

New technique put to use to test clean up of contaminated groundwater

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Cleaning up the dangerous contaminants — dry-cleaning fluids, solvents and petroleum hydrocarbons — found in underground water presents one of the most urgent challenges facing environmental science. A report issued today by the U.S. Environmental Protection Agency (EPA) sheds light on a new way to monitor and improve the success of clean-up efforts using a technique developed at the University of Toronto.

"The most common method to clean-up groundwater is biodegradation — using microbes to consume the contaminants and break them down into more benign end products that are not harmful to the environment," says U of T geochemist Barbara Sherwood Lollar, the scientist who initiated the concept and goals for the EPA report and is one of its five international authors.

The report outlines how this can be done using a novel technique called Compound Specific Isotope Analysis, developed in U of T's Stable Isotope Laboratory. The elements of carbon that form the basis for the hydrocarbon contaminants actually come in two types called isotopes, explains Sherwood Lollar. "When microbes degrade contaminants, they prefer the lighter isotope carbon 12 over the heavier isotope carbon 13. The resulting change in the ratio of these isotopes in the contaminant itself is a dramatic and definitive indicator that the biodegradation is successfully taking place."

Beginning in the 1990s, U of T's Stable Isotope Laboratory has been an international pioneer in discovering how different carbon isotopes can be

used to identify whether or not biodegradation is taking place. "Today, dozens of students in Canada have been trained in this method, drawn in by the fascinating combination of fundamental research that has important applications such as the clean-up of drinking water," says Sherwood Lollar. Over the past decade, as the new technique has become more widespread, centres for research and education — and even private companies — have blossomed worldwide.

"Much of the research on new methods of analyzing groundwater contamination has been published in scientific and professional journals but this report — written specifically for the practitioners in accessible language with clear procedural information and decision-making strategies — is a milestone," says Sherwood Lollar.

"It is particularly gratifying to be able to take a technique out of the lab and to put it into the hands of the people working on this issue every day around the world," she says.

Source: University of Toronto

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