

Bad Hair Day

Results from
Mercury Hair
Testing of
Montana
Legislators



VVE

Women's Voices for the Earth

Produced by Women's Voices for the Earth

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Abstract

Hair analysis of mercury was performed on samples from volunteer participants from the Montana State Capitol while the legislature was in session. There were two primary purposes for conducting the testing:

- to sample a targeted group of policy makers in order to raise awareness of mercury contamination in Montana and how it relates to human health; and
- to educate policy-makers about the need to adopt legislation that restricts the sale and disposal of mercury-containing products.

This testing sample provides a snapshot of mercury exposure in humans in Montana. The report highlights source pollution from mercury-containing products, which contribute 22-29 tons of mercury to the air and 50-80 tons to landfills each year nationwide. This report provides recommendations for reducing mercury pollution in the state.

Introduction

In January of 2007, Women's Voices for the Earth conducted mercury hair testing at the Montana state capitol. The bipartisan sample involved 34 subjects including the Governor, 28 legislators, 1 legislative staffer, 1 television reporter, the Director of the Department of Health and Human Services, the Director of the Department of Environmental Quality, and one board member of Women's Voices for the Earth. Study participants were tested for exposure to mercury through laboratory analysis of hair samples collected on January 16, 2007. Every single person tested exhibited some level of mercury contamination. Results ranged from 0.053 to 1.580 parts per million (ppm). The EPA/FDA maximum recommended reference dose for women of childbearing age and children is 1.0 ppm.

Impacts of Mercury on Human Health and the Environment

When mercury is emitted into the environment, bacteria found in soils and water convert it into a more biologically toxic form of mercury called methylmercury. Fish absorb this form of mercury into their bodies. Methylmercury accumulates as it is carried up the food chain from bacteria to small organisms and then to smaller fish. Therefore, large, predatory fish carry the heaviest mercury contamination. 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.

Unborn babies and young children under the age of 16 are particularly susceptible to the risks of mercury exposure. Mercury is a potent neurotoxin that is passed from a woman to her developing child in the womb and to infants through breastfeeding. Health effects in children associated with mercury exposure include learning disabilities, developmental delays, decreased IQ's and memory and attention problems. Mercury can also damage the nervous system or kidneys of adults. Furthermore, some healthcare professionals are concerned that chronic exposure to

methylmercury may also produce cardiovascular problems that would adversely affect any member of the population, though studies have not yet determined a reference dose for the 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. Currently males over age 16 and women over age 49 have no mercury exposure level guidelines. These guidelines are needed in order to be able to determine safe levels of mercury exposure for these populations.

Biomonitoring studies generally find higher levels of mercury associated with advancing age as mercury levels accumulate over time. Mercury is naturally excreted from the body through feces, urine and sweat. However, it can take months to excrete mercury after exposure, and most people are continuously exposed to mercury in the environment and food. The EPA and FDA recommend reducing consumption of fish high in mercury to avoid exposure. Some scientists also suggest increasing level of exercise and drinking excess fluids, along with maintaining a healthy diet, to reduce exposure to mercury.

The Mercury Hair Test

On January 16, 2007, staff of Women's Voices for the Earth (WVE) and volunteers from the R-tech College of Cosmetology in Helena collected hair samples from 34 study participants including the Governor of Montana, 28 Montana legislators, 1 legislative staffer, the Director of the Department of Health and Human Services, the Director of the Department of Environmental Quality, one TV reporter, and one board member of Women's Voices for the Earth. Samples were collected in a designated room at the Montana State Capitol 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. This is 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.

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 indicator 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.

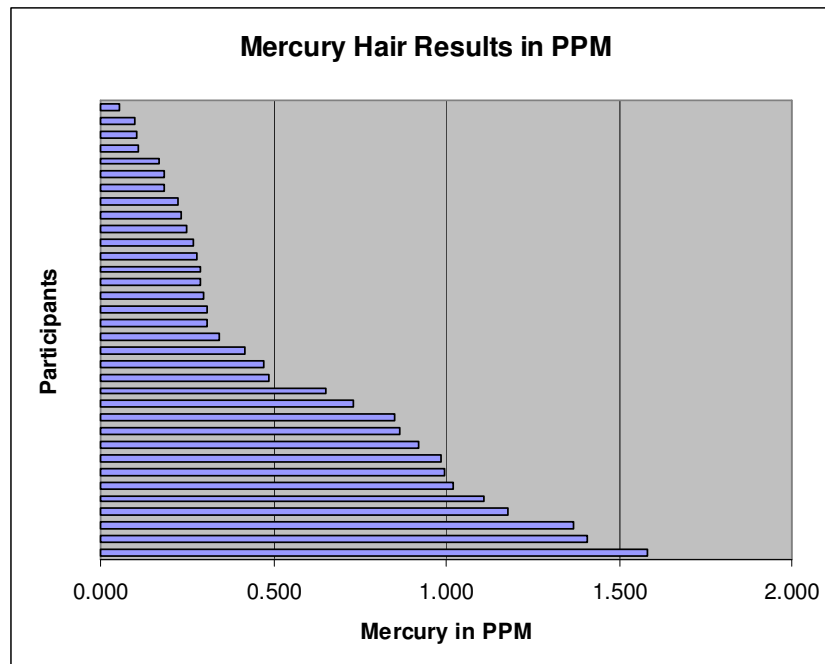
All hair samples submitted to the lab were identified only by the identification number for tracking purposes. The samples were analyzed by the lab under strict quality controls using an

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 thought to have a threshold or low dose limit for producing effects.

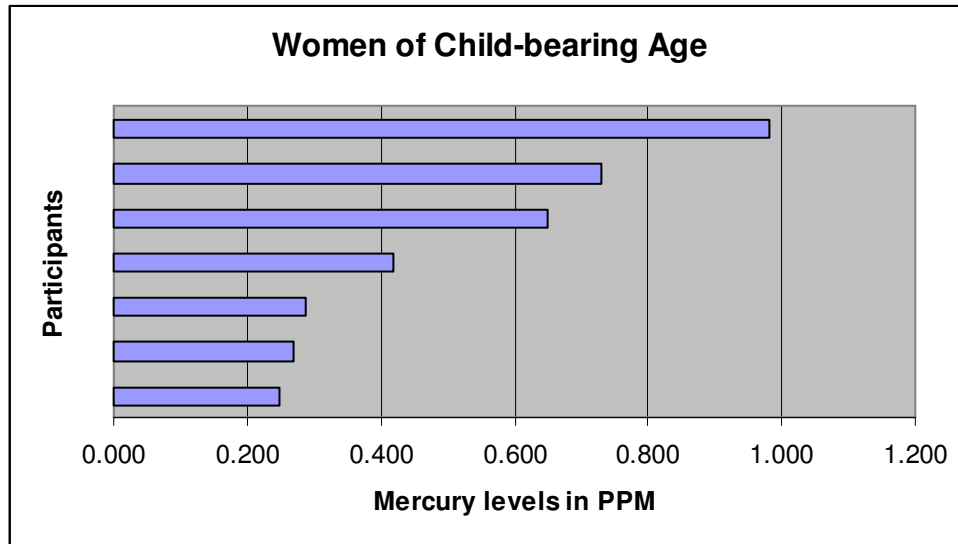
Although the sample group was not large, it does provide a snapshot of human exposure to mercury among state legislators and the Montana population as a whole. During the collection of hair samples, each participant was also asked to complete a short questionnaire to identify potential pathways of mercury exposure. Results of this survey indicated that most participants consumed fish at least once a week.

The Results

- All 34 participants exhibited some level of mercury in their hair.
- Results ranged from 0.053 to 1.580 parts per million (ppm) and the average was 0.560 ppm. These results are similar to a national study which reported an average hair mercury level of 0.47 ppm in women of childbearing age.¹
- 6 out of the 34 tested exceeded 1ppm. However, none of the six were women of childbearing age or children.
- 7 out of the 34 tested were women of child-bearing age. None exceeded the RfD of 1ppm.



¹ Centers for Disease Control. National Health and Nutrition Examination Survey (NHANES) (1999-2000)



The identities of participants are anonymous, in keeping with medical privacy standards. Each participant was notified of his or her mercury level. The breakdown of the 34 participants follows:

- Gender: 24 women, 10 men
- Location: 26 urban, 8 rural (“Urban” is defined as Billings, Bozeman, Butte, Great Falls, Helena, Missoula)
- Party Affiliation: 28 democrats, 2 republicans (only includes legislators and governor)
- Race/Ethnicity: 29 white, 2 Native American, 3 did not answer

Sources of Mercury Pollution in Montana

In Montana, industrial sources such as coal-fired power plants, cement kilns, and refineries all emit mercury. In 2003, these sources emitted approximately 700 pounds of mercury to landfills and approximately 1,000 pounds to the air.² Another source of mercury pollution in Montana comes from mercury-containing products such as thermometers, thermostats, fluorescent light bulbs and various measuring devices. Best available estimates indicate that these products are contributing up to 200 pounds of mercury into landfills each year in Montana. Mercury is also naturally occurring, but there are no available estimates as to how much is contributed to Montana’s environment.

Nationally, mercury products represent more than 2,000 tons of mercury in the environment. Nationwide, solid waste releases from mercury-containing products are estimated to range between 53 and 83 tons/year while coal plant emissions are estimated to be 40 tons/year. Air

² Toxic Release Inventory, EPA, 2003 <http://www.epa.gov/tri>

releases of mercury from products are estimated to be 22-29 tons/year and coal plant emissions represent approximately 48 tons/year nationwide.

Impacts of Mercury Pollution in Montana

Federal tests of fish caught in eight Montana lakes found that every fish sample tested was contaminated with mercury. More than half of these fish had mercury levels that exceeded the federal safe limit for consumption. The Montana Department of Public Health & Human Services recommends that women of childbearing age should avoid eating all lake trout, northern pike, and walleye over 15 inches in length, and that they should limit their intake of other lake fish caught in Montana.³ Federally, the Environmental Protection Agency and the Food and Drug Administration issued a joint advisory in 2004 warning pregnant women, women of childbearing age, and children to avoid shark, swordfish, king mackerel, and tilefish and to limit consumption of certain other fish, especially albacore tuna and fresh tuna.⁴

In addition, mercury's impact on wildlife raises concerns about the presence of mercury elsewhere in the food chain and how this may affect human health. In July of 2006, two bald eagles were found dead in Montana and were determined to have elevated mercury levels.

Additional Hazards of Mercury Products

The risk of a mercury product breaking and releasing mercury into the environment presents an additional threat to human health and the environment. These breakages can cause acute mercury exposure in a home, office or school. In addition, these accidents occur on a weekly basis across the United States and cost significant financial and human resources to clean up. Below are a few recent examples of accidents involving mercury products.

Example 1

<u>Place:</u>	Post Office, Kalispell, MT
<u>Date:</u>	February 17, 2007
<u>Incident:</u>	A mercury wall thermometer that was being shipped to Kalispell broke and leaked about 2 ounces of mercury out of the package.
<u>Clean-Up:</u>	The post office was closed and evacuated. The response included three hazardous waste specialists flown in from Wisconsin, contractor to decontaminate the area, 13 Kalispell fire department personnel, the office of emergency services director, 2 fire engines and an ambulance, and Kalispell police offices to provide security.
<u>Closure:</u>	The post office was closed for 26 hours and they had to pay holiday overtime on Monday to catch up on sorting mail.

Example 2

³ <http://fwp.state.mt.us/FwpPaperApps/fishing/fishconsumption.pdf>

⁴ <http://www.epa.gov/waterscience/fish/MethylmercuryBrochure.pdf>

Place: Sarasota County Technical Institute, Sarasota, FL
Date: October 13, 2006
Incident: A student broke into a wall thermostat containing 3 grams of mercury
Cleanup: The school and local Health Department conducted testing to determine extent of cleanup needed. Students exposed to mercury brought in clothes and shoes they were wearing for testing.
School Closure: School was evacuated and closed for two days.

Example 3

Place: Eden Valley-Watkins school, Eden Valley, MN
Date: December 7, 2006
Incident: Students dropped an old barometer containing a quarter cup of mercury.
Cleanup: 850 students were evacuated. Clothing and shoes of students and teachers was tested. The Minnesota Dept of Health, the Minnesota Pollution Control Agency and a private contractor were involved in the cleanup.
School Closure: School was evacuated and closed for three days.
Cost: Cleanup costs estimated at \$150,000.

Recommendations for Montana Policy-Makers & Consumers

Even low- level mercury exposure has been linked to detrimental health impacts, particularly for infants and children. Currently, the recommended solution offered to reduce this exposure is to limit or avoid consumption of contaminated fish. But we need long-term solutions that don't require asking consumers to give up an otherwise healthy food source. Fishing is also important to the cultural heritage of Montana and recreational fishing is a \$300 million dollar industry in the state. Furthermore, as long as mercury is polluting our environment, we risk that contamination spreading throughout the food chain, as animals that prey on fish are subjected to exposure. The most effective long-term solution is to reduce the potential for mercury pollution into the environment.

What can policy makers do?

- ✓ Restrict the sale of mercury products
- ✓ Ban the disposal of mercury products in landfills
- ✓ Regulate mercury emissions from coal-fired power plants

What can consumers do?

- ✓ Purchase products for your home that are mercury-free whenever possible. The most common household items are thermostats and thermometers. Buy digital or mechanical thermostats and digital or alcohol-based thermometers instead.

- ✓ Recycle products that do contain mercury.
 - Wall thermostats (often older, round ones). These can be recycled at your local county sanitarian or at Ace Hardware stores in Bozeman, Billings, and Missoula.
 - Fever thermometers (silver-tipped). Call your local sanitarian to see when and where the next hazardous waste collection day is in your area.
 - Compact fluorescent light bulbs. Recycling of these bulbs is still limited in Montana. They are accepted at P.E.T.E.'s in Missoula for a fee. Contact your local sanitarian to see if there is bulb recycling in your area.
(note: while these do contain a small amount of mercury, they reduce mercury emissions in the long-term because they last longer, thereby burning less coal to power)
- ✓ Encourage local businesses to carry mercury-free items whenever possible and to offer recycling in their stores.