



State of Ohio
Environmental Protection Agency

Office of Compliance Assistance and Pollution Prevention
and the Ohio Mercury Reduction Group

Guide to Mercury Issues for School Administrators



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1-800-282-9378

Guide to Mercury Issues for School Administrators

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INTRODUCTORY LETTER

Why should school administrators be aware of mercury?

Dear School Administrator:

The first time school district personnel think about mercury is often when a mercury spill occurs: closing a school, affecting a community, costing from the thousands to millions for clean-up. The community where the spill occurs is often alarmed and asks what the school administrators are doing about mercury in the school district.

Ohio law (Substitute House Bill 443 signed into law on January 4, 2007) bans the purchase of mercury and mercury-containing measuring devices for classroom use in schools, effective as of April, 2007. Other new legislation (Jarod's Law) to go into effect in 2007 sets up requirements for how health departments inspect schools for hazards, including mercury. In response to this legislation, local health departments will encourage schools to remove hazards containing mercury.

This guide, created by Ohio EPA and the Ohio Mercury Reduction Group (OMRG), provides school administrators with information needed to address mercury issues, strategies to prevent spills and actions to correctly respond to a spill. OMRG members include mercury experts and representatives from Ohio EPA, Ohio Department of Health, Ohio Poison Control Centers, local health departments, U.S. EPA, Bowling Green State University, and the Ohio Spill Prevention, Planning and Emergency Response Association. OMRG members write technical documents and educational materials about mercury and respond to mercury spills throughout Ohio.

If there is interest in adding mercury awareness to curriculum or classroom exercises, the University of Wisconsin has an excellent resource available at www.mercuryinschools.uwex.edu/.

If you have questions or need additional information, please contact us at 614-644-3469 or by e-mail at bill.narotski@epa.state.oh.us.

Sincerely,

William Narotski
Ohio EPA, Office of Compliance Assistance and Pollution Prevention
Coordinator, Ohio Mercury Reduction Group
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MERCURY

Mercury is a naturally occurring element that has often been used in school laboratories and equipment. Mercury is released into the atmosphere through coal burning utilities or from the combustion of materials. Its current and historic usage in schools could result in situations that could impact the health of students and faculty and may require costly professional assistance for cleanup. Mercury is a toxic chemical in all forms.

The most susceptible populations to the effects of mercury are women of child-bearing age, pregnant and nursing mothers, fetuses, and children under age fifteen.

The most common form of mercury found in schools is elemental or metallic mercury. It is a silver liquid metal found in school laboratories in bulk form or in equipment, like thermometers, thermostats and barometers. Elemental mercury is surprisingly dense, weighing over 100 pounds per gallon. Several spills have resulted when people, not prepared for the weight of the mercury, lifted and then dropped heavy mercury-filled containers.

Mercury chemical compounds may be at a school in several forms, including products used by the school nurse, old paints and pesticides, and in some rubberized gym floors.

When a mercury measuring device, like a thermometer or barometer breaks, elemental mercury can be spilled. Elemental mercury vaporizes at room temperature. Mercury vapors are poisonous, invisible and have no taste or smell. Spilled mercury divides into many small beads which can roll long distances from the spill point.

For more information on the properties of mercury:
www.epa.state.oh.us/ocapp/p2/mercury_pbt/mercury.html

Impact on the environment:

Once mercury in any form is released into the environment it can be transformed into methyl mercury. Methyl mercury can travel up the food chain and builds in concentration, also known as bioaccumulation. The largest fish in a lake can have mercury levels hundreds of thousands times greater than the concentration in the lake itself as a result of bioaccumulation. For these reasons mercury is classified as a persistent, bio-accumulative and toxic (PBT) chemical. Eating fish that are highly contaminated with mercury can impact human health. There is a statewide sport fish consumption advisory for all Ohio waters for mercury. Ohio recommends limiting fish consumption from Ohio waterways to one meal per week.

(www.epa.state.oh.us/dsw/fishadvisory/mercury.html).

Health impacts of elemental mercury

Mercury is a neurotoxin that can cause many health problems including permanently reducing the intellectual ability of young children. Students and teachers can become sick as a result of inhaling mercury vapors, when mercury is spilled in a classroom. Even small spills can create enough vapor to create an unsafe environment for students and teachers. Mercury spills must be properly cleaned up and should never be cleaned up with a vacuum cleaner.

Mercury causes many health problems. Impacted children may struggle to keep up in school and may require remedial classes or special education (U.S. EPA, 2001 Methylmercury fact sheet). The nervous system is very sensitive to all forms of mercury. Methylmercury and metallic mercury vapors are more harmful than other forms because more mercury in these forms reaches the brain.

It may be difficult to identify early mercury poisoning, because many of its symptoms are similar to a cold or flu. However, doctors may recognize the signs of heavy metal poisoning through testing and observation. Symptoms of mercury toxicity include irritability, shyness, tremors, changes in vision or hearing and memory problems.

Short-term exposure to high levels of metallic mercury vapor may cause lung damage, nausea vomiting, diarrhea, increases in blood pressure or heart rate, skin rashes and/or eye irritation.

Even small spills can create enough vapor to create an unsafe environment for students and teachers

Who is most susceptible?

- Women of childbearing age
- Pregnant women
- Fetuses
- Children under 15

Mercury gets into your body through:

1. breathing contaminated air;
2. eating fish or shellfish contaminated with methylmercury; and
3. skin contact with mercury or a mercury compound.

Those who exhibit mercury toxicity symptoms may have suffered exposure when living or working in an environment where an ineffectively cleaned spill vaporized over long time periods, or they may regularly eat fish that has high mercury content.

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Mercury accumulates in the body. When a woman becomes pregnant, mercury from her body can pass to her unborn child. Mercury is a neurotoxin that affects developing nervous systems and can lead to lifetime learning disabilities in children. Small children do not have much body mass, so less toxin can have a greater effect than on a full grown adult.

Some individuals may also be more sensitive to mercury, just like some people are more sensitive to certain allergens. Exposure to high levels of metallic, organic or inorganic mercury can permanently damage the brain, kidneys or a developing fetus. Learning and developmental disorders are the greatest concern for children who had high mercury levels during gestation.

For more information on the health effects of mercury:

U.S. EPA Mercury Health Effects: www.epa.gov/mercury/effects.htm

Agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profile for Mercury: www.atsdr.cdc.gov/toxprofiles/tp46.html

Comparison of quantities of mercury

Large Spill = 1 pound mercury

1 pound = 453.6 grams \approx 2 tablespoons mercury \approx 130 thermostats (NEMA estimates about 3.5 grams per thermostat)

1 fluid oz. = 394.4 grams mercury

1 gram = a bead the size of a pencil eraser

1 gallon = 104 pounds mercury

1 thermometer = \sim 0.5-3.0 grams of mercury

1 thermostat = \sim 3-5 grams mercury

1 thermostat = \sim 75-100 fluorescent lamps

1 sphygmomanometer (blood pressure cuff) = 70 - 90 grams mercury

Air concentrations: 1,000 ng/m³ = 1.0 ug/m³ = 0.001 mg/m³

Officially, one pound of spilled mercury is considered a large spill and must be reported. Visually, that is about two tablespoons of mercury. However, even a small spill can raise the air concentrations of mercury above ATSDR's safe threshold level.

REASONS FOR MERCURY REDUCTION

There are a variety of reasons that encourage school administrators to remove mercury from schools. Regulations and introduced legislation address hazards in schools. Schools face liability for future spills and improper management of the mercury at the facility. The cost of cleaning a school mercury spill ranges from the thousands to millions of dollars. Parents of students become stressed when they discover that toxic materials may be used in schools in a potentially unsafe manner.

Even the every day use of mercury and mercury-added products can put a strain on schools. The school needs to manage, label and store the mercury products to protect students against the toxicity of mercury; and also determine if the products are hazardous wastes when managed at the end of life ([link to management section](#)).

Unnecessary Health Risk

The simplest reason to remove mercury from schools is that it is not necessary in the curriculum and there are alternatives readily available (lighting being the exception). Just as important, mercury is toxic and the majority of school populations are those that are most sensitive to mercury toxicity: children (through puberty) and women of childbearing age. Parents and community members can and do become angry with school systems for the unnecessary use of mercury in school curricula.

Liability

Items that contain mercury and jars of elemental mercury are a liability for schools. Due to the difficulty in remediating a mercury spill, it is recommended that schools replace or remove mercury bearing items wherever possible, before a spill occurs. A school's liability increases if these materials are not properly removed from buildings. The improper handling of mercury and spill incidents can cause significant financial and legal problems. Improper spill mitigation or waste disposal may also create civil liability for schools and staff. Mercury spill cleanup can cost a school thousands to over a million dollars depending on the severity and distribution of mercury contamination.

Some insurance companies no longer cover mercury or hazardous substance spills. In this case, a school may need to search for another way to pay for mercury spill cleanup.

State School Bans

Ohio Substitute House Bill 443 ([Appendix E](#)) bans the new sale of mercury and mercury measuring devices in Ohio K-12 school classrooms, effective April, 2007. The law also bans the sale of mercury thermometers and novelty items, effective October, 2007. Mercury-containing thermostats shall not be offered for sale or installed after April, 2008. Ohio EPA is responsible for enforcing the regulations.

Jarod's Law

Jarod's Law (Senator Tom Raga, Substitute H.B. 203), was passed on December 19, 2005, and became effective on March 19, 2006. The law requires county health departments to inspect schools to identify dangerous health and safety conditions. The bill requires the state director of health to adopt rules establishing minimum standards for safety inspections in cooperation with Ohio School Boards Association, the Association of Ohio Health Commissioners, the Ohio Environmental Health Association and the Ohio Education Association by September 19, 2006. The law requires:

- the establishment of the School Health and Safety Network to coordinate and collect data from school safety inspections;
- local boards of health to inspect public and non-public school buildings and grounds at least once annually;

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- Inspection reports to be submitted to the building principal, administrator responsible for facility operations and maintenance, superintendent, school board, and the state auditor; and
- the school district, principal, or chief administrator to cooperate with the local health department's inspections and develop a plan of abatement for conditions that are determined to be hazardous to occupants.

Templates and checklists will be developed for the school inspections by the Ohio Department of Health (ODH). The inspections are to identify conditions dangerous to public health and safety present in or on the building or grounds, using the checklists. ODH is also creating an in-depth inspection guide for inspectors to follow.

Mercury and mercury-containing products used by schools are potentially hazardous. When addressing the potential hazards of mercury, schools should identify a spill contractor at the beginning of the year and have made the initial communication with the contractor.

POTW requirements

Publicly owned treatment works (POTWs) or wastewater treatment plants (WWTPs) treat wastewater from the community and return the treated water to streams, lakes and rivers. These facilities, regulated by federal and state governments, have limits on the amounts of pollutants, including mercury, that they are allowed to release. POTWs in the Great Lakes Basin have even more stringent limits on mercury. POTWs may also monitor and regulate schools that send them waste water for processing. If your school is identified as a source of mercury to the wastewater facility, it may ask or require the school to identify and reduce the mercury that is discharged to the POTW.

By November 2010, mixing zones for bioaccumulative chemicals of concern, including mercury, will be phased-out statewide. Every existing discharger, including schools, will have to assess whether it can meet the mercury water quality standard or implement a pollutant minimization plan (PMP) to be granted a variance. Community POTW permits are reviewed and reissued on a revolving cycle, and eventually every Ohio POTW must address mercury in some way. POTWs may choose to pursue mercury reduction programs to help them meet regulatory requirements for variances, as well as reducing mercury in their community.

SCHOOL MERCURY POLICY AND THE MERCURY MANAGEMENT PLAN

Most, if not all, schools contain mercury and mercury-containing devices. Even schools that believe they are mercury free will often discover a mercury thermometer or other mercury-containing device in the back of a storage cabinet or other obscure location. It is not uncommon for mercury to arrive at a school from an outside source, like a student bringing a mercury thermometer to school for a science project.

The first question for the school administrator is whether mercury use is necessary or a worthwhile risk in a school system.

If a mercury-containing product is not required, the school administration should determine when to remove the item: either immediately or gradually as costs become achievable. Fact sheets, in the [next section](#), include recommendations for developing a policy on the use and management of different types of mercury-related items.

The policies your school institutes to address mercury should identify and address potential issues before they become a problem. These policies should be compiled as part of a mercury management plan that is accessible to all staff who may use mercury or mercury products.

Management Commitment

Administration commitment and participation is essential to successfully manage mercury in your school

The initial task is to develop, publish and distribute a written statement of the administration's commitment and a policy regarding mercury and its use in the school. School administrators should consider an overall policy. Policies on purchasing and accepting donated items also should be considered.

Example Overall Policy Statement

Mercury-containing products and processes will not be purchased and/or used in any manner on school property, unless no reasonable alternative, as agreed to by the school administration, is available. When use of a mercury-containing product is permitted, measures will be taken to avoid introduction of mercury into the environment.

Example Purchasing Policy

The school will purchase non-mercury products whenever possible. In cases where a non-mercury alternative is not available or practicable, the school will purchase products containing less mercury where possible. When non-mercury alternatives are not available, the school will include clauses in its purchasing contracts to encourage product manufacturers to take back and recycle used mercury-containing products, and/or commit to recycling these products whenever possible.

Donated Items

School administrators may consider refusing to accept donated items that contain mercury. As with new purchases, it is recommended that if a mercury-containing item is offered to the school, the school should decline.

Mercury as a Component in Experiments

Discontinue mercury use in experiments. There are many other experiments that can demonstrate a chemical principle without the use of mercury. More information on the Mercury in biology, chemistry, physics and science rooms fact sheet [\[link\]](#).

Example Mercury Management Plan

1. The faculty, maintenance department, purchasing and administration will work together to identify product(s) or process(es) containing mercury currently in use within the school and to identify acceptable alternatives. A list of such products/processes and their alternatives will be presented to all employees working in affected areas. The list will be reviewed, updated and distributed at least once per year. (Appendix 1 is a checklist of mercury-containing products in schools.)
2. When mercury-containing products or processes are identified, the department(s) using such products/processes will develop a plan including a.) Procedures for the elimination of the use of these products/processes or an explanation of the rationale for continued use of such products/processes; and b.) Procedures for the proper disposal of any mercury-containing waste product.
3. The administration will review all mercury use plans and may approve the plans as submitted or with modification. Upon approval, the affected departmental manager(s) will implement the plans.
4. Department managers using mercury products/processes will maintain a readily retrievable log of the mercury-containing products/processes, the approved use(s), the alternatives considered, the reasons such alternatives were deemed unacceptable, and a schedule for reconsideration of available alternatives, and a management plan for the mercury-containing products/processes.
 - When no mercury-free alternatives are available, best management practices (BMPs) should be employed. Best management practices could include using the product or device containing the lowest amount of mercury, packaging it to provide the most protection against leaks or breakage. Also consider properly labeling items and waste materials, developing a spill response plan and providing appropriate training for individuals responding to mercury emergencies. Using safe storage and handling practices, transporting and recycling or disposal methods employed should all be important considerations for inclusion in a BMP.
 - In case of a mercury spill, employees will follow procedures set forth in the mercury management plan. All spills must be reported to the administration.
 - All employees are encouraged to present suggestions for eliminating mercury-containing products or improving processes to the administration.

SOURCES OF MERCURY IN SCHOOLS AND ALTERNATIVES

This section is broken down into mostly two-page summary sheets or fact sheets concerning possible mercury locations. Each fact sheet includes information on the relevant mercury-containing items, policy recommendations for schools, management requirements, status of future requirements, spill risk and ways to address specific mercury sources listed in the fact sheet.

This section has the following fact sheets:

- mercury in the heating ventilation and air conditioning system (HVAC) and in the building structure
- mercury in the auto, industrial arts, wood and metal shops
- mercury in the biology, chemistry, physics and science rooms
- mercury in the home economics classrooms
- mercury in the art classrooms
- mercury in the medical technology classrooms and school medical offices
- non-educational mercury-containing items
- mercury in flooring
- mercury in lighting

Appendix 1 is a checklist designed as an aide to assist schools in documenting the mercury found in buildings and in developing and implementing school mercury policy and management plan.

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Mercury in the Heating Ventilation and Air Conditioning System (HVAC) and in the building structure

Mercury product	Alternatives that are available
Thermostat (about 3 grams/switch, with as many as 6 switches)	Air-controlled, reed switch, vapor filled diaphragm, snap-switch, electronic
U-tubes	Electronic/aneroid gauges
Thermostat probes/flame sensor (flame sensors have about 3 grams)	Electric flame sensors, electronic ignition
Switches (switches, including mechanical/tilt switches, reed switches, float switches may have from 3.5 grams to 8 pounds of mercury per switch)	Hard-contact/solid-state/electro-optical switches
Switches in electrical equipment, relays, boilers, cooling and heating equipment, mercury-containing wall-mounted light switches manufactured before 1991	Mercury-free switches, temperature devices, relays, gas heating equipment with electronic ignitions
Inductive/capacitive/photoelectric/Ultrasonic sensors	Not at present time
Float switches	Mechanical, magnetic dry reed, optical sensors, metallic ball, sonic/ultrasonic, pressure transmitter, alloy, thermal, or capacitance float switches
Tilt switches	Metallic ball, electrolytic, potentiometers, mechanical, solid-state, or capacitive switches
Pressure switches	Mechanical pressure or solid-state pressure switches
Temperature switches	Mechanical temperature or solid state temperature switches
Relays	Dry magnetic weed, electro-mechanical, hybrid, or solid state relays, silicon controlled rectifiers

Recommended Policy

Do not purchase new mercury-containing products for the building or HVAC systems. When mercury-containing HVAC equipment needs to be replaced, use a non-mercury alternative. Recycle or dispose of spent equipment properly.

Management Requirements

Ohio law bans the sale of mercury-containing thermostats and their installation beginning April, 2008.

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All waste must be examined carefully to determine if it is hazardous (Ohio Administrative Code (OAC) 3745-52-11), unless the waste is managed as a universal waste, defined below. Used mercury-containing devices that are recycled are not considered hazardous waste (OAC 3745-51-02(C)(3)).

Many mercury-containing products are hazardous. All hazardous waste destined for disposal must be sent to a permitted hazardous waste facility and cannot be disposed in a dumpster or a solid waste landfill. Records must be kept on hazardous waste for three years.

Universal wastes (OAC 3745-273) are hazardous wastes that have **specific management requirements**. Universal wastes may be managed as universal waste without evaluation. Mercury thermostats and batteries should be managed as universal waste.

For universal waste, label an appropriate container **Universal Waste** and record the date when the first used item is placed on the container. Universal waste may be stored on-site for up to a year of when accumulation first begins. It is required to be managed by a universal waste destination facility or recycler.

Universal waste guidance: (www.epa.state.oh.us/dhwm/pdf/New_Universal_Waste_Guidance.pdf)
Universal Waste Rules for Handlers of Lamps: (www.epa.state.oh.us/dhwm/pdf/Universal_Waste_Rules_for_Handlers_of_Lamps.pdf)

Future Requirements

U.S. EPA has defined all mercury-containing products as universal waste. Ohio is likely to adopt this rule in 2007.

Spill Risk

Thermostats have been broken in schools. The air mercury concentrations of spilled mercury from a broken thermostat can go above the recommended safe threshold and a spill plan should be in place for thermostats.

Most other HVAC and building uses of mercury are unlikely to present much spill risk during normal operation. However, the other HVAC and building components can contain significant levels of mercury and a spill plan should be in place.

Resources

Bowling Green State University
Elemental Mercury Collection Program
www.bgsu.edu/offices/envhs/page18364.html
Phone: (419)372-2173

Ohio EPA Office of Compliance Assistance and Pollution Prevention
List of Ohio Mercury Recyclers: www.epa.state.oh.us/opp/recyc/mercrec.html
Phone: (800) 329-7518

Ohio EPA Division of Hazardous Waste Management
Regulatory and Information Services
Division of Hazardous Waste Generator's Handbook: www.epa.state.oh.us/dhwm/pdf/Generator_Treatment_Guidance.pdf
Phone: (614) 644-2917

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Mercury in the Auto, Industrial Arts, Wood and Metal Shops

Mercury product	Alternatives that are available
Mercury gauges	Electronic/aneroid gauges
Manometers, other pressure measuring devices, carburetor synchronizers	Aneroid/electronic manometers and analog (vacuum gauges)
Switches, relays, boilers, cooling/heating equipment	Mercury-free switches, temperature devices, relays, gas heating equipment
Solvent-based products	Water-based or bio-based solvents
Lubricants	Bio-based lubricants
Wood preservatives w/ pentachlorophenol	Untreated wood and non-wood alternative

Recommended Policy

Do not purchase new mercury-containing products for the auto, industrial arts, wood or metal shops. Discontinue the use of mercury measuring devices, solvent-based products, lubricants, and mercury-containing wood preservatives. When the mercury-containing equipment needs to be replaced, use a non-mercury alternative. Replacement measuring devices must be mercury free. Recycle or dispose spent products properly.

Management Requirements

Ohio law bans the purchase of mercury or a mercury-added measuring device for classroom use, as of April, 2007.

All waste must be examined carefully to determine if it is hazardous (OAC 3745-52-11), unless the waste is managed as a universal waste, defined below. Used mercury-containing devices that are recycled are not considered hazardous waste (OAC 3745-51-02(C)(3)).

Many mercury-containing products are hazardous. All hazardous waste destined for disposal must be sent to a permitted hazardous waste facility and cannot be disposed in a dumpster or a solid waste landfill. Records must be kept on hazardous waste for three years.

Universal wastes (OAC 3745-273) are hazardous wastes that have [specific management requirements](#). Universal wastes may be managed as universal waste without evaluation.

Future Requirements

U.S. EPA has defined all mercury-containing products as universal waste. Ohio is likely to adopt this rule in 2007.

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Spill Risk

Any mercury-containing measuring device used by students has an increased risk of breaking and of mercury being spilled. A mercury spill plan should be in place before these devices are used in a classroom.

Most building uses of mercury are unlikely to present much spill risk during normal operations. However, other items can contain significant levels of mercury and a spill plan should be in place.

Directions should be followed on the containers of solvent-based products, lubricants, and mercury-containing wood preservatives, if they must be used.

Resources

Bowling Green State University
Elemental Mercury Collection Program
www.bgsu.edu/offices/envhs/page18364.html
Phone: (419) 372-2173

Ohio EPA Office of Compliance Assistance and Pollution Prevention
List of Ohio Mercury Recyclers: www.epa.state.oh.us/opp/recyc/mercrec.html
Phone: (800) 329-7518

Ohio EPA Division of Hazardous Waste Management
Regulatory and Information Services
Division of Hazardous Waste Generator's Handbook: www.epa.state.oh.us/dhwm/pdf/Generator_Treatment_Guidance.pdf
Phone: (614) 644-2917

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Mercury in the Biology, Chemistry, Physics and Science Rooms

Mercury product	Alternatives that are available
Elemental mercury, jars or other bulk containers	Depends on the use
Mercury barometer	Aneroid and digital; new liquid type is being developed
Mercury (ii) chloride - HgCl_2	Nitric acid, magnesium chloride (MgCl_2)/sulfuric acid (H_2SO_4) or zinc formalin, freeze drying
Mercuric iodide (HgI_2)	Phenate method
Mercuric nitrate- $\text{Hg}(\text{NO}_3)_2$	Freeze drying
Mercuric oxide - HgO	Use of copper sulfate or potassium sulfate as catalyst in Kjeldahl reactions or the use of the Biuret method (where copper sulfate is used)
Mercury (ii) sulfate - HgSO_4	Ammonia/copper sulfate, neosporin, mycin, copper catalyst, silver nitrate/potassium/chromium, potassium sulfate
Mercury gas law apparatus	A simple Charles' Law Apparatus may suffice
Mercury anemometer	Digital
Mercury hydrometer	No alternative, properly dispose
Mercury hygrometer	Spirit-filled glass bulb, digital and aneroid
Mercury lab thermometer	Alcohol and mineral spirits glass bulbs, and digital
Mercury molecular motion device	Not at present time
Mercury sling psychrometer	Mineral spirits glass bulb thermometers, some can fit in old frames
Hg spectral tube	16 alternative gases are available
Mercury vacuum gauge	Needle or digital gauge
Zenker's solution (mercury chloride)	Zinc formalin
Colormetric chloride analysis	Ion-selective electrode method
Coulter cell counters	Mercury-free devices are available
Residual mercury may be present in drain traps and catch basins	Properly clean traps and basins. Recycle mercury
Formaldehyde or formalin	Formaldehyde-free preservatives
Solvents	Water-based or bio-based solvents

Recommended Policy

New measuring devices for classroom use must be mercury free. Discontinue the use of mercury measuring devices and mercury compounds. Do not perform classroom exercises that use mercury. When mercury-containing equipment needs replaced, use a non-mercury alternative. Recycle or dispose of spent equipment properly. Store all mercury and mercury compounds in a secure area.

Schools should take precautions to properly manage any mercury-containing compounds that are deemed necessary, including labeling the items and storing them to minimize risk.

The following controls apply to the labeling and storage of mercury and its compounds.

- Clearly label all containers of metallic mercury and its compounds.
- Do not store mercury near chemicals that can create explosive mixtures with mercury (e.g., acetylene, ammonia, boron phosphodiiodide, chlorine dioxide, methyl azide, and ground sodium carbide) or radioactive materials.
- Keep mercury compounds that are oxidizers separate from organic materials and other combustibles.
- Minimize the amount of mercury in use or in storage.
- Store liquid mercury in a cool place.
- Use containers made of impact-resistant material or put them in sturdy secondary containers.
- Keep mercury containers tightly closed when not in use.
- Avoid cutting cartons that contain plastic bottles filled with mercury. A plastic bottle could be torn open and cause a mercury spill.

If a science teacher feels that the experiment is absolutely necessary, determine if there are any videos of the experiment being performed or if the teacher can be taped performing the experiment and have the video shown to the students. Research other experiments that can demonstrate a chemical principle without using mercury.

If for some reason, the curricula developers for the science department require an experiment be completed using mercury, do the experiment at a microscale level using the minimum amount of mercury necessary to demonstrate the goal of the exercise. Use a fume hood and take precautionary steps to minimize the mercury exposure. Take extra care in collecting mercury from the experiment to assure it is managed properly. Any use of mercury in a classroom should be strongly discouraged.

Management Requirement

Schools may not purchase mercury or mercury-containing measuring devices for classroom use, as of April, 2007.

All waste must be examined carefully to determine if it is hazardous (OAC 3745-52-11), unless the waste is managed as a universal waste, defined below. Used mercury-containing devices that are recycled are not considered hazardous waste (OAC 3745-51-02(C)(3)).

Many mercury-containing products are hazardous. All hazardous waste destined for disposal must be sent to a permitted hazardous waste facility and cannot be disposed in a dumpster or a solid waste landfill. Records must be kept on hazardous waste for three years.

Universal wastes (OAC 3745-273) are hazardous wastes that have [specific management requirements](#). Universal wastes may be managed as universal waste without evaluation.

Future Requirements

U.S. EPA has defined all mercury-containing products as universal waste. Ohio is likely to adopt this rule in 2007.

Spill Risk

There is a recorded history of lab thermometer breaks and bulk elemental mercury spills in schools. Mercury-containing measuring devices handled by students have an increased risk of being broken. The air mercury concentrations of spilled mercury or mercury from a broken measuring device can go above the recommended safe threshold and a spill plan should be in place for mercury spills in school science classrooms and exercises.

Clean-up of mercury compounds should follow the directions provided by the supplier.

Resources

Bowling Green State University
Elemental Mercury Collection Program
www.bgsu.edu/offices/envhs/page18364.html
Phone: (419) 372-2173

Ohio EPA Office of Compliance Assistance and Pollution Prevention
List of Ohio Mercury Recyclers: www.epa.state.oh.us/opp/recyc/mercrec.html
Phone: (800) 329-7518

Ohio EPA Division of Hazardous Waste Management
Regulatory and Information Services
Division of Hazardous Waste Generator's Handbook: www.epa.state.oh.us/dhwm/pdf/Generator_Treatment_Guidance.pdf
Phone: (614) 644-2917

Guide to Mercury Issues for School Administrators

Mercury in the Home Economics Classrooms

Mercury product	Alternatives that are available
Mercury cooking thermometer	Spirit-filled glass bulb, and digital
Washing machine (power shut off)	Mechanical switch
Freezer light	Mechanical switch
Flame sensor on gas oven	Electronic ignition
Steam iron with 15 minute shut-off (tilt switch contains mercury)	Iron with non-mercury switch

Recommended Policy

Do not purchase new mercury-containing products for home economics classrooms. Discontinue the use of mercury cooking thermometers. When the mercury-containing equipment needs to be replaced, use a non-mercury alternative. Recycle or dispose of spent equipment properly.

Management Requirements

Mercury measuring devices, including mercury thermometers, may not be purchased for classroom use, as of April, 2007.

All waste must be examined carefully to determine if it is hazardous (OAC 3745-52-11), unless the waste is managed as a universal waste, defined below. Used mercury-containing devices that are recycled are not considered hazardous waste (OAC 3745-51-02(C)(3)). Mercury lamps and switches that are a part of an appliance are not regulated individually. If the appliance is recycled it is not considered hazardous waste.

Many mercury-containing products are hazardous. All hazardous waste destined for disposal must be sent to a permitted hazardous waste facility and cannot be disposed in a dumpster or a solid waste landfill. Records must be kept on hazardous waste for three years.

Universal wastes (OAC 3745-273) are hazardous wastes that have [specific management requirements](#). Universal wastes may be managed as universal waste without evaluation.

Future Requirements

U.S. EPA has defined all mercury-containing products as universal waste. Ohio is likely to adopt this rule in 2007.

Spill Risk

There is a recorded history of thermometers being broken in schools. If a cooking thermometer breaks in a high heat environment, such as an oven, there could be a risk of air mercury concentrations above the recommended safe threshold. A mercury spill plan should be in place.

Guide to Mercury Issues for School Administrators

Most mercury products that are components of appliances are unlikely to present much spill risk during normal operations. Nevertheless, a mercury spill plan should be in place for mercury spills in the home economics classroom.

Resources

Bowling Green State University
Elemental Mercury Collection Program
www.bgsu.edu/offices/envhs/page18364.html
Phone: (419) 372-2173

Ohio EPA Office of Compliance Assistance and Pollution Prevention
List of Ohio Mercury Recyclers: www.epa.state.oh.us/opp/recyc/mercrec.html
Phone: (800) 329-7518

Ohio EPA Division of Hazardous Waste Management
Regulatory and Information Services
Division of Hazardous Waste Generator's Handbook: www.epa.state.oh.us/dhwm/pdf/Generator_Treatment_Guidance.pdf
Phone: (614) 644-2917

Guide to Mercury Issues for School Administrators

Mercury in the Art Classrooms

Mercury product	Alternatives that are available
Cadmium vermillion red paint	Mercury-free and cadmium-free paint
Ceramic glazes	Lead and cadmium free glazes
Dyes (cold water and commercial)	Vegetable dyes
Inhalation hazards (e.g., clay in dry form, powdered paints, glazes, pigments, wheat paste and aerosol products)	Wet or liquid non-aerosol products
Instant paper-mache	Paper-mache made from black and white newspaper and library or white paste or flour and water paste
Solvent-based glues	Water-based glues
Solvent-based paints	Water-based paints
Permanent markers	Water-based markers
Polymer clay (designed to harden at conventional oven temperatures)	Paper-based, flour-based or wax-based clays
Low-temperature modeling clays (may contain glycol ethers or primary phthalate ethers)	Paper-based, flour-based or wax-based clays
True vermillion paint (contains mercury sulfide)	Mercury-free paint
Wood stains	Water-based wood stains
Moth repellants (for textiles)	Cedar chips, eucalyptus oil
Pigments used in printing inks, oils paints, and other media	Cadmium-free, lead-free and mercury-free alternatives are available
Solders for silver jewelry	Cadmium-free solder for silver jewelry
Stained-glass solders	Lead-free solder

Recommended Policy

Do not purchase new mercury-containing products for art classrooms. Discontinue use of mercury-containing products. When the mercury-containing products need replaced, use a non-mercury alternative. Recycle or dispose of waste products properly.

Guide to Mercury Issues for School Administrators

Management Requirements

All wastes must be examined carefully to determine if they are hazardous (OAC 3745-52-11). Many mercury-containing products are hazardous. All hazardous waste destined for disposal must be sent to a permitted hazardous waste facility and cannot be disposed in a dumpster or a solid waste landfill. Records must be kept on hazardous waste for three years.

Used mercury-containing materials are not considered hazardous waste when recycled (OAC 3745-51-02(C)(3)).

Resources

Ohio EPA Office of Compliance Assistance and Pollution Prevention

List of Ohio Mercury Recyclers: www.epa.state.oh.us/opp/recyc/mercrec.html

Phone: (800) 329-7518

Ohio EPA Division of Hazardous Waste Management

Regulatory and Information Services

Division of Hazardous Waste Generator's Handbook: www.epa.state.oh.us/dhwm/pdf/Generator_Treatment_Guidance.pdf

Phone: (614) 644-2917

Guide to Mercury Issues for School Administrators

Mercury in the Medical Technology Classrooms and School Medical Offices

Mercury product	Alternatives that are available
Fever thermometers	Digital, gallium-indium-tin (galinstan) thermometers, dot matrix thermometers
Blood pressure devices	Digital or aneroid
Topical disinfectants containing mercurochrome or tincture of meriolate*	Alcohol or hydrogen peroxide
Contact lens solution containing thimerosal, phenylmercuric acetate or phenylmercuric nitrate	Thimerosal-free, phenylmercuric acetate-free or phenylmercuric nitrate-free contact lens solution
Nasal sprays containing thimerosal, phenylmercuric acetate or phenylmercuric nitrate	Thimerosal-free phenylmercuric acetate-free or phenylmercuric nitrate-free nasal sprays

Recommended Policy

Do not purchase new mercury-containing products for medical technology classrooms or school medical offices. Discontinue the use of mercury-containing products. When the mercury-containing HVAC equipment needs to be replaced, use a non-mercury alternative. Recycle or dispose of spent equipment properly.

Management Requirements

New mercury thermometers and mercury and mercury measuring devices for K-12 classroom use may not be purchased, as of April, 2007.

All waste must be examined carefully to determine if it is hazardous (OAC 3745-52-11), unless the waste is managed as a universal waste, defined below. Used mercury-containing devices that are recycled are not considered hazardous waste (OAC 3745-51-02(C)(3)).

Many mercury-containing products are hazardous. All hazardous waste destined for disposal must be sent to a permitted hazardous waste facility and cannot be disposed in a dumpster or a solid waste landfill. Records must be kept on hazardous waste for three years.

Universal wastes (OAC 3745-273) are hazardous wastes that have [specific management requirements](#). Universal wastes may be managed as universal waste without evaluation.

Future Requirements

The U.S. EPA has defined all mercury-containing products as universal waste. Ohio is likely to adopt this rule in 2007.

Spill Risk

There is a recorded history of thermometers being broken in schools. A mercury spill plan should be put in place to address potential spills.

Guide to Mercury Issues for School Administrators

If a blood pressure device (sphygmomanometer) is broken, spill procedures should go into effect immediately and the room should be evacuated. The air mercury concentrations of spilled mercury from a broken blood pressure device can go above the recommended safe threshold. A spill plan should be in place for mercury spills in medical technology classrooms and school medical offices.

For other mercury-containing products follow the directions on the container for cleaning a spill.

Resources

Bowling Green State University
Elemental Mercury Collection Program
www.bgsu.edu/offices/envhs/page18364.html
Phone: (419) 372-2173

Ohio EPA Office of Compliance Assistance and Pollution Prevention
List of Ohio Mercury Recyclers: www.epa.state.oh.us/opp/recyc/mercrec.html
Phone: (800) 329-7518

Ohio EPA Division of Hazardous Waste Management
Regulatory and Information Services
Division of Hazardous Waste Generator's Handbook: www.epa.state.oh.us/dhwm/pdf/Generator_Treatment_Guidance.pdf
Phone: (614) 644-2917

Guide to Mercury Issues for School Administrators

Non-Educational Mercury-Containing Items

Mercury product	Alternatives that are available/Proper management
Mercury gauges	Electronic or aneroid gauges
Light switches ("silent" switches)	New light switches don't contain mercury
Mercury switches and relays	Switches and relays with electronic
Mercury thermostat probes and flame sensors	Hard-contact switches, inductive sensors, capacitive sensors, photoelectric sensors, and ultrasonic sensors
Old latex paint (purchased prior to 1992)	Properly dispose, new latex indoor paints do not contain mercury added fungicides
Fungicides (purchased prior to 1994)	Properly dispose
Pesticides (purchased prior to 1994)	Properly dispose
Mercury oxide or mercury zinc batteries (old alkaline type, prior to 1996) and button batteries	Non-mercury batteries
Amulets with mercury	Consult cultural or religious advisor for appropriate alternatives

Recommended Policy

Do not purchase new mercury-containing products with the exception of low-mercury lighting products. Purchase the most efficient low-mercury lighting product when necessary. When mercury-containing equipment needs to be replaced, use a non-mercury alternative. Recycle or dispose of spent equipment properly. Mandate that students NOT wear or bring in amulets containing mercury to school.

Management Requirements

Ohio law does not allow the sale of mercury or mercury measuring devices for K-12 classroom, or the sale of mercury novelty items.

All waste must be examined carefully to determine if it is hazardous (OAC 3745-52-11), unless the waste is managed as a universal waste, defined below. Used mercury-containing devices that are recycled are not considered hazardous waste (OAC 3745-51-02(C)(3)).

Many mercury-containing products are hazardous. All hazardous waste destined for disposal must be sent to a permitted hazardous waste facility and cannot be disposed in a dumpster or a solid waste landfill. Records must be kept on hazardous waste for three years.

Universal wastes (OAC 3745-273) are hazardous wastes that have [specific management requirements](#). Universal wastes may be managed as universal waste without evaluation. Mercury thermostats, fluorescent and HID lamps, batteries, and pesticides should be managed as universal waste (UW).

Guide to Mercury Issues for School Administrators

For universal waste, label an appropriate container Universal Waste and record the date when the first used item is placed in the container. Universal waste may be stored on-site for up to a year of when accumulation first began and is required to be managed by a universal waste destination facility or recycler.

Universal Waste Guidance: (www.epa.state.oh.us/dhwm/pdf/New_Universal_Waste_Guidance.pdf)
Universal Waste Rules for Handlers of Lamps: (www.epa.state.oh.us/dhwm/pdf/Universal_Waste_Rules_for_Handlers_of_Lamps.pdf)

Future Requirements

U.S. EPA has defined all mercury-containing products as universal waste. Ohio is likely to adopt this rule in 2007.

Spill Risk

There is a potential for thermostats to be broken in schools. The air mercury concentrations of spilled mercury from a broken thermostat can go above the recommended safe threshold and a spill plan should be in place for the thermostats.

A broken fluorescent lamps, poses little spill risk. It should be cleaned up and put into an appropriate container for universal waste management.

Most other uses of mercury are unlikely to present much spill risk during normal operations. However, a spill plan should be in place.

Resources

Bowling Green State University
Elemental Mercury Collection Program
www.bgsu.edu/offices/envhs/page18364.html
Phone: (419) 372-2173

Ohio EPA Office of Compliance Assistance and Pollution Prevention
List of Ohio Mercury Recyclers: www.epa.state.oh.us/opp/recyc/mercrec.html
Phone: (800) 329-7518

Ohio EPA Division of Hazardous Waste Management
Regulatory and Information Services
Division of Hazardous Waste Generator's Handbook: www.epa.state.oh.us/dhwm/pdf/Generator_Treatment_Guidance.pdf
Phone: (614) 644-2917

Mercury in rubberlike/polymer flooring

Mercury product	Alternatives that are available
3-M Tartan brand flooring, rubber-like flooring	Non-mercury alternative, dispose of properly

3-M Tartan brand flooring and other rubber-like gym floors used in schools may contain mercury. The 3M Tartan Brand floor covering is a solid, rubber-like polymer floor covering developed in the 1960s and promoted as a substitute for and improvement over wood flooring in gymnasiums; and as a durable running surface for both indoor and outdoor track and field facilities. These rubber-like polymer floorings were installed in a large number of elementary and secondary schools through the early 1970s and mid 1980s. During the production of Tartan flooring, mercury was used as a catalyst to help the mixture maintain a soft texture. Typically, Tartan flooring contained 0.1 percent to 0.2 percent mercury.

Health Concern

Tartan floors are capable of emitting mercury vapors. In some instances, the Tartan floors were shown to release mercury above the recommended ATSDR level. Items that have been in contact with these floors for long periods of time may also emit mercury vapor.

Recommended Policy

The Ohio Department of Health (ODH) recommends schools examine their facilities to determine if they have a rubber-like gym floor. If the floor is in a school facility, ODH recommends that the school obtain the services of an environmental contractor to determine whether vapor emissions are an issue. If levels are elevated, the school should evaluate the feasibility of removing the floor and replacing it with an alternative product. When flooring needs to be replaced, choose one that does not use mercury-containing substances.

Management Requirements

The flooring must be evaluated to determine if it is hazardous (OAC 3745-52-11) before it is disposed. Review the material safety data sheets (MSDS) to determine if mercury was used in setting the floor and/or have the flooring analyzed using the toxic characteristics leaching procedure (TCLP) test. The rubberized flooring may contain mercury and could be hazardous. All hazardous waste destined for disposal must be sent to a permitted hazardous waste facility and cannot be disposed in a dumpster, a solid waste landfill, or a construction and demolition landfill. Records must be kept on hazardous waste for three years.

Resources

Ohio Department of Health
 Health Assessment Section
 Phone: 614-466-1390

Ohio EPA Division of Hazardous Waste Management
 Regulatory and Information Services
 Phone: (614) 644-2917

Guide to Mercury Issues for School Administrators

Mercury in Lighting

Mercury product	Alternatives that are available
Fluorescent lamps	Low mercury fluorescent lamps are available. They are often marked by green ends or green etching on the bulb
Mercury vapor lamps	Alternative high intensity discharge lamp
Metal halide lamps	No alternative; properly recycle
High-pressure vapor sodium lamps	Non-mercury, high pressure sodium lamps
Light switches ("silent" switches)	New light switches don't contain mercury

Fluorescent, metal halide, neon, high-intensity discharge, mercury vapor lamps, and most high pressure sodium lamps contain mercury.

Recommended Policy

Purchase low-mercury fluorescent lamps. Check with the manufacturer or distributor of "green marked" lamps to determine the actual mercury content. Choose a lamp with the lowest mercury content, because some green-marked lamps are not low mercury. For other lighting needs, purchase non-mercury or low mercury alternatives as available. Recycle all lamps at end of life under the universal waste rules.

Management Requirements

All wastes must be evaluated to determine if they are hazardous (OAC 3745-52-11), unless the waste is managed as a universal waste. Many mercury-containing products are hazardous. All hazardous waste destined for disposal must be sent to a permitted hazardous waste facility and cannot be disposed in a dumpster or a solid waste landfill. Records must be kept on hazardous waste for three years.

Used mercury-containing devices are not considered hazardous waste when recycled (OAC 3745-51-02(C)(3)). Fluorescent and HID lamps should be managed as universal waste (UW). Universal wastes (OAC 3745-273) are hazardous waste that have alternative management requirements.

Label lamps universal waste lamps, waste lamps or used lamps and record the date when the first used lamp is placed in the container. Universal waste may be stored on-site for up to a year of when accumulation first begins and need to be managed by a universal waste destination facility or recycler.

Guide to Mercury Issues for School Administrators

Spill Risk

A broken fluorescent lamp poses little spill risk. It should be cleaned up and put into an appropriate container for universal waste management.

Resources

Ohio EPA Office of Compliance Assistance and Pollution Prevention

List of Ohio Mercury Recyclers: www.epa.state.oh.us/opp/recyc/mercrec.html

Phone: (800) 329-7518

Ohio EPA Division of Hazardous Waste Management

Regulatory and Information Services

Division of Hazardous Waste Generator's Handbook: [www.epa.state.oh.us/dhwm/pdf/](http://www.epa.state.oh.us/dhwm/pdf/Generator_Treatment_Guidance.pdf)

[Generator_Treatment_Guidance.pdf](http://www.epa.state.oh.us/dhwm/pdf/Generator_Treatment_Guidance.pdf)

Phone: (614) 644-2917

Universal Waste Guidance: www.epa.state.oh.us/dhwm/pdf/New_Universal_Waste_Guidance.pdf

Universal Waste Rules for Handlers of Lamps: [www.epa.state.oh.us/dhwm/pdf/](http://www.epa.state.oh.us/dhwm/pdf/Universal_Waste_Rules_for_Handlers_of_Lamps.pdf)

[Universal_Waste_Rules_for_Handlers_of_Lamps.pdf](http://www.epa.state.oh.us/dhwm/pdf/Universal_Waste_Rules_for_Handlers_of_Lamps.pdf)

MANAGEMENT AND DISPOSAL OF MERCURY-ADDED PRODUCTS

Never throw mercury products directly into the trash or dumpster, or down the drain.

Recycling is the recommended method of managing mercury-added products at the end of their lives. Mercury-containing materials that are not recycled may be managed under universal waste rules (OAC 3745-273). If the mercury-containing materials are not handled as universal waste, they must be evaluated to determine if they are hazardous. If the material is considered hazardous, and not recycled, it must be disposed as hazardous waste.

Recycling Mercury Products

The simplest way to manage mercury devices is to recycle them. By recycling the mercury-containing product, the school does not need to determine whether the products would be considered hazardous waste when they are disposed.

Used mercury-containing devices that are recycled are considered characteristic by-products. According to OAC 3745-51-02(C)(3), characteristic by-products are not wastes and hence not a hazardous waste when reclaimed. However, if mercury-containing devices are accumulated speculatively as defined in OAC 3745-51-02(C)(8); or used in a manner constituting disposal as described in OAC 3745-266-20, this recycling exclusion does not apply.

The Bowling Green State University offers a free elemental mercury collection and recycling program. For more information about the BGSU elemental mercury collection and reclamation program is located at www.bgsu.edu/offices/envhs/page18364.html or you may call the Department of Environmental Health and Safety, BGSU at (419) 372-2173.

Ohio EPA's Office of Compliance Assistance and Pollution Prevention (OCAPP) also maintains a list of Ohio Mercury Recyclers at www.epa.state.oh.us/opp/recyc/mercrec.html or you may call OCAPP at (800) 329-7518.

Universal Waste

Universal wastes (UW) are specific hazardous waste streams that a generator can choose to manage in an alternative manner in place of the more complex hazardous waste requirements. Universal wastes are generated by numerous businesses, typically in small quantities. UW categories that may have a mercury component include:

- batteries;
- lamps;
- pesticides; and
- mercury-containing thermostats.

The Universal Waste Rules (UWRs), OAC 3745-273, are intended to promote recycling as well as proper disposal by easing certain regulatory requirements. Businesses operating in Ohio should follow Ohio's UWRs, located in OAC Chapter 3745-273 (www.epa.state.oh.us/dhwm/l_ruwm.html).

Guide to Mercury Issues for School Administrators

A waste must be a hazardous waste before it can be a universal waste. If a hazardous waste stream is not managed as a universal waste, then the waste must be managed as a hazardous waste under the applicable hazardous waste regulations.

On August 5, 2005, U.S. EPA added mercury-containing equipment to the list of universal wastes. Some common devices are thermometers, barometers, manometers, mercury switches, pressure gauges, and sprinkler system contacts.

Ohio EPA's Division of Hazardous Waste Management expects to propose this rule in July 2007 with an effective date in November 2007. For more information about these changes, see the Division of Hazardous Waste Management's Web site at www.epa.state.oh.us/dhwm/2005all.html. If you will be recycling used mercury-containing equipment and you want to manage it as a universal waste before the rule becomes effective, you can.

The universal waste program is managed by Ohio EPA's Division of Hazardous Waste Management (DHWM). For more information, see DHWM's guidance "Universal Waste," available at: www.epa.state.oh.us/dhwm/pdf/New_Universal_Waste_Guidance.pdf.

For more information on management requirements for fluorescent lamps; see the "Universal Waste Rules for Handlers of Lamps" guidance material available through the DHWM Web site at: www.epa.state.oh.us/dhwm/pdf/Universal_Waste_Rules_for_Handlers_of_Lamps.pdf.

Hazardous Waste

Other mercury-containing devices that can no longer be used or recycled may be considered wastes. All wastes must be evaluated to determine if they are hazardous (OAC 3745-52-11) before they are disposed. Many mercury-containing products are hazardous. All hazardous waste destined for disposal must be sent to a permitted hazardous waste facility and cannot be disposed in a dumpster or a solid waste landfill. Record keeping for hazardous wastes is three years.

A material safety data sheet may be used to review the waste materials properties or it may be necessary to determine if the waste is characteristically hazardous due to toxicity using the toxicity characteristic leaching procedure.

To learn more about how to properly evaluate wastes, see Chapter 2 of Ohio EPA's Hazardous Waste Generator Handbook at www.epa.state.oh.us/dhwm/pdf/gen_handbook.pdf or OCAPP's online fact sheet titled, "Identifying Your Hazardous Waste" at www.epa.state.oh.us/ocapp/sb/publications/identifyingwaste.pdf.

Toxic Characteristics Leaching Procedure (TCLP)

The TCLP is designed to identify materials that should be treated as hazardous waste by determining the amount of chemical that is likely to leach out of the material once it is placed in a landfill. A material leaching mercury at a concentration above 0.2 milligrams per liter (mg/l) in this test must be managed as a hazardous waste.

MERCURY SPILLS

Mercury spills occur in schools and can be very expensive to clean. They pose a health risk and can disrupt classes.

Simply stated, a school should be prepared to respond to spills for all the chemicals it uses. A school can minimize the chance of a spill and should have a spill plan in place for a potential spill. When a spill occurs; there are clear steps that should be followed to protect the safety of students and teachers. There are also appropriate and inappropriate ways to address spills once the area is secured. After the spill is eliminated, the school should take the opportunity to review how well it reacted to the spill situation, whether it followed its own procedures and make improvements accordingly. A school mercury spill plan will address these issues and prepare you for the inevitable questions from the public and school administration.

"[Mercury Spills: All Eyes on You](#)" in Appendix C provides an excellent description of the nature and costs of mercury spills.

The mercury spills information is broken down into 3 sections.

- What to do before a mercury spill.
- What to do when mercury spills.
- What to do after the mercury spill.

What To Do Before A Mercury Spill

The best time to address mercury spills is before a spill occurs. The school should develop a mercury spill plan. The goal is to avoid a spill, but be prepared if one would occur. A spill plan should discuss spill prevention and spill clean-up procedures. This section covers the following topics.

- Removing unnecessary mercury.
- Handling procedures/train staff.
- Label and storage procedures.
- Have spill procedures in place.
- Choosing a mercury abatement contractor.
- Confirm insurance coverage.

***DON'T WAIT UNTIL
YOU HAVE A SPILL
TO CHOOSE A SPILL
CONTRACTOR!!***

Removing Unnecessary Mercury

If your school is not mercury-free, there is always a chance for a mercury spill. The simplest way to reduce the risk of a spill is to remove unnecessary sources of mercury. Educate students so that they do not bring mercury or mercury products into the school.

A private school in Northwest Ohio was vandalized in December 2005. A typical 250 cc container (approximately 5 pounds) of mercury, and many other chemicals, were vaporized when a gasoline bomb exploded in the chemical storage room starting a fire. The heat of the fire destroyed the storage room and sent the vaporized mercury up between the drop ceiling and the roof and through the entire school building. An active ventilation system further spread the contamination. As the mercury-contaminated soot and smoke dropped throughout the interior of the building, it contaminated everything within the building, including inside closed drawers and cabinets. Almost everything was lost because of mercury contamination. When clean-up began, the soot was off-gasing, emitting mercury from 60,000 to 70,000 ng/m³ mercury (1000 ng/m³ - 3000 ng/m³ is the acceptable threshold for a school).

For the clean-up, all contents in the school were removed, including the school books, furniture, carpeting, electronics, and musical instruments. The school had a large insurance policy which covered the equipment and materials with educational value. Personal items were not covered by the insurance. The total cost of response, decontamination, reconstruction and equipment replacement is estimated to be over \$5 million.

The school finished the 2005 school year in an alternative location while the property was remediated. The cleaned school was reopened in August 2006.

Handling Procedures/Train Staff

Training staff and students who use mercury or mercury-containing devices on proper handling procedures can greatly reduce the chance of a spill. Always use secondary containment when moving or working with mercury-containing devices. Storing mercury and mercury-containing devices in proper containers and under lock and key are good practices.

Label and Storage Procedures

The following controls apply to the labeling and storage of mercury and its compounds. • Minimize the amount of mercury in use or in storage.

- Use containers made of impact-resistant material or put them in sturdy secondary containers.
- Clearly label all containers of metallic mercury and its compounds.
- Keep mercury containers tightly closed when not in use.
- Store liquid mercury in a cool place.
- Do not store mercury near chemicals that can create explosive mixtures with mercury (e.g., acetylene, ammonia, boron phosphodiiodide, chlorine dioxide, methyl azide, and ground sodium carbide) or radioactive materials. Keep mercury compounds that are oxidizers separate from organic materials and other combustibles.
- Avoid cutting cartons that contain plastic bottles filled with mercury. A plastic bottle could be torn open and cause a mercury spill.
- The chemical storage area should have a secondary containment.
- The chemical storage area should be locked when not in use.

Have Spill Procedures in Place

Provide clear guidance on what to do in the case of a spill. Make sure that all staff understand the spill procedures that are in place. Provide guidelines for students. The "[What to do when mercury spills](#)" [Pg. 33] can be used for your spill procedures for mercury.

Confirm Insurance Coverage

Contact your insurance company to determine if your school has adequate insurance coverage in the event of a mercury or other hazardous substance spill. Many insurance companies may not provide this coverage under their standard policies.

Choosing a Mercury Abatement Contractor

- adopted from OSPPERA's "Choosing a Mercury Contractor" fact sheet

It is important to choose a contractor prior to a mercury release. Choose a spill contractor carefully, because all contractors are not the same. An established relationship can help the school and contractor communicate more effectively if a spill should occur.

Contact your Ohio EPA district office for recommendations of mercury abatement (mercury spill) contractors with a good reputation and who have the appropriate equipment. The Ohio Spill Planning, Prevention and Emergency Response Association (OSPPERA) also maintains a list of contractors and the air monitoring equipment they have.

Ask the contractor for many references. Contact as many of the references as needed to evaluate the contractor. Ask questions about the company's employees, its professionalism, and the effectiveness of the cleanup. A knowledgeable staff is important for abating mercury spills. There is no certification process for spill contractors, so the school administrator needs to do the research.

For mercury contractors to be effective, they must have appropriate collection and monitoring equipment. A mercury vacuum collects mercury and filters mercury vapors, without spreading the mercury contamination. Other types of vacuums, including HEPA, household, and shop vacuums do not filter the mercury vapors and will spread mercury contamination, increasing the severity of the spill.

Monitoring equipment is also very important and is the only way to determine the concentration of mercury vapors in the air. The Occupational Safety and Health Administration (OSHA) requirements for industrial settings only require the use of a Jerome® meter. However, this may not be able to get down to the air levels needed for a residential, school or commercial setting. Contractors will need access to a Lumex® or other more sensitive air monitoring equipment to determine if safe air levels are achieved. Gilian pumps and sampling tubes also are sensitive enough to be used to perform closure sampling, but take more time to provide mercury air concentration information and may need to be sent in to a laboratory to determine the mercury concentration.

Ask what type of mercury meter the contractor uses: A Jerome meter may not be sensitive enough

Understand the clean-up levels that will be expected before a spill occurs. OSPPERA recommends that a contractor signs a statement provided to the school certifying that they follow U.S. EPA action levels for clean-up. U.S. EPA has a guidance document for spill clean-ups that should be used. (www.epa.gov/epaoswer/hazwaste/mercury/faq/spills.htm#less)

Schools and potentially affected businesses should identify qualified contractors before there is a spill. The businesses should review who is qualified. General spill contractors for a business may not be the appropriate company to clean up a mercury spill, especially in a school or residential setting.

Guide to Mercury Issues for School Administrators

It is also important for the contractor to carry enough insurance to protect the liability of both the contractor and the school. OSPPERA recommends general liability, errors and omissions, pollution liability, automotive, and workers compensation insurances and the ability to name clients as "additionally insured."

In summary, you should find out.

- How many mercury spills has the contractor responded to.
- If they have good references.
- If the staff trained effectively.
- What clean-up standards does the contractor use.
- If they have a mercury vacuum and adequate monitoring equipment.
- If they have appropriate insurance.

Once you chose a contractor, invite them to your school so they can become familiar with mercury issues there. Show them where it is used and stored. Do everything you can to minimize any confusion that could occur during an actual spill response.

Case Study

In 2005, a Northeast Ohio middle school hired a contractor for a mercury spill clean-up. The contractor cleaned the spill to the OSHA Industrial level of 25 ug/m³. After the school contacted the local health department and Ohio EPA, they decided that they wanted the school cleaned to the more protective level recommended for residences. The contractors had a Jerome meter which was not sensitive enough to determine if the new target levels were reached, and so could not complete the cleanup. Another contractor was used to complete the abatement. This confusion could have been avoided if both the school administrator and the contractors understood and agreed upon the desired clean-up levels before cleanup began.

Understanding recommended mercury action levels

Mercury action or screening levels are concentrations of mercury in the air established by regulatory and public health agencies. These thresholds establish what levels of mercury in the air require immediate evacuation or are assumed to be safe.

The involvement of multiple health and environmental jurisdictions creates a need for consistency in presenting health risk information. The Agency for Toxic Substances and Disease Registry (ATSDR), at the request of state health departments and U.S. EPA, developed recommendations on action levels for various response activities under different exposure scenarios. Action levels differ according to differing populations, exposure durations, concentrations, and specific hazards involved in a spill situation. ATSDR's case study on Indoor Mercury Vapors in Homes or Businesses with Indoor Gas Regulators explains action levels in more detail and is available at: www.atsdr.cdc.gov/hac/pha/resmerc/nic_p1.html. Appendix D provides the screening levels or suggested action levels for Mercury in residential and occupational settings.

The goal of cleanups is to remove the sources of mercury vapor so the air concentrations approach as close as possible to zero. However, complete removal of a mercury vapor source may not be actually or economically possible. Sometimes surfaces are sealed to prevent any further volatilization.

The Ohio Department of Health recommends 1-3 ug/m³ as the screening level for schools and day care centers. School screening levels may be adjusted based on a number of contributing factors including the age of students, pregnancy and other factors such as room use.

WHAT TO DO WHEN MERCURY SPILLS

Mercury that was played with or mercury from a spill that was walked through and tracked on shoes to other places, can contaminate buses, vehicles, student's homes, or anywhere people went after stepping in the mercury. When mercury is spilled, school staff and students need to determine if the spill was successfully contained at its point of origin.

**DO NOT ATTEMPT TO CLEAN UP THE SPILL!
NEVER USE A HOUSEHOLD VACUUM CLEANER
OR SHOP VAC TO CLEAN UP MERCURY!**

**These devices will spread mercury vapors, increase the health risk,
and make the spill more difficult to clean.**

1. **EVACUATE THE SPILL AREA AND DIRECT EVERYONE TO AVOID THE SPILL.** Secure the scene (lock the door or use barrier tape for example) and restrict admission to those persons necessary to clean up the spill. Take students and staff to a nearby room to wait for monitoring.
2. **LOWER THE TEMPERATURE IN THE SPILL AREA** by turning down the thermostat. The cooler the temperature, the less mercury vapors will be released into the air.
3. **TURN OFF VENTILATING OR AIR CONDITIONING SYSTEMS** that could circulate air from the spill area to other parts of the building. If the HVAC in the spill area cannot be turned off, it may be necessary to turn off the HVAC for the entire building. Failure to do so could result in mercury vapors being circulated throughout the building.
4. **CLOSE INTERIOR DOORS** leading to other inside areas. Open exterior doors and windows.

CAUTION: Mercury vapors are absorbed through the lungs into the bloodstream and are especially hazardous. In some extreme situations, even very small amounts of metallic mercury (several drops) may raise air concentrations to harmful levels. Mercury vapors are also heavier than air and may linger in higher concentrations close to the floor. Be aware that young children who are already at the highest exposure risk, crawl or play in these areas.

5. **CONTACT THE SCHOOL ADMINISTRATOR**
6. **CALL YOUR FIRE DEPARTMENT - DIAL 911**
7. **CALL YOUR LOCAL HEALTH DEPARTMENT**

Phone number of Local Health Department:

The local health department should be called on every spill where people are or may have been impacted. It will simplify the job of the school administrator to bring them in early so they can be in the decision process to help determine when the spill is considered cleaned and the school is "cleared" for use. The health department is required to clear the building once the cleanup is completed.

8. REPORT THE SPILL TO OHIO EPA

Spill Hotline Number: (800) 282-9378

All mercury spills should be reported and assistance requested. Ohio EPA staff can assist the school in determining the level of cleanup necessary, sometimes over the phone. By reporting spills, schools gain access to people experienced with mercury spills. Ohio EPA'S on-scene coordinators can immediately help coordinate efforts with local health departments and contractors. A spill well managed from the start minimizes impacts and costs.

9. CONTACT A SPILL ABATEMENT CONTRACTOR

Phone number of mercury abatement contractor:

Ohio EPA recommends calling a qualified mercury cleanup company to clean larger mercury spills, when mercury has been tracked or anytime a member of a sensitive population is involved.

Clean up of any mercury should be performed by trained and qualified personnel. Never attempt to clean up a mercury spill without proper training and personal protective equipment. Cleanup personnel can be subject to very high mercury levels during cleanup, often exceeding OSHA Permissible Exposure Limits. There is no way to determine mercury levels in air without a mercury-monitoring device. If you are not monitoring air for mercury, an air-purifying respirator equipped with mercury cartridges should be worn.

10. ADDRESS INDIVIDUALS WHO WERE EVACUATED

Anyone who was evacuated from the spill area should be moved to a nearby but separate location. Anyone who came into contact with the mercury should immediately wash the contacted areas with soap and warm water. The only way to know if personal items were contaminated is to scan with monitoring equipment.

Allow spill responders to determine if shoes, clothing, or other articles have been splashed with mercury. If mercury came in contact with clothing or shoes, the items will need to be removed and placed in a sealed plastic bag (one per individual). Each bag should be clearly marked with the person's name and phone number. Contractors should have an inventory sheet showing what was taken from each person. This is especially important for contractors when they scan and, if necessary, decontaminate items taken from impacted persons early in the incident. The bags may be placed outside or taken away for decontamination.

WHAT TO DO AFTER MERCURY SPILLS

The local health department needs to grant clearance to the room for a return to use. This is typically achieved when the mercury air concentrations are considered within acceptable limits. Air monitoring is required to determine the effectiveness of the cleanup. If a contractor is used, they should achieve the mercury air concentrations that were agreed upon prior to the spill.

Air samples are taken in the "breathing zone" by using NIOSH Method 6009 or by real time air monitoring equipment. ATSDR set forth guidelines for acceptable levels of mercury in the air. Appendix D provides a summary of these limits.

Contacting Poison Control

Contact Ohio's Poison Control Center with questions on the toxicity of mercury or to assist anyone that interacted with the mercury who wishes more information. They can provide recommendations on follow-up after a mercury spill.

Funding of clean-ups

Many insurance companies are discontinuing coverage for mercury and other hazardous substance spills. You should already know your insurance company's policy on the school. If you do not know, you should review your policy.

U.S. EPA also provides other resources for communities, including possible grant opportunities through the Local Governments Reimbursement (LGR) Program, the Great Lakes National Program Office (GLNPO), and the Environmental Education (EE) Grants Program. The LGR Grants are available to local governments for up to \$25,000 for costs related to mercury and other hazardous substance spills. GLNPO grants are available for furthering protection and cleanup of the Great Lakes ecosystem. EE Grants support environmental education projects and increase public awareness and knowledge about environmental issues. To obtain specific grant information and application procedures, visit the U.S. EPA Web site at www.epa.gov.

Working With the Media After a Mercury Spill

When developing a policy for media relations about mercury issues, including spills, the phrase of the day should be "Be Prepared." Designate a location and a spokesperson for your organization, as well as someone to write news releases and advisories. It could be the same person, but in a crisis, it may be helpful to assign help. Make sure enough people are assigned to make copies of statements or news releases, send faxes, hook up equipment, and perform the duties needed for quick response. Choose a place that aids reporters in getting their information, while keeping them out of the way of the clean up site. Be sure there is enough room for cameras to set up, outlets for hook-up, if someone is doing a presentation and wants to demonstrate where information is available on the Internet, your response area may need to be Internet capable. Most schools have emergency procedures in place that include a plan for these measures. Be sure the players are familiar with the plan, and if possible, have them do drills to practice their responses. Establish a policy for which staff will take media questions for mercury issues and be sure everyone in your organization knows who that individual will be, and what to do if they are contacted first. Make sure you have a component in your plan to address rumor control and people designated to take community calls to address them.

Guide to Mercury Issues for School Administrators

Be proactive. Develop template news releases that could be used as a starting point in the event of an emergency. Leave spaces for locations, contacts, dates and other details that can be filled in when and if the document is ever needed.

When there are follow-up questions at a press event, don't rely on the reporter to ask the right ones. Interject points that are important to convey your school's perspective. If there is something pertinent that the reporter hasn't asked about, bring it up. Remember you are always on the record, even after the camera or recorder is off. Keep your answers short and concise and don't try to fill "dead air."

RESOURCES

Ohio Mercury Reduction Group

The Ohio Mercury Reduction Group (OMRG) is a network of State Agencies, local health departments, spill clean-up trade association and the Bowling Green State University (mercury collection program). OMRG's primary goal is to protect the environment and public health in Ohio against mercury exposure and the adverse effect of mercury. OMRG members work to promote the reduction of mercury and to ensure the proper management of mercury in Ohio. Educational information is available at www.epa.state.oh.us/opp/mercury_pbt.html.

OMRG members have produced educational resources on mercury reduction and spill response, including "Mercury the Magic Metal," an eight-minute video that illustrates the emission of mercury vapor and provides an introduction to mercury risks, "Mercury awareness for school teachers" fact sheet, and this document.

OMRG members can help schools develop mercury reduction programs, remove elemental mercury and mercury products, and advise schools on understanding mercury regulations. OMRG member information is available at www.epa.state.oh.us/opp/mercury_pbt/omrg.html or you may call Ohio EPA, Office of Compliance Assistance and Pollution Prevention at (800) 329-7518.

Bowling Green State University Elemental Mercury Collection and Reclamation Program

The Bowling Green State University (BGSU) elemental mercury collection and reclamation program began formally in January 1998. The program coordinates the collection of uncontaminated elemental mercury. The program is free to anyone having unwanted, uncontaminated elemental mercury. BGSU can arrange to come to a school to collect the mercury and mercury products. More information is located at www.bgsu.edu/offices/envhs/page18364.html or you may call the Department of Environmental Health and Safety, Bowling Green State University at (419) 372-2173.

Ohio Department of Health

The Ohio Department of Health, Health Assessment Section's (HAS) mission is to use the best environmental science to provide accurate health information and take public health actions to prevent harmful exposures and disease related to toxic substances. Working together with regulatory agencies, HAS can provide recommendations to schools about mercury spill cleanup options and determine health safety standards for school re-occupancy. The Ohio Department of Health's Health Assessment Section may be reached at (614) 466-1390.

Ohio EPA Office of Compliance Assistance and Pollution Prevention

The Office of Compliance Assistance and Pollution Prevention (OCAPP) has produced a variety of information on mercury reduction, including brochures for school teachers and administrators and households. OCAPP also distributes the video "Mercury the Magic Metal," an eight-minute video that illustrates mercury vapors and provides an introduction to mercury risks. OCAPP staff can also directly assist organizations developing mercury reduction programs. More information about the mercury resources available through OCAPP is located at www.epa.state.oh.us/ocapp/p2/mercury_pbt/mercury.html or you may call Ohio EPA, Office of Compliance Assistance and Pollution Prevention at (800) 329-7518.

OCAPP also maintains a list of mercury recyclers at www.epa.state.oh.us/opp/recyc/mercrec.html.

Guide to Mercury Issues for School Administrators

Ohio EPA Spill Responders and Hotline number

Ohio EPA district offices are excellent resources with a great deal of expertise about mercury spill avoidance and response.

Ohio EPA district offices may be contacted at:

Central District Office
Lazarus Government Center
50 West Town Street, Suite 700
Columbus, Ohio 43215
Telephone: (614) 728-3778

Northeast District Office
2110 East Aurora Road
Twinsburg, Ohio 44087
Telephone: (330) 963-1200

**The Ohio EPA spill hotline number is:
(800) 282-9378**

Northwest District Office
347 N. Dunbridge Road
Bowling Green, Ohio 43402
Phone: (419) 352-8461

Southwest District Office
401 East Fifth Street
Dayton, Ohio 45402
Phone: (937) 285-6357

Southeast District Office
2195 Front Street
Logan, Ohio 43138
Phone: (740) 385-8501

Ohio EPA's spill hotline is an important phone number and vital to have available for hazardous material release emergencies. It is staffed 24 hours a day, every day of the year. **The Ohio EPA spill hotline number is (800) 282-9378.**

U.S. EPA

Similar to Ohio EPA's response program, U.S. EPA's On-Scene Coordinators have vast spill response experience related to mercury and can offer useful advice on practical ways to handle a spill or manage contained elemental mercury. U.S. EPA has a two-hour presentation on spill response and touches that includes mercury pollution prevention issues that could be provided to schools.

U.S. EPA also provides other resources for communities, including possible grant opportunities through the Local Governments Reimbursement (LGR) Program, the Great Lakes National Program Office (GLNPO), and the Environmental Education (EE) Grants Program. The LGR Grants are available to local government for up to \$25,000 to cover costs related to mercury and other hazardous substance spills. GLNPO grants are available for furthering the protection and cleanup of the Great Lakes ecosystem. EE Grants support environmental education projects and increase public awareness and knowledge about environmental issues. To obtain specific grant information and application procedures, visit the U.S. EPA Web site at www.epa.gov.

For more information related to spill response, please contact U.S. EPA's Cleveland office at (440) 250-1743. For more information regarding other mercury contamination and risk-reduction issues, contact U.S. EPA's Region 5 Office, Chicago at (312) 353-2000.

Other States

Many states are actively working to address mercury issues and they can be great resources for developing mercury reduction programs. They are a valuable source of case studies and information on mercury reduction activities.

- Mercury Pollution Prevention for POTWs: WLSSD Blueprint for Mercury Elimination
www.wlssd.duluth.mn.us/publications/Blueprint%20for%20mercury/HG1.HTM
- Alternatives to Mercury-containing Products: Wisconsin's Mercury Source Book
www.epa.gov/glnpo/bnsdocs/hgsbook/index.html
- Indiana Department of Environmental Management Mercury Page
www.in.gov/idem/your_environment/mercury/
- Illinois Department of Public Health
<http://app.idph.state.il.us/envhealth/mercury/>
- Michigan Department of Environmental Quality Mercury Page
www.michigan.gov/deq/0,1607,7-135-3585_4127_4175--,00.html
- Minnesota Pollution Control Agency Mercury Page
www.pca.state.mn.us/air/mercury.html
- Wisconsin Department of Natural Resources -- Mercury in the Environment
www.dnr.state.wi.us/org/caer/cea/mercury/
- Mercury in Schools Page
www.mercuryinschools.uwex.edu/
- Northeast Waste Management Officials' Association (NEWMOA)
www.newmoa.org/Newmoa/htdocs/prevention/mercury/
- Vermont Agency of Natural Resources: Mercury Education and Reduction Campaign
www.mercvt.org/appman.htm

Other Internet Sources

There are many resources available on the Internet that can provide guidance on mercury reduction activities. An example of one excellent resource is:

- Interstate Mercury Education and Reduction Clearinghouse (IMERC) Mercury-Added Products Database - This online resource contains data about the mercury content of hundreds of products, including measuring devices, thermostats, batteries, lamps and numerous products that contain mercury-added switches, relays, lamps and button-cell batteries. Reporting companies and organizations are given a chance to review what they have submitted to IMERC prior to posting the information online. You can view the database at www.newmoa.org/prevention/mercury/imerc/notification/.

APPENDIX A. SCHOOL GUIDE TEAM CONTACT INFORMATION

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Joel Hogue
OSPPERA
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joelhogue@escoinfo.com

APPENDIX B. SOURCES OF MERCURY

Mercury product	Location	Do you have these items?	Number or amount of item (used and in storage)	Location of items (building, floor, room)	Do you have a management and retirement plan for the item?	Alternatives that are available
Thermostat (about 3 grams/switch, with as many as 6 switches)	HVAC					Air-controlled, reed switch, vapor filled diaphragm, snap-switch, electronic
U-tubes	HVAC					Electronic/aneroid gauges
Thermostat probes/flame sensor (flame sensors have about 3 grams)	HVAC					Electric flame sensors, electronic ignition
Switches (switches, including mechanical/tilt switches, reed switches, float switches may have from 3.5 grams to 8 pounds of mercury per switch)	Building					Hard-contact/solid-state/electro-optical switches
Switches in electrical equipment, relays, boilers, cooling and heating equipment, mercury-containing wall-mounted light switches manufactured before 1991	HVAC, building					Mercury-free switches, temperature devices, relays, gas heating equipment with electronic ignitions
Inductive/capacitive/photoelectric/ultrasonic sensors	HVAC					
Float switches	HVAC					Mechanical, magnetic dry reed, optical sensors, metallic ball, sonic/ultrasonic, pressure transmitter, alloy, thermal, or capacitance float switches

Mercury product	Location	Do you have these items?	Number or amount of item (used and in storage)	Location of items (building, floor, room)	Do you have a management and retirement plan for the item?	Alternatives that are available
Fluorescent light bulbs (10 - 50 mg per tube)	Building					Low mercury fluorescent lamps are available. These lamps are often marked by green ends or green etching on the bulb. They should also be recycled at the end of life.
High intensity discharge lamps (10-250 mg)	Building					Sylvania makes a non-mercury, high pressure sodium lamp called lumalux
Tilt switches	Building					Metallic ball, electrolytic, potentiometers, mechanical, solid-state, or capacitive switches
Pressure switches	Building					Mechanical pressure or solid-state pressure switches
Temperature switches	Building					Mechanical temperature or solid state temperature switches
Relays	Building,					Dry magnetic weed, electro-mechanical, hybrid, or solid state relays, silicon controlled rectifiers
Mercury gauges	Auto, industrial arts, wood and metal shops (aiawm)					Electronic/aneroid gauges
Manometers, other pressure measuring devices, carburetor synchronizers	Auto, industrial arts, wood and metal shops (aiawm)					Aneroid/electronic manometers and analog (vacuum gauges)
Switches, relays, boilers, cooling/heating equipment	Auto, industrial arts, wood and metal shops (aiawm)					Mercury-free switches, temperature devices, relays, gas heating equipment

Mercury product	Location	Do you have these items?	Number or amount of item (used and in storage)	Location of items (building, floor, room)	Do you have a management and retirement plan for the item?	Alternatives that are available
Solvent-based products	Auto, industrial arts, wood and metal shops (aiawm)					Water-based or bio-based solvents
Lubricants	Auto, industrial arts, wood and metal shops (aiawm)					Bio-based lubricants
Wood preservatives w/ pentachlorophenol	Auto, industrial arts, wood and metal shops (aiawm)					Untreated wood and non-wood alternative
Elemental mercury, jars or other bulk containers	Biology, chemistry, physics and science rooms					Depends on the use
Mercury barometer	Biology, chemistry, physics and science rooms					Aneroid and digital; new liquid one is being developed
Mercury (II) chloride- $HgCl_2$	Biology, chemistry, physics and science rooms					Nitric acid, magnesium chloride ($MgCl_2$)/sulfuric acid (H_2SO_4) or zinc formalin, freeze drying,
Mercuric iodide- HgI_2	Biology, chemistry, physics and science rooms					Phenate method
Mercuric nitrate- $Hg(NO_3)_2$	Biology, chemistry, physics and science rooms					Freeze drying
Mercuric oxide - HgO	Biology, chemistry, physics and science rooms					Use of copper sulfate or potassium sulfate as catalyst in Kjeldahl reactions or the use of the Biuret method (where copper sulfate is used)

Mercury product	Location	Do you have these items?	Number or amount of item (used and in storage)	Location of items (building, floor, room)	Do you have a management and retirement plan for the item?	Alternatives that are available
Mercury (ii) sulfate - HgSO_4	Biology, chemistry, physics and science rooms					Ammonia/copper sulfate, neosporin, mycin, copper catalyst, silver nitrate/potassium/chromium, potassium sulfate
Mercury gas law apparatus	Biology, chemistry, physics and science rooms					A simple Charles' Law apparatus may suffice.
Mercury anemometer	Biology, chemistry, physics and science rooms					Digital
Mercury hydrometer	Biology, chemistry, physics and science rooms					No alternative, properly dispose
Mercury hygrometer	Biology, chemistry, physics and science rooms					Spirit-filled glass bulb, digital and aneroid
Mercury lab thermometer	Biology, chemistry, physics and science rooms					Alcohol and mineral spirits glass bulbs, and digital
Mercury molecular motion device	Biology, chemistry, physics and science rooms					
Mercury sling psychrometer	Biology, chemistry, physics and science rooms					Mineral spirits glass bulb thermometers, some can fit in old frames.
Hg spectral tube	Biology, chemistry, physics and science rooms					16 alternative gases are available
Mercury vacuum gauge	Biology, chemistry, physics and science rooms					Needle or digital gauge
Zenker's solution (mercury chloride)	Biology, chemistry, physics and science rooms					Zinc formalin
Colormetric chloride analysis	Biology, chemistry, physics and science rooms					Ion-selective electrode method

Mercury product	Location	Do you have these items?	Number or amount of item (used and in storage)	Location of items (building, floor, room)	Do you have a management and retirement plan for the item?	Alternatives that are available
Coulter cell counters	Biology, chemistry, physics and science rooms					Mercury-free devices are available
Residual mercury may be present in drain traps and catch basins	Biology, chemistry, physics and science rooms					Properly clean traps and basins. Recycle mercury.
Formaldehyde or formalin	Biology, chemistry, physics and science rooms					Formaldehyde-free preservatives
Solvents	Biology, chemistry, physics and science rooms					Water-based or bio-based solvents
Mercury cooking thermometer	Home economics classrooms					Spirit-filled glass bulb, and digital
Washing machine (power shut off)	Home economics classrooms					Mechanical switch
Freezer light	Home economics classrooms					Mechanical switch
Flame sensor on gas oven	Home economics classrooms					Electronic ignition
Steam iron with 15 minute shut-off (tilt switch contains mercury)	Home economics classrooms					Iron with non-mercury switch
Cadmium vermilion red paint	Art classrooms					Mercury-free and cadmium-free paint
Ceramic glazes	Art classrooms					Lead and cadmium free glazes
Dyes (cold water and commercial)	Art classrooms					Vegetable dyes
Inhalation hazards (e.g., clay in dry form, powdered paints, glazes, pigments, wheat paste and aerosol products)	Art classrooms					Wet or liquid non-aerosol products

Mercury product	Location	Do you have these items?	Number or amount of item (used and in storage)	Location of items (building, floor, room)	Do you have a management and retirement plan for the item?	Alternatives that are available
Instant paper-mache	Art classrooms					Paper-mache made from black and white newspaper and library or white paste or flour and water paste
nt-based glues	Art classrooms					Water-based glues
Solvent-based paints	Art classrooms					Water-based paints
Permanent markers	Art classrooms					Water-based markers
Polymer clay (designed to harden at conventional oven temperatures)	Art classrooms					Paper-based, flour-based or wax-based clays
Low-temperature modeling clays (may contain glycol ethers or primary phthalate ethers)	Art classrooms					Paper-based, flour-based or wax-based clays
True vermilion paint (contains mercury sulfide)	Art classrooms					Mercury-free paint
Wood stains	Art classrooms					Water-based wood stains
Moth repellants (for textiles)	Art classrooms					Cedar chips, eucalyptus oil
Pigments used in printing inks, oils paints, and other media	Art classrooms					Cadmium-free, lead-free and mercury-free alternatives are available
Solders for silver jewelry	Art classrooms					Cadmium-free solder for silver jewelry
Stained-glass solders	Art classrooms					Lead-free solder
Fever thermometers	Medical technology classrooms and school medical offices					Digital, gallium-indium-tin (galinstan) thermometers, dot matrix thermometers
Blood pressure devices	Medical technology classrooms and school medical offices					Digital or aneroid

Mercury product	Location	Do you have these items?	Number or amount of item (used and in storage)	Location of items (building, floor, room)	Do you have a management and retirement plan for the item?	Alternatives that are available
Topical disinfectants containing mercurochrome or tincture of meriolate	Medical technology classrooms and school medical offices					Alcohol or hydrogen peroxide
Contact lens solution containing thimerosal, phenylmercuric acetate or phenylmercuric nitrate	Medical technology classrooms and school medical offices					Thimerosal-free, phenylmercuric acetate-free or phenylmercuric nitrate-free contact lens solution
Nasal sprays containing thimerosal, phenylmercuric acetate or phenylmercuric nitrate	Medical technology classrooms and school medical offices					Thimerosal-free phenylmercuric acetate-free or phenylmercuric nitrate-free nasal sprays
Fluorescent lamps	Non-educational mercury-containing items					No alternative; properly recycle
Mercury vapor lamps	Non-educational mercury-containing items					No alternative; properly recycle
Metal halide lamps	Non-educational mercury-containing items					No alternative; properly recycle
High-pressure vapor sodium lamps	Non-educational mercury-containing items					No alternative; properly recycle
Mercury gauges	Non-educational mercury-containing items					Electronic or aneroid gauges
Light switches ("silent" switches)	Non-educational mercury-containing items					New light switches don't contain mercury
Mercury switches and relays	Non-educational mercury-containing items					Switches and relays with electronic

Mercury product	Location	Do you have these items?	Number or amount of item (used and in storage)	Location of items (building, floor, room)	Do you have a management and retirement plan for the item?	Alternatives that are available
Mercury thermostat probes and flame sensors	Non-educational mercury-containing items					Hard-contact switches, inductive sensors, capacitive sensors, photoelectric sensors, and ultrasonic sensors
Old latex paint (purchased prior to 1992)	Non-educational mercury-containing items					Properly dispose, new latex indoor paints do not contain mercury added fungicides
Fungicides (purchased prior to 1994)	Non-educational mercury-containing items					Properly dispose
Pesticides (purchased prior to 1994)	Non-educational mercury-containing items					Properly dispose
Mercury oxide or mercury zinc batteries (old alkaline type, prior to 1996) and button batteries	Non-educational mercury-containing items					Non-mercury alternatives
Amulets with mercury	Non-educational mercury-containing items					Consult cultural or religious advisor for appropriate alternatives

APPENDIX C: MERCURY SPILLS: ALL EYES ON YOU

by Dale Farmer

Ohio EPA Emergency Response Coordinator

For Ohio EPA emergency response on-scene coordinators, it has become all too common a call: "mercury spill at a school or residence." With increased public awareness of the dangers of mercury, reports of mercury spills to the Ohio EPA Spills Hotline have been on the rise since 1997. In 2001 alone, the Spills Hotline received 77 reports of mercury spills. (In 2005, 274 mercury spills were reported, and in 2006, over 180 calls were reported to Ohio EPA.)

When responding to a mercury spill, the on-scene coordinator's first considerations focus on available resources to deal with the situation. In nearly every case, their most important resource is the local health department, who they will call for assistance with risk communication and occupancy standards. Ohio EPA's goal is to team with the local health department to answer questions such as, "Is my child going to be okay? How much mercury was my child exposed to? What are the symptoms of mercury exposure? Should my child be tested for mercury exposure? How do I know it is safe to go back into the classroom or home? What do we do with contaminated clothing, shoes and books?"

Ohio EPA has called on local health departments for mercury spill situations ranging from a broken thermometer in a residence to 100 pounds of mercury spilled in the trunk of a car. In late 1997, the Clark County Health Department played a key role in mitigating a large mercury spill caused by children who found 75 pounds of mercury in an abandoned scrap metal facility. The children took mercury in various containers and spilled it in three different locations throughout a neighborhood and at a school facility. This incident prompted U.S. EPA, Ohio EPA and the Ohio Department of Health, with help from the Clark County Health Department, to develop a protocol for responding to mercury spills in Ohio. Since then, these agencies have found that regardless of the size of a spill, the same basic response approach applies.

Ohio EPA recommends that mercury spills be cleaned up by a qualified clean-up contractor. The contractor will use a specialized mercury vacuum and commercial mercury decontamination compounds to clean mercury from nonporous surfaces such as tile floors and counter tops. Contaminated carpeting and upholstery and most other porous materials cannot be cleaned to a safe condition. Spilled mercury divides into extremely small, even microscopic, beads that find their way into the weave and nap of upholstery, carpeting and clothing. These items must be disposed properly. Contractors monitor indoor mercury vapor concentrations using air samplers and/or highly sensitive mercury vapor analyzers. Even seemingly small quantities of mercury, such as residential mercury from a broken thermometer that has not been properly cleaned up, can produce vapors that pose a health risk, especially to children and developing fetuses.

Mercury spill cleanup costs can be surprisingly high, usually ranging from one thousand to several thousand dollars. Insurance companies usually exclude environmental cleanups from homeowner coverage. This proved devastating for a homeowner who recently spilled a one-quart jar full of mercury in her garage, resulting in a \$15,000 cleanup bill.

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When dealing with a mercury spill, it is important to identify anyone that may have been exposed and potentially contaminated with mercury. In situations where there have been significant exposures to mercury, the local health department may refer potentially exposed people for clinical testing. Shoes, clothing, books and other personal items should be individually bagged in plastic trash bags. In most situations, you should dispose of contaminated items. For both school rooms and residences during and following the cleanup, the areas should be thoroughly ventilated and screened for remaining mercury vapors.

Ohio EPA emergency responders and local health departments have teamed up for numerous success stories of mercury spill responses in recent years. More and more health departments are responding to mercury spills in residences and schools as the public becomes more aware of the dangers associated with mercury vapor exposure, and more mercury spills are being reported.

Ohio EPA, U.S. EPA, the Ohio Department of Health, Bowling Green State University and the Ohio Spill Planning, Prevention and Emergency Response Association (OSPPEA) are currently working on the Ohio Mercury Outreach Project. The project is designed to provide information and action steps to reduce the presence of mercury in the community. For more information about this project, please contact Bill Narotski (Office of Compliance Assistance, 800-329-7518).

**APPENDIX D: SUGGESTED ACTION LEVELS FOR MERCURY (CAS # 7439-97-6) -
RESIDENTIAL AND OCCUPATIONAL SETTINGS†**

Indoor Air Concentration (ug/m ³)	Use of the Action Level	Rationale for Action Level	Method of Analysis *	Reference
<1.0	Level acceptable for occupancy of any structure after a spill (also called the residential occupancy level)	A spill occurred in this building, and the risk manager needs to know if the building is safe for occupancy. ATSDR would prefer no one ever be chronically exposed to concentrations above the MRLs; however, experience has shown cleanup operations in a response to concentrations below 1 ug/m ³ can be extremely disruptive to individual and family quality of life. While this concentration is slightly above HGVs, this level is still 25 times lower than the human LOAEL on which the MRL is based. An indoor air concentration of 1 ug/m ³ , as measured by the highest quality data (for example, NIOSH 6009 or equivalent), is considered safe and acceptable by ATSDR, provided no visible metallic mercury is present.	NIOSH 6009 or equivalent	Based on HGV's above. ATSDR, 1999. EPA/IRIS
No qualitative detection on an Arizona Instrument's Jerome™ Meter	Screening level for homes that had indoor gas meters with no evidence of a spill	Mercury was present in the regulator inside the home, but no evidence of a spill is found. The qualitative detection limit of the most commonly available air monitoring instruments approximates one order of magnitude below levels of known human health effects. As there was no spill, no visible metallic mercury should be present. Natural ventilation (for example, windows, HVAC air changes, etc.) should reduce any concentration even lower with no disruption of family life or costs.	Real-time Air monitoring instrument (Jerome™ meter or equivalent)	
10	Isolate residents from the exposure	When adjusted from an intermediate to chronic exposures to a continuous exposure scenario (that is, 24 hrs/day, 7days/week), this concentration approaches levels reported in the literature to cause subtle human health effects. Applied to acute exposures with good accuracy by real-time instruments, this value allows for interventions before health effects would be expected. Whenever possible, the mercury vapors should be prevented from reaching living spaces rather than temporarily relocating individuals. See the building evaluation protocol developed for these situations in your area and Section 2.1 of ATSDR's Toxicological Profile.	Real-time Air monitoring instrument (Jerome™ meter or equivalent)	ATSDR, 1999.
10	Acceptable level in a modified test procedure to allow personal effects to remain in the owner's possession	For personal effects, such as clothing, warmed in a discrete plastic container much smaller than a typical room (e.g., a garbage bag), this concentration in the air trapped inside the container is considered safe by ATSDR based on a number of factors.	Real-time Air monitoring instrument (Jerome™ meter or equivalent)	

Indoor Air Concentration (ug/m ³)	Use of the Action Level	Rationale for Action Level	Method of Analysis	Reference
3	Re-occupancy after a spill of an occupational or commercial setting where mercury is not usually handled	Based on residential occupancy level but adjusted for the shorter duration exposures typical of most workplaces. This concentration approximates one order of magnitude below levels of known human health effects, provided no visible metallic mercury is present to act as an attractive nuisance or a source for more vapors. Those exposed in this instance would not expect hazards associated with mercury as part of their normal work and may include transient exposures by more sensitive individuals (e.g., retail facilities).	NIOSH 6009 or equivalent	HGV's. ATSDR, 1999. EPA/IRIS
25	Occupational settings where mercury is handled •	Based on the 1996 ACGIH TLV. Assumes hazards communications programs as required by OSHA; engineering controls as recommended by NIOSH; and medical monitoring programs as recommended by the ILO, NIOSH, and ACGIH are in place. This concentration is ½ the peer-reviewed 1973 NIOSH REL and 1/4 the regulatory 1972 OSHA PEL. See HSDB at toxnet.nlm.nih.gov/sis on the Internet.	Real-time Air monitoring instrument (Jerome™ meter or equivalent)	HSDB, 1999
25	Response Worker Protective Equipment Upgrade •	Response workers subject to HAZWOPER should evaluate need to upgrade protective equipment. Based on the 1996 ACGIH TLV. Assumes hazards communications programs as required by OSHA; engineering controls as recommended by NIOSH; and medical monitoring programs as recommended by the ILO, NIOSH, AND ACGIH are in place. This concentration is half the peer-reviewed NIOSH REL and a quarter of the regulatory OSHA PEL. See HSDB at toxnet.nlm.nih.gov/sis on the Internet. For these workers, engineering controls are not typically in place, and it is not possible to control the exposure by other safety techniques.	Real-time Air monitoring instrument (Jerome™ meter or equivalent)	29 CFR 1910.120; 40 CFR 311; NIOSH, 1987
10,000	IDLH. Response Workers Protective Equipment upgrade	Response workers subject to HAZWOPER should upgrade protective equipment. See www.cdc.gov/niosh/idlh/idlh-1.html on the Internet.	Real-time Air monitoring instrument (Jerome™ meter or equivalent)	29 CFR 1910.120; 40 CFR 311; NIOSH 1987

* - Environmental analysis should be in accordance with the requirements specified by environmental authorities. When real-time air monitoring instruments are specified in this table, laboratory analysis may be substituted at the discretion of the risk managers involved in the event. Operation of real-time instruments should be in accordance with manufacturer's instructions.

† - Structures where mercury pressure regulating devices for natural gas meters were moved from inside the structure to outside the structure.

o - Women workers in these settings who are pregnant or attempting to become pregnant should consult their physicians regarding their mercury exposure.

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(sections that establish requirements governing mercury)

Sec. 3734.13. (A) The director of environmental protection may issue, modify, suspend, or revoke enforcement orders in accordance with Chapter 3745. of the Revised Code to a holder of a registration certificate, permit, or license issued by the director or a board of health under this chapter, or to another person, directing the holder or person to abate a violation, or to prevent any threatened violation, of any section of this chapter other than sections 3734.90 to 3734.9013 of the Revised Code, a rule adopted thereunder, or a term or condition of a permit, license, or variance issued thereunder within a specified, reasonable time.

(B) Notwithstanding division (C) of section 3734.85 of the Revised Code, if the director determines that an emergency exists requiring immediate action to protect the public health or safety or the environment, he the director may issue an order, without notice or hearing, reciting the existence of the emergency and requiring that such action be taken as necessary to meet the emergency. The order shall take effect immediately. Any person to whom the order is directed shall comply immediately, but on application to the director shall be afforded a hearing as soon as possible and not later than thirty days after application. On the basis of the hearing, the director shall continue the order in effect, revoke it, or modify it. No emergency order shall remain in effect for more than one hundred twenty days after its issuance.

(C) If the director determines that any person is violating or has violated this chapter, a rule adopted thereunder, or a term or condition of a permit, license, variance, or order issued thereunder, the director may request in writing that the attorney general bring a civil action for appropriate relief, including a temporary restraining order, preliminary or permanent injunction, and civil penalties in any court of competent jurisdiction. Such an action shall have precedence over all other cases. Except as otherwise provided in this division with regard to a violation of the provisions of this chapter governing scrap tires, a rule adopted under those provisions, a term or condition of a permit or license issued under them, or a term or condition of an order issued pertaining to scrap tires, the court may impose upon the person a civil penalty of not more than ten thousand dollars for each day of each violation of this chapter other than a violation of section 3734.60 of the Revised Code or, a violation of sections 3734.90 to 3734.9013 of the Revised Code or a rule adopted under those sections, a rule adopted thereunder other than a rule adopted under division (B) of section 3734.122 of the Revised Code, or a term or condition of a permit, license, variance, or order issued thereunder, or a violation of sections 3734.62 to 3734.65 of the Revised Code. The court may impose upon a person who violates a rule adopted under division (B) of section 3734.122 of the Revised Code a civil penalty of not more than twenty-five thousand dollars for each day of each violation of the rule. The court may impose upon a person who violates section 3734.60 of the Revised Code a civil penalty of not more than two hundred fifty dollars for each day of violation of that section. The court may impose upon a person who violates any of the provisions of this chapter governing scrap tires, a rule adopted under those provisions, a term or condition of a permit or license issued under them, or a term or condition of an order issued pertaining to scrap tires a civil penalty of not more than five thousand dollars for each day of each violation, except that if the violation is of a provision, rule, or term or condition that relates to the open burning or open dumping of scrap tires, or if the violation is of an emergency order of the director issued under division (B) of section 3734.13 of the Revised Code that pertains to scrap tires, the court may impose a civil penalty of not more than ten thousand dollars for each day of each violation. The court may impose upon a person who violates section 3734.62 of the Revised Code a civil penalty of not more than one hundred dollars for each violation of that section. The court may impose upon a person who violates section 3734.63, 3734.64,

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or 3734.65 of the Revised Code a civil penalty of not more than five thousand dollars for each day of each violation of the applicable section, but the total amount of a civil penalty imposed upon a person for a violation of the applicable section shall not exceed twenty-five thousand dollars.

Any action under this section is a civil action, governed by the Rules of Civil Procedure.

(D) No person shall violate any term or condition of any order issued under this section.

(E) Except as otherwise provided in this division, moneys resulting from civil penalties imposed under division (C) of this section shall be paid into the hazardous waste clean-up fund created in section 3734.28 of the Revised Code. Moneys resulting from civil penalties imposed under division (C) of this section for violations of any of the provisions of this chapter governing scrap tires, rules adopted under those provisions, terms or conditions of permits or licenses issued under them, or terms or conditions of orders issued pertaining to scrap tires shall be credited to the scrap tire management fund created in section 3734.82 of the Revised Code.

Sec. 3734.61. As used in sections 3734.61 to 3734.65 of the Revised Code:

(A) "Manufacturer" means any person that produces a mercury-containing thermometer or serves as an importer or domestic distributor of a mercury-containing thermometer that is produced outside the United States. In the case of a multicomponent mercury-containing thermometer, "manufacturer" means the last manufacturer to produce or assemble the thermometer unless the multicomponent mercury-containing thermometer is produced outside the United States, in which case "manufacturer" means the importer or domestic distributor.

(B) "Mercury" means elemental mercury and mercury compounds.

(C) "Mercury-added measuring device" means an instrument containing mercury that is designed to measure an amount or quantity of humidity, pressure, temperature, or vacuum or the force of wind, including, but not limited to, anemometers, barometers, flow meters, hydrometers, hygrometers, manometers, sphygmomanometers, and thermometers.

(D) "Mercury-added novelty" means a product in which mercury is present and that is intended mainly for personal or household enjoyment or adornment, including, but not limited to, products intended for use as practical jokes, figurines, adornments, toys, games, cards, ornaments, yard statues and figures, candles, jewelry, holiday decorations, footwear, other items of apparel, or similar products. "Mercury-added novelty" does not include a product that solely includes a fluorescent light bulb.

Sec. 3734.62. On and after the effective date of this section, no school district or educational service center established under Chapter 3311. of the Revised Code, community school established under Chapter 3314. of the Revised Code, or nonpublic school for which the state board of education prescribes standards under section 3301.07 of the Revised Code and no employee of such a school district, educational service center, community school, or nonpublic school shall purchase mercury or a mercury-added measuring device for classroom use.

If a school district, educational service center, community school, or nonpublic school or an employee of a school district, educational service center, community school, or nonpublic school purchases mercury or a mercury-added measuring device for classroom use on or after the effective date of this section in violation of this section, but properly recycles or disposes of the mercury or mercury-added

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measuring device upon learning of or being informed of the violation and creates and implements a mercury reduction plan, the director of environmental protection shall consider the recycling or disposal of the mercury or mercury-added measuring device and the implementation of and compliance with the mercury reduction plan as mitigating circumstances for purposes of enforcement of a violation of this section.

Sec. 3734.63. (A)(1) Beginning six months after the effective date of this section, and except as otherwise provided in division (A)(2) of this section, no manufacturer shall offer a mercury-containing thermometer for sale or distribute a mercury-containing thermometer for promotional purposes in this state unless the sale or distribution of a mercury-containing thermometer is required in order to comply with federal law, a person demonstrates to the director that a mercury-containing thermometer is the only temperature measuring device that is feasible for a research, quality control, or manufacturing application, or the only component of the thermometer that contains mercury is a button cell battery.

(2) Division (A)(1) of this section does not apply to the sale of a mercury-containing thermometer to a person who purchases a mercury-containing thermometer pursuant to a valid prescription.

(B) Beginning six months after the effective date of this section, a manufacturer of a mercury-containing thermometer that lawfully offers for sale or distributes such a thermometer in this state shall do both of the following:

(1) Provide notice in a conspicuous manner on the packaging of the thermometer that the thermometer contains mercury;

(2) Provide clear instructions with the thermometer regarding careful handling of the thermometer to avoid breakage, proper cleanup of mercury if the thermometer breaks, and proper management and disposal of the thermometer.

Sec. 3734.64. Beginning six months after the effective date of this section, no person shall offer a mercury-added novelty for sale or distribute such a novelty for promotional purposes in this state unless the only mercury in the mercury-added novelty is a removable button cell battery. Beginning January 1, 2011, no person shall offer any mercury-added novelty for sale or distribute any mercury-added novelty for promotional purposes in this state.

Sec. 3734.65. Beginning one year after the effective date of this section, no person shall offer a mercury-containing thermostat for sale in this state or install a mercury-containing thermostat in this state unless the mercury-containing thermostat is installed in the residence of a visually impaired person or the thermostat is used to sense and control temperatures as a part of a manufacturing process.

Sec. 3745.01. There is hereby created the environmental protection agency, headed by the director of environmental protection. The agency, under the supervision of the director, shall administer the laws pertaining to chemical emergency planning, community right-to-know, and toxic chemical release reporting; the cessation of chemical handling operations; the prevention, control, and abatement of air and water pollution; public water supply; comprehensive water resource management planning; products that contain mercury as defined in section 3734.61 of the Revised Code; and the disposal and treatment of solid wastes, infectious wastes, construction and demolition debris, hazardous waste, sewage, industrial waste, and other wastes. The director may do all of the following:

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(A) Provide such methods of administration, appoint such personnel, make such reports, and take such other action as may be necessary to comply with the requirements of the federal laws and regulations pertaining to chemical emergency planning, community right-to-know, and toxic chemical release reporting; air and water pollution control; public water supply; water resource planning; and waste disposal and treatment;

(B) Procure by contract the temporary or intermittent services of experts or consultants, or organizations thereof, when those services are to be performed on a part-time or fee-for-service basis and do not involve the performance of administrative duties;

(C) Advise, consult, cooperate, and enter into contracts or agreements with any other agencies of the state, the federal government, other states, and interstate agencies and with affected groups, political subdivisions, and industries in furtherance of the purposes of this chapter and Chapters 3704., 3714., 3734., 3751., 3752., 6109., and 6111. of the Revised Code;

(D) Establish advisory boards in accordance with section 121.13 of the Revised Code;

(E) Accept on behalf of the state any grant, gift, or contribution made for toxic chemical release reporting, air or water pollution control, public water supply, water resource planning, waste disposal or treatment, or related purposes, and expend it for those purposes;

(F) Make an annual report to the governor and the general assembly on activities and expenditures as well as recommendations for such additional legislation as the director considers appropriate to carry out the director's duties or accomplish the purposes of this section;

(G) Enter into environmental covenants in accordance with sections 5301.80 to 5301.92 of the Revised Code, and grant or accept easements or sell real property pursuant to section 3734.22, 3734.24, 3734.25, or 3734.26 of the Revised Code, as applicable.

The agency shall utilize the laboratory facilities of the department of health and other state institutions and agencies to the maximum extent that the utilization is practicable, economical, and technically satisfactory.

The director shall maintain and keep available for public inspection, at the director's principal office, a current register of all applications filed for permits, leases, licenses, variances, certificates, and approval of plans and specifications and of publicly owned treatment works pretreatment programs under the director's jurisdiction, hearings pending, the director's final action thereon, and the dates on which the filings, hearings, and final actions occur. The director shall maintain and keep available for public inspection at the director's principal office all plans, reports, and other documents required to be filed with the emergency response commission under Chapter 3750. of the Revised Code and rules adopted under it, and all reports and other documents required to be filed with the director under Chapter 3751. of the Revised Code and rules adopted under it, subject to the requirements of those chapters and rules adopted under them for the protection of trade secrets and confidential business information from disclosure to persons not authorized under those laws to receive trade secret or confidential business information.

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Sec. 3745.08. (A) An officer of an agency of the state or of a political subdivision, acting in his the officer's representative capacity, or any person who is or will be aggrieved or adversely affected by a violation that has occurred, is occurring, or will occur may file a complaint, in writing and verified by the affidavit of the complainant, his the complainant's agent, or attorney, with the director of environmental protection, in accordance with the rules of the director adopted pursuant to Chapter 119. of the Revised Code, alleging that another person has violated, is violating, or will violate any law, rule, standard, or order relating to air pollution, water pollution, solid waste, infectious wastes, construction and demolition debris, public water supply, hazardous waste, products that contain mercury, or cessation of chemical handling operations, or, if the person is in possession of a valid license, permit, variance, or plan approval relating to air pollution, water pollution, solid waste, infectious wastes, construction and demolition debris, public water supply, or hazardous waste, that the person has violated, is violating, or will violate the conditions of the license, permit, variance, or plan approval. The affidavit verifying a complaint authorized by this section may be made before any person authorized by law to administer oaths and shall be signed by the person who makes it. The person before whom it was taken shall certify that it was sworn to before him that person and signed in his that person's presence, and his that person's certificate signed officially by him that person shall be evidence that the affidavit was made, that the name of the person making the affidavit was written by himself the maker of the affidavit, and that he the maker of the affidavit was that person.

(B) Upon receipt of a complaint authorized by this section, the director shall cause a prompt investigation to be conducted such as is reasonably necessary to determine whether a violation, as alleged, has occurred, is occurring, or will occur. The investigation shall include a discussion of the complaint with the alleged violator. If, upon completion of the investigation, the director determines that a violation, as alleged, has occurred, is occurring, or will occur, he the director may enter such order as may be necessary, request the attorney general to commence appropriate legal proceedings, or, where he the director determines that prior violations have been terminated and that future violations of the same kind are unlikely to occur, he the director may dismiss the complaint. If the director does not determine that a violation, as alleged, has occurred, is occurring, or will occur, he the director shall dismiss the complaint. Before taking any action under this division, the director may commence a hearing. Twenty days prior to any hearing, the director shall cause publication of notice of the hearing in a newspaper with general circulation in the county wherein the alleged violation has occurred, is occurring, or will occur, and also shall mail written notice by certified mail, return receipt requested, to the person who filed the complaint and to the alleged violator. If the director enters an order pursuant to this division without having commenced a hearing, the director or his the director's delegate, prior to entry of the order, shall provide an opportunity to the complainant and the alleged violator to attend a conference with the director or his the director's delegate concerning the alleged violation.

(C) Any hearing commenced under this section shall be conducted before the director or a hearing examiner designated by the director. The agency and the alleged violator shall be parties. The person who filed the verified complaint may participate as a party by filing with the director, at any time prior to the hearing, a written notice of his the complainant's intent to so participate. Any other person may be permitted to intervene upon the granting by the director or hearing examiner of a motion to intervene filed in accordance with the rules of the director adopted pursuant to Chapter 119. of the Revised Code.

(D) A complaint filed under this section may be consolidated with any other complaint filed under this section, or any finding of the director, where the director determines that consolidation will facilitate enforcement of any law that the agency is charged with administering under section 3745.01 of the Revised Code and there are one or more issues of fact or law in common. Not more than one hearing under this section shall be conducted with respect to each violation alleged.

APPENDIX F: ACRONYMS AND METRICS

ACGIH - American Conference of Governmental Industrial Hygiene
ATSDR - Agency for Toxic Substances and Disease Registry
BGSU - Bowling Green State University
BMP - Best management practice
DHWM - Division of Hazardous Waste management
EE - Environmental Education (grants)
EPA - Environmental Protection Agency
GLNPO - Great Lakes National Program Office
HAS - Health Assessment Section (ODH)
HAZWOPER
H.B. - House Bill
HID - High Intensity Discharge (lamps)
HGV - Health Guideline Values
HSDB - Hazardous Substances Data Bank
HVAC - Heating, ventilation and air conditioning
IDLH - Immediately Dangerous to Life or Health
ILO - International Labour Organization
IMERC - Interstate Mercury Education and Reduction Clearinghouse
LGR - Local Governments Reimbursement (Program)
LOAEL - Lowest-Observed-Adverse-Effect Level
MRL - Minimum Risk Level
NEMA - National Electronics Manufacturing Association
NEWMOA - Northeast Waste Management Officials' Association
NIOSH - National Institute for Occupational Safety and Health
OCAPP - Office of Compliance Assistance and Pollution Prevention
OAC - Ohio Administrative Code
ODH - Ohio Department of Health
OMRG - Ohio Mercury Reduction Group
OSHA - Occupational Safety and Health Association
OSPPERA - Ohio Spill Planning, Prevention and Emergency Response Association
PBT - Persistent, bioaccumulative and toxic (substances)
PEL - Permissible exposure limit
POTW - Publicly owned treatment works
RCRA - Resource Conservation and Recovery Act
REL - Reference Exposure Level
TCLP - Toxic Characteristics Leaching Procedure
TLV - Threshold limit value
UW - Universal Waste
WWTP - Wastewater treatment plant

Metrics

cc - cubic centimeter
ng/m³ - nanograms per cubic meter
ug/m³ - micrograms per cubic meter

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