

# CAT

**The Newsletter of the Cumbria Amenity Trust  
Mining History Society**

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Coniston Copper Mill, from 'A Tour of the English Lakes 1821.  
Fielding & Walton.'

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No. 114

January 2014

# **Cumbria Amenity Trust Mining History Society**

## **Newsletter No 114, February 2014.**

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#### **Society Officers and Committee Members**

Back cover

## **Membership.**

We would like to welcome new members Michael Cooke, from Burnley, Keith Turner, from Blackburn and Martin Willey from Seascale.

## **Committee members needed**

Today in the age of the internet, social media and other new forms of activities for people, most societies are being challenged to change and adapt with the times. Although CATMHS is still very active, produces what has been described as one of the best newsletters in the country and is in its best financial state ever, it too has to adapt to these challenging times.

Therefore the committee has drafted a plan which highlights the areas that need to be focussed on to ensure that the society continues to be as successful as it has been for the last 35 years. The intention is to send the plan to the members and ask for comments on it. However the most pressing problem is that additional committee members are required to allow the society to continue to function in an efficient manner and to share the workload with the current members.

The committee has to meet at least four times a year and it is also looking at alternative places to meet to try and reduce the distance that people are travelling. If there is anyone who feels that they would like to join the committee, could they please contact Colin Woollard or Warren Allison.

Warren Allison  
Chairman

## **Cover Picture**

This picture was given to me by Peter Fleming. Eric Holland used it for the dust jacket of his book 'Coniston Copper' It was taken from a book by Fielding and Walton published in 1821 entitled "A Picturesque Tour of the English Lakes, Containing a Description of the Most Romantic Scenery of Cumberland, Westmoreland, and Lancashire, with Accounts of Ancient and Modern Manners and Customs, and Elucidation of the History and Antiquities of that Part of the Country, etc., etc.,". The authors spent two years in the Lake District making drawings and collecting information and "extracts from admired poets" to produce their magnificent work,

The volume was printed in London by William Clowes for Rudolph Ackermann, who was known for his lavishly illustrated publications. It contains forty-eight hand-coloured aquatints made from the original drawings by Fielding and Walton. Abe Books has a copy for sale for £3,000!

The picture is entitled 'Copper Mill, Coniston Fell'. Can anyone pinpoint the location or identify the peaks in the background?

## **Newsletter or Journal**

It has been suggested that we change the subtitle of the CAT Newsletter from ‘The **Newsletter** of the Cumbria Amenity Trust...’ to ‘The **Journal** of the Cumbria Amenity Trust ...’ in order to reflect its content.

As the Society has developed we have in general become somewhat less active in the field, particularly underground, and more involved with conservation, history, research and other aspects associated with mining. There have been fewer reports on CAT activities, and more articles on mining history and related topics. The last issue, NL113, had articles on Greenside Silver Lead Mine, Barrow Salt Mine, Sedgewick Gunpowder works, the survey by cavers of an extensive maze cave at Hudgillburn mine and an account of an accident to Parkside Engine in 1870, put together from contemporary newspaper reports and the recently transcribed Wadham’s Diaries. I would like to encourage more of such interesting and varied articles and for contributors to feel that they can, if they wish, send in depth articles as well as shorter ones.

We have, of course, at intervals of about five years, produced a proper journal, ‘The Mine Explorer’. Volume 6 was published in 2008, and if we were to continue the series then the next one would be due about now. However, we are not good at selling our publications and still have many copies of previous volumes unsold.

The time has come to decide whether or not to embark on Volume 7. We could explore the minimum quantity we would need to publish, as with modern technology print runs can be much smaller than previously. I would be grateful for any comments, and would especially like to hear from those who might contribute to either publication. Please email your opinions, suggestions or offers to [imatheson007@btinternet.com](mailto:imatheson007@btinternet.com)

Back to the Newsletter sub-title; if we rule out ‘Journal’, what do you think about ‘Bulletin’, ‘Compendium’, ‘Communique’, ‘Gazette’, ‘Magazine’, ‘Memorandum’, ‘Periodical’, ‘Record’ or ‘Report’. Can you think of a better word? Or should we just leave it as it is? [imatheson007@btinternet.com](mailto:imatheson007@btinternet.com)

Ian Matheson

## **CAT AGM and Dinner at Rydal Hall**

The CATMHS AGM and Dinner took place December 7<sup>th</sup> at Rydal Hall, as usual. It is always an enjoyable event, but the numbers attending decline slightly each year. The Committee were re-elected en block.

There were just over thirty people at the dinner. The food was nice; the staff looked after us well and they were very good natured regarding our rowdy activities following the meal. We do always clear up afterwards. After a short slide show by Jon Knowles everyone ended up chatting in the bar or in the foyer.

Breakfast at Rydal Hall is a pleasant experience, and afterwards people dispersed to do their own thing, some to go fell walking whilst others set off to descend to view the wheel barrow below Middle Level at Coniston mine.

### **CHAIRMAN'S REPORT 2013**

It is with regret to start with the sad news that John Helme passed away on the 4<sup>th</sup> September. I cannot add any more than Ian Matheson wrote in the November newsletter, other than to reiterate his contribution to CATMHS and also to the preservation of the Newland Furnace.

Could I once again sincerely thank the committee and members of the Society for their help and support during the year? Hopefully this report will demonstrate how active the society is even after nearly 40 years.

The clearing of the debris up to the second fall on the horse level at Tilberthwaite Mine has been completed and 24 feet of the actual fall has been dug with six sets of steel now installed. It has taken six weeks to install the last set due to the difficult ground. The pack wall is now some 80 yards long and in places 15 feet high. However the digging team is now down to three members and this is making it very tough going.

As part of the Carrock Mine project, Richard Shaw from the British Geological Society carried out a geological survey of Smiths Vein in May and the report is due out shortly. This was an interesting weekend which gave an insight into the geology of the mine something which is not usually looked at. Richard has offered to lead a meet to further explain this.

Also as part of that project John Hodgson from the LDNPA secured under the Higher Level Stewardship scheme £20,000 to carry out conservation work to the First World War mill and work starts in the next few weeks. There will be a second phase in 2014 and this would not have happened without CATMHS.

The society also assisted John Hodgson from the LDNPA who secured £500,000 from Natural England for various conservation works to the mining remains at Coniston and Tilberthwaite Mines which was on the proviso that the commoners would join the Higher Level Stewardship scheme. Unfortunately the commoners did not join the scheme. Therefore CATMHS and the LDNPA are to start on plan B, which is to submit a Heritage Lottery application.

A second Heritage Lottery application is also to be submitted for interpretation work at Greenside Mine.

The society was invited to present a paper at the LDNPA Archaeologist Conference in November attended by 200 people on its recent work in the Lake District which was very well received.

The Mines Forum meetings continue to be a mechanism for developing good relations with various organisations.

Members have contributed to the Windermere Reflections Project now in its third year being run by the LDNPA and National Trust which covered Grasmere Mine, Fairfield and Providence Iron Mines and Banks Quarry. The report is due out shortly.

A very good quality newsletter continues to be produced which Peter Claughton from NAMHO has commented that it is one of the best in the country.

Having supported the Newland Furnace Trust with a bridging loan to carry out work to the furnace, which has been repaid, the society is continuing its support by covering the cost of the insurance.

Members have led visits for other societies to mine sites which have been well attended and helped to raise CATHMS profile.

Some members have continued with surface surveying and have turned their attention to using 3D surveying techniques.

The Welsh branch regrettably organised a trip for the NAMHO conference which did not take place since an access agreement being negotiated with the Forestry Commission was delayed, but have volunteered to lead a trip for the 2014 conference which will again be in Wales.

Their explorations at Grogwinion in the Ystwyth valley have concluded without attaining access to the large stopes which are believed to have existed although what was entered indicates they have collapsed.

Six days was spent looking at Copper Mines in Snowdonia with most of the time being spent at Lliwedd. They consider to have fully explored the mine although less so, that not much was found in the way of artefacts or the waggons that David Bick claims to have seen there. Exploration was not without its challenges and one member will feel the pain for some time to come, whilst another, who will remain nameless, stated at one point "I would have given up if anybody could have heard my cries". Although the underground was more sporting than academic the surface remains are impressive and on a good day provides a pleasant walk and is recommended.

A weekend was spent at Cymystwyth which, has been widely reported elsewhere and has now been purchased from the Crown by a Trust, the driving force which is Roy Fellowes. This has been a "no-go" area for many years since the Crown was not keen on underground explorers. Whilst some may view the acquisition by the Trust as brave, or worse, in view of the liabilities that the site has, it does now offer some possibilities for exploration and potentially a model for mine ownership. Their initial visit identified two areas worthy of further exploration although there are a number of parts of the site which are still to visit.

In addition to the above, visits have also been made to Cwmorthin, Llwyn Ddu and Llwyngwern.

Work will start in the New Year at Greenside Mine to dig through the fall from the Lucy Level to the Lucy Engine Shaft which should uncover new ground.

Work continues at Force Crag Mine and Gategill Mine with the various agencies and applications have been submitted to:

- Open up and reinstate No3 level
- Secure the top of the rubble slope from No 3 level to No 2 level to ensure continued access to No 1 level

Work should start in Spring/Summer of next year

Some members have highlighted the problems of the condition of the remains at the Sedgewick Gunpowder Works near Kendal and the society is in discussion with the National Trust as landowner as to how best to carry out works to recover the situation.

A plan is being formulated with John Hodgson from the LDNPA to re-open Deep Level at Coniston Copper Mines.

Members have been suggesting other projects for the future such as clearing the rubbish from the flooded shaft at Myres Head Mine near Hartsop and photograph the pumps at the bottom of the shaft. To pump out the level at the bottom of Swinburn Gill near Red Gill Mine on the Caldbeck Fells.

However although the society is still very active, there are projects for the foreseeable future, is financially in its best position ever, produces a quality newsletter, has a fairly stable membership, etc, there are issues which are starting to appear and need to be addressed which includes

- Additional committee members are needed for the society to continue to operate efficiently and spread the work load.
- How does the society promote itself in this digital age and continue to attract new members.
- The digging team is down to three which is making it very tough on those members.

The committee is currently putting a review together of the current situation with proposed solutions which will be provided to each member for comment.

The Society should once again thank John Hodgson and Eleanor Kingston from the LDNPA for all the help and support they have given over many years.

Warren Allison,  
Chairman

### **Secretary's Report to CATMHS AGM #34**

Four committee meetings have been held with one planned meeting cancelled due to mid-summer holiday commitments. Minutes of the AGM and committee meetings are placed on the member's page of our web site. Sufficient committee members are willing to stand but we have agreed that the treasurer need not personally attend each committee meeting. We are currently in urgent need of two additional committee members to add breadth to our team.

A review of our publication stock has shown a need for a longer-term storage. Commercial storage appears to be too expensive so it is planned to use the Mandells Store. We will need to make it dry and secure to prevent damage from damp and vermin.

This year we have received a number of enquiries for information from our archives to support academic research and the interests of explorers wishing to visit Cumbria. Two requests for Greenside through-trips from caving clubs have been received. These have forced us to question our role in this area as we are a key holder principally for our own purposes and also we find we are not now capable of fully supporting the through trip; especially since the route has deteriorated in the recent past. We have reluctantly declined to actively support these groups.

Through the efforts of Dave Bridge, the society has supported the BBC Coast programme "The Workers Coast" which took a short look at plumbago and cannon ball production. Caving surveyors working in the natural caverns at Hudgillburn have to date recorded in excess of 4km of maze which has the potential to make Hudgillburn the largest known maze cave in the UK. We considered the possibility of seeking SSSI recognition to protect the caves but decided against this course of action unless deterioration is observed.

The society has been involved in interaction with external organisations throughout the year:

Advice to the LDNPA on the remedial works to the Deep Level entrance landslide.

The preparation of two proposals for the National Trust for the opening and gating of Force Crag No 3 level to be carried out by CATMHS in support of minewater control.

The clearance of the blockage to the Carrock Mine Brandy Gill Culvert and the conclusion of the 3 year management agreement with English Heritage.

A review of the National Trust Sedgewick New Gunpowder works in support of members wishing to help the Trust under their volunteer scheme.

At committee we are drafting a review of the society's position in order to manage our evolution over the next few years. We need to do this as trustees to ensure we change with the times. To do this well we need some additional committee members to give us diversity and insight – suggestions and volunteers are welcome.

Colin Woollard, Secretary

## Conservation work at Penny Rigg Mill, Tilberthwaite

Not a great deal is known about Tilberthwaite mine, situated at the top of Tilberthwaite Gill. It seems to have been worked intermittently through the seventeenth and eighteenth centuries, and in 1824 was being operated by Michael Knott, who then entered into an agreement with John Barratt. In 1850 Barratt started the 1000 yard Penny Rigg Adit to intersect the vein at depth. When it was finished he constructed the



Penny Rigg Mill to process the ore produced from the mine. The plant operated for 15 years but in 1875 production stopped due to the expense of maintaining the adit. The mill was abandoned and, although some of the buildings have been robbed for stone, what remains is more or less complete and has not been altered since it was built.



The site, which belongs to Rydal Estates, is not listed or protected in any way, and is deteriorating due to natural erosion, exacerbated by recent heavy rainfall. Some maintenance is needed. This was to have been funded from a very large pot of money available under the High Level Stewardship Scheme. Unfortunately some local farmers would not sign up to the scheme and the money was lost.

CATMHS is concerned that if nothing is done then some parts of the site will deteriorate beyond repair and the committee has decided to spend some of our own funds on repairs to the stilling dam, the wheel pit and a fragile gable end on one of the buildings.

Mark Scott has obtained estimates from David Birkett, a local professional waller, and Mr Birkett has agreed to carry out the work at local cost. Colin Woollard, as CATMHS Secretary, wrote to Carter Jonas, Agent for Rydal Estates, requesting permission to carry out the work, and we are awaiting a reply.

John Hodgson, LDNPA Senior Archaeologist is working on an application for a grant from the Heritage Lottery Fund, and it is hoped that in due course a grant might be available to conserve the rest of the site.

### **CIHS Mike Davies-Sheil Project update**

Mike Davies-Shiel started photographing industrial remains in the 1960's, over 50 years ago and annotated each slide with notes and remarks. When he died he left his extensive collection of slides to The Cumbria Industrial History Society. The CIHS reports that over 16,000 images have been stored and entered on a database, thanks to their volunteers cataloguing efforts.

This includes virtually all the photos that are of Cumbrian industries, so they are now taking stock and considering how they can make them available for researchers and interested others. Following consultation with the Archive Service, they are hopeful that the images and database will be made available for viewing at each of the local Record Offices.

They are also planning to use some of the images to illustrate their website and considering a linked photo-gallery.

The remaining slides, which cover Mike's other interests in geology, weather, etc, and industry in other parts of the country, will be sorted and decisions taken on which should be catalogued and digitised.

### **MoLES**

Mines of Lakeland Exploration Society has been wound up due to lack of support. It is sad to have to report that, at an Extraordinary General Meeting on Saturday 9th November, there was an overwhelming decision, by members present and those who didn't attend but responded by email or letter, to close down MoLES. This and the recent closure and dispersal of Ian Tyler's mining museum in Keswick is a considerable loss. Once there were three mining related organizations in Cumbria, CAT, LMQT and MoLES. CATMHS, the oldest of the three, established in 1979 by a group of individuals with a long standing interest in Cumbrian mines, is the only one still in existence. During its 34 years CATMHS has become a respected organisation by broadening its interests, especially in the fields of conservation and mining history, by establishing effective communications and good rapport with professional bodies, maintaining an archive, and publicizing its activities in a regular Newsletter and an occasional Journal.

Nevertheless, there are concerns regarding the future viability of our Society. Some of the early members are no longer with us, some have moved on to other interests and others are older and physically less active. The exciting explorations of the early years have all been done and we have little to attract active new members. With this in mind Colin Woollard has produced a draft Medium Term Development Plan, which the Committee is currently developing.

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### **Lake District Archaeology Conference, 3<sup>rd</sup> November**

This event, held at the Theatre by the Lake, Keswick, gets better each year, and 2013 was a sell out. It was apparent that technology continues to improve year on year, and this was reflected in the quality of the presentations and in the collection of data. Some stunning rotatable 3D digital models were shown; photographs taken from quadricopters (or even octocopters!) are processed by photogrammetric software.

Vivienne Reece, Chair of Historic Environment Group, LDNPA introduced the proceedings. She pointed out that all the talks were about projects by local societies. She praised the role of volunteers, drew attention to the launch of the Lake District archaeology volunteers network and pointed out that generous funding by the Heritage Lottery Fund has been crucial.

John Hodgson, introduced by Vivienne Reece as the Lake District Park's greatest asset, gave an overview of archaeology in the National Park in 2013. The Lake District Archaeology Volunteer Network was launched in February, and there are now sixty eight volunteers together with eight supervisors. This has been the third year of bracken cutting on Monuments at Risk and mechanical strimmers have been introduced to improve the process. Those monuments which had been cut in each of the three years were now showing signs of bracken eradication, some reverting to a grassy sward. 23 monuments had been cut this year. He too drew attention to the role of the HLF funding in enabling local projects. Last year the LDNPA application for the National Park to become a World Heritage Site was not successful, and a revised technical evaluation was submitted in October this year. It is hoped that this will enable a full bid to be made next year.

Holly Beavitt-Pike introduced Jamie Lund of the National Trust, who reported on the Windermere Reflections project at Greenhead Gill mine, near Grasmere. The Reflections on History program is funded by the Environment Agency to tackle water pollution of Windermere. There are 19 projects, including the Grasmere mines and Banks Quarry.

**Greenhead Gill** is an Elizabethan lead mine established in 1564 by the Company of Mines royal, who were based at Keswick. By 1568 a lodging house and smithy had been established near Grasmere, but their location is unclear. There were two coffin levels at Brackenthwaite, above Dove Cottage, which can still be seen. In 1568 four veins had been exposed alongside Greenhead Gill and two shafts had been sunk. One, called Benedict's shaft produced 800 kibbles of ore in 1568/9. A stamp mill was constructed in 1569; an inventory of 1586 lists twelve stamps and 11 square buddles. Six men, later increased to ten, and a washerwoman were employed and accommodated in a lodging house on site. In 1570/71 the ore pinched out and activity declined. The mine closed in 1573.

The Reflections survey recorded ten definite buddles ranged alongside the gill and a leat constructed to carry water from Rowantree Beck to a waterwheel and stamp mill. The survey identified the base of the sixteenth century building but concluded that the ruins of other buildings present post dated the Elizabethan workings. The lower adit was driven in 1870. A report is to be published shortly.

### **Banks Quarry, Elterwater**

A recording has been made by Kendal Oral History Society of reminiscences by Ted Bowness, whose grandfather and father and worked Banks Quarry, in Langdale, around the turn of the 19<sup>th</sup> century. Part of the recording was played to the assembly before Jamie Quartermaine of Oxford Archaeology North reported on Windermere Reflections survey of the Quarry.

It had been the intention for volunteers to survey the site, but it soon became apparent that the complexity of the site made it unsuitable. A photogrammetric survey was carried out using a quadricopter, and the final plan was drawn up by the volunteers. Clever (and probably very expensive) software was used to produce a stunning rotatable three dimensional digital model.

There were 76 quarries in the Windermere catchment, but only nine are recorded on the 1861 OS map. Most of the quarrying took place during the latter half of the 19<sup>th</sup> century, which coincides with industrial growth and Victorian house building during this period. Banks quarry existed in 1829, when it was known as Wood Quarry. In 1861 it was called Dale End Quarry, and in 1890, Banks Quarry.

It's golden age was in the 1850's, but there was a decline in output from 1870-80, followed by a recovery in the early 1900's. The 1914-18 war more or less stopped production, but it recovered somewhat in the early 1920's. An engine and compressor was installed in 1932 and the remains still exist, but nevertheless the quarry closed for good in 1934 due perhaps to lack of investment. However the inefficient 'company' system of working also contributed to its failure. This system involved groups of men forming working companies to take bargains. Each company worked independently, resulting, for example, in one quarry having four separate dressing floors and tips, probably being used simultaneously. 17 different working floors have been identified.

### **Longhouses in the Duddon Valley**

Following the Ring Cairns to Reservoirs project the Duddon Valley Local History Group have been surveying longhouses. A longhouse is a typically rectangular building with humans occupying one end and livestock the other. They are basically similar to the more recent black houses found on the Isle of Lewis. Long dry stone walls probably about a meter high supported a wooden A frame carrying a thatched roof. There is very little environmental evidence, but they are thought to be medieval, originating in the Norse period. There is little evidence of ploughing or cultivation, so they are thought to be associated with livestock farming. Fifteen probable long houses have been found in the Duddon Valley. All were abandoned by the mid 19<sup>th</sup> century.

Bracken is causing damage, and clearance is required. It is hoped that the project will continue with a quadricopter survey and a program of excavation. A report is available on the Duddon Valley Local History Group website.

### **Recent Work of the Cumbria Amenity Trust Mining History Society**

Warren Allison gave a talk about CATMHS' achievements. Time did not allow him to mention everything we have done, but nevertheless it was an impressive list. He showed photographs of work we have done at Carrock Mine, Tilberthwaite Horse Level, Kernal Level, Greenside, Middleclough and Hudgillburn mines, and talked about our exhibition at the Ruskin Museum, our association with the Time Team project at Coniston, our support of the Newland Furnace Trust and the visits and talks that we have provided for other groups.

Forthcoming projects include securing access to No 3 Level at Force Crag mine for the National Trust and investigations to find the 4<sup>th</sup> German Tunnel at Silver Gill. H also covered our concerns regarding the landslip blocking Deep Level portal at Coniston, our involvement with the authorities regarding pollution at Yellow Dam, Threlkeld mine and of interpretation of remains of Haltcliffe Smelter. CATMHS is supporting a grant application to establish a permanent interpretation of Greenside Mine at the Village Hall and an HLF grant to conserve Penny Rigg Mill at Tilberthwaite.

It has been suggested that a more comprehensive list might be published on the CATMHS website.

### **The Romans**

The rest of the day was given over to four presentations about projects on Roman remains in the Lake District: the vicus at Ravenglass, the Roman Fort and vicus at Ambleside, the Roman settlement at Maryport, and Derventio, a Roman site at Papcastle near Cockermouth.

Together they showed that there are extensive Roman remains all over our area which have been largely unexamined up till now. It must be an exciting time for archaeologists interested in Roman settlement. Current projects are focusing on environmental surveys and investigation of the Vicus, or neighbourhood of the well known and 'important' buildings, such as the Ambleside fort and the Ravenglass bathhouse. Geophysical surveys are revealing that extensive Civilian settlements surround these buildings and there are ongoing programs of excavation involving volunteers. Of particular interest was an excellent film of ongoing work at Ravenglass

The recent investigation of Derventio, a four year HLF funded project now in its second year, only came about after the floods of 2009. One and a half meters of soil was washed away by the river, revealing substantial Roman walls. The extensive site is on both sides of the River Derwent and the remains of the buildings are to my eyes in good condition and relatively easy to understand by those without special training.

There has been much speculation but not a great deal of evidence regarding Roman mining and quarrying activities. On the outskirts of Derventio quantities of tap slag have been found and there is evidence of possible iron mining down river. The Romans must have had quarries for building materials, so it is always possible that some evidence will come to light

Ian Matheson.

## **Mines Forum meeting, 5<sup>th</sup> July 2013**

### **Proposal for interpretation project at Greenside Mine**

J Hodgson reported that a meeting was held on the 4<sup>th</sup> June at Greenside Mine with the LDNPA, (which included a National Park planner) and W Allison. The Ullswater Whole Valley Planning project had indicated that local people had wanted more of the valley's history especially at Greenside. The interpretation project would need HLF funding and after much discussion would probably comprise of interpretation at the mine, digitizing the information from the exhibitions that W Allison held a number of years ago, oral history and making use of TV screens at the TIC as there was no room there for a static exhibition.

### **National Trust**

J Malley gave an update on the proposals at Force Crag Mine:

There had been a meeting with the Environment Agency a few weeks ago to discuss the outline proposals for the planning application to be submitted for the new passive treatment works and small wet land. If planning permission was granted, work would start between September and November.

Level Zero shows a gradual rise in the water level. DEFRA was getting keen on potential discharge events, while the National trust was committed to dewatering.

Geophysical work had been carried out by Atkins. Directional drilling to dewater Level Zero had been ruled out due to cost and digging a new tunnel was now an option as reopening the old entrance would require too large a hole in the fellside.

A Davidson (English Heritage) was content with the proposal to re-open No 3 Level as proposed by the Trust and CATMHS.

### **LDNPA**

Greenside Mine had escalated to a high corporate risk due to the preserved instability of No 1 tip and a geophysical survey was being proposed.

The World Heritage application was to be re-submitted with a larger technical evaluation which included industry and had to be submitted by October 2013.

A meeting was being arranged at Parrock Quarry to discuss the removal of stone for building. A planning application would be required, but there was a huge resource of suitable building material which was stipulated in planning permissions. A Cameron commented that there could be objections due to the sites historical content

The commoners at Caldbeck had entered the Higher Level Stewardship Scheme and this had made funds available to sort out the erosion of the tips at Old Potts Gill Copper Mine and at Potts Gill Barytes Mine where some re-profiling may be required.

### **CATMHS**

**Carrock Mine** Work to clear the culvert in Brandy Gill was planned for the 7<sup>th</sup> July.

Richard Shaw from the British Geological Survey had been on site from 25<sup>th</sup> May to 27<sup>th</sup> May to survey Smiths vein, financed by Natural England as part of the project to re-open the Harding level at Carrock Mine. J Hodgson was chasing up the proposed conservation work to the mill and interpretation panel

**Tilberthwaite Mine.** Work to clear the level was progressing slowly.

In conjunction with Rydal Estates on the 30<sup>th</sup> June the culvert which carries water from the mine to the leat was cleared of numerous blockages of vegetation and tree roots which would prevent water eroding the track to the mine

**Coniston Copper Mines.** A meeting was required to look at re-opening Deep Level at Coniston Copper Mines. The fence line is still to move at the Back Strings, Coniston and a date needed to be set.

**Heritage Lottery Fund grant applications.** CATMHS had agreed to support both applications at Coniston Copper mines and Greenside Mine

**Force Crag Mine.** The applications to re-open No 3 level and secure the route from No 3 Level to No 1 level had been submitted to the National Trust.

**Lancaster Archaeological Society.** On Saturday 15<sup>th</sup> June, 19 members of the society were shown up to underground at Tilberthwaite up to the first fall and the mill.

## **MOLES**

I Hebson commented that there had been one trip into Yewthwaite Mine and there was no problem with the spilling (previously reported at a Mines Forum meeting) of the fall on the Trustees Level as the boulder has just slipped against the wall of the level. Access to the higher levels was being examined with J Malley (National Trust)

## **Alistair Cameron**

A Cameron gave the following updates:

### **Honister Quarry**

Better slate coming out of Kimberly. There had been a site meeting to examine drilling below the access road way to access previously un-worked slate. The field trips were going well and Manchester University were working up a project to look at carrying out a microscopic assessment of the rock to determine what caused the creation of the volcanic beds in the Lake District.

### **Moss Rigg Quarry**

Due to the shortage of building stone in the National Park and that Burlington wanted to re-work the Moss Rigg Quarry tips for stone a meeting with the company attended by J Lund (National Trust), A Cameron, B Gibson and P Haggin (LDNPA planner) had been held. Two areas had been identified to be re-worked subject to various constraints such as sorting the waste on site, using a Land Rover and trailer, but planning permission would be needed.

## **5. Coniston Copper Mines conservation project**

J Hodgson reported that there was a Plan B for this project in light of the commoners not entering the Higher Level Stewardship Scheme, and this would be in the form of a HLF grant application. This would probably also need the support of Mr P Johnston, the Ruskin Museum, Coniston Parish Council etc and may also need a project officer.

**6. Reflections on History Survey project- Phase 3 Mining and Quarrying.** J Hodgson reported the surveying was well underway with Banks Quarry going very well, although the adverse weather had affected both sites. There was the possibility of a fourth phase due to an underspend and this would concentrate on iron smelting

After the meeting finished some of the attendees visited Threlkeld Mine

### **Mines Forum, November 2013**

**Environment Agency.** Peter Bardsley did not attend the meeting but sent this information:

**Gategill Mine** There are two aspects to Environment Agency involvement at this site: the treatment of minewater from Woodend level and flood risk from the deterioration of the culvert running under Yellow Dam and backing up of water from its blockage.

The design and build of the minewater treatment is on hold until the issues with the yellow dam/culvert have been resolved and R&D has proved to be effective for treating the high concentrations of zinc. The high zinc concentrations and low pH from the Woodend adit are much more of a problem than the comparative discharge from Force Crag mine and work is ongoing by Adam Jarvis at Newcastle University to develop the best practical and efficient solution for its treatment. We cannot effectively design any system until we know how, what and if the treatment will work and therefore the project is still in its infancy. Water sampling for flow and chemistry is still ongoing. Funds have been allocated for the build of treatment to ensure improvement of water quality as required by the Water Framework Directive.

Yellow dam is in poor condition, showing signs of failure. Properties and the A66 are at risk of flooding as a result of breach of the dam. The dam is privately owned, but since the dam owner has insufficient funds to take on remedial work, the EA plans to undertake this work to minimise risk to the public from a failure of the dam and associated flood risk. The recent wet weather has caused water to fill up behind Yellow Dam. As a result, we have been working with the landowner and Cumbria Fire & Rescue Service to pump water over the dam to reduce pressure on the dam in advance of potentially unsettled weather. This is a precautionary measure and part of our approach to reducing flood risk to homes and businesses in Threlkeld. We are working with partner organisations in a bid to share resource to develop options to resolve the problem. An environmental assessment to manage works will need to identify and resolve problems and early engagement with landowners and affected residents/organisations will be required. There are aspects of archaeology that need to be addressed.

**Greenside Mine.** The whole site is currently being assessed as Contaminated Land by Eden District Council. There are ongoing discussions regarding the stability of tip1 that fall outside the scope of Contaminated Land, but EA are working with LDNPA on this issue.

A cost benefit tool has been developed to review impact of metal mines on water catchments versus the benefits of remediation. Input parameters are being tweaked to evaluate the costs, but like any model, it will have constraints. The tool may be used in mitigation of infraction proceeding against UK's failure to deliver WFD improvements. Characterisation studies on many catchments that highlight metal failures e.g. Church Beck, Yewdale Beck, Whelpo will be required to monitor flow and concentration for input into the model.

**Force Crag Mine.** Works are ongoing to build the treatment facility. See photo attached. Drainage is being intercepted and diverted around the former tailing lagoons, which are being redesigned to form treatment lagoons.



Peter Bardsley

**National Trust.** The NT was not represented at this meeting

**Lake District National Park Authority.** John Hodgson reported on implications of the World Heritage bid for the Lake District National Park. Starting with the 19<sup>th</sup> Century Romantics the Lake District has been seen as an Agro-Pastoral Landscape. However its industrial heritage makes it much more complex. Funds may become available for study and conservation. The LDNPA is trying to manage the landscape and engage with local people and to develop a Valley Planning Strategy using the 13 major valleys identified by Wordsworth. Coniston is the first example.

At Greenside mine Tailings Dam 1 there are structural concerns. It is to be investigated and may need re-profiling as has already been done for Tailings Dam 2.

At Carrock mine a site meeting is to take place to examine the pre 1914 mill. Part of the structure has been collapsed and needs to be rebuilt. Funding is available for this but work must be carried out by the end of March 2014.

Potts Gill mine. The beck has flooded and dumped material on the farm below, which is currently used for residential and holiday purposes. When the mine was working the beck was routed around the dumps, but it is reverting to its original course and washing away dump material. There was some discussion as to whether it would be best to manage the water course or to remove the dumps. There was concern that archaeology would be lost if the dumps were moved.

Backbarrow. Negotiations were taking place with the developers regarding future use of the new buildings there. There was deterioration of the Furnace Stack and the Engine

House, here part of the roof has collapsed. A 50% HLF grant is negotiated for the earlier failed development is still available.

Rusland Valley. A HLF grant has been obtained for study and conservation of this important woodland. £158,000 is to be spent on the bloomery and forge.

The Lake District National Park is expecting a further 10% cut in income for the next year. This will entail some reorganization and the Environmental Heritage Department is expected to disappear. The future is uncertain.

There is a possibility that volunteers from the recently launched Lake District Archaeology Volunteer Network might be able to assist in CATMHS projects, either in the field or by researching records. We need to consider this.

**CATMHS.** Work at Tilberthwaite mine Horse Level continues.

At Force Crag mine the application to carry out work on No3 Level has not yet been submitted by the National Trust. Work is expected to be carried out next year to restore the portal to its original appearance, to prevent water running into the mine and to preserve internal access to the lower levels.

Coniston Deep Level blockage. Nothing has been done. A site meeting is required. There was discussion as to whether it would be possible to get a JCB to the site.

Sedgewick Gunpowder Works. CAT hopes to develop a project to deal with plant growth on the site.

**MoLES.** No activity. (It is understood that there is to be an Extraordinary General Meeting on November 9<sup>th</sup> to consider the future of MoLes. Ed.)

**English Heritage** No representative present. John Hodgson reported that EH was to receive another serious cut in income. This might result in a reduction of programs and less money for Lake District projects. EH is to be split into two divisions – the English Heritage charity to manage properties which generate income, such as the Stott Park Bobbin Mill and a National Heritage Protection Service, which may be known as Historic England.

**Alastair Cameron.** Alastair reported that due to a shortage of local stone for building there is an interest in reworking the slate tips at Coniston. This would be mostly by handpicking, with no use of machines. Alastair has prepared a review of slate working sites in the Coniston and Langdale region, considering access, quality of stone, suitability scale of working and site historic associations. He said that Burlington Slate was considering re-opening Moss Rigg Quarry.

On Coniston Old Man he was hoping to carry out a better survey of the underground slate workings. This would take place during January and February.

**Honister** are to review their planning consents. Some, which had been obtained some time ago, may be unwanted or unsuitable. They would probably negotiate these for current requirements.

In 2009 part of the track bed of the Honister Tramway was washed away, and this had since been eroding upwards.

Water was also causing a problem in the internal incline. It was intended to pipe it and bring it out of No3 level

A macroscopic examination of rock at Honister by Manchester University to determine the origin of the material which formed the slate had not been successful as the equipment failed.

John Hodgson asked a question that arose at the Archaeology conference Is it possible to determine the derivation of Roman slate from Ravenglass? To do this might require sophisticated techniques of splitting the slate for examination.

**Coppermines Conservation Project.** John Hodgson is to draw up a brief and obtain costings for the Heritage Lottery Fund.

**Greenside.** A project to provide interpretation of Greenside mine at the Village Hall is ongoing. Local people would like it to expand to include the history of the whole valley.

**Windermere Reflections.** A fourth phase is anticipated for next year. It would probably involve a geophysical survey of the bloomery at Blelham Tarn.

The next meeting will be held on 7<sup>th</sup> March.

Ian Matheson

**Dr Descender**

Dear Doctor

Whilst looking after the finances of one mining club I have recently invested in another. They have now ceased operating and I will receive a share of their surplus. Is this insider dealing?

Anon, London

Dear Captain Kneebone

Almost certainly yes, however I expected little else from you.

Doc.

### **Carrock Mine conservation work to the First World War crushing mill**

In 1913 the Carrock Mining Syndicate, which was managed by Anthony Wilson of Thornthwaite, (who also had dealings with several mines in the North of England over many years) took over Carrock Tungsten Mine near Caldbeck from the Cumbria Mining Company. This company was of German original and had operated the mine since 1905 and had gone into liquidation in September 1913.



*Carrock Mill during the First World War*

As part of the development of the mine, a new mill was built on the South side of Grainsgill Beck, being powered at the time by Pelton wheels, and in the words of W T Shaw “*was the best gravity-type plant ever built in Lakeland for it incorporated the then very latest concentrating tables for treating sand and slimes, cutting losses of the very fragile tungsten minerals to a minimum*”. According to I Tyler, Anthony Wilson was constantly improving the mill until the end of the First World War when the price of Tungsten dropped and the mine closed in 1919. The mill was dismantled and sold piecemeal over the next few years.

As part of the project by the LDNPA and the CATMHS to re-open the main entrance to the mine in conjunction with Dalmain Estates, Natural England, English Heritage and the Environment Agency, a detailed archaeological survey was carried out of this famous mine which is now a scheduled ancient monument.

The Caldbeck and Uldale commoners have joined the Higher Level Stewardship scheme (HLSS) which has enabled John Hodgson, senior archaeologist at the LDNPA to secure funding to have conservation work carried out to the First World War crushing mill by Heritage Construction. The survey was key to identifying what work was required which was started in mid December 2013.



*Before conservation*

*Conservation work,  
December 2013*



There is also funding available under the HLSS to install an interpretation panel at the mine which the LDNPA and CATMHS have started work on, which will give visitors to the site some information on this historic mine.

*January 2014*

## Cymystwyth Mine 26th & 27th October 2013

Attendees: Chris Cowdery, John Ashby, Mark Waite (26th only)  
Jon Knowles (ML)

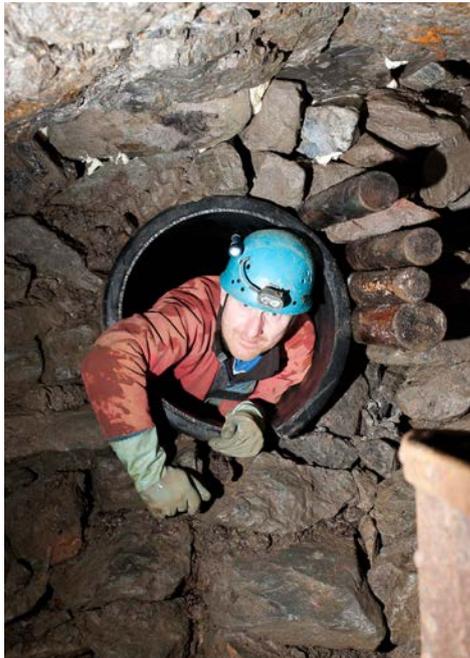
Although the meet was advertised as Ystwyth and Rheidol a decision was taken to postpone the re-visit to Cwm Rheidol due to recent heavy rain.

After a delayed start, due to Ashby having parking difficulties and heavy traffic, the team kitted up and entered the Level Fawr. Since the ML last entered the mine over 10 years ago two lengths of plastic pipe have been installed to pass through some poor ground and a large fall. Once through a descent was made to the Kingside level via



*General view of the site.*

the skip road. The area around the shaft contains impressive timbering rarely seen, both in terms of size and quantity, outside of Devon and Cornwall. The Kingside Adit was explored, one interesting feature being a level with goes up-hill before levelling off and then descending again. This appears to be the adit.



*Mark Waite crawls through one of the pipes.*

Re-ascending to the Lefel Fawr various stopes were then explored and two areas worth further exploration were identified:-

Above the head of the skip shaft fixed ropes head up to a point where bolting is needed to ascend further. Simon Hughes history of the site indicates that this area once extended to surface at Graig Fawr. Almost certainly getting up to surface would be impossible since the area collapsed when worked by Bonsall - he had a reputation for taking out all the ore and leaving nothing to support the hanging wall. Ascending a long existing ladder followed by ascent up stopes a point was obtained where a route along a stope could be followed with some bolting

It seems that the Level Fawr was used for ore transport from many parts the mine, right across to Jackilas. Therefore connections are possible to Jackilas Adit, Evans Adit, Taylors Adit and Freemans Adit for a start<sup>1</sup> although collapses have historically been a problem.

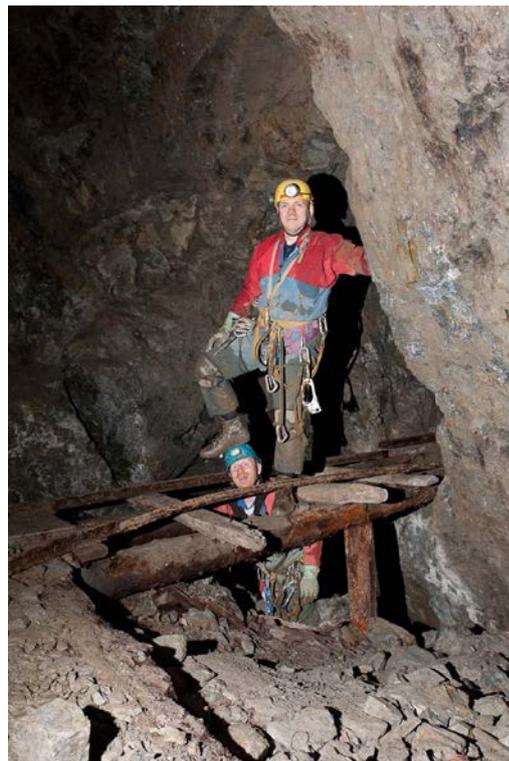
The area at the head of the skip shaft is extremely interesting. Skips were clearly wound up from the Kingside Adit, and below, and were then hauled above the Level Fawr to be tipped into hoppers. The skip was tipped into a wooden bifurcation box which had iron/steel guides on top. The box split the ore into two hoppers one either side of the skip shaft. It is assumed that the ore was then drawn off into wagons and trammed out of the level. The method by which skip shaft was powered remains unclear.



*A photograph taken whilst standing on a timber part way down the shaft endeavouring to show the wooden bifurcation box which enabled ore to be discharged into two hoppers either side of the shaft.*

Saturday night was spent at the Miners Arms in Pont Rhyd-y-groes where two members were defeated by the mixed grill.

On Sunday a return was made to the head of the skip shaft to take some photographs, a process not easy in the conditions. Following this a partial survey of surface adits was undertaken, summary of which is tabulated below. The numbers refers to those indicated on the modern surface plan which can be downloaded from the Adit Now website and those contained in the standard work on the site "The Cymystwyth Mines" by Simon Hughes.



a

*Trying to keep a good man down.*

<sup>1</sup> Information provided by Chris Cowdery

It should be noted that the surface and mineral rights have now been transferred from the Crown to the Cambrian Mines Trust which is led by Roy Fellowes.

| Number on Plan | Name             | Status  | Number on S.Hughes Plan |
|----------------|------------------|---|-------------------------|
| 021            | Lefel Fawr       | Open – see above  | 32                      |
| 048            | Turfstack Adit   | Open. Old narrow adit. After bridging a stope it is possible to walk down to a lower level which is assumed to be Turfstack adit although this is blocked at surface. | 36                      |
| 049            | Nant Wycyn Adit  | See Turfstack Adit.   | 38                      |
| 050            | Red & Black Adit | Open  | 34                      |
| 014            | Freeman's Adit   | Blocked   | 55                      |
| 022            | Alderson's Adit  | Open. Adit is cross-cut to vein. At in-by end of vane water pours in from Herbert's level above.  | 56                      |
| 017            | Herbert's Level  | Open. At in-by end joins stopes open to surface. Much falling water which flows along level before going down a hole to Alderson's.                                   | 57                      |
| 026            | Jackilas         | Collapsed.  | 51                      |
| 010            | Day              | Immediately below Jackilas. Ends in an ore hopper which appears to ascend to Jackilas level above. With care it may be possible to ascend.                            | 49                      |

Taylor's shaft was not visited although it is understood that a descent here could access other workings.

The following areas remain to be explored on surface:-



*Damp conditions level in Herbert's*

Coppa Hill  
 Craigfawr  
 The area immediately above Level Fawr & Mill.  
 Taylor's level.

Even if not venturing underground this remains a fascinating area on surface with a plethora of mining remains and numerous birds of prey.

Jon Knowles

### **Boxing Day Meet 2013.**

Coniston Coppermines water leat walk. 4 members attended the meet; Peter Blezard, Mark Simpson, Maureen Fleming, one guest, Vicki and two dogs, Fern and Aggy.

The aim of the walk was to follow some of the leats that provided the water that was vital to power the waterwheels raising the copper ore and water from the mines and also the dressing floors of Paddy End, Flemings Mine and the Bonsor area. Steam power was not an option due to the cost of transport cost of coal. The surveying and construction and maintenance of the infra- structure required for the extraction copper ore must have tested the mine owners as much as the extraction of the ore itself.

Virtually all of the water that fell on these slopes as rain and snow was collected and channelled to power water wheels. These raised water and ore from the mines, powered air compressors for rock drills and prepared the copper ore at the dressing floors ready for export to the smelters of Keswick, St Helens and Swansea; they also produced power for the slate extraction sites on either side of the Coppermines Valley. For over four hundred years water was a hindrance to the miners but it was importantly the main source of power generation in the valley. It is still used for hydro-electric power generation and as a water supply.

The height of the fells and differential rate of erosion of the various rock types has created a stepped landscape guaranteeing an almost constant supply of water which in turn allowed the construction of water leats; essential for carrying water to the waterwheels. If this were not the case the extraction of the copper ore would have been almost impossible.

There is an abundance of rain for most of the year in the Coppermines catchment area which encompasses an area of approximately 6.2square km from the eastern slopes of Coniston Old Man to the western slopes of Wetherlam. The majority of this rain fall was funnelled by way of leats or mill races to the water wheels and dressing floors. Problems occurred in times of drought; lack of rain in summer and freezing water in winter.

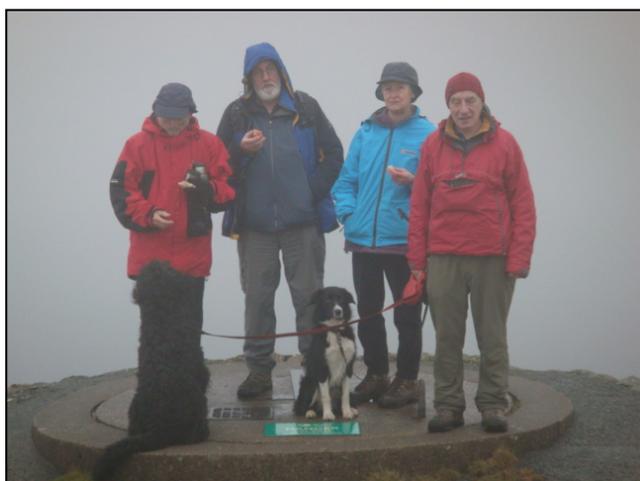
It is not the intention of this meet report to go into depth about the water supplies in the Coppermines Valley; that will come in another report.

The day was cool, overcast, and breezy and damp (see image!) The walk started from the Black Bull and headed towards the path behind Irish Row. We stopped for a short time at the junction of the path and discussed the relatively new weir supplying the hydro-electric generator in the valley bottom. The path towards Red Dell crosses over a leat, now mainly overgrown that supplied water to the Bonsor dressing floors. The next stop was the Bonsor East water wheel area. Water was fed to this area from Red Dell, which does not have a large catchment area and possibly by way of the leat from Levers Water Beck.

A short walk took us to the Old Engine Shaft area where we had lunch in the drippingly wet level and from there walked to the New Engine Shaft wheel pit and Flemings dressing floors.

The leat fed from Levers Water Beck was followed along the foot of Kennel – Kernal Crag and then track leading to Levers Water dam, the main water supply for the copper mines. For the first time since we were on the Red Dell path we left a water leat and headed towards the bridge close to the Pudding Stone from where we followed the leat flowing towards Paddy End dressing floors now used as a footpath to Hospital Level.

From the Paddy End waterworks we left the track and followed a leat which ran from



Paddy End to the Upper Bonsor dressing floors and the to the rehydration works of the Black Bull in Coniston. By chance Tony Holland was returning from Langdale after a circular run over the high fells and he was persuaded to rehydrate also.

A worthwhile walk with lots to look at; pity more people did not turn up. Perhaps if the same walk is on the summer meets list they will.

Mark Scott.

*Feeding time at Levers Water dam.*

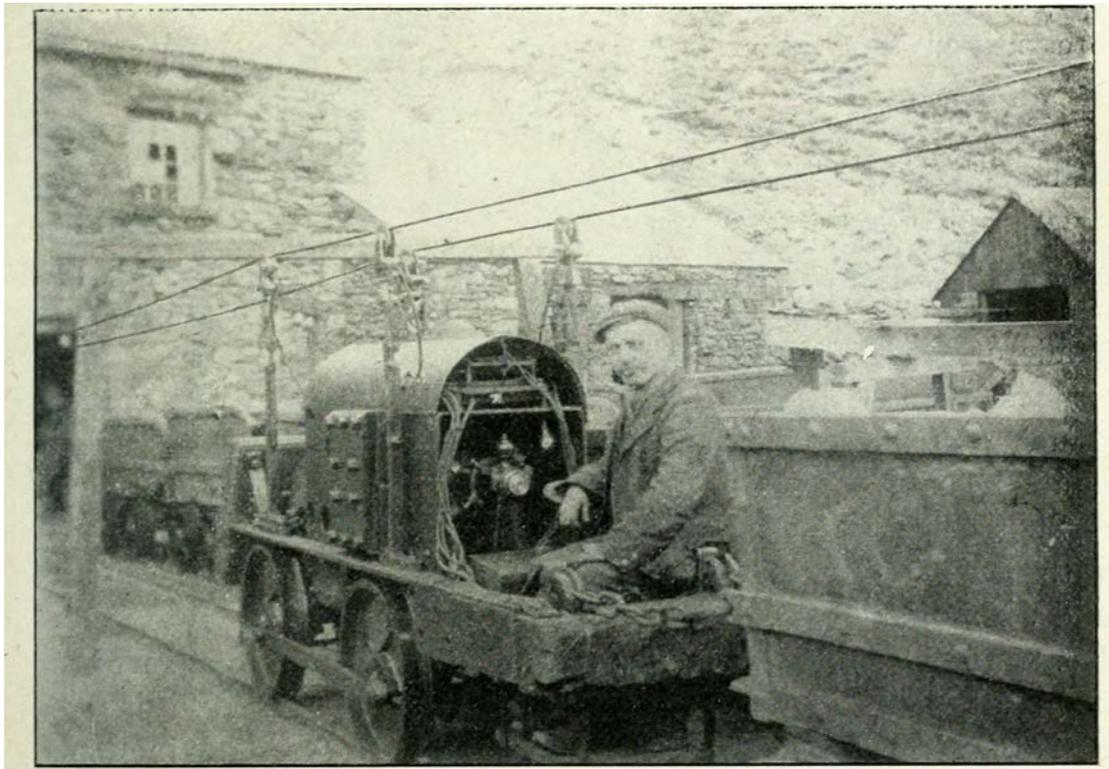


*An image taken from above Red Dell Beck looking towards the workings on the Bonsor vein. The complexity of paths and water leats is highlighted by the snow.*

**Description of the lead ore washing plant at the Greenside mines, Patterdale, in 1894. By W. M. H. Borlase**

Adit-level. —The vein-stuff, comprising quartz, baryta, copper-pyrites, iron-pyrites and galena, is brought from the mine through a long adit-level by an electric locomotive, and the wagons are discharged into stone-made hoppers or kilns, sloping gradually toward the fronts, at the bottom of which are fixed two steel-barred grids or grates, one over the other. The roughs on the top grate are hand-picked for conveyance to the stonebreaker: the stuff on the second grate is small enough for the roll-crushers: the stuff passing through is sized sufficiently for treatment at the Green plunger-jiggers, while the fines, slimes, etc. are caught in settling-tanks .

First Floor.—This point (the picking grates) being 150 feet lower than the site of the crushing-and-dressing plant, the several sizes are taken, in turn, as required, up the incline in self-tipping wagons, which the writer claims to have erected, the first of its class made in this country, in 1873, at the Ruthers iron-mine, Cornwall, from a design of his deceased father. The power employed in working the incline is derived from the No. 1 vortex-turbine of 20 horsepower. The tip is arranged so that two hoppers are served at one point: the first with rough stuff for the stone-breaker, and the second with the smalls for the crushing-rolls. The stone-breaker is driven by the No. 2 turbine of 15 horsepower, and is fixed, so as to allow the stuff passing through it to join the smaller stuff, being conveyed to the crushing-rolls, and the whole can be crushed together or separately as desired.



Electric Locomotive.

The crushers, driven by an overshot water-wheel, 30 feet in diameter and 4 1/2 feet wide, taking the exhaust-water from the No. 1 winding-turbine, comprise three sets of rolls, each 16 inches in diameter and 17 inches long. The top set of fluted rolls, made of specially chilled iron, further crushes the stuff before dropping it on to the two sets of plain rollers below.

Below the rolls, there is a revolving- screen-cylinder of 2 1/2 square meshes to the lineal inch, and the roughs separated by this operation, commonly called "raff" (which in most crushing- plants is elevated by "raff-wheels" and returned again to the same crusher), is taken to another crusher, with large Cornish rolls and crushed alone. This method, in the writer's opinion, is much to be preferred, the stuff, being composed of smalls, varying from 1/2 inch to 1 inch cube, when mixed again with larger stuff, escapes the rolls, and consequently may be several times so returned to the crushing-rolls, thus seriously reducing the work of the crusher.

The stuff passing through this screen is conveyed by water and shoots to the screen, with 3 holes to the lineal inch. The stuff, passing to the end of this sizer, feeds into the No. 1 plunger-jigger, with four compartments: the perforated plates being made of steel sheets of No. 10 wire-gauge with 3/8 inch round, punched holes. The plunger runs about 140 strokes of 1/2 inch per minute, and makes four grades of quality. The first grade consists of about 75 per cent, of galena; the second, of lead, baryta and blende-ores: the third and fourth is chats, composed of stone, quartz, etc., with particles of the before mentioned ores attached.

The next screen or sizer, C, meshed to 4 holes to the inch, receives the stuff passing through the meshes of screen, the rougher size going to No. 2 jigger, also of four compartments, with steel plates and 1/4 inch punched holes, and the plunger runs 140 strokes of 1/2 inch per minute. The results are similar to those of the No. 1 jigger, excepting that the first compartment produces almost pure galena.

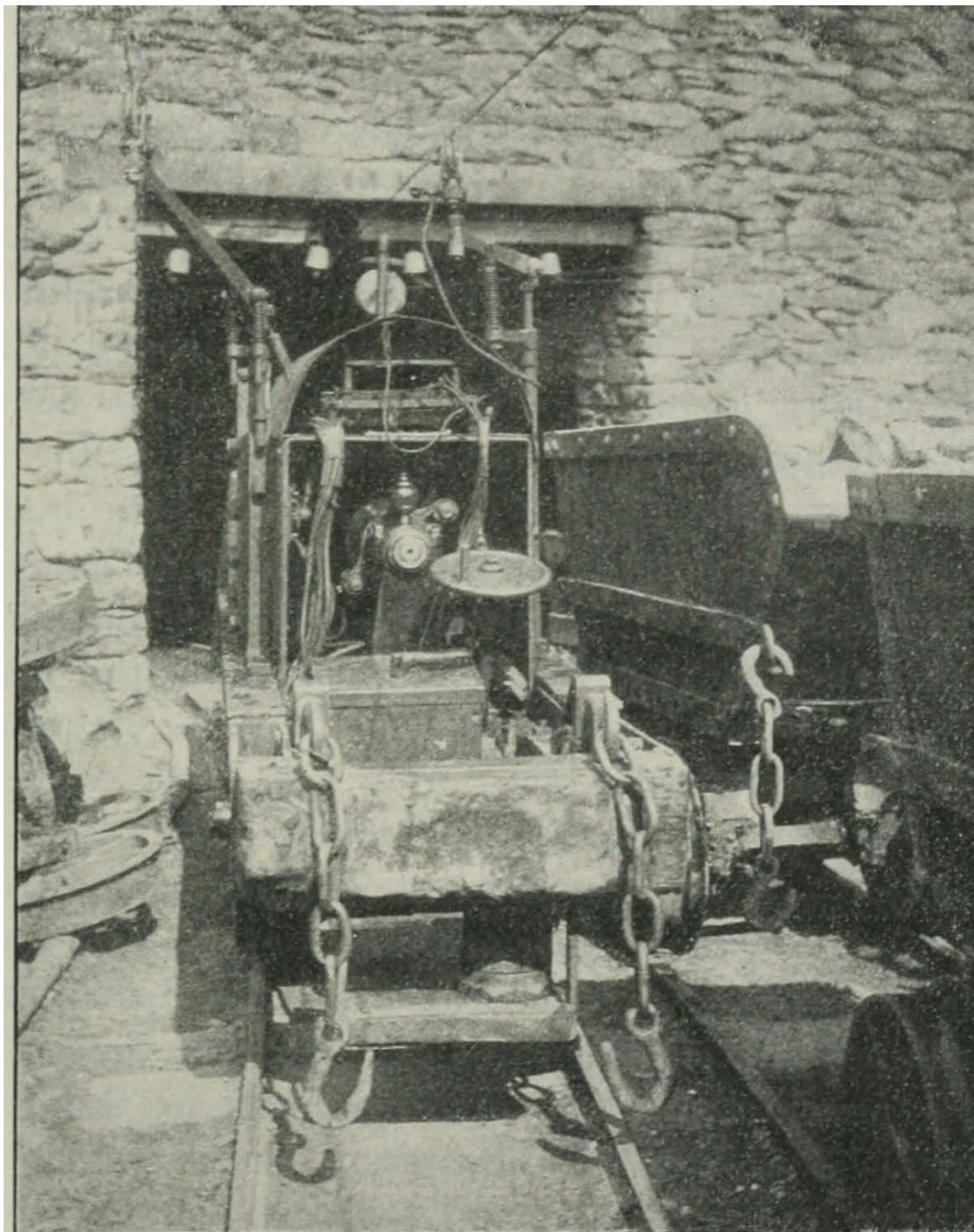
The next screen contains 6 holes to the lineal inch and its rough stuff supplies the No. 3 jigger of 3 compartments, fitted with copper-plates and conical punched holes of No. 7 Cornish gauge. The plunger makes 180 strokes of 3/8 inch per minute. The results comprize three qualities of stuff: the first, equal to about 80 per cent, of metallic lead; the second, of lead-ore, baryta, pyrites and blende-ore; the third, portions of the same ores mixed with quartz, etc.

From this point, the classification is continued through four spitzkasten boxes each supplied with clean water from the pressure-pipe (this pipe also supplies the extra water required for the jiggers), and each supplying separate jiggers of three compartment-capacity, according to the grade of the stuff.

The No. 4 jigger is fitted with copper-plates having conical punched holes of No. 14 Cornish gauge, and produces results equal to those of the No. 3 jig. The plunger runs at a speed of 200 strokes of 5/16 inch per minute. The No. 5 jigger is fitted with copper-plates with conical punched holes of No. 18 gauge, and the plunger runs at 220 strokes of 1/4 inch per minute. The No. 6 jigger, with holes of No. 23 gauge, runs at a speed of 230 strokes of 1/8 inch per minute. The No. 7 jigger, with holes of No. 29 gauge, runs at a speed of 250 strokes of 1/8 inch per minute. The results at each jigger are as follows:—The first compartments contain 80 per cent, of metallic lead; the second, a mixture of lead-ore, baryta, blende and pyrites; the third, small particles of ores attached to fine quartz, sand, etc.

Second Floor.—From this point, the overflow from the last classifier is taken by way of the downfall-launders, to a large spitzkasten where the heavy portions, dropping to the bottom, supply alternately two automatic buddies of the convex type. The

overflow from the spitzkasten goes to the classifier which supplies two other automatic buddles with finer grade stuff. The overflow from the classifier is then caught in settling-tanks for further treatment in other buddles on the slime-floor, below, when sufficient stuff has accumulated. The whole of the above plant is being supplied with stuff, which has been only once handled at the crusher.



Electric Locomotive entering the adit

The automatic buddles, of simple construction, are capable of dealing with a large quantity of stuff of low grade. Their diameter is 24 feet, with a head or centre 8 feet in diameter. The only bearing is an upright iron bar, with a top turned to a pivot-point on which the cover rests, acting as a coupling to the pipe, 1 1/2 inches in diameter,

encasing the upright bar, and carrying the whole of the moving parts. Outside the iron pipe is fixed the bell-mouthed receiver conveying clear water for the sprays, fitted with a flange at the bottom and four waterways. The flange is secured to the bottom of the larger receiver into which the slimes and water to supply the buddles are conveyed by feedlaunders. Into this receiver four short arms are screwed, having T pieces screwed to their ends, through which the stuff flows unto the head of the buddle. The resistance, or check of the flow at the T pieces and at the sprays in the long arms or pipes for the clear water, the outer ends being plugged, supplies sufficient power to give a rotary motion to the moving parts of the machine, which, as before mentioned, simply rests on the pivot-point of the upright bar.

Each buddle is capable of treating the fines from the crushers escaping the jiggers for a run of 200 tons of stuff, requiring little or no attention beyond the blocking or "stepping" up of the outlet or tail as the head of the buddle is gradually filled. The contents of the buddle are divided into four qualities, the tails being run direct to a classifier and another buddle on the waste-floor. The second and third partings are hand-fed to a small buddle, while the heads are treated in a small, mechanically-driven huddle, where the ore is brought up to the standard.

Second Floor.—The writer must now return to the treatment of the stuff caught in the hopper at the end of the first screen. The stuff is conveyed by a tram-wagon to a Cornish crusher for further crushing, and is afterwards classified for four jiggers in a similar manner to that already described in the first-floor jigging-house. Both sets of jiggers on the first and second floors are driven by the No. 3 vortex-turbine of 12 horsepower. The ore caught in the first compartments of the jiggers, Nos. 1, 1a, 2, 2a and 3, is separately conveyed to the cleaning-jig, No. 12, of another type, and thence to the ore-bings. The ore of the first compartment of the jigs, Nos. 3a, 4, 4a, 5, 6 and 7, is severally tipped into a trunking-box or rectangular buddle, through which a clean stream of water is passed to run through the stuff, as it is being thrown against the sloping head of the trunk. The water washes back any small impurities which may have happened to pass through the perforated plates of the jiggers. The produce is lead-ore, containing from 82 to 84 per cent of metallic lead.

The stuff from the second compartments of the jiggers, Nos. 1, 2 and 3, on the first floor, consisting of lead-ore, blende, baryta, copper-pyrites and iron-pyrites is conveyed by tram-wagon to the No. 3 crusher or chat-mill, especially set apart for this class of stuff. It is placed in the hopper, automatically fed by an eccentric arrangement to a belt, and conveyed to the rolls. The speed of the feed can be altered to suit each class of stuff. From this crusher, the stuff first passes into the octagonal, cone-shaped revolving classifier made of wood, containing a spiral screw made of hoop-iron strips, conveying the heavy and coarser grains to the top-end of the classifier, where a feed of clean water is introduced, that washes the fine lead and slimes back over the ribs of the screw, to a spitzkasten classifier, supplying a jig suitable for treating such fine stuff; the finer stuff going on to the settling-tanks.

The coarse stuff, having passed upward through the revolving classifier (the breaks or angles, causing the stuff to turn over many times in transit, greatly assisting the separation and classifying), falls into a jig fitted with copper-plates, with conical holes of No. 25 gauge and a plunger-speed of 200 strokes of 1/2 inch per minute. The fines pass into a jig, T, with holes of No. 30 gauge and a plunger-speed of 280 strokes of 1/4 inch per minute. The results are practically standard galena in the first

compartment of each jig. The second compartments contain baryta and blende, with a fair amount of lead-ore, and requiring further jiggling. The third compartments contain a very complex mixture, which must be further reduced in the stamps, while the overthrow is exceedingly poor in any mineral. This plant is driven by a Pelton wheel, 12 inches in diameter, under a fall of 400 feet, and capable of running at a speed of 1,400 revolutions per minute.

Fourth Floor.—The third compartments of the whole of the jiggers of fines, Nos. 3, 4, 5, 2a and 3a, are further reduced (as in the case above-named) in the small stamps battery, and classified; the rough portions are jiggled, the fines passing on to Luhrig horizontal jiggling-tables. These tables also treat the stuff from the third compartments of jiggers, Nos. 6, 7 and 4a.

The contents of the fourth compartment from jiggers, Nos. 1 and 2, and the third compartment of jiggers, Nos. 1a and 2a, are taken to No. 4 crusher, and crushed, classified and jiggled: the fines being sent to the Luhrig tables. The table-house is equipped with a very fine jig, running at a speed of 280 strokes of 1/16 inch per minute, fitted with conical punched holes of No. 36 gauge. The overflow of the classifier supplying this jig passes successive spitzkasten-classifiers, each supplying a table. These tables are doing excellent work, and it is intended to erect more of them, so soon as practicable, to treat the slimes, etc., now caught in the zig-zag settling-pits, and now treated by mechanically driven buddies of the old type, on the slime and waste-washings. The writer need not point out the advisability of arranging any washing-plant to avoid as much as possible the handling of the stuff, so as to dispense as far as practicable with labour and to reduce the charges to a minimum. The writer does not claim to have, as yet, accomplished this object in the plant under review, having met with too many drawbacks by way of old appliances and fixtures, which (to prevent a stoppage of the whole of the work) have had to be considered, and consequently stood in the way of the desired reforms. It would have been better for the installing of an improved plant, had the ground been cleared of all such obstacles. As far as practicable under existing circumstances, the plant is on the principle of continuous ore-dressing, to the extent that at least 70 per cent, of the produce is being delivered to the ore-bing ready for the smelt-mill, with only two handlings on the shovel after passing through the stonebreaker.

The settling of the fine-slimes in the pits for clarifying the water in some instances entails more cost than the value of their contents. The total labour-costs, including the picking of the crude stuff at the grates (containing about 7 per cent, of lead-ore) to the delivery of the ore (containing 82 per cent, of metallic lead), to the smelt-mill, is 10s. 6d. per ton of ore. A dynamo, for supplying the washings, smelt-mills, workshops, offices, etc., with electric light, is fixed in the No. 1 turbine-house, and is connected to the turbine (belt-driven) by clutch-gearing.

The President (Sir Lindsay Wood, Bart.) moved a vote of thanks to Mr. Borlase for his valuable paper. Mr. A. D. Nicholson (H.M. Inspector of Mines) seconded the resolution, which was cordially approved.

### **Wadham in America, 1873**

*Edward Wadham was born in 1828 in Frenchay, Bristol. He trained as an engineer and worked on the Great Western Railway before moving to the Furness area in 1851 to work for the Duke of Buccleuch as his mining agent. In 1860 Edward married Mary Elizabeth Ainslie, daughter of Montague and Mary Ann Ainslie of Grizedale Hall. Not only was he involved with the iron industry in Furness, he was also a director of the Furness Railway Company for 24 years, and involved with the North Lonsdale Iron and Steel Company, Barrow Haematite Steel Company and Barrow Shipbuilding Company, later Vickers.*

*His diaries cover a period in the history of Furness which saw the expansion of the iron and steel industry, the Furness Railway and ship building as well as the growth of Barrow-in-Furness.*

*One of his sons, Walter, succeeded Edward as the Duke of Buccleuch's agent and remained in the job until his death on 26 April 1946. On his death, Henry Atkinson Slater became the Duke's new agent and it is thanks to him and his son that Edward's diaries have survived. The diaries were deposited at Cumbria Archive and Local Studies Centre in 2012. Each volume was photographed and then transcribed by volunteers, one of whom was Peter Sandbach. This is probably the final instalment! IM.*

### **20 January 1873**

In Barrow in morning – Municipal offices, own office, Corn Mill – Had an interview with Ramsden and the vicar and made arrangements about opening of Iron Church – To Longlands to see how they were getting on with the Pumps, they having been choked with sand. Snow, hail – frost. Slippery.

### **28 February**

By 9 o'clock train to Liverpool to see after Alfred. (Ainslie) Took wife with me – Stopped the night at Rockferry with the Rooke's – Saw Alfred and Freddy but found Alfred in a very unsatisfactory state. Fine day.

### **1 March**

To Chester in the morning to see Sarah Ross's children Edith and Walter. Wife with me. Lunched at Chester. Came back to Liverpool and had another interview with Alfred. Came home by the 3.50 from Liverpool and brought Alfred's Pawn tickets with me. Very nasty day, snow and rain and very cold.

### **27 March (in Glasgow)**

After breakfast settled Alfred Ainslie's affairs, got all his things out of pawn and paid for his lodgings &c – in afternoon went with Mr Wallace to see the various "shipbuilding yards" on the Clyde and afterwards went with him to his house at Lockwood near Gartcosh and stopped the night.

### **28 March**

Went into Glasgow by the 9 o'clock train, had an interview with Messrs Luttman and Colonel Chamberlain, respecting an iron and coal property in Virginia also a line of steamers to an

English Port. Gave them an introduction to Sir James Ramsden – afterwards drove with Mr Wallace and Mr McCock round by their works at Gartshore and got back to Lockwood to dinner – after dinner went to Gartshenie and went underground with McCock to see the “Steam Collier” at work – it works first rate making a cut of 2ft 8in at the rate of one foot per minute. Fine day but cold wind.

### **9 June**

Engaged getting Alfred and Frederick et uxor<sup>1</sup> ready for Australia – W.G.A arrived at eight.

### **10 June**

Saw Frederick et uxor and Alfred off to Australia on board the Ship Ranee<sup>2</sup> (Messrs Thos Marwood & Co) Came home by the train leaving Liverpool at 1.15

### **24 July**

saw Edward Twisaday about his mines at Rusland –

### **7 August**

To Furness Abbey in morning to meet Mr Nicholl – went through several matters with him – then drove up to Millwood and thence to Ulverstone – lunched at Hannays – drove out to Newland and inspected new purchase – attended meeting at Sun Inn about Furnaces for Ulverston – Mr Nicholl went to the Exhibition – had an interview with William Ainslie about an exchange of Royalty with Lord Derby – came home and wrote letters – dined at Furness Abbey – table de hote – old Gradwell was there “tight” .

### **11 August**

Left Seascale by 8.40 train – called in Whitehaven – engaged John Dunstan<sup>3</sup> as Captain for the Longlands Mines. Went on to Carlisle at 10.30 – met Mr Hannay in Carlisle and went on with him to Ornockenoch<sup>4</sup> – Bob joined us at Dumfries.

### **5 September**

To Manchester – met the American gentleman and got a commission from Brogden to inspect two mines for him near Cumberland Gap for £500 fee – home at night. Showery.

### **6 September**

In morning underground at Urswick to inspect Mr Butler’s mine there - then to Longlands and inspected - met Brogden and his American friends at Furness Abbey to lunch at one o’clock and took them up to Rawlinson’s open works at Martin – left them at Lindal Station and drove back home - wrote some letters – and went to Seascale by 4.48 train.

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<sup>1</sup> Frederick Gale Hubert Ainslie and Alfred Montague Ainslie, half brothers of WGA and Alfred's wife Fanny.

<sup>2</sup> Iron clipper, 1264NRT built Liverpool 1864

<sup>3</sup> J K Dunstan worked for Wadham for the rest of his life and wrote a large number of mine reports.

<sup>4</sup> Robert Hannay's estate. The start of a week's shooting.

## **24 September**

Started for America. Spent the night with the Lockharts of Falkner Square, Liverpool.

## **25 September**

After breakfast went into Liverpool and bought a few things wanted for the voyage – then to Mr Lockhart's office and met his brother and some other gentlemen, who gave me some introductions in the States – also the prospectus of a Coal and Iron property in Birmingham in Alabama, about 120 miles south of Chattanooga – Went on board the “Adriatic<sup>5</sup>” at 12 o'clock and about 12.30 set sail for the United States with a calm sea and fair wind.

## **26 September**

Got up about 7.30 and found we were at anchor in Queenstown Bay – a most lovely place, completely land-locked, and a very secure Harbour. Wrote lot of letters to send off with the “Tender” – Wife made a sketch of the Harbour – a lot of shore boats came alongside with fruit and a vendor of Irish Bog Oak ornaments. I bought some Pears and two little ornaments from the Irish Bog Oak merchant.

Sailed from Queenstown at 12 o'clock with a fair wind, but when we got outside found it a rather a “cobbly” sea which upset me and Lizzie<sup>6</sup> also, and made me very independent of any food.

## **27 September**

I got up about 7.30 but Lizzie was too unwell and didn't get up all day. I did not want any breakfast or luncheon but got better by dinnertime, and enjoyed my dinner – Fine weather but still rather “cobbly”.

## **29 September**

Fine day – ship going well – but Lizzie still sick.

## **1 October**

Still fine weather – Got through the Banks of Newfoundland without any fog – saw several vessels but none of them within speaking distance – went over the Emigrants quarters with Mr Gartner a gentleman with whom I have picked up acquaintance and who was formerly connected with this line of vessels – had much talk with him about a line of Steamers between New York and Barrow and various other arrangements in connection therewith – Lizzie still very poorly and unable to take food.

## **2 October**

Got up at 7.30 – fine breeze but sea calm – opened the Ports in the Stateroom – went for breakfast and sent Lizzie's into her Stateroom – after breakfast went through the Engine room with Mr Gartner and right down the Tunnel of the Screw-shaft to the stern of the ship – got

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<sup>5</sup> Iron screw barque, 3888GRT, owned by Ocean Steam Navigation Co

<sup>6</sup> Mary Elizabeth Wadham, sister of W G Ainslie

Lizzie dressed and took her on deck at 11 o'clock – came down to write – Lizzie got on very well during the day and remained on deck until 9.0 pm.

#### **4 October**

Both got up at 7 o'clock and went on deck – sea very calm – “Pilot” had come on board during the night – met a great lot of “shipping” – got inside “Sandy Hook” at 1.30 and after inspection of officer of Health and Custom Ho ditto &c &c – landed at 6.30. Mr Wylie came down to meet us and accompanied us up to our quarters at St James' Hotel – I took a stroll out in the evening after dinner with Mr Gartner and Mr Haigh.

#### **6 October**

After breakfast walked half way down to John Street - the remainder in a “stage” – called on Mr Cosgreve and got Jerry Smith to go with me to Butcher's office in Douane Street – also to the bank to get my money and to Mr Wylie – called on Mr Evans and met Mr Braniff there and paid him the \$50 I borrowed from him on board ship – took Jerry with me to lunch at Shuttleworths and afterwards back to the Hotel to see the Wife – dined and stopped at home in the evening .

#### **7 October**

Immediately after breakfast went up to Manhattan Market - found it a very handsome building of Glass and Iron but nothing doing there – had a talk with Mr Gartner and got him to mark out my route to Albany – Niagara – Chicago and St Louis. Then took Wife down town, and handed her over to Jerry Smith to amuse whilst I wrote my letters in Cosgreve's office – left £145 – Bank of England – and two blank cheques in Cosgreve's care – Cosgreve gave us our lunch at Sutherlands - we then came back to the Hotel and found Miss Wylie and her brother waiting to take us for a drive in the Park and we went with them – home to dinner and we packed up our traps.

#### **8 October**

Left New York by the 10 o'clock train via the New York Central Railway - up the Hudson to Albany, then by the valley of the Mowhawk &c via Utica and Syracuse to Rochester – the scenery of the Hudson is magnificent and much resembles the Lake District of Lancashire and Westmorland – after you leave the Hudson it is flat, but the Woods are splendid in their autumnal tints – Had my pocket picked of my memorandum book but fortunately nothing was in it of value – Met with Dr Anderson. President of the Rochester University, who was very kind and gave us an introduction to the proprietor of the Osbourne House, Rochester.

#### **10 October**

Left Rochester by the 10.35 train and came on to Niagara; had dinner and took a carriage and visited the various points of interest, for which we had to pay at every step – went under the Falls –also got our Photos taken twice over – home to supper – at 10.30pm went out with one Mr Davey, the keeper of an Indian store, to Goat Island and saw the Falls by moonlight – saw the Lunar Rainbow splendidly- got home about 11.45.

### **12 October Sunday**

Came down to breakfast at about ½ past 8, met Mr Potter in the hall – breakfasted and took a carriage and drove out to a village about 8 miles distant where the Indians hold a service – heard the service performed by an Indian – he read out a portion of the Bible (St John's Gospel) in English and preached in Indian – he then read out a Psalm or Hymn in English which they all sang in English – in the middle of the service Mrs Haig and her friend walked in, and we found that they had been staying at the International Hotel, but were so badly fed, that they had come over to the Cataract House – after the service we walked about a mile and then drove home to dinner. After dinner we walked across the Suspension Bridge and took a carriage and drove over to the “Burning Springs” a most extraordinary phenomenon - the water is heavily charged with Sulphur and the Gas from it burns when mixed with the Atmosphere – drove back as far as the Suspension Bridge and walked home – had supper and remained in the House for the night.

### **13 October**

Left Niagara by the 9.05 train – Mr Potter came as far as Buffalo and brought us with him in the Directors carriage of the Grand Trunk Railway of Canada – a very fine affair having two sitting rooms and three good bedrooms in it – Stopped at Buffalo and called on the Eustaphieves – Miss E went with us for a drive around the City – it is remarkable for the goodness of the “residence houses” and the large quantity of land round them. At 1 o'clock left Buffalo and travelled right through to Chicago where we arrived at 8 o'clock Tuesday morning – the country is very uninteresting all the way from Buffalo to Chicago – flat and uncultivated and neglected looking.

### **14 October**

Arrived at Chicago at 8 o'clock in the morning. Lizzie was knocked up by the night travelling and had to lie down for the morning – I called on Mr Meeker of the “Joliet Ironworks” with an introduction from Mr Potter and he arranged for me to go to see the works tomorrow – spent the rest of the morning in walking about the town and went over one of the great Corn Stores and saw their method of working elevators &c – came home to dinner – after dinner took a carriage and drove out to the Park, which is very prettily situated on the banks of Lake Michigan – Lizzie, who by this time had recovered, – went with me – we also drove round the town and bought some Photographs – and drove through the Tunnel under the River – home to tea, and afterwards spent the evening at the “Industrial Exposition” – the buildings in Chicago are very handsome and have been built with marvellous rapidity what two years ago was a mass of ruins owing to the great fire is now covered with fine blocks of handsome shops, the architecture of which is very good. The finest building in the town is the Grand Pacific Hotel in which we stayed – the Dining Hall and the Entrance Hall being white marble. Also the staircase. The table is very well kept and you may, if you like, eat from 6 o'clock in the morning till 12 o'clock at night!!

### **15 October**

By 9.30am on the Chicago and Alton RR to Joliet to see the works there – Mr Meeker was unable to go with us but sent Mr Torrance, the manager, with us – it is about 32 miles from

Chicago – we spent the day and dined there and filled up our time by taking a drive in the Buggy – the works are very scattered – there is a Bessemer House with two Converters in it – A Steel Rail Mill, which was at work and working well – they put the "Blooms" through Rolls, instead of "hammering" them as we do at Barrow but with this exception, I saw nothing worth taking note of. There is also an "Iron-rail Mill" and a Merchant Mill but neither was at work and did not appear to have been worked for some time past. There are two new Blast Furnaces with the Engine, Lifts &c nearly ready for work but no one was at work at them in fact the place has on a whole a deserted appearance – there seems to be no staff and very little organisation. The manager Torrance seems to be a shrewd clever fellow with a monstrous good opinion of himself but appears to be in some way confused in carrying out his ideas. We got home to Chicago at ½ past 8 – had supper and wrote some letters to England then went to bed.

### **16 October**

Got up at 6 o'clock, had breakfast and started by the 8.25 train on the Illinois Central RR for St Louis – got as far as "Kankale" about 53 miles all right when we were stopped by a train coming from St Louis having run off the line and knocked down a bridge – we can't go forward and they won't take us back so here we are like rats in a trap - spent the day in investigating the Village which was originally a French settlement, the population at the present time being principally French and Germans it has no great attraction – Finally we got a start at about 5.30 and got across the "ditch" – into which the train had tumbled – there was the Engine on its side and the Cars all run into each other in a perfect network – we sat on the Prairie until 8 pm when we got a start, and travelled all night in the common Cars arriving at East St Louis about 7.30 where we were bundled into a great Buss with Four Horses - and oh, - such company!!! And taken across the river to St Louis arriving about 8.30 at the Southern Hotel without any baggage it all having been left on the Prairie for a night's airing.

### **17 October**

Arrived at St Louis about 8.30. Lizzie had a headache and had to lie down until 2 o'clock, when she got up and had some dinner – After dinner we took a carriage and drove up to call on the Montgomerys, our fellow passengers on the Adriatic, found them very friendly and wanted us to spend the evening with them - we were, however, tired and thought it best to return to the Hotel – Lizzie borrowed a night-dress - but she didn't want it for after several unsuccessful attempts we, at last, recovered one baggage at 10.0 p.m.

### **18 October**

Waiting for Rosenbey, a horrid nuisance in this dull place – called on the Montgomerys and returned the "sac de nuit" – took a walk about the city in the morning – In the afternoon, took the Cars and went down to the Vulcan Ironworks at Carondelet, they are very fine works and are turning out 100 ton of Iron Rail in 12 hours – the "gaffer" or "boss" went around with us, he is a very intelligent man – they are building a new Furnace which they expect to yield 50 tons per day. These furnaces are situated on the Mississippi and get their Ore from the Iron Mountain and other places in Missouri and their Coal partly from Big Muddy and partly from Pennsylvania - the latter is brought by river down the Ohio and is much better than the Big Muddy – Went to the theatre at night, very slow.

### **21 October**

Rosenbey turned up but no money – he didn't seem to know what to do – he produced a telegram from England purporting to say that “Turner was so satisfied of the goodness of Hunter's work that I should if necessary make the inspection of La Grange free” – to this I dissented and he telegraphed to England – we did not, however, come to any arrangement. Went to the theatre at night.

### **22 October**

Walked out after breakfast with Wife to see the new Bridge being built over the Mississippi – then went over to Mr Brawnes office and had a long conversation with him and General Hunter, the American representatives of the La Grange property. They proposed to me to inspect several properties for them in the Spring and we came to an arrangement whereby on condition of our being paid \$25,000 dollars (= £5,000) I would inspect La Grange and Turner should come out in the Spring for a month to inspect the other properties. I told them it needs be done through Bright & Co and we should expect to be paid in advance. Back to the Hotel and wrote letters. Started at 7.0 p.m. in an equally omnibus and quite as disgusting company as we arrived with by the night train for La Grange - on the St Louis and South Eastern Railway – got a Drawing room compartment in a Pullman Car, which was pleasant enough – Gen<sup>l</sup> Hunter and Rosenbey went with us.

### **23 October**

At 11.30a.m. having breakfasted on the road arrived at a place called Guthrie from whence we were to have gone on to La Grange by a special train – but the only Engine they had had broken down and we were consequently obliged to remain for the day.

Guthrie is a miserable little station in the midst of the forest – there is nothing round it but for a few dilapidated buildings and as it rained in torrents all day we were unable to move outside the house - so we amused ourselves as best we could playing cards &c. We had to sit in our bedroom, a sitting room being an unknown luxury – the windows did not open but you took them out when you wanted to admit any air – however we had plenty to eat, which was lucky and we did very well.

### **24 October**

Started from Guthrie at 3.15a.m. and went to Dauville by rail, arriving there at 6.15 where we were met by a Buggy from the La Grange Ironworks and were driven through the Forest five miles. There was nothing to call a “road” only a track – it was a frosty morning and our driver having felt cold had warmed himself up to such an extent that he drove regardless of holes, stumps of trees or anything else, and finally “broke the springs” going down into a “creek”, – we got patched up and arrived safely at La Grange about 8 o'clock – Spent the day riding over the estate and inspecting the iron deposits &c &c – I had a very good Horse what they call a “racker” i.e. a horse that runs - I had bad tooth ache and went to bed at 8 o'clock – we were hospitably entertained by the Manager of the works and his wife, Mr and Mrs Garnett. The house is an old fashioned log hut but was very comfortable.

## **25 October**

Breakfasted at 6 o'clock and again set off on horseback – and went to Clark Village thence over a large extent of finest land wherein were splendid trees of Oak, Chestnut &c – saw also numerous outbreaks of Ore - and limestone – on our way back to La Grange, called at a “Barbecue” or Niggers merry-making - where they roasted Pigs and Sheep - over a wooden fire, made by digging a trench in the ground and putting wood in it to burn – they then place sticks across the trench and on this they lay the Pig &c &c. To La Grange to dinner – and after dinner drove in a Mule waggon down to the River landing on the Tennessee river and by steamer up to Deauville, at Dauville took the train to Guthrie – Hunter and Rosenbey accompanied us this far – we then parted – and Lizzie and I went on by train to Nashville where we arrived at 3 o'clock in the morning, very tired and nothing to be got to eat or drink.

## **26 October Sunday**

Spent the day at Nashville – Lizzie had a bad headache in the morning but improved in afternoon and altho' it was raining we took a carriage and drove around to see the chief places in the town - it is apparently a nice town - but we were under a great disadvantage owing to the rain.

Took the train at 8 o'clock at night for Chattanooga, got a drawing room apartment in a Pullman car so we were snug enough.

## **27 October**

Arrived in Chattanooga at 5 a.m. but did not turn out from our Car until 7 when we got up and went to the Reade house – found Mr Wylie waiting for us - got breakfast, a miserable repast the worst we have seen yet – sent for Meredith to arrange about going to inspect the Lone Mountain – the roads, owing to yesterday's rain, were impassable so we had to give up the journey for the day, there being no steamer – we arranged to start next morning by the Steamer at 9 o'clock and take a Waggon and pair of horses with us – we then ordered some saddle horses and all started i.e. Lizzie, Wylie, Meredith & self for Lookout Mountain, and spent a very pleasant day, the foliage was most magnificent and the views from the top of the mountain splendid - got a very nice dinner at a clean, comfortable hotel at the top of the mountain – rode quietly down again and slept at the Reade house.

## **28 October**

Left Reade house at 8 o'clock and went with Mr Chamberlain to see the Rolling Mills – there is a very fine shed 100 yds long and a good plant but nothing was doing owing to the depression in trade – They had adopted the Danks's<sup>7</sup> puddling furnaces here, but they were found not to answer and were being replaced by ordinary “hand puddling” machines. At 9 o'clock went on board the steamer – J.T.Wilder on route for Bell's landing – Meredith – Terry – and Col<sup>l</sup> Hopkins as Pilot for Lone Mountain – the steamer is a barge with a steam engine set on her and a high deck above the engines, a most extraordinary machine altogether and a notice is put up that “in case of the steamer sinking or blowing up, life belts will be found in the State rooms” – We had a very slow passage taking until 6.30pm to do the 40 miles – the Tennessee

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<sup>7</sup> Rotary furnace for conversion of pig iron to wrought iron in use in the US from 1868

river was crowded with wild duck and wild geese all the way – Col<sup>l</sup> Hopkins took his fiddle and the Capn and some of the passengers danced – and when we got to Bell’s Landing the ship was anchored for the night and we slept on board, the Capn giving me his cabin – He and Harris – (Wilder’s mining Capn) and some more went ashore and had a spree and we saw no more of them.

### **29 October**

Turned out at 5 o’clock, having had a listless night, owing to another steamer coming alongside, and making a most awful screech all night - not to mention the Captain coming home at 3 o’clock half tight and wanting to get into his cabin, but I was too many for him, having locked it - Got breakfast at 6 o’clock and drove up to Smiths cross-roads where we got Horses and rode about all day inspecting the district – until 6.30 at night and never got a mouthful to eat or drink – We finally brought up for the night at a log-hut, where they killed a couple of “Roosters”, and fed us as best they could - and we turned in “double” – I slept in the same bed as Terry and Meredith with Hopkins all in one room.

### **30 October**

Started at 6.30 am and drove down to Chattanooga in Hopkins's waggon with his pair of thoro'-bred Kentucky horses – arrived there at 1.0 pm having performed the journey without stopping, the road most uninteresting nearly level the whole way, and with nothing to vary its monotony but an occasional farm house – got dinner at the Reade House – got rid of the time as best we could until 10.0 pm when we started accompanied by Mr Wyle for Jonesboro en route for Embreeville.

### **31 October**

Arrived at Jonesboro at 9.40am, breakfasted at the Inn at the Depot kept by one Capt Severe – found Maynard and Mr Wm Goodrich waiting for us after breakfast – Mr Wm Goodrich drove us out to Embreeville in his Wagon where we met with a most hospitable reception from his Father & Mother & his married Brother & his Wife –had some refreshments and took a walk out over the property which is beautifully situated on the banks of the Nolichucher (Indian for swift flowing) river – came home to dinner and got a comfortable roost – a contract from Chattanooga.

### **1 November**

Got in the saddle by 9.0am and spent the day until 5.30pm in riding over the property, we visited all the points of interest and found a practically inexhaustible deposit of iron ore – also fine beds of Limestone and magnificent forest, the whole place was delightful – Lizzie rode with us in the morning on Mr James Goodrich’s pony, a very nice beast. We lunched at a beautiful spot 4,000 feet above the sea called Mount Pisgah, the foliage of the young trees, surrounding which was splendid. The sun shone like midsummer – On the way home I saw some Coons or Racoons skins hung out to dry at a log hut and bought them for a quarter of a dollar each to bring home for a rug - Lizzie and Mr Wylie rode home to Embreeville after lunch.

### **3 November**

Started off at 8 o'clock on horseback to explore the proposed line of railway from Embreeville to Jonesboro – we crossed the Nolichuckee about a mile south of Embreeville, the place where the bridge is intended to cross it and on the opposite bank we found General Jackson (an old rebel general) waiting to pilot us over the course of the line – we found him a most intelligent and altogether superior man well acquainted with the various properties, the price of materials, cost of work and everything we wanted to know, he is a very fine man 63 and 64 years of age, as active and upright as a young man of 30 – He also gave us valuable information as to the value of various Coal properties both on Tennessee and Virginia.

We tested the altitudes by barometer and found there was no practical difficulty in making the line. We dined at Jonesboro at Capt Severe's hotel and rode quietly home by which time I was pretty tired.

### **4 November**

Busy in the morning packing up and writing letters to Brogden – dined at 12 o'clock and after dinner W Goodrich drove Maynard and me to Jonesboro en route for Cumberland Mountain to inspect Mr Davies' Coal field – Lizzie accompanied us to Jonesboro and returned to Embreeville with W Goodrich to remain there whilst we went to Cumberland Mountain. Slept at Jonesboro, found old Severe very attentive.

### **5 November**

Turned out at 6.0 a.m and breakfasted and left by the 6.30 a.m for Monistown – In the Cars we found Mr Harden, Mr Davis's engineer and our travelling companion across the Atlantic, Major Thornboro, also young Davis. Had a chat with Thornboro who was very glad to meet me again. Got as far as Monistown by 9.30 a.m. and had to wait there till 2.30 p.m. before we could get Horses – finally we got four Horses and a "stage" and started on our journey to Cumberland Mountain. We only got nine miles on our way, viz to Mineral Hill, by which time it was dark, and our driver returned to change one of the Horses. Mineral Hill is a beastly place, but we made the best we could of it by getting some supper and playing cards. Finally we "turned in" – the room that Maynard and I occupied had been made the headquarters of a "skunk" and he did stink so that we could hardly remain in the room, but after a while I fell asleep and made the best of it.

### **6 November**

Got a start at 7.30 a.m. - When we were about a quarter of a mile on our road a big Yankee flung himself onto the stage and said: "I guess I'll ride with you to the foot of the Hill" – this I thought rather queer but was told it was the manners and the customs of the natives so said no more – the roads are awful, mere tracks and most precipitous, - we got on as well as we could over Clinch Mountain – at the foot of which two of our Horses lost their shoes and he had to have them shod at "Tazewell", –here we got our dinner – got started again at 3.0 p.m. and at 4.0 p.m. had to take one of the horses out because he was ill and lead him – we hitched up a Unicorn team and Maynard drove and so we got as far as "Powell's River" – when it became dark and we were in danger of being obliged to "camp out" for the night, but fortunately the

Post-carrier came along and we "persuaded" him to stand by us and pilot us as far as Dr Patterson's, " an old Southerner" – and here we spent the night – about three miles from the Gap.

### **7 November**

Made a start at 8.0 a.m. - broke a spring at the foot of the Gap - and had to go to the blacksmith's to splice us up – spent the time we were waiting in examining an old Charcoal Furnace which was being filled up to start again – reached the summit at 10.30 where our guide had not arrived - waited till 11 o'clock and then proceeded as we thought on our road in Kentucky - at the Gap - the three states of Kentucky, Virginia and Tennessee meet – When we had got about 4 miles on our way, David Miller rode up to us and told us we were wrong – so Maynard and I took out the leaders and saddled them, and rode back with David Miller into the Forest – arranging with Harden and young Davis that they should go on to Pineville and meet us next day – Maynard and I inspected several seams of coal, all good, and may be valuable some day, but at present are too remote - Finally we put up in a Log-hut for the night - Maynard, Miller, self, Proprietor, and his Wife and family, all in one room which was pretty thick work.

### **8 November**

Maynard and I got into the saddle at 6.30a.m. and rode off to our rendezvous – some ten miles distant accompanied by David Miller – on arrival our friends had not got up to the place, so we went forward to meet them and found them about a mile back – "Held a council of war" in which we decided (Harden fully agreeing with us) that the property was not sufficiently near being in the market to warrant our recommending it to Mr Brogden, so agreed to start on our homeward voyage – We lunched on my Box of Sardines and flask of Brandy which I had in my Saddlebag and some Damper we managed to beg at a "log hut" – the day was most delightful and the ride through the Forest splendid – beautiful Pine trees and hard wood with varied foliage, We got back as far as old Pattersons, got supper off some Hog & hominy and went to bed.

### **9 November Sunday**

Started at 7.45 a.m. and got to Tazewell to dinner and on to Thornley at the foot of Clinch Mountain where we put up at Widow Easeley's for the night – we found our quarters here most comfortable after what we had experienced in the last four nights. We had a nice supper and nice clean beds and only one in a bed which was quite a luxury.

### **10 November**

Started at 7.30am made for Morristown at 12.0 noon and Jonesboro at 5.40 p.m. where we put up for the night.

### **11 November**

Drove out to Embreeville where made some further investigations as to water power – got dinner and took leave of our good friends the Goodrich's – and were driven in to Jonesboro by Wm Goodrich in time for the evening train which we started for Washington.

**12 November**

Travelled all day, crossed the Potomac in the dark and arrived at Washington at about 7.0 p.m.

**13 November**

Explored Washington – went to the Patent Office – the Capitol – also the White House where we had an interview with President Grant.

**14 November**

Visited the Agricultural Institution, a most perfect place for information on the Agriculture of the States with an exhibition of all kinds of produce also the Smithsonian Institution and the Naval Arsenal.

Left by the 1.30 train for Baltimore where we took a drive through the City, the Park &c &c – and went on to Philadelphia at night.

**22 November**

Sailed for England at 7.0 a.m. in the SS Baltic<sup>8</sup> – Capn Kennedy

**25 November**

Storm increasing, carried away one blade of the screw. Wife very ill.

**26 November**

Very heavy storm – Wife very ill, alarmingly so at night.

**28 November**

Got Wife on deck just in time to see the culmination of the storm in a “White squall” – Wife improving - had some Chicken broth, first thing she had taken since Sunday.

**1 December**

Reached Queenstown in fair weather – ran up channel in a beautiful moonlight evening – Wife much better and remained on deck quite late.

**2 December**

Arrived in Liverpool at 8.0 a.m. – spent the day with the Lockharts. Young Edward Braddyll dined.

**9 - 11 December**

To Ulverstone – attended meeting of the North Lonsdale Ironworks Co and was appointed a Director – the girls came down from Grizedale and we went to a Ball at Barrow at night – in aid of the Buccleuch Amateur Rowing Club.

**18 December**

In London – attended a meeting of the Lamplugh Hematite Iron Ore Company – called on Mr Jackson, Mr Braddyll's sol<sup>r</sup> – as to his property at Nook near Egremont – dined with “ye Doctor” and went to hear "Mark Twain" lecture which was dull affair.

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<sup>8</sup> Iron Screw Barque, 2622GRT owned by Oceanic Steam Navigation Co

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