

## Managing Mercury Switches Found at Water Treatment Plants in Massachusetts & Other States

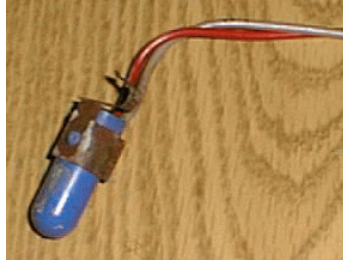
*Prepared by the Northeast Waste Management Officials' Association (NEWMOA) and the New England Interstate Water Pollution Control Commission (NEIWPC) with funding provided by the Massachusetts Department of Environmental Protection (MassDEP).*

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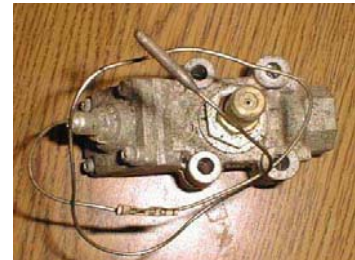
Typical applications for mercury devices in drinking water and wastewater treatment plants include water level monitoring, temperature control/monitoring, flow measurement, and pressure monitoring equipment, which are controlled by switches. Mercury-added switches include float switches, actuated by a change in liquid levels; pressure switches, actuated by a change in pressure; temperature switches and flame sensors, actuated by a change in temperature; and tilt switches, actuated by a change in the switch position. Depending on its size and intended use, the amount of mercury in an individual switch varies greatly. A mercury tilt switch, for example, can contain between 50 and 5,000 milligrams (5 grams), while a float switch can contain 100 to 70,000 milligrams (70 grams or 2.5 ounces) of mercury.



*Mercury Float Switch*



*Mercury Tilt Switch*



*Mercury Flame Sensor*

*Note: The three photographs above are courtesy of the Vermont Agency of Natural Resource from their Spring 2002 Report, "Household Appliance Mercury Switch Removal Manual."*

### **Why is Mercury a Problem?**

Mercury is toxic to the human nervous system, kidneys, liver, and immune system. The fetus and children are particularly to neuro-developmental toxicity caused by mercury. Elemental mercury, the silvery liquid form, volatilizes into air at room temperature and is readily absorbed into the body if inhaled. Mercury that is released to the environment may bioaccumulate in fish making them unsafe to eat. The Massachusetts Department of Public Health (DPH) has advised pregnant women, nursing mothers, women of child bearing age, and children under 12 to avoid eating most freshwater fish from Massachusetts lakes, rivers, and streams due to unacceptably high levels of mercury. DPH has also recommended that all Massachusetts residents avoid certain fish from those bodies of water where sampling has revealed a significant mercury problem.

When mercury devices are disposed of improperly, burned in a waste-to-energy plant, or buried in a landfill, mercury can be released into air and eventually transported to water bodies. While air pollution equipment at waste-to-energy plants can capture over 90 percent of the mercury released at these facilities, the remainder is emitted.

Improper disposal of mercury-containing items, such as switches, can lead to significant mercury releases to the environment. Accidental breakage of mercury-added devices can also cause potentially significant contamination in buildings, which may necessitate costly cleanups.

To minimize environmental mercury pollution and the potential for spills, many states, including Massachusetts, have adopted laws that prohibit the sale of numerous mercury-added products. In most cases, effective non-mercury alternatives exist. Facility renovations and upgrades provide opportunities to identify existing mercury-added devices on site and carefully replace them. To minimize environmental releases and accidental breakage mercury containing devices should be handled thoughtfully.

### **Safe Practices for Handling Mercury Switches**

Suggestions for the safe handling of mercury switches include:

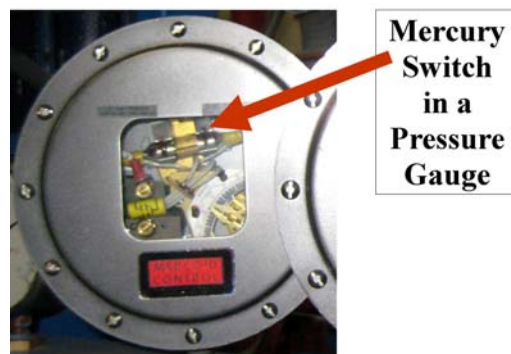
- Use personal protective equipment such as gloves and safety glasses when removing mercury switches.
- Remove and handle mercury switches in areas where accidental spills can easily be contained and properly cleaned.
- Store mercury switches in sturdy containers in designated and securable areas.

Facility operators and maintenance personnel that remove mercury switches should be familiar with proper hazardous waste handling and emergency procedures. A mercury spill cleanup system and guidance should be readily available. Facilities should have a protocol for handling mercury spills that includes:

- An emergency plan that covers proper response procedures and emergency contact information.
- A mercury spill kit that is located in an easily accessible area.

### **Cleaning Up or Reporting a Mercury Leak or Spill**

Mercury switches are typically encased in glass or plastic housing (see photo below) and as long as the device remains intact, there is a low probability of a mercury release.



*Note: The above photograph is courtesy of NEWMOA and was taken in May 2010.*

Technicians removing mercury switches from larger products need to be careful not to break the device, which could result in a mercury leak or spill. If a spill or break occurs, persons should

immediately contact their state environmental agency for instructions on proper clean-up and disposal. They should also contact their public health department if they have been directly exposed to the mercury.

In some states, spills greater than a designated threshold must be reported. In Massachusetts, spills of one pound of mercury (about two tablespoons), or more, must be reported to the Massachusetts Department of Environmental Protection (MassDEP). To report a spill, persons should contact the MassDEP Emergency Response Spill Line at 1-888-304-1133. Instructions for cleaning up small mercury spills are available at: [www.mass.gov/dep/toxics/stypes/spill.htm](http://www.mass.gov/dep/toxics/stypes/spill.htm).

### **Proper Disposal & Recycling of Mercury-Containing Switches**

In Massachusetts, as of May 1, 2008, mercury-containing items, including all types of mercury switches, are prohibited from being disposed of in the regular trash. These items must be managed and disposed of as a hazardous waste, or recycled at their end of useful life. Many other states, including Maine, Minnesota, New York, Rhode Island, and Vermont have similar disposal prohibitions. A list of licensed mercury waste recyclers that service Massachusetts is located at: [www.mass.gov/dep/toxics/stypes/hgcycle.htm](http://www.mass.gov/dep/toxics/stypes/hgcycle.htm).

### **Best Management Practices (BMPs) for Storing Mercury Switches**

After removal, intact mercury switches should be stored in a plastic 5-gallon bucket or a plastic-lined 55-gallon drum prior to their recycling or disposal. The bucket or drum should have a tight fitting lid and should be properly labeled. Facilities can store the mercury switches for up to one year after they are placed inside the container. Once the container is full, a year has lapsed, or enough switches have been collected, they should be disposed of properly as a hazardous waste, or sent to a licensed mercury recycler for reclamation.

### **Alternatives to Mercury Switches**

Massachusetts and many other states, including California, Connecticut, Illinois, Louisiana, Maine, Minnesota, New Hampshire, New York, Rhode Island, and Vermont, prohibit the sale and distribution of new mercury-added switches individually and as part of existing equipment. There are non-mercury alternatives to switches suitable for use in various products and applications at water treatment facilities. A summary of the non-mercury alternatives available for each type of switch is included in the Table below:

<b>Table 1: Alternatives to Mercury-Added Switches</b>		
<b>Type of Mercury Switch</b>	<b>Product(s) that May Contain These Switches</b>	<b>Non-Mercury Alternative(s)</b>
Flame sensor	Gas-fired appliances, including: boilers, furnaces, gas ovens, and space heaters	Electronic ignition system; non-mercury thermocouples
Float switch	Pumps and pump systems, including sump pumps and bilge pumps	Mechanical, magnetic dry reed, optical, conductive, metallic ball, sonic/ultrasonic, pressure transmitter, alloy, thermal, and capacitance level float switches
Pressure switch	Pressure gauges	Mechanical (e.g., snap-switch) or solid-state switches
Temperature switch		Mechanical or solid-state switches
Tilt switch	Old appliances, including: chest freezers and space heaters; Thermostats	Metallic ball, electrolytic, mechanical, solid-state, and capacitance switches

**For More Information**

- Visit MassDEP’s mercury management website at: [www.mass.gov/dep/toxics/stypes/hgres.htm](http://www.mass.gov/dep/toxics/stypes/hgres.htm)
- Visit NEWMOA’s website for information about mercury reduction programs and other resources: [www.newmoa.org/prevention/mercury/](http://www.newmoa.org/prevention/mercury/).
- Visit NEIWPC’s website for information on mercury and wastewater treatment facilities: [www.neiwpc.org/mercury/index.asp](http://www.neiwpc.org/mercury/index.asp) and [www.neiwpc.org/wwtreatment.asp](http://www.neiwpc.org/wwtreatment.asp).