



The NYSDEC's Program to Monitor Mercury Wet Deposition and Ambient Hg(0), Divalent Hg and Hg(p) in Two Urban Areas

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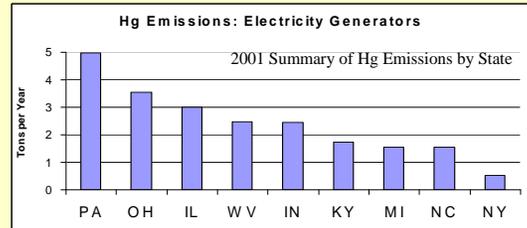
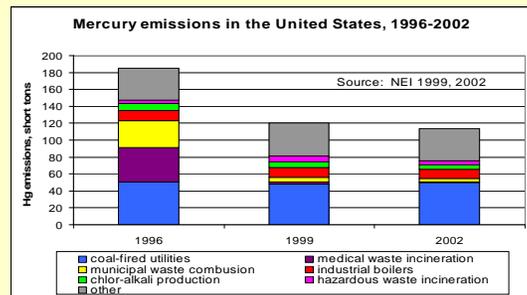


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Introduction

Mercury is a concern to public health and the natural resources in New York State. Due to the high levels of mercury in freshwater fish, the State Departments of Environmental Conservation and Health have issued specific warnings advising that pregnant women and children should not consume any servings of specific fish species that are caught in 93 lakes and more than 265 miles of rivers in the State. Much of the mercury deposited across the State results from human activities, including coal combustion, waste incineration, and other industrial applications. Once deposited, mercury can be converted to the highly toxic methyl form; methylmercury can bioaccumulate in the food chain and cause developmental and reproductive health issues with humans and piscivorous animals.

Over the past decade the largest reductions in anthropogenic mercury emissions have occurred from the municipal waste combustion and medical waste incineration sectors. During this same period, emissions of mercury from coal-fired utilities have not changed appreciably. However, mercury emissions from this sector are expected to decrease in the coming years as a result of Clean Air Mercury Rule legislation (CAMR). As these planned reductions are phased-in, it is important to monitor ambient concentrations and deposition of mercury to establish baseline levels and to determine the effectiveness of mercury emission controls



NYSDEC Mercury Monitoring Program

In 2005, the NYSDEC applied for an EPA Toxics Community Assessment Grant RFA: OAR-EMAD-05-16. This grant was awarded and will provide funding for two years to monitor air concentrations of elemental, divalent, and particle-bound mercury as well as weekly wet deposition of total mercury at two urban locations in New York State: Bronx and Rochester. Ancillary measurements of co-pollutants such as SO₂, O₃, CO, PM_{2.5}, acid deposition, and meteorological parameters are currently made at these locations, which will help aid in source attribution analyses. The monitoring instrumentation is currently undergoing acceptance testing in the NYSDEC laboratories and should be installed in the field locations by the end of the year. The ambient measurements will utilize a Tekran 2537B, 1130 and 1135 for elemental, divalent and particle-bound mercury respectively. The wet deposition measurements will follow the NADP/MDN protocol.

Mercury Monitoring Instrumentation

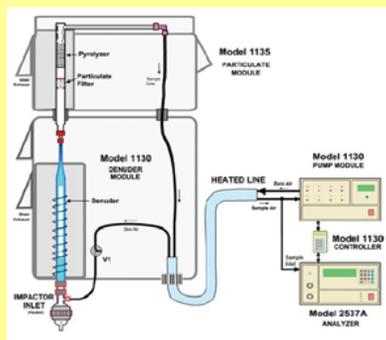
Elemental Hg Vapor Analyzer

Tekran 2537B Analyzer
Detection using CVAF: Cold Vapor Atomic Fluorescence
Two Gold Cartridges allow continuous sampling.
Sample interval: 5 Minutes
Permeation tube allows for frequent automatic calibrations.
Argon minimizes interferences.
A computer is needed to capture serial data stream.



Particle-Bound Hg Collector

Tekran 1135 houses quartz filter and pyrolyzer glassware
Sample flow is 10 l/m
The Hg is thermally desorbed every 3 hours at 800° C.
Quantitation provided by the elemental gas analyzer.



Divalent Hg Collector

Tekran 1130 houses KCl coated annular glass denuder
Sample flow is 10 l/m
The Hg is thermally desorbed every 3 hours at 500° C.
Quantitation provided by the elemental gas analyzer.

Wet Deposition Collector:

MDN 00-125-2 Automatic Precipitation Sampler
N-CON Systems Company, Inc. Crawford, GA
The system minimizes contamination by opening the collection bottle only when precipitation is detected by the infrared sensor.
The sample train is glass and is exchanged after each weekly sample pick-up.
Approved for use in the MDN Network



Wet Deposition Gauge:

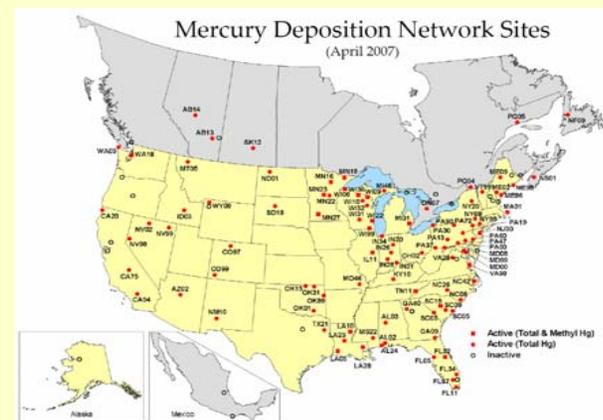
ETI NOAA IV Total Precipitation Measurement System
ETI Instrument Systems, Inc. Fort Collins, CO
The Gauge weighs all types of precipitation in the collector or clinging to the sides.
The onset detection system provides accurate time stamp for each precipitation event.
Approved for use in the MDN Network



Mercury Deposition Network (MDN)

The Mercury Deposition Network (MDN) is the mercury wet-deposition monitoring arm of the National Atmospheric Deposition Program (NADP). The NADP is a cooperative monitoring program comprised of federal and state agencies, academic institutions, Native American tribal governments, and private organizations. High-quality environmental data have been collected for NADP monitoring networks since 1978. The NADP has a long history of providing consistent, accurate, quality assured data to researchers, policymakers, and the general public. The MDN began measuring total mercury in precipitation (wet deposition) in 1996. It now has more than 100 sites. Automated wet-deposition collectors and precipitation gauges measure mercury concentrations and wet deposition. After review and validation by the NADP Program Office, data are made available to all users. The MDN:

- Provides a nationally consistent survey of mercury wet-deposition concentrations and fluxes showing regional and international deposition patterns.
- Identifies long-term pattern changes in wet-deposition rates over time and space.
- Provides high-quality data for use in estimating wet deposition rates locally or between sites, and for current and future mercury policy and modeling efforts.



MDN Mercury Initiative

The NADP is currently working on a new collaborative monitoring program called the Mercury Initiative. Its goals are to:

- Facilitate the calculation of wet, dry, and total deposition;
- Provide data for evaluating predictive and diagnostic models and for assessing source-receptor relationships
- Build a data set for analyzing spatial and temporal trends.

The program will institute a standard operating procedure for the operation of continuous ambient monitors, provide standardized methods for quality assurance and provide an access controlled central database. The NYSDEC plans on participating in this national effort.

Implications

These urban deposition measurements will allow for comparisons with MDN data from sites in Huntington Forest, Biscuit Brook, and West Point. The continuous data may provide insight on Hg dry deposition and co-pollutant interactions. All of these measurements will provide information necessary to determine contemporary baseline concentrations. Continued monitoring will be necessary to track changes resulting from CAMR and other proposed emissions controls. The EPA predicted the potential benefits from the CAMR through modeling, using the Community Multi-scale Air Quality model, for the years 2010 and 2018. Comparisons between baseline monitoring data and future monitoring data will allow EPA projections to be verified.

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