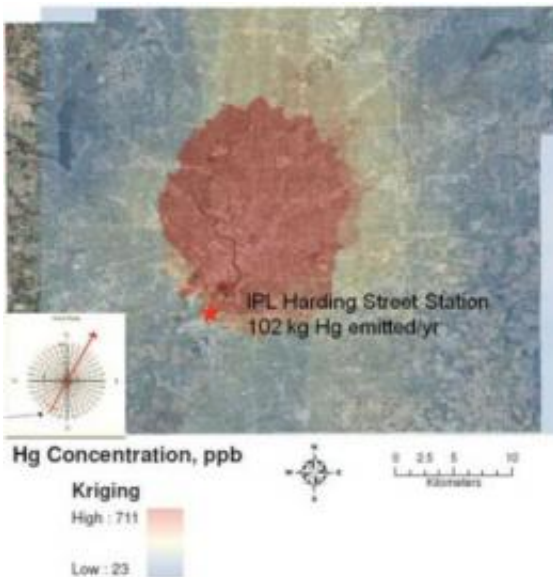


# Soil samples reveal urban mercury footprints

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The wind patterns in this area of Indiana blow dominantly to the northeast (see wind rose on lower left). The high soil mercury values are seen downwind of the largest mercury emitter in central Indiana. This pattern suggests that local sources of mercury also impact local deposition of mercury in central Indiana, which in turn causes high levels of mercury in waterways and in fish. Credit: School of Science at Indiana University-Purdue University Indianapolis

Indianapolis, St. Louis, Detroit, Buffalo, Richmond and Providence – cities scattered across the eastern half of the United States – have something in common, all have coal-fired power plants. A new study from the School of Science at Indiana University-Purdue University Indianapolis is among the first to investigate mercury deposits in industrialized city soil near this type of facility.

The study, which appears in the July 2011 issue of the journal *Water, Air & Soil Pollution*, reports that measurable amounts of the [mercury](#) emitted by coal-fired power plants is deposited in local soil and subsequently enters regional watersheds, contaminating fish and making them unsafe for human consumption.

Previous research on the spread of environmental mercury has focused on waterways. The IUPUI researchers looked at land, testing soil samples, detecting hot spots of mercury contamination in central Indiana specifically tied to local coal-fired power plants by chemical signatures. Winds blew the mercury contaminated soil to the northeast and the natural flow of waterways brought the mercury back to the southwest, far into bucolic appearing areas frequented by anglers.

While wind patterns vary by cities, the process in various urban areas is similar with mercury emitted from coal-fired power plants contaminating [soil](#) that is then transported downstream. Since cities have a high percentage of impervious surfaces like roads and parking lots, the mercury enters waterways rapidly.

"Mercury from coal-fired power plants has been found in the ice at the North and the South Poles, so the fact that these noxious emissions are swept far away to other areas or even continents, with global environmental impact, is well known. What had not been previously shown is the impact of the mercury on the environments in cities, suburbs and rural areas near specific coal-burning power plants," said senior author Gabriel M. Filippelli, Ph.D., professor of earth sciences at the School of Science at IUPUI.

Coal-fired [power plants](#) produce electricity at a relatively low cost. This is false economy, according to Filippelli, who directs the Center for Urban Health at IUPUI, because these cost figures do not factor in the impact of these plants on human health. He is a pioneer in the emerging

field of medical geology and served as the first elected chair of the Geological Society of America's Geology and Health Division.

Mercury poisoning can cause permanent neurological damage in humans. Pregnant women and their fetuses are especially susceptible to mercury, much of which enters the body through consumption of contaminated fish.

"We are fouling our local as well as global environment and little has been done to stop it. It all comes down to the choices we make to produce energy. As we gain a better understanding of the deposition and risk patterns of mercury from using dirty coal as our primary energy source in the Midwest, we hopefully will be better able to stop or decrease the emission of this neurotoxin and halt the damage it is causing humans," said Filippelli.

Carrie Lynn Hatcher, a former graduate student in the School of Science at IUPUI, now at the University of Toronto, is the co-author of "Mercury Cycling in an Urbanized Watershed: The Influence of Wind Distribution and Regional Subwatershed Geometry in Central Indiana, USA."

The study was supported by the School of Science at IUPUI and the IUPUI Center for Urban Health.

In a November 2010 publication, the U.S. Geological Survey (USGS) reported that mercury concentrations in Indiana watersheds "routinely exceeded criteria protective of humans and commonly exceeded criteria protective of wildlife." One in seven fish in Indiana contain mercury in levels not fit for human consumption.

Provided by Indiana University

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