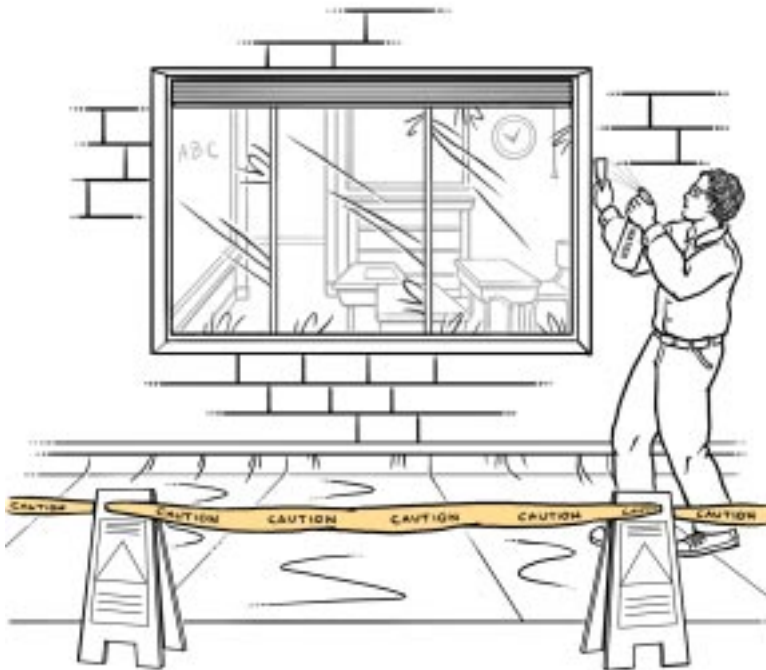


Working in a Lead-Safe School



Facts for School Maintenance Workers

Lead-Safe Schools Project
University of California at Berkeley

This booklet was produced by the Lead-Safe Schools Project, Labor Occupational Health Program, Center for Occupational and Environmental Health, University of California, 2223 Fulton St., Berkeley, CA 94720-5120. Phone (510) 642-5507 for more information.

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The information in this booklet is not intended for workers involved in lead abatement, demolition, renovation, or other activities involving the complete removal of lead paint. These tasks should be done by highly trained, state-certified professionals.

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Why Worry About Lead?

Is Lead Dangerous?



Yes. Lead was once widely used in products like paint, gasoline, solder, pipes, plumbing, batteries, and construction materials. It is highly toxic to the human body. It damages the brain, nervous system, and kidneys. Poisoning can occur gradually, and there are often 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 precautions aren't taken to control lead exposure on the job.

Is There Lead in California Schools?



Yes. A recent study by the California Department of Health Services found that there is lead paint in 96% of the elementary schools in the state—even in some newer buildings. The study also found lead in some school drinking water, and in the soil near older schools.

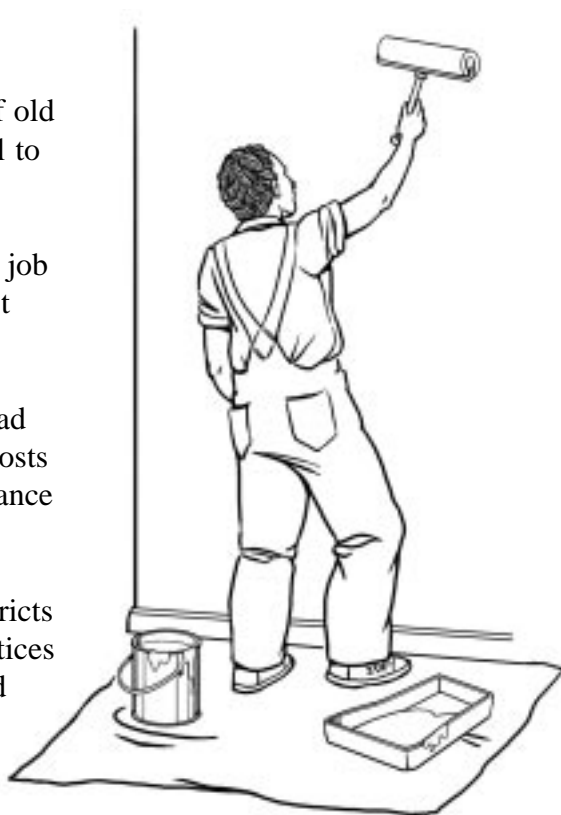
Why This Booklet?



This booklet is for school custodians and maintenance staff who may work around lead while doing their day-to-day tasks. These staff can play an important role in making schools lead-safe. The booklet shows how maintenance work can be done safely, and what precautions are needed. It can help workers protect both the children and themselves.

Some Facts About Lead

- ◆ If surfaces have lead paint, even a small maintenance job like drilling a hole can produce enough lead dust to poison a child.
- ◆ There is no safe level of lead exposure. Lead can be harmful even at very low levels.
- ◆ It is now illegal for California school districts to use lead paint. In 1992, use of lead paint was banned by the state Lead-Safe Schools Protection Act.
- ◆ Many schools may still have supplies of old lead paint around. Remember it's illegal to use it!
- ◆ Workers who are exposed to lead on the job can expose their families when lead dust travels home on their shoes or clothes.
- ◆ Some California school districts have had to pay thousands of dollars in cleanup costs after parents volunteered to do maintenance work and disturbed lead paint.
- ◆ A 1997 survey of California school districts found that potentially unsafe work practices are still common when maintenance and operations staff work around lead.



Lead and the Body

How Does Lead Get Into the Body?

Lead gets into the body when you **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.



Who Is at Risk?

Lead can harm people of any age.

Children eight and under have special risks because their bodies are still developing. When exposed, they absorb more lead than others.

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.



Lead and the Body

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
- ◆ Carpentry
- ◆ Renovation/demolition
- ◆ Welding
- ◆ Soldering
- ◆ Doing cleanup.



UNSAFE!

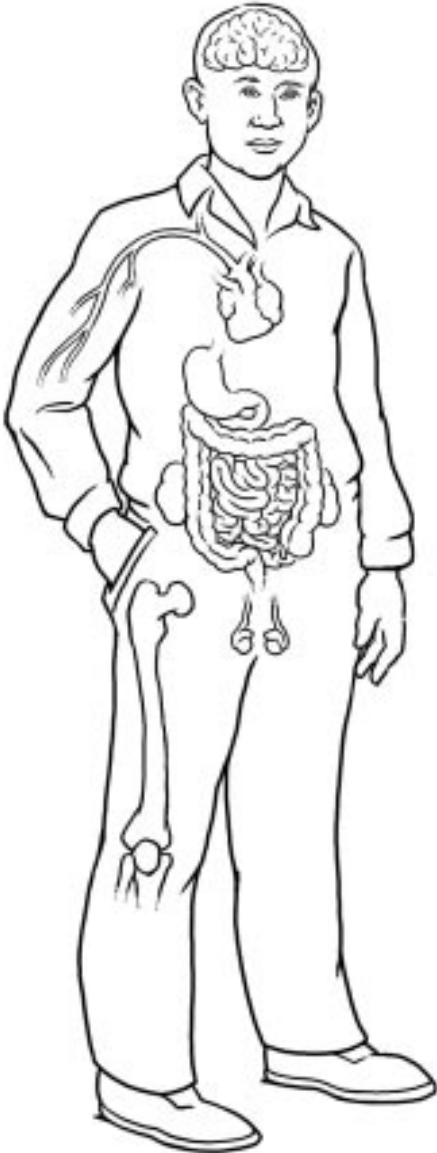
Are Workers' Families at Risk?

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.



Lead and the Body

What Health Problems Can Lead Cause?



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.

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.
- ◆ **Heart and Blood.** Lead can cause anemia (making you feel weak and tired) and high blood pressure.
- ◆ **Kidneys.** Permanent damage can occur.
- ◆ **Digestive System.** 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.

In children, lead can also cause learning and behavior problems, slow growth, and other difficulties.

How Is Lead in the Body Measured?

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).** The ZPP test estimates exposure over the past three or four months.



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.

The results of the BLL and ZPP tests are given in **micrograms** of lead per **deciliter** of blood. This is often abbreviated as $\mu\text{g}/\text{dl}$.

Most people, including children, are free of symptoms at levels of $10 \mu\text{g}/\text{dl}$ or less.

State and federal agencies consider any blood lead level above $10 \mu\text{g}/\text{dl}$ to be unsafe for children and pregnant or nursing women.

However, **no** level has been proven completely safe, either for children or for adults.

Lead and the Body

Can High Blood Lead Levels Be Reduced?

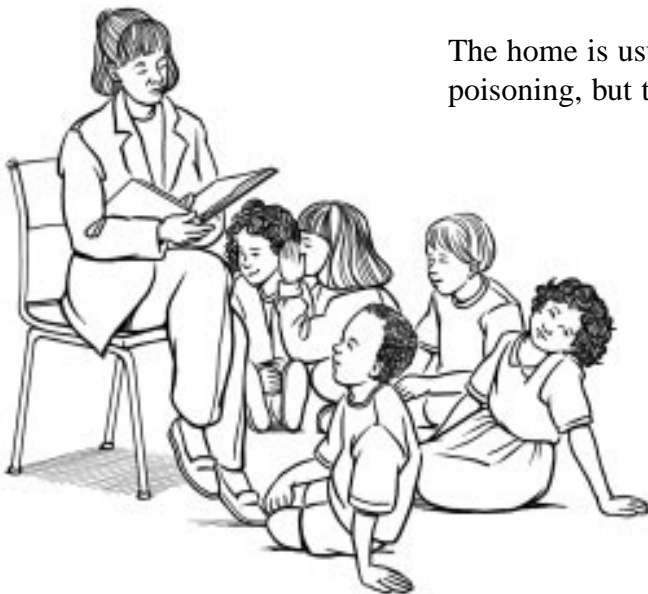
Yes. For both adults and children, health professionals usually treat high blood lead levels by finding a way to reduce lead **exposure**. If exposure is reduced, the level will usually go down.

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

State regulations say that workers with high blood lead levels (over 50 $\mu\text{g}/\text{dl}$) must be removed from the work where they are exposed.

Children. The source of the child's lead exposure should be found, and steps should be taken to reduce or eliminate it. The child's family should also be educated about preventing contact with lead.

The home is usually the main source of childhood lead poisoning, but the school can also be involved.



Where Is Lead Found in Schools?

Most commonly, lead is found in the **paint, dust, soil,** and **water**. There may be other sources of lead in some schools, like art supplies, photography supplies, pottery glazes, and science lab materials.

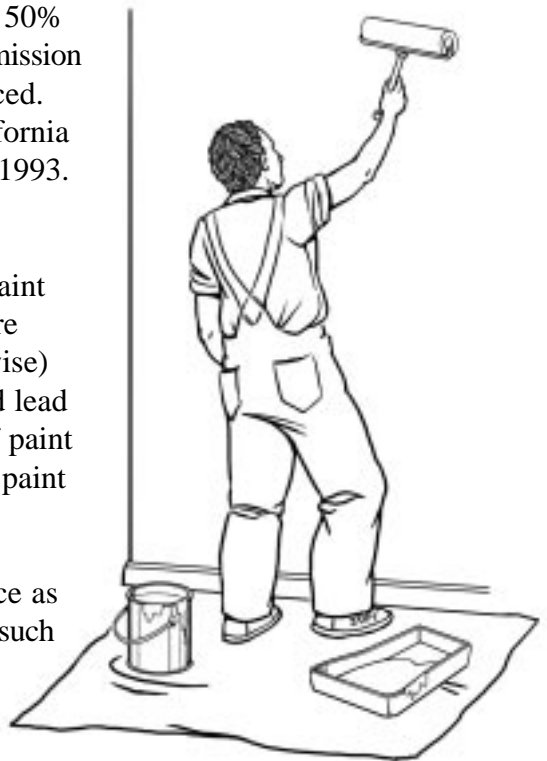
Does Most Paint Contain Lead?

Yes. Almost all commercial paint sold before 1993 contained some lead. Lead was added to paint to make it last longer, dry faster, and stick better.

Until the mid-1950s, paint contained as much as 50% lead. In 1978, the Consumer Product Safety Commission ordered that the lead in residential paint be reduced. Lead-based paint was later banned from all California schools built or renovated on or after January 1, 1993. Most latex paint has never contained lead.

Older school buildings are more likely to have paint with high levels of lead. All buildings built before January 1, 1993 (unless tested and shown otherwise) should be **assumed** to have lead-based paint. Old lead paint is often covered with more recent layers of paint that may not contain lead. So remember that the paint layers underneath may have a hidden danger.

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.



Lead in Schools

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.

Lead paint can become hazardous because of:



- ◆ Weather effects (sun or rain).
- ◆ Water damage or mildew.
- ◆ Aging effects (chipping, peeling, cracking, chalking).
- ◆ Maintenance work that disturbs the paint.
- ◆ Children chewing on painted surfaces.
- ◆ Impact that disturbs the paint, like doors being slammed or walls hit.
- ◆ Friction that disturbs the paint, like windows opening and closing or doors scraping.

Visual inspection can often tell you if paint is in poor condition. But sometimes deterioration is hidden and you won't notice it.

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

Should Paint Be Tested?

By law, school districts must **assume** all buildings built before January 1, 1993 have lead paint. Therefore, workers must take all lead-safe precautions if the paint is not tested. The only way to know for sure is to have the paint tested for lead.

There are several different ways to test:

- ◆ **Paint Chip Sampling.** Samples from a painted surface are taken by a state-certified lead inspector and sent to a laboratory. The lab reports how much lead is in the paint.

A sample is collected by scraping a 2 by 2 inch square area down to the underlying surface. The sample usually contains several layers of paint.



- ◆ **XRF Analysis.** A state-certified lead inspector comes to the site and uses a machine called an X-Ray Fluorescence (XRF) Analyzer. This gives a quick reading of the lead level in all paint layers, and doesn't disturb the painted surface.
- ◆ **Wet Chemical Field Test.** 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. The test identifies lead only in the surface paint that is exposed, not the undercoats. Also, if lead is present, the test doesn't tell you how much there is.

Lead in Schools

How Can Lead Get Into Soil?

Soil around schools can get contaminated by:



- ◆ Paint chips or dust. These may fall from nearby buildings or play 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.
- ◆ Pesticides. Many pesticides contain lead and can contaminate the soil in agricultural areas.

Tests can be done to check for lead in soil. They must be performed by a state-certified lead inspector.



How Can Lead Get Into Water?

Lead can leach into drinking water from pipes, solder, or brass plumbing fixtures, especially when plumbing work is less than five years old. Lead pipes were often used before 1930. Newer plumbing may have leaded solder, which wasn't banned in California until 1988.

Many school districts have already tested their drinking water for lead. Drinking water should be tested at **all** schools. Samples for testing must be taken following EPA procedures.

What Can Be Done About Lead?

Paint. Measures designed to reduce or eliminate lead hazards are called **abatement**. If abatement work is intended to reduce or eliminate a lead hazard for 20 years or more, it must be done by specially trained workers who are state-certified, and also requires special equipment and safety precautions.

Instead of abatement, many school districts leave intact lead paint in place and control deterioration by regular repainting. Lead paint is not hazardous if it is not deteriorated or disturbed.

Routine maintenance work can disturb lead paint and create dust. Therefore, safety precautions are required. These are called **lead-safe work practices** and are discussed later in this booklet.

Soil. Soil that is contaminated with lead should be “off limits” to children. The soil should be covered, and warning signs posted. It may be fenced off or planted densely to prevent access. If lead levels in the soil are very high, the first step is to restrict access (fence, cover, etc.). A long-term solution is to remove the soil or permanently cover it with asphalt or concrete.

Water. 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.



Worker Protection



What Safety Regulations Cover Lead Work?

California's health and safety agency, Cal/OSHA, has regulations to protect workers from many different workplace hazards. These are called **standards**. For lead work in schools, the most important one is the Lead in Construction standard.

Although not discussed in this booklet, other Cal/OSHA standards apply as well. Lead work is also covered by regulations from the California Department of Health Services and the U.S. Environmental Protection Agency (EPA).

What Does Cal/OSHA Require?



Cal/OSHA's Lead in Construction standard says that anyone who works around lead must be given the protective clothing and equipment they need. These can include coveralls, safety goggles, gloves, shoe coverings, and even respirators, depending on the nature of the task.

It is the **employer's** responsibility to provide protective clothing and equipment, at no cost to the worker.

Cal/OSHA's standard applies even if workers are only exposed to a very small amount of lead in paint. Different protective measures and training are required for different levels of lead exposure.

How Is Dust in the Air Measured?

Cal/OSHA's standard requires your employer to measure the lead dust created by each type of maintenance task. This is called **personal air sampling**. You wear a device that collects and measures the dust near your nose and mouth. The results are given in micrograms of lead per cubic meter of air ($\mu\text{g}/\text{m}^3$). Your employer must tell you the results within five working days.



How Much Is Too Much?

You should take precautions if you have **any** exposure to lead, no matter how small. For example, wash up thoroughly after any lead work. Cal/OSHA says that if lead dust in the air is above certain levels, it is cause for special concern.

Action Level. $30 \mu\text{g}/\text{m}^3$ is called the Cal/OSHA Action Level for lead. If your exposure (averaged over an eight hour day) is at the Action Level or higher, certain protective measures are required.

Permissible Exposure Limit. $50 \mu\text{g}/\text{m}^3$ is called the Cal/OSHA Permissible Exposure Limit (PEL) for lead. A PEL is the maximum amount of a substance allowed in the air you breathe on the job (averaged over an eight hour day). If you are exposed to a lead level at or above the PEL, the task clearly involves a high risk. In this case Cal/OSHA requires very strict protection. Workers must get special training and be state-certified.

Worker Protection

What Medical Tests Do Workers Need?

According to Cal/OSHA's Lead in Construction standard, some workers who are exposed to lead must be given free blood tests and medical exams. This is called a Medical Surveillance Program.

If you may be exposed to lead at or above the Action Level for even one day, you must have an initial "baseline" blood test. If you are exposed at or above the Action Level for more than 30 days in any 12-month period, you must have regular tests every few months. Blood test results are reported in micrograms of lead per deciliter of blood ($\mu\text{g}/\text{dl}$). You have a right to know your test results.

If your Blood Lead Level (BLL) is at or above $40 \mu\text{g}/\text{dl}$, you must be given regular medical exams. You must also be given a medical exam if you have symptoms of lead poisoning, or if you request medical advice about conception, pregnancy, or breathing difficulty.

What Is Medical Removal?

In some cases, workers must be temporarily removed from lead exposure at or above the Action Level. Cal/OSHA requires medical removal whenever a blood test (and one follow-up blood test) shows a BLL of $50 \mu\text{g}/\text{dl}$ or higher, or when recommended by a doctor. Cal/OSHA has rules that explain how long you must remain off the job, based on BLL results. You must receive full pay and benefits during the temporary removal, but can be assigned to work in lead-free areas.



Working Safely Around Lead

What Training Is Required?

Cal/OSHA says that anyone exposed to lead on the job must be given training. Even for low levels of exposure, workers must be trained about the health effects of lead, personal protective equipment, lead-safe work practices, the right to medical tests, and related topics. They must also be trained on the Cal/OSHA Lead in Construction standard.

If your lead exposure will be above the PEL, you must take an advanced course and become state-certified. For more information on certification, check the website www.childlead.com.



What Tasks Can Cause High Exposure?

Some tasks are unusually hazardous because they produce a lot of lead dust or fumes. They almost always cause lead exposure over the PEL. Only state-certified lead workers may do them. These are called **trigger tasks**.

Trigger tasks include manual demolition, dry sanding, power sanding, dry scraping, using a heat gun, sandblasting, welding, and torching.

This is only a partial list. Cal/OSHA's standard has a complete list of trigger tasks.



UNSAFE!

Working Safely Around Lead

What's the Key to Working Lead-Safe?

You can keep yourself and children safe if you:

- ◆ Restrict access to the work area.
- ◆ Use containment.
- ◆ Work wet.
- ◆ Choose safer work methods.
- ◆ Clean up thoroughly.

How Can You Restrict Access?

Only workers who are trained and directly involved in the lead maintenance task should be allowed near the work area. Make special efforts to keep children out.

Always:

- ◆ Schedule the work when there is no chance children might come near the site.
- ◆ Put up warning signs.
- ◆ Put up caution tape around the work area.
- ◆ If caution tape is not effective in keeping children out, erect temporary physical barriers like fences.



Working Safely Around Lead

What Is Containment?

The most important way to prevent lead contamination is to use containment. Containment is a system or barrier that keeps lead hazards inside the work area.

Protect the work area by laying disposable polyethylene sheeting (or poly) on the floor or ground. Use at least 4 mil sheeting. This catches dust and chips as they fall, and makes it much easier to clean up afterwards. Containment must be used for **every** lead task, no matter how small.

Indoors. Lay the poly so it extends at least five feet in all directions from the work area. Secure it to the wall with duct tape. Move or cover furniture and other nearby items.



Take special care to protect carpets. It is nearly impossible to remove lead dust from carpets once they become contaminated.

Whenever you do lead work, shut down the heating, ventilation, and air conditioning (HVAC) vents near the work area. Lock out the vents, or put warning tags on them. If the work will create a lot of dust, seal the vents with poly and shut down the entire HVAC system.

Outdoors. Lay poly ten feet in all directions and secure it with weights. Extend the poly farther if you are working high up (like on the side of a building) or if it is windy. Also cover bushes, landscaping, and nearby objects and secure the covers. Close nearby windows. Seal them with poly if there will be a lot of dust.

Working Safely Around Lead

What Is "Working Wet"?



Working wet means to keep dust levels low by wetting the surface while doing the job. For lead tasks, working wet is the key to safety.

To work wet, mist the area with a spray bottle or commercial sprayer throughout the course of the work. Allow for the water to soak into the material. Don't use too much water, which could cause runoff and damage to the building. Also keep debris and chips wet.

The only time wet methods are not recommended is near electricity. Whether the power is on or off, **never** use water around outlets, electrical boxes, or wiring. Watch out for concealed wiring in walls or ceilings.

Which Work Methods Are Safer?

Unsafe	Safer
Dry manual sanding or scraping.	Wet manual sanding or scraping.
Power sanding.	Wet manual sanding.
Using chemical strippers with methylene chloride.	Using chemical strippers without methylene chloride with proper protective equipment.
Dry sweeping.	Wet sweeping or using a vacuum with a HEPA filter.

Why Is Proper Cleanup Important?

Proper cleanup is crucial after a lead job. Unless cleanup is thorough and complete, large amounts of lead dust can remain. The dust is especially dangerous because it is nearly invisible.

Unsafe cleanup methods for lead dust include:

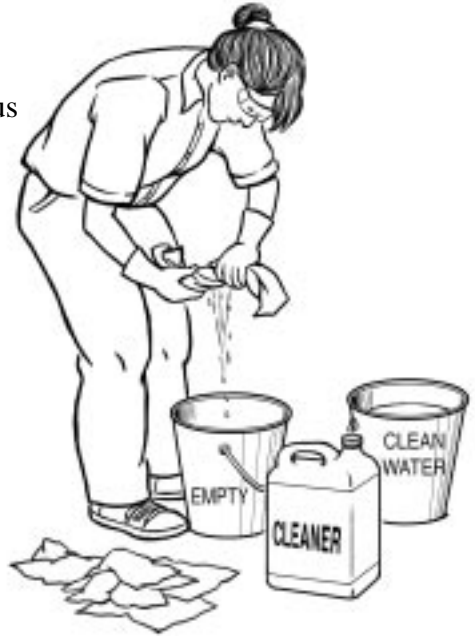
- ◆ Dry sweeping.
- ◆ Using compressed air to blow dust off.
- ◆ Any method that scatters dust into the air.

Safer and more effective cleanup methods include wet cleaning and HEPA vacuuming.

Wet Cleaning. You will need a detergent or a special solution made for lead cleaning. The solution attracts and picks up lead particles. Don't use trisodium phosphate (TSP) solutions because they can cause eye irritation and environmental damage. If any solution you use is an irritant, wear gloves and eye protection.

To do wet cleaning, you will need several cloths, two buckets, and your cleaning solution. Leave one bucket empty and fill one with clean water. Use the cloths to wash the area twice with the detergent and rinse the area twice with the clean water. Use the empty bucket to wring out your cloths after each wash and each rinse.

Wet clean all surfaces near the work area. Also wet clean the poly sheeting you have used before you remove it.



Lead-Safe Cleanup

What Is a HEPA Vacuum Cleaner?

HEPA Vacuuming. To clean up after a lead job that produces a lot of dust, use a special HEPA vacuum cleaner. (HEPA stands for High Efficiency Particulate Air.)



These special vacuums have filters that trap the dust. A regular shop vac just blows the dust back out into the room.

HEPA attachments with special filters are also available for power tools like drills, sanders, and grinders. They can catch the dust as you work and make the job much safer.

How Should You Remove Poly Sheeting?

After you have wet cleaned all surfaces near the work area, it's time for final cleanup. If the job produced a lot of dust, HEPA vacuum the area after wet cleaning. Finally, remove the poly sheeting and prepare it for disposal.

To take up the poly, fold it carefully **inward** from the corners and ends toward the middle. This traps any remaining dust. Remove any poly that covers doors and windows **last**. Dispose of the poly as described in the next section.

After the poly has been removed, clean the entire area again. In most cases, another wet cleaning may be enough.

How Should You Dispose of the Waste?

After a lead job, the waste that was generated must be disposed of safely. This waste may either be hazardous or non-hazardous, depending on how much lead is in it. If the waste is hazardous, there are strict rules on how and where your employer can dispose of it.

Always keep hazardous and non-hazardous waste separated **while** you are doing the job. This makes disposal much simpler.

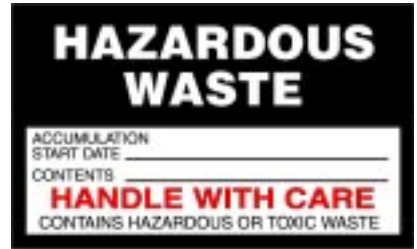
Hazardous waste may include:

- ◆ Paint chips and dust.
- ◆ Rags, mops, sponges, and other cleaning supplies.
- ◆ Used HEPA vacuum bags or filters.
- ◆ Sludge and other waste from chemical stripping.

Non-hazardous waste may include:

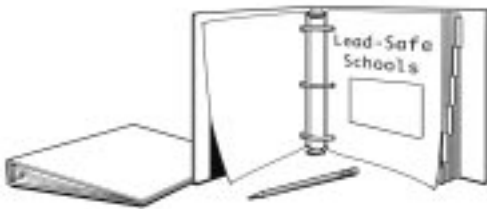
- ◆ Disposable work clothing.
- ◆ Poly sheeting if properly cleaned after use.
- ◆ Building materials with intact, unpeeling paint, such as doors, casements, moldings, and jambs.

The only way to know for sure if waste is hazardous is to have it tested. Hazardous waste must be transported to a licensed collection facility.







What's Important To Remember?

As a school maintenance worker, you can protect both yourself and the children from lead poisoning if you follow these simple rules:




- ◆ Watch out for lead paint! It's most common in older buildings, but may be in any building built before 1993. Lead paint is hazardous when it is in poor condition or is disturbed.
- ◆ Get training before you do any maintenance task that could disturb lead paint. Learn about lead-safe work practices, protective equipment, and Cal/OSHA's Lead in Construction standard.
- ◆ Don't do high risk lead jobs unless you are state-certified.
- ◆ Restrict access to the work area while doing any lead task. Use warning signs, caution tape, and, when needed, physical barriers.
- ◆ Use poly sheeting to contain dust and chips on every lead task, no matter how small.
- ◆ Always work wet when lead paint is involved. Continuously mist the area with a spray bottle or commercial sprayer.
- ◆ Clean the area thoroughly after doing lead work. Use lead-safe methods like wet cleaning and HEPA vacuuming. Dispose of hazardous waste properly. Also wash your hands and face thoroughly.

General Information About Lead

- ◆ Lead-Safe Schools Project, Labor Occupational Health Program, University of California, Berkeley. Offers training, educational materials, and information for California public school maintenance and operations staff.
 (510) 642-5507.
- ◆ Childhood Lead Poisoning Prevention Branch (CLPPB), California Department of Health Services. Offers educational materials on prevention of childhood lead poisoning. Also responsible for accrediting all lead training providers in California.
 (510) 622-5000 or go to the website **www.childlead.com**.
- ◆ Occupational Lead Poisoning Prevention Program (OLPPP), California Department of Health Services. Provides information on lead in the workplace, and has educational materials for workers, employers, and health professionals.
 (510) 622-4332 or go to the website **www.ohb.org/olppp.htm**.
- ◆ City and County Childhood Lead Poisoning Prevention Programs. Many California cities and counties have programs that provide information on poisoning prevention and testing children.
 Check your local phone book.

Workplace Health and Safety

- ◆ California Division of Occupational Safety and Health (Cal/OSHA). Enforces workplace health and safety regulations in California (including the Lead in Construction standard). Complaints are kept confidential. Cal/OSHA has offices throughout the state.
 Check your local phone book or go to the website **www.dir.ca.gov**.



LABOR OCCUPATIONAL HEALTH PROGRAM