Lead Awareness Training

Environmental Health and Safety
University of Tennessee Knoxville
What is Lead?

- Lead is a bluish, gray heavy metal
- It is very pliable and malleable
- It is corrosion resistant
- It has a low melting point, so it is easily smelted
- Can form lead compounds
In what products was lead commonly used?

- Gasoline (phase-out began 1980)
- Smelting
- Lead batteries (25-78% of all lead used in U.S.)
- Paints and coatings
- Solder
- Auto manufacturing
- Printing
Lead: Sources of Exposure

- Paints (paint chips)
- Leaded Gasoline
- Drinking water
- Ammunition (lead shot)
- Cheap Jewelry
- Plumbing and solder
- Older pottery
- Lead acid batteries
- Iron and steel production
- Lead contaminated dusts
- Lead smelters (release into air)
- Foods stored in lead crystal
- Folk remedies that contain lead
Where could I find lead on campus?
Could I find lead outside of campus?

• If your home was built before 1978, it may contain lead based paint.
• Hobbies: stained glass, home remodeling or painting, recreational target shooting, melting lead for fishing weights, lead glaze in ceramics.
• Non-occupational exposures: backyard scrap metal recycling, leaded crystal tableware, cookware, folk remedies, pica, mine tailings, beauty products (eye make up, certain hair dyes).
Use of Lead in Paint

- Lead was added to paint, stains and varnishes in the 1920’s-1970’s for three main reasons:
  - As a pigment to make the colors richer
  - To add durability and corrosion resistance
  - As a drying agent
When was Lead Banned in Paint?

- Lead based paint was banned from **residential use** in 1978 by the CPSC (Consumer Product Safety Commission) in the U.S., although it is still present in some industrial paints.
Definition of Lead-Based Paint

- EPA Definition: Lead Based Paint (LBP) is any paint or surface coatings that contains lead equal or greater than 0.5% by weight, or is present in quantities greater than 1 mg/cm² of lead.

- CPSC Definition: Any paint or surface coating that contains ≥ 0.06% or 600 ppm lead.
Where and When is lead-based paint found in buildings?

- **Before 1950**
  - Everywhere – inside and outside (all coatings)
- **Between 1950-1960**
  - Probably outside, may be inside
  - Trims, doors, windows, kitchens, bathrooms, etc.
- **Between 1960-1978**
  - May be outside, less likely inside

***Before 1978 we assume lead!!!***
Where is lead-based paint most likely found?

• Peeling, chipping, chalking, or cracking lead-based paint is a hazard and needs immediate attention.

• Lead-based paint may also be a hazard when found on surfaces that children can chew or that get a lot of wear-and-tear. These areas include:
  ▪ Windows and window sills.
  ▪ Doors and door frames.
  ▪ Stairs, railings, and banisters.
  ▪ Porches and fences.

• Note: Lead-based paint that is in good condition is usually not a hazard.
Where does lead-based paint dust come from?

- Lead dust can form when lead-based paint is dry scraped, dry sanded, or heated. Dust also forms when painted surfaces bump or rub together. Lead chips and dust can get on surfaces and objects that people touch. Settled lead dust can re-enter the air when people vacuum, sweep or walk through it.

- Lead in soil can be a hazard when children play in bare soil or when people bring soil into the house on their shoes.
What is a Lead-Based Paint (LBP) hazard?

- Lead dust from LBP which is damaged
- Lead dust from LBP on any friction surface
- Lead dust from LBP on an impact surface
- Lead contaminated dust anywhere that is above acceptable EPA levels (ask EHS for guidance on this)
- Dry sanding “any detectible” lead will probably result in excess lead in dust
Examples of Buildings on Campus with Lead-Based Paint

- White Avenue Daycare
- Pediatric Language Clinic Montcastle
- EHS: 916 22nd Street and Terrace Avenue
- Alumni Memorial
- Neyland Stadium
- Earth and Planetary Sciences
- Henson Hall
- Strong Hall
What are the Health Risks of Lead-Based Paint?

- Lead attaches to the red blood cells in the body.
- Lead exposure causes high blood pressure, may increase risk of heart attack, stroke and kidney disease.
- The nervous system is most affected by lead.
- Lead damages the brain and can kill brain cells.
Who is most at risk to lead exposure?

- Lead is especially hazardous to two main groups of people:
  - Children under age 6
  - Pregnant women
- Lead is also hazardous to workers and other adults.
What are the symptoms of LBP exposure?

- Specific symptoms that people with lead exposure sometimes complain of include:
  - Headache
  - Irritability
  - Fatigue
  - Loss of appetite
  - Joint/and or muscle pain

- Symptoms can be non-specific and are described as flu-like
Ways in which lead enters the body

- **Inhalation** - Breathing lead fumes or dust. This is the most common route of entry in the workplace.

- **Ingestion** - Swallowing lead dust via food, cigarettes etc.
Acceptable Methods of Paint Removal

- Examples of Acceptable Methods of Lead-Based Paint Removal:
  - Wet scraping or sanding.
  - Chemical stripping on- or off-site if strips do not contain Methylene Chloride
  - Replace painting components
  - Use heat guns below 1100° F.
  - HEPA vacuuming
Disturbing Lead-Based Paint Surface

- Any projects that involve disturbing a lead-based paint surface at the White Avenue Daycare can only be performed by an EPA Certified Renovator under the RRP (Renovation, Repair and Painting Rule).
- If you are not an EPA Certified Renovator, please ask your supervisor for guidance and do not proceed with work.
- If you are unsure whether a painted surface you will be disturbing has lead-based paint anywhere on campus, please contact Environmental Health and Safety so we can test the area to be disturbed before work should proceed.
OSHA Regulations

- OSHA has a Lead in Construction Standard: 29 CFR 1926.62, which outlines worker protection requirements.
- If lead is detectable, the standard is enforceable
  - Action Level: 30 µg/m³ over 8 hour period
  - Permissible Exposure Level (PEL): 50 µg/m³ over 8 hour period
OSHA Training Requirements

- Training is required if you are exposed to lead at or above the action level or if you suffer from skin or eye irritation from lead.

- Includes:
  - Specific job hazards from lead.
  - Protective measures, engineering controls & work practices to be taken.
  - Dangers of lead to your body.
  - Accessibility to written program/regulations.
  - Description of the medical surveillance program & medical removal program.
Occupational Exposures to Lead

- Construction activities; Demolition or salvage of structures containing lead
- Removal or encapsulation of lead materials (scraping, heating, sanding, grinding, blasting)
- Alteration, repair or renovation of structures containing lead
- Transportation, disposal, cleanup of lead materials
- Maintenance operations associated with construction activities
- Firing ranges
Operations Generating Dust and Fumes

- Abrasive blasting
- Flame torch cutting, welding, heat guns
- Sanding, scraping, grinding
- Maintaining lead equipment
How is lead exposure measured?

- **PEL:** You are allowed to be exposed up to the Permissible Exposure Limit established by OSHA of 50 μg/m³ based on an 8-hour time weighted average.

- **Action Level:** OSHA established an Action Level of 30 μg/m³ (micrograms per cubic meter of air) based on an 8 hour time weighted average.
Action Level

Action Level requires employers to:

- Reduce lead exposure
- Provide medical exam before starting job
- Provide blood tests
- Monitor the air
- Inform employees of lead hazards
- Provide access to medical records
Permissible Exposure Limit

Permissible Exposure Limit (PEL) requires employers

- Post signs in areas where lead exposure is high
- Restrict areas where lead work is being performed
- Provide Respirators
- Write and implement plans to reduce exposure
- Provide written compliance program for lead
- Provide showers, changing rooms, and lunchrooms
Air Monitoring

- OSHA requires air monitoring of employee exposure if there are any indications of dangerous lead levels in the work area, such as an employee with symptoms that could indicate lead exposure.
- If monitoring indicates exposure above the PEL, monitoring must be repeated every 3 months.
- If initial monitoring indicates exposure between the action level and the PEL, monitoring must be repeated at least every 6 months. If monitoring shows lead concentrations below the action level, no further monitoring is required unless there are changes in the workplace.
Air Monitoring

- Whenever any changes in the work area could lead to new or added exposure to lead, OSHA requires employers to conduct monitoring again.

- Employers must inform employees in writing about the lead levels revealed during monitoring in their work area, including any action taken or planned to reduce dangerous lead exposures.

- Employees or their representatives may observe any air monitoring. Air monitoring should include personal monitoring for full shifts in order to get an accurate picture of the lead exposure.

- Environmental Health and Safety can conduct air monitoring upon request.
Medical Surveillance Program

Workers exposed to lead above the action level must be in a Medical Surveillance Program.

This includes:

- Blood tests for lead: Blood Lead Level (BBL)
- Medical examinations
- Removal from lead exposure if worker health is at risk (Medical Removal Protection)
- Chelation: Use of certain drugs to remove lead from the body. Used only in severe cases of lead poisoning and only by a qualified MD.
Medical Surveillance

- Employers must provide a medical exam for employees when:
  - First assigned to work near lead
  - Exposed to the action level for more than 30 days a year
  - Symptoms are reported
  - High lead levels are present in blood
  - Employees request medical advice
- Employees must be informed of blood test results
- Employees should report symptoms immediately to their supervisor.
Medical Removal from Lead Exposure

- Employees must be removed from lead exposure when:
  - Blood levels are above 50 µg
  - Lead exposures cannot be brought below action level
  - Employee has increased risk of health impairment

- Employees removed because of lead exposure:
  - Must retain pay, seniority, and benefits
  - May return to job once blood levels are reduced
  - May be given drug therapy to reduce blood lead levels
Ways to Control Lead Exposure

- **Engineering Controls: 1\(^{st}\) Line of defense**
  - Examples: Installing Ventilation Systems; Removing Lead hazard

- **Administrative Controls: 2\(^{nd}\) Line of Defense**
  - Examples: Job Rotation; Training; Policies and Procedures; Prohibiting Worker access

- **Personal Protective Equipment: Last Line of Defense**
  - Examples: Respirators; Tyvek; Gloves

- In addition, good housekeeping measures and proper hygiene can lower lead exposures.
Engineering Controls

- Shrouded tools provide exhaust ventilation at the point where the dust is generated.
- High Efficiency Particulate Air (HEPA) filters on vacuums are capable of capturing very small dust particles with a 99.97% efficiency.
Administrative Controls

- **Signage:** Signs must be posted if the lead exposure is above the PEL.
- **Limit the number of workers exposed by restricting access to work areas with lead exposure above the PEL.**
- **Limit the number of entrances to the work area and make sure that only authorized employees enter the area.**
- **Implement job rotation, to limit employee exposure to less than 30 days per year.**
Personal Protective Equipment

- Workers should wear personal protective equipment if the lead levels exceed the PEL. Examples include:
  - Disposable Coveralls; Disposable N-100 Respirators; Painter’s Hats; Shoe Covers; Gloves
- OSHA may require more protection depending on the type of work, and the type of PPE depends upon the type of job (i.e. demolition would require more PPE than replacing a door). If respirators are required, then employers should follow OSHA’s Respiratory Protection Program.
- Refer to UT’s Personal Protective Equipment Policy and Respirator Protection Policy for more information.
PPE (Personal Protective Equipment)

- Used to keep lead dust off your body and clothes
- Examples include:
  - Safety Glasses or Goggles
  - Tyvek Coveralls
  - Gloves
  - Shoe Covers
  - Respirators
  - Painter’s Caps
Respiratory Protection

- Used when other types of controls are not sufficient to reduce lead exposure to below PEL.
- Medical surveillance, additional training, and respirator fit testing is required to wear a respirator.
- EHS can provide respirator fit testing and guidance on choosing a proper respirator for the job.
Types of Respirators

- Disposable Dust/Particulate Respirators (examples include: N-95, N-100)
- Half-mask, air purifying or cartridge
- Powered air-purifying (PAPR)
- Self-Contained Breathing Apparatus – (SCBA): Supplied Air
PPE Cleaning and Disposal

- Prevent the spread of lead contamination by cleaning and disposing of your PPE and clothing properly. The best way to remove dust from your protective clothing is with a HEPA vacuum or by using wet wipes.

- Do not remove lead dust by blowing with compressed air or by shaking your clothing. This only spreads the lead dust around and puts it into the air, where you will breathe it.

- Dispose of lead-contaminated clothing in sealed bags or containers. If you reuse your work clothing, keep it separate from personal clothing to prevent cross contamination.
Lead Disposal

- All waste (such as building debris and components, plastic sheeting, personal protective equipment contaminated with lead) should be bagged in heavy-duty contractor bags, or wrapped in plastic sheeting (i.e. windows and doors), and the outside should be HEPA vacuumed before removing from the work area.
- Waste should be stored in a secure area, and on-site storage time should be limited.
- Water used in the work area containing paint chips should be filtered and then can be dumped down a sink or tub.
- Consult EHS for more information.
Use exhaust ventilation to capture dust/fumes whenever possible;

HEPA vacuum lead dust covered work surfaces; dry sweeping or compressed air is prohibited; wet methods may be used;

Clean work area as you go so that dust does not accumulate.

Do not eat, drink, smoke or apply cosmetics in areas where lead is present;

Wash hands and face after lead work;

Wear protective clothing to avoid getting dust on your clothes and then bringing it home to spouse and children.
Recordkeeping

- Record keeping:
  - Exposure Monitoring: records must be maintained for 40 years or for duration of employment plus 20 years.
  - Medical Surveillance: same as exposure monitoring
  - Medical Removals: duration of employment
Questions?

- For any questions on lead, please contact your supervisor or Environmental Health and Safety at 974-5084.
- EHS can provide training, air monitoring, lead testing, or any other guidance needed.
- Please refer to the EHS Safety Manual on their web-site at: [http://web.utk.edu/~ehss/](http://web.utk.edu/~ehss/) for lead work safety policy and other safety policies.
Quiz Time

To complete the Lead Awareness Training Module, please click here for the quiz.