Illinois Environmental Protection Agency
Bureau of Land
1021 North Grand Avenue East
Springfield, IL 62794-9276
April 2001

Use of Push-Driven Technology

What is push-driven technology?

Also known as "direct-drive," drive-point" or "direct-push," push-driven technology refers to tools used to investigate sites by driving, pushing, and/or vi brating small-diameter hollow steel rods into the ground. Sampling tools can be attached to the end of the steel rods to collect soil, soil-gas and groundwater samples.

For purposes of this fact sheet, push-driven technology also includes push-driven equipment that is capable of using an auger tool (similar to that used for a conventional monitoring well) to install pre-pack monitoring wells.

What are some of the advantages of push-driven technology?

Push-driven technology is a useful and cost-effective technology, which yields accurate and representative soil and groundwater samples when used properly. This technology allows the collection of more samples in a shorter period of time, easier mobilization, and the ability to sample in areas not accessible to a drill rig.

Is push-driven technology acceptable for sampling?

Yes. Push-driven equipment is acceptable for sampling soil and groundwater if the inner diameter of the sampling device is 1.5 inches or greater. However, soil samples taken solely for analysis of contaminant (chemical) concentration can be collected with sampling devices less than 1.5 inches in diameter.

Specific acceptable uses for the collection of soil and groundwater samples are described below.

What are acceptable uses of push-driven technology for soil?

1. To determine the horizontal and vertical extent of soil contamination.

2. To determine the physical soil properties of the soil; for example, laboratory hydraulic conductivity, soil bulk density, organic carbon content, etc.

3. To investigate contaminant migration along natural and man-made pathways.

4. To characterize the unconsolidated deposits at the site; for example, the classification of unconsolidated geologic material and associated thickness or soil conductivity logging.

5. To investigate soil-gas.

What are acceptable uses of push-driven technology for groundwater?

1. To determine the rate and extent of groundwater contamination when the groundwater is collected through a screen point sampler or a pre-pack well.

   Pre-pack wells are acceptable for groundwater monitoring for up to one year. If a pre-pack well is to be used for greater than one year, a demonstration as to the integrity of the well (e.g., signs of frost heave, cracked surface seals, siltation, missing or broken locking mechanisms, cracked casing or standing water around the base of the well) should be made. Acceptability of a pre-pack well for greater than one year is made on a case-by-case basis.

   In order to collect a representative groundwater sample, proper care must be taken to allow the groundwater to be clear of sediment, as necessary, before

beginning sample collection so as not to disturb the sample (e.g., agitation of samples for VOC analysis) during sample collection.

2. To collect static water levels for determining groundwater flow direction when static water levels are measured in pre-pack wells installed with the auger tool or conventional wells.

   Pre-pack wells or piezometers may be installed using a push method if adequate site characterization has already been performed, i.e., the site has been characterized and the depth to which the pre-pack wells or piezometers should be installed is known. Because of the smaller diameter, special care should be taken when measuring the static groundwater level in pre-pack wells so that groundwater is not displaced, thus giving an inaccurate groundwater elevation.

3. To perform an in-situ hydraulic conductivity test using a pre-pack well installed with the auger tool or a conventional well.

What happens if a groundwater sample cannot be collected?

If you are not able to collect a groundwater sample, you should not automatically assume that groundwater does not exist to that depth. Push-driven sampling equipment can cause a deformation of the borehole (i.e., upper unit smearing over a lower unit) that may interfere with the ability to collect a groundwater sample. The deformation (smearing) of the borehole may cause the groundwater to recharge very slowly or not at all.

Therefore, in such cases, site-specific conditions and other available data are to be evaluated before it is concluded that no groundwater sample is available to that depth. This may include, but is not limited to, inspection of the core to determine any changes in lithology, lack of recovery, wet/moist soil and depth of groundwater in the area through previously installed wells on-site or off-site. If review of this data indicates that it is reasonable to expect groundwater to be present to this depth, installation of a pre-pack well using an auger tool or installation of a conventional well may be warranted. The use of the auger tool may reduce the smearing effect.

Whether using an auger or push method to install a groundwater monitoring well (conventional or pre-pack), there will likely be some deformation of the borehole wall (smearing). This forms a skin or film against the geologic material, potentially inhibiting groundwater recharge and the ability to obtain a groundwater sample. Proper development of the well is essential in breaking down the skin or film formed during well installation. Proper development, including surging, may increase recharge rates.

What are unacceptable uses of push-driven technology?

The site classification boring as required for Method One and Method Two in the Leaking Underground Storage Tank Program (35 Illinois Administrative Code, Section 732.307) cannot be performed using push-driven technology. A larger diameter boring (as with a conventional well and drill rig) is needed to compare the different stratigraphic units to the publication Illinois Geological Survey Circular No. 532 entitled "Potential for Contamination of Shallow Aquifers in Illinois" (1984), by Berg, Richard C., et al.

Will this fact sheet be updated?

Yes. This is an emerging technology and, as it evolves, the application of this technology will likely change. Applications of push-driven technology not addressed in this procedure may be accepted on a case-by-case basis.

The Push-Driven Technology fact sheet is for general information only and is not intended to replace, interpret or modify laws, rules and regulations.