Geotechnical Courses

Soil Description Workshop
15th Sept 2016, 21st Oct 2016
Rock Description Workshop
25th August 2016, 7th Oct 2016
Geo Foundation Design
21st Sept 2016

Health & Safety Courses

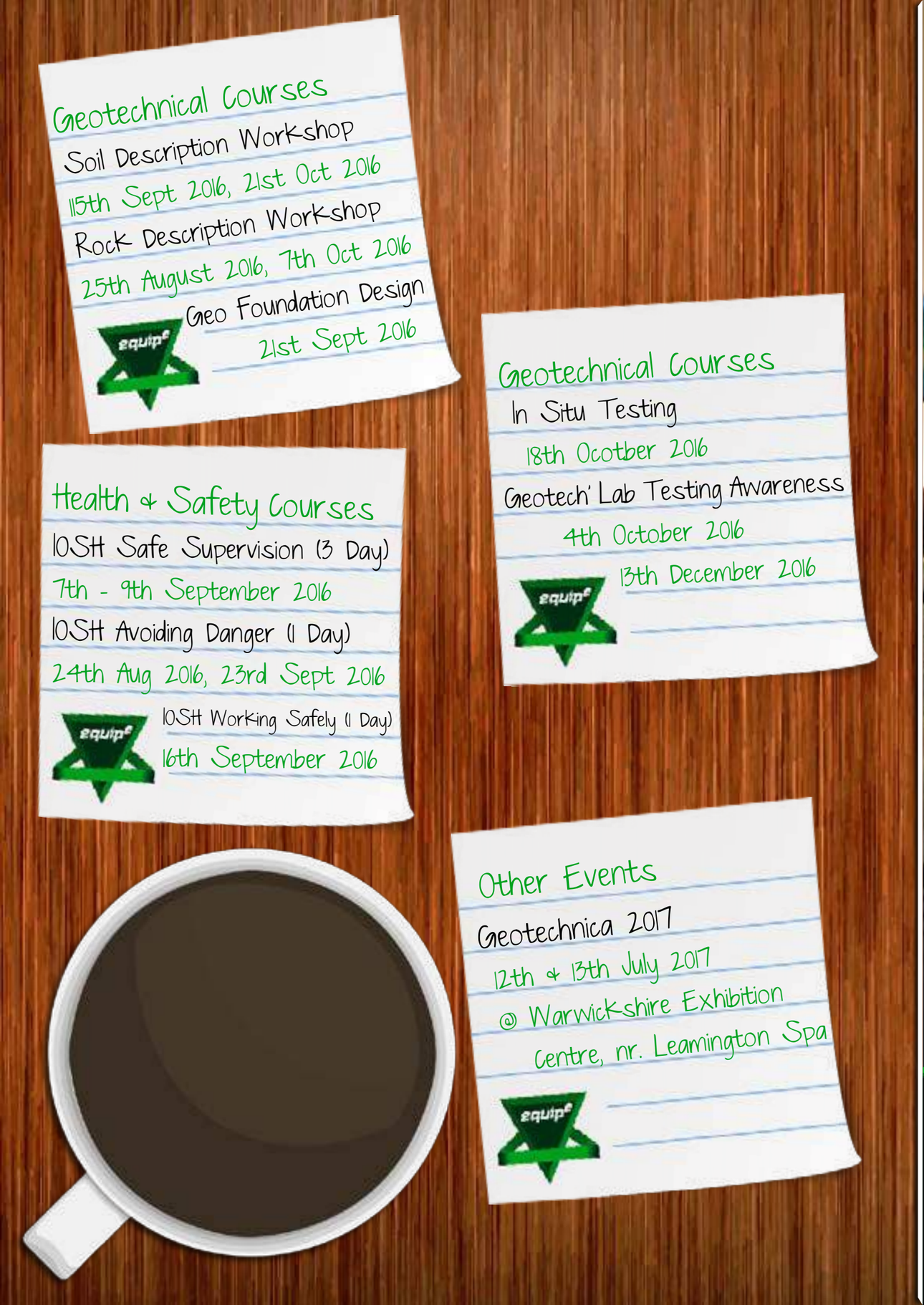
IOSH Safe Supervision (3 Day)
7th - 9th September 2016
IOSH Avoiding Danger (1 Day)
24th Aug 2016, 23rd Sept 2016
IOSH Working Safely (1 Day)
16th September 2016

Geotechnical Courses

In Situ Testing
18th Ocotber 2016
Geotech' Lab Testing Awareness
4th October 2016
13th December 2016

Other Events

Geotechnica 2017
12th & 13th July 2017
@ Warwickshire Exhibition Centre, nr. Leamington Spa



theGeotechnica

August 2016 | Issue 52

Geotechnica 2016

www.geotechnica.co.uk

Conference Review

A full presentation-by-presentation breakdown of the geotechnical conference from Geotechnica 2016

Wind Farm Contract Winners

Aarsleff reveal details of their latest project in Newark

In-depth Tarmac Analysis

Terra Tek's David Bowen provides a breakdown of tarmac analysis

Geotechnica 2017 Details

Information on Geotechnica's return to the WEC in 2017

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Providing an update on recent contract works are Aarsleff, one of theGeotechnica's valued regular contributors. In this month's issue Aarselff reveal details of a foundations contract at a new wind farm coming to Newark.

11 Geotechnica 2016 - Conference Review

July 6th and 7th saw Geotechnica 2016 make it's first appearance in the prestigious surroundings of Brunel University, London. The University, which takes its name from one of the world's greatest and respected engineers Isambard Kingdom Brunel, is home to some of the UK's brightest and best civil and structural engineering minds. However, 2016 saw geotechnical engineering brought to the forefront of the University's attention, as they invited Equipe to hold Geotechnica at the University in order to help launch their brand new Master's Degree in Geotechnical Engineering. In this issue of theGeotechnica, we review the conference content of this year's Geotechnica and examine the excellent presentations given this year's stellar event.

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Welcome

Welcome to the 52nd Edition of **theGeotechnica** - the UK's fastest growing online geotechnically focussed e-magazine.

In the opening article of this month's issue, Aasleff provide an update on recent contract works, one of our most valued regular contributors. In this month's issue Aarselff reveal details of a foundations contract at a new wind farm coming to Newark.

Next up, we provide a full presentation-by-presentation review of this year's conference at Geotechnica. July 6th and 7th saw Geotechnica 2016 make it's first appearance in the prestigious surroundings of Brunel University, London. The University, which takes its name from one of the world's greatest and respected engineers Isambard Kingdom Brunel, is home to some of the UK's brightest and best civil and structural engineering minds. However, 2016 saw geotechnical engineering brought to the forefront of the University's attention, as they invited Equipe to hold Geotechnica at the University in order to help launch their brand new Master's Degree in Geotechnical Engineering.

Our final contribution for this month's issue of

theGeotechnica is David Bowen of Terra Tek. David is a Senior Chemistry Supervisor at Terra Tek's Birmingham Laboratory. In this excellent case study, David provides an in-depth look at tarmac analysis.

As with every new edition of the magazine, the Editorial Team here at **theGeotechnica** will be on the lookout for even more new, original and interesting content from all corners of the sector, and would actively encourage all readers to come forward with any appropriate and relevant content - whether it be a small news item or a detailed case study of works recently completed or being undertaken. If this content is media rich and interactive, then all the better. We are looking to increase the already large readership of the magazine through better social media integration and promotion, as well as improving content month on month.

Finally, for any content that is submitted we will ensure that an advertising space, proportionate to the quality of content provided, is reserved should you wish to place an advert in that single edition of the magazine. We hope you enjoy this month's edition of the magazine and are inspired to contribute your own content for the coming editions of **theGeotechnica**.

Editorial Team,
theGeotechnica

CPD Approved Courses for Geotechnical Academy Alumni

Specifying Site Investigations
This one day course will look at the various methods available to carry out intrusive and non intrusive investigation. Whilst the course will concentrate on geotechnical methods some geo-environmental methods will be briefly discussed. The course will look at the aims of SI and categorise the various stages in an investigation.

Soil Description Workshop
From 2007 new European Standards have started replacing the British Standards (Codes) under which investigations in the UK have been carried out. UK working practice will have to change to meet these new requirements but few practitioners are aware of the changes or the timetable. The workshop will comprise a series of lectures on the changes, and lectures on soil description followed by practical sessions describing soil samples.

Rock Description Workshop
From 2007 new European Standards have started replacing the British Standards (Codes) under which investigations in the UK have been carried out. UK working practice will have to change to meet these new requirements but few practitioners are aware of the changes or the timetable. The workshop will comprise a series of lectures on the changes, and lectures on rock description followed by practical sessions describing rock and compiling mechanical logs of rock core.

In Situ Testing
The course will cover both the theory and the practice of various In Situ Testing techniques used on typical geotechnical projects. In addition the courses will consider the effect that Eurocodes will have on the UK's current practice. This course provides an overview of in situ tests used in common practice and some of the more specialist tests together with their advantages and limitations.

Field Instrumentation and Monitoring
The course comprises a comprehensive one day appreciation of the complete process involved in Instrumentation and Monitoring in the geotechnical environment. The course provides an overview of the current guidance documents and their requirements. The course will consider the design of both individual installations and the installation of suites of instruments in the wider site contex.

Geotechnical Foundation Design
This one day course will provide a general overview of foundation design. It will include an assessment of the use and choice of shallow foundations and piles. It will cover the derivation of bearing capacity formula and their use. Exercises will be carried out to calculate the working loads and settlement of simple foundations. The methods used to calculate these will be in accordance with those described in Eurocode.

IOSH Working Safely (on Geotechnical Sites)
This one day course is developed by industry specialists within RPA Safety Services and Equipe Training as a foundation to site safety. Its aim is to impart the core safety skills required of those working on geotechnical sites by building on their existing specialist technical skills. After attending the course, candidates should be able to identify hazards on site, understand basic safety legislation, participate fully and confidently in site safety consultation and manage priority risks to a sufficient standard.

IOSH Avoiding Danger from Underground Services
Partnering with RPA Safety Services once again, Equipe provide another IOSH certified health and safety course. This one day course is aimed at anybody involved in specifying, instructing, managing, supervising or actually breaking ground and really addresses the problems and risks related to underground services, which may be encountered during both planning and execution of geotechnical projects.

IOSH Safe Supervision of Geotechnical Sites
Equipe has partnered with RPA Safety Services, an independent occupational health and safety specialist, to provide a unique IOSH certified course for the Drilling and Geotechnics industry. The three day course is certified by IOSH, is specifically focussed on the geotechnical industry and provides a totally unique and relevant Health and Safety course for managers and supervisors.

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Equipe Training

AARSLEFF AWARDED FOUNDATION CONTRACT FOR NEWARK WIND FARM

Providing an update on recent contract works are Aarsleff, one of* theGeotechnica*'s valued regular contributors. In this month's issue Aarselff reveal details of a foundations contract at a new wind farm coming to Newark.

Adding to its already large portfolio of successful wind farm installs, Aarsleff Ground Engineering, one of the UK's leading contractors of driven precast piles and ground engineering solutions, has been awarded the foundations contract for the Newark Wind Farm, Hawton, Newark-on-Trent.

When complete, the three-turbine install will generate enough clean energy to power the equivalent of 5,400 homes, adding much-needed clean and renewable energy and helping further reduce the UK's reliance on fossil fuel.

"When complete, the three-turbine install will generate enough clean energy to power the equivalent of 5,400 homes..."

Works on the contract were awarded to Aarsleff by Main Contractor R.G. Carter Civil Engineering Ltd. Specifically, Aarsleff is required to install 162no. piles, which equates to 54no. for each of the three wind turbine bases. Piles installed will be 338mm diameter open-ended steel tubes, with an anticipated pile length ranging from 18 to 24m long founding in Sandstone.

"Aarsleff is required to install 162no. piles, which equates to 54no. for each of the three wind turbine bases."

The project was designed in close collaboration with the Main Contractor and commenced 27 June 2016. Aarsleff is expected on-site for approximately 3½ weeks and has deployed its Junttan PM20, fitted with a 5t accelerated hammer.

Speaking about the project, Chris Primett, Managing Director Aarsleff said: "We are pleased to be involved in yet another wind farm installation. It further compounds Aarsleff's growing expertise in this sector, as well as presenting an opportunity to highlight the company's new strapline "Smart Sustainable Solutions," which is a core objective for all of Aarsleff's activity going forward."

For further details contact Aarsleff on 01636 611140, email piling@aarsleff.co.uk or visit Aarsleff.co.uk. ■

Geotechnica 2016 CONFERENCE REVIEW

www.geotechnica.co.uk

July 6th and 7th saw Geotechnica 2016 make it's first appearance in the prestigious surroundings of Brunel University, London. The University, which takes its name from one of the world's greatest and respected engineers Isambard Kingdom Brunel, is home to some of the UK's brightest and best civil and structural engineering minds. However, 2016 saw geotechnical engineering brought to the forefront of the University's attention, as they invited Equipe to hold Geotechnica at the University in order to help launch their brand new Master's Degree in Geotechnical Engineering. In this issue of* theGeotechnica*, we review the conference content of this year's Geotechnica and examine the excellent presentations given this year's stellar event.

In contrast to previous occasions, this year's conference was the focal-point of Geotechnica, and an exceptional group of speakers were assembled to discuss a wide range of topics. The main theme of the conference was a focus on the future of ground investigation, reflecting on the current 'state of the industry', looking at what the industry is doing well, as well as lessons learnt from past and ongoing projects. Finally, the conference looked at new innovations and emerging technologies.

"One of the founding principles of Geotechnica is to encourage communication to increase knowledge and understanding across the sector."

One of the founding principles of Geotechnica is to encourage communication to increase knowledge and understanding across the sector. One area that the organisers of Geotechnica were and certainly still are encouraging more communication in is the current performance of the industry, and what can be done to improve ground investigation practices in the future.

Geotechnica 2016 was opened by a Keynote Speech from one of the industry's most highly regarded experts on slope stability, and a stalwart of the ground investigation industry for over 45 years – Professor Eddie Bromhead. Eddie's keynote address focussed on reasons that the UK's infrastructure as a whole needed a better standard of engineering geology and geotechnical engineering. Beginning by pointing out some of the more common reasons for delays in groundworks across the country, Eddie offered some of the negative effects of these delays: additions to costs, a diminished reputation, rise of ligation, safety issues and provision of work for over-paid 'experts'. After identifying the effects of poor ground investigations, Eddie then suggested some solutions by comparing the current situation and methods to those of 40 years ago. Professor Bromhead argued that education and training standards had fallen, not only in terms of quality training given, but also the amount of fresh life-blood coming into the industry. He also pointed to the equipment and methods being used during ground investigations, praising the diversity of methods available now, and also the conditions that works were carried out under, with better PPE and welfare available across the majority, but not all of the UK's GI sites. However, Eddie did then emphasise that the quality of investigations needed to be better and more thorough in order to avoid design failures, pointing to deceptive 'rockhead' and irregular 'rockhead' sites that are common across the UK's geology as a case-in-point. Overall, Professor

"Eddie's keynote address focussed on reasons that the UK's infrastructure as a whole needed a better standard of engineering geology and geotechnical engineering. "

Bromhead emphasised the need for understanding of data and a better depth of GI in order to ensure the best results, starting with qualified and experienced people leading project teams.

Following Eddie's keynote talk was HS2's Head of Health and Safety (Area South) Joe Murphy, who focussed his talk on the Ground Investigation lessons learnt so far on the HS2 project. HS2 is one of the single largest infrastructure projects ever undertaken on UK soil, the scope of which was revealed at Geotechnica 2015 by the then head of Ground Investigations Jonathan Gammon. HS2 estimates that 12,606 GI fieldwork locations will be required, spread across the considerable route. Joe also revealed other key statistics for the project, notably the 53km

"Joe then outlined the ugly, the bad and good factors of GI that HS2 has encountered so far..."

of tunnels being constructed, the 74km of cuttings and 128mt of excavated materials (90% of which will be reused on the project elsewhere). Emphasising the desire for HS2 to set the standard not only for GI as a whole across the industry, but also focussing specifically on health and safety, Joe outlined what safety meant to HS2: safety first, actions to mitigate risks, intervening if something is unsafe, and ultimately taking responsibility to our own and others wellbeing. Joe then outlined the ugly, the bad and good factors of GI that HS2 has encountered so far: The ugly covering collaboration, basic health and safety and staff behaviour and demeanour; The bad including lack of common standards and self-regulation, and also a lack of ownership; Finally, the good, including the openness and honestly of the industry, the professionalism and engaging and innovative nature. Most of all Joe was keen to stress that sites across the country were improving with every day, both through increased collaboration, but also common expectations now being met.

Next to the lectern was Tom Phillips, Managing Director of industry health and safety specialists RPA Safety Services. Taking a focus on design for

"Tom examined the role of CDM and how it is vital to creating a joined-up approach to the principles of good (safe) design."

ground investigation, Tom examined the role of CDM and how it is vital to creating a joined-up approach to the principles of good (safe) design. After outlining exactly what was meant by 'design' in terms of CDM, Tom then ran through the duties of Principal Designers according to CDM, as well as the Principles of Prevention. CDM's Red, amber and green lists for health and safety were also discussed, with Tom finally emphasizing the need for awareness, transparency and honestly from designers, planners and contractors in order to obtain and maintain the required levels of health and safety during the entire ground investigation process.

The final presentation of the first Wednesday morning session came from Professor Paul Nathanail. Paul discussed the recent changes to the planning system in the UK. These changes include the revised National Planning Policy Framework; Planning & Housing Bill and lastly Brownfield Registers. Paul explained the changes in detail and what each change

“Dr Powell outlined the pros and cons of both testing methods, however training and competence was a key theme throughout – after all even the best testing procedures can be rendered useless without correctly educated and trained operators.”

meant for planners and designers across the country.

After a short break, Session 2 of the conference was opened by Dr John Powell, Technical Director at GEOLABS Ltd and a frequent Geotechnica collaborator. John’s talk put in-situ testing under the microscope, along with more conventional laboratory testing. Dr Powell outlined the pros and cons of both testing methods, however training and competence was a key theme throughout – after all even the best testing procedures can be rendered useless without correctly educated and trained operators. While John made it clear that laboratory testing was already essential in all projects, he also emphasised that in-situ tests should also be essential, finishing with the delightful simile – Love and marriage, horse and carriage: It may not rhyme, but in-situ testing is lost/useless without laboratory testing.

Taking up the mantle from Dr Powell was Tom Lunne, Expert Advisor from the Norwegian Geotechnical Institute. Tom is considered to be one of the leading experts in the field of cone penetration testing, especially offshore, and geotechnical laboratory testing. In his presentation Tom discussed whether offshore sample quality methodology could be adapted and used for onshore investigations. After providing a background on sample quality criteria, Tom provided examples and methodology on how obtaining these samples was carried out firstly offshore, but then onshore. Although the sample quality criteria had been developed for use offshore, it is completely relevant to onshore investigations as well and

could be incorporated into new or revised standards.

Session 3 of the conference focussed specifically on specialist services available to the ground investigation industry, most notably: geophysics, cone penetration testing and subsurface laser scanning. Starting off the session and focussing on near-surface geophysics for ground investigations was Dr Simon Hughes, Operations Manager of TerraDat. Simon began by firstly outlining what was meant by 'geophysics' in terms of ground investigation, before then explaining the benefits of using the technique. Simon highlighted current failings in the procurement of many geophysical investigations especially with respect to poor specifications and instruction. He also highlighted

"Simon highlighted current failings in the procurement of many geophysical investigations especially with respect to poor specifications and instruction."

the huge benefits of such an environmentally friendly method and the lack of risk to site operatives. Simon also discussed some of the recent advances in geophysics such as GPS positioning and 3D integration with other sources of data. Finally, Dr Hughes provided a pertinent case study into geophysical benefits to a ground investigation.

Whilst still on the subject of geophysics, Kim Beesley of European Geophysical Services spoke next, about the benefits of downhole geophysics. Downhole geophysics has previously been featured in theGeotechnica in issue 43, however in this talk Kim went into further, specific depth about the advantages of acoustic and optical imagers. Kim was keen to stress however that downhole geophysics is not something that can be rushed, with boreholes needed to be cleaned out in order to obtain optimum and valued results.

Next up was Joseph Hobbs, Technical Manager at CPT specialists Lankelma. Joseph focussed on CPT usage on high-risk projects, where extra time and consideration, plus more savvy methodology must

be used in order to obtain the best results. After explaining that was 'common practice' among CPT investigations, Joseph explained what needed to be improved in order for CPT results on higher risk projects to get the most 'bang-for-your-buck' – principally, more impetus from clients specifying and engineers planning the work.

Wrapping up day one of the conference was Managing Director of Geoterra, Mark Hudson. Mark's talk focussed on subsurface laser scanning and multi-beam sonar void surveys and the advantages that the method has. Providing ample examples and case studies, Mark explained that the method was rapid in deployment and turnaround, was able to provide 2D cross-sections and plan sections of voids and also produce 3D measurable Navisworks scans for BIM models.

Kicking off Day 2 of

"Professor Stewart's presentation focussed on communication – something which we would discover later in the day that the ground investigation industry does not consider itself very good at."

Geotechnica's conference was probably the most anticipated presentation of 2016's event – a keynote address from one of the UK's most recognisable faces in the field of geology – Professor Iain Stewart. Professor Stewart's presentation focussed on communication – something which we would discover later in the day that the ground investigation industry does not consider itself very good at. Taking a look at the issue of fracking in particular, Iain described the issues facing scientific communities (a community in which geotechnics falls into) in terms of confusion and fear amongst the general public when seemingly scary new technologies and methodologies emerge that could be of benefit to the general population. Iain explained that the key to winning the support of the public and changing attitudes towards new technologies and sciences is simply better communication and engaging those people effected by the technologies at the earliest possible moment. If the hazards or issues of the new technologies are explained early and in depth, then the level of objection and outrage to the development is likely to be highly stemmed.

With Professor Iain Stewart's keynote address focussing so heavily on communication, it was incredibly poignant that the next speaker was the Project Chairman of the AGS / BDA Task Force that has assembled to communicate and engage with the entire ground investigation community in order to gauge perception and performance. Also Managing Director of Geotechnical Engineering, Andrew Milne decided against preparing a presentation and instead carried out an impromptu survey amongst the attendees of Geotechnica. Taking the opportunity to conduct a slim-lined, however still anonymous thanks to the use of duck whistles, version of the Task Force's Industry Survey, Andrew posed questions to the audience regarding what they thought the GI industry was good at, and what needed improvement. The results of the impromptu survey were surprising to many, with the majority of attendees willing to admit that although the services offered across the GI industry were high-calibre, they were poor at promoting themselves, poor at making themselves heard and hesitant to change. However, the audience were also more than willing to admit that the people to blame for the situation was themselves – they needed to stand up for themselves and take action, rather than just repeating words and mantras. The full AGS / BDA Task Force Survey is currently still open to all for completion and the results will be published following the survey's closing at the end of August 2016.

"The results of the impromptu survey were surprising to many, with the majority of attendees willing to admit that [...] they were poor at promoting themselves, poor at making themselves heard and hesitant to change."

The survey theme was carried over from Andrew Milne's presentation into the next, as Professor David Norbury discussed the results of an informal survey he had assisted in conducting into the ground investigation methodology used by other countries across northern Europe. Although the brief survey was only informally circulated, the results nevertheless revealed some interesting feedback. Predominantly the survey focussed on drilling methodology and field tests in four different stratas – soft to firm soil, stiff to very stiff soil, extremely weak to weak rock and finally medium strong or stronger rock. David explained that many of the methods used bear some reflection on the ground conditions nationally, although rotary core drilling was widely used down to firm soils and in most rocks. The survey also provided some strange selection of method with surprised many, such as Denmark being the only country to use geophysics to measure parameters.

"David explained that many of the methods used bear some reflection on the ground conditions nationally, although rotary core drilling was widely used down to firm soils and in most rocks."

ARUP's Ben Gilson was next up to present, finishing off Session 1 of Thursday morning. Ben's presentation asked whether UK linear infrastructure ground investigations were suitable for the investigation of mass soil property characteristics. Whilst presenting a number of case studies and a thorough examination of what is needed to measure soil

permeability when tackling issues such as heave in cuttings, Ben concluded that further innovations and improvements in GI practices were needed. These innovations would need to be accompanied by a better understanding of ground conditions along with a move to large field trials in order to obtain a better understanding of soil behaviour on a larger scale and obtain mass characteristic data.

Beginning Session 2 of Thursday's proceedings was Lead Geotechnical Engineer on HS2 – Nick Sartain. Nick's presentation outlined some of the challenges that HS2 has faced during Phase 1 of the project, identifying small strain parameters, adequate logging and the soil parameters along the line of the route being the primary obstacles to overcome on the project. Also discussed were the new technical topics that would be focussed on during Phase 2 of the project, namely karst, mine workings, contaminated land, landfill, urban GI and remote monitoring.

The final presentation before the lunch break was delivered by Dr Jackie Skipper of the Geotechnical Consulting Group, who asked the pertinent question of why exactly do we bother to investigate and understand the ground.

"Jackie discussed the value of geophysics and in situ testing when placed alongside the rest of the ground investigation suite…"

Jackie discussed the value of geophysics and in situ testing when placed alongside the rest of the ground investigation suite, explaining that traditional sampling methods are still required in order to quantify and substantiate the results of more advanced methods of GI. Dr Skipper finished by saying that we principally investigate the ground in order to understand its variability. This understanding includes analysis of historical data, well planned, interpreted and intrusive SI, as well as laboratory testing.

Closing out the conference was a final session focussing on innovation and emerging technologies. First to present was Engineer Diego Marchetti, a Partner at the Studio of Professor Marchetti. The Studio and Professor Marchetti are famous for creating the Flat Plate Dilatometer, which Diego ably provided further background information on. Diego discussed the various applications and recent developments of the Dilatometer, and the value that it can add to ground investigation sites across the UK.

One of the UK's leading proponents of digital geotechnical data followed Diego – Dr Roger Chandler, Managing Director of Keynetix. In his presentation Roger explained the exceptional value of digital geotechnical data, and how, if utilised correctly, it can transform even the most standard ground investigation into something of even greater value.

The final presentation of Geotechnica 2016 fell into the hands of Adrian Wilkinson, Director of DroneSurv. Adrian provided a full, detailed and comprehensive run-down of the use of drones for survey purposes. The laws surrounding the use of drones are extensive, however the benefits of the use of them have the potential to be vast when utilised expertly. So if you want to commission a drone survey make sure you check out that certification and approvals are in place before you let them fly as the fines are considerable.

Overall, the conference at Geotechnica 2016 was incredibly well received by all in attendance. The feedback from visitors to the event was extremely positive, with the calibre of speakers and depth of content discussed the best ever produced at a Geotechnica event. ■

Planning for Geotechnica 2017 is already well under way with bookings for the event now being taken. 2017 will see Geotechnica return to the Warwickshire Exhibition Centre for a more exhibition-focussed event. Full details can be found online at www.geotechnica.co.uk.

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TARMAC ANALYSIS

INCORPORATING CHROMATOGRAPHIC INTERPRETATIONS

The Organic Instrumentation Laboratory - Birmingham

Providing the following article for theGeotechnica is David Bowen of Terra Tek. David is a Senior Chemistry Supervisor at Terra Tek's Birmingham Laboratory. In this excellent case study, David provides an in-depth look at tarmac analysis.

Interpretation of data produced from Gas Chromatography and Mass Spectrometry analysis can be a useful tool in identifying route sources of environmental contaminants or anomalies found in site investigations. A high numerical result or an unexpected area specific "hot spot" of a particular contaminant, may not always give the full picture of what the source of the problem might be.

Using chromatograms produced from gas chromatography analysis, enables a visual representation of the contaminant found. This can be used to assess the possible source of the contaminant, evaluate if weathering has occurred (to assist in age dating), and establish whether multiple sources are present.

Two case studies on tarmac, completed by the Organic chemistry department at Terra Tek Birmingham, highlight the importance of incorporating Chromatographic fingerprinting into an environmental analysis suite to assist in understanding findings.

Tarmac samples

Case Study #1

An area of Tarmac on a client's site had lost its composition due to a suspected, as yet unknown, contaminant. Therefore, a laboratory investigation to understand the causes of this phenomenon was carried out.

Three samples were submitted to the laboratory for testing. These were a site "clean" tarmac sample unaffected by the contaminated area to be used as a field blank, and two contaminated tarmac samples taken from the affected area.

For each sample, a testing schedule of Total Petroleum Hydrocarbons (TPH) by GC-FID and Volatiles by GC-MS was requested, along with chromatographic fingerprinting and interpretation of the resulting analytical data.

A good test for bitumen / tarmac in samples is a TPH, and its presence in a sample would give a positive result predominantly in the heavy mineral oil >C21-C40 range. Therefore, a positive result was expected in the field blank, as this would indicate that the sample was indeed tarmac.

"A good test for bitumen / tarmac in samples is a TPH, and its presence in a sample would give a positive result..."

For this particular case, as all of the samples were tarmac, a numerical positive TPH would apply, although may vary in concentration due to possible contamination. Hence, without the chromatographic

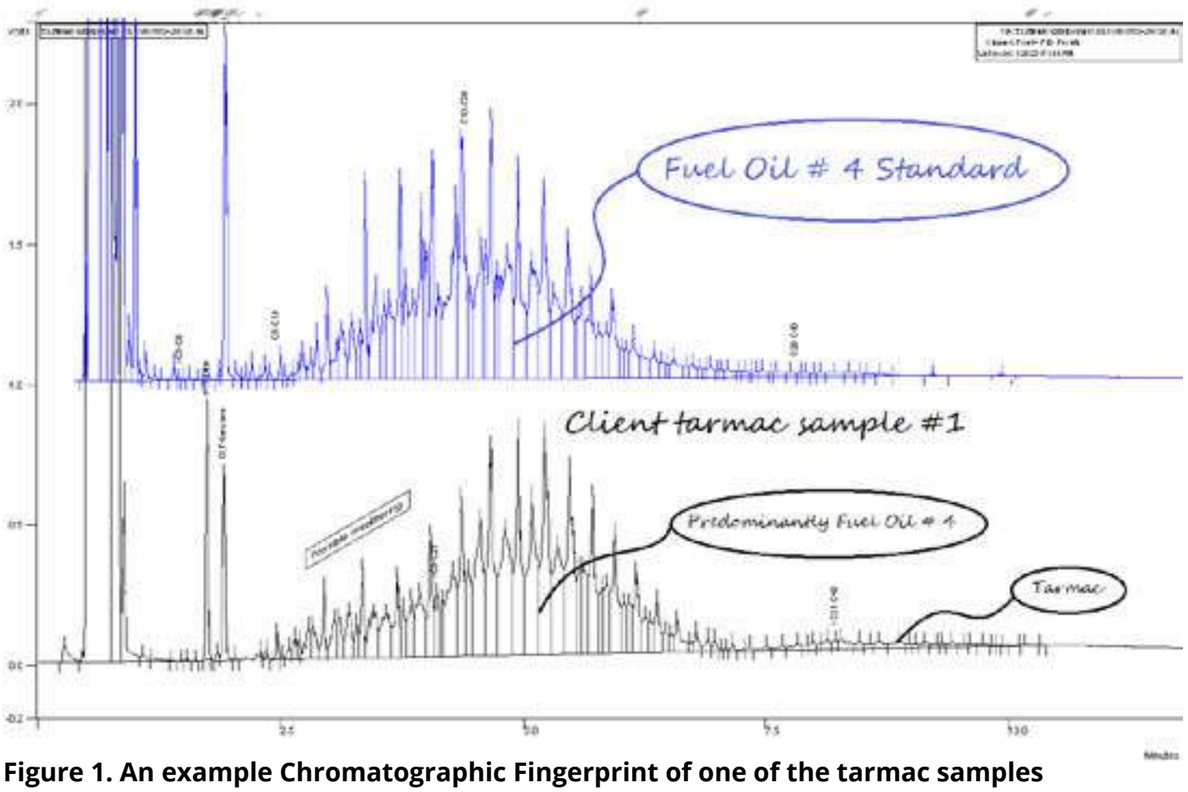

Figure 1. An example Chromatographic Fingerprint of one of the tarmac samples

Stockpiling of waste tarmac on a construction site (courtesy of James Stokes – DTS Raeburn)

fingerprint, the identity of any rogue element present could remain a mystery, except for the knowledge that something might be there as the TPH result is higher than the field blank.

Therefore, the chromatographic fingerprints produced from the analytical analysis were compared to each other, and to that of the standard of best fit, to establish whether contamination had occurred and the likely source.

"Therefore, the chromatographic fingerprints produced from the analytical analysis were compared to each other, and to that of the standard of best fit..."

On assessing the fingerprints and the analytical data, it became apparent that the tarmac in the affected area was indeed contaminated, and that the likely source of contaminant was a substance which was consistent with Fuel Oil #4, showing some signs of weathering.

It was therefore concluded, that it was probably the fuel oil contamination which was the root cause of the loss of tarmac composition experienced on the site.

The next stages of the project were to initiate laboratory trials to simulate the on-site loss of composition phenomenon, by assessing the impact of Fuel Oil #4 on the field blank tarmac sample.

"The next stages of the project were to initiate laboratory trials to simulate the on-site loss of composition phenomenon, by assessing the impact of Fuel Oil #4 on the field blank tarmac sample."

Tarmac samples arrive in sample reception

Case Study #2

A client had a large amount of tarmac to dispose of, and needed to assess whether coal tar was present.

Coal tar is a by-product of coal when it is carbonised or gasified, to make cokes or coal gas, and is a complex mixture of phenols, polycyclic aromatic hydrocarbons (PAH), and heterocyclic compounds.

"Coal tar is a by-product of coal when it is carbonised or gasified, to make cokes or coal gas..."

The analysis was required to classify the material, and ascertain which land fill tariff would apply on disposal. When considering the large quantity of tarmac to remove, the results of the analysis would therefore have significant cost implications.

Four tarmac samples were scheduled for TPH and Polynuclear Aromatic Hydrocarbon (PAH) analysis, with Chromatographic fingerprint interpretations.

Each fingerprint was compared to that of a coal tar standard, and the PAH results evaluated as the presence of these can be indicative of coal tar, as this is one of its main constituents.

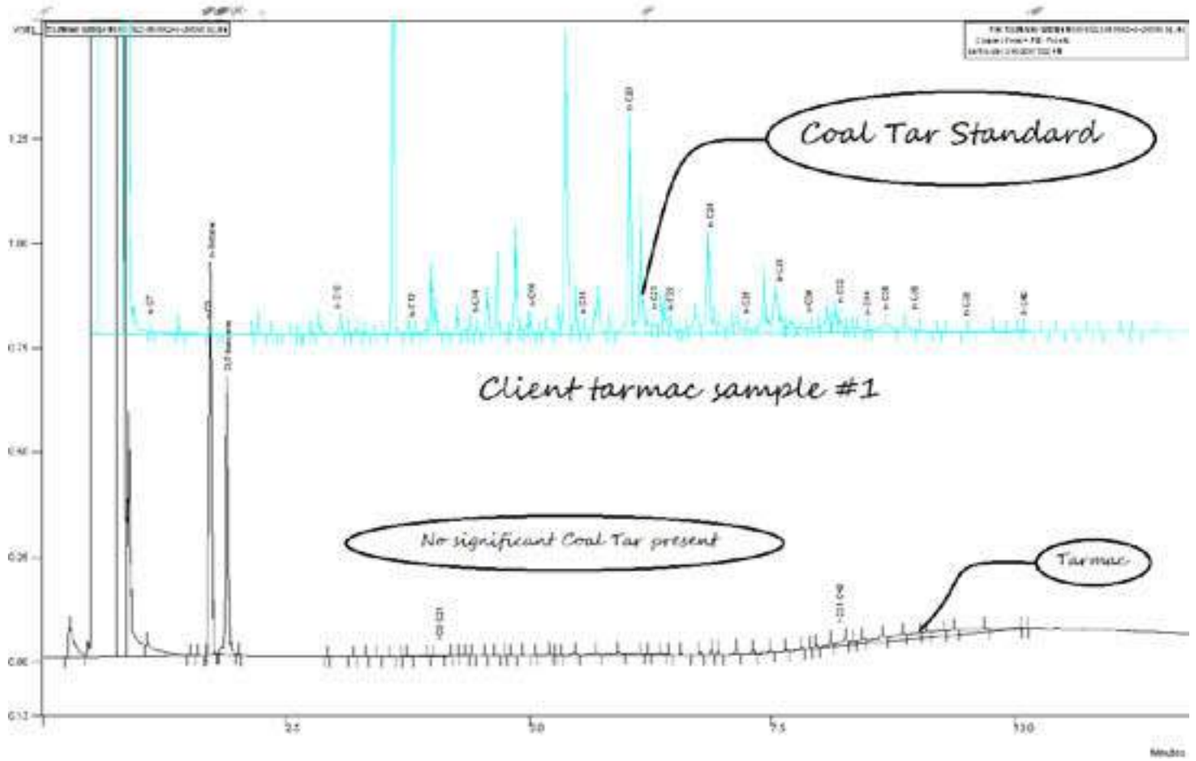

Figure 2. An example Chromatographic Fingerprint of one of the tarmac samples

"Each fingerprint was compared to that of a coal tar standard, and the PAH results evaluated as the presence of these can be indicative of coal tar, as this is one of its main constituents."

None of the tarmac samples contained elevated levels of PAH, and the appearance of the chromatographic fingerprints did not appear to be comparable to that of a coal tar standard. Therefore, it was concluded that the tarmac samples submitted for testing did not contain any significant levels of coal tar.

Conclusion

Tarmac was successfully analysed to assess for contamination. In case study #1 contamination was confirmed and identified, and in case study #2 it was established that no significant coal tar contamination had occurred.

This type of analysis incorporating chromatographic fingerprinting and interpretations is not exclusive to tarmac, and can be used for a whole range of matrix types.

Chromatographic fingerprinting is an additional option of Terra Tek's comprehensive range of environmental testing suites. ■

References

1. U.S. Department of Health and Human Services. Toxicological profile for wood creosote, coal tar creosote, coal tar, coal tar pitch, and coal tar pitch volatiles. September 2002. Rev March 2013

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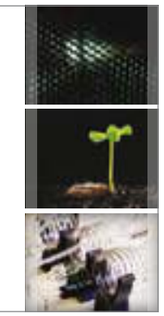

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