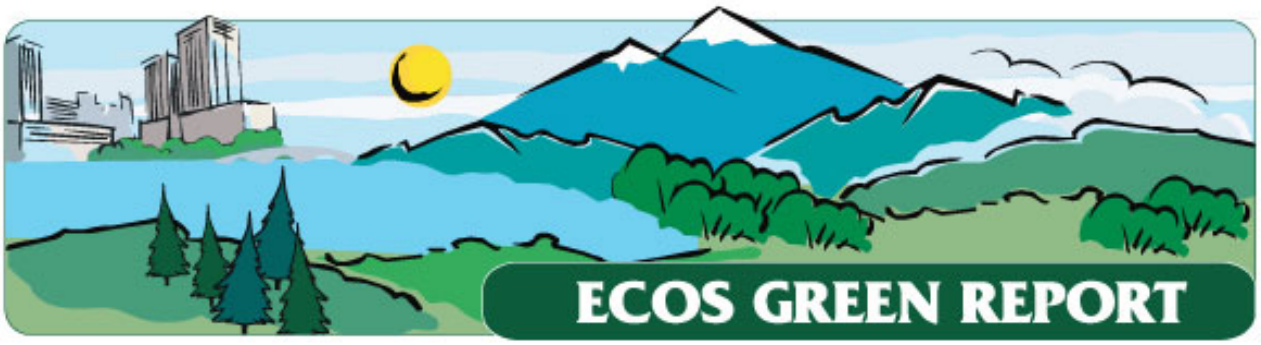

STATE ACTIONS FOR MANAGING MERCURY IN THE ENVIRONMENT

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STATEMENT OF THE ISSUE

Mercury in the environment can be converted by microorganisms to an organic form, methylmercury, which is toxic and bio-accumulates up the aquatic food chain to pose significant threats to humans and animals. To counter this threat, states are pursuing actions to reduce sources of mercury pollution.

SUMMARY

Due to the environmental health, human health, and economic impacts, states are pursuing action to reduce releases of mercury to the environment. These efforts are being made by states both individually and jointly through groups like the Quicksilver Caucus. Between 2005 and 2007, mercury management activity by states increased in general, with a marked increase in product stewardship of mercury-containing products. State actions range from mercury collection programs and mercury-related research to fish consumption advisories and bans on the sale of mercury-containing thermostats. A few recent mercury-related activities of note are the development of statewide and regional total maximum daily loads (TMDLs) for mercury, research related to compact fluorescent bulbs, and international outreach to address mercury.

REPORT

Background

Although mercury is a naturally occurring trace element found in air, water, and soil, human activities are primarily responsible for the high mercury levels that contaminate

lakes, rivers, and coastal waters.[1] Mercury is released through product use and disposal and by a variety of sources including coal-fired power plants, chemical plants, waste-burning incinerators, and dental offices. Intentional mercury use in consumer products such as relays and switches (found in vehicles and many other products), fluorescent lamps, thermostats, thermometers, medical measuring devices, lab chemicals, vaccines, pharmaceuticals, and dental fillings remains widespread in the United States. The mercury in these products can be released into the environment either when the products are disposed of in a landfill, incinerated with other waste, or discarded in wastewater.

Because bacteria can convert mercury into toxic methylmercury, which is readily absorbed by living things and bio-accumulates up the aquatic food chain, these anthropogenic sources of mercury in the environment have adverse effects on human health, wildlife, and the economy. Mercury is a potent neurotoxin that harms the development and function of the central nervous, cardiovascular, and reproductive systems. As a result, humans and wildlife that consume mercury-contaminated fish can suffer serious health problems, as can their unborn offspring. Even at low levels, mercury can cause subtle but permanent damage to the brain and central nervous system, leading to impaired fine motor skills, attention span, member, vision, and learning.[2] Because of high blood mercury levels in women of child-bearing age, approximately 300,000 children born every year in the United States are at risk of neurological damage due to prenatal mercury exposure.[3] Moreover, documented adverse effects in wildlife include a decreased ability to reproduce successfully, impaired growth and development, abnormal behavior, and death.[4]

In addition to posing serious human health and wildlife threats, mercury pollution can affect state and local economies. For instance, the increasing prevalence of mercury-contaminated fish consumption advisories threatens the country's multi-billion dollar fishing industry. With 40 million anglers in the United States, the fishing industry generates $45 billion in retail sales each year and supports more than a million jobs.[5] Studies show that mercury advisories cause anglers to choose other locations to fish and to take fewer overall fishing trips.[6] For local economies that are heavily dependent on fishing, the impact of lost revenue could be significant.

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[1] U.S. Environmental Protection Agency, Mercury Report to Congress, Vol. 1, EPA-452/R-97-003, December 1997.
[2] Grandjean, P. and White, R.F. Neurobehavioral Dysfunction as a Possible Sentinel of Methylmercury Exposure. *Human and Ecological Risk Assessment*, 2001, 7, 1079-1089.
[3] U.S. Environmental Protection Agency. Mercury website: human exposure. Available at http://www.eap.gov/mercury/exposure.htm.
[4] U.S. Environmental Protection Agency. Mercury website: environmental effects. Available at http://www.epa.gov/mercury/eco.htm.
[5] American Sportfishing Association. *Sportfishing in America: An Economic Engine and Conservation Powerhouse*. 2008.
[6] Jakus, P., McGuinness, M., and A. Krupnick. "The Benefits and Costs of Fish Consumption Advisories for Mercury." Resources for the Future. Discussion Paper 02-55. October 2002. Available at http://www.rff.org/Documents/RFF-DP-02-55.pdf.

Supporting State Actions

The Quicksilver Caucus (QSC) was formed in May 2001 by a coalition of state environmental association leaders to collaboratively develop holistic approaches for reducing mercury in the environment. QSC members who share mercury-related technical and policy information include the Environmental Council of the States (ECOS), the Association of State and Territorial Solid Waste Management Officials (ASTSWMO), the Association of State and Interstate Water Pollution Control Administrators (ASIWPCA), the Association of State Drinking Water Administrators (ASDWA), the National Association of Clean Air Agencies (NACAA), and the National Pollution Prevention Roundtable (NPPR). The QSC's long-term goal is that state, federal, and international actions result in net mercury reductions to the environment. The QSC is working collaboratively and in partnership in three priority areas:

- Stewardship approaches for reducing mercury in the environment and managing safe, long-term storage of elemental mercury nationally and internationally;
- Multi-media approaches for a mercury-based TMDL taking into account the contributions of the air and waste programs as well as using their statutes to craft solutions; and
- International approaches to decrease the global supply and demand for mercury.

Since 2001, QSC members have facilitated the development of policy positions and technical documents, as well as information sharing through workshops and conference calls. QSC members participated in the mediated negotiations leading to the National Vehicle Mercury Switch Recovery Program, were involved in the Federal Stakeholders Panel on Mercury Storage, and at the request of Congress provided testimony and technical assistance in the development of federal legislation to ban exports and provide safe long-term storage of mercury.

Tracking State Actions

In 2001, ECOS and the Clean Air Network published the first compendium of state mercury activities which described how 26 states were addressing management of mercury in the environment. This first compendium included information from states on the scope of their mercury reduction efforts, public outreach and education efforts, research and monitoring efforts, publications and resources, mercury committees and task forces, and current statistics on fish consumption advisories.

A second compendium was published in 2005 by the QSC and the National Wildlife Federation. Information from 45 states that responded to a QSC survey on state mercury actions was included in this document. Information collected for the second compendium revealed that states had increased their activities to reduce mercury in the environment since the publication of the first compendium. Although the actions varied from state to state, three areas of note for increased activity were creating multimedia state strategies or action plans to address mercury pollution, pursuing efforts to address mercury in consumer products, and implementing measures to deal with mercury in vehicle switches.

In order to obtain a snapshot of current state efforts related to mercury in the environment, ECOS in late 2007 distributed a brief survey on mercury actions to its members. Thirty-six states responded to this survey. State responses are reported in Appendices A and B.

Growing Number of State Actions on Mercury

By comparing the results of the 2005 and 2007 surveys of states, a general increase in state mercury efforts is seen. Areas with the greatest boost in activity are the phase-out of mercury-containing products, mercury collection programs, vehicle switch removal activities, and research and studies related to mercury. In addition to these four areas, the increase in fish consumption advisories for mercury is significant, as by the end of 2007 every state had an advisory.

Phase-out of mercury-containing products

- In 2005, 40% of the responding states indicated that they had phased out one or more mercury-containing products.
- In 2007, state activity had increased so that 78% of the responding states indicated that they have phased out one or more mercury-containing products.
- The Mercury Phase-Down Strategy being developed by the Great Lakes Regional Collaboration, which includes eight states in the Great Lakes region, sets forth that the goal of the strategy is to "phase down use of mercury-containing products and minimize mercury releases caused by remaining uses of mercury containing products in the great lakes region by 2015, or earlier where practical and appropriate."[7]

Mercury collection programs

- In 2005, 82% of the responding states indicated that there was a mercury collection program in their state.
- In 2007, state activity had increased so that 94% of the responding states indicated that there is a mercury collection program in their state.
- Between 2000 and 2006, state environmental programs in the Northeast collected and recycled approximately 7.5 tons of mercury.[8]

Mercury vehicle switch removal and recovery

- In 2005, 42% of the responding states indicated that they conducted activities related to mercury vehicle switch removal.
- In 2007, state activity had increased so that 97% of the responding states indicated that they conduct activities related to mercury vehicle switch removal.
- Through the National Vehicle Mercury Switch Recovery Program, which was started in August 2006, a national program involving states, the U.S. Environmental Protection Agency (U.S. EPA), environmental organizations, and industry was

[7] Great Lakes Regional Collaboration. *Draft Final Mercury Phase-Down Strategy*. 2008.
[8] *Northeast States Succeed in Reducing Mercury and Continue to Address Ongoing Challenges*. 2007. http://www.newmoa.org/prevention/mercury/NEWMOAMercurySuccessStory.pdf

established to remove mercury-containing light switches from scrap vehicles before the vehicles are flattened, shredded, and melted to make new steel.[9]

Mercury-related research and studies

- In 2005, 62% of the responding states indicated that they conducted research and/or studies related to mercury.
- In 2007, state activity had increased so that 78% of the responding states indicated that they conduct research and/or studies related to mercury.
- By tracking the mercury concentrations in sewage sludge, Massachusetts was able to show a relationship between mercury dental amalgam separators and mercury concentration in sewage sludge. Between 2004 and 2006, as approximately 75% of dentists in Massachusetts installed mercury amalgam separators, the wastewater treatment plant studied saw significant decreases in mercury concentration in sewage sludge.

Mercury fish consumption advisories

- In 2005, 45 states had statewide or water body-specific fish consumption advisories for mercury.
- By the end of 2007, all 50 states had statewide or water body specific fish consumption advisories for mercury.
- In late 2007, Alaska and Wyoming issued fish consumption advisories so that all states had at least one water body-specific advisory. Many states have statewide fish consumption advisories for mercury.

A full comparison of the state activity in 2005 and 2007 in ten areas of mercury management is presented below in *Table 1: Comparison of State Mercury Management Activity, 2005 and 2007*.

[9] *Northeast States Succeed in Reducing Mercury in the Environment.* 2007. http://www.newmoa.org/prevention/mercury/MercurySuccessStorySummary.pdf

Table 1: Comparison of State Mercury Management Activity, 2005 and 2007

Activity	2005		2007	
	Number of States	Percentage with 45 States Responding	Number of States	Percentage with 36 States Responding
Overall Mercury Action Plan/Strategy Document	22	49%	19	53%
Quantify Progress Reducing Mercury Pollution	25	56%	22	61%
Conduct Mercury Monitoring	43	96%	35	97%
Completed Mercury TMDLs, Watershed Plans, or Other Alternatives	18	40%	18	50%
Mercury Fish Consumption Advisory	42	93%	36	100%
Labeling of Mercury-Containing Products	12	27%	12	33%
Phase-out of Mercury-Containing Products	18	40%	28	78%
Mercury Collection Program	37	82%	34	94%
Mercury Vehicle Switch Removal	19	42%	35	97%
Mercury-Related Research/Studies	28	32%	28	78%

State Mercury-Containing Product Stewardship Efforts on the Rise

One area of mercury management that has seen a large increase in activity is the stewardship of mercury-containing products. In nine of ten mercury-containing product stewardship areas for which survey questions were asked, there was an increase in state activity between 2005 and 2007. Three areas that saw the greatest increase in state actions are banning mercury in schools, banning or phasing out mercury-containing thermostats, and banning or phasing out mercury manometers.

Ban on mercury in schools

- In 2005, 11% of the responding states indicated that they had a ban on mercury in schools.
- In 2007, state activity had increased so that 44% of the responding states indicated that they have a ban on mercury in schools.
- In 2007, the Minnesota Legislature passed a ban on schools purchasing mercury or mercury-containing equipment after December 31, 2007 and banned the storage of mercury or mercury-containing equipment at schools after December 31, 2009.[10]

Sales ban, use ban, or phasing out of mercury-containing thermostats

- In 2005, 11% of the responding states indicated that they had either a sales ban or a use ban, or had phased out mercury-containing thermostats.

[10] Minnesota Senate. S.F. 1085. https://www.revisor.leg.state.mn.us/bin/bldbill.php?bill=S1085.3.html&session=ls85

- In 2007, state activity had increased so that 39% of the responding states indicated that they have either a sales ban or a use ban, or have phased out mercury-containing thermostats.
- As of July 1, 2008, the sale of mercury-containing thermostats is banned in Illinois.

Sales ban, use ban, or phasing out of mercury manometers

- In 2005, 9% of the responding states indicated that they had either a sales ban, a use ban, or had phased out mercury manometers.
- In 2007, state activity had increased so that 33% of the responding states indicated that they have either a sales ban or a use ban, or have phased out mercury manometers.
- Effective July 1, 2007, Louisiana banned the sale of mercury-containing dairy and natural gas manometers.

A full comparison of state activity in 2005 and 2007 in ten areas of mercury-containing product stewardship is presented below in *Table 2: Comparison of State Mercury-Containing Product Stewardship, 2005 and 2007*.

Table 2: Comparison of State Mercury-Containing Product Stewardship, 2005 and 2007

Activity		2005		2007	
		Number of States	Percentage with 45 States Responding	Number of States	Percentage with 36 States Responding
Labeling Requirements		12	27%	13	36%
Ban Mercury in Schools		5	11%	16	44%
Sales Ban, Use Ban, or Phase Out	Thermometers	15	33%	16	44%
	Thermostats	5	11%	14	39%
	Manometers	4	9%	12	33%
	Novelty Items	8	18%	12	33%
	Certain Types of Switches (not vehicle)	6	13%	10	28%
	Other	9	20%	15	42%
Limits on Mercury in Products		12	27%	8	22%
Disposal Ban		11	24%	14	39%

Highlights of Some Recent Activities

Statewide and Regional TMDLs

A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet its water quality standards, and an allocation of that amount to the pollutant's sources. Section 303(d) of the Federal Clean Water Act requires that states develop lists of impaired waters and develop TMDLs for these waters. States have begun

developing statewide and regional TMDLs to address mercury impaired water bodies. Two such innovative TMDLs have been approved by U.S. EPA and are highlighted below. Others are currently being developed for submittal to U.S. EPA.

Minnesota Statewide Mercury TMDL
In 2004, mercury impairments made up two-thirds of Minnesota's list of impaired waters including 820 lakes and 419 rivers. In Minnesota, a water body is usually considered impaired for mercury due to contaminated fish. Approximately 90 percent of Minnesota's mercury deposition originates from outside the state, and atmospheric deposition of mercury accounts for more than 99.5% of the mercury entering fish in Minnesota's water bodies.

Minnesota developed a Statewide Mercury TMDL Plan to focus on reductions in the atmospheric deposition of mercury since it has been found to be a major contributor to high mercury levels in fish. The TMDL was approved by U.S. EPA in March 2007 and has a long-term goal of reducing the amount of mercury in fish so that it may be eaten once a week by all but the most sensitive groups. The TMDL establishes that a 93% reduction in mercury deposition from all manmade sources from 1990 levels be met for Minnesota to achieve its goal. This requires a 93% air emissions reduction goal for sources located in the state. Water point sources will also be required to stay below one percent of the total load to the state, and all but the smallest dischargers will be required to develop mercury minimization plans.

Reducing in-state mercury alone will not solve the mercury problem since 90% of deposition originates outside of the state. Consequently, Minnesota strives to be a model for what is needed from sources in the rest of the world and looks to the federal government for leadership in reducing emissions outside the state and country.

Minnesota is currently working with stakeholders to develop a plan to meet the ambitious reduction goals established in its TMDL, as well as target dates for reaching its identified goals. A final implementation plan is expected this summer.

For more information about Minnesota's Statewide Mercury TMDL Plan, visit http://www.pca.state.mn.us/water/tmdl/tmdl-mercuryplan.html.

Northeast Regional Mercury TMDL
In the Northeast, more than 10,000 lakes, ponds, and reservoirs, and over 46,000 river miles, are impaired for fish consumption due to mercury pollution, with much of the mercury in the Northeast originating from sources outside the region and from atmospheric deposition.[11] In December 2005, the New England Interstate Water Pollution Control Commission and the states of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont began collaborating to develop a regional TMDL to reduce mercury concentrations in fish in order to meet water quality

[11] New England Interstate Water Pollution Control Commission. *Northeast Regional TMDL*. http://www.neiwpcc.org/mercury/MercuryTMDL.asp.

standards. The Northeast states used Minnesota's Statewide Mercury TMDL as a model for their work.

The Northeast states determined that a minimum reduction of 87% of in-region and out-of-region anthropogenic sources of mercury atmospheric deposition was necessary to meet desired fish tissue levels. To realize the out-of-region reduction goals, the implementation of the TMDL is divided into three phases. Phase I, from 1998-2003, sets a goal of 50% reduction from in-region and out-of-region sources from an established 1998 baseline. Phase II, from 2003-2010, sets a goal of 75% reduction. In 2010, mercury emissions, deposition, and fish tissue concentration data will be re-evaluated to assess progress and set a timeline and goal for Phase III, which will involve making any necessary reductions to meet water quality standards.[12] The Northeast Regional TMDL was submitted to U.S. EPA on October 24, 2007, and was approved on December 20, 2007.

For more information about the Northeast Regional Mercury TMDL, visit http://www.neiwpcc.org/mercury/MercuryTMDL.asp.

Research Related to Mercury in Compact Fluorescent Lights

In February 2008, the Maine Department of Environmental Protection (DEP) published the results of a study it conducted on broken compact fluorescent (CFL) light bulb cleanup. The study evaluated multiple CFL breakages and multiple cleanup methods on carpeting and hardwood floors. Maine DEP concluded from the study that CFLs can be used safely but that broken bulbs need to be handled and cleaned up carefully to limit mercury exposure. The report and CFL cleanup guidance from Maine DEP can be found at http://www.maine.gov/dep/rwm/homeowner/cflreport.htm.

International Activities

The objectives of the QSC's international activities are to inform U.S. positions on mercury and to enhance federal resources to promote the reduction of mercury in the international arena. To accomplish these objectives, the QSC provides consultation and advice to the U.S. government upon its request and participates with U.S. EPA in United Nations Environment Programme (UNEP) activities related to UNEP's priority mercury partnerships.

Most recently, the QSC has worked in cooperation with U.S. EPA to develop a process for identifying state participation in the aforementioned UNEP international mercury partnership programs as well as other international initiatives aimed at reducing mercury in the environment. To assist with this effort, ECOS has developed a State Resource Network to identify state expertise related to mercury and to house information about state activities and experiences. Recently, using information from the State Resource Network, two state mercury experts were identified to participate in international meetings to share their knowledge about various mercury related issues. In September

[12] New England Interstate Water Pollution Control Commission. *Northeast Regional Mercury TMDL Factsheet*. 2007. *http://www.neiwpcc.org/mercury/mercury-docs/FINAL%20Northeast%20Regional%20Mercury%20TMDL%20Fact%20Sheet.pdf*

2007, a state representative from Massachusetts was selected to travel to Taiwan to participate in a Mercury Products Partnership Workshop sponsored by the Environmental Protection Administration of Taiwan to share “best practices.” This month, a representative from New York was selected to travel to Bangkok, Thailand, to help teach a “train the trainers” session on mercury and chemicals in schools at a conference sponsored by the Thailand Pollution Control Department, U.S. EPA, and UNEP. U.S. EPA provided travel support for both trips.

The State Resource Network makes information about state mercury experts available quickly and easily, and as a result, U.S. EPA can utilize state mercury expertise to support UNEP partnerships and other international work.

Appendix A – National Overview of Mercury Actions

State	Overall Mercury Action Plan	Quantify Progress in Reducing Mercury Pollution	Inventory Mercury Sources	Conduct Mercury Monitoring	Mercury TMDLs or Watershed Plans	Mercury Fish Consumption Advisory	Labeling Mercury-Containing Products	Phase-out Mercury-Containing Products	Mercury Collection Program	Mercury Vehicle Switch Removal	Mercury Related Research/Studies
Alaska				X		X			X		X
Arkansas			X	X	X	X			X	X	
Colorado	X	X	X	X	X	X			X	X	X
Connecticut	X	X	X	X	X(a)	X	X	X	X	X	X
Delaware				X		X				X	X
Florida		X	X	X		X	X	X	X	X	X
Illinois		X		X		X		X	X	X	X
Indiana		X	X	X		X		X	X	X	
Kentucky	P		X(air)	X		X		P	X	X	
Louisiana	X	X	X	X	X	X	X	X	X	X	X
Maine	X	X	X	X	X	X	X	X	X	X	X
Maryland		X	X	X	X	X	X	X	X	X	X
Massachusetts	X	X	X	X	X	X	X	X	X	X	X
Michigan	X	X	X	X	X	X		X	X	X	X
Minnesota	P		X	X	X	X	X	X	X	X	X
Mississippi	P	X	X	X	X	X			X	X	X
Missouri				X		X		X	X	X	
Montana	P			X		X		P	X	X	X
Nebraska	P		X	X		X		X	X	X	X
Nevada			X	X		X			X		X
New Hampshire	X	X	X	X	X	X		X	X	X	X
New York	X	X	X	X	X	X	X	X	X	X	X
Ohio		X	X	X		X		X	X	X	X
Oklahoma	P			X		X					
Oregon	X	X	X	X	X	X	X	X	X	X	X
Pennsylvania	X	X	X	X	X	X		P	X	X	X
Rhode Island	X	X	X		X	X	X	X	X	X	
South Dakota				X		X			X	X	X
Tennessee				X	X	X		P	X	X	
Utah	X	X	X	X		X		X	X	X	X
Vermont		X	X	X	X	X	X	X	X	X	X
Virginia		X	X	X	X	X			X	X	X
Washington	X	X	X	X		X	X	X	X	X	X
West Virginia			X	X		X			X		X
Wisconsin	X	X	X	X		X		P	X	X	X
Wyoming				X		X			X	X	

Key: X = yes
P = plan to develop
(a) = button cell batteries

Appendix B – State Actions Related to Mercury in Products (Excluding Vehicle Switches)

State	Labeling Requirements	Ban Mercury in Schools	Sales ban, use ban, or phase out						Limits on Mercury in Products	Disposal Ban
			Thermometers	Thermostats	Manometers	Novelty Items	Certain Types of Switches	Other		
Alaska										
Arkansas	X									
Colorado		X								X
Connecticut	X		X	X	X	X	X	X	X	
Delaware										
Florida	X							X	X	X
Illinois		X	X	X	X	X	X	X		
Indiana		X	X			X		X		
Kentucky										
Louisiana	X	X	X	X	X	X	X	X	X	X
Maine	X	X	X	X	X		X	X (a)	X	X
Maryland	X	X	X	X						X
Massachusetts	X	X	X	X	X		X	X		X
Michigan		X	X	X				X		
Minnesota	X	X	X	X	X	X	X	X	X	X
Mississippi										
Missouri								X	X	
Montana										
Nebraska			X		X					X(RCRA)
Nevada										
New Hampshire		X	X	X	X	X	X	X	X	X
New York	X	X	X	X	X	X	X	X		X
Ohio		X	X	X		X				
Oklahoma										X
Oregon	X	X		X		X				
Pennsylvania										
Rhode Island	X	X	X	X	X	X	X	X	X	X
South Dakota										
Tennessee										
Utah								X		
Vermont	X	X	X	X	X	X	X	X		X
Virginia										
Washington	X	X	X		X	X				
West Virginia										X
Wisconsin										
Wyoming										

Key: X = yes
(a) = button cell batteries