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**RACHEL'S HAZARDOUS WASTE NEWS #146**

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**POLLUTION OF WORLD'S LARGEST LAKES SHOWS IMPORTANCE OF  
BANNING TOXICS.**

The Great Lakes contain 95% of the fresh water in the U.S., and 20% of the fresh water in the entire world. For 200 years people considered these lakes too large to pollute; they thought you could dump anything and it would disappear. Nearly 40% of U.S. industry, and half of Canada's industry, operates within the Great Lakes basin (the area from which rainfall drains into the Great Lakes).

In 1970, LIFE magazine declared Lake Erie "dead," mainly due to phosphorus (from sewage treatment plants and factories) causing the excessive growth of algae, which used up the available oxygen and killed off other oxygen users, such as sport fish. Lake Ontario was not much better. The Cuyahoga River in Ohio became a symbol of industrial neglect when it caught fire several times in the late '60s.

The U.S. and Canada signed an agreement in 1972 and spent \$10 billion in the next five years cleaning up the lakes. Phosphorus dumped into the lake was cut 80% by building sewage treatment plants and limiting the phosphorus in detergents. Water quality began to improve. However, in 1978 it was obvious that more needed to be done, so a new agreement was signed, this time to control toxic discharges into the lakes. Authorities drew up a list of 350 toxics, aiming to keep them out of the lakes entirely. They identified 11 chemicals as critical pollutants: lead, mercury, hexachlorobenzene, PCBs, four pesticides (mirex, DDT, dieldrin and toxaphene), dioxins, furans, and polynuclear aromatic hydrocarbons (such as benzo[a]pyrene).

Nine years later, in 1987, it was plain that the toxics control program wasn't working, so a new agreement was signed. "The problem of persistent toxic substances is the foremost problem confronting the Great Lakes," says Thomas Brydges, a scientist with Environment Canada (equivalent to U.S. Environmental Protection Agency).

Wildlife is showing the effects. Fish in the Great Lakes are developing cancer of the liver. They have other cancers as well, but cancer of the liver is the most prevalent. As with any medical problem, a cause and effect relationship between pollution and fish tumors is impossible to "prove," but John Harshbarger, director of the registry of tumors in lower animals at the American Museum of Natural History, says the "circumstantial evidence is so strong it is almost impossible to deny."

In addition to liver tumors, 100% of the Coho salmon in the Great Lakes have goiters (enlargement of the thyroid gland). "They also lack secondary sex characteristics, have impaired lipid metabolism, are unusually small, and 75% of the embryos die," Harshbarger explains.

Birds in the Great Lakes are being born with serious birth defects. Some Cormorants are born with "crossed bill defect"--the upper and lower halves of their bills don't meet because the upper bill curves off to one side; they die within a few weeks because their bills are useless for catching fish. Hatching success is another measure of the health of bird populations; a colony of Forster's terns in Green Bay hatches 52% of its young, compared to 100% in colonies living in cleaner waters. Populations of mink and river otters are thought to be declining as a result of toxics interfering with reproduction.

Humans living in the Great Lakes basin accumulate more toxics than people elsewhere, according to a joint report by the U.S. National Research Council and Canada's Royal Society. The main route of exposure is eating fish from the lakes, but beef grown around the lakes also has high levels of PCBs.

Among women living in the Great Lakes basin, breast milk has high levels of PCBs. A breast-feeding infant gets six times the daily dose of PCBs approved by the U.S. Food and Drug Administration (FDA). Babies born to mothers who eat Great Lakes fish aren't carried to full term, have low birth weight, have small heads, and show behavior abnormalities. (See [RHWN #61](#).)

A report by two employees of Environment Canada summarized hundreds of studies relating levels of toxics in the Great Lakes with the health of wildlife and people. They point out that human cancer rates in the Great Lakes basin and the St. Lawrence River Valley are higher than in many other parts of the U. S. and Canada. Heart disease and birth defects also seem elevated in the Great Lakes basin. The report has caused a storm of controversy, but it has also drawn high praise; some scientists call it "very important, a revolutionary document akin to SILENT SPRING for people rather than birds." Others of a different stripe pooh-poo the suggestion that chemicals obviously harming wildlife might also be harming humans.

Back in 1972 when efforts were first begun to clean the Great Lakes, people thought toxics came from two sources: factories and sewage treatment plants. Now they recognize six major sources: factories, sewage plants, runoff from farmland and municipal streets (so-called non-point sources), contaminated groundwater, contaminated sediments (old pollution coming back to haunt us), and the atmosphere. Pollution of the atmosphere results from many legal and generally-accepted methods of waste disposal: the disposal of sewage sludge on the land, aeration of toxics in open lagoons, municipal waste incineration, sewage sludge incineration, and the cleansing of contaminated groundwater by "air

stripping." Obviously, another source is the 2.4 billion pounds of toxics that American industry reported releasing into the atmosphere in 1987.

The incineration of municipal solid waste is a major source of lead, cadmium and mercury. The combustion of coal is also a major source of these, plus arsenic; and motor fuel combustion is the biggest source for lead and cadmium. PCBs are evaporating into the atmosphere from U.S. landfills, where 154,000 tons of PCBs lie buried.

Pesticides banned in the U.S. but still being sold by U.S. companies in foreign locales may also be coming home to roost in the Great Lakes. For example, part of the 12,000 tons of DDT used in Latin America rains down on the Great Lakes each year, entering water, plankton, fish, and people. Another source of toxics for the Great Lakes is the 132 Superfund sites on the U.S. side and 10 major chemical dumps on the Canadian side. And these are just the "official" big ones. One river, the Niagara, has 164 chemical dumps along its U.S. side. CHEMICAL & ENGINEERING NEWS, a publication of the American Chemical Society, acknowledges the dilemmas caused by chemical dumps. "If the material is merely removed from one site and placed in another so-called secure landfill with a liner, the liner will eventually fail.... Similarly, active hazardous waste landfills that comply with current U.S. laws may present problems to future generations. Some of them are sited along the Great Lakes and rivers leading into them. When the liners fail, they too may require very expensive cleanup." The U.S. Geological Survey notes that soils around the Great Lakes are sand and gravel; leachate travels through such soils rapidly, entering the lakes.

For all the international concern about the Great Lakes, the toxics problem is worsening. Control programs are inadequate because the toxics problem is being treated in piecemeal fashion. The only time sharp improvement has occurred was when dieldrin, heptachlor, DDT, PCBs, and mirex were banned within the Great Lakes basin in the early '70s. It seems clear that until Americans and Canadians REDUCE THEIR USE OF TOXIC MATERIALS, the Great Lakes will continue to be poisoned more each year.

Get: Tom Muir and Anne Sudar, TOXIC CHEMICALS IN THE GREAT LAKES BASIN ECOSYSTEM: SOME OBSERVATIONS (1988); order from Tom Muir, Environment Canada, P.O. Box 5050, Burlington, Ontario, CN L7R4A6; phone (416) 336-4951. And see: Bette Hileman, "The Great Lakes Cleanup Effort," C&EN [CHEMICAL & ENGINEERING NEWS] February 8, 1988, pgs. 22-39.

--Peter Montague, Ph.D.

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