INDIA

5,000m up in the high passes of India

ISRAEL

Water Well logging near Bat Shlomo

TAJIKISTAN

Second tallest man-made dam in the world

ROBERTSON GEO

Unlocking Your GeoData

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Uzbekistan

Geotechnical and Hydrogeological Site Investigation Programme - 10,400m evaluated with Robertson Geo High Resolution Acoustic Televiewer (HRAT) and 3-Arm Caliper.

CARRIZO-WILCOX AQUIFER, TEXAS

COAL EXPLORATION IN INDIA

HS2: FROM THE WEST MIDLANDS TOWARDS CHESHIRE

'HE TURNS' – OFFSHORE WINDFARM, GERMANY

INSIDE:
FOUR PAGE EDITORIAL INSERT

NMR for Geotechnical, Hydrogeological and Mining Applications
The NMR technique for groundwater characterisation is rapidly gaining ground

Identification of iron and manganese in groundwater bearing sands within the Carrizo-Wilcox Aquifer, Henderson County, Texas

A LARGE CATTLE & livestock producer needed to replace an old existing well in Henderson County, East Texas drilled to 240ft, as it was not producing a viable amount of water to meet current needs, or ongoing expansion.

The (Robertson Geo client) drilling contractor and the livestock producer, emphasized the project objectives of not just water quantity but the quality of the water, as high concentrations of both Iron and Manganese were being observed and recorded from groundwater produced from the "old well".

It was determined that the drill was to be completed to a depth of 700ft below surface to target the higher yielding zones of the Lower Carrizo Aquifer. However, evaluation was also required for Iron content of the upper zones to isolate it from the lower producing zones.

The initial plan was to run the Robertson Geo ELOG probe to determine proper screen intervals and general water quality. Having experience with Magnetic Susceptibility in ore bodies for mining applications, it was considered possible to employ the same logging technique for observing Fe/Mn in groundwater bearing sands, to evaluate for Iron/Manganese often found in this area of Texas.

It was then proposed to run both the ELOG & Magnetic Susceptibility probes, and, after completing both log runs all involved were very excited about the results. The ELOG showed the driller had indeed reached the intended target for exposing the water-bearing zone of the Lower Carrizo while the Magnetic Susceptibility Probe clearly showed significant decrease in ferromagnetic influence at the same depth.

It was determined that the driller would set screen from approximately 480ft from the top of the lower water bearing sand and develop the well for testing and production. Subsequent laboratory water quality testing has confirmed that Fe & Mn concentrations were well below that acceptable for human consumption much less for agriculture and farming.

The Almalyk Geotechnical and Hydrogeological Site Investigation Programme

UZBEKISTAN

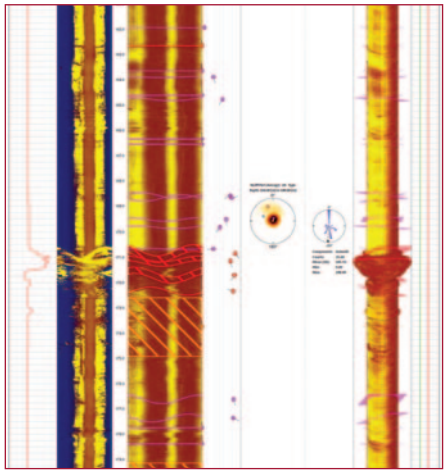
THE ALMALYK GEOTECHNICAL and Hydrogeological Site Investigation Programme is commissioned on behalf of AGMK (Almalyk Uzbekistan), the mine owner, with the project carried out at one of its six mines owned in Uzbekistan. The Robertson Geo client is the international drilling company Drillon of Turkey and the client representative providing the technical work being the international consultancy SRK.

"Geophysical surveying was performed as quickly as possible following completion of drilling to minimise the risk of hole instability. Cleaning of the borehole was necessary due to fractured formations before performing the geophysical surveys.

The Project was completed in the given time interval with success. It was the first time for us using down-hole geophysical survey devices, but we always received the excellent support of the Robertson Geo team whenever it was necessary both technically and logistically. Unfortunately, during the project, the HRAT probe was damaged due to highly fractured geology, and we had extremely limited time to finish the work, Robertson Geo did everything possible to support us and prepared a replacement tool and shipment within 24hrs.

Now, write us down as a very satisfied client that has ordered new equipment for our new upcoming projects in Morocco."

Cover image



Example of data.

Equipment used for the project:

- Robertson Geo Micrologger2
- 2,000m Winch (capacity 2000m of 3/16" 4Core Cable)
- High Resolution Optical Televiewer (Hi-OPTV)
- High Resolution Acoustic Televiewer (HRAT)
- 3-Arm Caliper probe
- Electric Log/Natural Gamma/Temperature
- Impeller Flowmeter (45mm)

Over 14,300m was drilled and 10,400m was measured by HRAT and 3-Arm Caliper.

Geophysical requirements for the project:

- Optical Televiewer (OTV) (for unsaturated length of hole, where applicable)
- Acoustic Televiewer (ATV) (for saturated length of hole, where applicable)
- Tilt and Azimuth survey (included in OTV/ATV)
- Caliper (borehole diameter survey)

Throughout the Survey equipment had to be capable of surveying the full depth of the hole.

HS2 Phase 2a: from the West Midlands towards Cheshire, UK

THE £3.48 BILLION, 36-mile (58 kilometres) scheme will run between the new Curzon Street station in Birmingham City Centre to Crewe Station, with six services per hour planned.

The UK's Department of Transport confirming the recent Act of Parliament now means HS2 Ltd will be allowed to begin work on constructing the next phase of the new high-speed railway between Crewe and Birmingham, the scheme is expected to support around 5,000 jobs during construction of this phase, with many more in the supply chain.

The track will include 17 viaducts, 65 bridges and 36 embankments. This amount of infrastructure requires a colossal undertaking for geotechnical ground investigations.

To meet this challenge, Robertson Geo Operational Services has been mobilising two field crews simultaneously with both running 9-11 probes per borehole. (To log 8 probes per borehole is a comprehensive suite of tools).

Infrastructure = Geophysical tools and a lot of data

Reliable and consistent data from wireline borehole logging provides an important understanding of rock strength and the presence of fractures that is essential for the location and positioning of new build construction and its foundations. Logging provides accurate and reliable data and is especially important in locations where collecting core samples is difficult and from poorly consolidated facies, weathered zones, soft formations, and shallow boreholes as examples.

Rock strength:

Can be estimated using measurements derived from Sonic (PS Logger® Probe) and Density (Formation Density Probe) logs. One common technique uses the seismic compressional (P) velocity to estimate Unconfined Compressive Strength (UCS). The P-wave velocity can also be combined with the shear (S) wave velocity and density to give stress/strain properties including Poisson's ratio, bulk modulus and Young's modulus.

Fractures faults and voids:

Can be detected using various imaging tools (High Resolution Optical Televiewer and High Resolution Acoustic Televiewer) to characterise features intersecting the borehole wall, including bedding, drilling-induced/natural fractures and faults. Integrated orientation measurements allow the inclination and direction of features to be understood relative to the borehole dip direction, or true or magnetic north.

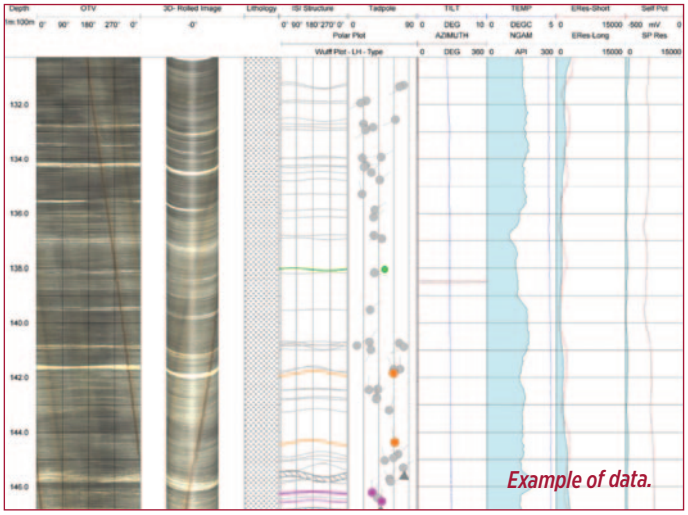
Porosity:

Borehole NMR is a technique that measures fluid volumes and the distribution of those fluids as a function of pore geometry enabling detailed characterisation of the storage and flow capacity of subsurface formations. Accurate and precise mapping of subsurface porosity and permeability can ensure that any underlying sediment formations are suitable for intended construction.

Robertson Geo Operational Services has a fleet of customised vehicles, fully equipped with data acquisition and surface and subsurface deployment capability.

HIMACHAL PROJECT

5,000m up in the high passes of India



Example of data.

THE NHIDCL (NATIONAL Highways and Infrastructure Development Corporation) is a fully-owned company of the Ministry of Road Transport & Highways, Government of India.

It has appointed Soiltech through the consultancy of Rites-GC for carrying out geotechnical investigation works for the development of a highway tunnel in the state of Himachal Pradesh.

The project is located on a pass which is at about 5,000 meters altitude above MSL. The boreholes drilled and logged were at an elevation of 4,651 meters.

The scope of work consisted of drilling and carrying out Borehole Resistivity Survey, Borehole Thermal Survey and Deviation measurement in deep boreholes, and in-situ stress measurement for which High Resolution Optical Televiewer (Hi-OPTV) and hydraulic fracturing was applied. Additionally, a Gamma log was collected in dry boreholes.

The work was carried out at about -20 degrees Celsius temperatures over a period of one week.

Coal exploration in **India**

WE, AT APC Drilling & Construction Ltd, Namakkal, Tamilnadu, India, are working in the field of coal drilling and logging throughout the country. Our work efficiency is proven within our customers in the field of geophysical exploration in coal blocks, particularly using our suite of loggers and deployment equipment from Robertson Geo. We use Geophysical logging to locate the Carbonaceous zone in a typical borehole by means of using the following probes:

- Electric Log probe
- Formation Density probe
- Full Waveform Triple Sonic probe
- Verticality probe

For exploring the coal seam in a typical borehole, we use logging with the above-mentioned probes for comparison of their data to confirm the existence of coal seams in a particular depth and to justify the lithology of that borehole.

We have used two to three more probes of other manufacturer but the development and the sharpness of the parameters of the data achieved by Robertson Geo tools are well amplified which helps a lot to reduce the confusions to determine the coal seam and to determine the boundaries of coal seams in a particular location.

Biswajit Piri
APC Drilling & Construction Limited

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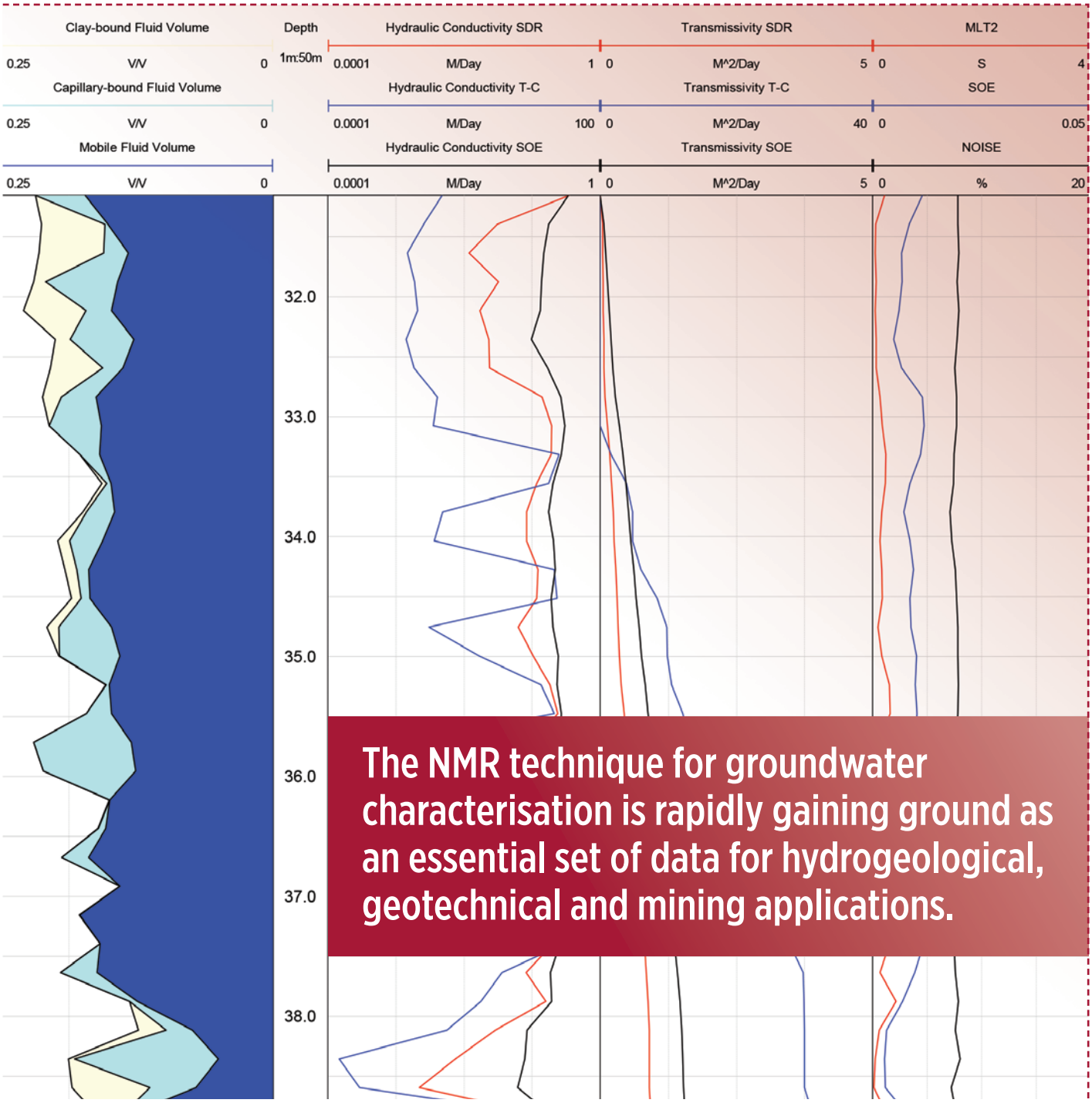
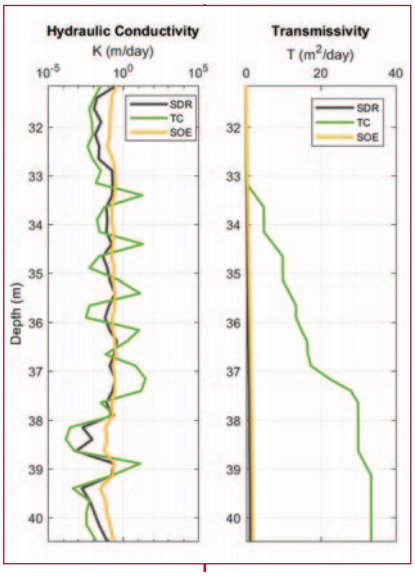
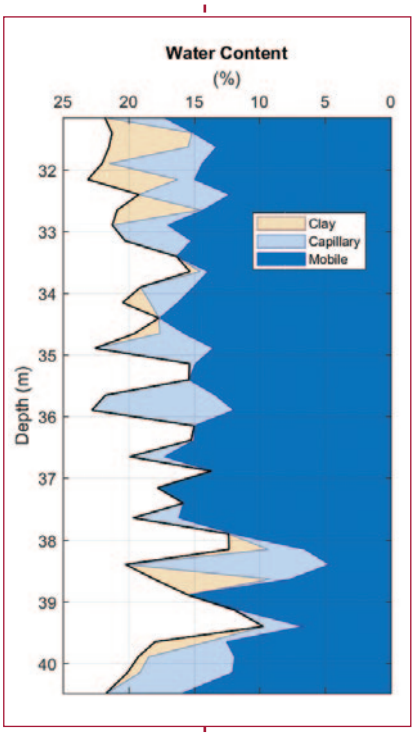
NMR for Geotechnical, Hydrogeological and Mining Applications



The NMR technique for groundwater characterisation is rapidly gaining ground as an essential set of data for hydrogeological, geotechnical and mining applications.





Above: Examples of NMR borehole data.

NMR versus Neutron Porosity Logging and Hydraulic Testing Techniques

Before the introduction of borehole NMR technology for measuring ground water pore size characteristics, estimates of hydraulic conductivity have traditionally been obtained by hydraulic testing techniques. There are a variety of established tests including slug tests, airlift tests, packer tests and pumping tests, with packer tests being popular for geotechnical boreholes. Packer tests involve isolating sections of the borehole with inflatable packers and then pumping water under pressure to enable measurement of the resulting fluid flow. The data resulting from the tests and the interpretation of it is well documented and understood.

Neutron porosity logs have enjoyed a lot of success measuring the water content in formations i.e. the total porosity. However, it is not possible with this method to identify how the fluid is held within the formation, whether it is mobile, capillary or clay bound.

In addition to the above, standard wireline probes are often run to provide further information about the groundwater conditions. Caliper and Televiewer data can indicate suitable sections of borehole over which the hydraulic tests can be run with Televiewers also providing information on fractures and bedding. Resistivity logs, long established as a standard for water logging, provide information on bedding layers and fluid distribution. Temperature Conductivity logs and flow meter logs also provide information relating to ingress and egress of borehole fluid from aquifers.

Packer tests can be time consuming and may not be suitable for very high or very low permeability formations. In addition, a clean rotary drilled borehole is required to prevent leakage around the packer which can cause false interpretation of the test results.

The disadvantages of neutron porosity logging are the limited data provided and the complex regulatory and safety overhead of systems using strong AmBe nuclear sources.

The advantage of the NMR technique is that it quickly provides detailed repeatable results characterising the groundwater profile from a single borehole including, most significantly, details of how the fluid is held within the formation.

Hydrogeology

Characterising and understanding groundwater conditions is vital for hydrogeologists involved with water production including public water supply, flood and drought management, water quality and contamination issues including wastewater and impacts on protected habitats.

Where NMR logging is conducted in the unsaturated zone above the water table good data is achievable from the reduced level NMR signal. However, only the water content of the formation will be measured yielding a volumetric water content as some of the pore space will not be water filled. Also, estimates of hydraulic conductivity using the standard formulas are not meaningful in the unsaturated zone.

Below the water table the NMR produces profiles with depth of water content distribution by pore size and values for hydraulic conductivity and transmissivity using three estimation techniques: Sum of Echoes, Schlumberger-Doll Research and Timor-Coates.

Geotechnical

For major civil engineering projects, designers will also need the expertise from hydrogeologists to understand how groundwater considerations may affect their designs. The information provided by NMR logging would be relevant for sub-surface structures, pile design and projects involving tunnels, therefore most major civil engineering projects.

Mining and Minerals

In the mining and minerals industry there are many hydrogeological factors that impact on the development and working of mines. To understand the hydrogeological conditions data may be collected from existing exploration boreholes initially, but as the project advances it may be necessary to drill additional boreholes purely for hydrogeological testing purposes. Apart from surface and groundwater considerations it is vital that geotechnical and hydraulic parameters of formations around the mine are understood as they may have implications on mine stability and depressurization. NMR logging, as with most geophysical probes can augment data from other investigation techniques providing valuable information on the undisturbed or ground state of the formation.

Robertson Geo Operational Services teams have been using NMR technologies at several locations and applications.

Lower Thames Crossing

In 2019, as part of a full suite of geophysical logging probes, Robertson Geo was asked to provide NMR logging. In partnership with Vista Clara Inc it supplied an NMR system using the Javelin JP238 probe with four depths of investigation or frequencies. Data quality was very good but deploying this tool through 100mm steel drill casing was problematic due to the strength of the magnets and relatively low weight of the tool (35 lbs). Consideration was then given to deploying the wireline Javelin probe which is heavier and contains fewer permanent magnets. Vista Clara also developed a new non-conductive standoff and centralizer specifically for deploying through these 100mm drill pipes.

HS2

HS2 is the largest infrastructure project in Europe and involves the construction of more than 300 bridges and 70 viaducts for the first phase alone. Robertson Geo has been working on the project since 2015 and site investigation work is continuing as new phases are undertaken. In the early days of HS2 site investigation NMR logging was not available but has now been included for work in the northern section between Birmingham and

Manchester in 2021. The Javelin JPY238 probe with two depths of investigation continues to be used on this project.

Kendal

Robertson Geo secured a contract to conduct a comprehensive geophysical survey for a major flood management scheme in Kendal. Part of the remit was to conduct NMR logging which was performed using a Vista Clara Javelin 238 probe with two depths of investigation. This operates in a standard wireline configuration which meant that the same winch could be used for NMR as for the rest of the geophysical probes, simplifying operations and reducing client costs. This project is still ongoing with NMR data being collected on all boreholes to date.

Robertson Geo engineers on-site at the flood management project site Kendal UK.
(GeoUnlocked issue 11, page 7)

BGS

At Sutton Bonington, in collaboration with BGS and Nottingham University, Robertson Geo is involved in pioneering research for carbon sequestration. Several deep boreholes have been constructed to provide a field site for the testing of carbon dioxide injection and monitoring its dispersal in a target formation. As part of the logging suite, NMR has been included to help understand the groundwater conditions across the test location. The boreholes being logged are cased with PVC which presents no problems when acquiring NMR data.

NMR Field Practice

The Javelin 238 probe deployed in its wireline configuration can, in many aspects be managed like any other probe, albeit quite long (3.6m) and heavy (30kg) with a 60mm diameter. It runs on 300V DC internally, and additional safety protocols have been put in place for its operation.

The CE certified Javelin Wireline system comprises a probe and a surface unit, from Vista Clara, and a custom-made patch box was designed by Robertson Geo development to connect with a standard four core winch. Due partly to Covid restrictions initial training was provided by video link from USA. Once staff were all trained, consideration was given to additional controls for working in the field environment. This covered the voltage, steelwork precautions, permanent magnets, power on/off sequencing, connectivity and manual handling of the probe.

In most cases the probe would be raised by use of a sheave wheel on the drill rig with centralisers/offsets affixed which reduced the potential adhesion of the magnets to the casing; this meant that entry to and exit from the borehole was easily achieved.

The probe is run from the bottom up to achieve smoothness and cannot be switched on near to metal casing. Log speed is typically less than 1 metre/minute and there is an option to run statically at discreet intervals.

As the majority of geotechnical boreholes are now drilled to 146mm "Geobor S" and are logged in sections it was vital that the probe could readily pass through the "Geobor S" drill bit without the magnets adhering. For the two depths of investigation system this worked perfectly.

NMR System Calibration

All geophysical logs conducted by Robertson Geo Operational Services are backed by a valid conformance certificate. As designers and manufacturers of practically all its own equipment the calibration and conformance requirements are similarly designed as an integral part of the development process.

The NMR, manufactured by Vista Clara, has its own calibration regime as below:

Pulse sequence parameters including pulse length and echo time shift are determined by testing in 100% water using repeated long repetition times until a maximum amplitude on the echo signals is achieved.

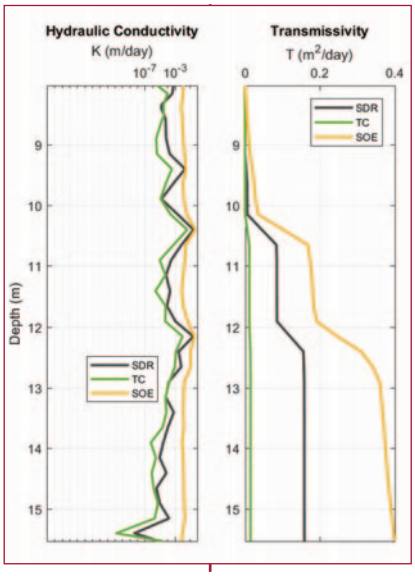
A second calibration is then run, in a similar manner in the same tank, to determine the conversion factor from NMR spin echo amplitude (in volts) to water content as a percentage of volume, as well as calibrating the phase of the signal.

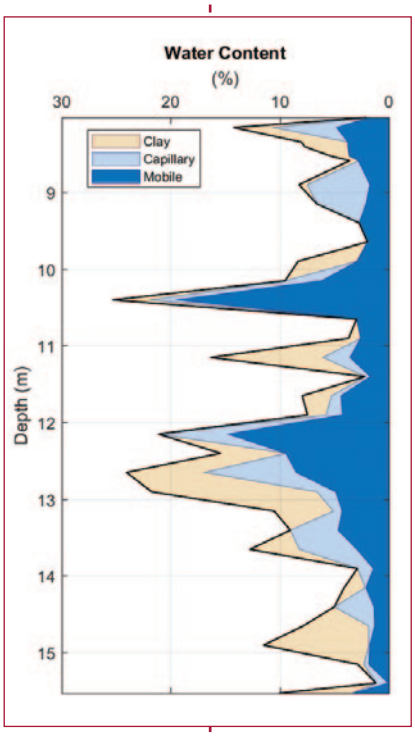
Once the above calibrations have been conducted there is unlikely to be significant change in the calibration unless some components are changed. As the requirements for the calibration are strict, (i.e. sufficient water tank size, no metal or steel in proximity and no external RF interference) this calibration is probably best left to the manufacturers. However, there is a facility in the Javelin Pro Processor software to enable this to be conducted anywhere where there is an acceptable test unit.

Vista Clara routinely re-calibrates all rental probes that pass through their manufacturing facility and for all probes the software can export a calibration report which will indicate if noise levels remain acceptable or if any calibration parameters have changed significantly.

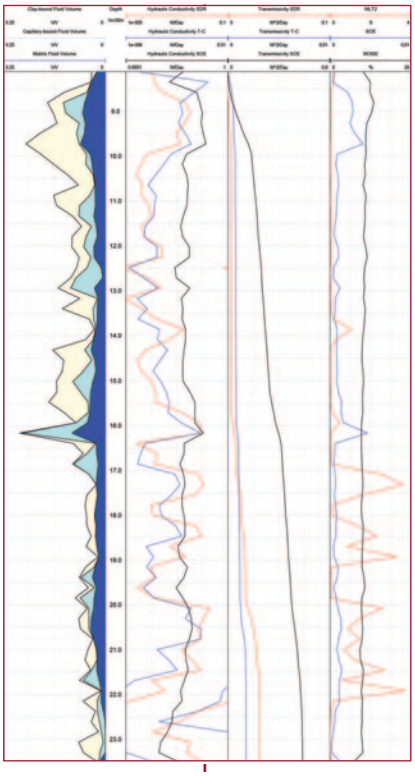
Multiple Investigation Depths (or frequencies)

To ensure that the resulting data from NMR relates to an undisturbed part of the formation it is vital that there is sufficient depth of investigation. Oil well boreholes with their relatively large diameters and invasive mudcake adhering to the walls require a deep radius of investigation, usually with four discreet radii (or frequencies). For geotechnical and mineral exploration boreholes





Above: Examples of NMR borehole data.



Above: Example of NMR borehole data.

The NMR probe produces the following outputs versus depth:

OUTPUT	UNIT	DESCRIPTION
Total Porosity ϕ	V/V	A unit equal to the percentage of pore space in a unit volume of rock, measured from the longitudinal relaxation rate
Clay Bound Fluid Volume	V/V	Percentage of pore space attributable to clay bound fluid, measured from a cut-off on the transverse relaxation rate T2
Capillary-bound Fluid Volume	V/V	Percentage of pore space attributable to capillary bound fluid, measured from cut-offs on the transverse relaxation rate T2
Mobile Fluid Volume	V/V	Percentage of pore space attributable to mobile fluid, measured from a cut-off on the transverse relaxation rate T2
Hydraulic Conductivity SDR	M/Day	Measure of how easily water can pass through soil or rock using Schlumberger Doll Research equation
Hydraulic Conductivity T-C	M/Day	Measure of how easily water can pass through soil or rock, estimated using Timur-Coates equation
Hydraulic Conductivity SOE	M/Day	Measure of how easily water can pass through soil or rock, estimated using Sum of Echoes
Transmissivity SDR	M^2/Day	Measure of how much water can be transmitted horizontally using Schlumberger Doll Research equation
Transmissivity T-C	M^2/Day	Measure of how much water can be transmitted horizontally using Timur-Coates equation
Transmissivity SOE	M^2/Day	Measure of how much water can be transmitted horizontally using Sum of Echoes
MLT2	log base 10 (sec)	Mean Log transverse relaxation rate (of T2)
SOE	µV	Sum of echoes
Noise	%	Percentage of signal attributed to noise

the diameter is generally less than 150mm and two depths of investigation gives sufficient radius to measure the undisturbed zone.

NMR Glossary of Data Outputs

The outputs from NMR logging show a variety of information, most of which will be familiar to hydrogeologists including hydraulic conductivity and transmissivity estimates. The detailed porosity data it provides however, being directly linked to pore size is difficult to obtain by other means.

As more data becomes available and comparative studies between NMR and existing techniques take place acceptance of NMR is expected to become routine as it provides a cost-effective means of augmenting or confirming data from other methods.

The Future of NMR

With a wealth of invaluable information and relatively straightforward deployment the NMR technique for groundwater characterisation is likely only to gain in popularity over time. Currently the price point for NMR logs remains significantly higher than other logs due to the cost and complexity of the systems, but Robertson Geo has committed to it as the way forward for groundwater investigation. If the point is reached when NMR can be accepted as a replacement for the established practice of packer testing then the price can quickly look extremely cost effective.

MORE: Javelin JPY238 NMR Probe *(GeoUnlocked issue 9, page 6)*

WATER WELL LOGGING NEAR Bat Shlomo, ISRAEL

Water supply in Israel relies essentially on groundwater from shallow aquifers (Israel Coastal aquifer), deep aquifers and seawater desalination.

A SUBSTANTIAL PORTION of the freshwater supply relies on water abstraction from deep aquifers, which are managed and utilized by mostly Mekorot, the Israel Water Company, which operates hundreds of such wells. Many of the wells are ageing and need to be replaced. In the coming years many wells are expected to be drilled. The depth of the water wells in the deep aquifers ranges between 400m and 1200m, depending on the location and the depth of water bearing layers, having sufficiently good hydraulic properties and sufficiently good groundwater quality.

Shacham, a subsidiary of the Mekorot Company is one of the main drilling contractors for this work. EWRE (Environmental and Water Resources Engineering Ltd) based in Haifa, has been commissioned by Shacham to manage the acquisition of data from the wells it drills. EWRE uses Robertson Geo equipment for the logging.

Loggings occurs at various stages of the drilling process:

- When reaching the upper section (usually 200-300 meters) and the target depth.
- After the casing and cementation of the well.

So far, the logs conducted during the drilling are:

- Electrical Resistivity
- Temperature
- Natural Gamma
- Full Waveform Sonic
- 3-Arm Caliper

High Resolution Acoustic Televiewer (HRAT), spectral radioactivity and density logs are also expected to be introduced.

Well Tut 1A, Carmel Aquifer. Target depth 650m, Ground Surface Elevation + 50m.

After the drilling, a CBL log and Gyroscopic verticality log are completed.

The purpose of the logging during drilling and before the casing is to characterise the geologic profile and correlate with data from other wells. This, to determine the location and size of the perforated section of the well and to determine the target depth of the well.

EWRE has developed a module based on several machine learning algorithms to classify the cross section into different rock types, based on the log data. The more logs conducted, the more refined is the classification procedure.

The gyroscopic verticality is needed for the installation of the production pump.

Hi-OPTV data from a difficult site to access at Hove, UK

ROBERTSON GEO ENGINEERS worked as part of a team investigating the slopes either side of a cutaway previously excavated to provide a route for trains leaving Brighton and Hove railway station.

Optical data was acquired from boreholes drilled at the peak of these slopes to look for signs of fracturing, faulting, collapse, or other signs of weakness.

A Robertson Geo Mini Winch was chosen due to its portability which allows engineers to carry it to the borehole, as access to the site was very limited. This winch was used to run the Robertson Geo High Resolution Optical Televiewer (Hi-OPTV). Although these boreholes were drilled immediately before investigation, data obtained was excellent due to the lack of water in the borehole which clouds optical images if disturbed by drilling. This approach allowed the site to be investigated to depths of 20m with a rapid turnaround to minimise disturbance to the surrounding residential area without compromising data quality.

An example of a feature captured by the High Resolution Optical Televiewer (Hi-OPTV) from the Hove site.

TJEM, Robertson Geo client in Tajikistan, purchased a logging system last year and have been using televiewers on the Nurek Dam project.

At 300m (984ft) the second tallest man-made dam in the world

THE NUREK DAM is an earth-fill embankment dam on the Vakhsh River in Tajikistan. Its primary purpose is hydroelectric power generation and its power station has an installed capacity of 3,015 MW. On completion it became the tallest dam in the world at the time. At 300m (984 ft) it is currently the second tallest man-made dam in the world, after being surpassed by Jinping-I Dam in 2013. The Rogun Dam, also along the Vakhsh in Tajikistan, may exceed it in size when completed.

"The equipment was purchased for the project Rehabilitation of the Nurek HPP. So far, the High Resolution Optical Televiewer (Hi-OPTV) has been used for video logging of slope wells on the left bank of the Vakhsh River. Since the slope has a complex/difficult section, it was necessary to conduct video logging of the wells immediately after the completion of drilling (to avoid collapse of the wellbore walls).

To do this, we have made changes in the use of the tripod. We adjusted it by mounting the tripod into the drilling machine holders. This saves time and facilitates the work of drillers (since if you move the rig, then afterwards it can be difficult to return it to its original location for drilling out the well). We can say that this helps not only in our project, but also in future projects, since we have mountainous terrain in Tajikistan and presumably everywhere we will have to carry out logging immediately after drilling, due to the complexity of the relief and underground conditions.

Overall, we are very satisfied with the equipment. We wish Robertson Geo every success and we look forward to further cooperation with you."

Dilshod Majidov

He Dreiht 'He Turns' – Offshore Windfarm

ROBERTSON GEO OPERATIONAL SERVICES logging engineers have recently successfully completed P & S Wave seismic velocity logging on 50m boreholes using the PS Logger® for the 'He Dreiht' offshore windfarm project off Northern Germany.

The 'He Dreiht' (translated literally to 'He Turns') windfarm, is within Germany's exclusive economic zone of the North Sea, located 85km north of Borkum island and 95km west of Helgoland Island.

Scheduled to be commissioned by 2025, the farm is planned to consist of 90 turbines producing a combined 900MW of clean energy, making it one of the largest wind power projects in Europe.

HI, I'M MARK Scarisbrick, a new addition to the Robertson Geo Operational Services logging team. Born and raised in Liverpool, I always had an interest in earth science, working outdoors and travelling so Geology seemed a great fit when applying to university. I have a BSc in Geology from LJMU and an MSc in Petroleum Reservoir Geoscience from the University of Liverpool.

I spent my early 20's in Australia working as a Rig Geologist on mine and coal seam gas projects, where I saw geophysical logging for the first time, switching to seismic acquisition 'stomping' geophones in the deepest reaches of the outback after a couple of years.

In the UK, I have plenty of experience working in the construction industry for the UK's largest piling companies, supervising the day-to-day running of projects around the UK, from small house improvements to large scale infrastructure schemes.

No two days at Robertson Geo so far have been the same, from getting to grips with all of our winches and probes on-site and in the field, to travelling to Denmark to pick up one of our team returning from an offshore job. I look forward to what the future at Robertson Geo has in store.

Mark, back from a European trip of 1,960 miles over 5 days. Robertson Geo Operational Services teams schedule projects for best utilization of resource and equipment for optimum cost and results effective projects.

Check out our Workbox videos on our **YouTube channel**

WE CONTINUE TO build our video playlists with tutorials and workbox videos. These we prepare within our technical support group, providing easy-to-access and understand step-by-step operation and maintenance of Robertson Geo logging tools.

Latest videos include:

- Installing centralisers
- Installing de-centralisers
- NGAM calibration
- Electric Log test box
- Focussed Electric test box
- Hi-OPTV window replacement
- Probehead: opening and 'O' Rings replacement
- Borehole Geometry spring cleaning and greasing
- 3-Arm Caliper rack cleaning and greasing
- Cablehead 'O' Rings

Easy to understand videos with instant customer access.

Appointment of Jay Prakash as Assistant Sales Manager – Americas

WE ARE PLEASED to announce that Jay Prakash has joined Robertson Geo in the position of Assistant Sales Manager – Americas, focusing on the company's North & South American markets.

Over his career he has gained skills and expertise in marine/land geology & geophysics, project management, sales and business development. Jay has a BSc in Geology, MSc in Applied Geology and Marketing.

Born and raised in Kerala, South India, he started his career in the financial consulting sector serving customers from the U.K. and Australia, however his passion for geology took him to Mumbai where he became a marine geologist conducting offshore site investigations onboard drilling vessels and jack-up barges. The job offered him opportunity to work with marine geophysics which took him not only extensively along the coasts of Arabian Sea and Bay of Bengal across India, but also to South East Asia and New Zealand.

The next phase of his life in Singapore and the USA got him involved with both marine/land geotechnical drilling and geophysical surveys that provided him the unique opportunity to blend various techniques to provide better resolution of the subsurface and greater value to the customers. His travel across the region acquainted him with cross cultural business opportunities engagements. His genuine care in solving problems gave him extensive experience in project management and business development.

Jay's various skill sets, spanning across multiple industries and segments as well as technologies, enable him the unique ability to approach issues with the attitude of a problem solver, valuing relationships and customer satisfaction over short term gains.

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Loggers Journal

Here there and everywhere... the life of a Robertson Geo Logging Engineer

Once upon a time 250m above the **Colorado River**

WE HAD TO respond to a client who had a now obsolete Videologger 2000 surface system causing some distress. It was being used for geotechnical ground investigation for the then upcoming Hoover Dam Bypass project.

The problem was that the entire system was mounted on a frame to be transported by helicopter to inaccessible locations, and as the Videologger system was not functioning properly his entire crew and the helicopter were effectively grounded. Within 48hrs from client contact and armed with some spares I suspected might be at fault, plus a spare Videologger system just in case, I arrived at Las Vegas.

We arrived early on site and I must admit I was becoming slightly concerned as to what the precise nature of the location of the equipment was. We followed a trail uphill for a short while and when we got to the top, the view of the Colorado River was breath-taking!

I could see the location of the logging system. It was uncomfortably close (it seemed to me) to the edge of a cliff which was apparently around 250m (800ft) above the Colorado River. With an increasingly dry throat, and a dizzy feeling I began work on the system with a rope around my waist more for comfort than anything else. It was quite a complicated piece of equipment to dismantle.

Staying focussed was a bit of a challenge for me under the circumstances. However, after a couple of hours of diagnostics the fault was found. A faulty printer interface was dragging one of the voltage lines down which was crashing the system. Everyone was pleased but not entirely convinced. It was suggested I reassemble the Videologger and leave the unit on soak test while we went for a late breakfast. Just to let the sun do its work for a bit.

We were delayed for nearly two hours on our way back across the Hoover Dam as the US Army Security were thoroughly searching each vehicle that was crossing. Jokingly, we resigned ourselves to the fact that there was nothing we could do about the situation, and when we returned to the unit we would be met with a puddle of blue molten plastic.

To our relief the unit was still working. Very much hot to the touch. But still working.

There was a borehole ready for logging at a location very close by which still required the helicopter to relocate the logging unit. As preparations were made for the lift the helicopter approached. I noticed the power cables not far overhead. The skill of the pilot was awe inspiring. He must have been less than twenty feet below the power cables during the lift!

We setup to log on the next hole and all seemed well. I felt so relieved that all was going well, until someone got my heart racing when by shouting "It's done it again!". Thank goodness it turned out he was just playing a trick on me.

This was one of my first commissioning/trips. The memories of which will stay with me forever.

Ralph Whiteley, Senior Logging Engineer

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