Mercury in Illinois' Environment
Random Test of Illinois Legislature

A Study by Mercury Free Illinois, December, 2006

At the end of March 2006, more than two dozen members of the Illinois General Assembly were tested for exposure to mercury. When the results of these tests were returned, one out of three had exceeded the safe level of mercury for women between the ages of 16 to 49 and for children under age 16. The legislator study was not a scientific sampling, but it does reflect an undeniable fact: There is too much mercury in the environment in Illinois, enough that it puts many of the state's residents at risk.

Impacts of Mercury

Mercury exposure is known to be harmful to public health. According to the National Academy of Sciences, the widespread, chronic, low-dose exposure to methylmercury, poses the greatest risks to public health, and the most common path for this exposure is the consumption of mercury contaminated fish.

After mercury is emitted into the environment, it is converted into a more biologically toxic form of mercury—methylmercury—by bacteria found in soils and water. Fish concentrate this mercury contamination as it is carried up the food chain from bacteria to small organisms and then to smaller fish. Large predatory fish (such as large and small mouth bass and walleye in Illinois), carry the heaviest mercury contamination.

Because unborn babies and young children under the age of 16 are particularly susceptible to the risks of mercury exposure, fish advisories are targeted at those populations as well as women of childbearing age. Risks from exposure include damage to nervous system development, developmental delays, decreased IQs, and memory and attention problems. Some healthcare professionals are concerned that chronic exposure to methylmercury may also produce cardiovascular effects that would adversely affect any member of the population, though studies have no yet determined a reference dose of level of exposure that might trigger these effects.

The U.S. Environmental Protection Agency (EPA) and the Food and Drug Administration (FDA) have jointly determined a reference dose for methylmercury of 0.1 ug/kg body weight/day, which corresponds to a hair mercury level of 1 part per million (ppm) for women of child-bearing age, pregnant and nursing women, and children under the age of fifteen.

A 2005 study done by Environmental Quality Institute at the University of North Carolina-Asheville found mercury levels exceeding the EPA's recommended limit in one in five women of childbearing age tested nationally and one in four in the Chicago area.

More than 6,600 people from 50 states of all ages volunteered to participate in the hair tests, answering a questionnaire that included questions about age, gender, flu vaccinations and level of fish consumption. The greatest single factor influencing mercury exposure was the frequency of fish consumption. The median hair mercury concentration for participants who consumed eight or more servings of seafood per month (including shellfish) was 0.83 ug/g more than those who reported consuming no fish, 0.68 ug/g more than those who consumed 1-2 servings per month, and 0.43 ug/g more than those who consumed 3-7 servings per month.

The Legislator Test

Prairie Rivers Network and the Illinois Environmental Council, both members of the Mercury Free Illinois campaign, collected hair samples from several members of the Illinois General Assembly, and had those hair samples tested for mercury. The group sampled was not large, but does provide a random snapshot of the legislature and the Illinois population as a whole. Most of the participants at least occasionally ate fish, and none were part of groups known to be at very high risk for mercury exposure (such as subsistence anglers or chlorine plant employees).

Hair sampling is an effective method of monitoring the amount of mercury in a person's blood, providing information about mercury consumption and contamination in the recent past. As hair grows, it carries mercury from the bloodstream, acting like an indictor strip of the mercury level in the blood at that time. Blood analysis is a more direct method to determine mercury levels in the body and to determine if someone has chronic mercury poisoning. However, hair sampling—when conducted according to strict protocols—is a widely accepted analysis technique for large-scale studies and is viewed as a valuable indicator of exposure over time.

In the legislative study, samples were collected on March 29, 2006 from 28 members of the Illinois General Assembly using a strict collection protocol to avoid cross contamination with the scissors or hands of the person cutting the hair. Each sample was labeled and double-bagged with an identification number. The samples were submitted for analysis to the Wisconsin State Laboratory of Hygiene, an accredited facility based on standards developed by the National Environmental Laboratory Accreditation Program, a national program designed to bring uniformity and consistency to the process used in accrediting environmental testing laboratories.

All hair samples submitted to the lab were identified only by the identification number for tracking purposes. The samples were analyzed by the lab under strict quality controls using an Atomic Fluorescence Spectrometer, a highly sensitive research-grade instrument capable of measuring mercury at levels down to 0.1 η g/ L (or 0.1 parts per trillion).

The results are measured in reference dose (RfD), a numerical estimate of a daily oral exposure to the human population, including sensitive subgroups such as children, which is not likely to cause harmful effects during a lifetime. RfDs are generally used for health effects that are though to have a threshold or low does limit for producing effects.

The Results

Twenty-eight legislators provided hair samples.

- All tested had some level of mercury in their hair.
- Nine of the samples, or 32 percent, exceeded the safe RfD of 1 part per million (ppm) established by US EPA and the FDA for woman between the ages of 16-49 and children under the age of 16.
- The results ranged from a low of .164 ppm to a high of 2.28 ppm.

RfD ppm
2.880
1.820
1.640
1.390
1.360
1.320
1.250
1.050
1.015
0.982
0.864
0.854
0.799
0.732
0.714
0.650
0.581
0.566
0.557
0.532
0.530
0.492
0.483
0.280
0.270
0.228
0.170
0.164

The identities of the participants are anonymous, in keeping with medical privacy standards. Each participant was notified of his or her mercury level. The breakdown of the 28 legislators:

Gender: 25 women, 3 men.

District Location: 7 Chicago, 17 six-county suburbs, 4 outside of Chicago area.

Race/Ethnicity: 20 white, 6 African American, 2 Latino.

Mercury in Illinois

Mercury pollution is a serious problem in Illinois. Much of the pollution ends up on our land and in our water, and there are troubling levels of mercury in our air, in our rain, in our water bodies and in our fish. While there is no one answer to this problem, there are several things we can and should do to address it, and the opportunities to do so are before us now and in the coming months.

In Illinois and across the country, coal-fired power plants are the largest source of man-made mercury emissions. Using data from the U.S. Environmental Protection Agency, the Illinois Environmental Protection Agency (IEPA) has estimated that coal-fired power plants account for more than 70 percent of Illinois' man-made mercury emissions, and that in-state coal-fired power plants emitted more than 7,000 pounds of mercury in 2002. Only five states had greater mercury emissions than Illinois that year.

Mercury emissions and pollution levels are so high in Illinois that every river, stream and lake in the state is under a fish advisory, warning sensitive populations such as women of childbearing age and young children to strictly limit their consumption of many species of fish caught in Illinois waters. A special advisory applies to 15 lakes and rivers where fish have been found to have particularly high levels of mercury contamination. In these areas, warning to limit consumption of certain fish species apply not only to women of childbearing age and young children, but also to the general population.

What Should be Done

Even low level mercury exposure has been linked to detrimental health impacts—particularly for infants and children. While there are medical treatments for extreme mercury poisoning, no safe treatment exists for low level exposure, other than reducing fish consumption or other source of mercury exposure.

Calling on people to stop fishing and to stop eating fish cannot be an acceptable long-term solution to this problem. Fish is healthy food and an important part of people's diets, culture and recreation. Recreational fishing is a $600 million dollar industry in Illinois, and mercury contamination also harms a range of fish-eating birds and mammals who cannot choose to reduce their fish consumption. So what should be done?

- **Regulate coal fired power plants**. The leading source of mercury pollution in Illinois, coal-fired power plants produce more than 7,000 pounds of mercury each year. Studies show a direct relationship between reducing mercury deposition and reducing mercury levels in fish. In a 2002 study in Wisconsin for example, researchers correlated a decrease in atmospheric mercury loading into a Wisconsin lake with a 30 percent reduction in fish tissue mercury concentrations after only six years.[1] Another study in Florida showed that a reduction in local

[1] Hrabik, TR and Watras, CJ. 2002. Recent declines in mercury concentrations in a freshwater fishery: Isolating the effects of de-acidification and decreased atmospheric mercury deposition in Little Rock Lake. The Science of the Total Environment 297.1-3:229-37.

atmospheric mercury emissions led to a decline of more than 80 percent of mercury contamination in fish and wildlife.[2] Reducing mercury pollution and deposition in Illinois would likely have similar benefits, and thereby reduce the risks for human exposure and the associated public health impacts, as well as the risks for fish and wildlife populations.

On November 2, 2006 the Illinois Pollution Control Board approved a rule proposed by Governor Blagojevich requiring a 90 percent reduction in mercury emissions from coal fired plants. The rule is now awaiting final approval before the Joint Committee on Administrative Rules, a body of state legislators.

- **Widen bans on products containing mercury.** In the past four years, Illinois has banned the sale and manufacture of mercury fever thermometers, mercury switches in consumer products and mercury products use in classrooms. Most recently, the legislature passed the Mercury Switch Removal Act, which requires auto manufacturers to remove mercury switches from cars before they are melted down for recycling. The primary remaining product uses are mercury switches in thermostats and in medical measuring devices, and legislations will likely be introduced in 2007 to ban these uses are well.

- **Widen the health discussion.** Currently, the federal government has provided mercury RfD only for people currently considered in high-risk categories. Despite the potential health risks mentioned above, men over age 16 and for women over age 49 have no mercury guidelines. All citizens deserve to know how they can manage their mercury exposure.

[2] Florida Department of Environmental Protection. Integrating Atmospheric Mercury Deposition with Aquatic Cycling in Southern Florida: An Approach for Conducting a Total Maximum Daily Load Analysis for an Atmospherically Derived Pollutant, (October 2002, Revised 2003) 88-99.