Letter Health Consultation

STATE OF IOWA

ARMSTRONG IOWA MERCURY SPILL

SEPTEMBER 5, 2012

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Community Health Investigations
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.

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LETTER HEALTH CONSULTATION

STATE OF IOWA

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Prepared By:

U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry (ATSDR)
Division of Community Health Investigations
Central Branch

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry
Atlanta, GA 30333

Ms Susan Fisher
EPA Region VII
901 North 5th Street
Kansas City, KS 66101

RE: Health Consultation for Armstrong IA Mercury

Dear Ms. Fisher

This letter consultation is intended to document the discussions between EPA and ATSDR during the recent response to the events surrounding a mercury spill in Armstrong, IA. It is not intended to modify any of the decisions made or actions taken during that response by any party.

BACKGROUND: On July 24, 2012, the Region VII Office of the Agency for Toxic Substances and Disease Registry (ATSDR) was contacted by the US Environmental Protection Agency (EPA) federal On-Scene Coordinator (OSC) responding to a mercury spill in Armstrong, Iowa. An individual walked into a bar in Armstrong, IA, on or about the night of July 20th with approximately 12 pounds of mercury. The mercury was subsequently spilled in the bar. An attempt was made to remove the mercury using a wet-dry vacuum but the removal was only partially successful. Local responders arriving at the bar on the night of the spill detected mercury at the door at a concentration of 65 ug/m3.
The bar was heated and underwent forced ventilation before EPA arrived on scene. [1]

The individual who brought the mercury took the collected mercury from the vacuum and temporarily stored it overnight in an outdoor child's sand box at his home. The following day, 3-4 children aged 1-7 found the mercury, opened the container, and played with the mercury in the sand box.

ATSDR Region VII contacted ATSDR Emergency Response, who referred them to ATSDR Region IV staff. ATSDR Region IV worked directly with the OSC over the course of the cleanup in Armstrong, IA. Upon arrival at the Armstrong bar, EPA found extensive contamination in the bar and a lesser degree of contamination in a home (the one with the sandbox) that they evaluated. The family in the home has moved out of the home, so it was vacant during the site investigation and cleanup. The concentration in the home was around 0.4 - 0.5 ug/m3. As this was below the recommended residential action level discussed below, EPA began their clean-up on the bar. The bar closed until the cleanup could be completed. [2]

On July 29th, EPA contacted ATSDR again regarding the home of another bar patron who had had mercury spilled on him on July 20th. The home was occupied by an older couple

(past child-bearing ages). EPA had conducted a cleanup of this home that included removal of the washer and dryer among other actions. The OSC was confident that this cleanup had captured all of the liquid mercury (i.e.,the source of the vapors.) that had been brought into the home by the patron, but the mercury vapor readings were still about 1.9 ug/m3. The OSC requested advice from ATSDR on whether the indoor air concentration of mercury after the cleanup actions to date warranted further action. [3]

The OSC also provided an update regarding the status of the bar after almost 5 days of cleanup. As of the morning of July29th, real-time air monitoring equipment indicated the mercury vapors were fairly evenly distributed throughout the bar with the highest concentration approximately t 8 ug/m^3. The bar is located in a building constructed in the late 19th century (~1880). In the course of the cleanup to date, EPA had removed a substantial amount of the readily available materials including the tile floors of the bar. Further removal actions would likely affect the structure of the building. EPA was confident the source of the mercury vapors had been removed and had placed a sealant over the subfloor to further reduce residual vapors. [3] Following ATSDR's recommendation, the bar was heated and underwent forced ventilation overnight before confirmation sampling using the Lumex Mercury Vapor Analyzer (e.g., a portable atomic absorption meter) the following day. The concentration of mercury in the bar continued to drop over the course of the sampling event and EPA reported a final 8 hour average of 6 ug/m^3. [4]

Discussion

While the OSC was still driving to the site on July 24th, ATSDR provided the OSC with various information resources that could assist residents, community members, healthcare providers, and state and local officials in understanding and managing their personal exposures. [6] In accordance with the Chemical Specific Consultation, ATSDR recommended an indoor action level of 3 ug/m3 in the bar and 1 ug/m3 in homes. [7] ATSDR Region VII had insured the OSC had the tables from the consult listing other recommended action levels for various common exposure scenarios. ATSDR later advised the OSC that average readings using the Lumex meter representative of 8 hours in lieu of laboratory samples for confirmation that cleanups were complete were acceptable to ATSDR. ATSDR provided references from an ERT study on the comparison of the Lumex to the NIOSH 6009 method that were cited in the Chemical Specific Consult and discussed removal options for the various settings with the OSC. [2,7]

Given the family was not living in the home with the sandbox, ATSDR concurred with the EPA's decision to focus initially on the bar. The concentration of 65 ug/m3 at the door of the bar that was reported by local responders was above occupational standards for mercury and above concentrations known to cause adverse health effects in studies of humans after chronic exposures. [5,7] The persistence of liquid mercury in indoor environments means that, unless removed, the mercury will likely be present for a period of time in the indoor air at levels that could cause adverse health effects.

The type of vacuum used in removing the mercury on the night of the spill was not very effective at collecting and removing the liquid mercury. It may even have spread any residual mercury liquid and vapors over a wider area than the original spill. [8] While heating and venting is effective for removing residual mercury vapors, it would take a prolonged period of time to completely remove liquid mercury by this method due to mercury's low vapor pressure. [5] It is possible - perhaps likely, depending on the size and location of the spill - that patrons and employees may have tracked liquid mercury from the bar to their homes. While sensitive individuals described below would not be expected in the bar, they may be present in the homes of those who present in the bar since the spill. These patrons and employees of the bar should be contacted and their homes, vehicles, and personal possessions that may have come into contact with liquid mercury should be evaluated. Any possessions that may have contacted liquid mercury should be isolated pending evaluation. Any sensitive individuals should minimize the time spent in vehicles that may be contaminated pending evaluation. [1]

Elemental or metallic mercury is a chronic threat primarily by inhalation. This form of mercury is poorly absorbed by ingestion or through direct contact with the intact skin. Liquid mercury vaporizes slowly at room temperatures and is persistent in the environment. In indoor environments, the concentration of mercury can reach levels of health concern under most conditions. In outdoor environments, the rate of vaporization is typically too low to reach these same levels. Individuals particularly sensitive to the effects of exposure would be those with developing central nervous systems; that is, children under the age of 6-7 and women who may be pregnant. [5]

Based on these chemical and physical properties, exposure to the children in the sandbox would have been expected to occur primarily via direct contact. Incidental ingestion by children of the ages reported is also possible. Unless the sandbox was protected by an enclosure of some kind preventing normal dispersion of vapors or if ambient air temperatures were unusually high, the ambient air concentration should not have reached levels of concern. Due to these factors, it is unlikely that the short term exposure between the spill and EPA's arrival was significant. However, the liquid mercury from the sand may have been tracked elsewhere. ATSDR recommended to the OSC that the sandbox and the homes of the children involved be evaluated and any liquid mercury discovered be removed. [1]

ATSDR also recommended the OSC consider contacting the county health officials for assistance in tracing individual patrons and employees of the bar. Local officials may also be able to facilitate a central location such as a community center where these individuals can bring their vehicles and possessions for evaluations. The homes of individuals with possessions or vehicles with mercury above the action levels recommended in the ATSDR Chemical Specific Consultation for Mercury should be evaluated before other homes.

Regarding the second home discussed on July 29th, ATSDR advised the OSC that, in the absence of a sensitive population in the home, 1.9 ug/m3 would be acceptable. Given that the source of the mercury was removed, the concentration in the home would be

expected to decrease over time. Regarding the final cleanup of the bar, ATSDR recommended that the structure be forced ventilated overnight. If the concentration continued to decrease, then it was likely that any residual mercury had been removed. Confirmation sampling indicated that this was the case and ATSDR concurred that the cleanup in the bar was complete.

CONCLUSION:

Based on the reported concentration after cleanup of 6 ug/m3 in the bar, 0.5 ug/m3 in the home with the sandbox, and 1.9 ug/m3 in the home of the older couple, ATSDR does not anticipate any adverse human health effects from the normal use of these buildings.

Richard A. Nickle
Environmental Health Scientist

Cc: ATSDR Region VII
ATSDR/DTHHS/ERG

References

[1] Electronic mail message from R. Nickle, ATSDR, to S. Fisher, EPA re: Armstrong IA Mercury dated 07/24/2012 at 1703 EDT.

[2] Electronic mail message from R. Nickle, ATSDR IV, to E. Harmon, ATSDR VII re: Armstrong IA Mercury dated 07/26/2012 at 1035 EDT.

[3] Electronic mail message from R. Nickle, ATSDR IV, to E. Harmon, ATSDR VII, re: Armstrong IA Mercury dated 07/29/2012 at 1541 EDT.

[4] Electronic mail message from R. Nickle, ATSDR IV, to E. Harmon, ATSDR VII, re: Armstrong IA Mercury dated 07/30/2012 at 1056 EDT.

[5] ATSDR, 1999. Toxicological Profile for Mercury. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry. Atlanta, GA March 1999

[6] Electronic mail message from R. Nickle, ATSDR, to S. Fisher, EPA re: Armstrong IA Mercury dated 07/24/2012 at 1450 EDT.

[7] ATSDR, 2012. Chemical Specific Consultation for Mercury: Action Levels for Elemental Mercury Spills. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry. Atlanta, GA March 22, 2012.

[8] ATSDR, 2009. Mercury Quick Facts: Cleaning Mercury Spills in Your House. Department of Health and Human Service, Agency for Toxic Substances and Disease Registry. Atlanta, GA February, 2009