

12 February, 2007

MEMORANDUM

FOR: ALL REGIONAL/HOSPITAL DIRECTORS

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Undersecretary of Health

**SUBJECT: GUIDELINES FOR HANDLING ELEMENTAL
MERCURY (Hg⁰) SPILLS AT HOME, SCHOOL AND MEDICAL
FACILITIES**

In the light of the increasing incidence of mercury spill incidents/accidents reported to the Department, may we provide your Office with the minimum basic guidelines and precautions in handling this type of chemical incident in your area of jurisdiction.

Kindly disseminate this information to the local government units, partner agencies and other stakeholders.

For dissemination to all concerned.

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GUIDELINES FOR THE HANDLING OF ELEMENTAL MERCURY (Hg⁰) SPILLS AT HOME, SCHOOL AND MEDICAL FACILITIES

Background Information:

Elemental mercury (Hg⁰) is a heavy, shiny, silver-white, odorless liquid, nonflammable, which easily vaporizes at room temperature and releases toxic vapor, especially when heated found in liquid form

Regulatory Standards and Advisories for Hg⁰

The occupational exposure limit set by the U.S. Occupational Safety Health Administration is 100 µg/m³ as a time-weighted average (TWA) for 8 hr/day, 5 days/week (NIOSH 1997).

The American Conference of Governmental and Industrial Hygienists (ACGIH) recommends a maximum Hg⁰ concentration of 25 µg/m³ as a TWA for the same exposure duration (ACGIH 1994). Because children are more sensitive than adults to mercury, occupational standards do not apply to them.

For Hg⁰, the recommended limit for continual habitation by children is 0.2 µg/m³, according to the ATSDR (1999). EPA suggested action levels for mercury vapors, 1 µg/m³ for clearance and a home evacuation level of 10 µg/m³ in living areas (ATSDR 2000).

STEPS IN MERCURY SPILL RESPONSE: SMALL SPILLS (ONE THERMOMETER)

1. **EVACUATE THE SPILL AREA:** Before people leave, be sure that their shoes, clothing, and other articles have not been splashed with mercury. Secure the scene (use barrier tape if necessary) and restrict admission to only those persons necessary to clean up the spill. Children and pets should be kept clear of the spill area.
2. **DECONTAMINATE.** Bathe and clean all people exposed to the mercury spill with a mild alkaline soap and wash with copious amounts of water especially the area contaminated (hair, skin, etc.) . Wash shoes. Separate contaminated clothes from the laundry. Do not wash clothes in the washing machine as this may contaminate the machine and other clothes. Pets contaminated should also be washed. Non-porous materials which were contaminated should also be decontaminated.

3. **DISCARD ALL CONTAMINATED MATERIALS.** All materials which have been contaminated especially porous materials should be discarded.
4. **TURN OFF VENTILATING OR AIR CONDITIONING SYSTEMS** that could circulate air from the spill area to other parts of the building.
5. **CLOSE INTERIOR DOORS** leading to other inside areas and open exterior doors and windows. Mercury vapors are also heavier than air and may linger in higher concentrations close to the floor. Children that crawl or play in these areas are at highest risk to exposure.
6. **DETERMINE IF THE SPILL MUST BE REPORTED.** NOTE: It is recommended that any mercury spill equal to or greater than 1 pound (more than two tablespoons) impacting the environment, i.e., groundwater and surface water, or that threatens public health, be reported immediately.
7. **CONTAIN THE SPILL:** Surround or block off the mercury to keep it from spreading onto sloped or porous surfaces. Divert all mercury away from floor drains, cracks, or crevices that may impact groundwater, surface water, and soils.
8. **PREVENT EXPOSURE.** Avoid breathing any dust, vapors, mist, or gas. Avoid contact with eyes, skin, and clothing.
9. **ASSEMBLE CLEAN UP SUPPLIES** or obtain a mercury spill kit. Mercury spill kits are commercially available and convenient, but not absolutely necessary to clean up a small mercury spill.

The following are some common household articles that could be used to construct an in-home mercury cleanup kit:

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| ○ eye dropper | ○ flashlight |
| ○ goggles | ○ napkins |
| ○ paper towel | ○ plastic bags with zipper seal |
| ○ plastic container with lid | ○ plastic dust pan |
| ○ plastic sheeting | ○ powdered sulfur (*1) |
| ○ powdered zinc (*2) | ○ rubber gloves |
| ○ rubber squeegee | ○ syringe without needle |
| ○ tape; wide, duct, or masking | ○ trash bags |
| ○ tray or box | ○ wide mouth container |

*1- visualizes mercury by turning from yellow to brown and forms mercuric sulfide.

Dusting the area with this powder also reduces mercury vapors.

*2- amalgamates (bonds with) mercury.

Note: Used items are to be double-bagged and disposed of in accordance with DENR requirements.

Use the flashlight to look all around on the floor, into crevices, etc. for more mercury.

The flashlight will reflect off the shiny silver mercury beads and make it easier to see them.

10. **DRESS APPROPRIATELY:** Remove all jewelry from hands and wrists so the mercury does not combine (amalgamate) with the precious metals. Change into old clothes and shoes that can be safely discarded should they happen to become contaminated. Put on rubber gloves and goggles or safety glasses.
11. **PICK UP ALL VISIBLE MERCURY DROPLETS:** Inspect the spill zone with a bright light to help illuminate any hidden droplets. Clean up any metallic beads of mercury by using a plastic squeegee or index card and plastic dust pan. With the index or plastic card, sweep the mercury toward the center of the spilled area away from any carpet, fabric, or porous surfaces. Carefully combine and consolidate the mercury droplets. Next, slide droplets onto a sheet of rigid paper like an index card.
12. **NEXT, GENTLY TRANSFER MERCURY INTO AN UNBREAKABLE PLASTIC CONTAINER** like a 35mm film canister with a locking or air tight lid (avoid using glass). If necessary, suction off the droplets using an eye dropper or syringe. Adhesive tape strips may also be used to clean up any tiny remaining mercury droplets. Place the plastic container inside a second plastic container to provide additional containment protection. Tighten each lid securely so that liquid and vapors will be contained. Be careful when handling the mercury!
13. **PLACE THE MERCURY WASTE CONTAINER(S) INTO A ZIP-LOCKED PLASTIC BAG:** This should ensure that in the event of any leakage, all mercury will be safely contained within the packaging. Label the package "Elemental Mercury Waste, [Hazardous]," and store in a secure place away from children. Contact your local environment department to obtain a list of service providers.
14. **REMOVE and DISPOSE OF CONTAMINATED CARPETING** or other articles that have directly contacted mercury. It may be necessary to remove contaminated carpet from the room where the spill incident occurred. Double or triple wrap these remnants in plastic trash bags and contact your local waste department for proper disposal. (Do NOT expose to heat or incinerate.)
15. **SPRINKLE FINE POWDER SULFUR OR ZINC ON THE SPILL SITE** to bind any remaining mercury. This may be supplied in mercury spill kits as mercury vapor absorbent or purchased separately from garden supply stores or chemical supply houses. Apply over hard to reach areas such as cracks and crevices to minimize the release of mercury vapors. In instances where furniture has been exposed to mercury, wash fabric thoroughly and allow all items to air out completely. Mercury may lodge in porous areas like carpet backing or cracks and crevices.
16. **SET ASIDE EVERYTHING YOU THINK MIGHT BE CONTAMINATED WITH MERCURY:** Package materials securely and label as "Elemental Mercury: Hazardous Waste." Specific labeling and disposal requirements may differ depending on whether the spill occurred at a household or at a 'regulated business.' Contact your local environment department.

17. **MONITOR SPILL ZONE FOR MERCURY VAPORS:** Even if the impacted area appears clean, there may still be hidden residual quantities of mercury present that emit vapors. For larger-sized spills, it may be necessary to monitor (test) mercury vapor levels in the immediate area. If mercury is detected, re-clean the impacted area using previously mentioned procedures and repeat testing until levels fall to within safe parameters.

- The Department of Health guidelines recommend using the Agency for Toxic Substance and Disease Registry (ATSDR) 'guideline' of ≤ 1 microgram per cubic meter ($\mu\text{g}/\text{m}^3$) as the acceptable level for most residential occupancy, provided no visible metallic mercury is present (Method of Analysis :NIOSH 6009 or equivalent). NIOSH testing is not usually necessary for spills as small as a broken fever thermometer.)

Note: For larger spills in sensitive areas (bedrooms or poorly ventilated, confined areas), a direct reading mercury vapor meter may be used to detect the presence of mercury. In extreme (human exposure) situations, mercury monitoring (testing) of blood plasma or urine might also be deemed necessary. Consult your doctor, local environment/health department or poison center, for further guidance and assistance.

18. **WASH HUMANS AND ANIMALS EXPOSED TO MERCURY** using an alkaline soap Afterwards, the remaining residue should be thoroughly rinsed. All wash water containing mercury should be collected and kept out of the sanitary sewer system.

19. **REPLACE BROKEN DEVICE WITH A 'MERCURY-FREE ALTERNATIVE**

20. **INVENTORY ALL REMAINING MERCURY-CONTAINING DEVICES AND REPLACE THEM WITH MERCURY FREE ALTERNATIVES:** The best way to address a mercury spill is to prevent it from ever happening in the first place. For additional pollution prevention ideas and assistance contact the DOH, DENR or UP-NPMCC

NOTE: Everything used during the cleanup procedure will need to be managed as 'HAZARDOUS WASTE,' unless you are positive it has NOT come into contact with mercury. You may seek disposal advice from your local environmental office.

IMPORTANT REMINDERS:

1. Never use a household vacuum cleaner to clean up mercury.
2. Never use a broom on mercury spill because it will only scatter the mercury droplets.
3. Never place mercury-contaminated materials in a washing machine.
4. Never pour liquid mercury compounds down the drain as it will accumulate in the S-trap of the drain and continue to emit harmful vapors.
5. Never walk around if your shoes might be contaminated with mercury. Contaminated clothing can also spread mercury around.
6. Never touch mercury with bare hands.

7. Do not place mercury contaminated substances in the trash.

FIRST AID/PRE-HOSPITAL MANAGEMENT

- Victims exposed to mercury vapor do not pose secondary contamination risks to rescuers. Rescuers may treat urgently ill patients without concern about acute secondary contamination to themselves or their equipment.
- Victims whose skin or clothing is visibly contaminated with liquid mercury can contaminate rescuers' equipment, clothing, or the indoor environment. Contamination of clothing or equipment can result in a subsequent chronic inhalation hazard to others as the elemental liquid mercury off-gasses.
- Symptoms of acute exposure to elemental mercury vapor inhalation occur within hours of the exposure and consist of cough, chills, fever, and shortness of breath. Symptoms might resolve or gradually progress to a chemical pneumonitis, adult respiratory distress syndrome (ARDS), respiratory failure, and renal failure. Inhalation of mercury vapor can also cause nausea, vomiting, diarrhea, renal dysfunction, visual disturbances, and CNS damage.
- Treatment of acute mercury exposure generally consists of removal of the patient from further exposure followed by support of respiratory and cardiovascular function. N-acetyl cysteine may be nebulized for exposure to mercury vapors and given orally or parenterally if systemic involvement occurs given.
- Quickly access for a patent airway, ensure adequate respiration and pulse. If neck trauma is suspected, maintain the head and neck in a sniffing position with the neck fixed forward and the head extended manually and apply a cervical collar and a backboard when feasible
- In cases of large-volume ingestion, obtain an abdominal radiograph to document the location of the mercury, and explain to the patient the importance of follow-up. The patient should be referred to a primary-care or specialist physician for follow-up.
- If elemental mercury has been ingested and the patient vomits, the vomitus might contain elemental mercury that can contaminate the emergency department. Have a suction apparatus ready and prepare several towels and double-sealable plastic bags to quickly clean up and isolate any mercury. If there is widespread contamination, only a professional mercury clean-up kit with a self-contained vacuum system should be used to decontaminate. Ordinary vacuum cleaners can vaporize elemental mercury and increase the concentration of airborne mercury.

DECONTAMINATION

Victims who are able may assist with their own decontamination. Remove and double-bag contaminated clothing and all personal belongings.

Wash exposed skin and hair with mild soap and water (preferably under a shower). Rinse thoroughly with water. Use caution to avoid hypothermia when decontaminating children or the elderly. Use blankets or warmers when appropriate.

Flush exposed or irritated eyes with plain water or saline for at least 5 minutes. Remove contact lenses if easily removable without additional trauma to the eye. If pain or injury is evident, continue irrigation while transferring the victim to the Support Zone.

Ensure that adequate eye irrigation has been completed. Test visual acuity. Examine the eyes for conjunctival or corneal damage and treat appropriately. Patients should be referred to an ophthalmologist when they have apparent or suspected corneal injury.

In cases of ingestion, **do not induce emesis.**

Consider appropriate management of chemically contaminated children, such as measures to reduce separation anxiety if a child is separated from a parent or other adult. If possible, seek assistance from a child separation expert.

Be aware that use of protective equipment by the provider may cause fear in children, resulting in decreased compliance with further management efforts.

Because of their relatively larger surface area:body weight ratio, children are more vulnerable to toxicants absorbed through the skin. Also emergency room personnel should examine children's mouths because of the frequency of hand-to-mouth activity among children.

For more information you may call the UP-NPMCC at 5241078 (24 hrs) or at EOHO-NCDPC at 7329966

Conclusions

The best way to prevent Hg⁰ spills is not to store Hg⁰ in the home, school, or workplace. Because large Hg⁰ spills may cause hazardous conditions, particularly for children, and may pollute the environment, it is not advisable for homeowners or janitorial staff to undertake the cleanup. Such cleanups, which can be expensive, are best done by hazardous waste firms that are qualified to perform this work. To reduce the chances of a spill occurring, alternatives to Hg⁰-containing devices (e.g., thermometers, barometers, manometers, and blood pressure and other medical devices) should be used in homes, schools, medical facilities, and workplaces. People need to be educated about the hazards of Hg⁰, the costs of cleaning it up, and the availability of Hg⁰-free products.