Selected U.S. Mercury Transport/Fate Research and Monitoring Activities

June 17, 2010
UNEP Partnership Meeting, Glasgow, Scotland

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Presentation Purpose and Background

- This Partnership sector has agreed (11/09 T and F Partnership teleconference) that it will:
  - give priority to informing the UNEP Intergovernmental Negotiating Committee (INC) process that is expected to result in a global mercury binding instrument in 2013.
  - extend its mission scope beyond emissions, air transport and deposition to include aquatic transport, methylation, bioaccumulation and exposure.

- The INC likely will need information to demonstrate Instrument effectiveness, e.g., trends, and to consider how reduced global emissions can affect exposures.

- Thus, we will briefly discuss selected U.S. monitoring and modeling efforts that can contribute to the Partnership's Business Plan.

Selected U.S. Mercury Monitoring/Modeling Efforts

- I. Coordination of mercury multimedia monitoring (emissions, deposition, etc) in the U.S.
- II. Mauna Loa, Hawaii air monitoring data.
- III. Studies linking global mercury emissions to U.S. exposure

I. *Coordination of U.S. Mercury Monitoring Programs*

- *Wet* deposition is monitored at over 100 National Atmosphere Deposition Program (NADP)/Mercury Deposition Network (MDN) sites across North America.
  - In addition, USEPA, in partnership with other Federal agencies, Environment Canada and National Atmosphere Deposition Program (NADP) is implementing a North American network (AMNet), for measuring atmospheric mercury species at 21 collocated MDN sites, to estimate *dry* deposition.
  - The group also has proposed linking the various monitoring programs in various media in a coordinated system (MercNet).

- We believe that AMNet is consistent with and a foundational building block for the global mercury multimedia network envisioned by the Partnership. AMNet has developed products and experience that now are ready to be communicated internationally.

- We note that the Italian-led, European Commission-funded Global Mercury Observation System (GMOS) project, developed within the framework of the Global Earth Observation System of Systems (GEOSS), is anticipated to be launched in late 2010.

- Therefore, USEPA looks forward to discussions soon with Italy and others on advancing various goals, including standardization of measurement methodologies, that are common to NADP, the Partnership and to GEOSS.

I. Coordination Continued: Atmospheric Mercury Network (AMNet)

Mission and Goals

- To **coordinate**, quality-assure, store, and share existing and new atmospheric mercury data
- To measure a baseline of **total deposition** (dry and wet)
- To analyze **trends** in total (dry and wet) deposition over time and geographically
- To evaluate and improve predictive-**models**
- To provide data to scientists and policy makers to **assess mercury** emission **reductions**
- To stimulate, test, and incorporate **R & D**

I. *AMNet Documentation and Data Products*

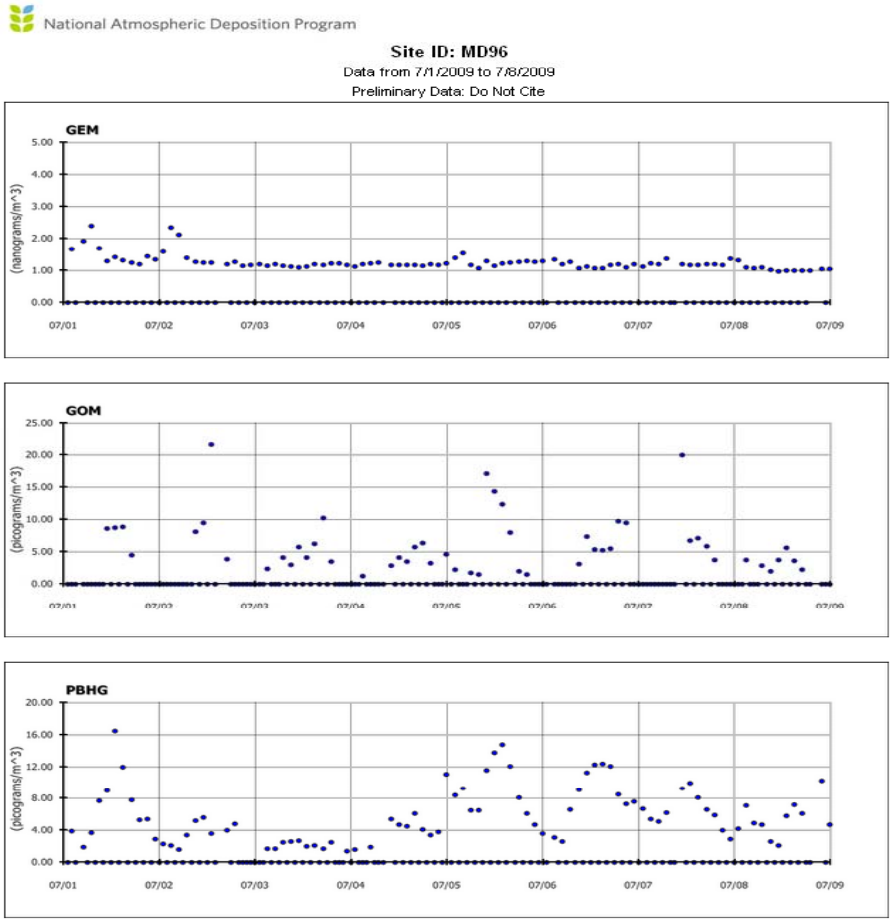
Network Documentation

- Network Standard Operating Procedures
  - Field Operations
  - Data Management
  - Site Survey
- Draft Siting Criteria
- Quality Assurance Plan
- 12 point plan
  - Network costs, benefits, summary of services cooperator contract

NADP/AMNet data products

- Hg speciation data products available on the NADP website in two formats
  - Bi-hourly graphical plots
  - Bi-hourly tables
- 20 sites reporting data
- Dataset with 3 million records

AMNet Website:
http://nadp.isws.illinois.edu/amn/



http://nadp.sws.uiuc.edu/amn/

I. Coordination – Cont: MercNet

- MercNet seeks to provide a national coordination framework for various U.S. mercury monitoring programs:

  - *Emissions*. The U.S. tracks emissions via the National Emissions Inventory (NEI), which includes various state and local data and the reported results of the Toxic Release Inventory (TRI).

  - *Ambient air concentrations and Deposition*. *Wet* deposition is monitored at over 100 NADP/MDN sites across North America. In addition, air concentrations are now measured at 21 collocated sites (AMNet) to estimate *dry* deposition.

  - *Surface water, sediments and biota*. Various states and Federal agencies monitor concentrations in fish and other biota in lakes, streams and coastal estuarine areas.

  - *Humans and wildlife*. The U.S. Health and Human Services routinely monitors blood levels through the National Health and Nutrition Examination Survey (NHANES); US Department of the Interior monitors some wildlife.

I. *Coordination – Continued: MercNet*

- MercNet's goal is to systematically monitor, assess and report on indicators of nationwide changes in various media in response to changing mercury emissions over time.

- While not fully implemented, MercNet:

  - Calls for 20 nationally distributed sites that have been preliminarily selected to represent a wide range of anticipated responses (timing and magnitude).

  - Provides a database of ~500,000 Hg multi-media sampling events, 1896-2009

- MercNet website: http://nadp.sws.uiuc.edu/mercnet/

II. Mauna Loa Air Monitoring Data

- Since 2002, EPA has collected air monitoring data, including speciated measurements of atmospheric mercury (Hg^0, RGM, and HGP), particulate matter and other criteria pollutants, at NOAA's high altitude observatory (approximately 11,000 feet) at Mauna Loa, Hawaii. Most of the data now have been quality assured.

- Data could be used to:
  - Better understand transformation and fate of globally cycled mercury, including trans-Pacific transport of anthropogenic emissions.
  - Further atmospheric process research by elucidating high altitude chemical and physical processes impacting mercury transformation and fate.
  - Link with data from other global baseline mercury measurement stations.
  - Provide support to accumulate a long-term record of various mercury species.
  - Support model development and evaluation.

II. Mauna Loa Data – Cont.

- Discussions are now underway between EPA and Italy to initiate a collaborative research effort using the Mauna Loa data.
  - Initial focus will be on model development and evaluation.
  - The effort could be expanded to include others in the Partnership.

- As per the Partnership Business Plan, a notice of availability for two years of data will be posted on the UNEP web site.
  - Interested collaborators may inquire about obtaining data to investigate hypotheses.

III. Modeling Studies of Global Emissions

- During 2010/2011, USEPA anticipates conducting an integrative modeling study of the fate of global emissions in the Northern Pacific Ocean and their impact, considering different emission reduction scenarios, on U.S. population exposures.
  - About 30 percent of U.S. intake of methylmercury is estimated to be from fish caught in the North Pacific above 30 N.

- This study will build on the approach of the Sunderland *et al.*, 2009 study, which modeled the 2005 global emissions inventory, linking a global model, GEOS-CHEM, to an ocean model.

- The study results can inform the Partnership and the INC. We will work to ensure that the information is shared.

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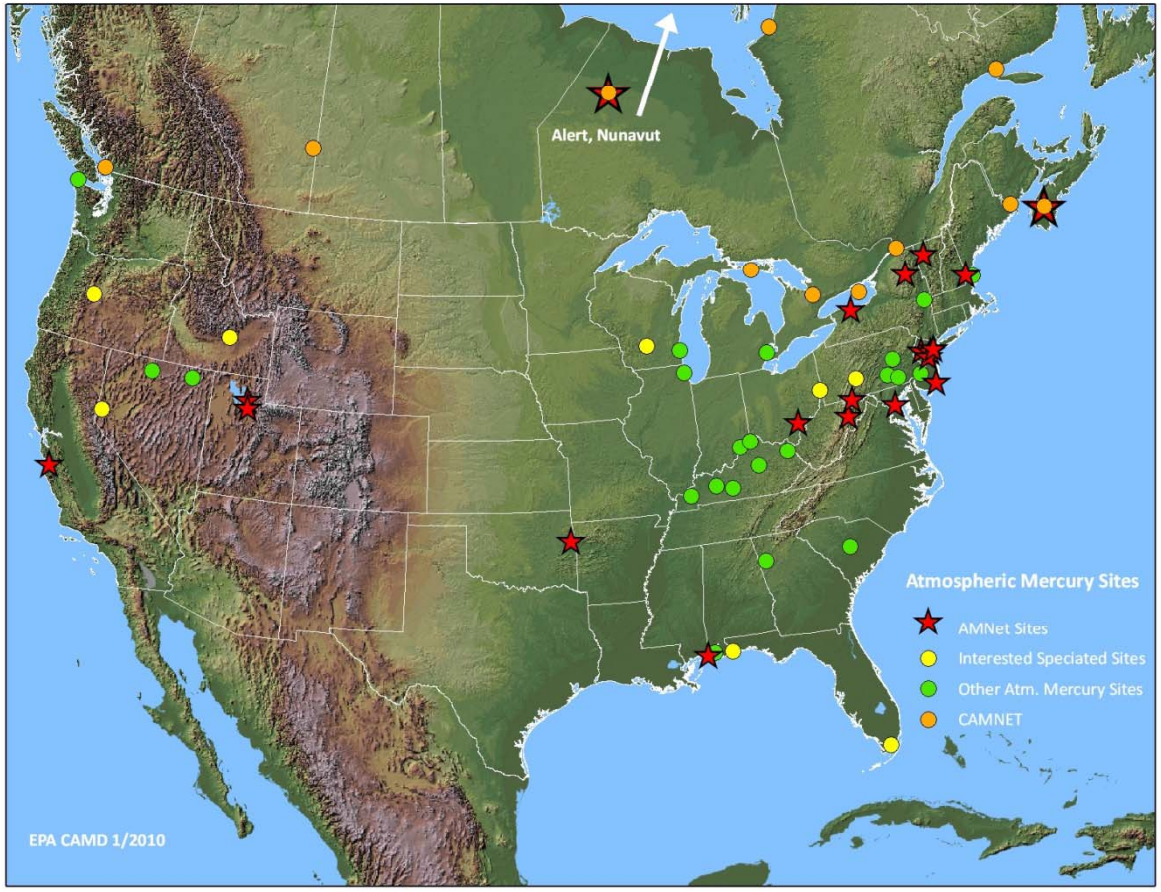
AMNet – Current Site Locations & Participants



- Federal Agencies
  - EPA, NOAA, USGS
- State Agencies
  - New York DEC, Utah DEQ, New Jersey DEP, Vermont DEC, Wisconsin DNR
- Tribes
  - Cherokee Nation
- International
  - Environment Canada
- Academic Institutions
  - Clarkson University, Ohio University, U. of New Hampshire, U. of Maryland, U. of Utah, U of California
- Private
  - Eastern Research Group, Tekran, Inc.