



PROBING TIMES

Information for the ENVIRONMENTAL, GEOTECHNICAL, GEOTHERMAL & EXPLORATION Industries

3230DT Versatility Impresses Owners

"The 3230DT is a departure from the conventional auger rigs we are used to operating. It has proven to be an extremely versatile machine and has exceeded my expectations in every regard.... Using the rig for cone penetrometer testing has been a major success for our crews. The efficiency with which we are now able to obtain seismic shear wave profiles has given us a unique advantage over our competition."

**Benjamin Coray, P.E. • Exploration Manager
Applied Geotechnical Engineering Consultants
Sandy, UT**



Taylor Nordquist, with Applied GeoTech, uses their Geoprobe® 3230DT to collect soil samples behind an existing residence for slope stability analysis. The 4.25-in. casing was used to advance the boring to a depth of 70 feet. The last 10 feet was through metamorphic bedrock. See page 3 for more of Applied GeoTech's summary of the 3230DT.

32 Series: This Machine Will Produce For You!

The 3230DT and 3200 are TRUE **combination machines**, which means their utilization rates go up simply because they are well suited for both geotechnical and environmental work.

The versatility of the 32 Series machines lies within the 4-function **CB6 Combo Head** ... the performance master for these rigs. There's **rotation** for augering, mud and wet rotary, and rock coring work, and a patented **hydraulic head clamp** for safely and quickly pulling 1.25- to 6.0 in. rods while maintaining an open ID for downhole work. There's a **percussion hammer** for direct push work, like driving 6-in. casing for monitoring well installation, and an **automatic drop hammer** that hydraulically swings out over the hole.

There's a **side-shift** feature for moving the head so you can work the inside diameter of the rod without moving the drill mast.

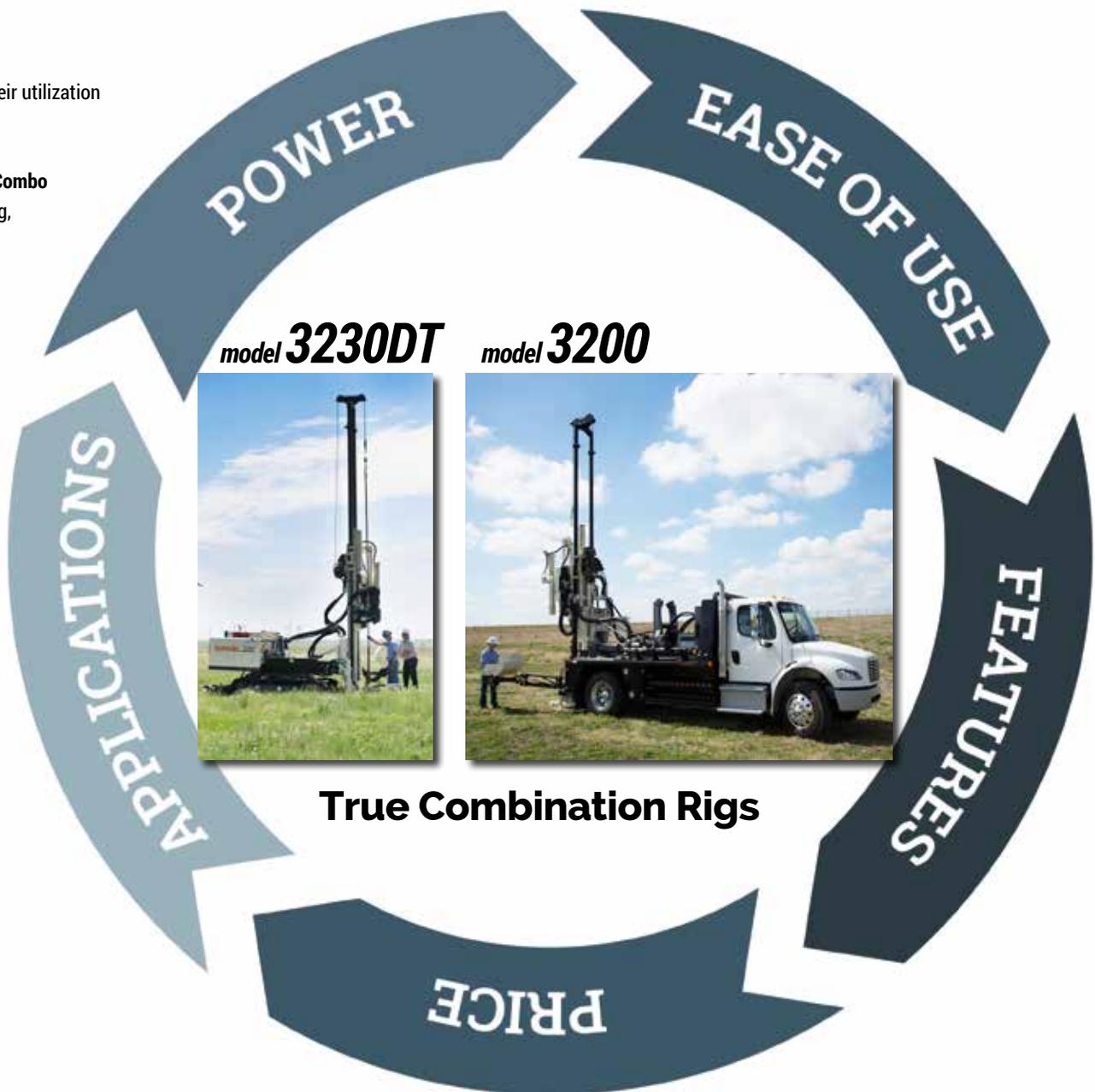
What about **torque**? These machines have plenty of it! There's low-end torque for hollow stem applications and plenty of high end speed for rock coring and air and mud rotary.

And don't forget the **control panel** ... it's adjustable, easy-to-use, and well planned. You can separately adjust weight on bit, rotation speed, and pump flow for excellent operator control in the field.

The most noticeable option on these machines is the 23-ft. **telescoping mast and dual winches**. They take the work out of setting monitoring wells or utilizing splitspoon samplers while tripping 20-ft. sections of rods at a time.

There's **800 rpm for coring bedrock**. There are drilling controls to do **rock coring**. Do you need 20 feet of rock coring done at 20 locations? This machine is perfect! And remember there's a **percussion hammer** to set up to 6-in. casing.

There are way too many features, options and applications possible that make the 32 Series machines too powerful and too versatile to not take a second look at them.



EnviroTek in Tampa, FL, uses a 3230DT to run high-speed wireline tooling at a Florida mining site.

Call today to schedule your demonstration!



New 3230DT video: geoprobe.com/videos/3230dt

When You Come to Geoprobe® You Don't Just Look!

"After seeing the 3230DT in person, in action, pictures and specs alone cannot describe the power and versatility of this machine until you are hands-on and experience it! The 3230DT can handle all of your drilling and direct push needs."

**Shawn Mathers
Operations Manager
Mathers Environmental Drilling
Houston, TX**



The 3230DT has proven to be an extremely versatile machine. Within a matter of a few months we were able to use it on a wide range of projects utilizing hollow stem auger, rotary wash, wireline rock coring and CPT methods. Geoprobe® has both the ability and the willingness to think outside the box with respect to customizing their products to fit our unique needs in the geotechnical drilling arena. It's a pleasure to work with a company that is passionately committed to our satisfaction with their products."

Benjamin Coray, P.E. • Exploration Manager
Applied GeoTech • Sandy, UT



On the second day of owning the 3230DT, Applied GeoTech advanced the Geoprobe® Nova Cone CPT to 100 feet for a new performing arts center in the suburbs of Salt Lake City.

3230_{DT} Fits Our Geotech Needs



Mud rotary being used to evaluate liquefaction potential in a lowland area of the Salt Lake Valley being considered for development.

Within weeks of joining the Applied Geotechnical Engineering Consultants (AGEC) drill rig lineup, they tested the limits of the Geoprobe® 3230DT on several deep exploratory borings utilizing the 4-in. direct push casing. "We were impressed that we could advance the exploratory holes through dense sedimentary soil deposits to depths of up to 120 feet with the GH70 hammer while obtaining SPT samples every 5 feet," said Benjamin Coray, P.E. with AGEC in Sandy, UT. "For us, one of the significant advantages of the direct push system is the pull-out and clean-up time. Not having to clean augers and dispose of cuttings saves us significant time and effort."

Using the 3230DT for cone penetrometer testing has also been a major success for the company. Using the Geoprobe® Nova Cone CPT with the addition of the seismic geophone, "We've easily pushed to depths in excess of 100 feet (most likely deeper if we hadn't run out of rod)," Ben added. "The efficiency with which we are now able to obtain seismic shear wave profiles on our projects has given us a unique advantage over our competition. What used to take several days at a significant cost can now be done in an afternoon," he said.

AGEC has also found that the 3230DT is excellent for mud rotary and coring work and is "a joy" to operate. Being able to separately adjust weight on bit, rotation speed and pump flow allows for excellent operator control while drilling in Utah's varied soil and rock formations. They have explored to depths of up to 170 feet in Salt Lake City lakebed sediments and gravels using rotary wash methods.

They also tested the rig's abilities on the slopes of a local ski resort east of the city. The project required rock coring to a depth of 50 feet in hard quartzite sandstone halfway up a ski run with grades of 35 to 40 percent. According to Ben, "The rig, fully loaded with heavy tooling, climbed the slope with ease. The low center of gravity of the 3230DT gave us confidence while traversing slopes that we would not have tried with our other rigs. The mast oscillation allowed us to stay plumb despite the uneven terrain."



Rock coring in uneven terrain at a local Utah ski resort using the 3230DT and wireline tooling.



How many times a day does your rig operator need access to the control panel from a different location based on what's happening under the head? The adjustable, easy-to-used swing-arm control panel, designed with an operator presence bar, easily moves to get the job done.

Geoprobe® 32Series

Direct Push Solid
Rotary Strong



The built-in Head Clamp can handle the 80,000 lb. of the rig's pullback.



Pulling 4.25-in. hollow stem augers with open ID to simplify well installations.



From the crow's nest! Looking down from the 23-ft telescoping mast.



Call for your
free Geoprobe® Machine Guide
or request it online at
geoprobe.com.



The truck-mounted 3200 makes mobilization to field sites easy and convenient.



Geoprobe® 3200



Dual winches mounted on 3230DT.

Dual Winch Options

Geoprobe® 32 Series combination machines can run two hydraulic winches on the optional telescoping mast. Operators generally prefer to size one winch for pulling capacity and the second winch for speed or length of line. While many combinations are available, a common combination is a 5,000-lb winch for the heavy pulling and an 1,100-lbf winch for the faster/deeper wireline work. For those needing to maximize pulling force, a new 8,500-lb winch is now available for these machines.

32 Series Winch Specifications

LINE PULL	LINE SPEED	LINE LENGTH	M/N
8,500 lbf	115 fpm	150 ft	225390
5,000lbf	130 fpm	125 ft	220616
1,800 lbf	110 fpm	175 ft	220615
1,100 lbf	230 fpm	250 ft	220614

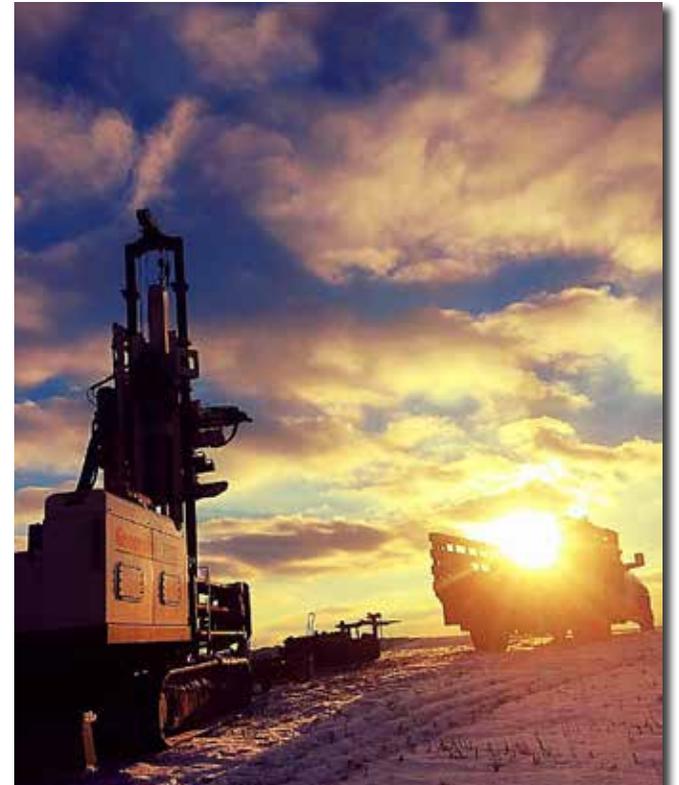
New 32 Series Winch Video:
geoprobe.com/videos/32winchoptions



Dual winches mounted on 3200.



These machines do NOT lack power! Drive 6-in. casing. Get your augers down. This machine is going to produce for you.



"Versatility is probably the best advantage of the 3230DT. We've found it to be proficient at rock coring and good for bedrock drilling. We've broken some of our performance records with it, especially in the areas of air rotary drilling, more efficiency, deeper depths; it covers about any open spot on the schedule for us."

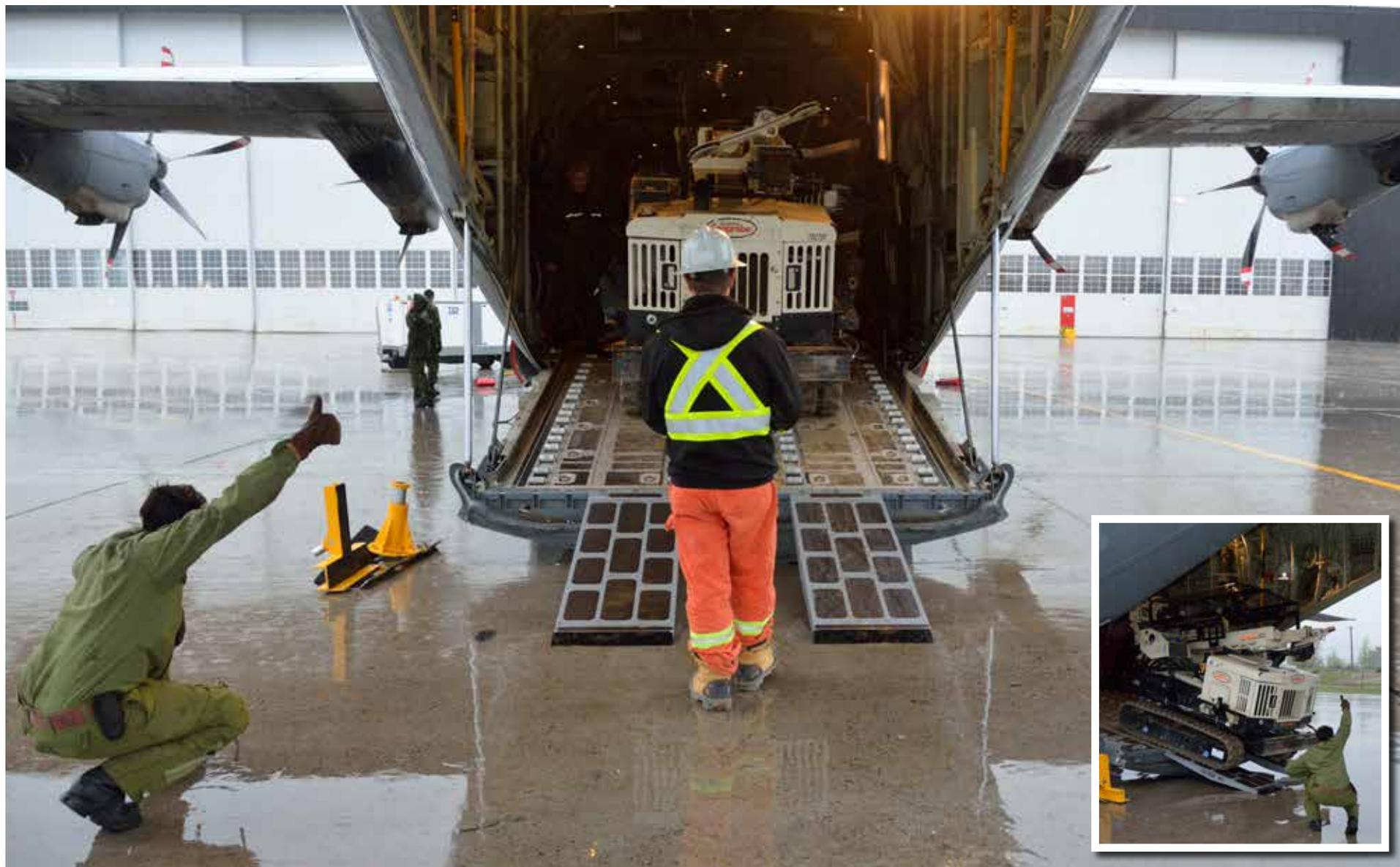
Joe Fleck • Owner
 EnviroCore LLC • Plain City, OH



3200 equipped with a Moyno® 3L8 pump.

New 3230DT video: geoprobe.com/videos/3230dt

Geoprobe® 3230DT



(Above) Brandon Stranz, Lead Driller for ALTECH Drilling and Investigative Services, unloads their Geoprobe® 7822DT out of a CC-130 J Hercules at 5 Wing Goose Bay, Newfoundland and Labrador. Altech's field team operated the 7822DT at the 5 Wing Practice Training Area, an austere military training facility.

Mission: Complete

In order to meet the Canadian military's potable water needs, ALTECH Drilling and Investigative Services in Cambridge, Ontario, Canada, performed hydrogeological investigations at the 5 Wing Practice Training Area in Newfoundland and Labrador in northern Canada.

The project was not short on challenges. "We knew there were no access roads to the facility, and with so many geologic unknowns, we knew we needed a drill capable of tackling a variety of drilling applications," said Tyler Yensen, Managing Partner for ALTECH Drilling. "It needed to be a lightweight drilling machine, capable of flying on a C-130, and versatile enough to perform any drilling applications the Canadian north would require." The scope of work included the ability to drill 35 feet of overburden and 50 feet into bedrock. They were also required to drill numerous sand points to 35 feet. "We figured our 7822DT was the right machine for the job," Tyler said.

A CC-130 J Hercules was used to transport the ALTECH field team, supplies and the rig to the training facility about 100 km southwest of Goose Bay. While at the site, the field team performed hydrogeological investigations including deep bedrock drilling using mud rotary techniques to install observation wells. Tyler stated the first 40 feet was a wet sand and silt formation, then they hit bedrock at 40 feet. "We used DT45 tooling (dual tube 4.5 in. diameter) to accomplish the overburden," he said, "then mud rotary to tackle the rock." ALTECH was onsite for two campaigns, approximately six days each. Various pumping tests were also completed.

The project site at 5 Wing Goose Bay is an austere military training facility operated by the Canadian military,



Just off-loaded from a CC-130 J Hercules at an air base in Canada, Brandon Stranz, with ALTECH Drilling and Investigative Services, drives their 7822DT across the air strip after completing hydrogeological work in northern Canada.



"We assembled a team based on previous Geoprobe® drilling experience and most important, the ability to solve problems. A trip to the drilling supplier was not an option here. Brandon Stranz and his team accomplished the goals of the Canadian military and then some. Great work, team!"

K. Tyler Yensen • Managing Partner
ALTECH Drilling and Investigative Svcs • Elmira, Ontario Canada



The ALTECH field team for the Goose Bay project: (l to r) Brandon Stranz, Tyler Yensen, Blake Yensen and Dave Oatman.

Scenic Backdrop for Erie Lake Project

“Drilling Engineers purchased our 7822DT in 2009, and we’ve found it to be versatile in its design for both Environmental and Geotechnical drilling projects. Because of its small size and light weight, we can complete projects that can’t be accessed with truck-mounted rigs.”

Rick Rogers • Owner
Drilling Engineers • Fort Collins, CO

Drilling Engineers in Fort Collins, CO, designed a barge, specifically for their Geoprobe® 7822DT to complete a pre-feasibility study on Erie Lake Reservoir in Erie, CO, to examine the potential for the construction of a new dam. The geotechnical investigation will also help determine if future expansion of the reservoir is feasible.

According to Rick Rogers, Owner of Drilling Engineers, “The 7822DT and barge setup worked beyond our expectations.”

The purpose of the study was to obtain samples of soils and bedrock inside the existing footprint of the reservoir in order to evaluate whether the material was suitable for building a new dam. “Core rods were used as spud bars to hold the barge in place while we drilled,” Rick explained. “We used our 7822DT and advanced 3.25-in. ID hollow stem augers to approximately 30- to 40-feet in depth or 10 feet into the underlying claystone bedrock.” Soil samples were obtained with split spoon and other samplers.

Drilling Engineers designed the barge so it could be transported with their equipment carrier. They can unload, assemble and load the drill in one day. The barge is equipped with a five horsepower engine.



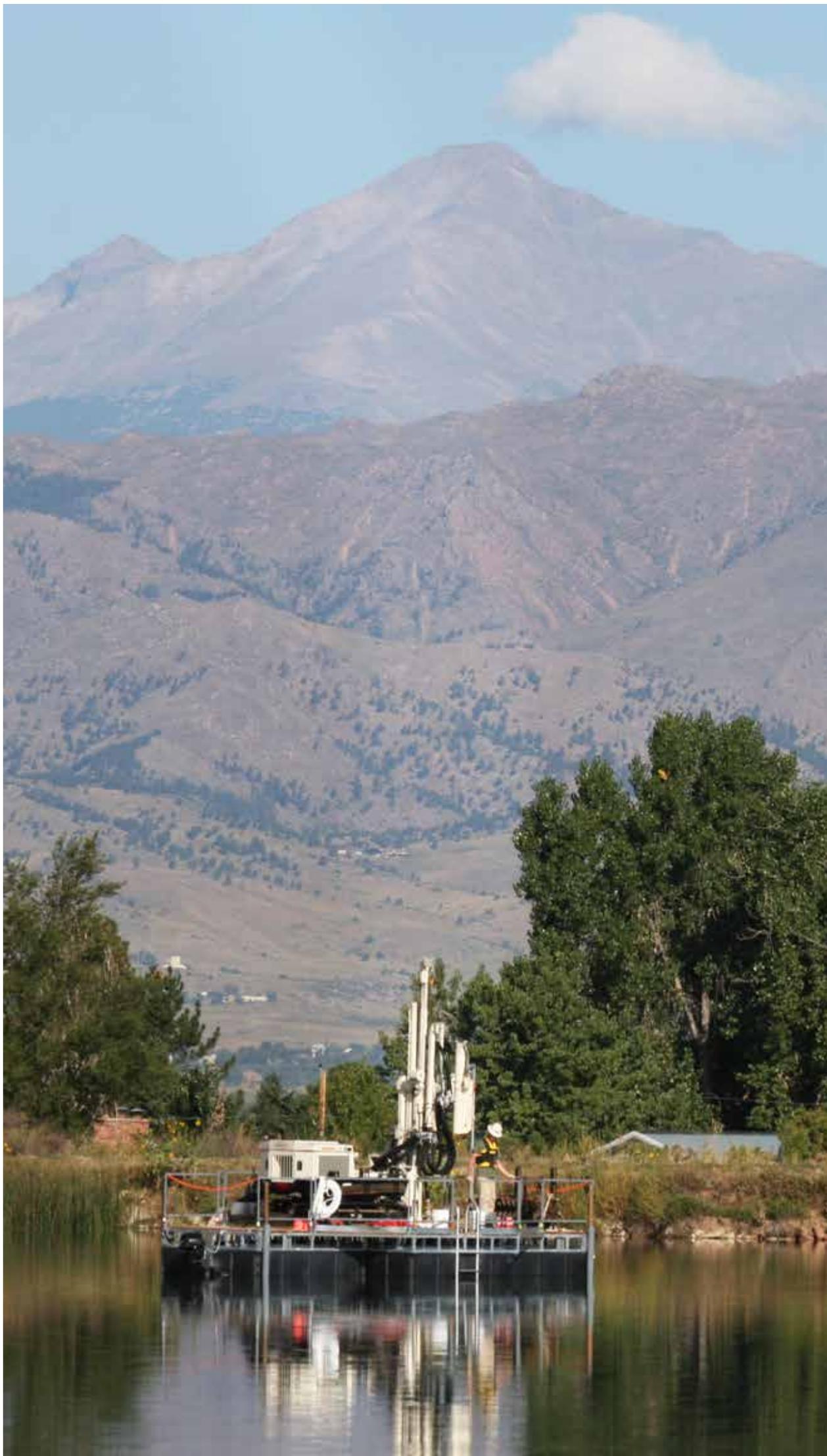
Drilling Engineers designed a barge to accommodate their Geoprobe® 7822DT for the geotechnical investigation on Erie Lake Reservoir.

“Because of its small size and light weight, we can complete multiple projects that could not be accessed with a

truck mounted rig,” Rick added. As well as the geotechnical barge drilling project, Rick said they hope to complete river/estuary sediment sampling with the 7822DT/barge combo for environmental investigations in the coming year.



Drillers for Drilling Engineers use 3.25 in. hollow stem augers with their 7822DT machine on a barge on Erie Lake Reservoir.



A total of three holes were drilled to approximately 40-50 feet below the water surface into the underlying bedrock to collect soil and bedrock samples.

Geoprobe® 7822DT Remains Most Popular Direct Push Machine



A new 7822DT that arrived at Sr. Stanford Bleming College is an example of the Resource Drilling and Blasting program's dedication to continue to use and teach with the best equipment available to the industry.

7822DT Arrives at Sir Sandford Fleming College

The Resource Drilling and Blasting program at Sir Sandford Fleming College welcomed their new 7822DT in January. Steve Wilkinson, Program Director, (a former graduate of the program) and many of the program's students, were extremely excited about the new arrival.

"We've been waiting a long time for this day to come," Steve said. "As the machine was unloaded and during the days following, students clamored over the machine wanting the opportunity to use it," he added.

According to Steve, "The 7822DT is an example of the program's dedication to continue to use and teach with the best equipment available to the industry."

The machine was introduced to the geotechnical program later in the semester and is now being used full-time by the environmental drilling program.

All the teachers in the Resource Drilling and Blasting program have come from the drilling industry and provide students with the proper skills

and real-world knowledge of what to expect when they go into the working world. The students are taught in the classroom and in the field using various types of drills. The program also emphasizes safety while working on and around the machines, (don't put yourself between something that moves and something that doesn't!).

The program offers students during their four semesters to learn about water well drilling, directional drilling, diamond core drilling, construction drilling, and side courses in geology and pumps.

According to Steve, after graduation, the students (and also summer students) become valuable assets to all drilling industries, foreign and domestic

The drilling program at Fleming College in Lindsay, Ontario, Canada has been in existence since 1979, and during its existence has grown in detail and popularity.



EPI's 7822DT machine has proved versatile and performed well for them as they plan to target air rotary and air hammer work as they continue to expand services they offer their customers.

EPI Targets Air Rotary/Hammer Work for 7822DT

Tony Pressimone, Operations Manager for Environmental Probing Investigations in Cream Ridge, NJ, says their 7822DT "has proven to be one of the most versatile rigs we own."

EPI has five Geoprobe track-mounted rigs in their stable: a 6620DT, two 7720DTs, a 6712DT and the 7822DT.

On a recent project in central New Jersey, EPI was tasked with installing five 4-in. monitoring wells for the New Jersey Turnpike Authority. Each well was set at varying depths from 35-ft bgs to 70-ft bgs.

"We were concerned because the top 35 feet of the geology was sticky clay," Tony explained. "The clay did slow down the 7822DT, but it didn't us from complet-

ing our mission. AJ Benjamin, EPI's 7822DT Operator, was skeptical at first about getting the 6-5/8-in. hollow stem augers down to depth considering the geology, "but the 7822DT just kept going," Tony said. "AJ and his assistant, Josh Septor were able to start, install and finish the 70-ft 4-in. well within eight hours onsite." Installing additional wells and soil borings were completed without any issues to close out the NJTPK Authority project.

Tony added, "All in all, the 7822DT is a versatile rig with lots of power. Its small footprint allows it access to some tight areas. It can advance soil borings from 5-ft bgs or to 130-ft bgs for groundwater sampling. Or we can use DT25 or DT32 (dual tube systems for 2.5-in. or for 3.25-in



AJ Benjamin, EPI's 7822DT Operator, uses the machine to turn 6-5/8-in. augers.

rods) for soil sampling, or for the installation of 0.75-in. PVC well points to 4-in. PVC monitoring wells."

The affixed & operable mini blade and drop rack system are also invaluable assets when dealing with rough terrain or remote site locations. We can carry water and additional tools out to each location and also clear the work area so it's suitable for the crew to walk around on level ground and also are free of any scrub brush

and small trees making the work area safer.

Because of the 7822DT's performance last year, EPI will be looking focusing on air rotary and air hammer work in the coming year.



Drilling Engineers in Fort Collins, CO, used a 7822DT to complete a pre-feasibility study on Erie Lake Reservoir in Erie, CO. The geotechnical investigation will also help determine if future expansion of the reservoir is feasible. (Story on page 7.)



It's not every day you get to drill at the ball park. Tim Winkler, Project Manager for Gestra Engineering in Milwaukee, WI, uses their 7822DT to pull samples at Lambeau Field, home of the Packers. So, is the Pack back?



7822DT information is available at geoprobe.com



Just a day at the beach! David Smith with Earth Solutions in St. Charles, IL, turned a few augers in the sands of Lake Michigan near Chicago.

Check Your Pipe Wrenches at the Door!

How do I prevent probe rods from falling down hole when pulling them out of the ground?

In years past, our best advice to you for preventing a tool string from falling back downhole was to use a trusty pipe wrench to help hold the rods while tripping out. Even our hard-working engineers and field teams used the old pipe wrench method during demonstrations and shows ... but not with a smile on their faces!

No More! Get rid of the pipe wrenches and use the Geoprobe® Portable Hydraulic Clamp that can be attached to most 6620DT, 7720DT, 7730DT, 7822DT, and 6712DT machines. The clamp uses an auxiliary hydraulic location on the machine with a detent button/handle on the control panel. The two-way auxiliary allows the clamp to open and close while maintaining constant pressure once the button or lever is let go. The self-adjusting Portable Hydraulic Clamp can be used with 1.25 in. to 3.75 in. rods. The clamp can either be put over the top of the rods or you can unpin the front of the clamp (hinged) to put it around the rods if the top of the rods are engaged with the probe machine. The clamp weighs about 30 lb.

This easy-to-use and durable Portable Hydraulic Clamp System is a MUST for one-man operations, for deep hole work with the Macro-Core® System, or for holding inner rods for dual tube systems. Don't fight those pipe wrenches any longer. The Geoprobe® Portable Hydraulic Clamp makes pulling rods out just as easy as driving them in!

For a video on this topic, go to geoprobe.com/videos/phrc

Todd Courbot

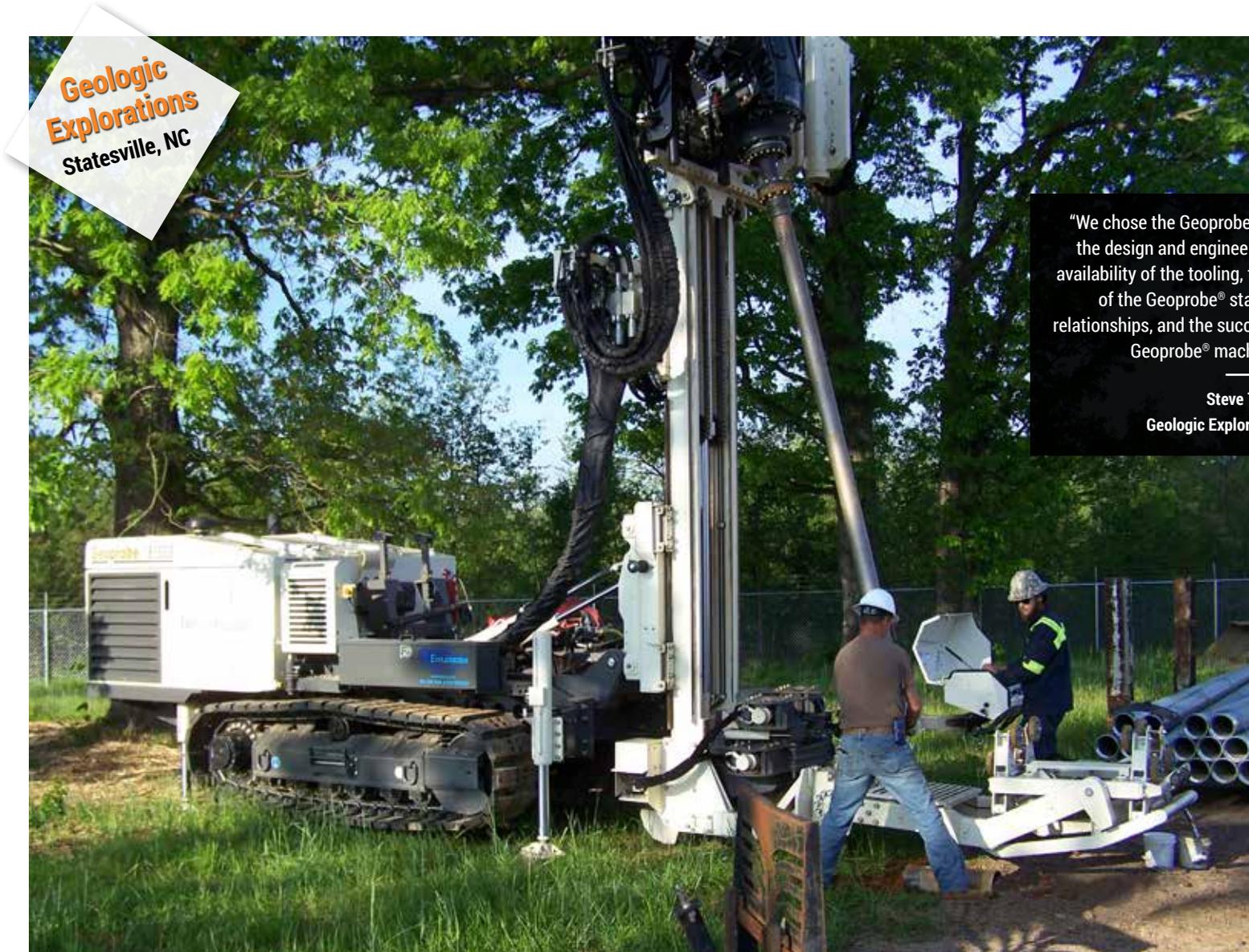
Geoprobe® Customer Service
1-785-404-1171
courbott@geoprobe.com

Geoprobe® Portable Hydraulic Rod Clamp



New Sonic Machines New Sonic Tools

The Geoprobe® 8150LS Rotary Sonic is a full-size sonic rig and has been proving itself in the field ... so much so, Geoprobe® sonic customers are purchasing more than one! For those of you who wanted a larger platform with more power to advance larger diameter tools to great depth, this sonic is for you. A key feature of this rig is the Geoprobe® designed and manufactured GV5 Sonic Head with 50K dynamic force. Call us to arrange for a demo, or check out more information at geoprobe.com.



"We chose the Geoprobe® 8150LS sonic rig because of the design and engineering of the rig, the quality and availability of the tooling, the knowledge and commitment of the Geoprobe® staff, the service department relationships, and the success we've had with the ten other Geoprobe® machines we have owned."

Steve Taylor • Owner
Geologic Explorations • Statesville, NC

"We like it [8150LS] and I like running it! Early on we went to 395 ft. with the 6-in. sonic dual tube coring system. The rig and the SDT60 weighted wireline system were both simple to learn. Joel [Christy from Geoprobe®] ran it a couple of times then I ran it. I come off an auger rig after 20 years, so this is easier on your body; you never have to man-handle the rods. It's also easier to run because of the way the controls are set up. One of our drillers who works on one of your competitor's rigs really likes this rig."

Billy Graham • Senior Env Driller
Assoc Env Industries • Norman, OK



Why Geoprobe® Sonic?

- Comprehensive Sonic Training •
- Full-size and Mid-size Rigs
- Sonic Service Support
- Continuous Sonic Product Development
- Sonic Tooling In Stock
- Exclusive Sonic Dual Tube Tooling

Success!

New Sonic Success!



Jed Davis, Geoprobe® Tooling Engineer, takes testing rigs and tooling seriously ... it's not for the faint of heart! Jed is running 6-in. casing using the 14-in. breakout with 9-in. vertical travel. The breakout has an adjustable clamp force of 0 to 21,000 lbf and 14,500 ft-lb of torque.



"The 8150LS was well thought-out by engineers during the design of the rig. It's well designed with a powerful sonic head. I like the versatility of the rig to switch from drilling sonic core samples, to driving SPT samples to the ease of controlling the head."

Rodney Labrosse • Driller
Walker-Hill Environmental • Foxworth, MS

"The side shift and extend slide allow for easier set up on a boring location. When you rig up on a location you don't have to be exact. You can use either the extend slide or side shift to line up on the boring location. The 8150LS allows for up and down movement of the breakout table so the operator can move the clamps up or down depending on where the break in the rods may be. And the rod handler takes away most safety hazards of heavy lifting and pinch points, and allows for easier threading or unthreading of rods. We can also use a helper to run the rod handler so the operator can focus on what he's doing."

Bo Barnes • Drill Supervisor/Shop Foreman
Walker-Hill Environmental • Foxworth, MS

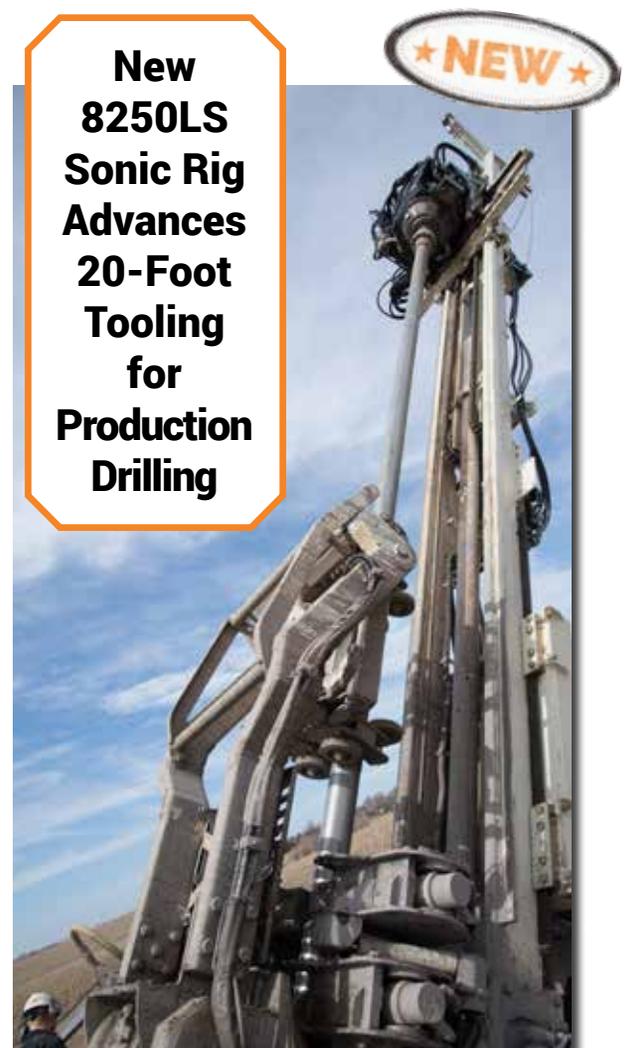
"SAEDACCO purchased a Geoprobe® 8150LS sonic for a variety of reasons – technical capabilities, engineering and mechanical support, willingness to customize the drill to our needs, and overall customer service. While there are other manufacturers that also make excellent sonic drills, we have developed a relationship with the Geoprobe® team that goes well beyond just purchasing a specialized piece of equipment. They have regularly provided us with rapid response to resolving problems, additional training to service and repair our equipment, and assistance with tooling R&D. I may ask a lot from my suppliers, but I'll give the same in return. It's all about relationships!"

Pete Byer • President • SAEDACCO • Fort Mill, SC



SAEDACCO
Fort Mill, SC

**New
8250LS
Sonic Rig
Advances
20-Foot
Tooling
for
Production
Drilling**



Geoprobe® Sonic Offering Continues to Expand



8140LC ...
mid-size rotary sonic,
Low Clearance Option
7 ft. 8 in. Head Travel



8140LS ...
mid-size rotary sonic,
Long Stroke Option
13 ft. 1 in. Head Travel



8150LS ...
full-size rotary sonic,
10 ft. Tooling
13 ft. 1 in. Head Travel



8250LS ...
full-size rotary sonic,
20 ft Tooling
24 ft. 6 in. Head Travel

New Technology: Commercial Release of Direct Image® OIP Logging Tool



Optical Image Profiler (OIP)

The Direct Image® Team at Geoprobe Systems® proudly announces the commercial release of their newest Direct Image® logging tool ... the Optical Image Profiler (OIP). The easy-to-use OIP is capable of capturing soil images using both visible and UV light sources. The logs can then be used to create highly detailed conceptual site models.

To further explain the new technology and how it came about, we asked Tom Christy (TMC), DI Team Leader and Geoprobe® Vice President, some questions. His remarks follow.

Probing Times (PT): Well, the Direct Image® Group here at Geoprobe Systems® is creating a bit of a splash with the release of the OIP tool. Could you give us an explanation of what this OIP tool is?

TMC: Well, it's pretty simple. OIP stands for "Optical Image Profiler." We put a small camera inside a probe that takes pictures of soil through a window in the side of the probe. So far so good, right? Then we supplied the camera with two light sources to view soil: a UV light and a visible light. Once you see it and work with the tool, the thing that you appreciate about it is its simplicity. But I can assure you, it was not an easy tool to develop.

PT: What was the difficulty? They make those cameras pretty small these days.

TMC: Fitting a camera to the probe was not too difficult. But making the probe so you can drive on it with a modern direct push machine like the 7822DT ... now that's a very hard task.

Probing Times: So, how did you do it?

TMC: I'm not telling ... exactly! Some things will be obvious to field users. We separated quite a bit of the system electronics into the connection section above the probe, much like we do with HPT. That's one part of the solution. The rest of it, the part in the probe itself, took some invention.

Probing Times: Did this product turn out like you had originally envisioned?

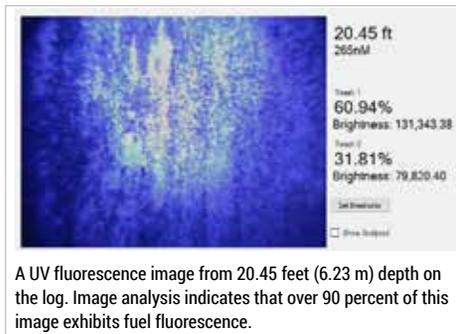
TMC: Not really. Troy Schmidt and I started bouncing ideas around on this tool years ago. Our first concept was for a visible image profiler. What surprised us were the amazing results from our feasibility studies using our probe camera as a fuel fluorescence detector. That early testing was so compelling that we pursued fluorescence as our primary objective for the tool.

Probing Times: What did you find so compelling?

TMC: The fact that we could see hydrocarbon fluorescence in real time. Sure, we can analyze those images to give a detection factor and make a log of that. But you can see it with your 'own eyes in the ground'. And you can save all those images and review them to QC the log. It's hard to argue with actual soil images.



OIP System Major Components:
(top, clockwise) Laptop Computer, Field Instrument (FI6000),
Optical Interface Probe (OP6560), Optical Interface (OP6100).



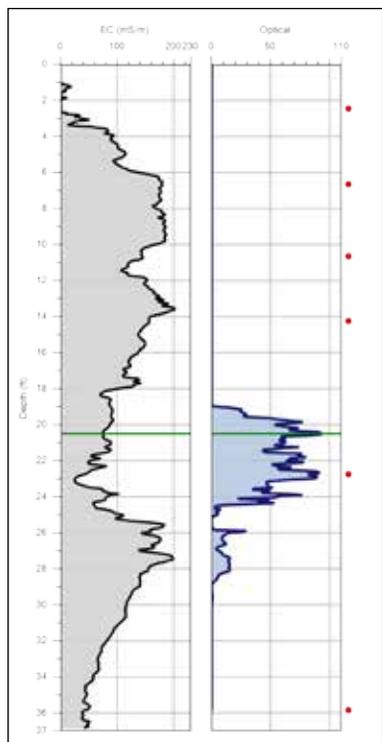
A UV fluorescence image from 20.45 feet (6.23 m) depth on the log. Image analysis indicates that over 90 percent of this image exhibits fuel fluorescence.

First Optical Logging Tool developed by Geoprobe Systems®

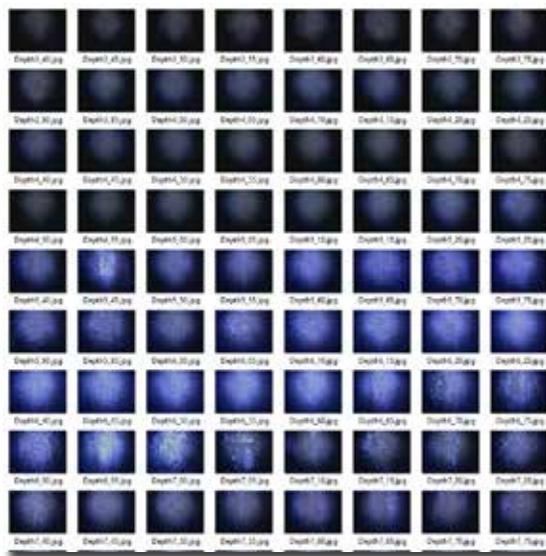
First Percussion-Driven Probe using Camera Imaging System*

First Fluorescence Logging Tool to use Image Analysis for Detection of Hydrocarbon Impact

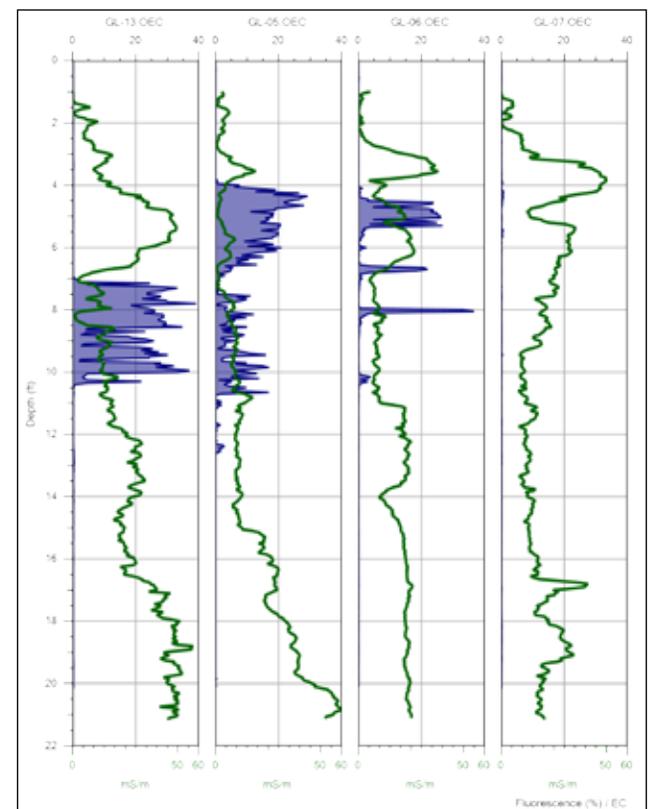
* based on information available to Geoprobe Systems®



Typical OIP log. The soil Electrical Conductivity is shown on the left. The OIP log of Fluorescence (% of Image Area) is shown on the right. In this case, the OIP log indicates the presence of NAPL from approximately 19 to 29 ft. (5.7 to 8.8 m).



A sample of file images from an OIP log. Fuel fluorescence can be readily observed in many of these images. OIP image analysis calculates a fluorescence area of each image for the OIP log.



OIP log cross-section from former gas station site. Electrical Conductivity (EC) logs are shown in green. The OIP fluorescence area (%) is shown by the blue shaded area. Cross sections of OIP logs are easily developed using the DI Viewer Software available from Geoprobe Systems®.

(left) The Orange Man Group, also know as the design team for the new Optical Interface Profiler: (l to r) Tom Christy, Dan Pipp, Troy Schmidt, Greg Shipley, Stephen Colgrove, Ben Jaster and Blake Slater. And actually everyone in the DI group was involved at some point!

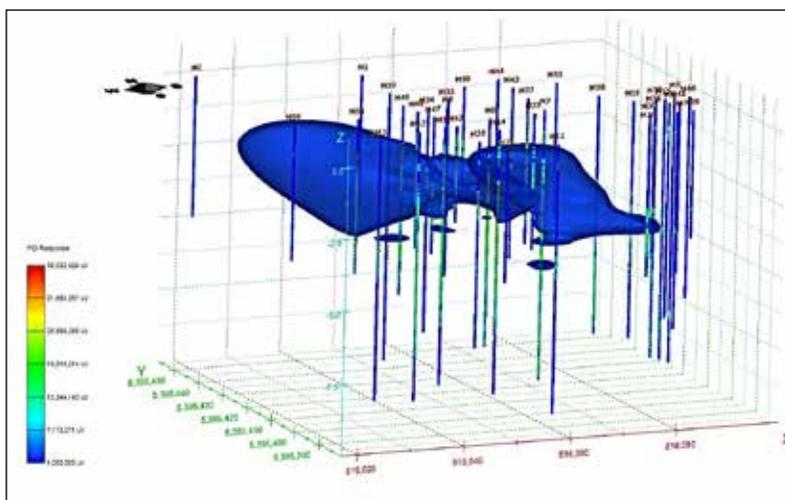
MIP Quickly Delineates PHC Impacts

Vertex Environmental was retained to complete a large in-situ chemical oxidation injection remediation project by the provincial government in northern Ontario, Canada. Due to large data gaps that existed in the soil and groundwater analytical data, a direct imaging tool, the Membrane Interface Probe (MIP), was deployed by Vertex, located in Cambridge, Ontario, to fully delineate the extent of petroleum hydrocarbon (PHC) impacts.

An historic leak from an underground storage tank released over 5,000 gal (19,000 L) of gasoline directly into the subsurface over a five-year period. Extensive borehole drilling and groundwater monitoring well installation was completed soon after the release was discovered to delineate the on-site plume. A downgradient area of high concentrations (>240,000 ug/L total PHCs) was discovered with groundwater impacts extending up to 85 feet (26 meters) below ground surface. However many data gaps were present for the size of remediation that was required for the site. An innovative and cost-efficient approach to delineation, both vertically and horizontally, was required to close these data gaps.

Instead of drilling additional boreholes and installing more groundwater monitoring wells for sampling and laboratory analysis, Vertex mobilized the MIP direct imaging tools to the site for rapid in-situ delineation. The MIP quickly and efficiently delineated the extents of the dissolved-phase PHC impacts where data gaps existed on-site, both vertically and horizontally across the impacted area. With the MIP data it was determined that the majority of the PHC impacts

were situated between 10 feet (3 meters) and 36 feet (11 meters) below ground surface, with minimal impacts present at greater depths. The MIP data were then imported into 3D visualization software to provide added clarity of the impacted zones. Without



MIP data collected onsite quickly delineated the extents of the dissolved-phase PHC impacts (between 10 and 36 feet (3 and 11 meters)). The data was imported into 3D visualization software to provide added clarity of the impacted zones.

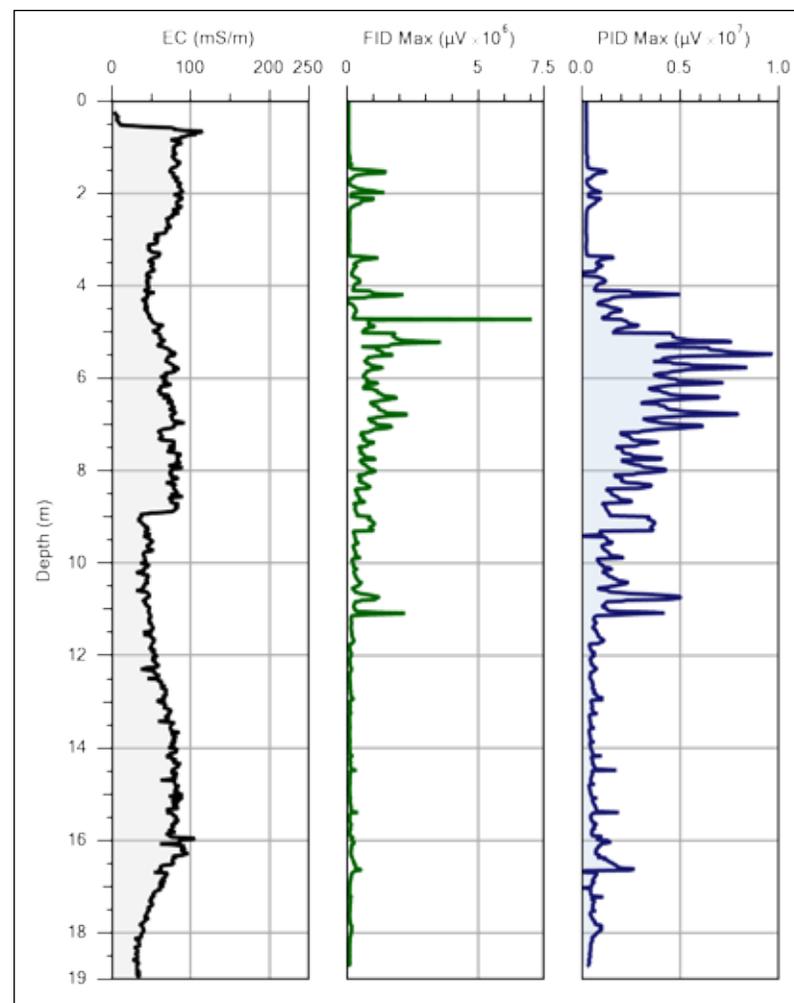
the comprehensive data from the MIP investigation, many impacted zones and depths would likely have been missed.

The subsequent remediation program was then optimized using the results from the MIP investigation for more efficient placement of chemical oxidants to specifically target the impacted zones. As such, these efforts resulted in better treatment of the PHC impacts at the site.



For more information regarding Direct Image® Logging Tools, go to: geoprobe.com

*Contributed by Patrick O'Neill, MASc
Project Manager for Vertex Environmental Inc.
Cambridge, Ontario Canada*



MIP log from the site in northern Ontario showing (l to r) Electrical Conductivity, MIP-PID, and MIP-FID. The log indicates the highest levels of contamination at depths from 11 to 37 ft. (3 to 11 m) bgs.



DI Users: Keep HPT Screens/Filters Clean

I'm having problems passing the HPT Reference Test and my HPT Line Pressure is High. What's my problem?

This problem is usually caused by one of two issues:

1. Soil build-up behind the HPT screen
2. HPT filter becoming plugged

Soil build-up behind the HPT screen is easy to troubleshoot by removing the HPT screen. Does the line pressure return to normal, and are you able to pass the HPT Reference Test? If 'Yes', either clean or replace the HPT screen. If 'No', it's time to clean or replace the HPT Filter. The detailed procedure for cleaning or replacing the HPT Filter, called "HPT Flow Module Filter Maintenance", can be found on the Geoprobe® website at: www.geoprobe.com/hpt-technical-documents.

Call me at 785-202-1101 or email me, koehlerd@geoprobe.com if you have questions.

Doug Koehler

Geoprobe® Direct Image® Specialist

1-785-404-1101
koehlerd@geoprobe.com



Service, the Geoprobe® Way

Since I don't have the opportunity to talk to you face-to-face about what makes our Service superior, maybe we can highlight a couple of thoughts I have and try to make sense of them!

A conversation with Darren Stanley, Geoprobe® Service Manager



Darren Stanley
Geoprobe® Service Manager
1-785-825-1842
stanleyd@geoprobe.com



What makes Geoprobe® Service Great?

- 1 EXPERT SERVICE TEAM ...** Whether it's routine maintenance or machine upgrades or total refurb, our service guys really like helping our customers! And with the support of the engineering team, we've got you covered. Your success is truly important to us.
- 2 IN-STOCK PARTS & COMPONENTS ...** We have original OEM replacement parts in stock available for same-day shipments. We also have rebuilt hammers and sonic heads available to eliminate downtime when repairs are needed.
- 3 FAST TURNAROUND ...** Once your machine arrives in Kansas, we're on it! You're our priority. One recent example was Brad Carr, with the University of Wyoming, who brought in his 7822DT for its first 200-hr service check. He was in and out in half a day. "Everything was great!" he told us.
- 4 RENTALS AVAILABLE ...** We have rental machines available to keep you in the field while your machine is here in Kansas with us. No down time for you. When your service is complete, we simply swap machines with you.
- 5 TRANSPORTATION OPTIONS ...** If you're too busy to drive in your machine to our service center, no worries. We can help organize the logistics. There are times when we can move machines very efficiently at a surprising low cost.
- 6 SERVICE TRAINING AVAILABLE ...** For customers that have a desire to grow their service skills, we'll teach you how to service and maintain your own rig, from slide replacement, electrical troubleshooting, to percussion hammer and sonic head repair.



Mark Wessel, Geoprobe® Hammer Specialist, demonstrates to customers how to install a new seal kit to a GH60 Series percussion hammer.

Check Your Machine's Battery Connections Often

What's the Easiest Way to Maintain Your Geoprobe® Machine?



Master Disconnect on 8040DT.

The battery on a machine, and specifically the connections to it, seems to be one of the most neglected items we see on a Geoprobe® rig. The hydraulics and engine may get serviced routinely, but very rarely do customers take time to clean and maintain the connections at the battery. According to Todd Ewing, Geoprobe® Service Specialist, loose or corroded connections can lead to starting issues in the field. Routine maintenance of the battery connections, and even the connections to the Master Disconnect on the machine can eliminate many problems down the road. A poor connection can lead to lower amperage from the battery getting to the starter, which can lead to cranking the starter too long without it starting, which in turn can burn up the starter or, at the very least, shorten its life. Just remove and clean the connections and reinstall them with some dielectric grease whenever you service the hydraulics. It's just that easy to eliminate possible problems with your Geoprobe® rig.

For a video on this topic, go to: geoprobe.com/mm/battery.



**MAINTENANCE
MINUTES-VIDEOS**
geoprobe.com/mm

Todd Ewing

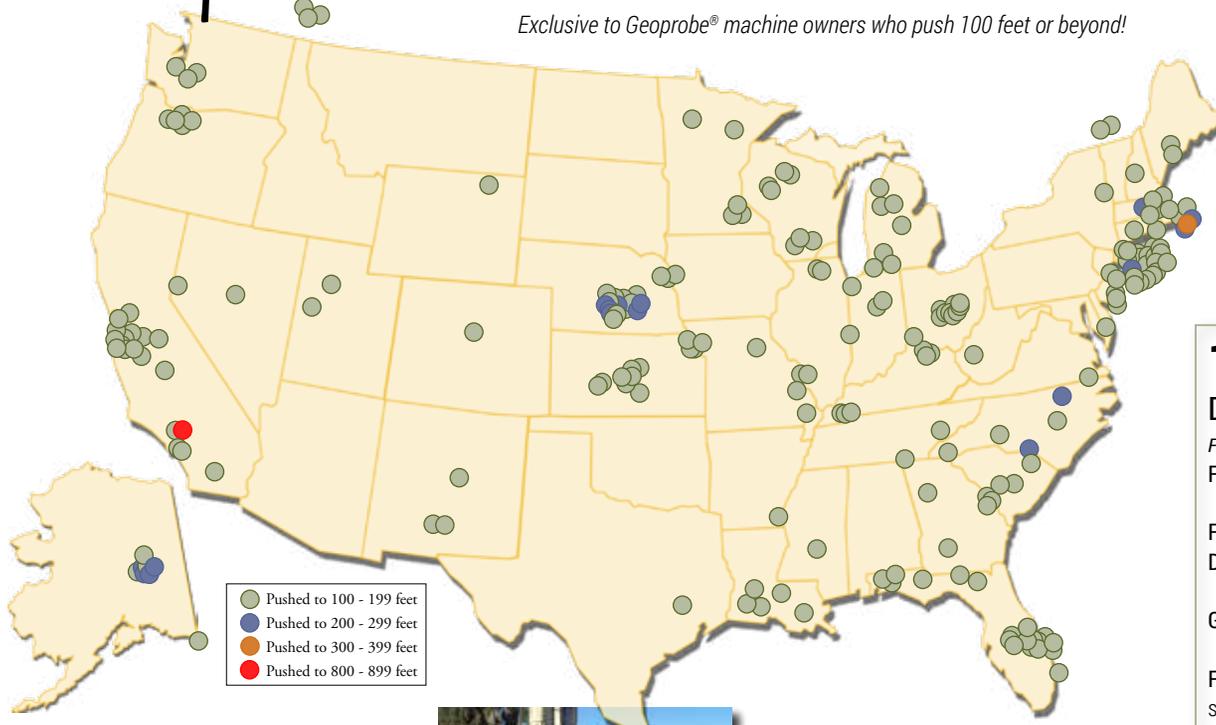
Geoprobe® Service Specialist
1-785-825-1842
ewingt@geoprobe.com



Join the "elite cadre of probists" who belong to ...

Geoprobe® '100' Club

Exclusive to Geoprobe® machine owners who push 100 feet or beyond!



● Pushed to 100 - 199 feet
 ● Pushed to 200 - 299 feet
 ● Pushed to 300 - 399 feet
 ● Pushed to 800 - 899 feet



160 ft. MO DNR – Missouri

FIELD NOTES

Field Team: (l to r) Ethan Musick, Brittany King, Sean Counihan, Caleb Trout & Ken Hannon
Field Site: Sikeston, MO
Depth/Date: 160 feet / Oct. 8, 2015 and 125 feet / Oct. 5, 2015
Geoprobe® Owner: MO Dept of Natural Resources, Jefferson City, MO
Field Data: Model 6600 using MC5 tooling for groundwater sampling. Typically don't push further than 40-60 ft ... "Cool footnote for our team!"



183 ft. Direct Push Services – Utah

FIELD NOTES

Field Team: Sean Bromley (not pictured), Ryan Roodbol & JT Loveland
Field Site: near Salt Lake City, UT
Depth/Date: 183 feet / Mar. 15, 2016 and 133 feet / Mar. 7, 2016
Geoprobe® Owner: Direct Push Services, Salt Lake City, UT
Field Data: Model 7822DT using ODEX system to install deep grounding rods for a solar farm in sand and unconsolidated rock. "The Struggle is Real" (on sign)

115 ft. Drillpro – Florida

FIELD NOTES
Field Team: (l to r) Daniel Curtin & Kevin Valentino
Field Site: Madison, FL
Depth/Date: 115 feet / Dec. 16, 2015
Geoprobe® Owner: Drillpro, Orlando, FL
Field Data: Model 7822DT for water sample boring, starting at 35 ft. then sampling every 5 ft.



158 ft. Env Assess. & Remediations – New York

FIELD NOTES
Field Team: Dennis Vigliotta & Peter Lombardo (not pictured, Jaime Allen)
Field Site: Westbury, NY
Depth/Date: 158 feet / Mar. 28, 2016
Field Data: Model 7822DT using 1.5-in. rods for groundwater samples collected through a 2-ft. mill-slotted sampler. Site is south of the Ronkonkoma Terminal Moraine where lithology is anything from silty sands to 10-ft cobble layers. With drillers from Clearwater Drilling.



Geoprobe® Tooling Reminders

geoprobe.com



Slim & Premium Prepacks

2.0-in. slim prepacks (left) for use with 3.75-in. tooling and 2.0-in. premium prepacks for use with 4.5-in. tooling
geoprobe.com/prepacks



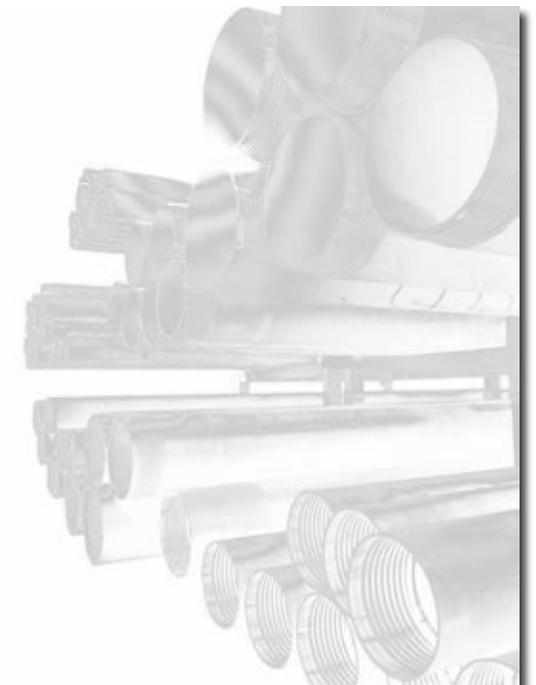
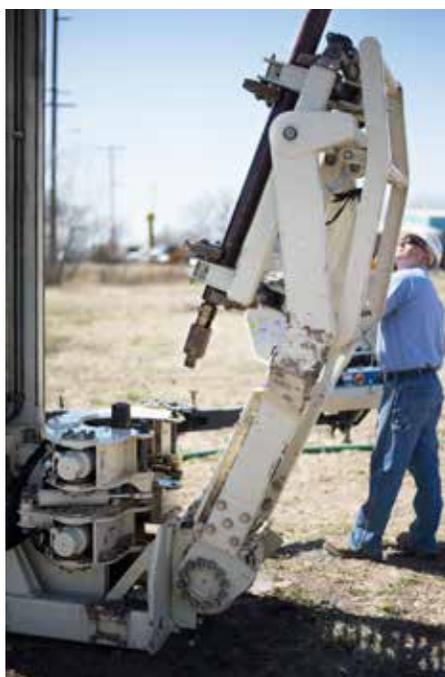
3.75 in. DP Tooling

Install 2.0-in. prepacked monitoring wells with your direct push machines
geoprobe.com/375

New video on 3.75-in. tooling at
geoprobe.com/videos/375

Sonic Weighted Wireline System

4.5 in. and 6.0 in. sonic dual tube systems
geoprobe.com/wwl



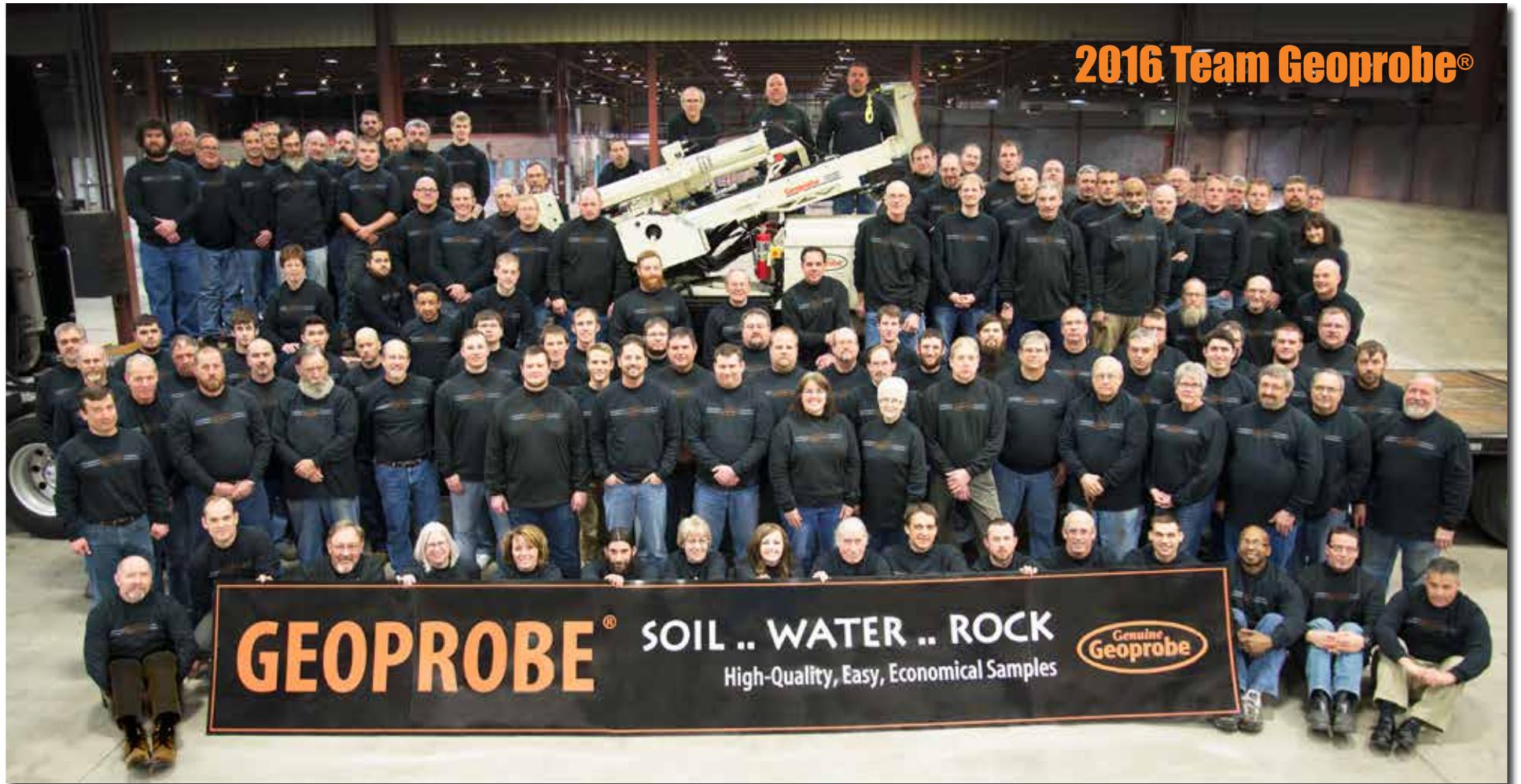
Sonic Casing

4-, 6-, 8-, and 10-in. sizes in stock and ready for distribution
geoprobe.com/sonic

The Probing Times is the official newsletter of Geoprobe Systems®. Suggestions for future newsletter articles or submission of 100 Club information are encouraged. Call Gayle Lacey at 1-800-436-7762 or email laceyg@geoprobe.com. An online version of the newsletter is available at geoprobe.com

Geoprobe Systems®
 1835 Wall Street • Salina KS 67401
 1-800-436-7762 • 785-825-1842
geoprobe.com

Geoprobe®, Geoprobe Systems®, Macro-Core® and Direct Image® are registered trademarks of Kejr, Inc.



Our goal is to provide THE BEST Probing and Drilling Equipment and Tooling in the World!
We're proud to be your professional partner ... from product concept to service support when you're in the field.
Call us if you have any questions about machines or tooling used for making holes.
We Are Team Geoprobe®!



Don't miss out on new machine and product announcements, plus lots more.

Follow 'GeoprobeSystems' on ...



1835 Wall Street • Salina, Kansas 67401

Change Service Requested

U.S. Postage
 PAID
 Wichita, KS
 Permit No. 482