



THE OHIO STATE UNIVERSITY

Lead Safety Program

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1.0 Introduction

- 1.1 It is the policy of The Ohio State University (OSU) to take precautions to eliminate potential hazards in the workplace. The purpose of this Lead Safety Program is to provide the hazards associated with lead and lead-containing materials; outline the steps to take to ensure employees who work with, or around lead are not exposed to hazardous levels of lead; and to provide procedures for common lead related work duties to minimize exposure in accordance with the OSHA Lead Standard (29 CFR 1910.1025).

The primary use of lead in the U.S. is for automobile lead-acid storage batteries, a type of rechargeable electric battery which uses an almost pure lead alloy. Lead-formed alloys are typically found in pipes, cable covering, building material, solder, radiation shielding, and collapsible tubes. Lead is also used in ceramic glazes and as a stabilizer in plastics. Lead was used extensively as a corrosion inhibitor and pigment in paints but concerns over its toxicity led the ban of lead in paint for residential and public buildings.

Lead enters the body primarily through inhalation and ingestion. Today, adults are mainly exposed to lead by breathing in lead-containing dust and fumes at work, or from hobbies that involve lead. Lead passes through the lungs into the blood where it can harm many of the body's organ systems. While inorganic lead does not readily enter the body through the skin, it can enter the body through accidental ingestion (eating, drinking, and smoking) via contaminated hands, clothing, and surfaces. Workers may develop a variety of ailments, such as neurological effects, gastrointestinal effects, anemia, and kidney disease.

2.0 Responsibilities

2.1 Environmental Health & Safety

2.1.2 Environmental Health & Safety (EHS) provides program oversight and consultation to OSU work groups regarding potential risks, exposure prevention and training relating to lead exposures.

2.1.3 Conduct building assessments for lead containing materials and perform employee lead hazard assessments/monitoring.

2.2 OSU Department (Facilities Operations & Development (FOD); Athletics; OSU Medical Center (OSUMC); Student Life; et. al.)

2.2.1 Each department with responsibilities for maintaining buildings or working in buildings with potential exposure to lead should:

2.2.1.1 Ensure the applicable components of the Lead Safety Program are available to all affected employees.

2.2.1.2 Provide applicable training to employees expected to work in, or with, building materials where there is a potential risk for lead exposure.

2.3 Supervisors

2.3.1 OSU employees who supervise personnel with responsibilities to work in areas where there is a risk of exposure to lead, must ensure employees are properly trained on the applicable contents of the Lead Safety Program and are provided appropriate personal protective equipment (PPE) when conducting such work.

2.4 Authorized Person

- 2.4.1 Employees working in areas where there is an identified risk of lead exposure must be properly trained on all applicable elements of the OSU Lead Safety Program; and be provided and utilize the appropriate PPE for the task being performed.

3.0 Definitions

- 3.1 The following definitions are provided to allow for a better understanding of the OSU Lead Safety Program.

Abatement:	Process of eliminating or reducing lead based paint hazards in building materials or other structures. This may include the removal of lead-based paint and lead-contaminated dust, the containment or encapsulation of lead-based paint, the replacement or demolition of lead-painted surfaces, and the removal or covering of lead-contaminated soil.
Action Level (AL):	Employee exposure, without regard to the use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air ($30\mu\text{g}/\text{m}^3$) calculated as an 8-hour time weighted average (TWA).
Authorized person:	An employee who has received proper training and exposure monitoring to safely work with lead containing materials.
Exposure Assessment:	The initial determination to find if any employee may be exposed to lead at or above the action level. Until the assessment is completed, employees shall take all precautions necessary to maintain exposures below the PEL.
HEPA:	High Efficiency Particulate Air. A filtering system capable of trapping and retaining at least 99.97% of all particles of 0.3 micron in diameter and larger.
Lead-based Paint:	Any paint, plaster, or other surface encapsulation materials containing more than 0.50% lead by weight calculated as lead metal in the dried solid, or more than $0.7\text{ mg}/\text{cm}^2$.
Lead-contaminated Dust:	Dust with a lead content equal to or greater than <ul style="list-style-type: none"> (a) $200\text{ mg}/\text{ft}^2$ in dust collected from a floor (b) $500\text{ }\mu\text{g}/\text{ft}^2$ in dust collected from a window sill (c) $800\text{ }\mu\text{g}/\text{ft}^2$ in dust collected from a window well
Lead-containing material:	Any material that has been confirmed through laboratory analysis, or other suitable means, to contain any detectable quantity of lead.
Permissible Exposure Limit:	(PEL) the OSHA limit for lead exposure. It is set at $50\mu\text{g}/\text{m}^3$, averaged over an 8-hour workday, as a TWA.
XRF:	X-Ray Fluorescence analyzer. A device that measures the lead content in paint and other materials with results typically expressed as mg of lead per square cm. (mg/cm^2).

4.0 Material Assessment

- 4.1 Any time there is a potential for lead containing materials to be involved in a renovation or demolition project, sources of lead must be assessed prior to disturbing. OSU Environmental Health & Safety or an authorized contractor can perform building material assessments to determine lead content in building materials.
- 4.2 Building materials can be assessed through sampling and laboratory analysis, or through the use of the OSU EHS X-Ray Fluorescence Analyzer. Results of testing should be made available to EHS and other departments/contractors involved in the project.
- 4.3 If airborne lead is expected to be generated during the project, OSU EHS shall be contacted to conduct exposure monitoring and ensure all safety precautions are followed to minimize exposure to airborne lead.

5.0 Exposure Monitoring

5.1 Initial Exposure Monitoring:

- 5.1.1 OSU employees expected to come in contact/work with lead containing materials where there is a risk of exposure through inhalation of lead dust should develop an exposure monitoring program.
- 5.1.2 Initial exposure monitoring should be conducted by OSU EHS to quantitatively evaluate the exposure to airborne lead.

5.2 Periodic Exposure Monitoring:

- 5.2.1 Whenever lead exposure levels are greater than, or equal to the Action Level ($30\mu\text{g}/\text{m}^3$), periodic exposure monitoring is required. It is the responsibility of the affected department to work with EHS and develop a periodic exposure monitoring schedule.

- 5.2.2 The frequency of exposure monitoring should be as follows:

<u>Measured Concentration:</u>	<u>Monitoring Frequency:</u>
Action level – $30\mu\text{g}/\text{m}^3$	6 months
Permissible Exposure Level – $50\mu\text{g}/\text{m}^3$	3 months

- 5.2.3 Exposure monitoring is not required by every employee at risk of airborne lead exposure. Enough sampling must be done to enable the employee's exposure level to be reasonably represented.

5.3 Termination of Exposure Monitoring:

- 5.3.1 Periodic exposure monitoring may be discontinued if results from two consecutive sampling periods taken at least 7 days apart show that employee exposure is below the action level.

5.4 Sampling methods

- 5.4.1 Personal exposure monitoring will be conducted using an approved NIOSH method. Monitoring records shall include the following.
- 5.4.1.1 The date, number, duration, location and results of each of the samples taken, including a description of the sampling procedure used to determine representative employee exposure where applicable.

5.4.1.2 A description of the sampling and analytical methods used.

5.4.1.3 The type of respiratory protective devices work, if any.

5.4.1.4 Name and job classification of the employee monitored.

5.4.1.5 Any environmental variables that could affect the measurement of the employee exposure.

5.5 Reporting of exposure monitoring results

5.5.1 EHS will notify the department/supervisor of exposure monitoring results within as soon as the final laboratory analysis is completed. The department/supervisor must provide this information to the affected employee(s) within 5 working days.

5.5.2 If levels are measured during the exposure monitoring exceeding the PEL, the EHS report will include steps and controls to reduce exposure to below the PEL.

5.5.3 Follow up exposure monitoring may be necessary if engineering or administrative controls are put in place to reduce hazardous exposures.

6.0 Exposure Control

6.1 Pre-project planning

6.1.1 Prior to projects taking place affecting OSU buildings/facilities, EHS reviews planning documents to account for potential exposures to hazardous materials, including lead.

6.1.2 EHS can conduct building material assessments to make determinations if there are any lead containing materials, which may be impacted by the project.

6.1.3 During the planning process, any lead containing materials are addressed and methods for exposure control are provided prior to work beginning.

6.1.4 If lead containing materials are to be disturbed during the project, the appropriate exposure control methods will be recommended by EHS.

6.2 Administrative/Engineering Controls

6.2.1 Where lead exposures at or above the Action Level have been documented, or are expected, the appropriate engineering or administrative controls will be implemented, where feasible. Follow-up exposure monitoring may be necessary when administrative or engineering exposure controls are utilized.

6.2.2 Laboratory/research applications where airborne lead is a potential risk, should be conducted in a chemical fume hood to mitigate exposure risks.

6.3 Personal Protective Equipment (PPE)

6.3.1 In addition to administrative/engineering controls, employees may be required to wear specific PPE during the handling of lead containing materials and/or when airborne lead is present. The level of protection will depend on the task being conducted and the tools being utilized to complete the task.

6.4 The following table can be used as a guide for selecting the appropriate engineering/administrative controls and/or PPE for lead related activities. Where lead exposures are unknown, or cannot be adequately controlled by engineering or administrative controls, respirators must be utilized. Employees required to wear respirators must be enrolled in the OSU Respiratory Protection Program. Enrollment in this program includes medical clearance to wear a respirator, training and quantitative fit testing through OSU EHS.

Process	Material	PPE
Handling	Lead bricks and shielding	<u>Level 1</u> - Gloves - Coveralls/lab coat - Hand washing facility on or near the worksite
- Demolition of building materials - Scraping/sanding of lead containing materials - Cleaning operations with dust removal systems	Lead coatings	<u>Level 2</u> - Gloves - Coveralls - Hand washing facility on or near the worksite - Dust controls (HEPA Vacuum, plastic containment, barrier tape, water mist) or - Half-face tight-fitting respirator (negative pressure)
- Spray Painting	Lead Paint	
- Applying	Lead containing mortar	
- Power tool cleaning without dust collection - Clean-up activities where dry abrasives are used - Movement and removal of abrasive blasting enclosures	Existing lead coatings	<u>Level 3</u> - Gloves - Coveralls - Hand washing facility on or near the worksite - Shower/decon facility on or near the worksite - Dust controls (HEPA Vacuum, plastic containment, barrier tape, water mist) or - Full-face tight-fitting respirator
- Working with molten lead	Elemental lead	
- Abrasive blasting - Welding - Cutting - Torch burning	Existing lead coatings	<u>Level 4</u> - Gloves - Coveralls - Hand washing facility on or near the worksite - Shower/decon facility on or near the worksite - Dust controls (HEPA Vacuum, plastic containment, barrier tape, water mist) or - Full-face supplied air respirator

6.4.1 If work clothing is provided, it must be provided in a clean and dry condition at least weekly, and daily if your airborne exposure to lead is greater than 200 ug/m(3). Appropriate protective work clothing and equipment can include coveralls or similar full-body work clothing, gloves, hats, shoes or disposable shoe coverlets, and face shields or vented goggles. Your employer is required to

provide all such equipment at no cost to the employee. The employer is responsible for providing repairs and replacement as necessary, and also is responsible for the cleaning, laundering or disposal of protective clothing and equipment. Contaminated work clothing or equipment must be removed in change rooms and not worn home or you will extend your exposure and expose your family since lead from your clothing can accumulate in your house, car, etc. Contaminated clothing which is to be cleaned, laundered or disposed of must be placed in closed containers in the change room. At no time may lead be removed from protective clothing or equipment by any means which disperses lead into the air.

7.0 Housekeeping & Hygiene Facilities

- 7.1 In areas where lead containing dust may be present, all surfaces must be maintained free from accumulations of lead dust to minimize potential lead exposure. Dust and other lead containing debris must be removed from the work area as soon as possible.
- 7.2 Acceptable method of lead dust removal includes the use of HEPA vacuum or wet methods such as wet mopping.
- 7.3 Unacceptable methods of lead dust removal include dry sweeping, vacuum cleaners, shop vacuums, and compressed air.
- 7.4 Follow all recommended procedures and utilize recommended PPE during lead containing debris cleanup activities.
- 7.5 Where lead containing materials are used, impacted, or being removed; and the employee is exposed to airborne lead levels at or above the PEL, the following requirements must be met.
 - 7.5.1 Change rooms, showers and filtered air lunchrooms must be constructed or in place.
 - 7.5.2 Employees do not eat or drink, use tobacco products or apply cosmetics except in designated areas.
 - 7.5.3 After showering, no clothing or equipment worn during the shift may be worn home, including shoes and undergarments.
 - 7.5.4 Lunchrooms may not be entered while wearing PPE contaminated with lead.
 - 7.5.5 Employees must wash both their hands and faces upon removal of PPE and prior to eating, drinking, or applying cosmetics.
 - 7.5.6 Used PPE must be bagged and properly disposed.
- 7.6 Where lead containing materials are used, impacted, or being removed; and the employee is not exposed to lead levels at the PEL, the following requirements must be met.
 - 7.6.1 PPE should be removed upon work completion and disposed of after each use.
 - 7.6.2 Employees must wash hands and are recommended to shower prior to leaving work.
 - 7.6.3 Ensure contaminated PPE, including footwear is not worn outside the work areas.

8.0 Medical Surveillance

- 8.1 Employees exposed to lead levels above the Action Level ($30 \mu\text{g}/\text{m}^3$) for more than 30 days in any 12 month period, or any employee working with lead who develops signs/symptoms of excessive lead exposure, should be enrolled in the Lead Medical Surveillance Program.

- 8.1.1 All medical surveillance will be performed by OSU Employee Health Services and results must be provided the affected employee and their supervisor within 15 days of the assessment.
- 8.1.2 The medical surveillance program consists of biological monitoring of blood lead levels on a semiannual (every 6 months) basis.
- 8.1.3 If elevated blood lead levels are detected over 40 µg/100g the monitoring frequency must be increased to every 2 months until the blood lead levels fall below 40 µg/100g on two consecutive monitoring sessions.

8.1.3.1 If an employee's blood lead levels are above 40 µg/100g Employee Health Services must notify the employee of the results within 5 days.

8.2 Employees exposed to lead levels above the Action Level at any time during their employment, regardless of PPE use, should have initial medical surveillance conducted to ensure lead exposure did not result in elevated blood lead levels. If so, the Medical Surveillance Program and Medical Removal Programs should be implemented.

8.3 Employee exposure to lead resulting in blood lead levels greater than 50 µg/100g must be removed from job sites where lead exposure hazards exist. Employees may return to the job only after subsequent medical evaluation determines the employee is no longer at increased risk of health impairment.

9.0 Training and Recordkeeping

9.1 Training requirements/recommendations are provided in the following table based on the risk of lead exposure and type of work being conducted with lead containing materials.

Criteria	Training
Working with lead containing materials without disturbing the material matrix (handling lead bricks)	Hazard Communication Lead Awareness
Working near lead containing material in poor condition or where there is a risk of accidentally disturbing lead containing material.	Hazard Communication Lead Awareness
Working with lead containing materials where exposure exceeds the Action Level or if there is a potential for skin/eye irritation from lead containing materials.	Hazard Communication Lead Worker Training (EPA) Respiratory Protection
Performing one, or more, of the following tasks where lead containing material is present regardless of PPE use or exposure monitoring results. <ul style="list-style-type: none"> • Building material demolition • Sanding or scraping • Heat gun applications • Power tool cleaning • Spray painting • Application of lead containing mortar • Application of lead containing burning • Rivet busting • Clean-up activities of lead containing dusts • Movement of abrasive blasting facilities • Abrasive blasting 	Hazard Communication Lead Worker Training (EPA) Respiratory Protection

<ul style="list-style-type: none"> • Welding/cutting/brazing • Machining lead • Working with molten lead 	
Supervisors of employees who may be exposed to lead levels exceeding the Action Level or perform any of the above listed tasks.	Hazard Communication Lead Worker Training (EPA)

- 9.2 Hazard Communication training is required by all OSU employees and should be conducted initially upon hiring. Additional information can be found at www.ehs.osu.edu.
- 9.3 Lead Awareness Training is available in person or at www.ehs.osu.edu. And must be offered to affected employees prior to working with lead and annually thereafter.
- 9.4 Lead Worker Training is an EPA certification, which is recommended as outlined in the above table for employees expected to be exposed to lead levels at or above the Action Level or based on tasks conducted as assigned. OSU EHS can assist with coordinating this training if necessary. Lead worker training is required initially and every 5 years thereafter.
- 9.5 Respiratory protection training, medical clearance, and quantitative fit testing is required under the Respiratory Protection Program. Contact EHS for additional information regarding enrollment in the program.
- 9.6 The supervisor is required to maintain all training, medical surveillance, and exposure monitoring results.

10.0 Guidelines for working with lead

- 10.1 The following provides common tasks which may require the employee to be exposed to lead and the recommended procedures to be in place for the affected employee(s).
- 10.2 Handling lead bricks, pellets or other solid lead materials: The most significant hazard associated with handling solid lead materials is the possibility of accumulating lead dust on skin or clothing, and wearing the clothing home or outside of work where children, pregnant women, or other at risk persons may be exposed.
- 10.2.1 Prior to handling lead materials, workers should assess the work to be completed, and plan processes in a manner to minimize lead exposure.
- 10.2.2 Utilize appropriate PPE when handling lead materials including disposable gloves and lab coats/aprons.
- 10.2.3 Upon completion of the job duties involving handling lead materials, employees must remove all PPE and dispose PPE properly in a sealed container.
- 10.2.4 Employees must wash hands upon removing PPE.
- 10.3 Working with lead containing paint: Additional information regarding the removal of lead-based paint can be found in the EPA Document 740-R-09-002, "Lead Safety for Renovation, Repair and Painting." (http://www2.epa.gov/sites/production/files/2014-05/documents/initial_renovator-student_oct2011_0.pdf).
- 10.3.1 It is recommended that any OSU employee performing work involving the removal of lead containing paint be certified through the above referenced EPA training. The following summarizes the requirements set forth by the EPA, which

should be enforced during work in OSU facilities where lead containing paint is being removed.

- 10.3.2 Work should be performed under the supervision of a certified employee.
 - 10.3.3 Workers must be trained and wear appropriate PPE including respiratory protection and body covering.
 - 10.3.4 Prior to removal of lead containing paint, non-affected areas must be isolated to ensure lead contaminated dust does not enter unwanted spaces. This includes sealing ductwork, windows and doors within the renovation area.
 - 10.3.5 Acceptable methods of lead containing paint removal include:
 - 10.3.5.1 Wet-scraping
 - 10.3.5.2 High speed sanding or grinding only with EPA approved equipment and HEPA filtration of any dust.
 - 10.3.6 Non-approved lead containing paint removal methods include:
 - 10.3.6.1 Open flame burning, torching or heat gun use over 1100°F.
 - 10.3.6.2 Use of high speed sanding, grinding, abrasive blasting or sand blasting, unless using EPA approved equipment and protocols.
 - 10.3.7 Lead waste must be collected at the end of each work shift and contained to prevent release of dust and debris. Waste must be properly disposed.
 - 10.3.8 Upon the completion of the project, the affected area must be thoroughly cleaned to remove all dust, debris and lead containing residue. This includes removal and proper disposal of paint chips, protective sheeting and PPE.
 - 10.3.9 The area should be cleared upon cleaning to ensure no lead containing debris remains. Contact EHS for testing.
- 10.4 Welding, cutting or brazing (Hot Work) of lead containing materials: Metal plumbing, piping and fittings may contain lead. When heated above 1100°F, lead is released as fumes and can be inhaled by the worker. The following precautions should be followed when conducting hot work on lead containing materials.
- 10.4.1 Contact EHS to determine if lead is present in materials to be welded, cut or brazed.
 - 10.4.2 If lead is present, all Hot Work activities must be performed by trained employees.
 - 10.4.3 Employees must also follow all protocols outlined in the OSU Hot Work Program.
 - 10.4.4 Workers must utilize the appropriate PPE including full-face respirators and full-body covering.
 - 10.4.5 Upon completion of the job, all waste must be disposed of properly, disposable PPE must be discarded properly and respirators must be properly cleaned.

10.5 Working with lead – Other: Locations such as art studios or workshops may present lead exposure risks. Risks may include certain oil-based paints, lead wire or tape, lead sheeting, and metal alloys. Often in these areas workers are not sufficiently aware of the lead exposure risks and hazards. Some general precautions are provided.

10.5.1 When handling lead containing materials, hand protection such as nitrile gloves are recommended.

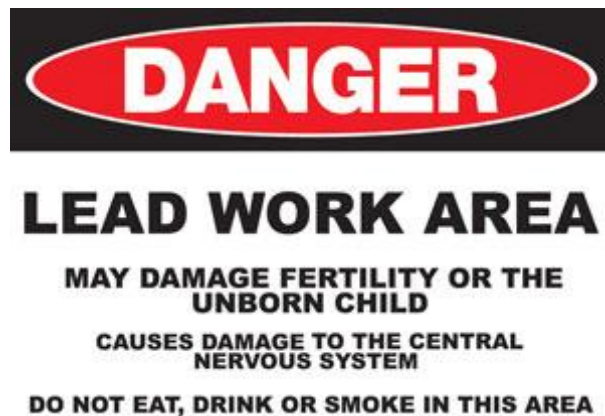
10.5.2 If working with oil-based paints, the use of non-porous gloves is recommended.

10.5.3 If any welding, cutting or brazing is to be done, these operations should be performed under an engineered local exhaust system and employee should be aware of the OSU Hot Work Program.

10.5.4 Frequent and thorough hand washing is recommended.

11.0 Signage

11.1 In areas where exposure to lead may exceed the PEL the following signage must be in place to warn employee of hazards.



11.2 Prior to June 1, 2016 the following sign may be used, after this date, only the above listed sign is approved.

