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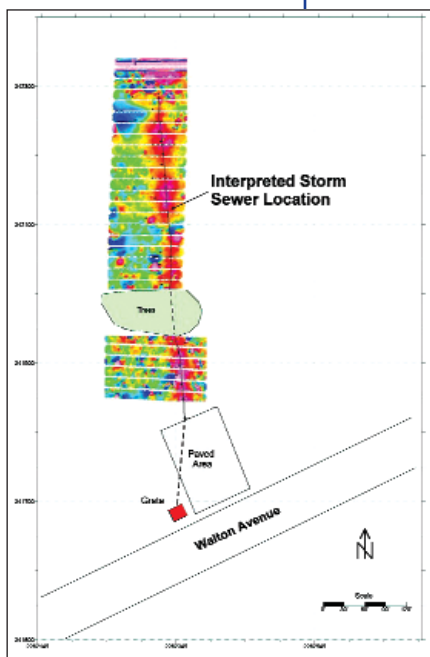
Strategic Partner



Geophysicists Respond After Hurricane Ivan Strikes

The remnants of Hurricane Ivan wreaked havoc on Central Pennsylvania over the weekend of September 18 and 19, 2004, causing massive flooding and related water damage. On Monday, September 20, the Borough of Hummelstown contacted ARM to help them locate a collapsed and clogged storm sewer. ARM geophysicists immediately mobilized their Ground Penetrating Radar (GPR) and line locating equipment to locate what they expected to be a relatively shallow storm sewer. GPR and line locating equipment are generally useful in detecting features within 10 feet of the ground surface. However, neither the GPR nor the line locator indicated the location of the problematic storm sewer, suggesting that the line might be greater than 10 feet deep. ARM then decided to use a G-tek TM-4 Magnetometer to identify the sewer line. Magnetometers are designed to “see” much deeper into the subsurface and, in fact, the magnetometer successfully detected the 27-foot deep corrugated metal pipe.

Data for this project were collected and digitally integrated with a survey-grade global positioning system (GPS), allowing ARM to accurately locate and mark the storm sewer in the field. Results of the magnetometer survey facilitated excavation of the pipe, saving the Borough funds that would have been expended in search of the storm sewer with an excavator.



Map showing the magnetic response data collected during the storm sewer survey.

Municipalities regularly maintain and repair underground piping and other infrastructure. They also encounter instances where historical reports, photos, and other forms of information indicate the presence of buried tanks, pipes, and underground structures near excavation projects. To limit the cost of excavation, these features can be identified before any digging takes place by using non-intrusive geophysical methodologies. Although there are numerous geophysical methods available today, differing geological and cultural scenarios dictate the use of different geophysical techniques. Use of the most appropriate method allows the geophysicist to provide timely, accurate, and concise information to the end user. Typical geophysical exploration methods include Ground Penetrating Radar (GPR), Electromagnetics (EM), Magnetometers, Metal Detectors, and Radio and Audio Frequency Locators.

For further information about the Borough of Hummelstown storm sewer project, please contact Hummelstown Borough Manager, Michael O'Keefe at 717-566-2555. For additional information about the geophysical survey services provided by ARM, contact Jeffrey Leberfinger at 717-533-8600 or jleberfinger@armgroup.net.

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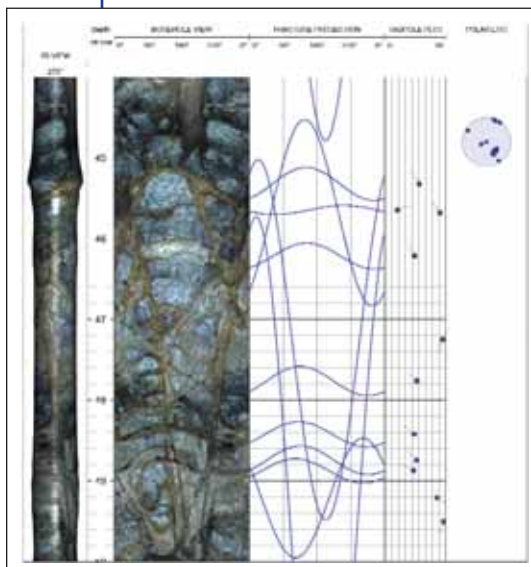
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ARM'S New Borehole Imaging Capabilities

ARM is pleased to announce that we are now able to perform high resolution borehole imaging in addition to standard borehole geophysical logging. Using a sophisticated optical imaging system called the Digital Optical Televiewer (DOPTV), ARM's geophysicists perform downhole imaging surveys free of the distortion commonly experienced with unoriented downhole video cameras. Using the DOPTV, images can be processed to provide complete feature analysis including strike, dip, frequency, and fracture aperture.



Example DOPTV log showing "virtual 3-D core", unwrapped borehole image, and orientation and location of fracture planes.

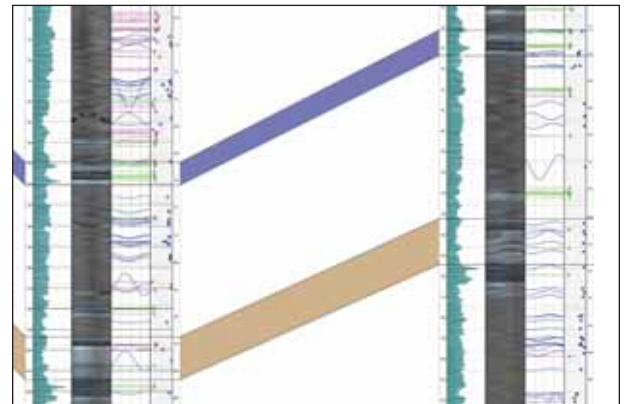
The DOPTV is sometimes confused with downhole video cameras. Downhole video cameras are constrained to a downward looking camera. In order to view the borehole wall, a side-looking mirror deflects the field of view. However, due to the distorting effect of an oblique view of the

cylindrical borehole wall, it is not possible to use such imagery for determination of geologic structure, even if the camera orientation were known.

The DOPTV probe combines the axial view of a downward looking digital imaging system with a precision ground hyperbolic mirror to obtain an undistorted 360-degree view of the borehole wall. The probe records one 360-degree scan at 0.003-ft depth intervals. Each scan is aligned with respect to True North and digitally stacked to construct a complete, undistorted, and oriented image of the borehole walls. The data are 24-bit true color, which facilitates lithologic determination as part of the interpretation. Since the acquired image is digitized and properly oriented with respect to borehole deviation and tool rotation, it allows accurate determination of strike and dip of structural and stratigraphic features.

Scott McQuown, P.G., leads ARM's borehole geophysics program. Scott has been using borehole geophysics on environmental, water resources, and geotechnical projects for over 16 years. Specifically, he has used DOPTV techniques to aid his clients in the identification of subsurface fractures which provide pathways for groundwater and contaminant flow, and performed foundation investigations where he determined the strike and dip of potential failure planes.

Scott has experience managing and performing integrated geophysical surveys for environmental, geotechnical and mining projects. Scott received his



DOPTV images and natural gamma logs used for stratigraphic correlation between wells.

B.S. degree in geology from Bowling Green University, Ohio in 1985 and his M.S. degree from Kent State University, Ohio in 1988. He is a certified professional geologist in Pennsylvania and Tennessee.

For additional information about the use of DOPTV imaging, please contact Scott at 717-533-8600 or via e-mail at smcquown@armgroup.net.

APPLICATIONS FOR THE DOPTV

- Contaminant migration studies
- Structural & stratigraphic mapping
- Locate water producing zones
- Nuclear waste repository studies
- Slope stability & foundation studies
- Tunnel hazard prediction
- Mining

City of Frederick Water Supply Project

The City of Frederick, Maryland has experienced a water shortage that has continued for over three years and has stifled planned development within the City. Efforts have been made by the County of Frederick to increase the capacity of its Potomac River water treatment plant and supply additional water to the City. However, the upgrades will take several years and the City and the County have experienced difficulties in arriving at a mutually acceptable agreement for delivery of the water. This has created an interim water deficit which the City must overcome in order to meet its planning goals and obligations.

ARM Group was retained by the Frederick County Builders' Association Land Use Council (LUC) to:

Evaluate the City's options for developing and permitting new water sources rapidly;

Identify viable water sources which could be developed in time to allow the City to meet its obligations until the County's Potomac River Plant can be adequately up-graded;

Provide coordination and act as a liaison between the LUC, the City, the public, the Maryland Department of the Environment, the press, the County and other critical stakeholders.

Ultimately, the City of Frederick formed a Water Task Force at the suggestion of the LUC and ARM. The Mayor of Frederick invited ARM to participate in the Task Force and ARM continues to provide valuable input.

As a result of ARM's efforts and contributions, the City is currently in the process of successfully developing a well field and a water source at a private quarry within the City boundaries. The quarry should provide an adequate water supply within a reasonable period of time for the City to meet its planning obligations until the new Potomac water is available.



City of Frederick water supply sign.

ARM to Work On \$200M Contract for OE Response and Services

ARM Group Inc. (ARM) is a primary team member on a \$200 million contract awarded to Explosive Ordnance Technology Incorporated (EOTI) to perform Ordnance and Explosive (OE) response and services at United States Department of Defense (DoD) sites. Contracts were awarded to EOTI and six other firms by the U.S. Army Engineering & Support Center, Huntsville (USAESCH).

The USAESCH program has a total ceiling value of \$1.4 billion dollars. The period of performance for the EOTI contract will be one base year and includes provisions for four one-year optional periods of performance. As a primary team member ARM is expected to receive 10% of the contract value and should perform up to \$20 million dollars of services over the life of the contract.

Under this contract ARM will perform digital geophysical mapping, system integration, data

management, project planning, historical data analysis, footprint reduction methodologies, field reconnaissance, engineering evaluations and studies, applying innovative technologies/approaches, cost analysis, risk analysis, risk management analysis, statistical sampling and analysis, regulatory interface and requirements, stakeholder involvement, community relations, media support, and documentation.

The EOTI team will perform OE services at various Formerly Used Defense Sites (FUDS), active DoD installations, DoD sites identified under the Base Realignment and Closure Act (BRAC), property adjoining DoD installations, and other federally controlled/owned sites which have been impacted by OE Operations. EOTI will also perform Non-stockpile Chemical Warfare Material (CWM) operations and comprehensive air monitoring for Hazardous, Toxic, and Radioactive Waste (HTRW) and CWM operations.



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What's New?

Have you seen ARM's web site recently? In November 2003, ARM launched a new web site with many dynamic features, including our "[Features](#)" page. This page provides a Calendar which lists upcoming regulatory compliance deadlines, conferences, and meetings. There is a "Helpful Links" section that provides links to internet sites expected to be of assistance to our clients and peers such as the American Society of Civil Engineers (ASCE), National Wetlands Inventory Interactive Mapping Tool, and US Environmental Protection Agency (USEPA). Copies of ARM's past newsletters and links to technical papers can also be found on the [Features](#) page.

We have a "What's New" button on our homepage and we post banners at the top of our homepage when we want to call attention to particular information. Recently these banners have linked to information about USEPA's revised Spill Prevention, Control, and Countermeasures (SPCC) regulations and ARM's participation in the Solid Waste Association of North America's (SWANA's) 7th Annual Pennsylvania Keystone Conference. ARM also posts career opportunities on our "[Careers](#)" page.

These items change regularly, so check our web site at: www.armgroup.net on a frequent basis. If you would like to be notified of changes in environmental regulations or compliance deadlines, we can send you e-mail notifications that provide links to detailed information. All we ask in order to provide this information is your e-mail address. Your e-mail address will not be given to any other organization and will be used only for the purpose of notifying you of regulatory information. You can provide your e-mail address by going to our "[Contact Us](#)" web page or by sending an e-mail or snail mail message to Rhonda Hakundy at rhakundy@armgroup.net or P.O. Box 797, Hershey, PA 17033.

If you haven't seen our web site yet, there are also pages that present an overview and history of ARM, descriptions of our services, and directions to our offices for your perusal. Very soon we will have a presentation of representative ARM projects and an outline of the markets we serve.

www.armgroup.net

Responsible Waste Management and Land Preservation Can Be Engineered

Lanchester Landfill, owned and operated by the Chester County Solid Waste Authority (CCSWA), is located on the border of Lancaster and Chester Counties, about 65 miles east of Harrisburg. Like many landfills in Pennsylvania, Lanchester Landfill is approaching its permitted capacity, and CCSWA needs to plan for the future waste management of Chester County. Municipal Waste Management Regulations (PA Code Title 25 Chapters 271 and 273) contain provisions that make permitting of new landfill capacity difficult, as it must be proven that the expansion project's "benefits" clearly outweigh the project's known and potential "harms." Community outcry concerning the nuisances typically associated with landfills carries more weight than ever. Landfill permitting prior to the new "harms vs. benefits" analysis provision of the regulations was previously focused on the technical adequacy of landfill siting and design. Although the technical requirements of permitting and operating a landfill or landfill expansion continue to be extensive, the "harms vs. benefits" analysis introduces a subjective component to the process that is challenging to overcome.

ARM was engaged by CCSWA to engineer and permit an expansion of Lanchester Landfill to allow 10 years of environmentally sound waste disposal within its existing permit boundary. Expansion concepts were developed and refined by ARM, accounting for the projected disposal needs of Chester County, physical restrictions, and engineering constraints of the site. From the inception of this project, CCSWA commissioned ARM to design the expansion with the following objectives:

- Sensitivity to community interests and concerns, particularly with respect to environmental issues such as storm water, groundwater, air quality, traffic, overall aesthetics, noise and odor.
- Full compliance with Pennsylvania Department of Environmental Protection (DEP) regulations.
- Avoidance of significant clearing (deforestation) of the property and any expansion of the existing solid waste permit boundary.

The resulting design incorporated several innovative features to realize CCSWA's objectives. To minimize the use of new land area and to avoid deforestation, CCSWA decided to incorporate an innovative alternative designed by ARM to enhance the utility of the existing landfill areas. ARM's design employed the use of a mechanically stabilized earth (MSE) berm to reduce the size of the expansion area, while reclaiming hundreds of thousands of tons of additional capacity over previously filled areas. Besides the reduction in tree loss and land disturbance, this option preserved other infrastructure at the site. This unique design feature facilitated effective "piggy-backing" over three

former disposal areas. Piggy-backing refers to reclaiming additional vertical space on top of an already



Diagram showing existing landfill and approximate expansion.

filled area. Piggy-backing, also known as "overfilling", makes optimal use of land and "air space" by using existing landfill area, thus avoiding use of new land.

When the final expansion is completed, CCSWA will reestablish the popular scenic vista currently present at the site, where thousands of people go each year to enjoy the incredible multi-county view created by their waste management facility.

For additional information about ARM's Lanchester Landfill design and other waste management services, please contact Bill Tafuto at 717-533-8600 or wtafuto@armgroup.net.

Strategic Partnership

ARM Group Inc. and Geophysical Technology Limited (G-tek) signed a Strategic Alliance agreement on March 29, 2004, to work together as an integrated team to provide high technology geophysical services throughout the world.



ARM and G-tek geophysicists conducting a magnetic survey with a G-tek TM-4.

G-tek, with its corporate headquarters in Brisbane, Australia, has been providing geophysical services for Unexploded Ordnance (UXO), mining, environmental services, and archaeology for over twenty years.

They are a developer,

manufacturer, and service provider of state-of-the-art digital geophysical sensor systems which include the TM-4 & TM-6 Magnetometers, TM-5EMU Electromagnetic detector, and the patented Sub-Audio Magnetics (SAM) technique. G-tek will be

providing ARM with equipment, training, and geophysical service support. ARM is pleased to add G-tek technology to its current geophysical sensor technology toolbox. ARM will be providing project managers, geophysicists, and data collectors to support G-tek projects. ARM has provided assistance on UXO Investigations for G-tek at Ft. Campbell, Kentucky, and Camp Navajo, near Flagstaff, Arizona, and is currently providing a Site Geophysicist to G-tek for a project at the Tooele Army Depot in Utah.

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