

Municipal Collections of Mercury

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What is mercury?

Mercury is an element with the atomic number 80 in the table of elements. It's symbol Hg comes from the Latin for liquid silver (hydrargyrum). The following are a list of some of its properties:

- only metal liquid at room temperature that stays liquid at minus fifty degrees
- heaviest liquid (2 tablespoons weighs about a pound)
- good conductor of electricity
- evaporates at room temperature
- kills bacteria and fungi
- occurs naturally as mercuric sulfide known as cinnabar
- present in fossil fuels especially coal
- potent neurotoxin
- expands and contracts uniformly with changes in temperature and pressure
- readily transforms into other organic/inorganic forms

These properties make mercury an integral part of a number of products like:

- Thermometers
- Thermostats
- Fluorescent lamps
- Barometers

- Sphygmomanometers (blood pressure cuffs)
- Pressure gauges
- Switches
- Flow meters
- Bactericides and fungicides
- Vaccine preservatives

How is mercury dangerous?

Mercury is a potent neurotoxin (toxic to our nervous system). In 2000 the Center for Disease Control (CDC) tested blood samples from women of child bearing age and found that one in ten had mercury levels high enough to cause developmental delays in their child if they were to become pregnant. Follow up studies have shown that the numbers in the CDC study were accurate and that mercury levels are higher in fetal blood samples than in the mothers blood. Children exposed in the womb to mercury can experience lasting impairment of language, attention and memory, even though their mothers do not show any symptoms. Developing fetuses, nursing babies and young children are most at risk to mercury due to their developing nervous system. Some of the characteristic effects of mercury to children are:

- visual impairment;
- learning disabilities,
- attention deficit,
- motor dysfunction;
- memory impairment
- at higher levels, smaller brain size, cellular distortions in brain, and mental retardation.

Mercury is suspected as a contributing factor in the increase of children with attention deficit, autism and early onset of adult nervous system diseases like Parkinson, Alzheimer and ALS. Mercury is also toxic to our liver, kidneys and in

some studies linked to cancer and heart disease.

Eating fish contaminated with mercury is the most common way we are exposed to mercury. The Massachusetts Department of Public Health (MDPH) advises pregnant women, nursing mothers, women who may become pregnant and children under the age of 12 not to eat any fish from freshwater bodies or swordfish, shark, king mackerel, tilefish and tuna steak from salt water. Light tuna as opposed to chunk white tuna (albacore) has been shown to have lesser amounts of mercury but we should eat no more than 12 ounces per week. Very small children and toddlers should eat less if at all.



Municipal Boards of Health receive updates from the Department of Public Health on Fish advisories for area fishing spots and should post these warnings at the fishing sites, town hall and public library. For more information on MDPH fish consumption advisories, visit their website at: <http://www.mass.gov/dph/beha/mercury/merchp.htm> where you can download “a Guide to Eating Fish Safely in Massachusetts” and check out local fresh

water fishing areas for mercury advisories, or call them at 617-624-5757.

How does mercury get into our environment and fish?

Fish bioaccumulate (concentrate) mercury in their muscle tissue by eating smaller fish contaminated with mercury. The larger older predator fish have the highest concentrations of mercury due to the years of eating small fish. The water may be safe to drink but the fish could contain 100,000 times the mercury due to this bioaccumulation. Most of the mercury in our water bodies is from human releases of mercury into the environment. Most of this mercury is released into the environment when we burn: coal to generate electricity or fire industrial boilers; other fossil fuels; medical waste containing mercury and municipal waste containing mercury bearing products.

Elemental mercury is volatile (evaporates) at room temperature. When products containing elemental mercury are broken, disposed of improperly or burned, evaporated mercury is released into the environment where it can travel in the upper atmosphere for miles until it ends up falling back to earth in particulate matter or rain water. The mercury contaminated particles and water travel into our water bodies. This is where it takes a ride up the food chain bioaccumulating in anything that eats something else growing in the water. One pound (approximately two tablespoons) of mercury released into the environment can contaminate two million pounds of fish.

We can be exposed to hazardous levels of mercury by breathing mercury vapors from broken and improperly cleaned up mercury bearing products like thermometers, thermostats and fluorescent lamps. Mercury vapor is heavier than air so it stays near the floor indoors posing an added exposure risk to

children playing on the floor. New York City health officials tested apartments for mercury vapor and found unsafe levels in apartments where thermometers had been broken up to 20 years ago. They could actually map where the mercury spills happened in apartments before talking to the residents to confirm the past spills.

Municipal Collection Programs

Municipalities can play a big role in stopping the release of mercury into the environment by setting up collection programs for mercury and mercury bearing products from residents, businesses and municipal buildings. Advertising these collections is a great opportunity to educate the public on exposure risks. Removing these items reduces exposures in the home, at work and in public buildings.

Collection programs will remove certain products, such as mercury fever thermometers, lab thermometers, barometers and blood pressure cuffs from use over time as non-mercury replacements are produced. Municipal collection programs may turn up a surprising amount of elemental mercury from residents. This should also decrease over time as personal stockpiles get cleaned out. Fluorescent lamps will be the main product that will not decrease in the foreseeable future as no mercury free substitute is available. Fluorescent lamps are still preferable to incandescent lamps as they use one quarter of the energy for the same amount of light. Coal burning which is used to produce some of our electricity in the northeast produces mercury and other pollutants. Reducing the energy consumption by using fluorescent lamps is still the preferred option. When spent fluorescent lamps are replaced, the used ones need to be recycled and not broken up and thrown in the trash, which releases the remaining mercury into the atmosphere.

Municipalities have a number of options for mercury collection programs. This document will address the following four popular options:

- 1. permanent universal waste collection of mercury bearing products;**
- 2. mercury fever thermometers swaps;**
- 3. advertising mercury collections at household hazardous waste collections;**
- 4. school and municipal building mercury clean-outs.**

Universal waste regulations and mercury

Mercury and mercury bearing products that we no longer need and wish to dispose of are considered hazardous waste, but, in the state of Massachusetts, when mercury is contained in an intact product, it can be collected and managed as a Universal Waste. The Massachusetts Universal Waste Rule (MUWR), modeled after the federal Universal Waste Rule, is designed to promote the collection and easy management of certain widely generated hazardous wastes. Universal Waste regulations are less stringent than hazardous waste regulations and include the following elements:

- **Storage:** Universal wastes must be stored in a manner that keeps the products intact to minimize releasing the mercury.
- **Labeling:** Containers must be labeled with the words “Universal Waste,” the type of waste it is, such as spent fluorescent lamps or waste thermostats, and the date that items were first placed in the container.
- **Time limits of storage:** Handlers of universal waste can store these wastes for up to a year before sending them to a permitted mercury recycler.

- Training: All persons handling universal wastes must be instructed in handling and spill clean up protocols.
- Transport: Universal wastes may be transported in vehicles that are not licensed for hazardous waste transport, provided the transport is done in a way that minimizes breakage. The transporter must be trained in basic handling and spill clean up protocols.

Municipalities that handle less than 5,000 kg of mercury bearing products at any one time are considered small quantity handlers of universal waste. They do not need to notify DEP to start collections and they do not need to keep records. Large quantity handlers in the business world collecting over the 5,000 kg amount must notify DEP and keep records for at least three years.

Note on transport: Municipal employees should transport universal waste in municipal vehicles, so in the case of an accident where mercury is released, the vehicle insurance will be honored.

Universal Waste Labeling

The containers pictured below are examples of what mercury recycling companies provide for the safe storage and transportation of mercury bearing products and how they should be labeled. The first is for a 5 gallon collection pail containing thermostats and thermometers started 12/8/01,



the second is a fiber drum for storing fluorescent lamps started 1/2/02. These fiber drums hold up to 85 lamps and keep them from breaking in storage and during transport.



Mercury Recyclers

How do you know a reputable mercury recycler and what is a fair price to pay for this service? Fortunately the Massachusetts Operational Services Division (OSD) has made this easy for us by soliciting bids for this service state wide. The following companies have been awarded contracts that are available to all public entities to provide mercury recycling services until the year 2007.

| Awarded Contractor | Service Ordering |
|---|---------------------------------------|
| AERC 2591 Mitchell Ave Allentown, PA 18103 | Barbara Diaz 800-554-2372 x 120 |
| Northeast Lamp Recycling 250 Main St. East Windsor, CT 06088 | Ray, Rob or Jackie 860-292-1992 |

| | |
|---|---|
| Onyx Superior 218 Canton St. Stoughton, MA 02072 | Amanda Poverchuk * 800-478-6055 x213 |
|---|---|

These companies will provide storage containers for different products and will pick these materials up when the containers are full. They each provide a range of additional products and services, including the sale of mercury spill kits and sorting of mixed batteries for recycling. Please review the OSD Update for a full explanation of the products and services these companies offer before selecting one for your municipality. The OSD contract title is FAC26 and can be found on www.comm-pass.com.

Elemental Mercury and Universal Waste Collections

When mercury is in its elemental form loose in a jar, a broken product or material used to clean up a mercury spill, it is technically considered a hazardous waste and must be managed as such. It is important to be clear to the public that elemental mercury should be brought to your hazardous waste collection days and not to a thermometer swap or universal waste collection shed. What do you do when someone brings it in anyway or brings in a broken mercury fever thermometer? The state will allow municipalities to store these materials temporarily in a universal waste collection area because they are an unintended result of the collection program, but they must be stored in separate sealable containers labeled:

- Hazardous Waste**
- Elemental Mercury**
- Toxic**
- Date**

The state contract mercury recyclers listed above will provide a sealable pail for this purpose and will pick up the material for recycling or disposal. It is a good management practice that all

broken products be stored in sealed zip lock bags before placing them into the pail and sealing shut with the top. If the municipality has a hazardous waste storage area, the pail should be stored there until pick-up can be arranged. It is not a good idea to keep a pail with elemental mercury in an enclosed office where people are working, even if it is double contained. Some municipalities will only accept elemental mercury from residents at their hazardous waste collections.

1. Permanent universal waste collection of mercury bearing products



Universal waste sheds are the most common, permanent municipal mercury collection programs in Massachusetts. The above picture is of a DEP mercury collection shed given out through the DEP equipment grant program. Permanent collection programs offer residents the convenience of an on-going program to drop off their waste mercury bearing devices. The shed may be available for drop off whenever a transfer station is open, or on designated times, such as the first Saturday morning of the month.

Permanent collection does not have to take place in a shed or separate building. Designating an area at a transfer station,

highway barn or school for Universal Waste storage can be as simple as picking a safe corner of a secure room not in a traffic flow area. Choose a visible location like a transfer station or recycling facility if the public is going to have access for dropping off materials. Monitoring a public use collection/storage area is essential to keep the materials stored correctly in containers and avoid breakage.

If the public has direct access to drop off materials at the facility, clear signs listing exactly what you take and where to place them are crucial. See example of sign below.



A mercury spill kit should be at each storage location and the people monitoring the area should know how to use it.

Advertising the location and start up of a mercury collection program is essential and should include:

- newspaper articles;
- handouts at the town hall and collection location;
- good signage at the collection point clearly listing what is collected.

2. Mercury fever thermometer swaps

The idea of the fever thermometer swap is to provide a digital or other non-mercury thermometer in exchange for a mercury fever thermometer that residents deliver for recycling. Mercury fever thermometer swaps can be done at hazardous waste collection events, through ongoing mercury universal waste collections or as a stand alone program. Municipalities have seen the collection of all types of mercury increase when mercury fever thermometer swaps are advertised. More than one community has had hazardous waste collection days for years without collecting any mercury and then when they ran a mercury fever thermometer swap in conjunction with a hazardous waste collection, received pounds of elemental mercury along with many mercury thermometers. Increased mercury volumes continue even after advertising the thermometer swaps stop. Advertising mercury fever thermometer swaps through newspaper articles makes people aware that mercury is a hazardous waste.

Digital replacement thermometers

Most municipalities offer to swap up to two new digital thermometers for the residents' old mercury fever thermometers, even if they bring several. Approximately 5% of your community's population will participate in the swap so plan on having that many replacement thermometers. For a list of reputable digital thermometer companies and more information on collections check out Health Care Without Harm's website www.noharm.org and Sustainable Hospitals website www.sustainablehospitals.org. The North East Waste Management Officials Association's (NEWMOA) website <http://www.newmoa.org/prevention/mercury/schools/publicize.cfm> has more information on planning a thermometer

swap. Some local businesses may donate replacement thermometers in exchange for the positive recognition they will receive. Some pharmacies will donate vouchers for digital thermometers for your swap or coupons for a discount on digital thermometers.

Collection materials and recycling

The same state mercury recycling contractors mentioned above can provide collection buckets for thermometers and pick up of these buckets for recycling when full. They can help estimate the cost of the program and provide a spill kit for cleaning up a small spill from a broken thermometer.

Where and when to collect

A decision will need to be made about where and how often to collect thermometers. Some municipalities do the collections through their board of health office or senior center which give residents more access than one annual hazardous waste collection day. Some do them ongoing at recycling centers that have universal waste collection sheds. Some do them just at the annual hazardous waste collections, which are the safest and easiest for the municipality, but do not give as much access to the public. The only real concern here is that the thermometers are collected and stored safely by trained staff, out of reach of children and in a secure place that will not expose workers to mercury vapors.

Collection and storage of thermometers

Who ever is designated to accept the thermometers from the public must know how to manage them safely and deal with a spill should one occur. Expect to get thermostats and small switches along with your fever thermometers. These can be recycled right along with your thermometers as long as they are not broken. Broken ones must go in a separate container with the broken thermometers as explained below.



The mercury in the thermometers should be triple contained, inside the thermometer, then inside a thermometer case or a sealed plastic bag and then inside a sealed collection container like the one below provided by a state mercury recycling contractor.



Broken thermometers should be sealed into a zip lock plastic bag and then into a separate sealed bucket labeled

Hazardous Waste

Broken Mercury Thermometers

Toxic

Date

Broken products containing mercury are technically a hazardous waste but when they are collected incidentally through a universal waste collection program, they can be stored in the universal waste storage area, as long as they are properly contained and labeled as hazardous waste.

Advertising a collection

Advertising is important to a good turn out at any event and mercury thermometer collections are no exception. A press release to the local papers about the event is a great time to educate the public on the health hazards of mercury, fish consumption advisories and what to do if a resident breaks a thermometer at home. Prominently list where and when the collections will take place. Residents should be advised to put the thermometer inside a solid container like the case they come in. If the original container is not available, a sealed zip lock bag is a good alternative. Keep the thermometer out of direct sunlight, which could easily break the thermometer. Be clear about how many non mercury replacements are being offered per resident and that all of the mercury fever thermometers residents bring in will be accepted. Explain that outdoor thermometers that are blue or red do not contain mercury and should not be brought to the collection. Posters, flyers and cable TV notices round out the advertising options for your collections.

3. Mercury collections at hazardous waste collections

Municipal hazardous waste collection events are one of the safest places to collect mercury and mercury bearing products because trained professionals are on site, but residents may not think of products that contain mercury as hazardous. Press releases for upcoming hazardous waste events list so many different materials collected that residents do not get the message about mercury and mercury bearing products. That is why running mercury fever thermometer swaps in conjunction with hazardous waste collection events is recommended, or at least doing a separate press release on mercury and mercury bearing products prior to a hazardous waste collection event. If a

mercury fever thermometer swap is planned, communicate with the contracted hazardous waste company before the event to be sure that they will have a mercury spill kit and containers for the thermometers. The municipality must provide the replacement thermometers and the people to hand them out at the event.

4. School and municipal building mercury clean-outs

Most schools have more mercury and more liability for a spill than any other municipal building. Many schools still have mercury lab thermometers, barometers, manometers, blood pressure cuffs, fever thermometers and elemental mercury in use daily. In addition, most vocational schools have thermostats, pressure gauges, old mercury filled electronic devices and various switches the students are learning about.

Most schools do not know how to handle a mercury spill. When mercury bearing products break, the mercury is rarely cleaned up without leaving a residue of mercury that contaminates the area. As part of cleaning up a spill, mercury may be poured down a sink and/or vacuumed up by a janitor, both of which continue to expose students and staff to mercury vapor above safe levels. Most schools do not seek professional clean-up to avoid publicity. The schools that do seek professional help are in for a surprise as to how expensive it is to clean mercury up to the point where there is no mercury residue vaporizing. If the spill is tracked around the school, by people walking through the spill area, the clean-up costs can reach hundreds of thousands of dollars .

All this liability and exposure risk to a young population most in need of protection make schools a bad place for mercury bearing products and especially elemental mercury. Elemental mercury is often used by science teachers to

demonstrate density. A bottle of elemental mercury is passed around the class so students can feel the difference in density of water and mercury. Some science teachers make their own manometers pouring elemental mercury into open glass tubes right in the classroom. These are both exciting for students but not worth the risk of a spill. Many of the worst spills occur right after one of these experiments has been conducted. A student decides mercury is cool steals some and plays with it in the school or at home. The school is then responsible for cleaning up any mercury that student spills even if it is off school grounds.

School officials can participate in municipal collection programs, but often don't because they are not aware of what mercury bearing items they have or may not consider them a hazard. For a comprehensive school clean-out, they need to have a list of the common mercury bearing items and where in the school these items might be found. The Northeast Waste Management Officials' Association website: <http://www.newmoa.org/prevention/mercury/schools> . has links to the following useful documents :

1. *"Getting mercury out of schools: Why it's a problem. Where it is. What to do"*
2. *"Identification of mercury devices in schools"*

Managing essential mercury products safely

Schools and many municipal buildings will have mercury bearing products that are essential to efficient operation, such as fluorescent lamps and mercury thermostats. These are safe products when they are used properly but when they are removed they need to be handled appropriately. Setting up universal waste storage areas in schools and municipal buildings as described above is the safe way to manage all of

these essential mercury bearing products.

Municipal water departments and sewer departments may have old mercury flow meters, switches and thermostats in their buildings that are not being used. Some of the old flow meters can contain many pounds of mercury and care should be taken when replacing them.

Mercury Spill Clean-up

Federal law requires manufacturing, educational and service facilities to report mercury spills greater than one pound (two tablespoons). In the state of Massachusetts anyone who spills a pound or more of mercury needs to report it to the Department of Environmental Protection by calling the 24 hour Release/Spill Notification Line at (888) 304-1133. They can also advise on clean-up protocol or professional hazardous waste clean up services, if it is necessary.

If a household or a school keeps mercury devices, they should have the materials and the ability to clean up small spills safely. If a spill occurs, stay calm and evaluate the spill area, paying close attention to whether people or pets have been exposed by walking through the area or splashed by the initial spill. If mercury is on clothes or shoes, remove them and leave them in the room. Open the windows in the room to ventilate the area, turn down the heat if it is on to reduce evaporation of the mercury, have everyone leave the room and shut the door. It is important not to track the spill all over the building while assembling the items needed to clean up the spill. Keep everyone out of the spill area especially children and pets.

Never vacuum or sweep up a mercury spill with a broom. Vacuums will heat the mercury and spread its vapor into the room. In addition, mercury droplets will adhere to metal parts inside the vacuum

cleaner and will vaporize little by little every time it is used. Dispose of any vacuum that has been used to clean up a mercury spill.(for a vacuum that has been used in an area that has very little mercury, we have recommended changing the vacuum bag, filter and then running the machine outdoors for an hour or so) Brooms break up the mercury into little balls that scatter around the room and contaminate the broom for future use.

Assemble the following materials:

- Mercury spill kit if you have one
- Latex/rubber gloves
- Goggles/safety glasses
- Two small pieces of stiff paper like index file cards or playing cards
- Plastic container like a used yogurt or cottage cheese container with lid
- Airtight zip lock plastic bags
- Garbage bags
- Flashlight
- Duct tape or masking tape
- Utility knife if the spill is on material like a rug that the spill area can be cut away from
- In a school, sulfur or zinc powder may readily available to suppress the evaporation of the mercury.

1. If a mercury spill kit is available, completely read the directions before starting to clean the spill and then enter the spill room and follow them carefully.
2. Remove jewelry from hands and wrists to avoid bonding the mercury to them and then put on the rubber gloves and safety glasses. Bring the assembled materials into the spill room.
3. Carefully assess the size of the spill area by looking at it from different angles before walking into the area. Mercury beads can travel fast and far when mercury products are dropped and broken. Outlining the spill area with tape can help contain the spill and make it clear what area needs to be cleaned.

4. Any clothes or shoes that have been contaminated with mercury and left in the room should be double bagged in the garbage bags for hazardous waste disposal.

5. If the mercury spill is on a small rug, double bag it for hazardous waste disposal. If it is on wall to wall carpet, cut out the affected area with the utility knife and double bag it for hazardous waste disposal.

6. If the spill is on a hard non porous surface, use the two index cards to gently push the beads into a pile and then use the cards to pick up the pile and place it in the rigid plastic container. When all the beads are in the container put the cards in as well.

7. If any tiny beads are left, use the tape to pick them up and then put the tape in the plastic container.

8. Put the gloves in the container and then seal the top on with tape.

9. If the spill is in a sink drain, put a sealable container under the sink drain, unscrew the drain plug carefully and drain the water and mercury into the container. Put the gloves in the container and then seal it up with tape.

All of the spill material is hazardous waste. Dispose of this material through one of the mercury collection companies listed above, or through a licensed hazardous waste company