



Ontario's Role in a National Mercury Elimination and Reduction Strategy

Prepared by

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POLLUTION PROBE is a non-profit charitable organization that works in partnership with all sectors of society to protect health by promoting clean air and clean water. Pollution Probe was established in 1969 following a gathering of 240 students and professors at the University of Toronto campus to discuss a series of disquieting pesticide-related stories that had appeared in the media. Early issues tackled by Pollution Probe included urging the Canadian government to ban DDT for almost all uses and campaigning for the clean-up of the Don River in Toronto. We encouraged curbside recycling in 140 Ontario communities and supported the development of the Blue Box programme. Pollution Probe has published several books, including *Profit from Pollution Prevention*, *The Canadian Green Consumer Guide* (of which more than 225,000 copies were sold across Canada) and *Additive Alert!*

In the 1990s, Pollution Probe focused its programmes on issues related to air pollution, water pollution, climate change and human health, including a major programme to remove human sources of mercury from the environment. Pollution Probe's scope has since expanded to include new concerns, such as the unique risks that environmental contaminants pose to children, the health risks related to exposures within indoor environments, and the development of innovative tools for promoting responsible environmental behaviour.

Since 1993, as part of our ongoing commitment to improving air quality, Pollution Probe has held an annual Clean Air Campaign during the month of June to raise awareness of the inter-relationships among vehicle emissions, smog, climate change and human respiratory problems. The Clean Air Campaign helped the Ontario Ministry of the Environment develop a mandatory vehicle emissions testing programme, called Drive Clean.

Pollution Probe offers innovative and practical solutions to environmental issues pertaining to air and water pollution. In defining environmental problems and advocating practical solutions, we draw upon sound science and technology, mobilize scientists and other experts, and build partnerships with industry, governments and communities.

March 3, 2008

This report examines Ontario's role in a national mercury elimination and reduction strategy. The main focus is on two areas in which Ontario can significantly reduce emissions – from the residential sector through phasing out and/or increasing the collection and recycling of mercury-containing products, and by phasing out mercury use in the health care sector.

Recent developments reinforce the need to effectively reduce and manage emissions related to mercury-containing products. In April 2007 the federal government and Ontario both announced that they will ban the sale of incandescent light bulbs by 2012. This measure will increase the residential use of mercury-containing lamps, such as compact fluorescent light bulbs, that may contain up to 5 mg of mercury. Millions of lamps will have to be recycled; otherwise, mercury emissions to the environment will increase dramatically. Waste incineration is another issue of concern. Only one Ontario municipality incinerates solid waste, but several more are considering or proposing incineration as a waste management option. Mercury releases during incineration are a major issue. The Government of Ontario is developing a diversion plan for Municipal Hazardous or Special Waste that will include mercury-containing products and will help with this issue; however, concerns about mercury emissions from incineration will remain until all sources are eliminated or diverted from the waste stream.

The federal government is currently holding consultations on a Risk Management Strategy for Mercury-containing Products. It is also working towards a national mercury strategy. Thus, Canada and Ontario could join other jurisdictions, such as the European Union, the United States and various states that are already implementing mercury strategies.

The time is ripe for Ontario to lead Canada in the development and implementation of a comprehensive provincial strategy to reduce mercury emissions. The time is also ripe for the federal government to build on this leadership as part of a national mercury strategy.

Sincerely,



Ken Ogilvie
Executive Director

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Part 1 – Introduction

1.1 Purpose

The purpose of this report is to examine Ontario's role in a national mercury elimination and reduction strategy, with specific focus on two areas – options to reduce mercury emissions from the residential sector through phasing out and/or increasing the collection and recycling of mercury-containing products, and phasing out mercury use in the health care sector.

1.2 Methodology

The goal of Pollution Probe's mercury program, which started in 1996, is to protect human and ecosystem health by reducing and/or eliminating the use and release of mercury from human sources to the environment. This report draws upon Pollution Probe's experience, as well as a literature review that compares collection, recycling and phase out activities in various jurisdictions.

1.3 Background

1.3.1 The Health and Environmental Risks of Mercury

Mercury is an element known as a heavy metal and is found in three general forms:

1. Inorganic mercury, which is primarily bound to particulates and not readily available for uptake by organisms.
2. Elemental mercury, which is a shiny liquid metal and is sometimes called "metallic mercury." Human exposure to elemental mercury occurs primarily from industrial processes and mercury-containing products.
3. Organic mercury, which is found mainly in the form of methylmercury. Human exposure to methylmercury occurs through the consumption of certain species of fish, aquatic mammals and waterfowl.¹

Methylmercury is the main form of mercury found in living organisms. It bioaccumulates, meaning contaminants are more rapidly taken up than eliminated in a body, and it biomagnifies up the food chain, meaning the concentration of the contaminant increases at each level of the food chain.

Mercury, in all forms, is a neurotoxicant – it can damage the brain and nervous system, and is a suspected endocrine disruptor – it can damage the

reproductive and hormonal development and growth of fetuses and infants. The health effects associated with exposure to mercury include permanent brain damage, central nervous system disorders, memory loss, heart disease, kidney failure, liver damage, loss of vision, loss of sensation and tremors.² The severity of the health effect depends on the level of mercury exposure. Acute exposure (high level exposure for short periods) results from inhaling mercury vapour or ingesting mercury and can cause serious injuries, such as personality changes, tremors, changes in vision, deafness, loss of muscle coordination, memory loss, intellectual impairment, and in extreme cases, even death.³ Chronic exposure (low level exposure for an extended period of time) results from eating food high in mercury throughout a lifetime and can cause neurological damage, reproductive system damage, behavioural problems, learning disabilities and memory loss.⁴

The most at-risk groups to the effects of mercury exposure through diet are populations that regularly eat fish high in mercury, such as First Nations populations, as well as pregnant women or those planning to have children, and children.

In March 2007, Health Canada issued two advisories concerning mercury content in fish. The first was an advisory with the following advice to vulnerable populations on the consumption of albacore or “white” canned tuna:

- Women who are or may become pregnant, or who are breastfeeding, should limit their consumption of canned albacore tuna to four Food Guide Servings per week (one Food Guide Serving is 75 g, 2½ oz, 125 mL or ½ cup).
- Children between one and four years of age should limit their consumption of canned albacore tuna to one Food Guide Serving per week.
- Children between five and 11 years of age should limit their consumption of canned albacore tuna to two Food Guide Servings per week.

The second advisory was a revision of the consumption guidelines for predatory fish species, including tuna (fresh and frozen), shark, swordfish, escolar, marlin and orange roughy, with the following information:

- The general Canadian population should limit the amount of these fish that they eat to 150 grams, or two Food Guide Servings, per week.
- Women who are or may become pregnant, or who are breastfeeding, should limit their consumption of these fish to 150 grams per month.
- Children between five and 11 years of age can safely eat 125 grams of these fish per month and children between one and four years of age should not eat more than 75 grams of these fish per month.

1.3.2 Sources of Mercury Exposure

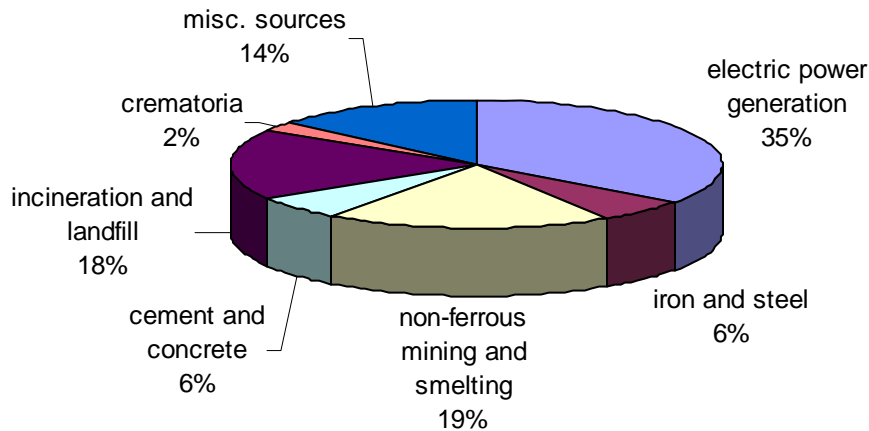
There are four general sources of mercury exposure:

1. Natural Processes – Mercury is an element that is found in nature. The most common natural occurrences of mercury include volcanic eruptions and the weathering of bedrock, which can release mercury that can be converted into methylmercury in lakes and rivers.
2. Incidental Release from Other Activities – Natural mercury is released when coal is burned to produce electricity, or through industrial activities, such as mining and base metal smelting.
3. Release from Mercury-containing Products – Mercury that is found in products is put there deliberately. This mercury can be released during manufacture, breakage or disposal of the products. When products are disposed of improperly, the mercury is released to the environment through breakage; for example, in the back of a garbage truck, in a landfill, or when the products are incinerated. Even recycling products that contain mercury can result in mercury emissions to the environment if technology is not installed to capture the mercury (e.g., in the case of recycling primary dry cell batteries in North America).
4. Direct use in Industrial Settings – This includes mercury used in chlor-alkali plants and small-scale gold mining processes.

While mercury is an element that occurs naturally, it is estimated that about half of the mercury in the atmosphere today comes from human activities.⁵

In Canada, mercury is released to the environment from a number of different sources, as shown in Figure 1. In 2003, Canada emitted approximately 7,000 kg of atmospheric mercury emissions with 35 per cent from electric power generation, 19 per cent from mining and smelting, 18 per cent from incineration and landfill, 6 per cent from iron and steel production, 6 per cent from cement and concrete production, 2 per cent from cremation and 14 per cent from miscellaneous sources, which includes residential wood and fuel combustion, commercial fuel combustion and industrial activities, such as pulp and paper production and rock quarrying.⁶

Figure 1: 2003 Canadian Mercury Emissions

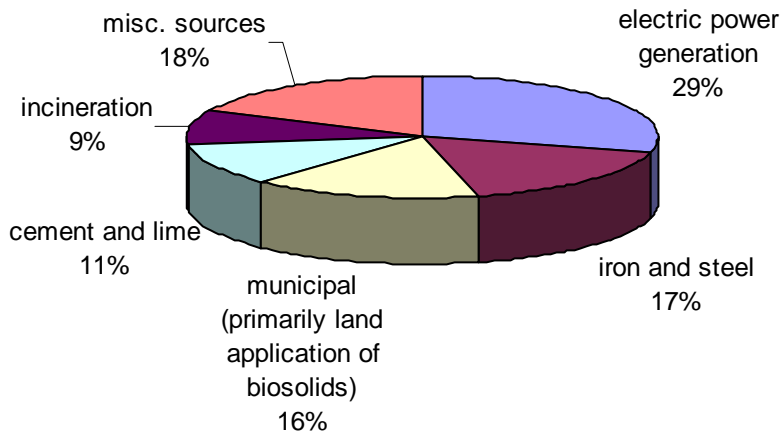


Source: Environment Canada. 2007. *Risk Management Strategy for Mercury-containing Products*.

www.ec.gc.ca/ceparegistry/documents/part/Merc_RMS/Merc_RMS.cfm

As shown in Figure 2, Ontario had a somewhat similar percentage distribution in its 2003 atmospheric mercury emissions, with 2,000 kg emitted.

Figure 2: 2003 Ontario Mercury Emissions



Source: Environment Canada, Ontario Region. 2005.

1.3.3 Mercury in Products

The largest deliberate use of elemental mercury in Ontario is in products and equipment, such as fluorescent lamps, thermostats, some types of batteries, electrical switches, and medical and scientific equipment.⁷ According to Environment Canada, the total amount of elemental mercury used in products in Canada in 2003 was approximately 10,000 kg.⁸

Mercury is used in a variety of different products because it is a good conductor of electricity and it reacts predictably to temperature and pressure changes. However, most products that contain mercury could be replaced by mercury-free alternatives that are reliable, cost-effective and safe.

The mercury found in products may be released to the environment at a number of different stages – during manufacturing, when products are broken while in use, when products are crushed in garbage trucks and when products are dumped in landfills, burned in incinerators, recycled or discharged to sewer systems.

If the product is broken, either during manufacture or use, human exposure can occur, for example, the mercury vapours can be absorbed into the bloodstream through the lungs, or the mercury could be ingested.⁹ Either inhalation or ingestion can result in acute mercury exposure.

Landfill disposal, which is currently the main method used to manage municipal solid waste in Ontario, can release mercury to the environment in two ways – through gaseous emissions to the atmosphere and through leachate migration into groundwater or streams.¹⁰

Incineration of mercury-containing products results in organic mercury being emitted to the atmosphere. As noted in 2003 data from Environment Canada, Ontario Region, incineration accounts for approximately 200 kg of annual mercury emissions in Ontario. Virtually all incinerators, including municipal solid waste incinerators, municipal sewage sludge incinerators, medical waste incinerators and hazardous waste incinerators, emit mercury to the atmosphere.¹¹ Once in the atmosphere, the mercury has the potential to be deposited in an aquatic ecosystem, where it can be converted to methylmercury and taken up through the food chain.

1.3.4 Recent Developments in Canada and Ontario

Recently, a number of announcements and developments in Canada and Ontario have further emphasized the need for all levels of government to address the issue of mercury-containing products.

In April 2007, both the federal government and the government of Ontario announced their intentions to ban the sale of incandescent light bulbs by 2012.¹² The shift away from less energy efficient incandescent lighting will dramatically increase the residential use of mercury-containing lamps, specifically compact fluorescent light bulbs (CFLs). While the shift to CFLs will decrease the energy used by the residential sector, and therefore will result in less mercury emissions

from coal-fired power generation (until the coal plants are phased out), there is currently no infrastructure in place for the collection and recycling of CFLs, which means the majority of bulbs will end up in the general waste stream.

Another issue that Ontario needs to address is waste incineration. While there is currently only one municipality that incinerates solid waste in Ontario, other facilities exist in Canada, and several Ontario municipalities, including Hamilton and the Regions of Niagara, York and Durham, are considering incineration technologies as waste management options.¹³ Ontario's one existing municipal solid waste incinerator is Algonquin Power Energy From Waste Inc., which has been in operation since 1992. This facility is located in the Region of Peel and is a waste-to-energy facility. It is crucial that mercury be removed from the waste before incineration. This will become an even greater concern as CFLs become widely used in Ontario.

The government of Ontario has legally required the province's coal-fired power plants to be shut down by 2014.¹⁴ Thus, mercury emissions from this source will continue to be released until 2014 unless expensive emission control technologies are implemented. An alternative would be to invest in a comprehensive strategy to eliminate and reduce mercury use.

Both the federal and provincial levels of government are aware of the need to deal with mercury-containing products. In December 2006, the federal government announced the development of a Risk Management Strategy (RMS) for mercury-containing products.¹⁵ The RMS is intended to provide a framework for the development of control instruments to manage the environmental effects of mercury used in products. As of February 2008, the timing and details concerning the development and publication of the proposed RMS were unknown.

In December 2007, the federal government released a consultation document that proposes policy instruments to ban the sale, import and distribution of mercury-containing products, excluding mercury-containing dental amalgam and lamps. The regulation is not yet finalized and the timing for implementation is unknown. In the meantime, consultative meetings have been scheduled for February 2008 in Toronto and Vancouver, and public comments to the consultation document¹⁶ will be accepted until March 7, 2008.

Also in December 2006, Ontario's Minister of the Environment initiated consultation on a diversion program for Municipal Hazardous or Special Waste (MHSW), which will include four categories of mercury-containing products – primary (or single use) dry cell batteries, fluorescent light bulbs and tubes, switches, and measuring devices, such as thermostats, thermometers and

barometers.¹⁷ As of February 2008, the timing, targets and details concerning the development and publication of the proposed MHSW program were unknown.

With both the federal RMS and Ontario's MHSW program in development, it is an opportune time for Canada and Ontario to look to other jurisdictions, such as the European Union (EU) and individual states in the United States (US), that have already created and are implementing mercury strategies that reduce emissions, decrease supply and demand, and protect against exposure. Canada has the capacity and obligation to implement a comprehensive national mercury strategy, and we believe that Ontario must play a leadership role in motivating, shaping and implementing that strategy. Ontario should play a role similar to that of leading states in the US, such as Connecticut, Maine, Massachusetts, Minnesota, New York and Vermont.

1.4 Structure of Report

The remainder of this report has three parts. Part 2 focuses on mercury strategies in general. It examines strategies that exist in the EU and US, then looks at the need for and elements of a Canadian mercury elimination and reduction strategy. It discusses the role that Ontario could play in such a strategy and makes recommendations on actions that Ontario should take.

Part 3 focuses on reducing mercury emissions in the residential sector through phasing out or increasing the collection and recycling of mercury-containing products. This section provides an overview of mercury-containing products and examines the current collection and recycling programs that exist across Canada and in other jurisdictions. The section examines options to increase collection and recycling rates and makes recommendations for Ontario.

Part 4 focuses on phasing out the use of mercury in the health care sector. This section provides an overview of the existing uses of mercury in the health care sector and the mercury-free alternatives that exist. The situation in Canada and other jurisdictions is examined, and an example of leadership is provided on the Trillium Health Centre in Mississauga, Ontario, which has successfully phased out mercury use. The section examines options to phase out mercury use in the health care sector and makes recommendations for Ontario.

Part 2 – Mercury Elimination and Reduction Strategies

2.1 Examples of Existing Strategies

2.1.1 *European Union*

The European Union (EU) has a mercury strategy that aims to reduce emissions, decrease supply and demand, and protect against exposure. Specifically, the EU manages a wide range of electrical and electronic products that contain mercury through two Directives – the Waste Electrical and Electronic Equipment (WEEE) Directive and the Restriction on Hazardous Substances (RoHS) Directive.

EU Mercury Strategy

In January 2005, the European Environment Commission launched its mercury strategy, which addresses mercury pollution both in the EU and globally. The strategy contains measures to reduce mercury emissions, cut supply and demand, and protect against exposure by setting out the following objectives and actions:

- Banning mercury exports by 2011;
- Participating in global action through input to international activities and cooperation with other countries (e.g., to control mercury trade, emissions and use in activities, such as gold mining);
- Reducing EU demand by restricting the marketing of measuring devices that contain mercury (e.g., thermometers) and further investigating the remaining uses (e.g., dental amalgam);
- Addressing EU surpluses through the safe storage of mercury decommissioned by industry and further studying the mercury that is already circulating in society (e.g., in old products still in use);
- Reducing EU emissions through a review of current EU laws, as well as providing information to support further emission reductions in member states and studying additional control options for releases from burning coal;
- Protecting against EU exposure by further investigating the dietary exposures for women of child-bearing age and children, and providing additional advice on mercury in food; and,
- Increasing research to improve understanding and address gaps in knowledge.¹⁸

The EU has started to put its strategy in motion. In June 2007, the European parliament approved a regulation to ban mercury exports from the EU by December 2010.¹⁹ The regulation will:

1. Ensure excess mercury is held in secure storage sites until technical advances allow for safe and permanent disposal;

2. Prevent the export of certain mercury compounds and mercury-containing goods that are already banned from sale in the EU; and,
3. Ban imports of metallic mercury and certain mercury compounds.

Additionally, in July 2007, the European parliament approved a ban on non-electrical mercury-containing thermometers and other mercury-containing instruments for general sale to the public, and in October 2007, these rules entered into force.²⁰ (Electrical measuring devices that contain mercury were already covered by the existing RoHS Directive. The main product group that hadn't been dealt with prior to July 2007 was non-electrical or non-electronic measuring and control equipment.) Under the new rules member states must ban mercury in all fever thermometers and similar measuring devices, such as manometers and blood-pressure meters, effective October 2008. Mercury-containing barometers for consumer use are banned effective October 2009; however, antique mercury-containing devices (defined as those over 50 years old) are exempted from the ban. There are some exemptions for mercury-containing sphygmomanometers and other mercury-containing devices in the health care sector, but the European commission must review the availability of safer alternatives to such mercury-based devices used in hospitals by October 2009.

WEEE and RoHS Directives

In 2003, the EU passed the Waste Electrical and Electronic Equipment (WEEE) Directive, which addresses the takeback of such equipment. The Restriction on Hazardous Substances (RoHS) Directive, which accompanies the WEEE Directive, "bans the use of heavy metals and brominated fire retardants in the manufacture of electrical and electronic equipment."²¹

The WEEE and RoHS Directives were to be implemented in European member states by August 2004, with the collection, treatment and financing systems for WEEE in place by September 2005, and the first collection and treatment targets attained by December 2006.²²

Under the WEEE Directive, the definition of electronic waste is broad, and includes just about any product used by consumers or businesses with a plug or a battery.²³ The WEEE Directive requires producers to set up collection systems for electrical and electronic waste from households and other end users, and it requires member states to collect four kilograms per person by the end of 2006, although targets will not be compulsory until more data are available.²⁴

The RoHS Directive bans new Electrical and Electronic Equipment (EEE) containing more than the permitted levels of lead, cadmium, mercury,

hexavalent chromium and both polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE) flame retardants from being put on the EU market as of July 1, 2006. A number of exempted applications for these substances exist, and the regulations do not apply to equipment that was put on the market prior to July 1, 2006.

Manufacturers need to ensure that their products – and the components and subassemblies of such products – comply with the requirements of the regulations in order to be put on the EU market. The regulations also impact companies that import EEE into the EU on a professional basis, those that export to other member states, and those that re-brand other manufacturers' EEE as their own. Producers must demonstrate compliance by submitting technical documentation to the enforcement authority on request and must retain such documentation for a period of four years after the EEE is placed on the market.

The EU also has a Battery Directive that establishes measures for proper recovery, treatment and disposal of waste batteries. This directive is examined in section 3.6 of the report.

2.1.2 *United States*

While the United States (US) does not have a national mercury strategy, it does have universal waste regulations²⁵ that pertain to mercury-containing products and a recently announced mercury export ban.

The universal waste regulations streamline the collection requirements for hazardous wastes in the following categories – batteries, pesticides, mercury-containing equipment (e.g., thermostats) and mercury-containing lamps (e.g., fluorescent bulbs). The regulations are designed to reduce hazardous waste in the municipal solid waste stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be modified by individual states and additional categories of universal waste can be added. For more information, see www.epa.gov/epaoswer/hazwaste/id/univwast.htm.

In May 1995, the US Environmental Protection Agency (EPA) promulgated the final universal waste rule establishing collection and management requirements for batteries, pesticides and thermostats. In July 1999, the US EPA added mercury-containing lamps to the universal waste rule. In July 2005, the US EPA added mercury-containing equipment to the universal waste rule. Mercury-containing equipment includes devices, items or articles that contain varying amounts of elemental mercury, including several types of instruments (i.e., thermostats, barometers, manometers, temperature and pressure gauges, and

mercury switches) that are used throughout electric utilities, other industries, municipalities and households.

Handlers of this mercury-containing universal waste are required to prevent mercury releases by using specific containers that will not release any mercury. The US EPA estimates that there are more than 1,800 generators handling approximately 550 tons of mercury-containing equipment that are affected by this rule.²⁶

In November 2007, the US House passed legislation that bans the export of mercury and prohibits federal agencies from selling or distributing mercury. The export ban, which will go into effect in 2010, also directs the Energy Department to provide permanent storage for domestic stocks of mercury, allowing for the safe disposition of some 1,500 tons of mercury still in use at plants in the US.²⁷

Similar to the EU, the US established the *Mercury-Containing and Rechargeable Battery Management Act* (further described in section 3.5 of the report) that prohibits the sale of alkaline-manganese and zinc-carbon batteries containing intentionally introduced mercury and restricts the concentration of mercury in alkaline-manganese button cell batteries.

Individual US States

Several individual states in the US have adopted strategies related to mercury-containing products. Some of the elements of these strategies include banning or phasing out the sale of mercury-containing products, labeling, collection, recycling and increasing public awareness.

In 2002, **Connecticut** enacted a law that implements the phase out of many mercury-added products. Effective July 1, 2006, the sale or distribution of mercury-added products containing more than 100 milligrams or 50 parts per million of mercury is prohibited (with some exceptions for mercury-containing lamps). This law requires product labeling for most mercury-added products and requires manufacturers to initiate collection programs for many mercury-added products. In 2006, Connecticut enacted additional legislation that established universal waste rule requirements for mercury-containing equipment and changed the product labeling requirements for mercury-containing lamps.

Beginning July 1, 2005, no mercury-added product may be offered for sale or use or distributed for promotional purposes in **Illinois** without prior written notification to the Illinois Environmental Protection Agency. This law provides that, on or before January 1, 2006, the Pollution Control Board must modify its rules governing universal hazardous waste to promote the recycling, recovery

and proper management of elemental mercury and mercury-added products on a statewide basis.

Between 2002 and 2006, **Maine** enacted a number of laws pertaining to mercury-containing products that prohibit the sale, use or distribution of any product to which mercury is intentionally added. The laws ban the sale of mercury-containing products as of certain dates – mercury switches, relays and measuring devices, effective July 1, 2006; motor vehicles with mercury switches, mercury-added thermostats, effective January 1, 2006; and, mercury-added fever thermometers, effective January 1, 2002. In addition, it is required that any mercury-added products sold in Maine after January 1, 2002, have an identifying label. In March 2006, *An Act to Regulate the Use of Batteries Containing Mercury* was enacted that requires button cell batteries that contain mercury to be labeled, prohibits the disposal of these batteries in landfills and incinerators, and requires retailers to provide take-back options for customers.

In 2006, **Massachusetts** passed *An Act Relative to Mercury Management* that requires manufacturers of mercury-added products to notify the Massachusetts Department of Environmental Protection (MA DEP) of components in their products that contain mercury and the amount of mercury in them. The Act also requires product labeling for most mercury-added products, effective May 1, 2008 and requires manufacturers selling mercury-added products in the state to set up and pay for collection programs for their end-of-life products, effective May 1, 2007. The law bans the sale or distribution of motor vehicles containing one or more mercury-added switch, effective January 1, 2007, as well as bans the sale of mercury-added measurement devices, such as thermostats and thermometers, effective May 1, 2008. In addition, the law directs the MA DEP to implement a program to educate residents about proper disposal of mercury-added products, bans the disposal of mercury-added products in any manner other than an approved method (such as recycling or disposal as hazardous waste), and requires manufacturers of mercury-added lamps to implement a plan to educate users about recycling end-of-life lamps and to meet specific recycling targets that increase over time.

In May 2007, **Minnesota** signed into law a comprehensive mercury products bill that requires labeling and public education for the sale of mercury-containing lamps, bans the disposal of these products as solid waste and requires these lamps to be recycled. In addition, lamp recyclers have to report to the state annually on the number of lamps recycled. The law bans the sale of mercury-containing sphygmomanometers, gastrointestinal devices, thermostats, barometers, pyrometers, manometers, diostats, cosmetics, toiletries, fragrances, over-the-counter pharmaceuticals, switches and relays, as well as the

purchase or use of both elemental mercury and specific mercury-containing products in schools.

In **New York**, the sale and distribution of certain mercury-added products are prohibited and manufacturers of mercury-added consumer products that are allowed for sale are required to label each product with a notice stating the product must be properly disposed of or recycled (any such product that is not so labeled is prohibited from sale). The state has established requirements for the recycling of mercury-added consumer products and has banned the disposal of consumer products with mercury, with an exemption for mercury-containing lamps from households and small businesses. In addition, manufacturers and trade associations dealing in mercury-added products are required to report certain information to the Department of Environmental Conservation.

Vermont has a law known as the *Comprehensive Management of Exposure to Mercury*, which proposes to establish a comprehensive approach to reducing the exposure of citizens to mercury released to the environment through mercury-added product use and disposal. Elements of this law include a ban on the distribution or sale of certain mercury-added novelties and products, a requirement for manufacturers of mercury-added products to provide notice to the state environmental agency and to report on the total mercury contained in certain products, and modification of existing labeling requirements for mercury-added products and packaging by expanding the types of products subject to labeling. The law also proposes to ban the disposal of mercury-added products in landfills and incinerators, to require source separation of discarded mercury-added products, and to require solid waste management facilities to inform customers of disposal bans and collection programs for mercury-added products. In addition, the law proposes to continue a mercury public education and outreach program and to continue an advisory committee on mercury pollution that reports annually to the legislature with recommendations on reducing mercury contamination and risk.

In October 2007, the **Great Lakes Regional Collaboration** (GLRC) released a draft *Mercury in Products Phase-Down Strategy*.²⁸ The GLRC was convened by federal agencies, Great Lakes governors, Great Lakes mayors, Great Lakes tribes and members of the Great Lakes States Congressional Delegation. The goal of this strategy is to reduce the use of mercury-containing products and to minimize mercury releases caused by remaining uses of mercury-containing products in the Great Lakes region by 2015. This strategy seeks to build on the experience and foundations of states, tribes and cities in the Great Lakes basin that have already passed laws or implemented programs to prevent pollution from mercury-containing products to accomplish the 2015 goal. The strategy recommends a wide range of policies, including sale bans and phase outs,

disposal regulations, public awareness and education programs, collection and end-of-life management for products, purchasing preferences, and labeling requirements. Some of the policy options will require legislative action, while others can be implemented by state, municipal or tribal agencies.

2.2 A National Mercury Elimination and Reduction Strategy

Based on the initiatives taken and progress that has been made in the EU and the US, Pollution Probe has been encouraging the various levels of government in Canada to develop and implement mercury elimination and reduction strategies.

In particular, Pollution Probe recommends that the Canadian government adopt the following domestic and international actions for a national mercury elimination and reduction strategy:

- Introducing regulations for mercury-containing products that would include phasing out or banning the sale of such products where mercury-free alternatives exist, mandatory labeling that includes mercury content as well as disposal requirements for existing mercury-containing products, banning the disposal of mercury-containing products from landfill or incineration, establishing recycling facilities to manage mercury-containing waste, and setting up accessible collection and recycling options for all Canadian citizens.
- Supporting the research and development needed to safely manage and recycle mercury from the waste stream.
- Reducing mercury supply through the safe storage of mercury decommissioned by industry and ensuring the safe long-term disposal of mercury surpluses and reservoirs, rather than allowing it to enter into the global market.
- Restricting mercury trade and banning mercury exports from Canada.
- Participating in global action through international activities and cooperation with other countries.
- Protecting against Canadian exposure through the further investigation of dietary exposure for women of child-bearing age and for children, and providing ongoing information to the public about mercury in food and products.
- Improving understanding through ongoing ecosystem monitoring and research to address gaps in mercury knowledge.

2.3 The Provincial Role in a Mercury Strategy

Many of the elements in the proposed national strategy can be adopted and carried out by provinces, either as a part of a national strategy or as independent provincial actions. While Pollution Probe hopes that the government of Canada will eventually adopt a national mercury elimination and reduction strategy, we do not want to see provinces that are ready to move ahead on mercury elimination and reduction wait for that to happen before they take action. Rather, similar to the progressive states in the US, Canadian provinces that are ready to take leadership on this issue should implement the parts of a national strategy that fall within their legislative authority.

The actions that Pollution Probe recommends provincial governments adopt in support of a comprehensive national mercury elimination and reduction strategy include:

- Closing coal-fired utilities or adding technology to reduce emissions by 90 per cent or greater;
- Phasing out or banning the sale of mercury-containing products where mercury-free alternatives exist, both in the residential and health care sectors;
- Establishing recycling infrastructure and facilities to safely manage mercury-containing waste;
- Increasing the collection and recycling of mercury-containing products from the residential sector, which will involve banning the disposal of mercury-containing products from landfill or incineration, setting up accessible collection and recycling options for all citizens, and providing ongoing awareness-raising information about mercury-containing products and the effects of mercury on human and ecosystem health;
- Working with the auto sector to reduce or eliminate the use of mercury in new vehicles (i.e., in headlamps and navigational devices), as well as to recycle the mercury from switches and ABS systems in existing vehicles at end-of life; and,
- Improving understanding through ongoing ecosystem monitoring and research to assess the effects of mercury control measures and to address gaps in knowledge of how mercury affects the environment and human health.

2.4 Recommendations for Ontario

Pollution Probe recommends that the government of Ontario take the following actions to reduce mercury use and emissions.

Coal-fired utilities – Pollution Probe supports the government of Ontario’s proposal for a legally binding regulation to close the Atikokan, Lambton, Nanticoke and Thunder Bay coal-fired facilities as soon as possible, but no later than December 31, 2014. We strongly support the closure of these facilities before the December 31, 2014 deadline and as soon as the possibility to do so exists. The Ontario Power Authority has estimated that a significant portion of electricity generation from Ontario’s coal-fired utilities could be phased out before the proposed closure date. The government of Ontario should therefore set legally binding dates for early reductions in mercury emissions from these facilities.

Banning mercury-containing products – In March 2007, Pollution Probe published a case study²⁹ on standards for mercury-containing products. The strategy looked at jurisdictions worldwide that have already banned or phased out non-essential mercury uses. These include the EU, which has banned a wide range of products that contain mercury, and a number of leading states in the US. As outlined in a legal analysis³⁰ commissioned by Pollution Probe in June 2005, Ontario has the legal authority to undertake similar initiatives in phasing out mercury-containing products. In particular, Section 175.1(b) of the *Environmental Protection Act* authorizes the Lieutenant Governor in Council to make regulations prohibiting, regulating or controlling the making, use, sale, display, advertising, transfer, transportation, operation, maintenance, storage, recycling, disposal, or discharge or any manner thereof of any product. This could include mercury-containing products. The government of Ontario should use its legal authority to phase out the sale, use and distribution of mercury-containing products, where alternatives exist. In parallel with this, Ontario should press the federal government to take leadership on a national level.

Establishing the recycling infrastructure and facilities to safely manage mercury-containing waste – In order to properly manage mercury-containing waste, the infrastructure and training to do so need to be developed. In North America, it is often the case that batteries are recycled at plants that do not collect mercury, which means the mercury is emitted to the atmosphere during the recycling process. In the EU, recycling companies have developed and installed the necessary technology to capture mercury from battery recycling. The government of Ontario needs to follow a similar approach and mandate the use of mercury removal technology by the recycling industry.

Increasing the collection and recycling of mercury-containing products –

While Pollution Probe commends the government of Ontario for the funding it has supplied to voluntary product collection programs, such as the Clean Air Foundation's SwitchOut and Switch the 'Stat programs, we believe that mandatory collection of existing mercury-containing products, either via industry take-back programs or municipal collection, will increase the recovery rate, as demonstrated by other jurisdictions (i.e., the EU and Taiwan) that have increased recycling rates through legislation and directives. In order to increase collection and recycling of mercury-containing waste, the government of Ontario needs to ban the disposal of mercury-containing products from landfill and incineration, set up accessible collection and recycling options for all citizens, and provide ongoing awareness-raising information about mercury-containing products and the effects of mercury on human and ecosystem health.

Part 3 – Reducing Emissions from Mercury-containing Products in the Residential Sector

As mentioned in Part 1, mercury is used in a variety of products because it is a good conductor of electricity and reacts predictably to temperature and pressure changes. However, reliable mercury-free alternatives are available for virtually all products that contain mercury. The one exception is fluorescent lamps, including compact fluorescent light bulbs (CFLs), in which mercury vapour is used to conduct electricity through the gaseous substance and light up the fluorescent particles. There is currently no alternative to the use of mercury for this application, although in the past two decades lamp manufacturers have reduced the amount of mercury used by nearly 75 per cent. As well, the development and increased use of new lighting technologies, such as light-emitting diodes (LEDs), offers the prospect of completely eliminating the use of mercury for certain lighting applications.

At the present time, neither Canada nor Ontario has regulations that ban or regulate mercury-containing products. While the federal government is in a consultative phase with proposed policy instruments to ban the sale, import and distribution of mercury-containing products, the regulation is not finalized and the timing for implementation is unknown. In the meantime, Pollution Probe stresses the need for an improved collection and recycling infrastructure to ensure that these products do not end up in the general waste stream where they will be incinerated or deposited to landfill.

3.1 Overview of Mercury-containing Product Categories

While all mercury-containing products are a concern in residential waste collection, this section focuses on four categories – mercury-containing thermometers, thermostats, fluorescent lamps and primary (or single use) dry cell batteries.

3.1.1 *Thermometers*

A typical mercury-containing fever thermometer contains approximately 0.7 grams of mercury, but larger thermometers can contain as much as 3 grams of mercury.

The use of mercury in thermometers remains one of the largest sources of mercury in Canadian commerce. Environment Canada estimates that 1.7 tonnes of mercury associated with fever thermometers is discarded each year in Canada.

Pollution Probe has estimated that a further 5 tonnes of mercury exists in fever thermometers in medicine cabinets around the country.³¹ The US EPA considers mercury thermometers to be one of the largest sources of mercury to the solid waste stream, estimated at 17 tons per year in the US.³² It is estimated that prior to 2005, thermometers contributed 25–30 tonnes of mercury to the EU waste stream each year.

Several types of mercury-free fever thermometers are commercially available in Canada, including digital electronic thermometers, glass gallium-indium-tin (galin-stan) thermometers and flexible forehead and ear canal thermometers.

3.1.2 *Thermostats*

A mercury-containing thermostat (or bimetal thermostat) contains an internal mercury switch that controls the flow of an electrical current. As it drops, the weight of the mercury moves the bimetal spring, creating a positive on/off switching action that can withstand millions of cycles without degradation of the contacts.

Mercury has been used in thermostats since the 1950s. A mercury-containing thermostat uses mercury in a sealed glass bulb. Each bulb contains approximately 3 grams of mercury. It is estimated that there are more than 50 million mercury-containing thermostats in homes across the United States.

Mercury-free thermostats include electronic models and snap switches. Electronic programmable thermostats add an energy conservation component by allowing for automatic adjustments while occupants are asleep or away from home.

3.1.3 *Mercury-containing Lamps*

Mercury-containing lamps include fluorescent lamps (such as tubes and compact fluorescent light bulbs (CFLs)), high intensity discharge (HID) lamps (such as high pressure sodium (HPS), mercury vapour and metal halide lamps) and ultraviolet (UV) lamps.

A typical fluorescent lamp is composed of a phosphor-coated glass tube with electrodes located at either end. The tube contains a small amount of mercury in vapour form. When a voltage is applied to the lamp, the electrodes energize the mercury vapour, causing it to emit UV energy. The phosphor coating absorbs the UV energy, causing the phosphor to fluoresce and emit visible light. Without the mercury vapour to produce UV energy, there would be no light. The amount of

mercury required varies by lamp type (see Table 1), manufacturer, date of manufacture and manufacturing plant.³³

Table 1: Mercury Content of Specific Mercury-containing Lamps

Lamp type	Hg content (mg)
Compact Fluorescent Lamps	1-25
Linear Fluorescent Lamps:	
Mercury reduced	3-12
Non-mercury reduced	10-50
Fluorescent U-tubes	3-12
Mercury Vapour Lamps:	
75-watt	25
1,500-watt	225
Metal Halide Lamps:	
75-watt	25
1,500-watt	225
Sodium Vapour Lamps:	
35-watt	20
1,000-watt	145

Source: Environment Canada's Mercury and the Environment Program.

Over the past two decades, the mercury content in fluorescent bulbs has steadily decreased. Today, the average four-foot linear fluorescent lamp contains less than 75 per cent of the mercury that the same lamp would have contained in 1985.

In 2005, Pollution Probe published a report³⁴ that found that Canada's recovery rate for mercury-containing lamps is only seven per cent – only 4.3 million mercury-containing lamps out of the 60 million sold annually are recycled. In contrast, the 2006 target recovery rate for mercury-containing lighting products in the EU was 80 per cent. And the US has set a goal to raise its national recycling rate for mercury-containing lamps from the 2005 level of 24 per cent to 80 per cent by 2009. Canada has no such goal.

Currently, there are no mercury-free alternatives to most uses of fluorescent lamps. In some cases, ordinary glow lights, low sodium vapour tubes, or high energy long-lasting lights may replace them; however, mercury-containing lamps are two to three times more energy efficient than incandescent lamps. As well, in some cases mercury-free lamps cannot be substituted for mercury-containing lamps because of incompatibilities of light output, shape, color, life, electrical characteristics and excessive heat, or because the increased energy consumption of the mercury-free lamps may violate energy codes and overload electrical circuits.³⁵

A potential alternative for CFLs in the future is light emitting diodes (LEDs), which do not contain mercury, burn cool, are sturdy and last up to 60,000 hours, which is 10 times longer than CFLs last.³⁶

3.1.4 Primary Use Dry Cell Batteries

Primary, or single use, dry cell batteries are batteries that are composed of one or more cell, including case, terminals and markings. Secondary batteries are defined as batteries that are designed to be recharged.

Unlike the EU or US, Canada does not impose content restrictions for batteries sold within the country. However, Canadian jurisdictions have benefited from legislation enacted in the US, which has forced the following actions:

- Elimination of intentionally introduced mercury in alkaline-manganese and zinc-carbon batteries;
- Discontinued manufacturing of button cell mercuric-oxide batteries;
- Low levels of mercury use in alkaline-manganese button cell batteries; and,
- Voluntary collection of end-of-life secondary (rechargeable) batteries.

As a direct consequence of the US' 1996 *Battery Act*, the manufacture of mercury oxide batteries was discontinued in Canada as of January 1996.³⁷ However, mercury is still found in some alkaline-manganese batteries and most types of button cell batteries that are sold in Canada. Table 2 shows the variance in mercury content by type of button cell batteries sold by US manufacturers.

Table 2: Average Mercury Content of Button Cell Batteries

Type of Button Cell Battery	Average Mercury Content (mg)	Proportion of Total Button Cell Batteries Sold (%)
Zinc Air	8.5	86
Silver Oxide	2.5	9
Alkaline	10.8	5

Batteries represent approximately two per cent of the current mercury consumption in the US. However, the National Electrical Manufacturers Association (NEMA) estimates the average level of mercury in alkaline batteries will continue to decline by about 50 per cent every two years, with most of them to be out of the waste stream by 2010.³⁸ In March 2006, the North American battery industry announced an initiative to eliminate mercury use in button cell batteries by June 30, 2011.

Another concern with batteries is counterfeit batteries that do not meet mercury limits, even though they are marketed as if they do.³⁹ Some companies and

retailers import batteries from non-North American manufacturing sources and these batteries may contain mercury at higher levels.⁴⁰

Novelty items that contain non-removable mercury-containing batteries are also a problem. In 2004, the New England Zero Mercury Coalition released test results which showed that a number of toys purchased at large retail stores were powered with non-removable mercury batteries.⁴¹

Batteries sold in Canada are supposed to be labeled according to the International Electrotechnical Commission Standard with at least the following information – use-related instructions to prevent hazards and promote maximum battery life and utility, as well as safety-related prohibitions.⁴²

In April 2007, Environment Canada released the *Canadian Consumer Battery Baseline Study*,⁴³ which provided the first national estimate of the amount of heavy metals, such as mercury, cadmium and lead, that are potentially released into the environment through the disposal of batteries. The study notes that the current rate of battery recycling is very low.

The total number of primary use dry cell batteries sold in Ontario annually is estimated to be 175 million batteries (with an overall weight of 5,040 tonnes).⁴⁴ The combined annual collection of primary dry cell batteries from municipal and non-municipal sources in Ontario is estimated to be 225 tonnes,⁴⁵ which is a collection rate of 4.5 per cent.

3.2 Current Situation in Canada

While the Government of Canada does not have regulations pertaining to mercury-containing products, it does have three statutes that are relevant to the control of toxic chemicals in consumer products. These are the *Canadian Environmental Protection Act (CEPA)*, the *Hazardous Products Act* and the *Food and Drugs Act*.

Under CEPA, the federal government has clear authority to ban or regulate products containing substances that are listed on the Toxic Substances List (TSL). Mercury is item 8 on the TSL.⁴⁶

In December 2006, the federal government announced its intention to develop a *Risk Management Strategy (RMS) for Mercury-containing Products*. According to Environment Canada, “the tool deemed most appropriate for managing mercury releases from mercury-containing products, to a level consistent with the risk

management objective, is a regulation under section 93 of CEPA 1999 with the following potential components:

- Prohibition of mercury-containing products for which mercury-free alternatives exist.
- Prohibition of mercury use in new products, not currently available on the Canadian market, with possible exemptions.
- Mercury content limits in products for which mercury-free alternatives do not exist (novelty items excluded).
- Extended producer responsibility requirements for end-of-life mercury-containing products.
- Labeling requirements for mercury-containing products."⁴⁷

In December 2007, the federal government released a consultation document that proposes policy instruments to ban the sale, import and distribution of mercury-containing products, excluding mercury-containing dental amalgam and lamps. The regulation is not yet finalized and the timing for implementation is unknown. In the meantime, consultative meetings have been scheduled for February 2008 in Toronto and Vancouver, and public comments to the consultation document⁴⁸ will be accepted until March 7, 2008.

The *Hazardous Products Act* gives the federal government broad powers to prohibit or restrict (regulate) products that are considered to be a danger to the health or safety of the public. Among other things, a product may be prohibited or restricted if it contains a poisonous or toxic substance, such as mercury. A product becomes prohibited or restricted by an order made by the Governor in Council (i.e., by the federal Cabinet). The Order adds the product to either Part 1 or Part 2 of Schedule 1 to the Act. Anything in Part 1 of Schedule 1 is a prohibited product and anything in Part 2 of Schedule 1 is a restricted product. If a product is prohibited, no person shall advertise, sell or import it in Canada. If a product is restricted, its advertisement, sale or import can be controlled by regulations.⁴⁹ But no mercury regulations have been issued for any products under this Act.

The *Food and Drugs Act* provides for the prohibition and regulation of medical devices, including measuring devices, such as medical or veterinary thermometers or sphygmomanometers. It authorizes the Governor in Council to control devices that pose an unacceptable risk to human health. *Medical Devices Regulations* also exist under the *Food and Drugs Act* and provide some authority for the Governor in Council to restrict the sale of mercury thermometers if the evidence of danger to human health is sufficiently strong and if adequate alternatives are available to do the same job at lower risk.⁵⁰

Another tool that has been used to manage mercury in products is the *Canada-wide Standards* (CWSs). Since 1998, the Canadian Council of Ministers of the

Environment has set CWSs for mercury emissions from base-metal smelters, waste incinerators and coal-fired power plants, as well as mercury released to the environment from mercury-containing lamps and dental amalgam waste.⁵¹

Despite the initiatives noted above, Canada lags leading jurisdictions, such as the EU and certain US states, in mercury control policies and regulations.

3.3 Current Situation in Ontario

Ontario has a number of regulations related to mercury-containing products.

As stated in section 2.4, Section 175.1(b) of the *Environmental Protection Act (EPA)*, the Lieutenant Governor in Council is authorized to make regulations prohibiting, regulating or controlling the making, use, sale, display, advertising, transfer, transportation, operation, maintenance, storage, recycling, disposal, or discharge or any manner thereof of any product. This could include mercury-containing products.⁵²

Regulation 347 under the *EPA* is a general regulation concerning waste management. It regulates the incineration of both municipal solid waste and hazardous waste. New municipal solid waste incinerators were banned in Ontario from 1992 to 1995 under Regulation 347. The regulation sets out a number of broad requirements, including location of the incineration site; separation and separate disposal of incinerator ash from fly-ash that is hazardous waste; and design and capacity of the incinerator to efficiently process the expected quantities of waste so that a minimum volume of residue is obtained and a minimum of air pollution results.⁵³

In 1996, the Ontario Ministry of the Environment developed *Guideline A-7 – Combustion and Air Pollution Control Requirements for New Municipal Waste Incinerators*. Guideline A-7 sets out technology-based emission limits for dioxins and furans, cadmium, lead, mercury, particulate matter and acid gases. There is a similar guideline for biomedical waste incinerators, but no comparable guideline for hazardous waste incinerators.⁵⁴

Another MOE policy, *Guideline A-8 – Guideline for the Implementation of Canada-wide Standards for Emissions of Mercury and of Dioxins and Furans and Monitoring and Reporting Requirements for Municipal Waste Incinerators, Biomedical Waste Incinerators, Sewage Sludge Incinerators, Hazardous Waste Incinerators, Steel Manufacturing Electric Arc Furnaces and Iron Sintering Plants* was introduced in 2004 and applies to new and existing incinerators and requires that all new

incinerators show compliance with mercury, dioxin and furan limits within six months of starting up.⁵⁵

The purpose of the *Waste Diversion Act (WDA)* is “to promote the reduction, reuse and recycling of waste and to provide for the development, implementation and operation of waste diversion programs.”⁵⁶

3.3.1 Current Municipal Hazardous or Special Waste (MHSW) Program

In Ontario, mercury-containing products are considered municipal hazardous or special waste (MHSW). Municipal collection and recycling programs for hazardous and special waste have existed in Ontario since the late 1980s. As there is currently no provincial legislation that requires municipalities to handle these wastes, each municipal program is voluntary and unique to local considerations, including geography and demographics.

As of 2005, 89 Ontario municipalities operated 98 depots and 169 collection events for MHSW, which served 11.4 million residents, or approximately 4.4 million households.⁵⁷ The current level of MHSW collection service provided by Ontario municipalities ranges from no service at all to annual single day collection events to year-round depots that close only on statutory holidays. Although year-round depots are located in all areas of the province, the majority of these are in south-central Ontario in the Greater Toronto Area (GTA). Outside of the GTA, many depots operate seasonally (e.g., May through October) and a number of depot-based programs, particularly those that serve large geographical areas, supplement depot collection using single day events.⁵⁸

According to a January 2006 report produced by the Association of Municipal Recycling Coordinators (AMRC),⁵⁹ the constraints to the public of the existing MHSW program include low frequency of service, long distance to collection event and high cost to participate. On the other hand, the challenges faced by municipalities that operate MHSW programs include financial constraints, regulatory requirements, liability concerns, training shortfalls, regional economics and political issues.

Waste Diversion Ontario (WDO) operates a provincial data call that requires municipalities to record and report the MHSW they collect. The only mercury-containing product category for which data are currently reported is fluorescent lamps. In 2005, more than 34 tonnes of lamps were collected by Ontario municipalities. In 2004, the weight of lamps collected was approximately 22 tonnes, and in 2003, the weight was approximately 13 tonnes.

3.3.2 Changes to the MHSW Program – Proposed Plan

In December 2006, WDO received a letter from the Minister of the Environment requesting the development of a diversion program for MHSW and directing Stewardship Ontario⁶⁰ to act as the Industry Funding Organization. The Minister's letter outlined program requirements and requested a consultation plan.

On May 25, 2007, the Minister of the Environment received the first phase of the MHSW Program Plan, along with a consultation document from WDO. The proposed plan was posted for a 30-day public review and comment period ending July 11, 2007. Comments received during the comment period are considered as part of the decision-making process by the Ministry of the Environment.

The MHSW program targets waste from homes and small businesses and focuses on the 3Rs – reduction, reuse and recycling – to divert these wastes from disposal. The program encompasses materials that are introduced as products into the Ontario market place, either as products that are sold as end products to consumers or as products that are included as components of products sold to consumers.

The MHSW Program Plan contains 16 product categories, divided into two phases. The mercury-containing products included in the plan are primary dry cell batteries in Phase 1 and three product categories in Phase 2 – fluorescent light bulbs and tubes; switches that contain mercury; and thermostats, thermometers, barometers, or other measuring devices that contain mercury.

As of February 2008, the timing, targets and details concerning the development and publication of the proposed MHSW program were not specified.

3.3.3 Waste Electrical and Electronic Equipment Program

On December 14, 2004, the Minister of the Environment filed the Waste Electrical and Electronic Equipment (WEEE) regulation under the *Waste Diversion Act*.⁶¹ This regulation designates seven categories of electronic and electrical equipment as waste, and targets more than 200 items. Many of the products designated contain primary dry cell batteries, which require proper end-of-life management under the WEEE regulation.

3.4 Current Situation in Other Provinces

A number of Canadian provinces have developed programs to manage the collection and recycling of mercury-containing products.

Alberta operates the “Partners in Recycling” program, which promotes the recycling of fluorescent lamps. It is a joint voluntary initiative among Alberta Environment, Northern CARE (Coordinated Action for Recycling), City of Calgary, Recycling Council of Alberta and Alberta Plastics Recycling Association. The 2002 province-wide recycling rate for fluorescent bulbs through this program was 23 per cent.

The Island Waste Management Corporation in **Prince Edward Island**, in partnership with 24 participating grocery retailers, introduced the “Re-Store Your Batteries” program in July 2005. The program allows consumers to return alkaline and lithium batteries of various sizes, as well as button cell batteries to participating stores, at no charge. The batteries are then shipped to the mainland to be recycled.⁶²

Manitoba has proposed legislation that would establish collection and disposal systems for household hazardous wastes. It uses a product stewardship approach that would place primary responsibility for managing the designated wastes on the manufacturers and sellers of products.

Alberta and **Saskatchewan** have WEEE regulations in place, and the remaining provinces and territories have announced plans to bring WEEE programs on-line within the next two to three years.

3.5 Activity in the United States

In July 2006, the US EPA published a *Roadmap for Mercury*.⁶³ The goal of the Roadmap is to reduce the risks associated with mercury, including promoting the reduction of mercury use in products and encouraging the development of mercury-free alternatives.

Many states have introduced regulatory measures to manage mercury in products, which range from banning the sale or disposal of products that contain mercury to labeling requirements. In addition to legislation, many states and local agencies have developed collection and/or exchange programs for mercury-containing products. Some of these programs include free collection and replacement of mercury-containing products, while others have employed a bounty approach to the collection of mercury-containing devices. In many

instances, the collection programs involve collaboration among state agencies, communities and businesses.⁶⁴

Thermometers

There is no federal law in the US that deals directly with mercury-containing thermometers. However, as shown in Table 3, a number of states have laws and ordinances pertaining to the manufacturing, selling, importing, collecting and/or recycling of mercury-containing thermometers.

Table 3: US State Action for Mercury-containing Thermometers

State	Actions Taken
California	Prohibits the sale of mercury-containing fever thermometers (except with written prescription).
Connecticut	Bans the sale and distribution of mercury-containing fever thermometers, effective January 1, 2003.
Delaware	Has a resolution that supports the Delaware Nurses Association sponsoring a mercury thermometer exchange week. The resolution further encourages retail establishments within the state to voluntarily stop stocking and selling mercury thermometers.
Illinois	Prohibits the sale, distribution and manufacture of mercury fever thermometers, effective July 1, 2004, exempting thermometers sold or provided to be used in health care facilities.
Indiana	Limits the circumstances under which a mercury fever thermometer may be sold or supplied to an individual after July 1, 2003.
Louisiana	Bans the sale of mercury thermometers. Requires labeling of mercury-added products and manufacturer notification to the state of mercury-added products and related provisions.
Maine	Bans the sale of mercury fever thermometers. Requires manufacturers to provide written notice to the state before offering a mercury-added product for sale in Maine. Requires manufacturers who sell products to hospitals to provide a certificate of mercury content upon hospital request.
Maryland	Prohibits marketers from selling or providing to consumers, beginning October 1, 2002, fever thermometers containing mercury, except under specified circumstances.
Massachusetts	Prohibits the sale of mercury fever thermometers, except by prescription or mercury emergency.
Michigan	Prohibits the sale of all types of mercury thermometers, with minor exemptions, effective October 3, 2002.

Minnesota	Prohibits the sale of almost all types of mercury thermometers, effective June 2001.
Nebraska	Prohibits the sale and distribution of liquid mercury thermometers.
New Hampshire	Bans the sale of mercury thermometers without a prescription.
New Jersey	Bans the sale of mercury thermometers.
New York	Bans the sale of mercury fever thermometers, except by prescription signed by a physician, effective January 1, 2005.
Oregon	Prohibits the sale of mercury fever thermometers.
Rhode Island	Bans the sale of mercury-containing fever thermometers, except with a prescription. Prohibits the landfill disposal of mercury and provides for the collection and proper handling of mercury.
Vermont	Bans the sale of mercury-added thermometers.
Washington	Bans the sale of mercury thermometers, effective January 2006, with some exceptions.

In January 2001, the town of Freeport, Maine, was the first municipality to ban the sale of mercury fever thermometers. The city council in Duluth, Minnesota, unanimously adopted an ordinance in September 2002 to ban the sale of mercury basal and fever thermometers. In Wisconsin, one county and 12 villages and cities throughout the state have adopted local ordinances banning the sale of mercury fever thermometers. For additional US municipalities that have adopted ordinances banning the sale of mercury thermometers, see www.noharm.org/us/mercury/ordinances.

Thermostats

In the US, mercury-containing thermostats fall under the universal waste rule (which was described in section 2.1.2 of this report), effective May 1995. In addition, as shown in Table 4, a number of individual states have laws pertaining to the manufacturing, selling, importing, collecting and/or recycling of mercury-containing thermostats.

Table 4: US State Action for Mercury-containing Thermostats

State	Actions Taken
California	Bans the sale of mercury thermostats, effective January 1, 2006, with exemptions for blind or visually impaired people or in manufacturing or industrial purposes. Prohibits them from being disposed of in landfills.
Connecticut	Implements a phase out of mercury-containing thermostats, effective July 1, 2006. Bans the sale and distribution, requires product labeling and requires manufacturers to initiate collection programs.
Illinois	Requires the state environment agency to report to the Governor and the General Assembly by July 1, 2006, concerning programs to reduce and recycle mercury from mercury thermostats.
Maine	Bans mercury thermostats, effective January 1, 2006. Requires that thermostat wholesalers serve as collection points for mercury thermostats. The wholesaler collection requirement builds on an existing Maine law, enacted in 2000, that requires thermostat manufacturers to provide sufficient incentives and information to ensure that the mercury is properly handled when mercury thermostats are removed from service. Manufactures have attempted to satisfy this requirement by placing collection bins at participating wholesale outlets. However, only 11 of the state’s 31 wholesale outlets had agreed to participate voluntarily as of January 2004. “An Act To Protect Maine Families and the Environment by Improving the Collection and Recycling of Mercury Thermostats” requires that beginning January 1, 2007 manufacturers of thermostats containing mercury that are sold in the state pay a minimum of \$5 for each thermostat containing mercury brought to a state-approved collection site. It also requires that manufacturers of thermostats containing mercury that are sold in the state report annually to the Department of Environmental Protection on the results of the thermostat collection and recycling efforts.
Maryland	Prohibits the sale or provision of thermostats containing mercury to consumers. Requires the Department of the Environment to report to the Governor and specified legislative committees on or before October 1, 2007, relating to the statewide collection, reclamation and recycling of all products containing mercury.
Massachusetts	Bans the sale or offer to sell of thermostats effective May 1, 2008.
Michigan	Requires labeling of thermostats as of January 1, 2006, and bans

	their sale as of January 1, 2010.
Minnesota	Prohibits the disposal of mercury thermostats into a solid waste processing or disposal facility unless the mercury has been removed for reuse or recycling.
New Hampshire	Requires that manufacturers of mercury-added thermostats notify the state about the quantity of mercury contained in their products.
New York	Bans the intentional disposal of mercury-added consumer products in solid waste landfills and incinerators, effective July 12, 2005, and requires an educational campaign on compliance with this requirement.
Oregon	Prohibits installation of thermostats containing mercury in commercial or residential building, but provides exceptions. Prohibits the sale of thermostats containing mercury, but provides exceptions.
Rhode Island	Phases-out mercury-added fabricated products with a mercury content of one gram, or mercury-added formulated products with a mercury content greater than 250 parts per million, effective January 1, 2006.
Vermont	Bans the sale of mercury-added thermostats. On March 23, 2007, the Vermont House passed a bill that creates a \$5 incentive for contractors and technicians to return thermostats containing mercury back to the wholesaler for safe disposal.
Washington	Bans the installation or reinstallation of mercury thermostats, effective January 2006, unless the manufacturer of the thermostat participates in a thermostat recycling program.

The city council in Duluth, Minnesota, unanimously adopted an ordinance in September 2002 to ban the sale or installation of mercury thermostats. In May 2002, Dane County, Wisconsin, adopted an ordinance to require retailers of mercury thermostats to take them back from consumers for recycling. The city of Madison, Wisconsin, adopted an ordinance that requires retailers of mercury thermostats to offer to take them back from customers for recycling.

Mercury-containing Lamps

Mercury-containing lamps were added to the federal universal waste rule in July 1999. While the federal regulations mandate the recycling of fluorescent lamps, they exempt households and other small users. Table 5 shows the laws that have been passed in various states pertaining to mercury-containing lamps.

Table 5: US State Action for Mercury-containing Lamps

State	Actions Taken
Arkansas	“The Shielded Outdoor Lighting Act” requires the Department of Environmental Quality to promulgate regulations to prohibit the knowing disposal of mercury-containing lamps into landfills.
California	Prohibits the disposal of fluorescent lamps as municipal waste.
Connecticut	Has established a working group to evaluate the uses of lamps with mercury content between 100 milligrams and one gram, and alternatives to those lamps, and to make recommendations regarding regulation by January 1, 2005. Extends the exemption date for phase out requirements for lamps to 2013. Requires labeling of mercury-added lamps.
Maine	“An Act to Amend the Law on Mercury-added Products” requires labeling of mercury-containing lamps, effective January 1, 2006.
Massachusetts	Requires manufacturers of mercury-added lamps to implement a plan to educate users about proper recycling options for end-of-life lamps and to meet specific recycling targets that increase over time.
Minnesota	Requires that any information regarding fluorescent lamps that is supplied by a utility to a customer (i.e., via mail, the utility’s website or contained in advertising) must state that the lamps contain mercury and that it is illegal to place them in garbage, as well as provide a toll-free telephone number or website that customers can access to learn how to lawfully dispose of the lamps. Prohibits the disposal of fluorescent or HID lamps in solid waste or a solid waste facility other than a household hazardous waste collection or recycling facility.
New Hampshire	Requires that manufacturers of mercury-added fluorescent lamps notify the state about the quantity of mercury contained in their products.
Rhode Island	Exempts HID lamps, including metal halide, high pressure sodium and mercury vapour lamps from phase out requirements.
Washington	Requires the labeling of fluorescent lamps by January 1, 2004.

The city of Minneapolis, Minnesota, has adopted an ordinance related to point-of-sale signage for mercury-containing lamps, which requires retailers to post information that has been approved by city environmental services stating that fluorescent bulbs contain mercury and indicating how they can be recycled. In May 2002, Dane County, Wisconsin, adopted an ordinance to require retailers of fluorescent lamps to take them back from consumers for recycling. Superior,

Wisconsin, has banned the landfilling of fluorescent light bulbs from all sources and included them in the city's mandatory recycling program. Marinette, Wisconsin has adopted ordinances to both ban placing fluorescent lamps in solid waste and to remove and recycle all mercury-containing products prior to the demolition of buildings. Madison, Wisconsin, adopted an ordinance that requires retailers of fluorescent lamps to offer to take them back for recycling from customers.

Primary Dry Cell Batteries

Since the early 1990s, the US government and several states have taken steps to eliminate or reduce mercury use in primary batteries. The threat of legislation restricting mercury use in primary batteries encouraged the battery industry to take early action to eliminate mercury in alkaline batteries (with the exception of alkaline-manganese button cell batteries) and zinc-carbon batteries. Consequently, the manufacture of these types of batteries in North America has been mercury-free since 1993.

In May 1995, the US EPA promulgated the final universal waste rule establishing collection and management requirements for universal waste batteries.

The 1996 *Mercury-Containing and Rechargeable Battery Management Act* (known as the Battery Act) prohibited the sale of alkaline-manganese and zinc-carbon batteries containing intentionally introduced mercury and restricted the use of mercury in alkaline-manganese button cell batteries to concentrations of 25 milligrams or less. The Battery Act also prohibited the sale of button cell mercuric-oxide batteries.

Most US states permit alkaline batteries purchased after 1993 to be placed in the garbage, and only a handful of states ban mercuric-oxide batteries from disposal. Table 6 shows the laws that have been passed in various states pertaining to mercury-containing batteries.

Table 6: US State Action for Mercury-containing Batteries

State	Actions Taken
California	Bans mercury-containing batteries from disposal.
Connecticut	Requires collection of button cell batteries. Bans novelty items that contain non-removable mercury batteries, effective July 1, 2003, under <i>An Act Concerning Mercury Education and Reduction</i> .
Maine	Bans the sale of novelty items with batteries containing mercury. Enacted legislation in 2004 requiring the review of mercury-containing batteries, especially button cell batteries. The legislation directed the Department of Environmental Protection to assess:

	<ul style="list-style-type: none"> • the need for a collection program targeting button cell batteries; • labeling requirements; • whether button cell batteries should be prohibited in novelty items and other uses; and, • the availability of alternative non-mercury button cell batteries. <p>Effective January 1, 2007, the disposal of button cell batteries in solid waste disposal facilities is prohibited. Such batteries must be packaged with information regarding proper disposal, and the sale of novelty items that contain mercury batteries is banned.</p>
Minnesota	Bans the disposal of mercury-containing batteries.
New Hampshire	Passed a law in 2000 that bans the sale of novelty items containing mercury. The law was updated in the 2005 legislative session.
New York	Enacted a mercury law in 2004 that requires product labeling, disposal bans and a ban on the sale of mercury-added novelty items, such as toys, effective January 1, 2005. Bans mercury-containing products from incineration.
Vermont	Requires the collection and recycling of mercury-containing batteries.

3.6 European Activity

Because European solid waste is usually incinerated, rather than landfilled, European governments have had to confront the problem of mercury from discarded products for some time. As described in section 2.1.1, the EU passed the Directive on Waste Electrical and Electronic Equipment (WEEE) in 2003, which addresses the take-back of such equipment. The Restriction on Hazardous Substances Directive (RoHS), which accompanies the WEEE Directive, “bans the use of heavy metals and brominated fire retardants in the manufacture of electrical and electronic equipment.”⁶⁵

The following actions from the EU mercury strategy relate directly to mercury-containing products:

Action 7 – The Commission proposed an amendment to restrict the marketing for consumer and health care use of non-electrical or electronic measuring and control equipment containing mercury.

Action 8 – The Commission will further study the remaining products and applications in the EU that use mercury. Any remaining uses may be subject to authorization and consideration of substitution under the new REACH Regulation.

Action 10 – The Commission will undertake further study of the fate of mercury in products already circulating in society.

Thermometers

Legislation banning the EU-wide sale of mercury thermometers to the health care sector and the general public was proposed in February 2006. On July 10, 2007, the European Parliament approved a ban on non-electrical mercury thermometers for general sale to the public,⁶⁶ and in October 2007, these rules entered into force.⁶⁷ Under the new rules member states must ban mercury in all fever thermometers effective October 2008.

Thermostats

Thermostats are considered as electric and electronic appliances; however, they do not fall under the scope of the RoHS Directive. Equipment that falls under categories 8 and 9 of the WEEE Directive (which includes medical equipment and monitoring and control equipment) is currently excluded from the scope of the RoHS Directive, but there is a review underway to determine the possibility of including such equipment. A report was prepared in 2006 and is available at http://ec.europa.eu/environment/waste/weee/pdf/era_study_final_report.pdf

Mercury-containing Lamps

The WEEE Directive requires producers to set up collection systems for electrical and electronic waste from households and other end users. The 2006 target recovery rate for lighting products under the WEEE Directive was 80 per cent.⁶⁸ Germany has already attained this rate. Other European countries, such as Netherlands, Switzerland and Austria, have recycling rates greater than 50 per cent and, though not yet in compliance, are well on their way to meeting the 2006 target.

The RoHS Exempted Applications guidelines designate the acceptable amounts of mercury in fluorescent lamps, as follows:

- Compact fluorescent lamps (CFLs) – no more than 5 mg of mercury per lamp.
- Straight fluorescent lamps – no more than 10 mg per halophosphate lamp, no more than 5 mg per triphosphate lamp with a normal lifetime, and no more than 8 mg per triphosphate lamp with a long lifetime.

The RoHS Directive does not appear to include restrictions on the use of mercury in fluorescent lamps for special purposes (i.e., black light lamps, disinfection lamps, medical/therapy lamps and pet care lamps), HID lamps, and circular and U-shaped fluorescent lamps.

Another regulatory tool for mercury-containing lamps in the EU is the CE mark, which is a mandatory label for certain product groups to indicate conformity with the essential health and safety requirements set out in European directives. The letters “CE” are an abbreviation of Conformité Européenne (French for European conformity). The CE mark is applicable to many product categories, such as medical devices, machinery, toys, electrical equipment and measuring equipment, and it is mandatory for CFLs and straight fluorescent lamps to have the CE mark.

Without the CE marking, and thus without complying with the provisions of the directives, products may not be placed on the market or put into service in the fifteen member states of the EU, as well as Norway, Iceland and Liechtenstein. If a product meets the provisions of the applicable directives, and the CE mark is affixed to the product, these countries may not prohibit, restrict or impede the placing of it on the market. For further information on CE marking, see www.cemarking.net.

Primary Dry Cell Batteries

The WEEE Directive requires that any WEEE product containing batteries must have the batteries removed prior to recycling of the product. This directive defers to the Battery Directive for proper management of the spent batteries. Despite targeting the hazardous substances found in batteries (i.e., cadmium, lead and mercury), the RoHS Directive does not apply to batteries, but refers to the Battery Directive for management of these hazardous substances.

The purpose of the Battery Directive, which was adopted in March 1991 and followed by three amended versions, is to establish measures for proper recovery, treatment and disposal of waste batteries and to restrict the sale of designated batteries throughout the EU. The first amendment to the 1991 Battery Directive occurred in 1993 and required that all batteries sold in the EU after January 1, 1994 be marked with a logo showing special collection requirements and heavy metal content. This drove the voluntary removal of mercury as of 1994. The second amendment, in 1998, limited the mercury content of batteries sold in the European market and required member states to ban by January 1, 2000 the following – batteries containing more than five ppm of mercury by weight and button cell batteries containing more than two per cent of mercury by weight.

Under the Battery Directive, member countries were given the responsibility of establishing their own collection programs, which resulted in the implementation of a wide array of different collection programs that targeted different battery types and had different recovery rates. In response to the

fractured approach by member states, the EU further amended the Battery Directive in 2006 to establish the following collection and diversion targets:

- a minimum collection target for each country in the EU of 25 per cent of all spent primary batteries after four years and 45 per cent after eight years; and,
- a 50 per cent diversion target for collected primary batteries, meaning that 50 per cent of the total weight of material collected must be recovered for recycling purposes.

The following collection rates have been reported by European countries that have been operating battery recycling programs (the programs typically include primary and secondary batteries):⁶⁹

- Belgium: operating for 9 years – 56 per cent
- Austria: operating for 14 years – 41 per cent
- Germany: operating for 6 years – 36 per cent
- France: operating for 4 years – 21 per cent
- Poland: operating for 2 years – 7 per cent⁷⁰

As stated earlier in the report, battery recycling companies in the EU have installed technologies to capture mercury released during the recycling process, which better equips them to handle illegal imports and counterfeit batteries that may contain mercury.

3.7 Other International Activity

In 2002, **Taiwan** implemented a compulsory fluorescent lamp recycling program, and as of 2005 had a collection rate of approximately 87 per cent.⁷¹ Beginning November 2004, citizens of Taiwan were able to recycle used fluorescent tubes in any of 2,000 shops island-wide that sell the lamps. Shop owners who fail to cooperate with the recycling project are fined between NT\$60,000 and NT\$300,000 (\$2,000–\$11,000 CDN).⁷²

Taiwan is also taking action on batteries through the Environmental Protection Administration (EPA), which announced that beginning September 2006, the manufacture, importation and sale of zinc-manganese and non-button cell alkaline-manganese batteries with a mercury content exceeding five ppm are prohibited. Anyone found manufacturing or importing non-compliant batteries is subject to fines ranging from NT\$60,000 and NT\$300,000 (\$2,000–\$11,000 CDN). Tests carried out in 2005 by the Taiwanese EPA showed that approximately 10 per cent of primary dry cell batteries on the market had a mercury level that exceeded five ppm, and that some batteries imported from China had mercury levels as high as 848 times that level.

In May 2003, the **Korean** Ministry of Environment amended the *Act on the Promotion of Saving and Recycling of Resources* in an effort to expand and improve the Extended Producer Responsibility (EPR) system, which came into effect in 2006.⁷³ The EPR system includes a total of 18 items, one of which is fluorescent lamps. Under the Korean EPR system, producers of the designated items receive mandatory recycling targets for their specific EPR item.

In February 2007, **Australia** became the first nation to announce its intentions to ban traditional light bulbs, requiring that consumers and businesses install high efficiency lighting to cut greenhouse gas emissions. The Australian government is currently examining the need for a national recycling scheme for CFLs and other fluorescent lamps, and is providing information about proper disposal options to the public via the following website www.environment.gov.au/settlements/waste/lamp-mercury.html.

3.8 NGO- or Industry-led Initiatives

Health Care Without Harm (HCWH), an international coalition of more than 400 organizations in 52 countries, has been working since the mid-1990s to promote the reduction and phase out of sources of mercury pollution from the health care sector.⁷⁴ Their work has focused on promoting the phase out of mercury-containing health care devices where reliable and affordable alternatives exist. HCWH's work on mercury began in the United States with mercury thermometer exchange campaigns and related efforts to foster local and state legislation. Building on this work, HCWH developed relationships with major medical device manufacturers and entered into a formal collaboration with the American Hospitals Association, the American Nurses Association and the US EPA. Currently, more than 4,000 health care facilities in the US have pledged to become mercury-free. HCWH is pursuing similar work in the EU, and is increasing its efforts in developing countries and countries with economies in transition.

In 2004, the **Detroit River Canadian Cleanup** (DRCC) held a mercury collection program for residents of Windsor and Essex County, Ontario. The DRCC partnered with the City of Windsor, Town of LaSalle, Environment Canada, Ontario Ministry of the Environment and the Essex-Windsor Solid Waste Authority to collect mercury from household items, such as thermostats, thermometers and CFLs. The project, which collected approximately 90 kilograms of mercury, has been expanded to educate business owners about the steps they can take to ensure that they are not contributing mercury to the environment.⁷⁵

In the US, the **Thermostat Recycling Corporation** (TRC), a not-for-profit corporation owned by three NEMA member companies – Honeywell, General Electric and White Rodgers – and Nordyne Inc., facilitates the collection of all brands of used, wall-mounted mercury-switch thermostats. Approximately 1,400 wholesale suppliers of thermostats and 225 heating, ventilation, and air conditioning (HVAC) contractors participate in the TRC program. Each wholesaler or contractor that joins the program receives a protective storage bin for a one-time cost of \$25. When the bins are full, participants send them to the TRC's recovery center where the switches are removed and sent to a mercury recycling facility. From its inception in January 1998 through the end of 2006, the TRC program has collected more than 534,000 mercury-switch thermostats and thereby recovered approximately 2,200 kilograms of mercury.

In Canada, the **Clean Air Foundation**, a not-for-profit organization that manages public engagement programs, operates the Switch the 'Stat program.⁷⁶ Switch the 'Stat is an exchange initiative for residential mercury-containing thermostats that is run in partnership with the Heating, Refrigeration, and Air Conditioning Institute (HRAI) of Canada. The objectives of the program are to encourage the use of energy efficient programmable thermostats, ensure that mercury-containing thermostats are prevented from entering landfill, and recover and store the mercury from the thermostats. The Switch the 'Stat program was piloted in Ontario during the summer of 2006 and has been an ongoing program of the Clean Air Foundation since April 2007. To date, the program has collected over 9,500 mercury-containing thermostats, which represents recovery and storage of approximately 24 kilograms of mercury. Currently, more than 750 heating and cooling contractors across Ontario are participating in the program, which is supported financially by the Ontario Ministry of the Environment, the Ontario Power Authority, Union Gas and Enbridge Gas Distribution.

In January 2007, the **Recycling Council of Ontario** (RCO) and **Toronto District School Board** (TDSB) launched a project to recover and recycle fluorescent tubes from TDSB schools. The program is expected to recover 48,000 lamps in six months from 600 buildings, recovering at least a half a kilogram of mercury. The pilot is based on a unique arrangement between all parties associated with fluorescent lamps – manufacturer (Osram-Sylvania), distributor (Wolf Electric and Lighting), user (TDSB) and recycler (Fluorescent Lamp Recyclers Inc.) – and will examine the effectiveness of the environmental stewardship initiative and the sharing of the financial costs associated with recovering and recycling mercury-containing fluorescent lamps.

Project Porchlight is a campaign of One Change (a not-for-profit organization based in Ottawa) that aims to deliver one free CFL to every household in Canada. The campaign is currently operating in Guelph, Thunder Bay and

Yukon, with cross-province campaigns planned for Alberta and Ontario. The organization would like to make options for CFL disposal and recycling one of the requirements of the campaign.

In Canada, two retailers are currently voluntarily accepting certain spent mercury-containing products from their customers. **IKEA** encourages its customers to return CFLs and batteries to its stores to be responsibly managed and recycled.⁷⁷ And in November 2007, **Home Depot Canada**, in partnership with Phillips Lighting and Fluorescent Lamp Recyclers Inc., announced its national in-store CFL recycling program.

3.9 Options to Increase Collection and Recycling of Mercury-containing Products

As has been described in this report, there is a variety of approaches that have been taken by various jurisdictions to keep mercury out of the waste stream. These include new legislation, regulations, take-back programs, reporting, and education and awareness raising.

Government Legislation/Regulation – There are a number of areas in which legislation can be used to keep mercury out of the waste stream. This can be in the form of banning or phasing out the sale of mercury-containing products, as seen in the EU with thermometers and in various US states and municipalities with thermometers, thermostats and batteries. Other legislative options include:

- Implementing mandatory collection systems that impose collection and recycling targets, as is the case with the EU WEEE and Battery Directives, as well as in a variety of US states that have set targets for the recovery of lamps and batteries.
- Banning the disposal of mercury-containing products from landfills and incineration, which is the case with the US Battery Act, as well as in various US states and municipalities for all four product categories;
- Mandatory labeling of mercury-containing products, which has happened in the EU with the CE label for lamps and a logo for batteries, as well as in a variety of US states and municipalities for all four product categories; and,
- Setting limits on the content of mercury in products, which is the case with the RoHS and Battery Directives in the EU, as well as in Taiwan for batteries.

Take-back Programs – There are various forms of take-back programs for mercury-containing products. There are industry-run take-back programs, such as the Thermostat Recycling Corporation's program, in which the manufacturer sets up and runs the program. There are programs that employ bounties to encourage the return of the products, such as those that are seen in Maine and

Vermont for thermostats. And there are programs that are run by non-governmental organizations (NGOs), such as the Clean Air Foundation, which receive funding support from government and industry. Another form of take-back program is the “return to retail” type. In the US, there are municipalities that require retailers to take back mercury-containing products from consumers for recycling. In Taiwan, retailers that don’t cooperate with the return to retail program for lamps are fined. In Canada, there are two retailers, IKEA and Home Depot, that have voluntarily set up take-back programs. And in PEI, the island’s waste management company and grocery stores have set up a voluntary take-back system for batteries. The value of return to retail programs is that they are easy for the consumer – when going to purchase a new CFL or battery, the consumer can just bring along the spent product to return it when they are buying a new one.

Reporting – A number of US states require certain information be reported to the environment ministries on mercury-containing products. Some require manufacturers to report on their sales and collection/recycling efforts, while others require reports about the mercury content in products. Finally, there are states that require reports on programs that have been implemented to reduce and recycle mercury-containing products.

Education and Public Awareness – Increasing consumer understanding of mercury as an environmental issue and providing information about the products that contain mercury are essential to improving collection and recycling rates. A variety of US states and municipalities, as well as Australia, require educational campaigns about mercury-containing products and end-of-life disposal options. There are also NGO campaigns, such as Project Porchlight and Health Care Without Harm, that educate users of mercury-containing products about mercury-free alternatives and safe disposal options. Another component of education and raising awareness is working in partnerships, which can be useful in terms of sharing information and spreading messages to a broad audience.

3.10 Recommendations for Ontario

Pollution Probe encourages the province of Ontario to adopt legislation and regulations to phase out mercury-containing products where suitable alternatives exist. This would result in the eventual removal of the need to collect and recycle most mercury-containing products.

In the absence of such a ban, or for mercury-containing products that are not subject to a ban, Pollution Probe recommends that Ontario implement regulations, set reduction targets and focus on educating the public about

mercury-containing products in order to increase the collection and recycling rates of these products. Some key measures are outlined below.

Regulations – Using the actions that have taken place in the EU and US as guidance, the government of Ontario should review existing regulations and develop progressively higher regulatory standards. In particular, regulations should be put in place that implement a mandatory collection system, ban the disposal of mercury-containing products from landfills and incineration, require labels on mercury-containing products that describe the mercury content as well as proper disposal options, and set limits on the content of mercury allowed in products sold in Ontario.

Targets and Tracking – In addition to a mandatory collection system for mercury-containing products, the government of Ontario needs to set aggressive targets and timelines for the collection and recycling of these products. Routine audits of the level of collection and recycling achieved should be undertaken to assess and identify under-serviced areas of the province.

Accessibility – Public convenience in returning mercury-containing waste is critical to increasing the collection rate. Decentralized collection systems are key to improving collection of mercury-containing products from the residential sector. While existing municipal depots and events have a role to play in Ontario, collection options need to go beyond this to return-to-retail or industry take-back programs. The government of Ontario should increase the emphasis that has been placed on industry to fund take-back programs and sponsor collection events.

Promotion and Education – Public education and promotion are important factors in increasing the collection and recycling of mercury-containing products. The public need to understand why mercury-containing waste is a problem and what they can do about it. Another important component in the education is providing information about non-toxic alternatives. The government of Ontario should run a public information campaign, or provide funding for such a campaign, that targets mercury-containing products and provides necessary information to consumers.

Timing of the MHSW Program – As noted throughout this report, the government of Ontario has a proposed MHSW program that will include batteries in Phase 1 and other mercury-containing products in Phase 2. As of February 2008, the timing, targets and other details of the MHSW program had not yet been disclosed. Pollution Probe recommends that the collection of both phases begin as quickly as possible after the Minister's approval of the program plan.

Data Gathering and Information Sharing – The government of Ontario should work with municipalities throughout the province to gather comprehensive information on the volumes of municipal and industrial wastes generated in Ontario, the costs to manage these wastes, and how much waste by type that goes to each of the various waste management options, including resource recovery, recycling, landfill and incineration. This information should be provided to the public in an annual summary.⁷⁸

Municipal Partnerships – The government of Ontario should work with and encourage municipalities throughout the province to take leadership in developing municipal by-laws that result in the reduction of emissions from mercury-containing products, either through sales bans or via collection and take-back programs.

Part 4 – Phasing out Mercury-containing Products in the Health Care Sector

Similar to products found in the residential sector, mercury is used in products in the health care sector because it is a good conductor of electricity and reacts predictably to temperature and pressure changes. Aside from its use in products, mercury is also found in the health care sector in dental clinics, lab chemicals and pharmaceuticals, such as vaccines. Also similar to the residential sector, most mercury-containing products and uses in the health care sector have mercury-free alternatives that are viable, cost-effective and safe.

As Pollution Probe determined a decade ago, there are many reasons why health care facilities should reduce or eliminate mercury from their facilities, including:

- Reducing the risk of accidental spills or discharges;
- Not wanting to contribute to environmental impairment;
- Obtaining savings through waste reduction;
- Demonstrating leadership in the community;
- Complying with requirements of present and future legislation and international agreements; and,
- Responding to a perceived ethical obligation.⁷⁹

The direct costs associated with mercury in the health care sector include purchase price, hazardous waste training, spill clean up, waste storage and disposal, potential non-compliance costs (i.e., fines, sampling, staff time, cleaning traps and drains) and potential health risks to staff, patients and visitors. Indirect costs include environmental costs and health costs to the general public.⁸⁰

4.1 Mercury in the Health Care Sector

According to the US EPA, there can be up to 50 times more mercury in medical waste than in general municipal waste.⁸¹ And a 1997 study by the US EPA found that medical waste incinerators were the fourth largest source of anthropogenic mercury emissions.⁸² Thus, mercury from the health care sector can have a direct impact on the environment and human health. In certain areas in the US it has been documented that hospitals contribute about five per cent of the total wastewater mercury load,⁸³ and mercury fever thermometers alone contribute about 17 tons of mercury to solid waste landfills annually.⁸⁴

A typical large hospital can easily contain many kilograms of mercury on-site, in hundreds of different devices and in dozens of separate locations.⁸⁵ The four general areas in which mercury is found in the health care sector are:

- Medical equipment, such as sphygmomanometers, thermometers, gastrointestinal tubes and esophageal dilators;
- Lab chemicals and pharmaceuticals, such as thimerosal and mercuric (II) chloride;
- Hospital dental clinics in dental amalgam; and,
- General use, such as fluorescent lighting, switches, batteries, thermostats, cleaners and plastics.⁸⁶

The amount of mercury used in medical equipment ranges from half a gram up to more than a kilogram. The specific quantities for the mercury-containing health care equipment most commonly used are listed in Table 7.

Table 7: Mercury Content in Health Care Products⁸⁷

Product	Mercury Content (grams)
Fever thermometers	0.5-1.5
Laboratory thermometers	3-4
Sphygmomanometers (wall units and floor portable units)	80-200
Maloney or Hurst bougies (esophageal dilators)	1,361
Cantor tubes (gastrointestinal tubes)	54-136
Miller Abbott tubes (gastrointestinal tubes)	136
Dennis tubes (gastrointestinal tubes)	136
Foley catheter	38

Mercury is a common contaminant of many chemicals and reagents found in hospital labs. It is used in preservatives, and often the preservative's name doesn't indicate that mercury is present. A further problem with mercury in lab chemicals is that the Material Safety Data Sheets (MSDS) provided with the chemicals and reagents do not generally identify mercury as an ingredient if the levels are below one per cent of the solution. Another area of concern in hospital labs is the plumbing, which can contain built-up mercury that is a result of lab procedures or past spills.⁸⁸

4.2 Existing Alternatives for Mercury-containing Products used in the Health Care Sector

In 2002, the National Wildlife Federation (NWF) produced *Mercury Products Guide: The Hidden Dangers of Mercury*. In addition to listing the alternatives available for mercury-containing products, which are shown in Table 8, NWF's guide also provided cost comparisons between mercury-containing products and

their mercury-free alternatives used in the health care sector. In most cases (i.e., sphygmomanometers, esophageal dilators and gastrointestinal tubes) the costs were comparable and in some cases (i.e., thermometers) the mercury-free options were less expensive.⁸⁹

Table 8: Mercury-containing Products and Mercury-free Alternatives

Mercury-containing Product	Mercury-free Alternative⁹⁰
Fever thermometers	Digital, electronic, tympanic, infrared and basal thermometers
Laboratory thermometers	Digital, alcohol and electronic thermometers
Sphygmomanometers	Aneroid and electronic versions
Esophageal dilators	Mercury-free versions containing tungsten or stainless steel
Gastrointestinal tubes	Anderson tubes and tubes weighted with tungsten, air or saline solution

A common misconception about mercury-containing health care products is that they are more accurate than mercury-free alternatives. This has recently been disproved in a number of cases. In 2002, the American Medical Association indicated that non-mercury fever thermometers were adequate diagnostic tools.⁹¹ Studies conducted by the Mayo Clinic’s replacement program and the University of Michigan Health System found that aneroid sphygmomanometers provided accurate measurements when a proper maintenance protocol was followed.⁹²

The Sustainable Hospitals Project (SHP) reported on a comparison of the three types of sphygmomanometers – aneroid, electronic and mercury. The overall scores (out of 30) indicated that the aneroid model was most favoured with a rating of 26, then the electronic model with a rating of 24 and finally the mercury-containing model with the lowest rating of 23.⁹³ The accuracy ratings (out of five) for the three types of sphygmomanometers were five for the electronic model, four for the aneroid model and three for the mercury-containing model.

Health Care Without Harm (HCWH) has found that one of the biggest motivators for a hospital to replace mercury-containing equipment is financial considerations. There is considerable cost associated with hazardous waste clean-up, reporting requirements for spills, closed patient rooms and staff training. By using mercury-free alternatives, these costs can be eliminated. It has been found that when associated lifecycle costs (such as compliance, liability and training) are included, the total cost per unit of an aneroid sphygmomanometer is about one-third that of a mercury-containing device.⁹⁴ A final incentive for health care facilities to switch to mercury-free sphygmomanometers is that many vendors of

aneroid sphygmomanometers now offer to take back old mercury-containing sphygmomanometers in their aneroid replacement contracts.

4.3 The Current Situation in Canada and Ontario

In 1996, Pollution Probe estimated that the mercury emission rate for Ontario hospitals was 0.49 kg per year. At that point, the hospitals in Ontario released a combined total of 128 kg of mercury per year.⁹⁵ In December 2002, the government of Ontario filed an amendment to the General Waste Management Regulation (O.Reg. 347) requiring all existing hospital incinerators to cease operations on or before December 6, 2003. Before this regulation came into effect, more than 70 hospital incinerators were operating in Ontario, and this sector was the fourth largest emitter of mercury in the province.⁹⁶

While Ontario has had success in closing hospital incinerators, as well as some accomplishments at individual hospitals (as described in sections 4.3.1-4.3.3), there are still more than 180 hospitals in the province that have not phased out mercury.

4.3.1 Ontario Mercury Elimination and Reduction Health Care Memorandum of Understanding

In April 1996, an Ontario Mercury Elimination and Reduction Health Care Memorandum of Understanding (MOU) was signed by three Toronto-based hospitals – Centenary Health Centre, Hospital for Sick Children, Toronto Hospital – as well as Environment Canada, Ontario Ministry of the Environment, Health Care Environment Network and Pollution Probe. The MOU signatories formed a steering committee to encourage information sharing and promote the elimination and reduction of mercury-containing products in the health care sector. As well, strategies and policies for reducing and eliminating uses and releases of mercury were developed by each of the three hospitals.

After the signing of the first MOU, the program was expanded to encourage other hospitals across Ontario to sign on, resulting in Orillia's Soldiers' Memorial Hospital and North York General Hospital joining. By November 1997, three of the hospital signatories (Toronto Hospital, Hospital for Sick Children and North York General Hospital) had reported significant reductions through:

- the complete replacement of all fluorescent lamps with new low-mercury lamp types;
- the elimination of mercury-containing laboratory chemicals;

- the replacement of mercury-containing blood pressure monitors with alternative types; and,
- the elimination of mercury-containing batteries.

4.3.2 Environment Canada – Ontario Hospitals Initiative

Since only six of Ontario's 188 hospitals signed-on to participate in the above-mentioned MOU and because the health care sector contributed approximately 20 per cent of the emissions and use of mercury in the province, Environment Canada conducted a survey to get a better understanding of the Ontario health care sector's mercury elimination and reduction activities. The survey was sent out to the hospitals in November 1999, with the results published in 2000.⁹⁷ Responses were received from 93 of the 188 hospitals in Ontario.

The survey results indicated that some hospitals were actively working towards mercury elimination in their facilities, but also revealed that a significant number of hospitals were experiencing difficulties when attempting to reduce mercury uses. Furthermore, a number of hospitals were unaware of mercury issues facing the health care sector. Some of the findings from the survey about mercury reduction activities were:

- 23 per cent of the respondents indicated that their facility did not have a formal mercury reduction program in place.
- 85 per cent of survey respondents indicated they had made some reductions in mercury-containing devices and substances, while 14 per cent indicated no reductions.
- 46 per cent of survey respondents indicated that an inventory had never been conducted at their facility to track the location of mercury-containing devices, and 20 per cent indicated that their last inventory took place more than five years before the survey.

In terms of disposal methods, 70 per cent of survey respondents indicated their facility disposed of mercury-containing waste via a waste contractor. Eight per cent disposed of mercury-containing waste via incineration, 29 per cent via recycling and 14 per cent via landfill. The authors acknowledged that further information was required from each hospital on the type of waste contractor or landfill site used in order to understand the risks associated with mercury disposal.

The survey also provided information on what the respondents believed were the main barriers to reducing mercury-containing devices and substances in their facilities. The barrier most commonly identified was a lack of knowledge or information about mercury and mercury-containing products (47 per cent), followed by the cost to switch to mercury-free options (43 per cent). Other

barriers included lack of resources, financial incentives, guidance/support, training and staff.

4.3.3 Trillium Health Centre – Ontario Environmental Leader

In November 2005, Trillium Health Centre was accepted into Ontario’s Environmental Leaders (OEL) program. It was the first health care facility to be recognized under the program. The OEL program is a voluntary environmental agreement initiative of the Ontario Ministry of the Environment.⁹⁸ Under the OEL program, Trillium Health Centre committed to a Provincial Priority Reduction Plan (PPRP), which outlined targets for solid waste reduction, hazardous waste management, biochemical waste management, emissions reduction, energy conservation and water quality management.

The specific pollution prevention targets for the facility included reducing mercury usage by 98 per cent by April 2006; diverting waste by an additional 30 per cent by 2008; and committing to mercury thermometer trade-in days at its Mississauga and Etobicoke facilities. The specific mercury reduction targets are outlined in Table 9.

Table 9: Trillium Health Centre’s Mercury-related Commitments for the OEL Program

Substance/Aspect	Baseline (year)	Targets
On-site mercury contained in equipment	215 mercury wall-mounted units (1,892 ml of mercury) 7 mercury mobile units (62 ml of mercury)	98 per cent replacement/disposal by 2006
Mercury thermometer trade-in program	2005	Host two trade-in days by 2007

Trillium Health Centre established implementation plans for the target aspects outlined in the PPRP. For the elimination of on-site mercury contained in equipment, the following activities took place:

- Project team assembled (June 2004)
- Mercury inventory conducted (June–August 2004)
- Program target established (October 2004)
- Review of best practice literature for vital signs monitoring (November 2004)
- Replacement items identified (December 2004)
- Target for replacement and disposal of mercury-containing vital signs equipment (October 2005)
- Third party verification of the achievement of the objectives (Spring 2006)

The following activities took place for the mercury thermometer trade-in program:

- A mercury thermometer trade-in day was held at the Mississauga and Etobicoke facilities in December 2006. Staff and members of the community were invited to bring their mercury-containing thermometers to exchange for digital thermometers.
- The mercury thermometers were disposed of as hazardous waste through a third-party disposal company.

In December 2006, Trillium Health Centre reported, via a news release,⁹⁹ that 200 pounds of mercury contained in thermometers, esophageal dilators, sphygmomanometers, lighting and switching devices had been eliminated from its facilities. And in another news release¹⁰⁰ in February 2007, Trillium Health Centre reported that it exceeded its target of 98 per cent by eliminating 100 per cent of mercury from its facilities.

4.4 Mercury Use in the Health Care Sector in the United States

Since 1988, there has been a dramatic decrease in the number of medical waste incinerators in the US, from 6,200 in 1988 to 96 in 2004. In 1990, medical waste incinerators accounted for 24 per cent of US national mercury emissions to air. By 2002, they accounted for less than two per cent of the total mercury atmospheric emissions.¹⁰¹

The US EPA's 1995 medical waste incinerator maximum achievable control technology (MACT) rule forced the closure of incinerators that could not meet pollution control standards and prompted many hospitals to evaluate their medical waste and incineration practices. The MACT rule was expected to reduce mercury emissions by 85 per cent, but led to a 99.6 per cent reduction in mercury emissions, from 49.7 tonnes per year in 1990 to 0.2 tonnes per year in 2002.¹⁰²

According to a 2005 survey¹⁰³ conducted by the **American Hospitals Association** (AHA) more than 54 per cent of hospital survey respondents had already established a facility policy statement to virtually eliminate mercury from their facilities, and almost 60 per cent of the respondents had implemented mercury management policies. Some key findings from the AHA survey include:

- Hospitals are removing mercury-containing medical devices from their facilities.
- Group purchasing organizations (GPOs) are removing mercury-containing devices from their contracts and replacing them with non-mercury alternatives, influencing the purchasing behavior of hospitals.

- To keep pace with GPO demands, manufacturers have changed their product lines. In a 2004 survey conducted by the Health Industry Distributors Association, the majority of respondents characterized the demand for mercury-containing products as “decreasing.”

As noted in section 3.5, a number of US states have laws pertaining specifically to mercury-containing thermometers. In addition to state regulations, a number of federal and state medical associations or societies are addressing the issue of mercury in the health care sector.

In July 2001, the **American Academy of Pediatrics** released a policy statement¹⁰⁴ on the role that pediatricians can play in decreasing the amount of mercury in the waste stream. One of the main recommendations made in the statement was for pediatricians to phase out mercury-containing devices, such as thermometers and sphygmomanometers, from their offices and other medical facilities and to encourage patients to remove mercury-containing thermometers from their homes.

The **American Medical Association** put forward the following resolution in 1992, which was renewed in 2000, concerning mercury in consumer products:

“Our AMA [American Medical Association]: (1) supports the development of standards to achieve non-hazardous levels of exposure to lead, mercury, or benzene arising from common household or workplace products; (2) encourages efforts to minimize or eliminate mercury use in hospitals and other health care facilities; and (3) will work in coalitions with appropriate federal agencies and health care organizations to educate physicians and other health care professionals about suitable alternatives to the use of mercury and mercury-containing devices and the appropriate disposal of mercury and mercury-containing devices.”¹⁰⁵

In March 2000, the **California Medical Association** committed to the following:

- “[T]he California Medical Association encourages the reduced use of mercury-containing products by urging medical product suppliers to continue to develop, produce, and bring to market appropriate, cost-competitive, environmentally protective, and effective mercury-free replacements; and, be it further
- [T]he CMA calls upon health care professionals to encourage the institutions with which they are associated to adopt policies that will lead toward the eventual elimination of mercury containing products where feasible, effective alternatives are available, and to promptly eliminate mercury from the waste-stream fed into incinerators.”¹⁰⁶

In April 2003, the **Illinois State Medical Society** committed to the following:

- “[T]he Illinois State Medical Society supports efforts to reduce and if possible eliminate mercury use in health care facilities; and be it further
- [T]he Illinois State Medical Society asks the American Medical Association to join with it in partnering with the [American Hospital Association] AHA, [US Environmental Protection Agency] USEPA, [Health Care Without Harm] HCWH, and the [American Nurses Association] ANA to educate physicians and other health care professionals about this topic.”¹⁰⁷

In November 2000, the **Massachusetts Medical Society** committed to the following:

- “[T]he Massachusetts Medical Society (MMS) encourages physicians to inform patients about mercury advisories for fish; and be it further
- [T]he MMS encourages physicians and hospitals to continue the process of phasing mercury-containing medical instruments out of medical care facilities; and be it further
- [T]he MMS advocates maintenance of the Massachusetts moratorium on new waste facilities, particularly incinerators, and for aggressive state policies for waste prevention at many stages of the product life cycle in order to achieve the dramatic reductions in volume and toxicity of the waste stream that have been proven to be feasible; and, be it further
- [T]he MMS advocates stricter mercury emission standards for power plants.”¹⁰⁸

In May 2002, the **Washington Academy of Family Physicians** committed to the following:

- “[T]he Washington Academy of Family Physicians (WAFP) encourages physicians and hospitals to phase out the purchase and use of mercury-containing products where alternatives are possible; and be it further
- [T]he WAFP urges medical product suppliers to continue to develop, produce, and market appropriate, cost-competitive, environmentally protective and effective mercury-free replacements; and be it further
- [T]he WAFP encourages physicians to inform patients about fish consumption advisories; and be it further
- [T]he WAFP calls upon health care professionals to encourage the institutions with which they are associated to adopt policies that will lead toward the eventual elimination of mercury containing products where feasible, effective alternatives are available; and be it further
- [T]he WAFP urges the Washington State Department of Ecology to develop a strong plan for the reduction and elimination of mercury into Washington’s environment, and to include in the plan the provisions of the Mercury Reduction and Education Act of 2002, which was supported by WAFP.”¹⁰⁹

There is also a variety of US-based collaborations that are actively targeting the reduction and elimination of mercury from the health care sector.

Health Care Without Harm (HCWH) promotes the phase out of mercury-containing health care devices where reliable and affordable alternatives exist. HCWH's work on mercury began with mercury thermometer exchange campaigns and related efforts to foster local and state legislation. Building on this work, HCWH developed relationships with major medical device manufacturers; and entered into a formal collaboration with the AHA, the American Nurses Association (ANA) and the US EPA. To date, more than 4,000 health care facilities in the US have pledged to become mercury free.

Hospitals for a Healthy Environment (H2E) was created in 1998 when the US EPA and the AHA signed an MOU to address the health care sector's contribution to mercury pollution, among other serious environmental concerns related to the sector. H2E is now a collaborative effort of the EPA, AHA, ANA and HCWH. The MOU calls for US hospitals to "virtually eliminate mercury-containing waste from hospitals' waste streams" by 2005.¹¹⁰ The top priorities of H2E are continued outreach to facilities that have not made the commitment to a mercury phase out plan, and addressing the presence of mercury in chemicals and other devices. It is also important to H2E that as mercury-containing items are removed from service in the US they are not simply exported elsewhere, such as to developing countries, thereby shifting the burden of mercury pollution.¹¹¹

The goal of California's **Mercury (Hg) Elimination Leadership Program (HELP)**¹¹² is the virtual elimination of mercury in California hospitals. HELP recognizes hospitals that have eliminated, or are working to eliminate, mercury from their facilities with a ceremony and presentation of a certificate. Collaborators of HELP include the Department of Toxic Substances Control, the Department of Health Services, the California Healthcare Association, US EPA (Region IX), H2E, California Water Environment Association, local governments and treatment facilities.

Sustainable Hospitals Project¹¹³ (SHP) is a program of the Lowell Center for Sustainable Production and is affiliated with the Department of Work Environment at the University of Massachusetts Lowell. The program members include faculty, staff and students of the Department of Work Environment and the Department of Nursing. SHP provides technical support to the health care industry in selecting products and work practices that eliminate or reduce occupational and environmental hazards, maintain quality patient care and contain costs. The project supports and collaborates with health care institutions, clinicians, unions representing health care practitioners, government, as well as environmental and health care advocacy groups.

4.5 Options to Phase out Mercury-containing Products in the Health Care Sector

A number of documents¹¹⁴ have been produced and distributed by various groups and associations that outline the steps that should be taken to phase out mercury use in the health care sector. The main steps for phase out are described below.

Assessment – Create an inventory of the mercury-containing products in the facility. Record where the mercury is and how much is in each location. Tag all mercury-containing items so that when the device is replaced, it will not only be replaced with a mercury-free alternative, but also be properly disposed of.

Commitment – Make a facility-wide commitment with support from senior decision makers, along with strong administrative support and adequate financial resources. Designate an enthusiastic program leader who will be given the necessary time to run the elimination and reduction program. Initiate formal administrative directives to purchase only mercury-free products where alternatives exist.

Communications and Training – Develop a broad communications program throughout the facility to increase staff awareness of mercury's adverse effects on human health and the environment. The communications program can start with staff and move to patients and the public. Until the facility is able to eliminate all mercury-containing items in the facility, there should be a comprehensive management plan in place that includes a mercury management policy, a mercury-free purchasing policy, a general employee education program covering mercury use and disposal issues, and an education program with information about spill prevention and response.

Elimination and Replacement – Develop an elimination and reduction strategy, set targets and start eliminating mercury from the facility as soon as possible. There are a variety of locations where replacements will be necessary – clinical devices (i.e., thermometers, sphygmomanometers, esophageal dilators, gastrointestinal tubes, etc.); facility devices (i.e., switches, gauges, thermostats, etc.); laboratory chemicals; and other chemicals (i.e., cleaning chemicals and pharmaceuticals).

Ongoing Management – Ensure that mercury and existing mercury-containing products that are removed from the facility are recycled, or properly treated and disposed of after being replaced.¹¹⁵ Keep the mercury out by working with the purchasing department to make sure that mercury-containing products do not find their way back into the hospital. Establish a mercury-free purchasing policy

by requiring vendors to sign a mercury-content disclosure agreement. Use the facility's mercury inventory to monitor the effectiveness of the policy. Repeat the inventory periodically to re-evaluate the effectiveness of the removal process. Identify successes and modify the facility's mercury elimination and reduction strategy as necessary.

Recognition – State the facility's mercury-free status in the hospital's mission statement and in relevant material that is posted and distributed in the facility. This will inform staff, patients and the public about the hospital's accomplishments, as well as continuing to educate them about mercury. Look for other venues to get further recognition (i.e., government programs, such as the Ontario Environmental Leaders program), as this is often a critical component for a facility's continued success.

4.6 Recommendations for Ontario

While progress has been made in the reduction of mercury from Ontario's health care sector as a result of the closure of hospital incinerators, there is more work to be done. As demonstrated by Environment Canada's 2000 survey results, there is still a large percentage of health care facilities that do not realize the extent of the problem with mercury and/or are not doing anything about it. The government of Ontario needs to take action to get this sector informed and actively engaged in reducing and eliminating mercury use.

Regulation – Pollution Probe encourages the government of Ontario to adopt regulations to ban the use and purchase of mercury and mercury-containing products within the health care sector.

Voluntary Challenges – Along with the development of regulations, the government of Ontario should use the success of the Trillium Health Centre in eliminating mercury from their facilities to encourage other health care facilities in Ontario to become mercury-free by issuing a formal province-wide challenge.

Targets – The government of Ontario should set timelines and targets for the complete phase out of mercury from the health care sector. Reasonably aggressive targets would be 75 per cent reduction by 2010, 90 per cent by 2012 and 100 per cent by 2015.

Education and Awareness Raising – The government of Ontario should develop training programs and material to increase the knowledge and understanding of health care workers about mercury. Health Care Without Harm (HCWH) would be a useful resource for the province to work with as they

have already developed such material for the US market that could be adapted for Ontario. After the health care sector, the education campaign could be expanded to patients and the public.

Partnerships – There are two types of partnerships that would be beneficial for phasing out mercury from the Ontario health care sector. First, approach and use existing groups or collaborations, such as HCWH, for their experience and pre-developed strategy model, as well as reference material. Another type of partnership that should be investigated is the possibility of setting up take-back programs for mercury-containing equipment with suppliers of mercury-free equipment.

Reporting – The government of Ontario should publish status reports that document mercury reductions in the health care sector. Many hospitals have little knowledge of mercury reduction initiatives; however, a bi-annual or annual report on reduction efforts across the province would serve as a reminder that reducing mercury should be a priority for each health care facility in Ontario.¹¹⁶

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