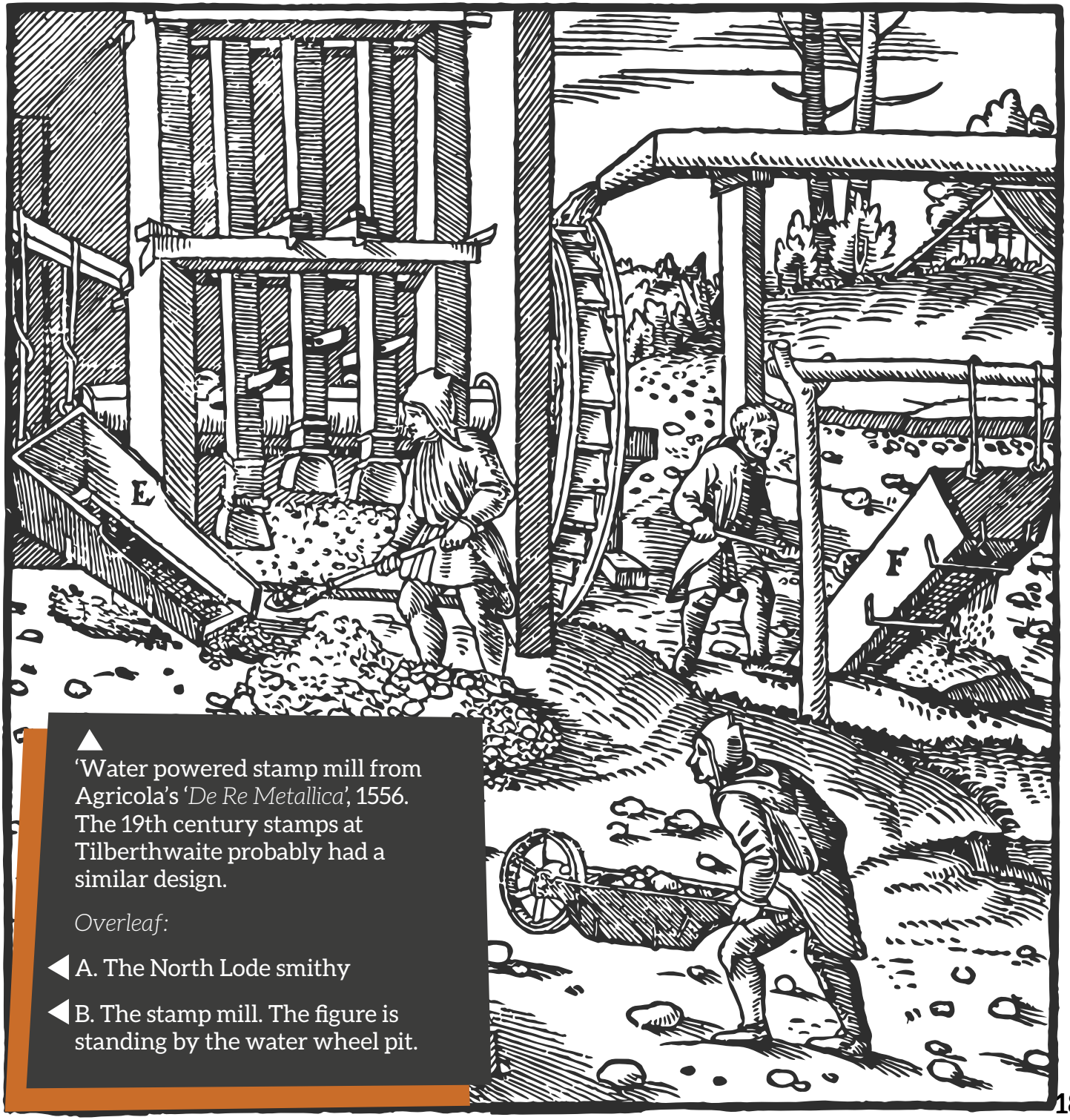
Two ruined, roofless buildings lie close to the North Lode. One is a small rectangular structure with an open front on the south side. Built early in the 19th century, it was probably used as a store and shelter before being converted to a smithy; the base of the blacksmith's hearth and a recess for the bellows can still be seen. Intriguingly, and somewhat dangerously, one corner of the building has been constructed over a backfilled section of mined opencast.

The other building is further down slope. Terraced against the hill slope and an earlier tip, it sits on a platform above the shaft on Shaft Lode. Detailed recording by the survey volunteers revealed that this structure has a complex history with a number of different uses over time. It was originally built as a stamp mill where hand-dressed ore was reworked. Stamps, powered by a water wheel, consisted of a set of vertical wooden poles with heavy cast iron bases, which were raised and dropped on to an iron plate where the ore was pulverised to a coarse powder. There was a stamp mill at Tilberthwaite Mine as early as 1691 but the surviving building is probably later, most likely the mill documented in 1815. The water wheel was located in the narrow, rubble-filled pit on the south side of the building and the stamps were probably housed inside. Ore was fed to the stamps through a ramp or hopper at the back of the building. Most stamps were wooden and some of the low-level recesses visible in the building's stonework may be joist holes and timber slots for the stamps' superstructure. We know that in the early 19th century there was a water-powered pump at the mine. This might have been in the Shaft Lode shaft and could also have been operated by the same water wheel that worked the stamps.

With the construction of the Penny Rigg dressing mill in the 1860s—see below—the stamping mill at the mine became redundant and the building was converted into another smithy. At a later date, perhaps


A


B



▲
'Water powered stamp mill from Agricola's '*De Re Metallica*', 1556. The 19th century stamps at Tilberthwaite probably had a similar design.

Overleaf:

◀ A. The North Lode smithy

◀ B. The stamp mill. The figure is standing by the water wheel pit.

during the last reworking of the mine in the 1920s, the building was used a miner's bothy and a fireplace was built into one of the walls.

Water for the stamp mill wheel was brought from Muckle Gill beck. Because the beck is an unpredictable water source—too little water during the summer and too much in winter—a dam and sluice gate were built upstream, which effectively impounded and flooded the extensive area of bog known as Dry Cove Bottom. This allowed the flow of water in the beck to be controlled and so ensured a constant water supply for the stamping mill. A leat was constructed just below the point where North Lode crosses the beck. This runs parallel with the opencast workings and feeds into a circular pond close to the first smithy building. The pond is now badly eroded but originally a wooden trough or launder carried water from here to the top of the stamp mill wheel. Interestingly, the leat can be seen to have been constructed across the top of earlier spoil tips.

Once the ore had been pulverised in the stamp mill it underwent further processing to separate and remove waste material. Small tips of finely crushed stone and a number of enigmatic wall footings in the flat area east of the stamping mill mark the site of the dressing floor where this final processing took place. This part of the site has suffered badly from erosion but some idea of the dressing process is contained in the 1815 report mentioned above:

" The quantity of ore now raised is usually about two tons and a half per week, which affords from two to three hundred weight of metal in the ton, but none more than three. It is separated and prepared into two different sorts at the works, namely into 'chattered' or hand ore, and what is termed 'slime ore'. The former consists of the finer parts of the ore, cleared of most of the extraneous matters, and broken into small pieces – the latter is formed from the more coarse refuse, by being subjected to the power of the stamping-machine in water, and washed in troughs contrived for the purpose."

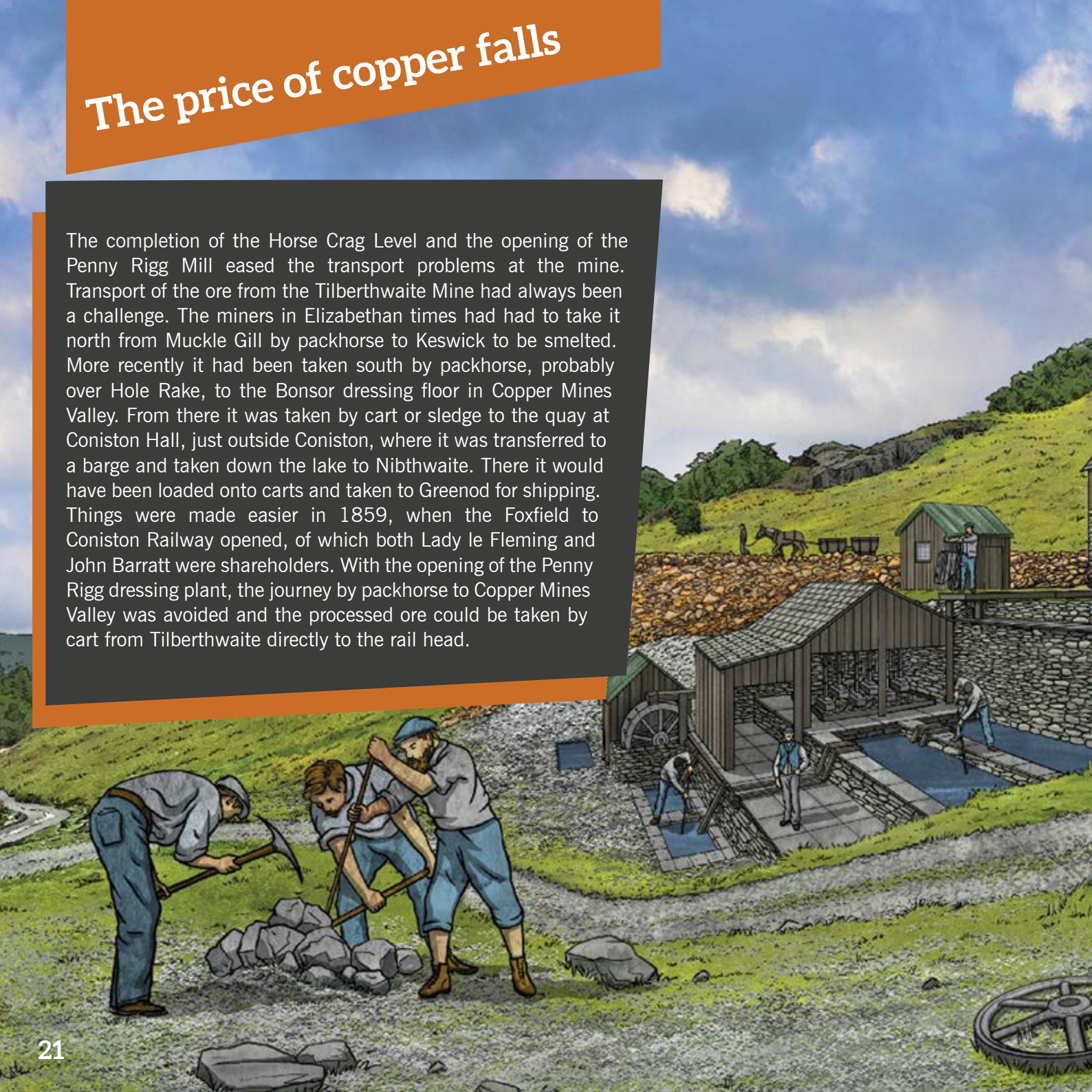
The dressing floors with stamp mill (right) ▲ and the top of Shaft Lode shaft (left).

The diversion channel.

On the opposite side of the beck to the mill leat, a large channel, just over 130 m long, has been excavated across the hillside. It ends in two large gullies close to Benson's Vein. This unusual feature was constructed to divert the beck away from the mine workings. The shaft on Shaft Lode, sunk on the north side of the beck at stream level, would have been at risk when Muckle Beck was in spate. This would have been a particular problem before the completion of Waterfall Level, as any flood water running into the shaft could have backed up and inundated the workings on both South and North Lodes. The construction of this diversion channel must have been a major undertaking in terms both of labour and capital but was necessary to allow deep mining to continue.

The price of copper falls

The completion of the Horse Crag Level and the opening of the Penny Rigg Mill eased the transport problems at the mine. Transport of the ore from the Tilberthwaite Mine had always been a challenge. The miners in Elizabethan times had had to take it north from Muckle Gill by packhorse to Keswick to be smelted. More recently it had been taken south by packhorse, probably over Hole Rake, to the Bonsor dressing floor in Copper Mines Valley. From there it was taken by cart or sledge to the quay at Coniston Hall, just outside Coniston, where it was transferred to a barge and taken down the lake to Nibthwaite. There it would have been loaded onto carts and taken to Greenod for shipping. Things were made easier in 1859, when the Foxfield to Coniston Railway opened, of which both Lady le Fleming and John Barratt were shareholders. With the opening of the Penny Rigg dressing plant, the journey by packhorse to Copper Mines Valley was avoided and the processed ore could be taken by cart from Tilberthwaite directly to the rail head.



▲ Reconstruction drawing of Penny Rigg Mill in the 1860s. *© Steven Hall as part of the Heritage Lottery Fund Coniston Copper project*

Tilberthwaite Mine now entered several years of continuous if modest production. In 1867, at least 18 men were recorded as working at the mine, an improvement on the position in 1862 when the Kinnaird Commission recorded just six men.

In 1868, Joseph Mason died, the last of the three original partners in the Company. John Barratt had died two years before and did not live long enough to see the completed mill in operation. John's nephew, William, took over as Chairman of the Board and in 1874 a new company, the Coniston & Tilberthwaite Mining Co, was formed to carry on the work.

However, competition from cheap Chilean imports of copper rendered the operation at both Coniston and Tilberthwaite uneconomic and in 1875 the Company eventually took the decision to sell. The Tilberthwaite Mine never returned the huge investment in driving the Horse Crag Level and constructing the Penny Rigg Mill.

The sale was by auction on 3rd August 1875 and the sales flyer gave an optimistic picture of the position at the Tilberthwaite stating that:

" there is no doubt large returns will be made from this Mine "

Thomas Wynne, an inspector of mines and a former shareholder in the Company, acquired the residue of the terms of the mining leases for both the Coniston and Tilberthwaite mines along with all the plant and machinery. In the same year, Wynne entered into a new 21 year lease of the le Fleming royalty. The following year, a similar lease was executed for the Muncaster royalty.

Wynn found himself in difficulties almost from the beginning. The collapse of the price of copper resulted in a catalogue of increasing outgoings, limited returns, escalating debts and mounting frustration on the part of Wynne and of those with whom he was dealing over the next fourteen years. Wynne does not appear to have continued work at Tilberthwaite and as early as 1883 the Horse Crag Level was reported to be in poor condition. The first phase of the operation of the Penny Rigg mill was therefore very short, perhaps less than 10 years—a very poor return on the sum invested in its construction.

In 1889, copper prices reached an all-time low and Wynne eventually sold the Tilberthwaite Mine to James Fleming, a local man. Fleming had intended to re-open the Horse Crag Level, which had been closed by a roof collapse, and began work to this end. There is some evidence to suggest that modifications were made to the mill at this time and that there may have been a short second phase of use. However, Fleming soon discovered that he had only acquired the mining rights in the le Fleming royalty, which comprised the

first 750 feet of the tunnel. A large section of the remainder of the tunnel was in the Manor of Muncaster, the rights for which remained with Wynne. As a result, Fleming's plans for the mine were frustrated. Subsequent efforts by Fleming and the le Fleming estate to secure a solution came to nothing.

Eventually, in 1891, Wynne relinquished his remaining interest in the le Fleming royalty to Thomas Warsop. Wynne died soon afterwards and in 1894 his trustees wrote to the agent for Lord Muncaster regarding the Muncaster royalty, requesting that the mine at Tilberthwaite be taken off their hands because they could neither sell, nor work the mine. Warsop had worked for Wynne at the Coniston Mine and he immediately negotiated a new 21 years lease of the le Fleming royalty. Fleming, it is presumed, must have surrendered his lease. Warsop set about raising capital and in March 1892 he sold his interest in the mines to the newly formed Coniston Mining Syndicate Ltd. The Syndicate set about trying to promote production at the Coniston Mine. Tilberthwaite Mine remained closed but Penny Rigg Slate Quarry was re-opened later that year, thereby bringing an end to the copper mill. However, the affairs of the Syndicate did not prosper, although it soldiered on at Coniston until 1908, when it was eventually wound up. In 1897, the 32ft water wheel at the disused Penny Rigg Copper Mill was dismantled and sold off.

Tilberthwaite Mine: the final years

A report in "The Cornishman" for 21st November 1907 stated that investigations had just been completed at the well-known Tilberthwaite and Greenburn Copper Mines, which were "highly productive" some years ago. The report continued that the mines would in future be entirely operated, lighted and their products smelted and refined by electricity, there being an abundance of water power available. Sadly, nothing came of this, although the Central Chile Copper Company undertook some prospecting in the Tilberthwaite area in 1912 and 1913 using some form of electrical prospecting system.

The Third Edition of the 25-inch Ordnance Survey sheet published in 1914 shows that by this time a closehead quarry (a sizeable underground slate working) was being worked inside the Horse Crag Level about 80 yards from the entrance.

In 1917, a small enterprise, the Langdale Silver, Lead and Copper Company, briefly took over the site but little was achieved. Then, in 1924, the Greenburn & Tilberthwaite Mining Company was set up. The Company cleared and re-timbered the Horse Crag Level and extended it a little, a ladder-way was constructed to the surface more than 500' above and work resumed on the North Lode. The Penny Rigg copper mill was not restored; the ore was hand-dressed and then carted to Coniston. The returns on the investment were poor and in 1930 a roof collapse in the Horse Crag Level terminated production and the mine was abandoned.

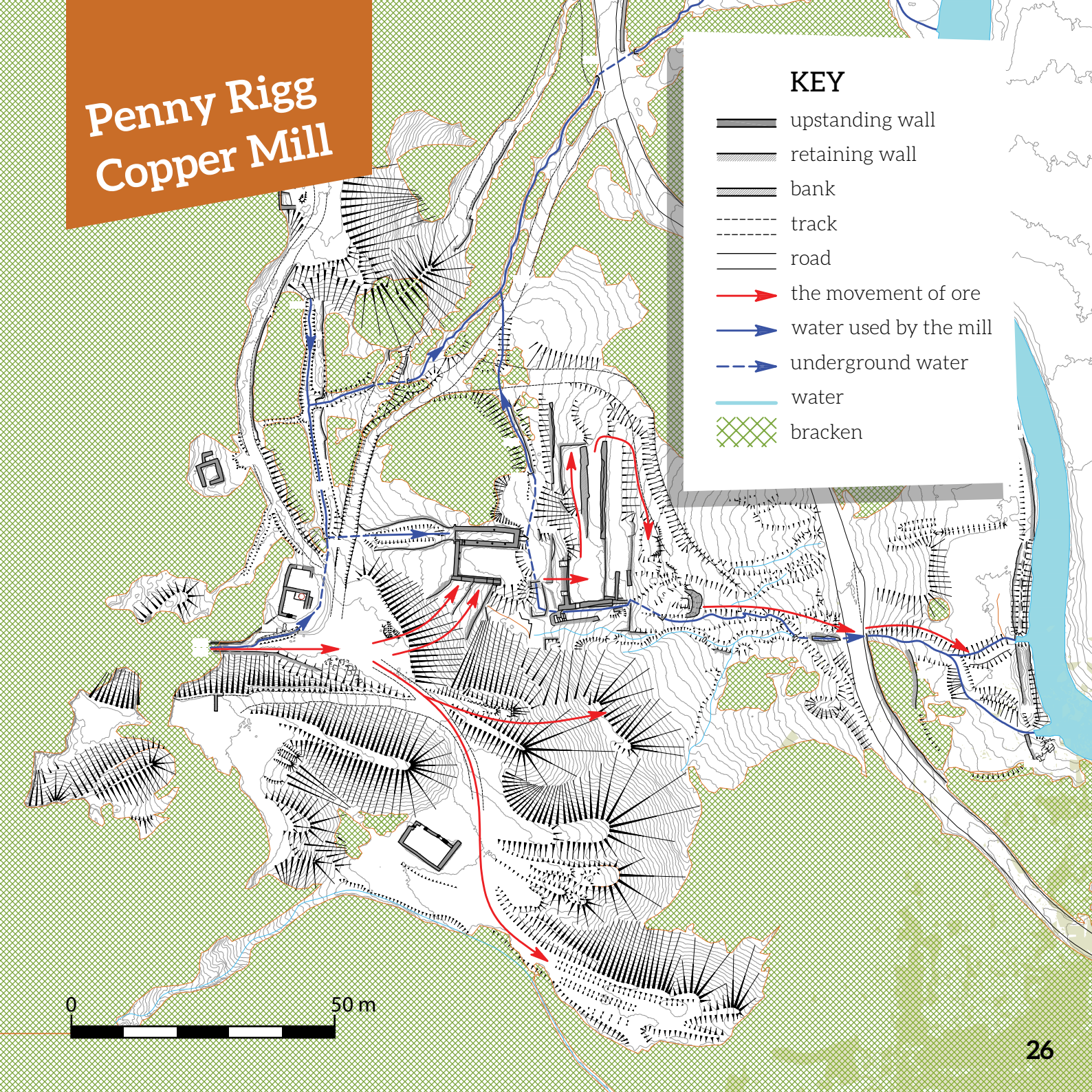
However, the Horse Crag Level was known to have cut through an area of good slate and some of this had been worked in 1914. In 1933, Oscar Gnosspelius and JW Shaw, after an unsuccessful venture at Brimfell Mine, decided to open up a further closehead quarry in the level about 300ft from the entrance, which was worked profitably until 1938 when Shaw retired. Arthur Ransome visited the closehead quarry in the Horse Crag Level and used the information he gleaned in his book Pigeon Post. It seems likely that the characters 'Squashy Hat' and 'Slater Bob' in the book were modelled on Gnosspelius and Shaw respectively.

The final act in the mining history of the Tilberthwaite Mine took place in 1989, when George Tarr obtained planning permission to re-open the closehead slate quarry in the Horse Crag Level. He worked it for 10 years until 2000. There has been no further commercial activity at the mine since that date.

Penny Rigg copper mill survey

Penny Rigg mill is one of the best preserved Victorian copper processing mills in England. Unlike the surface remains at Tilberthwaite Mine, most of the principal buildings are still standing, and it is possible to follow the full ore dressing process from initial sorting and crushing to the final treatment and containment of the waste sands. The mill buildings were constructed on a series of terraces, arranged to make best use of the natural topography, with the various processing areas arranged sequentially down the hillside.

Penny Rigg Copper Mill



Out of the mine

The entrance to Horse Crag Level lies at the end of a rock cutting on the top terrace. Although copper mining here finished in 1930, the level was used as recently as 2000 to access and exploit an underground slate quarry and the iron pipe running along the wall is the compressed air line that powered rock drills during this last period of working. At the end of the rock cutting are the ruins of the mine smithy, and the base of the smithy hearth, now entangle in tree roots, can be seen in one of the building's two rooms. The blacksmith had an important role. His main function was to prepare and sharpen the miners' picks and hand drills—a daily job—as well as undertake running repairs on mine tubs and other general mining equipment and machinery.

Not far from the smithy and close to the track leading up to the Penny Rigg slate quarries is an isolated building, the 'powder house', where the mine's gunpowder was stored. This is a simple, square, single-storey structure with a door on the south face and no windows. It was built partially into the hillside to absorb some of the impact from any accidental explosion. By the mid-19th century there was growing concern about the use and supply of explosives and the Metalliferous Mines Act of 1872 prohibited the underground storage of explosives and required all mines to have a secure magazine at the surface.

▲ The entrance to Horse Crag Level

Overleaf:

A. The Penny Rigg smithy. ▶

B. The powder house. ▶


A


B

Sorting and crushing the ore

The ore and veinstuff—the rock and waste mineral in the vein—was brought out of the level in horse-drawn tubs and tipped into open-fronted stone hoppers or ore-bins located close to the terrace edge in front of the smithy. All this material was washed in running water to remove mud and clay. The crude ore and ore-bearing rock were then hand-picked from the waste and broken to a uniform size with sledgehammers. All the waste rock was carted away and dumped at the south end of the site. Spoil from later slate quarrying has covered much of the original mine tip. Slate spoil has also obliterated the ore-bins, but their original position is marked on one of the historic mine plans.

The broken ore and any mineral rich veinstuff were then taken to the crusher house and reduced in size again. The crusher house is the largest remaining structure at the mill and the gabled south wall still stands to its original height of 6.4m. Attached to the crusher house is the stone-built pit for the water wheel that powered the crusher machinery and we know from a sales notice of 1875 that the wheel was 32ft (9.75m) in diameter. Above the wheel pit is a large stone-built holding pond fed from Tilberthwaite Gill by a 1km long leat. The holding pond also collected all the water draining from Horse Crag Level. The line of the first part of embanked leat can still be followed above the mine track, but its continuation to the north is concealed beneath later slate spoil. A raised wooden launder carried water from the pond to the top of the wheel but no trace of this has survived.

The ore crusher was a simple but highly efficient piece of equipment that worked like a giant, mechanised mangle. Two heavy cast iron rollers—one set on an extension of the water wheel's axle—were geared to turn inwards against each other. Ore was fed into the rollers from a hopper and the crushed material was collected beneath in a revolving, cylindrical sieve known as a trommel, where it was sorted by size. Crushed ore of the correct size fell through the holes in the trommel and was collected for further processing. Larger material passed through the trommel and was returned to the top of the crusher on a raff-wheel, a fixed wheel with elevator buckets on its sides. Both the trommel and raff-wheel were powered by the water wheel.

The gable wall of the crusher house. ▲

The crusher house is an intriguing building. The back wall is terraced into the slope, the north wall incorporates the outer side wall of the water wheel pit and the south wall is free standing with a gabled top. The east end of the building is open but may once have had a timbered front and there must have been another timber side wall above the wheel pit.

A series of joist holes on the back wall and a corresponding recess on the gable wall mark the position of a timber floor that once spanned the building's interior first floor. Crude ore was brought into the building at this level and tipped through a hopper into the crushers below.

Where exactly was the crusher located and how was it supported? To answer these questions a small community excavation took place in April 2017. A trench was excavated in the centre of the building, which revealed a floor of massive stone paving slabs.

Running across the centre of the floor were a series of rectangular holes that held a row of substantial timber uprights. Traces were also found of a large horizontal timber running parallel with the building's gable wall and a horizontal recess—perhaps the base of the raff-wheel—was discovered parallel to the wheel pit wall. Further investigation by the volunteers revealed evidence for an unexpected framework of horizontal timbers beneath the paved floor, which was tied in with and helped support the vertical timbers above. The trial excavation revealed evidence for a complicated and well-engineered timber structure, which was designed to both support the ore crushing machinery and also absorb and distribute the impact of operation. Despite the substantial size of its slabs, the stone floor surface was shown to be just a working surface built above and around the timber support structure. The excavation also demonstrated the high quality of the archaeological remains within the crushing house.

Excavation of the crusher house floor. ▼

▲ The ruins of the jig house with the settling ponds in front.

Concentrating the ore

The waste from the crusher was dumped at the south end of the site and the spoil tip, with its distinctive orange-brown rocks, can still be seen surrounded by later heaps of grey slate. The ore-rich material from the crusher was processed in a building on the terrace below, the jigger house. This was a large rectangular building with a stone gabled wall at its south end and a long back wall built against the hillside. The front wall was probably open, with timber uprights supporting a slate roof. The building housed a set of jigs, water-filled wooden tanks with internal box sieves. Crushed ore was agitated in the sieves with the heavy copper-rich part—the 'heads'—settling at the bottom, a mixture of stone and mineral known as 'middlings' forming in the centre and the lighter waste moving to the top. The middlings were jigged again to achieve a finer separation and the heads, now a useable copper concentrate, were dried, bagged and stored. The store building, known as the Copper House, was south of the crusher house; its location is marked today by the remains of a stone paved floor partly buried beneath slate quarry waste.

Jigs were operated by hand in the early 19th century, a slow process and hard, repetitive work for the jig operator. But by the 1860s, most jigs had become mechanised, worked by a crank shaft or line drive attached to a water wheel. Much of the initial work on developing mechanised jigs was pioneered by John Taylor and John Barratt at the Grassington Moor mines in Yorkshire. Therefore, it can be expected that Penny Rigg, as one of Barratt's new, improved mills, would also have had mechanised jigs. Were the jigs here mechanised or hand operated? To find out more, the volunteers excavated a trench within the centre of the jig house. Removal of turf and fallen masonry revealed a well-preserved cobbled area, with the cobbles set on end into a compact clay to create a solid, load bearing surface. In places, the cobbles were covered with a fine mineral-rich sand typical of jigging waste, but there was no evidence at all to suggest where the jigs were located. In fact, the only structural evidence was a single post hole, which probably once held a timber post supporting part of the jig house roof. So how were the jigs worked?

The clue was a fragment of iron rod discovered on the cobbled floor, which appeared to be part of a crank arm, possibly part of the transmission system for a mechanised jig. This suggests that the jigs at Penny Rigg were indeed mechanised. But there is still one important unanswered question: where was the water wheel that powered the jigs? There is no evidence for a water wheel attached to the jig house, so were the jigs actually worked, via some complicated gearing, by the crusher house wheel? It appears that Penny Rigg mill has still not revealed all of its secrets.

The waste from the jigs still contained valuable ore and underwent further processing in an attempt to extract as much copper as possible. The waste, now a thick rocky pulp, was initially fed into the two long, stone-lined settling tanks at the north end of the jig house. The tanks were filled with water and the heavier, copper rich fraction sank to the bottom as the waste settled. These tanks were periodically drained, and the base layer taken for reprocessing in the buddles located at the north end of the terrace below the jig house. By the time Penny Rigg mill was built in the 1860s, mechanised round buddles were in common use at many of the larger British metal mines. However, the archaeological evidence shows that Penny Rigg had simple, rectangular buddles, very similar to the much earlier type of hand-operated trough buddles identified during the survey at Tilberthwaite Mine. It is hard to explain why such a modern, state-of-the-art mill employed old-fashioned technology.

Excavating the floor of the jig house. ▼

Pollution control

Heaps of fine, processed sand can still be seen on the hill slope by the buddles. This material was of no further value to the mine owner, but it did present a pollution problem, especially if the toxic waste entered the beck. Below the road are the remains of an embanked lagoon or tailings pond with a large earth and stone bank separating the pond from Yewdale Beck. Until the mid-19th century the disposal of mining waste was self-regulated, but the Rivers Pollution Act of 1876 specifically prohibited mine owners from discharging waste into water courses. The tailings pond at Penny Rigg would have effectively contained the waste from the mill, suggesting the company was either aware of best practice in dealing with pollution or else was responding to the requirements of the new Act.

◀ The bank separating the slime ponds from Yewdale Beck.

The Horse Crag Level re-opened

The end of the commercial activity at Tilberthwaite Mine in 2000 is not quite the end of the story. In 1983, members of CATMHS explored the Waterfall Level and made a somewhat precarious descent of the shaft to the Horse Crag Level. Further descents were made in April 1986 and again in November 1995. The account of the descent from the CATMHS logbook for 27th April 1986 shows that, on arrival at the Horse Crag Level, it was found to be flooded and what began as a wade developed into a swim, until eventually high water levels impeded further progress.

Subsequently, in 2009, the decision was taken by CATMHS to attempt to reopen the blocked Horse Crag Level all the way to the mine. It proved to be a mammoth undertaking, not least because early efforts were set back by a serious flood in November 2009. It seems that water built up inside the mine until pressure caused it to burst through the blockage in the level, depositing material from the blockage in the cleared area and at the same time removing much of the material which CATMHS had placed to support the tunnel. Work recommenced and carried on over a period of some six years before a breakthrough was eventually made on 3rd October 2015 into the North Lode, the principal copper vein of the old mine. During the course of the work, the entire length of the Horse Crag Level was cleared and made safe.

Conclusion

Although Tilberthwaite Mine has been worked over a period of some 400 years, it will be clear from this account that working has, for the most part, been intermittent. The only period of more or less continuous working was during the Barratt years from 1824 to 1875, and even then the returns seem to have been modest. However, the fact that it attracted interest over such a long period suggests that it had promise. John Barratt must have been reasonably confident of the mine's potential before he embarked on driving the Horse Crag Level and constructing the Penny Rigg Mill in the mid-1800s; the Greenburn & Tilberthwaite Mining Company must have also thought it worthwhile to clear and re-timber the Horse Crag Level in 1924 and install a ladder way to the surface more than 500 feet above. Sadly, the mine never lived up to its promise.

Part of the problem was that the mine seems to have been "a little troubled with water". This was evident almost from the beginning. A problem with the ingress of water was referred to in the report of the Commission in 1602 and in the later report of 1815. It was also reflected in the driving of the Waterfall Level to dewater the mine during the late 1700s and the early 1800s and of the Horse Crag Level in the mid-1800s. Productivity at the mine was also bound up for some of the time with what was happening in Copper Mines Valley. From around 1830 until 1908, the Tilberthwaite Mine was held by the owners of the Coniston Copper Mines. The more profitable workings at Coniston would have had first call on resources, both capital and labour, and this would have contributed to the intermittent nature of the working at Tilberthwaite.

But the failure of the mine to deliver on its promise was not for lack of trying. Scattered around Muckle Gill are indications of numerous trials, along with evidence of the working of five veins, all of which were ultimately accessed from the Horse Crag Level. Of these, only the North Lode proved really productive. These, along with the evocative surface remains at Muckle Gill and Penny Rigg, provide a monument to four centuries of frustrated hopes.

Perhaps the last words should go to Slater Bob in Arthur Ransome's Pigeon Post:

" They think that's all gone, but there's more to find, for them that has eyes and a mind 't. Five hundred year folk have been working these fells, and now they've all give up, all but me, more fools they, when it stands to reason there's more in t'fells nor ever come out "

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Acknowledgements

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1800 - 1849

1805
- Battle of Trafalgar

1815
- Mine employs 25 men. Ore sent to Staffordshire for smelting
- Battle of Waterloo

1820
- George IV becomes king

1824
- Michael Knott working Tilbert waite Mine. John Taylor and John Barratt, the partnership working Coniston Copper Mines, absorb Knott's interest and take over the mine

1826
- Waterfall Level being driven towards Tilberthwaite North Lode

1833
- Slavery abolished

1837
- Victoria becomes queen

1841
- Taylor withdraws and sells some of his shares to John Barratt

c. 1847
- Work starts on Horse Crag Level

1850 - 1899

1854
- The Crimean War

c. 1857
- Horse Crag Level reaches Tilberthwaite Mine North Lode

1861
- Death of Prince Albert

1864-1865
- Construction of Penny Rigg Mill starts

1867-1868
- Penny Rigg Mill completed

1875
- Coniston and Tilberthwaite mines, including Penny Rigg Mill, sold at auction and bought by Thomas Wynne. Mill stops production. Little underground mining after this date

1889
- Tilberthwaite mine sold to James Fleming. Unsuccessful attempt to reopen Horse Crag Level
- Penny Rigg mill modified and reopened for short period

1890
- The first electric underground trains run in London

1891
- Thomas Warsop acquires the mine lease

1892
- Coniston Mining Syndicate takes over lease and reopens Penny Rigg slate quarry

1897
- Water wheel for ore crusher at Penny Rigg Mill dismantled and sold

1900 - 1999

1912
- Prospecting by Central Chile Copper Company

1914-1918
- World War I

1917
- Langdale Silver, Lead and Copper Company take over the site

1924
- Greenburn & Tilberthwaite Mining Company re-open Horse Crag Level. Some copper produced

1926
- General Strike

1930
- Mine abandoned after roof collapses in level

1933
- Underground slate quarry or closehead in Horse Crag Level

1939-45
- World War II

1951
- Festival of Britain

1953
- Elizabeth II crowned

1982
- Falklands War

1989
- Closehead in Horse Crag Level reworked by Geoge Tarr

1999
- Welsh Assembly and Scottish Parliament established

2000 - PRESENT

2009
- CATMHS start to reopen Horse Crag Level

2012
- UK hosts Olympic games

2015
- CATMHS clear Horse Crag Level to Tilberthwaite Mine North Lode

2016
- Coniston Copper project begins
- Community archaeology survey of Penny Rigg mill

2017
- Community archaeology survey of Tilberthwaite Mine, as part of the Coniston Copper Project
- Community excavation of part of Penny Rigg mill

The Coniston Copper project is a partnership between Lake District National Park, land owners, Ruskin Museum, YHA Coniston, Grizedale Arts and Cumbria Amenity Trust Mining History Society. It is funded through the Heritage Lottery Fund to conserve the mining heritage in the area and to provide improved opportunities for interpretation, learning and participation.

The Coniston Copper Mines represent a range of mining structures, spread across a total area of around 57 hectares in the south-west of the Lake District National Park. These structures cover an industrial archaeological heritage reaching back over 400 years to, at least, the late 16th century and the reign of Queen Elizabeth I.

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