

OLQ Geological Services
Technical Memorandum
January 8, 2003

Micro-Purge Sampling for Monitoring Wells

Background

The Office of Land Quality (OLQ), Science Services Branch has evaluated research and USEPA guidance on micro-purge or low-flow sampling; and concluded that this methodology can provide more consistent and reliable data than standard methods, with a significant savings in time, money, and waste generated (see the Geological Services Technical Memorandum of June 3, 1998). This method may prove particularly valuable under the common Indiana conditions of low permeable sediments and high turbidity. Accordingly, micro-purge sampling can be used as an optional sampling method, if the requirements below are met.

This document is not a complete outline of sampling procedures; for that refer to USEPA EPA/540/5-95/504 or EPA Regional guidance. This memorandum lists the various requirements or specifications requested by OLQ.

Equipment

- (1) Bladder or centrifugal pumps must be used. Peristaltic pumps may be used only if volatile organic compounds are not on the list of analytes. Inertial pumps may not be used.
- (2) A multi-probe, in-line flow cell, preferably transparent (to detect particulate build-up) must be used. The design of the flow cell must prevent air bubble entrapment during use.
- (3) Tubing used should be small diameter (1/4 or 3/8 inch) Teflon or Teflon-lined polyethylene. PVC, polypropylene, or polyethylene tubing may only be used for samples restricted to inorganic analyses. Stainless steel may be used for organics, but not metals.

Sampling

- (4) A dedicated, submersible pump is recommended. If a dedicated pump is not feasible, then the tubing used for each well should be dedicated and cut to length for that well. The use of a portable pump will require a longer purge time for stabilization. It must be lowered into place as slowly as possible to prevent

mixing or surging of the well.

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(5) The midpoint of the saturated screen is usually the optimum depth for the pump intake, but other depths may be used to target specific zones, such as maximum flow layers or zones of high chemical concentrations. Pump intakes must not be so close to the surface that the water level may be pulled below the intake. The pump intake should also be at least two feet above the bottom of the well to preclude excess turbidity from the well bottom. The site sampling and analysis plan must provide detailed information outlining why and how each pump intake depth was selected.

(6) A depth gauge must be used during purging to take continual water level readings. Drawdown must be held to less than 0.3 feet during purging. During initial pump start-up, drawdown may temporarily exceed this, before recovery.

The pump should be started at the lowest flow volume, and adjusted higher as long as the maximum drawdown is not exceeded. Typical extraction volumes are 100 ml/min to 300 ml/min. Volumes may approach 1.0 L/min in very highly permeable soils.

If, and only if, the well yield (recharge rate) is lower than the lowest extraction rate and the 0.3-foot maximum drawdown cannot be met, "passive sampling" can be used. To prevent dewatering the well, only the volume of the pump and tubing is purged before sampling. Permission must be obtained from the IDEM site manager before this option is used, and it must be noted in the sampling plan.

(7) The parameters normally measured for stability (listed in increasing order of sensitivity) are pH, temperature, specific conductivity, oxygen-reduction (redox) potential, dissolved oxygen (D0) and turbidity. Not all parameters may be used for each site, but at least one of the last three listed must be used. All measurements except turbidity must be made using a multi-probe, in-line flow cell.

The frequency of measurements will depend on the rate of sampling, but should generally be on the order of three to five minutes. Stability will be achieved when three consecutive readings do not vary more than $\pm 10\%$ for turbidity and D0, $\pm 3\%$ for conductivity and temperature, ± 10 microvolts for redox, and ± 0.1 for pH.

If, during purging, the turbidity readings increase, this indicates that the well is being re-developed, and the pumping rate should be lowered. Turbidity may be naturally high in some formations, but should stabilize at or below 5 nephelometric turbidity units (NTU). If samples consistently range higher than this, filters may be needed.

This technical memorandum will be updated as new information is

acquired. Please contact Steven Poe of Geological Services at
(317) 234-0992 if you have questions.