

Letter Health Consultation

Blood Mercury Data

CARPENTER AVENUE
IRON MOUNTAIN, MICHIGAN

EPA FACILITY ID: MIN000510317

**Prepared by the
Michigan Department of Community Health**

OCTOBER 13, 2009

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR Toll Free at
1-800-CDC-INFO

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LETTER HEALTH CONSULTATION

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STATE OF MICHIGAN
DEPARTMENT OF COMMUNITY HEALTH
LANSING

JENNIFER M. GRANHOLM
GOVERNOR

JANET OLSZEWSKI
DIRECTOR

August 19, 2009

Daren Deyaert, RS, BS, Environmental Health Director
Dickinson-Iron District Health Dept.
601 Washington Ave.
Iron River, MI 49935

Director Deyaert,

Preface

Previously in collaboration with your office to address a mercury spill I provided a memorandum (see Attachment A) summarizing blood mercury data from individuals associated with that spill. At the request of Agency for Toxic Substance and Disease Registry (ATSDR) for the purpose of meeting required formatting and documentation, I have re-formatted my original memorandum into a letter health consultation document. The findings of the original memorandum and this letter health consultation are the same.

Question

What does the mercury biomonitoring data (blood mercury results) indicate about these individuals exposure to mercury?

Background

On October 10, 2008, a large mercury spill occurred inside a 2-apartment duplex at 800 Carpenter Avenue, Iron Mountain, Michigan. The spill occurred in only one apartment (hereafter referred to as Apt 1). The US Environmental Protection Agency (US EPA) responded to the spill and documented their response at www.epaossc.net/carpenteravemercury.

Discussion

As a precaution, potentially exposed individuals were directed to their personal physicians for advice regarding health concerns. The potentially exposed individuals may have been breathing mercury vapors for 48-hours prior to reporting the spill to local officials on October 13, 2008. Nine of the individuals had blood tests for mercury and those results were shared with the local health department (Table 1). Three individuals had blood drawn on October 13, 2008 and six individuals had blood drawn on October 17, 2008. Individuals numbered 1-4 (Group I) in Table 1 were residents for six weeks at Apt 1 prior to the mercury spill, and were in direct contact with the liquid mercury. Individuals 5-7 (Group II) were the residence of Apt 2 at 800 Carpenter Avenue (adjacent apartment of the duplex) and were not in direct contact with the liquid mercury. Individuals 8 and 9 (Group III) were guests visiting Apt 1 during the time of the mercury spill.

The blood samples were analyzed by Mayo Clinic, Mayo Medical Laboratories in Rochester, Minnesota. According to the Mayo Medical Lab's website, blood mercury analyses are conducted using inductively coupled plasma-mass spectrometry (ICP-MS). The reported mercury blood concentration from the nine individuals were less than or equal to 2 ng/ml (Table 1). Two (numbers 1 and 9) of the three individuals tested on October 13, 2008 had the highest blood mercury concentrations of 2 ng/ml. All nine mercury blood concentrations are within the United States population normal range for 1999-2002¹ (Table 2). These blood concentrations are below the blood mercury concentration that is considered protective of human fetal exposure (5.8 ng/ml)^{2,3}. The blood concentrations were reviewed by Detroit Poison Control Center and no clinical interventions were required.

The three groups (I, II, and III) may provide some insights to the various exposure pathways to this mercury spill. The three groups have similarly low blood concentrations but different exposure pathway characteristics, which suggests that none of the individuals were exposed for enough time to reach elevated blood concentrations.

- Group I may provide some insights into the question of possible mercury contamination at Apt 1 of 800 Carpenter Avenue prior to October 10, 2008. Group I individuals lived in Apt 1 for six weeks prior to the mercury spill, had direct contact with the liquid mercury, and were in Apt 1 for up to 48 hours after the mercury spill; yet Group I had low blood concentrations. Given the low mercury blood concentrations after living in Apt 1 for six weeks, Apt 1 did not likely have mercury contamination prior to October 10, 2008 that could cause elevated blood concentrations.
- Group II individuals were not in direct contact with the liquid mercury nor did they occupy Apt 1, however, they did occupy the adjacent duplex (Apt 2). Group II had low blood concentrations suggesting that if mercury vapors moved from Apt 1 to Apt 2, the amount and duration of exposure were not great enough to cause elevated blood concentrations.
- Group III was likely in direct contact with the liquid mercury and did occupy Apt 1 during the 48 hours prior to reporting the mercury spill. Group III had low blood concentrations suggesting that this 48-hour exposure resulted in minimal exposure.

Conclusion

MDCH concludes that the breathing of mercury vapors from the apartment is not expected to harm people's health because the potentially exposed individuals did not suffer elevated blood

¹ Centers for Disease Control and Prevention. Third National Report on Human Exposure to Environmental Chemicals. Atlanta (GA): CDC, 2005. http://www.cdc.gov/exposurereport/results_01.htm

² US EPA 2001. Integrated Risk Information System. Methylmercury (MeHg) (CASRN 22967-92-6) <http://www.epa.gov/iris/subst/0073.htm>

³ NAS/NRC (National Academy of Sciences/ National Research). Council Committee on Toxicological Effects of Methylmercury. Board on Environmental Studies and Toxicology, Commission on Life Sciences. 2000. Toxicity of Methylmercury. National Academy Press, Washington, D.C.

concentrations. Although it is not possible to determine absolutely, Apt 1 of 800 Carpenter Avenue was not likely contaminated with mercury prior to October 10, 2008.

Recommendation

With the technical assistance of the Michigan Department of Community Health-Division of Environmental Health (MDCH-DEH), local health department should assist the attending physicians in consultation with the Detroit Poison Control Center (DPCC) to interpret and communicate the blood mercury results.

Public Health Action Plan

MDCH-DEH assisted the local health department in identifying the appropriate contacts at the DPCC to assist with a medical interpretation of the blood mercury results.

MDCH-DEH evaluated an exposure interpretation of the blood mercury data to the local health department.

MDCH-DEH provided assistance, as requested, to the local health department.

The local health department worked with the attending physicians, DPCC, and MDCH-DEH to ensure proper communication of the blood mercury results to the potentially exposed individuals and concerned public.

Table 1. Mercury blood concentration results from the potentially exposed individuals.

No.	Group	Description of Person	Association to Spill Location*	Date of Blood Draw	Blood Concentration ng/ml
1	I	Adult Female	Resident of 800 Carpenter Ave - Apt 1	10/13/2008	2
2	I	Child between 6-12 yrs old	Resident of 800 Carpenter Ave - Apt 1	10/17/2008	Less than 1
3	I	Child less than 6 yrs old	Resident of 800 Carpenter Ave - Apt 1	10/17/2008	1
4	I	Adult Male	Resident of 800 Carpenter Ave - Apt 1	10/17/2008	1
5	II	Adult Male	Resident of 800 Carpenter Ave - Apt 2	10/17/2008	Less than 1
6	II	Adult Female	Resident of 800 Carpenter Ave - Apt 2	10/17/2008	1
7	II	Infant Newborn	Resident of 800 Carpenter Ave - Apt 2	10/17/2008	1
8	III	Child between 6-12 yrs old	Visiting 800 Carpenter Ave - Apt 1	10/13/2008	Less than 1
9	III	Child less than 6 yrs old	Visiting 800 Carpenter Ave - Apt 1	10/13/2008	2

* 800 Carpenter Ave – Apt 1: location of the mercury spill, residents of Apt 1 lived at this location 6 weeks prior to the mercury spill on October 10, 2008.
 800 Carpenter Ave – Apt 2: associated duplex to Apt 1; no liquid mercury was spilled in the apartment, however, mercury vapors may have entered Apt 2.
 Visiting 800 Carpenter

Table 2. Reference mercury blood concentration results for children under 5 years old (males and females), all females, and all males from the Centers for Disease Control and Prevention, Third National Report on Human Exposure to Environmental Chemicals. Atlanta (GA): CDC, 2005.

Group	Year	N	Geometric Mean	GM 95% CI	Percentiles					
					50 th	95% CI	90 th	95% CI	95 th	95% CI
5 yr olds	1999-00	705	0.343	(.297-.395)	0.3	(.200-.300)	1.4	(1.00-2.30)	2.3	(1.20-3.50)
	2001 -02	872	0.318	(.268-.377)	0.3	(.200-.300)	1.2	(.900-1.60)	1.9	(1.40-2.90)
Females	1999-00	318	0.377	(.299-.475)	0.2	(.200-.300)	1.6	(1.00-2.80)	2.7	(1.30-5.50)
	2001 -02	432	0.329	(.265-.407)	0.3	(.200-.300)	1.3	(1.00-2.10)	2.6	(1.30-4.90)
Males	1999-00	387	0.317	(.269-.374)	0.2	(.200-.300)	1.1	(.800-1.60)	2.1	(1.10-3.50)
	2001 -02	440	0.307	(.256-.369)	0.3	(.200-.300)	1.3	(.900-1.70)	1.7	(1.40-2.00)

Attachment A. Original Memorandum

MEMORANDUM
DEPARTMENT OF COMMUNITY HEALTH
LANSING, MICHIGAN 48913

October 31, 2008

To: Linda Dykema, PhD., Manager
Toxicology and Response Section

From: Kory Groetsch, M.S., Toxicologist
Toxicology and Response Section

Re: Biomonitoring data from Iron Mountain Residential Mercury Spill

On October 10, 2008, a large mercury spill occurred inside a 2-apartment duplex at 800 Carpenter Avenue, Iron Mountain, Michigan. The spill occurred in only one apartment (hereafter referred to as Apt 1). The US Environmental Protection Agency (US EPA) responded to the spill and documented their response at www.epaosc.net/carpenteravemercury.

As a precaution, potentially exposed individuals were directed to their personal physicians for advice regarding health concerns. The potentially exposed individuals may have been breathing mercury vapors for 48-hours prior to reporting the spill to local officials on October 13, 2008. Nine of the individuals had blood tests for mercury and those results were shared with the local health department (Table 1). Three individuals had blood drawn on October 13, 2008 and six individuals had blood drawn on October 17, 2008. Individuals numbered 1-4 (Group I) in Table 1 were residents for six weeks at Apt 1 prior to the mercury spill, and were in direct contact with the liquid mercury. Individuals 5-7 (Group II) were the residence of Apt 2 at 800 Carpenter Avenue (adjacent apartment of the duplex) and were not in direct contact with the liquid mercury. Individuals 8 and 9 (Group III) were guests visiting Apt 1 during the time of the mercury spill.

The blood samples were analyzed by Mayo Clinic, Mayo Medical Laboratories in Rochester, Minnesota. According to the Mayo Medical Lab's website, blood mercury analyses are conducted using inductively coupled plasma-mass spectrometry (ICP-MS). The reported mercury blood concentration from the nine individuals were less than or equal to 2 ng/ml (Table 1). Two (numbers 1 and 9) of the three individuals tested on October 13, 2008 had the highest blood mercury concentrations of 2 ng/ml. All nine mercury blood concentrations are within the United States population normal range for 1999-2002⁴ (Table 2). These blood concentrations are below the blood mercury concentration that is considered protective of human fetal exposure (5.8 ng/ml)^{5,6}. The blood concentrations were reviewed by Detroit Poison Control Center and no clinical interventions were required.

⁴ Centers for Disease Control and Prevention. Third National Report on Human Exposure to Environmental Chemicals. Atlanta (GA): CDC, 2005. http://www.cdc.gov/exposurereport/results_01.htm

⁵ US EPA 2001. Integrated Risk Information System. Methylmercury (MeHg) (CASRN 22967-92-6) <http://www.epa.gov/iris/subst/0073.htm>

⁶ NAS/NRC (National Academy of Sciences/ National Research). Council Committee on

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- Group II individuals were not in direct contact with the liquid mercury nor did they occupy Apt 1, however, they did occupy the adjacent duplex (Apt 2). Group II had low blood concentrations suggesting that if mercury vapors moved from Apt 1 to Apt 2, the amount and duration of exposure were not great enough to cause elevated blood concentrations.
- Group III was likely in direct contact with the liquid mercury and did occupy Apt 1 during the 48 hours prior to reporting the mercury spill. Group III had low blood concentrations suggesting that this 48-hour exposure resulted in minimal exposure.

In conclusion, the potentially exposed individuals did not suffer elevated blood concentrations from this mercury spill. Although it is not possible to determine absolutely, Apt 1 of 800 Carpenter Avenue was not likely contaminated with mercury prior to October 10, 2008 that could cause elevated blood concentrations.

Table 1. Mercury blood concentration results from the potentially exposed individuals.

No.	Group	Description of Person	Association to Spill Location*	Date of Blood Draw	Blood Concentration ng/ml
1	I	Adult Female	Resident of 800 Carpenter Ave - Apt 1	10/13/2008	2
2	I	Child [Redacted]	Resident of 800 Carpenter Ave - Apt 1	10/17/2008	Less than 1
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8	III	Child [Redacted]	Visiting 800 Carpenter Ave - Apt 1	10/13/2008	Less than 1
9	III	Child [Redacted]	Visiting 800 Carpenter Ave - Apt 1	10/13/2008	2

- * 800 Carpenter Ave – Apt 1: location of the mercury spill, residents of Apt 1 lived at this location 6 weeks prior to the mercury spill on October 10, 2008.
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Certification

The Michigan Department of Community Health prepared this Letter Health Consultation, Carpenter Avenue Mercury Release, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). At the time this Health Consultation was written, it was in accordance with the approved methodologies and procedures. Editorial review was completed by the Cooperative Agreement partner.



Technical Project Officer, Cooperative Agreement Team, CAPEB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.



Team Leader, Cooperative Agreement Team, CAPEB, DHAC, ATSDR