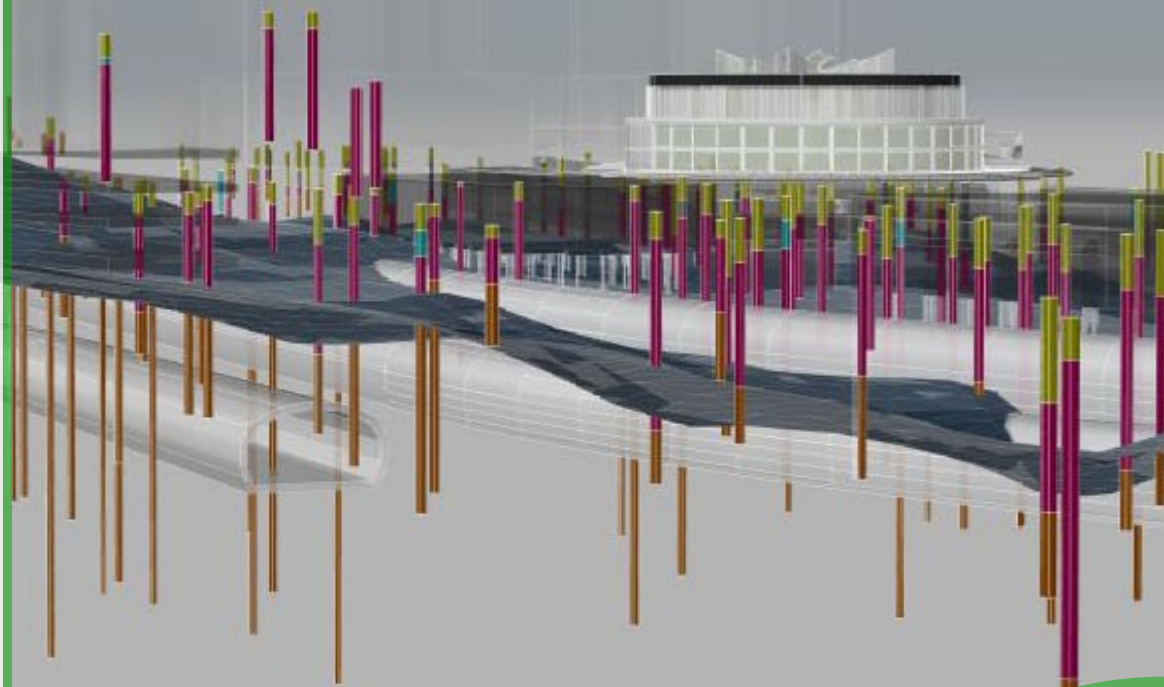


The Importance Of *Just how important is BIM to our industry?* **BIM**

Also included:

- The introduction of Pagani to the UK market.
- The re-launch of The Geotechnical Academy.
- Tom Phillips looks at the dangers of explosive working environments.
- Drilling Fluids - Article 5 from James Mansell of Clear Solutions.
- The changes in planning and revision of statutory guidance from Alcontrol's Geraint Williams.



Issue No.

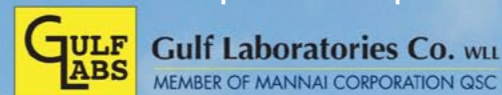
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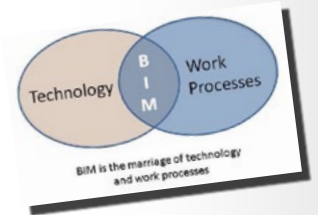
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Dr Roger Chandler of Keynetix explains why Building Information Modelling (BIM) is so important to the Geotechnical Engineer.



[Rockbit UK introduce Pagani to the UK](#)

Rockbit UK and Equipe Training unveil their new collaboration that will see Pagani CPTu rigs rolled out into the UK market. Whilst Rockbit are the agent, Equipe will provide the training needed to operate the rigs.



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[Working in Explosive Atmospheres](#)

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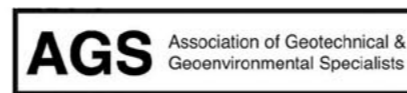
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Welcome

Welcome to the September 2012 issue of **theGeotechnica**, the 14th edition of the industry's leading exclusively online concept emagazine. Last month we unveiled the new design and format for **theGeotechnica**, seeing a more sleek and flowing magazine be distributed amongst our readership - you will be pleased to know that this month is offering more of the same.

"... this month the content is even more interesting and thought-provoking, particularly our featured cover article on Building Information Modelling..."

In addition, this month the content is even more interesting and thought-provoking, particularly our featured cover article on Building Information Modelling (BIM) penned by Keynetix' Dr Roger Chandler. Roger is a regular contributor to the magazine, however this month's offering is perhaps his most important article to date. It can be said that there is a lack of understanding of what BIM is, and the importance that it plays within our sector - Roger will be going some way to explaining this in his article to be found on page 6 of this month's edition.

"On page 12 we have a joint press-release from Rockbit UK, Pagani Geotechnical Equipment and Equipe Training, who are introducing Pagani's TG 63 CPTu range to the UK."

Roger's article is not the only must-read section of this month's magazine. On page 12 we have a joint press-release from Rockbit UK, Pagani Geotechnical Equipment and Equipe Training, who are introducing Pagani's TG 63 CPTu range to the UK. The press release details what the rig has to offer in terms of CPTu Insitu Testing, as well as revealing the partnership with Equipe Training



that sees them acting as the UK training base for the rig and equipment.

"The article details the benefits of The Geotechnical Academy, as well as how you can apply to participate."

On page 18 we also have details about the re-launch of The Geotechnical Academy - a joint venture by Geotechnical Engineering and Equipe Training aimed to provide fundamental technical and commercial training to aspiring geotechnical and commercial professionals. The article details the benefits of The Geotechnical Academy, as well as how you can apply to participate.

Elsewhere we have an offering from RPA Safety Services' Tom Phillips who discusses the hazards of working in explosive atmospheres; the fifth in an intriguing series about drilling fluids from



James Mansell of Clear Solutions and also an article on the changes in planning and revision of statutory guidance from Alcontrol's Geraint Williams.

"...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..."

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 even the slightest bit of 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.

"...for any content that is submitted we will provide free advertising space, proportionate to the quality of content provided..."

Once again, for any content that is submitted we will provide free advertising space, proportionate to the quality of content provided, for that single edition of the magazine. From then on, if you have submitted content, you will receive a discount on all further advertisements placed within **theGeotechnica**.

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

Programme of Upcoming Courses //

Below is a list of upcoming courses provided by Equipe Training:

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in partnership with RPA Safety Services

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- 28th September 2012

- 25th October 2012

- 29th November 2012

IOSH Safe Supervision of Geotechnical Sites

- 3rd - 5th October 2012

- 3rd - 5th November 2012

Geotechnical

Soil Description Workshop

- 12th October 2012

- 30th November 2012

Rock Description Workshop

- 19th October 2012

- 7th December 2012

Geotechnical Foundation Design

- 14th December 2012

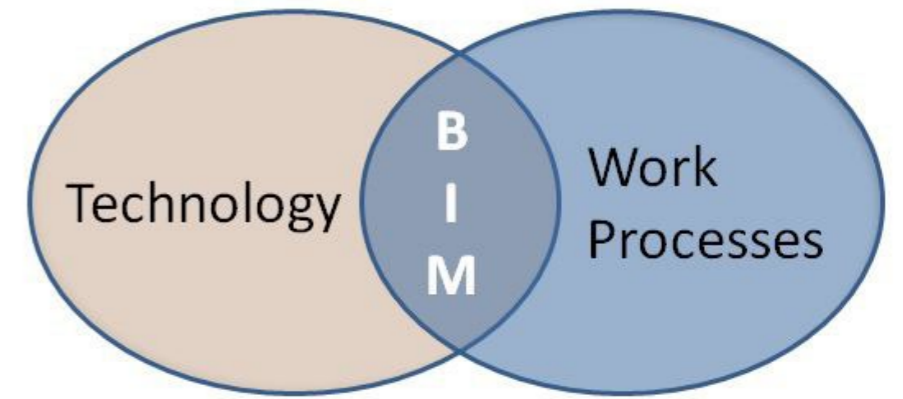
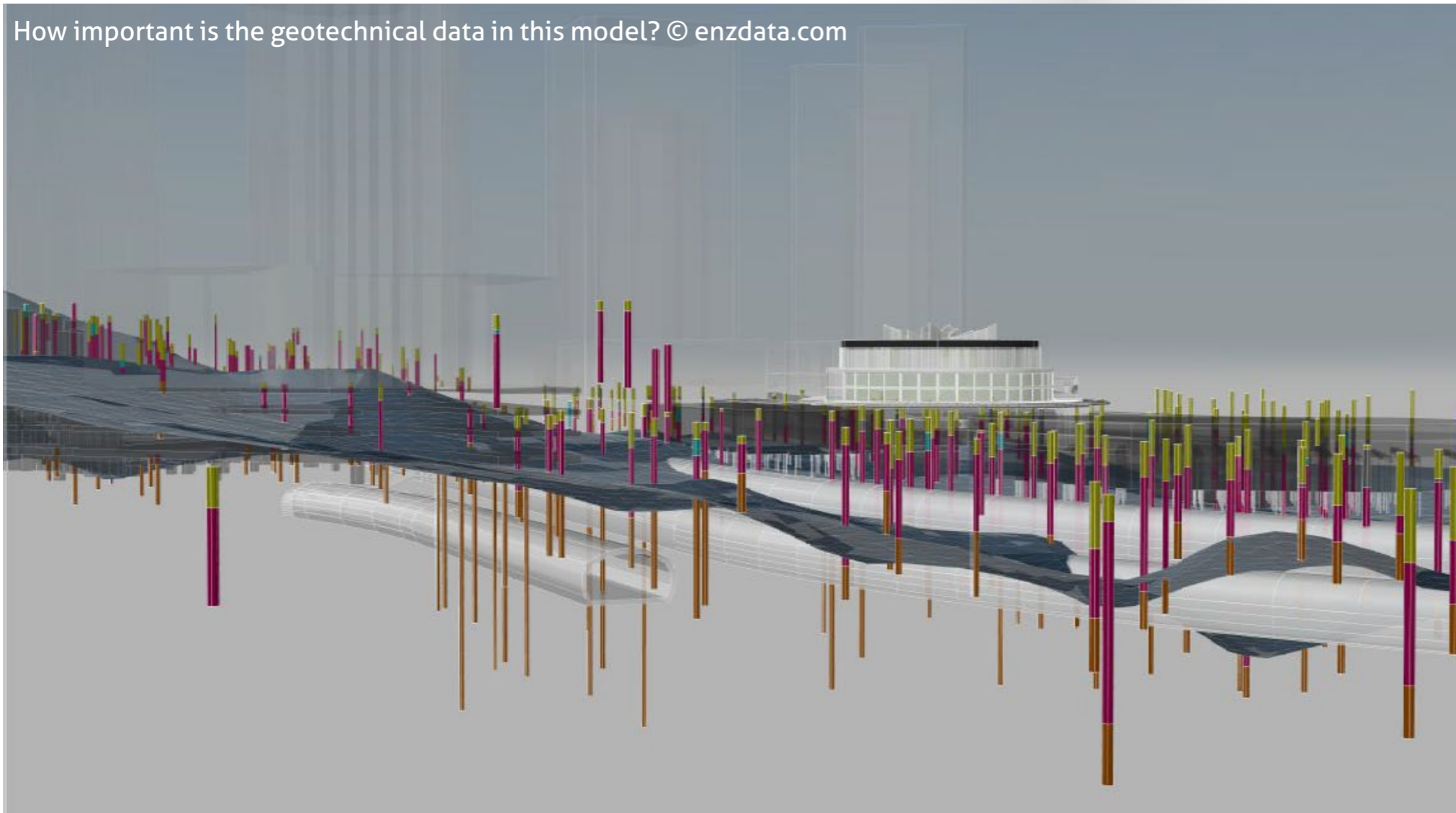


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BIM is the marriage of technology and work processes

WHY IS BIM SO IMPORTANT?

Dr Roger Chandler of [Keynetix](#) explains why Building Information Modelling (BIM) is so important to the Geotechnical Engineer.

1 INTRODUCTION

There are many definitions of Building Information Modelling (BIM), but The National Building Information Model Standard Project Committee (2008), in the USA defines BIM as:

Building Information Modeling (BIM) is a digital representation of physical and functional characteristics of a facility. A BIM is

a shared knowledge resource for information about a facility forming a reliable basis for decisions during its life-cycle; defined as existing from earliest conception to demolition.

Not all definitions will entirely concur with the above, but where they do tend to agree is that BIM is the marriage of a technology and a set of work processes. Different definitions

put the emphasis on either one or the other, dependent on author perspective, but there is widespread acceptance that they would be incomplete without both parts. To ensure that this article remains compact it will primarily focus on the aspect of BIM work processes with a secondary, smaller, consideration covering technology that could be used.

It's important to note that in order to produce coherent model, collaboration within disciplines isn't enough. Everyone involved must work together. BIM is by its nature multidisciplinary. This intelligent model-based process should provide insight for creating and managing building and infrastructure

“Technology is a crucial part of BIM and any BIM software portfolio should include comprehensive solutions for design, visualisation, simulation and collaboration...”

projects faster, more economically and with less environmental impact.

Technology is a crucial part of BIM and any BIM software portfolio should include comprehensive solutions for design, visualisation, simulation and collaboration that use the rich information in the intelligent model to inform better decision-making and break down the barriers to better business.

BIM is not just 3D CAD. The mistaken belief that it is, prevents the realisation that BIM isn't just another incremental improvement of existing methods, in the way that CAD improved upon hand drawing. It isn't a better way of doing things; it's a way to do better things. Issa, Suermann and Olbina (2009) sums up the importance of the move to BIM in their paper - "The transition to BIM is different from the move to CAD because CAD did not significantly alter business processes, but simply increased the speed at which centuries-old traditional tasks were completed through electronic means."

1.1 Geotechnical Data

Data is the primary deliverable for any site investigation. However in many cases the data is converted into information and presented to the client by means of borehole logs, site plans and charts etc. It is important to note this difference between geotechnical information and geotechnical data. With geotechnical information any additional representations (plots etc) or incorporation into a BIM environment would either require access to the data or to rekey it.

“It is therefore important that the site investigation data is available in a format that can be incorporated by the consultant or BIM teams no matter what software they are using.”

It is therefore important that the site investigation data is available in a format that can be incorporated by the consultant or BIM teams no matter what software they are using. The standardisation of electronic data deliverables has significant advantages for the data provider and the data producer on any project, especially if the standardisation adopted is already used by both parties.

AGS data format is a Comma Separated Variable (CSV) style text data format introduced by the Association of Geotechnical and Geoenvironmental Specialists in the UK (AGS 1992, 1999, 2010). The benefits of using the format have been well documented by Wathall & Parmer (2006), Richards and Chandler (2006), Chadwick et al (2006) among others and the format is widely used within



“The production and sharing of data is common between site investigation companies, laboratories and consultants but it is rarely shared beyond this point.”

the UK and HK and commonly available in Ireland, Singapore, Australia and New Zealand.

Where AGS data is widely used it is interesting to observe how this data is shared between the construction parties. The production and sharing of data is common between site investigation companies, laboratories and consultants but it is rarely shared beyond this point. Our interview research has shown that this is also true with geotechnical data for BIM and the main hurdle that consultants are face is the problems with sharing interpreted data.

Data gathered from a site investigation is factual information. However it very quickly becomes interpreted data once you start to review and use it. One of the first jobs of the consultant is to identify which geological layers each borehole stratigraphy relates to. This is interpretation, even at this initial level. This interpretation is then extended further when the consultant determines how the layers may connect with each other to produce a 2D section or 3D model.

When dealing with interpreted data is it important for the reviewer to understand how it was interpreted and for what purpose. Misunderstanding the interpretation methods or us-

ing the data for an unspecified purpose can result in the data being used incorrectly and this is the concern that consultants have and their main reason not to share interpreted data with other disciplines within their team. Consultants often prefer to offer the team consultation services to provide interpretations for the purpose the team require.

1.2 Benefits of BIM

In order for BIM to realise its true value over the whole life-cycle of a project all stakeholders must be engaged. In infrastructure projects especially, this means that government must be involved.

In 2011 the UK government announced that by 2016 it intended to require collaborative 3D BIM (with all project and asset information, documentation and data being electronic) on its projects. The benefits of supply-chain integration in the construction sector are largely understood in terms of performance improvement, greater project 'certainty' and reduced

“One of the key factors in achieving successful integration is the accuracy, effective flow and intelligent use of information...”

risk. One of the key factors in achieving successful integration is the accuracy, effective flow and intelligent use of information, which BIM – by requiring interoperability of information – will encourage.

In addition to design and build benefits, one of the main val-

ue-added applications of BIM is in the post-construction phase, through the on-going management of assets for optimum value in space utilisation, running costs and energy/carbon reduction.

In September 2009 Paul Morrell, The UK Government's Chief Construction Advisor, presented a short paper to the Government Construction Clients board outlining an Industry working group, to provide a report on the potential **“The final report by the Government Construction Client Group (2011) provides Government Clients with a suggested roadmap and strategy to enable the progressive use of BIM on Government construction programmes...”**

future use of BIM. The final report by the Government Construction Client Group (2011) provides Government Clients with a suggested roadmap and strategy to enable the progressive use of BIM on Government construction programmes as well as providing a framework for procurement and delivery standards. The report also considers the training and support required to enable the industry to rise to the BIM challenge.

1.2.1 Benefits of incorporating geotechnical data into the BIM

One of the major benefits of BIM is being able to model different options and refine design with the view of minimising the risk in the construction process. Unlike the manufacturing

industry, the construction industry cannot produce physical prototypes and BIM provides a means to optimise the design in the virtual world and reduce unknowns and risks (digital prototyping). The geotechnical information can be vital for this process when working with infrastructure projects, as illustrated in the image at the start of this article.

The process of conducting a site investigation is both costly and time consuming and therefore all the options that the design team consider will not have

“If the existing site investigation data has not been shared within the BIM team then they will not have immediate access to what data is available...”

been fully investigated. If the existing site investigation data has not been shared within the BIM team then they will not have immediate access to what data is available and therefore the level of interpretation the consultant will be able to conduct for them without further investigation.

Often BIM models appear to start from the ground up. They seem to consider the sub surface as homogeneous substance evenly distributed throughout the whole and therefore there is no risk involved in changing the design. Unfortunately we all know it is not that simple and the role of the geotechnical team is to minimise the risk in construction. Soil is never homogeneous and can differ considerably between locations. Likewise

the test results on samples from a borehole will only be relevant to that location, extrapolating this information across the site is once again in the area of interpretation.

For the full benefits of BIM to be obtained throughout the whole process from conception, to design, construction and maintenance, geotechnical information needs to be readily available to enable design refinements and therefore reduce risk.

1.2.2 Benefits of BIM to geotechnical team

Many of the geotechnical consultants interviewed while researching this article considered BIM as a one way flow of information. Many had been asked to submit geotechnical

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data to the BIM model but very few had been made aware of what other data was available to them through the model. It's crucial to remember BIM is a two way process and, it is not just a case of putting information into BIM, but importantly, getting information out.

"A major aspect of BIM is to aid communication and collaboration."

A major aspect of BIM is to aid communication and collaboration. Having better data sharing should lead to more information becoming available to the geotechnical team, which in turn leads to a more complete understanding of the project elements and informed decision making.

For the geotechnical team it means being able to see both the big picture and the details of the project, having access to the latest site layouts, having access to a range of data which might include mapping and remote sensing data. Having a clear image of the proposed design and full project information readily available will enable the geotechnical team to optimise the various phases of site investigation.

"A BIM methodology is also very useful internally within the geotechnical team..."

A BIM methodology is also very useful internally within the geotechnical team and SI partners, the concepts of data sharing, collaboration, central

data management all apply. Big improvements in efficiency and quality can be seen by having a well planned data journey and management strategy.

The UK Association of Geotechnical and Geoenvironmental Specialists (AGS) states in their Guidelines for Good Practice in Site Investigation :

- "The object of the site investigation is to characterise the ground conditions sufficiently to allow safe and economic designs to be developed and to reduce, as far as possible, the occurrence and impact of unforeseen conditions"

- "Early investigation allows the identification of any ground-related risks associated with a development so that they can be effectively man-

aged and associated costs controlled"

- "Site Investigation should be seen as an investment which has the capacity to optimise design and hence add considerable value to a project"

In essence a thorough site investigation is a means of moving the decision making process forward and reducing risk at construction time. These are the same reasons BIM is being employed on projects!

2 CONCLUSION

It appears many geotechnical teams are not supplying geotechnical data to BIM systems as they are unable to separate the factual and the interpreted information and are concerned by the possibility of the interpretative data being misused.

Not supplying any data to the BIM team however is likely to increase the risk to the project and not help the geotechnical team deliver the message that early and thorough site investigation can reduce risks to a BIM project.

Determining a company's geotechnical BIM strategy is however difficult as projects are varied and what works for one project may not work for others. It may therefore be a better approach to adopt a geo-

technical BIM framework which can be adapted to each project.

"The first step in this framework should always be to consult early with the BIM team and deliver the location of known information to the team as soon as it is available."

The first step in this framework should always be to consult early with the BIM team and deliver the location of known information to the team as soon as it is available.

"Currently the AGS format appears to suffice for factual information but does not allow the transfer of interpreted data..."

The next question for the geotechnical industry to answer is; in what format will geotechnical data be delivered to the BIM team? Currently the AGS format appears to suffice for factual information but does not allow the transfer of interpreted data such as geology surfaces. Should the industry look to extend the AGS format to work with this data or should other formats such as GeoSciML be better suited for this purpose?

BIM will, without a doubt, play a large part in construction teams in the near future and give geotechnical teams the opportunity to share their visions and concerns for the ground conditions early in the project design life. This is exactly what the geotechnical teams want and they should therefore be embracing BIM and helping to move it forward in our industry.

Dr Roger Chandler is the Managing Director of Keynetix limited. Keynetix is Autodesk's worldwide Geotechnical Industry Partner and specialise in providing data management solutions that transform the way in which the geotechnical industry views their data.

Keynetix and Autodesk are hosting a free online seminar "[The Role of Geotechnical Data in Building Information Modelling](#)" on the 20th September where the challenges that face our industry will be discussed. Their last webinar attracted 250 people so this event is sure to be a lively event.



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Above and Right: The Pagani TG63 150 Rig at Equipe's headquarters.

ROCKBIT UK INTRODUCE PAGANI TO THE UK

[Rockbit UK](#), with its 35 years experience of manufacture, contracting, service and supply within the Drilling and Mining industries, have recognised the growing demand for a strong and easy to-use CPTu system within the UK. The CPTu is considered as one of the most valid forms of Insitu Testing for a correct identification of Soil Mechanics and is greatly underused within the UK. As demands from clients for better quality and faster data at a

more affordable rate is increasing, Rockbit UK have teamed up with Italian specialists [Pagani Geotechnical Equipment](#) to introduce the Pagani TG 63 range to the UK market. The large, dedicated Pagani factory in northern Italy has over 40 years experience in the manufacture of these types of machines, and have supplied over 400 of the TG43 models to the European and worldwide market. These very versatile, lightweight rigs are perfect for the



"The cleverly designed rigs are completely self-sufficient and powered with either diesel or petrol 18hp engines..."

UK's emerging CPTu market, as well as more widely suitable for use in the Ground Investigation industry. The cleverly designed rigs are completely self-sufficient and powered with either diesel or petrol 18hp engines and each comes fully equipped with 20m of equipment and both CPT and CPTu cones. With the fully loaded rig weighing only 1400Kgs and with a footprint of only 2m X 1m is able to access even the tightest spaces. The Penetrometers are designed with an automatic self-anchoring system solving the problems often limiting the use of Static Penetrometer techniques. Anchored by inserting small helicoids into the ground, facilitated by the downwards push supplied by the purposed build motor, these when inserted correctly provide the resistance for up to the 15t of force that can be applied to the cones, from the very small foot-



print.

The TG63 150 increases its usability and versatility by incorporating a fully compliant SPT and dynamic super heavy (DSH) probing capability as standard. The rig's strong hydraulic rams (with a down force of some 150kn and extraction of 160kn) also give the ability to push samplers, allowing for the recovery of class one samples from a variety of stratum. The dynamic hammer allows for standard dynamic sampling to be carried out up to a diameter of 80mm in more difficult strata. Both of these types of sampling can be achieved either via Pagani's own custom designed sampling system, or industries standard sampling equipment. Other additional enhancements include ability to rotary auger difficult ground, insert casings and an ability to discreet sample more difficult, soft or contaminated ground accurately.

The Pagani touchscreen digital acquisition system TGAS07 (right) simplifies and speeds up the procedure of acquisition of the CPT data. The almost com-

pletely automated operations system allows for the equipment to be operated with minimal training. Powered via the rig itself, with a water-resistant, sunlight readable touchscreen and extended operating temperature range, the system can be used in all the harsh environmental conditions that the UK can offer.

The internal memory can save more than 2500 complete CPTu tests and the standard TGAS07 GPS detector has a position resolution accuracy of less than 2.5 meters. This memory is coupled with the standard GPRS module, giving the facility to send CPTu tests directly from the field to the office by the use of e-mails or FPT servers. If necessary it is also possible to download data by connecting the system directly to the company network or to a laptop/notebook by via a standard Ethernet or USB cable.

"In partnership with Equipe Training Ltd, Rockbit have developed a UK Training base for the use of the Pagani rigs and equipment."

In partnership with [Equipe Training Ltd](#), the UK's leading training provider for the industry, Rockbit have developed a

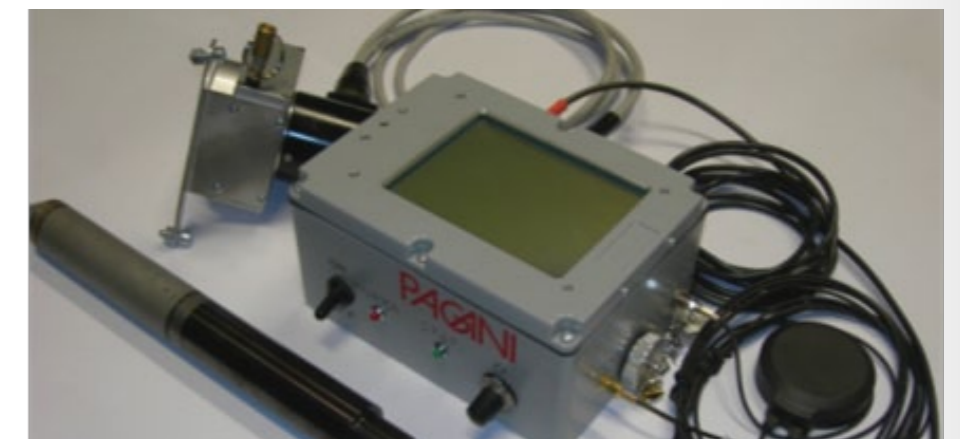
UK Training base for the use of the Pagani rigs and equipment. Equipe will utilise its fully equipped training centre and dedicated trainers near Banbury for both demonstration to potential customers and the training new users alike, along with giving on-going support to new users of the equipment.

"These relatively simple to operate machines require only 2 days of training..."

These relatively simple to operate machines require only 2 days of training to allow the operators to use and maintain both the rig and CPT equipment both safely and efficiently.

Rockbit are confident that with the strong support of the Pagani personnel, coupled with Equipe's unrivalled ability to deliver quality of training within the UK, that the widespread use of the CPTu data to supply high quality accurate data instantly will quickly become common place within the GI industry.

For more information on the new Pagani rigs or to arrange a demonstration of the equipment please contact Alan Vasey at alan@rockbituk.co.uk.



WORKING IN EXPLOSIVE ATMOSPHERES

Writing for theGeotechnica once again is Tom Phillips of RPA Safety Services. This month Tom discusses the hazards of working in and around explosive atmospheres.

When I first started working in the geotechnical industry, I remember reading a risk assessment and being puzzled by the phrase 'Chalwyn D Valve' and having to ask what it was used for. For those of you reading this article, who don't know what one is, it is a protective device fitted to diesel engines to reduce the likelihood of explosion. At the time, this and a spark arrestor were probably the only safety features required to work in a potentially **"...in 2002 the regulations and requirements for explosive atmospheres changed..."**

explosive atmosphere. But in 2002 the regulations and requirements for explosive atmospheres changed, with the introduction of the Dangerous Substances and Explosive Atmospheres (DSEAR) Regulations.

It is of concern though, that just last month I saw a 'Chalwyn D Valve' on a risk assessment as the sole control measure for working in a potentially methane rich environment. I therefore felt an article on DSEAR

might be timely. I will make an upfront apology regarding its technical nature but it is vital that anyone putting equipment in these areas (from drilling rigs **"It is also important to realise that expert advice is required to ensure the complex areas of design and implementation are fully complied with."**

to gas monitors), understands the implications and makes the correct decisions. It is also important to realise that expert advice is required to ensure the complex areas of design and implementation are fully complied with. The majority of readily available drilling or geotechnical equipment will not comply without specialist modification. Little has been designed for the specific purposes of DSEAR.

There are in actuality, three pieces of EU legislation which have been implemented in the United Kingdom – broadly headed under one heading known as Atex137. These have been implemented under DSEAR.



A highly flammable and thus explosive gas outlet.

The intention of Atex137 is to ensure workers receive at least the minimum level of protection specified, and that if working in different EU countries that they will receive similar levels of health and safety protection. DSEAR became law in December 2002 and became a mandatory requirement on the 30th of June 2003, with the 3 year transitional period ending on the 30th of June 2006. After these dates, all existing equipment and installations to be used in hazardous areas must have been assessed for use and

"It is not uncommon for equipment to be tested to a range of international standards..."

will require verification of explosion safety. In summary, any equipment taken into a hazardous area must be suitable for that area and certified as such.

International standard such as those used in the US and China will vary and must be complied with at a local level, but where you are working in a region

where no standards apply, then European standards will generally be considered suitable. It is not uncommon for equipment to be tested to a range of international standards but these are not directly equivalent so should be checked. As an example, US standards are very different in terms of accepted area classifications.

A hazardous area, in the context of DSEAR, is defined as a mixture of dangerous substances with air under atmospheric conditions which, should ignition

occur, would lead to the spread of combustion to the entire unburned mixture. Within the terminology of DSEAR, hazardous areas must be classified as zones, which apply to both gas and dust and given an appropriate number (dust zones are preceded by the number 2). Zone classifications are:

Zone 0 or 20
Flammable atmospheres present continuously or for long periods or frequently. Typically > 1000 hrs/yr.

Zone 1 or 21

Flammable atmosphere likely under normal operation occasionally. Typically 10 – 1000 hrs/yr.

Zone 2 or 22

Flammable atmosphere unlikely under normal operations and, if it does, will exist only for a short period. Typically < 10 hrs/yr.

So where might DSEAR apply in the geotechnical industry? The following is not a finite list of explosive areas but provides a clue as to those areas which should be considered of risk:

- Carbon Monoxide: Volcanic activity, mining activity, combustion engines, burning gas, coal seams. Normally explosive at levels in excess of 12.5%.

- Hydrogen Sulfide: Sewage works, manure tanks and slurry pits, landfills. Normally explosive at levels in excess of 4%.

- Ammonia: Manure tanks and slurry pits, vegetation. Normally explosive at levels in excess of 15%

- Methane: Landfill, mine workings, water and sewerage treatment, decaying organic matter. Normally explosive at levels in excess of 5%

- Petrol vapour. Petroleum manufacturing or storage.

“Once the area has been ‘zoned’ as above, a full hazardous area classification should be documented in a risk assessment by a competent person.”

mally explosive at levels in excess of 1.4%

Once the area has been ‘zoned’ as above, a full hazardous area classification should be documented in a risk assessment by a competent person. It is not sufficient to identify a hazardous area solely by the zone (although this is part of the classification), it must also consider and define the type of atmosphere which will exist, based on

“A simple zone classification does not allow the selection of suitable equipment for the area and it not sufficient just to select equipment marked with the Ex symbol...”

the substances encountered. A simple zone classification does not allow the selection of suitable equipment for the area and it not sufficient just to select equipment marked with the Ex symbol, denoting suitability for explosive atmospheres.

Equipment must not only be suitable for a particular zone, but must also consider such things as surface temperatures, ignition points and vapour molecule sizes. The zoned area classification should include:

- Designated 3 dimensional space or volume of the area

- Gas group (IIA, IIB or IIC)

- Temperature class (T1,T2,T3,T4,T5 or T6)

- Equipment protection level (Ga, Gb or Gc)

- Shape and extent of zone

Equipment for use in these areas must then be appropriately designed and marked. In addition to the required Ex marking, a typical marking for gas protection will also look something like this:

Ex de IIC T4 Gb

Personal equipment such as mobile phones and car alarm key fobs may also pose a risk of ignition or explosion and should be prohibited from the area. Even clothing must be considered carefully as it may generate excessive levels of static which can result in sparks through electrical discharge.

“In summary, DSEAR is very complex and selecting the right equipment for the hazardous area is not a simple task.”

In summary, DSEAR is very complex and selecting the right equipment for the hazardous area is not a simple task. Expert help is normally required to ensure compliance but the first stage in any assessment, is realising there is an issue which needs attention. I hope this article has clarified what is required and the importance, and difficulty, of selecting the correct equipment. ■

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Job Opportunities in New Zealand

EQUIPE GROUP
www.equipgroup.com
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Equipe is the sole agent for a geotechnical consultancy based in Auckland, New Zealand who are looking to set up an office in Christchurch to play an active role in the rebuilding of the city. There are a number of positions which we require to fill and details are provided below. The consultancy wishes to employ engineers from the UK to staff the office and for the right individuals to join the company on a permanent basis. This is a really exciting opportunity for anyone who wants to be involved with rebuilding one of the world’s major cities in a vibrant and diverse country.

Engineering Geologist

We are looking for at least one and possibly two geologists with site investigation experience and knowledge of borehole logging systems. The successful candidate should have a sound knowledge and plenty of practical experience of logging rotary boreholes and trial pits. The successful individuals will be able to think on their feet and be able to work independently, whilst being an integral part of the office team. A good knowledge of drilling and sampling methods will be essential.



All roles will attract a competitive salary, use of a company vehicle and contributory pension. A bonus is also offered subject to performance. Annual leave will be 4 weeks plus 10 statutory days - plenty of time to enjoy the fishing, skiing and hiking offered in the locality.

For more information on great opportunities, send a CV to: pete.reading@equipetraining.co.uk



THE GEOTECHNICAL ACADEMY

September sees the re-launch of *The Geotechnical Academy* - a collaboration between [Geotechnical Engineering Ltd](#) and [Equipe Training Ltd](#), aimed to provide fundamental technical and commercial training to aspiring geo-professionals.

What is the Geotechnical Academy?

The Geotechnical Academy is a collaboration between Equipe Training Ltd and Geotechnical Engineering Ltd., to provide fundamental technical and commercial training to aspiring geo-professionals.

“The training experience will be radically different from other more traditional offerings...”

The training experience will be radically different from other more traditional offerings, in that it will take a group of Delegates, and their Sponsors, on a journey over a whole year, to

greater awareness and appreciation of their subject.

At whom is this training targeted?

The training is targeted primarily at geotechnical and geo-environmental engineers in the early stages of their careers, from both ‘Consultant’ and ‘Contractor’ firms. However, it is also suitable for those who are moving into these geo-disciplines from other technical areas, or those who feel they could do with ‘a refresher’.

A key aim of the training is to help Delegates bring their theoretical and technical understanding into the practical and commercial world.

Who is involved?

Delegates will be drawn from various companies throughout the industry, to form groups of between 10 and 15 people. The same groups will meet eight times (approximately every month) over the course of a year.

Each Delegate will have a Sponsor, who is likely to be their Manager. Sponsors will be involved directly in the Geotechnical Academy experience, through remote discussions, debates and feedback. They will be welcome to attend the training days with their Delegate from time to time.

The Trainers will be organised

substantially fund the enterprise.

What subject matter does the training cover?

“On the technical side, the training covers the practical aspects of acquiring data on ‘the ground’...”

On the technical side, the training covers the practical aspects of acquiring data on ‘the ground’ (both geotechnical and geo-environmental), and the processing, analysis, interpretation and communication of that data. This includes field techniques (drilling, sampling, in situ testing, monitoring, observing, surveying), laboratory testing and scheduling, soil and rock logging, desk studies and report writing, all in line with the new Eurocodes. It does not include geotechnical or geo-environmental design.

On the commercial side, the training covers (broadly and superficially through debate and discussion) such topics as: risk and reward, conditions of contracts, specifications, procurement, insurance, finance and profitability, employment, management, health and safety, underground hazards, innovation, industry trends, political influences etc.

Full details of the content of the training days can be found on the website www.geotechnicalacademy.co.uk.

What form does the training take?

As stated, Delegates will be drawn from various companies

throughout the industry, to form groups of between 10 and 15 people. The same groups will meet eight times (approximately every month) over the course of a year.

The dates of the meetings will be set in advance, and a full commitment to attend all the meetings will be expected from each Delegate (and their Sponsor).

Each training day will be divided into roughly three periods:

The first period is likely to be conducted in a seminar room, and will involve ‘knowledge transfer’ from industry experts to the Delegates through lectures, videos, case studies etc.

“The second period is likely to involve practical demonstrations of equipment and techniques...”

The second period is likely to involve practical demonstrations of equipment and techniques, both in the field and in the laboratory, including some ‘hands on’ activities.

The third period is likely to be conducted back in the seminar room, with the furniture rearranged, and with a ‘Chairman’ leading and conducting debates and discussions amongst the Delegates. This will provide the opportunity of learning through shared experience.

What happens between, around and after the training days?

A networking infrastructure will be set up for each group, so that all parties – the Delegates,

their Sponsors, the Trainers, the Guest Speakers and Demonstrators, the Tutor and the Administrator – can keep in touch with each other.

The Tutor will initiate, stimulate and co-ordinate debates and discussions within this wider group. He will suggest further reading, answer questions, and will be available to help in any way that enhances the training experience.

“It is hoped that these groups will continue their interaction long after the training days have been completed...”

It is hoped that these groups will continue their interaction long after the training days have been completed, and provide support into the future for the Delegates as they continue to develop their careers.

Who will benefit from this training?

Both the Delegate and their Sponsor will benefit.

The Delegate will gain knowledge, will see and take part in practical demonstrations of equipment and techniques, will engage in discussion and debate about a wide variety of technical and commercial topics relevant to their work, and, above all, will have a thoroughly enjoyable experience to inspire into the future. All training days will be eligible for CPD certification. At the end of the course, the Delegate will be recognised as a ‘Graduate of the Geotechnical Academy’, a qualification which it is hoped

“The Sponsor will benefit through having a well trained and well motivated member of staff, with an enhanced and broader view of the industry.”

will be recognised as an ‘essential’ for a successful career within the industry.

The Sponsor will benefit through having a well trained and well motivated member of staff, with an enhanced and broader view of the industry. At the end of the course, the Sponsor will be recognised as a ‘Sponsor of the Geotechnical Academy’, which it is hoped will be proudly added to their own C.V. to demonstrate their commitment the advancement of the industry.

How much does it cost?

The training is provided for the total cost to the Sponsor of £500. This is payable in advance, to encourage full commitment by the Delegate and their Sponsor.

The cost covers an enrolment fee of £100, plus eight training days at £50 each, and represents a modest contribution to the overall costs incurred by Geotechnical Engineering Ltd.

Any further cost to the Sponsor (and their organisation) will be through the ‘lost potential’ of the Delegate whilst attending the training.

Where and when is the training held?

Most of the training will be held at Geotechnical Engineer-

ing Ltd’s premises in Gloucester, except where visits to sites are arranged.

Each day will start at 9.30am and finish at 4.00pm. The first course will start in November 2012, and a new course will start every two months or so thereafter. Please refer to the timetable on the website for the exact dates.

How do I apply?

Please complete and submit an ‘Expression of Interest’ form which can be found on the website www.geotechnicalacademy.co.uk. We will then contact both the Delegate and their Sponsor, and to discuss issues, dates and practicalities with them.

Interested parties are welcome to contact us via email or phone for discussions prior to application – the details are given below.

Membership of the Geotechnical Academy will be ‘by Invitation Only’. This ensures that we have the right balance of Delegates and Sponsors for each group. ■

Contact details:

Geotechnical Engineering Ltd
01452 527743
Andrew Milne

Equipe Training Ltd
01295 670990
Pete Reading

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Gapton Hall Industrial Estate
Great Yarmouth, Norfolk
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Or email to:
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CHANGES IN PLANNING & REVISION OF STATUTORY GUIDANCE

Writing for us once more is regular and valued contributor Geraint Williams of Alcontrol Laboratories. This month Geraint discusses the changes in planning and revision of statutory guidance.



“The new category 1-4 system is an attempt to prioritise scarce resources and reflect what assessors find...”

Following consultation two key documents have been published that will influence the way land is assessed. The National Planning Policy Framework (NPPF) was published in March. The revised Statutory Guidance of Part 2A came into effect the following month. Both documents are much reduced in line with the current Government’s drive for shorter and simpler guidance.

Revised Statutory Guidance

The revision of the Statutory Guidance was brought about after Defra highlighted flaws, which, in their words, led to unjustified regulatory intervention and inefficient remediation of land. The revision is the first review of the guidance (with regard to non-radioactive contamination) in 11 years. It was argued that the previous guidance did not adequately explain how to decide when land is contaminated land. The revised guidance needed to be precautionary in approach without being excessively over cautious.

In order to address some of these issues a four category test has been introduced to help in determining land. The new category 1-4 system is an attempt to prioritise scarce resources and reflect what assessors find when they investigate sites i.e. some are clearly contaminated land (Category 1); some clearly are not (Category 4); and some are less-straight-forward and need some level of detailed assessment before a decision can be taken as to whether or not they are contaminated land (Categories 2 and 3). In truth there is likely to be subtle graduations within the spectrum of contaminated land and there will always be uncertainty over the risk posed. Within the guidance there is a requirement to take account of these uncertainties when making decisions.

In the case of Category 2 and 3 sites, the regulator will have flexibility to take decisions

within set parameters. There would be less flexibility for Category 2 and 3 sites that clearly pose either a high or low risk. The regulator, however, has greater flexibility for sites closer to the Category 2/3 border to judge which side of the line a site will fall (e.g. taking account of their understanding of the risks, uncertainties and the interests of the local community). These are often complex decisions which need to be taken on a case-by-case basis.

Category 4 screening levels (C4SLs) are likely to provide the contaminated land industry with a more relevant risk marker. C4SLs are likely to be set a little below the top of Category 4. As C4SLs are not at the top of the Category 4 boundary there is still a place for detailed quantitative risk assessment. This recognises that the generic C4SLs will not be able to describe the Category 3/4 border itself because they are generic and would therefore err on the side of caution – whilst a detailed site-specific assessment would be able to push further by looking at specific circumstances relating to a specific site.

“The British Geological Survey were commissioned by Defra to establish data on normal background substances.”

The British Geological Survey were commissioned by Defra to establish data on normal background substances. These include substances naturally present as a result of varied and complex geology as well as those contaminants resulting from diffuse human pollution. Under Part 2A normal background substances should not qualify as contaminated land unless there is a particular reason to consider otherwise. This is a welcomed step in avoiding costly and unnecessary remediation.

National Planning Policy Framework

Following the publication of the NPPF, Planning Policy Statement 23 (PPS 23) Planning and Pollution Control and its Annex 2: Development on Land Affected by Contamination has been withdrawn. The NPPF, with its central focus on sustainable development, now fully replaces PPS 23 and other related planning statements. Much of the detail that originally ensured a consistent approach has been replaced by mere bullet points.

- The site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;

- After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part 2A; and

- Adequate site investigation information, prepared by a competent person, is presented.

Although the amount of guidance has been significantly reduced, it has not reduced the requirement to assess land contamination as part of the planning application. Land is still required to be suitable for use and cannot be determined as contaminated land under Part 2A. However the localism policy encapsulated in the NPPF means that there is unlikely to be a coherent and consistent national approach, as each local authority will set their own policies for dealing with contaminated land.

Conclusions

It will take some time for the guidance to become fully established and until further technical guidance is provided on C4SLs, and other supporting tools become available, it is difficult to judge how effective these changes are likely to be.

“It is unlikely that the approach to the assessment of contaminated land will change significantly in the short-term.”

It is unlikely that the approach to the assessment of contaminated land will change significantly in the short-term.

There is an inextricable link between Part 2A and planning regimes but it remains uncertain how specific developments will be applied. The revised guidance and subsequent initiatives will hopefully provide an improved reference point for determining when remediation is required in the context of planning. However until the C4SLs are published it remains to be seen what the local authority position will be on these new initiatives. It is likely to be at least a year before C4SLs (or a methodology to allow practitioners to determine these levels) is available. ■



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DRILLING FLUIDS FOR IMPROVED PRODUCTIVITY

James Mansell is a Director at [Clear Solutions International Ltd.](#) This month is his fifth in a series of articles about different types of drilling fluids, and the advantages and disadvantages of each when used.

In all drilling applications, we are continually striving to improve productivity while effectively controlling both risk and cost. To do this, it is critical that we not only stabilise the formations being drilled but also effectively clean the hole to ensure trouble-free product pipe installation.

“Before drilling commences, it is important that we understand the formation being drilled.”

Before drilling commences, it is important that we understand the formation being drilled. Ground conditions not only affect the choice of drill bit/drilling assembly, but also impact heavily on the selection of drilling fluid, the mud mixing, mud pumping and recycling equipment to be used for the project.

The three principle reasons for using a drilling fluid are:-

1. To support the ground during the drilling process; to stop the surrounding ground collapsing into the borehole and to control subsurface pressures (i.e. artesian water pressure) until the constructed product pipe is installed and sealed;
2. To remove drilled cuttings effectively from the borehole and to cool and lubricate the cutting head and drilling assembly; and
3. To seal and protect the formations and aquifers being drilled and to minimise the drilling operations environmental impact.

The fluid/formation interaction The majority of drilling fluids used in land based drilling projects are water-based. This has cost and environmental bene-

fits, however it has a down side in that the water component of the drilling fluid will in itself adversely affect many of the formations through which we commonly drill. For this reason, we must add drilling fluid additives to the water to control the following reactions:

- Swelling of the formation causing it to hydrate, slough into the borehole and reduce the effective borehole diameter – a common problem in clay formations;
- Fluid loss into permeable formations such as sands and gravels – this can not only permanently damage the natural permeability of production zones (i.e. aquifers) but also destabilise poorly consolidated formations such as sand and gravel, leading to hole collapse;
- Fluid loss into highly fractured formations;
- Washing out of the formation to form voids, which can destabilise the ground above, resulting in hole collapse;

- Artesian or subsurface pressure forcing ground water back to the surface in an uncontrolled manner, and
- The drilled cuttings also react with the water phase in the drilling fluid and if not controlled, can quickly destabilise the drilling fluid and as a result, rapidly build mud weight, viscosity and fluid loss, necessitating an expensive dump and dilute approach.

To offset these risks, the ideal drilling fluid is therefore cost-effective, environmentally acceptable, non-toxic, safe to handle, mixes quickly and is easily handled and maintained on the surface. Once mixed, the drilling fluid then enables the driller to cut a smooth, stable gauge, clean hole through a range of formations with no in-

“To achieve all of these factors, significant research and development has been put into developing high performance drilling fluid additives...”

dications of borehole instability, whilst also balancing down hole pressures, optimising penetration rates and preventing formation damage. To achieve all of these factors, significant research and development has been put into developing high performance drilling fluid additives such as Pure-Bore®, which exhibit the following characteristics:

- Low fluid loss and a tight, thin, tough wall cake to reduce the amount of water entering the formation. If the fluid can not escape from the borehole

into the formation and a positive hydrostatic head is maintained, then the formation cannot collapse into the borehole;

- An inhibitive/encapsulating fluid that helps prevent reactive formations wanting to hydrate and slough into the borehole and to prevent cuttings from these formations breaking up and dispersing within the drilling fluid;
- Low solids and a low sand content to reduce pressure losses and pump wear;
- A stabilised fluid system that is not upset by cement or high concentrations of chalk or limestone; and
- The ability to optimise hole cleaning.



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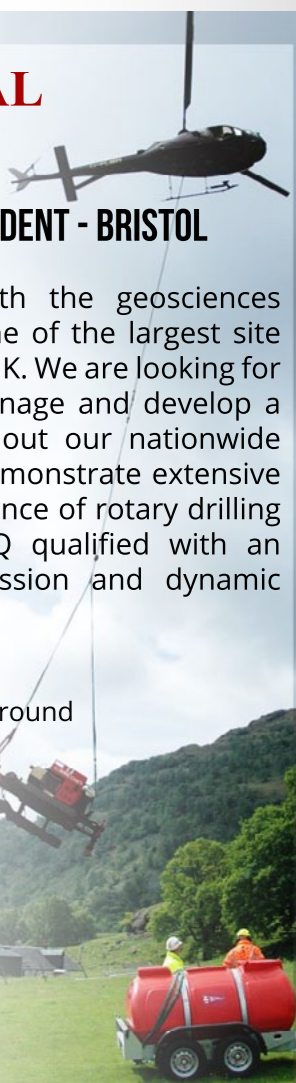
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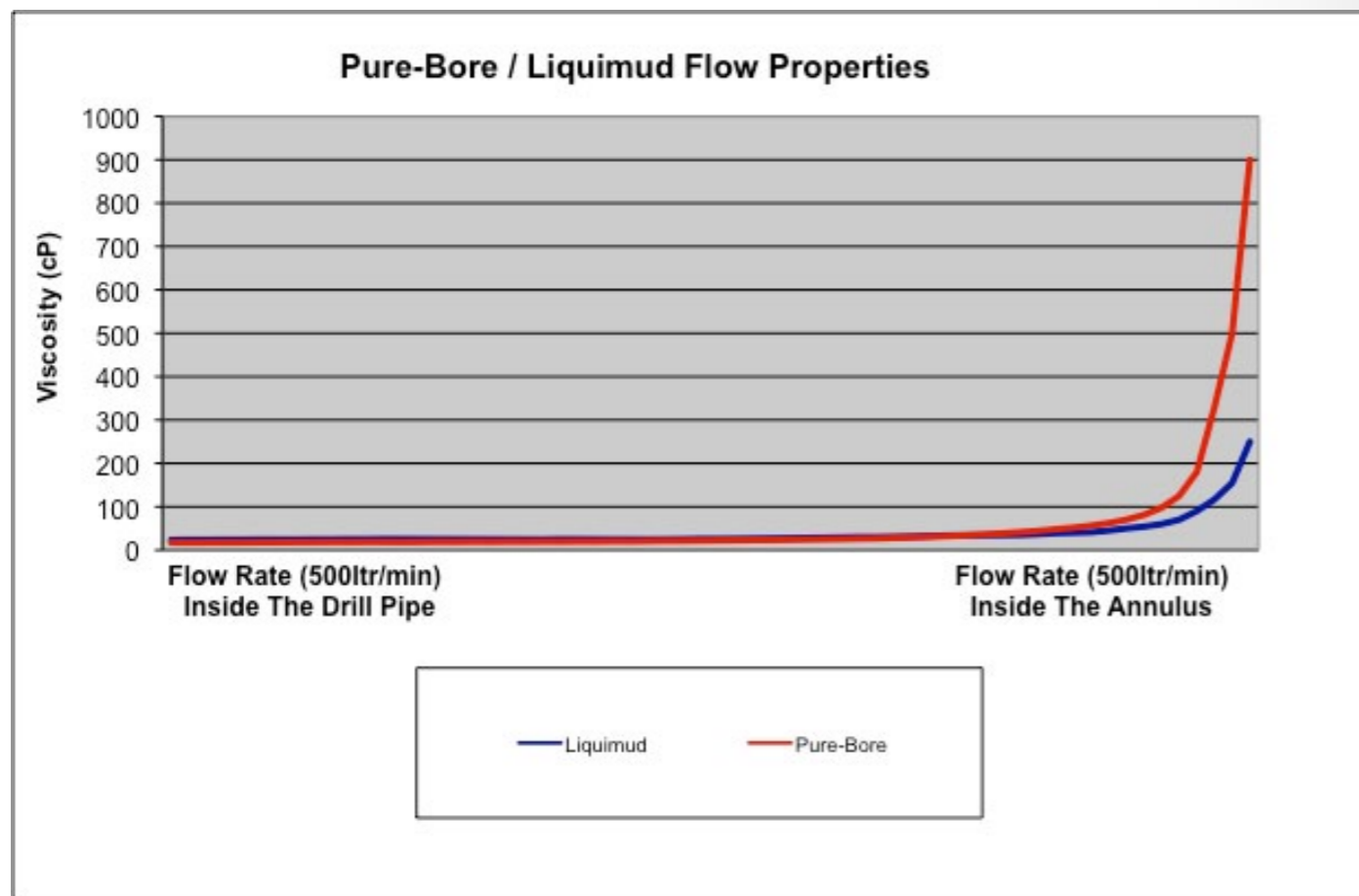
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The final factor (hole cleaning) is particularly important.

In Figure 1, the viscosity of two different drilling fluids at different flow rates have been measured.

“Pure-Bore® is a high yield, high performance drilling fluid specifically developed to optimise hole cleaning and borehole stability.”

Pure-Bore® is a high yield, high performance drilling fluid specifically developed to optimise hole cleaning and borehole stability. Liquimud® is a standard high yield, synthetic liquid co-polymer and is similar to many of the liquid PHPA co-polymers, which are commonly used within the land drilling industry. Both fluids have been mixed to the same apparent viscosity

(ie marsh funnel viscosity); the viscosity is then measured at different flow rates and plotted on the graph.

“The difference between the two drilling fluids is their ability to shear thin as they flow faster.”

The difference between the two drilling fluids is their ability to shear thin as they flow faster. As the two drilling fluids flow faster and faster (ie inside the narrow drill pipe) they both shear down to generate a very low viscosity, close to the 1cP viscosity of water. It is at this point inside the drill pipe that we need the fluid to flow as easily as possible with the lowest possible pump pressure.

Conversely, as the drilling fluid leaves the jets in the drill bit and enters the larger annular space, the flow rate slows right

down. It is at this point that we need the drilling fluid viscosity to increase dramatically to help transport the drilled cuttings back out of the hole to surface. As shown in Figure 1, it is at this point that the Pure-Bore® fluid generates a much higher viscosity than the Liquimud® polymer, effectively flushing the drilled cuttings out of the borehole. In addition, the Pure-Bore® fluid generates a high stable gel strength to help suspend drilled solids when the pumps are off.

“The Pure-Bore® drilling fluid creates a highly effective ‘conveyor belt’ to efficiently transport drilled solids out of the hole...”

The Pure-Bore® drilling fluid creates a highly effective ‘conveyor belt’ to efficiently transport drilled solids out of the

hole while keeping the circulating pressure to a minimum. An added benefit of using the fluid is that it also forms a tight firm filter cake to aid borehole sta-

“By adding Pure-Bore® at a low concentration we also provide exceptional clay and shale inhibition, and formation protection.”

bility and lubricity. By adding Pure-Bore® at a low concentration we also provide exceptional clay and shale inhibition, and formation protection.

If we are effectively cleaning the hole, it is then critical that an efficient system for the removing the drilled solids from the drilling fluid is also used on the surface. Drilled solids re-

maining within the drilling fluid not only cause significant wear to mud pumps, tooling and surface plant but also dramatically reduce the shear thinning characteristics of the drilling fluid, resulting in higher pump pressures, greater chance of lost circulation (frac-out to surface etc), higher water/additive usage and reduced production rates.

To ensure that the correct drilling fluid recycling equipment is in place on a given project, thorough analysis must be performed on the maximum flow rates from the drilling rig; on maximum achievable penetration rates, on anticipated fluid densities and viscosities, and on anticipated ground conditions in terms of grain size analysis. In addition, spatial constraints, maximum sound-

“In addition, spatial constraints, maximum sound-level requirements, proper walkways, handrails, stairwells, sufficient lighting and protection from the weather must all be factored into the design process...”

level requirements, proper walkways, handrails, stairwells, sufficient lighting and protection from the weather must all be factored into the design process and included within the scope of supply.

Most slurry separation plants utilise multiple processing stages, each designed to re-



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“One method of primary separation is to route excavated slurry from the borehole to a static bar screen with openings ranging from 10-50mm.”

move successively smaller solids.

Primary separation stage

One method of primary separation is to route excavated slurry from the borehole to a static bar screen with openings ranging from 10-50mm. However, these units are fast becoming obsolete, and they are being replaced by much more efficient; ultra high g-force scalping shakers running fine screens.

High g-force linear motion shakers effectively de-water the solids, removing the coarse solids along with many of the finer cuttings on the first pass. By utilising these high g-shakers in conjunction with encapsulating drilling fluid polymers such as Pure-Bore®, it is also possible

“By utilising these high g-shakers in conjunction with encapsulating drilling fluid polymers such as Pure-Bore®, it is also possible to remove the majority of the clay and shale cuttings on the primary shaker...”

to remove the majority of the clay and shale cuttings on the primary shaker, before they become further degraded as they pass through more pumps, flow lines etc, not only reducing downstream loading, but also dramatically improving overall separation efficiency. Depending on the plant design and/or nature of the excavated solids, the underflow from the primary shakers can then be fed directly into the hydro-cyclones.

Intermediate separation stages

In most cases, desanding cones then process the underflow from the primary shaker, with a typical desanding hydro-cyclone performing a separation of about 60-80µm at a flow rate of 120m³/hr per cone.

“The desander cone overflow is passed downstream to the next compartment in the base tank of the plant and becomes the feed to the desilter hydrocyclones.”

The desander cone overflow is passed downstream to the next compartment in the base tank of the plant and becomes the feed to the desilter hydro-cyclones. The desilter cones can make a separation as fine as 20µm and each process can separate a maximum of 15m³/hr. It is recommended that the desander and desilter cones are each able to process up to 150% of the drilling rig's maximum flow rate.

With underflow (recovered solids) from the desander and desilter cones still containing some free liquid, it is recom-

“These screens form the solids into a ‘stackable, conveyable’ consistency, allowing for easier handling of the recovered...” solids.

mended that, fine high-g dewatering screens be used to shake the remaining free liquid from the solids in the cone underflow. These screens form the solids into a ‘stackable, conveyable’ consistency, allowing for easier handling of the recovered solids.

“If required, the final stage of separation is to process the desilter cone overflow solids...”

Ultra fine solids recovery

If required, the final stage of separation is to process the desilter cone overflow solids (material finer than 20µm-40µm). This recovery is typically achieved through the use of high-speed, high g-force decanting centrifuges, which are capable of separation down to 2µ (microns) with a g-force of over 3,000.

Clear Solutions International manufactures environmentally friendly drilling fluid additives, drilling fluid mixing, pumping and separation equipment for a wide range of drilling applications, including for the HDD, gas drilling, deep geothermal, water well, tunnelling, micro-tunnelling and slurry wall/foundation markets. The company has been involved on numerous world record-breaking drilling projects. ■

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