Fact Sheet

Environmental Response & Revitalization
February 2015

Capabilities of the Site Investigation Field Unit (SIFU)

Geoprobe® Services

Overview

The Geoprobe® is a hydraulically powered direct-push rig that is used to collect soil cores, ground water samples and soil gas samples in an efficient and cost-effective manner. It is truck-mounted and uses the vehicle's static weight combined with percussion energy to advance soil and ground water sampling tools and probes into the earth. One advantage of the Geoprobe is that it produces a much smaller volume of waste soil cuttings in comparison to augers and other rotary drilling methods. The maximum depth of investigation is approximately 100 feet. Generally, the Geoprobe can investigate most soils in Ohio, which are typically clays, silts and sands. However, if the subsurface contains layers of gravel or numerous cobbles or boulders, Geoprobe sampling capability may be limited.

Soil Sampling

The Geoprobe uses three different methods for the collection of sub-surface soil samples. All three methods collect the soil in a transparent plastic liner.

- The Macro Core™ is used for continuous shallow soil core collection (generally less than 16 feet deep). Macro Cores are the largest diameter (1.625 inch soil core) of the three options and provide the most soil volume to achieve analytical sampling requirements for multiple constituents (VOCs, SVOC, metals, PCBs and/or pesticides). Because the soil sampler and rods are removed from the borehole every time a 4-foot core sample is collected, re-inserting the macro core sampler into the open borehole may cause the sampler to collect sidewall soils or soil that may have fallen into the borehole. This may hinder advancement of the boring beyond depths of 12 feet. In addition, because the sampler and rods are removed and reinserted in the borehole during drilling, this method may not be appropriate for sampling through

Field Screening and logging soil core

contaminated soils or shallow ground water zones.

- The dual tube system is used to collect continuous soil cores down to depths of 80 feet under favorable geologic conditions. Unlike the Macro Core, an outer steel casing is advanced along with the inner soil sampler so that a continuously cased borehole is advanced. The outer casing eliminates side wall swelling and sloughing/collapse problems. In addition, this techniques can be used to drill through contaminated soil or ground water without resulting in borehole cross contamination. However, dual-tube cores are smaller in diameter (1.125 inch OD soil core) than Macro Cores and may not provide sufficient soil core volume if analysis for multiple analytical parameters is needed. The dual tube componentry is also the system used when installing 0.75 inch pre-packed monitoring wells.

- The Large Bore sampler is used to sample discreet soil intervals two feet in length, enabling the user to sample targeted zones. Like the dual tube sampler, the large bore sampler is a double-cased system that prevents borehole collapse and concerns with cross contamination. This tool can be used to quickly and efficiently collect soil samples from discreet intervals. In addition, it can be helpful in verifying soil types inferred from electrical conductivity surveys or other geophysical methods. Like dual-tube cores, Large Bore cores are smaller in diameter than Macro Cores and may not provide sufficient soil core volume if analyzing the soil for multiple parameters.

Ground Water Sampling

The Geoprobe collects ground water grab samples and can install monitoring wells. Ground water grab samples are collected using a Screen Point Sampler. Under favorable geologic conditions, ground water grab samples can be collected at depths over one hundred feet below the ground surface. Monitoring wells with a ¾-inch inside diameter (ID) pre-packed stainless steel screen and ¾-inch ID PVC risers can be installed to depths of approximately 80 feet. Monitoring wells are completed at the ground surface with flush-mount manholes or stand pipe well protectors. Monitoring wells installed using the Geoprobe can be developed and sampled by SIFU in the same manner as larger diameter (two- to four-inch ID) "traditional" monitoring wells using other drilling methods. Studies comparing ground water sampling and analytical results from monitoring wells installed using direct-push methods (Geoprobe) with larger diameter monitoring wells have indicated that the analytical results are comparable.

SIFU's Resources – Geoprobe® Services

Installing a well screen

Flush mount well

Soil Gas Sampling

Soil gas samples can be easily collected with the Geoprobe. Two types of samples can be collected – temporary (grab samples) and samples collected from permanent sampling implants. Permanent sampling implants allow for repeated sampling from the same depth at the same location in order to evaluate variability of the soil gas over time.

- Grab samples of soil gas can be collected using the post-run tubing (PRT) system. The Geoprobe pushes rods to the target depth. Once the depth is reached, an expendable point is removed and tubing is inserted with an attached PRT adapter. At this point, a direct reading photoionization detector (PID) can be connected to the tubing to measure potential volatile organic compounds (VOC's) within the soil. If desired, soil gas samples can be collected using a vacuum chamber (*i.e.,* lung box) and Tedlar bags (or other sample container) for laboratory analysis. This method of soil gas collection does not leave a permanent sampling point.

PRT fitting and expendable point assembly

- Permanent implants can also be installed. Using the soil sampling equipment described above, the soil may be characterized so that a soil gas implant can be set at the optimal depth. The implant is attached to Teflon tubing and placed within a sand pack. Once in place, it is sealed with hydrated bentonite to the ground surface to isolate the target zone for sampling. Implants can also be nested at different depths within the same bore hole (*i.e.,* at 10 ft, 20 ft and 30 ft), in order to evaluate the vertical migration or distribution of the contaminants in a single bore hole. Each vapor sampler is separated from the other by hydrated bentonite to ensure that each sample is only collecting soil gas from a given depth. For long term studies, the vapor implant tubing and sampling ports can be secured within a protective housing much like a well cover.

Nested soil gas vapor probes sampled with a lung box and Tedlar bag.