

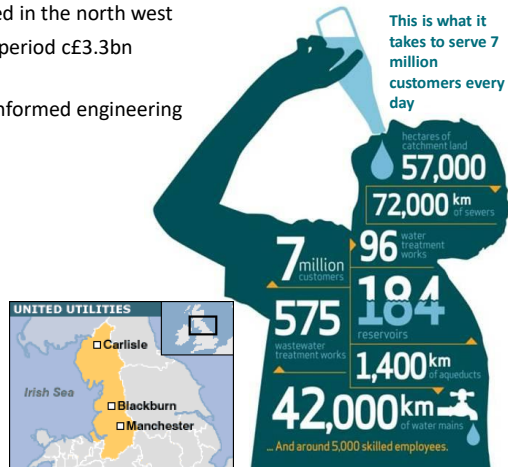


## United Utilities – Ground Engineering and feedback on CP drilling embargo and work shops

- United Utilities and the Ground Engineering Team
- UU GE team – project and professional activity
- CP Drilling Data on use during embargo
  - The incident
  - Immediate actions
  - Initial Rig Alterations
  - Workshop activities and findings
  - Options Actions and opinions during the embargo
  - Restart to full CP drilling
  - Future actions – Who's responsibility?

## United Utilities – Geotechnical Engineering; Introduction

- UU is a FTSE100 company; the only one based in the north west
- Privatisation in 1989; first AMP 1989, AMP6 period c£3.3bn investment
- Over 28 years about half time “In house” – informed engineering
- About 2.8bn of capital works including £100s million of ground engineering; in the order of £60m of improvements to dams and £20m of GI (through in house framework).
- The United Utilities (UU) Geotechnical Engineering team delivers and collaborates on a major proportion of the geotechnical, ground engineering and dam work
- Supporting non regulated work as far as Tallinn



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## United Utilities – Ground Engineering Team

- Origins in Northwest Water
- Current Geotechnical Engineering Team numbers about 23
- Chief Engineer reports through the Engineering Director to the Managing Director and Chief Executive
- Made up of Geotechnical Engineers, Geoenvironmental Engineers and Reservoir Supervising Engineers
- Professionally qualified team, a number with a GI back ground:
  - Fellows and Members of ICE
  - Chartered Engineers
  - Chartered Geologists
  - Chartered Scientists and Environmentalists
  - RoGEP qualified at Adviser and Specialist level
  - Reservoir Supervising Engineers (Geotechnical qualification /followed soil mechanics training)
  - SiC qualified
  - Graduates on accredited programmes



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## United Utilities – Ground Engineering – some of those professionals

- Promoting interest to potential younger professionals when opportunity presents itself – at the beach
- Developing....and exporting talent; Graduate Geoenvironmental Engineer - last month Graduate Engineer of the year
- Acute shortage of RSE
- Succession planning - recent trainee interviewed by panel at ICE
- Earlier in the year success for Geotechnical Engineer – holding Secretary of State letter of appointment



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## United Utilities; Ground Engineering team

- Individual team members from UU, ESP (Jacobs), CDP (MMB)
- Active in many national committees
- Securing funding for **Ciria** projects; active steering group input Grouting for Reservoirs
- Multi committee input to committees for BDS, hosting first Dam Conference in the north west for 20 years with significant team input
- Safety the fundamental topic for each of these stakeholder and bodies



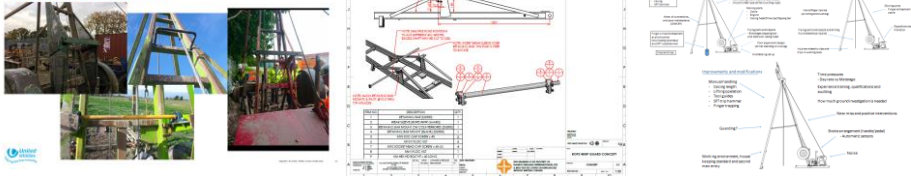
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## United Utilities – Geotechnical Engineering Team & Safety

- UU's core belief "Nothing we do is worth getting hurt for"
- Team and partner contractors have embraced a significant challenge related to a safety issue concerning Cable Percussive rig operation and design; an immediate halt to CP operations
- UU Ground Engineering took on a challenge; facilitating and taking active part in two industry workshops for about 70 people (UU, Contractors, BDA, Equipe, Dando, others)



### Examples of modifications



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## UU H&S Bulletin



### Two significant hand injuries

Ground investigation contractors badly injured.



We have had two separate injuries to drilling contractor's hands, both while using cable percussive rigs. One person has a fractured finger and the other person suffered an amputated thumb.

Warland Impounding reservoir – the driller was inserting the shell into the casing already in the ground when his little finger became trapped between the two. This resulted in a fractured finger.

Schola Green pumping station – Drilling was in progress when it appears the winch cable left the constraints of the mast and came in contact with the driller's left hand which was resting on the side of the mast.

As the rig continued to operate his thumb was trapped between the winch cable and the structure of the mast. Sufficient force was applied resulting in his left thumb being severed. Efforts made to re-attach his thumb in hospital were not successful.



#### Next steps

- The incidents are currently under investigation with the respective contractors, drilling rig manufacturer and trade associations.
- We are reviewing our policy on the use of cable percussive rigs.

Issued by: Programme Services, Engineering, Resilience Energy, Water Solutions, Water and Wastewater Services  
 Issued by: Chris Payne, Lead H&S Business Partner  
 Email: CP@uuwater.co.uk  
 Mobile: 07922 222760, mobile 88790

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## Incident - Review of Morecambe event



On 30<sup>th</sup> September a driller for a UU Framework Contractor had his left thumb amputated by the winch rope on a Cable Percussion Drilling Rig when working on a project at Morecombe.

His thumb was trapped between the winch cable and frame. Sadly, despite the remains of his thumb being recovered, the damage was so great at the point of severance that it was not possible for the thumb to be reattached.

The Contractor followed UU's AIRLine 222 procedure, reporting the incident immediately and filed a preliminary report with 2 days and a final report within 2 weeks.



## Examples of Contractor developed Safety Bar

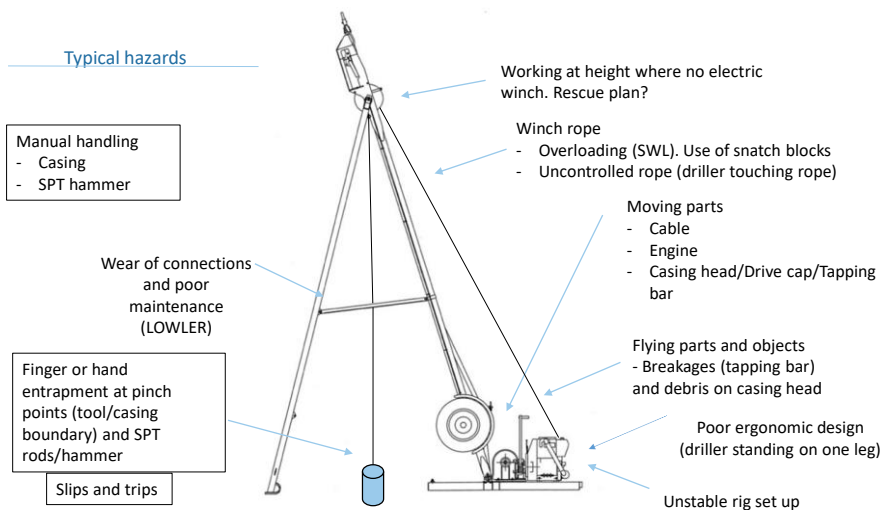
- Effective?
- Variety?
- Consistency?
- Designed, Compliant, verified?
- Rig manufacturers kit?
- Ease of Audit by specialists and non-specialists...appearance

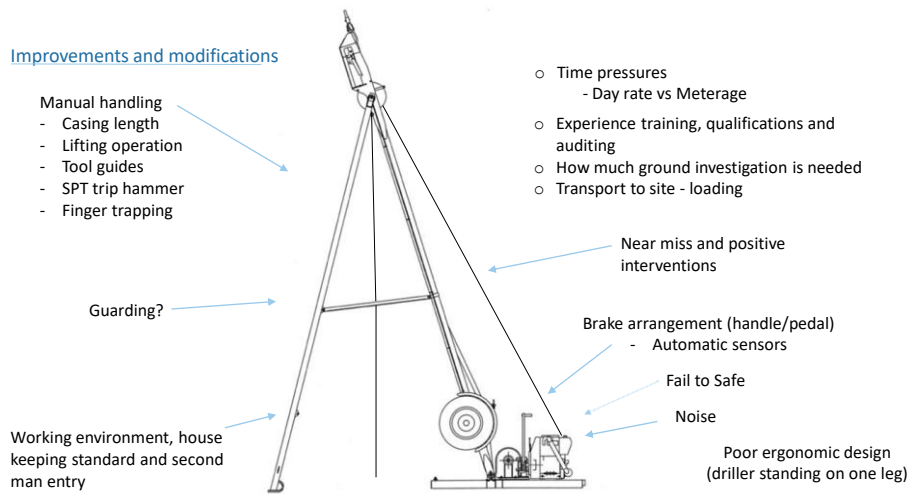
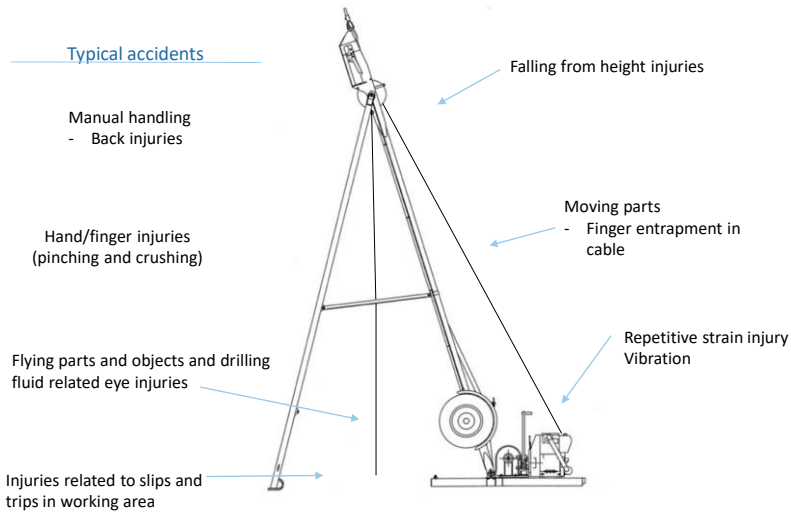
Examples of modifications



## UU CP Drilling - Workshop Stations

Workshop Station	
1. CP rig and methods, typical accidents and a review of all the hazards, behaviours etc.	
2. what the CP rig does very well....	
3. Alternative drilling and sampling and instrumentation techniques compared to CP drilling	
4. CP drilling – working on the possible accident black spots and hazards (from station 1) – what can be done to improve things?	
5. Alternative drilling – accident stats, hazards	
6. Competence, training, process, Drilling/UU WAP	







## CP drilling and alternatives during the embargo

Notes are observations provided by team members, not a Company position (one sided – nothing below from GI contractors yet):

- Were GI alternatives available

Full range of other options; CPT, Rotary, Sonic Drilling etc along with (after a period) CP rigs with additional safety bars/s/RAMS, observation, approval and monitoring. Any other techniques could be offered by any of the framework suppliers

- How many techniques were adopted on a project to replace CP work

Rotary work continued as anticipated.

Sonic drilling adopted for 3-4 projects (would some have been sonic anyway? One certainly hard slag to get through). Sonic considered on other sites.

Apparent process of approval for the CP rig with additional cost and mitigation preferred rather than adopt alternatives. (By engineers and Contractors?)



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## CP drilling and alternatives during the embargo

- Were there any accidents with the alternatives or during embargo

No

- Any differences in terms of ease of access

Some additional measures required for Sonic 'but nothing of issue' – lack of availability and cost were probably the main issues with this change to sonic

- Any changes required to planned scope of works or individual BH specifications

An issue around use of sonic at site xxxxxxxxxx and the lack of SPTs at depth – was this scoping or rather the sonic method adopted (any limitations)

Any detail on temperature of sampling? Any different to CP or other methods what has been monitored (Geoenvironmental – representative ground chemistry)

- Any implications for time period for GI

(Interesting observation) Immediately planned for the sonic work so no - however this could be an issue

Longer period for approvals of CP drilling with mitigation measures



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## CP drilling and alternatives during the embargo

- Impact on Costs per GI

Cost is higher but time on site less – so balanced out? We need to review the cost time balance in more detail  
 “Might have been different if they had done the SPTs” (ref to the site with a lower number of SPTs than was expected on the earlier referenced site)

- Impact on lead in/mobilisation time

See earlier comment regarding approval of RAMS and measures for CP with mitigation.

Sonic waiting for rig availability although manageable with planning (perhaps less GI undertaken overall during the embargo)

- Were you please to CP drilling back...?

Liked the embargo as gave me greater visibility as to the works that the CDP and others were proposing to carry out. Sonic was useful on 3-4 sites

In general Yes



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## Update on GI Incidents and CP Drilling on UU Projects

- Timeline:

29/09/16 – Finger injury, pinched between casing and tools at Warland

30/09/16 – Thumb amputation at Schola Green, Morecambe

03/10/16 – Arrangements begin for CP Workshop 1

07/10/16 – UU H&S Bulletin 227 published

07/10/16 – Embargo on CP Drilling on UU projects imposed

10/10/16 – Restart process developed

10/10/16 – Delivery driver minor facial injury at Hurstwood

12/10/16 – Restart agreed for HA Outage site following Site Specific Review

18/10/16 – Workshop 1 – CP Drilling Workshop

02/11/16 – Restart agreed for Schola Green site following Site Specific Review

08/11/16 – Workshop 2 – GI H&S

09/07/17 – UU allow general resumption of CP drilling under UU Framework subject to requirements



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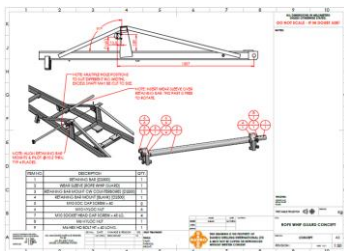
## Summary timeline

- Tuesday 8<sup>th</sup> November 2016 – UU arranged H&S Workshop held at MVGC to discuss the CP rig and safety of operation.
- Tuesday 8<sup>th</sup> November 2016 – H&S Working Group set up representing all GI Contractors present, Rig Manufacturer and BDA to discuss H&S issues and potential modifications.
- December 2016 to April 2017 –
  - Individual GI Contractors promote bar attachment to prevent recurrence of the incident.
  - In parallel Dando develop “Bar Kit” to be retro-fitted to their post-2005 drill rigs.
  - UU allow partial reintroduction of CP activity, subject to stringent H&S requirements and approved bar fitting
- Friday 9<sup>th</sup> June, 2017 – UU allow general resumption of CP drilling under UU Framework subject to restrictions.

## Resumption of CP drilling conditions

- 1) Rig manufactured post 2005 has been fitted with a “Dando Rope Protection Kit”
- 2) Rig manufactured post 2005 has been fitted with a (GI) Contractor commissioned Rope Protection Kit along with rig/rig type supporting documentation from Dando
- 3) A rig (Dando) manufactured pre 2005 has been modified by alternative means to an equivalent level to the preceding two points; to demonstrably show equivalence, potential modifications would likely require relevant certification and approvals from specialist testing and/or manufacturing company. It is our understanding that Dando will not be offering or certifying modification to pre-2005 rigs.
- 4) Non Dando CP drilling rigs; prior to planning the use of CP rigs from other manufacturers please provide for UU geotechnical/safety team consideration, a summary outlining why it is feasible, from this safety perspective, to use them on UU projects.

## UU H&S Bulletin



### Embargo lifted on CP Rigs

Collaborative approach identified solutions for cable percussive (CP) rigs.

#### Ban lifted on CP Rigs:

A recent ban on all CP Rigs has now been lifted following a collaborative approach between UU, The Ground Investigation (GI) Framework contractor and the rig manufacturer resulting in an agreed methodology to ensure that the safety concern regarding CP rigs is now resolved.

The ban was in place due to a serious incident that was outlined in Bulletin 227.

#### Next steps:

One of the four available options listed below must be adopted:



1. Rigs manufactured post 2005 must be fitted with a "Dando Rope Protection Kit".
2. Rigs manufactured post 2005 must be fitted with a (GI) Contractor commissioned Rope Protection Kit along with supporting documentation from Dando.
3. Dando rigs manufactured pre 2005 must be modified to an equivalent level of the preceding two points. These modifications would require relevant certification and approval from specialist testing and/or manufacturing companies. Dando will not be offering or certifying modification to pre-2005 rigs.
4. Non Dando CP drilling rigs will only be accepted once assessed by the UU geotechnical team.

Issued by: Programme Services, Engineering, Programme Services contractors, GI Framework contractor  
 Issued by: ADAM McANULTY, Lead Health and Safety Business Partner (Programme Services & Engineering)  
 Date: 27 July 2017  
 Mobile: 01880 060668

Email the Health & Safety mailbox on Outlook for any additional information or guidance.  
 Spotted a hazard or near miss? Need to report a safety incident or accident? DON'T WALK BY! Call Andrew 01949 021 9715.

## UU – Ground Engineering feedback CP drilling

- Please to achieve 60+ attendees at the workshops from about 12 contractors, 4+ Consultants, BDA, Equipe training, and notably CP Rig manufacturer Dando along with the UU Geotechnical Engineering Team.
- Safety, Technical, Sentimental...Emotional discussion – evolved into detailed debate, workshop sessions and clear subsequent actions; UU continued dialogue with contractors and manufacturer
- Temporary rig alterations, manufacturer comment and own proposals. Further work on other workshop risks...
- News from manufacturer; taking an active interest in the industry, talking to Contractors, looking at other issues raised at the workshops (fail to safe, manual handling, transport...); unable to be here.



**WHO IS TO CONTRIBUTE OR LEAD ANY CHANGE THAT'S REQUIRED?**



## United Utilities – Geotechnical Engineering Team

Some of the team involved



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## United Utilities – Ground Engineering



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## CP Drilling - discussion



- **WHO IS TO CONTRIBUTE OR LEAD ANY CHANGE THAT'S REQUIRED?**
- **WHAT WOULD IMPROVE CP RIG SAFETY; FAIL TO SAFE, MANUAL HANDLING, RIG ERGONOMICS (DRILLER POSITION).**
- **IS THERE AN ISSUE WITH TRANSPORT LOAD? LIMITATIONS ON DEPTH AND EQUIPMENT**
- **CAN OTHER TECHNIQUES DELIVER ALL THAT THE CP RIG PROVIDES?**
- **SIZE OF UK CP RILLING RIG FLEET?**
- **ARE THERE ALTERNATIVES AVAILABLE TO PICK UP ALL CP WORK**
- **IS IT AT ALL FEASIBLE TO REPLACE CP DRILLING WITH AN ALTERNATIVE?**
- **WHAT IS THE INVESTMENT REQUIRED FOR AN IMPROVED CP RIG; OVER WHAT PERIOD MIGHT OWNERS CONSIDER REPLACING?**
- **DOES THE INDUSTRY WANT A CHANGE OR NOT**



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## Deliverables from Workshop 1: CP Restart process

- It was agreed between members of the ELT, H&S, PS and Engineering that the reintroduction of CP drilling before the full review has been completed was only to be permitted on a case by case basis subject to the review of individual rig and site safety and with the full support of the rig manufacturer, the Principal Contractor and the GI Contractor and with the agreement of UU H&S and Engineering Geo team. Email sent to all parties concerned.

The basic process of how to get cable percussive rigs working again (prior to the main workshop) is as follows:

- Company Level
    - The contractor must assess each individual rig, decide if any modifications are required, get any modifications agreed with the manufacturer and implement
    - The contractor to update risk assessments / method statements as appropriate and ensure they are briefed and understood by the operatives
    - UU to be given opportunity to comment on the updated risk assessments / method statements
  - Project/Site Level
    - Consider do we need to use cable percussion rigs at all? Is there another equally good alternative? If we do need to use CP techniques...
    - Risk assessments / method statements to be made site specific and reviewed by Principal Contractor (where in place)
    - Principal Contractor to make sure site operatives are fully briefed and understand the site specific risk assessments / method statements
    - Site specific risk assessments / method statements to be provided to UU Geotechnical Engineer/Construction for comment
    - Principal Contractor to ensure a suitable and sufficient inspection regime is implemented
- This process has been agreed between the UU Geotechnical, Health and Safety and Construction teams

- Restarts have now begun following review of RAMS and rig modifications agreed with manufacturer



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