



Canada-Ontario Agreement  
Respecting the Great Lakes Basin Ecosystem

# Municipal Actions

# Reduce Mercury



March 2005



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## FOREWORD

Despite mercury's toxic nature, a wide range of mercury-containing products are still commercially available and used in homes and commercial, industrial and institutional buildings in Canada. These products include thermostats, thermometers, fluorescent lamps, pressure measuring devices, electrical switches and relays, and dental amalgam.

Because mercury can travel in the atmosphere on wind currents, mercury in the environment is a global issue. Municipalities can help address the issue by reducing or eliminating mercury releases from internal municipal operations and sources within the community. By taking action to address mercury in communities, Canadian municipalities can demonstrate a commitment to reduce its impact on human and environmental health and provide leadership for reductions globally.

This document provides guidance on how to develop a Municipal Mercury Elimination Policy and Plan that will appropriately direct efforts to reduce mercury releases.

With respect to internal municipal operations, this document contains information and case studies that will help municipalities manage mercury-containing products found in municipal buildings and street lighting. With respect to sources of mercury from within the community, information and case studies in this document can help municipalities determine if there are any actions to reduce mercury releases that would be appropriate for their communities.

Based on the following modules, municipalities can identify priorities, timelines and budget requirements for support and endorsement by Council. Adopting a Municipal Mercury Elimination Policy and Plan formally recognizes a municipality's commitment to reducing and eliminating mercury from the environment.



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## 1.1 The Mercury Problem

Mercury occurs naturally in the environment, but more than half of the mercury in the atmosphere today comes from human activities such as the burning of coal, the smelting of metal and the disposal and incineration of mercury-containing products. Common products that may contain mercury include fluorescent lamps, thermostats, temperature- and pressure-measuring devices, dental amalgam, electrical switches and relays.

In Canada, industrial releases of mercury have been substantially reduced since the 1970s and the use of mercury in products has declined. However, some products remain a significant source of mercury. For example, 10 milligrams of mercury - an amount that can be found in some fluorescent tubes - could contaminate up to 10,000 litres of water to levels that would exceed Health Canada's maximum acceptable concentration for safe drinking water ([www.hc-sc.gc.ca/hecs-sesc/water/publications/drinking\\_water\\_quality\\_guidelines/ch4.htm](http://www.hc-sc.gc.ca/hecs-sesc/water/publications/drinking_water_quality_guidelines/ch4.htm)).

Mercury can be carried on wind currents, remaining in the atmosphere for a length of time anywhere from hours to years, and then deposited around the globe. Once in lakes and waterways, mercury can be transformed into a more toxic form called methyl mercury, which can build up in the bodies of living creatures. Methyl mercury levels can then increase up the food chain as creatures accumulate the methyl mercury in their food. This is most often seen in fish eaters, like swordfish, bass, walleye, loons, and otters. The severity of the effects on wildlife depends on the level of exposure and may range from a slight physical or behavioural impairment to reproductive failure or death.

In order to prevent high levels of exposure to mercury through the accumulation of methyl mercury in fish, the federal, provincial and territorial governments have placed fish consumption advisories on individual species, lakes and in some cases on entire regions across Canada. Currently, over 90% of the fish consumption advisories issued in Canada and over 98% of the fish consumption advisories issued for inland lakes in Ontario are due to mercury. This is of particular concern for subsistence fishers who eat large quantities of fish as part of their traditional lifestyles. For more information, please read [Mercury: Fishing for Answers](#) available online at [www.ec.gc.ca/ceqg-rcqe/English/Pdf/mercury.pdf](http://www.ec.gc.ca/ceqg-rcqe/English/Pdf/mercury.pdf).

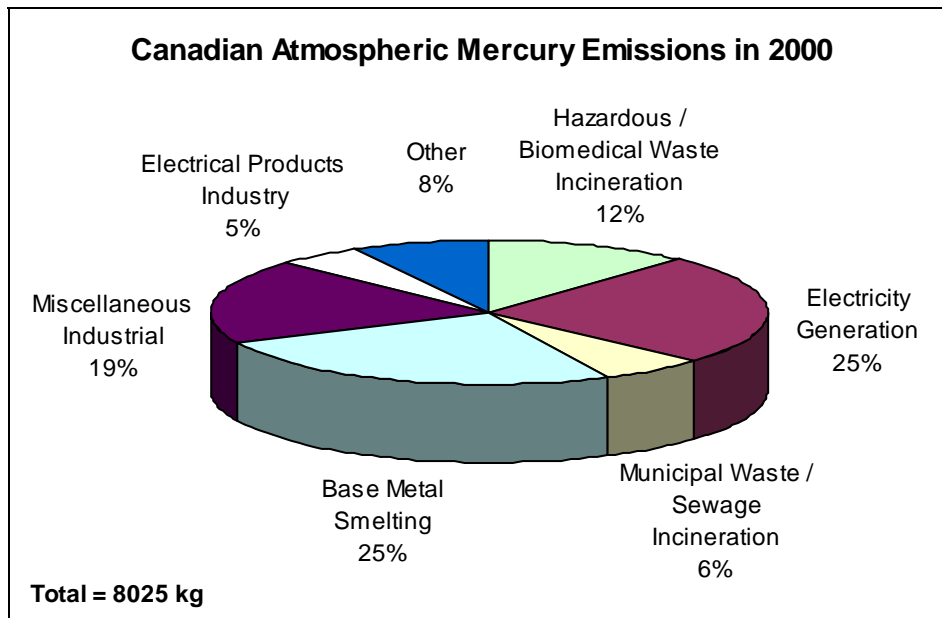
In general, mercury can cause brain, nerve, kidney, and lung damage and, in extreme cases, coma or death. Children who have been exposed to very low levels of mercury while in the womb can experience developmental effects.

Proper management of mercury-containing products can help reduce mercury releases, occupational exposure and mercury spills, thereby preventing impacts on humans and the environment. Environment Canada's "Mercury and the Environment" Web site provides information on the sources and effects of mercury; instructions for cleaning up small mercury spills; mercury-related legislation, policies, and initiatives; and fish consumption advisories ([www.ec.gc.ca/mercury](http://www.ec.gc.ca/mercury)).

## 1.2 Overview of Sources of Mercury

Hundreds of tonnes of mercury are put into consumer products every year throughout the world to measure temperature and pressure, to make fluorescent light bulbs, to conduct electricity, to act as an anti-fungal agent or to serve as the primary component in dental fillings. In 1999, Canada imported over nine tonnes of mercury, mainly to be used in electrical products and measuring devices. This is much less than the 50 tonnes per year imported in the late 1970s and early 1980s.

In the year 2000, eight tonnes of mercury were emitted to the atmosphere in Canada as a result of human activity. The largest sources were electricity generation and metal smelting, each accounting for 25% of the total. Figure 1 illustrates Canadian atmospheric mercury emissions from various sectors for the year 2000.



**Figure 1. Sources of atmospheric mercury emissions in Canada.**

Source: <http://www.ec.gc.ca/MERCURY/SM/EN/sm-cr.cfm?SELECT=SM>

While industrial point source emissions (i.e. from smokestacks of coal-fired power plants, incinerators, cement plants and steel mills) are responsible for a considerable portion of the mercury released into the air each year, they are not the only sources of mercury to the environment. When mercury-containing products are broken or disposed of, mercury can end up in sewer systems, landfills or in waste destined for incineration. As a result, mercury from products can enter the environment to water, groundwater, land and air.



Table 1 is a list of mercury-containing products. The Environment Canada Web site ([www.ec.gc.ca/MERCURY/SM/EN/sm-mcp.cfm?SELECT=SM](http://www.ec.gc.ca/MERCURY/SM/EN/sm-mcp.cfm?SELECT=SM)) contains descriptions and photographs of these products in addition to information on their mercury content and non-mercury alternatives.

**Table 1 Mercury-Containing Product**

<ul style="list-style-type: none"> <li>• <b>Barometers</b></li> <li>• <b>Batteries</b></li> <li>• <b>Dental Amalgams</b></li> <li>• <b>Flame Sensors</b></li> <li>• <b>Flowmeters</b></li> <li>• <b>Hydrometers</b></li> <li>• <b>Hygometers/Psychrometers</b></li> <li>• <b>Manometers</b></li> <li>• <b>Medical Devices:</b> <ul style="list-style-type: none"> <li>- Esophageal Dilators</li> <li>- Gastrointestinal Tubes</li> <li>- Sphygmomanometers</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Lamps:</b> <ul style="list-style-type: none"> <li>- Compact Fluorescent Lamps</li> <li>- Fluorescent U-Tubes</li> <li>- Linear Fluorescent Lamps</li> <li>- Mercury Vapour Lamps</li> <li>- Metal Halide Lamps</li> <li>- Sodium Vapour Lamps</li> </ul> </li> <li>• <b>Mercury Compounds</b></li> <li>• <b>Pyrometers</b></li> <li>• <b>Relays:</b> <ul style="list-style-type: none"> <li>- Wetted Reed Relays</li> <li>- Displacement and Contractor Relays</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Switches:</b> <ul style="list-style-type: none"> <li>- Flow Switches</li> <li>- Pressure Switches</li> <li>- Temperature Switches</li> <li>- Tilt Switches</li> </ul> </li> <li>• <b>Thermometers:</b> <ul style="list-style-type: none"> <li>- Fever Thermometers</li> <li>- Industrial Thermometers</li> <li>- Laboratory Thermometers</li> </ul> </li> <li>• <b>Thermostats</b></li> </ul>
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Source: [www.ec.gc.ca/MERCURY/SM/EN/sm-mcp.cfm?SELECT=SM](http://www.ec.gc.ca/MERCURY/SM/EN/sm-mcp.cfm?SELECT=SM)

### 1.3 Government Policies and Programs

Nations from around the world are becoming more aware of mercury's impact on human health and the environment. Due to its ability to cross borders via long-range atmospheric transportation and product import/export, measures are being taken on an international scale to ensure the decrease of mercury emissions due to human activity.

Canada is party to several international and domestic agreements and programs that aim to reduce mercury contamination in the environment. Among these are the Heavy Metals Protocol under the United Nations Economic Commission for Europe, the United Nations Environment Program's Global Mercury Assessment, the North American Regional Action Plan on mercury under NAFTA's Commission for Environmental Cooperation, the Canada-United States Strategy for Virtual Elimination of Persistent Toxic Substances in the Great Lakes, and the Canada-Ontario Agreement respecting the Great Lakes Basin Ecosystem.

In addition, Environment Canada uses regulatory tools under the *Canadian Environmental Protection Act (CEPA), 1999* and the *Fisheries Act* to manage toxic substances such as mercury. Mercury has been deemed a toxic substance under *CEPA* and is listed on Schedule 1 of the Act. There are requirements under *CEPA* for the management of mercury relating to the Chlor-alkali industry, the movement of hazardous waste, environmental emergencies and emissions from various sectors in the National Pollutant Release Inventory. Environment Canada is also involved in the research, development and implementation of non-regulatory initiatives to help reduce and manage releases of mercury due to human activity.

The provinces and territories of Canada may also have legislation, regulations and guidelines for mercury level, in liquid effluent, drinking water and emissions from industrial sources. There are also several non-governmental organizations in the country dedicated to environmental protection that incorporate mercury management strategies into various initiatives.



### 1.3.1 Canada Wide Standards

The Canadian Council of Ministers of the Environment (CCME) is made up of environment ministers from federal, provincial and territorial governments, which work to promote effective intergovernmental cooperation and coordinated approaches to interjurisdictional issues such as air pollution and toxic chemicals. CCME members collectively establish nationally-consistent environmental standards, strategies and objectives so as to achieve a high level of environmental quality across the country. The standards are developed in partnership, but they are implemented individually by each government for its own jurisdiction.

Under CCME, three Canada Wide Standards (CWS) for mercury have been endorsed. These standards target mercury from dental amalgam waste, fluorescent lamps, and emissions from base metal smelters and incinerators. A CWS for coal-fired power for electricity generation is currently under development. For more information, please visit [www.ccme.ca/initiatives/standards.html?category\\_id=53#19](http://www.ccme.ca/initiatives/standards.html?category_id=53#19)



#### 1.3.1.1 Dental Amalgam

In 2001, CCME endorsed a CWS on mercury for dental amalgam waste. The standard addresses the key parts of the dental amalgam life-cycle of environmental concern. The objective of the standard is to reduce environmental releases of dental amalgam waste from Canadian dentists by 95% by 2005 through the application of improved waste management practices. In February 2002, a Memorandum of Understanding (MOU) between Environment Canada and the Canadian Dental Association was signed in support of the CWS. The MOU included improved waste management practices for managing dental amalgam and elemental mercury. It also included the installation, use and maintenance of ISO certified amalgam separators or equivalent, by those dental practitioners generating amalgam wastes.

#### 1.3.1.2 Fluorescent Lamps

In 2001, CCME endorsed a CWS for Mercury-Containing Lamps. The intent of the CWS to reduce in the average mercury content of lamps sold in Canada, including fluorescent lamps (such as compact and four-foot lamp) and high intensity discharge lamps (i.e. mercury-vapour, metal halide and high pressure sodium lamps (streetlights)).

From a 1990 baseline, the CWS targets a 70% reduction by 2005 and an 80% reduction by 2010. Lamp manufacturers have voluntarily committed implement activities that will help achieve the targets of the CWS. In 2000, the industry reported a 1990 baseline mercury content of 43 mg per lamp. The industry has also reported that the average mercury content of all mercury-containing lamps sold in 2003 was 11.4 mg - a 73.5% reduction from the 1990 baseline.

The CWS for Mercury-Containing Lamps also includes a commitment for jurisdictions to assess the feasibility of recycling/recovery of lamps and to implement initiatives to encourage these types of activities when appropriate.

#### 1.3.1.3 Mercury Emissions – Base Metal Smelting and Waste Incineration

The CWS for Mercury Emissions applies to two sectors: base metal smelting and waste incineration.

For base metal smelting facilities, a two-part standard has been put forth to deal with existing and new or expanding operations. New and expanding facilities must be equipped to meet an emissions guideline of 0.2 g mercury per tonne of finished zinc, nickel, or lead or 1 g mercury per tonne of finished copper. Existing facilities must make a determined effort to reach a guideline of 2 g mercury per tonne of finished metal by 2008. Environmental Performance Indicator data for the year 2000 show that the majority of the facilities are meeting the CWS.

On September 25, 2004, Environment Canada published in the Canada Gazette, Part I, a Proposed Notice Requiring the Preparation and Implementation of Pollution Prevention Plans in respect to Specified Toxic Substances Released from Base Metals Smelters and Refineries and Zinc Plants. The Proposed Notice included the CWS for Mercury Emissions among its factors to consider. Environment Canada also published, for public consultation, a Draft Environmental Code of Practice for Base Metals Smelters and Refineries dated June 2004. The Code contains a series of guidelines, criteria, and recommended practices, including the Canada-wide Standard for Mercury Emissions. Conformance with the Code's guidelines, criteria, and recommended practices is also a factor to consider in the Proposed Notice mentioned above.

The CWS also addresses limits for the concentration of mercury in exhaust gas from medical, hazardous, sludge and municipal waste incineration. Changes in process, treatment technology and waste inputs have reduced mercury emissions from these incinerators by 60% (2 tonnes) since 1990. The CWS for the national allowable concentration of mercury, ranging from 20 to 70 microgram/cubic metre, will reduce present emissions (1200 kg/yr) by over 70% by 2006 (Refer to Table 2).

**Table 2 Canada-wide Standard for Mercury Emissions – Limits for Waste Incineration**

Type of Waste Incineration	Limit for Mercury in Exhaust Gas (ug/Rm <sup>3</sup> )*	Compliance Date
Municipal	20	2006
Medical**	20	2006
Hazardous	50	2003
Sewage sludge	70	2005

\* Micrograms per cubic metre (corrected to 11% O<sub>2</sub>)

\*\* Medical waste incinerators that process less than 120 tonnes/yr have a limit of 40ug/m<sup>3</sup>

Source: <http://www.ec.gc.ca/MERCURY/MM/EN/mm-cws.cfm?SELECT=MM#E>

#### 1.3.1.4 Coal-fired Electric Power Generation

On June 9, 2003, the CCME Deputy Ministers released a notice that committed the council to set a standard for mercury emissions in 2005 that would require reductions from coal-fired plants by 2010.

CCME has committed to explore the national capture of mercury from burned coal in the range of 60-90%. Provinces with coal fired power plants (New Brunswick, Nova Scotia, Ontario, Manitoba, Alberta and Saskatchewan) will be responsible for implementing the standard. To help generate nationally consistent and comparable data for the standard development process, a guidance document entitled The Canadian Uniform Data Collection Program has been made available to the responsible jurisdictions. The CCME is also reviewing current and emerging control technologies for mercury.

### 1.3.2 Great Lakes Basin

The Government of Canada is committed to reducing mercury in the Great Lakes basin.

#### 1.3.2.1 The Canada United States Great Lakes Binational Toxics Strategy

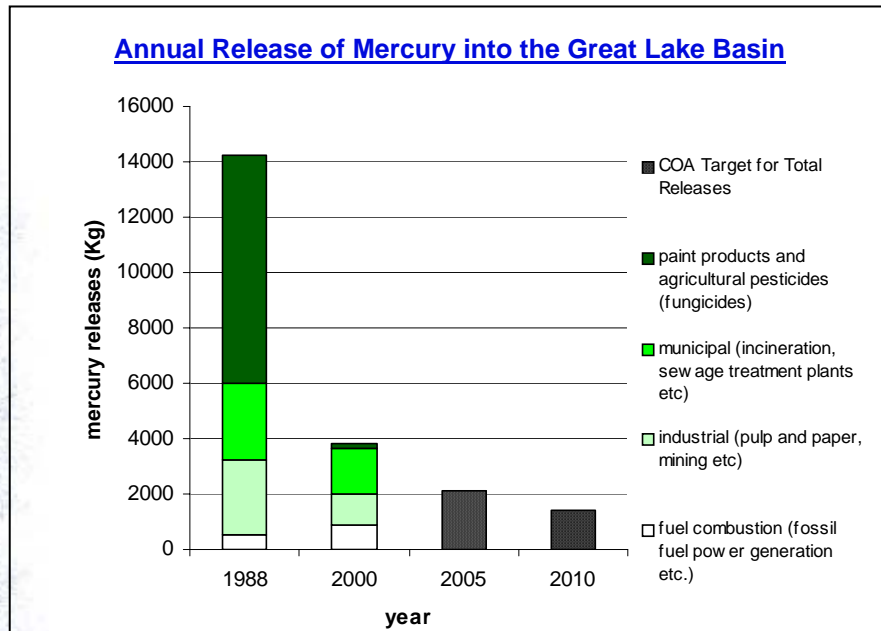
Signed in 1997, the Great Lakes Binational Toxics Strategy is an agreement between Canada and the United States to virtually eliminate persistent toxic substances from the Great Lakes environment. Environment Canada, the United States Environmental Protection Agency and stakeholders from industry, academia, state/provincial and local governments, Tribes, First Nations, and environment and community groups are working together to achieve the Strategy's

goals. Substance-specific workgroups are working to eliminate the Level 1 substances from the Great Lakes Basin, including mercury.

### 1.3.2.2 The Canada-Ontario Agreement Respecting the Great Lakes Basin

The Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem (COA) focuses on work to restore, protect and conserve the Great Lakes. It also helps Canada meet its goals under the Canada-U.S. Great Lakes Water Quality Agreement (GLWQA). The GLWQA aims to address the most pressing issues of the Great Lakes ecosystem. Since the signing of the COA in 1994, mercury pollution to the Great Lakes ecosystem has decreased by approximately 84% (from the 1988 base year). The annual release of mercury into the Great Lakes Basin has been reduced from more than 14,000 kilograms to less than 2,400 kilograms. This accomplishment is due to a dramatic reduction in mercury from paint and household batteries, the virtual elimination of the use of mercury based fungicides and reductions in emissions from sewage sludge and biomedical waste incineration.

A new COA was signed by the Governments of Canada and Ontario in March 2002. It will continue to pursue the goal of virtual elimination of persistent bioaccumulative toxic substances such as mercury, and the significant reduction of other harmful pollutants. One of the anticipated results of this agreement is a 90% reduction in mercury by 2010 (Refer to Figure 2).



**Figure 2. Reductions in mercury releases in Ontario from 1998 to 2002.**  
Source: Canada-Ontario Agreement: Reducing mercury In the Great Lakes (COA 2001), <http://www.ec.gc.ca/mercury/images/coa-e.pdf>.

Under the new COA, both governments will take steps to further reduce the use and release of mercury into the environment. Actions include encouraging the use of substitute products (mercury-free alternatives), alternative fuels, and better technologies to reduce and monitor mercury pollution. Additional activities include expanding recycling programs, decommissioning current mercury sources, and cleaning mercury-contaminated sediments and historic contamination problems. Cooperative programs with business, industry and local community groups are essential to the success of these efforts.



### 1.3.3 Provincial (MOE) Regulations

#### 1.3.3.1 Ontario Regulation 196/03, amending O. Reg. 205/94: Amalgam Waste Disposal

On May 31, 2003, *Ontario Regulation 205/94* under the *Dentistry Act 1991* was amended to include the Standard of Practice of the Profession for Amalgam Waste Disposal. These amendments require dental offices that place, repair or remove dental amalgam and that are maintained by a member of the Royal Collage of Dental Surgeons of Ontario to properly install a dental amalgam separator device that meets or exceeds the International Organization for Standardization (ISO) standard entitled "Dental Equipment – Amalgam Separators". The Regulation also requires the proper disposal of amalgam wastes. For more information, please visit [www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2003/R03196\\_e.htm](http://www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2003/R03196_e.htm).

#### 1.3.3.2 Ontario Regulation 323/02: Existing Hospitals Regulation

The Government of Ontario passed the *Existing Hospitals Regulation* (O. Reg. 323/02) requiring all existing hospital incinerators to close by December 6, 2003. Only a few years ago there were over 70 hospital incinerators and this sector was the fourth largest emitter of mercury in the province. For more information, please visit [www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2002/R02323\\_e.htm](http://www.e-laws.gov.on.ca/DBLaws/Source/Regs/English/2002/R02323_e.htm).

#### 1.3.3.3 Ontario Regulation 196/01: Lakeview Regulation

The Government of Ontario passed the *Lakeview Regulation* (O. Reg. 196/01) requiring Lakeview generating station to cease burning coal by April 2005. It is estimated that the closure of Lakeview will result in a reduction in annual mercury emissions of between 45 and 75 kilograms.

#### 1.3.3.4 Ontario OHS, Regulation 844: Designated Substance-Mercury

Under the *Occupational Health and Safety Act* (OHS), toxic and hazardous substances are controlled under the Designated Substance Regulation. This regulation specifically sets out the amount of mercury that workers can be exposed to in a given time period and the methods to both control and measure mercury in the workplace. For more information, please visit [www.e-laws.gov.on.ca/DBLaws/Regs/English/900844\\_e.htm](http://www.e-laws.gov.on.ca/DBLaws/Regs/English/900844_e.htm).

### 1.3.4 By-laws

By-laws also help form the basis on which the government enforces mercury-related controls. Some cities in Ontario have sewer use by-laws that restrict the concentration of mercury disposed of into the sewer system.

The City of Toronto By-law 457-2000 section 681-5 (Pollution Prevention Planning) has implications for dental and health care facilities within the City of Toronto. Facilities that emit any of the 38 subject pollutants, including mercury, are required to undertake a pollution prevention plan by December 31, 2001. The City of Toronto Sewer-Use by-law requires all dental clinics that place or remove amalgam fillings to install an amalgam separator to capture waste dental amalgam. Another requirement of the by-law is a limit on the concentration of mercury in drains leaving the clinics and entering the sewers. Initial test results of biosolids from some of Toronto's sewage treatment plants indicate that the by-law is already reducing the concentration of mercury entering the plants. For more information, please visit [www.city.toronto.on.ca/legdocs/municode/1184\\_681.pdf](http://www.city.toronto.on.ca/legdocs/municode/1184_681.pdf). For information on similar bylaws in others cities in Ontario and across Canada, please visit [www.ec.gc.ca/MERCURY/EN/lk.cfm#mun](http://www.ec.gc.ca/MERCURY/EN/lk.cfm#mun).



## Module 2

# Developing A Municipal Mercury Reduction and Elimination Policy and Plan

Mercury is the only metal that is a liquid at room temperature. As a result of its physical/chemical properties, mercury is used in a range of equipment and products, such as fluorescent lamps, thermometers, thermostats and switches. Municipalities may be using liquid mercury or chemicals that contain mercury.

A mercury policy and plan can help municipalities to reduce or eliminate the use and release of mercury. The following outlines a proactive systematic approach for municipalities to follow to develop a municipal mercury reduction and elimination policy and plan:

- establishing champions and key partners;
- developing an inventory of mercury-containing products in municipal operations;
- adopting lifecycle management practices for mercury in municipal operations;
- developing programs to manage mercury from community sources;
- determining regulatory requirements;
- evaluating and prioritizing options;
- determining resource requirements; and
- developing, implementing and evaluating.

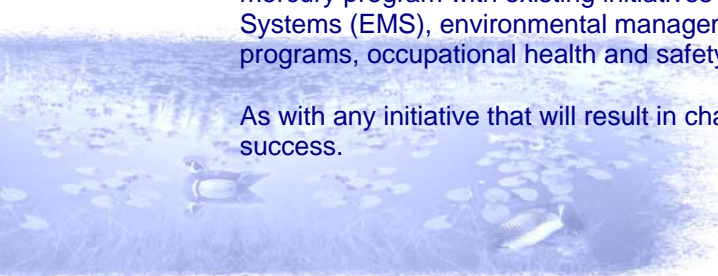
## 2.1 Establishing Champions and Key Partners

Managerial and council commitment to support a municipal mercury reduction and elimination policy and plan helps to ensure that the appropriate resources and personnel are available. It is also beneficial if champions and key partners can be identified to help lead the process. In addition, a workgroup that consists of staff from relevant municipal departments, helps to facilitate the process - particularly the data collection, evaluation and implementation steps. Departments that could be included are listed below:

- Waste Management Services Division (Public Works)
- Water and Wastewater Division (Public Works)
- Operational Support Services Division (Public Works)
- Transportation Services Division (Public Works)
- Corporate Services (Purchasing Department)
- Health Department
- Community Services Department
- Police Services

Members of the working group may also be able to help identify opportunities to integrate a mercury program with existing initiatives and facility operations (e.g. Environmental Management Systems (EMS), environmental management plans, pollution prevention programs, relamping programs, occupational health and safety and community outreach programs).

As with any initiative that will result in change, communication throughout the process is key to its success.



## 2.2 Developing an Inventory of Mercury-Containing Products in Municipal Operations

In order to develop a mercury reduction and elimination policy and plan, municipalities need to examine their current inventories and practices with respect to mercury. Developing a mercury inventory provides a starting point for assessing the risk of mercury within a municipality. An inventory defines the scope of the problem and serves as a road map to setting benchmarks, priorities, and timeframes. Analyzing data collected during the inventory will allow the organization to develop a holistic solution by determining appropriate short-term and long-term actions.

The term “inventory” refers to a list of mercury-containing equipment and products, their location, type and age, operational practices, mercury content and intended use (Refer to Section 1.2 or [www.ec.gc.ca/MERCURY/SM/EN/sm-mcp.cfm?SELECT=SM](http://www.ec.gc.ca/MERCURY/SM/EN/sm-mcp.cfm?SELECT=SM) for information on common mercury-containing products and their mercury content). Additional information for the inventory can include maintenance and repair history, performance, and equipment lifecycle (i.e. amount depreciated, equipment life). Equipment and products containing mercury should be identified for all municipal facilities. The inventory can include offices, commercial and industrial buildings, laboratories, medical and dental facilities and residences.

Preliminary research may be required to determine what information should be collected during the inventory. Contacting key people in various departments in the municipality will help focus efforts. In addition, reviewing the experiences of other municipalities is also useful. It may also be necessary to obtain additional data after the inventory to answer questions that may arise during the development of a municipal mercury reduction and elimination policy and plan.

**Appendix A** outlines, in checklist format, steps to consider when developing a facility mercury inventory. The suggested approach has many of the same features as an environmental audit conducted in accordance with ISO 14011 and is divided into the three key components: planning, conducting and reporting.

**Appendix B** provides a form which may be used to document mercury-containing equipment and products during the inventory process.

**Appendix C** provides a template to summarize the number of mercury-containing products found during the inventory process for different work areas, facilities, and/or departments. **Appendix C** also provides a template for summarizing inventory results for any relevant medical facilities.

## 2.3 Developing Lifecycle Management Practices

Mercury-containing products should be properly managed throughout its entire lifecycle. With detailed knowledge of where mercury-containing products can be found within municipal operations, appropriate lifecycle management activities for mercury can be developed to suit site-specific conditions. Management practices at the various stages of product use include procurement; handling, use and maintenance; spills management and disposal.



### 2.3.1 Procurement

Although some consumer products like switches and thermometers may still contain mercury, most can be manufactured without it. The procurement of non-mercury containing alternatives is suggested whenever feasible. Fluorescent lamps are an exception, as all fluorescent lamps contain small quantities of mercury - an essential component. Fluorescent lamps are far more energy efficient than incandescent lights. As coal-fired electricity generation is one of the largest sources of mercury emissions in Canada, high-efficiency and low-mercury content lamps should be requested from suppliers whenever they are available. Replacing incandescent bulbs with fluorescent lamps can reduce energy consumption and decrease overall mercury emissions during the life cycle of the bulb. Spent fluorescent tubes should be recycled where possible or be disposed of properly. Choosing fluorescent lighting and adopting appropriate life-cycle management practices will reduce the risks of mercury release and help implement the Canada-wide Standard for Mercury-containing Lamps.

Consulting with those who procure products to the facility inventory will help identify opportunities for mercury management and raise awareness of the issue. Examples of mercury stewardship activities related to procurement include:

- incorporating mandatory distributor/vendor-take-back programs for recycling spent fluorescent and high intensity discharge lamps into procurement policies;
- identifying essential products that must contain mercury with a sticker or label warning of their mercury content and providing appropriate contact information for disposal;
- initiating a moratorium on the purchase of new products containing mercury where alternatives exist;
- replacing end-of-life mercury-containing thermostats with programmable ones to allow for demand-side energy conservation, which may help reduce mercury from coal-fired power generation; and
- purchasing low-mercury, long-life, and high efficiency fluorescent lamps instead of incandescent or high-mercury-content fluorescent (or high intensity) lamps. To determine if a lamp has low mercury content, ask the supplier for details. Some mercury-reduced lamps can also be identified by manufacturer labelling or a green tip.

Refer to Section 1.2 or [www.ec.gc.ca/MERCURY/SM/EN/sm-mcp.cfm?SELECT=SM](http://www.ec.gc.ca/MERCURY/SM/EN/sm-mcp.cfm?SELECT=SM) for information on common mercury-containing products.

### 2.3.2 Handling, Use and Maintenance

Consulting with those responsible for the maintenance and replacement of mercury-containing equipment and products will help identify opportunities for mercury management and raise awareness. These consultations can also promote cradle-to-grave product management and the proper recycling or disposal of end-of-life mercury-containing equipment and products.

Ensuring that personnel are trained to safely handle mercury-containing equipment and products can help prevent workplace exposure and reduce mercury releases to the environment. Every employer is legally obliged under the Canadian Labour Code Part 2, section 125(l)(q) to provide the information, instruction, training and supervision necessary to ensure the health and safety of their employees. Further, section 125.1 states that employers must ensure that all hazardous substances in the workplace are stored and handled in the manner prescribed. Personnel and maintenance contractors who handle mercury-containing equipment and products must be identified and made aware of their potential risks, the appropriate ways to handle the equipment to prevent breakage or spillage, and the immediate response in the event of a mercury spill. Examples of mercury activities related to product handling and use include:

- ensuring that personnel and maintenance contractors are aware of (1) mercury present in the facility and (2) appropriate handling and disposal measures;
- identifying in-use mercury-containing equipment and products with stickers or labels warning of their mercury content and providing the municipal contact for spill cleanup and disposal procedures;
- ensuring that personal protective equipment is available if necessary, that personnel are trained in its use, and that it is used when appropriate;
- ensuring that spent fluorescent tubes and other end-of-life mercury-containing equipment and products are being stored according to relevant hazardous material management requirements prior to recycling/disposal;
- ensuring that mercury-containing equipment and products such as barometers, manometers, thermometers, or relays are kept in a safe area and sufficiently protected from breakage/tampering; and
- reducing the number of lamps/fixtures, which can often be done without loss to lighting quality.

### 2.3.3 Spill Management

Personnel need to know what immediate actions to take in the event of a mercury spill in order to minimize occupational exposure and environmental impacts. Even small mercury spills should be treated as hazardous, and measures should be taken to determine if the spill requires professional clean-up. Ambient air monitoring may be advisable after a spill, because air concentrations can remain elevated, even when no liquid mercury is visible. Additional information, general procedures and links related to mercury spills are available through Environment Canada's "Mercury and the Environment" Web site at [www.ec.gc.ca/MERCURY/EN/cu.cfm](http://www.ec.gc.ca/MERCURY/EN/cu.cfm). Examples of activities related to mercury spills include:

- developing a spill prevention and response plan (as part of the facility's EMS where applicable) that is appropriate to the risks identified;
- conducting job hazards analyses to identify safe work procedures for handling mercury-containing materials and equipment and develop correct work procedures (see [www.ccohs.ca/oshanswers/hsprograms/job-haz.html](http://www.ccohs.ca/oshanswers/hsprograms/job-haz.html) and [www.ccohs.ca/oshanswers/hsprograms/basic.html#\\_1\\_10](http://www.ccohs.ca/oshanswers/hsprograms/basic.html#_1_10));
- ensuring that personnel and maintenance contractors are aware of mercury present in the facility and have received training in correct work procedures and immediate mercury spill response measures;
- ensuring that training records/documents are kept; and
- making certain that spill response materials, such as spill kits and personal protective equipment, are readily available and used when appropriate.

### 2.3.4 Disposal

Spilled mercury and waste mercury-containing equipment and products should be treated as hazardous materials, be disposed of in accordance with all relevant legislated hazardous waste requirements and be recycled wherever possible. Mercury and mercury-containing equipment and products should not be thrown in the garbage and liquid mercury (or reagents containing mercury) should never be poured down the drain. In addition, end-of-life mercury-containing equipment and products should be properly managed to prevent breakage and/or mercury spillage. Examples of precautions that should be taken include:

- keeping barometers upright at all times;
- keeping fluorescent lamps intact to avoid mercury vapour, glass shards, and dust; and
- preventing damage or leaks by properly packaged mercury-containing equipment and products prior to transport for recycling or disposal.



Recycling is preferable to disposal of mercury and mercury-containing equipment and products. To discuss disposal options and procedures, contact waste management companies that have been issued a Waste Management Certificate of Approval by the Ontario Ministry of Environment for the management of mercury waste, including its collection, handling, transportation and storage.

Examples of mercury activities related to equipment and product disposal include:

- providing a municipal contact for disposal procedures on stickers adhered to in-use mercury-containing equipment and products;
- implementing fluorescent lamp recycling programs (see Section 3.1);
- providing sufficient information on the hazardous material content to the new owner if an item (such as a vehicle with a mercury switch) that contains mercury is being sold or auctioned;
- asking suppliers if they have a take-back program where mercury-products are returned for reuse or recycling; and
- incorporating a requirement for safe disposal in supply contracts.

## 2.4 Managing Mercury from Community Sources

Programs to help manage mercury from sources within the community should also be evaluated and adopted, where appropriate, to help prevent mercury from entering sewer systems, landfills and waste incinerators and from being released into the environment. Appropriate municipal initiatives should reflect the types of mercury sources that may be present, including households, services, and businesses in the community. Consider the following outreach programs to collect mercury from the community:

- White goods collection - mercury removal from old appliances (Refer to Section 3.2)
- Collection of mercury containing end-of life products (Refer to Section 3.3)
- Thermometer and thermostat take back programs (Refer to Section 3.3)
- Switch out program – encourage auto wreckers to remove switches from end-of-life vehicles (Refer to Section 5.1)
- Encouraging dental offices to install dental waste amalgam separators (Refer to Section 4.1). It is the law in Ontario (Refer to Section 1.3.3).
- Promoting audits and mercury reduction programs at hospitals and clinics (Refer to Section 4.2)
- Educating and informing municipal and other community business purchasing departments about mercury and green purchasing.



## 2.5 Determining Regulatory Requirements

In most cases, end of life mercury-containing products are considered to be hazardous waste. According to the Ontario Regulation 347: General-Waste Management under the Environmental Protection Act (Ontario), hazardous wastes must be:

- segregated;
- removed from the general waste stream;
- collected in dedicated containers; and
- collected and transported by waste management companies that have been approved by the Ministry of Environment (MOE).

Companies or individuals that transport hazardous wastes must have a Waste Management Certificate of Approval that is issued by the MOE.

Municipalities should check their Certificate of Approval (CofA) and Hazardous Waste Generator documentation to determine if they are approved for mercury containing items. Municipalities may have to apply for an amendment to their CofA.

Municipalities may need to contact their existing waste hauler to determine if the waste hauler has a Waste Management Certificate of Approval by the MOE for the management of mercury waste, including the collection, handling, transportation and storage.

Under provincial regulations, the generator of the waste is legally responsible for the proper disposal of hazardous wastes. To reduce liability, the following steps are recommended prior to entering into a service contract agreement:

- Confirm that the waste carrier has Certificates of Approval (CofA) for each hazardous waste class that it services;
- Consider a waste carrier that manages several classes of waste to simplify waste management services (cost, convenience);
- Confirm that the waste carrier's operations are in compliance with the *Transportation of Dangerous Goods Act* requirements such as labeling and containment;
- Confirm that the waste disposal sites have CofA 's for each hazardous waste class that it disposes;
- Confirm that the waste carrier can pick up from the sites;
- Use recyclable containers provided by waste carriers, where possible;
- Recycling of mercury is the preferred disposal method;
- Confirm cost estimates.

## 2.6 Evaluating and Prioritizing Options

The information from the inventories and current practices will help to establish a baseline, identify priorities, evaluate potential options and set goals/targets.

Criteria should be developed to evaluate options and to determine costs and benefits. Criteria can be weighted, depending on the importance of the factor. The following are factors that could be included as evaluation criteria:

- **Regulatory Frameworks** – at the provincial, federal, and municipal level
- **Service Level Expectations** – may vary for the different products that contain mercury
- **The Environment** – environmental priorities & considerations (e.g. water, air, sensitive habitats, wildlife)

- **Health & Safety** – human health issues, risk management and liability
- **Economics** – cost-benefit issues (e.g. availability of cost-effective, proven technology).
- **Operational and Organizational Impacts** – municipal resource allocations, staff training, staff time
- **Science and Technology** – evaluation and application of emerging scientific information and new technology, sharing of best management practices
- **Performance** – indicators of program success and directions for improvements
- **Key Stakeholders** – involvement of key stakeholders through various mechanisms (e.g., program partners, public consultations)
- **Political Process** – leadership from municipal government

Options should be considered in both short-term and long-term timeframes. A continuum of options exists from minimizing releases, reducing, and recycling in the short-term to complete elimination of mercury in the long-term. Evaluating and implementing purchasing, operational and engineering controls, which generally require less time and resources, can quickly decrease mercury releases and use. In addition, it will allow municipalities more time to thoroughly evaluate long-term options and integrate implementation of these options with other initiatives (e.g., asset replacement, reengineering). Set goals to eliminate mercury from operations and make reasonable efforts to upgrade to low or non-mercury alternatives where they exist. It is also important to ensure mercury is disposed of in an environmental sound manner.

## 2.7 Determining Resource Requirements

Operational and human resource requirements should be considered for each option. It is important to remember when conducting a cost-benefit analysis that even though equipment may not be fully depreciated, it may be cost effective to replace equipment as a result of gains in performance and reduced operating costs, or to convert equipment to an environmentally acceptable substitute as a result of reduced liabilities. Operational costs should include energy requirements.

## 2.8 Developing, Implementing, and Reporting

Municipal policies and plans on mercury reduction and elimination should incorporate initiatives suitable to manage mercury in municipal operations and in the community and should incorporate goals/targets to measure success. Actions on mercury can be embodied in an overarching Municipal Mercury Elimination Policy and Plan that formally outlines steps the municipality will take to reduce mercury releases to the environment.

**Appendix D** provides an example of the documentation prepared by the Region of Niagara to support a Regional Mercury Policy and Elimination Plan. **Appendix D** also includes an example of a Departmental Elimination Plan, prepared by the Region's Public Works Department. An example of a Report to Council can be found in **Appendix E**. **Appendix F** provides a summary of the amount of mercury found in mercury-containing items and equipment that were found in municipal operations in the region.

Approaches to develop a municipal mercury reduction and elimination policy and plan will vary from municipality to municipality, depending on local circumstances. One approach to consider



is developing plans for individual departments using a working group. These plans can then be approved by each department, and then consolidated and submitted to Council for approval as a comprehensive municipal mercury reduction and elimination policy and plan.

Implementation should consider who will be involved or affected; what resources will be required; when and where implementation will occur; and how the changes will be undertaken. Remember that communication is crucial throughout the whole process. In addition, evaluation should be part of the implementation process to identify opportunity for improvement.

Implementation should also be evaluated to determine success. Once municipalities have selected activities to implement, suitable mercury risk-reduction goals/targets should be established. For mercury in municipal operations, goals/targets can be developed using baseline data from the inventory. Timeframes should be associated with the goals/targets. Success can then be determined by comparing mercury reductions achieved with the established goals/targets. Examples of goals/targets that can be used for monitoring and reporting purposes include:

- the mass or percentage of mercury reduced/eliminated by x time period - this can be defined by product type (e.g. thermostats, switches) or facility or source;
- the number or percentage of fluorescent tubes sent for recycling vs. disposal;
- the number or percentage of lighting in municipal operations converted to low-mercury, long-life, energy efficient bulbs from older, higher mercury or incandescent bulbs;
- the number of mercury products (e.g. switches, thermometers, etc.) collected from municipal operations or community sources;
- the number of employees/community members that have participated in outreach programs promoting mercury awareness and reduction initiatives;
- the number of employees trained on occupational exposure risks and mercury-spill response measures; and
- the implementation of new procurement and/or waste management policies.

Maintain records of program implementation, mercury reductions and personnel training for reporting during performance audits and managerial reviews. Consider adding a review of the program to regular or annual maintenance and environmental audits. Annual reporting to the community should also be considered, including the following details:

- whether or not any non-conformance or non-compliance was identified and what corrective/preventative action, if any, was taken;
- whether or not appropriate spill prevention and response procedures have been developed;
- whether or not proper procurement, handling, and disposal techniques have been followed; and
- whether or not mercury reduction goals have been achieved.



### 3.1 Developing a Re-lamping Program

Coal-fire electricity generation is one of the largest domestic sources of mercury emissions. As awareness about the environmental impacts of energy production has grown in Canada, there have been various initiatives from all levels of government to reduce energy consumption. Although fluorescent lamps contain small quantities of mercury - an essential component - they are far more energy efficient than incandescent lights. Replacing incandescent bulbs with fluorescent lamps can reduce energy consumption and decrease overall mercury emissions during the life cycle of a bulb. Other ways to reduce releases of mercury include choosing to install high efficiency bulbs with the lowest possible mercury content and adopting appropriate life-cycle management practices, including lamp recycling where possible.

Environment Canada has undertaken a number of programs to address mercury pollution, some aimed at raising awareness about the importance of proper waste management; others aimed at reducing airborne mercury discharges from energy generation by reducing energy use.

At the municipal level there are not only sound environmental reasons for reducing energy use, but there are also strong economic arguments. Significant environmental and financial savings are being enjoyed by those communities where relamping projects have refitted high-energy, mercury-based content street lamps with high pressure sodium-based vapour bulbs that are high efficiency and low in mercury. While this often entails a substantial investment upfront, the “payback” more than covers the initial costs.

Relamping of interior lighting in municipal facilities can yield substantial savings in energy use and hence mercury emissions at the power generating level. Again, an investment is generally required at the outset, communities that have completed relamping projects are seeing their investment returned within eight to 10 years, sometimes sooner, due to operational savings.

Technological advances at the manufacturing stage have resulted in lighting fixtures that not only reduce energy use but also contain less mercury in each fluorescent lamp itself. Some examples of cities that have realized savings due to relamping programs include:

- Calgary – a large city with annual energy savings of \$2 million;
- Markham – a medium-sized municipality with annual energy savings of \$140,000;
- Peterborough - a small city with annual energy savings of \$150,500 - \$200,000.

An important aspect of managing lamps from municipal operations is consideration of proper disposal and recycling. To discuss disposal options, contact waste management companies that have been issued a Waste Management Certificate of Approval by the Ontario Ministry of Environment for the management of mercury waste, including collection, handling, transportation and storage.

### 3.1.1 Examples of Successful Re-lamping Programs

#### 3.1.1.1 Alberta Environment's Fluorescent Bulb and Computer Recycling Program

Launched in 2001, this initiative has helped increase the recycling rates of obsolete computers and burnt out fluorescent bulbs. The program is a joint initiative between Alberta Environment and several partners, including the City of Calgary. More information on the fluorescent bulb recycling program can be found at [www3.gov.ab.ca/env/waste/aow/flcr/](http://www3.gov.ab.ca/env/waste/aow/flcr/).

#### 3.1.1.2 City of Calgary

The City of Calgary has embarked on a major re-lamping project which will see about 40,000 of its street lights retrofitted with more energy-efficient technology. Another aspect of Calgary's plan is to start using "dark sky compliant" fixtures, which use a special flat lens that sends light downward to reduce light pollution.

#### 3.1.1.3 Thunder Bay Area

In the Thunder Bay area, EcoSuperior is coordinating fluorescent lamp recycling as part of its Merc-Divert Superior initiative. The program has operated for approximately two years and has resulted in the recycling of thousands of spent lights from major industries in Thunder Bay communities along the North Shore of Lake Superior. Please see section 5.6 for more information. Please see **section 5.6**

#### 3.1.1.4 City of Brantford

The City of Brantford undertook a major re-lamping initiative a few years ago. There are currently 8,630 street lamps in the city. Almost all are high pressure sodium, with a handful of metal halide lamps in parking lots. There are no mercury vapour lamps in the city. Spent lamps are sent to a fluorescent lamp recycler.

#### 3.1.1.5 Town of Markham

Energy savings was the primary goal of major re-lamping which saw 19 buildings in the Town of Markham retrofitted with new fixtures. In addition to changing T-12 lamps to the narrower and more energy efficient T-8s, the number of lamps in individual fixtures was often reduced from two to one, with no loss of light quality.

The retrofit cost of the Markham relamping project was approximately \$535,000. The savings in hydro operating costs were estimated at the time at \$140,000 per year, but this did not include the savings from the regular relamping budget. (Markham routinely changes lamps on a three-year cycle).

Approximately 12,000 fluorescent lamps were sent to a fluorescent lamp recycler, yielding four kilograms of mercury. The town is now investigating in the latest, "greener" bulb technology which has higher energy efficiency and reduced mercury content.



## 3.2 Adding Mercury Switch & Sensor Removal to a Municipal White Goods Program (MWGP)



The use of mercury in domestic appliances manufactured in Canada has been phased out as of the year 2000. However, at the end of their useful life, appliances containing mercury will continue to be seen in the domestic waste stream for decades to come.

The following is a list of general steps for adding mercury switch and sensor removal to an existing MWGP. Recognizing that the operation of white goods programs varies between municipalities, some of these steps may not apply to every program. These steps and the cost estimation worksheet in Table 3 are based on a pilot program that took place in the Niagara Region. As part of this pilot, a how-to manual and video have been developed to assist other municipalities in establishing similar programs. Contact the Association of Municipal Recycling Coordinators (AMRC) at <http://www.amrc.guelph.org/> to obtain a copy of these resources.

### 3.2.1 Determining Program Design and Costs

To determine program design and costs, information from the current MWGP will be needed. Those individuals currently running the MWGP program (staff and/or contractors) should be able to provide answers to the following questions:

- What are the types of appliances currently received? Checking Chlorofluorocarbon (CFC) removal records may provide an estimate of the number of chest freezers received annually.
- Will municipal staff or a contractor be removing the mercury switches and sensors?
- Could the current mechanisms (e.g. contractor) for removal of CFCs be extended to mercury switch/sensor removal?
- How are the costs for the current program determined? Are these costs, including CFC removal, based on the amount (tonnes) of white goods, the number of units processed, or by some other method?
- Does the program receive revenues from the metal recycled?
- Do residents currently pay a fee for collection or drop off of appliances? Can an additional amount be added (e.g. \$1-2) to this fee to cover the costs associated with mercury collection?
- Will additional tools, personal protective equipment and/or a mercury spill kit be required?





Based on the answers to the above questions, program costs can be estimated using Table 3.

**Table 3 Estimating Program Costs – Worksheet**

Item / Activity	Estimated Purchase costs	Estimated Operating cost	Calculation	Estimated one year costs
Tools	\$50.00 – \$100.00			
Personal Protective equipment: safety glasses, latex gloves, work gloves	\$25.00 – \$75.00			
Mercury Spill Kit	\$100.00 – \$200.00			
Pail with securable lid	\$20.00			
Lab pack container	Usually provided by HHW contractor			
Staff time		Cost per hour	x 2 minutes per chest freezer x # of chest freezers per year	
		Cost per hour	x 10 minutes per other appliance X # of these appliances per year	
		Cost per hour		
		Training on mercury spill procedure	1 hour x # of staff + cost of training	
Disposal		\$65 - \$120 per lab pack		
Total one year costs	_____ + _____		= _____	

### 3.2.2 Determining Site Logistics

Municipalities should determine if any additional space is required for mercury device remove. It may be possible to use the area currently allocated for CFC removal to set aside additional appliances (e.g. gas ranges, old washing machines) for inspection and mercury device removal. Another consideration is the need for indoor space. In the Niagara pilot (April through December), all of the work was done outside. During the winter months, however, it may be preferable to have an indoor work area for removing the more time consuming sensors (e.g. gas ranges). An alternative option is to have additional outdoor space to store these appliances until the weather is warmer.

### 3.2.3 Determining Regulatory Requirements

Municipalities should review any other regulations, such as Occupational Health and Safety Regulations, to determine if there are any other considerations for the program (refer to Section 2.6).



### 3.2.4 Examples of Successful Mercury Municipal White Good Program (MWGP)

#### 3.2.4.1 Niagara Pilot

In 2001, the Regional Municipality of Niagara undertook a nine month pilot at tow of its waste handling sites to assess the feasibility of removing mercury-containing devices from discarded appliances, as part of its MWGP. Appliances suspected of containing mercury were segregated and examined and mercury switches and sensors were removed if found. Of the 1,314 appliances received, 120 were found to contain mercury switches. Of these, 117 were chest freezers. The other three mercury-containing appliances were gas ranges.

Time and cost assessments were carried out during the pilot. The average time to remove the switches from freezers was under two minutes. Segregation and space concerns were minimal as the freezers had to be segregated for CFC removal anyway. At the end of nine months, the Region had not collected a full container (205 litre drum or lab pack) that could be picked up by the Region's Household Hazardous Waste contractor.

The Regional Municipality of Niagara, working with the Association of Municipal Recycling Coordinators, has developed a mercury switch collection program for household appliances. A how-to manual and video have also been developed to assist other municipalities in conducting similar programs. Contact AMRC at <http://www.amrc.guelph.org/> to obtain a copy of these resources.

#### 3.2.4.2 Owen Sound

The City of Owen Sound added mercury switch removal to its white goods program in 2001. Removal of the switches is being done by the City's white goods contractor at no additional cost.

#### 3.2.4.3 US Programs

A number of U.S. states have targeted and/or mandated the removal of mercury switches and sensors from old appliances. California has mandated the removal of mercury from appliances. The State of Vermont, which now requires labeling of all consumer items containing mercury, has two solid wastes districts that remove mercury containing devices prior to recycling. Numerous Midwestern states have done extensive research and have piloted programs.



## 3.3 Developing a Mercury Collection Program

A mercury collection program allows participants to turn in mercury containing products at the end of their useful life. These programs not only provide an opportunity to educate the public about the environmental and health effects of mercury, but also allow participants to be part of the solution to the mercury problem.

The following is a list of general steps for developing a mercury collection program.

### 3.3.1 Determining the Program

The collection program should target high volume/risk areas or easy successes for reducing or eliminating mercury. A municipality may want to target a specific mercury-containing product or a specific audience (e.g. any household, school or hospital). The following are examples of products that could be included in a mercury collection program:

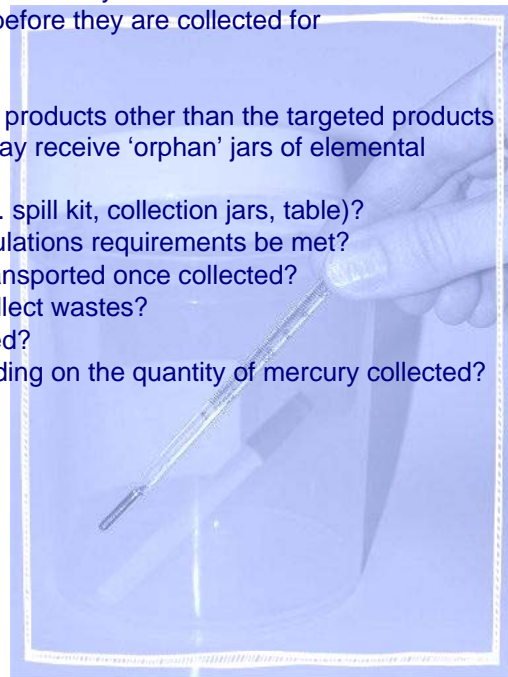
- Fever thermometers
- Thermostats
- Button cell batteries
- Fluorescent light bulbs

The program goals will influence the choice of target audiences. Examples of target audiences include:

- General public
- Health care sector (Refer to Section 5.1 and 5.2)
- Municipal facilities (Refer to Section 2)
- Institutional sector (e.g. schools)
- Industrial sector

The target audience will also influence the way the program is organized and promoted. The following are other factors to consider when designing the program:

- Where will the collection of mercury-containing products occur?
- How will the handling, collection, and disposal of mercury occur?
- Who will be handling the mercury products as they are collected?
- Where will collected products be stored before they are collected for recycling/disposal?
- What happens if there is a mercury spill?
- Can the program accommodate mercury products other than the targeted products (e.g. thermometer collection programs may receive 'orphan' jars of elemental mercury)?
- Are materials or equipment required (e.g. spill kit, collection jars, table)?
- How will hazardous waste and other regulations requirements be met?
- How will the products and mercury be transported once collected?
- Is a licensed waste hauler required to collect wastes?
- At what frequency will wastes be collected?
- Do collection frequencies change depending on the quantity of mercury collected?
- Will the wastes be recycled?
- What are the costs?





### 3.3.2 Determining the Timing and Duration

The program may be for a specific time or it may be ongoing. A limited time may be appropriate for fixed budgets and to motivate the target audience to participate. However, convenience will be an important factor to participants. For limited-duration events (e.g. a few weeks or months), consider product-appropriate timing for the event. For example:

- Household products may be more appropriately timed for “spring cleaning”.
- Fever thermometers may be popular near the winter “flu season”.

Partners and sponsors may influence the timing of events.

For longer duration events, timing is less critical. However, it requires greater planning, promotion and infrastructure to maintain the program. Longer projects should consider a periodic review and improvement process.

### 3.3.3 Determining the Location

The location for collection should be convenient for the target audience and should consider the implications of hazardous waste regulations (e.g. manifesting, spills, requirements of licensed waste hauler/recycler). Examples of potential locations include:

- Household Hazardous Waste Depots
- Pick-up services
- Hospitals
- Schools
- Community meeting areas
- Workplace / buildings
- Businesses (e.g. pharmacies, hardware stores, etc.)

Regulatory requirements may influence the location choice, may result in program restrictions (e.g. limits based on small quantity exemptions), or may require regulatory approvals. Refer to Sections 2.6 and 3.2.3 for information on Regulatory Requirements.



### **3.3.4 Establishing a Working Group and Identifying Key Partners**

A working group and key partners may be able to assist in delivering a municipal mercury collection program.

The working group should implement the program, since implementation will require input from several departments (e.g. waste management, health department, communications, etc.). It is essential that the working group have members with expertise or knowledge in the following areas:ws

- Federal and provincial regulations pertaining to the transport, handling and disposal of household hazardous waste;
- Regulations pertaining to occupational health and safety, as well as relevant corporate policies and practices;
- Environmental issues of interest within the local community; and
- Communication, outreach and educational programs.

If your organization does not have the expertise required, consider including key partners such as other agencies, organizations and businesses that might have an interest in participating in the program. Possible stakeholders could include:

- Federal or provincial governments;
- Other municipal governments;
- Managers of household waste collection sites, programs or services;
- Businesses that sell mercury-free alternative products;
- Community environmental groups; and
- Industry.

Approach each organization and outline the mercury collection concept, the need for a local project and its benefits. Invite representatives of the various stakeholder groups to participate. Partners may be able to assist with knowledge, outreach, in-kind services and the budget.

Consider recruiting sponsors to help promote or provide incentives to participants in the program. Offering an incentive like coupons or non-mercury replacement products has been shown to increase participation in collection programs. For example, some fever thermometer collection programs have offered replacements or discount coupons for mercury fever thermometers. Sponsors may also be interested in assisting with the outreach and promotion of the program.

### **3.3.5 Developing a Communication Strategy**

The success of a collection program depends on effective promotion. A communication strategy should be developed to aid in planning. This document usually includes:

- the issue, program or initiative;
- the background;
- the communications goals;
- the key audiences;
- strategic considerations (including a public analysis, stakeholder reactions, anticipated coverage, horizontal linkages, etc.);
- key messages;
- the approach;
- the communication activities (e.g. media events, interviews, articles, Web site updates, contests, e-mail announcements, etc.);
- the communication products (e.g. fact sheets, pamphlets, posters, bookmarks, fridge magnets, calendars, post-it notes, quick reference guides, etc.); and
- the follow-up activities such as media monitoring and an evaluation.

Communication material could include background information on the mercury issue, the purpose of the program, how to participate, the location and duration of the program, incentives, sponsors, contacts, and additional references. Other considerations include information on fish consumption advisories, other products that contain mercury, how to manage a mercury spill, proper disposal of household hazardous waste, and actions by government.

The communication strategy and education package should outline the various methods and products that will be employed to raise awareness and encourage participation in the program. It is best to use a variety of outreach products and vehicles to reach the target audience. This may require developing specific outreach products, as well as utilizing existing products/forums, such as a newsletter or Web site.

Consideration should be given to lead times required for material development, review, approval, printing, translation, and distribution. Consideration should also be given to using partners and associations to assist in outreach.

Creating a media event with interesting/prominent individuals can attract local/national television, radio and newspaper. Consideration should be given to having the media even coincide with the program launch. Appropriate lead times should be given to the various media. In addition, media spokespersons should be identified and provided with key messages. They should also be accessible to media when needed (e.g. the day of a media event or press release).

Outreach should begin several weeks before the launch of the program and should extend throughout the collection period.

### 3.3.6 Evaluating the Program

During implementation, the program should be continually evaluated, and adjusted as necessary, based on the following considerations:

- Is the communications strategy achieving its goals?
- Are the program goals being met?
- Are the regulatory requirements being met?

The program should be evaluated to determine results, identify lessons learned and possible areas for improvement. Some outreach should be done as soon as possible after the program to report on the results and to thank participants and stakeholders for their participation. If results are not immediately available, they could be included in a subsequent document, such as an annual report. Acknowledgement of in-kind contributors should also be considered.





### 3.3.7 Examples of Successful Mercury Collection Programs

The following are examples of mercury collection programs. Table 4 compares three different types of mercury collection programs.

**Table 4. Comparison of three different types of mercury collection programs**

Program	Household Hazardous Waste Depot Mercury Collection Program	Hospital Mercury Collection Program	Pharmacy Mercury Collection Program
<b>Pros</b>	<ul style="list-style-type: none"> <li>- The greatest diversity of mercury-containing products was brought into the Household Chemical Waste Depot (HCW) Depot.</li> </ul>	<ul style="list-style-type: none"> <li>- This event collected the greatest amount of mercury thermometers.</li> <li>- All partners were extremely pleased with the event.</li> <li>- The educational brochures handed out to participants was an effective addition to the program to educate the public.</li> </ul>	<ul style="list-style-type: none"> <li>- Very effective considering no monetary incentives were provided.</li> </ul>
<b>Cons</b>	<ul style="list-style-type: none"> <li>- Collected the least amount of mercury thermometers.</li> </ul>	<ul style="list-style-type: none"> <li>- As this event focused on thermometers, few other household mercury containing products were brought in.</li> <li>- Some hospitals ran out of free digital thermometers causing some participants to refuse to give up their mercury thermometer.</li> <li>- Fewer digital thermometers were obtained than planned, as they had to be purchased rather than donated.</li> <li>- The proposal for this project overestimated the participation rate by more than double, expecting 4,000 thermometers.</li> </ul>	<ul style="list-style-type: none"> <li>- Since pharmacies were restricted to collect thermometers only, people that brought in other mercury-containing products were turned away.</li> </ul>



**Table 4. Comparison of three different types of mercury collection programs. Continued...**

Program	Household Hazardous Waste Depot Mercury Collection Program	Hospital Mercury Collection Program	Pharmacy Mercury Collection Program																														
<b>Location</b>	Household Chemical Waste Depot (HCW) in the Windsor-Essex Region	Six Ontario Hospitals: - Hospital for Sick Children - University Health Network - Women's College Ambulatory Care Centre (Sunnybrook and Women's Health Sciences Centre) - Cambridge Memorial Hospital - St. Mary's General Hospital - Grand River Hospital	105 pharmacies in London, Ottawa and Thunder Bay																														
<b>Incentives</b>	<ul style="list-style-type: none"> <li>- Free digital thermometers for the first 700 people who participate</li> <li>- Entry into a prize draw</li> <li>- Discount coupons for digital thermometers from Zehrs</li> <li>- 1,000 Shoppers Optimum Points with the purchase of \$25 or more</li> </ul>	<ul style="list-style-type: none"> <li>- Free digital thermometers, 1600</li> <li>- Free educational package about mercury</li> </ul>	<ul style="list-style-type: none"> <li>- No monetary incentives</li> <li>- One of the suppliers (not one of the pharmacies) had coupons available for purchase of their brand of digital thermometers. This was not used by all pharmacies.</li> </ul>																														
<b>Budget</b>	<ul style="list-style-type: none"> <li>- Project cost \$ 15K and was shared equally between federal, provincial and municipal (the City of Windsor) governments.</li> <li>- Significant expense is disposal costs which were done per 45 gallon drum, and included delivery/pickup service.</li> </ul>	<p><b>Cash contributions</b></p> <table border="0"> <tr><td>*Communications consultant</td><td>\$12,000</td></tr> <tr><td>TD Canada Trust Friends of the Environment</td><td>\$3237</td></tr> <tr><td>Sustainability Network</td><td>\$2000</td></tr> <tr><td>Environment Canada</td><td>\$2000</td></tr> <tr><td>Health Care Without Harm</td><td><u>\$2000</u></td></tr> <tr><td><b>Total</b></td><td><b>\$21,237</b></td></tr> </table> <p><b>In-Kind Contributions</b></p> <table border="0"> <tr><td>Coordination/volunteers (est.)</td><td>\$7000</td></tr> <tr><td>Pollution Probe – digital thermometers</td><td>\$960</td></tr> <tr><td>Hospital for Sick Children – poster design</td><td><u>\$1891</u></td></tr> <tr><td><b>Total</b></td><td><b>\$9851</b></td></tr> </table> <p><b>Costs</b></p> <table border="0"> <tr><td>Communication &amp; education materials</td><td>\$5689</td></tr> <tr><td>Digital Thermometers</td><td>\$3795</td></tr> <tr><td>Collection and Disposal</td><td>\$599</td></tr> <tr><td>Couriers / transportation</td><td><u>\$100</u></td></tr> <tr><td><b>Total</b></td><td><b>\$10,574</b></td></tr> </table> <p>*this expense was covered through a grant from the Sustainability Network.</p>	*Communications consultant	\$12,000	TD Canada Trust Friends of the Environment	\$3237	Sustainability Network	\$2000	Environment Canada	\$2000	Health Care Without Harm	<u>\$2000</u>	<b>Total</b>	<b>\$21,237</b>	Coordination/volunteers (est.)	\$7000	Pollution Probe – digital thermometers	\$960	Hospital for Sick Children – poster design	<u>\$1891</u>	<b>Total</b>	<b>\$9851</b>	Communication & education materials	\$5689	Digital Thermometers	\$3795	Collection and Disposal	\$599	Couriers / transportation	<u>\$100</u>	<b>Total</b>	<b>\$10,574</b>	
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<b>Total</b>	<b>\$10,574</b>																																
<b>Duration</b>	Entire month of April, 2004 (1 week extension was given at the end)	One day event held on Feb. 13 or Feb. 18, 2003	One Month – from Feb. 15 to March 15, 2002																														

**Table 4. Comparison of three different types of mercury collection programs. Continued...**

Program	Household Hazardous Waste Depot Mercury Collection Program	Hospital Mercury Collection Program	Pharmacy Mercury Collection Program
<b>Media Coverage / Communication Material</b>	<ul style="list-style-type: none"> <li>- Television (kick-off event generated 2 news spots, ran in more than one news cast)</li> <li>- Radio interviews</li> <li>- Newspaper Ad (1- 4"x6" ad &amp; 2 small stories on Windsor Star)</li> <li>- Essex-Windsor Solid Waste Authority newsletter (Enviro Tips to very household)</li> <li>- Residential Collection Calendar (month of April)</li> <li>- Several community newsletter</li> <li>- Poster, brochures (Shoppers Drug Marts and Zehrs stores, municipal buildings, community centres, libraries, workplaces of DRCC partners)</li> <li>- Web Site</li> <li>- Word of Mouth</li> <li>- Previous Visit to HCW Depot</li> <li>- Earth Day (unexpected media connection)</li> </ul>	<ul style="list-style-type: none"> <li>- Posters (hallways, meeting rooms, elevators, table tops and parking garages)</li> <li>- Flyer</li> <li>- Intranet (inter office emails)</li> <li>- Staff newsletter</li> <li>- Banners (on the day of event)</li> <li>- Presentation (physicians were targeted)</li> <li>- Educational Brochure</li> <li>- One hospital charted progress on s stand-up "thermometer" (like a fundraising drive).</li> </ul>	<ul style="list-style-type: none"> <li>- Press event (launched in Ottawa by the Minister of the Environment by Print, Radio and local television stations in the pilot cities – London, Thunder Bay and Ottawa)</li> <li>- Radio</li> <li>- Television</li> <li>- Pharmacists Guide</li> <li>- Brochure</li> <li>- Newspaper (ad &amp; article)</li> <li>- Banners</li> </ul>
Mercury Recovery	<ul style="list-style-type: none"> <li>- 492 mercury thermometers</li> <li>- 57 fluorescent bulbs</li> <li>- 53 mercury thermostats</li> <li>- 18 containers of elemental mercury</li> <li>- 16 button batteries</li> <li>- 12 other items (i.e. batteries, meters, smoke detectors, switches, pesticides, from furnace)</li> <li>- A total of 648 mercury containing items</li> <li>- <b>Over 90 Kg</b> of mercury</li> </ul>	<ul style="list-style-type: none"> <li>- 1,761 mercury thermometers</li> <li>- 5 blood pressure gauges</li> <li>- 2 vials of liquid mercury</li> <li>- 2 thermostats</li> <li>- 1 mercury switch</li> <li>- <b>Approximately 2.5kg of mercury</b></li> </ul>	<ul style="list-style-type: none"> <li>- Over 1,500 thermometers</li> <li>- <b>Approximately 1.5 Kg of mercury</b></li> </ul>
<b>Survey Comparison</b>	<ul style="list-style-type: none"> <li>- 54% of the participants heard about the take back program from a newspaper ad or article</li> <li>- The most common method that was used to clean up a mercury thermometer that had broken in the last five years was to dispose of it at the HCW Depot (23%)</li> <li>- The participants were mainly very concerned about the effects of mercury on the environment, human health and children (64%, 59% and 59% respectively)</li> </ul>	<ul style="list-style-type: none"> <li>- No data provided</li> </ul>	<ul style="list-style-type: none"> <li>- 35% of the participants heard about the take back program from newspapers</li> <li>- 57% of the participants that broke a mercury thermometer in the past five years disposed of it into the sink/household garbage</li> <li>- 74% of the participants would not buy a mercury thermometer knowing about the potential dangers to children and the environment</li> </ul>



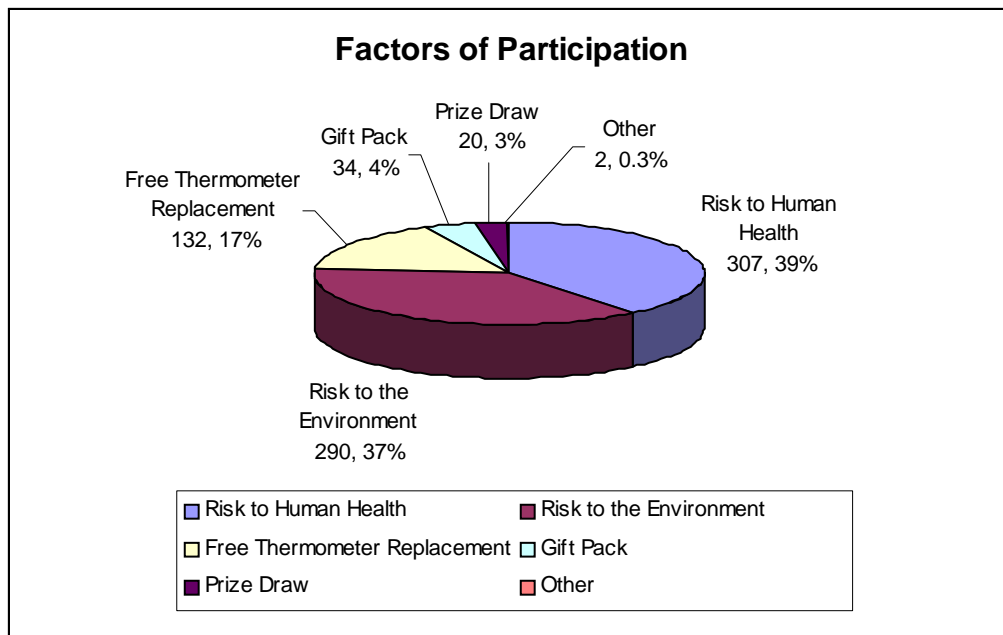
### 3.3.7.1 Essex-Windsor HHW Depot Mercury Collection Program

In April 2004, the Detroit River Canadian Cleanup encouraged residents of Windsor and surrounding areas to participate in a household hazardous waste (HHW) depot mercury collection program. The program was a collaborative effort between the Essex Windsor Solid Waste Authority, City of Windsor, Town of LaSalle, Ontario Ministry of Environment and Environment Canada. Over 600 residents of Windsor and surrounding areas participated in the Household Mercury Collection Project. The program offered free digital thermometers for the first 700 participants, discount coupons for digital thermometers from Zehrs, entry into a prize draw and 1,000 Shoppers Optimum Points with the purchase of \$25 or more.

In the one-month period, over 600 participants safely disposed of about 200 pounds of mercury. Seven hundred and fifty thermometers were collected in addition to more than 100 thermostats, hundreds of fluorescent light bulbs and 20 jars of elemental mercury.

During the program, participants were asked to complete a survey at the HHW Depot. The results of the survey indicate that the key factor for participation was the risk to human health and the environment which accounted for over 75% of the survey responses. The free thermometer replacement promotion accounted for 17% of the responses while gift packs and a prize draw accounted for 7%. Refer to Figure 3 for the varying factors of participation.

Figure 3



### 3.3.7.2 Pharmacy Take-back Program

Environment Canada and the Ontario Ministry of Environment piloted a mercury fever thermometer take-back program with participating retail pharmacies in Ottawa, London and Thunder Bay from February 15 to March 15, 2002. The purpose of the program was to:

- educate the public about mercury products in the home;
- recover and properly dispose of household mercury thermometers; and
- determine the feasibility of a national program.

The program consisted of a scoping phase which involved inviting representatives from major pharmacies, the Association of Chain Drug Stores, distributors, waste haulers, and environmental groups to a meeting to discuss voluntary elimination of mercury thermometers and participation in a pilot take-back program. The following issues were discussed:

- The work and time involved to obtain support and coordinate with pharmacies;
- The possibility of incentives to participants;
- The timing of the event;
- The outreach plan;
- The contract liability issues associated with proper handling and staff training;
- The need and costs of providing pharmacies with spill kits/storage receptacles;
- The coordination of pick-ups by hazardous waste carriers when maximum quantities are obtained; and
- The waste hauling costs.

The pharmacies pledged to eliminate mercury thermometer sales, provide employee training and promote the program. Environment Canada provided collection materials and spill kits; waste hauling and disposal; pamphlets and other promotional material; a Ministerial event launch; and a public survey.

Over 100 pharmacies participated, including Wal-Mart, Shopper's Drug Mart, Pharma-Plus, Rexall, The Medicine Shoppe, Medi-Plus and independents. Overall, 1,400 thermometers were returned (0-115 thermometers per pharmacy). Household participation rates were 2.9% in London, 2.5% in Thunder Bay and 0.7% in Ottawa.

### **3.3.7.3 Mercury Thermometer Hospital Event**

On February 13 and 18, 2001, the Canadian Coalition for Green Health Care with support from Environment Canada, the Sustainability Network, TD Friends of the Environment and GLPi Communications Inc. held a mercury thermometer take back event at six hospitals in the Toronto and Cambridge/Kitchener-Waterloo areas. The hospitals included the Hospital for Sick Children, the University Health Network, the Women's College site of Sunnybrook and Women's Health Sciences Centre, the Cambridge Memorial Hospital, the St. Mary's General Hospital and the Grand River Hospital.

The one-day event invited staff to exchange mercury thermometers from home or work for a free digital thermometer. The goals of the program were to:

- educate the health care sector and the public about the environmental and health hazards of mercury, using a common mercury fever thermometer as an example;
- collect and safely dispose of mercury being used in several key Ontario hospitals;
- strengthen commitment to mercury elimination in several key Ontario hospitals;
- model a mercury thermometer hospital event that could be held in any community or institution; and
- strengthen links between the environmental non-government organizations and the health care sectors.

The program engaged over 2,000 staff and visitors at the sites. In addition, over 1,700 mercury thermometers were collected and approximately 1,500 digital thermometers were distributed. Volunteers also collected two vials of liquid mercury, two thermostats, five blood pressure gauges and a mercury switch. It is estimated that over 2.5 kg of mercury was collected and safely disposed of, removing the risk to workers and the community.



## 4.1 Dental Activities

Dental practice environments generate a number of wastes, including hazardous wastes that can be harmful to the environment if not properly managed. Mercury can be released by the dental community into the environment through the management of dental amalgam wastes. The regulatory and policy framework that governs mercury releases from the dental sector include:

- CCME Canada Wide Standards (CWS) on mercury for dental amalgam waste (Refer to Section 1.3.1.1)
- Ontario Regulation 196/03 (Refer to Section 1.3.3.1)
- By-laws (Refer to Section 1.3.4)

Members of the dental community are also encouraged to incorporate pollution prevention activities into their practice environments in order to reduce the amount of hazardous wastes requiring disposal. Pollution prevention is a voluntary initiative that seeks to eliminate the causes of pollution by reducing and controlling the use of toxic substances.



### 4.1.1 Best Management Practice

The Memorandum of Understanding between Environment Canada and the Canadian Dental Association that supported the CCME CWS included best management practices (BMP) for managing dental amalgam and elemental mercury (Refer to Section 1.3.2). In 2002, Environment Canada convened a working group of dental professionals to develop a BMP to assist the dental community in managing its waste. In 2003, the following dental waste BMP flow charts were distributed to dental practices.

- *Best Management Practices for the Disposal of Dental Amalgam and Mercury Wastes in Ontario*
- *Best Management Practices for the Disposal of Lead Containing and Other Chemical Wastes in Ontario*
- *Best Management Practices for the Disposal of Silver Containing Wastes in Ontario*
- *Best Management Practices for the Disposal of Biomedical/Pathological Wastes in Ontario*

These flowcharts are available at [www.ec.gc.ca/MERCURY/DA/EN/da-ont-bmp.cfm](http://www.ec.gc.ca/MERCURY/DA/EN/da-ont-bmp.cfm) and the Web sites of various dental organizations. The BMP manual describes best practice options for the management of heavy metals, biomedical/pathological and chemical wastes generated by the dental community.

### 4.1.2 Clean Sweep Project

A survey conducted by the Ontario Dental Association in the summer of 2001 estimated that 9% of dental offices in Ontario had elemental mercury in their practice and among those, 44% stored elemental mercury on site. Environment Canada estimates that there are 120 kg of elemental mercury currently stored in Ontario's dental practices.

Environment Canada and the Ontario Ministry of Environment are working collaboratively with representatives of the dental community and hazardous waste management companies in

Ontario to deliver an Ontario-wide *Dental Elemental Mercury Clean Sweep Project*. This one-time initiative runs from September 2004 through March 2005. The project will “piggy back” on existing services provided by waste carriers for this sector to reduce costs of separation, diversion and transportation. This project is an opportunity to safely remove stores of elemental mercury from dental practices and to reduce the potential for the accidental release of elemental mercury into the environment. In addition, the elemental mercury collected will be recycled, reducing the impacts on local landfills and on the demand for virgin (mined) mercury.

## 4.2 Healthcare Activities

### 4.2.1 Mercury Reduction in Ontario Hospitals

The health care sector has worked hard in the past several years to reduce mercury exposure through pollution prevention. Much of this work was guided by the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem and the Great Lakes Binational Toxics Strategy (Refer to Section 1.3.2.2). In the mid 1990s, a Memorandum Of Understanding (MOU) to voluntarily reduce and eliminate the use of mercury was signed by Environment Canada, the Ontario Ministry of Environment, Pollution Probe and six Ontario hospitals. Many other hospitals who did not sign the MOU have also voluntarily begun to reduce mercury use.

As a follow-up to the Memorandum of Understanding (MOU), Environment Canada conducted a survey of mercury reduction initiatives at Ontario hospitals in 1999. The survey results were compiled from 93 of the 188 hospitals contacted in Ontario. The results are as follows:

- Approximately 70 % of hospitals had put a formal reduction program in place and that the average program was 6.4 years.
- 31% of the hospitals had reduced the amount of mercury in products and devices by 1 to 50%, and over half had greater than 51% reduction.
- Approximately 30% of the hospitals are recycling at least some mercury waste
- Approximately 46% of the hospitals have never conducted an inventory of mercury devices and substances.
- Over 80% of the hospitals indicated that they use mercury spill kits for clean-up, while 35% also stated that they use protective equipment such as eye protection, body suits and closed shoes.
- Approximately 30% of the hospitals indicated they use mercury disposal containers to prevent contamination of other wastes.
- A small number of facilities have invested in mercury vacuums to handle spills.

According to the survey results, the five devices most commonly targeted for mercury reduction were thermometers, sphygmomanometers, pressure gauges, batteries and incubator thermostats. Other products containing mercury in the health care sector include:

- esophageal dilators;
- cantor tubes;
- miller-Abbot tubes;
- feeding tubes;
- switches and relays;
- fluorescent lamps;
- dental amalgams;
- zenker's solution (mercury(II) chloride);
- thimerosal (mercury chloride);
- colourimetric chloride analysis; and
- other analytical instruments.



The following are some additional examples of how mercury is being effectively phased out of many Ontario hospitals since 1999:

- The Hospital for Sick Children in Toronto has reduced the use of many items containing mercury such as thermometers, sphygmomanometers, weighted esophageal dilators, mercury switches and old microwave ovens. The facility has also phased out the use of mercury-containing defibrillators, and retrofitted lighting to use more energy-efficient lamps that contain less mercury
- The Centenary Hospital in Scarborough has reduced the use of mercury in batteries, nursing incubator thermometers, old microwaves and electric mercury relays
- St. Joseph's Health Centre in Toronto has phased out the use of Thimerosal, nursing incubator thermostats and thermometers with mercury

In February 2005, Environment Canada released the following two case studies to assist the healthcare sector in reducing the use and release of toxic substances, including mercury:

- Replacing Histological Reagents Containing Mercury in Hospital Laboratories
- Replacing Cleaners Containing Nonylphenol (NP) and its Ethoxylates (NPEs) in Healthcare Facilities

To obtain copies of these documents, please contact the Public Inquiry line at 416-739-4826.



There are several environmental non-governmental organizations in the country that incorporate mercury management strategies into their initiatives. Both voluntary and non-governmental initiatives serve to synergize the effects of existing, regulatory tools.

### 5.1 Clean Air Foundation

The Clean Air Foundation is a non-profit organization that develops, implements and manages public engagement programs and other strategic initiatives that lead to measurable emissions reductions.

#### 5.1.1 Switch Out

Switch Out is the first program in Canada to address the use of mercury in vehicles and mercury-emissions from vehicle recycling. It represents a partnership of government, industry, and non-profit organizations with the common goal of implementing an effective, cost-efficient, and sustainable program to recover mercury from vehicles, preventing it from being released into the environment. While automakers have phased out the use of mercury in convenience lighting switches (e.g. hood lighting), pre-2003 models often contain mercury, where a bead of mercury in a “tilt switch” rolls to make or break an electrical contact. When vehicles are scrapped, crushed or used in the production of new steel, this mercury is emitted to the environment. Building on the initial success of Pollution Probe’s pilot success, this program was launched in 2001 with 11 scrap yards participating. The program expanded in 2003 to include over 130 participating scrap yards and discussions have begun with other provinces to expand Switch Out across the country.



The Switch Out program is designed to be as simple, sustainable and cost-effective as possible. Participating auto recyclers receive a collection kit which includes: a training manual, a list of vehicles most likely to contain switches, a collection container and a Purolator waybill for shipping the container, once full. The program is entirely voluntary, and has been well-supported by the recycler member organizations of each of the provinces in which it is currently being delivered: British Columbia Automotive Recycler Association in British Columbia, Ontario Automotive Recycler Association in Ontario and Alberta Automotive Recycler and Dismantlers Association in Alberta, and at a national level by the Auto Recyclers of Canada.

In each province, the switches are collected at an interim storage site and then eventually transported en masse to a centralized mercury recycling facility. There, the switches are processed to recover the mercury. In the absence of a closed-loop recycling program, and given Switch Out’s mandate to prevent mercury releases to the environment; the mercury collected by Switch Out is currently being put into long term storage.

To-date, Switch Out has:

- enlisted participation of over 430 auto recyclers across Canada.
- achieved significant reductions in mercury emissions, with collection of more than 74,000 convenience lighting switches;
- received an Honourable Mention in the Innovation Category of the 2003 Pollution Prevention Awards from the Canadian Council for Ministers of the Environment (CCME);

- developed a courier-based collection system using Purolator Courier to reduce collection costs and increase convenience for participating automotive recyclers;
- increased the level of awareness in the auto recycling industry, scrap and steel industries, and government regarding:
  - the significance of mercury in vehicles and
  - the ability to achieve cost-effective mercury reductions through a switch collection program.
- developed multi-sector industry partnerships which include the Automotive Recyclers of Canada (ARC), the Ontario Automotive Recyclers Association (OARA), the Alberta Automotive Recyclers and Dismantlers Association (AARDA), the Canadian Association of Recycling Industries (CARI), Florescent Lamp Recyclers (FLR), the Recycling Council of Alberta (RCA), and the International Centre for Sustainable Cities (ICSC), to promote proper end-of-life vehicle management.

The success of Switch Out has increased industry and government support of this voluntary program which has achieved measurable reductions in mercury emissions. This program is strongly supported by Environment Canada, the Ontario Ministry of Environment, Alberta Environment, and British Columbia Water, Land and Air Protection, as well as the steel and automotive recycling sectors. For more information, please visit: [www.switchout.ca](http://www.switchout.ca).

### 5.1.2 Keep Cool

One of Clean Air Foundation's core programs – Keep Cool – was developed in 2002 as a response to increasing peak-demand electricity use in Southern Ontario and Quebec. In the summertime, cooling is largely responsible for this phenomenon (known as “peaking”), which leads to high concentrations of smog and other greenhouse gas emissions. In 2000, electricity generation and metal smelting were equally the largest sources of mercury into the atmosphere, each accounting for 25% of Canadian emissions.

2004 marked the third year for the Keep Cool program. As in past years, the program encouraged the retirement of old, inefficient room air conditioners (RACs) by providing product rebates off brand new ENERGY STAR® qualified models. Through centralized drop-off locations in Toronto and Montreal, the public was able to drop off their old RACs for free collection and recycling. At that point, coupons were distributed, offering instant rebates off various models of ENERGY STAR® qualified RACs, from participating retailers.

In 2005, the Keep Cool program will be expanding to municipalities across Ontario and will include a cash “bounty” for old room air conditioners. Additionally, the Clean Air Foundation will be piloting a fridge exchange program in one select market, modelled after the successful Keep Cool program.



## 5.2 EcoSuperior–Merc-Divert Superior Mercury Reduction Program

EcoSuperior is a non-profit organization based in Thunder Bay on Lake Superior's North Shore. The organization has a volunteer board of directors comprising a cross-section of community members and provides residents of the Lake Superior basin with information and motivation for building healthy, sustainable communities. The organization pursues projects that help promote pollution prevention, water and energy conservation, waste reduction, and urban greenspaces.

The pollution prevention programs of EcoSuperior are part of a broader program carried out by the "Lake Superior Binational Program To Restore And Protect The Lake Superior Basin". The Binational Program is supported by Environment Canada and the Ontario Ministries of Environment and Natural Resources. The U.S. Environmental Protection Agency, as well as several state and tribal agencies, also support this program.



### 5.2.1 Merc – Divert Superior

EcoSuperior's Merc-Divert Superior pollution prevention initiative focuses on the reduction of mercury input to the Great Lakes environment, with particular emphasis on the Lake Superior basin. The program is supported by Environment Canada, the Ontario Ministry of Environment and several municipal, commercial and industrial partners.

#### 5.2.1.1 Reclaiming Mercury From Common Products

EcoSuperior's Merc-Divert Superior mercury reduction programs seek to reclaim the mercury from devices, preventing mercury from entering the environment via landfilling.

In the fall of 2004, EcoSuperior coordinated household hazardous waste collections in Schreiber and Nipigon, both on the north shore of Lake Superior. Residents of these and neighbouring communities brought in substantial quantities of mercury, pesticides, used oil, paint, solvents, creosote, cleaning products and other materials. Highlights included the collection of 70 pounds of mercury. Local industries, municipalities and First Nation councils were instrumental in the promotion of the event.

##### 5.2.1.1.1 Fluorescent Lights

This program reclaims the mercury in spent fluorescent lights. Several industrial participants recycle thousands of spent lights per year at a cost of approximately 50 cents per spent four foot light. For smaller generators of spent lights (e.g. local electricians), MGM Electric operates a depot on a "pay-as-you-go" basis. For the lowest volume generators (i.e. homeowners) a depot is located at EcoSuperior. There is no charge to the public and financial support for EcoSuperior's depot is provided by Ontario Power Generation.

##### 5.2.1.1.2 Thermostats

This program recycles mercury from thermostats which have been removed from use. Contractors and homeowners can drop off thermostats at depots located at all Heating Supply Outlets in Thunder Bay at no charge. Thermostats are sent to Honeywell for recycling.



#### **5.2.1.1.3 Button Batteries**

This program recycles button batteries found in watches, calculators and other small electronic equipment. In-store depots at Wal-Mart, Sears, Mappins Jewellers, and others are accessible to participants to drop off button batteries at no charge.

#### **5.2.1.2 Mercury Thermometer Take-back**

This program collects mercury thermometer from the public. Depots have been set up at pharmacies in every community on the North Shore of Lake Superior. Thermometers have been collect from every community with a depot.

#### **5.2.1.3 Dental Mercury Reduction**

EcoSuperior is currently producing a guide that will assist dental offices in learning more about amalgam separators and other pollution prevention best management practices. In addition, EcoSuperior is working with Environment Canada to reach Lake Superior basin dentists with the Clean Sweep Elemental Mercury Collection Program.

#### **5.2.1.4 Automotive Mercury Switchout**

In conjunction with the Clean Air Foundation, EcoSuperior has enrolled most of the auto recyclers within the Lake Superior Basin in the vehicle “switch out” program (Refer to Section 6.1.1).

#### **5.2.1.5 Mercury Product Bans**

With the assistance of the Canadian Environmental Law Association, EcoSuperior is working with area municipalities to implement a ban on the retail sale of products containing mercury. One community has been approached but as yet no decision has been made.

#### **5.2.1.6 Water and energy conservation**

EcoSuperior has home energy efficiency and water conservation programs. Saving energy means burning less coal in power plants – hence less mercury entering the environment. In addition, water conservation decreases the amount of energy required to move water around a community. Participation in these programs in Thunder Bay is extremely strong.

#### **5.2.1.7 Mercury reduction in schools**

EcoSuperior is currently planning a program to assist schools in the removal of mercury which may be unused and stored on back shelves in a chemistry classroom or may be contained in equipment within schools.

#### **5.2.1.8 Pollution Prevention Outreach**

EcoSuperior continues an extensive program of public education about mercury, mercury pollution prevention and mercury and human health. Information is made available to the public in newspapers, television, radio and the EcoSuperior Web site at [www.ecosuperior.com](http://www.ecosuperior.com).

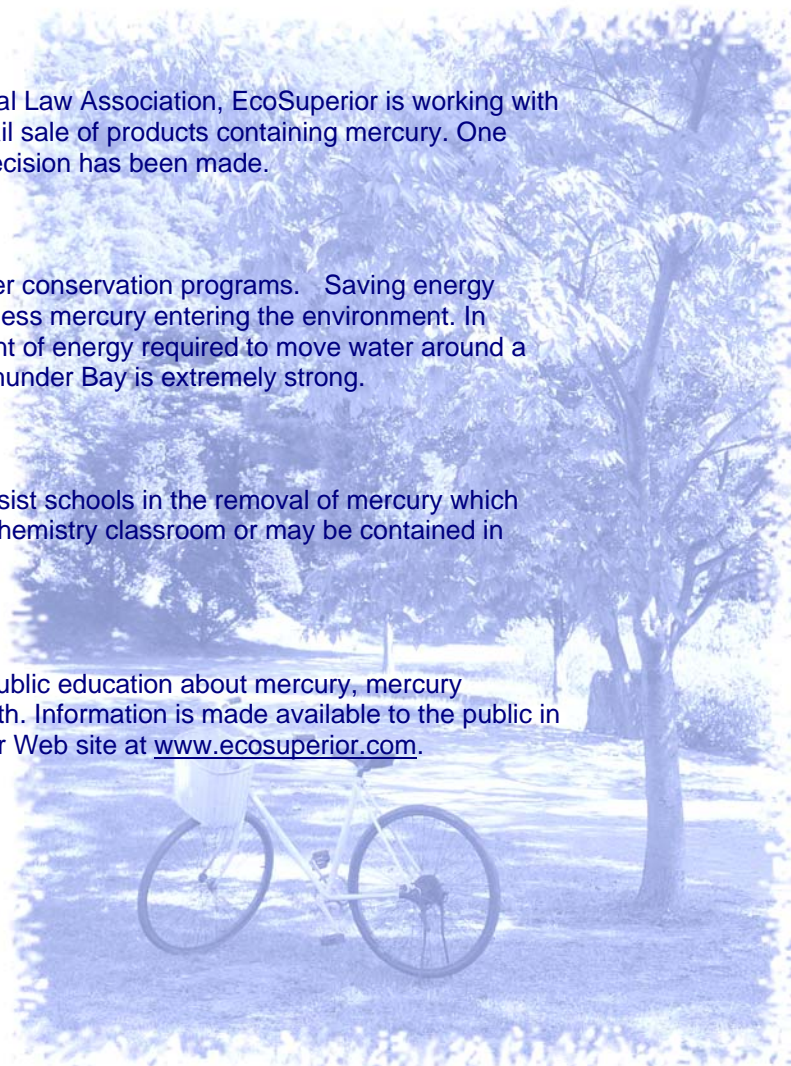
For more information, please contact:

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[www.ecosuperior.com](http://www.ecosuperior.com)



## 5.3 Delta Institute – Mercury Pollution Prevention Road Map

The Delta Institute is a Chicago-based non-profit organization that engages in the policy and practice of improving environmental quality and promoting community and economic development. Through this work the Delta Institute is contributing to the development of sustainable communities so that:

- people have access to living-wage jobs in a healthy environment;
- businesses, industries and communities operate in harmony with the environment and in doing so thrive and prosper;
- human and natural resources are nurtured, not wasted;
- remedies to environmental, economic and social problems are equitable, benefiting current and future generations.

The Delta Institute has implemented a watershed initiative to reduce mercury releases from sources in two sub-watersheds located within the Lake Erie Basin. Many of the National Pollutant Discharge Elimination System water discharge permits being issued to sewage treatment plants, particularly those in the Great Lakes region, contain strict effluent limits for mercury. In order to comply with these limits, facilities must identify significant sources of mercury that are directly discharging to their systems and work with these sources to reduce or eliminate the use and release of mercury.

Sewage treatment plants are in a unique position to go beyond traditional regulatory approaches, such as federally mandated phase-out programs, to minimize mercury releases to the environment. Because of the diverse sources of influent to the plant - residential, commercial, and industrial – staff at sewage treatment plants can build on existing contacts and duties to initiate community-wide mercury reduction programs. A community-wide mercury reduction program serves two purposes: it aims to reduce the amount of mercury discharged directly to the plant and to eliminate sources of mercury in the community.

The tools and strategies presented through the Delta Institute's work can be tailored to most sewage treatment plants seeking to reduce mercury in the plant influent and in their community. It is especially applicable to sewage treatment plants that are located within the Great Lakes Basin.

Based on the Delta Institute's experience with two sewage treatment plants in northern Ohio, the Delta Institute developed a series of steps and associated tools that can be used as a guide for involving dischargers and others in the process of reducing mercury to the sewage treatment plant. In practice, sewage treatment plants in different circumstances can adapt this process to fit their needs. In most cases, these steps would not be carried out in immediate succession but would be part of a fluid and ongoing interaction with relevant members of the community. This information can be found at the Delta Institute's Web site: [delta-institute.org/pollprev/mercury/roadmap/images/roadmap.php](http://delta-institute.org/pollprev/mercury/roadmap/images/roadmap.php).

For more information, please contact:  
Abigail Corso, PE  
Delta Institute  
53 West Jackson, Suite 230  
Chicago, Illinois 60604  
312-554-0900 ext. 25  
[www.delta-institute.org](http://www.delta-institute.org)



# Appendix A Mercury Inventory Checklist

This checklist outlines steps to plan, conduct, and report an inventory of mercury-containing equipment and products at municipal facilities.

## Planning

<i>Description</i>	<i>Completed</i>
Determine the scope of the inventory by identifying the facility(s) and building(s) to be inventoried.	<input type="checkbox"/>
In order to identify mercury-containing products, become familiar with the photographs and product descriptions	<input type="checkbox"/>
Determine the roles of personnel to be involved in the inventory process (client, facility operator and inventory team).	<input type="checkbox"/>
Produce an inventory plan and include the following details:	
Inventory objective and scope, including the facility, buildings and products to be inventoried;	<input type="checkbox"/>
Procedures to inventory the facility;	<input type="checkbox"/>
Language to conduct the inventory;	<input type="checkbox"/>
Reference documents;	<input type="checkbox"/>
Time, duration and schedule of the inventory;	<input type="checkbox"/>
Inventory team members (contacts and escorts);	<input type="checkbox"/>
Document retention;	<input type="checkbox"/>
Inventory report details; and	<input type="checkbox"/>
Confidentiality Statement (if applicable).	<input type="checkbox"/>
Receive client approval of the inventory plan prior to commencement of on-site activity.	<input type="checkbox"/>
Develop a contact list for facility contact and escorts (if applicable) to be used while on site.	<input type="checkbox"/>
Consider acquiring building plans (if necessary) in order to help ensure that all rooms are inventoried and numbered properly.	<input type="checkbox"/>
Prepare equipment for the inventory. Ensure that sufficient copies of “ <b>Appendix C. Mercury Inventory Sheet</b> ” are available and consider what other equipment may be useful or necessary during the inventory.	<input type="checkbox"/>
Some useful equipment could include a flashlight, a digital camera, a step ladder (to help identify lighting and other overhead items), safety boots, safety goggles, nitrile gloves, and ear defenders or plugs. A magnet may also be useful to determine if thermocouples contain mercury (typically non-ferrous thermocouples have no mercury).	<input type="checkbox"/>

**Conduct**

<i>Description</i>	<i>Completed</i>
The mercury inventory must be conducted in accordance with the mercury inventory plan. The following information should be gathered prior to arrival or upon arrival to the facility:	
Determine if the facility contact person is aware of mercury-containing products at the facility. If yes, the contact should provide a list if possible.	<input type="checkbox"/>
If applicable, contact personnel responsible for hazardous materials disposal to determine, perhaps through a review of waste manifests, whether mercury has been disposed of from the facility.	<input type="checkbox"/>
If possible, determine what known mercury-containing equipment or products have been purchased for the facility.	<input type="checkbox"/>
Determine whether the facility has established a mercury replacement program, for example, programs that have introduced new non-mercury-containing or mercury-reduced products in the workplace (e.g. low -mercury lighting).	<input type="checkbox"/>
Hold an opening meeting. This meeting is less formal than an audit opening meeting but serves a similar purpose. The meeting should include: <ul style="list-style-type: none"> <li>• an introduction of the facility operator and the inventory personnel;</li> <li>• a brief discussion of the plan to reiterate the scope, timetable, and procedures;</li> <li>• confirmation of contacts and escorts (if required);</li> <li>• confirmation of security, safety, and emergency procedures; and</li> <li>• promotion of active participation of facility personnel.</li> </ul>	<input type="checkbox"/>
The inventory team and escorts must visit the facility to conduct the inventory and must maintain accurate records of: <ul style="list-style-type: none"> <li>• location of mercury-containing products;</li> <li>• interviews conducted; and</li> <li>• documents reviewed.</li> </ul> During the inventory: <ul style="list-style-type: none"> <li>• Each room should be accessed to determine mercury content (any exceptions must be noted).</li> <li>• Use building floor plans (if available) as a guide to ensure all parts of the building have been inventoried.</li> <li>• Complete the information required by "Appendix C. Mercury Inventory Sheet."</li> <li>• If desired, take photos of examples of products and equipment.</li> <li>• Make maximum use of escort and specialist knowledge. Suitable escorts can include building supervisors, electricians, and systems technicians.</li> </ul>	<input type="checkbox"/>
Upon completion of the on-site visit, the inventory team should meet with the facility contact to review the conduct of the inventory and discuss timelines for completion of the inventory report.	<input type="checkbox"/>

**Report**

<i>Description</i>	<i>Completed</i>
Produce an inventory report to include:	
Inventory objective and scope	<input type="checkbox"/>
Names of participating facility personnel	<input type="checkbox"/>
Names of inventory team personnel	<input type="checkbox"/>
Dates that the inventory was conducted	<input type="checkbox"/>
Confidentiality statement	<input type="checkbox"/>
Distribution list	<input type="checkbox"/>
Summary of the inventory process (include difficulties encountered)	<input type="checkbox"/>
Inventory summary based on reports generated from the database	<input type="checkbox"/>



# Appendix B

# Mercury Inventory Sheet

Name and Address of Facility:

Page \_\_\_\_ of \_\_\_\_  
Date:

Escort:

Contact Information:

Room	Product	Category	Model and manufacturer	Age of Equipment	Quantity	Comments (use or location of product)

# Appendix C Mercury Inventory Summary

## Mercury Audit

Work area: \_\_\_\_\_

Department: \_\_\_\_\_

Supervisor/Manager: \_\_\_\_\_ Date: \_\_\_\_\_

### Mercury Sources

Please indicate the following sources of mercury used in your department, by placing a check mark in the boxes provided, and if relevant, the number of items you have.

- Barometers #: \_\_\_\_\_
- Batteries  
Types/Numbers \_\_\_\_\_
- DC Watt hour meters, Flow meters, Vibration meters  
# (total) \_\_\_\_\_
- Displacement/plunger relay; # \_\_\_\_\_  
Power supply switching, 1 to 4 poles, NO, NC, many voltage and current ratings, generally for high-current, high-voltage applications such as lighting, resistance heating, commercial welders
- Flame Sensors/Safety valves (check gas-fired ranges, boilers, HVAC, furnaces)
  - some infrared heaters (Robert Shaw and Harper Wyman); # \_\_\_\_\_
  - some furnaces (White Rodgers); # \_\_\_\_\_
  - stainless steel bulb, capillary tube, bellows/control device – used for burners in certain gas-fired devices with standing pilot or electronic ignition pilot; # \_\_\_\_\_
- Lamps
  - fluorescent; # \_\_\_\_\_
  - high pressure sodium; # \_\_\_\_\_
  - metal halide; # \_\_\_\_\_
  - ultraviolet; # \_\_\_\_\_
- Switches
  - relay switches; # \_\_\_\_\_
  - pressure control (mounted on bourdon tube or diaphragm); # \_\_\_\_\_
  - tilt switches; # \_\_\_\_\_
  - silent light switches (single pole and three way); # \_\_\_\_\_
  - temperature control (mounted on bimetal coil or attached to bulb device); # \_\_\_\_\_
  - fire alarm box switch; # \_\_\_\_\_
  - sump pump floats
- Reed relays
  - used for low voltage, high precision analytical equipment; # \_\_\_\_\_
- Thermometers
- Thermostats
  - room temperature control; # \_\_\_\_\_
  - ovens; # \_\_\_\_\_
  - refrigerators; # \_\_\_\_\_
- Vacuum gauges
  - needle or bourdon gauges, manometers; # \_\_\_\_\_
- Other possible mercury sources: \_\_\_\_\_

# Medical Facility Mercury Audit

Facility name: \_\_\_\_\_

(Department): \_\_\_\_\_

Supervisor/Manager: \_\_\_\_\_ Date: \_\_\_\_\_

## Mercury Sources

Please indicate the following sources of mercury used in your department, by placing a check mark in the boxes provided, and if relevant, the number of items you have.

- Fever thermometers #: \_\_\_\_\_
- Sphygmomanometers #: \_\_\_\_\_
- Commercial manometer #: \_\_\_\_\_
- Gastrointestinal diagnostic equipment #: \_\_\_\_\_
- Feeding tubes #: \_\_\_\_\_

## Chemicals

- Zenker's solution
- Histological fixatives

## Staining solution and preservatives

- Mercury chloride
- Mercury (II) sulfate
- Other
- Mercury (II) oxide
- Mercury nitrate
- Mercury (II) chloride
- Mercury iodide

## Lamps

- fluorescent; # \_\_\_\_\_
- metal halide; # \_\_\_\_\_
- high pressure sodium; # \_\_\_\_\_
- ultraviolet; # \_\_\_\_\_

## Batteries

- mercuric oxide: # \_\_\_\_\_
- button batteries

Thermostats: # \_\_\_\_\_

Barometers: # \_\_\_\_\_

Switches (relay, tilt, silent)

Other possible mercury sources:

---

Have you considered mercury-free alternatives for any of the products listed above?

## NIAGARA REGIONAL MERCURY POLICY AND ELIMINATION PLAN

DEVELOPED BY: Waste Management Services Division, Public Works

APPROVED BY: Corporate Management Team (CMT)

DATE: February 12, 2004

EFFECTIVE DATE: February 12, 2004

LATEST REVISION: Not Applicable

### **POLICY STATEMENT:**

Mercury is one of a group of persistent, toxic bioaccumulative substances that has been targeted for virtual elimination. In order to conform with federal and provincial policies, standards, and activities that are directed towards minimizing the release of mercury to the environment, the Regional Municipality of Niagara has established the following policy.

### **POLICY**

It is the goal of the Regional Municipality of Niagara to eliminate the use of mercury and mercury containing equipment or materials from its operations. In order to achieve this goal, the Region will assess and evaluate mercury sources in its operations on an ongoing basis, and take specific action to reduce and/or eliminate these sources. Further, the Region will undertake to ensure that mercury containing devices and equipment will be safely handled at the end of their useful lives and disposed in an environmentally sound manner.

It is acknowledged that it may not be technically feasible to eliminate mercury from all Regional operations at the present time, but all reasonable efforts will be made to upgrade to low or non-mercury alternatives where they exist.

### **PROCEDURE**

In late 2002 and early 2003, mercury inventories were developed within the departments/divisions that were considered to most likely contain mercury within their operations/services and mercury reduction/action plans were also developed. The following departments/divisions were included:

#### Public Works Department

- Water and Wastewater Division
- Operational Support Services Division
- Transportation Services Division
- Solid Waste Management Services Division

#### Community Services

- Building Services
- Children's Services

#### Police Services

#### Public Health Services

- Public Health
- Ambulance Services

#### Corporate Services

- Purchasing Division



As a result of the mercury inventories and estimates, this policy provides an overview of the internal and external activities the Region will employ to reduce mercury releases to the environment. Costs for the removal and disposal of mercury from each department will be the responsibility of each applicable department.

1) Internal Operations

<b>Activity</b>	<b>Department</b>	<b>Outcome</b>
<i>Purchasing and Procurement Policy:</i> Distributor/vendor take-back program for recycling of spent fluorescent lamps (interior) and high-pressure sodium street lights.	Corporate Services Public Works Community Services	Mercury and lamp components are recycled so that hazardous components are kept out of waste stream. (This type of program is currently carried out for UV disinfection lamps)
<i>Thermostat replacement program:</i> Replace old mercury-containing thermostats with digital units	Corporate Services Public Works Community Services	Mercury-containing thermostats are removed and recycled; digital thermostats allow for demand side energy conservation.
<i>Mercury Switch alternatives:</i> Retrofits Program to replace mercury containing switches with non-mercury alternatives	Public Works	Mercury-containing switches are removed and recycled where technically feasible.
<i>Mercury declaration in articles sold or auctioned:</i> Identify mercury status in surplus items such as vehicles and appliances when they are sold.	Corporate Services Police	Mercury status stays with registration or bill of sale, alerting each owner as well as recycler/scrap dealer.
<i>Departmental education program:</i> Stickers identify items that contain mercury (from departments audits). A telephone number on the sticker will identify a number to call for additional information.	All	Mercury-containing items are safely handled, recycled and disposed.

2) Exploration of Potential External Activities Aimed at Reducing Mercury

<b>Activity</b>	<b>Department</b>	<b>Outcome</b>
Public Education	Public Works Public Health Services	Encourage use of household hazardous waste (HHW) programs for end-of-life mercury (residential) items such as thermometers, fluorescent lamps, etc.
Thermometer Take back program	Public Works Public Health Services	In partnership with pharmacies and health units, encourage public to bring in mercury thermometers, in return for a coupon for a digital thermometer.
Thermostat take-back program	Corporate Services Public Works	In partnership with building departments or area municipalities and building suppliers, building permits would require accounting and plan for ensuring that mercury containing thermostats are not disposed of in the regular garbage. Building suppliers could operate take-back program in partnership with thermostat manufacturers.
Automotive mercury switch removal	Public Works	Promote and support "Mercury Switch Out" program at automotive recycling yards and wreckers.
Mercury audits and reduction programs	Public Works Public Health	Promote audits and mercury reduction programs at hospitals and clinics.

## Mercury Reduction and Elimination Program

**REPORT TO:** \_\_\_\_\_

**SUBJECT:** Municipal Mercury Reduction and Elimination Plan and Policy

---

### RECOMMENDATION

That a department-by-department inventory of all mercury containing equipment and devices be conducted to establish:

- 1) the amount of mercury currently in use in all municipal operations, and
- 2) the current handling and disposal procedures for end-of-life mercury containing equipment

That the results of the inventory be used to prepare a Municipal Mercury Reduction/Elimination Plan covering all departments, and

That this initiative be supported by a policy submitted to and endorsed by Council declaring the intention of reducing and eliminating wherever practicable.

### PURPOSE

The purpose of this report is to describe the rationale for reducing mercury releases, both from internal municipal operations, and from residential and industrial sources within the municipality.

### BACKGROUND

Mercury has been demonstrated to be a toxic and bioaccumulative substance, and as such has been targeted for virtual elimination. It is listed in Schedule 1 of the Canadian Environmental Protection Act, 1999 (CEPA), the list of Toxic Substances. Mercury-containing consumer items such as thermometers and fluorescent lights are presently collected through this municipality's household hazardous waste program, but there is no municipal policy that directs staff on the purchase, handling and disposal of potential mercury containing items for municipal operations.

The Regional Municipality of Niagara has recently completed an audit of its operations, in preparation for a Regional Policy on mercury reduction and elimination. The results of the audit found the total amount of mercury to be just under five kilograms (4,890) grams. The most prevalent mercury-containing items were fluorescent lamps, thermostats and switches. In most cases, there were no special handling or disposal programs in place for these items.

Although this quantity may be relatively low, this amount of mercury is capable of polluting a large area: one gram of mercury is sufficient to contaminate all of the fish in a lake with a surface area of 8 hectares.

In resolving to ensure that mercury-containing items are reduced or eliminated from regional operations to the furthest extent possible, the Region has ensured that mercury releases will be minimized.

### RECOMMENDATION

It is recommended that this municipality adopt a mercury reduction and elimination policy that will guide and inform all municipal operations in ensuring that mercury releases are reduced to zero.

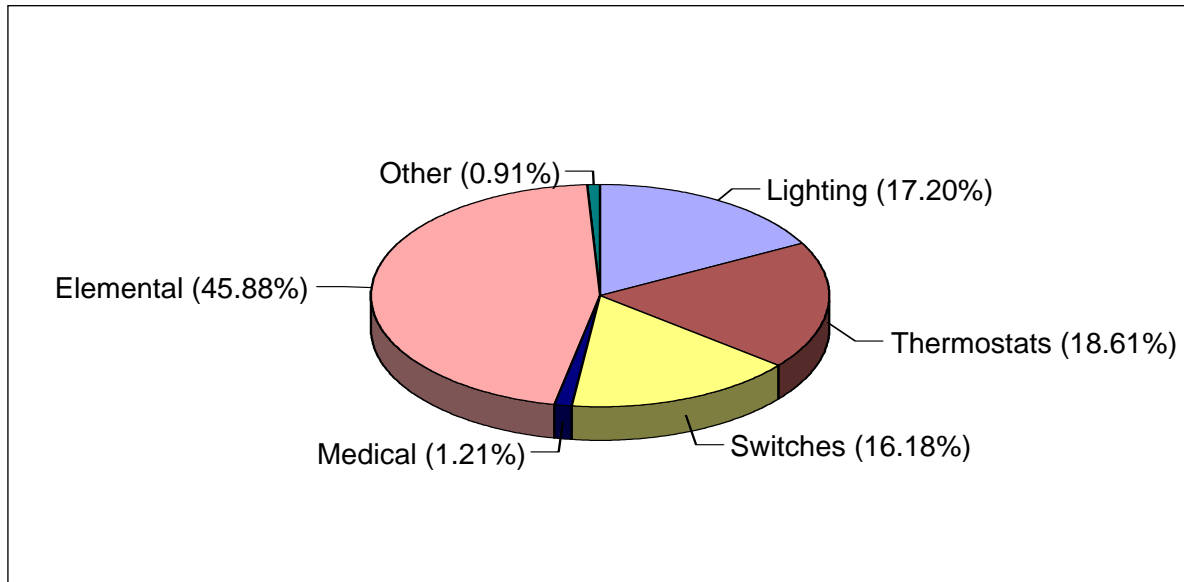
# Appendix F

# Niagara Region's Mercury Audit Results

The following table summarizes the mercury-containing items and equipment across all Regional departments.

<b>Equipment</b>	<b>Amount</b>
Fluorescent Lamps	28,403
High pressure sodium lamps	1,372
Metal halide lamps	148
UV disinfection lamps	163
Thermometers	262
Switches	750
Sensors	20
Flow meter	8
Medical equipment	50 pieces
<b>Total mercury in equipment</b>	<b>4,890 grams</b>

The following chart illustrates the relative amount of mercury in the items inventoried.



# NOTES

