

Northeast Waste Management Officials' Association
Mercury Education & Reduction Projects
March 22, 2010 – June 30, 2010

Final Report

This Report summarizes the mercury-added products research and development tasks performed by the Northeast Waste Management Officials' Association (NEWMOA) for the Massachusetts Department of Environmental Protection (MassDEP) under the FY 2010 Mercury Initiative, contract number: # 30111088NEWMOA000001, from March through June 2010.

The primary tasks for FY 2010 included:

1. Research on mercury pollution prevention awareness, practices, and outreach under ARRA and state revolving fund primary and secondary wastewater treatment plant upgrades.
2. Research on improved metrics to evaluate end-of-life thermostat collection and recycling program effectiveness.

For Task 1, NEWMOA partnered with the New England Interstate Water Pollution Control Commission (NEIWPCC). This Final Report presents the results of the organizations' combined efforts for this project under Task 1. Subtasks included: preparing a report summarizing mercury devices likely to be found at water treatment facilities; conducting outreach and assistance to facilities through phone calls, an online survey, and site visits; and drafting an article for possible publication in an industry-related magazine.

Task 2 was completed by the Product Stewardship Institute (PSI) under a sub-contract with NEWMOA. The results are reported in a separate document.

Mercury Devices at WWT Facilities Report

As part of this project, under Subtask 1A, NEWMOA researched information about all of the mercury-added products that could potentially be found at wastewater and drinking water treatment facilities. The resulting report, entitled, *Mercury-Added Products Found at Drinking Water & Wastewater Treatment Facilities*, identifies mercury-containing devices and equipment likely to be found at these facilities, including information and photographs on products in use, the amount of mercury they contain, their potential for breakage and spills, and appropriate non-mercury alternatives.

Outreach Conducted to Facilities

John Felix, Director of Operations, Bureau of Resource Protection at MassDEP, provided NEWMOA and NEIWPCC with a list of drinking water treatment and wastewater treatment facilities that had received American Recovery and Reinvestment Act (ARRA) or state revolving funds (SRFs) for facility upgrades in the past three years (i.e., 2007, 2008, and 2009). The list

was generated to specifically target facility projects that would most likely involve the replacement or disposal of mercury-containing equipment in their upgrades and included sites from every region of Massachusetts. The list included 39 facilities – 21 drinking water treatment plants and 18 wastewater treatment plants.

NEWMOA and NEIWPCCC contacted all of the facilities included on this list to identify a subset of drinking water and wastewater treatment facilities to participate in this mercury-added product education and outreach project. The organizations' outreach strategy focused on individual contacts, via phone calls and emails with drinking water and wastewater treatment facilities, followed by distribution of an online survey (available at: www.surveymonkey.com/s/GGT7937) and site visits.

NEWMOA and NEIWPCCC provided education and assistance during onsite visits at six participating facilities. The organizations' assisted staff with completing an inventory of mercury and mercury-containing equipment throughout the facility. NEWMOA also distributed information about proper disposal/recycling of mercury items, including a list of mercury recyclers in Massachusetts, as well as information about non-mercury alternatives as possible replacement equipment.

NEWMOA and NEIWPCCC conducted additional follow-up with facilities directly after the site visits, making additional information and resources available to these facilities upon request. Some examples of additional information sent to facilities following a site visit include a fact sheet about Massachusetts' mercury disposal prohibition in the Mercury Management Act, and MassDEP's recommended clean-up procedures for elemental mercury spills and broken fluorescent lamps.

Appendix C lists all of the outreach materials distributed by NEWMOA and NEIWPCCC, including fact sheets and other information developed by MassDEP.

Participating Facilities

The drinking water and wastewater treatment facilities listed below (in alphabetical order) participated in the mercury education and outreach project in 2010 by completing at least some portion of the online survey. The six facilities with an asterisk* also participated in onsite visits:

1. Billerica Wastewater Treatment Facility, Billerica*
2. East Fitchburg Wastewater Treatment Facility, Fitchburg/Leominster*
3. Greater Lawrence Sanitary Sewer District, North Andover*
4. Lee Drinking Water Facility, Lee
5. Lowell Drinking Water Utility, Lowell
6. Lowell Regional Wastewater Utility, Lowell*
7. Millbury Wastewater Treatment Facility, Millbury
8. Webster Wastewater Treatment Facility, Webster*
9. Westford Drinking Water Facility, Westford*
10. Woburn Drinking Water Facility, Woburn

The photographs below were taken outside during site visits at the Billerica, Fitchburg, and Webster wastewater treatment facilities, respectively.



Appendix A provides a detailed list of the facilities contacted by NEWMOA and/or NEIWPC, including the facility ID number and contact information, and notes whether the facility participated in the online survey and/or site visit.

Results

NEWMOA and NEIWPC found that the following types of mercury-containing items (in alphabetical order) were in use at the drinking water and wastewater treatment facilities in Massachusetts that participated in this project:

- Float switches – used in pumping stations and sump pumps
- Fluorescent lamps – all types
- Gas flow regulators with mercury pressure switches
- High pressure sodium (HPS) lamps
- Metal halide lamps
- Mercury compounds: mercuric chloride, mercuric nitrate, and mercuric sulfate
- Pressure gauges with mercury pressure switches
- Pressuretrols
- Thermometers
- Thermostats
- Ultraviolet germicidal lamps
- Vacuum gauges with mercury manometers – used to measure air flow

Float switches are commonly used at wastewater treatment facilities. They are used in pump stations, process waste stations, sump pumps, and bilge pumps to activate the pumping system when the water level is either too high or too low. The mercury is encased in the float switch and rises or falls in response to changes in the level of a liquid. Non-mercury alternatives include: mechanical, magnetic dry reed, optical, conductive, metallic ball, sonic/ultrasonic, pressure transmitter, alloy, thermal, and capacitance level float switches. The Greater Lawrence Sanitary Sewer District currently uses mechanical float switches for all of their sump pumps.

Mercury-added lighting, including fluorescent, high pressure sodium, metal halide, and ultraviolet lamps, are often used in commercial and industrial settings because of their energy-efficiency and cost-effectiveness, and are therefore commonly found at drinking water and wastewater treatment facilities. However, because of the mercury that they contain, facilities in

Massachusetts must properly manage and recycle the bulbs as Universal Waste. Several of the facilities visited reported that they recycle their spent lamps through town collection programs. One facility reported that their supplier removes the spent lamps at the same time they replace the bulbs. Light-emitting diodes (LEDs) are a non-mercury lighting alternative that is also energy efficient and may be suitable for commercial applications; however, LEDs cannot yet compete with fluorescent lamps because of their cost.



The photograph to the left is of ultraviolet (UV) germicidal lamps which are used for water disinfection/sanitation at one Massachusetts drinking water treatment facility. There are three UV disinfection systems, each with approximately 40 lamps. Each UV lamp contains less than 5 milligrams to more than 1,000 milligrams (1 gram) of mercury.

Mercury-added pressure switches and Pressuretrols™ are a common mercury-added device found at water treatment facilities, although an increasing number of digital pressure gauges are also used. These devices convert a change in pressure into an electrical function. For example, Pressuretrols™ are used to maintain the steam pressure in boilers – the mercury in the switch is activated by changes in pressure and will shut-off the burner when enough pressure is built up in the system. Digital and aneroid pressure gauges were seen in use at a couple of the facilities. One facility reported that they spent over \$1,000 on a digital pressure gauge. Because the non-mercury replacement was so expensive, they could not afford to replace them all at the same time, but have plans to eventually replace the other pressure switches with digital devices.



The photograph to the left shows a Pressuretrol™ (left) and a pressure gauge that contains a mercury switch (right) used at a Massachusetts wastewater treatment facility. The facility also uses non-mercury pressure gauges as shown in the two photographs described below.

The needle/bourbon pressure gauge (aka aneroid or dial) in the left-hand photo and the digital pressure gauge in the right-hand photo do not contain mercury. Both the Westford and Fitchburg water treatment facilities are using these devices in place of their mercury pressure gauges and switches.



NEWMOA and NEIWPC found various types of mercury-containing chemicals at the drinking water and wastewater treatment facilities. All of the facilities conduct at least some of their water testing in onsite laboratories. Bottles of mercuric chloride, mercuric nitrate, and/or mercuric sulfate were no longer being used, but were found in storage cabinets at two of the facilities. The Billerica Wastewater Treatment Facility recently conducted a clean-out of all unused and expired chemicals, solvents, and latex- and oil-based paints and disposed of them as hazardous waste. Other facilities reported that they would like to dispose of their unused mercury compounds, but have not yet been able to because of budgetary restrictions.

Other mercury devices, such as thermometers and thermostats were found at several of the wastewater and drinking water treatment facilities in their laboratories and throughout their buildings, respectively. However, many had already been upgraded to non-mercury versions, such as alcohol-based thermometers and digital thermostats.

The largest amount of mercury was found in vacuum gauges used in conjunction with blowers to measure the pressure of air flow into wastewater tanks. Depending on the size, style, and use, pressure/vacuum gauges may contain 50 to 500 grams of mercury. The particular vacuum gauges that NEWMOA and NEIWPC found were approximately three and a half feet tall and contained a significant amount of elemental mercury in a manometer-style column on the front of the device.



One Massachusetts wastewater treatment facility had two of these devices in use (shown in the photograph to the left), as well as two that were out-of-service, awaiting proper disposal by the construction company implementing upgrades at the site. The facility is replacing these devices with non-mercury alternatives as part of their upgrades. Non-mercury alternatives include: needle/bourbon gauges that operate under a vacuum with a needle indicator as opposed to a liquid mercury column, as well as digital/electronic gauges.

Several mercury-added products included in the questionnaire were not found at any of the participating facilities. The plants no longer use many of these products, including: older appliances (e.g., chest freezers, furnaces, gas ovens, and silent light switches); batteries; certain chemicals; DC watt hour meters; gyroscopes; mercury rings, seals, and balances; older paints (e.g., latex and marine); permeters; rectifiers; and trickling filters. For example, the last wastewater treatment plant in Massachusetts to have a trickling filter with mercury-containing arm bearings was located in Millbury, but the entire site was demolished many years ago and is now a pump station. In addition, some of the items listed on the checklist were unknown to facility operators and staff, indicating that these products were probably used a very long time ago and are obsolete. There is a possibility that some of these products may still be used in very old facilities that have never undergone upgrades, but NEWMOA and NEIWPC were not able to locate any such facility.

Appendix B presents the results of the online survey administered to all of the drinking water and wastewater facilities identified in this project. It includes supplemental information about mercury-added products identified at the facilities that participated in the onsite visits.

Lessons Learned

NEWMOA and NEIWPCCC learned some important lessons about mercury-added products at drinking water and wastewater treatment facilities, including:

Engineering Firms No Longer Design Upgrades with Mercury Devices

Based on conversations with two engineering firms that perform this type of work, NEWMOA and NEIWPCCC learned that, for the most part, all of the water treatment plant upgrades in Massachusetts are designed with non-mercury devices. Alternative devices are being used for mercury seals, switches, and/or thermostats. Engineering firms working on facility design upgrades in Massachusetts stated that they would not approve new mercury devices under most scenarios. Instead, they plan for the treatment plants to phase-out mercury devices over time. The mercury devices still used at the facilities generally have small amounts of mercury encased in the device and remain in use due to their reliability and effectiveness.

Construction Companies in Charge of the Implementation Dispose of Hazardous Wastes

Conversations with two engineering firms also indicated that the companies that are doing the construction during the facility upgrades have very strict and specific language in their contracts about proper hazardous waste disposal in accordance with the local, state, and federal regulations. In addition to mercury, there are many other hazardous materials present during the construction and upgrade of facilities, including asbestos, flammable/explosive/radioactive materials, lead, and polychlorinated biphenyls (PCB). The contracted construction company is responsible for all hazardous materials that require removal, storage, treatment, transfer, special handling, or shipment of which is restricted, prohibited, regulated, or penalized by federal, state, county, or municipal statutes.

Several Facilities Already Use Non-Mercury Devices

There are non-mercury devices currently in use at many of the wastewater and drinking water treatment facilities in Massachusetts. Examples of non-mercury alternatives noted during onsite visits include: aneroid barometers, mechanical float switches and pumps, ultrasonic flow meters, aneroid and digital pressure gauges, alcohol-based and digital thermometers, and digital thermostats.

The Webster Wastewater Treatment Facility recently purchased two mechanical float switches that do not contain mercury through USA BlueBook, an equipment supplier for the water and wastewater treatment industry. The facility was already aware that mercury float switches could not be sold in Massachusetts, a fact that was confirmed by the supplier during their purchase. The facility currently has some mercury float switches in use, but is replacing them with mechanical switches as necessary.

In addition, during the past few years, the Greater Lawrence Sanitary Sewer District upgraded their mercury flow meters, which can contain between 60 and 80 pounds of mercury, to

ultrasonic flow meters. The two photographs below show the ultrasonic flow meters attached to the pipes to measure water flow (on the left) with the results displayed digitally (on the right).



Accurately Identifying Mercury-Added Lighting at Facilities

All of the facilities that NEWMOA and NEIWPCPC visited were aware that fluorescent and ultraviolet (UV) lamps contain mercury. However, most were not aware that the other lamps onsite, such as the high pressure sodium (HPS) and metal halide also contain mercury, and therefore, need to be properly managed and recycled at their end-of-life. A couple of the facilities reported that they recently conducted energy audits under a MassDEP SRF program and were advised to switch their fluorescent lamps to more energy-efficient HPS lamps and/or light-emitting diode (LED) technologies (e.g., Exit signs). Following the advice they received during the energy audit, one facility replaced all of their traditional fluorescent lamps with the low-mercury, green-tipped bulbs, thinking that these bulbs could be disposed of in the landfill when they burnt out. However, this is not the case in Massachusetts, as all lamps that contain mercury, even those that are “low-mercury,” need to be recycled at their end-of-life. Improved information regarding this issue appears warranted.

Facilities Lack Knowledge on Proper Handling and Disposal of Mercury Devices

In many cases, there were no specific protocols for properly handling or disposing of mercury devices and no clearly identified spill clean-up and prevention procedures at the facilities. NEWMOA and NEIWPCPC provided information to the facilities on the disposal and handling procedures for devices containing mercury. For the plants that still have these devices, they will eventually be phased-out once they no longer work and need to be replaced. The mercury devices that are still being used do not pose a direct risk, but it is important that the operators are aware of which devices could potentially contain mercury to ensure proper disposal.

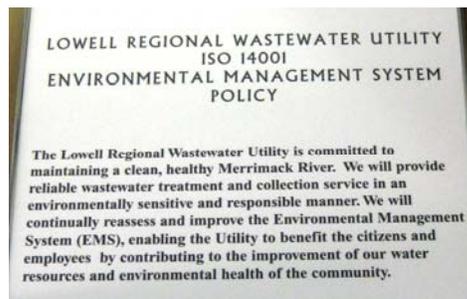
Operator Awareness is Key for Proper Mercury Handling and Disposal

There are alternatives to mercury devices and many are already being used at the plants. For the plants that are unaware of the alternatives, it is important that they learn about them. In some instances, the plants were unaware of new regulations and technologies or non-mercury device alternatives. Improved dissemination of this information would help to raise awareness of these issues.

Successful Mercury Cleanouts are Possible

The last facility that NEWMOA and NEIWPCPC visited during this project was the Lowell Regional Wastewater Treatment Utility. This facility provides a good example of a successful mercury cleanout. With the exception of fluorescent lighting, all of the mercury-containing devices have been removed from the facility – the last of which was removed in the past six months under the latest series of upgrades. In addition, the Lowell facility is ISO 14001 certified

and has an environmental management system (EMS) in place (see photographs below).



In accordance with the ISO certification standards, the Lowell facility recycles as many different types of materials as possible and keeps track of all of the information. In 2008, the facility recycled 4,400 linear feet of fluorescent bulbs. The facility also runs a mercury thermometer exchange program. Citizens can bring in their old mercury fever thermometers and the facility will give them a digital thermometer in return.

Utility Contractors Magazine Article

As part of this project, under Subtask 1D, NEWMOA and NEIWPC drafted an article for potential publication in the Utility Contractors Association of New England's (UCANE) monthly magazine, *Construction Outlook*. The focus of the article, tentatively titled, *Managing Mercury Switches Found at Water Treatment Plants in Massachusetts & Other States*, is mercury-added switches, based on conversations with the Executive Director and Editor of the magazine regarding topics of interest to their readers. It includes background information about the health effects of mercury, the types of mercury-added switches that are likely to be found at these facilities, their potential for breakage, and proper disposal/recycling of these devices. NEWMOA will submit this article to the magazine for potential publication following review and approval by MassDEP.

Future Work

NEWMOA recognizes that mercury continues to be a priority and recommends the following projects as options for continuing mercury education and reduction work in Massachusetts:

Continue Outreach Efforts at Water Treatment Facilities

Drinking water and wastewater treatment facilities may contain significant quantities of mercury-added products and equipment. However, many of the facilities visited by NEWMOA and NEIWPC that were in the process of, or had already undergone, upgrades were successfully managing many of their mercury-containing devices.

Therefore, NEWMOA and NEIWPC suggest that outreach and assistance to older water treatment facilities that have not had upgrades would be most beneficial because those are the facilities that would most likely have mercury equipment onsite (either still in use or stored at the facility). They are also the facilities that are not currently working with outside contractors so would presumably have the least amount of knowledge and awareness about properly

disposing/recycling mercury, and about the availability of non-mercury replacement products. Although these facilities may be less able to fund the purchase of non-mercury replacements themselves, they may be able to use the information gained through the outreach and assistance to apply for funding facility upgrades of non-mercury equipment in the future or when products are in need of replacement.

Partner with MassDEP or Utility Representatives Conducting Energy Audits

Almost all of the water treatment facilities visited during this project had recently undergone energy audits. Most of the audits were completed under an SRF administered by MassDEP and were conducted by state or local government agencies, local utilities, and/or private consultants. The facilities are eager to adopt practices recommended during these energy audits. NEWMOA and NEIWPC see further opportunities to combine energy efficiency assistance with outreach and education about reducing mercury onsite.

Mercury-added lighting, such as fluorescent lamps, high-intensity discharge (HID) lamps, high pressure sodium, metal halide, and others, is recommended for use at water treatment facilities because of their energy efficiency. However, most facilities were not aware that these lamps contain mercury and need to be recycled at their end-of-life (depending on the bulb, the amount of mercury ranges from less than one milligram to over one gram). In addition, all of the facilities had at least one mercury thermostat. Mercury thermostats contain approximately four grams of mercury. Replacing them with energy-efficient, programmable electronic/digital models and ensuring that the mercury thermostats are properly recycled, reduces the potential for a mercury release and saves energy (and money).

Incorporate Research into Mercury-Added Legacy Products Website

During NEWMOA's research on mercury-added products found at treatment facilities, it became apparent that many of the products are no longer being manufactured with mercury and are typically not in current use at many facilities. Examples include DC watt-hour meters, rectifiers, and mercury seals on trickling filters. It would, none-the-less, be beneficial to include these products in the Mercury-Added Legacy Products website, developed by NEWMOA in FY 2008, located at: www.newmoa.org/prevention/mercury/projects/legacy/.

The website provides information about the past and current uses of mercury products, including photographs, locations where they might be found, and information on proper handling, removal, and disposal. The resource currently features 46 mercury-added legacy products and includes both consumer-related products and products found in hospitals, farms, schools, and other commercial facilities. Adding a section on mercury legacy products from wastewater treatment facilities would require some additional research to fill-in missing information based on the current format and minor website programming to incorporate the additional products.

Appendix A

List of Eligible Wastewater Treatment & Drinking Water Treatment Facilities in Massachusetts

Facility ID Number	Facility Name/Location	Facility Contact	Contact Information	Made Initial Phone Call	Sent Online Survey via Email	Visit Scheduled
Wastewater Treatment Facilities						
CWSRF No. 30582	Billerica	Lorraine Sander	978-671-0956	Yes	Yes - completed 5/4	May 7th at 9:30am
CWSRF No. 3092	Erving	Tom Sharp	413-422-2800	Yes	Yes	
CWSRF No. 3101	Marlborough	Ronald Lafreniere	508-624-6910	Yes	Yes	
CWSRF No. 3105	Webster	Timothy Loftus	508-949-3865	Yes	Yes - completed 6/16	Juen 23rd at 10:00am
CWSRF No. 3107	Fitchburg	Joseph Jordan	978-345-9622	Yes	Yes - completed 5/4	June 3rd at 2:30pm
CWSRF No. 3134	MWRA - Deer Island Treatment Facility	Frederick Laskey	617-788-1101	Yes	Yes	
CWSRF No. 3136 (3298 green portion)	Lowell Regional Wastewater Utility	Mark Young / Steve Faxon	978-970-4248	Yes	Yes - completed 5/5	June 25th at 10:00am
CWSRF No. 3142	Gloucester	Michael Hale	978-281-9785	Yes	Yes	
CWSRF No. 3146	Maynard	Jerry Flood	978-897-1017	Yes	Yes	
CWSRF No. 3168 (3296 green portion)	Pittsfield	James Ruberto	413-499-9330	Yes	Yes	
CWSRF No. 3197	Millbury	Thomas Walsh	508-755-1286	Yes	Yes - completed 5/5	Not available May/June
CWSRF No. 3198	Sturbridge	Michael Racicot	508-347-2500	Yes	Yes	
CWSRF No. 3209	Leominster	Roger Brooks	978-534-7590	Yes	Yes	
CWSRF No. 3266 (3313 green portion)	Newburyport	Brendan O'Regan	978-465-4464	Yes	Yes	
CWSRF No. 3295	North Andover	Richard Hogan	978-685-1612	Yes	Yes - completed 5/7	June 11th at 10:00am
CWSRF No. 3308	Fairhaven	William Fitzgerald	508-979-4030	Yes	Yes	
CWSRF No. 3319	Lawrence			Yes	Yes	
CWSRF No. 3434	Ipswich			Yes	Yes	

Facility ID Number	Facility Name/Location	Facility Contact	Contact Information	Made Initial Phone Call	Sent Online Survey via Email	Visit Scheduled
Drinking Water Treatment Facilities						
DWSRF No. 3037	Lowell	Steven Duchesne	978-970-4242	Yes	Yes - completed 4/28	Declined
DWSRF No. 3052	Woburn	Anthony Blazejowski	781-897-5945	Yes	Yes - completed 4/30	No mercury at facility
DWSRF No. 3111	Leominster	Patrick LaPoint	978-534-7590	Yes	Yes	
DWSRF No. 3112	South Grafton Water District	Steve Lemoine	508-839-0512	Yes	Yes	
DWSRF No. 3114	Abington/Rockland Joint Water Works	Daniel Callahan	781-878-0462	Yes	Yes	
DWSRF No. 3117	Dennis Water District	David Larkowski	508-398-3351	Yes	Yes	
DWSRF No. 3159	Amesbury	Jeff Mason	978-388-0853	Yes	Yes	
DWSRF No. 3165		Nancy McBride	978-987-1787	Yes	Yes	
DWSRF No. 3188	Holden	James Shuris	508-829-0256	Yes	Yes	
DWSRF No. 3211	Framingham	Paul Barden	508-532-6060	Yes	Yes	
DWSRF No. 3216	Westford	Robert Worthley	978-399-2456	Yes	Yes - completed 4/21	April 28th at 10:00am
DWSRF No. 3216	Westford	John Livsey	978-692-5520	Yes	Yes	
DWSRF No. 3222	Barnstable	Mark Ellis	508-862-4092	Yes	Yes	
DWSRF No. 3303	Worcester	Philip Guerin	508-799-1484	Yes	Yes	
DWSRF No. 3304	Lee	Michael Towler	413-243-5526	Yes	Yes - completed 4/26	Cancelled
DWSRF No. 3305	Ashland	Joseph Celano	508-881-0122	Yes	Yes	
DWSRF No. 3306	New Bedford	Ronald Labelle	508-979-1520	Yes	Yes	
DWSRF No. 3327	Danvers Water Department	Donald Bancroft	978-774-5054	Yes	Yes	
DWSRF No. 3369	Gloucester	Larry Durkin	978-281-9792	Yes	Yes	
DWSRF No. 3451	Newburyport	Paul Colby	978-465-4466	Yes	Yes	
DWSRF No. 3484	Gloucester	Lawrence Durkin	978-281-9792	Yes	Yes	

Appendix B

Results of the Online Survey Sent to Drinking Water & Wastewater Treatment Facilities

Facility Name / Location	Has the facility ever done an inventory of mercury-added devices?	Is the facility planning any upgrades that involve removing or replacing mercury-added equipment with non-mercury?	Have there been any upgrades associated with removing or replacing mercury equipment at the facility in the past?	Does the facility have specific handling and disposal procedures for mercury-added items that are no longer in use?	Has there ever been a mercury spill at the facility?	Mercury products identified at the facility*
Billerica	No	No	No	No	Not sure	Float switches used in pumps and pump systems, fluorescent lamps, oven, incubator, and refrigerator thermometers
Fitchburg	No	No	Yes - removed flow meters and mercury level indicators, upgraded some pressure switches to digital	Not sure	No	Float switches, gas flow regulator, high pressure sodium lamps (HPS), pressure switches, pressuretrols, oven thermometer, thermometer on boiler, thermostats, mercuric sulfate
Lee	No	Yes - new thermostats	No	Not sure	No	No response
Lowell	Yes	No response	No response	No response	No response	No response
Lowell WWT	No	Yes - in the process of upgrading equipment and removing any mercury devices	Yes - thermostats and manometers	Yes - the City's recycling coordinator is notified	No	Flourescent bulbs only

Facility Name / Location	Has the facility ever done an inventory of mercury-added devices?	Is the facility planning any upgrades that involve removing or replacing mercury-added equipment with non-mercury?	Have there been any upgrades associated with removing or replacing mercury equipment at the facility in the past?	Does the facility have specific handling and disposal procedures for mercury-added items that are no longer in use?	Has there ever been a mercury spill at the facility?	Mercury products identified at the facility*
Millsbury	No	Yes - not specifically trying to replace mercury-containing material, but are doing so to the extent practicable as we go along as part of the overall improvements	Yes	No	Not sure	No response
North Andover	No	No	Yes - removed mercury flow meters and replaced with ultrasonic flow meters; also replaced mercury float switches and level switches with non-mercury mechanical floats	No	No	High pressure sodium lamps, metal halide lamps, pressure switches, pressuretrols, thermostats
Webster	No	No	No	No	No	Fluorescent lamps, float switches, pressure switches, lab thermometers, outdoor max-min thermometer, thermostats, vacuum gauges
Westford	Yes	Not sure	Yes - removed mercury flow meters	Yes - mercury devices are collected by the town	Not sure	Fluorescent lamps, pressure switches, pressuretrols, thermostats, thermometers, UV germicidal lamps
Woburn	Yes	No	No	Yes - mercury devices have been removed by certified hazardous materials collector	No	None - all mercury devices have been removed

* This column includes mercury products that were identified during the site visit as well as in the online survey.

Appendix C

Outreach Materials Developed and/or Distributed During this Project

NEWMOA developed the following outreach materials to distribute to drinking water and wastewater treatment facilities during facility site visits. Copies of these materials are included in the following pages:

1. Mercury Recyclers in Massachusetts, May 2010
2. Non-Mercury Alternative Products, April 2010

The following additional outreach materials developed by the Massachusetts Department of Environmental Protection (MassDEP) were distributed to wastewater and drinking water treatment facilities following upon request:

1. Cleaning up Elemental Mercury Spills
<http://www.mass.gov/dep/toxics/stypes/spill.pdf>
2. Cleanup Procedures for Broken Fluorescent Lamps
<http://www.mass.gov/dep/toxics/stypes/brknefls.pdf>
3. Fluorescent Lamp Management for Businesses and Institutions
<http://www.mass.gov/dep/toxics/stypes/flampbiz.pdf>
4. Frequently Asked Questions: Disposal Prohibition Provision of the Mercury Management Act (Chapter 190 of the Acts of 2006)
<http://www.mass.gov/dep/toxics/laws/hgbanfaq.pdf>
5. Summary: Massachusetts Mercury Management Act
<http://www.mass.gov/dep/toxics/laws/hglawfax.pdf>

Mercury Recyclers in Massachusetts May 2010

The following companies provide collection, transportation, and recycling/disposal services for mercury-containing devices in Massachusetts:

AERC Recycling Solutions

2591 Mitchell Ave.
Allentown, PA 18103
Phone: 610-797-7608
Website: www.aercrecycling.com

***Mill City Environmental Corporation**

116 John Street
Lowell, MA 01852
Phone: 978-654-6741
Website: www.millcityenv.com

Clean Harbors Environmental Services

Eastern New England Technical Services
1 Hill Ave.
Braintree, MA 02184
Phone: 781-380-7175

Northeast Lamp Recycling, Inc. (NLR)

P.O. Box 680
East Windsor, CT 06088
Phone: 860-292-1992
Website: www.nlrlamp.com

Clean Harbors Environmental Services

North Andover Technical Services
221 Sutton Street
North Andover, MA 01845
Phone: 978-683-1002

***Veolia Environmental Services (VES)**

218 Canton Street
Stoughton, MA 02072
Phone: 781-341-6080
Website: www.veoliaes.com

***Complete Recycling Solutions, LLC**

1075 Airport Road
Fall River, MA 02720
Phone: 508-402-7700
Toll-Free: 866-277-9797
Website: www.crsrecycle.com

WorkWaste, LLC

10 Twin Bridge Road, Unit 1A
Merrimack, NH 03054
Phone: 603-423-0000 or 603-423-1016
Toll Free: 877-WorkWaste
Website: www.workwaste.com

*These companies are included in Statewide Contract #FAC53 for the collection and recycling of fluorescent and other mercury-containing lamps and equipment.

The Massachusetts Department of Environmental Protection (MassDEP) maintains a listing of mercury-added product recycling drop-off locations for cities and towns in Massachusetts. For more information, visit: <http://www.mass.gov/dep/recycle/hgmap.htm>.

Please note: Mention of a company should not be considered an endorsement by the Northeast Waste Management Officials' Association (NEWMOA), the New England Interstate Water Pollution Control Commission (NEIWPC), or the Massachusetts Department of Environmental Protection (MassDEP).

Non-Mercury Alternative Products April 2010

The following chart provides information on mercury products and components likely to be found at wastewater treatment facilities, and options for replacing them with non-mercury alternatives:

Product	Mercury Component	Non-Mercury Alternative
# Accustat® Thermostats – (e.g., PSG Controls)	Accutherm® mercury-based sensors	Accustat® Independence thermostats use electronic sensors
# Barometers		Aneroid, digital, and Eco-celli liquid-gas silicon barometers
Batteries		Non-mercury lithium, zinc air, silver oxide, and alkaline manganese button-cell batteries. Non-miniature cylindrical alkaline batteries
Computer Monitors / Flat Panel Displays	Cathode ray tube (CRT) or liquid crystal display (LCD)	Light emitting diode (LED) monitors
Counterweights / Dampers		Non-mercury weights
* DC Watt-Hour Meters – (e.g., Duncan Mfg. Co.)	Mercury bearing	Commutator or induction meter
# Fever Thermometers		Non-mercury liquid indium-gallium-tin thermometers. Digital, instant-read, and tympanic fever thermometers
# Fire Alarm Pull Boxes	Tilt switch	Fire alarm boxes with a snap-action or push-button switch
# Flame Sensors		Non-mercury thermocouples.
# Float Switches		Mechanical, magnetic dry reed, optical, conductive, metallic ball, sonic/ultrasonic, pressure transmitter, alloy, thermal, and capacitance level float switches
* # Flow Meters	Mercury manometer	Digital, optical, and ball-actuated flow meters
* Furnaces	Flame sensor	Electronic ignition systems
* Gas Flow Regulators		New gas flow regulators (manufactured after 1960) do not contain mercury
# Gas Ovens	Flame sensor	Electronic ignition systems
Gyroscope	Mercury ring or damper	Mechanical gyroscopes that use ball bearings or a pendulum
* # Hydrometers		Hydrometers that use lead ballast as a weight
Hydronic and Warm Air Controls	Tilt switch	Devices with a mechanical or snap-action switch
* Infrared Heaters – (e.g., Harper-Wyman, Robertshaw)	Flame sensor	Heaters with a non-mercury pendulum switch
Lamps		Light-emitting diodes (LEDs)

Product		Mercury Component	Non-Mercury Alternative
*	Latex Paint (pre-1990's)		Latex paint manufactured after 1992 does not contain mercury
	Level & Rotation Sensors		Electrical, mechanical, magnetic, optical, and ultrasonic sensors Non-mercury pressure transmitters
#	Manometers		Dial or digital manometers
*	Marine Paint		Anti-fouling marine paint made with copper E-poxy and vinyl paint Silicon and Teflon coatings
*	Mercurochrome		Non-mercury antiseptic or antibacterial ointment
*	Pesticides / Fungicides / Herbicides		Pesticides produced since 1995 do not contain mercury
	Polarographic Analyzers	Mercury drop electrodes (DME, HMDE, or SMDE)	Electrodes made of inert metals such as gold, silver, and platinum, or glassy carbon and pyrolytic carbon (graphite)
	Pressure Gauges / Vacuum Gauges		Needle/bourbon gauges Electronic, digital, non-mercury-liquid, and aneroid pressure gauges
	Pressure Transducers / Transmitters		Silicon pressure transducers Devices that use sodium-potassium (NaK) fluid or food grade oil as transmission fluid
	Pressuretrols	Mercury pressure switch	Non-mercury pressuretrol sensors
#	Pressure Switches		Mechanical (e.g., snap-switch) or solid-state switches
* #	Pyrometers		Devices with nitrogen containing stems Digital pyrometers
*	Rectifiers		Solid state rectifiers, silicon semiconductor rectifiers, and high power thyristor circuits
*	Refrigerators / Freezers	Tilt switch	Devices with mechanical switches
#	Relays		Dry magnetic reed, electro-mechanical, and solid-state relays Silicon rectifiers
	Semiconductors / Solar Cells / Infrared Detectors		Silicon-based bolometers and infrared cameras Devices manufactured w/ semiconductors made of indium-antimonide, gallium-arsenide, or aluminum-gallium-arsenide

	Product	Mercury Component	Non-Mercury Alternative
	Shunt Trips		Metal coil with a mechanical or “limit” switch
*	Silent Light Switches		Standard light switches
*	Space Heater – (e.g., Presto Industries, Inc.)	Tilt switch	Heaters with a non-mercury pendulum switch
#	Sphygmomanometers		Digital and aneroid blood pressure devices
#	Sump Pumps / Bilge Pumps	Float switch	Pumps that use dry reed switches, optic sensors, or mechanical ball switches
#	Temperature Switches		Mechanical or solid-state switches
	Thermometers		Non-mercury liquid alcohol or mineral-spirit glass bulb thermometers Digital thermometers
#	Thermostats / Thermo-regulators	Tilt switch	Mechanical switches such as air-controlled, reed, vapor-filled diaphragm, and snap-switches Electronic or digital thermostats
*	Thimerosal (in eye wash)		Thimerosal-free saline solution
#	Tilt Switches		Metallic ball, electrolytic, mechanical, solid-state, and capacitance switches Non-mercury potentiometers
*	Trickling Filter / Pivot Arm Bearings		Devices with mechanical ring seals
	Vibration Meters		Analog and digital vibration meters

* *Research indicates that these products are no longer manufactured with mercury. New products and replacements for these products or components manufactured and/or sold in the U.S. are automatically non-mercury. For more information on these “legacy” mercury-added products, see: www.newmoa.org/prevention/mercury/projects/legacy/index.cfm.*

Mercury-added products are not legally available for sale in Massachusetts – only non-mercury alternatives for these products may be sold or distributed. For more information on Massachusetts’ mercury-added product phase-outs and sales bans, see: www.newmoa.org/prevention/mercury/imerc/productban.cfm and www.newmoa.org/prevention/mercury/imerc/phaseoutinfo.cfm.