Dartmouth Toxic Metals
Superfund Research Program

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Hg
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Mercury: What you need to know

How does Mercury get into the environment?

Mercury is a naturally occurring element found in various rocks, minerals and compounds, that is released into the environment when these compounds break down over time, or when there are catastrophic natural events such as volcanic eruptions. Today, however, two-thirds of the mercury entering the environment comes from manmade sources including coal burning, industrial plants, and incinerators. These manmade sources are also responsible for a three-fold increase in global mercury deposited to the landscape in recent decades, with four- to six-fold increases in the Northeastern United States. Former Chlor-alkali facilities like the factory previously in Berlin, NH, are also a major source of mercury contamination to adjacent water bodies. As a result, many of these areas, including Berlin, have been designated by the U.S. Environmental Protection Agency (EPA) as Superfund sites.

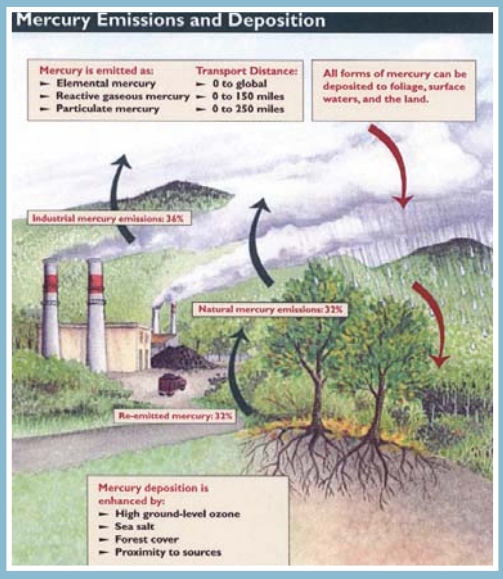
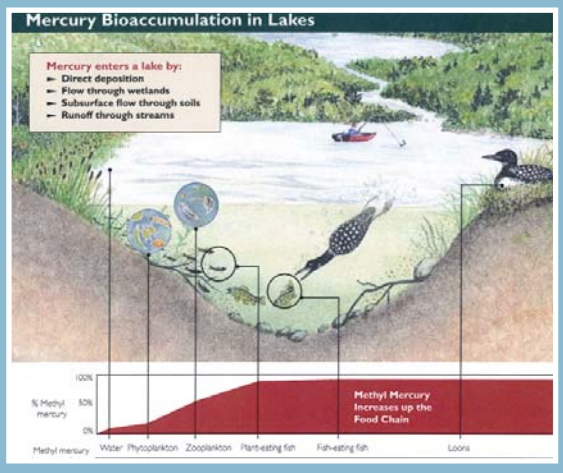


Illustration courtesy of Mercury Matters (2007) a publication of the Hubbard Brook Research Foundation

How are humans exposed to Mercury?

Once mercury is released into the environment, it is deposited on the Earth's surface in one of two ways: *wet* deposition (rain or snowfall) or *dry* deposition (gases or particles). Where the deposits become most problematic are in bodies of water, where run-off carries these trace amounts of mercury into aquatic ecosystems. After settling on the bottoms of lakes, rivers, or streams, bacteria turn the inorganic mercury into toxic methylmercury, which is in turn consumed by microscopic organisms at the bottom of aquatic food chains. Methylmercury becomes more concentrated as it moves up the food chain in a phenomenon known as *biomagnification*. Eating fish near the top of these food chains is the most common way for humans to be exposed to dangerous levels of methylmercury.



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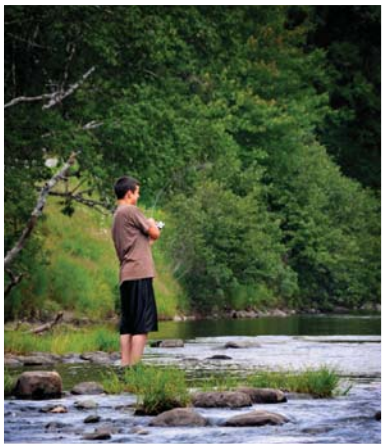
Berlin Superfund Site

Over the summer of 2010, researchers with the Dartmouth Toxic Metals Superfund Research Program studied mercury in soil, water, plants and animals at the Berlin Superfund site adjacent to the Androscoggin River. Researchers studied the fate of methylmercury within the food web of the river, and additional studies involved characterizing the form of methylmercury in the Androscoggin. By measuring how much of the toxin was bound to organic materials or associated with organic tissue of plants and animals, results from this research will help determine how methylmercury is being transported and taken up in the Androscoggin River ecosystem. Future research will involve comparing the pattern of mercury bioaccumulation in invertebrates and fish near the Superfund site and farther downstream.



Fishing along the Androscoggin River

How does Mercury affect humans?

Mercury intake is particularly dangerous to pregnant women, unborn babies, and young children since it causes problems with the nervous system, memory, speech, personality, and brain function. In high doses it can also hurt liver and kidney function, even in average adults. Research has shown that fish-eating wildlife suffers behavioral changes and reproductive problems due to chronic methylmercury exposure, particularly aquatic wildfowl like the common loon. Due to its frequent occurrence and ability to damage the vital systems of a wide range of organisms, it is ranked third on the U.S. EPA's list of hazardous substances and is also the third most common contaminant in Superfund sites across the country.

C-MERC

Despite the significant connection between the bioaccumulation of mercury in marine food webs and dietary consumption of fish by humans, many important uncertainties and gaps exist in our understanding of the sources of methylmercury in marine systems and the pathways to human exposure. The Coastal and Marine Mercury Ecosystem Research Collaborative (C-MERC), sponsored by the Dartmouth College Toxic Metals Superfund Research Program, is working to address these important questions. Guided by a steering committee and support staff, C-MERC has convened a team of scientists and stakeholders to work together over a two-year period to gather and analyze data to publish papers which will elucidate key processes related to the inputs, cycling and uptake of mercury in marine ecosystems. The relevant findings from this initiative will be translated and distributed to public health and policy stakeholders and the general public.

For information on eating fish to stay healthy and avoid too much mercury go to:

http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/advisories_index.cfm
http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm110591.htm
http://www.consumerreports.org/cro/magazine-archive/2011/january/food/mercury-in-tuna/mercury-in-fish/index.htm

For more information on mercury research go to:

www.c-merc.org

Why do some fish have more Mercury than others?

Recent studies at Dartmouth have examined the fate of mercury in aquatic food webs in ecosystems that have ranged from lakes, ponds, and reservoirs to coastal estuaries, contaminated and pristine alike. The research looks to further our understanding of the relationship between environmental exposures to mercury and its bioaccumulation in aquatic food webs. By studying factors that influence mercury exposure and availability, this research indicates that factors such as land use, plankton abundance, and nutrient inputs affect the amount of methylmercury in aquatic food webs and has generated a greater understanding of mercury fate in the environment.

River Trout

Common Loon

Please visit our website at: http://www.dartmouth.edu/~toxmetal

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