

PROBING TIMES

Information for the ENVIRONMENTAL, GEOTECHNICAL, GEOTHERMAL & EXPLORATION Industries

Geoprobe® SONIC

Here's Why ...

Geoprobe® Sonic Head

High-Speed Coring Head

Drill Mast Side Shift

Head Centerline Side Shift

50K Dynamic Force

Auto Drop Hammer

Adjustable Control Panel

Hydraulic Rod Handler

Indexing Rack

Dual Winch System

14-in. Double Wrench Breakout

Remote Diagnostics

Fits in 40-ft. Shipping Container

see more reasons inside!

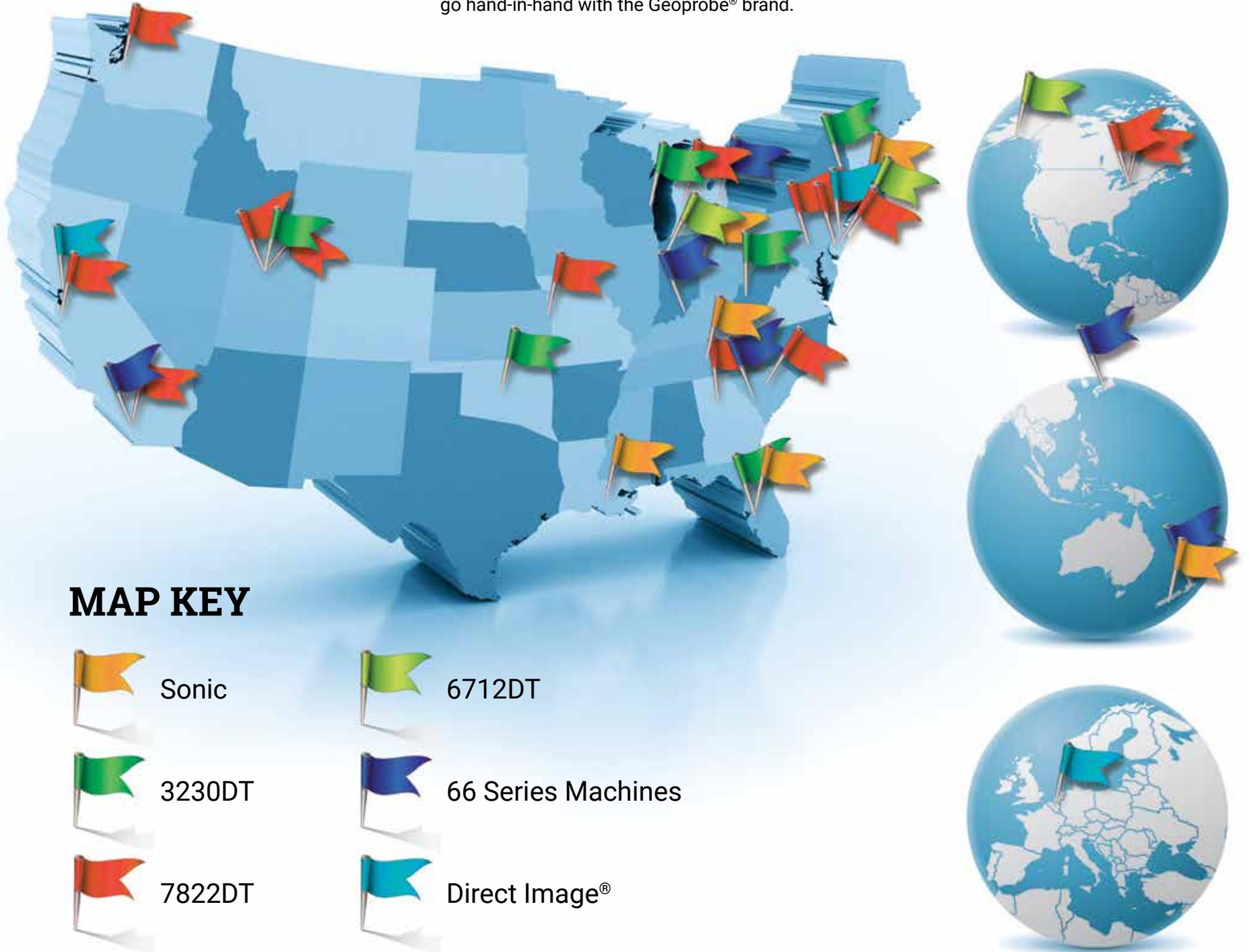


Geoprobe®

A Geoprobe® 8150LS Rotary Sonic, owned by EnviroProbe Integrated Solutions in Nitro, WV, is used for taking environmental and geotechnical samples at a contaminated jobsite. (r to l) Mike Hager, Driller; Jake Lesher, Driller's Helper; and a client representative work the site. (See EnviroProbe's story on page 6.)

PARTNERING WITH OUR CUSTOMERS

This issue of **The Probing Times** features customer reactions and successes from across the U.S. and around the world. You'll find stories on Geoprobe® Sonic Rigs, the 3230DT, 7822DT, 6712DT, 66 Series machines, & Direct Image® tooling. As you read, you'll find a recurring theme ... **Satisfaction, Success, and Customer's Growing go hand-in-hand with the Geoprobe® brand.**



What's Your Challenge?

In this Probing Times, there are many Geoprobe® customers sharing their field experiences. They've detailed projects completed with innovative Geoprobe® machines and tools. All projects have challenges. All successful customers have had challenges to overcome. What's YOUR challenge? Let us find a Geoprobe® solution for you. Nearly all of the innovative products we develop are in response to field challenges our customers have faced. **Go to our web link, let us know what your challenge is, and we'll send you a Geoprobe® Challenge T-shirt!**

geoprobe.com/challenge



Looking for an Advantage?



Are you looking to get an edge on the competition ... or maybe you need to add another service for your customers? We've hand-picked a few of our favorite NEW offerings we REALLY want you to see. There's a little bit for everyone. These are just a few of the products and options we've been working on to help you in the field.



New

1
6-Speed Combo Head
 for 32 Series Rigs
 Increased torque for
 augering. Increased
 speed for rock coring.
(details on page 12)
geoprobe.com/3230dt

2
20-Ton CPT Press
 for 67 Series Machine
 One modular machine with
 either Direct Push mast or
 20-ton CPT Press.
(details on page 32)
geoprobe.com/20-cpt-press

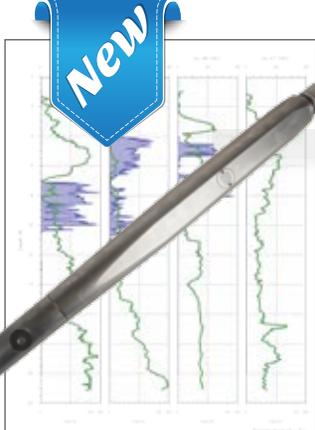


New

3
8-inch Sonic Tooling
 for Sonic Rigs
 Our rigs get bigger and
 so does the tooling.
(details on page 4)
geoprobe.com/8-sonic



New



4
OIP Probe
 Optical Image Profiler
 captures soil images
 using both visible and
 UV light sources.
(details on page 47)
geoprobe.com/oip

New

7
Free Listing From Geoprobe Systems®
 A listing of Geoprobe® Service Providers in your area is
 available by calling us. If you're a Consultant or a Service
 Provider looking for Geoprobe® help ... call us!



New

5
High-Speed Coring Head
 for Geoprobe® Sonics.
 Switch from sonic to
 high-speed coring in
 less than 5 minutes!
(details on page 4)
geoprobe.com/core-head

6
Sonic Indexing Rack
 for 10-ft. sonic tooling.
 Tool handling has
 definitely become
 easier. This is
 a 'must have'
(details on page 4)
geoprobe.com/index-rack



New

geoprobe.com/core-head

geoprobe.com/index-rack

Full and Mid-Size Rotary Sonic Rigs with Time-Saving Options

GEOPROBE® Sonic



Is It Time For You To Sonic?



8-in. Sonic Tooling



Jed Davis uses the rod handler option on the 8140LS with the new sonic indexing rack in front for easy and safe rod handling.

What's happening in the Geoprobe® Sonic world? Geoprobe® Sonic owners in this issue are finding how easy and safe our sonic rigs are to operate. And the rig's work schedules are filling fast. Are you interested in a Sonic demo? Call us!



An 8150LS, owned by Associated Environmental Industries in Norman, OK, runs SDT60 and a 6.0-in. Weighted Wireline system.

Why Geoprobe® Sonic?

- Full- & Mid-Size Rigs with Built-in Safety Systems
- Geoprobe® Designed & Built Sonic Head
- Rod Handling System & Indexing Rack
- Drill Mast & Head Centerline Side-Shift
- Efficiently Operated with 2/3 Person Crew
- Automatic Drop Hammer Option for SPT
- High-Speed Coring Head with Weight-on Bit Control
- Geoprobe® Sonic Training
- In-Stock Tooling including Weighted Wireline

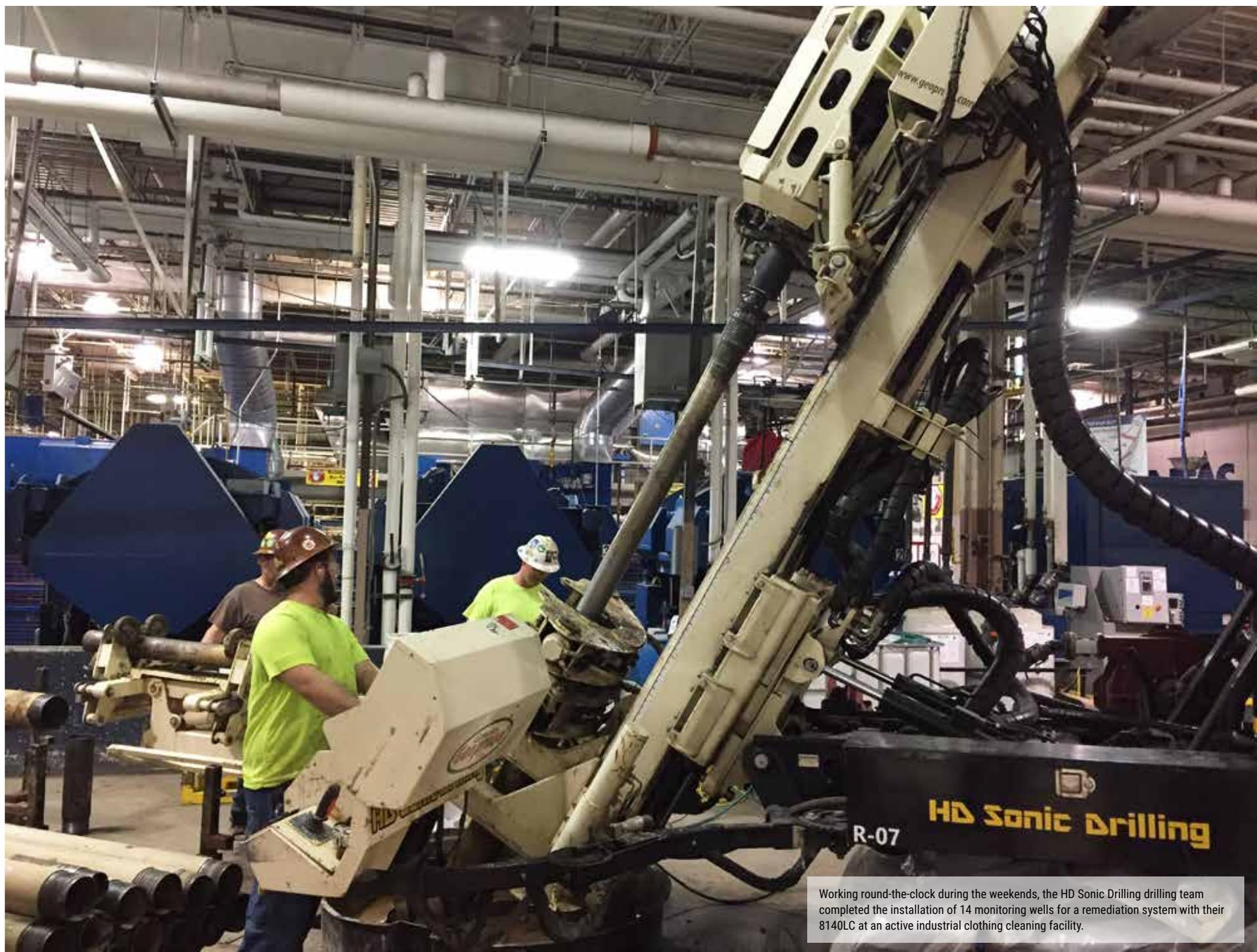
"We're finding more and more jobs are being specified for sonic machines. If you're ready to jump into the market, it's important to remember we build engineered systems and machines! Our six, distinctive sampling systems, including SDT45, DT45WWL, SDT60, SP60, DT60WWL, are in stock and ready for distribution. Plus, we're the industry leaders for Service, Customer Support and innovative product development.



John Martinuzzi
Geoprobe® Sales

geoprobe.com/sonic

Limited Site Access for HD Sonic Drilling



Working round-the-clock during the weekends, the HD Sonic Drilling drilling team completed the installation of 14 monitoring wells for a remediation system with their 8140LC at an active industrial clothing cleaning facility.



An 8250LS recovers samples from coal refuse sites.

Jim Nidzgorski, of HD Sonic Drilling in East Palestine, OH, mobilized their Geoprobe® 8140LC Rotary Sonic inside an active industrial clothing cleaning facility, squeezing through 6.5- to 8.5-ft. aisles and walkways with 14- to 16-ft. head room clearance.

According to Jim, in addition to working within such confined areas and difficulty entering the facility, another constraint was thrown into the mix. "We were limited to working from Fridays, beginning at 10pm," he said, "and then had to have the site cleaned up and everything moved out by 5am Monday morning so the shop crews could begin their regular work schedules." Two field teams worked two shifts around the clock during four weekends to accomplish the project.

Jim tapped their sonic rig to do the angle drilling for the installation of a remediation system because of difficult subsurface conditions under the facility's floor. "Our work had to be completed under in-place machinery where we would encounter mostly sands, gravel and cobbles," he said. Six angle holes, three double-cased nested wells, and two single wells were drilled vertically and at angles of 30 to 35 degrees using sonic 4x6 to 70 feet and 8-in. double-cased holes 20- to 40-ft. The HD Sonic Drilling team was onsite to set fourteen 2- and 4-in. monitoring wells.

The drilling team utilized an exhaust scrubber on the rig.



The field team was in 'full containment' mode while setting 14 bioremediation wells.

HD Sonic Drilling also used a Geoprobe® 8250LS at six coal refuse sites in Ohio and Pennsylvania. The land owner may decide to reclaim the refuse piles to see if there is any value in such a project. The company's field team used 20-ft. lengths of sonic tooling, drilling 4x6 tooling to 85-foot deep, to collect samples.



(above) Ronda and Rod Moore take possession of EnviroProbe's 8150LS Sonic from Victor Rotonda, Geoprobe® Mid-Atlantic Sales. Rod hand-picked options for the rig, including the sonic rod indexing rack (below).



EnviroProbe Integrated Solutions, Inc., in Nitro, WV, initiates their new Geoprobe® 8150LS Rotary Sonic at a contaminated site requiring geotechnical work near Louisville, KY.



Installing PZs using PW Wireline Casing Advancers (coal refuse impoundment) with the 3230DT.



(above & below) Because temporary 'roads' were uneven, oscillating the 3230DT and 7822DT drill masts made adjusting to side-hill terrain easy.



EnviroProbe Packs Double Punch With Sonic & 3230DT

The Force is definitely with EnviroProbe Integrated Solutions, Inc., when it comes to knocking out environmental, geotechnical and exploration work. With the recent addition of the Geoprobe® 8150LS Rotary Sonic, coupled with the power of the 3230DT, Rod Moore, Owner of the Nitro, WV, company, and his field team are well prepared!

With their new sonic, EnviroProbe returned to a jobsite they had previously drilled, but stopped drilling when significant contamination was detected. After regrouping, taking health, safety and protection of the environment into full consideration, additional locations were drilled for environmental sampling with the 8150LS. Since geotechnical data was also needed, SPT samples were collected as well.

Sonic methods were chosen instead of augering because there are significantly less cuttings/IDW, presence of surface and subsurface concrete/obstructions, challenges with heaving sands, and a desire for geotechnical and environmental sample collections from 80 feet.

At another site, EnviroProbe will spend the next few months installing up to 4,000 2-in. dewatering points using their 3230DT. Tooling to be used includes the DT45 system with 6-in. diameter cutting shoe/ expendable point holder.

The dewatering points were installed in a flyash/bottom ash basin to depths averaging 20-ft. EnviroProbe crews introduced sand filter pack to approximately 3-ft. bgs to allow for full-profile dewatering. Their client connected each of the dewatering points to a vacuum pumping and collection system to allow for 24/7 dewatering of the ash prior to construction of a geotextile/soil capping system. A Geoprobe® 7822DT was also used at the site.

EnviroProbe also used the 3230DT to install larger diameter (4-in. PVC) dewatering points to depths of

80 feet using 8.25-in. hollow stem augers. These wells were screened from the bottom to between 5- to 15-ft. bgs. A sand filter pack was used above the screened interval.

According to Rod, the 3230DT and 7822DT easily penetrated the ash. The saturated ash was influenced by the hydrostatic pressure of the water which required EnviroProbe drillers to fill the steel with water prior to knocking out the expendable points. He explained, "The 9-in. (3230DT) and 7-in. (7822DT) breakout clamps really made handling the steel very efficient and resulted in less labor." Because the 3230DT handled the tooling quicker, more dewatering points were installed per day using the side head clamp on the 3230DT.



On average, the 3230DT (above) and 7822DT installed 15 to 25 dewatering points per day. Much of the variation was the result of weather and access. The contractor on site constructed "floating" roads on the ash to allow for truck and rig traffic. The roads involved placement of geo-grid material and a combination of soil and ash to a thickness of about 5- to 10-ft. to bridge over the saturated/soft ash material. This often resulted in roads that were not level.

Geoprobe® Sonic Broadens M&W Drilling's Services



M&W Drilling has yet to find the depth limitation of their rig!

The vision at M&W Drilling, LLC, has been to aggressively expand drilling capabilities to provide a broader range of services to existing clients as well as to attract new ones. Already owning multiple air rotary, mud rotary, auger, rock coring, and Geoprobe® direct push rigs of various sizes and capabilities, they knew sonic drilling would complete their repertoire of drilling capabilities.

According to Firas Mishu, Owner of the Knoxville, TN, company, "Through our research and past experience, we knew we wanted to stay with the Geoprobe® brand due to the quality and versatility of the equipment and tooling, as well as their second-to-none customer service." M&W's new Geoprobe® 8150LS Rotary Sonic arrived in September of 2016.

"Seeing more and more work being specified as mandatory sonic," Firas said, "we knew we were missing out on opportunities to impress current and potential clients. With sonic, we also saw opportunities to increase drilling production in geologies in which we were previously able to drill, but not as efficiently."

Throughout the summer of 2016, M&W worked closely with Geoprobe® to make sure that their new sonic rig would contain all of the functionality they initially envisioned. He added, "With the help of the Geoprobe® team, we enhanced the capability of this rig by adding a couple of packages that were a first of their kind in the drilling industry, including the ability to rock core (NQ, HQ, PQ) and obtain SPT (split spoon samples) with an auto drop hammer. This ability makes our one-of-a-kind 8150LS Sonic extremely versatile."

Once the unconsolidated portion of a hole is completed using the sonic technique, no longer will a separate rock coring rig need to be mobilized to obtain rock core samples. M&W simply switches over to the rock coring functionality and, in a matter of minutes, they're obtaining rock cores per ASTM standards. "Site investigation work does not always end up going the way that it was originally planned," he said, "but we now have the ability to adjust on the fly to obtain the data required by our clients without remobilizing to the site with additional equipment."

Since the 8150LS arrived, Firas said they have drilled 400 ft. holes at a federal facility for the U.S. government, drilling through clay, limestone, and shale, using 6-in. dual tube casing, unique to Geoprobe® sonic tooling. This allowed for a more efficient installation of 2-in. wells as well as minimizing drill cuttings and the additional costs associated with IDW disposal. On other projects, they have installed monitoring wells and injection points (type 2 and 3), drilled geotechnical borings and obtained NQ, HQ, and PQ rock cores and have, of course, performed sampling with 2.25- to 6-in. sonic dual tube sampling equipment.

Other projects have included a multi-week geotechnical/rock coring project on a marshy reclamation site that required a track rig, mud mats, and clearing activities, and also a multi-day sampling project at a small abandoned warehouse. "Projects like these are why we purchased this machine," Firas added.

"There is nothing more frustrating in our industry than being asked by a client to drill for them, only to find out that the type of rig needed to efficiently drill the project is not something we own," he said. "Now, with the 8150LS, along with our other rigs, M&W Drilling is able to efficiently drill through practically any type of geology found in the United States. Our clients never have to worry about whether we can drill something for them again. They only have to pick up the phone, set up the work, and we're there!"



Because of the rig's tracks, M&W's 8150LS can access difficult terrain.



A Coring Head (to the right of the Combo Head), another option for the 8150LS, makes swift and easy work of coring rock.

"We've been extremely pleased with the capabilities of the 8150LS sonic. We've been meeting our expansion goals and growing our services. The rig has opened up opportunities to drill in geologies and in areas that were previously either completely unavailable or inefficient for traditional drilling methods. It has proven to offer substantial cost savings to our clients by performing multiple drilling tasks with one mobilization."

Firas Mishu • Owner
M&W Drilling • Knoxville, TN



The Automatic Drop Hammer option for the 8150LS sonic allows for collecting split spoon samples and other geotechnical applications.



Angle drilling and the rod handling system show the capabilities of the 8150LS sonic.



The Walker-Hill field team used both their 8150LS Rotary Sonic and 7822DT (foreground) for the discharge pipe abandonment work.

Walker Hill Field Team Completes Abandonment of 48-in. Discharge Pipe

Unused since the early 1970s, a 48-in. diameter discharge pipe in a 2-million-gallon industrial wastewater lagoon was tapped for abandonment to remove the potential for a damaging environmental release. The pipe was initially installed in the lagoon, which is currently in use, with the sluice gate on the lagoon side, while the other end was left open-ended. The condition of the sluice gate was unknown but had most likely reached the end of its design life.

The Walker-Hill Environmental (WHE) team, led by Daren Bracey, Project Manager, knew one end of the culvert was 60-ft. below grade, but over the years, dirt and debris had been piled on the other end eventually causing it to be 30-ft. below current ground surface.

Flying Blind

Daren said, "Finding the exact location of the culvert was most challenging, especially since we couldn't see either end of it. We needed a good hole in the pipe to install our 4-in. pipes which were to be used for supply and return of grout. If either seal were to fail, it might prevent filling the culvert with grout, thus not accomplishing the abandonment of the culvert and the potential for an environmental release would remain."

There was a chance if the pipe collapsed or the sluice gate in the pond started leaking or deteriorated, the lagoon could drain and release 2 million gallons of wastewater into the environment. "We needed a good hole in to the pipe," he added, "to install and seal our 4-in. pipe to facilitate pumping and returning grout so it didn't leak and the grout wouldn't go into the pipe and not accomplish sealing the pipe."

The Plan Comes Together

WHE mobilized a Geoprobe® 7822DT, with driller Dennis Herrera and technician Jack Womble, to locate the crown of the 48-in. concrete pipe.

Great care was taken to insure a plumb hole was advanced. The soil was inspected to ensure stability of the levee during sonic drilling, and to confirm the ability to seal the 4-in. casing.

The field team then started knocking off the steps of their plan.

Upon completion of the exploratory borings at the levee portion of the site, a Geoprobe® 8150LS sonic rig, with driller Rodney LaBrosse, and technicians Colby Pounds and Tyler Smith, advanced to the upper end of the concrete pipe with 4-in. tooling, then overrode with 6- and 8-in. tooling to the top of the pipe. The 4-in. tooling was used to penetrate through the concrete pipe, and was then removed from the borehole. Hydraulic connectivity to the lagoon was verified not to exist. The 6-in. tooling was then pulled from the hole, and a 4-in. casing was installed to act as a vent during filling, then grouted in place as the 8-in. tooling was removed from the borehole.

The crew then moved to the lower portion of the site to locate and penetrate the concrete pipe in a similar manner to set an injection port for pumping a grout slurry into the pipe.

The cementing operation was completed using an oilfield cement pumping unit to continuously pump the cement slurry from the lower portion of the pipe toward the levee to ensure no voids in the cement plug. After pumping was completed, 470 barrels (19,733 gallons) of cement slurry were pumped to seal the 48-in. concrete pipe.

Proper Planning Results in Success

Daren believes this project was a great success due to properly considering and planning for all the possible

hazards and conditions, preparing the crews for the step-by-step approach, and utilizing the proper equipment to locate and penetrate the concrete pipe and setting casing. "All steps in the process were designed and implemented to reach the final goal of cementing the 48-in. concrete lagoon discharge pipe," Darren added, "eliminating the future liability of an unexpected discharge from this pipe into the bayou or Mississippi River."

As Gary Hill, WHE Owner, reminds us all, "Success is not achieved alone; there was lots of communication between all parties involved, and a guiding hand from the Lord above!"



An oilfield cement pumping unit was used to pump cement slurry during the abandonment process. In all, nearly 20,000 gallons of slurry was used. The 8150LS (right) was used to penetrate the concrete pipe in the lagoon.

Glacier Drilling Hosts 'Sweet' Sonic Drilling Field Demo

Glacier Drilling, in Durham, CT, designed a "Sonic Drilling Overview and Field Demonstration" course last October for the Connecticut Licensed Environmental Professionals (LEPs). The event consisted of an indoor presentation and discussion of the pros and cons of sonic drilling. It was followed by a field demonstration using Glacier's drilling equipment: an auger rig pulling 2-in. split spoon samples, a Geoprobe® 8040DT rig that sampled 5-ft. Macro-Core® soil samples, and a Geoprobe® 8140LS Rotary Sonic drill collecting both 4- and 6-in. soil cores as well as 4-in. samples of the underlying basalt bedrock. The larger diameter 6-in. cores clearly revealed exactly what was below the ground surface.

What sample string tells the best story?

All aspects from cost, speed obtained, and sample accuracy were discussed. The topics covered sonic safety, costs incurred, heat generated from dense soil drilling and how to minimize, sonic tooling options, and groundwater sampling. Mark Schock, Owner of Glacier Drilling and event moderator, also spoke about the advantages of drilling speed in all formations, minimized wastes generated, actions of vibrations transmitted to tool strings, head design, and why he chose Geoprobe® versus other sonic manufacturers.

Mark said the course was "in the works over five years. We held it at a small ski area that was in full fall foliage," he said. "It was sweet!"



Mark Schock, Owner of Glacier Drilling, designed and moderated a 4-hour course for the Connecticut Licensed Environmental Professionals (LEPs) in Middlefield, CT.

One attendee stated, "Mark did a good job explaining the pros and cons of the system. The audience was mostly senior-level people who might make decisions in using this tool if not previously exposed to it."

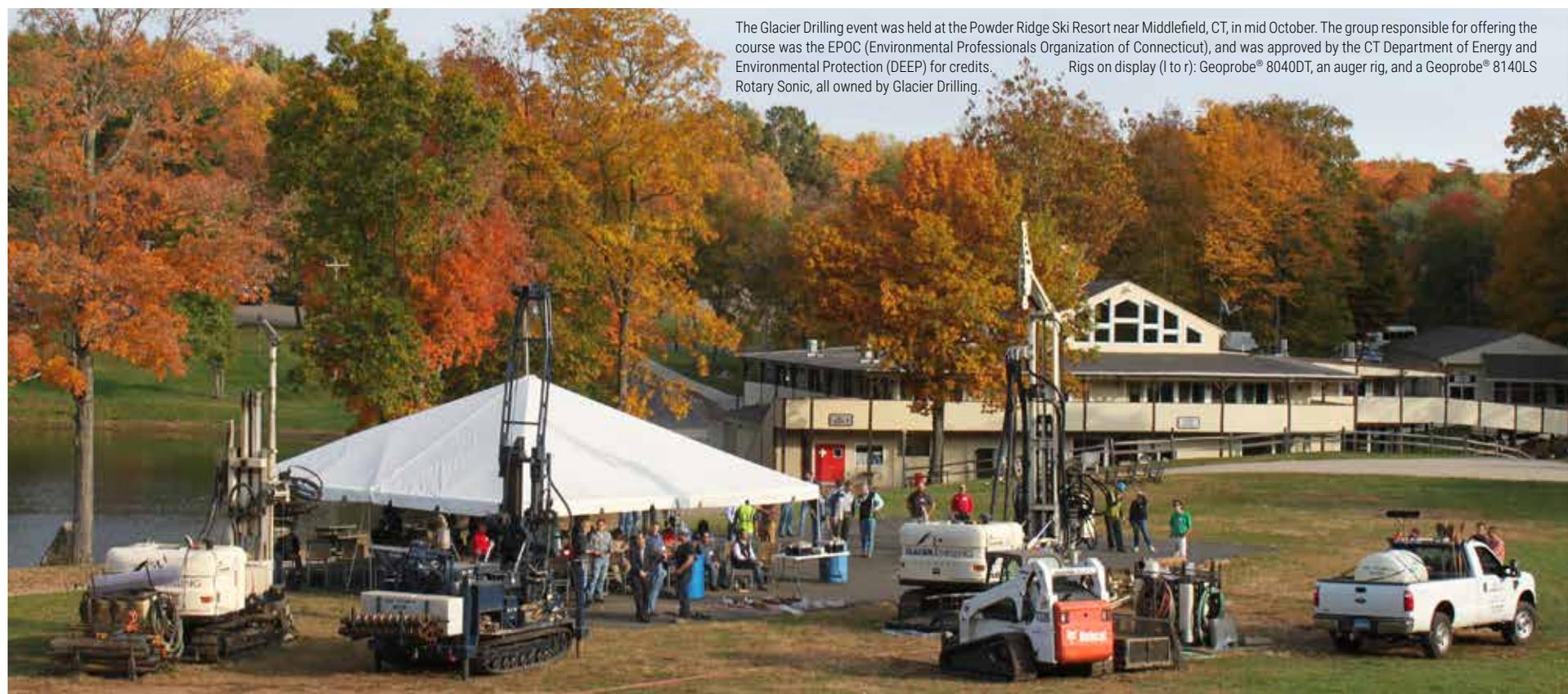
Glacier Drilling has been in business for 21 years, and offers a variety of subsurface tools for specific project requirements, including Geoprobe® machines of all sizes, from 420M to 8040DT to the 8140LS sonic rig.



Soil samples collected by three Glacier Drilling rigs were on display next to each other so they could be examined and compared. Mark Schock, Owner of Glacier Drilling, reviewed the cost, sampling speed, and sample accuracy. Soils drilled were sandy fill followed by glacial till and bedrock.



Glacier Team members Matthew Schock and Michael Also operate the 8040DT, one of Glacier Drilling's rigs, to collect soil samples.



The Glacier Drilling event was held at the Powder Ridge Ski Resort near Middlefield, CT, in mid October. The group responsible for offering the course was the EPOC (Environmental Professionals Organization of Connecticut), and was approved by the CT Department of Energy and Environmental Protection (DEEP) for credits. Rigs on display (l to r): Geoprobe® 8040DT, an auger rig, and a Geoprobe® 8140LS Rotary Sonic, all owned by Glacier Drilling.



A Geoprobe® 8140 Rotary Sonic rig and two 7822DT machines, owned by Huss Drilling, have spent two years at a large environmental project in west central Florida.

Huss Drilling Uses Multiple Rigs at Florida Site

In the spring of 2015, Huss Drilling, Dade City, FL, embarked on a large environmental project in West Central Florida that included the environmental assessment and remediation of chlorinated solvents and petroleum hydrocarbons. The project initiated with direct push soil sampling and micro well installations in the overburden soils to complete contamination assessments in the surficial aquifer and soils.

Two Geoprobe® 7822DT machines worked at the site for several months during the initial phase, and after completion of the surficial delineation, a Geoprobe® 8140 sonic rig was mobilized to characterize the contamination in the Floridan Aquifer. The sonic machine performed soil sampling and installed monitoring wells and nested wells at various depths.

After the assessment phase, a remedial action plan was initiated that included direct injection of various compounds which target the onsite contaminants. The 7822DT machines drove injection tooling into various depths in the overburden soils, and used a variety of pumps to inject the various chemical solutions. After several phases of injections in the surficial aquifer, the 8140 was remobilized to begin injections in the limestones of the upper Floridan Aquifer. The sonic crew used a Geoprobe® inflatable packer to zone off the pressurized sections of rock to be injected in to. Again, a variety of pumps were used depending on flow rates and pressure amounts.

The project is nearing completion and the remediation treatments are working well

cleaning up the contamination ahead of schedule. According to Ben Huss, Owner of Huss Drilling, the project managers hope to have the site work completed by August of 2017. "During the duration of the project, not a single day has been lost to breakdowns of any of the Geoprobe® drilling rigs," he added.



(above) A 7822DT drives injection tooling in the overburden soils.

(left) An 8140 Rotary Sonic is used to inject compounds into the limestone of the upper Floridan Aquifer. A Geoprobe® inflatable packer was used to zone off the pressurized sections of rock.



Marlan Duncan (left) and Fred Portofe, with Huss Drilling, work with a 7822DT during the injection process.

McMillan Drilling in New Zealand says Geoprobe® Sonic Capabilities are ...

Understated and Over Delivered

The success of their first Geoprobe® 8140LS Rotary Sonic rig and associated tooling led McMillan Drilling to the purchase of a Geoprobe 8140LC just 12 months later. McMillan Drilling, located in New Zealand, had investigated sonic technology for almost ten years before purchasing their 8140LS.

The Geoprobe® 8140LS sonic rig was one of the first proprietary sonic rigs in New Zealand.

According to Iain Haycock, Group Manager for McMillan, the rigs have proven to be very successful over the past 5-6 years. "The success includes us completing a wide range of applications spanning both the geotechnical and environmental markets," Iain said.

High Sample Recovery Success

"One of the strengths of these rigs is the ability to achieve very high sample recovery in cohesionless, inundated, interbedded sand/gravel/cobble formations where traditional drilling methods struggle," he explained. "The unique capability of running clear, PVC sample liners as an option, and using a dual tube approach in lieu of 'bottom out' or 'over casing' techniques, are some of the key points of difference between Geoprobe® and more conventional sonic systems. **The dual tube system makes sonic drilling a viable investigation tool for geotechnical investigations where in-situ testing is required.**"

McMillan Drilling's sonic rigs are mainly utilized in the predominantly coarse-grained alluvial soils. However, Iain said they have completed many other projects in a range of soil and rock formations including highly-fractured Greywacke, Basalt and extremely variable volcanic deposits to very soft sensitive organic silts and clays.

The company's rigs have also found themselves in various environments, both on land and off shore. Iain said the relatively compact footprint of the rigs and the "platform kinematics are such that there are not many sites that cannot be reached by tracking, crane assistance, and even occasionally floating on a barge. The only feature that is missing is a set of wings for the rig to fly!"

Best Choice for McMillan

The McMillan Drilling team is certain that selecting a Geoprobe® sonic rig was the best choice. Iain recalled numerous discussions with Tom Omli and Greg Johnson trying to understand the capacity and reliability of the sonic oscillator as one of the main areas of concern as a potential customer. "While any sales pitch is probably a bit subjective, based on our experience using the rigs continuously, **the capacity and reliability was understated and over delivered.** I think this bears good testimony to the integrity of the design, manufacture and the team at Geoprobe®," he concluded.



McMillan Drilling's sonic rigs have found projects in various environments, both on land and off shore.



The only feature that is clearly missing on the Geoprobe® sonic rigs is a set of wings for easier transport!



McMillan Drilling field team and two clients. McMillan drillers are (far left) Chris Nee and (far right) Paul Taulava.

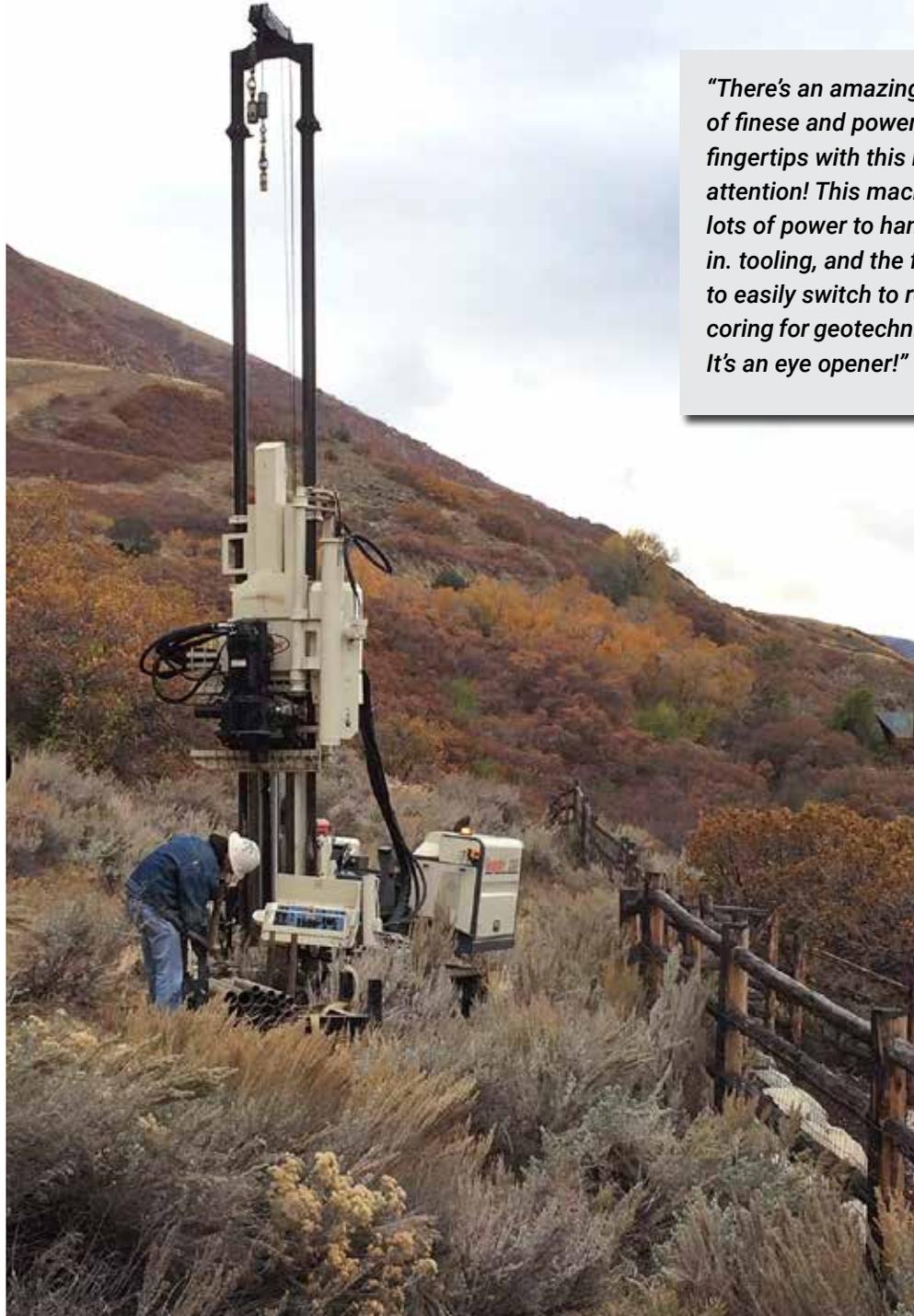


McMillan sonic rigs are racking up frequent flyer miles. The rig's compact footprint and the platform kinematics allow it to be transported to a variety of sites.

The McMillan Drilling crew used their Geoprobe® 8140LS Rotary Sonic on an environmental project recovering core samples to circa 25-30 mbgl through coarse-grained alluvial deposits (mainly gravels and cobbles). On completion, the boreholes were equipped with 50 NB uPVC monitoring wells for ongoing water sampling and level logging.

Geotechnical to Environmental With One Machine

32 Series



"There's an amazing amount of finesse and power at your fingertips with this rig! Pay attention! This machine has lots of power to handle 6.0-in. tooling, and the flexibility to easily switch to rock coring for geotechnical work. It's an eye opener!"



Lee Shaw
Geoprobe® Sales

Geoprobe® 3230DT Owners are literally breaking new ground with their 3230DTs! On the next few pages you'll see how those Owners are using the 3230DT to shake up the environmental and geotechnical markets in their geographical areas. Are you interested in a 3230DT demo? Call us!

3230DT Powerful Features!

- Power! New 6-Speed Combo Head!
- Flexibility and Control at your fingertips.
- Adjustable Control Panel.
- 6.0-inch Tooling Applications.
- Rock Coring. Augering. Mud Rotary.
- Driven Casing. SPT Sampling.
- New Triple Winch Configuration.
- Safety Features from Front to Back.

Applied Geotechnical Engineering Consultants in Sandy, UT, have found the 3230DT excellent for mud rotary, coring work, and CPT.



NEW! Triple Winch Option. One big winch for pulling, an intermediate winch for pulling and lifting tools, and one for wireline work.



NEW! 6-Speed Combo Head Option. Increased torque (8,700 ft-lbf maximum torque) for augering. Increased speed for rock coring (900 rpm maximum rotation)..



(above) NEWly designed, adjustable control panel. Easier height adjustment and position changes.
(below) NEW 3L8 Moyno® Pump option. More flow for rock coring and mud rotary.



Pushing 6-in. casing is a breeze with the 3230DT. You'll find DT60 to be one of your most-used tooling systems because it's so easy to use.

"The 3230DT has no issues with torque! We've had 8.25-in. augers to 100+ feet ... and this pony had much more room to get-up-and go! If you like to make money why wouldn't you want this machine?"

Jake Leshar • Driller's Helper
EnviroProbe Integrated Solutions • Nitro, WV



geoprobe.com/why-3230dt

3230DT

“There’s no way we’re not going to be successful!”

Dolese Brothers in Oklahoma City, OK, was founded before Oklahoma became a state, back in 1902. They have been transforming the state’s raw rock into roads, bridges, skyscrapers, and foundations throughout Oklahoma for 115 years. That also means they are very experienced at knowing what type of equipment they want to work with.

After a review of other drilling equipment and a tour with demos at Geoprobe® HQ in Kansas, John and Josh with Dolese Brothers knew a Geoprobe® 3230DT was what they wanted for their aggregate business.

“We liked what we saw. The people, the service, everything was excellent,” Josh Caldwell, Dolese Exploration Specialist said. **“From the company values, to the cleanliness of the facilities, the followup, and seeing how people took pride in what they did ... the experience as a whole was awesome!”**

Although the rig is new and the guys are just getting experience at the controls, their level of excitement is high. “I really like the three-winch combo we have,” John Durbin added, also an Exploration Specialist. “I was the assistant driller on our old rig, so I was the guy throwing the bits and taking the bits off. This will be safer and easier!”

Josh also added that there is no comparison between the 3230DT and their old machine. The old machine had one safety bar. **“The 3230DT has safety’s all over it, and the idea of safety to Dolese is our Number 1 priority,”** he said. **“There’s so much this rig will do. There’s no way we’re not going to be successful!”**

After collecting DT35 sand cores on their first project at one of their Oklahoma quarries, they mobilized the rig to southeastern Oklahoma for several weeks of rock coring. What was it like using the 3230DT pulling full 5-ft. rock cores? “Nothing to it!” Josh said.

Both Josh and John see “unlimited possibilities” with the 3230DT. **“I cannot begin to tell you all the jobs that are lined up and the excitement from management on down about this rig!”** Josh said. “In the past, Dolese has had to contract out the rock coring. **Never before have we been able to do so much inhouse with one machine!”**



John Durbin says it’s a mighty fine 5-ft. rock core pulled with their 3230DT! John and Josh Caldwell spent a couple days in Kansas training on their new sonic, and successfully pulled this sample at their first rock coring site.



John Durbin (left) and Josh Caldwell, Exploration Drillers for Dolese Brothers, believe their new 3230DT rig has unlimited possibilities!

Josh Caldwell, Dolese Brothers, is at the controls of the 3230DT in southeastern Oklahoma. DT35 sample cores will make for easier sampling and provide the company with high-quality information to know what’s in their quarries and to know where to blast.

3230DT

Collecting sediment samples using Macro-Core® soil sampler.



Derek Fennell and Bob Gannon complete split spoon, Macro-Core® soil sampling, and wireline rock coring on an earthen dam.

Aztech Likes Versatility of 3230DT Rig

The 3230DT Combo Rig has seemed to 'fill the bill' for Aztech Environmental Technologies in Ballston Spa, NY.

According to Fil Fina III, PE, Vice President of Aztech, the company has found the 3230DT to be a very versatile machine, capable of direct push applications, including large diameter casing as well as hollow stem auger boring, down hole hammer drilling, and rock coring. The company also added two new Kenworth trucks to carry and support the new rig. One truck is fitted with an aluminum deck with ramps, and the support truck is fitted with a 20-foot bed and lift gate.

The company performed a wide variety of geotechnical drilling and direct push operations on and behind a former hydroelectric dam in northern New York ... the first job for the new 3230DT. Aztech utilized the rig to complete hollow stem auger drilling and split spoon sampling in conjunction with conventional Macro-Core® sampling and wireline rock coring on the earthen and concrete dam. At the same site, the 3230DT was hoisted onto a barge to collect sediment samples using dual wall direct push methods.

The next job for the 3230DT also presented some unique challenges. "The second site the 3230DT went to," Fil explained, "is a former chemical facility located on the banks of the Hudson River." This required working over the side of a steep embankment. "We



Mike Deyette, Tommy Giamichael, and Bob Gannon, lowering the 3230DT onto the barge.



Sweet ride!



Derek Fennell and Bob Gannon, Drillers with Aztech Environmental Technologies, use the 3230DT for split spoon, Macro-Core® soil sampling, and wireline rock coring on an earthen dam.

calculated the cable size required to winch the 3230DT over the embankment by using the coefficient of friction of rubber tracks on wet grass" he said. The rig was anchored to a support truck and winched into place. It was then jacked to the maximum angle that the Kubota diesel engine is certified to operate. Then, the mast was pivoted to vertical. Multiple two-inch diameter monitoring wells were installed using 4.25-in. hollow stem augers, and Macro-Core® sampling was completed.

Fil added, "Since the 3230DT has exceeded Aztech's expectations, a new 3200 truck-mounted rig was purchased in January."

3230DT

New Doors Open to 3230DT's Power

Action Environmental Proud to Participate in Tampa's Downtown Transformation

It's a beautiful setting

Downtown Tampa, FL, is located on Tampa Bay with the Hillsborough River running through it and Tampa University just on the other side of the river.

To the locals, the city is one of those places that brings people in for their jobs, but when the clock strikes 5 o'clock, the place turns into the proverbial ghost town. City planners have wanted to bring more housing and shopping to the downtown area, to transform it into a city that could sustain a full time population with all the amenities so it could be a night-time destination as well.

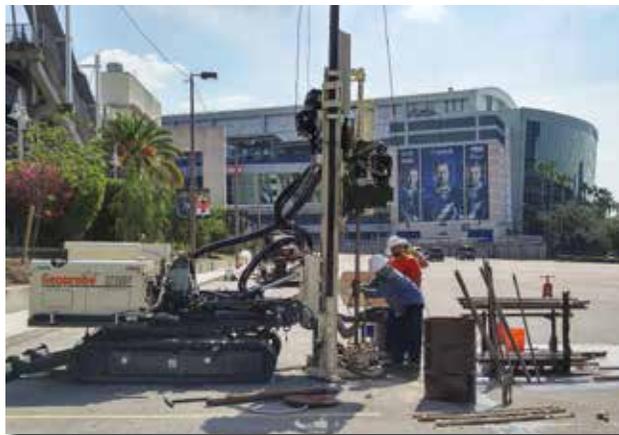
Action Environmental in Tampa was approached to see if they had a drill rig large enough to handle proposed environmental work; otherwise sonic options would be pursued.

"The project was literally in our backyard," Fred McKay, Operations Manager for Action said. **"We were confident in our capabilities, plus the project would be great to be involved with since it was one the City of Tampa had a lot riding on.** They were thrilled to find out that our new 3230DT had 50,000 lbf of down force and 80,000 lbf of pull back, and was substantially more powerful than the smaller rigs in the area."

The 3230DT would be required to collect soil and groundwater samples to depths of 40- to 50-ft. below grade. The project would require all the power the 3230DT could muster to sample through the difficult geology of dense clays and weathered limestone.

After the initial work was completed, Fred said the company would return to the downtown area to continue the front end work needed to lay the ground work for the transformation of the city. "It's very rewarding knowing that we have contributed in a small way to this enormous undertaking," he said.

Since purchasing the 3230DT, Action Environmental (formally EnviroTek) has enjoyed a number of opportunities that would never have been afforded to them without the additional capabilities the 3230DT brought to their drilling fleet. **"Our 3230DT was originally purchased to fulfill a client's needs in the mining industry, but has since opened new doors with new opportunities with other clients,"** Fred added. "We couldn't be happier with the way the 3230DT has performed for us."



Action Environmental used their 3230DT to complete soil and groundwater sampling needed to assess the properties in downtown Tampa that were planned for future development.



Using the robust MC5 sampler and 2.5-in. rods, the 3230DT was able to easily get through the dense clays and weathered limestone.



Action Environmental is involved in the ongoing efforts to assess properties in the Tampa, FL, downtown area that are part of a major redevelopment project that the City is proud of. The 3230DT has been able to complete deep sampling for both soil and groundwater for this project.

3230DT

Whole City Bricks Found in DT60 Core

“The environmental drilling industry is a competitive market. But with Geoprobe® technology on the cutting edge, we believe they can give us an advantage in a market where sometimes saving the client a little bit of money can go a long way in bringing back repeat business,” so believes Adam Sweet, Vice President of Horizon Construction and Exploration in Fredonia, WI.

Specifically, Adam thinks the DT60 sampling system, used with the Geoprobe® 3230DT, delivers incredible quality soil samples, but delivers a 6-in. borehole meeting proper well codes for installing standard 2.0-in. monitoring wells without the use of prepacks.

Horizon has used Macro-Core® sampling in the past and their 7822DT with great success, but knew DT37 and larger dual tube methods were on the rise. Adam also had a new 3230DT image in the back of his mind. The 3230DT would provide the speed and power necessary for completing these new projects.

After a rainy day demo in Wisconsin, Lee Shaw, Geoprobe® Midwest Sales, showed Adam and his crew the capabilities of the powerful combo rig. “After that, we really couldn’t wait to get our hands on the 3230DT and DT60 sampling system. The benefits could be potentially earth shattering for us,” Adam said.

The DT60 system was easy to operate. Not only is its size impressive, “but the mechanics of how it operates is even cooler,” Adam said. The patent pending split sheath, that can be run with collapsible liners or with no liner at all, literally comes apart, almost as if it is a giant split spoon, but with a way fancier cut!” he added.

It was the typical ‘Lee Shaw Shock and Awe’ demo!
Inhouse talks. Decision made. Order placed. Delivery scheduled.



Adam Sweet, (left) Vice President of Horizon Construction and Exploration, and Robert Albinger recover 6-in. samples with the 3230DT on its first project in Milwaukee, WI.

Horizon’s first 3230DT project landed them on an historical property in Milwaukee’s Third Ward District. The rig was used for pulling soil samples with the DT60 system and installing monitoring wells. Horizon’s clients were “very impressed” by the soil samples recovered. “In one case, our field team recovered multiple, whole cream city bricks inside of the sample sheath which were easy to identify.” Adam added, “The best part is we saved our client the cost of hauling and disposing of six 55-gallon drums of IDW.”

“With Geoprobe® technology on the cutting edge, we believe they can give us an advantage in a market where sometimes saving the client a little bit of money can go a long way”
Adam Sweet • Vice President
Horizon Construction and Exploration • Fredonia, WI

Benefits of Direct Push DT60 over HSA

- Faster Depth Advancement
- Higher Quality Samples
- No Auger Cleaning
- Increased Production
- Little-to-no Waste (no drums)
- No Auger Cuttings
- Less Labor for Driller



Robert Albinger uses a 3230DT to install monitoring wells in a newly paved parking lot. DT60 system was used for soil core collection and the outer casing is used for installing the well.



Horizon drillers utilized both of their Geoprobe® machines, the 3230DT and 7822DT on a project in Wisconsin.



“Thanks to the versatility and maneuverability of the Geoprobe® 3230DT, we’ve been able to take on and successfully complete projects we otherwise could not have done. Adding the 3230DT to our fleet of exploration equipment has increased our abilities and contributed to the success of our clients.”

Benjamin Coray, PE • Exploration Manager
Applied Geotechnical Engineering Consultants • Sandy, UT

The AGEC 3230DT completed the investigation of backfill material surrounding an existing office tower by drilling through 6 feet of Geofoam placed in a landscape planter.

Versatility is Key for 3230DT



Thomas Maughan surveys the AGEC 3230DT and his work area during a site investigation surrounding an office tower in Salt Lake City.

From rock coring at a ski resort, to performing CPT for liquefaction analysis for a new performing arts center, to locating an abandoned mine tunnel, Applied Geotechnical Engineering Consultants in Sandy, UT, continues to test the limits of their Geoprobe® 3230DT.

Versatility remains at the forefront of Ben Coray’s comments about the combo rig. Ben, who is the Exploration Manager for AGECE, says the ability and the willingness of Geoprobe® engineers to think outside the box with respect to customizing their products remains important to him. “Fitting their products to meet our unique needs in the geotechnical drilling arena is important,” Ben said.

Recently, AGECE used the 3230DT to investigate backfill material surrounding an existing office tower in Salt Lake City. The area of investigation was in a landscape planter that had been excavated 6-ft. below grade. Surrounding the planter was an area covered by a second story concrete plaza, except for a small opening above the planter. To gain access for the rig, the planter was filled with large Geofoam blocks. “We maneuvered the 3230DT onto the blocks so the mast could be raised through the opening in the upper level deck,” Ben explained. “The project had an extra layer of complexity in that our work had to be performed overnight as to not disturb the building’s occupants.”

Last fall AGECE was asked to locate an abandoned mine tunnel below a new hotel project in the Wasatch mountain range east of Salt Lake City. They used a 5-in. diameter ODEX rotary hammer to advance a casing at several locations until the tunnel was found. Ben said they inserted a camera to view the condition of the tunnel. “We saw timbers and other items that were likely over 100 years old. This was a very unique and interesting project,” he said.



Nate Salazar uses the 3230DT to locate an abandoned mine tunnel below a proposed new hotel project in the Wasatch mountain range east of Salt Lake City. The inset above shows one of the images taken downhole of the tunnel.

The Industry Benchmark for Direct Push Equipment

7822DT GEOPROBE® Series

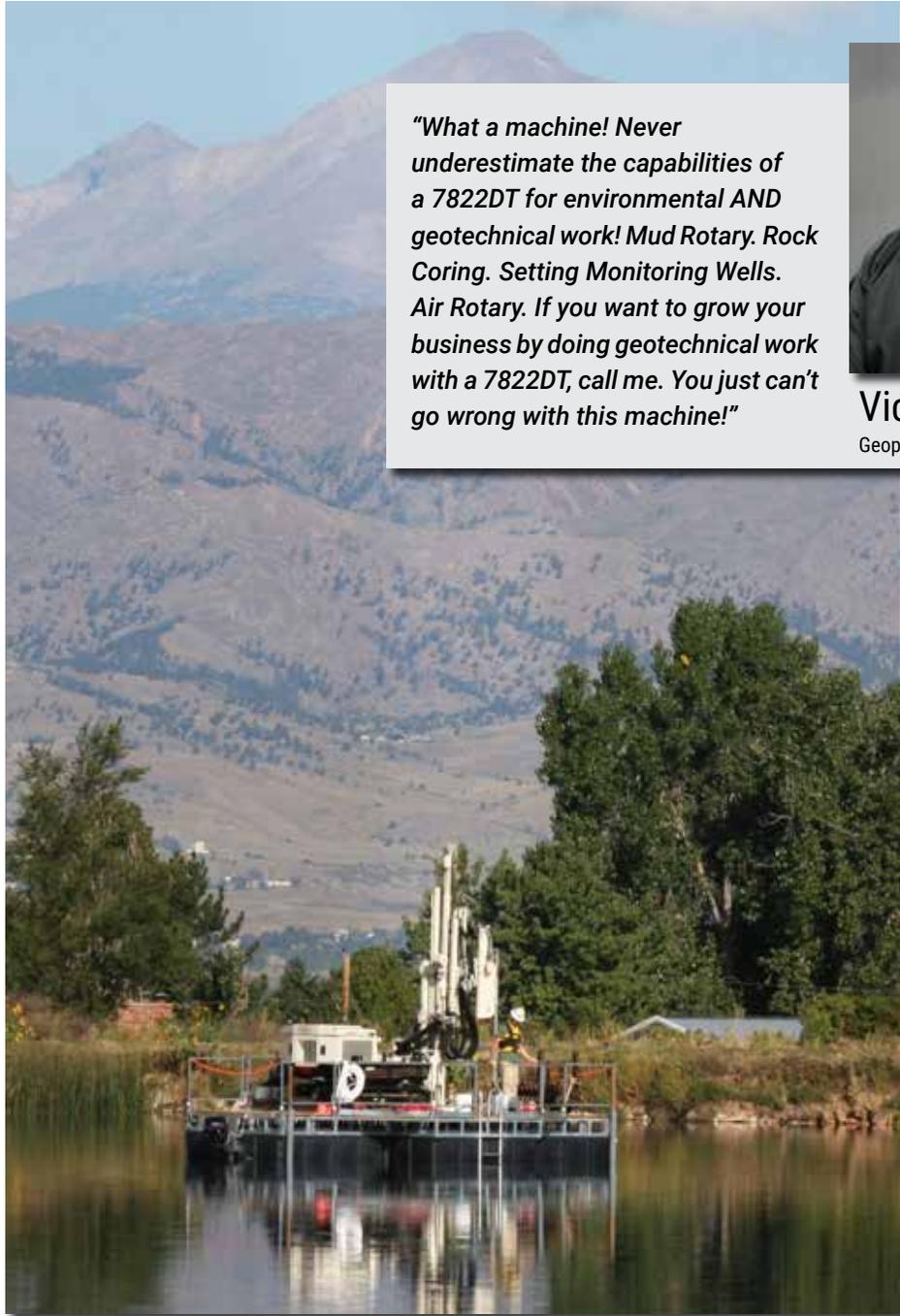
"What a machine! Never underestimate the capabilities of a 7822DT for environmental AND geotechnical work! Mud Rotary. Rock Coring. Setting Monitoring Wells. Air Rotary. If you want to grow your business by doing geotechnical work with a 7822DT, call me. You just can't go wrong with this machine!"



Victor Rotonda
Geoprobe® Sales



CORTEK Drilling in Spring Hill, TN, installs monitoring wells at a UST using air rotary.



Drilling Engineers in Fort Collins, CO, conducted geotechnical drilling operations on the Erie Lake Reservoir as part of a feasibility study to examine the potential for construction of a new dam. Three holes were drilled to approximately 40-50 feet below the water surface into the underlying bedrock to collect soil and bedrock samples.



Very little head room. The vertical work space for this 7822DT, owned by Hynes & Associates in Salisbury, MD, was only 13 feet, but it was enough room to collect foundation information for structural modifications for the building.

Nearly every day we hear of Geoprobe® 7822DT Owners trying new and different things with their machines, just like the ones on the following pages. Their success rate is still rising! You never know what's in store when you own the most popular direct push machine on the market. Call us to find out how you can expand your services ... environmental and geotechnical ... with the 7822DT!

7822DT Will Change the Way You do Business!

- Dependable. Versatile. Expandable.
- For Environmental & Geotechnical Projects
- Rock Coring Compatible
- Dual Winch Options
- Integrated Drill Mast Oscillation
- Two- and Four-Speed Augerhead Options
- Rear Blade for Tooling Transport

View the 7822DT videos at
geoprobe.com/7822dt

7822DT

Versatility of 7822DT Important to Geo Lab Success

While Geo Lab Drilling near Atlanta, GA, provides an array of services across the Environmental and Geotechnical spectrum, they contend that remediation projects are often the most rewarding. "With all the subsurface investigation work we do, it's sure rewarding to be part of the solution once we identify the problem," said Brian Strickland, Geo Lab's Owner.

"Our hand in the remediation phase has been continually enhanced and furthered by the Geoprobe® rigs and downhole tooling we deploy," he continued. The company operates rigs on a variety of in-situ remediation projects including chemical injection, bioremediation and bio-augmentation injection, thermal remediation with Electrical Resistance Heating (ERH), as well as conventional remediation system installation.

To echo the now clichéd mantra of in-situ remediation injection, Brian emphasized, "It is a 'contact sport,' and the success of your project will be determined by whether you can apply the amendments with sufficient distribution to achieve direct contact with the contaminants. This is exactly what Geoprobe® rigs and our direct push injection tooling will accomplish," he said. Without the budget to install high-cost permanent well delivery systems, Geo Lab's clients have options beyond solely injecting into sparsely laid out existing wells. The company's fleet of Geoprobe® rigs, and specifically their track-mounted models, have become a staple of their in-situ remediation services due to their capabilities to provide good distribution.

Brian believes the versatility of the track rigs to navigate difficult terrain or tight spaces and alleyways are important in the process. He explained for a thorough distribution of an injected amendment, or an exactly placed ERH electrode, "the ability to navigate into difficult spaces, combined with ample power to advance tooling to required depths, becomes critically important to the overall remediation design."

Several recent projects using the 7822DT and the 6620DT are described in these photos.

Geo Lab spent several months near Douglas, GA, advancing 326 direct push injection points with a Geoprobe® 6620DT. More than 8,500 linear feet of direct push rod were used in the application of more than 90,000 gallons of solution. Costs were minimized by using direct push points, due mostly to the efficiency of direct push techniques, allowing for large volumes of amendments to be placed with thorough coverage across impacted areas. Most of the proposed injection point locations were in wetland areas with a foot of surface water, involving challenging rig maneuvers and difficult working conditions. Installation of permanent injection wells in this topography, not to mention the eventual abandonment process, may have been exponentially more expensive without direct push. At another site near Atlanta, Geo Lab continues with a multi-year project where more than 100,000 gallons of Emulsified Vegetable Oil (EVO) have been injected. They also completed bio-augmentation with the application of DHC microorganisms to enhance and accelerate the clean-up process.



Near Augusta, GA, Geo Lab mixed and injected more than 45,000 gallons of Emulsified Vegetable Oil (EVO) as well as performed bio-augmentation with the controlled subsurface application of microorganisms to enhance and accelerate the process. The precise vertical placement of both the EVO and microorganisms was critical to the success of the project and proper implementation of the overall remediation design. This project also involved the challenge of navigating difficult off-road terrain to advance the points in the specific locations according to the plan. A Geoprobe® 6620DT was used for the work.



(above and below) Drew Small with TRS contacted Geo Lab to assist with ERH electrode installation at an active manufacturing facility near Murphy, NC. For this most recent phase, Geo Lab installed supplemental electrodes, as well as obtained continuous soil samples with soil temperatures around 200 degrees F. A 7822DT pulled the continuous hot soil samples, from 100 ft. bgs, by advancing a Macro-Core® sampler with stainless steel liners to withstand the heat. Following the sampling, Geo Lab installed multiple electrodes to greater than 100 ft. using hollow stem augers, requiring very careful handling of the steaming mud. After completion, Drew Small said that in the early stages of the project he had his doubts as to whether the scope of work could be completed. "I was impressed with the capability of the rig and your guys during this install," he said. "I wasn't sure it was possible."



Eichelbergers Successfully Ventures into Water Well Market with 7822DT

Eichelbergers, Inc., in Mechanicsburg, PA, was approached by a municipal client who needed to do some exploratory water supply well drilling in a remote, environmentally sensitive area in northern Pennsylvania. No rubber tired vehicle access was permitted at this wooded location. After considering a variety of options to install these wells, the decision was made to use one of the company's Geoprobe® 7822DT machines.



Installing 10-in. steel casing with the 7822DT.

The crew tracked the 7822DT through the steep, mountainous terrain following a crude path and weaving between trees so as not to cause any damage. Once the machine was maneuvered to the site, the crew assembled 500 feet of 2-in. air line from a high pressure auxiliary air compressor to transport the supply of air to the 7822DT for the air hammer drilling.

All of the tooling, casings and water supply tanks were moved to the well location with a track skid steer.

The crew began the job by augering a 12-in. hole through the overburden to a depth of 35 feet to accommodate the installation of the 10-in. steel surface casing.

"I thought that installing the 10-in. string of casing would be the most challenging part of the project," said

Ted Gayman, Executive Vice President of Eichelbergers, Inc., "but the Geoprobe® machine performed flawlessly to complete this portion of the job."

Following the installation of 35 feet of 10-in. casing, a nominal 9-in. diameter hole was drilled to a depth of 60 feet using a percussion air hammer. The crew then installed 60 feet of 5-in. steel casing with a drive shoe. After seating the casing into the bedrock, a nominal 5-in. open rock hole was advanced to a final depth of 182 feet using a percussion air hammer.

"The crew did an outstanding job as we ventured into the water well market with the 7822DT machine," Ted added.



Connor Neely, Driller (left), and Chris Chronister, Eichelberger Field Superintendent, add a drill rod during the 5-in. air percussion drilling.



Chris Chronister, Field Superintendent for Eichelbergers, uses a 7822DT and a tool string with 8-in. air hammer and stabilizer to install a water well in a remote, protected area.

Since purchasing a Geoprobe® 7822DT, which was originally envisioned to perform mainly environmental direct push projects, EarthProbe Field Services has found a niche in the geotechnical drilling market.

“Early on,” Mark Taggart, Co-Owner of EarthProbe said, “we found that we could not compete head-to-head with the larger auger drilling rigs, in speed and depth. However, when the word got out that our 7822DT could fit into limited access and sensitive areas, we’ve been able to add another dimension to our basket of services.”

The company was recently tasked to drill two 50-foot geotechnical borings on a significant slope of a fairway at Ogden Golf and Country Club. The only access to the drilling location was along the fairway. “To say the least, the grounds keeper was concerned!” Mark said. “A traditional drill rig would have certainly damaged the turf and caused additional impact constructing a drill pad on the slope. Our 7822DT proved to be an excellent alternative. Because of the rubber tracks and exceptional weight distribution, we were able to traverse the fairway without any noticeable impact. We were also able to situate our rig on the slope without disturbing the ground surface.”

In the end, the field team provided the client the necessary information they needed (blow counts, split spoon & Shelby samples), the grounds keeper was happy there was no damage to his fairway, and EarthProbe received two more geotechnical projects that week.



Ogden, UT. EarthProbe's clients know that the 7822DT can get where it needs to go to get the job done. The field team completes geotechnical sampling at a golf course location.

Relationships and Reliability

Keep EarthProbe Field Services Partnered with Geoprobe®

“We have been using Geoprobe® equipment since we started our company in 1995, and have stayed with Geoprobe® since. And it’s because of the reliability and value of the equipment, the innovation, the tooling, and all the people at Geoprobe® we have come to know over the last 22 years in business.”

**Mark Taggart and Pat Casey • Owners
EarthProbe Field Services • Bountiful, UT**



Sandpoint, ID. Supporting UVOST/MIP/HPT direct sensing investigation and confirmation soil sampling with a Geoprobe® 7800.



West Bountiful, UT. A 6620DT, EarthProbe's most used piece of equipment because of its versatility, completes a soil and groundwater investigation.



Salt Lake City, UT. A 54LT excelled inside a former dry cleaners facility for a soil and groundwater investigation.

7822DT

Elite Techniques Credits 7822DT's Versatility to Continued Success

Elite Techniques, in Camden, SC, has experienced substantial growth since it was launched in early 2013 by Dearal Rodgers and his wife, April. Today, the Women Owned Small Business has a dozen employees and is the proud owner of three Geoprobe® 7822DT's.

Known for his drilling and fishing accomplishments, Dearal believes the versatility of the 7822DT is a key component to the company's success.

Over the last few years, Elite Techniques has put the machine to the test. A few of the many jobs that have been successfully completed include; augering 4.25-in. hollow stem augers to 120 feet, auger and mud rotary SPT holes to 100 feet, installing 4-in. water wells with mud and air rotary to 100 feet, and two "unforgettable" rock coring locations through granite that reached 220 feet. "We have asked a lot from our 7822DTs," Dearal said, "and each time, they've exceeded us and our client's expectations."

Training and the Right Equipment

As a relatively small company, Dearal has been asked why not stick with environmental OR geotechnical drilling? Why both?

He found the answer fishing!

Most of Dearal's clients know that he likes to tournament bass fish. It's something that he's always enjoyed and, "I have been blessed to compete nationally, at fishing's highest level," he said. "When I first started competing in the early 2000's, I learned pretty quickly that I didn't know as much as I thought I did about bass fishing! Where I grew up, we almost always used a plastic worm!"

Versatility Leads to Success

As he climbed the ladder in the sport and continued to compete against the best bass anglers in the world, Dearal learned how to use spinnerbaits, crankbaits, swimbaits, frogs, topwater, buzzbaits, and hundreds of other techniques. "I made an effort to learn it all," he said, "and it worked! **Versatility was the key.**" (Dearal won the 2009 FLW Tour CoAngler of the year award, and the 2010 FLW Tour Forrest Wood Cup.)

Elite's clients can confirm that Dearal knows a thing or two about drilling as well. Similar to fishing, he's tried to learn as much as possible about the capabilities of the 7822DT and also how to complete

each drilling technique professionally.

"These 78 rigs are extremely versatile. They can probe, mud rotary, auger, air rotary, SPT, CPT, inject, and so much more," he explained. "Drilling, to me, is a lot like fishing. You're working with a lure or drill rod that you can't see the business end of because it's in the water or in the ground. You have to

make the right adjustments to achieve success. It's very rewarding when success comes because of the decisions you made. It's what I strive for, to learn as many techniques as I can and to be the best, whether I am fishing or drilling. It's also where I got the idea for our business name, Elite Techniques."

Finding Your Niche

He admits that it takes a larger investment to acquire the tooling and training for all the things their company does, but, according to Dearal, it has been worth every penny!

"The market changes and you have to be ready for whatever happens," he said, "and the 7822DT definitely has prepared us for that. Last year, the flooding in South Carolina created a lot of geotechnical work for ATV type rigs. We were fortunate and had three 7822DTs ready to go. **It's really pretty simple; the more techniques a machine can do and that we, as drillers, know how to do, the more work there is for us.** For every technique I've learned in drilling, there has been a market for it."

Grow Your Capabilities

Being versatile has been the key to the company avoiding down time. He and his crew plan to push the 7822DT to new heights (or depths!), drilling longer, in tighter places, deeper, and in harder material than has ever been done before. According to Dearal, "When the phone rings and the client asks, 'Can you do it?' I'll say what I always say ... YES, WE CAN!"

Elite Technique's crews are currently working at numerous high profile sites throughout South Carolina, North Carolina, Georgia, and Florida.



Tyler Felder and Randy Eddings use the 7822DT to rock core deep in the woods near Reidsville, NC



Dearal Rodgers, Co-Owner of Elite Techniques, won the 2010 FLW Tour Forrest Wood Cup.



Right-of-way work on tracks near Darlington, SC. Kyle King is at the controls of Elite's 7822DT.



A 7822DT was lifted by a crane to complete a dam project in Aiken, SC.



Kyle King, Driller for Elite Techniques, and a 7822DT are soil sampling on the South Carolina State House lawn.



Tyler Felder, Driller for Elite Techniques, completes an angled well installation in upstate South Carolina.

Trinity Drilling is Growing & Building

When David Reinsma, now Owner of Trinity Drilling, first attended a Geoprobe® Open House event nearly eight years ago, he was working on his 'What Do I Want To Do' dream. He had yet to establish Trinity Drilling, but he'd seen other California Bay Area companies using Geoprobe® machines. "I just went to Kansas to see and envision a dream about what's next for myself," he said.

Being involved with related industries, David had been familiar with the Geoprobe® brand for over 20 years. "I saw you grow, so I went to Salina to find out what I was going to do and what I was going to buy."

Leadership. Equipment. Service. People.

"I saw in Geoprobe® the people you don't normally see in other companies," he added. "There was an energy, a level of commitment. And there was leadership in the company that I could believe in. A lot of other companies provide equipment. But, I could see for myself that there was enough tooling and machines that you guys offered that I could find my future in this."

David started his 'dream' with a 420M, a limited access rig, and awaited its delivery in California. A few months later, a 54LT headed to Trinity Drilling to further enhance the level of services to their clients.

Trinity completed work for Google in Sunnyvale, CA, drilling inside a building that was being retrofitted and a new foundation was to be added. They used the 420M and 54LT, David said, "and because I'm a geologist, I designed a profiling program for them, and we pre-profiled all the soil so they could dig, get it profiled for the landfill, and direct haul it."

Trinity has worked on Phase II projects for property transactions, including one for the Port of Oakland, an old contaminated railyard.

David believes there's a large market for him with his limited access equipment. "I feel there's a very large swath of services that this equipment can do that people aren't even thinking of doing with it," he said. "That's what I think about at 2:00 in the morning! The Geoprobe® founders and the engineers ... they've all had dreams. I bought in to it, and what they don't realize is that they're helping me to create my dream."

A Bigger, Better Dream.

He soon realized that a truck-mounted rig could help him capture whole projects, not just limited access work in the Bay Area. "If I had my druthers, I'd have an 8040DT, and a 7822DT, and a 7800, to work with the limited access rigs ... two sets of each, he said.

And although torn between a 7822DT and a 7800, in less than



Drew Gagnier, with Trinity Drilling, uses a 420M to complete a soil investigation inside Sunnyvale, CA, Google complex.



(above) Eric Choi, at the controls of the Trinity Drilling 7800, using concrete coring to retrieve soil samples at a Watsonville, CA, commercial development. (below) Eric Choi and Drew Gagnier complete a soil and groundwater investigation at a residential site in East Palo Alto, CA.

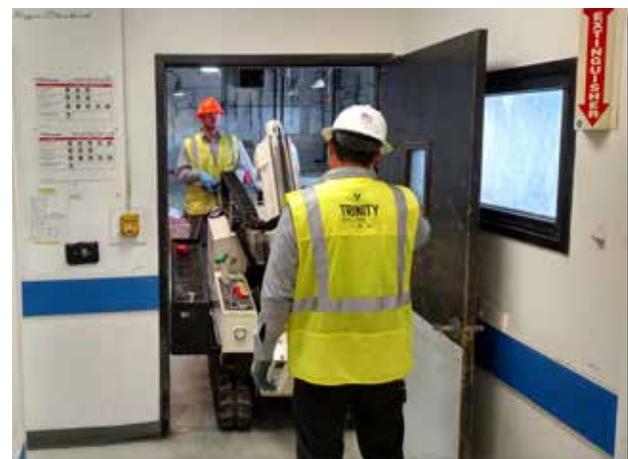


13 months, Trinity Drilling ordered their third Geoprobe® machine. "I went with the 7800 because I could tow the trailer with the limited access rigs. The 4WD truck option allows us to go to a lot of places that are off-road. The 7822DT was more versatile," David added, "but I figured I could still do 80-90 percent of the 7822DT jobs."

The 7800 setup has provided the company with good visibility throughout the Bay Area. "A 7822DT is my next rig, though!"

Growing Services.

The Trinity team is in growth mode; building their client base, building their services, and building the reputation of the company. "I see a lot of opportunity with this equipment. With the changes that Geoprobe® continues to make, and the fact that you're branching into other markets, I know I'll be following you!" David said.



Drew Gagnier (left) and Eric Choi drive the 54LT through an industrial doorway inside the Sunnyvale, CA, Google complex.



Catherine Byrne and David Reinsma, the husband/wife duo at Trinity Drilling in Santa Cruz, CA, are ready to leave Kansas with their new Geoprobe® 7800. Catherine grew up in South Africa, and with David's help, they have been encouraging David's three grown children to create and find their own dreams!

EPI: Two Thumbs Up For Air & Mud Rotary Drilling with 7822DT



EPI Driller, Dave Latimer, uses a 6-in. roller bit with air to chew through some tight overburden in the Philadelphia area. The 7822DT makes switching over to air easy and a pleasure to run.

Environmental Probing Investigations, in Cream Ridge, NJ, has been in the drilling business for 20-plus years. Although air and mud rotary work was not on their watch list while running smaller Geoprobe® machines, nor has mud or air rotary drilling been associated with a Geoprobe® 7822DT ... until companies, such as EPI, got the itch to try it out.

"We've been asked many times over the years if we can do air rotary, rock drilling, or mud drilling," Tony Pressimone, Operations Manager for EPI said. "Up until August of 2016, we had always said 'no' to that work."

Air Rotary / Rock Drilling

With the purchase of a 5-in. air hammer and a 6-in. bit, we took on a project in Nazareth, PA, with our 7822DT to drill four wells to approximately 40 ft. bgs. "We've always had the knowledge inhouse," he said, "as most of our drillers have done this in the past working for other companies, but we had never tackled it with our 7822DT."

EPI drilled with the Geoprobe® 7822DT using 6.25-in. hollow stem augers as the temporary casing. Once depth to bedrock was established, EPI switched to 6-in. air rotary to extend the well depth into the bedrock. When the depth to groundwater was determined, wells were then drilled to 40 ft. bgs, 58 ft. bgs, 34 ft. bgs, and 53 ft. bgs. All holes were lined with 4-in. PVC, sand packed and grouted to surface, and finished with flush mounts.

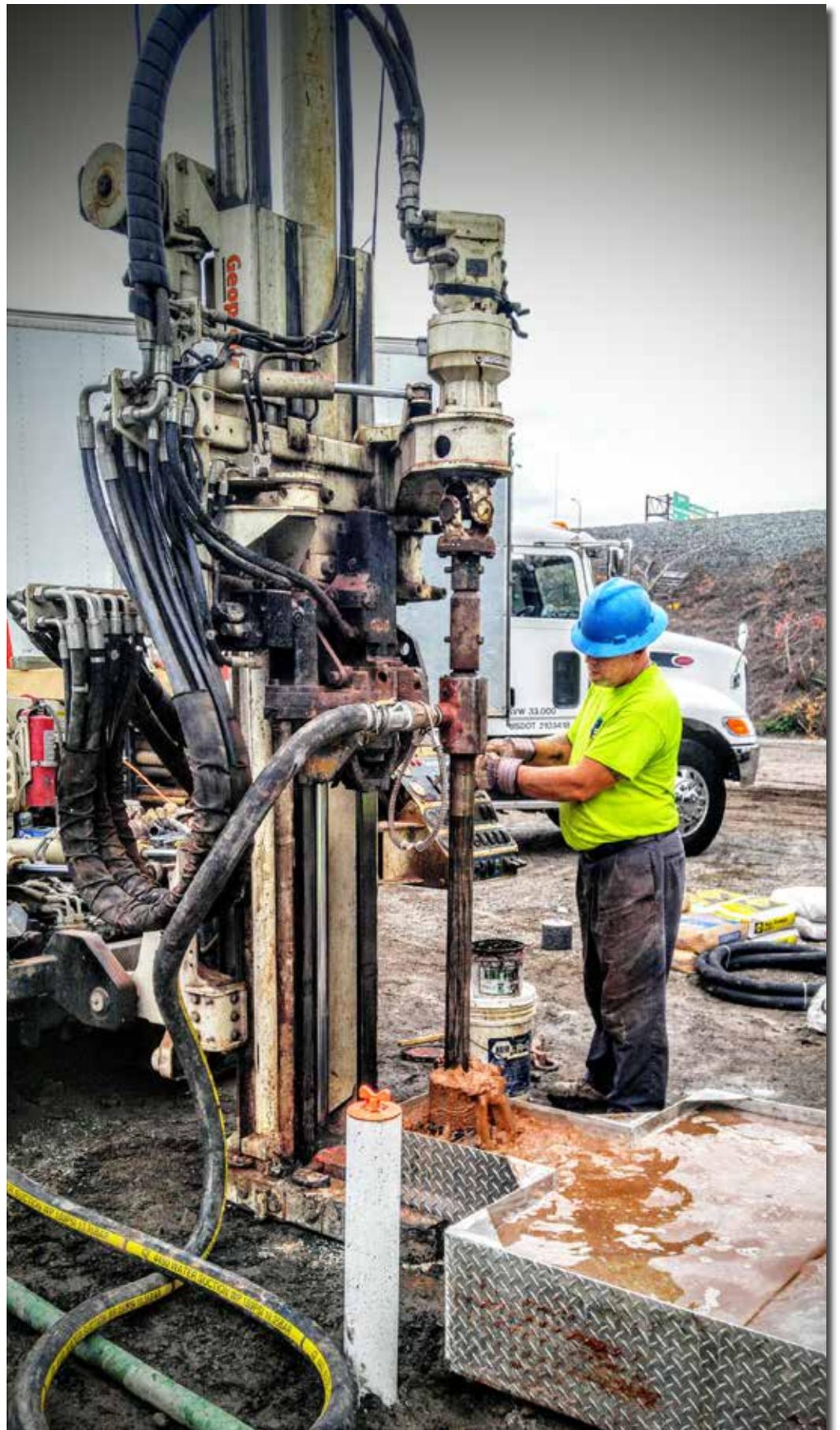
"It's time to make the right choices. With EPI and Geoprobe Systems® on your team, you are moving in the right direction."

**Tony Pressimone • Operations Manager
Environmental Probing Investigations • Cream Ridge, NJ**

Mud Rotary

Last November, EPI drilled with the 7822DT and grouted in 40 ft. of Schedule 80 PVC through 10.25-in. augers at a site in Jersey City, NJ. On the second day onsite, EPI set up the mud tub and drill rod, and started mixing mud. The field team used a 6-in. diameter drag bit to drill through the clay, organics and gravel layers encountered as they drilled to 65 ft. bgs to install a 2-in. monitoring well to 63 ft. bgs. The well was finished at surface with stick-up protective casing.

After doing several air/mud projects with a 2012 era 7822DT, EPI purchased another 7822DT to expand their air and mud rotary operations. "With the ease of set up, our knowledge, some ingenuity, and the purchase of a few options from Geoprobe Systems®," Tony added, "both rigs are now operator friendly for doing a 10-ft. soil boring, or for drilling 6-in. air or mud rotary to 100-ft. bgs."



Dave Latimer, EPT Driller, is at the controls of a 7822DT while doing mud rotary work for a well installation.



Dave Latimer, Driller with EPI, runs 6-in. air with a 7822DT to 85 feet based on water levels determined during the project.



Dave Latimer, Joe Abell, and Gary Decker use the EPI 7822DT to advance a 6-in. drag bit on their way to 65 ft. bgs to install a 2-in. PVC monitoring well with mud rotary.

7822DT

Leaking CPT Holes Cause Problems

An artesian effect was causing a problem with an undeveloped site in California where several CPT boreholes, abandoned by another contractor, were leaking appreciable amounts of groundwater.

This area is known for containing a confined aquifer under pressure (artesian effect) at 30- to 45-ft. below ground surface. Using the original CPT logs, CoreProbe International, in San Gabriel, CA, brought in their 7822DT to re-enter the same borings and pressure grout a minimum of 3 volumes under pressure at the saturated zone to plug the holes..

On the first day, CoreProbe measured, located, and staked the leaky boreholes in the north side of the site. They then dug channels to drain the work area, then calculated mixing quantities for a 5 percent bentonite and 95 percent Portland cement grout mixture. The 7822DT was used to drive 1.5-in. probe rods, with expendable points, to 35-ft. bgs, then mixed the grout. The expendable points were released, and a Geoprobe® GS1000 pressure grouted, bottom up, the leaky CPT location. The process was repeated at each borehole. The holes were allowed to sit a few days.

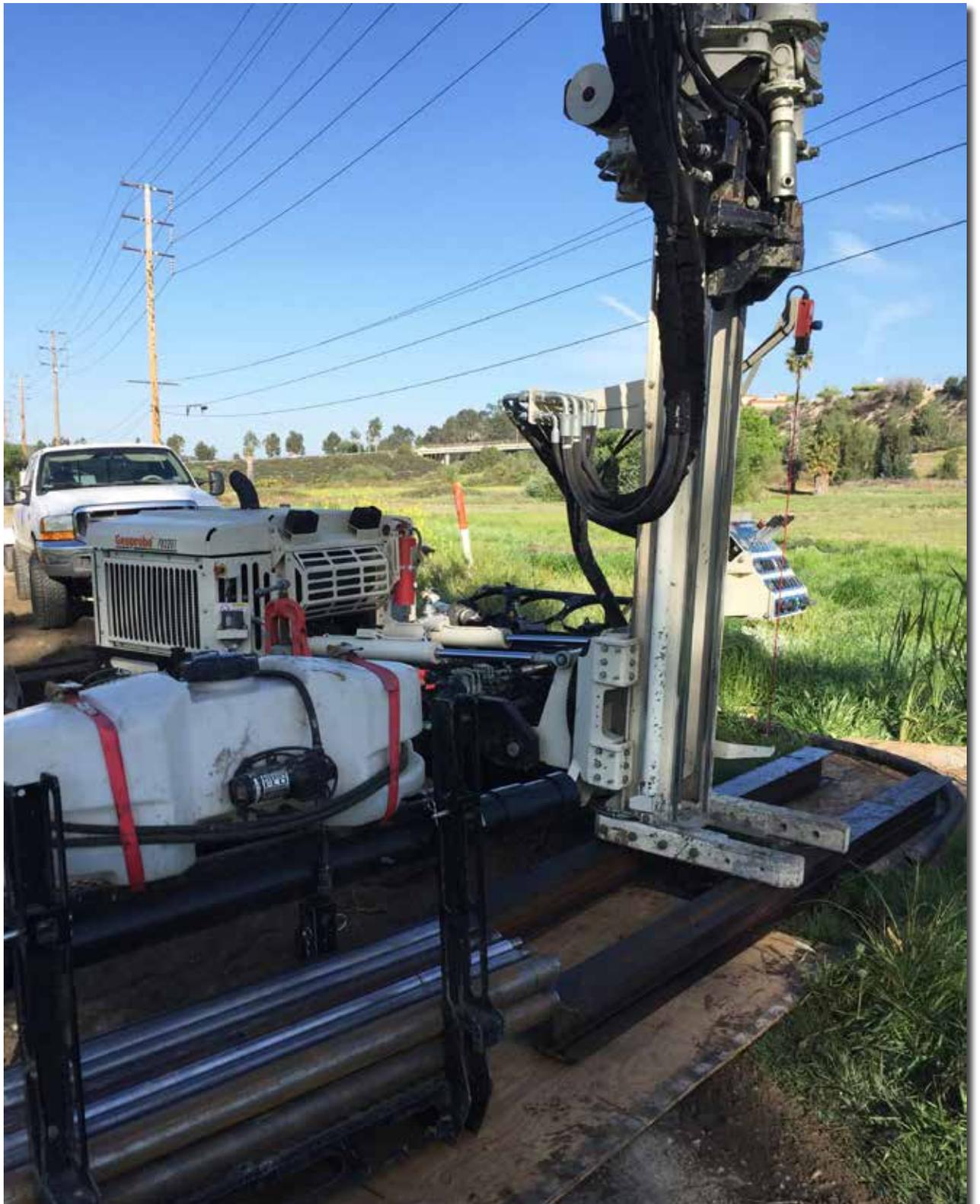
One of the abandoned CPT boreholes had grown up to 9 inches in diameter at the surface, and had a flow rate of about 6 gpm.

Before mobilization on the second day, the CoreProbe field team fabricated a 3.25-in. OD probe rod attachment to the high volume cement pump (pressure relief valve and pressure gauge) and brought in 'I' beams and plywood sheeting for stability.

Two truckloads of gravel were brought in to make sure the cement trucks, pump truck, and 7822DT did not sink! CoreProbe used the 7822DT blade to level the gravel in the only dirt road.



The grout mixture is pressure pumped through 1.5-in. rods using a Geoprobe® GS1000 grout machine.



With 'I' beams and plywood sheeting for stabilization, the 7822DT is ready to plug one of several leaky abandoned CPT boreholes. One of the abandoned boreholes had grown up to 9-in. in diameter at the surface, and had a flow rate of about 6 gpm.

Only half loads of ready mix were used due to the heavy grout material that made the trucks top heavy, and to also prevent the trucks from sinking in the soft muddy dirt road. Water tanks were filled from the water producing borehole to use during the entire project. The 'I' beams and plywood sheeting were set in place to avoid sinking during rod retraction; then the field team was ready to roll.

The 7822DT was situated over the beams, then drove 3.25-in. rods to 42-ft bgs with an expendable drive point into the flowing borehole, hoping not to lose the points on the way down. A concrete contractor used a mix of 20 percent barite and 80 percent Portland cement grout to pressure grout, bottom up, as the rods were retracted, making sure enough product in the producing zone would plug the flow and allow the grout mixture to set. CoreProbe continued to grout the

"The job was a complete success! We plugged all boreholes, and are now scheduled to plug new locations that sprang up due to the recent heavy rains."

**Stewart Graham, PG • President
CoreProbe International • San Gabriel, CA**

remainder linear footage of the boreholes, building sufficient pressure to close all piping cavities.

In addition, CoreProbe is going to pressure grout an old well that leaks in the south side of the property. This well was located via geophysical methods. A ramp will be used to avoid equipment sinking in the soft saturated ground around this well. Stay tuned....



Stearns Drilling uses their 7822DT to work on a bedrock study for the Michigan Division of the U.S. Geological Society in conjunction with Western Michigan University.



Ron Dutmer, Driller's Helper, and Tom Ulrich, Driller/Crewchief with Stearns Drilling use a Macro-Core® sampler in Ohio to retrieve bio samples from screened intervals of a nearby well. Each sample had to be capped and sealed as it was removed from the core liner.



With 30-ft. ash ponds on either side, a 7822DT, with a tubing pump (and check ball), collect SP16 groundwater samples from between 50- to 60-ft bgs. The machine is located on a road between ash ponds with 3-foot-high berms.

Stearns Drilling's 7822DT ... Outstanding in its Field

The Stearns Drilling 7822DT celebrates its fifth birthday this fall. Since first arriving in the Dutton, MI, office in 2012, the machine continues to keep its favorable status with Tom Ulrich, Driller with Stearns for nearly 20 years. With barely enough time for routine maintenance, the machine keeps Tom busy. "The machine is a time-saver for me, and because of the drop rack system, I can place the tooling and work table in a central location where it's easily accessible and best fits my needs," Tom said. "I love working with this machine!"

"I love working with this machine! Because of its versatility, I'm not pigeon-holed into one aspect of drilling. I stay busy because the 7822DT can auger in wells, do geotech drilling, collect samples using direct push, even rotary drill. It's compact. And it's very adaptable. What more could you ask for?"

**Tom Ulrich • Driller/Crewchief
Stearns Drilling • Dutton, MI**



A 7822DT uses trailer ramps and soil to enter a tank farm berm at an abandoned factory in Niles, MI. Stearns Drilling was onsite to collect soil and groundwater samples.

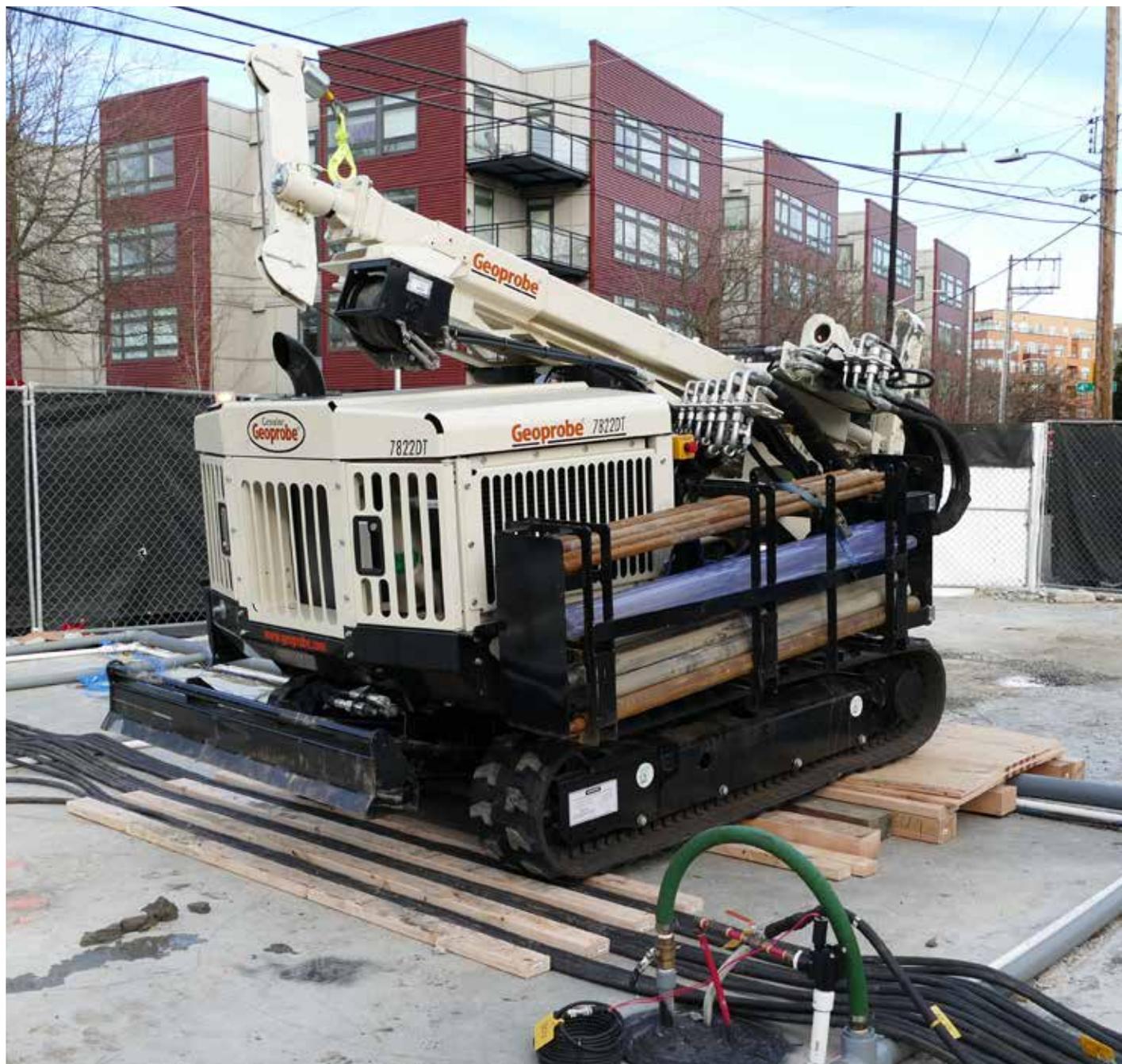


John Deitrick, Driller, and the Stearns Drilling 7822DT retrieve soil samples for a future I-75 bridge reconstruction project in Allen Park, MI.



Tom Ulrich, Driller/Crewchief, is caught sitting down on the job while taking soil samples in an old landfill to help determine the extent of the contamination cell.

7822DT Meets Required Checklist for Holocene Drilling's Urban Needs



(above and right) Soil confirmation borings had previously been completed on this Electrical Resistance Heating (ERS) site in downtown Seattle, WA. Holocene Drilling returned with their new 7822DT to confirm the project's success. The small footprint of the 7822DT allowed the company to access the boring locations within a very confined area.

Holocene Drilling, Inc., servicing the Seattle, WA, and Portland, OR, markets, constantly works in crowded urban areas. That's why, when the task came to invest in another drill rig, the company put together a 'Must Do' list that the new machine had to meet.

Holocene needed a powerful direct push rig that could penetrate the varied Pacific Northwest subsurface conditions, but was small enough to access even the most crowded urban sites. They also needed the versatility of a low overhead rig that could sample soil and groundwater, and could set small diameter monitoring wells. They found that the Geoprobe® 7822DT met those requirements.

The company often encounters buried concrete slabs. **With the power of the GH64 hammer and its rotational features, the 7822DT can core through unexpected buried concrete and continue to work without interruption.**

Holocene recently conducted confirmation soil borings on an Electrical Resistance Heating (ERS) site in downtown Seattle. Holocene initially drilled and installed over 40 electrodes and thermal monitoring points on this small urban site, and returned with the 7822DT to confirm the project's success. Without the narrow footprint and maneuvering ability of the 7822DT, they would not have been able to access all the confirmation boring locations.

This ongoing project will eventually facilitate the redevelopment of a valuable piece of commercial urban property.



Holocene Drilling developed a checklist their new drilling machine had to measure up to. The Holocene team found a machine to meet those requirements, and took delivery of their new 7822DT late last summer.

Holocene Drilling's Machine Checklist

- ✓ Powerful Direct Push Machine
- ✓ Ability to Penetrate Varied Pacific Northwest Subsurface
- ✓ Versatility of a Low Overhead Rig
- ✓ Sample Soil and Groundwater
- ✓ Install Small Diameter Monitoring Wells



Working in the city provides a different set of restrictions for drill rigs. The compact footprint of the 7822DT helps it maneuver within the confines of alleyways and between buildings.

Landshark Drilling Continues to Grow and Develop More Geoprobe® Services



One of Landshark's 7822DTs is angle drilling a directional boring for tiebacks.

Landshark Drilling, located in southern Ontario, Canada, provides an extensive list of environmental drilling, geotechnical drilling, and environmental services throughout the entire Ontario market. According to John Theurer, who is the head of Business Development and Operations for Landshark, they have invested in the newest inventory of drilling equipment in the industry, and have expanded rapidly to become a leader in redefining the Canadian environmental and geotechnical drilling industry.

Landshark currently operates three Geoprobe® 7822DT machines and one 6620DT direct push machine, all capable of probing, augering and rock coring. They use either Macro-Core® or dual tube soil sampling systems with their direct push platforms, and SPT (Standard Penetration Testing) with automatic drop hammers and augering capabilities.

"We started with Geoprobe® as it was the market-accepted rig by most of our clients/consultants," John said. "It also provided us with the most flexibility for geotechnical and environmental projects."

As shown in the photo to the right, one of Landshark's ongoing projects is to complete environmental and geotechnical borings along a major roadway in downtown Toronto. For this project, they complete between 150 and 200 borings every 4 weeks using a combination of dual tube, MC5, and split spoon soil sampling. Most of the boreholes are between 15- and 20-feet deep.

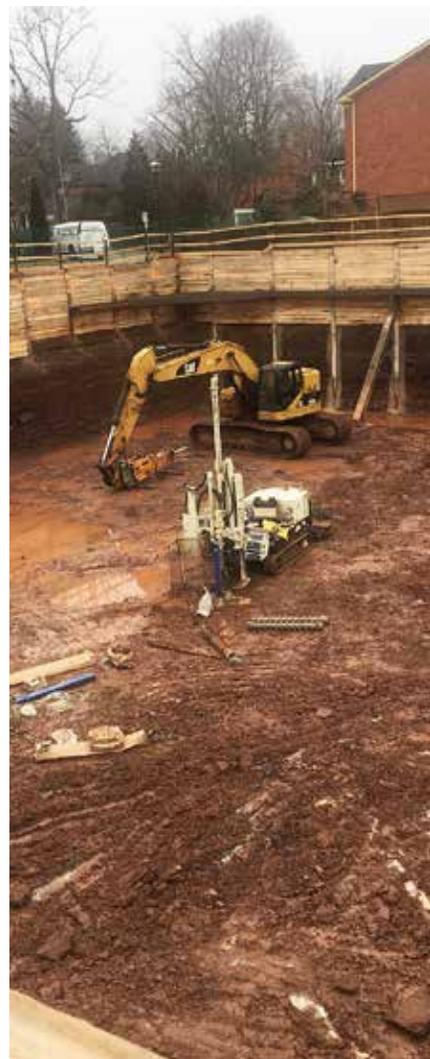
Landshark's licensed operators install 1- to 4-in. monitoring wells through 3.25- or 4.25-in. hollow stem and solid stem augers into the water tables. They

carry 1-, 1.5- and 2-in. PVC pipe, and are able to install deep wells through multiple water tables with no cross contamination, using a variety of grouting methods.

"We are proud to recognize that our crews continuously perform 200 to 250 feet of direct push footages on a daily basis," John added.

The company, who has been in operation for over four years, offers drillers the ability to work for themselves through their unique owner/operator ownership opportunities.

(Why did a Canadian company adopt the name 'Landshark?' The President of the company is a Jimmy Buffet fan!)



A 7822DT is lowered by crane into a shored excavation area for an environmental investigation.



A 7822DT completes monitoring well installation airside at Pearson International Airport.



All Landshark employees are E-Rail certified for work on all Canadian Railroad lines.



A Landshark Drilling field team works on an environmental investigation which required the installation of multiple monitoring wells along a sensitive watershed.



The small footprint of the 7822DT allowed Landshark Drilling to operate at a busy intersection in downtown Toronto. The 7822DT averaged 270 feet per day of direct push for the large infrastructure project.

Direct Push Services in Utah Can Always Count on EDNA



(above) The Direct Push Services field team squeezed inside the new substation area to install copper grounding rods for their project in central Utah.



(l to r) Ryan Roodbol, Sean Bromley, and Jon Thompson drilled to 133 feet and 183 feet at all three locations to install the grounding rods.



The DPS Field Team and equipment got a little dusty as they worked!

Solar grids were constructed in the central region of Utah which run through the state into Nevada to help meet the demand for more power. For each solar grid, a new substation was also constructed. That's where Direct Push Services in Salt Lake City, UT, entered the picture.

Direct Push Services installed copper grounding rods at each new substation which required the placement of four grounding rods between 133- to 183-ft. bgs. In order to reach those depths in soil conditions consisting of largely layered sand, gravel, and cobbles, as well as 3- to 15-ft. layers of weathered shell, DPS needed to have 4.5-in. diameter holes. Those drilling conditions did not allow for direct push or auger methods, so DPS used ODEX.

According to Sean Bromley, Owner of Direct Push Services, "We were extremely grateful to have the breakout wrench and the overhead winch on the 7822DT to hold and manage the weight of the downhole hammer and drill tooling at those great depths. Once we were able to trip the hammer out and begin installing the grounding rods, we fed the copper wire through the winch pulley to lower it down the hole and keep tension on it while backfilling and retrieving the outer casing," he added. The grounding rods were 10-ft.-long 1-in. solid copper rods which were heat welded to a spool of 3/4-in. copper wire. DPS was on this project at three separate sites for ten days.

DPS would drill and set multiple grounding rods between 133 and 183 feet. Even though the site was out in the "middle of nowhere," the drilling conditions were tight with little wiggle room.

The field team worked on elevated soils both outside and inside a fenced area at the same time the substation was being constructed.

Those overseeing the project were impressed with the small footprint and capabilities of the 7822DT.

"Our field team showed great ingenuity for getting the necessary drill rods and tooling into tight areas, as well as being able to pull an air compressor in to place," Sean said. "With the help of Geoprobe® engineers, we were able to use 4.5-in. tooling as the outer drill string and attach a downhole hammer system with a casing advancer."

"The 7822DT we used on this project is nick named 'EDNA,'" Sean added, "after Ryan Roodbol's grandmother who passed away last year. She raised him from a little boy, and he could always count on her for whatever he needed."



The new grounding rods Direct Push Services installed for the Utah solar grid project will help meet the demand for more power in the state.



Subsurface work was completed at the same time a new substation was constructed at each of the three sites.

7822DT & Air Rotary Success

A gas station located within the urban core of a major midwestern city was confirmed to have leaking underground storage tanks. Since there was limited access to the drilling locations, RAZEK Environmental, in Louisburg, KS, brought in their 7822DT to complete the air rotary rock drilling work. Tony Poulter and Rob Ray of RAZEK had previously used the 7822DT with air rotary rock drilling so they were confident in a successful outcome.

Scope of work:

- 20 soil borings advanced to bedrock, ranging from 7- to 15-ft. bgs
- 20 borings using 10 5/8-in. OD augers to bedrock for 8-in. surface casing installation
- 20 air rotary boreholes through weathered limestone and into bedrock for 2-in. monitoring well installations

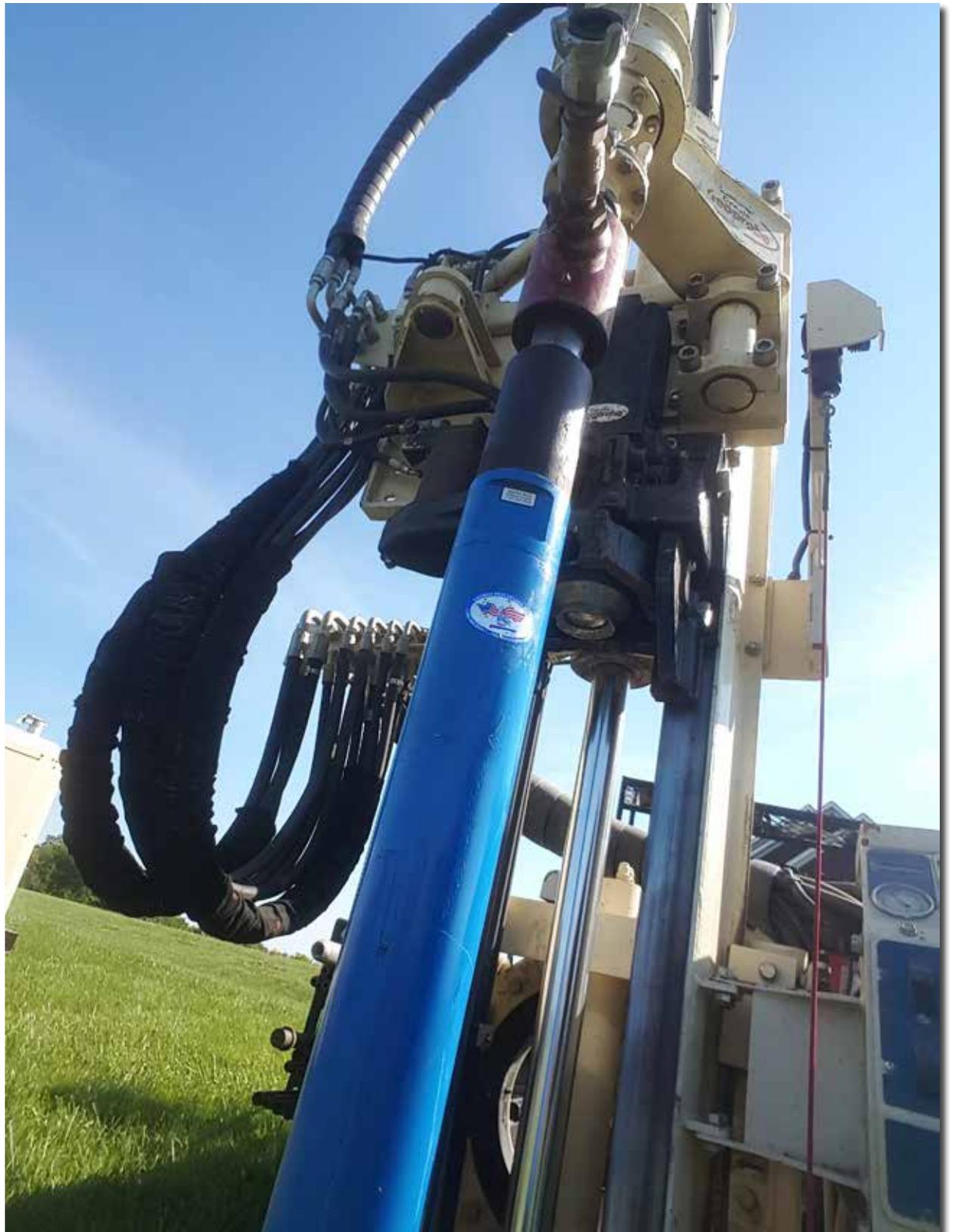
Project challenges:

- Delineating petroleum impacted groundwater within fractured limestone
- Urban setting with limited access to drilling locations
- Identification of migration pathways for petroleum contaminants in limestone rock

Tony said their 7822DT was ideal for drilling under the canopy at the gas station, behind the gas station building (with 6 feet of clearance),



With only a 6-ft. access alley, the 7822DT had inches to spare while at some of the more confined work areas.



RAZEK Environmental used air rotary with their 7822DT on an underground storage tank site. All of the drilling and well installations were successfully completed within 2 weeks.

within residential backyards, under low hanging trees, along sidewalks, and in high-traffic areas.

"Our Geoprobe® 7822DT had no problem turning the 10 5/8-in. augers down to bedrock in order to set 8-in. surface casings," Tony said. They used a downhole hammer attached to the augerhead with a swivel to advance a 6-in. diameter boring into the weathered limestone.

The geologist onsite was able to screen the rock cuttings with a handheld PID to measure hydrocarbon levels during drilling operations. The readings were used to determine the vertical extent of hydrocarbons at each location. As an added benefit, Tony said, "We were able to determine the depth of competent limestone (confining layer for groundwater) across the area at depths ranging from 30- to 40-ft. deep."

This information was used to map the bedrock and ultimately provide a guide for further delineation of the migrating petroleum hydrocarbons through the weathered limestone.



Soil sampling with the 7822DT to bedrock at 45 feet, augering to bedrock at 45 feet, then air rotary to 57 feet to set a 2-in. monitoring well. All in a day's work for RAZEK!

7822DT

Geoprobe® VIDEOS



MACHINES • TOOLING • SONIC
DIRECT IMAGE® • MAINTENANCE

New

Geoprobe® 3230DT COMBO RIG

Geoprobe® 8150LS HIGHLY PRODUCTIVE

20 CPT PRESS Flexible CPT Mast Option

Geoprobe® Indexing Rack
Safe • Easy to Use
Cost Effective • Efficient

Geoprobe® 78 SERIES FEATURES
Overhead Hydraulic Winches

3.75\"/>

Spring Assisted Swivel Pull Cap

Sample Sheath

"Have you checked out our growing Geoprobe® video libraries online? From specialized tooling, to servicing your hammer, to machine operation. They're available any time of day! I think you'll find it to be a very helpful resource."

Steve White
Geoprobe® Sales

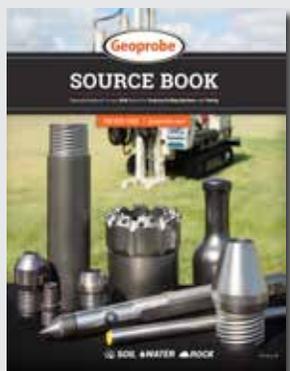
New videos are available at

www.geoprobe.com/video

Check back regularly as videos are added often.



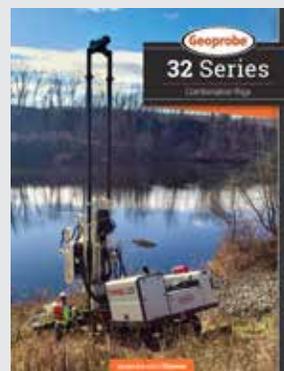
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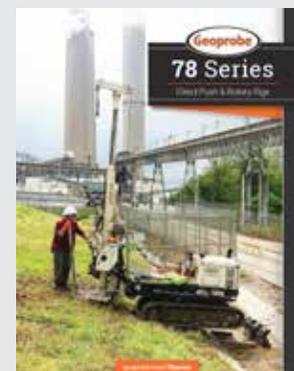
Source Book



Sonic Brochure



32 Series Brochure



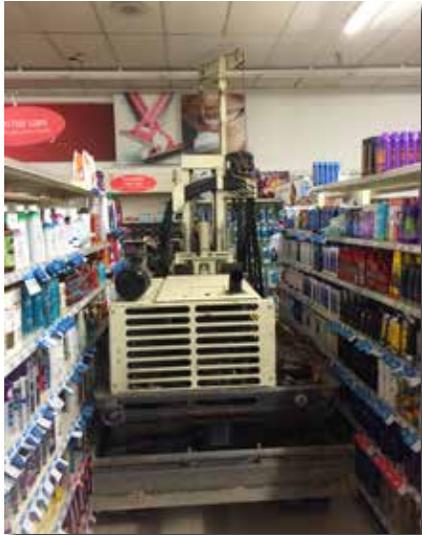
78 Series Brochure

Request your free copies of any of our printed literature at www.geoprobe.com/print.

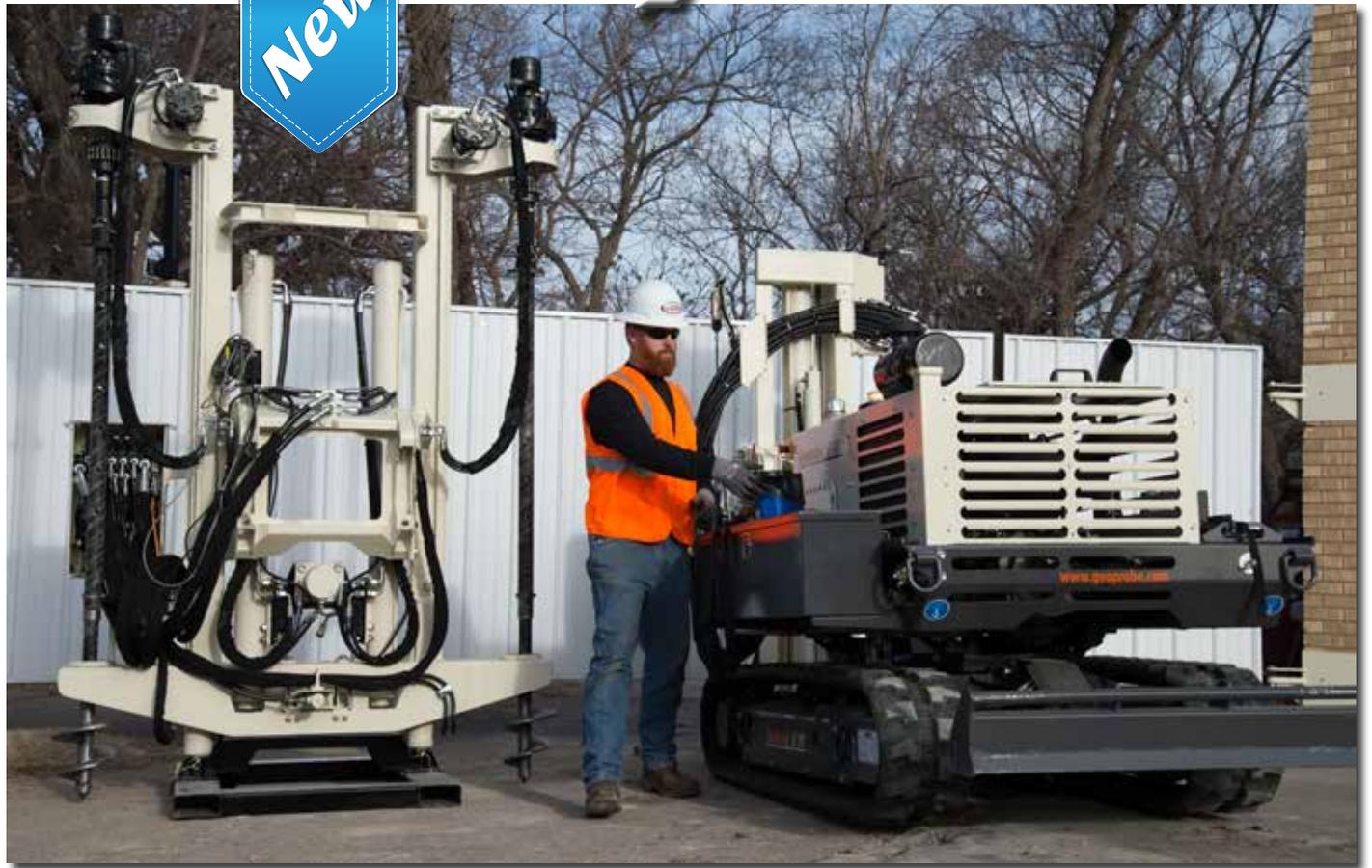
Small, Modular Direct Push Machine or 20-ton CPT Press

67 GEOPROBE® Series

On the next few pages you'll see how Geoprobe® 6712DT Owners are thinking outside the box of typical uses for this limited access machine. Lots of power here that doesn't disappoint. Are you interested in the capabilities of this machine and how it will fit in your fleet? Call us!



Enviro-Dynamics in Hebron, IN, uses a 6712DT with low clearance option inside a grocery store with inches to spare.



Josh Dreiling, Geoprobe® Engineer, prepares to move the 6712 power unit module away from the direct push mast and connect it to the 20-ton CPT Press unit (left). The 20CPT Press has 20 tons of hydraulic downforce, and features two built-in soil anchors, adjustable feed rate, and top and bottom hydraulic rod clamps.



Riding in Style! This Ford F550 transport is the perfect hauler for your 20CPT Press and 67 Power Unit. Call us for details!



Doug Koehler, Geoprobe® Sales, operates the 20CPT Press on the 67 Series power unit. This 20-ton CPT Press is another way for you to economically diversify your business with Geoprobe® products.

"Big news for our 6712DT! A new 20-Ton CPT Press Option can easily and quickly replace the Direct Push Mast module in less than 15 minutes. It can also be mounted on a skid steer. Plenty of power for CPT projects."



Tom Wardell
Geoprobe® Sales

6712DT Powerful Features!

- Strong Direct Push Hammer System
- 20-Ton CPT Press Option
- Optional Modular Design
- Side Frame Rail System
- Low Clearance Option
- Side-Shift Mast
- Rear Transport Blade

Need info for the 6712DT? ... geoprobe.com/6712dt
Call us for a 20CPT Press Demo! ... geoprobe.com/20-cpt-press

New Electro Kinetic Remediation Technology Used in New York

EPhase 2 in Huntington Station, NY, utilized a Geoprobe® 6712DT to install the first U.S. application of a newly-developed Electro Kinetic Field (EKF) remediation technology from Clean Ground Solutions, Inc. to successfully remediate a site highly contaminated with petroleum in just 120 days.

The 6712DT was mobilized to Queens, NY, to a site with a persistent and ongoing historical contamination problem. Although most of the impacted soil had been removed, some deeper soil contamination remained. Groundwater was contaminated nearly 20 feet into the water table. Traditional chemical injection and surfactant treatments had failed to produce results, so Barbara and Scott Yanuck, Co-Owners of EPhase 2, decided to deploy the EKF remediation technology, which involved installing steel rebar in a grid pattern, and inducing a low-level electrical current in an optimized pulsed voltage pattern to break down contaminants in impacted soil and groundwater.

“The flexibility of our 6712DT allowed fast and cost-effective installation of this leading-edge remediation technology,” Barbara Yanuck, Co-Owner of EPhase 2, explained. “We obtained a significant reduction in contaminant levels in groundwater without the addition of water or treatment chemicals, and, most importantly, **without the waste or disposal requirements generated by traditional remediation methods.**”

The 6712DT was well suited to the job with the two-day installation covering a total treatment volume of 6,000 tons to a depth of 35-ft below ground surface. **The small size and agility of the rig made it possible for the retail businesses to continue operations without any interruption throughout the entire installation process.** After 120 days of operation, the contaminants were reduced to levels that allowed for regulatory closure of the spill after 17 years and numerous previously-unsuccessful attempts at remediation.

Geotechnical Uses

EPhase 2, who offers environmental and geotechnical drilling and remediation services, also found the 6712DT to be an excellent choice for installing geothermal heating and cooling systems, which include direct exchange earth loops installed to various depths. Scott said the rig is “small and agile enough to easily access locations throughout each property with minimal potential for damage, and is powerful enough to efficiently complete installations to depths of 100 feet or more.”

In addition, EPhase 2 has utilized the machine, equipped with the Geoprobe® DH100 automatic drop hammer system, to complete geotechnical borings at several sites. “As with the other examples,” Barbara said, “**the rig’s versatility and ability to access restricted locations provides the opportunity to complete projects where traditional drilling equipment cannot.**”



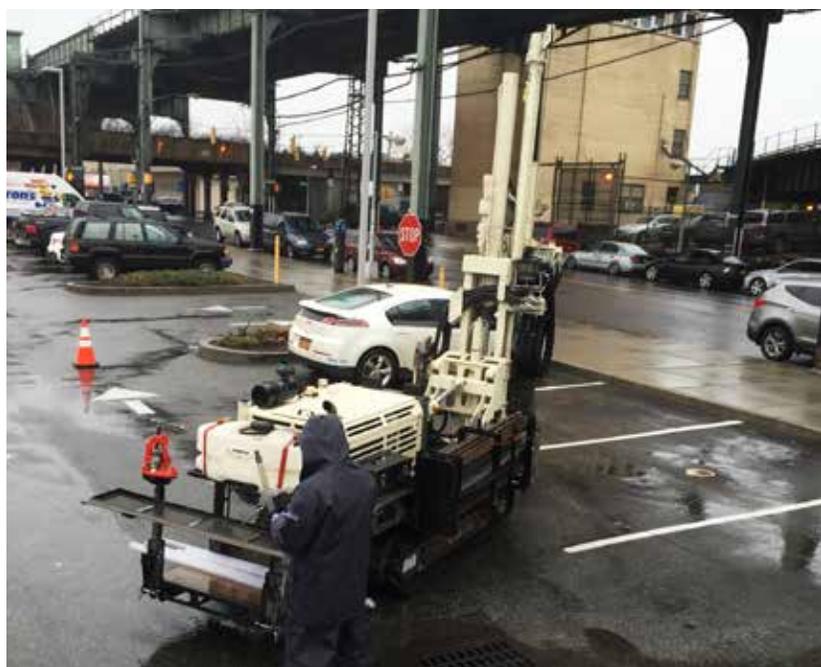
EPhase 2 uses the auto drop hammer on the 6712DT to complete geotechnical borings close to nowhere!



Because of a persistent and ongoing historical contamination, Brian McCabe and Steve Bitetto (in front of rig), with EPhase 2, install the new EKF remediation technology at a site in Queens, NY.

“We’ve found the Geoprobe® 6712DT to be extremely versatile. We’ve been able to leverage the operational advantages of this machine in many innovative ways.”

Barbara Yanuck • Co-Owner
EPhase 2 • Huntington Station, NY



Retail businesses in the area were able to continue with operations without interruption throughout the remediation installation process. Steve Bitetto preps the 6712DT for the next installation location.



Steve Bitetto, at the controls of the 6712DT for EPhase2, installs geothermal heating and cooling systems, including direct exchange earth loops to various depths.



(l to r) Drillers Scott Bombard, Derek Dell and Project Engineer, Ryan Campbell, try to stay warm in their makeshift wind fort on the harsh tundra in northern Alaska.



Another damp day in southeast Alaska as Gary Erickson operates the 7822DT.



Air rotary casing advancement at a 45 degree angle with the 7822DT.



Scott Bombard, Driller, displays a high level of dedication and filthiness as he advances air rotary tooling through murky water.

Discovery Drilling Finds Right Mix

Contributed by DJ Wardwell, Operations Manager for Discovery Drilling in Anchorage, AK

As a Driller's Helper, and now a Driller, it didn't take long for me to become a "Geoprobe® Enthusiast." And it didn't take long, after traveling all over our great state using our Geoprobe® machines in all manner of ways, to realize we weren't using our rigs to the fullest extent.

Our busiest platforms these days are our 7822DT, 6712DT(two), and 54LT.

6712DT Changed Everything

The modular design of the 6712DT has changed everything for us. The ability to separate the tower, unit platform, and tracks from each other has opened up a plethora of logistical options. In Alaska, where many jobsites are accessible only by small aircraft, landing craft, or helicopter, the simple modular design of the 6712DT has alleviated many logistical headaches. A pair of bolts and a few quick connects later, the tower is separated from the rest of the machine, and the load is split for easy air mobilization in smaller aircraft. We've slung our 6712DTs to the tops of many mountains, as well as extremely remote locations with no access options other than helicopter. **The 6712DT truly is the perfect drill platform for our Alaskan drilling adventures**, and we've successfully employed some very non-traditional tooling options with it (air rotary, DT45, wireline coring, and more!). **It's been a real game-changer for us, and the Geoprobe® Team has been extremely supportive in helping us employ the 6712DT in some very unconventional ways.**

7822DT Is Phenomenal

After I attended the 2014 Geoprobe® Open House and had spoken to drillers from all over the world, it became clear that our fleet was lacking a 7822DT. Everyone had positive things to say about the machine, so we purchased one shortly after I returned to Anchorage. **It turned out to be a very wise purchase, and opened the door for us to complete more challenging projects and efficiently run larger tooling options** (DT45, specifically). Our drillers love the machine's extra stroke and power, and the on-board break-out tool allows us to complete harder jobs faster, on top of providing extra convenience and options for the operators. **Pound for pound, the 7822DT is a phenomenal machine.**

54LT ... The Little Rig That Could

The 54LT has been an amazing supplement to our ever-growing fleet of Geoprobe® machines, often being the solution to a big project that requires a small drill. We've used it for its traditional direct push applications in some very interesting locals, and like it's big brother, the 6712DT, it has now taken to the sky! Once we realized we could incorporate a method of air rotary using the adjustable percussion-to-rotation valve on the GH42 hammer, we started slinging our 54LT to remote mountain-top sites to assist with communication tower construction. Watching the 54LT fly through the air on a helicopter long line is quite a site! We're really pleased with the performance and versatility of the 54LT.

Enthusiastic Geoprobe® Service

We always know that however major, minor, or downright ridiculous our problems might be, someone at Geoprobe® is always there to enthusiastically assist us. Considering we are just one out of countless drilling contractors all over the world who look to Geoprobe® for support and technical guidance, I try not to take for granted the amount of time and effort their field technicians put into helping us. **We're fortunate to have a vendor**



Soni Makihele, Driller, advances air rotary tooling through bedrock on a remote mountain top. The 6712DT was mobilized via helicopter long line.

who not only provides us with superior drilling equipment and tooling, but who also gives us a level of customer support that is unparalleled throughout the industry. Thank you to the team at Geoprobe Systems®, for helping our business succeed in ways we never thought possible. You can count on Discovery Drilling to push your drills to new extremes for many years to come!



Darrin VanDehey, Driller, uses air rotary with a 6712DT.



A 5-ft. rock core collected by DJ Wardwell, Operations Manager, with a 6712DT.



Scott Bombard, Driller, uses air rotary with a 54LT to facilitate grounding rod installation.



Darrin VanDehey advances air rotary tooling with the 6712DT sitting at a substantial angle.



Richard Banzhaf, Driller, collects 3-in. MC7 soil samples using the 7822DT.

Small Company Success Based On Great Employees and Reliable Equipment

Contributed by Rob Mores, Owner of Enviro-Dynamics in Hebron, IN

I'm proud to celebrate 20 years as a partner of Enviro-Dynamics, an environmental drilling company based in northwest Indiana. My wife, Amy, and I started the business in 1997. I had 10 years of experience in environmental contracting and consulting, and Amy had over six years sales and marketing experience. I would handle field operations while Amy manage the administrative and accounting functions.

We started out with a loan co-signed by my brother, and money liquidated from both of our 401Ks. That may not seem very risky; however, we had a one year old and two year old daughter, a mortgage payment on a new house, and all the other expenses of a young married couple.

In the beginning, my vision was simple: provide direct push services as an efficient and cost-effect alternative to traditional drilling methods. Our first machine was a Geoprobe® 4220 mounted on a Kawasaki Mule. Tooling included the basics: 1-in. and 1.25-in. probe rods with Large Bore and Macro-Core® soil samplers and mill-slot groundwater sampler.

Early on, it became very apparent that Geoprobe® was a great partner for our equipment and tooling needs. I was impressed with their continued innovation with both machines and tooling, and with their excellent customer support.

Within the first two years, we purchased our first 5400 truck-mounted machine and moved the 4220 from the Kawasaki Mule to a skid-loader capable of fitting through a 36-in. doorway. We converted the skid-loader from gasoline to propane to target limited access work, both indoors and out. However, we found there was a greater demand for outside limited access work requiring a more versatile ATV type rig.

In 1999, we sold the 4220 skid-loader and purchased a Geoprobe® 54DT. **The 54DT opened up many more opportunities due to its size, power, and versatility.** It's also the only machine that put us in the Geoprobe® 100 Club two different times! And talk about reliable ... we put well over 5,000 hours on the 54DT before we finally sold it!

In January 2000, we hired our first employee. We also added dual tube to our tooling options. The dual tube system was one of the best tooling additions Geoprobe® made to their lineup. **Dual-tube sampling dramatically increased productivity, sample quality and integrity.**

Prior to dual tube, a decent day of continuous sampling was 125- to 175-linear feet in a day. Since then, we have completed over 300 linear feet per day using dual tube. **There were even a few times we reached over 400 linear feet in a day.** The larger dual tube rods also allow us to install small diameter wells using expendable cutting shoes and points.

In 2003, we purchased a 6610DT with an auger attachment which correlated into a sharp increase in our workload by having augering capabilities and the ability to use larger tooling.

In 2007, we added a 6600 truck with a PC111 carrier, and we had grown to three fulltime operators. Our capabilities had expanded to soil, soil gas, and groundwater sampling, installation of both standard and prepacked screened monitoring wells, injection services, and installation of 2-in. and 4-in. wells using hollow stem augers.

As years progressed, our 5400 resided in three different carrier trucks. We also added a 5410 and a 66DT. Except for our 6600/PC111, we have replaced all these rigs with a 6712DT and a 7822DT.

Today, we have four full-time operators, including myself, and our Geoprobe® fleet includes a 6600/PC111, 6712DT (low clearance cylinder), and 7822DT. We're also working with Geoprobe® to refurbish our 6600 and mount it in a different truck.

I believe this lineup gives us options to work in a wide variety of environments including all-terrain settings, limited access, and low-overhead clearance without sacrificing power and performance.

Looking back 20 years ago, I would have never imagined that we would own a Geoprobe® machine capable of setting a double-cased well by turning 6.25-in augers

to 25 feet, setting a 5-in casing, then advancing 3.75-in. probe rods through the casing to set a 2-in. prepacked screen well to 50 feet!

We have owned nine different Geoprobe® rigs over the past

20 years. **Our decision to stay with Geoprobe® equipment and tooling has been one of the greatest keys to our success. The continued innovation and outstanding customer support from Geoprobe Systems® has helped us grow into the company we are today.**

However, it's obvious that machines can't run on their own. Reliable and competent employees who operate our machines have also been critical to our success. Mark Montalvo (with Enviro-Dynamics for 12 years), Steve Baltus (9 years), and Tobin Mielenz (5 years) are in the field every day representing our company well and servicing our client's needs. I'm extremely confident in their knowledge and experience and their ability to operate the best equipment in the direct push industry.



Rob Mores and his father, Rich, use the 4220 to collect soil samples on an elevated railroad embankment in Chicago. A crane lifted the machine onto the top of the embankment because of the steep side slopes.



The 54DT is used to advance a series of 40 to 45 degree angled rods along a building to collect SP15 groundwater samples under the foundation.



Using a 54DT and Macro-Core® sampler to collect soil cores on top of a landfill to measure clay/soil cap thickness.



The Enviro-Dynamics Geoprobe® fleet: 7822DT, 6600 with PC111 carrier, and 6712DT with low clearance option.



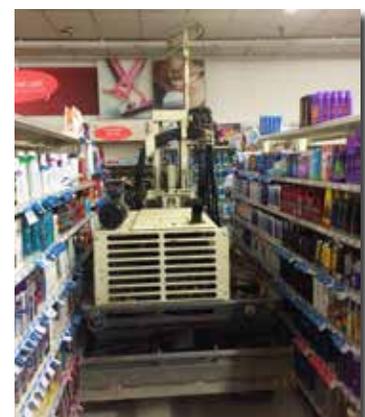
6712DT



Mark Montalvo (left) and Tobin Mielenz use the Enviro-Dynamics 7822DT to perform dual tube sampling to installing 1-in. temporary wells.



Steve Baltus navigates the 6712DT through some rugged terrain to complete discrete groundwater sampling up to 90 feet using an SP16 sampler.



Cleanup in Health & Beauty Aids. The 6712DT, with a low clearance option, has only inches to spare between aisles.



Toby Mielenz (left) and Rob Mores use a 7822DT for angle probing to install 1-in. sparge wells.

(left) Rob Mores uses 6.25-in. hollow stem augers to install a 4-in. groundwater extraction well.

Summit Drilling Finds Veterans Important Asset for Company

Summit Drilling, with offices throughout the eastern U.S., is actively participating with a Veterans Transition Assistance organization named **Bridging The Gap** to add additional talent to the company's roster. **Bridging the Gap** is a veteran-owned, 503 (c)(3) non-profit that has built an effective process for helping military veterans integrate into a civilian workforce. The system works in partnership with vet-friendly employers, and is thought to be more effective than traditional and highly competitive job postings, staffing companies, newspaper ads and job fairs.



(left to right) Casey Christian, Driller's Assitant (U.S. Coast Guard & Army/National Guard); Denis Crayon, Director of Health & Safety and former Driller (U.S. Air Force); John Boehm, Licensed Driller (U.S. Marines); Nick DelVecchio, Corporate Buyer (U.S. Marines); John Passananti, Fleet Director (U.S. Marines). Not pictured: Luis Mojica (U.S. Army/National Guard).



With multiple models of Geoprobe® machines in their drilling fleet, Summit Drilling completes drilling and installation of monitoring wells that enable subsurface investigations of groundwater to geotechnical soil borings that confirm bedrock in a broad range of geologies.

Summit Drilling provides a wide range of environmental and geotechnical services throughout the Eastern U.S. They have been partnering with Geoprobe Systems® since they purchased their first Model 5400 in 1995. Since that time, they have added multiple direct push machines to their fleet, including four 7822DT rigs currently out on jobsites.

As with other drilling companies, finding and keeping quality drillers at the controls of their rigs is important to Summit Drilling's continued success. Success in the field is dependent on many factors ... training, teamwork, real-time situational analysis, communications, safety, equipment and a personal commitment to doing the job right. All are important factors in accomplishing the objective.

Like many aspects of military operations, drilling can be very tough work that requires specially-trained teams to operate highly

technical and sophisticated equipment – in conditions that are often difficult.

To better support veterans, Summit looks to the Veterans Transition Assistance organization, **Bridging The Gap**, to add talent to the employee roster.

"This unique program is a win-win opportunity", states Tory Donnelly, President of Summit Drilling. "The qualities we find in military veterans is congruent with what is needed to perform this type of work successfully," continues Tory. "We look forward to a long and productive relationship with **Bridging the Gap**, and sharing a mission to provide opportunities to the people who have so bravely served our great country."

Nick DelVecchio, Summit's Corporate Buyer and former U.S. Marine, said, "You go in at a very young age and grow up there. You

come out more mature and with a sense of how to approach things. You have strong attention to detail. You learn to be punctual, accountable and very disciplined ... to have pride in what you do."

Denis Crayon, CHST and Director of Health and Safety for Summit Drilling, who served in the U.S. Air Force, summed up how military experience has translated/helped him.

Discipline. First and foremost, this is one of the hardest assets to learn and to develop but indispensable for growing up.

Responsibility. Show up on time and be prepared for the day and tasks ahead.

Respect. Show respect to superiors and team members. Disrespect was not tolerated. No individual is greater than the team.

Training. On-the-job training in order to become proficient in my job. Being trained by those who came before me was all important and showed the need for continuity in any operation.

Recognition. Everyone likes to be recognized for a job well done. It can oftentimes provide motivation when money can't be offered.

Accountability. No excuses. You're trained what to do, how to do it, provided with the tools and equipment to perform, and an expected timeline to complete.

Mission. Having a mission provided focus for all involved and brought about camaraderie. Knowing the roles others played toward mission accomplishment was all important.

More information is available about Veterans Transition Assistance **Bridging the Gap** at bridgingthegap.net.



Casey Christian, U.S. Coast Guard & Army/National Guard



Denis Crayon, U.S. Air Force



John Boehm, U.S. Marines



John Passananti, U.S. Marines

In five years, Pro-Drill in New Zealand used a 6622DT to push over 150,000 meters ...

Most Versatile CPT Push Platform



Foundation investigation on iron sand sand dunes for wind turbine construction for power generation on the west coast of Auckland.



The machine's light weight and small footprint enabled testing on sensitive grass turf of QBE Stadium in Auckland.



Searching for a pot of gold!



Working on swamp mats for post testing of ground strength after driven wooden piles were used to improve ground conditions for a bridge construction on state highway upgrades.

written by Kris Hines, Direct Image® Specialist for Pro-Drill

The 6622CPT punches way above its weight, literally!! The small and compact platform enables the rig to get into tight access locations and inside buildings with ease, and the overall dimensions of the rig enable CPT pushes in the space of a car parking space without blocking traffic flow. And the next day our rig could be scaling up sand dunes or cross country over hills and dirt tracks and on the sloped face of a dam. The stability and low center of gravity of the rig makes it very adaptable to traversing across rough terrain, and its light weight ensures it won't get bogged down or stuck.

We have confidence that the power of the push cylinders will get the probe to the depth of a large, static-weighted rig. **Its secret is the powerful auger anchoring system.** Since there is no need to move the rig to drive in separate anchors, set up is fast! We just level the rig in the test location and screw the augers to depth. The augers cause minimal disturbance to the ground.

The percussion hammer on the rig allows us to use a concrete steel to punch a small hole through the concrete to enable the probe to be pushed into the ground below the slab. Mobilizing one rig to a site to complete all CPT testing saves time and money for our clients. No worries about the concrete cutting subcontractor not showing up!

The fact that the probe is pushed at the front and not in the center of the rig means that CPT tests can be performed close to foundations, footings, piles and buildings, allowing us to collect information as close as possible to areas of interest.

The speed of set up of the CPT rig is the key to us being able to have constant production rates of 180 total meters of CPT pushes in a day, every day. **In five years of CPT testing with the 6622CPT, I have pushed over 150,000 meters of CPT tests.**

Our Geoprobe® 6622CPT is truly the most versatile rig I have worked on and have seen in operation. It has enabled Pro-Drill to exceed the expectations of our clients and provide important data collection from locations and sites that would never have been possible with larger static rigs or smaller less powerful rigs.



Having the ability to set up the mast vertical while the tracks follow the slope of the terrain has given Pro-Drill the ability to perform soundings on hill faces and on dam faces without the need to dig in tracks or platforms.

"After spending over 3,000 hours on our Geoprobe® 6622CPT, I'm often left in awe of how adaptable and flexible this rig is. Everyday we have new challenges to face collecting CPT data. It's all made easier having confidence in a machine that I know is up to the task in every aspect."

**Kris Hines • Direct Image® Specialist
Pro-Drill • Franklin, New Zealand**



Pro-Drill fabricated a foot for the augers which they dyna-bolt to concrete slabs and foundations to perform successful pushes without cutting the concrete to screw in the anchors.

390 Times and Not One Failure

Long-time Geoprobe® Customer Experiences 100% Success Using Genuine Geoprobe® Products



Filled DT22 soil core liners recovered by GeoServ using Geoprobe® liners and a 6620DT. The integrated core catchers in the liners (shown at end of each liner) keeps the sample from falling out the bottom of the liner as the core is retracted.

After completing 65 borings in stiff- to medium-stiff clay, GeoServ, using their faithful 6620DT, was able to provide complete sample recovery using the DT22 system coupled with Genuine Geoprobe® liners with an integrated core catcher.

According to Dean Govan, Environmental Geologist and President of GeoServ in New Hudson, MI, "The core catcher was a critical component to the success of the project, providing 100 percent sample retention during the retrieval of the liner after advancement."



With a 100 percent retrieval success rate you'd be dancin', too! Robert Hansen, GeoServ Driller, is clearly pleased with the recovery results of the DT22 sampling system using a 6620DT.

The soil encountered during the investigation was a medium-stiff clay. Because of the nature of the formation (expanding clay), it was necessary to only advance half push between liner retrieval. In many cases, 5 feet of soil was recovered with a 2.5-ft. push. Dean said 100 percent sample retrieval was obtained in all 390 soil cores recovered. "Not one time during the duration of the project did we experience sample loss of the stiff clay," he said. "In the past, we've experienced problems with a portion of the soil core being left downhole using aftermarket liners fitted with core catchers or using liners without a core catcher." This caused delays or incomplete contaminant delineation for the GeoServ team. The only lack of sample recovery occurred from the occasional rock encountered which was easily overcome by pushing a solid point to displace the rock from the cutting shoe.

Dean summed up the work: "The consistency in the quality of the Genuine Geoprobe® product for the entire duration of this project was very impressive to me and was one of the many key pieces that made this project go so well! This is the level of quality we have come to expect from Geoprobe®, and it's what GeoServ strives for in our services – a good partnership!"



Because of the expanding clay in the formation, Robert Hansen, GeoServ Driller, sometimes recovered a 5-ft. soil core with only a 2.5-ft. push.

6620DT Keeps on Tickin'

In 2008, when Strongarm Environmental Field Services first purchased their Geoprobe® 6620DT, they had a very large sampling project on a very complex 2,800 acre remedial site assessment in Southern California. After completing hundreds of borings on the site with all sizes of Geoprobe® truck-mounted equipment, Casey Crosby, President of Strongarm, determined that "the 6620DT was the right piece of equipment for the job."

"We couldn't have anticipated how awesome this piece of equipment was for this site work," said lead driller Francisco Rodriguez. Over nine years later, as the project is winding down to completion, the Strongarm field team is still out completing borings down to bedrock with their 6620DT.

"It's amazing that over the years we have used the 6620DT on literally a thousand projects," Francisco said, "with absolutely no downtime. And it has taken a beating on some jobs! We take a lot of pride in the equipment we own," he said, "and feel like our **regular maintenance** and the outstanding quality of the Geoprobe® equipment makes this rig a tireless workhorse".

Casey added, "We realize that the new standard for fieldwork is the 7822DT (or larger), but **we've been able to get so much production out of this rig** we have been reluctant to upgrade just yet." The size of the 6620DT is perfect for fitting into most of the limited size spaces that they are asked to work in.

"This rig compliments the other four Geoprobe® rigs we operate, and gives us plenty of versatility to complete all of the work we've been asked to do," Francisco said.



The Geoprobe® fleet of Strongarm Environmental Field Services.



Eric Herrera, Driller for Strongarm Environmental, uses the 6620DT to tag bedrock.



Strongarm's 6620DT flies in to help in the redevelopment of downtown Los Angeles.

"When we ordered our first Geoprobe® 5400 way back in 1997, it seemed like a big risk.... However, after over 20 years in business, and five Geoprobe® rigs out operating everyday, it seems like that decision paid off! We are proud Geoprobe® owners, and consider Geoprobe Systems® business partners that have helped our business be more successful."

Casey Crosby • President
Strongarm Environmental Field Services • Norwalk, CA

Geo Logic Makes the Most of Their Investment

"While anyone in their right mind would rather run our 7822DT, there are some sites and locations (inside grocery stores, under low ceilings, tight petroleum terminals, etc.) that the 66DT is the only rig that will fit. And it does its job quite nicely," says Dennis Samsel, Owner of Geo Logic in Clarksville, IN, and proud owner of a 'mature' Geoprobe® 66DT.

Dennis said he bought the machine used in 2000.

Well used.

Very VERY well used.

"So used, in fact," he said, "we sent it to Geoprobe® Service in Kansas rather than tackle the makeover ourselves!" The machine carries a 1995 serial number.

"Your service team, namely Darren, Bryan, and mainly Roman, did a FANTASTIC job on the refurb!" Dennis said. While it was at HQ, Geo Logic added the remote control unit, upgraded the auger to a 2-speed GA3000, and also installed the drop hammer bracket and plumbed for an auto drop hammer.

And since its refurb, Geo Logic continues to keep their investment in top shape.

A Niche Market for the 66DT

Geo Logic was recently asked to mobilize a tracked Geoprobe® rig with a 'small footprint' to do some sampling and site delineation after a release of ethyl alcohol. The project consisted of several phases of work.

Initial Investigation Phase

"The first phase of the project," Dennis said, "dealt with finding out what we had and where we had it." Since they were on the gulf coast, Dennis knew groundwater would be shallow, but he was unsure what effect the tidal influence would have on the site. Mini-excavators and loaders were used to remove the bulk of the release, while Geo Logic used their 66DT to delineate the perimeter towards the gulf. "We primarily used DT22 to screen the soils (sands) and then to set 1-in. piezometers to monitor the water levels and the tidal influences.

Second Phase

Once the initial data was collected and they "had time to digest it, we had a much better handle on where and how to set and screen our monitoring points," he said. They again used their 66DT to drill and install the 2-in. PVC wells.

Remedial Phase

Concurrent with the monitoring installation phase, Geo Logic was tasked with installing 4-in. recovery wells. The 66DT again had no problem turning 6.25-in. augers to the desired depths. The recovery wells that were drilled and installed were left above grade and connected to a portable remediation system as soon as they were completed, so product recovery could begin nearly immediately. Once the dedicated system was online and running, Dennis said they were able to temporarily turn each well off individually while they trenched and more permanently connected each well to the system below grade to minimize site traffic disturbances.

Future Plan Remedial Phase

Depending upon how the data guides them, Dennis said there may be an additional phase of work that will consist of direct driving 2-foot long steel 1.25-in. stainless steel screens that will serve as air sparge points to bubble in diffused air.

Dennis and his field teams at Geo Logic are great examples of how timely maintenance and care of a machine that supports your livelihood is a good idea ... especially when you've identified your niche in the market and know how to leverage both.



Nearly as shiny and clean as it was coming out of the factory, Geo Logic's 66DT retrieves soil samples inside a grocery store (after hours).



Sampling and site delineation after an ethyl alcohol leak near the Gulf Coast.



Confirmatory UST sampling for petroleum hydrocarbons with the 7822DT overlooking Black Mountain in Kentucky (Kentucky's highest peak at 4,400 ft.) near the Virginia border.



(above) BEFORE ... Vista GeoScience's 7720DT underwent a Genuine Geoprobe® Service makeover.

AFTER. The machine arrived back in Colorado to celebrate it's 10th birthday in April.

Geoprobe® Service Resource Center Outstanding Service

Is your older Geoprobe® machine still important to your company, like the 66 series machines seen on the previous four pages? Would you rather refurbish it than retire it? These owners know about Genuine Geoprobe® Service. "A used 7720DT is quite hard to find," said Isaac Gregg, Project Manager for Vista GeoScience in Golden, CO. "so it's worth it to us to have the machine repaired." Vista's 7720DT underwent a Geoprobe® Service makeover in April. Because of the extended lifespan of Geoprobe® machines, Vista decided to reinvest in "one of our top rigs," added David Fontana, Direct Imaging Specialist for Vista GeoScience. "Having Geoprobe® Service maintain the 7720DT gives our team confidence to keep it working on major projects here at Vista." You can be assured of receiving genuine OEM replacement parts and upgrades designed for your machine at Geoprobe Systems®. Call us to schedule a spruce-up or just some maintenance work on your machine. We're always ready to help!

"It's one of our top rigs. Having Geoprobe® Service maintain the 7720DT gives our team confidence to keep it working major projects here at Vista."

David Fontana • Direct Imaging Specialist
Vista GeoScience • Golden, CO



**MAINTENANCE
MINUTES-VIDEOS**

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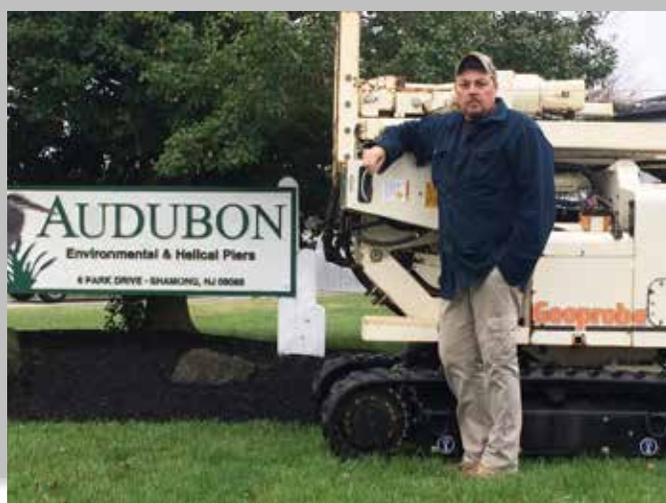
from simple repairs to refurbishing

- Repair/Refurb Machines with Genuine Geoprobe® Parts
- Online Machine Service Records for Geoprobe® Customers
- Maintenance Minutes Videos Available on our Website
- Most OEM Parts Available for Same Day Shipping
- Periodic Machine Service/Maintenance
- Free Maintenance Logs Available
- Has Your Probe Outlasted Your Carrier Vehicle? We Can Help!



Genuine Geoprobe® Service Team: (left to right) Roman Burrows, Lane Mills, Darren Stanley (Service Manager), and Brian Rogers. (seated) Todd Ewing, Jared Sawyer and Bryan Lorenson. They'll treat you like family!

geoprobe.com/service



My Company is a Hero in the Eyes of Our Client

"I am writing this email to express my immense gratitude to your company for helping me out of what could have been a client-losing situation. This morning (0700 east coast time), I was attempting to load my 7720DT onto its trailer, when I realized I had no hydraulic pressure in the system, and the machine wouldn't budge. After checking the normal culprits, and having no success, I contacted Victor Rotonda (Geoprobe® Mid-Atlantic Sales) for help, who I found out later was very sick. Victor didn't know what was causing the problem and told me that he would do some checking and call me back. **Fifteen minutes and two phone calls later, he gave me the fix that got the machine going.** I asked him where he found the information, and he told me that he called a technician (Bryan Lorenson) in Kansas on his personal phone, and that the technician had resolved the issue. The fact that both of these gentlemen went out of their way, one being sick, and the other offering his assistance on his own time, outside normal business hours, reinforces my belief in your brand. **Your equipment and service have always been top notch, but today I was witness to just how committed your staff is.** Those two gentlemen made my company a hero in the eyes of our client today, and I am in their debt."

Bob Gorman • Director of Field Operations
Audubon Environmental • Shamong, NJ

if your equipment puts holes in the ground ...

We'll Help You Sell It!

Do you have an under utilized piece of drilling equipment ... any brand? Call us. More and more companies are talking used equipment with our sales team, whether it be for trade-in or for outright purchase. If your equipment puts holes in the ground, we'll help you sell it on our newly designed 'Used' web page. Post your used equipment ... without charge! No fees. No listing charges. If you're in the market for a used drill rig, Geoprobe® or other brands, call us! We may know where to find the machine you're looking for. We can also provide suggested trade-in values for your machines to help in the process.

- Under-utilized Geoprobe® machine to move? Call us!
- Trading for a new Geoprobe® model? Call us!
- Looking at used rather than new? Call us!
- Specific need at a specific price point? Call us!
- Looking for a used Geoprobe® sonic? Call us!

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geoprobe.com/used**

used equipment is found under the machines menu

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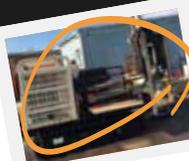
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Find used machines that are currently available for trade-in or for outright purchase.

machines organized by category

Overview / FAQ's Sonic 8040 32 Series **78 Series** 6712 **66/77 Series** 54 Series Limited Access

postings listed by date

Model	Year	Post Date	For Sale By
 7730DT	2007	03/06/17	Owner
 7720DT	2008	12/22/16	Owner
 6620DT	2006	11/15/16	Owner

click on a machine for more photos and information

www.geoprobe.com/used

"Are you needing to add another rig to your fleet but 'new' just isn't in your budget? Whether you're looking to buy or sell, Geoprobe® brand or other brands, you can list it free! The easy-to-follow posting instructions are on our website. I encourage you to check it out."



Doug Koehler
Geoprobe® Sales



Our newly-designed "Used Equipment" listing at geoprobe.com makes it much easier for you to find or list equipment for sale.

ASTM Award for Wes McCall

Wes McCall, PG, Geoprobe® Environmental Geologist, will receive the Richard S. Ladd D18 Standards Development Award for “the time and extensive effort you spent in the development of ASTM Standard Designation D8037,” as stated on his award notification. **The Executive Subcommittee of D18 unanimously approved the award which will be presented to Wes in June in Toronto, Canada.**

The Committee D18 on Soil and Rock appreciated his efforts for his work on “Standard Practice for Direct Push Hydraulic Logging for Profiling Variations of Permeability in Soils.”

Wes worked within the ASTM D18 Subcommittee to write and ballot a new ASTM Practice for Injection Logging (know around here as HPT logging ... Hydraulic Profiling Tool). This new Standard Practice was published last December under designation D8037. The referenced Practice outlines the methods and procedures that should be used to conduct logging with the HPT to define the lithology and permeability of unconsolidated formations, and provides a standard procedure to use HPT and other types of injection logging across the industry. Consultants and regulators can simply cite this standard in project specifications or requests for proposals to assure that the correct methods and procedures are used to perform HPT logging so that good quality data is obtained.

Wes started working on Direct Push standards with ASTM almost 20 years ago. “It can sometimes take five years to get a Standard through the balloting process,” Wes said, “so this is tedious work.” The HPT Standard was in the works for about two years.

“This is not just Geoprobe® specifying a method for using HPT, as an example,” he said. “It’s many independent specialists, regulators and experts across the country and around the world getting to provide input and recommend modifications to the draft standard to improve it.”

ASTM (American Society for Testing and Materials) provides ‘consensus’ standards for a wide range of materials, products, systems, and services, so after these Standards are published, they have been reviewed, commented and voted on by professionals and experts involved in many aspects of industry. “We often learn things from the review and comment process that helps us make tooling and methods better for our customers around the country,” Wes added.

You can purchase and download a pdf of the D8037 Practice for Injection logging on the ASTM website (www.astm.org).

If you have questions about HPT logging, HPT data interpretation, or any of the HPT logging tools, contact Wes or any of our other Direct Image® specialists at Geoprobe®.



Wes McCall, PG

Geoprobe® Environmental Geologist

Multiple Options for HPT Logging

Since the release of the Hydraulic Profiling Tool (HPT) in 2006, our Direct Image® R&D guys have been busy. Really busy!

Initially developed to collect continuous, real-time logs of soil hydraulic properties, in addition to Soil Conductivity, the ability to collect HPT logs has been paired with other systems to provide added, high-quality results with an easier, one probe method.

HPT-GW Sampler

The newest HPT tool is a 20-port HPT-GW Sampler which expands the sampling range of the groundwater profiling tool from four ports to 20. “Groundwater is sampled through 20 ports on four sides of the tool,” Wes McCall, Geoprobe® Environmental Geologist, said. “An

EC (Electrical Conductivity) dipole is located on the tool drive point.”

Groundwater can be sampled using a peristaltic pump in shallow water table conditions, or with the Geoprobe® Mechanical Bladder Pump in deeper water table settings.

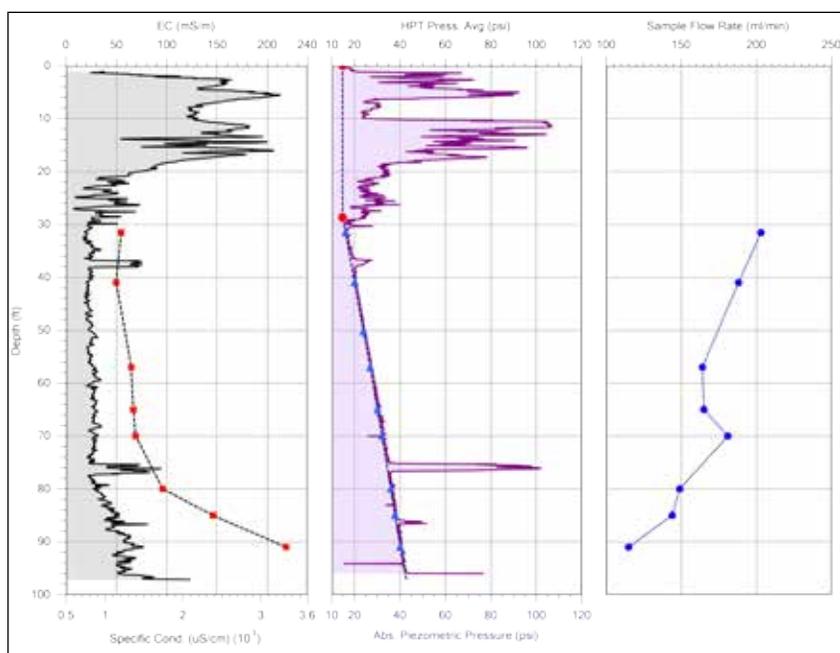
“A log of both HPT injection pressure and EC are made as the tool is advanced to depth,” Wes explained, “allowing the user to evaluate the formation for sample yield.” The HPT-GWS tool is used to perform groundwater profiling; a collection of samples at multiple levels at a single location.

MiHpt Probe

There are lots of good results coming in from around the world regarding the MiHpt.

The MiHpt Probe is a combination probe that can perform MIP, HPT, and EC measurements in ONE push with ONE probe!

The MiHpt Probe detects volatile contaminants with the MIP (Membrane Interface Probe), measures soil electrical conductivity with a standard MIP dipole array, and measures HPT injection pressure using the same downhole transducer as the Geoprobe® stand-alone HPT system. In post-processing the log data with Geoprobe® DI Viewer software, the user is able to estimate hydraulic conductivity (K) and water table elevation, as well as prepare graphic outputs of the log data.



HPT-GWS log showing (l to r) EC log and specific conductance of for the eight sampled intervals.

for more information
geoprobe.com/di



Gregg Drilling Uses MIP To Develop Strategic ISCO Treatment

Gregg Drilling & Testing, based in California, recently partnered with a Northern California environmental consultant to provide Membrane Interface Probe (MIP) and Cone Penetration Testing (CPT) services to aid in delineating the extent of a contamination plume. Previously, the consultant has relied on traditional monitoring well data to define the plume, but felt using the MIP and CPT would provide more refined data which would save money on In-Situ Chemical Oxidation (ISCO) costs in the future.

Todd Hanna, Remediation Program Manager, said the combined CPT and MIP systems offered cost-effective and rapid screening capabilities. "Pairing these two systems emerged as the best tool for screening the groundwater impacted zones to define vertical and horizontal extent of the plume," he said.

The site was a fuel storage facility utilizing underground tanks, and remained in use until 1990. The focus of the investigation was delineating a plume of TPH-g (Total Petroleum Hydrocarbons – Gasoline) with a possibility of encountering diesel hydrocarbons as well. "Our goal was to implement a strategy to remediate the site using ISCO so the client could eventually sell the property," Todd added.

Gregg Remediation used an MIP system with a PID, XSD and FID coupled with CPT tooling. These tools gather the soil stratigraphy, groundwater information and contaminant screening with depth. The company was tasked to collect 15 boring locations to depths of approximately 30-feet below ground surface.

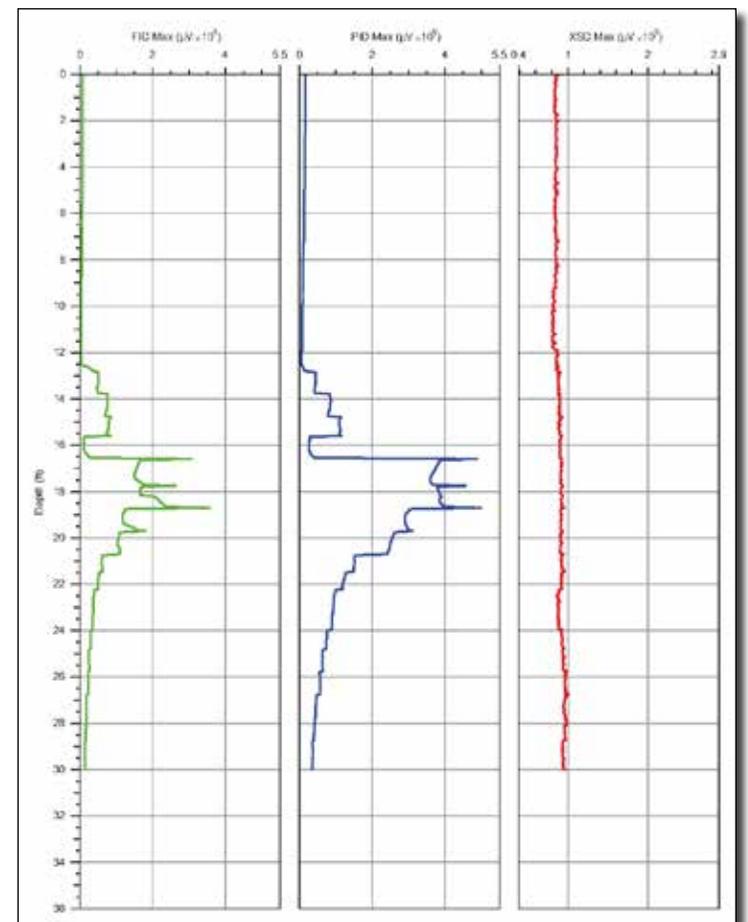
Frank Stolfi, HRSC Division Manager explained the process. "Raw data was collected from the MIP showing a spike in all three detectors from roughly 12- to 24-feet in depth," he said. "Because the CPT and MIP are pushed as one unit, soil cuttings are eliminated and we completed the entire site investigation quickly, achieving roughly 200-ft. per day."

"Because the MIP and CPT are pushed as one unit, soil cuttings are eliminated and the entire site investigation is completed quickly, achieving roughly 200-ft. per day."

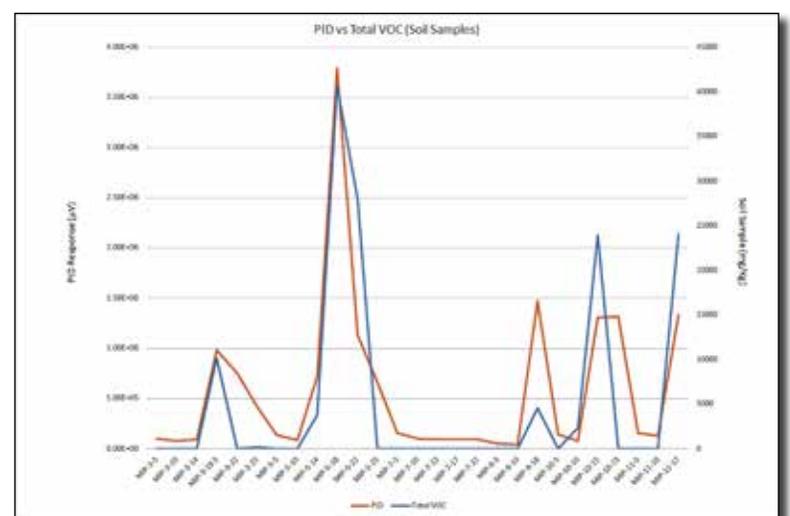
**Todd Hanna • Remediation Program Manager
Gregg Drilling and Testing • California**

Using the Earth Volumetric Software by CTech, Frank created a 3D image of the plume for visualization purposes. The PID detector data, in combination with the CPT data, showed a silt layer on-site. "The visualization aids consultants with demonstrating the extent of the plume to their client," Frank said, "as well as designing an appropriate ISCO solution to target the specific plume. Adding in the soil stratigraphy aids in determining the proper remediation solution when considering permeability of certain layers and the soil type containing the hydrocarbons."

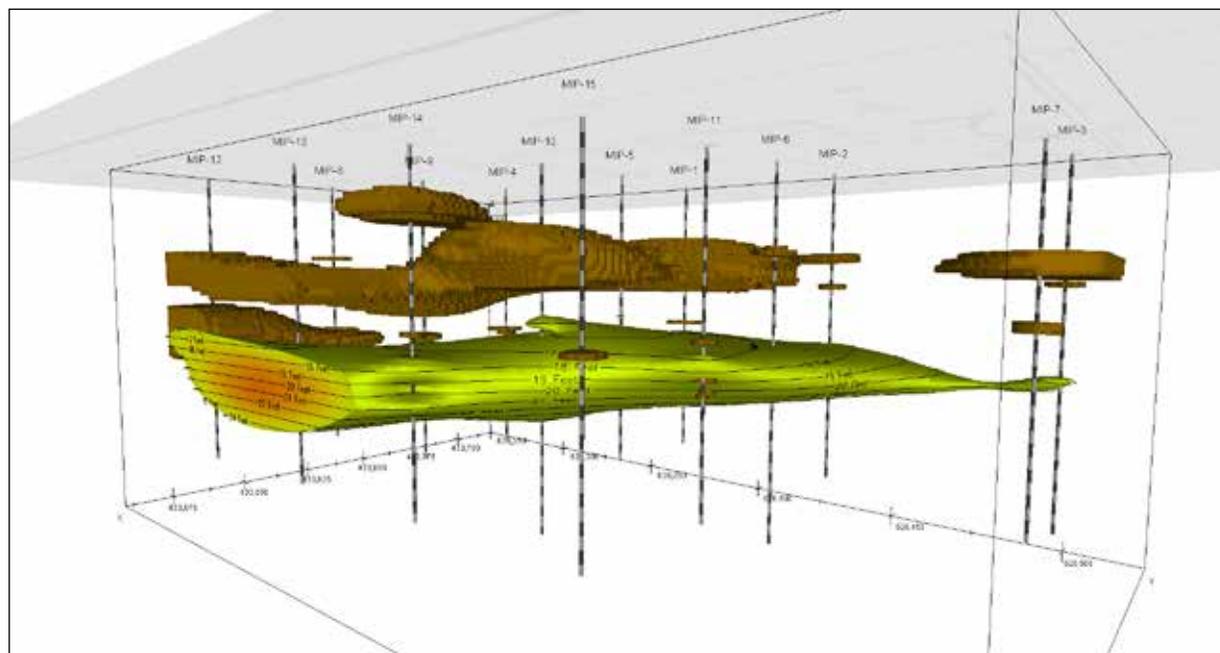
Gregg Remediation, a division within Gregg Drilling and Testing Inc., a California-based site investigation contractor, provides HRSC (High Resolution Site Characterization) tooling and chemical injection for remedial approaches.



MIP data is displayed by plotting the three individual detector responses with depth.



Comparison of PID response to discrete soil sample total response.



3D Model of the PID detector above a threshold of 1.0E+6 and CPT data (silty soil)..



MIP and CPT tooling ready for deployment.

Enhanced In Situ Soil Analysis

The success of soil investigations and remediation designs is highly dependent on a solid and constantly adjusted conceptual site model (CSM). A detailed visualization of the contaminant situation will provide the consultant improved insight into the source, pathways, exposure and remediation alternatives but will also help to recognize and identify the many data gaps and uncertainties.

The CSM is built by collecting and analyzing samples of the site. However, a qualitative characterization of source and plume zone, based on conventional soil samples and monitoring wells, is an intensive and time-consuming task. Since the soil is a very heterogeneous medium and contaminants can have a complex occurrence and distribution, high data densities are required to obtain a sound CSM. With conventional methods this high density cannot be obtained in a cost- nor time-efficient way.

In addition, target depths for monitoring wells are often arbitrarily apprehended for further delineation based on initial results, leading to wrong screen depths and an unreliable CSM. Despite the high accuracy and precision of the analysis at the certified labs where the collected samples end up, a large portion of the accuracy is already lost during the sampling, handling and preserving in the field. Environmental consultants are sometimes blind-folded by the final analytical certificate which gives them a false sense of certainty. To lower the uncertainty and improve the CSM, a higher data density (and more accurate sampling and analysis methods) should be achieved.

In situ screening methods like the Geoprobe® Membrane Interface Probe (MIP) provide a higher data density and perform so called High Resolution Site Characterization (HRSC). In this approach, the scale of measurement matches the scale of the contaminant distribution and soil characteristics. This leads to a greater certainty of the CSM, supporting appropriate risk assessment and faster and more effective site remediation.

To meet the growing need for more accurate and sensitive site investigation of large plumes of (semi) volatiles, the EnISSA-team of MAVA, an environmental consultancy company located in Belgium, developed the EnISSA-MIP.

To increase sensitivity and selectivity of the conventional MIP system, the EnISSA method uses a modified GCMS system which is connected to the MIP system. The advantages of using a GCMS detector are the low, intrinsic detection limits of the detector and the capabilities to measure individual compounds, which brings the lab into the field. Field evaluations demonstrated that the EnISSA MIP is capable of measuring soil profiles for individual compounds with detection limits near 10-20 µg/l.

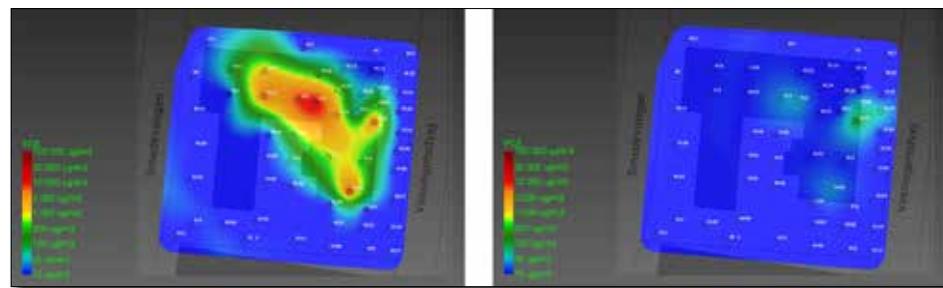


Figure 1. Soil gas results for PCE, TCE, DCE, VC. The results indicate the presence of mainly TCE at this site. The screening also showed the presence of other less expected VOC compounds at one of the sites that could be identified based on the GCMS screening.

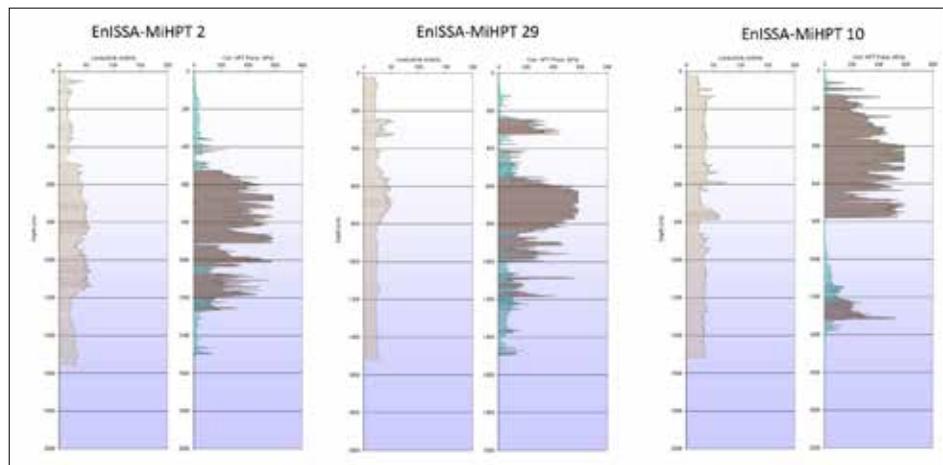


Figure 2. EC-HPT Cross Section.

Since individual components are measured below the soil remediation standards, the applicability of MIP has substantially increased. Both source and plume delineation is possible. The component-specific soil profiles allow reliable onsite decisions and a dynamic sampling strategy. The on-site information on pollutant cocktails is directly correlated to the remediation standards and are an added value to the data obtained by the sum-detectors used in conventional MIP.

This makes it possible to delineate the entire source, and especially the plume, giving a well-defined image of the contaminated area and reducing both sampling costs and time.

Since 2010 EnISSA has been deployed at more than 150 project locations for different clients throughout Europe (Belgium, The Netherlands, Denmark, Sweden, Germany, France, Spain, Switzerland). Those projects showed the benefits of EnISSA in very different contaminant situations going from classical cVOCs and BTEX up to MTBE or MIBK, hexane, chlorobenzene, naphthalene, and also demonstrated how EnISSA is capable of enhancing the conceptual site model (CSM) resulting in accurate decision making.

Recently a Danish consultant invited an EnISSA field crew to provide high resolution data at three neighboring industrial sites located in the Copenhagen area. Due to historical activities, the sites were suspected to be contaminated with chlorinated solvents and BTEX. A fast and cost-effective sampling strategy was requested to investigate and delineate the presence of those contaminants.

The overall geology in the area is about 40-50 meters of prequaternary sediments, mainly meltwater sediments underlain by limestone. Local geology in general consists of 0-3 m fill material underlain by clay till to around 10 m-bgl. Below the meltwater, sediments consist of sand and gravel with embedded layers of more silty materials. At the sites, the groundwater level is about 8 m-bgl.

Because little was known about the possible sources of contaminants, at the start of the campaign EnISSA's field GCMS method was used to analyse >400 tedlar bags with soil gas samples taken with soil gas probe and vacuum box at 1.0 m-bgl to screen for hot spots/source zones. The high horizontal resolution data were imported and modelled to clearly visualize the situation. Results are shown in Figure 1.

Based on the horizontal screening, an EnISSA-MiHPT grid has been established, and the contaminant distribution and soil hydrogeology were characterized. Although the 6620DT rig was used to perform the MIP drillings, MIP locations were limited by accessibility at the active warehouse.

The Hydraulic Profiling Tool (HPT), which was used in the combined MIP-HPT probe (MiHPT), showed to be very interesting in this typical meltwater sediments. Formation with low permeability (max HPT pressure) were alternated with high permeability materials (HPT pressure close to zero) as seen in Figure 2. This important information is less clear from the EC logs.

The EnISSA GCMS MIP results indicate little degradation at this location. The contamination is mainly TCE. A cross section of the TCE results is shown in Figure 3. A typical EnISSA-MIP profile from another project, demonstrating the added value of the compound specific results, is shown in Figure 4. PCE is degraded to TCE and cis-1,2-DCE but further degradation is observed and no vinyl chloride is detected.

These results indicate the differences in occurrence of the breakdown products with depth resulting in more insight in degradation and remediation potential.

In total, at the 3 sites, 37 EnISSA-MiHPT's were performed to deliver a complete characterization of the contamination and soil hydrogeology. The data was loaded in the EnISSA visualisation and modelling software application to clearly summarize this huge dataset (3D images for every individual contaminant).

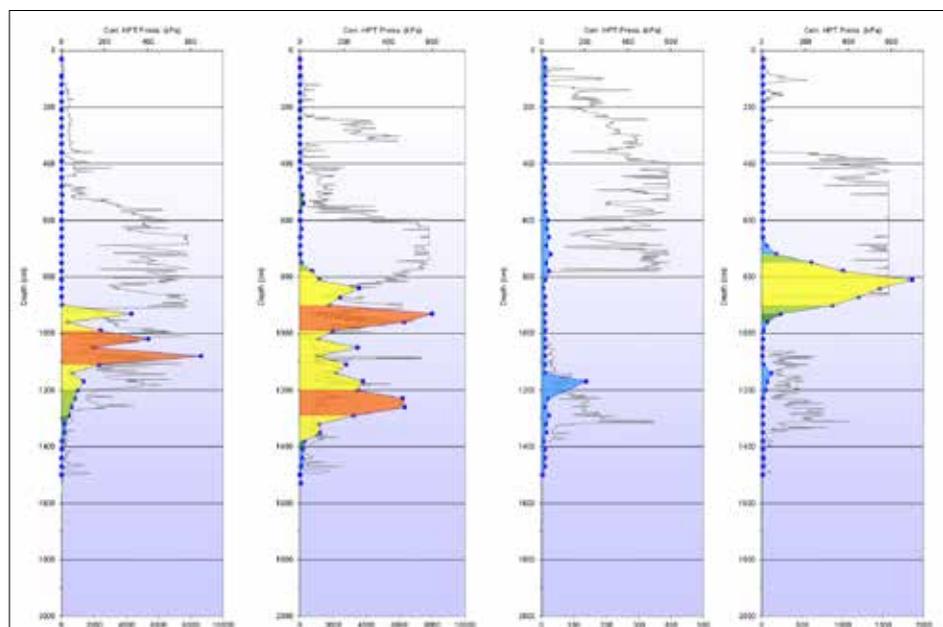


Figure 3. Cross Section TCE results.

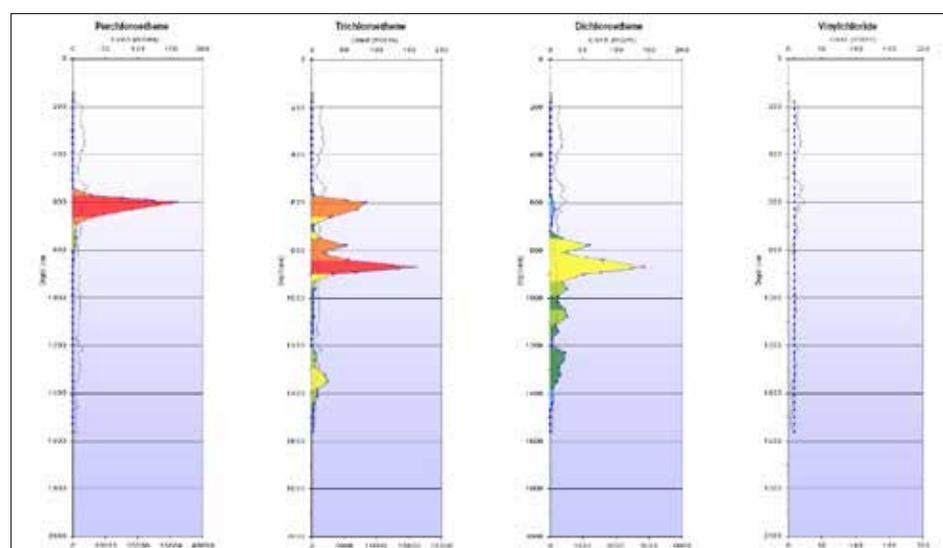


Figure 4. A typical EnISSA-MIP profile from another project, demonstrating the added value of the compound specific results.

Demand High for Using OIP System From Vista GeoScience Clients

“Geoprobe® released the OIP system in late 2016, and since we purchased the system, the demand has kept it busy ever since.”

**John Fontana, PG • President/CEO
Vista GeoScience • Golden, CO**

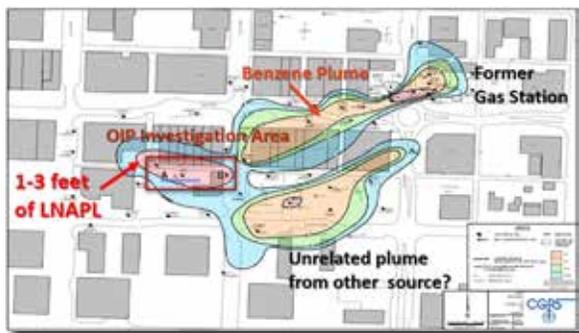
John Fontana, PG and President/CEO of Vista GeoScience in Golden, CO, and his direct sensing team are especially excited about the new Optical Image Profiler (OIP) system from Geoprobe Systems®.

“Geoprobe® released the OIP system in late 2016 and we added it to our tooling options soon after,” he said, “and the demand has kept it busy ever since. Our clients who have used other fuel fluorescence technologies on their sites are happy to see the OIP system produces very similar fluorescence responses and plume maps.” John says the 275nm excitation light responds very well even to the lightest hydrocarbons, including gasoline. “The saved fluorescence and visible images make this a very powerful system,” he added.

One of the first sites Vista GeoScience used the OIP system on was a state lead tank fund project in old downtown Grand Junction, CO, for CGRS Inc. Three of the site monitoring wells had 1 to 3 feet of gasoline LNAPL with a lead content dating back to the 1930s. The



A Vista GeoScience field crew runs MIP (Membrane Interface Probe) and OIP (Optical Image Profiler) systems at a former gas station site in Denver, CO. Vista mounted their new MiHPT and OIP systems in a self-contained, steel pallet rack system which slides into the back of a 4WD ATV allowing maximum mobility and access on more difficult sites.



The Grand Junction, CO, plume map.

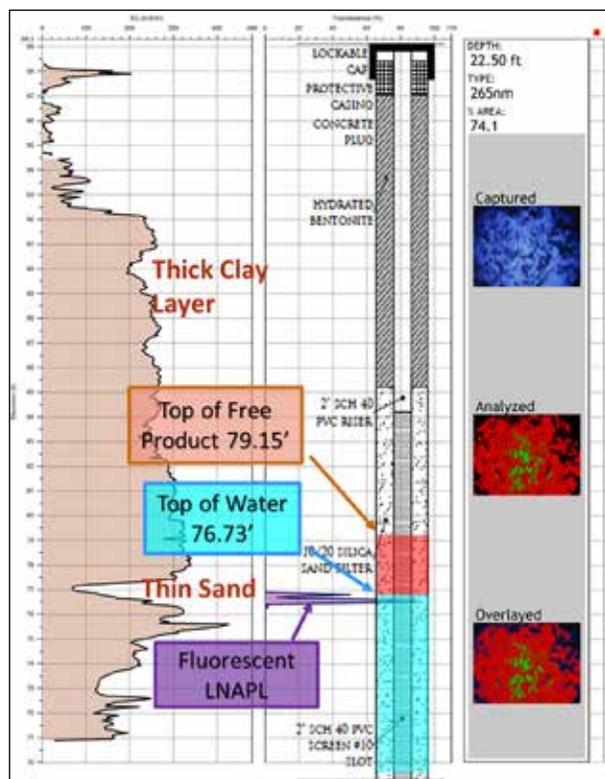
LNAPL is downgradient from a more recent release site and is believed to be from a different source area yet to be discovered. Their client wanted the investigation completed to expose the LNAPL migration pathway and determine the source of the product.

The investigation was conducted around two of the three monitoring wells that contained significant LNAPL. Several OIP borings detected LNAPL around the wells while others showed no LNAPL in as little as a 10-ft. step-out. The OIP logs provided some different explanations for the LNAPL thicknesses observed in the monitoring wells.

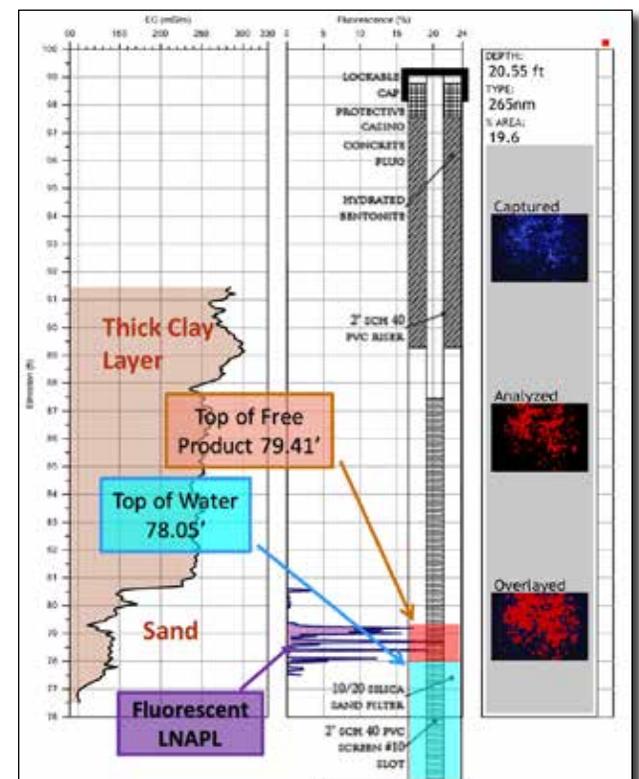
The LNAPL appears to be confined in a thin sand seam in the western area near DG-45 (A wells) and unconfined east near DG-28 (B wells). Groundwater flow is to the southwest; however, the slope of the confining clay layer could be allowing the LNAPL to migrate up gradient to the east where it becomes unconfined.

Additional borings are planned at this site to help determine if this is an accurate understanding of the plume migration.

“Mapping the LNAPL with OIP was crucial to understanding the intricacies of the geology and plume migration pathways of this site that has previously eluded the investigating consultants,” John added.

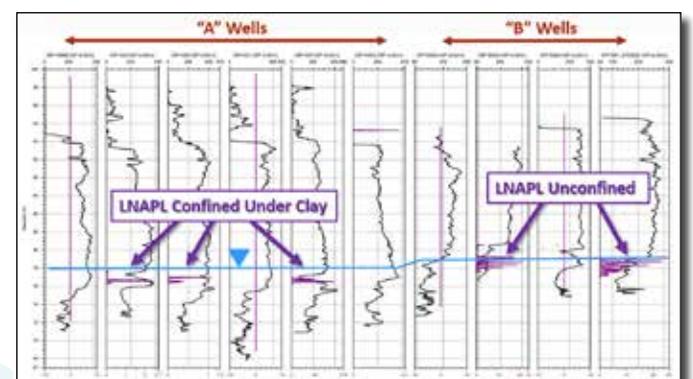


OIP-A07 reveals a thin LNAPL layer is confined under a thick clay (high conductivity) but gives a false or exaggerated thickness in monitor well DG-45



OIP-B03 reveals fluorescence over a thickness equivalent to the thickness in the nearby monitor well DG-28. This is because the LNAPL is no longer trapped by the confining clay as in A07.

OIP Log cross section with EC and OIP Fluorescence showing LNAPL under two different site conditions.



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

Optical Image Profiler (OIP)

View the Video
geoprobe.com/oip

The Direct Image® Team at Geoprobe Systems® proudly announces the 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.

The Optical Image Profiler (OIP) is a direct push probe that uses UV fluorescence to locate hydrocarbon contamination as the probe is pushed or driven into soil. This new system uses camera imaging of the soil in the presence of UV light to identify and log non-aqueous phase (NAPL) hydrocarbons in soil.

The probe can be percussion driven through unconsolidated formations using the extensive line of Geoprobe® direct push machines.

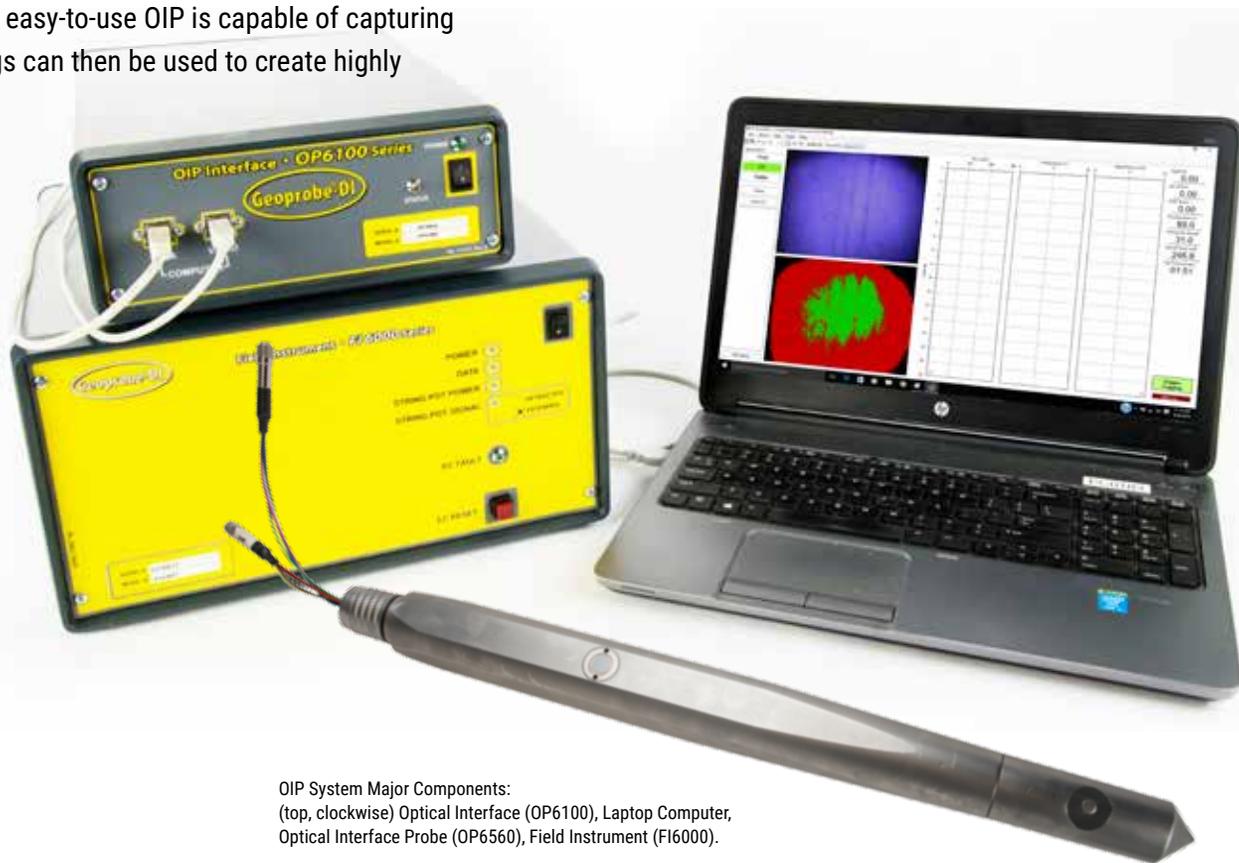
The OIP probe is switchable between visible and fluorescent light images and is equipped with an electrical conductance array for logging soil lithology. The OIP has been used to determine the extent of contamination from leaking underground storage tanks and pipeline spill sites with gasoline, diesel fuel, and crude oil hydrocarbons. The probe is capable of logging to depths greater than 80 feet (24m).

"The OIP logging tool continues the Geoprobe® history of innovation," says Tom Christy, Vice President, Geoprobe® DI Group Team Leader. "Imagine a probe you can drive into the ground and see images of fuel fluorescence, and then flip to visible mode and see the soil." The OIP systems makes that concept a reality.

"The fact that we could see hydrocarbon fluorescence in real time was very compelling," Tom added. "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."

The OIP shares many compatible tool string and data acquisition components with the company's popular MIP and HPT tools. A patent is pending for this device.

More information, plus a video, is available at geoprobe.com/oip-optical-image-profiler



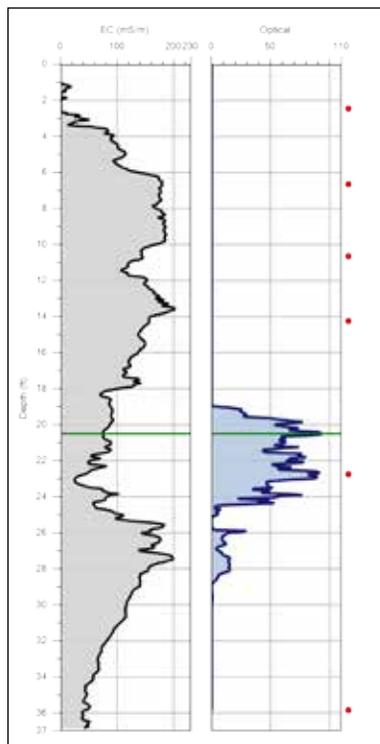
OIP System Major Components:
 (top, clockwise) Optical Interface (OP6100), Laptop Computer, Optical Interface Probe (OIP6560), Field Instrument (FI6000).

First Optical Logging Tool developed by Geoprobe Systems®

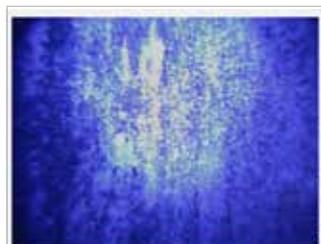
First Percussion-Driven Probe using Camera Imaging System*

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

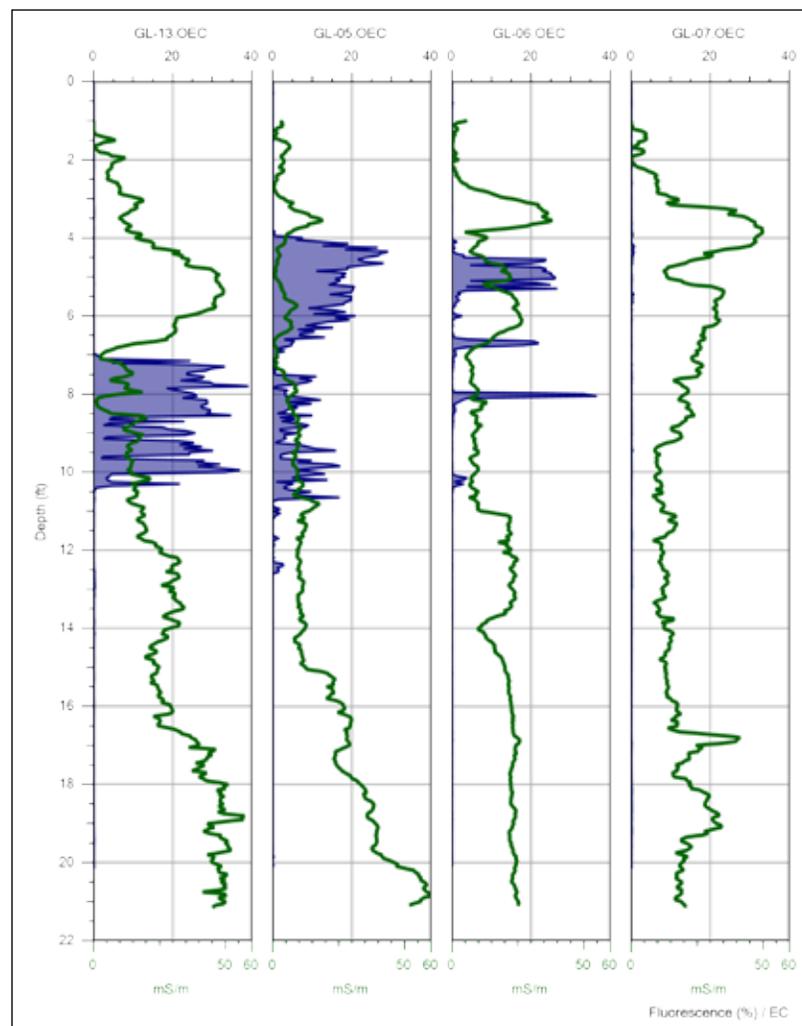
* based on information available to Geoprobe Systems®



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 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.



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

Searching for DNAPL Using Direct Image® Tools

S2C2, Betts Environmental & Alternative Fuels Services and Geoprobe Systems® present information on these two pages summarizing the success of using MIP and OIP tooling to locate DNAPL.

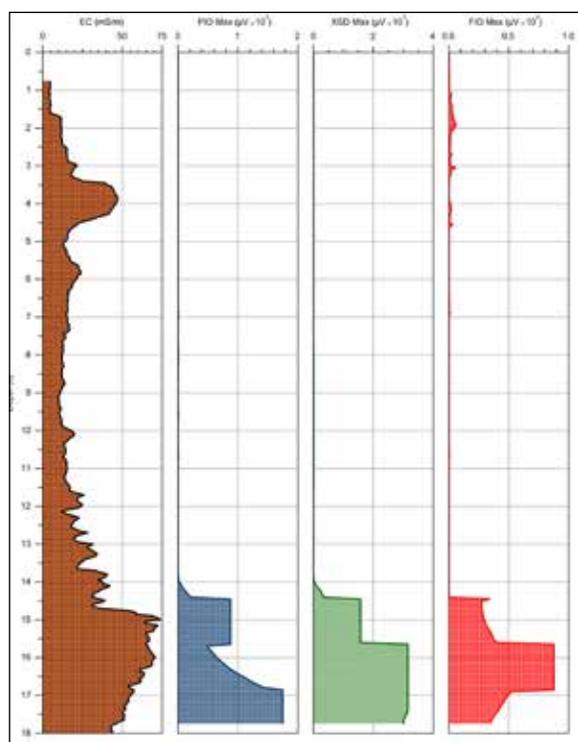
S2C2, Inc., in Raritan, NJ, was contracted by Betts Environmental & Alternative Fuels Services (Betts) in Butler, NJ, to assist with supplemental environmental characterization of previously identified chlorinated volatile organic compound (CVOC) impacts in saturated overburden at a site located in northern New Jersey.

Investigations conducted by other consulting firms in 2010 indicated the presence of elevated CVOC concentrations (>100 mg/L) at select locations using "traditional" investigation activities, including the collection of groundwater grab samples from temporary points and groundwater monitoring wells. Three years later, groundwater samples from the monitoring wells showed CVOC concentrations generally an order of magnitude lower. The primary objectives were to better understand the current dissolved CVOC concentrations and configuration, and to determine the origin of the impacts.

Based upon a review of historical site data, representatives of Betts met with Steven Gelb, President of S2C2, to develop a revised Conceptual Site Model (CSM). A decision was made to utilize the Geoprobe® Membrane Interface Probe (MIP) coupled with a Heated Trunkline (HTL) for this program. The HTL was proposed due to the cold ambient air temperatures expected during the winter, and in anticipation of elevated CVOC concentrations.

Field work began in December 2016 with S2C2 advancing 22 HTL-MIP locations focusing around a former septic system to determine if it was the source of the CVOC impacts. On the third day of field work, S2C2 advanced the seventh HTL-MIP log to a depth of 18 feet bgs where all three detectors (FID, PID, XSD) showed significant responses (i.e. "flat-lined") despite attempts by the operator to remain on scale. This location was not situated near the former septic system.

The MIP detector responses and electrical conductivity (EC) suggested that DNAPL was encountered just above a continuous clay unit at the site. Five additional MIP pushes were advanced following the identification of the suspected DNAPL area with results suggesting the DNAPL zone was extremely localized. Confirmation groundwater sampling conducted by S2C2 at location 17 confirmed the presence of DNAPL. Analytical results of the DNAPL indicated that it was comprised of primarily trichloroethene (TCE) along with elevated concentrations of a variety of co-mingled volatile organic compounds (VOCs).



MIP-17 Log. EC, PID, XSD and FID detector responses showing DNAPL level magnitudes.

Now that DNAPL had been identified at the site, Betts tasked S2C2 to track the lateral extent and configuration of the DNAPL, not just the dissolved phase plume. Prior to remobilizing to the site, S2C2 contacted the Direct Image® team at Geoprobe Systems®. Bench tests were conducted by the DI team and by Tom Koester of S2C2. These tests resulted in a list of suggestions of how to optimize the MIP detector system when expecting to encounter DNAPL.

A poster, shown on the following page, was presented by S2C2, Betts, and Geoprobe Systems® at the RemTech Summit in Denver, CO. The poster can be viewed at www.geoprobe.com/dnapl.

Additional bench tests were performed to determine if the DNAPL would fluoresce on the Optical Image Profiler (OIP) which S2C2 recently acquired. The idea was based upon the analytical results of the DNAPL sample collected at the site. When the DNAPL was placed on the OIP sapphire window it did fluoresce quite nicely. It should be noted that the CVOCs don't fluoresce, but the hydrocarbon compounds comingled with the CVOCs can.

In late February 2017, S2C2 and Betts remobilized to the site to track the DNAPL and determine its source. The updated 3-dimensional CSM showed that the DNAPL had pooled on top of a low point in the continuous clay unit as determined from the EC logs on the MIP. In addition, a review of historical aerial photographs dating back to the 1950's, obtained by Betts, indicated the presence of an old stream



Confirmation sampling conducted by S2C2 using an SP16 groundwater sampler at Location 17 confirmed the presence of DNAPL.

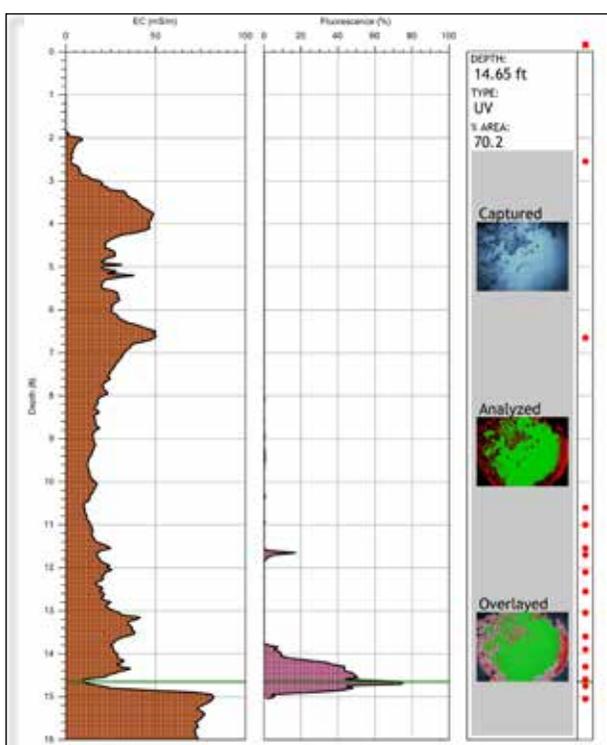
"Based upon our experiences at this site and others, we believe the MIP is the best tool to use to determine where DNAPL is likely to be located in the overburden."

Matthew Ruf • S2C2 Director of Direct Sensing Services
S2C2 Inc. • Raritan, NJ

channel coming onto the site at the same location where the DNAPL had been identified. Accordingly, S2C2 utilized HTL-MIP, advancing 21 additional borings, to identify areas with the highest likelihood of the presence of DNAPL and then used the OIP to confirm the presence of DNAPL where it was suspected to be located.

Twelve OIP borings were advanced in a very high density pattern (6 ft²) around the suspected DNAPL locations. Data obtained from the OIP confirmed the extremely localized presence of DNAPL without being influenced by the elevated dissolved phase VOC plume. All the data collected as part of this field characterization program, together with previously obtained information, was used to update the CSM and to create a 3D-visualization of subsurface conditions.

The ability to use MIP to identify DNAPL sources has been questioned in the past. Using the recommended changes by Dan Pipp, Chemist at Geoprobe Systems®, S2C2 was better able to keep high dissolved phase and DNAPL impacts on scale on the MIP detector logs. Data collected as part of this study indicate that the MIP can, in fact, detect and differentiate DNAPL from high dissolved phase concentrations.



OIP-3 Log. Offset from MIP-17 showing EC and fuel fluorescence comingled with the DNAPL.



S2C2 field crew setup advancing HTL-MIP on jobsite.

Application of Membrane Interface Probe (MIP) with XSD Detector to Identify DNAPL Zones

Daniel Phipp, Chemist, Geoprobe
Matthew Ruf, Director, Direct Imaging Services S2C2
Tom Koester, Senior Environmental Scientist, S2C2
Thomas Christy, PE, Geoprobe
Wesley McCall, PG, Geoprobe

This study has been undertaken to show that identifying zones of chlorinated DNAPLs can be successfully pinpointed using the Membrane Interface Probe (MIP) system. We have designed an operational protocol when expecting to encounter high dissolved phase VOC plumes and/or DNAPL zones. This will give MIP operators and data reviewers the knowledge needed to help identify DNAPL zones as well as determine their vertical extent from MIP logs.

MIP Theory of Operation

Left: A continuous carrier gas flow (nitrogen) sweeps past a heated semipermeable membrane. VOCs in the subsurface diffuse across the membrane into the carrier gas stream where they are carried to gas phase detectors at the surface.

The MIP system consists of the membrane probe, trunkline and the gas phase detectors.

MIP Detectors

PID (Photo Ionization Detector)
Responds to all molecules whose ionization potential is below 10.6eV. This includes aromatic hydrocarbons and molecules with carbon double bonds (C=C, C=C). Most common PID lamp = 10.6eV.

FID (Flame Ionization Detector)
Responds to any molecule with a carbon-hydrogen bond which oxidizes most VOCs which combust in the H₂ Air flame. The FID is a mass not concentration sensitive.

XSD (Halogen Specific Detector)
Responds only to halogenated (F, Cl, Br) VOC compounds.

MIP Detectors Lower Detection Limits

PID, XSD & ECD - 10-100 50ppm TCE
FID - 10-100 100ppm TCE

The FID is not as sensitive as the PID and XSD at lower concentrations.

A MIP system detection limit should be determined by system specific MIP chemical response tests.

- Based upon MIP operation with a 20" standard Trunkline (TL) using a 4000psi carrier gas flow rate
- Lower detection limit and detector response are directly related to the membrane response.

MIP Detectors Upper Detection Limits

PID, XSD
Both detectors display similar response magnitudes for TCE response standards beyond the TCE solubility point of water.

FID
Displays far greater response contrast of high dissolved phase and DNAPL than the PID and XSD.

ECD
Response is variable to the number of chlorine atoms on the molecule and chemical structure. The ECD does not differentiate between high dissolved phase and DNAPL.

PID, XSD and FID all exhibit good response beyond the water solubility point of TCE.

Vertical Definition of DNAPL – How the Detector Response Affects Contaminant Carryover

Below Left: The vertical position of DNAPL is clear based upon the FID drop in response even though the PID and XSD are slower to return to baseline. The FID's insensitivity at lower concentrations will help define the bottom of the DNAPL plume with minimal carryover.

Below: The laboratory tests reveal that when TCE NAPL was removed from the membrane, after 3 feet of exposure, the FID would reach 2% of the max detector signal within 2 minutes, providing the clearest picture of the DNAPL zone vertical thickness.

MIP Detector Gain Adjustments

Below: The FID in the log below shows the problem that can occur when detector gain settings are not adjusted properly when the MIP system encounters high dissolved phase or DNAPL concentrations. The top of the detector response peaks will get clipped. This is a critical step when mapping high concentration VOC plumes.

Below Right: Peak clipping occurs due to the Gas Chromatograph having a maximum signal output limit which on some instruments is 5,000mV. The signal can go higher than this however the instrument cannot output that signal without getting it clipped at the limit (above right). Peak "clipping" can be avoided with proper adjustments by the operator which can be made either during the logs as needed or prior to beginning a log in anticipation of the high responses seen in high dissolved phase or NAPL plumes.

MIP Operational Protocol when Mapping High Dissolved Phase to DNAPL Chlorinated VOCs

1. Pre-set the detector gain adjustment to a low setting along with the proper software attenuation adjustments to avoid peak "clipping"
2. Use the information from all 3 detectors to best determine DNAPL vertical thickness. The FID shows the greatest response contrast between high dissolved phase and DNAPL.
3. Chlorinated contaminants will be confirmed with the use of the XSD.
4. Display the logs in cross section format of a common detector scale to seek out locations where detector response magnitudes are indicative of where DNAPL would be present.
5. Do not use or pay attention to ECD responses in these locations.

These procedures would be effective for all chlorinated VOC DNAPLs and could also be useful when encountering DNAPL gasoline plumes.

Field Site – DNAPL Identification

The site was a former industrial facility in northern New Jersey that used chlorinated solvents in their processes. The consultants found a 1990's aerial photo of a former stream channel that came onto the property from an adjacent site. The goal of the investigation was to determine the origin of the DNAPL.

MIP Operating Conditions

MIP Operator: S2C2
100' (30m) heated Trunkline set to 100°C, probe temp: 121°C
Carrier gas flow rate 3 (nd/min), MIP pressure – 5PSIG
GC with PID, FID and XSD detector. Detector gain settings in a low position for the highest response at the start of the log along with appropriate attenuation factors in the software.

Below: The site map below shows where MIP logs have been performed on this site. The blue line shows the logs included in the cross section MIP graphs which show electrical conductivity (EC) along with each detector response.

Below: The field crew crew is preparing to advance the MIP probe with the heated Trunkline.

Left: The MIP log cross-sections show where the contaminants are present. The XSD lets us know it is chlorinated, the FID shows it is a double bonded VOC and the FID displays the greatest contrast in response magnitude between high dissolved phase and DNAPL. The FID's intensity at lower concentrations help us to focus on MIP logs #2, #3, and #7 as the most likely to contain DNAPL.

Below: After completing MIP log #7 a discrete groundwater sample was taken. The bucket below shows the water and DNAPL coming from the tubing showing that DNAPL was present. Samples were sent to a lab for analysis – results shown below.

Below Right: Results of the lab analysis show a significant amount of TCE = 22% in the sample taken from the DNAPL zone as well as a number of other contaminants including a high concentration of Toluene.

Other Indicators of DNAPL revealed by the MIP Logs

MIP Pressure Increases

Above: Throughout this study on DNAPL detection using MIP instrumentation we have slight pressure increases in the MIP Trunkline. These increases would occur when DNAPL has been exposed to the membrane and would be traveling in the MIP carrier gas line on its way to the detectors.

These pressure increases are not large and may not be completely reliable in their occurrence, however they serve as a possible indicator of the presence of DNAPL in the carrier gas break. This pressure increase is likely due to an increased vapor density within the gas line which slightly increases the MIP gas line pressure needed to maintain the same carrier gas flow rate in the system.

Permeability Traps in an Aquitard

Left: Review EC and/or MIP pressure graphs in cross-section using the DV Viewer software. This can help to pinpoint any permeable depressions in an aquitard that can form a pool for the DNAPL to reside. If depressions do exist in the logs, logs displayed in cross sections or a 3D map of EC or MIP pressure may reveal a buried stream channel that could be carrying the contaminant either so or off site.

Above: This image shows the top of the clay unit with its surface depressions near the center of the image. Each MIP-XSD log response is also positioned on the map with the highest XSD responses located at the low spots in the clay surface. This is where chlorinated DNAPL has been recovered.

DNAPL Confirmation using OIP Fluorescence

Right: Multiple Optical Image Profiles (OIP) logs were performed to map the fluorescence of hydrocarbons present in the DNAPL. The OIP system utilizes a 275nm UV LED and an onboard camera to take images of the fluorescence which are analyzed for their color.

DNAPL TCE by itself will not fluoresce, however with the presence of enough PAHs in the form of oil and/or grease the DNAPL will fluoresce when introduced to the 275nm UV light source. This site investigation is attempting to determine if the source originates within site boundaries or if the TCE has been brought onsite from the adjacent site.

The OIP log (performed within 1' of MIP #7) confirms the DNAPL is located in a 1' band sitting on top of the clay from 3.4' - 13'. This fluorescence of the DNAPL confirms the beginning of the detector responses from the PID and XSD as well as the increased MIP pressure spike seen in the log.

This 40 in. x 55 in. wall poster was presented as an overview of the DNAPL project at the RemTec Summit in March 2017, in Denver, CO.

Mapping DNAPL With MIP

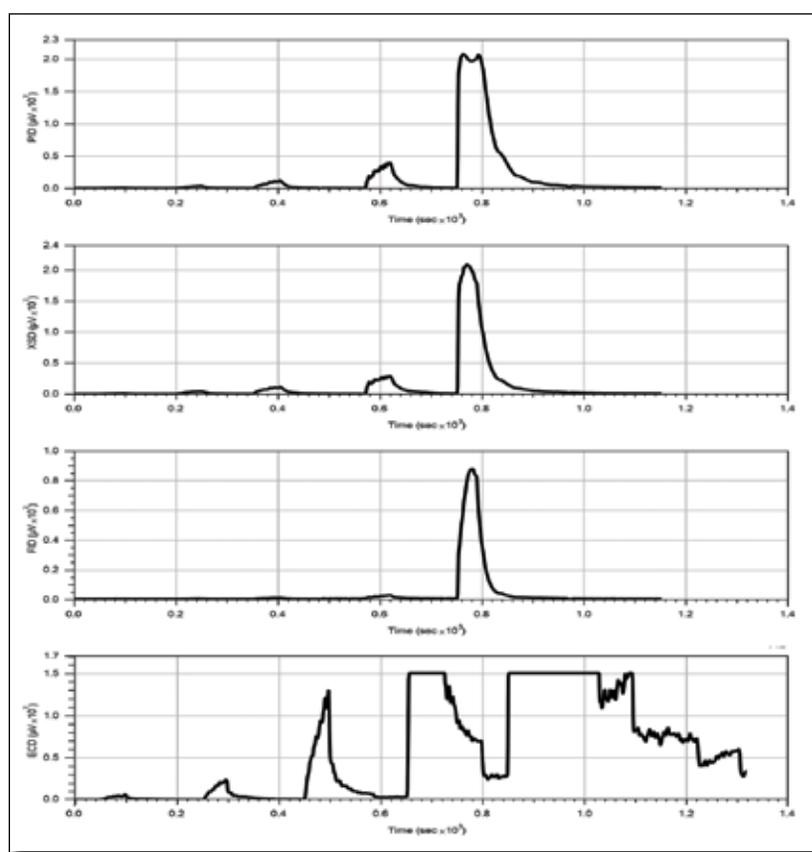
Most MIP (Membrane Interface Probe) work is performed to map low- to mid-concentration dissolved phase VOC plumes. MIP is capable of mapping light fuel hydrocarbons and chlorinated (c) VOC contaminants from ~0.25 ppm levels to very high ppm VOC concentrations, including pure product. Some operators stay away from NAPLs for fear of extended contaminant carryover within the MIP system. They also tend to doubt that MIP can pinpoint the presence of NAPLs.

MIP logs can indicate where chlorinated DNAPLs are present and provide good representation of the DNAPL zone thickness. Our Geoprobe® Direct Image® Specialists worked with S2C2 of Raritan, NJ, on a study to develop and test an operational protocol and isolate MIP log indicators where the project goal was to identify chlorinated DNAPL zones.

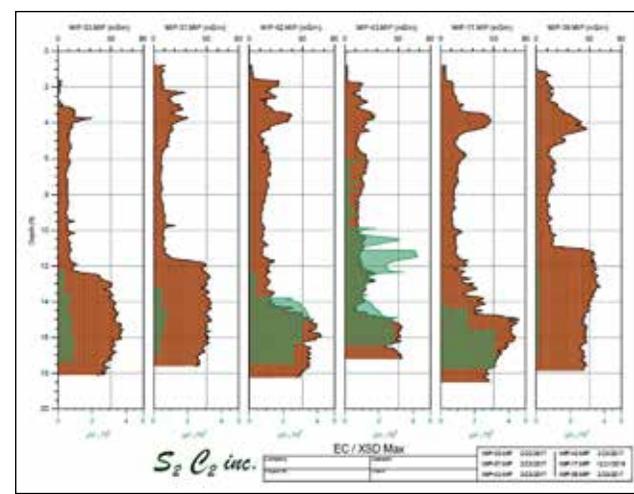
The results of this study and associated work in the Geoprobe® lab should put any doubts to rest.

The chemical response tests show TCE response from low ppm to DNAPL (TCE saturated sand) levels on common MIP detectors. These results show similar responses between the MIP-PID and XSD with a good response to TCE over the water saturation point (1,280ppm) on both detectors. Because of the FID's insensitivity at lower concentrations, it shows the greatest contrast between very high dissolved phase and DNAPL. The ECD displays its inability to resolve TCE concentrations above 300ppm.

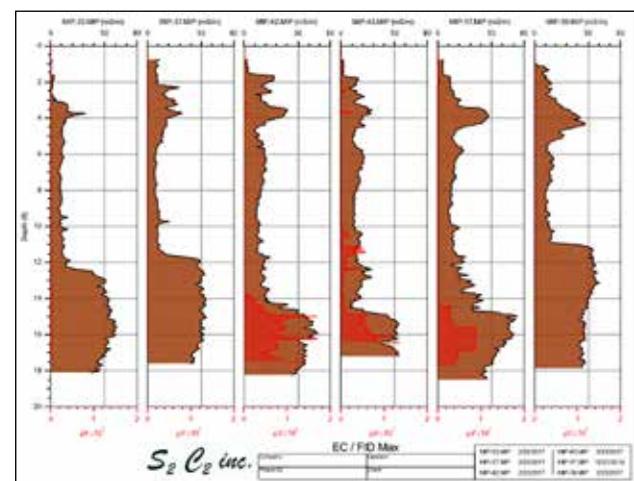
In the MIP cross section graphs, the XSD confirms the presence of a chlorinated contaminant and the FID displays the greatest response contrast highlighting the logs where DNAPL may be present and was recovered. The electrical conductivity graphs show a low point in the aquitard from the 3rd - 5th logs, which are also the logs where the highest MIP-FID response was seen.



High ppm TCE responses on various MIP detectors.



MIP-XSD log cross section.



MIP-FID log cross section.



Andrew - Direct Environmental Drilling Inc.



Derek - Discovery Drilling



Tammy & Jen - Traut Wells



John & Josh - Dolese Bros.



Bob - Env Probing Investigations



Vincent & Joseph - Cascade Technical Services



Mario, Nathan, and Jonathan - Subterra Environmental Services



Donald - Talon LPE



Ian & Chris - Terratest Environmental Pty Ltd



Dylan, Samuel & Christopher - ICON Environmental Services



Mason & Wes - Geoprobe Systems®



John - Cascade Technical Services

Some friends having fun with a

Geoprobe® Selfie

geoprobe.com/selfies



Ryan & Tobby - McCray Drilling



Isaac & Anthony - Vista GeoScience



Scott, Jason, Lee - Drillworx



Cory - Idea Drilling



Sarah, Ian & Matt - South Western Drilling Pty Ltd



Steve - Hammer Enviromental



Travis - Environmental Field Services



Josh Rush - Matrix Drilling



Chase & Trevor - Vista GeoScience



Travis & Brandon - Env. Drilling and Probing Services



Carl - Env Probing Investigations



Dave - Env Probing Investigations



John - Edge Drilling



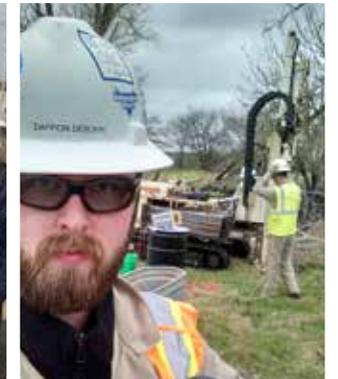
Jackson & Grandpa Kenny - Geoprobe®



Michael - Talon LPE



Tom & O'Keefe Drilling



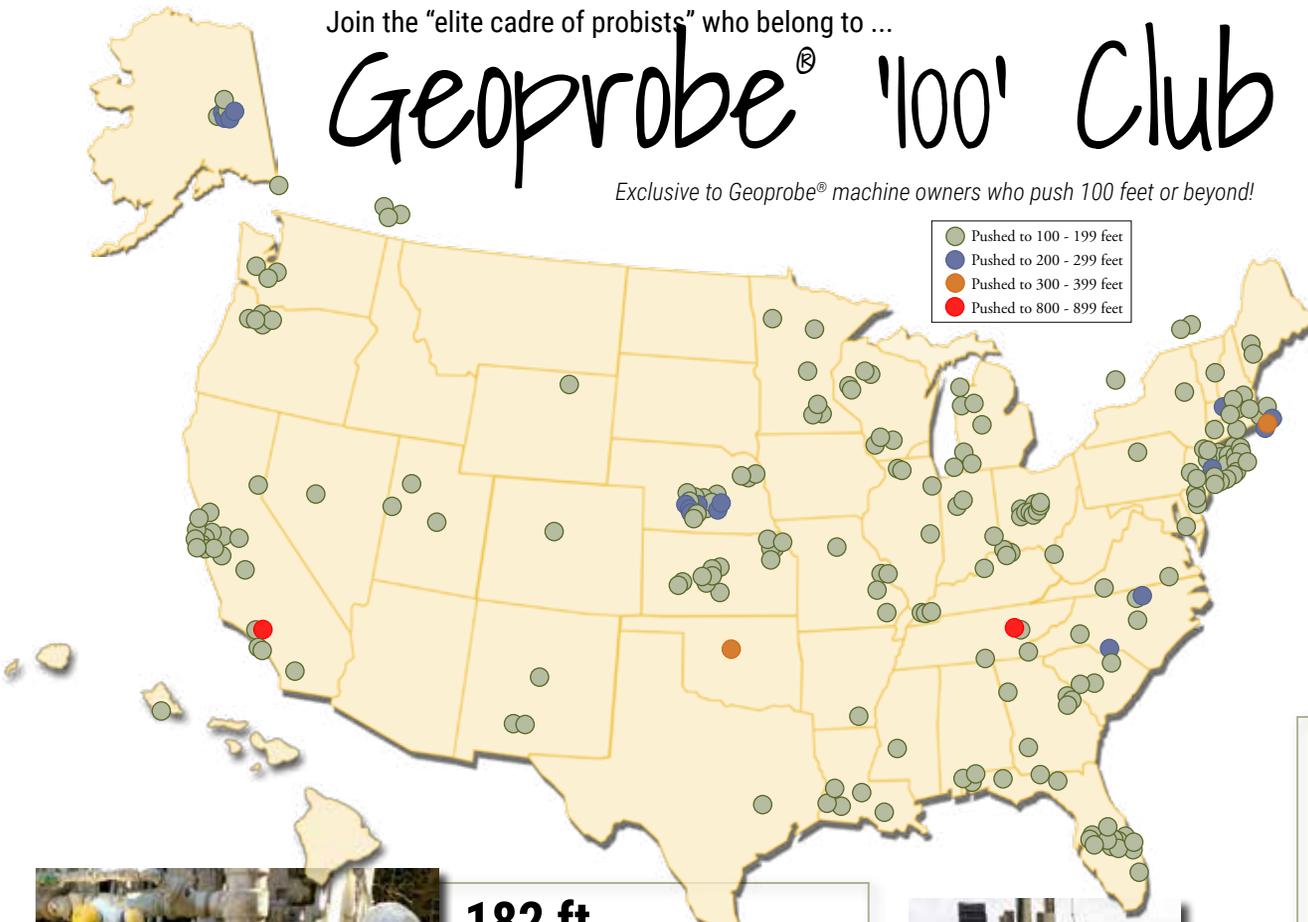
Darron & Mike - ERM

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



100 ft.

SGS – New Jersey

FIELD NOTES

Field Team: Peter Hanley & Philip Gfroehrer
Field Site: Vineland, NJ
Depth/Date: 100 feet / September 1, 2016
Geoprobe® Owner: SGS North America, Browns Mills, NJ
Field Data: Model 7822DT.



182 ft.

Eichelbergers – Pennsylvania

FIELD NOTES

Field Team: (l to r) Connor Neely and Chris Chronister
Field Site: Watrous, PA
Depth/Date: 182 feet / September 13, 2016
Geoprobe® Owner: Eichelbergers, Mechanicsburg, PA
Field Data: Model 7822DT. 60 ft. of 9-in. air rotary, then 5-in. air rotary to 182 ft.



119 ft.

Geo Logic – Indiana

FIELD NOTES

Field Team: (l to r) Sean Martin and Mickey Reynolds
Field Site: Louisville, KY
Depth/Date: 119 feet / March, 2017
Geoprobe® Owner: Geo Logic, Clarksville, IN
Field Data: Model 66DT advancing groundwater profiler.



101 ft.

Cascade Drilling – South Carolina

FIELD NOTES

Field Team: Richard Mooney
Field Site: Duke Energy plant, Roxboro, NC
Depth/Date: 101 feet / November 2016
Geoprobe® Owner: Cascade Drilling, New Ellenton, SC
Field Data: Model 6620DT.



105 ft.

Strata Drilling Group – Canada

FIELD NOTES

Field Team: Mike Leccese, Nathan Poole and Jamie McCoy
Field Site: Canadian Forces Base, Trenton, Ontario
Depth/Date: 105 feet / October, 2016
Geoprobe® Owner: Strata Drilling Group, Markham, Ontario
Field Data: Model 7822DT. Ran casings down to 40 ft, then DHH 65 ft. through casings



103 ft.

Mark J Traut Wells – Minnesota

FIELD NOTES

Field Team: (l to r) Jen Foged and Tammy Wahl
Field Site: Becker, MN
Depth/Date: 103 feet / December 23, 2016
Geoprobe® Owner: Mark J Traut Wells, Waite Park, MN
Field Data: Model 7800. Static water level at 18-19 ft. Used MC5 continuous sampling to 50 ft., then sampled every other 5 ft. to 100 ft. Hit cobble at 105 ft.



100 ft.

Catawba Valley Engr – North Carolina

FIELD NOTES

Field Team: David Reynolds
Field Site: Stuart, VA
Depth/Date: 100 feet / March 15, 2017
Geoprobe® Owner: Catawba Valley Engineering and Testing, Hickory, NC
Field Data: Model 7822DT. Geotechnical soil sampling. 20 degrees plus a wind chill!



220 ft.

Jibanshikenjo Co Ltd – Japan

FIELD NOTES

Field Team: Yutaka Hojo and Takashi Kamoshida
Field Site: Sanjo-city, Japan
Depth/Date: 220 feet / November 2016
Geoprobe® Owner: Jibanshikenjo Co Ltd, Niigata, Japan
Field Data: Model 6610DT pushing CPT cone and SPT.

183 ft.

Direct Push Services – Utah

FIELD NOTES

Field Team: Sean Bromley, Ryan Roodbol and Jon Thompson
Field Site: Central Utah
Depth/Date: 183 feet / June, 2016
Geoprobe® Owner: Direct Push Services, Salt Lake City, UT
Field Data: Model 7822DT running 4.5-in. casing with downhole hammer with a casing advancer. **"The Struggle is Real"**



408 ft.

M&W Drilling – Tennessee

FIELD NOTES

Field Team: Jon Keifer, Ryan Post and Brandon Pritchett
Field Site: Oak Ridge, TN
Depth/Date: 408 feet / Fall 2016
Geoprobe® Owner: M&W Drilling
Field Data: Model 8150LS and Geoprobe® sonic tooling.

The Probing Times is the official newsletter of Geoprobe Systems®. An online version of the newsletter is available at geoprobe.com

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APRIL 26, 2018



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Todd Courbot
Geoprobe® Open House Coordinator



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