

DIOXIN DANGERS--WHAT'S GOING ON?

We urge our readers to attend the First Citizens' Conference on Dioxin September 21-22, 1991, at the Omni-Europa Hotel in Chapel Hill, North Carolina. For more information phone Ellen and Paul Connnett in Canton, NY: (315) 379-9200. The conference will discuss the latest scientific information on dioxin, fraud and manipulation in dioxin studies, and solutions to the dioxin problem offered by citizens.

The recent flap in the press over dioxin can all be traced back to a single government scientist who announced in April that he believes dioxin is less able to cause cancer in humans, and is therefore less dangerous, than he believed 10 years ago. In late April, Vernon N. Houk, a 62-year-old government worker, was keynote speaker at a University of Missouri conference sponsored by Syntex, a company that was being sued in a Missouri court by the family of a truck driver who had died of cancer and who had worked for years in a truck terminal that was contaminated with dioxin. Syntex faces another 350 dioxin lawsuits from individuals who lived at Times Beach, Missouri--a town the U.S. government bought out when they found it was heavily contaminated with dioxin, 10 years ago. During his speech in April, Dr. Houk dropped a bombshell: he said he believed he himself had made a mistake 10 years ago when he urged the federal government to evacuate 2200 residents from Times Beach. In August, the *New York Times* turned Dr. Houk's reassessment into two front-page stories and an editorial, the main message of which was, "Many scientists now believe dioxin isn't as bad as we thought." At least 26 other newspapers in the U.S. and Canada jumped on the bandwagon.

As the summer wore on, Dr. Houk himself went even further. In August he was quoted in the *Seattle* (Washington) *Times* (August 18, pg. B3) saying he believed the pulp and paper industry in the northwestern U.S. "has reduced dioxin levels enough to protect public health." He said this was his personal view, not a government opinion. As we saw last week (*RHWN* #248), the paper industry is facing so many dioxin lawsuits that it is now being compared to the asbestos industry. In a story devoted to Dr. Houk himself, the *New York Times* noted that he is now being praised and acclaimed (the *Times* said "lionized") by industrial companies

that produce dioxin as a waste product, because they say he has put an end to the "dioxin scare."

Dr. Houk's views on the dangers of dioxin reflect the narrow public health perspectives of the federal government. Standards for exposure to a chemical are generally based on the chemical's ability to cause cancer, and not on its ability to cause other health problems. On this basis, Dr. Houk justifies his change of heart: "If [dioxin's] a carcinogen, it's a very weak carcinogen and Federal policy needs to reflect that," Dr. Houk says.

In actual fact there is much new scientific evidence indicating that dioxin is more dangerous than anyone knew 10 years ago. Recent evidence (summarized in a long article in the *New York Times* May 15, 1991 [pg. C4], and in *Chemical & Engineering News* August 12, 1991 [pgs. 7-14]) reveals that dioxin has many toxic effects on wildlife and humans besides its ability to cause cancer. In one species of animal or another, dioxin causes wasting syndrome [progressive weight loss leading to death]; atrophy of the thymus (a blood-forming organ important in the immune system); atrophy of the spleen (another blood-forming organ important in the immune system); atrophy of the testicles; enlargement, deterioration and death of liver tissue; hyperplasia (excessive cell growth) in the urinary tract and bile ducts; birth defects; and suppression of the immune system. In addition, its ability to cause cancer in laboratory animals, wildlife and humans is now a matter of record (see *RHWN* #219.)

The present understanding of dioxin is that it functions like a steroid hormone. Steroid hormones are powerful chemicals that enter cells, bind to a "receptor" (a protein), form a "complex" that then attaches to the cell's chromosomes where it directly encounters the genetic material, turning on and off chemical switches that may then affect distant parts of the body in various important ways. It is not unusual for very small amounts of a steroid hormone to have major effects on the body.

In animal studies, dioxin is still the most potent poison ever seen. For example, it kills hamsters at one 64-thousandth of the fatal dose of sodium cyanide. The hamsters die of "wasting syndrome"--they lose weight and die. In rainbow trout, northern pike, and salmon, one-tenth of a part per trillion of dioxin in water causes growth retardation of young fish. The U.S. Fish and Wildlife Service calls dioxin "the most toxic synthetic compound ever tested under laboratory conditions."¹ No new evidence has changed any of this. Back when Dr. Houk was recommending that people be evacuated from Times

Beach, in 1981, the danger did not seem remote or theoretical. Seventy-five horses in the town had died. Dogs, rodents, chickens, cats and birds had died. No new evidence has been found in the past 10 years to change anyone's estimate of dioxin's toxicity to these species.

In rhesus monkeys, as little as 25 parts per trillion in the diet causes increased passivity and measurable reductions in the ability to learn.²

"With laboratory animals, it seemed as if dioxin caused just about any effect you can think of," says Dr. Steven Safe, a toxicologist at Texas A&M University. "You name it, it did it, and at extremely low doses," he says. Dr. Safe says the mystery of dioxin has largely been solved by confirmation that TCDD [dioxin] and other toxic agents interact directly with genetic material [the chromosomes that, taken together, comprise the DNA molecule], the way hormones do. It is not unusual for a hormone to have different effects and different potencies in different species of animals. This does not make dioxin any less toxic--it merely makes it better-understood.

Chemical & Engineering News says, "One of the most significant realizations of the past few years is that TCDD [dioxin] cannot be considered by itself... that there are a number of dioxin-like compounds that can all have toxic effects." Dioxins, dibenzofurans, PCBs, and some halogenated naphthalenes all mimic hormones; therefore scientists now believe they can all cause the range of toxic effects attributed to dioxin. This is not good news for anyone because dioxin alone may account for 7 ppt [parts per trillion] in the blood of average Americans but when these related compounds are taken into consideration, the average American may be carrying 100 ppt of dioxin equivalents in his or her blood stream. The meaning of these levels of contamination will become clearer in the next few years.

Even now, far-reaching effects in fish and birds

in the Great Lakes are observable at 35 to 65 ppt. Philip M. Cook at the U.S. Environmental Protection Agency laboratory in Duluth, MN, says he believes Great Lakes fish are failing to reproduce already because of the dioxin burden they carry.

Researchers observing wildlife in the Great Lakes are seeing hermaphroditic offspring of birds--for example, male birds with partially developed female sex organs. They are seeing female-female bonding behavior. These potent dioxin-family toxins seem to act like, or interfere with, normal sex hormones like estrogen, producing "chemically castrated" males, and sexually-confused females.

Linda S. Birnbaum, director of the Environmental Toxicology Division of the EPA's Environmental Health Effects Research Laboratory has overall responsibility for the EPA's year-long reassessment of dioxin's toxicity (see *RHWN* #248). Unlike Vernon Houk, for whom "the issue is mostly decided" already (says *Chemical & Engineering News*), Dr. Birnbaum believes when all the evidence has been evaluated, EPA may not change its regulatory number for dioxin much. The number was initially established because of a great fear of dioxin as a carcinogen. Now a whole new set of toxic properties of dioxin, and dioxin-like chemicals, have become apparent, even as the carcinogenicity question has assumed less importance.

¹ Ronard Eisler, *Dioxin Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review*. [Biological Report 85(1.8); Contaminant Hazard Reviews Report No. 8]. Laurel, Maryland: U.S. Department of the Interior, Fish and Wildlife Service, Patuxent Wildlife Research Center, May, 1986.

² R. Bowman and others. "Behavioral Effects in Monkeys Exposed to 2,3,7,8-TCDD Transmitted Maternally During Gestation and for Four Months of Nursing," *Chemosphere* Vol. 18 (1989), pg. 235.

Rachel's Hazardous Waste News is published weekly by Environmental Research Foundation, P.O. Box 73700, Washington, DC 20056-3700. Telephone (202) 328-1119. Editor: Peter Montague, Ph.D.; Associate Editor: Maria B. Pellerano; Assistant Editor: Annette Eubank; Circulation Manager: Laura Burt; Associate Director: Robbin Lee Zeff, Ph.D.; Research Assistant: Sophie Young. Subscription rates: \$40 per year for individuals and citizen groups, \$80 for government agencies, \$15 for students and seniors with ID, \$400 for businesses and professionals. In Canada and Mexico, add \$6.00; in all other countries, add \$11.00. All payments in U.S. funds. Printed on 100% recycled paper.

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