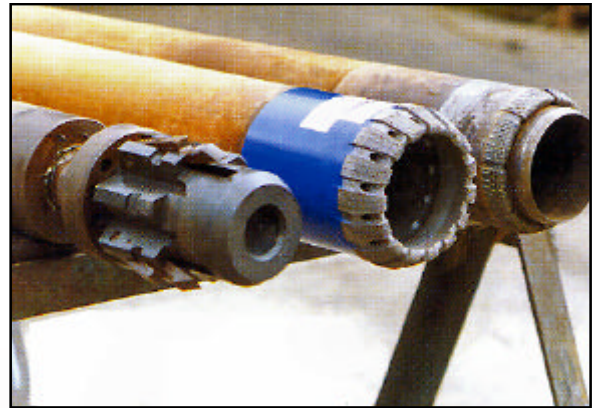


# Fugro Engineering Services Limited

## DRILLING SERVICES

### WIRELINE CORING

Two elements characterise today's commercial and industrial environment: increasing sophistication and an ever growing need for higher quality data. As a result, recovery of larger diameter core is often a requirement, particularly in superficial deposits and weak solid formations. To this end Fugro Engineering Services can provide triple tube wireline barrels, producing 102mm diameter core. The design of the core barrel, bit, core spring and flushing media combine to provide the necessary in-hole configuration to maximise core recovery and borehole stability.



*Geobore 'S' wireline inner and outer core barrels and Triefus 5 1/2" and 4" triple tube retractor core barrel*

Quality and experience are our bywords. Appropriate surface drilling plant and in-hole equipment, together with suitably experienced drilling personnel conversant with a wide variety of geological conditions, mean we can obtain high quality cores. We pay particular attention to the capability of the rotary rig, to enable the driller to respond to sensitive changes in the lithology of the strata being cored and to variations in the piezometric head in the borehole. Careful design of the drilling flush storage, cleaning and circulation system ensures optimum stability of the borehole, lubrication of the drilling bit and the transportation of the cutting clear of the bit face. This achieves maximum recovery of continuous core samples with the minimum of disturbance.



*Conventional rotary core drilling of canal tunnel lining and surrounding ground*

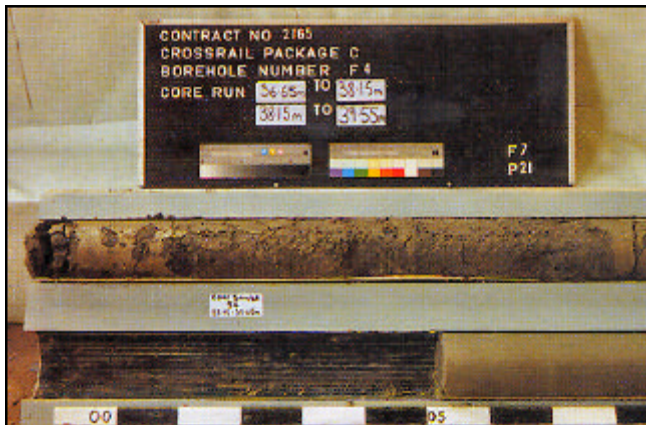
### CONVENTIONAL CORING

Conventional Coring using triple tube systems may provide a suitable alternative to the more sophisticated wireline techniques. Plant, equipment and drilling staff from Fugro Engineering Services are capable of undertaking and coring requirement. Resources include a:

- selection of truck or tractor mounted rigs, small trailer and skid mounted drills, or portable and semi-portable equipment for sites with access or headroom constraints
- wide range of core barrels providing:
  - 42mm diameter 115mm diameter core using 'T' Series metric equipment
  - 76mm diameter to 140mm diameter core using DCDMA equipment
  - 108mm diameter core using Triefus Triple Tube Retractor and Non-Retractor equipment
- choice of drill flushing systems including air, water, mist, polymer or foam flushing techniques to ensure compatibility with the overall drilling programme and to suit the anticipated geological conditions, the specified in-hole equipment and the borehole locations
- variety of drilling plant capable of undertaking inclined drilling operations using conventional or wireline drilling techniques
- choice of survey systems to determine the angle and azimuth of a borehole and a core orientation technique developed by our own drilling staff

The Fugro Group is an international organisation with around seven thousand staff in over fifty countries.

Our major disciplines are Geotechnics, Environmental Services and Survey.



*Recovery of Thanet sand using Geobore 'S' coring system with polymer flush. Sample removed for consolidated drained triaxial test with local strain measurement*

## BOREHOLE TESTING, SURVEY AND INSTRUMENTATION

The Company offers a wide range of in-situ testing techniques in rotary drilled boreholes, including variable, constant head and packer permeability tests, well pumping tests, pressuremeter and dilatometer tests, impression packer tests, geological borehole logging and our own core orientation technique. A number of borehole survey methods are available including geophysical and closed circuit television survey techniques and regular surveying of borehole direction using Tropari and Eastman survey instruments.

The Company has also gained significant experience from the installation and operation of permanent borehole instruments such as standpipes for gas, water or leachate monitoring and sampling, and piezometer installations for groundwater studies.

## OPEN HOLE DRILLING

Fugro Engineering Services is able to offer full hole drilling techniques employing direct or reverse circulation systems with conventional tricone, or drag bits and down-the-hole hammer techniques using air, water, mist, polymer or foam circulation or dry drilling techniques such as auger or barrel auger systems.

## AUGER DRILLING

Where a dry drilling technique is needed to penetrate soil or waste deposits, we can offer various types of auger equipment. These include:

- **solid stem auger or barrel auger systems, particularly suited to penetrating domestic refuse and other waste materials, generally used for the installation of gas monitoring points, gas flare stacks or gas plumping wells**
- **hollow stem auger with a wireline sampling system, particularly suited to the investigation of contaminated land and facilitating recovery of a continuous 100mm diameter soil sample to profile the ground penetrated.**

These systems are also used for mineral resource investigations such as sand and gravel surveys.



*Construction of a large diameter pumping well using a polymer based recirculating system*

Details of services and specifications may change without notice.

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Ref: FES - Drilling Services - Wireline Coring

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