

Research team releases Great Lakes sediment material for measuring organic pollutants

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Researchers use the Ponar grab to extract sediment samples from the lakebed in Milwaukee Bay. Credit: M. Ellisor/NIST

People who live near the Great Lakes might go there to enjoy a swim or a boat ride. But if you're visiting from the National Institute of Standards and Technology (NIST), you might go boating for science.

Collaborating with researchers from the Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric

Administration (NOAA), NIST researchers collected freshwater [sediment](#) samples from Milwaukee Harbor in Lake Michigan.

Their overarching mission is to help scientists accurately measure organic pollutants in the environment. To help do so, NIST has released a reference material containing carefully measured organic contaminants in Great Lakes sediment.

Measurements are important in understanding the impact of pollutants on the environment and how that in return affects us. "It's important to know water and soil quality. You don't want to be near contaminated sediment or eat contaminated fish," said NIST researcher Jessica Reiner.

Reiner and her colleagues want to further improve measurements of persistent organic pollutants (POPs), toxic chemicals that can negatively affect human health and the environment. They last for long periods of time and aren't easily broken down. Many POPs were first produced after World War II and introduced commercially for agriculture, manufacturing and other uses. But unfortunately, these organic pollutants can also pass through the food chain from one species to another.

Concerns are rising about POP concentration in freshwater regions such as the Great Lakes, which border the northern part of the U.S and southern Canada. Freshwater bodies are important as they're sources of our drinking water. Collectively, the Great Lakes make up the largest body of fresh water on the planet and account for one-fifth of the total fresh water on Earth, around 6 quadrillion gallons of water.

The EPA is working to reduce organic pollutants found in the Great Lakes, concentrations of which are known as Areas of Concern (AOC). With information about the AOCs, NIST worked with NOAA to find sites in the Great Lakes in which specific pollutants are known to be present.



NIST researchers collected sediment material from three different sites in Milwaukee Bay. The sediment was put in stainless steel milk cans for storage before being transported to Hollings Marine Laboratory for sample analysis. Credit: M. Ellisor/NIST

NIST researchers focused on two types of POPs: Polycyclic aromatic hydrocarbons (PAH) and per- and polyfluoroalkyl substances (PFAS). PAHs are a group of chemicals naturally found in coal, crude oil and gasoline and are also released into the environment from the burning of coal, oil, gas, wood, solid waste and tobacco. PFAS are a group of chemicals found in products made to resist heat, oil, stains, grease and water. They can be found in everything from clothing and furniture to the insulation of electrical wires.

Both are a concern because they do not easily break down in the environment and can move through soils to contaminate drinking water

sources like rivers and lakes. Increasing evidence suggests that PFAS and PAHs have detrimental health effects.

Over the years NIST has developed a variety of environmentally related SRMs, but until now there was not a freshwater sediment reference material available for the scientific community with values for organic contaminants. NIST's new SRM 1936—Great Lakes Sediment—enables scientists to validate the methods they're using when measuring for organic pollutants in their own sediment samples.

NOAA researchers collected sediment samples from various AOCs around the Great Lakes region, which helped NIST researchers pick the sample site of Milwaukee Harbor for their sediment samples.

Researchers then took a boat out to three different sites in Milwaukee Harbor, part of Lake Michigan. They used the Ponar grab, a metal device that's lowered to the bottom of the lake, to scoop up samples from the lakebed. The sediment samples were placed in stainless steel cans before they were transported to the Hollings Marine Laboratory in Charleston, South Carolina, for storage.

The batches of sediment then went to the main NIST campus in Gaithersburg, Maryland. Workers there broke the sediment down into a uniform consistency and bottled it. The bottled samples returned to Charleston, where scientists analyzed and characterized the organic pollutants in them.

The organic pollutants in the Great Lakes sediment SRM will be useful for regulatory environmental agencies such as the EPA and NOAA, as well as state agencies, to help with ongoing efforts in monitoring trends of organic pollutants in the Great Lakes area, which will determine if contaminant reduction efforts are working. The SRM will also be beneficial to scientists working in analytical chemistry laboratories conducting research on PFAS and PAH measurements and analyzing

their own soil samples for specific pollutants, as well as academic labs.

SRM 1936 will be replacing SRM 1944 (New York/New Jersey Waterway Sediment) and SRM 1941b (Organics in Marine Sediment). But it's not the only SRM that deals with organic pollutants like PFAS. NIST also has a domestic sludge SRM and fish tissues SRMs specific to Lake Michigan and Lake Superior.

Provided by National Institute of Standards and Technology

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