

LEAD EXPOSURE

A Simplified Guide

Table of Contents

Lead in the Workplace	3
Lead and Worker Health	3
Employer responsibilities	4
Worker Protection through Safe Practices	4
Understanding Blood Lead Tests	5
Others Who Can Help	5
Working with Lead Paint	6
Common questions about working with lead-based paint	6
Working with Lead-based Paint	7
Removing Lead-based Paint	8
Methods and Practices	8
Protecting Workers & Employer Responsibilities	9
Best Practices	10
Containment	10
Multiple-bucket mopping.....	10
HEPA vacuuming.....	10

Lead in the Workplace

These activities and workplaces may have problems with lead exposure:

- ❑ Lead production or smelting
- ❑ Brass, copper, and lead foundries
- ❑ Lead fishing-weight production
- ❑ Machining and grinding lead alloys
- ❑ Battery manufacturing and recycling
- ❑ Radiator manufacturing and repair
- ❑ Scrap metal handling
- ❑ Lead soldering
- ❑ Indoor firing ranges
- ❑ Ceramic glaze mixing

The following construction activities are of particular concern:

- Demolition of old structures
- Steel-bridge maintenance
- Thermal stripping or sanding/scraping of old paint
- Welding, burning, and torching of old painted metal
- Abrasive blasting or rivet busting of structures with lead paint
- Home renovation and remodeling
- Use of marine paints

Other sources of lead in the environment include:

- ❑ Paint in houses built before 1978
- ❑ Marine paints
- ❑ Drinking water from lead-soldered pipes
- ❑ Soil and air near buildings and factories where people work (or have worked) with lead
- ❑ Soil in areas where lead-containing pesticides were used
- ❑ Leaded gasoline

Lead and Worker Health

Lead enters the body in several ways:

- Workers can inhale in lead dust, mist, or fumes.
- Workers can ingest lead dust that gets on their hands, beards, or clothes, or that gets in or on food, drinks, or anything else they put in their mouths.
- Leaded gasoline can be absorbed through the skin.

Once lead gets into the body, it stays there for a long time. Lead can build up in the body to dangerous levels over time. Too much lead in the body can damage the brain, nerves, kidneys, and blood cells.

Lead can also affect the ability to conceive and bear a healthy child. If a pregnant woman is exposed to lead, it can harm her fetus. Men with lead exposure can have damaged sperm.

Overexposure to lead is common. Although many people with high lead levels do not feel sick or poisoned, their health may be seriously affected. The longer people have elevated lead levels, the greater the risk of health problems. Sometimes the damage is permanent.

Individuals respond differently to lead. Some symptoms of lead poisoning or overexposure include:

- ❑ Male impotency
- ❑ Irritability
- ❑ Muscle or joint pains
- ❑ Muscle weakness
- ❑ Stomach aches and cramps
- ❑ Trouble concentrating
- ❑ Tiredness

Employer responsibilities

Under federal and state worker-protection regulations (the “lead standard”), employers must ensure that workers are protected from harmful lead exposure. This includes making sure that lead concentration in the air of the workplace is not greater than 50 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) averaged over an eight-hour period. These levels are easily exceeded during typical construction operations such as drywall demolition, manual scraping/sanding, heat gun applications, and spraying lead-based paint.

Employers must:

- Perform initial air monitoring to determine if any worker’s exposure exceeds 30 $\mu\text{g}/\text{m}^3$.
- Implement engineering and work practice controls to limit worker exposure to lead.
- Provide a respiratory protection program for workers exposed above 50 $\mu\text{g}/\text{m}^3$.
- Provide protective clothing if workers are exposed above 50 $\mu\text{g}/\text{m}^3$, or if workers are exposed to irritating compounds of lead.
- Provide hygiene facilities, including change rooms and showers, in most cases.
- Implement a medical surveillance program.
- Train workers regarding the harmful effects of lead and protective measures.
- Post warning signs.
- Maintain exposure and medical records of affected workers.
- Under certain conditions, transfer workers to a non-lead-exposed job without loss of pay or benefits.

Employees have a right to:

- ❑ Receive training on the health hazards of lead.
- ❑ Receive appropriate personal protective equipment and training on how to use it.
- ❑ Receive a copy of air-monitoring results.
- ❑ Receive a copy of OSHA’s Lead Standard.
- ❑ Receive medical monitoring. If exposed to airborne lead at levels above 30 $\mu\text{g}/\text{m}^3$ for more than 30 days per year, employers must provide a medical surveillance program that includes blood testing for lead and medical examinations. Under the lead-in-construction regulations, certain high-risk construction jobs require monitoring even without documented high airborne lead levels.

Worker Protection through Safe Practices

Workers can carry lead dust home on clothes and shoes, affecting the health of others in the family. Young children are especially sensitive to the effects of lead.

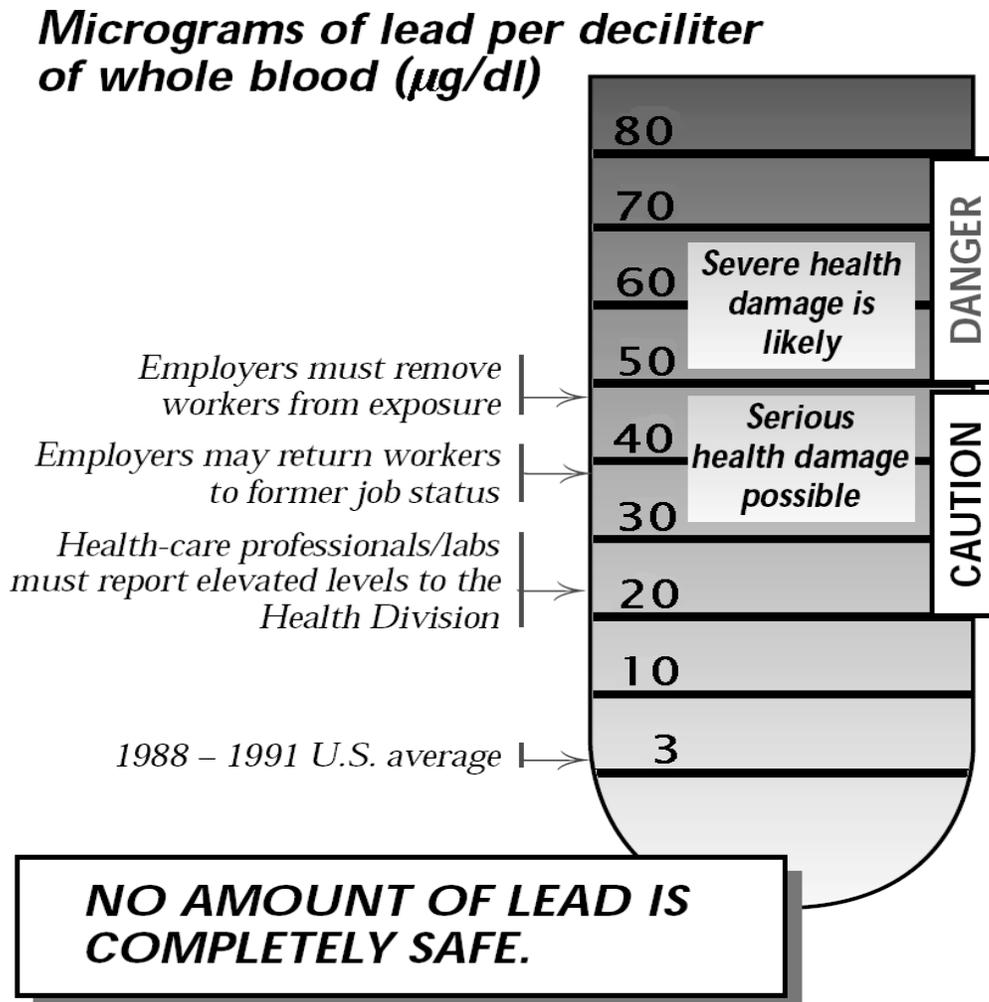
There are some things you can do right away to protect you and your family from lead exposure:

- Use separate work clothes and shoes or boots while at work.
- Keep your street clothes in a clean place.
- Do not wear your work clothes and shoes or boots home.
- If possible, shower at work before going home.

- Launder your clothes at work. If you must take clothes home, wash and dry them separately.
- Wash your hands and face before you eat, drink, or smoke.
- Eat, drink, and smoke only in areas free of lead dust and fumes.
- Work with your employer to ensure that you are not overexposed to lead in your workplace. This may include special ventilation equipment or the use of a properly-fitted respirator.
- Avoid stirring up lead-containing dust with dry sweeping or blowing. Wet cleaning and vacuuming (using HEPA filters) are generally safer.

Understanding Blood Lead Tests

The most common test for lead is called the blood lead level. It measures how much lead is in the bloodstream. The following chart shows what various blood lead levels mean:



Others Who Can Help

Doctors or other health-care providers

Workers who are concerned about lead over-exposure for themselves or others in their household should see a doctor. The doctor can arrange for blood lead level testing and help interpret any exposure and health effects. It is important for the doctor to know if you have been exposed to lead, even if you have no symptoms.

These are rules for employers on using lead safely and ensuring that workers are protected from the harmful effects of lead. OSHA will investigate complaints from workers who believe they are being overexposed to lead or other chemicals.

Working with Lead Paint

What You Can Expect From This Guide

This guide tells what you need to know to protect yourself, your workers, your customers, and the environment when you work with lead-based paint. Lead and its compounds are toxic. Unless you handle them properly you risk contaminating the job site, polluting the environment, and harming others – children and the unborn are the most vulnerable. Lead damages the brain, nervous system, blood cells, kidneys, and reproductive organs – the effects can be permanent. Lead dust, a by-product of remodeling and painting 'prep' work, is the major source of lead poisoning in children. If you have questions about working with lead-based paint that this guide does not answer, do not hesitate to contact your State Health Division.

Common questions about working with lead-based paint

People have been working with lead paint for years and nobody made a big deal about it. Why all the fuss?

Public health agencies became concerned about lead after many tested children showed high levels of lead in their blood. After refiners removed lead from gasoline, children's blood lead levels dropped. Now the biggest source of lead in the environment is from lead paint. Most childhood lead poisoning results from ingested lead-paint dust.

Where can I get training about working with lead paint?

The Lead Remodelers Training Course developed by the Department of Housing and Urban Development and the National Association of the Remodeling Industry.

How can I tell if a building has lead paint?

The best way is to have it tested by a professional; the State Health Division certifies inspectors and risk assessors who provide this service. Lead was restricted in residential paint in 1978. In general, the older a building, the greater the chance that it contains lead-based paint. Houses built before 1950 are very commonly painted with lead paint.

Can I use lead-test kits to find out if paint has lead in it?

OSHA will permit the use of these products for positive determination only, i.e., that lead is present. Negative results do not guarantee that lead is absent and must be confirmed by a laboratory. If lead is present, then you must provide worker protection. Health Division rules prohibit making the results of test kits known to clients, since residential lead inspections can only be performed by certified inspectors or risk assessors.

How can I clean rugs, carpets, or upholstery that have been contaminated by lead dust?

You cannot. Porous surfaces are lead-dust traps. No known methods can clean them effectively once they are contaminated. Always cover or remove these items before starting work.

How much lead dust is dangerous?

According to the current federal lead hazard standard, if the sugar in a one-gram packet of sugar were lead dust, it could contaminate one hundred 10' x 10' kitchens.

What is federally-required pre-renovation notification?

The Environmental Protection Agency requires that Remodelers distribute a lead-paint hazards pamphlet to clients before beginning remodeling work. (A remodeler is any professional who disturbs more than two square feet of paint in a residence or child-occupied facility built before 1978.) For more information on these requirements contact the State Health Division.

What is lead paint abatement?

Abatement is the permanent removal or elimination of lead-based-paint hazards from surfaces and from soil. "Permanent" means that the treatment must last 20 years. Abatement strategies for surfaces include encapsulation (application of a tough coating), containment (placement of a rigid barrier over the painted surface), and paint removal or replacement of building components. Soil can be paved over or removed and replaced. Lead-based-paint abatement rules do not apply to most residential painting and remodeling work. "Prep" work, painting, and other contracting that are part of renovation or routine home maintenance are not regulated. However, when the primary purpose of your work is removing lead-based paint, the work is considered "abatement". Keep in mind that OSHA and Department of Environmental Quality requirements apply.

Working with Lead-based Paint

Why You Should be Concerned

What You Should Do

Understand the rules and regulations

OSHA requires contractors who work with lead-based paint to follow specific procedures. Contractors are responsible for understanding the procedures and for training their employees to follow them.

Review this guide. It highlights requirements and offers guidelines on protecting you, your workers, your customers, and the environment from lead-based-paint contaminants.

Contain work areas

Uncontained lead dust, chips, and debris settle on soil, plants, and furniture. Cleanup or replacement can be very expensive. It is a good idea to notify neighbors before work begins. It is good P.R. and it gives them a chance to close windows, move play equipment, cover garden spots, etc. in case any lead debris moves into the next yard.

Interiors

- Turn off and seal the HVAC system.
- Remove belongings or wrap them in plastic — especially rugs and upholstered furniture.
- Cover floors and carpet with double layers of heavy-duty plastic sheeting and tape the sheeting to the skirting boards.
- Use protected passageways or plastic runners between work areas and exits.
- Close off the work area with heavy-duty plastic sheeting (see the "Best practices" page).
- Work on one room at a time.
- Keep all residents, especially children and women of child-bearing age, out of the work area.

Exteriors

- Spread heavy-duty plastic sheeting at least 10 feet from the foundation, covering the ground and vegetation.
- Move play equipment away from the work areas and cover sand pits.
- Close nearby windows and doors.
- Use a shade cloth to contain dust.
- Capture and filter waste water; make sure it doesn't run into a storm drain.
- Keep all residents, especially children and women of child-bearing age, out of the work area.

Choose an appropriate work method

Some paint removal activities produce toxic fumes and mists, and other methods spread lead dust. Cleaning up uncontained contaminants can be very expensive.

Minimize the amount of lead-based paint you disturb. If you need to remove lead-based paint, review the tables on the following pages. They highlight what you need to know about various methods for removing lead-based paint: what you should do, what you should avoid, and your responsibilities under OSHA's safety and health rules.

Clean up work areas properly

Cleanup methods such as dry sweeping and using household or shop vacuums spread dust and debris.

Work wet and clean up daily. Wet debris before sweeping. For cleanup, wet down debris and use a HEPA vacuum (see the "Best practices" page).

Dispose of waste correctly

Paint chips, sludge, and contaminated PPE may be hazardous waste. Disposing of them improperly could harm customers, neighbors, or the environment.

Clean up daily using wet methods and HEPA vacuum. Collect visible paint chips. Put the debris into heavy-duty plastic bags, buckets or similar containers, and secure them. Contact the DEQ to find out how to dispose of waste.

Do a clearance test

Even though your finished project may look clean, high levels of contaminated dust may still be present on some surfaces, exposing residents to lead hazards.

Hire a certified lead-based paint risk assessor to conduct a clearance test. (This is a dust-wipe sampling technique that requires laboratory analysis). Contact the Health Division for a list of certified risk assessors and for more information about cleanup practices.

Removing Lead-based Paint

Methods and Practices

What You Should Avoid

What You Should Do

**Hand
scraping
and
sanding**



Do not use dry scraping or sanding. This method spreads lead dust, the most common source of lead poisoning, particularly among children and pets. Their injuries could be your responsibility.

Work wet and contain the work area. Use a hand or backpack sprayer or hose with fine spray nozzle to wet surfaces. Cover the floors of interior rooms with double layers of plastic sheeting before you begin work. Close all windows. Contain the work area.

**Using
heat**



Avoid using extreme heat. Lead-based paint heated above approx. 950° F can generate harmful toxic fumes.

Do not use open flame torching. When an open flame heats lead-based paint, it generates toxic fumes.

Use a heat gun and keep the setting low (below 750°F) or work wet with a hand scraper, sanding sponge, or wire brush.

**Using
power
sanders,
grinders,
and saws**



Do not use uncontained power sanding, grinding, or abrasive blasting. Lead dust is the most common source of household lead poisoning, particularly among children and pets. Their injuries could be your responsibility. Site cleanup costs can be very expensive.

Use only powered sanding and grinding equipment fitted with a special shrouding and a HEPA vacuum exhaust. If shrouded HEPA-vac tools are not available, use a complete containment system. Always use a complete containment system with abrasive sandblasting equipment.

**Using
power
washers**



Do not use uncontained power-washing and hydro-blasting. Lead-contaminated water can enter storm drains; most street drains empty directly into creeks or streams. Filter waste water. Never empty filtered water into street drains or on the ground. Contaminated ground may require expensive clean-up and/or removal and replacement of topsoil or landscaping.

For single family residences ONLY: minimize runoff to drains by allowing water to infiltrate to the soil using landscape cloth and by diverting water from hard surfaces to where it can infiltrate. Where runoff reaches drains, minimize the movement of paint chips into the storm drain by placing burlap or commercial filtering media over the drain, and held in place with bio-bags or other means, to filter out the paint chips. Visually inspect drain when complete to remove any visible paint chips. For commercial and multi-family residences, contact DEQ to determine if a wash water permit and the associated guidance is required.

**Using
chemical
paint
strippers**



Avoid inhaling or contacting chemical paint strippers. The chemicals are harsh and some produce harmful vapors. Methylene chloride, a common paint stripper, is particularly hazardous.

Use chemical paint strippers only for small tasks. Cross-ventilate work areas, use non-corrosive, nonvolatile strippers, and wear chemically resistant gloves. The sludge from stripping work is hazardous waste; dispose of it correctly.

**Manual
demolition**



Avoid doing manual demolition work in uncontained areas — cleaning up contaminated living space, household goods, and adjoining areas can be very expensive.

Always contain and cover work areas, work wet, and clean up daily, alternating wash and HEPA vacuum cycles.

Protecting Workers & Employer Responsibilities

Are painters and remodelers covered by OSHA's lead rules?

If you employ painters, remodelers, or those who do demolition work you must protect them from lead hazards. Residential buildings and child care facilities built before 1978 may expose them to lead. OSHA's lead standard for the construction industry sets the worker protection requirements.

When should I consider lead hazardous?

You should consider lead hazardous when it exceeds 50 micrograms per cubic meter of air (50 mg/m³) averaged over an eight-hour period. This quantity, called a permissible exposure limit (PEL), is the highest concentration of lead that a worker can be exposed to without needing protective equipment.

What do I need to do to protect workers?

For those who may be exposed to lead above the PEL, protection begins with a respirator. You must provide workers with respirators that will protect them. In addition to respirators, you must provide workers with the following:

- Proper protective clothing — such as coveralls, gloves, and eye protection
- Hand washing facilities — so they can wash their hands before eating or drinking
- Training covering lead hazards, hazard communication, and use of respirators
- Medical surveillance that includes biological monitoring

OSHA has established categories of trigger tasks — activities that could expose workers to lead — based on increasing exposure levels (shown in the table below). In general, the more a task exposes a worker to lead above the PEL, the more protection a worker needs to control exposure.

Trigger Task Examples	Exposure Levels	Respiratory Protection
Manual scraping, sanding, and demolition tasks; heat gun work; power tool cleaning with a dust collector.	Up to ten times the PEL	N, P, or R 100 filtering face piece Half-face respirator with HEPA or N, P, or R 100 cartridges
Power tool cleaning without a dust collector	Ten to 50 times the PEL	Full-face respirator with HEPA or N, P, or R 100 cartridges Tight-fitting powered air-purifying respirator with HEPA or N, P, or R 100 cartridges
Torch burning, abrasive blasting, welding, and cutting	Fifty to 1000 times the PEL	Half-mask supplied-air respirator operated in the pressure-demand or positive-pressure mode.

What is biological monitoring?

Biological monitoring is a fancy term for blood testing. Blood tests are one way to identify workers who may be overexposed to lead. These tests must be done under the direction of a licensed physician. If tests show the amount of lead in a worker's blood is increasing, you must reduce the worker's exposure level.

What else must I do to comply?

When workers disturb lead paint, you must make sure they clean it up daily — by containing it, wetting it down, then sweeping it or HEPA vacuuming it. (See the Best practices page.) If you require workers to wear respirators, you must first develop a written respiratory protection program that covers medical evaluations, fit testing, and worker training.

Best Practices

Containment

Close off the work area with heavy-duty plastic sheeting and secure the sheeting with duct tape.

To secure an access door, tape heavy-duty plastic to the perimeter of the door. Leave the plastic a couple of inches long so you can tape it to the floor. Cut a lengthwise slice in the plastic so you can walk through it. Finally, tape a second plastic sheet to the top of the door so that it will drape against the first sheet.

Vertical containment for exterior work can be erected using plastic sheeting over scaffolding or a wood frame.

Keep everyone except protected workers out of work area. Keep worksite dust and debris from contaminating non-work area. Make sure workers, tools, equipment, etc. are cleaned, wrapped, or de-contaminated before leaving the contained area.

Multiple-bucket mopping

Use at least two buckets for mopping work surfaces – one for washing and one for rinsing. A general household cleaner is fine. Change the wash solution and rinse water often. Wrap or bag mopheads and sponges to discard when the job is complete. Empty waste water in toilet or sanitary line "clean-out," not street drains, gutters, or on the ground.

HEPA vacuuming

A HEPA (high efficiency particulate air) vacuum is designed to pick up very small particles (0.3 microns, or about 1/500th the width of a human hair). Household and shop vacuum cleaners spread dust around. HEPA vacuums capture it.

Keep in Mind

- Minimize the amount of lead-based paint you disturb.
- Contain the work area and cover or remove belongings.
- Protect workers from harmful lead exposure.
- Work wet.
- Contain and filter wastewater.
- Clean up daily and dispose of waste correctly.

