DEQ in the Classroom:

Conduct a Mercury Audit in Your School

IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY

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Grade Level:

Grades 8 – 12

Time Required:

3.5 hours in-class spread over 4 days, plus time for optional oral presentations.
3 - 5 weeks to conduct project outside of class time.

Objective:

Students gain an understanding of the pervasiveness of mercury in their schools, communities, homes, and environment and how and why this is an environmental and health concern. Students also gain experience dealing with a "real-life" issue that affects their school and community.

Meets State Standards:

Grade 8: 8-9.PS.1.6.2, 8-9.ES.1.6.2, 8-9.ES.5.2.1, 8.LA.6.2.2, 7-8.H.1.1.9
Grade 9: 8-9.PS.1.6.2, 8-9.ES.1.6.2, 8-9.ES.5.2.1, 9-10.B.1.6.2, 9-10.B.5.1.1,
Grade 10: 9-10.B.1.6.2 ,9-10.B.5.1.1

Meets standards in science, health, language arts.
Can also be used to meet additional standards in language arts based on the criteria used when assigning the oral/written report portion of this activity (see Step 8).

Focus:

Waste, mercury in schools, mercury and health.

Materials:

Copies of news articles about mercury (attached, pages 14 - 20; however, you are encouraged to look for additional articles that may be more timely or location-specific; students may also do this as part of, or as a follow-up to, the activity. See pages 3 and 5.)

Handouts: *Mercury At School: Where To Look and What To Look For*
(attached, pages 7 - 9)

Copies of *Mercury Audit Checklists* (one per team, as appropriate)
(attached, pages 10 - 13)

Students should <u>not</u> handle or remove any mercury or mercury-containing products.

IN CASE OF A MERCURY SPILL, see *Best Practices for Mercury*, pages 21 - 22.

This activity has been adapted from *Mercury In Your School and the Community: A National Issue* produced by the University of Wisconsin, Cooperative Extension. Used with permission.

Background:

At room temperature, pure elemental mercury is a silvery liquid metal. It occurs naturally in the earth's surface in several mineral forms. It conducts electricity, expands uniformly with temperature, and easily mixes with other metals (forms "alloys" or "amalgams"; see Vocabulary, page 3). For these reasons, it is used in many common products. However, mercury also evaporates easily and is toxic (poisonous).

There have been many incidents involving mercury spilled in homes and schools that cause alarm and require cleanup. Mercury that is spilled or spread through a building creates an immediate health issue and may require expensive cleanup and monitoring. Spilled mercury can evaporate at room temperature and be inhaled; it can also spread long distances and settle in cracks and porous materials like cloth, carpet, or wood, slowly emitting vapors over a long period of time.

Mercury is released to the environment from many sources. It is used in many household and commercial products, as well as industrial processes. Coal-fired power plants, incinerators, some manufacturing plants, hospitals, dental offices, schools, and even homes have all been found to release mercury. At school, mercury may be in science and chemistry classrooms, the nurse's office, and electrical systems. At home, mercury can be found in fluorescent lights, thermostats, thermometers, and even some children's toys.

In many cases, the presence of mercury-containing products does not necessarily mean individuals will be exposed to mercury or are at risk from it. It is often only when/if a mercury-containing device (e.g., a fluorescent light or thermometer) is broken or improperly disposed of that mercury can be released into the environment and becomes a hazard.

Large amounts of mercury can become airborne when coal, oil, or natural gas is burned as fuel or mercury-containing garbage is incinerated. Once in the air, mercury can fall to the ground with dust, rain, or snow, and land on soils or water bodies, causing contamination. Lakes and rivers can also be contaminated when there is a direct discharge of mercury-containing industrial waste or municipal sewage. Once present in a water body, mercury can accumulate in fish and may reach the dinner table in unhealthful concentrations.

Short-term exposure to a high concentration of mercury or mercury vapors can lead to nausea, shortness of breath, bronchitis, migraine headaches, and fatigue. Long-term exposure can result in damage to the nervous system, kidneys, and liver. Symptoms include tremors, numbness in the fingers and toes, loss of muscle control, memory loss, and kidney disease. Children, fetuses, and women of childbearing age are the most at risk for the chronic neurological effects of mercury poisoning.

Electricity generation is currently the largest source of mercury emissions in the U.S. Practicing energy conservation reduces the amount of mercury released by power plants. One way to conserve energy is to use fluorescent light bulbs. While these contain mercury, their greater energy efficiency reduces the amount of mercury discharged by power plants generating electricity, thus resulting in fewer mercury emissions. Most newer fluorescent bulbs contain less mercury than older ones. However, mercury-containing bulbs should be carefully handled and recycled appropriately to minimize the risk associated with this mercury.

When products come into direct contact with students or staff and/or are at high risk for spills or breakage, it is prudent for schools to remove these products and replace them with mercury-free alternatives as soon as possible. Examples of such products include mercury thermometers and elemental mercury used in the classroom. Other products, such as switches and thermostats, pose little risk in day-to-day use and are best left alone until they reach the end of their life cycle. At that time, be sure they are removed and disposed of properly and consider replacing them with mercury-free alternatives. In the meantime, it is worthwhile to label those products as containing mercury.

Many mercury-containing products can be recycled. Visit *www.deq.idaho.gov/waste/recycling/recycle_home.cfm* to learn what mercury-containing products can be recycled in your area.

Vocabulary:

Alloy	A substance composed of two or more metals, or of a metal or metals with a nonmetal.
Amalgam	An alloy of mercury with another metal or metals.
Mercury	A heavy, silvery, highly toxic metallic element. Symbol: Hg.
Methylmercury	Any of several extremely toxic compounds formed from mercury by the action of microorganisms. Capable of entering the food chain. It is this type of mercury that can concentrate in fish and cause mercury exposure through eating the contaminated fish.

Procedure:

Ahead of Time: Obtain approval from your school's principal to conduct the audit and discuss the audit with staff at your school that may be asked to assist (janitorial staff, nursing staff, teachers who work with your school's science laboratory, etc.). Be sure staff are willing to work with the students as they conduct their audit, as their assistance will be vital.

You may wish to have these conversations yourself, or you may choose to assign students to do this as part of the learning experience.

Day 1.

Step 1. Introduce the topic of mercury to the class. See *Background,* page 2. You may also wish to print out the *Background* page and provide it to your students to use for reference.

Step 2. Hand out copies of the attached news articles about mercury spills in Idaho (pages 14 – 20). (You may also wish to find new/different/more timely articles for your students to read.) Have students read the articles overnight.

Optional: Instead of providing students with articles to read/discuss, have students conduct their own searches for articles to discuss as a class.

Day 2.

Step 3. In small groups or as a class, have students summarize (orally) the mercury articles they read, then discuss them. *Where was the mercury? How did it get there? When spills were involved, what types of spills occurred? How much mercury spilled? What was the result? (Did people get sick? Was there an expensive cleanup?) How did those affected by the spill react? How did the public and news media react? Could things have been done differently to prevent the spill? What?*

Optional: You may wish to have students watch the video *Mercury Vapor Experiment* (see Additional Resources, page 6) at this point. It shows mercury vapors evaporating from a simulated mercury spill.

Step 4. Hand out copies of *Mercury at School: Where To Look and What To Look For* (pages 7 – 9). Have students read the handouts before you continue with Step 5. (Either provide time in class or assign as homework.)

Day 3.
Step 5. Divide your school into sections, either by location (e.g., west wing, east wing) or function (e.g., science labs, nurse's office, maintenance materials). Divide students into research teams (one team per section of the school) and assign research teams to cover specific sections.

You may want to get a copy of the building blueprint to share with the students.

Step 6. Using the *Mercury at School: Where To Look and What To Look For* handouts and copies of the appropriate mercury audit checklists (pages 10 – 13) have the student teams develop audit "plans" for their areas. The plans should cover what they will look for, who they will talk to, what questions they will ask, how they will record the data, etc. They may wish to map the likely locations of mercury beforehand or map the actual locations of the mercury once they are done with their audits.

There will likely be items listed on the mercury audit checklists that your students are unfamiliar with, such as various kinds of mercury-containing lamps (light bulbs) on the facilities checklist. That is OK; the students aren't expected to understand the details of each mercury-containing device that may be in their building.

Also note that the handouts and mercury audit checklists are not exhaustive. Students may identify other mercury-containing products or items in your school.

Outside of Class; allow at least two to three weeks.
Step 7. Conduct the audit using the mercury audit checklists (pages 10 - 13) or a checklist designed by the students.

Allow plenty of time (at least two to three weeks) to conduct the audits. Some of the questions the students ask may require research on the part of the person being interviewed (e.g., nurse or janitor), or that person may recommend the students contact someone else (e.g., a contractor who handles lighting in the building). Students, or the person they are interviewing, may also need to obtain a copy of the original plans and specifications for the building, which may also require additional time.

Remind students to not handle or remove any mercury or mercury-containing products.

After audits are complete. Allow one to two weeks to organize data and prepare presentation/report.
Step 8. Have students compile and organize their results and prepare them in a manner suitable to present to the rest of the class, the principal, science teachers, school nurse, and engineering and/or janitorial staff. This step may include a written report, poster, map, and/or oral presentation.

Have students include recommendations for ways to deal with the mercury in their school, such as safely recycling mercury, replacing mercury-containing products or equipment, appropriately labeling mercury-containing equipment, etc., as appropriate.

Step 9. Have students submit their data and written reports and give their oral presentations. If appropriate, students may also need/want to discuss specific results and recommendations with the principal, science teachers, school nurse, and engineering and/or janitorial staff one-on-one, as well as in a formal presentation.

Step 10. Discuss the Questions for Discussion (page 5) as a class as a wrap-up after the project is complete.

Questions for Discussion:

1. How did what you found in your audits compare with what you expected to find? Did you find more items that contain mercury? Fewer items? Did you find mercury in places you didn't expect it? Was it more difficult to figure out what contained mercury than you expected? Easier?

2. Mercury in our schools, homes, and environment is considered both an environmental issue and a health issue. Why?

3. If you were in charge of your school and had enough money to deal with mercury in just one area/aspect of your school (e.g., nurse's office, science labs, janitorial supplies, lighting), which would you pick? Why? How would you do it?

4. Since most mercury in the environment is created through generating energy, are there things you or your school can do to reduce this source of mercury?

Assessment/Follow-Up Suggestions:

- Have students conduct a similar mercury audit of their homes and research ways they can reduce the amount of mercury there.

- Take a field trip to your local sanitary landfill or to a recycling center to see how they handle/recycle mercury-containing items, such as fluorescent bulbs. Or, invite a guest speaker from your local sanitary landfill or recycling center.

- Work with your school to find ways to reduce the amount of mercury found there. Ideas may include raising funds to replace mercury-containing equipment, encouraging science teachers to use reduced-scale chemistry, etc.

- Work with your school to reduce its energy use to help reduce the amount of mercury emitted through energy generation. Ideas include using fluorescent bulbs, turning down heat on evenings/weekends, installing motion-sensor lights in restrooms so lights are only on when the rooms are in use, or simply reminding teachers/students to turn off lights when they leave the room.

- Over a period of time (a month, a semester, a year), have students gather news articles about mercury in the environment and collect them in a notebook. See *Mercury in the News Teaching Ideas*, page 23, for a list of ideas of ways to use those articles.

- Learn more about how mercury can bioaccumulate in the food chain using the Idaho Division of Health's lesson plan found at www.healthandwelfare.idaho.gov/DesktopModules/DocumentsSortable/DocumentsSrtView.aspx?tabID=0&ItemID=9690&MId=10885&wversion=Staging.

- Learn more about mercury exposure using the Idaho Division of Health's lesson plan found at www.healthandwelfare.idaho.gov/DesktopModules/DocumentsSortable/DocumentsSrtView.aspx?tabID=0&ItemID=9702&MId=10885&wversion=Staging.

Now that you know what you have, do you need assistance removing mercury and other hazardous chemicals from your school?

The *Idaho Chemical Roundup* is a Department of Environmental Quality program that can help your school remove mercury and/or other hazardous chemicals from school grounds.
See www.deq.idaho.gov/waste /educ_ tools/chemical_roundup.cfm for more details.

Additional Resources:

Idaho Chemical Roundup – Resources to help you remove hazardous chemicals from your school (DEQ Web site)
www.deq.idaho.gov/waste/educ_tools/chemical_roundup.cfm

Mercury Vapor Experiment (Short video on Bowling Green State University Web site)
wbgustream.bgsu.edu/bgsu/epa/index-qt.html

Online Recycling Directory (DEQ Web site)
www.deq.idaho.gov/waste/recycling/recycle_home.cfm

Pollution Prevention (DEQ Web site)
www.deq.idaho.gov/multimedia_assistance/p2/overview.cfm

Reduced Scale Chemistry (pdf on DEQ Web site)
www.deq.idaho.gov/waste/educ_tools/chemical_roundup_reduced_scale_chemistry_fs.pdf

Waste Management Educational Tools (DEQ Web site)
www.deq.idaho.gov/waste/educ_tools.cfm

Waste Management and Remediation: Programs and Issues (DEQ Web site)
www.deq.idaho.gov/waste/prog_issues.cfm

Mercury at School: Where to Look and What to Look For

Science, Chemistry, Physics, and Biology Classrooms/Laboratories

Check for: Pure mercury, mercury compounds, thermometers, barometers, or other devices that may contain mercury.

Why?: Mercury and mercury compounds are sometimes used in experiments. They may or may not be used now, but they may still be in the cabinet or chemical closet. Mercury thermometers, barometers, or other mercury-containing devices may be used in science, chemistry, biology, and physics classes.

Alternatives: Other chemicals can be used in class experiments to illustrate science or chemistry principles. Alcohol or electronic thermometers are readily available and sufficiently accurate. If mercury is used in experiments, often it is possible to use other chemicals to illustrate the same chemistry principles, or do reduced scale* experiments to reduce the amount of materials necessary and reduce the need to have large quantities of mercury at the school. If mercury is used as part of the curriculum, make sure to have a mercury spill kit available, and that staff are trained in its use.

Who to talk to: Chemistry and other science teachers.

Questions to ask:
(1) Are mercury or mercury compounds currently used in class?
(2) If they are being used, could other chemicals replace them?
(3) Do you know if these have been used in the past in science classes in this school?
(4) Are these being stored in a closet, cabinet, or elsewhere?
(5) How many mercury thermometers or other mercury devices are in the classroom?
(6) Have you ever experienced a spill of mercury or a broken thermometer in your class room?
(7) Is a spill kit readily available, if a spill occurs?
(8) Are you familiar with the proper spill control procedures for mercury?

Possible actions: Make sure any mercury, mercury compounds, or thermometers are in non-breakable containers. These should all be collected by school engineering/ janitorial staff and held in a safe, secured area prior to recycling them.

Your school should not wait for mercury thermometers to break before replacing them with non-mercury alternatives. If a barometer is to be retained, make sure it is protected by a Plexiglas or similar enclosure. If mercury thermometers or barometers will not be replaced at this time, obtain spill kits for the science classrooms and storage rooms. Make sure that at least several staff people are trained in proper spill control procedures.

*See http://www.deq.idaho.gov/waste/educ_tools/chemical_roundup_reduced_scale_chemistry_fs.pdf for more information on reduced scale chemistry.

Mercury at School: Where to Look and What to Look For

Nurse's Office

Check for: Thermometers, blood pressure measuring device (sphygmomanometer), nasal spray, and contact lens solution.

Why?: Mercury thermometers are used to check for fever. Sphygmomanometers can contain up to several pounds of mercury. Nasal spray and contact lens solution may contain thimerosal (an ingredient that has mercury in it), phenylmercuric acetate or phenylmercuric nitrate.

Alternatives: Alcohol or electronic thermometers are readily available. Aneroid blood pressure devices are just as effective as the mercury versions. Many brands of nasal spray and contact lens solution do not contain mercury, however the labels do not always indicate which ones are mercury free.

Who to talk to: School nurse

Questions to ask:
(1) How many mercury thermometers are in the nurse's office?
(2) Have you ever experienced a broken thermometer?
(3) Is a spill kit readily available, if a spill occurs?
(4) Are you familiar with the proper spill control procedures for mercury?
(5) Do you use a sphygmomanometer? If yes, have you considered replacing it with an aneroid blood pressure device that does not contain mercury?
(6) Do you stock nasal spray or contact lens solution? If yes, have you contacted the manufacturer to make sure they do not contain mercury?

Possible actions:
Make sure mercury thermometers are in non-breakable containers. These should all be collected by school engineering or janitorial staff and held in a safe, secured area prior to recycling them. Do not wait for mercury thermometers to break before replacing them with alcohol or electronic alternatives. Replace sphygmomanometers with aneroid blood pressure devices.

If mercury thermometers or sphygmomanometers will not be replaced at this time, obtain a spill kit for the nurse's office. Make sure that the nurse(s) are trained in proper spill control procedures. Use up existing stock of nasal spray or contact lens solution containing mercury and then purchase mercury-free alternatives.

The nurse's office may have the most mercury in the school, including thermometers and blood pressure measuring devices. Blood pressure gauges or sphygmomanometers may contain several pounds of mercury. Aneroid blood pressure devices and digital thermometers are available, and are as accurate as mercury-containing ones.

There are also nasal sprays and contact lens solutions that contain thimerosal, phenylmercuric acetate, or phenylmercuric nitrate. These compounds all have mercury in them, and have mercury free alternatives.

Mercury at School: Where to Look and What to Look For

School Infrastructure: Electrical and Heating Equipment and Fluorescent and High-Intensity Discharge (HID) Lamps

Check for: Thermostats, "silent*" light switches, and fluorescent, mercury vapor, metal halide, high-pressure sodium, and neon lamps (light bulbs).

Why?: Thermostats are used to control the temperature in buildings. Approximately 75% of thermostats in use today contain mercury. Many "silent" light switches contain mercury. Each fluorescent tube in lighting fixtures contains a tiny amount of mercury. However, your school probably uses a large number of these fluorescent bulbs throughout the building, so the total amount of mercury can be significant.

Alternatives: Electronic thermostats and non-mercury switches are widely available. Continue to use fluorescent bulbs, but be sure they are recycled, rather than thrown away. Fluorescent lighting is an excellent business and environmental choice because it can use up to 50% less electricity than incandescent lighting. However, used fluorescent lamps must be managed properly because they contain mercury.

Who to talk to: School engineering or janitorial staff

Questions to ask:
(1) How many thermostats and "silent" light switches are there in your school building?
(2) How many of these contain mercury?
(3) How are used fluorescent bulbs managed? Are they recycled or thrown out in the trash?
(4) If they are recycled, how and where are they stored before they are taken from the building for recycling? How are they protected to avoid breaking them?
(5) Are any other type of mercury-containing bulbs (e.g., mercury vapor, metal halide) bulbs used? If so, how are they managed?

Possible actions:
Place stickers (designed by the students) on any mercury thermostats or silent switches that indicate:
(1) This device contains mercury.
(2) When this device is disposed of, the mercury should be recycled.
(3) When purchasing a replacement, a mercury-free model should be chosen.

Notify the purchasing department to try to get mercury-free thermostats or light switches when purchasing replacements. Many HVAC contractors will recycle mercury thermostats. Your school should recycle used fluorescent bulbs by replacing them in their original box in a safe, secure storage area until they are picked up by a recycling contractor.

When disposing of lamps (bulbs), store them in an area and in a way that will prevent them from breaking, such as in boxes the lamps came in. Mark the lamp storage area with the words "Fluorescent lamps for recycling." Do not break or crush lamps because mercury may be released. If lamps are accidentally broken, store them in a sealed container. Pick up spilled powder and add it to the sealed container.

Check the Department of Environmental Quality's online recycling directory at www.deq.idaho.gov/waste/recycling/recycle_home.cfm or contact your local city/county public works department or trash hauler, or the vendor where you purchased the lamps to determine what options are available for lamp recycling.

Dispose of old, mercury-containing pesticides, fungicides, and paints as hazardous wastes.

*"Silent" light switches were manufactured prior to 1991. They look like typical wall switches, but they do not make the audible "click" sound when activated. Not all light switches manufactured before 1991 were "silent."

Mercury Audit: Assessment Checklist for Schools

Science, Chemistry, Physics, Biology Rooms

Item	No	Yes	Use?	How Many/ How Much?	Location?
Liquid mercury					
Mercury thermometers					
Mercury barometers					
Mercury vacuum gauges					
Mercury spectral tubes					
Mercury molecular motion device					
Mercury sling psychrometer					
Mercury compounds					
Mercury oxide					
Mercury (II) chloride					
Mercury (II) sulfate					
Mercury nitrate					
Mercury iodine					
Zenker's solution					
Other					

Mercury Audit: Assessment Checklist for Schools

Nurse's Office/Medical

Item	No	Yes	Use?	How Many/ How Much?	Location?
Mercury fever thermometers					
Sphygmomanometers (blood pressure devices) - with silver liquid					
Nasal spray that contains thimerosal, phenylmercuric acetate, or phenylmercuric nitrate					
Contact lens solution that contains thimerosal, phenylmercuric acetate, or phenylmercuric nitrate					
Other					

Mercury Audit: Assessment Checklist for Schools

Facilities

Item	No	Yes	Use?	How Many/ How Much?	Location?
Fluorescent lamps (bulbs)					
Mercury thermostats					
Various types of lamps (light bulbs: mercury vapor, metal halide, high-pressure vapor sodium, high intensity discharge (HID)					
Mercury gauges					
"Silent" light switches					
Mercury float control switches (e.g., on sump pumps)					
Flow meters with mercury switches					
Other equipment with mercury switches (e.g. fire alarms, safety valves)					
Older fungicides and pesticides (manufactured prior to 1991)					
Latex paint (manufactured prior to 1992)					
Other					

Mercury Audit: Assessment Checklist for Schools

Other

Item	No	Yes	Use?	How Many/ How Much?	Location?
Mercury cooking thermometer (kitchen)					
True vermillion paint (contains mercuric sulfide) (art rooms)					
Mercury oxide/mercury zinc batteries (old alkaline type, prior to 1996 and button batteries)					
Other					

Idaho health agency finds high mercury levels in bass

www.KTVB.com, The Associated Press

Edition Date: 08/18/08

The Idaho Department of Health and Welfare is warning Idaho women and children to limit how much bass they eat because of high levels of mercury.

The agency issued an advisory on Monday after increased levels of mercury were detected in both smallmouth and largemouth bass in Idaho lakes, rivers and reservoirs.

Elevated mercury levels have been linked to learning disabilities in children and heart, nervous system and kidney damage in adults. Pregnant women should not eat fish containing mercury.

Agency spokesman Tom Shanahan says mercury intake can be limited by eating young bass that are small and have accumulated less mercury than larger bass.

Mercury levels can also be reduced by eating other fish, such as rainbow trout.

Boise family plans to move after mercury spill

www.idahostatesman.com, The Associated Press

Edition Date: 08/02/08

A family whose apartment was contaminated with mercury plans to move out of the building.

"We just don't feel comfortable here," said Jeremy Cohen, who lived in the unit with his wife Ashley and their four children, in an interview with the Idaho Statesman.

The Cohens spent a week out of the rental home after the volatile heavy metal was found on July 24.

No one was sickened, but mercury levels in one of the two apartments that were evacuated were seven times higher than what is considered safe by the Environmental Protection Agency.

Cohen said he was leery about the possibility of lingering effects, even though health officials told him that a week of cleanup and remediation have made the site perfectly safe.

Mercury, which can damage the human nervous system, particularly in developing fetuses, was discovered after children were found playing with the heavy, silvery-white metal that remains in liquid form at normal temperatures.

EPA investigators believe a former tenant of one of the apartments dumped the mercury. Cohen said the man likely used the mercury for gold mining.

Officials estimate they recovered between 12 and 14 ounces of mercury and ripped up a concrete driveway and sidewalk to reduce the contamination.

The cleanup likely cost about $200,000, said Mike Sibley, EPA's on-scene coordinator, adding that whoever was responsible for the contamination could be liable for the costs and could face criminal charges.

The Cohens were initially forced to leave without their shoes and other necessities while they were checked for contamination but say they harbor no ill will toward the former tenant. The family received assistance from the Red Cross, including temporary housing, food and clothing.

"If you sit around and be angry about it, you'll die of a coronary," Cohen said.

Neighbors say a former tenant brought mercury to Boise complex; the EPA is still cleaning up tainted items and soil and also will have to remove some paving

www.idahostatesman.com, Heath Druzin

Edition Date: 07/30/08

A former tenant of a Boise Bench apartment complex is likely responsible for liquid mercury contamination - one that prompted officials to rip up parts of a concrete driveway and sidewalk.

The investigation and clean-up, in its seventh day on Wednesday, could cost between $100,000 to $200,000. Environmental Protection Agency officials said the cleanup is important because as little as two tablespoons of mercury can be toxic.

Children like to play with mercury because of its consistency, said Mike Sibley, the EPA's on-scene coordinator.

"When it sits in your hand it's like Jell-O," Sibley said.

But heat can cause mercury to vaporize, and inhaling the metal is the most dangerous form of contact.

The mercury was discovered Thursday because children were playing with it outside an apartment complex in the 700 block of White Cloud Drive, near South Cole Road and West McMullen Street. Officials estimated there was between 12 and 16 ounces of mercury.

Workers in white haz-mat suits and masks continued the task of hauling away anything that had traces of mercury on it - furniture, clothing and even soil. So far, about 120 cubic yards of soil had been taken away in four dump trucks.

Officials said it was decided to remove parts of a driveway and sidewalk after workers were unable to lower mercury levels on the concrete.

Mercury poisoning can cause dizziness, memory loss, diarrhea, and vomiting. It can be fatal, and it is especially dangerous to children.

Neighbors told EPA investigators that a man who once lived in one of the contaminated buildings brought the mercury to the apartment complex, Sibley said. The agency is still searching for the man and is not releasing his name.

Investigators are not sure why the man had the mercury, though it is commonly used in mining, Sibley said.

"There's no reason to have mercury (in the home)," Sibley said.

Two apartment complexes have been cordoned off and two families evacuated from the buildings.

The Red Cross of Greater Idaho has been helping the families, said CEO Shawn Tolman.

Sibley said he hoped to allow the families to move back Wednesday. The EPA sometimes helps people replace contaminated furniture and clothes, on a case- by-case basis, Sibley said.

"We're not just going to go in and destroy a place and then leave," he said.

In March, Central District Health Department officials said there had been four mercury spills in three weeks in the Treasure Valley, including two in area schools, one in a private home and one on a public street. None of the incidents resulted in long-term problems for people or the environment.

In 2004, an antique barometer broke inside a Riggins home, spilling about eight ounces of the substance. The entire family became ill with mercury poisoning, and the EPA designated the home a Superfund cleanup site. A 15-year-old girl who lived there had to be hospitalized and had symptoms for several months.

Mercury spills prompt warnings about disposal

www.idahostatesman.com, Colleen LaMay

Edition Date: 03/08/08

Four local mercury spills, including two at schools, have been cleaned up in the past few weeks, prompting officials Friday to remind residents to properly dispose of the potentially dangerous chemical.

"These incidents remind us of the ongoing danger presented by mercury-containing items in our community," Dave Fotsch, spokesman for the Central District Health Department in Boise said at a news conference at the Hidden Hollow Sanitary Landfill.

At Saint Joseph's Catholic School in the North End, a student dropped a jar with mercury in it. A teacher was passing it around to let children see what it looked like and be aware of the dangers it posed.

At a home in Northwest Boise, a mercury thermometer broke.

In Eagle, someone found mercury, maybe four tablespoons of it, in a gutter between a curb and the sidewalk along a public street.

At Emmett High School, broken laboratory thermometers were found on a storage room floor.

No one was hurt in the spills.

The danger comes from inhaling mercury vapors. Short-term exposure to high levels can cause skin rashes, chills, nausea, fatigue and diarrhea, said Rob Howarth, director of environmental health and emergency preparedness for the health department.

Cleanups are time-consuming and expensive, agency officials said. It is better to take items containing mercury to the landfill or other designated sites for proper disposal.

Items with mercury include old furnace thermostats, old weather barometers and some types of light bulbs and tube lights.

Representatives at the news conference included the Boise Fire Department, the Idaho Department of Environmental Quality and the U.S. Environmental Protection Agency.

Mercury Spill – Felony Charges:

Spill Control Association of America, *Spill Briefs* (their source: www.magicvalley.com)

Edition Date: 05/05/06

Three students at the Timberline High School in Weippe, Idaho are expected to face felony charges for intentionally spilling mercury in the school, causing the evacuation of the school and cleanup of the spill. The boys allegedly removed about one cup of mercury from a science lab; while fighting over who could play with it next, the mercury was spilled in several locations throughout the school. The boys are expected to be charged with malicious destruction of property. (Source: www.magicvalley.com)

Riggins, Idaho Family Recovering from Mercury Poisoning

www.KTVB.com, Associated Press

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Fifteen-year-old Stephanie Wicker got sick about a month after an antique barometer broke in her Riggins, ID home. After a battery of tests, doctors diagnosed her and her parents with mercury poisoning. About eight ounces of the liquid metal from the broken barometer had been tracked throughout the house. When temperatures increased, the mercury vaporized, allowing family members to breathe it into their lungs. Now the Wicker's home is a Superfund site being cleaned by the U.S. EPA. Anything that is porous -- like paper, fabric or carpet -- must be tossed out.

John and Sandra Wicker and their daughter are slowly recovering from the mercury poisoning. Stephanie's still in a lot of pain, but it's lessening as days go by. Her parents still suffer anxiety and shortterm memory loss.

The family says they want to warn others to throw away any mercury-containing items in the home and to immediately call authorities after even the tiniest spill.

Mercury

Mercury is a naturally occurring metallic element that is found in trace amounts in air, water, and soil. It comes in three forms—elemental, inorganic, and organic. Mercury is familiar to most of us in its *elemental* form as the heavy, silvery liquid metal used in thermometers and fluorescent light bulbs. *Inorganic* mercury compounds are created when mercury is combined with other elements, such as chlorine, sulfur, or oxygen. In labs, common forms include mercuric chloride, mercuric sulfide, and mercuric nitrate. *Organic* mercury compounds are formed when microscopic organisms convert inorganic mercury into methylmercury, which accumulates up the food chain and can build up to unhealthy levels causing fish consumption advisories and other restrictions.

All forms of mercury are poisonous, especially to children. The severity of effects depends largely on the amount and timing of exposure. Short-term exposure to high concentrations of mercury vapor can cause harmful effects on the kidneys and the nervous, digestive, and respiratory systems. Chronic exposure can permanently damage the brain and kidneys.

Best Practices

Schools should work to eliminate mercury from the classroom wherever possible.

- ✓ Identify mercury-containing equipment and chemicals in your lab. Thermometers, barometers, fluorescent lighting, thermostats, switches, novelty items such as mazes, and chemicals may contain mercury.
- ✓ Replace mercury compounds and thermometers with mercury-free alternatives.
- ✓ Remove and recycle bulk mercury and mercury containing items.

Disposal Considerations

Mercury is recyclable. Best practices suggest mercury and mercury-containing equipment be recycled through a hazardous waste management company. Some equipment vendors may offer product take-back programs to recycle older mercury equipment. For example, mercury thermostats can be recycled through a national recycling program. Consult DEQ's recycling directory for mercury recycling services at www.deq.idaho.gov/waste/recycling/recycle_home.cfm.

Many landfills refuse to take mercury waste, in which case a hazardous waste management company will be your only option. If your school is a conditionally exempt small quantity generator, it may be permissible to dispose of mercury at your local landfill, but only with permission of the landfill operator.

Do not pour mercury down the drain. It is highly toxic to organisms in your septic tank or at the wastewater treatment plant. Mercury is heavy and can become stuck in sink traps and spill when cleaning the traps, creating a health risk.

Mercury Spills

Mercury and mercury-containing components are hazardous wastes due to their toxicity. Keep students and staff away from contaminated areas. Even small amounts of mercury can pose a risk to human health and the environment. Exposure to mercury by inhalation is of particular concern in managing a spill. Spills of more than one pound (two tablespoons) must be reported to the U.S. Environmental Protection Agency (EPA) through the National Response Center (NRC). The NRC hotline operates 24 hours a day, 7 days a week. Call (800) 424-8802.

For small spills, less than the amount contained in a thermometer:
According to EPA, the general public can clean up small mercury spills no greater than the amount contained in a thermometer if spilled on a flat surface. If your spill is larger, is not on a flat surface, or uncertainty exists to the cleanup method, spill size, or exposure, isolate the contaminated area and call the Idaho State Communications Center at (800) 632-8000 or (208) 846-7610.

Spill clean up with a mercury spill kit:
Mercury spill kits contain powders, granules, sprays, and/or cleanup materials specific for cleaning mercury spills. Spill kits range in price from $50 to $300 depending on contents. Follow the directions outlined in the kit.

If you do not have a mercury spill kit:
If a commercial mercury spill kit is not available, the spill may be managed with other items. Have on hand nitrile or neoprene gloves, a squeegee or playing card, eye dropper, plastic zipper-type bags, paper towels, and sulfur powder. Powdered sulfur may be purchased at garden supply stores or pharmacies.

1. Put on gloves.
2. Secure the area to keep the mercury spill from spreading and to keep people from coming in contact with it.
3. If there are any broken pieces of glass or sharp objects, pick them up with care. Place all broken objects on a paper towel. Fold the paper towel and place in a zipper-type bag. Secure the bag and label the bag accordingly (i.e., broken glass).
4. Use a squeegee or cardboard to gather the mercury beads. Use slow sweeping motions to keep the mercury from becoming uncontrollable. Use a flashlight to look for any additional mercury beads that may be sticking to the surface or in small cracked areas of the surface.
5. Use an eyedropper, piece of paper, or cardboard to collect or draw up the mercury beads. Slowly and carefully transfer the mercury onto a damp paper towel. Place the paper towel in a zipper-type bag and secure. Label the bag.
6. Place all materials used with the cleanup, including your gloves, and all mercury beads and objects into a zipper-type bag. Secure and label the bag as mercury-contaminated hazardous waste.
7. Shine a flashlight on the spilled area. If you still see any small droplets, they can be picked up by touching them with a piece of duct tape. (Remember to wear gloves and dispose of all materials in zipper-type, labeled bag.)
8. Once all visible mercury is picked up and placed in the bag, sprinkle sulfur powder on the spill area; a color change from yellow to brown indicates that mercury is still present. Use a small brush to sweep up the sulfur and residual mercury, and place it into the same bag.
9. Contact your hazardous waste management company for disposal in accordance with local, state, and federal laws.
10. Keep a window open for at least 24 to 48 hours **after** your successful cleanup. Continue to keep students and staff out of cleanup area. If sickness occurs, seek medical attention immediately.
11. Mercury can be cleaned up easily from hard, smooth surfaces like wood, linoleum, and tile. If a spill occurs on carpet, curtains, upholstery, or a similar surface, cut out the contaminated portions and dispose of as hazardous waste as outlined above. Once removed, check the floor below to ensure mercury has not soaked through the carpet.

Mercury can spread easily and volatilize at room temperature, increasing exposure.

- ✓ Never use a vacuum cleaner to clean up mercury. The vacuum will put mercury vapor into the air and increase exposure. The vacuum will become contaminated and need to be disposed of as hazardous waste.
- ✓ Never use a broom to clean up mercury. It will break the mercury into smaller droplets and become contaminated.
- ✓ Never pour mercury down the drain. It may lodge in the plumbing and continue to volatilize over time, or expose workers during maintenance and repair of plumbing system. Due to its toxicity, it may also cause problems with the operation of the septic or sewer system.
- ✓ Never wash mercury-contaminated items in a washing machine. Mercury may contaminate the machine.
- ✓ Avoid foot traffic in spill areas. This will spread the mercury around making it harder to clean.
- ✓ Do not wear jewelry when cleaning up a spill. Mercury will adhere to and contaminate gold and other metals.

For More Information

For information about mercury and Idaho's hazardous waste requirements, contact the Department of Environmental Quality at (208) 373-0502 or visit www.deq.idaho.gov.

Mercury in the News Notebook
Teaching Ideas

Have students scan the news and read news articles about mercury for a specified period of time and collect them in a notebook. Below are some suggestions of ways to expand on this.

- Have class discussions (weekly, monthly, periodically) about what the students have found. Share and discuss news items.
  - Watch for times when one student's item may provide additional background or detail to supplement another's.
  - Watch for times when two news stories about the same topic may show different "slants" of the same story. Discuss.

- As the time for collecting articles comes to a close, have each student pick one story line to research further then write a report, prepare a poster, create a timeline, or present to the class. Items students may want to discuss in their projects include:
  - What past events contributed to the current issue? How?
  - Who is affected by the issue? How? (Look for people in addition to the obvious ones.)
  - What else is affected by the issue? (e.g., wildlife, economy, policy, other environmental issues, etc.)
  - What sort of differing opinions do people have about the issue? Look at those affected, politicians, interest groups, professionals dealing with the issue, etc.
  - If the issue has been resolved, how? Do you see it coming up again? Why?
  - If it has not been resolved, what do you think will happen? Why?
  - Have different news media covered the issue differently? How? Why?

- Have students create a timeline that spans the time they were collecting articles that shows one or more of the issues they followed. (Individually, in small groups, or as a class.) Discuss how the issue(s) evolved.

- Have students sort their articles into groups, then graph the occurrence of different types of issues. (Individually, small groups, or as a class.) Some ways students could sort include:
  - By general topic (e.g., mercury spills at schools, mercury spills at home, mercury at mines, mercury in water, mercury deposition from air, mercury from power plants, mercury and fish advisories, mercury bioaccumulation, mercury and health).
  - By location (Idaho vs. other states, part of the state, county).

- Using all of their articles have students look for trends or places where issues may overlap or affect each other. Discuss, write a report, or create a poster. (Individually, small groups, or as a class.)

- Pick one issue and do historical research on the same topic.
  - Has this issue (or a similar one) occurred before?
  - If so, compare and contrast the old occurrence with the current issue.
  - When did the old issue occur?
  - How was it the same? How was it different?
  - How was it resolved (if it was)?
  - Who were the key players?