

Office of Compliance Assistance and Pollution Prevention

Developing a Community Mercury Reduction Program



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Bob Taft, Governor
Christopher Jones, Director

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Alexis Cain, U.S. EPA, Region 5 Headquarters

Delta Institute, Chicago

Judy Mentzer, Ohio EPA, Division of Environmental & Financial Assistance

Ohio EPA, Public Interest Center

Ohio Mercury Reduction Group

John Reindl, Dane County Department of Public Works, Wisconsin

Contents

CHAPTER 1: INTRODUCTION	1
Developing a Community Mercury Reduction Program	1
The Issue for Local Governments	1
Mercury	1
Health Impacts of Mercury	3
Mercury Spills	3
CHAPTER 2: ESTABLISHING A MERCURY REDUCTION PROGRAM	6
1. Establish the Project Coordinator	6
2. Develop the Scope and Goals of the Program	7
3. Gather Partners	7
4. Determine Whether Facilitators or Consultants are Necessary	8
5. Assess Sources of Mercury	10
6. Mercury Reduction Activities	10
7. Identify Resources	11
8. Promote the Program	11
9. Measure the Project's Success	11
10. Evaluate Program for Closure or Expansion	12
CHAPTER 3: PARTNERS	14
City/Community Council	14
Local Health Department	14
Emergency Assistance and Mercury Spill Response Organizations	14
Publicly Owned Treatment Works	15
Solid Waste Management District/Household Hazardous Waste Collection Days	15
Local Business and Industry	16
Regional Dental Association and Local Dentists	16
Medical Facilities and Veterinary Facilities	19
Schools	19
Public/Environmental/Outdoor Community Groups	20
Local Media	20
Local Utilities	20
CHAPTER 4. IDENTIFYING MERCURY SOURCES IN THE COMMUNITY	21
Wastewater Discharger Data	21
The Toxic Chemical Releases Inventory	22
Community Self Assessments	23

CHAPTER 5: POTENTIAL PROJECTS	24
Start with Your Own Organization	24
Types of Projects	24
Education and Outreach	24
Energy Efficiency Awareness Campaign	25
Ritualistic Use of Mercury Awareness Campaign	25
Retail Stores	25
Crematoriums	25
Fundamental Changes in Organization Operations	25
Local Government Policy	26
Collection and Exchange	26
Thermometer Exchanges	26
Automobile and Appliance Scrapyards and Recyclers	27
Dairy Farms	27
Household Hazardous Waste Collection Days	27
Recognition	28
Dental Recognition Program	28
Recognition of Hospital Activities	28
Comprehensive and Multi-faceted Projects	28
Mercury Free Schools Program	28
Promote Thermostat Recycling	29
CHAPTER 6: THERMOMETER EXCHANGES	31
Assistance with Organizing the Exchange	31
Financing the Thermometer Exchange	31
Where to Hold an Event	32
When to Hold the Collection Event	32
Planning for Bad Weather	32
Determining the Number and Type of Thermometers Distributed from the Thermometer Exchange	33
Promoting the Event	33
Use Your Imagination to Get the Word Out	34
Setting Up the Event	35
What to Expect	35
Managing Collected Thermometers	36
Spill Readiness	36
Other Information About Holding a Thermometer Exchange	37
Help is Available	37

CHAPTER 7: RESOURCES	38
Ohio Mercury Reduction Group	38
Bowling Green State University Elemental Mercury Collection and Reclamation Program	38
Health Care without Harm	39
Ohio Department of Health	39
Ohio EPA Office of Compliance Assistance and Pollution Prevention	39
Ohio EPA Spill Responders and Hotline Number	40
U.S. EPA	40
Other States	41
Other Internet Sources	42
APPENDIX	A-1
References	A-2
Identification of Mercury Devices in Households	A-4
Identification of Mercury Devices in School Science Rooms	A-6
Identification of Mercury Devices in School Medical, Home Economic, Art and Other Rooms	A-8
Identification of Mercury Devices in School Facilities	A-10
Checklist of Mercury Sources to Consider in a Baseline Inventory	A-12
Publicly Owned Treatment Works Self Assessment	A-15

CHAPTER 1: INTRODUCTION

DEVELOPING A COMMUNITY MERCURY REDUCTION PROGRAM

The purpose of this manual is to walk a community representative through the process of developing a mercury reduction program. Several case studies are provided throughout the document to provide relevant examples. The goals of this manual are in many cases the same goals a community has when initiating a mercury reduction program, namely to:

- Raise awareness about mercury issues
- Identify stakeholders that can contribute to mercury reduction
- Identify the sources of mercury in the community
- Identify activities to reduce mercury in the community
- Identify resources to help a community achieve a successful program

This manual provides guidance to communities interested in pursuing mercury reduction and provides a roadmap on the process of building a successful program with explanations of each step of the process.

THE ISSUE FOR LOCAL GOVERNMENTS

Local government officials are becoming more aware of the risks of mercury in their communities. With the news media reporting on the latest sports fish consumption advisory or health impact from mercury-contaminated fish, industries discharging mercury into the environment, or schools that have had a mercury spill, there is greater pressure being placed on local governments to take action to protect their community.

Many communities have been surprised when a mercury spill occurs. Mercury spills are health hazards that can temporarily close schools and cause fear in the community. They are also expensive to clean up. In many cases there is no remuneration for the cleanup costs as mercury spills are written out of many insurance policies, leaving families, schools or the community with a large bill.

Federal regulations are reducing the allowable limits of mercury discharged from municipal wastewater treatment plants. This is putting pressure on communities to take the time to consider what they can do about mercury in order to keep costs down and meet environmental regulations.

Overall, communities are discovering that mercury reduction projects are an important means to address mercury and have the added benefits of reducing the communities' liability, being cost effective and helping the environment. There are many opportunities to reduce the presence of this environmental and human health concern in the community.

MERCURY

Mercury is a naturally occurring element. It is released into the atmosphere through forest fires, soil erosion and volcanic action, as well as through human activities. It has many useful properties and is used in many items in households and throughout the community. Through burning fossil fuels for

electricity, specifically coal, and through human use, mercury’s presence in the environment has greatly increased.

Coal-burning electric utilities are the primary source of mercury emissions in the United States with about 48 tons of emissions annually, or about 40 percent of the estimated total releases. More than a third of the mercury emissions from electric utilities in the United States originate in Great Lakes states, and Ohio is a significant contributor.

Mercury is a toxic chemical in all forms. Elemental mercury is the silver liquid metal found in thermometers, thermostats and barometers, school chemistry laboratories, dental offices and botanicas selling mercury for religious uses, just to name a few. When a thermometer breaks, elemental mercury is spilled. Elemental mercury vaporizes at 70 degrees Fahrenheit, or about room temperature, becoming a poisonous gas. Mercury vapors are invisible and have no taste or smell. Mercury has inorganic forms that have been and still are used as medical preservatives, paints and fertilizers. Organic mercury is readily available for uptake by living organisms. Elemental and inorganic mercury can be transformed by bacteria into organic mercury. Methyl mercury is the most common form of organic mercury and is particularly dangerous.

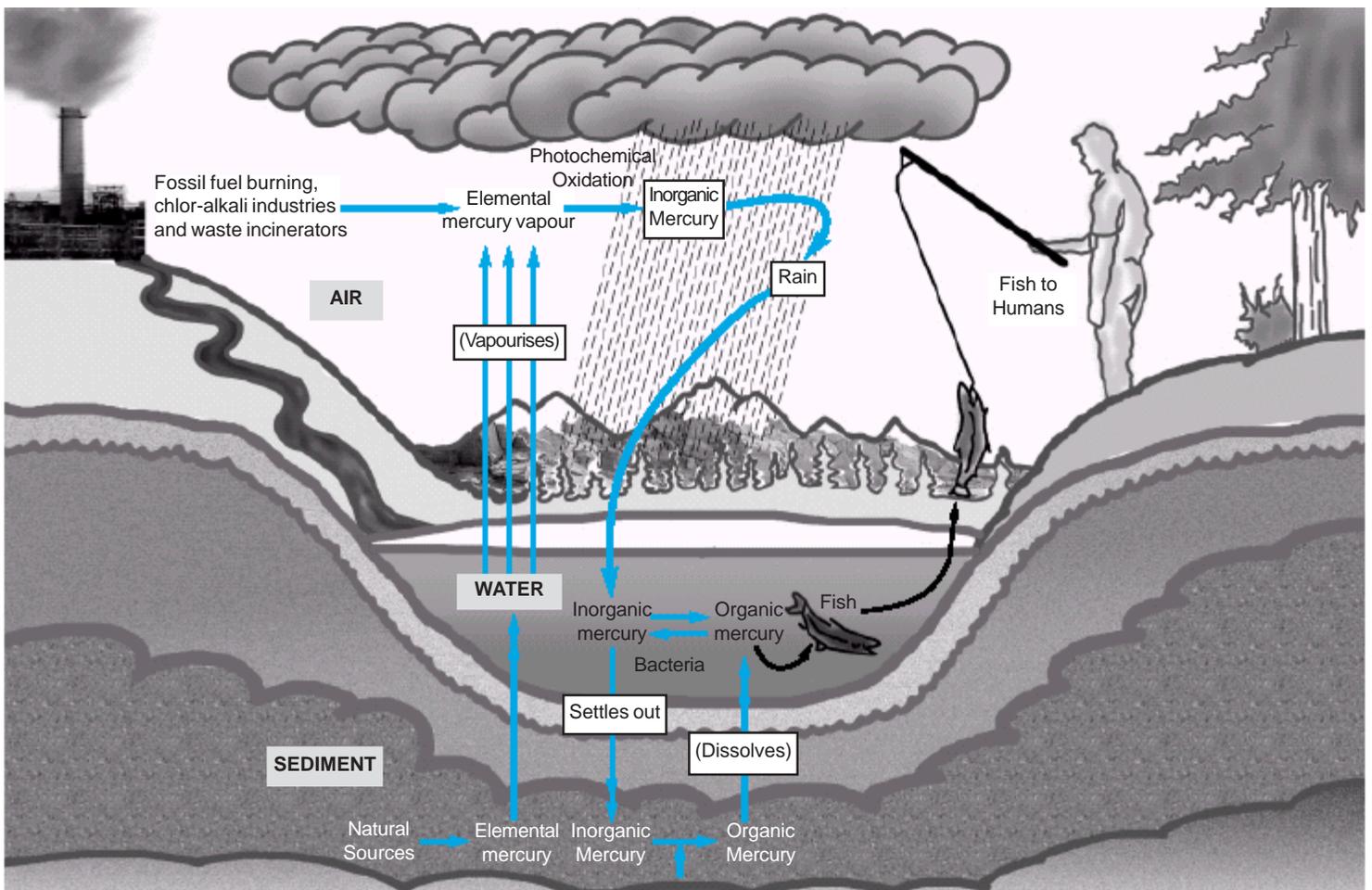


Figure 1 (Source: Global Mercury Assessment, UNEP; CGEIC)

Figure 1. Mercury cycles in the environment and can be transformed into an organic form. The organic form can travel up the food chain and reach humans.

Once mercury in any form is released into the environment it can be transformed into methylmercury. Methylmercury can travel up the food chain and greatly increases in concentration. This is known as bio-accumulation. The largest fish in a lake can have mercury levels in their bodies hundreds of thousands times greater than the concentration of mercury in the lake itself. For these reasons, mercury is classified as a persistent, bio-accumulative and toxic (PBT) chemical. Eating fish that are highly contaminated with mercury can impact human health. There is a statewide sport fish consumption advisory for all waters of Ohio that recommends limiting the consumption of fish from Ohio's lakes and rivers because of elevated mercury levels in the fish.

HEALTH IMPACTS OF MERCURY

Mercury is a neurotoxin that can make people sick and permanently reduce the intellectual capacity of young children. Impacted children may have to struggle to keep up in school and may require remedial classes or special education (U.S. EPA, 2001). Mercury poisoning impacts the brain, liver and kidneys and can cause development disorders in children. (NEWMOA, 8 Good Ideas). Children, expectant women and women of childbearing age are the most at risk of mercury poisoning. The Federal Centers for Disease Control and Prevention (Schober, 2003), estimates eight percent (one in 12) of women of childbearing age have unsafe mercury levels in their blood that could put an estimated 300,000 children at risk every year. New research by the Centers for Disease Control and Prevention (2004) suggest that the risk to children may be significantly greater, impacting one in six women and about 630,000 children. Learning and developmental disorders are the greatest concern for children who have high mercury levels as fetuses.

The exposure route of greatest concern is the ingestion of contaminated fish. Mercury accumulates up the food chain, so the top predators of a water system tend to have the highest mercury levels. The State of Ohio has issued a statewide sports fish consumption advisory for all fish in Ohio, driven by the risk of mercury poisoning (www.epa.state.oh.us/dsw/fishadvisory/index.html). People can also become sick when exposed to elemental mercury vapors, including mercury released when a mercury-containing fever thermometer, thermostat or barometer is broken. When mercury is not properly cleaned up after a spill it can fill a room with vapor, especially if the air temperature is warm, the mercury spills on a heated surface or if someone attempts to collect the spilled mercury with a vacuum cleaner. Even small spills can create enough vapor to create an unsafe environment for humans.

MERCURY SPILLS

Mercury spills occur more often than people realize. What surprises them most about mercury spills is the cost and time of clean-up of even small spills. It is extremely important to understand that most spills are avoidable and greater awareness of mercury issues can go a long way to help reduce their occurrence.

Proper response is critical in order to minimize the potential health risks and the cost of the clean-up. The best solution is simply not to use mercury-containing items and to replace them whenever feasible.



If you need immediate assistance responding to a mercury spill, call Ohio EPA's spill hotline at 1-800-282-9378. For more information on how to respond to mercury spills, please refer to the Ohio Department of Health's 2004 Health

Department Mercury Packet, U.S. EPA's 2004 Ohio Mercury Outreach and Training Manual or contact Ohio EPA.



Case Study - Four mercury-related deaths in Lincoln Park, Detroit 1989

In 1989, four people living in the same house in Lincoln Park, a suburb of Detroit, died of mercury poisoning. One member of the household was heating dental amalgam (approximately half of dental amalgam content is mercury) in the home to extract the silver. Mercury was released in lethal amounts from the smelting process killing the four residents. The house was extremely contaminated and 78 pounds of mercury were collected from the atmosphere inside the house. Afterwards, the house still was not inhabitable and had to be demolished and sent to a hazardous waste landfill.

Units of Mercury (U.S. EPA, 2000)

1,000 ng/m³ = 1.0 ug/m³ = 0.001 mg/m³

1 gram = bead size of a pencil eraser

1 pound = 453.6 grams = 2 tablespoons mercury = 130 thermostats (NEMA estimates about 3.5 grams per thermostat)

1 fluid oz. = 394.4 grams mercury

1 gallon = 104 pounds mercury

Large Spill = 1 pound mercury

1 thermometer = ~ 0.5 -3.0 grams of mercury

1 thermostat = ~75-100 fluorescent lamps

1 thermostat = ~3-5 grams mercury

1 sphygmomanometer (blood pressure cuff) = 70 - 90 grams mercury

Case Study - Boys find mercury in abandoned warehouse, Springfield 1997

In 1997, in Springfield, Ohio, seven boys found mercury at the abandoned Tower Metal Alloy factory warehouse. The youths took mercury from the abandoned warehouse, shared it with their friends and took it to Schaefer Middle School.

When Ohio EPA arrived, they found mercury puddles on neighborhood lawns, streets and sidewalks. The emergency response included monitoring 31 houses and two duplexes. The community clean-up displaced 16 families and three of the homes inspected were considered highly contaminated with mercury vapor.

In one of the houses, mercury was spilled in a child's bedroom with a heated waterbed. Two children had been sleeping in the room and both were identified as having high levels of mercury. They were taken to the hospital for treatment. One of the children was hospitalized and underwent chelation therapy to help lower the mercury level in his blood.

When the school investigated, they found mercury in two lockers. However, 140 individuals gave urine samples in the initial screening. The clean-up from the community filled 22 dumpster-like containers with contaminated soil and household items. Spill responders also cleaned up the abandoned factory warehouse, removing 75 pounds of mercury from the site. The clean-up cost approximately \$500,000, which was paid from U.S. EPA's Superfund.

The spill response raised community awareness. The community followed the spill response with a mercury collection event where 200 additional pounds of mercury were collected.

Case Study - Youths find mercury vials in alley, Springfield 2000

In 2000, neighborhood youths found a large number of mercury vials from industrial relay switches in a 55-gallon drum in an alley and began to play with the mercury. Initially, 20 youths between the ages eight and 13 were involved. The youths spread the mercury throughout several yards and alleys. As a result of

the mercury spill, 31 homes were sampled and six families had to be evacuated. Additionally, the clothing and textiles from several homes had to be disposed. The cost of the clean-up was more than \$100,000.

Case Study - Spill in Celina Schools, April 2001

Although Celina Intermediate School had previously removed elemental mercury from its chemical stores, this did not prevent a spill occurring at the school. In April 2001, a student brought two to three ounces of mercury in a bottle into the school and shared the find with friends. The students passed the mercury around in a glass jar in science class, taking it out and playing with it in their hands.

The Celina Fire Department and Mercer County Health Department responded to the spill. When they got to the school, they found mercury droplets on the floor, chairs, desktops, waste container, spread between books, paper, coats and backpacks. Additionally, some of the mercury was reported to have been dumped down a drain. It was determined that the science classroom, the boy's bathroom, main hallway and adjacent stairs were all contaminated with unsafe levels of mercury.

Students' parents were called during the school day and asked to bring a change of clothing for their children. Twenty-three sixth grade students from the science class, four other students and the science teacher had interacted with the mercury during the day and were contaminated. Clothing and shoes worn during the school day were found to be highly contaminated. The contaminated materials filled 35 drums and included contaminated floor tiles that could not be cleaned. Approximately three ounces of elemental mercury were accepted by the Bowling Green State University Mercury Collection program.

There was an attempt to search the house of the student who brought the mercury into the school to determine whether it was safe, however the parents denied access.

Interdyne was hired to decontaminate the students and subcontracted the work to I.T. Corp. The school continued to monitor the air in the building the next week, which corresponded with its spring break. The end result was that the school was closed for one day to allow for clean up. The air mercury levels declined enough during spring break so that school could resume as scheduled afterward.

Case Study - School teacher shop vacuuming mercury spill from broken thermometer, 2003

On September 15, 2003, a field thermometer was broken in New Knoxville High School's Chemistry Lab (Auglaize County). This was initially a relatively minor incident and students succeeded in leaving the room without spreading the spill. However, the science teacher then attempted to clean up the broken thermometer using a shop vacuum. The mercury was vaporized by the vacuum, contaminating a much larger area than the spill. Ohio EPA was contacted to follow up on the clean-up, which became an important response once they learned that the shop vacuum had been used. Mercury vapor was detected with levels as high as 10,000 ng/cubic meter as measured with a mercury meter. The spill clean-up costs were almost \$8,000, including clean-up, disposal, hiring an industrial hygienist for monitoring and disposal of the heavily contaminated vacuum. If the spill had been cleaned up properly, it would have contaminated a much smaller area and would have cost a great deal less.



CHAPTER 2: ESTABLISHING A MERCURY REDUCTION PROGRAM

When developing a community mercury reduction program, the following activities should be completed:

1. Establish the project coordinator
2. Develop the scope and goals of the program
3. Gather partners
4. Determine whether facilitators or consultants are needed
5. Assess sources of mercury
6. Determine the mercury reduction activities
7. Identify resources
8. Promote the program
9. Measure the project's success
10. Evaluate program for closure or expansion

1. ESTABLISH THE PROJECT COORDINATOR

The first activity is to establish the project coordinator. This individual will be responsible for representing the lead organization, gathering partners and opening up the dialogue to begin building the program. This role is pivotal and can be the glue that holds the overall project together.

The most common organizations leading community mercury projects are the local health department, the local wastewater treatment plant (WWTP) or publicly owned treatment works (POTW) and the local Solid Waste Management District (SWMD). These organizations are often important partners in achieving mercury usage reduction within the community. The motivation for these and other organizations is explained in more detail in Chapter 3: Partners.

It is the responsibility of the project coordinator to bring all the community members together and request their participation, help explain the importance of the mercury reduction program and lead the participants through the process of

A note to the mercury reduction project coordinator

Congratulations! You have become the project coordinator. You are leading the charge to raise awareness in your community about mercury issues and getting everyone to the table for initial discussions. This role is pivotal; it is the glue that holds the overall project together.

As the coordinator or lead of the project, you will have many responsibilities, including shaping the attitude of the group, recognizing realistic limitations and seeing beyond your own preconceptions. Sometimes the community can surprise you with a willingness to create a better program than you anticipated. As the coordinator, a lack of enthusiasm on your part could bury their great idea, while a commitment of support for an idea can empower your team and make a better program than you could hope.

Initially, the majority of the legwork and calling around will fall to you. It will be up to you to understand the resources that the sponsoring organization is allowing for this activity, including your time. At the minimum, you will arrange the initial meeting place and make the calls to bring members of your community to the meeting. Once everyone is together you will gain a better understanding of the community resources available to you. You will be challenged to encourage other organizations to contribute their time and resources to address mercury in the community. Use your group's knowledge of the community and you may find a wide variety of resources to help you succeed.

Use this guide as a starting point to build a program that reflects the needs and values of your community. The Office of Pollution Prevention and the Ohio Mercury Reduction Group members are resources that are available to help, so feel free to contact us for our insight. Best of luck on your project.

Office of Compliance Assistance and Pollution Prevention, Ohio EPA
P.O. Box 1049
Columbus, Ohio 43216-1049
Phone: (614) 644-3469
e-mail: P2mail@epa.state.oh.us

developing a mercury reduction program. The project coordinator will identify many potential participants in the community, many projects that can be done to reduce environmental impact of mercury and a variety of resources available to help. This document is meant to serve as a guide for the project coordinator.

2. DEVELOP THE SCOPE AND GOALS OF THE PROGRAM

The first step as the coordinator of your community's mercury reduction program is to determine the scope of the program. There are many different projects and approaches to reduce mercury in the community. Likewise, there are many mercury sources that can be targeted for reduction. Therefore, it is important to recognize the time requirements and resources needed when making a more comprehensive program. Mercury reduction programs may be used to address regulatory requirements or they can be proactive projects that address the persistent pollutant and how to reduce risk to the community. It is often worthwhile to consider starting small with trial projects and expanding as the community gets experience and more success under its belt.

Once the scope of the program is determined, the coordinator should consider whether using a facilitator from the beginning is useful or necessary, and how much of a role the partners will have in setting the

project's goals. For projects that have a larger scope, it is advantageous to involve partners earlier and work with them to develop the project goals. When partners help establish the project goals, they have greater ownership and acceptance of the project.

Goals of a mercury reduction program

Some of the most basic goals of mercury reduction programs are to:

- Increase public awareness of mercury risks
- Reduce the use of mercury
- Promote mercury recycling
- Reduce mercury spills

Adding numerical targets, such as collecting 1000 fever thermometers and removing all mercury and mercury-containing items from local schools, helps the community measure how well it has achieved its goals. If progress is not being made, the mercury reduction team can reevaluate the project and its goals. Achieving goals is a great springboard to improve and enlarge programs.

Establishing the scope and goals for the project is not necessarily the same as determining which activities will be pursued. Recognizing why your organization is sponsoring the mercury reduction team and what it hopes to accomplish is important in order to provide a foundation for the mercury reduction team. Once the partners have been gathered, all members of the team can help define the goals better and then determine the target audience and the specific activities that will be pursued to achieve the goals of the project.

3. GATHER PARTNERS

Developing a plan to address mercury in the community can be a large project. The project will be more successful if the coordinator has help achieving the project goals. There are many organizations and businesses within the community that may contribute to mercury reduction. It is important to determine what the mercury reduction project will focus on in order to gain community support and cooperation.

For the mercury reduction project to succeed, it is also important for any business or organization that may be targeted by the program to have an opportunity to participate and share their insights and concerns about how to effectively address mercury issues.

When forming a new group, it is typical that not everyone has the same agenda. Some individuals or organizations will immediately see the need for mercury reduction activities that protect the environment and the community. Some individuals may not recognize that mercury is a problem. Some views may be institutionalized, as some organizations may officially hold a position that does not recognize mercury as an environmental concern or a health issue. As the coordinator, you must provide information about mercury and clearly present your organization's vision and goals for the program. It is important that all the partners agree to work toward the project's goals, whether to meet regulatory requirements or to proactively reduce risk to the community. If it becomes a challenge to get the partners to work together, even though everyone still wishes to participate, it may be worthwhile to consider a facilitator.

Chapter 3: Partners reviews organizations, their rationale for participating and the potential resources they may provide.

4. DETERMINE WHETHER FACILITATORS OR CONSULTANTS ARE NECESSARY

Coordinating a project with representatives who have diverse backgrounds and busy calendars can be challenging. If everyone on the project team is a member of community government, the team typically works well together. A facilitator may be of the greatest benefit when working with local government, industry and the public when diverse views and strategies could slow the decision making within the group.

At times it can be difficult to make progress, to understand where the other organizations are coming from or to reach consensus. If this is a recurring issue with the project team, it may be worthwhile to find a facilitator with the appropriate background to help work through issues. The larger and more diverse the group, the greater the assistance a facilitator can provide. If the community has the means, hiring a consultant is one option to helping achieve project goals.

Case Study - contributed by the Delta Institute Facilitating Mercury Reduction Efforts in the Lake Erie Basin

In order to assist sewage treatment plants in meeting low mercury discharge limits established by the Great Lakes Initiative, Delta Institute served as an outside facilitator for two facilities that had recently initiated mercury reduction efforts in the Lake Erie basin: The Water Reclamation Department in Solon, Ohio, and Wastewater Pollution Control in Elyria, Ohio. This was achieved through a one-year grant from the U.S. EPA Great Lakes National Program Office

Delta has experience in addressing pollution prevention issues and in working with communities. This assists organizations in developing mercury reduction efforts and connecting with partners who may not have been otherwise identified. Delta's initial efforts help organizations build understanding so they may continue mercury reduction efforts on their own.

Initially, Delta worked with each facility to plan a course of action that would enable its staff to implement an effective mercury reduction program. During this phase, Delta provided the staff with information about how other sewage treatment plants had addressed the mercury issue and their relative levels of success. Using benchmark information from other facilities, information from monitoring and using a Source Sector Assessment tool and identifying major inputs of mercury into the treatment plants, the pretreatment coordinators determined which types of sources to reach out to regarding mercury reduction.

This allowed the waste water treatment plants to prioritize the goals of the project. Along with the facilitator, they identified some goals including:

Lead by example. Delta provided a “Mercury Self-Assessment for Sewage Treatment Plants” tool and encouraged the staff to identify mercury sources inside the facility before working directly with their dischargers. In this first exercise, the plant staff encountered some of the same challenges that their dischargers would face. Additionally, the plants were able to share those experiences with their dischargers and demonstrated that they were taking the lead on mercury reduction efforts internally as well as throughout the community.

Consult with stakeholders. The wastewater treatment community sometimes feels that the public is only interested in sewage treatment when something goes wrong. Delta helped identify critical stakeholders and explained how they fit into the process. A meeting with representatives of other organizations within their communities — including the solid waste association, local dental components and homeowners’ associations, was held. Once the stakeholder groups were underway, both communities realized the many benefits of these partners.

As soon as the mercury reduction efforts were in full swing, the pretreatment coordinators found that these projects could take up a significant amount of time, while the demands of their other duties remained constant. When workloads were heavy, Delta was able to share the workload. It helped make the initial contacts with targeted participants and prepared many of the meeting materials. Meanwhile, the plant staff focused on the day-to-day business of their mercury reduction efforts, from sampling to interpreting their regulatory authority under these circumstances, to completing documentation required by state regulatory authorities. Through weekly conference calls, the pretreatment coordinators and Delta were able to exchange ideas about different approaches on a regular basis and fine tune their strategies for developing outreach efforts. These calls also kept the facilitators aware of the types of information and tools that were helpful for the pretreatment coordinators.

As each facility kicked off outreach efforts with a meeting of its respective stakeholder group, they called on Delta to participate in the meetings. The facilitators presented the historical and regulatory foundations of the mercury issue and the results of the Source Sector Assessment. They were also available to answer some of the more contentious questions, allowing the pretreatment coordinators to develop a more amicable relationship with their dischargers.

Each sewage treatment plant dealt with its dischargers differently. Although the pretreatment coordinators had regulated industry and other large facilities before, working with the dental community was new to them. The dental offices in both communities were some of the largest sources of mercury sent to the sewage treatment plants. Delta facilitated communications between the sewage treatment plants and the local dental associations. They helped identify issues that might cause additional concern from the dental community and prepared the pretreatment coordinators with the knowledge they would need to

calm those fears. This enabled both communities to respond to the dentists' questions without using purely regulatory force.

Both Solon and Elyria hosted mercury thermometer exchanges, which were coordinated and publicized through contacts they made in their stakeholder groups. Both exchanges were partially funded by some of those partners as well. Delta Institute helped get everyone together at the initial meetings so that both sewage treatment plants coordinated subsequent meetings. When all was said and done, Elyria established the Lorain County Mercury Reduction Collaboration, a consortium of parties engaged in mercury reduction efforts; and Solon's Mercury Reclamation Partnership received a Proclamation from the Solon City Council in recognition of its efforts.

5. ASSESS SOURCES OF MERCURY

Reviewing available data and performing assessments is useful when trying to gain a complete and realistic understanding of where mercury is found in your community.

Many mercury sources can be identified without performing any type of assessment. The following facilities typically have mercury-containing items:

- Medical facilities, including dental offices, hospitals and veterinary offices
- Education and research facilities, including schools and laboratories
- Households (especially mercury-containing products)
- Retailers (especially mercury-containing products)
- All institutional, commercial or industrial buildings contain mercury devices that can be released through spills or demolition
- Publicly owned treatment works (POTWs)
- Most heavy industry has mercury-containing devices and meters
- Automobile recycling facilities

Methods and resources to help you identify mercury sources in your community are explored in more depth in Chapter 4: Identifying Mercury Sources in the Community.

6. MERCURY REDUCTION ACTIVITIES

Once you have an understanding of the team's goals and the mercury sources that are being targeted, it is time to determine what type of project will best address the team's goals and implement them. Mercury reduction activities require different levels of commitment, cooperation and resources. It is often a good idea to build a program slowly. Start with a simple project, learn from its mistakes and build upon its success.

A thermometer exchange is often one of the first projects pursued. It raises awareness about mercury and the need for action while removing the substance from residences. Thermometer exchanges can be community wide or more narrowly focused on residents, schools or doctors' offices. Greater interest and participation is achieved in this community activity because participants enjoy receiving a new digital thermometer.

Chapter 5: Mercury Reduction Activities, provides information about a variety of projects worth considering. Chapter 6: Thermometer Exchanges, provides a detailed walkthrough about organizing a thermometer exchange in Ohio.

7. IDENTIFY RESOURCES

Your group does not have to go forward blindly. There is a great deal of information available for the asking. Other organizations have developed mercury reduction programs, so there is a variety of outreach material that can be provided to your project team. You do not have to reinvent the wheel. Chapter 7: Resources, provides a description of organizations and information that are available to your project team, along with contact information.

8. PROMOTE THE PROGRAM

Once your group has determined what it wants to accomplish, it is critical to promote the program and inform the targeted audience of the needs, goals and the benefits of the program. It is important to guide the target audience, whether residents or businesses, to your event to ensure participation. Tapping into local resources to get as much free publicity as possible is often the only way to make the community aware. Work through your local solid waste district, city officials or county commissioners. They often have personnel experienced in dealing with hazardous material and promoting community events. Often local news media have space or time available for public service announcements. Setting up booths at community events to increase understanding and promote your event is very effective. Working through schools to make students aware can also be a successful way to reach parents. Talk to people in your community who are experienced in non-profit promotion and learn what has succeeded for them.

Again, it is not necessary to reinvent the wheel. Contact communities that have already had mercury reduction programs, art work and ads created for promotional purposes. Brainstorm with your committee members to come up with new and interesting ideas to raise awareness. Find out what has worked in other communities and adapt it to fit your community's needs. What is important is that you promote the program and encourage the community to participate.

9. MEASURE THE PROJECT'S SUCCESS

It is important to develop a tool to measure success and to include these results in the promotion campaign. You should measure the progress against your goals. By reviewing the program's successes and failures you can see how it has been the most effective. Also, by tracking the amount of mercury the program has removed from the community you can judge the program's overall success and determine whether there is a demand for expanding the program. It may be necessary to determine baseline values or initial levels of mercury release to determine the effectiveness of the program, such as a campaign to reduce mercury sources to your POTW. Alternatively, you may simply want to keep track of how much mercury has been removed from the community in pounds and the number of devices safely collected.

The information gathered from initial successes can be used to inform community members of the program's effectiveness and build support for expansion. If your community replaced 1000 thermostats in low-income housing, and calls from others within the community reveal additional demand, this supports enlarging the program. Records of the program's achievements also demonstrate the benefits gained by using the community's resources. This will help the group be accountable to the community and build credibility.

Information about the success of the program should be shared with the community. Publicize the program's success. Review potential savings to the community and home owners. Celebrate the program's achievement with the community. Assure community members that they are doing their part to help reduce the risks from mercury. By firmly establishing the program's success you are recognizing the community's achievement of reducing mercury risks, creating support for continuing the program and creating a stepping stone for enlarging the program's scope.

10. EVALUATE PROGRAM FOR CLOSURE OR EXPANSION

Congratulations are in order. Your team has organized and implemented a mercury reduction project. Now it is time to evaluate the project's success and whether there is a demand for continuing services or expanding the program.

For project closure, be sure to thank the project team and the community. Share the program results with them. Provide information on who to contact if there are questions or the need for additional services. It is common for community members to continue to ask for services after the projects end date. Therefore, it is worthwhile to plan accordingly, and to be able to provide information or services to community members who could not participate initially.

Review the resources that you have used and whether resources are still available. These may be used for community members who were unable to participate in the scheduled activities and can be provided upon request.

Communities that have had thermometer exchanges may also continue to receive calls for replacement thermometers well past the end date of the program. Project organizers may want to keep extra digital thermometers in their offices to exchange for mercury-containing thermometers from walk-in clients. Be prepared to provide contact information for bulk mercury pick-ups as well (BGSU is currently working with Ohio EPA to provide this service statewide and is an excellent contact).

A successful mercury awareness campaign also will raise awareness in the community and more people will request information about the proper management of mercury-containing items and related health issues. One of the common outcomes of a mercury awareness program is that more people report mercury spills and broken thermometers.

If there is demand for continuing the program, now is the prime time to evaluate the initial project. Determine which lessons from the first project will apply to an extended program. Determine whether team members will remain or whether this is an opportune time to invite new members while allowing existing team members to gracefully retire. Take what you have learned from the first program, run and build on it, and use the resources that you have discovered.

Not all programs have simple conclusions. Regulatory programs, including monitoring and permit requirements, are on-going. Requirements for mercury reduction programs that are part of a regulatory initiative will be defined by those regulations.

CHAPTER 3: PARTNERS

Developing a plan to address mercury in the community can be a daunting project. The project coordinator will be more successful if she has help achieving the project goals. There are many organizations and businesses within the community that may contribute to mercury reduction. It is important to determine what of the mercury reduction project's focus will be, and then gain support and cooperation from the community. This section discusses organizations, their rationale for participating and the potential resources they could provide. This is by no means an exhaustive list, but it does provide several good places to start.

CITY/COMMUNITY COUNCIL

The community's governing body, the city or community council, are likely candidates to involve in a community-wide mercury reduction program. The council is an ideal organization to help build community support and share information throughout the community. It can also directly reduce the mercury releases through its purchasing decisions, low-income housing management, demolitions management and by enacting ordinances limiting mercury use in the community.

LOCAL HEALTH DEPARTMENT

The local health department also should be one of the first organizations contacted when developing a mercury reduction program. They often have expertise in addressing mercury toxicity and have an organizational goal to reduce toxicity risks to human. The local health department is often responsible for managing groups who respond to mercury spills as well.

Local health departments may support a community mercury reduction program that helps fulfill their responsibility to the community. Health departments are required to enter schools twice a year, and can serve as one method of raising awareness by getting schools involved.

EMERGENCY ASSISTANCE AND MERCURY SPILL RESPONSE ORGANIZATIONS

Local fire departments, emergency management agencies and local emergency planning committees (LEPC) often work with local health departments and can play an important role in a mercury reduction program. These organizations respond to mercury spills, often receiving the first call, or are responsible for spill planning. Removing mercury from the community and raising awareness about mercury makes their jobs easier. They also should be informed of or invited to participate in mercury-collection activities. Their experience can help minimize the impact of a spill on collection day.

PUBLICLY OWNED TREATMENT WORKS

Publicly owned treatment works (POTWs) or wastewater treatment plants (WWTPs) are responsible for treating wastewater from the community and returning the treated water to streams, lakes and rivers. These facilities are regulated by federal and state governments, and there are limits on the amounts of pollutants, including mercury, allowed to be released from them. They are also regulators, monitoring and regulating facilities that send wastewater to them for processing. POTWs may be able to identify the facilities that are mercury sources and also may use local pretreatment limits to control the amount of mercury that enters the plant. It is very expensive to remove mercury from plant influent, and though some industrial dischargers may be identified, a significant amount of mercury is derived from households and small businesses. These small sources can make it extremely difficult for the facility to meet its water discharge limits, even in the absence of industrial sources. Therefore, facility personnel may be willing to join a project team in order to encourage voluntary mercury reductions in the community, along with encouraging their industrial dischargers to participate in the community program.

SOLID WASTE MANAGEMENT DISTRICT/HOUSEHOLD HAZARDOUS WASTE COLLECTION DAYS

The solid waste management district (SWMD) is responsible for limiting the amount of hazardous waste reaching municipal landfills. Business and industry must dispose of mercury-containing materials properly. Mercury-containing items typically fail toxicity characteristic leaching procedure (TCLP) tests and the business or industry is required to dispose of such materials as hazardous waste. Homeowners and residents are exempt from the hazardous waste regulations, so some mercury-containing materials make their way into municipal landfills. Once in the landfills, the mercury from these materials may leach from landfills and endanger organisms in the environment. However, managing household mercury-containing materials as a hazardous material reduces the risk of mercury leaching into the environment. It is the SWMD's responsibility to prevent improper disposal of hazardous materials.

A closer look at POTWs

POTWs, especially in the Great Lakes Basin, have stringent limits on mercury levels in their effluent. Prior to 1999, mercury sampling analysis was not sensitive enough to gauge compliance with the water quality based effluent limits. In 1999, the U.S. EPA approved a significantly more sensitive sampling analysis (Method 1631) that allowed POTWs to gauge true compliance with their NPDES permit limits (it can detect mercury levels in water as low as 0.2 ng/L).

Many POTWs discovered that they were actually violating their NPDES mercury limits and needed to take action. In 2000, Ohio EPA allowed a general variance to the mercury water quality standard. Implementation of the general mercury variance is intended to prevent substantial and widespread social and economic impacts. The general mercury variance offers POTWs an opportunity for relief from installing costly end-of-pipe treatment in order to comply with very low average water quality-based mercury limits. In order for POTWs to be granted the mercury variance, they must submit a pollutant minimization plan (PMP) that lists current plans to reduce and/or eliminate known mercury sources.

By November 2010, mixing zones for bioaccumulative chemicals of concern, mercury, will be phased-out statewide, and every existing discharger will have to assess whether it can meet the mercury water quality standard or implement the PMP and be granted a variance. Community POTW permits are reviewed and reissued on a revolving cycle. Eventually, every Ohio POTW must address mercury in some way.

Many POTWs will be required to find ways to reduce the amount of mercury being released into the environment. It is very costly to remove mercury from their influent, from \$10 million-\$100 million per pound reduced below 12 ng/L, according to the Association of Metropolitan Sewer Agencies (AMSA, 2000). POTWs may choose to pursue mercury reduction programs to help them meet regulatory requirements for variances, as well as reducing mercury in their community.

SWMDs are excellent partners for helping communities voluntarily remove mercury from the waste stream. They are often already working closely with many other potential team members. They may already have a collection mechanism for mercury-containing items through household hazardous waste collection events. They can use their knowledge of the community to identify mercury collection sites. The SWMD may also be willing to sponsor and help fund community projects that reduce the quantity of waste reaching landfills or that encourage recycling.

LOCAL BUSINESS AND INDUSTRY

Business and industry representatives are worth inviting onto the project team. They can provide important insight on how the program will impact local businesses. Those that participate may be willing to help promote or fund part of a community project, acting as a “good neighbor” and for public relations benefits.

Businesses are worth considering for several reasons, including:

- Some manufacturers use mercury or have impurities in their materials that result in the discharge of mercury in air emissions, wastewater or as hazardous waste.
- Almost all businesses use fluorescent lamps and other mercury-containing items.
- Many retail businesses sell mercury-containing products.
- Some businesses deal with end-of-life products and contribute to the release of mercury.

Local businesses that have mercury limits in their water permits may be interested in a community-wide mercury reduction program. Industry may use mercury in its products or as a catalyst. Often the facility’s mercury source can be surprising. It can be found in items such as caustic soda, sulfuric acid, chlorine bleach and there are trace amounts in some soaps.

All local businesses are required to dispose of mercury-containing products properly, including fluorescent lamps, button cell batteries and mercury-containing thermostats. This typically involves working with a hazardous waste contractor or certified recycler. If the mercury-containing item can be demonstrated to be non-hazardous, then it does not have the more stringent disposal requirements. The Universal Waste Rule for lamps took effect in 2004. This rule has specific management requirements for businesses that intend to dispose of or recycle hazardous lamps.

REGIONAL DENTAL ASSOCIATION AND LOCAL DENTISTS

Dental offices are typically the largest mercury contributor to small- to medium-sized local POTWs. If they place or remove dental amalgam fillings, dental offices discharge mercury from dental amalgam through their wastewater.

Because they use and release mercury and are aware of mercury issues, it could be beneficial to invite members of the dental community to participate on your team. The Ohio Dental Association is interested in representing its members in community programs and may be contacted at (614) 486-2700. However, if dentists in a given community are not members of the association, they should be contacted separately to encourage their participation.

Close-up: Auto Salvage Yards and Steel Mills

Automobile salvage yards and steel mills can contribute to the release of mercury into the environment. Many vehicles have mercury switches to operate convenience lighting. Vehicles often have mercury in anti-lock (ABS) braking systems, in dashboard lighting and in mercury-lamp headlights. If these devices are not removed before vehicles are crushed, some of the mercury is released at the salvage yard and much is captured in scrap metal. Mercury can leach into the soil at the salvage yard and run off-site when it rains. The mercury that is in the scrap metal is emitted into the air when the scrap metal is processed.

If local iron and steel mills release more mercury than their air permits allow, they may be required to develop a program to reduce their mercury emissions. This could require purchasing expensive control equipment or working with suppliers to reduce mercury from scrap metal feedstock. Iron and steel mills also could require that auto scrap suppliers demonstrate that mercury switches have been removed.

The iron foundry maximum available control technology (MACT) standard was finalized in April 2004, and will take effect in April 2005. The new standard will require that major source iron and steel mill facilities implement work practice standards that will require certification for their charged materials, or that they develop a scrap selection and inspection program to minimize the amount of hazardous air pollutant (HAP) metals, including mercury, in furnace charged materials. A certification option could allow the facilities to reject post automobile scraps. Ohio EPA, Division of Air Pollution Control (DAPC) will determine how to establish the certification program that will foster compliance. Electric arc furnace salvage yards also could be area mercury emissions sources and are regulated for HAP emissions.

Addressing the Dental Amalgam Debate

It is important when working with dentists to recognize that the dental community generally supports the use of dental amalgam. Dental amalgam, typically silver in color, is a mixture of mercury, silver and tin. More than half of the material in the amalgam is mercury. Many dentists and dental associations support the position that mercury from dental amalgam does not contribute to environmental degradation. They also may not believe they have a role in a mercury reduction program. However, there is debate within the dental community about the safety of dental amalgam because of mercury. It is important to recognize the dental community's position, on dental amalgam's impact on the environment, and be able to respond accordingly.

Issue: The American Dental Association and the Ohio Dental Association recommend and promote the use of amalgam for filling teeth for its safety, versatility, durability and economics. (There is a small group of dentists who argue that the mercury in amalgam may contribute to deleterious health effects.)

Response: Dental amalgam safety is not the issue here; however it is often the first point in the debate over regulatory requirements and is therefore being addressed.

The focus on mercury from dental amalgam is driven by the regulatory requirements on POTWs. POTWs may be required to work within their respective communities to reduce the amount of mercury in their influent. For many POTWs, the dental community is the largest mercury source. On average, they account for 42 percent of the POTW's mercury load in Ohio (Conway, 2004). In 2002, the Association of Metropolitan Sewerage Agencies (AMSA) estimated the mercury load from dental offices to be about 37 percent. Generally, communities with less industry have a greater percentage of mercury load from the dental community.

The health effects of mercury from dental amalgam has been researched in depth. The American Medical Association (2004) has identified that the greatest amount of mercury enters the body during installation and/or removal of dental amalgam. It also found that there is a correlation between the blood mercury concentration and the number of dental amalgams a patient has, though the amount of mercury in the bloodstream from dental amalgam is very small and does not appear to be harmful for most patients. The FDA also reports that there is no valid scientific evidence that amalgams cause harm except in rare cases when patients have demonstrated an allergic reaction.

Issue: AMSA values are only an estimate and should not be taken too seriously.

Response: AMSA's values are an estimate based on real data. The value was derived using a formula that takes the product of average real values of similar types of industry, the flow rate and the number of industries in that category. Although an estimate, the values should be considered accurate and not dismissed lightly.

Issue: Dentists strive to differentiate between “**total mercury**” in dental office wastewater bound in a dental amalgam, from “**free**” or “**elemental mercury**,” readily available to living organisms as defined in water regulations.

Response: Mercury in dental amalgam contributes to the total mercury load of POTWs. POTWs' limits are based on total mercury. POTWs are also regulated on the amount of total mercury that they release into the environment. Once released into the wastewater system, amalgam can break down to its constituents, making the mercury available to organisms.

Issue: Mercury in dental amalgam is fairly stable and does not break down easily. Dental amalgam is not free mercury and is not biologically available. Mercury amalgam fillings are also almost exclusively endorsed by insurance providers.

Response: Once dental amalgam is released into the wastewater system, it can break down to its constituents, making mercury available to organisms (Connecticut State Dental Association; MAREK, M. 1990. Other studies corroborate this finding). The Madison Metropolitan Sewerage District, the district has detected the release of mercury in very small quantities from teeth with amalgam fillings. By using a sensitive mercury air monitor (Lumex 915 RA+ ®), emission of elemental mercury can also be demonstrated in the breath of persons with dental amalgams.

Issue: On a global scale, dental use of mercury is responsible for less than one percent of all mercury released into the environment from human activity.

Response: The one percent referred to is derived from all forms of emissions, including mercury release as a byproduct of coal-burning power plants, chemical plants (chlor-alkali industry), and waste releases. Mercury use by dental offices ranks third overall in industrial mercury use in the United States, representing more than 22 percent of the mercury consumed in 2001.

In 2001, total mercury used was about 220 metric tons (including chlor-alkali plants) (*Chemical and Engineering News*, February 5, 2001). The breakdown is as follows:

Thermostats and electrical switches	30%
Chlor-alkali production	23%
Dental amalgam	22%
Lighting	14%
Instruments	11%

Issue: The American Dental Association (ADA) and ODA have compiled a list of best management practices (BMPs) that can help reduce the amount of mercury that is released into the sewer systems. The ADA and ODA do not recommend separators for all dental offices.

Response: A number of technologies are available to dental offices that reduce the discharge of mercury-containing dental amalgam to the environment. The BMPs are an excellent starting place to address mercury releases. Whole facility amalgam separators are available and are considered very effective in capturing dental amalgam. These amalgam separators effectively increase the capture rate of dental amalgam (from 95 percent to more than 98 percent efficiency). When used by dental offices, amalgam separators can significantly reduce the amount of mercury released to the sewer system. Amalgam separators are required in some communities where the POTW required greater reductions of mercury by the dental community (Stone, 2004).

MEDICAL FACILITIES AND VETERINARY FACILITIES

An area's medical facilities are often involved in community activities to raise awareness about health issues. These facilities often use mercury-containing products and devices, including thermometers and blood pressure meters (sphygmomanometers). Like dental offices, medical facilities and veterinary clinics contribute to the mercury load to the sewers. The amount of mercury released by medical facilities is usually less than dental offices but can still contribute to the overall mercury load to the community. The medical profession in Ohio is working actively to remove mercury-containing products through the Ohio Healthy Hospital Pollution Prevention Initiative and the Ohio Mercury Challenge. Many hospitals have been involved in mercury awareness campaigns and have hosted mercury thermometer exchanges to help get it out of the community. They may also be willing to help promote the community's program.

SCHOOLS

Schools are always great candidates for participating in mercury reduction programs. School administrators, business managers, science teachers and janitorial staff may be called upon to respond to mercury issues. Sending information home with students can help reach a broad range of people. If a project captures students' interest, the students can become great champions for promoting mercury awareness and collection campaigns.

School buildings are often full of mercury-containing products and are often sites of mercury spills. During renovations, school administrators are often surprised that some rubberized gym floors contain enough mercury to fail a hazardous materials test (TCLP). This means that flooring must be disposed as hazardous waste. Some schools may have mercury-containing thermometers and barometers that students use in science classes, or bulk elemental mercury located in the chemical storage area. Students also may bring in mercury that they have found outside of school. When a spill occurs, it is not uncommon for schools to close off laboratories or the whole building, sometimes for a couple of days, while expensive mercury clean-ups take place. Teachers often improperly clean up spills, exacerbating the problem. Additionally, schools' occupants are among the populations most susceptible to mercury toxicity: children and women of child-bearing age. Schools are an essential place to raise mercury awareness.

Close Up: Fisher Titus, Norwalk and Dayton's Children Hospital.

Fisher-Titus Medical Center (FTMC) in Norwalk has held four mercury thermometer exchange days as part of Ohio EPA and Ohio Hospital Association's Mercury Challenge Project. Two exchanges were held in Norwalk, one in New London and one in Wakeman. Nearly 900 mercury thermometers were collected, along with \$750 in donations. Fisher-Titus has reached 546 households.

The purpose of this program is to protect the health of local families and their communities, reduce the risk of mercury contamination of the environment, educate the public about the hazards of mercury and provide community members the opportunity to be "part of the solution," said Lisa Meyer, director of environmental services at FTMC. Families are asked to collect all mercury-based thermometers from their homes and bring them to the collection point where they will be properly packaged and disposed. Each family will receive a free digital thermometer from Fisher-Titus Medical Center, and a \$1 donation is requested to help defray the cost of collection materials.

PUBLIC/ENVIRONMENTAL/OUTDOOR COMMUNITY GROUPS

Citizens may be interested in learning what the community is doing and why. Environmentally aware residents or organizations and those who fish may have an interest in finding out what their community is doing to protect the environment. When planning a community-wide mercury reduction program, it is worthwhile to encourage public participation on the committee.

LOCAL MEDIA

All public awareness campaigns owe much of their success on how well they promote the program and share their message. If it is possible to partner with the local media and have them sponsor the program in some way, this could result in less expensive marketing and a much greater awareness of the program. The program also may benefit from inviting a reporter to the initial meeting to raise awareness about the mercury reduction program in the community.

LOCAL UTILITIES

A primary source of mercury emissions into the environment is electricity generation, especially from coal-burning utilities. Coal-burning utilities are estimated to be responsible for one-third of anthropogenic mercury sources to the environment. It may be worthwhile to invite representatives of these utilities to participate as sponsors for mercury-reduction activities. They could sponsor mercury reduction activities as a community service.

CHAPTER 4. IDENTIFYING MERCURY SOURCES IN THE COMMUNITY

When implementing large projects aimed at reducing mercury use, identifying mercury sources in the community is important, and there are resources that can help identify specific industrial sources. There also are many projects that may not require specific information. For well-defined projects, it may not be necessary to perform an in-depth review of community mercury sources, that is, when the group's focus is a specific project such as a thermometer exchange or an awareness raising campaign. In cases where the project does not include identifying additional sources of mercury, the group can save time by omitting the in-depth research and using the following list as probable mercury sources.

These facilities typically have mercury-containing items:

1. Medical facilities including hospitals and dental, medical and veterinary offices;
2. Education and research facilities (especially laboratories);
3. Households;
4. Retailers (especially of mercury-containing products);
5. All institutional/commercial/industrial buildings contain mercury in devices that can be released through spills or demolition (heavy industry has more sources in metering devices);
6. Publicly owned treatment works or wastewater treatment plants; and
7. Automobile recycling facilities.

The group could still decide to research mercury sources that are relevant to a project by using a survey tool. If a thermometer exchange or thermostat collection day is part of the program, the group may decide to survey retailers to see what types of products they are selling, including mercury-containing thermostats and mercury-containing thermometers.

If more detailed information is necessary, there are resources that provide information on industrial mercury dischargers. These sources of data are most useful for whole community mercury reduction campaigns or for targeted regulatory driven programs. When contacting an organization for information, explain the purpose of the research so that the organization can more easily assist you. This description will help them frame your needs and will result in a more informative response.

More detailed data on mercury releases can be obtained through wastewater discharger data, Toxic Chemical Release Inventory (TRI) data and community assessments.

WASTEWATER DISCHARGER DATA

The local wastewater treatment plant or publicly owned treatment works (POTW) is the most valuable source of information about companies that are releasing mercury to the plant. It can identify companies that discharge mercury as a byproduct of the manufacturing process, and may be able to identify companies whose only mercury source is the cleaning supplies that the companies use. Having a person from the plant on your mercury reduction team makes getting the information and understanding it easier.

The first step to getting information about your community's discharge of mercury to water is to contact the POTW. Find out whether the POTW has a pretreatment program for indirect dischargers, whether any of the facilities have mercury in their permits and the proper method to request this information. Given the right context, the POTW staff can provide you with information and explain how to acquire and use the data.

Older data, before 1999, must be reviewed critically since the data may not be accurate. Older monitoring procedures did not identify mercury at the same levels as those used today. The default level assigned ("below detection limit" value) may not be accurate by the current standards. POTW staff can explain which information is most accurate and relevant to your project.

If the community does not have pretreatment data available for indirect discharge permits, contact the appropriate Ohio EPA District Office (www.epa.state.oh.us/new/divs.html) and request direct and indirect discharge mercury information about the companies in your area. Make sure to specify that you are looking for facilities with mercury releases.

Ohio EPA's district office Division of Surface Water also should be contacted to determine whether there are direct dischargers into your community's rivers and lakes. Direct dischargers do not send their waste water to a wastewater treatment plant; they release it directly to lakes and streams. When contacting an Ohio EPA district office, ask which facilities in the community are regulated by Ohio EPA's Division of Surface Water for mercury.

THE TOXIC CHEMICAL RELEASES INVENTORY

Data from the Toxic Release Inventory (TRI) can provide information about mercury releases from larger companies. However, it may be of limited use because it excludes a large number of smaller businesses in the community. TRI can provide the greatest assistance for community wide mercury reduction efforts, particularly with regulatory driven programs, including water quality driven efforts.

The TRI is a database that contains information about specific toxic chemical releases, transfers, waste management and pollution prevention activities at manufacturing facilities throughout the United States. This inventory was established under the Emergency Planning and Community Right-to-Know Act of 1986

"Mercury, sometimes not where people would expect to find it."

Mercury has been found in many places and used in many products that might surprise you. The Massachusetts Water Resource Authority (MWRA) compiled a list of commonly used household products, and the concentration of mercury found in each is reported as parts per billion (ppb). Items include:

- Ajax Powder 0.17
- Comet Cleanser 0.15
- Lysol 0.011
- Soft Scrub <0.013
- Dove soap 0.0027
- Ivory dish soap 0.061
- Murphy's Oil Soap <0.012
- Sunlight dish soap <0.011

Mercury also has been found in other places and used in some of these products as well. Below are just a few of the surprising locations you could find mercury:

- Tartan ® flooring (mercury was used as a catalyst for these rubberized gym floors);
- In grandfather clock pendula;
- In hunting bow and rifle stabilizers;
- In neon light kits;
- In maze toys;
- In fishing lures, making the lure act "alive";
- In the basements of plumbers and HVAC contractors who have brought it home from their work; and
- In botanicas (mercury, as azogue or vidajan, is used by some faiths, including Santeria).

(EPCRA), which Congress passed to promote planning for chemical emergencies, and to provide information to the public about the presence and release of toxic and hazardous chemicals. TRI does not regulate chemical discharges. In Ohio, state authority has been granted to Ohio EPA under the Ohio Right-to-Know Act of 1988 and Ohio Revised Code Chapter 3751.

Generally, facilities that must report have 10 or more full-time employees and meet the established thresholds for manufacturing, processing or otherwise using listed chemicals. For mercury, the reporting quantity is 10 pounds.

To request information about facilities in your area, contact Ohio EPA's Division of Air Pollution Control, TRI Unit at (614) 644-2270 or by mail at:

Ohio EPA, Division of Air Pollution Control, TRI Unit
Lazarus Governmental Center
122 South Front St.
Columbus, OH 43215

COMMUNITY SELF ASSESSMENTS

Self assessments are excellent tools for raising awareness and encouraging members of the community to contact you when they have mercury sources or mercury-containing products that they wish to manage appropriately. These assessments work best when sent to specific community groups or businesses. However, unless you work with the community groups directly, it may be challenging to get groups to return their assessments.

A number of resources are available for self assessments, including those for households, schools, hospitals and for publicly owned treatment works. Generally, these resources are checklists that allow assessors to tally the number and type of mercury-containing items in each location. These checklists are available in the Appendix or at:

- Household self assessment
- School self assessment: www.newmoa.org/Newmoa/htdocs/prevention/mercury/schools/checklist.cfm
- Hospital self assessment: www.epa.state.oh.us/opp/Mercury%20Challenge_Web.pdf
- POTW self assessment: www.delta-institute.org/pollprev/mercury/selfassess.php

CHAPTER 5: POTENTIAL PROJECTS

There are many potential projects that can be pursued to raise awareness and reduce the prevalence of mercury in the community. Regardless of the type of project that is chosen, it is important for the organization that takes the lead on the mercury reduction program to demonstrate its commitment by leading by example.

START WITH YOUR OWN ORGANIZATION

When your mercury team starts reviewing potential projects, you may be able to increase acceptance and participation from the community and local businesses by leading by example. Look at your own practices and policies to determine where mercury can be addressed. Make sure that your organization turns in its mercury-containing equipment when there is a mercury and thermometer collection day. This demonstrates that the lead organization is serious and willing to implement its own recommendations. Keep track, specifically, of what your organization and the local government have done and share this information with the community.

TYPES OF PROJECTS

This chapter introduces four categories of projects, provides examples of each, to address mercury in the community:

1. Education and outreach
2. Fundamental changes in organization operations
3. Collection and exchange
4. Recognition

The effort made in the different project categories can be decreased or expanded as necessary to serve the team's goals and stay within its resources. Additionally, categories can be combined into a more comprehensive project. Examples of comprehensive and multi-faceted projects can be found at the end of this chapter.

EDUCATION AND OUTREACH

Educating members of the community, just like educating your team, helps them appreciate the problems that mercury can cause. An education and outreach project should be developed with the target audience in mind. The goal of a mercury education campaign can go beyond raising awareness about mercury. It should provide the target audience with methods to *address* mercury issues. For example, a program encouraging children not to touch mercury should encourage them to tell a parent if they do or if they find mercury, so that the parent can call the Ohio Spill Hotline. The educational materials should be appropriate for the target audience. More comprehensive mercury projects typically will have an educational component as well. Some examples of education and outreach projects include:

ENERGY EFFICIENCY AWARENESS CAMPAIGN

The greatest single source of anthropogenic mercury release into the environment is from coal-burning utilities. Therefore, it makes sense to address this source during community mercury reduction programs by conducting an energy efficiency campaign. A great deal of material is available on energy efficiency and the amount of pollution that is produced while generating electricity for the home. Simply teaching and reminding the community to turn off unused lights and choose more energy efficient products can help reduce a number of pollutants, including mercury, entering the environment.

RITUALISTIC USE OF MERCURY AWARENESS CAMPAIGN

The community could develop a program to educate cultural and religious groups about the dangers involved in the ritualistic use of mercury for certain Latino and Afro-Caribbean traditions, including Santería, Palo, Voodoo and Espiritismo. Some botanicas or bodegas also sell religious supplies. They sell mercury under a variety of names, including azogue, quicksilver or vidajan. Mercury may be worn in amulets, sprinkled in houses, vehicles and on newborns for good luck, added to candles, taken for medical reasons or used in other ritualistic ways. Raising awareness about the health and environmental impacts of mercury can be beneficial to the wellbeing of members of these communities. The National Association of County and City Health Officials (www.naccho.org/project87.cfm) and the U.S. EPA Ritual Use of Mercury Taskforce Report (www.epa.gov/oppt/cahp/actlocal/merc.html) can provide additional information on ritualistic uses of mercury.

RETAIL STORES

Invite community retail stores to become partners in an education campaign, and consider expanding the project to include a collection/exchange event for thermostats and other mercury-containing products. Retail stores can provide information to the community at the time mercury-containing products are purchased. This is an excellent opportunity to educate their customers about alternative products that the store carries. Customers who are replacing mercury-containing products can be informed about the best way to dispose of them. Local building construction retailers are especially fitting, because their stock includes alternatives and mercury-containing products that residents may purchase or replace during home improvement projects.

CREMATORIUMS

Creating an education campaign for crematorium managers is another method for reducing mercury emissions into the environment. When dental amalgam is oxidized, mercury is released into the environment. Working with crematoria to remove dental amalgams can reduce this release of mercury into the atmosphere.

FUNDAMENTAL CHANGES IN ORGANIZATION OPERATIONS

Incorporating procedures and policies at the most basic level, where an organization is run, is one of the most effective methods of addressing mercury releases. Often mercury can be addressed through the organization's purchasing decisions. Establishing policies that require using alternatives for mercury-containing products in all of an organizations activities, whether purchasing equipment for their

organization or when considering policies and rules for the community, will result in a reduction in the use of mercury-containing items and reduced risk of a spill.

LOCAL GOVERNMENT POLICY

There are several activities that can be performed by the city council or local government that can result in measurable mercury reductions while demonstrating the local government's dedication to mercury reduction. These include:

- Pursue environmentally preferable purchasing by developing a local government policy to purchase products that do not contain mercury. Incorporate this mercury-free policy into the municipal code. The Interstate Mercury Education & Reduction Clearinghouse (IMERC) Mercury-Added Products Database (www.newmoa.org/Newmoa/htdocs/prevention/mercury/imerc/notification/) lists mercury-containing products and can help with this activity.
- Add a purchasing specification or enact a local ordinance that requires contractors working with urban and low income housing authorities to use thermostats that do not contain mercury. There are inexpensive and effective alternatives. Expand this project to an education and collection project, and fund the replacement of mercury-containing thermostats in low-income housing. Local grant funds may help reach this goal.
- Require the removal of mercury-containing items at the same time contractors are checking for asbestos before demolishing buildings over which the local government has demolition oversight. Many mercury-containing items may be found in these buildings. Typically, fluorescent lamps and mercury-containing thermostats are present. If these items are left inside the building, mercury could leach or otherwise escape from the construction and demolition debris landfill. Simply requiring the removal of mercury-containing thermostats and fluorescent bulbs before demolition can prevent significant amounts of mercury from entering the environment.
- Enact a municipal ban on the sale of mercury-containing thermometers and thermostats within the city. Health Care Without Harm's site has complete language of local mercury ordinances at www.noharm.org/mercury/ordinances#local.

COLLECTION AND EXCHANGE

Collection programs establish a location for the community to turn in its mercury-containing items. An exchange program offers a replacement product as an incentive for participation. Collection and exchange programs work best when combined with an education campaign.

Bowling Green State University works with the Ohio EPA to provide a free statewide mercury collection service. More information about the program can be found in the Resources chapter and at www.bgsu.edu/offices/envhs/environmental_health/mercury/program.htm.

THERMOMETER EXCHANGES

A thermometer exchange is often one of the first collection and education projects pursued. It raises awareness about mercury and the need for action while removing the substance from homes. Thermometer exchanges can be communitywide or more narrowly focused on residents, schools or doctor's offices. Greater interest and participation is achieved in this community activity because participants enjoy receiving a new digital thermometer.

Organizing a thermometer exchange is fairly straightforward. An exchange can be planned and implemented by a small number of individuals or by the network established for your mercury reduction project. Health Care Without Harm has developed an excellent thermometer exchange guidance document which is available at www.noharm.org/mercury/issue. A complete walkthrough about how to host a thermometer exchange in Ohio is presented in Chapter 6.

AUTOMOBILE AND APPLIANCE SCRAPYARDS AND RECYCLERS

Automobile and appliance recyclers may send metals from collected products to steel mills. Automobiles and household appliances may have mercury switches in them. If the mercury switches are not removed when the products are melted down for their steel content, the mercury from the switches can be released into the atmosphere. Communities could provide incentives to scrapyards to remove mercury switches from automobiles and household appliances. They can also work with iron and steel mills and shredding firms to encourage or require that the mercury switches be removed before the scrap arrives. The collected mercury can then be sent to a long-term storage facility or to a mercury recycler.

DAIRY FARMS

Though uncommon in Ohio, there are still dairy farms that use mercury manometers to measure the their milking machines' vacuum. Additionally, farms that have old milking equipment and/or have a milking parlor may still have quantities of bulk elemental mercury. Many farmers may not be aware of the dangers of mercury or of the services available to help them remove mercury-containing products. Contacting dairy farms can lead to collecting significant amounts of mercury and reducing the risk of an environmental release.

HOUSEHOLD HAZARDOUS WASTE COLLECTION DAYS

Many communities already have household hazardous waste collection days and in fact, have, been accepting mercury-containing items on a continuous basis. Household hazardous waste collection days are generally sponsored by the local solid waste management district. Promoting these events through a mercury outreach campaign can increase participation and the collection of mercury-containing items. Promoting household hazardous waste collection days can be particularly effective to increase properly managing and recycling thermometers, thermostats and button cell batteries. Mercury-containing products should be double-bagged in a sealable plastic bag before they are brought to collection events.

Transporting mercury

Communities should recommend against transporting large quantities of mercury. Mercury is very heavy and even a small jar may catch the unsuspecting homeowner off guard. A mercury spill in a vehicle can "total" the vehicle. Quantities of mercury greater than one pound (two tablespoons) should be kept secure and left alone until arrangements can be made for it to be picked up at its current location. Provide instructions to community members on how to arrange a mercury pick-up from their homes. This could greatly reduce the potential for a spill.



RECOGNITION

Some groups and members of industry may be willing to develop their own projects and may deserve special recognition when creating an outstanding program. It is worthwhile to demonstrate the community's support for these projects.

State and federal programs may already be in place and have materials available to acknowledge organizations. The community can recognize local participation in these programs as well.

DENTAL RECOGNITION PROGRAM

Local government can recognize dental offices that are following or improving upon the Ohio Dental Association's best management practices (BMPs), and publicly award offices that have installed amalgam separators and are recycling the scrap amalgam.

A certificate program may be an effective way to recognize facilities that have amalgam separators. They can be recognized as outstanding leaders in reducing dental amalgam mercury in waterways. Amalgam separators may be required by some POTWs as a pretreatment requirement in the Great Lakes Basin of Ohio, as the POTWs investigate pollution minimization opportunities in order to receive a mercury variance.

RECOGNITION OF HOSPITAL ACTIVITIES

The community team can use programs that are already in place and encourage greater participation on a local level. For example, the Ohio EPA and the Ohio Hospital Association have initiated a joint effort to work with healthcare institutions in Ohio to reduce mercury and address other environmental issues. It is a way for Ohio's medical facilities to discover and implement responsible environmental practices for mercury, and to receive community recognition for those good efforts.

The Mercury Challenge ensures that medical facilities that achieve their goals will be recognized in their community for their efforts. The Mercury Challenge is open to any hospital in Ohio. Facilities design their own specific reduction goals and agree to make a good faith voluntary effort to identify and implement prevention measures. For more information about the Mercury Challenge, go to www.epa.state.oh.us/opp/Mercury%20Challenge_Web.pdf.

COMPREHENSIVE AND MULTI-FACETED PROJECTS

Combining different project types can create a more comprehensive program. It is also possible to use a multi-faceted approach in order to address a specific mercury-containing product from several angles. An example of a comprehensive project might include a mercury-free schools program or a thermostat awareness and collection program.

MERCURY FREE SCHOOLS PROGRAM

School populations are especially vulnerable to mercury toxicity and are ideal target audiences for mercury awareness campaigns. The community could develop an in-depth mercury project using all of

the identified project categories. These categories could be brought together in a pledge program where schools commit to raising on-site mercury awareness and reducing the risk of a mercury spill. The lead organization might provide a certificate or plaque to recognize “Mercury Free” schools. The community would recognize schools that develop an education program for staff and students, add purchase specifications to prevent unnecessary purchases of mercury-containing products, and replace or commit to replacing mercury-containing products with cost-effective alternatives.

A community program for schools could have some or all of the following components:

1. Pledge program
2. Education, curricula for students, training for administrators/science teachers/school nurse (education and outreach)
3. Inventory the school for mercury-containing products/equipment
4. Remove and replace mercury-containing products/equipment (collection)
5. Adopt a policy to purchase non-mercury-containing products where possible (fundamental changes in organization operations)
6. Track success
7. Certificate of accomplishment from local government (recognition)

A great deal of information is available to help schools develop mercury awareness programs. The following resources can be of particular assistance: Ohio EPA’s Mercury Awareness for School Teachers fact sheet www.epa.state.oh.us/opp/schoolt1.pdf; Illinois Department of Public Health’s Web page for teachers and family members <http://app.idph.state.il.us/envhealth/mercury/>; and University of Wisconsin Extension’s Solid and Hazardous Waste Education Center Mercury in Schools Project www.mercuryinschools.uwex.edu/

PROMOTE THERMOSTAT RECYCLING

Thermostats are among the most recognized mercury-containing items and are found in many households. There are many resources available to educate the community, reduce the number of mercury-containing devices in the community and increase the number of thermostats being properly managed. Projects that can be pursued to address thermostats include:

1. Contacting local heating and cooling system (HVAC) contractors to encourage removing and recycling mercury-containing thermostats with mercury-free alternatives.
2. Working with local building supply stores to raise awareness. These retail outlets are able to reach a large number of residents and often sell mercury-containing items and their alternatives. By collecting mercury-containing products as they are replaced, instead of being disposed in residential waste, a great deal of mercury can be kept out of local landfills. This kind of participation assists the local solid waste management district. Local stores could be a central collection point for thermostats, household fluorescent lamps, batteries and other mercury-containing products.
3. Increasing participation in the Thermostat Recycling Corporation (TRC), a nonprofit corporation that facilitates the collection of all brands of used, wall-mounted, mercury-switch thermostats by HVAC wholesalers from contractors so that the mercury can be purified for re-use. More information on TRC is available at: www.nema.org/index_nema.cfm/664/. The project team could work with TRC to encourage wholesalers to participate and collect thermostats for recycling.

4. Holding a thermostat exchange. Consider working with local retailers and providing vouchers or coupons for mercury-free thermostat replacements. Develop a program that accepts old mercury-containing thermometers and gives coupons for alternatives.
5. Developing a local replacement program for mercury-containing thermostats in low income apartments and housing. This has several benefits, including reducing the likelihood of spills and the likelihood that mercury will be released into the environment. Inexpensive non-mercury thermostats are available for such an exchange program.
6. Hold a public ceremony to identify participants in the thermostat collection and awareness program, and the retailers and wholesalers in the community who have committed to assist in the program. Identify participants on the community Web page.

CHAPTER 6: THERMOMETER EXCHANGES

A thermometer exchange is an excellent way to raise awareness and to reduce improper disposal or breaking of mercury-containing items. Thermometer exchanges can be communitywide or targeted at residents, schools or doctors offices. Thermometer exchanges can be planned and implemented by a small number of individuals or by the team established for your mercury reduction project. Many thermometer exchanges are a one-time half-day event. Some communities have ongoing exchanges, accepting thermometers at their health departments or fire departments. This chapter is more focused on the one-time event, but has useful information for ongoing thermometer collections as well.

When organizing any project, thermometer exchanges included, the initial project planning is very important to guaranteeing a successful event. Take the time to think about how the project will be funded, when and where to hold the event, how many replacement thermometers to provide, how the event will be promoted, who will recycle the collected thermometers, and if the collection will be ongoing. **Consider the following issues when planning a thermometer exchange:**

ASSISTANCE WITH ORGANIZING THE EXCHANGE

The Ohio Mercury Reduction Group (OMRG) can provide aid for thermometer exchanges in Ohio and includes representatives from Bowling Green State University, Ohio EPA and Ohio Department of Health. OMRG can help identify educational resources, help arrange for free mercury-containing products collection and provide guidance on preparing for a spill. Information on the OMRG is available at: www.epa.state.oh.us/opp/mercury_pbt/omrg.html.

FINANCING THE THERMOMETER EXCHANGE

Financial assistance can come in a variety of forms including direct monetary support or the donation of replacement thermometers. In-kind support such as providing a facility for the event, event promotion, media coverage, food for volunteers and mercury collection and management may also be available.

When it comes to funding, the most important questions include who will be paying for the event, how much will it cost to manage the collected thermometers and how many and what type of replacement thermometers to purchase for the event. Therefore, the maximum number and type of replacement thermometers depends on the funds available for the program. Currently, Bowling Green State University works with OMRG to collect mercury-containing items from communities events and manage them properly at no charge.

The lead organization often pays for the thermometers from its budget. Some organizations receive assistance from local solid waste management districts, local fire departments, local publicly owned treatment works/wastewater treatment plants, local and state grants and charities. Consider seeking corporate sponsors or developing agreements for matching funds with community businesses to help defray costs. It is not uncommon to request a donation from individual participants, typically about one dollar, to help defray the cost of the replacement thermometer.

Buying thermometers in bulk can leverage a better price for replacement thermometers. Coordinating your efforts with other communities could reduce the price of non-mercury thermometers.

WHERE TO HOLD AN EVENT

Organizers must determine where to hold an event in order to facilitate management while encouraging participation by community members. To increase participation, it is important to choose a location that is well known and easy to access. Thermometer exchanges have been held in hospitals, health departments, fire departments, government offices, office buildings, hospital parking lots, retail store parking lots and at household hazardous waste drop offs. Exchanges can be successful inside or outside.

In all cases, permission should be secured from the property manager to hold the thermometer exchange. This is, of course, easier if the location is at your organization or on a partner's property.

If holding an indoor event, avoid carpeted areas if possible. A mercury spill in a carpeted room is more complicated and expensive to clean up than in a non-carpeted room. If a carpeted area is your best location, consider laying plastic down over the carpet. Even then, use caution if the plastic is slippery.

For a drive-through exchange, it is important to have a well-marked route. Otherwise, vehicles may cut across your well-planned pathway and approach your drop-off stations from directions other than planned. Use pylons and signs, and educate staff members to help participants follow the designated route to thermometer exchange stations.

WHEN TO HOLD THE COLLECTION EVENT

Choosing when to hold a thermometer exchange is important when considering the comfort of participants and staff who are helping with the event. Typically, exchanges are held on warm-weather weekends, especially if they're outdoor events.

PLANNING FOR BAD WEATHER

Consider setting up an alternative plan for inclement weather. If the exchange is indoors, this may not be a problem, but may result in a lower turnout. If the exchange is taking place outdoors, consider special arrangements needed to make staff and participants more comfortable. Do you have a back-up date in case of rain?

DETERMINING THE NUMBER AND TYPE OF THERMOMETERS DISTRIBUTED FROM THE THERMOMETER EXCHANGE

If you order too many replacement thermometers you will have an excess supply to manage. If you do not have enough thermometers, participants may not be willing to give away their mercury-containing thermometers for nothing. Determining the number of mercury-free thermometers to provide is often simplified by the program's budget.

There are many types of thermometers that do not contain mercury, such as alcohol, crystal diode, digital, mineral spirit and galinstan (gallium, indium and tin alloy) thermometers. Each of these types has its advantages and disadvantages. Be aware that galinstan thermometers have silver-colored columns of metal, like mercury-containing thermometers, and are sometimes brought to mercury thermometer exchanges. Galinstan thermometers typically have a "contains no mercury" label printed on them.

Participants in thermometer exchanges often prefer digital thermometers that have large read-outs. Digital thermometers typically use button cell batteries, which contain some mercury. **It is important to look into digital thermometers using disposable batteries or solar power.** For many communities, solar-powered-battery-containing digital thermometers are price prohibitive. If the replacement thermometers being offered contain button cell batteries, consider including information on proper disposal of old batteries.

In Vermont, the exchange planners included a label to raise awareness of the mercury in the batteries. It read:

This digital fever thermometer contains a replaceable button battery, which should last for many years. Button batteries contain a very small amount of mercury and should be recycled through your local Solid Waste District or town's hazardous waste collection program.

There are many thermometer manufacturers. Once you determine the type of thermometer you wish to supply, it is worth shopping around to determine whether suppliers offer discounts for large orders.

PROMOTING THE EVENT

This is an opportunity to work with media and community partners to really raise awareness about mercury and the thermometer exchange. Consider the following promotion methods:

- Show the "Mercury the Magic Metal" video (an 8-minute video available from Ohio EPA) or use the 30-second and one-minute public service announcements (PSAs) to provide information on public access television
- Newspaper PSAs, articles, editorials and sponsorship ads, including neighborhood papers
- Radio spots and news stories

ESTIMATING HOW MANY THERMOMETERS ARE NEEDED (from Health Care Without Harm)

Deciding how many thermometers are needed is important for budgeting. As discussed earlier, the number of thermometers brought in is directly related to promotion of the event. If only one mercury-free thermometer is exchanged per household, a reliable estimate for workplace and school events is easy to determine. For school roundups, experience has determined an exchange rate range of 18 percent to 25 percent on a student population basis, and for the workplace an exchange rate of 11 percent to 18 percent based on the quantity of employees. If the event is well-promoted and you have good support within the school or workplace, you can estimate an exchange rate on the high end of the range given. For small schools and workplaces (less than a population of 500), the return rate is also typically on the higher end of this range. This table gives two examples of how to estimate the amount of thermometers that will be needed:

Location	Anywhere Hospital	Anywhere High School
Population	4000 employees	600 students
Expected exchange rate	11% to 18%	18% to 25%
Level of exchange awareness <small>(guess-estimate based on population size and level of promotion)</small>	Low to medium	High
Estimated exchange rate	13%	25%
Exchange factor	.13	.25
Quantity of thermometers needed	4000 x .13 = 390	600 x .25 = 150

- Community newsletters, calendars and e-mail lists
- Fliers distributed by schools or students
- Fliers available at pediatricians’ offices and grocery stores
- Fliers distributed at town meetings, municipal offices and libraries
- Community Web-sites
- Posters at schools and public buildings

USE YOUR IMAGINATION TO GET THE WORD OUT

The advertisement for a thermometer exchange is critical and should include much more information than the “when” and “where” of the event. **Remember these important marketing points:**

- Date of the event
- Location
- Participants should place all thermometers in the original case and inside a sealable plastic bag or inside two sealable plastic bags, each one sealed, to minimize the risk of a thermometer breaking or of mercury being spilled.
- Participants should not bring containers of mercury or mercury-containing items having more than one pound of mercury to the event, but should arrange for a separate pick-up of those items. Provide a phone number for bulk pick-up.
- Information on the Ohio Spill Hotline.

SETTING UP THE EVENT

Preparation is very important for a successful thermometer exchange. Allow plenty of time to arrange the drop-off station, signs, route markers (for drive-through exchanges), and be sure the workers know their responsibilities.

The following materials will be useful for the exchange:

- mercury-free thermometers;
- mercury spill kit and emergency procedure in place (review with workers ahead of time);
- table and chairs for volunteers;
- a tally sheet, whether paper sheet or flip chart, to keep track of the number of thermometers or other devices collected;
- a phone, in case a spill does occur or for any other reason;
- educational materials to hand out, including any information package for media or public relations;
- extra sealable plastic bags (participants often do not bring thermometers in plastic bags despite information in promotion materials);
- several (minimum of two) five-gallon buckets with lids or another plastic sealable large container to hold collected thermometers (these containers should be labeled “Mercury Thermometers”);
- bills-of-lading (BOL) for the collection buckets (BOLs should be provided by the those who collect and transport the mercury for recycling);
- oversized containment bucket for other mercury-containing products (although advertisements provide specific directions for bulk pick-up, sometimes unanticipated products are brought to the exchange. It is recommended that you accept items and contact your mercury management company as soon as possible. The less mercury-containing items are handled the better.);
- a roll of plastic sheeting, to cover spilled mercury until a spill responder arrives;
- a lock box, if accepting donations; and
- worker amenities, if any are being provided, such as bottles of water if outside.



Some of the Education Materials Available:

Information and educational material for a thermometer exchange can be developed in-house by the coordinator. Other excellent sources of information that can be made available at a thermometer exchange include:

- Health Care without Harm's Mercury Thermometers and Your Family's Health - www.noharm.org/mercury/issue
- Ohio EPA's "Mercury in the Household" and "Mercury Awareness for School Teachers" - freely provided to Ohio communities - www.epa.state.oh.us/opp/mercury_pbt/mercury.html
- State of Ohio Sport Fish Consumption Advisory www.epa.state.oh.us/dsw/fishadvisory/index.html

WHAT TO EXPECT

Historically, all types of products have shown up at collection events. Every type of thermometer could be brought in, including different types of fever thermometers, outdoor alcohol and bimetal thermometers, cooking thermometers, small bottles of mercury and other potentially mercury-containing items.

A six-foot tall mercury-containing school barometer was brought into a hospital thermometer exchange. When the local emergency management association (EMA) was contacted, they could not be reached for quite a while. The hospital chose to accept the barometer so that the chance of it breaking was minimized. However, the hospital then became responsible for its proper management. Publicizing clear instructions about which materials will be accepted is the best way to avoid surprises. It is also important to contact all organizations assisting with the event ahead of time in order to confirm their participation and to have a contingency plan in case of poor weather or a spill.

People also will ask what will be done with the mercury from the thermometers. Talk to the mercury recycler to find out what they do with the mercury once it is removed. People are often surprised to discover that the mercury collected during the event may become commercially available in other mercury-containing devices.

MANAGING COLLECTED THERMOMETERS

Coordinate plans for managing the thermometers with the mercury recycling company well before the mercury exchange. Make arrangements for bulk pick-ups of mercury and mercury-containing items before the event. Discuss with the recycler what they expect, including labeling requirements for collected thermometers. Confirm with the recycler that they will provide the bills-of-lading for collection receptacles used to transport collected thermometers. Ohio EPA maintains a list of companies that recycle mercury at www.epa.state.oh.us/opp/recyc/mercrec.html.

Ohio EPA, working in conjunction with the Bowling Green State University Mercury Collection Program, can also assist with managing collected thermometers and bulk mercury pick-up. More information on the Bowling Green State University Mercury Collection Program is available at www.bgsu.edu/offices/envhs/environmental_health/mercury/index.htm.

SPILL READINESS

Although having a spill at a thermometer exchange is rare, it is important to contact your local Emergency Management Agency or other community spill response unit **before the event** and make sure they are aware and are available should a spill occur. Additionally, a mercury spill kit and someone who is knowledgeable on its use should be available for the event. Finally, remember to **NEVER USE A VACUUM ON A MERCURY SPILL**.

If you need immediate assistance responding to a mercury spill call Ohio EPA's spill hotline at 1-800-282-9378. For more information on how to respond to mercury spills, please refer to Ohio Department of Health's 2004 Health Department Mercury Packet, U.S. EPA's 2004 Ohio Mercury Outreach and Training Manual or contact Ohio EPA.

OTHER INFORMATION ABOUT HOLDING A THERMOMETER EXCHANGE

- Health Care Without Harm: [How to Plan and Hold a Mercury Thermometer Exchange](http://www.noharm.org/mercury/issue), www.noharm.org/mercury/issue
- Northeast Waste Management Officials' Association (NEWMOA) - Mercury in Schools and Communities: [Nearly Everything You Need to Know about Mercury Fever Thermometer Exchanges](http://www.newmoa.org/prevention/mercury/schools/publicize.cfm), www.newmoa.org/prevention/mercury/schools/publicize.cfm
- The State of Vermont's Guidance on how to hold a thermometer exchange and final report www.mercvt.org/PDF/thermrpt.pdf

HELP IS AVAILABLE

As stated before, OMRG members have helped with many thermometer exchanges in Ohio. If you would like assistance with planning your thermometer exchange, a list of members is available at www.epa.state.oh.us/opp/mercury_pbt/omrg.html or contact the Ohio EPA Office of Compliance Assistance and Pollution Prevention at (614) 644-3469.

You are not alone. Below, find a list of other organizations that have sponsored thermometer exchanges:

- City of Columbus Health Department
- Clark County Combined Health District
- Darke County Health Department
- Dayton's Children Hospital
- Fisher Titus Medical Center
- Franklin County Fire Departments
- Hamilton County Environmental Services
- Logan County Local Emergency Planning Commission (LEPC)
- Ohio Hospital Association
- Southeast Ohio Health Departments

CHAPTER 7: RESOURCES

Many resources are available to help communities develop mercury reduction programs. A great deal of research has already been completed, and many organizations have completed mercury reduction programs. Some of these organizations may participate on your team and provide insight on how to get started. Others can provide free information and mercury collection, while some can provide examples of what has or has not worked.

OHIO MERCURY REDUCTION GROUP



The Ohio Mercury Reduction Group (OMRG) is a networking organization whose membership includes Ohio EPA, Ohio Department of Health, Bowling Green State University, Ohio Spill Prevention Planning and Emergency Response Association, Central Ohio Poison Control Center, and several local health departments. OMRG's primary goal is to protect the environment and public health in Ohio against mercury exposure and the adverse effect of mercury. OMRG members work to assess the needs of participating organizations with mercury issues and to develop projects to address them; educate homeowners, schools, medical facilities, manufacturers, trade associations and others on mercury hazards; support and provide content to the Office of Compliance Assistance and Pollution Prevention Web page on mercury issues: www.epa.state.oh.us/opp/mercury_pbt.html; and facilitate collecting mercury and retired mercury-containing devices.

OMRG members have produced a variety of mercury-related educational resources including information on mercury reduction and spill response. This information includes "Mercury the Magic Metal," an eight-minute video that illustrates the emission of mercury vapor and provides an introduction to mercury risks. Other materials are listed under the organizations that created them.

OMRG members can help organizations develop mercury reduction programs, thermometer exchanges, arrange the removal of elemental mercury, provide information on current regulations and advise communities on the proper methods of hazardous materials disposal, including those containing mercury. More information on OMRG and information about how to contact its members is available at www.epa.state.oh.us/opp/mercury_pbt/omrg.html or you may call Ohio EPA, Office of Compliance Assistance and Pollution Prevention at (614) 644-3469.

BOWLING GREEN STATE UNIVERSITY ELEMENTAL MERCURY COLLECTION AND RECLAMATION PROGRAM

The Bowling Green State University (BGSU) elemental mercury collection and reclamation program began formally in January 1998. The program coordinates the collection of uncontaminated elemental mercury from a variety of sources such as thermometers, manometers, barometers, sphygmomanometers (blood pressure measurement devices), mercury-containing thermostats, mercury switches, as well as containers of elemental mercury. The program is free to individuals, academic institutions, small businesses, industries, medical and dental facilities, emergency response and other governmental agencies, spill response companies and any additional entity having unwanted, uncontaminated elemental mercury.

More information about the BGSU elemental mercury collection and reclamation program is located at www.bgsu.edu/offices/envhs/environmental_health/mercury/index.htm or you may call the Department of Environmental Health and Safety, Bowling Green State University at (419) 372-2173.

HEALTH CARE WITHOUT HARM

The Health Care Without Harm mercury Web site (www.noharm.org/mercury/issue) contains information on organizing a thermometer exchange and provides information on existing laws at the local and state level. Lists of state and community regulations are located at the site, as well as the language from local ordinances and resolutions from throughout the United States. This site offers useful guidance about how to hold a thermometer exchange and provides a model for developing local ordinance language to manage mercury in the community.

OHIO DEPARTMENT OF HEALTH

The Ohio Department of Health, Health Assessment Section's (HAS) mission is to use the best environmental science to provide accurate health information and take public health actions to prevent harmful exposures and disease related to toxic substances. Today's complex environmental public health problems require a coordinated response from multiple agencies, organizations and a variety of health professionals. HAS works closely with the ATSDR, the U.S. Environmental Protection Agency (EPA) and Ohio EPA, local health departments and the concerned communities to investigate and eliminate the public health threat posed by toxic substances in the environment. Working together with regulatory agencies, HAS can provide recommendations to homeowners about mercury spill cleanup options and determine health safety standards for residential re-occupancy. The Ohio Department of Health's Health Assessment Section may be reached at (614) 466-1390.

OHIO EPA OFFICE OF COMPLIANCE ASSISTANCE AND POLLUTION PREVENTION

The Office of Compliance Assistance and Pollution Prevention (OCAPP) has produced a variety of mercury-related educational resources, including information on mercury reduction. This information includes brochures for school teachers and administrators, households and general population, and dairy farms. The Mercury Challenge Guide provides specific information about how hospitals can develop mercury reduction programs. It lists mercury-containing products commonly located in medical facilities. OCAPP's Web page on mercury issues is: www.epa.state.oh.us/opp/mercury_pbt.html. OCAPP also distributes the video "Mercury the Magic Metal," an eight-minute video that illustrates mercury vapors and provides an introduction to mercury risks. OCAPP staff can also directly assist organizations developing mercury reduction programs. More information about the mercury resources available through OCAPP is located at: www.epa.state.oh.us/opp/mercury_pbt/mercury.html or you may call OCAPP at (614) 644-3469.

OHIO EPA SPILL RESPONDERS AND HOTLINE NUMBER

When developing any mercury outreach program, it is useful to identify and get feedback from spill responders to ensure that your events are safe. Ohio EPA district offices are excellent resources with a great deal of expertise about mercury spill avoidance and response. Ohio EPA district offices may be contacted at:

Central District Office

3232 Alum Creek Dr.
Columbus, OH 43207-3417
Telephone: (614) 728-3778

Northeast District Office

2110 East Aurora Rd.
Twinsburg, OH 44087
Telephone: (330) 963-1200

Northwest District Office

347 N. Dunbridge Rd.
Bowling Green, OH 43402
Phone: (419) 352-8461

Southeast District Office

2195 Front St.
Logan, OH 43138
Phone: (740) 385-8501

Southwest District Office

401 East Fifth St.
Dayton, OH 45402
Phone: (937) 285-6357

Ohio EPA's spill hotline is an important phone number and vital to have available for hazardous material release emergencies. It is manned 24 hours a day, every day of the year. **The Ohio EPA spill hotline number is: 1-800-282-9378.**

U.S. EPA

Similar to Ohio EPA's response program, U.S. EPA's On-Scene Coordinators have vast spill response experience related to mercury and can offer useful advice on practical ways to handle a spill or manage contained elemental mercury. U.S. EPA developed an outreach program for Ohio's counties that focuses on spill response and touches on mercury pollution prevention issues. The program is a two-hour presentation that includes video documentaries and a training and resource manual.

U.S. EPA also provides other resources for communities, including possible grant opportunities through the Local Governments Reimbursement (LGR) Program, the Great Lakes National Program Office (GLNPO), and the Environmental Education (EE) Grants Program. LGR Grants are available to local

government for up to \$25,000 to cover costs related to mercury and other hazardous substance spills. GLNPO grants are available for furthering the protection and cleanup of the Great Lakes ecosystem. EE grants support environmental education projects and increase public awareness and knowledge about environmental issues. To obtain specific grant information and application procedures, visit the U.S. EPA Web site at www.epa.gov.

For more information related to spill response, please contact U.S. EPA's Cleveland office at (440) 250-1743. For more information regarding other mercury contamination and risk-reduction issues, contact U.S. EPA's Region 5 Office, Chicago at (312) 353-2000.

OTHER STATES

Many states are actively working to address mercury issues and they can be great resources for developing mercury reduction programs. States offer a valuable resource helping to bench-mark what has been done already and providing innovative ideas on how to address mercury issues. They are a valuable source of case studies and information on mercury reduction activities.

Great Lakes Region Mercury Links:

- Mercury Pollution Prevention for POTWs: WLSSD Blueprint for Mercury Elimination
www.wlssd.duluth.mn.us/publications/Blueprint%20for%20mercury/HG1.HTM
- Alternatives to Mercury-containing Products: Wisconsin's Mercury Source Book
www.epa.gov/glnpo/bnsdocs/hgsbook/index.html
- Indiana Department of Environmental Management Mercury Page
www.state.in.us/idem/ctap/mercury/index.html
- Illinois Department of Public Health
<http://app.idph.state.il.us/envhealth/mercury/>
- Michigan Department of Environmental Quality Mercury Page
www.michigan.gov/deq/0,1607,7-135-3307_29693_4175---,00.html
- Minnesota Pollution Control Agency Mercury Page
www.pca.state.mn.us/air/mercury.html
- Wisconsin Department of Natural Resources — Mercury in the Environment
www.dnr.state.wi.us/org/caer/cea/mercury/
- Mercury in Schools Page
www.mercuryinschools.uwex.edu/
- Northeast Waste Management Officials' Association (NEWMOA)
www.newmoa.org/Newmoa/htdocs/prevention/mercury/
- Vermont Agency of Natural Resources: Household Appliance Mercury Switch Removal Manual
www.mercvt.org/appman.htm

OTHER INTERNET SOURCES

There are many resources available on the Internet that can provide guidance on mercury reduction activities. The following two may be particularly useful and are excellent examples of Internet resources:

- Delta Institute's Mercury Self-Assessment for Sewage Treatment Plants - This site provides information to help sewage treatment plants develop mercury reduction projects, including a checklist that identifies mercury sources for sewage treatment plants to consider. It lists a variety of products, chemicals and equipment that may contain mercury. A self-assessment is available in this document's appendix and at: <http://delta-institute.org/pollprev/mercury/selfassess.php>.
- Interstate Mercury Education & Reduction Clearinghouse (IMERC) Mercury-Added Products Database - This online resource contains data about the mercury content of hundreds of products, including measuring devices, thermostats, batteries, lamps and numerous products that contain mercury-added switches, relays, lamps and button-cell batteries. Reporting companies and organizations are given a chance to review what they have submitted to IMERC prior to posting the information online. You can view the database at www.newmoa.org/prevention/mercury/imerc/notification/.

APPENDIX

- **REFERENCES**
- **IDENTIFICATION OF MERCURY DEVICES IN HOUSEHOLDS**
- **IDENTIFICATION OF MERCURY DEVICES IN SCHOOL SCIENCE ROOMS**
- **IDENTIFICATION OF MERCURY DEVICES IN SCHOOL MEDICAL, HOME ECONOMIC, ART AND OTHER ROOMS**
- **IDENTIFICATION OF MERCURY DEVICES IN SCHOOL FACILITIES**
- **CHECKLIST OF MERCURY SOURCES TO CONSIDER IN A BASELINE INVENTORY**
- **PUBLICLY OWNED TREATMENT WORKS SELF ASSESSMENT**

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IDENTIFICATION OF MERCURY DEVICES IN HOUSEHOLDS

Please use this table to help identify and locate mercury-containing products in homes. This inventory can help the homeowner properly dispose of mercury-containing items and can help identify alternative products when it is time to dispose of the mercury-containing product. Information for this table was adapted from the NEWMOA's Mercury in Schools Project, 2002.

Item	Do You Have the Item?		Location of Items	Non-Mercury Alternatives
	Yes	No		
Bulk elemental mercury				Contact the Ohio EPA or Bowling Green State University to arrange for someone to pick up the mercury from your home. For more information contact: Dave Heinlen, BGSU, (419) 372-2173. www.bgsu.edu/offices/envhs/environmental_health/mercury/contacts.htm
Fluorescent lamps			Do you currently recycle them? Yes No	Low-mercury fluorescent lamps are available (identified by green ends), but should still be recycled.
Mercury vapor lamps, metal halide lamps, high-pressure sodium vapor lamps				Sylvania makes a non-mercury, high-pressure sodium lamp called Lumalux. (Mercury vapor lamps are the oldest and least efficient high-intensity discharge lamp.)
“Silent light” switches				Light switches no longer contain mercury. Manufactured prior to 1991, mercury light switches look like typical wall switches, but they do not make the audible "click" sound when activated.
Mercury thermostats				Non-mercury sealed switches, and programmable and non-programmable electronic . Some HVAC wholesalers collect mercury thermostats for recycling. For more info contact: Ric Erdheim, Thermostat Recycling Corporation, (703) 841-3249 www.nema.org/index_nema.cfm/664/
Mercury barometer				Aneroid and digital; new liquid barometer being developed.
Mercury cooking thermometer (with the silver liquid)				Spirit-filled glass bulb and digital.

Item	Do You Have the Item?		Location of Items	Non-Mercury Alternatives
	Yes	No		
Mercury fever thermometer				Digital, alcohol, glass bulb non-mercury (gallium, indium, tin) and tympanic
Sphygmomanometer (blood pressure device) - with silver liquid, hand-held unit, mobile unit, or wall unit				Aneroid and digital
Mercury thermometer for freezers, refrigerators				Spirit filled thermometers
Mercury float control switches (e.g., on sump pumps)				Non-mercury alternatives are available. For more information, see: http://abe.www.ecn.purdue.edu/~mercury/src/devicepage.htm#mcs .
Mercury oxide or mercury zinc batteries (old alkaline type, prior to 1996) and button batteries				No alternatives available for button batteries. Newer alkaline batteries don't contain mercury.
True vermilion paint (contains mercuric sulfide) for art projects				Request mercury-free vermilion paints, but be aware that these paints may contain other hazards, such as cadmium.
Latex paint (produced before 1992)				Latex paint no longer contains mercury as a fungicide. You may be able to dispose of old latex paint during a community household hazardous waste program (usually a part of your town's recycling program, public works, or board of health.) Contact your town or Ohio EPA at (614) 644-2621 for more information. www.epa.state.oh.us/dsiwm/pages/recycpro.html
Old fungicides and pesticides (prior to 1991)				You may be able to dispose of fungicides and pesticides through your town's household hazardous waste program.

Identification of Mercury Devices in School Science Rooms

Please use this table to help you identify and locate mercury-containing products in science classrooms and labs. Please indicate on the following list (1) whether you have any of these mercury-containing items, (2) the total number or amount of each item that you currently use and/or store, and the number of replacement items you might need, and (3) the location of both used and/or stored items. The last column lists possible non-mercury replacement products.

SCIENCE ROOMS						
Item	(1) Do you have it (them)?		(2) Usage/Replacement		(3) Location of items	Non-Mercury Replacements
	Yes	No	Total Number or Amount of Item (used and stored)	How many replacements do you need?		
Elemental Mercury						None
Mercury Lab Thermometer						Alcohol and mineral spirits glass bulbs, and digital
Mercury Barometer						Aneroid and digital; new liquid one being developed
Mercury Hygrometer						Spirit-filled glass bulb, digital and aneroid
Mercury Hydrometer						
Mercury Vacuum Gauge						
Hg Spectral Tube						16 alternative gases are available
Mercury Molecular Motion Device						
Mercury Sling Psychrometer						Mineral spirits glass bulb thermometers, some can fit in old frames

SCIENCE ROOMS						
Item	(1) Do you have it (them)?		(2) Usage/Replacement		(3) Location of items	Non-Mercury Replacements
	Yes	No	Total Number or Amount of Item (used and stored)	How many replacements do you need?		
Mercury Compounds (mercury oxide, chloride, sulfate, nitrate, iodide; Zencker's solution; or other compound)						None
Mercury Gas Law Apparatus						A simple Charles' Law Apparatus may suffice.
Other mercury-containing instruments:						

Contact Information

Name: _____

Title: _____

Phone: _____

Fax: _____

E-mail: _____

School Name : _____

Identification of Mercury Devices in School Medical, Home Economic, Art and Other Rooms

Please use this table to help you identify and locate mercury-containing products in medical offices, home economics and art classrooms. Please indicate on the following list (1) whether you have any of these mercury-containing items, (2) the total number or amount of each item that you currently use and/or store, and the number of replacement items you might need, and (3) the location of both used and/or stored items. The last column lists possible non-mercury replacement products.

MEDICAL, HOME ECONOMICS & ART, OTHER						
Item	(1) Do You Have It (Them)?		(2) Usage/Replacement		(3) Location of items	Non-Mercury Replacements
	Yes	No	Total Number or Amount of Item	How many replacements do you need?		
MEDICAL						
Mercury Fever Thermometer						Digital, glass bulb non-mercury (gallium, indium, tin), and tympanic
Sphygmomanometer (Blood Pressure Device) - with silver liquid, hand-held unit, mobile unit, or wall unit						Aneroid and digital.
Mercury thermometer for freezers, refrigerators, and incubators						Spirit filled thermometers
HOME ECONOMICS & ART						
Mercury Cooking Thermometer (with the silver liquid)						Spirit-filled glass bulb, and digital
True Vermillion Paint (contains mercuric sulfide)						Request mercury-free vermilion paints, but be aware that these paints may contain other hazards, such as cadmium.

MEDICAL, HOME ECONOMICS & ART, OTHER						
Item	(1) Do You Have It (Them)?		(2) Usage/Replacement		(3) Location of items	Non-Mercury Replacements
	Yes	No	Total Number or Amount of Item	How many replacements do you need?		
Cadmium Vermillion Red						Same as above.
OTHER						
Mercury Oxide or Mercury Zinc Batteries (old alkaline type, prior to 1996) and Button Batteries						No alternatives available for button batteries. Newer alkaline batteries don't contain mercury.

Contact Information

Name: _____

Title: _____

Phone: _____

Fax: _____

E-mail: _____

School Name: _____

Identification of Mercury Devices in School Facilities

Please use this table to help you identify and locate mercury-containing products in school facilities. We recommend that you keep a record of mercury-containing equipment or place a tag on the equipment, indicating that it contains mercury and must be properly disposed of. Inventorying your mercury-containing equipment can help you remember to handle this equipment as hazardous waste when the time comes to replace or service it.

FACILITIES				
Item	(1) Do You Have It (Them)?		(2) Location of items	(3) Non-Mercury Replacements
	Yes	No		
Fluorescent lamps			Do you currently recycle them? Yes No	Low-mercury fluorescent lamps are available (identified by green ends) but should still be recycled.
Mercury Thermostats				Non-mercury sealed switches, and programmable and non-programmable electronic . Some HVAC wholesalers collect mercury thermostats for recycling. For more info contact: Ric Erdheim, Thermostat Recycling Corporation, (703) 841-3249 http://www.nema.org/index_nema.cfm/664/
Mercury Vapor Lamps, Metal Halide Lamps, High-Pressure Sodium Vapor Lamps				Sylvania makes a non-mercury, high-pressure sodium lamp called Lumalux. (Mercury vapor lamps are the oldest and least efficient high-intensity discharge lamp.)
Mercury Gauges				Depends on the application.
"Silent light" switches				Light switches no longer contain mercury. Manufactured prior to 1991, mercury light switches look like typical wall switches, but they do not make the audible "click" sound when activated
Mercury Float Control Switches (e.g. on Sump Pumps)				Non-mercury alternatives are available. For more information, see: http://abe.www.ecn.purdue.edu/~mercury/src/devicepage.htm#mcs
Flow Meters with Mercury Switches				For most uses, your supplier will have a non-mercury model.
Other equipment with				Non-mercury alternatives are available, such as hard-

FACILITIES				
Item	(1) Do You Have It (Them)?		(2) Location of items	(3) Non-Mercury Replacements
	Yes	No		
mercury switches (e.g., flame sensors, fire alarms, safety valves)				contact switches, solid-state switches, electro-optical switches, inductive sensors, capacitive sensors, photoelectric sensors, and ultrasonic sensors. For more information, see: http://abe.www.ecn.purdue.edu/~mercury/src/devicepage.htm http://216.239.33.100/search?q=cache:tZNhIDskYIsC:www.informinc.org/fsmercaltts.pdf+non-mercury+flow+meter&hl=en&ie=UTF8
Old fungicides and pesticides (prior to 1991)				You may be able to dispose of fungicides and pesticides through your town's Household Hazardous waste program (usually a part of your town's Recycling Program, Public Works, or Board of Health.) Contact your town or the Ohio EPA at (614) 644-2621 or at www.epa.state.oh.us/dsiwm/pages/recycpro.html

Contact Information

Name: _____ E-mail: _____

Title: _____ School Name: _____

Phone: _____

Fax: _____

CHECKLIST OF MERCURY SOURCES TO CONSIDER IN A BASELINE INVENTORY

The following checklist is a resource that can be used to evaluate your mercury baseline. This form should serve as a guide for the type of information that you may want to collect in a baseline inventory of your facility.

Mercury policies and practices: Does your facility:

- Have a policy regarding the purchase of mercury-containing products? Yes No
- Centrally track or have an inventory form for mercury products? Yes No
- Have a policy on how to clean up a mercury spill? Yes No
- Have procedures for cleaning and refilling instruments with mercury? Yes No
- Label the equipment as containing mercury? Yes No
- Phase out mercury parts when replacing equipment? (e.g., thermometers) Yes No
- Recycle mercury parts when you replace old equipment? (e.g., switches) Yes No
- Require the manufacturer/vendor to disclose mercury concentrations? Yes No
- Have a policy to ensure mercury products are not disposed of down the drain? Yes No
- Have a protocol for disposal of intact mercury-containing products? Yes No
- Train employees on mercury awareness? Yes No
- Train employees how to properly clean up a mercury spill? Yes No
- Clean mercury out of traps, surps and pipes in your sewer lines? Yes No
- Send new mothers or patients home with mercury thermometers? Yes No
- If so, how many are issued each year? _____

Mercury Equipment: Does your facility or its satellites use/purchase:

- Mercury thermometers? Yes No How many? _____
- Mercury sphygmomanometers? Yes No How many? _____
- Mercury oxide (mercury zinc) batteries? Yes No How many? _____
- Do you recycle batteries? Yes No
- Are you phasing out mercury batteries? Yes No
- Do you recycle other types of batteries? Yes No
- Mercury lamps (e.g., fluorescent lights)? Yes No
- Are your spent lamps recycled? Yes No

- Mercury weight esophageal dilators? Yes No How many?_____
- Mercury weight Cantor tubes? Yes No How many?_____
- Mercury weight Miller-Abbott tubes? Yes No How many?_____
- Mercury weight feeding tubes? Yes No How many?_____
- Mercury-containing dental amalgams? Yes No
- Thermostats with mercury switches? Yes No
- Gauges with liquid mercury? Yes No
- Equipment with mercury switches? Yes No
- Displacement/plunger relay? Yes No
- Flame Sensor/Safety Valve (thermostat probes)? Yes No
- Hitachi Chem Analyzer? Yes No
- Electron microscope? Yes No
- Mercury barometers? Yes No
- Other mercury-containing equipment? Yes No
If yes, what kind?

Mercury in Lab: Do you use:

- ___ Histological fixatives
- ___ Zenker's Solution
- ___ Thimerosal
- ___ Carbol-fuchin stain
- ___ Gram iodine stain
- ___ Mercurochrome
- ___ Immu-Sal
- ___ Carnoy-Lebrun
- ___ Shardin
- ___ Takata's reagent
- ___ Golgi's

Please indicate response by **Y** = Yes, **N** = No, **D** = Don't know

- ___ Phenolic mercuric
- ___ Acetate
- ___ Alum
- ___ Mercury nitrate
- ___ Million's reagent
- ___ Nesser's solution
- ___ Mucolexx
- ___ Ohlamacher
- ___ Cajal's
- ___ Camco
- ___ Cesium Internal Std.
- ___ Mercury chloride
- ___ Mercury (II) oxide
- ___ Mercury (II) chloride
- ___ Mercury iodide
- ___ Hematoxylin (Solution A)
- ___ Channing's solution
- ___ B 5 fixative
- ___ Helly
- ___ Gomori's
- ___ Stabilur Tablets
- ___ Phenylmercuric Acetate

Other mercury-containing lab chemicals? Yes No If yes, what kind?

Are you phasing out mercury laboratory chemicals? Yes No

Are you phasing out mercury pharmaceutical products? Yes No

Do any of your cleaners/degreasers contain mercury? Yes No Don't know

Mercury Spills

Estimate the number of spills of mercury in the facility last year? _____ Don't know

Estimate the amount of mercury involved in spills last year? _____ Don't know

What was the total estimated cost for all mercury spill cleanups last year? _____ Don't know

Estimated total mercury (this is the toughest question!)

Based on your inventory, how much mercury do you estimate is in use at the facility? _____

How much mercury do you estimate went into a waste stream (solid, biohaz, water, haz)? _____

How much mercury recycling in the past year was collected for proper disposal? _____

How many grams of mercury are in a barometer? The following Web site has a mercury assessment worksheet on page 35 of the PDF file that lists mercury containing medical equipment and how many grams of mercury are in each piece of equipment.

www.dhs.ca.gov/ps/ddwem/environmental/Med_Waste/guide_to_mercury_assessment_v1.00.pdf

Notes:

POTW SELF ASSESSMENT

MERCURY CHECKLIST FOR SEWAGE TREATMENT PLANTS- ITEMS THAT MAY CONTAIN MERCURY AT YOUR FACILITIES

Produced by the Delta Institute, Sewage Treatment Plants Web Page: <http://delta-institute.org/pollprev/mercury/selfassess.php> .

This checklist attempts to provide a detailed listing of all possible sources of mercury at a sewage treatment plant. It lists a wide variety of products, chemicals and equipment that **may** contain mercury — it is up to staff to determine if each item or type of item actually does contain mercury and how much. Once mercury sources have been inventoried, it is up to sewage treatment plant administration to determine how to address each source within the context of their overall mercury reduction goals. Many of these sources may be easily and economically replaced with non-mercury or lower mercury alternatives.

Others, such as fluorescent lamps, should continue to be used and then safely recycled. Still others may be small, well protected parts of larger equipment that should be properly recycled when this equipment is changed out.

This list of potential mercury-containing items is followed by a list of questions designed to help you think about facility policies and procedures that relate to mercury reduction. These can help you implement procedures to minimize future releases of mercury and assure that no new mercury is used at the facility. They can also help you to make recommendations to other units of your local government to reduce or eliminate their mercury use.

Additional information to help you with your mercury reduction efforts can be found in:

- *Wisconsin Mercury Sourcebook*, chapter on Wastewater Treatment Plants. This can be found at www.epa.gov/glnpo/bnsdocs/hgsbook/index.html.
- *An Investigation of Alternatives to Mercury-containing Products* by the Center for Sustainable Production at the University of Massachusetts at Lowell for the Maine Department of Environmental Protection at www.maine.gov/dep/mercury/lcspfinal.pdf. Chapter 4 provides an excellent listing of mercury bearing equipment and non-mercury alternatives.

MERCURY POLICIES AND PROCEDURES AT YOUR FACILITY

The following checklist, adapted for sewage treatment plants from the Ohio EPA *Mercury Challenge Handbook* (for medical facilities), can be used to evaluate and improve your mercury reduction efforts. Does your facility:

1. Have a policy regarding the purchase of mercury-containing equipment and products?
2. Track or have an inventory form for mercury-containing products, chemicals, and equipment and products?
3. Have a policy on how to clean up a mercury spill?
4. Train staff in preventing and cleaning up mercury spills?
5. Have procedures for cleaning and refilling instruments containing mercury?

6. Label equipment that contains mercury?
7. Recycle mercury parts when you replace old equipment? (e.g., switches)
8. Require the manufacturer or vendor to disclose mercury content or concentration?
9. Have a policy to ensure mercury products are not disposed of down the drain or in the garbage?
10. Clean mercury out of traps, sumps and sewer lines?
11. Recycle spent fluorescent lamps and other lamps that contain mercury?
12. Recycle batteries containing mercury?

PRODUCTS, CHEMICALS AND EQUIPMENT THAT MAY CONTAIN MERCURY

1. Laboratory Equipment
 - a. Manometers
 - b. Barometers
 - c. Thermometers
 - d. Ion exchange cartridges for lab water purification system
 - e. Hanging mercury drop electrodes for polarographic analyzers
2. Laboratory Chemicals
 - a. COD analysis reagent (mercuric sulfate)
 - b. TKN and TP analysis digestion reagents
 - c. Nessler reagent,
 - d. Mercury analytical standards
 - e. Gas chromatograph sample interferences (elemental mercury)
 - f. Sodium hypochlorite (Clorox)
 - g. Mercury or mercurous chloride,
 - h. Mercury iodide,
 - i. Mercury nitrate,
 - j. Mercury (II) oxide,
 - k. Mercury (II) sulfate,
 - l. Merthiolate
3. Bulk Chemicals
 - a. Phosphorus removal chemicals
 - b. Dechlorination chemicals
 - c. Sludge-thickening polymers
 - d. Potassium hydroxide
 - e. Sodium hydroxide
 - f. Sodium chloride
 - g. Chlorine
 - h. Sodium hypochlorite
 - i. Sulfuric acid
 - j. Nitric acid
 - k. Ferric or ferrous chloride
 - l. Pickling liquor (for phosphorus removal)
4. Process Control and Measuring Equipment
 - a. Accustats
 - b. Barometers
 - c. Counterweights
 - d. Elemental mercury for refilling mercury-containing equipment.

- e. Flow meters
- f. Gas regulators and meters
- g. Gyroscopes
- h. Hydrometers with thermometers
- i. Level and rotation sensors
- j. Manometers, pressure gauges and vacuum gauges
- k. Mercury-sealed pistons
- l. Perimeters
- m. Pressure-trols
- n. Pyrometers
- o. Rectifiers
- p. Ring balances
- q. Shunt trips
- r. Steam flow meters
- s. Stokes gauges
- t. Switches and relays:
 - 1. displacement plunger relays;
 - 2. mercooid control switches;
 - 3. pressure control switches (mounted on bourdon tube or diaphragm);
 - 4. relay switches;
 - 5. mercury wetted relays;
 - 6. mercury displacement relays (found in motors);
 - 7. sump pump, bilge pump and other float controls; or
 - 8. tilt switches.
- u. Thermometers (including industrial dial face thermometers with capillary tubes)
- v. Thermostats and thermoregulators
- w. Transmitters

5. Buildings

- a. DC watt-hour meters
- b. Flame sensors (found in the pilot light and burner assembly on gas-fired furnaces, boilers, unit heaters and space heaters)
- c. Hydronic and warm air controls with tilt switches such as:
 - 1. aquastats;
 - 2. pressurestats;
 - 3. firestats;
 - 4. fan limit controls; or
 - 5. pressure/flow controls on air handling units.
- d. Switches and relays:
 - 1. fire alarm box switches;
 - 2. silent light switches;
 - 3. relay switches;
 - 4. mercury wetted relays;
 - 5. mercury displacement relays (found in lighting, resistance heating and motors);
 - 6. sump pump, bilge pump and other float controls; or
 - 7. tilt switches.
- e. Thermostats

6. Trickling filter Pivot Arm Bearings (mercury bearings/water seals)

7. Lamps

- a. Fluorescent;
- b. High-pressure sodium;
- c. Mercury arc;
- d. Mercury vapor lamps;
- e. Metal halide; or
- f. Ultraviolet disinfection.

8. Batteries

- a. Mercury-zinc (button);
- b. Mercury-cadmium;
- c. Mercury alkaline; or
- d. Mercury oxide.

9. Paint

- a. Old latex (pre-1990)
- b. Marine paint

10. First Aid/Medical

- a. Mercurochrome;
- b. Sphygmomanometers (blood pressure cuffs);
- c. Thermometers; or
- d. Thimerosal (in eye wash).

11. Other

- a. Old pesticides, fungicides and herbicides;
- b. Tree root growth control products;
- c. Computer monitors; or
- d. Fleet vehicles may contain ABS, convenience and trunk lighting switches and HID headlamps.

**Ohio Environmental Protection Agency
Office of Compliance Assistance and Pollution Prevention
Lazarus Government Center
122 South Front Street
P.O. Box 1049
Columbus, Ohio 43216-1049**

**Phone: (614) 644-3469
FAX: (614) 644-2807
www.epa.state.oh.us/ocapp**



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