

# **Review of the Thermostat Recycling Corporation Activities in the Northeast**

**Prepared by the Northeast Waste Management Officials' Association (NEWMOA)<sup>1</sup>  
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## **Executive Summary**

The Northeast Waste Management Officials' Association (NEWMOA) conducted a phone survey of the electrical wholesale firms in the Northeast, who participate in the Thermostat Recycling Corporation's (TRC) program to collect used mercury-containing thermostats. At the time of the survey, the TRC listed 78 wholesalers on their website as participants in their program. The survey found that overall, 22 percent of these wholesalers could not be reached, did not respond to the survey, and/or reported that they do not participate in the program. NEWMOA estimated the total number of electrical wholesale firms in business in the region to determine the universe of possible outlets for thermostat collection through the TRC program and found that there is a significant number of potential participants in all of the northeast states that have not been recruited to participate in the TRC collection program. NEWMOA also estimated the number of used thermostats that may be generated annually in the Northeast states and estimated that TRC program is projected to collect between 1.3 and 4.9 percent of the possible number of mercury thermostats that could be collected in 2001. The report concludes with a number of recommendations for improving the TRC program.

## **Background**

The Thermostat Recycling Corporation (TRC) is a private corporation originally established by thermostat manufacturers Honeywell, General Electric and White-Rogers to facilitate the recycling of used mercury-switch thermostats. Under this voluntary, industry-sponsored effort, heating and cooling contractors drop off old mercury-switch thermostats – no matter what brand – at participating wholesalers. The wholesalers collect the thermostats in bins supplied by TRC. When the bins are full, wholesalers send them to the corporation's recycling center where the switches are removed and forwarded to a mercury recycler. TRC decided to focus on heating and air conditioning contractors and wholesalers because TRC believes that these wholesalers sell and install the majority of thermostats and have an infrastructure to support a recycling program. According to the TRC, a small percentage of replacement thermostats are installed by homeowners themselves.

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<sup>1</sup> The Northeast Waste Management Officials' Association (NEWMOA) is a non-profit, non-partisan interstate governmental association. The membership is composed of state environmental agency directors from the pollution prevention, hazardous and solid waste, and waste site cleanup programs in Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont. This report does not cover TRC activities in New Jersey because they only recently rejoined NEWMOA and were not actively involved in this effort when the phone survey was conducted. Terri Goldberg, NEWMOA Deputy Director managed this project; Karen Thomas, NEWMOA Project Manager was a primary author and conducted many of the interviews; Hannah Sarnow, NEWMOA Project Staff assisted with this effort by conducting a number of interviews.

TRC has been recycling mercury-switch thermostats since January 1998 when they initiated the program in nine states – Florida, Illinois, Iowa, Minnesota, North Dakota, Ohio and Wisconsin. In 2000 TRC added 13 additional states, including Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and West Virginia. In the spring of 2001, the Company announced that it was expanding to all 48 states on the mainland of the U.S.

The purpose of this report is threefold:

- to examine the effectiveness of this program in the northeast states (including Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont)
- to assess the potential for expansion of this program in the northeast states
- to present the results of a recent survey of wholesalers in the region that are identified by TRC as participating in the program

The ultimate goal of this effort is to provide data and information to help the TRC and the Northeast states increase the number of mercury-switch thermostats collected for recycling, thereby reducing the amount of mercury entering the solid waste stream;

The first sections of this report cover why the state environmental agencies are concerned about mercury in the environment and how mercury is used in thermostats. This is followed by a presentation of the results of the collection efforts by the Thermostat Recycling Corporation in the Northeast. The next sections present the results of a phone survey of wholesalers in the Northeast that participate in the TRC program and a description of state efforts to support the program. The final sections present an estimate of the potential universe of wholesalers in the Northeast that might be available to participate in TRC's collection system and an estimate of the number of used thermostats in the region that could be collected and recycled annually. The report ends with some brief recommendations for improving TRC's program in the Northeast.

### **Why be Concerned About Mercury in Thermostats?**

Wall-mounted, mercury-switch thermostats are an important source of mercury in the solid waste stream. When mercury-switch thermostats are burned in incinerators or broken as they are transported to a landfill, mercury can be released into the environment.

Mercury is a toxic liquid metal that can pose a public health threat. It can be transformed into a vapor at room temperatures and taken up in the air. It is emitted into the environment through air emissions from waste incinerators and coal-fired power plants, through discharge into waterways or groundwater, and through vaporization. Mercury does not break down in the environment. When mercury enters the environment, it can become available for uptake by living organisms. Mercury can be transformed by

bacteria in the environment into a very toxic form, called methylmercury. Methylmercury can build up in fish, birds, and ultimately people who consume the fish. Fish consumption is one of the most common ways people are exposed to methylmercury.

Mercury can affect red blood cells, the kidneys and the central nervous system. Fetuses and young children are at particular risk for the neurotoxic effects of mercury exposure since their brains and nervous systems are still developing.

All of the states in the Northeast have been testing fish in lakes, ponds, and rivers and finding elevated levels of mercury in certain species. In many cases these levels exceed those considered to be safe for human consumption, particularly pregnant women and young children, by state public health authorities. As a result, all of the states in the Northeast have issued fresh water fish advisories warning people about consuming certain fish from various locations because of concern over potential for methylmercury exposure.

### **How is Mercury Used in Thermostats?**

Mercury's unique properties — high conductivity, high surface tension and liquidity at room temperature — have made it a useful component in electric switches, including thermostats. In a mercury-switch thermostat, a ball of mercury rolls between contacts in one or more sealed glass ampoules, which are attached to a metal strip. The mercury switch works by making or breaking an electrical circuit, which creates a signal for turning on heating or cooling from a furnace or central air conditioning system. Each glass ampoule contains approximately three to four grams of mercury, which is approximately the size of a dime.

Thermostats with mercury operate effectively, require little or no maintenance, and provide up to 30-40 years of service. According to the National Electrical Manufacturers Association (NEMA), there are more than 50 million mercury-switch thermostats in homes across the United States.

Mercury-switch thermostats are specifically designed to protect and hold the mercury ampoules they contain. In normal use, the consumer is not exposed to the mercury. The switch is durable, the metal strip helps absorb shocks, and the bulb is contained in a plastic or metal thermostat case. Nevertheless, these thermostats should always be handled with care.

### **Results of TRC's Collection Program**

According to the TRC, from 1998 – 2000 nationally they collected and processed 74,661 thermostats containing 657.2 pounds of mercury. The company recovered over 15,000 thermostats containing 163.5 pounds of mercury in the nine participating states in 1998. They collected and processed 31,611 thermostats containing 256 pounds of mercury in 2000 from the 22 participating states. This is a 14

percent increase in thermostats and an 8 percent increase in mercury over 1999 levels. According to the TRC, the increase is associated with the expansion of the program to the Eastern U.S. See Table 1 for a summary of the TRC collections.

**Table 1**  
**Thermostats and Elemental Mercury Collected by TRC, 1998-2000**

| <b>Year</b>            | <b># of States Participating</b> | <b># of Thermostats Collected</b> | <b>Pounds of Hg Contained in Thermostats Collected</b> |
|------------------------|----------------------------------|-----------------------------------|--|
| 1998                   | 9                                | 15,270                            | 163.5  |
| 1999                   | 9                                | 27,780                            | 238.0  |
| 2000                   | 22                               | 31,611                            | 255.7  |
| <b>Total 1998-2000</b> |                                  | <b>74,661</b>                     | <b>657.2</b>   |

Source: <http://www.nema.org/government/environment/>, August 6, 2001.

**Table 2**  
**Thermostat Collection Results for the Northeast States, 2000 and January through June 2001**

| <b>State</b>  | <b># Thermostats Collected, 2000</b> | <b>Pounds of Hg Contained in Thermostats Collected</b> | <b># Thermostats Collected, January-June 2001</b> | <b>Pounds of Hg Contained in Thermostats Collected</b> |
|---------------|--------------------------------------|--|---|--|
| Connecticut   | 0*                                   | 0  | 0*  | 0  |
| Maine         | 0*                                   | 0  | 120   | 0.81   |
| Massachusetts | 219                                  | 1.9  | 144   | 1.07   |
| New Hampshire | 0*                                   | 0  | 0*  | 0  |
| New York      | 2,083                                | 19.7   | 1,096   | 12.45  |
| Rhode Island  | 0*                                   | 0  | 0*  | 0  |
| Vermont       | 0*                                   | 0  | 0*  | 0  |
| <b>Total</b>  | <b>2,302</b>                         | <b>21.6</b>  | <b>1,360</b>                                      | <b>14.33</b>   |

Source: <http://www.nema.org/government/environment/>, August 6, 2001 and TRC Report dated July 25, 2001; Note: 2000 data does not necessarily represent an entire year of collection because not all bins were in place on January 1. For example, Maine bins were placed in fall and winter 2000. \* The reasons that these states show zero thermostats collected may include the following: there were either no wholesalers participating in the TRC Program, only a few participating in the TRC Program, or the wholesalers had just recently begun participation so the totals shown did not reflect current collections.

Table 2 presents the data available from TRC on the results of the collection programs in the northeast U.S. for full year 2000 and January through June 2001.

### **Survey of Northeast Wholesalers Participating in the Program**

NEWMOA initiated development of this report as a result of its efforts to support the Massachusetts environmental agencies – MA EOE and MA DEP – in their efforts to expand community mercury reduction programs. In particular, during the spring of 2001, NEWMOA staff worked with building contractors in Lowell, Massachusetts to promote their participation in mercury recycling. As part of this effort, the staff contacted the two Lowell wholesalers listed on the NEMA<sup>2</sup> website ([www.nema.org](http://www.nema.org)) as participating in the TRC program to ensure that the information NEWMOA was providing to the contractors was correct. The two wholesalers informed NEWMOA staff that they were no longer participating in the program. This information caused NEWMOA staff to conduct a survey of all of the wholesalers in Massachusetts to help state officials understand their participation in the TRC program. After reporting the results of this effort to representatives of the other environmental agencies in the Northeast, the states asked NEWMOA to conduct a region-wide survey in cooperation with environmental agency staff.

In the spring and summer of 2001, NEWMOA and CT DEP staff conducted a survey of the wholesalers in the northeast region listed on NEMA's website as participating in the TRC program as of the date of the survey. The purpose of the survey was to determine whether the wholesalers were still actively engaged in the program and to assess the availability of these services in the region for the NEWMOA-member state environmental agencies.

The survey consisted of contacting by phone the wholesalers listed as participating from the northeast region. In general, the wholesalers were asked four questions after a brief introduction:

- Do they have the TRC bins at their facility?
- Do their customers use the bins?
- Do they know where to send the bins when they become full?
- Do they have any comments on the program?

When the NEWMOA and CT DEP staff contacted the wholesalers, they asked for the appropriate person on their staff to address the questions about the thermostat collection program. The Maine, New Hampshire, New York, Rhode Island and Vermont wholesalers were interviewed by one person.

The Connecticut and Massachusetts wholesalers were interviewed by two different people.

Connecticut wholesalers were not asked the third and fourth questions.

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<sup>2</sup> NEMA, a national trade association for electrical manufacturers, is host to the on-line information about the TRC program.

Appendix A presents a complete set of survey results for each of the wholesalers that NEWMOA and CT DEP staff attempted to contact. Table 3 summarizes the overall results for each state.

There are a number of interesting results to report from Table 3 and Attachment A. These results focus on how active the wholesalers that were contacted are in TRC's program. The following summarizes a few key points:

- overall, 78 percent (61) of the wholesalers listed on the TRC website could be reached, responded to the survey and indicated that they participate in the program
- of the 78 wholesalers contacted, staff were unable to reach approximately 5 percent (4) because they either had incorrect phone numbers listed, had gone out of business, or were unavailable for another reason
- of the 74 wholesalers that were reached, 16 percent (12) reported that they were no longer participating in the program
- of the 58 wholesalers that use the bins, 95 percent (55) reported that they know where to send them (assuming that the 4 CT wholesalers who were not asked this question know where to send the bins)
- three Massachusetts wholesalers that have bins reported that they did not know where to send them

Overall, these results indicate that approximately 30% of the wholesalers listed on the NEMA website as participating in the TRC program are not currently collecting mercury-switch thermostats for recycling for a variety of reasons. This indicates that there is an ongoing and continuing need for education and outreach to participating wholesalers in the region on the benefits of the TRC program and how to participate in its efforts.

### **Assistance from State Environmental Agencies**

The TRC program is an entirely voluntary program that is funded and managed by thermostat manufacturers. However, in the interest of promoting mercury reduction in solid waste the state environmental agencies in the northeast U.S. have been helping the TRC in their outreach and assistance efforts to heating and cooling wholesalers and contractors. Several state environmental agencies have initiated programs to reach wholesalers in their states to facilitate their participation in the TRC program.

**Table 3**  
**Summary of the Survey Results by State**

|   | <b>CT</b> | <b>ME</b>      | <b>MA</b>       | <b>NH</b>      | <b>NY</b>       | <b>RI</b> | <b>VT</b>       | <b>Total</b>          |
|---|-----------|----------------|-----------------|----------------|-----------------|-----------|-----------------|-----------------------|
| Total Number of Wholesalers <b>Listed</b> as Participating in the TRC Program | 5         | 7 <sup>a</sup> | 30 <sup>b</sup> | 0 <sup>c</sup> | 16              | 1         | 19 <sup>d</sup> | <b>78</b>             |
| Number of Wholesalers Surveyors Attempted to Contact                          | 5         | 7              | 30              | 0              | 16 <sup>e</sup> | 1         | 19              | <b>78</b>             |
| Number of Wholesalers Unable to Reach   | 0         | 1              | 0               | 0              | 2               | 0         | 1               | <b>4</b>              |
| Number of Wholesalers No Longer Participating or Who Never Participated       | 1         | 1              | 7               | 0              | 0               | 0         | 3               | <b>12</b>             |
| Number of Wholesalers Who are Participating and Have Bins                     | 4         | 5              | 23              | 0              | 13              | 1         | 15              | <b>61</b>             |
| Number of Wholesalers Who Use Bins  | 4         | 5              | 20              | 0              | 13              | 1         | 15              | <b>58</b>             |
| Number of Wholesalers Who Know Where to Send the Bins (of those who use them) | NA        | 5              | 17              | 0              | 13              | 1         | 15              | <b>55<sup>f</sup></b> |

NA = Not Available

<sup>a</sup> In 2000, the Me DEP purchased 10 bins and distributed them to 5 wholesalers interested in participating in the program.

<sup>b</sup> 25 of these wholesalers received bins at no cost to them through a Supplemental Environmental Project (SEP) by Wheelabrator Technologies, Inc., managed by Scanlon Associates; Scanlon Associates is listed as a participant in the TRC Program but was not included in the survey because they are a consulting firm, not a wholesaler.

<sup>c</sup> In 2001, the NH Pollution Prevention Program purchased and distributed 8 bins to wholesalers interested in participating.

<sup>d</sup> At the time of the survey, 19 VT wholesalers were participating in the program; since then 11 more wholesalers have been added through direct outreach efforts by Vermont Department of Environmental Conservation officials.

<sup>e</sup> One wholesaler who was contacted did not wish to participate in the survey.

<sup>f</sup> The total assumes that all CT wholesalers that are participating know where to send the bins

Note: These results are as of August 6, 2001.

For example, Vermont DEC has taken a very active role. The Agency purchased 20 of the TRC bins. Mercury educational material was sent by mail to all of the heating, ventilation, and air conditioning (HVAC), plumbing and heating, and electrical wholesalers in the state. They phoned the wholesalers and took the bins and TRC literature to 20 wholesalers, who agreed to participate. They purchased 10 additional bins and placed these 10 bins at additional wholesalers in the second phase of their outreach

efforts. (These 10 bins are not included in the analysis in this report because these wholesalers were not listed as participating in the TRC Program as of the time of the survey.) In addition, Vermont DEC sent promotional posters and bill stuffers advertising the program to all participating wholesalers. The Vermont DEC involvement has improved the level of participation by wholesalers in that state.

Connecticut DEP sent a mailing to the electrical wholesalers in the state describing the program and urging them to participate. CT DEP also promoted the TRC program at an HVAC conference.

Maine DEP identified possible wholesalers through the telephone book yellow pages and contacted each one to determine if they were a wholesaler of mercury-switch thermostats. Maine DEP forwarded the names of the Maine wholesalers, who were selling mercury-switch thermostats, to the TRC and the wholesalers received a letter from TRC asking if they would like to participate. Maine DEP also purchased 10 bins and contacted stores to ask them to enter to program. Maine DEP has also been active in advertising the program to contractors and getting recognition for wholesalers who agree to participate through press releases and news articles.

In Massachusetts, 25 of the 30 wholesalers listed on the NEMA website as participating in the TRC program were provided a bin at no cost to the wholesaler through a Supplemental Environmental Project (SEP) by Wheelabrator Technologies, Inc., managed by their contractor, Scanlon Associates. The Massachusetts Department of Environmental Protection has encouraged participation in the TRC program through a mercury hotline, municipal mercury grants and implementation of plans by Municipal Waste Combustors to separate products containing mercury from their waste streams.

Although there were no participating wholesalers listed for New Hampshire when this report was written, the New Hampshire Department of Environmental Services, Pollution Prevention Program (PPP) has recently been involved in assisting the implementation of the TRC program in New Hampshire. In 2001, the PPP purchased and distributed 8 bins and is awaiting 10 additional bins for further distribution. The PPP delivered the bins to interested wholesalers, and provided a display poster and brochures explaining the TRC program.

### **Potential Wholesalers Available to Participate in the TRC Program**

To gain a perspective on the universe of HVAC, electrical and plumbing wholesalers in the Region that could participate in TRC Program, NEWMOA staff contacted the North American Heating, Refrigeration and Air Conditioning Wholesalers Association<sup>3</sup> (NHRAW) and obtained a list of their members in the northeast states. This is the list of companies that were initially identified by the TRC Program as potential participants. Table 4 presents the number of NHRAW members and the number of members that participate in the TRC Program in each state in the northeast region.

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<sup>3</sup> The online directory of members is currently under construction at <http://www.nhraw.org>.



**Table 4**  
**NHRAW Members and TRC Program Participants**

| State | # Currently <sup>a</sup> participating in TRC Program | # NHRAW Members | # of Wholesalers that Participate that are Listed as NHRAW Members | Percent of NHRAW Members Participating in TRC Program |
|-------|---|-----------------|--|---|
| CT    | 4   | 33              | 3  | 9   |
| ME    | 5   | 8               | 0  | 0   |
| MA    | 23  | 57              | 7  | 12  |
| NH    | 0   | 8               | 0  | 0   |
| NY    | 13  | 106             | 11   | 10  |
| RI    | 1   | 10              | 1  | 10  |
| VT    | 15  | 7               | 3  | 43  |

<sup>a</sup> as of August 7, 2001, participation verified by phone survey.

Table 4 shows that there is significant potential to increase participation of the NHRAW members in the TRC Program. The data from Massachusetts and Vermont indicate that there are also potential participants that are not NHRAW members. Massachusetts has 16 wholesalers participating that are not NHRAW members and Vermont has 12.

To attempt to determine the actual number of heating and cooling wholesalers in the northeast region, NEWMOA staff consulted the telephone book yellow pages<sup>4</sup> and searched in the following three categories:

- Air Conditioning & Heating Equipment & Supplies - Wholesale
- Plumbing & Heating Equipment & Supplies - Wholesale
- Electrical Supplies – Wholesale

NEWMOA staff deleted the duplicate listings among the yellow pages categories and duplicate listings with the NHRAW list. The results are presented in Table 5. The number of wholesalers currently participating in the TRC program from each state is shown for comparison. Due to time constraints, no effort was made to verify that the companies listed are currently in business, are indeed wholesalers or that they sell mercury-switch thermostats. However, Maine DEP staff contacted 26 wholesalers listed

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<sup>4</sup> [www.yellowpages.com](http://www.yellowpages.com)

in the telephone book under the categories of “Heating Equipment Wholesalers” and “Plumbing Wholesalers” and found that 21 of them were wholesalers that carried mercury-switch thermostats. Table 5 indicates that there are a significant number of potential participants in all of the northeast states that have not been recruited to participate in the TRC collection program.

**Table 5**  
**Number of Wholesalers in the Northeast States and Percent Participating in TRC Program**

| State | # Currently in TRC Program | Yellow Pages                      |   |   | # N.Amer. Heating, Refrigeration & A/C Wholesalers | Total # of Potential Wholesalers from Two Sources | % from Two Sources Participating in TRC Program |
|-------|----------------------------|-----------------------------------|---|---|--|---|---|
|       |                            | # Electrical Supplies Wholesalers | # AC & Heating Equipment & Supplies Wholesalers | # Plumbing & Heating Equipment & Supplies Wholesalers |  |   |   |
| CT    | 4                          | 31                                | 30  | 31  | 33   | 125   | <b>3%</b>                                       |
| ME    | 5                          | 11                                | 15  | 11  | 8  | 45  | <b>11%</b>                                      |
| MA    | 23                         | 85                                | 63  | 144   | 57   | 349   | <b>6%</b>                                       |
| NH    | 0                          | 23                                | 15  | 17  | 8  | 63  | <b>0%</b>                                       |
| NY    | 13                         | 131                               | 160   | 153   | 106  | 550   | <b>2%</b>                                       |
| RI    | 1                          | 12                                | 14  | 15  | 10   | 51  | <b>2%</b>                                       |
| VT    | 15                         | 18                                | 9   | 5   | 7  | 39  | <b>39%</b>                                      |

Notes: Sources of the data were the North American Heating, Refrigeration and Air-Conditioning Wholesalers and [www.yellowpages.com](http://www.yellowpages.com) in the following three categories: 1) Air Conditioning & Heating Equipment & Supplies – Wholesale, 2) Plumbing & Heating Equipment & Supplies – Wholesale, 3) Electrical Supplies – Wholesale. Duplicate listings were omitted. Due to time constraints, no effort was made to verify that the companies listed are currently in business, that they are in fact wholesalers, or that they sell mercury-switch thermostats.

## **Participation by National and Regional Chains**

By examining the names of the wholesalers that are both listed as NHRAW members and participating in the TRC Program, it becomes clear that commitment to this program by the large regional and national chains can add many locations for collecting mercury-switch thermostats. For example, the company, R.E. Michel, has committed to the program at a national level. As a result of this, in the northeast region, there are 19 individual R.E. Michel locations where thermostats are being collected.

However, many national and regional chains have not signed onto the program. For example, there are six national or regional electrical wholesale chains operating in Connecticut – R.E. Michel, Homan Associated, Bell-Simmons, Winair, Sid Harvey, and W.W. Grainger. Of these, only R.E. Michel has committed to participation in the TRC Program. CT DEP staff contacted several of the Connecticut wholesalers that have not signed up to participate in the TRC program and asked them why they were not involved. Their responses indicated that the decision to be involved in the program would have to be made at the national level and not at the distributor level. These national and regional chains offer a large untapped opportunity for many more wholesalers to participate in the TRC Program.

## **Potential Number of Thermostats to be Recycled in the Northeast**

In an effort to understand the potential for mercury-switch thermostat recycling in the northeast states, NEWMOA and CT DEP staff used two scenarios. The first scenario (Method 1) was to estimate the potential number of mercury-switch thermostats that each state in the northeast could reasonably expect to collect annually. The second scenario (Method 2) was to estimate the potential number of mercury-switch thermostats that could be expected to be discarded in the northeast annually. It should be noted that these numbers are not readily available, and the estimates presented contain many assumptions.

Method 1 (the number of mercury-switch thermostats that could reasonably be expected to be collected annually) is based on the documented success of two counties that collected a large number of thermostats through the TRC Program in 2000. Appendix B contains a detailed description of the methodology used to make this estimation. The two counties in Minnesota and Florida collected between 1.4 and 2.0 mercury-switch thermostats per 1000 people. This ratio was then compared to the populations in the northeast states. According to the 2000 U.S. Census<sup>5</sup>, Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont have a combined population of 32,898,974. Using 1.7 (the average of 1.4 and 2.0) mercury-switch thermostats per 1,000 population, the northeast region could potentially be collecting 55,927 mercury-switch thermostats per year (containing 598 pounds of mercury). The results are presented in Table 6.

The vast majority of the thermostats collected in these two counties came from a single wholesaler in each area. Phone interviews of the managers at these two facilities indicated that they were personally

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<sup>5</sup> <http://www.census.gov>

committed to the program and had marketed it in a variety of ways to their contractors, including distributing literature about the program in their invoices and offering a \$2 rebate on the purchase of an electronic thermostat for those who bring in a mercury-switch thermostat.

Method 2 (the potential number of mercury-switch thermostats that could be expected to be discarded in the northeast annually) is based on a May 1994 report by the U.S. Environmental Protection Agency, Risk Reduction Engineering Laboratory. Appendix B provides a detailed description of the methodology used to make this estimation. This report stated that “thermostat manufacturers estimate that 2 to 3 million thermostats are brought out of service each year” in the U.S and that “90 percent of the thermostats contained a mercury switch.” Based on these figures, NEWMOA estimates that there are approximately 1,800,000 thermostats discarded in the U.S. per year -- 90 percent of 2,000,000 thermostats [the lower bound of EPA’s estimate of the number mercury-switch thermostats brought out of service annually]. When this is pro-rated based on the year 2000 population of the U.S., the result indicates that there may be approximately 6.4 mercury thermostats per 1,000 people brought out of service per year.

To calculate the number of mercury-switch thermostats that are brought out of service each year in the Northeast, NEWMOA applied the U.S. ratio of 6.4 thermostats per 1,000 people to the population of the Northeast -- Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. The result indicates that an estimated 234,000 mercury-switch thermostats (containing 2,504 pounds of mercury) could be discarded in the region annually. These results are presented in Table 6.

Using either scenario, it is clear that there is much work to be done to improve the number currently collected. If one assumes that the TRC program results for the first six months of 2001 continues throughout the rest of the year, there could be approximately 2,720 thermostats collected in the Northeast in 2001. Comparing this projection to the results presented in Table 6, the TRC program is projected to collect between 1.3 and 4.9 percent of the possible number of mercury thermostats that could be collected through the TRC Program in 2001.

It should be noted that some northeast states collect mercury-switch thermostats through their household hazardous waste programs. For example, CT DEP collected 148 mercury-switch thermostats through their household hazardous waste collection program in 2000. If every northeast state had the same mercury thermostat collection rate as Connecticut, the northeast states could collect approximately 1,429 thermostats (containing 15.3 pounds of mercury), in addition to those collected through the TRC Program in 2001. This may be a high estimate since not all of the states in the region have active household hazardous waste programs that are collecting mercury thermostats.

**Table 6**  
**Estimates of the Number of Mercury-Switch Thermostats to be Collected and Discarded Annually in Each Northeast State**

| State         | Population<br>(from 2000<br>US Census) | Estimated # of<br>Mercury Thermostats<br>using Method 1<br><small>(based on estimated 1.7 mercury<br/>thermostats per 1000 people)</small> | Estimated # of<br>Mercury<br>Thermostats using<br>Method 2<br><small>(based on estimated 6.4<br/>mercury thermostats discarded<br/>per 1000 people)</small> |
|---------------|--|--|---|
| Connecticut   | 3,405,565                              | 5,788  | 21,796  |
| Maine         | 1,274,923                              | 2,165  | 8,160   |
| Massachusetts | 6,349,097                              | 10,793   | 40,634  |
| New Hampshire | 1,235,786                              | 2,099  | 7,909   |
| New York      | 18,976,457                             | 32,259   | 121,449   |
| Rhode Island  | 1,048,319                              | 1,781  | 6,709   |
| Vermont       | 608,827                                | 1,033  | 3,896   |
| Total         | 32,898,974                             | 55,928   | 210,553   |

Note: These are gross estimates determined using a series of assumptions. For additional information on how the estimates were determined, see Appendix B of this report.

## Recommendations

As a result of this analysis, the NEWMOA states recommend a number of measures that TRC could take to increase participation in the TRC Program in the northeast and, thereby, increase the number of mercury-switch thermostats collected and remove larger quantities of mercury from the states' solid waste streams.

- **Continuously Maintain and Update NEMA Website and Contact with Wholesalers.** There is a need for continuing communication and outreach to the participating wholesalers to maintain their involvement and understanding of how to participate in the program.
- **Commitment from TRC to Continue to Actively Solicit Support from the National Wholesaler Chains.** There is great potential to increase wholesaler participation by obtaining commitments from additional national chains.
- **Increase the Number of Participating Outlets.** There is great potential to increase wholesaler participation by obtaining commitments from the numerous independent wholesalers in the northeast region.

- **Improve Outreach to Contractors.** As has been proven in Hennipin and Pinellas counties, outreach to contractors about the program greatly increases the number of mercury-switch thermostats collected. Perhaps providing signage with the bins would assist in this effort.
- **Aggressively Advertise the Program.** There is a great opportunity to provide positive public relations and advertising for the wholesalers who have committed to the program.
- **Actively Encourage Homeowners to Participate.** Homeowners should be encouraged to drop off mercury-switch thermostats at participating wholesalers.
- **Actively Encourage Retailers to Participate.** Expanding the program to retail outlets may be an effective way to increase the number thermostats collected and recycled.
- **Place Containers at Household Hazardous Waste (HHW) Facilities.** A significant number of mercury-switch thermostats are collected at HHW events and transfer stations in the states that sponsor those programs. By placing TRC containers at HHW facilities and transfer stations and allowing HHW vendors to mail thermostats collected in one-day HHW events or at permanent sites back to TRC, the number of thermostats collected through this program would increase.
- **Actively Acknowledge the Important Role that the State Agencies Are Playing in Promoting TRC.** By showing that the program has involved both state and TRC efforts, the Corporation may be able to foster greater state support.

## Appendix A: Detailed Results of the Survey of Wholesalers in the NE Participating in the TRC Collection

| <u>CONNECTICUT</u>      |                  |          |         |                                       |   |
|-------------------------|------------------|----------|---------|---------------------------------------|---|
|                         |                  | Has Bins | Use Bin | Where to send                         | Comments  |
| R.E. MICHEL             | EAST HARTFORD    | Yes      | Yes     | Interviewer did not ask this question | Started collecting in March 01, only about 15 in first month.   |
| R.E. MICHEL             | EAST HARTFORD    | Yes      | Yes     |                                       | Only has one contractor & they have been dropping off thermostats, about 10 in first two months   |
| R.E. MICHEL             | HARTFORD         | Yes      | Yes     |                                       | Has not been very successful, collected 4 in the first month  |
| R.E. MICHEL             | STRATFORD        | No       | No      |                                       | They have not received any information.   |
| SHELTON WINNAIR         | SHELTON          | Yes      | Yes     |                                       | The person who answered the phone didn't know anything about the program but later spoke with the owner who said they had the container.  |
| <u>MAINE</u>            |                  |          |         |                                       |   |
| ROLANDS PLUMBING SUPPLY | KENNEBUNK, ME    | Yes      | Yes     | Yes                                   | Received from State, through plumbing association. Boss probably knows where to send the bin  |
| WEBBER SUPPLY INC.      | SO. PORTLAND, ME | Yes      | Yes     | Thinks so                             | Thinks had to order bin. (Person who does recycling is out of town.)  |
| REDLON AND JOHNSON      | AUGUSTA, ME      | Yes      | Yes     | Yes                                   |   |
| WEBBER SUPPLY INC.      | BANGOR, ME       | NA       | NA      | NA                                    | Busy signal. Still busy 6/20/2001 and 6/25/2001! Can't find other number.   |
| REDLON AND JOHNSON      | BATH, ME         | No       | No      | No                                    | Not participating anymore. Decision was made through Portland office. Bins had been dropped off and were put out, but then they were told to not collect any thermomstats and are waiting for the bins to be picked up. |
| CHAS.FOSTER CO.         | ELLSWORTH, ME.   | Yes      | Yes     | Yes                                   | Not very successful in collecting, but trying. They don't send in. Rather, someone stops in every so often to take what they've collected.  |
| FW WEBB CO.             | CARIBOU, ME.     | Yes      | Yes     | Yes                                   | Have collected a couple. Once full, will send in.   |
| <u>MASSACHUSETTS</u>    |                  |          |         |                                       |   |
| AIR PURCHASES INC.      | BEVERLY, MA      | Yes      | Yes     | Yes                                   |   |
| AVON SUPPLY CO. INC     | WAKEFIELD, MA    | No       | No      | No                                    | No idea   |
| BELL/ SIMONS CO         | METHVEN, MA      | No       | No      | No                                    |   |



|   |                   |  |     |     |  |
|---|-------------------|--|-----|-----|--|
| COUNTY SUPPLY   | LOWELL, MA        | No   | No  | No  | No idea  |
| DUGAN SUPPLY  | NEWBURY PORT, MA  | Yes  | Yes | Yes |  |
| F.W. WEBB CO  | HAVERHILL, MA     | Yes  | Yes | Yes |  |
| F.W. WEBB CO  | LOWELL, MA        | No   | No  | No  | No longer participating.   |
| F.W. WEBB CO  | BURLINGTON, MA    | Yes  | Yes | No  | Wants to know what to do with the bin - I emailed him  |
| F.W. WEBB CO  | SALEM, MA         | Yes  | Yes | Yes | Yes, half full   |
| F.W. WEBB CO  | GLOUCESTER, MA    | Yes  | Yes | No  | Yes - no one's been by to pick it up for a year, don't know anything about mailing it  |
| FERGUSON ENTERPRISES                                  | LYNN, MA          | No   | No  | No  |  |
| G.S.G. SUPPLY CO. INC                                 | HAVERHILL, MA     | Yes  | Yes | Yes |  |
| GRAINGER INDUSTRIAL SUP                               | LAWRENCE, MA      | Yes  | Yes | Yes |  |
| GRAINGER INDUSTRIAL SUP                               | WOBURN, MA        | Yes  | Yes | Yes |  |
| INTESTATE ELECTRIC EQUIPMENT                          | BRIGHTON, MA      | Yes  | Yes | Yes |  |
| NORTH SHORE HEATING                                   | LYNN, MA          | Yes  | Yes | Yes | Have collected only 2 thermostats in the past year that they've had the green box. Literature came with box, but hasn't looked at it/paid any attention to it. |
| PEABODY SUPPLY CO                                     | NORTH ANDOVER, MA | Yes  | Yes | Yes | Yes - plumbers use them, we promote it   |
| PEABODY SUPPLY CO                                     | PEABODY, MA       | No   | No  | No  | No - would like information about it   |
| R.E. MICHEL COMPANY, INC                              | MEDFORD, MA       | Yes  | No  | No  | Yes - no one uses it   |
| R.E. MICHEL COMPANY, INC                              | WORCESTER, MA     | Yes  | No  | No  | Yes - no one uses it   |
| RIVERVALLEY SUPPLY CO - now called The Portland Group | HAVERHILL, MA     | Yes  | Yes | Yes |  |
| S.G. TORRICE CO                                       | WOBURN, MA        | Yes  | Yes | Yes |  |
| S.G. TORRICE CO                                       | BEVERLY, MA       | Yes  | Yes | Yes | Yes - guy picks it up, haven't seen him in a year, 15 or so in it now  |
| SALEM PLUMBING  | BEVERLY, MA       | Yes  | No  | Yes | Yes - no one uses it   |
| SCANLON ASSOCIATES                                    | ANDOVER, MA       | This is the contractor who implemented the SEP for Wheelabrator Technologies, Inc. |     |     | Pat Scanlon  |
| THE BOURNEUF CORP                                     | LYNN, MA          | Yes  | Yes | Yes |  |
| THE PORTLAND GROUP                                    | N. BILLERICA, MA  | No   | No  | No  | No - gentleman removed the bin   |
| UNITED REFRIG   | WOBURN, MA        | Yes  | Yes | Yes |  |
| WEBB AIR  | WOBURN, MA        | Yes  | Yes | Yes |  |
| NORTH SHORE HEATING                                   | LYNN, MA          | Yes  | Yes | No  | Have collected only 2 thermostats in the past year that they've had the green box. Literature came with box, but hasn't looked at it/paid any attention to it. |
| THE BOURNEUF CORP                                     | LYNN, MA          | Yes  | Yes | Yes | In the program, but no one has brought any thermostats in.   |

|                            |                        |                                |     |     |  |
|----------------------------|------------------------|--------------------------------|-----|-----|--|
|                            |                        |                                |     |     |  |
| <b><u>NEW YORK</u></b>     |                        |                                |     |     |  |
| MARTIN WALSHIN INC.        | HASTINGS-ON-HUDSON, NY | Yes                            | Yes | Yes | Successful in his opinion- have sent bins back to TRC on several occasions.  |
| H&L HEATING SUPPLY CO      | BROOKLYN, NY           | NA                             | NA  | NA  | No phone number provided.  |
| KEYSPAN ENERGY SOLUTIONS   | BROOKLYN, NY           | Yes                            | Yes | Yes | Very successful. Getting a lot of thermostats back.  |
| R.E. MICHEL COMPANY, INC   | ALBANY, NY             | 2 bins                         | Yes | Yes | Not very successful- only 1 or 2 thermostats so far. Send bins back to main office, but doesn't know what main office does with them.                  |
| R.E. MICHEL COMPANY, INC   | SCOTIA, NY             | Yes                            | Yes | Yes | Very effective/successful. Sends about a box a month back to TRC. Customers like it.   |
| R.E. MICHEL COMPANY, INC   | NEW WINDSOR, NY        | Interviewer did not follow up. |     |     | Doesn't have time. Fax questions over. 845-568-0760  |
| R.E. MICHEL COMPANY, INC   | PLATTSBURGH, NY        | Yes                            | Yes | Yes | Not successful. Doesn't think enough info out there to consumers/contractors to bring in. Easier to throw in trash.                                    |
| R.E. MICHEL COMPANY, INC   | SYRACUSE, NY           | Yes                            | Yes | Yes | He would say that it has been successful. Sends to corporate offices in Baltimore and they take care of it from there.                                 |
| R.E. MICHEL COMPANY, INC   | UTICA, NY              | Yes                            | Yes | Yes | Nobody has brought any in yet.   |
| R.E. MICHEL COMPANY, INC   | WATERTOWN, NY          | Yes                            | Yes | Yes | So-so on successfulness.   |
| R.E. MICHEL COMPANY, INC   | MASSENA, NY            | Yes                            | Yes | Yes | They get a few when contractors bring them in.   |
| R.E. MICHEL COMPANY, INC   | BINGHAMTON, NY         | 2 bins                         | Yes | Yes | Pretty successful. Already sent one bin back in and received a replacement bin.  |
| ABR WHOLESALERS, INC       | ROCHESTER, NY          | Yes                            | Yes | Yes | Started slow, but has been increasing in popularity. Have bin on counter, customers ask about it, and have been bringing in thermostats more and more. |
| R.E. MICHEL COMPANY, INC   | ROCHESTER, NY          | NA                             | NA  | NA  | Call cannot be completed as dialed.  |
| R.E. MICHEL COMPANY, INC   | JAMESTOWN, NY          | 2 bins                         | Yes | Yes | One bin is half full.  |
| R.E. MICHEL COMPANY, INC   | BETHEL PARK, NY        | Yes                            | Yes | Yes | Hasn't collected too many to date.   |
| <b><u>RHODE ISLAND</u></b> |                        |                                |     |     |  |
| R.E. MICHEL COMPANY, INC   | PROVIDENCE, RI         | Yes                            | Yes | Yes |  |
| <b><u>VERMONT</u></b>      |                        |                                |     |     |  |
| BLODGETT SUPPLY            | WHITE RIVER JCT. VT    | Yes                            | Yes | Yes | Just started participating this spring. Hasn't sent in a bin yet. Sends to Williston, who handles all the paperwork.                                   |

|                          |                 |     |     |     |  |
|--------------------------|-----------------|-----|-----|-----|--|
| F. W. WEBB CO            | BRATTLEBORO VT  | Yes | Yes | Yes | Not too many collected yet, but people are aware and are bringin them in. Someone comes to collect bin when full (didn't know who comes- would have to look it up).  |
| GRANITE GROUP WHOLESALE  | BURLINGTON, VT  | Yes | Yes | Yes | Have collected a few.  |
| HULBERT SUPPLY CO        | BURLINGTON, VT  | Yes | Yes | Yes |  |
| SONDIK SUPPLY CO         | BURLINGTON, VT  | Yes | Yes | Yes | Quite a few thermostats are in the bin.  |
| BURGESS ELECTRICAL       | BURLINGTON, VT  | Yes | Yes | Yes | Successful 60% of the time (thinks people still need to be educated). The State has been great and has made things easy for them as far as what they need to do with bins, etc.  |
| CHAMPLAIN WINAIR         | COLSCHESTER, VT | No  | No  | No  | About who? Doesn't know anything about it.   |
| R.E. MICHEL COMPANY, INC | WILLISTON, VT   | Yes | Yes | Yes |  |
| F. B. WEBB               | WILLISTON, VT   | Yes | Yes | Yes | Participates through the State. Fairly successful- still in process of educating customers that they can bring them back. They let State know when bin full and State comes by to collect.   |
| SID HARVEY INDUSTRIES    | WILLISTON, VT   | Yes | Yes | Yes | None have come back yet. Thinks because they deal with contractors, not end users, so up to contractors, who probably leave old them w/ end users. When full, will call number on bin and someone comes by to collect and replace bin. |
| BLODGETT SUPPLY          | WILLISTON, VT   | Yes | Yes | Yes | As of last count (a week ago), had 33. Have bins in all 9 stores. Service techs think a great idea and should have been done a long time ago.  |
| BLODGETT SUPPLY          | MONTPELIER VT   | NA  | NA  | NA  | This is the wrong number (private residence)!  |
| CAPITOL P & H SUPPLY     | BARRE VT        | Yes | Yes | Yes | All branches have bins. Contractors have been bringing some in.  |
| HULBERT SUPPLY CO        | BARRE VT        | Yes | Yes | Yes | Haven't gotten a single one yet.   |
| DT SUPPLY                | RUTLAND VT      | No  | No  | No  | Used to have bins, but not anymore.  |
| BLODGETT SUPPLY          | RUTLAND VT      | No  | No  | No  | Do not have any bins. (Seemed perplexed.)  |

|                        |                  |     |     |     |  |
|------------------------|------------------|-----|-----|-----|--|
| HULBERT SUPPLY CO      | BRANDON, VT      | Yes | Yes | Yes | Just started a few weeks ago, so none have come in yet, but everyone (customers) knows about it. When full, calls a number and someone comes by to pick up (doesn't remember who comes). |
| APPLACHIAN SUPPLY INC. | ST JOHNSBURY VT  | Yes | Yes | Yes | Have collected 2 thermostats so far.   |
| BLODGETT SUPPLY        | NEWPORT CITY, VT | Yes | Yes | Yes | Have about 40 or 50 thermostats. When bin is full, ship back to main office in Williston. Doesn't know what main office does with them.  |

## Appendix B

### Method 1 - Used to Estimate a Potentially Achievable Goal for Annual Mercury Thermostat Collection in the Northeast

In order to estimate the possible number of mercury-switch thermostats that could reasonably be expected to be collected, NEWMOA and CT DEP staff compared the northeast states to other areas in the country that have collected large numbers of thermostats through the TRC Program. According to TRC thermostat collection data organized by zip code, the two areas that collected the largest number of thermostats through the TRC Program in 2000 were Hennepin County, Minnesota and Pinellas County, Florida. The vast majority of the thermostats collected in these two zip codes came from a single wholesaler in each area. Through phone interviews with the managers at these two facilities, the names of surrounding counties that they service were obtained. The population data for all of these counties was then collected from the 2000 Census. In addition, using TRC information the total number of mercury-switch thermostats collected in all of these counties was determined using the zip code information. Table 7 shows the number of thermostats collected in these two areas and the estimated population these wholesalers serve.

These numbers correspond to 1.4-2.0 mercury-switch thermostats collected per 1,000 population. Clearly, this ratio does not represent the total potential number of mercury-switch thermostats discarded in these counties in 2000 because not every mercury-switch thermostat that was discarded was collected; but this ratio represents a potentially achievable annual collection goal.

**Table 7**  
**Number of Thermostats Collected in Counties with the Highest Number Collected Through the TRC Program, 2000**

| <b>Location</b>  | <b>Population</b> | <b># of Thermostats Collected</b> | <b>Pounds of Mercury</b> | <b># of Thermostats per 1000 population</b> |
|--|-------------------|-----------------------------------|--------------------------|---|
| Hennepin County, Minnesota and surrounding counties <sup>a</sup> | 2,800,000         | 5,700                             | 52                       | 2.0   |
| Pinellas County, Florida and surrounding counties <sup>b</sup>   | 3,500,000         | 4,800                             | 44                       | 1.4   |

Source: <http://www.nema.org/government/environment/>; <sup>a</sup> surrounding counties are Scott, Washington, Ramsey, Carver, Wright, and Sherburne.

<sup>b</sup> surrounding counties are Citrus, Sarasota, Pasco, Hernando, Manatee, Hardee, Desoto, Sumter, Hillsborough and Polk.

This ratio was then compared to the populations in the northeast states. According to the 2000 U.S. Census<sup>6</sup>, Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont have a combined population of 32,898,974. Using 1.7 (the average of 1.4 and 2.0) mercury-switch thermostats per 1,000 population, the northeast region could potentially be collecting 55,928 mercury-switch thermostats per year (containing 598 pounds of mercury). Based on individual state populations from 2000, this corresponds to 5,788 mercury-switch thermostats to be collected in Connecticut (pop. 3,405,565), 2,165 mercury-switch thermostats to be collected in Maine (pop. 1,274,923), 10,793 mercury-switch thermostats to be collected in Massachusetts (pop. 6,349,097), 2,099 mercury-switch thermostats to be collected in New Hampshire (pop. 1,235,786), 32,259 mercury-switch thermostats to be collected in New York (pop. 18,976,457), 1,781 mercury-switch thermostats to be collected in Rhode Island (pop. 1,048,319), and 1,033 mercury-switch thermostats to be collected in Vermont (pop. 608,827).

## **Method 2 - Used to Estimate the Number of Mercury Thermostats Discarded Annually in the Northeast**

In order to estimate the possible number of mercury-switch thermostats brought out of service each year in the northeast, NEWMOA and CT DEP staff used data from a May 1994 study by the U.S. Environmental Protection Agency, Risk Reduction Engineering Laboratory, which reported that “thermostat manufacturers estimate that 2 to 3 million thermostats are brought out of service each year” in the U.S and that “90 percent of the thermostats contained a mercury switch.”<sup>7</sup> Using 90 percent of 2,000,000 (the lower estimate of thermostats brought out of service annually), NEWMOA estimates that there are approximately 6.4 thermostats brought out of service per 1000 people annually. (According to the 2000 Census, the U.S. population is 281,421,906.)

To calculate the number of mercury-switch thermostats that are brought out of service each year in the Northeast, NEWMOA applied the U.S. ratio of 6.4 thermostats per 1,000 people to the population of the Northeast -- Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. The result shows that an estimated 210,553 mercury-switch thermostats combined (containing 2,253 pounds of mercury) may be discarded in the region annually. The individual state breakdown is as follows: 21,796 mercury-switch thermostats discarded annually in Connecticut (pop. 3,405,565), 8,160 mercury-switch thermostats discarded annually in Maine (pop. 1,274,923), 40,634 mercury-switch thermostats discarded annually in Massachusetts (pop. 6,349,097), 7,909 mercury-switch thermostats discarded annually in New Hampshire (pop. 1,235,786), 121,449 mercury-switch thermostats discarded annually in New York (pop. 18,976,457), 6,709 mercury-switch thermostats discarded annually in Rhode Island (pop. 1,048,319), and 3,896 mercury-switch thermostats discarded annually in Vermont (pop. 608,827).

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<sup>6</sup> <http://www.census.gov>

<sup>7</sup> US EPA, “Mercury Usage and Alternatives in the Electrical and Electronics Industries,” May 1994, EPA/600/SR-94/047.

The estimate of 6.4 thermostats per 1000 people annually is somewhat conservative because it is based on the lower EPA estimate of the number of total thermostats discarded annually, and it was distributed over the larger U.S. population in 2000 instead of the smaller U.S. population in 1994. However, the estimate may also be somewhat inflated because the use of mercury-switch thermostats may be on the decline due to the popularity of electronic replacements. Therefore, in 2001, it is possible that a lower percentage of those brought out of service annually are mercury-switch thermostats.