

The HydroPunch tool: a cost-effective method of groundwater sampling

D.A. Pupek¹, B.E. Broster² and M.T. Miller¹

¹*New Brunswick Department of the Environment, P.O. Box 6000, Fredericton, New Brunswick E3B 5H1, Canada*

²*Quaternary and Environmental Studies Group, Department of Geology, University of New Brunswick, Fredericton, New Brunswick E3B 5H3, Canada*

The HydroPunch provides a fast and relatively inexpensive method for delineation of groundwater contamination. Constructed almost entirely of stainless steel, it is used in environmental investigations to acquire *in situ* groundwater samples without the need for installation of permanent monitoring wells. The HydroPunch is not recommended as a replacement for monitoring wells. However, the tool is re-useable and provides a highly effective method of sample recovery.

The HydroPunch tool is driven into the subsurface from the bottom of a borehole. The unit is essentially a long pipe containing a sealed intake screen and 1.2 litre sample chamber, isolated from the surrounding material behind a cone-shaped drive point as the tool is advanced. The tool is driven to the desired sampling depth using an attached threaded drive rod. The drive point is held in place by friction during

advancement of the tool, occasionally aided by an o-ring and a heavy elastic band.

Field tests indicated that consistent recovery and results can be achieved from a target zone when the tool is placed within a high permeability area or slightly above any underlying low permeability clay or silt stratum. Once installed at the desired level, the drive rod is pulled back approximately 0.5 m. This action causes the drive point to disengage and the outer casing to rise, exposing a screened collection chamber and allowing it to be filled with a non-aerated sample. Screens can be interchanged (0.125 mm or 0.250 mm) to accommodate the grain size of the target unit. Sample collection can take from 30 minutes to 2 hours depending on the permeability and hydrostatic subsurface conditions at each site. When the HydroPunch tool is pulled further upward, frictional resistance on the drive point causes an upper and lower check

valve to close sealing the sample chamber. The tool, with a filled sample chamber, is then retracted to the surface and fitted with a threaded discharge valve allowing the sample to be decanted into a sample bottle. Decontamination of the HydroPunch tool requires disassembly and thorough cleaning at a location away from the investigation site. Septas and o-rings are removed and discarded. Small re-useable parts can be cleaned in a stainless steel cage. The entire assemblage should be spray cleaned with a high pressure hot wa-

ter/steam jenny and rinsed with laboratory grade acetone and hexane.

Minor problems identified from use at over sixty locations included, leakage at threaded joints, failure to release the drive point due to insufficient friction, and siltation due to installation of incorrect screen size. Overall, the use of the HydroPunch tool provided an efficient environmental sampling technique during examination of unconsolidated deposits.