

ADVISORY COMMITTEE ON MERCURY POLLUTION



2010 ANNUAL REPORT

to the Governor, General Assembly
and Citizens of the State of Vermont
January 2010

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
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	William Bress	Vermont Department of Health
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EXECUTIVE SUMMARY

This is the twelfth 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

- The Committee has developed a dental patient information fact sheet on health and environmental concerns of dental amalgam (a draft appended to this report). The Committee intends to disseminate this information to the general public and to various health care providers, as part of its statutory charge to advise the general public on mercury exposure issues.
- The Committee recommends to the Legislature that there be equal proportional compensation for amalgam and restorative resin-based composite restorations on posterior teeth provided through dental insurance plans regulated by Banking, Insurance, Securities, and Health Care Administration (BISHCA).
- Consistent with ongoing efforts to virtually eliminate the release of anthropogenic mercury in Vermont, the Committee recommends that the Legislature consider an eventual phase-out of mercury-containing dental amalgam by 2012.
- The Committee recommends that the Legislature consider legislation to prohibit placement of dental amalgam in pregnant women and children under 18 years of age.

Fish Mercury Monitoring Program

- The Committee reiterates its recommendation in its 2006 through 2009 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 need for a fish mercury monitoring program is increasingly acute. Several initiatives are reliant on ongoing fish mercury testing, including Lake Champlain Basin Program's State of the Lake Report; the 2010 Total Maximum Daily Load (TMDL) reassessment; and adoption

of Vermont as a core site under the National Mercury Monitoring Network (initiatives discussed in this report).

- The cost of an ongoing fish mercury monitoring program has been estimated to be \$40,000 every other year. This cost supports field operations necessary to acquire and process fish for analysis. This figure is predicated on the continuing availability of analytical capacity at the VT DEC LaRosa Environmental Laboratory, which has for many years supported fish testing, using DEC's operating budgets. 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-Containing Lamps

- Vermont should adopt mercury content limits for general purpose fluorescent lighting products, consistent with laws passed in the States of California (currently in place) and Maine (currently under development) which are sold, distributed, or manufactured in Vermont.
- Vermont has one of the most successful lamp recycling programs in the country at municipal, retail, and wholesale levels. A sustainable source of funding should be established to ensure the sustainability of this convenient mercury lamp recycling infrastructure in Vermont for residents and small businesses. The Committee recommends that a sustainably funded program be established by the Legislature which includes shared responsibility for collection and recycling by lamp manufacturers, municipalities, retailers and state government.
- As energy efficient non-mercury lighting products become readily available in the marketplace and are demonstrated to be cost-effective alternatives to mercury-containing lamps, the Committee recommends that a mechanism be put in place to phase out the distribution and sale of these mercury lamps.

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 except in the case of a medical emergency.

The Vermont Department of Health should develop and disseminate information for Vermonters on how to obtain thimerosal-free vaccines and report on the status of thimerosal-free vaccines in Vermont on its web site.

INTRODUCTION

This is the twelfth annual report of the Advisory Committee on Mercury Pollution. The Committee 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. The Committee met six times in the past year. Since 1998 the Committee has met 96 times. Information, minutes, and reports of the Committee can be found at: 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 Member Background
- VI. Committee Work Plan for 2009

I. Background for This Year's Report

Human Health and Ecological Effects of Mercury

The health and environmental effects of mercury pollution have been detailed by the Advisory Committee in previous reports (www.mercvt.org). Mercury is a metal that is found in the environment in several forms, all of which are toxic to varying degrees. Mercury enters the environment from natural sources (such as volcanic eruptions) and human activities such as the combustion of fossil fuels (coal and petroleum) and the release of mercury from products, primarily through breakage and end-of-life disposal in landfills and incinerators.

Mercury in its several forms is very mobile in the environment and can be converted from one form to another. Of particular concern is mercury's conversion by bacteria to methylmercury, which is highly toxic and can be concentrated (biomagnified) in living organisms. Methylmercury also biomagnifies up the food chain and reaches high concentrations in top predators in the food chain. As a result, 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% of American women of childbearing age had amounts of mercury in their blood above levels considered safe. The Vermont Department of Health (VDH) has issued fish consumption advisories for freshwater fish that are caught in Vermont waters.¹

Mercury Sources

The New England States and Eastern Canadian Provinces have collaborated to implement mercury reduction strategies in the region and have been successful in reducing in-region mercury emissions by over 70% 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 as a result of state laws banning mercury use in products and prohibiting their disposal as solid waste. Presently, out-of-region emission sources comprise 85% of the mercury deposited in 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, and more significantly in the Northeast region, there is much more to be done to reduce mercury emissions, as fish from many water bodies in Vermont and the region are still not safe for consumption.²

EPA's Clean Air Act Mercury Rule (CAMR) regulating mercury emissions from coal burning utilities was successfully challenged in federal court in a suit brought by 16 states, including Vermont. The law suit asserted that the 70 percent mercury emissions reductions from coal burning utilities that would be realized under the cap-and-trade federal rule are insufficient to achieve mercury levels in the environment and fish tissue sufficient to protect human health. EPA must now develop a maximum achievable control technology (MACT) standard to regulate coal-fired power plant emissions to the average amount emitted by the best performing 12% of coal-fired boilers. Several environmental organizations have sued EPA to regulate emissions no later than December 2010. At least 18 states have laws or regulations requiring mercury emissions reductions at coal-fired power plants. In addition, one-fourth of the industry achieved mercury reductions of 90 percent or more as a co-benefit of pollution control devices for other air contaminants.³

Trends in Mercury Use in Products

Recent mercury product manufacturer information gathered by the Interstate Mercury Education and Reduction Clearinghouse⁴ (IMERC) shows a significant decrease in mercury use in products between 2001 and 2007 at the national level. The major uses of mercury in products currently include electrical/mechanical switches and relays, dental amalgam, mercury lamps, and measuring devices. Between 2001 and 2007, IMERC estimates a 46% overall reduction in mercury use (from 129 tons to 69 tons). Mercury reduction by product category is as follows: thermostats (73%), dental amalgam (46%), switches and relays (48%), thermometers and measuring devices (77%), and batteries (25%). Overall mercury use in lamps remained unchanged over the period. Much of the success in mercury reductions in products can be attributed to state laws that have banned or restricted the sale of many mercury-added products for which feasible non-mercury alternatives exist. See Figures 1 and 2.

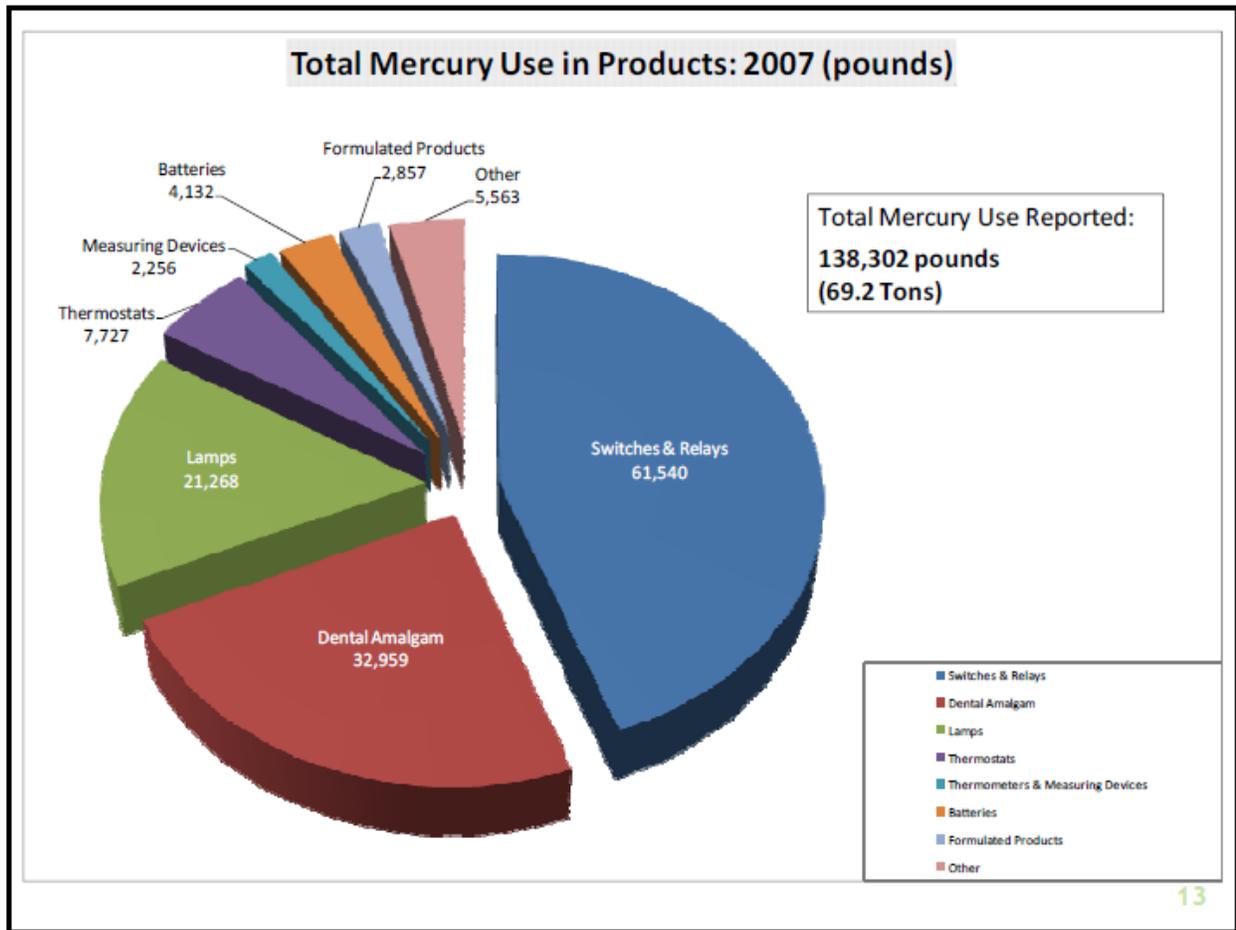


Figure 1. Total mercury use in products sold in the U.S. (2007) by category.⁵

Total Amount of Mercury Sold in Fabricated & Formulated Products in the U.S. 2001 – 2007			
Products/Components	Total Mercury Sold in U.S. (tons)		
	2001	2004	2007
Switches & Relays	57.81	51.78	30.77
Dental Amalgam	30.77	30.39	16.48
Thermostats	14.63	14.16	3.86
Lamps	10.16	9.56	10.63
Miscellaneous	5.11	2.40	2.78
Batteries	2.95	2.53	2.07
Chemicals and Solutions	1.03	0.91	1.43
Sphygmomanometers**	2.15	1.11	0.83
Thermometers**	1.70	1.40	0.30
Manometers**	0.97	1.27	0
Barometer**	0.18	0.12	0
Total	~ 129.4 tons	~ 115.2 tons	~ 69.2 tons

** Referred to collectively as "Measuring Devices"

Figure 2. Comparison of the total amount of mercury sold in fabricated and formulated mercury products in the U.S. (2001-2007).⁶

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.

National Study of Chemical Residues in Fish – Consumption Limits Exceeded in 49% of Lakes

The *National Study of Chemical Residues in Lake Fish* characterized contaminant levels in fillet tissue for predators and in whole bodies for bottom-dwelling fish species. The study targeted pollutants that were classified as persistent, bioaccumulative, and toxic (PBT) chemicals, including mercury, arsenic, PCBs, dioxins and furans, DDT, and chlordane. This survey provided data to develop national estimates for 268 PBT chemicals in fish tissue from lakes and reservoirs in the 48 continental states (excluding the Great Lakes and the Great Salt Lake). Mercury, PCBs, dioxins and furans, and DDT were found to be widely distributed in lakes and reservoirs across the country. Mercury and PCBs were detected in all fish samples, while dioxins and furans were detected in 81% of the predator samples and 99% of the bottom-dwelling fish samples. DDT was detected in 78% of the predator samples and 98% of the bottom-dwelling samples. Established human consumption limits were exceeded in 49% of the sampled lakes for mercury, in 17% of the lakes for total PCBs, and in 8% of the lakes for dioxins and furans.⁷

Regional TMDL Petition to USEPA Pursuant to Clean Water Act §319(g)

This initiative was reported in previous reports. The Northeast Regional Total Maximum Daily Load (TMDL), the pollution control plans required by the Clean Water Act, focuses on reducing atmospheric deposition of mercury so that concentrations of mercury in fish can be reduced to healthier levels. Based on calculations in the TMDL, atmospheric deposition of mercury needs to be reduced by 98% from sources both inside and outside of the region in order to meet desired fish tissue concentrations. In January 2008, EPA approved the TMDL. In October 2008, the Northeast Interstate Water Pollution Control Commission (NEIWPC), on behalf of its member states, filed a petition under Section 319 (g) of the Clean Water Act asking EPA to convene a conference with a specific purpose – to forge an agreement to reduce the amount of mercury that enters our states' waters from sources outside the region. At present, the Northeast States await EPA's formal response on the petition. Despite a protracted timeline, there are indications that EPA will schedule the conference early in 2009. A successful outcome of the conference would be national or state-specific MACT-based (maximum achievable control technology) mercury emissions controls that would result in fish mercury reductions in Vermont waters, and progress toward attainment of the Northeast Regional Mercury TMDL.⁸

National Mercury Monitoring Program

Resource managers and scientists across the U.S. continue to work with Congress to develop a Comprehensive Mercury Monitoring Program. As of this writing, Senator Collins (ME) and Senator Carper (DE) have co-sponsored the Comprehensive National Mercury Monitoring Act (S.2913). The bill would establish mercury monitoring sites across the nation in order to measure mercury levels in air, rain, soil, lakes, streams, as well as in fish, wildlife, and plants. The Advisory Committee supports this legislation, which would provide resources to Vermont to implement a streamlined and predictable monitoring program for mercury in the environment.

New Online Repository of Mercury Project Data

The MercNet Monitoring Inventory is a new, searchable online database with details about mercury datasets from around the continent. Each dataset has information about where and when data were collected, contact information, and data types. Open-access datasets will be available for download from the site by the beginning of 2010. MercNet is intended to become an information clearinghouse for North American mercury data, and the creation of a monitoring inventory is an important step towards this goal.⁹ The project was developed with support from the USEPA and Great Lakes Commission, and contains information on mercury from many regional and Vermont sources.

Wet and Dry Mercury Deposition Monitoring Continues at the Underhill Mercury Monitoring Station – Wet Deposition Funding Uncertain

As in prior years, the Underhill Monitoring Station continues to operate under funding provided by NOAA (National Oceanic and Atmospheric Administration) and USEPA. During 2008, NOAA undertook a research program review of the work conducted in the Lake Champlain Basin, including the important air deposition monitoring at Underhill (along with more broad-reaching weather monitoring and forecasting services). The outcome of this review was quite positive, highlighting noteworthy accomplishments of the Underhill site. This said, NOAA has chosen to suspend its support of the Lake Champlain NOAA Congressional earmark due to difficulties in administering the funding stream. In short, NOAA-funded operations for monitoring of mercury in rainfall and snowfall are expected to cease by the end of September 2010. USEPA continues to fund dry mercury deposition measurements, and that agency has just issued a five-year grant to continue dry deposition monitoring. There is a need to assure funding of wet-deposition monitoring as well.

The Underhill station continues to produce excellent results:

- No trend is observable in wet mercury deposition 1993-2007 despite large national and regional reductions in Hg emissions.
- Almost all of the mercury emissions reductions over this period were realized from municipal waste combustors, medical waste incinerators, and some industrial facilities.
- Emissions from coal-burning power plants changed very little over this period.
- The year-to-year variation in wet mercury deposition and concentration is well explained by year-to-year differences in rainfall amounts and may be related to El Niño.
- Measurements of a large number of mercury air samples since 2004 have allowed researchers to use methods such as air-mass back trajectory modeling to identify likely source regions of high mercury air concentrations.
- These studies indicate that coal-fired power plants to the south and west of Vermont are the likely sources of elevated atmospheric concentrations of mercury arriving in northern Vermont.
- The lack of decline in the emissions of coal sources explains the lack of decline in mercury deposition observed at Underhill.

Lake Champlain Modeling Project

This ongoing project has been reported in prior ACMP reports. Researchers at Dartmouth (as part of the project team) have developed a new method for methylmercury analysis in water. This new method revealed for the first time that there was a very dynamic (rapidly changing over the course of weeks) methylmercury pool in Lake Champlain surface waters. Using this new method the project team found that both inorganic and methyl mercury can increase several fold in Lake Champlain surface waters in response to atmospheric and tributary loading events (rain storms). This short-term increase in water column mercury was found to be rapidly taken up by

zooplankton (within weeks). These observations help explain how mercury enters the Lake Champlain food web, leading to advisory levels in fish.

The Lake Champlain Project data will also be used in a new large-scale analysis known as the “GLAD” project. This Great Lakes-centered initiative will provide a broad assessment of mercury in water, sediment, and biota, based on existing and available information across the Great Lakes and Lake Champlain. This project is modeled after the Northeast Ecosystem Research Consortium project discussed in prior ACMP reports. Several research papers will synthesize the body of Lake Champlain mercury research in a dedicated issue of the scientific journal, *Ecotoxicology*.

Mercury Monitoring by USGS

During 2009, USGS (U.S. Geological Survey) continued monitoring mercury discharges from the stormwater-impaired Englesby Ravine watershed in Chittenden County. 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, by trapping the sediment on which mercury is carried. However, the sediment-trapping ponds can themselves exacerbate the mercury problem, by creating an environment where mercury is readily transformed to toxic and bioavailable methylmercury. 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 Northeast. USGS also continues monitoring of mercury at the Sleepers River watershed (Danville), where they are investigating the use of real-time sensors to compute accurate estimates of mercury loads from this experimental watershed.

Mercury Geo-spatial Assessments for the New England Region: The EPA-led MERGANSER Project

As reported previously, 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. USEPA, USGS and other regional researchers are actively constructing the model as of this writing. A smaller investigation was undertaken by the University of Maine, looking at a subset of landscape and water quality attributes known to affect mercury concentrations in water. That project found that smaller lake volume, greater watershed area, and higher water organic content tended to predict greater mercury across various models.

Soil and Sediment Testing

VT DEC is assisting in two projects that are looking at changes in soil or sediment mercury levels over time. For USGS and the Vermont Monitoring Cooperative, the Department has supported the analysis of approximately 60 soil samples collected from indicator locations in Vermont forests. This is a cycle-two of an assessment that is designed to take place in five-year recurring intervals, over a 100-year timeframe. The Department is also assisting the University of Vermont’s Department of Plant and Soil Science in analyzing trends in mercury in soil cores from forests of differing types. For this project, 18 forest sites have been evaluated, encompassing three community types. The project researchers will calculate the total burden of mercury stored in soils, and assess the degree to which this mercury can move off-site and into receiving waters.

Vermont Fish Contaminant Monitoring Committee

This Committee oversees collection and analysis of fish contaminants throughout Vermont. Very few samples were collected in 2009, owing to resource constraints. As part of the Northeast regional mercury TMDL, NEIWPCC is coordinating a 2010 reassessment of fish mercury levels using a probability survey of Northeastern lakes, leveraging technical resources from its member States (this assessment was originally envisioned by a Vermont Mercury Advisory Committee member). DEC is working with the Lake Champlain Basin Program to develop a fish assessment project for that Lake to complement the 2010 Hg TMDL reassessment.

Other Fish Monitoring

Every five years, the operators of the Fifteen Mile Falls reservoir system on the Connecticut River are required by their federal operating license to sample fish mercury in project reservoirs. A total of 240 fishes were tested in 2008 by the Biodiversity Research Institute of Maine. Results indicate that there have been statistically significant declines in fish mercury levels of smaller prey-sized fish in the reservoirs. The researchers attribute these reductions to reduced water level fluctuations. Reductions were also observed in consumption-sized smallmouth bass, however, these were not statistically significant.

Studies of High-Elevation songbirds by the Vermont Center for Ecostudies

A new research paper by Dr. Chris Rimmer of the Vermont Institute of Natural Science, is the first well-documented study that identifies clear evidence of bioaccumulation of mercury in a terrestrial environment. These studies focus on the Bicknell's thrush, and emphasize that mercury contaminates Vermont forested environments as well as our aquatic environments.

Physiological Research into Methylmercury Toxicity in Humans at the University of VT

In federally funded research, Dr. Matthew Rand of the Department of Anatomy and Neurobiology at UVM is investigating fundamental mechanisms of methylmercury toxicity in the developing nervous system. These studies are identifying novel cell and molecular pathways that are targeted by methylmercury. Importantly, these studies are elucidating genes that are capable of conferring tolerance to methylmercury which may ultimately help explain the varied profile of susceptibility to mercury toxicity that is experienced across the human population.

III. Recent Mercury Education and Reduction Efforts

Implementation of Recent Mercury Product Legislation

Mercury Thermostat Collection Program: Vermont's mercury thermostat recycling program commenced in April 2009 with over 50 participating plumbing, heating and electrical contractors; over 70 hardware stores; and 19 municipal collection locations. Vermont's mercury thermostat law (10 V.S.A. § 7116) requires thermostat manufacturers to provide a no-cost collection program to wholesalers, retailers, and municipalities, including a \$5 cash incentive for each mercury thermostat turned in. Vermont was the second state after Maine to mandate both collection and a cash incentive.

This year, DEC has focused on providing outreach and assistance to collection locations around the state, which were provided with collection bins, program instructions, and educational materials, and were each individually visited by DEC staff. Publicity about the program is ongoing through obligations on the manufacturers as well as efforts by DEC and municipal solid waste programs. DEC acknowledges that the current level of general public knowledge about

the program is lower than desired and is working to improve this. The level of knowledge of plumbing and heating contractors, who remove a large majority of mercury thermostats, is fairly high. In calendar year 2009, 1890 mercury thermostats were collected for recycling, equating to 13.6 pounds of mercury. The number of mercury thermostats collected in 2009 increased over the previous two years, 2008 and 2009, when 1665 and 1367 thermostats, respectively, were collected.

DEC has submitted a report to the Legislature in January on the status of the program. In 2010, DEC will establish a methodology to estimate the number of out-of-service thermostats generated in Vermont on an annual basis and then begin to determine recycling rates on an annual basis. Should collection efforts fail to result in the collection of at least 65% of the out-of-service mercury thermostats in the state, then DEC shall require modifications to the approved manufacturer collection plans. The Advisory Committee intends to monitor the thermostat collection program progress in the coming year.

Mercury Auto Switch Collection: DEC oversees the implementation of a mandatory mercury auto switch removal program for auto salvage yards/auto dismantlers and other handlers of junk or end-of-life vehicles (effective in 2007). 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. 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 provides all participating facilities collection buckets, instructions, and other program materials. The *National Vehicle Mercury Switch Recycling Program* (NVMSRP) was formed in August 2006 by associations and organizations representing dismantlers, automakers, automotive steel and scrap industries, environmental groups, and state/federal environmental agencies. A four million dollar fund was established as a financial incentive to compensate salvage yards/auto dismantlers on a first-come, first-serve basis for their removal and collection efforts. On August 1, 2008, the fee paid per switch was increased from one dollar to four dollars for each light switch and up to six dollars for each anti-lock brake switch assembly. In the summer of 2009, the national reimbursement fund was depleted; therefore, salvage yards and dismantlers no longer receive a cash incentive payment. Nevertheless, they are still required by Vermont law to remove mercury switches prior to vehicle crushing.

DEC has submitted annual reports to the Legislature on the status of the mercury auto switch collection program. To summarize the status of the program, 67 Vermont salvage yards/auto dismantlers have been provided with collection materials. In 2008, 1,522 switches were returned (equivalent to 3.34 pounds of mercury), representing a 37 percent increase over 2007. In 2009, only 930 switches were returned (2.05 pounds of mercury). The downturn in the scrap metal market has decreased the number of autos that are being received and processed in Vermont, and therefore the number of switches available for collection. Based on the NVMSRP estimates, Vermont's capture rate for auto switches is 17-19%, which places Vermont in the top 15 states for capture rates, however, below the top tier of states with capture rates as high as 67%. Over time, the number of switches collected will decline, as older vehicles (with more mercury switches) have been recycled. In its report to the Legislature, DEC indicated that it will continue to monitor compliance with auto switch removal and collection through regulatory inspections, periodic reminder letters and telephone calls, and monitoring of annual reports submitted by ELVS. DEC has committed additional resources to salvage yard compliance and enforcement, in general, and as such, there will be additional compliance oversight of mercury auto switch collection.

In 2009, the ELVS program was in jeopardy of losing funding from General Motors due to bankruptcy proceedings. GM pays for over 50% of the ELVS program costs based on their share of the number of mercury switches placed in vehicles that have been sold. "Old GM" has agreed to continue to fund the program until the company is dissolved. "New GM" has not committed to paying program costs in the future. The State of Vermont filed a proof of claim for future costs against Old GM, along with several other states with mandatory switch collection programs.

Dental Mercury

Dental clinics are required to submit biennial self-certifications of compliance with dental best management practices (BMPs) to the DEC every two years. The self-certification includes documentation on amalgam separator installation and maintenance and other best management practices to properly manage and recycle dental amalgam. In the most recent self-certifications (due January 31, 2009), 213 of 216 dental practices, or 98%, were in compliance with the amalgam separator requirements.

As also discussed in Section IV of this report, the Committee has developed a dental patient information fact sheet on health and environmental concerns of dental amalgam (See Attachment 1). The Committee intends to disseminate this information to the general public and to various health care providers, as part of its statutory charge to advise the general public on mercury exposure issues.

This dental amalgam fact sheet arose out of Committee concerns that other public information newly available to dental patients, did not completely address certain environmental and health concerns. As previously stated by the Committee, the purpose of the Committee's dental amalgam fact sheet is to supplement other sources of information available to the public on this topic.

Mercury Emissions from Crematoria

The Advisory Committee continued discussions on mercury emissions from cremations, which largely result from the presence of dental amalgam. There are approximately 2500 cremations annually in Vermont that can potentially result in the release of 20-25 pounds of mercury to the air. The number of cremations is increasing annually. The Committee kept abreast of research at the University of Minnesota on developing an amalgam encapsulating device to capture mercury from dental amalgams during the cremation process. The University of Minnesota evaluated different techniques and focused on testing refractory materials that could be injected into the mouth (consistency of oatmeal) that harden and can insulate the teeth from the heat of the cremation process (thereby preventing the mercury in amalgam from volatilizing). There is no additional funding as this time to continue this initial research. Communications with other state programs indicate that there is little attention being paid to this emission source at present.

Due to the fact that this is one of the largest uncontrolled mercury emissions sources in Vermont, and may be increasing, the Committee will continue to explore this issue in 2010 and strategies that may be employed to reduce emissions.

Outreach to Sensitive Populations on Mercury in Fish

Distribution of mercury-in-fish materials: DEC continues to provide physicians' offices and WIC clinics with mercury-in-fish materials geared toward the general public and sensitive populations (such as women of child bearing age and children). Mercury in fish cards that visually portray relative amounts of mercury in various commercial fish and fresh water fish continue to be popular.

Due to staffing and budget cuts, DEC and VDH were not active in posting fish advisories at public fishing and boating access areas and in actively monitoring grocery store postings of the advisories. In 2010, there are plans in place to work more closely with grocery stores on postings, to post advisories at the boating access areas, and to provide fish advisories to agents who sell fishing licenses, as has been done in the past.

Healthy Communities Grant Project: DEC was awarded a two-year grant from EPA, partnering with VDH and the Vermont Department of Fish and Wildlife (F&W), to develop language-specific fish advisories for the major ethnic populations in Vermont. Due to staffing reductions at DEC the grant project will not be conducted and the funding has been returned to EPA.

Fluorescent Lamp Recycling

True Value hardware stores began their spent fluorescent lamp recycling and collection program in August of 2005; ACE stores began in August of 2007; and Do it Best stores in September 2007. The program serves households and small businesses, allowing up to six mercury-added lamps to be brought per visit to the store by a customer, at no cost. A total of 73 Vermont hardware stores collect mercury bulbs across the state. The goal of the project is to increase lamp recycling and provide a convenient, no-cost option for recycling. Since 2005, over 547,000 lineal feet of straight-tube lamps have been collected as well as over 37,500 compact fluorescent bulbs (CFLs) and other miscellaneous mercury-containing bulbs. The True Value/ACE/Do it Best Lamp Recycling Program has been funded by DEC enforcement penalties over the past four years.

In addition to this program, Efficiency Vermont funds a CFL collection program at over 40 locations, including Aubuchon Hardware stores and other lighting partners. In 2009, over 4300 CFLs were collected through this program.

In 2009, funding for the TrueValue/ACE/Do It Best lamp recycling program was depleted. In an agreement with DEC and the Vermont Small Business Development Center, Efficiency Vermont has agreed to fund the program for the next two years. As part of the agreement, DEC has committed to work towards finding a sustainable source of funding for the collection and recycling program at hardware stores. More detail on funding recommendations of the Committee can be found in Section IV of this report. The following table (Table 1) shows program results since its onset in 2005.

	9/2005-2006	2007	2008	2009	TOTAL
Lineal feet collected	67,277	119,504	197,071	139,498	523,550
# of Misc. bulbs, CFL, circular, U-tubes, HID	1,212	5,349	19,060	12,012	37,633

Table 1. Fluorescent lamps and bulbs collected in the TruValue/ACE/Do It Best hardware store recycling program since the program inception in 2005.

Municipal Collection of Mercury-Containing Wastes

Table 2 below shows the amount of mercury collected through municipal household hazardous waste programs over the last eight calendar years from households and 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.

Type of Mercury Waste	2001	2002	2003	2004	2005	2006	2007	2008
Mercury Products/ Debris* (thermometers, measuring devices, switches)	1,675 pounds	1,740 pounds	972 pounds	2,575 pounds	1,701 pounds	3,577 pounds	1,173 pounds	1782 pounds
Elemental Mercury **	161 lbs	168 lbs	183.5 lbs	246 lbs	36 lbs	17 lbs	31 lbs	33.5 lbs
Mercury-added Lamps ** (fluorescent and HID)	1.4 lbs 248,200 linear ft	1.9 lbs 339,000 linear ft	2.1 lbs 378,403 linear ft	2.4 lbs 430,012 linear ft	2.5 lbs 450,818 linear ft	2.9 lbs 524,694 linear ft	3.5 lbs 639,379 linear ft	3.2 lbs 582,330 linear ft

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

** Represents actual weight of mercury collected

Table 2. Municipal collection of mercury-containing waste (2001-2008). Numbers of CFLs and other miscellaneous fluorescent bulbs from municipal collection programs is not available.

IV. Committee Recommendations

The Advisory Committee on Mercury Pollution's recommendations to the Legislature for reducing mercury risk and exposure are as follows.

Dental Mercury

- The Committee has developed a dental patient information fact sheet on health and environmental concerns of dental amalgam (See Attachment 1). The Committee intends to disseminate this information to the general public and to various health care providers, as part of its statutory charge to advise the general public on mercury exposure issues.
- Consistent with ongoing efforts to virtually eliminate the release of anthropogenic mercury in Vermont, the Committee recommends that the Legislature consider an eventual phase-out of mercury-containing dental amalgam by 2012.
- The Committee recommends that the Legislature consider legislation to prohibit placement of dental amalgams in pregnant women and children under 18 years of age.
- The Committee recommends to the legislature that there be equal proportional compensation for amalgam and restorative resin-based composite restorations on posterior teeth provided through dental insurance plans regulated by Banking, Insurance, Securities, and Health Care Administration (BISHCA).

Rationale:

As part of its work plan for 2009, the Committee has developed a dental patient information fact sheet on health and environmental concerns of dental amalgam (See Attachment 1). As previously stated by the Committee, the purpose of the Committee's dental amalgam fact sheet is to supplement other sources of information available to the public on this topic. The Committee intends to disseminate this information to the general public and to various health care providers in the coming year.

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 the State of Vermont's goal for the "virtual elimination" of mercury use in products where viable alternatives exist.

Based upon the latest available information, it is the Committee's position that dental amalgam has not been given a clean bill of health. The US Food and Drug Administration (FDA) considers that dental amalgam fillings are safe for adults and children ages 6 and above; however, FDA goes on to state: *The developing neurological systems in fetuses and young children may be more sensitive to the neurotoxic effects of mercury vapor. Very limited to no clinical information is available regarding long-term health outcomes in pregnant women and their developing fetuses, and children under the age of six, including infants who are breastfed.*¹⁰

In 2009, the FDA also issued a final regulation which reclassified the mercury component of dental amalgam from Class I (low risk) to Class II (moderate risk). FDA recommended that

dental amalgam product labeling include the warning statement that vapors may be harmful if inhaled, as well as the following information:

FDA recommends that the labeling of your dental amalgam, mercury, and amalgam alloy devices include the following statement regarding use of the devices, and that dental professionals consider this information when developing individual treatment recommendations:

“Dental amalgam has been demonstrated to be an effective restorative material that has benefits in terms of strength, marginal integrity, suitability for large occlusal surfaces, and durability. Dental amalgam also releases low levels of mercury vapor, a chemical that at high exposure levels is well-documented to cause neurological and renal adverse health effects. Mercury vapor concentrations are highest immediately after placement and removal of dental amalgam but decline thereafter.”¹¹

Norway, Sweden and Denmark have instituted a ban on the use of dental amalgam. Norway’s recommendations are based on both the public health and environmental perspectives, by first recommending a reduction in use and subsequent environmental release of dental mercury, and second, by reducing exposure in patients. One of the more problematic issues identified was the total exposure to mercury detected 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).

In order to reduce the use of dental amalgam prior to an eventual phase-out, the Committee supports equity in dental insurance coverage for amalgam and non-amalgam (composite fillings). Providing equal proportional compensation through dental insurance plans regulated by BISHCA will minimize any economic incentives to the use of mercury-containing amalgam fillings over non-mercury alternatives such as composite resins.

In 2008, the Advisory Committee received dental insurance information from BISHCA, Northeast Delta Dental, VSDS, and the Vermont Medicaid Program. Approximately 169,000 Vermonters are covered by dental insurance plans regulated by BISHCA (this number does not include Medicaid dental patients). These dental plans provide equal proportional coverage (same percentage cost coverage) for dental amalgam or composite resin fillings on anterior teeth but not for posterior teeth (molars). Composite resin fillings are usually more expensive than amalgam fillings due primarily to increased time to place this type of restoration. The Advisory Committee believes that equalizing proportional (percentage) coverage for amalgams and composites for all teeth would remove a financial disincentive to receiving a non-mercury filling. Information provided by Vermont Medicaid indicates that for Medicaid patients, there is no cost to the patient for either dental amalgam or composite resin restorations, and both are covered at 100 percent of cost; therefore, there is no financial disincentive for Medicaid patients to receiving composite resin fillings. In addition, Medicaid pays a higher rate to dentists for composite resins.

Northeast Delta Dental indicated to the Committee that equal proportional coverage would increase dental insurance premiums by approximately two percent over current dental plan costs. It was suggested that this provision would potentially increase insurance premiums by \$15 per year per subscriber. They urged caution that this premium increase, coupled with increases in medical insurance premiums, could cause some Vermonters to lose coverage if such coverage were made mandatory. Nevertheless, the Advisory Committee feels that the

benefits of removing this financial disincentive may outweigh the costs and urges the Legislature to consider this.

Fish Mercury Monitoring Program

- The Committee reiterates its recommendation in its 2006 through 2009 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 need for a fish mercury monitoring program is increasingly acute. Several initiatives are reliant on ongoing fish mercury testing, including Lake Champlain Basin Program's State of the Lake Report; the 2010 Total Maximum Daily Load (TMDL) reassessment; and adoption of Vermont as a core site under the National Mercury Monitoring Network (initiatives discussed in this report).
- The cost of an ongoing fish mercury monitoring program has been estimated to be \$40,000 every other year. This cost supports field operations necessary to acquire and process fish for analysis. This figure is predicated on the continuing availability of analytical capacity at the VT DEC LaRosa Environmental Laboratory, which has for many years supported fish testing, using DEC's operating budgets. 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 observed. 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, even in Vermont, 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. Vermont is a participatory state to the Northeast Mercury TMDL, and will be expected to participate in a planned 2010-2011 reassessment of fish mercury levels in our lakes as part of a broad region-wide, consistent sampling program. Other initiatives, such as Vermont's participation as a core site (Underhill) under the National Mercury Monitoring Network, and Lake Champlain Basin Program's State of the Lake Report rely on an ongoing mercury monitoring program.

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. Program costs were estimated in 2006 to be \$40,000 every other year.

Mercury-Containing Lamps

- Vermont should adopt mercury content limits for general purpose fluorescent lighting products, consistent with laws passed in the States of California (currently in place) and Maine (currently under development) which are sold, distributed, or manufactured in Vermont.
- Vermont has one of the most successful lamp recycling programs in the country at municipal, retail, and wholesale levels. A sustainable source of funding should be established to ensure the sustainability of this convenient mercury lamp recycling infrastructure in Vermont for residents and small businesses. The Committee recommends that a sustainably funded program be established by the Legislature which includes shared responsibility for collection and recycling by lamp manufacturers, municipalities, retailers and state government.
- As energy efficient non-mercury lighting products become readily available in the marketplace and are demonstrated to be cost-effective alternatives to mercury-containing lamps, the Committee recommends that a mechanism be put in place to phase out the distribution and sale of these mercury lamps.

Rationale: Both fluorescent and high intensity discharge (HID) lamps contain mercury. HID lamps generally contain much higher amounts of mercury per lamp than fluorescents (up to one gram for high wattage varieties), but far fewer are produced.

Globally, an estimated 120-150 metric tons of mercury was used to produce lamps in 2005. This mercury accounts for about five percent of global mercury use and is expected to increase significantly due to the energy efficiency of and demand for fluorescent lighting over incandescent lighting. Moreover, federal legislation requires phase-out of inefficient incandescent lighting beginning in 2012. The amount of mercury in a lamp varies by lamp type and manufacturer. Many linear fluorescent lamps (LFL) are currently in the 5-10 milligram range per bulb. Older less efficient models may still contain 10-50 milligrams. The most advanced LFLs (such as T8 and T5) contain less than 2 milligrams. Compact fluorescent lamps (CFL) have relatively low amounts of mercury. For screw-in CFLs, National Electrical Manufacturing Association (NEMA) members recently committed to a cap of 5 milligrams of mercury for 25 watt lamps or less, and to a cap of 6 milligrams for 25-40 watt CFLs. However, at least two major manufacturers currently make CFLs containing less than 2 milligrams.

For HIDs, there is a similar disparity in mercury content by lamp type and manufacturer. Most HID lamps (used for roadways, parking lots, warehouses) are in the 20-100 milligram range, although the high wattage varieties can contain up to one gram of mercury. However, others can contain below 10 milligrams and one manufacturer has a line of mercury-free HIDs.

One reason for the disparity in mercury content is the method used to insert mercury into the lamp. The newer, more efficient “dosing” methods use a mercury pellet or amalgam where the amount of mercury inserted can be more precisely controlled than the older method of inserting liquid mercury via a drip or spray injection technique. Significantly, the older methods also lose more mercury in the production process; potentially up to one-half of the mercury is wasted.

The European Union, through the Restriction on Hazardous Substances (RoHS) Directive, has been the most active regulatory body setting mercury limits for lamps. At the present time, the EU has a 5 milligram limit for CFLs and a 5-10 milligram limit for LFLs. More importantly, the EU has begun a process for revising and significantly lowering these limits. In 2009, the European Environmental Bureau and Green Purchasing Institute submitted a consolidated NGO response in this standards revision process, recommending lower mercury content standards than currently exist for many categories of lamps.¹² Lamp manufacturers represented by the National Electrical Manufacturers Association, have supported minimizing mercury content.¹³ The State of California has passed a law which requires, effective January 1, 2010, that any lamp manufactured or sold into the state meet the applicable standards under the EU RoHS Directive. The State of Maine passed legislation in 2009 that requires mercury content standards for lamps sold or manufactured in the state by 2012 – these standards must be based on California standards, but Maine may adopt mercury content standards for lamp categories exempted in California (for example, HID and neon).

Vermont has been successful as a state in establishing infrastructure for collection and recycling of spent fluorescent lamps. Most larger institutions, businesses, utilities, municipalities, and state government are complying with the disposal ban on spent lamps by utilizing lamp recycling programs and paying a fee for transportation and recycling services. Residential and smaller businesses and institutions utilize collection infrastructure established at hardware stores and retail stores as well as municipal solid waste district programs. These fluorescent lamp recycling programs described in Section III of this report have grown significantly from year to year and do not currently have a sustainable funding source into the future. Efficiency Vermont has agreed to level fund the current lamp recycling program at hardware stores for the next two years as the state works toward finding a sustainable way to fund the program.

The Committee urges the Legislature to explore options that include the involvement of lamp manufacturers, retailers, municipalities, and consumers. Mercury thermostat legislation, which passed in 2008, is one example of how manufacturers, retailers, wholesalers, and municipalities were involved in a solution to increasing the recycling of mercury thermostats. S.232, An Act Relating to the collection and recycling of mercury-added lamps, is a starting point for discussions of shared responsibility for mercury lamp recycling, as well as mercury content standards for these lamps.

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 except in the case of a medical emergency.
- The Vermont Department of Health should develop and disseminate information for Vermonters on how to obtain thimerosal-free vaccines and report on the status of thimerosal-free vaccines in Vermont on its web site.

Rationale: A preservative, known as thimerosal, which contains 49% ethyl mercury (a known neurotoxin), is commonly added to flu vaccines to prevent contamination, yet single dose vaccines are generally available for most vaccine types that do not require this mercury preservative. Preservatives have been used in vaccines to prevent the growth of bacteria and fungi since the 1930s. 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. Currently, flu vaccine is the only vaccine remaining that contains thimerosal – and is used only in multi-dose vials and not single dose vials.

For the 2009-2010 flu season, 45,550 children's flu vaccines have been ordered. Of these, 19,000 doses are the multi-dose vial presentation that contain thimerosal. The percentage of thimerosal-free children's vaccine obtained is similar to last season (58% vs. 62%).

For the 2009-2010 H1N1 swine flu vaccine, 139,600 doses have been ordered by VDH. Of these, 77,200 doses contain thimerosal. According to VDH, there is only one manufacturer licensed for children's vaccine production that is thimerosal-free, compared to 18 thimerosal-free adult vaccine manufacturers. In other words, it may be easier for an adult to obtain thimerosal-free flu vaccine than those more sensitive populations, such as children. The Committee also learned that there can be great variability in the availability of thimerosal-free vaccine from one physician to the next. As an example, some physicians stock only multi-dose thimerosal-containing flu vaccine, because of limited refrigerated storage space (single-dose vaccine consumes more storage space). In general, it appears that the availability of thimerosal-free vaccine is on the increase from year to year.

From a precautionary viewpoint, enough concerns have been raised to justify not allowing thimerosal to be injected into sensitive populations, such as 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, at least 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 vaccine supply 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 flu vaccine, preference should be given to providing younger children with thimerosal-free vaccine.

The Advisory Committee has learned that Vermonters that would 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 VDH to prepare and disseminate such guidance to health care providers and to provide more information to the general public on its web site on how to go about obtaining thimerosal-free flu vaccine and the questions to ask physicians. VDH should also make available on its web site annually updated information on the general availability of thimerosal-free vaccine for Vermonters of all ages.

V. Committee Member Background

Advisory Committee members are involved in various mercury environmental and health issues at local, regional, national and international levels. Here are some examples below.

Neil Kamman – Chief, DEC Water Quality Monitoring, Assessment and Planning Program. Mr. Kamman is Chair of the Advisory Committee and serves on the Committee as science advisor. Mr. Kamman works with a wide network of scientists regionally and nationally on mercury issues. In recent years, he has been involved in several regional and national efforts to document the extent and severity of mercury contamination in lakes and reservoirs. In 2009, he co-authored two new peer-reviewed manuscripts; one detailing why mercury levels are so high in reservoirs compared to natural lakes, and the other regarding an optimal ocean fish mercury monitoring program for the North Atlantic region. Mr. Kamman analyzed all of the underlying fish mercury information required to construct the Northeast Mercury Total Maximum Daily Load (discussed further in Section II). He is a member of the Vermont Fish Contaminant Monitoring Committee. He has contributed to a recent national workshop to design the National Mercury Monitoring Network, and is a member of the USGS' "Merganser" team.

Jen Holliday – Environmental and Safety Compliance Manager, Chittenden Solid Waste District (CSWD). Ms. Holliday serves as the Vice Chair on the Committee representing municipal solid waste districts. She oversees the CSWD hazardous waste collection program for businesses and residents in Chittenden County and has been involved in numerous activities through her program to help collect mercury and mercury products in Vermont. This includes helping to coordinate a statewide school lab cleanout program that collected unwanted chemicals from science labs throughout the state, including 625 pounds of mercury. Ms. Holliday also helped coordinate collection of all the thermometers which were managed by CSWD during the state-wide "Catch the Fever" mercury thermometer exchange sponsored by the Agency of Natural Resources. CSWD accepted over 45,000 mercury thermometers for this program. She has also been involved with the state-wide mercury manometer exchange, the state-wide maple thermometer exchange, and continues to provide an outlet for dental mercury through her facility that has accepted over 120 pounds of elemental mercury from dentists. She serves as Vice Chair on the board of the Product Stewardship Institute, a national non-profit organization which works with stakeholders to ensure that all those involved in the lifecycle of a product share responsibility for reducing its environmental impacts. As a Board member for the Product Stewardship Institute, she has been an active participant in a number of dialogues and initiatives and an advocate for the passage of mercury bills in Vermont, including H.515, which requires manufacturers of mercury thermostats to set up a collection system to safely manage their products at the end of life. Ms. Holliday is also a founding member and Chair of the newly-formed Vermont Product Stewardship Council, which is the first product stewardship council in the east.

Michael Bender – Director, Mercury Policy Project (MPP), is a past Chair of the Advisory Committee and currently serves on the committee as a representative of the Abenaki. Mr. Bender is a member of the United Nations Environment Program (UNEP) Global Mercury Partnership Advisory Group and is the interim chair of the Storage and Supply Partnership.¹⁴ He has also assisted UNEP in development of its Mercury Awareness Raising Toolkit for developing countries and countries with economies in transition.¹⁵ In addition, Mr. Bender co-founded and helps coordinate the work of the Zero Mercury Working Group (ZMWG), a coalition of more than 80 public interest nongovernmental organizations from around the world. The ZMWG provides input into the UNEP Governing Council decision-making process, including the

development of a global legally binding treaty on mercury, with discussions set to begin in Stockholm in June 2010. In the U.S., Mr. Bender works extensively with a coalition of 20 state and national groups to promote policies and programs to reduce mercury exposure, use and release, ban exports and store surplus mercury.

William Bress – Toxicologist, Vermont Department of Health. Mr. Bress is Chief of the Toxicology and Risk Assessment Program which establishes mercury in fish advisories for Vermont. His program also helps in developing mercury in air standards for the state. Mr. Bress has conducted presentations to physicians, nurses, and students about the toxicity of mercury in all its forms. He helped with developing fact sheets on mercury in fish and cleanup of broken mercury-containing bulbs, thermometers, and other mercury products. He routinely handles calls from the public about mercury spills in homes and schools and has been involved in making recommendations for re-entry into buildings that have had large mercury spills.

John Berino, MS, CIH, CSP - Mr. Berino represents the Vermont hospitals on the Advisory Committee. Mr. Berino has over twenty two years of experience in the environmental and occupational health field in both the private and public sectors. He has a varied background in industrial hygiene, human health risk assessment, hazardous waste site remediation and agrichemical toxicology. Mr. Berino has spent the last 14 years working in a hospital setting where he manages the environmental health programs including all aspects of mercury elimination.

Mary Jean Rajda, MA Ed, BSN, RN – Ms. Rajda is an Infection Control Nurse and Emergency Preparedness Coordinator at Porter Hospital in Middlebury. She has been involved in the fields of health care education and infection control for over 25 years. Porter Hospital was an early leader in mercury use reduction in the hospital setting.

Ruma Kohli – Ms. Kohli is the Product Stewardship Program Manager at IBM in Essex Junction. She has a B.S. and M.S. degrees in Organic Chemistry and has over 20 years of manufacturing and environmental engineering experience at IBM. Her areas of expertise include a comprehensive regulatory knowledge and implementation of various regulations in an operational setting, as well as extensive knowledge of Environmental Management Systems and Worldwide Product Regulatory Requirements. Ms. Kohli has successfully collaborated with manufacturing and facilities teams to identify and implement sustainable environmental methods and practices resulting in enhanced environmental performance at the Burlington facility. She is also responsible for the development and implementation of Microelectronics Division products with regard to emerging product regulations such as European Union's RoHS Directive (restricts the use of mercury and other heavy metals in electrical and electronic equipment), REACH regulations, and China RoHS. Ms. Kohli has participated on several of ISMIs (International SEMATECH Working Initiative) environmental working groups addressing environmental, health and safety issues for the global semiconductor industry.

Gary Gulka – Chief, DEC, Assistance and Pollution Prevention Program. Mr. Gulka oversees DEC's regulatory and education programs on mercury. He also serves as staff support to the Advisory Committee and helps to compile the Committee's legislative report each year. He is a member of the Interstate Mercury Education and Reduction Clearinghouse, which promotes interstate coordination on implementing mercury product regulations dealing with manufacturer notification, labeling, and exemption requests from product phase-out. In addition to these regulatory programs, he has been involved with other regulatory programs to reduce mercury use and release by hospitals, dental clinics, and auto

salvage yards. Several years ago, he was also involved with developing and coordinating a statewide mercury and hazardous waste cleanout of school science laboratories.

A special thanks to Karen Knaebel

From 1998 – 2009, Karen Knaebel served as Mercury Education and Reduction Coordinator in DEC. In 2009, due to staff reductions in DEC, Ms. Knaebel position was eliminated and she was transferred to the Waste Management Division with other job duties. She ably served as staff support to the Advisory Committee over these years, helping to keep the Committee focused and on task. Among her accomplishments, she helped to lay the groundwork for mercury product labeling in the country, as Vermont was one of the first states in the nation to require product and package labeling. Now there are more than a dozen states that require labeling, and most mercury-containing products sold in the U.S. are labeled for mercury content and proper disposal. Perhaps Karen's most cherished accomplishments are those related to mercury outreach and education of both the general public and sensitive populations. Due to Karen's efforts, physicians' offices, WIC clinics, and other health care providers provide patients with mercury in fish information. She enjoyed reaching out to school age children by doing numerous school presentations and coordinated the development of a mercury educational video entitled *Mission Mercury*, which is used by EPA as part of a Mercury Educators Tool Kit. Almost too numerous to mention are numerous mercury reduction efforts that Karen has been involved with over the years, including a statewide mercury fever thermometer exchange, mercury thermostat collection program, dairy manometer exchange, and maple sugaring thermometer exchange. In addition, Karen created DEC's mercury education and reduction campaign web site, mercv.org, which is frequently praised by the general public both inside and outside of Vermont for its user friendly information. The Committee thanks Karen for her dedication to mercury education and reduction and making a difference in the work she did for Vermonters.

VI. Committee Work Plan for 2010

The Advisory Committee has identified the following priority areas of work in 2010

- Legislative Recommendations – The Committee will respond to inquiries and requests for legislative testimony on the content of this report and recommendations.
- Status of Mercury Product Law Implementation – The Committee will assess the status of implementation of the mercury products legislation and identify any implementation issues needing attention, especially in light of recent cutbacks in DEC program staffing.
- The Committee will monitor progress of the new mercury thermostat collection program in capturing mercury thermostats for recycling. In particular, the Committee will monitor the process conducted by DEC to develop a collection rate methodology for assessing achievement of mandatory recycling rate performance goals.
- The Committee will monitor public dissemination of the dental amalgam fact sheet that was prepared by the Committee in 2009.
- Outreach to Sensitive Populations – The Committee has identified outreach to sensitive populations as a continued high priority area and will continue to review efforts by DEC and VDH to inform the general public and those populations most sensitive to mercury exposure

from fish consumption. In particular, the Committee will monitor efforts to place mercury-in-fish posters at public boating and fishing access areas and grocery stores. The Committee will assess new information and scientific studies that come to its attention on human exposure and risk of mercury.

- 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 monitor mercury product collection programs such as lamps, auto switches and batteries. 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: (1) review the issue of mercury emissions from crematoria and make recommendations for options to reduce emissions; (2) monitor research results associated with abatement of crematory mercury emissions; and (3) meet with DEC’s Air Pollution Control Division to explore alternative permitting procedures that take into account localized impacts of mercury releases from crematoria.
- 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.
- The Committee is planning to sponsor a public forum on mercury environmental and health concerns to educate Committee members and share information with health and environmental professionals in Vermont.

ATTACHMENT 1

DENTAL AMALGAM FACT SHEET

DENTAL AMALGAM FILLINGS

ENVIRONMENTAL AND HEALTH FACTS FOR DENTAL PATIENTS

Prepared by the Vermont Advisory Committee on Mercury Pollution

About the Fact Sheet

The Vermont Advisory Committee on Mercury Pollution was formed by the Vermont Legislature in 1998 to report on and advise state government and the general public on the extent of mercury contamination in Vermont, the risks posed to Vermonters, and methods to minimize the risk of mercury exposure to the general public. The Advisory Committee has reported annually to the Legislature since 1999 and has made numerous recommendations over the years, many of which have become law.

Mercury is a heavy metal. It is found in nature. Mercury is found in different forms. Many years of burning coal, other fuels, and wastes, as well as using mercury in consumer products (batteries, thermometers, thermostats, fluorescent lights, electrical switches, and dental amalgam fillings), has caused too much mercury to get into the environment.

The mercury contained in dental amalgam fillings contributes to overall human exposure to this toxic metal. According to the World Health Organization, there is uncertainty as to how much mercury in your body can cause harm. Cremation of bodies with dental amalgams is a significant source of mercury release to the Vermont environment. For these reasons, the Advisory Committee has recommended to the Legislature that dental amalgam use be discontinued in the future in most instances, and that dental patients be provided with unbiased information on the health and environmental concerns with dental amalgam. The purpose of this fact sheet is to provide such information to the general public on health and environmental concerns. For further information on the Advisory Committee on Mercury Pollution, see www.mercvt.org.

Amalgam Fillings and Mercury

Amalgam fillings are also called dental amalgams or silver fillings. Dental amalgam is a compound of mercury (43-54%) combined with other metals including silver, copper and tin. These fillings give off mercury vapor. The amount depends on how many fillings you have and activities such as chewing, grinding of teeth, and drinking hot liquids. Mercury vapor can be inhaled and enter the bloodstream. It can then be carried throughout the body. For people with a number of fillings, this can be the main way that mercury gets into the body. Any mercury from amalgam fillings we swallow is very poorly absorbed and most does not enter our bloodstream. Amalgam filling use is beginning to decline, due to better decay prevention and substitution with other restorative filling materials in its place. Dental amalgam is one of the major product uses for mercury. It is a major contributor of mercury in municipal wastewater. Some countries have banned the use of dental amalgam for health or environmental reasons.

Health Concerns

There is a lot of debate about health effects from the mercury in amalgam fillings. Allergic responses to dental amalgams are rare, but it is important to tell your dentist of any allergies you have before a filling material is chosen. Too much mercury in the body can damage the kidneys, nerves and the brain. Developing fetuses, infants, and young children are at the highest risk from mercury exposure, since their brains and nervous systems are still forming.

The U.S. Food and Drug Administration (FDA) considers dental amalgam safe for adults and children ages six and above. There is limited clinical information about the potential health effects of dental amalgam fillings on pregnant women and their developing fetuses, and on children under the age of six. Based on this uncertainty, Canada and several countries in Europe recommend limits on the use of dental amalgam. They advise that pregnant women should not have amalgam fillings placed in or removed from their teeth. Some of these same countries issue the same warning for nursing women and people with kidney problems. Some countries advise limits on using amalgam fillings with young children and people with braces.

Environmental Concerns

Some countries limit the use of amalgam fillings to help reduce mercury pollution. Waste amalgam is made when new fillings are put in teeth or when fillings are removed. It can pollute the environment. Vermont dentists are now using traps and filters to collect the mercury for recycling. Amalgam fillings cause our body's waste (urine and feces) to contain mercury. When these mercury-containing wastes enter sewers, they can add to the pollution of our waters.

Once mercury enters our waters, it can change to methyl mercury, a very toxic form of mercury that builds up in fish. Many states, including Vermont, have issued Safe Eating Guidelines on eating fish, due to mercury pollution. Mercury used in dentistry is not the major cause of our mercury pollution and resulting fish consumption warnings, but it does add to the problem. Wildlife that eat fish, such as eagles, loons and otters, are also at risk of harm from mercury pollution.

What You Can Do

The best thing you can do is avoid the need for any fillings by preventing tooth decay in the first place. It is important for you to know that there are alternatives to amalgam fillings, such as composite (resin) fillings – using them is another way to reduce the amount of mercury that ends up in the environment. You can talk with your dentist about the kind of filling material that is best for you and for the tooth that needs to be filled. Each kind of material has advantages and disadvantages. You should know what these factors are so that you can make an informed choice.

Talk to your dentist. The final choice is yours.

Internet web links to additional information:

Vermont State Dental Society: [http: www.vsds.org/mem_resources/index.aspx](http://www.vsds.org/mem_resources/index.aspx)

Maine Bureau of Health: <http://www.maine.gov/dhhs/boh/files/odh/AmalBrochFinal2.doc>

Endnotes

¹ Mercury in Fish Health Alert. Vermont Department of Health. June 2007.

<http://www.healthvermont.gov/enviro/fish_alert/fish_alert.aspx>

² Mercury Task Force. Mercury task force activities and work plan. Report to 33rd conference of New England Governors and Eastern Canadian Premiers. 2009.

³ Mercury Control Technologies at Coal-fired Power Plants Have Achieved Substantial Emissions Reductions. U.S. Government Accountability Office, October 2009.

⁴ The Interstate Mercury Education and Reduction Clearinghouse (IMERC) is a program of the Northeast Waste Management Officials' Association that assists states, including Vermont, with the implementation of mercury product laws, including manufacturer notification, product labeling, and product phase-out exemptions. There are 13 member states.

⁵ Data collected and analyzed by the Interstate Mercury Education and Reduction Clearinghouse (IMERC) from mercury product manufacturer notification filings.

⁶ Data collected and analyzed by the Interstate Mercury Education and Reduction Clearinghouse (IMERC) from mercury product manufacturer notification filings.

⁷ For more information see: <<http://www.epa.gov/waterscience/fish/study/overview.htm>>

⁸ For further information see: <<http://www.neiwpcc.org/mercury/index.asp>>

⁹ For further information see: <<http://mercnet.briloon.org/>>

¹⁰ U.S. Food and Drug Administration web site: <<http://www.fda.gov/Medical Devices/Device Regulation Guidance/Guidance Documents/ucm073311.htm>>

¹¹ Ibid

¹² Consolidated Environmental NGOs Response to Stakeholder consultation on mercury-containing lamps (Review of Annex to the RoHS directive). <http://www.zeromercury.org/EU_developments/090831NGOs-RoHS-Review-of-AnnexHg-in-lamps-Consolidated.pdf> August. 2009

¹³ Lamp Industry Product Stewardship: A Record of Accomplishment. National Electrical Manufacturers' Association. http://www.nema.org/gov/env_conscious_design/lamps/upload/PRODUCT%20STEWARDSHIP%20Final%2010%2004.pdf October 2004.

¹⁴ For further information see: <http://www.chem.unep.ch/mercury/partnerships/new_partnership.htm>

¹⁵ For more information see: http://www.chem.unep.ch/MERCURY/awareness_raising_package/default.htm

By the Advisory Committee on Mercury Pollution:

Neil Kamman



Chair of Advisory Committee on Mercury Pollution

On behalf of the members:

Michael Bender	Abenaki Self-Help Association, Inc. – Executive Director Mercury Policy Project
John Berino	Representative for the Vermont Association of Hospitals and Healthcare Systems
William Bress	PhD, Diplomat American Board of Forensic Toxicology, State Toxicologist and Chief of the Environmental Health Division, Vermont Department of Health
Gary Gulka	Waste Prevention Section Chief, Environmental Assistance Office, Vermont Agency of Natural Resources
Jen Holliday	Environmental & Safety Compliance Manager, Chittenden Solid Waste District
Representative Jim McCullough	House Committee on Fish, Wildlife and Water Resources
Ruma Kohli	Chemical Management Program Manager, IBM, Burlington
Neil Kamman	Vermont Agency of Natural Resources, Environmental Scientist
Wayne LaRoche	Commissioner, Department of Fish and Wildlife, Vermont Agency of Natural Resources
Senator Richard McCormack	Senate Natural Resources and Energy Committee
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