

NADP's Atmospheric Mercury Network

Moving toward Total Mercury Deposition

At its Fall 2009 meeting, the National Atmospheric Deposition Program (NADP) Executive Committee approved the Atmospheric Mercury Network (AMNet) to establish a network of monitoring stations that measure atmospheric mercury species (or fractions) across North America. This new network will be an intensively operated subset of the existing Mercury Deposition Network (MDN) sites. Each station will measure the concentration of atmospheric mercury fractions from continuously automated measuring systems, the concentration of total mercury in precipitation, and meteorological conditions. This information will be used to calculate mercury wet deposition and estimate mercury dry deposition. Data will be collected using standardized instrumentation, methods and quality assurance procedures. The goal will be an international archive of mercury concentrations and deposition estimates for use in scientific studies, modeling efforts and for policy needs.



The Importance of Total Mercury Deposition

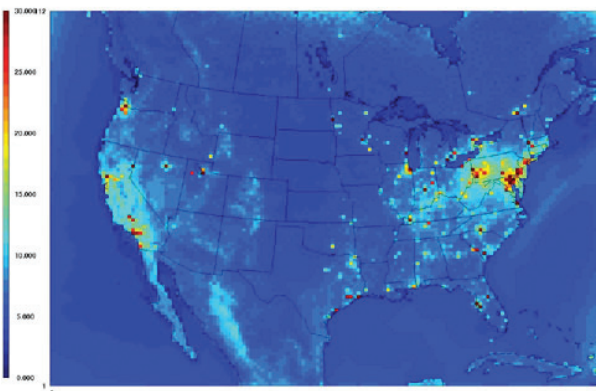
Mercury is an environmental pollutant and a neurotoxin. Widespread distribution in the environment has been linked to adverse health impacts in humans, fish and wildlife. The single largest source of mercury pollution in the U.S. is atmospheric emissions and subsequent deposition associated with combustion from coal-fired power plants, waste incinerators, and chlorine production plants. Atmospheric deposition to surface waters and wetlands has been linked to movement of mercury through the food web, resulting in high concentrations in fish and mammal populations. Mercury moves to humans through food consumption (of fish for example), resulting in health risks especially to fetuses and young children.

Despite the widespread mercury pollution and its serious health risks, there is no organized national monitoring of total mercury deposition. The MDN currently monitors wet deposition of mercury, or mercury that is removed from the atmosphere by precipitation processes. However, dry deposition of mercury, or removal without precipitation, is not measured across the U.S. and is also important. Under certain situations, dry mercury deposition could exceed wet mercury deposition. Therefore, it is necessary to monitor both wet AND dry deposition.

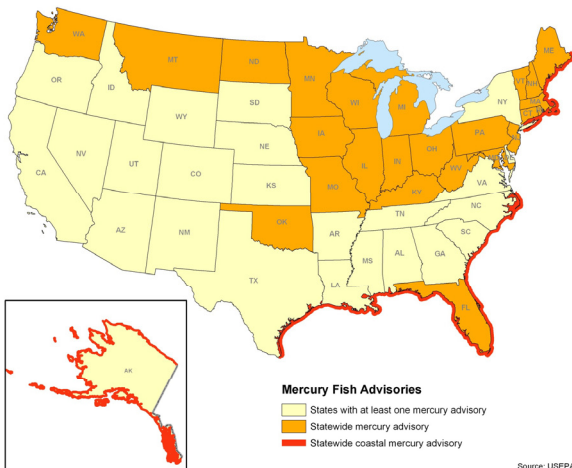
Others understand the importance of mercury monitoring. For example, the U.S. EPA Office of the Inspector General cited (May 15, 2006) the gap in U.S. mercury monitoring, recommending "that EPA develop and implement a mercury monitoring



Atmospheric mercury measurement field sites



Annual mercury dry deposition estimate (EPA, 2001)



Mercury fish advisories by state

plan to (1) assess the impact of the mercury rules on mercury deposition and fish tissue; and (2) evaluate and refine mercury estimation tools and models". Planning is currently underway with the MercNet to estimate dry deposition and measure wet deposition in support of combined federal and state efforts, and the need for long-term monitoring of total mercury deposition. AMNet is integral to this effort.

Monitoring Goals, Approach, and Cooperators

There are three major goals for AMNet:

- determine the status and trends in concentrations of atmospheric mercury fractions (reactive gaseous, particulate-bound, and elemental) in select locations;
- offer high-quality measurements to estimate dry and total deposition of atmospheric mercury to aquatic ecosystems and other areas of interest on the local, regional, and global scale; and
- provide data for atmospheric mercury model development, validation, and improvement.

Monitoring and analysis of the three atmospheric mercury fractions uses a 2.5-micrometer impactor and KCl-coated annular denuder (for ionic mercury), thermally-desorbed, regenerable particulate filter (for particulate-bound mercury), and

gold traps (for elemental mercury). Analysis uses cold vapor atomic fluorescence spectroscopy (CVAFS).

NADP is actively seeking global partners to operate individual instruments and field sites. The network is currently operating at 20 U.S. and Canadian locations (see map at left). These sites are all operating under consistent operating principles, with a dataset being built at the NADP's Program Office. Over 15 site years of measurements have been collected and quality assured. More information about participation and the network is available at <http://nadp.isws.illinois.edu/amn>.

NADP's primary network responsibility is to assure that the network data are accessible, quality assured, and comparable. Specifically, NADP:

- coordinates the network through the established, transparent, collaborative NADP process;
- produces sampling and analysis standard operating procedures;
- produces quality assurance procedures and auditing services to provide confidence and consistency in network data;
- provides data management and validation; and
- provides multi-station data in a forum that supports mercury research, modeling efforts, and informed policy decisions.

Further information on network participation, planning, operation, and status is available at the NADP web site. Any comments, suggestions or inquiries about participation are welcome, and can be submitted to the NADP's Network Coordinator (David Gay; dgay@illinois.edu).

<http://nadp.isws.illinois.edu> • 217-333-7871

National Atmospheric Deposition Program
2204 Griffith Drive, Champaign, IL 61820



Photos and illustrations courtesy U.S. Fish and Wildlife Service