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Dioxin: From Cradle to Grave

What Are Dioxins?

Dioxins are a class of chlorine-containing chemicals widely recognized as some of the most toxic chemicals ever made by humans. They are produced as the unwanted by-products of industrial processes involving chlorine or chlorine-containing materials such as the manufacture of polyvinyl chloride plastic (PVC); pesticide production; and pulp and paper bleaching. Dioxins are also produced when municipal, domestic and industrial wastes that contain chlorinated materials, such as PVC, are burned in incinerators, cement kilns, industrial furnaces and boilers, open barrels and when landfill fires occur.

Once released, dioxins accumulate in soils and sediments and on vegetation, where they are ingested or otherwise taken up by fish, cattle, and other animals that serve as food sources. Consequently, dioxins are concentrated in the meat, fish, dairy, and other animal products that we eat. As a further result, dioxins contaminate the tissues, blood and breast milk of people in all industrialized countries. In the U.S., the general population already carries dioxin levels that are near the levels where health effects may occur.

In 2000, the U.S. Environmental Protection Agency (EPA) finally classified the most potent of the dioxins as a human carcinogen, estimating a 1 in 1,000 risk to Americans from cancer due to dioxin exposure. Dioxins are associated with a wide range of other health impacts including:

- Altered sexual development
- Male and female reproductive problems
- Suppression of the immune system
- Diabetes
- Organ toxicity
- Altered sex ratio (reduced number of male offspring)
- Mimicking or blocking the actions of hormones.

Dioxins: Here, There and Everywhere

Dioxins are unusually stable chemicals and do not break down readily in the environment. Consequently, they can be carried great distances by air and ocean currents, circulating through the global environment. Dioxins do not dissolve readily in water, but do dissolve easily in fats. As a result, they build up in the fatty tissues of living organisms, beginning with simple creatures such as phytoplankton and building up to higher levels as they are passed up the food chain. Animals at the top of the food chain, such as people, and those with a high fat content, such as whales, polar bears or dolphins, generally carry the highest levels of dioxins.

When an industrial facility disperses dioxins into a nearby body of water, the dioxins accumulate in the phytoplankton and other small organisms in the water. They build up to higher levels in the small fish that feed on these simpler organisms. Then, the small fish are eaten by larger fish, which are then eaten by a person. That person has unintentionally ingested dioxins that have built up at each step in the food chain. As people age, the buildup of dioxins continues and the concentrations become higher, so that health impacts are potentially more serious.

The Dirty Dozen

Dioxins are among the first twelve Persistent Organic Pollutants (POPs) that have been targeted for elimination by the impending global POPs treaty because they constitute a serious threat to human health. Other examples of POPs are PCBs (transformer fluids) and DDT (a pesticide).

Given the transfer of technology from industrialized to newly industrialized nations, it is crucial that the global POPs treaty includes measures to discourage wealthy countries from promoting and exporting technologies that generate dioxins, such as incineration. Measures must also be included to encourage wealthy countries and aid programs to assist

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newly industrialized countries in devising and implementing programs to support the development of technologies that are free of dioxins. Preventing dioxins from being generated in the first place is the only real answer.

Major sources of dioxins requiring urgent action include:

- Production and disposal of polyvinyl chloride (PVC) plastic
- Incineration (municipal, hazardous and medical waste)
- Pulp and paper production that uses chlorine.

PVC Production, Use and Disposal

Taken as a whole, the production and disposal of PVC (or vinyl) plastic comprises one of the world's largest sources of dioxins. Dioxins are created when PVC is produced and when it is burned in incinerators, open fires, landfill fires, etc. PVC is one of the most common chlorine-containing products and is found in many household items such as children's toys, shower curtains, miniblinds, flooring, and wall coverings. Its production accounts for nearly 40 percent of all chlorine in the United States (more than any other use of chlorine), is the single most damaging of all plastics, and is the least recyclable. As the environmental and health costs of PVC are recognized, it is important that practical alternatives are demanded and made available. The replacement of PVC by alternative materials appears to be highly favorable economically. For example, in a Canadian analysis, replacing PVC with alternative materials was estimated to lead to a 15-fold increase in domestic revenues and a 25-fold increase in jobs.

Effects of Dioxin

Recent research on the health effects from dioxins has shown that there is serious concern for developing fetuses, children, adults and animals. Exposure to dioxins begins at conception and continues throughout fetal development, when vulnerability is greatest. Exposure to dioxins prior to birth and during early infancy can result in irreversible changes that manifest in subtle but highly problematic effects such as learning disabilities. Children are more vulnerable than adults to many kinds of pollution and exposure to dioxins during childhood can have lifelong effects. Adults can also face the threats of lung, skin and liver cancer, reduced sperm counts and increases in other disorders of the reproductive organs. These trends parallel the high incidence of tumors and reproductive problems of animals exposed to dioxins.

Dioxin Source Elimination

Greenpeace is calling for a zero dioxin plan, which seeks to eliminate dioxin sources, not just reduce dioxin releases. Due to the persistent nature of these chemicals, the current global build-up of dioxins will take years to decrease.

The elimination of dioxin sources will have both positive and negative economic impacts in the communities where sources such as manufacturing and disposal facilities are located. To mitigate potentially negative economic impacts, transition planning processes must be an integral component of any strategy to eliminate dioxins. This process must be guided by participation from labor, community and other stakeholders and should seek to minimize the economic effects of the transition and insure that costs and benefits are equitably distributed. For instance, the Oil, Chemical, and Atomic Workers Union proposed a tax on chlorine and related chemicals; the revenue would be used to encourage reinvestment in affected communities and to provide income protection, continued health care, and meaningful opportunities for higher education and reemployment for workers and their families.

Taking Action

What You Can Do

1. **Avoid buying vinyl/PVC and other chlorine-containing products whenever possible, and reduce your overall use of disposable products.**
2. **Contact manufacturers of consumer products and find out if their products contain PVC or other chlorine-containing materials. Demand alternatives.**
3. **Avoid burning household trash. It often contains chlorine-containing materials, such as PVC, which create dioxins when burned.**
4. **Call on President Bush to support the global POPs treaty, which is scheduled to be finalized in May 2000, at the Stockholm Convention, and also urge him to seek U.S. Senate ratification.**

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