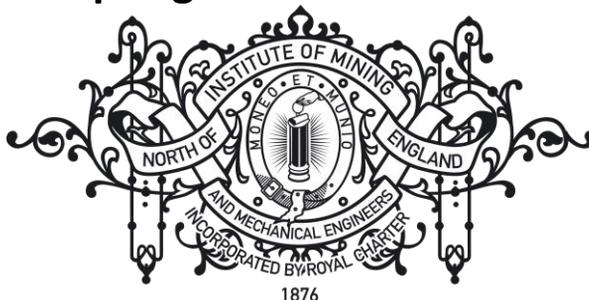




### Spring Newsletter 2020



In these difficult times, when social contact is zero, our Institute is suffering the loss of our Lecture programme, as well as the meeting up in Neville Hall for social events. This also caused the progress on Neville Hall refurbishment to cease for a short while, but work is now continuing, albeit on a limited scale, and the schedule has shifted by some months. This suspension of Lectures has prompted NEIMME to look at how lectures may be conducted online, using webinars, and significant progress is being made to this end. We will, of course, still have live lectures when the spectre of COVID-19 has receded into history. You will be informed of how these web lectures can be accessed when we set up the software. The articles printed above have been received from our members, and are not necessarily certified or endorsed by NEIMME, and are published for interest only.

*Steve Martin MNEIMME*

### Statement from Sirius Minerals on Woodsmith Polyhalite Mine – May 2020 Matt Parsons, General Manager, External Affairs, Anglo American

In November 2019, Sirius Minerals announced that it was seeking to secure the future of the Woodsmith Project – the development of a polyhalite mine and associated transport and processing infrastructure - after being unable to deliver its Stage 2 financing plan. Sirius undertook an extensive global search for other options and in January Anglo American made an offer to buy Sirius Minerals outright. The acquisition was approved by shareholders and completed on 17th of March. Anglo American is headquartered in London and as one of the world's major mining companies has the financial and technical capability to make sure that the Woodsmith Project gets developed. Whilst there will not be major changes to the team on the ground, the Project will benefit from expertise of the wider Anglo American Group. Anglo American has stated that the Woodsmith Project is a natural fit for its portfolio as it supports the transition towards metals and minerals that will meet the world's evolving needs – including infrastructure and food – to support a fast-growing global population. Construction update and response to



*Woodsmith Mine*

COVID-19. The plan is to continue construction broadly in line with the schedule that was announced by Sirius in November last year. The focus of the next two years is shaft sinking and continuing with the first drive of the mineral transport system (MTS) tunnel. The current situation with Covid-19 will impact some short-term milestones but the overall schedule remains unchanged. In light of the Covid-19 crisis, the government's guidance is that construction should continue if it is safe to do so.





This has led to a reassessment of the way construction work at the Project is being undertaken, so as to minimise the risk of the spread of Covid-19 to the workforce and the community. Across the Project, anyone who can or should work from home is doing so. As a result, the office in Scarborough is currently closed. At Woodsmith Mine, a site operating procedure has been developed, to ensure that the risks of the virus are mitigated and managed. Measures include workers travelling to site individually, temperature monitoring, increased site cleaning and handwashing facilities, social distancing, and staggered shifts and breaks. The focus is on construction activity that supports the continuity of the Project and enables the resumption of full construction as safely and quickly as possible when the current situation has improved. The shafts are currently being prepared for the main shaft sinking. The excavation and lining of the service shaft has been completed to a depth of 120m and the Shaft Boring Roadheader (SBR) is currently being assembled in preparation for the main sink later in the year. At the production shaft, the foreshaft has been completed to a depth of 45m. Excavation will start soon on the excavating the inner shaft to 120m. From there, another SBR will take over to complete shaft sinking to 1,600m. The access shaft for the tunnel will be sunk to a depth of 360m. A vertical shaft sinking machine (VSM) completed excavation to 115m. This was the first time that a VSM had been used in the UK and the greatest depth a VSM had achieved anywhere in the world. Over the last few months a temporary winding tower has been erected to facilitate the main shaft sinking shaft, which will be done using a conventional drill and blast method starting later in the year. At Wilton International, the northern end of the Project, progress has been excellent over the last few months despite the issues with financing. Having paused, in order to develop safe working procedures in response to Covid-19, tunnelling has resumed and the tunnel boring machine has now reached approximately 5.5km from Wilton on its way to Lockwood Beck. In the community The Project has already contributed £580m to the regional economy, employing 1,200 people and creating 740 indirect jobs since construction started in 2017. Anglo American work closely with communities around the world and have made a firm commitment to deliver social and economic benefits to the area. An example of this is Anglo American's contribution of £4 million to the Sirius Minerals Foundation.

The first £1 million was paid on completion of the takeover and a further £3 million will be paid over the next three years. The Foundation has supported over 150 projects since 2017 and this additional funding will help it to do even more. The Project's engineering apprenticeship programme is also set to continue. The fourteen apprentices who started in September 2019 will carry on their training for long-term roles with the Project and a further 36 engineering apprenticeships will be created over the next three or four years. Working with schools to raise the skills and aspirations of young people in the area will also remain a key part of the company's work in the community. Over the last seven years this has involved engaging more than 30,000 young people from the area, with a focus on promoting STEM careers and targeting young people from disadvantaged backgrounds.

## The Lit & Phil in Lockdown

**The Lit & Phil have been our neighbours and have hosted our meetings and lectures whilst Neville Hall has been refurbished,so since the lockdown,it was understood that they would be suffering with having reduced income and of course,footfall, during this period.There is concern that a prestigious established society,of which some of our members are a part of, would see difficult times,so we requested an update of their situation. The following report comes from Marianne Abbott, Marketing Manager, Lit & Phil.**

If necessity is the mother of invention then crisis is definitely the father. When Newcastle's venerable Lit & Phil, which hadn't closed its doors to the public in 227 years was forced to do exactly that on 20 March this year, there could be no option but to rise to the challenge. After all, as historically one of the world's most important cornerstones for science, literature and enlightenment, it has a strong track record in invention.

As the immediate need for protective social distancing swept the UK and wider world this 'hidden gem' on Westgate Road, the largest independent library outside London, normally buzzing with concerts, social activity, literary events, and bibliophiles hard at work,





was silenced. The challenge was set – how could we continue to inspire minds, stimulate imaginations and confer a wealth of knowledge to young and old alike with a skeleton staff team working from home? And so the 'virtual Lit & Phil' was born - our attempt to create a 'remote' service for our Members as best we can and offer a little entertainment, distraction and light relief into the bargain. This so far has included a new Blog on our website which features articles long and short, factual and fictional, engaging and interactive. Within it we explore our famed Society's founding fathers and its historic 'movers and shakers', pioneering scientists and radical inventors. We feature previously unpublished works from some of the region's unsung literary stars and champion submissions from our associate writers, artists, poets and professors. Here visitors may also find competitions, puzzles, inspirational reading lists and thought-provoking topical pieces.

We remain in frequent communication with our loyal Members through our e-newsletters and across social media channels (our 'Gems from the Collection' posts on Facebook are always very popular!) and we have also widened our digital services so all Members can now access the Naxos Music Library and Spoken Word Library and so download thousands of classical tracks and audiobooks for free.

Although this time is challenging for us (as it is for so many organisations!) it has also inspired us to consider new and dynamic ways of serving and supporting our Members and visitors, many of which activities we hope to continue after the pandemic comes to an end. For over 200 years the Lit & Phil has served the community of Newcastle and the North East and we will endeavour to do that always – through the rough and the smooth!

To find out more about becoming a Member, or to explore our Blog or sign up to our e-newsletters, please visit: [www.litandphil.org.uk](http://www.litandphil.org.uk)

If you are already a Member and want to know more about our increased digital services, please email: [library@litandphil.org.uk](mailto:library@litandphil.org.uk)



*Schematic drawing of proposed Horizontal Directional Drilled (HDD) river crossing.*

**An extract from "The Geological Evolution of Saudi Arabia : a Journey through Space and Time" compiled and written by David Grainger, Published by the Saudi Geological Survey, 2007.**

David Grainger has been a member of NEIMME and IOM3 for many years, and has worked as a Field Geologist, Lecturer and Geoscience editor. As a field geologist he worked on regional mapping and mineral exploration projects for government geological surveys and mining consultancy companies in Tanzania, Canada, Antarctica, Papua New Guinea, Iran and Libya. He was a lecturer at Sunderland Polytechnic from 1976 to 1978. A career change then took him into geological editing with the Saudi Arabian Deputy Ministry for Mineral Resources until 1999, when he joined the Bahrain based petroleum industry journal "GeoArabia" as Geoscience Editor, and retired in 2003. David has a BSc in Geology from Nottingham University, and a MSc in Mineral Exploration from Imperial College, London, and is a fellow of the Geological Society of London.





## Some Early Muslim Scientists

Within a few years of the death of the Prophet Mohammed in 632 CE, Persia, Asia Minor, Egypt, the whole of North Africa, and Spain had submitted to Islam and this vast area, together with the heartland of Arabia, constituted the Islamic empire. There followed a thirst for knowledge and the rulers of the new empire encouraged learning of all kinds. Ideas were assimilated from Greek, Persian, Hindu and Chinese sources in a cultural melting pot. Greek manuscripts were collected and studied in large numbers, so preserving and expanding the Greco-Roman inheritance of philosophy and the natural sciences. The old learning was infused with a new vigour. Baghdad became the intellectual centre of the world imbued with a new scientific spirit of enquiry and experimentation, and Damascus, Cairo, and the Arab cities of Andalusia in Spain followed suit. Medicine, alchemy/chemistry, mathematics, and astrology/astronomy were the main scientific disciplines and several of these had a bearing on the development of geology and metallurgy.

Chemistry as a science was the invention of the Muslims and it was they who were pre-eminent in the subject until the 17<sup>th</sup> Century CE. Chemistry grew out of alchemy and alchemists were also metallurgists. Jabir ibn Hayyan (died 803 CE) was the most famous Arab alchemist and is known as the Father of Modern Chemistry. He developed a theory for the geologic formation of certain metals based on the proportions of the contained sulphur and mercury. Because of the alchemists' preoccupation with attempts to transmute base metals into gold, it is no wonder that Ibn Hayyan was involved in the refining of metals and in the preparation of steel.

Al-Masudi who was born in Baghdad in 896 CE and died in Cairo in 956 CE has been compared to the Romans Pliny and Herodotus as being the first Arab to combine history with the scientific study of geography on a large scale. He travelled widely through Persia, Central Asia, India, the Near East, Madagascar, and the China Sea. His celebrated encyclopaedic work called *The Meadows of Gold* contained his views on the earth and included history, cosmology, and geography. He noted the patterns of the monsoons and discussed the formation of clouds by evaporation of moisture.

He described an earthquake and that the environment influenced plant and animal life. His book contains rudimentary ideas on evolution.

By the end of the 10<sup>th</sup> century CE, Muslim astronomers had established that the earth is round and had measured its circumference, thus confirming the philosophical work of Aristotle in the 4<sup>th</sup> century BCE and the measurements of Eratosthenes of Alexandria (275-194 BCE).

Al-Biruni (973-1048 CE) was the first known writer to comment on the formation of sedimentary rocks and he recognised that geological processes required time for their fulfilment. He improved upon the contemporary methods that geologic processes required time for their fulfilment. He improved upon the contemporary methods of determining latitude and longitude, the heights of mountains, and the circumference of the earth, and he had ideas on the evolution of fossils. He made accurate determinations of the density of certain precious stones and metals and explained the phenomena of natural springs and artesian wells by using hydrostatic principles. It is probable that Leonardo da Vinci in the 16<sup>th</sup> century based his geologic concepts on those of Al-Biruni.

As noted in Chapter 2, the famous Muslim scientist Ibn Sina (born Bokhara 980 CE; died Hamadan, Persia in 1037 CE) had modern ideas on the formation of sedimentary rocks and recognised that rocks lower in a succession are older than those lying above. Ibn Sina, more commonly known in the West as Avicenna, was the author of *Kitab al-Shifa* (Book of the Remedy) written between 1021 and 1023 CE. The Latin rendering (*De Mineralibus*) was previously attributed to the Ancient Greek philosopher, Aristotle. It is a remarkable work, which has in many respects a distinctly modern outlook. In it, Ibn Sina equated the rise of mountains with earthquakes and related erosion to the action of wind and running water. Unusually for a scientist of his time, Ibn Sina did not believe in the transmutation of base metals into gold. He is known to have corresponded with Al-Biruni, and their writings were the major sources for the geologic ideas that developed in the West in the later part of the Middle Ages.





## A meteorite falls, and seems destined to keep in touch with the Institute.

From Russell Benson and Andrew Dobrzański

In March 1881 the "Aerolite" meteorite fell from the sky landing close to three platelayers who happened to be working on the railway near Middlesbrough. This lump of god-given rock, six inches across at most, was passed upwards through the rank, eventually reaching the Durham University College of Science at Newcastle. Professor Alexander Stewart Herschel also happened to be one of the country's leading specialists in matters meteoric, 1871-1886. Not only was this particular Herschel the grandson of Sir Frederick William, who identified Uranus, and son of Sir John Herschel, but at that time the said College of Science was located immediately adjacent to, and south of the Wood Memorial Library. The College of Science was in fact partly housed within the Institute buildings for a time as well. From Andrews' copy of "the University of Durham 1832 - 1932":

*"Adjoining the coal trade buildings and the College of Medicine was the Wood Memorial Hall, built in memory of Nicholas Wood. Her there were 3 cellars in the basement: one, a small dark room, became the private apartments of the Professor of Physics; a second, little bigger than a passage, was used for the physics laboratory, whilst the third made a lecture room for physics and chemistry. The Wood Memorial Hall housed the not very extensive library of the North of England Institute of Mining and Mechanical Engineers. This was thrown open for the students."*

It is fair to say the library has expanded since then! Professor Herschel was also an Honorary member of NEIMME, The funeral notice given by his friend and colleague at Newcastle G.A Labour is quoted to say:

*"He took frequent part in the discussion at the meeting of the North of England Institute of Mining Engineers(sic) of which he was an Honorary Member, and consequently helped in the scientific work of that Association. He was an active member of its Special Committees, and much labour was spent by him in making experiments for them on fans for Mine ventilation. He designed apparatus for registering earth tremors, and on many other subjects of applied science"*



*An accurately weighted replica of the Middlesbrough meteorite of 1881 amongst Fellows of the Geological Society of London (Cheese course for scale)*

*"He also carried out a long series of experiments on fluorescence, on the conductivity of heat for many rocks, on electrical storage, films for photography, on filaments for incandescent electric lamps, and in many other directions. He spent as much time as he could spare in the late Mr R.S. Newall's observatory at Gateshead where the best telescopes and other astronomical appliances were always placed at his disposal by friends"*

Alexander was such a benefactor to the University during his lifetime that his memory survives to this day in the name of the Herschel Building at Newcastle.

Returning to the meteorite, steam enthusiasts know that Aerolite is a Gateshead built locomotive in the National collection at York, rather than the name given to a mineral from the air. But the meteorite itself seems destined to keep returning to the Institute through time from one MNEIMME to another. At geological dinner in London just before Christmas 2019 and was lucky enough to be in the presence of a cast of the "Aerolite" meteorite. The original Chondrite specimen is in the Yorkshire museum but the replica was made to be the same weight as the original (about 1.5kg). The presenter of the meteorite claimed that when the railway workers recovered it, they described its temperature to be "like fresh milk". You will agree it makes a lovely table decoration and could perhaps inspire the dessert at our next annual dinner.





## The World of William Coulson

Les Turnbull is a graduate of the universities of Durham and Newcastle: at the former he graduated with an honours degree in modern history, while at the latter he trained as a teacher and was subsequently awarded a masters degree in education. Les has worked in several schools, both in the region and abroad, before serving as a lecturer in the Education Department of Newcastle University and then as a senior adviser with Gateshead L.E.A. Upon retirement he became a volunteer at the Mining Institute, a position he has held for almost twenty years. In 1966, the University of Newcastle published 'Coals from Newcastle' and in the following 50 odd years Les has written numerous books and papers, some for an international audience. His latest book, 'The Railway Revolution' was published by the Mining Institute in 2019 and has been widely acclaimed. This paper is dedicated to the memory of our late colleague Dr. Eric Wade who did much to promote the achievements of William Coulson both in Britain and Germany.

*'Mr Coulson was a self-made man. Beginning life as a trapper boy in one of the collieries of the north, his energy, industry and indomitable perseverance, allied to an inborn genius for surmounting the most stubborn obstacles of nature, elevated him to a high place amongst the mining engineers of the present day.'*

So began William Coulson's (Fig. 1) obituary in the Durham County Advertiser. Like Nelson at the Battle of Trafalgar, this veteran master sinker died at the scene of his greatest triumph. On Monday 12th June 1865, Coulson left his home in Durham City for a short drive to Hetton, the mining village where four decades earlier, he had conquered the magnesian limestone plateau to prove the rich coal seams below. Shortly after arriving at Hetton Hall for a business meeting with his friend, the eminent engineer Nicholas Wood, he had a stroke and died a few hours later. Thus ended the life of one of the unsung heroes of the industrial revolution in Europe.

The obituary continued with a synopsis of Coulson's career in the mining industry: within the last 40 years



Figure 1: Mr William Coulson

he 'had a hand in winning most of the collieries that had been sunk in the Durham Coalfield' and advised on many others. But his fame was not confined to the North East of England. Coulson and his team of Durham sinkers worked in Lancashire and Wales but, more importantly, they were responsible for opening up the deep reserves of the Ruhr Coalfield in Germany: as the journalist reported, 'the Hibernia and Banrock collieries in Prussia owe their celebrity to Mr. Coulson's practical knowledge and perseverance'. The team also worked for the Emperor of Austria and 'were employed by the Belgian Government in opening out several of the large collieries in different parts of that kingdom'. The Chester-le-Street correspondent of the Advertiser noted that the 'sudden death of Mr. Coulson called forth great regret from the workmen of Messrs Murray and Company' the famous engineering firm in the town; and added that 'very many – if not all of the engines required in his important operations on the Continent – have been supplied by this engine works'. But steam engines were not the only export from County Durham. Rumour has it that Coulson's team also took a football and introduced the beautiful game to Europe.<sup>[1]</sup>

The local parish records and the later national census returns add more information to our knowledge of the Coulson family. His father, also called William, was a pitman at Eighton Banks Colliery, part of the empire of the Grand Allies – the largest mining consortium in the world at this time.





Figure 2: Ravensworth Castle

On 24th April 1790, he was married to Barbara Mallaburn at St. Andrew's Church Lamesley which is now overlooked by the Angel of the North. In April 1791, the first of their ten children was baptised at St. Andrews and named William Coulson after his father as was the custom at the time – much to the annoyance of later historians.<sup>[2]</sup> This church served the Ravensworth estate where his grandfather was a blacksmith (Fig. 2). The estate belonged to the Liddell family, the principal members of the Grand Allies, who replaced their medieval castle with the magnificent house, above, built by John Nash the architect of Buckingham Palace in 1808 - all paid for from the wealth created by the coal trade. It was here that Alice Liddell, the little girl who ventured through wonderland, spent her childhood.

At the turn of the nineteenth century, the young William Coulson was working as a trapper boy in a mine south of the Tyne where he would spend twelve hours underground opening and closing a door to enable the ventilation system to function properly. From this humble but important beginning, he would have graduated to become a putter and then a hewer, the pride of the workforce. It is possible that he received some education at Craggies school in Crookcreek, which was part funded by the Liddells, where he may have first met Nicholas Wood. He was certainly a hewer at Walker Colliery, one of the great mines of the Tyne Basin, over 100 fathoms deep, which had been won in 1762. The mine was closed in 1811 because of problems with firedamp – explosive methane gas.

It is likely that young William moved to one of the neighbouring collieries – Heaton Main or St. Anthony's – both managed by George Johnson<sup>[3]</sup>, one of the leading viewers of the day. This was the start of a long and valuable friendship for one seeking advancement in the mining industry. Tradition has it that after an eight hour shift as a hewer, Coulson worked as a trimmer south of the river which is an indication of both his formidable constitution and his ambition.<sup>[2]</sup> He married Anne Dobson at St. Mary's Church in Gateshead on 11th July 1812.<sup>[4]</sup>

As Wellington was bringing the Napoleonic Wars to an end at Waterloo, Coulson was beginning to establish himself as an independent mining contractor – a development which would ultimately also have a profound effect upon Europe. He began, in about 1812, with a contract for winning coals at Thornley Colliery in County Durham.

In 1814<sup>[5]</sup>, he was living at Newbottle and his first daughter Dorothy was baptised at St. Michael's Haughton-le-Spring in November. The family seem to have moved to Gateshead and his first son William was baptised at St. Mary's in April 1816. By then he had turned to sinking shafts. One of his first contracts was at Whitley Colliery in Northumberland. Sinking began at the 'A' Pit in April 1817 and the 'B' Pit in October 1819. Meanwhile, by 1817, Walker Colliery was able to re-open because of the invention of the safety lamp and Coulson seems to have been involved in deepening the shafts to access the Low Main seam. These successes





established his reputation and he was invited to become part of the team led by Master Sinker George Jowsey who was attempting to drive a shaft through the magnesian limestone plateau at Hetton where others had failed.<sup>[6]</sup> On 6th December 1820 work began on the Blossom or Engine Pit and on 23rd December on the Minor Pit nearby. Both were connected by drifts. In the quicksand beneath the plateau, the team of sinkers encountered three thousand gallons of water per minute, which Coulson overcame by improving the traditional metal tubbing with four wedging cribs as well as developing techniques for releasing the pressure of water and gas behind the tubbing.<sup>[7]</sup> Consequently, he became known as the man who had won Hetton (Fig. 3) and proved to viewers, such as the sceptical John Buddle, that the coal seams in the west of the county ran beneath the limestone.<sup>[8]</sup> On 3rd September 1822, the High Main seam was found at a depth of 109 fathoms; and on 6th January 1823, the sinkers reached the Hutton seam at a depth of 147 fathoms. This marked the beginning of the exploitation of the East Durham coalfield which was to have enormous economic importance for the North East England. Although he was not in charge of the operation, Coulson's reputation as a master sinker was made because of his unique contribution of using wedging cribs. Working alongside him at Hetton was another self-made man who had also risen from a humble mining background – George Stephenson was responsible for designing the railway across Warden Law to Sunderland which was the first in the world to

be designed for steam power. His brother Robert was the enginewright responsible for all the stationary and travelling steam engines both the eight at the colliery and the sixteen on the railway to Sunderland and at the staithes on the River Wear.<sup>[9]</sup>

Unfortunately, no detailed plans of the sinking at Hetton survive but some indication of the enormity of the task can be achieved from the plans of Murton Colliery (Fig. 4) which was sunk nearby between 1838 and 1843 by Edward Potter. His account in the Transactions of the Mining Institute provides an insight into what Coulson must have frequently faced.<sup>[10]</sup> Initially the battle was almost lost when the first two shafts were flooded. But, on the advice of George Johnson and Nicholas Wood, a third and larger shaft was sunk further west which housed two 450 HP pumping engines served by a bank of 18 boilers. This gigantic effort won the day. Much of the machinery illustrated was temporary and used only for the sinking operations.

The sketch map in Fig. 5 shows the shafts sunk by Coulson in the Great Northern Coalfield as recorded in the obituary. They are arranged in chronological order. Note that there is a ten year gap, between 1849 and 1859, when Coulson and his team, which by then included his brother Frank and his two sons William and James, were sinking shafts elsewhere. Between 1849 and 1856, they were working in Lancashire and Wales. The team was then recruited by William Mulvany and Michael Corrs to open up the Ruhr coalfield.

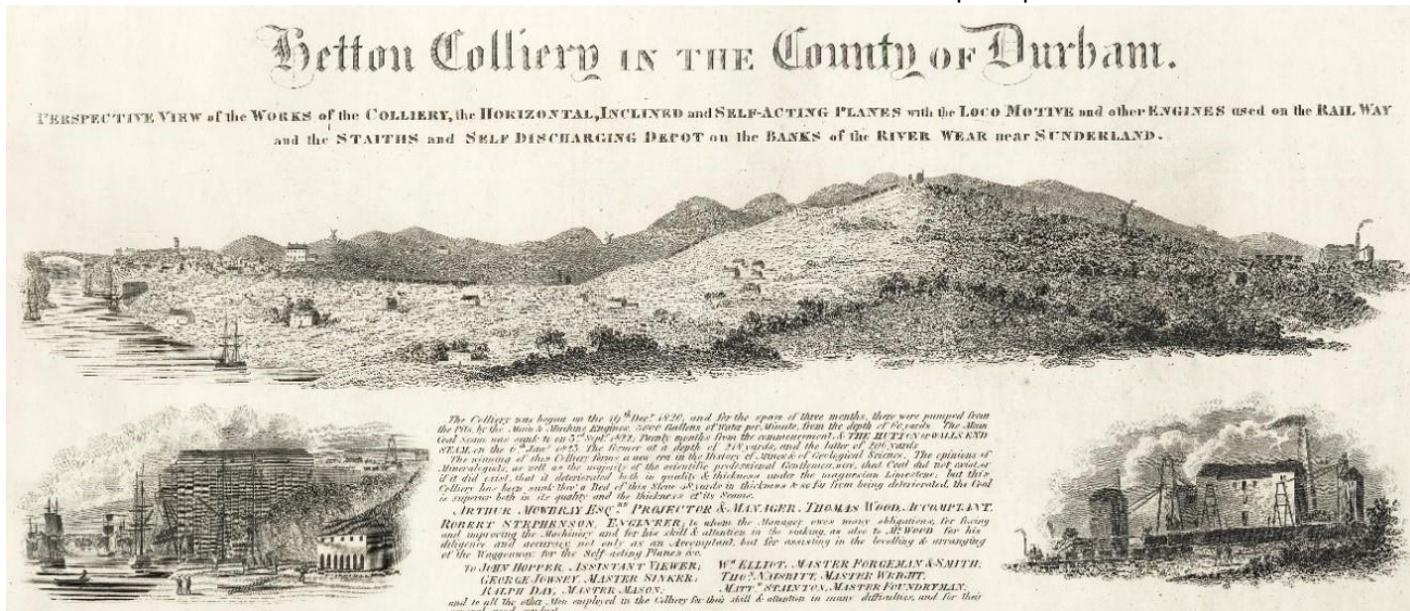


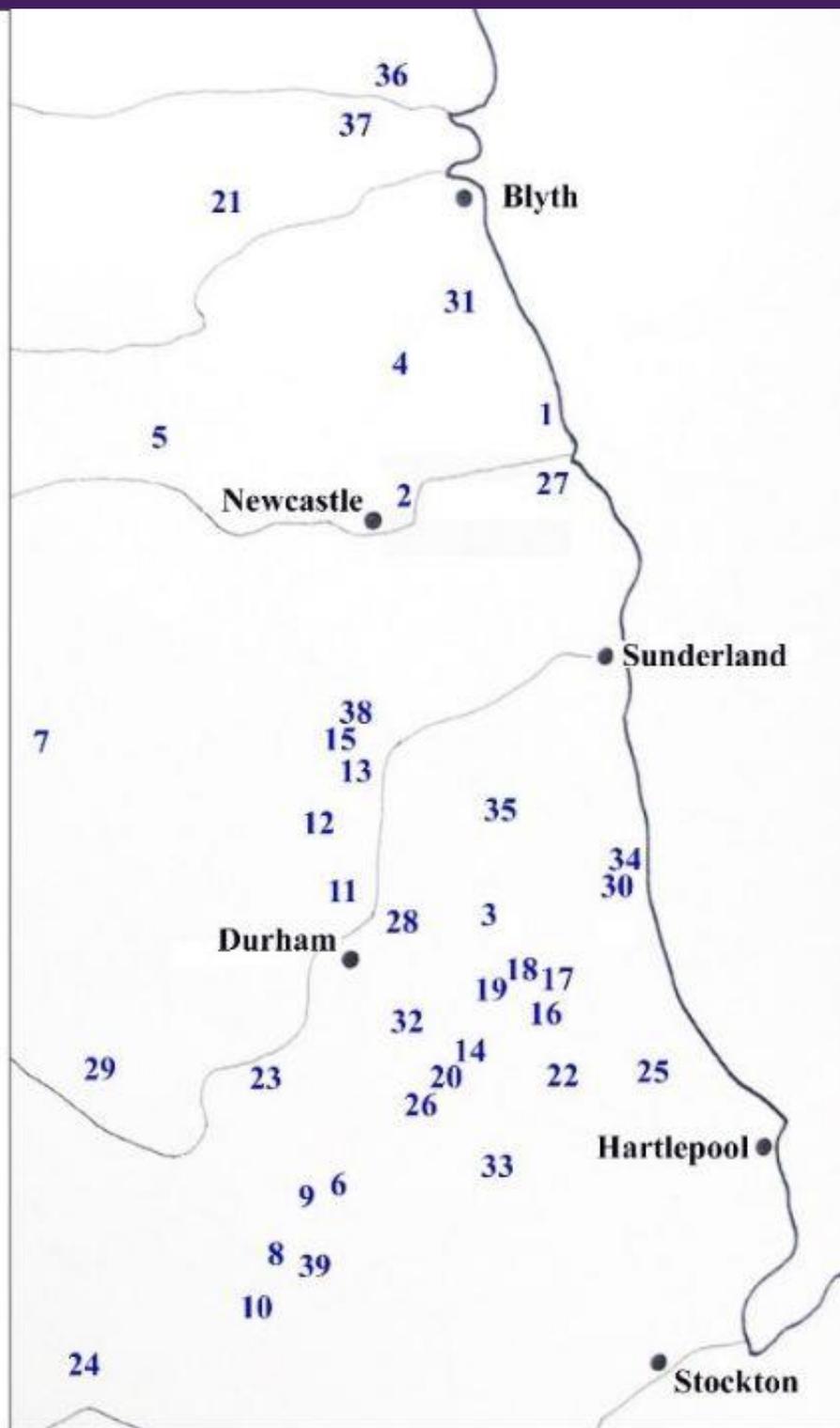
Figure 3: Poster produced to celebrate the winning of Hetton Colliery in 1822







1. Whitley 1817
2. Walker 1817
3. Hetton 1820
4. Seghill 1824
5. Callerton 1827
6. Eldon 1829
7. Crookhall 1830
8. Adelaide 1830
9. Black Boy 1830
10. Thickley 1830
11. Framwellgate 1830
12. Waldrige Fell 1831
13. Pelaw 1832
14. Crowtrees 1834
15. Urpeth 1835
16. Thornley 1835
17. Haswell 1835
18. Sherburn 1835
19. Sherburn Hill 1835
20. West Hetton 1836
21. Bedlington 1838
22. Wingate 1839
23. Whitworth 1841
24. Norwood (Tees) 1841
25. Castle Eden 1842
26. Coxhoe 1843
27. Harton 1844
28. Grange 1841
29. Roddymoor 1844
30. Seaton 1845
31. New Hartley 1845
32. Bowburn 1846
33. Bishop Middleham 1846
34. Seaham 1849
35. Philadelphia 1849
36. North Seaton 1859
37. West Sleekburn 1859
38. Bewicke Main 1862
39. Pease 2nd Adelaide 1862



### Shafts sunk by William Coulson in the Great Northern Coalfield

*Figure 5: Coulsons' Shafts*

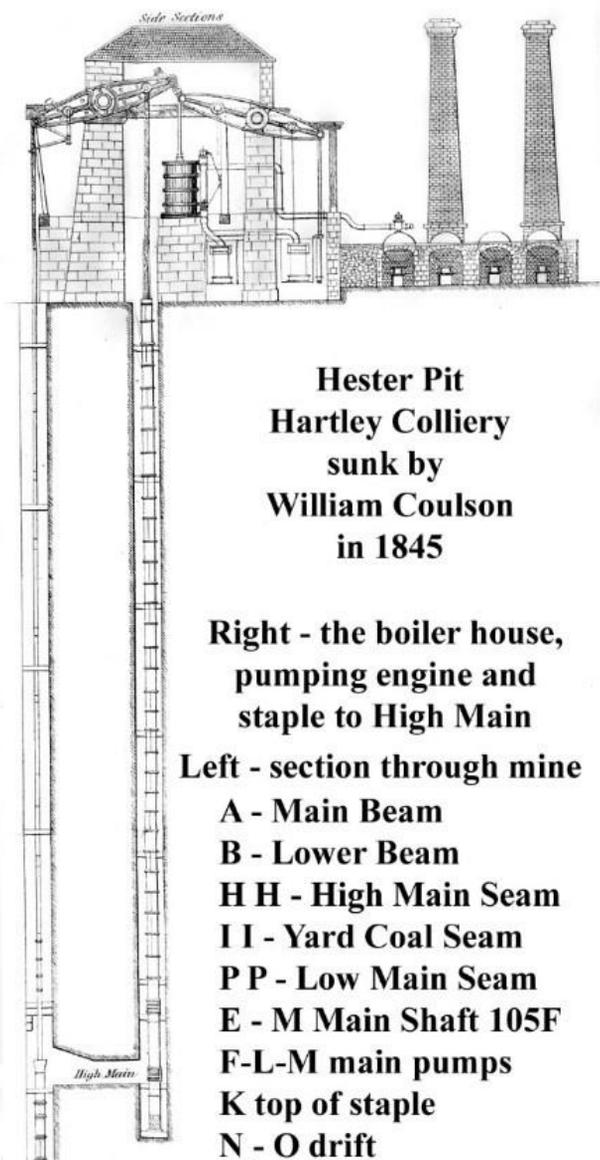
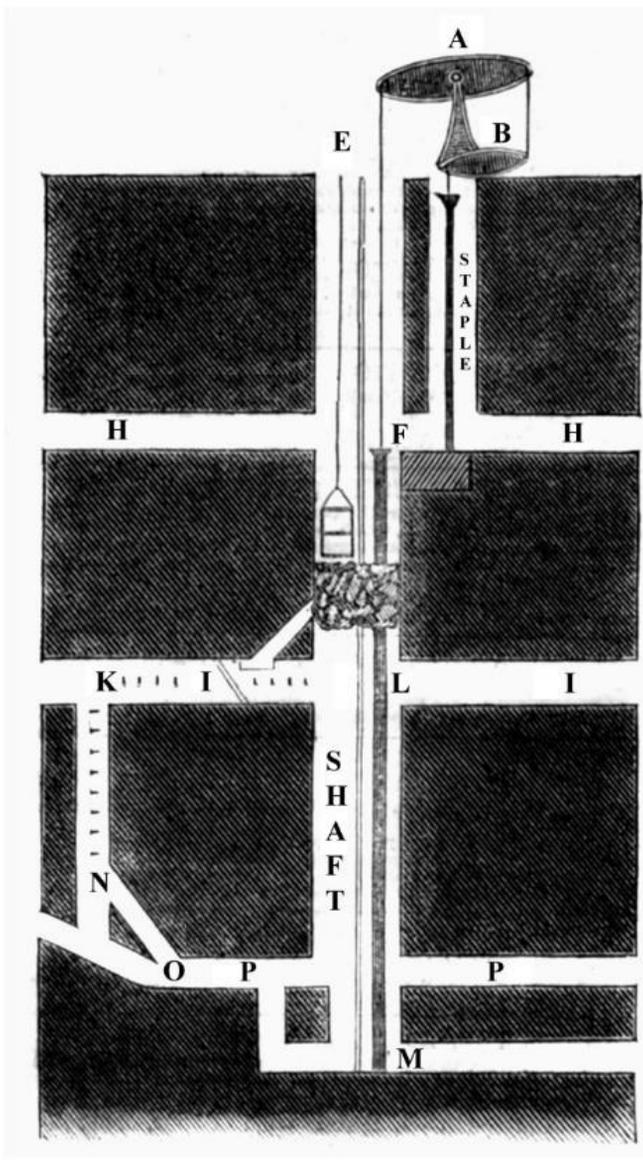




However, young Billy still maintained his interest in continental ventures. His obituary in the Journal of the Institute of Mechanical Engineers noted that 'besides carrying out sinkings in nearly all the English coalfields, he spent some time in Portugal exploring for coal and opened out a considerable number of collieries in Germany'. But part of the family remained in Europe to operate the continental wing of his business. Coulson senior's obituary recorded that he left four sons and three daughters 'all of whom apart from Mr. William Coulson of Crossgate Foundry are settled abroad'.<sup>[13]</sup> William Coulson IV, born at Seaton in 1853, married a German girl Ada and their first child was born in 1872 in Westphalia. His elder brother Francis, born at Seaton in

1850, would become president of the North of England Institute of Mining and Mechanical Engineers in 1916 by which time the family's businesses were operating on a global scale for half a century.

Despite his achievements as a master sinker, Coulson is most remembered for his attempt to rescue the 199 men entombed in New Hartley Colliery. On 16th January 1862, the 42 ton beam of the pumping engine snapped in half and crashed down the shaft sealing the only entrance into the mine – the shaft sunk by Coulson in 1845. In the process the ventilation system was destroyed. The following day Coulson and his team arrived but despite all their heroic efforts they failed to rescue the men before they had suffocated.



**Hester Pit  
Hartley Colliery  
sunk by  
William Coulson  
in 1845**

- Right - the boiler house, pumping engine and staple to High Main**
- Left - section through mine**
- A - Main Beam**
- B - Lower Beam**
- H H - High Main Seam**
- I I - Yard Coal Seam**
- P P - Low Main Seam**
- E - M Main Shaft 105F**
- F-L-M main pumps**
- K top of staple**
- N - O drift**

Figure 6: Poster produced to celebrate the winning of Hetton Colliery in 1822





Figure 6 is based upon a contemporary illustration in the London Illustrated News. It shows the shaft sunk by Coulson in 1845. This was divided by a wooden brattice to create a ventilation system – one part for the upcast air where the cage was situated, the other part for the downcast air which was also for the pumps. The men were working in the Low Main when the beam fractured crashing down the shaft and bringing the pumps, brattice and other debris down with it. The debris lodged just above the vent for the ventilation furnace destroying the system. Eight men were travelling in the cage when the accident happened – only three survived. In total 204 men and 43 horses were lost making Hartley one of the worst disasters in the Great Northern Coalfield. A list of the 45 men who had been part of the rescue attempt survives in NEIMME. It bears the interesting comment that 'the names ticked in red are those of the men who left or ran away – so says Coulson'. As was to be expected, not all the rescuers were heroes. Those who escaped Coulson's red pen were presented with a medallion to acknowledge their bravery. Figure 7 shows William Coulson and the leading members of the rescue team – David Wilkinson, George Emmerson and William Shields – all shown the distinctive headgear of a sinker. These are the faces of some of the heroes of Hartley – skilled and powerful men who risked their lives in the attempt to rescue their fellow workmen. There is some uncertainty as to whether the first drawing is William Coulson Snr. or William Coulson Jnr. to my mind it looks more like a man of 32 than 71.



*Fig 7: (top) William Coulson and (below) the leading members of the rescue team – David Wilkinson, George Emmerson and William Shields – all shown the distinctive headgear of a sinker.*



DAVID WILKINSON MASTER SINKER



MR GEORGE EMMERSON MASTER SINKER



WILLIAM SHIELDS MASTER SINKER





Coulson may have started life in humble circumstances but this should not be exaggerated. His father was a hewer in the Great Northern Coalfield and was one of the better paid members of the working classes albeit as a result of doing a difficult and very dangerous job. The family had a long connection with the Liddells, the leaders of the Grand Allies, the richest mining consortium in the world at the beginning of the nineteenth century. Henry Liddell and another mine owner John Simpson financed a school at Crawcrook for the gifted children of their workers and it may be that Coulson, like Nicholas Wood, was a pupil. Certainly, as a young man he appears to have had the ability to attract valuable friendships such as Nicholas Wood and George Johnson the leading viewers on the River Tyne. It is likely that Johnson was instrumental in securing Coulson's first major contracts at South East Northumberland. There followed an outstanding career as a master sinker in Britain and Europe during which this unassuming man enjoyed the friendship of the leading mining engineers of the day and the respect of a committed team of highly skilled workers. The words of one of these workers, William Douglas, reflected the sentiment of many when he presented a silver service to his master on behalf of all the team at Eppleton Colliery as a 'token of their admiration of his abilities and gratitude for his protecting care'. Like many before and after, the lads at Eppleton were prepared to risk their lives for Coulson because they recognised his skills and knew he valued their efforts. William Coulson is one of the unsung heroes of the Industrial Revolution – a gifted man who simply got on with the job.

### References & Footnotes

- [1] Durham County Advertiser, 16th June 1865; 27th June 1873. Newcastle Guardian, 17th June 1865. I am grateful to NEIMME volunteer Ian Winship for access to his research.
- [2] There are four generations of William Coulsons: William Coulson I (1748 – 1813), our man William Coulson II (1791 – 1865), William Coulson III (1816 – 1894) and William Coulson IV b. 1852. I am grateful to NEIMME volunteer Alison Johnson for access to her research.
- [3] At a dinner in Durham given by a number of Northumberland and Durham gentlemen in Coulson's honour chaired by George Johnson in 1856, Johnson claimed to have known Coulson for 45 years. This is likely to have been the mining engineer from Byker rather than the builder from Hetton. Durham County Advertiser 16th June, 1865.
- [4] His sons Robert and Matthew were born at Byker Hill in 1818 and 1820. The house of George Johnson who had with

with numerous models of mining machinery and model railway, was nearby.

- [5] In his evidence to the Hartley Colliery disaster of January 1862, Coulson stated that 'I have been about 48 years a sinker'. Thus, he began about 1814. An advert for his business in the Newcastle Journal 9th 1835 stated that he had 20 years' experience as a sinker.
- [6] In 1818, the Vane Tempest's agent Arthur Mowbray attempted to win Hetton near Cruddass House but 'in attempting to spend a considerable sum of money to pass through the quicksand, the site was abandoned'. This may well have been the reason for Mowbray being removed in 1819. NEIMME: Trans. V p.56.
- [7] Metal tubing had first been used by Thomas Barnes in sinking the King Pit at Walker Colliery in 1796. The tubing consisted of whole cylinders, six feet in diameter, cast at the famous Soho factory in Birmingham. Coulson used segments to form the cylinder.
- [8] At a dinner in honour of Coulson in December 1856, George Johnson, a senior viewer well connected with Hetton Colliery, commented that Coulson the first 'to prove to colliery viewers that coal was to be found below magnesian limestone. He it was who sunk the Hetton collieries in 1821 when the fact was first proved'.
- [9] Details of all these engines can be found at Tyne and Wear Archives and Museums: DF/WF/28/1 – p.448.
- [10] NEIMME: Trans. V p.43
- [11] The sketch map shows the 39 collieries mentioned in the obituary. At a dinner in October 1854 to celebrate the sinking of the Caroline Pit of Eppleton Colliery, the Durham Advertiser recorded that he had completed 36 new pits and was engaged in 3 others plus innumerable staples and bore holes which is more or less in accord. However, in his evidence to the Hartley inquiry, Coulson stated that he had sunk about 84 shafts, seemingly a doubling of his output in the last decade of his life. But these figures can be reconciled by taking into consideration two points. Firstly, some of the collieries had double winnings like Hetton, Whitley and Castle Eden which would increase the number of shafts; and secondly, in his later years, he was acting as a consultant engineer and had a resident master sinker on site. For example, his brother Frank was Coulson's man at Eppleton which is not on the list and there were clearly others.
- [12] There is a fascinating series of articles in the Newcastle Courant 18th Jan to 12th April 1878 recalling the adventures of Marshall Cresswell who 'in the latter part of December 1856...heard from his employer (the late William Coulson wanting three or four sinkers to go to Borneo on an engagement for three years'
- [13] His three daughters were Anne (1813), Dorothy (1822) and Barbara (1828); his sons were William (1816), James Dobson (1824) and two others.



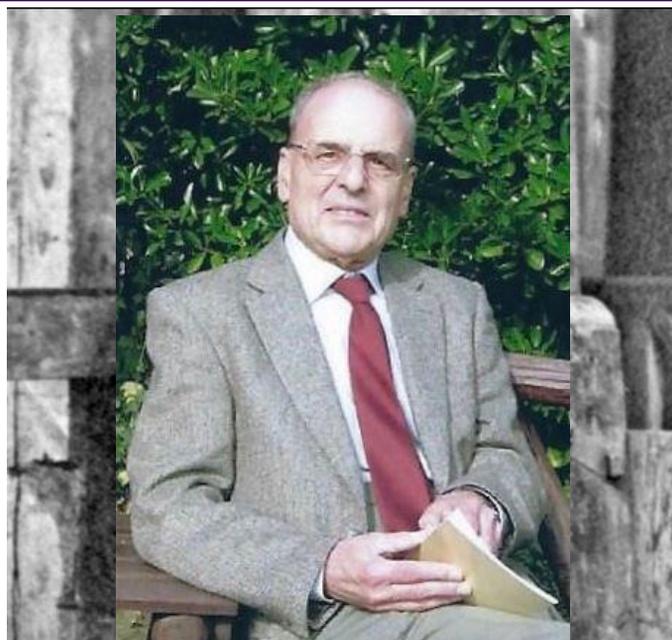


## The Jake Almond Archive

Rick Smith

Some members may remember Dr J.K.(Jake) Almond who died at Eston, in December 2018, aged 90. Jake graduated from Imperial College as a PhD Minerals engineer in 1955, having spent time in training at Stanhopeburn fluorspar mine in Weardale, Broken Hill Mine in Northern Rhodesia, and several smelters and metal refiners. He spent the next four years in the Gambia, and Travancore, India running beach sand operations for the recovery of Titanium minerals; and the following nine years in Uganda running the Geological Survey's mineral processing laboratory. Ill health brought him back to the U.K where he began an illustrious career at Teeside Polytechnic, later University, and the Open University, lecturing on iron and steel, mineral processing and economic Geology. His legendary curiosity led him to take on the role as editor for numerous journals and societies, especially concerned with industrial archaeology. Jake wrote upwards of 30 papers on subjects as diverse as the metallurgy of steel used in a nineteenth century locomotive, zinc smelting in the Northumbrian Pennines, and Sydney Harbour bridge.

After his untimely death I, Rick Smith, was tasked, as his executor, with the sorting and removal of 3 tons of books and papers from his house to a Jake Almond Archive, set up at the Materials Processing Institute, Middlesbrough, by kind approval of its Director Chris McDonald (who lectured to the Mining Institute in 2017). The whole exercise took exactly a year, during which a team of ten or so volunteers from CIE and CIAS, led by Sue Parker, examined and catalogued the material for future public access. Smaller volumes of materials were donated to the Mining Institute Library collection (mining and processing), Nenthead Mines Preservation Society (lead smelting at Nenthead, Weardale Folk Museum (early Methodism) Stockton on Tees Library service (Head Wrightson Record) and The Mighty Wurlitzer (articles on electric organ construction, and some sheet music)! In years to come this remarkable collection will provide a source of much value for industrial archaeologists and other researchers—a fitting memorial to a remarkable man, and great friend to NEIMME.



*Dr J.K. (Jake) Almond*

## New Members

**The Institute welcomes our latest new Member, Dr Robrecht Schmitz, currently Global Leader Mining and Geotechnics with Sibelco, previously with RWE at mines in Germany and Hungary. Robrecht qualified in 2000 with an MSc-Eng in Mining and Petroleum Engineering at Delft University, then an MSc in advanced studies Geotechnics at the University of Liege 2001, followed by a PhD in applied science, geotechnics, also at the University of Liege in 2004. He is registered CGeol, CEng, CSi, Cenv, CMgr and CPG. Robrecht lives in Germany.**





## HOPES FOR A CORNISH MINING REVIVAL

The article below was submitted by Rick Smith, and explains the resurgence of mineral exploration in the U.K. The last Cornish mine closed in 1998, but Rick will tell us the current story.

The Devon and Cornwall Orefield has a 4000 history of mineral exploitation, best known of course for copper and tin, but including tungsten, silver, lead, zinc, arsenic and of course china clay. It was the most famous mining centre in the world during the 18th Century and the diaspora of Cornish miners and engineers carried their cutting edge deep mining and steam pumping technology around the globe. South Crofty, the last mine, closed in 1998 but exploration activity never gave up. Attention focussed this April on the activities of Strongbow Exploration, a company listed on the Toronto stock exchange. They acquired South Crofty in 2016 and now have it fully permitted and ready to go, subject to completion of a feasibility study. Their literature quotes Indicated Resources of nearly 2 M t of tin-copper-zinc ore, and Inferred Resources of a further million tonnes, all at an average grade of 1.55% tin equivalent. A blockage in New Cook's Kitchen shaft has been cleared ready for installation of pumps.

Dewatering will take place in three stages down to 870m below surface and a mine water treatment plant has been constructed. Meanwhile Strongbow signed an agreement in 2016 with Cornish Lithium Ltd., a UK company exploring for lithium-rich geothermal brines known to exist at depth in the Gwennap area. The deal allows CLL to explore for lithium within six thousand hectares of Strongbow's leases. Extraction of lithium from brine is said to be relatively easy and the metal is in high demand, now and forecast into the future, for new generation lithium-ion batteries. CLL raised £1.4M in October 2019, via an oversubscribed crowd-funded exercise, to fund two investigatory boreholes to test parameters such as permeability, flow rates, temperature and rock characteristics. The first drilled to 1100m and found more zones of lithium brines than anticipated. CLL reported its results as "encouraging". Lithium results for the second hole, GWDD002, in a previously unmined area at United Downs, have not been announced, but unexpectedly it cored 14.7m of a mineralised zone grading 7.5% copper and 1.2% tin



*Chief surveyor Allan Reynolds (Strongbow Exploration ) in South Crofty mine, near Camborne. (Credit: Jay Williams)*



*Tungsten and copper mineralised drill core from Redmoor drilling (Credite: Cornwall Resources)*





at just 90 to 105m from surface. The true width of the zone is unknown, but the high grade and shallow depth have spurred speculation about a come-back for the local industry. Nearby Wheal Jane and Mount Wellington mined semi-massive sulphide ores of a similar appearance to the latest discovery until their closures following the Tin Crisis of 1985. CLL is also drilling 40 shallow test holes near St Austell to investigate the potential to extract lithium from granite rock at a location believed to have been mined for lithium during World War Two. Mica in the St Austell granite contains up to 2.5% lithium.

Other recent activity in Cornwall includes the Redmoor tin-tungsten prospect owned by Cornish Resources Ltd., part of Strategic Minerals Ltd. Located in an historic mining district, interest here has run since 1978 under several owners and drilling campaigns. The latest work confirmed the presence of a sheeted vein system that in 2019 was reported to have Inferred Resources of 11.7 Mt at 0.56% WO<sub>3</sub>, 0.16% Sn and 0.5% Cu. This again is under assessment pending further exploration and studies.

Previous hopes for a revival of tungsten mining in the region had been dashed, of course, in 2018 when Australian group Wolf Minerals' Drakelands Mine, at the old Hemerdon site in Devon, went into liquidation owing £70M having apparently lost £100M in its three years of operation. This famous project, with a nameplate capacity of 2.6 ktpa of tungsten in concentrates, and said to contain the world's fourth largest tungsten resource, had been subject to decades of investigations but still the mill recovery failed to reach that anticipated in feasibility studies. The mothballed project was then bought by Drakelands Restoration Ltd, owned by Durham company Hargreaves Services who had lost £8.1M when Wolf went bust. They in turn sold it on last year to Tungsten West Ltd. ( a private limited company registered address in London, and apparently bankrolled by wealthy Channel Islands investment company Baker Steel resources) for £2.8M cash and the promise of a ten year mining service contract. TWL announced last November that they intended to resume mining "in due

course", restoring about 200 local jobs. Industry specialists estimate that it will cost at least £40M to bring back to life, assuming the previous problems can be overcome.

It is said that the total value of past production of tin and copper in Devon and Cornwall amounts to around £56 billion in present day money. No wonder interest continues!

*(Sources - company websites and press releases)*



*Wolf Minerals Drakelands tungsten mine*

The Institute is the Royal Chartered Membership organisation for science and technology in the North. For more information on joining see: [mininginstitute.org.uk/membership/](http://mininginstitute.org.uk/membership/)

The North of England Institute of Mining and Mechanical Engineers is a membership organisation governed by Royal Charter and a registered charity with the Charity Commission: registration number 220208. Newsletter edited by S. Martin MNEIMME and formatted by A. Dobrzański MNEIMME.

