GUIDANCE DOCUMENT
Mercury Related to Gymnasium Flooring in Schools
2019 NJSBGA Annual Conference

Information provided is based on Environmental Protection Agency (EPA), Occupational Safety and Health Administration (OSHA), and Agency for Toxic Substances and Disease Registry (ATSDR) guidelines.

BACKGROUND

Mercury is a metal that exists in liquid and vapor form. It is commonly used in many consumer products and is typically encountered in homes, schools, hospitals, offices and industrial workplaces. In the 1960s, many manufacturers began to include mercury in their rubberized gym floor products to help keep the rubber flexible over time. According to the U.S. Centers for Disease Control’s Agency for Toxic Substances Disease Registry (ATSDR), “In the 1960s, a number of companies began manufacturing and installing a thin layer of synthetic, polyurethane flooring on top of concrete sub-floors, to provide a resilient and rubberlike surface.” According to the ATSDR, mercury-containing polyurethane floors were widely installed in school gymnasiums across the U.S., until being discontinued in the mid-1980s. Many of these floors remain in place today, and recent reports have demonstrated that some emit notable amounts of elemental mercury vapor, which has raised questions about inhalation health risks, particularly for children in schools.

EXISTING GUIDELINES AND STANDARDS

New Jersey currently has no specific recommended exposure limits for members of the general public or children in schools for exposure to mercury. However, various federal and industry groups have published recommended exposure limits for mercury vapors:

- OSHA: 100 micrograms per cubic meter (µg/m³)
- NIOSH: 50 µg/m³
- ACGIH: 25 µg/m³
- ATSDR: 3.0 µg/m³
- NJDOH: 0.8 µg/m³
- MDH: 0.750 µg/m³
- USEPA: 0.3 µg/m³
- California REL: 0.060 µg/m³

In September 2017, the New Jersey Education Association (NJEA), the New Jersey Work Environment Council (WEC) and the Healthy Schools Now Coalition (HSN) issued a report (2nd edition) titled, Health and Safety Guide: Mercury Hazard in Schools from Rubber-Like Polyurethane Floors. In this report, these groups recommend if air samples are above 0.060 µg/m³ the removal of the floors would be necessary.

However, a report issued by the Rutgers Environmental and Occupational Health Sciences Institute in March of 2017 summarizes that the California REL is not appropriate for determining day-to-day protectiveness of teachers and children. The report concludes that a time-weighted average air mercury level of 0.3 µg/m³ or below is adequate and that no adverse health effects are detected at this level.
RECOMMENDED STEPS IF YOU HAVE FLOORS SUSPECTED OF CONTAINING MERCURY

STEP 1 – DEVELOP SAMPLING PLAN
STEP 2 – BULK SAMPLING OF RUBBERIZED FLOORING
STEP 3 – CONDUCT MERCURY AIR SAMPLING
STEP 4 – PREPARE TECHNICAL REPORT

STEP 1 – Develop Sampling Plan

Prior to conducting sampling, a sampling plan should be made that should represent sampling procedures, locations, sampling media, laboratory analysis, etc. The sampling plan should be developed to identify occupied vs unoccupied or worst-case scenarios such as HVAC systems turned off, etc. The sampling plan should be developed and signed off by a Certified Industrial Hygienist. It is important to note that temperature and Relative Humidity directly affects the volatility of mercury and testing in winter months should likely result in lower concentrations than in summer months.

STEP 2 – Bulk Sampling of Rubberized Flooring


An industrial hygienist should collect representative full-thickness pieces of the floor for analysis at an accredited lab. Approximately a two square inch floor sample should be collected and should be analyzed using EPA 7471A to determine the amount of mercury present. If the EPA 7471A test shows that mercury in a floor is less than 1 ppm, it can be assumed that the floor was not manufactured using a mercury containing catalyst. If mercury in floor levels are greater than 1 ppm, proper floor maintenance, adequate ventilation and cooling and initial worst-case air sampling should be implemented.

If mercury is found in the flooring greater than 1 ppm, it is recommended that a toxicity characteristic leaching procedure (TCLP) Method 1311 be performed on the flooring as well. The industrial hygienist should collect an eight square inch floor sample to determine whether the floor must be disposed of in a hazardous waste landfill or can be disposed of as non-hazardous waste. Floors with leachate that exceeds the EPA maximum concentration of 0.2 ppm (mg/L) of mercury must be disposed of as hazardous waste.

STEP 3 – Conduct Mercury Air Sampling

The New Jersey Education Association, New Jersey Work Environment Council and Healthy Schools Now Coalition report, Health and Safety Guide: Mercury Hazard in Schools from Rubber-Like Polyurethane Floors recommends that if floor bulk sampling results are above 1 ppm air sampling should be performed.

A representative number of full-day (8-hour), samples should be collected in the breathing zone (3 feet for up to eighth grade; 5 feet for higher grades) air samples in each gymnasium for analysis by an accredited laboratory using NIOSH Method 6009. Sampling should be conducted using active sampling pumps. A background sample should be collected outdoors at each location. Samples should be collected for approximately 480 minutes at a calibrated rate of 0.15 liters per minute for an approximately total value of 72 liters. It is anticipated that one sample per gymnasium would be the minimum.
Prior to the collection of air representative air samples, a real-time Mercury Vapor Analyzer such as a Jerome J405 or J505 should be used to record instantaneous mercury concentrations. Approximately 25-30 readings should be collected at breathing zone height in a grid pattern throughout the gymnasium. The location with the highest observed reading, if any, should be selected for the air sampling test by NIOSH Method 6009. Air samples should be set up in the center of the room initially and moved as needed to adjust for the documented readings.

If elevated concentrations of mercury are identified, additional samples may be recommended in adjacent areas such as locker rooms, coach and PE offices, bathrooms, and hallways.

**STEP 4 – Prepare Technical Report**

Upon completion of assessment and sampling activities, a technical report should be prepared summarizing observations made during the investigation and recommendations for remediation or additional sampling. The report should include, but not be limited to; site plan, air sampling certificates of analysis, calibration documentation, photographs, and other information gathered during the project.

**FOR MORE INFORMATION CONTACT:**

Pennoni Associates, Inc.
856-547-0505
Haddon Heights, NJ // Camden, NJ // Vineland, NJ

Alan Lloyd, CIH, CSP, ENV SP
Certified Industrial Hygienist #9099CP
Certified Safety Professional #21632
Environmental Sustainability Partner #19471
alloyd@pennoni.com

Nancy Wilson, REHS, CMC
Senior Industrial Hygienist
Registered Environmental Health Specialist #B101753
Certified Microbial Consultant #1005087
nwilson@pennoni.com