

Total Maximum Daily Loads (TMDLs) and Mercury—Overview of Resources on the EPA Webpage

Introduction

Thousands of waterbodies are listed on State Clean Water Act Section 303(d) lists as impaired due to mercury, often due to high mercury levels in fish. Mercury accumulates in fish tissue as methylmercury, the form that presents the greatest risk to human health through consumption of contaminated fish. Many states have issued advisories to limit consumption from certain waters or certain fish due to high levels of mercury.

In many waterbodies, mercury originates largely from air sources, such as coal-fired power plants and incinerators that deposit in waters or adjacent lands that then wash into nearby waters. Contributions may come from a combination of local, regional, and international sources. In some cases the presence of mercury may be a result of past practices that used mercury, such as historic gold mining, or from geologic deposits. Some mercury may be discharged via water point sources, although in many waterbodies, the amounts are usually very small compared to other sources. Products containing mercury may also result in releases to water and air during waste handling and disposal processes.

Given the variety of potential mercury sources, developing and implementing TMDLs for mercury-impaired waters may involve coordination among multiple programs – water, air, waste, and toxics programs. EPA, states, and other stakeholders continue to work on how best to develop mercury TMDLs and reduce sources of mercury. Examples of policy and technical tools to assist in developing mercury TMDLs, and example mercury TMDLs, are included below.

[National Summary of Mercury Impairments](#)

Policy and Guidance Documents

[Cover memo transmitting Mercury TMDL Elements Documents \(PDF\)](#) (2 pp, 13K) – memorandum signed by Craig Hooks, September 29, 2008

[Recommended TMDL Elements and Factors to Consider in Developing Mercury TMDLs \(PDF\)](#) (22 pp, 410K), September 29, 2008

[Listing Waters Impaired by Atmospheric Mercury](#) Under Clean Water Act Section 303(d): Voluntary Subcategory 5m for States with Comprehensive Mercury Reduction Programs -- memorandum signed by Craig Hooks, Mar. 8, 2007

[Methylmercury Criterion Implementation Guidance](#) This document provides technical guidance to States and authorized Tribes on how they may want to use the January 2001 fish tissue-based recommended water quality criterion for methylmercury in surface water protection programs (e.g., TMDLs, NPDES permitting).


Mercury TMDL Examples and Supporting Studies

Mercury TMDL Examples

- [Mercury TMDL Examples](#) Examples of TMDLs involving mercury from air deposition and legacy sources.

Mercury Air Deposition Pilot Project Reports

Pilot projects were conducted to examine modeling approaches that could be used in a TMDL where mercury is predominantly from atmospheric deposition. The projects looked at how to integrate air and water modeling results. In the Devil's Lake pilot, a modeling approach for identifying contributions from air sources to a waterbody was also evaluated.

- [Pilot Study for Conducting A Mercury Total Maximum Daily Load Analysis for an Atmospherically Derived Pollutant in Devil's Lake, Wisconsin \(PDF\)](#) (97 pp, 985K)
- [Fact Sheet on Everglades Mercury TMDL Pilot Report](#)
- [Everglades Mercury TMDL Pilot Study Report](#) 

Atmospheric Mercury Deposition Project for Watershed Planning

The Atmospheric Mercury Deposition Project for Watershed Planning contains the results of a 12–km grid cell modeling analysis for the lower 48 States. In this project, roughly 300 of the top mercury emitters in the US were "tagged" in order to allow source attribution analysis for individual areas of concern, such as waterbodies, watersheds, or catchments.

- [Fact Sheet: Model-based Analysis and Tracking of Airborne Mercury Emissions to Assist in Watershed Planning Report. \(PDF\)](#) (2 pp, 38K), September 2008.
 - [Model-based Analysis and Tracking of Airborne Mercury Emissions to Assist in Watershed Planning Report \(PDF\)](#) (350 pp, 9.6MB), August 2008.
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Examples of Mercury Deposition Modeling Tools

Atmospheric Deposition Models

Atmospheric deposition models can be used to help develop mercury TMDLs by estimating the load falling to a particular waterbody or waterbodies of interest. In addition, they can shed light on the relative contributions from key sources. Because deposition in a given area is typically made up of contributions from local, regional, as well as global air emission sources located in other countries, modeling techniques for TMDL applications need to be able to account for deposition from a broad array of geographically dispersed sources. Examples of continental–scale and global–scale models that can be used in TMDLs are provided below.

Continental-scale Models:

Continental-scale models contain detailed emission data from sources in the US, plus Canada and Mexico. Such models incorporate results from global-scale models in order to account for long-range transport of mercury primarily from sources located outside of North America. A link to The North American Mercury Model Intercomparison Study (NAMMIS), which compares these and other related models, is provided below.

- [EPA Community Multiscale Air Quality \(CMAQ\) Model](#)
- [Regional Modeling System for Aerosols and Deposition \(REMSAD\)](#) EXIT Disclaimer
- [The North American Mercury Model Intercomparison Study \(NAMMIS\)](#) EXIT Disclaimer

[An analysis of simulated wet deposition of mercury from the North American Mercury Model Intercomparison Study](#) EXIT Disclaimer

Global-scale Models:

Global-scale models contain emissions data from sources located around the world. Results from these models tend to be coarser than that from Continental-scale models.

- [Goddard Earth Observing System \(GEOS-Chem\) Model](#) EXIT Disclaimer
- [Global/Regional Atmospheric Heavy Metals \(GRAHM\) Model](#) EXIT Disclaimer

Watershed and Waterbody Models

TMDLs calculate the maximum amount of a pollutant that can enter a waterbody, such that the waterbody will meet water quality standards for that particular pollutant. This "loading capacity", and the specific reductions needed to meet it, is typically calculated using water quality modeling tools. Below are links to some information on water quality models that may be used in developing mercury TMDLs. Additional information on water quality models and example of their use in mercury TMDLs can be found in the [Methylmercury Criterion Implementation Guidance](#).

- [EPA Mercury Modeling in Watersheds and Waterbodies](#)
- [EPA Mercury Maps](#)

Clean Water Act Section 319(g) Management Conference

Overview

A Clean Water Act Section 319(g) Management Conference took place on June 22–23, 2010, in Philadelphia, Pennsylvania. The Management Conference was convened by EPA in response to a Clean Water Act Section 319(g) petition from the Northeast states. Under Section 319(g), a state may petition EPA to convene an interstate management conference if the state is not meeting water quality standards in whole or in part as a result of nonpoint source pollution from another state.

[Clean Water Act Section 319\(g\) Petition from Northeast States and Northeast Regional Mercury Total Maximum Daily Load \(PDF\)](#) (237 pp, 2.9MB)

[Announcement of Clean Water Act Section 319\(g\) Management Conference on June 22–23, 2010, in Philadelphia, Pennsylvania \(PDF\)](#) (3 pp, 1.6MB) — memorandum signed by Denise Keehner, April 26, 2010

[EPA Response to Northeast States' Petition, April 2010 \(PDF\)](#) (4 pp, 38K)

[Conference Agenda \(PDF\)](#) (2 pp, 21K)

[Meeting Summary \(PDF\)](#) (17 pp, 319K)

[Participant List \(PDF\)](#) (4 pp, 368K)

Conference Presentations

- [The Northeast Regional Mercury TMDL and the 319g Petition \(PDF\)](#) (23 pp, 791K) — presentation by Beth Card and Susy King, New England Interstate Water Pollution Control Commission.
- [Determination of Mercury Deposition Contributions from States Outside the Northeast \(PDF\)](#) (9 pp, 241K) — presentation by R. Dwight Atkinson, US EPA Office of Water.
- [Controlling Mercury Air Emissions: Successes and Challenges \(PDF\)](#) (14 pp, 477K) — presentation by Ellen Kurlansky, US EPA Office of Air and Radiation.
- [Mercury Reduction in the Northeast: Successes and Challenges \(PDF\)](#) (18 pp, 507K) — presentation by Mark Smith, Massachusetts Department of Environmental Protection.

State Summaries of Mercury Programs

- [Summary for Northeast States \(PDF\)](#) (13 pp, 308K)
- [Summary for Eleven States Named in Petition \(PDF\)](#) (23 pp, 443K)

Other Mercury Resources

[EPA Mercury Homepage](#)

[EPA Mercury Roadmap](#)

[EPA Atmospheric Deposition Handbook](#)

[EPA Fish Consumption Advisories for Mercury](#)

[EPA Air Programs](#)

[National Atmospheric Deposition Program \(NADP\): Mercury Deposition Network \(MDN\)](#) [EXIT Disclaimer](#)

[Environmental Council of the States \(ECOS\) Quicksilver Caucus \(QSC\)](#) [EXIT Disclaimer](#)

[U.S. Geological Survey \(USGS\) Mercury In The Environment Web site](#)