



Strata Drilling Group

SUPPLYING DRILLING SERVICES FOR THE ENVIRONMENTAL, GEOTECHNICAL AND EXPLORATION INDUSTRIES



ENVIRONMENTAL DRILLING

GEOTECHNICAL DRILLING

EXPLORATION DRILLING

LIMITED ACCESS DRILLING

INJECTION REMEDIATION

HIGH RESOLUTION VERTICAL PROFILING

Toll Free: 1.866.7.STRATA (1.866.778.7282)

stratadrillinggroup.com

OUR PEOPLE MAKE THE DIFFERENCE

With over 40 years of experience in the Environmental, Geotechnical and Mineral Exploration drilling industries, Strata Drilling Group, and its group of companies, is one of the largest specialized operators in the province of Ontario. Success has come from our three main competitive advantages: a diverse fleet of the most technologically advanced equipment, highly-trained skilled personnel and our long standing relationships with the world's leading Environmental/Engineering Consulting and Mining companies.

Our drilling services include: Environmental, Geotechnical, Mineral Exploration, Injection Remediation, Monitoring Well Installation, Decommissioning (abandonment) of Wells, High Resolution Vertical Profiling using MIP and LIF tools, CPT, Seismic CPT as well as Rock Coring and Air Rotary. To support our customers' varied requirements, we maintain field offices in Ottawa, Belleville and London, Ontario, with our Head Office in Toronto, Ontario.

Strata Drilling Group has achieved strong growth while remaining focused on the long-term objective of building a solid company for the future. Our strategy remains the same; to be competitive by investing in and maintaining a fleet of state-of-the-art equipment to provide our customers with the right equipment to increase productivity and deliver lower total costs with a leading Health & Safety Management System.

OUR SERVICES

ENVIRONMENTAL DRILLING

Environmental drilling is used to monitor the quality of soil and groundwater and assist in the control and remediation of soil and/or groundwater contamination. At Strata Drilling Group all of our machines are rubber track mounted or hand portable and CE Certified and equipped with the latest safety equipment including Auger Guards. We have all the tools and know how to get the job done.

GEOTECHNICAL DRILLING

Geotechnical Drilling is conducted to determine ground formation characteristics and to gather information and data about subsurface for potential construction sites. At Strata Drilling Group we provide high quality sampling and testing using state of the art equipment including SPT, DCPT, CPT, Seismic CPT, Shelby Tubes and Vanes.

EXPLORATION DRILLING

By withdrawing a core of soil or rock from the orebody of known mineral deposits and potential sites, geologists can analyze the core by chemical assay and conduct mineralogical studies of the rock. Strata Drilling Group uses a wide variety of sampling methods including track mounted, hand portable, heli-portable, drilling rigs to sample mine tailings, sediments, basal till and rock.

INJECTION REMEDIATION

Strata Drilling Group performs drilling services for injection of in-situ remediation chemicals and reagents for our clients including oxidants, reductants, electron donors and oxygen-releasing compounds using Geoprobe® high-pressure injection pump systems coupled with our Geoprobe® direct-push probe equipment.



CUSTOMER FOCUS

Harsh elements and challenging environments are part of day-to-day operations. Precise planning ensures the deployment of most effective equipment for the job and safest operation. Strata Drilling Group's highly-skilled field technical personnel allows for on-site adaptability and effective job completion. All our Field Technical Drillers (FTD) are fully licensed and conversant in their fields. Our field managers and supervisors are in a position to find effective solutions to customer challenges.

A CULTURE OF SAFETY

Strata Drilling Group has a long-standing and ongoing commitment to Health, Safety and the Environment in all aspects of our operations. Strata Drilling Group knows that workplace safety is of paramount importance, not only to our employees but also to our clients. Our commitment is to work together with all concerned to improve prevention mechanisms, training programs and policy compliance to ensure maximum productivity. We believe that each employee can be a safety leader on the job simply by taking ownership of his or her own safety and making the health and safety of people around them their primary concern. Strata Drilling Group's fleet of equipment is CE Certified safety standard with Emergency Shut-offs and Auger Guards installed on each piece of equipment.

LIMITED ACCESS DRILLING

Limited access rigs are used when we have the challenge of extreme space constrictions: narrow access, limited work pad area, overhead restrictions and low ceilings. Strata Drilling Group has the most powerful state-of-the-art limited access equipment on the market.

HIGH RESOLUTION VERTICAL PROFILING

The **Membrane Interface Probe (MIP)** is one of the highest resolution vertical profiling tools used to detect contaminations for environmental site assessments and characterizations. MIP is a tool used for mapping **Volatile Organic Compounds (VOCs)** in soil and groundwater. Using carrier gas, the VOCs are brought to the surface

through tubing that is connected to a laboratory grade EC, PID, FID and XSD-detectors for immediate analysis.

Laser Induced Fluorescence (LIF) is a **Non-Aqueous Phase Liquid (NAPL)** mapping tool used to delineate the depth and horizontal extent of free product and residual petroleum contamination. The fluorescence signal scales proportionately with NAPL concentration.

Cone Penetration Test (CPT) and **Seismic CPT** offer cost savings over more traditional boring and sampling methods for the geotechnical industry. Used from a variety of direct push platforms, CPT provides continuous data of the geotechnical engineering properties of soils and delineating soil stratigraphy in situ.



GEOPROBE® MODEL 7822DT

The Geoprobe® 7822DT is a fully hydraulic track mounted remote controlled multi-purpose drill rig. Equipped with a G64 hydraulic hammer with built in rotary spindle for concrete drilling and anchoring, this rig has over a 24 ton pulling capacity for larger tooling and deeper depths, as well as an improved auger head for turning hollow stem augers. The compact size and rubber tracks, which reduce ground pressure, allow the rig to get into buildings and drive over sensitive landscaped areas with virtually no damage to the ground/floor surface.

Also is equipped with an Automatic Drop Hammer (ASTM cert.) for Geotechnical site investigations (SPT, DCPT, CPT, and SCPT). The Model 7822DT is CE certified and equipped with Auger Guard, safety pull cable and several E-stops. Powered by a diesel engine and equipped with an exhaust purifier makes the machine an environmentally safe site investigation rig.



MODEL 7822DT SPECIFICATIONS

Stroke	78in	1981mm
Weight	7,555lb	3427kg
Width	60in	1524mm
Length (folded)	133in	3378mm
Height (folded)	92.5in	2350mm
Height (unfolded)	184in	4674mm
Down Force	36,000lb	160kN
Retraction Force	48,000lb	214kN
Hammer System		GH64
Percussion Rate		32Hz
Engine (diesel)	Kubota, 4-cylinder turbo	
Ground Speed	0-5mph	0-8kph
Surface Load	3.9lb/in ²	0.27kg/cm ²

GH64 HAMMER SPECIFICATIONS

Torque, forward (high torque/low speed)	450 ft lb	610Nm
Torque, forward (low torque/high speed)	225 ft lb	305Nm
Torque, reverse (high torque/low speed)	600 ft lb	813Nm
Rotation Speed (low speed/high torque)	0-250 rpm	
Rotation Speed (high speed/low torque)	0-500 rpm	

DH103 AUTO DROP HAMMER SPECIFICATIONS

- 140 lbs weight, standard 30" stroke
- All moving parts, including the 140lb (64 kg) weight are fully enclosed in a protective steel cabinet
- No cables or ropes needed for operation

ROCK CORING SPECIFICATIONS

- BQ Rock Coring Capability

AUGER HEAD SPECIFICATIONS

Torque (high torque/low speed)	4,000 ft lb	5423Nm
Torque (low torque/high speed)	2,000 ft lb	2711Nm
Hex adapter	1-5/8 in	41mm

TOOLING OPTIONS:

- | | |
|---|--|
| <ul style="list-style-type: none"> • Split Spoon Sample System • DT325 Soil Sampling System • DT22 Soil Sampling System • MC5 Soil Sampling System • SP16 & SP22 Groundwater | <ul style="list-style-type: none"> • Sampling Systems • 5" Solid Stem Augering System • 4.25" Hollow Stem Augering System • Basal Till Sampling System |
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STRATA DRILLING GROUP: MACHINES

DRILL RIG FLEET

MACHINES

GEOMACHINE MODEL GM100

The GM100 is a fully hydraulic, rugged and mobile multi-purpose drill rig for Environment and Geotechnical site investigation, Exploration Drilling, Rock Drilling with Air or Core Drilling. The crawler can be simultaneously equipped for several methods:

- Percussive drilling with top hammer
- Diamond core drilling with BQ, NQ
- Drilling with casing tubes as well as Symmetrix using air
- SPT/Dynamic probing and CPT: Cone Penetration Testing
- Sampling with ie: morain, auger-samplers, piston-samplers

The GM100 is designed for rough field conditions. Its movements are nimble even in very soft terrain and tight situations due to well balanced length/width of tracks.

MODEL GM100 SPECIFICATIONS

Weight	10-12K lbs	3800 - 4700 kg
Length	14.75ft	4500mm
Width	5.9ft	1900mm
Height (rig in transport position)	5.57ft	1900mm

CRAWLER

- Traveling speed Max 6km/hr
- Hydraulically driven crawler with two driving motors, 4 wheels, steering cog wheel in front, double bogies and brakes on both sides
- Hydraulically tightened fabric-reinforced tracks
- Diesel engine 108Hp 90 kW

ROTATION UNIT

Effective Stroke	Drilling	Coring	Geotechnical
Torque lb/ft/RPM	2500/25	200/2000	2500/25
Rotation Speed RPM	0-120	0-3000	0-120
Hammer: Furukawa F3			

STANDARD EQUIPMENT

- Hydraulic rod clamps
- Remote control for drive and winch
- Top driven diamond coring unit
- Impact unit for SPT (dynamic probing with adjustable falling height)
- Rock air drilling
- 375 CFM compressor

AUTO DROP HAMMER SPECIFICATIONS

- 140 lbs weight, standard 30" stroke
- All moving parts, including the 140lb (64 kg) weight are fully enclosed in a protective steel cabinet
- No cables or ropes needed for operation



TOOLING OPTIONS:

- Split Spoon Sampl System
- DT325 Soil Sampling System
- DT22 Soil Sampling System
- MC5 Soil Sampling System
- SP16 & SP22 Ground Water Sampling Systems
- 5" Solid Stem Augering System
- Basal Till Sampling System

GEOPROBE® MODEL 6620DT

The Geoprobe® 6620DT is a fully hydraulic, rubber track mounted mobile remote controlled drill rig equipped with a very powerful hydraulic hammer with built in rotary spindle for concrete drilling and anchoring, over 20 ton pulling capacity. The compact size and rubber tracks which reduce ground pressure allows this machine to get inside buildings and drive over sensitive landscaped areas with virtually no damage to the ground/floor surface. Also is equipped with an Automatic Drop Hammer (ASTM cert.) for any Geotechnical site investigations (SPT, DCPT, CPT, and Seismic CPT). The Model 6620DT is CE certified and equipped with Auger Guard, a safety pull cable and several e-stops. Powered by a diesel engine and equipped with an exhaust purifier making the machine an operator and environmentally safe site investigation rig.

MODEL 6620DT SPECIFICATIONS

Stroke	66in	1676mm
Weight	6,100lb	2767kg
Width	60in	1524mm
Length (folded)	96in	2438mm
Height (folded)	89in	2260mm
Height (unfolded)	153in	3886mm
Engine (diesel)	Kubota, 4-cylinder turbo	
Ground Speed	0-4.5mph	0-7.2kph
Surface Load	3.7lb/in ²	0.26kg/cm ²
Down Force	36,000lb	160kN
Retraction Force	48,000lb	214kN

GH62 HAMMER SPECIFICATIONS

Torque, forward (high torque/low speed)	450 ft lb	610Nm
Torque, forward (low torque/high speed)	225 ft lb	305Nm
Torque, reverse (high torque/low speed)	600 ft lb	813Nm

DH103 AUTO DROP HAMMER SPECIFICATIONS

- 140 lbs weight, standard 30" stroke
- All moving parts, including the 140lb (64 kg) weight are fully enclosed in a protective steel cabinet
- No cables or ropes needed for operation

AUGER HEAD SPECIFICATIONS

Torque (high torque/low speed)	3,000 ft lb	4067Nm
Torque (low torque/high speed)	1,500 ft lb	2034Nm
Hex adapter	1-5/8 in	41mm

TOOLING OPTIONS:

- Split Spoon Sampl System
- DT325 Soil Sampling System
- MC5 Soil Sampling System
- SP16 & SP22 Groundwater
- Sampling Systems
- 5" Solid Stem Augering System
- 4.25" Hollow Stem Augering System
- Basal Till Sampling System



LIMITED ACCESS: GEOPROBE® MODEL 540MT

The Geoprobe® Model 540MT direct push machine is a rugged, compact probing unit designed for tight spaces and rough terrain. Easily maneuvered by 2 people, the 540MT is less than 29" high. The rear wheel and handle pivot 360° to deliver the tightest turning radius possible.

PROBE FEATURES

- GH42 percussion hammer
- Bi-directional hammer rotation for concrete drilling
- Standard cart mounted machine w/ rear stabilization points
- Towing hitch for site relocation
- E-Stop

MODEL 540MT SPECIFICATIONS

Stroke	54in	1372mm
Weight	990lb	449kg
Transport Height	35in	889mm
Transport Width	35in	889mm
Transport Length (folded)	93in	2362mm
Working Height (maximum)	121in	3073mm
Working Width (incl outriggers)	56in	1422mm
Working Length (incl hitch)	105in	2667mm
Down Force	18,000lb	80kN
Retraction Force	25,000lb	111kN
Hammer system		GH42
Percussion Rate		30Hz

TOOLING OPTIONS:

- MC5 Soil Sampling System
- DT22 Soil Sampling System
- Basal Till Chip Samplers
- SP16 Groundwater Sampling System
- LB Discrete Sampling System

OPTIONAL EQUIPMENT

- ATV
- UTV (Utility vehicle)
- Snow mobiles
- Raft (sediment sampling)



LIMITED ACCESS: GEOPROBE® MODEL 54LT

Strata Drilling Group uses Geoprobe® direct push track mounted technology. The Geoprobe® Model 54LT direct push machine is a rugged, compact probing unit designed for tight spaces and rough terrain. This unit is narrow enough to fit through a standard 36" door to get into confined, enclosed places a vehicle mounted unit can not access.

PROBE FEATURES

- Hydraulic lateral swing for easy offset placement of probe
- Wire remote for ease of maneuverability
- Rubber tracks
- Auxillary hydraulic ports provide power supply for remote equipment
- Limited access
- Emergency stop systems for safety of operation
- Rear Stabilizer

MODEL 54LT SPECIFICATIONS

Stroke	54in	1372mm
Weight	2,715lb	1232kg
Width	34.5in	876mm
Length (folded)	87in	2210mm
Height (folded)	64in	1626mm
Height (unfolded)	123in	3124mm
Down Force	20,000lb	89kN
Retraction Force	27,000lb	120kN
Hammer system		GH42
Percussion Rate		30Hz
Fuel capacity (diesel)		Kubota, 3-cylinder

TOOLING OPTIONS:

- LB Discrete Soil Sampling System
- SP16 Groundwater Sampling System
- MC5 Soil Sampling System
- DT22 Dual Tube Sampling System
- Basal Till Sampling System



LIMITED ACCESS: GEOPROBE® MODEL 420M

Strata Drilling Group uses Geoprobe® direct push technology to access small, as well as large testing areas. The Geoprobe® Model 420M is a compact probing unit designed for tight spaces. This powerful little machine is designed specifically to be durable yet as lightweight as possible. At 19" wide and 62" tall (folded) and weighing less than 425 lb, the 420M can be manually lifted and carried to remote sampling locations. It can also be deployed to hard-to-reach and narrow sampling locations both indoors and out. The 420M is powered by a remote hydraulic power source.

PROBE FEATURES

- Equipped with reliable GH42 Soil Probing Hammer
- Performs same operations as larger probes including concrete drilling, soil and groundwater sampling and conductivity
- Maximum weight under 425 lb (193 kg)
- Maximum width is 19" (483mm)
- Minimum operating height is 6' (1800mm)
- Maximum operating height is 7.5' (2280mm)
- Power/strength cuts operating time in half from conventional hand held drilling methods
- Easily attaches to remote power unit by hydraulic lines up to 150' away (46m)
- Removable outriggers enhance stability while probing

MODEL 420M SPECIFICATIONS

Stroke	42in	1067mm
Weight	411lb	187kg
Width	23in	584mm
Length (folded)	28in	711mm
Height (folded)	62in	1575mm
Height (unfolded)	94in	2388mm
Down Force	11,700lb	52.1kN
Retraction Force	14,000lb	62.3kN
Percussion Rate		30Hz

ROCK CORING SPECIFICATIONS

BQ Rock Coring Capability

TOOLING OPTIONS:

- MC5 Soil Sampling System
- DT22 Soil Sampling System
- Basal Till Chip Samplers
- SP16 Groundwater Sampling System
- LB Discrete Sampling System



INJECTION REMEDIATION

In-Situ remediation is one discipline within the broader scope of Environmental remediation. Strata Drilling Group is the leading provider of direct injection equipment & services through direct push points that can be used for distributing high viscosity agents and caustic remediation fluids throughout the entire site where permanent treatment systems are not desired, necessary or feasible. Periodic direct injection of remediation products can be a cost efficient, noninvasive cleanup method.

BENEFITS:

- Minimal site disturbance
- Capable of "bottom-up" or "top-down" injections.
- Capable of operating systems in confined sites including inside buildings

FEATURES:

- Strata Drilling Group offers the following equipment for injection services:

Drill Rigs:

Geoprobe® 7822DT	Geoprobe® 6620DT
Geoprobe® 54LT	Geoprobe® 420M
Geoprobe® 540MT	

PUMPS:

1. **GP300 GROUT SYSTEM:** hydraulically driven dual piston pump, used to inject high viscosity materials
 - 3.6 gpm
 - Operating pressure up to 1,800psi
 - Injection of both high viscosity agents and caustic remediation fluids
 - Injection of the most abrasive grouts
2. **GP800 INJECTION SYSTEM:** gas driven diaphragm pump used to inject corrosive oxidizers
 - 8 gpm
 - Operating pressure up to 650psi
 - Operates independently of probe machine
 - Injection of corrosive oxidizers: permanganates, peroxides and other acids
 - Stainless steel pump and internal component construction to resist corrosion caused by oxidants
 - Capable of "bottom-up" or "top-down" injections



TOOLING OPTIONS:

- Bottom-up injection
- 2.25", 1.5" & 1.25" pressure activated injection probe

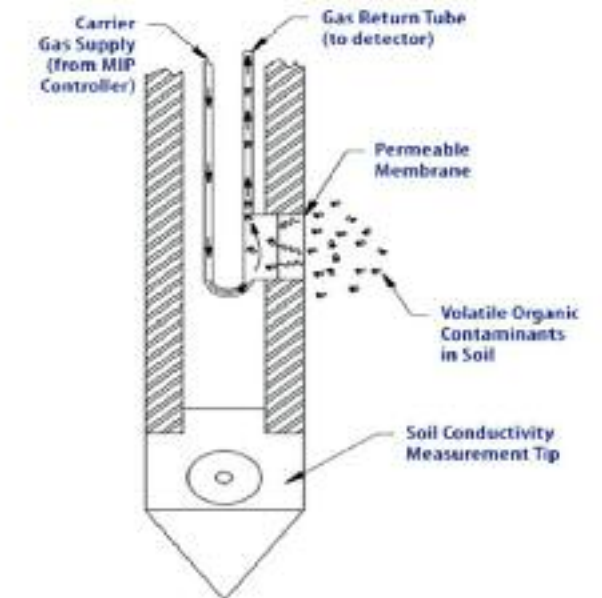
MEMBRANE INTERFACE PROBE

The **MIP (Membrane Interface Probe)** system is offered by Strata Drilling Group. It is a **tool for mapping contaminants in soil and groundwater**. The Membrane Interface Probe is a continuous volatile organic compound (VOC) detection system which heats the soil, water, and vapor matrix as it is driven into the subsurface. The VOC mass which is extracted across a permeable membrane is carried to the surface by an inert purge gas via small diameter inert tubing. Once the compounds reach the surface they are analyzed by a suite of three laboratory grade detectors.

The sensor detection system includes:

- Photo Ionization Detector (PID)
- Flame Ionization Detector (FID)
- Halogen Capture Detector (XSD)

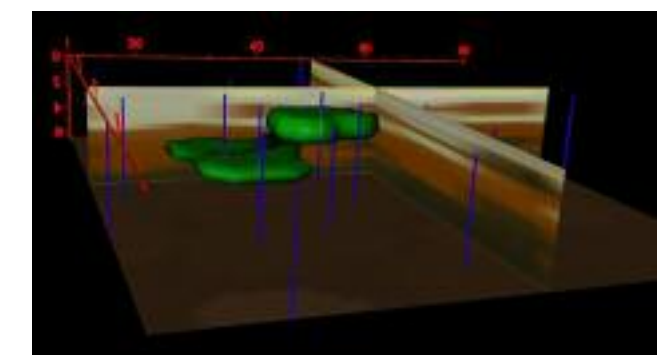
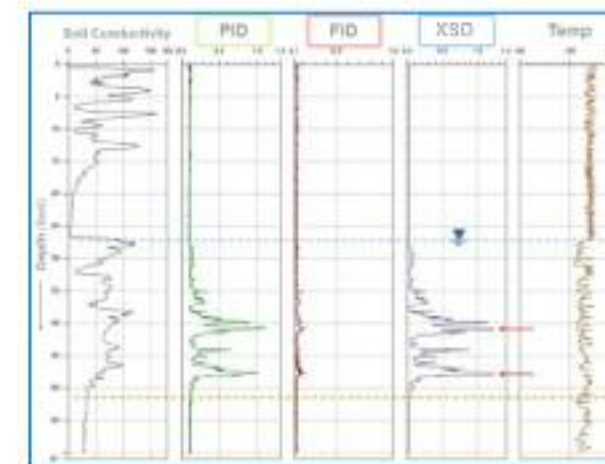
These three detectors together offer a range of sensitivities and a means of discriminating different classes of compounds – anything from chlorinated solvents to gasoline hydrocarbons to methane soil gas. The use of multiple detectors is important for separating different zones of contamination such as petroleum (retail gas station) from chlorinated (dry cleaner). The complementary range of performance of the different detectors enables the system to function from low contaminant level to near NAPL levels.



The Membrane Interface Probe is ideal for:

- Dry cleaners and PCE (Perchloroethylene) sites
- Manufacturing facilities, warehouses, and other TCE (Trichloroethylene) sites
- Service stations with BTEX (Benzene, Toulene, Ethylbenzene, and Xylene) plumes
- Brownfields and redevelopment projects
- DNAPL (Dense Non Aqueous Phase Liquid) sites
- Dissolved phase petroleum sites

MIP includes an integrated EC (Electrical Conductivity) probe to provide indication of general soil characteristics such as sands, clays, and silts. Using the EC logs you can define zones of lower conductivity which allow the movement of contaminants into the subsurface.



3 dimensional contaminant imaging



STRATA IMAGING HIGH RESOLUTION VERTICAL PROFILING

TOOL BOX

LASER INDUCED FLUORESCENCE

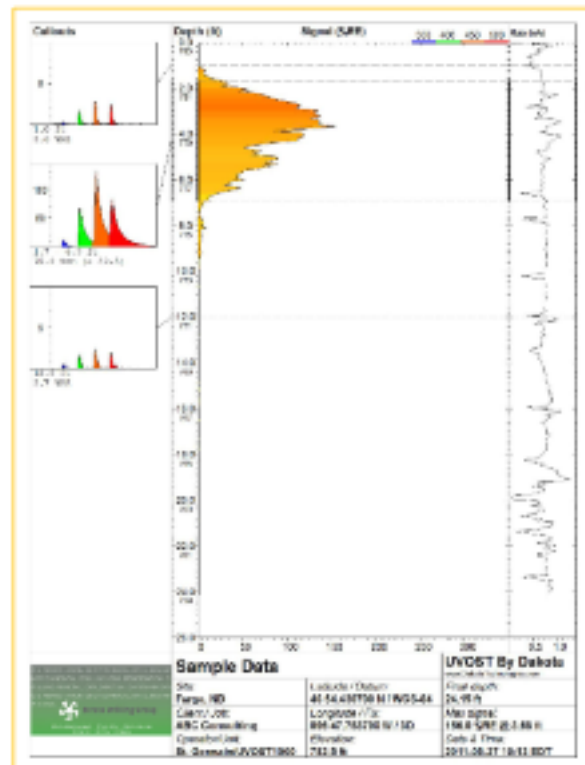
The LIF (Laser Induced Fluorescence) system is offered by Strata Drilling Group to **delineate the depth and horizontal extent of free product and residual petroleum contamination**. The fiber optic-based fluorescence system is deployed with standard direct push equipment. All LIF systems use a laser to send pulses of monochromatic light down a fiber optic line to a probe where the light is emitted and excites any polycyclic aromatic hydrocarbon (PAH) containing compounds in the subsurface, causing them to fluoresce with a characteristic wavelength signature. The induced fluorescence from the PAHs is returned over a separate fiber optic line to the surface where it is quantified using a detector system. The peak wave-length and intensity provide information about the type of petroleum product or potential interferences.

The technologies used to investigate petroleum source areas is UVOST® (Ultraviolet Optical Screening Tool), a sophisticated system for detecting residual-phase SVOCs

(gasoline, diesel, kerosene, aviation fuel, machine oils, lubricants, and some crude oils), making it a prime tool for investigating petroleum source areas. The principal difference of UVOST® to previous systems is the use of an excimer rather than a solid state laser and the integration of the lasing and detecting systems into a compact, userfriendly package. Use of the excimer and the system integration provides greater reliability, better reproducibility, and less room for operator error.

UVOST® is ideal for locations such as:

- Service stations where free product is known or suspected
- LUST (Leaking Underground Storage Tank) sites
- Refineries and petroleum terminals
- Most LNAPL (Light Non-Aqueous Phase Liquid) source areas
- Petroleum DNAPL (Dense Non-Aqueous Phase Liquid) source areas



CPT & SEISMIC CPT

Strata Geotechnical provides:

Cone Penetration Test (CPT) is performed using an instrumented probe with a conical tip pushed into the soil hydraulically at a constant rate. A CPT instrument reports tip resistance and shear resistance along the cylindrical barrel.

Seismic Cone Penetration Tests (SCPT) employs a triaxial seismic digital cone. The cone has a 10 ton (100 MPa) capacity with a tip area of 10 cm² and a friction sleeve area of 150 cm². The test collects tip resistance, sleeve friction and pore pressure measurements at a 2 to 5 cm depth interval, which provides a rapid indication of soil behavior.

Down the hole seismic shear and compression waves can be measured at 1m depth intervals, as three geophones are embedded in the cone. These values are correlated to a number of geotechnical parameters.

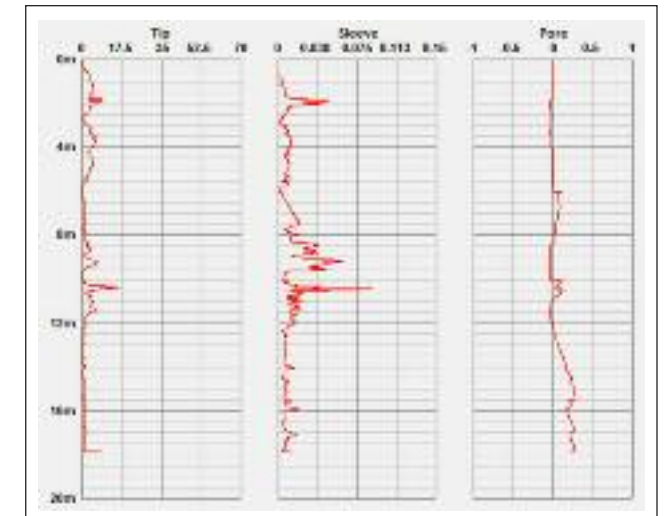
FEATURES:

Cone Penetration Test (CPT)

- Cordless probes, providing a constant stream of real-time data while you are probing
- Information collected: soil resistance on the cone tip, resistance on the outer sides and pore pressure generated during the test
- Calculates: geotechnical parameters, (SPT) blow counts correlation, shear strength, relative density, friction angle and lateral stress
- Cone meets the ASTM D-5778

Seismic Cone Penetration Test (SCPT)

- CPT coupled with Seismic CPT gives details on soil types, engineering parameters and shear wave velocity in the same test hole
- Cross correlation removes human bias and gives realistic error estimates
- Seismic cone adaptor is equipped with Geophones so that we achieve the best definition of the frequency spectrum and avoid data smearing
- Able to measure shear wave velocity and in triaxial configuration for measuring shear and compression wave velocity



LEADERS IN ENVIRONMENTAL, GEOTECHNICAL AND EXPLORATION DRILLING



Based in Toronto, Ontario, Canada, with offices in London, Belleville and Ottawa, Ontario and affiliations in Red Deer, Alberta, Strata Drilling Group is a multi-disciplinary group of companies that provide contract drilling services to engineers in Canadian and international markets that include:

- Strata Soil Sampling utilizing state-of-the-art soil and groundwater sampling technologies
- Strata Exploration provides Geological Exploration equipment and services, including mine tailings and overburden sampling in remote areas
- Strata Geotech provides Geotechnical services to the engineering and construction industry and municipal governments.
- Strata Imaging provides high resolution vertical profiling using Laser Induced Fluorescence (LIF) with a fiber optic based fluorescence system, Membrane Interface Probe (MIP) a continuous volatile organic compound (VOC) sampling system, Cone Penetration Test (CPT) and Seismic Cone Penetration Test (SCPT) for real-time geotechnical data.



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