

EXTRACTIONS



a newsletter from O'CONNOR ASSOCIATES

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DANGERS OF CHLORINE

A recent Health Canada report says there is a risk that chlorinated tap water may cause bladder cancer and birth defects. Does this mean that consumers should rush out to buy filters or bottled water? Or that municipalities should use an alternative to chlorine for disinfecting? No—the health risks are very low, especially compared to the risk of not chlorinating drinking water or using alternative methods (1 000 to 100 000 times lower). The compounds at issue are trihalomethanes and haloacetates, by-products of adding chlorine to water that contains organic material such as algae and humus. Since surface water has more organic material than well water, cities that draw water from a river or lake can take steps to reduce the risk by filtering out the organic matter before chlorinating.

Dr. Peter O'Brien, a pharmacy professor at the University of Toronto, said the link between chlorinated water and cancer is not a serious threat for big cities like Toronto. "But it could be a serious threat for outlying areas where there's a high amount of chlorine that goes into the water due to the high amount of humus content, and rural areas might not have the water filtration systems big cities do," O'Brien cautioned. Franca Ursitti, a consultant for Toronto's public health department, says Toronto's trihalomethane levels are between 12 and 15 micrograms per litre ($\mu\text{g/L}$) on average.

A survey by the American Water System reported an average groundwater trihalomethane level of 19 $\mu\text{g/L}$ compared to 60 $\mu\text{g/L}$ for surface waters and haloacetic acid levels of 8 $\mu\text{g/L}$ for groundwater and 48 $\mu\text{g/L}$ for surface waters.

What is a safe limit? This February, the US Environmental Protection Agency revised its limits for total trihalomethanes in drinking water to 80 $\mu\text{g/L}$ and haloacetates to 60 $\mu\text{g/L}$.

The Federal/Provincial Drinking Water Committee plans to re-examine existing Canadian standards for chlorinated by-products in drinking water.

[from *Calgary Herald*, January 14, 1999, *Toronto Sun*, November 24, 1998, and <<http://www.epa.gov/OGWDW/mdbp/dbpfr.html>>]

SOIL BACTERIA AND PCBs

Dr. Lindsay Eltis at Laval University and Dr. Michel Sylvestre at the Université du Québec in Montreal are heading two teams of scientists studying how four natural enzymes enable bacteria to break down some polychlorinated biphenyls (PCBs) and not others. Currently, these four enzymes can at least partially break down 30 to 40 of the 209 PCB compounds.

PCBs are notoriously long-lived and hard to get rid of. If they are buried, there is a high risk of leaks; if burned at too low a temperature, there are toxic by-products.

"But if you use natural bacteria, you don't have to transport contaminated soil or burn PCBs," says Dr. Eltis. "This would cost less, and there would be no toxic by-products. . . . In essence, we hope to be able to reduce pollution cleanly and affordably."

The teams plan to have enzymes that will bioremediate all 209 PCB compounds by the end of the project in late 1999.

[from *Env. Sci. & Engineering*, January 1999, p. 22]

PIPELINE LEAKS

A spectacular explosion from a natural gas leak near Rocky Mountain House, Alberta, has focused public attention on the ongoing problem of pipeline leaks. *Pipeline Performance in Alberta*, a report of the Alberta Energy and Utilities Board, says that there were 750 pipeline failures in 1997. Between 1980 and 1997, there was an average of 674 pipeline failures per year, but the average for the last five years increased to 734 pipeline failures per year. This is due, not only to the growing number of pipelines in Alberta, but also to their increasing age. Nine out of ten pipes that leaked were minor lines of less than 15 centimetres. Corrosion was the reported cause of 501 of 1997's 750 incidents.

Ikhtyar Omar, at the Northern Alberta Institute of Technology, said the number of leaks could be cut if companies used coated pipe. Coated pipe is more expensive initially than non-coated pipe, but economical in the long run because it is better able to withstand corrosion, he said.

[from *Calgary Herald*, February 11, 1999]

ON THE INCOMING TIDE

Halifax, N.S. and many other coastal communities (including St. John's, Newfoundland and Victoria, B.C.) dump their sewage into the ocean, expecting the tide to carry it away. But that may not always be the case. A marine geologist at the Bedford Institute of Oceanography has found that sewage is instead accumulating on the floor of Halifax harbour. It seems that when the sewage enters the harbour, it flows out in the surface currents. However, the particles quickly begin to stick together, become heavier, sink into the deeper currents flowing back into the harbour, and finally settle.

To aid the harbour's pending cleanup, a high-tech ocean mapping system has helped chart where the material has accumulated over the years.

[from *Env. Sci. & Engineering*, January 1999, p. 20]

SCIENTISTS WRITE TO PM

David Suzuki and University of Alberta professor David Schindler are among the 640 scientists who wrote to Prime Minister Jean Cretien asking for prompt federal action to include habitat protection in the proposed endangered species legislation. "We thought we should demonstrate the depth of scientific consensus on this," Schindler said. "You can't protect species unless you protect a place where they can live. It's as simple as that." Although Alberta has protection for endangered species in many pieces of provincial legislation, critics say it's not enough. "It is indefensible that an endangered grizzly bear is legally protected in the US, but as soon as it wanders into Alberta or B.C., it can be legally hunted, Schindler said. Alberta Environmental Protection says that there are about 800 grizzlies in Alberta and the population is growing.

[from *Calgary Herald*, February 25, 1999, p. B12]

NEW METHODS

The US Department of Defence (DOD) has many hazardous waste sites around the world. The Advanced Applied Technology Demonstration Facility at Rice University in Houston, Texas, has co-ordinated the development of some new technologies for hazardous waste cleanup aided by a \$19.3 million grant from the DOD:

PROBLEM	NEW TECHNOLOGY	CONTACTS
Groundwater cleanup of hydrocarbons and chlorinated solvents	Treatment gates that are permeable and reactive. These passive barriers eliminate the need for the extensive operation and maintenance of pump and treat systems.	James Barker and John Devlin, University of Waterloo, Waterloo, Ontario
Cleanup of contaminated aquifers	A round of surfactant is injected, followed by air to generate foam. The foam fills the spaces along the most accessible flow path and diverts the flow of a second round of surfactants to the less accessible paths, cleaning more of the aquifer, and reducing average contamination to 0.03 percent.	George Hirasake and Clarence Miller, Rice University, Houston, Texas
Surfactant recovery	A separation process that recovers more than 90 percent of the surfactant for reuse in surfactant flush methods.	University of Oklahoma, Norman, Oklahoma
Hydrocarbon mixtures in soil	A phytoremediation project that demonstrated that tall fescue and white clover removed 50 percent of the contamination.	Katherine Banks, Purdue and Kansas State Universities
Hydrocarbon fuels in clay soil	Hydraulic fracturing followed by soil heating (steam or electro-heating) vapourizes the contaminants.	Jay Dablow, Fluor Daniel GTI, Inc.
High boiling-point contaminants	Radio frequency energy heats the soil and boils out the contaminants from a waste site.	University of Texas, Austin, Texas
Determining soil contaminants	Laser-induced fluorescence probe identifies classes and concentrations of hydrocarbons at depths up to 16 metres.	Johnathan Kenny, Tufts University, Medford, Massachusetts

O'Connor Associates and Shell Canada Ltd. are jointly pilot-testing the use of electrically heating soil to vapourize contaminants, which may enhance the effectiveness of both vapour extraction and biodegradation.

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