President’s Message
Welcome once again to our regular newsletter, thank you for taking the time to read our latest updates. We are always interested to hear the thought of our members so if you have an article that you feel is of interest to our membership or have a creative streak and would like to compose an article then please forward any relevant content to our editor and secretary David Seath.

Firstly, a huge thanks to all those that organised and participated in The Mining Institute of Scotland (MIS) local heat of the IOM3 (Institute of Materials, Minerals & Mining) Young Persons’ Lecture Competition. Thank you to our events sub-committee for their efforts in delivering the recent in-person/hybrid presentations, it has been brilliant to get active with these, meeting MIS members, Council, and the organisers from our joint meetings with Edinburgh Geological Society and Institute of Quarrying. Also thank you to our speakers Dr Nathan Magnall, Dr Steven Hollis and Phil Rayson. Although there is only one more to come this year, we are already looking forward to next year’s programme. I look forward to meeting you at an event soon.

I would like to mention a little more about professional accreditation. The MIS has an active programme for helping people to achieve various levels of professional accreditation from initial membership through to chartership programmes for CEng, CSci and CEnv. In addition, IOM3 has its own Fellowship programme (FIMMM) for experienced professionals. As a lifelong learner, I have completed the FIMMM. This accreditation is not exclusive to degree holders, in fact the process is quite straightforward, and we are here to guide you through something which will recognise your professional competency and benefit your career. Please reach out to us for support.

If you are interested in volunteering to help us in the running of the MIS events and subcommittees, becoming involved with delivering relevant information to our members then please reach out to myself, David Seath or any of the committee members and we would be incredibly grateful for your help.

Scott Petrie FIMMM
scottie_petrie@hotmail.com

EIG Conferences
Having really enjoyed being back to a face to face conference in Exeter, it has been confirmed the 22nd EIG conference will be held at the University of Hull on Wednesday 4th and Thursday 5th of September 2024, with fieldtrips to be run on the day before and the day after the main conference. The Extractive Industry Geology (EIG) Conference is the principal event for sharing knowledge, scientific research and good practice in the field of applied geology within the UK minerals industry.
Geotechnical Engineering

Ground investigation for the 132kv Renewables Connection Scheme on Shetland

BAM Ritchies supported SSE Networks (Transmission) in the delivery of a Ground Investigation for the 132kv Renewables Connection Scheme on Shetland. Investigations were undertaken to manage the ground risk for the design of a new power connection and to provide more cost certainty for construction in difficult ground conditions.

Investigations were undertaken for 42.5km of new cable route and a switching station in the most remote, difficult to access, part of the UK. Located within a UNESCO Geopark, rocks of every era from the Precambrian to the Carboniferous are present meaning Shetland’s geology is more diverse than any similar sized area in Europe. These factors presented challenges logistically, geologically and in terms of risk management.

The fieldwork, undertaken in 2022, comprised 38No. boreholes (dynamic sampling and rotary coring) varying between 10m and 50m in depth, 342No. machine excavated trial pits up to 3m in depth, and associated in-situ testing.

All works were completed on time and had minimal impact on the environment. Works were completed with excellent safety performance with no incidents recorded.

Innovative techniques were used to access locations to minimise our footprint on sensitive peat land. Low ground pressure plant was utilised to minimise environmental impact. Plant, equipment and personnel were transported on low pressure vehicles (Hagglunds) and wide-spread 7t excavators were utilised.

Other aspects that were taken into account during works were UXO (unexploded ordinance), sites of archaeological interest and protected species (ecological mitigation). Therefore, we engaged the expertise of specialists within their given field:

- an EOC (Explosive Ordinance Clearance) Engineer supervising all excavation within the Shetland Battle School near Setter, Shetland was a strategic location in WWII;
- various archaeologists or ACoW (archaeological clerk of works) conducting watching briefs and walkovers in consultation with the Shetland Amenity Trust;
- guidance and supervision by local ecologists who surveyed ahead of and during works, conducted watching briefs and engaged with NatureScot and the Peatland Restoration Project (Shetland Amenity Trust) - ecological considerations were key to protect ground nesting birds and otters in particular. This included the innovative use of camera traps deployed to understand otter activity around holts.

Relationships benefited the local community with several local companies used to supply equipment and services, which with their local knowledge also benefited the scheme in return:

1. Welfare hire and supply of excavators and operators;
2. Fencing contractor for permanent reinstatement of fences crossed;
3. Local ecologists for consultation and supervision on environmental mitigation.

All images supplied curtesy of BAM

Jamie Lodge MIMMM, Ground Geotechnical Engineer, BAM Ritchies
2023 Young Persons’ Lecture Competition

For the twelfth year, the School of Earth and Environmental Sciences, University of St Andrews hosted the Scottish Heat of the Young Persons’ Lecture Competition with the event being held online using Microsoft Teams. The competition was held on 24 February and presented our judges, Bob Laird (Mining Technology), Jim Wishart (Mining Technology) and John Wilcox (Scottish Association for Metals), with an interesting task.

Gillean Brooks, University of St Andrews was declared the winner and will go on to represent Scotland at the National Final to be held on 3 May. His presentation was entitled: Data Mining: How Machine Learning is Shaping Geology.

Abstract: In this lecture I will explore how machine learning already has, and will continue to, change the field with case studies from the worlds of mining, hydrothermal, and research geology. I will attempt to demystify and explain the core concepts of machine learning and inspire fellow geologists in the audience to consider the applications of this existing technology to their own projects.

Other presentations were delivered by:

Drew Garrick on Rolling out efficiencies: a novel mass manufacturing method to produce grid stiffened structures

Stuart Munro on The Life Cycle of a Placer Deposit

Tesni Morgan on The octopus’s garden: genesis of submarine polymetallic nodules.

Gillean receives his winner’s prize from Bob Laird © MIS

Drew receives his prize from Bob Laird © MIS

Stuart receives his prize from Bob Laird © MIS

Tesni receives her prize from Bob Laird © MIS
Minerals Matter

The UK Mining Education Forum (UKMEF) report showed that there was a shortage of graduate mining and mineral processing engineers educated in the UK. A consortium of respected industry organisations and employers have taken a key role in leading a major project aimed at raising the profile of the sector and inspiring young people and adults to become the next generation of quarrying and mineral products professionals. Future-proofing the sector’s ageing workforce and increasing educational pathways are industry imperatives. ‘Minerals Matter’ is a coordinated cross-sector approach to address the key challenges the industry faces around diversity and the skills gap, promoting the positive contribution to the economy and efforts around decarbonisation and the circular economy.

To find out about career routes and discover what it’s like to work in quarrying, mineral products and mineral processing, brought to you by minerals industry organisations and employers, ‘Minerals Matter’ is a resource for young people and adults thinking about their career options. There is a YouTube video (https://youtu.be/hlmj7Pw0qg4) published that targets inspiring the next generation into a career that will shape their world. It’s also helpful for parents, guardians, carers, school teachers, careers advisors and educators, wanting minerals industry information to guide people with their career choices.

The minerals industry plays a vital part in our everyday lives. Mineral products are all around you. From your phone and TV, the glasses and cutlery you use daily, to roads, cars, trains, buildings and the built environment, they’re everywhere.

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The main mineral products and essential materials extracted and processed by the minerals industry include:

**Aggregates** – these are rocks broken down into smaller pieces, such as sand, gravel and crushed rock.

**Asphalt** – a mixture of aggregates with hot bitumen to create a hard-wearing surface, such as for roads, footpaths, playgrounds, car parks or runways.

**Cement** – the key ingredient in concrete, used widely in construction. It’s made by heating limestone with shale, then ground into cement powder.

**Concrete** – a mixture of cement, aggregates and water, it’s the most common man-made building material.

**Dimension stone** – used predominantly in the heritage sector, for stone carving and to maintain local character to stone buildings.

**Lime** – both agricultural and industrial. Agricultural lime is produced from calcium carbonate and is used for improving soil so that healthy crops can grow. Industrial lime is used for making steel, glass, foods, chemicals and medicines.

**Mortar** – this is what’s used to ‘glue’ bricks and blocks together for most buildings.

**Silica sand** – used in glass, paint and plastic making.

Minerals and mining is very much alive in the UK. On 5 February 2023, the BBC programme *Countryfile* spent almost an hour covering ‘Underground Britain’ and the programme will be available on iPlayer for another 10 months. The programme covers legacy environmental issues before moving on to the modern and vibrant mining sector. Anyone interested in a mining sector career should watch.
Energy Transition Group

To date the IOM3 has been reactive in the public domain, predominantly responding to requests for input to consultations issued by the UK Government. The latest member survey showed that members want IOM3 to be more proactive and have a greater public profile on key issues. Accordingly, IOM3 has asked the ETG to produce the first IOM3 Position Paper which will be used to inform members, the public and decision makers on the energy transition.

The ETG leadership group held a full day workshop at IOM3 HQ, London on Thursday, 9 March to determine the format, content and action plan to deliver the paper. Following a successful recruitment campaign the ETG has a diverse leadership group with expertise across the full spectrum of energy sources. The Group agreed to produce an initial high level Paper, by June 2023, that will set out: the vital importance of energy, key principles for the transition to a sustainable energy supply, key challenges and actions required. Thereafter the ETG leadership group will produce a series of more detailed papers on specific aspects of the energy transition with their challenges and actions required. The intent is to bring issues that are not currently receiving sufficient attention to the forefront, to raise public awareness and influence decision makers e.g. politicians, industrialists, financiers and academics. The Paper will be based on accurate information in the public domain from reliable sources, for example the Digest of UK Energy Statistics (DUKES) issued annually by the UK Government. The leadership group have begun collating the reference material and already have an extensive list.

Steve Bedford
stevebedford5@gmail.com

Mining Technology Group

The MTG will not meet again until 30 March. Nevertheless, a sub-group has been formed to develop proposals for a conference in 2024. The sub-group is chaired by Colin Comberbach drawing on input from Andrew Fulton, Wyn Griffith, Steve Straw, Alan Auld, and David Seath amongst others. An initial meeting was held on 21 February and followed up with a meeting on 15 March.

So far it has been agreed that the title of the conference will be ‘Advances in Mining Technology and Minerals Supply’. The sub-group has been tasked with writing a scope for the conference, duration, audience, speakers, venue, etc. Further discussion will take place on 13 April.

Symposium on Ground Freezing

The 11th International Symposium on Ground Freezing will be held on 10-12 October 2023 at the Museum of the London Docklands, close to Canary Wharf. The Wilberforce Room which is on the 3rd floor will hold 270 delegates in theatre style. Additional facilities include a 310sqm area Riverside Room on the Ground Floor with private access and private outdoor terrace for catering and exhibition purposes. On the 3rd floor also is the Quayside Room which will hold 100 seated delegates. The response to our request for the submission of Abstracts for papers to be considered for publication in the Symposium Proceedings has exceeded our expectations with offers of 75 papers. The Symposium will need to consist of parallel sessions throughout the three-day event. Referees to vet the papers and Chairmen for the Symposium Sessions will be required, so volunteers will be welcome. We have twelve sponsors and exhibitors so far. We need to continue increasing these to enable us to provide more social and networking activities. The International Organising Committee comprises eight UK Members and eleven from overseas. It is intended to hold an on-line Committee meeting in the near future to update everybody.

Newsletter

The Spring issue of the MTG Newsletter was published on 20 March. Included were two specific articles on mining-related matters in Scotland. One article featured critical mineral exploration in the North-East of Scotland whilst the other article looked at the Museum of the Scottish Shale Oil Industry.

Other matters

The MTG Leadership Team has nominated two speakers from our (i.e. MIS) Technical Programme for the IOM3 Thornton Medal 2023.

David Seath
d.seath@btinternet.com
Institute, Industry & Other News

IOM3

The Presidential Address will be delivered by Dr Kate Thornton on 29 March. The AGM will be held on 12 September. Both events will be hybrid events with the speakers at IOM3 HQ, London.

From 1 March 2024 only those current members who hold the new QMR accreditation – Qualified for Minerals Reporting – will be accepted by IOM3 as being of the “minimum membership class” to be involved in the compilation of Public Reports.

Student & Early Career

On 18 January after years of postponing, Materials Matter took place. Sixteen students visited Tata Steel, Port Talbot, learned about careers in the steel industry and had a guided tour of the hot mill.

Planned events and activity in 2023 include:

- Matopoly Nottingham
  This orienteering, clue-based networking event will be returning in the summer (20 May) and run by EMMS on behalf of SECG.
- Materials Matters: Other Venues
  Planning has started to roll out Materials Matters events to other venues in 2023. Venues where SECC members are based include MTC, Minton Treharne and Davies Ltd, Sandbeg, along with the Non-Ferrous & Light Metals Group.
- Road to Chartership
  The event will follow the same successful format featuring experiences and views from academic and/or industrial chartered engineers/scientists.

Road to Chartership

The 2023 Production Plan has the objective to sustainably ramp up to 2,000 oz of gold per month. The salient points were:

- Finalised detailed mine plan for 2023 using granulised data from grade control and resource definition drilling undertaken in 2022
- Plan facilitates higher gold grades and gold ounce production continuity
- Transitioning from tunnel development to long hole stoping
- Long hole stoping from Q2 2023
- Long-hole stoping mining method allows minimal dilution and increased ore mined will be realised

The 2023 Mine Plan outcomes being forecast include:

- Incline redesigned to run centrally through the centre of mass for the western mining zone and providing two ore drives on each level
- 2023 western mining zone grade estimation is based on grade control model channel sampling data tied in with underground mapping and historical drillhole information
- Eastern ventilation drive extended from current 415 ODE face to intersect historical development. This reduces development required to complete ventilation circuit by 50%
- Eastern ventilation drive enables access to eastern ore zone and firming up of resource sooner
- Transition from cut and fill to long-hole stoping.
Why we need mining

Even if we were to recycle all the freely available metals and minerals in the world today, we would only meet a small percentage of the total mineral and metal requirements of society. This is in part due to the demands of a growing global population but also the reality that metals and minerals can remain in use for many years and are simply unavailable for recycling. For example, steel forms the framework of buildings; it can't be recycled until the building has been demolished. Mining is, therefore, key to almost every facet of our lives, from construction to the technological innovations that improve our lives. But we need to be mindful of the broader balance of benefits and impacts and how mining operations should be managed.

The means to achieving that balance lies in the concept of sustainable development. Its central idea is that any human activity, including mining, should be undertaken in such a way that it provides a net positive contribution to people and the environment. This means that the benefits (which cannot be measured in purely economic terms) must outweigh the costs. The growing demand for minerals and metals is sure to keep mining and the management of its impact and benefits front and centre. Across this site, you’ll find information on some of the key sustainable development challenges facing the mining and metals industry.

Mining and metal production has evolved from being manual, unsafe, dirty and small-scale to being partially- or fully-automated, safer, cleaner and large-scale. Unlike their predecessors, today’s workers are highly trained personnel performing skilled work in accordance with the highest health, safety and environmental standards. Apprenticeships, guest lecturing and funding are needed to drive growth in numbers of people choosing a career in mining. All are different avenues to bridge the gap but, as in the broader engineering community, the problem is far from solved. We all need to continue to inspire new mining and mineral processing engineers, encourage them with promotion outside their home industry and back these initiatives, reinforcing the fact that mining is indeed an exciting, necessary, rewarding career.

Before a mine is established a long process of metal and mineral exploration is required. Advanced scientific techniques (e.g. geochemical analysis of the Earth’s crust or airborne surveys to measure magnetic, gravitational and electromagnetic fields) are used to help determine whether a location has a sufficient mineral deposit to warrant mining. Once this preliminary investigation has been carried out, more and larger rock samples are drilled and sent to a laboratory for testing. Very few rock samples contain metals or mineral of a high enough grade to be worth mining. Each exploratory step is based on the information available at that time. Money and effort are spent to raise the degree of confidence in the measurement of the shape, size and grade of the mineralisation held in the Earth’s crust. When a company decides that a mining operation is feasible, a social and environmental impact assessment is undertaken and submitted to the relevant environmental regulatory authorities for approval.

After extraction, the metal or mineral product (in solid, slurry or dissolved form) may require further processing to increase its purity. The waste material is sent to long-term storage. Coarse waste is moved to a residue pad, and tailings (fine waste) is pumped to the tailings storage facility. The state (solid, liquid or dissolved) or the metal or mineral determines how it is purified. Some products, like iron ore, only need to be sized and shaped. To produce London Metal Exchange grade copper cathodes, the copper must first be changed from a dissolved to a solid state by solvent extraction or activated carbon adsorption. This is then followed by electrowinning and electrorefining. Metals in a liquid (slurry) form are filtered and dried before being smelted or roasted. Smelting is a high-temperature process that extracts the molten metal from the slag (unwanted molten waste). Roasting is also a high-temperature process. It produces metal oxide particles. The metals are further chemically refined to increase their purity to the standards set for world metal markets. Most trading takes place at 99.9% purity.

The environmental challenges of these refining processes include the handling of solid, liquid and gaseous waste. The biggest issue is the airborne gases and dust that can be emitted from the smelting and roasting processes. In addition, mercury risk management is the subject of a UN Environment Programme (UNEP) convention. The control of cyanide used for the recovery of gold and silver and in heap leaching processes is also critical and is the subject of its own management code. Regulatory controls and technology, made possible by the large capital investments of mining companies, have greatly reduced environmental emissions of all kinds over the last five decades.
Decommissioning practice from the UK and Europe

The UK has been actively decommissioning offshore since the early 1990s, in theory giving the industry about 30 years of experience. But it’s only in the last five or six years that it has become a mainstream activity in the UK. The regulatory framework influences what industry does and how it is delivered. So, owners of offshore oil and gas infrastructure have an obligation to manage their energy legacy, either through the repurposing of infrastructure or by decommissioning it.

The industry traditionally worked on the assumption that infrastructure will be removed from the marine environment when oil and gas production ends, but with the emergence of alternative energies and carbon storage we’re seeing opportunities to repurpose some specific pieces of infrastructure.

The North Sea Transition Authority (NSTA) regulates and influences the oil, gas and carbon storage industries in the UK, and it is driving the creation of an integrated energy system.

NSTA’s understanding of repurposing is growing, and there’s no doubt that some of the redundant oil and gas infrastructure may have a life beyond oil and gas.

There’s a subtle but important distinction between re-using or repurposing infrastructure that’s come ashore and reuse or repurposing in-situ. If you re-use or repurpose infrastructure onshore, then you’ll have removed it from the marine environment and therefore decommissioned it. But if you repurpose infrastructure in-situ then the decommissioning obligation gets transferred to the new owner/or user.

NSTA currently works with operators to identify repurposing opportunities and seeing that pipelines offer the greatest opportunity, especially the larger trunklines. It might be small in number but it could make a large impact. However, the work is also showing that decommissioning remains the likely destination for redundant oil and gas infrastructure, and it’s a big and growing part of capital spend in the UK.

Decommissioning is regulated by central government, managed through OPRED - the Offshore Petroleum Regulator for the Environment and Decommissioning. OPRED not only manages the liability for decommissioning, but it is also responsible for reviewing, monitoring and approving decommissioning programmes.

OPRED makes sure that decommissioning is aligned with the UK’s environmental ambitions, and they specify that decommissioning must aim to achieve a clear seabed. They have published detailed guidance for many years setting out the requirements for industry. It’s a system that’s understood by industry, and it’s shared widely across the globe as countries, including Australia, look at developing their own decommissioning system.

As with any capital investment programme, when work is executed offshore it’s underpinned by significant onshore planning and engineering. In decommissioning the UK has built exemplary experience in environmental assessment, survey, engineering and project management to support project delivery.

Where platforms are concerned, industry has learned that managing opex after production has ceased is critical. So, expertise in engineering well decommissioning alongside executing work has become a major focus. The industry has moved beyond platform wells to include subsea wells too. Over the past two years there has been significant growth and expertise in well decommissioning, with operators and the supply chain testing innovation in contracting approaches to aggregate scope and give schedule flexibility, establishing the campaign model as a means to delivery.

The model is showing that spending time doing detailed engineering onshore to determine the right vessel and scope can lead to efficient offshore delivery. Couple that with a highly skilled offshore team who are experienced, with long-term certainty of work, means you minimise time offshore on each well and thus minimise cost. While that feels like common sense, the industry has had to change some of its standard approaches to make it happen. That takes commitment and effort from operators and the supply chain.

The topside removal and onshore dismantlement market are a highly visible and important part of decommissioning. The model that many operators have moved to is a single lift of a topside transferred to shore for safe dismantlement and onward recycling or disposal. It’s been working well for the UKCS, but competition for services is increasing globally and where once the UK had the makings of a smooth, efficient, stable market it is facing less certain times and now considering the implications of that. What it highlights is never get complacent – you might think you’ve got an efficient market but things can change so it pays to keep learning.
Programme of Events, Contact and Other Matters

MIS Risk Register (abridged and subject to final Council ratification and approval)

Council has spent time updating its Risk Register. The task was led by Steve Bedford supported by President Scott Petrie and Secretary David Seath. There are 8 significant risks identified and an action list details responsibility for improvement activity (i.e. Further risk treatment measures). The full approved version will be published on the website in April 2023. Meanwhile, some details are as follows:

<table>
<thead>
<tr>
<th>Risk No.</th>
<th>Risk description</th>
<th>Responsible person/body</th>
<th>Further risk treatment measures</th>
<th>Action status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insufficient members</td>
<td>Council</td>
<td>1. Produce an information pack for running an event that includes a checklist and templates covering the following: event advertising, funding, sponsorship, MIS/IOM3 brochures, advertising of membership benefits, gift for the speaker, vote of thanks, attendance log and feedback forms for continuous improvement. 2. Proposal for a 2024 conference on the supply of critical raw materials in Scotland/North of England with a strong Scottish input. 3. Review MIS/IOM3 offering and support in Scotland for student and early career members (including technicians) and report back to Council with proposals for any changes to increase MIS student and early career membership and engagement. Workgroup to be formed to support Meghan, including MIS Trust representation.</td>
<td>1. Due by Sep 23 2. Due by Sep 23 3. Due by Jan 24</td>
</tr>
<tr>
<td>2</td>
<td>Loss of facilities or buildings</td>
<td>M Council Programme Committee/ Martin Downing MIS SECG / Meghan Oliver</td>
<td>No further risk treatment measures required (i.e. accept the residual risk)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Budget shortfall</td>
<td>L MIS Trust</td>
<td>4. MIS Trust to provide an annual update on the Trust status and activities through an article in the MIS Newsletter immediately following the Trust AGM. The Trust funds derive from bequests. The annual Newsletter article will include a reminder that the Trust is a Registered Charity; therefore bequests and donations attract the relevant tax reliefs which will be highlighted in the article along with information on how to make a bequest or donation. The MIS Secretary is the Chair of the MIS Trust and will advise the responsible person for the action.</td>
<td>4. Due by Apr 23</td>
</tr>
<tr>
<td>4</td>
<td>Loss of ALS status</td>
<td>L Council / President</td>
<td>5. Increase MIS attendance at the regular Scottish ALS meetings to a minimum of two people from the Secretary, President and Treasurer.</td>
<td>5. Due by Apr 23</td>
</tr>
<tr>
<td>5</td>
<td>Insufficient volunteers</td>
<td>M Council</td>
<td>Residual risk accepted but Council will actively seek new members and take action when these are insufficient.</td>
<td></td>
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<tr>
<td>6</td>
<td>Disruption to meetings and/or events</td>
<td>L Chair of meeting / event</td>
<td>No further risk treatment measures required (i.e. accept residual risk)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Inability to communicate effectively with members</td>
<td>M Council / Secretary</td>
<td>7. Secretary to archive key MIS documents such that the MIS can operate effectively in the event of the temporary or permanent loss of material hosted by the IOM3. Electronic archive material should be stored on a standalone device and account taken of potential future software updates: documents required for long term archive should be stored in pdf format and/or paper copy.</td>
<td>7. Due by Jun 23</td>
</tr>
</tbody>
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Calendar of Events

Technical Meetings

19 April 2023 – 6.00 pm online (Zoom)  
Modern underground survey techniques  
Mark Hudson, Geoterra

Other Events

Retired Members’ Lunch  
9 May 2023 – noon  
Lochside Hotel, New Cumnock, Ayrshire

Secretary

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