

Information Sources on Mercury Submitted by United States

U.S. Environmental Protection Agency

Most U.S. EPA public information is easily accessed at the EPA mercury portal, www.epa.gov. Key documents, studies, and tools are explained here.

General:

Mercury Study Report to Congress - EPA prepared this report to fulfill requirements of the Clean Air Act Amendments of 1990. Published in 1997, it is an eight volume assessment of the magnitude of U.S. mercury emissions by source; the health and environmental impacts of those emissions; and the availability and cost of control technologies. This comprehensive study concluded that the major route of mercury exposure in the U.S. was by fish ingestion and that the source of the mercury in the fish was primarily from air emissions. It also provided the first quantitative risk assessment of mercury, and found that 7 percent of U.S. women of childbearing age have exposures above EPA's methylmercury reference level. It can be accessed at <http://www.epa.gov/mercury/report.htm>.

EPA's Roadmap for Mercury (July 2006) - This report highlights mercury sources and uses, describes the Agency's progress to date in addressing mercury issues domestically and internationally, and outlines EPA's major ongoing and planned actions to reduce risks associated with mercury. The Roadmap focuses on six key areas: mercury releases to the environment; mercury uses in products and industrial processes; managing commodity-grade mercury supplies; communicating risks to the public; addressing international mercury sources; and conducting mercury research and monitoring. It can be accessed at <http://www.epa.gov/mercury/roadmap.htm>.

U.S. EPA Mercury Emissions, Release and Deposition Information:

The latest national mercury emissions information, for 2005, including in chart form, can be found online in EPA's Office of Research and Development National Center for Environmental Assessment Report on the Environment. The online version of this report was updated for mercury emissions in December, 2009 and can be accessed at <http://cfpub.epa.gov/eroe/index.cfm?fuseaction=detail.viewInd&ch=46&subtop=341&lv=list.listByChapter&r=188199>.

Mercury Deposition Network (MDN) is a national database of weekly concentrations of total mercury in precipitation and the seasonal and annual flux of total mercury in wet deposition. It can be used to develop information on spatial and seasonal trends in mercury deposited to surface waters, forested watersheds, and other sensitive receptors.

MDN is part of the National Atmospheric Deposition Program (NADP), a nationwide network of precipitation monitoring sites run cooperatively by many different groups. The NADP Program Office is located at the Illinois State Water Survey in Champaign, IL and is one of five scientific units at the Water Survey. The Water Survey is an affiliated agency of the University of Illinois at Urbana-Champaign and a Division of the Illinois Department of Natural Resources. This site also includes information on the Atmospheric Mercury Network (AMNet) which operates in conjunction with MDN. It can be accessed at <http://nadp.sws.uiuc.edu/mdn/>.

Toxics Release Inventory (TRI) - EPA released the 2004 TRI Data (PDF) (228 pp, 3 MB, About PDF) on April 12, 2006. For Reporting Year 2004, 23,675 facilities, including federal facilities, reported to EPA's TRI Program. The TRI Explorer provides access to the TRI data to help communities identify specific facilities and chemical release patterns that warrant further study and analysis. Combined with hazard and exposure information, the TRI Explorer can be a valuable tool for risk identification. TRI can be accessed at <http://www.epa.gov/tri/>.

Exposure and Reference Dose Information:

<http://www.epa.gov/mercury/exposure.htm>.

IRIS Health Assessment for Mercury and Methylmercury - Information about the human health effects that may result from exposure to mercury and methylmercury (separate health assessments). The Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment. The information in IRIS is intended for those without extensive training in toxicology, but with some knowledge of health sciences. IRIS is accessed at <http://www.epa.gov/iris/subst/0370.htm>.

Mercury and Fish Consumption Advisories - State and local governments issue fish consumption advisories when the fish are unsafe to eat. The advisories may suggest that people avoid eating certain kinds or certain amounts of fish. Some advisories apply to specific water types (like lakes). This information can be accessed at <http://www.epa.gov/mercury/advisories.htm>.

National Health and Nutrition Survey (NHANES), National Center for Health Statistics. This database can be accessed at <http://www.cdc.gov/nchs/nhanes.htm>.

Mercury Use in Products and Processes:

<http://epa.gov/mercury/consumer.htm>

Interstate Mercury Education & Reduction Clearinghouse (IMERC) Mercury-Added Products Database - This NEWMOA (Northeast Waste Management Officials' Association) database presents information submitted to IMERC on the amount and

purpose of mercury in consumer products. The database is intended to inform consumers, recyclers, policy makers and others about products that contain intentionally-added mercury and the amount of mercury, along with the manufacturers of these products. The database is accessed at <http://www.newmoa.org/prevention/mercury/imerc/notification/>.

Mercury Reductions Programs Database - Developed and maintained by NEWMOA (Northeast Waste Management Officials' Association), this is a database for searching where mercury reduction programs are taking place nationally. The database is accessed at <http://www.p2rx.org/Networking/MercuryDB.cfm>.

Information on the cancellation, as of 1995, of all U.S. registrations for mercury-containing pesticides can be found at <http://www.epa.gov/waste/hazard/tsd/mercury/conprod.htm#t1c16>.

Mercury Lamp Drum-Top Crusher Study - Drum-top mercury lamp crushers are devices used to improve waste lamp storage and transport, and reduce costs associated with lamp recycling. EPA released this study in August 2006 to provide information on the performance of these devices and to help states, users of mercury-containing lamps, and lamp recyclers make more informed decisions when managing fluorescent lamps. The study is at <http://www.epa.gov/epawaste/hazard/wastetypes/universal/drumtop/index.htm>.

The Chlorine Institute's Twelfth Annual Report to EPA on Mercury on Mercury Use and Emissions in the United States can be found at <http://www.epa.gov/reg5oair/mercury/12thcl2report.pdf>.

Mercury Storage and Trade:

U.S. Export Ban legislation can be found at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=110_cong_public_laws&docid=f:publ414.110.pdf

EPA's Stakeholder Panel for Managing Domestic Stocks of Commodity Grade Mercury is explained at <http://epa.gov/mercury/stocks/index.htm>.

Mercury Awareness Raising:

- Fish consumption advisories: <http://epa.gov/mercury/advisories.htm>
- Consumer and commercial products: <http://epa.gov/mercury/consumer.htm>
- Schools and mercury: <http://epa.gov/mercury/schools.htm>
- Information for consumers: <http://epa.gov/mercury/consumerinfo.htm>
- Business and industry: <http://epa.gov/mercury/business.htm>
- Mercury videos: <http://www.epa.gov/osw/hazard/tsd/mercury/videos.htm>
- EPA and ATSDR mercury video: <http://www.dontmesswithmercury.org>

Key Scientific Studies:

National Academy of Sciences. 2009. *Global Sources of Local Pollution: An Assessment of Long-Range Transport of Key Air Pollutants To and From the United States*. National Academies Press, 500 Fifth Street, NW, Washington, D.C.

- This report assesses and summarizes the science regarding transport of mercury into and from the U.S., concluding, among other things, that about 70 percent of U.S. deposition is from global sources.

Sunderland, E.M.; D. Krabbenhoft; J.W. Moreau; S. A. Strode; and W. Landing (2009). “Mercury sources, distribution, and bioavailability in the North Pacific Ocean: Insights from data and models.” *Global Biogeochem. Cycles*, 23, GB2010, DOI:10.1029/2008GB003435.

- This landmark paper presents a multimedia modeling/monitoring study that links global emissions to deposition in the Northern Pacific and then to a oceanic transport model to predict water column concentrations in the Northeastern Pacific. The study concludes that at current global emission rates that water column concentrations will double by 2050. This is a significant study since it is the first of its type relating global emissions to specific estimated marine concentrations and U.S. exposures. The implications for U.S. exposure are important, since about 30 percent of total methylmercury intake in the U.S. is from fish catches in this sector.

Sunderland, Elsie M. “Mercury Exposure from Domestic and Imported Estuarine and Marine Fish in the U.S. Seafood Market” *Environmental Health Perspectives*. Vol 115, Number 2, February 2007.

- This study provides information on exposure from various fish consumption sources in the United States.

Scudder, B.C., Chasar, L.C., Wentz, D.A., Bauch, N.J., Brigham, M.E., Moran, P.W., and Krabbenhoft, D.P., 2009, Mercury in fish, bed sediment, and water from streams across the United States, 1998–2005: U.S. Geological Survey Scientific Investigations Report 2009–5109, 74.

- This study found the 25 percent of freshwater lakes exceed EPA’s reference level.

EPA National Fish Study, see www.epa.gov/waterscience/fish/study/ and Stahl, L.L., B.D. Snyder; A.R. Olsen, and J.L. Pitt (2009) “Contaminants in fish tissue from U.S. lakes and reservoirs: a national probabilistic study”, *Environ Monit Assess*, 150.3-19.

- This study found about 50 percent of a statistical sample of freshwater lakes exceeded EPA’s reference level.

U.S. Food and Drug Administration

FDA's current website on dental amalgam is:

<http://www.fda.gov/MedicalDevices/ProductsandMedicalProcedures/DentalProducts/DentalAmalgam/ucm171094.htm>

U.S. Department of Energy

"U.S. Department of Energy Interim Guidance on Packaging, Transportation, Receipt, Management, and Long-Term Storage of Elemental Mercury" [November 2009]

Pursuant to the Mercury Export Ban Act of 2008 (Public Law No. 110-414), the Secretary of Energy shall designate a DOE facility or facilities (which shall not include any portion of the Oak Ridge Reservation, Tennessee) for the purpose of long-term management and storage of elemental mercury generated within the United States. The Mercury Export Ban Act of 2008 also requires that the Department of Energy (DOE), after consultation with the U.S. Environmental Protection Agency (EPA) and all appropriate State agencies in affected States, shall issue guidance to potential users of the long-term mercury management and storage program. DOE, in consultation with EPA and all appropriate State agencies in potentially affected States, prepared the following guidance on packaging, transportation, receipt, management, and long-term storage of elemental mercury at a DOE facility or facilities as mandated by this Act. This guidance document establishes basic standards and procedures for the receipt, management, and long-term storage of elemental mercury at a DOE facility or facilities.

DOE Interim Guidance:

[http://www.mercurystorageeis.com/Elementalmercurystorage%20Interim%20Guidance%20\(dated%202009-11-13\).pdf](http://www.mercurystorageeis.com/Elementalmercurystorage%20Interim%20Guidance%20(dated%202009-11-13).pdf)

"Draft Long-Term Management and Storage of Elemental Mercury Environmental Impact Statement [DOE/EIS-0423D, January 2010]

Pursuant to the Mercury Export Ban Act of 2008 (Public Law No. 110-414), DOE has been directed to designate a facility or facilities for the long-term management and storage of elemental mercury generated within the United States. DOE is analyzing the storage of up to 10,000 metric tons (11,000 tons) of elemental mercury in a facility(ies) constructed and operated in accordance with the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA). DOE has prepared this draft

Mercury Storage Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321 et seq.), the Council on Environmental Quality (CEQ) implementing regulations (40 CFR 1500 - 1508), and DOE's NEPA implementing procedures (10 CFR 1021) to evaluate the reasonable alternatives for a facility(ies) for the long-term management and storage of elemental mercury. This Mercury Storage EIS analyzes the potential environmental, human health, and socioeconomic impacts of elemental mercury storage at seven candidate locations.

Draft Environmental Impact Statement:

Draft EIS

http://www.mercurystorageeis.com/draft/EIS-0423_D-DraftEIS.pdf

EIS Cover

http://www.mercurystorageeis.com/draft/EIS-0423_D-Cover.pdf

Executive Summary

http://www.mercurystorageeis.com/draft/EIS-0423_D-Summary.pdf

Executive Summary Cover

http://www.mercurystorageeis.com/draft/EIS-0423_D-SummaryCover.pdf

Information Sources on Mercury Submitted by United States (part 2)

U.S. National Oceanographic and Atmospheric Administration (NOAA)

Information Request Areas

I. References to key information resources relating to mercury, such as national reviews or assessments, scientific publications or other material which has been considered in taking action on mercury:

- **NOAA Report to Congress on Great Lakes Mercury Contamination**
http://www.arl.noaa.gov/documents/reports/NOAA_GL_Hg.pdf
http://www.arl.noaa.gov/documents/reports/NOAA_GL_Hg_briefing.pdf
 - The Air Resources Laboratory is scheduled to carry out an assessment of atmospheric deposition of mercury to the Great Lakes from national and international sources under the auspices of the FY 2010 Great Lakes Restoration Initiative. This work is scheduled to begin in March or April 2010 and the initial phase of the study -- producing baseline results -- is expected to last for one year. We expect this work to be relevant to upcoming negotiations for a global legally binding instrument as it will include estimates of the relative impact of anthropogenic vs. natural sources, and the relative impacts of different source types (coal-fired power plants, waste incineration, smelters, etc.) and source regions (local, regional, national, continental, global) on the Great Lakes. We also plan to include in the analysis other key receptors relevant to the U.S., e.g., the Gulf of Mexico, Chesapeake Bay, etc. If the funding for this work continues in FY11, we plan to carry out analyses of different emissions scenarios and other policy-relevant "what if" scenarios.

Other Key Sources and Material:

- **Ache, B.W., Boyle, J.D., and Morse, C.E. 2000.** *A Survey of the Occurrence of Mercury in the Fishery Resources of the Gulf of Mexico.* Prepared by Battelle for the U.S. EPA Gulf of Mexico Program, Stennis Space Center, MS.
- **Kaneko and Ralston (2007).** Selenium and Mercury in Pelagic Fish in the Central North Pacific Near Hawaii. *Biol. Trace Elem. Res.* 119: 242-254.
- **Kraepiel, Anne M.L.; Keller, Klaus; Chin, Henry B.; Malcolm, Elizabeth G. and Francois M.M. Morel. 2003.** Sources and variations of mercury in tuna. *Environ. Sci. Tech.* 37, 5551-5558.
- **Lowery, Tony and E. Spencer Garrett III. June 2005.** *Synoptic Survey of Total Mercury in Recreational Finfish of the Gulf of Mexico.* NOAA Fisheries.
- **Methylmercury in the Gulf of Mexico: State of Knowledge and Research Needs. June 2004.** National Science and Technology Council, Committee on the Environment and Natural Resources. Interagency Working Group on Methylmercury.

- **Ralston, Nicholas V.C.; Blackwell, J. Lloyd, II.; and Laura J. Raymond. 2007.** Importance of Molar Ratios in Selenium-Dependent Protection Against Methylmercury Toxicity. *Biol. Trace Elem.* 119: 255–268.
 - This is a critical paper addressing concerns expressed by NOAA with respect to the protective effects of selenium against mercury toxicity in seafood.
- **Ralston Nicholas V.C.; Ralston, Carla R.; Blackwell, J. Lloyd III. and Laura J. Raymond. 2008.** Dietary and tissue selenium in relation to methylmercury toxicity. *Neurotoxicology* (in press).
- **Seafood Choices: Balancing Benefits and Risks. October 2006.** Institute of Medicine of the National Academies.
- **Summary of NOAA Mercury Monitoring Activities and Priorities. May 2008.** Prepared for the National Mercury Monitoring Workshop.

II. Descriptions of assessment tools which have proved useful in making risk management decisions relating to mercury or in assessing the mercury challenges faced nationally.

- The Air Resources Laboratory has an integrated atmospheric mercury monitoring and modeling program that represents useful assessment tools. ARL's National Atmospheric Deposition Program does speciated wet and dry atmospheric measurements as well as comprehensive atmospheric fate and transport modeling. More information is available at:
 - <http://www.arl.noaa.gov/mercury.php>
 - http://www.arl.noaa.gov/Mercury_modeling.php
 - http://www.arl.noaa.gov/Mercury_meas.php
 - http://www.arl.noaa.gov/HYSPLIT_info.php
- **Comparison of Total Mercury Determinations of Fish Fillet Homogenates by Thermal Decomposition, Amalgamation and Atomic Absorption Spectrophotometry Versus Cold Vapor Atomic Absorption Spectrophotometry. 2007.** *Journal of Aquatic Food Product Technology*. Vol. 16: 2.

III. Details of national or regional actions taken to control mercury, such as legislative or regulatory action either directly on mercury or designed to control industries which use mercury in products or processes, industry initiatives, awareness raising campaigns or other actions relevant to the upcoming negotiations for a global legally binding instrument on mercury.

- ARL has helped lead the design and implementation of a National Mercury Monitoring Network. More information is available at:

<http://nadp.sws.uiuc.edu/mercnet/>
<http://nadp.sws.uiuc.edu/mercnet/MercNetExecSumm.pdf>
<http://nadp.sws.uiuc.edu/mercnet/MercNetFinalReport.pdf>

- ARL has helped lead the design and implementation of a national Atmospheric Mercury Network (AMN). ARL was one of the first institutions to join the network and we now have four sites in the emerging AMN. We're grateful for assistance from within NOAA (e.g., NOS-NCCOS) and from outside NOAA (e.g., EPA-Clean Air Markets Division) in helping to support these sites. More information is available at:
<http://nadp.sws.uiuc.edu/AMN/>

IV. Summaries of national assessments of the costs of inaction on mercury, including in relation to environmental and health effects.

- ARL's atmospheric modeling work includes estimates of atmospheric mercury deposition to waterbodies and watersheds from current emissions sources. In a sense, this represents the impact if nothing is done. Our work also includes assessments that consider the impact of alternative future emissions regimes.
- ***NOAA economics of Mercury Contamination:***
<http://www.economics.noaa.gov/?goal=ecosystems&file=events/mercury>

V. Data on mercury releases to water bodies and the health effects of such releases.

- ARL's atmospheric modeling work includes estimates of atmospheric mercury deposition to waterbodies and watersheds. This mercury comes from anthropogenic and natural sources. It's not quite as "simple" as an "effluent pipe" discharging wastes directly to a waterbody. We try to estimate the total amount of mercury being deposited as well as source attribution for this deposition, i.e., where does it come from and how much comes from each major source category and source region. The HYSPLIT-Hg model is one of the few global models that address the key policy question of source attribution for deposition to a given receptor. Examples of this work are provided in the Report to Congress in Category #1 above and at the Mercury modeling web page referenced in Category #2 above.
- NOAA is also engaged in a long term study with multiple Federal partners, the University of Southern Mississippi and the Avon Longitudinal Study of Parents and Children on the simultaneous effects of maternal selenium, mercury, and omega-3 levels on childhood neurological performance, behavioral tendencies, and academic performance in a 6,000 mother-child cohort that has been tracked since the early 90's (***ALSPAC Study 2006***). This study is scheduled to be completed in FY 2012 and is anticipated to be the definitive study that should provide a large portion of the foundation for a scientifically

defensible seafood risk benefits assessments.

Additional key information resources related to mercury include:

www.atsdr.cdc.gov <<http://www.atsdr.cdc.gov>>

www.epa.gov/mercury <<http://www.epa.gov/mercury>>

www.usgs.gov/mercury <<http://www.usgs.gov/mercury>>

<http://loer.tamug.edu/calFed/>