April 26, 2005

The Honorable Donald L. Carcieri
Governor, State of Rhode Island
Executive Chambers
State House
Providence, RI 02903

Dear Governor Carcieri:

I am pleased to submit to you the April 2005 Final Report of the Rhode Island Commission on Mercury Reduction and Education. This report has been prepared in accordance with Rhode Island General Law §23-24.9-2.1 and is being transmitted under separate cover to Senate President Joseph Montalbano and House Speaker William Murphy. I would like to take this opportunity to highlight a number of important findings that can be found within the report for reducing and eliminating mercury hazards in Rhode Island.

Mercury is a naturally-occurring shiny, silver white, odorless metal that conducts electricity. It exists in gas, liquid, or solid form; it is liquid at room temperature, combines easily with other metals, and expands and contracts evenly with temperature changes. Because of these unique chemical and physical properties, mercury performs numerous functions in the home and workplace. However, mercury in the environment can be toxic at low levels and human exposure to mercury can lead to health problems. For these reasons, Rhode Island adopted one of the most comprehensive laws governing the use of mercury in products in the country in 2001.

Shortly after the passage of this law, the Rhode Island General Assembly and your office acknowledged that implementation of this law is a highly complex undertaking requiring cooperation among all interested parties (businesses, government and private organizations). In 2003, citing the critical need for "systems planning", the Rhode Island General Assembly passed new legislation creating the Commission on Mercury Reduction and Education "to study the system(s) for reducing and eliminating mercury hazards in Rhode Island." This Commission met from May 2004 through April 2005.

At the Commission's first meeting on May 14, 2004, members unanimously agreed upon a mission statement: "The mission of this Commission is to prevent man-made sources of mercury from getting into the environment (air, water, soil)". The Commission acknowledged one very important, factual premise: *this mission statement pertains only to those sources of mercury that Rhode Island can control*. As you are well aware, mercury (air) pollution is a significant environmental problem for the northeastern United States and in this respect is similar to other air quality problems facing this region. Because a significant amount of our mercury (air) pollution originates from sources outside the region, action must be taken at the national level to reduce mercury to levels that will fully protect all residents equally.

As a result, the Commission recommends:

- Rhode Island should aggressively support more stringent federal standards with well defined targets and deadlines for reducing emissions from power plants, industrial and commercial boilers and sewage sludge incinerators, as well as long-term management and storage of excess elemental mercury; and
- Rhode Island Department of Environmental Management (RI DEM) should continue to facilitate strong interstate collaboration in developing and implementing public education and outreach programs on mercury-added products.

The northeastern states have made significant progress in reducing mercury emission sources from within the region and continue to further reduce mercury in products and waste through state legislation. The Commission's recommendations reflect and refine this current law so that this state's efforts can be facilitated and its results can be optimized. All of the Commission's recommendations can be found in the Executive Summary and in Section 8 of this report.

The Commission's key recommendations include:

- Rhode Island should establish a comprehensive environmental monitoring program to obtain initial and periodic air emissions, groundwater and soil measurements of mercury within the state;
- Rhode Island should establish a comprehensive biological monitoring program to obtain initial and periodic mercury levels in humans in order to define the extent of mercury exposure in Rhode Island residents (particularly pregnant

woman and fetuses), as well as sentinel species such as sphagnum moss and fish, since consumption of certain kinds of fish is the primary source of mercury contamination in humans;

- Rhode Island should continue to phase-out mercury products wherever feasible, but the implementation date for the first tier of the statutory phase-out should be delayed from July 1, 2005 to July 1, 2006;
- Rhode Island should exempt from all phase-out provisions high intensity discharge (HID) lamps, including metal halide, high pressure sodium, and mercury vapor types and laboratory chemical standards as well;
- Rhode Island should delay implementation date of the labeling requirements for mercury-added products sold and distributed in the state from July 1, 2005 to July 1, 2006. The Commission's recommendations include wording changes to the existing law so that labeling requirements will be consistent with other states. A delay in implementation provides manufacturers time to comply;
- Rhode Island should undertake a comprehensive review of current mercury-related educational materials so that these materials can target at-risk audiences;
- Rhode Island should extend the implementation deadline for collection plans and disposal bans from July 1, 2005 to July 1, 2006;
- RI DEM and the Rhode Island Resource Recovery Corporation (RI RRC) should strive to establish a statewide network for the collection of household mercury-added products;
- The Rhode Island General Assembly should amend the Mercury Reduction and Education Act (RIGL 23-24.9) to establish disposal ban and collection requirements for mercury-containing auto switches at vehicle end of life;
- The Governor and Legislature should adequately fund mercury reduction-related programs and activities including an effective public education program, environmental and biological monitoring, and adequate staffing within RI DEM, RI Department of Health (RI DoH) and RI RRC to implement the provisions of this law; and
- RI DEM should be authorized to establish a fee structure in order to implement the purposes of this mercury education and reduction program (RIGL Chapter 42-17.1).

I will answer any questions you may have regarding the content of this report, all of the Commission's recommendations and the challenges Rhode Island faces in continuing its mercury reduction efforts. Copies of the report can be found on the Commission's website at: *http://204.139.0.230/hgcomm/index.htm* Please contact me at 401-884-4265 or by e-mail at *marcy_thompson1@yahoo.com*. Thank you for this opportunity to serve the citizens of Rhode Island.

Sincerely,

Marcella R. Thompson, CSP, RN, COHN-S
Chair

C/ The Honorable Joseph Montalbano, Senate President
The Honorable M. Teresa Paiva-Weed, Senate Majority Leader
The Honorable William Murphy, Speaker of House
The Honorable Gordon Fox, House Majority Leader
The Honorable Dennis Algiere, Senate Minority Leader
The Honorable Robert Watson, House Minority Leader
The Honorbale Peter T. Giniatt, Chairman House Environment Committee
The Honorbale V. Susan Sosnowski, Chair Senate Environment Committee
Kenneth Payne, Senate Policy Office
Mercury Commission Members
Governor's Policy Office

FINAL REPORT
OF THE
RHODE ISLAND COMMISSION
ON
MERCURY REDUCTION AND EDUCATION

Pursuant to RIGL §23-24.9

Submitted to Governor Donald L. Carcieri and the Rhode Island General Assembly
April 2005

Marcella R. Thompson, Chair
Affirmed by Commission April 2005

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Mercury Legislation

RI General Law Chapter 23-24.9 the Rhode Island Mercury Reduction and Education Act was adopted by the RI General Assembly in July 2001. This law is based upon model legislation drafted by the Northeast Waste Management Officials Association (NEWMOA). It addresses products to which mercury has been intentionally added as well as the sale of elemental mercury. The stated purpose of RIGL 23-24.9 is "to achieve significant reductions in environmental mercury by encouraging the establishment of effective waste reduction, recycling, management and education programs."

Formation of the Commission

Shortly after the enactment of RIGL 23-24.9, the legislature became aware of "unintended consequences of this law" and acknowledged that implementation of this law is "a highly complex undertaking requiring cooperation among all interested parties." Citing the critical "need for systems planning," a legislative amendment created the Commission on Mercury Reduction and Education (April 2004 – July 2005) "to study the system(s) for reducing and eliminating mercury hazards in Rhode Island."

On May 14, 2004, members of the Commission unanimously agreed upon the following mission statement: "The mission of this Commission is to prevent man-made sources of mercury from getting into the environment (air, water, soil)." The Commission acknowledged one factual premise: this mission statement pertains only to those sources that Rhode Island can control. The Commission agreed that achievement is possible through cooperation, consensus and commitment of all interested parties. The Commission on Mercury Reduction and Education submits this report with its findings and recommendations to Governor Donald E. Carcieri. It represents one year of intense investigation, serious reflection and concentrated work.

General Findings

This legislation follows the precautionary principle: "when an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established" (Santillo, 1999). Evaluation of mercury exposure and toxicity is a complex issue. While background levels of mercury in RI are significantly below guidelines for acceptable exposure, people may be exposed to mercury through interaction with the ambient environment either through breathing ambient air or more likely through contact with other media or food sources that have been contaminated with mercury as a result of historical deposition of the mercury. Mercury persists in the environment for a very long period of time. Exposure to women and the impacts on their babies' developing nervous systems are the primary public health concerns associated with mercury exposure. For a small, significant percentage of RI women, there is little margin of safety between the levels of mercury found in their blood and the levels that can harm the developing child.

A few sources of mercury dominate national estimates of mercury exposures, but many diverse mercury sources may contribute to exposures of the general population. Mercury deposited in Rhode Island's water and soil comes primarily from man-made (anthropogenic) air emission sources such as solid waste incinerators or coal-fired power plants outside the State and Region. Globally, the U.S. accounts for six percent (6%) of man-made sources of mercury emissions into the air while Asia accounts for 53 percent (53%) of these emissions. While this legislation does not address emission sources outside of Rhode Island, the Commission urges the State to actively engage in supporting efforts aimed at aggressively controlling them.

Mercury concentrations in the ambient air are usually low. The total annual mercury emissions from within Rhode Island are likely to range between 400 pounds and 1,200 pounds. The major

industrial emitters of mercury in the State are hospital incinerators (averaging about 25 pounds per year) and wastewater treatment sludge incinerators (averaging about 15 pounds per year per facility). Mercury can also enter the environment through the disposal of wastes containing the contaminant and by local spills and releases. A Rhode Island Department of Environmental Management (RI DEM) analysis showed that approximately 150 entities generated about 146,000 pounds of hazardous waste containing mercury over the time period from January 1, 1998 to November 1, 2004. Unfortunately, spills of elemental mercury are not unusual in Rhode Island. The RI DEM Office of Emergency Response normally recovers several dozen pounds per year, chiefly from old industrial sites or hospitals or schools where instruments that contain mercury break. Mercury emissions from U.S. municipal solid waste landfills are insignificant. Based on estimated nationwide emissions of mercury from landfills from the EPA mercury report to Congress and Rhode Island's percent of the US population, emissions of mercury from Rhode Island landfills amount to less than one (1) pound per year. With the decline of mercury in products, this is expected to decline even further.

Mercury Use

The NEWMOA database lists well-known and commonly used mercury-containing products. Mercury use in products is declining. Many industries have been voluntarily reducing the amount of mercury contained within their products or opting to eliminate mercury totally. The effect of regulatory efforts may be influential. Individuals and businesses in residential, commercial and industrial settings in Rhode Island use mercury-containing or mercury-added products. Identified users of mercury include: industry, offices, schools, medical and dental; lighting users, distributors and contractors; agriculture, dentistry, municipal water treatment facilities, energy utilities, and individual (household) consumers. The Commission acknowledges that some uses of mercury are critical to certain industries and cannot be phased out, including energy-efficient lighting. Permanent exemptions should be extended to high intensity discharge (HID) lamps such as metal halide, high-pressure sodium, and mercury vapor types used in public safety, the semiconductor industry and the entertainment industry. The use of chemical standards for mercury analysis in laboratories should be permanently exempted as well.

As requested, the Commission studied the issues regarding mercury in automobiles and electronic-waste. RI DEM projects that approximately 602 pounds of mercury remain in convenience light switches in vehicles registered in Rhode Island. In addition to this mercury from cars registered in Rhode Island, it estimated that approximately 50,000 Rhode Island vehicles are retired annually and approximately 60,000 vehicles come from out-of-state. Independent auto recyclers also process an unknown number of out-of-state vehicles. From these combined sources, it is estimated by the Commission Subcommittee on Mercury in Automobiles that in Rhode Island, 43 pounds of mercury per year can be recovered from mercury switches in automobiles.

Current State Mercury Reduction and Education Efforts

Requiring product labeling, collecting mercury-containing products and providing information to the public are among the mercury-reducing efforts currently in place in Rhode Island. This State has a variety of collaborative programs that target educational institutions and another voluntary education program for managing mercury in health care facilities. In Rhode Island, the Narragansett Bay Commission has begun implementing Best Management Practices, requiring dentists in their service area to monitor wastewater for mercury or to install amalgam separators capable of removing 99% of amalgam. RI DEM should consider developing a similar statewide program in conjunction with stakeholders to reduce the release of mercury into the environment (e.g. wastewater, septic systems and sewage sludge) from this source.

Santillo, D., P. Johnston, and R. Stringer (1999). The precautionary principle in practice: a mandate for anticipatory preventive action. In C. Raffensperger and J. Tickner (eds.) Protecting public health and the environment. Washington, DC: Island Press, 36-50.

Final Recommendations

If Rhode Island is to achieve "significant reductions in environmental mercury," the Commission recommends a variety of actions. For a complete listing of recommendations with associated rationales, see Section 8 of this report. The following is a list of the Commission's specific recommendations:

23-24.9-4 Interstate Clearinghouse

The Commission recommends that the RI Department of Environmental Management continue its participation and membership in the IMERC interstate clearinghouse.

The Commission recommends that the RI DEM should continue to look to IMERC for technical and programmatic assistance and to facilitate strong interstate collaboration on the development and implementation of public education and outreach programs on mercury-added products.

23-24.9-7 Phase-outs and Exemptions

The Commission recommends the following additions and changes:

CHANGE (d) to read: Fluorescent lamps and high intensity discharge (HID) lamps, including metal halide, high pressure sodium, and mercury vapor types, shall be exempted from the requirements of subsection (a) of this section.

ADD (e) Laboratory chemical standards shall be exempted from the requirements of -7(a).

CHANGE (f) to read: Manufacturers of a mercury-added product may apply to the director for an exemption for no more than ~~two (2)~~ five (5) years from the limits on total mercury content set forth in subsection (a) of this section for a product or category of products.

CHANGE (g) paragraph (ii) to read: he or she finds ~~each of~~ the following criteria are met:
(1) Use of the product is beneficial to the environment or protective of public health or protective of public safety; and/or
(2) There is no technically feasible alternative to the use of the mercury in the product; and
(3) There is no comparable non-mercury-added product available at reasonable cost.

CHANGE (g) final sentence to read: Upon reapplication by the manufacturer and findings by the director of continued eligibility under the criteria of this subsection and of compliance by the manufacturer with the conditions of the director's original approval, an exemption may be renewed one or more times and each renewal may be for a period of no longer than ~~two (2)~~ five (5) years.

23-24.9-8 Labeling

The Commission recommends the following additions and changes:

CHANGE (2) paragraph 1 to read: The department shall adopt rules to establish standards for affixing labels to the product and product package. The rules shall be consistent with labeling programs in other states and provide for approval of alternative compliance plans by the department.

ADD to (2) new paragraph 2 to read: The manufacturer of a mercury-added product is in compliance with the requirements of this subsection if the manufacturer is in compliance with the labeling requirements of another state.

CHANGE (3) paragraph 2 to read: This subsection does not apply to ~~mercury-added lamps~~, mercury-added button cell batteries and products whose only mercury component is a mercury button cell battery or a mercury-added lamp.

23-24.9-9 Disposal Ban

The Commission recommends no changes to this section.

23-24.9-10 Collection

The Commission recommends the following addition:

ADD paragraph (b): The Department and the Rhode Island Resource Recovery Corporation shall establish a statewide network for the collection of mercury-added products when the household consumer is finished with them. Manufacturers of mercury-added products may satisfy their obligations, as set forth above in section (a), by entering into a written agreement with those agencies to support the statewide program including, but not limited to, advertisement, education and/or funding through system established in regulation.

23-24.9-11 Healthcare Facilities

The Commission recommends no changes to this section.

23-24.9-13 Existing Inventories

The Commission recommends no changes to this section.

23-24.9-14 Education

The Commission recommends no changes to this section.

The Commission recommends the Department of Environmental Management educate industries with regard to the universal waste law.

The Commission recommends a comprehensive review of current mercury-related educational materials aimed at improving the quality of their information in terms of educational objectives. Effective and adequate distribution of these materials to reach at-risk audiences is needed.

23-24.9-16 Violations

The Commission recommends no changes to this section.

23-24.9-18 FDA

The Commission recommends no changes to this section, as it is consistent with other states.

23-24.9-19 Mercury Advisory Working Group

The Commission recommends no changes to this section.

23-24.9-20 Regulations

The Commission recommends the Department of Environmental Management be authorized in **RIGL 42-17.1** to establish a fee structure to implement the purposes of this program.

Commission Recommendations Regarding Effective Dates

23-24.9-7 Phase-outs and Exemptions

1,000 mg phase-out extended from July 1, 2005 to July 1, 2006

23-24.9-8 Labeling

Labeling extended from July 1, 2005 to July 1, 2006

23-24.9-9 Disposal Ban

Disposal ban extended from July 1, 2005.to July 1, 2006

23-24.9-10 Collection

Collection extended from July 1, 2005 to July 1, 2006

23-24.9-11 Disclosure Healthcare Facilities

July 1, 2005. The Commission recommends no change in effective date.

23-24.9-16 Violations

July 1, 2005. The Commission recommends no change in effective date.

Additional Commission Recommendations, General

The Commission recommends strongly that the Governor and legislature adequately fund mercury-related programs and activities initially and for the long-term including support for an effective public education program, environmental and biological monitoring programs, and staffing within RI DEM, RI DoH and RI RRC.

The Commission recommends establishing and funding a Mercury Pollution Prevention Award Program for businesses, institutions, government agencies, or individuals who have made significant strides in the field of reducing mercury pollution.

The Commission recommends Rhode Island aggressively support more stringent federal standards with well-defined targets (Maximum Achievable Control Technology, MACT) and deadlines for reducing emissions from power plants, industrial and commercial boilers and sewage sludge incinerators as well as long-term management and storage of excess elemental mercury.

This commission recommends that the Rhode Island Attorney General's Office seek legal recourse from the Federal EPA to protect the health of all Rhode Islanders.

The commission recommends that the Rhode Island Department of Environmental Management continually monitor implementation of the current cap and trade format so that mercury emissions are adequately reduced in Rhode Island and that Rhode Island is not further adversely impacted.

The Commission recommends Rhode Island establish a comprehensive monitoring program to obtain initial and periodic air emissions, groundwater and soil measurements of mercury within the state. Furthermore, the Commission recommends that RI DEM include sampling and analysis for mercury as it implements the proposed statewide Water Quality Monitoring Strategy, continues to work on water quality monitoring with the interagency Rhode Island Environmental Monitoring Collaborative, and studies ambient air quality and the level and impacts from toxic air contaminants throughout the state.

The Commission recommends Rhode Island determine the impact of mercury contamination from burning of residential fuel oil. Based upon regional data, residential fuel oil (specifically the high sulfur content type) releases mercury into the air when it is burned and may represent a major in-state source of mercury in Rhode Island.

The Commission recommends the Department of Environmental Management adopt statewide a program similar to the Narragansett Bay Commission's dental amalgam mercury program. Recovery of mercury in dental amalgam would reduce significantly this source of groundwater / freshwater contamination.

The Commission recommends Rhode Island establish a comprehensive biological monitoring program to obtain initial and periodic mercury levels in sentinel species such as sphagnum moss and fish.

The Commission recommends that Rhode Island establish a comprehensive biological monitoring program in humans to define the extent of mercury exposure in Rhode Island residents, particularly pregnant woman and fetuses.

Additional Commission Recommendations, **Automotive**

The Commission recommends establishing a disposal ban and collection requirement for mercury switches at vehicle end of life. The Rhode Island General Assembly should amend the Mercury Reduction and Education Act (RIGL 23-24.9) to establish a disposal ban and collection requirements for auto switches containing mercury. The collection requirement should establish performance criteria for the amount of mercury to be collected by the auto manufacturers on an annual basis. The legislation should specify that, if the capture rates are not met in a timely fashion, RI DEM shall adopt regulations to establish a manufacturer funded collection program.

The Commission recommends making the following changes to the Mercury Reduction and Education Act regarding the collection of mercury-added products:

23-24.9-9 Disposal ban. – (a) After July 1, 2005, no person shall dispose of mercury-added products in a manner other than by recycling or disposal as hazardous waste. Mercury from mercury-added products may not be discharged to water, wastewater treatment, and wastewater disposal systems except when it is done in compliance with local, state, and federal applicable requirements.

(b) If a formulated mercury-added product is a cosmetic or pharmaceutical product subject to the regulatory requirements relating to mercury of the federal food and drug administration, then the product is exempt from the requirements of this section.

(c) This section shall not apply to: (1) anyone who disposes of a mercury-added button cell battery; <u>or</u> (2) ~~mercury-added components as contained in motor vehicles; and (3)~~ households disposing of lamps and products containing lamps.

(d) This section shall not apply to mercury-added components as contained in motor vehicles unless the Department promulgates regulations in accordance with 23-24.9-10 (e).

23-24.9-10 Collection of mercury-added products. (a) After July 1, 2005, no mercury-added product shall be offered for final sale or use or distribution for promotional purposes in Rhode Island unless the manufacturer either on its own or in concert with other persons has submitted a plan for a convenient and accessible collection system for such products when the consumer is finished with them and the plan has received approval of the director. Where a mercury-added product is a component of another product, the collection system must provide for removal and collection of the mercury-added component or collection of both the mercury-added component and the product containing it.

(b) This section shall not apply to the collection of mercury-added button cell batteries or mercury-added lamps or products where the only mercury contained in the product comes from a mercury-added button cell battery or a mercury-added lamp; and

~~(2) This section shall not apply to motor vehicles.~~

(2) Manufacturers of motor vehicles sold in Rhode Island that contain mercury switches shall, individually or collectively, establish and implement a collection program for mercury switches as follows:

a) In accordance with 23-24.9-9, the program shall be developed to meet the goal of collecting and recycling no less than 43 pounds of mercury from switches removed from motor vehicles per year for the calendar years 2006 and 2007. For following years, the Department shall review the goal and establish target collection rates for the program.

b) By September 1, 2005, submit a plan outlining the proposed collection program to the Department. At a minimum, the plan must:

i) Explain how the goal is anticipated to be met through implementation of the plan
ii) Ensure that mercury switches collected are managed in accordance with the universal waste rules adopted by the Department;
iii) Provide the department and persons who remove motor vehicle components under this section with information, training and other technical assistance required to facilitate removal and recycling of the components in accordance with the universal waste rules;
iv) Make available to the public information concerning services to remove mercury light switches in motor vehicles

c) Implement said plan, with any adjustments or recommendations provided by the Department, by January 1, 2006.

d) Provide quarterly reports to the Department beginning March 31, 2006 on the number of switches collected and the amount of mercury collected and recycled through the program.

e) In the event that collections do not meet the goals of the program in any calendar year, the Department shall develop and implement regulations within six months compelling the manufacturers of motor vehicles sold in Rhode Island to undertake an alternative collection program. The total cost of the removal, replacement, collection, and recovery system for mercury switches shall be borne by the manufacturer or manufacturers. Costs shall include, but not be limited to the following: (1) labor to remove, or replace where possible, mercury switches. Labor shall be reimbursed at the prevailing rate auto manufacturers use to reimburse automotive dealers for replacing faulty switches under the manufacturer-dealer warranty program; (2) training; (3) packaging in which to transport mercury switches to recycling, storage or disposal facilities; (4) shipping of mercury switches to recycling, storage or disposal facilities; (5) recycling, storage or disposal of the mercury switches; (6) public education materials and presentations; and (7) maintenance of all appropriate systems and procedures to protect the environment from mercury contamination.

The commission recommends creating an education and training program regarding mercury switch removal from automobiles. Training and education would target both management and employees.

The Commission recommends the establishment of a Rhode Island Auto Mercury Pollution Prevention Awards Program.

The Commission recommends that any of the above changes to current Rhode Island law should maintain an enforcement mechanism consistent with the Mercury Reduction and Education Act (RIGL 23-24.9-16).

The Commission recommends that In the event a national program is developed to address collection of mercury from auto parts, the Department of Environmental Management may adopt the national program provided that it is consistent with the purposes and policies of current law.

The Commission recommends that Rhode Island encourage auto manufacturers to develop both in-use and end-of-life vehicle collection programs**.**

Commission Members, appointed by Governor Donald E. Carcieri

Name	Organization/Affiliation
Canada, Kate[1]	RI Public Interest Research Group
Cote, Claude (designee of Director of RIRRC)	RI Resource Recovery Corporation
Dormody, Sheila	Clean Water Action
Goss, Richard[2]	Electronic Industry Alliance
Gray, Terrence (designee of Director of RI DEM)	RI Department of Environmental Management
Horner, Pamela[3]	OSRAM SYLVANIA
Kaplan, Susan (designee of Director of RI EDC)	RI Economic Development Corporation
Knapp, Andrew	Hasbro, Inc.
Magnani, Jamie (designee of Director of RILCT)	RI League of Cities and Towns
Marks, Eugenia	Audubon Society of Rhode Island
Rosenberg, Howard	Novomont Ventures
Thompson, Marcella (Chair)	ON Semiconductor Corporation
Tsiongas, Nicholas, M.D.	Ocean State Workplace Health
Vanderslice, Robert, Ph.D. (designee of Director of RI DOH)	RI Department of Health

1. Served May – June 2004; no replacement designated
2. Appointed March 2005, replacing Jason Linnell of EIA who served from May – December 2004
3. Replaced Peter Bleasby of OSRAM SYLVANIA who served from May – September 2004

Background: NEG/ECP – Mercury Action Plan

In June 1997, the Conference of the New England Governors and Eastern Canadian Premiers (NEG/ECP) charged its Committee on the Environment to: "continue to advance the understanding of mercury in this region;" "support cooperative action...to begin to address mercury releases and resulting public health and environmental impacts;" and develop a regional Mercury Action Plan. A draft framework for the Mercury Action Plan was subsequently developed by representatives of the New England states and Eastern Canadian provinces. This draft was refined following the NEG/ECP Workshop on Acid Rain and Mercury in February 1998.

The Conference of New England Governors and Eastern Canadian Premiers concluded that aggressive and concerted actions are needed to reduce potential health risks attributable to mercury exposures and to expand scientific information on mercury sources, controls and environmental impacts. This conclusion is based on extensive scientific data indicating that mercury is pervasive in freshwater fish in the Northeast at levels that pose plausible health risks to people and to some species of fish eating wildlife. In addition to the potential health effects caused by this contamination, there are important economic consequences, including reducing the recreational and commercial value of fisheries resources across the region.

Background: NEWMOA and IMERC

Beginning in 1999, the states in the Northeast and other parts of the country actively began to pursue enactment of legislation focused on reducing mercury in products and waste in response to the 1998 NEG/ECP Mercury Action Plan. Working in concert with the Northeast Waste Management Officials' Association (NEWMOA), the northeast states focused on the Mercury Education and Reduction Model Legislation, which included these key provisions: *making information readily available to the public about mercury-containing products; reducing unnecessary uses of mercury-added products where environmentally preferable alternatives exist; and increasing the collection of mercury-added products used by consumers*. Considerable progress has been made regionally to advance these objectives.

In 2001, the Northeast Waste Management Officials' Association (NEWMOA) launched the Interstate Mercury Education and Reduction Clearinghouse (IMERC) to provide ongoing technical and programmatic assistance to states that have enacted provisions of the Mercury Education and Reduction Model Legislation. In addition, IMERC shall serve as a single point of contact for industry and the public for information on mercury-added products and member states' mercury education and reduction programs.

Specifically, IMERC is intended to:

- collect and manage data submitted by manufacturers of mercury-added products, as necessary to implement the notification provisions of state mercury reduction legislation;
- facilitate interstate collaboration on the development and implementation of public education and outreach programs on mercury-added products;
- endeavor to make information on mercury-added products available to industry and the public;
- respond to public information requests for information on mercury-added products, the requirements of the Act, and the status of state implementation of the Act; and
- provide technical assistance, facilitate reviews, and make recommendations to the member states concerning (i) manufacturers' applications for exemptions to the phase-out of mercury-added products; (ii) manufacturers' applications for

alternative labeling of mercury-added products; and (iii) manufacturers' plans for collection and proper waste management of mercury-containing materials.

IMERC's membership includes NEWMOA and non-NEWMOA member state government agencies. The IMERC state members include Connecticut, Illinois, Maine, Massachusetts, New Hampshire, New Jersey, New York, **Rhode Island,** Vermont, and Washington. All member states that participate in the Clearinghouse pay an annual fee.

Historical Background: Summary of Mercury Reduction Efforts

1997: In June 1997, the Conference of the New England Governors and Eastern Canadian Premiers (NEG/ECP) charged its Committee on the Environment with developing a regional Mercury Action Plan. (1997 NEG/ECP Resolution on Mercury)

1998: In June, the Action Plan is completed and submitted to the full NEG/ECP. The Governors and Premiers support and endorse the action plan's ultimate goal of virtual elimination of anthropogenic (anthropogenic) mercury releases in the region.

1999: In conjunction with the Northeast Waste Management Officials' Association (NEWMOA), the states in the Northeast and other parts of the country actively begin to pursue enactment of legislation focused on reducing mercury in products and waste.

2001: RI DEM introduces the NEWMOA model legislation here in RI. The RI General Assembly adopts most of the provisions of the model legislation in the summer of 2001. The RI Mercury Education and Reduction Act of 2001 is one of the strongest mercury laws on the books in any state.

The Northeast Waste Management Officials' Association (NEWMOA) launches the Interstate Mercury Education and Reduction Clearinghouse (IMERC) to provide ongoing technical and programmatic assistance to states that have enacted provisions of the Mercury Education and Reduction Model Legislation.

2003: RI General Assembly amends the 2001 RI Mercury Education and Reduction Act. These amendments serve to delay or postpone most of the major provisions of RI's law by pushing off, until 2005 and later, many of the key provisions of the law (e.g. phase-outs, labeling, disposal ban, collection plans, and disclosure for formulated mercury-added products). In addition the RI General Assembly creates a 14-member Rhode Island Commission on Mercury Reduction and Education. The Commission is asked is provide final recommendations by January 1, 2005.

2004: In April, RI DEM adopts mercury regulations in order to implement the RI Mercury Education and Reduction Act. A lengthy stakeholder process is convened to help draft these regulations.

In May, the 14-member Rhode Island Commission on Mercury Reduction and Education begins meeting. A sub-group to the full commission is created to specifically examine the topic of mercury in cars is formally created in August. Both the full commission and the sub-group on mercury in cars continue to meet through the early part of 2005. The chair expects to issue a final report by April of 2005.

October - Major mercury spill incident in Pawtucket, RI.

2005: The Commission (and its sub-group on mercury in automobiles) continues to meet. Final recommendations included in this report.

RI Mercury Reduction and Education Act, RIGL 23-24.9 (2001)

*The full text of the act, including amendments, may be found in **Appendix A** of this report. The stated purpose of RIGL23-24.9 is "to achieve significant reductions in environmental mercury by encouraging the establishment of effective waste reduction, recycling, management and education programs."*

Amendments to RIGL 23-24.9 (July 2003)

Stays effective dates until July 1, 2005 or later for the following sections:

23-24.9-7	Phase Out/Exemptions
23-24.9-8	Labeling of Mercury-Added Products
23-24.9-9	Disposal Ban
23-24.9-10	Collection System Plans
23-24.9-11	Disclosure to Healthcare Facilities

Formation of Mercury Reduction Commission

Legislative amendment creates the Commission on Mercury Reduction and Education (April 2004 – July 2005);

Purpose: To study the system(s) for reducing and eliminating mercury hazards in Rhode Island;

Cites implementation of this law is a highly complex undertaking requiring cooperation among all interested parties;

Finds there is incomplete regulatory implementation with unintended consequences; and

Acknowledges that systems planning is critical to implementation.

Commission's Objectives, per RIGL 23-24.9-2.1 as Amended

To identify current and projected sources of mercury hazards;

To evaluate programs and efforts to reduce these sources in a cost-effective and efficient manner that does not place Rhode Island at a disadvantage with other states;

To build on effective efforts in other states and achieve a consistency with other states in terms of approach and timing of implementation;

To determine the availability and effectiveness to consumers and the public of programs, facilities for disposal and recycling mercury-added products; and

To determine the availability and effectiveness to consumers and the public of education programs about mercury-added products and mercury hazards.

To file findings and final recommendations and/or appropriate amendments to law by January 1, 2005.

Additional Objectives, per House and Senate Resolution H8639 and S-3209 (June 2004)

To develop a plan to address the collection and recycling of mercury-added auto parts in a manner that is convenient and minimizes costs to taxpayers and to consumers, and

To submit recommendations and/or appropriate amendments to law by January 31, 2005.

*The full text of this resolution may be found in **Appendix B** of this report.*

Commission's Members to Motor Vehicles Subcommittee, appointed by Commission Chair Marcella Thompson (July 2004)

Chair	Sheila Dormody, Clean Water Action
Members	Eugenia Marks, Audubon Society of Rhode Island
	Terrence Gray, RI Department of Environmental Management
	Jamie Magnani, RI League of Cities and Towns

Additional Objectives, per House Resolution H7527 Sub A (February 2004)

To develop a plan to address the collection and recycling of electronic waste in a matter that is convenient and minimizes costs to taxpayers and to consumers of electronic products and

To submit recommendations and/or appropriate amendments to law by January 31, 2005.

*The full text of this resolution may be found in **Appendix C** of this report.*

Commission's Members to Electronic Waste Subcommittee, appointed by Commission Chair Marcella Thompson (December 2004)

Chair	Claude Cote, RI Resource Recovery Corporation
Members	Jamie Magnani, RI League of Cities and Towns
	Terrence Gray, RI Department of Environmental Management
	Sheila Dormody, Clean Water Action

Commission Mission Statement

On May 14, 2004, members of the Commission unanimously agreed upon the following mission statement: "**The mission of this Commission is to prevent man-made sources of mercury from getting into the environment (air, water, soil)."** The Commission acknowledged one factual premise: this (mission statement) pertains only to those sources that Rhode Island can control. The Commission agrees that achievement is possible through cooperation, consensus and commitment of all interested parties.

Acknowledgements

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- Greg Benik, Holland and Knight LLP representing Metals Recycling;
- Paul D'Adamo, Automotive Recyclers Association of Rhode Island;
- Wally Gernt, The Bradford Group representing Metals Recycling;
- Jack Hogan, F/S Capitol Associates LLC, representing the Alliance of Automobile Manufacturers;
- Sarah Hoisington, Metals Recycling; and
- Chris Reilly, The Bradford Group representing Metal Recycling.

Introduction

This section reviews issues related to mercury toxicity and exposure and summarizes key points of scientific consensus. In contrast to Sections 3 and 4**,** which address the question, "How does mercury get into the environment?" this section provides information to answer the questions "How does mercury get into our bodies, and what does it do once it gets there?"

Toxicity and guidelines for exposure

Current mercury exposures to Rhode Island residents reflect mercury's wide distribution in the environment and its long history of use in commerce. The extent that commonplace exposures pose a risk to the general population is the subject of debate and controversy. The debate is complex because science, policy, risk perception, and other issues are all important to this debate.

Evaluation of mercury exposures and toxicity is a complex issue.

Scientific debate exists because there are legitimate differences on how best to interpret studies of mercury's impacts and toxic effects, especially the effects mercury can have on the developing nervous system of a fetus. Even when scientific consensus exists, policy debates can arise about how best to act on scientific findings. For example, adherents to the precautionary principle have argued that studies of mercury toxicity justify minimizing mercury exposures to the greatest extent possible (NEG-ECP, 1998; CWA 2004), while officials in regulatory programs may use the same information to fine tune estimates of acceptable mercury exposures (EPA, IRIS, 2004; ATSDR, 1999, p. A-1). Risk perception issues are important because the public is generally more accepting of natural or everyday hazards, like exposures to mercury in fish, than those associated with industrial pollution (ATSDR, 2001).

A further complication to evaluating mercury exposures and toxicity is that mercury can exist in many forms, including as a silvery liquid metal, a metallic vapor, an ion or salt, or an organic form like methyl mercury. Although the chemical and biological properties differ among these forms, to various degrees all forms of mercury can be toxic, and once in the environment or inside the body, one form of mercury can change into another.

Mercury toxicity is not a new issue. In the past, extremely high mercury exposures were routine for workers in many industries. Workers who used mercury to treat felt experienced a spectrum of neurological symptoms that included hallucinations and mental disturbances, and condition made famous by Lewis Carroll and referred to as "Mad Hatter Syndrome." Rhode Island's state and federal occupational safety and health programs report no investigations into occupational mercury problems in recent years.

Mercury exposures can adversely affect the nervous system, kidneys, heart, immune system, reproductive system, skin or other organs.

The serious public health consequences of high-level mercury exposures are documented in reports of tragic mercury contamination incidents. Birth defects including mental retardation, cerebral palsy, deafness, blindness, and speech problems resulted when pregnant women ate mercury-contaminated fish from Minimata Bay, Japan and in Iraq after women ate bread made from seed grain treated with a mercury-containing fungicide. Studies of occupational exposures, suicide attempts and therapeutic uses of mercury demonstrate that mercury poisoning can affect people of any age and affect many organ systems. In addition to its effects on the nervous system, mercury exposure can adversely affect the kidneys, heart, immune system, reproductive system, skin or other organs depending on the nature of the exposure. However, exposures to pregnant women and the impacts on their babies' developing nervous systems are the primary public health concerns associated with routine mercury exposures. Future research may identify other sensitive endpoints of mercury toxicity (NRC 2000).

Exposure to women and the impacts on their babies' developing nervous systems are the primary public health concerns associated with mercury exposure.

The National Research Council (NRC, 2000) reviewed the available information on methyl mercury toxicity, including recent studies of people living in New Zealand, the Faroe Islands, and the Seychelles Islands, populations whose mercury exposures resulted primarily from consuming diets high in seafood. Although the Seychelles Islands study failed to identify significant health impacts associated with mercury exposures, other studies did detect adverse neurological effects in children born to women exposed to mercury while pregnant. These effects were noted for women with mercury levels above about 50 μg /l in blood or 12 μg /g in hair. The NRC panel concluded that the Faroe Islands study provided sufficient scientific evidence to support the current US Environmental Protection Agency guidance for daily exposure of 0.1 μg/kg/day. This guidance value is called a Reference Dose or RfD defined as *an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime (US EPA 2004)*.

In addition to the NRC review of methyl mercury, both the US EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) have reviewed the literature on inorganic mercury. These reviews served as the supporting documentation for guidance for long-term exposure to mercury vapor. Both agencies based guidance values on occupational studies of the neurological effects of mercury on workers, and arrived at similar values: 0.3 μg /m3 (US EPA 2004) and 0.2 μg /m3 (ATSDR 1999).

The ATSDR and other federal agencies have developed fact sheets to succinctly describe the spectrum of toxic effects environmental contamination of mercury can cause (ATSDR 1999).

Exposures

Background levels of mercury in RI are significantly below guidelines for acceptable exposure.

How much mercury are Rhode Islanders exposed to each day? How do these exposures occur? Two very different data sets can provide information to help answer these questions about exposure. In addition, two case studies are presented below which demonstrate the different ways people can be exposed to high levels of mercury. There is enough mercury in commerce and our environment for incidents of mercury poisoning to still be possible in Rhode Island.

Ambient exposures. One method of estimating the exposures of the general public to mercury is to compile information about the levels of mercury in Rhode Island's environment. Although no routine monitoring for mercury is conducted in Rhode Island, sufficient data exist to estimate exposures (ATSDR, 1999, US EPA 1997, US EPA 2002). These data indicate that background levels of mercury in ambient air, water and soil are in trace amounts, levels significantly below guidelines for acceptable exposures. However, the trace levels of mercury in air, water and soil have public health significance because these trace levels contribute to mercury in the food chain, especially fish.

Table 1. Ambient environmental levels of mercury in RI

Media	Estimated Background Levels in RI	Standard or guidance level	Reference
Air	National average: 1.5 ng/m3 RI (95th percentile): 3.0 ng/m3	300 ng/m3 (EPA RfC)	US EPA 2002
Water	Ambient background: 0.9 ng/l Ambient near air source: 2.9 ng/l Drinking water in RI: below limit of detection	2000 ng/l (Drinking water MCL)	US EPA 1997 Swallow 2004
Soil	Ambient background: 47 μg /kg Ambient near source: 110 μg /kg	23,000 μg /kg residential soil	US EPA 1997

Fish is a primary source of mercury exposure.

The RI Department of Health advises pregnant women to refrain from eating any fish caught in RI.

Dietary sources. Dietary sources account for the majority of the mercury exposures to the general population. Some mercury can be found in grains, produce and meat, but fish consumption accounts for the majority of dietary exposures (US EPA 2002). Rhode Island issues fish advisories when more than 10% of fish in a sample have mercury levels that exceed 0.3 ppm (equivalent to 0.3 μg /g). At 0.3 ppm, a weekly fish meal of 160 g (a bit more than 1/3 pound) will deliver a dose of mercury equivalent to EPA's Reference Dose. More frequent meals or weekly meals of a more generous serving size would exceed this guideline for exposure. For RI freshwaters, bass and pike routinely exceed 0.3 ppm, and in several water bodies, all fish tested, even those that generally exhibit low mercury levels, exceed 0.3 ppm. In RI fish retail stores, swordfish, shark and albacore tuna routinely exceed 0.3 ppm. For this reason, the RI Department of Health advises pregnant women to refrain from eating any fish caught in RI as well as swordfish and shark, and recommends chunk light tuna over other types of tuna (HEALTH, 2004). See http://www.health.ri.gov/environment/risk/fish.php

Table 2. Fish and ponds for which the RI Department of Health has issued specific advisories (RI Department of Health, 2004). Pregnant women are advised to eat no RI fresh water fish.

Source	Fish that exceed 0.3 ppm mercury
RI Freshwaters – all waters combined	Bass, pike, pickerel, crappie, eel
RI Freshwater - all species	Yawgoog, Windcheck, Meadowbrook, Quidnick, Tucker, Yawgoo, Watchaug
Saltwater sold in retail stores and restaurants	Common species: swordfish, shark; also recommend eating chunk light tuna instead of other types (e.g., albacore)

Eating fish has beneficial effects on health.

Although HEALTH conducts outreach to warn of the dangers of eating fish high in mercury, fish consumption has beneficial impacts on health. Fish is a low-fat source of protein. Studies suggest that the omega-3-fatty acids found in fish are responsible for the association between fish consumption and the prevention of heart disease and promotion of neurological development in children, the same endpoint that mercury exposure impairs (Kiewa 2004).

Other exposures. The mercury contained in dental amalgams, consumer products, disinfectants and a myriad of other products constitute other sources of exposure that are difficult to quantify or even estimate. The fact that these sources can have dramatic impacts on public health is demonstrated by the case studies described below. Some uses of mercury are intentional, such as the ritualistic uses of mercury in Santeria or Voodoo cultural practices. Other voluntary practices, such as the use of skin creams or traditional remedies with high mercury content may lead to inadvertent exposures. Many more exposures may be accidental or unknown, the result of inadequate cleanup of spilled mercury.

Data on the disposal of mercury from RI households provides evidence that significant mercury exposures can result from diverse sources. Rhode Island's community-based mercury collection efforts yield an assortment of articles including unusual mercury-containing devices, glass jars filled with elemental mercury and more commonplace items such as thermometers and thermostats (RI Dept. of Health, 2004).

Each year since 2001, the Rhode Island Resource Recovery Corporation's Eco-Depot has collected over 100 pounds of mercury from RI residents. The Eco-Depot collected approximately 400 pounds in 2003 alone (RI RRC 2004). These efforts may prevent serious exposure due to improper storage or inadequate cleanup of mercury spilled in RI households.

For a small, significant percentage of RI women, there is little margin of safety between the levels of mercury found in their blood and the levels that can harm the developing child.

Clinical data. A second method to evaluate exposures is to screen clinical samples, such as blood, urine or hair, for their mercury content. Although no standard reference value exists for the acceptable range of mercury in these clinical samples, studies described earlier in this section have served as the basis for US EPA and NRC estimates of the levels of mercury in blood or hair that are associated with adverse health effects (NRC 2000; EPA 2004). With respect to average background levels of mercury, an extensive data set exists for mercury and other contaminants in blood and urine samples, collected as part of a national survey (CDC 2002). Other data on mercury are available from special studies of mercury exposure and toxicity (Jones et al, 2004). This and similar studies show average levels are low (geometric means were below 1 μg /l for women and children, but a percentage (5.66% of women) had blood levels above 5.8 μg /l, the level associated with the EPA RfD. There is no scientific consensus on the likely health impacts these levels have on nervous system development. In RI, a recent mercury contamination incident in Pawtucket has provided us with another opportunity to compare environmental and clinical samples for mercury. In addition to opportunities to determine exposures via blood and urine, some researchers have used hair analysis to determine past mercury exposures. While hair analysis is not recommended for clinical diagnosis and medical management of patients, mercury is one of the few contaminants for which hair analysis provides a credible source of exposure information (NRC 2000).

Table 3. Background mercury levels in blood samples from national and local surveys of vulnerable populations.

Population	Mercury levels
Survey of representative national sample (CDC 2002)	Geometric mean: Women (child-bearing age): 1.02 μg /l Children (1 to 5 years): 0.34 μg /l
CDC survey of pregnant women and young children (Jones 2004)	Geometric mean: Women (child-bearing age): 0.92 μg /l Children (1 to 5 years): 0.33 μg /l
Residents in Pawtucket, RI	Results available in Spring 2005.

Case study #1. During an environmental investigation of a Tiverton, RI, neighborhood in 2003, high levels of mercury were detected on a residential property that had originally been the site of a company that manufactured hats. Levels of mercury in the soil exceeded 1000 mg/kg (equivalent to 0.1% mercury by weight) in at least one location in the yard. Pieces of felt and leather found buried at the site are the apparent source of the mercury. [Mercury was commonly used to in the hat industry, the mercury-related neurological effects made famous by Lewis Carrol's Mad Hatter.] Mercury vapors were also detected at the site, with soil gas readings occasionally exceeding 100 ng/m3 (US EPA 2004a).

Two case studies demonstrate the difficulty in determining the extent of toxic mercury exposures in RI.

Residents expressed concerns about the health of those who had used the site for gardens in the past. Because mercury can affect many different organ systems, it is difficult to rule out the possibility that health problems in exposed individuals could be related to mercury. However, it is also difficult to implicate mercury when the spectrum of symptoms is different from symptoms those typically described in cases of mercury poisoning. Clinical tests for mercury exposures do not provide useful data about exposures in the past because mercury is cleared from the blood in a matter of days, and from the urine in weeks (ATSDR 1999)

How many other sites may experience similar or greater mercury contamination?

Case study #2. In September 2004, vandals broke into a facility where approximately 20 pounds of elemental mercury was stored. Approximately 10 pounds was spilled at this facility. The remaining 10 pounds was carried back to an apartment complex in Pawtucket, RI, where it was spilled on the grounds and parking lot. Residents were unaware of the hazard and tracked the mercury into their apartments. In October, about 3 weeks after the incident, authorities discovered the missing mercury and identified the contamination problem. Mercury contamination was found throughout the parking lot, and in the common areas of all four buildings. Residents were relocated. Approximately 150 individuals with known or suspected exposures received blood testing. An analysis of the findings of incident will be available in the spring of 2005.

Mercury Poisoning

The expression of mercury toxicity depends on a number of factors. Was the mercury ingested, inhaled or only in contact with the skin? How long did the exposure last? Which form or forms of mercury were present, metallic, ionic or organic? The ATSDR and other federal agencies have developed fact sheets to succinctly describe the spectrum of toxic effects environmental contamination of mercury can cause (ATSDR 1999). One unusual syndrome associated with high mercury exposures is acrodynia, an uncommon hypersensitivity reaction to elevated elemental mercury exposures (US EPA 2004). This section has focused on the likely public health impacts of relatively long-level mercury exposures. Information about acrodynia and other symptoms of acute mercury poisoning can be found elsewhere (ATSDR 1999; US EPA 2004)

Summary of Mercury Toxicity and Exposure

Despite the existence of several controversial issues, the body of research on mercury is sufficient to develop scientific consensus on several key points.

1) Current sources of mercury exposures in RI present potential health risks to the general population, especially pregnant women.
The two cases studies, advisories to pregnant women about the hazards of eating fish even from ponds that appear pristine or fish routinely sold in markets and restaurants, and the low margin of safety between current blood levels and levels that are associated with toxic effects provide evidence to support this conclusion.

2) A few sources of mercury dominate national estimates of mercury exposures, but many diverse mercury sources also may contribute to exposures of the general population. While exposures from fish and dental amalgams are the focus of much of the research on mercury exposures, mercury collection and cleanup efforts in RI demonstrate they are not the only significant source of exposures..

3) Despite a series of recent studies to determine safe mercury exposures, it is likely that controversy about guidelines/standards for safe mercury exposures will continue.

Population-based studies of mercury exposures are unlikely to have the level of precision necessary to eliminate controversy concerning what constitutes safe mercury exposures. Individuals vary in their sensitivity to mercury. The effects of mercury poisoning can range from subtle decrements in development or intelligence to acute developmental disabilities to kidneys, immune system, or reproductive system disorders to increased likelihood of heart disease.

References for Section 2:

ATSDR. 1999. Toxicological Profile for Mercury. Prepared for the Agency for Toxic Substances and Disease Registry by the Research Triangle Institute. March 1999.

ATSDR. 2001. A Primer On Health Risk Communication Principles and Practices. Available at http://www.atsdr.cdc.gov/HEC/primer.html.

CDC. 2003. Second Report on Human Exposure to Environmental Chemicals. National Center for Environmental Health. Centers for Disease Control, Atlanta, GA. Available at: http://www.cdc.gov/exposurereport/2nd/pdf/mercury.pdf

Clean Water Action. 2004. New England Zero Mercury Campaign pamphlet. Clean Water Action. Available at www.cleanwateraction.org/ir

Jones, RL et al. Blood mercury levels in young children and child-bearing aged women – United States 1999-2002. MMWR.

Kiewa, K. 2004. Fishy Business. Harvard Public Health Review. Pp. 12-13 (Fall 2004). Available at: www.hsph.harvard.edu/review/risk_fish.txt.html

National Research Council. 2000. Toxicological Effects of Methylmercury. National Academy Press, Washington, DC. Available at http://www.nap.edu/books/0309071402/html/

New England Governors and Eastern Canadian Premiers Committee on the Environment. 1998. Mercury Action Plan. Available at: www.mass.gov/dep/ors/files/negecp.pdf

RI Department of Health. 2004. Mercury Thermometer Exchange Program. Report of Activities – 2003. RI Department of Health.

RI Resource Recovery Corporation. 2004. ECO-DEPOT program. Available at: www.rirrc.org .

Swallow, June. 2004. Personal Communication. RI Department of Health.

US EPA. 1997 Mercury Study Report to Congress. Office of Air Quality and Standards, and Office of Research and Development. EPA – 452/R097. Available at www.epa.gov/oar/mercury.html.

US EPA. 2002. National Scale Air Toxics Assessment for 1996: Estimated Emissions Concentration and Risk. Data tables available at www.epa.gov/ttn/atw/nata/tablconc.html

US EPA. 2004. Integrated Risk Information System (IRIS). Available at: http://www.epa.gov/iriswebp/iris/index.html

US EPA. 2004a. Laboratory Report for Project Number 04080058. Office of Environmental Measurement and Evaluation, North Chelmsford, MA.

Introduction

This section discusses the various sources of mercury emitted into the atmosphere, globally, nationally, and regionally. Mercury can be emitted into the atmosphere from either natural sources, such as from volcanic eruptions, or from man-made (anthropogenic) sources, such as solid waste incinerators or coal-fired power plants. Once emitted, people may be exposed to this contaminant through interaction with the ambient environment as outlined in Chapter 2, either through breathing ambient air or, more likely, through contact with other media or food sources that have been contaminated with mercury as a result of historical deposition of the mercury emitted into the atmosphere. Mercury concentrations in the ambient air are usually low. However, once mercury enters water, including through deposition from the air, biological processes transform it into methylmercury, a highly toxic form of mercury that bioaccumulates in fish and other animals that eat fish. When a substance bioaccumulates, its concentration increases as it moves through the food chain (see ***Appendix I***).

This chapter outlines the sources of mercury emissions to the atmosphere on a global scale, a national scale, and a local scale.

Global Sources of Mercury Emissions

Globally, the US now accounts for 6% of man-made sources of mercury emissions into the air, while Asia now accounts for 53% of these emissions.

Mercury is a natural element that is transported across the globe. The best source of data for worldwide emissions of mercury comes from the UN Environmental Programme (UNEP) 2002 Global Mercury Assessment. Paragraph 87 of the executive summary says that as of 1995, 2,200 metric tons of mercury was released to the environment from anthropogenic (man made) sources. Asia accounted for 1070 tons with North America accounting for 210 tons, the same amount as Africa and 50 tons less than Europe. Since then US emissions have dropped to approximately 130 tons while Asian emissions have increased to over 1,100 tons or more than half of all mercury emissions on the earth. The US now accounts for 6% of anthropogenic emissions, while Asia accounts for 53% and Africa accounts for 18%. Paragraph 93 of the UNEP report says that natural sources of mercury (volcanoes, mineral erosion, forest fires) account for less than 50% of total mercury emissions. The natural sources further reduce the percent of mercury emissions from human activity in the US. The US EPA mercury report to Congress says that the US accounts for 3% of total worldwide mercury emissions as of 1995.

US Sources of Mercury Emissions

The U.S. Environmental Protection Agency (EPA) has been the lead agency for tracking national mercury emissions, primarily under the authority of the federal Clean Air Act.

EPA has designated 1990 as the baseline year for U.S. mercury emissions.

For purposes of tracking and assessing reductions and evaluating trends for mercury emissions, EPA has designated 1990 as the baseline. This represents the year of the most recent mercury emissions inventory available at the time the Binational Toxics Strategy was signed (based on the draft Mercury Report to Congress 1990 emissions inventory). The EPA subsequently updated its 1990 inventory in the 1993 National Toxics Inventory (NTI), which included data for the years 1990 through 1993, depending on the source category, with most data for mercury coming from 1990. Total for annual mercury emissions for 1990 was estimated at 206 tons.

Total annual U.S. mercury emissions in 1990 were estimated at 206 tons.

A comprehensive study of mercury emissions to the atmosphere was conducted by EPA and presented to Congress in 1997. That eight-volume report, entitled Mercury Study Report to Congress, was required by the Clean Air Act and examined all sources of mercury emissions in the United States.

The majority of U.S. anthropogenic mercury emissions is due to combustion.

The study found that of the estimated 158 tons of mercury emitted annually (based on the 1994-1995 national emissions inventory) into the atmosphere by anthropogenic sources in the United States, approximately 87 percent was from combustion point sources, 10 percent was from manufacturing point sources, 2 percent was from area sources (area sources of mercury emissions are sources that are typically small and numerous and usually cannot be readily located geographically), and 1 percent was from other miscellaneous sources.

Combustion sources include coal-fired utility boiler, municipal waste combustion, commercial boilers, and medical waste incinerators.

Four specific source categories account for approximately 80 percent of the total anthropogenic emissions--coal-fired utility boilers (33 percent), municipal waste combustion (19 percent), commercial/industrial boilers (18 percent), and medical waste incinerators (10 percent). It should be noted that the U.S. EPA has finalized mercury emission limits for municipal waste combustors and medical waste incinerators. When fully implemented, these emission limits will reduce mercury emissions from these sources by an additional 90 percent over 1995 levels. All four of the most significant sources represent high temperature waste combustion or fossil fuel processes. For each of these operations, the mercury is present as a trace contaminant in the fuel or feedstock. Because of its relatively low boiling point, mercury is volatilized during high temperature operations and discharged to the atmosphere with the exhaust gas.

US sources of mercury emissions have been declining.

A later estimate of anthropogenic emissions in the US is found in a report published by EPA Region V reporting on progress in achieving mercury reduction goals in the Great Lakes. Table 2 of the report estimates that US anthropogenic emissions have declined from 197 tons in 1990 (the Region V report contends that mercury emissions from various sectors may have been overestimated when the original baseline was set [see above], and they factored this adjustment into their analysis as presented in Table 2 of the report) to 149 tons in 1996, with further projected reductions to 115 tons in 2001.

In addition, some specific source categories were examined. Based on the adjusted data, the following information was presented on the major sectors emitting mercury:

Emissions from utility boilers using coal combustion increased from 42 tons in 1990 to 47 tons in 1996.

1. Utility Boilers using Coal Combustion- Emissions from utility boilers using coal combustion increased from 42 tons in 1990 to 47 tons in 1996. Furthermore, the report notes that coal use in this sector continued to grow by two percent between 1996 and 1999.

2. Medical Waste Incinerators- Emissions from medical waste incinerators decreased substantially from 50 tons in 1990 to 16 tons in 1996, with further projected reductions to the 5-10 ton range by 2001, as various states implemented more stringent emissions standards for these sources.

Mercury emissions from US municipal waste combustion declined by 90% during the decade of the 1990's.

3. Municipal Waste Combustion – Municipal waste combustion emissions declined from 42 tons in 1990 to 24 tons in 1996, with further projected reductions to 4 tons in 2001. In fact, an EPA survey conducted after this report showed US municipal solid waste incinerator emissions of mercury declined from 45 tons in 1990 to 2 tons in 2000 (June 20, 2002 memo from Walt Stevenson, EPA Air Office). This decline is due to the decline of mercury in products and emission controls required by the Clean Air Act Amendments of 1990.

Impacts of Upwind Mercury Emissions on the Northeast

The largest contributors to mercury emissions in the Northeast are from outside the region.

Deposition of mercury is coming largely from out of region/state. The Northeast States for coordinated Air Use Management (NESCAUM) 1998 report, "Mercury Study, A Framework for Action," using 1995 data, estimated hat 53% of mercury deposition in the northeast (New York, New Jersey and the six New England states), came from outside the region For anthropogenic sources, out of state emissions were responsible for 39% of regional deposition. In 1995 the largest source of mercury emissions in the region came from municipal solid waste incinerators. The report estimates that 42% of all mercury deposition from anthropogenic sources in the Northeast came from municipal solid waste and sewage sludge incinerators in the northeast.

Municipal solid waste incinerators accounted for 89% of this total. Since emissions from municipal solid waste incinerator have dropped significantly (~ 90%) without corresponding reductions from coal-fired power plants and many other sources, emissions of mercury from outside the region today are responsible for an even greater share of deposition in the northeast.

The NESCAUM report estimates regional emissions at 15,903 kg of mercury and regional deposition from regional sources at 3,787 kg of mercury, meaning that approximately one fourth of regional emissions are deposited in the region.

Mercury Emissions in Rhode Island

Mercury deposited in water and soil of RI comes primarily from emissions outside the State and Region.

Rhode Island does not have many of the major sources of mercury emissions identified in the national studies. The State has no coal-fired power plants or industrial boilers and no municipal waste combustors. However Rhode Island receives electricity from the New England grid, which includes generation from coal combustion sources.

The State does have several industrial sources of mercury emissions.

RI Air Pollution Regulation 14 requires facilities emitting air pollutants to submit emissions data to the RI DEM annually. RI DEM collects this emissions data from approximately 600 stationary sources in the State. The data is used: to calculate emission fees, to determine compliance with emission limitations, identify air toxics sources, to identify sources which would be regulated by newly promulgated state and federal regulations, to respond to citizen inquiries and complaints, in regional ozone modeling and to track the success of emission reduction programs.

The information is inputted and maintained at a database at RI DEM. That database was examined for facilities that emit mercury and the estimated amount of those mercury emissions was evaluated.

All combustion sources emit mercury. In the emissions inventory, mercury emissions are calculated for the larger combustion sources.

The emissions inventory reports that seven facilities in the State emitted more than one hundred pounds of mercury during the time period 1990-2002. Three of the seven were hospital incinerators (averaging about 25 lbs/year per facility). All of these sources have since ceased operation. Three of the seven were wastewater treatment sludge incinerators (averaging about 15 lb/yr per facility). The remaining facility was a barrel reconditioner that changed operations and is no longer considered a source.

Since Rhode Island has no municipal waste combustors, or incinerators, virtually all of the solid waste generated in the State is disposed in the Central Landfill in Johnston. Emissions from the landfill occur primarily when landfill gas is collected and burned to create energy. Unfortunately, no actual testing of emissions from that gas-to-energy facility has occurred. However, potential emissions were evaluated in the most recent air pollution control permitting process using assumptions and estimating criteria provided by EPA. At a peak rate, both in terms of operation of the generators and the generation of gas, this facility is only estimated to emit 0.6 lbs/yr of mercury. Direct monitoring for mercury is required as a condition of the most recent permit for the facility.

Mercury emissions from US municipal solid waste landfills are less than 1% of total anthropogenic sources.

As stated above, municipal solid waste landfills do emit mercury but at very low levels. The EPA Mercury Report to Congress concluded that, nationally, mercury emissions from municipal solid waste landfills in total were only .05 percent of total anthropogenic sources of mercury emissions or 162 pounds out of 154 tons. In making this estimate, EPA estimated that the mercury concentration in landfill gas ranges from 5.8ng/m^3 to 20.8 μg /m^3. A study funded in part by the Florida DEP found that the mean concentration of total gaseous mercury emissions measured at the Brevard County landfill was 7.2 μg /m^3, well within the range that EPA used in its report. A recent analysis of mercury emissions for the New York – New Jersey Harbor prepared for the New York Academy of Sciences, after reviewing the Florida data and applying it to the Fresh Kills landfill in Staten Island, concluded, "…landfills are not a major source of gaseous emissions of mercury." And the 2002 New Jersey Mercury Task Force Final Report concludes, "Low concentration of mercury in landfill gas…argues that no efforts to control this source are necessary at this time."

Earlier this year, the Solid Waste Association of North America (SWANA) Applied Research Foundation released a report, "The Effectiveness of Municipal Solid Waste Landfills in Controlling Releases of Heavy Metals to the Environment." *A summary of the key findings is found in* ***Appendix E****.* The report concludes:

"MSW landfills can provide for the safe, efficient and long-term management of disposed products containing RCRA heavy metals without exceeding limits that have been established to protect public health and the environment. MSW landfills should contain the releases of Resource Conservation and Recovery Act (RCRA) heavy metal pollutants at levels that protect public health and the environment for extremely long periods of time if not forever."

In summary, according to the 2000 Annual Solid Waste Report from the Rhode Island Department of Environmental Management's Office of Waste Management, virtually all Rhode Island municipal solid waste is placed in landfills. Based on estimated nationwide emissions of mercury from landfills from the EPA mercury report to Congress, and Rhode Island's percent of the US population, emissions of mercury from Rhode Island landfills would be less than 1 lb.

Rhode Island has not conducted a specific inventory of other categories of mercury emissions. However, other neighboring states have analyzed other sources, any of which are common in Rhode Island, and estimated emissions from these sectors.

a. *Vermont* – According to the Vermont Air Pollution Control Division, the 2000 Source Contribution of Mercury Emissions in the state for the 192.8 pounds of mercury emitted in the state were as follows:

Residential Fuel Combustion	- 36.4%
Automobile Switches	- 22.2%
Mobile Sources	- 15.3%
Industrial Fuel Combustion	- 11.7%
Residential Open Burning	- 4.1%
Lamp Breakage	- 3.9%
Crematoria	- 3.8%
Dental Applications	- 1.5%
Lab Use	- 1.0%
Landfills	- 0.1%

The two sources estimated by Vermont that relate to the municipal solid waste stream, lamp breakage and landfill emissions, were responsible for 7.8 pounds of mercury. Vermont has no in state municipal solid waste incinerators or coal fired power plants.

b. *New Hampshire* – The New Hampshire Department of Environmental Services released state emissions data from 2000. Of the 1,000 pounds of emissions, 37.6% came from burning fuel oil and 28.6% came from coal combustion. Large municipal solid waste incinerators were responsible for 16.6 %. The emissions from this source, however, exclusively came from one incinerator that is about to install emission controls since the DES released the study. As a result, municipal solid waste incineration would account for less than 2% of emissions in the state. New Hampshire did not estimate emissions from landfills.

Burning residential fuel oil represents the largest % of mercury emissions in VT and NH, while commercial and industrial boilers represent the largest % of mercury emissions in ME.

c. *Maine* – The Maine Department of Environmental Protection has published a report, "Mercury in Maine: A Status Report" in February 2002. The report (page 18) estimates that of the 1,467.21 pounds of mercury emitted in 2001 in Maine, 845 came from commercial and industrial boilers. Municipal solid waste incinerators emitted 43.6 pounds or less than 3% of mercury emissions. Landfills emitted 6 pounds or 0.41% of emissions. Volatilization of mercury from breakage of all products emitted 93 pounds or 6.34% of emissions.

Based on the data in these analyses we can arrive at some estimates for Rhode Island. Given that Rhode Island's population is about double Vermont's and 15% less than New Hampshire and Maine, Rhode Island's mercury emissions are likely to range between 400 pounds (double the Vermont estimate) and 1,200 pounds (Maine total minus MSW incinerator emissions that are nonexistent in Rhode Island times 85% to reflect population differences). An estimate using New Hampshire emissions and adjusting for population falls in this range.

Summary of Mercury Emissions

Mercury can be emitted into the atmosphere from either natural sources, such as from volcanic eruptions, or from anthropogenic sources, such as solid waste incinerators or coal-fired power plants. Globally, the vast majority of mercury emissions occur in Asia, with significantly lower contributions from North America, Europe and Africa. Nationally, total anthropogenic emissions of mercury are decreasing, primarily due to significantly decreased emissions from municipal solid waste and medical waste incinerators. Emissions from coal-fired power plants and industrial boilers, which are a major source of mercury emissions in the United States, have not decreased. The Northeast, including Rhode Island, is impacted from these emissions primarily through contact with other media or food sources that have been contaminated as a result of historical and continuing deposition.

Rhode Island does not have many of the major sources of mercury emissions identified in the national studies. Using data from other New England states, total annual mercury emissions in Rhode Island are likely to range between 400 pounds and 1,200 pounds. The State has no coal-fired power plants or industrial boilers, no municipal waste combustors, and no medical waste incinerators. The largest remaining source type is wastewater treatment sludge incinerators that emit an average of about 15 lb/yr of mercury per facility.

References for Section 3:

UN Environmental Programme (UNEP) 2002 Global Mercury Assessment. www.chem.unep.ch/mercury/default.htm.

EPA Region V report on progress in mercury reduction goals in the Great Lakes. http://www.epa.gov/region5/air/mercury/progress.html. Table 2

Presentation by Bill Wehrum, Counsel to the Assistant Administrator for Air and Radiation at EPA, July 2004.

US EPA mercury report to Congress. http://www.epa.gov/ttn/oarpg/t3/reports/volume1.pdf (p.12).

Memo from Walt Stevenson, EPA Air Office, June 20, 2002.

Solid Waste Association of North America (SWANA) Applied Research Foundation,, "The Effectiveness of Municipal Solid Waste Landfills in Controlling Releases of Heavy Metals to the Environment," 2004.

Sources and Material Balance of Mercury in the New York – New Jersey Harbor, by Nickolas J. Themelis and Alexander F. Gregory, Report to the New York Academy of Sciences, November 31, 2001, P. 23.

New Jersey Mercury Task Force Final Report, 2002, page 157.

NESCAUM (Northeast States for Coordinated Air Use Management) report, “Mercury Study, A Framework for Action,” 1998, (Pages V-4, VI-16, VI-24).

Annual Solid Waste Report, Rhode Island Department of Environmental Management Office of Waste Management, 2000, http://www.state.ri.us/dem/programs/benviron/waste/pdf/swrep00.pdf

Vermont Air Pollution Control Division Report, 2000.

New Hampshire Department of Environmental Services state emissions data, 2000.

Introduction

Mercury enters the environment from a number of routes, including most commonly through air emissions as explained in Section 3. Mercury can also enter the environment through the disposal of wastes containing the contaminant and by local spills and releases. The impacts of mercury are measured through sampling and monitoring strategies. This chapter will outline the air and water monitoring activities that have occurred in Rhode Island; planned monitoring of fish tissue (which is seen as a valuable environmental indicator of the trends of the amount of mercury in the environment); a summary of the origins, types and amounts of hazardous wastes that contain mercury in RI that are generated in this State; and three case studies of the local acute impacts of mercury spills and releases on the environment.

Ambient Air Monitoring and Air Pollution Control Strategies

Limited data are available on mercury levels in ambient air in Rhode Island.

On average, RI mercury levels are higher at the monitored urban site than in rural sites.

Limited amounts of data are available on mercury levels in ambient air in Rhode Island. Wet and dry mercury deposition and atmospheric particulate and gaseous mercury levels were measured at RI DEM's East Providence monitoring site and at rural sites in Vermont and Massachusetts in 1997 and 1998 as part of the USEPA's Regional Ecological and Assessment Program (REMAP). Atmospheric gaseous and particulate mercury levels were, on average, higher at the Rhode Island urban site than at the rural sites. More information about the results of that study is available at. http://www.eman-rese.ca/eman/reports/publications/98_mercury2/oralpresentations_day1.html .

RI participates in US EPA's fine particulate speciation network, with mercury being one of the measured substances.

Since 2002, Rhode Island has participated in the US EPA's fine particulate speciation network. Mercury is one of approximately 60 substances measured in fine particles as part of this program. Average fine particulate mercury levels measured in Rhode Island are at the lower end of the range of levels measured in the northeast area. Note that these concentrations do not include gaseous mercury or mercury present in particles larger than 2.5 microns. Data generated by this program are entered into the US EPA's Air Quality System (AQS) database (http://www.epa.gov/ttn/airs/airsaqs/aqsweb/aqswebhome.htm).

RI DEM has taken measures to limit local mercury emissions, particularly as they relate to hospital and medical waste incinerators.

In addition, RI DEM has taken measures to limit the local emissions of mercury to the atmosphere. Effective August 21, 2000 APC Regulation No. 39 requires that Hospital/Medical/Infectious waste incinerators comply with an emission limit and develop a waste management plan. The waste management plan must include: an evaluation of the feasibility of removing mercury-containing products from the waste stream; a recycling program for mercury products; and, measures and milestones for becoming mercury free by 2003.

The RI list of air toxics has been updated to include acceptable ambient levels (AALs) for methyl mercury, inorganic and elemental mercury

In April 2004, the Office of Air Resources amended APC Regulation No. 22, "Air Toxics" to expand the list of air toxics and to update the acceptable ambient levels (AALs). The amended regulation includes AALs for methyl mercury and inorganic and elemental mercury. Facilities must demonstrate, using specified modeling techniques, that their emissions will not cause ground level off-property levels exceeding the AALs in order to receive a pre-construction permit or an Air Toxics Operating Permit. The regulation is on the RI DEM website at: http://www.state.ri.us/dem/pubs/regs/index.htm#Air

Water Monitoring and Assessment Strategies

RI DEM surveys water quality for attainment of Federal Clean Water Act goals, measured in five key use areas: aquatic life, drinking water, shell fishing, fish consumption, and swimming.

In accordance with Section 305(b) of the federal Clean Water Act, states are required to survey their water quality for attainment of the Act's goals regarding fishing and swimming, and to report the findings in the biennial "State of the State's Waters Report", also known as the 305(b) Report. The attainment of the CWA goals is measured by determining how well waters support their designated uses (defined as the most sensitive and therefore governing water uses which the class is intended to protect). For the purposes of the 305(b) report, five designated uses are evaluated: aquatic life, drinking water supply, shell fishing, fish consumption, and swimming. The State's WQS are then used to categorize waters as "fully", "partially", or "not" supporting specific designated uses. In the assessments, use support status is determined by comparing available water quality information to the water quality standards.

RI DEM utilizes water quality information available from a variety of sources including data collected by state, federal and local agencies; universities; and volunteer monitoring organizations. Most of the baseline monitoring consists of quarterly and seasonal sampling programs. Stations are assessed based on either biological data only, chemical data only or at some sites, both chemical and biological data.

There are specific criteria for determining attainment of the individual designated uses. The protocol used for the determination of use support in Rhode Island's surface waters generally follows the EPA 1998 305(b) assessment guidance entitled Guidelines for Preparation of Comprehensive State Water Quality Assessments (305(b) Report) and Electronic Update, September 1997.

All New England states, including RI, have issued fish consumption advisories due to mercury levels in fish tissue.

All of the New England states, including Rhode Island, currently have statewide fish consumption advisories in effect due to high levels of mercury in fish tissue. Most of the states also list individual lakes and ponds where the fish collected from these water bodies exceed state safe consumption levels for mercury. In Rhode Island, this hazard has affected five water bodies (Woonasquatucket River, Quidneck Reservoir, Wincheck Pond, Yawgoog Pond, and Meadowbrook Pond) for which specific advisories for limiting or avoiding fish consumption have been issued by the Rhode Island Department of Health.

Atmospheric deposition of mercury appears to be the major cause of mercury impairment in RI ponds.

As stated above, four ponds are currently listed for mercury impairments; Meadowbrook Pond, Wincheck Pond, Yawgoog Pond, and Quidneck Reservoir. These impairments are believed to be largely resulting from atmospheric deposition of mercury. The strategy for addressing these water bodies is through implementation of the New England Governors and Eastern Canadian Premiers Mercury Action Plan adopted June 1998.

In addition, the Woonasquatucket River is also listed for mercury impairments, but is a receiving body for point source discharges. For such water bodies, the Clean Water Act requires States to develop plans for cleaning them up. The Total Maximum Daily Load (TMDL) program provides a process for determining pollution budgets for the nation's waters that, once implemented, will assure that Clean Water Act goals will be met. The TMDL for the Woonasquatucket River for metals impairments, including mercury, is scheduled for completion in June 2005.

RI DEM has developed a strategy for comprehensive monitoring of the State's waters.

Earlier this year, RI DEM developed a strategy for comprehensive monitoring of the State's waters. The strategy includes the approach, sampling designs and related actions that are needed to implement an effective, comprehensive monitoring and assessment program for surface waters in the state. When fully implemented as proposed, it will provide data essential to state management programs and support the comprehensive assessment of water quality with respect to supporting aquatic life and recreational uses of surface waters statewide by 2010. The addition of monitoring for fish tissue contamination will allow the comprehensive assessment of all designated uses of surface waters to be completed by 2020.

Given the expense of such monitoring and the persistent nature of the contaminants, such as mercury, it is proposed to phase in the program by initially sampling a portion of each watershed included in the rotating basin assessment. Under this approach, it may require 2, possibly 3, rotation cycles (up to a 15 year period) to cover the entire state. The fish tissue sampling design would select a sub–set of the locations being sampled in a watershed under the rotating assessment. Based on the Wood River Demonstration Project, it is estimated that 6-10 sites per basin would be needed to initially monitor the larger streams that draw the most fishing activity. The specific design for fish tissue monitoring will focus on larger streams and exclude first order streams unless downstream data indicate a pollution problem. Under this approach, it is estimated that up to 20-24 locations will need to be sampled in the first cycle (allowing for some follow-up verification sampling). Initial targeted locations would be those sites judged to be the most heavily fished or presenting the greatest potential for public health risk.

Generation of Mercury-Containing Hazardous Wastes in Rhode Island

In accordance with State and federal rules on hazardous waste management, generators of hazardous waste must ship those wastes for disposal accompanied by a manifest. These manifests serve as tracking forms to ensure that the wastes are properly handled from the point of generation to the point of disposal. Data from these manifests are entered into a database at RI DEM for storage and evaluation. This database was queried to determine what the types and quantities of hazardous waste containing mercury are generated in Rhode Island and what types of industrial operations are generating those wastes.

Mercury-containing hazardous wastes are assigned a waste code of D009, and the query was designed to work for this code. Data in the database goes back to January 1, 1998. Data evaluated focuses on regularly generated wastes from "permanent" facilities and does not consider one-time cleanouts or emergency response actions.

This analysis showed that approximately 150 entities generated about 146,000 pounds of mercury-containing hazardous waste over the time period from January 1, 1998 to November 1, 2004. The Naval Education and Training Center (NETC) on Aquidneck Island generated slightly over 57,000 pounds, or 40%, of that total. Eleven hospitals were found to generate a total of 15,800 pounds, or 11%, and several universities were listed, generating a total of 10,000 pounds, or 7%.

The distribution of generators of mercury-containing hazardous waste was as follows:

Number of Generators	Amount of Waste Generated
1	> 50,000 lbs.
3	> 10,000 lbs and < 50,000 lbs
18	> 1,000 lbs and < 10,000 lbs
54	> 100 lbs and < 1,000 lbs
74	< 100 lbs

The types of wastes noted on the manifests included elemental mercury, alkaline batteries, fluorescent bulbs, mercuric compounds, and various chemical mixtures containing mercury.

Release and Spill Response

Risks from consumption of contaminated fish or fossil fuel and factory emissions may be the most commonly perceived problems from mercury. Exposure to these sources of mercury – ingestion and inhalation – is certainly ubiquitous in the U.S. and large in its cumulative effect. However, acute local effects can also be significant.

RI DEM Office of Emergency Response recovers several dozen pounds of mercury per year due to spills of elemental mercury.

Spills of elemental mercury are not unusual in Rhode Island. The RI DEM Office of Emergency Response normally recovers several dozen pounds per year, chiefly from old industrial sites or hospitals or schools where instruments that contain mercury break. Releases and spills of mercury and mercury-containing materials to the environment must be reported to RI DEM. A process to evaluate the nature and extent of contamination is then initiated either as an emergency response action or as a longer term clean up under the authority of the RI DEM Rules and Regulations for the Investigation and Remediation of Hazardous Material Releases. Three case studies of investigation and response to mercury contamination of soil and other media are outlined below:

Apartments in Pawtucket

In the Fall of 2004, about twenty pounds of elemental mercury were spilled in Pawtucket. The incident posed a serious threat to the environment and public health in Rhode Island. Remediation was successful only with the forbearance of more than 150 residents who were evacuated for two months, with the concerted, coordinated effort of state, local, and federal agencies, their contractors, neighboring schools and businesses, and charitable organizations, plus millions of dollars from the potential responsible party.

The Pawtucket spill, though, was distinctly hazardous because it entailed a relatively large amount in liquid form and spread from a single point of concentration to dozens of nearby homes.

In a residence, elemental mercury gravitates into crevices, where it is very difficult to remove, and clings to furniture, pets, and especially carpets, where it is apt to be tracked out to public walkways and then into cars, buses, and far-flung public facilities. What is worse, residents are apt to spend many more hours at home, near those contaminated belongings, than they would anywhere else. Exposures are unusually sustained and likely to reach those who are most vulnerable, pregnant women and children. In residences, even miniscule amounts of liquid and attendant vapors can pose a serious threat to public health.

Ironically, mercury was accumulated in Pawtucket in a storage building through efforts associated with environmental protection. Since the 1980s, when the risks of mercury were well publicized, public utilities companies collected mercury from old gas pressure regulators and thermostats, thermometers and other devices that customers identified. Given safer alternatives, these companies helped reduce potential sources of spills. In this case, though state and local officials apparently did not know that there was any mercury in this storage building. No one recorded where or how it was stored, the relevant collection, security, and disposal protocols, and – perhaps most important - how much there was.

Local residents discovered the mercury when the storage building was vandalized. Sometime “just after Labor Day” (the first week in September, 2004), vandals broke into a storage building inside the fenced-in property. They grabbed several bottles and began playing with the liquid mercury that they contained. Judging from that amounts that were recovered during the following days and weeks of cleanup, about ten pounds were spilled in and around the storage building and another ten pounds were carried back to a nearby affordable housing complex, where the alleged perpetrators lived. Mercury was splashed around the parking lot of the complex, thrown and tracked around the complex.

The break-in and release of mercury went undetected until Tuesday morning, October 19. During routine maintenance work at the site, the break in and vandalism was discovered. After discovery, cleanup contractors and state, local, and federal emergency responders were notified. In the next three days (by the end of Friday, October 22) mercury contamination was traced from the site to the apartment complex. One entire building (22 residents) was evacuated, and three alleged perpetrators were apprehended. Soon thereafter (October 23-25), responders discovered far more extensive contamination than anyone anticipated. The entire apartment complex (five buildings with a total of about 150 residents) as well as two other off-site apartments had to be evacuated.

Although responders anticipated that evacuees might return to their homes within a very few weeks, assessment and remediation kept them out of their homes for two months. In fact, the number and duration of residential evacuations ranks the Pawtucket spill as one of the most traumatic mercury spills in American history. Cleanup was complex and costly. It entailed removing and replacing the entire parking lot, sidewalks, all of the carpeting, and much of the mechanical core (plumbing, furnaces, doorways, and whole stairs) of the five buildings in the apartment complex. Contaminated debris totaled more than 30 roll offs, 300 cubic yards of asphalt, and 180 cubic yards of topsoil. By the end of just three months, the total cost was reported to be over $6.6 million.

The dislocation was especially stressful for apartment residents, many of whom were minority and low-income citizens. They lost some of their most precious possessions as well as the joys, privacy, and security of normal daily life. Other neighbors also were anxious about cross-contamination of their public spaces, schools, and buses.

Fortunately, contamination off-site was limited. Mercury measurements were below action levels where visitors lived and worked and school buses, hallways, and classrooms with just a couple of exceptions, possibly from other sources. Anyone who expected that they might have been exposed was encouraged to a free blood screening. October to December, a total of 92 off-site properties as well as the apartment complex, and 255 people were screened.

Fortunately, not one person – tenant or emergency responder -- showed symptoms of mercury poisoning and no one had toxic levels in their blood. Only ten people had blood tests sufficiently high in mercury that physicians recommended follow-up testing. Specimens from every one of those who agreed to receive follow-up care fell to normal levels within one more month.

Photek/Rol-Flo Engineering Inc.

The Rol-Flo Engineering, Inc. property located on Liberty Lane in South Kingstown, Rhode Island, is a one-acre parcel where mercury wastes from former operations were alleged to have been buried in the early 1960s.

A remedial investigation confirmed conclusions that mercury-containing wastes in the former disposal area represent the principal source of mercury in the environment. Shallow groundwater beneath the former disposal area discharges to the adjacent wetlands, which are part of the Great Swamp, but groundwater is not a significant migration pathway for mercury in the environment.

Mercury was found in the wetlands sediments and surface water. The area containing elevated mercury in wetlands is at least 2.5 acres. Dispersion of mercury on particulates by surface water runoff and by periodic flooding is believed to be the principal transport mechanism for mercury in the environment under current and historical conditions.

An Ecological Risk Assessment was submitted to RI DEM on March 13, 1997. The conclusion of that study was that “based on site-specific sediment, plant, and earthworm concentrations…the majority of wildlife receptors within the wetland, including avian and large mammal species, are unlikely to be at risk from exposure to mercury in the wetland sediments.” Despite these conclusions in the Risk Assessment, the Department negotiated hot spot removal in the wetlands.

Remedial actions were performed in 1998-1999. Remedial actions consisted of excavation of onsite source soils, and excavation of “hot spot” sediments in the wetlands. Contaminated soils/sediments greater than RI DEM’s Industrial/Commercial Exposure Criteria were shipped offsite for proper disposal. Soils that were greater than the Residential Direct Exposure Criteria but less than the Industrial/Commercial Criteria were encapsulated onsite. After the remediation, the disturbed wetlands were replanted and the upland portion of the site was seeded. The Site is currently being monitored.

A Connell Street, Tiverton

In December 2004, EPA began work to clean the "A Connell Street" site in Tiverton, R.I. A single-family residence is located on this property. At the request of RI DEM, EPA took the lead in investigating this site. Soil samplings were conducted and led to the identification of mercury contamination on the property. The mercury is thought to be the result of a hat factory, which operated on the property about 100 years ago.

Results of the investigation showed that the mercury contamination was localized to the vicinity of this one residential property. One soil sample taken at this property was analyzed three times for different combination of materials. The results were— the portion consisted of felt material and surrounding soil had mercury concentration of 892 mg/kg; the portion consisted of felt and leather material had mercury concentration of 3,890 mg/kg; and the portion consisted only the surrounding soil had mercury concentration of 1,290 mg/kg. EPA has established a soil screen value of 23 mg/kg for mercury.

As part of the clean up efforts, EPA conducted additional soil sampling to identify the limits of the mercury contaminated soil, excavated the contaminated surface soils and shipped them off-site for safe disposal at a facility licensed to handle hazardous waste, effectively capping contaminated soils in place which may remain at depth, backfilling the excavated area with clean fill and restoring areas disturbed by site activities.

Summary

Mercury enters the environment from a number of routes, including emission to the air and subsequent deposition back to soil and water bodies. Mercury can also enter the environment through the disposal of wastes containing the contaminant and by local spills and releases. The impacts of mercury are measured through sampling and monitoring strategies. Rhode Island has done some limited sampling for mercury as part of a larger air sampling strategy focused on airborne particulate matter. Although direct sampling for mercury in water bodies has not occurred across the State, five water bodies are presumed degraded from this contaminant, including four ponds due to atmospheric deposition and the Woonasquatucket River, which runs through a historically industrialized region and has been subject to numerous historic point discharges. All of the New England states, including Rhode Island, currently have statewide fish consumption advisories in effect due to high levels of mercury in fish tissue.

RI DEM has developed a statewide monitoring strategy to include collecting fish tissue samples and analyzing them for mercury content. Samples will take from water bodies within basins subject to a rotational schedule. RI DEM has also implemented regulatory requirements under the air pollution control programs that will limit future mercury emissions from RI sources.

Since January 1, 1998, approximately 150 Rhode Island companies have generated a total of over 146,000 pounds of hazardous wastes containing mercury. The Naval Education and Training Center (NETC) on Aquidneck Island generated slightly over 57,000 pounds, or 40%, of that total. Eleven hospitals were found to generate a total of 15,800 pounds, or 11%, and several universities were listed, generating a total of 10,000 pounds, or 7%.

Spills and releases of mercury create acute, localized impacts on both the environment and the health and welfare of the public. Contamination levels from these spills can reach levels that present serious, immediate risks to human health. Investigation and clean up of these spills can be expensive, time consuming and extremely disruptive of the lives of impacted parties.

Mercury use in products is declining

Mercury use in products is constantly and substantially declining, with an increasing number of non-mercury alternatives becoming available to replace traditional mercury products. A 2001 report from US EPA Region V www.epa.gov/region5/air/mercury/progress.html estimates that mercury used by US industry declined from 478 tons in 1995 to a projected 220 tons in 2001. Of this amount chlorine manufacturers and dental equipment used nearly half. But even this number may overestimate current mercury use. For example, while the EPA estimated that the lighting industry used 31 tons of mercury in 2001, the industry's 2003 survey shows that all lamps sold in the US (including those imported from other countries) contain only 7 tons of mercury, with US manufacturers using only 6 tons. Likewise, mercury in the thermostat industry has been declining by roughly 10% per year, indicating that mercury thermostats are being replaced by mercury-free alternatives.

Anecdotal information from mercury recyclers confirms that demand for mercury by US industries has dropped significantly in the last few years.

NEWMOA has posted on their website an extensive database of mercury containing products

The Northeast Waste Management Officials Association (NEWMOA) has created an extensive database of mercury containing products. See http://www.newmoa.org/Newmoa/htdocs/prevention/mercury/imerc/notification/filerlist.cfm?list=product&view=1 for a comprehensive product category list. The database lists well-known and commonly used mercury-containing products such as thermometers and dental amalgams.

It also lists products that are considered to be components of other products, such as:

- Button cell batteries
- Electric lamps
- Valves
- Switches
- Sensors
- Relays

Additionally, it lists products that contain or use these components, such as:

- Computers
- Appliances
- Automobiles
- Industrial machinery
- LCDs, monitors, and projectors
- Measuring devices
- Office equipment
- Recreational vehicles
- Thermostats

Mercury Use in Automobiles in RI

In 2004, both houses of the Rhode Island General Assembly passed resolutions "respectfully urging the Mercury Reduction Oversight Commission to prevent mercury pollution from auto parts." (*See Appendix B)*

The resolution urged the 14-member Mercury Reduction Oversight Commission (established pursuant to RIGL §23-14.9-2.1) to develop a plan to address the collection and recycling of mercury added auto parts in a manner that is convenient and minimizes costs to taxpayers and consumers. The resolution urges the Commission to submit a recommended plan to the General Assembly by January 30, 2005 including any legislation necessary to implement the plan, for the collection and recycling of mercury-added auto parts that utilizes a "producer responsibility" model. The Mercury Reduction Oversight Commission, which began meeting in May 2004, established a subgroup of interested parties in August 2004 in order to address the issues raised by the General Assembly's resolution. Participants included representatives from the Audubon Society of Rhode Island, the Automotive Recyclers Association of Rhode Island, the Alliance of Auto Manufacturers, Clean Water Action, the Department of Environmental Management, the Rhode Island League of Cities and Towns, and Metals Recycling.

While mercury can be found in numerous automobile components, the subgroup decided to prioritize its initial efforts and to focus on mercury switches (commonly used in convenience lighting fixtures and, to a lesser degree, in anti-lock breaking systems (ABS)).

The subgroup reviewed the magnitude of the problem of mercury pollution from auto parts in Rhode Island, models for addressing the issue developed by other states, and the feasibility of implementing a program to address the issue in Rhode Island.

RI DEM projects that approximately 602 lbs. of mercury remains in convenience light switches in vehicles registered in Rhode Island.

Approximately 43 pounds of mercury are available per year to feasibly be collected from mercury switches in Rhode Island.

The Rhode Island Department of Environmental Management (RI DEM) estimates that approximately 50,000 Rhode Island vehicles are retired annually. Based on a model developed by the Maine Department of Environmental Protection with input from industry representatives, RI DEM projects that approximately 602 lbs. of mercury remains in convenience light switches in vehicles registered in Rhode Island. In addition to this mercury from cars registered in Rhode Island, Metals Recycling processes approximately 60,000 vehicles from out-of-state each year. Of these vehicles, approximately 24,000 are in a condition from which mercury switches could be recovered. Independent auto recyclers also process an unknown number of out-of-state vehicles. From this pool, it is estimated that 43 pounds of mercury are available per year to feasibly be collected from mercury switches in Rhode Island.

This market-driven approach will encourage wide participation in the program and minimize the need for the Department of Environmental Management to engage in time-consuming enforcement actions.

The subgroup developed a creative approach to capture and dispose of mercury switches from auto parts, which grants a significant degree of flexibility for auto manufacturers and affected parties to craft an effective collection program of their own design. The proposed plan strays from recommending a more traditional "command and control" style approach to pollution prevention and instead recommends a performance standard strategy that defines the terms of success for mercury switch removal program.

*The full Auto Subgroup Report is found in **Appendix H**.*

	Individuals and businesses in residential, commercial and industrial settings in Rhode Island use all of the product categories listed in Section 5, and more. Identifying the users of mercury will guide efforts to reduce exposure and guide safe disposal.
Offices	Municipal offices contain equipment that contains mercury including computer screens, fluorescent bulbs, switches, lamps, and thermostats in the offices. Mercury-containing high intensity discharge lamps may be used for outdoor lighting. The Association of Metropolitan Sewerage Agencies (AMSA) reports that mercury levels in household wastewater are sufficiently high to pose Clean Water Act compliance problems for the nation's wastewater treatment plants, many of which are municipal agencies. Mercury goes to sludge, and when sludge is incinerated the mercury becomes airborne, then falling with precipitation (rain and snow) into ponds and lakes where it gets into the food chain. Municipal buildings that were used for bomb shelters during the 1950s may contain mercury that was part of the shelter's kit.
Schools	In addition to the extensive use of fluorescent bulbs, art, home economics, medical and chemistry rooms may use and store compounds containing mercury. Cinnabar or vermilion red pigment for example is mercuric sulfide. Switches and thermostats may also contain elemental mercury. In addition, schools and other institutions that served as bomb shelters during the 1950s may still house containers of elemental mercury included in the shelter materials. www.newmoa.org/newmoa/htdocs/prevention/mercury/schools/
Medical/Dental	Medical equipment containing mercury include thermometers, sphygmomanometers, barometer, esophageal dilators, Cantor tubes, Miller Abbot tubes, feeding tubes, electrical equipment, lamps, analytical instruments using mercury chloride as a reagent, and batteries containing mercuric oxide (for hearing aids, defibrillators, pagers, temperature alarms, etc.). www.epa.gov/grtlakes/seahome/mercury/src/mercmed.htm Most dentists still use "silver" fillings, which are an amalgam of four metals—mercury, silver, copper and tin—with mercury comprising around 50% by weight. When fillings are repaired or replaced, mercury is often washed down the drain, thrown in the trash or combined with biomedical waste, which is incinerated. In 2004, the U.S.

	Environmental Protection Agency (EPA) estimated that dental clinics use 34 tons of mercury annually, 24% of the total annual mercury consumption in the U.S. In addition, thimerosal and mercuric oxide are used extensively in analysis in hospital laboratories, and hospital incinerators disposing of surgical materials may be the sources of mercury emissions. Mercurochrome as an antiseptic has been mostly supplanted but stored materials in medical units may be a source. Veterinary clinics and nursing homes use medical instruments containing mercury, as well as sources in illumination devices, button batteries, switches, and some cleaning solutions.
Ethnic-Cultural Users	A religious practice of Latin American cultures known as Santeria uses elemental mercury in rituals. Some skin-lightening cream contains mercury. http://www.epa.gov/oppt/cahp/actlocal/merc.html
Agriculture	Mercury was traditionally used in agricultural chemicals as a fungicide, mildewcide, or pesticide. All food uses of mercury-containing pesticides were cancelled in 1969, and all US pesticide registrations were canceled in as of early 1995. The last four uses to be cancelled were turf fungicide, mildewcide for fresh cut wood, latex paint fungicide/preservative, and outdoor fabric treatment. However, many mercury-containing chemicals may still be present on farms or golf courses in the form of old stockpiles. These materials should be targeted by waste pesticide collection or clean sweep programs to prevent further emissions to the environment. www.epa.gov
Individual Consumers	Consumers of retail products for home, horticultural/agricultural use, footwear may purchase items containing mercury. Obvious products include mercury thermostats and thermometers for fever or food. It should be noted that mercury thermometers may no longer be sold in RI without a prescription. Certain toiletry products, household cleansers, food coloring are other sources of mercury (hundreds to thousands ng/l concentrations – cf. Association of Metropolitan Sewerage Agencies report). Child's rubber boots were identified as a source of mercury causing dermatitis, and some children's light-up shoes contain mercury switches. Electronic display screens, auto switches, and fluorescent lamps usually contain mercury. Novelty items, including those that light up through pressure, often contain mercury; however RI has banned most mercury-containing novelties from sale.

Lighting Users, Distributors and Contractors	Mercury-containing lamps are used to provide general indoor and outdoor lighting. Glass for some of these lamps is manufactured by OSRAM SYLVANIA in Rhode Island. Lamps are sold by RI electrical distributors and are used by RI businesses and institutions to save energy and to comply with Federal and State energy codes. Lamps are also used for other purposes, including security lighting, sports lighting, and flood lighting for highway repair. Semiconductor and integrated circuit board manufacturers such as Arch Chemical use mercury-containing lighting for photo etching. These lamps are used for ultraviolet curing of inks, paints, adhesives, coatings and graphics manufactured across the US, including Rhode Island. Ultraviolet (UV) lighting systems with mercury containing lamps are used by water treatment facilities to control bacteria, and by some to control bacteria in air. Lighting is also essential for the RI entertainment industry including television, movies, concerts and stage production. Backlighting in electronic products, including medical devices, increases the energy efficiency of those products.

References for Section 6:

US EPA, *International Mercury Market Study and the Role and Impact of US Environmental Policy, 2004.*
http://www.nih.gov/od/ors/ds/nomercury/links.htm
http://www.tellus.org/risk/publications/Tellus%20hospital%20report.pdf
http://www.amsa-cleanwater.org/pubs/mercury/mercury.cfm
http://www.epa.gov/glnpo/bnsdocs/hgsbook/index.html

A mercury control strategy is a means to eliminate, reduce, or responsibly manage mercury in the State of Rhode Island. There are several programs that could effectively control mercury in RI, including model programs from surrounding states. Some of the programs most relevant to RI are summarized below. For a comprehensive list of RI programs, cross-referenced to best-practice programs, see ***Appendix F***.

Programs for Health Care Facilities

RI has a voluntary education program for managing mercury in health care facilities.

RI: RI partners with the EPA in their Hospital for a Healthy Environment (H2E) program. This program in RI also includes participation by the Narragansett Bay Commission. The partnership has held several conferences and workshops for health care facilities and is currently studying the feasibility of becoming a H2E Champion. Planning is ongoing for a spring/summer 2005 workshop to expand state hospital partners in this program. Information on the details of this program are located at: http://www.H2E-online.org . RI opted to use the partnership strategy after an Environmental Leadership Feasibility study completed in 2001 indicated that RI facilities preferred this type of partnership to a separate state program."

Other states (New York): Creation of P2 team, The P2 team has developed a recognition program entitled "EPA Region 2's Green Facility Program: Healthcare Facility Challenge" as a way to encourage healthcare facilities to implement P2 and waste minimization practices. In order to become recognized under this program, a healthcare facility must perform a baseline survey to determine its current total volume of waste generated, as well as all sources of mercury. They must then establish waste reduction goals and report to EPA Region 2 on the measurable progress made towards achieving these goals. The activities reported must have resulted in a substantial and permanent environmentally beneficial change in the way they did business. Successful facilities will receive certificates of recognition and window decals; no regulatory or enforcement flexibility is offered. In a related manner, the Office of Enforcement and Compliance Assurance is funding a virtual healthcare facility on the Internet where a compliance assistance provider or healthcare facility can walk through and identify the various waste streams, applicable regulations, and pollution prevention opportunities associated with hospital operations.

Programs for Dental Amalgam

In Rhode Island, the Narragansett Bay Commission has begun implementing Best Management Practices, requiring dentists in their service area to monitor wastewater for mercury or to install amalgam separators capable of removing 99% of amalgam.

RI: The Narragansett Bay Commissions (NBC) has developed an Environmental Best Management Practices (EBMP) document titled "Best Management Practices for the Management of Waste Dental Amalgam." Tailored for the small- to medium-sized dental office, this document outlines safe ways of handling scrap amalgam and describes the various technologies and equipment available to remove scrap amalgam from dental wastewater.

Other States (Vermont): Vermont is currently on a trail of several types of amalgam separators. Pending the results of the study require amalgam separators in all dental offices to collect mercury based on which ones worked best according to the results of the study.

Other States (Massachusetts): The Massachusetts Department of Environmental Protection (DEP) has worked with the Massachusetts Dental Society to establish a voluntary program for dental practices and facilities to certify to DEP that they are using amalgam separators and recycling amalgam waste containing mercury.

Dental practices that participate in this voluntary program by January 31, 2005, will be exempt from future DEP regulations relating to the installation, operation, maintenance and upgrading of amalgam separation systems, and related DEP fees, until February 1, 2010. If more than half of Massachusetts dentists participate in the voluntary program during its first year, a second one-year opportunity will be offered, which would exempt participating dentists from additional amalgam separator rules and fees until February 1, 2007.

This program is intended to reduce the amount of mercury released into the environment by Massachusetts dental practices and facilities. DEP is implementing this voluntary approach to encourage early installation and use of amalgam separators by dentists before the agency adopts regulations that would require these actions.

Amalgam waste from the dental sector contributes to the mercury released into the environment from Massachusetts sources, and was identified in the "Zero Mercury Strategy" adopted by the Massachusetts Executive Office of Environmental Affairs in 2000 as a potential candidate for pollution prevention.

Programs for Switches

RI switches are being phased out, based on volume of mercury in the product.

RI: Switches in RI are being phased out as a result of the Mercury Reduction and Education Act. Phase out begins based on volume of mercury contained in the product. This will be implemented for any product containing a mercury switch including automobile parts, thermostats, and other various products, unless an exemption is provided.

Other States (Maine): Maine has banned the use of mercury switches and has implemented a bounty program for the collection of switches from vehicles. Education on where to find these switches is also extremely important.

Programs for Educational Institutions

The RI Chemical Safe Schools Committee is a collaborative effort of participants from RI Dept of Environmental Management, Dept of Education, RI Dept of Health, RI Dept of Labor and Training, RI State Fire Marshals Office, Brown University, Community College of RI, University of RI, RICOSH, independent environmental consultants and others who have come together to look at the unique environmental risks in school settings. Their mission, over the past few years, has been to inform all persons associated with these facilities, and the public, with information and training materials dedicated to eliminate or minimize the risks associated with their everyday exposure to the chemicals in their workplace.

Programs have been very well attended and the network that has developed between participants and committee members has brought about a new partnership between regulators, educators and the public.

RI has a variety of collaborative programs targeting educational institutions.

Additionally, these workshops have sparked interest in providing services to schools in other ways. As a result of mailings to 376 educational facilities, RI DEM committee members, in association with Stericycle (a local Hazardous waste transporter), have organized collection and disposal of mercury devices from 7 schools (approximately 30 lbs. of mercury from thermometers, switches and thermostats). Several schools have sponsored thermometer take-back days under the guidance of RI DEM. RI DEM's Emergency Response staff has visited about ten schools and talked to several by telephone concerning their chemicals. They have removed mercury, chemicals, lecture bottles, and explosive chemicals. They have also provided contractor information for the proper disposal of their chemicals to many schools.

In a project directed by the Department of Labor and Training with the assistance of the Department of Education committee members, compiled a Lab Safety Workbook for school personnel, that has become an important reference tool for all personnel in school systems.

Brown University led a project that has produced an electronic version of this lab safety information, which includes many reference sources that identify proper storage, handling and disposal of chemicals found in school laboratories.

Through a series of targeted outreach and training efforts, this group has reached out to: RI School Committee Chairs, Independent School Association of RI, RI Fire Chiefs, RI High School Chemistry Department Chairs, RI Association of School Committees, RI School Maintenance Directors, The Diocese of Providence, RI Local Emergency Planning Commissions, RI Science Teachers Association and others, to provide information associated with maintaining compliance with regulatory requirements governing the safe management chemicals in schools.

Through the cooperative efforts of this committee, workshops have been held addressing: Lab Safety and Hazardous Waste, Mercury Elimination, Toxics in Schools, Indoor Air Quality, Developing a Chemical Hygiene Plan and Waste Management in K-8 science programs.

Efforts have been made to introduce science educators to concepts such as demonstration projects and micro scaling experiments, to reduce the use of dangerous chemicals in schools. Examples of science curriculum using alternative, non-hazardous products have been offered to science teachers and have been incorporated into several school curriculum plans.

One of the best examples of this group's innovative efforts, however, is the incorporation of many of the initiatives of this group into the Department of Labor's School Health Regulations. Based on existing requirements for school districts to have updated Chemical Hygiene Plans and designated Chemical Hygiene Officers, and the public concern about the exposure of children to chemicals at school, we initiated a project that will ultimately ban many chemicals from schools. This effort is modeled after a program implemented in Colorado, and promises to set a new standard for both safety in schools and inter-agency cooperation.

In order to facilitate the removal of items to be banned in schools by September 2005, this group has actively solicited funding mechanisms that can be used to supplement local contributions for waste disposal activities. The program awards federal grant dollars to local school districts to assist in funding removal activities. This program has proven to be a significant success in the use of partnerships used to achieve goals.

RI has also partnered with NEWMOA to implement their "Getting Mercury Out of Schools" program. Information on this project is located at: http://www.newmoa.org/Newmoa/htdocs/prevention/mercury/schools/facts.cfm

Other States (Massachusetts): NEWMOA has conducted an education program through Massachusetts where school staff, students and administration are informed about the sources of mercury and it's impact on the environment and public health. The program is called "Getting mercury out of schools and communities".

Farming Programs

RI: The Department of Health has done a door-to-door visit to most RI dairies. They identified approximately 16 dairy farms in RI and have had strong success with phasing out mercury manometers.

The states of Maine and Wisconsin may serve as good models for mercury reduction in farming.

Other States (Maine): The state contracted with licensed hazardous waste transporters in order to collect and replace mercury manometers used to measure vacuum in milking machines. The program will be operated at no cost to the farmer. A brochure has been printed and distributed to the target audience with the help of the Department of Agriculture.

Other States (Wisconsin): This program encourages the recycling of mercury manometers (used in milking houses) and the use of digital manometers. Participating dairy equipment dealers receive a $200 rebate toward a digital manometer when a mercury manometer is replaced. The Wisconsin Department of Natural Resources (WDNR) partnered with the Department of Agriculture, Trade and Consumer Protection so manometers could be recycled at Agriculture Clean Sweeps.

Mercury Education Programs

Education about the effects of exposure to mercury, the pathways by which individuals are exposed to mercury and mercury compounds, and appropriate management of mercury is necessary to protect public and environmental health. Requiring product labeling, collecting and managing mercury-containing products and wastes, and providing information to the public are among the education efforts currently in place in Rhode Island.

A preliminary review of printed and electronic materials, programs, and labeling to educate consumers and the general public on exposures, routes, sources, and proper disposal of mercury has been conducted.

Agency Outreach in Rhode Island

Requiring product labeling, collecting and managing mercury containing products and wastes, and providing information to the public are among the education efforts currently in place in RI.

Various state agencies in Rhode Island are working closely together to provide information and programs to reduce exposure to mercury. In addition to enforcement activities, RI Department of Environmental Management (RI DEM) has coordinated a collection program with the RI Department of Health (RI DoH) to retrieve thermometers, thermostats, and other medical related mercury-containing materials from homes, schools and hospitals. Stericycle, a RI licensed hazardous/medical waste collector/hauler has provided multiple free collections. RI DEM also has participated in a RI Chemical Safe Schools Committee to facilitate removal of hazardous materials, including mercury from school facilities.

As these materials have been collected, a questionnaire about fish-consumption habits has been administered to participants, and RI DoH's brochure on safe consumption of fish has been distributed. RI DEM has several citations about mercury in its website www.state.ri.us/dem

RI Resource Recovery Corporation collects electronic waste, fluorescent bulbs, and other items containing mercury in its Eco-Depot.

Narragansett Bay Commission (NBC) has implemented a program to remove mercury-containing dental wastes from sewage sludge that is incinerated and thus creates air-borne mercury. Working with the RI Dental Association, the NBC has provided workshops and published a pamphlet "Environmental Best Management Practices for the Management of Waste Dental Amalgam" as part of its program to reduce mercury in effluent.

RI Attorney General's office spearheaded a group of agencies and non-profits listed above which have met monthly to assure implementation of RI General Law on mercury and to review projects that include education of dentists and the general public on disposal issues. This group is now known as the Mercury Education and Reduction Group (MERG).

Other Sources of Information

Regional sources for education materials include New England Waste Management Officials Association at www.newmoa.org/prevention/mercury **through Interstate Mercury Elimination and Reduction Clearinghouse**

The U. S. EPA offers extensive information about mercury on its website at www.epa.gov/mercury. In addition, Northeast Waste Management Officials Association (NEWMOA) lists an up to date report on Mercury Source Reduction Legislation on their website www.newmoa.org/Newmoa/htdocs/prevention/mercury/modelleg.cfm.

Occupational Safety and Health Administration regulates workplace exposure to mercury, with support from National Institute for Occupational Safety and Health (NIOSH) and the American Conference of Governmental Industrial Hygienists.

The US government and several northeastern states (ME, MA, CT, NY, NJ) publish mercury education materials.

Many states publish mercury education for the public, and many websites provide links to various levels of quality information. The state of Maine's DEP partners with schools to assure safety for students and promotes a video on mercury produced by the National Wildlife Federation's affiliate in the state. The state of Massachusetts sponsors a website with many links to technical information about mercury and mercury exposure. The state of Connecticut's DEP provides a section of its website to general information about mercury as well as a sources for fact sheets for industry on managing mercury products and waste. The New York Academy of Sciences has published *Pollution Prevention & Management Strategies for Mercury in the New York/ New Jersey Harbor* that lists calculations of projected releases of mercury from various sources.

Corporations and private non-profits have developed information about mercury.

Summary of Mercury Education Programs

The model for organizing information about toxins addresses the source, the concentration, the pathway, and the receptor. Effective education will provide materials tuned to the audience whose behavior changes will produce the desired outcome, prevention of exposure, whether preventing ingestion, blocking the pathway, or preventing the source.

Publications about Mercury by RI public agencies

RI Department of Health

Fish is Good/ Mercury is Bad. 3-fold brochure, published in 5 languages.

The Department also distributes brochures, in Spanish and English, on Azogue (elemental mercury) that have been published by CT DoH.

Mercury Thermometer Exchange Program, Report of Activities 2003.

Rules & Regulations for School Health Programs, that includes rules banning certain mercury compounds from school chemical laboratory use. Published with RI Department of Elementary & Secondary Education

Web site information: www.dem.state.ri.us

RI Department of Environmental Management

Fact Sheet: Mercury in Common Household Products

Web site information: www.health.ri.gov

Narragansett Bay Commission

Environmental Best Management Practices for the Management of Waste Dental Amalgam, distributed to dentists within the NBC service area.

RI Resource Recovery Corporation

Eco-Depot: A Safer Home A Cleaner State. Packet contains brochure from RI DoH, a Mercury fact sheet from RI DEM, and a Mercury Fact sheet from the Zero Mercury Campaign.

Legislative Control Efforts

Mercury Reduction & Education Statutes in NE States

December 2004

RI General Law Chapter 23-24.9, the Rhode Island Mercury Reduction and Education Act, was adopted by the RI General Assembly in July 2001 and subsequently amended in 2003 in order to delay the implementation of numerous portions of the law. It establishes a phased-in program to eliminate non-essential uses of mercury in consumer, commercial and household products. The ultimate goal is to reduce levels of mercury in the environment. Mercury performs numerous functions in the home and workplace; however, human exposure to mercury in the environment (e.g. through spills) is toxic and can lead to health problems.

Rhode Island's law is based upon model legislation drafted by the Northeast Waste Management Officials Association (NEWMOA) and addresses products to which mercury has been intentionally added as well as the sale of elemental mercury. States in New England and across the country have moved to adopt provisions and requirements similar to those in effect in Rhode Island. The first provisions of Rhode Island's law became effective January 1, 2002, with complete implementation of all requirements currently planned for January 1, 2010. Some of the most common portions of the NEWMOA model legislation adopted by states in the northeast include: 1) mercury-added product notification 2) a ban on the sale of certain mercury-added products such as thermometers and novelty items containing mercury; 3) labeling of certain mercury-added products; and 4) authority to implement public education and outreach programs.

The following table, produced by NEWMOA in October 2004, shows the status of mercury education and reduction legislation that has been introduced or enacted in each state legislature by the fall of 2004 (*note, the table differentiates between enacted and proposed laws*).

NEWMOA's entire *Mercury Source Reduction Legislation - 2004 Overview of Progress: Status Report* can be found in the appendix of this report and on the web at: http://www.newmoa.org/Newmoa/htdocs/prevention/mercury/modelleg.cfm. Similarly, the Electronic Industries Alliance (EIA) (www.eia.org) has produced a state-by-state table outlining mercury education and reduction programs in CT, ME, MD, MN, NH, NY, RI, VT and WA.

Status of Mercury Education and Reduction Legislation in the Northeast as of Oct. 2004
(As prepared by the Northeast Waste Management Officials' Association [1])

Requirement	CT	IL	ME	MA	NH	NJ	NY	RI	VT	WA
Mercury-added Product Notification	✪	✓	✪	✓	✪			✪	✓	
Interstate Clearinghouse	✪	✪	✪	✓	✪		✪	✪	✓	
Bans on Certain Mercury-Added Products	✪	✪	✪	✓	✪	✓	✪	✪	✓	✪
Novelty ban	✪	✪		✓	✪		✪	✪	✓	✪
Thermometer ban	✪	✪	✪	✪	✪	✓	✪	✪	✓	✪
School ban		✪	✪	✓	✪		✪	✪	✓	✪
Manometer ban	✪		✪	✓	✓			✪	✓	✪
Phase-Out & Exemptions	✪	✪	✪	✓	✓			✪	✓	
Labeling	✪		✪	✓	✓		✪	✪	✪	✪
Disposal Ban	✪		✪	✓	✓		✪	✪	✪	
Collection System Plans	✪	✓		✓	✓			✪		
Disclosure			✪	✓				✪		
Control on Sale of Elemental Mercury	✪	✪	✪	✓	✪		✪	✪	✓	✪
Public Education and Outreach	✪		✪	✓	✪	✪	✪	✪	✪	✪
Universal Waste Rule	*	*	*	*	*	*	*	✪	✪	
State Procurement			*	✓	✓			✪	*	
Education on Dental Amalgam			✪	✓	✪					
Dental Amalgam Separators Required			✪	✓	✪					
Dental Amalgam Collection							✪			
Mercury Auto Switch Phase-out & Removal		✓	✪		✓	✓		✓		

✪= Provisions that have been passed this year or previous years
✓= Provisions proposed in 2002, 2003 or 2004
*= Authority exists to implement under existing laws or policies
Links to the laws/statutes of the above listed states can be found at the following:

[1] From NEWMOA website at *www.newmoa.org*

RI: *RI General Laws Chapter 23-24.9 (RI Mercury Reduction and Education Act) and Additional Laws on Thermometers and Mercury in Fish*
http://www.rilin.state.ri.us/Statutes/TITLE23/23-24.9/INDEX.HTM
http://www.rilin.state.ri.us/Statutes/TITLE23/23-24.8/INDEX.HTM
http://www.rilin.state.ri.us/Statutes/TITLE23/23-72/INDEX.HTM

CT: *CT Chapter 446m (Mercury Reduction and Education)*
http://www.cga.ct.gov/2003/pub/Chap446m.htm

IL: *IL Public Act 093-0165 and IL Public Act 093-0964*
http://www.legis.state.il.us/legislation/publicacts/93/PDF/093-0165.pdf
http://www.legis.state.il.us/legislation/publicacts/fulltext.asp?name=093-0964

ME: *MRSA Title 38 Chapter 16-B §1661-§1671*
http://www.maine.gov/dep/mercury/legreg.htm

MA: *MA General Laws Part IV, Title 1, Chapter 270, Section 24*
http://www.mass.gov/legis/laws/mgl/270-24.htm

NH: *NH Revised Statutes, Section 152 M51 through Section 152 M57*
http://www.gencourt.state.nh.us/rsa/html/indexes/149-M.html

NJ: *NJ Title 26 Chapter 2 Part FF Mercury Health Advisories and Consumption of Fish*
http://www.njleg.state.nj.us/2002/Bills/AL03/174_.PDF

NY: *Laws of New York 2004, Chapter 145*
http://assembly.state.ny.us/leg/?ch=145

VT: *Vermont Statutes – 10 VSA Chapter 159*
http://www.leg.state.vt.us/DOCS/1998/ACTS/ACT151.HTM

WA: *Washington RCW Title 70 Chapter 70.95M*
http://www.leg.wa.gov/pub/billinfo/2003-04/House/1000-1024/1002-s_sl_05202003.txt
http://www.leg.wa.gov/RCW/index.cfm?fuseaction=chapterdigest&chapter=70.95M

Legislative efforts in non-NEWMOA state are summarized in ***Appendix G*** of this report.

23-24.9-4 Interstate Clearinghouse

The Commission recommends that the RI Department of Environmental Management continue its participation and membership in the IMERC interstate clearinghouse because it is a more efficient, less redundant and cost efficient system than establishing a separate state-specific system. In addition, IMERC is more convenient for manufacturers and distributors with regard to notification.

The Commission recommends that the RI DEM continue to look to IMERC for technical and programmatic assistance and to facilitate strong interstate collaboration on the development and implementation of public education and outreach programs on mercury-added products.

23-24.9-7 Phase-outs and Exemptions

The Commission recommends the following additions and changes:

CHANGE (d) to read: Fluorescent lamps and high intensity discharge (HID) lamps, including metal halide, high pressure sodium, and mercury vapor types, shall be exempted from the requirements of subsection (a) of this section.

ADD (e) Laboratory chemical standards shall be exempted from the requirements of -7(a).

CHANGE (f) to read: Manufacturers of a mercury-added product may apply to the director for an exemption for no more than ~~two (2)~~ five (5) years from the limits on total mercury content set forth in subsection (a) of this section for a product or category of products.

CHANGE (g) paragraph (ii) to read: he or she finds ~~each of~~ the following criteria are met:
(1) Use of the product is beneficial to the environment or protective of public health or protective of public safety; and/or
(2) There is no technically feasible alternative to the use of the mercury in the product; and
(3) There is no comparable non-mercury-added product available at reasonable cost.

This change is recommended because there are products that would meet the second and third exemption requirements that are not exclusively beneficial to the environment or protective of public health or public safety.

CHANGE (g) final sentence to read: Upon reapplication by the manufacturer and findings by the director of continued eligibility under the criteria of this subsection and of compliance by the manufacturer with the conditions of the director's original approval, an exemption may be renewed one or more times and each renewal may be for a period of no longer than ~~two (2)~~ five (5) years.

23-24.9-8 Labeling

The Commission recommends the following additions and changes:

CHANGE (2) paragraph 1 to read: The department shall adopt rules to establish standards for affixing labels to the product and product package. The rules shall be consistent with labeling programs in other states and provide for approval of alternative compliance plans by the department.

ADD to (2) new paragraph 2 to read: The manufacturer of a mercury-added product is in compliance with the requirements of this subsection if the manufacturer is in compliance with the labeling requirements of another state.

CHANGE (3) paragraph 2 to read: This subsection does not apply to ~~mercury-added lamps~~, mercury-added button cell batteries and products whose only mercury component is a mercury button cell battery or a mercury-added lamp.

The purpose of these changes is to align RI programs for consistency with other states' effective efforts. Manufacturers of mercury lights and mercury-added lamps are labeling their products currently under a nationwide label. Even though manufacturers are labeling mercury-added lamps, since some products containing these lamps cannot be removed easily, another venue of hazard communication was proposed but no consensus was reached.

23-24.9-9 Disposal Ban

The Commission recommends no changes to this section.

23-24.9-10 Collection

The Commission recommends the following addition:

ADD paragraph (b): The Department and the Rhode Island Resource Recovery Corporation shall establish a statewide network for the collection of mercury-added products when the household consumer is finished with them. Manufacturers of mercury-added products may satisfy their obligations, as set forth above in section (a), by entering into a written agreement with those agencies to support the statewide program including, but not limited to, advertisement, education and/or funding through system established in regulation.

This addition to the law provides a clear alternative for industry to comply with this section without placing industry in a financially disadvantaged position.

23-24.9-11 Healthcare Facilities

The Commission recommends no changes to this section.

RI DEM contacted RI hospitals and representatives of the Soap & Detergent Manufacturers regarding the level of their satisfaction with language adopted; they are satisfied with the healthcare reporting language as currently written.

23-24.9-13 Existing Inventories

The Commission recommends no changes to this section.

23-24.9-14 Education

The Commission recommends no changes to this section.

The Commission recommends the Department of Environmental Management educate industries with regard to the universal waste law.

The Commission recommends a comprehensive review of current mercury-related educational materials aimed at improving the quality of their information in terms of educational objectives. Effective and adequate distribution of these materials to reach at-risk audiences is needed.

23-24.9-16 Violations

The Commission recommends no changes to this section.

23-24.9-18 FDA

The Commission recommends no changes to this section, as it is consistent with other states.

23-24.9-19 Mercury Advisory Working Group

The Commission recommends no changes to this section.

23-24.9-20 Regulations

The Commission recommends the Department of Environmental Management be authorized in **RIGL 42-17.1** to establish a fee structure to implement the purposes of this program.

Commission Recommendations Regarding Effective Dates

23-24.9-7 Phase-outs and Exemptions

1,000 mg phase-out extended from July 1, 2005 to July 1, 2006

23-24.9-8 Labeling

Labeling extended from July 1, 2005 to July 1, 2006

23-24.9-9 Disposal Ban

Disposal ban extended from July 1, 2005.to July 1, 2006

23-24.9-10 Collection

Collection extended from July 1, 2005 to July 1, 2006

23-24.9-11 Disclosure Healthcare Facilities

July 1, 2005. The Commission recommends no change in effective date.

23-24.9-16 Violations

July 1, 2005. The Commission recommends no change in effective date.

The Commission also recommends the following:

A Commitment to Fund the Mercury Reduction and Education Program

The Commission recommends strongly that the Governor and legislature adequately fund mercury-related programs and activities initially and for the long-term including support for an effective public education program, environmental and biological monitoring programs, and staffing within RI DEM, RI DoH and RI RRC.

Mercury Pollution Prevention Award Program

In an effort to encourage greater participation in mercury reduction and elimination programs by Rhode Island businesses, the Commission recommends establishing and funding a Mercury Pollution Prevention Award Program for businesses, institutions, government agencies, or individuals who have made significant strides in the field of reducing mercury pollution.

Sources of Mercury Outside of Rhode Island

Because much of environmental mercury contamination comes from outside of Rhode Island, the Commission recommends Rhode Island aggressively support more stringent federal standards with well defined targets (Maximum Achievable Control Technology, MACT) and deadlines for reducing emissions from power plants, industrial and commercial boilers and sewage sludge incinerators as well as long-term management and storage of excess elemental mercury.

This commission recommends that the Rhode Island Attorney General's Office seek legal recourse from the Federal EPA to protect the health of all Rhode Islanders.

The commission recommends that the Rhode Island Department of Environmental Management continually monitor implementation of the current cap and trade format so that mercury emissions are adequately reduced in Rhode Island and that Rhode Island is not further adversely impacted.

The new EPA's March 15, 2005 Clean Air Mercury Rule (CAMR) places Rhode Island residents at risk to elevated mercury exposure from coal burning plants nationwide. This ruling promulgates an emissions cap and trade program that ignores the fact that proven technology exists to remove 90% of mercury from power plant emissions at a retail power cost increase of 1%. This EPA ruling will allow at best, a 21% emissions reduction by 2010, annually exposing the human environment to at least an additional 67,000 pounds of mercury, thereby ensuring that Rhode Islanders receive significantly more mercury exposure than they would receive from responsible implementation of proven technology. If more coal is burned, mercury emissions could increase.

EPA has the power and wherewithal to bring mercury emissions down from over 96,000 pound per year to less than 10,000 pounds per year. The current ruling will at best achieve 76,000 pound per year of emissions by 2010.

MA, NJ, CT, and NH and have implemented technology based emissions-reduction strategies without cap and trade programs. This will achieve a significantly greater reduction (85 to 95% control) in a much shorter time period, from now to 2008, six years before the full implementation of the federal program.

Sources of Mercury Inside of Rhode Island

The Commission recommends Rhode Island establish a comprehensive monitoring program to obtain initial and periodic air emissions, groundwater and soil measurements of mercury within the state. Furthermore, the Commission recommends that RI DEM include sampling and analysis for mercury as it implements the proposed statewide Water Quality Monitoring Strategy, continues to work on water quality monitoring with the interagency Rhode Island Environmental Monitoring Collaborative, and studies ambient air quality and the level and impacts from toxic air contaminants throughout the state.

Current RI data on environmental mercury levels are limited and only estimate the extent of current mercury contamination. These data do not provide an adequate basis for identifying how levels change over time. Data on the environmental levels of mercury are essential to evaluating the effectiveness of mercury reduction efforts.

The Commission recommends Rhode Island determine the impact of mercury contamination from burning of residential fuel oil. Based upon regional data, residential fuel oil (specifically the high sulfur content type) releases mercury into the air when it is burned and may represent a major in-state source of mercury in Rhode Island.

One of the significant sources of mercury releases into RI's environment results from the use of mercury amalgam in dental offices. For over 150 years, dental mercury fillings (called "amalgam") have been used extensively to fill cavities in teeth. Amalgam is a metallic alloy consisting primarily of four metals - mercury, silver, copper and tin—with mercury comprising around 50 percent of the amalgam materials by weight. In Rhode Island, the Narragansett Bay Commission has begun implementing Best Management Practices, requiring dentists in their service area to monitor wastewater for mercury or to install amalgam separators capable of removing 99% of amalgam. RI DEM should consider developing a similar statewide program to reduce the release of mercury into the environment (e.g. wastewater, septic systems and sewage sludge) from this source.

Biological Monitoring Programs in Rhode Island

The Commission recommends Rhode Island establish a comprehensive biological monitoring program to obtain initial and periodic mercury levels in sentinel species such as sphagnum moss and fish, since fish consumption is the primary source of mercury contamination in humans.

The Commission recommends that Rhode Island establish a comprehensive biological monitoring program in humans to define the extent of mercury exposure in Rhode Island residents, particularly pregnant woman and fetuses, the most vulnerable population. There is virtually no risk to measuring the mercury content of blood drawn from the umbilical cord after the birth of a baby. This recommendation addresses the unacceptable fact that without this data, the extent of mercury exposure to Rhode Island citizens is unknown.

Current data on mercury levels in humans are limited and only estimate the extent of current mercury contamination and do not provide an adequate basis for identifying how levels change over time. Data on the levels of mercury in humans are essential to evaluating the effectiveness of mercury reduction efforts.

H8639 Mercury-Added Parts in Motor Vehicles

Recommendation: Establish a disposal ban and collection requirement for mercury switches at vehicle end of life. The Rhode Island General Assembly should amend the Mercury Reduction and Education Act (RIGL 23-24.9) to establish a disposal ban and collection requirements for auto switches containing mercury. The collection requirement should establish performance criteria for the amount of mercury to be collected by the auto manufacturers on an annual basis. The legislation should specify that, if the capture rates are not met in a timely fashion, RI DEM shall adopt regulations to establish a manufacturer funded collection program.

In developing their plan to meet collection performance criteria, the auto manufacturers should note the wide range of opportunities to collect mercury components from both vehicles still in-use as well as at the end of the vehicle's use. The plan could include replacing switches at dealerships or safety/emissions inspections, fleet cleanings, as well as collection of switches by auto recyclers and scrap recyclers.

We recommend establishing 43 lbs. as the target for the first two years and then require the Department of Environmental Management to set the target by for years thereafter. This target is reasonable based on our analysis of the magnitude of the problem of mercury in auto parts in Rhode Island, and setting this specific target for the first two years would avoid an unnecessary delay in implementing the legislation

The subgroup recommends the following changes to the Mercury Reduction and Education Act regarding the collection of mercury-added products:

To this end, the Commission recommends the following changes to the Mercury Reduction and Education Act regarding the collection of mercury-added products:

23-24.9-9 Disposal ban. – (a) After July 1, 2005, no person shall dispose of mercury-added products in a manner other than by recycling or disposal as hazardous waste. Mercury from mercury-added products may not be discharged to water, wastewater treatment, and wastewater disposal systems except when it is done in compliance with local, state, and federal applicable requirements.

(b) If a formulated mercury-added product is a cosmetic or pharmaceutical product subject to the regulatory requirements relating to mercury of the federal food and drug administration, then the product is exempt from the requirements of this section.

(c) This section shall not apply to: (1) anyone who disposes of a mercury-added button cell battery; or (2) ~~mercury-added components as contained in motor vehicles; and (3)~~ households disposing of lamps and products containing lamps.

(d) This section shall not apply to mercury-added components as contained in motor vehicles unless the Department promulgates regulations in accordance with 23-24.9-10 (e).

23-24.9-10 Collection of mercury-added products. (a) After July 1, 2005, no mercury-added product shall be offered for final sale or use or distribution for promotional purposes in Rhode Island unless the manufacturer either on its own or in concert with other persons has submitted a plan for a convenient and accessible collection system for such products when the consumer is finished with them and the plan has received approval of the director. Where a mercury-added product is a component of another product, the collection system must provide for removal and collection of the mercury-added component or collection of both the mercury-added component and the product containing it.

(b) This section shall not apply to the collection of mercury-added button cell batteries or mercury-added lamps or products where the only mercury contained in the product comes from a mercury-added button cell battery or a mercury-added lamp; and
~~(2) This section shall not apply to motor vehicles.~~
(2) Manufacturers of motor vehicles sold in Rhode Island that contain mercury switches shall, individually or collectively, establish and implement a collection program for mercury switches as follows:

a) In accordance with 23-24.9-9, the program shall be developed to meet the goal of collecting and recycling no less than 43 pounds of mercury from switches removed from motor vehicles per year for the calendar years 2006 and 2007. For following years, the Department shall review the goal and establish target collection rates for the program.

b) By September 1, 2005, submit a plan outlining the proposed collection program to the Department. At a minimum, the plan must:

i) Explain how the goal is anticipated to be met through implementation of the plan
ii) Ensure that mercury switches collected are managed in accordance with the universal waste rules adopted by the Department;
iii) Provide the department and persons who remove motor vehicle components under this section with information, training and other technical assistance required to facilitate removal and recycling of the components in accordance with the universal waste rules;
iv) Make available to the public information concerning services to remove mercury light switches in motor vehicles

c) Implement said plan, with any adjustments or recommendations provided by the Department, by January 1, 2006.

d) Provide quarterly reports to the Department beginning March 31, 2006 on the number of switches collected and the amount of mercury collected and recycled through the program.

e) In the event that collections do not meet the goals of the program in any calendar year, the Department shall develop and implement regulations within six months compelling the manufacturers of motor vehicles sold in Rhode Island to undertake an alternative collection program. The total cost of the removal, replacement, collection, and recovery system for mercury switches shall be borne by the manufacturer or manufacturers. Costs shall include, but not be limited to the following: (1) labor to remove, or replace where possible, mercury switches. Labor shall be reimbursed at the prevailing rate auto manufacturers use to reimburse automotive dealers for replacing faulty switches under the manufacturer-dealer warranty program; (2) training; (3) packaging in which to transport mercury switches to recycling, storage or disposal facilities; (4) shipping of mercury switches to recycling, storage or disposal facilities; (5) recycling, storage or disposal of the mercury switches; (6) public education materials and presentations; and (7) maintenance of all appropriate systems and procedures to protect the environment from mercury contamination.

Recommendation: Develop an education and training program regarding mercury removal.

A thorough education and training program would have the following objectives:

- Train management of recovery facilities as to their company's responsibility for removing mercury switches and cooperating in the program
- Provide hands-on training for employees removing and handling the switches.

The following aspects of Mercury Recovery should be included in any training program:

- Responsibility
- Identification
- Safety

- Removal/Handling
- Record Keeping
- Storage
- Cleaning Up Mercury Spills
- First Aid Measures
- Transportation

An effective program would make use of existing resources from states and agencies that have already developed materials including those available in New York (Appendix 6) and Maine. Specific funding will need to be available to implement an outreach and education program.

Recommendation: Develop Rhode Island Auto Mercury Pollution Prevention Awards Program. A wide variety of Rhode Island businesses, industries, organizations, and non-profits play a key role in protecting Rhode Island's environment. This is especially true when it comes to removing mercury (e.g. switches and other mercury components) from automobiles before final disposal (e.g. dismantled and shredded). Some companies and organizations are already making an effort to remove mercury from cars – but more can be done to help eliminate mercury releases from end-of-life vehicles (ELVs).

In an effort to encourage greater participation in mercury reduction and elimination programs by RI businesses which handle ELVs, Rhode Island should consider creating an annual awards program for businesses, institutions, government agencies, or individuals who have made significant strides in the field of reducing mercury pollution from vehicles. Award recipients will have demonstrated a commitment to the environment and the health and public safety of Rhode Island residents.

Any person, company, or organization in the state may apply for the award or be nominated. This includes business and industry, educational institutions, local governments, state and federal agencies and public utilities. Work must have been done in the State of Rhode Island and may not have been completed more than one year prior to the nomination, although the work may have spanned any number of years.

Winning projects should have achieved significant and practical reductions in the use, release or generation of mercury intended for use in vehicles – including product development, improvements in process or procedure, substitution of different materials for mercury in vehicles, technological modifications, or improved management practices.

Recommendation: Any of the above changes to current Rhode Island law should maintain an enforcement mechanism consistent with the Mercury Reduction and Education Act (RIGL 23-24.9-16). The current law requires that a violation of any of the provisions of this law or any rule or regulation promulgated pursuant thereto shall be punishable, in the case of a first violation, by a civil penalty not to exceed one thousand dollars ($1,000). In the case of a second and any further violations, the liability shall be for a civil penalty not to exceed five thousand dollars ($5,000) for each violation.

Recommendation: In the event that a national program is developed to address collection of mercury from auto parts, the Department of Environmental Management may adopt the national program provided that it is consistent with the purposes and policies of current law.

Recommendation: Encourage auto manufacturers to develop both in-use and end-of-life vehicle collection programs. In developing their plan to meet collection performance criteria, the auto manufacturers should note the wide range of opportunities to collect mercury components from both vehicles still in-use as well as at the end of the vehicle's use. The plan could include replacing switches at dealerships or safety/emissions inspections, fleet cleanings, as well as collection of switches by auto recyclers and scrappers.

H7527 Electronic Waste

Background

In June 2004, the Rhode Island House of Representatives passed a resolution urging the Mercury Reduction Oversight Commission to develop a plan to address the collection and recycling of electronic waste in a manner that is convenient and minimizes costs to taxpayers and to consumers of electronic products. The resolution requested that the commission develop a recommended plan that uses producer responsibility for the collection and recycling of electronic waste and submit the plan and any necessary legislation to implement the plan to the general assembly no later than January 30, 2005.

As the resolution notes, computers, cell phones and other electronic products contain mercury as well as lead, chromium, cadmium, polyvinyl chloride, mixed plastics, beryllium, brominated flame retardants and other hazardous substances, and therefore pose a threat to human health and the environment if improperly disposed of at the end of their useful life.

While there is no state or federal law prohibiting disposal of residential toxic electronic waste in landfills, Rhode Island Resource Recovery Corporation (RIRRC) offers Rhode Island residents free recycling for their home computer equipment and cellular phones. Residents can recycle their computers, monitors, mouse pointers, hard drives, modems, scanners, laptops, printers, cellular phones and all other related equipment at Resource Recovery's facility in Johnston or at a scheduled satellite collection. Televisions are accepted at the Johnston location only for a fee of $5.00 each.

RIRRC's computer recycling program is strictly for Rhode Island residents' home computers and cellular phones. Businesses with a small amount of computer equipment to recycle (fewer than 15 complete systems) may do so by appointment at RIRRC for a fee of $0.20 per pound. Businesses with a large amount of material to recycle are directed to commercial recyclers.

In 2004, RIRRC has recovered and recycled 343,000 lbs. of electronic waste and 1,125 televisions. It is presumed that, because residential recyclers are self-selective as are all non-mandatory recyclers, RIRRC's collection program is only accounting for the tip of the iceberg of electronic waste in Rhode Island. Presuming that the state bans the disposal of electronic waste in a way other than as recycling or hazardous waste, it is estimated that over 4 million computers and televisions will become trash within seven years. The cost for recycling 95% of this waste would be $42 million. It would be difficult and expensive for RIRRC to maintain this unsubsidized level of effort to handle this waste.

Besides RIRRC's collection programs, RI DEM has been involved with various interstate organizations on the development of an approach for recycling electronics waste. Rhode Island is a member of the Northeast Recycling Coalition (NERC) and the Product Stewardship Institute (PSI). Both of these organizations have ongoing efforts on electronics and RI DEM is becoming much more actively engaged in those dialogs. Regionally, the office supply company Staples undertook a pilot program using their retail stores as a network for collection and recycling of electronics waste. Rhode Island was part of that pilot and the preliminary results of the effort are currently under review. On the national level, RI DEM has been evaluating becoming a partner with EPA under the Resource Conservation Challenge (RCC). This national effort promotes product stewardship through collaborative partnerships with stakeholders. Under the RCC, EPA's e-Cycling initiative led to the recycling of 26.4 million pounds of waste electronics in 2003.

Internationally, the European Union has developed a model to address these problems. In 2002, the European Union passed a suite of regulations requiring electronics manufacturers to take back and recycle their products, and to phase out the use of toxic materials for some products. In August 2005, manufacturers will be individually financially responsible for their products marketed after that date, and collectively responsible for products sold prior to that date. By July 2006, manufacturers must eliminate mercury in certain products and five other toxic elements from electronic equipment.

Recommended Policy

As a matter of consistency, since Rhode Island has decided that mercury products should be banned from disposal and the manufacturers of toxic products containing mercury should be required to develop and finance collection plans for proper recycling of these products, electronic waste should be handled in a similar manner. Many electronic devices contain mercury and are already covered by the Mercury Reduction and Education Act.

The Commission agrees with the House resolution that a system of producer responsibility for the collection and recycling of covered electronic devices is the most effective and equitable means of keeping this toxic waste out of the landfill, alleviating the full financial and physical burden placed on the state and municipal governments for handling e-waste, while also providing a powerful incentive for manufacturers to reduce toxins and redesign products for recycling. Additionally, that producers of electronic devices and components should have the flexibility to act in partnership with each other, with state, municipal and regional governments and with businesses that provide collection and handling services to develop, implement and promote a safe and effective electronics recycling system for the state. RI DEM and RIRRC should remain actively engaged with interstate, regional and national efforts on electronics waste to develop an efficient and effective program for Rhode Island.

The Commission recommends that toxic electronic waste should be banned from disposal other than as recycling or hazardous waste. Further, regulations should be established to develop requirements for environmentally sound recycling including verifiable performance standards for electronics recyclers, reporting and penalties for violations, worker health and safety and other criteria, to ensure that materials are managed in an environmentally superior manner.

The Commission further recommends that, similar to the recommendation to adopt performance standards for the collection of mercury in auto parts, the state should adopt standards for manufacturers regarding the collection of electronic waste. The collection plans should encourage re-use of functional electronic waste before processing for recycling. Lastly, the Commission recommends legislation to follow the European Union’s lead and phase out specific hazardous materials from the manufacture of electronic equipment, including but not limited to lead, mercury, polyvinyl chloride, and brominated flame-retardants. RI DEM and RIRRC should closely evaluate the collection programs developed for mercury-added products to determine if that model, and the lessons learned, can be applied to the electronics waste stream.

CHAPTER 23-24.9
RI Mercury Reduction and Education Act
(Adopted in 2001 and amended by RI General Assembly in 2003)

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§ 23-24.9-1 Short title. – This chapter shall be known as the "Mercury Reduction and Education Act."

§ 23-24.9-2 Findings. – The general assembly has found and hereby declares that:
(1) Mercury is a persistent and toxic pollutant that bioaccumulates in the environment;
(2) Mercury deposition has proven to be a significant problem in the northeastern United States;
(3) Consumption of mercury-contaminated freshwater fish poses a significant public health threat to the residents of Rhode Island;
(4) In order to address these real threats to public health and the environment, the state has been and should continue to actively cooperate with other states in the region to help minimize harm resulting from mercury in food, soil, air and water; and
(5) The intent of this chapter is to achieve significant reductions in environmental mercury by encouraging the establishment of effective waste reduction, recycling, management and education programs.

§ 23-24.9-2.1 Oversight and systems planning. – (a) The general assembly further finds:
(1) That reduction and elimination of health and environmental threats from mercury is a highly complex undertaking requiring cooperation among policy makers, public health and environmental officials and advocates, private businesses from diverse industries and sectors, consumers, and the general public within Rhode Island and depending on actions in other states and at the federal level;

(2) That systems planning is critical to the smooth, effective, and efficient implementation of programs to reduce and eliminate health and environmental threats from mercury in Rhode Island;
(3) That the implementation of the provisions of this chapter between July 2001 and July 2003 has been incomplete and partial and has given rise to unintended consequences; and
(4) That additional time is required to study how to make the provisions of this chapter more efficient and effective and to provide for needed systems planning.
(b) There is hereby created a fourteen (14) member commission on oversight and planning for mercury hazard reduction and elimination with the following membership: nine (9) members to be appointed by the governor; four (4) representatives of private business; one of whom shall be an engineer with expertise in manufacturing processes and pollution prevention; one of whom shall be an expert on the effects of mercury on public health and/or the environment; one of whom shall be a representative of consumer interests, and two (2) of whom shall be representatives of advocacy organizations, and five (5) of whom shall be ex officio, voting members: the director of the department of environmental management, the director of the department of health, the executive of the Rhode Island economic development corporation, the executive director of the Rhode Island resource recovery corporation, and the executive director of the Rhode Island League of Cities and Towns. The ex-officio members may designate an alternate in writing who shall have voting privileges. The members of the commission shall not receive compensation services. From the membership of the commission, the Governor shall designate a chairperson.
(2) The purposes of the commission shall be to study the system for reducing and eliminating mercury hazards in Rhode Island, including, but not limited to:
(A) Identifying current and projected sources of mercury hazards;
(B) Evaluating programs and efforts to reduce the sources in a cost-effective and efficient manner that does not place Rhode Island at a disadvantage with other states;
(C) Building on effective efforts in other states and achieving a consistency with other states in terms of approach and timing of implementation; and
(D) Determining the availability and effectiveness to consumers and the public of programs, facilities for disposal and recycling mercury-added products, and education about mercury-added products and mercury hazards. On or before March 1, 2004, and on or before September 1, 2004, the commission shall present to the governor, the speaker of the house of representatives, and the president of the senate an interim progress report informing them of the scope and progress of the commission's work, to date. The commission shall report its findings and recommendations to the governor, the speaker of the house, and the president of the senate by January 1, 2005, which recommendation shall include such proposals as the commission deems necessary or appropriate for amendments to this chapter.
(3) The commission shall meet at the call of the chair, and shall have the power to adopt bylaws for its organization and appoint such officers and committees as it deems appropriate.
(4) All departments and agencies of the state shall furnish such advice and information, documentary or otherwise, and such support and assistance as the commission deems necessary or desirable. The director of administration shall arrange meeting space for and organizational support to the commission.
(5) The commission shall terminate effective July 1, 2005.
(c) In order to provide time for the commission to complete its work, for planning and implementing such changes to programs as may be proposed, and for enacting such changes as may be desirable, that effective dates for implementing the provisions of this chapter pertaining to phase-outs and exemptions (§ 23-24.9-7), labeling (§ 23-24.9-8), disposal bans (§ 23-24.9-9), collection of mercury-added products (§ 23-24.9-10), disclosure (§ 23-24.9-11), and violations (§ 23-24.9-16) shall be July 1, 2005, unless a later date is provided for in the section, and no actions to enforce said provisions may be undertaken until July 1, 2005, or after, provided, however that voluntary use of the provisions shall be facilitated and allowed.

§ 23-24.9-3 Definitions. – For the purpose of this chapter:

(1) "Component" means a mercury-added product which is incorporated into another product to form a fabricated mercury-added product, including, but not limited to, electrical switches and lamps.
(2) "Department" means the department of environmental management.
(3) "Director" means the director of the department of environmental management or any subordinate or subordinates to whom the director has delegated the powers and duties vested in him or her by this chapter.
(4) "Fabricated mercury-added product" means a product that consists of a combination of individual components that combine to make a single unit, including, but not limited to, mercury-added measuring devices, lamps and switches to which mercury or a mercury compound is intentionally added in order to provide a specific characteristic, appearance, or quality, or to perform a specific function or for any other reason.
(5) "Formulated mercury-added product" means a product that includes, but is not limited to, laboratory chemicals, cleaning products, cosmetics, pharmaceuticals and coating materials that are sold as a consistent mixture of chemicals to which mercury or a mercury compound is intentionally added in order to provide a specific characteristic, appearance, or quality, or to perform a specific function or for any other reason.
(6) "Healthcare facility" means any hospital, nursing home, extended care facility, long-term care facility, clinical or medical laboratory, state or private health or mental institution, clinic, physician's office or health maintenance organization.
(7) "Manufacturer" means any person, firm, association, partnership, corporation, governmental entity, organization, combination or joint venture that produces a mercury-added product or an importer or domestic distributor of a mercury-added product produced in a foreign country. In the case of a multi-component mercury-added product, the manufacturer is the last manufacturer to produce or assemble the product. If the multi-component product is produced in a foreign country, the manufacturer is the importer or domestic distributor.
(8) "Mercury-added button cell battery" means a button cell battery to which the manufacturer intentionally introduces mercury for the operation of the battery.
(9) "Mercury-added novelty" means a mercury-added product intended mainly for personal or household enjoyment or adornment. Mercury-added novelties include, but are not limited to, items intended for use as figurines, adornments, toys, games, cards, ornaments, yard statues and figures, candles, jewelry, holiday decorations, items of apparel (including footwear), or similar products.
(10) "Mercury-added product" means a product, commodity, chemical or a product with a component that contains mercury or a mercury compound intentionally added to the product, commodity, chemical or component in order to provide a specific characteristic, appearance, or quality, or to perform a specific function or for any other reason. These products include formulated mercury-added products and fabricated mercury-added products.
(11) "Mercury fever thermometer" means a mercury-added product that is used for measuring body temperature.

§ 23-24.9-4 Interstate clearinghouse. – The department is authorized to participate in the establishment and implementation of a regional, multi-state clearinghouse to assist in carrying out the requirements of this chapter and to help coordinate reviews of the manufacturers' notifications regarding mercury-added products, applications for phase-out exemptions, the collection system plans, the disclosures of mercury content for products defined in § 23-24.9-3, applications for alternative labeling/notification systems, education and outreach activities, and any other related functions. The clearinghouse may also maintain a list of all mercury added products; a file on all exemptions granted by the state; a file of all the manufacturers' reports on the effectiveness of their collection systems; and a file of the certificates of analysis for mercury-added products used by healthcare facilities as defined in § 23-24.9-11.

§ 23-24.9-5 Notification. – (a) No later than January 1, 2002, no mercury-added product shall be offered for final sale or use or distributed for promotional purposes in Rhode Island without

prior notification in writing by the manufacturer of the product, or its industry trade group, to the director in accordance with the requirements of this section. Such notification shall at a minimum include: (1) a brief description of the product to be offered for sale, use, or distribution; (2) the amount of and purpose for mercury in each unit of the product; (3) the total amount of mercury contained in all products manufactured by the manufacturer; and (4) the name and address of the manufacturer, and the name, address and phone number of a contact.
(b) Any mercury-added product for which federal law governs notice in a manner that preempts state authority shall be exempt from the requirements of this section.
(c) With the approval of the director, the manufacturer may supply the information required in subsection (a) of this section for a product category rather than an individual product. The manufacturer shall update and revise the information in the notification whenever there is significant change in the information or when requested by the director. The director may define and adopt specific requirements for the content and submission of the required notification.
(d) A fabricated mercury-added product manufacturer is not required to provide mercury content information on its mercury-added component if the component manufacturer has provided the information to the department and if the fabricated mercury-added product manufacturer notifies the department of the specific components used in the fabricated mercury-added product.

§ 23-24.9-6 Restrictions on the sale of certain mercury-added products. – (a) No later than January 1, 2003, no mercury-added novelty shall be offered for final sale or use or distributed for promotional purposes in Rhode Island. Manufacturers that produce and sell mercury-added novelties must notify retailers about the provisions of this product ban and how to dispose of the remaining inventory properly. The requirements of this section shall apply to all mercury-added novelties irrespective of whether or not the product is exempt from the phase-out requirements of § 23-24.9-11.
(b) No mercury fever thermometer may be distributed, sold or offered for sale in this state on or after January 1, 2002, except by prescription. As used in this section, the term "mercury fever thermometer" includes any device containing mercury in which the mercury is used to measure the internal body temperature of a person. This restriction shall not apply to digital thermometers utilizing mercury-added button cell batteries. The manufacturers of mercury fever thermometers shall supply clear instructions on the careful handling of the thermometer to avoid breakage and proper cleanup should a breakage occur with all mercury fever thermometers sold through prescription. Mercury fever thermometers manufacturers must also comply with §§ 23-24.9-5 and 23-24.9-7 – 23-24.9-10.
(c) After January 1, 2003, no school in Rhode Island may use or purchase for use in a primary or secondary classroom, bulk elemental or chemical mercury, or mercury compounds. Manufacturers that produce and sell such materials must notify retailers about the provisions of this ban and how to dispose of the remaining inventory properly. Other mercury-added products that are used by schools are not subject to this prohibition.
(d) This ban on sale, use or distribution shall not apply to a novelty incorporating one or more mercury-added button cell batteries as its only mercury-added component or components.

§ 23-24.9-7 Phase-out and exemptions. – (a) No mercury-added product shall be offered for final sale or use or distributed for promotional purposes in Rhode Island if the mercury content of the product exceeds:
(1) One gram (1000 milligrams) for mercury-added fabricated products or two hundred fifty (250) parts per million (ppm) for mercury-added formulated products, effective July 1, 2005;
(2) One hundred (100) milligrams for mercury-added fabricated products or fifty (50) parts per million (ppm) for mercury-added formulated products, effective July 1, 2007; and
(3) Ten (10) milligrams for mercury-added fabricated products or ten (10) parts per million (ppm) for mercury-added formulated products, effective July 1, 2009.
(b) For a product that contains one or more mercury-added products as a component, this section is applicable to each component part or parts and not to the entire product. For example, if an iron has a mercury switch, the phase-out applies to the switch and not the entire iron.

(c) For a product that contains more than one mercury-added product as a component, the phase-out limits specified in subsection (a) of this section apply to each component and not the sum of the mercury in all of the components. For example, for a car that contains mercury-added switches and lighting, the phase-out limits would apply to each component separately, and not the combined total of mercury in all of the components.
(d) Fluorescent lamps shall be exempt from the requirements of subsection (a) of this section. As of January 1, 2010, the mercury content of fluorescent bulbs shall either not exceed ten (10) milligrams or the manufacturer shall comply with the exemption requirements pursuant to subsection (f) of this section.
(2) Specialized lighting used in the entertainment industry, such as metal halide lights, shall be exempted from the requirements of § 23-24.9-7(a).
(e) A mercury-added product shall be exempt from the limits on total mercury content set forth in subsection (f) of this section if the level of mercury or mercury compounds contained in the product are required in order to comply with federal or state health or safety requirements. In order to claim exemption under this section, the manufacturer must notify the department, in writing, and provide the legal justification for the claim of exemption.
(f) Manufacturers of a mercury-added product may apply to the director for an exemption for no more than two (2) years from the limits on total mercury content set forth in subsection (a) of this section for a product or category of products. Applications for exemptions must: (1) document the basis for the requested exemption or renewal of exemption; (2) describe how the manufacturer will ensure that a system exists for the proper collection, transportation and processing of the product(s) at the end of their useful life; and (3) document the readiness of all necessary parties to perform as intended in the planned system.
(g) The director may grant, with modifications or conditions, an exemption for a product or category of products if he or she finds: (i) a system exists for the proper collection, transportation and processing of the mercury-added product, including direct return of a waste product to the manufacturer, an industry or trade group supported collection and recycling system, or other similar private or public sector efforts; and (ii) he or she finds each of the following criteria are met:
(1) Use of the product is beneficial to the environment or protective of public health or protective of public safety; and
(2) There is no technically feasible alternative to the use of mercury in the product; and
(3) There is no comparable non-mercury-added product available at reasonable cost.
Prior to issuing an exemption, the director shall consult with neighboring states and provinces and regional organizations to promote consistency. The state shall avoid, to the extent feasible, inconsistencies in the implementation of this section. Upon reapplication by the manufacturer and findings by the director of continued eligibility under the criteria of this subsection and of compliance by the manufacturer with the conditions of the director's original approval, an exemption may be renewed one or more times and each renewal may be for a period of no longer than two (2) years.

§ 23-24.9-8 Labeling required for certain products. – *(a) Mercury-added products.* (1) Effective July 1, 2005, a manufacturer may not sell at retail in this state or to a retailer in this state, and a retailer may not knowingly sell, a mercury-added product unless the item is labeled pursuant to this subsection. The label must clearly inform the purchaser or consumer that mercury is present in the item and that the item may not be disposed of or placed in waste stream destined for disposal until the mercury is removed or reused, recycled or otherwise managed to ensure that it does not become part of solid waste or wastewater. Manufacturers shall affix to mercury-added products labels that conform to the requirements of this subsection.
(2) The department shall adopt rules to establish standards for affixing labels to the product and product package. The rules must strive for consistency with labeling programs in other states and provide for approval of alternative compliance plans by the department. This subsection does not apply to mercury-added lamps, mercury-added button cell batteries and products whose only mercury component is a mercury button cell battery or a mercury added lamp.

(b) Mercury-added lamps: large use applications. (1) A person who sells mercury-added lamps to the owner or manager of an industrial, commercial or office building or to any person who replaces or removes from service outdoor lamps that contain mercury shall clearly inform the purchaser in writing on the invoice for the lamps or in a separate document that the lamps contain mercury, a hazardous substance that is regulated by federal and state law, and that they may not be placed in solid waste destined for disposal. Retail establishments that incidentally sell mercury-added lamps to the specified purchasers are exempt from the requirements of this subsection.
(2) A person who contracts with the owner or manager of an industrial, commercial or office building or with a person responsible for outdoor lighting to remove from service mercury-added lamps shall clearly inform in writing the person for whom the work is being done that the lamps being removed from service contain mercury and what the contractor's arrangements are for the management of the mercury in the removed lamps.

§ 23-24.9-9 Disposal ban. – (a) After July 1, 2005, no person shall dispose of mercury-added products in a manner other than by recycling or disposal as hazardous waste. Mercury from mercury-added products may not be discharged to water, wastewater treatment, and wastewater disposal systems except when it is done in compliance with local, state, and federal applicable requirements.
(b) If a formulated mercury-added product is a cosmetic or pharmaceutical product subject to the regulatory requirements relating to mercury of the federal food and drug administration, then the product is exempt from the requirements of this section.
(c) This section shall not apply to: (1) anyone who disposes of a mercury-added button cell battery; (2) mercury-added components as contained in motor vehicles; and (3) households disposing of lamps and products containing lamps.

§ 23-24.9-10 Collection of mercury-added products. – (a) After July 1, 2005, no mercury-added product shall be offered for final sale or use or distribution for promotional purposes in Rhode Island unless the manufacturer either on its own or in concert with other persons has submitted a plan for a convenient and accessible collection system for such products when the consumer is finished with them and the plan has received approval of the director. Where a mercury-added product is a component of another product, the collection system must provide for removal and collection of the mercury-added component or collection of both the mercury-added component and the product containing it.
(b) This section shall not apply to the collection of mercury-added button cell batteries or mercury-added lamps or products where the only mercury contained in the product comes from a mercury-added button cell battery or a mercury-added lamp; and
(2) This section shall not apply to motor vehicles.

§ 23-24.9-11 Disclosure for mercury-added formulated products – Healthcare facilities. – (a) By July 1, 2005, the manufacturers of formulated mercury-added products offered for sale or use to a health care facility in Rhode Island must provide both the director and the recipient healthcare facility a certificate of analysis documenting the mercury content of the product, down to a one part per billion level. Such formulated mercury-added products include, but are not limited to: acids; alkalis; bleach (sodium hypochlorite); materials used for cleaning, in maintenance, or for disinfection; stains; reagents; preservatives; fixatives; buffers; and dyes.
(b) The certificate of analysis must report the result of an analysis performed for mercury on the specific batch or lot of that product offered for sale. The batch or lot number of the product shall be clearly identified on the product and on the certificate of analysis.

§ 23-24.9-12 Limitations on the use of elemental mercury. – After January 1, 2003, no person may sell or provide elemental mercury to another person in Rhode Island, except for manufacturing or recycling or disposal purposes, without providing a material safety data sheet, as defined in the United States Code, title 42, section 11049 [42 U.S.C. § 1109], and requiring the purchaser or recipient to sign a statement that the purchaser: (1) will use the mercury only

for medical, dental amalgam dispose-caps, research, or manufacturing purposes; (2) understands that mercury is toxic and that the purchaser will store and use it appropriately so that no person is exposed to the mercury; and (3) will not place or allow anyone under the purchaser's control to place or cause to be placed the mercury in solid waste for disposal or in a wastewater treatment and disposal system.

§ 23-24.9-13 Existing inventories. – Those mercury-added products with a code or date of manufacture indicating they were manufactured prior to July 13, 2001 are exempt from § 23-24.9-6 – 23-24.9-8 and §§ 23-24.9-10 and 23-24.9-11. If the mercury-added product has a date of manufacture or the manufacturer can provide documentation that the product in question was manufactured prior to July 13, 2001, it is exempt from the above listed sections. Situations that are beyond the control of the manufacturer, such as old stock being held by retailers, should be addressed on a case-by-case basis.

§ 23-24.9-14 Public education and outreach. – (a) The director shall coordinate the development of a public education, outreach, and assistance program for households, hazardous waste generators, local and regional solid waste management agencies, small businesses, health care facilities, scrap metal facilities, dismantlers, institutions, schools, and other interested groups in concert with other relevant state agencies. This public education, outreach, and assistance program should focus on the hazards of mercury; the requirements and obligations of individuals, manufacturers, and agencies under this law; and voluntary efforts that individuals, institutions, and businesses can undertake to help further reduce mercury in the environment.
(b) The director shall cooperate with the neighboring states and provinces and regional organizations in the northeastern U.S. and Canada on developing outreach, assistance, and education programs, where appropriate.

§ 23-24.9-15 State procurement preferences for low or nonmercury-added products. – (a) Notwithstanding other policies and guidelines for the procurement of equipment, supplies, and other products, the Rhode Island department of administration shall by January 1, 2003, revise its policies, rules and procedures to implement the purposes of this chapter.
(b) The Rhode Island department of administration shall give priority and preference to the purchase of equipment, supplies, and other products that do not contain mercury-added compounds or components, unless there is no economically feasible nonmercury-added alternative that performs a similar function. In circumstances where a nonmercury-added product is not available, preference shall be given to the purchase of products that contain the least amount of mercury-added to the product necessary for the required performance.
(c) State dental insurance contracts negotiated after January 1, 2003, shall provide coverage for non-mercury fillings at no additional expense to the state employee.

§ 23-24.9-16 Violations. – Effective July 1, 2005, a violation of any of the provisions of this law or any rule or regulation promulgated pursuant thereto shall be punishable, in the case of a first violation, by a civil penalty not to exceed one thousand dollars ($1,000). In the case of a second and any further violations, the liability shall be for a civil penalty not to exceed five thousand dollars ($5,000) for each violation.

§ 23-24.9-17 State review. – The department shall, in consultation with the conference of New England Governors/Eastern Canadian Premiers Environment Committee and/or an interstate mercury clearinghouse should one be developed, coordinate a review of the effectiveness of this chapter no later than January 1, 2006, and shall provide a report based upon that review to the governor and general assembly. The report shall review the effectiveness of the programs as established under the chapter and contain recommendations for improving them. As part of this review, the department shall evaluate the effectiveness of the collection systems established under this chapter and determine whether additional state authority or targeted capture rates are needed to improve those systems. In addition to this review process, the department shall

evaluate the need for additional incentives for manufacturers of mercury-added products that are below ten (10) milligrams to reduce the amount of mercury in those products.

§ 23-24.9-18 Application to products regulated by Food and Drug Administration (FDA). – Nothing in this chapter shall apply to prescription drugs regulated by the Food and Drug Administration under the Federal Food, Drug and Cosmetic Act, 21 U.S.C. § 301 et. seq., to biological products regulated by the Food and Drug Administration under the Public Health Service Act, 42 U.S.C. § 262 et. seq., or to any substance that may be lawfully sold over the counter without a prescription under the Federal Food, Drug and Cosmetic Act, 21 U.S.C. § 301 et. seq.

§ 23-24.9-19 Mercury advisory working group. – The department of environmental management shall be authorized to coordinate the development of a mercury reduction and education advisory working group to advise the department with regard to the development of regulations and programs for the implementation of the provisions of this chapter and with regard to public education pertaining to the continued elimination of mercury-added products in the State of Rhode Island. This advisory working group may include, but not be limited to, designees from the following: the general assembly, department of environmental management, department of health, the attorney general's office, state and/or national organizations interested in mercury reduction and education, consumer and children's advocacy groups, local chambers of commerce, and those industries that manufacture consumer products which contain mercury.

§ 23-24.9-20 Regulations. – The department shall promulgate rules and regulations as may be necessary to implement and carry out the provisions of this chapter.

§ 23-24.9-21 Severability and construction. – The provisions of this chapter shall be severable, and if any court declares any phrase, clause, sentence, or provision of this chapter to be invalid, or its applicability of any government, agency, person, or circumstance is declared invalid, the remainder of the chapter and its relevant applicability shall not be affected. The provisions of this chapter shall be liberally construed to give effect to the purposes thereof.

H 8639 and S-3209

S T A T E O F R H O D E I S L A N D

IN GENERAL ASSEMBLY
JANUARY SESSION, A.D. 2004

RESPECTFULLY URGING THE MERCURY REDUCTION OVERSIGHT COMMISSION TO PREVENT MERCURY POLLUTION FROM AUTO PARTS

WHEREAS, The Mercury Reduction Oversight Commission has the mission to prevent human sources of mercury from contaminating the environment (air, water, soil); and
WHEREAS, The Mercury Reduction and Education Act passed by the General Assembly in 2001 has declared that mercury is a persistent and toxic pollutant that bioaccumulates in the environment, and mercury deposition has proven to be a significant problem in the northeastern United States; and
WHEREAS, The Mercury Reduction and Education Act prohibits the disposal of mercury-added products by means other than recycling or hazardous waste disposal as of July 2005; and
WHEREAS, Convenience light switches and other auto parts may contain mercury, and therefore pose a threat to human health and the environment if improperly disposed of at the end of their useful life; and WHEREAS, An estimated 890 pounds of mercury has been released from Rhode Island autos over the past 30 years and an equal amount could be released over the next two decades if action is not taken soon to recover the mercury from vehicles before they are scrapped; and
WHEREAS, The Mercury Reduction and Education Act exempts mercury-added components as contained in motor vehicles from the disposal ban (23-24.9-9) and collection plan (23-24.9-10); and
WHEREAS, The state currently has no system to address the need to collect mercury added to auto parts before they are incinerated or otherwise released into the environment; and
WHEREAS, Mercury from auto parts threatens the health of Rhode Islanders, and the Rhode Island Health Department warns young children and pregnant or nursing women not to eat any freshwater fish caught in Rhode Island due to mercury contamination; and
WHEREAS, The state of Maine has successfully implemented a mercury switch collection program which has withstood legal challenges and is effectively collecting mercury-added switches for recycling; and
WHEREAS, An effective mercury product recycling system must be convenient and 8minimize costs to taxpayers and to consumers; and
WHEREAS, Auto manufacturers should be responsible for ensuring proper handling, recycling and disposal of discarded products and that costs associated with consolidation, handling and recycling be internalized by the manufacturers; and
WHEREAS, A system of producer responsibility for the collection and recycling of mercury-added auto parts is the most effective and equitable means of keeping this toxic waste out of the waste stream and environment, while also providing and a powerful incentive for manufacturers to reduce toxins and re-design products for recycling; and
WHEREAS, Auto manufacturers should have the flexibility to act in partnership with each other, with state, municipal and regional governments and with businesses that provide collection and handling services to develop, implement and promote a safe and effective

recycling system for mercury-added auto parts; now, therefore be it
RESOLVED, That this House of Representatives of the State of Rhode Island and Providence Plantations hereby respectfully urges the Mercury Reduction Oversight Commission to develop a plan to address the collection and recycling of mercury added auto parts in a manner that is convenient and minimizes costs to taxpayers and consumers; and
RESOLVED, That this House of Representatives of the State of Rhode Island and Providence Plantations hereby respectfully urges the Mercury Reduction Oversight Commission to submit to the General Assembly no later than January 30, 2005 a recommended plan, including any legislation necessary to implement the plan, for the collection and recycling of mercury- added auto parts that utilizes producer responsibility; and be it further
RESOLVED, That the Secretary of State be and he hereby is authorized and directed to submit duly certified copies of this resolution to the Chair of the Mercury Reduction Oversight Commission, and all of the commission members.

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S T A T E O F R H O D E I S L A N D
IN GENERAL ASSEMBLY
JANUARY SESSION, A.D. 2004

H O U S E R E S O L U T I O N
RESPECTFULLY URGING THE MERCURY REDUCTION OVERSIGHT COMMISSION TO PREVENT MERCURY POLLUTION FROM ELECTRONIC WASTE

Introduced By: Representatives Handy, McNamara, Naughton, Cerra, and Long
Date Introduced: February 04, 2004
Referred To: House Health, Education & Welfare

WHEREAS, The Mercury Reduction Oversight Commission has the mission to prevent human sources of mercury from contaminating the environment (air, water, soil); and
WHEREAS, The Mercury Reduction and Education Act prohibits the disposal of mercury-added products by means other than recycling or hazardous waste disposal as of July 2005; and
WHEREAS, Computers, cell phones and other electronic products contain mercury as well as lead, chromium, cadmium, polyvinyl chloride, mixed plastics, beryllium, brominated flame retardants and other hazardous substances, and therefore pose a threat to human health and the environment if improperly disposed of at the end of their useful life; and
WHEREAS, Electronic waste (e-waste) is a significant and growing problem for governments that currently bear the burden of managing them; and
WHEREAS, According to the United States Environmental Protection Agency, in 1997 more than 3.2 million tons of e-waste ended up in landfills; and
WHEREAS, Discarded e-waste is the fastest growing portion of the United States waste stream; and
WHEREAS, The Central Landfill in Johnston, Rhode Island is the final resting place for Rhode Island's discarded e-waste and recycling it would conserve needed landfill capacity; and
WHEREAS, In Rhode Island, over 4 million computers, televisions, and monitors will become trash by 2011; and
WHEREAS, Costs for collecting and properly recycling 95% of this e-waste will cost Rhode Islanders an estimated $42 million from 2006 – 2011; and
WHEREAS, The full extent of the public health threat and environmental contamination resulting from electronic equipment entering the waste stream through disposal into landfills or incinerators is unknown, but it is estimated that seventy percent of the heavy metals in municipal landfills come from electronic discards; and
WHEREAS, An effective electronics recycling system must be convenient and minimize costs to taxpayers and to consumers of electronic products; and
WHEREAS, Producers of electronic products and components should be responsible for ensuring proper handling, recycling and disposal of discarded products and that costs associated with consolidation, handling and recycling be internalized by the manufacturers of electronic products and components before the point of purchase; and
WHEREAS, A system of producer responsibility for the collection and recycling of

covered electronic devices is the most effective and equitable means of keeping this toxic waste out of the landfill, alleviating the full financial and physical burden placed on the state and local governments for handling e-waste, while also providing a powerful incentive for manufacturers to reduce toxins and redesign products for recycling; and

WHEREAS, Producers of electronic devices and components should have the flexibility to act in partnership with each other, with state, municipal and regional governments and with businesses that provide collection and handling services to develop, implement and promote a safe and effective electronics recycling system for the state; now, therefore be it

RESOLVED, That this House of Representatives of the State of Rhode Island and Providence Plantations hereby respectfully urges the Mercury Reduction Oversight Commission to develop a plan to address the collection and recycling of electronic waste in a manner that is convenient and minimizes costs to taxpayers and to consumers of electronic products; and be it further

RESOLVED, That this House of Representatives of the State of Rhode Island and Providence Plantations hereby respectfully urges the Mercury Reduction Oversight Commission to submit to the general assembly no later than January 30, 2005 a recommended plan, including any legislation necessary to implement the plan, for the collection and recycling of electronic waste that utilizes producer responsibility; and be it further

RESOLVED, That the Secretary of State be and he hereby is authorized and directed to transmit duly certified copies of this resolution to the Chair of the Mercury Reduction Oversight Commission and all of the commission members.

EXPLANATION
BY THE LEGISLATIVE COUNCIL
OF
H O U S E R E S O L U T I O N
RESPECTFULLY URGING THE MERCURY REDUCTION OVERSIGHT COMMISSION TO PREVENT MERCURY POLLUTION FROM ELECTRONIC WASTE

***

This act would require that producers of electronic waste be financially and environmentally responsible for this waste and its disposal.

This act would take effect upon passage.

Commission Activities

The Commission's Meeting Rules and Meeting Calendar were established for 2004 and 2005. Meeting Agenda were posted in accordance with open meeting laws. Approved meeting minutes are filed with the RI Secretary of State and are posted on the Commission's website.

During each Commission meeting, there was discussion of the issues that centered on those provisions whose effective implementation dates were stayed in the amendment. These sections represent those in greatest dispute among interested parties. Progress was steady, but slowed by the delayed appointment of Commission members.

Commission Meeting Rules

Informal meeting environment; Chair will evoke Roberts Rules (current version) when necessary;

Quorum: simple majority of seven members plus the Chair;

Voting quorum: two-thirds of the members (eight members plus the Chair);

Distribute meeting minutes to the commission members electronically for comment and electronic approval. Approved meeting minutes will be posted on the RI Mercury Commission website: http://www.state.ri.us/dem/topics/mercury

Online repository for mercury-related information and commission-related activities

Process for posting any mercury-related information for the web page. Commission Members shall be allowed to participate via telephone, with permission of the Chair.

Commission Meetings

The Commission held meetings from May 14, 2004 through April 15, 2005. Meeting notices and minutes may be found at http://www.state.ri.us/dem/hgcomm/ . In addition to regular Commission meetings, small working groups met numerous times for purposes of drafting this final report.

The Motor Vehicle SubCommittee held meetings from August 2004 through March 2005. Meeting notices and minutes may be found at http://www.state.ri.us/dem/hgcomm/ .

Appendix E: Summary of SWANA Report

"The Effectiveness of Municipal Solid Waste Landfills in Controlling Releases of Heavy Metals to the Environment," Solid Waste Association of North America (SWANA) Applied Research Foundation (March 2004)

Heavy Metals in the Municipal Waste Stream

The SWANA report focused on the following metals: Arsenic, Barium, Cadmium, Chromium, Lead, Mercury, Selenium, and Silver.

Heavy Metals in Landfill Leachate

While metal concentrations have a wide range, on average concentration is "relatively low."

EPA leachate database shows mean concentrations of metals averaging less than 1 mg/liter.

Mean concentrations of metals in leachate database for non hazardous waste landfills are 10 or more times less than TCLP regulatory level. 90th percentile leachate values are all lower than TCLP regulatory levels.

EPA water quality standards for landfills as a point source concluded that neither national pretreatment or direct discharge limits of leachate were necessary.

EPA data shows subtitle D landfill median concentration was nondetectable at treatable levels for cadmium, lead, mercury and silver.

EPA leachate database shows metal concentrations are all less than 10 times their respective maximum contaminant level for allowable concentrations of groundwater. EPA regulations assume metal concentrations in leachate will be diluted and attenuated by a factor of 100 before reaching point of compliance.

Heavy Metals in Landfill Gas

Quantities of heavy metals in landfill gas are relatively low.

Same attenuating mechanisms limiting leaching also limit release of metals in gas. These are presence of sulfides, neutral pH and reducing conditions.

EPA did not establish standard for any heavy metal in its air pollution standards for landfills.

Relative amount of mercury in landfill gas is very low compared to other sources.

EPA mercury report estimates landfill gas at less than 0.1% of all sources; New Jersey estimates landfill gas represents 0.7% of all state emissions.

Effectiveness of Landfill Pollution Control Systems

Landfill liners have a half-life of 970 years and willl last through timeframe when the landfill generates a significant quantity of leachate.

>99% of leachate is collected and treated; Combustion of landfill gas converts methyl mercury to elemental mercury.

Appendix F: Summary of Mercury Programs

"Section 7a_Appendix B_D

The full text of ***Appendix F*** may be found at www.state.ri.us/dem/hgcomm/.

Using a spreadsheet format, the Appendix summarizes many programs across the U.S. relating to mercury in various product categories and applications, such as:

- Appliances
- Autos (scrap and salvage)
- Buildings
- Dental Amalgam
- Education
- Educational Institutions
- Farming
- Fluorescent Lamps
- Health Care
- Novelties
- Switches
- Thermometers
- Thermostats
- Universal Waste Laws

Further, ***Appendix F*** shows which organizations are involved in these programs, short descriptions of the various programs, a list of groups affected by these programs, and notations regarding similar Rhode Island programs, where applicable.

In addition to the description of mercury programs, ***Appendix F*** also includes descriptions of how and where mercury is used in some of the listed products and applications. Further, regarding products, ***Appendix F*** includes a list of some alternatives to mercury-containing products.

Program Grouping	Programs	Organization	Description	Who's affected	RI Program	Organization	Description
Appliances							
	Demanufacturing of Appliances in Union County	New Jersey Department of Environmental Protection/	Under this program, discarded appliances are dis-assembled and components containing heavy metals, including Cd, Pb, and Hg are removed.	Hospitals/Health Care Facilities, Manufacturing Facilities, Municipalities, Primary/Secondary Schools, Small Business, State/Federal Facilities, Universities/Colleges, Waste-to-Energy Facilities, White Goods	**Eco Depot programs**	RI Resource Recovery	Household hazardous waste program for reduction of landfilled material
					Town heavy rubbish collecitons	Metals Recycling	Accept and recycle white goods for reduction of trash and scrap metals
Autos/ Salvage/Scrap							
	Automobile Component Source Separation Plan	Maine Department of Environmental Protection	The Maine DEP is required to develop a source separation plan for mercury-added auto components by January 1, 2002. The plan will be developed in consultation with auto makers, dismantlers, and other interested parties and will address source reduction. An advisory group has been convened and is exploring opportunities to remove convenience light switches, both at vehicle end-of-life and earlier in the vehicle life cycle.	Scrap Metal / Auto Salvage	**Recommend language to establish a collection program**	RI Mercury Reduction Commission	Program to collect Hg over time at a target rate of 43lbs per year
	Automotive Mercury Switch Collection Project	Environmental Protection Agency - Region 2 (New York)	NYS DEC is conducting a mercury reduction project, focusing on the collection and recycling of mercury switches from the hoods and trunks of automobiles. The project will prevent an estimated 500 pounds of mercury from entering the Great Lakes Basin mostly from crushing and shredding operations at scrap and salvage yards. The automotive mercury switches will be voluntarily removed and collected from vehicles by scrap and salvage yards through participation at household hazardous waste collections and as a voluntary service provided by auto dealerships. The goal is to remove 250,000 switches from vehicles in the major population centers of New York State's portion of the Great Lakes	Scrap Metal / Auto Salvage			

	Best Management Practice Manual for Auto Salvage Yard Operators	New Hampshire Department of Environmental Services	**The DES has developed a Best Management Practice manual and training program for auto salvage yard operators, which includes information on methods on removal of mercury switches and proper recycling/disposal prior to vehicle crushing.**	Scrap Metal / Auto Salvage			
	ME Junkyards	Maine Dept. of Environmental Protection	The Maine Department of Environmental Protection (ME DEP) is undertaking a junkyard initiative in conjunction with the passage of a law requiring proper removal and reclamation of mercury switches from automobiles. The DEP is planning to: • organize trainings for auto salvage/junkyards • draft Best Management Practices for the handling of hazardous fluids • hold 10 “breakfast” training sessions for auto salvage/ junkyard operators	Scrap Metal / Auto Salvage			
	Michigan Mercury Automotive 'Switch Sweep' Program	Michigan Dept. of Environmental Quality and Alliance of Automobile Manufacturers	Michigan has become the first state in the courny to enter into a cooperative agreement with automobile manufacturers to offer a voluntary statewide collection program for the recovery of mercury automotive switches from end-of-life vehicles. The Michigan Department of Environmental Quality and the Alliance of Automobile Manufacturers (AAM) signed a Memorandum of Understanding on July 20, 2004, establishing this program. The voluntary program known as the Michigan Mercury Automotive 'Switch Sweep' Program, was rolled out August 1, 2004. Participants (dismantlers, recylcers, salvage yards and others) entering the program were provided with instructions, program logistics, storage buckets and/or mailers. After the mercury switches are removed, the AAM and/or their project manager will arrange for transport to one of the 'team approved' collection points. These points would likely be one or more of the existing Michigan Groundwater Stewardship Clean Sweep Program sites. The goal of the	Scrap Metal / Auto Salvage			
	Reduction and Recycling of Mercury Switches from the Automobile Sector in Ontario	Pollution Probe	manufacturing sector and the automobile recycling sector to look at ways to reduce and recycle mercury-containing switches.	Manufacturing Facilities, Scrap Metal / Auto Salvage			

	Mercury Steel Mill Virtual Elimination Initiative	Indiana Department of Environmental Management	Three major Indiana Steel Mills came together with USEPA, IDEM, and the Delta Institute to work on the Mercury Steel Mill Virtual Elimination Initiative. US Steel, Ispat Inland Steel, and Bethlehem Steel have completed two phases of the work: They have completed a report identifying all the areas where mercury is located and have developed a time line plan to clean the facilities of mercury, which they are now implementing.	Manufacturing Facilities, Primary Metals Products			
Buildings (also see lamps)							
	Outreach to Plumbers	Environmental Protection Agency - Region 2 (New York)	A partnership among Con Edison, EPA Region 2, and Keyspan hosted a forum in October 2001 in Queens aimed a helping plumbers learn about the health, environmental and liability issues surrounding the use of mercury gauges or manometers. A follow-up exchange program provided licensed plumbers with safe, mercury-free gauges and mercury disposal services free-of-charge at four locations in New York City and surrounding areas. Licensed plumbers have historically used mercury gauges to pressure-test gas lines and ensure safe gas levels for the operation of appliances, such as stoves, hot water heaters, and heating systems. If mercury gauges are not used or handled properly, or are accidentally broken, the mercury may be released into the environment and evaporate into the air. Since October 2001, NYS DEC has been conducting outreach programs to plumbers, trade associations, and other stakeholders state-wide to promote the use of mercury-fee	Plumbers, Policy Makers/Regulators	**Federal Facilities Project**	EPA New England, MA DEP, NEWMOA	Surveying federal facilities in the region to determine their mercury management policies and practices and to make recommendations for reducing, eliminating, and/or better managing mercury. A best management handbook will be drafted as part of the project.
Dental Amalgam							

	Mercury in Dentistry	Maine Department of Environmental Protection	The DEP is working with dentists to develop a plan to reduce mercury emissions from dental practices. The plan will include options and strategies for source reduction. A stakeholder group has been convened to advise the DEP on plan development. The plan is due to the Legislature by July 15, 2002	Dental Clinics	**Environmental Best Management Practices**	Rhode Island Narragansett Bay Commission	NBC has developed an Environmental Best Management Practices (EBMP) document titled "Best Management Practices for the Management of Waste Dental Amalgam." Tailored for the small- to medium-sized dental office, this document outlines safe ways of handling scrap amalgam and describes the various technologies and equipment available to remove scrap amalgam from dental wastewater. Dental amalgam can contain as much as 50 percent by weight mercury, a heavy metal that, in addition to being regulated as a hazardous waste by RI DEM and EPA, is also strictly regulated under NBC's Pretreatment Program at the very low discharge limit of 0.005 mg/l. By encouraging the use and application of these best management practices, NBC hopes to see enough reduction in mercury loadings at the head-works of its two wastewater treatment facilities so as to avoid the need for further regulatory control measures. NBC introduced these best management practices to more than 100 members of the RI
	Amalgam Separator Pilot Project	Vermont Dept. of Environmental Conservation	Amalgam separators have been installed in over 20 dental offices as part of a DEC pilot project to evaluate operational performance of 6 different types of separators. The amalgam separators included in the pilot are: AB Dental Trends, Air Techniques, Bio-Sym Medical, Metasys, Rebec, and Solmetex. The pilot will run for six to eight months, and DEC expects to have a project report available in the spring of 2004. As of Summer 2003, there is no requirement for separators in Vermont.	Dental Clinics			
	Dental Elemental Mercury Collection	Massachusetts Department of Environmental Protection	This project is a partnership of the Massachusetts Dental Association, DEP, and Sterecycle to collect pure elemental mercury from dental offices across the state over a period of a year. The collected material will be sent to a facility in Pennsylvania for reuse. Educational materials on other common mercury-containing products used by dentists will be provided.	Dental Clinics			

	Dental Mercury Program	Indiana Dept. of Environmental Management	The Indiana Department of Environmental Management, in partnership with the Indiana Department of Health, the Indiana Dental Association, and the Indiana Solid Waste Management Districts, conducted an elemental (liquid) mercury sweep for Indiana dentists during the month of April, 2003.	Dental Clinics			
	Dental Waste Management Project	King County Hazardous Waste Program	This is a regulatory program by the County Wastewater Treatment Division that requires dental offices to meet local discharge limits for mercury and silver levels as of July 1, 2003. If a dentist installs an approved amalgam separator or is an exempt specialty they do not need to obtain a permit or submit paperwork to the county.	Dental Clinics			
	Environmentally Responsible Dental Office	Connecticut Dept. of Environmental Protection	Similar to a guide done in Vermont, this guide assists Dentists in the proper management of their hazardous wastes, with an emphasis on mercury.	Dental Clinics			
	Targeting Dental Amalgam Mercury Wastes	Massachusetts Dept. of Environmental Protection and Massachusetts Dental Society	In January of 2004, the Department of Environmental Protection and the Massachusetts Dental Society agreed to establish a voluntary program to remove dental amalgam containing mercury from the waste stream, which will reduce the amount of mercury entering wastewater from dental offices by up to 95 percent over the next two years. To participate in this voluntary program, dental practices and facilities will need to certify to DEP that they have installed an amalgam separator system that removes at least 95 percent of the amalgam waste containing mercury. The program also requires that all amalgam waste containing mercury be recycled. This program is intended to reduce the amount of mercury released into the environment by Massachusetts dental practices and facilities. DEP is implementing this voluntary approach to encourage early installation and use of amalgam separators by dentists before the Department adopts regulations that would require these actions.	Dental Clinics			

	Virginia Dental Mercury Collection Program	Virginia Dental Association	The Virginia Dental Association has worked with the Virginia Department of Health (VDH) to coordinate a system of collection sites for dental offices that have antiquated supplies of elemental mercury. The VDA contracted with a mercury recycler to collect the mercury at 22 VDH collection sites. The collection was held from April 1 to May 31, 2000, resulting in the collection of more than 400 pounds of mercury.	Dental Clinics			
	Pollution Prevention in NH Dental Offices	New Hampshire Dept. of Environmental Services	NHPPP has formed a close working relationship with the NH Hospitals for a Healthy Environment, to provide the infomation to reduce the volume and toxicity of wastes, including mercury, red bag waste, and polyvinyl chloride (PVC) plastic waste from hospitals. As an expansion of the successful P2 progress made at NH hospitals, NHPPP has expanded its outreach to other healthcare facilties including speciality hospitals, extended care facilities, mental health clinics, medical clinics, the Visiting Nurses Association, and hospice care.	Dental Clinics			
	MWRA Dental Project	Massachusetts Water Resources Authority (MWRA)	As part of TRAC's overall effort to reduce mercury, the Dental Project was undertaken to 1) estimate the mercury contribution to the sewer by dental offices, 2) examine possible remedies, 3) research existing technologies and the ISO standard, 4) educate the dental community on the proper handling and disposal techniques for mercury, and 5) determine the best course of action to reduce the contribution of mercury to the sewer system by the dental community.	Dental Clinics			
Education							

	Mercury Education & Reduction Initatives	Vermont Dept. of Environmental Conservation	VT DEC's Environmental Assistance Division staff made mercury presentations at elementary and middle schools throughout the state. School science teachers were mailed an announcement before the beginning of the school year with a return postcard, with which they could request a date for a presentation. This system worked well and may be repeated in the future. The Division participated in the annual Vermont State Dental Society meeting in 2002 and presented on environmental best management practices. They also had a booth at the meeting and were able to meet and talk with many dentists about their environmental management practices. The Division is working with the Advisory Committee on Mercury Pollution to conduct a pilot project on dental amalgam separators. DEC has 6-7 vendors of amalgam separators and about 20 dental offices lined up for a pilot project where separators will be installed for a period of 6 to 8 months to gather operational information on each of the	Dental Clinics, General Public, Hospitals/Health Care Facilities, HVAC Contractors/Wholesalers, Primary/Secondary Schools, Scrap Metal / Auto Salvage	**IMERC**	Northeast Waste Management Officials' Association (NEWMOA)	During 2002, the NEWMOA member states formed a Clearinghouse – the Interstate Mercury Education and Reduction Clearinghouse (IMERC) – to facilitate ongoing technical and programmatic assistance to states that have enacted provisions of the Mercury Education and Reduction Model Legislation, and a single point of contact for industry and the public for information on mercury-added products and member states' mercury education and reduction programs. The first function of IMERC has been to provide a central repository of the Mercury-Added Product Notification Forms that manufacturers and distributors have been submitting for approval under recently-enacted state laws in Connecticut, Maine, New Hampshire, and Rhode Island. The Forms require the mercury-added product manufacturers and distributors to provide information on the mercury content of their products or the components in their products and the total amount of mercury used in all of the product sold in the US in 2001. IMERC has used this
	Mercury Reduction Brochures	Northeast Waste Management Officials' Association (NEWMOA)	NEWMOA has developed two written products on mercury issues. One is a 6-page brochure for municipal officials titled "Eight Good Ideas for Reducing Mercury Exposure and Pollution in Your Community." This material is meant to assist municipal staff in planning local mercury programs and can be tailored to the specific details of any state. The second product is a four-page case study on a mercury clean-out at a vocational technical high school. This is meant to encourage other vocational schools to participate in the MA school mercury clean out program. Both products became available on the NEWMOA	General Public, Municipalities, Primary/Secondary Schools	**Model Mercury Reduction Legislation**	Northeast Waste Management Officials' Association (NEWMOA)	As part of the implementation of the conference of NE Governors/Eastern Canadian Premiers Mercury Action Plan, NEWMOA is developing model state mercury in waste reduction legislation.

	Mercury Video	Northeast Waste Management Officials' Association (NEWMOA)	To educate the public on some of the issues associated with mercury-added products and the work of NEWMOA's Interstate Mercury Education and Reduction Clearinghouse (IMERC), in 2002 the Association worked with a company that produces short videos that are aired on public broadcasting stations around the country. The program is part of the American Environmental Review series. The five-minute video is now being broadcast, and there is a web link to it on the NEWMOA website. It provides an overview of the environmental problems associated with mercury and what the states in the region are doing to address mercury–containing products in waste.	Education and Outreach, Policy/Legislative, Website	**RI Mercury Reduction Commission**	RI Department of Environmental Management (technical assistance)	This project is under the supervision of the Governor of RI. Technical assistance is provided by RIDEM. A fourteen member commission on oversight and planning for mercury hazard reduction and elimination was created with various representatives from public departments, private businesses, advocacy organizations, and experts in this field. The purposes of this commission shall be to study options for reducing and eliminating mercury hazards in Rhode Island. On or before March 1, 2004, and on or before September 1, 2004, the commission shall present to the Governor, the Speaker of the House of Representatives, and the President of the Senate an interim progress report. A final report of the commission's findings and recommendations shall be presented
	Breaking the Mercury Cycle	Northeast Waste Management Officials' Association (NEWMOA)	NEWMOA organized a national conference, "Breaking the Mercury Cycle: Long Term Management of Surplus and Recycled Mercury and Mercury-Bearing Waste" held on May 1-3, 2002. The conference focused on the policies, technologies and techniques to address environmentally sound management and treatment of excess mercury supplies and stockpiles, and mercury-bearing wastes. It provided an opportunity for participants to learn about the current policy framework, mercury materials flow, research underway on different treatment and storage technologies, and other long term options for management of surplus and recycled mercury and mercury-bearing waste.	Policy Makers/Regulators	**Mercury Education and Reduction Group**	RI Department of Environmental Management and others	The Mercury Education and Reduction Group (MERG) was initiated by the RI Attorney General's office in May 2001 to provide a forum for environmental advocates and state officials to work jointly on reducing mercury releases and exposures in Rhode Island. Regulators, advocates, and interested parties meet regularly to ensure accountability of existing programs, document successes, and create strategies for future progress. With no staff, budget, or legislative mandate, the Working Group functions mainly as a clearinghouse and support group for those actively working to address Rhode Island's mercury contamination problems. The MWG meets approximately every six weeks. Participants include regulators: Office of the Attorney General, Department of Environmental Management, Department of Health, Narragansett Bay Commission, and USEPA; advocates: Clean Water Action, Sierra Club Rhode Island Chapter, and Audubon Society of Rhode Island; and interested parties: RI Dental Association, Brown University,

	Community Mercury Reduction Program	Wisconsin Department of Natural Resources	This project ran through September 30, 2003. WDNR is worked with several Wisconsin communities to develop comprehensive mercury reduction programs addressing mercury-using sectors. Each community established a local advisory committee, conducted educational outreach, measured sector mercury reduction, and	Municipalities, Waste-to-Energy Facilities			
	Guidance on Mercury Product Labeling & Phase-Out	Northeast Waste Management Officials' Association (NEWMOA)	The Interstate Mercury Education and Reduction Clearinghouse (IMERC), a program of NEWMOA, has developed and posted guidance on its website for manufacturers of mercury-added products to help them with compliance with state labeling and phase-out requirements. The states of Maine, Connecticut, Rhode Island, and Vermont have requirements for labeling products that contain intentionally added mercury. The guidance provides a roadmap for companies that need to label their products. In addition, Connecticut, Maine, and Rhode Island have specific mercury product phase-out and collection system plan requirements and the guidance material on the website describes how companies can comply with them	Facilities Managers, General Public, Manufacturing Facilities, Policy Makers/Regulators, Switch Manufacturer			
	Mercury Awareness Program	Indiana Dept. of Environmental Management	In an unprecedented, cooperative action, the Indiana Regional Household Hazardous Waste Task Force and the Indiana Department of Environmental Management are working with Indiana solid waste management districts, communities, and businesses to reduce mercury contamination. Indiana's Mercury Awareness Program (M.A.P.) started taking shape early in January of 1998 as a part of Governor O'Bannon's Building Bright Beginings Program. The MAP serves to both educate citizens on the environmental and health-related dangers associated with mercury and to encourage the proper disposal of mercury-containing items by providing free recycling in all 92 counties	General Public			

	Product Labeling	Maine Department of Environmental Protection	Beginning January 1, 2002, a mercury added product may not be offered for sale in Maine unless labeled to indicate that it contains mercury and may not be put in the trash. The rule allows for alternatives to labeling. Labeling will be used to inform consumers about the dangers of mercury in the environment and the need for proper disposal of mercury products. Labeling also is expected to encourage consumer preference for non-mercury alternatives when available.	Manufacturing Facilities			
	Vermont's Mercury-Added Products Labeling Law	Vermont Agency of Natural Resources, Environmental Assistance Division	The Vermont Legislature passed a law in 1998 to regulate the sale and disposal of mercury-added products. The law requires certain categories of mercury-added products to be labeled prior to "sale for use" in the state of Vermont.	Manufacturing Facilities			
	Mercury Reduction in Region 2	Environmental Protection Agency - Region 2	Many activities are underway in the Region to reduce the volume of mercury in the environment, including the reduction of mercury via the MOU between EPA and the AHA; replacing mercury containing products, such as manometers and plumbing gauges; and recycling and properly disposing of mercury recovered from automobiles, computers and other electronic products. Sample projects include: a PPIS (2000) grant to the Solid Waste Management Authority of Puerto Rico to initiate a mercury reduction program for hospitals; and an EJP2 (1999) grant to the City University of New York to conduct outreach on health and environmental impacts relating to mercury use in religious activities. EPA staff have also been working closely with the NJ Mercury Task Force on developing recommendations to reduce the volume of mercury in the	Hospitals/Health Care Facilities, Outreach Providers, Religious Organizations, Scrap Metal / Auto Salvage			
Educational Institution Reduction							

	Mercury in Schools	University of Wisconsin Extension	Create and maintain a basinwide clearinghouse for information, documents and programs relating to reducing mercury usage, increasing mercury recycling and improving mercury management in schools	Primary/Secondary Schools	**Getting Mercury Out of Schools and Communities**	Northeast Waste Managment Officials' Association (NEWMOA)	The schools project was intended to educate Massachusetts school staff, students and administrators about the sources of mercury and its impacts on the environment and public health. In addition, mercury materials were collected from schools and non-mercury replacements were provided. The communities project included outreach and education about mercury and organizing 3 community mercury fever thermometer exchanges.
	P2 for K-12 Schools	Connecticut Dept. of Environmental Protection	As part of Commissioner Arthur J. Rocque's 2001 mercury collection initiative, a pilot program succeeded in cleaning out mercury and chemicals from six schools in Connecticut during 2001. The program was well received, and there is currently a waiting list of schools interested in the program. For 2002, an educational poster, "Exposing Mercury," has been printed and 15 copies are being mailed to all schools in the state. The poster is based on a tabletop exhibit created by the Office of Pollution Prevention to help educate the public on the effects of mercury exposure and how mercury moves through the environment. An all-day conference on removing toxics from the school environment was scheduled for May 21, 2002, at Quinnipiac College in Hamden, CT. Partners that sponsored the conference include EPA Region 1-New England, CT DEP, CT Department of Health and CT OSHA. It featured CT schools that have already conducted lab clean-outs and implemented Integrated Pest	Primary/Secondary Schools	**EPP for Mercury in K-12 Schools**	Northeast Waste Management Officials' Association (NEWMOA)	To ensure that schools no longer purchase items that contain mercury, the 2001-2002 Mercury School Clean Out project, conducted by NEWMOA, required participating schools to sign a participation agreement. An important condition of the agreement required schools to commit to purchasing non-mercury items in the future where available. For mercury items where no non-mercury alternatives exist (e.g., fluorescent bulbs), the schools agreed to set up a recycling program for these items. In order to assist schools in finding these non-mercury alternatives, NEWMOA created a table of common mercury items in schools and their non-mercury alternatives. For example, mercury laboratory thermometers can be replaced with alcohol or mineral spirit-filled glass bulb thermometers or with digital laboratory thermometers. Mercury barometers can be replaced with non-mercury aneroid or digital barometers. In the nurse's office, mercury sphygmomanometers can be replaced with aneroid or digital

	Mercury Reduction in Schools	Illinois Environmental Protection Agency	This project is a component of the hazardous educational waste collections sponsored by the Illinois EPA. With the exception of mercury containing wastes, only hazardous educational wastes can be accepted. Hazardous educational wastes are a waste product that could pose a hazard during normal storage, transportation, or disposal generated from an instructional curriculum including laboratory wastes, expired chemicals, unstable compounds, and toxic or flammable materials. Hazardous educational waste does not include wastes generated as a result of building, grounds, or vehicle maintenance, asbestos abatement, lead paint abatement, or other non-curriculum activities. Mercury containing wastes that are not educational wastes and not part of the routine waste stream are collected and properly recycled or disposed (if recycling is not an option). For example, mercury thermometers from nurse's offices are accepted but fluorescent light bulbs are not.	Primary/Secondary Schools	**DEM reccomendation to extend NEWMOA Program into RI**	DEM/ NEWMOA	See above
	Mercury in Schools	University of Wisconsin Extension	Create and maintain a basinwide clearinghouse for information, documents and programs relating to reducing mercury usage, increasing mercury recycling and improving mercury management in schools	Primary/Secondary Schools			

	Mercury in Schools Workshop	Environmental Protection Agency - Region 2 (New York)	On March 23, 2002, Steve Brachman (University of Wisconsin-Extension, Solid & Hazardous Waste Education Center) and Steve Skavroneck (Pollution Prevention Partnership) led a workshop titled "Mercury In Your School and the Community" at the Science Council of New York City Annual Conference at South Shore High School in Brooklyn, NY. Approximately 30-50 science teachers were expected to attend the workshop. EPA Region 2 gave away mercury-free thermometers to the first 30 educators that sign up for the workshop. Educators were also invited to bring their mercury thermometers to the workshop for proper disposal and recycling. A module has been created to facilitate such outreach efforts. Module topics include: the basics of mercury, how it is released to the environment from human activities (including ritualistic uses), health issues, and unique properties of mercury. Activities include case studies of mercury contamination;	General Public, Primary/Secondary Schools			
	Mercury out of Schools Program	Connecticut Dept. of Environmental Protection	A statewide conference entitled "Getting Toxic Chemicals out of CT Schools" was held on May 21, 2002. The audience included teachers, school administrators, emergency responders, local officials, and school nurses. The agenda provided information on spill clean-up, state and federal requirements, case studies from a town on spill management, and a large high school on a clean-out. A program to clean out schools of mercury and other hazardous chemicals has been established at the Agency. Approximately 30 schools indicated interest in participation as of Summer 2002, and the clean-outs were	Primary/Secondary Schools			

	School Mercury Reduction	Wisconsin Department of Natural Resources	The School Mercury Reduction Program holds workshops for science teachers to show them how to reduce mercury in their schools. In addition, the program promotes implementation of a mercury curriculum and has developed a collection program in which cash bounties can be received for surrendered mercury devices (in Milwaukee, Superior, and Fox River Valley).	Primary/Secondary Schools	**RI Chemical Safe Schools Committee**	RI Department of Environmental Management	The mission of this program is to reduce the risks associated with chemicals in schools and promote best practices for safe chemical storage, use, management, and disposal. The program is composed of members of RIDEM; Departments of Health, Labor and Training, and Education; representatives from area colleges and universities. The main activity of the group is to provide ongoing training to RI School District personnel on the safe handling of chemicals in their workplace.
Farming							
	Dairy Farm Mercury Manometer Project	New York State Dept. of Environmental Conservation	Staff in cooperation with the NYS Department of Ag & Markets has surveyed farms to identify the current use of mercury manometers. The initial survey had certified milk inspectors interviewing farmers. The survey was completed with a direct mailing to the remaining farms. Over 3000 farms were surveyed and 549 manometers in use were identified.	Dairy Farms	**DOH Door to Door**	Department Of Health (DOH)	Identified approximately 16 Dairy farms in RI, went door to door and have fazed most out. (DOH)
	Dairy Mercury Manometer Collection	Washington Department of Ecology	This was a 2-year program to collect manometers from dairy farmers and provide a rebate toward the purchase of a mercury-free alternative device.	Dairy Farms			
	Manometer Collection	Maine Department of Environmental Protection	The state contracted with licensed hazardous waste transporters in order to collect and replace mercury manometers used to measure vacuum in milking machines. The program will be operated at no cost to the farmer. A brochure has been printed and distributed to the target audience with the help of the Department of Agriculture.	Dairy Farms			
	Dairy Mercury Manometer Replacement Program	Wisconsin Department of Natural Resources	This program encourages the recycling of mercury manometers (used in milking houses) and the use of digital manometers. Participating dairy equipment dealers receive a $200 rebate towards a digital manometer when a mercury manometer is replaced. WDNR partnered with the Department of Agriculture, Trade and Consumer Protection so manometers could be recycled at Agriculture Clean Sweeps	Dairy Farms			
Fluorescent Lamps							

	Contract for Recycling of Fluorescent Lamps	New Hampshire Department of Environmental Services	The State of New Hampshire has extended it's contract to collect and recycle all state agencies' fluorescent lamps. The contract is also available to municipalities.	Municipalities, State/Federal Facilities	Universal Waste Rule	Federal Regulation	Universal wastes may not be disposed of with household trash Outreach campaign with the office of energy that deals with disposal at the products end of life.
	Fluorescent Lamp Recycling	Local Hazardous Waste Management Program in King County	New rules from EPA and Washington State add spent fluorescent lamps to the list of universal wastes, requiring that lamps be recycled or managed as hazardous waste. The Local Hazardous Waste Management Program in King County is working with small quantity generator businesses to improve lamp recycling through outreach and education, on-site assistance, and financial incentives. Specific efforts include outreach to property managers and lighting contractors; site visits; trade show exhibits; publishing of a website, brochures, and regular ads in business trade publications; and a partnership with Seattle City Light to assist businesses undergoing lighting retrofits.	Facilities Managers, General Public, Municipalities, Small Business			
	Fluorescent light bulb collection programs, New Jersey	Union County, Morris County, Burlington County	The purpose of this project is to collect fluorescent tubes removed in quantity from large buildings and send to recycling facilities who recover most of the mercury. Union County, Morris County, and Burlington County are participants in this program.	Hospitals/Health Care Facilities, Manufacturing Facilities, Municipalities, Primary/Secondary Schools, Small Business, State/Federal Facilities			
Health Care							

	Grant to Reduce Mercury in Hospitals	Massachusetts Dept. of Environmental Protection	The project is intended to help hospitals achieve the American Hospitals Association (AHA) and EPA goals of voluntarily eliminating mercury use. DEP will form a partnership with the Massachusetts Office of Technical Assistance and private partners, such as the MA Hospital Association and the Lowell Center for Sustainable Hospitals at UMASS, Lowell to implement the program. The project will have three phases: curriculum development, training, and audits. Project team representatives and healthcare operations experts will work together to develop a training curriculum. This training will cover hospital operations that involve the use of mercury and hazardous materials, reduction techniques and recycling opportunities and finally the economic benefits associated with the reduction and disposal of hazardous medical waste. The project will include a 2 to 3 day training for 20 program participants from DEP, UMASS Lowell's Sustainable Hospitals program and	Hospitals/Health Care Facilities	**Health Care without Harm**	DOH (Bob Vanderslice) NBC and EPA	Seminars with RI hospitals that cover reduction of mercury (close to if not 100 percent attendance/ Bev Migliore DEM)
	Guide to Mercury Assessment and Elimination in Healthcare Facilities	California Environmental Protection Agency	This guide is arranged so that the reader is presented with information as to where mercury may be found in healthcare settings, how it should be handled, how to plan for its removal,	Hospitals/Health Care Facilities			
	Health Care Outreach	Maine Dept. of Environmental Protection	The P2 Program has recently started working with the healthcare industry on mercury source reduction efforts.	Hospitals/Health Care Facilities			

	Healthcare Facility Challenge	Environmental Protection Agency - Region 2 (New York)	**The P2 team has developed a recognition program entitled "EPA Region 2's Green Facility Program: Healthcare Facility Challenge" as a way to encourage healthcare facilities to implement P2 and waste minimization practices. In order to become recognized under this program, a healthcare facility must perform a baseline survey to determine its current total volume of waste generated, as well as all sources of mercury. They must then establish waste reduction goals and report to EPA Region 2 on the measurable progress made towards achieving these goals. The activities reported must have resulted in a substantial and permanent environmentally beneficial change in the way they did business. Successful facilities will receive certificates of recognition and window decals; no regulatory or enforcement flexibility is offered. EPA Region 2 hoped to launch the program during P2 Week in September 2001. In a related manner, the Office of Enforcement and Compliance Assurance is funding a virtual healthcare facility on the Internet where a compliance assistance pro**	Hospitals/Health Care Facilities	**Review NYS protram, has a lot of promissing potential among all programs listed.**		
	Hospital Outreach	Environmental Protection Agency - Region 1 (MA)	Janet Bowen leads Region I's outreach efforts to hospitals on mercury reduction, and works closely with Jeri Weiss on EPA's overall mercury efforts. Janet's focus is the Mercury Challenge program, modeled on EPA's Partners for Change program. With state P2 programs and other partners, Region I will support hospitals in taking on the challenge through workshops, on-site assistance, and tools for identifying alternative products. Five PPIS grants to be awarded in FY99 in NE focus on assistance to health care facilities in reducing mercury and other problematic substances. Region I is coordinating with EPA HQ's P2 Division's work with the American	Hospitals/Health Care Facilities			

	Hospitals & Health Care	Vermont Dept. of Environmental Conservation	VT DEC co-sponsored a statewide environmental conference for hospitals with the state's hospital association in February 2004. The conference focused on regulatory compliance, what to expect in an inspection, pollution prevention, and mercury reduction issues. Vermont hospitals are voluntarily preparing mercury reduction plans, and DEC is hoping to achieve 100 percent participation in the program. DEC will also be providing outreach to physician's offices and clinics on mercury reduction and encouraging these facilities to disseminate patient information about mercury fish consumption advisories. DEC will be completing a dental amalgam separator pilot project in April 2004. Agency staff is completing field observations on 19 separators (6 different types) and will prepare a report for Vermont dentists that will help guide them on considerations for choosing an amalgam separator. The amalgam separators included in the	Dental Clinics, Hospitals/Health Care Facilities			
	Hospitals for a Healthy Environment	U.S. EPA, OPPT	EPA and the American Hospital Association are in a joint program to "virtually eliminate" all mercury-containing hospital waste by year 2005.	Hospitals/Health Care Facilities			
	Maine Hospitals for a Healthy Environment	Maine Department of Environmental Protection	Me DEP is working with the Maine Hospital Association, Health Care Without Harm, Region I EPA, and the Natural Resources Council of Maine toward the virtual elimination of mercury from their institutions. To date, they have drafted a Pollution Prevention Agreement that will be formally signed by the parties in Early March, 2001. The agreement goes beyond mercury and includes PVC plastics and other chlorinated compounds and PBTs. The agreement includes general waste volume reductions and recycling goals. Environmentally preferable purchasing techniques will be instrumental in keeping targeted materials out of the institutions in the first place. Finally, the group is moving toward deploying in-state, non-incineration alternatives for treating biomedical	Hospitals/Health Care Facilities			

	Mercury Reduction at Healthcare Facilities	New Hampshire Department of Environmental Services	NHDES, the NH Hospital Association's Foundation for Healthy Communities, Concord Hospital, Dartmouth Hitchcock Medical Center, WasteCap ReCoN, UNH, and EPA have partnered to work on a project to promote pollution prevention and mercury reduction in the healthcare sector. Two hospitals were selected for on-site assistance in P2 and mercury reduction. A baseline survey was distributed to all NH hospitals to collect data on the current use and amounts of mercury-containing products and equipment sited at healthcare facilites. Based on the results of the survey, a workshop was developed. The workshop topics included mercury-free product alternatives, environmentally preferable purchasing, and recycling and disposal options. In the next phase of the project, additional hospitals will be provided with on-site	Hospitals/Health Care Facilities			
	Mercury Reduction at Rogers Memorial Hospital	Massachusetts Dept. of Environmental Protection	In 1999, the Edith Norse Rogers Memorial Veterans Hospital (VA) located in Bedford, MA agreed to perform a Supplemental Environmental Project (SEP) in lieu of paying a penalty. The goals outlined in the DEP consent order were the elimination of products containing mercury within one year and the development of Best Management Practices for use by other hospitals at the national level. The VA was able to accomplish these goals and eliminate considerable amounts of mercury. Beyond its mercury reduction actions, the VA is a member of MassRecycle's, Hospital Recycling Council and is a recipient of the Institutional Recycling Award. In four years they recycled 3,720,000 pounds of materials. In fiscal year 2000 alone they were recycling approximately 40 percent of their total solid waste	Hospitals/Health Care Facilities			
	Mercury Reduction Program for Illinois Hospitals	Illinois Environmental Protection Agency and Illinois Waste Management and Research Center	Technical specialists from the two agencies are available to conduct free on-site waste reduction assessments at hospitals, focusing on mercury use, solid waste generation, waste solvents and infectious waste segregation practices.	Hospitals/Health Care Facilities			

	Replacing Mercury at Hospitals	Massachusetts Dept. of Environmental Protection	The Massachusetts Department of Environmental Protection (DEP) is implementing an EPA Pollution Prevention Incentives for States (PPIS) grant to conduct Pollution Prevention (P2) technical assistance assessments at participating area hospitals. The purpose of the assessments is to identify opportunities to reduce hazardous, solid, and infectious "red bag" waste in hospitals. A primary focus of the audits in 2002 has been to identify the use of products and material that contain mercury and recommend less hazardous or non-toxic materials. The assessment teams have thus far recommended replacing mercury-containing blood pressure cuffs, fever and lab thermometers, measuring devices; and PVC-containing items, including feeding tubes, IV bags and tubing, transfusion devices, and	Hospitals/Health Care Facilities			Education and Outreach, Onsite Assistance, Product Elimination/Reduction
	Reducing Mercury Use in Health Care	Monroe County Health Department and University of Rochester	The University of Rochester's Strong Memorial Hospital and Eastman Dental Center conducted successful mercury pollution prevention programs and, with the Monroe County Health Department, developed educational programs and materials. A manual for hospitals and booklet for dental offices were produced for use at other facilities. The hospital manual, Reducing Mercury Use in Health Care: Promoting a Healthier Environment, is available online, and the dental booklet is Appendix M of the manual.	Dental Clinics, Hospitals/Health Care Facilities			
	University of Massachusetts at Lowell's Sustainable Hospital Project Website	Massachusetts Department of Environmental Protection	The Sustainable Hospital website provides information on mercury-containing products used in hospitals and health care facilities and alternative non- or low-mercury substitutes.	Hospitals/Health Care Facilities			

	Pollution Prevention at NH Healthcare Facilities	New Hampshire Dept. of Environmental Services	NHPPP has formed a close working relationship with the NH Hospitals for a Healthy Environment, to provide the infomation to reduce the volume and toxicity of wastes, including mercury, red bag waste, and polyvinyl chloride (PVC) plastic waste from hospitals. As an expansion of the successful P2 progress made at NH hospitals, NHPPP has expanded its outreach to other healthcare facilties including speciality hospitals, extended care facilities, mental health clinics, medical clinics, the Visiting Nurses Association, and hospice care.	Hospitals/Health Care Facilities			
	Sustainable Hospital Project	Environmental Protection Agency - Region 1	The Sustainable Hospital Project (SHP) augmented their on-line database of alternatives to mercury-containing products in 2002. The database can be searched by product category, manufacturer, hazard type, and product name. Some of the products featured in the database include: dental mercury removal systems, gastrointestinal tubes, laboratory chemicals and equipment, sphygmomanometers, and thermometers. The SHP uses professional judgment and sound science to evaluate product substitutes. Rather than promoting a particular material or type of product, the SHP discusses alternatives and openly acknowledges the merits and shortcomings of every choice. This information enables healthcare facilities to evaluate and make informed decisions about the products and practices they choose. The SHP is a project of the Lowell Center for	Dental Clinics, Hospitals/Health Care Facilities			

	P2 in New York Health Care	Environmental Protection Agency - Region 2	Region 2's P2 Team, RCRA, and the Compliance Assistance program are coordinating efforts to develop pollution prevention/mercury reduction workshops and follow-up metrics for hospitals throughout the state of New York. Two focus group meetings have been held to exchange information on the status of mercury use/management in the health care field, and to develop a strategy for mercury reduction and other pollution prevention/PBT-related issues in New York. Stakeholders include state agencies and associations and individual hospitals. The program is shaping up to potentially include teaching tours of model institutions, and a regional recognition program. The next focus group meeting is February 24. This effort is aimed toward advancing the goals outlined in the EPA/American Hospital	Hospitals/Health Care Facilities			
Novelties							
	Product Ban				(novelty band in RI)		
Switches							
	Mercury Switch Collection	Camden County & Camus International, Inc.	Under this program, HVAC contractors and plumbers return removed switches, thermostats, etc. to plumbing supply and HVAC equipment distributors, who then send collected items to Camus International. Camus International recycles the mercury. Camden County covers the cost of shipping the collected items to Camus International.	HVAC Contractors/Wholesalers	NEWMOA Switch phase out	NEWMOA	
	Reduction of Mercury use in Electrical Switch Applications in Ontario	Pollution Probe					
	Maine Mercury Switch program		Identification of Boat Switched that contain mercury in bilge pumps.	Boaters, Marinas, Repair replacement shops	**Review and consider adoption of Maine's program**		
Thermometers							

	Florida Mercury Thermometer Exchanges - 1999 and 2000	Florida Department of Environmental Protection and Local Agencies	The 1999 statewide medical mercury thermometer exchange served 77% of Florida's residents. Local agencies in 27 counties and 2 municipalities participated. In 2000, the amount of mercury collected was almost double the amount from 1999, though the number of participants was smaller. Counties attributed this success to increased public awareness and more effective advertising campaigns. Exchanges were held in 20 counties and 2 municipalities, serving 64% of the state's population.	General Public	Thermometer Take back	DOH (department of health)	DOH has taken an initative to take back thermometers
Thermostats							
	Indiana Mercury Thermostat Reduction and Recycling Program	Indiana Departmant of Environmental Management	In the winter of 1996, a voluntary Mercury Thermostat Reduction and Recycling Program was developed for the heating, ventilation, air conditioning and refrigeration industry. As part of the program, HVAC-R contractors and suppliers agree to a pledge indicating the company's commitment to protecting customers and the environment from the dangers of mercury. The program participants are working with the Thermostat Recycling Corporation to utilize free recycling of the discarded mercury-containing thermostats.	HVAC Contractors/Wholesalers	TRC- NEMA		All RI programs need more education associated with them.
	Lewis County Thermometer Exchange	Lewis County	The Lewis County Solid Waste Utility is offering a thermometer exchange in an attempt to get hazardous materials out of area homes. Lewis county residents can trade in their mercury thermometers for mercury-free thermometers at the county-operated Hazo-Hut. Hazo-Hut also offers free and proper disposal of household hazardous wastes such as paints, lawn chemicals, cleaning products, and automotive products.	General Public			
	Thermostat Recycling Program	Wisconsin Department of Natural Resources	This program encourages HVAC wholesaler use of the National Thermostat Recycling Corporation. A pledge program was developed to encourage participation by thermostat wholesalers and contractors and to recognize their participation. There is also some retailer participation.	HVAC Contractors/Wholesalers			
Universal Waste Laws							

(also pertains to CRT's/Lamp Recycling/Thermostats & Thermometers)	**Universal Waste Recycling Project**	Massachusetts Department of Environmental Protection	The DEP is establishing municipal collection programs for mercury-containing products in 21 Western Massachusetts communities, setting up school lab cleanouts and inventory systems, and conducting education on non-mercury alternatives and safe handling.	Municipalities, Primary/Secondary Schools, Small Business, Universities/Colleges	**RI Universal Waste Law**	EPA	
(also pertains to CRT's/Lamp Recycling/Thermostats & Thermometers)	**Universal Waste Shed Grants**	Massachusetts Department of Environmental Protection	The agency offers sheds to communities so they can store mercury-containing wastes until they accumulate a sufficient number to recycle economically (through a volume discount). DEP has a state-wide contract with a company to pick	Municipalities, Primary/Secondary Schools, Small Business			
	Maine Provides Funding for Municipalities for Universal Waste Collection	Maine State Planning Office	Maine has developed and delivered a program to provide funding and technical assistance to municipalities for the collection and recycling of universal waste. Mercury-added products are targeted under this program.	General Public, Municipalities, Primary/Secondary Schools, Small Business, Wastewater Treatment Facilities			

MERCURY-CONTAINING PRODUCTS	SOURCE OF MERCURY	ALTERNATIVE PRODUCT (general)	GUIDE REFERENCE	NOTES
APPLIANCES (major)				
Central air conditioners	Tilt switch	Alternative switches are available- contact manufacturer to find mercury-free products		See http://abe.enc.purdue.edu/~mercury/src/devicespage.htm for information on removal techinques
Chest freezers	Tilt switch (in lid light)	Mercury is being phased out of new models		
Gas furnaces and boilers	Hg Flame sensors, aquastats	Electric flame sensors/ignitiors; electronic temperature sensors		
Gas refrigerators	Hg flame sensors	Electric flame sensors		
Grills	Hg flame sensors	Electric flame sensors		
Commercial hot water heaters	Hg flame sensors	Electric flame sensors		Mercury is not used in household HW heaters
Ovens/ranges	Hg flame sensors, some oven thermostats	Certain electic ignition ranges have no Hg containing devices	Any ignition sources with a standing or spark ignition pilot light contains a mercury flame sensor	Some oven thermostats contained Hg until mid 1970's
Washing machines and gas dryers	Tilt switch in lid of washing machine, Flame sensor in dryer	There are in older products only. Alternative switches are available	These applications reportedly discontinued in 1970's	
APPLIANCES (minor)				
Attic fans	Tilt switch (airflow/fan limit controls)	Alternative switches are available		
Steam and curling irons	Tilt switch (for the shut-off feature)	Look for one-hour timer feature		
Microwave oven (old)		Use new models		(source: Sustainable Hospitals Project)
Comercial popcorn poppers	Tilt switch	Alternative switches are available		
Portable phones	Tilt switch	Alternative switches are available		
Electric space heaters	Tilt switch (safety Shut-off)	Newer models may not contain mercury		May have been discontinued in 1995
MOTOTIZED VEHICLES AND EQUIPMENT				
ABS sensors	G-Sensor	Mercury-containing switches are being phased out		For information on specific models containing mercury, go to http://www.cleancarcampaign.org/mercury.html
Bilge pumps in boats	Mercury float switch for auto shut-off	Being phased out		

Glove box	Tilt switch	Ball-type switch or mechanical switch		
Headlights	Mercury-containg bulbs	Standard headlamp bulb		
Hood and truck lights	Tilt switch	Ball-type switch or mechanical switch		
Lawn tractor/riding mowers	Fuel level indicator	Mechanical device		
LCD computer displays	Mercury-containg bulbs	No redily available substitute		
Outboard motors	Safety shut-off			
"Ride Control" automatic levleing suspension	Tilt switch	Mechanical switch		Scheduled for phaseout in US automakers in 2001
Seatbelts	Electronically activated inertia lock			
Security alarms	Tilt switch	Mechanical switch		
Vanity mirrors	Tilt switch	Mechanical switch		
Carburetor synchronizer for motorcycles and other engines	Manometer	Non-mercury vacuum gauge setup		
BUILDINGS (also see Appliances and Lamps)				
DC watt hour meters	Hg contained within the device	Other and newer models are mercury free	Duncan brand-no longer manufactured- but may still be in use	
Flow meters	Device contains reservoir of Hg	Mercury-free models are available		Found in water, sewage, power, and heating plants
Fluid level controls	Tilt switch mounted on float, lever arm, or on plungeror sump pump		Most new foats are made without mercury- look for magnetic dry reed switches, optic sensors, or mechanical switches	
Old paint	Ingredients in paint (especially marine and deck paints)	new paints no longer contain mercury		Manufactured before 1991
Septic tanks	Mercury float switch			
Silent' wall switches	Tilt switch	Mechanical light switches		-Makes no audible 'click' sound-Discontinued by GE 1991
Sump pump	Mercury float switch			
Thermostats	Tilt switches (range of one to six switchs per unit)	Programmable electornic thermostats- look for the Energy Star label		
Water heaters (only a few commercial models)	Mercury-containg flame sensor	Electic flame sensor		
Pneumatic tube conveyor systems				

Fire alarm and sprinler systems				
Boiler room and heating plant: numerous control and monitoring devices				
CLEANERS				
Ajax powder, Comet, Lysol Direct, Soft Scrub, Joy & Ivory dish soap, Soft Dish Soap, Alconox, Cidex, Enzol, Derma Scrub, Dove Soap, Murphy's Oil Soap	These products may contain small amounts of mercury. Hg is introduced as a perservative or disinfectant in some cases. Products that contain chlorine as caustic soda may have mercury contamination form the production process	Look out for products containing mercury based perservatives or disinfectants-may not be clear on the label. Choose products that are chlorine free of possible. See Product Legislation Section for more info on labeling laws and product bans. States are developing and implementing Hg labeling laws- requiring manufacturers to disclose the amount of mercury in an product (down to a certain level) whether the mercury is intentinal or unintentional.		
COMPUTERS				
Body of the computer	Electrical switches, back lighting and batteries	Limited or no alternatives		
Flat screens- Liquid Crystal Display (LCD)	Flourescent lamps used for backlighting in the screen	Alternatives are not redily available, although technology exists		See Flourescent Lamp section
ELECTRICAL EQUIPMENT				
Batteries (Hg-zinc, Hg-cadmium, Hg-oxide) (manufactured prior to 1996)	Conponents of battery	Lithium, Zinc air, alkaline batteries produced after 1996		Batteries manufactured outside of the US may contain Hg
HEALTHCARE (Medical & Dental)				
Dental Amalgam	Mercury is mixed with silver and other compounds to form the amalgam	Gold, ceramics, porcelain, composite		
Deveices cointaining Hg-Oxide, most Zinc-air, and foreign made alkaline batteries: Oxygen monitors, ECG monitors, personal pagers, defibrillators, hearing aids pacemakers, fetal monitors, etc.	Chosose battery-free devices, or use lithium and alkaline batteries produced in US after 1996	Also see electircal equipment	Source: INFORM	
Bougie tubes (weighted esophageal dilator)	Some products are weighted with mercury	Mercury-free versions contain tungsten or stainless steel		

Feeding tubes (old)	Weighted with mercury	Partically all new tubes use tungsten, air, or saline solution		
Sphygmomanometer	Blood pressure measuring device that uses mercury to inticate pressure levels	Aneroid, electronic		Some clinicians believe non-Hg devices are less accurate. Studies have shown that this in not true, and that hospitals must regularly callibrate all mercury and other devices to maintain accuracy
Sphygmomanometer service kits	Kit comes with bottles of elemental Hg	Switching to alternatinves eliminates need to keep kis in stock		The elemental Hg from existing kits can be recycled
Thermometers (for patient temperature)	Mercury contained within the device	Mercury-free electronic, tympanic, infrared, basal, and digital thermometers are available	Also see section on measuring devices for info on other types	
MEASURING DEVICES				
Barometers	Mercury contained within the device	Digital and other mercury-free barometers are available		See http://abe.enc.purdue.edu/~mercury/src/devicespage.htm for information on removal techinques
Hydrometers (measure moisture content)	Mercury contained within the device	Digital and other mercury-free devices are available		
Manometers	Mercury contained within the device	Aneroid, electric, and analog gauges		See http://abe.enc.purdue.edu/~mercury/src/devicespage.htm for information on removal techinques
Pyrometers	Mercury contained within the device	Mercury-free devices are available		
Thermometers	Mercury contained within the device	Alcohol and other non-mercury liquid devices can be used in labs and for weather		
LAB USE				
Coulter Cell Counters	Mercury-containg gauge	Not all models and years contain mercury. Request mercury-free when purchasing new equipment		

Laboratory and institutional size ovens, refrigerators stoves, and freezers	Thermometers are often used with these products in laboratories, use non-mercury thermometers			
Laboratory thermometers	Mercury contained within the device	Labs can use alcohol, digital, and electronic thermometers		
Reagents: assorted	Uses mercury as a component	Alternatives are available for many mercury-containg reagents	Check resource section of this report	See Sustainable Hospital links for more information www.sustainablehospitals.org
LAMPS				
Flourescent: general purpose straight, U-bent, compact, high output, black light, 'bug zapper' devices	Bulb contains mercury	No alternative	See Lamp section of the report	See http://www.lamprecycle.org for a national list of companies accepting lamps for recycling and http://www.nema.org/government/environment/ for more information on lamp recycling in general
High Intensity Discharge: mercury vapor, high pressure sodium, metal halide	Bulb contains mercury	Mercury-free lamps have recently been developed and are becoming available	See Lamp section of the report	Used for street lights and outdoor security lighting
Neon lamps	Mose colors (except red, orange and pink) contain Hg in the tube	No known alternative		
NOVELTY PRODUCTS/ RECREATION				
Archery/ Crossbow stabilizer	Mercury contained with the device	Look for mercury-free alternatives		
Cameras	Override sensor to protect CCD from damage			
Electic organs	Switches for non-keyboard controls			
Fishing lures or ice-fishing tip-ups	Mercury contained with the device	Look for mercury-free alternatives		
Grandfather clocks	Weights and counter weights			

Jewelry	Mercury in vial, or mercury as a switch for light up jewlry	Avoid purchase		Jewelry with mercury in a vial often originates in Mexico
Light-up shoes (LA Gear's 'My lil Lights')	Mercury switch	Avoid buying second hand		Mercury use discontinued after June 1994
Quicksilver maze' toys	Mercury contained with the device	No alternative		
PERSONAL CARE PRODUCTS				
Contact lens solution	Mercury is used as a preservative/ disinfectant	Mercury-free alternatives are available		
Thimerosal and phenyl mercury compounds				
Cosmetics	Mercury is used as a preservative/ disinfectant	Mercury-free alternatives are available		
Disinfectants	Mercury is a component	Mercury-free alternatives are available		
Diuretics	Mercury is used as a preservative/ disinfectant	Mercury-free alternatives are available		
Eye and ear preparations	Mercury is used as a preservative	Mercury-free alternatives are available		
Homeopathic medications	Mercury sis a component	If information on ingredients is not available then avoid purchase		
Mercurochrome	A disinfectant made with Hg	Avoid purchase		
Nasal sprays	Mercury is used as a preservative/ disinfectant	Mercury-free alternatives are available		
Traditional Chinese Medicine	Mercury is a component	If information on ingredients is not available then avoid purchase		
Vaccines	Mercury is used as a preservative	Mercury-free alternatives are available		
*Information found in this table was gathered from INFORM, Draft Wisconsin Mercury Sourcebook, and others which are listed with the table. *				

PRODUCT	ALTERNATIVES	MANUFACTURER/DISTRIBUTOR
LAB CHEMICALS		
Mercuric chloride	Nitric acid	VWR International, Fisher Scientific
mercuric iodide	Phenalte method	VWR International, Fisher Scientific
Mercuric nitrate		VWR International, Fisher Scientific
Mercuric oxide	Use of copper sufate or potassium sufate as catalyst in Kjeldahl reactions, or the use of the Biurut method (where copper sulfate is used)	VWR International, Fisher Scientific
Mercury (II) Sulfate	Potassium sulfate	Mallinckrodt
Silver nitrate	Chromium-(III)sulfate	VWR International, Fisher Scientific
Phenolic Mercuric Acetate	Ion selective electrode	VWR International, Fisher Scientific
LAB EQUIPMENT		
Manometers	Aneroid, electric, and analog gauges	VWR International
Pyrometers	Mercury-free devices are available	Pyrometer Instrument Co/ Barnstead.Thermolyne
Thermometers	Mercury-free devices are available	VWR International
Coulter cell counters	Not all models and years contain mercury	Beckman Coulter
Ovens Refrigerators and freezers	Check with manufacturer about switches	
Cantor tubes	Anderson tube	Anderson Products
Weighted esophageal dilator	Mercury-free versions are now available with Tungsten or stainless steal	
Miller-Abbott tube	Tungsten tubing	Rusch
Sequential Multiple Analyzer	Ion selective electrode	
Sphygmomanometer	Aneroid or electronic	
Clinical Thermometer		
PERSONAL CARE PRODUCTS		

Avoid the following components with products: Thimerosal or common synonyms; Mercurochrome, Merzonin, Merthiolate Sodium, Mertorgan, Ethylmercurithiosalicylate, Ethyl (2-mercaptobenzoato-S) mercury sodium salt, Mercurothialate, Merfamin, Thiomersalate, Thiomersal, Thiomersalan, [(0-carboxyphenyl)thio] Ehtylmercury sodium salt. Phenylmercuric Acetate (PMA) Phenylmercuric nitrate (PMN), other phenylmercury compounds. Refer to the following website for updated information: www.truetest.com

PRODUCT	ALTERNATIVES	MANUFACTURER/DISTRIBUTOR
Cosmetics (mercury is used as a perservative and/or a disinfectant)	Mercury-free altermatives are available	All Almay products, L'Oreal Voluminous Mascara, All Physicians Fourmula products
Disinfectants	Mercury-free altermatives are available	

Eye Perparation (mercury is used as a preservative)	Cortisporin Otic Solution	
Homeopathic medications (mercury is used as a component)	If information on ingredients is not available, avoid purchase	
Disinfectants containing Mercurochrome	There are many alternative topical disinfectants	
Nasal sprays (mercury is used as a preservative)	Afrin Nasal Spray Beconase AQ	
Traditional Chinese Medicine	Read product label to avoid mercury-containing ingredients	
Vaccines (mercury is used as a perservative in some)	Mercury-free alternatives are available, ask your physician for a substitute BayHep B	Hep-B-Gammagee
BUILDINGS/ HOMES/ FARM		
Thermostats	Electronic,mechanical snap-acting switch, open-contact magnetic snap switch, sealed-contact magnetic snap switch	
Dairy manometers	Aneroid, electric, and analog gauges	
Most all products and alternatives on this list are comperable in price		
*Information found in this table was gathered from INFORM, Draft Wisconsin Mercury Sourcebook, and others which are listed with the table. *		

Minnesota, Wisconsin and Michigan, which are not members of NEWMOA's mercury clearinghouse, have instituted comprehensive mercury reduction and education programs. While the focus of these programs may vary slightly state by state, overall goals are consistent with those of the NEWMOA member states. Some highlights from MN, WI and MI are listed below.

Minnesota

Taken from the Mercury Reduction Program Progress Report to the MN Legislature, 2002. Available at http://www.pca.state.mn.us/air/mercury.html

Legislation in MN

In 1999, the legislature passed Minn. Stat. § 116.915 to help reduce mercury contamination in Minnesota fish. The statute (1) sets state mercury release goals, (2) lists Minnesota Pollution Control Agency (MPCA) contamination-reduction strategies, (3) requires the MPCA to solicit voluntary reduction agreements, and (4) requires reports in 2001 and 2005.

The Office of Environmental Assistance developed a 2001 Session legislative proposal to prohibit the sale of most mercury thermometers in Minnesota. Two legislators also introduced mercury thermometer sales prohibitions. The legislature passed the most comprehensive language from these proposals. With a few narrow exemptions to cover legally required uses, products with no available alternative, and primary calibration standards, the sales prohibition became effective January 1, 2002.

Mercury-Free Zone Program

The statewide Mercury-Free Zone Program is an expansion of a regional Minnesota Pollution Control Agency (MPCA) project that began in seven northeastern Minnesota counties. In the statewide program, 70 schools have so far pledged to become Mercury-Free Zones, and elemental mercury, mercury-containing chemicals and mercury-bearing equipment have been removed from 60 of these schools.

Mercury Switches in State Vehicles

The Office of Environmental Assistance (OEA), the MPCA and the nonprofit group INFORM worked with the Department of Administration, Materials Management Division, to include a mercury component disclosure requirement in the 2002 Vehicle Request for Bids. The state intends to require the vehicles it buys to be mercury free in future model years, and will use this year's information disclosure to develop future bid specifications.

Mercury Switches in Steel Scrap Project

The MPCA and OEA are working on a cooperative project with Ramsey County, North Star Steel and other counties to reduce the amount of mercury that is released when scrap steel is recycled. The MPCA has provided ready-to-mail containers for mercury switches to scrap yards, and North Star Steel has started paying a bonus to scrap suppliers who remove mercury switches from vehicles before crushing them.

Dental Amalgam Waste Management

Through a grant to the Minnesota Dental Association, the OEA supported the development of a dental amalgam management training video and associated Continuing Dental Education credit for all dental office staff.

Wisconsin

From the Wisconsin Mercury Reduction Homepage at:
http://www.dnr.state.wi.us/org/caer/cea/mercury/program.htm

The Wisconsin Mercury Reduction Program uses a variety of tools, including partnerships between the Department and numerous Wisconsin communities educational outreach, and innovative reduction and recycling activities to reach its goal of reducing mercury in the environment.

Medical - Healthcare facilities contain mercury in a lot of their medical equipment (e.g. pressure gauges, thermometers), laboratory reagents, and common facility items (e.g., fluorescent lights, thermostats, cleaning supplies). Mercury spills in hospitals are not uncommon due to the large amount of mercury used in a wide variety of products all over the facility. Besides the occasional spill, mercury devices and other mercury wastes are often incinerated with medical waste, which emits mercury directly into the environment. The American Hospital Association and the Environmental Protection Agency have signed a Memorandum of Understanding for hospitals to become mercury-free by 2005. To reach this goal Wisconsin communities are organizing workshops to educate hospital personnel (including doctors, nurses, environmental and safety coordinators, and equipment purchasers) about the issue of mercury and the need for alternatives.

Dental - The main sources of mercury from dental offices is from the amalgam. However, mercury is also found in common items, like fluorescent lights, thermometers, and thermostats. The Department teamed up with the Wisconsin Dental Association (WDA) to create a Best Management Practices Guide for recycling amalgam wastes. This guidance was sent to WDA member dentists and is being promoted at local WDA meetings.

Schools - Schools have mercury mostly in the science labs, but also in common items around the facility, like fluorescent light, thermostats, and thermometers in the nurse's office. A set of teaching activities was developed for teachers in order to educate the students about the mercury. These teaching activities have the potential to reduce mercury in both schools and homes, assuming students take the knowledge with them.

Heating, Ventilation, and Air Conditioning –Wholesalers and contractors sell and install mercury-containing thermostats. Three major thermostat manufacturers established the Thermostat Recycling Corporation, which offers free thermostat recycling to HVAC wholesalers. After a contractor removes a mercury-containing thermostat from a building, it is dropped off in a recycling bin at a wholesaler and once the bin fills up, it is shipped off to a recycling facility. Not only is this program free and simple, but the Department has also created an incentive for wholesalers and contractors that choose to participate. If they pledge to recycle thermostats they get certificates and pledge patches, both of which are good customer relations tools.

Dairy Farms – A small percentage of Wisconsin's dairy farmers use mercury-filled manometers to measure vacuum pressure in their dairy cow milking system. Mercury-filled manometers contain about 12 ounces of mercury in an open-ended, 30-inch U-shaped tube. These manometers present a special mercury spillage risk due to their exposed location on the milking pipeline and because they are sometimes abandoned when a dairy farm goes out of business. The Department of Natural Resources (DNR) currently administers a grant program to help farmers replace these manometers with mercury-free gauges. Farmers that choose to replace their mercury-filled manometer with a mercury-free gauge effectively receive a $200 reimbursement from the DNR. The farmer's regular dairy equipment service provider typically performs the replacement to assure that the mercury is safely handled and that the new gauge is

accurately installed. When a farmer stops milking cows and abandons the manometer in a barn, the DNR pays a service provider $100 to find and remove it. As of May 1, 2004, 525 manometers containing 405 pounds of mercury have been removed from Wisconsin dairy farms.

Automotive - Mercury is found in the hood and trunk light switches of many vehicles (approximately 1/3 of vehicles have mercury light switches). Mercury is also found in the anti-lock braking system, navigational displays, and headlights of many cars. Wisconsin has initiated a Mercury Switch Recycling Program, with help from Concerned Auto Recyclers of Wisconsin (CARS) and Wisconsin Institute of Scrap Recycling Industries (WISRI), to remove mercury light switches from end-of-life vehicles and appliances before they are processed.

Thermometers - Many fever, basal, lab, and candy/deep fry thermometers contain mercury. The mercury reduction communities hold numerous thermometer exchanges for the public and businesses in which mercury thermometers can be exchanged for free digital thermometers. Also, some parts of Wisconsin, like Dane County, the city of Racine, the city of Ashland, and the city of Superior, are banning the sale of mercury thermometers. Other cities to take this action include San Francisco, Boston, and Duluth. Many major retailers (e.g. Target, Wal-Mart, K-Mart, Toys-R-Us, Walgreens) have also banned the sale of mercury thermometers.

2004 Mercury Thermometer Collection Grants - The United States Environmental Protection Agency has given a grant to the Department of Natural Resources to enable Wisconsin medical facilities and communities to collect mercury thermometers from homes and schools. These grants will only fund outreach and disposal. The funds cannot be used for incentives (e.g. digital thermometers) or for disposal of mercury products from medical facilities.

Mercury Collections/Recycling - The mercury reduction communities sponsored free and low-cost mercury collections for households and businesses. Over 5,000 pounds of mercury were collected in a 1998 Mercury Roundup and 6,600 pounds were collected in the 1999-2001 recycling program. The total for the collections held by Wisconsin communities in 2002 yielded 970 pounds of mercury. The total amount of mercury collected and recycled through these programs along with the Dairy Mercury Manometer Replacement Program and the Auto Switch Recovery Program in Wisconsin is 13,000 pounds over the last five years. These represent the largest public collections of mercury-containing products in the United States to date. Further, almost all the products collected for recycling were permanently replaced with non-mercury devices.

Legislation - The DNR and some of the mercury reduction communities are working on mercury product sales bans (the sale of mercury thermometers has been banned in Dane County, City of Racine, City of Ashland, and nationally by most major retail stores). The Wisconsin Department of Natural Resources (WDNR) is in the process of writing rules to reduce mercury emissions from electric utilities (WI will be the first state to establish such rules).

Michigan

From the Michigan DEQ Mercury P2 Homepage at:
http://www.mi.gov/deq/0,1607,7-135-3307_29693_4175---,00.html

Recent legislation has been introduced in the Michigan legislature on the following topics:

1. To require that auto manufactures establish programs to recover at least 90% of the mercury- containing ABS and light switches in end-of-life vehicles prior to crushing or as part of dismantling.

2. To prohibit the use of mercury in hospitals unless no mercury-free product is available.

In July 2004, a Memorandum of Understanding (MOU) was executed between the Michigan Department of Environmental Quality (DEQ) and the Alliance of Automobile Manufacturers (AAM) to establish a statewide mercury switch collection program for end of life vehicles. The purpose of the program is to collect and recycle mercury containing switches found in automobiles to ensure they are safely removed before vehicles are shredded, crushed, or smelted; and that the mercury is therefore, not released to the environment. The voluntary program known as the Michigan Mercury Automotive 'Switch Sweep' Program, was rolled out August 1, 2004. Participants (dismantlers, recyclers, salvage yards, etc.) entering the program were provided with instructions, program logistics, storage buckets and/or mailers. After the mercury switches are removed, the AAM and/or their project manager will arrange for transport to one of the 'team approved' collection points. These points would likely be one or more of the existing Michigan Groundwater Stewardship Clean Sweep Program sites. The goal of the program will be to inspect and, when present, remove mercury switches from at least 80 percent of the total number of motor vehicles processed in Michigan each year. The signed agreement remains in effect until September 30, 2006.

According to Public Act 376 of 2000 (Enrolled Senate Bill #1262), Michigan schools must phase out mercury use in the classroom and in the health/nurse's office. This law applies to liquid (free flowing) elemental mercury, as well as, mercury-containing instruments such as thermometers, barometers, manometers, and sphygmomanometers (blood pressure gauges). Schools had until the end of 2004 to complete this process.

Department has sponsored numerous thermometer exchange programs throughout Michigan and distributed thousands of mercury-free digital thermometers.

A wealth of information about the state's mercury education and reductions efforts, including fact sheets, guidance documents, information on non-mercury alternatives, disposal options, and the handling of mercury spills, can be found on the Michigan DEQ Pollution Prevention website at http://www.michigan.gov/deq

Recommendations to Prevent Mercury Pollution from Auto Parts

A Report to the Rhode Island Commission on Mercury Reduction and Education
From the Subgroup on Auto Mercury

March 2005

Subgroup Participants

- Sheila Dormody, Environment Council of Rhode Island and Clean Water Action, Chair
- Greg Benik, Holland and Knight LLP representing Metals Recycling
- Paul D'Adamo, Automotive Recyclers Association of Rhode Island
- Terrence Gray, Rhode Island Department of Environmental Management
- Wally Gernt, The Bradford Group representing Metals Recycling
- Jack Hogan, F/S Capitol Associates LLC, representing the Alliance of Automobile Manufacturers)
- Sarah Hoisington, Metals Recycling
- Jamie Magnani, Rhode Island League of Cities and Towns
- Eugenia Marks, Audubon Society of Rhode Island
- Beverly Migliore, Rhode Island Department of Environmental Management
- Chris Reilly, The Bradford Group representing Metals Recycling
- Elizabeth Stone, Rhode Island Department of Environmental Management

Executive Summary

In 2004, both houses of the Rhode Island General Assembly passed resolutions "respectfully urging the Mercury Reduction Oversight Commission to prevent mercury pollution from auto parts." (See Appendix 1)

The resolution urged the 14-member Mercury Reduction Oversight Commission (established pursuant to RIGL §23-14.9-2.1) to develop a plan to address the collection and recycling of mercury added auto parts in a manner that is convenient and minimizes costs to taxpayers and consumers. The resolution urges the Commission to submit a recommended plan to the General Assembly by January 30, 2005 including any legislation necessary to implement the plan, for the collection and recycling of mercury-added auto parts that utilizes a "producer responsibility" model. The Mercury Reduction Oversight Commission, which began meeting in May 2004, established a subgroup of interested parties in August 2004 in order to address the issues raised by the General Assembly's resolution. Participants included representatives from the Audubon Society of Rhode Island, the Automotive Recyclers Association of Rhode Island, the Alliance of Auto Manufacturers, Clean Water Action, the Department of Environmental Management, the Rhode Island League of Cities and Towns, and Metals Recycling.

The subgroup reviewed the magnitude of the problem of mercury pollution from auto parts in Rhode Island, models for addressing the issue developed by other states, and the feasibility of implementing a program to address the issue in Rhode Island. **While mercury can be found in numerous automobile components, the subgroup decided to prioritize its initial efforts and to focus on mercury switches (commonly used in convenience lighting fixtures and, to a lesser degree, in anti-lock breaking systems (ABS)).**

The Rhode Island Department of Environmental Management (RI DEM) estimates that approximately 50,000 Rhode Island vehicles are retired annually. Based on a model developed by the Maine Department of Environmental Protection with input from industry representatives, **RI DEM projects that approximately 602 lbs. of mercury remains in convenience light switches in vehicles registered in Rhode Island.** In addition to this mercury from cars registered in Rhode Island, Metals Recycling processes approximately 60,000 vehicles from out-of-state each year. Of these vehicles, approximately 24,000 are in a condition from which mercury switches could be recovered. Independent auto recyclers also process an unknown number of out-of-state vehicles. **From this pool, it is estimated that 43 pounds of mercury are available per year to feasibly be collected from mercury switches in Rhode Island.**

The subgroup developed a creative approach to capture and dispose of mercury switches from auto parts, which grants a significant degree of flexibility for auto manufacturers and affected parties to craft an effective collection program of their own design. The proposed plan strays from recommending a more traditional "command and control" style approach to pollution prevention and instead recommends a performance standard strategy that defines the terms of success for mercury switch removal program. **This market-driven approach will encourage wide participation in the program and minimize the need for the Department of Environmental Management to engage in time-consuming enforcement actions.**

Summary of Recommendations

Based on the information gathered by the subgroup, the following recommendations are offered to prevent mercury pollution from auto parts in Rhode Island.

1. **Recommendation – Establish a disposal ban and collection requirement for mercury switches at vehicle end of life.** The Rhode Island General Assembly should amend the Mercury Reduction and Education Act (RIGL 23-24.9) to establish a disposal ban and collection requirement for auto switches containing mercury. The collection requirement should establish performance criteria for the amount of mercury to be collected by the auto manufacturers on an annual basis. The legislation should specify that, if the capture rates are not met in a timely fashion, RI DEM shall be authorized to adopt regulations establishing a manufacturer funded collection program.

   In developing a plan to meet collection performance criteria, the auto manufacturers should take advantage of the wide range of opportunities to collect mercury components from both vehicles still in-use as well as at the end of the vehicle's use. The plan could include replacing switches at dealerships or safety/emissions inspections, fleet cleanings, as well as collection of switches by auto recyclers and scrap recyclers.

2. **Recommendation – Require auto manufacturers to develop an education and training program regarding mercury removal.** A thorough education and training program should have the objectives to train management of recovery facilities as to their company's responsibility for removing mercury switches and cooperating in the program and to provide hands-on training for employees removing and handling the switches.

3. **Recommendation – Develop Rhode Island Auto Mercury Pollution Prevention Awards Program.** In an effort to encourage greater voluntary participation in mercury reduction and elimination programs by Rhode Island businesses, Rhode Island should consider creating an annual awards program for businesses, institutions, government agencies, or individuals who have made significant strides in the field of reducing mercury pollution from vehicles. The awards should be focused on vehicle fleets voluntarily participating in "switch the switch" programs.

4. **Recommendation – Any of the above changes to current Rhode Island law should maintain an enforcement mechanism consistent with the Mercury Reduction and Education Act** (RIGL 23-24.9-16). The current law requires that a violation of any of the provisions of this law be punishable, in the case of a first violation, by a civil penalty not to exceed one thousand dollars ($1,000). In the case of a second and any further violations, the liability shall be a civil penalty not to exceed five thousand dollars ($5,000) for each violation.

5. **Recommendation – The state should consider defaulting to a comparable national program should it be developed.** In the event that a national program is developed to address collection of mercury from auto parts, the Department of Environmental Management should consider deferring to the national program, provided it is consistent with the purposes and policies of Rhode Island's current auto mercury requirements. A regional or national strategy to address the problem of mercury in vehicles should be encouraged and promoted.

Legislative Background

Since 2002, legislation to specifically address mercury from auto parts has been introduced and heard by the Rhode Island General Assembly, but not passed. The Mercury-Free Vehicle Act would establish a comprehensive program to phase out the use of mercury-added components from motor vehicles and require the auto manufacturers to fund a system to remove collect and recycle mercury-added components from motor vehicles at no cost to the owners with a target removal rate of 90 percent a year.

During the 2004 session, members of the General Assembly recognized that the Mercury Reduction Oversight Commission has the mission to prevent human sources of mercury from contaminating the environment (air, water, soil) and is an appropriate body to make recommendations to address the challenge of mercury pollution from auto parts before legislative action occurs. In 2004, both houses of the Rhode Island General Assembly passed resolutions "respectfully urging the Mercury Reduction Oversight Commission to prevent mercury pollution from auto parts." (See Appendix 1)

Specifically, the resolution urged the Mercury Reduction Oversight Commission to develop a plan to address the collection and recycling of mercury added auto parts in a manner that is convenient and minimizes costs to taxpayers and consumers and to submit to the General Assembly no later than January 30, 2005 a recommended plan, including any legislation necessary to implement the plan, for the collection and recycling of mercury-added auto parts that utilizes producer responsibility.

The resolution noted that the Mercury Reduction and Education Act passed in 2001 acknowledged the dangers of mercury contamination and prohibited the disposal of mercury-added products by means other than recycling or hazardous waste disposal but exempts mercury-added components as contained in motor vehicles from the disposal ban (23-24.9-9) and collection plan (23-24.9-10). Additionally, the resolution noted that the state currently has no system to address the need to collect mercury added to auto parts before they are incinerated or otherwise released into the environment.

The resolution recommends the following characteristics for a plan to address mercury from auto parts:

- An effective mercury product recycling system must be convenient and minimize costs to taxpayers and to consumers.
- Auto manufacturers should be responsible for ensuring proper handling, recycling and disposal of discarded products and the costs associated with consolidation, handling and recycling be internalized by the manufacturers.
- A system of producer responsibility for the collection and recycling of mercury-added auto parts is the most effective and equitable means of keeping this toxic waste out of the waste stream and environment, while also providing a powerful incentive for manufacturers to reduce toxins and re-design products for recycling.
- Auto manufacturers should have the flexibility to act in partnership with each other, with state, municipal and regional governments and with businesses that provide collection and handling services to develop, implement and promote a safe and effective recycling system for mercury-added auto parts.

Risks of Mercury Pollution

The General Assembly's resolution noted that mercury from auto parts threatens the health of Rhode Islanders and that the Rhode Island Department of Health warns young children and pregnant or nursing women not to eat any freshwater fish caught in Rhode Island due to mercury contamination.

Studies continue to show the dangers of mercury. In comments to the U.S. EPA in 2004, the Northeast States for Coordinated Air Use Management (NESCAUM) noted that, "over 15,000 fish samples collected in the Northeast region confirm widespread mercury contamination of our aquatic ecosystems, irreparably threatening human health and wildlife unless actions are taken to reduce significant sources of mercury emissions. All Northeast states have issued fish consumption advisories because of mercury contamination. In addition to the toll on human health and wildlife, mercury contamination also threatens the tourist and recreational fishing industries, which contribute $3 billion a year to our regional economy."

Additionally, new studies from the past year document that even more children in America than previously thought are endangered by mercury pollution, and that health damage to the developing child is a greater risk, broader and can be more permanent than previously believed.

Scientists with the Environmental Protection Agency now estimate that one in six women of childbearing age have unsafe mercury levels. This translates into over 630,000 children born in the United States at risk from mercury exposure each year.

A recent Harvard School of Public Health study found that the health problems from prenatal mercury exposure are irreversible and add up as the child grows older. In addition to the problems that begin prenatally, the study documents that children develop more health problems from eating mercury-contaminated fish as they get older.

NESCAUM summarized the problem by stating that, in the Northeast, the prospect of over 84,000 newborns potentially at-risk for irreversible neurological deficits and cardiovascular abnormalities from mercury exposure represents one of the most critical public health threats in our region today.

Mercury Components in Auto Parts

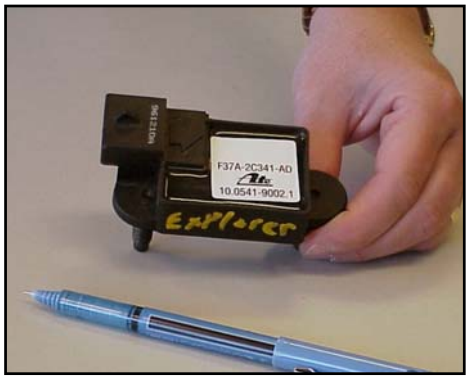
Historically, mercury has been used most in convenience lighting in trunk and hood lights, anti-lock brake applications, and ride-control systems. While these applications are being phased out, new uses, including mercury-vapor fluorescent and high intensity discharge (HID) headlamps and backlit panel displays, have been introduced. Other automobile parts that may contain mercury include acceleration sensors for air bags, seatbelts, rechargeable batteries for radios, batteries for remote transmitters, switches for vanity mirrors, heated rear windows and speedometer systems.

The Maine Department of Environmental Protection's January 2002 report, *Reducing Mercury Releases from Maine Motor Vehicles* analyzed the use of mercury in auto parts and is attached as Appendix 2.

The following pictures* denote some uses of mercury in auto parts.

Convenience Light Switch

Placement of light switch in hood



ABS switch unit for a Ford Explorer

ABS switch unit for a Jeep

*Pictures from *Reducing Mercury Releases from Maine Motor Vehicles,* Maine Department of Environmental Protection, January 2002.

Finding, Removing, and Replacing Mercury Switches

The Environmental Protection Agency has compiled a useful set of resources finding, removing, and replacing mercury switches. The website includes instructions from Ford, GM, and Chrysler about how to remove mercury switches from cars. Additionally, the site lists state agency materials about switch replacement programs. These instructions would provide the basis for a training program for removal or replacement of mercury switches. The information is available online at www.epa.gov/ARD-R5/mercury/autoswitch.htm#remove.

Additionally, the IMERC notification database (www.newmoa.org) provides information about which vehicles contain mercury components.

Magnitude of the Mercury Problem in Auto Parts in RI

The General Assembly resolution noted that an estimated 890 pounds of mercury has been released from Rhode Island autos over the past 30 years and an equal amount could be released over the next two decades if action is not taken soon to recover the mercury from vehicles before they are scrapped. These numbers are derived from auto manufacturers estimated usage numbers reported in the *Mercury in Vehicles Update* (Appendix 3), a state-by-state report by the Clean Car Campaign on automotive mercury releases to the environment in 2004.

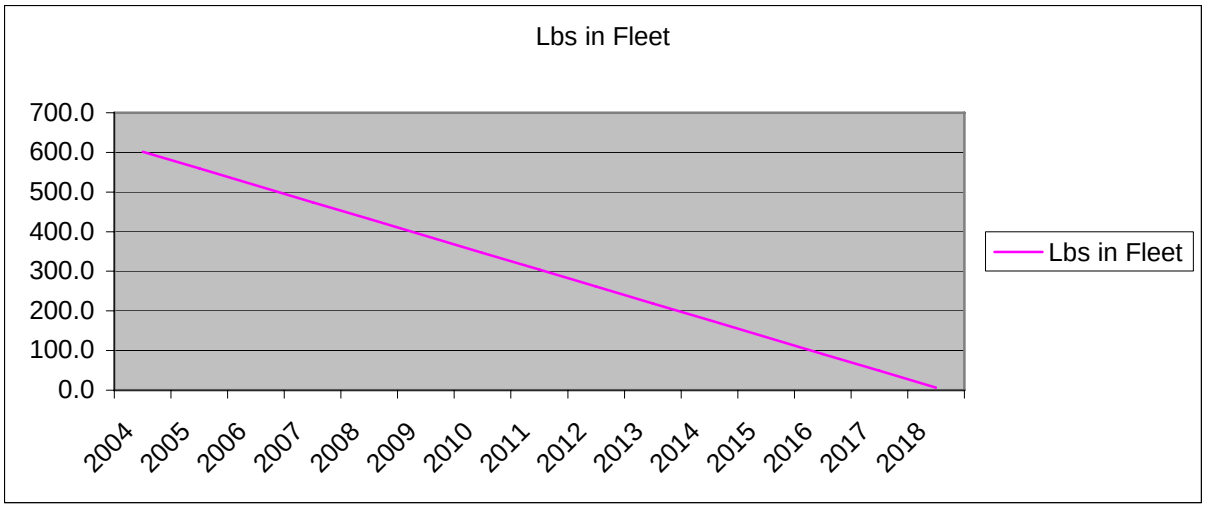
The Rhode Island Department of Environmental Management estimates that approximately 50,000 Rhode Island vehicles are retired annually. Based on a model developed by the Maine Department of Environmental Protection with input from industry representatives, RI DEM projects that approximately 602 lbs. of mercury remains in convenience light switches in vehicles registered in Rhode Island. These conservative projections are based on assumptions that each convenience light switch contains one gram of mercury, and that there are .6 switches per vehicle.

In addition to the cars registered in Rhode Island, independent auto recyclers and Metals Recycling process other cars from out-of-state. Metals Recycling LLC is in Johnston, Rhode Island where it operates a shredder and a 1000-ton shear. The company also operates an export terminal in the Port of Providence. Metals Recycling supplies domestic mills with scrap metal, primarily by rail, and exports scrap to many foreign destinations, including China, Korea, Malaysia, and Mexico.

Metals Recycling reports that they process approximately 20,000 cars a month. Approximately 60% to 70% of these cars arrive in a flattened (crushed) condition and removal of mercury switches would not be feasible. Approximately 50% of the cars are from in-state and 50% are from outside of Rhode island (mostly Connecticut and Massachusetts). Therefore, approximately 24,000 vehicles are in a condition from which Metals Recycling could recover mercury switches from out-of-state vehicles. The number of out-of-state vehicles processed by independent auto recyclers is unknown.

Overall from this pool of in-state and out-of-state vehicles, the subgroup estimates that 43 pounds of mercury are available per year to feasibly be collected from mercury switches in Rhode Island.

The following chart produced by RI DEM projects the amount of mercury available to be collected from convenience light switches from 2004 through 2017. These numbers are based on a projected 6.6% retirement rate.



Cost Analysis

The Maine Department of Environmental Protection's January 2002 report, *Reducing Mercury Releases from Maine Motor Vehicles* (Appendix 2) analyzed the costs of removing auto mercury components. The costs include labor, recycling, transportation, and safety measures. Maine calculated that program costs for removal and recycling of mercury light switches range from 40¢ to 90¢ per switch.

The New Jersey Department of Environmental Protection's, March 2004 report, *Mercury Switch Data Collection Pilot Project* (Appendix 4) found the total cost for mercury switch removal, handling, transportation, proper disposal and record keeping is conservatively estimated to be $3.00 per switch.

However, these costs do not include an outreach and training program to ensure participation or administrative oversight by the state agency.

Early analysis of the implementation of Maine's collection program has shown that another important aspect of the cost of the program to be considered is the need to provide an adequate incentive for auto recyclers to participate in the collection program. *Mercury Switch Removal from Motor Vehicles in Maine* (Appendix 5) reports on the status of the first year of the implementation and recommends increasing the $1 bounty currently offered by the state's program. Legislation has been introduced in Maine to follow that recommendation.

Based on the Department's estimates of the magnitude of the problem of mercury in auto parts, it is estimated that a collection and disposal program for mercury switches in Rhode Island would cost approximately $200,000 per year.

Challenges to Collecting and Recycling Mercury-Containing Auto Parts in Rhode Island

The subgroup found that while infrastructure exists for collecting mercury switches through processors of end-of-life vehicles, the primary obstacle to collection is the need for an economic incentive to ensure participation in a collection program.

Auto recyclers and scrap recyclers acquire vehicles in various states of functionality such as insurance wrecks and end of live vehicles. Their only economic reward lies in their ability to extract value via the resale of parts and/or scrap. For example, the only value in an end of life vehicle might be its aluminum wheels, catalytic converter, and its scrap value. Aluminum wheels average $9/wheel, catalytic converters average $25, and a scrap body could net $100 – 150 for a total average value of $186. Because mercury-containing parts have no monetary value, there is no economic incentive to extract them from vehicles.

The need for an economic incentive derives from the negative value associated with the mercury. Unlike the other materials that are handled by licensed facilities, i.e. gas, batteries, anti-freeze, etc, mercury is a toxic chemical with no value.

Material	Value	Cost
Batteries	Resale or sold for scrap	n/a
Gas	Filtered and used in vehicles	n/a
Anti-Freeze	Used on-site, given to customers/ waste recyclers	n/a
Freon	R12 sold to recyclers	n/a
Tires	Resale to wholesale/retail customers,	Pay to remove
scrap		
Oils*	Burn in Waste Oil Furnace or sell to Oil Recyclers	n/a
Catalytic Converter	Resale to recyclers	n/a

*includes motor oil, transmission fluid, power steering fluid, and brake fluid.

The direct costs associated with mercury removal for the licensed auto recycler include:

- Training
- Removal of the switch assembly from hood and trunk, if applicable
- Removal of the pellet from the plastic housing
- Storage
- Transportation
- Record keeping
- Disposal

The indirect cost associated with mercury removal is the potential regulatory costs for handling and removal (OSHA, RI DEM, EPA), legal and penalty costs, and potential insurance rate hikes in liability and workers comp insurance.

There are 85 licensed auto recyclers in Rhode Island, and the average facility is a family enterprise employing less than 10 people. The scope of responsibility and liability for mercury recovery with little or no economic incentive is disproportionate to most auto recyclers' primary business function.

A major "indirect" component of the need for an economic incentive is to give the automakers a disincentive for including mercury-added products in their automobiles. By passing off the liability and penalties associated with the handling of mercury, the automakers have lessened their liability.

Non-hazardous mechanical switches were used for many years and yet the automakers introduced mercury switches into millions of automobiles. The legal and financial burden and responsibility for the removal of mercury switches from automobiles should not be put solely on the auto recyclers.

Current Requirements Regarding Mercury in Auto Parts

The Subgroup on Auto Parts would like to note its support for the following provisions in existing law to address mercury in auto parts:

Public education and outreach program: The Mercury Reduction and Education Act (RIGL 23-24.9-14) requires the RI DEM director to coordinate an education program regarding the hazards of mercury; the requirements and obligations of individuals, manufacturers, and agencies under this law; and voluntary efforts that individuals, institutions, and businesses can undertake to help further reduce mercury in the environment.

The subgroup also encourages other non-governmental organizations and interested parties to continue outreach and education efforts to inform the general public about opportunities to reduce the hazards of mercury pollution from auto parts.

Labeling of mercury in auto parts: The Mercury Reduction and Education Act (RIGL 23-24.9-8) requires that effective July 1, 2005, a manufacturer shall not sell at retail in this state or to a retailer in this state, and a retailer shall not knowingly sell, a mercury-added product unless the item is labeled pursuant to this subsection.

Phase out of mercury in auto parts: The Mercury Reduction and Education Act (RIGL 23-24.9-7) requires that no mercury-added product shall be offered for final sale or use or distributed for promotional purposes in Rhode Island if the mercury content of the product exceeds:
(1) One gram (1000 milligrams) for mercury-added fabricated products or two hundred fifty (250) parts per million (ppm) for mercury-added formulated products, effective July 1, 2005;
(2) One hundred (100) milligrams for mercury-added fabricated products or fifty (50) parts per million (ppm) for mercury-added formulated products, effective July 1, 2007; and
(3) Ten (10) milligrams for mercury-added fabricated products or ten (10) parts per million (ppm) for mercury-added formulated products, effective July 1, 2009.

The law specifically notes that products that contain more than one mercury-added product as a component, the phase-out limits specified apply to each component and not the sum of the mercury in all of the components. The law states, “For example, for a car that contains mercury-added switches and lighting, the phase-out limits would apply to each component separately, and not the combined total of mercury in all of the components.”

Other Options Considered

The Subgroup on Auto Parts considered but rejected the possibility of a state-funded switch removal and collection program developed by RI DEM as well as the possibility of a mandate for the auto recyclers to collect mercury switches without providing an economic incentive. By reviewing programs from other states, and in consultation with recyclers in Rhode Island, the subgroup determined that an economic incentive would be a critical component for implementing an auto mercury switch collection program.

The end-of-life auto dismantling system works on the basis of incentives: removing parts for their re-sale or bounty value. The payment for mercury switches is a necessary market incentive to encourage auto recyclers to collect mercury switches. Trying to enforce their collection without this incentive would be unwieldy to enforce for RI DEM and an unfunded burden on the auto recyclers.

Additionally, the State has no financial means to cover the budget for the proper collection and disposal of these mercury components.

Lastly, the resolution passed by both houses of the General Assembly recommends a producer responsibility model. The resolution notes that a system of producer responsibility for the collection and recycling of mercury-added auto parts is the most effective and equitable means of keeping this toxic waste out of the waste stream and environment, while also providing a powerful incentive for manufacturers to reduce toxins and re-design products for recycling. The following recommendations follow that model.

Recommendations

1. **Recommendation – Establish a disposal ban and collection requirement for mercury switches at vehicle end of life.** The Rhode Island General Assembly should amend the Mercury Reduction and Education Act (RIGL 23-24.9) to establish a disposal ban and collection requirements for auto switches containing mercury. The collection requirement should establish performance criteria for the amount of mercury to be collected by the auto manufacturers on an annual basis. The legislation should specify that, if the capture rates are not met in a timely fashion, RI DEM shall adopt regulations to establish a manufacturer funded collection program.

   In developing their plan to meet collection performance criteria, the auto manufacturers should note the wide range of opportunities to collect mercury components from both vehicles still in-use as well as at the end of the vehicle's use. The plan could include replacing switches at dealerships or safety/emissions inspections, fleet cleanings, as well as collection of switches by auto recyclers and scrap recyclers.

   We recommend establishing "43 lbs." as the target for the first two years and then require the Department of Environmental Management to set the target by for years thereafter. This target is reasonable based on our analysis of the magnitude of the problem of mercury in auto parts in Rhode Island (see page 6), and setting this specific target for the first two years would avoid an unnecessary delay in implementing the legislation

The subgroup recommends the following changes to the Mercury Reduction and Education Act regarding the collection of mercury-added products:

23-24.9-9 Disposal ban. – (a) After July 1, 2005, no person shall dispose of mercury-added products in a manner other than by recycling or disposal as hazardous waste. Mercury from mercury-added products may not be discharged to water, wastewater treatment, and wastewater disposal systems except when it is done in compliance with local, state, and federal applicable requirements.

(b) If a formulated mercury-added product is a cosmetic or pharmaceutical product subject to the regulatory requirements relating to mercury of the federal food and drug administration, then the product is exempt from the requirements of this section.

(c) This section shall not apply to: (1) anyone who disposes of a mercury-added button cell battery; or (2) ~~mercury-added components as contained in motor vehicles; and (3)~~ households disposing of lamps and products containing lamps.

(d) This section shall not apply to mercury-added components as contained in motor vehicles unless the Department promulgates regulations in accordance with 23-24.9-10 (e).

23-24.9-10 Collection of mercury-added products. (a) After July 1, 2005, no mercury-added product shall be offered for final sale or use or distribution for promotional purposes in Rhode Island unless the manufacturer either on its own or in concert with other persons has submitted a plan for a convenient and accessible collection system for such products when the consumer is finished with them and the plan has received approval of the director. Where a mercury-added product is a component of another product, the collection system must provide for removal and collection of the mercury-added component or collection of both the mercury-added component and the product containing it.

(b) This section shall not apply to the collection of mercury-added button cell batteries or mercury-added lamps or products where the only mercury contained in the product comes from a mercury-added button cell battery or a mercury-added lamp; and

~~(2) This section shall not apply to motor vehicles.~~

(2) Manufacturers of motor vehicles sold in Rhode Island that contain mercury switches shall, individually or collectively, establish and implement a collection program for mercury switches as follows:

a) In accordance with 23-24.9-9, the program shall be developed to meet the goal of collecting and recycling no less than 43 pounds of mercury from switches removed from motor vehicles per year for the calendar years 2006 and 2007. For following years, the Department shall review the goal and establish target collection rates for the program.

b) By September 1, 2005, submit a plan outlining the proposed collection program to the Department. At a minimum, the plan must:

i) Explain how the goal is anticipated to be met through implementation of the plan
ii) Ensure that mercury switches collected are managed in accordance with the universal waste rules adopted by the Department;
iii) Provide the department and persons who remove motor vehicle components under this section with information, training and other technical assistance required to facilitate removal and recycling of the components in accordance with the universal waste rules;

iv) Make available to the public information concerning services to remove mercury light switches in motor vehicles

c) Implement said plan, with any adjustments or recommendations provided by the Department, by January 1, 2006.

d) Provide quarterly reports to the Department beginning March 31, 2006 on the number of switches collected and the amount of mercury collected and recycled through the program.

e) In the event that collections do not meet the goals of the program in any calendar year, the Department shall develop and implement regulations within six months compelling the manufacturers of motor vehicles sold in Rhode Island to undertake an alternative collection program. The total cost of the removal, replacement, collection, and recovery system for mercury switches shall be borne by the manufacturer or manufacturers. Costs shall include, but not be limited to the following: (1) labor to remove, or replace where possible, mercury switches. Labor shall be reimbursed at the prevailing rate auto manufacturers use to reimburse automotive dealers for replacing faulty switches under the manufacturer-dealer warranty program; (2) training; (3) packaging in which to transport mercury switches to recycling, storage or disposal facilities; (4) shipping of mercury switches to recycling, storage or disposal facilities; (5) recycling, storage or disposal of the mercury switches; (6) public education materials and presentations; and (7) maintenance of all appropriate systems and procedures to protect the environment from mercury contamination.

1. **Recommendation – Develop an education and training program regarding mercury removal.** A thorough education and training program would have the following objectives:
   1) Train management of recovery facilities as to their company's responsibility for removing mercury switches and cooperating in the program
   2) Provide hands-on training for employees removing and handling the switches.

   The following aspects of mercury recovery should be included in any training program:
   - Responsibility
   - Identification
   - Safety
   - Removal/Handling
   - Record Keeping
   - Storage
   - Cleaning Up Mercury Spills
   - First Aid Measures
   - Transportation

   An effective program would make use of existing resources from states and agencies that have already developed materials including those available in New York (Appendix F) and Maine. Specific funding will need to be available to implement an outreach and education program.

2. **Recommendation – Develop Rhode Island Auto Mercury Pollution Prevention Awards Program.** A wide variety of Rhode Island businesses, industries, organizations, and non-profits play a key role in protecting Rhode Island's environment. This is especially true when it comes to removing mercury (e.g. switches and other mercury components) from automobiles before final disposal (e.g. dismantled and shredded). Some companies and organizations are already making an effort to remove mercury from cars – but more can be done to help eliminate mercury releases from end-of-life vehicles (ELVs).

In an effort to encourage greater participation in mercury reduction and elimination programs by Rhode Island businesses which handle ELVs, the State should develop an annual awards program for businesses, institutions, government agencies, or individuals who have made significant strides in the field of reducing mercury pollution from vehicles. Award recipients will have demonstrated a commitment to the environment and the health and public safety of Rhode Island residents.

Any person, company, or organization in the state may apply for the award or be nominated. This includes business and industry, educational institutions, local governments, state and federal agencies and public utilities. Work must have been done in the State of Rhode Island and may not have been completed more than 1 year prior to the nomination, although the work may have spanned any number of years.

Winning projects should have achieved significant and practical reductions in the use, release or generation of mercury intended for use in vehicles – including product development, improvements in process or procedure, substitution of different materials for mercury in vehicles, technological modifications, or improved management practices.

3. **Recommendation – Any of the above changes to current Rhode Island law should maintain an enforcement mechanism consistent with the Mercury Reduction and Education Act (RIGL 23-24.9-16).** The current law requires that a violation of any of the provisions of this law or any rule or regulation promulgated pursuant thereto shall be punishable, in the case of a first violation, by a civil penalty not to exceed one thousand dollars ($1,000). In the case of a second and any further violations, the liability shall be for a civil penalty not to exceed five thousand dollars ($5,000) for each violation.

4. **Recommendation – The state should consider defaulting to a comparable national program should it be developed**. In the event that a national program is developed to address collection of mercury from auto parts, the Department of Environmental Management should consider opting into the national program, provided it is consistent with the purposes and policies of Rhode Island's current auto mercury requirements. A regional or national strategy to address the problem of mercury in vehicles should be encouraged and promoted.

Auto Sub-Group Appendices and Resource List

Appendix 1
Rhode Island General Assembly resolutions "respectfully urging the Mercury Reduction Oversight Commission to prevent mercury pollution from auto parts"
http://www.rilin.state.ri.us/Billtext/BillText04/HouseText04/H8639.pdf

Appendix 2
Reducing Mercury Releases from Maine Motor Vehicles
Report from the Maine Department of Environmental Protection
January 2002
http://mainegov-images.informe.org/dep/rwm/mercury/pdf/Auto%20Releases.pdf

Appendix 3
Mercury in Vehicles Update
Clean Car Campaign Report April 2004
http://www.cleancarcampaign.org/releases/20040407mercury.shtml

Appendix 4
Mercury Switch Data Collection Pilot Project
New Jersey Department of Environmental Protection Report March 2004
http://www.state.nj.us/dep/dsr/hg-switch/index.htm

Appendix 5
Status Report (January 2004): Mercury Switch Removal From Motor Vehicles in Maine
Maine Department of Environmental Protection
http://mainegov-images.informe.org/dep/rwm/publications/legislativereports/pdf/finalreport.pdf

Appendix 6
Automotive Mercury Switch Recycling Project
New York State Department of Environmental Conservation
http://www.dec.state.ny.us/website/ppu/p2autosw.html

Available Resources Regarding Mercury in Auto Parts

1. **Maine DEP Report (January 2002): Reducing Mercury Releases From Maine Motor Vehicles**
   Maine Department of Environmental Protection's (DEP) initial report from 2002 from their stakeholders group to develop a plan to address mercury from auto parts. The group included representatives from agency staff, auto manufacturers, auto recyclers and environmentalists. It is called: A Plan to Reduce Mercury Releases from Motor Vehicles in Maine.
   http://www.state.me.us/dep/rwm/mercury/pdf/Auto%20Releases.pdf

2. **Maine Mercury Motor Vehicle Law As Adopted by the Maine Legislature**
   http://janus.state.me.us/legis/statutes/38/title38sec1665-A.html

3. **The Compliance Plan from the Alliance of Automobile Manufacturers (AAM) (as approved by the Maine DEP)**
   http://janus.state.me.us/legis/statutes/38/title38sec1665-A.html

4. **Judgments from the AAM lawsuit against the state of Maine**
   Magistrate Judge Kravchuk's recommendation providing an analysis rejecting the automakers' claims:
   http://www.med.uscourts.gov/Site/opinions/kravchuk/2003/MJK_07172003_1-02cv149_Alliance_v_Kirkpatrick_AFFIRMED_02172004.pdf.

   The second is the Judge Woodcock's affirmance of the initial judgment:
   http://www.med.uscourts.gov/Site/opinions/woodcock/2004/JAW_02172004_1-02cv149_ALLIANCE_V_KIRKPATRICK.pdf

5. **Mercury Switch Removal from Motor Vehicles**
   The Maine DEP's report about the progress of the first year and survey of the auto recyclers about the implementation.
   Status Report (January 2004): Mercury Switch Removal From Motor Vehicles in Maine

6. **The Mercury Free Vehicle Act**
   This bill has been introduced by Rep. Peter Ginaitt and Sen. Dominick Ruggerio to address mercury in auto parts. The General Assembly decided not to take action on these bills until getting a report from the Mercury Reduction Oversight Commission. The House version of the bill is available online at:
   http://www.rilin.state.ri.us/Billtext/BillText04/HouseText04/H7179.pdf

   General Assembly House and Senate resolutions, "respectfully urging the Mercury Reduction Oversight Commission to prevent mercury pollution from auto parts."
   http://www.rilin.state.ri.us/Billtext/BillText04/HouseText04/H8639.pdf
   http://www.rilin.state.ri.us/Billtext/BillText04/SenateText04/S3209.pdf

7. **NEWMOA**
   Northeast Waste Management Officials' Association
   www.newmoa.org

8. **IMERC**
   Interstate Mercury Education and Reduction Clearinghouse
   http://www.newmoa.org/Newmoa/htdocs/prevention/mercury/imerc.cfm

9. **NESCAUM**
   Northeast States for Coordinated Air Use Management
   www.nescaum.org

10. **Mercury in Vehicles Update**
    Clean Car Campaign report on automotive mercury releases to the environment state-by-state. http://www.cleancarcampaign.org/

11. **Partnership for Mercury Free Vehicles letter to policy makers supporting the Mercury-Free Vehicle Act**
    The Partners are: Automotive Recyclers Association / Clean Car Campaign / Clean Production Network / Great Lakes United / Ecology Center / Environmental Defense / Institute of Scrap Recycling Industries, Inc. / Mercury Policy Project / Steel Manufacturers Association / Steel Recycling Institute http://www.cleancarcampaign.org/

12. **Removal and Replacement of Mercury Switch in 1970-1988 GM Hood and Trunk Lighting Assembly (instructions with photographs)**
    www.cleancarcampaign.org

13. **State of Vermont 2000-2003 Mercury Use by Model Data, Updated April, 2003**
    www.cleancarcampaign.org/mercury.shtml

14. **States Call For Removal of Toxic Car Part: Attorneys General Say Mercury Light Switch Poses Major Environmental Hazard.** Media statement from A.G. Eliot Spitzer and 25 other attorneys general and Attorneys General letters to Ford Motor Company.
    www.cleancarcampaign.org

15. **U.S. EPA page on Auto Mercury Switch Removal**
    This page contains links to information related to automotive mercury, including:
    Information on how to find, remove, and replace mercury switches used in convenience lighting in various types of vehicles; http://www.epa.gov/region5/air/mercury/#remove
    Guidance from New York State Department of Environmental Conservation (NYSDEC) on regulatory issues related to auto mercury switch removal;
    http://www.epa.gov/region5/air/mercury/#guidance
    Information about NYSDEC programs to promote proper management of mercury-containing switches in autos. http://www.epa.gov/region5/air/mercury/#programs
    Information on this page was supplied by NYSDEC, as well as by the Auto Alliance.
    http://www.epa.gov/region5/air/mercury/autoswitch.htm

16. **In-Service Mercury Switch Review**
    Michigan report recommending using scrap yards to remove switches rather than having automakers conduct a recall.
    http://www.deq.state.mi.us/documents/deq-ess-p2-mercury-InServiceReview.pdf

Source: USGS website http://wi.water.usgs.gov/pubs/FS-216-95/ , Figure 6.

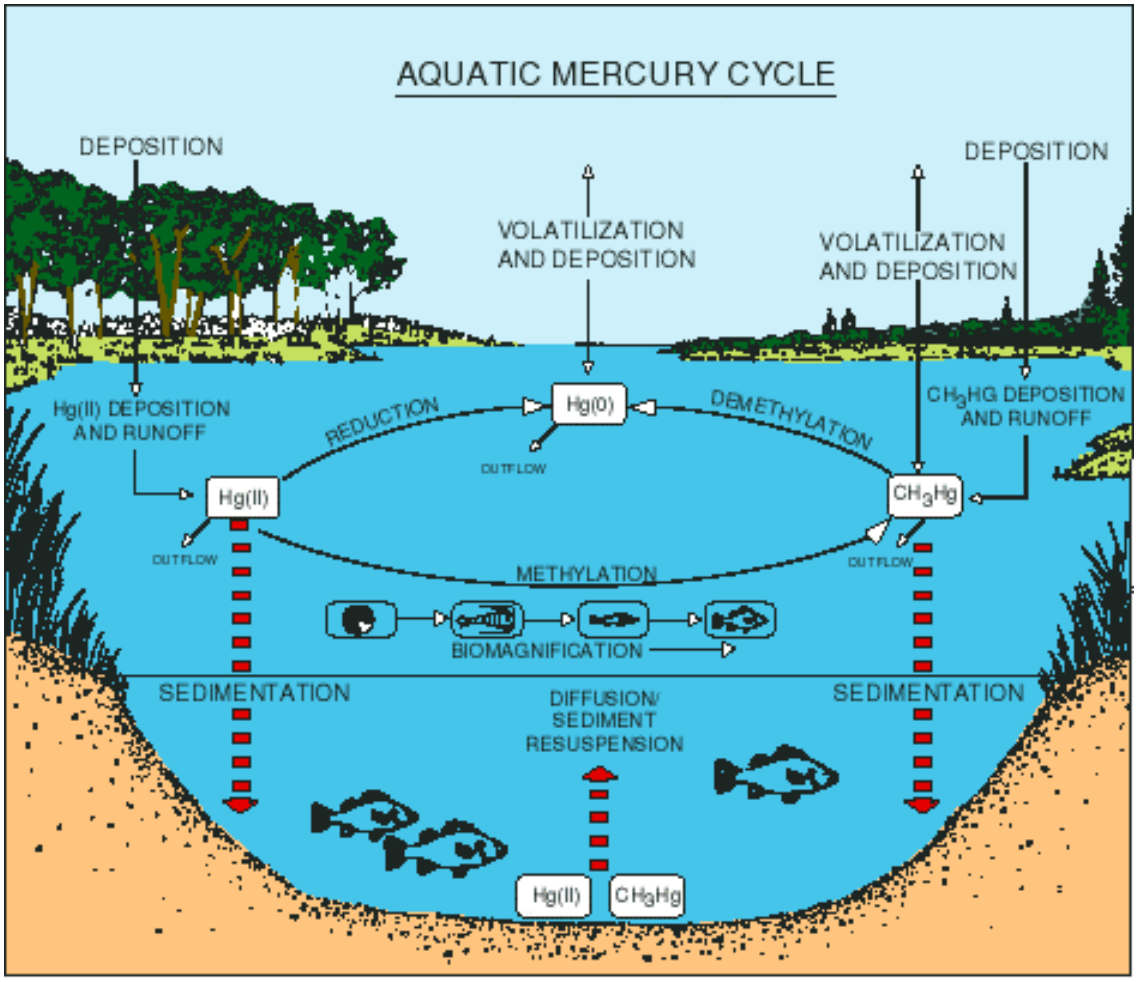


Figure 6. *Mercury cycling pathways in aquatic environments are very complex. The various forms of mercury can be converted from one to the next; most important is the conversion to methylmercury (CH_3Hg^+), the most toxic form. Ultimately, mercury ends up in the sediments, fish and wildlife, or evades back to the atmosphere by volatilization. Reprinted with permission from Mercury Pollution: Integration and Synthesis. Copyright Lewis Publishers, an imprint of CRC Press.*