

**MERCURY THERMOSTATS:
METHODS TO INCREASE RECYCLING
LEGISLATIVE REPORT**

**THE VERMONT
AGENCY OF NATURAL RESOURCES (ANR)**

{Title 10 VSA, Chapter 164 §7107(d)}

Submitted to the Vermont General Assembly By:

Department of Environmental Conservation

Agency of Natural Resources

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I. Introduction

10 V.S.A. §7107(d) required the following study by the Agency:

“The agency shall conduct a study, and in consultation with the advisory committee on mercury pollution, make recommendations on methods to increase recycling of mercury thermostats. The study shall identify incentive-based programs and other feasible programs, including costs and mechanisms for financing such programs. The agency shall report to the general assembly no later than January 15, 2008.”

The results of this study and the recommendations presented in this report have been shared with the Advisory Committee on Mercury Pollution (ACMP). The Advisory Committee’s report also contains recommendations for increasing collection and recycling of mercury thermostats that are consistent with this report.

In 2006, the Agency submitted a report to the Legislature with recommendations on improving collection of mercury thermostats. In this report, the Agency concluded the following:

- The replacement and discard of mercury thermostats in Vermont constitutes a significant amount of mercury (15-23 pounds per year) and efforts are necessary to prevent environmental releases of this mercury.
- Despite bans on the purchase and disposal of mercury thermostats the Agency needs to continue educational efforts to inform the public of the requirements of the law and the opportunities for convenient recycling.
- The Agency should explore financial incentives to increase the rates of capture and recycling and should consider a pilot project.

In 2007, the Department of Environmental Conservation (DEC) on behalf of the Agency developed, funded, and conducted a two-month mercury thermostat collection pilot project at retail locations throughout the state to test the effect of a financial incentive on thermostat collection from homeowners. A financial incentive in the form of \$5.00 off of the purchase of anything at the retail store was offered.

The results of this pilot project are discussed in this report, as well as pilot projects in two other states (Indiana and Oregon) that evaluated financial incentives. Also, the state of Maine’s experience with its mercury thermostat law with financial incentives is reviewed.

II. Background on Mercury Thermostats

A typical mercury wall thermostat contains mercury in one or more sealed glass ampoules and serves as an on-off electromechanical switch in heating and cooling systems. The mercury moves in the glass ampoule to make or break an electrical circuit to turning the system on or off. Mercury thermostats generally contain between one and

six mercury-containing switches. The average mercury thermostat contains about four grams of mercury.

There are an estimated 50 million thermostats in use in the U.S. today, and about 90% of these contain mercury. Thermostat manufacturers estimate that two to three million thermostats are taken out of service each year. About 75% of thermostats are installed by professionals and 25% by homeowners.

Vermont has banned the sale of mercury thermostats after July 1, 2006. Many other states have also implemented sales bans. Mercury-free alternatives include electronic programmable thermostats and mechanical thermostats. Vermont law also bans the disposal of mercury thermostats in solid waste facilities.

Based on thermostat discard rates determined by the Product Stewardship Institute (as described in Section V), approximately 2000-3000 thermostats are discarded annually in Vermont. This equates to 15-23 pounds of mercury per year in discarded thermostats.

Due to the long life of mercury thermostats, many still remain in service in residential, institutional, and commercial locations. As the popularity of electronic programmable thermostats grows, more of these in-service mercury thermostats will be removed from service in all likelihood. Coupled with the ban on the sale of new mercury thermostats, it can be expected that the number of mercury thermostats available for collection and recycling each year will diminish over time.

III. Thermostat Manufacturer-Sponsored Collection

Three of the major thermostat manufacturers in the U.S. created a voluntary thermostat collection program in 2001 under the name of Thermostat Recycling Corporation (TRC) to recycle discarded mercury thermostats generated and collected by heating, ventilation, and cooling (HVAC) contractors. HVAC contractors can take a mercury switch thermostat to a participating wholesaler of plumbing and heating supplies free-of-charge. Wholesalers collect thermostats in collection bins provided by TRC which are then shipped at no cost by the wholesaler to a recycling facility in Minnesota. There is a one-time startup fee of \$25 paid by the wholesaler to participate in the program. TRC provides yearly data, by state, on the number of thermostats collected through the program. Since the onset of the collection program in 2001, TRC has reported that on average, 97% of the thermostats collected were manufactured by either Honeywell, General Electric, or White Rogers. Recently a fourth manufacturer, Nordyne, has joined TRC.

In 2001, DEC on behalf of the Agency set up approximately 30 wholesale supply locations across the state to collect mercury containing thermostats from contractors utilizing the TRC program. Some of these wholesalers are electrical supply and some are plumbing and heating supply wholesalers. Two additional wholesaler locations had enrolled with TRC prior to the onset of the DEC's program. The initial set up included a

site visit and instructions on how to properly implement the program. In 2002 DEC did a follow-up visit and provided posters and bill stuffers to the wholesalers to further promote the program. From the results of the follow up visits which also evaluated the progress of the program; it was noted that several locations, within the first year, had lost or misplaced their collection bin and needed to be re-instructed on the program. On two occasions after the follow-up visits, the Agency sent mailings to licensed plumbers to inform them of the sales and disposal ban and locations for the free recycling program. The program was promoted on the mercvt.org web site for both homeowners and contractors and displays were set up at various building contractor conferences.

In 2007, the Agency visited all 32 locations and found that two locations had gone out of business and several had moved. Eleven locations in all were no longer collecting and the remaining 21 locations were still participating in the program. Of the 21 participating locations, seven were very active in thermostat collection but many of the remaining bins were still not full after six years. None of the locations visited had posters which promoted the program; however, those who were actively collecting thermostats felt that there was awareness with the contractors who frequented their stores and no need for promotion. All wholesalers were knowledgeable about thermostats being banned from sale and that thermostats could not be thrown away in the regular trash. They also believed that contractors had the same level of awareness.

The number of thermostats collected in Vermont through the TRC program is as follows:

YEAR	2002	2003	2004	2005	2006
NUMBER OF THERMOSTATS COLLECTED	54	194	151	372	223

In the past year, TRC has made thermostat collection bins available to municipalities, and several of Vermont’s municipal solid waste districts and alliances use this program to collect residential thermostats and thermostats from small businesses. TRC distributed about 30 collection bins to household hazardous waste programs.

IV. Vermont’s Thermostat Pilot Project

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

Almost 1,200 mercury thermostats were collected during the two-month program. The majority of thermostats were brought in by homeowners but some thermostats were returned by contractors. In comparison, there were 192 mercury thermostats delivered to municipal solid waste districts during a two-and-a-half month period prior to the pilot. The collection numbers significantly exceeded total yearly collections at TRC wholesaler locations.

The collection of thermostats collected in the two-month pilot represents 40 – 60 % of the thermostats estimated to be available for collection on a yearly basis as estimated by DEC in its 2006 report to the Legislature.

V. Indiana and Oregon Thermostat Collection Pilot Projects Through PSI

The Product Stewardship Institute (PSI) is a nonprofit membership-based organization in Boston that works with state and local governments to partner with manufacturers, retailers and others to encourage manufacturer and joint responsibility for end-of-life product management, including collection and recycling. PSI's work has focused on a number of product categories including: carpet, consumer electronics, paints, pesticides, pharmaceuticals, and mercury products, including thermostats.

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

VI. Maine's Thermostat Recycling Program

The State of Maine's thermostat law contains a provision for a minimum financial incentive of \$5.00 for contractor and household mercury thermostats that are turned in for collection. Maine is implementing the law in two phases. The first phase began in May 2007 for contractors who remove thermostats. Thermostat manufacturers provide collection bins to plumbing, heating, and electrical wholesaler locations. A \$5.00 cash coupon is provided to HVAC contractors that turn in a thermostat. This coupon is mailed in by the contractor in order to obtain a cash rebate. There is a dual system collection system – a collection container for TRC-member thermostats (GE, Honeywell, White Rogers, and Nordyne) and a collection container for all other thermostat manufacturers.

Coupons are returned to two different third-party administrators. Maine has determined that there are approximately 35 thermostat manufacturers who are responsible for participating in the collection programs and providing financial incentives. According to the Maine DEP, since the law went into effect, the recycling of thermostats from contactors has more than doubled compared to the same period the previous year. The great majority of mercury thermostats collected are manufactured by Honeywell, GE and White Rogers, with only a few or no thermostats from other manufacturers.

The second phase, a homeowner collection program for TRC members, is currently under review by the Maine Department of Environmental Protection. In order to serve the rural parts of the state, there will be a mail-back component whereby homeowners can request a pre-paid UPS mailing label from TRC for return of the thermostat. The homeowner would have to provide the packaging material for mailing. TRC would then send a check to the homeowner once the thermostat is received. As another option, homeowners may also take their thermostat to a participating wholesale location or a household hazardous waste facility. Using this option, they would be given a mail-in coupon in order to claim their \$5.00 incentive, similar to a contractor, and the thermostat would be dropped off for collection through the TRC bin program.

VII. Proposed Thermostat Legislation in Vermont – H.515

In 2007, the House passed H.515 related to mercury thermostat collection and is under consideration by the Senate. Under the bill, all thermostat manufacturers who sold or distributed mercury-containing thermostats in Vermont at any time must: (1) implement a collection system for discarded mercury thermostats that includes wholesaler locations; (2) implement an education and outreach program directed toward wholesalers, retailers, contractors, and homeowners; (3) provide a financial incentive with a minimum value of \$5.00 for all thermostats turned in for collection; (4) submit a collection plan for approval by the Agency that ensures that certain collection rates of discarded thermostats are met; and (5) report annually to the agency on collection results.

Wholesalers who sell thermostats would be required to act as a collection sites for discarded mercury thermostats and promote the thermostat collection program, including outreach materials, provided by manufacturers. Retailers who sell thermostats would be required to display educational materials as provided by the manufacturers. Retailers, municipal solid waste districts, and municipalities may register as collection points and would be provided with collection containers by the thermostat manufacturers for a one-time fee.

The Agency must review collection plans submitted by manufacturers and report annually on the effectiveness of thermostat collection and make recommendations to the Legislature on program improvements.

VIII. Conclusion and Recommendations

Collection of thermostats increased dramatically during Vermont's two-month pilot collection project when a \$5.00 cash incentive was offered for thermostats at retail locations. The number of thermostats collected exceeded in-state collection prior to the program by more than five-fold. In the two-month pilot, Vermont's thermostat collection exceeded the total annual collection of thermostats in 22 states (through the TRC program).

Consistent with the findings in Maine, Indiana, and Oregon, a financial incentive coupled with adequate program advertising and convenient recycling can yield substantial increases in mercury thermostat recycling. Through contact with homeowners who participated in Vermont's pilot program, there seemed to be a variety and often a combination of factors that motivated individuals to participate, including the cash incentive, convenient recycling, and environmental concerns. It was also clear that since many of the collected thermostats were in service at the time, this pilot provided motivation to make a change to an energy-conserving digital programmable thermostat.

We believe that the form of the cash incentive - \$5.00 off the purchase of anything in the store - was more effective than incentives offered through programs in other states. First of all, it was a direct rebate to the customer with no requirement to mail in rebates forms or coupons. Secondly, it appears that the \$5.00 cash incentive also was a motivation for hardware stores to voluntarily participate in and promote the program. This can be seen by the large number of hardware stores that elected to participate in the two-month pilot (86 hardware stores from four different chains). The DEC was easily able to administer the reimbursement to the 86 hardware stores rather than to each customer participating in the program. Each participating customer returning the thermostat completed a short form, thus providing easy verification for reimbursement.

Was the cash incentive a significant motivating factor in the collection program? It was significant enough that of all the thermostats collected, only about 40 of the thermostats did not have a cash incentive payout (and some of this was due to a limit of 3 thermostat rebates per customer when a customer turned in more than three thermostats).

The DEC has seen disappointing results in thermostat collection at wholesaler locations when only outreach and convenient recycling have been provided as motivators. Despite letters to contractors and advertising in wholesale locations, the best year yielded 372 thermostats. Based on the experiences in Maine and Oregon, we believe that a similar financial incentive offered for mercury thermostats returned primarily by contractors to wholesale locations would yield significant increases in thermostat collection.

Based on the DEC's experience over the last five years in thermostat recycling, a key to success in achieving high rates of mercury thermostat collection is a collaboration involving manufacturers, retailers, wholesalers, municipalities, and the DEC, each playing a critical role in providing the necessary collection infrastructure, convenience, and education/outreach, and regulatory oversight of the mercury product disposal ban in landfills.

Vermont's pilot project demonstrated a very effective and straightforward type of financial incentive that has many benefits over more complicated rebate or coupon programs. This type of incentive provides an additional motivation for retailers to participate in collection because they too derive financial benefit from the cash incentive. The customer returning a mercury thermostat receives an immediate cash incentive, instead of mailing in a form and waiting for a check. The reimbursement process is simple and would reduce overhead costs for administering a financial incentive, a primary concern that thermostat manufacturers expressed in Committee discussion of H.515 in 2007. A similar cash incentive mechanism at wholesaler locations may also be appropriate.

The Agency continues to support H.515 as passed by the House. However, based on the findings in this report, modifications should be considered to the bill to streamline the implementation process including the following considerations:

- Specifying financial incentive rebates, like that offered through the Vermont pilot, which would reduce administrative burden and cost for wholesalers, retailers, manufacturers, homeowners, and contractors.
- A goal of the legislation and a directive to the Agency in approving manufacturer collection plans should be a single collection system in which all responsible parties participate. This would avoid several different collection systems for individual manufacturers' thermostats to be managed at any given collection location. Considering that approximately 97% of the collected thermostats originate from the three manufacturers who already have a working recycling infrastructure in place through TRC, and, considering that since 2001, TRC, under their collection program, has been recycling thermostats regardless of manufacturer, it makes sense to continue this straightforward collection system that is much easier to implement at wholesaler and retailer locations. We urge the Legislature to explore this issue with thermostat manufacturers during legislative testimony to find out how a single collection system can be achieved.
- Based on Maine's experience in implementing their mercury thermostat legislation, the 20-30 other manufacturers that represent only 3% of the market share of thermostats turned in for recycling have been difficult to identify. Many of these still have not submitted collection plans. Vermont's current resources would be limited to identify and enforce the requirements for manufacturers who have a lesser contribution to the overall universe of thermostats that may be collected for recycling. Given this, the law may be more practical if Original Equipment Manufacturers (OEMs) were the only thermostat manufacturers subject to the requirements of H.515. This would greatly reduce the number of manufacturers subject to the law and may facilitate a single collection system that all manufacturers can agree to.