NEW YORK STATE
Conservationist
for Kids!

# MERCURY

## It's Everywhere!


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## In this issue: MERCURY

**has been used by people for thousands of years. Proper care must be taken to keep this toxic metal from harming the environment and people.**

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**MERCURY** is a metal which is a silvery, odorless liquid when it's at room temperature in its pure state (elemental mercury). In this form, it is sometimes called "**quicksilver**." At room temperature—and especially when heated—it evaporates, becoming a vapor which spreads easily in the atmosphere.

**Mercury** occurs naturally in the Earth. The main ore for mercury is the mineral **cinnabar**.

Mercury conducts electricity, combines easily with other metals and expands and contracts uniformly when temperatures change. It has been used in many products we use every day that require these properties, for example, light bulbs, light switches, dental fillings, thermometers and more. It's even used in the small "button" batteries of some toys, light-up shoes, clothing and accessories.

**While mercury is useful, it can also be very dangerous—even deadly—if it's not handled properly.**

**Mercury is poisonous to people and wildlife; it damages nerve tissue in the body. Symptoms of mercury poisoning include changes in behavior, skin rash, muscle problems and more. High levels of mercury can cause developmental problems in young children.**

**Mercury can be released into the air when we burn coal or garbage. From there, it can land in lakes and rivers. Wildlife is exposed to mercury when it's in their habitat, especially in the plants and animals they eat.**

**People are exposed to mercury when they breathe in the fumes, when they have direct skin contact with it, or when they eat fish that came from waters with high amounts of mercury.**

# MERCURY

occurs naturally in the environment from volcanic activity, forest fires, erosion of rocks and decomposition of soils. It also enters the environment from human activity.

1

Most of the mercury in our air from human sources comes from electric power plants that burn coal to generate electricity. Other human sources include emissions from factory smokestacks and burning waste contaminated with mercury. Mercury is also used in mining to purify gold and silver.

POWER PLANT

MANUFACTURING

WASTE DISPOSAL

## Researchers study the amount of mercury in our environment.

They test our air, water, and food (fish) to determine how much mercury is present and whether the level is harmful. They also investigate which kinds of wildlife are most affected by mercury and what those effects are. They study the effects of mercury on fish, loons, songbirds, river otters, bald eagles, bats, insects and spiders.

## 2

Once it's in the air, mercury can travel wherever the wind blows. When rain or snow falls, it carries mercury from the atmosphere onto the land and into the water of rivers, wetlands, lakes and oceans. Mercury on the land is carried into water bodies by runoff and groundwater.

## 3

When mercury falls into a waterbody, bacteria in the sediment can convert it to methylmercury, a form of the metal that dissolves in water.

Methylmercury can be taken up by aquatic plants and absorbed by insects, worms and other small creatures that live in the sediments.

Fish can also absorb methylmercury directly from the water.

## 4

Methylmercury accumulates in the body; it doesn't pass through and go away. When plants and animals are eaten, methylmercury is carried through the food chain. Animals at the end of the food chain get all the methylmercury consumed by all of the animals before them.

METHYLMERCURY

# Reducing MERCURY in Your World


***Most of the mercury in our air from human sources comes from power plants that burn coal to generate electricity.***

***The easiest way to reduce the amount of mercury added to the environment is to reduce the amount of electricity you use each day. What can you turn off to reduce your power consumption?***

## A mercury spill in your home could be dangerous to your health and costly to clean up.

**Learn how to safely dispose of mercury from your home.**

**Mercury-containing thermometers, thermostats and light bulbs should be handled with care—by an adult—to avoid breakage.** They should be recycled; in most cases it is illegal to put them in the trash. Some electronic equipment, such as LCD TVs and LCD monitors, contain small amounts of mercury and should be properly recycled at the end of their useful life.

Many communities have one or more "household hazardous waste" days each year. **You can drop off your hazardous items for proper disposal, including reuse or recycling.** Check with your local government office to see when your community's household hazardous waste day is scheduled and what items are acceptable. Electronic waste may be recycled through various manufacturers' collection and recycling programs.

**Ask your teachers about mercury in your school.** Schools sometimes have old equipment in science labs or health offices which may contain mercury and could be harmful. DEC and the New York State Department of Health (DOH) have information about how to safely remove mercury from schools.

## Fluorescent Light Bulbs and Mercury

Standard fluorescent light bulbs and compact fluorescent light bulbs (CFLs) each contain a tiny amount of mercury, about enough to fit on the tip of a ballpoint pen. As long as the bulb isn't broken, the mercury is contained. These bulbs are very energy efficient. When you consider the amount of mercury added to the atmosphere by power plants making electricity to light a CFL over its lifetime, and the amount of mercury in the bulb itself, a CFL actually uses less mercury than an incandescent bulb.

Be sure to return fluorescent bulbs for recycling when they stop working, or take them to a household hazardous waste collection.

If you accidently break a fluorescent bulb, ***leave the room and let an adult know immediately.*** The adult will clean up the spill following the instructions found at the websites in the green box, below.

## Keeping YOU Safe

**Because mercury can cause serious problems if it's not handled properly, there are rules and regulations about how it can be used and disposed of.** Many government agencies work together to keep us safe from mercury, including DEC, DOH and the United States Environmental Protection Agency (USEPA). They limit how much mercury factories and power plants are permitted to release into the environment, and work to reduce the amount of mercury added to the environment.

Learn how to **clean up a broken CFL at www.dec.ny.gov/chemical/44927.html** or **www.health.ny.gov/environmental/chemicals/hsees/mercury/fluorescent_lamps.htm**

### For More Information:

*The Magic School Bus Gets Cleaned Up* (EPA/Scholastic publication for children)
*Elements (Vol. 6): Zinc, Cadmium and Mercury* by Brian Knapp (Grolier Educational, Danbury, CT, 1997)
http://www.dec.ny.gov/chemical/28716.html DEC's "What Do You Know About Mercury?" page
http://www.dec.ny.gov/chemical/285.html DEC's gateway page with links about mercury
http://www.dec.ny.gov/chemical/8485.html DEC's Household Hazardous Waste page
http://www.dec.ny.gov/chemical/44927.html DEC's CFL page
http://www.dec.ny.gov/chemical/65583.html DEC's Recycling Electronic Waste page
http://www.epa.gov/air/toxicair/newtoxics.html EPA's "About Air Toxics"
http://www.epa.gov/hg/about.htm EPA's Basic Information about Mercury
http://dnr.wi.gov/org/caer/ce/eek/earth/mercury.htm Wisconsin DNR kids' page on mercury

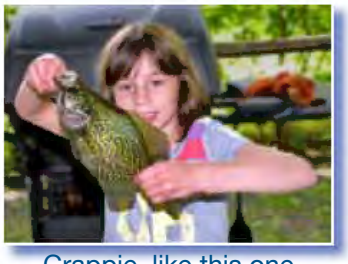
# The OUTSIDE Page

## Reducing Mercury

There are plenty of ways you can help reduce mercury pollution, starting with cutting back how much electricity you use and encouraging adults to remove items that contain mercury from your home and school. In many cases, there are mercury-free substitutes that can do the job just as well. Write a list of changes you can make, then put it into action!

### Here are some suggestions:

- **Use digital thermometers.**
- **Replace older mercury thermostats (round) with digital thermostats.**
- **Replace mercury light switches (sliders) with non-mercury switches (click style).**
- **Avoid batteries that contain mercury. If you don't have a choice, make sure to dispose of them properly at a battery recycling center or at a household hazardous waste collection.**
- **Dispose of computers, cell phones and other electronics containing mercury and other toxic metals safely when you're done with them.**



Crappie, like this one from Honeoye Lake, are a tasty treat.

## You are what you eat…

Many anglers enjoy catch-and-release fishing, but for those who like to eat their catch, it's important to know whether fish are safe to eat. The New York State Department of Health has information to help you. Go to www.health.ny.gov/fish to learn which kinds of fish are safe to eat in different areas of the state.

Some Adirondack fish are good to eat, but some are not because they have high levels of mercury.

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Joe Martens
Commissioner

# *Conservationist for Kids*

Supplement for Classroom Teachers – Mercury: It's Everywhere!

## Mercury

Mercury, a metal, is naturally present in the environment. In this issue of *Conservationist for Kids* (C4K), we discuss where mercury is found and modern uses for it. We also discuss how mercury may enter the environment as a by-product of human activities, and how students and their families can reduce it in their environment, their homes and their schools.

People have used mercury for thousands of years and for many purposes. We use it today in button-cell batteries, fluorescent light bulbs, and many other products. When we use or dispose of products which contain mercury, we must do so in a safe manner, as the effects of mercury exposure on human health can be deadly and the environmental effects far reaching.

Emissions from coal-fired power plants are the primary source of anthropogenic mercury in the atmosphere, from which it may be deposited in water and on land. Reduced demand for energy can result in reduced emissions of all kinds—including mercury—from power plants.

In addition to DEC, the New York State Department of Health (DOH) has concerns about mercury. They issue advisories about mercury in fish, helping us make healthy dietary choices. DOH also addresses mercury in schools. They note that in some communities, elemental mercury is used in cultural or religious practices, which may include wearing a glass pendant filled with elemental mercury. If the pendant breaks or leaks, a mercury spill occurs. Even a small spill can be hazardous.

Cleaning up a mercury spill, whether from a chemistry lab, a broken thermometer or another source, can be expensive and time consuming. Mercury spills in schools can be avoided by removing as many sources of mercury as reasonable. Detailed information about mercury in schools and how to safely remove it is available from DEC and DOH (see Online Resources on the back of this page).

## This Issue's "Outside Page"

The Outside Page (pg. 8) of this issue of C4K addresses how families can limit their exposure to mercury. It's astounding how many sources of mercury may be present in our homes. Awareness is the first step to taking action to remove it.

## Teacher Workshops

For teachers who have participated in a Project WILD Aquatic, Project WET or Project Learning Tree workshop, the activities listed below complement this issue of C4K. Visit **www.dec.ny.gov/education/1913.html** for information about workshops for educators and about how to obtain curriculum and activity guides.

**Project WILD Aquatic:** Watershed, What's in the Water?, Where Does Water Run?
**Project Learning Tree:** Pollution Search
**Project WET and Project WET 2.0:** Sum of the Parts, There is No Away

## Do you have an interactive white board in your classroom?

If you use a SMART® Board or similar interactive white board or projection system in your classroom, consider downloading a PDF of C4K and using it in your classroom, along with the printed copies enclosed in this mailing. This issue of C4K and all of our back issues are available at **www.dec.ny.gov/education/40248.html**.

# Supplemental Activities for the Classroom

**Mercury and People**

To help people make healthy choices about fish consumption, the New York State Department of Health (DOH) issues advisories about sportfish (fish you catch). These tell people which fish to avoid and how to reduce exposure to contaminants in the fish they do eat. By following this advice, people can still get the health benefits of eating fish while minimizing the risks.

Fish from fresh waters are more likely to be contaminated than fish from remote marine waters because many fresh waters are close to human activities and contamination sources. Anglers often eat fish from a limited number of water bodies as they tend to fish in favorite locations repeatedly. When these locations contain fish with higher contaminant levels, the people who eat them—both anglers and those with whom they share their catch—have higher exposures.

Explore **www.health.ny.gov/fish** with your students to help them understand DOH's health advisories. Information on the website details how to safely consume fish caught in the wild in New York State and provides a link to the booklet, *Health Advice on Eating Sportfish and Game*. It also contains information about eating fish and shellfish purchased in restaurants and markets.

**Mercury Bioaccumulation Tag**

The Environmental Protection Agency (EPA) has a simulation game which helps students better understand how mercury moves through an aquatic food chain. Students assume the roles of zooplankton, small fish, large fish and birds of prey while playing a modified game of tag. Questions and answers to prompt discussion are provided for the leader. *Mercury Bioaccumulation Tag* is fully described at **www.epa.gov/students/pdf/mercury.pdf**

**Learn about Loons**

Common loons are a familiar site on Adirondack lakes and are found in other areas of the state. Their diet is mostly fish. Loons in the Adirondacks have been found to have elevated levels of mercury, which affects their reproduction success. As a class, work together to learn about the common loon: what it looks like, where it lives (habitat and range) and what it eats. When researching what loons eat, use the information to create likely food chains and food webs that include loons, and discuss how mercury might enter their food supply. A summary of findings from a recently released study about loons and mercury in the Adirondacks can be found on the *Adirondack Daily Enterprise's* website at **www.adirondackdailyenterprise.com/page/content.detail/id/531596/Loons---mercury-victims--update-.html?nav=5008**

# Online Resources

***General Information about Mercury:***

**www.dec.ny.gov/chemical/285.html** DEC's mercury information page
**www.epa.gov/region7/mercury/educator_toolkit.htm** EPA's "Mercury: An Educator's Toolkit"
**www.epa.gov/mercury/index.html** EPA's mercury homepage (links to basic information, health and environmental effects of mercury exposure)
**www.epa.gov/mercury/consumer.htm** EPA's list of consumer and commercial products containing mercury
**http://water.epa.gov/scitech/swguidance/fishshellfish/outreach/factsheet.cfm** Consumption Advice: Joint Federal Advisory for Mercury in Fish (EPA and FDA)
**www.enotes.com/how-products-encyclopedia/mercury** E-Notes on mercury
**www.ec.gc.ca/mercure-mercury/default.asp?lang=En&n=D721AC1F-1** Environment Canada's "Mercury in the Food Chain"

***Mercury and Schools:***

**www.dec.ny.gov/chemical/35381.html** DEC's "How to Initiate a Mercury Clean Out in Your School"
**www.health.ny.gov/environmental/chemicals/hsees/mercury/index.htm** DOH's mercury brochures for schools
**www.epa.gov/hg/schools.htm** EPA's Schools and Mercury webpage

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