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The Newsletter of the Cumbria Amenity Trust Mining History Society

No. 147 May 2022

Cumbria Amenity Trust Mining History Society
Newsletter No 147, May 2022.

Cover picture. Tilberthwaite Slate Quarries Meet, Cathedral Quarry. Photo Mark Hatton.

New members
Jeff Croston, from Wigan. Jeff is a member of Bradford Pothole Club.

Rebecca Lawson, from Merseyside. Has experience in surveying and is a member of Red Rose Caving and Pothole Club.

Andy Hopkirk, from Slaggyford, near Carlisle. He is also a member of the Nenthead Mines Conservation Society.

James Johnson, from Newbiggen on Lune. He is a local Quarry manager near to Kendal, and has a wide knowledge of surface and underground Mining and a life-long interest in mining and underground exploration. Member of Derbyshire Caving Club

David Hudson, from Ross on Wye. Before retiring he was employed by the Mineral Products Qualifications Council. Responsibilities included the development of all the National Occupational Standards and competence based qualifications for mining, quarrying and dredging. He is member of NMRC.

The CATMHS newsletter, a personal view.
I have been involved in writing articles for Journal 7, and even in the day of social media have been through all the past CAT newsletters looking for information to fill in gaps in the articles. This was especially useful when writing about the New Coledale Mining Company when they worked Force Crag Mine in the 1980's and about the Mines Forum. It has made me realise even more that our newsletters are a historical record of events, some of which happened forty years ago. Will it be possible in a few years' time to access articles put on social media?

Virtually all the meetings of the Mines Forum are in the newsletters and they contain projects and work at sites that I had forgotten about. I have literally lifted various sections out for the article and condensed them, but it hopefully demonstrates how much activity there has been over the years. I know of people now who are exploring and have gone back into the newsletters for information which would not be available on social media.

I have also re-read articles on places I had forgotten about. One example being Spot How Gill Copper Mine, which Mark Hatton recently wrote about which, is just what I needed to provide the information to organise a potential meet there.

When I was a member of Mines of Lakeland Exploration Society (Moles) and before, when some illicit digs were being carried out, we got into places which no-one will get back into, and much of this material was never published. I have started to rectify this by publishing articles in the CATMHS newsletters.

I do enjoy looking at the posts on social media but wish they could also be included in the newsletter, even if just a copy of the post, which would provide people with access to them in the future. An article does not need to be long or wordy, so please could I encourage people to send their posts to Ian or myself to include in the newsletter. Editor's note: All the past CAT newsletters are available to all on the CATMHS website, www.catmhs.org.uk

Warren Allison

Forthcoming meets.
15th May - Photographic meet to Coniston Old Man Slate Quarries led by Liz Withey and Peter Archer. A unique opportunity to light up some of the larger closeheads and hone your photographic skills. Bring your cameras. Capacity is twelve people. Contact Warren Allison 01228 523923.

5th June - Greenside Mine work meet led by Colin Woollard, John Brown and Warren Allison. Ian Hebson and friends gained access to the Lucy Tongue Engine Shaft which was reported in a recent newsletter. There was no need to dig through the collapse, as you could climb up between a couple of large boulders. The meet is to open up the entrance to allow easier access to possibly one of the finest engine rooms in Cumbria, and new ground which will need surveying and photographing. Capacity twelve people. Contact Warren Allison, 01228 523923.

12th June - Capelcleugh Mine. SRT meet led by Leif Andrews.
A difficult and serious trip limited to four people. Contact Mark Hatton, 07774 499589.

17th July - Roughtongill and Silvergill Mines at Caldbeck, to be led Warren Allison.
A surface walk and easy underground to these famous mines on the Caldbeck Fells. Silvergill is proven to have been worked in the medieval period 1020-1200 and was the site of the main German workings in the Lake District. It has the wooden waggon way that, until a few years ago, was the earliest evidence in Europe. The National Railway Museum considers it to be the birth of the railway and it is a site of international importance. No restrictions on numbers. meet at the car park at Fellside Farm. Grid reference NY 304 374. Postcode CA7 8HA.
Contact Warren Allison 01228 523923

7th August – A surface walk to the coal mines around Midgeholme on the Brampton to Alston Road, led by Clive Seal. This coal field stretches from Brampton nearly to Alston and is an area not previously visited by CATMHS. Clive is an ex-coal miner from Alston. There is much of interest, and it is where Stephenson's famous railway engine "The Rocket" ended its working life hauling coal. No restrictions on numbers. Meet at the layby in Midgeholme. Postcode CA8 7LY. Grid reference NY 6397 5894. Contact Warren Allison 01228 523923.

4th September - Nenthead SRT tour of less visited corners of Smallcleugh and Middleclough Mines, led by Leif Andrew. Capacity is eight people. Contact Mark Hatton 0777 499589.

Meets in progress with more to follow:
TBC September - Nenthead trip to the ballroom led by Nick Green.

TBC - Greenside Mine, Lucy Tongue Level, to include the Lucy Tongue Shaft, led by Warren Allison and Liz Withey. A walk along the Lucy Level and a photographic meet.

NAMHO 2023 Conference Planning Update.
Planning is well underway for the forthcoming NAMHO conference that CATMHS is hosting in 2023. The event will be held between 7th and 9th July 2023, based at Grasmere Village Hall. The conference theme is "5000 years of mining and quarrying in The Lake District". This opens up subject areas ranging from the Langdale Axe Factory to Greenside Lead Mine, and to currently operating sites such as Burlington Slate.

The organising committee are currently planning the meets programme, comprising surface walks and underground trips. The lecture programme is in its early stages too. We are hoping

to offer a few trips on the following Monday for further afield locations, for example Burlington Slate Quarry have offered a visit. We are still looking for volunteers from the Society to help out with the event:

Meet Leaders and Deputies.
We have some of the bigger trips organised, but still need leaders for smaller locations, e.g. Goldscope, Levers Water and others.

Lecture Programme.
Do you have a subject on which you would like to give a 45 minute talk? It could be tied in with a surface walk, and the organisers would arrange the programme to suit.

Checking out venues.
Before the conference can take place, all of the locations will need to be visited, and the trip 'rehearsed'. This may trigger some remedial work, e.g. new bolts, or fixed aids. It will also allow the risk assessments to be done.

An outstanding issue is provision of camping in or near Grasmere; the organisers would like offers of help to organise that. Please volunteer at namho2023@catmhs.org.uk

Chris Cowdery & John Aird.

Cumbria Geoweek- 7th to 15th May 2022.
Livi Adu Curatorial Assistant at Tullie House in Carlisle had been in touch with Mark Hatton regarding this project, which is a national initiative that seeks to introduce Geoscience to as many members of the public as possible. In Cumbria this will cover:

- Increasing the interest of Cumbrian Geology by making it more accessible.
- Reconnect the public with the environment.
- Display opportunities to get involved with Cumbrian geology

CATMHS contribution in conjunction with:
The National Trust- Mark Hatton is doing a talk on the Wad mine and leading a walk to Goldcope Mine.

Force Crag Mine- The mill is being opened up and a training day is also being organised for the National Trust volunteers to give them an understanding of the underground workings.

Tullie House Museum in Carlisle- Providing photographs of mine site above and below ground to complement a mineral display.

Ruskin Museum -Helping Cumbria Geoconservation lead a short walk to the dressing floors at Coniston Copper Mines before returning to the Ruskin Museum for a visit to the museum.

Cumbria boasts some of the richest geological heritage in the world - Half a billion years of Earth history laid open across our craggy surface, skirted with undulating blankets of younger strata and sculpted by prehistoric ice. The bones of a landscape that inspired poetry and art from luminaries such as Ruskin, Wordsworth, Turner and Coleridge. In celebration of this, Tullie House have teamed up with societies, and museums across the county to create 10 days of Geology themed events. To find out more and book events near you, visit the Geoweek website by clicking at. **https://earth-science.org.uk/geoweek/**

Special Events for Geo-week 2022.

Explore the formation of Cumbria's landscape through these talks, walks and workshops. Please use the website for more information on booking tickets for events and exhibitions.

Saturday 7th May

River Lune Ramble. Exploring rocks and Fossils at Kirkby Lonsdale. Book with Kendal Museum.
Great Asby Scar Guided Geo-walk. Led by Westmorland Dales Landscape Partnership
Geo-walk Skiddaw Granite at Sinen Gill, **Skiddaw.** Book with Penrith Museum.
Wandering with Wordsworth. Geological guided walk. Ticketed event, book with Wordsworth Grasmere.
Geology drawing workshop. At Tullie House.
Every Stone is a Mountain in Miniature: Ruskin, Geology & Art. Talk and walk at the Ruskin Museum.

Sunday 8th May

Rocks and fossils in Trowbarrow Quarry. Book with the Ruskin Museum
Force Crag Mine Processing Mill. Book with the National Trust.

Monday 9th May

Geology and Identity in Cumbrian Literature workshop. By Dr Penny Bradshaw. Book through Brantwood.
Rocks, soils and the rest. A talk. Book with Killhope Mine.

Tuesday 10th May

Every Stone is a Mountain in Miniature: Ruskin, Geology & Art. Talk and walk at the Ruskin Museum
Explore Brown Howe Quarry and discover some of the Lake District's Fiery past (Coniston) Book with Cumbria Geoconservation.
Geowalk around CWT's Eyecott Hill. Book with Penrith Museum.
Behind the Scenes. At Wordsworth Grasmere. (Free with admission)
Geology-themed Loose-Leaf Poetry at Wordsworth Grasmere.

Wednesday 11th May

Geology Day at Nenthead Mine. Surface and underground walks.
Geology-themed Loose Leaf Poetry. At Wordsworth Grasmere.
Gelt Woods – A braided river in the Triassic Desert. Book through Tullie House.
A geological walk around Keswick. Book with Penrith Museum.

Thursday 2th May

A talk on the rocks **in and around Barrow.** Book with the Dock Museum.
Geoweek Symposium. At The University of Cumbria.
The Wad Mine. A talk with CATMHS (online). Book with the National Trust.
Two part Excursion – Igneous intrusions into Skiddaw. Book with Penrith Museum.
Geology Rocks. At Tullie house. (Free with admission)

Friday 13th May

Introduction to Geology. Led by David Evans with the Westmorland Dales Landscape Partnership.
Goldscope Mine. A walk with CATMHS. Book with the National Trust.
Rocks, soils and the rest. A talk. Book with Killhope Mine.
Geoweek Symposium. At The University of Cumbria.

Saturday 14th May

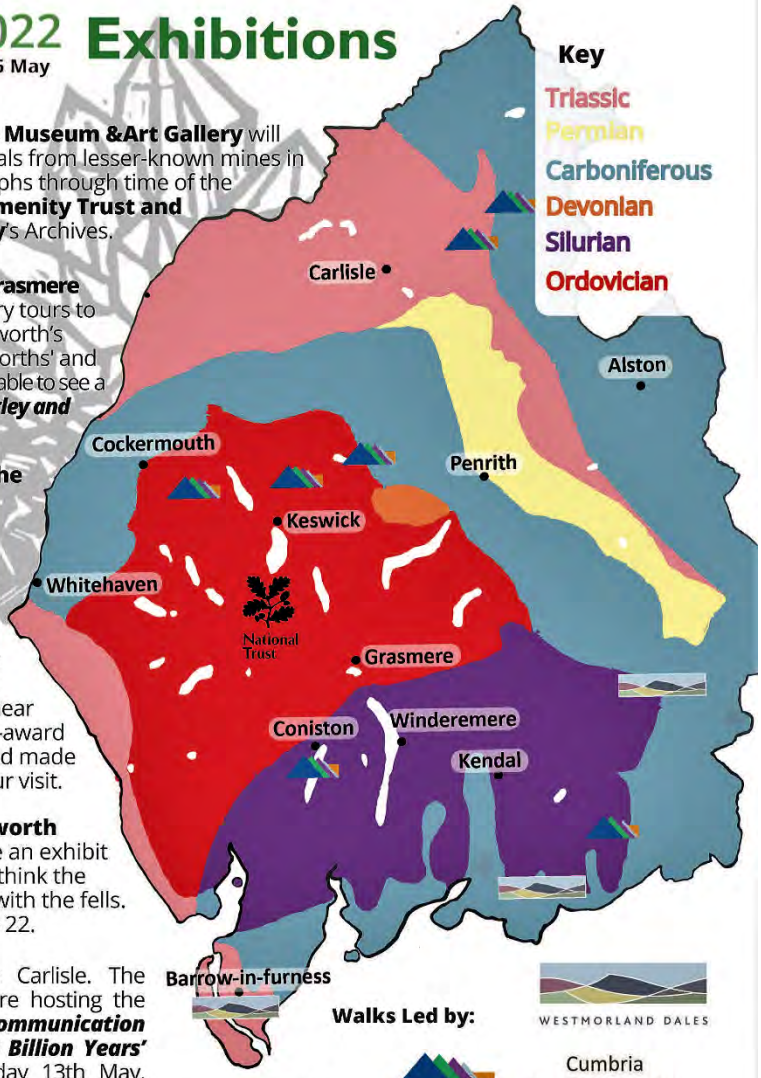
The Geomorphology and Nicholson's poetry. Fieldtrip with the Norman Nicholson Society.
Force Crag Mine Processing Mill. Book with the National Trust.
Geology-themed Loose Leaf Poetry. At Wordsworth Grasmere.
Art Rocks. With the Windermere Science Festival. Book with the Windermere Jetty Museum

Sunday 15th May

Coombe Crags: Tropical Seas and River Deltas of the Carboniferous. Book with Tullie House.
Making sense of our Landscape. Book with the Ruskin Museum.

GeoWeek 2022 Exhibitions

Active Geoscience 7–15 May



TULLIE HOUSE MUSEUM AND ART GALLERY CARLISLE

In Carlisle, **Tullie House Museum &Art Gallery** will be exhibiting rare minerals from lesser-known mines in Cumbria. With photographs through time of the mines from **Cumbria Amenity Trust and Mining History Society**'s Archives.

wordsworth GRASMERE

Wordsworth Grasmere have daily gallery tours to explore Wordsworth's Guide to the Lakes, activities on Wordsworths' and geology. At the Jerwood Centre, you will be able to see a special exhibit: ***'Wordsworth, Jonathon Otley and the environment'***.

the beacon museum

In Whitehaven, use **the Beacon Museum**'s interactive digital geology experiences and powerful telescopes, to find out about the history and development of Whitehaven's town and harbour.

Killhope

Visit 19th century mining museum, **Killhope mine**, near Alston. This multi-award winning museum is giving site tours and made a '***Giant Spar box***' for you to see on your visit.

National Trust

In Cockermouth, **Wordsworth House and Garden** have an exhibit which challenges us to rethink the basis of our relationship with the fells. ***'Scree'*** is on until 6th Nov 22.

University of CUMBRIA

At the Vallum Gallery in Carlisle. The **University of Cumbria** are hosting the ***'Geoweek Symposium: Communication Measures to Bridge 4.543 Billion Years'*** Exhibit. Monday 9th - Friday 13th May,

THE DOCK MUSEUM BARROW-IN-FURNESS

In Barrow, **the Dock Museum** has permanent exhibits based on the iron ore mines and how Barrow in Furness was built on this geological discovery.

THE RUSKIN MUSEUM BLUEBIRD

In Coniston, **The Ruskin Museum** have an exhibit on the industrial remains of the Coppermines Valley and Tilberthwaite by redisplaying ***'The Copper Collection'***, with a new case, interpretation, and Audio-Visual show.

Kendal MUSEUM Where History and Nature Meet

Kendal Museum has a permanent geology exhibit, with rooms of rocks and minerals flowing between the Natural History galleries. Their online resources allow you to view photo-graphs of local rocks and minerals.

Walks Led by:

WESTMORLAND DALES

Cumbria GeoConservation

National Trust

CUMBRIA AMENITY TRUST MINING HISTORY SOCIETY

Honorary President: Lord Egremont

Brantwood

John Ruskin's home 1872 - 1900

Brantwood, Coniston, will release daily video shorts exploring their relationship to Ruskin and Geology. Including highlights from the ***'Treasury'*** gallery, which has specimens from John Ruskin's personal collection.

PENRITH AND EDEN MUSEUM

Penrith and Eden Museum, have permanent geology exhibit : ***'Ages of Eden'***, which you on a journey through the geology of Eden. Explore their virtual tour through ***the Penrith Museum Blog***.

Newland Furnace

The roof of the loading barn at Newland Furnace was replaced in 2005. As much as possible of the original timbers were incorporated in the reconstruction, but unfortunately one of the original rafters has now failed. Measures were taken to support the broken strut with Accro props, and a draft plan to splice the rafter with steel plate was submitted to English Heritage. The engineers responded and offered an alternative option:

"In principle, the repair is feasible, however, the main issue is the fact that the structural arrangement of the truss has been altered at some point in the past. The truss should surely have struts between the bottom chord and the rafters, at the point where the mortise/tenon joint forming the main weakness of the rafter is located. If these struts could be reinstated, it could negate the requirement for the strengthening plate to be installed"

The Trust submitted a drawing of their interpretation of this proposal, which was forwarded to the EH structural engineer who has taken on the case, Leon Walsh. He commented:

"With reference to the Trust email, yes, they are almost correct with their interpretation, although normally with a king post truss there would be a vertical strut between the apex and the mid-point of the bottom chord. In this situation, the pair of diagonal struts meeting at the mid span would probably be acceptable to provide restraint to the principal rafters. The main advantage of using new timbers rather than a plated repair would be that the void in the rafter would be filled with timber, as previously mentioned.

Replacement of struts is my preferred solution, however, any solution will depend on the condition of the timber and the suitability of it for repair. A Rotafix repair may prove to be required as well as the installation of the struts, depending on how much timber is lost".

A site visit was arranged for English Heritage officials to assess the roof truss in order to finalise the approach on how to repair it. Unfortunately the Inspector of Ancient Monuments, Andrew Davidson, was unable to attend due to Covid, but the engineer Leon Walsh did attend, together with several members of the Trust.

Having looked at the problem, Leon's initial thoughts were to clamp the fractured beam top and bottom with "U-shaped" shoes that could be tightened to compress the broken joint back into position. Rotafix resin would also be used to reinforce the repair. A similar shoe was proposed for the opposite truss and the design would allow for the upper chord to be reinstated. He also proposed that the apex of the two trusses be reinforced with a triangular wooden strengthener.

This sparked a discussion in which other options were also offered for Leo to consider. These included replacing the trusses, reiteration of the original steel plate option, a hybrid shoe and plate option and the queen/king post variant. A scarf joint repair was also discussed.

The meeting ended with Leon being shown around the rest of the furnace as this was his first visit to Newland. Leon left saying that he would consider all the options and come up with a series of proposals which he would put to Andrew Davison for their archaeological aesthetics to be considered. We await the outcome of this procedure.

Update on progress of work at Coniston Old Man Quarries.

The extensive interpretation and historical project work that we have been carrying out on Coniston Old Man started in the early 1990's. At that time CATMHS was heavily committed to ore-mining work and so the Coniston Local History Group, in which a number of us were involved, became our guiding light. Since then the plans for the interpretation of the history of the site have progressed enormously.

Looking down into High Moss chamber

Our initial work was financed by the Heritage Lottery Fund and Nationwide Building Society, and was overseen by the Countryside Agency. The project progressed well and it became clear early on in the work that the initial industrial activity on the mountain must have occurred as far back as the 1200's, if not earlier.

We hope to produce a four panel display at the Saddlestone site describing the history of the working of slate that has taken place on Coniston Old Man since earliest times. The design of our first two panels has now been completed and approved by specialists in the field. We have been strongly recommended by the National Park Authority to attach these to the existing buildings on the site in the first instance. Subsequently we will construct a small 'hub' on Saddlestone Bank which will become a permanent site for the panels. I anticipate that this will take place within two years of the panels first being displayed. We are now busy designing the third and fourth panels for this feature.

The former smithy and 'power station', situated below the spoil banks at the site, is an extremely important artefact and some maintenance has been carried out on the structure on occasions in the past, some of it involving CATMHS. This building started life as the Smithy, serving all the slate workings above, and today it is still referred to by that name by the Estate and the present team. It contains an air compressor and electricity generator, both powered from a 'pelton' water wheel. Water supply for the wheel was piped down from Low Water Tarn high above. We understand that the slates were removed from the roof of the building during the 1970's, and more recently the timber structures formerly supporting the roof have collapsed, the last of these during storm Arwen last year. We were able to remove the rotten timbers before any significant damage to the equipment occurred and some timbers within the structure of the walls have also been replaced. Robert Gurr will continue to oversee future work on this structure.

Saddlestone Quarry. Warren Allison, Liz Withey and Alastair Cameron. Photo Robert Gurr.

We are very fortunate that Donald Kelly, now in his 80's, is still living in Coniston. He was 'manager' of the Smithy towards the end of his working life. Donald's memory is still very

astute and we have a recording on a CD which I made a few years ago of him describing the operation of the site. Donald was also involved in the temporary re-opening of the Old Man quarries about two years after they had been closed down, to provide slates to repair the roofs of the Houses of Parliament. He and three former colleagues managed to get the whole site operating again, including the aerial flights. They then set off one blast in Middle Moss Head, which produced a good amount of top quality slate, selected the best blocks, docked and rove the slates to the quantity ordered, and left the rest. I have often thought that a small brass plaque should be fixed to one of the blocks that remain on the chamber floor explaining why they are lying there.

We have also started a further geological study of the slate bands on the mountain. There appear to be three bands, of differing colours and, most likely of different ages, which pass through the mountain and have been worked at various locations. We have also started a further geological study of the slate bands on the mountain. There appear to be three bands, of differing colours and, most likely of different ages, which pass through the mountain and have been worked at various locations. We are very lucky to have Lorraine Crisp, who has an interest in the geology of the mountain, as part of the team. She is pleased to help with this project and we will be spending some time with her on the mountain later this spring, when the weather settles down a bit.

We have also produced documentation for Coniston Mountain Rescue Team. This is in the form of charts and diagrams of the workings on the mountain and these are now installed in their base-station at the Coniston Station site, close to the Mandall's store. Quite a few of the team members are very familiar with the underground workings on the mountain. A further project, which we hope to start very soon, is to produce a 3D 'map' of the mountain showing each of the eight separate chambers in 3D imagery. This will require a certain amount of software and computing abilities. However one member of our team, Peter Archer, has already carried out very successful 3D imagery trials with his father on a slate working site in Tilberthwaite. If we are successful on Coniston Old Man the results should be very impressive and also very useful to the Rescue Team for future incidents.

Over the years since the project was commenced a significant level of interest has been shown within the South Cumbria area. Earlier in the year Richard le Fleming, Lord of the Manor of Rydal, started to take an interest in our work. In a lengthy meeting I had with him in February we discussed the work being carried out on 'his' mountain and we agreed that I would be his link on the work and would produce a periodic report on progress of the project. We also agreed that no structural work would take place at any site on the mountain without prior approval by himself or his agents, Carter Jonas, Kendal.

We have also offered to take Mr le Fleming on a tour of the site and, in particular, of the Middle Moss Head chamber so that he can appreciate the former slate working closeheads. We can also explain to him the 'weaseling' system that was used to work the closeheads. Hopefully we may be able to get a 'lift' arranged for him in a Burlington Stone Landrover up to their Brossen Stone Quarry site, from where it is a reasonably easy walk across to the Middle Moss Head level portal.

Alastair Cameron.

Conservation at Yewthwaite mine.
Yewthwaite is a lead mine situated on the west flank of Cat Bells (NY240194), and it is the property of the National Trust. There are numerous shallow workings on the back of the vein, but the later deep workings were reached by two levels, the Low Adit at approximately 850ft A.O.D and the Trustees' Level at approximately 700ft A.O.D. The mine was abandoned in 1893. The NT has regularly raised issues at the Mines Forum concerning its safety and conservation. Some exploration was carried out by the now defunct Mines of Lakeland Exploration Society (MoLES), but so far CATMHS has not been active at the site. Colin Woollard recently took a look at Yewthwaite and suggested three possibilities we might consider in order to secure the entrance in the short and longer term.

Warren Allison commented: The National Trust gave MoLES permission but MoLES put a time limit on the dig, which there was no need to do. This meant it had to be done in a hurry and that is why the entrance to the level is where it is. There was no time to dig it to the floor as it should have been done and to be honest it was a poor dig, which also only allows access when the water level is low, as in drought. Ian Hebson (Heb), who is a long standing CATMHS member, and was part of MoLES, has been through recently after someone posted a trip on Youtube, and found the underground dig is as it was. Heb is concerned that with the demise of MoLES there is no one to really look after the entrance to prevent further access and he has made it as secure as he can at the moment. My view is that if someone did get back in and something untoward happened then it could reflect badly on mine exploration in the Lake District as it is a high profile site, being on National Trust land.

Colin Woollard's suggestions: Retain the existing tube door and refurbish. The locking mechanism is not effective; it is a slack chain and people can get to reach the chain with a grinder etc. The hinges are exposed to the elements and prone to seizure and also abuse from a grinder man. The door is well constructed otherwise. The door is rusty and quite an eyesore when visible. If desired the lid could be cleaned down and painted an agreed colour/camouflage.
Another approach would be to manufacture a new fully protected and galvanised door which could be taken up and simply fitted to the 36 inch concrete tube – not so vital as the existing door was better than expected.

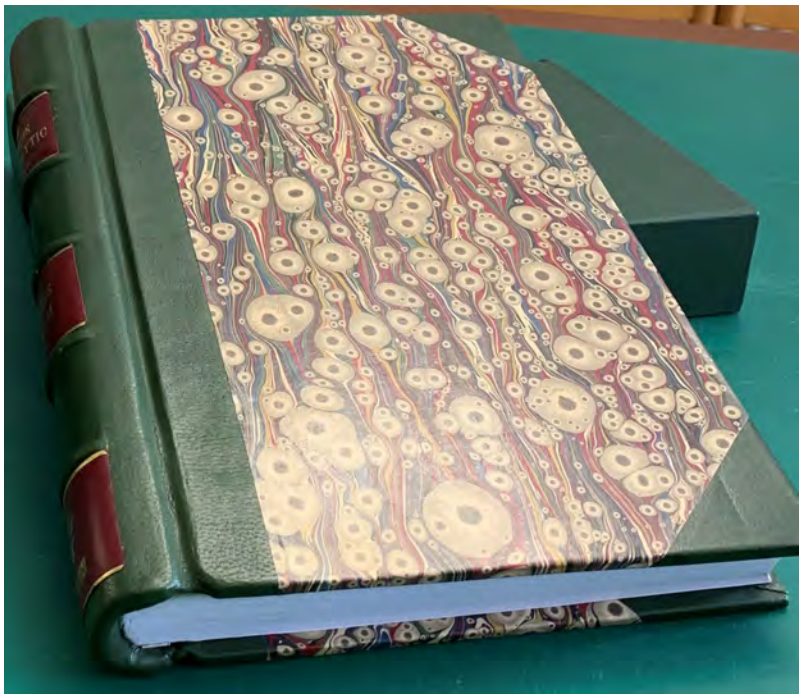
Yewthwaite Trustees Level 2022. Photo CW

A longer term prestigious approach would be to partner with the National Trust and dig out the entrance, drain the level and reinstate some sort of entrance depending on what remains of the original. It is a high opening so may be difficult unless the original arching remains serviceable. A quick refurbish could be carried out, and if there were enough enthusiasm the third option would be worthwhile and beneficial. Any of these options would be subject to or dependant on an agreement of the National Trust.

Archival books

CATMHS has always had a special interest in the Coniston copper mines and our archive at the Armitt Museum and Library at Ambleside has a collection of ledgers and documents dating from the 19th and early 20th centuries, when the mine was working. Years ago Mark Simpson and Ian Matheson, with permission from Vicky Slowe, the then curator of the Ruskin Museum, and of the late Major JWB Hext, our Vice President, photographed many of the Coniston documents. During lockdown Collin Woollard developed a hobby of book binding, and although still learning, is now able to produce books bound to a professional standard, and he decided to revisit some of the documents for which we have digital images.

At the Ruskin there is a collection of letters written in French in 1913-14 and sent by the Coniston Electrolytic Company to their manager at Coniston, Count Henri de Varinay. Ian Matheson, arranged for them to be translated into English by Rudy Devriese in Antwerp, James Churton in Paris and Joyce King in Ulverston. They provide an insight into the working practices and personal relations of the French company. Ian collaborated with Colin to enhance the images and to tidy up the transcriptions. Colin has made leather bound volumes of some 400 pages, in which all the documents are presented in date order with an image of the original and its transcript set on facing pages. There are two copies, one for the CATMHS archive and one to offer to the Ruskin Museum.



In 2010, after Major Hext had died, his effects were sold by Tennants of Leyburn at a special auction. Two lots were of particular interest. – A collection of letters and reports mostly written by John Barratt to John Taylor between 1823 and 1834, which had been bound into a book by Bernard C Middleton, and Costbook No. 2, a ledger which recorded the running costs of the Coniston mine between 1838 and 1843, and contained a wealth of ancillary information. CATMHS was able to purchase the Costbook, but the Barratt letters exceeded our reserve of £3,000 and the book was sold to another bidder. We do however, have digital images the content of both books.

Once the Coniston Electrolytic Co. books were more or less complete, attention turned to the Barratt letter book. Several people had helped to transcribe the very difficult handwriting, using the digital images. John & Lesley Aird, Sheila Barker, Dave Bridge, John & Joan Helme, Tony Holland, Peter & Margaret Fleming and Ian Matheson all contributed, along with Mike Gill of PDMHS, who has a special interest in the mines of Grassington Moor. The digital images were not good enough for a printed version, so a lot of time was spent adjusting and enhancing them. The book is nearly ready to be printed and bound, and when it is finished it will have an introduction and all the letters set on facing pages with their transcript. As far as is possible it will have the appearance and size of the Middleton volume. A copy will be deposited in the CAT archive.

Costbook No.2, which CATMHS purchased at the Hext sale, was displayed at an exhibition at the Ruskin Museum and subsequently deposited in the County Archive at Carlisle. Once the Barratt book is finished it is proposed to attempt to make a replica to be added to the CATMHS archive and used as a working resource. We do have digital images of this book, but as it is still available we will probably re-do the photographs, using modern equipment. PDF versions of all three books will be made available.

Ian Matheson.

The CIHS Spring Conference

The Cumbria Industrial History Society held its Spring Conference on 26th March at the North Lakes Hotel, Penrith. The theme was Iron-Making in Cumbria, which was of particular interest to members of the Newland Furnace Trust. Titles were ‘Managing wood supplies for the Iron Industry in the 18th Century.’ Backbarrow Ironworks – Past Present and Future.’ ‘Ulverston Foundries.’ Rise and Fall of the Iron and Steel Industry along the Cumbrian Coast.’

The organisers encouraged displays and bookstalls, and Peter Sandbach set up a stand to sell CATMHS books, aided by Paul Timewell and Anton Thomas.

Making it Mine – Sir Arthur Russell and his Mineral Collection by Roy Starkey
Knowing that there are people in the Society who are interested in Geology and Mineralogy, I asked Roy Starkey to write a resume of a limited-edition book on the famous mineral collector Sir Arthur Russell which he is about to publish who's collection included specimens from mines in Cumbria.

Roy Starkey's resume
To the mineralogist and mineral collector Sir Arthur Russell needs little introduction. Anyone who has visited the mineral gallery of the Natural History Museum in London will have seen his name and perhaps lingered by the display case close to the entrance of the gallery, admiring a small selection of superb specimens from his collection of British minerals.

The honorific 'Sir' is not a knighthood for public service but the result of him becoming the 6th Baronet Russell of Swallowfield in Berkshire, a hereditary title created for his great-grandfather Sir Henry Russell (1751–1836). One might be forgiven for imagining that his family background would have bestowed upon him a comfortable lifestyle, but the reality was rather different. He was by nature a frugal person with the common touch, equally at home with miners and quarrymen as he was with the mine owners and landowners that paid their wages.

Sir Arthur's contributions to the study of British mineralogy are many and varied. He was undoubtedly drawn to the beauty and wonder of natural objects, collected minerals himself, acquired specimens from miners and made a remarkably thorough job of tracing and purchasing old collections. As a consequence, through his wonderful collection of minerals, we can travel back in time to places that are no longer accessible, and via the associated historical connections with earlier collectors, gain a sense of the value attributed to crystals and mineral specimens 250 years ago.

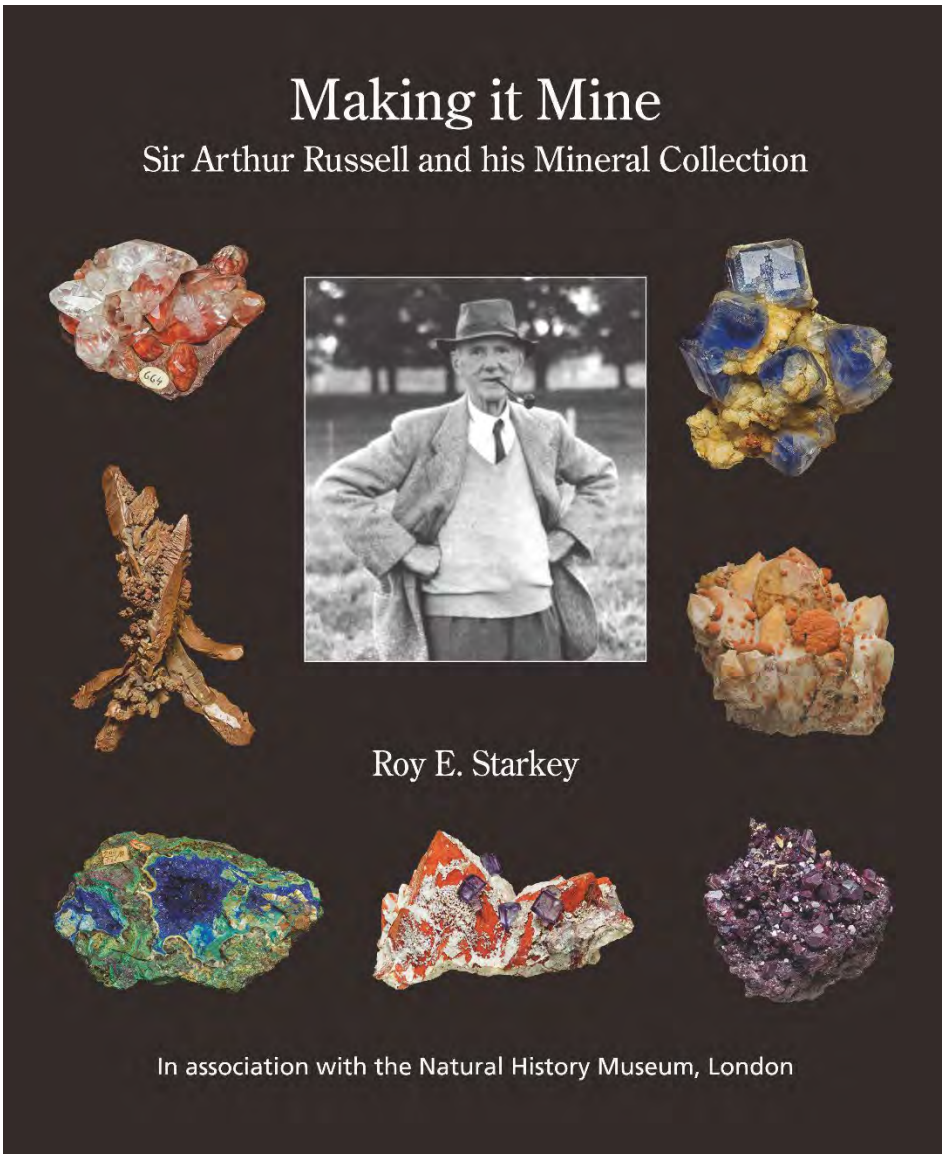
One of Sir Arthur's unfulfilled ambitions was to produce an updated version of the Manual of the Mineralogy of Great Britain and Ireland (Greg and Lettsom, 1858). His manuscript notes made in preparation for such a publication survive, and from them we can gain considerable insight to his meticulous research and archival detective work. Largely self-taught, and with no formal scientific qualifications, he rose to become President of the Mineralogical Society of Great Britain and Ireland and was awarded several prestigious medals for his work in mineralogy.

Making it Mine explores the fascinating story of Sir Arthur Russell 6th Baronet as he pursued his quest to build the finest collection of British minerals ever assembled. Lavishly illustrated with more than 750 photographs and diagrams, including 445 previously unpublished images of specimens from Sir Arthur's collection, the book delves into his family history, the background to his passion for mineralogy and his single-minded determination to secure the very best specimens for his collection. The stories and people behind the specimens are woven into a compelling narrative together with sketches and anecdotes concerning the many colleagues and contacts that assisted him along the way.

Chapter 17 consists of accounts of 13 localities or areas which are particularly strongly represented in Sir Arthur's collection. These include Greenside Mine, Patterdale; Nentsberry Haggs Mine, Alston Moor; Rotherhope Fell Mine, Alston Moor; and the West Cumberland Iron Mines each of which includes splendid photographs of fine mineral specimens.

Privileged access both to the Sir Arthur Russell Collection of British Minerals, and the Russell Archive, at the Natural History Museum in London has allowed the author to tell the story in detail. The book will appeal to all those interested in British mineralogy, to mineral collectors and dealers, to historians of mineralogy, museum curators, university researchers and to anyone who is simply interested in the treasures of the natural world. This is neither a coffee table book nor a biography, but rather a blend of the two that takes the reader on an absorbing journey through the last 200 years of mineral collecting.

The book has been printed in the UK on FSC sourced, 150 gsm silk finish paper, and is registered with the World Land Trust carbon balanced paper scheme. Attractively produced and running to 432 large format pages (276 × 218 mm), the book includes 757 images, maps and diagrams, 1100 references and a comprehensive index. Hardback £40 plus p&p. (ISBN 978-0-9930182-4-4).



For further information, or to order a copy, please go to www.britishmineralogy.com or email roy@britishmineralogy.com

Sir Arthur Russell and his mineral collection.

At Glenridding the disaster, coupled with the price of lead, resulted in the final demise of the old Greenside Mining Company, which wound up in 1934. The operation was subsequently purchased by the Basinghall Mining Syndicate, which invested £250,000 to bring the mine back into production. Mining continued until the economic ore reserves were exhausted, with final closure in January 1962.

The total production of the mine is uncertain, but Shaw (1972) estimated the output to have been approaching 250,000 tonnes of lead concentrate from about three million tonnes of ore.

Specimens from the Greenside mine are seen only infrequently on the market and are represented in relatively few collections. Arthur Russell visited Greenside mine on a number of occasions between 1925 and 1941 and maintained contact with the management over a period of 25 years. He also acquired specimens from W F Davidson, mineral dealer of Penrith. The Russell collection includes more than thirty specimens from Greenside mine: barite (3); calcite (14); chalcopyrite (5); galena (8); and quartz, pseudomorphous after barite (1).
The specimens illustrated below are a representative selection.

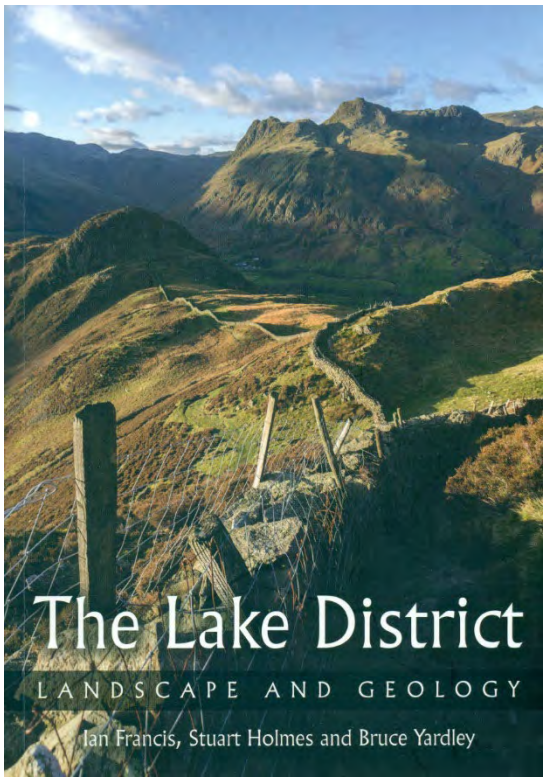
Figure 606. CHALCOPYRITE: brassy yellow, metallic, sphenoidal crystals, with small octahedra of galena, on grey drusy quartz. Sir Arthur Russell Collection, Natural History Museum, London, Reg. No. BM.1964,R4229. Dimensions 185 × 100 × 30 mm. Greenside Mine, Patterdale, Westmorland. Collected by Arthur Russell on the 150 fathom level, Station 21, in May 1938.

Figure 607. CHALCOPYRITE: small brassy yellow to slightly iridescent, composite sphenoidal crystals, on white acute scalenohedra of calcite. Sir Arthur Russell Collection, Natural History Museum, London, Reg. No. BM.1964,R4238. Dimensions 70 × 70 × 60 mm. Greenside Mine, Patterdale, Westmorland. Collected on the 175 fathom level in 1950. Purchased from W. F. Davidson of Penrith.

Figure 608. GALENA and CALCITE: bright, silvery grey metallic, composite crystals, partly coated with translucent cream crystals of calcite. Sir Arthur Russell Collection, Natural History Museum, London, Reg. No. BM.1964,R3833. Dimensions 120 × 70 × 50 mm. Greenside Mine, Patterdale, Westmorland. Collected by Arthur Russell on the East Branch, 120 fathom level south, in September 1925.

Book review – The Lake District, Landscape and Geology.

Written by Ian Francis who has a PHD in geology, Stuart Holmes is a self-taught photographer and Bruce Yardley is Emeritus Professor in the School of Earth and Environment at the University of Leeds.



It explains how the rocks were formed and how the geology has affected the landscape. It explores the long human story of the Lakeland landscape and finishes with seven guided excursions to easily accessible geological locations. The book is accompanied by over two hundred and thirty illustrations.

This is probably the best book I have read on the geology of the Lake District, so easy to understand, not full of jargon and explains in layman's terms how the landscape of the Lakes was formed and shaped.

I started reading it and could hardly put it down, it was riveting and made so much sense of the landscape of places I had walked. It will make future excursions onto the fells so much more interesting, and I am tempted to buy another one for the rucksack.

Warren Allison

More on Rock Canon

Reading the latest newsletter I must challenge the assumption that it is "just some holes" and not a rock Cannon at the Wad Mine, on the following basis:-

When holes were drilled on vertical surfaces my understanding is that goose fat was used to hold the black powder. I attach for information an extract from Griff's book which provides more details on the Canon at the mine. The ref. 126 is to page 123 of Tyler's book and also Farey's Report from 1818 attributed to the Jackson Collection at Carlisle Library.

Seathwaite Wad (Graphite) Mine, Cumbria.

['Some of the last trials made during 1798 involved the complete re-opening of Gortons Stage [126], which had been again backfilled for security. This was inspected by the agent William Charlton who, after a few yards of driving, discovered a wad pipe just beyond Gortons Pipe. William was a man of high spirits and was so cheered by his discovery, that he fired off the guardhouse blunderbuss for fun and earned himself a strong reprimand for wasting gunpowder! Some of his fellow agents however, appear to have been just as crazy and amused by loud reports. A favourite pastime was to drill a series of six or seven shot holes in the surface crags near Harrisons Level, these were then loosely charged and fired in fast repetition. These firings became known as 'The Rock Cannon' and when management heard about it, the men were again taken to task for wasting the company's gunpowder'].

Yesterday, 5th March 2022, Mark Waite and I cleaned up the Rock Cannon at Aberllefenni to take a photo for my forthcoming book about the Quarry. These are found at many quarries and were fired with gunpowder on special occasions giving a sound like fireworks. Thanks to Les for loan of the brush. Grid location is SH77000987 and it contains 134 holes.

Jon Knowles.

How the Minerals Came to Cumbria – synopsis of a CATMHS Zoom talk given by Julian Cruikshank on 11th March 2022.

About 480 million years ago an ocean (called Iapetus by geologists) south of the Equator was slowly closing, forcing Scotland on one side towards England on the other. Sediments deposited in the deep ocean before it closed formed the Skiddaw Slates in the north of the Lakes.

About 455 million years ago volcanic ash and lavas created by the melting of the sinking ocean crust then formed the Borrowdale Volcanic Group in the Central Lakes, underlain by magma which formed the Eskdale and Ennerdale Granites to the west. Later subsidence led to marine sedimentation forming the Windermere Supergroup to the south of the Lakes.

Between about 410 - 400 million years ago the crustal pile up reached its conclusion with the intrusion of shallow granites beneath Cumbria – oldest in the west (Crummock) youngest in the east (Shap, Skiddaw and Weardale). The pressure from this event produced the cleavage in the existing fine grained rocks producing slates and a number of folds and faults.

Cumbria slowly drifted northwards into the Equatorial zone, and first limestone was deposited in a coral sea and then sandstone and coal in a deltaic swamp. As the sea dried up, evaporation gave rise to gypsum and anhydrite deposits in the Vale of Eden and Irish Sea Basins, followed by continental deposits of red sandstone.

About 290 million years ago Cumbria went into north – south compression due to crustal plate collision to the south (which caused faulting in the West Cumbrian coalfield) followed by east west extension which formed the lead/ zinc mineralised veins of the North Pennine Orefield (and Lake District?).

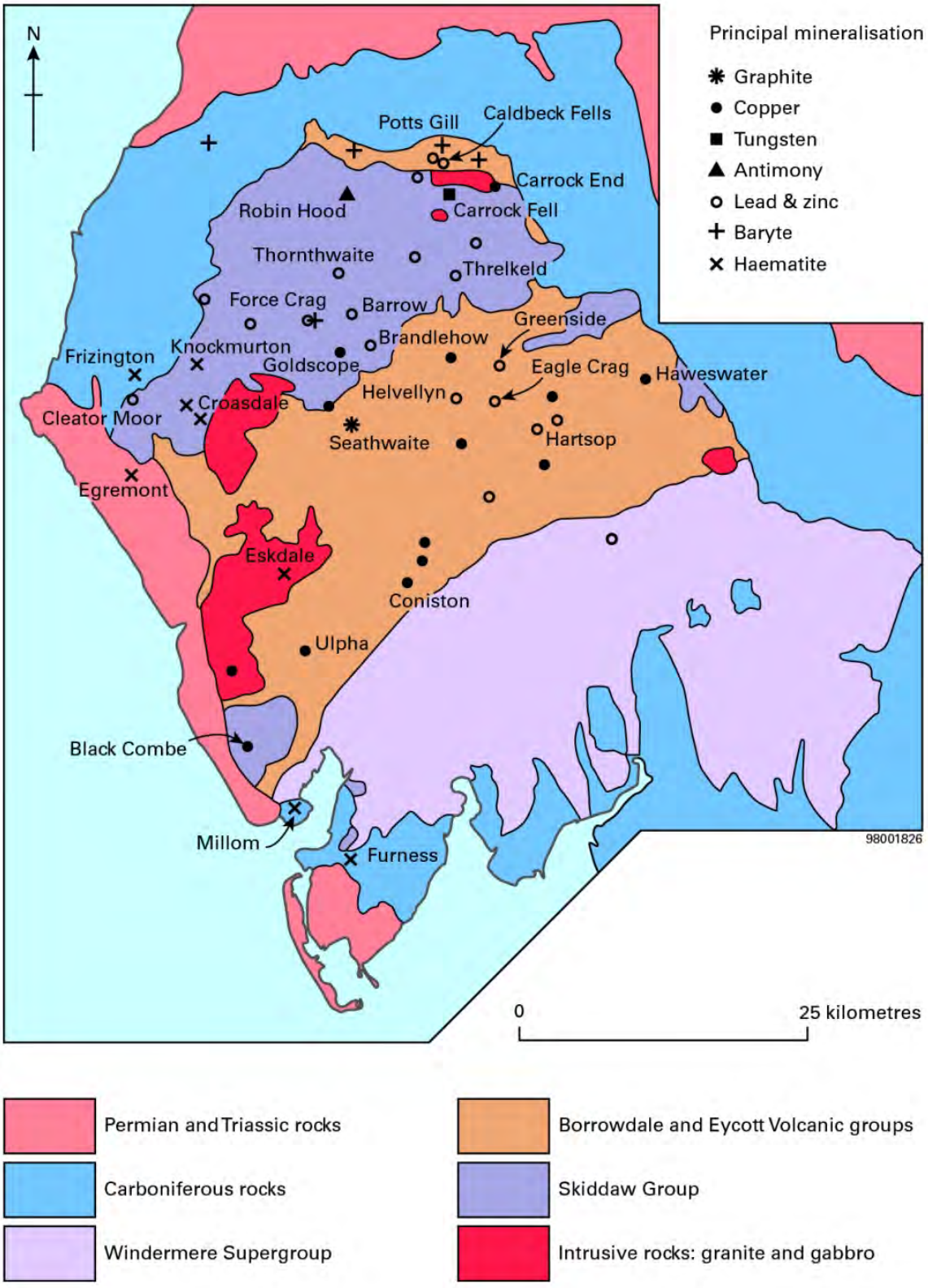
As Cumbria drifted north to its current latitude, general east – west tension persisted with the formation of the North Atlantic about 55 million years ago. The Lake District and North Pennines remained strong, stable and buoyant blocks due to the underlying granites but the Irish Sea and Vale of Eden became Rift Basins with the formation of Lake District and the Pennine Boundary Faults. The structural high of the Lake District led to the erosion of the younger rocks, exposing the older volcanics, slates and granites in its core. The current topography is shaped by the Ice Age.

Mineralisation within the Lake District has a close association to the form of the largely concealed underlying granite. Veins are typically concentrated above, or close to, ridges in the roof region of the granite batholith or above its north and south walls. The virtual absence of veins from the Windermere Supergroup is consistent with their distance from the granite. The granite provided the connection to the heat, and hot fluids leached elements from rocks and deposited them in faults or other zones of weakness (veins). The mineral form depended largely on the chemistry and temperature. A lot of the colourful and exotic minerals are the result of subsequent reaction with near surface chemistry.

The timing of the mineralisation can be summarised as follows:

- Copper-rich assemblages in the closing stages of the Iapetus Ocean

- Tungsten-bearing veins at the time of the shallow granite intrusion
- Lead–zinc mineralisation, locally accompanied by abundant baryte, after the Carboniferous Limestone but before the Permian Red Sandstone
- Coal and Evaporites at the time of their deposition
- Widespread post-Permian haematite mineralisation



The distribution of the minerals follows the following general pattern:

- Copper in the south, associated with the Borrowdale Volcanic Group
- Lead/zinc/baryte in the north and east, sourced from Carboniferous rocks to North and East (plus the Skiddaw Group and Granites?)
- Haematite in the west, sourced from Irish Sea sediments

No clear uniformity of vein orientation is apparent within the Lake District, though it has been observed that copper-bearing veins are commonly orientated east–west with a southerly dip, whereas mainly lead–zinc veins typically trend within 45° of north and dip towards the east. This pattern may be linked to the orientation of crustal tension at the time of their emplacement.

View of Newlands Valley

Line of Goldscope Mine veins

Although evidence exists for vertical zonation of constituent minerals in a few instances, most of the Lake District deposits show no obvious lateral or vertical zonation of constituent minerals. In this they differ from the commonly zoned veins of the nearby Northern Pennines.

Graphite

- The Seathwaite graphite deposit in Borrowdale is unique in the British Isles and has very few parallels elsewhere in the world
- The graphite is closely associated with an intrusion into the lowest part of the Borrowdale Volcanic Group
- It occurs in veins and in a series of at least eight individual, steeply inclined, pipe-like bodies developed at the intersection of faults
- The ‘pipes’ are each up to 1 m by 3 m across and from 2 m to 100 m in vertical extent. Within these, the graphite forms discrete nodules from 1 mm up to over a metre across, though nodules up to a few centimetres across were probably commonest
- The nodules occur within a buff-coloured matrix of intensely altered intrusion rock and graphite locally appears to replace the host
- The carbon was derived from organic-rich sediments within the underlying Skiddaw Group and deposited at high temperature (c. 500°C)

Copper

- In these deposits, chalcopyrite is the most widespread primary copper sulphide mineral, though tennantite, chalcocite and bornite are locally abundant, the last in situations which suggest some secondary enrichment

- Associated ore minerals commonly include abundant arsenopyrite, pyrite and pyrrhotite, with very much smaller amounts of native bismuth, bismuthinite, bismuth sulphoselenides and sulphotellurides, cobalt and nickel minerals, galena and sphalerite. Traces of gold have been identified in a few localities
- Associated non-valuable minerals mainly comprise quartz, chlorite and dolomite
- Magnetite, most of which appears to replace original haematite, is plentiful in a few veins, notably the Bonsor Vein at Coniston, where mine records suggest the proportion of this mineral increases with depth
- Copper-bearing veins in the Coniston area appear to have been widest, up to several metres across, and were most productive where they cut volcanic ashes rich in silica
- Within the Bonsor Vein, temperatures of 350–400°C have been suggested for the deposition of early arsenopyrite and replacement of early haematite by magnetite. Quartz, chlorite, calcite, dolomite, pyrrhotite, chalcopyrite, sphalerite and later arsenopyrite were probably deposited at temperatures of around 240°C, with later minerals including pyrite, native bismuth, bismuthinite and galena likely to have been deposited at temperatures as low as 200°C
- The Borrowdale Volcanic Group rocks have been proposed as the source of the metallic elements whereas the Skiddaw Group is considered the most likely source of the sulphur. These veins predate the regional cleavage and are therefore likely to have formed during or shortly after the final phases of volcanism.

Tungsten

- A small group of veins, formerly worked at the Carrock Fell Mine comprise the only known occurrence of tungsten mineralisation in Britain outside of south-west England that has ever attracted commercial interest
- The tungsten ores wolframite and scheelite are accompanied at Carrock Fell Mine by arsenopyrite, pyrrhotite and pyrite in quartz–muscovite–apatite veins which strike approximately north–south
- Minor constituents of the veins include native bismuth, bismuthinite, bismuth sulphotellurides, molybdenite (with an age for mineralisation of about 392 Ma), iron-rich sphalerite and traces of gold. A few specimens of cassiterite have been reported. Significant tungsten mineralisation appears to have been confined to strike lengths of only 1 km centred around the mine, though panned concentrates from surrounding streams suggest that tungsten minerals may be more widely distributed.
- The Carrock Fell veins are genetically associated with the Skiddaw Granite and studies suggest maximum temperatures of over 300°C for tungsten mineralisation. The tungsten-bearing veins are cut by later quartz and galena-bearing veins and there is abundant evidence of a complex series of mineralising events. Later near surface chemical alteration has produced a great variety of unusual mineral species.

Lead – Zinc

- Galena and sphalerite are the main primary ore minerals in these veins, accompanied locally by minor amounts of chalcopyrite
- Silver is almost invariably present within the galena. Assay values of up to 30 ozs of silver per ton of lead (838 ppm) have been recorded from the Caldbeck Fells and high concentrations of silver are known to be present in tetrahedrite at Eagle Crag and

elsewhere. Small specimens of native silver have been reported within the near-surface alteration parts of veins at Force Crag and Red Gill on the Caldbeck Fells

- The Force Crag Vein contains significant concentrations of manganese oxide minerals in its upper near surface alteration zone and a few tonnes of manganese ore are understood to have been mined here
- Non valuable minerals in these veins include abundant quartz, baryte, calcite, dolomite and locally siderite. Baryte is especially common in the upper parts of the Force Crag Vein, which was worked partly for this mineral. Fluorite is a minor constituent of several veins
- Depositional temperatures in the range 110–130°C have been suggested and the metals may have been derived from rocks of the Skiddaw Group, the underlying granites or from Carboniferous sediments in the adjoining Solway–Northumberland Trough
- The Lake District lead–zinc veins are known to cut and thus postdate the copper-bearing veins and many aspects of the veins invite close comparison with those of the Northern Pennine Orefield
- Evidence from boreholes in the Sellafield area suggests that lead–zinc mineralisation may be similar in age to the main phase of haematite mineralisation in West Cumbria

Baryte

- Baryte is a common mineral in several of the lead–zinc veins but is present in unusually great abundance in several veins in the Caldbeck Fells, notably at Potts Gill, where it was an important commercial mineral
- There, the baryte is accompanied only by quartz and manganese oxides with traces of sulphide minerals. These veins, and perhaps the baryte mineralisation at Force Crag, may represent a separate episode of baryte mineralisation, perhaps postdating the lead–zinc mineralisation.

Hematite

- Although haematite is locally a constituent of a variety of veins within the Lake District, it is the dominant mineral within a distinctive suite of veins within Skiddaw Group rocks at the Knockmurton and Kelton Fell mines near Loweswater and within the Eskdale Granite in mines near Boot
- Other less economically significant veins include those within Borrowdale Volcanic Group rocks at Ore Gap, Grasmere and Deepdale, and in the Ennerdale intrusion
- Vein widths of up to 7 m were encountered at Kelton Fell and all of these veins are typically filled with haematite with very small amounts of quartz, dolomite or calcite
- Very large replacement bodies of haematite exist within the Carboniferous limestones of west and south Cumbria
- The Cumbrian haematite deposits typically occur as large irregular or flat-lying replacements of limestone, usually associated with or adjacent to faults, and original features of the host limestone, including bedding planes and fossils are commonly preserved in haematite
- The Furness portion of the south Cumbrian orefield contains numerous haematite bodies known as “sops” which fill large, roughly conical dissolution hollows in limestone

- Some manganese oxide minerals locally accompany the haematite and were worked on a small scale in a few mines in the Bigrigg and Askham areas.
- Currently, the most widely accepted models for origin involve the transport of iron derived either from Permo-Triassic sedimentary rocks in the Irish Sea Basin, or from the granites of the western Lake District. Convective leaching of iron was effected by fluids circulating in response to a probable heat source beneath the Irish Sea. The iron-rich fluids were driven up-dip and gained access to the limestones via faults, and in the Furness area via dissolution hollows; large-scale replacement of limestone then took place.
- In west Cumbria where permeable Permo-Triassic rocks rest directly upon limestones, ore bodies are common, but where thick mudstones intervene, orebodies are generally absent
- It is likely that a former covering of permeable red sandstone or limestone acted as a pathway enabling mineralising fluids to gain access to fractures within the older rocks of the Lake District, where haematite was deposited as fissure fillings. Such a hypothesis is entirely consistent with the comparative abundance of haematite veins in the western parts of the Lake District and their absence from the east of the region.
- Fluid inclusion studies suggest that the mineralising fluids were at temperatures of up to 120°C

Reference: 2010. British regional geology: Northern England.Fifth edition. BGS.

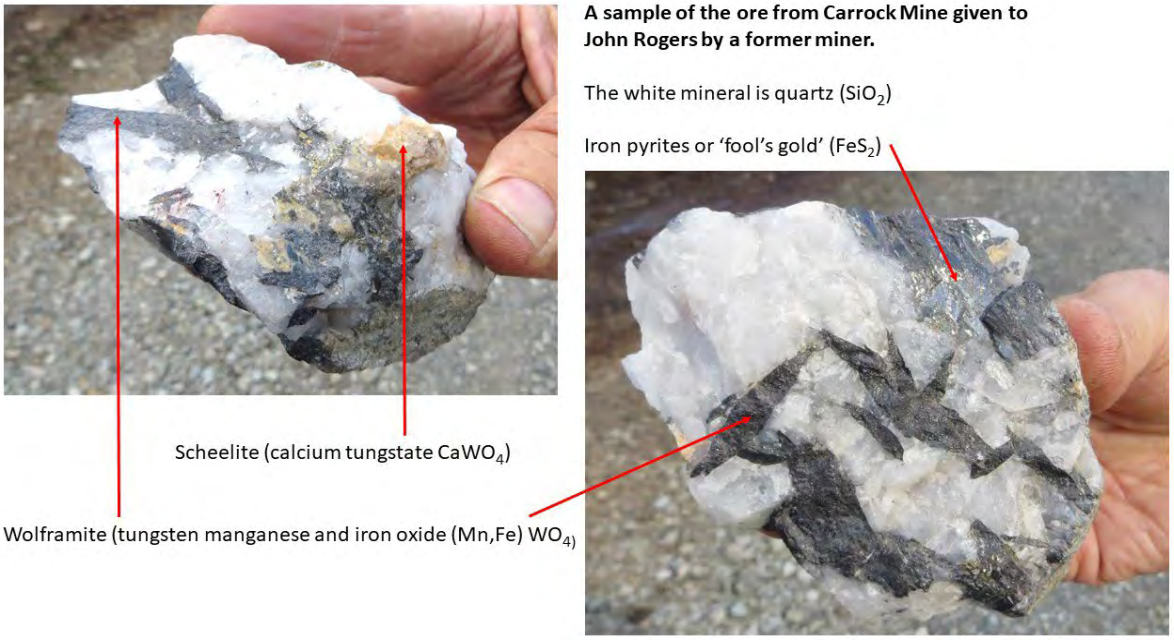
Visit to Carrock Fell Mine – 22nd March 2022

The secretary had been approached by Peter Davis-Merry through the webmaster to request an underground visit to Carrock Fell Mine. Peter was requesting the visit by a group of past students of Chris Wilson's Skiddaw U3A geology courses. These geologists have continued their interest beyond the formal courses in an informal way and having explored the surface of the Carrock Mine area they were keen to see how things looked inside.

Having advised the landowner, Dalemain Estates, in accordance with our letter of understanding, the visit was arranged. Seven members were in the group and we met at the Mosedale Quaker Meeting House car park before relocating to the mine site. After a short overview of the site and armed with some of Lorraine Crisp's notes it was quickly obvious that some of the party were very knowledgeable and knew what was, or had been, going on in the area. Prof. Chris Wilson was one of the group so we were in good hands.

The gate was in good order and we proceeded to the intersection of the Canadian Level and the Harding Level. The silt build up to the south behind the bag dam appears to have grown somewhat over the last eight or nine years. We visited the extent of the Smith vein and the cross-cut into the Wilson vein. The party appeared to identify several minerals of interest and many photographs were taken. We returned and explored the Harding vein, its hoppers and wellie cooling sections. The sub-level was used to bypass the blockage caused by hopper 6, and we viewed the colourful vein up above the northern spur from this level.

Returning, we detoured across to the Emerson vein, passing under Brandy Gill where the previous blockage had been cleared enough to allow passage into the knee deep water of the Emerson. Our progress was barred by the fall in the northern timbered section which looked to hold back deeper water. We made our exit and locked up.



These photographs were provided by Peter and they identify some of the mineralisation to be found at Carrock Mine

The group at Smith's vein/Wilson vein.

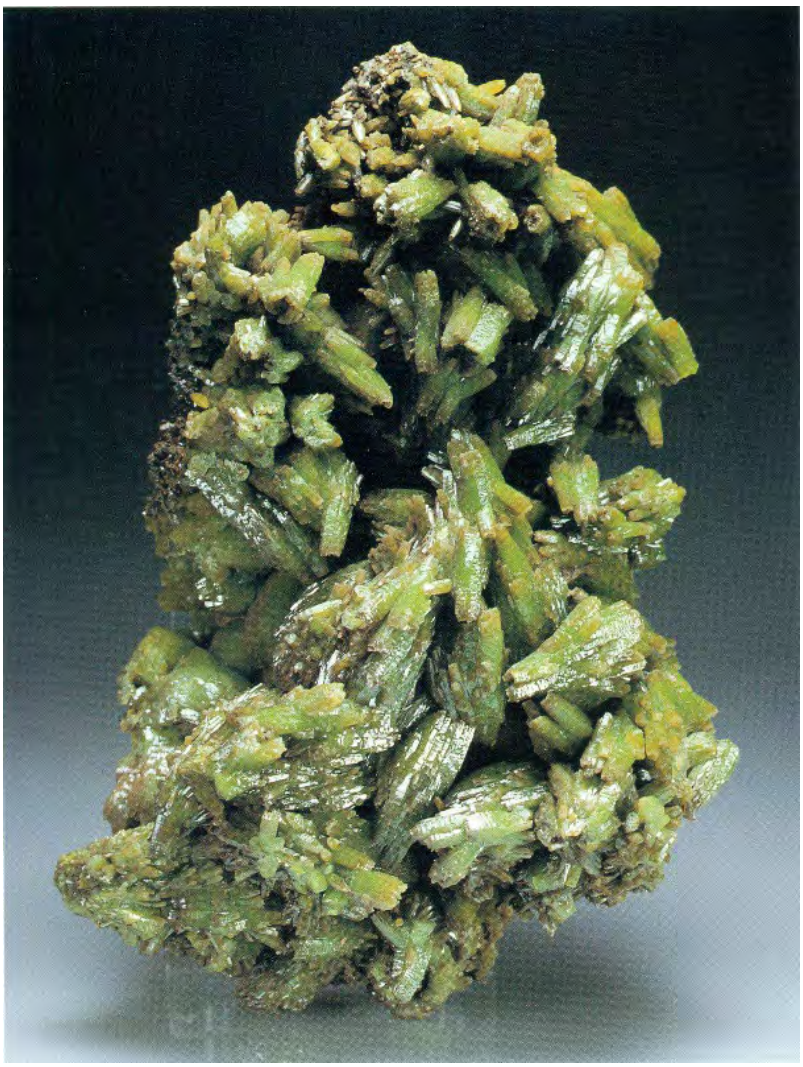
Many thanks to Lorraine for her notes; nods of approval from the professional geologists in the group so much appreciated. Colin Woollard and John Brown.

Carrock Mine Zoom talk, 12th February

I presented a talk on Carrock Mine in February which I had originally put together for the NAMHO 2015 conference held at Nenthead in Cumbria, and modified it to include an updated section courtesy of Lorraine Crisp on the geology, and additional photographs taken by Samuel Murphy and Michael Davis Shiel in the 1980's while the mine was working.

The talk started with how Dalemain Estate came to own the land and still do, when Sir Edward Hasell bought Dalemain in 1679 thanks to a legacy from his employer Lady Anne Clifford, for whom he had acted as her 'Chiefe Officer' until her death in 1676.

The next part covered the geology, which is complex, and the minerals found in the area, of which many specimens found are amongst the finest in the world.



The finest Pyromorphite specimen ever found, source Roughtongill Mine. Courtesy of Minerals of the English Lake District.

About twenty years ago I held this specimen in my hand when it was owned by a good friend, Lindsay Greenbank (one of the directors of the New Coledale Mining Company who worked Force Crag Mine) and on asking how much it was valued at he replied '£100,000', so I promptly handed it back!

The mine was possibly worked by the Germans for bismuth, as covered in the CATMHS journal 'Mine Explorer Volume 4', when Dave Bridge wrote a paper on 'The German miners and the question of Bismuth'. He wrote that in early 1569 James and William Stable, the London carriers employed by the company, were paid 14/6d for the carriage of four hemispheres of bismuth weighing 147 pounds. These were sent in a cask from Keswick to London and Antwerp. At the same time 1/1d was paid for transporting another cask of Bismuth to London.

The next period of working recorded was when Mr Emerson started to work the mine for lead in 1853, and he erected a crushing mill which was driven by a large waterwheel which was situated adjacent to the office at the bottom of Brandy Gill, employing some thirty men. The date the mine closed is not clear, having produced little in the way of lead. The water wheel that is reputed to have worked the mill was dismantled and re-built at the Caldbeck Bobbin Mill. The legacy of this period was the discovery of the large Tungsten bearing vein now known as the Emmerson vein, but it was of no use at the time.

Then moving on to the turn of the 20th century, with the working in earnest of the Tungsten veins and how a German company put the operation onto a large scale before the first World War when the British Government basically took over the mine.
The next period was the Second World War, when the mine was re-opened, and ore reserves proven, but no real mining took place until 1971 when a new mill was built, through to the 1980's when there was an intense period of working, before final closure and demolition of the mill.

Carrock mine in the 1980's. Photo by Sam Murphy

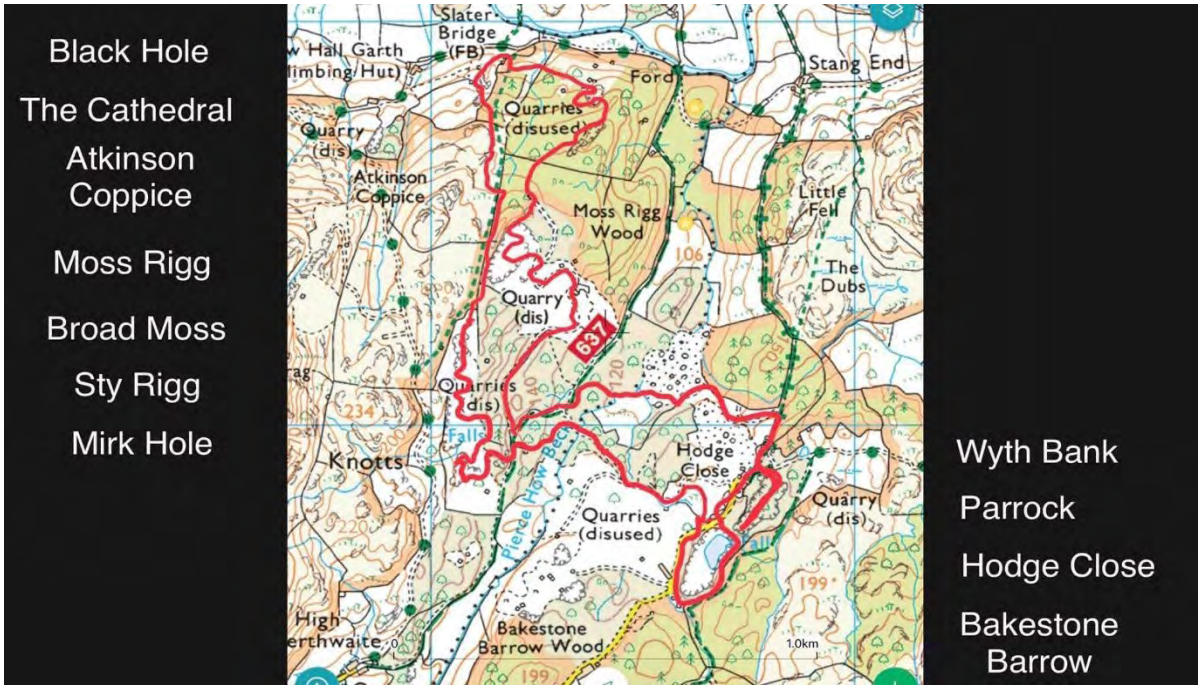
The last part of the talk covered the re-opening of the main level by CATMHS in 2011 following long discussions with various agencies.

Warren Allison.

Tilberthwaite Slate Quarries, 20th March 2022

Participants: Mark Hatton (Meet Leader), Duncan Scott, Stephe Cove, Dave Hughes, Celia Burbush, Alastair Cameron, Nigel Addy, Philip Newton, Steve Sim, Kev Timmins, Roger Ramsden, Brian Sutton, Bob Mayow and Julian Cruickshank plus non-member try outs Sulwen Roberts, Mike Cambray.

Tilberthwaite offers a feast of slate quarry workings, some of which are well known and often visited, but many more are tucked away and seldom seen. This meet was designed to take in those less well known workings, mainly on the west side of the valley, where the woodland screens some very interesting and beautiful quarries. Slate was extracted from Tilberthwaite from the 17th Century and there are still people making a living from slate here today. The scale of the workings varies from modest to enormous. Hodge Close and Parrock are well known large scale workings on the east side of the valley, with Moss Rigg on the west side is of similar proportions, but far less well known. Cathedral Quarry at the North end of the valley is perhaps the most visited closehead in the country, for good reason, as it is easy access and breathtakingly beautiful.



The weather Gods were extraordinarily generous to us as the whole walk was in glorious sunshine providing us with the most spectacular views. The route left Hodge Close and crossed over the valley to Mirk Hole, then up through Sty Rigg, to Broad Moss. Then the rocky connection along the top edge of Moss Rigg, down to Black Hole, through The Cathedral then up and past Atkinson Coppice, to explore Moss Rigg. We then crossed back over to Hodge Close where helmets were fitted before plunging in to the depths of the Wyth Bank tunnel and closehead complex. We then took the wet divers tunnel into Hodge Close and finally climbed back up by the cars.

Everyone was impressed by the extent and variety of slate workings in this most interesting valley. Even seasoned walkers and explorers found themselves in previously unvisited quarries. All in all the perfect day to explore this magical corner of the Lake District, saturated in slate quarrying history. Thanks to Duncan, Stephe, Dave, Celia, Alastair, Nigel, Sulwen, Mike, Philip, Steve, Kev, Roger, Brian, Bob and Julian for being such enthusiastic participants in today's meet. Mark Hatton.

East Bonsor Stope Work Meet, Coniston. Sunday 3rd April 2022.
Attendees : Mark Hatton (Meet Leader), Michael Pringle, Julian Cruickshank, Chris Bunker

The east end of the Bonsor vein was vigorously worked in the early 1600's and again in the mid 1700's. By the end of the 18th Century the vein had been taken out to a depth of over two hundred feet and all of the rock and water had to be lifted up to surface using winches & pumps, powered by the East Bonsor water wheel. In the 1800's during the construction of the Old Engine Shaft a tunnel was driven from the East Bonsor vein about forty yards through to the shaft along which the spoil from driving the shaft was extracted. This tunnel now provides us with a very fine view of the pump rods still held in situ in the Old Engine Shaft by wires installed by CATMHS several decades ago. Access to this tunnel requires crossing the East Bonsor Stope using a bridging plank. For many years a wooden plank has served as that bridge, with a rope hand line. But the wooden plank was recently assessed as "rotten" and rust had so severely corroded several of the hangers for the rope hand line that the whole lot badly needed replacing. This work party was called to carry out the necessary works.

A large yellow fibre glass "waffle board" had been procured which would form a longer lasting and more secure bridge. Thankfully Phil Johnson volunteered to take the waffle board and all of the gear needed for the installation up to the East Bonsor wheel using a quad bike and trailer. This saved us a good deal of heavy lifting up the steep slopes of Red Dell. Installation was fairly straightforward, using the old wooden plank to guide the new much larger and heavier waffle board across the stope. A fall here would certainly be fatal as it is a long drop down to Deep Level with much to hit on the way down, so great care was taken. The waffle board was secured into position using a bolt and wire. A new hand-line was installed using 11mm rope and 6 new bolts and hangers. We also took the opportunity to install an additional wire support for the pumping rods but noted that further work will be needed to secure these in future. Thanks to Michael, Julian and Chris for the diligent work and to Phil for transporting the gear.

Mark Hatton.

Coniston Old Engine Shaft Pump rods.

In newsletter 30, July 1991, Page 14, the Meets Secretary Ian Matheson reported: "Some deterioration has occurred in the Old Engine Shaft at Coniston, and I proposed that CATMHS should carry out some conservation work. Our committee voted £50 towards the cost and a grant of a further £50 was.obtained from the Northern Mines Research Society.

The shaft was sunk to provide both pumping and winding below the Deep Level. The head gear is situated 310 feet above Deep Level at the top of an eight foot square rock shaft which had a wooden partition running down it. One side was used for winding and the other carried the ladders and the pump rods. Power was provided by a100HP water wheel of 45 feet diameter. The head of the shaft is underground and the original 1850 headgear and winding wheel are still in place, as are some two hundred feet of the six inch square timber pump rods, which now hang in the shaft suspended from a catch wing some forty feet below the bob plat.

A major supporting beam has dropped out from the head gear so that the seven foot diameter sheave winding wheel has partially collapsed to lean against the side of the shaft. The remaining timbers were found to be complete and in sound condition. The original iron pins driven into the rock and used to hoist the wheel into position were still in place. Before disturbing anything the wheel was secured to these pins with steel rope to make it safe. A replacement for the missing support, which had been 10 inches square and 113 inches long was made up by laminating three 10 x 3 timbers which were supplied by the 'Furness Adventurers', Anton Thomas and Paul Timewell. The wheel was winched upright and the new timber located in the existing rock niches.

Whilst this was being done one of the bearers for the wheel gave out some alarming cracking sounds, for it had been located beneath a small drip from the roof and had rotted down to about a third of its original girth. This was supported by inserting a prop from a substantial stemple beneath it. After a few weeks, when it had settled down all the working equipment was removed, leaving a single wire strop fixing the wheel to the roof as a safety precaution. A notice was fixed to the wall out of reach of the general public which reads 'This 19thC winding wheel was restored by CAT Mining History Society, Please don't throw anything down the shaft.'

About two hundred feet of wooden Victorian pump rods remain in the shaft. They are made from pitch pine specially imported from Canada. We estimate them to weigh about three tons, and they are supported from a catch-wing in the Bonsor East crosscut. This is also deteriorating, and in the course of time the rods will plunge down the shaft to their destruction. We propose to attach them to the rock at intervals down the shaft using galvanised wire rope and 10mm rock bolts. Once this has been completed there will be a CATMHS meet in the Bonsor Stopes and there will be an opportunity to do the 310 feet abseil down the Old Engine Shaft to see what has been achieved."

Recently, whilst installing the replacement plank in Bonsor East, it was seen that the original catch-wing has deteriorated, and the second hand galvanised wire that we installed over thirty years ago now appears to be taking the full weight of the pump rods. If the wire or any of the fastenings were to fail then the whole string of pump rods hanging from it would fall. The preventative work that CATMHS carried out has done its job, but it is time to reinforce it with

new stainless materials. Until this is done anyone attempting to descend the Old Engine Shaft or inspecting it from Deep Level might get a nasty shock.

Ian Matheson.

The supporting wires taking the strain. They were installed by CATMHS in 1991.

Photographed in 2017 by Mark Hatton.

The remains of the catch wing, which was installed c1850. It was designed to prevent the rods from falling in case of failure of the attachment to the nose of the balance bob. Such a failure occurred with the man-engine at Levant mine on 20th October 1919. On that occasion the catch wings failed and 31 men were killed.

Photo Carl Barrow, 2022.

Lucy Tongue Engine Shaft, at Greenside mine.

In Newsletter No 142 February 2021, Ian Hebson (Heb) wrote about the discovery of the elusive Lucy Tongue Engine Shaft which, many years ago, the digging team had started to plan a dig through what we thought was a collapsed stope. One day John Brown and I, had a 'prod' at the collapse and suddenly there was a roar of rocks and boulders coming down from high above into the flooded stope. We rushed down the level to watch a huge amount of material disappearing, the noise was incredible, and the water stopped flowing. This resulted in two large boulders wedging themselves. Along with the other members of the digging team we wondered how we could support them while digging through to the right-hand side. Other projects ensued, and we never got round to doing the dig.

Heb got in touch and said he would show the digging team how his group had accessed the Lucy shaft and commented "we will kick ourselves". Arrangements were made for a visit on the 27th of November last year, but a severe storm which brought down thousands of trees, blocking many roads put paid to that. A phone call to Heb that morning to cancel the trip met with a response of "I cannot get back home from work anyway due to trees blocking the roads".

We re-arranged the trip for the 26th of February when Heb, John Brown, Colin Woollard, Andrew Woollard, Liz Withey and I met at the mine. On reaching the flooded stope, Heb went to the left-hand side of the boulders and disappeared up, then dropped an electron ladder down to help us up. It wasn't far up through the boulders before we arrived in the stope, and he was right, we were kicking ourselves.

Heb then led us through a level to arrive at the Lucy Shaft which is just unbelievable. The engine bed for the winding engine is about ten to twelve feet above the actual shaft and there are hitches cut into the bedrock to carry the timbers for the sheave wheels. Possibly this is one of the best engine rooms in Cumbria.

There was much discussion as to what type of engine was originally there and how the water to drive it got there, as the access level is small. The water originally came from Glencoyne Beck into the Glencoyne and High Horse levels where there are dams, as the levels were used as a reservoir (water was also apparently siphoned in from Top Dam Reservoir through the High Horse level). The water was fed 200 feet down the shaft connecting to the Low Horse level to drive the winding engine at the Willie shaft before being taken further down in pipes through the workings to Brook's sump to drive the engine at the Lucy shaft, and then the water was run along the Lucy level to be used on the dressing floors.

Heb showed us around the rest of the workings, which were very interesting and far more extensive than I thought they would be. One of the men who worked at Greenside told me of a dam built in a rise near the Lucy shaft which was used as a water supply. I think we found this, and it was probably the bottom of Brook's sump.

I re-read Grey Gold by Sam Murphy and quote relevant parts relating to the shaft below:

Coultas Dodsworth of Haydon Bridge was a mining engineer … In September 1871 he inspected the south end of the Lucy Tongue level and drew up plans for an engine shaft which was now needed to exploit the rich ground under the sole of the new adit level. The records show that in October 1871 Thomas Brooks, heading a large partnership of twelve miners, set to work on the cutting of an Engine Room, according to Coultas's plan, ready for sinking of this second shaft at Greenside, some twenty years after the Low Level Shaft (*Also known as*

the *Willie Shaft- W Allison*) was started. The shaft was to be sunk vertically from a twenty yard long crosscut into the footwall of the Greenside vein, and Brook's men drove the crosscut and opened out a chamber in which the headgear for the shaft would be placed. Brooks had done a highly satisfactory job sinking the connecting sump from the 48fm level to the Lucy Level, and so was selected to head the team carrying out this important new task. A partnership of twelve miners represents round-the-clock working by three sets of four men, so the directors were clearly anxious to develop the newly-found ore reserves below the Lucy Tongue Level as quickly as possible...

Once the engine room had been cut out, Brooks put together a nine-man partnership to sink the engine shaft itself, and work commenced on this immediately. The first ten fathoms of shaft were completed in six months later in October 1872 at a cost of £300; the high rate of £30 per fathom shows the great difficulty of sinking a large shaft in solid rock.

Work continued elsewhere in the Lucy Level, for several different partnerships extended the Lucy Level forehead, including trying a branch vein, and John Douglas with six partners drove a crosscut west to find the footwall of the vein in the wide ground at the south end of the Lucy Level.

It was January 1874 before work on the Lucy Engine Shaft was restarted, this time by Thomas Jewell and initially eight other partners, a number soon raised to eleven, and by the end of April 1874 they had sunk eleven fathoms at the enormous cost of £50 per fathom. Drawing water, cutting hitches for the climbing stemples set in the shaft wall, and labouring added another £55/11/- to the cost. From May to October William Hindmore and his team pumped water from the shaft and drove a level for thirty six fathoms at £9 per fathom; this was the 20 fathom level (called No. 1) north from the Lucy Engine Shaft, which was then just twenty one fathoms deep. Pumping continued in November and December 1974, and in the latter month John Place (not the foreman of the same name) was engaged in "*Loosing hoppers from the Lucy Tongue Engine Shaft*", indicating that ore hoppers had been installed by then in the level off the shaft.

This second phase of work on the Lucy Tongue Shaft was considerably aided by the introduction of powerful new explosives at Greenside Mine in March 1874, when 500lb of Nobel's Safety Powder Dynamite, 2,000 detonators and 50 double coils of gutta-percha fuse was obtained from Henry Kitchen & Co, agents for the British Dynamite Company Ltd.

Coincident with the introduction of dynamite for blasting, the Company bought their first rock drills, a pair of pneumatic 'Kaintomon' drills, sizes No. 1 and No. 2, complete with two steel drills, each and swages for forging the ends of the drills, from Thomas A. Warrington & Co. of London…

The high-pressure compressed air which was stored in a wrought iron receiver, was provided by a piston-type compressor built in unit with a Schmid's patent hydraulic engine, the exhaust water from which was used to cool the barrel of the compressor.

The Company was already making provision for a supply of high-pressure water for a winding engine which was to be used at the Lucy Tongue Shaft, so the rock drill compressor was probably installed at the head of the Lucy Tongue Engine Shaft and may have been used to sink the second half of that shaft, although there is no mention of this in the mine records.

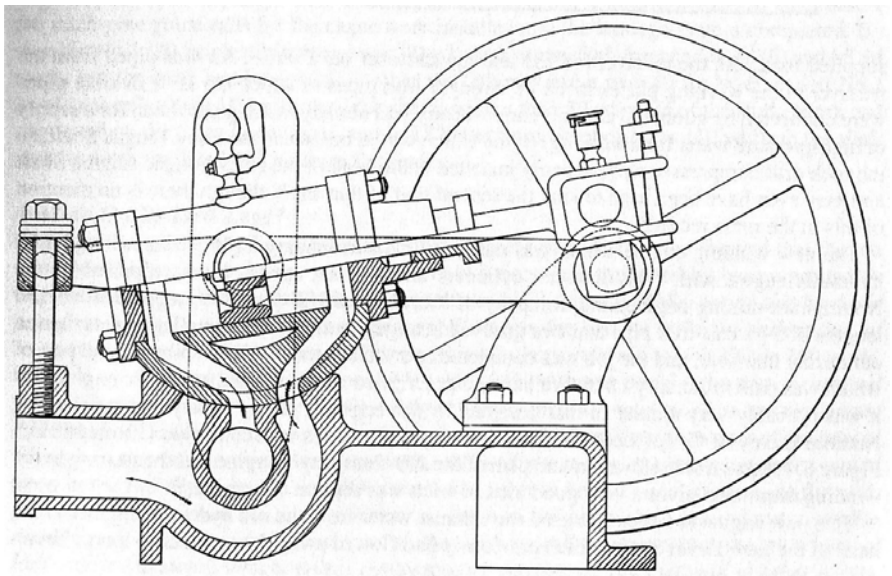


Figure 6.3: Schmid patent hydraulic engine, with automatic valving caused by oscillation of the working cylinder about the cylindrical mounting containing the inlet and exhaust ports.

The new winding engine, which was partly paid for in January 1875, was a twin-cylinder hydraulic engine with 7in. diameter cylinders and a 28in. stroke. It was supplied by the Nottingham mining engineering company of Warsop and Hill for £379, together with one hundred and fifty lengths of 2in. cast iron pipe and two grooved headgear pulleys. The installation was carried out during that year, and the job was completed at a total cost of £761/2/-, the second part of which was paid in January 1876. We have no description of this

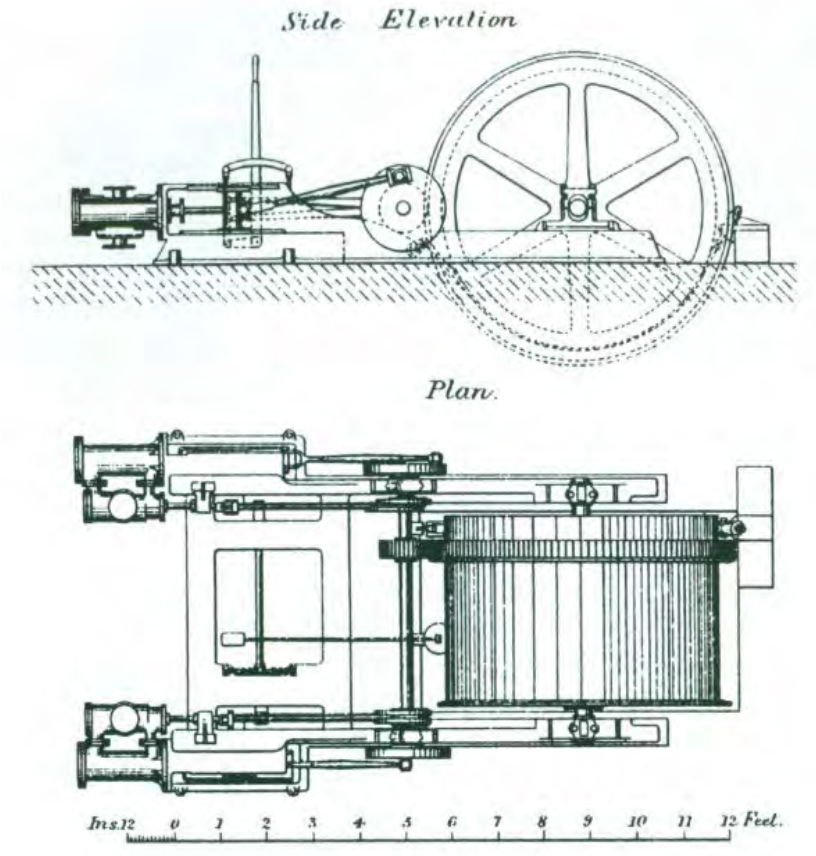


Figure 6.4: Hydraulic winding engine installed at the internal shaft at the end of the Sir Francis level in Gunnerside Gill, Swaledale in 1880. This engine is a typical example of a winding engine of the period and the new engine bought from Warsop & Hill was probably similar. The AD Company was in trouble and probably never fully paid for this engine, so when the mine closed it was left behind and remains there to this day. (Proc. Inst. Mech. Eng. 1880)

second hydraulic engine, but it was probably very similar to that designed by the engineer Henry Davey and supplied by Hathorn Davey & Co. of Leeds to the AD Company's mines in Gunnerside Gill in 1881. Fig 6.4 above shows a side elevation and plan of the AD Company's engine and gearing to the winding drum and gives a good idea of what was done at Greenside.

This new engine at Greenside used the exhaust water from the old hydraulic engines at the head of the Low Level Shaft, which previously had flowed away down the Low Horse Level. Since Brook's sump was close to the head of the Lucy Shaft, the water was probably diverted down the Low Level Shaft, along the 48 fm level, then the two hundred feet down through Brook's sump to the Lucy engine room. Heavy cast-iron flanged pressure pipe was used for the whole of the distance from the head of the Low Level Shaft, so that a total head of four hundred and eighty feet of water was available for the powerful twin-cylinder engine. The long fall would have provided a pressure of 208 psi at the Lucy Tongue Engine, much higher than that at the Low Level Engine, so a smaller five inch bore was used for the feed pipe. After operating the winding engine, the exhaust water then flowed out of the mine along the Lucy Level.

The new winding engine first came into operation in December 1875, when Edward Pool, one of the horse drivers in the Lucy Level, became an 'Engine Breaksman', like William Glenwright who operated the hydraulic winder at the Low Level Engine Shaft. Pool was paid 4/- per day, a shilling less than Glenwright. At the same time his son Edward Pool Junior took over the driving of the horse. Thomas Wynn and his partner were paid for caging and landing the work at the Low Level Shaft, but there is no mention of caging and landing payments for the men in the Lucy Tongue Shaft, so the work was almost certainly brought up the shaft in kibbles, just as it was in the Low Level Shaft before it. As for the Low Level Shaft, communication between the onsetters and engineman was by a gutta perch tube with mouth-pieces at each end.

A double-acting 'Deep Well' water pump was bought from the Williamson Bros. for £118 in June 1876 and a year later, in June 1877, a small hydraulic pumping engine costing only £55 was supplied by Warsop and Hill. This, like the rock drill, was coupled to the winding engine water supply from the Low Level, and was probably used to drain the water from the sump of the Lucy Tongue Engine Shaft. The pipes for this pump were only two inches in diameter, showing that this was a new type of pump located at the foot of the shaft and driven by rods from the engine at the top. The pumps were installed during 1878, but it was in the middle of 1879 before the pitch-pine guide rails for the cages were installed and the haulage system completed. By the time the No.1 (20 fm) level forehead was forty yards south of the shaft (reached in 1876) and eighty eight north, the shaft had been sunk another ten fathoms and a new forty fathom level, called No. 2 level, was only about ten yards north of the shaft and less than thirty yards south of the shaft. Work had continued on the Lucy Level itself, and in 1879 the south forehead was one hundred and ten yards from the shaft and the north forehead four hundred and sixty eight yards from the shaft.

These photographs, taken by Subterranea Britannica, show the engine in the Sir Francis Level at Gunnerside Gill, which is the same set up as at the Lucy Tongue Engine Shaft.

Winding engine at the Francis level, Gunnerside Gill.

Sheave wheels above the shaft at the Sir Francis level

Shaft and landing stage at Gunnerside

The digging team has looked at the potential to open up the entrance to the stope leading to the engine room which is feasible, and a work meet is being organised for the 5th June which will be on the meets list. Following this the whole area is to be re-surveyed, recorded and see if we can work out what went where from what Sam wrote in his book.

A huge thank you to Heb for gaining access and showing us what is a remarkable place.

Warren Allison.

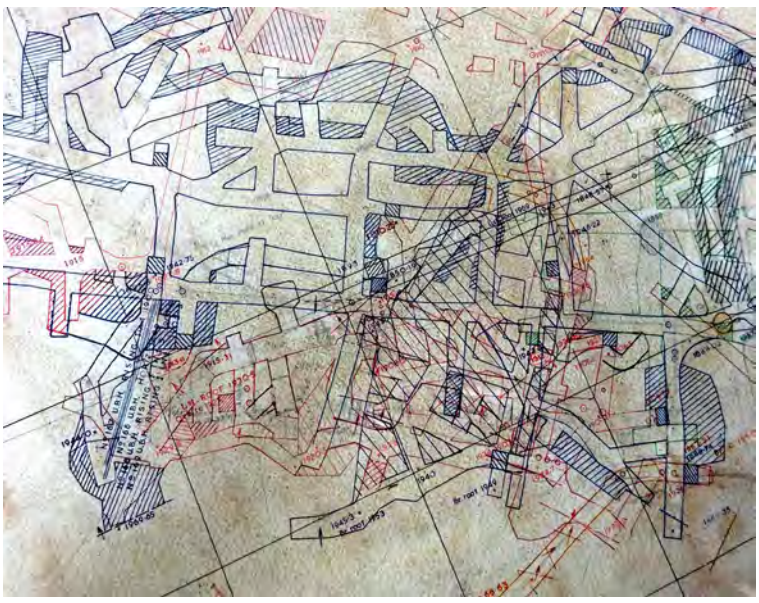
Mysterious Mine Plans

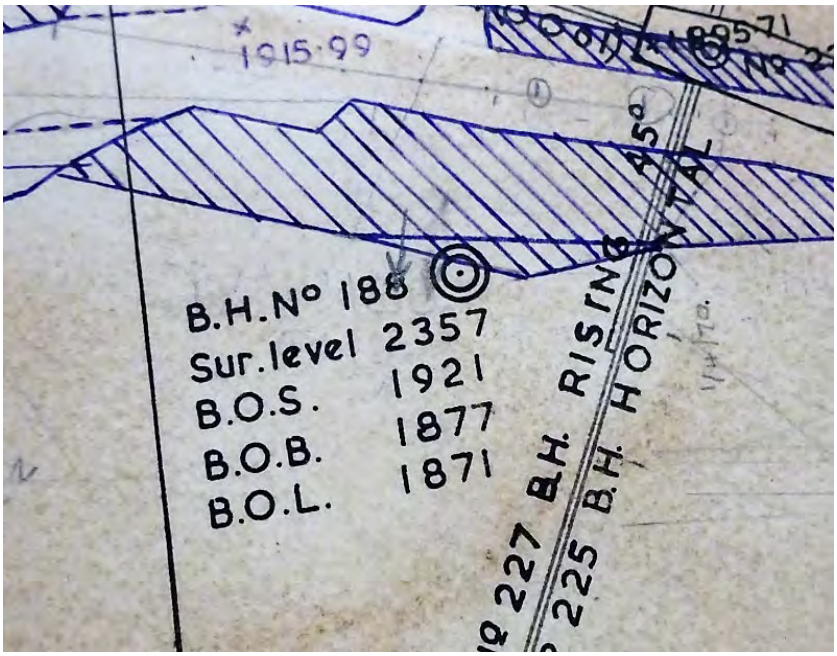
A little while back, my local County Archive (Northampton) contacted me because they had discovered a set of mine plans in their archive for which they had no idea of location, nor how they came to be in their possession. Since I was the only person who had recently been in touch with them regarding mine plans (for the ironstone of Northamptonshire), they turned to me for help. I visited the record office, and inspected the sheets. There were approximately 25 sheets which were approximately A0 in size, and a stack of another 23 transparencies. None of the sheets had any indication of location or orientation.

After a little head scratching, I realised that there was a grid system, and that the sheets were in groups which did fit together. So we assembled the sheets as best we could, and ended up with two relatively large groups and a number of miscellaneous sheets. The transparencies turned out to be horizontal sections of the same location, presumably so they could be overlaid, but again they had no identification.

I took mediocre photographs of each sheet, and repaired back home to investigate further. Closer inspection showed that some of the plans showed some basic geological information describing the strata of interest in that part of the mine. Altitude information was also shown, but of an unknown datum. I canvassed the opinions of some experts in the field, and the general conclusion was the plans were of a Cumbrian Ore mine (or mines) based on the geology.

The plans were hard to understand because the mine appears to have been worked on multiple levels, which is indicated on the plan with different colours. An example is shown here showing workings in red, black, blue, orange and green! Closer inspection showed multiple instances of the text B.H. followed by a number. I guessed these were borehole references, so I went on the BGS website which shows their archive of boreholes. I started clicking at borehole logs from various parts of the Cumbrian orefield, and soon found some with the same style of reference (B.H.) and similar numbers. Further clicking and I eventually found the same number! From this, I could check the numbers of nearby boreholes, and found they matched up with the plans.





The photograph of the mine plan for Borehole 188 shows the surface level at 2357ft, and gives three altitudes for the Base of Sandstone, Base of Breccia and Base of Limestone. This can be compared with the borehole record, and seen to have the same surface level, allowing for the datum to be 2000ft below Ordnance Datum. The borehole record names the location as Beckermet 'Head of Haile'

This approach unlocked the plans, as bit of internet research showed the location to be Haile Moor Mine, near Beckermet. Colin Woollard found some other plans of Haile Moor which gave additional confirmation, and he even redrew one which is reproduced here.

NY/00/NW/230

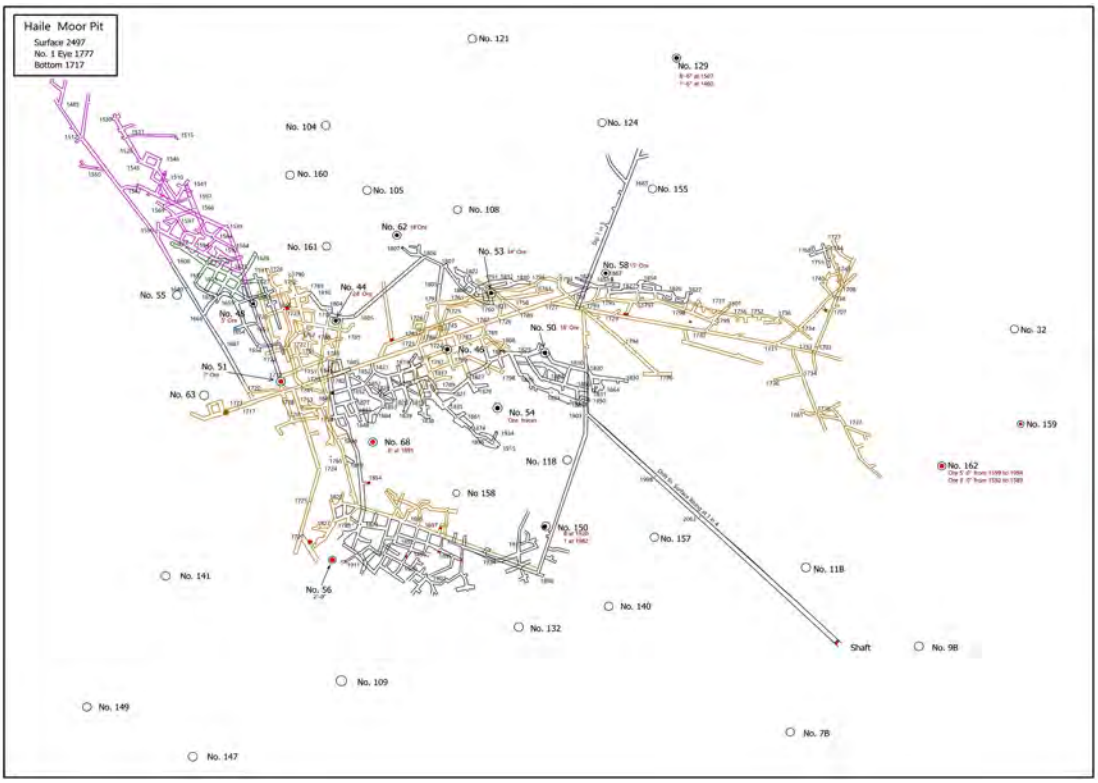
SITE. BECKERMET No. 188. LOCATION. HEAD OF HAILE.

DRILLED. 26.10.61 - 14.11.61 MAP No. LXXIII. 9

SURFACE LEVEL. 357·03 FIELD Nº 245

108·32 NY 0367 0900

DEPTH	LEVEL	THICK-NESS	ROCK TYPE	% CORE			
0 GLACIAL DRIFT			Soil 1'0" Pinel 5'6"				



The one outstanding issue is the location of the mine shown in the transparencies. They appear to show some opencast working, with underground workings beneath. One example sheet is given in this article, however the location is still unknown, so if you have any suggestions, please let the author know and he will send you the whole set to look at.

Once the location of the transparencies has been resolved, the plans will be transferred from Northampton, probably to Whitehaven, and properly indexed to allow future scholars to study them further.

Chris Cowdery
http://www.cowdery.org.uk

A very interesting talk with William Houston

I did a talk on Greenside Mine in January to the Trevithick Society in Cornwall and in the questions at the end a gentleman called William Houston said that he purchased some of the equipment from the mill when it closed. Asking if it was possible to meet up, he replied he lived in Grange which turned out to be only 25 minutes from Liz's house at Carnforth and he still works for an aggregates business in the town.

So, arrangements were made, and I met him at his house one Saturday afternoon and what a very interesting man he is. He has worked all over the country in mining, the aggregates industry and buying and selling mining equipment. He worked for Bill Shaw at Force Crag Mine and the Clogau? Gold Mines in North Wales in the early 1960's. I said a very good friend of mine John Hodgkins worked at the gold mines around that time. William replied that "John was one of my workmates, does he still live in Normanton in Yorkshire?". It's a very small world. William and I spent about five hours chatting, with me furiously making rough notes which I will have to check with him, but give a flavour:

Duplex Pan American Jig from Greenside went to Force Crag Mine which he sold for £25, to Horace Taylor in Derbyshire.

Two Hartz Jigs from Greenside went to Sandbeds, then to Force Crag which he bought for £6 and sold to Bert Marshall Minerals at Winster in Derbyshire.

Wilfley Table from Greenside went to Sandbeds then Force crag. William bought it for £6 and sold it to Edwin Drake and William Taylor, who were working the tips at Grassington and Wet Groves in Wensleydale. However, he bought it back and tried to sell it for £50 to Middleton Mining in Derbyshire, but eventually got £120 for it through Captain the Right Honourable Sir Charles Waterhouse Bart, who owned the estate.

William worked for a while at the old Middlehope Mine and went to the Rookhope Mill (think this was to do with an exploratory borehole being sunk which involved Kingsley Dunham). He remembers a small jaw crusher at the mill which he obtained and swopped it for a stone saw with Pete Blezard (CATMHS member).

William knew Earnest Gregory who worked barytes at Driggith Mine just after the Second World War where he would float the barytes down the level in a tin bath. (Ian Tyler has written about this period in his book Roughtongill and the Mines of the Caldbeck Fells). William described other places; Earnest had worked at such as taking on a lease on the Devon Great Consols Mines, a copper mine in Devon and other events in his colourful life.

The Flotation cells from Greenside were bought by Earnest Shavels(?) and when Carrock Mine re-opened a deal was done with Roger Stanion, the manager, in exchange for a set of crushing rollers to be used at a mine in the Pennines. However, the flotation cells fell apart when they were taken off the wagon at Carrock Mine.

One of the crushers from Greenside went to the Shap Blue Quarry and apparently is now at the Threlkeld Mining Museum.

William wrote articles for the Mine and Quarry Engineering magazine. He remembers Monty Banks who apparently was the mill manager at Greenside and was known as Old Banks. At one time he ran the Vieille Montagne Plant at Nenthead, which was being operated by Anglo Austrian when the tips were being reworked. It seems that Settlingstones Mine near Hexham also took an interest in the operation.

William worked in the mill at Great Runnerdale Beck near Dufton in the 1980's when the tips were being worked for barytes.

There was also mention of the best Galena from Greenside being sold for makeup which I have written an article for a recent newsletter (NL 146 p27) on this from a letter by Dennis Champion, who worked at the mine in the 1930's (?) William mentioned that the galena was being sold to Hope and Davies, who ground the ore for makeup, being exported to Africa and India as well as being used in the brake linings on the London Underground.

I hope this has given a flavour of William's memories. The next time we meet I will have to be far more methodical in recording them because he is one of the most interesting people I have met in connection with mining.

Warren Allison.

CUMBRIA AMENITY TRUST MINING HISTORY SOCIETY

Registered Charity No. 1180198

Honorary President:	Lord Egremont Petworth House, Sussex
Chairman	Warren Allison Phone: 01228 523923 Email: chairman@catmhs.org.uk
Secretary:	Colin Woollard, Phone 01900 823686 Email: secretary@catmhs.org.uk
Treasurer:	John Aird, Phone: 0208 997 5985 Email: treasurer@catmhs.org.uk
Membership Secretary & Newsletter Editor:	Ian Matheson Phone: 015394 32957. Email: membership@catmhs.org.uk
Meets Secretary:	Vacant
Webmaster	Chris Cowdery Email: webmaster@catmhs.org.uk
Committee members:	John Aird, Warren Allison, John Brown, Chris Bunker, Stephe Cove, Chris Cowdery, Lorraine Crisp, Graham Derbyshire, Mark Hatton, Ian Matheson, Michael Oddie, Michael Pringle, Colin Woollard
CATMHS website:	www.catmhs.org.uk

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