



# PROBING TIMES

Information for the ENVIRONMENTAL, GEOTECHNICAL, GEOTHERMAL & EXPLORATION Industries

## Adaptable Versatile Compact

It's why the **7822DT** stays busy for Stearns Drilling.



Customer feedback on the Geoprobe® 7822DT continues to give high marks for this highly versatile, easy-to-use machine, making it the most popular direct push machine in the world. With 30-ft. ash ponds on either side, Stearns Drilling, in Dutton, MI, uses this 7822DT to take Macro-Core® samples to determine depth, and then grab groundwater bio samples from between 50- to 60-ft bgs. to detect any communication between the ponds and groundwater. Each sample had to be capped and sealed as it was removed from the core liner. The field team is working on a road between ash ponds with 3-foot-high berms.





A man and his machine. Billy Graham, AEI Senior Environmental Driller, drills in the red dirt of central Oklahoma with AEI's 8150LS Rotary Sonic.



Billy Graham, Senior Environmental Driller with AEI in Norman, OK, runs 'his' sonic rig, a Geoprobe® 8150LS.

# Switch to Sonic? No Way!

**"I came in to work one day, and Robert said he was switching me over to run a sonic rig. I didn't like it. I didn't like it one bit! I'd been running an auger rig for 20 years, and I don't like change. And now? I love it! It's so much easier on you. No shoveling. No augering. I like that! It beats the heck out of tripping pipe!" .... Billy Graham, Driller, AEI in OK**

Robert Keyes, President of Associated Environmental Industries in Norman, OK, believes he's got a winning combination on his hands ... a Geoprobe® 8150LS Rotary Sonic with Billy Graham, AEI Senior Environmental Driller, at the controls.

"The Geoprobe® sonic rig has really done some incredible things" Robert said. "Everywhere we've gone it's really impressed everyone. And Billy can core 200 feet per day with it, no problem."

What makes the 8150LS different for AEI is the rod handling system and the ability to run weighted wireline tooling. "I think our Geoprobe® sonic can get twice as much done in a day as other rigs because it's so fast and easy on the operator," he said. "And the wireline is the holy grail of sonic! It helps take out the labor and saves time." He also believes time is wasted when rods are manually handled. The rod handling system makes all the difference to Billy and his field team.

When the consultant can get enough people to the site to take care of the cores, the 8150LS is a production machine ... and nobody gets beat up or worn out. "You can do 150-ft per day with hollow stem augers, but at the end of the day you're worn slick," Robert added. "That's not the case with Billy and the Geoprobe® sonic."

For AEI, getting the science right is key. They believe if you're really concerned about getting the science right then sonic will give you the better chance to achieve your goal. "We've found that recovery is most successful with sonic. Hands down. Across the board," Robert said. "Especially if you're experiencing difficult drilling conditions. And providing our customers with results is what gets us invited back for another bid."

Support for their rig and tooling is also extremely important to AEI. "Geoprobe® engineers back in Kansas can run diagnostics on our unit and troubleshoot a problem," Robert added. "I don't know anybody else that can do that."



Sonic soil cores are examined in the field by an onsite geologist. The cores were retrieved by running SDT60 and an 8150LS.

Continuous sonic core samples taken from 0- to 350-ft. bgs using 8150LS Rotary Sonic and SDT60 Weighted Wireline. AEI achieved 100 percent recovery.



0 Feet BGS to ...



100 Feet BGS to ...



200 Feet BGS to ...



300 Feet BGS to ...



350 Feet BGS.



## Geoprobe® Sonic Weighted Wireline

# A Real Game Changer for the Sonic Industry

Moving things forward. That's what the sonic weighted wireline tooling from Geoprobe Systems® does. Call it raising the bar. Innovation. Game changer. Or outside the box. This method of sampling moves things forward in the sonic industry.

Day in and day out we hear from customers that there are three aspects of their day-to-day operations that require increased attention in order to be competitive and profitable. And our sonic weighted wireline tooling addresses them all!

Those aspects? **Safety. Efficiency. Profitability.**

**SAFETY.** It's safer because it requires far less tool handling.

Tool handling has a direct correlation to safety. The more tooling is handled the more likely an injury may occur. The weighted wireline (WWL) system eliminates the need to trip rods in and out of the cased hole.

**EFFICIENCY.** It's more efficient because it's faster than all other methods. When using the WWL, the sample barrel and weight assembly are tripped in and out together with only the use of the winch, so the speed and efficiency of the system becomes more and more evident the deeper you go. Geoprobe® engineers completed a time study on trip in and trip out times (right). Mike Carlin, Geoprobe® Tools Group Leader, says check the numbers regarding efficiency. **"The use of the winch with WWL significantly reduces the time to trip samplers and core barrels in and out of the casing,"** he said. **"The numbers don't lie!"**

"I'm turning 58 years old and I can run our 8150LS sonic all day long! It's easy on me. And I love that the weighted wireline system takes care of the physical aspect and safety concerns."

**Robert Keyes • President**  
Associated Environmental Industries • Norman, OK

**PROFITABILITY.** It increases profitability because it requires few parts to operate. Overall efficiency correlates nicely to profitability. So does a clean safety record. But the overall cost to tool up for and maintain a weighted wireline system is quite low compared to conventional systems such as 4x6 since it requires so few parts.

Both weighted wireline systems ... SDT45 and SDT60 (for 4.5- and 6.0-in. casing) ... are simple to use. Jed Davis, Tools Engineer, said, **"During a customer training session, it only took one core run for the drill crew to understand the weighted wireline system, and just a few more runs to have it completely mastered. We didn't hit a home run this time; we think it was a grand slam!!"**

Mike also said the weighted wireline system is not meant to replace conventional 4x6 or dual tube systems. "It has always been our recommendation that weighted wireline systems complement these other soil sampling systems," he said. "We don't suggest going to the field with one tool in your tool box, nor do we recommend that you limit yourself to one sampling system." There are formations where 4x6 works great. The same can be said for dual tube systems, **"But when you can incorporate a weighted wireline system into your project,"** Mike added, **"the benefits far outweigh any costs.** You can spend all day taking the back roads to Grandma's house, but why bother when the interstate will get you there twice as fast."

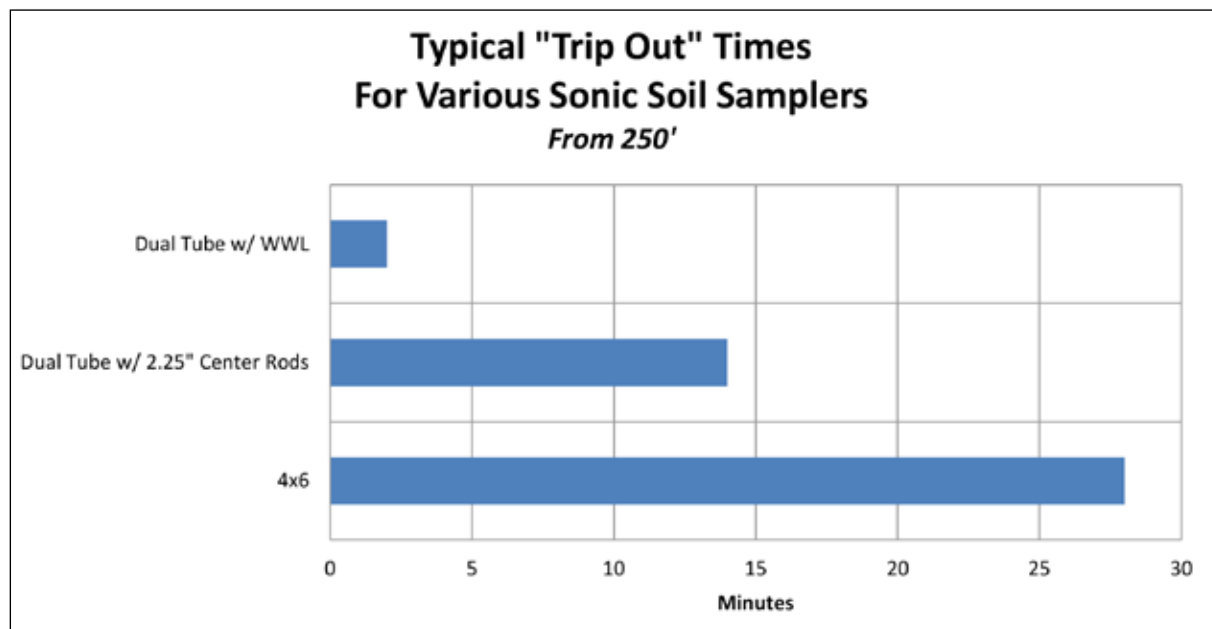
Previous Probing Times articles on Geoprobe® Sonic Weighted Wireline are available at:

[www.geoprobe.com/pt-spring2015](http://www.geoprobe.com/pt-spring2015) and [www.geoprobe.com/pt-fall2015](http://www.geoprobe.com/pt-fall2015).



Running sonic weighted wireline with SDT45 tooling. (above) Modular weight assembly, with the overshoot 'spear' visible inside the weight head prior to being lowered downhole. The modular weight assembly consists of two, 150-lb. weight segments coupled together and a threaded head and overshoot spear.

## — Faster Tripping Times —



High-quality soil samples in less time! This graph was created by analyzing thousands of feet of various sonic drilling data collected by Geoprobe® engineers. At deeper depths, simple math indicates how much faster the sonic dual tube weighted wireline system can be.



**Mike Carlin**  
Geoprobe® Tools Group Leader



Rock core recovered using SDT60 Weighted Wireline Tooling.



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





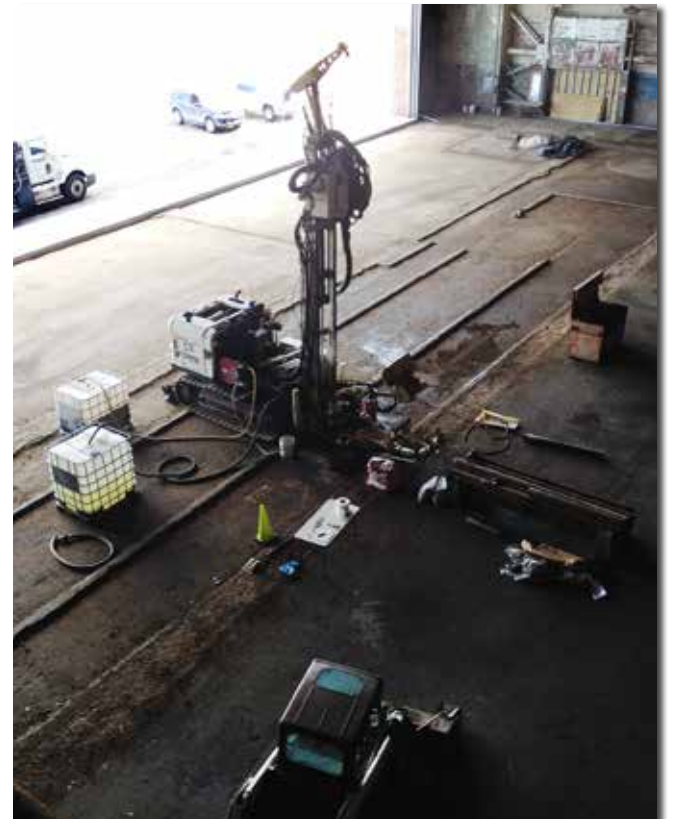
The Stearns Drilling 8140LS Rotary Sonic sets up inside one of the production buildings at the former Willow Run Powertrain Plant in southeastern Michigan for soil sampling and monitoring well installation. In the background sits a DeHaviland DHC-4 Caribou.

Stearns Drilling mobilized their Geoprobe® 8140LS rotary sonic to the former Willow Run Powertrain Plant in Ypsilanti Township in Michigan, the site of one of the largest manufacturing plants under one roof in the world. The Ford Motor Company broke ground for the facility in 1941 to supply the military with desperately needed equipment and supplies for World War II.

After completion in 1942, this "Arsenal of Democracy", as it was referred to, produced 8,685 B-24 Liberator Bombers, and had a peak employment of 42,000 men and women. After the war, the newly formed Kaiser-Frazer Corporation, in an unsuccessful effort to create a large-scale automotive empire, occupied the plant. The Kaiser-Frazer group manufactured the first of 739,000 passenger cars, as well as military aircraft. The corporation transferred its diminishing operations in 1953 from Willow Run to Toledo, OH, and Argentina.

Stearns Drilling was called to the site as part of redevelopment activities progress for the 332-acre property. According to an announcement made by the property owners, the site in southeast Michigan is "the proposed home for a technologically-advanced connected vehicle research center, a project that could become a hub of research and development for the vehicles of tomorrow and a catalyst for jobs in innovative automotive research," the release stated. A portion of the property could become a shared research and development center and test track for connected vehicles ... the first of its kind, and would jointly serve automakers, suppliers and related technology companies.

# Stearns Drilling On Site of Possible Vehicle Research Center



This three-week sampling and well installation project is part of the early phase of a 332-acre redevelopment agreement for the site.

The Yankee Air Museum plans to purchase and separate a portion of the Willow Run Powertrain plant to serve as a permanent home for a museum and its collections.

The Stearns Field Team, consisting of Bryan Marshall, Mike Hefferan, and John Deitrick, used their sonic rig to take Shelby tube and soil samples, and to install monitoring wells. During the three-week project, they also drilled several 90-ft. borings.

"My crew was very experienced and worked flawlessly to complete the project," Bryan said. "One of the challenges at this site was adapting NWJ rods and pushing Shelby tubes at various depths, but the 8140LS performed very well."

No estimated completion date for the redevelopment work is available.



One of the facility's fulltime residents, a Martin RB57 Canberra.





# Sonic Double Wall 4.5 in. (SDW45) Sampling System

The Sonic Double Wall 4.5-in. (SDW45) tooling system compliments the conventional sonic 4x6 system. It's a simple and effective tooling system designed to obtain critical confirmatory rock or bedrock samples at the end of a boring, whether sonic 4x6 or sonic dual tube 4.5-in. (SDT45) tooling is used.

According to Joel Christy, Geoprobe® Tools Group and Licensed Driller, the beauty of this system is that it's a "minimalist" system. "If you already have 4x6 sonic tooling, you can be set up to use SDW45 by adding just a few parts," he said. There are no real limitations to this system as it can be used for environmental, geotechnical, mineral exploration, and for most projects where 4x6 is used. "SDW45 can also be used in place of our traditional sonic dual tube system when angled drilling is required," Joel added.

Conventional sonic 4x6 systems perform well to reach bedrock. Once you make that switch to harder, consolidated formations, it changes the dynamics downhole significantly. When taking a confirmatory rock sample, water must be pumped through the inner casing to flush cuttings away from the drill bit. With sonic 4x6, this water comes in direct contact with the sample core and dramatically reduces the ability to collect a confirmatory bedrock sample. The SDW45 method allows the water to flow around the sample sheath and exit the water ports on the bit face, leaving the sample core unaffected. "This gives you a more representative sample than a coring casing method, especially in consolidated formations," Joel said.

One of the key benefits of this system is that conventional sonic 4x6 can be used until the operator is ready to take a confirmatory rock sample. The outer 6-in. casing can be left in place while the inner rod string is pulled. The SDW45 assembly is then lowered to the bottom of the casing using the same 4.5-in. rods. As the assembly is advanced, a confirmatory rock or bedrock sample can be taken in 5-ft. or 10-ft. increments (an optional liner can be utilized for 5-ft. increments).



**Joel Christy**

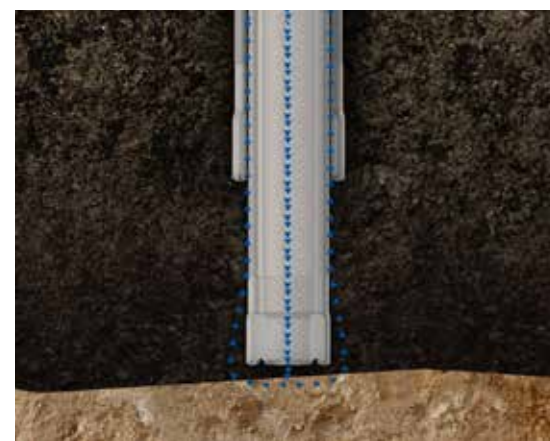
Geoprobe® Tools Group –  
Licensed Driller

- Simple and Effective Sonic Tooling System Designed to Obtain Critical Confirmatory Rock or Bedrock Samples
- Compliments Conventional Sonic 4x6 Sampling Systems
- Minimalist System ... A Handful of Parts Results in Another Valuable Tool for your Field Team
- Replaces Sonic Dual Tube System when Angle Drilling is Required



View the Video at [www.geoprobe.com/sdw45](http://www.geoprobe.com/sdw45).

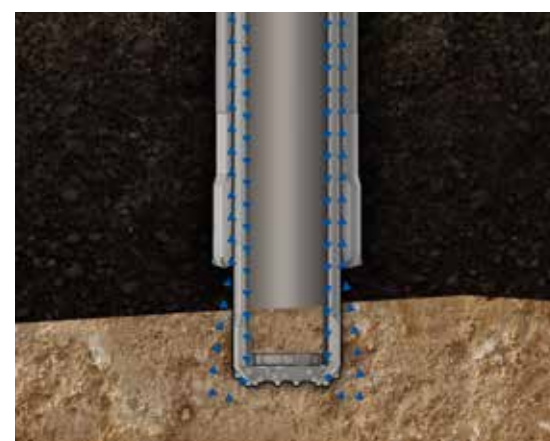
## Animation Sequence of the Sonic Double Wall 4.5 in. (SDW45) System in Action



With conventional sonic 4x6 sampling, water comes in direct contact with the sample core and dramatically reduces the ability to collect a confirmatory bedrock sample.



The SDW45 sonic system allows water to flow around the sampler sheath.



After water flows around the sample sheath, it exits the water ports on the bit face. This leaves the sample core unaffected.



## Quality Training Key to Success in the Field

You're going to see lots of 'NEW' stickers in this issue of the newsletter. There's lots going on and many new options and tooling systems to take in. Sometimes it's hard to keep up, so we not only train our customers on how to use machines and tooling safely and correctly, but our Sales Team also benefits from training sessions to better help you in the field. Call to schedule a visit or training session with our Kansas Team and enjoy our Sunflower hospitality.





# 8140LC Sonic: Unmatched Versatility

"As far as rig performance goes, I have to say it did very well," Randy Crandell, Driller for Major Drilling in Salt Lake City, UT, said recently. "I had the 8140LC rotary sonic running pretty much full power for 10 to 12 hours a day for nearly 25 days straight, and it never gave me any issues,"

Those comments pretty well summed up the results of a non-typical job on a barge in Iowa that Major Drilling completed 3-1/2 weeks ahead of schedule.

The main goal of the project was to install de-watering wells inside a cofferdam into the underlying strata to relieve any hydrostatic pressure that may exist. The work was performed on a dam near Des Moines. The various layers of soil drilled through included clays, small gravels, and sand zones.

The Major Drilling Field Team, consisting of Randy Crandell, Chris Ruschmeyer, Shaun Biggs, and Larry Thoren, were running a 6x8

"In 24 years of drilling, not one of the other rigs I've worked with compares with the quality of workmanship put into the 8140LC. We were able to complete the project 3-1/2 weeks ahead of schedule, and in the end, had a very pleased client."

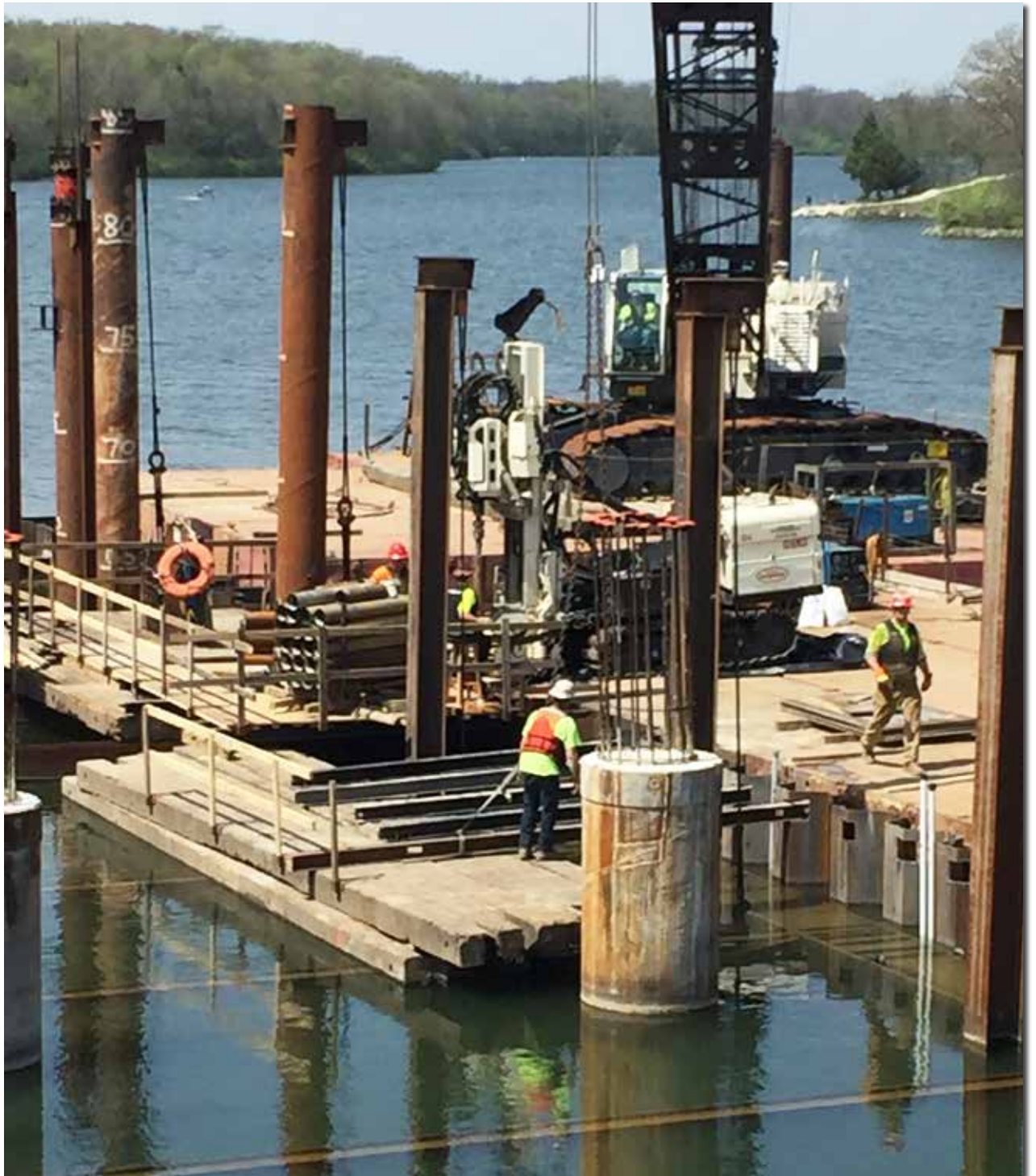
Larry Thoren • Field Superintendent  
Major Drilling • Salt Lake City, UT

casing setup while sampling with a 4-in. core barrel. All drilling was performed from the barge. The Field Team would boat in everyday to get to the rig.

The general work summary states that the Major Field Team installed 18, two-in. nested wells and four piezometers in 22 holes, 6- to 8-in. in diameter to a depth of 110-ft. They also completed continuous soil sampling below the water.

"This is a quality rig. It was a pleasure to have the 8140LC on site for this non-typical job," Larry Thoren, Field Superintendent for Major Drilling, said. "I've been around all types of drill rigs, (RC, core, rotary, oil field) and now sonic and environmental rigs for 24 years, and not one of the other rigs compares with the quality of workmanship put into the 8140LC sonic rig."

"It was also a pleasure to work with the Geoprobe® Service Team," Randy added. "Todd Ewing is Grade A," added Larry. "This is a quality machine; astounding! We were definitely impressed with the workmanship and customer support."



The Field Team for Major Drilling in Salt Lake City, UT, was actually not in the field but on the water for the installation of de-watering wells inside a cofferdam near Des Moines, IA. The goal of the work was to relieve any hydrostatic pressure that may exist.



(l to r) Randy Crandell (at the control panel), Chris Ruschmeyer, and Shaun Biggs used an 8140LC rotary sonic to advance 6-in. casing to complete all of the sampling and nested well installation work, completing the job 3-1/2 weeks ahead of schedule.



Major Drilling used their 8140LC with 6x8 sonic casing. Continuous soil sampling below the water was completed with a 4-in. core barrel.



(l to r) Randy Crandell (at the controls), Shaun Biggs, and Chris Ruschmeyer add a stick of 6-in. casing to be advanced over a 4-in. core barrel using the 8140LC rotary sonic on a barge.



NEW



The Geoprobe® Indexing rack is a simple approach to assisting drill crews with tripping rods in and out of the borehole as well as easily moving large amounts of drill casing around the drill site. Our indexing rack is designed to assist helpers when positioning 10-ft. sonic tooling into the grippers of a rig-based rod handler.

**Tool handling is becoming a necessity rather than an option on many drill sites these days.**

*Historically, as a manufacturer, we've focused on building great rigs and performance-based tooling to get the job done safely and efficiently. In the past several years we've put a lot of focus and investment into handling tools safely and reducing the physical effort required to do field work. Our R&D yard is littered with countless prototypes of different rack systems, all with the goal of helping drillers and helpers handle tooling less; each prototype yielding more answers and refinements on how to better achieve this goal. Here's our end result:*

**Geoprobe® Indexing Rack for 10-Foot Sonic Tooling.**



# Indexing Rack for 10-Foot Sonic Tooling

**Safe • Low Cost • Easy-To-Use • Easy to Transport**

With a few basic movements and one 'touch' of the drill stem, sonic tooling can be loaded into the rig's rod loader, and the machine's functions take over. The same can be said when tripping rods out of the borehole. The machine-based rod loader lowers the tooling to a position where once again a few basic movements and one 'touch' of the casing puts the tool safely back into the indexing rack until it's needed for the next interval. **The rack is adaptable to run 3.5-in. to 10-in. sonic casing in 10-ft. lengths.**

The Geoprobe® Indexing Rack features two, easy-to-use, adjustable jacks for working on uneven ground, and a unique and simple racking system that separates tooling into rows making the management of individual pieces of 10-ft. sonic tooling more manageable. The indexing rack also features rubber rollers with a special latch arrangement for positioning each row of tooling being used. This is especially efficient on 4x6 applications where the entire drill stem is tripped in and out of the casing on each interval. The rollers can also be positioned so that long segments of center rods (2.25 in. diameter) can be placed on them without rolling off. This proves very helpful on dual tube applications where long strings of center rods are tripped in and out of the borehole.



The indexing rack includes a basic frame system with large fork pockets in the base making drill site navigation a cinch. Load it up, pick it up, put it on the truck, and head to the site.

With one of these racks working in tandem with your sonic rig, you'll be able to say goodbye to the days of wrestling heavy 10-ft. tooling in and out of racks, off of saw horses, out of slings, or worse case, off the ground! The countless, physical motions and dangerous touch points required to navigate tooling in and out of the borehole without the racking system will also be on the way out. **This rack easy enough for a two-man drill crew to work safely and efficiently. No more 3- and 4-man crews will be required for a high-production day.**

Not sure if you need one? Just try it out! Call us for more information.

View the Video at [www.geoprobe.com/index-rack](http://www.geoprobe.com/index-rack)



The indexing rack has two, 12-in. rubber rollers that do all the heavy lifting during trip-in and trip-out operations. The rollers feature a unique latch arrangement so they can be easily positioned up and down for each row of tooling being used.



The rack also utilizes two, adjustable, mechanical jacks so the height and approach angle to the loader can be adjusted for uneven ground.

NEW

## High-Speed Coring Head for Geoprobe® Sonics

While Geoprobe® sonic machines effectively core rock, sonic does tend to induce fractures in the sample. So if the job calls for accurate measurement of RQD (Rock-Quality Designation), why not use a proven method? Diamond Coring. To that end, a new option for the Geoprobe® sonic machines is a high-speed coring head. Based on our proven coring head (used on 8040DT machines for years), the drive has a maximum speed of 800 rpm and 540 ft-lb. of torque (breakout torque: 720 ft-lb). **The switchover from sonic to high-speed coring is easy, taking less than five minutes in the field.** Also, the high-speed coring head incorporates a side-feed swivel, and is setup to work with our floating subs. The floating subs have 2 inches of travel simplifying make-up with the tool string. Thread options include: AWJ, NWJ, NWL, HWL, or PWL connections.

The next time you have a job that needs quality overburden samples, casing socketed into bedrock, and a high-quality core of the bedrock, consider taking a Geoprobe® sonic rig equipped with the high-speed coring option to the field.

View the Video at [www.geoprobe.com/core-head](http://www.geoprobe.com/core-head)

### Coring Head Specifications

Max Speed: 800 rpm  
Max Torque: 540 ft-lb  
Breakout Torque: 720 ft-lb  
Pull/Push: 10,000 lb

Call  
1-785-825-1842  
for details!



Geoprobe® Coring Head for Diamond Drilling.



# 3230DT Helps Expand Services for Active Environmental Technologies

*Contributed by Keith Gerber, Drilling Division Manager, Active Environmental Technologies, Mount Holly, NJ*

Our goal at Active Environmental Technologies, Inc. was to expand the drilling division to provide a much broader range of services to our existing clients as well as expand our current drilling capabilities. At the time, Active owned a Geoprobe® 7822DT as well as a 54DT, so we knew we wanted to stay with the Geoprobe® brand based on the quality and versatility of the equipment and tooling, as well as excellent Geoprobe® customer service.

After several months of research, we narrowed our decision to the 3230DT. As a growing division, we saw the value that the 3230DT offered which would allow us **to meet our goals of expanding and adding drilling services that we couldn't offer in the past and increase our customer base.**

"I love the 6-in. rod system and am happy we ordered it with our 3230DT. The 6-in. tooling simplifies our 2-in. monitoring well installations while increasing our productivity. Our project site stays neat and clean because we aren't using hollow stem augers for installation. Our clients are happy because no augers means no cuttings. And on top of all that, it's a safer method for our crews!"

**Keith Gerber • Operations Manager**  
Active Environmental Technologies • Mount Holly, NJ

Of the many rig features that appealed to us, the key feature was the diversity offered in this single machine. **The ability to direct push, spin hollow stem augers, perform air rotary, mud drilling, geotechnical borings as well as rock coring, all with one machine ... quickly ... got our attention.** With the user-friendly platform, the 3230DT has the ability to change from one task to another in a matter of minutes to perform multiple tasks without mobilizing multiple rigs. All of these options are available on the 3230DT platform which can fit in to just about any location.

In this industry, initial plans for site investigation work do not always end up the way they were originally anticipated, but now we have the ability to change on the fly to obtain the data required by our clients without remobilizing to the site with additional equipment.

Since the 3230DT arrived, we have installed 2-in. wells via direct pushing a closed point using 6-in. dual tube casing, unique to Geoprobe® tooling. This allows for a more efficient installation of 2-in. wells as well as eliminating soil cuttings and the additional costs associated with drum disposal. Active has also installed monitoring wells and injection points utilizing hollow stem augers, ranging from 4.25 inches to 8.25 inches, 50-foot-deep air rotary rock wells, geotechnical borings, rock coring, and of course, deep dual tube soil sampling with 2.25- to 6-in. dual tube sampling equipment. **The 3230DT has increased our efficiency, as well as offered a cost savings to our clients by being able to perform multiple drilling tasks with one mobilization.**

Other projects have included a multi-day geotechnical/rock coring project in an urban area where traffic control and the work area was limited, and a multi-day aquifer testing project located in a large, mountainous, wooded area accessible only via old logging roads utilizing casing advancement tooling specific for unconsolidated subsurface soils. Projects like this are why we purchased this machine. As a former environmental consultant, nothing is more frustrating than being on a project and having site conditions change, which requires a remobilization of different equipment. Now, with the 3230DT, clients do not have to worry about that anymore. **We have been extremely pleased with the abilities of this machine especially since we've been meeting our expansion goals and growing our services.**



Nick Kolenda (left) and Tom Hartwell, Drillers for Active Environmental Technologies, use a 3230DT to install 2-inch monitoring wells in a residential area. Monitoring wells were installed to determine potential groundwater impact.



Nick Kolenda (left) and Doug Turner use 4.5 in. casing and DT37 for soil core collection at an industrial equipment facility.



One tight area! Active Environmental experienced just how versatile the 3230DT rig can be by snugging up to a residence to install a monitoring well.





Threading/Unthreading Casing Has Never Been Easier or Safer!

# Spring Assisted Swivel Pull Cap

For use with 2.25-in. Rods



Spring Assisted Swivel Pull Cap (left, pin) 217609 and (box) 226053. Options for pin up and pin down applications.



**Lee Shaw**

Geoprobe® Sales  
1-785-825-1842  
shawl@geoprobe.com



Today's larger machines enable operators to handle long sections of inner rods with an overhead winch. The 2.25-in. Spring Assisted Swivel Pull Cap is designed to reduce operator fatigue when adding or removing these sections of rods to the inner tool string ... safely and easily. Above, Lee Shaw uses the Spring Assisted Swivel Pull Cap under a 3230DT during well installation. Tooling systems that benefit from this accessory include Sonic SDT45 and SDT60, and Direct Push DT45 and DT60. Geotechnical applications include driving casing with 2.25-in. center rods and split spoon sampling with 2.25-in. rods.

*A passionate and light-hearted testimonial provided by Lee Shaw.*

This is one of my favorite accessory tools. It's simple and effective. This is a true impact-making, gotta-see-it-to-believe-it, must-have tool for your tool box! I still remember the first time I experienced the freedom when using this accessory tool.

You see, I'm a creature of habit (stuck-in-a-rut/resist change kind of guy). I was the helper on a 3230DT while our engineers were conducting an exercise of performing multiple applications in a single borehole. From 0 to 40 feet, we collected 2-in. split spoon samples via hollow stem augers on 5-ft. intervals. At 40 to 50 feet, soil samples were collect via MC7 through 4.5-in. rods. Then we finished the boring to 115 feet using mud rotary. All this was done using the 2.25-in. rods as either center rods or as casing. At one point, as I was removing and adding 20-ft. sections of the 2.25-in. rods the operator said, "Hey, try this lifting cap with an assist spring." He must have noticed that I was struggling with threading and unthreading the center rods. But more likely he was tired of waiting on me (remember, resistant to change, keep doing it the same way even if it's difficult, that's me).

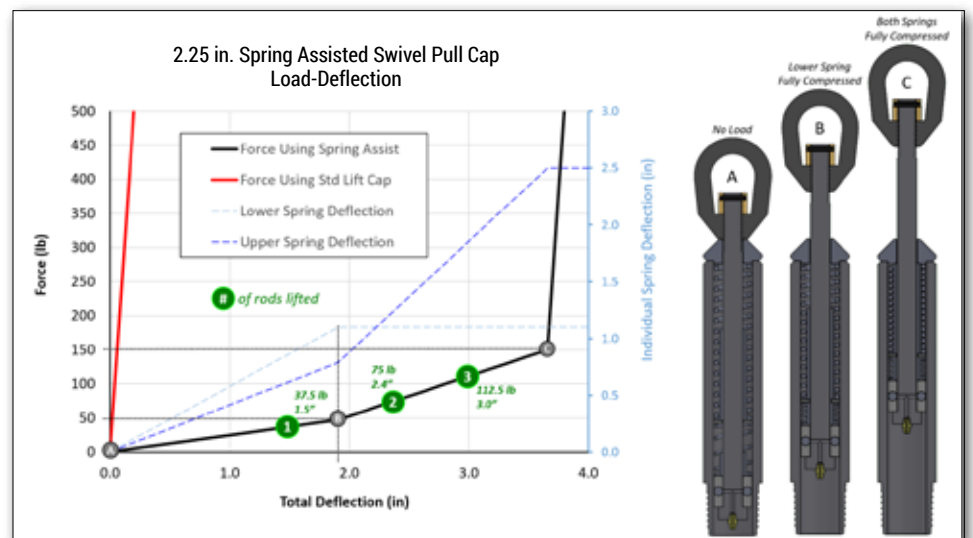
I'm telling you, **the Spring Assisted Swivel Pull Cap made an immediate impact on my role as the helper and the overall field experience.** The days of struggling to remove and add the 2.25-in. rods were over for me. Finished. Done. No more!

We completed the remaining exercise using the Spring Assisted Swivel Pull Cap and saved time, my energy, and my hands and forearms.

By using the Spring Assisted Swivel Pull Cap, 2.25-in. center rods can now be threaded or unthreaded with minimal effort.



Birds-eye view. The Spring Assisted Swivel Pull Cap in action.



With the 2.25-in. Spring Assisted Swivel Pull Cap, the operator can use the winch to support the weight of the rods being added or removed which allows the rods to be threaded or unthreaded with minimal effort. Essentially, the rods 'float' on and off. The operator is physically lifting less weight to align the rods. The mechanics of the Spring Assisted Swivel Pull Cap provide natural self-alignment of the suspended rod string, preventing the rods from tipping off center and binding the threads.

View the Video at [www.geoprobe.com/spring-assist-pull](http://www.geoprobe.com/spring-assist-pull).



# Air Rotary Drilling with a 7822DT

Never underestimate the capability of the 7822DT! Every day, customers become aware of applications they can offer their clients based on the power of the 7822DT.

According to Tom Wardell, Geoprobe® Sales for the Midwestern Region, "One of the really great, and sometimes overlooked, applications of a 7822DT is air rotary drilling," he said. "I've had many customers ask me if the 7822DT has enough power for air drilling. My quick answer is a definite, 'Yes, you can!'"

The GA4000 Augerhead on the 7822DT, when paired with a side port swivel and an auxiliary air compressor, is all you need.

Several field applications that work well with this setup include residential geothermal well installation, installing anodes for underground storage tank remediation, or monitoring well or water well installation.

"Because of the versatility of this machine," Tom added, "it gives companies the ability to expand their business from basic environmental sampling to the wide range of tasks that can be completed by using air rotary drilling."

"Having the ability to do air rotary with your 7822DT is often times overlooked. The 78 machine can be equipped with a GA4000 augerhead which provides plenty of power and rotation for air rotary drilling. What a machine!"

Victor Rotonda • Geoprobe® Sales  
Mid-Atlantic and Northern Regions



A Geoprobe® 7822DT, connected to an air compressor, is used to install monitoring wells at an underground storage tank site by Cory Walker, Owner of CORTEK Drilling.

## 7822DT Options for Air Rotary Drilling

Options are available for the 7822DT that make air rotary drilling possible.

The **78-in. Stroke** allows plenty of room for mounting a side-port swivel, with a 1-5/8 in. hex, directly to the auger drive on the machine. "This is a quick and easy connection to the air flow line from an air compressor," said Victor Rotonda, Geoprobe® Sales for

Mid-Atlantic and Northeastern regions. "The swivel also comes with a stabilizer arm that connects to a mounting bracket on the 7822DT. This produces a solid connection to the drill string," Victor explained.

The **7-in. Breakout Kit**, which mounts to the 'toes' of the 7822DT, generates 17,500 lbf clamping force, and its hydraulic breakout wrench has over 6,000 ft-lbf breakout torque. The operator and crew can quickly and safely break apart tight joints on larger diameter drill rods.

The 7822DT can also be equipped with **Feed Rate Controls** for the Operator to adjust to changes in subsurface conditions. "It's not surprising that many Geoprobe® 7822DT Owners now offer air rotary services," Victor said. This seems to be one of the important options that make the 7822DT so attractive to customers."

"What a machine!", he added.

A GA4000 augerhead provides the power and rotation needed for air rotary drilling with the 7822DT.



Using a special enclosure to minimize escaping dust, a 7822DT is used to install monitoring wells in a roadway right-of-way. Air rotary drilling was a feature that convinced the machine's owner, Cory Walker, CORTEK Drilling, to purchase the machine.



Cory Walker, with CORTEK Drilling in Spring Hill, TN, is installing monitoring wells using air rotary drilling methods.



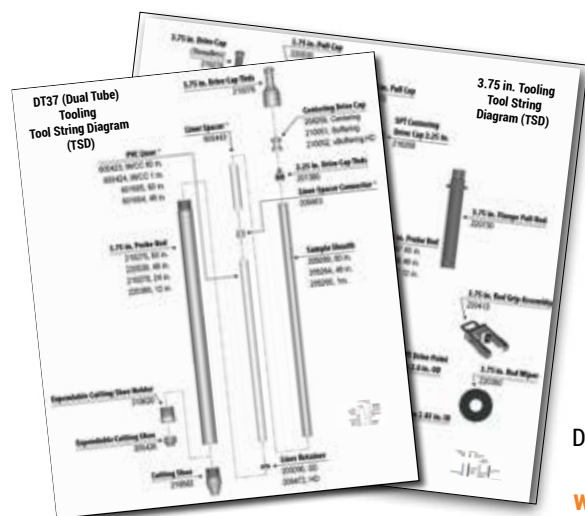
# Customers Find Success with Geoprobe® 3.75 in. Tooling

Geoprobe® 3.75 in. tooling was designed in conjunction with the Geoprobe® 2.0-in. Slim Prepacks to create a more efficient method of installing 2.0-in. Schedule 40 prepacked monitoring wells. The 3.75 in. rods have a 3.75 in. OD and an ID of 3.0 in. In short, it's an optimal casing combining ease of use for 2.0-in. Slim Prepack installation, minimal borehole size to maintain reasonable penetration rates, and a robust thread design. In short, **this is a durable and robust tooling system that can be driven with 60-, 70- and 80-Series Geoprobe® percussion hammers.**

Just how good is it? We've let our customers speak to their success with this system (see comments to the right)!

If you have questions about the 3.75 in. products, or about any of the other Geoprobe® tooling lines, please call Customer Service, 1-785-825-1842, or go to [www.geoprobe.com/375](http://www.geoprobe.com/375).

**You'll find a complete listing of this tooling system in the NEW 2017 Geoprobe® Source Book (available December, 2016).**



Setting a Geoprobe® 2.0 in. Slim Prepack using 3.75-in. tooling and a 7822DT.

Geoprobe® Tool String Diagrams (TSDs) are available for download at [www.geoprobe.com/tsd](http://www.geoprobe.com/tsd).

## EXAMPLE DRIVE TIMES

View the Video at [www.geoprobe.com/375-direct-push](http://www.geoprobe.com/375-direct-push).



**Percussion hammer power translates into tool advancement rates.** Here's one example ... during informal testing in our backyard, our 7822DT (above left) could drive a 3.75-in. rod string to approximately 30 feet in 21 minutes. The 3230DT (above right) advanced the 3.75-in. rods to 30 feet in well under 6 minutes. Both had a solid drive point on the lead end.



Geoprobe® 2.0 in. Slim Prepack 220282 for use with 3.75 in. tooling

Geoprobe® 2.0 in. Premium Prepack 206644 for use with 4.5 in. tooling

"In addition to **saving our clients time and money** by using 3.75-in. tooling to set 2-in. slim prepacks, with no cuttings, we've also saved them thousands of dollars by using the 3.75-in. tooling along with hollow stem augers to provide a **double-cased well installation** where large casing isn't required. We can use the 3.75-in. tooling to get jobs done that previously would have required a large sonic or auger rig to be on site."

**Rob Mores • Owner**  
Enviro Dynamics • Hebron, IN

"We use the 3.75-in. casing on our 7822DTs every single day. We've been busy on geotech projects, and have sampled down to over 50 feet with it. Most of our projects involve continuous sampling down to 12 feet, and then every 5 feet after that. We just completed a project where we constructed test borings to 50 feet. When we encounter bedrock, we have enough room to run our NX core barrel out the bottom."

**Robbie Pryce • Operations Manager**  
Atlantic Testing Lab • Canton, NY

"Clients really like us being able to set the 2-in. Slim Prepacks after soil sampling without the additional expense of running hollow stem augers when we use the 3.75-in. rods. They like that **time is saved** in addition to the benefit of lower costs due to the **reduced soil cuttings** which equal less drums and less soils for disposal. We like using this system for a couple of reasons. The 3.75-in. rods are much easier to clean and decon than traditional hollow stem augers, and they are **much lighter and easier to handle** versus the augers. It's a win/win for our clients and our employees in the field."

**Cory Hebert • Owner**  
Devonian Group • Lafayette, LA

"We were tasked with setting a double-cased well inside a building with space restrictions that would have made entry of traditional rigs impossible. We were able to use our Geoprobe® 7822DT to turn 6.25-in. hollow stem augers and set a 5-in. casing. We then utilized our 3.75-in. rods and DT37 expendable shoes to set a 2-in. Slim Prepacked Well Screen. The new tooling was the **perfect solution for our job, and it worked flawlessly.**"

**Phil Palsgrove • Owner**  
GeoServe Inc • Woodstock, IL

"C&S customers see the **huge cost savings** of using 3.75-in. probe rods with our 3230DT for completing subsurface assessments verses using 3.25-in. ID hollow stem augers. There's no need to have a lot of soil drums for cuttings containment and soil drum staging, hauling, and proper disposal."

**Buford Collier • Project Manager**  
C&S Lease Services • Kilgore, TX



# 7822DT Uses Air Rotary for Geothermal Loop Installation

During the last 23 years, Tony Poulter, Vice President and Co-Owner of RAZEK in Louisburg, KS, has operated a Geoprobe® machine. And it seemed to him that the second question he was asked every day was, "How deep can that thing go?" And the answer has always been, "until we hit rock or run out of rods!", Tony said. "Of course the first question was, "Y'all drillin' for oil?"

The answer to both questions has now become more complicated for Tony and the company.

On May 21, 2016, Tony attempted to drill a 6-in. boring to 150 feet for the installation of geothermal loops at their headquarters in Kansas. They spent a lot of time researching whether they could even attempt rock drilling with their 7822DT, and many of the experts told them they

were foolish to even try. According to Tony, "they said rock drilling must be done with a larger rig with more weight, more torque, and higher rotation speed." But, as Tony found out, **the 7822DT out-performed all of the 'experts' and created a very lucrative niche market for their firm.**

Direct push refusal at the property is around 8 feet, and at 12 feet they encountered clay overburden with intermittent layers of weathered limestone and some shale. During the first 30 minutes of air rotary drilling with the 7822DT, they passed 50 feet and felt "very confident," Tony said. Limestone bedrock was encountered around 80 feet, and the drilling rate slowed. As they advanced deeper into the boring, and

the rock became tougher to penetrate, the 7822DT never slowed down.

"We passed 100 feet at the 90-minute mark and ended up at 162-ft. below ground surface," Tony said, "just 3.5 hours after beginning (give or take a few breaks along the way). We could have kept drilling deeper but, as history has proven, we could only go until we ran out of rods!"

They drilled the 6-in. diameter borings to install 15 geothermal loops at their facility to upgrade the company's furnace and air conditioning systems for ground source geothermal

heating and cooling.

Tripping out of the boring in 5-ft. increments was no small task, but the Geoprobe® hydraulic break-out system worked flawlessly on every joint.

For the project, RAZEK used an industry-standard drill rod with a side-port swivel connected to the augerhead. An external air compressor was used to clean the cuttings out of the boreholes and to activate the downhole hammer.

Removing drill stems from 162-ft. bgs.



Tony Poulter, Vice President and Co-Owner of RAZEK Environmental, installs geothermal loops in 6-in. diameter, 150-ft. deep bores with a 7822DT. Tripping out of the boring in 5-ft. increments "worked flawlessly."



Five-foot drill stem sticks after removal using the Geoprobe® hydraulic breakout system.





CJ, Driller, and Dalles, Helper, collect MC5 samples with a 7822DT in Cambridge, Ontario.

In 2005, Andrew and Tony Armstrong set forward to challenge themselves by starting their own company, Direct Environmental Drilling, in London, Ontario, Canada. Andrew provided the company with business management and project management, and Tony brought 10 years of drilling experience to the mix. As with all companies, success requires hard work and long days, a supportive family, a good staff, a great product, and, perhaps, a touch of good luck. Today, eleven years later, Direct Environmental Drilling, based on the values that started the company, continues to grow.

Of course the beginning was the hardest part. "Convincing potential customers that the new, compact Geoprobe® 6620DT was equal, if not better than, the large bulky auger drills they were used to using was a challenge that was quickly rewarded," Tony recalled. **"Once they saw what we could do with our 6620DT and the hard work of determined owners and employees, success came much easier."**

According to Andrew, sticking with the Geoprobe® brand was one of the simpler decisions they had to make as a company. "We've been impressed with the support that we get from the service team at Geoprobe Systems®," he said. "They have provided key support at key times."

"Our customers also love what our field team and our Geoprobe® machines can accomplish in one work day with little to no cuttings, leaving no indication that a machine had been there to delineate a contaminated site," Andrew added. "And should the customer require a 2-in. well, the company can provide a high-quality sample before switching over to augering on their 7822DT machines."

Going forward, Direct Environmental Drilling sees themselves growing their Geoprobe® machine family even more.



CJ, Driller, and Dallas, Helper, running LL-MIP with Matrix Environmental and JFM Environmental Ltd.



Running the 7822DT on an abandoned lot in London, Ontario.

*"Our customers love what our field team and our Geoprobe® machines can accomplish in one work day with little to no cuttings, leaving no indication that a machine had been there to delineate a contaminated site. And should our customer require a 2-in. well, we can provide a high-quality sample before switching over to augering on our 7822DT."*

**Andrew Armstrong • Co-Owner  
Direct Environmental Drilling • London, ON Canada**

# Brothers Find Employees and Geoprobe® Valuable to Grow Business

**"We believe we've hit upon the perfect formula to grow ourselves with all the support we get from our terrific employees, our supportive families, and the team at Geoprobe®."**

Direct Environmental Drilling focuses their skills within the environmental and geotechnical field across Ontario. With Ontario's constantly challenging formations, the company has risen up the ranks for reliability by consulting and engineering companies.



A look back to 2005. Standing here with their original machine, Tony Armstrong (left) and Andrew Armstrong, Brothers and Owners of Direct Environmental Drilling, took delivery of and completed a training session on their first Geoprobe® machine, a 6620DT, in 2005. They currently own a fleet of 6620DT's and 7822DT's.





Drayko welds two sections of pipe together under the overhang of a pump station. The maneuverability of the 6620DT permitted a battered installation under the buried sewer main to ensure a 'solid' frozen curtain.

# GeoTek Hawaii Helps Introduce Ground Freezing Technology to Paradise



GeoTek was selected for the work because the 6620DT allowed pipe installation under the overhang and without the removal of the fence. Neither criteria could be met by competitors who don't own Geoprobe® equipment. The installation layout can be seen encompassing the equipment.

GeoTek Hawaii was recently retained by Drayko Construction in Honolulu, HI, to complete an innovative project for the City and County of Honolulu. The City had an 18-in. diameter pressure sewer main elbow that required replacement. What made this particular work difficult was its location. According to Quinton Wilson, Operations Manager for GeoTek Hawaii, "The sewer main was wedged between the pump station foundation and Oahu's main fuel supply pipeline corridor," he said. "Not only was its proximity to multiple utility infrastructures difficult to work around, but it was also located approximately four feet below groundwater." Regular excavation and shoring was not an option.

Drayko proposed a common construction technology, but something that wasn't common for the tropical paradise of Hawaii ... freezing the ground.

Drayko needed 31 freeze pipe conduits installed in a very strategic layout with precise placement next to the pump station foundation and the pipeline corridor to ensure success. Installation of 30-foot-long, 3-inch diameter steel pipes in a circumference around the elbow was engineered on paper to be the solution.

Those involved in the placement design turned to GeoTek to turn engineered plans into reality. A site visit revealed that GeoTek could perform where others could not. "Drayko was surprised when I told them that we could drill their pattern without removing the fencing and also get under the overhang," Quinton said. Both of which were compromises Drayko was willing to concede under requirements from another contractor. **"They were quite thrilled and even a bit skeptical when I told them we could do it,"** he added.

GeoTek Hawaii relied on their Geoprobe® 6620DT to use solid stem augers to drill the holes and install the conduits. A modified overhead winch mast served dual purposes. A bolt-on extension allowed the hoisting of a single 30-foot-long pipe for installation, and also was removable for seven of the installations under a 15-foot high overhang next to the pump station.

Since each freeze pipe had a limited radius of influence, placement in X, Y, and Z axis were critical for success. **"Boreholes had to be in exact locations and installed within 1 degree of plumb,"** Quinton explained. The adaptability of the 6620DT allowed in the field flexibility as the field engineer required an additional battered pipe to freeze the ground under the sewer main. GeoTek's skill at implementing a simple drilling technique replaced more expensive approaches. Discussions with the field engineer resulted in compliments on GeoTek's performance with such simple machines and tools.

"GeoTek Hawaii successfully pulled off the exact placement of the battered freeze pipe directly under the force main, and installed it at exactly 82-degrees to ensure a solid freeze curtain for the excavation," he added.

All groups involved were under close scrutiny to prove the ground freezing technique in Hawaii. Each group deemed this a successful project from their respective points of view.

The GeoTek field team included: Quinton Wilson, Project Manager and Driller; Kevin Rogers, Driller; Marvin Thedford, Crew; and Elisha Qalo, Crew.



# Limited Head Space for 7822DT

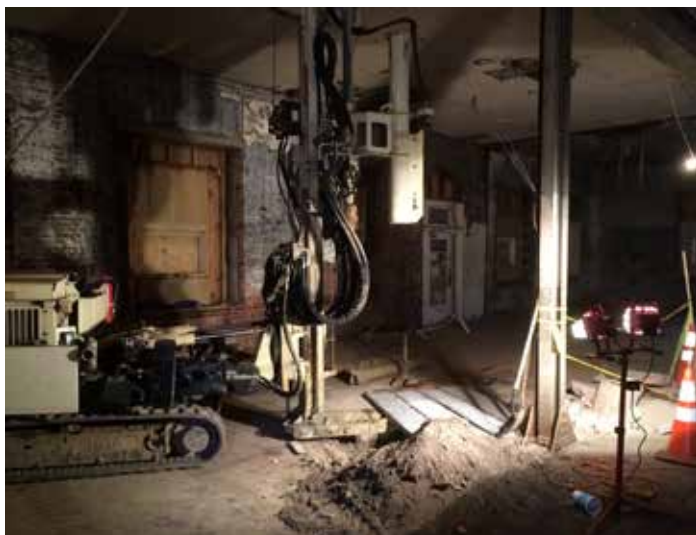
Hynes & Associates, in Salisbury, MD, recently completed another difficult drilling project using a Geoprobe® 7822DT. As the drilling contractor for Columbia, MD-based Geotechnical Laboratories, Inc. (GeoLab), Hynes & Associates was to drill two test borings inside a building that was in the process of being modified, and drill one boring outside of the building. The structural engineer needed GeoLab to provide foundation recommendations on a very quick turnaround time for structural modifications that were in progress for the Cumberland Dye Works in Cumberland, MD.

GeoLab had already attempted test pit excavations. The test pits were unsuccessful due to the rocky conditions.

Mike Hynes, Hynes & Associates' Drilling Manager, was able to drill the Standard Penetration Test (SPT) borings inside the building with temporary lighting and heavy-duty fans to circulate air inside the building. The head room was only 13 feet.

The field team completed both interior borings and one exterior boring in one day. The borings were drilled to refusal at 16.5- to 20.5-feet.

"Our Geoprobe® 7822DT made a difficult job easy. The versatility of the 7822DT delivered another successful project for Hynes & Associates and for our customer," Mike said.



(above and right) Very little head room. The vertical work space for this 7822DT was only 13 feet, but it was enough for Hynes & Associates to collect foundation information for structural modifications for the building.



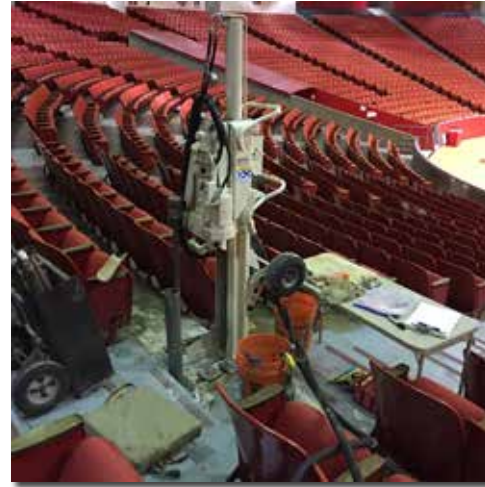
## 78 Series Machines: From Rubble to Remediation



(right) Midwestern Drilling's 7822DT is lifted over a pile of rubble caused by a train derailment. (above) Dusty Schroeder, President of Midwestern Drilling in Holloway, MN, installs monitoring wells with a 7800 at a local landfill.







GeoTest Services collected approximately 30-in. long concrete cores with a 420M as part of the project for five limited access borings at the University of Houston inside the main auditorium of the Hofheinz Pavilion. The concrete coring was through hard rock aggregate concrete found in the older structures in Houston.

GeoTest Services in San Antonio Knows How to Dial In ...

# Limited Access Machines

GeoTest Services in San Antonio, TX, completed five limited access interior borings to +/- 20 feet at the University of Houston Cougars Hofheinz Pavilion/Guy V. Lewis Court Basketball Arena in Houston. Alex Forhertz, Andrew Cardenas, and Angel Hernandez, the field team for GeoTest, used the 420MT in the arena while a PortaCo hydraulic pump and their unique 200-ft. auxiliary hose system was set up outside to power the machine inside.

According to Paul Wolf, President of GeoTest Services, the scope of work required that borings be taken at four locations on the riser steps in the main auditorium, and at one location in the service concourse under the seating. "We cored about 30 inches of concrete on the riser steps," Paul explained, "to gain access to the soils below the structure."

The borings were taken about halfway down the riser steps from the arena's main concourse to the playing court. The steps alternated in width from 12 inches to 22 inches on every other step. The 420M was brought in and anchored to the steps. "We anchored the 420M to the 22-in. wide steps," Paul added, "and were able to complete all of the borings. The geotechnical engineer and the University of Houston were extremely pleased that we were able to obtain the soil samples they needed in the redesign of the Hofheinz Pavilion."

The project took two days to complete due to the spread out logistics and the extreme amount of concrete coring .... not to mention that the concrete coring was through the famous 'hard rock aggregate concrete' found in the older structures of Houston!

GeoTest Services has paired their Geoprobe® 420M with a 54LT (far right) to provide shallow sampling and limited access work for their customer base.

"The 420M was the perfect machine for this project. In fact, I'm not sure there is another machine that could have completed the project in the fashion that the owner and project engineer wanted it to be done. The geotechnical engineer and the University of Houston were extremely pleased that we were able to obtain the soil samples they needed..."

— Paul Wolf Jr. • President  
GeoTest Services • San Antonio, TX



Ray Meinhardt (right) and Bill Seymour set up the GeoTest 54LT for shallow sampling work inside an office building. At 34.5-in. wide, the 54LT fits through most doorways.



The GeoTest team operates their 420M inside an historical building in San Antonio after a fire severely damaged the structure. The 420M was used in the building's basement to obtain geotechnical samples as part of the structural design requirements for a new elevator shaft.



54TR mounted on Kubota BX2370 subcompact utility tractor.

## 54TR Mounting Options

Are you looking for a limited access, specialty direct push machine? Our 54TR combines the proven 54 Series probe assembly and GH40 Series hydraulic hammer with a highly maneuverable, 4-wheel-drive, rubber-tire carrier vehicle. Rubber tires provide low site impact for work in landscaped areas of commercial and residential properties. **Quick setup and fast ground speed make this an ideal machine for shallow, high-volume sampling common in railroad, refinery, and pipeline jobs where the travel distance between sample locations can be significant.** Operators will appreciate the ability to safely ride between sampling locations. These utility vehicles can be driven to the field site or transported on a tandem axle trailer.



54TR mounted on John Deere JD2520 compact utility tractor.



# MIP Logging Used to Investigate Site Contaminated by Mixture of VOCs

Dekonta company, a central/eastern European environmental company in Prague, completed both research and commercial activities at a site with complex contamination from a mixture of volatile organic compounds. Because the site was close to drinking water resources, the environmental risk was emphasized. The subsoil at the site is contaminated mainly by BTEX, mono-chlorobenzene (MCB), chlorinated ethenes (CIE), and drug residuals that are present in the soil and groundwater. The aquifer is shallow and well permeable, with the water table at 3- to 4-m below ground level.

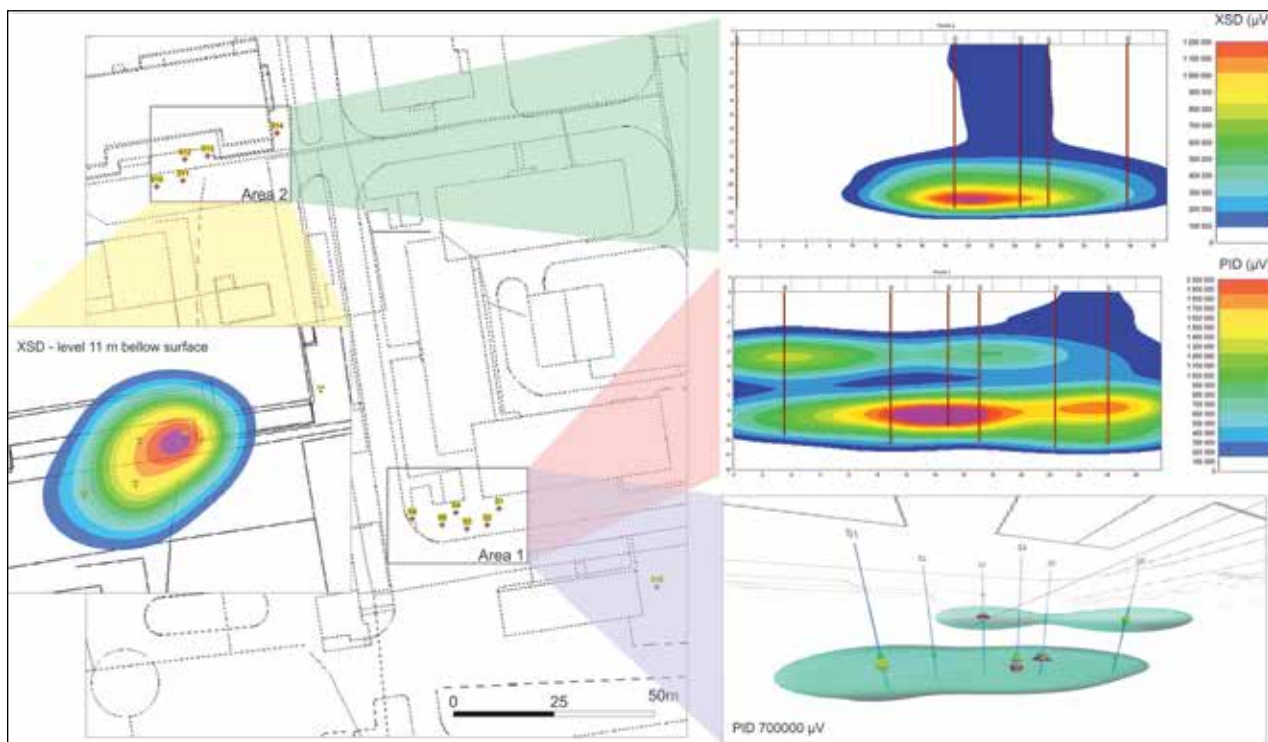
At one of the most contaminated areas on the site, Dekonta used an MIP (membrane interface probe) system combined with core sampling in order to get information on distribution of the contaminants which were mainly BTEX and MCB. Another MIP investigation was performed in an area that was believed to be only slightly contaminated by CIE.

A Geoprobe® 7822DT and MIP system were used to complete the field work. The MIP system was set up with three detectors: a PID, FID, and XSD. MIP logs were used to determine locations for soil samples to be taken. The samples were evaluated and proved good correlation between the MIP logs and the lab data.

The obtained MIP data was processed using the Ejlskov Studio Pro software (provided by the Danish company EJLSKOV), which uses MIP data to model spatial distribution of the contamination expressed as detector response (Figure 1). The results showed good correlation between the soil samples and the MIP logs. Based on the data obtained, Dekonta documented that MIP can be used to monitor mixed contamination by BTEX and MCB. Investigators were able to determine the presence of BTEX and MCB by observing the PID and XSD signals. Both contaminants have a similar signal on the PID. The presence of MCB is indicated by an increase in XSD response.

The MIP investigation of the area contaminated by CIE discovered strong contamination, mainly between 9- to 11-m bgs in lower permeable formations. According to Jan Kakucka, Project Manager, at Dekonta, "This was an important finding because the depth of all historical monitoring wells within the area reached only to 8 meters bgs. Therefore, the extent of this contamination was unclear before. The pilot test results will help significantly in preparing the final remediation design of the whole contaminated site. We also plan further MIP investigation throughout the course of the remediation activities on the site."

All the work was performed within the research project called PASSES, which focused on the utilization of innovative monitoring tools for a detailed characterization of contaminated sites. The pilot test ongoing at the site aims to assess in situ biodegradation potential of the contaminants. "Within the framework of the pilot test," Jan added, "different methods of oxygen delivery into the aquifer will be tested, including direct push injection of three different oxygen-release compounds using Geoprobe® tooling."



Visualization of the MIP detector signals (results from the Ejlskov Studio Pro software).



Vladislav Knytl is the MIP Operator for Dekonta.

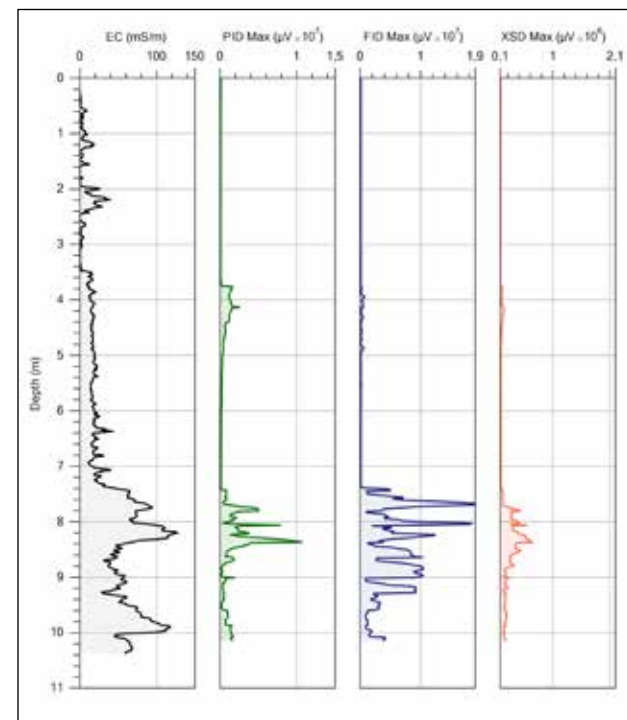


FIGURE 1. Example of MIP log from the site contaminated mainly by BTEX and monochlorobenzene (MCB). The PID signal shows residual contamination by BTEX around the groundwater (4 m bgs), and massive contamination of clay layers between 7.5 and 9.5 m bgs. The presence of MCB is confirmed by the signal from the XSD detector.

Activities at the pilot site were funded from the Norwegian Financial Mechanism 2009–2014, and by the Ministry of Education, Youth, and Sports in the Czech Republic.

*Dekonta treats hundreds of thousands of tons of hazardous waste every year, and completes hundreds of environmental projects. They have offices in industrial centers of the Czech Republic, and provide services to Slovakia, Poland, Russia, Serbia, Montenegro, Romania, Turkey and China.*



## Geoprobe® Source Book

2017 Edition

Available December, 2016

It's filled with an extensive OEM tools listing to help you keep current with Geoprobe® tooling systems.

Call Lori, 785-825-1842,

for your FREE copy, or go to ...

[www.geoprobe.com/literature-request](http://www.geoprobe.com/literature-request)



On site for the MIP investigation were Dekonta's MIP support vehicle; a 7822DT was used to advance the MIP probe and collect soil samples.



The Direct Image® Team at Geoprobe Systems® uses HPT Logs for ...

# Identifying Brine Impact on Fresh Water Aquifers



**Wes McCall**

Geoprobe® Geologist  
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mccallw@geoprobe.com

Last summer Wes McCall and Geoprobe® summer intern Mateus Evald conducted field tests with the Hydraulic Profiling Tool–Groundwater Sampler (HPT-GWS) in a local alluvial aquifer in Kansas. Their test results provide a good example of how to use HPT log data to identify brine impact on a fresh water aquifer.

At the background location, a plot of corrected HPT pressure over Electrical Conductivity (EC) allowed them to see the upper 35 feet of the formation exhibit relatively high EC and HPT pressure correlating with the sandy to silty clays in the upper part of the formation (Figure 1). Below 35 feet, low, flat HPT pressure and low, flat EC responses indicated the presence of clean sands and gravels. Dissipation tests indicated the local water level was just above 30 feet so the sand-gravel materials were all saturated with groundwater. Much of the bulk formation EC measured in a saturated, clean sand and gravel formation is the result of the specific conductance of the contained groundwater. Dry sand and gravel typically will have a bulk EC of less than 2 or 3 mS/m (milliSiemens /meter). At the background location, the bulk formation EC was around 30mS/m in the saturated sand and gravel.

A few hundred feet to the northwest of the background location, the EC log and water quality data are markedly different (Figure 2). While the HPT pressure remained low and flat in the saturated sand and gravel, the EC log displayed definite increases with depth. Groundwater profile samples here also displayed distinct increases in specific conductance, and sodium and chloride concentrations versus depth. It became evident from this data that increases in bulk formation EC, while the corrected HPT pressure remains low, indicated an increase in dissolved ions (salts/brines). At this site it was evident that plots of corrected HPT pressure over the EC log become an effective tool to identify brine impact to other-wise freshwater formations.

A complete presentation about this project and use of the EC/HPT comparison data can be found at [www.geoprobe.com/hpt-gws](http://www.geoprobe.com/hpt-gws).

Our summer intern, Mateus, is now back in Brazil, enrolled in the Federal University of Pelotas (Universidade Federal de Pelotas)..

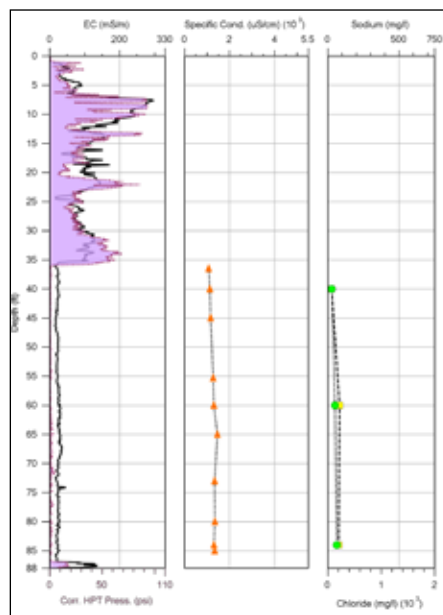


Figure 1: Background Log.

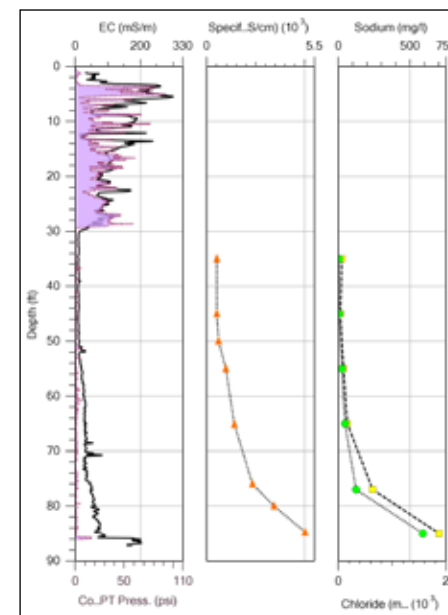
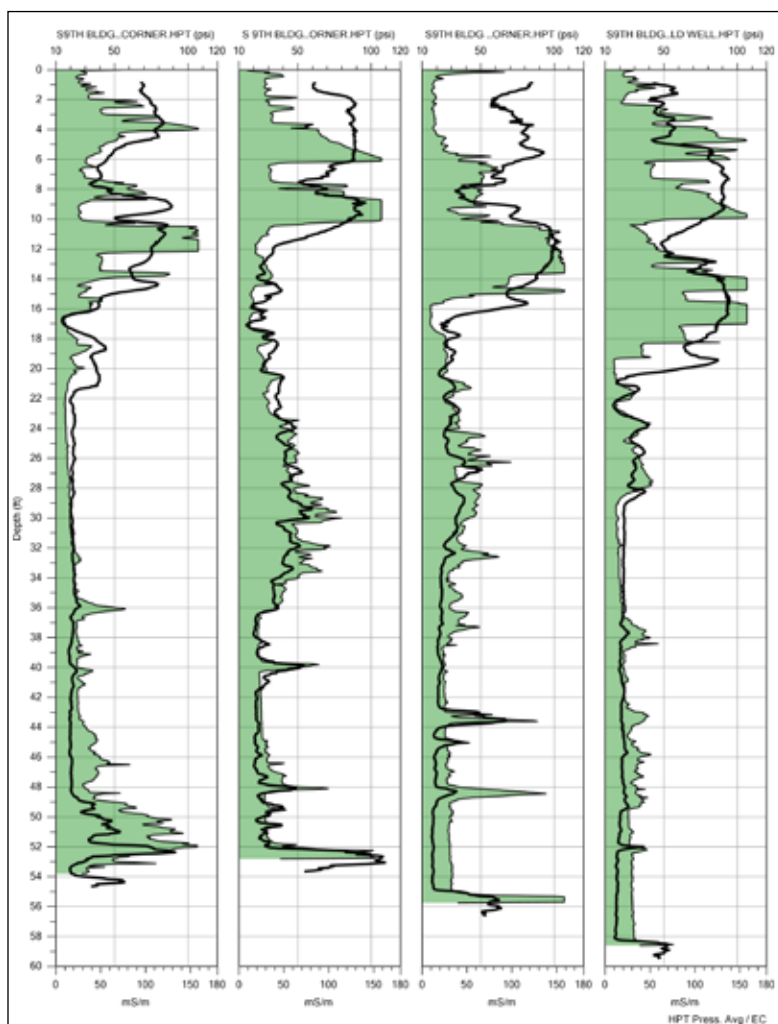


Figure 2: Brine-impacted Log.

For both figures: Purple = Corrected HPT Pressure; Black = EC; Orange = Groundwater Specific Conductance; Yellow = Sodium; and Green = Chloride.



Cross-section of HPT logs showing HPT pressure (green) and EC. Cross sections like this are useful in high resolution site characterization (HRSC).

## Geoprobe® DI Team Posts HPT Logging Services Specification

Hydraulic Profiling Tool (HPT) Logging is getting a lot of use these days. HPT logs are a good tool for evaluating site stratigraphy, permeability trends, piezometric profiles, and estimates of hydraulic conductivity (K). HPT logs are often used in high resolution site characterization (HRSC) projects.

In the DI Group, we often get asked to review HPT logs for consultants and site owners who have contracted service providers to perform HPT logging. Most of the logs we see are good logs and reflect good workmanship on the part of HPT logging contractors.

Unfortunately, we see our share of bad logs and it is a painful experience.

Some poor field work could be avoided through proper contract specifications for the logging service.



With this in mind we have created a sample specification to serve as guidance for those who contract HPT logging services. **The document may be downloaded from the Geoprobe® website at: [www.geoprobe.com/hpt-sample](http://www.geoprobe.com/hpt-sample).**

This specification covers such topics as pre- and post-log QA testing (an absolute requirement for quality field work), on-site spare parts, deliverables, and operator experience. The document is available in Word format and may be copied, modified, or incorporated into other contract specifications.



# Riverbed Characterization on Aa River in Belgium

*Contributed by Gert Ghysels, PhD student, and Marijke Huysmans, Professor, PhD. Engineer, at the Free University of Brussels, Department of Hydrology and Hydraulic Engineering.*

Students and a Professor from the Free University of Brussel (Vrije Universiteit Brussel) used a Geoprobe® Pneumatic Slug Test Kit to perform slug tests inside the Aa riverbed sediments, a typical lowland river in Belgium. The main objective of the field campaign was to characterize the heterogeneity of riverbed sediments. Slug tests are widely used to determine hydraulic conductivities of aquifers. However, the technique has not often been applied for the characterization of riverbeds. For this study we were looking for a fast and efficient way to perform a lot of slug tests on a relatively small area in the river. The campaign showed that the Pneumatic Slug Test Kit developed by Geoprobe Systems® is a reliable option for an efficient characterization of the hydraulic conductivity of riverbed sediments.

In total, 126 slug tests were performed at 83 different locations on a stretch of the river of about 20 m in length. At several locations, test were repeated to assess the repeatability reproducibility of the measurements. These tests showed that even in an unconventional environment such as the riverbed, reliable estimates of hydraulic conductivity can be obtained with the Pneumatic Slug Test Kit. Results showed that riverbed hydraulic conductivity varied over several orders of magnitude with the highest calculated value (18.3m/day or  $\sim 2.1E-3$ cm/sec) being more than 200 times larger than the lowest calculated value (0.08m/day or  $\sim 9.3E-5$ cm/sec). Moreover, patterns of riverbed conductivity were identified with higher values in the middle of the river compared to the sides.

Pneumatic slug tests were completed in a controlled procedure. The pneumatic manifold was installed on mini-piezometers (33.7 mm OD) which were manually driven into the riverbed sediment. These piezometers consisted of a 20 cm well screen (0.65 mm slot size) welded to a drive point at the lower end and a stainless steel pipe at the upper end. The slug test was initiated by pressurization of the piezometer with a hand pump, forcing water levels down. Once water level was stable, the release valve was opened, instantaneously releasing the air pressure. The recovery of hydraulic head to its static level was recorded with a small-diameter pressure transducer. Hydraulic heads were monitored on a laptop in real time with the Geoprobe® Slug Test Acquisition Software. This way the quality of the measurements could be assessed in real time. Based on the recovery curves, riverbed conductivities were calculated with the Bouwer & Rice (1976) method.

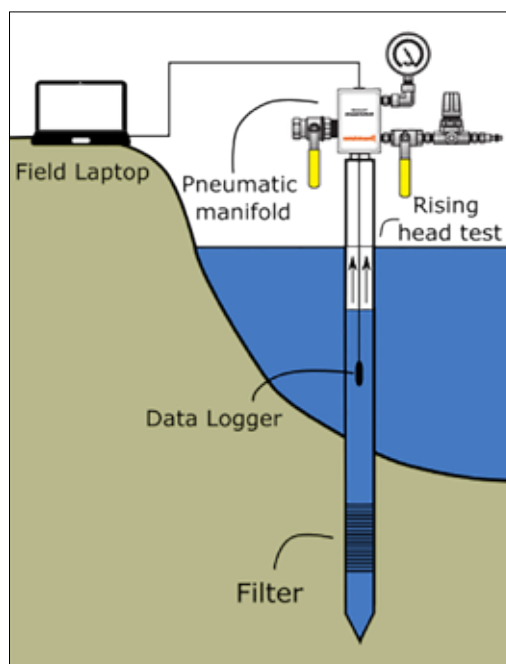
In short, the Pneumatic Slug Test Kit was proven to be efficient for a reliable characterization of riverbed heterogeneity and small-scale spatial variability. This is why the Department of Hydrology and Hydraulic Engineering decided to order a second PST kit for their future field measurement campaigns.

*Wes McCall, Geologist at Geoprobe Systems®, noted the researchers at VUB used piezometers they designed for the project. The SP16 Groundwater Sampler is often used for slug testing discrete intervals in many unconsolidated formations, similar to the work done at the University.*

Graphical presentation of the Pneumatic Slug Test setup showing the combination of a mini-piezometer and pneumatic manifold connected to a field laptop to monitor measurements in real time.



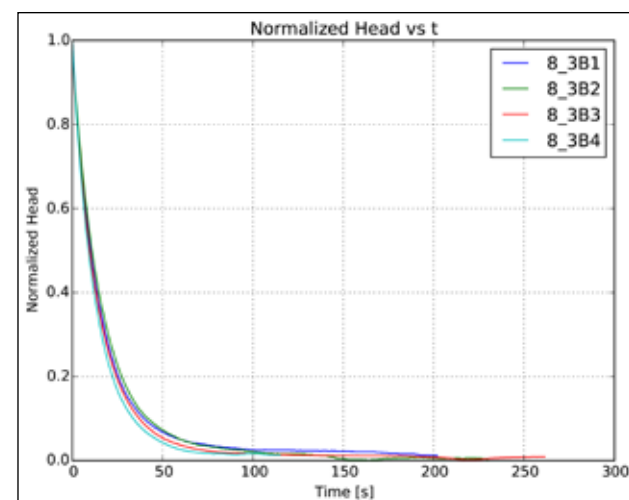
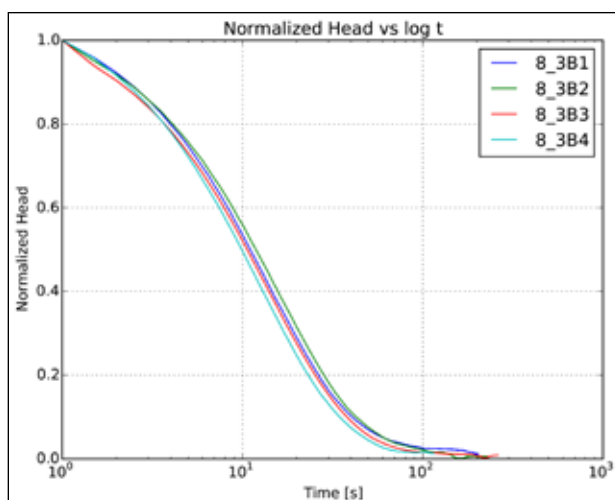
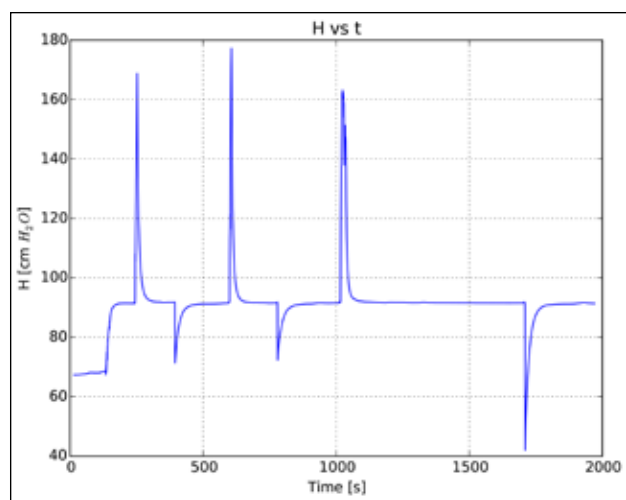
Professor Marijke Huysmans, PhD. Engineer at the Vrije Universiteit Brussel, Dept. of Hydrology and Hydraulic Engineering (top) and Abebe Debele Tolche, Master Student of the IUPWARE program with VUB and the Catholic University of Leuven (Katholieke Universiteit Leuven ... KUL).



Gert Ghysels, PhD. student at the Department of Hydrology and Hydraulic Engineering at Vrije Universiteit Brussel.



Syed Md. Touhidul Mustafa, PhD. student at the Department of Hydrology and Hydraulic Engineering at Vrije Universiteit Brussel.



(left) Plot of hydraulic head versus time for three repeating slug tests at the same location with different initial head displacements. (center) Normalized head versus time and (right) normalized head versus logarithm of time show that the repeating tests give similar test responses, indicating that conventional slug test theory is applicable at this location.



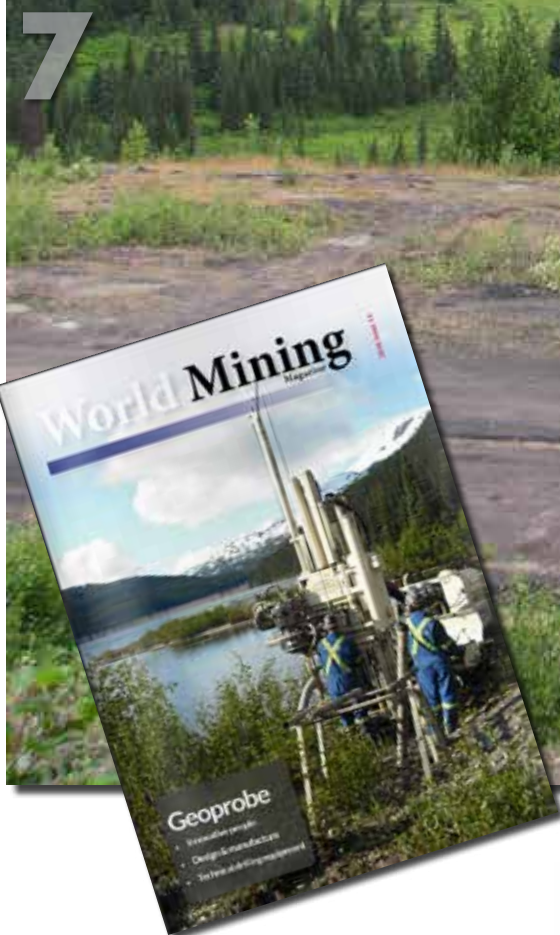
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Our customers describe our equipment as “Versatile, Innovative, Easy-to-use, and Supported like no other drilling equipment” they own.

To read about our Exploration offerings or view our July 2016 feature in *World Mining* magazine, go to our website: [www.geoprobe.com/world-mining](http://www.geoprobe.com/world-mining).

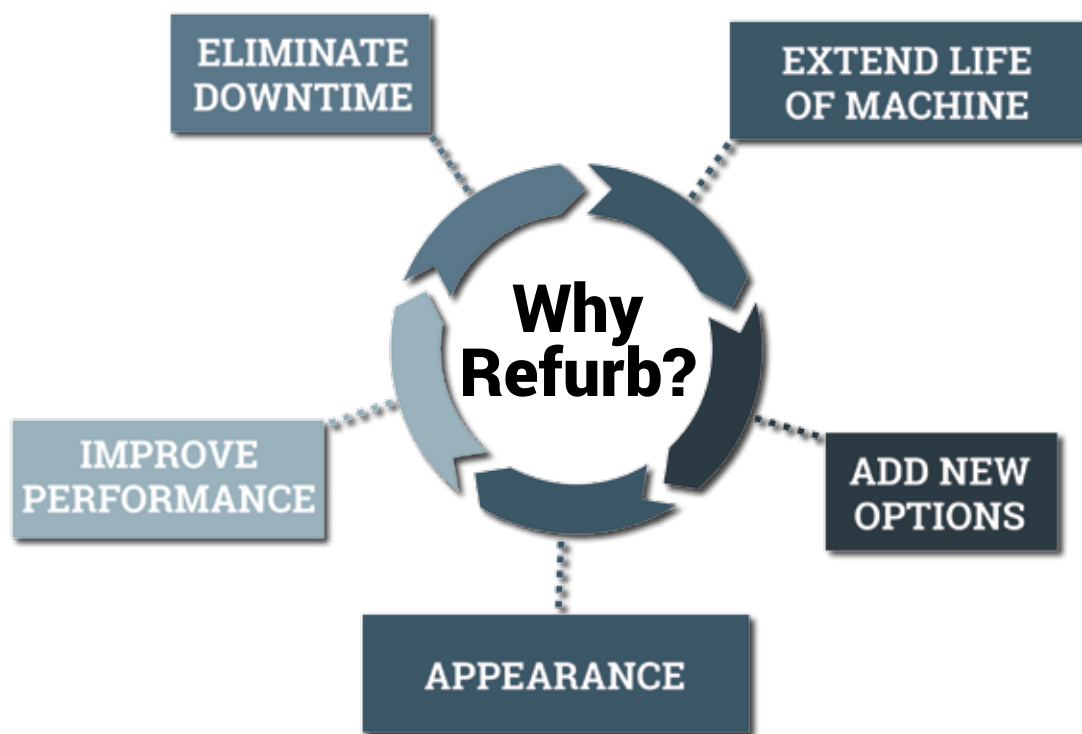


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(clockwise, top right) [1] EnviroTek in Tampa, FL, on future mining site with 3230DT; [2] MT Hojgaard on potential mining site in Greenland with 540MT; [3] Discovery Drilling in Anchorage, AK lower the tracks of a 6712DT to a remote site in Alaska; [4] Geo Logic in New Albany, IN, uses 7720DT in the hills of West Virginia; [5] 7822DT owned by Strata Drilling in Canada collects data for new mining site; [6] McMillan Drilling Services in Canterbury, New Zealand with 8140LC; [7] GeoTek-AK in Anchorage, AK on mine tailings site with 8040DT.



# Machine Refurbish Makes Good Cents



The timing is right for 7822DTs, 8040DTs, and even some sonic rigs to come in for a refurb or repairs, especially if you continue to run one of the older 60 Series machines that remains a beast in the field. "Most of the current machines were introduced in 2008-2010," Darren Stanley, Geoprobe® Service Manager said, "so many of them are in need of repairs or a check-up."

In addition to making your machine look great again (your clients will know when you arrive on site your fleet and field team are bringing their best), a refurb is a great time to improve the performance of your machine and add new options or features that weren't available when the machine was released (such as cooling updates, high pressure filters, hydraulic tank cleanout panels, plus numerous others). It's also a great time to add a drop hammer, pumps, and winch systems. You tell us what you want; we'll do the work.

Many Geoprobe® owners are taking advantage of the refurb program. Call our Geoprobe® Service Team at 1-785-825-1842 to find out more.

And don't forget about our quick-to-watch Maintenance Minutes videos for day-to-day simple maintenance and service.



## Fuel System Maintenance

### What's an easy way to keep your Geoprobe® machine running at peak performance?



Regular fuel system maintenance is important for a happy machine. Remember: NEVER pre-fill a fuel filter for your Geoprobe® rig, and ALWAYS fill your rig's fuel tank at the end of the day.

We get calls every week, "the engine cranks but will not start or will not run well." The number one cause is improper fuel system maintenance. Whether it's a Geoprobe® legacy machine or one in current production, it has at least one, if not two, fuel filters. We recommend changing the filters every 200 hours, making sure to follow the engine priming instructions (see owner's manual for engine manufacturer recommendations). And **NEVER pre-fill a fuel filter for your Geoprobe® rig**. If you pre-fill a filter you're putting unfiltered fuel on the downstream side of the filter element which will contaminate the fuel injection system ... a costly mistake!

If you constantly source your fuel from a tender truck, out of portable fuel cans, or similar sources, expect to change your fuel filters more often. The cleanliness of these sources is marginal, at best. In the winter, it's best to run a fuel additive as well. If you have a contaminated fuel system, you'll be changing fuel filters more often, and it's advisable that you keep an extra set of filters for the machine on hand. If you're working in a remote area, keep a set of filters with the machine. And **always fill your rig's fuel tank at the end of the day**. This will negate condensation collection inside the tank due to humidity/temperature swings which will lead to contamination issues.

#### Fuel System Maintenance Summary

- Service the fuel system at recommended intervals or sooner if conditions warrant
- Keep an extra set of fuel filters on hand (in-line and canister)
- Make sure the fuel source is reliable and clean (yellow cans, tender truck, or fuel farm)
- **NEVER PRE-FILL** a fuel filter
- Fill your rig's fuel tank at the end of each day with clean diesel
- Use fuel additive in the winter even if using winter blend fuel



**Brian Rogers**

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

Call your Geoprobe® Service Team if you have any questions ... 1-785-825-1842.





# THE BIKES ON BROADWAY

Ever present on the North Campus of Geoprobe Systems® (located on Broadway Blvd) but seldom seen by the public, these men and their 'machines' ride silently through the daylight hours as almost-legendary examples of the company's stance on cost efficiency, fuel savings, and innovation. Take a look behind-the-scenes at this carefully guarded company secret that only co-workers and customers coming to Kansas have witnessed.

## A conversation with the Broadway Bikers.

We like to think we're being resourceful while reducing our carbon footprint! Plus, junk bikes are just funny. Each is better than the last one we had. We started really modest ... with real junk. Now we've got GOOD junk!

Riding really took hold when the Beach Cruiser came to be. The Cruiser was the turning point for the whole bike movement! It's ergonomically correct, comfortable, fast. Like being in a La-Z-Boy®. You could nap on that thing! That's when we realized life was good with the bicycles around here. Once we got the 'cool' bikes, everybody wanted to ride them!

When we have demos going on across the street, and one of us rides a bike over to deliver a part, especially with the El Camino and we're wobbling and trying not to fall over, the customers' attention becomes focused on us! Especially when we're carrying like 70 lb. worth of parts. It's a real conversation starter for sure! It may not be cool, but it's unique!

We have multiple buildings at our facility so the bikes serve a real purpose. We can ride a bike to the SAW Shop with raw material, get the part sawed, then ride directly up to the lathe. Unload it and machine what we need, load it back on the bike, ride it back to R&D, and get it ready for customers. You can also fit a cooler with ice, a 2 lb bag of Gardetto's, and peanut M&M's in the basket of the Trike! But with the Cruiser, whatever you take has to fit in your back pocket, but it's a comfortable ride!



The El Camino features a long bed, sturdy basket, but only one brake. When it starts to fall over, you just let it go and get out of the way!



The Bike Pack. (l to r) Dave Golden, Tim Androes, Jed Davis, Mike Carlin, Dustin Fross and Kyle Riedel. Wal-Mart bikes are too fancy for these guys. They prefer cast asides. Alley treasures. Hand-me-downs. Junk. Getting stranded is a legitimate concern, especially if they're loaded down with heavy tooling. Cell phones are a necessity when on the bikes!



DORC - Data Off Road Cart. Replaced 'chincy' little shopping cart for transporting testing equipment. No hitches on bikes but can be towed with a bungee cord.

Voted best user of a bike by the Bikers: Kyle Riedel! He used a bike while testing sonic weighted wireline tooling. We were testing a 400-ft. hole. Normally, the soft tape measure used would take forever to pull out by hand. So Kyle hooked it up to the back of the El Camino and rode off to pull the tape out of the hole! One guy stood at the hole to make sure the tape didn't get caught. Kyle would rewind the tape back on the reel while the others back at the

hole would start drilling again. It sure sped up the process, and it worked pretty good!

When it's clean-up day at the shops, it's also time to spruce up the fleet! Sometimes we have to reslime them, repair flats, and also add more flare if somebody finds something cool along the road!

Not all garage sale finds are worthy to fit in to the fleet. Someone brought in a Trek bike with a basket on it. It didn't drive well plus you couldn't fit a dead squirrel in the basket! The Trek is no longer in the rotation.

That's their story and their sticking to it. Stop by and check them out when you're in the area!



**Name: El Camino aka Long Bike**  
**Jed Davis ... Tools Design Engineer**  
 Unique feature: one brake, thus the nickname, Man-Killer! Came from one of Tom Christy's missionary friends. Slightly modified with cut-out car hub cap (found along Broadway) and long bed for hauling larger tooling. No kick stand so a bit clumsy to park but can haul over 100 lb of tooling. Has been on campus at least 15 years.



**Name: The Beach Cruiser**  
**Mike Carlin ... Tools Group Leader**  
 Previously pink (Urban Lady) with straw basket. Pink was over-rated. Sand blasted it, tore it down to nothing. Ran it through paint then blasted it and treated it with Mercuric acid and added salt from the upstairs breakroom to make it rust ... like a Rat Rod! Corrosives made it sweet, then clear-coated it. Gold chain for pop. Removed chain guard for more flair.



**Name: Ram's Horn**  
**Kyle Riedel ... Tools Design Engineer**  
 Huffy 10-speed (now no-speed), bought at garage sale with rainbow stickers on it (now no stickers). Denim seat cover. Road bike style handlebars (drop bars) were flipped upside down ... thus the name, Ram's Horn.



**Name: Tim's Bike**  
**Tim Androes ... SAW Shop Supervisor**  
 Transplanted from Tim's house after realizing he could save time and shoe leather by riding it back and forth from the many Broadway locations. If he moves to another building, the bike moves with him!



**Name: Dustin's Bike**  
**Dustin Fross ... Plasma Press Brake Operator**  
 Hand-me-down from R&D because of bent handle bars. "A bike that wasn't good enough for them anymore because of the new fancy bikes they acquired!" Sleek red paint job and electrical tape holding the grips on. Used to deliver parts to the shop and to nearby buildings on campus.



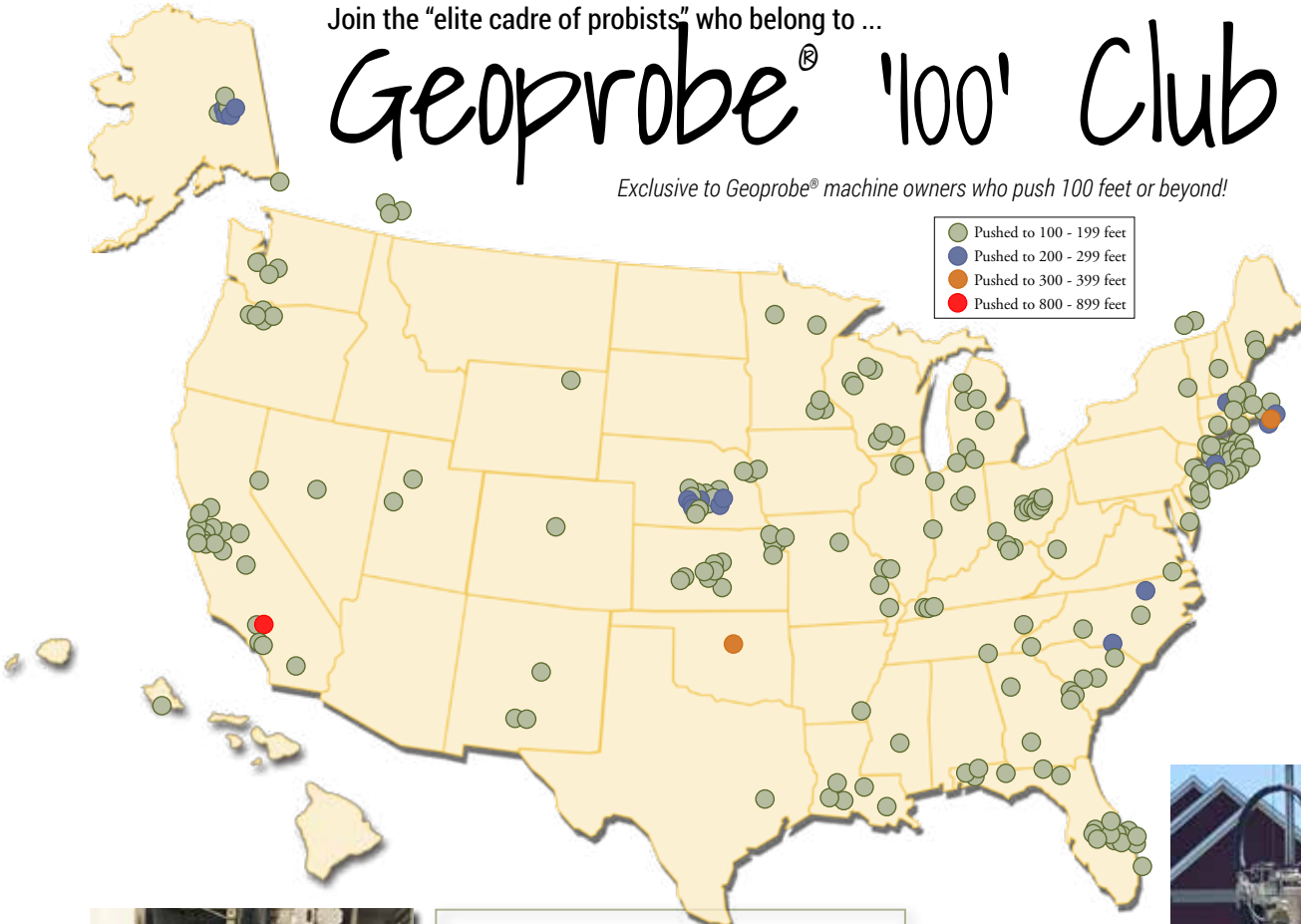
**Name: The Trike**  
**Dave Golden ... Tools Group Draftsman**  
 Couldn't pass up a used trike ... with a basket ... and it's a Schwinn! "When we ride the Trike we get to relive our childhood!" THE bike of choice for heavy parts or hauling large casing, such as 80 lb. 2-ft. long 10-in. casing. Has also carried an entire set of fixturing for lift cap destruction testing (200 lb.) while pulling a trailer (needed a push to get started, but made the trip!) Kansas summers get pretty hot so the umbrella is a bonus.



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

# Geoprobe® '100' Club

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



## 104 ft. Geo Lab Drilling – Georgia

**FIELD NOTES**

**Field Team:** (l to r) Phillip Ricker, Jimmy Knight, AJ Melhorn  
**Field Site:** Murphy, NC  
**Depth/Date:** 104 feet / May 28, 2016  
**Geoprobe® Owner:** Geo Lab Drilling, Dacula, GA  
**Field Data:** Model 7822DT continuous soil sampling with MC5 and SS sleeves to 100 feet, and then installed electrodes with HSA to 104 feet for additions to an electrical resistance heating remediation system. Temperature of soil samples and cuttings reached 216 degrees F!



## 125 ft. GeoTek Hawaii – Hawaii

**FIELD NOTES**

**Field Team:** (l to r) Marvin Thedford and Kevin Rogers  
**Field Site:** Pearl Harbor, Honolulu, HI  
**Depth/Date:** 125 feet / March 22, 2016  
**Geoprobe® Owner:** GeoTek Hawaii, Pearl City, HI  
**Field Data:** Model 6600. Completed several 125-ft. seismic CPT holes to compare data against several traditional geotech borings GeoTek had completed.



## 162 ft. RAZEK Environmental – Kansas

**FIELD NOTES**

**Field Team:** Tony Poulter  
**Field Site:** Louisburg, KS  
**Depth/Date:** 162 feet / May 21, 2016  
**Geoprobe® Owner:** RAZEK Environmental, Louisburg, KS  
**Field Data:** Model 7822DT. Drilled 6.0 in. diameter borings to install 15 geothermal loops.



## 116 ft. Geo Lab Drilling – Georgia

**FIELD NOTES**

**Field Team:** (l to r) Phillip Ricker, Lat Sorensen, Jimmy Knight  
**Field Site:** Aiken, SC  
**Depth/Date:** 116 feet / May 17 and 113 feet / May 16, 2016  
**Geoprobe® Owner:** Geo Lab Drilling, Dacula, GA  
**Field Data:** Model 7822DT continuous soil sampling with DT22 to 95 ft, then installed 2-in. monitoring wells with HSA. Drilled inside a building with only 13.5-ft. overhead clearance!



## 100.05 ft. Stock Drilling – Michigan

**FIELD NOTES**

**Field Team:** (l to r) Mike Cooper and Jake Bacome  
**Field Site:** South Bend, IN  
**Depth/Date:** 100.05 feet / August 4, 2016  
**Geoprobe® Owner:** Stock Drilling, Ida, MI  
**Field Data:** Model 7730DT pushing HPT with 1.75-in. rods. For the last 10 feet or so we had to keep spraying our dampener with water to keep it from smoking, but we made it to 100.05 feet and found the glacial till our client was looking for.



## 138 ft. (42 m) Matrix Drilling – Victoria, Australia

**FIELD NOTES**

**Field Team:** Adam Kempster, Paul Blincow & Gavin  
**Field Site:** Bendigo, Victoria  
**Depth/Date:** 138 feet (42 m) / March, 2016  
**Geoprobe® Owner:** Matrix Drilling, Victoria  
**Field Data:** Model 7822DT.

# geoprobe® 300 club

## 385 ft. Associated Environmental – Oklahoma

**FIELD NOTES**

**Field Team:** Billy Graham  
**Field Site:** Central Oklahoma  
**Depth/Date:** 385 feet / April, 2016  
**Geoprobe® Owner:** Associated Environmental Industries, Norman, OK  
**Field Data:** Model 8150LS using SDT60 and 6.0-in. Weighted Wireline System.



## it's Game Day!

...and the Minnesota Vikings are on tv!



You know it's football season when the 'family' gathers on the sofa for a Sunday afternoon of Vikings football on tv! Jill Mealey, with Idea Drilling in Virginia, MN, shares all the action with her four-legged Vikings fans.

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

An online version of the newsletter is available at [geoprobe.com](http://geoprobe.com)

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