



## The Minerals Engineering Society (formerly The Coal Preparation Society)

# Horizons

### Hopley Lecture 2015 - A fracking success

The 41<sup>st</sup> Hopley Lecture, held at Willesley Park Golf Club on 15 January 2015, attracted a record attendance of 111 adults (and one baby!). They turned up in droves to listen to an excellent presentation by William Gagie MRICS, a partner in the Minerals Division of Fisher German LLP, who covered the controversial and topical subject of fracking for gas in a very detailed and wide-ranging manner. William, who is a



local lad to the Ashby area, has a wide background in minerals and was well qualified to advise the audience on the current situation and future expectations of fracking in the UK.

The meeting was opened by MES President, David Baillie, who welcomed the widely diverse audience from the engineering bodies and the general public to the golf club. He introduced the paper entitled,

“Fracking: Energy Security or a White Elephant?” and, then, for all the best reasons, allowed the speaker properly to introduce himself.

William started by explaining “the science behind the controversy”, describing what hydraulic fracturing involved technically and how the operators and advocates for the technology had allowed the protestors against it to establish strong initial opposition. This opposition has proven very hard for the energy companies to counteract, perhaps due to an ingrained British suspicion of big companies. The name “Fracking” is now synonymous with water aquifer contamination and earthquakes due to misinformation, with much of the evidence on which this was based having now been discredited. Slides showing a typical drilling operation demonstrated how little impact such sites could have on the surrounding landscapes once they are operational. The main environmental impacts would likely be road transport of water, sand and the few additives required for viscosity/friction control of the high pressure pumping operations involved. Noise from the initial drilling rigs would also be a factor to consider so there would have to be strict environmental legislation applied to any commercial operation.

A possible weak link in fracking was identified as the strength of the well casings closest to the surface, not the effect of drilling vertical and horizontally to a depth of ~ 10,000 ft. Failure of such multi-layer concrete casings could contaminate surface aquifers. Accordingly safety standards must protect against this. It is expected that each drill hole would have a 200m diameter “fracking effect” underground so a commercial site will carry out numerous “fracks” from each well and will probably sink several wells at each site to maximise production and minimise the number of planning applications.



#### Special points of Interest:

- Hopley Lecture 2015
- Bretby Reunion
- Glebe Mines Visit
- ICPC 2016 Update
- Southern Group Visits
- Northern Group Visits
- Social Events
- Letter to the Editor

#### Inside this issue:

Message from the President	3
British Fluorspar Visit	3
Bretby Reunion	4
Crown Hotel Christmas Dinner & Dance	6
Home of the Archive in the News	6
Letter to the Editor	7
Moulding Solutions Visit	8

## Hopley lecture continued.....

William proceeded to look at various sources for UK gas including shale gas, coal bed methane and coal gasification and their possible future contributions to UK energy supply. Regarding shale gas, the latest BGS estimates for the Bowland Shale deposits indicate 1329 trillion cubic feet (tcf) gas in place. Assuming a 10% recoverable figure this would result in 133tcf production. With current UK gas consumption at ~3tcfpa, this implies potentially over 40 years supply! But there is so much uncertainty over proven reserves much more exploration and study is required to determine a realistic resource and some commercial sites need to start operating to determine actual recovery levels.

In order to encourage local communities to embrace fracking there are community impact payments available which may encourage site development. These are currently proposed at £100,000 per drill site, £20,000 per horizontal drill and 1% of revenue. In many cases this will amount to a large sum of money and how this is allocated and spent by local communities could have a big impact on public acceptance. Recent proposals by Ineos could further alter this. The latest situation is demonstrated by the latest PEDL submissions (the 14<sup>th</sup> Round) for developing new fracking sites which ended October 2014. Currently there are 120 oil and gas production sites in the UK plus a further 300 applications for a further 98 sites.

William ended his presentation not claiming to have all the answers but he certainly asked all the right questions. Is it commercially sound in the current low oil price scenario to press ahead with such a controversial technology, despite it being such a success recently in the USA? They have gone from net importers of gas to exporters of gas on the back of fracking albeit in very different circumstances from the UK but even so some sites have become uneconomic at current energy prices.



Will the UK consumer be prepared to pay above the market price for their energy in order to have some degree of energy security? Will the Government's need for tax income lead them to promote UK production at the expense of imports?

The main questions following the presentation were based on the need to establish realistic estimates of shale gas reserves in the UK, whether or not it is commercially viable to process them at present. It is more about determining what we have for the future should it become commercially or strategically sensible to develop.

Rod Stace, Secretary of the South Midlands Mining and Minerals Institute, proposed a Vote of Thanks to William for his excellent paper and presented him with the Hopley Shield together with an engraved tankard as a memento for his efforts which were obviously well appreciated by the audience.

The only one to fall asleep during the evening was the baby (thankfully!). The evening ended with an excellent buffet provided by the Golf Club and generously sponsored by SMMMI. Roll on next year (14th January 2016) for the next instalment!

## Message from the President



Welcome to this Spring issue of Horizons which I trust will bring you all up to date with everything we have recently been doing and with our plans for future MES events. As you can see, we have been very active in preparing events for the benefit of our membership. There have been several interesting technical visits and technical / social meetings which are reported in full in this Newsletter and please note our next major event is the 2015 Minerals Engineering Symposium on 14<sup>th</sup> May in Kegworth, which has a full and exceptionally interesting programme. These annual Symposia, jointly sponsored by South Midlands Mining and Minerals Institute (SMMMI) and the Coal Research Forum (CRF), but arranged and organised by the MES, have proven very successful for many years and I would encourage you all to come along, meet up with friends and colleagues and learn about what is going on in the minerals industry.

I am especially pleased that we are able to include a 'Letter to the Editor' in this issue in response to the 2014 Coal Science Lecture report in the previous issue. I believe this may be the first such response we have had from our members (thanks, Pete) for a long, long time and hopefully it won't be the last. Don't be shy to express your views on anything we include in Horizons as it is gratifying to believe that our efforts stimulate some interest! As always many thanks to all who contributed to this issue.

### Northern Group Visit to British Fluorspar

This is a report on a visit to the British Fluorspar plant at Cavendish Mill on 19th November when I was part of a group from the Minerals Engineering Society.

The plant at Cavendish Mill which had been closed in 2010 was (in 2012) purchased by British Fluorspar, a subsidiary of the Italian Fluorsid Group.

The target is to process around 200,000 tonnes per annum of ore to produce 40,000 tonnes of acid grade fluorspar, 8000 tonnes of barytes and 1000 tonnes of lead concentrate.

Ore is being obtained from three sources – Milldam Mine, the opencast site at Longstone Edge and the new opencast at Tearsall on Bonsall Moor. The opencast on Longstone Edge will be worked out in a few months whilst Milldam has a 20-year life and the Tearsall Opencast is expected to have an eight year life.

Following refurbishment, the Mill became operational again in April 2013 and is now operating in campaigns of seven days on and seven days off and processing around 1700 tonnes per day.

Around 20 people (from a workforce of 60) are employed in the plant and it is interesting to note that the fresh water supply comes from Watergrove Mine.

The fluorspar product is sold to a number of customers in Italy and Mexico with some very high purity material going into welding rod manufacture. The galena concentrate is being packed into bulk bags and sold to China.

One of the other members of the group was Mr Doug Jenkinson whom PDMHS members will recall gave a very interesting talk at the 2013 AGM on his experiences at Cavendish Mill during WW 2.

My thanks go to Chris Large, Mill Superintendent, for this very enlightening and informative visit.

*John Pigott* PDMHS



## Bretby Reunion



Despite the fact that Bretby Technical Services and Research Establishment (TSRE) finally closed for good 20 years ago (1994), when British Coal ceased operations, there are still a surprisingly significant number of survivors who attend the three-yearly reunions to catch up with “old” friends and ex-work colleagues. The latest get-together was once again held at the usual venue, Willesley Park Golf Club, in November 2014 when a total of 25 colleagues and partners attended what turned out to be a really enjoyable and successful evening. Despite a few late call-offs due to illness (we are now more susceptible to colds and flu!) it was great to meet up again and reminisce about past

experiences and find out what everyone is up to presently and their plans for the future. The general consensus was, “Thank God for the BCSS index linked pension”! The evening flew past very quickly and the excellent buffet was appreciated by all (although there was an observation that we had no dessert this year). What can you expect for £10! Douglas Jenkinson thanked Rod O’Brian, Dr Trev Jones, Dave Parker, Dr Steve Ivatt and Dave Baillie for organising the reunion. The next one will be held during November 2016 with a bit of luck (a two-year break this time as we are all getting on a bit – sorry, maturing!). No photos were taken on the night as everyone forgot their cameras and phones (sign of old age!) so included is a copy of the original Coal Prep Div. “wake” held on 24 March 1994 at Geary House, Bretby. How many individuals can you identify?

## International Coal Preparation Congress St Petersburg - Update

Members of the IOC from Turkey, Australia, Germany, Hungary, India, Poland, South Africa, China, Great Britain and the United States of America met with the National Organising Committee at the University of Mines, St Petersburg, Russia, to plan the next ICPC in 2016.

Delegates were welcomed by Prof. Dr Litvinenko, Rector of the National Minerals Resources University (University of Mines) who introduced the members of the National Organising Committee who would be responsible for organising the next ICPC Congress in June 2016.



After the preliminaries the following decisions were made:-

- Confirmed that Prof. L A Weisberg would be Chairman of the IOC.
- The XVIIIth ICPC would be held in the University of Mines, St Petersburg, from 28<sup>th</sup> June to 1<sup>st</sup> July 2016.
- An exhibition of coal preparation equipment would be held at the same time as the Congress.
- A dedicated website to be set up and a call for paper abstracts be made for submission by 10<sup>th</sup> May 2015. Full texts of papers accepted to be submitted by 15<sup>th</sup> November 2015.
- The Delegate registration fees to be \$700US for early registration (March 2016) and \$800US thereafter: Student fees to be \$100US. Authors to register and pay fees before paper printed.
- To request the Ministry of Energy of the Russian Federation and Ministry of Foreign Affairs to establish a simplified procedure for the issue of visas to Congress delegates. Currently applicants need a letter of invitation, completion of a four-page form and payment of £50 visa fee plus £40 for administration charges.
- To accept the proposal from India to host the XIXth Congress in New Delhi in 2019.
- Agreed the emblem of the XVIIIth Congress.

Agreed that the IOC would meet on 24<sup>th</sup> – 27<sup>th</sup> June 2015 to review abstracts and decide those to be presented at the Congress.

**Joint IoQ/MES Northern Group meeting - The Stables Conference Centre, High Melton, Doncaster**

Title: - Relocation & Stabilisation of Quarry Waste Materials

Presenter: - John Heneghan of AECOM

John began his presentation with a short review of AECOM as a company whose legacy companies includes two names he felt those present would know in Scott Wilson and Faber Maunsall. AECOM employ close to 100,000 staff in 150 countries worldwide with a turnover approaching \$20 billion. They apply a fusion of science, engineering and design to address pressing engineering, environmental and infrastructure needs.



This presentation would concentrate on work being undertaken around the Swinden Quarry Site situated in the Yorkshire Dales National Park to ensure that when quarrying is finished the site is returned as an environmentally friendly asset. The site gained planning approval to extract a further 24 million tonnes in 2010 in return for the surrender of the former Thesfield Quarry, which guarantees its future until 2030 along with 110 local jobs. But reaching this landmark decision has not been an easy task.

The Swinden site produces between 1.5 and 2.0 mtpa and the quarries main source of mineral is carboniferous reef limestone bounded by overlying Carboniferous shale. AECOM are involved in developing a strategy for "managing the legacy material" associated with historic lime production which are present in perimeter screening mounds, mounds which need to be relocated to facilitate future mineral extraction.

Together with the legacy tipped materials, there is a considerable volume of overburden that also requires stripping to release the mineral. The break down of all the materials that require relocation are roughly as follows:

1million/m<sup>3</sup> legacy waste material comprising quarry scalplings and lime waste, the latter with a pH of 12 to 13. The lime contaminated volume is roughly 300,000m<sup>3</sup>, 1million/m<sup>3</sup> boulder clay, 1million/m<sup>3</sup> carboniferous shale, a dark organic rich pyritic sulphur bearing material.

An assessment of management options has identified emplacement of the material in the base of the current worked areas as the most viable option. In order to provide confidence in the suitability of this approach Lafarge Tarmac, with technical support from AECOM, has been undertaking lime pad trials on site since 2006 and will run until 2017/18. These trials involve simulating the materials' end state, with various combinations of the lime contaminated tip being mixed with shale and boulder clay to assess how they will react when restoration is undertaken. The first phase were small scale, short term trials sufficient to obtain planning permission for the extension, with the current second phase being large scale long-term trials more closely replicating real-life conditions.

The philosophy of this second stage is to adopt "engineering approach" whereby Lafarge Tarmac can ensure before construction starts that the proposed material treatment will not affect the local water environment, allow the company to obtain the relevant Mine Waste Permits and discharge planning obligations. This work will ensure that at the end of its life, Swinden Quarry will represent a significant amenity for the Yorkshire Dales National Park, wildlife, residents and visitors alike.

This work is ongoing and relies on bringing together geotechnical and geochemical skills in close collaboration between Lafarge Tarmac and AECOM and an open collaborative relationship with the relevant regulatory bodies particularly the Yorkshire Dales National Park and the Environment Agency.

## Christmas Dinner and Dance - The Crown Hotel, Bawtry, Doncaster

The first Friday in December saw 86 members and guests gather once again in Bawtry for the Northern Group's annual pre-Christmas bash. Many old and several new faces had the usual enjoyable evening with good food, good dancing and even better company. Unfortunately it will probably prove to be the last time we gather in Bawtry as the Crown has been concerned for a number of years now about the falling numbers (their view) and are insisting that we have to guarantee a minimum attendance of 90 people for the event to continue. Also last year there were problems with over-booking of rooms by the hotel and five couples had to be asked to move to a nearby hotel in Barnby Moor. Two of these couples were members of the "Social Committee" and they



took the opportunity to look at the Olde Bell Hotel as a possible replacement venue - more of that later. We are once again indebted to the five main companies that have supported the evening for several years now, namely Don Valley Engineering, Hargreaves Industrial Services, BASF, GB Railfreight and Rulmeca and for the first time we had a second "Old Codgers" table this year - although the second table were not really old enough to qualify! There were the usual Ladies table prizes and raffle featuring an even larger television than the previous year and a good party was enjoyed by all - it's just a shame that five couples then had to take a taxi from the hotel to go to bed - but the breakfast was good the following morning!

## Home of the MES Archive in the news.

Last autumn the Library at the North of England Institute of Mining and Mechanical Engineers has been home to Singer/Songwriter Gareth Davies-Jones who has revelled in creating new work from the stories contained in this world renowned library. The world of mining and mechanical engineering is no stranger to song, and there is a rich legacy of music in the industry, which any visit to a Mining Gala will confirm.

However, this residency is not a historical 'round-up' of mining ballads, but a new approach to telling the story of the library collections through song. The North of England Institute of Mining and Mechanical Engineers in Newcastle is a cathedral to this country's mining wealth. Art is no stranger to the industry and even a brief visit to the Library in Neville Hall will confirm that 'Art' was acclaimed by the founding fathers of the industry and echoed in their founding statement 'for art and science'. Gareth has been a professional musician for ten years, and has toured extensively throughout the UK. His song-writing has been described as masterful and thought-provoking, and this was recognised when he was asked to perform his work PQ17 at the Arctic Convoy Commemoration week in Wester Ross.



Gareth's first piece from The Seam is Practical Coal Mining based on the engineering manual of the same name. "Looking through the volumes of the 1951 2nd edition, the flow and eloquence of the writing in what was principally a very technical tome really struck me. It was so very lyrical. The introduction and contents pages in particular appeared to have a rhythm and metre all of their own. Practical Coal Mining is a real celebration of the knowledge and skills required to mine in the mid- 20th Century" said Gareth.

The Institute's Librarian, Jennifer Hillyard, is excited about the project. "As a singer myself, presenting our unique collections through song and music is a terrific way to tell the story of our collections."

**Letter to the Editor.**

As former Editor-in-Chief of *Horizons*, I wish to pay tribute first of all to the team now responsible for its production. Led by Greg Kelley, they provide a publication worthy of the Society and the envy of some other learned bodies. What follows is a personal response to the article about the 2014 Coal Science Lecture published on Page 7 of Issue 19, written by Vic Branfoot. Vic has once again provided an interesting and well-written report on the lecture, given on this occasion by Dr Nigel Burdett, Head of Environment at Drax Power. I hope that this 'Letter to the Editor' will encourage other members to contribute to the Society's Newsletter.

Drax Power plans to convert some of the six coal-fired units at the station to biomass. Indeed two units have already been converted and a third conversion is planned for 2015/16, with the possibility of a fourth conversion under consideration. None of these conversions would have been undertaken without government subsidy. The fact is that without subsidy under the Renewable Obligation scheme, guaranteed until 2027, and more recently the (even more lucrative) Contracts for Difference funding scheme, Drax would not convert any units to biomass because the financial case does not stand up and never has. Drax will receive hundreds of millions of pounds of subsidy each year, over a billion if the fourth conversion goes ahead. You may be wondering why I take an interest; well, for 'government subsidy' read 'my money'!

The whole subject makes me cringe, and a statement like "Drax will become the largest green power station in the world" just makes me laugh (or is it cry?). Many argue that creating large scale demand for wood for power generation is not sustainable, that it poses a threat to climate change and forest ecosystems, that burning wood in fact emits more carbon than burning coal in the short term and that it will take decades for the 'carbon debt' to be repaid by re-planting – an argument discounted by the government for its greenhouse gas calculations, which count wood burning as 'carbon neutral'. At full capacity, each unit would burn just less than four million tonnes a year of wood. Although Drax has drafted sustainability guidelines, environmentalists question whether the world's largest biomass power station will be able to sustain itself on wood pellets made from just logging residue. Of course, wood burning emits less sulphur dioxide than coal, enabling Drax to shut down some of its FGD system, thereby effecting a substantial operating cost saving on top of the subsidy. NOx emissions are another argument, especially if the fuel used in cutting, loading, pelletising and transporting thousands of miles from the south-eastern USA is taken into account. So to hell with the green credentials: it really is simply all about money – my money!

The article in *Horizons* refers to the government's 2050 carbon reduction targets being unattainable without substantial use of biomass and carbon capture and storage and mentions the White Rose Project. This involves Drax Power, Alstom and BOC and the proposal is to build a new 430MW coal-fired 'Oxyfuel' power plant equipped with CCS technology at the Drax site, linked to a cross-country and subsea pipeline by National Grid for storage under the North Sea. Consultations have been held and an application submitted but work is not projected to start until 2016 and the plant will probably not be operational until towards the end of the decade. So the project is not directly related to the biomass conversion proposals and, as far as I am aware, there are no firm plans to connect the biomass units to the CCS system. Here again, government funding is being made available and also some EU funding. We are talking about many more millions here and it's still my money!

I do agree with Dr Burdett on one thing though – having seen early efforts at co-firing biomass, I wouldn't have believed that less than ten years later the technology would be as advanced as it is now, but in mitigation the efforts I saw were done 'on a shoestring' (because subsidies were relatively low) and seemed inherently dangerous to me. I didn't think that enough money would be made available to advance – I have occasionally been proved wrong in the past: but again, it's my money!

Peter Cooper - FMES

## Southern Group Visit to Moulding Solutions, Doncaster

MES Southern Group organised a technical visit to Moulding Solutions Ltd., located at Hexthorpe, Doncaster, on 25th February 2015. The small (limited number) group were welcomed by the owner, Ernie Hall, who explained that it was a 16-year-old family run business with his two sons, daughter and wife taking a very active role in day-to-day operations. The company recycles all types of plastic material that comes in from local authorities, waste from plastic extruders such as pipe makers, plus recovered pipes from underground. With local authorities constantly revising their recycling policies, the company purchases unwanted black, green and blue wheelie bins in their thousands.



The first and most important part of the process is to segregate the different types of plastic to enable them to be sent down the correct processing route. The plastic is washed, crushed and passed through baths similar to the old Ridley Scholes dense medium unit. The small-sized plastic is dried in centrifuges and then subjected to high pressure augers that compress it and then extrude it as small pellets. The pellets are dried and collected in large-sized bags holding about one tonne and are sold to those manufacturing extruded plastic products. There are a number of processing streams depending on the type of plastic and colour so that products of specific types can be pelletised and sold on for remanufacture. Ensuring the right type of plastic is selected for processing, visitors saw a small laboratory that carried out float and sink tests. In this case the separating densities were less than 1.0, so mixtures of alcohol and water were used. There were many questions and these were very well handled by Mr Hall who was extremely proud of the way the company had grown to be one of the leading plastic recyclers in the country (46% growth in 2014!). The Southern Group Chairman, Arthur Morgan thanked Ernie and also Gary Wain (Bretby Gam-matech) who organised the visit. Members retired to the Boat Inn, Lower Sprotboro', for an excellent lunch.

## MES News

### Christmas Dinner and Dance has a new home

Since Bawtry in December 2014 the Social committee have looked at several alternative venues and have decided that the Olde Bell at Barnby Moor fits our requirements better and keeps the venue in a similar location as it is only 4 miles from Bawtry and adjacent to the A1 for access. A booking has been confirmed for **Friday 4th December 2015** when we hope the traditions of a relaxed enjoyable evening amongst good friends will start the Christmas season. As they say, "a change is as good as a rest" sometimes.

### Welcome to new company members



**Goldcrest Chemicals** is one of the UK's leading **water treatment** and **waste water treatment** specialists. For over 30 years Goldcrest have been serving industry with water soluble polymers used for water treatment and wastewater treatment.



## Measurement Systems Consultancy Ltd.

Consulting Engineers providing a range of measurement solutions for all Industries, with focus on Mining and Power Generation applications