

The Facts about PVC, Dioxin and the Air We Breathe

What is PVC?

- PVC—polyvinyl chloride—is a plastic (technically, a thermoplastic polymer) used to make piping, plumbing and other building materials (<http://www.pvc.org/en/p/how-is-pvc-used>), although it has some other uses in items such as packaging. PVC containers can be identified by the number 3 inside the triangular recycling symbol.

We recycle other types of plastics— why aren't we recycling PVC?

- Until recently, this was true. But now more and more Connecticut cities and towns—including the 74 municipalities in the CRRA recycling system—accept food and beverage containers made from all type of plastic for recycling (http://www.crra.org/pages/mid-conn_recycling_table.htm). It had been difficult to recycle PVC because there was no widely used process for recycling PVC.

So what happens if PVC winds up in the trash?

- In Connecticut, trash that isn't recycled is burned to generate electricity at one of our state's six trash-to-energy plants.

What happens when we burn plastic?

- Plastics, including PVC, that are not removed from the waste stream may be safely combusted in any of Connecticut's six trash-to-energy facilities.

The air pollutants of greatest concern from such combustion are hydrogen chloride and dioxins. Modern trash-to-energy facilities control hydrogen chloride emissions by using pollution control equipment which reduces those emissions to safe levels, capturing over 95 percent of hydrogen chloride before it can get into our air. Emissions of dioxins are controlled through advanced combustion techniques and pollution control equipment to levels measured in a few *billionths* of a gram—the most recent testing of our Mid-Connecticut trash-to-energy facility measured 0.00000016 grams per dry standard cubic meter (http://www.crra.org/pages/emiss_mc.htm#dioxin). These extremely low levels of emissions are permitted by the Connecticut Department of Energy & Environmental Protection (DEEP) and the U. S. Environmental Protection Agency (EPA). Connecticut trash-to-energy plants are tested annually at full load to verify compliance with the strict standards set by these agencies.

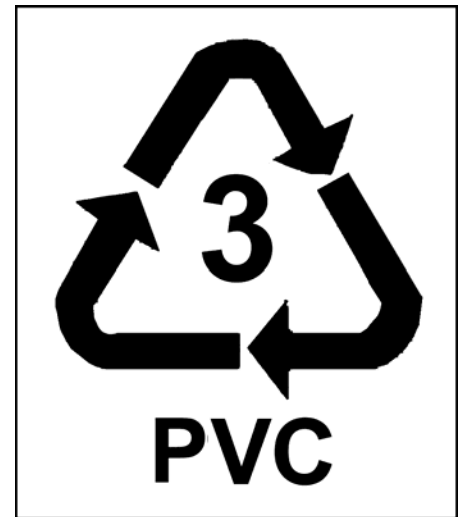
What is dioxin?

- Dioxin is the common name for a large group of compounds made up of carbon, chlorine, hydrogen and oxygen. Dioxin is formed in trace quantities during the combustion of almost every material, as well as in some industrial chemical processes. Dioxins can also be formed naturally during the biological degradation of organic material. Among this family of compounds there are 17 specific species (or isomers) which are toxic to humans and animals but only at extremely high exposures.

What are the sources of dioxin to which people are generally exposed?

- The general population is exposed primarily through the consumption of food containing trace levels of dioxin, in particular beef and dairy products. The source of the dioxins found in foodstuffs is unclear. The western and midwestern food-growing regions of the nation are far from most known sources of man-made dioxin releases to the environment. It should be noted that forest fires, both controlled and uncontrolled, as well as field straw burning, are the largest dioxin emissions sources today. These emissions sources, especially forest fires, are in fact upwind of the nation's food-growing regions.

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Are dioxins and dioxin-like compounds harmful to human health? What about claims of dioxins causing various illnesses?

- EPA's most recent dioxin reassessment report shows that there is no evidence that current dioxin exposures to the general population are causing harm. A study by the federal Centers for Disease Control (CDC) and National Institute for Occupational Safety & Health (NIOSH) finds no strong linkage even in cases of workers exposed to high levels of dioxin (<http://www.cdc.gov/niosh/pgms/worknotify/dioxinMedStudy.html>). The inference that other health effects may be occurring at exposures near our current exposure levels is based for the most part on extrapolations of results of studies done on animals exposed to high comparative doses—not unlike studies in the 1970s (<http://articles.latimes.com/2010/dec/27/health/la-he-nutrition-lab-saccharin-20101227>) that claimed saccharin was unsafe but were later debunked when it was learned those findings were based on animals whose diets were more than 3 percent saccharin.

Is human exposure to dioxin and dioxin-like compounds increasing?

- Dioxin levels in our bodies are decreasing (http://www.dioxinfacts.org/sources_trends/treands_04_10_04.html). EPA found in Americans had declined from 55 parts per trillion (ppt) to less than 25 ppt over the 10 years prior to its most recent dioxin reassessment. It is believed that this reduction is due to large reductions in industrial emissions, as well as the environmental decline in PCB concentrations since PCB use was banned. PCBs are considered to be dioxin-like compounds with similar health effects.
- Further, current levels of dioxin in our bodies are so low that a 2003 CDC study found dioxin levels in the blood of the average U.S. resident were below levels of detection.

How much do CRRA's trash-to-energy dioxin emissions contribute to Connecticut's environment?

- It is difficult to get an accurate picture of dioxin in Connecticut's environment. There is no detailed dioxin emissions inventory for the State of Connecticut or an assessment of the amount that arrives by atmospheric transport from upwind out-of-state sources. It is not known with any certainty what the relative contributions of sources of dioxin emissions are other than trash-to-energy facilities. Emissions from trucks, power plants, home heating, fireplaces, wood stoves, crematoria, sewage sludge incinerators and other known sources have not been measured or estimated. There is, however, ample evidence that the dioxin emissions from the CRRA trash-to-energy facilities are not impacting the environment to any measurable degree.
- In fact, results of emissions testing at our trash-to-energy plants are available on-line at <http://www.crra.org/pages/emissions.htm>.
- Nationwide, trash-to-energy facilities today represent less than one percent of the manmade inventory of dioxin sources, according to an EPA Fact Sheet, "Final Air Regulations for Municipal Waste Combustors."
- Ambient monitoring has been conducted in the vicinity of the four CRRA trash-to-energy facilities since they started operations. DEEP set an annual ambient air limit of 1.0 pg/m³ TEF^(*) which is not to be exceeded near trash-to-energy facilities. The maximum measured concentrations in any year, in any season of the year, and at any site was .025 pg/m³ TEF – 97.5 percent less than the allowable limit.
- Put another way, based on data from studies on lab animals, someone living at a point of maximum impact near any one of CRRA's trash-to-energy facilities would have less of a cancer risk due to dioxin exposure than a person who eats one 4-ounce hamburger per week.
- In addition to the state's ambient monitoring, cows' milk was monitored before and after the start-up of the CRRA Southeast Project trash-to-energy facility in Preston (http://www.crra.org/pages/proj_se_facilities.htm). The measurements were made by the Connecticut Agricultural Experiment Station on milk samples from four nearby farms. No differences were found between the "before" and "after" samples.

(*) – picograms per cubic meter, toxic equivalency factor

How do we know what CRRA's trash-to-energy emissions are?

- DEEP has required annual dioxin emissions testing on each of the CRRA trash-to-energy facilities since 1994. Emissions from the facilities have been in compliance with state limits. In addition to these annual direct measurements, other operational parameters are monitored continuously to maintain those conditions that minimize dioxin emissions. Stricter EPA limits for dioxin emissions took effect at the end of 2000, but all of CRRA's facilities were already in compliance with those stricter limits for many years.
- In fact, all of CRRA's trash-to-energy plants have been so far below DEEP's limits for so long that they have qualified for reduced testing. DEEP is satisfied the plants are environmentally sound.

How do CRRA's trash-to-energy dioxin emissions test data compare to state and federal emissions limits?

- CRRA's trash-to-energy facilities have always had emissions well below, generally, a small fraction of the allowable dioxin emissions test limit. The new dioxin emissions limit for trash-to-energy facilities is based on the maximum available control technology. CRRA does everything technologically possible to keep dioxins out of its waste-to-energy emissions.

How does CRRA take dioxin out of its emissions?

- At our Preston trash-to-energy facility, we inject the flue gases coming out of the combustors with activated carbon, which absorbs dioxin. The carbon is then captured in fabric filters.
- Our Hartford facility uses combustion technology different from that of the state's other facilities. This technology destroys virtually all the dioxin when the trash is burned.

If CRRA's trash-to-energy facilities are not responsible for Connecticut's human dioxin exposure, then what is?

- Studies indicate that most of Connecticut residents' dioxin exposure comes from foodstuffs, including fast foods. Imported food products, as well as those grown within the state, contribute to the current intake of dioxins. The sources of dioxins that are in locally grown foodstuffs are highly speculative. When one considers the proximity of roadways to farms in our state, emissions from diesel trucks may be the most likely source. Measurements of milk produced near CRRA facilities clearly show that other sources are the main contributor to the observed levels of dioxin in milk.

What is the health risk associated with current dioxin exposure compared to other commonly accepted health risks?

- Based on available science, levels of dioxin exposure are far less hazardous than exposure to substances found in other common products. Again, someone living at a point of maximum impact near any one of CRRA's trash-to-energy facilities would have less of a cancer risk due to dioxin exposure than a person who eats one 4-ounce hamburger per week.

What is the significance of the latest EPA report, which indicates that dioxins are a greater cancer threat than previously thought?

- While its most recent dioxin reassessment found that cancer potency **may** be six times higher than previously reported, EPA still concluded that there are no recognized health impacts associated with the current population's exposure to dioxins (http://www.epa.gov/ncea/pdfs/dioxin/factsheets/dioxin_short.pdf).

Since CRRA's trash-to-energy facilities have known dioxin emissions, why not use alternative disposal methods to eliminate such risks?

- All other trash disposal methods have associated dioxin risks, in addition to other significant environmental risks which are not associated with trash-to-energy facilities. Municipal solid waste (MSW) contains measurable levels of dioxin.
 - Municipal waste combustion removes all but barely-measurable quantities of dioxin. Composting does not destroy or reduce the dioxin present in MSW.
 - Landfilling does not affect the dioxin levels present in MSW, and because of the potential threat to groundwater state policy prohibits landfilling of raw MSW.
 - The long hauling of MSW to distant landfills increases tenfold the calculable risk of injury and death due to transportation accidents.
 - Even some recycling operations, such as newsprint de-inking and aluminum can de-lacquering, while economically beneficial in some respects, have significant dioxin emissions associated with them.

How concerned should Connecticut citizens be about CRRA's trash-to-energy facilities and their dioxin emissions?

- Every solid-waste management strategy has associated dioxin exposure risks. In Connecticut, the trash-to-energy process is the best alternative with the least risk. Both emissions testing data, as well as actual environmental measurement data, have confirmed this conclusion. It is quite clear the current mix of strategies poses the least risk to the people of Connecticut.