

Mercury in Flooring

Mercury-Containing Polymer Floors

- ODH/ATSDR Partnership
- Hg in Flooring - Summary of Issues
- Assessment/Screening
- Floor Maintenance/Building Ventilation
- Regulation (Removal/Disposal/Worker Safety)

Presented at the Building Environment Council
of Ohio (BECO) Fall Conference
October 21, 2010



Ohio Department of Health

Health Assessment Section

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- **Greg Stein, Community Involvement/Health Ed.**

Cooperative Agreement Program

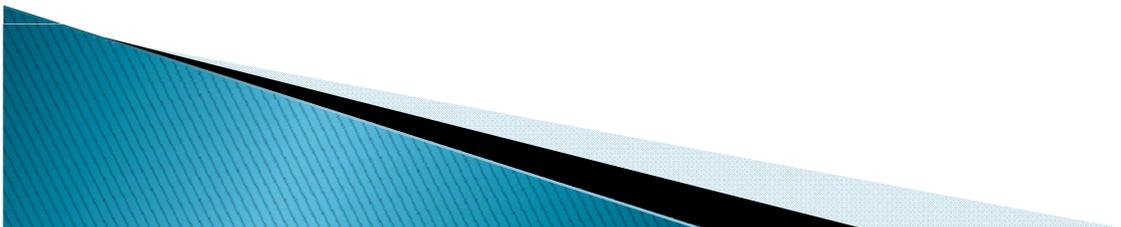
ODH/Agency for Toxic Substances and Disease Registry (ATSDR)

- **ATSDR is the sister agency of the CDC and the principal federal public health agency involved with chemical exposures and human health issues.**
 - ❖ **Headquartered in Atlanta, GA - Approx. 325 employees - 10 regional offices.**
 - ❖ **ODH Health Assessment Section (HAS) receives ATSDR Cooperative Agreement Program federal grant dollars to fund staff training and salary.**
- **The mission of the federal-state partnership is to protect public health by identifying and evaluating the levels of chemicals in the environment in order to reduce/eliminate human exposure to toxic chemicals.**





HAS works closely with the ATSDR, the U.S. EPA, the Ohio EPA, the local health departments, schools, media and Ohio's concerned communities.

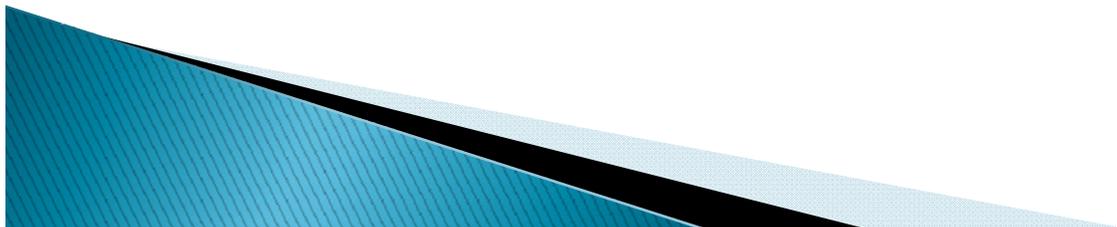


HAS Services:

- Exposure Investigations
- Emergency Response
- Community Involvement
- Health Education
- Public Health Assessments
- Health Consultations
- Technical Assists

| | |
|---|---|
|  <p>Bureau of Environmental Health Health Assessment Section</p> <p>"To protect and improve the health of all Ohioans"</p> | <h2>Mercury Packet Contents</h2> |
| <p>What is the responsibility of the local health department when a mercury spill occurs? Ohio's local health departments have no legal mandate to address mercury spills. However, local health departments often serve as contacts and sources of information for concerned residents and local fire and EMS-EMA services. Health departments may be the first responders, perhaps talking with concerned citizens who broke a fever thermometer or becoming involved with a mercury spill at one of the local schools.</p> <p>Mercury spill site containment can fall under local health departments' public health nuisance laws. With the assistance of the Ohio and U.S. Environmental Protection Agencies, Ohio's local health departments can assess whether a mercury spill is contained or if mercury was removed or tracked from a spill site.</p> <p>Local health departments may also be asked to provide health action levels for indoor mercury vapors in homes or schools where a mercury spill occurred. Working together with the Ohio Department of Health (ODH) and the Ohio and U.S. EPA, health departments can provide recommendations to homeowners about spill cleanup options and determine health safety standards for re-occupancy.</p> <p>The ODH Mercury Packet was created to provide Ohio's local health departments with a tool so they can better address the various types of mercury information and education needs.</p> <p>IMPORTANT NOTES !!</p> <p>#1 Pregnant women and children should be immediately removed from a mercury spill site.</p> <p>#2 If a resident has already vacuumed the mercury spill, walked through the spill and tracked it to other parts of the house/building, or otherwise extended the spill beyond its initial spill location, disregard the small mercury spills fact sheet and mercury cleanup kit document and contact the Ohio EPA's Spill Hotline at 1-800-282-9378.</p> <p>#3 School spills should always involve contacting the Ohio EPA Spill Hotline and a mercury clean-up contractor.</p> <p>#4 If a residential spill was <u>properly</u> contained and cleaned, testing may not be necessary for spills as small as a broken fever thermometer. However, if a homeowner wants to <u>ensure</u> his residence is safe for re-occupancy after a mercury spill, he would need to have his home tested with a real-time mercury vapor analyzer.</p> <p>For more information: Ohio Department of Health Health Assessment Section Phone: (614) 466-1390 E-mail: BEH@ow.odh.state.oh.us</p>  | <p>Mercury Packet Contents:</p> <p>Mercury fact sheet (general information) The mercury fact sheet provides general information about the different forms of mercury, how mercury enters the environment, how mercury affects human health and how families can reduce their exposure to mercury.</p> <p>Mercury Spills fact sheet The mercury spills fact sheet addresses metallic mercury spills, the testing mechanisms available for air and personal exposure and mercury disposal options.</p> <p>Suggested Action Levels for Indoor Mercury Vapors in Homes The suggested action levels for indoor mercury vapors in homes document was created by the federal Agency for Toxic Substances and Disease Registry (ATSDR). This document provides health action levels for indoor air mercury contamination. The suggested action levels provided in this document are intended as recommendations for cleanup values and are not regulatory. Each mercury spill site is unique and will require the health department to make health action level decisions based upon site specific facts.</p> <p>Small Mercury Spills The small mercury spills fact sheet is a step-by-step guide to containing and cleaning small residential mercury spills (fever thermometer). The fact sheet also addresses what kind of health screenings and residential air tests are available and the health recommendations for a residential mercury spill. IMPORTANT NOTE: If a resident has vacuumed a mercury spill, walked through the spill, or otherwise extended the spill beyond its initial spill location, disregard the small mercury spills fact sheet and the mercury cleanup kit and contact the Ohio EPA's spill hotline at 1-800-282-9378.</p> <p>Large Mercury Spills The large mercury spills fact sheet contains six mandatory action steps to be completed prior to the arrival of a mercury cleanup contractor.</p> <p>Mercury Cleanup Kit The mercury cleanup kit document provides a list of common household items that could be used to construct an in-home mercury cleanup kit to clean a small and contained mercury spill (thermometer break).</p> <p>Ohio EPA "Mercury in the Household" The Ohio EPA mercury in the household document is a listing of common household items that contain mercury as well as contact information on source reduction, recycling and disposal of mercury-containing products.</p> |

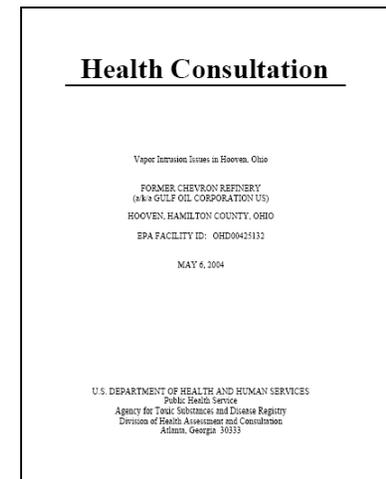
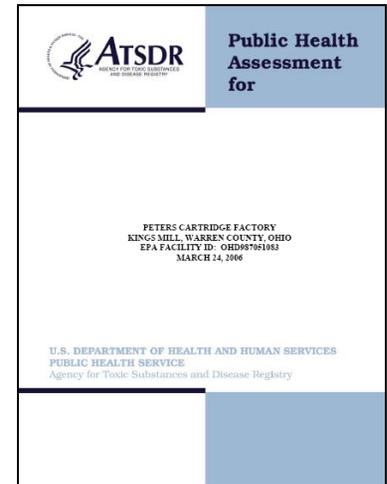
Created February 2004



Public Health Assessment (PHA) Health Consultation (HC)

- Focus on the site hazardous waste chemical(s) of concern and the exposure pathway(s).
- Provide conclusions regarding potential public health threat.
- Provide recommendations for reducing or eliminating human exposure.

HAS role is primarily advisory, recommending actions to be taken by the potentially responsible party or regulatory agency (EPA) partners.



*** Public health documents produced by HAS are reviewed by a team of ATSDR scientists and finalized as federal ATSDR public health documents.**



Agency for Toxic Substances & Disease Registry

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Public Health Assessments & Health Consultations

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HEALTH CONSULTATION

Mercury Exposures from 3M Tartan Brand Floors

WESTERVILLE SCHOOLS
WESTERVILLE, FRANKLIN COUNTY, OHIO

March 19, 2003

Prepared by:

Ohio Department of Health
Health Assessment Section
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

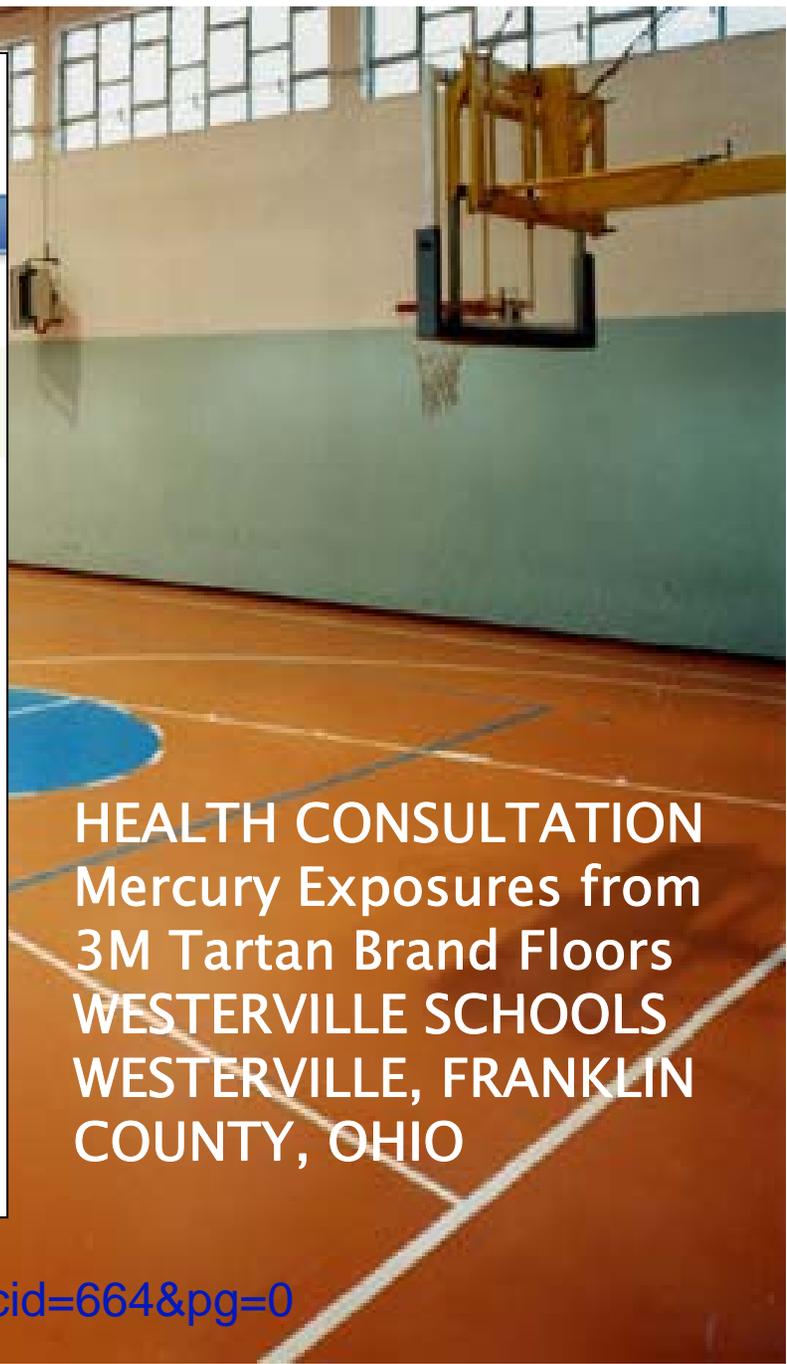
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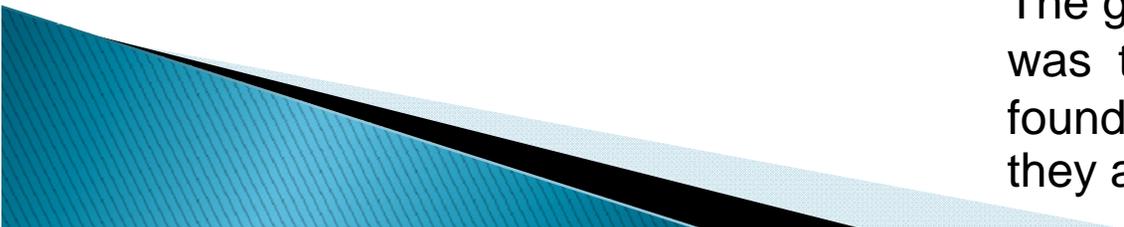
HEALTH CONSULTATION
Mercury Exposures from
3M Tartan Brand Floors
WESTERVILLE SCHOOLS
WESTERVILLE, FRANKLIN
COUNTY, OHIO

www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=664&pg=0

Mercury in Flooring

Health Consultations

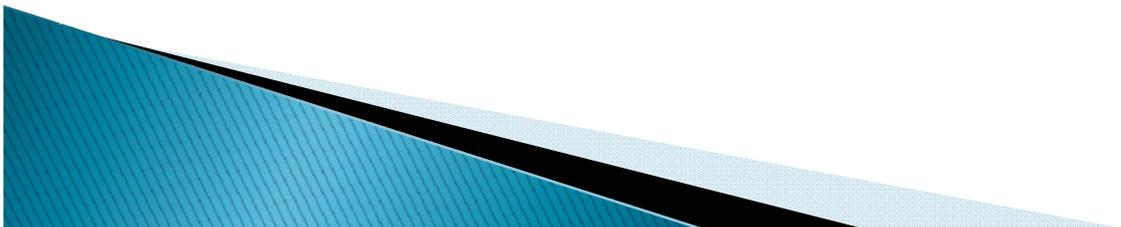
- **Ohio – Westerville Schools (2003) – Gandee & Associates**
- **Michigan – Mid-Michigan Mercury Floor (2004)**
- **Oregon – Salem-Keizer School District 3M Flooring (2006)**
- **Minnesota**
 - ❖ **Mercury Vapor Release/Athletic Polymer Floors (2006)**
 - ❖ **Bethel University (2008)**



The goal of the public health consultation was to determine if Hg vapors were found in the indoor air and if so, were they at levels which could be harmful.

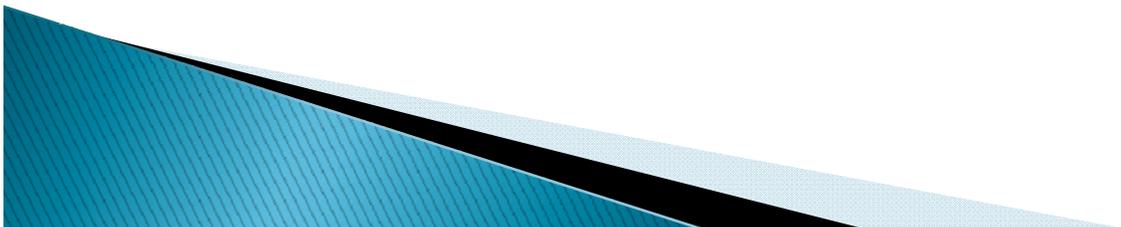
Background:

- From the 1960s to the mid 1990s, schools, colleges/universities, athletic facilities, prisons and other facilities throughout the country installed synthetic rubber-like flooring in indoor gymnasiums, field houses, outdoor running tracks and similar rooms and facilities.
- When mixing the polyurethane formulation to form the rubberized floor surface, phenyl-mercuric-acetate (PMA) was used as a catalyst to facilitate the liquid's spreading and leveling. According to the 3M Corporation, their Tartan[®] brand flooring product can contain between 0.1% to 0.2% Hg (1,000-2,000 ppm).



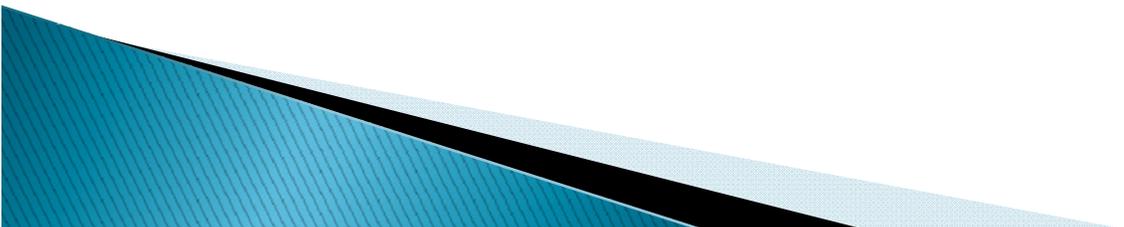
Background: (cont.)

- As recent as 2006, Illinois discovered a European company poured Hg-containing floor in a private school in Joliet -- MSDS did not list Hg.
- Estimates from just one manufacturer (Athletic Polymer Systems -- APS) claim that they have installed over 25 million pounds of polyurethane flooring product over the past 40 years (industry-wide data has not been collected).
- A lot of uncertainty exists about the number of these floors that currently exist and whether they are still being installed.



Polyurethane floor/surface manufacturers and products:

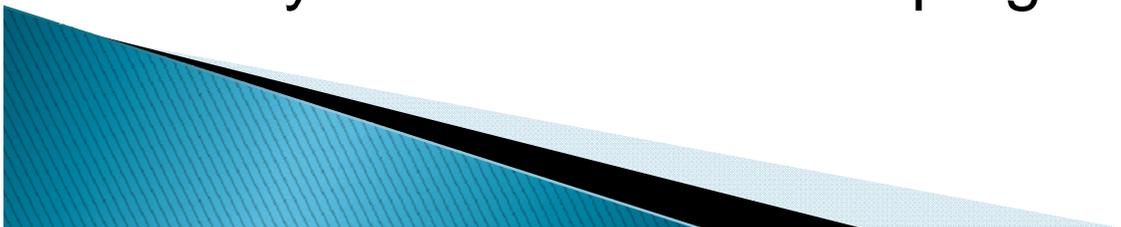
- 3M Corporation – Tartan[®] floors and Tartan[®] track
- American Bilrite Rubber Co. Inc.: Amtico Rubber Flooring
- Athletic Polymer Systems (APS)
- Crossfield Products Corp. -- Dex-O-Tex
- Mondo Rubber
- Pitzer Inc.
- Selby Battersby & Company
- Sportan Surfaces, Inc.
- Robbins Sports Surfaces – Chemturf[®]



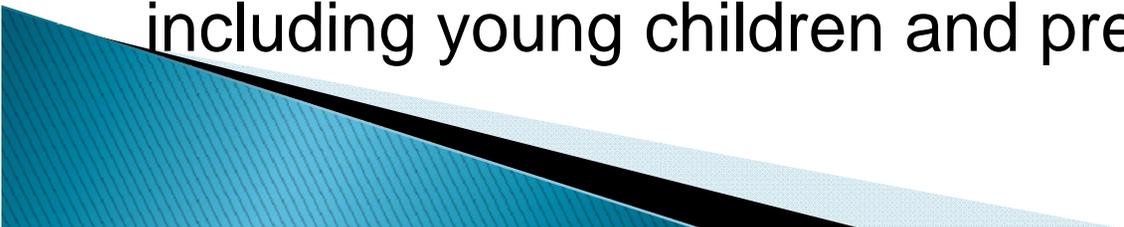
* Not a comprehensive listing of manufacturers and/or their products.

The Public Health Concern

- Any rubberized floor which uses Hg as an ingredient has the potential to off-gas, particularly in places where the floors are damaged or there are cracks, seams and holes. In poorly-ventilated spaces, even in large spaces such as gymnasiums, relatively high levels of Hg have been found.
- Exposure to high levels of Hg can permanently damage the brain, kidneys or a developing fetus.
- Children and pregnant women are at greatest risk from Hg exposure, as the neuropathways of children <15 years are still developing.



Public Health Concern (cont.)

- As children tend to be shorter than adults, their breathing zone is closer the floor where the higher Hg levels would typically be found. Also, children and adults in a gym would likely be engaging in an activity which would increase respiration. Couple that with a child's lower body weight and higher intake rate, the result would be a greater dose of hazardous substance per unit of body weight.
 - In evaluating the potential public health hazards from exposure to Hg, ATSDR uses conservative estimates of exposure and toxicity to determine the potential for adverse health impacts to vulnerable populations including young children and pregnant women.
- 

- ATSDR recommends that breathing zone Hg levels not exceed 1,000 ng/m³ (1.0 ug/m³) for re-entry in a residential, medical or school setting after a Hg spill.

Suggested Action Levels for Mercury (CAS # 7439-97-6)

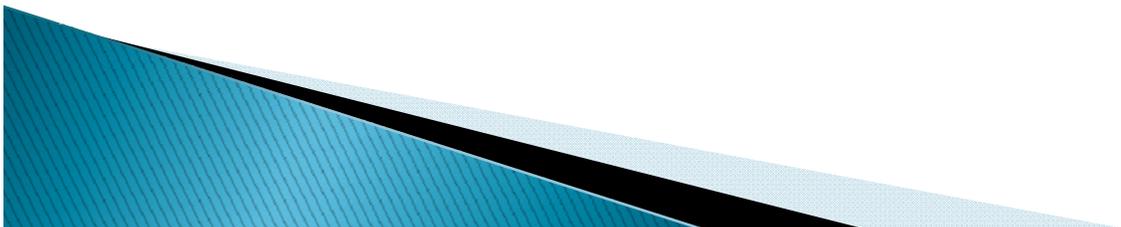
| Indoor Air Concentration (ug/m ³) | Use of the Action Level | Method of Analysis * | Reference |
|---|---|---|--|
| <1.0 | Level acceptable for occupancy of any structure after a spill (also called the residential occupancy level) | NIOSH 6009 or Real-time air monitoring with Lumex or equivalent | ATSDR HGVs 1999. EPA/IRIS |
| 10 | Isolate residents from the exposure | Real-time air monitoring instrument (i.e., Jerome™ or Lumex meter equivalent) | ATSDR, 1999. |
| 10 | Acceptable level in a modified test procedure to allow personal effects to remain in the owner's possession | Real-time air monitoring instrument (i.e., Jerome™ or Lumex meter equivalent) | |
| 3.0 | Re-occupancy after a spill of an occupational or commercial setting where mercury is not usually handled. | NIOSH 6009 or equivalent | ATSDR HGVs 1999. EPA/IRIS |
| 25 | Occupational settings where mercury is handled. ♂ | Real-time air monitoring instrument (i.e., Jerome™ or Lumex meter equivalent) | HSDB, 1999 |
| 25 | Response Worker Protective Equipment Upgrade. ♂ | Real-time air monitoring instrument (i.e., Jerome™ or Lumex meter equivalent) | 29 CFR 1910.120; 40 CFR 311; NIOSH, 1987 |
| 10,000 | IDLH. Response Workers Protective Equipment upgrade. | Real-time air monitoring instrument (i.e., Jerome™ or Lumex meter equivalent) | 29 CFR 1910.120; 40 CFR 311; NIOSH 1987 |

* Environmental analysis should be in accordance with the requirements specified by environmental authorities. When real-time air monitoring instruments are specified in this table, laboratory analysis may be substituted at the discretion of the risk managers involved in the event. Operation of real-time instruments should be in accordance with manufacturer's instructions.
 ♂ Women workers in these settings who are pregnant or attempting to become pregnant should consult their physicians regarding their mercury exposure.

Site Assessment

- Not every polyurethane floor used Hg as a catalyst and not every floor which used Hg as a catalyst is a public health hazard.
 - ❖ Of the 37 gyms tested in MI, 15 showed Hg off-gassing (most within safe limits).

- Due to the high degree of variability of these floors, it is difficult to make generalized conclusions about which floors emit unacceptable levels of Hg vapor.
 - ❖ In order to assess if a floor is emitting Hg at potentially harmful levels, testing is necessary.



Communicating the Risk

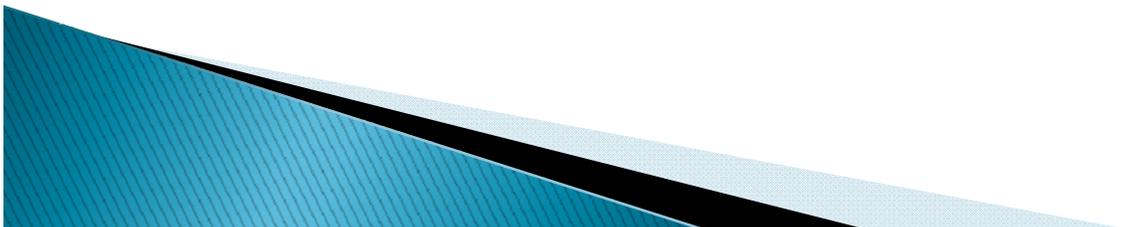
- To avoid creating uncertainty or undue concern about the hazards posed by these polyurethane floors, the ATSDR recently formed the Mercury in Flooring Workgroup. The focus of the Workgroup is to create a guidance document which would provide science-based information to local school authorities who can then make informed risk management decisions about their facilities.
- The guidance document will also provide appropriate public health information for parents, students and staff.



Photo from Minnesota Dept. of Health
Mercury in Schools presentation

Hg in Flooring Guidance Document

- One of the goals of the guidance document is to provide helpful information on how to approach an initial investigation and how to present the results and/or the future plans for leaving the floor in place or the removal.
- The guidance document will also attempt to provide information/recommendations about the appropriate maintenance and the optimal conditions to reduce off-gassing of the flooring left in place, proper ventilation of the room, and recommendations on floor removal procedures and subsequent disposal options.



Site Assessment – Screening

Determining if a floor contains mercury:

Using a Lumex real-time mercury vapor analyzer (or equivalent)

- When first determining if a polymer floor contains PMA, a Lumex real-time mercury vapor analyzer (or equivalent) can be used as a screening tool. Other testing methods are available, but they can be more complex and expensive than real-time measurements.
- The minimum detection limit for an instrument used to screen Hg vapor concentrations in a school or in an area where the public may be exposed should be 300 nanograms per cubic meter (ng/m³) or less.

* Results from chamber testing on flooring in MI correlated well with Lumex testing.

* A Beaulieu, 2008 analysis felt the Lumex compared well with the NIOSH 6009 method.

Note: Toxicity Characteristic Leaching Procedure (TCLP) testing results are not a good indicator of the likelihood or degree of off-gassing, but are mandatory for disposal.

Site Assessment – Screening

Recommended sampling conditions :

- Determine if there are operable windows, AC, HVAC, mechanical ventilation [air handling unit (AHU)]. To simulate a worst-case scenario, windows & doors should be closed and ventilation system off for 24hrs.



Photo from Michigan Dept. of Community Health

Site Assessment – Screening

Indoor Air/Floor Temperature:

- Hg volatilizes at room temperature (77°F - 25°C). Measure the indoor air temperature and consider testing the ground/floor temperature to document the areas of the floor where there may be higher levels found.

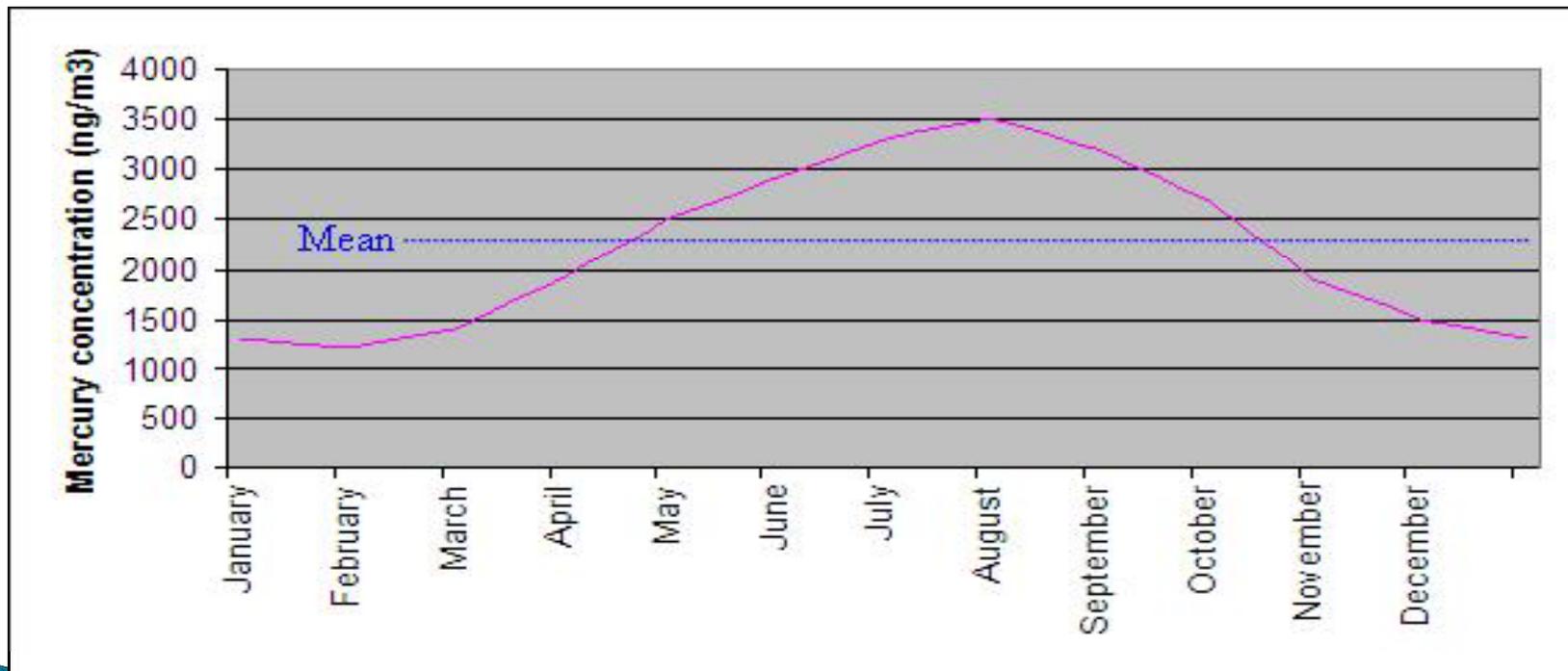
- To measure floor temperature, place a thermometer or temperature probe directly on the floor surface. Cover it with a very small cardboard box, and allow it to remain in place (equilibrate) for approximately 10 minutes before recording the measurement. Try to collect floor temperature measurements in the following locations:
 - ❖ 3 feet from an outside wall
 - ❖ Center of the room
 - ❖ 3 feet from an inside wall



Site Assessment – Screening

Consider additional sampling conditions :

- As mercury vapor concentration is related to temperature, consider testing/retesting during other seasons, especially during the heat of the summer.



The above Minnesota Dept. of Health chart shows an example of Hg vapor concentrations that may be found in a gym with a Hg-containing floor over 12 months. Temperature would rely on ground/floor temp as well as air temp. **Note:** Modeled and not based on actual data.

Site Assessment – Screening

Where to Sample:

- Consider who might be exposed in the school gym class, athletic team, spectators, those milling about an expo center, etc. and take measurements close to their breathing zone (infant, toddlers & young kids, seated adults & standing adults).
- Test the surfaces which are likely to give off higher levels of Hg vapor, particularly concentrate where areas of the floors are cracked, damaged or there are holes and/or seams.



Photos from Michigan Dept. of Community Health

Lumex Results Options:

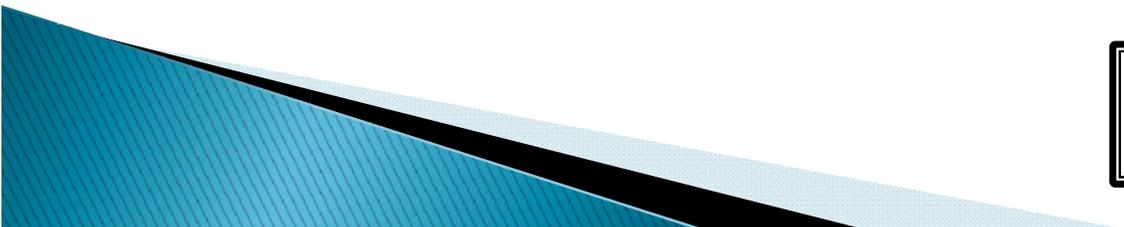
Scenario 1: If Lumex results come back below the 800 ng/m³:

Action:

1. Confirm that the Hg vapor analyzer is operating properly.
2. Retest seasonally to assure average concentration is 800 ng/m³ or below: Make adjustments to the floor maintenance and ventilation system if there are exceedances.

Scenario 2: If Lumex results come back above 800 ng/m³:

Action: Recommend laboratory analysis to determine the Hg concentration of the flooring: bulk testing.



800 ng/m³ levels established by the Minnesota Dept. of Health

Site Assessment – Lab testing

NIOSH 6009, chamber and bulk testing

- Other methods of mercury vapor testing:
 - ❖ NIOSH 6009
 - ❖ Chamber testing
- ✓ The above methods require chemical analysis of samples that are taken over extended periods of time. Averaging mercury vapor concentrations over time, as these methods do, may result in more realistic/accurate exposure data and may remove sampling bias. However, unless sample collection is guided by a real-time mercury vapor analyzer, the maximum exposure concentrations are not likely to be measured.

- Bulk testing:
 - ❖ To determine the concentration of the Hg in the flooring, sample and analyze a small section of flooring ($\frac{1}{2}$ inch square and full thickness).



Laboratory results (bulk testing):

- If Hg is less than 1 ppm, it can be assumed that the flooring was not manufactured using a mercury-containing catalyst.
- If Hg is greater than 1 ppm and less than 20 ppm, it is unlikely that exposures to Hg vapor in the gym could reach levels of concern. However, proper floor maintenance, adequate ventilation and periodic testing should take place to document levels are not exceeded.
- If Hg is 20 ppm or greater, the concentration in the gym may approach or exceed levels of health concern under specific conditions. Disposal should be considered, but active ventilation could be an option.

Mitigation Options:

Removal versus Leaving in place:

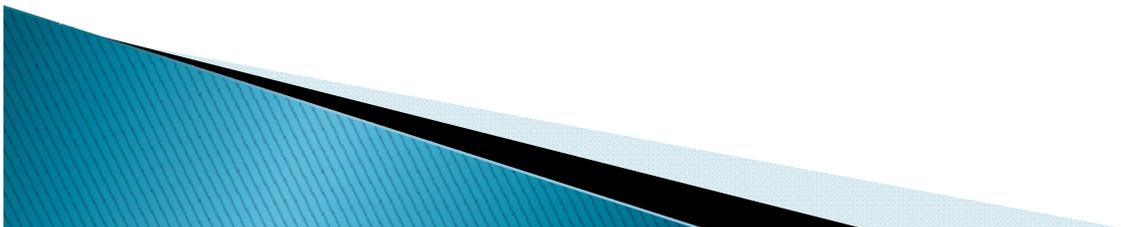
- Develop a cost-benefit analysis of removal versus long-term maintenance of floors left in place.



Photos from Google images

Removing a floor:

- If a floor emits Hg vapor greater than 800 ng/m³, or if laboratory analysis detects Hg at a concentration of 20 ppm or greater, the best **permanent** solution is to remove the floor and replace it with a floor that does not contain Hg.
- If removal is being considered, the Ohio EPA should be consulted. TCLP testing will be required to determine the proper disposal options available (see disposal).
 - ❖ CD's&D's Landfill –
 - ❖ Municipal Solid Waste Landfill -
 - ❖ Hazardous Waste Landfill –



Removing a floor:

- Safety precautions should be used during removal because the process may cause mercury vapor emissions to increase.
 - ❖ Floors abraded during resurfacing or removal may release more mercury than floors that are in use (Boyle 2006).
 - ❖ Beaulieu (2008 article) found airborne Hg levels up to 74,000 ng/m³ during abatement.
- Precautions may include isolation of the building, vapor monitoring, dust control, and personal protection equipment for workers carrying out the removal.



Photos from Google images



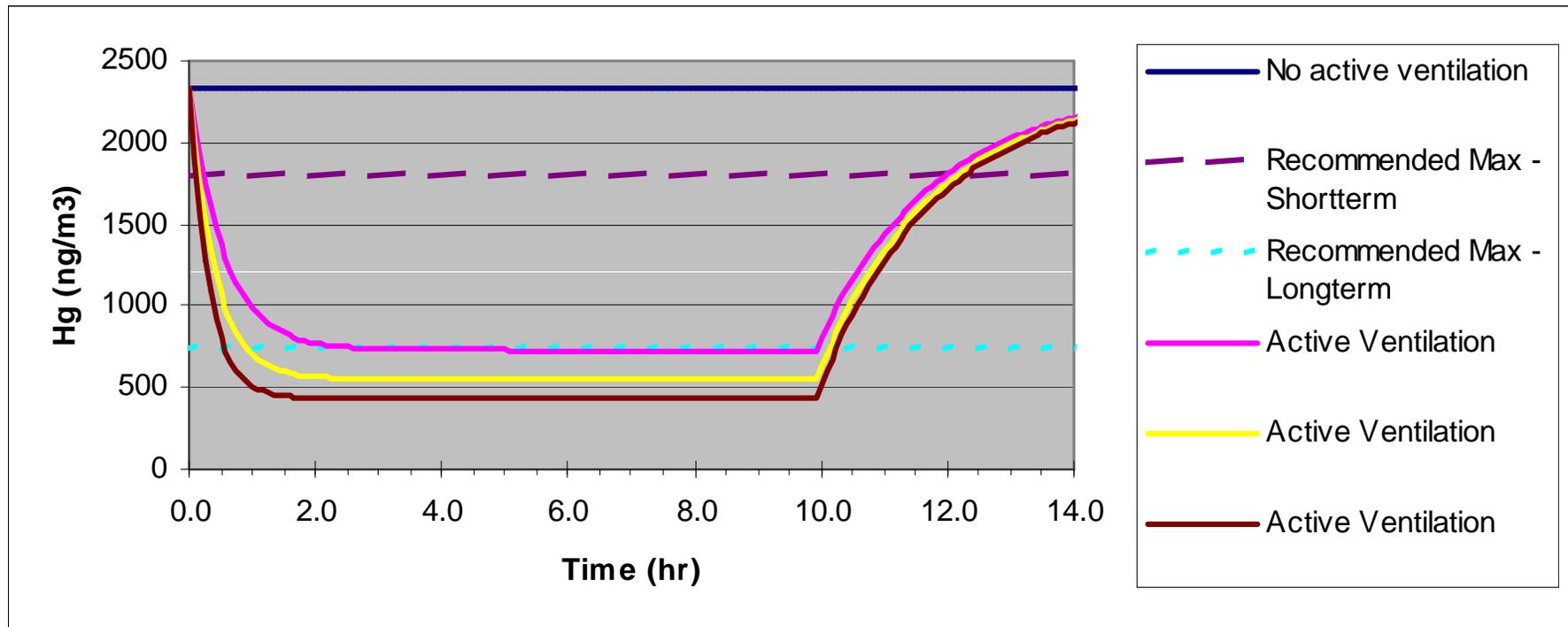
Leaving a floor in place – The importance of active ventilation

- Merely opening windows and doors, without an active system pulling in outside air, may not appear to provide sufficient ventilation to reduce the Hg vapor to safe levels. Gyms should be actively ventilated with fresh air, beginning at least two hours before the gym is occupied and continuing throughout the period of use.



Photo from Google images

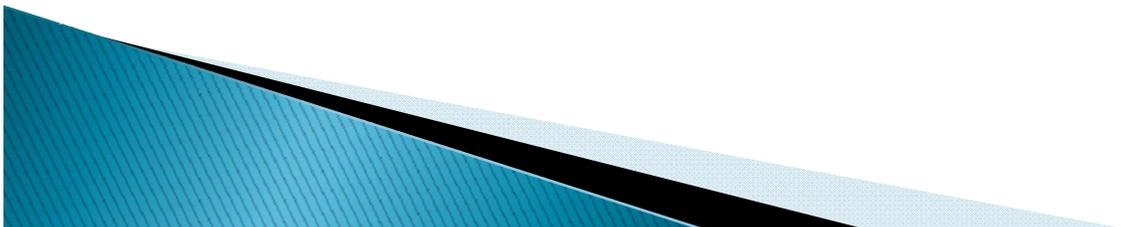
Impact of ventilation on Hg vapor concentration



- ❖ Hg vapor concentrations in a gym over a 14-hour period.
- ❖ After the ventilation is turned on, the concentration decreases relatively rapidly over a 1-2 hour period below health-based levels.
- ❖ When the ventilation is turned off, the concentration slowly increases.

Ventilation: Maintenance and Long-term Engineering Controls

- Concentrations of Hg above 800 ng/m^3 may be managed by active ventilation of the room. It may be necessary to work with an environmental consultant or the facility's HVAC engineers to determine how the ventilation system can be adjusted so that it operates to ensure average exposures are not higher than 800 ng/m^3 .
- If changes are made to the heating, air conditioning or the school ventilation system, or if there are changes to the gym that may affect Hg emissions or ventilation, Hg vapor concentrations in the gym should be measured again.



Hg Flooring Ventilation Calculator

The Minnesota Dept. of Health created a Hg Flooring Ventilation calculator, where you put in the dimensions of the room (and other parameters) and the calculator estimates the mercury vapor concentration or the necessary ventilation rate for a desired mercury concentration.

Minnesota Department of Health
Protecting, maintaining and improving the health of all Minnesotans

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Mercury

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Mercury Flooring Ventilation Calculator for Mercury Vapor Reduction

The calculator below will provide a rough estimate of A) the mercury vapor concentration in a gym under different ventilation and temperature conditions; B) the ventilation needed to attain a target mercury concentration in a school gym with a mercury-containing polymer floor. Enter gym and testing information into all yellow boxes, and the green boxes will show the estimated results. Please click on the "refresh calculations" button at the bottom if the input values are changed after the initial values have been entered. **Note: All the yellow boxes must have values before an estimate will be calculated.**

Outputs of this calculator are estimates from the best available model. However, results are only estimates. Mercury vapor testing needs to be conducted to determine the actual mercury vapor concentrations under any set of conditions in a gym with a mercury-containing floor. MDH makes no guarantee that the estimates produced by this calculator are suitable for any particular building.

MDH is interested in hearing about your experience using this calculator. Did the results of this calculator accurately predict mercury vapor testing results? Please provide us with feedback at: hazhealth@state.mn.us

Site Specific Gym Data

Gym Dimensions

Length (ft) Width (ft) Height (ft)

Test 1

Mercury vapor concentration (nm/m3)

Floor temperature (F)

Test 2

Change in ventilation (CFM)

Mercury vapor concentration (nm/m3)

Floor temperature (F)

Turnovers per hour

Solutions

Estimated Mercury Vapor Concentration

Anticipated Ventilation (CFM)

Floor temperature (F)

Modeled Mercury Vapor Concentration

Estimated Ventilation

Target Mercury vapor concentration (ng/m3)

Floor temperature (F)

Required change in ventilation

Change from Test #1

Change from Test #2

For more information about this page, please contact us at health_hazard@state.mn.us call 651-201-4897, or toll-free 1-800-657-3908 and press "4" to leave a message.

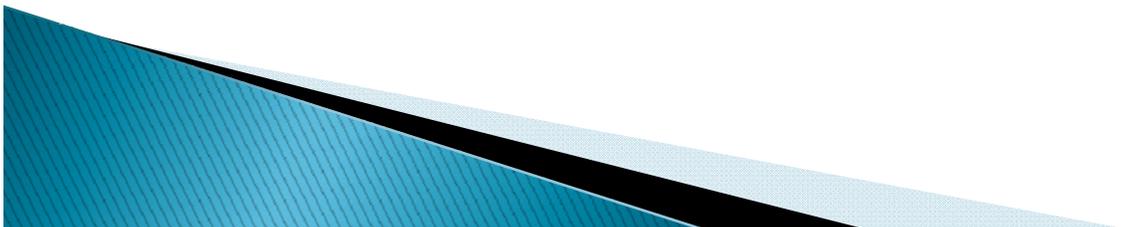
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www.health.state.mn.us/divs/eh/hazardous/topics/mercury/hgvaporcalc.html

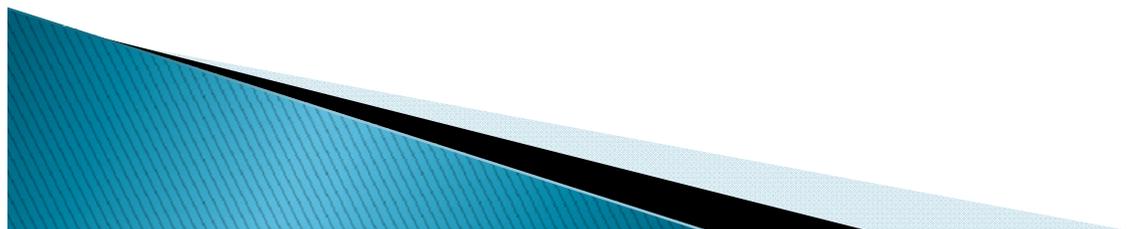
Sealing/Covering/ Encapsulation

- While applying sealant to the entire floor, sealing floor seams, and/or other encapsulation methods could potentially reduce the levels of Hg vapors, the effectiveness of these methods depends on many factors, including how completely the floor is sealed to eliminate Hg off-gassing and/or if the seal becomes compromised.
- While applying sealant to the floor may reduce the levels of Hg vapors, consider that you will be introducing chemical sealants to the indoor air environment.



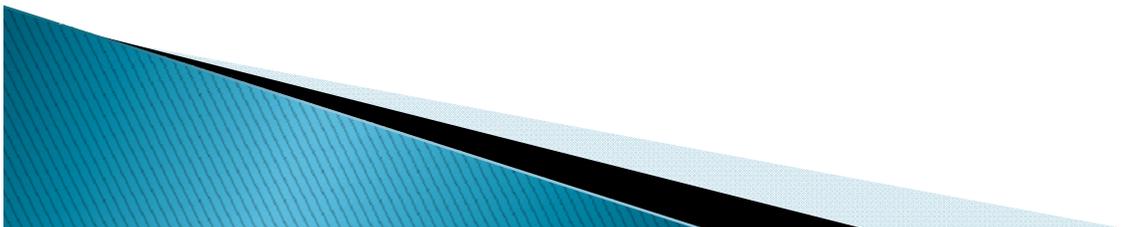
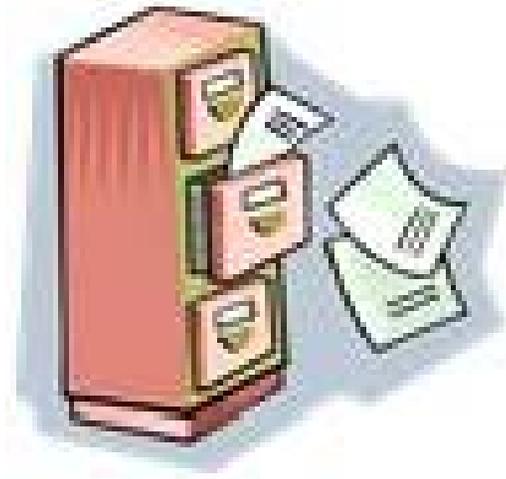
Placing a new floor on top of the old one:

- While placing a new floor on top of the old one could potentially reduce the levels of Hg vapors, the effectiveness depends on many factors, including how completely the old floor is sealed and/or if that seal becomes compromised (punctured, torn, cracked, etc).
- If a Hg-containing floor is covered by a new floor, follow-up and continued periodic air sampling should be done to confirm Hg vapor levels remain below 800 ng/m³.
- You must also consider that your new flooring could become contaminated from the old one, which would require special disposal when it is eventually removed.



Keeping Records:

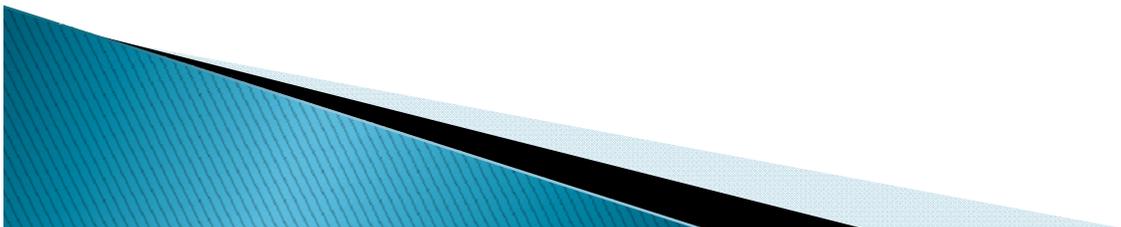
- Whether a Hg-containing floor is left in place, sealed and/or covered, or if the removal of the Hg-containing floor will not occur for a number of years, it is important maintain facility records so that when the floor is eventually removed, it is properly disposed according to state or federal EPA regulations.



Disposal:

- The regulations for disposal of Hg-containing floors are not universal and can vary from state to state.
- To determine how the flooring will be classified for landfill disposal, the flooring should be analyzed utilizing the toxic characteristics leaching procedure (TCLP) test. This test is designed to identify materials that should be treated as hazardous waste.

Westerville Schools collected 10 samples of the 3M Tartan Brand flooring from 9 schools for analysis. 5 of the 9 schools' samples exceeded the TCLP standard for classification as hazardous material (Gandee & Associates, 2002).



Disposal:

Low Mercury Waste - High Mercury Waste:

Low Mercury Waste: Low mercury wastes are those hazardous wastes containing less than 260 mg/kg of total mercury. Current regulations require that these wastes be treated to a certain numerical level, i.e., 0.20 mg/L, measured using the TCLP for mercury residues from retorting, and 0.025 mg/L TCLP for all other low mercury wastes.

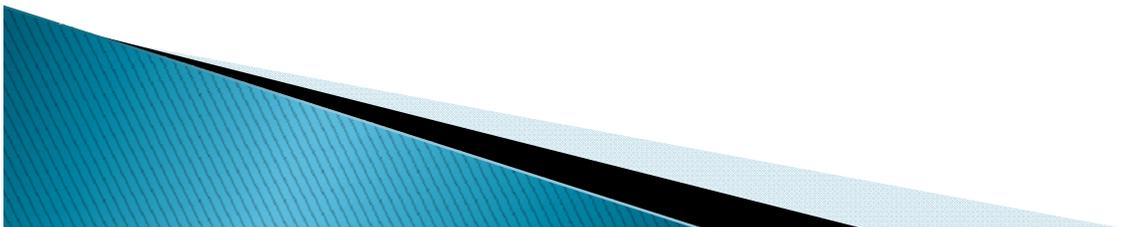
High Mercury Waste: High mercury wastes are those that are characteristically hazardous and that contain greater than 260 mg/kg total mercury. Because of this high concentration of mercury, they are generally required to undergo roasting or retorting defined, in part, as: "Retorting or roasting in a thermal processing unit capable of volatilizing mercury and subsequently condensing the volatilized mercury for recovery." The residuals from the roasting or retorting process are then subject to a numerical treatment standard (if the residues meet the definition of "low mercury subcategory").

In Ohio, consult the Ohio EPA for proper landfill disposal issues.



Uncertainty:

- There is uncertainty about the number of these floors that currently exist, whether they are still being installed, and what institutions have them.
- There is uncertainty about the differences in Hg content between pre-formed polyurethane flooring versus flooring poured-in-place.
- Uncertainty exists about what specific factors distinguish flooring surfaces with higher emissions from those that have minimal releases.
- Uncertainty exists about what factors influence off-gassing (e.g. age of flooring, manufacturer, physical condition of surface, maintenance procedures) and how best to manage the floors to minimize off-gassing.



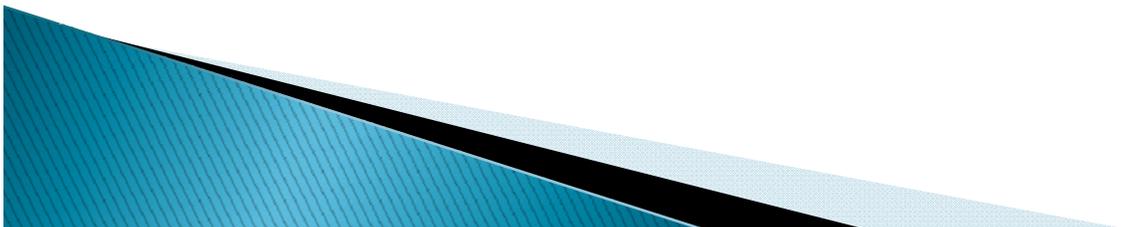
Uncertainty

- Uncertainty exists about whether off-gassing Hg be absorbed by gym equipment.
- Uncertainty exists about whether off-gassing Hg can bind to dust/particulates on the floors and if the dust is a mechanism of dispersion to other areas of the school.
- Uncertainty exists about the bioavailability of Hg from polyurethane floorings in the non-vapor form.
- There is a high degree of uncertainty in Hg vapor exposure models. However, these models do provide a technical framework for planning investigations and collecting data.



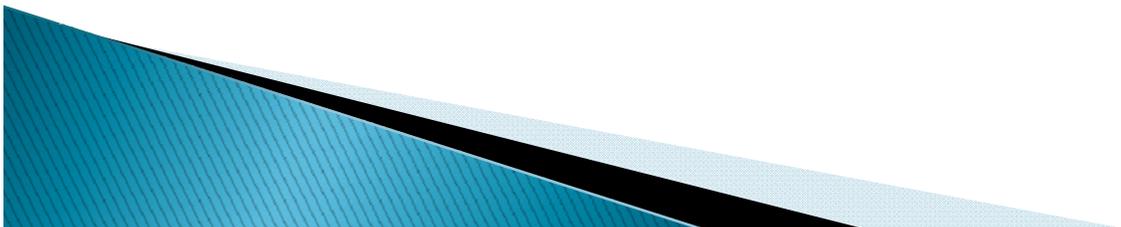
Uncertainty:

- There is uncertainty regarding if the application of new floor overlays to reduce emissions from polyurethane flooring.
- Uncertainty exists about whether Hg off-gasses and is absorbed by a concrete sub-floor.
- Uncertainty exists about how best to remove and dispose of these floors.
- Mercuric salts are reported to have been used as catalysts in the production of other polyurethane products including athletic equipment, mats and medical training aids. These products have not been studied.



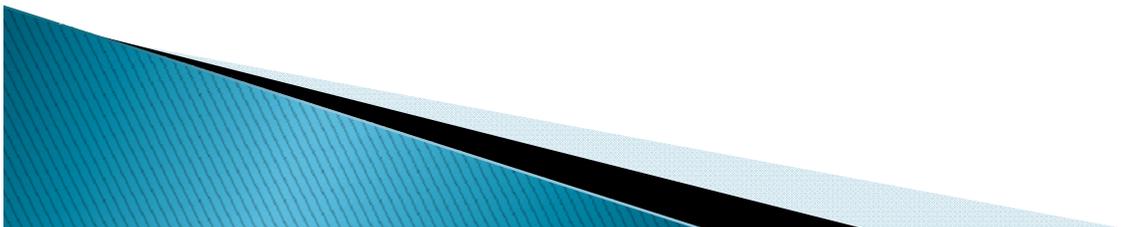
What's next?

- The Mercury in Flooring Workgroup is in-process of developing a “best practices” guidance document to help guide efforts for future assessments of mercury-containing polymer floors.
- Creation of a standardized data-collection tool.
- Develop methodology for the analyses of the existing data, including appropriate modeling applications and schematic development.
- Develop guidance for assessment, data interpretation, in-place management, floor removal, and occupant and worker protection.
- Because many of these floors are in schools, guidance for messaging and communication to minimize uncertainty and concern will also be included.



What's next

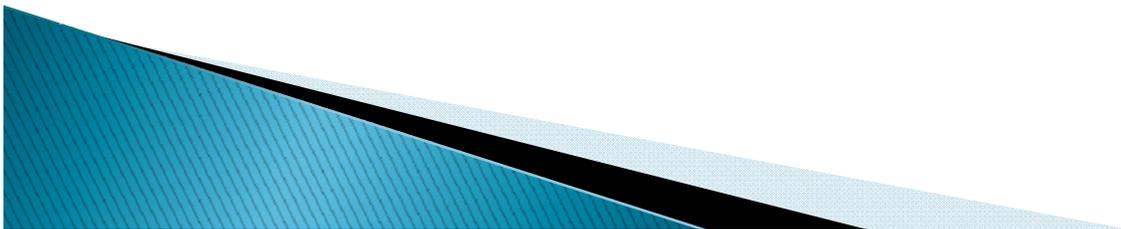
- Work with ATSDR, state and local-federal EPA partners to determine the available disposal scenarios for any removed flooring.
- **Development of Communications Strategy:** The end product of this project is the development of a strategy to communicate this guidance to school officials, facility managers, parents, and the general public.
 - Partnerships in the development and implementation of this public communications strategy should include the EPA Tools for Schools program, CDC Healthy Schools program, national educator's organizations, flooring manufacturers etc.



References:

- Connecticut Department of Public Health
- Illinois Department of Public Health
- Michigan Department of Community Health
- Minnesota Department of Health

Many thanks to our partners working in the other states who are addressing the Hg in flooring issue. Information contained in this presentation was gathered from their/our investigation/observation and much of it was found in our draft Hg in Flooring guidance document.





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