ture was found to have a significant impact on the effectiveness of entrainers for soil extractions of phenol. Entrainers appropriate for extracting wetted soil were found to be the same as those advantageous for aqueous extractions. Benzene was also extracted from dry and wetted soil to investigate the extractability of a hydrophobic compound. Pure carbon dioxide was found to be the best solvent for this system.

CHOOSING LANDFILL SITES: STABLE ISOTOPE ANALYSES OF GROUNDWATER AS AN EVALUATION TOOL

JAMES R. LAWRENCE

Department of Geoscience, University of Houston, Houston, TX 77204-5503 (U.S.A.)

Abstract

In choosing landfill sites one of the most important considerations is to evaluate losses of toxic substances from the site to the surrounding environment. Groundwaters represent the transport medium for these toxic substances. Choosing sites where groundwater flow through the site is minimal is clearly an objective. Stable isotope analyses of groundwaters and precipitation provide a method of making this evaluation for a variety of potential or existing landfill sites.

Groundwaters represent the sequential accumulation of a large number of precipitation events. Rainfall percolates into the ground and days, months or years later is released to streams. The amount of rainfall and it's oxygen isotopic composition are highly variable, whereas groundwater is much more uniform because it represents a long term average of many precipitation events. When a large rainfall occurs which has a substantially different oxygen isotopic composition from groundwater an isotopic spike may be seen in the groundwater. The magnitude of the spike at any given location reflects the extent to which the rainfall has percolated through the ground. The smaller the spike the greater the percentage of the water has run-off over the land surface and gone directly into streams. The oxygen isotopic composition of water therefore represents a totally natural tracer that can easily be utilized to evaluate the extent of groundwater percolation around landfill sites.

Preliminary isotopic studies of rainfall and groundwaters in urban, suburban and rural areas have been made. Results show that percolation of rainfall into the ground versus run-off directly into streams is highly variable from one location to another. The relative proportions of ground water infiltration versus run-off has been quantified at selected test sites.