

Dow Chemical and Dioxin

Historical and ongoing production at Dow's many manufacturing sites globally has and continues to result in the creation and release of dioxins to the environment. Dow's products, not only during manufacture, but also during use and disposal, can also create and disperse dioxin. Operations at Dow's global headquarters in Midland Michigan have contaminated the Dow site and the city of Midland with dioxin. Highly elevated levels of dioxin have also been found in the floodplain downriver from Dow's site and throughout the watershed -- in soils, sediments and wildlife. This legacy of contamination and ongoing releases could represent a significant liability for Dow Chemical. The material included below summarizes several agency and NGO reports on this topic.

Dow has engaged in dioxin-generating activities for more than 60 years

Dow has manufacturing facilities in dozens of countries, making products related to food, transportation, health and medicine, personal and home care, and building construction among others, and annual sales of \$28 billion.

The company's 50,000 employees are engaged in research and development and production of chemicals that include halogens, in particular chlorinated compounds, which can be associated with the formation of dioxin and dioxin-like compounds in their manufacture and disposal.

Over the years, Dow has manufactured a number of chemicals which can create dioxin as an unintended byproduct, including mustard gas, Agent Orange, napalm, and pesticides like 2,4,5-trichlorophenol, 2,4-D, Dursban (chlorpyrifos), vinyl chloride monomer and ethylene dichloride (monomers that are the building blocks of PVC or vinyl). Production of some of these compounds continues at Dow facilities today. 2,4-D, for instance, is still manufactured and used widely, and includes dioxin as a trace contaminant in the product and the waste stream.

According to a Greenpeace report, Dow is:

- The world's largest producer of chlorine and chlorine-based products.
- The largest producers of chlorinated pesticides in the US.
- The world's largest producer of the feedstocks that are used to make PVC plastic.
- The nation's largest producer of chlorinated solvents.

As a result of these activities, additional sites of environmental contamination at Dow's manufacturing facilities globally are a possibility. In addition, combustion of these products at the end of their life can also create and disperse dioxin to the environment. PVC products for instance, represent a larger reservoir of potential dioxin precursors in areas where the predominant disposal method is incineration.

Operations at Dow's Global Headquarters in Midland have released dioxin

Dow has operated a manufacturing facility on the shores of the Tittabawassee River since 1897. Over the years, Dow has manufactured a number of chemicals which can create dioxin as an unintended byproduct of production or which can create dioxin during disposal, including mustard gas, Agent Orange, napalm, and pesticides like 2,4,5-trichlorophenol, 2,4-D, Dursban (chlorpyrifos). Production of some of these compounds continues at Dow today. 2,4-D, for instance, is still manufactured and used widely, and includes dioxin as a trace contaminant in the product and the waste stream.

In addition, Dow has operated on-site incinerators for years. Dow is continually generating a large chlorinated waste stream as a result of the wide array of chlorinated compounds produced on site. When this waste stream is incinerated, it generates dioxin, which Dow is permitted to release to the air. Over the years, dioxin released from the incinerator has deposited in the community.

"Ambient air dispersion modeling and monitoring indicate that the northeastern quadrant of the city of Midland has been impacted by emissions from the incinerators." (ATSDR Petitioned Health Consultation, 2002, draft)

Dow is also permitted to discharge dioxin to the Tittabawassee River along with a long list of other industrial chemicals. In addition, the Dow site includes uncontrolled landfills containing dioxin-contaminated wastes; very large tertiary treatment ponds with dioxin-contaminated sediments; and numerous other historical dioxin reservoirs.

The City of Midland, has elevated levels of dioxin

A number of studies have now been conducted on surficial soils and sediments in Midland. Most recently, in 1986, 35 locations were sampled in schools, parks, community use areas and at 15 sites at the Dow plant. These locations were selected as a follow-up to studies conducted in the mid-80's that found elevated levels of dioxin in the area. The 1986 results found that many of the samples, particularly those located directly adjacent to and downwind from the Dow facility exceeded **Michigan's residential soil cleanup criteria of 90 ppt**. These include samples taken at local elementary schools and parks. Community (although not residential) sampling results ranged from 6 ppt to 602 ppt. The Dow site levels ranged from 16.5 to 8,840 ppt.

In 1998, as a followup to the 1996 study, Dow collected samples at the Dow Corporate Center. The Corporate Center is downwind from the manufacturing complex and near residential areas, and was therefore used as a surrogate for additional community testing. Soil samples at four sites found levels ranging from .07 to 583 ppt, with the highest value measured across the street from a residential area. The perimeter of the site was tested, and levels ranged from 6 ppt to 2,663 ppt. The plant site values were between 170 and 17,030 ppt dioxin.

Dioxin contamination has been noted in the watershed for years

Numerous fish and wildlife studies have noted elevated levels of dioxin in ecosystems downriver from the Dow facility. The Michigan Department of Community Health has issued fish advisories for the Tittabawassee River below Midland based on detected levels of dioxins and PCB's in fish. Restrictions are recommended for carp, catfish, white bass, smallmouth bass and all other species. Similar advisories have been issued for waterbodies downriver from the Tittabawassee including the Saginaw River. Saginaw Bay and Lake Huron (recipients of both the Tittabawassee and Saginaw Rivers, both have restricted consumption advisories because of dioxin levels in fish.

A number of studies of birds and other wildlife in the region have demonstrated elevated levels of dioxin, and developmental and other effects as a result of that exposure.

In addition, occasional sampling of sediments have detected dioxins. Significant floods through the years, including a large watershed-wide flood in 1986 has washed contaminants downriver.

The downriver floodplain is contaminated with dioxin

Remarkably high dioxin levels in the floodplain 22 miles down river from Dow were recently discovered. After an initial high reading, follow up sampling to confirm the finding was done. Of 36 samples taken in 5 locations, a high of 7,261 ppt was found. This level is 80 times above the state residential cleanup standard of 90 ppt. The average of the samples was 985 ppt. Approximately 3,000 households are located in the floodplain.

The results of follow up sampling to determine the extent of the contamination, and the pattern of dioxin deposition were released in June 2002. River sediments were tested both upriver from the City of Midland and Dow's Headquarters, as well as downriver. Upriver, levels of dioxin were between 1 and 5 ppt. Downriver, sediment samples ranged from 5 ppt to 2,000 ppt. Depositional zones for river sediment appeared to have higher levels of dioxin.

Dioxin is a potent poison

There is near scientific unanimity that dioxin is a carcinogen and a potent immune, hormone and reproductive system toxin. A massive review of the science, called the Dioxin Reassessment, is now nearing completion after more than ten years and two rounds of scientific review. That report's conclusions have just been confirmed by a General Accounting Office review. The most important findings include:

- The risk of getting cancer from dioxin is 10 times higher than reported in 1994 for the most highly exposed. The EPA now considers TCDD, the most potent form of dioxin to be "carcinogenic to humans."
- Some adverse effects may already be occurring in humans at average levels of exposure (background levels). Subtle effects, such as an impact on learning ability, thyroid and liver functions and increased susceptibility to infections have been seen in children exposed to background levels of dioxin.
- Dioxin also has the potential to cause adverse impacts on human metabolism, developmental and/or reproductive biology, and perhaps, other effects in the range of current human exposures. The evidence for these effects comes from a "limited" number of studies of men exposed to dioxin. In these studies, subtle changes in biochemistry and physiology, glucose tolerance, and diabetes, were detected.
- At above average levels of human exposure, dioxin has been linked to cardiovascular disease, hypertension, miscarriage and infant death, birth defects, fewer male births to female and soft tissue sarcoma, chloracne, and other conditions.
- Data indicate that laboratory animals and humans respond similarly to dioxin. Most scientists involved in the reassessment as authors have indicated that it is reasonable to infer that a spectrum of non-cancer effects will occur in humans, even though there is an absence of "better" human data. Animal studies have linked dioxin to endometriosis, demasculinization, birth defects like cleft palate and hypospadias, hydronephrosis, increased susceptibility to bacteria, viruses, parasites and tumors and suppression of the T cells.
- Dioxins adverse effects seem to occur at the most basic cellular level. Dioxin alters the way genes function, turning them on or off at the wrong times or for too short or too long a time period.
- EPA states that "The lack of clear indication of disease in the general population attributable to dioxin-like compounds should not be considered strong evidence for no effects of exposure to dioxins. Rather a lack of clear indication of disease may be the result of the inability of our current data and scientific tools to directly detect effects at these levels of exposure."