



Case Study: Standards for Mercury-containing Products

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Introduction

This case study reviews regulations and standards that exist in the European Union, the United States and Canada for four categories of mercury-containing products — fever thermometers, thermostats, switches in vehicles and fluorescent lamps. The purpose is to compare and contrast regulations and standards among leading jurisdictions and to identify weaknesses in Canada’s approach to mercury product standards.

Mercury-free alternatives are available for virtually all products that contain mercury. One exception is fluorescent lamps, including compact fluorescent bulbs, in which mercury vapour is used to conduct electricity through the gaseous substance, causing fluorescent particles to “light up.” There is no commercial alternative to using mercury in this application, although in the past decade lamp manufacturers have reduced the amount of mercury used by nearly 75 per cent.

Besides offering health and environmental benefits, mercury-free products offer consumers a number of other benefits. Electronic thermostats are generally programmable, so that the temperature of a house can be adjusted automatically at night or during the day if the house is empty. In addition to lowering energy costs, electronic thermostats can also reduce emissions of mercury and the many other pollutants associated with coal-based electricity production. Fever thermometers are another example in which mercury-free digital alternatives provide the added benefits of being easy to use, easy to read and unbreakable. Mercury tilt switches used in cars are an example in which simple and inexpensive mechanical or ball bearing switches have been available for many years and used by most of the non-North American vehicle manufacturers.

The serious environmental and human health impacts of mercury are not covered in this report, but can be easily accessed, given the extensive literature that exists on this toxic substance. Pollution Probe’s *Mercury in the Environment — A Primer* is a widely used educational document on this subject and is available at www.pollutionprobe.org/Publications/Primers.htm.

Standards/Regulations that Cover All Four Product Categories

European Union

Through the WEEE and RoHS Directives, the European Union (EU) has banned a wide range of electrical and electronic products that contain mercury. As well, the EU has a mercury strategy that aims to reduce emissions, decrease supply and demand, and protect against exposure.

WEEE and RoHS Directives

In 2003, the EU passed the Directive on Waste Electrical and Electronic Equipment (WEEE), which addresses the takeback of waste electrical and electronic 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.”¹

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 2006.² 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.³

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.⁴

The RoHS regulations ban 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. However, a number of exempted applications for these substances exist and the regulations do not apply to the re-use of equipment that was put on the market before 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 Single Market. The Regulations will also have an impact

¹ Letsrecycle.com. Waste Electrical and Electronic Equipment (WEEE) webpage. www.letsrecycle.com/legislation/weee/fridge.jsp.

² Ibid.

³ Raymond Communications. 2002. *Electronics Takeback Laws: A Summary*.

⁴ Ibid.

on companies that import EEE into the European Union 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.

Responsibility for the enforcement of the RoHS Regulations rests with the Secretary of State for Trade and Industry, who has appointed the National Weights and Measures Laboratory (NWML), an executive agency, to act on his behalf.

EU Mercury Strategy

In January 2005, the European Environment Commission launched its mercury strategy, which is a comprehensive plan addressing mercury pollution in both the EU and globally. The strategy contains twenty measures to reduce mercury emissions, cut supply and demand, and protect against exposure.

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

Action 7 — The Commission intends to propose in 2005 an amendment to Directive 76/769/EEC13 to restrict the marketing for consumer use and healthcare of non-electrical or electronic measuring and control equipment containing mercury.

Action 8 — The Commission will further study in the short term the few remaining products and applications in the EU that use small amounts of mercury. In the medium to longer term, any remaining uses may be subject to authorization and consideration of substitution under the proposed REACH Regulation14, once adopted.

Action 10 — The Commission will undertake further study in the short to medium term of the fate of mercury in products already circulating in society.

As a follow up to Action 7, in February 2006, the Commission put forward the proposal to ban mercury in fever thermometers. The Commission expects that a ban on mercury in thermometers will lead to a significant reduction of mercury emissions. The proposal will also establish uniform rules for marketing of measuring devices containing mercury on the internal EU market, as the current rules in the member states differ.

United States

The United States (US) has universal waste regulations that streamline the collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (e.g., thermostats) and mercury-containing lamps (e.g., fluorescent bulbs). The rule is 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.

In May 1995, the US Environmental Protection Agency (EPA) promulgated the final universal waste rule establishing streamlined collection and management requirements for universal waste batteries, pesticides, and thermostats. In July 1999, the 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. Handlers of this new category of universal waste must prevent mercury releases by using specific containers that will not release any mercury. Mercury-containing equipment includes devices, items or articles that contain varying amounts of elemental mercury, including several types of instruments that are used throughout electric utilities and other industries, municipalities and households. Some commonly recognized devices are thermostats, barometers, manometers, temperature and pressure gauges, and mercury switches, such as light switches in automobiles.

The US EPA estimates that there are 1,877 generators handling approximately 550 tons of mercury-containing equipment that will be affected by this rule. The EPA's analysis shows that adding used mercury-containing equipment to the universal waste program will improve implementation of, and compliance with, the federal hazardous waste program. The addition also will establish more facilities to consolidate mercury waste, as well as reduce emissions from mercury.

Individual US States

In addition to a number of product-specific regulations, which will be covered in later sections of the case study, several states have adopted mercury strategies. These strategies range from banning or phasing-out the sale of mercury-containing products, to labeling, collection and recycling.

In 2002, **Connecticut** enacted a law that implements a 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 the manufacturers to initiate collection programs for many mercury-added products. In 2006, Connecticut enacted additional mercury product legislation that establishes universal waste rule requirements for mercury-containing equipment and changes 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 the prior written notification to the Illinois Environmental Protection Agency by the manufacturer of the product. This law provides that, on or before January 1, 2006, the Pollution

Control Board must modify its rules governing universal hazardous waste, as appropriate, to promote the recycling, recovery and proper management of elemental mercury and mercury-added products on a statewide basis.

In **Maryland**, manufacturers and retailers are prohibited from selling, on or after April 1, 2006, specified products that contain mercury, unless a specified label is affixed to the product. In addition, the state requires a person with a specified number of fluorescent lamps to handle them through reclamation facilities, on or after October 1, 2006.

In 2006, **Massachusetts** passed “An Act Relative to Mercury Management” that mandates 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 switches, effective January 1, 2007, as well as bans the sale, or offer to sell, 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 recycling, disposal as hazardous waste or another approved method, and requires manufacturers of mercury-added lamps to implement a plan for educating users about recycling end-of-life lamps and to meet specific recycling targets that increase over time.

Between 2002 and 2006, **Maine** enacted a number of mercury product laws that prohibit the sale, use or distribution of any product to which mercury is intentionally added, effective January 1, 2002 (unless the manufacturer has notified the Maine Department of Environmental Protection as to the amount and purpose of the mercury), as well as ban the sale of certain mercury-containing products — 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, automobile manufacturers are required to establish a statewide system to consolidate and recycle the switches, and it is required that mercury-added products sold in Maine after January 1, 2002, have an identifying label.

In **New York**, the sale and distribution of certain additional mercury-added products are prohibited and manufacturers of mercury-added consumer products that are allowed for sale are required to conspicuously label each product with notice that it must be properly disposed of or recycled (any such product that is not so labeled is prohibited from sale). The state 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 “Comprehensive Management of Exposure to Mercury,” which proposes to establish a comprehensive approach to reducing the exposure of citizens to mercury released in the environment through mercury-added product use and disposal. Elements of this law include a ban on the distribution or offering for sale of certain mercury-added novelties and products, requiring manufacturers of mercury-added products to provide certain notice to the agency and report on total mercury contained in certain products, and to modify the 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, it proposes to continue a mercury public education and outreach program and to continue an advisory committee on mercury pollution to report annually to the legislature with recommendations on reducing mercury contamination and risk.

Canada

While the Government of Canada does not have regulations that ban or regulate 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*. Although all of these statutes play a role in curtailing the use of hazardous chemicals in consumer products, none is tailored to the direct and effective control of toxic chemicals in consumer products.

Under Part 5 of the *Canadian Environmental Protection Act*, the federal government has clear authority to ban or regulate products containing substances that are listed on the Domestic Substances List (“DSL”). Mercury is item 8 on the DSL.

Section 93 of CEPA authorizes the Governor in Council to make extensive regulations for a product that contains a substance on the DSL. Such regulations could control, among other things:

- (e) the quantity of [mercury] that may be manufactured, processed, used, offered for sale or sold in Canada;
- (f) the purposes for which [mercury] or a product containing it may be imported, manufactured, processed, used, offered for sale or sold;
- (l) the total, partial or conditional prohibition of the manufacture, use, processing, sale, offering for sale, import or export of [mercury] or a product containing it;

- (o) the manner in which, conditions under which and the purposes for which [mercury] or a product containing it may be advertised or offered for sale; etc.

Environment Canada has authority under CEPA to regulate or ban products that contain mercury if there is a scientific case to do so, and if the human and ecological benefits of a ban outweigh its cost.

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.

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 alternate thermometers are available to do the same job at lower risk.

Environment Canada is currently holding consultations on a Risk Management Strategy (RMS) for mercury-containing products. This strategy will provide a framework for the development of control instruments to manage the environmental effects of mercury used in products. Environment Canada has completed the following reports related to the RMS — “Technical Background Study of Mercury-Containing Products”, “Socioeconomic Study of Mercury-Containing Products” and “Alternatives and Qualitative Screening of Management Tools” — and a quantitative assessment (cost-benefit analysis) of the management tools will be completed in the spring/summer of 2007. The development and publication of the proposed RMS tools are expected in the fall of 2007.

In addition to the tools from the RMS, Environment Canada will continue to work with the provinces and territories to share information and best practices to assist with recycling and waste reduction efforts.

On April 5, 2007, Environment Canada released the Canadian Consumer Battery Baseline Study (www.ec.gc.ca/nopp/docs/rpt/battery), which provides the first national estimates 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 suggests that the current rate of recycling of rechargeable batteries is very low.

Along with the federal statutes, the following provinces in Canada have authority to ban or regulate mercury-containing products.

Alberta — Section 162 of the *Environmental Protection and Enhancement Act* authorizes the Lieutenant Governor in Council (the provincial Cabinet) to make regulations respecting and prohibiting the importation into Alberta or the manufacturing, processing, use or sale of a hazardous substance or a product containing a hazardous substance.

Manitoba — Section 41 of the *Environment Act* authorizes the Lieutenant Governor in Council to make regulations respecting the use, restriction, or prohibition of use of any product or substance that may pollute or damage the environment.

Nova Scotia — Section 66 of the *Environment Act* authorizes the Governor in Council (the provincial Cabinet) to make regulations governing and prohibiting the use of any thing for the protection of the environment, including regulations governing the design, construction, maintenance or use of the thing. As well, section 66 states that the Governor in Council may make regulations governing and prohibiting the manufacture, sale or use of any equipment or device designed or provided for any purpose related to the protection of the environment.

Ontario — 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.

Prince Edward Island — Section 25 (1)(j) of the *Environmental Protection Act* authorizes the Lieutenant Governor in Council to make regulations regulating or prohibiting the use of any product that may adversely affect the environment.

Quebec — Section 31 of the *Environment Quality Act* authorizes the government to make regulations to “regulate or prohibit the use of any contaminants and the presence of any contaminants in products sold, distributed or utilized in Quebec.”

Yukon — Section 110(1) of the *Environment Act* authorizes the Minister, if satisfied that the normal use of a manufactured product will cause significant impairment of the natural environment, to ban the sale of the product.

As well, Canadian municipalities can ban the sale or use of mercury-containing devices if there is satisfactory evidence that they pose a material hazard (specifically municipalities in Alberta, Nova Scotia, Ontario and Quebec have pioneered a broader approach to municipal authority).

Ontario Municipal Hazardous or Special Waste: Phase 2

In June 2002, the Province of Ontario passed the Waste Diversion Act (WDA) to promote the reduction, reuse and recycling of waste and to provide for the development, implementation and operation of waste diversion programs. The WDA empowers the Minister of the Environment to designate a material for which a waste diversion program is to be established.

Once the Minister has designated a material through a regulation under the WDA, Waste Diversion Ontario develops a diversion program. In December 2006, the Minister filed a regulation under the WDA designating Municipal Hazardous or Special Waste (MHSW). The Minister's Program Request Letter directed that the MHSW program be implemented in multiple phases. Phase 2 of the MHSW program will include mercury-containing products — fluorescent lamps, mercury-containing switches, thermostats, thermometers, barometers and other measuring devices containing mercury. As of March 2007, the timing and collection/diversion targets for Phase 2 products were not known.

Fever 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 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.⁵ It is estimated that prior to 2005, thermometers contributed 25–30 tonnes of mercury to the EU waste stream.

Several types of mercury-free fever thermometers are commercially available. These include:

- Digital electronic thermometers
- Glass gallium-indium-tin (galin-stan) thermometers
- Flexible forehead and ear canal thermometers

A recent statement by the American Medical Association indicated that non-mercury fever thermometers are adequate diagnostic tools.⁶

Existing Standards

EU — Legislation banning the EU-wide sale of mercury thermometers to hospitals and the general public was proposed in February 2006.

US — There is no federal law that deals directly with banning mercury-containing thermometers.

Individual US States — Table 1 shows the laws that have been passed in various US states pertaining to the manufacturing, selling, importing, collecting and/or recycling of mercury thermometers.

Table 1: 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.

⁵ HCWH fact sheet, Nov. 5, 2002

⁶ Ibid.

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 department 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.

US Municipalities — The town of Freeport, Maine was the first municipality in Maine to ban the sale of mercury fever thermometers in January 2001. 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

A mercury-containing thermostat (or bimetal thermostat) contains an internal mercury switch that controls the flow of an electrical current. The weight of the mercury drop 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-switch 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.

Existing Standards

EU — Thermostats are considered as electric and electronic appliances; however, they are not under the present 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.

US — Mercury-containing thermostats fall under the universal waste rule.

Individual US States — Table 2 shows the laws that have been passed in various US states pertaining to the manufacturing, selling, importing, collecting and/or recycling of mercury thermostats.

Table 2: 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 labelling 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	<p>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. Manufacturers 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.</p> <p>"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 this 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 joint standing committee of the Legislature having jurisdiction over natural resources matters on the fees imposed, and to the Department of Environmental Protection on the results of the thermostat collection and recycling efforts.</p>
Maryland	Prohibits a specified marketer from selling or providing a thermostat containing mercury to a consumer. Requires the Department of the Environment to make a specified 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 creates 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.

US Municipalities — 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 offer to take them back from their customers for recycling.

Mercury-containing Switches in Vehicles

Mercury-containing switches have been used in vehicles for convenience lighting and anti-locking braking systems (ABS). These switches are found in vehicles manufactured in North America before 2003 and in imports from before the mid-1990s. While import automakers stopped using mercury switches in the mid-1990s, North American automakers only began phasing them out in 1995 and it wasn't until model year 2003 that mercury switches finally stopped being used in new North American cars.

Mercury tilt switches for under the hood or trunk convenience lighting operate as follows — when the hood or trunk reaches a certain angle, the mercury makes electrical contact and turns the light on. There is one switch per light, with the mercury content per switch being 0.7–1.0 grams (with an average of 0.85 grams of mercury per switch).

In the anti-lock braking system, the mercury switch is used to detect deceleration rates and to take four-wheel drive out during slipping and re-engage after the event has passed. There are usually three switches per vehicle for ABS applications, with 0.8 grams of mercury per switch.

While each mercury-containing switch in vehicles contains just less than a gram of mercury, cumulatively they amount to 13 to 15 tonnes of mercury in vehicles on the road in Canada today, with more than five tonnes in Ontario alone. Mercury in automobiles is the single largest source of mercury in use in Canadian products.

The alternatives for mercury-containing switches used for under hood/trunk convenience lighting are pendulums or ball bearings. The alternative for the mercury-containing switches used for ABS is a computerized ABS.

Existing Standards

EU — Mercury-containing switches were phased-out of vehicles manufactured in the EU in the mid-1990s.

US — Mercury-containing switches in vehicles fall under the universal waste rule. In addition, in July 2006, the US EPA proposed a Significant New Use Rule (SNUR) that requires notification to the EPA 90 days prior to US manufacture, import or processing of elemental mercury for use in switches in certain motor vehicles. This proposed rule covers manufacture or processing of elemental mercury for:

1. use in convenience light switches, ABS switches and active ride control system switches in new motor vehicles;
2. use in convenience light switches as new aftermarket replacement parts for any motor vehicle; and
3. use in ABS and ride control switches as new aftermarket replacement parts for motor vehicles that were manufactured after January 1, 2003.

The proposed rule does not include mercury switches used as aftermarket replacement parts for ABS and ride control systems in pre-2003 vehicles, because there are currently no suitable mercury-free substitutes for these replacement parts and the remaining market for these products is very limited and declining.⁷

Individual US States — Table 3 shows the laws that have been passed in various US states pertaining to the manufacturing, selling, importing, collecting and/or recycling of mercury-containing switches in vehicles.

Table 3: US State Action for Mercury-containing Switches in Vehicles

State	Actions Taken
Arkansas	The “Mercury Switch Removal Act of 2005” requires manufacturers to develop, implement and finance a mercury switch removal program for vehicles, including both convenience lighting and ABS.
California	Enacted a law in 2005 that prohibits the sale of mercury-added switches and relays, with the opportunity for applying for an exemption.
Illinois	The “Mercury Switch Removal Act (2004)” requires manufacturers of vehicles containing mercury switches to begin a mercury switch collection program that facilitates removal of mercury switches from end-of-life vehicles prior to processing these vehicles for recycling, effective April 24, 2006. The Act requires that mercury switches removed from vehicles be managed in accordance with the Illinois Environmental Protection Act and associated regulations, and requires the vehicle recyclers, crushers and scrap metal recyclers that remove mercury switches maintain records and make reports relating to the mercury switches removed.
Indiana	Requires a manufacturer of motor vehicles offered for sale in Indiana to develop and implement a plan to remove, replace, collect and recover mercury switches from motor vehicles. Prohibits the sale of motor vehicles that contain mercury-added components, beginning with the 2009 model year, but provides for certain exceptions. Establishes the mercury switch removal fund to implement mercury switch removal plans. Imposes mercury switch removal fees on vehicle registrations and titles, and requires deposit of those fees in the fund.
Maine	“An Act to Prevent Mercury Emissions when Recycling and Disposing of Motor Vehicles” prohibits the sale of mercury switches in automobiles as of January 1, 2003, and requires automobile manufacturers to establish a statewide system to collect, consolidate and recycle the switches. A bounty of \$1 per switch is provided for people who remove switches and return them for recycling, with money to be provided by the auto

⁷ From www.epa.gov/mercury/snur.htm, last updated February 28, 2007.

	manufacturers.
Massachusetts	Bans the sale or distribution of motor vehicles containing one or more mercury-added switches, effective January 1, 2007. Prohibits the installation of mercury-added switches in motor vehicles and requires that existing mercury-added switches be replaced with a non-mercury alternative, if available. Requires vehicle manufacturers to set up a program to remove all mercury switches from end-of-life vehicles and requires all vehicle dismantlers and recyclers to remove mercury-added switches and devices prior to crushing or shredding.
New Jersey	Has established a program for the removal of mercury switches from scrapped vehicles.
New York	Requires removal and collection of fluids, lead acid batteries, mercury switches and other mercury-added devices prior to crushing and scrapping end-of-life vehicles. Requires vehicle dismantlers to complete and submit to the state Department of Environmental Conservation an annual report concerning end-of-life vehicles received, processed and stored. Bans the sale of motor vehicles (commencing in calendar year 2011, with model year 2012) with any mercury-added component that contains greater than 15 milligrams of mercury, which is intentionally added in order to provide a specific characteristic, appearance or quality, to perform a specific function, or for any other purpose (components include, but are not limited to, switches, sensors, lights and navigational systems), effective January 1, 2007. Instructs the state's agencies to give priority to purchasing mercury-free vehicles, taking into consideration competition, price, availability and performance.
North Carolina	Calls for the development and implementation of a plan to recover at least 90 per cent of mercury switches from recycled automobiles, with reimbursement of \$5 per switch to auto recyclers, with the revenue for this purpose from the certificate of titles for vehicles. Vehicle manufacturers are also required to report annually to the state on all mercury-containing products included in their vehicles.
Oregon	Prohibits the sale of motor vehicles containing mercury light switches. Requires the removal of mercury light switches from state-owned motor vehicles. Directs the Department of Environmental Quality to work with local agencies to provide technical assistance to wrecking businesses concerning the removal of mercury light switches from motor vehicles.
Rhode Island	The "Mercury Reduction and Education Act" requires manufacturers of motor vehicles sold in the state to establish and implement a collection program for mercury switches by January 1, 2006. The Act eliminates the "voluntary" auto mercury program established by the General Assembly in 2005 and

	requires the state to adopt a more regulatory program that obligates auto manufacturers to pay auto recyclers a minimum bounty of \$5 per switch removed from end-of-life vehicles. The goal is to attain a capture rate of not less than 50 per cent for calendar year 2006 and not less than 70 per cent for calendar years 2007–2017. The Act requires that quarterly reports on the number of switches collected, the amount of mercury collected and recycled through the program, and the capture rate be submitted quarterly, beginning March 31, 2006.
South Carolina	Requires that manufacturers of motor vehicles sold in the state develop a mercury minimization plan to be filed with the department of health and environmental control and provides for certain costs with regard to the collection and recovery of mercury switches to be paid by the vehicle manufacturer. Provides for other related provisions pertaining to the recycling, storage and disposal of mercury switches, including designating mercury switches as universal waste and requiring the department to promulgate regulations for the management of these switches.
Texas	Requires vehicle manufactures to develop an informational program for the location and methods of removal of mercury switches from end-of-life vehicles and to pay the costs of packaging and shipping of the switches, as well as the costs associated with recycling, storage or disposal of the switches. A vehicle recycler or scrap metal recycling facility that removes switches from eligible vehicles in accordance with the educational materials received will be provided regulatory incentives by the Commission on Environmental Quality.
Utah	The “Mercury Switch Removal Act” requires manufacturers of vehicles sold in the state to submit a plan for the removal and collection of mercury switches, pay for the costs of removing and collecting mercury switches, and submit an annual report to the Solid and Hazardous Waste Control Board. The Act specifies plan contents and authorizes the Solid and Hazardous Waste Control Board to establish a fee for the review and approval of the plan.
Vermont	Requires both vehicle manufacturers and vehicle recyclers to develop a vehicle switch recovery program, with financing of the collection and processing of switches by vehicle manufacturers.
Virginia	Requires certification by vehicle demolishers of removal of mercury switches in motor vehicles prior to demolition.
Washington	Bans the sale of automobiles with mercury switches, effective January 2006.

Canada — In December 2006, Environment Canada published a proposed notice titled, “Pollution Prevention Planning in Respect of Mercury Releases from Mercury Switches in End-of-life Vehicles Processed by Steel Mills” under Part 4 of the *Canadian Environmental Protection Act, 1999*. The notice outlines the proposed requirements to prepare and implement pollution prevention plans for mercury releases from mercury switches in end-of-life vehicles processed by steel mills.

The notice applies to any class of persons who, at any time since January 1, 1988, has been a manufacturer of vehicles that contain one or more mercury switches, as well as any class of persons who owns or operates a steel mill that processes end-of-life vehicles to produce steel.

The factors to be considered in preparing the pollution prevention plans include:

- Participation by each vehicle manufacturer for 15 years after the last model year in which mercury switches were installed by that vehicle manufacturer.
- Participation by steel mills until December 31, 2017.
- Establishing and maintaining funding to support the mercury switch management program until 15 years have passed since the last model year in which mercury switches were installed for vehicle manufacturers, or until December 31, 2017, for steel mills. Funding provided by the vehicle manufacturers and steel mills that supports the mercury switch management program could include incentives or compensation for costs incurred by vehicle recyclers who participate in the mercury switch management program. Funding provided by vehicle manufacturers could be based on the number of mercury switches installed by that vehicle manufacturer as a proportion of those installed by all vehicle manufacturers since January 1, 1988.
- Compliance with all applicable federal, provincial and municipal legislation.
- Promotion and communication of the mercury switch management program to vehicle recyclers and the public.
- Development of annual targets for the number of switches to be collected and for the capture rate of mercury switches, in consideration of an ultimate goal of achieving an annual capture rate of 90 per cent within the first four years of participation in the mercury switch management program.
- Public reporting of targets, timelines and results in the management of mercury switches on an annual basis. The public reporting should include, but not be limited to, reporting the number of mercury switches collected and the estimated capture rate.
- Annual mercury switch management program review and implementation of steps to improve upon program performance in order to improve the capture rate, until such time as a capture rate of 90 per cent is achieved.
- Annual evaluation of the fate of the mercury contained in the mercury switches that were collected in order to ensure that the releases of mercury into the environment are reduced to the maximum extent possible.
- The distribution of guidance material by vehicle manufacturers to vehicle recyclers that specifies the location of mercury switches in vehicles manufactured by that vehicle manufacturer and also explains how to remove

- and manage the mercury switches.
- The development and implementation of a procurement policy by steel mills that requires the steel mill to purchase only end-of-life vehicles from which the accessible mercury switches have been removed.
 - Evaluation of the effectiveness of the notice with respect to the risk management objective, in order to determine if other measures, including regulations, are needed to further prevent or reduce negative impacts on the environment and human health from mercury releases from mercury switches in end-of-life vehicles.

The proposed notice was published in the *Canada Gazette*, Part I, for a 60-day comment period that ended February 7, 2007. The comments received are currently being considered. After this, a final notice requiring the preparation and implementation of pollution prevention plans for mercury releases from switches in end-of-life vehicles processed by steel mills will be published in Part I of the *Canada Gazette*. As of March 2007, the timing for the final notice was not known.

Mercury-containing Lamps

Mercury-containing lamps include fluorescent lamps (includes tubes and compact fluorescent lamps, or CFLs), high intensity discharge (HID) lamps (includes high pressure sodium (HPS), mercury vapour and metal halide lamps) and 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 ultraviolet (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 4), date of manufacture, manufacturing plant and manufacturer.⁸

Table 4: 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
1500-watt	225
Metal Halide Lamps:	
75-watt	25
1500-watt	225
Sodium Vapour Lamps:	
35-watt	20
1000-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.

There are no ready alternatives to 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 electric 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

⁸ North Carolina Department of Environment and Natural Resources. Mercury website. www.p2pays.org/mercury/lights.asp#lights1.

lamps may violate energy codes and overload electrical circuits.⁹

Existing Standards

EU — 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.

There does not appear to be 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.

The WEEE Directive, which addresses the takeback of waste electrical and electronic equipment, 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 is 80 per cent.¹⁰

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 in the market or put into service in the fifteen member states of the European Union and Norway, Iceland and Liechtenstein. If the product meets the provisions of the applicable European Directives, and the CE mark is affixed to a product, these countries may not prohibit, restrict or impede the placing in the market of the product. For further information on CE marking, see www.cemarking.net.

Other International — **Taiwan** implemented a compulsory fluorescent lamp recycling program in 2002 and now has a collection rate of approximately 87 per cent.¹¹ Beginning November 2004, citizens of Taiwan are able to recycle used fluorescent tubes in any of 2,000 shops island-wide that sell the lamps. Shop

⁹ NEMA. 2001. *Alternatives to Mercury-Containing Light Sources*. www.nema.org/gov/ehs/committees/lamps/upload/alt-mercury-lightsourcespdf.pdf.

¹⁰ Ibid.

¹¹ Environmental Policy Monthly. June 2000. *Recycling of Fluorescent Light Tubes to Begin July 2001*. Volume III, Issue 12. http://ivy2.epa.gov.tw/out_web/english/EPM/issue0006.htm, accessed March 17, 2005.

owners who fail to cooperate with the recycling project will be fined between NT\$60,000 and NT\$300,000 (\$2,000–\$11,000 CDN).¹²

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 will come into effect in 2006.¹³ The EPR system includes a total of 15 items, one of which is fluorescent light bulbs. Under the Korean EPR system, producers of the included items receive mandatory recycling obligations for their specific EPR item.

Many **Australian** government agencies are beginning to include mercury-containing lamp recycling as an environmental management system (EMS) activity. The Department of the Environment and Heritage (DEH) has committed to the ongoing recycling of fluorescent tubes from its operations.¹⁴

US — Mercury-containing lamps fall under the universal waste rule. The federal regulations mandate the recycling of fluorescent lamps, but exempt households and other small users.

Individual US States — Table 5 shows the laws that have been passed in various US 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 a mercury content of 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

¹² Taipei Times. October 30, 2004. *Tube recycling system launched*.

www.taipetitimes.com/News/taiwan/archives/2004/10/30/2003208949.

¹³ Ministry of Environment, Republic of Korea. 2004. *Act on the Promotion of Saving and Recycling of Resources*.

http://eng.me.go.kr/user/envnews/envnews_view.html?seq=275&page=1, accessed March 17, 2005.

¹⁴ Australian Government, Department of the Environment and Heritage.

www.deh.gov.au/industry/agency-performance/tubes.html, accessed December 14, 2004.

	over time.
Minnesota	Requires that any information regarding fluorescent lamps containing mercury that is sent by a utility to a customer, or is present on a utility's website or contained in a print, radio or video advertisement, must state that the lamps contain mercury that is harmful to the environment and that it is illegal to place them in garbage, and must 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 high intensity discharge 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 high intensity discharge (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.

US Municipalities — The city of Minneapolis, Minnesota, has adopted an ordinance related to point-of-sale signage for mercury-containing lamps, which requires retailers to post signage 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 offer to take them back for recycling from their customers.

Canada — In June 2001, the Canadian Council of Ministers of the Environment (CCME) implemented a Canada-wide standard (CWS) for the mercury content in mercury-containing lamps, with the numeric target of 70 per cent reduction by 2005 (from a 1990 baseline) and a total reduction of 80 per cent by 2010. The CWS also includes a commitment to assess the feasibility of recycling and recovering mercury-containing lamps and to implement initiatives to encourage these types of activities.

Individual Canadian Provinces — Ontario considers end-of-life lamps to be domestic waste, which can be disposed of at municipal landfill sites if there are less than 17 lamps per month (standard four-foot long). However, for disposal of large quantities of lamps, building owners and businesses have to comply with Ontario's hazardous waste Regulation 347 and must disposed of the lamps at either a hazardous waste landfill site or lamp recycler.

Table 6 shows the voluntary actions taken by various Canadian provinces pertaining to mercury-containing lamps.

Table 6: Canadian Provincial Action for Mercury-containing Lamps

State	Actions Taken
Alberta	Operates the “Partners in Recycling” program, which promotes the recycling of fluorescent lamps. It is a joint voluntary initiative between Alberta Environment and Northern CARE (Coordinated Action for Recycling), City of Calgary, Recycling Council of Alberta and Alberta Plastics Recycling Association. The recycling rate for fluorescent bulbs in 2002 for this program was 23 per cent.
Manitoba	Promotes lamps that contain lower levels of mercury in government buildings as part of its procurement policy. Assesses and promotes programs to recycle and recover mercury-containing lamps from government buildings.
New Brunswick	Uses low mercury fluorescent lights in government buildings, wherever possible, and encourages large property owners to use such lamps.