

# UI study measures levels of PCBs flowing from Indiana canal to air and water

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A University of Iowa study supports an earlier UI report that found polychlorinated biphenyls (PCBs) in sediments lining the Indiana Harbor and Ship Canal (IHSC) in East Chicago, Ind. The study also presents data showing that the sediments are a significant source of PCBs found in surrounding air and in Lake Michigan.

The study appears in the online edition of the journal [Environmental Science and Technology](#) (ES&T), a publication of the American Chemical Society and is scheduled for formal journal publication in April.

The study emphasizes the fact that it is unknown whether the proposed dredging of the canal to improve its navigability will result in the release of greater amounts of PCBs due to disturbing the sediments or lesser amounts through [sediment](#) removal. However, one thing is certain -- PCBs are already leaching into the environment in significant amounts, said Keri Hornbuckle, professor in the UI College of Engineering Department of Civil and Environmental Engineering and corresponding author on the study.

"We have analyzed PCBs in surficial sediment, water, suspended particles and air and examined the potential for chemical movement in the harbor system," Hornbuckle said. "We have shown that the system is currently a significant source of PCBs to the air and to [Lake Michigan](#), even under quiescent conditions."

In order to obtain accurate estimates of each PCB emission, the researchers used on-site sampling in conjunction with a predictive model for chemical mass transfer and a mathematical approach to estimate the variability in the results.

They found that annually about 4 kilograms (kg) were released from the sediment to the water and about 7 kg were transferred from the water to the air. The PCB input from the upstream regions of the canal system measured 45 kg per year and the amount exported to Lake Michigan was 43.9 kg. The study noted that the measured PCBs account for nearly all the PCB inputs and losses to the navigational regions.

The PCB profiles in sediment, water and air support their determination that the contaminated sediment is a major source of PCBs into the water and air above it, noted Hornbuckle and colleagues Andres Martinez, lead author and civil and environmental engineering graduate student, and Kai Wang, associate professor of biostatistics in the UI College of Public Health.

"We were not surprised to discover that PCBs were continuously emitted from the sediments of the Indiana Harbor and Ship Canal. However, without our study, there was no way to determine how much was being released. Now we better understand the magnitude of the PCB release to Lake Michigan and to the air over the harbor and canal," Hornbuckle said. "We have found that this tributary releases more PCBs to Lake Michigan than any other known direct discharge of PCBs to the lake."

"We don't know if the airborne PCBs are dispersed into the surrounding community, Hornbuckle added. "Furthermore, we don't yet know if the emissions of airborne PCBs from this contaminated [water](#) system are a large source compared to many other possible sources in the area.

"One of the surprising findings of our study is that there appear to be

upstream sources. Although we examined PCBs within the navigational regions of the canal, we were not able to study regions of the canal that are inaccessible to our research vessel. But our study suggests that there are large sources of PCBs in the upper reaches of the canal," she said.

Manufactured from about 1930 until being banned in the 1970s due to their toxicity and persistence in the environment, PCBs were widely used as coolants, in electrical transformers and in a wide variety of products ranging from waterproofing compounds to paints and pesticides.

**More information:** The study can be found online at:  
[pubs.acs.org/doi/abs/10.1021/es902911a?prevSearch=  
%255Bauthor%253A%2Bhornbuckle%255D&searchHistoryKey](https://pubs.acs.org/doi/abs/10.1021/es902911a?prevSearch=%255Bauthor%253A%2Bhornbuckle%255D&searchHistoryKey)

Provided by University of Iowa

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