# Working Lead-Safe

# A Lead-Related Construction Work Course



# Student Manual

January 2006 Revison 2

Labor Occupational Health Program University of California, Berkeley

Childhood Lead Poisoning Prevention Program California Department of Health Services



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# Introduction

#### About This Manual

This manual is for workers who will be doing lead abatement or other lead-related construction work. It shows how this work can be done safely and what precautions are needed. It can help you protect both building occupants and yourself.

By law, only lead workers certified by the California Department of Health Services (DHS) may do a lead-related construction job on a public or residential building that is designed to permanently reduce the lead hazard, or that generates a lot of lead dust.

In California there are two sets of regulations that govern how lead work should be done and when state-certified lead workers must be used. These are the Cal/OSHA Lead in Construction standard and the California Department of Health Services' requirements in Title 17 of the California Code of Regulations (17 CCR).

> The Lead in Construction standard addresses how workers must be protected whenever they are doing construction or maintenance tasks that disturb lead paint. Title 17 mandates use of certain work practices that protect workers, building occupants, and the surrounding environment whenever a lead abatement project is planned. These requirements follow those spelled out in the federal Department of Housing and Urban Development (HUD) *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*.



Title 17 also sets out training and certification requirements for lead workers, lead supervisors, lead inspector/assessors, lead project monitors, and lead project designers.

To become DHS-certified as a worker, you must complete a lead worker course, pass an exam at the end of the course, submit an application for certification, and pay a fee to DHS. To maintain your certification it must be renewed annually and a Continuing Education training must be taken bi-annually (every other year). This manual is part of a course that will give you the information you need to get state certification.



# Lead: An Overview

#### Where Is Lead Found?

Most commonly, lead is found in paint. It is estimated that 600 million pounds of lead paint were used in California homes over the years. Lead is also found in soil, water, and dust. Other sources of lead include:

- Art supplies
- Batteries
- Hobby supplies: fishing sinkers, bullets, lead "came" for stained glass
- Glazes on dishes and pottery
- Certain folk medicines and home remedies
- Many vinyl products including some blinds, electrical cords, and telephone cords
- Lead solder
- Brass faucets, valves, or fittings
- Old pipes
- Brass keys
- Computer monitors
- Other electronic equipment
- Some food products.



### Why Was Lead Added to Paint?



Lead was added to paint to make it last longer, dry faster, and stick better. Lead paint also provided better color and prevented the growth of mold and mildew.

In California, **lead-based paint** is defined by state law as "paint, varnish, shellac, or other coatings on surfaces that contain more than  $1.0 \text{ mg/cm}^2$  of lead or more than 0.5% lead by weight."

Until the mid-1950s, some paint contained as much as 50% lead (500,000 parts per million). In 1979, the U.S. Consumer Product Safety Commission ordered the lead in residential paint reduced to 600 parts per million.

Latex paint has very rarely contained lead.

Older buildings are more likely to have paint with high levels of lead. All buildings should be **assumed** to have lead-based paint unless they have been tested and shown otherwise, or unless paint records prove that the building has always been painted only with latex paint.

Old lead paint is often covered with more recent layers of paint that don't contain lead. So remember that the paint layers underneath may have a hidden danger.

Lead-based paint was frequently used in kitchens and bathrooms, but it may be found throughout the interior and exterior of older homes. Where there is lead paint, exterior painted surfaces usually have about twice as much lead as interior surfaces. The paint on trim such as window sashes, door jambs, and baseboards usually has more lead than wall paint.

#### Is All Lead Paint Hazardous?

**No.** Lead paint becomes hazardous when it is deteriorated or disturbed. Intact lead paint is not a hazard. But when sun, water, age, or maintenance work damage the paint, contaminated dust and chips can be created.

#### How Does Lead Get Into the Body?

Lead gets into the body when adults or children **breathe** or **swallow** lead dust, fumes, particles, or chips. These may be:

- In the air, soil, or water On surfaces like floors or counters
- On objects like tools or toys On food, drink, or cigarettes.

### Why Is Lead Dangerous?

Lead is highly toxic to the human body. It damages the brain, nervous system, and kidneys. Poisoning can occur gradually, and often there are no obvious symptoms.

Even at low levels, lead can cause children to have learning and behavior problems, slow growth, and lower IQs. Children are not the only ones at risk. Workers in many occupations can also be poisoned if steps aren't taken to control lead exposure on the job.

#### How Can Workers Prevent Lead Poisoning?

We will look at ways to work safely around lead throughout this manual. Some important methods are:

- Use safe work practices. For example, use surface preparation methods that generate lower amounts of lead dust (for example, manual wet scraping instead of power sanding).
- Mist surfaces with water before working on them to keep the dust down.
- Use a ventilation system that removes dust at the source so lead can't get into the air. For example, use tools with HEPA vacuum exhaust systems.
- Wear appropriate personal protective suits and respirators.
- Contain the dust by building proper containment structures (use plastic sheeting, etc.).
- Spend less time doing hazardous work by rotating tasks.
- Clean up the area thoroughly after working, using wet methods.
- Wash up thoroughly before eating, drinking, or going home.

#### Key Points: Chapter One

- Lead can get into your body when you breathe it in or swallow it.
- The primary sources of lead exposure are paint and soil.
- Intact lead paint is **not** a hazard.
- Deteriorated lead paint is a hazard.
- If you disturb lead paint during maintenance or renovation, it becomes a hazard.
- When lead paint becomes a hazard, the lead must be controlled or the paint removed.

<sup>10</sup> Chapter One-Lead: An Overview



# Health Effects of Lead Exposure

### How Is Lead in the Body Measured?

The amount of lead in your body is determined through a blood test. The results are given in micrograms of lead per deciliter of blood, often abbreviated as  $\mu$ g/dL. A microgram weighs one millionth of a gram. A deciliter of is one tenth of a liter (a little less than half a cup).

Two kinds of blood tests are used to measure how much lead has entered the body recently. Both tests can be done from the same blood sample.

**Blood Lead Level (BLL).** The BLL test gives an estimate of exposure in the past two to three weeks.

**Zinc Protoporphyrin (ZPP).** ZPP is a substance in red blood cells that increases when lead interferes with the production of hemoglobin. Hemoglobin is the oxygen carrier in the blood. An increase in ZPP usually lags an increase in BLL by two to six weeks. The ZPP reflects lead absorption over the past 3–4 months and is a better indicator of lead body burden. Therefore, if ZPP is normal but BLL is high, this suggests very recent lead exposure AND vice versa the ZPP test is the fail safe for the straight BLL test.

Neither the BLL nor the ZPP test can measure how much lead is **stored** in the body, or what **effect** lead is having on the body.



### Who Is at Risk from Lead?

Lead can harm people of any age.

It is especially hazardous for **children** six and under because:

- They often put their hands and toys into their mouths, and can easily swallow lead-contaminated dust and soil.
- Their bodies absorb up to 50% of the lead they swallow, compared to 10-15% for adults.
- Their bodies and nervous systems are still developing, so their health is more likely to be permanently damaged by the lead they absorb.
- Lead is stored in the bones, brain, and other organs (i.e. lead body burden). This lead can continue to harm normal growth and development for as long as thirty years after exposure.

Adults can also be affected, especially:

- Pregnant women, because lead can easily cross the placenta and harm the fetus.
- Men and women planning to have children, because reproductive damage can occur.
- Workers who are exposed to high amounts of lead on the job.

#### Are Workers' Families at Risk?

**Yes.** Workers may accidentally take lead dust home with them when they wear work clothes or shoes home. Lead dust can get into the car, furniture, and carpets. It may then be spread throughout the home, endangering everyone.



#### What Health Problems Can Lead Cause?

Health problems can develop soon after exposure, or many years later.



They may include:

Brain and Nervous System. Permanent brain damage and personality changes can occur. Even at low levels of exposure, lead can cause children to grow more slowly, have learning disabilities, or experience behavioral problems.

Heart and Blood. Lead can cause anemia (making you feel weak and tired) and high blood pressure.

Kidneys. Permanent damage can occur.

**Digestive System.** Lead can cause nausea, constipation, diarrhea, cramps, lack of appetite, and pain.

**Reproductive System.** Lead can affect both a woman's eggs and a man's sperm. Results can be reduced sex drive, infertility, miscarriage, stillbirth, and birth defects.

**Bones.** Lead stored in the bones can go back into the bloodstream if you are under stress, sick, or pregnant. It may then cause damage throughout the body.

# What Are the Symptoms of Lead Poisoning?

Many lead-poisoned children and adults show no symptoms at all. But even those who appear healthy can have dangerous levels of lead in their bodies. The more lead in the body, the more likely that damage will eventually occur.

Common symptoms of high exposure to lead include:

- Headache •
- Loss of appetite
- Irritability ٠

- •
- Low sex drive

- Tiredness
- Pain in muscles and joints •

Nausea

- Trouble concentrating •
- Stomach pain

•

- Constipation
- Flu-like symptoms.

#### How Can You Be Exposed on the Job?

You can be exposed if you do any work that produces lead dust or fumes.

Here are a few examples:

- Sanding paint
  Scraping paint
- Grinding paint

Soldering

Carpentry

Welding

- Renovation/demolition
- Doing cleanup.



#### What Blood Lead Levels Are Unsafe?

The U.S. government's Centers for Disease Control and Prevention (CDC) consider any blood lead level above 10  $\mu$ g/dL to be unsafe for children and pregnant or nursing women. BLLs of 20–30  $\mu$ g/dL can cause harmful reproductive effects in both men and women. Cal/OSHA defines 40  $\mu$ g/dL as a high BLL in workers. However, **no** level has been proven completely safe, either for children or for adults.

#### Can High Blood Lead Levels Be Reduced?

**Yes.** For both adults and children, health professionals usually treat high blood lead levels by finding a way to reduce lead **exposure.** If exposure is reduced, the level will usually go down.

**Adults.** Many adults with high blood lead levels have been exposed to lead on the job. This job exposure should be reduced or eliminated.

**Children.** The home is usually the main source of childhood lead poisoning. The cause of the child's lead exposure should be found, and steps should be taken to reduce or eliminate it. The child and family should also be educated about preventing contact with lead.

#### What Is Chelation?

For both children and adults with extremely high levels of lead in the body, a medical treatment called **chelation** may sometimes be used. Chelating drugs pull the lead out of your body through the kidneys. Chelation cannot repair damaged tissue and it can have serious, permanent side effects.

Employers may not use chelating drugs to keep workers' blood lead levels low. This practice is called **prophylactic chelation** and it is prohibited by California health and safety regulations. Employers should reduce workers' exposure instead.

#### When Should Lead Workers Get Blood Tests?

Cal/OSHA, California's state health and safety agency, issues and enforces many regulations to keep the workplace safe. These are called standards. One of them is the **Lead in Construction standard** (Title 8 CCR §1532.1). This spells out how lead work must be done and what employers must do to protect workers. Throughout this manual we'll be discussing the requirements of the Lead in Construction standard.

According to this standard, employers must use a process called air sampling to determine how much lead is in the air workers breathe. Based on the air sampling, they must offer free blood lead tests to workers who are exposed at or above 30 micrograms of lead per cubic meter of air ( $30 \mu g/m^3$ ). This is called the Cal/OSHA Action Level for lead. (See Chapter 4 for more information.)

If you are exposed to lead at the Action Level for even one day during a year, you must be offered a blood test (known as a baseline test). This is called **initial medical surveillance**. If you are exposed at the Action Level for at least 30 days during a year, you are entitled to **full medical surveillance**. This consists of frequent blood testing as well as a free medical exam and consultation. Workers exposed to higher levels of lead must be offered even more frequent blood testing and other medical services.

# What If a Worker's BLL Is Too High?

Based on the results of the initial blood tests, Cal/OSHA says that your employer must sometimes provide additional blood tests and medical exams, at no cost to you.

#### Additional Blood Tests

Cal/OSHA's "level of concern" for blood lead test results is 40 micrograms of lead per deciliter of blood ( $\mu$ g/dL). Workers with BLLs at or above this level must receive both BLL and ZPP tests every two months until consecutive results show that the BLL has dropped below 40  $\mu$ g/dL. The employer must use an OSHA-approved laboratory for the blood analysis, and must report the results of all blood tests back to the worker within five working days of receiving them.

#### **Medical Exams**

If a worker has a BLL at or above 40  $\mu$ g/dL, it is important to find out if there has been any health damage. So the employer must send the worker to a doctor for a full medical exam. This exam must be provided each year to any worker who has had a BLL at or above 40  $\mu$ g/dL at any time during the previous 12 months.

You can request another medical opinion if you do not agree with the findings by your employer's doctor. You must request the second exam, in writing, within 15 days of receiving the results of the first exam. (Your employer has to pay for both exams.)

The doctor provides the following results to the employer: 1) BLL; 2) limitations or protective measures; 3) limitations in the use of respirators; and 4) opinion whether the worker should work with lead. Any other medical information should be given directly from doctor to employee.

The Cal/OSHA standard says you also have the right to a free and convenient medical exam and consultation, regardless of your blood lead level, if:

- You are exposed to lead dust in the air at or above the Action Level for at least 30 days during a year
- You have any symptoms of lead poisoning
- You are pregnant or trying to conceive
- You have any trouble breathing while wearing a respirator.

Your employer must give you the results of all medical exams within five working days of receiving them.

#### Can Your Employer Get Your Medical Records?

Cal/OSHA provides that your employer:

- **Does** have a right to get the results of your blood lead tests.
- **Does** have a right to get a statement from the doctor that it's OK for you to work around lead, and that you can wear a respirator safely.
- **Does not** have a right to know why the doctor made a "final medical determination" that you cannot work with lead. For example, a doctor may recommend that you not work with lead simply because you want to have a healthy child. Your medical privacy is protected in the event that the doctor makes a "final medical determination" prohibiting you from working with lead. Only you are entitled to know why. Your employer is not entitled to this information.
- **Does not** have a right to any other medical information, including your previous medical history.

### What's Included in the Medical Exam?

The medical exam consists of:

- Your work history and medical history. Particular attention is paid to past lead exposure and past symptoms of lead poisoning.
- A complete physical. This helps determine if any organs or body systems have been affected by lead.
- A blood pressure check. This may show either that lead exposure has raised your blood pressure, or that you have pre-existing high blood pressure that makes working around lead more dangerous for you.
- Blood tests to check lead levels. Both BLL and ZPP tests are given.
- Routine urinalysis. This is to check protein levels in the kidneys.
- Any additional tests that the doctor thinks is necessary. These may include tests for pregnancy and fertility if you request them.

#### What Is Medical Removal Protection?

Cal/OSHA considers a very high blood lead level in a worker to be 50  $\mu$ g/dL or more. If a BLL test and follow up test show your BLL is at or above this level, your employer is required to remove you from any job task where there is lead exposure above the Action Level. This is called **medical removal protection (MRP)**. You continue to get the same pay and benefits up to 18 months, and don't lose seniority. You can be assigned to work in an area with lower lead exposure if such work is available.

A doctor can also remove you from lead exposure, regardless of your BLL, if you have symptoms of lead poisoning, are pregnant, or have certain other medical conditions, such as bad kidneys or high blood pressure. In this case, the doctor writes a report called a **final medical determination**.

When to begin and end medical removal is a decision that must be made by a doctor.

When a blood test shows that your BLL is  $50 \,\mu\text{g/dL}$  or higher, your employer must send you for blood testing again within two weeks of receiving the results. Then you must be tested once a month until two consecutive tests show that your BLL has dropped below  $40 \,\mu\text{g/dL}$ .

The employer must also record the fact that you had a BLL of  $50 \mu g/dL$  or more on the Cal/OSHA Log 300 form. (See Chapter 7 for more information.) The doctor must file a Doctor's First Report of Injury with the California Division of Workers' Compensation.

# Key Points: Chapter Two

- Lead in blood is measured in micrograms per deciliter ( $\mu g/dL$ ).
- In children, a Blood Lead Level (BLL) of 10 µg/dL or more is a health concern.
- Cal/OSHA says that in workers a BLL of 40 µg/dL or more is a health concern, although adults may experience negative health effects below this level (especially reproductive effects). Workers at this level must be offered regular blood tests and a medical exam.
- Workers with a BLL of  $50 \mu g/dL$  or more on two consecutive tests must be removed from jobs exposing them to high amounts of lead.
- Treatment for very high BLLs is called chelation therapy.
- Prophylactic chelation is prohibited by Cal/OSHA.



# Identifying Lead Hazards

### When Is Lead Paint Hazardous?

If lead paint is in good condition and left intact, it isn't a problem. If lead paint is in poor condition or if it is disturbed, contaminated dust and chips can be created. This paint is a lead hazard.

Signs of paint deterioration include cracking, flaking, peeling, chipping, chalking, and paint separating from a surface.

Lead paint can become hazardous because of:

- Weather effects (sun or rain)
- Water damage
- Mold and mildew
- Aging
- Maintenance or construction work that disturbs the paint
- Children chewing on painted surfaces
- Impact that disturbs the paint
- Friction that disturbs the paint.



Note that there may be a lot of lead dust and chips near painted surfaces that are subject to impact, like stairs, baseboards, railings, and walls that are often hit (especially in corners). There may also be chips and dust near windows because of friction on the paint as the window opens and closes. The interior horizontal surfaces of windows usually have the greatest amount of lead dust. Doors (including those on cabinets) are also common sources of friction.

Lead paint hazards are of special concern in areas that children use.

#### How Is Paint Tested for Lead?

Testing is the only way to know for sure if there is lead in paint. There are several ways to test paint for lead. Only two (paint chip sampling and XRF analysis) are approved methods.

#### Paint Chip Sampling

In this test, a sample is collected by scraping chips of paint down to the substrate. Care must be taken not to collect the underlying wood, plaster, etc. The sample is then sent to a lab accredited by the National Lead Laboratory Accreditation Program (NLLAP). The results are usually given as milligrams of lead per square centimeter (mg/cm<sup>2</sup>), or as a percentage by weight. If there is more than 0.5% lead by weight, or 1 mg/cm<sup>2</sup>, DHS considers it lead-based paint.



Cost of this test varies from \$5 to \$25 per sample.

This testing method is very accurate. The lab can tell you whether there is **any** lead in the paint. This is important because the Cal/OSHA Lead standard requires that workers be protected if there is **any** lead in the paint. The key disadvantage of paint chip sampling is that the painted surface must be disturbed, which will then require patching, priming, and repainting.

Labs often provide instructions on where and how to take paint chip samples. They may prefer that their own container be used. For a list of NLLAP-accredited labs in California, see the website *www.dhs.ca.gov/childlead/html/lablist.html*.

For more information on paint chip sampling methods, see Appendix 13.2 of the U.S. Department of Housing and Urban Development (HUD) *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, June 1995 (Title X, Section 1017).

#### **XRF** Analysis

Another way to test painted surfaces is to hire a state-certified lead inspector/assessor to come to the site and use an instrument called an X-ray Fluorescence (XRF) Analyzer. This test gives an immediate reading of the lead level in the paint. The test does not disturb the painted surface. It is also quicker and cheaper than paint chip sampling for testing large numbers of building components.

DHS defines a reading of at least 1.0 milligram of lead per square centimeter (mg/cm<sup>2</sup>) to be lead-based paint.

XRF Analyzers are expensive. They cost between \$8,000 and \$30,000. To use one, you must be specially trained and certified. They are also a source of radiation exposure.



#### Wet Chemical Field Test (Lead Stick)

These tests are available in paint stores, are cheap, and give quick results. They are commonly referred to as lead sticks. However, the results can be unreliable. They only test the surface coating unless you expose all the paint layers. Also, if lead is present, the test doesn't tell you how much there is. This is **not** an approved testing method.

#### What Is a Risk Assessment?

Certified lead inspector/assessors are qualified to test paint for lead. They also perform **risk assessments**. Testing and inspection tell you **if** a building has lead paint, and **where** it is. A risk assessment tells you if there is a lead **hazard** in the building. The inspector/assessor looks for deteriorated paint, takes samples, and then suggests ways to control any hazards that are found.

#### What Is Dust Wipe Sampling?

During a risk assessment, one of the methods the inspector/assessor uses is to collect dust wipe samples. This involves wiping a measured surface to determine how much lead dust it has. A special, approved wipe must be used, and the wipe sample must be sent to an approved laboratory.

Dust wipe samples can help find lead hazards in a building. They are also taken at the end of a job to see if the work site has been cleaned properly. These are called "clearance samples."

Obviously, this is a method that measures only the amount of lead in surface dust. It's not a way to test for the amount of lead in the paint.

DHS defines lead-contaminated dust as dust that contains lead in these amounts or more:

- For interior floors, 50 micrograms of lead per square foot  $(50 \,\mu\text{g/ft}^2)$
- For interior horizontal surfaces (like window sills), 250 µg/ft<sup>2</sup>
- For exterior surfaces, 800 µg/ft<sup>2</sup>.

**Note:** Lead dust must be below these levels (called clearance levels) for a site to pass final inspection. To be consistent with U.S. EPA regulations, these levels are expected to be revised soon to  $40 \,\mu\text{g/ft}^2$  for interior floors and  $400 \,\mu\text{g/ft}^2$  for exterior surfaces. The U.S. EPA sets national standards defining pollution of soil, air, and water. Individual states can set more stringent standards.

# How Can Lead Get Into Soil?

Soil around buildings can get contaminated by:

- Paint chips or dust. These may fall from any nearby structures that have lead paint.
- Auto exhaust. Before leaded gasoline was banned, tons of lead from exhaust settled into soil.
- Industrial pollution. Lead smelters, battery plants, oil refineries, power plants, waste facilities, and other industries can contaminate the soil with lead.
- Pesticides. Many pesticides contained lead and might have contaminated the soil in agricultural areas.

The hazard posed by lead in soil depends on:

- The amount of lead in the soil
- Whether the soil is bare
- Whether the soil is in an area frequently used by people, especially young children.

The amount of lead in soil which DHS defines as hazardous 1s:

- In children's play areas (defined as 9 square feet of bare soil) a hazard is equal to or above 400 ppm (parts per million) of lead.
- In all other areas of the yard at or above 1000 ppm of lead.
- If removing the soil, the California Department of Toxic Substances Control defines soil as a hazardous waste when it is at or above 1000 ppm of lead.



#### How Is Soil Tested for Lead?

Soil testing must be done by a state-certified lead inspector/assessor. A maximum of ten soil samples of equal size, taken from an "X" pattern, are combined to make up one composite sample. This composite sample is sent to a lab accredited by the National Lead Laboratory Accreditation Program (NLLAP).

#### How Can Lead Get Into Water?

Lead can leach into drinking water from both old and new plumbing. Lead pipes were often used before 1930. Newer plumbing may have leaded solder, which wasn't banned in California until 1988. Brass plumbing fixtures also contain lead. The danger of lead getting into water is greatest when plumbing work is less than five years old.

Drinking water should be tested. Samples for testing must be taken following EPA procedures.

High lead levels can be temporarily reduced by flushing faucets and fountains. Flushing means running the water for at least 30 seconds to wash out as much lead as possible. It **must** be done daily, early in the morning, removing lead that has leached overnight. This is not a permanent solution. Eventually, the source of the lead has to be found and eliminated.

#### Key Points: Chapter Three

- Paint chip analysis and XRF analysis are the two **approved** ways to sample for lead in paint.
- The DHS definition of lead-based paint is 0.5% by weight (5000 parts per million), or 1.0 mg/cm<sup>2</sup>.
- Cal/OSHA requires workers be protected whenever there is **any** lead in the paint.
- Lead paint is a hazard when it is deteriorated.
- The DHS definition of lead-contaminated dust is currently 50 µg/ft<sup>2</sup> for interior floors, 250 µg/ft<sup>2</sup> for interior horizontal surfaces, and 800 µg/ft<sup>2</sup> for exterior surfaces. Limits will soon be reduced to 40 µg/ft<sup>2</sup> for interior floors and 400 µg/ft<sup>2</sup> for exterior surfaces.
- The DHS definition of lead-contaminated soil is 400 ppm in bare soil in children's play areas and 1000 ppm in other areas.

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# How Much Is Too Much?

# What Is Personal Air Sampling?

According to Cal/OSHA's Lead in Construction standard, your employer must measure the amount of lead dust in the air you breathe on the job. This is called **personal air sampling**.

You wear a device that collects the dust near your nose and mouth onto a filter. The filter is then sent to a lab to see how much lead dust there is in your "breathing zone."

Your employer must use personal air sampling to measure the dust created by each type of lead-related construction, maintenance, or abatement task.

Sampling must also be done every time the conditions on your job change-for example, if work is being done on a different building component that has a higher lead content.

Your employer must give you the results of all air sampling within five working days after getting them back from the lab.

Air sampling results are used to determine what kind of protection must be in place to minimize your lead exposure.



#### What Protective Measures Does Cal/OSHA Require?

The level of protection required depends on how much lead dust is generated by the task being done.

When workers are exposed to **any** amount of lead dust, the employer must provide:

- Hand washing facilities
- Good housekeeping to keep surfaces free of lead dust, paint chips, and debris
- Basic "awareness level" training about the hazards of lead.

Workers exposed to **significant** lead dust must be provided with more protection. Cal/OSHA has set limits on how much airborne lead a worker may be exposed to. If personal air sampling shows you are exposed above these limits, additional protections must be in place to reduce your exposure.

Cal/OSHA's most important limits are called the Action Level and the Permissible Exposure Limit.



#### What Is the Action Level?

Cal/OSHA's Action Level is 30 micrograms of lead per cubic meter of air ( $\mu g/m^3$ ). This represents an average over an 8-hour work day. If personal air sampling finds your average exposure over an 8-hour day is at the Action Level or higher, certain protective measures are required.

Think of the Action Level as a yellow traffic light. It means caution. If you are exposed at or above this level, even for one day a year, you must be provided with the protective measures listed in the section above, **plus**:

- More training, especially about the hazards of working with lead
- An initial blood lead test.

#### What Is the Permissible Exposure Limit?

Cal/OSHA's Permissible Exposure Limit (PEL) is 50 micrograms of lead per cubic meter of air ( $\mu$ g/m<sup>3</sup>). This also represents an average over an 8-hour work day. The PEL is the **maximum** amount of lead you may be exposed to.

Think of the PEL as the red traffic light. It means stop. If the exposure level is higher than the PEL, your lead exposure **must** be reduced.

If you are exposed above the PEL, you must be provided with all the protective measures listed in the two sections above, **plus**:

- A respirator
- Regular blood lead tests
- Protective clothing and other personal protective equipment (like goggles)
- A special area to change clothes so you don't wear work clothes home
- A shower (where feasible)
- A separate eating area free of lead
- Warning signs to restrict access to the work area
- Become a DHS-certified lead worker. (Remember, to become a DHS-certified lead worker, you must take a course, pass the course exam, submit an application for certification, and pay a fee to DHS.)

#### Is the PEL Different If You Work Over 8 Hours?

**Yes.** The PEL is an "8-hour time weighted average." This means it is based on the amount of lead you are exposed to, averaged over an 8-hour period. Your actual exposure may be higher at some times and lower at others.

The PEL must be adjusted when you work more than an 8-hour day. The adjusted PEL is determined by dividing  $400 \,\mu\text{g/m}^3$  by the number of hours in the work shift.

For example, if your work shift is actually 10 hours, the PEL is:

#### $400 \ \mu g/m^3 \div 10 \ hours = 40 \ \mu g/m^3$ .

However, if your work shift is **less** than 8 hours, the PEL is the same as for an 8-hour day. The PEL is never more than  $50 \ \mu g/m^3$ .

#### What Are Trigger Tasks?

Certain tasks are known to generate a lot of lead dust. Workers who do them need to be fully protected, even before air sampling results come back.

These tasks, listed in the Cal/OSHA Lead in Construction standard, are called **trigger tasks**. When doing a trigger task (if no air sampling results are available), workers must be protected as if they were exposed above the PEL.

Cal/OSHA defines three levels of trigger tasks. The tasks at each level are **assumed** to produce lead exposure within a certain range. At each higher level, a worker needs a more protective type of respirator.



#### Level 1 Trigger Tasks (assumed exposure above 50 $\mu$ g/m<sup>3</sup> and not exceeding 500 $\mu$ g/m<sup>3</sup>)

• Manual demolition

Manual sanding

• Manual scraping

- Using a heat gun
- Spray painting with lead paint
- Removing lead paint with a power tool that has a HEPA vacuum attachment.

#### Level 2 Trigger Tasks (assumed exposure above 500 $\mu$ g/m<sup>3</sup> and not exceeding 2500 $\mu$ g/m<sup>3</sup>)

•

• Lead burning

Using lead mortar

Cleanup of dry abrasives

- Rivet busting
- Removing lead paint with a power tool that has **no** HEPA vacuum attachment
- Moving and removing abrasive blasting enclosures.

#### Level 3 Trigger Tasks (assumed exposure over 2500 µg/m<sup>3</sup>)

- Abrasive blasting
  Welding
- Cutting Torch burning.

Notice that all three levels of trigger tasks assume that exposure will be above the PEL. If air sampling hasn't been done and you are doing a trigger task, you must be provided with the same protections required when exposure is actually above the PEL. The one exception is that you don't have to attend a 24-hour Lead Worker training class and become state-certified unless air sampling shows you **really** are being exposed above the PEL.

#### Key Points: Chapter Four

- Cal/OSHA requires personal air sampling to determine how much lead dust is generated by each construction or maintenance task.
- Cal/OSHA has limits on how much airborne lead a worker may be exposed to over an 8-hour work day. The Action Level (AL) is 30 µg/m<sup>3</sup> and the Permissible Exposure Limit (PEL) is 50 µg/m<sup>3</sup>.
- Cal/OSHA has a list of "trigger tasks" that are presumed to expose a worker above the PEL.
- For any lead exposure, even below the AL, Cal/OSHA requires worker training, hand washing facilities, and good housekeeping.
- For lead exposure between the AL and PEL, Cal/OSHA also requires more specific training and an initial blood test. If exposure is above the AL for at least 30 days in 12 consecutive months, a medical surveillance program is required.
- For lead exposure that may go above the PEL, Cal/OSHA requires hand washing facilities, regular blood tests, respirators, other PPE, special warning signs, a written employer plan, a 24-hour lead worker training course, and certification.

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# **Other Site Hazards**

# What Other Hazards May There Be at a Job Site?

When you're doing a lead-related construction, maintenance, or abatement job, lead is not the only hazard.

A job hazard is defined as anything at work that can hurt you, make you sick, or harm your mental health. Some job hazards are very obvious, but others are not. Hazards commonly found on a lead job can be divided into three categories:

**Safety hazards** can cause immediate accidents and injuries. *Example:* slippery surfaces, ladders, tools.

**Chemical hazards** are gases, vapors, liquids, or dusts that can harm your body, either right away or after long-term exposure. *Examples:* lead dust, solvents, asbestos.

**Physical hazards** may sometimes be less obvious because they may not cause immediate symptoms or health problems. *Examples:* noise, repetitive movements, heat, cold.

There are many hazards in all these categories on most lead jobs. There may also be **biological** hazards like molds and bacteria. Worker protection from workplace hazards is regulated by Cal/OSHA.



#### JOB SITE HAZARDS

Hazard	Health or Safety Problems
Heat (Physical Hazard)	
<i>Sources:</i> Working in PPE, hot temperatures, confined spaces.	Dizziness, disorientation, fainting, heat exhaustion, heat stress, heat stroke, death. Heat stroke is a medical emergency and occurs when your body can't cool down.
Electrical hazards (Safety Hazard)	
<i>Sources:</i> Defective or ungrounded power tools, overhead power lines, electrical equipment in contact with water or with metal ladders.	Electric shock, electrocution, explosion.
Power tools (Safety Hazard)	
<i>Sources:</i> Heat guns, power sanders, drills, needle guns.	Cuts, punctures, eye injuries, electric shock, repetitive strain injuries, vibration, burns.
Asbestos (Chemical Hazard)	
<i>Sources:</i> Ceiling treatments, siding tiles, pipe lagging, furnace insulation, floor tiles.	Lung disease, cancer, long-term risk of death.
Other chemicals (Chemical Hazard)	
<i>Sources:</i> Solvents, paint strippers, cleaning products, carbon monoxide. Spills and sudden releases of chemical products are particularly hazardous.	Skin burns, eye damage, respiratory problems, liver and kidney damage, cancer, fire, explosion, death.
Slips, trips, and falls (Safety Hazard)	
<i>Sources:</i> Plastic sheeting (especially when wet), ladders, scaffolds, roofs, electrical cords, debris, clutter, poor lighting.	Broken bones, back injury, concussion, cuts, musculoskeletal strain, death.

Heavy lifting (Safety Hazard)	
<i>Sources:</i> Boards, boxes, bags, equipment, machinery, waste.	Back injury, musculoskeletal strain.
Repetitive motion (Physical Hazard)	
<i>Sources:</i> Using power or hand tools, scraping, sanding, painting.	Musculoskeletal strain, tendinitis, carpal tunnel syndrome.
Fire and explosion (Safety Hazard)	
<i>Sources:</i> Chemicals near heat, flame, or spark, chemicals in confined spaces, heaters, defective/ungrounded electrical equipment.	Burns, smoke inhalation, cuts, broken bones, concussion, death.
Noise (Physical Hazard)	
Sources: Power tools, machinery, vehicles.	Hearing loss, stress, distraction leading to accidents.
Confined spaces and trenches (Safety Hazard)	
<i>Sources:</i> Working in any enclosed or partly enclosed area with difficult access, especially with vapors, fumes, or lack of oxygen.	Suffocation, injury from explosion or cave-in, harmful chemicals, death.

#### How Can Job Hazards Be Controlled?

Cal/OSHA says it is the employer's responsibility to reduce or eliminate job hazards. Although every effort should be made to control hazards and prevent injuries, it is also important to have someone who knows CPR and first aid on your crew in case someone does get hurt. A first aid kit must be available.

There are many ways to control hazards, but some are better than others. Three main methods are:

**Remove the hazard.** The best method is to get rid of the hazard altogether. An old, ungrounded power tool could be replaced with a modern grounded one. Or a toxic chemical product could be replaced with a safer product, like using a water-based paint stripper instead of a solvent-based one.

**Have safe work policies and procedures.** Employer policies could limit the amount of time a worker is exposed to a hazard. They could also require that spills be cleaned up immediately, and that heavy objects always be lifted by two people.

**Use protective clothing and equipment.** Respirators, protective suits, gloves, and other PPE should be used only when other methods fail to give workers enough protection. Some of the disadvantages of PPE are:

- The PPE has to fit properly in order to work.
- Workers may not want to use it because it can be uncomfortable, hot, and may make it hard to communicate.
- The PPE has to be right for the particular hazard, like the right respirator cartridge or glove for a particular chemical.
- PPE doesn't get rid of the hazard itself.

#### Some Common Hazards

Below are some hazards commonly found on a lead-related job site, and recommended ways to control them.

#### Heat

Always work with a buddy. Report symptoms of heat stress to your supervisor right away, including headache, dizziness, confusion, and nausea. Take frequent breaks in a cool area if possible. Drink plenty of cool water (8-16 ounces at every break). Get used to the heat gradually (it takes about two weeks to acclimate to heat). If you stop sweating, you could have heat stroke, which is a medical emergency.

#### Chemicals

Use less hazardous chemicals when possible. Have good ventilation. Keep air compressors, generators, and vehicles with gasoline engines away from enclosed work spaces. The carbon monoxide gas produced can be deadly. Get training on how to work safely around chemicals. Check Material Safety Data Sheets (MSDSs) for chemical products. The MSDS should tell you if you need a respirator or other PPE and what to do in case of a spill or other exposure.

#### Fire and Explosion

Avoid welding, cutting, and doing other work that produces sparks if there are combustible materials nearby. Use safety lights with cages that keep the hot bulb from touching a surface and starting a fire. Keep power tools in good condition. Don't smoke in the work area. Use fire resistant materials whenever possible. Have an ABCrated fire extinguisher on site. Have an escape plan for the job site, with emergency phone numbers available.
#### Electricity

Shut off power and lock out the electrical circuit whenever you are working around water. Always use ground fault circuit interrupters (GFCIs). Extension cords should have their own GFCI. Use power tools that are double insulated, grounded, and have plastic or rubber handles. Check to make sure power tools and cords are in good condition. Use non-metal ladders. Watch for hidden live wires in walls and ceilings. Assume all wires are live until they are tested. Never touch a worker who has been shocked. In case of shock, shut off electricity, then move the worker away from anything metal using a dry wooden pole.

#### Noise

Noise levels should be reduced to below 85 decibels. If levels can't be reduced low enough, wear hearing protection such as ear muffs or ear plugs. Cal/OSHA requires hearing protection when noise levels exceed 90 dBA.

#### Ladders

Inspect ladders before use. Look for broken or slippery rungs, a wobbly frame, and missing rubber feet. Set the ladder on a substantial base and place it so the distance from the wall to the base of the ladder is one-fourth the height of the ladder. Extend ladder side rails to at least three feet above the landing if handholds are not available. Never splice ladders together. When using a ladder, or when going up or down, always face the ladder. Never stand on the top three rungs. Use both hands when going up or down. Use a tool belt to keep your hands free. Don't over-extend your reach when on a ladder. All portable ladders must be tied or otherwise secured. If using a stepladder, don't lean it against the wall. Make sure the stepladder is properly set and locked. Don't step on the topcap or the step below the topcap. Don't place planks on the topcap.

#### Slips, Trips, and Falls

Keep floors dry. Try to use as little water as possible and use a wet/dry HEPA vacuum to pick up any accumulated water. Put strips of duct tape on the bottoms of your shoe coverings to increase traction. Keep the job site organized and free of clutter. Use ladders and other equipment safely. When working at heights, check to see if you need a fall protection device. Personal fall protection must be used when working over 7 1/2 feet.

#### Lifting

When lifting, bend your legs, keep your back straight, and keep the object close to your body. Always get help from someone else when lifting heavy objects, or use a mechanical lifting device.

#### **Repetitive Motion and Awkward Posture**

If you are doing repetitive physical work, or are forced to work with an awkward posture, rotate jobs so you're not doing it for too long a time. Also try to avoid using vibrating tools or equipment for too long. Find ways to reduce the amount of vibration.

## Key Points: Chapter Five

- Some hazards on a lead job can be more dangerous than lead exposure.
- Heat stress, falls, confined spaces, and electrical shocks can kill you.
- Each time you enter your site, look around for potential hazards. Being aware of hazards is the first step toward protecting yourself.
- When you see a hazard, report it!
- There are different ways to control hazards, but the best are the ones that remove the hazard completely.



## **Know Your Rights**

## Do Workers Have a Right to Safety on the Job?

**Yes**. Under state and federal law, you have the right to a safe workplace. In California, Cal/OSHA sets and enforces standards that spell out in detail what employers must do to keep the workplace safe. We discuss one of these, the Lead in Construction standard, throughout this manual. This standard gives you specific rights related to your lead exposure, such as the right to have a respirator and the right to get blood tests.

You have additional health and safety rights under other Cal/OSHA standards and under laws and regulations enforced by various state and federal agencies.

These rights fall into three categories:

- The **Right to Know** about workplace hazards
- The **Right to Protection** from exposure to hazards
- The **Right to Act** to improve health and safety conditions.



## What Is the Right to Know?

This is the right to get specific information from your employer about the hazards found in your workplace. Several Cal/OSHA standards give you this right.

#### Lead in Construction Standard (Title 8 CCR §1532.1)

Cal/OSHA's Lead in Construction standard gives you the "right to know" in several ways. You have the right to know:

- How much lead dust is in the air you breathe during a lead job, through personal air sampling. You have the right to know the results of this air sampling within five working days after your employer receives the results in writing.
- How much lead is in your blood. You have the right to blood lead testing if you are exposed to lead dust in the air at or above the Action Level or if you are doing trigger tasks. You have the right to know the results of any blood lead tests or medical evaluations within five working days after your employer receives the results in writing.
- The hazards of lead and how to work safely. Your employer must give you training.

#### Hazard Communication Standard (Title 8 CCR §5194)

This Cal/OSHA standard gives you the right to information about the chemicals and other hazardous substances you may be exposed to at work. It requires your employer to provide Material Safety Data Sheets (MSDSs), chemical labels, and training.

• **MSDSs.** Manufacturers of products containing hazardous ingredients must prepare MSDSs for those products and distribute them to purchasers (such as employers). Employers receive MSDSs from manufacturers and must make them available to workers. Employers must have an up-to-date MSDS for each chemical product they use.

MSDSs should include very detailed information about the ingredients in the product, their hazards, any exposure limits that have been set, how to use the product safely, and emergency procedures. (See box for a complete list of items an MSDS must cover.)

- **Chemical labels.** Employers must make sure that all products with hazardous ingredients are properly labeled. Labels must include the names of the hazardous ingredients, specific warnings about potential hazards, short and long term health effects, and the name and address of the manufacturer or importer.
- **Training.** Employers are required to train workers about the hazardous substances used at work, their health effects, and how to work safely with them. The training must also cover how accidental chemical releases are detected, and emergency procedures.

#### What's on an MSDS?

Every MSDS must include:

- Product name and ingredients
- Emergency phone number
- Fire/explosion/reactivity hazards
- Legal exposure limits
- Protective control measures
- Emergency and first aid measures
- Manufacturer name/address
- Product characteristics: physical/chemical
- Health hazards
- Handling and use precautions
- Personal protective equipment needed
- Spill and leak procedures.

#### Access to Employee Exposure and Medical Records Standard (Title 8 CCR §3204)

This Cal/OSHA standard gives you the right to see and copy certain records kept by your employer. These include:

- Your own medical records (like blood lead test results)
- Records of your workplace exposure to chemicals or other hazards (like personal air sampling results).

This standard does **not** require your employer to do any medical tests or air sampling, but it does require your employer to give you access to these records if they exist. The Lead in Construction standard **does** require air sampling, and in some cases blood tests and medical exams.

Medical records are confidential. You are the only one who can obtain your records. However, you do have the right to sign a release so your doctor or union representative can get them. Doctors and union reps also can request summaries of medical records, without names, to look for trends (for example, high blood lead levels among a group of workers).

Exposure records are not confidential. Doctors, union reps, and others can request them directly.

#### Log 300 Regulation (Title 8 CCR §14300)

This is a Cal/OSHA regulation that requires most employers with 10 or more employees to record most occupational injuries and illnesses on a state form called Log 300.

Workers have a right to get a copy of the Log 300 as well as the Annual Summary of the log (Form 300A) and individual Incident Reports (Form 301). When workers request these, the employer must supply them by the end of the next business day. The Annual Summary must also be posted at the worksite for three months, from February 1 to April 30 each year.

Injuries and illnesses must be recorded on the log if they result in death, days away from work, restricted work, transfer to another job, medical treatment beyond first aid, loss of consciousness, or diagnosis of a significant medical condition by a physician or other licensed health care professional. This includes workers with blood lead levels over 50 µg/dL.

A few industries are exempt from these requirements.

The Log 300 must be kept at the local worksite. When there is no fixed worksite, as in construction, the log must be kept at the office or station where workers are supervised. The Log 300 is important because it can provide information about serious hazards and other problems that need to be corrected. Cal/OSHA reviews the log when conducting an inspection.

False or incomplete information on the log can result in large penalties for the employer.

## What Is the Right to Protection?

If there are hazards in your workplace, Cal/OSHA says you have a right to be protected from them. Your employer must try to reduce or eliminate hazards by all possible means. If a hazard can't be eliminated completely, your employer must protect you from it by supplying special equipment like respirators, protective clothing, goggles, gloves, safety shoes, or fall protection devices. Cal/OSHA's Lead in Construction standard gives you the "right to protection" because it says your employer must give you a respirator and PPE in many situations.

You have the right to protection under the Department of Industrial Relations (California Labor Code §6400). This says that employers have a duty to provide a safe and healthful workplace. There are numerous Cal/OSHA standards that spell out protective measures required for specific industries and specific hazards. An important Cal/OSHA regulation t hat gives you a "right to protection" is the IIPP standard.

#### Injury and Illness Prevention Program (Title 8 CCR §3203)

This Cal/OSHA standard requires employers to set up and maintain an effective health and safety program. Your employer must:

- Identify someone who will be responsible for the program.
- Have a system to identify and correct unsafe or unhealthful conditions. This must include periodic inspections of the worksite. Supervisors must be informed of any problems identified.
- Have procedures for workers to report unsafe conditions without reprisal.
- Train workers about hazards before they start work and every time a new hazard is introduced. (Cal/OSHA also has a regulation that tailgate safety meetings must be held with workers in construction at least every 10 days.)

- Make sure that workers comply with safety rules and other established procedures.
- Put the program in writing and post it where workers can see it.
- Periodically evaluate the program to see if it is effective.

## What Is the Right to Act?

This is your right to speak up and take action to improve health and safety conditions at work. It includes the right to discuss health and safety problems with your supervisor without fear of discrimination, the right to join a union, the right to make a complaint to Cal/OSHA or other agencies, and the right to refuse unsafe work.

These rights are enforced by the National Labor Relations Board (NLRB), Cal/OSHA, or the California Labor Commissioner, as explained below.

#### Right to Join a Union (California Labor Code §923 and Title 29 USC §157)

State and federal laws protect your right to join a union, to have a union represent you in dealing with your employer, and to bargain collectively with your employer through the union about wages and working conditions.

Most workers in private industry have these rights under the National Labor Relations Act (NLRA). Other workers have similar rights under the California Labor Code.

Your union has the right to negotiate health and safety contract language, which may give you better rights and protections than you have under Cal/OSHA standards.

Under the NLRA, your union also has the right to get health and safety information from your employer in order to bargain effectively. Unions can request a wide range of information, including names of chemicals, MSDSs, sampling data, group summaries of blood tests and other medical tests, death and pension records, and written company health and safety policies. The NLRA also gives unions the right to bring in their own industrial hygienist to inspect the workplace.

The National Labor Relations Board (NLRB) enforces the NLRA. You can file a complaint with the NLRB if the employer interferes with any of your NLRA rights.

#### Right to File a Cal/OSHA Complaint (California Labor Code §6309)

You have the right to file a complaint with Cal/OSHA about workplace health and safety hazards. Cal/OSHA is required by law to keep your name confidential unless you request otherwise. A union representative also may file a complaint on behalf of a group of workers.

Complaints may be filed in person at a Cal/OSHA office, by phone, by letter, or online at Cal/OSHA's website. If you make your complaint by phone, follow up with a written complaint.

Cal/OSHA will investigate the complaint within three days if the problem could result in death or serious physical harm. Otherwise, the complaint will be investigated within 14 days.

In most cases, Cal/OSHA will send an inspector to your workplace. The inspector walks through the workplace and may take photos or measurements. If you are the person who filed the complaint and wish to do so, you can participate in the inspection on paid work time. You may also designate your union rep to participate. After the inspection, you can request a copy of the inspector's report.

The employer may be cited or fined if Cal/OSHA finds health and safety violations during the inspection.

Cal/OSHA usually responds more quickly to a complaint if you:

- Sign the complaint
- Explain that you have already tried to resolve the problem with management
- Show that the hazard is serious
- Show that many people are affected
- Give details on the location of the problem and the best time of day to observe it
- Cite the standard or regulation that is being violated (although this is not required)
- Follow up the complaint with a phone call.

#### Right to Refuse Unsafe Work (California Labor Code §6311)

The California Labor Code says you can refuse to do unsafe work if doing the work would:

- Create a real and apparent hazard, and
- Violate a Cal/OSHA standard or state law.

You have the right to refuse unsafe work, but using this right can be risky if you don't have a union to protect you. If you lose your job or are discriminated against after refusing unsafe work, you can complain to the California Labor Commissioner (Department of Industrial Relations, Division of Labor Standards Enforcement). However, these cases can take two to three years to resolve. So you should not refuse unsafe work unless you have no alternative. Refuse work only if there is a danger of death or serious injury. Before you refuse to do an unsafe job:

- Talk to your co-workers to be sure you agree. It can be helpful if several workers believe that the job creates a serious hazard.
- Tell your employer about the unsafe condition and ask him/her to correct the problem before work is done. Say that you believe there is a serious hazard and offer to do some other work instead.
- Contact your union representative, if you have one.
- Request an immediate Cal/OSHA inspection.

#### Right to File a Discrimination Complaint (California Labor Code §6310)

You have the right to file a discrimination complaint if you believe your employer has punished you for bringing in Cal/OSHA, for refusing unsafe work, or for exercising any of your other Cal/OSHA rights. Discrimination may include a written or oral warning, firing, layoff, demotion, transfer, threat, or harassment.

To make a discrimination complaint, contact the California Labor Commissioner (Department of Industrial Relations, Division of Labor Standards Enforcement). Ask for a complaint form and instructions. The Labor Commissioner's services are free. Their office will investigate your complaint and may hold a hearing.

When you make a complaint, be prepared to:

- Explain how your employer has discriminated against you for your job safety and health activities.
- Provide names and addresses of people involved or witnesses to the punishment.
- Supply any documents, letters, or other materials that relate to the incident.

If the Labor Commissioner finds that your employer has discriminated against you for exercising your health and safety rights, your employer will be ordered to restore what you lost—your job, pay, benefits, and/or seniority. You may also get back pay. However, it may take several years to resolve your case.

## How Can You Use These Rights to Solve Safety Problems?

Numerous state and federal laws give you the "right to know," the "right to protection," and the "right to act." But using these rights to your advantage is not easy. To solve a workplace health or safety problem, you must be organized and persistent, pressing the employer as well as the government to fulfill their legal responsibilities.

Here are some steps to follow.

- Identify the problem you want to correct.
- Build a strong foundation for your case. Gather written material that documents the problem. Request your medical and exposure records, and records of past accidents or illnesses at your workplace that are related to the problem. Also document your attempts to get management to correct the problem.
- Decide how the problem could be corrected. You may want to bring in your own outside technical experts for advice.
- Come up with a timetable for correcting the problem.
- Involve other workers and keep them informed. Co-workers should be your base of support for advice and direction. This will help you determine how many people are affected by the problem and care about it.
- Work with the union if there is one at your workplace.
- First try to solve the problem by talking to your supervisor or negotiating with the company. But if necessary, you can bring in a government agency like Cal/OSHA.
- If you call in an outside agency, ask to participate in inspections and in all meetings between the agency and the company. Keep co-workers informed.
- Be persistent in your follow-up.

#### What Is Workers' Compensation?

Workers' compensation is another important right that you have on the job. It is a no-fault insurance program that provides cash and other benefits in the event of work-related injury, illness, or death. You are eligible for benefits even if you have a pre-existing medical condition. The program is paid for by employers and administered by the State Division of Workers' Compensation and the Workers' Compensation Appeals Board.

All employers are required to carry workers' compensation insurance. Nearly every worker in California is covered by the law.

If you are injured on the job, first get medical help. Then notify your supervisor and union, even if you do not lose any time from work. Ask your supervisor for a workers' compensation claim form to fill out. Generally you have 30 days to file a claim for a job injury. As a work-related illness may not be detected immediately, employees should notify their employer immediately of an incident or illness, even if they haven't seen a doctor yet.

#### What Are the Benefits?

California law gives you four kinds of workers' compensation benefits:

#### **Medical treatment**

The employer fully pays the cost of hospitalization, x-rays, lab tests, and transportation. Injured workers are eligible for medical care even if they have not missed time at work.

#### **Vocational Rehabilitation or vouchers**

Job training vouchers and other services may be available to eligible workers whose disability prevents them from re-employment.

#### Death benefits

Eligible dependents of a worker who is killed on the job receive payments, including burial expenses.

#### Payments to replace lost wages

The amounts are set by state law and are different for temporary disability and permanent disability. To be eligible, you must be unable to do your usual job for more than three days or be hospitalized overnight.

As a general rule, temporary disability benefits are two-thirds of the gross (pre-tax) wages you lose while recovering from your job injury. However, you can't receive less than a minimum weekly amount, or more than a maximum weekly amount. The minimum and maximum change from year to year, according to a state formula.

Permanent disability benefits are payable if you still have some limitations in your ability to work after your condition stabilizes. The amount depends on your permanent disability "rating," your date of injury, and your wages before you were injured.

Workers with high blood lead levels (greater than 50  $\mu$ g/dL) are paid in a different way if they lose time from work while waiting for their BLL to go down. Under the Medical Removal Protection requirements of the Cal/OSHA Lead in Construction standard, they are entitled to their full salary and benefits during this period, up to 18 months. (See Chapter 2 for more information on Medical Removal Protection.)

## What Other Laws Apply to Lead Work?

There are Cal/OSHA, DHS Title 17, and federal HUD and EPA regulations that protect both workers and building occupants. According to the law:

• Any lead-related construction must be done by workers trained about lead-safe work practices.

- If the job involves permanently abating the lead hazard (more than 20 years), it must be done by certified lead workers and overseen by a certified lead supervisor.
- Safe work practices, including wet methods, must be used during the job to minimize dust.
- Power tools should have HEPA vacuum attachments to capture dust.
- Plastic sheeting must be placed on the floor or ground to prevent contamination. This is called containment.
- Areas should be wet cleaned and HEPA vacuumed when work there is complete. On an abatement job, certified professionals must take "clearance wipe samples" to make sure surfaces have been adequately cleaned up. Waste from the job should be disposed of in accordance with hazardous waste regulations.
- Building occupants should be kept well informed of the procedures that will be followed and what will be expected of them.
- Residents should not be allowed in any work area. Areas must be thoroughly cleaned before residents can enter them.

## Who Must Be Notified Before a Lead Job?

Cal/OSHA and EPA both have notification requirements when any lead job is planned.

Cal/OSHA says signs must be posted alerting workers and building occupants if lead dust will be generated above the PEL; this is called a "regulated area."

Advance written notice must be given to Cal/OSHA if the job will involve any trigger task. Some work involving very small amounts of lead is exempt from this requirement. Notice must also be given to DHS if the job involves abatement.

EPA requires that the owners and tenants be notified of possible lead hazards if renovation is planned on pre-1979 housing.

## Key Points: Chapter Six

- **Right to Know.** Workers have the right to get information about the hazards on their job under Cal/OSHA's Lead in Construction standard, Hazard Communication standard, Access to Employee Exposure and Medical Records standard, and Log 300 regulations. One way to learn about chemical hazards is through Material Safety Data Sheets (MSDSs).
- **Right to Protection.** Workers have the right to be protected from health and safety hazard`s under the Department of Industrial Relations' California Labor Code and Cal/OSHA standards.

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- **Right to Act.** Workers have the right to take action to prevent serious harm.
- **Title 17.** This Department of Health Services (DHS) regulation requires safe work practices on lead jobs. It also spells out training requirements for workers, supervisors, and others involved in lead-related construction and maintenance work.

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## **Abating Lead Hazards**

### What Is Lead Abatement?

**Abatement** means measures specifically designed to reduce or eliminate lead hazards in public or residential buildings. There are two basic ways to abate lead hazards. They can be controlled using **temporary** methods (expected to last up to 20 years). Or they can be controlled using **permanent** methods (expected to last more than 20 years).

The U.S. Department of Housing and Urban Development (HUD) requires that lead-based paint be permanently abated on all public or federally-assisted housing before it undergoes comprehensive modernization. Permanent abatement is not required for other public buildings or residential housing.

#### Who Is Qualified to Do Lead Work?

Once you complete this course you can become a lead worker certified by the California Department of Health Services (DHS).

Both the Cal/OSHA Lead in Construction standard (Title 8 CCR §1532.1) and DHS' Title 17 (Title 17 CCR §36000 and §36001) address how lead work should be done and when DHS-certified lead workers must be used. According to these regulations, only DHScertified lead workers may do a lead-related construction job on a public or residential building that:

- Is designed to reduce the lead hazard for 20 years or more (permanent abatement), or
- Generates lead dust in excess of Cal/OSHA's PEL for lead  $(50 \,\mu\text{g/m}^3)$ .

In addition to lead worker certification, DHS also has other levels of certification such as lead supervisor, lead project monitor, and lead inspector/assessor, with different training requirements. See Appendix A for descriptions of the different levels and the tasks each type of certification qualifies you to do.

It is illegal to do lead-related construction work or permanent abatement without the proper certification. The fine can be up to \$1000 per violation. (California Health and Safety Code \$105255-6)

## What Methods Are Used for Temporary Abatement?

Temporary abatement methods keep lead dust levels down and can help prevent lead dust exposure. They are considered temporary because the lead paint remains and could become a hazard again. These methods reduce the lead hazard for less than 20 years.

Temporary abatement methods are usually used when painted surfaces are mostly intact and the building components are structurally sound.

There are temporary abatement methods for both paint and soil. They include one, or a combination, of the following:

- If lead paint is deteriorated, fix the underlying problem to prevent further deterioration. This can include repairing water leaks, defective plaster, rotted or defective substrates, and damaged structural parts. Fix holes and eliminate any sources of moisture.
- Stabilize deteriorated lead painted surfaces by removing the damaged paint, prepping the surface, and then painting over.
- Find ways to protect friction and impact surfaces so they won't continue to cause a hazard after repainting.
- Regularly check paint for deterioration. Remember that temporary abatement methods only work as long as the repainted surface remains in good condition.
- Deal with contaminated soil so it doesn't present a hazard. Cover the soil with plantings or gravel. Or restrict access to the area.
- Inform residents, building owners, and workers how to avoid creating lead hazards. Whenever a temporary method is used, residents and owners must be told about where the lead is, the hazards of lead, and the need to have the surface periodically inspected and maintained.

Sometimes temporary abatement methods are not a good solution. Building components that are severely deteriorated, subject to a lot of moisture, or not structurally sound can cause temporary methods to fail rapidly. In these situations a permanent solution should be used.

## What Methods Are Used for Permanent Abatement?

Permanent abatement is expected to last more than 20 years. Whenever a permanent abatement job is planned, a state-certified lead supervisor or lead project monitor must determine which methods will be used.

There are permanent abatement methods for both paint and soil. Methods for paint include:

- Removal—take all the lead-based paint off.
- Replacement—replace a lead painted building component with a new component that has no lead paint.
- Encapsulation—coat the lead painted surface with a special liquid sealant so that lead dust cannot be released. (To be considered a permanent abatement method they must be guaranteed to last more than 20 years.)
- Enclosure—cover the lead painted surface with drywall, siding, or another suitable material.

Permanent soil abatement methods include:

- Remove and replace contaminated soil.
- Cover contaminated soil with concrete or asphalt.

Permanent abatement may be required in some situations—for example, if a child in a home has a high blood lead level. The federal Department of Housing and Urban Development (HUD) also requires that permanent abatement methods be used on all public or federally-assisted housing before undergoing comprehensive modernization. This doesn't apply to other public buildings or other residential housing.

## What Are Lead-Safe Work Practices?

Whenever you do lead-related work, whether it is an abatement job or just working on a building with lead paint, it is important to do the work in a lead-safe manner. You should generate as little lead dust and fume as possible.

Lead-safe work practices are ways of doing the job that minimize the amount of lead getting into the air. The result is lower worker exposure, lower exposure for building occupants, and less dust to clean up later.

In California there are two sets of regulations that outline how lead work should be done. These are:

- Cal/OSHA Lead in Construction standard (portions of Title 8 CCR §1532.1)
- California Department of Health Services' "Accreditation, Certification, and Work Practices for Lead-based Paint and Lead Hazards" in Title 17 of the California Code of Regulations. (Work practice standards can be found in Title 17 CCR §36000 and 36100.)

Cal/OSHA's Lead in Construction standard spells out how workers must be protected whenever they are doing construction or maintenance tasks that disturb lead paint.

DHS's Title 17 requires specific work practices that protect workers, building occupants, and the surrounding environment. These work practices are the same as those required by the federal Department of Housing and Urban Development (HUD) *Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing*, June 1995.

Also, a new California law makes it illegal to create a lead hazard, or to have a condition that is a lead hazard, in a residential or public building. Lead-safe work practices will help you comply with this law. **SB 460** (effective January 1, 2003) says enforcement agencies (local health and building departments and the state Department of Health Services) can inspect sites and issue orders to abate or correct lead hazards. They can also issue "cease and desist" orders for activities that create a lead hazard, such as dry sanding or scraping, power washing or abrasive blasting without environmental protections, or failing to restrict access to the work area. Anyone who fails to comply with an order can be fined up to \$1000 per violation (California Health and Safety Code \$105255-6).

Lead-safe work practices include "working wet" and using special power tools with HEPA vacuum attachments to collect dust. (HEPA stands for High Efficiency Particulate Air.)

## How Do You "Work Wet"?

One way to "work wet" is to mist the work area periodically with a spray bottle or commercial sprayer when you are scraping or sanding paint. Don't use too much water, which could cause runoff or damage the building component. Also keep the dust, chips, and debris wet as you go.

Another way to "work wet" is to use a water-based stripper, deglosser, or etcher to prepare a work surface instead of scraping or sanding. Water-based strippers are safer than solvent-based ones because you have less exposure to harmful chemicals. Especially avoid strippers that contain methylene chloride because of the risk of cancer.



Don't use wet methods around electricity. Whether the power is on or off, **never** use water near outlets, electrical boxes, or wiring. Watch out for concealed wiring in walls or ceilings.

## How Do HEPA Power Tools Work?

HEPA power tools capture the dust they generate before it gets into the air. They have a vacuum attachment that sucks up the dust. The HEPA filter prevents dust from being blown out the vacuum exhaust and back into the work area. Instead, the dust is collected in the vacuum bag.

HEPA attachments are available for sanders and other power tools. Special HEPA vacuum cleaners are also used in lead work. These are vacuums designed to clean up toxic dusts like lead that have collected on surfaces.



## Do Lead-Safe Work Practices Really Make a Difference?

**Yes.** A study recently conducted by the California Department of Health Services (DHS) showed that wet manual sanding compared to dry manual sanding dramatically reduced exposure to lead dust. Over a 30-minute period, lead exposure was  $420 \,\mu\text{g/m}^3$  for dry sanding and only  $3.3 \,\mu\text{g/m}^3$  for wet sanding.

Using a HEPA vacuum attachment on a power sander also significantly reduced lead exposure. Over a 30-minute period, lead exposure was  $580 \,\mu\text{g/m}^3$  without the attachment and only  $33 \,\mu\text{g/m}^3$  when using it.

Safer Work Methods	
U=Unsafe P=Prohibited	Safer
<b>P</b> Dry manual sanding, scraping, or wirebrushing	Wet manual sanding, scraping, or wirebrushing Using a chemical stripper, deglosser, or etcher
<b>P</b> Power sanding or grinding <b>without</b> a HEPA tool	Power sanding or grinding with a HEPA tool
P Uncontained dry abrasive blasting	Vacuum and wet blasting methods
P Open flame burning	Using a heat gun at low temperature, chemical stripper, or HEPA power tool
<b>U</b> Dry manual demolition	Mist area with water during work
U Dry removal of containment	Mist containment before removal

## Key Points: Chapter Seven

- Temporary abatement methods are designed to reduce the lead hazard for less than 20 years.
- Permanent abatement methods are designed to eliminate the lead hazard for more than 20 years.
- Always use safe work practices: work wet and use HEPA vacuum attachments on power tools. Use heat guns only at low temperatures.
- Protect both yourself and the building occupants.



# **Respirators: How and Why?**

## Do You Need a Respirator for Lead Work?

Cal/OSHA says that employers must make sure workers do not breathe air contaminated by toxic materials like lead dust or solvent vapors.They must try to reduce contaminants in the air by any possible means. But if this can't be done, workers must sometimes use respirators.

Cal/OSHA says you must be given a respirator if:

- Your lead exposure is above the PEL (50  $\mu$ g/m<sup>3</sup>), *or*
- You are doing a trigger task and air sampling has not been done, *or*
- You request a respirator, even if your lead exposure is below the PEL.

A medical evaluation is required to make sure you can wear a respirator safely. For example, if you have asthma, other breathing problems, or heart problems, you may not be able to wear a respirator.

Respirators can be hot, awkward, and uncomfortable. They can make it harder to breathe and harder to work. To be protected, the worker must wear the right kind of respirator for the job. Also, the respirator must fit properly in order to work properly. Cal/OSHA says control measures that reduce the actual air lead levels below the PEL are a better way to protect workers. But if lead levels are above the PEL or you are doing a trigger task, you **must** wear a respirator.



## How Do You Know Your Respirator Fits?

You can't tell if a respirator fits correctly just by looking at it. Cal/OSHA says you must have a fit test to be sure the respirator can be properly sealed to your face. If you wear a respirator that doesn't fit well, air and dust will leak in.

Many factors can interfere with the fit. The shape of your face, a broken nose, scars, dentures, missing teeth, a change in weight, facial hair, and eyeglasses can all make it difficult to fit a respirator properly. Your employer must provide several sizes of respirators to choose from, and then do fit tests to find the one that fits properly. You should be retested every twelve months.

There are two types of fit tests:



**Qualitative fit test.** You will be asked to put on your mask and adjust the seal. You will then be exposed to an identifiable odor like banana oil or a bitter or sweet chemical. If you notice the odor, smoke, or chemical, the respirator does not fit properly. This test may be used only for testing halfmask respirators.

**Quantitative fit test.** This test is done inside a special chamber. A device inside the respirator measures how much of a test gas or vapor leaks into the respirator. This test can also be done with a device that measures substances in the air both inside and outside the facepiece.



## What Is a Respiratory Protection Program?

If respirators are used, Cal/OSHA requires your employer to have a complete Respiratory Protection Program. This program must have written guidelines for:

- Checking workers' health to make sure they can safely wear respirators
- Choosing, fit testing, and using respirators
- Training workers in the proper use and limitations of respirators
- Cleaning, sanitizing, storing, inspecting, repairing, and replacing respirators
- Evaluating the program itself.

## What Are the Types of Respirators?

The type of respirator needed for a lead job depends on the amount of lead in the air and the level of protection the respirator offers.

Ordinary paper or cloth dust masks do not protect you against lead dust, and they are prohibited on lead jobs.

The types of respirators you use in lead work are the following: APR, PAPR, and ASR.

#### Air Purifying Respirators (APRs)

APRs use cartridges with filters that clean the air you breathe. Different cartridges protect you from different substances.

You must have the right cartridge for the job. For lead work, you need a HEPA (High Efficiency Particulate Air) filter, also called a P-100, N-100, or R-100. These are usually purple or magenta, but read the label to be sure you have the right filter.

You need to change cartridges whenever it becomes hard to breathe, or if the filters inside get wet.

If your work involves lead and also other chemicals (such as solvents), you will need a different type of cartridge or a combination cartridge. You may even need a different type of respirator.

APRs may be either full-face or half-mask. A full-face APR provides more protection than a half-mask APR, and also protects your eyes.

APRs create negative pressure. When you breathe in, you create suction, or negative pressure, inside the mask. The facepiece has to fit perfectly on your nose, chin, and cheeks to create a tight seal.

If the respirator does not fit perfectly, air and dust can leak in around the edges of the mask. Remember, a respirator is only as good as its fit!



HALF-MASK APR



FULL-FACE APR

#### Powered Air Purifying Respirators (PAPRs)

With this type of APR, a battery-powered pump pulls air through the filters and blows it through a hose into the mask. The air from the pump creates positive pressure inside the mask which prevents lead dust from getting in. For this reason a PAPR provides better protection than an APR.

However, if the batteries fail or get weak, or if you breathe too hard because of exertion, a PAPR can lose positive pressure and become no more effective than a regular negative pressure APR.

PAPR

#### **APR** Limitations

If there is not enough oxygen in the workplace (such as in a storage tank or other confined space), do not use any type of APR. Instead, use a supplied air respirator, which provides clean air to breathe.

#### Atmosphere-Supplying Respirators (ASRs)

The other main type of respirator is the atmosphere-supplying respirator. It supplies clean air to you from an uncontaminated source. There are many types of atmosphere-supplying respirators, including Supplied-Air Respirators (SAR) and Self-Contained Breathing Apparatuses (SCBA). The SAR provides breathing air through a hose, while a SCBA allows the user to carry a breathing air cylinder. The SCBA has the highest protection factor and may be used for confined spaces and extreme exposure greater than 100,000  $\mu$ g/m<sup>3</sup>. The SAR and SCBA may be operated in demand mode or other positive-pressure mode. For example, the SAR may also be operated in continuous- flow mode.

- **Continuous flow respirators** provide air at a constant rate to maintain positive pressure in the facepiece. They work correctly when you are doing moderate work and breathing moderately. Any work that causes heavy breathing can create negative pressure inside the mask.
- **Pressure demand respirators** make sure you get more air as you breathe harder. They provide enough airflow inside the mask to maintain positive pressure all the time.



Demand flow respirators provide air only when you inhale, allowing the pressure in the mask to become negative. Therefore, they are not recommended for lead work.

**Type CE** supplied air respirators are used for abrasive blasting. They are like Type C, but have a hood or helmet attached to the mask. This is designed to protect you from flying grit. Like Type C, Type CE respirators may be either continuous flow or pressure demand.

## Which Respirator Is Right for the Job?

Different respirators offer different levels of protection. Your employer must provide the appropriate respirator for your exposure. For example:

- A half-mask APR provides enough protection for lead exposure up to 500 µg/m<sup>3</sup>. (Therefore, it is appropriate for Level 1 trigger tasks.)
- A full-face APR provides enough protection for lead exposure up to 2500 µg/m<sup>3</sup>. (Appropriate for Level 1 and 2 trigger tasks.)
- A half-mask supplied air respirator in positive pressure mode or a Type CE hood or helmet abrasive blasting respirator operated in continuous flow mode (with neck cuff or neck sealing feature) provides enough protection for lead exposure up to 50,000 µg/m<sup>3</sup>. (Appropriate for Level 1, 2, and 3 trigger tasks.)
- A Type C or CE full-face, pressure demand, supplied air respirator provides enough protection for lead exposure up to  $100,000 \,\mu\text{g/m}^3$ . (Also appropriate for Level 1, 2, and 3 trigger tasks.)

## Key Points: Chapter Eight

- Your employer must give you a respirator when you are exposed above the PEL, or doing trigger tasks when no air sampling has been done.
- On a lead job, your employer must also give you a respirator whenever you ask for one.
- Your respirator must be fit tested to you.
- Your employer must have a respiratory protection program whenever respirators are used.
- Different types of respirators offer different amounts of protection.

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## **Get To Know Your Respirator**

## How Do You Inspect a Respirator?

A respirator must be inspected before each use to be sure that it is complete and in good operating condition. If there is anything wrong, or if parts are missing, do not wear the respirator until it is fixed.

Respirator parts must come from the same manufacturer that made the respirator. For example, you may not use  $MSA^{TM}$  filters on an  $AO^{TM}$  brand respirator.

All respirators and cartridges must be approved by the National Institute for Occupational Safety and Health (NIOSH). Look for an approval statement or sticker on them.

#### Inspecting an Air Purifying Respirator

You should look at all of these parts:

**Facepiece (mask).** This may be made of rubber, silicone, or other materials. Is it ripped or worn? Is it dry, cracked, warped, or bent? Is it dirty?

**Inhalation valves.** These are two small rubber flaps inside the facepiece, on opposite sides, behind the filters. Make sure both of them are there. Are they ripped or bent? Are they dirty? Is the rubber decomposing?



**Exhalation valve.** This is a small, quarter-sized, rubber flap underneath the valve cover by your chin. Remove the valve cover and check to see if it is bent or warped. Is the flap ripped, bent, dry, cracked, or dirty? Is it properly seated?

**Screw-in cartridges.** These have filters in them that clean contaminants, like lead, out of the air you breathe. Remove the cartridges. Do they appear dirty or wet? Do you have the right cartridges? Remember that when you work with lead, you need cartridges with HEPA filters, which are usually magenta or purple.



If you also work with solvents or caustics, you may need combination cartridges that protect you from both the lead and the chemicals. Also check the cartridge holder. Is it cracked or broken? Are the threads stripped or worn?

**Gaskets.** These are rubber rings that make a tight seal between the filter and the facepiece. (Not every respirator has gaskets.) Are they there? Are they dry, cracked, ripped, or torn? Are they properly seated? Is the rubber decomposing?

**Elastic straps and headband.** These hold the respirator on your head. One strap goes over the crown of your head and the other two straps connect behind your neck. Are the straps still elastic? Are they stretched, stiff, frayed, torn, or cut? Are the buckles or snaps broken?

#### Inspecting a Powered Air Purifying Respirator

If you have a PAPR, you will need to check the parts above and these others:

**Hose.** If the PAPR's fan is on your belt, a hose carries air to your face. Check to see if it is bent or cut.

**Cord.** If the fan is on your facepiece, a cord supplies it with electricity from the battery. Check that the cord is in good condition.

**Fan.** Check to see how much air the fan is blowing. Use a flow meter. If it reads at least a four, the fan is working correctly.

**Battery.** Every PAPR has a battery to run the fan. Make sure that it has been properly and fully charged.

#### Inspecting a Supplied Air Respirator

If you have a supplied air respirator, you will also need to check these parts:

**Air regulator.** This valve controls how much air comes into the mask. It is either a continuous flow or pressure demand type. Make sure it appears in good condition.

**Escape cartridge.** Many Type C respirators have a HEPA filter, which is used to clean outside air if supplied air stops coming through the hose. Check for a HEPA filter. Is it clean?

**Escape air bottle.** Many Type C respirators have a small bottle of air. If air stops coming through the hose, you can breathe air out of the escape bottle. Check to see if the bottle is full.

## What Are User Seal Checks?

Although Cal/OSHA requires your employer to give you a fit test when you first get a respirator, and repeat it annually thereafter, a fit test is not enough. To make sure your respirator fits tightly to your face all the time, you should do two **user seal checks** every time you put the respirator on. These test for negative and positive pressure, and are also known as negative and positive user seal checks.

First, follow these steps to put on your respirator:

- Put the mask on your face so that the exhalation valve is under the chin and the narrow part of the facepiece is over the nose.
- Put the elastic straps on your head, top strap first. Then hook the bottom elastic straps behind the neck and below the ears.
- Adjust the facepiece on your face for a comfortable fit. Tighten the elastic straps while holding the facepiece against your face. Do not make the straps too tight. The mask will dig into your skin and be uncomfortable.

#### **Negative User Seal Check**

Follow these steps :

- Make sure the respirator fits comfortably on the face and that the straps are tightened.
- Cover the filters with your palms so that air cannot get in. Use just a small amount of pressure. Do not press the respirator against your face. You may also use a piece of tape or plastic wrap to cover the filters.



- Inhale gently and hold your breath for 10 seconds.
- If the face mask collapses slightly, you have no leakage of air and there is a good fit. If air is leaking in, check the valves, adjust the straps, and try again.
- Remove your hands, tape, or plastic wrap from the filters.

#### Positive User Seal Check

Follow these steps :

- Make sure the respirator fits comfortably on the face and that the straps are tightened.
- Cover the exhalation valve, found under the chin, by covering it with one hand. You may also use a piece of tape or plastic wrap to cover the exhalation valve.
- Exhale gently and wait.
- If the face mask extends (moves away from you a bit), you have no leakage of air and there is a good fit. If air is leaking out, check the valve, adjust the straps, and try again.



• Remove your hand, tape, or plastic wrap from the exhalation valve.

### How Should You Clean and Store a Respirator?

**Cleaning.** The manufacturer may have special instructions for cleaning the respirator. Always wash your hands before you clean it. In most cases, you should unscrew the cartridges and wipe them clean with a damp cloth. Wash the facepiece in warm water with a mild soap, then rinse well. Dry off the respirator before storing it. Use baby wipes if you don't have soap and water.

**Storage.** Store the respirator in a resealable bag or box in a location that will keep the mask from being crushed or bent out of shape. Keep it away from moisture.

## Key Points: Chapter Nine

- You must do an inspection and a user seal check every time you put on a respirator.
- You must clean your respirator and store it properly each time you finish using it.



## **Personal Protective Equipment**

## Do You Need Other PPE for Lead Work?

**Yes.** In addition to a respirator, your employer must provide personal protective equipment (PPE) if you are exposed to lead at or above the PEL, or if you are doing a trigger task. This may include a disposable protective suit, eye protection, gloves, protective footwear, hearing protection, a hardhat, and other items.



## What PPE May You Need?

You may need:



A disposable suit. This stops lead from getting on your clothes and skin. It also keeps lead from being taken out of the work area because you remove the suit before you leave. If a disposable suit is not available, you should wear coveralls, or a long sleeve shirt and long pants, and change clothes before you leave work.

**Eye protection.** This may include goggles, safety glasses, a face shield, or a full-face respirator (which covers your eyes). A portable eye wash station should also be available.





**Gloves.** Different glove materials protect you from different hazardous substances. You need to wear the right type of glove for the hazardous substance you are working with.

**Footwear.** You should wear disposable shoe covers (booties) to prevent the spread of lead from the work area. Discard the booties before you leave. To avoid slipping and falling, never wear booties on ladders or scaffolds. If you are doing demolition work, you may also need steel-toed safety shoes or boots. Boots with rubber soles give better footing in wet conditions. If you have to work around live electrical circuits, use insulated boots that protect against electric shock.





**Hearing protection.** If you are working in noisy conditions (90 decibels or above), and noise levels can't be reduced in some other way, you may need ear plugs or earmuffs.

**Other PPE.** Sometimes you may need other personal protective equipment, like a hard hat. Not all hard hats are the same. You must wear the right hard hat for the job.



## How Should You Put On and Take Off PPE?

There is a recommended way to put on ("don") and take off ("doff") your PPE.

**Donning.** Follow these steps to put on your PPE:

- Put on the disposable protective suit and booties. If the suit has a hood, leave it off for now. Make sure the suit fits properly. A good fit makes the suit more comfortable and allows more freedom of movement without tearing the material. Adjust the fit of the suit by using duct tape to create a belt or to shorten sleeves. Leave a tab at the end of each strip of duct tape for easy removal later.
- **2.** Put on the respirator before you put on the hood of the disposable suit. The respirator straps should be under the hood. Do the two user seal checks (see previous section).
- **3.** Put on the hood.
- 4. Put on the gloves.

**Doffing.** Follow these steps to take off your PPE:

- **1.** Before going into the change room, HEPA vacuum and damp wipe the lead dust from the disposable suit and take off the booties.
- **2.** Then go into the "dirty area" of the change room and gently release the duct tape on the disposable suit by pulling on the tabs.
- **3.** Remove the disposable suit by carefully rolling it down your body with the contaminated side inward. Put the suit and the tape in a properly labeled, closed waste container or plastic bag.
- 4. Remove the gloves.
- **5.** Move to the wash area before taking off the respirator. While the respirator is still on your face, clean it off with a pre-moistened disposable wipe approved by the respirator manufacturer.
- **6.** Use another disposable wipe to clean your face around the respirator. If a shower is available, you can shower with the respirator on.
- 7. Wash your hands with soap and water.
- 8. Remove the respirator and clean it properly.
- 9. Go into the "clean area" of the change room and put on your street clothes.

## Who Is Responsible for Providing PPE?

According to Cal/OSHA, your employer is required to provide you with the protective clothing and equipment you need.

Clean protective clothing must be provided at least once a week if your lead exposure is above the PEL but below  $200 \ \mu g/m^3$ .

If your exposure is over  $200 \,\mu g/m^3$ , clean protective clothing must be provided daily **or** as often as needed to maintain its effectiveness.

Disposable suits should be changed whenever they rip beyond repair. This usually happens daily.

Your employer must also provide a proper change facility, which includes a "clean area" for changing into and out of street clothing, a shower or some other way to wash up, and a "dirty area" for changing into and out of work clothes.

## Who Is Responsible for Cleaning PPE?

Your employer is responsible for the proper cleaning, laundering, and disposal of protective clothing and equipment. They must provide a closed container or bag for used protective clothing. There should be a warning label on it that reads:

**Caution**: Clothing contaminated with lead. Do not remove dust by blowing or shaking. Dispose of lead contaminated wash water in accordance with applicable local, state, or federal regulations.

## Key Points: Chapter Ten

- Cal/OSHA requires that workers be provided with appropriate PPE when they are exposed to lead above the permissible exposure limit (PEL), when they work with lead compounds that can cause skin or eye irritation, or when they do trigger tasks if air monitoring results are not yet available.
- PPE must be provided, replaced, maintained, and laundered or disposed of by the employer.
- If PPE is not worn properly, it **won't** protect you.
- Follow proper decontamination and doffing procedures *every* time you leave the work area, including breaks and lunch, not just at the end of the shift.
- **Never** take protective clothing or work shoes home because they could contaminate your home and family.





# Handling Hazardous Waste

## What Is Hazardous Waste?

Lead work can generate both hazardous and non-hazardous waste.

Hazardous waste is defined as any solid, liquid, or gas that could threaten human health or the environment. According to federal law, it includes substances that are toxic, corrosive, ignitable, or reactive.

HAZ	ARDOUS
W	<b>ASTE</b>
FEDERAL LAW P	ROHIBITS IMPROPER DISPOSAL
IF FOUND, C PUBLIC S	ONTACT THE NEAREST POLICE, SAFETY AUTHORITY, OR THE
U.S. ENVIRON	MENTAL PROTECTION AGENCY
PROPER D.O.T. SHIPPING NAME	UN OR NA#
GENERATOR INFORMATION:	
NAME	
ADDRESS	
CITY	STATE ZIP
EPA ID NO.	EPA WASTE NO.
ACCUMULATION START DATE	MANIFEST DOCUMENT NO.
HANDL	E WITH CARE!
CONTAINS HAZARDOUS OR TOXIC WASTES	

#### **Toxic Waste**

Could include paint chips, used chemical strippers, and used poly sheeting and PPE that have not been cleaned.

#### **Corrosive Waste**

Could include acidic or caustic paint strippers and their sludge.

#### **Ignitable Waste**

Includes some solvents and compressed gases.

#### **Reactive Waste**

Not usually found on a lead-related job. This type of waste easily produces other explosive or toxic substances.

## How Can You Tell If Waste Is Hazardous?

It is important to determine whether each waste item from a lead job is hazardous, because special procedures must be followed when handling and disposing of hazardous waste.

Disposal of hazardous waste is expensive, so it is best to avoid creating it as much as possible. Hazardous waste must be disposed of at a facility that is licensed to accept it. Non-hazardous waste, on the other hand, can be thrown away along with all the other trash and debris.

Your employer is responsible for disposal of waste materials according to federal, state, and local regulations. In California, hazardous waste is regulated by the Department of Toxic Substances Control of the California Environmental Protection Agency (Cal/EPA). For more information, the employer should contact Cal/EPA, the waste hauler, or the waste disposal facility **before** starting a lead job.

Cal/EPA requires employers to determine if specific waste materials are hazardous. There are lab tests that must be done to evaluate the waste.

Another way to tell if waste is hazardous is to have paint chips analyzed **before** a job to determine the lead levels. You can roughly assume all chips and dust from the same building components contain the same level.

A final option is to assume that certain types of waste are **always** hazardous. This is a simple and cost effective approach for small jobs where waste is limited to paint chips and small debris.

## How Should Waste Be Sorted?

You can sort the waste as you work, or include waste sorting as a part of daily cleanup. Waste from lead work should be separated into four categories.

**Category I—Low Lead Waste.** This includes regular construction debris and items that are non-hazardous. These items may be disposed of along with the regular trash.

**Category II—Architectural Components.** This includes painted finish items larger than 2-1/2 inches in either width or length, such as doors and trim. Testing will help determine if these items are hazardous or non-hazardous.

**Category III—Concentrated Lead Waste.** This includes waste with high lead content as well as any items that could be toxic, corrosive, ignitable, or reactive. These items should be kept separate and labeled with a hazardous waste label. The date of each accumulation period must be clearly marked.

**Category IV—Other Waste**. This includes all waste that does not fall into one of the other three categories. This waste should be tested to see if it is hazardous. If it is found to be hazardous it should be considered Category III and labeled appropriately. Non-hazardous waste should be added to Category I.
# How Long Can Hazardous Waste Be Stored?

There are rules about how much hazardous waste can be kept on site, for how long, and when a certified hazardous waste hauler must be used to remove the waste.

Small amounts of hazardous waste can be kept on site. If you generate less than 220 pounds per month, you can use a non-certified person to transport the hazardous waste to a licensed collection facility, provided no more than 50 pounds or 5 gallons are transported at a time, it is not mixed waste, and it is in closed containers, sealed to prevent spilling or breaking.

Non-hazardous waste should be bagged or wrapped and sealed with duct tape. It then can be stored in a dumpster until final disposal at a municipal landfill or other disposal site used for ordinary waste. Wrapping and sealing are useful because even non-hazardous waste may still have some lead in it, although not enough to be considered hazardous waste.

## Waste Water

Waste water, such as mop and shower water, that is disposed of in a municipal waste water treatment system, is regulated under the Clean Water Act and thus is exempt from the Resource Conservation and Recovery Act (RCRA). Local water departments are authorized to regulate water discharges from lead hazard control sites.

Waste water can be filtered effectively by using a  $20 \,\mu m$  (micron) pore size filter, although a pump may be necessary to force the water through a filter. A coarse screen or cheesecloth is often used as a prefilter (HUD Chapter 10).

# Key Points: Chapter Eleven

- Category I is low lead waste (example: cleaned PPE).
- Category II consists of architectural components (example: window trim).
- Category III is concentrated lead waste (example: paint chips).
- Category IV is other waste (example: soil).
- Hazardous waste must be transported and disposed of according to state and federal regulations.

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# Site Prep

# What Are the Rules for Setting Up a Lead Job?

Setting up any job that disturbs lead paint requires that you take special precautions to protect the building occupants, the environment, and yourself. How you set up depends on the size of the job and the number of days it will take.

Details on how to set up various types of lead jobs are found in the HUD Guidelines. (See Appendix B.)

# What Steps Should You Follow to Set Up?

When setting up and doing a lead-related abatement or construction job:



- Restrict access to the worksite, keeping residents and other unauthorized people away.
- Clean up any visible paint chips and dust before beginning the work.
- Set up **containment** to catch the dust and chips as you work. Plastic sheeting (often called "poly") is usually used.
- Make any necessary structural repairs.

- As you do the job, follow lead-safe work practices to minimize lead dust. (See Chapter 7.)
- Clean up thoroughly as you work and after the job. Keep the site free from accumulating lead dust. Also make sure the site is safe for returning occupants.
- Dispose of hazardous lead waste properly.

# How Do You Restrict Access?

Only workers who are trained and directly involved in the job should be allowed in or near the work area. For building occupants, the requirements for restricting access depend on the size and length of the job. The HUD Guidelines identify several different levels of lead jobs.



## Small Jobs (HUD Levels 1 and 2)

Level 1 jobs disturb less than two square feet of surface and can easily be completed in one day or less. They generally create low levels of lead dust. Schedule these jobs when the occupants are away, or put up a barrier to keep them out of the work area. Post a warning sign at the room entrance. In a residential building, make sure any residents who remain have access to other lead-safe living areas, including a bathroom and an entry/exit way.

Similar rules apply to Level 2 jobs, which disturb up to ten square feet of surface, but can still be completed in one day.

## Larger Jobs (HUD Level 3)

These disturb between two and ten square feet and last up to five days. They tend to create more lead dust, so extra precautions are needed to restrict access.

In residences, occupants should leave their home during the day when these jobs are done. A warning sign must be posted at the room entrance. Do a cleanup at the end of each work day if residents will return to their home at night. Although they should stay out of the immediate work area when they return, be sure they will have access to other lead-safe living areas, including a bathroom and an entry/exit way, until the work is completely finished.

## Very Large Jobs (HUD Level 4)

Whenever jobs disturb **more** than ten square feet, building occupants should be relocated until the work is completed, regardless of how many days the job lasts. Warning signs must be posted at the main and secondary entrances. The residents may return only after the work area has been thoroughly cleaned and has passed final inspection.

# How Do You Set Up Containment for an Interior Job?

Containment is a system or barrier that keeps lead inside the work area. Use 6-mil poly sheeting, secured with duct tape, to catch and contain the dust, chips, and other debris created during a lead job.

## Small Inside Jobs (HUD Level 1)

A single layer of poly sheeting is sufficient. If the job is indoors, lay at least five feet of poly in every direction from the work being done. Use duct tape to secure the poly. Furniture and other items within five feet should be moved or covered with poly. Be sure to protect carpets because it is almost impossible to remove lead dust from contaminated carpets. If working on the ceiling, cover the entire floor with poly.

When working on the inside of a window, attach two layers of poly all around the exterior side of the window frame. When working on the outside of a window, attach two layers of poly all around the interior side of the window frame.

## Other Inside Jobs (HUD Levels 2, 3, and 4)

These require the use of more poly sheeting to isolate the work area and keep lead dust and debris inside. To build a containment for any interior job that will disturb more than two square feet:

- Use **two** layers of 6-mil poly over the **entire** floor. Tape it two inches up the wall.
- Turn off the ventilation system and seal vents with poly to prevent dust from spreading. Lock out the ventilation system so someone doesn't accidentally turn it on.
- If you might come in contact with electricity (especially when working wet), turn off the electrical system, following lockout/tagout procedures.
- Build airlocks over doorways.



# How Do You Build an Airlock?

To create an airlock over a door, you will need two sheets of poly sheeting. Follow these steps:

- **1.** Tape the first sheet of poly to the top, sides and bottom of the doorway.
- **2.** Cut a 6-foot slit vertically down the middle of the first sheet. Don't cut the slit all the way down to the floor.
- **3.** Tape the second sheet of poly across the top of the door only, so that it acts as a flap. The flap should open into the work room.



Airlocks are required over every doorway that workers will use to enter and exit the work area when doing jobs that disturb over two square feet of surface.

# What About the Ventilation System?

The ventilation system in the room or building must be turned off during a lead job. In some cases, the vents must also be sealed with poly. See Appendix B for detailed requirements.

# What About Furniture in the Room?

Any furniture in the room that is within five feet of the work must be sealed with poly during small jobs. The furniture must be removed from the room or sealed before beginning large jobs. See Appendix B for detailed requirements.

# How Should a Window Job Be Set Up?

If a lead job only involves working on windows, residents may remain inside the building but outside the work area until the project has been completed.

When working on the inside of a window, attach two layers of poly all around the exterior side of the window frame.

When working on the outside of a window, attach two layers of poly all around the interior side of the window frame.

See Appendix B for detailed requirements.

# How Do You Set Up Containment for an Exterior Job?

The HUD Guidelines require that containment also be used on outside jobs.

- Use one layer of poly on the ground, extending it ten feet in every direction from the working surface. Tape it to the side of the building. If working above the first floor, add another ten feet of poly per story. If working above the second floor, you need to build a vertical containment.
- Post warning signs at 20-foot intervals around the perimeter of the building.
- Cover bushes and landscaping, and protect adjacent property.
- Protect the poly from falling debris, nails, etc. to prevent puncture.
- Puncture the poly to secure ladders to the ground. Don't anchor ladder feet on top of poly.
- Stop work when wind speeds are greater than 20 miles per hour (unless you use vertical containment).
- Stop work and thoroughly clean the area before rain begins.
- Provide a lead-safe entry/exit way to the building for residents.
- Keep all windows within 20 feet of the work closed, including those on nearby buildings.
- Don't leave debris or poly out overnight if the work is not completed.

# Should Signs Be Posted?

Warning signs are usually required on any lead job (DHS Form 8551). The sign should read:

## "Warning: Lead Work Area. Poison. No Smoking or Eating."

The most current version of the form can be downloaded from the following website link. *http://www.dhs.ca.gov/publications/forms/pdf/dhs8551.pdf* 

Where the signs must be posted depends on the size of the job. See Appendix B for detailed requirements.

# Key Points: Chapter Twelve

The HUD Guidelines cover:

- How much access building occupants should have while the work is being done.
- How much poly sheeting to use when building a containment.
- When and where to post signs.
- Many other protective measures.

Follow the HUD Guidelines when setting up a lead job in a residential or public building:

- Restrict access to the work area.
- Use containment.
- Use safe work methods—work wet and use tools with HEPA vacuum attachments.
- Clean up thoroughly and dispose of waste properly.



# **Abatement Methods**

# What Methods Are Used to Abate Lead Hazards?

There are many ways to abate a lead hazard. Here are examples of several methods, with information on how to perform these tasks safely.

## Heat Gun Application

Using a heat gun is a Level 1 trigger task, so a respirator with HEPA filters is required.

Most heat guns have two settings: low (500-600 degrees) and high (1100 degrees). The high setting should never be used for lead work because the heat could cause lead fumes to be released. If you have difficulty removing paint on the lower setting, use a different removal method.

Serious burns can occur, even on the lower setting, so always point the gun away from you. If you do get burned, run cold water over the area. Heat guns should always be used on solid surfaces, never on hollow surfaces. Avoid damaging the substrate (gouging or abrading it) when you use the gun.

Always keep a fire extinguisher on hand because heat guns can cause smoldering fires.



## Manual Wet Sanding and Wet Scraping

Manual sanding and scraping, even if done wet, are Level 1 trigger tasks, so a respirator with HEPA filters is required.

The goal of these methods is to minimize the creation of dust while removing loose lead paint. Wet sanding and wet scraping are used primarily as surface preparation for small areas. They take a lot of time and are probably not cost efficient for a large surface. Surfaces that require a fine cosmetic finish may be sanded using wet/dry sandpaper and a spray bottle of water. For surfaces that do not require a fine finish, you can use a sanding sponge. Avoid wetting areas near electrical wiring. When finished, label and properly dispose of sludge and debris.

## Paint Removal with HEPA Power Tools

This type of removal is a Level 1 trigger task, so a respirator with HEPA filters is required.

Read and follow the manufacturer's instructions for proper use of HEPA power tools. A shroud or cover is needed for the vacuum to work and should never be removed or pulled back. Shrouded tools must be used only on flat surfaces and you should move the tool very slowly to keep the shroud in place. If you work too fast, the shroud seal will break and lead dust will get into the air.

## **Chemical Stripping**

Read the MSDS for the stripper you are using. Is respiratory protection required when using the product? Are special gloves or any other PPE required?

If possible, avoid strippers containing methylene chloride. Some strippers are caustic and can cause skin and eye damage. With these, use chemical resistant protective clothing as recommended on the MSDS, and keep a portable eye wash nearby. Some strippers, especially those that are solvent based, are toxic if inhaled. Make sure you use these strippers with sufficient ventilation and atmosphere-supplying respirators (ASRs).

The kind of chemical stripper that can be used on a job depends on the number of paint layers that need to be removed. Usually, non-caustic strippers are not as effective at removing multiple layers of paint in a single application. Testing the thickness of the original paint will help determine what product should be used.

Different products require different steps. Read and follow the manufacturer's instructions. When applying the stripper with a brush or roller, pay close attention to any crevices or cracks. For any product, you may need to allow between 20-30 minutes for the paint to loosen.

You may need to neutralize the surface after using the stripper. Following neutralization, the damp surface should be thoroughly cleaned. When you have finished, label and properly dispose of sludge and debris. Remember, too, that it may be possible to remove a component and take it off-site to be stripped.

## Replacement

This means removing a lead-painted building component and replacing it with a new one that has no lead paint. Replacement gets rid of the lead paint forever. It is a permanent solution. However, replacement can involve demolition work, which creates a lot of dust. Demolition is a Level 1 trigger task, so the job is presumed to expose workers to lead over the PEL unless air monitoring proves otherwise. A respirator with HEPA filters is required.

Wet mist and HEPA vacuum the building component before removing it. Avoid wetting areas near electrical wiring. Score all painted seams with a sharp knife. Remove nails, screws, and other fasteners, and then pry the component from the substrate. Once it is removed, wet mist it again, wrap it in poly, and seal it with duct tape. Label the component and remove it to a waste storage area. HEPA vacuum the dust and chips left behind, and then install the replacement component.

## Enclosure

An enclosure covers a lead painted surface with a solid, dust-tight barrier that cannot easily be removed. Good enclosure materials include paneling, drywall, and tile. Before you enclose a surface, remove any chipping or peeling paint and fix any underlying problems (like water leaks) that may have caused the paint to deteriorate. Next, HEPA vacuum the area to be enclosed and label the surface every two feet (horizontally and vertically) in permanent ink with the warning, "Danger: Lead-Based Paint." This will alert anyone who removes the enclosure in the future.

When you enclose a surface, you need to use both adhesive and physical fasteners to create a dust-tight seal. Caulk the contact side of the enclosure material before you install it. After installation, seal all the seams with caulk and also use nails or screws to mechanically attach the enclosure material.



## **Encapsulation**

Encapsulant products (sealants) can be applied only to lead painted surfaces that are stable and in good condition. Different products will require different steps. Always read and follow the manufacturer's instructions. Only when an encapsulant is guaranteed to last at least 20 years does it qualify as an abatement method.

To check the condition of the paint, a patch test should be performed on a small area of the painted surface before work begins. Clean a small area with water and allow it to dry. Then apply a 6-10 inch strip of duct tape. Press the tape down on the surface with the eraser end of a pencil. After 90 seconds, pull the tape gently off the surface. No more than one square inch of paint should come off. If more paint comes off, the surface is not in good condition and will need more thorough preparation.

Depending on the results of the patch test, you may need to repair the surface or the substrate, or clean dirt and mildew off the surface.

Read the MSDS for the encapsulant. Are good ventilation or respiratory protection required when using the product? Are special gloves or any other PPE required? Multiple coats may be necessary to achieve the proper thickness required to secure the manufacturer's guarantee. The manufacturer may supply a measurement tool to use. The product must be allowed to dry and cure to be effective.

After an encapsulant has been applied and cured, a second test should be performed to see how well the encapsulant has adhered to the painted surface.

# Key Points: Chapter Thirteen

Work in a lead-safe way when you use any abatement method. Methods include:

- Heat Gun Application
- Manual Wet Sanding and Wet Scraping
- Paint Removal with HEPA Power Tools
- Chemical Stripping
- Replacement
- Enclosure
- Encapsulation.





# **Cleanup and Clearance**

# Why Is Cleanup Important?

Any job that disturbs a lead painted surface creates lead dust. Both the Cal/OSHA Lead in Construction standard and Title 17 require that surfaces be kept free from accumulated lead throughout any lead job.

Special cleanup procedures must be a part of every lead job. No matter how effective your containment may be, or how safe your work practices are, there will always be a certain amount of lead dust. On every job, you should periodically clean the site as you work ("clean as you go"). But for a large job, more thorough cleanup is needed at the end of each day and the end of the entire job.





# How Do You Decontaminate?

Every time you leave the work area, before every break, before lunch, and at the end of the shift you will need to go through decontamination procedures.

These steps were first introduced when we discussed PPE.

- Clean all tools (end of shift only).
- HEPA vacuum and damp wipe your protective clothing and shoes, then enter the decontamination area in the change room.
- Remove your work shoes.
- Remove your protective clothing by rolling it inward. Don't remove your respirator yet.
- Enter the wash area, with your respirator still on.
- Wipe off the respirator, wash your hands, and then remove the respirator.
- Wash up thoroughly, then leave the wash area.
- Enter the clean area of the change room, and put on your street clothes and shoes.

# How Do You Do Daily Cleanup?

When a job lasts more than one day, it is important to do a thorough cleanup of the entire area at the end of every work day. This is called daily cleanup. Careful daily cleanup ensures that residents returning to their homes can do so safely. Remember that residents are allowed to return each night if an abatement job lasts more than one day and disturbs less than ten square feet (HUD Level 3). Careful daily cleanup also makes final cleanup, at the end of the job, much easier.

Daily cleanup should follow the steps below whenever residents will return in the evening. If residents will not be returning, these steps are not required.

- **Remove large debris.** Wrap large architectural components in 6 mil poly and seal with duct tape. Label this as "Lead Contaminated" and store it in a secure area until it can be disposed of properly. Keep hazardous waste separate from non-hazardous waste.
- **Remove small debris.** Mist the small debris, like paint chips, with water. Wet wipe it all up. Dry sweeping is never allowed. Put the small debris into a container such as a 6 mil plastic bag. Seal the bag and label it as hazardous waste. Store it in a secure area until it can be disposed of properly. Be careful not to overload the bag so it doesn't rupture or break.

• HEPA vacuum, wet wash, HEPA vacuum. HEPA vacuum all the surfaces in the area, including poly sheeting. Start at the end of the room farthest from the entrance and work toward the entrance. When you HEPA vacuum vertical surfaces (walls, etc.), start from the top and work your way down to the floor. Then wet wash all surfaces and HEPA vacuum again.



• **Inspect and repair the containment.** Although you should check for tears in the poly throughout the day, and repair any rips as you find them, you should inspect the poly more thoroughly at the end of the day. Inspect the whole containment. Patch the poly using duct tape. Also check the poly that covers air vents and reseal it if necessary.

If you are doing an exterior job, remember that poly sheeting may not be left out overnight. It must be cleaned and removed every day. Check to make sure that no lead debris has escaped the containment. If it has, rake or sweep the debris into a 6 mil poly bag or other suitable container. Seal the bag and label it as hazardous waste. Remove the bag to the waste storage area. HEPA vacuum all hard exterior surfaces.

# How Do You Do Final Cleanup To Pass Clearance?

At the end of an abatement job you must do final cleanup. Many abatement jobs fail the final inspection because the final cleanup was not done properly. If the site fails final inspection, you will have to do cleanup over again until it passes. It is better to do it right the first time.

After finishing a large lead job, wait at least one hour before you start final cleanup. Waiting allows lead dust in the air to settle. Always wear your protective equipment, including a respirator, when doing cleanup. The initial steps of final cleanup are very similar to daily cleanup. To do a final cleanup:

- **Remove any remaining large debris.** Wrap large architectural components in 6 mil poly and seal with duct tape. Label this as "Lead Contaminated" and store it in a secure area until disposal. Keep hazardous waste separate from non-hazardous waste.
- **Remove any remaining small debris.** Mist the small debris, like paint chips, with water. Wet wipe it all up. Never dry sweep. Remember the small debris is hazardous waste. Label it and store it in a secure area.
- **Clean tools.** HEPA vacuum and wet wash equipment like putty knives, ladders, and power tools before taking them out of the work area.
- **HEPA vacuum, wet wash, HEPA vacuum.** HEPA vacuum all the surfaces in the area, including poly sheeting. Start at the end of the room farthest from the entrance and work toward the entrance. When you HEPA vacuum vertical surfaces (walls, etc.), start from the top and work your way down to the floor. Then wet wash and HEPA vacuum again.

- **Remove poly.** Carefully remove all the cleaned poly. Leave the floor poly and airlock poly for later. Fold up the poly, corners in first, then ends towards the middle. Secure the folded poly with duct tape. Dispose of it along with other general debris. Since it was HEPA vacuumed, it is not considered hazardous waste. When removing floor poly, first remove the top layer, then HEPA vacuum the bottom layer and remove it.
- **HEPA vacuum, wet wash, HEPA vacuum again.** After all poly is removed, repeat the HEPA/wet wash/HEPA sequence on all surfaces, starting at the top and working your way down to the floor.
- Have a certified lead supervisor or inspector do a visual inspection. This will determine if all the abatement and cleanup work have been done and that no visible dust or debris remain. If the job does not pass, you will have to re-clean the area until it does.
- **Remove airlocks.** After the area passes the visual inspection remove airlock poly.
- **Paint the surfaces.** After the job passes the visual inspection, the abated surfaces can now be painted and/or sealed.
- **Repeat the cleaning process.** HEPA vacuum and wet wash the entire work area again. Then do a final HEPA vacuuming.
- Have an inspector/assessor or a project monitor do a final inspection.

Once the area has been repainted and cleaned again, a certified lead inspector/assessor or project monitor will take dust samples. These are called clearance dust samples. Clearance dust samples should only be taken after floors have been sealed (HUD 15-11). The lead dust levels in these samples must be acceptable for clearance. Clearance means that the area is a lead-safe place for residents, especially young children. If the dust samples meet these clearance levels, the job passes final inspection. If the dust samples are above the acceptable levels, the area is unsafe for residents and you must re-clean as many times as it takes to pass final inspection.

Clearance Levels		
Surface	Maximum allowable lead in dust	
Interior floors	50 μg/ft²	
Interior horizontal window surfaces	250 μg/ft²	
Exterior horizontal window surfaces and exterior floors	800 µg/ft²	
<b>Note:</b> Some of these California levels are expected to be revised soon to be consistent with updated U.S. EPA regulations. New levels will be 40 $\mu$ g/ft <sup>2</sup> for interior floors and 400 $\mu$ g/ft <sup>2</sup> for all exterior horizontal surfaces. It is the employer's responsibility to stay informed of changes in state and federal rules.		

# Key Points: Chapter Fourteen

- Cleanup must be a part of every lead job.
- Whenever you leave the work area, follow decontamination procedures.
- Clean the entire area at the end of each day if residents will be returning.
- Do a thorough final cleanup at the end of the job, and remove the containment.
- The area must pass a clearance inspection. Dust samples will be collected and tested.

## Certification Levels in California

The table below shows which job responsibilities are permitted depending on a person's level of certification. It reflects both DHS Title 17 and Cal/OSHA regulations. Some of the training requirements for each level are also shown.



The following definitions are provided for guidance. They are based on Title 17.

**Abatement:** Any set of measures designed to reduce or eliminate lead hazards or lead-based paint in public and residential buildings. Does not include containment or cleaning. Abatement which is designed to reduce lead paint or other lead hazards for a minimum of twenty years requires state-certified supervisors and state-certified workers, among other requirements.

**Clearance Inspection:** An on-site limited investigation (as described by HUD Guidelines) to determine if lead work has been completed as specified, and if the work area is safe to enter. Does not include sampling done to ensure Cal/OSHA compliance or for hazardous waste disposal purposes.

**Lead Hazard Evaluation:** The on-site investigation, for compensation, of lead hazards or lead-based paint, such as a lead inspection, risk assessment, and clearance inspection, in public and residential buildings. Does not include activities intended to determine Cal/OSHA compliance or adequacy of containment.

**Lead Hazard:** Deteriorated lead-based paint, lead contaminated dust, lead contaminated soil, disturbing lead-based paint or presumed lead-based paint without containment, or any other nuisance which may result in persistent and quantifiable lead exposure.

# HUD Guidelines for Worksite Preparation

Description	Level 1	Level 2	Level 3	Level 4
Typical Applications (Hazard Controls)	Dust removal and any abatement or interim control method dis- turbing no more than 2 square feet of painted surface per room.	Any interim control or abatement method disturbing between 2 and 10 square feet of painted surface per room.	Same as Level 2.	Any interim control or abatement method disturbing more than 10 square feet per room.
Time Limit Per Dwelling	One work day.	One work day.	Five work days.	None.
Resident Location	Inside dwelling, but outside work area. Resident must have lead-safe passage to bathroom, at least one living area, and entry/egress pathways. Alternatively, resident can leave the dwelling during the work day.	Same as Level 1.	Outside the dwelling; but can return in evening after day's work and cleanup are completed. Resident must have safe pas- sage to bathroom, at least one living area, and entry/egress path- ways upon return. Alternatively, resident can leave until all work is completed.	Outside the dwelling for duration of project; cannot return until clearance has been achieved.
Containment and Barrier System	Single layer of plastic sheeting on floor ex- tending 5 feet beyond the perimeter of the treated area in all direc- tions. No plastic sheet- ing on doorways is required, but a low physical barrier (furni- ture, wood planking) to prevent inadvertent access by resident is recommended. Children should not have access to plastic sheeting (suffocation hazard).	Two layers of plastic on entire floor. Plastic sheet with primitive airlock flap on all door- ways. Doors secured from inside the work area need not be sealed. Children should not have access to plastic sheeting (suffocation hazard).	Two layers of plastic on entire floor. Plastic sheet with primitive airlock flap on all door- ways to work areas. Doors secured from inside the work area need not be sealed. Overnight barrier should be locked or firmly secured. Children should not have access to plastic sheeting (suffocation hazard).	Two layers of plastic on entire floor. If entire unit is being treated, cleaned, and cleared, individual room door- ways need not be sealed. If only a few rooms are being treat- ed, seal all doorways with primitive airlock flap to avoid cleaning entire dwelling. Doors secured from inside the work area need not be sealed.
Warning Signs	Required at entry to room but not on build- ing (unless exterior work is also under way).	Same as Level 1.	Posted at main and secondary entryways, since resident will not be present to answer the door.	Posted at building exterior near main and secondary entryways.

(This table continues on the next page.)

Description	Level 1	Level 2	Level 3	Level 4
Ventilation System	Dwelling ventilation system turned off, but vents need not be sealed with plastic if they are more than 5 feet away from the surface being treated. Negative pressure zones (with "negative air" machines) are not required, unless large supplies of fresh air must be admitted into the work area to con- trol exposures to other hazardous substances (for example, solvent vapors).	Turned off and all vents in room sealed with plastic. Negative pres- sure zones (with "neg- ative air" machines) are not required, unless large supplies of fresh air must be admitted into the work area to control exposure to other hazardous sub- stances (for example, solvent vapors).	Same as Level 2.	Same as Level 2.
Furniture	Left in place uncovered if furniture is more than 5 feet from working sur- face. If within 5 feet, fur- niture should be sealed with a single layer of plastic or moved for paint treatment. No covering is required for dust removal.	Removed from work area. Large items that cannot be moved can be sealed with a single layer of plastic sheeting and left in work area.	Same as Level 2.	Same as Level 2.
<b>Cleanup</b> (See Chapter 14 for further discussion of cleanup methods)	HEPA vacuum, wet wash, and HEPA vac- uum all surfaces and floors extending 5 feet in all directions from the treated surface. For dust removal work alone, a HEPA vacuum and wet wash cycle is adequate (i.e., no sec- ond pass with a HEPA vacuum is needed). Also wet wash and HEPA vacuum floor in adjacent area(s) used as pathway to work area. Do not store debris inside dwelling overnight; transfer to a locked secure area at the end of each day.	HEPA vacuum, wet wash, and HEPA vac- uum <i>all</i> surfaces in room. Also wet wash and HEPA vacuum floor in adjacent area(s) used as pathway to work area. Do not store de bris inside dwelling overnight; use a secure locked area.	Remove top layer of plastic from floor and discard. Keep bottom layer of plastic on floor for use on the next day. HEPA vacuum, wet wash, and HEPA vacuum <i>all</i> surfaces in room. Also wet wash and HEPA vacuum floor in adjacent area(s) used as pathway to work area. Do not store debris inside dwelling overnight; use a secure locked area.	Full HEPA vacuum, wet wash, and HEPA vacuum cycle, as de- tailed in Chapter 14.
Dust Sampling	Clearance only.	Clearance only.	One sample collected outside work area every few jobs plus clearance.	Clearance only.

Table 8.1	Interior Worksite	Preparation L	evels (Not	Includina	Windows)	(continued)
						10011010001

Note: Primitive air locks are constructed using two sheets of plastic. The first one is taped on the top, the floor, and two sides of doorway. Next, cut a slit about 6 feet high down the middle of the plastic; do not cut the slit all the way down to the floor. Tape the second sheet of plastic across the top of the door only, so that it acts as a flap. The flap should open *into* the work area.

[		<u> </u>	
Description	Level 1	Level 2	Level 3
Typical Applications	Any interim control or abatement method disturbing less than 10 square feet of exterior painted surface per dwelling. Also includes soil control work.	Any interim control or abatement method disturbing 10 to 50 square feet of exterior painted surface per dwelling. Also includes soil control work.	Any interim control or abatement method disturbing more than 50 square feet of exterior painted surface per dwelling. Also includes soil control work.
Time Limit Per Dwelling	One day.	None.	None.
Resident Location	Inside dwelling but outside work area for duration of project until cleanup has been completed. Al- ternatively, resident can leave un- til all work has been completed Resident must have lead-safe access to entry/egress pathways.	Relocated from dwelling dur- ing workday, but may return after daily cleanup has been completed.	Relocated from dwelling for duration of project until final clearance is achieved.
Containment and Barrier System	One layer of plastic on ground extending 10 feet beyond the perimeter of working surfaces. Do not anchor ladder feet on top of plastic (puncture the plastic to anchor ladders securely to ground). For all other exterior plastic surfaces, protect plastic with boards to prevent puncture from falling debris, nails, etc., if necessary. Raise edges of plastic to create a basin to prevent contaminated runoff in the event of unexpected precipitation. Secure plastic to side of building with tape or other anchoring system (no gaps between plastic and building). Weight all plastic sheets down with two-by-fours or similar objects. Keep all windows within 20 feet of working surfaces closed, including windows of adjacent structures.	Same as Level 1.	Same as Level 1.
Playground Equipment, Toys, Sandbox	Remove all movable items to a 20-foot distance from working surfaces. Items that cannot be readily moved to a 20-foot distance can be sealed with taped plastic sheeting.	Same as Level 1.	Same as Level 1.

(This table continues on the next page.)

Table 8.2 Exterior Worksite Preparation Levels (Not Including	Windows)	(continued)
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Description	Level 1	Level 2	Level 3
Security	Erect temporary fencing or bar- rier tape at a 20-foot perimeter around working surfaces (or less if distance to next building or sidewalk is less than 20 feet). If an entryway is within 10 feet of working surfaces, require use of alternative entryway. If practical install vertical containment to prevent exposure. Use a locked dumpster, covered truck, or locked room to store debris before disposal.	Same as Level 1.	Same as Level 1.
Signs	Post warning signs on the build- ing and at a 20-foot perimeter around building (or less if dis- tance to next building or side- walk is less than 20 feet).	Same as Level 1.	Same as Level 1.
Weather	Do not conduct work if wind speeds are greater than 20 miles per hour. Work must stop and cleanup must occur before rain begins.	Same as Level 1.	Same as Level 1.
Cleanup (See Chapter 14)	Do not leave debris or plastic out overnight if work is not completed. Keep all debris in secured area until final disposal.	Same as Level 1.	Same as Level 1.
Porches	One lead-safe entryway must be made available to residents at all times. Do not treat front and rear porches at the same time if there is not a third doorway.	Front and rear porches can be treated at the same time, unless unprotected workers must use the entryway.	Same as Level 2.

Table 8.	3 Window	Treatment or	Replacement	Worksite	Preparation

Appropriate Applications	Any Window Treatment or Replacement
Resident Location	Remain inside dwelling but outside work area until project has been completed. Alternatively, can leave until all work has been completed. Resident must have access to lead-safe entry/egress pathway.
Time Limit Per Dwelling	None.
Containment and Barrier System	One layer of plastic sheeting on ground or floor extending 5 feet beyond perimeter of window being treated/replaced. Two layers of plastic taped to interior wall if working on window from outside; if working from the inside, tape two layers of plastic to exterior wall. If working from inside, implement a minimum Interior Worksite Preparation Level 2. Children cannot be present in an interior room where plastic sheeting is located due to suffocation hazard. Do not anchor ladder feet on top of plastic (puncture the plastic to anchor ladders securely to ground). For all other exterior plastic surfaces, protect plastic with boards to prevent puncture from falling debris, nails, etc. (if necessary). Secure plastic to side of building with tape or other anchoring system (no gaps between plastic and building). Weigh all plastic sheets down with two-by-fours or similar objects. All windows in dwelling should be kept closed.
Signs	Post warning signs on the building and at a 20-foot perimeter around building (or less if distance to next building or sidewalk is less than 20 feet). If window is to be removed from inside, no exterior sign is necessary.
Security	Erect temporary fencing or barrier tape at a 20-foot perimeter around building (or less if distance to next building or sidewalk is less than 20 feet). Use a locked dumpster, covered truck, or locked room to store debris before disposal.
Weather	Do not conduct work if wind speeds are greater than 20 miles per hour. Work must stop and cleanup must occur before rain begins, or work should proceed from the inside only.
Playground Equipment, Toys, Sandbox	Removed from work area and adjacent areas. Remove all items to a 20-foot distance from dwelling. Large, unmovable items can be sealed with taped plastic sheeting.
Cleaning	If working from inside, HEPA vacuum, wet wash, and HEPA vacuum all interior surfaces within 10 feet of work area in all directions. If working from the exterior, no cleaning of the interior is needed, unless the containment is breached. Similarly, no cleaning is needed on the exterior if all work is done on the interior and the containment is not breached. If containment is breached, then cleaning on both sides of the window should be performed. No debris or plastic should be left out overnight if work is not completed. All debris must be kept in a secure area until final disposal.

## Appendix C

# Acronyms

This Appendix contains a list of Acronyms used throughout the text and is followed by a Glossary of Terms starting on page 98.

AL	Action Level
APR	Air Purifying Respirator
ASR	Air Supplied Respirator
BLL	Blood Lead Level
BPb	Blood Lead
Cal/EPA	California Environmental Protection Agency
Cal/OSHA	California Occupational Safety and Health Program
CDC	Centers for Disease Control and Prevention
CLPPB	Childhood Lead Poisoning Prevention Branch
DHS	Department of Health Services
dL	Deciliter
DTSC	Department of Toxic Substances Control
EBL	Elevated Blood Level
EPA	U.S. Environmental Protection Agency
HAZCOM	Hazard Communication
HEPA	High Efficiency Particulate Air
HUD	U.S. Department of Housing and Urban Development
IIPP	Injury and Illness Prevention Program
МС	Methylene Chloride
mg	Milligram

MRP	Medical Removal Protection
MSDS	Material Safety Data Sheet
NIOSH	National Institute for Occupational Safety and Health
NLLAP	National Lead Laboratory Accreditation Program
OLPPP	Occupational Lead Poisoning Prevention Program
OSHA	Occupational Safety and Health Administration
PAPR	Powered Air Purifying Respirator
Pb	Lead
PEL	Permissible Exposure Limit
ррb	Parts per Billion
ppm	Parts per Million
RCRA	Resource Conservation and Recovery Act
SAR	Supplied Air Respirator
SCBA	Self-Contained Breathing Apparatus
TSCA	Toxic Substances Control Act
TSP	Trisodium Phosphate
TWA	Time Weighted Average
WET	Waste Extraction Test
XRF	X-Ray Fluorescence Analyzer
ZPP	Zinc Protoporphyrin

# A—

Abatement See Lead Abatement.

#### Accreditation

Under Title 17, refers to a training provider obtaining state approval to offer courses that workers must take to become certified by the California Department of Health Services (DHS) to do lead-related abatement or construction work.

#### **Accredited Training Provider**

A training provider accredited by DHS to train individuals to be certified as Lead Workers, Lead Supervisors, Lead Project Designers, Lead Project Monitors, and Lead Inspector/Assessors.

#### Action Level (AL)

According to Cal/OSHA's Lead in Construction standard, this is a concentration of 30 micrograms of lead per cubic meter of air ( $\mu$ g/m<sup>3</sup>), averaged over an 8-hour workday. Employees exposed to lead at or above the Action Level but below the Permissible Exposure Limit (PEL) must be trained annually in the hazards of lead and must be included in a Medical Surveillance Program. There are other required health and safety measures for these employees also. See Appendix B.

#### Air Purifying Respirator (APR)

A type of respirator that uses filter cartridges to reduce the amount of dust, fumes, or vapors that workers inhale. APRs require the wearer to draw air through the filter cartridges when inhaling.

#### **Air Sampling**

See Personal Air Sampling.

#### Air Supplied Respirator (ASR)

See Supplied Air Respirator (SAR).

# **B**—

#### **Biological Monitoring**

Required by Cal/OSHA for workers exposed to lead. Includes tests for Blood Lead Level (BLL), which measures the amount of lead in the blood, and Zinc Protoporphyrin (ZPP), which measures damage to the blood-forming system.

#### **Blood Lead Level (BLL)**

A blood test that measures how much lead is in a person's blood. The BLL usually reflects lead exposure received over the prior two to three weeks, but also may be high if the person has a large amount of lead stored in the body.

#### **Breathing Zone**

The area around a worker's nose and mouth (about a 1-foot radius). Personal air sampling to measure worker exposure to lead is done by placing a small filter within the breathing zone (near or on the collar), attached to a pump which operates while the person is working.

# **C**—

#### Cal/EPA

California Environmental Protection Agency, the state agency responsible for issuing and enforcing environmental regulations. These include regulations on air and water pollution and hazardous waste.

#### Cal/OSHA

The Division of Occupational Safety and Health within the California Department of Industrial Relations. The state agency that issues and enforces regulations to protect worker health and safety.

#### **Cal/OSHA Consultation Service**

A program of Cal/OSHA that provides free, voluntary assistance to employers to help evaluate and correct health and safety hazards in the workplace.

#### California Department of Health Services (DHS)

See Department of Health Services.

#### Canister

See Cartridge.

#### Cartridge or Canister

A container with a filter, sorbent, or catalyst, or combination of these items, which removes specific contaminants from the air passed through the container.

#### Centers for Disease Control and Prevention (CDC)

The federal public health agency that oversees the National Institute for Occupational Safety and Health (NIOSH). CDC also provides guidance on the management of childhood lead poisoning cases.

#### Certification

Under Title 17, the process by which a Lead Worker, Lead Supervisor, Lead Project Monitor, Lead Project Designer, or Lead Inspector/Assessor in California obtains a state certificate to do lead work. Only if certified may they do high risk lead jobs. There are five types of certification, each with different training and experience requirements.

#### **Certified Lead Inspector/Assessor**

See Certification and Inspector/Assessor.

#### **Certified Lead Project Designer**

See Certification and Project Designer.

#### **Certified Lead Project Monitor**

See Certification and Project Monitor.

#### **Certified Lead Supervisor**

See Certification and Supervisor.

#### **Certified Lead Worker**

See Certification and Worker.

#### Chelation

A medical treatment for severe lead poisoning. Can reduce high blood lead levels but may be dangerous. Prophylactic chelation is prohibited by Cal/OSHA regulations. See *Prophylactic Chelation*.

#### Childhood Lead Poisoning Prevention Branch (CLPPB)

A program within DHS that does training and research designed to protect children from lead poisoning. Also accredits lead training providers and certifies individuals to do lead-related abatement and construction work.

#### **Clearance Inspection**

An on-site inspection after a job to determine if an area is lead-safe. Ensures that cleanup has been done properly and that lead dust levels meet defined clearance levels. Does not include sampling to ensure Cal/OSHA compliance or for hazardous waste disposal purposes. See *Clearance Level* and *Dust Wipe Sampling*.

#### **Clearance Level**

The maximum amount of lead dust that can be present after a job for the site to pass inspection. For each type of surface, dust levels may not exceed those in the Title 17 definition of lead-contaminated dust, or the federal standard, whichever is more stringent. See *Lead-Contaminated Dust*.

#### Containment

A system, process, or barrier that is used to keep lead hazards inside a work area. One common method is using "poly" (plastic sheeting).

# **D**—

#### Deciliter (dL)

One tenth of a liter, or a little less than half a cup of liquid. Used when measuring lead in the blood.

#### **Department of Health Services (DHS)**

The state government public health department.

#### **Department of Toxic Substances Control (DTSC)**

A Cal/EPA program that is responsible for issuing and enforcing hazardous waste regulations.

#### **Deteriorated Lead-Based Paint**

Defined by Title 17 as lead-based paint or surface coating that is cracking, chalking, flaking, chipping, peeling, non-intact, failed, or separating from the surface to which it was applied.

#### **Dust Wipe Sampling**

A test to measure how much lead is present on a surface. A surface of a specific size is wiped with an approved wipe, which is sent to a laboratory for analysis. The test is used after lead work to determine if thorough cleanup has been done and that lead dust levels meet defined clearance levels. See *Clearance Level*.

# E—

#### Encapsulation

An abatement method in which a lead-painted surface is coated with a special liquid that hardens and prevents lead dust from being released. For encapsulation to be considered an abatement method, the encapsulant must be guaranteed to last at least 20 years.

#### Enclosure

An abatement method in which a lead-painted surface is covered with paneling, wallboard, or other approved material to prevent lead dust from being released.

## **Engineering Controls**

Changes that can be made in the work environment to reduce or eliminate hazards, such as substituting a less hazardous chemical, installing ventilation, or using special HEPA-exhausted tools. Cal/OSHA requires employers to use all possible engineering controls to reduce lead exposure that is higher than the PEL.

## **Environmental Protection Agency (EPA)**

The federal agency responsible for protecting the public from the effects of toxic substances in the environment.

## Filter

F\_\_\_

A component designed to remove particulate, fumes, or vapors when air is drawn through it, most commonly used in respirators, cigarettes, vacuums, and air changing machines. Typically filters are contained in canisters or cartridges attached to the respirator.

#### Fit Test

Testing that should be done by the employer when a respirator is first issued, and annually thereafter, to ensure that the respirator fits properly. Procedures for fit testing are described in the Cal/OSHA Respiratory Protection standard. (Title 8, California Code of Regulations, Sections 1531 and 5144.)

In **qualitative** fit tests, a chemical that is irritating or has an odor is introduced in the air around the respirator wearer's head. If the wearer detects the chemical through the respirator, the respirator does not fit well enough to protect the worker.

A **quantitative** fit test can be done if the respirator is of a special type. This test has the ability to detect a chemical inside the respirator (or detect a difference in dust levels between inside and outside). It provides a numerical concentration of the contaminant.

#### Fumes

Very tiny particles generated when a material containing any metal is heated to high temperatures. Fumes are very easily breathed deep into the lungs.

# **G**—

#### **General Duty Clause**

A requirement in California state law that every employer has a "general duty" to maintain a safe and healthful workplace. (California Labor Code, Section 6400.)

# Н—

#### Hazard Communication (HAZCOM)

A Cal/OSHA standard that requires employers to provide information and regular training to workers about hazardous substances in their workplace. (Title 8, California Code of Regulations, Section 5194.)

#### **Hazardous Waste**

Any waste that is defined as dangerous to people or the environment by federal or state laws. There are specific federal, state, and local regulations governing the proper storage and disposal of waste that has been defined as hazardous.

#### **HEPA Filter**

High efficiency particulate air filter, also called a high efficiency N-100, P-100, or R-100 filter. A type of filter that efficiently captures very small particles. These typically remove 99.97% of all dust particles that are 0.3 microns or larger in diameter. HEPA filters may be used in respirators, special vacuum cleaners, tool attachments, and ventilation systems to capture toxic dusts or fumes such as lead.

## HUD (U.S. Department of Housing and Urban Development)

The federal agency responsible for federally financed housing. Assists in enforcing certain federal lead regulations. California's Title 17 incorporates many regulations found in HUD's "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing," June 1995.

## Injury and Illness Prevention Program (IIPP)

A Cal/OSHA standard that requires every employer to have a health and safety program. The program must include identification, assessment, and control of hazards in the workplace as well as training. Employers must involve workers in maintaining a safe workplace. (Title 8, California Code of Regulations, Sections 1509 and 3203.)

#### Inspector/Assessor

An individual who has been certified by DHS to perform lead-based paint inspection and/or a risk assessment

#### Leach

The process in which a substance that can be dissolved is extracted from some material. This process is used to detect the level of lead in a sample that is submitted to a lab.

#### Lead Abatement

Defined by Title 17 as any activity designed to reduce or eliminate lead hazards or lead-based paint. Title 17 requires the use of state-certified Lead Workers and Lead Supervisors for abatement which is designed to reduce lead hazards for a minimum of 20 years. The four types of abatement designed to last a minimum of 20 years are removal, enclosure, encapsulation, and replacement.

#### Lead-Based Paint

Defined by Title 17 as paint or other surface coatings, like varnish and shellac, that contain an amount of lead equal to, or in excess of, one milligram per square centimeter  $(1 \text{ mg/cm}^2)$ ; or more than half of one percent (0.5%) by weight.

#### Lead-Contaminated Dust

Defined by Title 17 as any dust that contains an amount of lead equal to, or in excess of, 50 micrograms per square foot ( $\mu g/ft^2$ ) for interior floor surfaces, 250  $\mu g/ft^2$  for interior horizontal window surfaces, and 800  $\mu g/ft^2$  for exterior floors and exterior horizontal window surfaces. Use federal regulatory levels where more stringent.

#### Lead-Contaminated Soil

Defined by Title 17 as bare soil that contains 400 parts of lead per million parts of soil (400 ppm) or more in children's play areas, and 1000 ppm or more in all other areas.

#### Lead Hazard

Defined by Title 17 as deteriorated lead-based paint, lead contaminated dust, lead contaminated soil, disturbing lead-based paint or presumed lead-based paint without containment, or any other nuisance which may result in persistent or quantifiable lead exposure.

#### Lead Hazard Evaluation

Defined by Title 17 as the on-site investigation, for compensation, of lead-based paint or lead hazards, such as a lead inspection, risk assessment, and clearance inspection, for public and residential buildings. Does not include activities intended to determine adequacy of containment or compliance with regulatory requirements.

#### Lead in Construction Standard

A Cal/OSHA standard that spells out protective measures that employers must use to protect workers exposed to lead during construction work. (Title 8, California Code of Regulations, Section 1532.1.)

#### Lead Inspection

Defined by Title 17 as a surface-by-surface investigation to determine the presence of leadbased paint.

#### Lead-Related Construction Work

Defined by Title 17 as any construction, alteration, painting, demolition, salvage, renovation, repair, or maintenance of any building or structure, including preparation and cleanup, that by using or disturbing lead-containing material or soil, may result in significant exposure of employees to lead.

#### Lead Stick

See Wet Chemical Field Test.

#### Lockout/Tagout or Lockout/Blockout

Defined procedures for shutting down any energy source (electrical, hydraulic, mechanical, compressed air, or other) that might pose a danger if unexpectedly energized. These energy systems must be disengaged, blocked, or de-energized and then locked in the OFF position. (Title 8, California Code of Regulations, Section 3314.)

#### Log 300

A record of occupational fatalities, injuries, and illnesses which Cal/OSHA requires every employer to maintain. This would include any worker with a blood lead level of  $50 \mu g/dL$  or more must be shown on the log. A log summary must be posted annually and the complete log must be made available for workers to see and copy at any time.

# **M**—

## Material Safety Data Sheet (MSDS)

A factsheet provided by manufacturers or suppliers about the hazards of chemical products used in the workplace. According to Cal/OSHA's Hazard Communication standard, employers must make MSDSs available to workers on request.

## **Medical Removal Protection (MRP)**

A requirement of Cal/OSHA's Lead in Construction standard. Employers must temporarily remove workers from lead exposure at or above the Action Level if they have a BLL of  $50 \ \mu g/dL$  or higher on two consecutive tests, or when recommended by a doctor for health reasons. Workers on MRP may be given work in areas where lead exposure is below the Action Level ( $30 \ \mu g/m^3$ ). They must be paid their usual wages as long as their original job exists, or for up to 18 months for each instance of medical removal.

#### **Medical Supervisor**

A physician in charge of an employer's Medical Surveillance Program.

#### Medical Surveillance Program

A program of medical exams and blood testing that an employer must make available to exposed workers under the Lead in Construction standard.

#### Methylene Chloride (MC)

A chemical sometimes used in paint strippers. Avoid use of methylene chloride strippers because they can cause cancer and other serious health damage. Supplied air respirators must be used when using MC because air purifying respirators (APRs) do not provide adequate respiratory protection. MC vapors are heavier than air and are highly flammable when not properly ventilated.

#### Microgram (µg)

One millionth of a gram.

#### Micrograms per Cubic Meter (µg/m<sup>3</sup>)

The units used to express how much lead is in the air.

#### Micrograms per Deciliter (µg/dL)

The units used to express how much lead is in your blood.

#### Mil

One thousandth (1/1,000) of an inch. Poly sheeting used for containment on lead jobs should be 6 mils thick. This unit is also used to measure the thickness of paint.

#### Milligram (mg)

One thousandth of a gram.



#### National Institute for Occupational Safety and Health (NIOSH)

An agency within CDC that conducts research and education on worker health and safety, investigates health hazards, and issues publications. Also certifies respirators.

#### National Lead Laboratory Accreditation Program (NLLAP)

Laboratories recognized by the EPA to be qualified to perform analyses of lead in environmental samples.

# 0—

#### Occupational Lead Poisoning Prevention Program (OLPPP)

A program within DHS that does training and research designed to protect workers from lead poisoning.

#### **Occupational Safety and Health Administration (OSHA)**

A federal agency in the U.S. Department of Labor that issues and enforces regulations to protect worker health and safety nationwide. Its state counterpart in California is Cal/OSHA, some of whose standards are stricter and supersede federal OSHA standards.

# **P**-

P-100 Filter

See HEPA Filter.

## **Paint Chip Sampling**

Testing done by an accredited laboratory to measure the amount of lead in a paint chip sample that was removed from a surface.

## **Paint Removal**

An abatement method where lead-based paint is removed from surfaces.

## Parts per Million (ppm)

A unit used to identify the amount of lead in paint. It is the weight of lead per million weights of a sample (including the lead). For example, if a sample contains 5,000 micrograms of lead in 1 gram of paint, then the lead concentration is 5,000 ppm.

## Permissible Exposure Limit (PEL)

According to Cal/OSHA, this is the maximum amount of a substance that workers may be exposed to over an 8-hour workday. The PEL for lead is 50 micrograms per cubic meter of air ( $\mu$ g/m<sup>3</sup>).

## **Personal Air Sampling**

Tests done to measure the amount of lead in the air a worker breathes on the job. Sometimes called "air monitoring." (See *Breathing Zone*.)

## Poly

Polyethylene plastic sheeting, used to protect surfaces during lead work. Should be 6 mils thick.

## **Power Tool Cleaning**

The use of power tools (such as grinders, sanders, brushes, and needle guns) to remove dirt or paint from surfaces.

## Powered Air Purifying Respirator (PAPR)

A respirator equipped with a battery-powered blower which draws air through cartridges and into the face piece.

## **Presumed Hazardous Waste**

Non-intact presumed lead-based paint generated from structures built before January 1, 1979.

## **Presumed Lead-Based Paint**

Defined by Title 17 as any paint or surface coating affixed to a component in or on a structure (except on residences built on or after January 1, 1979, or a school constructed on or after January 1, 1993).

## **Presumed Non-Hazardous Waste**

Intact paint or surface coatings affixed to a component, generated from a residential or public building.
### Priming

Application of a liquid coating designed to seal a substrate and create a bondable surface capable of receiving a subsequent paint application.

### **Project Designer**

An individual who has been certified by DHS and is allowed to write abatement plans for lead abatement projects.

### **Project Monitor**

An individual who has been certified by DHS to write abatement plans and do clearance inspections for lead abatement projects.

### **Prophylactic Chelation**

Using drugs to artificially keep blood lead levels low. Prohibited by Cal/OSHA regulations, as this in not effective and is dangerous.



### **Regulated Area**

An area where work is expected to generate lead dust over the PEL. Warning signs must be posted to mark the regulated area and restrict access.

#### Replacement

A type of abatement that involves removing components coated with lead-based paint, such as windows, doors, and trim. They are replaced with components that are free of lead-based paint.

#### **Resource Conservation and Recovery Act (RCRA)**

A federal law that regulates hazardous waste disposal. (Title 42, United States Code, Section 821 et seq.)

#### Respirator

A device worn by a worker for protection against toxic substances in the air. There are several types. An air purifying respirator (APR) uses a filter cartridge to remove the substances. It may be half-mask or full-face. An atmosphere supplying respirator provides a separate source of clean air from a hose or tank. Respirators must be NIOSH-approved. (See *Air Purifying Respirator* and *Supplied Air Respirator*.)

#### **Respiratory Protection Program**

A program required by Cal/OSHA. Employers must put measures in place to ensure the safe and effective use of respirators on the job, including training, testing, selection, and maintenance. The program must be in writing. (Title 8, California Code of Regulations, Sections 1531 and 5144.)

#### **Risk Assessment**

An on-site investigation to determine the existence, nature, severity, and location of lead hazards.

### **Risk Assessor**

An individual who has been certified by DHS as an Inspector/Assessor to perform risk assessments for lead hazards.

# **S**–

### Self-Contained Breathing Apparatus (SCBA)

A type of Supplied Air Respirator which supplies clean air to the face piece from a tank carried on the worker's back.

### Substrate

A surface on which paint, varnish, or other coating has been applied or may be applied. Examples of substrates include wood, plaster, metal, and drywall.

### Supervisor

An individual who has been certified by DHS to perform and supervise lead abatement projects and write lead abatement plans.

### Supplied Air Respirator (SAR)

A type of respirator that supplies clean air. This may be from an air compressor hose or from a tank on the worker's back (SCBA). (See *Self-Contained Breathing Apparatus.*)

### **Take-Home Lead**

Lead that is brought home from the job on a worker's clothing, shoes, or body. Take-home lead can contaminate cars and homes, endangering household members, especially young children and pregnant women.

### Time Weighted Average (TWA)

A way of expressing the amount of chemical exposure to a worker by averaging the exposure over a period of time. For example, an eight-hour TWA averages exposure over an eight-hour workday.

#### Title 17

This is the key regulation for work with lead in California. It requires accreditation of training providers by DHS. Workers who perform high risk lead work or abatement work designed to reduce lead hazards for a minimum of 20 years must be trained by an accredited training provider and be certified by DHS. Title 17 also specifies work practices required for lead jobs. (Section 35001 et seq of the California Code of Regulations.)

### Title X

This law directs federal government agencies to develop regulations to strengthen and redirect national lead poisoning prevention efforts. Also called the Lead-Based Paint Hazard Reduction Act of 1992. (Title X of the Housing and Community Development Act of 1992, Public Law 102-550.)

### **Toxic Substances Control Act (TSCA)**

A 1976 federal law (Title 15, United States Code, Section 2601 et seq.) Title IV of TSCA covers lead paint hazards.

### **Trigger Task**

Any of the specific lead tasks listed as high risk in Cal/OSHA's Lead in Construction standard. These tasks are presumed to cause lead exposure over the PEL until personal air sampling results indicate otherwise.

### Trisodium Phosphate (TSP)

A detergent once widely used for many types of cleaning. It binds well to lead and was added to water for cleaning up lead dust. It can cause eye irritation and environmental damage, and has been banned by some states and all federal projects. Other cleaning agents are available.

# **u**—

### **User Seal Check**

A test that should be done by individual workers every time they put on a respirator to make sure it seals to the face properly. There are two types of seal checks (positive and negative pressure) described in Cal/OSHA's Respiratory Protection standard. Compare to *Fit Test*.

### μ

Sympol for "micro." See *Microgram* (µg).

W\_\_\_

### Waste Extraction Test (WET)

A test to measure the concentration of soluble lead in a waste sample. This is one step in determining whether the waste should be classified and disposed of as "hazardous waste."

### Wet Chemical Field Test

A test using a chemical that turns pink or red on contact with certain amounts of lead. One example is the "lead stick." The use of this method is not recommended by HUD, as it is not reliable.

### Wipe Sampling

See Dust Wipe Sampling.

### Worker

An individual who has been certified by DHS to perform the labor involved in lead abatement projects.



### X-ray Fluorescence Analyzer (XRF)

An electronic instrument used to test for lead in paint. The testing is non-destructive, and the results are reported in milligrams per square centimeter  $(mg/cm^2)$ .



### Zinc Protoporphyrin (ZPP)

A blood test that reflects a person's lead exposure over the prior 3 to 4 months This test shows how much the blood-forming system has been damaged.

# **Resources for More Information**

## **Federal Government Agencies**

### **Centers for Disease Control & Prevention (CDC)**

### **CDC Headquarters**

1600 Clifton Road NE Atlanta, GA 30333

(404) 639-3311 (Operator) (800) 311-3435 (Public Inquiry) (770) 488-7100 (24-hour Emergency Assistance) (404) 639-3312 (TTY) *www.cdc.gov* 

An agency of the Department of Health and Human Services whose mission is to promote health and quality of life by preventing and controlling disease, injury, and disability.

### CDC National Center for Environmental Health (NCEH)

1600 Clifton Road NE, Mail Stop E-25 Atlanta, GA 30333

(888) 232-6789 (Healthline) www.cdc.gov/nceh/ncehhome.htm

Call to get information on lead poisoning, related issues, and a list of publications. NCEH's Childhood Lead Poisoning Prevention Program develops programs and policies, educates the public and health care providers, provides funding to state and local health departments, and supports research.

### CDC Agency for Toxic Substances and Disease Registry (ATSDR)

1600 Clifton Road NE, Mail Stop E-57 Atlanta, GA 30333

(888) 422-8737 (Toll Free) (404) 498-0110 (Local) (404) 498-0093 (Fax) *www.atsdr.cdc.gov* 

Provides information on health effects for those living or working near hazardous waste sites. Can provide information on lead poisoning and effects of other toxic substances.

### Department of Housing and Urban Development (HUD)

### HUD Office of Lead Hazard Control

451 7th Street SW, Room P-3206 Washington, DC 20410

(202) 708-1112 (Public Information)
(202) 708-1455 (TTY)
(202) 755-1785 x104 (Regulations Hotline)
(415) 489-6400 (San Francisco Office)
www.hud.gov

Advises all HUD program offices and field offices on lead poisoning prevention. Committed to providing lead-safe housing to the nation's children while preserving affordable housing.

### **Environmental Protection Agency (EPA)**

### **EPA Region 9 Toxics Office**

CMD-4, 75 Hawthorne Street San Francisco, CA 94105

(415) 947-4180

Responds to inquiries and complaints, and gives technical information about lead-based paint. Involved in EPA training and certification programs with Indian Tribes in Region 9 (California, Arizona, Nevada, Hawaii). Handles lack of lead-based paint disclosures in California real estate transactions (renting, selling, remodeling).

### **EPA National Lead Information Center**

422 South Clinton Avenue Rochester, NY 14620

(800) 424-LEAD (Toll Free) (585) 232-3111 (Fax) www.epa.gov/lead/nlic.htm

NLIC is funded by the EPA to maintain a Lead Educational Materials Database which they can search in response to a caller's needs. They provide information to help parents protect their children from poisoning in the home, and can furnish a list of state and local contacts. Written materials and recordings are available in English and Spanish.

### EPA Office of Pollution Prevention and Toxics—Lead Programs

(800) 424-LEAD www.epa.gov/opptintr/lead Responds to inquiries about lead and lead-based paint. Has information and materials in English and Spanish. Also involved in regulating training and certification programs.

### EPA Safe Drinking Water Hotline

(800) 426-4791 www.epa.gov/safewater/

Provides educational materials, explanation of lab analysis results, and other information about contaminants in drinking water, including lead.

### Food and Drug Administration (FDA)

### **FDA California Office**

1431 Harbor Bay Parkway Alameda, CA 94502

(510) 337-6700 www.fda.gov

Regulates food, drugs, cosmetics, and medical devices. Also regulates, investigates, and samples dinnerware, pottery, etc. for metals content such as lead.

### **California State Agencies**

### Cal/OSHA (Division of Occupational Safety and Health)

### Cal/OSHA Compliance—Headquarters

1515 Clay St., Suite 1901 Oakland, CA 94612

(510) 286-7000 www.dir.ca.gov/occupational\_safety.html

Investigates worksite fatalities, serious injuries or illnesses, and complaints about workplace hazards. Also conducts scheduled inspections of high-risk workplaces.

### Cal/OSHA Compliance—District Offices

Concord	(925) 602-6517
Fremont	(510) 794-2521
Fresno	(559) 445-5302
Foster City/San Mateo	(650) 573-3812
Los Angeles	(213) 576-7451

Modesto	(209) 576-6260
Monrovia	(626) 256-7913
Oakland	(510) 622-2916
Sacramento	(916) 263-2800
San Bernardino	(909) 383-4321
San Diego	(619) 767-2280
San Francisco	(415) 972-8670
Santa Ana	(714) 558-4451
Santa Rosa	(707) 576-2388
Torrance	(310) 516-3734
Van Nuys	(818) 901-5403
Ventura	(805) 654-4581
West Covina	(626) 472-0046

### Cal/OSHA Consultation Service—Headquarters

### (800) 963-9424

Provides free services to employers, including on-site evaluation of health and safety conditions in the workplace, training, publications, and information.

### Cal/OSHA Consultation Service—Area Offices

Fresno	(559) 454-1295
Los Angeles	(562) 944-9366
Oakland	(510) 622-2891
Sacramento	(916) 263-0704
San Bernardino	(909) 383-4567
San Diego	(619) 767-2060
Van Nuys/San Fernando Valley	(818) 901-5754

### **Department of Health Services**

### Childhood Lead Poisoning Prevention Branch (CLPPB)

850 Marina Bay Parkway, Bldg. P, Third Floor Richmond, CA 94804-6403

(510) 620-5600 (General Information)(800) 597-5323 (Lead-Related Construction Information Line)www.dhs.ca.gov/childlead/

Helps eliminate childhood lead poisoning by identifying and caring for lead burdened children, and preventing environmental exposures to lead. CLPPB is responsible for accrediting lead-

related construction training providers and certifying individuals to conduct lead-related construction activities.

### Division of Drinking Water and Environmental Management (DDWEM)

Drinking Water Program PO Box 942732 Sacramento, CA 94234-7320

(916) 323-6111 www.dhs.ca.gov/ps/ddwem/

Assures protection of the public through the regulation and monitoring of public water systems.

### **Occupational Lead Poisoning Prevention Program (OLPPP)**

850 Marina Bay Parkway, Bldg. P, Third Floor Richmond, CA 94804-6403

(510) 620-5757 (Office) (866) 627-1587 (Information and Publications) *www.dhs.ca.gov/ohb/olppp/* 

Provides information and services designed to prevent and control lead poisoning in California workplaces. Activities directed towards workers, unions, employers, industry groups, health professionals and the general public.

### **Environmental Protection Agency (Cal/EPA)**

**Cal/EPA Department of Toxic Substances Control** 1001 I Street, PO Box 806 Sacramento, CA 95812

(916) 322-0476 (General Information) (800) 728-6942 (Toll Free, California only) www.dtsc.ca.gov

Protects public health and the environment by regulating hazardous waste and enforcing pollution prevention laws.

### Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA)

PO Box 4010 Sacramento, CA 95812

(916) 324-7572 www.oehha.ca.gov

Regulates lead exposure under California's Proposition 65.

# **Local Government Agencies**

### **California Childhood Lead Poisoning Prevention Programs**

### **City and County Offices**

Many city and county lead programs provide information on testing children for lead, general lead information, and lead poisoning prevention services.

Alameda County	(510) 567-8294
Alpine County	(530) 694-2146
Amador County	(209) 223-6407
Berkeley (City)	(510) 981-5289
Butte County	(530) 538-7829
Calaveras County	(209) 754-6460
Colusa County	(530) 458-0380
Contra Costa County	(925) 313-6217
Del Norte County	(707) 464-3191
El Dorado County	(530) 621-6109
Fresno County	(559) 445-3330
Glenn County	(530) 934-6588
Humboldt County	(707) 268-2121
Imperial County	(760) 482-4635
Inyo County	(760) 878-0231
Kern County	(661) 868-0360
Kings County	(559) 584-1401
Lake County	(707) 263-1090
Lassen County	(530) 251-8183
Long Beach (City)	(562) 570-4203
Los Angeles County	(323) 869-7171
Madera County	(559) 658-7456
Marin County	(415) 499-3254
Mariposa County	(209) 966-3689
Mendocino County	(707) 463-4130
Merced County	(209) 381-1124
Modoc County	(530) 233-6311
Mono County	(760) 924-1842
Monterey County	(831) 755-4796
Napa County	(707) 253-4807
Nevada County	(530) 265-7265
Orange County	(714) 834-8485
Pasadena (City)	(626) 744-6036
Placer County	(530) 889-7144
Plumas County	(530) 283-6330

## **Regional and Statewide Organizations**

### **University Programs**

### Labor Occupational Health Program (LOHP)

Lead-Safe Schools Project University of California, Berkeley 2223 Fulton St., 4th Floor Berkeley, CA 94720-5120

(510) 642-5507 www.leadsafeschools.org

Produces materials and presents training programs for school personnel on lead safety in California schools. LOHP also has information on other workplace safety and health issues.

### UCLA Labor Occupational Safety and Health Program

Hershey Hall PO Box 951478 Los Angeles, CA 90095-1478

(310) 794-5964 www.losh.ucla.edu

Provides training, publications and technical assistance on occupational health and safety issues in Southern California.

### **Occupational and Environmental Health Clinics**

### **California Clinics**

Many doctors do not have experience in treating patients with lead poisoning or other workrelated health problems. To consult with experts in lead-related health effects and other occupational and environmental health problems, contact the following clinics.

University of California, Davis (Sacramento)	(530)	754-7635
University of California, Irvine	(949)	824-8641
University of California, Los Angeles	(310)	794-8144
University of California, San Francisco	(415)2	206-4320

### **Nationwide Clinics**

### Association of Occupational and Environmental Clinics

1010 Vermont Avenue NW, Suite 513 Washington, DC 20005

(202) 347-4976 (888) 347-AOEC (Toll Free) *www.aoec.org* 

Has a complete list of affiliated occupational and environmental health clinics nationwide.