

STATE OF CONNECTICUT

**TOWARD THE VIRTUAL ELIMINATION
OF MERCURY FROM THE SOLID
WASTE STREAM**

March 2000



DEPARTMENT OF
ENVIRONMENTAL PROTECTION
79 Elm Street
Hartford, CT 06106-5127

Arthur J. Rocque, Jr., Commissioner

This mercury report is submitted in accordance with Public Act 99-228.

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1.0 Executive Summary

This report is submitted by the Commissioner of the Connecticut Department of Environmental Protection (CT DEP) in accordance with Public Act 99-228 to provide information to the Governor and General Assembly on ways to eliminate mercury from the solid waste stream (see Appendix A). The report focuses on two initiatives: (1) collecting existing stocks of elemental mercury from households and schools and (2) ensuring that elemental mercury and mercury in products are not released to the environment in the future.

Mercury can affect human health in a number of ways depending on the route of exposure, the dose, the duration of exposure, and the type of mercury. Exposure to high levels of elemental mercury (inorganic) or methylmercury (organic) can permanently damage the brain, kidneys and the developing fetus. Mercury can cause behavioral changes such as shyness, irritability, tremors, changes in vision or hearing and memory problems. The U.S. Environmental Protection Agency (US EPA) has determined that mercuric chloride and methylmercury are possible human carcinogens.¹ Mercury is also detrimental to fish-eating animals such as loons and minks. In Nova Scotia, scientists have discovered that mercury is impairing the reproductive process in loons.² The U.S. Agency for Toxic Substances and Disease Registry (ATSDR) places mercury third on its priority list of hazardous substances.

Although the mercury cycle is not entirely understood, scientists have determined that mercury can be transported in the atmosphere and deposited in lakes, streams and other water bodies. In the environment, elemental mercury is converted readily to methylmercury. Methylmercury bioaccumulates in the food chain. Such high concentrations of methylmercury have been found in certain fish in Connecticut have caused the Connecticut Departments of Public Health and Environmental Protection to issue fish consumption advisories for mercury for all of Connecticut's freshwater bodies (Appendix B). High risk groups (children under six, pregnant women and women planning on becoming pregnant) are advised to limit consumption of fish from freshwater in Connecticut to one meal per month and none at all from Lake Wyassup, Lake McDonough, Silver Lake in Berlin and Dodge Pond. All others should restrict their intake from these water bodies to one meal per month.

The incineration of mercury-containing products and spills of elemental mercury contribute to the presence of mercury from manmade sources in the environment. The United States Environmental Protection Agency indicated in its 1997 Mercury Study that mercury emissions are a particular concern in the Northeast and that one of the leading sources of mercury emissions is waste combustors (resource recovery facilities, medical waste incinerators and sludge incinerators).³ A regional study released in February 1998 by a consortium of Canadian and New England interstate environmental organizations indicated that resource recovery facilities and sewage sludge incinerators accounted for 48% of

¹ Mercury Fact Sheet, Agency for Toxic Substances and Disease Registry, April 1999.

² Martin Mittlestadt, "Mercury Rising" *Globe and Mail*, January 13, 2000.

³ United States Environmental Protection Agency, "Mercury Report" Volume II, pgs. ES4 - ES8.

speciated mercury emissions from Northeast sources.⁴ Because Connecticut relies heavily on resource recovery facilities to manage our solid waste, the state must be especially attentive to eliminating mercury from its solid waste stream. While waste-to-energy facilities in Connecticut are adding new emission controls for mercury, even these more stringent controls do not capture all of the mercury and that mercury which is captured ends up in the facility ash residue. In addition, mercury is released from products when it is spilled or broken before it is incinerated. For these reasons, the Department supports source reduction as the best approach.

The ATSDR reports that “mercury has been the most frequently encountered chemical in our emergency response program for the last eight years”.⁵ The Connecticut Poison Control Center at the University of Connecticut Health Center received 542 calls regarding mercury exposure in 1998. Of this number, 58 patients were evaluated for mercury exposure. Mercury spills also occurred at schools. There were 11 reported school spill incidents from January through October of 1999. A spill in a storage trailer at a Clinton High School will cost \$250,000 to remediate.

In addition to the health advisory mentioned above, Connecticut has undertaken a series of initiatives to begin to address the mercury problem. In 1990 the General Assembly required the elimination of mercury from most packaging (CGS Section 22a-255g-255m), and in 1992 it restricted the level of mercury in alkaline batteries (CGS Section 22a-256d). The CT DEP identified mercury as a priority pollutant in the state Pollution Prevention Plan (1996) and has promulgated regulations that require resource recovery facilities to meet a standard for mercury emissions stricter than that adopted by the federal government (RCSA Section 22a-174-38). Similar standards are under consideration for medical waste incinerators. The University of Connecticut Environmental Research Institute, under contract to the CT DEP, has monitored mercury concentrations in fish tissue and is now tracking atmospheric mercury levels and mercury deposition through a statewide monitoring network. As part of an ongoing initiative of the Conference of New England Governors and Eastern Canadian Premiers, Governor John Rowland hosted a regional Mercury Summit in January 1999 to generate ideas for reducing and recycling mercury-containing wastes. In November 1999, the Connecticut Council on Environmental Quality issued a report promoting the removal of all mercury-containing products from the waste stream.

The next step is to ensure that existing stocks of elemental mercury are removed from households and schools. Many people who are storing mercury in their cupboards, basements and garages do not understand the magnitude of the health and environmental impact that can occur if the mercury is spilled or improperly disposed. Although less than a single gram of mercury in a lake can contaminate the fish population,⁶ people periodically bring in a pound

⁴ Northeast States for Coordinated Air Use Management, Northeast Waste Management Officials' Association, New England Interstate Waste Pollution Control Commission and Canadian Ecological Monitoring and Assessment Network, “Northeast States and Eastern Canadian Provinces Mercury Study: A Framework for Action”, February 1998, pg. VI-10.

⁵ Barry Johnson, Ph.D., Agency for Toxic Substances and Disease Registry, Congressional Testimony, “The Scientific Aspects of Mercury”, October 1, 1998.

⁶ Indiana Department of Environmental Management, “Statewide Mercury Awareness Program Summary,” June 5, 1998.

or more at a time to household hazardous waste collections. Based on results of mercury collections in other states, CT DEP estimates there may be a total of a thousand pounds or more of elemental mercury stored in Connecticut homes. Elemental mercury is also a concern in school science programs. A serious health and environmental risk results from the fact that often teachers and students are unfamiliar with proper storage, handling and disposal procedures.

At the same time, Connecticut must address the issue of properly managing products that contain mercury so that they do not end up in the solid waste stream. Mercury is found in a number of medical and consumer products. Mercury-containing products include thermostats, switches and relays, thermometers, button cell batteries, blood pressure cuffs and fluorescent lights. Some products, such as energy efficient fluorescent lights, must contain at least a small amount of mercury to operate properly. Other products, such as thermometers, have feasible non-mercury alternatives and, in most cases, should be replaced. Alkaline battery and paint manufacturers have removed mercury entirely from their products. The body of this report includes a discussion of management approaches for many of these mercury-containing products.

For existing mercury-containing products and those products for which there is no feasible non-mercury alternative, collection programs need to be implemented to ensure that the mercury is recycled or safely disposed. Manufacturers need to help design and pay for the collection infrastructures appropriate to the products they produce. The concept of a manufacturer accepting financial responsibility for its product from manufacture through disposal is referred to as “extended producer responsibility” or “product stewardship.”

The type of collection infrastructure needed depends on the nature and function of the product and where it is generated, but every system will require a financial commitment by the manufacturer to educate the consumers and handlers of the products about how safely to collect and manage them. Examples of collection infrastructures in Connecticut include:

- **Household Hazardous Waste Collections.** Residents can take items like elemental mercury, thermometers and small mercury-containing devices to household hazardous waste facilities and collection events. (When the Universal Waste Rule is adopted, some businesses may also be able to utilize these facilities and events for products which heretofore have been more strictly regulated under the hazardous waste section of the Resource Conservation and Recovery Act (RCRA). Under the Universal Waste Rule certain products may be shipped for recycling without using a licensed hazardous waste hauler, record-keeping is simplified, and on-site storage may be longer.)
- **Scrap Metal Businesses.** Automobiles and white goods that have mercury-containing components, such as switches, can be handled by scrap metal dealers who have been educated on how to remove and properly manage the mercury-containing devices.
- **Retail Establishments.** Smaller products which are used in great quantity and which may require frequent changes, such as button cell batteries for hearing aids, could be returned

to a retail establishment. This is already happening with silver oxide batteries collected and recycled by jewelers who repair watches.

- **Reverse Distribution.** Products like fluorescent lamps which are used in great quantity but which are very fragile are already being collected and sent for recycling as the new lamps are installed by property managers.
- **Manufacturer Take-Back Programs .** The Thermostat Recycling Corporation (TRC) has established a collection and recycling program for thermostats utilizing electrical contractors and wholesalers. This program has recently been expanded to include Connecticut.

As more information about mercury-containing products is developed, new products may be identified which cannot effectively be handled through the infrastructures listed above. The Department will work with the manufacturers of such products to ensure that effective collection systems are established.

Connecticut is not alone in its commitment to reducing mercury in the environment. The Conference of New England Governors and Eastern Canadian Premiers in 1998 adopted a Mercury Action Plan. Action Item 3 of the plan says a regional goal is to: “Eliminate or reduce nonessential uses of mercury in household, institutional and industrial products and processes. Segregate and recycle mercury attributable to the remaining uses and or products to the maximum degree possible.” To implement that goal, Connecticut has been working with the Northeast Waste Management Officials Association (NEWMOA) to draft comprehensive model legislative concepts designed to help eliminate manmade mercury emissions by removing mercury and mercury-containing products from the waste stream (Appendix C). The proposal is still being revised, but the present draft would require manufacturers to notify the state of any products containing mercury, phase out certain mercury products, require labels for products containing mercury, ban the disposal in regular solid waste of mercury-containing products, require manufacturers to establish or identify collection programs, restrict the sale elemental mercury and certain mercury products, require manufacturers to disclose mercury content for products used in health care facilities, and provide for public education.

Summary of Connecticut Mercury Report Recommendations

Managing Elemental Mercury

- Prohibit elemental mercury from schools and provide funding for collection and safe management of elemental mercury from schools.
- Working with the Connecticut Dental Association, assess the need for, and if necessary implement a statewide collection of elemental mercury from dental offices. Also assess how dentists are managing waste dental amalgam.
- Limit the sale of elemental mercury to manufacturing, dental amalgam, and research uses only.
- Prohibit the sale of elemental mercury to the general public.
- Encourage residents to bring elemental mercury to household hazardous waste collections.

- Encourage municipalities to provide sufficient collection opportunities for their residents through regional household hazardous waste collections to increase the amount of mercury collected from residents.
- Set a goal for permanently retiring through secure disposal a percentage of elemental mercury collected from residents, schools, health care facilities and offices.
- Fund the Department of Environmental Protection, Department of Public Health, and the Department of Consumer Protection to conduct an educational campaign targeted at households and schools on the dangers of mercury. The campaign should identify how people can safely dispose of elemental mercury and mercury-containing products.
- Conduct educational programs discouraging the ritualistic uses of elemental mercury.⁷

Mercury in Products

- Establish goals for the recovery of specific mercury-containing products.
- Require manufacturers of products containing mercury to notify the CT DEP of the type of product, the amount of mercury in each product, and the total number of units sold annually.
- Prohibit the sale of nonessential products containing mercury.
- Prohibit the disposal of items containing mercury.
- Adopt the Universal Waste Rule and include mercury-containing devices on the list of universal wastes to facilitate the collection of mercury-containing products.
- Require manufacturers to provide labeling that indicates the mercury content of products in order to promote consumer awareness and facilitate collection.
- Use education and enforcement to discourage the disposal of mercury and mercury-containing products in the solid waste stream.
- Encourage hospitals to commit to the American Hospital Association's agreement with the EPA to virtually eliminate mercury wastes by 2005 and provide information on the dangers of mercury to other health care facilities.
- Encourage municipalities to collect fluorescent lamps at permitted recycling facilities.

Manufacturer Take-Back Programs for Mercury-Containing Products

- Promote the Thermostat Recycling Corporation's take-back program and similar programs as they are developed by manufacturers.
- Require manufacturers of products containing mercury to develop a plan for financing a collection infrastructure for their products and submit this plan to the CT DEP for approval.
- Adopt the Universal Waste Rule⁸ and include mercury-containing devices to facilitate manufacturer take-back programs.

A Regional Approach to Eliminating Mercury Wastes – The Northeast Waste Management Officials Association (NEWMOA) Model Legislation

- Adopt legislation and regulations consistent with, and in support of, the Northeast regional effort to achieve virtual elimination of manmade mercury emissions.

⁷ Certain Caribbean cultures use elemental mercury for ritualistic purposes called "Azogue".

⁸ The Universal Waste Rule is a hazardous waste regulation that establishes a less stringent management requirement for certain hazardous wastes which facilitates collection and recycling.

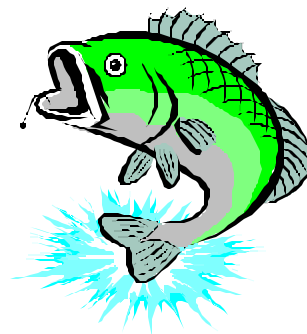
2.0 Introduction

Mercury is a naturally occurring element valued for its chemical and physical properties. It is a very dense metal with a specific gravity greater than lead. Mercury begins to vaporize at room temperature. The warmer the air, the more quickly it vaporizes. It is used in a number of consumer products and industrial processes. It also has well-documented health and environmental impacts. The CT DPH reports that even a small amount of mercury (less than one gram) can represent an exposure risk. Reducing anthropogenic mercury emissions is an important step in protecting human health and the environment. In recognition of this fact, the General Assembly adopted Public Act 99-228, “An Act Concerning Products Containing Mercury and the Universal Waste Rule”, which required the CT DEP to prepare this report on measures to reduce mercury wastes. (Appendix A)

Mercury can affect human health in a number of ways depending on the route of exposure, the dose, the duration of exposure, and the type of mercury. Exposure to high levels of elemental or organic mercury can permanently damage the brain, kidneys and the developing fetus. Mercury can cause behavioral changes such as shyness, irritability, tremors, changes in vision or hearing and memory problems. The EPA has determined that mercuric chloride and methylmercury are possible human carcinogens.⁹

The Agency for Toxic Substances and Disease Registry (ATSDR) places mercury number three on its priority list of hazardous substances. ATSDR reports that “mercury has been the most frequently encountered chemical in our emergency response program for the last eight years”.¹⁰

Methylmercury is an organic form of mercury which bioaccumulates readily in the food chain. When elemental mercury from products such as thermometers, fluorescent lights, and switches is disposed, the mercury may be released into the environment. Through atmospheric deposition, it can then end up in a waterbody, be converted readily by bacteria into methylmercury, and be taken up by plants and eventually fish. When people and wildlife consume this fish in sufficient quantities, they can suffer from toxic neurological effects. Methylmercury also passes easily across the placenta and can harm developing fetuses. Methylmercury rapidly enters the central nervous system and can cause behavioral and neuromotor disorders (ATSDR 1989). The CT DPH and CT DEP have issued a statewide consumption advisory covering certain species of freshwater fish in Connecticut. The CT DPH advises high risk groups, i.e., children under six years old, pregnant women and women planning on becoming pregnant within one year, to limit the amount of freshwater fish they eat from Connecticut waters to one meal per month due to the elevated mercury levels in the fish. These groups are advised to eat no fish from four specific Connecticut waterbodies, Dodge Pond, Lake McDonough, Silver Lake in Berlin, and Lake



⁹ “Mercury Fact Sheet”, Agency for Toxic Substances and Disease Registry, April 1999.

¹⁰ Barry Johnson, Ph.D., Agency for Toxic Substances and Disease Registry, Congressional Testimony, “The Scientific Aspects of Mercury”, October 1, 1998.

Wyassup, where mercury pollution is particularly high¹¹. Similar advisories are in effect in all the other New England states. (Appendix B)

Spills of elemental mercury occur regularly in Connecticut. The Connecticut Poison Control Center received 542 calls regarding mercury exposure in 1998, representing 1.7% of all the calls they received that year. The majority, 429, were related to broken thermometers. In 1998, the Poison Control Center at the University of Connecticut Health Center evaluated 58 patients for mercury exposure.¹² In 1999, the Oil and Chemical Spill Response Division of CT DEP logged 203 calls for mercury spills, the majority of which were broken thermometers in the home. There were 12 reported spills involving schools during this time. Some of these schools discovered that remediating mercury spills can be expensive. A high school in Clinton was faced with a \$250,000 expense after a barometer broke in a trailer containing textbooks. The textbooks had to be replaced and the trailer decontaminated. In another case, a family filed a lawsuit against a Wallingford high school after their home was contaminated by mercury taken from a teacher's desk.

The federal government has identified mercury emissions from waste combustion facilities as a serious problem. Such facilities include resources recovery facilities, sludge incinerators, and medical waste incinerators. The Environmental Protection Agency in its 1997 *Mercury Report* said the Northeast is one of the regions of the country with the highest rates of mercury deposition. *The Mercury Study* released in February of 1998 by a consortium of Canadian and New England interstate environmental organizations indicated that municipal waste combustors and sewage sludge combustors accounted for 48% of speciated mercury emissions for Northeast sources.¹³ Connecticut relies heavily on waste combustion as a means of waste management. It has the highest per capita rate of waste combustion in the nation. In 1999, 82% of Connecticut municipal solid waste (MSW) that required disposal was disposed at one of the state's six resources recovery facilities. That percentage is expected to grow as our few remaining MSW landfills close. Although Connecticut's resources recovery facilities are required to have stringent air pollution controls, the best long-term approach is to reduce as much as possible the amount of mercury and mercury-containing products which enter the waste stream.

At the state, regional, national and international levels, voluntary and mandatory programs have been implemented to reduce the public health and environmental risks associated with anthropogenic sources of mercury. In June 1998, the Conference of New England Governors and Eastern Canadian Premiers adopted the *Mercury Action Plan*. The plan, which was endorsed by John Rowland, Governor of Connecticut, establishes objectives for reaching the goal of "virtual elimination of anthropogenic mercury releases in the region through a combination of source reduction, safe waste management practices and aggressive emissions

¹¹ "If I Catch It Can I Eat It?" CT DPH Pamphlet, 1999.

¹² Mary McCormick, Administrative Director, Poison Control Center, UCONN Health Center. Phone conversation with Tom Metzner, CT DEP, January 7, 2000.

¹³ Northeast States for Coordinated Air Use Management, Northeast Waste Management Officials' Association, New England Interstate Water Pollution Control Commission and Canadian Ecological Monitoring and Assessment Network, "Northeast States and Eastern Canadian Provinces Mercury Study: A Framework for Action", February 1998, pg. VI-10.

controls”. Action item #3 of the plan entitled “Source Reduction and Safe Waste Management including Recycling,” lists the overall regional objective as:

“Eliminate or reduce nonessential uses of mercury in household, institutional and industrial products and processes. Segregate and recycle mercury attributable to the remaining uses and or products to the maximum degree possible.”

Connecticut is active in addressing mercury as an environmental and public health threat. The measures the state has taken to assess and manage mercury include:

1990

- The General Assembly adopted the Toxics in Packaging Act that requires the elimination of mercury from most packaging by 1992 (CGS Section 22a-255g-255m).

1992

- Connecticut was one of the first states to pass a law restricting the level of mercury in alkaline batteries (CGS Section 22a-256d).

1996

- The CT DEP has initiated programs to encourage the recycling of mercury-containing lamps and has permitted a facility that recycles mercury-containing lamps.
- CT DPH and CT DEP have issued a statewide, freshwater fish consumption advisory for mercury.
- The CT DEP has identified mercury as a priority pollutant in the state Pollution Prevention Plan.

1999

- Connecticut has adopted a standard more stringent than that required by federal law for mercury emissions from solid waste incinerators (RCSA Section 22a-174-38). The CT DEP is now evaluating whether there should also be a more stringent emission standard for medical waste incinerators.
- Connecticut hosted a regional Mercury Summit that generated ideas for specific initiatives to increase source reduction and recycling of mercury-containing wastes. Governor John Rowland was the keynote speaker.
- The Council of Environmental Quality issued a report, “*Eat, Drink and Be Wary?*” promoting the removal of all mercury-containing products from the waste stream.

Ongoing

- The University of Connecticut, funded by the CT DEP is conducting ongoing research including monitoring of mercury concentrations in fish tissue and levels of mercury deposition through a statewide ambient air monitoring network.
- The CT DEP participates on the Mercury Task Force of the Conference of New England Governors and Eastern Canadian Premiers to implement the Mercury Action Plan.
- The CT DEP is working with the Northeast Waste Management Officials Association (NEWMOA) to develop comprehensive model legislative concepts to reduce or eliminate mercury in products. The Mercury Task Force delegated this task to NEWMOA.

- The Northeast Natural Resource Center of the National Wildlife Federation, the Connecticut Dental Association, the Connecticut Resources Recovery Authority and the CT DEP are cooperating in the publication and distribution of a pamphlet entitled, “The Environmentally Responsible Dental Office: A Guide to Proper Waste Management in Dental Offices” that emphasizes proper management of elemental mercury and mercury-containing wastes.

Mercury can be transported great distances through the air. Therefore regional cooperation is essential for effectively minimizing the release of manmade mercury to the environment. Connecticut is committed to working in the regional context to achieve consistency in policies, regulations and laws designed to virtually eliminate mercury from consumer and medical products. The following report focuses on the necessity of eliminating existing, unnecessary stocks of elemental mercury and mercury compounds, on the feasibility of eliminating or reducing mercury in consumer products, and on approaches to establishing collection systems for those mercury-containing products which might otherwise be disposed in the solid waste stream. The report also summarizes the NEWMOA legislative concepts that are now undergoing public review.

3.0 Managing Elemental Mercury

Recommendations

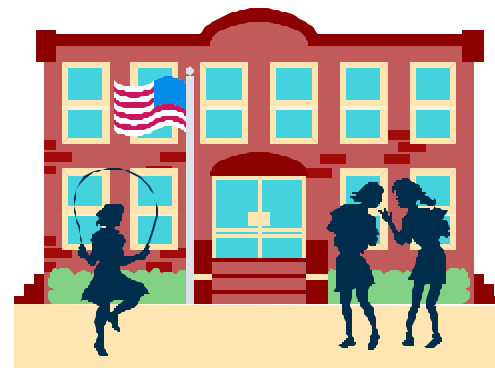
- Prohibit elemental mercury from schools and provide funding for collection and safe management of elemental mercury from schools.
- Working with the Connecticut State Dental Association, assess the need for, and if necessary implement, a statewide collection of elemental mercury from dental offices. Also assess how dentists are managing waste dental amalgam.
- Limit the sale of elemental mercury to manufacturing, dental amalgam, and research uses only.
- Prohibit the sale of elemental mercury to the general public.
- Encourage residents to bring elemental mercury to household hazardous waste collections.
- Encourage municipalities to provide sufficient collection opportunities for their residents through regional household hazardous waste collections to increase the amount of mercury collected from residents.
- Set a goal for permanently retiring through secure disposal a percentage of elemental mercury collected from residents, schools, health care facilities and offices.
- Fund CT DEP, CT DPH and the Department of Consumer Protection to conduct an educational campaign targeted at households and schools on the dangers of mercury. The campaign should identify how people can safely dispose of elemental mercury and mercury-containing products.
- Conduct educational programs discouraging the ritualistic uses of elemental mercury.

An essential step to addressing the mercury issue in Connecticut is to acknowledge that there are probably large amounts of elemental mercury in our homes, school chemistry labs, and possibly dental offices. Based on household hazardous waste collection days conducted in Connecticut and in other states, CT DEP estimates that there are thousands of pounds of elemental mercury in Connecticut needing proper management. To provide perspective, if the state were to recycle 100% of the estimated 10 million spent fluorescent lamps generated annually in Connecticut, it would conservatively take five years to capture the same amount of elemental mercury estimated now to be stored in schools, homes, and other shops and offices. Immediate attention to this short-term mercury problem would result in long-term benefits to the environment and public health.

3.1 The elimination of the use of mercury in science education programs

Mercury has been used in many school chemistry labs in Connecticut. There have been several incidents over the past few years where students in Connecticut schools took mercury and contaminated their homes or schools with it. A family in Wallingford recently filed a lawsuit against the town after a student took mercury from a teacher's desk and brought it to a friend's house. The home was contaminated and had to be temporarily evacuated. In June 1996, students at a middle school in Missouri played with some mercury. Approximately 200 students had to be tested for mercury contamination, one child was hospitalized, and five had to undergo treatment to remove the mercury from their systems. In addition, two homes and a car required decontamination.¹⁴

When a school has even a small amount of mercury, there is a significant contamination and exposure potential. Mercury is often stored in unmarked jars with no information about health dangers or proper handling and storage procedures. Children handling mercury do not have the proper training to work with mercury. Industries that work with mercury must follow strict OSHA safety procedures, including medical monitoring and training. School children and staff are not provided with this training. An additional concern is that some schools may be disposing of small amounts of mercury down the drain, which can contaminate sewage sludge. There is no benefit to having mercury in schools. School chemistry classes can study mercury through computer simulated experiments.



3.2 Managing elemental mercury in dental offices

Mercury has been used in dental amalgams for 150 years. Although there are alternatives, it is still the first choice of most dentists. The American Dental Association (ADA) describes mercury amalgam as “safe, affordable, and durable” and concurs with the U.S. Public Health Service that amalgam has “continuing value in maintaining oral health.” Nevertheless, the ADA supports ongoing research in the development of new materials that are as safe and effective as mercury.¹⁵ Until there is a widely accepted mercury amalgam alternative, there is a need to manage the mercury from dental offices.

Mercury amalgam is a mix of silver, copper and tin bound together and hardened by the addition of mercury. The amalgam now comes pre-mixed to dental offices. In the past, dentists mixed the mercury amalgam themselves. Consequently, there may be some dentists' offices that are storing elemental mercury. Such offices need to dispose of their elemental mercury safely. Some dentists may also be disposing of pre-mixed amalgam in the solid waste. The state should work with the Connecticut State Dental Association to survey its members to determine if any dentists are storing elemental mercury and are properly handling pre-mixed amalgam.

¹⁴ “Alert! Patterns of Metallic Mercury Exposure”, Agency for Toxic Substances and Disease Registry Fact Sheet, June 1997.

¹⁵ ADA News Release, 1995.

In addition, mercury debris from dental activity is generally washed down the drain. There are drain traps that can capture the majority of dental amalgam. The amalgam waste then needs to be disposed of properly. After the Western Lake Superior Sanitary District (WLSSD) in Minnesota confirmed that mercury was being released to the sewer system by dental offices, WLSSD and the Northeast Dental Society conducted a survey of dentists that indicated that some dentists were disposing of mercury in the solid waste stream. As a result, the WLSSD developed a partnership with local dentists to increase proper mercury amalgam management¹⁶. Connecticut needs to work with state dentists to ensure that safe management practices for waste mercury amalgam are being implemented.

3.3 Curtailing the sale of elemental mercury to the general public

Very small amounts of mercury can impact human health and the environment, yet it is found in homes in much greater amounts. Less than one gram of mercury in a lake can contaminate the fish¹⁷. The National Institute for Occupational Safety and Health (NIOSH) limit for immediate danger to life or health (IDLH) for elemental mercury is 10mg/m³. Yet CT DEP has received calls from residents who want safely to dispose of as much as a pound, two pounds, or even four pounds or more of elemental mercury. Consequently, it is evident that the sale of elemental mercury to the general public needs to be restricted.

The Consumer Product Safety Commission indicated that, although there are no federal laws restricting the sale of elemental mercury to the general public, a chemical supply company that sold elemental mercury would have to provide labeling and other hazard information in compliance with the Hazardous Substances Act¹⁸. Bethlehem Apparatus, a recycler of mercury wastes located in Hellertown, Pennsylvania, indicated it does not sell mercury to the general public; nor is it aware of stores that sell elemental mercury off the shelf to the general public.¹⁹ However, a chemical supply company in Florida listed in the Hartford Yellow Pages was willing to sell elemental mercury to a CT DEP employee and indicated they sell it to the general public.²⁰

There are some Caribbean cultures that use mercury for ritualistic purposes. It is referred to as “*Azogue*” and is sold in stores called “*Botanicas*” in capsules containing three to five ounces of mercury. The Environmental Health Unit of the Hispanic Health Council has put out a flyer on *Azogue* that calls for the use of substitutes. However, the CT DPH believes that this practice continues.

There are no reasons for the sale of mercury to the public that justify the resulting threat to human health and the environment. The general public is largely unaware of the risks of

¹⁶ Heidi Ringhofer and Timothy Tuominen, “Dental Mercury Project”, November 1997 Proceedings, Solid Waste Association of North America /North American Hazardous Materials Management Association 1997 Hazardous Materials Management Conference, pg. 198.

¹⁷ Indiana Department of Environmental Management, “Statewide Mercury Awareness Program Summary”, June 5, 1998.

¹⁸ Phone Conversation between Ken Giles, Consumer Product Safety Commission, and Tom Metzner, CT DEP, December 1, 1999.

¹⁹ Ibid.

²⁰ Phone Conversation between Advanced Scientific and Chemical Inc., Ft. Lauderdale, Florida, and Tom Metzner, CT DEP, December 1, 1999.

mercury and the proper way to store and dispose of it. The sale of elemental mercury to the general public needs to be prohibited.

3.4 Recycling and safe management of existing stocks of elemental mercury

Much of the mercury collected from products or from elemental mercury is recycled. In a typical recycling process, mercury wastes are recovered through a heating process, then triple distilled for purity. There are a number of companies that recycle mercury products such as fluorescent lamps or thermostats and a few companies that retort the mercury into a raw material.

As indicated above, anecdotal evidence based on calls to the CT DEP and household hazardous waste collections suggest there is a significant amount of elemental mercury in people's homes. The CT DEP has received calls from residents asking how to dispose of mercury. They report having as much as 4 pounds or more. This is the equivalent of the mercury in over 70,000 fluorescent lights or 490 thermostats. Most of the people who call do not remember where their elemental mercury came from. John Gilkeson of the Minnesota Office of Technical Assistance stated that "It is routine to have anywhere from one to 90 pounds at a time brought in by people who you would never suspect of having mercury stashed in their house." He went on to say that people might have taken the mercury home in the past from small industrial operations. Mercury was also used on dairy farms in manometers. Bethlehem Apparatus indicated that mercury was quite valuable in the 1960s and speculated that some people may have taken it from commercial sources to try to resell it.²¹

A mercury collection in the State of Kansas, a state with a population less than Connecticut's (2.7 million versus 3.3 million), netted 1800 pounds of elemental mercury.²² This total did not include the numerous mercury-containing thermometers and other devices which were brought to the collection. A similar collection in Pennsylvania in 1998 collected 1245 pounds of elemental mercury.²³ In 1998, the State of Indiana conducted a "Mercury Awareness Program" which netted over 2000 pounds of mercury, most of which was in elemental form. Another 600 pounds were collected in the first months of 1999. In kicking off the program, the Commissioner of the Indiana Department of Environmental Maintenance, John Hamilton, stated that "Many homes have jars and jugs of mercury in their basements and closets."²⁴ Although Connecticut has an active household hazardous waste collection program, there may still be a significant amount of elemental mercury sitting in residents' cupboards, garages and basements because typically only 3-5% of households participate in a household hazardous waste collection in a given year. If people were more aware of the hazards associated with mercury, they would be more inclined to dispose of it at a household hazardous waste collection.

²¹ Phone conversation between Bruce Lawrence, Bethlehem Apparatus, and Tom Metzner, CT DEP, December 1, 1999.

²² Kansas Department of Health and Environment, "Mercury Collection Program", October 1998.

²³ Edward F. Orris, PA Department of Environmental Protection.

²⁴ Stephanie A. Biehn and Paula M. Smith, "Mercury Awareness Program: Protecting Indiana's Kids", Solid Waste Association of North America /North American Hazardous Materials Management Association 1997 Hazardous Materials Management Conference, pg. 74.

As mentioned above, Indiana, Kansas and Pennsylvania conducted collections for elemental mercury that were very successful. Since nearly every municipality in Connecticut participates in a household hazardous waste collection program and such collections accept elemental mercury from residents, Connecticut could expect to collect significant amounts of elemental mercury by combining its existing household hazardous waste infrastructure with a concentrated education campaign. However some municipalities do not participate in collections or participate inconsistently. In order to maximize the benefit of a mercury awareness campaign, it is imperative that municipalities commit to regional household hazardous waste collections that offer more than one collection opportunity annually.

It is likely that there is also elemental mercury in some schools, municipal buildings and businesses. Mercury from these sources is required to be managed in accordance with hazardous waste regulations. Mercury from certain small generators of hazardous waste, also known as Conditionally Exempt Small Quantity Generators, could safely be managed through household hazardous waste collections in accordance with state regulations that will soon be promulgated. Mercury and other hazardous chemicals in schools should be removed through a separate program. The cost of such a program for schools varies depending on the size of the school and the type and amount of chemicals. However the average cost is \$2,000 - \$3,000 for a small high school, \$5,000 - \$10,000 for a medium sized high school and up to \$20,000 for a large high school.²⁵

Once the mercury is collected, the best management option is the permanent retirement of at least a portion of the collected mercury. In 1997, 346 metric tons of mercury were used in industrial processes, while 389 metric tons were recovered from recycling. The U.S. EPA has stated that “These figures continued the trend since 1995 of secondary production exceeding industrial consumption”.²⁶ As Connecticut and other states increase efforts to recover mercury wastes, this trend could accelerate and lower the price and perhaps increase exports of mercury. Since mercury can be carried long distances by the air, selling mercury overseas, where there are frequently less stringent environmental controls, could add to the global pool of mercury.

There are two disposal technologies that can safely contain mercury and prevent its future release: amalgamation and solidification/stabilization. In amalgamation, elemental mercury is mixed with a powdered granular metal, usually zinc, to prevent it from leaching. Solidification/stabilization immobilizes the mercury while decreasing its permeability by encasing it in a substance, most commonly a mixture of Portland cement, lime and fly ash.²⁷ U.S. EPA is investigating and seeking comment on retirement technologies to determine which are most effective. A percentage of mercury from the collection programs should be retired in a safe manner to avoid increasing health risks in other countries and expanding the global pool of mercury that results from human activities.

²⁵ Average costs for clean outs provided by Safety Kleen Corporation. Phone call from Brenda Leonardo to Tom Metzner, CT DEP, January 31, 2000.

²⁶US EPA, “Potential Revisions to the Land Disposal Restrictions Mercury Treatment Standards”, Federal Register, May 28, 1999.

²⁷ Ibid.

3.5 Public education on the risks of elemental mercury

The success of the Indiana, Kansas and Pennsylvania collections can be attributed in part to aggressive promotion. Kansas implemented a comprehensive mercury awareness campaign with a “Mercury Monster” theme. The staff and public education costs for this one-time program were \$59,000.²⁸ The State of Indiana conducted a similar campaign, spending over \$500,000 on education, administration, replacement thermometers and other supplies.²⁹ The Kansas collection was only designed for a 60-day period, while the Indiana program lasted two years. These programs were designed to remove elemental mercury and mercury-containing devices from homes.

Connecticut should increase public awareness through a promotional campaign similar to that of Indiana. Part of the campaign should focus on collecting elemental mercury from residential sources. It should include information on the health impacts of exposure to mercury and mercury’s physical and chemical properties, and it should identify a convenient and appropriate disposal outlet for every Connecticut resident. The materials should be provided in Spanish to reach the practitioners of rituals involving Azogue and in other languages as necessary to reach all of Connecticut’s communities. In addition, health care professionals should be educated about the importance of providing information to their patients on mercury toxicity. As indicated above, even moderate success can be equivalent to collecting thousands of fluorescent lamps and mercury thermometers.

The CT DEP has been working with schools as part of a comprehensive program to properly manage hazardous school lab chemicals. This outreach should be expanded to focus on mercury. As indicated above, there have been a number of spill incidents at Connecticut schools involving mercury. Drawing attention to the mercury problem may encourage schools to take inventory of their chemicals and properly dispose of mercury and other obsolete and unnecessary chemicals.

Some of the funding for this outreach program can come from a \$350,000 supplemental environmental project required to be conducted by the Connecticut Resources Recovery Authority under a consent order with the CT DEP. However, ongoing public education about the environmental and human health impacts of mercury should be at least partially financed by the manufacturers of consumer items that contain mercury.

²⁸ Mohammad Saqib Khan, Robert D. Jurgens and Phyllis K. Funk, “Statewide Mercury Collection Program” Kansas Department of Health and Environment, October 1998.

²⁹ Stephanie Biehn, Indiana Department of Environmental Management, Phone Conversation with Tom Metzner, CT DEP, January 31, 2000

4.0 Mercury in Products

Recommendations

- Establish goals for the recovery of specific mercury-containing products.
- Require manufacturers of products containing mercury to notify the CT DEP of the type of product, the amount of mercury in each product, and the total number of units sold annually.
- Prohibit the sale of nonessential products containing mercury.
- Prohibit the disposal of items containing mercury.
- Adopt the Universal Waste Rule and include mercury-containing devices on the list of universal wastes to facilitate collections of mercury-containing products.
- Require manufacturers to provide labeling that indicates the mercury content of products in order to promote consumer awareness and facilitate collection.
- Use education and enforcement to discourage the disposal of mercury and mercury-containing products in the solid waste stream.
- Encourage hospitals in Connecticut to commit to the American Hospital Association's agreement with the EPA to virtually eliminate mercury wastes by 2005 and provide information on the dangers of mercury to other health care facilities.
- Encourage municipalities to collect fluorescent lamps at permitted recycling facilities.

Mercury has been used in consumer and medical products for years. Many of these uses are known, but there is no system for identifying all uses or evaluating their relative contribution to the mercury problem. In order to develop effective programs for eliminating or reducing mercury in products, DEP needs more comprehensive information on which products contain mercury, the amount of mercury per unit of product and an estimate of the number of units of product sold in North America. This information will allow CT DEP to prioritize its efforts, establish recovery goals and educate the public about mercury-containing products so they can make informed purchasing and waste management decisions. The notification could most efficiently be accomplished through the regional clearinghouse proposed in Section 6.10 of this report.

As the toxicological and ecological impacts of mercury have become better understood, there has been an effort to eliminate nonessential uses of mercury in products, develop non-mercury alternatives or reduce the mercury content of products. Several years ago, L.A. Gear made a sneaker with a mercury switch in the heel that caused the shoe to light up. The shoe has since been removed from the product line in part because of pressure from various state regulators and environmental groups. Other nonessential uses are found in jewelry, toys, and ornaments. The sale of such items should be prohibited in Connecticut.

Some manufacturers have developed mercury free alternatives to essential products that used to contain mercury. Manufacturers have removed mercury from paints, where it served as a fungicide. It has also been discontinued in pesticides and alkaline batteries, and there are now non-mercury alternatives for most switches, thermostats and thermometers. Mercury, however, is necessary to the proper operation of some products. In these cases, it is often still possible to achieve mercury reductions. Manufacturers of fluorescent lamps and button cell batteries have gradually reduced the amount of mercury in their products.

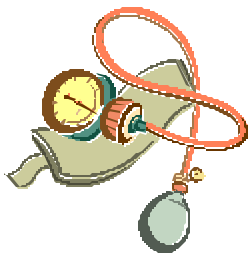
Eventually, many mercury-containing products find their way into the solid waste stream. Consequently, as a corollary to the effort to eliminate or reduce mercury from products, the state needs to prohibit the disposal of mercury-containing products in solid waste and establish appropriate collection infrastructures for mercury-containing products. Such collections should be financed at least in part by the manufacturers of the products. Collections will be facilitated by including mercury-containing devices in the Universal Waste Rule and thus limiting the regulatory burden of collecting and shipping these hazardous wastes for recycling. Labeling and enforcement are also important. Manufacturers will need clearly to label their products with respect to mercury content so that the public will know when they buy a mercury-containing product that it should not be disposed in solid waste and should be collected for recycling. (Section 6.0 of this report summarizes a proposed regional approach to product labeling.) CT DEP will need the authority to enforce the disposal prohibition.

4.1 Medical products

Mercury is used in a number of medical products including fever thermometers, blood pressure cuffs, specialized batteries, cantor tubes, esophageal dilators and pulmonary scholander devices.

4.1.1 Feasibility of elimination or source reduction of mercury in medical products

It is highly feasible for hospitals to significantly reduce, if not eliminate, mercury in medical products. There are viable alternatives to the mercury-containing devices mentioned above. Hospitals across the country have taken steps to become “mercury free” by replacing mercury-containing products with non-mercury alternatives. For example, in 1998 Hartford Hospital reported 25 spills involving mercury. Realizing the occupational hazards of exposure to mercury vapors resulting from such spills, Hartford Hospital committed to replacing mercury-containing items. They properly disposed of 35 pounds of elemental mercury that was used for maintenance activities. They have replaced mercury sphygmomanometers with aneroid sphygmomanometers - this alone removed 241 pounds of mercury. They have also replaced mercury cantor tubes with non-mercury tubes and switched to electronic and tympanic alternatives to mercury fever thermometers.³⁰



The EPA is working with the American Hospital Association (AHA) to eliminate mercury from hospitals throughout the country. The EPA and the AHA have signed a Memorandum

³⁰Darlene Powell, Manager of Industrial Hygiene, Hartford Hospital, “From Confusion to Compliance”, 1999.

of Understanding (MOU) that establishes a goal of virtually eliminating mercury-containing waste from hospitals by 2005. All hospitals in Connecticut should be encouraged to implement this MOU as a means of avoiding mercury spills and eliminating mercury from their waste streams.

4.2 Consumer products

As noted above, mercury has been reduced or eliminated in several consumer products including latex paint, pesticides, fluorescent lights, alkaline batteries and switches. For some products, there are ready substitutes that do not contain mercury. For other products and for specific applications, mercury remains the preferred choice because of its unique physical and chemical properties. For those products whose mercury content cannot be eliminated or reduced and for which there is no feasible alternative, there needs to be a collection infrastructure to ensure that the mercury does not find its way into the solid waste stream. Although the collection infrastructures for various consumer products may differ, each should be financed at least in part by the product manufacturer.

4.2.1 Fluorescent lamps and other mercury-containing lamps

Mercury is essential to the performance of a fluorescent lamp. There are now no alternatives to fluorescent lamps that do not contain mercury and are as energy efficient. In a fluorescent lamp, mercury is energized by an electric arc that generates ultraviolet light. This ultraviolet light is absorbed by phosphor powder which then emits visible light. While it cannot be eliminated, the mercury can be reduced. In 1985 the average four-foot fluorescent lamp contained 48 milligrams of mercury. By 1994 the amount of mercury had been reduced to 23 milligrams.³¹ Manufacturers have continued voluntarily to decrease the amount of mercury introduced into lamps. Today there are low-mercury lamps that contain less than 10 milligrams of mercury per four-foot lamp while maintaining the same performance standards of higher mercury lamps. There are other specialty lamps that contain mercury, including high-pressure sodium, mercury vapor and metal halide lamps. Osram Sylvania reports that they are the first to produce a mercury-free and lead-free high-pressure sodium lamp.³²

Lowering the amount of mercury in the lamp is only helpful if it does not decrease the life expectancy of the lamp or lower the lumen output. Manufacturers maintain they have reached the threshold for mercury reduction. Since fluorescent lamps are desirable for their energy efficiency and the Environmental Protection Agency has promoted their use through the Green Lights Program, the percentage of mercury in consumer products attributed to fluorescent lights is likely to grow as their use grows even though the amount of mercury in each lamp has diminished.

4.2.1.1 Feasibility of elimination or source reduction of mercury

Because fluorescent lamps have reached a threshold of mercury content beyond which they cannot go without impacting the functioning of the lamp and because their energy efficiency is desirable, the only practical solution to reducing or eliminating mercury from fluorescent lamps is for manufacturers to continue research into developing a mercury-free lamp which is

³¹ Paul Walitsky, "New Fluorescent Lights Shed Light on Hazardous Waste Problems", Plant Services, April, 1996.

³² Peter Bleasby, Osram Sylvania letter to Tom Metzner, CT DEP, June 23, 1999.

as energy efficient and price competitive as fluorescent lamps. At this point it does not appear to be either feasible or practical to further reduce or totally eliminate mercury from fluorescent lamps.

4.2.1.2 Implementing a statewide collection

Fluorescent lamps in Connecticut which do not come from households are considered a hazardous waste based on their mercury content and may not be disposed in the solid waste stream. DEP inspections of resource recovery facilities, schools and transfer stations, along with discussions with fluorescent lamp recyclers, indicate that compliance with this disposal prohibition is inconsistent at best. Estimates of spent lamps thrown into the solid waste stream range from 70% -85%.

Lamp manufacturers, recyclers, and the DEP agree that modifying some of the existing hazardous waste regulations would facilitate recycling of fluorescent lamps generated by the commercial sector. There is consensus that the Universal Waste Rule could serve this purpose while still protecting human health and the environment. Under the Universal Waste Rule, spent fluorescent lamps could be transported via a common carrier without having to use a hazardous waste manifest. This change would allow a lamp distributor to use a reverse distribution network to recover spent fluorescent lamps. When lighting contractors change lamps in a large building, they usually change large quantities at a time. Under the Universal Waste Rule, a contractor could change out lamps and immediately collect the spent lamps and ship them to a lamp wholesaler or recycling facility.

Lamps generated by households, which comprise about 15% of the market, may legally be thrown into the trash because they are defined as household hazardous waste for regulatory purposes. The best management option, however, is to collect and recycle them. At the moment there are few opportunities for recycling fluorescent lamps from residential settings. Currently, the three permanent household hazardous waste facilities and some one-day collections of household hazardous waste are the only places where residents can properly recycle their fluorescent lamps.

To make it more convenient for residents to recycle their spent mercury-containing lamps, the CT DEP has modified the Recycling General Permit. The modification allows municipalities to establish collection points at their recycling facilities or elsewhere within their borders. Municipalities should be encouraged to apply for this general permit so their residents have a place conveniently to recycle their spent fluorescent lamps. Private entities such as hardware stores or electrical wholesalers could also obtain a general permit and collect residentially generated fluorescent lamps. The household hazardous waste facilities and one-day collections should also continue to serve as collection points for residential lamps

For both residential and commercial sectors, education is essential to increasing collection. A greater effort is needed to educate generators, lamp change-out contractors, building managers, and residents to understand that there is mercury in fluorescent lamps that can be released through improper handling and disposal. Requiring lamps to be recycled and labeling lamps to indicate mercury content are also necessary to assure that fluorescent lamps are kept out of the solid waste stream.

According to a representative from the National Electrical Manufacturers Association, Connecticut generated approximately 10 million spent fluorescent lamps in 1998³³. Of this amount, an estimated 15% (1.5 million) were recycled.³⁴ The average lamp disposed of in 1998 had about 25 milligrams of mercury.³⁵ This means that 467 pounds of mercury were sent into our solid waste from the disposal of fluorescent lamps. Through increased education about proper disposal of fluorescent lamps, adopting the Universal Waste Rule and facilitating municipal collections through the general permit, the state can establish a realistic goal of recovering at least 85% of the spent lamps. If this goal were achieved and the manufacturers decrease the average amount of mercury in lamps from 23 milligrams to 12 milligrams, the state could reduce mercury in the waste stream from fluorescent lamps by 371 pounds annually by 2003.

Mercury Savings from Source Reduction and Recycling of Fluorescent Lamps

| Date | Generation | Recycling Rate | Amount of Mercury/Lamp (mg) | Amount of mercury in solid waste stream (pounds) |
|-------------|--|-----------------------|------------------------------------|---|
| 1998 | 10 million | 15% (Estimated) | 25 | 467 |
| 2003 | 11.6 million (projected) ³⁶ | 85% (Goal) | 12 ³⁷ | 96 |

Total Mercury Reduction – 371 pounds

4.2.2 Batteries

Mercury has been used as a gas suppressant in many different types of batteries. In 1980 batteries were the leading source of mercury in consumer products, accounting for 959 metric tons nationally.³⁸ By 1995, due to state legislative requirements and industry initiatives, the annual mercury consumption for batteries had fallen to below 106 tons. In 1992 Connecticut became one of the first states to limit the amount of mercury in alkaline and zinc carbon cylindrical batteries. Federal law now requires that manufacturers produce alkaline and zinc carbon batteries with no added mercury. The law also virtually bans mercuric-oxide button-cell batteries.

4.2.2.1 Feasibility of elimination or source reduction of mercury

Button-cell batteries now have lower amounts of mercury than previous generations of such batteries. The potential to reduce mercury in these waste streams lies in the development of

³³ Ric Erdheim, National Electrical Manufacturers Association, phone conversation with Tom Metzner, CT DEP, September 9, 1999.

³⁴ Raymond Graczyk, Northeast Lamp Recycling, phone conversation with Tom Metzner, CT DEP, September 9, 1999.

³⁵ *Ibid.* and discussions with the National Electrical Manufacturers Association put the average at about 23 milligrams per lamp.

³⁶ Based on 4% annual growth in sales – NEMA, phone conversation between Ric Erdheim, NEMA and Tom Metzner, CT DEP, September 9, 1999.

³⁷ Ric Erdheim, National Electrical Manufacturer’s Association, phone conversation with Tom Metzner, CT DEP, September 9, 1999. Generation based on 4% annual growth in sales

³⁸ Jasinski and Reese.

mercury-free button-cell batteries that can replace the existing mercury button-cells: alkaline, silver-oxide and zinc-air. There are still applications such as hearing aids and watches that require silver-oxide or zinc-air batteries.

It is possible that mercury will be eliminated from button-cell batteries within the next five years. The National Electrical Manufacturers Association (NEMA), which represents the battery industry, has indicated that battery manufacturers are working to develop mercury-free button-cell batteries. Duracell, a major manufacturer of button-cell batteries, is working on a mercury-free button-cell battery and hopes to develop one in the next few years.³⁹

4.2.2.2 Implementing a statewide collection

Collecting and recycling button-cell batteries is complex. There are several different types of button-cell batteries. Some contain mercury, and some do not. Some are collected already due to market value; others are not currently recyclable. For example, lithium batteries do not contain mercury and are not currently recycled; but the vast majority of silver-oxide batteries are collected for their silver value by repair shops and jewelers that change batteries.

Unfortunately, button-cell batteries are similar in appearance and are not labeled as to content. While some recyclers can accept mixed button-cell batteries, it is expensive to pay for sorting the batteries and disposing of those that are collected but cannot be recycled. Labeling button-cell batteries for mercury content is thus essential so that both consumers and recyclers know what they contain and how they must be handled. Although the batteries are small, a simple label can be imprinted on each battery indicating mercury content.

The recycling infrastructure for button-cell batteries is largely in place. As noted above, mercury is found in silver-oxide, alkaline and zinc-air button-cells. There are companies that recycle these batteries to recover the mercury, and they can be collected at household hazardous waste events or permitted recycling facilities. Special collection points may be useful for certain batteries. For example, zinc-air batteries are commonly used in hearing aids. Establishing collection points at senior citizen community centers and health care facilities may increase the collection of zinc-air batteries. The challenge now is to make sure the batteries are labeled as to content and to educate the public about where to take them for collection.

Mercury Savings from Recycling of Mercury Button Cell Batteries⁴⁰

| Button Cell Type | National Battery Use (millions of units) | Connecticut Battery Use (millions of units) | Mercury per Unit (milligrams) | Estimated Mercury for Connecticut (pounds) |
|-------------------------|---|--|--------------------------------------|---|
| Zinc-air | 138.3 | 1.79 | 9.0 | 35.4 |
| Silver-oxide | 84.3 | 1.09 | 3.5 | 8.4 |
| Alkaline | 32.5 | .42 | 10.9 | 10.1 |
| Totals | | | | 53.9 pounds |

³⁹ Sharon O'Farrell, Gillette (Duracell), Email to Tom Metzner, CT DEP, October 27, 1999.

⁴⁰ Data is extrapolated from letter dated September 24, 1996, from NEMA to Scott Cassel, Massachusetts Department of Environmental Protection, for Connecticut population.

4.2.3 Switches

Mercury is an excellent material for use in switches because of its physical and chemical properties. The mercury in switches is used to complete or break an electrical circuit. There are various types of switches including reed relays, float switches, tilt switches, motion sensors and displacement relays. These switches are used in applications such as automatic turn-offs for irons, for switches in freezers, furnaces, sump pumps, air conditioners, and as flame sensors in gas stoves.⁴¹ The amount of mercury used in switches is significant. Mercury switches accounted for 57 metric tons [62.7 tons] of mercury nationally in 1997.⁴²

There are a number of non-mercury switches available which are currently being researched and developed. Some auto manufacturers have replaced mercury switches with mercury-free ball switches. These switches are commonly found in trunk and hood convenience lighting. The Association of International Automobile Manufacturers states they have removed virtually all mercury switches from motor vehicles and that they remain committed to eliminating mercury from their products.⁴³ General Motors Midsize and Luxury Car Group has eliminated mercury switches from hood and trunk convenience lighting and replaced them with non-mercury switches. Chrysler and Ford have plans to introduce non-mercury switches but had not done so as of March 1999. The ball switches cost 9 cents more than the mercury switches, but even this differential has proven to be a disincentive for some manufacturers.⁴⁴

4.2.3.1 Feasibility of elimination or reduction of mercury

The feasibility for elimination or reduction of mercury from switches is moderate. Mercury switches are no longer used in many applications. The sensor switch which shuts off a washing machine when the lid is open is no longer a mercury switch. Silent wall switches were discontinued in 1991. The mercury tilt switch used to shut off irons when they fall over can be replaced with a ball switch. There are, however, some applications where mercury switches are clearly superior in price and performance, specifically, switches used at higher temperatures. Research continues into developing non-mercury alternatives. One of the most frequently mentioned is a combination of gallium, indium, and tin, which is marketed under several names including “newmerc” and “galistan”. According to Comus International, “newmerc” is comparable to mercury but is more expensive and there are performance problems when it is exposed to air during the manufacturing process. “Newmerc” also does not perform as well at extreme cold temperatures. Comus International continues to develop “newmerc” for switch applications.⁴⁵

⁴¹ John Gilkeson, “Mercury in Mobile and Stationary Sources”, Proceedings from Solid Waste Association of North America /North American Hazardous Materials Management Association 1998 Hazardous Materials Management Conference, pg. 40.

⁴² S.M. Jasinski 1995, “The Materials Flow of Mercury in the United States”, Resources Conservation and Recycling, Vol. 15, 1998, pgs. 145-179, and Robert G. Reese, “Mercury”, Minerals Yearbook 1997, Vol. 1 Metals and Minerals.

⁴³ Letter from Gregory Dana, Association of International Automobile Manufacturers to Carmine DiBattista, CT DEP, June 21, 1999.

⁴⁴ Alexis Cain, “Binational Toxics Strategy: The Mercury Challenge”, Proceedings, Solid Waste Association of North America /North American Hazardous Materials Management Association 1998 Hazardous Materials Management Conference, pg. 44.

⁴⁵ Robert Romano, Comus International, Phone conversation with Tom Metzner, CT DEP January 21, 2000.

Scientists at Virginia Tech have also developed a mercury alternative switch that they describe as “reliable and superior”.⁴⁶ With research continuing into non-mercury alternatives, there is a high potential to eliminate mercury from this product line for some applications. There are other applications for which mercury switches are still clearly the better option in terms of cost and performance.

4.2.3.2 Implementing a statewide collection

Mercury-containing switches are found in products such as cars, ovens, pumps, irons, freezers and many other applications. Collection methods for such switches differ depending on the product involved.

Mercury is used in cars for convenience switches for trunks and hoods, anti-lock brakes, and ride control. It has recently been used in headlights. While some automobile manufacturers have made progress in eliminating mercury switches from automobiles, more remains to be done. If mercury switches are not removed prior to a car being scrapped, the mercury will end up in the “fluff”, the residue of junked cars. The State of Minnesota requires automobile dismantlers to make a “good faith effort” to identify and remove mercury switches. A more effective means of recovering these switches would be to require manufacturers to identify the location of each switch in the car on the front door panel. Dismantlers, junkyards and repair facilities could use this information to identify and reclaim the mercury switches. The State of Vermont took this approach in labeling discussions with automobile manufacturers.

For switches found in major appliances, repair facility personnel need to be educated on the presence and location of mercury switches and management requirements. Manufacturers should provide each distributor, recycler and repair facility with information on the location of mercury switches and proper management requirements.

There are many other products that contain mercury switches. Some are small consumer products such as irons and sump pumps, but most of them are used in industrial applications such as furnaces. The residentially generated items can be collected at a household hazardous waste facility or one-day collection. Those generated by the commercial sector are subject to hazardous waste regulations when they become waste. In addition to requiring manufacturers to substitute non-mercury switches where feasible, mercury switches need to be labeled and collected for recycling. Adding mercury switches to the list of state universal wastes would facilitate recycling. The Universal Waste Rule would allow repair shops and wholesalers to accept mercury switches from customers and other generators and to transport them without a manifest or hazardous waste transporter permit.

The amount of mercury in a switch varies depending on the application, and estimates differ concerning the quantity of mercury switches manufactured and/or discarded. According to EPA, there were an estimated 62.7 tons of mercury used in switches in 1995 in the United

⁴⁶ Virginia’s Center for Innovative Technology at Virginia Tech University. Web site <http://www.rgs.vt.edu>. October 21, 1999.

States.⁴⁷ The State of Maine estimated there were 97 pounds of mercury going into the waste stream each year from switches.⁴⁸ One expert estimated that 11 tons of mercury were used in automobile switches alone in 1995.⁴⁹ Extrapolating from these estimates, replacing mercury switches with alternatives and through voluntary and mandated programs to remove mercury switches from cars where feasible, Connecticut should be able to reduce the mercury in the solid waste stream by approximately 200-300 pounds annually. This amount will gradually decrease as older cars and appliances are taken out of service.

4.2.4 Thermostats

Mercury thermostats typically contain between three and five grams of mercury and last between 20 and 30 years. There are approximately 50 million mercury-containing thermostats in American households.⁵⁰ Because mercury is liquid at room temperature, has a high electrical conductivity, and has a high surface tension, it is ideally suited for thermostats. There are, however, mercury-free alternatives, most notably electronic thermostats that are programmable. Programmable thermostats are not only mercury-free but save energy by more precisely regulating temperature.

4.2.4.1 Feasibility of elimination or source reduction of mercury

It is feasible to eliminate mercury in thermostats by replacing them with programmable thermostats. This could be accomplished by exchange programs and changes in building codes to require non-mercury thermostats. Programmable thermostats are relatively expensive, usually running between \$30 and \$120, however they can reduce heating and cooling bills by giving greater control over temperature.

4.2.4.2 Implementing a statewide collection

The Thermostat Recycling Corporation (TRC) has developed a collection and recycling program described in Section 5.0. This program should recover the majority of spent mercury thermostats from residents and businesses.

The program has only been operating since 1998, so has only one and one-half years worth of data. However the data does allow for a ballpark estimate of how many thermostats might be collected in Connecticut. Of the nine states currently participating in this program, the states of Minnesota and Florida have collected the most thermostats. Both states have been aggressive with legislation and public education to decrease the amount of mercury in the solid waste stream. Minnesota collected 7107 thermostats and Florida, 3376, in 1998. Florida surpassed its 1998 total in the first six months of 1999. The number of thermostats and the

⁴⁷, Alexis Cain, EPA "Binational Toxics Strategy," Proceedings, Solid Waste Association of North America /North American Hazardous Materials Management Association 1998 Hazardous Materials Management Conference, pg. 43.

⁴⁸ "Labeling and Collection of Mercury-Added Products", Report to Joint Standing Committee on Natural Resources, 119th Maine Legislature, January 1, 1999.

⁴⁹ John Gilkeson, "Mercury in Mobile and Stationary Sources", Proceedings, Solid Waste Association of North America /North American Hazardous Materials Management Association 1998 Hazardous Materials Management Conference. pg. 39.

⁵⁰ Honeywell Inc. on web site for Greening of the White House, October 21, 1999.

amount of mercury collected are up significantly over the first six months of 1999 for most states participating in the program.⁵¹

The TRC program is now beginning to be implemented in Connecticut. The National Electrical Manufacturer's Association (NEMA) will provide education in the form of press releases to each participating state to kick off the program. NEMA will also provide the CT DEP with a list of participating wholesale outlets. The CT DEP should monitor the number of thermostats recycled in Connecticut to determine if the state is meeting projections for thermostats collected and to quantify the amount of mercury collected.

Based on TRC collection data from other states, Connecticut can establish a reasonable goal of collecting 1500 thermostats per year by 2003. With an average thermostat containing 3.7 grams of mercury⁵², this program would remove 12 pounds of mercury from the waste stream each year. (This estimate assumes that the thermostats are now in the solid waste stream and not recycled).

4.2.5. Thermometers

Mercury thermometers have been the industry standard for many years. They are a significant source of mercury in the solid waste stream, contributing 16.9 tons annually in the United States in 1995, second only to fluorescent lamps⁵³. In some places it has been a common practice for hospitals to give mercury fever thermometers to parents of newborns. There are also larger mercury thermometers for outdoor, scientific and industrial uses.

Because they are so often broken, mercury thermometers are a potential health threat in the home. A standard mercury thermometer contains one-half gram of mercury. Most people do not know how properly to contain a mercury spill. If they attempt to vacuum a spill, they can spread the mercury vapor and increase exposure. Carpeting and clothing can become contaminated, sometimes requiring expensive remediation. The Indiana Department of Environmental Management (DEM) reported 481 cases of mercury exposure from thermometers in 1996.⁵⁴ Minnesota and Michigan have taken steps to stop hospitals from distributing mercury fever thermometers. From January through mid-October 1999, the Oil and Chemical Spill Response Division at the Connecticut Department of Environmental Protection received 104 calls from citizens reporting broken thermometers. Thermometers also broke in schools and at a town swimming pool.



4.2.5.1 Feasibility of elimination or source reduction of mercury

Non-mercury thermometers are available at a reasonable cost. Electronic thermometers tend to be more expensive but are highly reliable. There are also alcohol-based thermometers that cost about the same as mercury thermometers. A German company has developed a thermometer using a non-toxic mix of gallium, indium and tin that is marketed under the

⁵¹ Ric Erdheim, Thermostat Recycling Corporation. Letter to Paul Little, Alexis Cain, et. al, July 30, 1999.

⁵² Ric Erdheim, National Electrical Manufacturer's Association, phone conversation with Tom Metzner, CT DEP, September 9, 1999.

⁵³ US EPA Mercury Report to Congress, December 1997.

⁵⁴ Indiana DEM, Mercury Awareness Program, October 1998.

name Geratherm⁵⁵. Hallcrest Incorporated has developed a forehead strip that utilizes liquid crystals to determine temperature⁵⁶. Minnesota has placed restrictions on the sale of mercury thermometers. The elimination of mercury from thermometers is highly feasible. The majority of thermometers should be mercury-free within the next few years.

4.2.5.2 Implementing a statewide collection

One of the more efficient ways of removing a large number of mercury thermometers from service is through a specific collection event. There have been several mercury thermometer collections held in the Northeast. Beth Israel Hospital in Boston sponsored a one-day collection of mercury thermometers from employees and neighbors in April, 1999. The collection netted 768 thermometers. Dartmouth Hitchcock Medical Center tallied 675 mercury thermometers in their collection. Monroe County, New York, conducted a thermometer exchange for residents and collected over 1000 mercury thermometers. Household hazardous waste collections are another convenient option for the disposal of mercury thermometers from households. Household hazardous waste vendors accept any mercury-containing device at such collections in Connecticut. In order to encourage more residents to use these collections, specific education campaigns focused on collecting mercury thermometers and funds for purchasing non-toxic alternatives are needed.

Universities are another significant source of mercury thermometers. The University of Vermont replaced 1150 mercury thermometers collected from its campus. The Kansas mercury collection netted 1089 fever thermometers and another 3951 lab thermometers. CT DEP and CT DPH should work with all health care and educational facilities to encourage them to replace mercury thermometers with other types and to provide collection opportunities and public education for employees, patients and students.

A ballpark estimate of the number of mercury thermometers in Connecticut can be based on national data. A 1995 national EPA estimate of mercury discards indicates that 16.9 tons of mercury came from mercury thermometers nationwide. Extrapolating from the national figures for Connecticut's population and assuming 1/2 gram of mercury per thermometer, the CT DEP estimates that there could be as many as 400,000 thermometers in the state⁵⁷. A collection and concentrated public education effort to replace mercury thermometers could reduce mercury in the solid waste stream or accidentally released by 330 pounds. This assumes a statewide concentrated collection of 75% of the mercury thermometers by 2003.

4.2.6 Other mercury-containing household items

There are other non-standard items sometimes found in the home which contain mercury. Certain novelties such as toys, chemistry sets, sneakers, and jewelry may have contained mercury. These items are nonessential and have mercury-free alternatives.

⁵⁵ Karl Leif Bates, "Health: New Substitute for Mercury Now in Thermometers", Detroit Free News, August 20, 1997.

⁵⁶ Phone conversation between Hallcrest Inc. and Tom Metzner, CT DEP, November 29, 1999.

⁵⁷ EPA Mercury Report to Congress, December 1997.

4.2.6.1 Feasibility of eliminating or source reducing mercury

The feasibility of eliminating mercury from these other household items is high. The NEWMOA draft legislative concepts have proposed to prohibit the sale of such nonessential products. (See Section 6.10 of this report). Such legislation is a simple and effective way to eliminate the use of mercury in these household items.

4.2.6.2 Implementing a statewide collection

The best way to collect these mercury wastes is to educate the public to recognize and bring them to household hazardous waste collections.

Summary of Feasibility of Source Reduction or Elimination of Mercury

| Item | Low Feasibility | Medium Feasibility | High Feasibility | Comments |
|-----------------------|-----------------|--------------------|------------------|---|
| Fluorescent Lamps | x | | | Have virtually reached the limits for low mercury, no viable alternative. Establish a recovery goal of 85% annually and a mercury limit of 12 mg per lamp by 2003 |
| Other Mercury Lamps | | X | | Manufacturers are working on mercury reduction |
| Button Cell Batteries | | X | | Manufacturers are working on developing mercury-free button-cells |
| Switches | | X | | Viable alternatives for some applications, but for others, mercury switches still perform better |
| Thermostats | | | X | Can replace with electronic thermostats, but they are more expensive. Current thermostats will last additional 20-30 years |
| Thermometers | | | X | Readily available alternatives. Establish a goal to remove 75% from residents' homes by 2003. |

5.0 Manufacturer Take-Back Programs for Mercury-containing Products

Recommendations

- Promote the Thermostat Recycling Corporation's take-back program and similar programs as they are developed by manufacturers.
- Require manufacturers of products containing mercury to develop a plan for financing a collection infrastructure for their products and submit this plan to the CT DEP for approval.
- Adopt the Universal Waste Rule and include mercury-containing devices to facilitate manufacturer take-back programs.

Manufacturer take-back programs are a feasible and cost effective means of managing some mercury-containing products. For other products, take-back programs may be less practical; however, manufacturers can still help finance collection and recycling programs for their products and assist with the public education which is necessary for their success. Manufacturers should consider the various collection alternatives and available recycling infrastructures and choose those which will maximize collection and minimize costs.

There are several take-back programs now operating in the United States and more in Europe. The Thermostat Recycling Corporation (TRC) is an organization consisting of the three major manufacturers of thermostats: White-Rogers, Honeywell, and General Electric. The TRC has established a program to collect and recycle their mercury-containing thermostats. The program is currently operating in nine states in the Great Lakes region and Florida. The next expansion of the program is occurring now and will include Connecticut and other Northeast states.

The TRC program identifies heating, ventilation and air conditioning (HVAC) wholesale outlets in the participating state. The wholesale outlets accept and store old mercury thermostats brought in by HVAC contractors. When a container is filled, it is shipped by common carrier under provisions of the Universal Waste Rule to the TRC for recycling. The program was designed and is financed by the product manufacturers. TRC pays for shipping and recycling costs. The wholesaler pays \$15 for the cost of the recycling container. Connecticut needs actively to promote programs such as the TRC collection.

There are other examples of manufacturer take back programs, most notably a program established by the Rechargeable Battery Recycling Corporation (RBRC) (battery manufacturers) to collect and recycle rechargeable nickel-cadmium batteries through participating retail outlets. Under this program, consumers take their spent nickel-cadmium batteries to a participating retail outlet where they are then transported to a recycling facility under the provisions of the Universal Waste Rule. This program has been operating in

Connecticut since 1996 and allows us to comply with a state law to recycle nickel-cadmium batteries (CGS Section 22a-256a). It is fully financed by the RBRC.

Watlow Electric Manufacturing Company has implemented a take-back program for their mercury displacement relays (MDR). They used to manufacture MDRs for control panels for industrial heating systems. They stopped manufacturing the MDRs in 1997 due to environmental concerns and replaced them with an electronic alternative. They continue to take back any Watlow MDR for proper disposal.⁵⁸

Japan has passed legislation that will require manufacturers to take back consumer electronics. As a result, Japanese manufacturers are establishing a collection infrastructure, increasing the efficiency of disassembling electronics, and designing future electronics for recyclability⁵⁹. The European Union has drafted similar legislation requiring manufacturer responsibility.

5.1 Recommendations on manufacturer take-back programs

The concept of “product stewardship” or “extended producer responsibility” holds that a manufacturer needs to accept responsibility for its product from production through recycling or safe disposal. Product stewardship is the most cost efficient and equitable means of managing a waste because the costs are built into the price of the product. The manufacturer passes along the cost of recycling or safe disposal to the consumer. Therefore, only the consumers who purchase products that contain hazardous components pay for their proper management.

The other common method for collecting such products is through municipal household hazardous waste collection events. These collections typically are financed by the municipality through tax revenues. To encourage disposal at a household hazardous waste collection, the residential participant does not pay a fee for proper disposal. This system provides no financial incentive to the manufacturer or the consumer to reduce their use of products with hazardous components. When the manufacturer and consumer pay for proper disposal, there is a financial incentive for manufacturers to develop and for consumers to purchase less hazardous or nonhazardous alternatives.

The type of take-back system depends on the nature of the product and its distribution system. Typical take-back programs involve a customer bringing a commodity back to the retail outlet where it was purchased. This works well for nickel-cadmium batteries and would also work well for button-cell batteries and fever thermometers that contain mercury.

Retail take-back programs are not a practical system for mercury switches embedded in motor vehicles or large appliances. Consequently, the take-back concept should be expanded to include producer financing of collection and recycling infrastructures for such products. For example, switches contained in larger products such as cars and appliances are best recovered through dismantlers and recyclers. The manufacturer can provide information on the location

⁵⁸ Larry Crane, Watlow Electric Manufacturing Company. Phone conversation with Tom Metzner, CT DEP, December 20, 1999.

⁵⁹ Dennis Normile, “Electronics with 9 Lives”, Popular Science, December 1999, pg. 40.

of the switches and financially support their collection and recycling. In the future, manufacturers should develop non-mercury alternatives. In cases where this is not feasible, manufacturers should agree not only to help finance a collection infrastructure utilizing existing dismantlers, collection points and transporters, but also to buy back the recycled mercury for the next generation of switches or to remove it from commerce so that the global reservoir will diminish.

Because the take-back system will vary from product to product, the manufacturers of products containing mercury should submit a plan to CT DEP for the collection and recycling of their products. To simplify the process, these plans could be submitted through trade associations who represent the industry and coordinated through a regional clearinghouse as described in Section 6.10 below.

The servicing and replacement of fluorescent lights and thermostats are largely handled by contractors. An efficient take-back system for these items is one financed by manufacturers utilizing contractors who replace spent lamps or thermostats and transport them to a distributor who sends them for recycling. The manufacturers could then buy back the recycled mercury and other components to use in the next generation of products or remove it from commerce. The most efficient way to implement a program like this is under the Universal Waste Rule. As described above, the Universal Waste Rule takes certain hazardous wastes and establishes less stringent management guidelines that facilitate recycling. Universal wastes do not require a hazardous waste manifest or permitted hazardous waste transporters. Fluorescent lamps and other mercury-containing devices such as switches, relays, and thermometers are excellent candidates for inclusion in the Universal Waste Rule in Connecticut.

6.0 A Regional Approach to Eliminating Mercury Wastes – The Northeast Waste Management Officials Association (NEWMOA) Model Legislation

Recommendation

- Adopt legislation and regulations consistent with, and in support of, the Northeast regional effort to achieve virtual elimination of manmade mercury emissions.

Since mercury is an airborne pollutant, the regulatory approaches and policies of one state can have a significant effect on the environment in other states. Mercury can be transported great distances in the air and then deposited with rain (wet deposition) or without rain (dry deposition). For example, mercury originating from a coal-fired power plant in the Midwest can end up in a lake in the Northeast. Mercury that has been deposited can also be reentrained in the atmosphere and deposited somewhere else. Mercury is thus a regional problem requiring a regional solution.

Statutes and regulations should be compatible among neighboring states so manufacturers can implement effective public education and interstate collection programs. Interstate cooperation can benefit all participating states and manufacturers by imposing fairly uniform requirements for the management of elemental mercury and mercury-containing products. Such cooperation also discourages states from reaping unfair advantages by refusing to adopt similar requirements.

Connecticut has taken a leadership role in the regional mercury management initiative. CT DEP participated extensively in writing the Northeast States and Eastern Canadian Provinces Mercury Study: A Framework for Action (February 1998), which was developed in response to the draft EPA Mercury Study that indicated high mercury deposition rates in the Northeast. CT DEP has been a co-chair of the Mercury Task Force of the Conference of New England Governors and Eastern Canadian Premiers. This task force is charged with implementing the Mercury Action Plan that the Conference adopted in June 1998 to address the regional mercury problem. The Mercury Task Force has delegated to NEWMOA the responsibility for drafting comprehensive legislative concepts designed to support the Mercury Action Plan's goal of "virtual elimination of anthropogenic mercury releases from the region".⁶⁰

CT DEP participated on the NEWMOA Mercury Work Group that drafted the legislative concepts. To date, the concepts include eliminating mercury from school laboratories, eliminating the sale of elemental mercury to the general public, eliminating or reducing mercury in products and creating an infrastructure for collecting and properly managing those mercury-containing products for which feasible alternatives do not exist. At two conferences in December, 1999, NEWMOA introduced the draft legislative concepts to the

⁶⁰ The Conference of New England Governors and Eastern Canadian Premiers, "Mercury Action Plan 1998", June 1998, pg. 1.

public and the regulated community. A copy of the draft is included as Appendix C. The draft is now being revised based on public comment for presentation to the Environment Committee of the Conference of New England Governors in the spring of 2000. It is important that the northeast states adopt consistent legislative language. This will simplify public education, regulatory review by environmental agencies and compliance by the regulated community.

As of January 2000, the key components of the NEWMOA draft are:

- Notification to the states by manufacturers of mercury-containing products
- Mercury-containing product phase-outs and exemptions
- Labeling of mercury-containing products
- Solid waste disposal ban on mercury-containing products
- Collection of existing inventory of banned and phased-out mercury-containing products
- Prohibition on the use of elemental mercury in schools and on the sale of certain consumer products that contain mercury
- Disclosure for certain mercury-containing products used in health care facilities
- Limitations on the sale elemental mercury
- Public education and outreach
- Interstate Clearinghouse to coordinate state reviews of manufacturer notifications, applications for exemption, collection plan reviews, etc.
- Enforcement and appropriations necessary to implement the legislation

6.1 Notification to the states by manufacturers of mercury-containing products

The NEWMOA draft legislation would require manufacturers of products with intentionally added mercury to notify the states concerning (1) the type of product manufactured, (2) the name and address of the manufacturer, (3) amount of mercury in each unit of product, and (4) the total number of units sold in North America.

A first step in reducing and eliminating mercury in the solid waste stream is to be aware of those items containing mercury. There are many different products that contain mercury, and there are numerous applications for mercury switches and relays, thermometers, lighting, gauges, batteries, and others. The information requested through the notification provision would enable the states to characterize the local mercury issue, design appropriate mercury reduction programs, better estimate the impacts of mercury reduction efforts, and enforce the provisions of the legislation. Notification could occur through the interstate clearinghouse recommended in Section 6.10 below to simplify manufacturer compliance.

6.2 Mercury-containing product phase-outs and exemptions

Over a six-year period, many products containing more than 10 milligrams of mercury would gradually be phased out. Certain products could receive exemptions from the phase-out based on their environmental or human health benefits and the lack of a feasible alternative.

Phasing out non-essential products containing mercury is the surest way to keep them out of the waste stream because recycling programs are unlikely to achieve 100% compliance. Some products that contain mercury, such as fever thermometers, have feasible non-mercury alternatives. Phase-outs are an incentive for manufacturers to develop those alternatives.

6.5 Labeling of mercury-containing products

The NEWMOA draft legislation would require the labeling of products that contain mercury and their packaging. The proposed label would, at a minimum, include the periodic table symbol for mercury “Hg” with a circle around it.

Labeling items that contain mercury will facilitate their collection and recycling. Labeling educates the public about those items that contain mercury and therefore require safe waste management practices. Labeling may also encourage consumers to choose non-mercury or low-mercury substitutes. For example, the CT DEP encourages the use of fluorescent lamps because they conserve energy. However, these lamps also contain a small amount of mercury, so spent fluorescent lamps should be recycled and not disposed in the regular trash. Labeling lamps encourages consumers to recycle them. Public Act 99-228 allows the CT DEP to adopt regulations requiring labeling of mercury-containing products provided the symbol for labeling is agreed upon by the Northeast Governors and Eastern Canadian Premiers.

Manufacturers of products that contain mercury have actively opposed previous labeling initiatives. The National Electrical Manufacturer’s Association (NEMA) has successfully sued the State of Vermont over its labeling requirements. The Association’s primary argument in the case was that the manufacturers would have to make a separate lamp for sale in Vermont, which would not be practical. Regional cooperation should allow the manufacturers to develop a uniform label in consultation with the states.

Button-cell battery manufacturers also objected to labeling requirements, testifying that some button-cells are too small to make a label practical. However if the label is simple in design, such as the periodic symbol for mercury “Hg” in a circle, then the battery can be labeled. NEMA has indicated that the major battery manufacturers are currently working on a mercury-free button-cell. This would be the best solution.

Manufacturers of large appliances and automobiles have objected to labeling indicating that the switches that contain mercury are not visible to the public. They advocate as an alternative educating dismantlers to identify mercury switches in their products. The NEWMOA draft makes provision for waivers or alternatives to the labeling requirements. Such alternatives or waivers would be coordinated through the Clearinghouse described in Section 6.10.

6.4 Solid waste disposal ban on mercury-containing products

The NEWMOA draft calls for a disposal ban for mercury-added products. Under this ban, it would be illegal for a solid waste disposal facility knowingly to accept a product with added mercury. The ban would also prohibit a person from knowingly placing a product containing mercury in the solid waste stream. The language is similar to a law in Minnesota.

There are some items, such as fluorescent lamps, which must contain mercury but which should be kept out of the waste stream. A disposal ban on existing mercury-containing products and new products for which there are not feasible alternatives would help ensure that these products are not placed in the solid waste stream where they can contribute to mercury

emissions from solid waste facilities. Although the ban would probably not be 100% effective, it would be an excellent public education tool and it would decrease the overall amount of mercury thereby moving us closer to the Mercury Action Plan's goal of the virtual elimination of mercury emissions.

6.5 Collection of existing inventory of banned and phased-out mercury-containing products

The NEWMOA draft legislation would require manufacturers to establish a collection program for their products that contain mercury. They would also be required to finance the cost of the collection, although it is assumed that this cost would be incorporated into the cost of the product. The draft leaves the choice of the collection mechanism to the manufacturers, but would require them to submit plans to the state. Review of these plans could be coordinated through the regional Clearinghouse (See Section 6.10).

If products are banned from disposal, then a collection and recycling infrastructure is imperative. Collection programs may or may not involve direct take-back systems and they may include existing collection infrastructures, but whatever the system, it must be convenient and accessible for consumers.

6.6 Prohibition on the use of elemental mercury in schools and on the sale of certain consumer products that contain mercury

The NEWMOA draft would prohibit the sale of novelty items such as games, ornaments and cards that contain mercury. These items are nonessential and will eventually end up in the solid waste stream where they can contribute to mercury emissions from solid waste facilities. It would also prohibit the sale of mercury for use in schools and the sale of mercury fever thermometers without a prescription.

6.7 Disclosure for certain mercury-containing products used in health care facilities

The NEWMOA draft would require product manufacturers to disclose mercury content down to one part per billion to health care facilities through a Certificate of Analysis. There are products used in hospitals and other health care facilities that contain trace amounts of mercury. The mercury is not intentionally added to the products but is detectable in ranges from parts per million to parts per billion. These products include soaps, reagents, acids, alkalis, pharmaceuticals, bleaches and preservatives. The State of Massachusetts has discovered through extensive work with hospitals that the trace mercury in these products may contribute to mercury in wastewater. Both the manufacturers and the purchasers of these products may be unaware of their mercury content. A certificate of analysis would enable the health care facilities to identify the products containing trace amounts of mercury in order to meet strict limits on mercury levels in wastewater. As more is learned about discharges of mercury in wastewater, facilities other than health care facilities may need to receive this type of disclosure.

6.8 Limitations on the sale of elemental mercury

The NEWMOA draft would prohibit the sale of elemental mercury without a material safety data sheet (MSDS) and limit its use to medical, research and manufacturing purposes only. The purchaser would have to sign an agreement indicating that he understands that mercury is

toxic, that he will use and store it properly, and that he will not place it in the solid waste stream or down the drain.

There are limited uses for elemental mercury. In the hands of the general public it can become an immediate public health risk as well as an environmental risk. Mercury can vaporize at room temperature and be entrained in the atmosphere. This legislation seeks to remove that risk.

6.9 Public education and outreach

The NEWMOA draft legislation would require the states to implement a comprehensive public education program on ways to reduce mercury in the environment. This educational program would require the CT DEP to cooperate with product manufacturers and other states to develop such educational programs. As noted throughout this report, consumer education is essential to the state's mercury reduction effort.

6.10 Interstate clearinghouse to coordinate state reviews of manufacturer notifications, applications for exemption, collection plan reviews, etc.

The NEWMOA draft proposes a regional interstate clearinghouse be established to ensure coordination on the implementation of the act, including manufacturer exemption requests, labeling waivers or alternatives, recycling collection systems, and any other aspect of the legislation from which states would benefit by coordination. The clearinghouse concept is borrowed from the Toxics in Packaging statutes that have been adopted almost verbatim by at least eighteen states and some European countries (CGS Section 222-255g-255m). These statutes require the elimination of certain heavy metals from packaging and include exemption provisions. The Toxics in Packaging Clearinghouse has been extremely effective in coordinating the manufacturer exceptions among the states that participate.

6.11 Enforcement and appropriations necessary to implement the legislation.

These provisions would be state specific. Both enforcement authority and funding would be necessary to make this legislation effective. The funding required would depend which elements of the proposal are adopted.

Appendix A

Public Act 99-228

“An Act Concerning Products Containing Mercury and The Universal Waste Rule”

Substitute House Bill No. 6625

Public Act No. 99-228

An Act Concerning Products Containing Mercury and the Universal Waste Rule.
Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. (NEW) (a) For purposes of this section: "Retailer" means a person who engages in the sale to the general public of items for which a label is required under the regulations adopted under this section; "wholesaler" means a person who engages in the sale of any such item to a retailer; and "manufacturer" means a person who manufactures any such item and sells such item to a retailer or wholesaler.

(b) After the adoption of the regulations authorized by subsection (c) of this section, a manufacturer or wholesaler may not sell for use in this state, and a retailer may not sell, any of the items for which a label is required under the regulations adopted under this section unless the item is labeled to clearly inform the purchaser or consumer that mercury is present in the item and that the item must be properly disposed of or recycled.

(c) The Commissioner of Environmental Protection shall cooperate with any effort to adopt a proposed label for products containing mercury which effort is undertaken by the New England Governors' Conference and the eastern Canadian premiers who adopted a mercury action plan in June, 1998. If such group agrees to a proposed label, the commissioner, in regulations adopted in accordance with the provisions of chapter 54 of the general statutes, shall require such label to be affixed to any product sold in this state which the commissioner deems necessary, other than any medication. The purpose of such regulations shall be to facilitate the recycling of such products and to reduce the presence of mercury in the solid waste stream. If said group does not agree to a proposed label on or before January 1, 2001, the commissioner shall propose to the joint standing committee of the General Assembly having cognizance of matters relating to the environment a plan for the labeling of products containing mercury.

Sec. 2. (NEW) (a) Each manufacturer of electric lamps containing mercury sold in this state, in consultation with the Commissioner of Environmental Protection and the Connecticut Resources Recovery Authority, shall provide to any distributor of such lamps written information stating that mercury is contained in such lamps and a description of the laws of this state governing management of spent lamps containing mercury. Each such manufacturer shall provide such information either on each such lamp containing mercury, or in or on the packaging of each such lamp containing mercury, or in a sufficient amount of printed material provided to retailers to allow retailers to make such information available to any consumer purchasing any such lamp containing mercury. Each such manufacturer shall provide to each municipality in this state information regarding the appropriate management of spent lamps containing mercury.

(b) On or before January 1, 2001, the Connecticut Resources Recovery Authority shall report to the joint standing committee of the General Assembly having cognizance of matters relating to the environment regarding any changes which said authority has detected in the amount of mercury-containing products in the waste stream over the previous two years.

Sec. 3. (NEW) On or before July 1, 1999, the Commissioner of Environmental Protection shall publish notice of intent to adopt regulations, in accordance with the provisions of chapter 54 of the general statutes, to implement the set of waste management standards for thermostats containing mercury, batteries and pesticides which standards are provided in 40 CFR 273, et seq., as an alternative to regulating such wastes as otherwise provided under the Resource

Conservation and Recovery Act (42 USC 6901 et seq.). The commissioner shall petition the United States Environmental Protection Agency under 40 CFR 273.80, et seq., to include fluorescent lamps in such alternative program of regulation. Such regulations shall further provide for and facilitate the storage of electronic equipment for recycling and the recycling of electronic equipment.

Sec. 4. On or before February 1, 2000, the Commissioner of Environmental Protection shall provide a report to the Governor and the General Assembly regarding measures to reduce the overall amount of mercury-containing wastes from facilities under the control of the state or municipal governments and household, commercial and industrial sources through source reduction, segregation and safe waste management, including recycling. Such report shall include, but not be limited to, recommendations on the feasibility or effectiveness of (1) measures to eliminate or reduce the use of mercury in medical and consumer products; (2) manufacturer take-back programs for mercury-containing products; (3) the elimination of the use of mercury in science education programs; (4) encouraging the recycling and safe management of existing stocks of elemental mercury; (5) curtailing the sale of elemental mercury to the general public and public education regarding the risks involved with the use of elemental mercury; and (6) implementing a state-wide collection of spent fluorescent lamps, elemental mercury, thermostats, switches, thermometers, button cell batteries and other mercury-containing items from households.

Sec. 5. This act shall take effect from its passage, except that section 2 shall take effect January 1, 2000.

Approved June 29, 1999

TOP

Appendix B

Department of Public Health and Department of Environmental Protection Fish Consumption Advisory

APPENDIX B

Connecticut Fish Consumption Advisory For Mercury

| Advisory | Waterbody | Fish Species | High Risk Group | Low Risk Group |
|--------------------------|---|--|------------------------|-----------------------|
| Statewide Freshwater | Remainder of CT's waterbodies | All species except Trout | One meal per month | One meal per month |
| Specific Freshwater Fish | Dodge Pond Lake McDonough Silver Lake, Berlin Lake Wyassup | Largemouth Bass Smallmouth Bass Pickerel | Do not eat | One meal per month |

No advisory for Trout

High Risk Group includes pregnant women, women planning on becoming pregnant within one year, and children under six.

Low Risk Group includes everyone not listed in the High Risk Group

Source - 2000 Connecticut Angler's Guide

Appendix C

NEWMOA Draft Mercury Legislation (December 10, 1999)

MERCURY EDUCATION AND REDUCTION MODEL ACT
An Act Concerning Mercury Education and Reduction

Sec. 22a-254 Legislative finding. The General Assembly finds that mercury is a persistent and toxic pollutant that bioaccumulates in the environment; that according to recent studies, mercury deposition is a significant problem in the Northeast; that consumption of mercury-contaminated freshwater fish poses a significant public health threat; that because of this threat, all of the Northeastern states have issued freshwater fish advisories, warning certain individuals against consuming fish from affected water bodies; that studies have documented that exposure to the elevated levels of mercury in the environment has resulted in serious harm to fish-consuming wildlife; that combustion of municipal and other solid waste is a major source of mercury in the Northeast; that at least one recent study has raised concern about potential emissions of mercury during the transportation and storage of solid waste; that removal of mercury containing products from the waste stream prior to combustion is an effective way to reduce mercury at solid waste management facilities; that the Governors of the New England States and the Premiers of the Eastern Canadian Provinces have endorsed a regional goal of "the virtual elimination of the discharge of anthropogenic mercury into the environment"; that manufacturers of certain mercury-added products, such as thermostats, have established successful "take back" programs for properly managing the products at the end of their useful life; that a visible label on the product and/or its packaging increases effective consumer education, encourages informed purchasing, and bolsters participation in programs designed to separate, collect, and properly manage or recycle mercury-added products; that accidental mercury spills, breakages, and releases have occurred at schools throughout the Northeast and these incidences have proven costly to clean-up and have exposed students, teachers, and/or administrators to mercury emissions; that health care facilities, educational and research institutions, and businesses have also experienced significant employee exposures and incurred significant costs due to accidental mercury releases; that state procurement of environmentally responsible products can improve the markets for those products, including low or non-mercury-added products and energy efficient products; that the intent of this Act is to achieve significant reductions in environmental mercury by encouraging the establishment of effective state and local waste reduction, recycling, and management programs while continuing to spur economic development.

Sec. 22a-254a. Definitions. As used in sections 22a-254a to 22a-254 (?) inclusive:

(1) "Formulated mercury-added product" means a chemical product, including but not limited to laboratory chemicals, cleaning products, cosmetics, pharmaceuticals, and coating materials, that are sold as a consistent mixture of chemicals;

(2) "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;

(3) "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;

(4) "Mercury fever thermometer" means a mercury-added product that is used for measuring body temperature;

(5) "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 practical jokes, figurines, adornments, toys, games, cards, ornaments, yard statues and figures, candles, jewelry, holiday decorations, items of apparel (including footwear), or similar products;

(6) "Manufacturer" means any person, firm, association, partnership, corporation, governmental entity, organization, combination, or joint venture which 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;

Sec. 22a-254b. Interstate Clearinghouse. The Commissioner of Environmental Protection is authorized to participate in the establishment and implementation of a regional, multi-state clearinghouse to assist in carrying out the requirements of this Act 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, applications for alternative labeling/notification systems, education and outreach activities, and any other related functions. The clearinghouse may also maintain a list of all products containing mercury, including mercury-added products; a file on all exemptions granted by the states; and a file of all the manufacturers' reports on the effectiveness of their collection systems.

Sec. 22a-254c. Notification of mercury content in products. (a) After six months from the effective date of this Act no mercury-added product shall be offered for final sale or use or distributed for promotional purposes in Connecticut without prior notification in writing by the manufacturer of the product to the Commissioner 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.

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.

With the approval of the Commissioner, the manufacturer may supply the information required above 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 Commissioner. The Commissioner may define and adopt specific requirements in accordance with [state administrative and public participation requirements] for the content and submission of the required notification.

Public disclosure of confidential business information submitted to the Connecticut pursuant to this section shall be governed by the requirements of the [state's freedom of information act].

Notwithstanding the requirements of the [state's freedom of information act] the state may provide the interstate clearinghouse with copies of such information and the Commissioner and the interstate clearinghouse may compile or publish analyses or summaries of such information provided that the analyses or summaries do not identify any manufacturer or reveal any confidential information.

Sec. 22a-254d. Restrictions on the Sale of Certain Mercury-added Products. (a) No later than one year after the adoption of this Act no mercury-added novelty shall be offered for final sale or use or distributed for promotional purposes in Connecticut. 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 Sec.22a-254e.

(b) Six months after adoption of this Act, a person may not sell or supply mercury fever thermometers to consumers and patients, except by prescription. The manufacturers of mercury fever thermometers must, in addition to providing notice of mercury content and instructions on proper disposal, supply clear instructions on the careful handling of the thermometer to avoid breakage and on proper cleanup should a breakage occur. Mercury fever thermometer manufacturers must also comply with Sec. 22a-254c, Sec. 22a-254e, Sec. 22a-254f, Sec. 22a-254g, and Sec. 22a-254h.

Within one year of the adoption of this Act, no school in Connecticut 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) No later than one year after the adoption of this Act no mercury dairy manometers shall be offered for final sale or use or distributed for promotional purposes in Connecticut. Manufacturers that produce and sell mercury dairy manometers must notify retailers about the provisions of this product ban and how to dispose of the remaining inventory properly. The Commissioner of Environmental Protection in consultation with the Commissioner of Agriculture shall examine the feasibility of implementing a collection and replacement program for dairy manometers.

Sec. 22a-254e. Phase-out and Exemptions. (a) No mercury-added product shall be offered for final sale or use or distributed for promotional purposes in Connecticut if the mercury content of the product exceeds; (1) 1 gram (1000 milligrams) for mercury-added fabricated products or 250 parts per million (ppm) for mercury-added formulated products, effective two years from the date of this Act; (2) 100 milligrams for mercury-added fabricated products or 50 parts per million (ppm) for mercury-added formulated products, effective four years from the date of this Act; and (3) 10 milligrams for mercury-added fabricated products or 10 parts per million (ppm) for mercury-added formulated products, effective six years from the date of this Act.

(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.

For a product that contains more than one mercury-added products as a component, the phase out limits specified in subsection "a" apply to each component and not the sum of the mercury in all of the components. For example, a car can contain 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.

Fluorescent lamps shall be exempt from the requirements of subsection "a." Eight years from the effective date of this Act the mercury content of fluorescent bulbs must either not exceed 10 milligrams or the manufacturer must comply with the exemption requirements pursuant to subsection (a).

A mercury-added product shall be exempt from the limits on total mercury content set forth in subsection "a" 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, in writing, the Commissioner and provide the legal justification for the claim of exemption.

Manufacturers of a mercury-added product may apply to the Commissioner for an exemption for no more than two years from the limits on total mercury content set forth in subsection (a) 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. The Commissioner may grant with modifications or conditions an exemption for a product or category of products if (1) it finds that a system exists for the proper collection, transportation, and processing of the mercury-added product. Such a system may include direct return of a waste product to the manufacturer or an industry or trade group supported collection and recycling system, or other similar private and public sector efforts; and (2) it finds each of the following criteria are met: (i) use of the product is beneficial to the environment or protective of public health or protective of public safety; (ii) there is no technically feasible alternative to use of mercury in the product; and (iii) there is no comparable non-mercury-added product available at reasonable cost.

(f) Prior to issuing an exemption the Commissioner 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 re-application by the manufacturer and findings by the Commissioner of continued eligibility under the criteria of this subsection and of compliance by the manufacturer with the conditions of its original approval, an exemption may be renewed one or more times and each renewal may be for a period of no longer than two years.

Sec. 22a-254g. Labeling of Mercury-Added Products. (a) No mercury-added product manufactured after two years from the effective date of this Act shall be offered for final sale or use or distributed for promotional purposes in Connecticut unless both the product and its packaging are labeled in accordance with this section, any adopted rules, or the terms of any approved alternative labeling or notification granted under subsection "h." A retailer may not be found in violation of this subsection if the retailer lacked knowledge that the product contained mercury.

Where a mercury-added product is a component of another product, the product containing the component and the component must both be labeled.

The label on a product containing a mercury-added component shall identify the component with sufficient detail so that it may be readily located for removal.

All labels must be clearly visible prior to sale and must inform the purchaser, using words or symbols, that mercury is present in the product and that the product should not be disposed of or placed in a waste stream destined for disposal until the mercury is removed and reused, recycled, or otherwise managed to ensure that the mercury in the

product does not become mixed with other solid waste or wastewater. Labels affixed to the product shall be constructed of materials that are sufficiently durable to remain legible for the useful life of the product.

After two years from the effective date of this Act, any person offering a mercury-added product for final sale or use or promotional purposes to an address in Connecticut shall clearly advise the purchaser or recipient at the point of sale that the product contains mercury. This requirement applies to all transactions where the purchaser or recipient is unable to view the labels on the package or the product prior to purchase or receipt, including but not limited to catalogue, telephone, and Internet sales.

Responsibility for product and package labels required under this section shall be on the manufacturer, and not on the wholesaler or retailer unless the wholesaler or retailer agrees with the manufacturer to accept responsibility in conjunction with implementation of an alternative to the labeling requirements of this section approved under subsection "h." In the case of a multi-component product the responsible manufacturer is the last manufacturer to produce or assemble the product or, if the multi-component product is produced in a foreign country, the responsible manufacturer is the importer or domestic distributor.

Labeling for Specific Products

Labeling of large appliances (commonly called white goods) sold in a store where the appliance is on display shall meet all requirements of this section except that no package labeling is required.

Labeling of mercury fever thermometers and button cell batteries shall meet all requirements of this section except that no product labeling is required.

Labeling of motor vehicles shall meet all requirements of this section except that the mercury-added components are not required to be labeled. A doorpost label shall list the mercury-added components that may be present in the vehicle.

Alternative Methods of Public Notification

A manufacturer may apply to the Commissioner for an alternative to the requirements of this section where: strict compliance with the requirements is not feasible; or the proposed alternative would be at least as effective in providing pre-sale notification of mercury content and in providing instructions on proper disposal; or federal law governs labeling in a manner that preempts state authority.

Applications for an alternative to the requirements of this section must: (1) document the justification for the requested alternative; (2) describe how the alternative ensures that purchasers or recipients of mercury-added products are made aware of mercury content prior to purchase or receipt; (3) describe how a person discarding the product will be made aware of the need for proper handling to ensure that it does not become part of solid waste or wastewater; (4) document the

readiness of all necessary parties to implement the proposed alternative; and (5) describe the performance measures to be utilized by the manufacturer to demonstrate that the alternative is providing effective pre-sale notification and pre-disposal notification.

The Commissioner may, grant, deny, modify, or condition a request for an alternative to the requirements of this section and approval of an alternative. Such waiver shall be for a period of no more than two years and may, upon continued eligibility under the criteria of this section and compliance with the conditions of its prior approval, be renewed at two-year intervals. Prior to approving an alternative, the Commissioner shall consult with neighboring states, provinces and regional organizations to insure that its labeling requirements are consistent with those of other governments in the region.

Sec. 22a-254h. Disposal Ban and Proper Management of Mercury Scrap Metal Facilities. (a) After two years from the effective date of this Act no person shall dispose of mercury-added products in a manner other than by recycling or disposal as hazardous waste. Mercury 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) Mercury-added products may be disposed of in a licensed hazardous waste disposal or recycling facility.

At a minimum, owners and operators of solid waste management facilities are required to (1) post signs at the facility providing notice of the prohibition of the disposal and incineration of mercury-added products; (2) provide written notification to or contractual agreements with the facility's customers on a frequency determined by the Commissioner, providing notice of the prohibition on the disposal and incineration of mercury-added products; and (3) implement a plan approved by the Commissioner for periodically monitoring incoming wastes to detect the presence of mercury-added products at the facility.

A person may not crush a motor vehicle or shred an appliance unless the person has first made a good faith effort to remove all of the component mercury-added products.

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.

Sec. 22a-254i. Collection of Mercury-Added Products. (a) Within one year of the adoption of this Act, no mercury-added product shall be offered for final sale or use or distribution for promotional purposes in Connecticut 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 such a plan has received approval of the Commissioner. 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.

The collection system plan shall include (1) a public education program to inform the public about the purpose of the collection program and how to participate in it; (2) a targeted capture rate for the mercury-added products or components; (3) a plan for implementing and financing the collection system; (4) documentation of the willingness of all necessary parties to implement the proposed collection system; (5) a description of the performance measures to be utilized and reported by the manufacturer to demonstrate that the collection system is meeting capture rate targets and other measures of program effectiveness as required by the Commissioner; and (6) a description of additional or alternative actions that will be implemented to improve the collection system and its operation in the event that the program targets are not met.

In developing a collection system plan, manufacturers are encouraged to utilize or expand on existing collection and recycling infrastructure where feasible and cost-effective. In the event that the manufacturer has elected not to utilize existing local collection and recycling infrastructure, the manufacturer shall include in its collection system plan the reasons for its decision to establish a separate collection system.

Within a year of the state approval of the collection system plan, the manufacturer or entity that submitted the plan on behalf of the manufacturer shall ensure that a convenient and accessible recovery system for the users of those products is in full operation.

Two years following the implementation of the collection system plan required under this section and biennially thereafter, the manufacturer or entity that submitted the plan on behalf of the manufacturer shall be required to submit a report on the effectiveness of the collection system. The report shall include an estimate of the amount of mercury that was collected, the capture rate for the mercury-added products or components, the results of the other performance measures included in the manufacturer's collection system plan, and such other information as the Commissioner may require. Such reports shall be made available to the public by the Commissioner.

The cost for the collection system must be borne by the manufacturer or manufacturers of mercury-added products. Manufacturers may include the cost of the collection system in the price of the product and may not assess a separate fee for the use of the collection system.

The Commissioner shall review the regulatory framework governing handling of waste from mercury-added products and may revise, if necessary, its rules as appropriate to facilitate collection.

Mercury-added formulated products intended to be totally consumed in use, such as reagents, cosmetics, pharmaceuticals, and other laboratory

chemicals, shall be exempt from the requirements of this section.

Sec. 22a-254j. Universal Waste Rule. The Commissioner shall modify its rules governing universal hazardous waste as appropriate to promote the recycling, recovery, and proper management of elemental mercury and mercury-added products on a statewide and regional basis.

Sec. 22a-254k. Disclosure for Mercury-Containing Formulated Products That Are Used in Health Care Facilities. (a) Within one year of the effective date of this Act, the manufacturers of formulated products that contain mercury or a mercury compound from any source or cause, whether intended or unintended, and are offered for sale or use to a health care facility in Connecticut must provide both the Commissioner and the recipient health care facility a Certificate of Analysis documenting the mercury content of the product, down to a 1 part per billion level. Such formulated products include, but are not limited to: acids; alkalies; bleach (sodium hypochlorite); materials used for cleaning, in maintenance, or for disinfection; pharmaceutical products; stains; reagents; preservatives; fixatives; buffers; and dyes.

(b) The Certificate of Analysis (COA) 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 COA.

(c) Upon receipt of the COA, the Commissioner may review the data, in consultation with the manufacturer and take appropriate action.

Sec. 22a-254l. Limitations on the Use of Elemental Mercury. (a) Within one year of adoption of this Act, no person may sell or provide elemental mercury to another person in Connecticut without providing a Material Safety Data Sheet, as defined in the United States Code, Title 42, Section 11049, 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.

Sec. 22a-254m. Existing Inventories. Those mercury-added products with a code or date of manufacture indicating they were manufactured prior to the effective date of this Act are exempt from Sec. 22a-254d, Sec. 22a-254e, Sec. 22a-254f, Sec. 22a-454h, and Sec. 22a-254k. 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 the effective date, 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.

Sec. 22a-254n. Public Education and Outreach. (a) The Commissioner shall implement a comprehensive 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. The Commissioner shall cooperate with manufacturers of mercury-added products and other affected businesses in the development and implementation of public education and technical assistance programs.

The Commissioner 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.

(c) The Commissioner may develop an awards program to recognize the accomplishments of manufacturers, municipalities, solid waste management facilities, solid waste recycling facilities, household hazardous waste collection facilities, citizens, or others who go beyond the minimum requirements in this legislation and excel at reducing or eliminating mercury in air emissions, solid waste, and wastewater discharges.

To facilitate compliance with the disposal ban, the Commissioner shall prepare and publish best management practice guidelines for dental offices and laboratories.

Sec. 22a-254o. State Procurement Preferences for Low or Non-mercury-added Products. (a) Notwithstanding other policies and guidelines for the procurement of equipment, supplies, and other products, the Commissioner of Administrative Services shall, within 1 year of the effective date of this section, revise its policies, rules and procedures to implement the purposes of this Act.

The Commissioner of Administrative Services shall give priority and preference to the purchase of equipment, supplies, and other products that contain no mercury-added compounds or components, unless there is no economically feasible non-mercury-added alternative that performs a similar function. In circumstances where a non-mercury-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.

The Commissioner of Administrative Services is authorized to give a price preference of up to ____ percent for products that contain no mercury or less mercury.

This priority and preference shall apply to all state purchases, as well as any purchases made by others with state funds;

With respect to lighting, energy efficient lamps for lighting purposes shall be purchased in preference to other less efficient lighting options. To the maximum extent possible, purchases shall be restricted to lights that contain the lowest total mercury content per lumen hour available. Spent bulbs shall be recycled to the maximum extent feasible.

The procurement agent shall specify non-mercury or reduced mercury-added products, as applicable, in procurement bid documents.

State dental insurance contracts negotiated after the effective date of this Act shall provide equal coverage for non-mercury fillings and mercury amalgam fillings at no additional expense to the state employee.

Sec. 22a-254p. Enforcement. 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 ____ dollars. In the case of a second and any further violation, the liability shall be for a civil penalty not to exceed _____ dollars for each violation.
[Each state may add additional enforcement provisions.]

Sec. 22a-254q. Public Notification and Review.
[Each state to add its own Public Notification and Review Provisions.]

Sec. 22a-254r. State Review.
The Commissioner shall, in consultation, with the Conference of the New England Governors/Eastern Canadian Premiers Environment Committee, review the effectiveness of this Act no later than 4 years after its adoption and may provide a report based upon that review to the Governor and the legislature. The report shall review the effectiveness of the programs required under the Act and may contain recommendations for improving them. As part of this review, the state Commissioner shall evaluate the effectiveness of the collection systems established under this Act and determine whether additional state authority or targeted capture rates are needed to improve those systems. In addition through this review process, the Commissioner shall evaluate the need for additional incentives for manufacturers of mercury-added products that are below 10 milligrams to reduce the amount of mercury in those products.

Sec. 22a-254s. Severability Clause
[Each state to add its own severability clause.]

Sec. 22a-254t. Effective Date.
This Act shall become effective immediately upon adoption.

Sec. 22a-254u. Administrative Fees and Regulations. The Commissioner may impose fees sufficient to cover the costs of administering the provisions of this Act. The Commissioner may adopt regulations to implement the provisions of this Act consistent with the policies and purposes of this Act.

Sec. 22a-254v. Appropriations.
[Each state to add its own appropriations provisions.]