

HEALTH CONSULTATION

**MMI MERCURY SPILL
(a/k/a MOBILE MEDICAL MERCURY)**

BOYNTON BEACH, PALM BEACH COUNTY, FLORIDA

EPA FACILITY ID: FLN000407615

Prepared by:

**Florida Department of Health
Bureau of Environmental Epidemiology
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry**

Foreword

This health consultation summarizes public health concerns from a mercury spill in the Mobile Medical Industries (MMI) building in Boynton Beach, Florida. It is based on a site evaluation prepared by the Florida Department of Health (DOH). A site evaluation involves a number of steps:

Evaluating exposure: Florida DOH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is on the site, and how people might be exposed to it. Usually, Florida DOH does not collect its own environmental sampling data. We rely on information provided by the Florida Department of Environmental Protection (DEP), the U.S. Environmental Protection Agency (USEPA), and other government agencies, businesses, and the public.

Evaluating health effects: If evidence is found that people are being exposed—or could be exposed—to hazardous substances, Florida DOH scientists will take steps to determine whether that exposure could be harmful to human health. Their assessment focuses on public health; that is, the health impact on the community as a whole, and is based on existing scientific information.

Developing recommendations: In an evaluation report—such as this health consultation—Florida DOH outlines its conclusions regarding any potential health threat posed by a site, and offers recommendations for reducing or eliminating human exposure to contaminants. The role of Florida DOH in dealing with hazardous waste sites is primarily advisory. For that reason the evaluation report will typically recommend actions to be taken by other agencies—including the EPA and Florida DEP. If, however, the health threat is immediate, Florida DOH will issue a public health advisory warning people of the danger and will work to resolve the problem.

Soliciting community input: The evaluation process is interactive. Florida DOH starts by soliciting and evaluating information from various government agencies, the organizations or individuals responsible for cleaning up the site, and from community members who live near the site. Any conclusions are shared with the organizations and individuals who provided information. Once an evaluation report has been prepared, Florida DOH seeks feedback from the public. *If you have questions or comments about this health consultation, we encourage you to contact us.*

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Summary and Statement of Issues

This health consultation summarizes public health concerns and actions taken as a result of a mercury spill in the Mobile Medical Industries (MMI) building in Boynton Beach, Florida. It is based on a site evaluation prepared by the Florida Department of Health (DOH). The Florida Department of Health (DOH), in cooperation with the U.S. Agency for Toxic Substances and Disease Registry (ATSDR), assesses the public health threats from exposure to environmental contaminants such as mercury.

In November 2002, a MMI employee spilled liquid mercury from a leaking medical blood pressure machine. The mercury contaminated the floors of several rooms in the MMI building. The Boynton Beach Fire Department (BBFD) assisted with the cleanup and evacuated employees. The Palm Beach County Health Department (CHD) and the U.S. Environmental Protection Agency (USEPA) assisted in the mercury air monitoring; the Florida DOH provided technical assistance. Air tests showed the cleanup was successful—mercury levels were no longer a health threat for workers. Immediately after the spill, one child and one adult obtained mercury urine testing through their personal physicians; the results were negative. Within 3 days of the spill, the MMI employees returned to the building. In February 2003, MMI's contractor conducted final air monitoring and confirmed measured air mercury concentrations had decreased. The measured levels were determined to be acceptable for workers, the public, and sensitive populations such as children and pregnant women.

Site Description and History

The Mobile Medical Industries (MMI) building, at 2500 Quantum Lakes Drive in Boynton Beach, Florida, employs nurses, office staff and field staff who conduct in-home health care for patients (Figures 1 and 2). The one-story building contains approximately 5000 square feet of space.

On November 15, 2002, an MMI employee removed from storage and carried, from one end of the building to the other, a leaking, 1-year old medical blood pressure calibrating machine. Along areas of the employee's path, mercury dripped from the machine—particularly in one office and in a conference room in one of the suites. The total amount of mercury the blood pressure machine originally contained is unknown.

On the day of the spill, an MMI employee called the Boynton Beach Fire Department (BBFD). The BBFD advised the Palm Beach County Health Department (CHD) of the mercury spill. Within a few hours of the spill, most of the MMI employees were evacuated from the building. The BBFD used a mercury clean up kit to remove the mercury beads from surfaces inside the building. The clean up kit contains a powder that converts the mercury into a benign amalgamate (i.e., a different, harmless substance). MMI staff then hired SWS First Response, Inc. (SWS) to clean or remove contaminated materials from the building. Among other measures, SWS recommended turning the building's air conditioning system off and ventilating the building overnight.

On November 15, 2002, MMI staff informed the Palm Beach CHD that because of the spill one employee had sought medical treatment. In addition, mercury had contaminated three employees' clothing and shoes. These individuals were decontaminated on site and their clothing and shoes bagged for later testing. On the day of the spill one employee's small child was present

in the building. The parents had the child examined by a physician, but the examination occurred before MMI had a chance to call the parents and discuss urine testing. The Palm Beach CHD reported that MMI did advise the parents to return to the child's physician for consultation and testing regarding potential mercury exposure. MMI reported that the parents would return to the physician as suggested.

In addition, on November 15, 2002, the Florida DOH spoke with the MMI Safety Manager regarding employees who sought medical treatment. The Florida DOH suggested they might want to ask their doctors about mercury urine testing and that they should undergo those urine tests within 72 hours of when they were last in the building. One adult and one child were tested by their physician. The MMI Safety Manager informed the Florida DOH both these urine tests were negative for mercury.

Discussion

Mercury Indoors

Elemental mercury is a liquid metal, which constantly emits vapors. The amount of vapor created depends on the temperature and the mercury droplet surface area. Mercury evaporates very slowly, but even at very low levels, exposure to mercury vapor can pose a chronic hazard. Mercury is toxic by inhalation and by ingestion; to a lesser degree, it is toxic by skin contact. Children are more susceptible than are adults to exposure. When dropped or spilled, liquid mercury shatters into many tiny beads, increasing the amount of vapor and increasing the difficulty of cleanup (USEPA 2002). If possible, health service providers should replace items such as mercury thermometers, barometers, and blood pressure machines with alcohol or electronic equipment.

Air Monitoring Results and Interpretation

On November 16, 2002, the Palm Beach CHD and EPA used Jerome and Lumex meters to measure indoor air mercury concentrations in the MMI building. The Palm Beach CHD then contacted the Florida DOH for guidance and technical assistance; specifically, the Palm Beach CHD wanted confirmation that after the cleanup, measured mercury levels were low enough that employees could re-enter the building—the MMI manager had asked if the employees could re-enter the building by November 18.

The Palm Beach CHD's initial Jerome meter scan measured the highest indoor air mercury contamination at $3.0 \mu\text{g}/\text{m}^3$. Later that day, USEPA, using a Lumex meter, measured the maximum indoor air mercury concentration at $10 \mu\text{g}/\text{m}^3$ from the carpet where the spill occurred. The carpet in the copying room also had high readings— $8.0 \mu\text{g}/\text{m}^3$. The range of detected indoor air mercury concentration (Lumex meter) in the building was $0.9\text{--}10 \mu\text{g}/\text{m}^3$. USEPA took Lumex meter readings 0–4 feet off the floor, depending upon the location in the building. Following EPA's recommendation, SWS removed all of the contaminated carpeting from the building. After the carpeting was removed the indoor air mercury levels measured were less than or equal to $3 \mu\text{g}/\text{m}^3$.

One of the main concerns resulting from the indoor mercury spill was the possibility of exposure to a toddler in the building on the day of the spill. Another concern was the possibility of

in the building. The parents had the child examined by a physician, but the examination occurred before MMI had a chance to call the parents and discuss urine testing. The Palm Beach CHD reported that MMI did advise the parents to return to the child's physician for consultation and testing regarding potential mercury exposure. MMI reported that the parents would return to the physician as suggested.

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One of the main concerns resulting from the indoor mercury spill was the possibility of exposure to a toddler in the building on the day of the spill. Another concern was the possibility of

exposure to a pregnant woman who was not at work on the day of the spill but who was expected to return to work in a few weeks. Therefore, the Palm Beach CHD decided the cleanup actions for this building should be protective not only for workers but also for children and pregnant women. The USEPA guidance industrial action level is between 3–10 $\mu\text{g}/\text{m}^3$. For indoor mercury levels of 10 $\mu\text{g}/\text{m}^3$ or higher the USEPA recommends relocation and that the structure not be reoccupied until the contaminated area is cleaned to acceptable standards (USEPA 2002).

By November 18, 2002, the Florida DOH confirmed the measured mercury levels inside the building were acceptable for employees. The Palm Beach CHD determined, however, children should not yet re-enter the workplace.

In November 2002, MMI's contractor completed its final clean up of the building. Because, USEPA's and the Florida DEP's Lumex meters were unavailable, the contractor encountered delays obtaining a Lumex meter for final confirmation air sampling. To protect young children and pregnant women in the building, the indoor air mercury levels recommended by the Palm Beach CHD were lower than the EPA's residential standard of 1 $\mu\text{g}/\text{m}^3$ or less (EPA 2002). Consequently, after the spill MMI informed the Palm Beach CHD and the Florida DOH that they had posted a sign on the door stating children and pregnant women were not allowed in the building.

On February 12, 2003, again using a Lumex meter, SWS measured indoor air for mercury in the building at every 10 cubic feet; recording average readings from three results every 10 seconds. SWS collected samples at floor level and breathing zone level at 10 sampling locations. The minimum indoor air mercury concentration (0.006 $\mu\text{g}/\text{m}^3$) was detected in the hallway, lounge, fax area and north offices. The maximum indoor air mercury concentration (0.022 $\mu\text{g}/\text{m}^3$) was detected in the south offices of the building, where the initial mercury release occurred (SWS 2003).

According to MMI staff, the "no children or pregnant women allowed" sign remained posted until confirmatory Lumex meter readings were taken on February 12, 2003. The readings enabled SWS to inform MMI staff the indoor air mercury levels had decreased such that no measurable risk to children from exposure to the mercury spill in the building would occur. The Florida DOH received the final air mercury monitoring results for evaluation from MMI on March 26, 2003.

Special Considerations of Women and Children

Women and children can sometimes be affected differently from the general population by contaminants in the environment. Both women and children tend to be smaller than the average person, which means they can be affected by smaller quantities of contaminants. The effect of hormonal variations, pregnancy, and lactation can change the way a woman's body responds to some substances. Past exposures experienced by the mother, as well as exposure during pregnancy and lactation, can expose a fetus or infant to chemicals through the placenta or in the mother's milk. Depending on the stage of pregnancy, the nature of the chemical involved, and the dose of that chemical, fetal exposure can result in problems such as miscarriage, stillbirth, and birth defects.

ATSDR's Child Health Considerations program recognizes that developing young people, whether fetuses, infants, or children, have unique vulnerabilities. Children are not small adults; a child's exposure can differ from an adult's exposure in many ways. A child drinks more fluids, eats more food, and breathes more air per kilogram of body weight than an adult, and has a larger skin surface area in proportion to body volume. A child's behavior and lifestyle also influence exposure. Children crawl on floors, put things in their mouths, play close to the ground, and spend more time outdoors. These behaviors may result in longer exposure durations and higher intake rates (ATSDR 1999).

The MMI spill occurred in a building mainly occupied by adults. Even though one toddler was in the building the day the spill occurred, the child was removed from the building. In addition, the toddler's mercury urine results were negative. Therefore, the child's possible exposure to indoor air mercury measured in the building is not likely to cause illness.

Conclusions

The MMI mercury spill is categorized as **no apparent public health hazard** since the indoor air was thoroughly monitored, urine test results for one child and one adult were negative, employees were evacuated from the MMI building after the spill, and the maximum indoor air mercury concentration in the building, after cleanup, was measured at $0.022 \mu\text{g}/\text{m}^3$.

Recommendations/Public Health Action Plan

At this time and for this health consultation only, the Florida DOH does not offer any recommendations for this site.

References

[ATSDR] Agency for Toxic Substances and Disease Registry. Toxicological profile for mercury. 1999. Atlanta: US Department of Health and Human Services. [SWS] SWS Environmental First Response. 2003. Mercury vapor assessment for Mobile Medical Industries, Boynton Beach, Florida.

[USEPA] Environmental Protection Agency. 2002. Mercury cleanup guidelines. Tampa, Florida: EPA/ATSDR OSC Training.

Other References:

Palm Beach County Health Department. 2002. November 15 memorandum summarizing mercury spill.

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Figures

FLORIDA COUNTIES



Figure 1
Mobile Medical Industries (MMI)
County Location Map

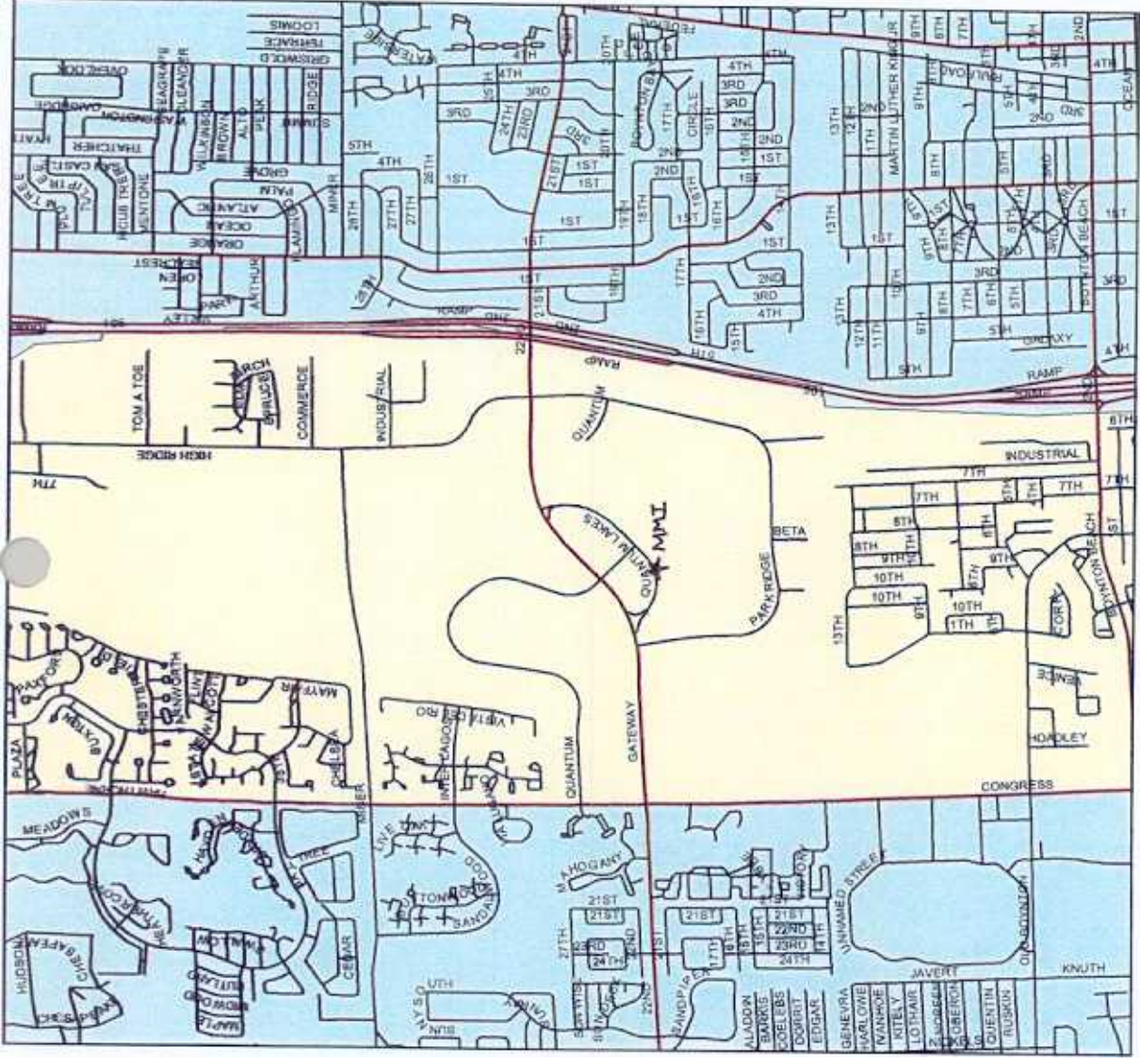


Figure 2
 Mob: Medical Industrie; (MMI)
 Site Location Map
 Source: ArcView 2000

Glossary

ATSDR: The Agency for Toxic Substances and Disease Registry. ATSDR is a federal health agency in Atlanta, Georgia, that deals with hazardous substance and waste site issues. ATSDR gives people information about harmful chemicals in their environment and tells people how to protect themselves from coming into contact with chemicals.

Concentration: How much or the amount of a substance present in a certain amount of soil water, air, or food.

Contaminant: See **Environmental Contaminant**.

Environmental Contaminant: A substance (chemical) that gets into a system (person, animal, or the environment) in amounts higher than that found in **Background Level**, or what would be expected.

U.S. Environmental Protection Agency (EPA): The federal agency that develops and enforces environmental laws to protect the environment and the public's health.

Exposure: Coming into contact with a chemical substance. (For the three ways people can come in contact with substances, see **Route of Exposure**.)

Route of Exposure: The way a chemical can get into a person's body. There are three exposure routes:

- breathing (also called inhalation),
- eating or drinking (also called ingestion), and
- or getting something on the skin (also called dermal contact).

Health Effect: ATSDR deals only with **Adverse Health Effects** (see definition in this Glossary).

Adverse Health Effect: A change in body function or the structures of cells that can lead to disease or health problems.

No Apparent Public Health Hazard: The category is used in ATSDR's Public Health Assessment documents for sites where exposure to site-related chemicals may have occurred in the past or is still occurring but the exposures are not at levels expected to cause adverse health effects.

Toxic: Harmful. Any substance or chemical can be toxic at a certain dose (amount). The dose is what determines the potential harm of a chemical and whether it would cause someone to get sick.

Certification

The Mobile Medical Industries (MMI) health consultation was prepared by the Florida Department of Health, Bureau of Environmental Epidemiology, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It is in accordance with approved methodology and procedures existing at the time the health consultation was begun.



Debra Gable
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The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.



for
Roberta Erlwein
Section Chief,
SPS, SSAB, DHAC, ATSDR