

# Study finds rising levels of dioxins from common soap ingredient in Mississippi River

May 18 2010

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University of Minnesota researchers extract sediment samples from Lake Pepin at the Mississippi River in southeastern Minnesota to test for specific dioxins derived from the antibacterial agent triclosan, used in many hand soaps, deodorants, dishwashing liquids and other consumer products. Credit: University of Minnesota

Specific dioxins derived from the antibacterial agent triclosan, used in many hand soaps, deodorants, dishwashing liquids and other consumer products, account for an increasing proportion of total dioxins in Mississippi River sediments, according to University of Minnesota research.

The study appears online in the May 18 issue of the journal [Environmental Science and Technology](#).

The researchers, from the university's Institute of Technology (soon to be College of Science and Engineering), found that over the last 30 years, the levels of the four dioxins derived from triclosan have risen by 200 to 300 percent, while levels of all the other dioxins have dropped by 73 to 90 percent.

In April, the [Food and Drug Administration](#) announced it would study the safety of triclosan, which has been linked to disruptions of hormonal function and may also play a role in the evolution of bacterial resistance to antibiotics. In papers published in 2003 and 2009, university civil engineering professor William Arnold and his colleague Kristopher McNeill, a former professor in the university's Department of Chemistry, discovered that triclosan, when exposed to sunlight, generated a specific suite of four dioxins.

In the current study spearheaded by Jeff Buth, a recent Ph.D. graduate in chemistry (supervised by Arnold and McNeill), the researchers examined [sediment core](#) samples from Lake Pepin, an enlargement of the Mississippi River 120 miles downstream from the Minneapolis-St. Paul metro area. The sediment cores, containing a record of pollutant accumulation in the lake for the past 50 years, were analyzed for triclosan, the four dioxins derived from triclosan, and the entire family of dioxin chemicals. The study was a collaborative effort between researchers at the University of Minnesota, Pace Analytical (Minneapolis), the Science Museum of Minnesota and Virginia Tech.

"These four dioxins only come from triclosan. They didn't exist in Lake Pepin before triclosan was introduced," Arnold said. "In the most current sediments, these triclosan-derived dioxins account for about 30 percent of the total dioxin mass."

Triclosan was first added to commercial liquid hand soap in 1987, and by 2001 about 76 percent of commercial liquid hand soaps contained it, researchers say. About 96 percent of triclosan from consumer products is disposed of in residential drains, leading to large loads of the chemical in water entering wastewater treatment plants.

Triclosan is incompletely removed during the wastewater treatment process, and when treated wastewater is released to the environment, sunlight converts some of the triclosan (and related compounds) into dioxins. Triclosan and the dioxins ended up in Lake Pepin sediments by sticking to organic particles in the river, which then sank when they reached the calmer waters of the [lake](#).

The toxicity of the [dioxins](#) derived from triclosan currently is not well understood, nor is the extent of their distribution in the environment at large, Arnold says.

**More information:** To read the complete study, visit [pubs.acs.org/doi/abs/10.1021/es1001105](https://pubs.acs.org/doi/abs/10.1021/es1001105)

Provided by University of Minnesota

Citation: Study finds rising levels of dioxins from common soap ingredient in Mississippi River (2010, May 18) retrieved 24 April 2024 from <https://phys.org/news/2010-05-dioxins-common-soap-ingredient-mississippi.html>

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