

Low Purge Volume Sampling Technique for the Collection of Groundwater Samples at Brookhaven National Laboratory

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Biographical Sketch of the Author:

Douglas E. Paquette: B.S. Geology from State University of New York at Stony Brook, M.S. Geology from Wright State University, a Professional Geologist in the Commonwealth of Pennsylvania, and a Certified Professional Geologist by the American Institute of Professional Geologists. Mr. Paquette is the Project Manager for BNL's Groundwater Surveillance Program, and has 16 years of experience in hydrogeological investigations and environmental surveillance projects.

The removal of three to five well casing volumes prior to sampling groundwater monitoring wells has been the industry standard for many years. Recent research has indicated that high volume purging of monitoring wells prior to sample collection may not be necessary to provide data that are sufficient quality for environmental surveillance and regulatory decision making. To evaluate contaminant concentrations as a function of purge volume, water samples were collected from twenty-one wells at multiple pre-determined purge volumes. Purge volumes ranged from 0.05 casing volume (which is sufficient to purge the dedicated sample pump and discharge line), up to the standard three casing volumes. A total of 219 samples were analyzed. In ten of fifteen (67 percent) well sampling events where one or more volatile organic compounds were detected at concentrations $>5 \mu\text{g/L}$, and in all seven sampling events where tritium concentrations were $>1,000 \text{ pCi/L}$, stabilization (i.e., concentrations were within ± 20 percent for three consecutive samples) was achieved following the purging of 0.05 to 0.25 casing volumes. In several cases however, initially stable VOC and tritium concentrations became less stable as more water was purged from the wells. The findings of this study suggest that variations in contaminant concentrations within a plume and the plume's position relative to a monitoring well's screen zone and sampling pump have a far greater effect on contaminant concentrations than the amount of water purged from a well prior to sampling.

The low purge volume sampling method has been used at Brookhaven since April 1999, and has resulted in a $>92\%$ reduction in purge water volume. The reduced volume of contaminated purge water that requires treatment and reduced time required to sample the wells has resulted in annual saving of nearly \$250,000 in waste management costs and \$175,000 in labor costs.