

USE OF TRITIUM - <sup>3</sup>HELIUM GROUNDWATER DATING TECHNIQUE TO ESTIMATE  
MIGRATION RATES OF VOLATILE ORGANIC COMPOUNDS  
IN AN UNCONSOLIDATED SAND AND GRAVEL AQUIFER SYSTEM

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ABSTRACT

The movement of Volatile Organic Compounds (VOCs) in an aquifer is dictated by its solubility, attenuation characteristics, recharge volume, and groundwater movement (velocity and direction). At Brookhaven National Laboratory (BNL), past handling and disposal practices at the Hazardous Waste Management Facility (HWMF) and "Current" Landfill (CL) have resulted in the release of VOCs and the radioisotope Tritium to the underlying "Sole Source" Upper Glacial aquifer, which is characterized by unconsolidated sands and gravel. The rate of VOC migration from these source areas was examined by using the following procedures: 1) distribution plots of VOCs and Tritium; 2) Tritium/Helium ratios, which provides an estimate of the age of water, and hence the rate of groundwater movement; and 3) groundwater flow velocities within the Upper Glacial aquifer utilizing conductivity, porosity, and gradient data.

Preliminary results indicate that whereas the comparison of the calculated groundwater flow gradient to Tritium/Helium age determinations are fairly consistent, application to VOC movement is suggestive, but will require additional monitoring and analysis to infer VOC movement by using Tritium/Helium ratios. More confirmatory results could be expected by studying the vertical migration rates as well by using such ratios.