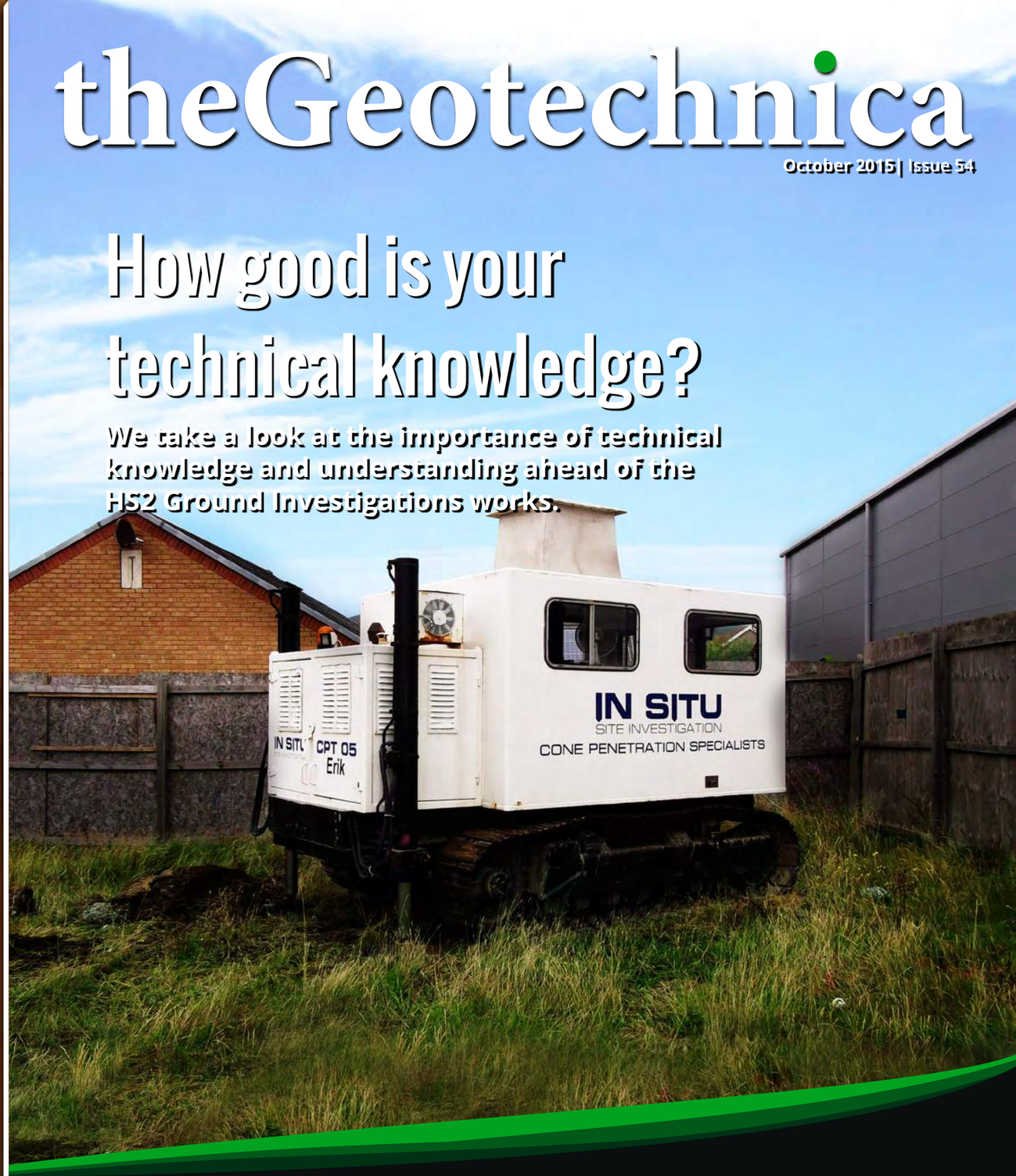
theGeotechnica

October 2015 | Issue 54

How good is your technical knowledge?

We take a look at the importance of technical knowledge and understanding ahead of the HS2 Ground Investigations works.



Capital Quarter Piling

Piling firm Aarsleff continue work on Cardiff's Capital Quarter

Contaminant of the Month: TCE

Geraint Williams continues his series on contaminants

Digital Technology Revolution

Has the rise of digital tech passed the geotechnical industry by?

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Welcome

Welcome to the 45th Edition of **theGeotechnica** - the UK's fastest growing online geotechnically focussed e-magazine.

The opening article of this month's issue comes from Debbie Darling of Jooce Marketing & PR on behalf of Aarsleff. This month Debbie reveals details of Aarsleff's recent work on the Capital Quarter, a new development in the centre of Cardiff.

Next up we have one of our highly valued regular contributors, Geraint Williams of Alcontrol Laboratories. This month Geraint returns to the extremely popular contaminant of the month series, and reviews the uses, properties and toxicology of Trichloroethene.

Following this is our cover article, in which we take a look at areas of potential improvement for the geotechnical industry's technical knowledge courtesy of Calum Spires of the Equipe Group. As the industry looks to increase the efficiency and effectiveness of it's ground investigations, Calum asks what can be done to help get the most out of standard GI practices.

Finally, this month in **theGeotechnica** we examine the rise of digital technology implementation across the geotechnical industry. Providing this examination are Julian Lovell and Calum Spires of the Equipe Group, as well as a case study of technology use from Shaun Corcoran, ICT Manager at Geotechnical Engineering.

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

ALL FOUR QUARTERS

A CAPITAL RESULT FOR AARSLEFF'S PRECAST PILING

Writing for theGeotechnica this month is Debbie Darling of Jooce Marketing & PR on behalf of Aarsleff. This month Debbie reveals details of Aarsleff's recent work on the Capital Quarter, a new development in the centre of Cardiff.

Aarsleff, one of the UK's leading precast concrete piling contractors, has successfully completed piling works for the latest element of the Cardiff City Centre development – Capital Quarter.

The Capital Quarter development, which is being undertaken by JR Smart (Builders) Ltd, is an exciting 8-acre mixed-use development, which when complete will feature in excess of 800,000 sq. ft. of constructions including offices, hotels, student housing, residential and education buildings.

Block K, the fourth major structure on the site and final element of the scheme, is a multi-storey car park and saw Aarsleff drive 207no. concrete piles measuring 300 x 300mm at depths of between 10 and 12m for a 600 – 900kN pile load. A further 14 tubular steel piles sized 339mm in diameter were also driven up to 15 metres depth for a maximum 900kN pile load.

"Aarsleff's involvement on the development has been considerable having also piled the other major structures... "

Aarsleff's involvement on the development has been considerable having also piled the other major structures, which required some 685no. precast piles being driven in total.

The project was not without its challenges as Nathan Sale, Aarsleff project manager who supervised the piling program, explained: "We had to work out a strategy to limit noise and vibration as construction was still underway on one of the new buildings. We also had to meet with Network Rail to ensure a safe system of work to protect their adjacent line. From our surveys and site knowledge we predicted a challenging drive scenario for the piling as there is a two-metre deep band of hard sand and gravel running across the site and we needed the full power of the Junttan PM20 piling rig."

Commenting on the work of Aarsleff on the project Gareth Smart, development director, JR Smart said: We have worked with Aarsleff on many developments and as expected this project ran true to schedule. We had cleared the site a couple of years ago and were able to provide a good stable and level base for the rig to operate on. Fortunately we have plenty of easy access for the pile delivery and holding. The drive went well and the crew were meticulous in positioning the rig. We expect to be working with Aarsleff again soon. We have applied for planning permission for a 23-storey block of apartments so we can foresee five more years' development on this site."

"We have applied for planning permission for a 23-storey block of apartments so we can foresee five more years' development on this site."

Nathan added: "We had previously piled the three adjacent structures and have established a good working relationship with the JR Smart team. It is a sensible two-way communications relationship which works well for both parties aiming to move the projects along at best possible speed." ■

THE GEOTECHNICAL ACADEMY

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geotechnical

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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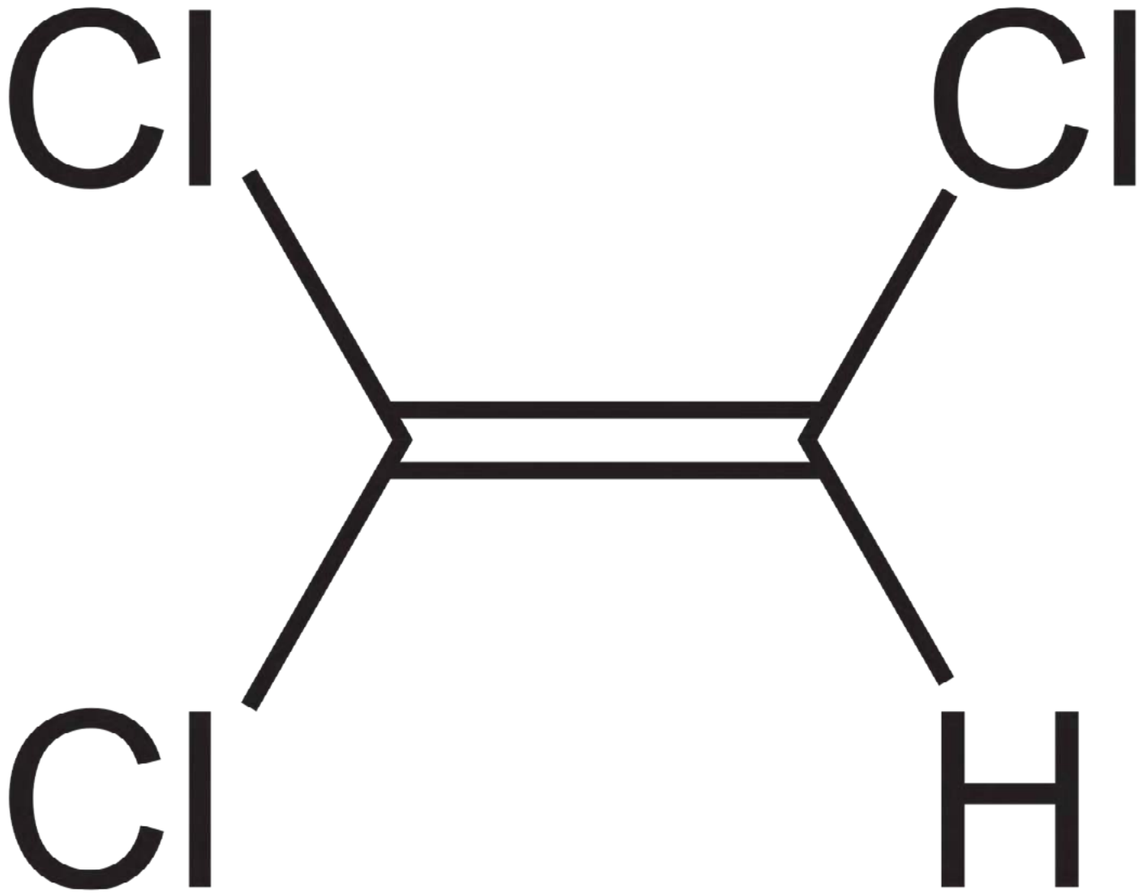

CONTAMINANT OF THE MONTH: TRICHLOROETHENE (TCE)

Writing for theGeotechnica this month is Geraint Williams of Alcontrol Laboratories. This month Geraint returns to the extremely popular contaminant of the month series, and reviews the uses, properties and toxicology of Trichloroethene.

Trichloroethene (TCE) (CAS No. 75-01-6) is a widely occurring contaminant in the UK. It is commonly known as trichloroethylene and other synonyms include 1,1,2-Trichloroethylene; acetylene trichloride; ethinyl trichloride; TRI; TRIC; and 1-Chloro-2,2-dichloroethylene. TCE is a chlorinated solvent which exists at room temperature as a colourless, non-flammable liquid with a sweet smell (NTP 2015).

TCE does not occur naturally in the soil. It has been produced commercially since the 1920s. The main uses of TCE are as a metal degreaser and solvent for a variety of organic materials.

"The main uses of TCE are as a metal degreaser and solvent..."

It is also used as a chemical intermediate and solvent for applications related to adhesives, painting, lacquering and varnishes. In the past, TCE was used as a grain fumigant, an extraction solvent in the food industry and an anaesthetic agent. It was extensively used in the dry cleaning industry until the mid-1950s, when it was replaced by tetrachloroethene.

"It was used in the dry cleaning industry until the mid-1950s, when it was replaced by tetra-chloroethene..."

The majority of TCE present on soil surfaces will volatilise to atmosphere. However, because TCE is denser than water, it will more likely move downward through the subsurface until lower permeability features impede its progress resulting in groundwater contamination (ASTDR 2014). TCE is not readily biodegradable, although rates may increase in the presence of certain substrates. Under anaerobic conditions, it may be slowly biodegraded by reductive dechlorination to 1,1-dichloroethene and vinyl chloride. The metabolites may pose additional toxicity concerns, but several studies have shown that reductive dechlorination may continue to produce ethene and ethane. The extent and rate of degradation will depend upon the strength of the reducing environment. Aerobic biodegradation only occurs under oxidative conditions such as those occurring in the soil surface layer and does not produce toxic metabolites (Environment Agency 2004).

A range of authoritative, relevant and up to date toxicological evaluations for TCE have been published by the USEPA (2011), ATSDR (1997,2013), IARC (2014) and NTP (2015). These recent evaluations supersede the now outdated DEFRA and the Environment Agency's TOX 24 report in 2004 that established a Health Criteria Value of 5.2 µg/kg bw/day.

The USEPA Integrated Risk Information System (IRIS) programme released an updated toxicological review of TCE in 2011. TCE causes a variety of toxic, developmental and carcinogenic effects with the kidney being an important target organ for both cancer and non-cancer effects. Whilst TCE's carcinogenic effects remain a risk driver for chronic exposure, non-cancer effects have been considered in USEPA's reference dose (RfD) including heart malformations and immunotoxicity.

"TCE causes a variety of toxic, developmental and carcinogenic effects with the kidney being an important target organ for both cancer and non-cancer effects."

The IRIS posting for TCE included an inhalation unit risk cancer potency based upon rodent and human inhalation studies (4E-06 µg/m3), an oral cancer potency factor extrapolated from the inhalation value of 50 µg/kg/day, a RfD based upon oral studies in rodents (0.5 µg/kg/day) and a reference concentration (RfC) for inhalation exposure of 2 µg/m3 (USEPA 2011).

"The USEPA concluded, by a weight of evidence evaluation for kidney cancer, that TCE can be characterised as carcinogenic to humans..."

The USEPA concluded, by a weight of evidence evaluation for kidney cancer, that TCE can be characterised as carcinogenic to humans by all routes of exposure since TCE is systemically available, distributes to organs and tissues and undergoes systemic metabolism from all routes of exposure (USEPA 2011). According to the USEPA there is convincing evidence of a causal association between TCE exposure in humans and kidney cancer across a number of independent studies. The human evidence of carcinogenicity from epidemiologic studies of TCE exposure is strong for non-Hodgkin lymphoma and more limited for liver, biliary tract and other types of cancer (IRIS 2011).

The re-evaluation of TCE by the International Agency for Research on Cancer (IARC) in 2014 resulted in a new classification in Group 1, carcinogenic to humans based on sufficient epidemiological evidence for cancer of the kidney, with strong mechanistic support from studies in experimental animals and exposed humans. The epidemiological data also identified evidence for an association with liver cancer and non-Hodgkin lymphoma.

The US Agency for Toxicity and Disease Substance Registry (ATSDR) (2013) published an addendum of their Toxicological Profile which was originally published in 1997. In publishing Minimal Risk Levels (MRL) they took into account health effects information made available subsequent to the previous publication and adopted the USEPA's RfD of 0.5 µg/kg/day for the chronic-duration oral MRL and the chronic RfC of 2 µg/m3 for the chronic-duration inhalation MRL.

"In publishing MRL they took into account health effects information made available subsequent to the previous publication..."

In the UK context, it is important to understand the basis of the assumptions made in any international toxicological reviews. These factors have been taken into account, and where appropriate, applied in the recently published Suitable 4 Use Levels by Land Quality Management and the Chartered Institute of Environmental Health. TCE may also be a possible candidate for future Category 4 Screening Levels in line with the previously established framework for their derivation. ■

References

ATSDR (2013) Addendum for Trichloroethylene: Supplement to the 1997 Toxicological Profile for Trichloroethylene, January 2013. Agency for Toxic Substances and Disease Registry: http://www.atsdr.cdc.gov/toxprofiles/tce_addendum.pdf

DEFRA & Environment Agency (2004) Contaminants in soil: Collation of toxicological data and intake values for humans. Trichloroethene. Environment Agency: Bristol UK: http://webarchive.nationalarchives.gov.uk/20140328084622/http://www.environment-agency.gov.uk/static/documents/Research/percold_2029065.pdf

IARC (2014) Trichloroethylene, Tetrachloroethylene and some chlorinated agents. Volume 106. International Agency for Research on Cancer, World Health Organisation: http://monographs.iarc.fr/ENG/Monographs/vol106/mono106.pdf

NTP (2015) Report on Carcinogens. Monograph on Trichloroethylene: http://ntp.niehs.nih.gov/ntp/roc/monographs/finaltce_508.pdf

Nathanail C.P., McCaffrey, C., Gillett, A.G., Ogden R.C. and Nathanail, J.F. 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham

USEPA IRIS (2011) IRIS profile for Trichloroethylene http://www.epa.gov/iris/subst/0199.html

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DO WE NEED TO INCREASE OUR TECHNICAL KNOWLEDGE?

Taking a look at areas of potential improvement for the geotechnical industry's technical knowledge is Calum Spires of the Equipe Group. ***As the industry looks to increase the efficiency and effectiveness of it's ground investigations, Calum asks what can be done to help get the most out of standard GI practices.***

With the ever increasing workload that is beginning to permeate the geotechnical and ground investigation industries, the need for a greater understanding of the many investigatory tools at our disposal has never been so vital. Whilst the demand for more and more standard ground investigation sampling techniques leaves the industry scrambling for more rigs and trained on-site staff, there has also been an upturn in demands for less environmentally intrusive GI.

At Geotechnica 2015 Dr Nader Saffari from London Underground and Jonathan Gammon from HS2 discussed plans for a massive amount of upcoming site investigation work on a number of rail projects, however what was more interesting was the desire from both of these large clients for more innovative methods of SI to be utilised. Dr Saffari specifically pointed to the use of lasers, drones and remote sensors for survey purposes on projects on the Northern Line Extension on the London Underground as examples of less instructive methods of GI. More and more importance is being placed on GI becoming less intrusive by the largest UK clients in order to reduce costs and increase efficiency, as conventional methods can be time consuming and if the results obtained are not satisfactory, they can become a black-hole of inefficient money spending.

"... what was more interesting was the desire from both of these large clients for more innovative methods of SI to be utilised."

In addition to the desire for works to become less intrusive, clients are now asking for GI to be carried out in a greater number of sites with restricted access, meaning that conventional routes of investigation are unable to be carried out; once again calling for innovation in order to complete the necessary works. It may be time to ask ourselves to not only look for further innovations in technology to decrease the intrusiveness of standard ground investigation, but to also look to better our understanding and get better results from the already widely-used techniques at our disposal.

One such technique has been highly featured in previous issues of theGeotechnica – geophysics. There are a number of geophysics specialists working within the UK sector such as European Geophysical Services, TerraDat and Arrow Geophysics (among many others), however it could be said that the understanding of the advantages of geophysics accompanying standard GI practices are not widely known, nor is its implementation used to full potential.

Broadly speaking, geophysics is the remote study of the Earth through physical techniques - principally analysing seismic data, but also applying gravity, magnetic and electrical methods. Geophysics requires far less physical labour for the operators, therefore reducing the health and safety risk, however it can also be used very effectively to compliment onshore, obtrusive investigations carried out in the conventional ground investigation mould – drill and sample, drill and sample. Downhole or borehole geophysical techniques utilise the best of both worlds and are often used in the oil and gas sector as well as in groundwater and environmental investigations to obtain information on well construction, rock lithology and fractures, permeability and porosity, and water quality. While there are a number of GI companies operating in the UK that can provide geophysical surveys that include downhole techniques, the level of understanding of these techniques are not as high as they potentially could be in order to maximise the usefulness of the data

"Geophysics requires far less physical labour for the operators, therefore reducing the health and safety risk..."

“Although the bulk of GI work over the next 5 years will certainly be taking place onshore, it is also critical to note that there is a very large amount of offshore GI to be completed...”

obtained.

Although the bulk of GI work over the next 5 years will certainly be taking place onshore, it is also critical to note that there is a very large amount of offshore GI to be completed for planned offshore wind farms in the North East of the UK [1]. Obviously, conventional GI is extremely difficult to carry out on the seabed, with drilling ships and subsea rigs obtaining mixed results. However, perhaps the most reliable method below the surface is cone penetration testing. The test method consists of pushing an instrumented cone, with the tip facing down, into the ground at a controlled rate in order to determine the geotechnical engineering properties of soils and delineating soil stratigraphy. Due to the nature of the testing and the environment required for success, CPT has become the go-to method of investigation when completing offshore GI work – however it can be argued that the awareness of the techniques and the required level of expertise when carrying out the testing is somewhat lacking in the UK, whether offshore or indeed even onshore.

CPT is one of the most technologically advanced methods of GI at the UK industry’s disposal, despite being around since the 1950’s.

“Advances in different sensors [...] have allowed the method to stay at the very forefront of innovative GI techniques...”

Advances in different sensors (seismic cone, electrical resistivity, nuclear density etc.) have allowed the method to stay at the very forefront of innovative GI techniques, with a high number of companies throughout the UK such as In Situ Site Investigations, Lankelma and Fugro Geoservices carrying out CPT tests on a daily basis across a wide spectrum of sites. However, keeping on top of all of the advances in the

“However, keeping on top of all of the advances in the technology and maintaining the ability to identifying suspect/erroneous data obtained is becoming an issue for the UK market.”

technology and maintaining the ability to identifying suspect/ erroneous data obtained is becoming an issue for the UK market.

Considering the importance being placed on getting the most out of any GI work being undertaken in the UK in order to increase efficiency and reduce cost, it is vital that knowledge and the correct implementation of techniques such as geophysics and cone penetration testing be increased. To help solve this apparent knowledge-gap, Equipe Training has partnered with some of the UK and world's leading experts in the fields of geophysics and CPT for two Technical Seminars taking place in November.

"To help solve this apparent knowledge-gap, Equipe Training has partnered with some of the UK and world's leading experts in the fields of geophysics and CPT for two Technical Seminars taking place in November."

The first of these seminars will be titled 'Geophysics in Geotechnical Practice' and will seek to increase awareness regarding the correct use of geophysics for non-invasive investigations, structural and geological mapping and ground modelling. The use of geophysics can provide an in depth and continuous understanding of both surface and subsurface conditions and can also reduce the risk of underground hazards and optimise budgets. Run in collaboration with European Geophysical Services and TerraDat UK at Equipe Training's head offices in Banbury on the 10th of November, the seminar will be led by Kim Beesley and Dr Simon Hughes – two of the UK's resident experts on the field of geophysics. Content covered during the seminar will include advice on best techniques, using geophysics to manage risk and data handling, as well as looking at both the advantages and limitation of various geophysical techniques. Attending delegates will gain a greater understanding of the importance of using a geophysics specialists, along with gaining an appreciation of what the results mean and how they are obtained.

Following the geophysics' seminar will be a two-day training course titled 'Cone Penetration Testing in Geotechnical Practice' that will be held at Brunel University in London. The seminar on the 24th and 25th of November will be an essential comprehensive training course and refresher for geotechnical and geo-environmental practitioners involved in Cone Penetration Testing for Onshore and Offshore Geotechnics. The course will be devoted to raising awareness of current test procedures, advances, data derived from the tests and the importance of quality control. Again, the seminar will be run in collaboration with two of the world's leading authorities in the field of CPT – Dr John Powell and Tom Lunne. Darren Ward of In Situ SI will also provide a live demonstration of the latest CPT techniques using one of In Situ's purpose built CPT trucks. Attendees will also receive a complimentary copy of the CPT 'bible', also titled 'Cone Penetration Testing in Geotechnical Practice' authored by Lunne, Robertson and Powell.

It is hoped that these two seminars will provide a platform to increase the knowledge and understanding of both of these GI techniques in order to help maximise efficiency and effectiveness of upcoming GI work, whether on or offshore. A greater appreciation of the results obtained from these techniques is likely to aid the reduction of project costs and increase the rate at which the ground investigation can be completed.

For further information on the seminars, as well as full rates for attendance, please visit the Equipe Group website here. ■

[1] https://www.gov.uk/government/news/offshore-wind-farm-gets-the-go-ahead

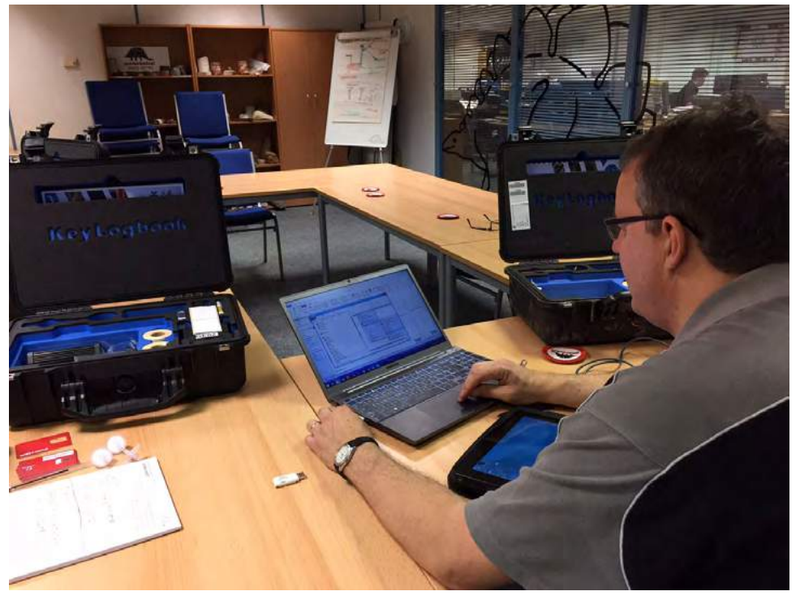
THE DIGITAL REVOLUTION

THE USE OF DIGITAL TECHNOLOGY ON GEOTECHNICAL SITES

This month in theGeotechnica we examine the rise of digital technology implementation across the geotechnical industry. Providing this examination are Julian Lovell and Calum Spires of the Equipe Group, as well as a case study of technology use from Shaun Corcoran, ICT Manager at Geotechnical Engineering.

Throughout the last 15 years the geotechnical industry has seen an influx of upgrades and advances in the machinery and tooling used to carry out a successful ground investigation. Every year at industry trade shows such as Geotechnica the latest rigs and equipment are revealed to the public, with even more intuitive and inventive developments introduced. Techniques such as sonic drilling have come a long way since the inception of the method in the late 1940's, with the latest rota-sonic drill heads starting to permeate the mainstream GI industry in a big way. However, although the investment and advances in plant and machinery are very visible the use of digital technology is less so. As an industry whose final product is often a digital report of what happened in the field, it is questionable why digital technology is not being used to capture data in the field and why there is still a heavy reliance upon pen and paper?

Around 15 years ago, borehole data was beginning to be captured by drillers digitally via the use of Excel spreadsheets on a laptop. At the same time, software developers such as Keynetix were investing heavily to improve office based data technologies such as KeyLAB and HoleBASE. It took another 10 years before field based technologies had improved to an extent where digital data capturing devices were being seriously considered. Since then, the common issues such as robustness, cost and battery life have been overcome and field based PDIs and tablets are now commonplace on almost every large geotechnical worksite in the UK. They are used to collect a multitude of geotechnical data including gas monitoring, water levels, CAT scans, lugeon tests and now even borehole and trial pit data.



"Even the smaller companies within the geotechnical industry have started to dip their toe into the water and have adopted data capture systems such as KeyLogbook"

Couple the rise of digital logging software and devices with the unprecedented growth in popularity of smartphones and tablets that offer a number of intelligent and intuitive apps to aid day-to-day communication and on-site works, and it is easy to see how and why ground investigation sites across the country are now looking seriously at embracing hand-held digital technology. Even the smaller companies within the geotechnical industry have started to dip their toe into the water and have adopted data capture systems such as KeyLogbook to take their office to the field and both improve efficiency as well as cutting costs.

As the use of digital data capture on site becomes even more vital with clients and designers needing their data quicker and in a format which other stakeholders can use, pen and paper is beginning to be forced out. The importance of digital data within geotechnics is also highlighted in BS 8574:2014 Code of practice for the management of geotechnical data for ground engineering projects, as well as within the recent revision of BS 5930:2015. The requirement for data to be delivered from site almost immediately, coupled with the desire to

manage time more effectively and the need for greater communication will see more and more digital technology introduced to drilling sites across the UK. Geotechnical firms are not only going to have to invest time and money in implementing these new technologies, but they are going to have to be savvy in the way they incorporate them in order to get the most bang for their buck. However, with the right company strategy not only the large companies but also the small companies will benefit from embracing technology and not fighting it.

Geotechnical Engineering Limited are one such company to embrace technology in order to carry out work to the highest possible standards and efficiency in an attempt to help them stay that "one step ahead". theGeotechnica has been speaking to ICT Manager Shaun Corcoran on their implementation of such technology.

All field staff at GEL are issued with smartphones to enable them to send and receive emails, check calendar entries, research topics in the field and of course communicate with clients, each other and the office. The smartphones can also double up as personal Wi-Fi hotspots to allow field staff to temporarily connect their laptops to a data connection in order to send or receive that important document straight away.

"Over the past few months, Geotechnical Engineering have also started to issue all drillers with KeyLogbook – robust tablet computers loaded with specialist software so that they can complete drill logs in real time."

Over the past few months, Geotechnical Engineering have also started to issue all drillers with KeyLogbook – robust tablet computers loaded with specialist software so that they can complete drill logs "in real time" and get them back to the engineer for checking the same day. This in turn enables them to quickly forward them to the client, as will be demanded on almost all of HS2's sites.

Even in remote areas GEL are now able to set up a fully functioning "connected" office using 3G/4G Wi-Fi dongles that all staff laptops can connect to so that information, worksheets, stat plans etc. can be easily accessed sent and received as required. Embracing this technology wasn't simply seen as an option for them, but rather a necessity in order to stay one step ahead of the geotechnical game.

Looking to the future GEL are researching the advantages of utilising drones at project planning stage to remotely record information during a site visit in areas that personnel may not be able to access at that stage. This would give them a comprehensive knowledge and therefore an accurate quote and timescale of the job required.

"...the pace at which the demand for these technologies is likely to increase will mean a short and relatively steep learning-curve for a number of on-site operatives."

There are already a number of companies operating across the UK that are utilising the technology at hand to its full extent, in much the same manner as Geotechnical Engineering. However the pace at which the demand for these technologies is likely to increase will mean a short and relatively steep learning-curve for a number of on-site operatives.

It is vital that preparations are made and procedures put in place for geotechnical companies of every size, so that they are fully ready for when digital data capture becomes the norm. The capture and use of digital data will undoubtedly change the way every company operates and those not willing to adopt systems like KeyLogbook will be left far behind. The current rate of development of these technologies is astonishing and it will be truly a case of 'adapt and survive'.

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