ADVISORY COMMITTEE ON MERCURY POLLUTION

2009 ANNUAL REPORT

to the Governor, General Assembly
and Citizens of the State of Vermont
January 2009

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EXECUTIVE SUMMARY

This is the eleventh 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 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.

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 and report on the status of thimerosal-free vaccines in Vermont on its web site.

Fish Mercury Monitoring Program

- The Committee reiterates its recommendation in its 2006 through 2008 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-Containing Lamps

- Vermont should adopt mercury content limits for general purpose fluorescent lighting products, consistent with the State of California's limits that will be developed by January 1, 2010 for all lighting sold, distributed, or manufactured in the State.

- A sustainable source of funding should be established to ensure the necessary long-term financing of a convenient mercury-containing lamp recycling infrastructure in Vermont which, to the extent possible, includes extended producer responsibility and retailer involvement, with all of the parties involved in the chain of commerce and lighting use sharing in this responsibility.

- 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.

INTRODUCTION

This is the eleventh 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 nine times in the past year. Since 1998 the Committee has met 89 times. Information, minutes, and reports of the Committee can be found at: www.mercvt.org. As specified in legislation, the Advisory Committee sunsets on January 1, 2010.

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 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 methyl mercury, which is highly toxic and can be concentrated (biomagnified) in living organisms. Methyl mercury 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 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.[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 70-75% 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 as well as banning solid waste disposal. 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, there is much work to be done, 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) that regulates mercury emissions from coal burning utilities was successfully challenged last year 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 federal rule are insufficient to achieve mercury levels in the environment and fish tissue sufficient to protect human health. EPA must now re-draft the rule.

Federal and State Mercury Legislation

In 2008, U.S. Congress passed legislation that bans the exportation of elemental mercury from both commercial sources and any surplus mercury held in storage by the U.S. Departments of Defense and Energy, and directs the federal government to develop adequate secure storage for excess mercury. In 2007, the Vermont Legislature was one of the first state legislatures to pass a resolution requesting Congress to take such action. Given the efforts by many states

like Vermont to ban the disposal of mercury-containing products and encourage mercury recycling, this federal legislation ensures that recycled mercury is not re-released into the environment after exportation to countries with less stringent controls on mercury use.

In 2008, mercury thermostat collection legislation was passed 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.

In addition, the Advisory Committee on Mercury Pollution (ACMP) was mandated by 2008 legislation to evaluate the expansion of the Committee to address other toxic substances of concern in addition to mercury. The ACMP has addressed the legislative charge in a separate report to the Legislature entitled *Expansion of the Advisory Committee on Mercury Pollution*.

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.

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

Last year's report discussed the Northeast Regional Total Maximum Daily Load (TMDL), or the pollution control plans required by the Clean Water Act that articulate maximum allowable pollutant loadings for mercury impaired waters. The regional TMDL called for more aggressive mercury emissions controls than specified by the national Clean Air Mercury Rule to achieve water quality goals. Pursuant to § 319(g) of the Clean Water Act, states may petition EPA to mediate an interstate settlement in situations where the water pollutants from one state impact upon attainment of designated uses in another state. Under this little-used provision of the Act, petitioning State(s) are vested with the authority to require that EPA convene a Water Quality Conference with the goal of imposing regulatory guidelines in the "sending" state(s) such that water quality standards are achieved in the "receiving" state(s).

In the case of mercury, emissions from unregulated coal-fired power plants and other sources have demonstrable impacts on water in Vermont and the Northeast. Therefore, the New England Interstate Water Pollution Control Commission has, on behalf of its member States, filed a §319(g) petition to this effect. The petition shows that Vermont and the other New England states have implemented meaningful controls on mercury emissions, and places the necessary steps to reducing the out-of-region contamination upon out-of-region sources. As Vermont and other New England states lack the authority to impose regulatory change on other States, the 319(g) conference is appropriate. A successful outcome of the conference, national or state-specific MACT-based (maximum achievable control technology) mercury emissions controls under the Clean Air Act, will result in fish mercury reductions in Vermont waters, and progress towards attainment of the Northeast Regional Mercury TMDL.

National Mercury Monitoring Program

This initiative was described in the 2008 ACMP report. In May of 2008, EPA convened a workshop of the nation's top mercury scientists to select the sites that would be core to the national program. Vermont was represented at this meeting, where the importance of the Underhill site as a core national monitoring site was recognized. As each core site has, by design, associated cluster monitoring locations (lakes, rivers, wetlands, and forests near the core location), Vermont would be highly served by the national program. This program may yield

a dependable support mechanism for the Underhill site and associated cluster sites, should the full envisioned federal funding be realized.

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

As in prior years, the Underhill Monitoring Station continues to operate with funding support from NOAA, EPA and UVM. 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, if positive, should reinforce the importance of continued operation of the mercury monitoring functions of this nationally prominent research station. As of this writing, NOAA has not yet delivered the results of its review.

Continuation of the Lake Champlain Modeling Project

This ongoing project has been reported in prior ACMP reports. 2008 marks the final year of sampling for the project. This most successful field season yet has provided the data necessary to clarify the movement of mercury from source region to deposition on Lake Champlain, further into the water, then finally the food-web. Several important findings stem from the project, including the development of new and highly precise analytical methods to track low-level mercury, and an understanding of how fish mercury levels in the most nutrient rich segments of the lake remain low despite considerable mercury loadings.

The Lake Champlain Project data will also be used in a new large-scale analysis centered around the Great Lakes. This 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.

Mercury Monitoring by USGS

During 2008, USGS 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 to which mercury is attached. However, the sediment-trapping ponds can themselves exacerbate the mercury problem, by creating an environment where mercury is readily transformed to toxic and bioavailable methyl mercury. As such, the combined effect of the Englesby stormwater project may be to reduce total mercury discharge, but increase methyl mercury discharge. This important research carries implications for stormwater controls throughout the Northeast.

Complementary work continues in the Sleepers River watershed, where USGS scientists are working to clarify relationships between the turbidity and organic matter content of water, and the losses of mercury from the watershed. Further, they are identifying mechanisms that regulate the rate of methyl mercury production. Results of such work will permit much more precise estimations of mercury and methyl mercury discharges to other waters in Vermont.

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. This model will allow managers to identify ecosystem features associated with high levels of mercury in fish and fish-eating birds, 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. This project is on-going.

Soil and Sediment Testing

The Vermont Department of Environmental Conservation (DEC) is assisting or coordinating three projects that are looking at changes in soil or sediment mercury levels over time. For USGS and the Vermont Monitoring Cooperative, the Department is supporting the analysis of about 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. DEC is also assisting the UVM's Department of Plant and Soil Science in analyzing trends in mercury in soil cores from forests of differing types. In a third project, the Department has just completed a 50-lake survey of sediment mercury. This is a 10-year re-sampling of sediment mercury concentrations in Vermont lakes, and offers assessment of changes in contamination since the completion of the 1998-1999 EPA-funded "REMAP" Mercury Project.

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 Legislature, in response to 10 VSA §7114, outlining elements of a necessary indicator-based mercury monitoring initiative for Vermont. The plan has seen no action as of this writing, despite considerable need. Therefore, the committee continues to collect samples as time and resources permit, on an ad-hoc basis. EPA has assisted Vermont by providing analysis of 114 fishes collected in 2007. During 2008, the Vermont Department of Fish and Wildlife undertook a screening of Vermont lakes for viral hemorrhagic septicemia. Sixty-three fishes were retained from that initiative for mercury analysis. Pending legislative action upon the Expansion of the ACMP report, it will become relevant that other fish contaminants such as PCB's and poly-brominated diphenyl ethers (a chemical class of flame retardants) remain poorly characterized in Vermont.

Other Fish Monitoring

Every five years, the operators of the Fifteen Mile Falls reservoir system and hydroelectric dams are required by their federal operating license to sample fish mercury in project reservoirs. Two hundred forty individual fish tissue samples were tested in 2008 by the Biodiversity Research Institute of Maine. Results are pending as of this writing.

III. Recent Mercury Education and Reduction Efforts

Implementation of Recent Mercury Product Legislation

DEC continues to implement the provisions of the 2007 mercury product legislation which includes reviewing sale restriction exemption applications, updated labeling and notification plans, and maintaining the auto switch collection program. Additions to the law in 2008 established a thermostat collection incentive program with manufacturer-funded recycling and financial incentives.

Mercury Thermostat Collection Program: The 2007 Vermont Thermostat Collection Pilot project demonstrated that a program with an incentive approach for collection of mercury thermostats is effective in increasing thermostat collections. In 2008, legislation passed requiring mercury

thermostat manufacturers to submit a plan and implement a collection program with financial incentives by April 1, 2009.

Manufacturers submitted a collection plan to the Agency through the Thermostat Recycling Corporation (TRC) representing a consortium of mercury thermostat manufacturers. The plan underwent a 30-day public comment period. The plan allows for reimbursement to contractors though wholesalers with a coupon that is presented to the manufacturers for rebate. Homeowners will be able to take their mercury thermostats to retail locations across the state and receive $5.00 off the purchase of anything in the retail store utilizing the program. Municipal solid waste programs can also participate in the collection and rebate program for household customers and small businesses with a coupon that is mailed to the manufacturer for the rebate. DEC and TRC are currently negotiating the details of the required collection plan in relationship to the outreach efforts that will be required in order to achieve the maximum collection of mercury thermostats available for recycling. The Agency has notified all wholesale and retail locations of the upcoming program. It is expected that over 40 plumbing and heating wholesale locations will participate in the collection and rebate program. Some Vermont wholesalers and HHW programs were collecting thermostats prior to the law, utilizing the current TRC collection bins. Over 50 retail locations have already signed up voluntarily as registered collection points, as well as most municipal solid waste districts and alliances. All but one mercury thermostat manufacturer has filed a required collection plan that was due October 1, 2008; DEC is taking measures to ensure compliance by this manufacturer.

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. Vermont is the only state that allows purchasers in Vermont to apply for an exemption in order to purchase the product for specific needs. Two Vermont labs were granted an exemption for purchase and one was assisted in locating a non-mercury alternative for an autoclave thermometer. Neon sign manufacturers submitted an exemption application through their association (International Sign Association) to DEC and the Interstate Mercury Education and Reduction Clearinghouse (IMERC) clearinghouse exemption process. DEC assumed the lead on the review and has requested the association to reapply for those neon uses that specifically do not have alternatives (rather than a blanket exemption for all product lines). Vermont is the only state that specifically bans neon signs in legislation, while other New England states restrict neon according to permissible levels of mercury established in statute for mercury-containing products in general.

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 (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. 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. 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 salvage yards/auto dismantlers on a first-come, first-serve basis for their 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.

DEC has submitted an annual report 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. To date 22 facilities have returned mercury switches to the national collection program for reimbursement. In 2008, 1,522 switches were returned (equivalent to 3.34 pounds of mercury), representing a 37 percent increase over 2007. 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%. 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.

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. In 2008, all 16 hospitals have fulfilled the planning requirement by providing the necessary documentation that mercury use has been reduced by 95% or more. Total documented mercury reduction is over 1000 pounds.

Dental Mercury

During 2008, ACMP discussed with the Vermont State Dental Society (VSDS) a patient information brochure reviewing dental restorations/options in relation to mercury. For several years, ACMP and VSDS have discussed the relative merits of such a publication, often with opposing views on content. VSDS views mercury-containing dental amalgam as a safe, effective, and durable restoration material. The ACMP goal is to educate Vermonters about the documented environmental and possible health effects of mercury used in dental amalgam restorations.

During 2008, VSDS developed a brochure, by adapting the content of a similar document from the American Dental Association for the Vermont audience. The VSDS shared the results of its work with the Committee in the summer of 2008. ACMP thanks the VSDS for its dedication to this initiative, commends their willingness to engage in the issue, and appreciates that the brochure occupies a central placement on the VSDS website.

However, in reviewing the brochures, ACMP determined that certain information regarding the risks of dental amalgam was incompletely discussed or missing. Key points that ACMP raised for inclusion, but that were inadequately addressed, include:

- The brochure did not make mention that mercury is a known neurotoxin.
- The brochure did not address that dental amalgam use is the largest use of mercury in Vermont.
- The brochure did not acknowledge that dental mercury is a significant source of environmental mercury in wastewater discharges.
- The brochure did not strongly precaution against the use of amalgam in young children and pregnant mothers.

Other points that were raised, but that ACMP had not specifically requested be incorporated in the brochure include: *(Note: The VSDS disagrees with these statements.)*

- That there are reported cases of extreme sensitivity to mercury in placed dental amalgams that have resulted in reported health impacts to individuals.
- That there are health effects attributable to human exposure from mercury in placed dental amalgam.

As a result, the ACMP has determined that in 2009, it will prepare a separate fact sheet in concert with the VT Department of Health (VDH), to complement the VSDS document. The purpose of this will not be to supplant the VSDS brochure, but rather to introduce more detailed information regarding the risks of continued dental amalgam use. It is envisioned that this document will be distributed by ACMP via the www.mercvt.org website, as well as by VDH.

Mercury Emissions from Crematoria

The Advisory Committee continued discussions on mercury emissions from cremations, which largely result from the presence of dental amalgam. The Committee interviewed Vermont's Air Pollution Control Division on its regulation of emissions from crematoria. In addition, the Committee kept abreast of research at the University of Minnesota which continues to investigate abatement techniques that can be employed to reduce mercury emissions from dental amalgam prior to cremation.

There are approximately 2500 cremations in Vermont annually that can potentially result in the release of 20-25 pounds of mercury to the air. Vermont's Air Pollution Control Division issues air emissions permits for crematoria only under a general permit process. This is because the levels of mercury emitted from crematoria typically fall below thresholds that, under current rules, necessitate individual permits. As a result, mercury emissions from crematoria are not examined in aggregate, resulting in the existence of small emissions sources that may produce deposition hotspots on the Vermont landscape. There are eleven permitted crematoria and there may be others in existence that pre-date the air pollution permitting rules.

The Committee has received updates on work at the University of Minnesota through a multidisciplinary research team that is exploring methods to control the volatilization of mercury from dental amalgam during the cremation process and then remove the amalgam from the remains after cremation. They believe that this process holds promise and will be conducting tests in the coming year.

The Committee will continue to discuss mercury emissions from crematoria in the coming year. In particular, it will continue discussions with the Air Pollution Control Division to explore alternative permitting procedures that take into account localized impacts of mercury releases from crematoria. In addition, the Committee will continue to follow the abatement research at the University of Minnesota.

Dairy Manometer Removal and Replacement Project

The Agency of Agriculture, Food, and Markets, Vermont's municipal Solid Waste Districts, and DEC completed work in locating, removing, and replacing all known mercury dairy manometers from working and non-working farms. A total of 180 manometers were removed and 159 non-mercury replacements were installed for a total of 77 pounds of mercury removed from Vermont farms.

Maple Sugar Thermometer Exchange Project

During 2008, DEC partnered with the Agency of Agriculture, Food, and Markets and the Maple Sugar Makers Association to implement a no-cost maple sugar thermometer exchange program with Vermont sugar makers. Extensive research was conducted to locate an appropriate mercury-free replacement thermometer for over 100 sugar makers. The first round of exchanges was held at the three-day Maplerama at Tunbridge Fair in late July 2008. The remaining thermometers (not exchanged during the July event) will be exchanged during the annual maple schools held each year in January across the state. Recycling and transportation of mercury thermometers was provided at no cost by the Chittenden Solid Waste District through use of its hazardous waste mobile collection vehicle (Rover). This program was funded through a special fund for mercury reduction projects.

Outreach to Sensitive Populations on Mercury in Fish

Distribution of mercury-in-fish materials: The following distribution of mercury-in-fish materials was completed:

- The Vermont Grocers Association, VDH and DEC partnered again this year to make available new mercury-in-fish advisory cards for posting in grocery stores to provide customer information on relative mercury content of commercial fish.
- Over 300 physicians' offices were offered mercury-in-fish information materials in December together with requests for needs of other language based information. The Department of Corrections and DEC Public Facilities engineers collaborated to post and maintain new mercury fish advisories at Fish & Wildlife fishing access areas.
- A mailing of updated fish advisories was sent by DEC in fall of 2008 to all agents who sell fishing licenses in the state. This will be the fourth such mailing and the Department has received valuable cooperation from the agents in posting these materials.

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. DEC will be working with VDH refugee resettlement and nutrition programs as well as the state toxicologist to evaluate types of fish consumed, cultural trends, and language challenges to accomplish the task. F&W will also assist in efforts to identify fish species commonly consumed by various ethic populations and to work with ethnic populations that have no knowledge of fishing techniques or the legal requirements for fishing. One goal of the grant is to teach lay community leaders to fish and to help identify which fish are lower in mercury for wise consumption choices. DEC is also working to evaluate potential language translations into Abenaki.

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 penalty 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 pharmacies across the state. An outreach program will begin early next year and new in-store materials will be distributed to increase awareness.

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. The following chart shows program results since its onset in 2005.

	9/2005-2006	2007	2008	TOTAL
Lineal feet collected	**67,277**	**119,504**	**197,071**	**383,852**
# of Misc. bulbs, CFL, circular, U-tubes, HID	**1,212**	**5,349**	**19,062**	**25,627**

From calendar year 2006 to 2007, lamp collections in this project increased 78% for the collection of lineal fluorescent lamps (bulbs) and 341% for the collection of compact fluorescent lamps (CFLs) and other miscellaneous lamps. From the 2007 collections to the end of 2008, lineal fluorescent collections increased another 65% and CFLs an additional 256% from the prior year.

The True Value/ACE/Do it Best Lamp Recycling Program has been funded by DEC enforcement penalties over the past three years. Due to the increase in popularity of the program, lamp recycling rates have increased and funding is nearly exhausted. Although the hardware stores are committed to sustaining the program through their efforts, the probability for sustainable future funding of the program is dim. The Small Business Development Center (SBDC) has been administering this program since its onset and applied for the SEP funding. SBDC is currently searching for a funding source to continue the project and, at best, may be able to sustain the program for another 6 months.

DEC also collaborated with Efficiency Vermont (EVT) at the onset of their CFL collection and recycling project to share information to coordinate both programs across the state. EVT and DEC included collection locations on both web sites. EVT set up mail-back collection buckets at various lighting partner stores, grocery stores, and other miscellaneous sites. To date, EVT has established approximately 41 CFL collection locations collecting 2,810 CFL bulbs in the first year. EVT Retail Account Managers also assist DEC in distributing in-store materials as needed to True Value, ACE and Do it Best stores around the state during their regular visits. The collaboration of EVT and DEC on these projects has been beneficial for both programs. EVT has committed to funding this project for another year; however, as lamp collections increase and costs increase, adequate funding is uncertain.

Clean-up Guidance for Mercury Spills and Compact Fluorescent Bulbs

DEC and VDH, together with representatives from EVT collaborated to develop unified guidance for mercury spills for products such as thermometers and broken compact fluorescent bulbs. A packet with contact information, mercury spill guidance, and information for proper clean up of fluorescent bulbs was distributed to first responders (environmental, health and safety agencies and organizations) across the state to develop a unified protocol for handling mercury spills and

lamp breakage. DEC, VDH, and EVT web sites were updated with corresponding guidance information. Calls are directed primarily to VDH (to address health issues) which, in turn, commonly notifies DEC to coordinate on proper disposal and product questions. This partnership has simplified the process for handling consumer inquiries and also provides a more comprehensive evaluation of both health and product related concerns.

Municipal Collection of Mercury–Containing Wastes

The table below shows the amount of mercury collected through municipal household hazardous waste programs over the last seven 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. 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.

Type of Mercury Waste	2001	2002	2003	2004	2005	2006	2007
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**
Elemental Mercury **	**161 lbs**	**168 lbs**	**183.5 lbs**	**246 lbs**	**36 lbs**	**17 lbs**	**31 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**

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

**** Represents actual weight of mercury collected**

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

- 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.

- 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: There are three major pathways that have been evaluated by the Committee of mercury release and exposure related to dental amalgam: (1) crematoria emissions, (2) wastewater discharges from dental clinics, and (3) amalgam use.

Mercury air emissions from crematoria contain vaporized dental amalgam. This constitutes a significant mercury emission source in Vermont and for that reason, the Vermont Air Pollution Control Division has encouraged the Advisory Committee "… to recommend that the use of dental amalgam in Vermont be banned or rapidly phased out." The Committee continues to evaluate methods to reduce mercury emissions from crematoria.

Legislation enacted in 2006 requiring the installation of amalgam separators and implementation of Best Management Practices has addressed mercury wastewater discharges. Dental amalgams are approximately 50 percent mercury and constitute the largest sources of mercury use in products. Although amalgam use has declined in favor of other alternatives, such as composite resins, dental mercury is the largest contributor of mercury to wastewater discharges.

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 updated June 3, 2008 U.S. Food and Drug Administration web site states: "*Dental amalgams contain mercury, which may have neurotoxic effects on the nervous systems of developing children and fetus*." The FDA website also now states that "*Some other countries follow a "precautionary principle" and avoid the use of dental amalgam in pregnant women.*"

Last year, Norway and Sweden announced a ban on the use of dental amalgam. Norway's recommendations are based on both the public health and environmental perspective 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).

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.

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.

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.

The Advisory Committee has consistently supported better patient information on filling choices, both from a health and an environmental perspective. This would also include informing Medicaid patients of equal coverage availability for amalgam and composite resin fillings. It is the Committee's concern that a lack of awareness of this by Medicaid patients may lead to the placement of more amalgam fillings. As further discussed in Sections III and V of this report, the Advisory Committee intends to develop dental patient care information on filling choices and make this available to the public as part of fulfilling its legislative charge.

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 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. 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.

In 2008-2009 flu season, there has been an increase in the number of thimerosal-free flu vaccine doses obtained by VDH and distributed to physicians' offices. Last season, there were about 5000 thimerosal-free vaccine doses obtained through the Centers of Disease Control. Of 38,000 doses of children's flu vaccine purchased by VDH this season, 23,000 (62 percent) were thimerosal-free. 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 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.

Fish Mercury Monitoring Program

- The Committee reiterates its recommendation in its 2006, 2007, and 2008 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 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 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-Containing Lamps

- Vermont should adopt mercury content limits for general purpose fluorescent lighting products, consistent with the State of California's limits that will be developed by January 1, 2010 for all lighting sold, distributed, or manufactured in the State.

- A sustainable source of funding should be established to ensure the necessary long-term financing of a convenient mercury-containing lamp recycling infrastructure in Vermont

which, to the extent possible, includes extended producer responsibility and retailer involvement, with all of the parties involved in the chain of commerce and lighting use sharing in this responsibility.

- 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 began a process for revising and significantly lowering these limits. This process should be completed in 2009. The State of California has passed a law which requires, effective January 1, 2010, than any lamp manufactured or sold into the state meet the applicable standards under the EU RoHS Directive.

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 are growing significantly from year to year and do

not currently have a sustainable funding source into the future. In fact, some of these programs are in jeopardy of ceasing in the next year. Interruption of collection and recycling due to the unavailability of funding may result in household mercury products once again being indiscriminately deposited into landfill waste.

Although the Advisory Committee has not had the opportunity to explore the specifics of a sustainable funding mechanism for lamp collection and recycling, we urge the Legislature to engage in a dialogue in the coming legislative session to explore options that include the involvement of lamp manufacturers, retailers, municipalities, and consumers. Mercury thermostat legislation passed which passed in 2008 is one example of how manufactures, retailers, wholesalers, and municipalities (the general public) were engaged in developing a solution to increasing thermostat collection.

The Advisory Committee commends the work of the Vermont Department of Buildings and General Services, Office of Purchasing and Contracting, for its work under Executive Order #03-02 requiring the purchase and subsequent recycling of the best performing and lowest mercury content lamps. The bidding and contract process has lead to procurement of lamps with the lowest mercury content available and an effective recycling program. Change-out of lamps to newer technology T8s and T5s has both increased energy efficiency and reduced mercury content. The Advisory Committee recommends that such work continue to reduce and eliminate the use of mercury in lamps whenever feasible, and that municipalities that can purchase lamps under state contract are made aware of these procurement opportunities.

V. Committee Work Plan for 2009

The Advisory Committee has identified the following priority areas of work in 2009. The Committee will sunset on January 1, 2010.

- 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 the new mercury thermostat collection program.

- 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. The Committee will assess new information and scientific studies that come to its attention on human exposure and risk of mercury. In addition, the Committee will review implementation of DEC's EPA Healthy Communities Grant project to develop language-specific fish advisories for ethnic populations.

- Mercury Education and Reduction – The Committee will continue to evaluate and monitor ongoing mercury education and reduction efforts in DEC and VDH. 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-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, increased infrastructure and collection rates, 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 miscellaneous and new sources of mercury exposure (such as health supplements, tattoos, etc.)

- Dental Filling Choices – In consultation with VDH and DEC, the Committee will prepare a fact sheet on dental filling choices to complement the VDH brochure and further expands on the environmental and health effects of mercury as it relates to dental amalgam use.

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[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. 2007. Mercury task force activities and work plan. Report to 31st conference of New England Governors and Eastern Canadian Premiers.