Geotechnical Courses

Soil Description Workshop
3rd June 2016, 13th July 2016
Rock Description Workshop
14th July 2016,, 25th August 2016
Geo Foundation Design
18th May 2016

Health & Safety Courses

IOSH Safe Supervision (3 Day)
23rd - 25th May 2016
IOSH Avoiding Danger (1 Day)
2nd June 2016, 15th July 2016
IOSH Working Safely (1 Day)
20th May 2016

Geotechnical Courses

In Situ Testing
31st May 2016
Geotech' Lab Testing Awareness
10th May 2016, 26th July 2016

Other Events

Geotechnica 2016
6th & 7th July 2016
@ Brunel University, London

theGeotechnica

May 2016 | Issue 50

Spotlight on the Industry: The Task Ahead

Full details of the new joint AGS and BDA Initiative aiming to galvanize the UK GI industry

ALSO INCLUDED:
GEOTECHNICA 2016 CONFERENCE DETAILS

Artesian Drill Site Conditions

Geotechnical Engineering discuss the pains of flooded drill sites

8 Year Training Journey for Equipe

A retrospective look at the history of the quality training offered by Equipe

Volatile Organic Compounds

DETS take a look at VOCs and offer a technical breakdown of what they are

Contents

Welcome

Welcome to the 50th Edition of **theGeotechnica** - the UK's fastest growing online geotechnically focussed e-magazine.

In the opening article of this month's issue, theGeotechnica provides more specific information regarding both the intention of the new AGS/BDA Task Force initiative and the format of the survey it will aim to produce. Background information on the people behind the initiative is also included. In this article we will hear from the Team Leaders in charge of organising the creation, distribution and analysis of the survey, about why they chose to become involved and what they hope the collaboration can achieve.

Next up, providing the fourth in a series of pieces for theGeotechnica is Liz Withington, Senior Manager at Geotechnical Engineering Ltd. This month Liz tackles the tricky issue of coping with artesian conditions on flooding drill sites.

Following on from Liz is a special 50th Edition retrospective piece. During the course of the last 50 issues of theGeotechnica, its parent company the Equipe Group have gone from strength to strength – mirroring the magazine's continued success. In this retrospective piece we will be looking back at the history of Equipe, documenting the growth of the UK's only dedicated geotechnical training provider.

Our final contribution is another excellent, technical article from Hazel Davidson of Derwentside Environmental Testing Services. This month, Hazel turns her attention to Volatile Organic Compounds, providing valuable insight into what VOC's actually are.

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

THE TASK AHEAD

In the March issue of **theGeotechnica** *we revealed plans for a joint* Association of Geotechnical and Geo-environmental Specialists (AGS) *and* British Drilling Association (BDA) *venture to shine a spotlight on the industry. The article sparked much discussion amongst the ground investigation community, with some members keen to express their objection to some of the negative perceptions regarding the GI industry that were revealed.*

Following on from the announcement of the venture, **theGeotechnica** *will be providing more specific information regarding both the intention of the initiative and the format of the survey it will aim to produce. Background information on the people behind the initiative will also be included. In this article we will hear from the Team Leaders in charge of organising the creation, distribution and analysis of the survey, about why they chose to become involved and what they hope the collaboration can achieve.*

Much has been said about the recent announcement of the joint AGS and BDA initiative – it is safe to say that conversation is rife within the industry. What is it for? Why do we need it? Who is involved?

The initiative has been set up principally to put a spotlight on the industry, that is on-going and built on collaboration from all stakeholders within it. It is hoped that with the support of all disparate corners of the sector, the project and its survey will produce some interesting statistics, points of view and exposures that can be utilised to shine a light on what is actually going on in the UK ground investigation industry – for better or for worse.

"The initiative has been set up principally to put a spotlight on the industry, that is on-going and built on collaboration..."

Once this has been achieved, the AGS/BDA Task Force will look to help promote healthy debate and discussion around the outcome of the survey – reasons for stances, consequences and lessons to be learned. This will be done through many forms of media – articles in industry magazines, social media platforms such as Twitter, Facebook and LinkedIn and association websites, to name a few. Following on from the survey and subsequent discussions, it is hoped that some actions and shifts in behaviour may then occur, in a collaborative effort from all involved in the industry.

"It is vital to acknowledge that the survey will be entirely anonymous..."

It is vital to acknowledge that the survey will be entirely anonymous, with no trace back to respondents in order to ensure that all discoveries produced are completely neutral and non-judgemental.

First up for the project is the production of a Position Paper that will outline the current 'official' Standards all UK ground investigation projects should be working to. The Standards are already recognised by both the AGS and BDA, and are currently

THE TASK FORCE
Meet the team

AGS Chairman
Matthew Baldwin
Technical Director
Soil Engineering Ltd

Project Chairmain
Andrew Milne
Managing Director
Geotechnical Engineering Ltd

BDA Representative
Andrew Stevenson
Ground Investigation Manager
BAM Richies

Team 1
Position Paper

Team Leader
Gary Walker
Associate Director
Arcadis Consulting

Ken Marsh
Director
Ian Farmer Associates

Alan White
Director
Red Rock Geoscience Ltd

Richard Thomas
Director
Peter Brett Associates

Neil Brownlie
Principal Engineer
Fugro Geoservices Ltd

Team 2
Contractors' Survey Questions

Team Leader
Wesley Wray

Jon Duxbury
Project Manager
Bridgeway Consulting Ltd

Athena Livesey
Principal Engineering Geologist
WSP / PB

Martin Fitch-Roy
Managing Director
Dando Drilling Int. Ltd

Jonathan Gammon
Head of GI
HS2 Ltd

Peter Redford
Director
BDA

Team 3
Consultants' Survey Questions

Team Leader
Ann Izatt-Lowry
Director
Dunelm Geotechnical & Environmental Ltd

John Booth
Managing Director
Geotechnics Ltd

Adam Branson
Chartered Senior Engineer
Card Geotechnics Ltd

Peter Boyd
Director
AECOM

Eric Wu
Director of Operations
Jacobs

Team 4
Promotion

Team Leader
Gordon Ross
Chief Estimator
Raeburn Drilling & Geotechnical Ltd

Julian Lovell
Managing Director
Equipe Group

John Cartwright
Managing Director
Applied Geology Ltd

Danilo Bettosi
Operations Manager
Earth Science Partnership

@AGS_BDA

AGS BDA Task Force

ags.bda.taskforce@outlook.com

being advocated to all members. The Team Leader for this portion of the initiative is Gary Walker, Associate Director at Arcadis Consulting. **theGeotechnica** spoke to Gary recently to discuss his involvement in the project:

What has your Team been tasked to do?

Gary Walker: *Team 1 were asked to provide a factual account of what the industry should do as a 'standard approach' for GI. However, early on the team realised that this was looking too much like an opportunity to wave a big stick – an approach we felt uncomfortable with. The Position Paper therefore looks back over the history of how we arrived at where we are now in terms of applicable standards and seeks to open discussion on commonly faced issues.*

"However, early on the team realised that this was looking too much like an opportunity to wave a big stick – an approach we felt uncomfortable with."

What was it that sparked your involvement in the project?

GW: *I have always tried to support the AGS and to further our profession in all its forms. The theme of the Task Force echoed with my own thoughts (and probably those of many practitioners). In the majority of small and medium sized projects, the procurement of GI and the involvement of non-specialist designers appeared to be a growing concern. This has led to a situation which appears to reward low-budget, non-compliant GI without a thought to project risk outcomes. This is something that needs addressing.*

Following the delivery of the Position Paper, there will be a single, all-inclusive survey created for everyone in the industry to complete – big and small, high and low, junior and senior. All stakeholders will be encouraged to participate in order to obtain a full, all-encompassing view of the state of the industry. The key parts to the survey are likely to be: a) Identification of the status and position of the responder (to enable interpretation of views); b) Awareness of the Position Paper, the standards identified in it, and to what extent they are adhered to; c) Some views on why the standards are not adhered to completely i.e. where are the problems?; and d) What are the major challenges ahead for the industry?

"All stakeholders will be encouraged to participate in order to obtain a full, all-encompassing view of the state of the industry."

The survey will be devised by two teams: Team 2, led by Wesley Wray, will focus on producing relevant lines of questioning for the UK's Contractors; while Team 3 will be led by Ann Izatt-Lowry, Director at Dunelm Geotechnical and Environmental, and will focus on the questions for the Consultants and Clients within the sector.

What have your Teams been tasked to do?

Wesley Wray: *Essentially Team 2 has been asked to derive a questionnaire / survey to capture the current perception and position of the ground investigation industry by those who are employed by Contractors operating within it. In order to paint a true picture of the industry, we need respondents from all corners of the GI sector, from the major organisations to the smaller individually operated companies.*

"In order to paint a true picture of the industry, we need respondents from all corners of the GI sector…"

Ann Izatt-Lowry: *Team 3's role will be similar to that of Team 2, although the focus of the questions we produce will be directed at the Consultants and Clients within the sector. We will be ensuring that all of the survey's questions follow a similar theme and style and are compatible with each other. One of our main remits will be to focus the questions to gauge opinions on the relevance of the current Standards, and stray as far away as possible from any leading questions – we want the honest truth from all involved in UK GI.*

WW: *When we have the responses we will be reviewing them to ascertain whether or not there are any patterns with regards to where we consider the industry is working well and where there may be areas for improvement, be it quality, equipment used / working methods or safety.*

"I wanted to be part of the process of discovering a benchmark for UK GI – an honest appraisal of where are we currently and where are we going."

Why did you both want to become involved?

AI-L: *I wanted to be part of the process of discovering a benchmark for UK GI – an honest appraisal of where we are currently and where we are going. Also, I do feel it is important to have a female input into any discussions on the industry direction – increasing diversity in the sector is crucial in order to help UK GI continue to grow and prosper.*

"I believe the geotechnical industry, in particular ground investigation, is undervalued within the UK."

WW: *I believe the geotechnical industry, in particular ground investigation, is undervalued within the UK. With 'new' codes, standards and investigative technologies being introduced, this represents a brilliant opportunity to raise the awareness of what we do within the wider construction industry.*

Why is this initiative worthwhile?

WW: *It's the first time the industry has attempted something like this and with the BDA and AGS joining forces for this initiative it has the potential to encompass the majority, if not all, of the industry. It's an opportunity for everyone to get involved and help to shape and direct the industry for the future, to ensure we continue to have an industry we are proud to be part of.*

"It's an opportunity for everyone to get involved and help to shape and direct the industry for the future..."

AI-L: *Primarily, I wanted to help increase positivity in our industry. Occasionally everything can seem a bit 'doom and gloom', and I want to help alter that perception.*

Of course, all of this information will need to be delivered to all parties involved, that is where Team 4 and its leader Gordon Ross, Chief Estimator at Raeburn Drilling and Geotechnical steps in:

What has your Team been tasked to do?

Gordon Ross: *Essentially, Team 4 will organise and co-ordinate the practicalities and the marketing of the activities of Teams 1, 2 and 3. We will be identifying and contacting all of the 'players' in the Ground Investigation Community to provide a preliminary understanding of how the industry is structured so that the questions in the survey are targeted and relevant. Once this is achieved we will be advertising and delivering the survey, and then providing support for those completing the survey – answering questions, etc.*

"We need to energise the industry and unite all involved to create a more positive perception."

Why did you want to become involved in the Task Force?

GR: *I felt that the initiative had the potential to make a positive contribution to how the industry reacts to a recent and unfavourable perception by a "major Client". We need to energise the industry and unite all involved to create a more positive perception.*

Also, I think that the industry as a whole need to identify and consider the broad impact of "Eurocodes and amended British Standards" and determine the scale of compliance or non-compliance amongst Contractors and Consultants. A common bond needs to be struck between Consultant and Contractor to enable enhanced understanding and cooperation.

Why do you consider this a worthwhile initiative?

GR: *Presently, the industry comprises a vast range of 'players', 'practitioners', both large, medium and small companies, with a diverse range of practices/methodologies used and services provided. Attempting to better understand this would be of huge benefit. It would also be good to know if we are all adhering to the same rules and regulations.*

Lastly, what aspects of our Industry can be improved and developed? Can we improve health and safety, improve collaboration, increase innovation? These are all questions that need answering. ■

The Position Paper is due to be delivered by the AGS/BDA collective on the 1st June, with the Survey being released for completion by the industry a month later on 1st July. The Project's Chairman Andrew Milne will also be presenting the Position Paper at Geotechnica 2016 in the first week of July. It is hoped that Geotechnica will be a major platform for discussion about the initiative. Both the AGS and the BDA will shortly be releasing further information to their respective members, however to stay fully up-to-date with all developments, follow the Task Force across Twitter, Facebook and the initiative email: ags.bda.taskforce@outlook.com.

THE GEOTECHNICAL ACADEMY

Got the theory but missing the practice?

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The Geotechnical Academy is a partnership between Geotechnical Engineering Ltd & Equipe Training, providing a unique, good value, high quality vocational geotechnical **CPD** and **training** to propel bright engineers through professional hoops and hurdles.

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Equipe Training

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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HELP!

WE'VE GONE ARTESIAN

Providing the fourth in a series of pieces for theGeotechnica is Liz Withington, Senior Manager at Geotechnical Engineering Ltd. This month Liz tackles the tricky issue of coping with artesian conditions on flooding drill sites.

We have all either made that phone call or taken that phone call "HELP! We've gone artesian, the site is flooding". So what can be done?

Firstly, let's consider what artesian conditions are. They form when the water in an "aquifer" is released under positive pressure. An aquifer can be defined as a groundwater bearing geological strata such as sand and gravel, limestone or sandstone that is confined between impermeable clays or rocks. In the UK the main aquifers include chalk, Lower Greensand, the Jurassic Limestones and the Permo-Triassic sandstones, although technically aquifers can be any confined water bearing strata.

For an aquifer to become artesian it must reach the surface, which for the ground investigation industry means when a borehole penetrates through the impermeable strata and relieves the pressure in the aquifer. This is caused by there being enough pressure in the aquifer to force the water to the surface without any assistance, causing anything from a small trickle to a "gushing geyser" which floods the site. Either way it needs to be controlled to prevent a number of issues including wash out erosion, subsidence, water wastage, and to prevent water carrying sediments from reaching surface water courses.

"This is caused by there being enough pressure in the aquifer to force the water to the surface without any assistance..."

The UK Specification for Ground Investigation (2nd Edition)[1] provides guidance on how to deal with artesian water. In summary this states that on first encountering artesian water the investigation supervisor should be immediately informed and an attempt made to balance the pressure of the water or "head" by extending the casing above the existing ground level by as much as possible. If the extended casing fails to stem the flow of water it may be useful to cap the casing and install a pressure gauge to measure the head of water. The measure of the head of water will aid the design of remedial measures to stop the flow of the water.

"... on first encountering artesian water the investigation supervisor should be immediately informed and an attempt made to balance the pressure of the water..."

If the head of water is generally around 1.00m or less and if there is suitable provision to manage water flow by channelling the excess water into a containment facility then the borehole can be advanced as normal, although with slower progress. On completion the borehole can be sealed using bentonite pellets or cement/bentonite grout in accordance with Clause 5.7 of the UK Specification for Ground Investigation. It may be useful to add the bentonite pellets in "plugs" which are pellets placed inside geotextile "sock" material which are then placed in the borehole using the drill rods and allowed to expand within the borehole. Bentonite/cement grout needs to be tremmied into the borehole from the base upwards. In selecting the grouting materials consideration needs to be made to both the contamination status of the site and any particular requirements from the Environment Agency.

For artesian boreholes with a head of water above 1.00m the method to manage and seal the flow of water is only dealt with in a general way in the UK Specification for Ground

"... where control of flow cannot be achieved using bentonite pellets alone... a weighted grout could be used."

Investigation. Therefore, where control of flow cannot be achieved using bentonite pellets alone, or where the driller cannot balance the head of water above the casing, a weighted grout could be used. This involves adding barite to the grout to overbalance and stabilise the artesian water pressure. To determine the extra weight of barite required to counteract the pressure of the artesian water the estimated artesian head and depth to the top of the aquifer is required. This can be calculated using a "Weight Up Calculation" which can be found on many mud suppliers' websites. For an example of one of these calculations the Ministry of the Environment British Columbia[2] suggest the formulae in Figure 1 to estimate the additional weight of drilling mud needed to control flow.

The formula in Figure 2 can therefore be used to approximately estimate the additional weight required.

Therefore if the depth to the top of the aquifer is 25 metres and the height of water above the ground is estimated at 5m, the additional weight of drilling mud would be (3.8x5/25) + 0.2= @1kg/4 litres water

If the weighted grout proves unable to contain or balance the head of water, then resource needs to be made in the form of a sacrificial packer. This involves using an inflatable bung of the appropriate diameter into the borehole using either the drill rods or other suitable rigid equipment. The bung should then be inflated to the correct pressure and the inflation line detached. A second packer may be required if pressure and flow are excessive. It is then useful to add a weighted grout above the packer to seal the borehole and prevent wash out. ■

References:

[1] *ICE Institution of Civil Engineers UK Specification for Ground Investigation Second Edition 2012*

[2] *Ministry of Environment British Columbia Flowing Artesian Wells*

Figure. 1

Additional mud weight =

(8.34 lbs/USgal* x height of water above ground level (ft)) + 0.4 lbs/USgal*
((Depth to top of aquifer (ft))

**Figure. 2*

Additional mud weight =

3.8 (kgs)/ x height of water above ground level (m) + 0.2 kgs/ (a safety factor)
Depth to top of aquifer (m)

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The true value of a good ground investigation is all too often missed and as an industry we often revert to blaming the client or resigning ourselves to 'lowest cost always wins'. However, the geotechnical industry is full of intelligent, competent, resourceful and hard-working individuals.

Geotechnica 2016 will reflect on the current 'state of the industry', look at what the industry is doing well, lessons learnt from past and ongoing projects, innovations and emerging technologies. It is an inclusive event and will be used to share knowledge, promote best practice and help the industry debate, evaluate and establish initiatives to move forward.

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- **Learn** from the best minds the industry has to offer.

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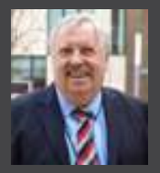
Conference Keynote Speakers



Wednesday 6th July
Professor Eddie Bromhead
Chief Scientific Editor QJEGH Editorial Board - The Geological Society & Former Professor - Kingston University

Thursday 7th July
Professor Iain Stewart
Director of Sustainable Earth Institute - Plymouth University

Evening Networking Gala Dinner

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Dinner Speakers
Professor Stefaan Simons
Dean for the College of Engineering - Brunel University

Professor Iain Stewart
Director of Sustainable Earth Institute - Plymouth University

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Conference Programme

Key topics to be discussed in 2016

Wednesday 6th July

Session - Planning

Jonathan Gammon
Head of Ground Investigations - HS2 Ltd

Dr Jackie Skipper
Associate Director - Geotechnical Consulting Group
Title: *Investigating and understanding the ground - why bother?*

Professor Paul Nathanail
Professor of Engineering Geology - Nottingham University & Managing Director - LQM Ltd
Title: *Changes to the Planning system - revised National Planning Policy Framework; Planning & Housing Bill; Brownfield Registers.*

Session - Laboratory Testing and Sampling

Dr John Powell
Technical Director - GEOLABS Ltd
Title: *Geotechnical laboratory testing vs. In situ testing*

Tom Lunne
Expert Advisor - Norweigan Geotechnical Institute
Title: *Using offshore sample quality methodology for onshore investigations*

Session - Maximising the benefits of Ground Investigation Specialist Services

Dr Simon Hughes
Operations Manager - TerraDat
Title: *The importance of Near Surface Geophysics in Geotechnical Site Investigations.*

Kim Beesley
Managing Director - European Geophysical Services
Title: *How, When and Why to Geophysically Log in SI?*

Joseph Hobbs
Technical Manager - Lankelma
Title: *CPTs for High Risk Projects*

Mark Hudson
Managing Director - Geoterra
Title: *Mitigating your Risk – Subsurface laser scanning and multibeam sonar void surveys – What lies beneath & where?*

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Thursday 7th July

Session - Ground Investigation Techniques

Andrew Milne
Project Chairman - AGS/BDA Task Force & Managing Director - Geotechnical Engineering
Title: *State of the Industry 2016*

Professor David Norbury
Director - David Norbury Ltd
Title: *An overview of European GI*

Ben Gilson
Senior Engineer (Geotechnics & Tunnelling) - Arup
Title: *Micro to macro – Are UK linear infrastructure GIs suitable for investigating mass soil property characteristics?*

Session - Health, Safety and Environmental

Joe Murphy
Head of Health and Safety (Area South) - HS2 Ltd
Title: *Leasons learnt on HS2*

Tom Phillips
Managing Director, RPA Safety Services
Title: *Design and CDM – A joined up approach to the principles of good (safe) design.*

Session - Innovation and Emerging Technologies - Where next for the industry?

Eng. Diego Marchetti
Partner - Studio of Professor Marchetti
Title: *The Flat Dilatometer: Applications and Recent Developments*

Adrian Wilkinson
Director - LM-Geotechnical
Title: *Drones – The Law & the Benefits*

Dr Roger Chandler
Managing Director - Keynetix

EQUIPE TRAINING AN 8 YEAR JOURNEY

During the course of the last 50 issues of theGeotechnica, its parent company the Equipe Group have gone from strength to strength – mirroring the magazine's continued success. In this retrospective piece we will be looking back at the history of Equipe, documenting the growth of the UK's only dedicated geotechnical training provider.

Back in 2008, Julian Lovell and Peter Reading, at the time of Soil Mechanics, met with Keith Spires of Geotechnics to discuss the potential advantages of creating a company dedicated to raising the standard of knowledge within the geotechnical industry across the board. Although there were many skilled and knowledgeable workers operating within the geotechnical sector, there wasn't a dedicated facility or company that offered high-standard training on a consistent and committed basis. There was seemingly a hole in the market that needed filling, for the betterment of the entire geotechnical community.

After a number of extremely positive and insightful meetings, the three took the plunge and established Equipe Training Ltd on the 28th April 2008.

Initially, the plan for Equipe was to hold both open and bespoke courses 5 days a week, focussing on technical, vocational education for specific industry skills and practices.

"Courses were divided into packages for Undergraduates, Postgraduates and varying levels of experienced Engineers."

Courses were divided into packages for Undergraduates, Postgraduates and varying levels of experienced Engineers. Courses were also developed specifically for on-site drilling technicians; laboratory technicians; contracts managers and various other specialist roles within the sector. Equipe also partnered with the British Red Cross to offer a range of health and safety courses, as well as CAT and Genny instruction.

Unfortunately for the ambitious trio, although the demand for training and education within the industry was there at the start of the year, by mid-2008 the investment wasn't. With the global economy in freefall, Equipe quickly had to learn to diversify their services to stay afloat. Whilst training was very much still the company's main focus, they also delved into National Vocational Qualifications, SPT Calibrations, LOLER Inspections and began to draw up plans for a new grassroots trade show – Geotechnica.

"With the global economy in freefall, Equipe quickly had to learn to diversify their services..."

In the years since this diversification, Equipe's bread and butter has still remained training. Their passion for education and improving industry standards has seen a broad spectrum

"They have worked with the largest clients on projects like HS2, geotechnical consultancies such as ARUP and WSP, all the way down to the hardest working smaller drilling sub-contractors."

of courses delivered to all levels of profession within the geotechnical and drilling sector. Across the last 8 years, their courses have included:

Geotechnical:

Geotechnical Foundation Design, Geotechnical Laboratory Testing Awareness, Soil and Rock Description Workshops, In Situ Testing, Instrumentation and Monitoring, Site Investigation Awareness, Eurocode 7 Compliance, Geo-environmental Awareness, Earthworks Awareness, Pressuremeter Workshops, CPT in Geotechnical Practice, Geophysics in Geotechnical Practice

Drilling:

Rotary Drilling Awareness for Engineers, Rotary Drilling Applications, Mini-Mud Schools, Principles of Cable Percussion Drilling, Principles of Dynamic Sampling, Pagani Penetrometer Training

Health and Safety:

IOSH Safe Supervision of Geotechnical Sites, IOSH Avoiding Danger from Underground Services, IOSH Working Safely (on Geotechnical Sites), Site Safety and Management, First Aid, CAT and Genny Instruction, Manual Handling, Asbestos Awareness

Commercial:

Contractual Awareness – ICE, NEC/ECC Contracts

Equipe have also delivered bespoke training packages for the Saudi Geological Survey, Nigerian Geological Survey, Cathie Associates and Gulf Laboratories amongst many others.

Throughout their time delivering training and carrying out NVQ Assessments, Equipe have encountered and built relationships with every level of operation within the geotechnical industry. They have worked with the largest clients on projects like HS2, geotechnical consultancies such as ARUP and WSP, all the way down to the hardest working smaller drilling sub-contractors. Using these relationships and the knowledge obtained from years of working within the sector, they have been able to streamline their training courses to deliver precisely what the industry needs to develop its skillset.

Of course each individual course provides its own challenges – some requiring expert knowledge out of the reach of even Equipe's Directors. This has meant that Equipe have established

“Equipe have established a network of experts from across the industry to ensure that it’s courses are delivered by the very best and most knowledgeable people…”

a network of experts from across the industry to ensure that it’s courses are delivered by the very best and most knowledgeable people that the sector has to offer. RPA Safety Services have become partners and introduced IOSH certification for health and safety courses; Professor David Norbury continues to deliver outstanding Soil and Rock Description Workshops for all levels of experience; Cambridge Insitu have delivered training on pressuremeters; whilst CPT experts Dr John Powell and Tom Lunne have helped provide advanced CPT seminars. Many other valued collaborators have come and gone, always providing the very best standard of education for all attending delegates.

In 2010 Equipe started one of its longest running training partnerships with Geotechnical Engineering Ltd to develop a unique learning experience targeted at geotechnical and geo-environmental engineers in the early years of their careers - or those who feel they could do with a refresher. This learning experience would come to be known as The Geotechnical Academy – a modular training course focussing on geo-professionals wishing to obtain real life geotechnical knowledge and skills which can be applied to their working environment. The Academy has been running strongly for the last 6 years and it’s 11th Group with shortly be graduating.

Over the last 8 years Equipe have delivered vocational courses to over 500 companies working within the geotechnical sector, and over 7000 individual delegates have sat one or another of their courses, seminars, workshops or other CPD endorsed events. In 2015 alone over 1000 delegates attended an Equipe Training event, and 2016 looks set to beat this number by a distance.

Just as the geotechnical sector continues to move from strength to strength, the call for continued comprehensive and extensive vocational training continues to grow. The future looks bright for Equipe Training and its extended geotechnical family – make sure you are a part of it. ■

Equipe’s open courses are available for booking now on their website. Bespoke courses and packages can also be arranged by getting in touch via info@equipegroup.com.

Equipe’s next large CPD event will be the geotechnical conference at Geotechnica 2016, to be held on the 6th and 7th of July at Brunel University, London. The keynote speakers for Geotechnica have recently been confirmed as Professor Iain Stewart of television documentary fame, as well as former Glossop Lecturer and slope stability expert, Professor Eddie Bromhead. Visit www.geotechnica.co.uk *to register your place at Geotechnica 2016 now.*

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VOLATILE ORGANIC COMPOUNDS

In another excellent, technical article, Hazel Davidson of Derwentside Environmental Testing Services returns to write for theGeotechnica. This month, Hazel turns her attention to Volatile Organic Compounds, providing valuable insight into what VOC's actually are.

A VOC is considered to be an organic compound with a boiling point in the range -25°C to 200°C and within the carbon range C_4 – C_{12}.

"They are a common legacy of many industrial processes, particularly petroleum related..."

They are a common legacy of many industrial processes, particularly petroleum related, and VOCs can consist of both LNAPLs and DNAPLs (Light or Dense Non-Aqueous Phase Liquids). An LNAPL has a density of < 1.0 and will therefore float on top of a water column in a monitoring well. Care in sampling is needed when free product is present in a well.

Solubility in groundwater is highly variable, as demonstrated below:

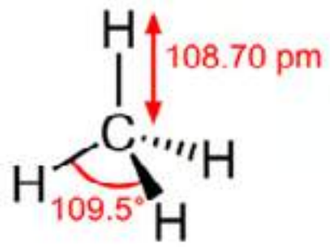
Some definitions:

- Halogenated compounds – hydrocarbons containing one or more of the halogens - chlorine, bromine, fluorine or iodine
- Trihalomethanes – containing 3 halogen atoms, e.g. chloroform, $CHCl_3$
- Aromatic compounds – hydrocarbons including one or more benzene rings, e.g. any of the BTEX species
- Alkanes – aliphatics containing no double bonds
- Alkenes – aliphatics containing double bonds

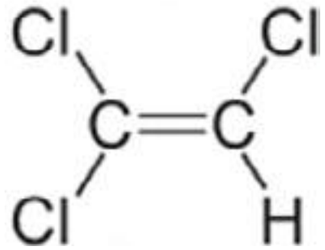
Synonyms:

- methylene chloride = dichloromethane
- vinyl chloride = chloroethene
- trichloromethane = chloroform
- trichloroethene = trichloroethylene, TCE, Trike
- tetrachloroethene = perchloroethene, PCE, Perc

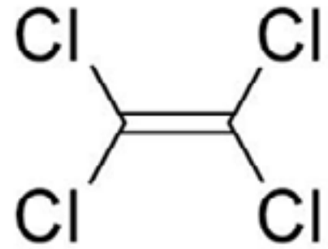
	Density (g/cm^3)	Boiling Point (°C)	Solubility in water (g/l)	
Vinyl chloride	0.91	-13.4	2.7	LNAPL
Dichloromethane	1.32	39.8	1.7	-
Trichloroethene	1.46	87.3	1.28	-
Chloroform	1.48	61.2	0.8	-
Tetrachloroethene	1.62	121	0.15	-
Bromochloromethane	1.99	68.3	16.7	-
Pentane	0.62	36	0.04	LNAPL
MTBE	0.74	55.2	26.0	LNAPL



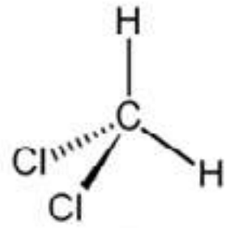
Methane



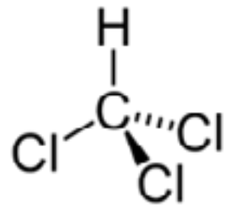
Trichloroethene



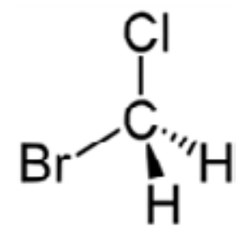
Tetrachloroethene



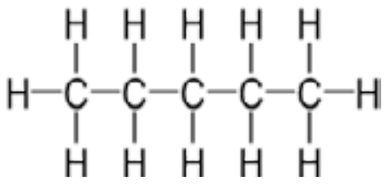
Dichloromethane



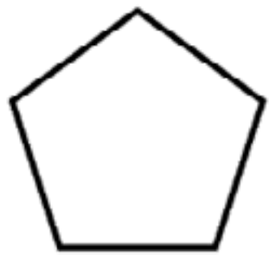
Trichloromethane



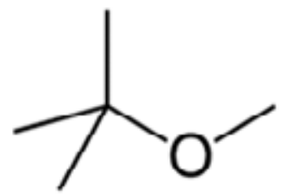
Bromochloromethane



Pentane



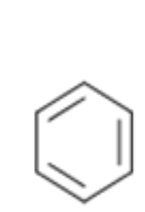
Cyclopentane



MTBE – methyl tertiary butyl ether $(CH_3)_3COCH_3$

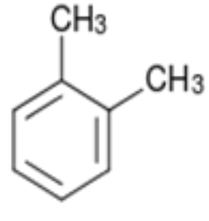
Some examples of volatile organic compounds are shown above.

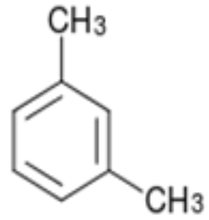
Aromatic compounds are shown to the right.

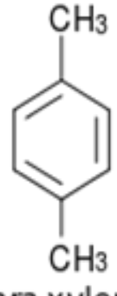


benzene

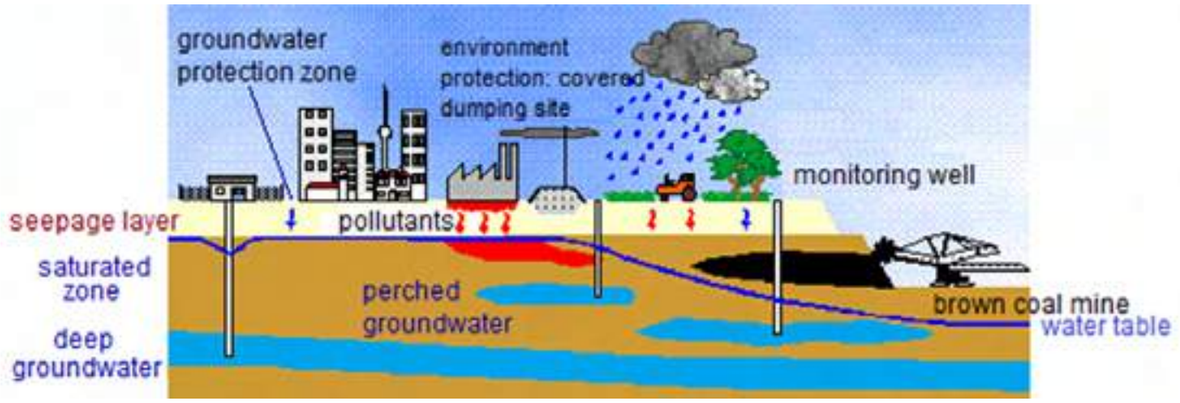
toluene







ortho-xylene *meta*-xylene *para*-xylene



Industrial processes – likely sources

Petroleum refineries and petrol stations, airports and transport companies, solvent production, pharmaceuticals, chemical synthesis, dry cleaning, electroplating/degreasing.

Presence in soil and groundwater

VOCS can enter the soil and permeate through to any underlying aquifer. The risk to the aquifer depends on several factors:

- Depth from the surface
- Aquifer porosity
- Contaminant load
- Hydrogeology

VOCs can be found in soil in a variety of forms

- Liquid film around particles
- Adsorbed onto the surface of particles
- Absorbed into soil particles
- Occupation of pore spaces

And in groundwater

- Truly dissolved – varying solubilities
- Colloidal suspension
- Free product film

VOCs in soil will break down or be removed by:

- Sorption
- Degradation
- Dispersion
- Volatilisation
- Advective flow – carried along by groundwater
- Diffusive flow – movement along a concentration gradient

The rate of dispersion/ degradation in soil depends upon a number of factors:

- Chemical, biochemical, and physical reactions
- Organic content of soil
- Particle size of soil
- Soil composition (matrix)
- Bacterial composition and concentration
- Moisture content
- pH
- Partition coefficient of each VOC compound

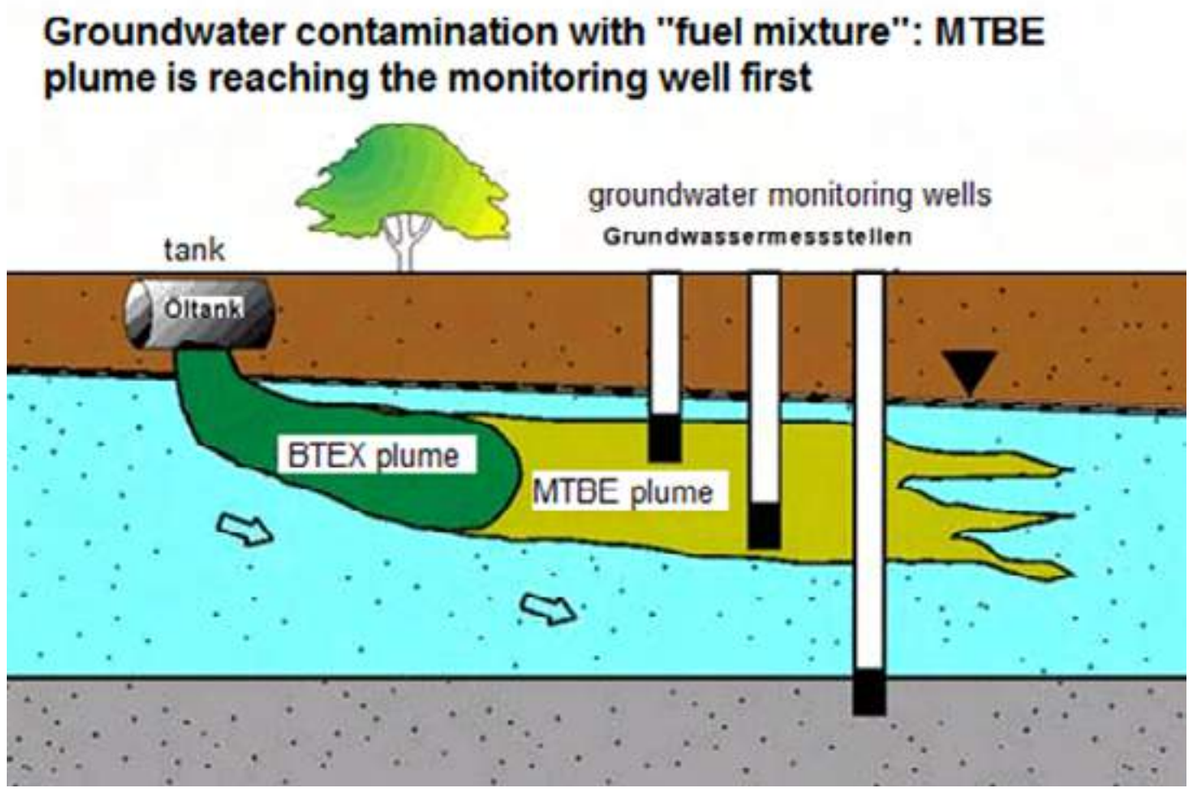
An example of the implications of these properties is demonstrated below – MTBE moves much more quickly through a subsoil and will be detected in monitoring wells before the other petroleum compounds.

Sampling VOCs

Water samples should be taken in 40 ml amber glass vials with a septum in the lid to allow withdrawal of the sample without losing volatiles. It is important to ensure there is no headspace in the vial. Soil samples should be taken in 60 g amber glass jars and pressed down to avoid any headspace.

Samples should be stored cold in the dark and sent to the laboratory the same day. It is important to take a duplicate of each sample, to allow for further analysis, repeats and checks, as the same vial cannot be used twice.

It is critical samples are taken and stored correctly, as they will be classed as deviating if not received in the correct containers. ■



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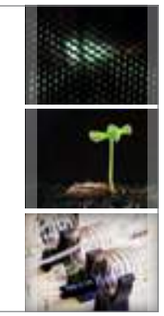

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