Welcome to our Summer MTD Newsletter. Our Newsletters are still very much a work in progress, so any comments, ideas and articles would be most welcome. Contact us via Frances at frances.perry@iom3.org, it would be great to hear from you, the good the bad and the ugly as they say. It's quite an extended newsletter this time, but I hope you enjoy it. Additional articles will be on our webpage, plus the continuation of some articles. Please do visit our webpage on the main IOM3 site (iom3.org/mining-technology-division), we are trying very hard to put some new and interesting articles on there. But please feel free to tell us what articles you’d like to see or a theme we should follow.

Covid-19 is affecting all our lives at the moment, it’s a very sad time for everyone, not just the UK. In addition to our Mining round up, we thought we would ask a couple of our mining friends to tell us about the pandemic in their parts of the world.

MTD are busy working on a new publication with regard to the importance of mining and how this can be portrayed to the general public. We managed to hold a virtual meeting, which turned out well, not as good as the face to face, nevertheless it keeps us together and moving forward.

Conferences are all on hold, however collation of papers for the “Legacies of mineral extraction and sustainability opportunities” is still moving forward, see page 12 for details.

Take care of yourselves till next time (Autumn 2020).

Christine Blackmore MTD CHAIRMAN

STOP PRESS

See MTD webpage for latest articles:
- Eliminating Mercury from Gold Mining
- Artisanal Mining in Nicaragua....................full article..............
- Sustainability in Mining

EDITORIAL TEAM AND CONTRIBUTORS:

Christine Blackmore  Dr Rod Stace  contact via Frances Perry (frances.perry@iom3.org).
I was born and brought up in Middlesbrough in the north east of England, in a normal working-class family. My grandad worked for British Rail and I have fond memories of heading down to the railway sheds at Thornaby on a weekend to drive diesel locos in the sidings and sitting in the cab with the driver on train journeys to Whitby.

As a boy I always had an interest in engineering and how things worked. Following comprehensive and gaining decent ‘O’ levels I decided to study geology at ‘A’ level as it was interesting and a bit different to school subjects. I was fortunate to have an excellent geology teacher (Terry Cattermole) who had worked for most of his career as a mining geologist; I can remember him telling me not to study geology at university but to look at mining engineering if I was serious about being involved in the extractive and resources industry. Back in the 80’s there were still five universities offering mining engineering degree courses in the UK. After visiting them all I decided that Camborne School of Mines was my preference, despite Cornwall being a long way from the north east.

I graduated with a 2.1 with honours in 1993 and was offered a job with Trafalgar House, a large construction conglomerate, who also had two mining businesses based in the UK (Cementation Mining and Davy Mining). As a result, I spent the formative years of my career working as a contractor in a wide range of mines in the UK and overseas, including the remains of the UK coal industry in the early 90’s. Along the way I completed a part-time research degree into underground rock cutting using roadheaders and gained chartered engineer status. Eventually I progressed to senior project management and director roles at Skanska Construction. I’ve been extremely fortunate to work within a wide range of underground construction projects, including hydro-electric schemes, tunnelling (hand works, mechanised and tunnel boring) shaft sinking, production mining and greenfield mine developments.

I do genuinely find the resources industry fascinating in its diversity and challenges. Mining engineering covers a very wide range of skills and topics – including finance, survey, computer modelling, geotechnical, mechanical etc. It taught me an awful lot very quickly and you soon realise that the camaraderie and nature of working underground makes it a unique and very special workplace; I’ve worked with some great people who I’ve respected through my career, as well as some unusual characters too!

Starting and developing new mining projects can be extremely challenging – it involves a very wide range of skills, with technical knowledge of mining being crucial to really understanding the project development process. Attempting to build the first new coal mine in 30 years to supply the steel industry is in no way straightforward; whether that is planning, design, environmental, legal, resources or perception. I believe that being a CEO is about inspiring people, being consistent in behaviours whilst showing determination and passion in leading and bringing people on the journey as a business/project grows. I also strongly believe that businesses have a duty to be open and honest in all their public and stakeholder engagement.

I have always liked a challenge; having ridden motorbikes for a long time and then gained my private pilot’s licence (helicopters). I also enjoy practical hobbies such as DIY and read a lot of current affairs and technical journals. I’ve been fortunate also to gain experience through external roles, including sitting on the British Tunnelling Society committee for a term, whilst I am now a member on the Committee on Radioactive Waste Management (CoRWM), advising the UK Government on geological disposal of nuclear waste. Finally, I was very proud to achieve the status of Fellow of the IMM and hope I can continue to inspire younger professionals to enter and enjoy working in our industry.
FEATURE: WEST CUMBRIA MINING

New Coal Mine for West Cumbria

An October report by financial think tank Carbon Tracker says four in five EU coal businesses are losing money with a total loss of €6.6Bn forecast for 2019. Investors and policy makers should, they say, prepare themselves for a complete phase-out of coal in the next ten years. The driver for this change is “sustained competition from ever lower cost wind and solar power and temporarily cheap gas”. In this respect the UK seems to be ahead of the curve with its last coal mine, Kelling-ley in North Yorkshire, closing in 2015.

What to make, then, of West Cumbria Mining’s application to build a new colliery – the Woodhouse Mine – at the former Marchon chemical works site near Whitehaven? In March this year Cumbria County Council unanimously approved this application but Tim Farron, then Liberal Democrat MP for Westmoreland and Lonsdale, called for the Government to “call in” the application; this was refused prompting Mr Farron to say this was a “kick in the teeth” for climate change. Whatever the truth of this, the mine can now go ahead.

The answer to the apparent change in attitude to coal mining lies in the quality of the West Cumbria deposit – it’s not just any old coal but metallurgical grade coking coal - ‘met’ coal. And while thermal coal for electricity generation is quickly being outpriced and displaced by renewables, met coal is classed by the European Commission as a critical raw material. A typical price premium for top quality met coal being about 50%. Demand has increased following a more than doubling, since 2000, of world steel production; and it is expected to keep on increasing. About three quarters of steel is derived from cast iron produced by blast furnaces. And if you want high quality steel then you need both blast furnaces and high quality coke to fuel them – almost 800kg of it for every tonne of iron produced. High quality means high volatile content in the original coal together with low phosphorous, low sulphur and low ash.

The new Woodhouse mine is expected to extract and process up to 2.45 Mt of met coal per year from two offshore seams, Bannock and Main Band, formerly worked at Haig Colliery. This started production in 1916 and closed in 1986 with the loss of 3,500 jobs. Both target seams are around 2.4m in thickness and West Cumbria Mining reckons there is enough coal for at least 40 years using conventional methods. The rank of coking coal in the Cumbria coalfield broadly increases from north to south and with greater depth; on that basis the proposed workings look to be in an ideal location. All the tunnels and infrastructure will be new apart from two 2500m long access drifts which were formerly part of the Sand with Anhydrite Mine. At full production, a directly-employed workforce of 500 will be needed and recruitment will start next year, taking people from within a 20 mile radius of the mine. Site works are expected to commence in Spring 2020, with coal production commencing around 24-months later.

Ian Crossland

West Cumbria Mining has developed a number of factsheets to provide you with key details and information about their project:

Haigh Colliery Mining Museum and adjacent terraced houses pictured 2008 (source Old Cumbria Gazetteer http://www.geog.port.ac.uk/)
**WHAT’S IN THE NEWS: ROUND UP**

Global Mining Review reports:

**Support for clean energy mining**

The Canadian government indicated a commitment to write-off the full cost of clean energy equipment. In March they announced accelerated write-off to a broader suite of mine electric vehicles which provide significant benefits. For underground mines, electric vehicles reduce ventilation requirements, and reduce greenhouse gas (GHG) emissions that contribute to climate change. The electrification of mines can make a significant contribution to reducing the mining sector’s GHG emissions. Increased investments in infrastructure to provide access to clean electricity are also critical.

*MTD Comment: This is to be commended, the push for a sustainable mining industry can only be helped by these measures*

**General Update on Coronavirus**

Earlier in the year there were reports of a world shortage of materials and parts from China due to China’s extended shutdown and disruption of logistics chains. Shortages of critical and often minor components out of China caused many problems. Assemblers which thought they could simply switch to local manufacturers discovered that their local manufacturers were also reliant on smaller components from China highlighting further problems with the supply chain. In many cases critical components rely on rare earth elements, almost all of which comes from China. This was found particularly to be the case in relation to the rare earth elements in permanent magnets holding up the supply of urgently needed ventilators from some manufacturers.

*MTD Comment: If nothing else, this should help us to understand why it is critical to finding REE closer to home.*

However by March, just as it was reported that losses in China and the rest of the world may be contained with many factories and mines re-starting in China, the rest of the world was suffering its own hit!

**Changes in the way mines are run?**

Covid 19 is likely to have a marked impact on the way many remote mines are run and is likely to help in cost cutting and may potentially make some mines more efficient and sustainable. It is accelerating the use of more automated equipment, making shift patterns more effective and employing younger and possibly fewer people to better enable social distancing. There are fewer site visits from outside local communities, with management either be based at the mine site or managed through conference calls. Some operating costs are reducing as oil prices tumble.

However it is not all good news as restocking reagents for mineral processing may be at risk, any extended lockdown period could cause some process plants and their associated mines to grind to a halt. However things look like they are staring to open up a bit.

*MTD Comment: The push for operational continuity, whilst Covid 19 is about, must be commended but remote managing of mines is literally fraught with danger as the need to eyeball the safety of operations is paramount. The high competency and calibre of the on-site personnel must be maintained.*

**Mining Companies helping local communities**

Many mining companies are helping local communities prepare for COVID-19. It is known from the Ebola outbreak that mining companies are good at organising health security for mines and local communities. In many countries mining companies and exploration teams are working with local communities to help prepare for the disruption of the virus with the supply of PPE, testing kits and urgent supplies. One (and possibly more) has even provided beds and bedding for an isolation centre. medical equipment and ventilators.

*MTD Comment: Whilst noting that it is in the mining companies interests to do this, it shows the importance that they put on supporting the local communities in which they work, something which is often forgotten in the mining debate!*

**Brazil Tailings**

In April the Brazilian mining regulator ANM ordered closure of 47 mining dams that failed to certify their stability, 25 of which were run by Vale. This has quite rightly posed threat to iron ore production.

*MTD comment: The hazard created by an unsafe Tailings facilities is well documented and the MTD fully supports the efforts being made to ensure all such facilities are safe and signed off by independent Competent People.*

**Exploration using Drones**

Drones are making mining exploration faster, more accurate, safer and substantially less expensive. A rapid increase in the utilisation of drones for exploration and surveying by junior mining companies makes their work faster, more effective and less expensive. Drones are being used for photogrammetric surveying, Induced Polarisation surveys as well as general mapping. They can do low-altitude geophysical magnetic prospecting from just 5 meters above the ground in rugged terrain with reduced magnetic interference in the flight platform with sensors slung below the drone. Drones are also able to carry sensitive and valuable equipment safely over rough terrain and could reduce the need to make roads and lines into previously inaccessible areas.

**Australian Thermal Coal**

Another problem for Australian thermal coal as Westpack Banking Corp said it would exit the sector by 2030, leaving Australia and New Zealand Bank as the last of the country’s big four still in the sector. Australia is the world’s second-biggest thermal coal exporter- generating A$26bn in export revenue in the year to end-June 2019. Financing coal projects has become increasingly difficult as financial institutions shun fossil fuel investment, due to pressure from shareholders and climate groups.

*MTD Comment: Someone has to tell the investors the difference between thermal and coking coal, otherwise we are in danger of chucking the baby out with the bathwater.*

**Just a note from the World Bank**

The World Bank also forecasts that some 3bnt of minerals and metals will be needed for power generation and energy storage (Mining.com). This means that even if recycling rates were to reach 100% that there would not be enough copper, aluminium and other metals to meet the demand. The World Bank is encouraging nations to strengthen their commitments to climate-smart mining principles.

*MTD Comment: Let’s get that message out, we need mining! And most big mining companies already are putting enormous resources into ‘climate smart mining’.*

Compiled by Robin Dean MTD Board Member
Peter Robinson talks about Covid-19 protection at British Fluorspar

British Fluorspar (FBFL) is a small British Mining Company that operates an underground mine and associated flotation plant in the Derbyshire Peak district. FBFL mines and process the polymetallic, sub vertical Fluorite/lead veins in the North Derbyshire ore field. The principal FBFL mineral target is Acid grade Fluorspar which is a strategically important raw material for the European Chemical Industry.

During the current virus affected period it has been essential that FBFL remains in production to maintain raw material supply to our Fluorochemical customers. FBFL mining and mineral processing operations continue to operate safely in accordance with our strict COVID-19 PANDEMIC – Health & Hygiene policy, which is in accordance with Government guidelines and kept under constant review to take account of changing circumstances. The key features of the FBFL policy for operation of our Mine and Processing Plant are:

**Underground Mine**

- Staggered shift patterns
- Well ventilated mine offices, change house facilities and surface workshop facilities
- Good Underground Ventilation - no entry to non-operational less well-ventilated sections of the underground workings.
- Regular disinfection of surface facilities and underground safe havens
- All personal laundry undertaken separately by each member of the workforce
- Two-man maximum mining teams to facilitate distancing policy
- PPE, gloves, masks, visors
- Daily health checks and consultation with each member of the workforce. Strict self-isolation away from the mine where both symptoms or contact with people showing symptoms of the virus are reported.
- Staggered home working for technical and administrative staff
- Essential visitors only to the mine.

**Mineral Processing Plant**

- Campaign operation of the Mineral Processing plant once a month
- Two-man maximum working teams to facilitate distancing
- PPE, gloves, masks, visors
- Daily disinfection of all facilities
- Weighbridge isolation – no interaction with delivery and bulk material lorry drivers
- Staggered and segregated meal breaks
- Essential visitors with approved appointments only
- Administrative and technical staff home working where possible
- Daily health checks/consultations to identify possible exposure to the virus.

**Mining in Sweden – Effects of the Corona crisis**

Production in Sweden’s mines seems not to have been significantly affected by the corona crisis, but is instead continuing as usual. Also demand appears not to have declined yet. A recent member survey by Sverin, the industry association of mines and minerals and metal producers in Sweden, showed that the Swedish mining and mineral companies “have performed well so far and remain strong with a production rate that in most cases is not negatively affected” or even increasing. Technology and service providers too seem to do well overall, even though some companies face problems with logistics and transport, a declining order situation and transfer of key competences. However, smaller exploration companies are having a tougher time now. According to the survey, 75% of all exploration companies in Sweden consider the current financing situation problematic or very problematic. Besides being dependent on external capital, the exploration companies struggle with losing their permits if exploration work is not carried out.

The logistics chains of the mines are still functioning as usual with some minor redeployment. The supply of spare parts is not critical yet due to sufficient warehousing. Staff are still in place, working in standard production shifts or, in the case of non-operational staff, working partly from home. In addition to the general recommendations issued by the Public Health Authority, some companies have taken additional precautionary measures, such as restricting visits and business trips, avoiding larger meetings, closure of staff restaurants (selling food boxes instead), increased frequency of cleaning, and reduced contact between different shift teams.

Employees at Boliden and LKAB operations, who have a background in health care can temporarily take leave of absence if they want and can return to work in local health care during the ongoing health crisis. Both companies additionally support this by paying any difference in salary for those who are taking this leave and who will return. To support trade and restaurants close to their operations, LKAB provides all employees with a gift card that can be used at the local small businesses affected by the corona crisis.

Dr Jan Rosenkranz—Luleå University of Technology
COVID—19 PANDEMIC—MINING DURING LOCKDOWN

Mining activity in Oman—Brian Spratley

I started a new mining company in 2019, Knights Bay, and was in a portfolio building and project origination phase when the viral dominos began to fall. As a resident of Oman for some time, having been involved in the development of a minor metal smelter in an industrial free zone in the port of Sohar, I had to make a call to stay and, as I thought, continue with what we were doing or return to the UK and join the, by then, inevitable lock down. I opted to stay.

For those of you who don’t know Oman, it has fantastic landscapes that only the combination of a bright blue sea, rugged and jagged mountains, and desert environment can bring. Most of the country is also lightly occupied by man, featuring the bare physical geography and geological features of Holmes with little sign of our presence unless you are on one of the new superhighways, the northern seaboard, or in one of the major cities.

Oman has a rich mining history based on copper due to a 400km long VMS belt through the northern mountains, but other modern metals are proving elusive, and most of the extractive industry is based on industrial minerals and construction quarrying.

We had concluded discussions with a potential partner in Qatar and travelling to Muscat it was a shock to suddenly be faced with the reality of an empty aeroplane and deserted airports. We passed the temperature and bureaucratic checks and retired to our hotel to hear that flight bans were promulgated and in a matter of days we were confined to residence with only essential travel allowed. The essential travel included working and despite some lapses most of the now routine social distancing rules were established very quickly.

During the past two months the spread of the disease has been slowed by government action aimed at the cities, mainly around Muscat where there was a particular outbreak, but in general travel for authorised people has not been completely stopped. Such authorisation comes as a company letter for essential travel or going to work as normal with restrictions of contacts. Industry, cement production and construction, in the Gulf states, has been declared an essential business and offtake of mineral products has not slowed by much. Thus, the mines and quarries have continued to produced and the road networks carrying the industrial products, limestone, gabbro aggregates, gypsum, iron ore and kaolin, have operated with a few stoppages. The ports have maintained bulk transfers for the iron pelletising, iron and steel making and aggregate exports. Most of the workforce driving the industry is expatriate and operations have continued as usual except most of the management is undertaken remotely.

We have been fortunate to have been able to conclude a joint venture agreement with a local company, largely from remote working in the lockdown. We have also been able to arrange all the services necessary for initial evaluation of the orebody, including assay laboratory, physical testing of materials and literature surveys. We have open access to the mine and environs and are lucky that it is in a remote location with only our staff and the contractors.

Oman has been fortunate to have been able to maintain essential services and access to supermarkets and fresh produce during the whole period, but like everywhere else, less important businesses are suffering. We have had a good, but tentative response from most of the government agencies who are running a skeleton operation and some services are not available or deferred till later. The challenge now comes to prepare and undertake an extensive resource evaluation without the specialist personnel to supervise the onsite activities and studies, most of whom are in lockdown around the world, or waiting the crisis out in another remote location.

And for us Boomers, who have survived thus far, we know you cannot evaluate a mining project over the internet no matter how good the connection.
There were two unexpected pieces of library news during the last week in April: firstly that the Library Management System (requested repeatedly down the decades) has at last been approved and secondly that Frances has been furloughed for May in response to the Covid-19 pandemic.

A Library Management System is a software package that provides ordering, accessioning, cataloguing, loan tracking and other library facilities and will enable us finally to provide an online catalogue of the whole library for members to search, instead of the many scattered partial catalogues in different formats that are all we have at present. The package we have selected is Koha, which will be implemented and hosted by PTFs. This is the same system the North of England institute of Mining and Mechanical Engineers uses – see https://minst.koha-ptfs.co.uk/cgi-bin/koha/opac-main.pl. Linda Dawes, the new Grantham library assistant, tells me she’s been in contact with Jennifer, the NEIMME librarian, who is very proactive and helpful and has offered to let us use her records to help with inputting if we have overlaps. The system is also used by the Royal Geographical Society https://rgs.koha-ptfs.co.uk/ and Science Museum https://smg.koha-ptfs.co.uk/ amongst others.

We appointed Linda, who is a highly experienced professional librarian, with both this project and the pending library move in mind, so she is already working on the mountain of data preparation required: she “just” needs to clean our current Excel catalogues of the Materials Library collections, split fields, and MARC field match, all of which is time-consuming, and to which Frances has added the Word file of the minerals and mining book catalogue (it does have field indicators, which I hope will help) and the entire set of IMMAGE records, which have four different record structures – article, book, chapter/conference paper, and unresolved (ones whose references the Head software people didn’t manage to unpick electronically when we transferred them from CAIRS). However, the eventual result should be a unified online catalogue that will include the whole of IMMAGE along with all the books from the Materials Library, Tata Steel collection and other disparate parts of the library, greatly improving member access.

Meanwhile the reunification of the physical library is still on track – provisionally, depending on the behaviour of the virus! – for new stacks to be installed in the Boilerhouse at the end of August and the library to be moved down from Unit 17 in September. This will put the two separated sections of the Minerals and Mining Library back together and will place them adjacent to the Materials Library, with a map room and library reading room. The five-year lease on Unit 17 expires in November and will not be renewed, so we are watching the national situation anxiously in the hope that the move can take place as planned. Hilda Kaune has been on sick leave for the first half of the year and with Frances now grounded for 12 weeks by the virus we are hoping all the staff will be available once again to assist with the move! The manufacture of the rolling stacks is going ahead and the supplier David Learoy, who has built stacks for us before, has visited the Boilerhouse again this week, so we are still cautiously optimistic (i.e. fingers and toes all tightly crossed!) Normal photocopy requests and enquiries have continued despite the library having been closed since 20th March (as Linda has had occasional access to the collection) although library visits have had to be curtailed. Indeed, library activity appears to have increased over the past year. Abstracting for IMMAGE has also continued and the March issue of IMM Abstracts went to the printers as usual, although subscribers have been warned that problems with international post mean we may have to send the next issue out electronically.

Frances Perry
FEATURE: THE CURSE OF THE WORKING BREAKFAST

The Americans have given the world many benefits, arguably the personal computer, chocolate chip cookies, Coca-Cola, the internet and one of my pet hates, the working breakfast. It is based on the premise that there is not a moment in the day to be lost, and as everyone is fresh after a good night’s sleep, then in that valuable hour over the coffee cups and waffles strategic objectives can be hatched and award-winning sales pitches, well, pitched.

Last year, at the PDAC in Toronto, I had to attend several working breakfasts, and their ugly sibling the working dinner. We were seeking investors for a mine build. I turn up at around 7:30 am with several other staff members and we inevitably wait for the star of the show, the investment banker. He, and it is always a he, saunters in at 8:00 am with his entourage, as a less than subtle reminder that his time is extremely valuable. The menus have already been handed out but none of us dare order until the show starts, although we may sneak in an odd cup of coffee. And only when the big cheese picks up his menu, we follow suit, in my case anticipating eggs, toast and tea.

The big man orders coffee and juice, no time for anything else, and waves the menu away. Inexorably the rest of us want to show our virtue-signalling and order the same, though one brave and naïve soul orders a hot breakfast.

So, business begins, laptops sprout up like dandelions in a lawn, spreadsheets and documents are revealed. The coffee is sipped, the juice glasses left half-full. After a coffee refill the star rises to leave, gets thanked by our side, and invites us to a working dinner that night. The brave individual who ordered breakfast, after suffering the censorious miens of some and pitying looks of our side, pushes his barely touched plate to one side. But most of us are still hungry. On the way out, we visit the hotel coffee shop buying muffins and buns, and a takeaway hot coffee for the ride.

The ugly sister is the working dinner. Usually at 7:00 pm, it is held in a very posh restaurant or a ‘hidden’ boutique diner where the investment banker has known the owner, Luigi, for years. The session starts with a drink, then another, and another, and so the alcohol flows. Work soon degenerates into shaggy dog stories and pissing competitions. One PDAC dinner had the investment bank’s team and our directors boasting about how many vintage cars and motorcycles each one owned. As I ran only an 8-year old Honda Civic hybrid, I was pushed out of the conversation, so I nodded and smiled, and drank more wine. The dinner normally ends in a disorderly fashion, people peel off to get taxis, go to nightclubs and brothels, secret cabals, or carry on drinking. At this point no-one cares how much you eat.

At some time in the early evening you are informed of the next breakfast meeting with a different banker…

EL Pirrato

NEW ELEMENT FOUND

A new element was recently discovered by researchers.

Tentatively named Administratium, it has no protons or electrons, and thus has an atomic number of 0. However, it does have one neutron, 125 assistant neutrons, 75 vice neutrons, and 111 assistant vice neutrons. This gives it an atomic mass of 312. These 312 particles are held together in a nucleus by a force that involves the continuous exchange of particles called morons.

Since it has no electrons, Administratium is totally inert. However, it can be detected chemically, since it impedes every reaction it comes into contact with.

Administratium has a normal half life of approximately three years, at which time it does not actually decay, but instead undergoes a reorganization in which neutrons, vice neutrons, and assistant vice neutrons exchange places.

Scientists point out that Administratium is known to be toxic at any level of concentration and can easily destroy any productive reactions where it is allowed to accumulate. Attempts are being made to determine how Administratium can be controlled to prevent irreversible damage, but results to date are not promising.

Anon
FEATURE: SUSTAINABILITY IN MINING

There has recently been much discussion regarding climate change, recycling of materials, sustainability and social responsibility. Governments are promising to plant billions of trees per year. Our food packaging cannot be recycled (so why not make packaging that can?). Coal is dirty. Hydrocarbons are polluting the atmosphere. SF6 is more harmful than methane. There are plastic mountains in the ocean. Meat is bad. All gloom and doom.

Unfortunately mining, which always comes in for criticism, is at the top of the hit (or the beating) list. Let us consider for a moment the oldest profession. Genesis 2:11 and 12 tell us that “The name of the first river is Pishon; it winds through the whole land of Havilah, where there is gold. And the gold of that land is pure, and bdellium and onyx are found there”. These metals and minerals have always been associated with mining activities (and of course exploration and metallurgy, otherwise, how would people know where to find it, and how would they know it is pure?). In verse 15 the man is placed in the Garden of Eden “to cultivate and keep it”. Thus farming is the second oldest profession. Which brings us to the point of this history/theological lesson. If it can’t be grown, and it can’t be bred, it has to be mined.

If we consider the environment, many things we take for granted are extracted from the earth, and processed into something useful. A house is always a good starting point to assess this. Steel for the supporting girders is processed from iron ore, coal and other metals and minerals. Glass is processed from a specific type of silica sand. Door handles are made of brass (copper and zinc) if you are lucky enough to be able to afford it. Tiles and bathroom furniture traditionally was made from clay, and other additives, and fired using coal (Staffordshire was famous for “Vitreous China”). Then of course, traditionally there are the services; copper wire, lead piping, metal piping, cast iron guttering. Many of these items are replaced by “plastic” items (PVC, uPVC, HDPE etc), which are created from processing various “fractions” derived from oil (extracted from the earth). Bricks are made from clay, and fired either using coal or other hydrocarbon, cement is mined, or quarried, and “processed” using coal. Slate, marble, alabaster, granite etc is mined, or quarried. Mining is important to us in many ways.

If we consider the computer, mobile/cell phone, the motor car, the refrigerator, the microwave, the vacuum cleaner or other aspects of our twenty first century life, many of the components have to be mined, and with the global populations increasing demand for these communication and labour saving devices, not all this demand can be met from recycling the old or discarded items.

However, in the quest to satisfy the global demand for minerals and metals, mining companies are realising that they have to be part of the solution to ensure the effect of mining on the environment is minimised as far as is possible. A single mining related disaster can wipe millions (if not billions) of pounds off the value of mining companies, send prices spiralling upwards, making our much loved gadgets and labour saving devices more and more expensive. Some of these events have had a severe impact on the environment, including Deepwater Horizon oil spill, Mariana and Brumadinho tailings dam failures, Baia Mare cyanide spill, etc. Mining is a risk industry, and there have been several disasters where loss of life has been a tragic consequence of the event.

Responsible mining companies are now looking to reduce the impact of their activities on the environment. This is where sustainability is important. Traditionally, a definition of sustainability would be “able to maintain operations at a certain rate or level”. More recently this has become “the ability to exist constantly. In the 21st century, it refers generally to the capacity for the biosphere (environment) and human civilisation to coexist”. To achieve this mining companies are now planning for closure (and rehabilitation) of the mine even before the first tonne of rock is removed. They are considering more suitable sources of energy (photovoltaic, wind, concentrated solar power, hydropower, even hybrids combining a number of “renewable” types of electricity generation). They are ensuring the local community will not be affected during the operation of the mine, or after the mine has closed..........................

Read the full article on our webpage: https://www.iom3.org/mining-technology-division

Laurence Morris MTD Board Member
This article outlines the development of a few of the international professional alliances and organisations, and those organisations that have contributed to some of the "standardisation" of certain reporting requirements from around the world.

**CRIRSCO**

CRIRSCO was formed in 1994 under the auspices of the Council of Mining and Metallurgical Institutes (CMMI). It is a grouping of representatives of organisations that are responsible for developing mineral reporting codes and guidelines in many countries with a mature mining industry. The combined value of mining companies listed on the stock exchanges of these countries accounts for more than 80% of the listed capital of the mining industry.

The international initiative to standardise market-related reporting definitions for mineral resources and mineral reserves had its start at the 15th CMMI Congress at Sun City, South Africa in 1994. The mineral definitions working group (later called CRIRSCO) was formed after a meeting at that Congress, and was made up of representatives from many countries, with the primary objective of developing a set of international standard definitions for the reporting of mineral resources and mineral reserves.

In 1997, agreement for the definitions of the two major categories, Mineral Resources and Mineral Reserves, was reached and their respective subcategories Measured, Indicated and Inferred Mineral Resources, and Proved and Probable Mineral Reserves.

The similarity of the various national reporting codes and guidelines has enabled CRIRSCO to develop an International Minerals Reporting Code Template. This can act as a "core code and guidelines" for any country wishing to adopt its own CRIRSCO-style reporting standard, after including provisions for country-specific requirements such as those of a legal and investment regulatory nature.

**IOM3 is a Participating Organisation for the PERC Standard.** For more information see [http://www.crirasco.com](http://www.crirasco.com)

**GMPA**

In an effort to better serve the global mining industry and its members, four of the world’s most influential mining organisations entered into a Memorandum of Understanding in September 2013 to establish the Global Mineral Professionals Alliance (GMPA).

The participating societies guaranteed access to education, public information, business networking and technical exchange opportunities for mining and minerals industry professionals worldwide. "The mutually beneficial relationship of the GMPA partners will promote the minerals industry and advance the professional development of members across a wide range of disciplines and areas of expertise."

The GMPA announced the launch of the Global Action on Tailings initiative, aimed at dealing with the challenges around mine waste, particularly tailings. The members of the Alliance agreed on the urgency of examining tailings from the perspective of disposal and closure, as well as of advancing discussions related to tailings management, tailings reprocessing/repurposing and ultimately, moving towards tailings elimination.

**IOM3 is a member of this alliance.** For more information see [https://www.iom3.org/news/2019/mar/06/iom3-supports-global-action-tailings](https://www.iom3.org/news/2019/mar/06/iom3-supports-global-action-tailings)

**OneMine**

OneMine is a searchable online global mining and minerals library. It contains over 130 years of peer reviewed works from a number of professional societies involved in the mining and extractive industries.

OneMine was launched as a collaborative effort between these societies in the mining and minerals related fields to promote access to technical articles, periodicals, books, and other published work as research source for engineers in related disciplines. It currently contains more than 125,000 articles, technical papers and other documents from mining societies around the world.

OneMine is a collaborative effort among multiple societies, including the IOM3, to gather the world's most comprehensive collection of mining and minerals based research in one place.

OneMine’s titles are published by societies and other not-for-profit organizational publishers which, until now, have been available only in printed form. OneMine provides integrated, cost-effective access to a thoroughly linked information resource of interrelated documents focused on the mining, mineral and exploration sciences. OneMine is unique in that it brings these sources into one search engine and location.

**IOM3 members have free access these mining and minerals related documents via OneMine.**

For more information see [https://www.iom3.org/onemine](https://www.iom3.org/onemine)

**ICMM**

ICMM is an international organisation dedicated to a safe, fair and sustainable mining and metals industry. Bringing together 27 mining and metals companies and 38 regional and commodities associations the ICMM strengthens environmental and social performance, and serves as a catalyst for change; enhancing mining’s contribution to society. By encouraging closer collaboration among industry leaders it is expected that poverty can be alleviated and give people access to a better life. This collaboration is supported by continuous dialogue with a broad range of stakeholders, including governments, international organisations, representatives of communities and indigenous peoples, civil society, academia and other industrial sectors in the value chains of minerals and metals.

For more information see [https://www.icmm.com/en-gb/about-us](https://www.icmm.com/en-gb/about-us)

---

Andy Birtles  TCB and MTD Board Member
Montreal Goldfield

In September 1880, gold nuggets were discovered on a beach north of Bermagui, on the coast of New South Wales, Australia. This was in a remote area some 380 km south, by road, from Sydney. The first man to make this discovery was, reputedly, a Canadian prospector, a Mr. H. Williams. This is the Canadian connection that gave the discovery its name, “The Montreal Goldfield”. Within 3 days of Williams staking his own 700 sq. ft. claim on the beach, it is said that a further 4km. of the coastline had also been staked out with claims. In true ‘goldrush’ style, it is also reported that within 3 weeks, as the news of this discovery spread, some 2000 people had descended on this area. As quickly as they had come, most left and within two months all of the gold on the beach had been removed, leaving only 400 men to widen the search.

The Montreal goldfield is an alluvial deposit. The gold that was first found on the beach is one of only two occurrences of this type in the southern hemisphere (the other being in New Zealand). The gold came from the erosion of quartz in older rocks located a few kilometres inland, most notably on the mountain known by European settlers as Mount Dromedary. A river flowing down to the sea in geological times had eroded the gold bearing quartz reefs in the mountain, allowing gold to be deposited in the gravel river bed. A thin (20 – 50cm) coarse gravel zone at the base of this ancient river bed contained almost all of the deposited gold. The discoveries on the beach indicated to the experienced prospectors that more gold could be found if the buried river bed was followed upstream. The second phase of this goldrush did just that, concentrating mining in a small area between the coast and Wallaga Lake some 2 km inland. This is where the Montreal Goldfield Heritage centre can be found today.

The surface deposits consist of a 10 to 15m thickness of clay material that the miners had to remove, as well as the dense bush vegetation, to reach the gravel river bed containing the gold. This was done by means of sinking vertical shafts or adits that were opened up at their bases to access as much of the gold bearing deposit as possible, not unlike the use of bell pits in coal mining. All mining was conducted manually using pick and shovel. Many of these shafts, rectangular in cross section and approximately 1.5 to 2 square metres in section, have survived largely intact and can still be seen today, together with some of the early mining artefacts. By shining torches down the mine shafts, guides show visitors the footholds cut into the shaft walls that were used to climb in and out of the workings. As would be expected, the bush vegetation has now regrown completely but the preservationists have constructed a boardwalk for visitors to tour the site so that many of the old access points can be seen safely without the danger of falling into an undiscovered void.

A substantial town sprang up around the workings as an infrastructure was developed to support the mining activity. Gold mining continued from 1880 through to 1883. In this time some 250kg had been mined at this site. Then the gold finds became exhausted. The miners moved on and left behind a scarred and devastated landscape that took a number of years for nature to reclaim.

There is another story associated with the Montreal Goldfield that reinforces interest in this historic site. On hearing of the increase in gold mining activity, the New South Wales government sent their geologist, Lamont Young and his assistant, Max Schneider, to the site to investigate the extent of the deposits and to arrange for mining licences to be issued. During their stay both gentlemen took a ride in a small boat owned by three local traders. The boat and its five occupants were seen travelling north of the mining site, close to the shore. However, a day later, it was found washed up on a local beach. What was strange was that all the belongings of Mr Young were found undisturbed in the boat, but all the occupants had disappeared. Police were called and decided that murder had been committed, but they had no evidence or bodies. Rewards were offered, but no-one was forthcoming with information and the mystery of the fate of these people remains unsolved to this day. Nowadays, the beach where the empty boat was discovered is known as Mystery Bay.

Did the boat founder and the occupants drown, or where they, indeed, murdered, but for what reason? Gold rush towns were lawless places in the 1880’s and Mr Young represented authority. This was the era of the bushranger, criminals who frequently ambushed gold shipments. Alternatively, perhaps the five men got rich beyond their wildest dreams and just chose to vanish and start a new life. No-one has ever found out. The story helps to sell tourism today and bring people to this, still fairly remote, corner of Australia.

More information about the Montreal Goldfield Heritage Centre can be found at www.montrealgoldfield.org.au/wp/
A Boost for UK Coal Mining?

A few issues ago MTD Newsletter discussed the prospects for the UK Heritage Railways and the fact that they may literally run out of steam with the demise of UK coal mining. Just before the country (including all the Heritage Sector Railways!) was locked down by the terrible events due to Coronavirus, on March 4th 2020 Kevin Hollinrake MP whose Thirsk and Malton constituency covers the North Yorkshire Moors Railway (the most popular Heritage Railway in the UK in terms of numbers of passengers) organised a meeting at the House of Commons between Government Ministers and members of the Heritage Railway Association to discuss further the possible implications to the heritage sector of the loss of UK mined coal. There was (and still is) a great fear expressed by the steam railway community that reliance on imported coal would lead to a huge financial burden and result in the wholesale closure of an important sector of tourism (and deny future generations the opportunity of seeing coal fired steam locomotives working as opposed to stuffed in museums!).

The MPs considered a proposal to provide support with the extra costs of importing the lumped coal needed to run steam locos from Russia or Australia – however, whilst financial support would be welcome – as a last resort -such a scheme would have adverse environmental impacts compared to using coal mined in the UK. It is reassuring to learn that the Ministry of Housing, Communities and Local Government is also considering planning permissions to extend the life of, or, to even create new coal mines, allowing the UK to produce its own coal specifically for Heritage Railways in addition to allowing plans for new mines to produce coking coal for use in steel manufacture (coking coal is still considered a Critical Raw Material) in Europe!

This is heartening, but by no means a done deal – however, I would urge anybody keen on preserving living examples of an industrial sector in which the UK once proudly led the World to lobby their local MP supporting the concept of mining coal in the UK for use in the Heritage Sector.

Dr Chris Broadbent
MP Board Member

EVENTS: CONFERENCE UPDATES

Mining Technology Division (MTD) Conference—Legacies of mineral extraction and sustainability opportunities,
Neville Hall, Newcastle-upon-Tyne

Coronavirus Update.

As a result of the current Virus Pandemic the MTD Conference Committee held an online meeting on Wednesday April 22nd to review strategy. We have been informed that all work on refurbishment on Neville Hall is now suspended provisionally for 6 months. This means that the Conference Date is now likely to be delayed until the First Quarter 2021, at the earliest.

It is the wish of the Organisers that the work to date should be utilised fully. Abstracts for the Conference have now been received and an outline programme developed. Authors have been contacted and are aware of the postponement from the original date.

Therefore, the submission process for abstracts is now closed and the programme is full. Any additional abstracts received will be placed on a ‘reserve’ list.

All presenters at the Conference are asked to submit a full written version of their paper for potential inclusion in the conference proceedings volume (subject to peer review), which will be issued to everyone attending the conference. It is also an opportunity to promote their work to a wider audience as well as giving independently verifiable CPD experience. In event of further changing circumstances the Committee are reviewing possibilities of developing a means of ensuring the papers are retained as future reference documents.

Any questions about the Conference, please contact David Seath

(MTD-Conferences@iom3materialscycle.org) for Details of the Venue - Please refer to Website for Common Room of Great North