

Application of a New Vertical Profiling Tool (ESASS) for Sampling Groundwater Quality During Hollow-Stem Auger Drilling

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Abstract

A new tool called ESASS (Enhanced Screen Auger Sampling System) was developed by the U.S. Geological Survey. The use of ESASS, because of its unique U.S. patent design (U.S. patent no. 7,631,705 B1), allows for the collection of representative, depth-specific groundwater samples (vertical profiling) in a quick and efficient manner using a 0.305-m long screen auger during hollow-stem auger drilling. With ESASS, the water column in the flights above the screen auger is separated from the water in the screen auger by a specially designed removable plug and collar. The tool fits inside an auger of standard inner diameter (82.55 mm). The novel design of the system constituted by the plug, collar, and A-rod allows the plug to be retrieved using conventional drilling A-rods. After retrieval, standard-diameter (50.8 mm) observation wells can be installed within the hollow-stem augers. Testing of ESASS was conducted at one waste-disposal site with tetrachloroethylene (PCE) contamination and at two reference sites with no known waste-disposal history. All three sites have similar geology and are underlain by glacial, stratified-drift deposits. For the applications tested, ESASS proved to be a useful tool in vertical profiling of groundwater quality. At the waste site, PCE concentrations measured with ESASS profiling at several depths were comparable (relative percent difference <25%) to PCE concentrations sampled from wells. Vertical profiling with ESASS at the reference sites illustrated the vertical resolution achievable in the profile system; shallow groundwater quality varied by a factor of five in concentration of some constituents (nitrate and nitrite) over short (0.61 m) distances.