SCIENCE FOR THE PEOPLE

Vol. 15 No. 4 $2.50

WATER CONTAMINATION:

CITIZENS RESPOND

SPECIAL WATER ISSUE

PCBs and Warren County
Interview with Rev. Bruce Young
Water Diversion and Water Policy

Dioxin and Dow
Industriplex-128

SCIENCE FOR THE PEOPLE

July/August 1983
Vol. 15 No. 4

FEATURES:

Cover: Photograph of Connecticut River by Doug Cooke

DEPARTMENTS:

Science for the People is published bimonthly by the Science Resource Center, Inc., a non-profit corporation. The magazine is edited and produced by the national organization Science for the People. Our address is 897 Main St., Cambridge, MA 02139; our phone number is (617) 547-0370. We offer a progressive view of science and technology, covering a broad range of issues. We welcome contributions of all kinds; articles, letters, book reviews, artwork, cartoons, news notes, etc. If possible, please type manuscripts (double spaced) and send three copies. Be sure to keep one copy for yourself. Unless otherwise stated, all material in this magazine is copyright 1983 by Science for the People.

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Bookstores may order on consignment directly from Science for the People or through Carrier Pigeon Distributors, P.O. Box 2783, Boston, MA 02208. The magazine is available on microfilm from Xerox Microfilms, 300 North Zeeb Rd., Ann Arbor, MI 48109. *Science for the People* is indexed in *Alternative Press Index*, P.O. Box 7229, Baltimore, MD 21218. Science for the People's ISSN (International Standard Serial Number) is: 0048-9662.

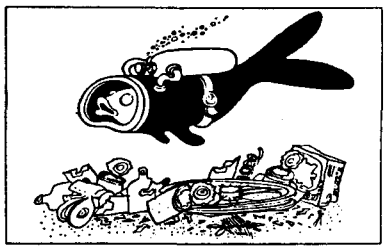
news notes

Banking on Dirty Water

Christopher Willoughby, Director of the Transportation and Water Department of the World Bank, noted at a press briefing this spring that more than 1.5 billion people in the world lack a safe supply of water and even basic sanitation. In accordance with this figure, the United Nations has declared the 1980s the "International Drinking Water Supply and Sanitation Decade." Over three quarters of the 1.5 billion people cited by the World Bank live in rural areas, and 7 to 9 million children die each year of water-related diseases.

Unfortunately, despite such acknowledgements of the problem, World Bank lending in this area has been an economic drop in the bucket. Senior Economist Fredrick Golladay, also of the World Bank, estimates that $300 billion is necessary to meet the current basic water needs cited above. World Bank lending for water-related projects *over the past twenty years* has been approximately $5 billion.

—information from World Bank News 3/31/83



Hazards from Fluorescent Lights?

In yet another potential office hazard, an Australian study indicates a possible link between flourescent lighting and a dangerous form of skin cancer called 'melanoma'. According to the study of over 800 subjects, 274 of whom were female melanoma patients, the researchers found a doubling in melanoma risk in people who work under fluorescent lights.

While much more research clearly needs to be done in this area before any conclusive undertaking is arrived at, one theory for the greater incidence of melanoma among workers exposed to fluorescent lights is the qualitative difference in the spectral emissions between fluorescent lighting and sunlight, fluorescent lights emitting a much more jagged spectrum, with peaks somewhat higher than that of sunlight. Another possibility could be the prescence in fluorescent lights of longer wave length UV radiation, which may itself be carcinogenic.

—information from Science News

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A New Nuclear Threat

In a particularly disheartening news item, the Reading, Pennsylvania *Eagle-Times* reported recently that Libya has joined the ever-expanding coterie of countries with nuclear capabilities. The newspaper stated that according to a "highly reliable" intelligence source, agents operating in the middle east have discovered that Libya has five crude atomic weapons, but, as of yet, no system to deliver them accurately.

According to the *Eagle-Times,* Libya obtained the bombs through Pakistan, after investing more than $100 million in a Pakistani project, and also providing Pakistan with uranium from Niger. If the report is true, Libya would be the first of the Islamic nations in the middle east to obtain nuclear weapons. More importantly, however, it would mean that nuclear capabilities are in perhaps the scariest hands yet: those of extremist Libyan leader Moammar Khadafy.

In the weeks since the news was published, White House and State Department officials have characteristically refused to comment on this story due to its basis in an intelligence report. However, a Congressional investigation into this matter is already underway.

CIA Coup in Australia?

In a story that is only recently coming fully to light in the U.S. press, evidence indicates that the CIA played a central role in overthrowing Australian Labor Party Prime Minister Gough Whitlam in 1975, and effectively dissolving the entire legislative apparatus of Australia at that time.

Governor General Sir John Kerr, representative of the British Crown to Australia, dismissed Australian Prime Minister Gough Whitlam, of the Labor Party, on November 11, 1975, and appointed Liberal-Country Party leader Malcolm Fraser as caretaker of the Australian government. After the Australian House of Representatives passed a resolution of no confidence in the new coalition government, Kerr dissolved the entire House of Representatives and the Senate! Kerr, who was appointed representative of the Crown by Whitlam himself in 1974, used an archaic constitutional power to oust the Whitlam government amid charges of Labor Party mismanagement of the economy and an improper multi-billion dollar loan deal.

Australian elections installed the new government headed by Fraser, an ardent supporter of the military policies of the Reagan administration. Relations between the U.S. and Australia, strained by the Whitlam government, began once again to flourish.

It is now known that Kerr, who replaced the Australian government without giving advance notice to the British Foreign Office or the queen, has served in Australian intelligence since WWII, when he first developed contacts with the Office of Strategic Services, the precursor of the CIA. Kerr founded Law-Asia, a branch of the Asia Foundation, and was active in the Congress for Cultural Freedom, both CIA-funded enterprises. The day before Kerr deposed Whitlam, the permanent secretary of the Australian department of defense briefed the Governor General on CIA discontent with Whitlam. He expressed concern over possible parliamentary disclosures of CIA activities and Whitlam's threat to alter or terminate a lease for a spy-satellite base at Pine Gap, Australia.

Whitlam never got a chance to do much "harm". He ignored the defense secretary's pleas to stop a parliamentary debate about CIA agents and the Pine Gap facility scheduled for November 11, 1975. On the day of the hearings, Kerr dismissed Whitlam.

The Pine Gap spy station intercepts Soviet and Chinese military communications, pinpoints military targets, eavesdrops on domestic and international telephone and telex communications, and provides a direct link for CIA spies with the CIA headquarters in Virginia. It seems that concern over the renewal of the Pine Gap lease, and over possible release of evidence of CIA operations aimed at Australian unions and political parties, prompted the swift and heavy-handed action.

Fraser renewed the lease for the Pine Gap installation in December 1975. In the first budget of the Fraser government, ASIO was the only organization to receive a substantial increase in funding and Kerr received the only salary increase—a whopping 171 percent increase! While the recently-elected administration in Australia led by Prime Minister Robert Hawke, is once again Labor Party, Hawke has distinguished himself from his unfortunate Labor Party predecessor: he has clearly stated his intentions to leave the Pine Gap lease agreement alone.

—Will Doherty

—information from Foreign Policy *Winter 1983, pp. 168-85,* Counterspy *March-May 1983 pp 8-9, and* Covert Action Information Bulletin *#16 March 1982 pp 52-55.*

Weapons Labs Move In On Stanford University

The continuing debate on weapons research has heated up again at Stanford University. This time the stakes may be higher than ever in the face of an offer by three of the country's top nuclear weapons producers to construct facilities on Stanford land. The proposal—submitted by Los Alamos and Livermore National Laboratories, and Sandia Corporation to officials at the Stanford Synchotron Radiation Laboratory (SSRL)—has sparked widespread opposition and the first signs of a consolidated student movement against war research since the Vietnam War.

The disclosure of the weapons labs' budget request for this project to the Department of Energy's Office of Military Applications has fueled the controversy. The research, relying on SSRL's x-rays, is closely linked to the development of a nuclear-pumped laser beam weapon for us in an orbiting Anti-Ballistic Missile (ABM) system, unveiled in its early test phases by Aviation Week in February 1981. This technological initiative is a natural ingredient to the Pentagon's "Star Wars" scheme, as announced by President Reagan in March. If set into motion, the project would absorb the labor of hundreds of technical staff at the huge experimental physics complex comprised of SSRL and the Stanford Linear Accelerator Center (SLAC)—from which the synchrotron lab gets its x-rays.

At a Stanford rally held in late April protesting the university's unfolding deal with the weapons labs, Mary James, a SLAC engineer, expressed the emotional pitch within the two university laboratories. "I feel you are selling my work to the weapons establishment. You are selling it without my permission . . . and I am upset you are selling my work . . . ," she said, referring to remarks she had aimed at SSRL director, Arthur Bienenstock. The rally culminated a two-week university-wide petition drive launched by the Stanford Students Against Nuclear Weapons Research, which amassed the signatures of some 3,000 students, faculty, and staff who oppose "any research dedicated to nuclear weapons testing instrumentation undertaken . . . anywhere on campus, even if unclassified." Registered opposition has come from 75% of the employees at SSRL, 300 SLAC staff, over one-half of the SLAC faculty, and a resolution of the Associated Students of Stanford University Senate.

Bienenstock has already set the stage for the project's approval by claiming that its focus on weapons design will not be a factor in making his decision. Most observers believe he (Bienenstock) will pass the proposal, with unspecified cosmetic changes, on to university officials sometimes this summer.

This latest bid by the military for a niche at Stanford University occurs in the continuum of an expanding relationship between universities and the military establishment. In line with national trends—over the past five years Department of Defense (DOD) spending on basic research in the universities has increased by over 70%[1]—Stanford is one of numerous schools that have acquired a significant and growing dependence on contracts with the DOD. DOD funding, heavily concentrated in the math and science based disciplines, has for example consumed the largest share in the School of Engineering, and can even dominate within some departments, as with the computer sciences.

While the university's bureaucracy paves the way for the weapons labs, a core of activists is currently engaged in an attempt to set up administrative roadblocks. A coalition of staff and faculty at SSRL and SLAC, this group has brought the issue before a university panel that oversees the flow of research contracts. The group is arguing that the "involuntary moral servitude" that would be imposed on researchers by the weapons-related research contradicts Stanford's "Statement of Principles Concerning Research" which purports to defend "the individual researcher's responsibility to assure that the sources of funding for his *[sic]* research, and its perceived applications, are consistent with his own judgment and conscience." The group also cites another conflict with research policy in the inevitable erosion of the work environment at SSRL and SLAC—for both university employees and visiting foreign scientists—due to the presence of a scientific effort so highly stigmatized.

These administrative tactics may not, in themselves, stop Livermore, Los Alamos, and Sandia. In particular, the university may very likely uphold the decision-making power of SSRL officials, overriding the will of the scientific staff whose labor will sustain the operation. When a scrutiny of the proposal begins in the fall, university officials might seize and act upon an arsenal of loopholes in responding to the challenges. As one veteran activist here has pointed out, however, Stanford's administration is quite capable of utilizing it loophole-ridden machinery to turn down the weapons-related research, but only under the pressure of a popular mobilization that is set to "fight power with truth," namely to oppose nuclear weapons and policies that they represent. This is the prevailing sentiment of organizers here, in building for the coming months, hoping to attract the solidarity of the wider disarmament movement.

—Palo Alto Science for the People

[1]Daniel S. Greenberg, "The New Harmony Between Campuses And The Pentagon," The Chronicle of Higher Education, February 23, 1981.

An Overview

TOXIC WASTE AND CITIZEN ACTION

by J. Larry Brown and Deborah Allen

According to the EPA, about 1,000 new chemicals are put on the market each year. Presently, of the total 50,000 different chemical compounds on the market, the EPA estimates 35,000 are definitely or potentially hazardous to human health.[1]

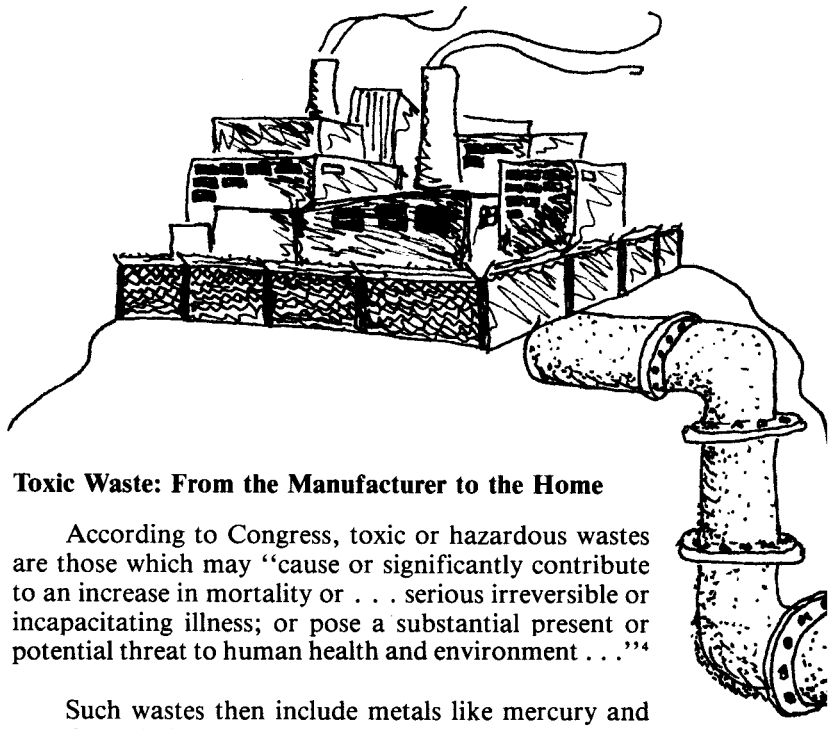
During World War II, the developing technology made possible by organic chemistry was turned to creation of synthetic substitutes for materials which were in short supply due to the war effort. Many of these materials were petrochemicals, by-products of oil production. Since the war, the economic imperatives of the oil industry have led to vast growth in the chemical industry. In 1940, for example, only twenty-five million gallons of the solvent benzene were produced. Today, in the United States alone, benzene production has reached nearly two billion gallons. Similarly, in the past fifteen years, production of solvents has increased 700%, and plastics 2,000%.

Today, chemical production accounts for an estimated 60% of hazardous waste.[2] More than 77 billion pounds of hazardous wastes are generated in the United States each year—nearly twenty pounds for each person on the face of the earth. The EPA estimates that only ten percent of it is being handled safely. Unfortunately, much of that which is considered safe is in landfills not unlike the one at Love Canal, considered safe until just a few years ago.

EPA official Gary Dietrich says that, "At least half the waste is being dumped indiscriminately." His characterization may be appropriate: America has over 50,000 sites where toxic chemicals have been dumped, 2,000 of which are currently known to pose serious health hazards.[3]

J. Larry Brown is the Director of the Community Health Improvement Program (CHIP) at the Harvard School of Public Health, where he teaches.

Deborah Allen is the Senior Program Coordinator of the CHIP program.



Toxic Waste: From the Manufacturer to the Home

According to Congress, toxic or hazardous wastes are those which may "cause or significantly contribute to an increase in mortality or . . . serious irreversible or incapacitating illness; or pose a substantial present or potential threat to human health and environment . . ."[4]

Such wastes then include metals like mercury and arsenic, volatile liquids such as solvents, synthetic organic chemicals like PCBs or halogenated hydrocarbon pesticides and industrial gases. The EPA says that fifteen industries produce 85% of the hazardous wastes.[5] These industries include primary metals, organic chemicals, and electroplating. Some of the hazardous waste materials are disposed of directly into rivers and streams. Most of it, however, is disposed of on land, in waste-water impoundments called lagoons, or in industrial or municipal landfills. Once improperly disposed of, toxic wastes boomerang back into the environment.

Through wind erosion, burning and evaporation, waste gets into the air. It poisons us through direct contact or accumulation in the food chain. But the most

frequent route of entry appears to be groundwater that lies a few feet to a half mile below the earth's surface. Held in stretches of permeable rock, sand and gravel known as aquifers, these huge subterranean reservoirs hold five times as much water as flows each year in all lakes, streams and rivers. Unlike surface water, underground water is almost impossible to purify once contaminated. Once underground, chemicals are shielded from the atmosphere and not exposed to natural purification by air and sunlight which evaporate water, leaving salts, chemicals and minerals.

Chemical landfills slowly drip their contents into aquifers below. Rain and water pass through a landfill, removing soluble contents from the waste, leaving a grossly polluted substance called leachate. The EPA estimates that an average landfill of seventeen acres generates 4.6 million gallons of leachate a year for up to one hundred years. The EPA further estimates that of the 181,000 lagoons in America, 72% are unprotected, leaching chemicals into the pure water below.[6]

As chemicals enter our bodies through food, air and water, they affect our health. The Library of Congress, in a study of 32 chemical sites, concluded that toxic chemicals "are so long-lasting and pervasive in the environment that virtually the entire population of the nation, indeed the world, carries some burden of one or several of them."[7]

We know a fair amount about the impact of certain chemicals. Benzene, for example, has been found to cause chromosomal damage at levels less than ten parts per million. Another compound, carbon tetrachloride, is a potent carcinogen. But we know little or nothing about the effects of literally thousands of other compounds.[8]

Yet perhaps the most dismaying fact is that while we know toxic chemicals affect our health, our ability to protect ourselves or even to predict disease is minimal. Many factors contribute to disease, making it difficult to isolate any one. Often the onset of disease is delayed after exposure, limiting our ability to analyze cause and effect. The danger, according to some scientists, is that a very gradual, insidious deterioration of health might be occurring unrecognized as a result of increasing environmental chemicalization.[9]

Dr. Irving Selikoff, director of the Environmental Science Laboratory at New York Mount Sinai Hospital, states it a bit more bluntly: "We're fouling our own nest, and we can't survive if we continue.[10]

Toxics in Town: How the Problem Confronts Communities

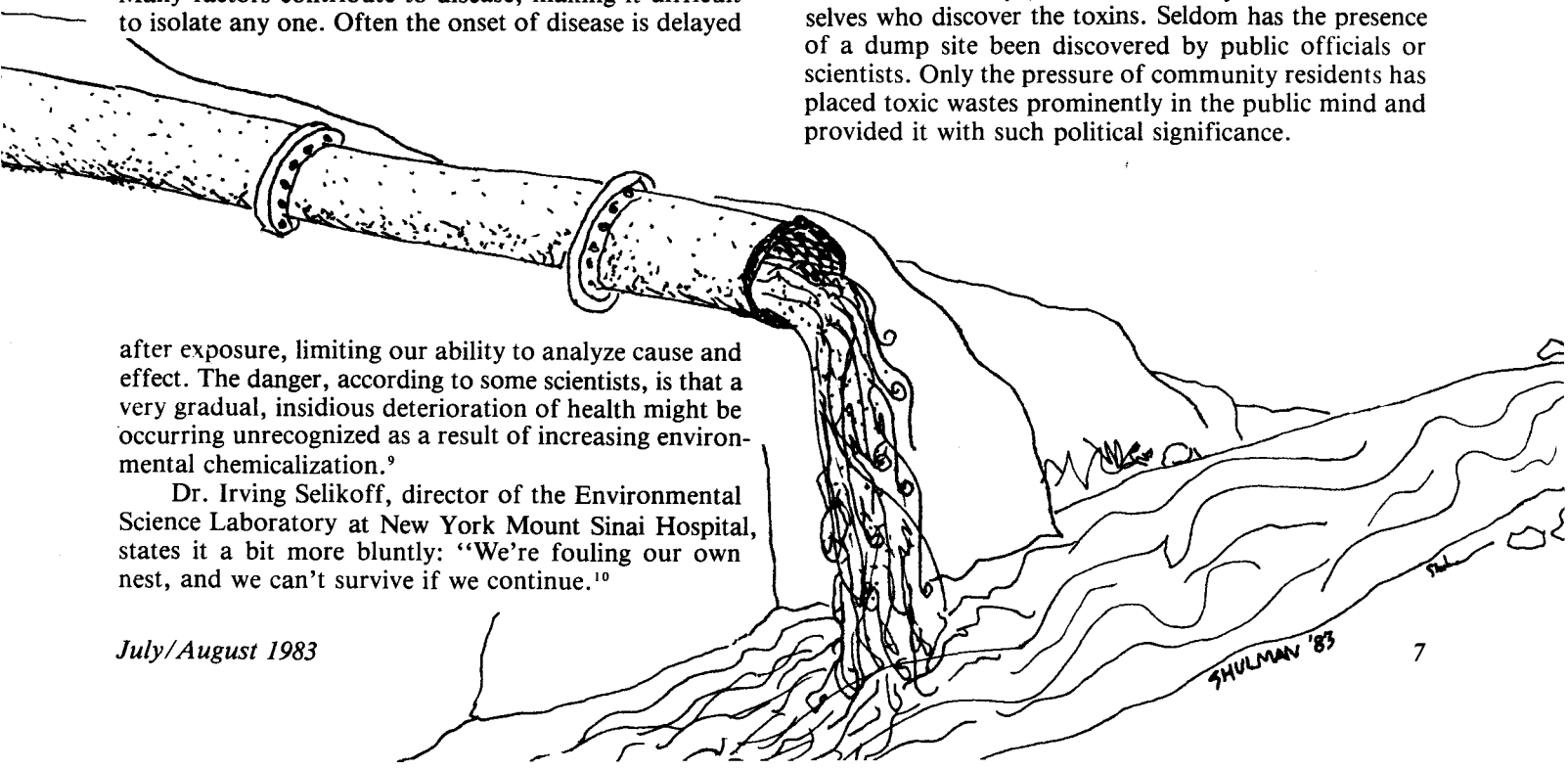
Discovery of toxic wastes has a piercing impact on a community. So stark is the phenomenon that name symbols have come to represent the overall problem. Mention Woburn or Times Beach or Love Canal and many Americans will immediately think of environmental toxins. These symbols represent literally hundreds of communities where individuals and families have suffered dislocation of their lives through the discovery that something unnatural and potentially harmful resides in their brooks, on their playgrounds, even in their homes.

In 1979, the Massachusetts Special Legislative Commission on Water Supply issued a study revealing that forty-eight communities in the state had contaminated water supplies. The Commission estimated that at least one-third of these were affected by chemical contamination.[11] Since the report, estimates of chemical contamination of water supplies have gone up substantially.

These data, however, obscure the very personal impact of toxic waste contamination in the communities which are "diseased." The train of events from community to community may vary. Acton, Massachusetts, for example, had known toxins but no evidence of elevated disease.[12] Woburn, Massachusetts, on the other hand, had a confirmed disease elevation but no know toxins at the time.[13] Other communities had evidence of both toxins and elevated disease rates, but no "proof" of their relation.[14]

Yet in virtually every community there is a common pattern to what residents experience as they confront toxins. Examination of the patterns reveals both what is wrong and, importantly, what must be done to clean up our nation.

Almost always, it is community residents themselves who discover the toxins. Seldom has the presence of a dump site been discovered by public officials or scientists. Only the pressure of community residents has placed toxic wastes prominently in the public mind and provided it with such political significance.



In most cases, alarmed local citizens do what they are supposed to do: they go to local officials to express their concerns and request assistance. They may appeal to the mayor, city council, selectmen, or local board of health. They want some action; they want at least the assurance that the problem will be investigated. Generally they do not get it. It is at this point that the initial shock of the existence of toxins takes a back seat to the outrage people experience as their officials do nothing. In some instances, local officials are simply unresponsive. They literally do not address the problem. Other officials express concern but don't know what to do. The local board of health often turns out to be a small committee appointed by the mayor with no relevant expertise. Some town officials actually become hostile because the problem was revealed and they are expected to do something about it. In a classic form of beheading the messenger, town officials may charge the citizens with being "radicals," of being "insensitive to the economic repercussions" of the issue, or even of "seeking to foster fear and turmoil in our community."

It is at this point that the town usually splits on the issue of toxins. Citizens on one side of the issue either ignore the problem by tuning out, or attack the people who exposed the problem. Sometimes, this is spurred by local industry threatening to shut down if an issue is made of pollution. Those concerned about the problem may be shunned by fellow townspeople, or labelled as troublemakers in the local newspaper. Officials say they are overstating the problem; industry charges them with jeopardizing jobs in the community. In the face of this, it is easy for self doubt to grow. On the other side of the issue, people begin to wonder if they really are overreacting. Maybe they are pushing too hard. Local officials deny the problem. Neighbors are mad. And they are told they have no "proof" that the toxins are hurting anyone. So it often happens, the people who first discovered the problem now bear the burden of proving it is a problem. The onus is on them to show that something is wrong, and to get something done to correct it. The equation has become inverted: local citizens are forced to do what public officials are paid to do.

The next stage for residents is the search for outside help. Faced with self-doubt and enormous frustration, but spurred on by concern for their families, citizens begin to look for experts. The first likely target is a state agency such as the public health or environmental agency. Here they find that state officials may be more likely to understand the technical aspects of toxic wastes than local ones, but they are not necessarily responsive to the fears of the community.

State officials, short of staff and equipment, may even be curt, asking the citizens for evidence. Even when they know what to do themselves, their actions may be constrained by their relationship with local officials or by the way the matter may be intertwined with electoral politics.

At this point, citizens often try to "get political." They have had it with runarounds. They try other avenues, often simultaneously. They visit elected representatives, state and federal, to recount their experiences and request that pressure be placed on appropriate agencies. They go to the newspapers to politicize what previously have been descriptive stories about the local situation. And they begin to conduct their own studies: where are people ill, how many, when did they become ill, what is the diagnosis. Finally, citizens may turn to academia in the belief that science can help prove there is a problem, describe the nature of the health threat, and suggest ways to correct it.

Unfortunately, citizens usually are frustrated at this step too. Many scientists and academics have an aversion to being drawn into so-called local problems. They fear political controversy. When they are willing to help, they usually speak in the vague and hedged language of their scientific field. And when there are those who speak strongly and eloquently on behalf of community concerns, local town officials and industry can pro-

Acton, Massachusetts:

WR Grace opened its chemical plant in Acton, Massachusetts in 1954. As far back as 1973 complaints about chemical odors were raised by local residents, and evidence of chemical contamination of groundwater near the plant was discovered. Air pollution problems grew steadily worse as the plant was emitting what was later discovered to be phenol formaldehyde vapors. In 1981, a large release of styrene vapor required the evacuation of nearby residents. An EPA official claimed that the air pollution problem was the biggest problem at the Grace site.

However, the air pollution problem was just the tip of the iceberg. In 1978, Grace petitioned the town for the right to build a new battery separator plant not far from two wells that supplied 40% of the town's water supply. Local residents fought the petition, raising the issues of the impact on water quality as well as air pollution. Town water officials were also concerned about groundwater contamination. DEQE sampled water from the two wells, which are approximately ½ mile from the Grace plant, and the results showed that nine chemical contaminants were present (benzene, toluene, 1,1, dichloroethylene, trichloroethylene, chloroform, methylene chloride, chlorobenzene and ethylbenzene). Although the town selectpeople knew of the results on November 7, 1978, they were not released to the public until December 19. Meanwhile, Grace was awarded the permit for the new building on November 14. In exchange for the permit, Grace secretly agreed to pay $90,000 for a hydrogeological study to be performed by a firm hired by the town to discover the source of the well's contamination.

duce their own experts to counter their statements. The role of science itself becomes politicized—inevitably so, because there is no definitive, unchallengeable truth to discover.

Having gone through these stages, citizens begin to understand that they don't have a scientific or technical problem, but a political one. It is the politics of priorities, constraints and special interests which prevents action to fix their toxic waste problem. And, they begin to realize, it is the politics of citizen activism that eventually will force appropriate action.

Barbara Opaki, a member of the activist citizen group in Woburn, Massachusetts, summarized this experience, "[We] probably got a big walk-around, and didn't even realize it, from people who didn't want to bother with the problem. We had the idea somehow that a lot of higher up big brother types were taking care of it and that sort of stuff. But it turned out that no one was taking care of it."[15]

Environmental Laws: Frequently Inadequate, Often Ignored

Until the late 1960s, no laws were specifically designed to protect the public from toxins. The only recourse was private lawsuits, called damage suits, to stop one person (or company) from doing harm to another. As the scope of the toxic waste problem became more clear, it became obvious that litigation is an inadequate vehicle to protect human health: cause-and-effect is hard to prove; health hazards may be obvious to some people and more subtle to others; and it is hard to trace back to determine who was responsible for the contamination originally.

Due to public outcry, however, a body of law was developed with the intent of *preventing* harm by regulating pollutants and the sources of pollution. These laws include the National Environmental Health Policy Act, Clean Air Act, Federal Water Pollution Control Act, Toxic Substances Control Act, and the Resource and Conversation Recovery Act (RCRA). These laws, de-

A Case Study

On December 19, the results of DEQE's samples were released and the wells were shut down. The Acton Citizens for Environmental Safety (ACES) formed soon after. ACES was greeted with hostility by the town's selectpeople and board of health. Town officials claimed the wells were not that bad but just to be safe they were closing them. They stated that the chemicals "may even be good for you!" They denied that Grace could be responsible (even though they knew that the wells were directly downstream from the plant) and blamed the residents' septic tank cleaners for the contamination. (Dichloroethylene cannot be used as a septic cleaner because it would clog such a system.)

ACES set about trying to stop Grace's disposal practice of discharging its process wastewater in unlined lagoons. ACES attended every meeting held by town officials, wrote letters to DEQE, EPA and legislators. They investigated the health effects of the pollutants and studied the laws related to air and water pollution. Initially ACES was unpopular, receiving little support from other residents or environmental organizations. However, by December 1979, the findings of the hydrogeological study proved that Grace contaminated the wells. As a result, ACES' credibility grew at the expense of the selectpeople and board of health. Still, Grace's disposal practices continued. Both the DEQE and the board of health claimed that there was nothing they could do to stop Grace. Later, ACES discovered that in fact there were laws that empowered these agencies to stop practices that polluted groundwaters or posed a health threat to the community.

Finally, two years after the wells' contamination was first discovered, and one year after the company was implicated as the polluter, Grace signed a consent decree with EPA and DEQE and ended its disposal practices. But the struggle continues. Under the consent decree, Grace hired a consultant firm to conduct the site assessment. This assessment, completed in August 1982 and approved by EPA, failed to examine the landfill on Grace's site which was used for wastes generated at Grace's plants in New Hampshire, Cambridge, MA and Acton. Its tests were performed in such a manner as to minimize the extent and threat of the pollution. Nevertheless, the fact that some of the pollutants' concentrations were increasing could not be concealed. Although the wells are in the process of being treated for the organic contaminants, nothing has been done, since the problem was discovered in 1978, to contain or remove the contaminants at the Grace landfill. Toxic metals such as arsenic, beryllium and chromium were found in high concentrations in the sludge in the lagoons, but the contaminated wells have not been tested for these pollutants. In December, 1982, the WR Grace site was listed as a Superfund site.

ACES' efforts have been aided by the fact that some of its members have legal training and a background in organic chemistry. Their persistence and investigative ability have earned respect from local, state and EPA officials. Their efforts are now focused on clean up of the site.

signed to prevent exposure and otherwise protect Americans from unacceptable risks, implied a promise from government: enforcement would be strong and aggressive, and resources would be available to correct the problems. Moreover, the laws promised that citizens would be part of the regulatory process through public meetings, open debate, citizen lawsuits against corporate polluters, and the right to hold government agencies accountable for carrying out their responsibilities.

Estelle Carol/Bob Simpson

In the years since their passage, none of these laws has been enforced vigorously by the federal government. Although the Clean Water Act requires the EPA to control the discharge of toxic chemicals into waterways, it took litigation by environmentalists to even get regulations promulgated. The Clean Air Act, passed in 1970, contains provisions to establish maximum emission levels for hazardous air pollutants. To date, only four substances have been regulated under these provisions. And although RCRA was passed in 1976, it took until 1980 for the EPA to issue regulations covering the Act.

Nor have there been aggressive responses to violations of these laws. In July, 1981, for example, the EPA announced a suit against eleven of the country's largest chemical companies for pollution of marshland and the Mississippi River in Louisana.[16] Yet twelve years before, local landowners had sued these companies for precisely the same problem. So what did the government's suit demand? Only that the companies clean up the mess they had made. No fines were sought for their twelve year delay. No damages were requested. The message to corporate polluters was clear: the worst that is likely to happen to you is that you may have to clean up your own mess—no penalties for not having complied all along, no punishment to you for jeopardizing the health of innocent people. So companies actually gain from dilatory delay, freeing their funds for more profitable endeavors.

In addition, adequate resources have not been forthcoming. The touted Superfund of $1.6 billion could, at best, clear up only a few waste sites. And it isn't being used. Only five of 438 Superfund sites have been cleaned up.[17] The recent Reagan EPA scandal revealed why. The Reagan administration has issued a clear message to the corporate community: you have a friend in Washington; regulations designed to corral you will be eliminated, weakened, or ignored. Carry on!

And, perhaps most seriously, government at no level has shown the kind of respect and openness owed to citizens concerning issues so critical to their well-being. Even at Love Canal, a situation where there was significant risk to health and life, it took years of struggle, of being characterized as "hysterical housewives," or denial that there was a danger, before citizens won even partial relief.

The lesson in all this is clear: laws, even laws that look strong on paper, are meaningless without citizen action. All legislation, including environmental legislation, is the starting rather that the ending point.

The Limits of Academia in Political Disputes

The presence of a toxic waste dump in a town raises a number of scientific questions for residents: what chemicals are in the dump; how do they act in the environment; what is known about their effect on human health; and what is the best means of cleaning up the site. Quite reasonably, townspeople look to science for answers to these questions. They take their concerns to experts hoping for incisive answers to what may be life and death questions. Usually they do not get them. Science, like the law, frequently is a necessary but inadequate tool.

First, it is usually difficult for community residents to find someone willing to help them. One reason is that academia usually does not reward faculty for service to the community. It is something done in one's spare time. Another problem is that many academics with expertise in a relevant field such as toxicology or epidemiology are in some way tied to industry—sometimes as part-time employees or indirectly through grants to university laboratories. Scientists dependent in this manner are unlikely to embark on work that may run counter to the interests of their funding sources. Even when willing scientists are located, money to conduct research on behalf of a group of community residents is difficult to find. And even small-scale studies cost something.

Even if scientists are found and money obtained, it is likely that little useful information can be provided by academic research—even if there is time and the desire to have it done. The issue for which communities most often seek assistance in toxic waste situations is health: have there been any effects to date, and what is the likelihood that there may be? It is almost impossible for science to answer these questions. If, for instance, two cases of an unusual cancer are discovered in a small

town, should they be attributed to toxic exposure or to chance? Science has difficulty answering that question in larger populations, let alone very small ones.

Often it isn't even clear what health problems should be examined. A community may be exposed to dozens of chemicals interacting in a variety of ways under a variety of circumstances. Perhaps they cause a range of outcomes, no one of which shows up to significant excess in the population but which, collectively, are quite serious. And when both disease and toxin have been discovered, are they to be linked? If so, how? How does one measure the exposure of an affected individual if one is concerned with drinking water consumed years ago? In town after town faced with a toxic waste problem, residents facing these problems have been disappointed with the limits of science.

Occasionally what seems to be a strong link between toxic exposure and illness is found. Residents of Love Canal, for example, working in conjunction with scientists, conducted a study and concluded that particular adverse health outcomes (birth defects, blood disorders and cancer) were associated with exposure to toxins in the canal. Many people found the evidence convincing. But the state of New York dismissed their results as "housewives' epidemiology."[18]

The lesson of Love Canal should not be lost on other communities: no study is irrefutable. So long as there are conflicting interests, there will be debate. Just as the cigarette industry to this day disputes the danger of its product, and just as food manufacturers dispute studies on the effects of sugar or salt in their products, any party responsible for environmental pollution or its clean-up may dispute a study which concludes that there are health effects.

This does not mean studies should not be done. Communities have every right to the best possible information about the potential impact of toxins with which they have been forced to live. And, as studies are done, science itself will advance. Methods for assessing the impact of toxins on health and the environment will sharpen. But no reason exists to believe that the best evidence of health effects will get a dump site cleaned up absent public outcry.

Like good laws, good science can strengthen the impact of an organized community. But it does not replace the political power of organizing. Science alone does not make social change. And cleaning up a toxic waste dump site, given the vested interests and competing powers involved, is a form of social change.

No town should accept the contention that hard evidence of illness should be required before known toxins are removed from their community. Dr. Leroy Burney, Surgeon General under President Eisenhower, spoke to this truth years ago:

> Referring to the circumstantial evidence relating cancer to atmospheric pollution, I remarked that the case has not yet been proved. This legal metaphor is frequently used. I submit that it is misleading. In law the suspect is

TOXIC WASTE DISPOSAL GLOSSARY

Landfills: An old and widely-used waste disposal process whereby wastes are placed into or on a land area for permanent disposal. The two types of landfills are:

- **"Secure"**—a permanent depository where the wastes are segregated by category and enclosed by "impervious" liners of either compacted clay, synthetic membranes, or both. Despite the name, history has shown that no landfill is secure for long. Many start leaching chemicals as soon as five years after they are built.
- **"Sanitary"**—unlined pits used for the disposal of municipal trash, household garbage and other domestic wastes. Sanitary landfills are not intended for disposal of hazardous wastes.

Leachate: Groundwater and/or runoff water contaminated by contact with chemical/toxic wastes in a landfill or impoundment.

Coliform: A Class of bacteria which includes those species existing in the human intestinal tract. The measurement of their population ("a coliform count") is typically used as a water quality indicator by public health departments, even though it does not include non-bacterial contamination.

Slurry Walls: A construction technique used for remedial action at uncontrolled hazardous waste sites. This method includes trenching around the perimeter of the contaminated zone and injecting a suspension of clay and water into the trench to prevent further migration of leachate.

Capping: The process of placing an "impervious" cover on top of a landfill, lagoon, or impound to prevent the infiltration of water and minimize the generation of leachate (see also secure landfill).

Incineration: A variety of processes for treating wastes which involve the "total destruction" of the wastes by combustion. Besides being expensive to build and operate, incinerators pose the significant threat of contributing to air pollution through incomplete combustion and the production of even more toxic by-products.

innocent until his guilt is proved beyond reasonable doubt. In the protection of human health, such absolute proof often comes too late. To wait for it is to invite disaster, or at least to suffer unnecessarily through long periods of time.[19]

The Role of Citizen Action

"I ain't an expert in nothin', but I'm gonna be an expert in gettin' rid of that company and them barrels."[20]

The widespread poisoning of American communities by industry is, by definition, a national problem. While it has been recognized as such, it largely is still being treated as a local one. Ultimately it is a problem which will only be resolved at the national level. Laws, even strong ones, will not solve it. And certainly it will not be solved by political hyperbole. Resolution of this major issue demands and requires leadership commensurate with the virtually unprecedented threat the problem poses.

The "war on waste" which this nation must fight must be comparable to a national defense alert. In fact, until it is recognized as an actual national defense threat, it will not be dealt with adequately. Little evidence exists to indicate that any administration in this country will challenge big business in the manner required, unless forced to do so. "Leadership" must be created by citizens—largely by those directly affected by toxins. Ironically, both the evidence to point to the power of citizen movements and the evidence that individual citizen efforts alone cannot remedy this national problem, lie in the experiences of those communities which already have faced the problem.

One can point easily to specific things which must happen ultimately to protect our people from toxins. Centralized planning with respect to industrial production and waste control and recovery must take place to a far greater degree than even debated in modern-day America. A strong federal role in coordinating the production of industrial waste inevitably must develop in the absence of evidence that the public health will be protected by letting industry police itself.

At both the federal and state levels, laws and responsibilities must be tightened. Responsibility must be fixed—clearly and specifically—for identifying and classifying toxic waste sites; clear responsibility must be established for responding to towns and citizens groups. Written procedures must be spelled out so citizens can know what to do, and can monitor to make sure that they get what they need, when they need it. Better data and information are needed: not only birth and cancer registries, but strong "right to know" laws that place the public interest ahead of the interest of industry to patent formulas and reap profits through secrecy, at the expense of the public's health and well-being.

Will all this happen? Not tomorrow. But it will happen. The poisoning of our environment and our citizens cuts across many of the lines which usually separate us as a people. With toxins affecting all population groups, the environmental movement is a movement waiting to happen. The nature of the problem confronting us, and the enormous power in the diversity of people affected, will help us solve this crisis. But we must not forget that this environmental health crisis is a political problem. And it must be solved politically.

This may sound peculiar to those who believe that the undue influence which industrial titans exert over America's environmental policy began under this Administration. And it may sound off-base to those who believe that science and technology hold the keys to solving our toxic waste problem. But science is uniquely incapable of altering the hold which industry has on our federal policies. Only the politics of citizens' movements can do so.

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PCBs and WARREN COUNTY

"Water, water everywhere and N'ere a drop to drink"
—Samuel Taylor Coleridge

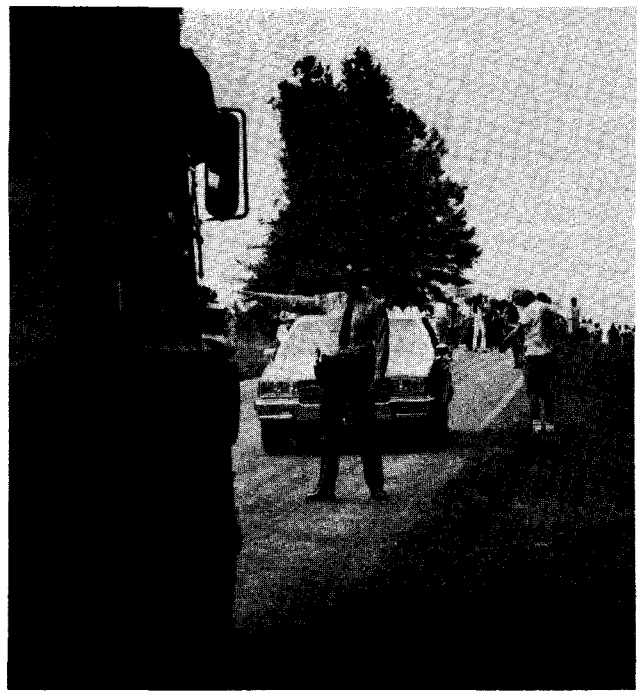
by Ken Geiser and Gerry Waneck

Water is a precious resource on the surface of this planet. It is required by all life forms—the average human consumption is two quarts per day—and it represents most of the mass of living organisms. It covers most of the earth's crust but it cannot escape the earth's atmosphere—it can only move from place to place. Thus the water cycle is a closed system.

Throughout the industrial world today, vast bodies of water are being contaminated by synthetic toxic chemicals. Whole lakes and rivers have been declared too dangerous for human exposure. As these pollutants seep into creeks and groundwater, water acts as a vehicle that carries these toxins from our physical environment into our biological environment.

This article wishes to call attention to the serious consequences of chemical contamination of the earth's water resources. It focuses on one of the most hazardous of contaminants: PCBs, a close relative of dioxin. Some of the scientific background needed to understand the chemistry and biology of these compounds is provided. It shows how industrial negligence and government ineffectiveness are responsible for the crisis. As more and more communities are faced with this threat, people often find that they themselves must take action if they are to overcome it.

In the fall of 1982, a large protest occurred in Warren County, North Carolina, against an effort by the state to dump over 6000 truckloads of PCBs-laden soil into what officials called "a secure landfill." Protestors



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Demonstrators at the front of the march face the trucks attempting to bring PCBs to the Warren County landfill, October 1982.

came from miles around as blacks and whites, young and old, united in a courageous attempt to block roads to the landfill with their bodies. Over 500 arrests were made as the protest drew national attention. Why are PCBs so frightening that people were willing to risk arrest while using their bodies to stop the dumptrucks?

Chemistry and Biology of PCBs

PCBs is an abbreviation for "polychlorinated biphenyls," members of the family of halogenated aromatic hydrocarbons. This family also contains DDT and TCDD (Dioxin), some of the most toxic substances known to life.[1] (Their chemical structures are illustrated in Figure 1.) All of these compounds are synthetic: they do not occur naturally and must be made by

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Gerry Waneck is a graduate student in Immunology at Tufts Sackler Graduate School. He is an active member of Science for the People *and a representative of Federation For Progress, based in New York City.*

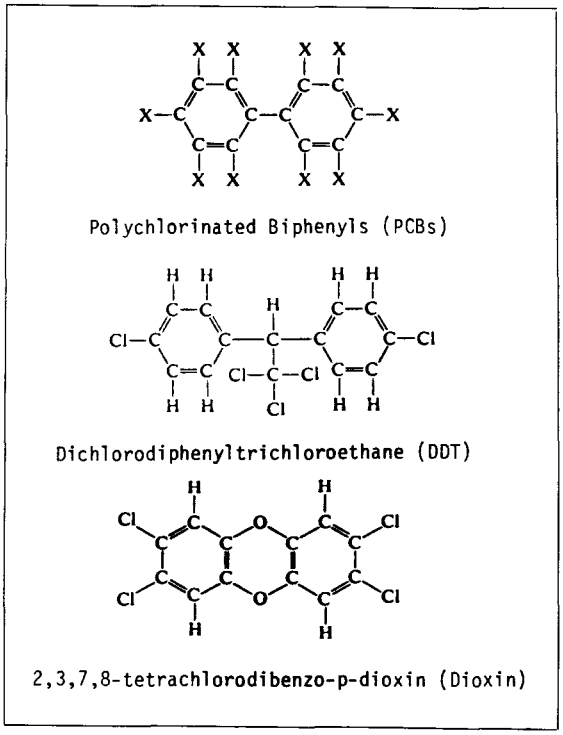

Figure 1. *Structural similarity between PCBs, DDT and Dioxin. All are members of the family of Chlorinated Aromatic Hydrocarbons. Most commercial PCBs are actually a mixture of 50 or 60 individual structures where the X may be either H (hydrogen) or Cl (chlorine). There are 210 possible structures, but data are scant on which structures are the most toxic.*

reacting chlorine or other halogens with certain petroleum derivatives. Commercial PCBs are inevitably contaminated with dioxin because of their common manufacturing process.

The very properties of PCBs that make them so hazardous to life are the properties that make them so attractive to industry: they are virtually indestructible. PCBs are chemically inert, heat resistant, nonflammable, and electrically nonconducting. They are most commonly used in transformers and capacitors, but have also been used in pesticides, heat exchanger fluids, paints, copying paper, adhesives, sealants, and plastics.[2]

Much of the PCBs have already escaped into the general environment although "hot spots" have been identified. PCBs have been found in lakes, bays and rivers across the country. The list includes the Great Lakes (see Dioxin and Dow in box on the next page); Escambia Bay, Florida; the Waukegan River in Illinois; the Ohio River; the Housatonic River in Connecticut; the Chesapeake Bay; San Francisco Bay; Puget Sound, Washington, and in New York's Hudson River. Most of these waters have been polluted by discharge of industrial wastes, either directly or indirectly through municipal sewer systems.[3]

The problem encountered in all attempts at disposal is how to detoxify the PCBs, contaminated soil and river sludge. Thus far, high temperature incineration is the only EPA-approved method. However, scientists debating how to dispose of PCBs from the Hudson River found that burning the contaminated sludge at temperatures as high as 1000°C merely drove PCBs out of the residues into the gas stream exiting from the furnace. Treatment in an after burner at 1800°C was necessary to completely destroy the PCBs. The main problem with incineration at such extremely high temperatures is that it consumes a tremendous amount of fuel—approximately one gallon of oil for every cubic foot of river bottom treated.[4] It is ironic that incomplete incineration is also one way in which PCBs can be converted to dioxins.[5]

Of the PCBs that have made their way into the environment, a large amount have entered the food chain and the EPA estimates that 90% of the world's population have measurable levels of PCBs in their bodies. Although PCBs and their relatives are poorly soluble in water, they are carried by water and accumulate in the oils and fats of plants and animals where they cannot be excreted. As Joseph Highland of the Environmental Defense Fund has stated, "The levels of contamination and the number of people affected continue to increase every year. Human breast milk is so heavily contaminated that currently the average nursing infant exceeds by ten times the maximum daily intake level for PCBs set up by the Food and Drug Administration. Fish, birds and livestock in many parts of the U.S. are literally sodden with PCBs."[6] Animal studies have shown these chemicals to be carcinogenic, toxic to the liver and to interfere with reproduction. Studies of their effects on humans have been limited to accidental or occupational exposure. One such incident is described below.

In 1968, some 1200 Japanese developed severe rashes, accompanied by discharge from the eyes, dark brown pigmentation of the skin and nails, headaches and physical weakness. Scientists painstakingly traced the problem to a specific batch of rice oil that was used for cooking by all the affected families. The oil was found to be heavily contaminated with heat exchanger fluid that had leaked into the oil during processing.

PCBs, long known to produce rashes and other skin symptoms in industrial workers, was found to be the major contaminant of the fluid. When this was discovered, the doctors treating these patients focused primarily on these skin symptoms, while tending to ignore the more general complaints. As time passed, however, the skin rashes disappeared while the general symptoms persisted and grew worse. In the years since the incident, these patients have shown disturbances in the liver, blood, nerves, immune responses and reproductive function. There is also some indication that the cancer rate may be unusually high among these people, although even now it is still not long enough after the accident to be certain.[7]

The "Yusho" patients (Yusho is Japanese for "oil disease") along with victims from a chemical plant explosion in Seveso, Italy, constitute the largest group of people known to be suffering from exposure to PCBs or

dioxin. Their specific symptoms are probably a result of the close chemical resemblance of these chlorinated aromatic hydrocarbons to certain growth or sex hormones and to certain mutagens. Liver enzymes are also thought to play a role in the induction of cancer as they attempt to metabolize these chemicals.[8] The effects on the majority of the population who chronically receive much lower exposures over a lifetime can only be extrapolated from the available data on acute exposures.

The Role of Government and Industry

Many of the problems caused by toxic wastes are due to a combination of negligence by industry and failure of governmental agencies to take proper action. In many cases the desire for a favorable business climate and increased profits subordinate their responsibility to society. We are just beginning to see the hidden costs of our technological society and have yet to understand how we will pay the price. According to Dr. Mary-Jane Schneider, in her book *Persistent Poisons:*

> Even. if no further pollution were to occur, enough PCBs are already dispersed throughout the environment to cause concern for the indefinite future. The cumulative production of PCBs in North America through 1970 (after which production fell off) has been estimated at 500,000 tons, and world wide production was about twice that. In North America, an estimated 300,000 tons have been disposed of into dumps and landfills and may or may not be leaking into air and waters. About 30,000 tons have been released into the atmosphere and were probably carried back to earth by rain and snow. And about 60,000 tons were released into fresh and coastal waters.[9]

With clean and inexpensive detoxification technologies still years off, what actions can be taken to reduce the PCBs threat to our environment? One step has already been taken—that of "source reduction."

The effort to reduce the source actually began some time ago. Although little concern was raised over the chemical between 1929 (when Monsanto first began production) and 1968, the news of the "Yusho" poisoning incident in Japan brought the issue squarely to public attention. The reaction here in the U.S. was so significant that in 1972 Monsanto voluntarily restricted sales of PCBs to closed electrical and hydraulic systems. In 1976 the U.S. Congress took an even bolder step with the passage of the Toxic Substances Control Act by specifically banning the manufacture or continued use of PCBs except in sealed systems. Monsanto ceased production of all PCBs in 1977 which left only the problem of regulating continued use and disposal.

In regulating use and disposal of PCBs manufactured prior to 1977, the government has been less than aggressive. In 1979 the EPA published regulations limiting the use of PCBs to intact, non-leaking capacitors, electromagnets and transformers. The Environmental Defense Fund petitioned the U.S. Court of Appeals to review these regulations as less than adequate and in 1981 the court ruled the regulations invalid and granted an 18 month interim period to promulgate new regulations. The new regulations proposed by EPA in 1982 are limited to providing for indefinite use of current transformers containing PCBs and a ten year phase out of PCB containing capacitors.

The U.S. Food and Drug Administration first established standards for PCBs in food in 1973. Those regulations permitting 2.5 parts per million in milk and dairy products were later reduced to even lower levels in 1979. Similarly, the National Institute of Occupational Safety and Health has recently reviewed Occupational Safety and Health Administration standards for worker exposure and recommended tighter standards, but OSHA under the current administration has failed to act.

Regulations outlawing PCBs have now left us with large amounts of PCBs-ladened substances facing disposal. The government has been procrastinating here as well. Almost two years elapsed between the time EPA promulgated disposal regulations and the first incineration facilities were licensed. Presently there are only two licensed incinerators on land and the incinerator ship Vulcanus is occasionally provided temporary permits to burn PCBs at sea. There are nine landfills permitted to accept solid PCBs wastes (less than 500 ppm) and several Mobil chemical treatment plants are permitted to detoxify PCBs-contaminated oil. With such limited facilities the problem of backlog and storage of PCBs, particularly in discarded transformers, remains serious.

Thus, although PCBs production has actually stopped, the struggle to regulate the use and disposal has moved more slowly. One of the primary impediments to more aggressive government action has been the pressure of current industrial users for whom tighter regulations on use would increase costs. The current federal administration's reluctance to advance regulations will mean that any increased efforts to reduce the source of PCBs contamination must come from interests outside the government. Neither government nor industry is likely to move forward on further source reduction or clean-up of existing water and soil contamination without public pressure. That message has clearly been read in neighborhoods and communities across the country and the result has been a groundswell of local citizen action.

Community Action: The Source of Real Solutions

In many communities across the country, citizens have come together into local voluntary organizations to struggle against the threat of PCBs. These grassroots organizations have become the wellspring for generating the political muscle necessary to confront government officials and irresponsible industries.

Citizens have organized to press for state enforcement of existing laws and regulations. Citizen groups

have also pushed ahead in researching, advocating and demanding many new and innovative approaches to toxic chemical contamination. In clean-up efforts, citizen groups have pressured state agencies for studies of contaminants, removal of above-ground containers and remedial action to contain chemicals discharged into the ground. In the area of health, citizens groups have conducted their own door-to-door health surveys, pressed for professional epidemiological studies of potentially affected populations and advocated long term health screening programs for monitoring exposure victims. Recently citizen groups have initiated campaigns aimed at the industrial sources of the chemicals themselves.

Broad-based coalitions have formed in several states advocating source reduction, "right to know" and "right to inspect." *Source Reduction* as discussed in the case of PCBs above, generally involves a whole series of technological changes in industrial production ranging from simple chemical substitution to complex treatment and detoxification processes whereby the amount of hazardous material produced as waste is reduced. *Right to know* provides workers in plants and community residents living near plants the right to gain the name of and information about toxic chemicals used in the plant. *Right to inspect* provides workers and community residents the right to tour industrial facilities and review current health and safety features.

While much of this citizen action is recent, it is off to a strong start, offering hope of a comprehensive approach to the massive and widespread problem of chemical contamination in water and soil. The character of the citizen action is yet emerging, but so far it appears to be based in working class communities where the hazards are most prevalent and to draw upon the direct action tactics developed over years of community organizing experience. The protest in Warren County, North Carolina is a good example.

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Demonstrators at the march to stop the dump trucks from reaching the landfill, Warren County, NC, October 1982.

PCBs contamination in the state of North Carolina was caused by the deliberate criminal dumping of PCBs fluid from the Ward Transfer Company of Raleigh by the Robert J. Burns trucking operation of Jamestown, New York. Court records show that, faced with an economic loss brought about by the EPA's ban on resale in 1979, Burns and Ward chose to illegally dump the PCBs. Burns and Ward are now serving sentences for their crimes,[10] but there are only a handful who have been brought to justice for similar actions.

Meanwhile, thirty-thousand gallons of the PCBs fluid remained on 270 miles of roadway in fourteen North Carolina counties for four years before the EPA and the state began the clean up. Because of the technical difficulty and prohibitive expense of permanent detoxification, the state decided to build a landfill in which to store the contaminated soil indefinitely.

As soon as the state announced that Warren County was being chosen as a potential site for the landfill, Warren County Citizens Concerned About PCBs was formed under the leadership of Ken Ferruccio, one of the residents of the town of Afton (in Warren County).

Warren County is the poorest county in the state with per capita income of around $5,000 in 1980. Its population is 65% black. According to Ken Ferruccio, "The trend is very clear. They would rather experiment with poor black people, poor white people, than to experiment with the middle and upper classes . . . The regulations are such that allow landfills to be placed in environmentally unsafe, but politically powerless areas."

Landfills were discussed at a citizens meeting in Moore County in February 1982, attended by Ken and his wife Deborah. Moore County is one of several that is being considered by the Chemical Wastes Management Co. for siting of landfills. Speaking at this meeting were Mr. William Sanjour, branch chief of the EPA's Hazardous Wastes Management Division, and Ms. Lois Gibbs, organizer of the Love Canal residents. According to Deborah Feruccio, "Mr. Sanjour supervised studies on the damages caused by hazardous wastes, on industries which generate hazardous wastes, and on the technology to handle these wastes. Nearly $20 million were spent in these studies. The results, which were quite conclusive, were that *landfills inevitably leak*; and that safe landfill technology is only a concept, not a reality."[11] In New Jersey, construction of landfills with the same basic design have been outlawed because of leaching problems.

There are economic factors involved in the political decision of where to site landfills. Landfills have federal common law liability regulations that absolve landfill operators from all liability after five years. The producer passes the responsibility for damages from hazardous wastes onto the landfill operator. Landfill operators usually operate at the edge of bankruptcy, so when a landfill leaks, the company goes bankrupt and the taxpayers are left with the burden.

In the case of Warren County, it became clear that the state of North Carolina had other economic and industrial considerations in mind when Afton was sited. According to Ken Ferruccio, "The Afton site is only three miles from a new regional industrial waste water treatment plant connected by pipeline to Soul City, potentially one of the industrial parks in North Carolina. The Afton site would begin the completion of an industrial package consisting of Soul City (production), the treatment plant (waste processing), and landfills (waste storage).

"As the plot unfolded, the scenario became even more depressing. Documents revealed that the overriding consideration for the state's desire to acquire the Afton site was the need for a legal chemical waste dump in North Carolina. This would mean that Afton would have to eventually store not only the PCBs, and not only waste eventually generated during production at Soul City, but also waste imported from various parts of the region as well."[12]

The site at Afton was not even scientifically the most suitable. The water table of Afton, N.C. (site of the landfill) is only 5-10 feet below the surface, and the residents of the community derive all of their drinking water from local wells. Only the most optimistic could believe that the heavy concentration of PCBs in the Afton landfill will not eventually leach into the groundwater. Unless a more permanent solution is found, it will only be a matter of time before the PCBs end up in these people's wells.

The October 1982 protest by the Warren County Citizens Group represented the first time people have gone to jail trying to stop a toxic wastes landfill. Actions like these have been characteristic of the civil rights and anti-nuclear movements. Both analogies have merit. The issue at Warren County *is* a question of civil rights; and the danger of the toxic wastes threat *is* related to the nuclear threat. In the case of the toxic wastes, however, "meltdowns" have already occured all over the country.

The PCBs protest failed to prevent the landfill from being completed, but it succeeded in a number of ways. The governor, James Hunt, had initially refused to meet with the group but was then forced to make concessions to their community. These were that no more landfills would be built in Warren County and that well water and body levels would be monitored. The Concerned Citizens group is still actively pressuring the state to remove or detoxify the landfill as soon as possible.

The Warren County protest illustrates some of the real opportunities of citizen action. The common threat of the waste dump in Afton united the community in a concerted action of defense. Black and white residents met together, worked together and were arrested together. In fact, the presence of national civil rights figures and members of the national Black Congressional Caucus served to link the protest to larger civil rights and "poor people's" movements. Participants in the community organization educated themselves about the technical issues, learned about PCBs and health hazards and developed an in-depth analysis of the policy and financial questions which led to the selection of Afton as the dump site. United and educated, the citizens of Warren County have developed a true sense of community and a heightened sense of community efficacy.

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Police arrest demonstrator at PCBs march, Warren County, October 1982.

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INDUSTRIPLEX-128: A TOXIC LEGACY

by Sue Tafler

Woburn, Massachusetts is a suburb north of Boston with questionable drinking water. Woburn is also known in surrounding communities for the "Woburn odor," a pungent, putrid smell emanating from an industrial park in its northeast corner. That industrial park, Industriplex-128, as well as municipal wells G and H,* both appear on the Environmental Protection Agency's (EPA) Superfund list. Whether either Industriplex-128 or wells G and H are responsible for the high incidence of childhood leukemia (and some adult cancers) in Woburn (concentrated especially in the neighborhood of east Woburn) is not yet known. Nor has an official connection been made yet between the chemicals leaching out of the Industriplex site and the chemicals found in wells G and H.

Industriplex-128 is a partially-developed industrial park of about 800 acres which has attracted many businesses and provided a welcome tax base for the City of Woburn. It is a classic example of the estimated 30,000 plus sites around the country known to contain hazardous wastes which are suspected of polluting our air and jeopardizing our drinking water. Of these, the EPA estimates that over 2,000 pose "significant problems" for public health and has named 418 of the worst sites as eligible for Superfund money. Industriplex is a case study useful as a means to focus on a deadly serious national problem of almost incomprehensible proportions.

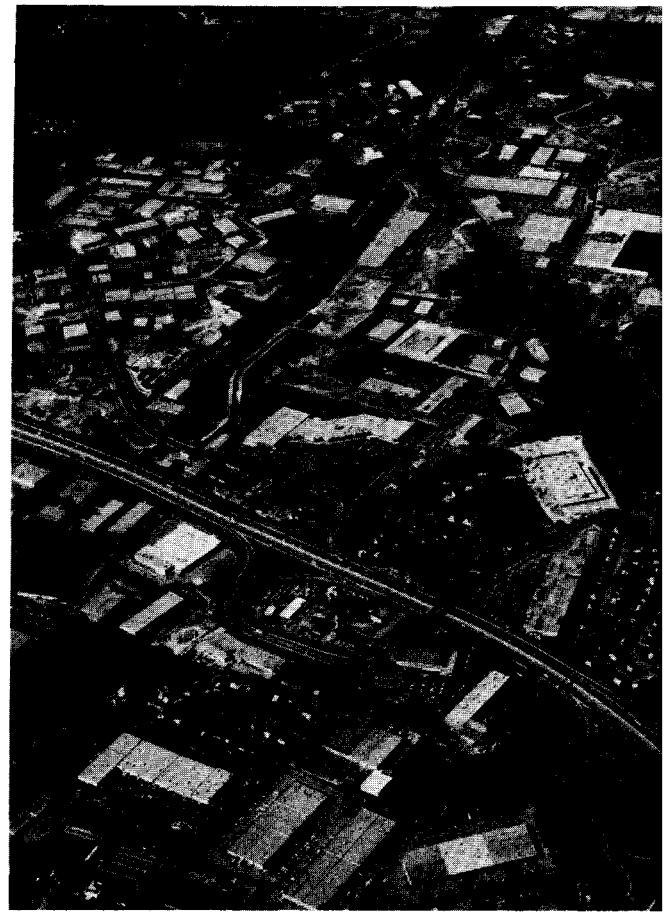
Sue Tafler is a long-time member of Science for the People. *She is a high school teacher and a free-lance writer with an interest in environmental and food issues. She lives in Stoneham, MA, one of the towns next to Woburn.*

*See the accompanying interview on the opposite page with Rev. Bruce Young on the discovery of the leukemia cases and the closure of wells G and H.

Toxic Legacy

It has taken over one hundred years of industrial activity to accumulate Industriplex's legacy of toxic wastes: buried rotting animal hides, arsenic pits, chro-

(continued on page 23)



Aerial view of entire Industriplex-128 with environs. Industrip above Route 128 (Interstate 95). The area below Route 128 is ano Reading, Massachusetts is to the right of Interstate 93. The chron in the upper third of the site as are the hide piles (relocated from

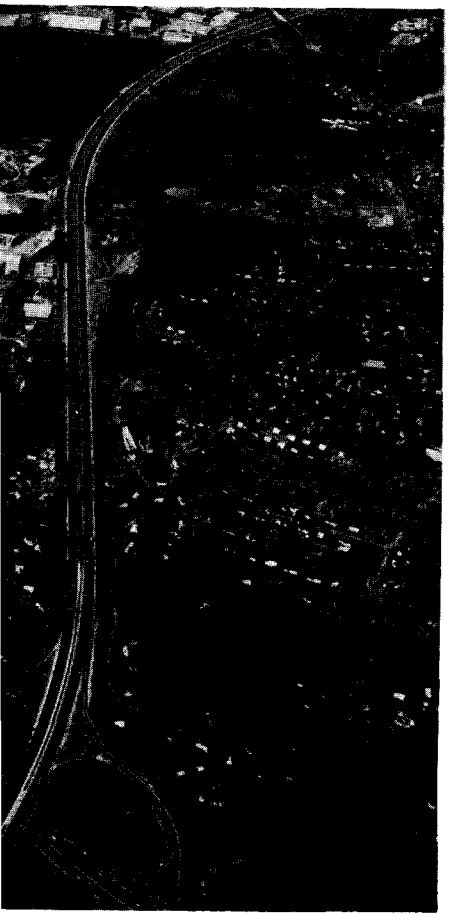
SCIENCE BY THE PEOPLE

an Interview with Rev. Bruce Young

Interviewed by Sue Tafler

Bruce Young, a minister at the Trinity Episcopal Church in Woburn, Massachusetts, is a member of FACE (For a Cleaner Environment), a citizens group that has fought for attention to Woburn's toxic contamination problems. For over ten years, Rev. Young has addressed the elevated incidence of childhood leukemia in the Woburn area. FACE has dealt with local and national agencies, the legislature, and conducted a local health survey.

This interview was conducted by SftP*er Sue Tafler, the author of the accompanying article on the Industriplex-128 site.*



courtesy Les Vants Photo Service

lls the area to the left of Interstate 93 and industrial park. The residential west end of lagoons and arsenic pits are located mostly vations when buildings were constructed).

Perhaps we should start with the history of how you got involved: What was the first hint that there was a high incidence of childhood leukemia in east Woburn?

The first awareness of the high incidence of leukemia came about ten or eleven years ago as part of my normal functions as a parish priest. A parishoner, Anne Anderson, came to me with a request for assistance getting into Boston. Her son Jimmy had been diagnosed with leukemia and needed regular treatments in Boston; she didn't drive. Subsequently as I came to transport them personally into Boston over the next several months, she opened up and shared her feelings that there was an awful lot of leukemia in her neighborhood. The day she came home from the hospital with the diagnosis of her son, a neighbor came over and said it was too bad that two children around the corner also had leukemia. Mrs. Anderson made a rather quick intuitive step and jumped to the conclusion that there was a high incidence and the cause lay in the municipal water supply, in the air, or both. We all thought this a hasty judgment and a simplistic answer without scientific data to support it. Her husband asked me to try to dissuade her from this belief because it was really starting to get to her. And that is how we began our survey. It was an attempt really to disprove her intuitive assumption. Eleven years later we have not been able to do that.

Did you go door-to-door?

No. What we did was try to go to the proper agencies and have them share with us whatever information was available. We found that doors were repeatedly closed, that a good lead would end up nowhere. We ended up knowing about as little after six or seven years as when we first went in. We did not *know* the leukemia was elevated in east Woburn until we went public in October 1979. We put a small article in a local newspaper that invited residents of the community to come here to the church to identify themselves, if they had had a child with leukemia over a fifteen year span, whether the child was still living or had died. We were just trying to gather some numbers.

The result of that meeting was that about eight families came forward and some of those knew other parents who did not want to go public at that time but were willing to fill out information forms we had distributed. We took the data from all the responses and plotted it on a map to see where the people were living and if there was any sort of geography to this disease. And it was pretty startling. It showed that there were eight cases of childhood leukemia in Mrs. Anderson's immediate neighborhood, in a half-mile area. The rest of the community was impacted on a rather haphazard basis as you would expect, but that was not the case in east Woburn. If you apply the *expected* percentage to the population of east Woburn, it come out that in a fifteen year period there would be an expected 0.8 cases of childhood leukemia. In fact, in a *ten* year period we had eight cases.

When we took that information and showed it to Dr. John Truman at Mass. General, Chief of Pediatric Hematology, he immediately called the Center for Disease Control in Atlanta (CDC) and asked them to come over and investigate, which they did. Subsequently there was also an investigation by the Mass. Department of Public Health.

Which were the agencies you had first talked with when Mrs. Anderson first spoke with you?

Some were town and some were state. Here in Woburn we went to the Board of Health, actually to one member who is a physician. He was helpful but his information was incomplete. He had found that the pediatrician with the largest practice in town had only diagnosed one or two cases of leukemia in a ten year period.

Another area that we went to locally which also was not fruitful was the death certificates, trying just to cull out how many children had died from leukemia. Again, we subsequently learned that death certificates are a very poor instrument to use for this kind of study. In many cases for children who have leukemia, the primary cause of death is not leukemia, but some related disease.

Not just because of the leukemia cases?

No, it had predated the leukemia. People had been concerned about the quality of the water from municipal wells G and H. It had a pungent odor to it. It seemed to have a sulfur content. It had taste qualities that were not aesthetic. Visibly, it had sediment in it and you could see the particles. It was not uncommon for people to pour a glass of water from the tap and then wait for the sediment to settle out and drink from the top. It also had a corrosive characteristic to it. The city acknowledged that "it didn't look good, but the reason was we were back-flushing or doing this or that. It will settle out in a week or so and be fine." You'd call back a week later and they'd say, "we've tested it all the time and there is no danger."

"We took the data from all the responses and plotted it on a map to see where the people were living and if there was any sort of geography to this disease. It was pretty startling."

We went to the State Bureau of Statistics, Documents and Deeds in Boston, trying to gather information. We went to the Massachusetts Department of Public Health and got some bad information, erroneous information.

Was this a matter of people being resistant to being helpful, or simply not having the information?

On a local level, it seemed like we were a terrible annoyance. The resistance was one of attitudes, in terms of how people view the public having access to public documents. There is something about secretaries who don't like to reveal anything and get in your way and make it very difficult. That is part of the problem and why this thing got such a head start on us. Also, people have limited time, and if after repeated attempts to get information, they are either told it is okay or they are sort of patted on the head and told to go away, then they will do that after a period of time. Or they will just forget about it. That is what happened with the issue of the drinking water. For years people had been calling the city . . .

Testing for freedom from bacteria?

Coliform count, that's all they were after. We have no reason not to believe that it passed all those tests; it was free of bacteria. It is the carcinogenic matter that may be in there that we are worried about.

Going back to the problem of tracing down how many children have leukemia in an area, there has been an effort to establish a State-wide tumor registry, hasn't there?

You are right on target. That was one of the reasons we could get no information—there was no cancer registry. So in may cases the state was operating blind as well. Leukemia is not a reportable disease. If we were looking for chicken pox or mumps, we could have found out how many cases. The League of Women Voters was one of the groups that had tried for several years to get a registry. The first time around the governor vetoed it; the second time around he pocket-vetoed it; the third time around he vetoed it again. Our citizens' group, *For A Cleaner Environment* (FACE), was organized at this time and we mounted a campaign. We had several hundred people lobby the legislature. Through our efforts we were able to have the legislature override the governor's veto. His next ploy was not to fund implementation of the registry. We fought that battle out in the legislature and had funds restored. The cancer registry is now functioning and has been operating since January 1982.

When the CDC and Mass. Public Health did their investigations, what other agencies got involved? I have the impression that there are several agencies that have a little bit of jurisdiction but not complete responsibility, and there is no central coordination. Has that been a problem getting anything done along the way?

That was especially true in the early stages, before the passage of Superfund with the accompanying funding of that. You look at an agency before Superfund and their official agency stance was "we do not have primary responsibility for that." As soon as Superfund came down, everyone had their own proposals, masterful plans on how they were going to spend all the money. And they *did* want jurisdiction. Ultimately it did evolve into a fairly good working relationship between EPA and DEQE [Massachusetts Department of Environmental Quality Engineering].

But in the Woburn case you have two different problems, we think—Industriplex-128 being one and the municipal water supply (Wells G and H) being the other. (See accompanying article for the history of toxic contamination at the Industriplex-128 site.) They may or may not be related; we do not know for sure if the wells have been contaminated by chemicals from Industriplex.

When were Wells G and H actually closed? Was that a DEQE or local decision?

A situation developed in the spring of 1979. Understand that the wells went into operation in the mid-'60s, and almost from the day they went on line people complained about the quality of the water. The City maintained that these wells were only used for emergency purposes, during the summer months, to get through the drought. The pumping records show that that is not the case, unless you consider a summer drought to include November, December, January, February and March. The water was so bad that it was heavily chlorinated and that was part of the explanation that was given to the residents about the bad taste. All the time the complaints are

coming in and the City saying that the bottom line is the water is safe to drink.

In April 1979, a midnight dumper left 180 55-gallon drums along the side of Route 128 (Interstate 95) here in Woburn. They did not sit very long before they were discovered. In a matter of hours, there was a complaint to the police department, and the city notified the DEQE.

It was just at that time that the DEQE had access to a new toy they wanted to try out, a mass spectrometer. So, one of the investigators said, "we should try out the nearest municipal water supply to see if any of these chemicals have infiltrated." That was absolutely bizarre! The drums had been there for a matter of hours. The nearest water supply was about three-quarters of a mile away. There was no way on God's earth that anything was going to leak out of those drums and get into the water supply that fast. Secondly, I was told, there was not evidence that the drums had ruptured or that the seals had broken at all. It appears that under the cover of prudence someone wanted a good reason to try out this new piece of equipment they had. So they did; they went down and took samples of the water supply (wells G and H). When they put it through this mass spectrometer it told them that there were high levels of tricholorethylene (TCE) in there, and some other chemicals as well.

And that was it. The state said: wait, you can't use this water. It's contaminated and doesn't pass the test. At that point the acceptable levels of TCE for drinking water was 30 units, and the measurement that day was 260 units. You're talking about very close to ten times. So they shut the wells down.

If that guy had dumped his load in Stoneham, two miles down the road, we would still be drinking the water from Wells G and H, with all the TCE and all the other chemicals. Only a fluke. Talk about dedicated scientists doing the right thing!

What does it mean now that Wells G and H are on the priority list for Superfund money?

What happens there depends on local officials and the state, in terms of how quickly we are able to mobilize and present a plan to the EPA. What the shape of that plan would be, I do not know.

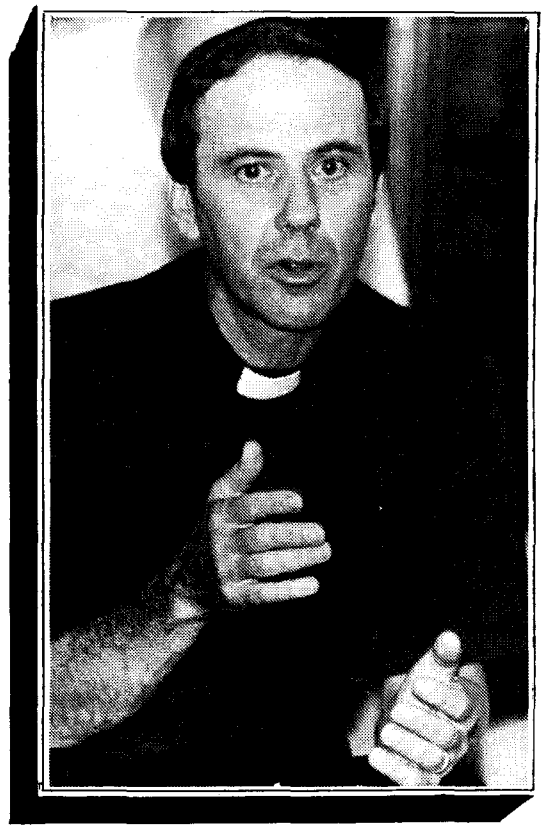
My interests may not be parallel to that of the EPA, but my interest focuses on the issue of public health and childhood leukemia. I'd like to see those wells scrutinized and a lot of technical/analytical laboratory work done, maybe even doing it in the area of synergism, to see if we can find out if TCE in combination with other chemicals can have any effect as a leukemogen, or if they act as promoters, or if they act as something else within the immune system, that would in fact result in a rise of childhood leukemia. That is what I would like to see happen with the money.

Right now you are talking in medical terms that I would imagine are not usually part of your seminary training. I guess you must have gained a lot of scientific and medical expertise, as it were, over the years. How has it been coming as a lay person and having to deal with experts?

I don't pretend to be able to play ball in their ball park. I don't have any medical background; you are right. A lot of the language is beyond me and I can't even pronounce it, let alone understand it. I think I am finding some people who are responsive to the fact that one does not have to have an M.D. in order to point out some things or ask some good questions. And because those people have been responsible to John Q. Citizen or Bruce A. Young, you are able to establish some sort of relationship that helps in terms of their pushing the ball in areas they have some influence in, in the medical community. When I presented our map to John Truman, at Mass. General, he called Atlanta (CDC) and they jumped. If I had called Atlanta, it would have been recorded as another incoming call with a request. But when you have somebody of stature calling in the Feds, they come. We have been fortunate and extremely blessed because of the support of the people at Harvard (School of Public Health), who have encouraged us, and in some cases provided funding to make a health survey of the community a reality. That is exciting for us.

I would really like to learn more about the Health Status Survey. Is it still being done?

It is almost at the point of conclusion for us in terms of gathering the raw data. To summarize, it is a ten page questionnaire that is administered by telephone, not a door-to-door campaign. It asks about general health with some questions about cancer specifically. It is not a cancer survey, exclusively. It deals with other public health issues as well, because the community asked for it. The survey was designed by people in the community.



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Rev. Bruce Young

By FACE members? They are doing the phoning?

Yes. They are just angels. Most of them are local residents. We have also had an extremely generous response from people from other communities, from organizations and groups who are concerned about their own communities, and see Woburn as worthy of establishing a model which can then be applied to their communities later on. People from as far away as Concord and Boston are participating on a regular basis.

Could you describe the dynamics of creating a health survey where you have citizen input as well as guidance from Harvard School of Public Health (HSPH)?

It started with an invitation by Dr. Larry Brown at Harvard to address his class. He has a program called CHIPs, a Cooperative Health Improvement Program, where they expose students to community issues and problems, and try to bring the HSPH out of their ivory tower and into the community with some real experience. Larry asked me to speak to his class, which I did.

When the class was over, I was introduced to another professor, who had sat in on the class, Dr. Marvin Zellen. Dr. Zellen is the chairman of the Depart-

ment of Biostatistics at HSPH, also has a position at the Sidney Farber Institute, and is involved in the World Health Organization. He was intrigued by what I had said in my lecture and asked if we would be interested in gathering some information to use in a biostatistical health model he had developed. Of course I was very interested. From that, we had several meetings with his staff and members of FACE, and we put together a health survey that will, when it is completed, be held up against a model that he has designed and developed.

I guess the bottom line on it would be to see if we can show some sort of correlation, not proof or cause-and-effect, but just show an association between your location in a community and an environmental hazard or risk. We are trying to see if you are at greater risk living closer to Wells G and H than if you lived on the extreme edge of that system. We are trying to see if you are at greater risk because you live closer to Industriplex or not.

How many families are being surveyed?

The survey was designed to reach every family in the City of Woburn, which has 35,000 people or about 10,000 households. Then, the instrument itself is designed to kick out certain groups: people who are new to the community, recognizing that whatever disease they have, they have brought in with them and should not be laid on the doorstep of Woburn. The other thing is we drop out senior citizens, the assumption there being that there are always reliably chronic problems that come with the aging process and should not be confused with other health problems. So now you are down to about 7000 households. At this point, we have firm, complete data on about 2500. We would like to have 3500 or 50 percent, though I am told that even one-third is an incredibly high percentage and will bring some numbers that would not be questioned within the medical and scientific community.

Having been involved in this for more than ten years, are there any lessons about the political power of citizen action groups? Knowing what you know, is there anything you would have done differently ten years ago?

It is very clear in retrospect that it takes an awful lot of resolve to see the think through. It will not happen quickly. If you had told me ten years ago that I would still be beating my head against the wall ten years later, I don't know if I would have wanted to start. I'd like to believe that I would, but in reality I am not sure how many people are willing to run a race that long. Secondly, I think that things began to happen when it moved from two people who were concerned to twenty-five people, to one hundred people, to five hundred. Clearly for us, there was strength in numbers.

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This is when you had the meeting at the church to seek out other families?

Yes, that made a big difference, if for no other reason than to offer the support and encouragement to continue. The other thing that happened for us, and you can't plan it or draw an outline and make it happen in another community, is tremendous enthusiastic and solid support from some key politicians, such as Senator Ted Kennedy. He went to Industriplex and the media followed him. But the plus side of it was he did more than go out there and have his picture taken; he worked back in Washington to make Superfund a reality and to make Woburn a priority. He has worked to make sure the agencies have followed up and done what they are supposed to. It really does take that kind of political clout. The other thing we have, and I dearly wish we didn't, is a documented serious health problem affecting kids. Because it is children, it adds a dimension that makes it difficult for people to turn away.

One of the things I have learned in ten years is you don't expect government agencies to do their job because it is their job. That was disappointing, a bitter pill I had to swallow. I have found that sometimes you have to drag them kicking and biting and screaming to their desk to do their job. And then I find that all the agencies sing the same song, probably justifiably so: "we are overworked and understaffed and we do not have the facilities to meet the need. Budgets are being cut, positions are vacant and we do not have laboratory space. Although we are interested in the following tests in Woburn, we are also performing tests in New Bedford, Canton, Plymouth, Tewksbury, and Ashland, and it's all over the Commonwealth and we do not have enough people to do it. Speak to your legislature and get them to give us some more money." The name of the game in terms of public health, in terms of protecting the environment, is money. That's why I am incensed with the Reagan administration and their handling of Superfund. It is just a national disaster to allow them to do what they have done, to dismantle the EPA and not to spend the money that's there. Just unbelievable!

Is there anything I haven't asked that should be included in telling the story?

Yes, I'd say it's been minimized, but I think it is terribly important, and that was Mrs. Anderson's initial gut reaction —the water, the air, or a combination of both. She still hasn't been disproved. That tells me that your non-technical, non-scientific person has a place in this world and that we do not have to transfer all power to those that have several academic degrees or are masters in computer science or whatever. There is a place for the average citizen who thinks something is going on and who is able to get others to show some interest. Even in this age of specialization, old-fashioned Yankee ingenuity or maybe mother's intuition is still alive. It would be nice if that were the case. In any event, whatever the final result is, I hope that some mothers take solace that it was a mother that got this thing started.

And that a citizen's group such as FACE saw it through. I guess that the way *SftP* would talk about it is that it is science done *by* the people. That's what has impressed me.

We've been called lay epidemiologists by many professional epidemiologists who have been very laudatory in their comments about the way we conducted ourselves. I guess common sense helps.

Industriplex-128

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mium lagoons, and other deposits still being discovered. In 1863 Merrimac Chemical Company bought out the first manufacturer on the site and continued to supply acids, and other chemicals to regional textile, leather, and paper industries. Throughout the years Merrimac also manufactured arsenical insecticides as well as TNT and other explosives. In 1929, the Monsanto Corporation bought out Merrimac, closing down the Woburn operations in 1931. A series of companies producing hide and bone glue and animal grease (using chromium-containing tannery scraps) followed Monsanto, the last of these being Stauffer Chemical Company from 1960-1968. All of these industries disposed of their toxic wastes on site and these chemicals have been slowly leaching into the groundwater, washing away in surface water, and drifting into the air for more than a century.

Stauffer sold its land in 1968 to the present owner, a developer named William D'Annolfo, trustee of the Mark Phillip Realty Trust. D'Annolfo subdivided the parcel of land and several portions have been sold to others for commercial development. In addition, he himself began work in 1972 on the remaining 300 acres involving grading, excavating, and construction. When excavation work exposed the buried hides and chemicals, some of these were moved to the northern end of the site, forming 50-foot high "hide piles."

The exposed hides were suspected of being responsible for frequent complaints of a foul odor, especially in Reading, the town immediately eastward and downwind of Woburn. Residents of the western neighborhood of Reading have suffered over the years from nausea, stinging eyes, and breathing problems on those days when the wind and a high level of construction activity at Industriplex combined to spread what is officially called a "nuisance odor." In the summer, with windows open, it was a toss-up as to whether it was worse to let children play outside or in. There have even been reports of peeling paint on house exteriors. According to "professional sniffers," odor chemists working for Arthur D. Little Company under contract to the EPA, the odor is caused mainly by sulfurous and nitrogenous compounds, especially hydrogen sulfide.

Beginning in the early 1970s, D'Annolfo was given first a series of notices of air pollution violation by the Massachusetts Department of Public Health (DPH) in response to vocal complaints by Reading residents. Later came a series of cease-and-desist orders by the Massachusetts Department of Environmental Quality Engineering (DEQE) and the Massachusetts Attorney General. D'Annolfo ignored all of these and citizen frustration mounted. He also did not comply with a consent decree and court orders to use lime and water to abate the odor while digging. Eventually, the Town of Reading went to court seeking odor abatement and an end to excavation.

D'Annolfo finally stopped construction work in 1979. At this time, the EPA also entered the picture, sharing with the DEQE responsibility for several studies of the site. The EPA paid for a fence which prevents access to the arsenic pits. Whether D'Annolfo will ever pay for any of the containment or clean-up measures in the consent decrees may be a moot point, because the Mark Phillip Trust has conveniently gone bankrupt. While D'Annolfo is certainly not responsible for placing toxic wastes on the site, much of the wastes would not now be exposed to surface water and air if it were not for the development construction.

Estelle Carol/Bob Simpson

Whose Problem?

The jurisdiction of federal, state, and local agencies over the Industriplex site is a complex tangle and the available measures of litigation and enforcement are varied, to say the least. Federal control by the EPA and Army Corps stems from the Toxic Substances Control Act of 1976, the Resources Conservation and Recovery Act of 1976, and the Water Pollution Control Act Amendments of 1972. On the state level, the DEQE administers the Massachusetts Clean Air Act and Clean Water Act, as well as the older Solid Waste Disposal Act of 1965. The state Office of Environmental Affairs administers the Massachusetts Environmental Protection Act (MEPA) which oversees the environmental impact of construction projects. On the local level, the Conservation Commissions, Boards of Health, and Boards of Selectmen in both Woburn and Reading are involved.

This governmental pluralism has complicated the problem in many ways and allowed considerable buck passing in past years. Only incessant public pressure in the press and on elected representatives by Citizens Against Pollution (CAP) in Reading, For a Cleaner Environmental (FACE) in Woburn, the Mystic River Watershed Association in Winchester, and the League of

Women Voters, has forced what governmental action has taken place. To date, the most concrete result of ten years of activism is the EPA's fence. With the passage of Superfund, however, a better degree of cooperation and communication seems to have been worked out, especially between DEQE and EPA.

The EPA has been charged under the Superfund law to spend $1.6 billion for emergency clean-up and containment of abandoned or inactive hazardous waste dumps and spills. It is doubtful that this amount of money is anywhere near sufficient to deal with all of the 418 priority sites. One can only speculate as to what sorts of measures will be undertaken at Industriplex and when.

Superfund legally allows for a "no action" alternative if studies show no environmental hazard, but this possibility is remote. The option of trucking to an off-site location is also unlikely considering the immense amount of material. Also, there is no place in the state of Massachusetts to put it. The more likely options are deed restriction (preventing further development of the land) and containment on-site, possibly by capping (the hide piles, for example), slurry walls to deflect groundwater flow, and solidification to prevent leaching (from the chromium lagoons, for example). Part of Industriplex could even become a hazardous landfill facility.

States must pay 10% of the costs of remedial action under Superfund (50% if the site is publically owned). A bill to provide $25 million for the 14 Superfund sites in Massachusetts died in the last hours of the 1982 legislative session. A new version of the bill has been reported out of committee as of this writing and the League of Women Voters, among other groups, is lobbying for its passage.

Who pays the price for clean-up projects is a crucial part of the Superfund process. The EPA is mandated to establish responsibility of those parties who caused or contributed to the release of hazardous wastes. Responsible parties are to be held strictly liable for removal or remedial costs and damage to the environment. If brought to court, they must reimburse the EPA for triple damages (three times the clean-up costs paid by Superfund). Getting the chemical industry to pay for cleaning up their own messes will of course save the federal government (and taxpayers) considerable money. The EPA under Superfund does not have to wait for polluters to come forward or for completion of lengthy litigation to proceed with remedial measures.

Stauffer Chemicals (glue factory on the site until 1968) has voluntarily come forward, a move that will be closely watched by other chemical companies in similar situations and by all of us who are suspicious of corporate good intentions. Stauffer (corporate headquarters in Westport, Connecticut) signed a consent order with the EPA and DEQE in may 1982. In it, Stauffer offered to undertake at its own expense an Investigative Study of the Industriplex site prior to undertaking any remedial action. Phase I, completed in March 1983, surveyed the site, located hazardous waste deposits, and assessed their impact on surface waters, groundwater, and air. Among the Phase I findings are that the arsenic pits are more extensive than previously thought (due to encroachment over the edges by dirt and vegetation). Also it appears likely that the northeast portion of the site, which is relatively free of waste deposits, will only require groundwater monitoring, and may be developed in the future. Phase II will investigate the source and/or extent of contamination identified in Phase I and screen possible remedial actions for those "most cost effective and environmentally sound" which Stauffer will recommend. Upon approval by the EPA and DEQE, remedial action will be implemented by Stauffer or EPA's contractor or both.

What does Stauffer get from this? First, the consent order protects Stauffer from litigation by the EPA and the possible risk of triple damages. Second, the agreement limits Stuaffer's financial responsibility to an amount proportional to its share of the wastes now at the site. Other responsible parties will be assessed for clean-up costs proportional to that portion of the waste problem that they were responsible for, and Stauffer will be involved in the apportionment process that sets the percentages of responsibility. Monsanto, the major third party, has taken the position of challenging the EPA to prove they were responsible for wastes and sue them.

Finally, Stauffer's voluntary involvement has been successful public relations showing them to be a public-spirited corporation. After all, dumping in the past had been legal, Stauffer did not expect it to be dug up, and little had been known about groundwater and the like. Stauffer has come out looking more cooperative than Monsanto. Representatives of Woburn and Reading sitting on the Citizen Advisory Committee (CAC) for Industriplex have mostly praise for Stauffer's proposal for its Remedial Investigation Plan, with its technical thoroughness and safeguards built in for EPA and DEQE review, despite initial skepticism regarding Stauffer's motives. Apparently Stauffer has listened to and incorporated CAC recommendations into its research plan. Other chemical companies who are finding themselves in jeopardy under Superfund are looking at the Stauffer plan as a model for ways they can deal with their own troubles, and the EPA has generally been favoring out-of-court settlements of Superfund cases.

Citizen Watchdogs

Efforts in the 1970s by citizen action groups to attract media attention to Industriplex, pressure state representatives and congresspeople, and mobilize government agencies have subsided for the time being. Instead a Citizen Advisory Committee (CAC) diligently meets biweekly with representatives of the DEQE and EPA, carefully reviews research proposals and reports, offers

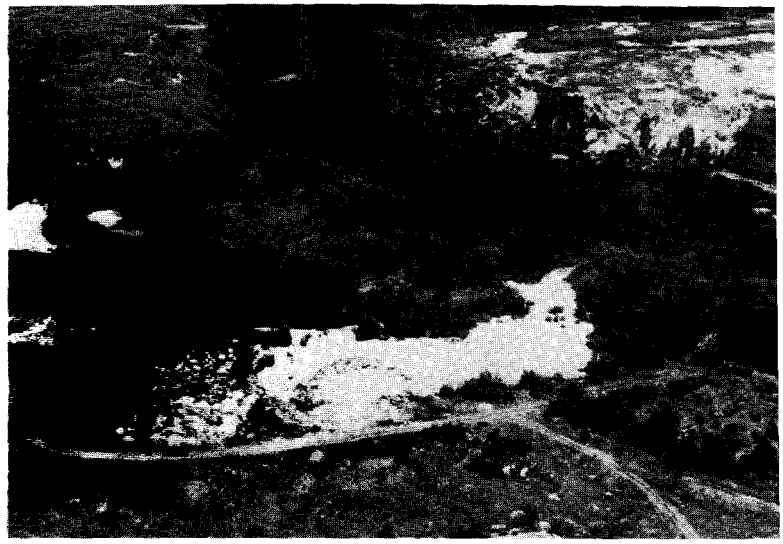
constructive criticism, and tries to ensure that nothing happens at Industriplex without community knowledge. The CAC includes representatives from Woburn, Reading, Winchester, and Wilmington.

The CAC has had to fight for the right to see all documents relevant to Industriplex. The EPA did not want the CAC to see the consent order with Stauffer prior to signing, for example, on the excuse that it was the subject of potential litigation. But the City of Woburn and the Town of Reading had an agreement with the Massachusetts Attorney General, dating from the legal actions of the late 1970s, that they could review "all reports and findings" and the EPA was forced to allow three citizens to read a copy of the consent order in the EPA's Boston office. The MEPA office in Boston has ruled that Stauffer's Phase I and II reports are "environmental impact statements" and so must also be shared with the CAC. MEPA mandates CACs for construction projects in Massachusetts with major environmental impact (such as D'Annolfo's development of Industriplex) but this CAC is unique so far as toxic wastes sites go. In fact, the CAC may be unique among Superfund sites nationally. Steven Oston, a resident of Reading on the CAC, hopes that their committee will serve as a model for other communities around the country, but the Superfund law only requires general "public participation" and this requirement could be satisfied, for example, by once-yearly public hearings or by soliciting written input.

Gretchen Latowsky, member of the CAC from the Reading League of Women Voters, attributes much of what governmental intervention has happened with Industriplex to the CAC. She thinks that the weekly commitment of the people involved and the fact that the citizens have asked for nothing unreasonable has "given credibility to a citizen's committee and gained the respect of legislators and congresspeople and of the DEQE and EPA." If the EPA drags its feet on remedial action after Stauffer's Phase II is complete, the CAC will be in the position to know about it and can, as Lotowsky puts it, "do the screaming citizen bit again."

The future of the Industriplex site has not been finally decided. It is prime industrial land and the City of Woburn wants the area developed for tax purposes. The environmental problems are complicated by the fact that other chemical companies are now disposing of wastes and venting organics in other sites in Woburn and neighboring communities. Tests of the groundwater entering the Industriplex site from the north, from Wilmington, show that the groundwater is already contaminated with lead *before* it gets to Industriplex.

One is inclined to believe that it is unlikely that Stauffer will serve as a prototype for an enlightened chemical industry of the future. Stauffer's voluntary action, after all, is based on financial self-interest. Whether other companies will follow suit depends on whether they feel their profits threatened by the possibility



Aerial view of some of the toxic waste deposits at Industriplex-128. The white area in the foreground is an arsenic pit (note car on dirt road for scale). The areas to the left and right of the pond (underneath the power lines at the top of the photograph) are fifty-foot-tall hide piles.

of being held accountable by an EPA that vacilates between the well-being of the environment and corporate prosperity. The chemical industry is more likely to keep lobbying for relaxation of environmental regulations. It will not be easy to keep them from succeeding, particularly if the people who used to fight for environmental issues popular in the 1970s devote their energies exclusively to the issue of nuclear disarmament. Toxic wastes are a present danger and the hazards to public health and the environment are here and now. Few environmental activists or peace activists see the unity which exists between the generators of toxic wastes and the weapons industry, both integral parts of an economic system where the interest of "the people" have not come first.

That the EPA and DEQE take seriously the input of the CAC on matters of Woburn's Industriplex, and even the fact that the government agencies forced the stoppage of the further development of the site are testimony to the power of citizen action groups. At this point in the Industriplex story, the involvement of a few citizens with the patience to diligently read the details of reports and studies and then speak up seems the most appropriate action. When the time comes for Stauffer and the EPA actually to implement the recommended remedial action, the CAC will contribute its input and will closely monitor the decision making process. Vigilance by the CAC will tell if or when renewed effective mobilization of broader citizen action will be necessary to ensure that the public interest is best served. The goal for Woburn, Reading, and surrounding communities, after all, is to feel confident that their air is safe to breathe and their water safe to drink. People should not have to settle for less.

DIOXIN and DOW CHEMICAL

by Susan Sylvester and Carol Ann Barth

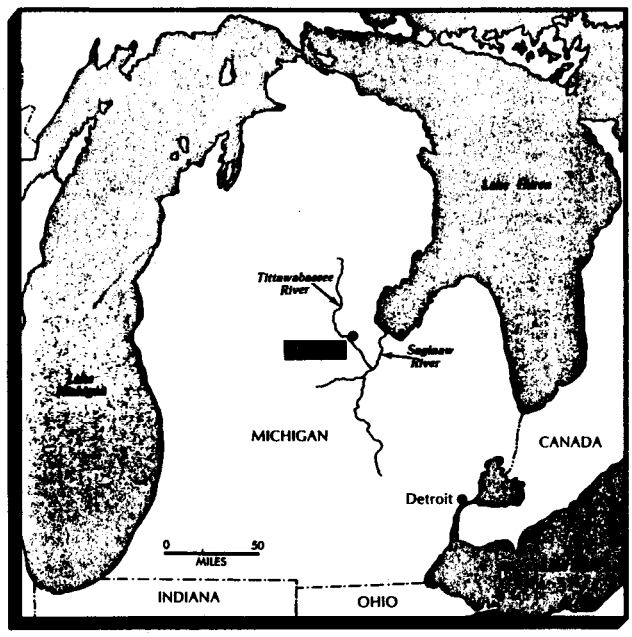
Dioxin is often called the most toxic chemical ever made. In concentrations as low as one part per billion, dioxin can be lethal. In smaller concentrations (such as parts per trillion or per quadrillion), dioxin can cause cancer, systemic poisoning, and serious skin rashes. There is also a high correlation between dioxin exposure and birth defects and spontaneous abortion. The US Food and Drug Administration (FDA) has set 100 parts *per trillion* as the safe limit for dioxin contamination in edible fish. Canada's safe limit is 20 parts per trillion; and New York State has set 10 parts per trillion as the safe limit. The FDA is now considering reducing its limits to 50 parts per trillion.

In December 1980, the minister of the environment of Canada confirmed that TCDD, the most toxic form of dioxin, had been found in herring gull eggs in Saginaw Bay, Lake Huron, and Lake Ontario. (See map.) TCDD levels as high as 695 parts per trillion have been found in fish from Saginaw Bay and Lake Huron.

The quantities of TCDD in these fish have caused the Michigan Department of Public Health to advise people not to eat them. Such an advisory seriously jeopardizes the commercial and recreational fishing industries, both major contributors to Michigan's economy.

Newspapers in Canada and the United States, as well as the Canadian embassy, have mentioned the Dow Chemical plant in Midland, Michigan, as a source of the TCDD.

Dow Chemical, one of the largest chemical companies in the world, has manufactured chemicals at its facility in Midland, Michigan since the late 1890s. Today the Midland, Michigan site is one of the largest chemical plants in the world, covering approximately two square miles. At this site, Dow manufactures more than 300 chemicals, including organic compounds, such as pesticides and solvents, and inorganic compounds, such as heavy metals and fertilizers. For all this, Dow's facility in Midland uses approximately 63 million gallons of water per day.



This map appeared in the May issue of Environmental Action magazine. It is reprinted with permission.

The finding of TCDD in fish and herring gull eggs is alarming because TCDD is so toxic than any quantity in the environment can present a danger. TCDD and substances like it accumulate in living systems, so that what starts out as a miniscule quantity in water can become a potentially dangerous quantity in living things. As a hypothetical example, a chemical company discharges TCDD into a river at a level of one part per quadrillion. As small aquatic organisms feed, their bodies store TCDD so that it reaches a level in the part per trillion range. When fish eat aquatic organisms, the level in their bodies may reach several hundred parts per trillion. When larger fish eat these fish, the level of TCDD may reach the part per billion range. By the time people eat the larger fish, the quantity of TCDD has reached dangerous levels.

Toxic chemical pollution of water seems to occur because certain exceptionally toxic substances, such as TCDD, are formed as by-products of various chemicals, many of which are manufactured by Dow Chemical. Even though the quantities of the toxic materials are so small that they are difficult to detect even with the most sophisticated analytical equipment, the problem is magnified because of bioaccumulation in living things.

This article is based on several articles written by the authors which have appeared in the CBE newsletter.

Carol Ann Barth is the research director for Citizens for a Better Environment (CBE) in Minnesota.

Susan Sylvester is a research scientist at CBE's Chicago office.

Dow has contended that the dioxins found in Saginaw Bay fish are from past, not current, problems. These contentions have not been widely accepted. Stormwater runoff from the Dow plant site may be a current source. Dow's own data, presented in *Science*, October 1981, show that dioxin is present in dust and soils at the Midland plant in quantities thousands of times larger than at any other place sampled.

Dow also discharges large volumes of wastewater into small receiving waters. The area of the Tittabawassee River into which Dow is allowed to discharge wastewater only yields a dilution factor of about one to one. Being located on a small receiving stream means that Dow should discharge wastewater in smaller concentrations to protect the water quality for fish and other aquatic organisms.

The federal Clean Water Act requires all pollutants discharged into surface waters to be controlled by permits issued under the National Pollutant Discharge Elimination System (NPDES). (For more information on NPDES permits see box.)

In Michigan, NPDES permits are written by the Michigan Department of Natural Resources (DNR) and issued by the Michigan Water Resources Commission. The DNR extensively reviews the permit, establishes the discharge limits, then releases the permit for public comments. After the public comment period, the DNR presents the permit to the Water Resources Commission for issuance.

When Dow's NPDES permit came up for reissuance in October 1981, Citizens for a Better Environment (CBE), an active environmental group in the midwest, decided to review it. Not only had the US Environmental Protection Agency (EPA) designated the Midland/Saginaw area as a toxic "hot spot," but CBE felt that Dow's permit would be a precedent for other NPDES industrial permits throughout the nation. Because Dow's wastewater contains toxic and carcinogenic substances, its permit would help determine whether industry will have to control the discharge of these substances.

The Structure of the NPDES Permit Process

Since 1982, it has been illegal to discharge pollution into lakes and rivers without a government-issued permit. The permit places limits on the amount of pollution that can be discharged and requires periodic chemical testing of the discharged materials to ensure compliance with the limitations. Permits are valid for a maximum of five years and must be reevaluated and reissued at their expiration.

Originally, the US Environmental Protection Agency (EPA) was responsible for evaluating and issuing permits. However, various states have applied for and been granted authority to issue these permits, which are called National Pollution Discharge Elimination System (NPDES) permits. The NPDES permit process is similar whether administered by the EPA or the state.

The Clean Water Act governs the NPDES permit system and demands that permit limitations be made more restrictive as time passes. The goal is that by 1985 all pollution discharges will be eliminated. The Clean Water Act required two kinds of pollution reduction by dischargers: technology based and water quality based.

Technology-Based Limits

The Clean Water Act required the EPA to study each category of industry in the United States and to determine what type of pollution control each could achieve. The EPA would then establish pollution discharge limits in each industrial category, based on the best practicable technology currently available (BPT). By 1977, each plant in that category had to reach the level of pollution control based on BPT. The BPT limits actually control very few toxic chemicals.

By 1984, industries will be required to meet a more stringent limit, called best available technology economically achievable (BAT). These limits will control toxic chemicals normally discharged by each category of industry as well as the conventional pollutants. Not only has the EPA not yet established BAT limits for most industries, but it has not yet even completed its review of industries nor set BPT limits for all.

Water-Quality-Based Limits

The Clean Water Act recognized that in some circumstances technology-based limits alone may not protect the receiving waters. This could occur where many industries discharge into a short segment of river or where a very large industry discharges into a very small stream. The Clean Water Act required states to set maximum safe levels for pollution in waterways based on water quality and to evaluate whether technology-based pollution limits would cause the polluting industry to pollute the water beyond those water-quality-based standards. If, after review, the permitting authority decides that the technology-based limits would cause a violation of the water quality standards, the permit limits must be restricted further to protect the receiving water.

Public Participation

Public participation is a major component of the Clean Water Act. The "public" is a broad term including everyone but the permit issuing authority, and thus includes industry, business, local government, interest groups, and citizens. The public is given a fixed time period, usually 30 days, to review the draft permit, permit application, and other data used in preparing the draft permit. If the public believes that the permit terms are improper, they can prepare a comment or a statement that the permit needs to be modified to address certain concerns. The more specific the comment is, the more likely it is that the permitting authority will respond to the comment or revise the permit. Permitting authorities are most likely to respond to a comment that uses the authority's own data to show that the waterway is being harmed or technology-based limits are not being met.

Dow's previous NPDES permit, issued in 1974, limited its discharges of conventional pollutants. The recently proposed permit was almost the same; only limits on phenol and residual chlorine were added. This permit should have contained limits on discharges of toxic organic compounds and heavy metals. By a special provision, the proposed permit required Dow to monitor its discharges for one year; after that year of monitoring and analyzing the wastewater, another permit would be written based on the year's data.

CBE, in conjunction with the Michigan United Conservation Clubs, reviewed all the data in the DNR's and EPA's files. Dow's application for permit renewal, dated May 1979, contained a list of chemicals and their concentrations known or thought to be present in each outfall effluent. What the application did not list were other chemical waste streams that Dow either sent through its hazardous waste treatment process or discharged directly into the Tittabawassee River.

Dow also has a leachate collection system for its hazardous waste landfill and a liquid waste incinerator, which has air pollution control equipment. Both the leachate from the collection system and the wash water from the air pollution control equipment are routed to the wastewater treatment system. But neither of these waste streams were identified during the development of the new NPDES permit.

Without knowledge of the chemical composition and volumes of these additional waste streams, it is virtually impossible to determine whether or not the wastewater treatment system at Dow is capable of adequately treating them or whether these chemicals present new hazards.

CBE wrote to the permit issuing authority, the Water Resources Commission, requesting that discharges from these additional waste streams be prohibited until Dow submitted a revised permit application stating the volume of these wastes, the chemicals in them, and their concentrations.

CBE evaluated the proposed NPDES permit and prepared extensive comments during the public comment period. The group also reviewed DNR procedures and policies for establishing effluent limitations.

After presenting their comments and recommendations, CBE, along with other environmental groups, met with the DNR to discuss the matter. As a direct result of environmental group input, the DNR decided to take a stronger position in regulating Dow's surface water discharges.

A new permit was drafted and released to the public for comment on March 12, 1982. This permit reflected a strong environmental posture on the part of a governmental agency and requires Dow to do the following:

1. Limit discharges to specific levels for the following chemicals: TCDD; 2,4-D; pentachlorophenol; carbon tetrachloride; chloroform; polychlorinated biphenyls (PCBs); hexachlorobenzene; tetrachlorethylene (perchlorethylene, PCE); 2,4,6-trichlorophenol.

2. Submit a plan to quantify the amounts of cadmium, silver, mercury, and zinc in wastewater.

3. Conduct a facility wastewater characterization study of 69 different chemicals. This study would determine the identity and concentration of chemicals present in all discharges.

4. Conduct bioassays on substances for which toxicity information is not now available.

5. Conduct a study of total dioxin contribution to the Tittabawassee River from the Dow facility.

6. Eliminate the discharge of any of the 129 priority pollutants listed by EPA and the 265 chemicals listed on Michigan's Critical Material Register that are not listed in Dow's permit application or are listed at less than detectable concentrations.

7. Eliminate the discharge of chemicals listed in Dow's permit application but not reported as being discharged in detectable concentrations.

Although CBE requested lower limits, the DNR approach is certainly the right step forward in protecting receiving waters. CBE was satisfied with these permit conditions. Most of the concerns presented in CBE's written comments were addressed at least partially by the new permit. CBE sent a letter and presented oral testimony to the Water Resources Commission recommending immediate issuance of the permit to begin preventing any further degradation to the Tittabawassee River, its tributaries, and the fish and aquatic organisms dependent on them. That recommendation met with less success.

Since its issuance over a year ago, the Dow NPDES permit has been held up in the administrative contested case hearings process. The old NPDES permit, which doesn't even mention dioxin, thus still stands for the time being. Meanwhile, according to *Environmental Action* magazine, rather than clean up its dumping procedures, Dow has recently hired Hill & Knowlton, one of the world's largest public relations firms, to clean up its image.

The latest event is that the DNR has received a new application form for a five-year permit from Dow and has begun working on this new round. Because the environmentalists and the general public have had sufficient lead time, this time they are prepared to stand even stronger in the ongoing battle. The National Wildlife Federation, and the Great Lakes Natural Resources Center, located in Ann Arbor, Michigan have been extremely active in this permit, as have other groups, including the Canadian group Pollution Probe, located in Toronto, Ontario.

While this case is far from settled, the lessons learned are abundantly clear. Citizen involvement forced the issuance of more responsible government regulation of toxic waste dumping into our water. Citizen involvement is called upon again to enforce the regulations. We are hopeful that we will be able to meet that challenge. If there is a precedent being set in Michigan for other locales, let this be it.

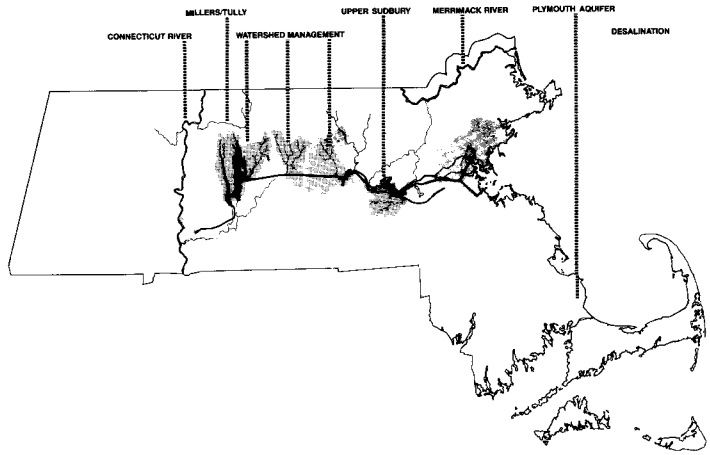
The Connecticut River and the Quabbin Reservoir

WATER DIVERSION AND WATER POLICY

by Terri Goldberg and Robie Hubley

In recent years, a major controversy in Massachusetts has erupted over whether to divert water from the Connecticut River to Quabbin Reservoir to augment metropolitan Boston's water supply. Quabbin was built about 40 years ago by flooding four towns in Western Massachusetts. This specific controversy sheds light on more than a regional water policy dispute; it outlines several prevalent aspects of the problems and politics of water diversion and water policy in this country.

The history of Boston's water supply is similar to many major metropolitan area, especially on the East Coast. When the town was first settled in the seventeenth century it had an adequate water supply on site. As it grew to 25,000-30,000 people there was not enough water within the town. The city extended its water line progressively westward—from Jamaica Pond to the Mystic Lakes, to a reservoir system developed near Sudbury on the Sudbury River. In the latter part of the last century, the city started bringing in water from Wachusett Reservoir which is on a tributary of the Merrimack River. (See map.) In the 1930-1940s the Quabbin Reservoir was built on a tributary of the Connecticut River. The metropolitan region has gone farther and farther from its core to find uncontaminated supplies that require minimal treatment.



Not every city has a similar history of water supply. For example, London supplies a major part of its water by tertiary treatment of its waste. And New Orleans uses the Mississippi River for water supply. Rather than seek uncontaminated remote sources, these cities chose to treat their readily-available water sources. While there are various sources that cities use, the water supply histories of metropolitan Boston, New York city, and many other cities across the country are similar in their use of increasingly remote sources. These water systems also share similar problems.

The Proposal to Divert the Connecticut River

In the 1960s, the Metropolitan District Commission (MDC), the state agency responsible for providing 35 metropolitan Boston and 10 central Massachusetts communities with water, was provided with an opportunity to get additional water. This opportunity came when the Vernon Nuclear power plant was put on the Connecticut River. The utility, Northeast Utilities, had to find a way to store excess power that is generated when they are in the low use times of the day/night. They decided to build a hydroelectric pumped storage station at Northfield, Massachusetts. Because Northfield is on the Connecticut River, they had to get a Federal license to build the facility.

This article is based on a discussion between Terri Goldberg and Robie Hubley.

Robie Hubley is the Executive Director of the Water Supply Citizen Advisory Committee (WSCAC), and he is the regional environmentalist for the Mass. Audubon Society.

He works on agricultural land use issues with Mass. Audubon, and water supply issues with WSCAC. He has been involved in issues relating to rivers for about 20 years. Previously, he focused on flood control, flood management, dam building, and now he is concerned about Massachusetts water supply.

Terri Goldberg is the former magazine coordinator of Science for the People. *Before working for* SftP *she was the director of the Connecticut River Public Education Project.*

One of the requirements of the license is that the developer show multiple use for the project. It was hard to figure out what could be done for multiple uses of a pump storage facility. Someone had the idea that maybe the city of Springfield could use some of the water for water supply; so the utility called the Springfield water department. Springfield had plenty of water, but they suggested that Northeast Utilities try MDC. MDC believed they could use the additional water. It seems that it was more of an historical accident that kicked off MDC's current search for water than a regular planning cycle, as they would have the public believe.

MDC is proposing to "skim" water out of the Connecticut River when the flow of water in the river exceeds 17,000 cubic feet per second. The water would be transferred to the reservoir on the top of Northfield Mountain at the pumped storage facility. An aqueduct would carry the water from Northfield to Quabbin. The Northfield Reservoir was built with an extra few feet in height to accomodate the additional water that would be pumped during diversion. Under the present legislation, water could be diverted during roughly 70 days per year of peak flow. The 375 million gallons per day (mgd) available to MDC during the diversion period would produce an average of about 72 mgd on an annual basis.

MDC claims that as a result of a drought in the 1960s, they feel insecure about their water supply. MDC officials have stated that they think a drought of that sort occurs in 20 year cycles. Although there *are* some places in the country which experience regular drought cycles, an analysis of the weather data in this part of the country does not support such a thesis. In fact, the 1960s drought is the worst drought that has been recorded in 150 years of weather data. Massachusetts got through that drought without requiring the metropolitan-area to take any standard water conservation—no one was required to stop watering their lawns or washing their automobiles. We survived the worst drought in the history of the existing water supply, and the water levels in Quabbin were back to normal within a few years.

Our experience working with MDC has led us to conclude that the relationship between demand and supply is not simply one where the water supply agencies seek new supplies when demand increases. In this specific case, until the early 1970s water consumption in the Boston-area was on the increase, but since then water consumption has been declining. The Water Supply Citizen Advisory Committee (WSCAC) has asked MDC why they are looking for additional water in a declining demand period.

Diversions of rivers like the Connecticut are not in MDC's interest or in the water consumers' interests. MDC is also currently considering other diversion projects. These diversions represent a radical departure from the previous water supply policy of MDC. That policy was: use only upland sources that were free of contamination and require absolutely minimal treatment. The information in the drafts of the environmental impacts report undertaken by MDC on this diversion and other water supply alternatives indicate clearly that less potentially harmful measures can be taken to live within existing supplies. This leads us to wonder in whose interests are the proposals to divert water from the Merrimack or Connecticut River?

Who Benefits from River Diversion?

To understand the situation, one must consider the bureaucratic interests of the MDC. For MDC to live within their existing supply, they must encourage communities on the periphery of the urban core to preserve *their* existing supplies. Many of these communities have their own supplies now, but under the law, if they need water they can become part of MDC's system. If the communities remain independent, using their own supplies, they have the centralized supply to fall back on should anything happen to their local supplies. If these communities get on the central supply, they have no fall back. So it is better for the communities to maintain their local supply. But it is better for the central bureaucracy, the MDC, to get these towns on their system.

The more cities the MDC provides with water the more money is flowing through the agency. This translates into bureaucratic interests by increasing the number of people in every department of the agency. The agency has to have more engineers, more planners, more police, and a bigger budget for it to be more powerful and more likely to persist. The larger they are, the greater their political clout.

In addition, water planners seem to prefer diversion as a way to augment water supply because it is the most susceptible to absolutely straightforward engineering. For example, the diversion of the Connecticut River is simply a matter of building an aqueduct about 10 miles long. The water runs down the pipe by gravity. The other water supply alternatives are much more complex. They involve making communities protect and conserve their local supplies.

Environmental Impacts

There are multiple environmental problems with the proposed diversion. Communities along the Connecticut River dump treated sewage into it. This diversion would be downstream from Keene and Brattleboro, and it is about 10 miles downstream from the Vernon Nuclear Reactor. The diversion would put second-class water into Quabbin, and the MDC *postulates* that Quabbin may be able to assimilate this material. The MDC does not know. They are also considering installing a treatment plant for the water before it comes into Quabbin.

But there is another more diffuse environmental impact. When communities in the metropolitan area joined the MDC, by law they were required to abandon

their own local supplies. Historically one can document that if communities abandon their local supplies then the watershed around that reservoir or lake becomes available for potential development. Some of the old abandoned reservoirs have become the dumps or the disposal sites for hazardous waste. One can investigate what happened to all those reservoirs that were abandoned when communties joined the MDC system. We have found that often they are now toxic waste sites.

In order to keep the watershed area pure enough to deliver clean water, a community must develop a local interest in environmental quality that permeates beyond the water supply. There appears to be a direct relationship between the general environmental quality within a town and whether it maintains its water supply.

Some communities on the periphery of the metropolitan area that have been responsible about their water supply—Reading, North Reading, Weston, and Wellesley—do not want to get on the Quabbin. Wellesley, for example, pays $20,000 a year to have a MDC pipe come right up to the town line, and they do not buy any water. They use their own water supply, and they have the pipe in case their water becomes contaminated. They are trying to preserve the community's environmental quality at an adequate level to maintain their own supply. If the environmental quality deteriorates to the point where they can not rely on their own water, they will use MDC water.

Case studies have shown that as the water supply becomes more centralized and people have less contact with the sources of the water they use, they are less careful that toxic wastes are not dumped into local marshes, streams, and abandoned reservoirs. Massachusetts has many communities with serious toxic waste problems. We would be less likely to have these terrible problems if we did not rely exclusively on large scale centralized water systems.

Industries and Water Supply Policy

The industries in eastern Massachusetts did not advocate centralized water departments. The industrial sector of Boston did not create MDC. The towns, through their municipal governments, created the MDC system mainly for domestic use.

But the benefits to the industries have been tremendous. At first the water was almost given away, and in some cases it *was* given away. Certain kinds of water use were not metered. As cities start metering and developing rates for water and sewage that can realistically pay for the maintenance of the system, industry develops a strong interest in conserving water. Today most of the water is metered.

However, if cities paid for water what it is worth in terms of its implicit energy content—if one had to pay for water the amount that it would cost for electricity to distill the water to purify it to the state it is in when it comes to your faucet—the cities would not be buying it for $240 per million gallons. They would be paying much more. Howard Odum, a well-known ecologist, has analyzed the value of water as a fuel. He believes that water is delivering energy to any industrial process—that is, free solar energy—which is how many industries use it. That free energy supplement is converted by industry into goods, services, or processes which are sold. So when a community pumps clean water into an industry, they are delivering dollars. And industries are able to buy the dollars for preposterously little money.

If MDC transfers large amounts of pure water from the Connecticut River watershed to eastern Massachusetts, they are taking potential economic wealth from the inhabitants of one watershed and transferring it to another watershed.

The Citizens Respond

When MDC proposed the diversion, a group of western Massachusetts citizens began to investigate its potential environmental impacts. This group has an interesting history. Communities in the Connecticut River Valley have many strong environmentally/socially concerned citizens. In the early 1970s the Army Corps of Engineers proposed to build almost $2 billion worth of dams on the Connecticut River. In response to this proposal, a group of people rose up in defiance. We worked our way into the official part of the process. We got the planning agency at the time, the New England River Basin's Commission (NERBC), to admit a group of citizens as an advisory committee. Eventually we turned the whole project around. They dropped the dams and created a water management plan for the Connecticut River.

When that was done (the NERBC went out of business), we found out that the MDC was proposing to reactivate the diversion proposal. We had the group of citizens who had already been involved in this kind of an issue and were ready as a cadre to move into a new project. By going to the statehouse and meeting with the state officials and demanding a role in the decision making process, we got ourselves ensconsed in reviewing and commenting on the environmental impact report that MDC is preparing.

In 1978 when we approached the Massachusetts Secretary of Environmental Affairs, she looked at the proposed diversion and decided that it was what Massachusetts law calls a "major and complicated project." This gave her the discretion to put additional conditions in the scope of the environmental impact report (EIR) beyond what is simply part of the Massachusetts Environmental Protection Act (MEPA) Code. She decided that the proposing agency would have to fund (through another neutral agency) the Water Study Citizen Advisory Committee (WSCAC), so that we could have a full-time professional staff and funds for operation. Our role was to have, "a full formal advisory role in the pre-

paration of the EIR and to channel and formulate public response." This is basically what we do. We read all the documents and respond to them formally, and our response is in a special category that has to be taken into consideration by the agency. We also seek responses from appropriate sectors of the public. When there is a matter that pertains to statistics, we might call statisticans; when there is a scientific matter, for example botany or hydrology we contact a botanist or a hydrologist. We have gotten much of the public in different sectors involved in commenting on the reports that have been done.

In addition, we meet regularly to discuss the work in progress. We hear reports on how the consultants, hired by MDC to write the reports, are doing the research, how they are conceptualizing the problems, and in what directions they are taking the work. We have the opportunity to advise on drafts of the report, research techniques, and data analysis while the work is in progress. We have also written reports proposing directions the study could take.

The Citizens Advisory Committee involves many different kinds of people, from representatives of environmental groups, academicians, attorneys, farmers, students, representatives of community groups, and planners to business people and state legislators.

The way the Citizen Advisory Committee has organized is unique. The group is attempting to have imput as the environmental impact report (EIR) process proceeds rather than reacting to the report after it is complete. Very often in these issues citizens do not get to raise environmental questions until after the EIR is completed.

As a study like this proceeds, initial assumptions become imbedded in the research and conclusions whether they are explicit or not. This project is complex. It involves 40-50 different towns including 2/3 of the state's population and a major metropolitan area, trying to project their population, industrial development, and their institutions for 40 years into the future. To receive just a final report and try to disentangle every thread all the way back to the beginning is quite impossible. Each aspect of the report is complicated.

In one section of the report, for example, the consultants are using a state economic model that projects the development of industries in various sectors. Each sector of industry has a different demand for water. The chemical industry demands large amounts of water. Computer assembly demands much less water. In order to figure out how much water industry demands, they have disaggregated the industrial sector. There is a single computer model incorporated into the study that projects industry by category to 2007. Now the model itself is many pages of computer print-out. If a citizen got the final report without the opportunity to go through the model and look at where it projects growth and question its assumptions, he or she would be utterly lost.

The Citizen Advisory Committee found one typo of *20 million gallons per day*. The proposed diversion of the Sudbury River would yield 20 mgd. Just by a typographical error you could factor in diversion of a river. A citizen or environmental group would never catch these kinds of mistakes if they just read the final report.

In the work of the WSCAC and all of our previous fights over the Connecticut River we have found that political activism involves mostly theatre and communications. Anybody who has the ingenuity to be an effective communicator is effective in the political arena. People stop listening to the same thing over and over again. So what an activist is called on to do is innovate all the time—make up something new, do something that has never been done before by anyone else, or make an old idea look original.

The Alternatives to the Diversion

As soon as the CAC began organizing as the Northfield Citizens Advisory Committee (NCNC, the predecessor organization of the WSCAC), we established a group of task forces. It occurred to us that there must be some alternatives to the diversion; so we set up an alternatives task force. They started looking around at every way that you could go about providing adequate water for Boston. We suggested nine alternatives—from other rivers that could be diverted, ground water supplies, reopening local supplies in MDC communities, watershed management (around Quabbin to increase yield), to desalination, conservation, leak detection and repair.

Water conservation is the alternative which can and should be implemented immediately. But MDC cannot require a community to conserve water. MDC is a wholesaler of water. The communities are the retailers. MDC does not have any jurisdiction in the communities. They just deliver the water to the door. The community can take it and hand it out without metering it. Beyond that, if the agency wants to buildup its bureaucracy it has no interest in conserving water. Mechanisms must be developed to give communities on the MDC water system incentives to conserve water. Furthermore, building a pipe and adding water provides one with more water. Conservation is an activity that requires long-term public attention.

One effect of river diversion is to make a major portion of urban water supply dependent on a single pipe. That makes that portion of the supply less secure, more subject to disruption. For instance, the water from Northfield is pumped by electricity, subject to power failure, and the electricity is generated by a nuclear power plant, with all its uncertainties.

In contrast, development and maintenance of local supplies shortens the supply lines, and diversifies sources, avoiding vulnerability and enhancing local environments at the same time. The centralized bureaucracy may favor the big engineering solutions, the public interest would be better served by taking responsibility within communities for water supply.

book review

by Linda Ziedrich

Report on the Lands of the Arid Region
by John Wesley Powell, Harvard Common Press, Boston, MA 1983

"All values inhere in the water," wrote John Wesley Powell in his *Report on the Lands of the Arid Region.* This statement was no less than revolutionary in 1878, when his report was first issued by the U.S. Government Printing Office. A bearded, one-armed explorer who had made his name surveying the Colorado River, Powell raised a lone voice of reason against the heedless development of the West. He thus undertook a desperate struggle against a powerful coalition of government and private interests—a struggle that lasted his lifetime and continues today. Reissued this year, John Wesley Powell's *Report* remains as important and pertinent to the water problems in the American West today as it was in 1878.

The boomers and boosters of the West in Powell's day included both government officials and railroad interests. Having been given vast acreage by the government, the railroad barons wanted to exploit these lands for profit. They renamed the Great American Desert "the Garden of the World" and assured skeptics that rain follows the plow. The government divided the land into neat square tracts and enticed poor but ambitious easterners with this offer: anyone who could "prove up" a claim to 160 acres of federal land in five years would own it forever. With the passage of the Homestead Act of 1862, said Sen. William E. Borah, "the government bets 160 acres against the entry fee. . . that the settler can't live on the land for five years without starving to death." More often than not, the government won its bet.

During his eight-year survey of the Plateau Province, John Wesley Powell had amassed an enormous quantity of scientific information on the Arid Region—an area that makes up over four-tenths of the United States, excluding Alaska. He had mapped canyons and rivers, studied native peoples, climbed mountains, run rivers—and watched settlers starve. Though the report that resulted from this expedition consisted mostly of geological and geographical abstracts on the Utah Territory, its first two chapters comprised proposals for land reform so radical that if even half of them had been adopted, the history of the West—and the entire United States—would have been completely transformed.

Without irrigation western farmers were doomed to fail, Powell wrote. The current approach to water use, moreover, would inevitably lead to monopolization of land, since those claiming upstream parcels could control access to water by their neighbors downstream and for miles around. Powell proposed, therefore, that the government scrap the century-old system of square tracts and fashion streamside units as irregularly as necessary to provide each with equal access to water. He recommended that the size of an irrigated farm be reduced to eighty acres, since a single family couldn't cope with more, and that irrigable farms be differentiated from parcels suitable only for grazing, which should be no smaller than 2,560 acres. He advised the government to encourage the formation of co-operative organizations among western settlers; ranchers' co-ops could eliminate fencing between members' parcels, thus preventing overgrazing, and farmers' co-ops could both control the distribution of water among members and finance the construction of needed dams and ditches.

To anyone who believed the government's true intent was to provide land for the landless, these proposals must have seemed entirely sensible. But the boomers were outraged at Powell's report, and Congress simply ignored it. A master bureaucrat, Powell attempted to realize some of his proposals over the next few years by engineering the creation of the Public Lands Commission, the U.S. Geological Survey, and the U.S. Bureau of American Ethnology. Eventually the boomers could no longer hide the fact that farmers were perishing on their desert plots; between 1891 and 1901 they held International Irrigation Congresses almost annually, and representatives from all over the West cried out for "forty million forty-acre farms." Again they refused to listen to Powell, who warned one such congress: "There is not sufficient water to irrigate all the land which could be irrigated, and only a small portion can be irrigated. . . I tell you, gentlemen, you are piling up a heritage of conflict. . . for there is not sufficient water to supply the land!"

But the boomers kept demanding, and their demands resulted in the passage of the Reclamation Act of 1902, the year of Powell's death. Thus was created the Reclamation Service (later renamed the Bureau of Reclamation), which has since dammed the Colorado, the Rio Grande, and many more western rivers. The act contained one provision, however, of which Powell would have at least partially approved—the 160-acre limitation, by which water from reclamation projects would be delivered only to farms of 160 acres or less (320 or less for a married couple). But the boomers have blocked enforcement of this provision over generations, to the benefit of the large corporate farm owners who now exert monopoly control over much of our food supply. Finally, under an administration that makes no bones about its aim to stick the poor, the boomers got rid of the provision altogether: last fall Congress passed a bill that increased the 160-acre limitation to 960 for "small" corporations and 640 for large, and granted free leasing privileges to all.

Though ignored since its writing by those with the power to change the course of western development, Powell's report stands as a classic among books on water politics and the American West. Long out of print, it is now available in a facsimile of the second edition (1879), with a lively introduction by T.H. Watkins. Those active in the struggle for environmental protection and land reform will not want to miss it.

Linda Ziedrich is a long-time Science for the People *member.*

resources

RESOURCES FOR ACTIVISTS

Winning the Right to Know: A Handbook for Activists. Includes summaries of Right to Know Legislation from states across the country, contacts, reference lists, and first-hand accounts. 100 pages $7.00 from the Deleware Valley Toxics Coalition (DVTC) 1315 Walnut St. Rm. 1632 Philadelphia, PA 19107.

Dumpsite Cleanups: A Citizen's Guide to the Superfund Program. A manual covering: Community Action, Health Effects, Legal Strategies, Site Assessment, and Remedial Action. $5.00 for citizen groups, $10.00 for nonprofit groups, $25.00 for private organizations. Environmental Defense Fund (EDF), Dept. DC, 1525 18th St., NW, Washington, DC 20036. 1983.

Training Materials on Toxic Substances: Tools for Effective Action. Two volumes of information, reprints and training materials. A comprehensive source for activists. From Information Services, Sierra Club, 530 Bush St. San Francisco, CA 94108, special price for citizen's groups.

Citizen's Guide to the NPDES Permit Program. Overview of the water discharge permit system. Natural Resources Defense Council, Attn: Toxic Water Watch, 1725 Eye St., NW, Suite 600, Washington, DC 20006.

The Toxic Substances Dilemma: A Plan for Citizen Action, National Wildlife Federation (1412 Sixteenth St., NW, Washington, DC, 20036) 123 pages.

We're Tired of Being Guinea Pigs: A Handbook for Citizens on Environmental Health in Appalachia, Juliet Merrifield, et al., Highlander Center (Route 3, Box 370, New Market, TN 37820) 1980, ca. 100 pages, $5.50 plus $1.00/item for shipping. "Reviews some of the potential health effects associated with major industries in the Appalachian region: energy, agriculture and forestry, and chemicals, and provides tools for citizens to investigate further particular problems in their community."

Clean Water Action Newsletter, Clean Water Action Project, (733 15th St. NW, Suite 1110, Washington, DC 20005) quarterly, $18/yr. CWAP is an environmental lobby focusing on water quality issues.

Alternatives to the Land Disposal of Hazardous Wastes, prepared by the Toxic Waste Assessment Group (Office of Appropriate Technology, 1322 O Street, Sacramento, CA 95814).

A Guide to the Clean Water Act Amendments, U.S. EPA, Office of Public Awareness (Washington, DC, 20460) History of the Act and explanation of the major 1977 amendments. Free from U.S. Environmental Protection Agency, Washington, DC 20460.

Toxics in Appalachia. Special issue of *Mountain Life and Work*, Council of Southern Mountains, Drawer N, Clintwood, VA 24228. Feature articles, interviews with activists, resources including books, slides, films, phone numbers, list of groups in Appalachia region and national. Includes article on "Documenting Hazards . . .": how to collect water samples and where to send them.

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FILMS

Hazardous Waste: Who Bears the Cost?, a 30-minute 16mm color documentary on "the nation's oldest chemical waste dump" in Woburn, MA. (See Sue Tafler's article in this issue.) $50.00 rental fee per day. Umbrella Films, 60 Blake Road, Brookline MA 02146.

In Our Water, a highly-acclaimed documentary on a personal struggle for clean water. Available from Foresight Films, 18 2nd Place, Brooklyn NY.

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DISARMAMENT

Handbook: Women's Encampment for a Future of Peace and Justice. $2.00 plus postage. Contacts: Women's Peace Encampment: NYC —339 Lafayette St., NY, NY 10012 (212) 585-8493. Boston, MA — 145 Tremont St., Boston, MA (617) 338-6378. Geneva, NY — (315) 789-8610. Posters, T shirts and buttons also available.

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TOXICS BOOKS

Hazardous Waste in America, Samuel Epstein, Lestor O. Brown, and Carl Pope, "An encyclopedic sourcebook." 592 pages including 14 appendices with listing of waste sites across the country, sample health surveys, etc. Sierra Club Books (530 Bush St. San Francisco, CA 94108). 1982, $27.50.

America the Poisoned, Lewis Regenstein, Acropolis Books (2400 17th St. NW, Washington, DC 20009) 420 pages, $16.95

Fear at Work: Job Blackmail, Labor and the Environment. Refutes the charges that workplace and environmental protections are throwing people out of work and strangling the nation's economy. Paperback, 320 pages, from Environmentalists for Full Employment (1536 16th St. NW, Washington, DC 20036) 1982, $10.95.

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