THE 2nd CITIZENS' CONFERENCE ON DIOXIN

St. Louis University,
Tegeler Hall, Missouri
July 29-31, 1994

AUG 2 2 1994

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Dear Conference Panelist, August 18, 1994

The Conference was a wonderful success and we thank you, so very much, for your contribution.

The message that came out of this Conference was loud and clear: dioxin poses a perilous and immediate threat to the integrity of our natural world and humankind. We believe that the Conference reinvigorated all who attended to work even harder for the elimination of all sources of dioxin and dioxin-like compounds from entering our environment and to remain involved in the U.S. EPA's public comment phase of the dioxin reassessment.

The dioxin saga is at its most critical phase. As organizers, we believe it is imperative for us all to be fully equipped with the information necessary to move our governments and corporations into meaningful action. Your contribution has helped to provide the information necessary to fulfill this monumental task. We sincerely thank you for sharing your time and knowledge with us.

Publishing a collection of essays will be a critical part of consolidating the work of the Conference. It will be a handbook which activists can use to oppose incinerators and organochlorine production. To do this, we ask that you submit:

1. a paper or essay that is representative of what you presented at the Conference.
2. graphs, photos or other visuals to clarify your information or otherwise illustrate dioxin issues.
3. a reading list (with references) of the what you consider to be the most important papers/books/articles/videos available on the dioxin issue.
4. (if you have the time) a brief essay on other thoughts you have about dioxin.
5. a brief (under 50 words) description of yourself which we can include in the collection.
6. references to your publications relating to dioxin.
7. If you can, please submit all of the above on diskette (MacIntosh or IBM-compatible, preferably formatted on ASCII).

In order to get the collection in people's hands in a timely way, we need to receive your submissions before **September 30, 1994**. It would be a big help if you could send it before the deadline. We realize that some people who speak are not comfortable writing. We cannot promise to transcribe your talk from the Conference tapes because it is an extremely time-consuming task. However, let us know if you would prefer a transcription of your talk to writing an essay and we will see if it is possible to do.

We hope to distribute the Conference collection to the widest possible audience and will be contacting publishers. If you have a working relationship with a publisher who might be interested in producing the collection, please contact Ellen.

If you haven't been reimbursed for your Conference expenses, please submit original receipts to Billie Elmore, NC WARN, 5301 Rolling Hill Rd., Sanford, N.C. 27330. Tel: 919-774-9566.

Thank you for coming to St. Louis!
Sincerely, Ellen & Paul Connett, Billie Elmore and Don Fitz.

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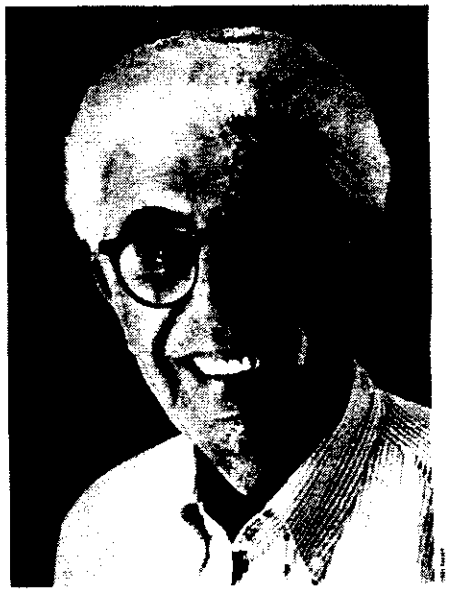
A Turning Point in the Political History of Dioxin



Keynote Address at the

SECOND CITIZENS' CONFERENCE ON DIOXIN

St. Louis, Missouri
July 30, 1994

by Barry Commoner

It is fitting that this conference, which marks a momentous turning point in the notorious history of dioxin*, should take place in St. Louis. It was not far from here that the threat of dioxin to the general public first became apparent -- when a local dealer mixed dioxin-contaminated chemical waste into used oil and sprayed it in horse arenas, killing animals and sickening children. It was here that the enormous power of dioxin to disrupt our lives was demonstrated -- when, for the first time, chemical contamination caused an entire town, **Times Beach**, to close down. It was the local chemical company -- **Monsanto** -- that first began the manufacture of polychlorbiphenyl in **Anniston, Alabama** -- a type of process, we now know, that inevitably produces dioxin-like substances as well. And the first unwitting discovery that such materials create dangerous industrial hazards to chemical workers was made in the early 1930s when most of the workers in the Monsanto plant became sick.

We also meet at a crucial <u>time</u> in the history of dioxin. I am convinced that 1994 will be seen as the year in which -- despite every effort of the chemical industry and its journalistic allies to confuse and misinform us -- the true dimensions of the ominous threat of dioxin to human health became known. The profound significance of its diverse attack on living things has now become clear:

Dioxin and dioxin-like substances represent the most perilous chemical threat to the health and biological integrity of human beings and the environment.

The history of dioxin is a sordid story -- of devastating sickness inflicted, unawares, on chemical workers; of callous disregard for the impact of toxic wastes on the public; of denial after denial by the chemical industry; of the industry's repeated efforts to hide the facts about dioxin and, when these become known, to distort them. Our task here is to learn from this history -- not only from the data generated by the rapidly growing list of scientific studies, and the crucial facts unearthed by grassroots activists -- but also from the attempts of the chemical industry and its allies to distort them. **We need to learn what must be done, now, <u>not</u> merely to diminish, but to end -- the menace of dioxin and its many toxic cousins to life.**

* The term "dioxin" is used to connote the group of 210 similar substances -- polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans. Certain types of polychlorbiphenyls (PCBs) have similar biological effects and are included among "dioxin-like" substances.

A good place to start is right here in Missouri, with the events that led to the evacuation of Times Beach. On **May 26, 1971**, 2,000 gallons of what was supposed to be waste oil were sprayed on the soil in a nearby horse arena. Three days later the arena was littered with dead birds; four days later three horses and the ringmaster were sick. By June, 29 horses, 11 cats and four dogs had died; in August the six-year-old daughter of one of the owners was admitted to St. Louis Children's Hospital with a severe kidney disorder. Several other children and grown-ups reported less severe ailments. It was not until **August 1974**, after a foot of soil was removed and replaced, that the arena could shelter healthy horses, pets and birds. This was the beginning of a decade of study, controversy and concern that climaxed when Times Beach was evacuated.

It took three years of work by state and U.S. health laboratories to pin down the cause of all this sickness and death. Dioxin, at a level 30-53 parts per million, was identified in a sample of the arena soil. By then it was clear that the "waste oil" included chemical residue from a plant in **Verona, Missouri**, that had been synthesizing **trichlorophenol** -- an intermediate of manufacturing **2,4,5-T, the herbicide "Agent Orange"** that the U.S. had sprayed in huge amounts in the war against Vietnam.

Why should a chemical plant designed to produce trichlorophenol also produce dioxin? The explanation lies in the special nature of chemical manufacturing, which is very different from manufacturing anything else. When a car, let us say, is made, pieces of metal, glass, rubber and many other materials are assembled, but the matter of which these materials are made is not changed. The waste is just some left-over wiring, paint fumes, or perhaps a cracked windshield, produced in amounts much less than the car itself and reducible by good housekeeping.

But the purpose of chemical manufacturing is to change matter, to rearrange atoms and make new molecules. In such a chemical reaction huge numbers of molecules jostle around, their constituent atoms assemblyng and disassembling in many different arrangements. The chemist learns to favor the production of a particular molecule by controlling temperature, pressure and other conditions and, more precisely, by introducing a catalyst. But the process is never perfect; some unwanted molecules that happen to be very stable and resist being further transformed will persist -- as waste.

Dioxins are just such very stable compounds. In the production of trichlorophenol -- or for that matter in most reactions involving organic (carbon-containing) chemicals and chlorine -- dioxin is likely to be formed, and once formed, to persist as an unwanted waste. By its very nature, such waste -- much of it toxic -- is built into chemical manufacturing. **Toxic waste is not simply a matter of poor housekeeping or bad management; it is an inescapable part of chlorine-based chemical production.** Moreover, some of the industry's actual products, for example solvents, are themselves toxic, and many produce toxic substances -- including dioxin -- when an effort is made to dispose of them, especially by incineration.

Since the early 1970s a great deal has been learned about why dioxin should be so dangerous in such small amounts. But the fact that dioxin-like compounds -- complex, highly chlorinated organic chemicals -- are very toxic has been known, or should have been known, much earlier. Again, there is a Missouri connection, for the discovery was made in the 1930s in Monsanto's **Anniston, Alabama**, plant. Within a year after the plant opened, most of the workers had developed chloracne and a wide range of other symptoms.

In **1936** two Atlanta physicians published a case history in the Archives of Dermatology and Syphilology about one of the **Monsanto** workers described as: **"O.D., a Negro aged 26 [who] began work in the distillation of chlorinated diphenyl in April 1930."** They reported that the patient had a **severe case of chloracne** and observed that the patient, even in December 1933, **"...complained of lassitude, loss of appetite and loss of libido."** Some sense of the authors' ability to appreciate the significance of these symptoms, later shown to be characteristic of dioxin poisoning, can be gained from their additional comment:

"His complaint of lassitude was not borne out by anything more than the usual temperament of the Negro toward work..."

We have heard the same sorry tale very often since then: "The only human disease attributable to dioxin is chloracne." But step by distressing step, the full range of the devastating effect of dioxin on people has

confirmed the reality of O.D.'s symptoms, and much more.

The carcinogenic effect of dioxin played a key role in the evacuation of Times Beach and in the general assessment of its risk. In 1978, the first comprehensive animal tests showed that rats and mice raised on a dioxin-containing diet developed an excess incidence of cancer. In 1985 the EPA issued its first formal cancer risk assessment of dioxin. It concluded, from the animal tests and consideration of the possible mechanisms of chemical induction of cancer, that a dosage of 0.006 picograms per kilogram of body weight per day -- which in an adult amounts to a daily intake of 14 trillionths of an ounce -- would represent a lifetime cancer risk of one in a million. **This singled out dioxin as the most potent synthetic carcinogenic chemical.** EPA estimated that people would be exposed to the one-per-million risk if they lived near soil contaminated at the level of one part per billion. When soil in Times Beach was found to considerably exceed this level, the EPA decided to evacuate the town.

Apart from the terrible disruption of the lives of the people of Times Beach, what does this decision tell us? Why should EPA and other government agencies try to establish such a cut-off level -- a dividing point between remedial action and doing nothing? I suppose that one reason is simply bureaucratic timidity -- a way of avoiding a decision based on personal judgment; it is safer, for the bureaucrat if not for the rest of us, to rely instead on some number, arrived at by "objective science" rather than by responsible human beings.

But there is much more to the notion of a "safe" level of exposure than protecting human health or environmental quality. For **Syntex (USA) Inc.** -- the company responsible for the dioxin clean-up costs in Missouri -- it is a matter of money. In 1986 **Syntex** staff members published a graph showing the relation between different clean-up standards and the expected costs of achieving them in the Missouri dioxin-contaminated sites. It showed, for example, that if the soil-contamination standard of one part per billion were relaxed to 10 parts per billion, **Syntex** would need to spend 65% less on the clean-up. The **Syntex** people proposed that the 1985 EPA risk assessment should be sharply reduced. This would not only save **Syntex** money, it would also reduce the need to clean up many Superfund sites; it would improve the environmental acceptability of incinerators; it would weaken the claims of the veterans who were exposed to Agent Orange in Vietnam, and it would affect the outcome of numerous court cases. EPA did not refute the **Syntex** proposal, adhering to the Reaganesque line that environmental hazards must be balanced against the cost of remedying them.

It is no wonder, then, that polluters declared open season on dioxin risk estimates. Their techniques varied. Some of the most imaginative efforts were made by companies that built incinerators -- major sources of environmental dioxin. They usually accepted the EPA's estimate of dioxin's high carcinogenic potency, but tried to get around it by showing that the dioxin would be so diluted once it left the incinerator smokestack that the people exposed would fall within the one-in-a-million cancer risk standard of "acceptability." **The prize for the most imaginative example of dioxin detoxification by dilution goes to the author of the environmental impact statement for the proposed -- and <u>still</u> not built -- trash-burning incinerator at the Brooklyn Navy Yard in New York.** Here is his prize-winning idea: Dioxin emitted into the air by the incinerator would fall to the ground and there become mixed into the upper 10 cm. of the soil. This would greatly dilute the dioxin, so that when it finally came in contact with the people of Brooklyn, it would result in the risk -- magically -- of just under one in a million. **Unfortunately, most of Brooklyn is not covered with soil, but with asphalt and houses.**

Perhaps embarrassed by such ludicrous efforts to evade the consequences of its 1985 cancer risk assessment, EPA decided to make life easier for the industry's inventive risk assessors by revising the risk assessment itself. Was dioxin really so potent a carcinogen that absorbing only 14 trillionths of an ounce per day would carry the one-in-a-million lifetime cancer risk? With the director of EPA's Office of Research and Development as Chairman, a Workgroup of EPA staff reviewed the 1985 document and re-examined its data and reasoning. They had little to say about the data and concentrated their attention on the fact that there were several different theories about how chemicals like dioxin might cause cancer. Most of the alternative theories predicted a dioxin cancer potency much lower than the 1985 risk assessment and were incompatible with the theory that guided it. If these alternative theories were right, then the assessment's theory had to be wrong.

What to do? In a spectacular intellectual feat (its originality seriously compromised by the fact that it had been suggested by a recent manifesto from the Reagan/Bush Office of Management and Budget), the Workgroup decided that the "scientifically sound" thing to do was to average the potency values indicated by the different theories. Because the high potency value of the 1985 assessment's theory was outweighed by the more numerous low-potency theories, the average turned out to be 16 times less stringent than the 1985 risk assessment.

When the Workgroup's draft was sent out for review in 1987, I was among those invited to respond. (Such strange things sometimes happen when a bureaucracy tries to navigate the risky passage between science and politics.) Tom Webster and I prepared a detailed point-by-point criticism of the Workgroup report. But what really counted was a much simpler point -- which I had the opportunity of making in a speech to the entire Washington EPA staff in January 1988 (another strange event): If the low-potency theories are right, then the original high-potency theory is wrong, and vice versa -- a situation that can hardly be corrected by averaging their mutually contradictory results.

This and other criticism of the Workgroup's 1987 attempt to revise the 1985 risk assessment had an effect: A revised draft was issued that scrapped the first one. Now the Workgroup decided that the low-potency models were inadequate and accepted a version of the original high-potency model as the basis for its analysis. Then, without any factual evidence to support it, the Workgroup nevertheless decided that the original 1985 risk assessment "...may be an overestimate," although "the scientific data do not permit an estimate of the extent of the overestimate." So, having decided that the original potency estimate was too high, and not knowing by how much (which logically could be only 1% of the original value -- a difference totally lost in the range of uncertainty of the estimate) -- the Workgroup concluded that the true value is -- once again -- 16 times lower than the 1985 estimate. That the same decision for a 16-fold reduction of dioxin's cancer potency was based on two sets of mutually contradictory reasons suggested that the result was unencumbered by factual scientific analysis.

Stated a little less politely, I would credit the Workgroup with a new, highly imaginative approach to the evaluation of dioxin's toxicity: **fact-free detoxification.** All this became clear in public hearings on the draft Workgroup report, with the result that it died a quiet death somewhere in the EPA bureaucracy. The 1985 cancer risk assessment survived.

Thus far, the attempts to downgrade the EPA's 1985 risk assessment had avoided a direct challenge to the data on which it was based -- chiefly, the results of a rat feeding test carried out by a researcher at the **Dow Chemical Company**. In 1986 it was confirmed that paper mills using chlorine bleach produced dioxin in their waste water at levels that would exceed a standard based on the 1985 risk assessment. This was the result of chlorine reacting with chemical constituents of wood. Seeking to avoid proposed regulations that would restrict the use of chlorine, the paper industry decided to challenge the results of the **Dow** rat test. They borrowed the original tissue microscope slides from **Dow** and assembled a panel of "independent" toxicologists who examined each slide and decided for themselves whether cancer was evident or not. Since they were not unanimous in their decisions, the cancer frequency was decided by majority vote. This reduced the original potency figure by half -- hardly a significant change. And once more, under this new assault -- **detoxification by recount** -- the 1985 risk assessment survived. Nevertheless, the paper companies asked EPA to "rethink" it.

This brings us to October 1990 and a place called the **Banbury Center** in Long Island. There, under the sponsorship of EPA and the **Chlorine Institute** -- an industry group -- toxicologists and biochemists were convened to consider the "Biological Basis for Risk Assessment of Dioxins and Related Compounds." The purpose of the conference was to review new data about how dioxin caused cancer in order to provide a "scientific" basis for a new risk assessment. The "new data" were studies that actually went back to the 1970s. They showed that dioxin's effects were exerted through a receptor -- a particular protein in animal cells called Ah -- that tightly bound dioxin and facilitated its action, through the cell's genetic system, on protein synthesis.

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At Banbury, the relationship between science and politics of dioxin, until then a kind of cautious flirtation, came into full flower. On the scientific side the conference made a lot of sense, for it came on the heels of a rapid expansion of what was known about the biological effects of dioxin and dioxin-like compounds such as PCBs. The participants agreed that most, if not all, of these newly recognized effects (actually many of them were seen earlier in industrial exposures such as "O.D."s) were mediated through dioxin's primary interaction with the Ah receptor. A few participants proposed an additional, highly controversial conclusion: that the effect of a chemical operating through a receptor must have a threshold, a dose below which there would be no effect. They also claimed that the existence of a threshold would justify downgrading the dioxin potency, but many other participants disagreed. The latter were surprised to learn, from news stories based on a press release prepared by a conference participant hired by the **Chlorine Institute (but not originally identified in that way)**, that there was a consensus -- that the dioxin risk should be downgraded.

The EPA participants in the **Banbury Conference** hurried back to Washington with news that prompted the Administrator, **William K. Reilly**, to predict that a new reassessment would in fact reduce the dioxin risk. This set the stage for the latest chapter in dioxin's sordid history: a new, Banbury-inspired, re-evaluation of the 1985 risk assessment. This has now been completed and is scheduled for release in September - we hope. But we already know what it will say, thanks to a leak of the report's conclusions a few weeks ago. The new attempt to downgrade the dioxin hazard, like all the earlier ones, has failed. But in failing, it has not simply confirmed the important but narrow result of the 1985 risk assessment that dioxin is an enormously potent carcinogen. It has also greatly expanded the range and biological impact of dioxin's effects, at levels of exposure already experienced by the entire U.S. population.

If, as a skeptic like myself might conclude, the **Banbury Conference** was set up to urge EPA to find new "scientific" reasons for downgrading dioxin's cancer potency, the planners made two serious tactical mistakes. First, by concentrating attention on the receptor theory, the Conference validated the growing but until then largely unconnected evidence about the non-cancer effects of dioxin, such as hormonal and developmental disruptions, at concentrations even lower than those that induce cancer. The second mistake arose out of the threshold concept itself, for it raised the question of whether the dioxin level carried in people's bodies was already at or above the threshold. If so, added exposure would then be expected to have an effect on the incidence of cancer and other disease regardless of whether or not the threshold theory was correct.

The threshold proponents proposed that a dietary intake of one to three picograms per kilogram per day would be "safe." Unfortunately, EPA studies of the body burden of dioxin showed that the U.S. average has already reached that level. Earlier, Tom Webster and I had shown that this level indicated a cancer risk of 330 per million. Apparently Americans are sufficiently exposed to some very general source of dioxin to put us all well above the "acceptable" cancer risk of one in a million, and within range of its numerous other harmful effects. That source, according to the forthcoming EPA report, is chiefly food.

Dr. Arnold Schecter, who has so courageously pioneered in this area, has recently completed a study of the dioxin content of U.S. food, which he has kindly allowed me to share with you. His basic conclusion is that a typical daily diet delivers between 0.3 to 3.0 picograms per kilogram of body weight (a level that represents a lifetime cancer risk of 50 - 500 per million). The new EPA risk assessment reports that if dioxin-like types of PCB are included in the assessment, the average U.S. intake is 3 - 6 picograms per kilogram per day, representing a cancer risk of 500 to 1,000 per million. As the new EPA report states -- rather delicately -- **"the weight of the evidence suggests concern for the impact of these chemicals on humans at or near current background levels."**

Stated more simply, the situation is this: **The general spread of dioxin and dioxin-like chemicals in the U.S. environment has already exposed the entire population to levels of these extremely toxic substances that are expected to cause a number of serious health effects. These include an average risk of cancer of 100 or more per million in the entire U.S. population -- 100 times greater than the risk standard that has triggered EPA remedial action, for example at Times Beach.**

The EPA document acknowledges that the newly appreciated hazards of dioxin go far beyond the risk of cancer. At or near the observed levels of dioxin and dioxin-like compounds in the U.S. population, the expected non-cancer effects include:

* **disruption of endocrine hormone systems, especially those related to sexual development; specifically by mimicking, interfering with, or amplifying the effects of estrogen especially during fetal development;**

* **disruption of critical stages of embryonic development, for example of the nervous system;**

* **damage to the developing immune system, leading to increased susceptibility to infectious diseases.**

These are all intergenerational defects; they are imprinted for life on the developing fetus by the effect of dioxin on the mother and sometimes the father. In its recent Seventh Biennial Report on the environmental impact of persistent toxic substances such as dioxin on the Great Lakes, the International Joint Commission has bluntly confronted the catastrophic implication of this threat, stating:

> **"Surely, there can be no more compelling self-interest to force us to come to grips with this problem than the spectre of damaging the integrity of our own species and its entire environment."**

Why should such biologically powerful agents arise from the normal activities of the chemical industry? Why should ordinary commercial products like PCB, or a routine by-product of numerous chemical industry processes like dioxin act in the body a though they were hormones?

Dioxin and dioxin-like chemicals have become widely known as "environmental hormones" because they enter into the complex network of natural hormones that govern sexual development and other embryonic processes -- and disrupt them. They are man-made chemicals that, present in only miniscule amounts, can powerfully alter the natural biochemical processes that determine how animals develop, grow, and behave. However, dioxin is not in fact a hormone, a term that is properly restricted to chemical substances that are produced inside the cells of living things, and not in the reactors of the chemical industry. **There is a crucial molecular difference between dioxin and hormones. Dioxin is distinctively characterized by its chlorine atoms, which, when linked to particular carbon atoms in its molecular structure, give rise to dioxin's powerful toxic properties. In contrast, no natural hormone is chlorinated.**

What should we call a man-made substance that is not a hormone but acts like one -- inducing powerful, often destructive changes in biochemical processes? We already have a generic name for such substances, chemicals that are designed to powerfully modify cellular chemistry, but in useful ways: pharmaceutical drugs. It makes more sense, I believe, to call dioxin an **"environmental drug"** than an "environmental hormone," for it helps to explain why dioxins and dioxin-like substances are so menacing to human health and environmental quality.

Unlike ordinary pharmaceutical drugs, dioxins were not subjected to years of testing in the laboratory, and in patients, in order to make sure that they do more good than harm. Unlike ordinary drugs, they are not prescribed by a physician for the use of an individual patient in order to counter a previously diagnosed ailment. Instead, dioxin and dioxin-like substances were massively released into the environment long before their enormous biological powers were studied, let alone understood.

Dioxin and its chemical cousins have been administered, wholesale, to everyone -- whether old, young, or not yet born; whether well or sick; whether they want it or not; and certainly not under the watchful care of a physician. Thus, like the pharmaceutical companies, the entire chemical

industry is also in the drug business -- but in a wildly unregulated and extremely dangerous way.

How can we bring this rogue sector of the chemical industry under control and protect ourselves from its powerful threats? The world owes the **International Joint Commission (IJC)**, its staff and scientific consultants (and indeed, **Greenpeace** and the other grassroots organizations that have participated in this work) a huge debt of gratitude for their efforts to understand this issue and develop constructive ways of dealing with it. In its most recent (Seventh) Biennial Report, the IJC spells out its key conclusions:

* "Persistent toxic substances are too dangerous to the biosphere and to humans to permit their release in any quantity, and

* "All persistent toxic substance are dangerous to the environment, deleterious to the human condition, and can no longer be tolerated in the ecosystem, whether or not unassailable scientific proof of acute or chronic damage is universally accepted.

* "The production and release of these substances into the environment must, therefore, be considered contrary to the Agreement legally, unsupportable ecologically and dangerous to health generally. Above all, they are ethically and morally unacceptable. The limits on allowable quantities of these substances entering the environment must be effectively zero, and the primary means to achieve zero should be the prevention of their production, use and release rather than their subsequent removal."

Clearly, this means that changes must be made in the chemical industry to alter or eliminate the processes that give rise to dioxin and dioxin-like substances. These dangerous chemicals can be formed in many of the industry's organo-chlorine reactions, or whenever the products of these reactions, such as **PVC**, are burned. What needs to be done about <u>that</u> has also been made clear in an earlier (the Sixth) IJC Report:

> "We know that when chlorine is used as a feedstock in a manufacturing process, one cannot necessarily predict or control which chlorinated organics will result, and in what quantity. Accordingly, the Commission concludes that the use of chlorine and its compounds should be avoided in the manufacturing process."

This proposal and the campaigns developed by **Greenpeace** and other environmental organizations have already launched the issue of "banning chlorine" into the domain of public debate. We have already heard the replies from the industry and its friends. One argument, advanced by the chemist **G.W. Gribble**, is that "[C]hlorine is as natural to our world as carbon, oxygen and hydrogen." Of course that is true, but the point is that chlorinated organic compounds are not so natural. They are rare in living things; only about 600 such substances have been identified, compared with tens of thousands of different organic substances made by living things that are <u>not</u> chlorinated. Moreover, not a single chlorinated organic compound has been identified as natural in mammals. In **Gribble's** compilation of 611 chlorinated (and other halogenated organic) compounds produced by living things, there are numerous examples from fungi, higher plants, algae, sponges, jellyfish, worms, and other marine animals. There is exactly **one entry under mammals** -- a chlorinated compound found in the urine of a group of cattle. Recently I called the author of the paper cited by Gribble, **Dr. K-C. Luk**. He told me that he had no way of knowing whether the chlorinated compound was a natural metabolic product or was acquired by the cattle from the environment. Given the huge amount of unnatural chlorinated organic compounds that beset modern agriculture, I would bet on the environment.

In fact, these data are very illuminating. It looks as though in the early evolution of living things, a few organochlorine compounds were included in their biochemical systems. But when the first mammals -- or possibly vertebrates -- emerged, chlorine was abruptly excluded from this new form of life. As a result, chlorinated organic compounds like dioxin are incompatible with the distinctively complex hormonal systems and developmental processes that are characteristic of vertebrates, especially mammals. The chemical industry has violated this biological taboo, and we are all paying dearly for this transgression -- for, in the words of the IJC, it has created "the spectre of damaging the integrity of our own species [and probably of other vertebrates as well] and its entire environment."

The industry's chief defense against shutting down the use of chlorine in chemical manufacturing is that it is essential to the manufacture of most of its products (true), which are in turn essential to most other industries and agriculture (not so true). It is true that synthetic organic chemicals -- plastics, pesticides, detergents and solvents -- have deeply penetrated the modem world. This was done not so much by creating new industries as it was by taking over existing forms of production. After all, we did have food before synthetic pesticides, and there was furniture, flooring and paint long before plastics. In fact, as pointed out by one of the leaders in the development of the petrochemical industry, **Lord Beeching**, it grew through a virulent form of industrial imperialism:

> "Instead of producing known products to satisfy existing industrial needs, it [the petrochemical industry] is, increasingly, producing new forms of matter which not only replace the materials used by existing industries, but which cause extension and modification of those industries...To an increasing degree it forces existing industries to adapt themselves to use its products."

I believe that this is where the industry is most vulnerable. **As the source of persistent, dangerously toxic substances, the chemical industry must drastically change its methods of production -- and where necessary its products -- beginning with the elimination of chlorine.** Of course, the industry will use its enormous wealth and political power to resist such change. But some of its equally powerful corporate customers -- paper mills, electronics manufacturers, and the food industry -- may be less rigid. Yes, they have been invaded by the chemical industry's products that they use. But with those products have come the built-in toxic accompaniments and the economic liability for their damage.

We now know, for example, that the U.S. population is exposed to dioxin not so much from the chemical industry's direct emissions, but chiefly from food that has been contaminated with dioxin entering the food chain, especially beef and dairy products. These industries, already suffering from reduced consumption to avoid fat and cholesterol, are now likely to be hit once more, this time by the dioxin problem. Sooner or later, properly encouraged by grassroots activists, they will use their corporate power to persuade the chemical industry to change its ways. Already the paper industry has begun -- very quietly -- to make plans for ending chlorine bleach processes. There are even whispers from the chemical industry itself that they have got the message; very quietly, I have heard, their chemists are looking for ways to take chlorine out of their processes.

These are some of the reasons why we are at a turning point not only in the history of dioxin, but of the chemical industry itself. **What has brought us to this point, I am convinced, is the environmental movement -- at its powerful grassroots: the numerous community campaigns against trash-burning incinerators; the valiant battles against hazardous waste incinerators at East Liverpool and Jacksonville; the struggles at Times Beach and Love Canal; the campaign for justice for the veterans exposed to Agent Orange.**

Let this conference, here in the place where it all began, be the start of new campaigns and new victories -- for the sake of the environment and people who live in it.

Dr. Barry Commoner is the Director of the Center for the Biology of Natural Systems, Queens College, Flushing, New York 11367.

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The **2nd Citizens' Conference on Dioxin**, held July 29-31, 1994, at St. Louis University, Missouri, was sponsored by *Waste Not;* the Gateway Green Alliance, St. Louis, Missouri; and NC WARN (Waste Awareness & Reduction Network), Sanford, North Carolina. A report containing the papers presented at the Conference will be published in early 1995.

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Waste Not The Weekly Reporter for rational resource management 297

A publication of *Work On Waste USA, Inc.*, 82 Judson, Canton, NY 13617 315-379-9200 August 1994

2nd CITIZENS' CONFERENCE ON DIOXIN

July 29-31, 1994
St. Louis University, St. Louis, Missouri

RESOLUTION OF CONFERENCE

It is our conviction that the general spread of dioxin and dioxin-like compounds has already reached dangerously critical levels, thereby threatening the integrity of our own species and making the risk of inaction too high to accept.

WHEREAS, dioxin and dioxin-like compounds are the most potent man made poisons currently known, are persistent in the environment and bioaccumulate in living organisms;

WHEREAS, even the U.S. Environmental Protection Agency has concluded that:

Dioxin causes cancer in humans;

Immune system and reproductive effects appear to occur at body burdens approximately 100 times lower than those associated with cancer;

Current exposure levels to dioxin appear to place people at or near a body burden where sensitive responses may occur, especially for nursing infants and recreational and subsistence anglers;

WHEREAS, established international peer-approved scientific research demonstrates that dioxin and other dioxin-like compounds can be expected to have **transgenerational** non-cancer effects in wildlife and humans, including:

* Disruption of endocrine hormone systems, especially those related to sexual development: specifically by mimicking, interfering with, or amplifying the effects of estrogen especially during fetal development.
* Disruption of critical stages of embryonic development, for example the nervous system;
* Damage to the developing immune system, leading to increased susceptibility to infectious diseases.

WHEREAS, the International Joint Commission, the monitoring body of the Great Lakes Water Quality Agreement of 1978, identified dioxin and dioxin-like compounds as persistent toxic substances and recommends zero discharge;

THEREFORE, be it resolved that the 2nd Citizens' Conference on Dioxin demands:

1. An immediate halt to the incineration of municipal, hazardous, medical, military, and radioactive waste, and any such wastes incinerated in cement or aggregate kilns, or any other open-ended device.
2. An immediate commencement of a phase-out of the industrial production and use of chlorinated organic compounds (including the plastic, PVC).

Conference Sponsors: Waste Not, 82 Judson Street, Canton, N.Y. 13617; Gateway Green Alliance, PO Box 8094, St. Louis, Missouri 63156; and NC WARN (Waste Awareness & Reduction Network) 5301 Rolling Hill Rd., Sanford, N.C. 27330.

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THREE 'ESSENTIAL READING' REPORTS:

HORMONE COPYCATS

April 4, 1994

61 pages, Cost $6, from:
National Wildlife Federation
Great Lakes Natural Resource Center
506 E. Liberty, Ann Arbor, MI 48104
Tel: 313-769-3351

"The foundation of our well-being -interactions between endocrine, immune and nervous systems- is being undermined by synthetic chemicals in the world's environment. We are living in a newly-made sea of hormone-like chemicals and similar toxic substances. **There is growing evidence that 'hormone copycat' chemicals at levels found in our everyday environment are assaulting intricate biological systems. Human reproductive potential, the health of our children and the diversity of life on Earth is at risk.** Among at least 48 common chemicals known to have reproductive- and endocrine-disrupting effects are pesticides, including **PCBs, dioxin, mercury, cadmium and hexachlorobenzene; and components of plastics, which can leach from consumer products. Chlorine is an essential ingredient in about half of these chemicals**... Our conclusions: Current industry practices and consumer habits pose unacceptable risks to life from exposure to toxic chemicals. Government regulations and industry testing of chemicals provide inadequate protection, particularly from risks of exposure to everyday combinations of environmental contaminants that can damage health...**Among the most bizarre trends cited in this report are discoveries of sexual anomalies in wildlife. Various forms of 'inter-sex' features of male/female organs are being seen globally in marine snails, fish, alligators, turtles, fish-eating birds, marine mammals and bears...**"

ACHIEVING ZERO DIOXIN

An Emergency Strategy for Dioxin Elimination

by Joe Thornton

July 29, 1994
57 pages
Cost $5 non-profit; $25 for-profit; from:
Greenpeace Chlorine-Free Campaign
1436 U Street, N.W.
Washington, D.C. 20009

"**There does not appear to be a threshold or 'safe dose' below which effects do not occur. EPA's research has been unable to identify a level of exposure, no matter how low, at which dioxin does not bind to its receptor, interact with DNA, and induce enzymes and growth factors that are involved in both cancer and non-cancer effects**...In its reassessment documents, EPA makes a preliminary attempt to catalogue dioxin sources, identifying two of the largest known sources of dioxin:

* **Incinerators that burn chlorinated wastes, including garbage, hazardous waste, and hospital waste, along with other facility types in combustor sectors;**
* **Pulp mills that use chlorine and chlorine-dioxide bleaches.**

But EPA's list neglects dozens of other dioxin sources that have been identified in the scientific literature and government reports and underestimates actual emissions from incinerators. As a result, the agency's list accounts for only 10 to 50 percent of the 25,000 grams of dioxin that EPA estimates are deposited into the environment each year. Major sources neglected by EPA include the following: * **Chemical Industry**. Dioxin is produced in the manufacture of chlorine and a full range of chlorinated organic chemicals, including PVC, pesticides, solvents, and other chemicals used in rubber, dyes, plastics, and other products. * **PVC plastic.** Throughout its lifecycle, PVC appears to be responsible for more dioxin formation than any other product. When PVC feedstocks are manufactured, large quantities of dioxins are formed and are released in air emissions, water releases, solid and liquid wastes. Recent Swedish studies have found that the PVC plastic itself is contaminated with dioxin. PVC is also the largest source of chlorine -- and thus the major dioxin precursor -- in most of the largest combustion sources of dioxin, including hospital waste incinerators, trash incinerators, and copper and steel smelters. Finally, the accidental burning of PVC in home and building fires appears to be an extremely large dioxin source. Preliminary estimates suggest that PVC may account for up to one-third of all dioxin formation. * **Garbage incinerators.** EPA's estimate of combined dioxin emissions from the nation's 120 garbage incinerators is 15 times *lower* than measured dioxin emissions from a *single* incinerator in Columbus, Ohio. Garbage burners appear to be the largest point sources of dioxin, with total nationwide emissions hundreds of times higher than EPA estimates. * **Cement kilns** that burn hazardous waste. High dioxin emissions have been documented from these facilities, in which more hazardous waste is burned than in officially designated 'incinerators.' * **Hazardous waste incinerators.** EPA underestimates actual emissions from these facilities by basing its estimate on a trial burn at a single facility. Data from real incinerators -- which operate under non-optimal or upset conditions -- indicates that EPA has underestimated actual dioxin releases by more than 20 times. * **Ash and dusts** from all types of waste incinerators, which may carry up to 100 times more dioxin into the environment than air emissions..."

7th BIENNIAL REPORT

on Great Lakes Water Quality
March 1994
58 pages. Available free from the:
International Joint Commission
1250 23rd Street, N.W., Suite 100
Washington, D.C. 20440

"As research findings demonstrate linkages between persistent toxic substances and biological injury, they continue to reinforce the Commission's conclusions...:

* persistent toxic substances are too dangerous to the biosphere and to humans to permit their release in any quantity; and
* all persistent toxic substances are dangerous to the environment, deleterious to the human condition, and can no longer be tolerated in the ecosystem, whether or not unassailable scientific proof of acute or chronic damage is universally accepted."

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