

Health Consultation

Mercury Exposure Incident

TRURO CENTRAL SCHOOL

TRURO, MASSACHUSETTS

**Prepared by the
Massachusetts Department of Public Health**

MAY 3, 2010

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.

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HEALTH CONSULTATION

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SUMMARY

INTRODUCTION: The Massachusetts Department of Public Health, Bureau of Environmental Health (MDPH/BEH), uses this health consultation to provide the Truro Central School community the best information possible on any public health concerns associated with a mercury leak at the school. On the afternoon of December 7, 2009, MDPH/BEH was notified by the Massachusetts Department of Environmental Protection (MDEP) of a potential mercury spill involving students and staff at the Truro Central School in the Town of Truro, MA. The MDPH/BEH Indoor Air Quality (IAQ) and Environmental Toxicology programs (ETP) and other MDPH/BEH regional staff responded. A sphygmomanometer (blood pressure cuff) containing mercury began to leak as two children in a kindergarten class were playing with it in a classroom. Staff members noticed the leak, removed all children from the kindergarten classroom and the adjacent pre-K classroom, and contacted the MDEP. At the request of the Truro School Department, MDPH/BEH IAQ staff were dispatched to the school the following morning to provide on-scene assistance. In addition, MDPH/BEH staff coordinated urinary mercury testing for kindergarten/pre-K students and school staff who may have been exposed during the incident.

The purpose of this health consultation is to evaluate the public health concerns for students, teachers, and others who may have come into contact with elemental mercury as a result of the release of mercury within the school. The mercury release in a kindergarten classroom with very small children raised concerns regarding the impact of mercury exposure, as well as the potential for mercury to be transferred to secondary locations in the elementary school from contact with shoes and other belongings.

Urine samples were collected by MDPH/BEH staff and analyzed by the MDPH William A. Hinton State Laboratory Institute (SLI). Environmental data and biomonitoring results were evaluated in this health consultation to determine if health effects were likely for those students, teachers, and others who may have been breathing mercury vapors in the indoor air of the school.

CONCLUSION: MDPH concludes that indoor air exposures following a release of mercury at the Truro Central School is not expected to harm people's health.

BASIS FOR DECISION:	Risk-reduction measures, including vacating the immediate area, monitoring of clothing and air, and clean up of the affected classrooms, limited the duration and extent of exposure to mercury vapors in the school. Urinary mercury analysis and results for those students and teachers in the vicinity of the mercury spill were below levels at which health effects would be expected and confirmed the efficacy of risk reduction measures.
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NEXT STEPS:	<ul style="list-style-type: none">- MDPH/BEH provided recommendations to school administrators and local health officials with respect to avoidance of contaminated areas, possible health effects and clinical testing, and interpretation of air analyses and urine testing results.- Air testing was conducted at the conclusion of clean up, and the pre-K and kindergarten classrooms in Truro Central School reopened on December 14, 2009.- The Truro Central School officials implemented all recommended actions and policy changes following the incident. At this time, no further actions are necessary to protect the population involved.
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FOR MORE INFORMATION:	If you have concerns about your health, you should contact your health care provider. You may also call MDPH at 617-624-5757 and ask for information on mercury exposure.
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BACKGROUND

On December 7, 2009, the Massachusetts Department of Environmental Protection (MDEP) responded at approximately 4:00 PM to a report of a mercury spill in the Truro Central School, which includes a student population of 141 students in pre-K and kindergarten, and grades 1-6. Reportedly a blood pressure cuff or sphygmomanometer that kindergarten children were playing with in classroom 213 began to leak mercury. A classroom teacher noticed the mercury on the floor near the children, moved the children away from the area and the device, and called for assistance. All children in the classroom and the adjacent pre-K classroom 211 were relocated to the gym shortly thereafter. The school custodian used a mercury spill kit powder to spread over the visible mercury on the tile floor.

At approximately 4:30 PM the Massachusetts Department of Public Health/Bureau of Environmental Health (MDPH/BEH) received a call about the incident from the MDEP. In response, MDPH/BEH offered to send Indoor Air Quality (IAQ) Program staff the following morning to assist in the response, as well as, to conduct urinary mercury testing.

In addition, school officials notified staff of the incident and parents of children who might have been exposed during the incident were contacted to return to the school to have clothing and shoes measured for mercury contamination. Parents of the children and school staff were also notified that urine testing for mercury levels would be offered by MDPH/BEH the next morning for persons concerned about potential exposure to mercury.

Following the initial clean up by the school custodian, MDEP used a Lumex Mercury Analyzer to carry out an initial assessment of the indoor air for mercury levels. School officials hired a contractor, Global Remediation Services, Inc. to carry out a comprehensive assessment and clean up of the school. A Lumex meter was used to take mercury measurements generally at floor level, in the vicinity of the breathing zone, or on surface areas (e.g. desks, laptops, lockers) (OccuHealth 2009).

Lumex meter readings in classroom 213 on December 7, 2009 ranged from 5.435 – 9 $\mu\text{g}/\text{m}^3$. Visible beads were noted under the table where the cuff broke. Gloves and debris from the incident registered levels as high as 21.7 $\mu\text{g}/\text{m}^3$, while students shoes showed levels as high as 49 $\mu\text{g}/\text{m}^3$. In the nurse's office mercury concentrations were 0.4-0.5 $\mu\text{g}/\text{m}^3$, while an area in the hallway near the bathroom area, outside of the classroom where the blood pressure cuff broke, registered 1.8 $\mu\text{g}/\text{m}^3$.

The remediation contractor conducted cleanup activities until mercury levels in all affected areas were under 0.3 $\mu\text{g}/\text{m}^3$. Carpet, stuffed animals and clothing in the area that may have absorbed mercury were also disposed of.

The U.S. Environmental Protection Agency (U.S. EPA) has a chronic (at least one year of daily exposure) inhalation reference concentration (RfC) of 0.3 $\mu\text{g}/\text{m}^3$ for elemental mercury. ATSDR does not have a guideline value for short-term air exposure to elemental mercury, which would be more appropriate in this situation, but does use a guideline of 1 $\mu\text{g}/\text{m}^3$ for re-occupancy of a residence after a mercury release has been cleaned up (ATSDR 2000).

An MDEP-certified licensed site professional supervised the clean up of the school. BEH/IAQ made recommendations to the MDEP and to the contractor concerning positioning of the ventilation equipment with respect to the spill area.

As part of the response, and because of elevated air mercury concentrations that could have presented health concerns given sufficient exposure opportunities, MDPH/BEH offered urinary mercury testing to all the individuals that were identified as being in the area of the spill or where mercury levels were detected during the initial response. School officials contacted the parents of children in the kindergarten classroom and school staff during the afternoon and evening of the incident to offer the testing, and arranged for a location for individuals that wanted to participate to come the next morning (December 8) to provide a urine sample (at the Truro Community Center). MDPH/BEH staff picked up urine sample kits at the William A. Hinton State Laboratory Institute and transported the kits to Truro the following morning. In addition, copies of informed consent forms were made and taken for participants to sign, a requirement in order to participate in the urinary testing effort.

Fifteen urine samples (ten children in the classroom and five adults) were collected on December 8th between 11:00 AM and 12:15 PM and placed in a cooler with ice packs. Chain of Custody documentation was maintained for all samples, which were then transported to the MDPH SLI in Jamaica Plain, MA. Urine mercury analysis was performed by the MDPH SLI Environmental Chemistry Laboratory using Cold Vapor Atomic Absorption Spectroscopy (CVAAS). The reporting limit for these analyses was 12 µg/L, or 12 parts per billion (ppb). The final urinary mercury levels were reported as (1) total mercury in urine (micrograms of mercury per liter of urine, µg/L) and also (2) mercury concentration in urine adjusted for creatinine (micrograms of mercury per gram of creatinine, µg/g). It is a common laboratory method to adjust for creatinine content as this adjustment corrects for variable dilutions among spot urine samples (Barr et al., 2005).

RESULTS OF URINARY MERCURY TESTING

A total of 15 urine samples were analyzed, of which all showed no detectable mercury (detection limit of 12 µg/L). A review of scientific literature indicates no clinical or subclinical effects have been reported for urine mercury levels below 20 µg/L (ATSDR 1992, 1999).

DISCUSSION

Urinary mercury analysis is reliable and simple, and provides rapid identification of individuals with elevated mercury levels (ATSDR 1992, 1999). The individuals tested represented those with the greatest opportunity for exposure/concern (based on reports from Truro Central School staff regarding the incident) and based on these urinary mercury results, health effects would not be expected as a result of the mercury spill at the Truro Central School. That no one tested for urinary mercury had detectable mercury in their urine indicated they had minimal or no exposure to the airborne mercury. Students were reported to have been evacuated from the building within a half hour of the spill and contaminated clothes/shoes were disposed of as hazardous waste. Prompt evacuation of students at the school significantly limited the duration of exposure.

Letters were sent by MDPH/BEH to all individuals who submitted urine samples (to parents or guardians for students) including the results of the analysis and an interpretation of the mercury level.

Air testing was conducted at the conclusion of clean up operations to ensure that mercury levels in the school were below the ATSDR acceptable level for occupancy of any structure after a spill ($1 \mu\text{g}/\text{m}^3$) and all classrooms in the Truro Central School reopened on December 14, 2008.

CONCLUSIONS

ATSDR requires that overarching conclusion category statements be used to summarize the findings of a public health assessment. ATSDR conclusion category statements are selected from site-specific conditions such as the degree of public health hazard based on the presence and duration of human exposure, contaminant concentration, the nature of toxic effects associated with site-related contaminants, presence of physical hazards, and community health concerns. Therefore, based on MDPH's evaluation of the available environmental and biomonitoring data, the following conclusions were made at the time of the notification and in the days that followed:

The incident at the Truro Central School was a mercury release resulting in contamination with the potential for cross-contamination and exposure to a vulnerable population. These factors and the combination of an unknown quantity of mercury, and an indeterminate time frame for exposure, put the school population and others with potential secondary exposures at risk for health effects associated with inhalation of mercury vapors. However, the rapid risk-reduction measures, including evacuation and clean up, limited significant exposure.

Based on the data collected in the course of this investigation, ATSDR would conclude that exposure to mercury vapor in the indoor air at the Truro Central School during the incident described is not expected to harm people's health. The reason for this conclusion is that risk-reduction measures, including evacuation and clean up, limited the duration of exposure to mercury vapors in the school. In addition, mercury urinalysis results for those students and teachers in the vicinity of the mercury spill (and hence with the greatest opportunities for exposure) showed no detectable levels of mercury. Thus, students and teachers in the vicinity of the mercury spill were likely exposed to mercury vapors, but not at sufficiently high concentrations or for durations expected to harm people's health as demonstrated by urine mercury results.

RECOMMENDATIONS

MDPH/BEH provided recommendations to the school administrators and local health agency with respect to avoidance of contaminated areas, possible health effects and clinical testing, and interpretation of air analyses and urine testing results. These recommendations included: 1) mercury awareness training should be conducted for appropriate teachers and maintenance personnel, and as part of the curriculum for specific courses; 2) mercury spill kits should continue to be maintained on-site for immediate use in the event of an emergency; and, 3) all

vintage equipment at the school should be evaluated to determine if any contain mercury. MDPH/BEH programs provide ongoing assistance to schools, and to programs and individuals serving children, with respect to exposures to mercury and other hazardous materials.

Individuals with additional information or questions regarding this health consultation should contact the Bureau of Environmental Health, MDPH, Environmental Toxicology Program, at (617) 624-5757.

PUBLIC HEALTH ACTION PLAN

The Truro officials endorsed all recommended actions and policy changes following the incident. At this time, no further actions are necessary to protect the population involved. The school or Truro Board of Health will continue to provide assistance or secure additional resources as necessary to support the recovery phase of this response.

REFERENCES

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PREPARER

This document was prepared by the Bureau of Environmental Health of the Massachusetts Department of Public Health. If you have any questions about this document, please contact Suzanne K. Condon, Director of BEH/MDPH at 250 Washington Street, 7th Floor, Boston, MA 02108.

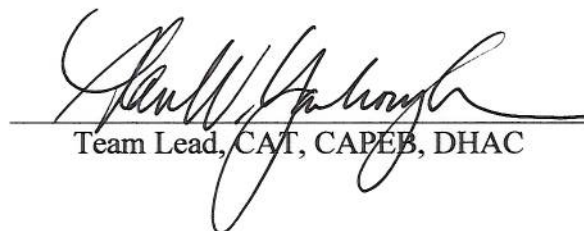
CERTIFICATION

The Health Consultation, *Mercury Exposure Incident, Truro Central School Truro, Massachusetts*, was prepared by the Massachusetts Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Health Consultation was initiated. Editorial review was completed by the cooperative agreement partner.

A handwritten signature in dark ink, appearing to read "Steve P. O'Leary", is written over a horizontal line.

Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

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

A handwritten signature in dark ink, appearing to read "Shawn W. Gahagan", is written over a horizontal line.

Team Lead, CAT, CAPEB, DHAC