The organic trek to groundwater

Groundwater is often used as a source of drinking water because it tends to be the least contaminated of natural water supplies. However, because river water is a primary source of groundwater, there has been growing concern about how to keep toxic industrial water pollutants — especially organic chemicals — from accompanying river water to groundwater aquifers. A common first step in efforts to keep river pollutants from going underground has been to encourage natural riverbank filtration by increasing the absorption area. It's been hoped that noxious pollutants will — as they pass through riverbank soil — either be retained or be converted by soil microbes into less destructive substances. But work by Swiss researchers now shows that if the pollutants of concern are several of the common industrial ones they studied, these hopes are in vain.

For two years René Schwarzenbach and colleagues of the Swiss Federal Institute for Water Resources and Water Pollution Control in Dübendorf have tracked the natural infiltration of water (from the rivers Glatt and Aare) to groundwater. Special attention was paid to the fate of accompanying chlorinated hydrocarbons, alkylated benzenes and chlorinated phenols.

What they found was that volatile organic chemicals such as the aromatic hydrocarbons toluene, various C_2- and C_3-benzene isomers and naphthalene were indeed eliminated by microbial or chemical action within the first few meters of soil infiltration. They also found "strong evidence" that certain pollutants such as the moth repellant para-dichlorobenzene were only bio-degraded under aerobic (in the presence of air) conditions.

More important, some toxic organics passed right through the soils swiftly and untransformed. "Among the compounds that were found to be persistent under any conditions were chloroform, 1,1,1-trichloroethane, trichloroethylene and tetrachloroethylene," the researchers report in the August Environmental Science and Technology. All four traveled several kilometers in a few days to a few weeks.

Is it mercury or Lou Gehrig's disease?

Acute elemental-mercury poisoning may masquerade as Lou Gehrig's disease (amyotrophic lateral sclerosis, or ALS), according to Charles Adams, Dewey Ziegler and James Lin in the Aug. 5 Journal of the American Medical Association. The University of Kansas Medical Center neurologists report on a 54-year-old cannery worker they encountered with ALS symptoms: mild atrophy and twitching of several muscles, a feeling of severe weakness, easy fatigability, unsteady handwriting and a 20-pound weight loss over six weeks.

The first clue something else might be at work was the results of a heavy-metal screening test showing elevated (24-hour) mercury levels of 98.75 micrograms per liter in the urine. It turned out that 3.5 months earlier the man had spent two days salvaging liquid mercury from industrial-grade thermometers. The man eventually recovered fully, without treatment, and his urine mercury levels dropped to 7.5 μg/l.

ALS symptoms have been seen after chronic exposures to organic-mercury fungicides and inorganic mercury. What makes this case exceptional, the neurologists report, is that delayed and sustained symptoms followed such a brief exposure.

Oily sources of ocean pollution

Attempting to assuage concern over offshore oil-and-gas drilling, the Interior Department released data last month showing that the 20,000 wells in U.S. waters have produced only 0.05 percent of the ocean's oil pollution—less than 5,700 barrels per year of oil since 1971. By contrast, river runoff accounts for 41 percent of the ocean's oil, tanker mishaps and routine discharges for 20 percent, and natural oil seeps for 15 percent.

Biotechnology—EPA's new responsibility

Genetically engineered bacteria are being developed to prevent frost from forming on crops. Are these bacteria new chemicals? This is an issue being wrestled with within the Environmental Protection Agency (EPA) since that agency decided to assume regulatory authority—under the Toxic Substances Control Act (TOSCA)—for monitoring and controlling many commercial bioengineering products.

Anne Hollander of EPA's toxic-substances office notes that TOSCA specifically exempts coverage of drugs, pesticides and food—all of which are regulated by other federal laws. So the Food and Drug Administration will handle bioengineered pharmaceutical products, and EPA's pesticide office will have responsibility for pesticides. "What we'll be doing is everything else, presumably, the stuff that falls between the cracks," Hollander says.

At present, EPA's toxic-substances office expects to serve mainly as a data catch-all: "We have a reporting requirement" under TOSCA, Hollander explains, which requires that notification be given the agency whenever a new chemical is being developed for commercial use. EPA must also receive 90 days notice before new chemicals are manufactured.

In congressional testimony earlier this summer, EPA acting assistant administrator Don Clay explained that TOSCA is the agency's "gap-filling environmental law" because its purpose is to regulate chemicals not specifically covered by other federal acts. But are viruses and bacteria chemicals? Clay said his agency's view is that since deoxyribonucleic acid—DNA—is a chemical, recombinant DNA should thus be viewed a *new* chemical.

Smoking and the longevity gap

The reason why U.S. women live longer than U.S. men is because more men smoke cigarettes, a number of studies have suggested. But now a study that more directly addresses this difference in smoking habits has also arrived at the same explanation. Gus H. Miller, director of Studies on Smoking, an independent clinical and research center in Edinboro, Pa., and Dean R. Gerstein with the National Research Council in Washington, D.C., hypothesized that, if the higher rate of violent deaths among men was removed as a confounding factor, and if cigarette smoking's influence on longevity was totally eliminated, no difference in life span between women and men would be found.

To test this hypothesis, they collected data on the lifetime smoking habits of adults (over age 30) in Erie County, Pa., between 1972 and 1974. They excluded any subject from their sample who had died by violent means (accident, suicide or homicide) and were careful to group former smokers with smokers rather than with nonsmokers. They then calculated life tables for male and female nonsmokers and compared them.

The results, they report in the July-August Public Health Reports, were as expected: Life expectancy figures for nonsmoking men and women were virtually identical.

New national technology award

Nominations are being solicited through November 30 for Technology Medal candidates. An engineering counterpart to the National Medal of Science, this new award is being established to give presidential recognition to people and companies that have made outstanding contributions to improving the nation's health through promotion of technology or technology manpower. Recipients must be U.S. citizens or U.S.-owned firms. Nominations should be addressed to the Assistant Secretary for Productivity, Technology and Innovation, U.S. Commerce Department, 14th St. and Constitution Ave., Washington DC 20230. Commerce Secretary Malcolm Baldridge will make the final recommendations to the President.