What EPA is Doing to Reduce Mercury Pollution, and Exposures to Mercury

Limiting the amount of mercury:

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Emitted Into the Air From Specific Sources

- In 2011, EPA issued the Mercury and Air Toxics Standards (MATS) regulation to reduce emissions of toxic air pollutants from **coal- and oil-fired power plants**. The compliance date for MATS was in 2015, and power plants have taken steps such as installing controls or updating operations to meet these standards, which protect public health. The standards also provide considerable health benefits. MATS was estimated to prevent up to 11,000 premature deaths, 4,700 heart attacks and 130,000 asthma attacks every year beginning in 2016.
  - Mercury and Air Toxics Standards <https://epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards>
- **Dental amalgam waste** can end up in sewage that is then sent to **public incinerators that burn sewage**. If there is mercury waste in the sewage, mercury emissions can be released during the burning process. To reduce mercury release into the environment, in 2011, EPA published a rule limiting specific pollutant emissions, including mercury, from public incinerators that burn sewage <https://www.regulations.gov/docket/epa-hq-oar-2009-0559>.

- On September 6, 2013, EPA published a rule that limits all emissions, including mercury emissions, from **medical waste incinerators**.
  - EPA's air emission regulations for hospital/medical/infectious waste incinerators (HMIWI) <https://epa.gov/stationary-sources-air-pollution/hospital-medical-and-infectious-waste-incinerators-hmiwi-new>
- EPA issued final standards for mercury from **chlor-alkali production**, a technology used to produce chlorine, in 2003. EPA estimates that mercury emissions from chlor-alkali plants have been reduced by approximately 88 percent from the pre-2003 levels; this estimate includes reductions resulting from plant closures. In 2008 and 2011, EPA proposed amendments to these final standards.
  - EPA's mercury emission regulations for mercury cell chlor-alkali plants <https://epa.gov/stationary-sources-air-pollution/mercury-cell-chloralkali-plants-national-emissions-standards>
- EPA issued final regulations for **large municipal waste combustors (MWCs)** in 1995 and for small MWCs in 2000. Implementation of large MWC regulations has reduced mercury emissions by 88 percent from 1990 emission levels. **Large municipal waste combustors** are incinerators which are capable of burning greater than 250 tons of municipal waste per day and which burn household, commercial, and/or institutional waste. Burning waste reduces its volume before disposal into a landfill. Municipal waste combustors include the subcategory of waste-to-energy plants which generate electricity or steam from burning waste. **Small municipal waste combustors** serve smaller communities and burn 35 to 250 tons of waste per day.
  - Rule and implementation information for large MWCs <https://epa.gov/stationary-sources-air-pollution/large-municipal-waste-combustors-lmwc-new-source-performance>
  - Rule and implementation information for small MWCs <https://epa.gov/stationary-sources-air-pollution/small-municipal-waste-combustors-smwc-new-source-performance>

- In the past mercury was used in many **paints** as a fungicide to prevent the growth of bacteria. To be used as a fungicide, it had to be registered with EPA's pesticides program. In 1990, EPA cancelled this registration, in effect banning its use in paint.
  - EPA has also limited emissions of mercury from:
    - Boilers and process heaters (2012) <https://epa.gov/afos-air/emission-standards-farm-equipment-boilers>
    - Commercial and industrial solid waste incinerators (2011) <https://epa.gov/stationary-sources-air-pollution/commercial-and-industrial-solid-waste-incineration-units-ciswi-new>
    - Sewage sludge incinerators (2011) <https://epa.gov/stationary-sources-air-pollution/sewage-sludge-incineration-units-ssi-new-source-performance>
    - Portland cement plants (2010) <https://epa.gov/stationary-sources-air-pollution/clean-air-act-standards-and-guidelines-mineral-processing>
    - Gold mine ore processing and production facilities (2010) <https://epa.gov/stationary-sources-air-pollution/fact-sheet-final-air-toxics-rule-gold-mine-ore-processing-and>
    - Electric arc furnaces at steelmaking facilities (2007) <https://epa.gov/stationary-sources-air-pollution/electric-arc-furnaces-eafs-and-argon-oxygen-decarburization>

Discharged into water from specific sources

- EPA issues effluent guidelines, which are national regulatory standards for wastewater discharged to surface waters and municipal sewage treatment plants. EPA issues these regulations for industrial categories, based on the performance of treatment and control technologies.

- **Dental effluent guidelines**. EPA has issued final pretreatment standards to reduce discharges of mercury from dental offices into municipal wastewater treatment plants. The final rule requires dental offices that place or remove amalgam fillings to install amalgam separators that remove and collect the amalgam so that the mercury in it can be easily recycled. EPA expects compliance with this final rule will annually reduce the discharge of mercury by 5.1 tons.
    - Dental effluent guidelines <https://epa.gov/eg/dental-effluent-guidelines>
- Effluent guidelines for steam electric utilities. In September 2015, EPA finalized a rule revising the regulations for steam electric plants. Steam electric plants use nuclear or fossil fuels (such as coal, oil and natural gas) to heat water in boilers, which generates steam. The steam is used to drive turbines connected to electric generators. The plants generate wastewater in the form of chemical pollutants and thermal pollution (heated water) from their water treatment, power cycle, ash handling and air pollution control systems, as well as from coal piles, yard and floor drainage, and other miscellaneous wastes.
- The rule sets the first federal limits on the levels of toxic metals in wastewater that can be discharged from these plants, based on technology improvements in the steam electric power industry over the last three decades.
    - Steam Electric Power Generating Effluent Guidelines <https://epa.gov/eg/steam-electric-power-generating-effluent-guidelines>
    - Information about the 2015 final rule <https://epa.gov/eg/steam-electric-power-generating-effluent-guidelines-2015-final-rule>

In your drinking water

- Under the Safe Drinking Water Act, EPA in 1991 set an enforceable regulation for inorganic mercury, called a maximum contaminant level (MCL), at 0.002 mg/L or 2 ppb. Public water systems must ensure that your drinking water does not exceed the MCL for mercury. MCLs are set as close to the health goals as possible, considering cost, benefits and the ability of public water systems to detect and remove contaminants using suitable treatment technologies. EPA periodically reviews this standard to ensure that the MCL continues to be protective of human health.
  - EPA regulations to limit mercury in drinking water <https://epa.gov/sdwa/drinking-water-regulations-and-contaminants>

Disposed of in landfills and surface impoundments

- Coal combustion residuals, commonly known as coal ash, are created when coal is burned by power plants to produce electricity. Coal ash contains contaminants like mercury, cadmium and arsenic. EPA has developed regulations on the safe disposal of coal ash in landfills and surface impoundments.
  - 2015 Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities <https://epa.gov/coalash/coal-ash-rule>

Also

Understanding what levels of mercury pollution might affect human health

- In 1997, EPA published the Mercury Study Report to Congress to fulfill requirements of the Clean Air Act Amendments of 1990. The report 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.
- Volume IV of the report is an assessment of exposure to mercury in the United States.
  - View the Mercury Study Report to Congress
- EPA has also calculated a reference dose (RfD) level for methylmercury. An RfD is EPA's estimate of the maximum acceptable daily exposure to humans that is not likely to cause harmful effects during a lifetime. EPA's RfD for methylmercury, last revised in 2001, is currently 0.1 micrograms per kilogram of body weight per day.
  - View a technical description of EPA's RfD for methylmercury (PDF) <https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0073_summary.pdf#namedd est=rfd>
- To protect human health, EPA has calculated an acceptable limit for methylmercury in fish. This limit is called the "Methylmercury Fish Tissue Criterion". EPA has published guidance for states and tribes to help them establish water quality standards that will result in meeting this limit.
  - Learn more about the Methylmercury Fish Tissue Criterion <https://epa.gov/wqc/human-health-criteria-methylmercury>

- EPA develops criteria for determining when water has become unsafe for people and wildlife using the latest scientific knowledge. These criteria are recommendations. State and tribal governments may use these criteria or use them as guidance in developing their own.
    - View the Ambient Water Quality Criteria for Mercury <https://epa.gov/node/219245>
    - Human Health Criteria for Methylmercury <https://epa.gov/wqc/human-health-criteria-methylmercury>

Measuring and monitoring

- **Measuring emissions of mercury into the air from various sources**: EPA estimates releases of emissions of pollutants into the air, including emissions of mercury. We take data provided by state, local, and tribal air agencies for sources in their jurisdictions, supplement that data with other data developed by EPA, and analyze and release the data every three years in a National Emissions Inventory (NEI) <https://epa.gov/air-emissions-inventories/national-emissions-inventory-nei>. The most recent NEI estimates that nationwide mercury emissions add up to 52 tons. Learn more:
    - 2014 National Emissions Inventory, version 2, Technical Support Document (July 2018)(PDF) <https://epa.gov/sites/production/files/2018-07/documents/nei2014v2_tsd_05jul2018.pdf> (discussion starts on page 2-23 of the PDF document)
    - National Emissions Inventories (NEI) <https://epa.gov/air-emissions-inventories/national-emissions-inventory-nei>
- **Measuring and monitoring mercury contamination in fish**: EPA collaborated with federal agencies, states and other partners to conduct a series of fish contamination studies. These studies provide data on concentrations of mercury and a variety of other chemicals in fish tissue.
    - Learn about EPA's studies of fish contamination <https://epa.gov/choose-fish-and-shellfish-wisely/studies-fish-tissue-contamination>

Cleaning up sites contaminated with mercury

Some of the sites contaminated with mercury that EPA's Superfund Program is cleaning up:

- Mercury Refining, Inc. site located in the towns of Guilderland and Colonie, New York
- Carson River Mercury site in Dayton, Nevada
- Sulphur Bank Mercury Mine site located in Clear Lake, California
- New Idria Mercury Mine site located in and near the abandoned town of Idria, California

Providing consumers, states and tribes with guidance to reduce exposures

- **Fish advisories**: EPA and the U.S. Food and Drug Administration (FDA) work with states and tribes to give advice to parents, nursing and pregnant mothers, and women who may become pregnant, about reducing mercury exposures when selecting and eating fish and shellfish. By following the recommendations, women and young children will receive the benefits of eating fish and shellfish and be confident that they have minimized their exposure to the harmful effects of methylmercury. In 2004 we issued the first-ever joint consumer advice on this topic; we issued a draft revision in 2014 and a final revision in 2017. Fish is a beneficial part of the diet, so EPA and FDA encourage people to continue to eat fish that are low in methylmercury.

  U.S. states also issue fish advisories to limit or avoid eating fish or shellfish caught from particular bodies of water. These advisories apply to men, women, and children of all ages.

  - More about our guidelines for eating fish that contain mercury <https://epa.gov/mercury/guidelines-eating-fish-contain-mercury>
  - EPA-FDA advisory on mercury in fish and shellfish <https://epa.gov/choose-fish-and-shellfish-wisely/epa-fda-advice-about-eating-fish-and-shellfish>
  - EPA consumer site: Choose Fish and Shellfish Wisely <https://epa.gov/choose-fish-and-shellfish-wisely>
  - EPA website on Technical Resources for Fish and Shellfish Consumption <https://epa.gov/fish-tech>

- **Mercury-containing products:** EPA advises consumers on using alternatives to products that contain mercury and on recycling and disposing of these products.

  - Learn more about mercury used in consumer products <https://epa.gov/mercury/mercury-consumer-products>.

- **Pollution "diets**": Under the Clean Water Act, states and tribes are required to develop lists of waterbodies that are too polluted to meet the water quality standards they have set. States and tribes must then create plans to reduce the pollution levels in these waterbodies. The plans include developing "Total Maximum Daily Loads (TMDLs)," which are calculations of the maximum amount of a specific pollutant that a waterbody can receive and still safely meet water quality standards. EPA helps the states and tribes develop their plans.
  - Learn about TMDLs and mercury <https://epa.gov/tmdl/impaired-waters-and-mercury>

Developing and demonstration technologies to prevent mercury emissions into the air

- To reduce **airborne mercury emissions from small-scale gold buying and refining facilities** located in over 55 countries around the world, EPA and the Argonne National Laboratory (ANL) have partnered to design a low cost, easily constructible technology called the Gold Shop Mercury Capture System (MCS).
  - Learn more about the Gold Shop Mercury Capture System on the Artisanal and Small-Scale Gold Mining Without Mercury page <https://epa.gov/international-cooperation/reducing-mercury-pollution-artisanal-and-small-scale-gold-mining>
- In 2014, EPA collaborated with the United Nations Environment Programme (UNEP), the Swedish Environmental Research Institute, the International Science and Technology Center and others in a **project to demonstrate the effectiveness of injecting activated carbon sorbents to control mercury air emissions** at a pilot facility located at coal-fired Cherepetskaya Thermal Power Plant in Russia. Historically, Russian power plants have not relied on activated carbon sorbents to control emissions of mercury.
  - Report on the Demonstration: Mercury Emissions Capture Efficiency with Activated Carbon Injection at a Russian Coal-Fired Thermal Power Plant (PDF) (UNEP.org)

Participating in international projects

- EPA works with international organizations to prevent the release of mercury in other countries. In 2013, the United States joined the Minamata Convention on Mercury <https://epa.gov/international-cooperation/minamata-convention-mercury>, a multilateral environmental agreement that addresses specific human activities which are contributing to widespread mercury pollution. Implementation of this agreement will help reduce global mercury pollution over the coming decades. EPA also engages its international partners, multilaterally and bilaterally, through the United Nations Global Mercury Partnership in order to address key mercury issues such as:
    - Data collection and inventory development
    - Source characterization
    - Best practices for emissions and use reduction
- More information
    - EPA's leadership in the Global Mercury Partnership <https://epa.gov/international-cooperation/epa-leadership-global-mercury-partnership>
    - EPA's international work to reduce mercury emissions and use <https://epa.gov/international-cooperation/international-actions-reducing-mercury-emissions-and-use>
- In the panel above this one ("Developing and demonstration technologies to prevent mercury emissions into the air"), you can learn about EPA's participation in:
    - The Gold Shop Mercury Capture System Project
    - A 2014 effort to demonstrate the effectiveness of injecting activated carbon sorbents to control mercury air emissions at a pilot facility located at coal-fired Cherepetskaya Thermal Power Plant in Russia

Engaging in partnerships and consume outreach to promote voluntary reductions in mercury use and releases.

- **Mercury switches**: EPA, along with:
  - Vehicle manufacturers
  - The American Iron and Steel Institute
  - The Steel Manufacturers Association
  - The Institute of Scrap Recycling Industries
  - The Automotive Recyclers Association
  - Environmental Defense
  - The Ecology Center (Ann Arbor)
  - Representatives of the Environmental Council of the States

  Created a fund, called the National Vehicle Mercury Switch Recovery Program (NVMSRP), to help pay for the recovery of mercury switches from scrap cars and trucks before they are shredded for recycling. The fund was depleted in 2009 and the program was set to expire in 2017. Given the program's effectiveness, in late 2018 EPA re-joined the memorandum of understanding (MOU) with the NVMSRP. The MOU is now extended to 2021. Learn more:

  - EPA Mercury Switch Recovery Program page <https://epa.gov/smartsectors/mercury-switch-recovery-program>
  - End of Life Vehicle Solutions website <http://elvsolutions.org/>
  - Search EPA's archive for older information about the National Vehicle Mercury Switch Recovery Program SEARCH EPA ARCHIVE <https://archive.epa.gov/>

- **Industrial thermometers**: EPA is working with the National Institute of Standards and Technology and stakeholders to reduce the use of mercury-containing non-fever thermometers in industrial and commercial settings. Learn more about the phase-out of industrial and lab thermometers that contain mercury <https://epa.gov/mercury/mercury-thermometers#industrial>. For answers to more specific questions about the phase-out, visit EPA's Phasing-Out of Mercury Thermometers Used in Industrial and Laboratory Settings page <https://epa.gov/mercury/phasing-out-mercury-thermometers-used-industrial-and-laboratory-settings>.

- **Waste from dental amalgam**: EPA has worked with the American Dental Association and with dental amalgam manufacturers to teach dentists and dental students best management practices for disposing of amalgam waste.

  In 2008, EPA, the American Dental Association (ADA) and the National Association of Clean Water Agencies (NACWA) signed a Memorandum of Understanding (PDF) <https://epa.gov/sites/production/files/2015-06/documents/reducing-dental-amalgam-discharges-mou-dec-2008.pdf>. This memorandum establishes a Voluntary Dental Amalgam Discharge Reduction Program. The goal of the program is for dentists to follow the ADA's best management practices (BMPs) for amalgam waste <https://epa.gov//www.ada.org/resources/ada-library/oral-health-topics/amalgam-separators>.

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