

# ADVISORY COMMITTEE ON MERCURY POLLUTION



## 2008 ANNUAL REPORT

to the Governor, General Assembly  
and Citizens of the State of Vermont  
January 2008

### Committee Members:

Chair	Neil Kamman	Vermont Agency of Natural Resources
Vice-Chair	Jen Holliday	Chittenden Solid Waste District
	Michael Bender	Abenaki Self-Help Association, Inc
	John Berino	Vermont Assn. of Hospitals & Healthcare Systems
	William Bress	Vermont Department of Health
	Gary Gulka	Vermont Agency of Natural Resources
	Cynthia Martin	House Fish and Wildlife Committee
	Ruma Kohli	IBM Burlington
	Eric Palmer	Vermont Agency of Natural Resources
	Richard McCormack	Senate Natural Resources and Energy Committee
	Mary Jean Rajda	Porter Hospital, Inc.

## **EXECUTIVE SUMMARY**

This is the tenth annual report of the Advisory Committee on Mercury Pollution, which was established in 1998 by the Vermont Legislature to address and report on mercury contamination in the environment, health risks posed, and to review programs and methods to reduce contamination and health risks of mercury to Vermonters (10 V.S.A. §7113).

The report reviews the status of recent mercury education and reduction efforts in Vermont; mercury environmental and health update; and Committee recommendations to the Legislature on reducing mercury exposure and risk.

## **Committee Recommendations**

### **Dental Mercury**

- Consistent with ongoing efforts to virtually eliminate the release of anthropogenic mercury in Vermont, the Committee reiterates its support from its 2007 annual report and recommends that the Legislature consider an eventual phase-out of mercury-containing dental amalgam by 2012.
- Dental clinics should provide information to patients about the advantages and disadvantages to human health and the environment from using dental amalgam and other filling materials. This information should be developed by the Vermont Department of Health in consultation with the Vermont State Dental Society and the Advisory Committee on Mercury Pollution. In addition, the Committee recommends that the Legislature consider legislation to prohibit placement of dental amalgams in pregnant women and children under 18 years of age.
- Legislation should be considered instructing the Banking, Insurance, Securities and Health Care Administration (BISHCA) to ensure that insurance coverage provides equivalent benefits to patients for non-mercury fillings.

### **Thimerosal in Vaccines**

- Vermont should prohibit the use of thimerosal, a mercury-containing preservative, in vaccines administered to children less than 18 years of age and in pregnant women, except in the case of an emergency or a temporary shortage.
- The use of thimerosal should be phased out from all vaccines administered in Vermont by 2011.
- The Vermont Department of Health should develop and disseminate information for Vermonters on how to obtain thimerosal-free vaccines.

### **Fish Mercury Monitoring Program**

- The Committee reiterates its recommendation in its 2006 and 2007 reports to the Legislature for a proposed fish mercury monitoring program for Vermont's freshwaters. The proposed fish mercury monitoring program would enable the Vermont Fish Contaminant Monitoring

Committee (Vermont Departments of Health, Fish and Wildlife and Environmental Conservation) to document the occurrence of and trends in mercury contamination in fresh water fishes in Vermont's lakes and rivers and relate trends to mercury reduction management actions. This monitoring program is essential to understanding and managing the risk of mercury contamination from fresh water fish consumption.

- The cost of an ongoing fish mercury monitoring program is \$40,000 per biennium. Vermont's efforts to monitor fish mercury from inland waters presently lag behind those of most New England states, but this can easily be changed. Adequate funding should be available to the Departments of Environmental Conservation and Fish and Wildlife to perform this important task.

### **Mercury Thermostats**

- The Committee supports H.115, mercury thermostat legislation that passed the House in 2007, which would require thermostat manufacturers to provide convenient collection and recycling programs for out-of-service mercury thermostats from all sources, including residential, commercial, and institutional.
- The bill should maintain provisions to allow meaningful financial incentives to significantly increase the collection rate of mercury thermostats, achieve a high rate of recycling of mercury thermostats that would otherwise be discarded each year, and require manufacturers to submit annual reports to the Agency on thermostat collection amounts. Several thermostat collection pilot projects, including one in Vermont, and a permanent program in Maine, have clearly demonstrated that a financial incentive, in the form of a cash rebate, is an important component to a successful collection program along with adequate education, outreach, and convenient collection opportunities.

### **Mercury-Containing Lamps**

- The Committee recommends that the Legislature promote state policies and programs for producer (manufacturer) responsibility of mercury-containing lamps throughout their entire life cycle, including funding the collection of mercury-containing lamps at end-of-life.
- The State of Vermont should take a leadership role in the adoption of statewide lighting policies and purchasing specifications that include: 1) energy efficiency; 2) toxicity (specifically mercury and lead); 3) lamp life (which can reduce manufacturing, transportation, and disposal impacts); 4) sustainable manufacturing (such as the use of encapsulated mercury dosing technologies); 5) end-of-life management (particularly through producer responsibility in funding collection and recycling programs for spent lamps); and 6) innovative technologies such as light-emitting diodes (LEDs) that are mercury-free, and use less toxic or non toxic materials, have significantly longer life, and are more energy efficient than mercury-containing lamps.
- State and local government agencies should be directed to purchase more up-to-date, low-mercury lighting equipment, which is usually cost-effective on a life-cycle basis. Policies and incentives are also needed to require hardware stores and other retail outlets to phase out the sale of less expensive, yet inefficient, lighting technologies and offer easily accessible and affordable recycling programs for mercury-containing lamps.

# INTRODUCTION

This is the tenth annual report of the Advisory Committee on Mercury Pollution. The Committee met nine times in the past year. Since 1998 the Committee (which was established in 1998 by the Vermont Legislature to address and report on mercury contamination in the environment, health risks posed, and to review programs and methods to reduce contamination and health risk of mercury to Vermonters) has met 80 times. Information, minutes, and reports of the Committee can be found at: [www.mercvt.org](http://www.mercvt.org).

This report is divided into the following sections:

- I. **Background for This Year's Report**
- II. **Mercury – Environmental and Health Update and Highlights**
- III. **Recent Mercury Education and Reduction Efforts**
- IV. **Committee Recommendations**
- V. **Committee Work Plan for 2008**

## I. Background for This Year's Report

### ***Human Health Effects of Mercury***

The health and environmental effects of mercury pollution have been detailed by the Advisory Committee in previous reports ([www.mercvt.org](http://www.mercvt.org)). The main route of exposure of the general public to methylmercury (the most toxic form of mercury) is through the consumption of fresh water and marine fish and shellfish. The Food and Drug Administration (FDA) has issued stringent advisories for pregnant women and children to limit consumption of all fish to twelve ounces per week and canned white albacore tuna and tuna steak to six ounces per week. The federal Center for Disease Control and Prevention found that one in six, or 16 percent of American women of childbearing age had amounts of mercury in their blood above levels considered safe. The Vermont Department of Health has issued fish consumption advisories for freshwater fish that are caught in Vermont waters and these advisories have been updated this year.<sup>1</sup>

Elevated methylmercury in the bloodstream of unborn babies and young children may harm the developing nervous system, impairing learning ability and resulting in a loss of IQ. One study has even estimated that this loss of intelligence exacts a cost to American Society of hundreds of millions of dollars in lost productivity annually.<sup>2</sup> There is also evidence that exposures to methylmercury have can have genetic and immunological effects. Other research points to renal and cardiovascular effects. A recent study provides evidence of how various forms of mercury can activate an enzyme that damages blood vessel walls.<sup>3</sup> Additional studies are needed to better characterize all of these impacts of mercury.

While the primary way that humans are exposed to methylmercury is through fish consumption, the general public may become exposed to harmful levels of elemental mercury vapor in homes and workplaces. Liquid elemental mercury easily vaporizes and can be inhaled. Exposures

from improper handling of mercury in schools, laboratories, health care facilities, and manufacturing plants; from accidental mercury spills, or in cultural or ritualistic uses of liquid elemental mercury can be serious. Very small amounts of mercury (on the scale of a few drops) can raise indoor air concentrations of mercury to harmful levels. Mercury-containing fluorescent lamps, when broken, can lead to elevated levels of mercury vapor that are of concern, requiring some special but simple cleanup precautions.<sup>4</sup>

### ***Ecological Effects of Mercury***

Birds and mammals that eat fish are at risk for exposure to methylmercury. Depending on the level of exposure, effects of methylmercury on wildlife may include mortality, reduced fertility, and slower growth and development, and abnormal behavior, all of which can affect survival.<sup>5</sup> Mercury has also been detected at levels of concern in wildlife that is not closely connected to the aquatic environment, such as upland birds, as further discussed in this report. An excellent overview of the extent and effects of mercury pollution in the Northeast, entitled *Mercury Matters*, is a summary of the major findings of a series of 23 scientific research papers that were published in the journals, *Ecotoxicology* (2005) and *Bioscience* (2006).<sup>6</sup>

### ***Mercury Sources***

The Northeast states have an impressive record for mercury emission reductions in the last decade. Mercury emissions from the Northeast have been reduced from 15,900 kg to 4,700 kg; a 71% reduction since 1998. These reductions can be attributed largely to reductions in mercury emissions from municipal and medical waste combustors, coal-fired utility plants, and sewage sludge incinerators. Other reductions have occurred due to state laws banning mercury use in products and controlling or banning disposal of mercury products in landfills. The New England Governors and Eastern Canadian Premiers have set a goal of virtual elimination of mercury releases and have an interim goal of 75% reduction by 2010. Point emission sources of mercury comprise 76% of the current total emissions, including municipal waste combustors, sewage sludge incinerators, electrical utility boilers, and steel and cement manufacturing. Area sources comprise the remainder of mercury releases and include releases from products and fluorescent bulbs, home heating fuel combustion emissions, dental waste water discharges, and crematoria emissions. Presently, out-of-region emission sources comprise 85% of the mercury deposited to the Northeast (mostly from coal burning utilities in the Southeast and Midwest), and in-region sources comprise 15%. Although mercury emissions have dropped nationally by 45% since 1990, there is much work to be done, as fish from many waterbodies in Vermont and the region are still not safe for consumption.<sup>7</sup>

Under the federal Clean Water Act, states are required to develop a total maximum daily load (TMDL) estimate for mercury pollution for impaired water bodies. A TMDL is a calculation of the maximum amount a pollutant that a water body or group of water bodies can receive and still meet applicable water quality standards; in this case, fish that are safe to eat. As discussed in this report, the New England states and New York received approval for a regional TMDL for mercury, indicating that anthropogenic inputs of mercury to our region's freshwater bodies will need to be reduced between 86% and 98% to restore our contaminated fisheries to a point where fish consumption advisories are not necessary. Emission reductions from coal-fired utilities and other out-of-region sources would be necessary to achieve these targets. These findings support the need for continuing to pursue aggressive regional mercury reduction goals and the need for commensurate federal action, including emissions from coal-fired utilities greater than the 70% stipulated under the federal Clean Air Act Mercury Rule (CAMR). The Northeast states have played a leading role in challenging the legal basis and adequacy of CAMR for this reason.<sup>8</sup>

This legal challenge has been brought by 16 states, including Vermont, against EPA in the U.S. District Court of Appeals (D.C. Circuit) in regard to the inadequacy of CAMR in controlling emissions from coal-fired utilities. EPA contends that its regulations, when fully implemented, will reduce utility emissions of mercury from 48 tons to 15 tons, approximately a 70% reduction. However, the states argue that additional reductions, on the order of 90% are necessary in order to meet desired fish tissue levels as detailed in the regional mercury TMDL.

The three regional interstate organizations, New England Interstate Water Pollution Control Commission, Northeast States Coordinated Air Use Management Association, and Northeast Waste Management Officials' Association have developed excellent summaries of progress to date in reducing mercury in the environment.<sup>9 10 11 12</sup> The Mercury Task Force of the Conference of New England Governors and Eastern Canadian Premiers has issued a biannual progress report detailing the regional mercury reduction initiatives and progress toward the 2010 regional goal of 75% reduction in mercury emissions.

### ***Mercury Legislation in Vermont***

In 2005, comprehensive mercury legislation was passed to reduce the amount of mercury released to the environment through the discard of mercury-added products. This law bans the sale of certain mercury-added products such as thermostats, fever thermometers, and dairy manometers and restricts the sale of numerous other measuring devices containing mercury and mercury-added switch and relay components in thousands of products. The law further prohibits the use of mercury in schools, requires reduction in mercury releases from dental clinics, and requires mercury reduction plans from hospitals. The law clarifies the product labeling requirements for mercury-added products and bans the discard of mercury-added products in landfills and municipal waste incinerators.

In 2006, further mercury legislation was passed that requires the removal of mercury-added auto switches (trunk and hood convenience light switches and anti-lock brake mercury switches) from junk or end-of-life vehicles prior to crushing and scrap metal processing. The legislation also required the Agency of Natural Resources to report to the Legislature on recommendations to increase the recycling rate of mercury wall thermostats that are still in use in residential, commercial, and institutional settings.

In 2007, new provisions to the existing law extended the time period for compliance to assist the electronics industry as well as legislation to clarify language dealing with electronics.

In 2007, the Vermont Legislature, at the recommendation of the Advisory Committee on Mercury Pollution, passed a resolution requesting the U.S. Congress to ban the exportation of elemental mercury both from commercial sources and any surplus mercury held in storage by the U.S. Departments of Defense and Energy, and for the U.S. government to develop adequate capacity for storage of excess mercury. Several other states followed suit with resolutions and recently, the U.S. House of Representatives passed a bill, H.1534, that would accomplish similar goals. A companion bill has recently been introduced into the U.S. Senate.

Also in 2007, a mercury thermostat collection bill (H.515), was passed by the Vermont House requiring thermostat manufacturers to establish collection programs for contractor and consumer-generated mercury thermostats and providing a financial incentive of \$5 for turning in a thermostat for recycling.

## II. Mercury – Environmental and Health Update and Highlights

The following is an update of noteworthy environmental and health issues regarding mercury that is of relevance to the Advisory Committee and its charge.

### ***METALLICUS: The Mercury Experiment to Assess Loadings in Canada and the US***

This major study being carried out in the northern Experimental Lakes Area of Manitoba has been mentioned in prior Advisory Committee on Mercury Pollution (ACMP) Annual Reports. METALLICUS is a groundbreaking, multi-million dollar study where researchers from the US and Canada have experimentally dosed a small lake with known quantities of chemically distinguishable forms of mercury known as stable isotopes. The design of the study is such that researchers can understand whether mercury deposited to land, water, or wetlands is most readily available to fish. The study has allowed researchers to observe both the increase in biota mercury that would be attributable to increasing mercury deposition, and the declines in biota mercury that are expected under declining deposition rates. The authors have just reported on their groundbreaking results in the *Proceedings of the National Academy of Sciences*. Their profound findings are as pertinent to Vermont waters as to that tiny Manitoba Lake that was experimentally dosed for the study. The most salient finding is directly quoted here from the *Proceedings*:<sup>13</sup>

*“Essentially all of the increase in fish methylmercury concentrations came from mercury deposited directly to the lake surface. In contrast, <1% of the mercury isotope deposited to the watershed was exported to the lake (...). Lake mercury isotope concentrations were still rising in lake biota, and watershed mercury isotope exports to the lake were increasing slowly. Therefore, we predict that mercury emissions reductions will yield rapid (years) reductions in fish methylmercury concentrations and will yield concomitant reductions in risk. However, a full response will be delayed by the gradual export of mercury stored in watersheds. The rate of response will vary among lakes depending on the relative surface areas of water and watershed.”*

### ***Release of the Northeast Regional Mercury Total Maximum Daily Load***

The New England states and New York, in collaboration with the New England Interstate Water Pollution Control Commission have completed a total maximum daily load (TMDL) analysis addressing all mercury-impaired water bodies in the region. TMDL's are pollution control plans required by the Clean Water Act that articulate maximum allowable loadings of pollutants to receiving waters from nonpoint and point sources. The Northeast Regional TMDL is novel in three respects. It is the first in the country to adopt a regional set of goals and allocations to address a regional collection of water bodies. In addition, the TMDL calls for more aggressive emission controls within the national Clean Air Mercury Rule than are presently envisioned by the current Environmental Protection Agency (EPA) administration. Finally, the plan imposes an allocation of nonpoint (e.g. atmospheric) mercury upon jurisdictions outside of the region in which the plan applies. New England Interstate Water Pollution Control Commission (NEIWPC), the plan technical team, and EPA have had several meetings regarding the TMDL, and recently approved the plan on December 20, 2007.

Many other states are looking closely at the outcome of EPA's approval decision, and are considering adopting a similar TMDL approach. While this was a regional initiative, Vermont Agency of Natural Resources (ANR) staff played a very significant role in the development of this plan.

### ***Important Synthesis Studies by Hubbard Brook Research Foundation***

The Hubbard Brook Research Foundation's ScienceLinks team published two important journal articles that stand as statements on the overall footprint of the mercury problem in the Northeast.<sup>14 15</sup> These were described in the 2006 ACMP Annual Report, but were published after the printing of that report. The media release of these studies served to spotlight that mercury remains an environmental issue in the northeastern United States, despite the initial implementation of the Federal Clean Air Mercury Rule. These studies provided critical technical support to the regional Mercury TMDL.

### ***National Mercury Monitoring Program***

Both of the Hubbard Brook journal articles speak to the need for a National Mercury Monitoring Program, to consistently track changes in mercury contamination over time, across a suite of selected locations. A bill has been drafted by US Senators Snowe and Collins (both of Maine) that would establish the program. In the past two years, northeastern Senators have been approached to dedicate funds to establish pilot National Monitoring Program studies in Vermont, New Hampshire, and Maine. At present, one earmark has been dedicated to the Hubbard Brook Research Foundation to pilot the program at the Hubbard Brook Research Forest in New Hampshire. The sponsoring Senators have recently made mention of the clear link between the need for EPA to approve the Northeast Regional TMDL and the associated need to establish the National Mercury Monitoring Program.

### ***Vermont Fish Contaminant Monitoring Committee***

This committee oversees collection and analysis of fish contaminants throughout Vermont. In 2006, the Committee delivered a report to the General Assembly, in response to 10VSA§7114, outlining elements of a necessary indicator-based mercury monitoring initiative for Vermont. The plan has seen no action as of this writing. Despite this, the Committee continues to collect samples as time and resources permit, on an ad-hoc basis. The most newly available fish tissue samples were collected during this past summer, from inland lakes and ponds in Vermont. During 2007, the US Environmental Protection Agency provided Vermont with invaluable assistance for both field sampling and chemical mercury (and PCB) analysis. This assistance included the first-ever measurements of fish mercury from Shelburne Pond, a valued Champlain Valley lake fishery. The analysis of the 2007 fish tissues is proceeding, in partnership with EPA, as of this writing. During 2008, the Vermont Department of Fish and Wildlife will undertake a major screening of waters statewide for viral hemorrhagic septicemia. Fishes collected for this effort will also be sampled for mercury and hopefully other contaminants. It bears mention in this Report that other fish contaminants such as PCB's and poly-brominated diphenyl ethers (a chemical class of flame retardants) remain poorly characterized in Vermont.

### ***New Fish Consumption Guidance Issued***

Based on the newly obtained fish tissue mercury data from the period 2003-2005, the Vermont Department of Health (VDH) has revised the Vermont fish advisory. This advisory clarifies, improves upon, and supersedes the 2001 Advisory, which was the last advisory issued by VDH. In order to disseminate the Advisory, VDH, in partnership with Vermont ANR and the ACMP, developed a new fish mercury poster containing the Advisory, for distribution as outlined in following sections of this Report. Some of the refinements to the advisory include new guidance against the consumption of the largest yellow perch, a minor relaxation in the suggested allowable meals-per-month of certain other locally caught fish species, and minor modifications to specially-identified waters. Also guidance was provided for species where monitoring data were previously unavailable, such as the white sucker.

### ***Wet and Dry Mercury Deposition Monitoring Continues at the Underhill Mercury Monitoring Station***

In 2006, the Committee reported on the work of Dr. Eric Miller of the Ecosystems Research Group, (Norwich, VT) who has been making wet and dry mercury deposition measurements at the Underhill monitoring station with novel and groundbreaking techniques. Dr. Miller has developed stronger evidence than ever before that certain mercury deposition events measured in Vermont can be directly attributed to mercury emissions from Midwestern areas, reinforcing the understanding that meaningful reductions in mercury emissions from coal fired power plants will result in an important reduction in mercury deposition to Vermont. This is a central tenet of the Northeast Regional Mercury TMDL, and one validated by the findings of METALLICUS.

In early 2007, Dr. Miller lost earmark-based EPA funding that had, for the prior several years, supported advanced atmospheric monitoring initiatives at Underhill. Thankfully, other EPA funding was made available to ten locations nationwide to begin the atmospheric monitoring portion of the National Mercury Monitoring Program, with the specific goal of tracking changes attributable to implementation of the Clean Air Mercury Rule. Dr. Miller successfully competed for these funds, securing the advanced monitoring operations at Underhill for the next two years. In addition to the advanced initiative, monitoring of wet mercury deposition also continues at Underhill. This work is supported by the Lake Champlain Research Consortium (LCRC), using funding from National Oceanic and Atmospheric Administration (NOAA). The more routine monitoring supported by this latter funding stream is critical to maintain a complete understanding of mercury deposition in Vermont. At present, ACMP understands that funding provided through LCRC may not be sustainable over the long-term. The Underhill monitoring location is the longest running such station in the world.

### ***Continuation of the Lake Champlain Modeling Project***

This long-standing project is in the second of a three-year cycle, and is now also being led by Dr. Miller. The project was substantially augmented during 2007. The project has been redesigned to link measurements of reactive gaseous mercury deposition (measured dry deposition) to mercury in water, then to methylmercury, and in-turn to the biota that accumulate methylmercury. In this way, the project team will be able to track deposition events of mercury from known sources into the aquatic food web in Lake Champlain. This project is a unique partnership of Dr. Miller, Dartmouth College, the Agency of Natural Resources, and the U.S. Geological Survey (USGS).

### ***Mercury Monitoring by USGS***

During 2007, USGS commenced monitoring of mercury discharges from the stormwater-impaired Englesby Ravine watershed. This is an interesting study site, in that the installation of stormwater detention ponds can have simultaneous and counteracting effects on mercury bioavailability. On one hand, the detention ponds are expected to reduce total mercury delivery from Englesby Ravine to Lake Champlain. However, the pollutant-trapping ponds that are so important to hydrologic and sediment controls can themselves exacerbate the mercury problem, by creating an environment wherein mercury is readily methylated. As such, the combined effect of the Englesby stormwater project may be to reduce total mercury discharge, but increase methylmercury discharge. This important research carries implications for stormwater controls throughout the country.

In addition to this, USGS monitoring of mercury at their experimental site on the Sleepers River (Danville) continues. Dr. Jamie Shanley (USGS office in Montpelier) and others from USGS recently published an important scientific article in the journal *Water Air and Soil Pollution* describing the movement and methylation of mercury from the Sleepers River site.<sup>16</sup>

Finally, during 2008 the USGS also plans to augment the Lake Champlain Modeling Project by initiating a collaboration with Dr. Mark Marvin DiPasquale, one of the nation's foremost mercury scientists. Dr. Marvin DiPasquale specializes in the mechanisms by which methylmercury is produced, retained, and distributed in lake sediments.

### ***Modeling Mercury in the New England Region: The EPA-led MERGANSER Project***

The main objective of this collaborative project is to integrate environmental models, observational databases, and a rich body of research findings from Vermont and the remainder of New England to produce a regional GIS-based tool that will enhance our understanding of mercury sources, fates, risks, and exposures throughout the region. With recently obtained EPA funding, the project team, consisting of scientists from EPA, USGS, Vermont ANR, NEIWPC, and the Northeast States for Cooperative Air Use Management, along with Dr. Eric Miller and Dr. David Evers, will develop this modeling system. This model will allow managers to identify ecosystem features (such as stream density, watershed size, amount and type of wetlands, water chemistry, mercury sources, and land-use and topological patterns that determine wet and dry deposition patterns of mercury) associated with high levels of mercury in fish and fish-eating birds (e.g., loons), and to predict mercury levels in fish and birds at lakes where no tissue data are available. In addition, the model will be useful for determining optimal locations for long-term monitoring and identifying monitoring needs for lakes that may be most susceptible to elevated mercury. The MERGANSER initiative is to commence during 2008.

### ***Loon Recovery Project***

Abandoned loon eggs and feathers from Vermont lakes continue to be analyzed for mercury in conjunction with the Loon Recovery Project, in partnership with the Biodiversity Research Institute in Maine.

### ***Mercury is No Longer Only a Water Issue***

While mercury has long been considered to be a problem of the aquatic world, new research in New England and elsewhere is beginning to broaden this perspective. In 2005, ACMP reported to the legislature on the discovery of high levels of mercury in the mountaintop-dwelling Bicknell's thrush. Recent investigations show that many birds are affected by mercury contamination, in landscapes where this would not be expected. For example, in the Sudbury River of Massachusetts, Dr. David Evers from the Biodiversity Research Institute (Maine) has shown that common redwing blackbirds, a species that feeds from an insectivorous food chain, can have as mercury levels as much as two-times that of kingfisher (an obligate piscivore), in habitats where these birds co-occur. Dr. Evers explains that the redwing blackbirds feed upon spiders, that themselves feed upon smaller spiders or other insects that live in the margins of wetlands. By contrast, the kingfisher feeds on small fishes within the wetland, which themselves depend on plankton. What Dr. Evers' research is showing is that the methylmercury is generated in the aquatic environment can negatively impact terrestrial birds, in wetland habitats throughout the country. This research further shows that the risks of mercury are pervasive across our environment, which makes the virtual elimination of mercury from Vermont that much more important.

## **III. Recent Mercury Education and Reduction Efforts**

### ***Implementation of Recent Mercury Product Legislation***

The Department of Environmental Conservation (DEC) continues to implement the provisions of the 2005 mercury product legislation along with additions for auto switch removal passed in 2006 and modifications to the legislation in the 2007 session to clarify existing language related

to electronics labeling. Solid waste districts assisted schools in implementing bans on use of mercury in schools. Hospital and dental offices worked with DEC to fulfill requirements to reduce mercury use and release.

Mercury Product Manufacturer Requirements: Manufacturers were required to submit and implement updated or new plans for labeling by July 1, 2007. New certified labeling plans from manufacturers who have never submitted plans continue to come into the state for approval.

Restrictions on Sale of Certain Mercury Added Products: Effective January 1, 2007 mercury added neon signs, measuring devices, mercury switches, mercury thermometers (other than fever), blood pressure devices, and other instruments were restricted from sale if an exemption has not been granted. A small number of exemption requests were received from mercury product manufacturers and these were reviewed in collaboration with the Interstate Mercury Education and Reduction Clearinghouse, coordinated by the State of Connecticut.

Mercury Auto Switches: DEC is directing the implementation of a mandatory mercury auto switch removal program for auto salvage yards and other handlers of junk or end-of-life vehicles that passed in the 2006 legislative session. Under the law, mercury-added trunk and hood convenience light switches and anti-lock brake system switches must be removed and recycled prior to crushing starting January 1, 2007. A switch collection program is required to be provided by automobile manufacturers. Automakers have formed *End-of-Life Vehicle Solutions Corporation* (ELVS) to implement a mercury switch education, collection, and recycling program. ELVS has been mailing all participating facilities collection buckets, instructions, and other program materials to all auto salvage operations identified by DEC. The *National Vehicle Mercury Switch Recycling Program* (NVMSRP) was formed in August 2006 by associations and individuals representing dismantlers, automakers, automotive steel and scrap industries, environmental groups, and state/federal environmental agencies. A four million dollar fund has been established as a financial incentive and to compensate auto dismantlers/recyclers on a first-come, first-serve basis for their efforts by paying one dollar per switch received. Vermont dismantlers and recyclers are eligible for this incentive.

In the fall of 2006, DEC contracted with DSM Environmental Services, Inc., a Vermont environmental consulting firm, to provide on-site training at auto salvage yards on auto switch removal and collection and monitor progress in program implementation during 2007. DEC and DSM Environmental, Inc. identified 65 auto salvage yards that were enlisted in the auto switch program. A total of 63 facilities received training on identifying, locating, and removing mercury switches. DEC paid for the contractor through its special fund for mercury reduction projects.

ELVS submitted an annual report on the participating facilities and the number of switches that were turned into the program. A total of 12 facilities had turned in 1,113 switches, amounting to 2.45 pounds of mercury. Nationwide, the ELVS program has collected over 1800 pounds of mercury. Based on the information provided through the contractor's contact with Vermont auto salvage facilities, most facilities had not processed enough vehicles to completely fill their collection buckets yet, which are capable of holding between 70 and 140 switches. In a 2006 report to the Legislature, DEC estimated that there could be as many as 25,000 switches per year available for collection. This would mean that only 4.5% of the switches available for collection are accounted for. It appears that there are many Vermont motor vehicles that are taken out of state for processing, and there are some mobile auto crushers that may be removing auto switches themselves at Vermont salvage yards which are not counted in the Vermont totals. Due to the newness of the program, DEC intends to closely monitor the program in the coming year, especially those facilities that have not turned in switches to date.

The Advisory Committee on Mercury Pollution will be monitoring the progress of the auto switch removal program in the coming year.

A new federal rule, adopted December 15, 2007, controlling mercury emissions from electric arc furnaces (that accept auto scrap for smelting and recycling) requires these facilities to purchase motor vehicle scrap only from those facilities participating in a program for the removal of mercury switches.<sup>17</sup> DEC believes that this requirement will provide further incentive for auto salvage yards to remove mercury switches.

Hospital Mercury Reduction Plans: Vermont hospitals were required by legislation, passed in 2005, to develop mercury reduction plans for mercury use in all patient care sites by 2007. Many Vermont hospitals have virtually eliminated the use of mercury in measuring devices, equipment and laboratory chemicals. However, to date, only 10 of 16 hospitals have fulfilled the planning requirement by providing the necessary documentation. DEC intends to make it a priority to achieve full compliance by June 30, 2008.

Dental Mercury: DEC has issued Dental Best Management Practices (BMPs) and is requiring all dental practices to self-certify to compliance with these BMPs by January 31, 2007 as required by statute. Self-certification is required every two years. These BMPs also address the requirement to install amalgam separators on the wastewater discharge system by January 1, 2007 as well as proper handling of dental amalgam wastes and other hazardous wastes. Over 230 dental practices have self-certified compliance with BMPs, including amalgam separator installation. This represents greater than 95% compliance rate. The Vermont State Dental Society assisted DEC in its efforts to obtain a high compliance rate. In October 2007, the American Dental Association (ADA) announced support of the installation of amalgam separators as a BMP. The amalgam separator requirement should lead to a significant decrease in mercury releases to municipal wastewater treatment plants, and it is expected that there will be measurable decreases in mercury in municipal sludges in the coming years. For example, mercury levels in the sludge at the Massachusetts Water Resources Authority treatment plant in Boston decreased by nearly 50% after amalgam separators were installed in dental offices.

Dental Amalgam use survey: Vermont statute (10 V.S.A. § 7110(e)) requires a survey of dental amalgam use by dentists in Vermont once every five years:

In late 2006 and early 2007, the Department of Environmental Conservation (DEC) and the Vermont State Dental Society collaborated to develop and administer a survey of all licensed dentists in Vermont. The survey contained questions related to use of amalgam, number of amalgam restorations placed, and the trend in amalgam use (increase or decrease) over the last two years. Below is a summary of the survey results. In addition to the survey, DEC received information on amalgam use by Vermont dental practices through the Dental Best Management Practices self-certification forms filed in 2007 (Note: This was a mandatory filing and, as such, a much higher rate of response than the voluntary survey; however, limited information on amalgam use was obtained.)

#### Summary of Dental Amalgam Use Survey Results

Surveys mailed	326
Responses	200
Response Rate	61%

- 167 responding dentists place restorations.
- Of these, 33 responding dentists (20%) place only non-amalgam restoration and 134 (80%) use amalgam.
- 58% of dentists who use amalgam reported a decrease in use of amalgam over the last two years.
- 40% of dentists who use amalgam reported about the same amount of use over the last two years.
- 2% of dentists who use amalgam reported an increase in use over the last two years.

Of the dentists reporting that they use amalgam the following table is a breakdown of number of restorations placed weekly.

No. of Amalgam Restorations Per Week	Percentage of Respondents
0-1	34%
2-5	18%
6-10	14%
11-20	21%
21-25	7%
26-35	5%
36-50	2%

Of dentists using dental amalgam:

- 34% use amalgam 0-1 time per week
- 66% use it 10 times per week or less
- 86% use it 20 times per week or less

#### Dental Amalgam Use Results from Dental BMP Certification Filings

145 of 201 (71%) of general dentistry practices use dental amalgam.

29% of general dentistry practices do not use dental amalgam.

No information is available from these filings on relative amounts of amalgam used or whether or not there has been a change in use over time.

#### ***Mercury Emissions from Crematoria***

The Advisory Committee researched the issue of mercury emissions from crematoria and the connection with dental mercury. The number of cremations is increasing annually and the amount of mercury released is expected to increase in the next few decades due to an increase in the number of deceased having a larger number of their own teeth with amalgam restorations. This increase is expected to be followed by a decrease in mercury emissions as the next generation will have both fewer cavities and few amalgam restorations.

Research by the Colorado Department of Public Health and Environment has shown that EPA has significantly underestimated mercury emissions from crematoria.<sup>18</sup> Applying new emissions factors to Vermont cremations (estimated at 2000 per year) results in about 14 pounds of mercury emissions per year.<sup>19</sup>

The options for reducing mercury emissions from crematoria are limited to either controlling emissions of mercury from the crematory exhaust stack or removing teeth containing amalgam prior to cremation. The option of removing teeth prior to cremation has some cultural implications that may be unacceptable to the general public. The only country that controls mercury emissions from crematoria is the United Kingdom, where it is expected that pollution controls, emissions trading, and closure of smaller facilities will achieve a 50% reduction in mercury emissions. The Committee explored the two emissions control options, concluding that there are economic and social/cultural issues that are obstacles and challenges to controlling mercury from this source. Crematoria emissions of mercury will continue to be on the work plan of the Committee for further discussion in the coming year.

***Vermont's Mercury Thermostat Collection Pilot Demonstrates Financial Incentives Work***  
DEC conducted a two-month mercury thermostat collection pilot project directed at households to test the effect of a financial incentive on increasing the rate of mercury thermostat recycling. There were 86 hardware stores serving as collection points throughout the state during the months of October and November. A \$5.00 cash incentive was provided in the form of \$5.00 off the purchase of anything in the participating store where the thermostat was returned. DEC paid for the program through its special fund for mercury reduction projects. The Thermostat Recycling Corporation provided the collection bins and recycling at no charge to the stores. DEC arranged for newspaper and radio advertisements and in-store advertising materials.

Over 1000 mercury thermostats were collected during the two-month period, which represents an estimated 500% increase in collection rates prior to the pilot for household thermostats. It also exceeds the statewide collection of thermostats from all sources by approximately three-fold. This represents 33 – 50 % of the thermostats available for collection on a yearly basis as estimated by DEC in a previous report to the Legislature. DEC has concluded from this study that financial incentives do have a positive impact on thermostat recycling rates.

In comparison, a report was prepared by the Product Stewardship Institute (PSI) on two separate state mercury thermostat collection pilot projects directed toward heating, ventilating and air conditioning contractors and designed to test the effect of financial incentives.<sup>20</sup> One-year pilots in Indiana and Oregon provided a \$3.00 and \$4.00 incentive, respectively, in the form of a rebate off the purchase of an Energy Star qualified non-mercury thermostat. In Oregon, there was a 124% increase in thermostat recycling and in Indiana a 6% increase. A key difference in the two states was a greater degree of outreach in Oregon about the pilot program. The PSI report concluded that financial incentives can be effective and must be implemented over the long term. There was a significant decrease in thermostat recycling in both states after the pilot program ended. The report also concluded that three factors appear to be important in yielding successful collection results: program awareness, convenient collection programs, and sufficient motivation.

The State of Maine's thermostat law contains a provision for a \$5.00 financial incentive for household and residential thermostats. According to the Maine DEP, the recycling of thermostats from contractors has doubled since the law went into effect.<sup>21</sup>

### ***Dairy Manometer Removal and Replacement Project***

The Agency of Agriculture, Food, and Markets and Vermont's municipal Solid Waste Districts began removing mercury-added dairy manometers on active and inactive farms in the Lake Champlain Basin. This first phase of this project replaced 80 manometers with mercury-free manometers at no cost to the farm utilizing funds from the Lake Champlain Basin Program. The current project is targeted to remove the remaining manometers from active and inactive farms across the state and funded by DEC's special fund for mercury reduction projects. To date there have been an additional 42 manometers removed with a remaining 26 identified for removal. The goal of the project is to have all mercury-added dairy manometers removed and replaced during 2008. The sale of mercury-added manometers was banned in Vermont after July of 2006. These manometers each contain a half-pound or more of mercury.

### ***Maple Sugar Thermometer Exchange Project***

On January 1, 2007 mercury thermometers utilized by maple sugarhouses were banned from sale in the state. During 2008, DEC, in partnership with the Agency of Agriculture, Food, and Markets and the Maple Sugar Association will implement a no-cost maple sugar thermometer exchange program with Vermont maple sugarhouses. DEC's special fund for mercury reduction projects will fund the exchange. Over 100 maple sugar makers have signed up for the exchange and will be bringing in approximately 210 mercury-containing thermometers to exchange for digital non-mercury replacement thermometers. Chittenden Solid Waste Management District has offered free recycling and transportation for this project.

Obtaining a non-mercury alternative thermometer is more difficult than previously thought given the specific criteria needed for maple sugar makers. Lynn Lang, a local expert and teacher on use of maple sugar thermometers from Lang Farm in Essex and Rick Marsh from Vermont Maple Outlet in Jeffersonville both offered their valuable support in getting the word out to maple sugar makers. They also assisted the state by identifying the optimal selection of sugaring thermometers for the exchange.

### ***Outreach to Sensitive Populations on Mercury in Fish***

#### **Distribution of Mercury-In-Fish Materials**

- Over 50,000 mercury-in-fish posters and brochures have been distributed over the course of this program, primarily through healthcare providers, to educate Vermonters about making informed choices regarding consumption of both fish caught in Vermont waters and commercial fish purchased in stores.
- The fish advisory developed collaboratively by VDH and ANR was updated utilizing new fish data. The advisory added the white sucker fish to the list of fish in the advisory and levels were slightly modified on the advisory visual portion of the card to more accurately depict fish mercury levels. VDH and ANR worked together to combine the educational materials with the new advisory. Over 17,000 fish cards have been printed for the anticipated distribution this coming year.
- Town Health Officers again participated in posting mercury in fish posters at fishing access areas across the state. The Department of Corrections will be maintaining these areas and posting replacement posters as needed.
- A joint mailing by Fish and Wildlife, and the Departments of Health and Environmental Conservation will be sent again in 2008 to all agents who sell fishing licenses in the state. This will be the third such mailing and the Departments have received valuable cooperation from the agents in posting these materials.

Survey of parents of newborns: A two-year survey conducted by DEC of parents of newborn babies was completed in September of 2007. This survey determined whether a new mother, during her pregnancy, knew about fish advisories, safe eating guidelines and also identifies types and quantities of fish consumed and potential changes in behavior due to knowledge of Vermont's fish consumption advisories. VDH has been supplying the data for identifying random survey participants based on location of residence within the state and has completed a preliminary evaluation of the data as follows:

- 5,800 women surveyed – approximate 40% overall response rate
- 72% overall awareness of the benefits to eating fish/shellfish
- Most common sources of obtaining information about mercury in fish were newspaper or magazine articles, nurse or doctor, and family or friend.
- 95% of mothers surveyed had been told or read about mercury in fish being bad for their baby. The most common source of this information was a nurse or doctor.
- 40% of mothers knew mercury could affect the baby up to age six.
- Nearly 67% knew about safe eating guidelines for fish. Less than half had seen one of the brochures, posters, or publications on mercury in fish.
- 53% of women that knew about the safe eating guidelines chose to limit their intake of fish. An additional 23% stated they never eat fish.
- There was a wide variation on knowledge of the safe eating guidelines based on country of residence.
- Mothers appear likely to eat more meals of canned tuna and shellfish (1-2 meals) when they are aware that fish is good for their baby.

Final results of this survey will be evaluated and posted at [www.mercvt.org](http://www.mercvt.org) some time in early 2008.

### ***Button Cell Battery Pilot Project***

A pilot project to collect mercury-added button cell batteries was initiated in 2006 in nearly 100 pharmacies across the state as well as over 20 nursing homes. The project was implemented through and administered by the Vermont Nursing Home Association. The program expanded to include placement of collection containers in 15 Audiologists/Hearing Aid Dispensers' offices across the state. The program allows for free disposal for the customer or nursing home resident. Utilizing DEC enforcement funds, the program has been extended for an additional year. In the first year of this program over 89 pounds of batteries have been collected at the pharmacies across the state. Brooks Pharmacies that were bought by Rite Aid are currently being reinstated in the program and some smaller locations have since gone out of business. Because of the various changes, new guidance materials and in-store posters will be mailed to the participants after the first of the year.

### ***Clean-up Guidance for Mercury Spills and Compact Fluorescent Bulbs***

The Vermont Departments of Environmental Conservation and Health together with representatives from Efficiency Vermont collaborated to develop unified guidance for mercury spills for products such as thermometers and broken compact fluorescent bulbs. These organizations acknowledged that cleanup guidance should be consistent in response to public concerns regarding health exposure. Some media coverage on broken fluorescent bulbs may have generated misconceptions on public health risk and appropriate cleanup methods. The guidance materials are focused toward guidance for homeowners and small spills. The group also has developed a contact list for first responders with names, telephone numbers and web site locations for emergency information. A packet with contact information, mercury spill guidance and information for proper clean up of fluorescent bulbs will be distributed across the state in the early part of 2008.

### ***Fluorescent Lamp Recycling***

True Value hardware stores completed their second year of a pilot project throughout Vermont to serve as collection points for spent fluorescent bulbs from households and small businesses. The program allows for up to six mercury-added lamps to be brought per visit to the store by a customer, at no cost. At the end of the first year, ACE hardware stores were also added as participants in the program. In September of 2007 the Do it Best hardware chains also joined the program to provide lamp recycling for a total of 73 Vermont hardware stores collecting mercury bulbs across the state. The goal of the project is to increase lamp recycling and provide a convenient, no-cost option for recycling. The following chart shows the results of the program since August of 2005.

	<b>9/2005-2006</b>	<b>2007</b>	<b>TOTAL</b>
<b>Lineal feet collected</b>	<b>84,242</b>	<b>101,567</b>	<b>185,809</b>
<b>Misc. bulbs CFL, circular, U-tubes, HID</b>	<b>1,212</b>	<b>5,329</b>	<b>6,541</b>

From calendar year 2006 to 2007, lamp collections in this project have increased 56% for the collection of lineal fluorescent lamps (bulbs) and 78% for the collection of compact fluorescent lamps (CFLs) and other miscellaneous lamps. Some of this increase can be attributed to the addition of 23 ACE collection sites to the program. However, True Value collections alone increased 49% for lineal and 63% for CFL and miscellaneous lamps from 2006 to 2007 annual collection numbers.

New Hampshire duplicated this program in 2006 for their True Value stores. Many states and organizations are considering modeling after Vermont's efforts and continue to explore possible sustainable funding to duplicate the program.

### ***Municipal Collection of Mercury-Containing Wastes***

The table below shows the amount of mercury collected through municipal household hazardous waste programs over the last eight calendar years from households and some small businesses. Municipal solid waste districts and other municipal entities continue to play a significant role in the proper management of mercury-containing wastes. Wastes typically collected include thermometers, thermostats, mercury switches and mercury spill clean-up debris. Due to recent outreach to encourage fluorescent lamp recycling, it is anticipated that lamp collection will continue to increase, although some lamps will be diverted to the True Value, ACE, and Do it Best hardware store pilot collection program and will not be counted in municipal collection programs.

<b>Mercury Collection in Municipal Programs</b>								
<b>Type of Mercury Waste</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>***2007</b>
<b>Mercury Products/ Debris* (thermometers, measuring devices, switches)</b>	<b>972 pounds</b>	<b>1,675 pounds</b>	<b>1,740 pounds</b>	<b>1,740 pounds</b>	<b>2,049 pounds</b>	<b>1,696 pounds</b>	<b>2,511 pounds</b>	<b>797 pounds</b>
<b>Elemental Mercury **</b>	<b>25 lbs</b>	<b>161 lbs</b>	<b>168 lbs</b>	<b>204 lbs</b>	<b>234 lbs</b>	<b>35 lbs</b>	<b>17 lbs</b>	<b>5 lbs</b>
<b>Mercury-added Lamps ** (fluorescent and HID)</b>	<b>0.8 lbs</b> <b>141,000 linear ft</b>	<b>1.4 lbs</b> <b>248,200 linear ft</b>	<b>1.9 lbs</b> <b>339,000 linear ft</b>	<b>2.1 lbs</b> <b>378,000 linear ft</b>	<b>2.3 lbs</b> <b>411,711 linear ft</b>	<b>2.5 lbs</b> <b>446,455 linear ft</b>	<b>2.5 lbs</b> <b>449,148 linear ft</b>	<b>3.4 lbs</b> <b>608,943 linear ft</b>

\* Includes the weight of mercury and non-mercury containing components

\*\* Represents actual weight of mercury collected

\*\*\* Preliminary numbers for 2007- does not represent final totals for all programs.

#### **IV. Committee Recommendations**

The Advisory Committee on Mercury Pollution's recommendations to the Legislature for reducing mercury risk and exposure are divided into two categories: mercury exposure reduction and mercury release reduction recommendations.

#### **MERCURY EXPOSURE REDUCTION RECOMMENDATIONS**

##### **Dental Mercury**

- Consistent with ongoing efforts to virtually eliminate the release of anthropogenic mercury in Vermont, the Committee reiterates its support from its 2007 annual report and recommends that the Legislature consider an eventual phase-out of mercury-containing dental amalgam by 2012.
- Dental clinics should provide information to patients about the advantages and disadvantages to human health and the environment from using dental amalgam and other filling materials. This information should be developed by the Vermont Department of Health in consultation with the Vermont State Dental Society and the Advisory Committee on Mercury Pollution. In addition, the Committee recommends that the Legislature consider legislation to prohibit placement of dental amalgams in pregnant women and children under 18 years of age.

- Legislation should be considered instructing the Banking, Insurance, Securities and Health Care Administration (BISHCA), in consultation with Vermont Department of Health, to ensure that insurance coverage provides equivalent benefits to patients for non-mercury fillings.

Rationale: There are three major pathways that have been evaluated by the Committee of mercury release and exposure related to dental amalgam: 1) amalgam use, 2) wastewater discharges from dental clinics, and 3) crematoria emissions. Legislation enacted in 2006 requiring the installation of amalgam separators and Best Management Practices has addressed mercury wastewater discharges. The Committee continues to evaluate methods to reduce mercury emissions from crematoria. In the previous two reports, the Committee has addressed and made recommendations on amalgam use and exposure.

Dental amalgams are approximately 50 percent mercury and constitute the largest sources of mercury use in products. Although amalgam use has declined significantly in favor of other alternatives, such as composite resins, dental mercury is the largest contributor of mercury to wastewater discharges. Mercury air emissions from crematoria contain vaporized mercury dental amalgam restorations. This constitutes a significant mercury emission source in Vermont, estimated at over 14 pounds of mercury emissions per year. Norway recently announced a ban on the use of mercury, including dental amalgam that took effect on January 1, 2008. Sweden announced a similar ban.

The Committee supports an eventual phase-out of dental amalgam use by 2012, with limited exemptions provided only in situations or applications where there is no technically feasible alternative. The Committee's position with regard to phase-out of dental amalgam use is consistent with its support for the State of Vermont's goal for the "virtual elimination" of mercury use in products where viable alternatives exist.

The Committee reiterates its position from its 2006 and 2007 report to the Legislature that dental patients should be provided with unbiased information on the advantages and disadvantages of the various dental filling materials. Based upon the latest available information, it is the Committee's position that dental amalgam has not been given a clean bill of health. For example, the U.S. Food and Drug Administration developed a draft report that analyzed published research since 1997 on health effects of dental amalgam which concluded that there is no evidence to show that mercury-containing silver fillings are dangerous. However, in September 2006, two U.S. Expert Advisory Panels selected by FDA that reviewed the draft report, voted 13-7 that the report was not complete, the evidence presented was often contradictory, and that conclusions based on the limited search by FDA should not be made. The panel recommended that the FDA re-evaluate the scientific literature. Specifically, they wanted to know if there was additional information available regarding the effects of dental amalgam on pregnant women, small children, and sensitive individuals, and on exposure levels during initial placement or removal of amalgam fillings. For that matter, other popular alternatives to dental amalgam, such as composite resins may expose patients to chemical compounds that are of health concern. It seems only appropriate that Vermonters be provided with unbiased information on what is known as well as what is unknown concerning the safety of filling materials. The precedent has been set in California, Maine, New Hampshire, and Connecticut where such information has been published by the government agencies in these states. In fact, members of the FDA Advisory Panels recommended similar measures nationally, including that FDA should consider informed consent for patients receiving amalgam and labeling changes restricting its use in pregnant women and children.

Given that elevated blood mercury levels can be found in patients after receiving amalgam fillings, it also seems only appropriate, as a precautionary measure, to restrict amalgam use in the populations most sensitive and affected by mercury exposure—children and pregnant women.

Recently the American Dental Association developed new brochures for patients on the advantages and disadvantages of dental restorative materials. The Committee is currently working with the Vermont State Dental Society to review the content and advise on any changes to the language of the brochures to be distributed to Vermont dentists.

BISHCA has confirmed that 13 companies that have filed specific schedules of covered services have “benefit amount distinctions based on the type of material used to restore and repair damaged or deteriorated teeth.” BISHCA has stated that all 13 companies used the term “amalgams” to describe one restorative procedure. Providing equivalent benefits for non-mercury alternatives will eliminate any economic incentives to the use of mercury-containing amalgam fillings over non-mercury alternatives.

A member of the Committee, Michael Bender, testified at a hearing of the U.S. House Subcommittee on Domestic Policy of the Committee on Oversight and Government Reform on November 14, 2007 concerning the environmental risks of dental mercury.<sup>22</sup>

### **Thimerosal in Vaccines**

- Vermont should prohibit the use of thimerosal, a mercury-containing preservative, in vaccines administered to children less than 18 years of age and in pregnant women, except in the case of an emergency or a temporary shortage.
- The use of thimerosal should be phased out from all vaccines administered in Vermont by 2011.
- The Vermont Department of Health should develop and disseminate information for Vermonters on how to obtain thimerosal-free vaccines.

Rationale: A preservative, known as thimerosal, which contains 49% ethyl mercury (a known neurotoxin), is commonly added to vaccines to prevent contamination, yet single dose vaccines are generally available for most vaccine types that do not require this mercury preservative. In 1999, vaccine manufacturers began removing thimerosal as a preservative from the vaccines administered to children from birth to age four at the request of the American Academy of Pediatrics and the U.S. Public Health Service. However, thimerosal continues to be used in the optional flu vaccine that is annually administered in Vermont. From a precautionary viewpoint, enough concerns have been raised to justify not allowing thimerosal to be injected into sensitive populations, including pregnant women and children. This concern is based on both the fact that organic mercury is a known neurodevelopmental toxin and because there are viable, non-toxic alternatives that are generally available. However, at this time mercury-free flu vaccines are not available from manufacturers in sufficient quantities for all age classes. Yet seven states have passed legislation banning thimerosal use. Consistent with these other states, the Committee recommends that Vermont should use a similar precautionary approach and phase out thimerosal from all vaccines.

Exceptions to this prohibition should only be made in the event of a public health emergency such as an epidemic, or a temporary shortage of supply of a vaccine at reasonable cost. Vaccination is an important tool for public health – the Committee does not want Vermonters to

fail to vaccinate because of concerns for the safety of the vaccines. In the event of a shortage in supply of a particular vaccine, the Committee believes that preference should be given to providing younger children with thimerosal-free vaccine.

The Advisory Committee has learned that Vermonters that prefer to obtain vaccines without thimerosal are not always advised by health care professionals about the availability and access to these vaccines. As such, the Committee believes that it is appropriate for the Vermont Department of Health to prepare and disseminate such guidance.

### **Fish Mercury Monitoring Program**

- The Committee reiterates its recommendation in its 2006 and 2007 reports to the Legislature for a proposed fish mercury monitoring program for Vermont's freshwaters. The proposed fish mercury monitoring program would enable the Vermont Fish Contaminant Monitoring Committee (Vermont Departments of Health, Fish and Wildlife and Environmental Conservation) to document the occurrence of and trends in mercury contamination in fresh water fishes in Vermont's lakes and rivers and relate trends to mercury reduction management actions. This monitoring program is essential to understanding and managing the risk of mercury contamination from fresh water fish consumption.
- The cost of an ongoing fish mercury monitoring program is \$40,000 per biennium. Vermont's efforts to monitor fish mercury from inland waters presently lag behind those of most New England states, but this can easily be changed. Adequate funding should be available to the Departments of Environmental Conservation and Fish and Wildlife to perform this important task.

Rationale: Vermont needs a more rigorous fish tissue monitoring program that can assess trends in freshwater fish mercury levels over time. Mercury in fish poses the greatest known exposure potential to methylmercury in the general public and in wildlife, and there are already proven health impacts at the environmental mercury levels seen. Therefore, it is imperative to monitor the risk over time, by monitoring mercury levels over time. Given the state, regional, and federal management actions being implemented to reduce mercury releases to the environment, we should begin to see reduced mercury levels and reduced risk to humans and wildlife. Recent studies suggest that the recovery may even be rapid. A more rigorous fish tissue monitoring program will allow us to set more accurate fish consumption advisories at the state level and thus provide a greater level of protection to the fish-eating general public.

The State's Fish Contaminant Monitoring Committee has proposed a scientifically sound and affordable fish mercury monitoring program consisting of three biennially recurring rounds of fish tissue sampling. The first round of sampling targets fishes from Lake Champlain and Lake Memphremagog, Vermont's largest lakes. The second round (two years later) targets similar fish species in specified size ranges from 15 inland lakes and 15 larger rivers. The third round (two years after the second round and in year six) of fish mercury sampling would be randomized sampling in 15 lakes and 15 streams, to provide a statistical assessment of statewide fish mercury contamination levels. The assessment cycle then repeats, starting with Lake Champlain and Lake Memphremagog sampling. Adequate funding should be available to the Agency at the earliest possible date to initiate and then maintain this important project.

## **MERCURY RELEASE REDUCTION RECOMMENDATIONS**

### **Mercury-Thermostats**

- The Committee supports H.115, mercury thermostat legislation that passed the House in 2007, which would require thermostat manufacturers to provide convenient collection and recycling programs for out-of-service mercury thermostats from all sources, including residential, commercial, and institutional
- The bill should maintain provisions to allow meaningful financial incentives to significantly increase the collection rate of mercury thermostats, achieve a high rate of recycling of mercury thermostats estimated to be discarded each year, and require manufacturers to submit annual reports to the Agency on thermostat collection amounts.

Rationale: Mercury thermostats are a significant source of mercury in the waste stream and recycling rates are currently very low despite disposal bans and convenient recycling opportunities for contractors. Mercury thermostats that are currently in use and ones that are replaced each year in older heating systems represent a significant single product source of potential mercury release. Mercury thermostats are banned from sale in Vermont and banned from disposal as solid waste. Municipalities in Vermont must pay for collection programs for mercury-containing waste products and other hazardous wastes from homeowners and small businesses. Product manufacturers should share responsibility for their hazardous products in commerce. Several thermostat manufacturers have provided mercury thermostat collection at minimal cost for contractors and have expanded services to municipal hazardous waste collection programs through the Thermostat Recycling Corporation. These efforts by thermostat manufacturers should be commended.

Several thermostat collection pilot projects, including one in Vermont, and a permanent program in Maine, have clearly demonstrated that a financial incentive, in the form of a cash rebate, is an important component to a successful collection program along with adequate education, outreach, and convenient collection opportunities.

### **Mercury-Containing Lamps**

- The Committee recommends that the Legislature promote state policies and programs for producer (manufacturer) responsibility of mercury-containing lamps throughout their entire life cycle, including funding the collection of mercury-containing lamps at end-of-life.
- The State of Vermont should take a leadership role in the adoption of statewide lighting policies and purchasing specifications that include: 1) energy efficiency; 2) toxicity (specifically mercury and lead); 3) lamp life (which can reduce manufacturing, transportation, and disposal impacts); 4) sustainable manufacturing (such as the use of encapsulated mercury dosing technologies); 5) end-of-life management (particularly through producer responsibility in funding collection and recycling programs for spent lamps); and 6) innovative technologies such as light-emitting diodes (LEDs) that are mercury-free and use less toxic or non-toxic materials, have significantly longer life, and are more energy efficient than mercury-containing lamps.

- State and local government agencies should be directed to purchase more up-to-date, low-mercury lighting equipment, which is usually cost-effective on a life-cycle basis. Policies and incentives are also needed to require hardware stores and other retail outlets to phase out the sale of less expensive, yet inefficient, lighting technologies and offer easily accessible and affordable recycling programs for mercury-containing lamps.

Rationale: While many steps have been taken in Vermont to reduce mercury use and pollution and to encourage energy efficient lighting, much more remains to be done to ensure a wholesale shift in consumer and institutional lighting equipment over to highly-efficient, low-toxicity and long-lasting products that are made with sustainable manufacturing techniques by companies that have an effective collection program in place for these mercury-containing products at the end of their useful life. For example:

- The bulk of lighting equipment that is offered for sale in hardware stores and other retail outlets often consists of relatively old lamps, ballasts and fixtures that are inefficient, add a significant amount of money to consumer's utility bills, and unnecessarily contribute to increased toxic and solid waste and climate change. Unfortunately, these products often can saturate the market because retail outlets are highly competitive and largely offer the least expensive models available.
- Similarly, many government agencies continue to purchase outmoded lighting equipment even when more efficient, longer-lasting, environmentally preferable products are available that often save them money over a relatively short period of time through lower utility bills and maintenance costs. This occurs because most lighting contracts fail to include minimum efficiency and environmental criteria, and manufacturers tend to offer their best discounts on outdated lighting equipment – such as incandescent bulbs and “first generation” fluorescent models.

While some states have already taken the important next steps to reduce the overall footprint of mercury, Vermont needs to follow suit or expand efforts in this area to foster the availability and sales of additional models of lamps, ballasts and fixtures that were produced using less mercury during their manufacture and that contain less mercury in the bulb and that last longer. (For example, during the production of fluorescent light bulbs, an equivalent or greater amount of mercury can be lost to the environment and may present an exposure risk to workers, depending upon the production method used. In the aggregate, this quantity of mercury lost is globally significant. The adoption of bid specifications and other standards for lighting equipment by government agencies, nonprofit organizations, and businesses has the potential to exert a strong stimulus in the marketplace and spur manufacturers to adopt practices that better protect workers, consumers and the environment throughout the life-cycle of their products.

## **V. Committee Work Plan for 2008**

The Advisory Committee has identified the following priority areas of work in 2008

- Legislative Recommendations – The Committee will respond to inquiries and requests for legislative testimony on the content of this report, including recommendations.
- Status of Mercury Product Law Implementation – The Committee will assess the status of implementation of the mercury products law passed last legislative session and identify any

implementation issues needing attention. In particular, the Committee will review the status of mercury auto switch collection and dental mercury issues.

- Outreach to Sensitive Populations – The Committee has identified outreach to sensitive populations as a continued high priority area. The Committee will continue to review efforts by DEC and the VDH to inform the general public and those populations most sensitive to mercury exposure from fish consumption. The Committee will assess new information and scientific studies that come to its attention on human exposure and risk of mercury. The committee will ensure that outreach and educational materials will continue to be distributed to maintain the effectiveness of the message to both more sensitive populations and the general public regarding fish consumption.
- Mercury Education and Reduction – The Committee will continue to evaluate and monitor ongoing mercury education and reduction efforts in DEC and VDH. In particular, the Committee will take up the issue of mercury in schools and colleges to determine what additional efforts can be made to reduce inventories of mercury and mercury-added products as well as mercury use. The Committee will review and advise DEC on priority uses of its special mercury reduction fund.
- Mercury Emissions from Crematoria – The Committee will continue to review the issue of mercury emissions from crematoria and make recommendations for options to reduce emissions.
- Mercury-Containing Lamps – The Committee will review methods to reduce public exposure to mercury during the entire life cycle of mercury-containing lamps, extended producer responsibility for the management of spent lamps, the adequacy of guidance to the public on mercury exposure from broken lamps, and state procurement policies that reduce mercury use and exposure.
- Mercury in the Environment – The Committee will continue to evaluate and assess environmental monitoring and mercury emissions inventory data to better understand potential impacts and trends and further steps that can be taken to reduce the risk of mercury exposure.
- Exposure Reduction Initiatives – The Committee will monitor and review developments and identify opportunities to raise awareness and further reduce exposure to mercury. In particular, the Committee will further investigate the risk to Vermonters of herbal supplements from Asia that have been reported to contain mercury and other heavy metals at high concentrations.

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<sup>1</sup> Mercury in Fish Health Alert. Vermont Department of Health. June 2007.

<[http://www.healthvermont.gov/enviro/fish\\_alert/fish\\_alert.aspx](http://www.healthvermont.gov/enviro/fish_alert/fish_alert.aspx)>

<sup>2</sup> Trasande, L., Landrigan, P., and Schechter, C. 2005. Public health and economic Consequences of methylmercury toxicity to the developing brain. Environmental Health Perspectives, <<http://dx.doi.org/>>.

<sup>3</sup> Hagele, T., Mazerik, J., Gregory, A., Kaufman, B., Magalang, U., Kuppusamy, M., Marsh, C., Kuppusamy, P., and Parinandi, N. 2007. Mercury activates vascular endothelial cell phospholipase D through thiols and oxidative stress. International Journal of Toxicology, Volume 26, pages 57-69.

<sup>4</sup> U.S. Environmental Protection Agency. 2006. EPA's roadmap for mercury. EPA-HQ-OPPT-2005-0013.

<sup>5</sup> Ibid.

<sup>6</sup> Driscoll, C., Evers, D., Lambert, K., Kamman, N., Holsen, T., Han, Y-J., Chen, C., Goodale, W., Butler, T., Clair, T., and Munson, R. 2007. Mercury matters: Linking mercury science with public policy in the Northeastern United States. Hubbard Brook Research Foundation. Science Links Publication. Vol. 1, no.3.

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- <sup>7</sup> Mercury Task Force. 2007. Mercury task force activities and work plan. Report to 31<sup>st</sup> conference of New England Governors and Eastern Canadian Premiers.
- <sup>8</sup> Ibid.
- <sup>9</sup> Northeast states succeed in reducing mercury in the environment. Compiled by the New England Interstate Water Pollution Control Commission, Northeast States for Coordinated Air Use Management, and Northeast Waste Management Officials' Association. September 2007. <<http://www.newmoa.org/prevention/mercury/publications.cfm>>
- <sup>10</sup> Reducing mercury in wastewater and spreading the word about mercury in the environment. Compiled by the New England Interstate Water Pollution Control Commission. September 2007. <<http://www.neiwpcc.org/mercury/success.asp>>
- <sup>11</sup> Tracking progress in reducing mercury air emissions. Compiled by the Northeast States for Coordinated Air Use. September 2007. <<http://www.nescaum.org/documents/northeast-states-succeed-in-reducing-mercury-in-the-environment/>>
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