

## INDUSTRIAL MERCURY USE

Mercury, like lead and other heavy metals, is a metallic element that belongs to a class of toxins known as PBTs (persistent, bioaccumulative toxins). PBTs do not break down in the environment; they are also highly toxic, posing serious threats to human health. For this reason, they can never be used or disposed of safely.

From Maine to California, legislative action has been taken to reduce mercury releases that occur through the use and disposal of products. Many states have enacted outright bans on specific product categories such as mercury fever thermometers and mercury-added toys.

Some legislation, including a 2005 bill in New York City, gives preference to products that contain the least mercury. Other strategies require mercury-added products such as lamps and switches to be labeled.

Many large companies and institutions have drafted “environmental policies” that seek to reduce the impact of their operations on human and environmental health. Some of these policies address hazardous substances such as mercury.

Manufacturers that have eliminated or reduced the amount of mercury in their products are already ahead of the national trend of requiring cleaner, safer products. This trend is not likely to reverse itself because the costs, monetarily and environmentally, of using and disposing of mercury continue to increase. Also, manufacturers who cater to the growing demand for products that do not threaten human and environmental health are at a competitive advantage.

### ***What is mercury?***

Mercury is a naturally occurring metallic element. Elemental mercury—mercury that has not formed bonds with other chemicals—is silver-white, liquid at room temperature, and easily beads when handled. When it enters the ecosystem, elemental mercury combines with carbon, creating methylmercury, an organic mercury compound that builds up in the food chain and threatens human health.<sup>1</sup>

### ***What properties make mercury useful?***

Its electrical and physical properties make mercury useful for a myriad of electric and mechanical applications.<sup>2</sup> Mercury conducts electricity efficiently. It measures temperature accurately because it expands uniformly in response to heat. A liquid at room temperature, mercury has an extremely low freezing point, and it vaporizes easily, which makes it indispensable as a conductor in many types of energy-efficient electric lamps. Mercury also forms alloys with most other metals for applications such as dental amalgams for fillings. Certain chlorine production processes use mercury as a catalyst; for this reason, chlorine production facilities remain the largest industrial source of mercury releases.

### **PBTs**

Persistent, bioaccumulative toxins (PBTs) threaten human and environmental health even when released in small, legally allowed quantities. Once released into the environment, these toxins do not break down; instead, they remain there indefinitely. In the environment, they build up in the food chain because they remain in the tissues of living animals when these organisms consume PBT-contaminated foods. These toxins also increase in concentration as they move up the food chain, reaching dangerous levels in “top feeding” carnivores.

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### ***How are we exposed to mercury?***

The most common route of human exposure to mercury is eating contaminated fish. In 2004, the latest year for which US statistics are available, 44 states, 1 territory, and 2 tribes issued mercury advisories, and mercury was responsible for 76 percent of the 2,436 advisories issued.<sup>3</sup> Fish consumption advisories are also in effect for many kinds of imported fish because mercury is a global problem; this is a cause for concern because more than 68 percent of the fish we eat is imported.<sup>4</sup>

### ***Why should we be concerned about mercury exposure?***

Mercury can cause irreversible damage to the developing brains of fetuses and small children. Even when mercury exposure occurs at levels that cause no apparent harm to a pregnant woman, it can still affect her fetus to the point that it retards development. According to an analysis from the Centers for Disease Control and Prevention (CDC), nearly 8 percent of women of childbearing age in the US have mercury blood levels that exceed the US Environmental Protection Agency's (EPA's) safe upper limit for fetal risk. Based on these findings, the CDC estimates that, annually, as many as 630,000 children born in the US (one out of six newborns) could be at risk for developmental delays associated with mercury exposure.<sup>5</sup>

### ***How can manufacturers reduce mercury use?***

Mercury-free components often cost the same and work better than mercury-added devices. Manufacturers can actually improve the accuracy and function of their equipment by using electronic devices in place of mercury-added technology. For everything from pressure gauges to thermostats and thermometers, electronic alternatives are readily available.

For some applications, the biggest challenge for the manufacturer is educating the customer or end-user about the benefits of mercury-free products. Some manufacturers, such as McDonnell & Miller, a manufacturer of heating, ventilation and air conditioning (HVAC) equipment, promote mercury-free equipment by pricing it more competitively than mercury-added products that perform the same functions. By encouraging the specification of mercury-free products, these companies are paving the way for the phase-out of mercury-added products in areas where the mercury does not play a singular role in product function.

Manufacturers can identify the mercury-added components they purchase and common alternatives to them. They can then educate their customer base about the benefits of specifying mercury-free equipment.

### ***Are manufacturers likely to benefit from making mercury-free products?***

Many market sectors are phasing out most mercury-added products, including hospitals, energy suppliers, and schools. A growing number of hospitals are purchasing mercury-free manometers and other pressure measurement gauges in an effort to phase out mercury-added equipment. Schools, including all public schools in New York state—which has passed strict laws regulating the sale and labeling of mercury-added products—no longer allow mercury-added thermometers and other equipment in school buildings.

To remain competitive, manufacturers need to offer mercury-free products either because these products are superior in some way or because consumers are demanding them.

### ***Are mercury-free alternatives available for all applications?***

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For a small number of applications, the mercury-added products are the best available choice; cost-effective alternatives that meet performance specifications simply do not exist. For example, most energy-efficient lamps contain mercury, and meters used to monitor natural gas consumption in homes and businesses rely on mercury-based technology.

### ***What resources are available for identifying mercury-free production opportunities?***

Various databases and fact sheets list mercury-added products and alternatives for most market sectors. This information helps manufacturers identify opportunities for reducing or eliminating mercury from their products. (See the resources list at the end of this fact sheet.)

The EPA offers a Design for the Environment (DfE) Program that works directly with industry to integrate health and environmental considerations into business decisions. DfE assists manufacturers in determining the hazards presented by chemicals used in the industry and in assessing alternative processes, formulations, and new technologies. (DfE's resources can be accessed at <http://www.epa.gov/dfepubs/about/index.htm>.)

### ***Recommendations***

Manufacturers can prepare for a mercury-free future by looking at the mercury-added products they manufacture today and identifying how they can make these items without mercury. Retooling a manufacturing process is expensive—which is why taking into account the growing market for environmentally responsible products is imperative when deciding to go mercury free.

### ***Resources***

The following resources provide manufacturers with an overview of mercury-free products that have been produced by others and with information about market sectors in which companies are pursuing mercury-free products.

#### **INFORM, Inc., Fact Sheets**

“Mercury-Containing Products and Alternatives”

<http://www.informinc.org/fsmercalts.pdf>

“Mercury-Containing Products and Alternatives in the Health Care Setting”

<http://www.informinc.org/fsmerchealth.pdf>

“Purchasing for Pollution Prevention: Mercury-Free Industrial Thermometers, Manometers, Thermostats, and Switches”

[http://www.informinc.org/fs\\_P3industrial\\_meters.pdf](http://www.informinc.org/fs_P3industrial_meters.pdf)

“Purchasing for Pollution Prevention: Specifying and Sourcing Mercury-Free HVAC and Building Equipment”

[http://www.informinc.org/fs\\_P3merchvac.pdf](http://www.informinc.org/fs_P3merchvac.pdf)

“Purchasing for Pollution Prevention: The Lowdown on Mercury in Fluorescent Lamps”

[http://www.informinc.org/fs\\_P3fluorescentlamps.pdf](http://www.informinc.org/fs_P3fluorescentlamps.pdf)

“Purchasing for Pollution Prevention: High-Bay Lighting: Opportunities for Mercury Reduction and Energy Efficiency”

[http://www.informinc.org/fs\\_P3highbay.pdf](http://www.informinc.org/fs_P3highbay.pdf)

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### **US Environmental Protection Agency**

“Mercury”

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

“Design for the Environment (DfE)”

<http://www.epa.gov/dfe/pubs/about/index.htm>

“Mercury: Consumer Products”

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

### **Northeast Waste Management Officials’ Association (NEWMOA) Fact Sheets**

“Mercury: Mercury in Products”

<http://www.newmoa.org/Newmoa/htdocs/prevention/topichub/subsection.cfm?hub=22&subsec=19&nav=19>

“Mercury: Assistance Approaches”

<http://www.newmoa.org/Newmoa/htdocs/prevention/topichub/subsection.cfm?hub=22&subsec=18&nav=18>

### **Sustainable Hospitals Fact Sheets**

“Amounts of Mercury in Hospital Equipment”

[http://www.sustainablehospitals.org/HTMLSrc/IP\\_mercury\\_amounts.html](http://www.sustainablehospitals.org/HTMLSrc/IP_mercury_amounts.html)

“Is There Mercury in Your Coulter Counter?”

[http://www.sustainablehospitals.org/HTMLSrc/IP\\_Merc\\_Coulter.html](http://www.sustainablehospitals.org/HTMLSrc/IP_Merc_Coulter.html)

“Mercury in Gauges and Switches”

[http://www.sustainablehospitals.org/HTMLSrc/IP\\_Mercurygauges.html](http://www.sustainablehospitals.org/HTMLSrc/IP_Mercurygauges.html)

“Aneroid Sphygmomanometers”

[http://www.sustainablehospitals.org/HTMLSrc/IP\\_aneroid\\_sphygmo.html](http://www.sustainablehospitals.org/HTMLSrc/IP_aneroid_sphygmo.html)

“Comparing Mercury and Aneroid Sphygmomanometers”

[http://www.sustainablehospitals.org/HTMLSrc/IP\\_Merc\\_Tools\\_CompSphyg.html](http://www.sustainablehospitals.org/HTMLSrc/IP_Merc_Tools_CompSphyg.html)

## **References**

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<sup>1</sup> US Environmental Protection Agency, Mercury, “Frequent Questions about Mercury,” March 3, 2006, available at <http://www.epa.gov/mercury/faq.htm>.

<sup>2</sup> UN Environment Programme, Mercury Programme, “Global Mercury Assessment—Summary of the Report,” February 2003, available at <http://www.chem.unep.ch/mercury/Report/Summary%20of%20the%20report.htm>.

<sup>3</sup> US Environmental Protection Agency, Office of Water, “2004 National Listing of Fish Advisories,” fact sheet, EPA-823-F-05-004, September 2005, available at <http://epa.gov/waterscience/fish/advisories/fs2004.pdf>.

<sup>4</sup> A. Jerardo, “Import Share of US Food Consumption Stable at 11 Percent,” FAU-79-01, Washington, DC: Economic Research Service, US Department of Agriculture, July 2003, available at <http://usda.mannlib.cornell.edu/reports/erssor/trade/fau-bb/text/2003/fau7901.pdf>.

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<sup>5</sup> K.R. Mahaffey, "Update on Recent Epidemiologic Mercury Studies," in *Proceedings of the National Forum on Contaminants in Fish*, EPA-823-R-04-006, San Diego, Calif., January 25–28, Washington, DC: US Environmental Protection Agency, 2004, p. 31.