WHAT IS LEAD?

WHERE IS IT FOUND?

In this chapter you will learn:

- What lead is;
- Why lead was used;
- Where lead is found today;
- How you can be exposed to lead;
- What jobs and hobbies can expose you to lead; and
- The lead paint problem in the United States.

What is Lead?

Lead is a heavy, gray metal which is also soft and pliable. Lead dust and particles stick to surfaces. The chemical symbol for lead is Pb.

People used lead even before history was recorded. The Egyptians used it in solder, cosmetics, and building materials. The Greeks and Romans used lead in plumbing. The Romans used it in food containers. They added lead to wine because it tastes sweet and prevents spoiling.
Why was Lead used?

Lead has been put in products for many reasons:

- **It prevents corrosion.** Lead will not crack easily with wear, weather, or temperature change.
- **It kills mold and mildew.** Lead is used in areas with lots of moisture.
- **It is easy to shape.** Lead is a soft metal and melts at a low temperature (620°F).
- **It is strong.** Lead has a lot of mechanical strength.
- **It blocks radiation.** Lead is used in products designed to block radiation, such as the lead aprons used when X-rays are taken.
- **It blocks sound.** Lead was sometimes used for sound-proofing.
- **It helps paint dry.** Lead was added to paint to quicken the drying process.

Lead is Dangerous.

**Lead is a dangerous poison.** You can't see or feel the lead that can make you sick. Lead is most dangerous when it is in the form of dust or fumes.

Lead dust particles can be very small. Sometimes they are so small, you can't see them. They are easy to breathe if they are in the air. They are also easy to swallow if they are on anything you put in your mouth-like food, cigarettes, or fingers. Lead dust settles on flat surfaces. When you touch those surfaces, you get lead on your hands. If you put your hands to your mouth, you will swallow lead dust. Since young children put their hands in their mouths a lot, they are at a high risk for lead poisoning.

Lead Causes Health Problems.

Lead has caused sickness for thousands of years. Ancient Egyptians knew that lead could kill people if they swallowed too much of it. In the Middle Ages, doctors realized that the health
problems of painters, miners, and artists were caused by exposure to lead on the job.

More than 200 years ago, Ben Franklin wrote to a friend about work-related lead poisoning cases.

Dear Friends,

I recollect that when I had the great Pleasure of seeing you at Southhampton, now a 12 month since, we had some Conversation on the bad Effects of Lead taken inwardly; at your Request I promis'd to send you in writing a particular Account of several Facts I then mention 'd to you...

The first thing I remember of this Kind, was a ... Complaint from North Carolina against New England Rum, that it poison'd their People, giving them the Dry Bellyach, with a Loss of Use of their limbs. The Distilleries being examin'd on the Occasion, it was found that several of them used leaden Still-heads and Worms, and the Physicians were of Opinion that the Mischief was occaion'd by that Use of Lead. The Legislature of the Massachusetts thereupon pass'd an Act prohibiting under severe Penalties the Use of such stillheads & Worms thereafter.

In 1724, being in London, I went to work in the Printing House of Mr. Palmer, Bartholomew Close as a Compositor. I there found a Practice I had never seen before, of drying a Case of types which are wet in Distribution by placing it sloping before the Fire ... an old Workman observing it, advis'd me not to do so, telling me I might lose the Use of my hands by it, as two of our Companions had nearly done. But talking afterwards with Mr. James, a Letter-founder in the Close, and asking him if his People, who work'd over the little Furnaces of
melted Metal, were not subject to that Disorder; he make light of any Danger from the Effluvia, but ascrib'd it to Particles of the Metal swallow'd with their Food by slovenly Workmen, who went to their Meals after handling the Metal, without washing.

You will see by it, that the Opinion of the mischievous Effect from Lead, is at least above Sixty Years old; and you will observe with Concern how long a useful Truth may be known, and exists; before it is generally receiv'd and practis'd on.

I am ever, Your's most affectionately,

B. Franklin

In the early 1900's, doctors found that lead–based paint caused reproductive problems for workers and their families. Doctors began to study lead-based paint as a cause of childhood diseases. Many doctors in the United States studied and wrote about childhood lead poisoning. In 1913, Dr. Alice Hamilton wrote about painters and the hazards of their work. She documented their exposure to lead and their health problems.

Where is Lead Found?

Lead can be found almost anywhere today. Let's look at some places where we find lead: Lead-based paint is defined in the law (known as Title X) as paint, varnish, shellac, or other coatings on surfaces that contain more than 1.0 mg/cm² of lead or more than 0.5% (5,000 ppm) lead by weight.

Lead was used in paints for color and durability. Lead-based paint made a coating that stood up to wear and tear and weather changes. Lead was also added to paints to help them dry faster.
Lead-based paint seems like a good product. But when it gets old or damaged, it creates lead dust and chips. Sometimes children put lead paint chips in their mouths and swallow lead. Dust from lead-based paint is easy to breathe and swallow. If you breathe or swallow lead, it is a poison in the body.

**Lead dust pollutes the air, soil, household dust, and any surface it lands on.** Lead dust contaminates floors, counter tops, furniture, toys, shelves, books, pets, and people. Lead dust can get on children when they play on the floor, even when the floor looks clean. Children put their dusty hands and toys in their mouth and swallow lead dust. Pets can pick up lead from dust and soil. When children play with pets, they pick up lead dust. This is called **hand-to-mouth contact.** Most lead-poisoned children are poisoned by lead dust.

**House Paint.** Lead-based paint in the home is a major source of lead poisoning. Any home built before 1978 may contain lead-based paint (87% of homes built before 1940). Homes built before 1960 are more likely to contain higher levels of lead.

Lead-based paint was used inside homes on woodwork, walls, floors, windows, doors, and stairs because it stood up to wear and tear. It was also used on the outside of homes, porches, windows, and doors because it stood up to weather changes.

Lead-based paint kills mold and mildew, which grow in wet areas. So, lead-based paint was often used in places where moisture is found, like kitchen and bathroom walls and on windows and doors.
Industrial Uses of Lead-based Paint. Lead-based paint is still used on bridges and on the inside and outside of steel structures to prevent rust and corrosion. This is called industrial use.

Lead-based paint is still allowed for bridges, road paint, and shipbuilding and repair. About 90,000 bridges in the United States are coated with lead-based paint. Blasting or grinding lead-based paint off steel structures creates huge amounts of lead dust that workers can be exposed to. The community may also be exposed to this lead dust since it gets into the air and nearby soil, plants, and water.

Leaded Gasoline. In the past, lead was added to gasoline as an anti-knock agent. The lead was released into the air through car exhaust. This lead polluted the air and soil.

In 1978, the EPA cut the amount of lead that could be added to gasoline. By 1982, the U.S. national average level of lead found in people's blood dropped by 37%. A higher amount of lead is allowed for farm vehicles and equipment. Leaded gas is still used in some other countries.

Industrial Releases. Lead is used in many different types of products, such as batteries, ceramics, lead crystal, bullets, and plastics. When these products are made, lead can be released into the air. Lead in the air can pollute anything it lands on. These products can pollute soil, water, and air.

Soil. You can find traces of lead in most soil. High levels of lead in soil can come from paint dust, leaded gas exhaust, and industrial releases. Some yards, gardens, and playgrounds have soil that contains very high levels of lead. Such bare soil areas are very dangerous to
children. Children who play in them get dirt that has lead in it on their hands. They can get lead poisoned if they swallow the lead on their hands when they touch their mouths with their hands.

**Food.** Food grown in soil that has lead can contain lead. Lead ceramic ware, pottery, and glassware is used for cooking and eating. This lead can be released into the food.

Another source of lead is food packed in cans that contain lead solder. Leaded solder can be used to hold cans together. **As of November 1991, lead-soldered cans are no longer produced in the United States.**

**Drinking Water.** Lead was used in pipes and soldering – even in water coolers. This is how lead got into our drinking water. Now it is illegal to use lead in household plumbing because of the **Safe Drinking Water Act** (1986 and 1988). However, old lead pipes and lead soldering still can contaminate drinking water.

**Hobbies.**

Many people can be exposed to lead in their hobbies. Hobbies that may expose you to lead are:

- Home remodeling
- Glazed pottery making
- Target shooting at firing ranges
- Electronics
- Car and boat repair
- Refinishing furniture
- Painting – some art paints have lead pigments
- Making lead fishing sinkers or lures
- Stained-glass window making

**Occupational Exposures.**

Many jobs or occupations can expose people to lead. These
workers are in danger of getting lead poisoned. They may also contaminate their cars and homes by bringing home lead dust on their clothes, shoes, hair, or skin. If they do this, they could poison their own families. Some jobs that have a high risk of lead exposure include –

**Construction Trades**
- Lead abatement workers
- Steel welders and cutters
- Carpenters
- Sheet metal workers
- Remodelers
- Painters
- Renovators
- Plumbers and pipe fitters
- Demolition workers
- Cable splicers
- Ironworkers

**Industry**
- Lead miners
- Lead smelter workers
- Lead refinery workers
- Lead crystal makers
- Ceramic glaze manufacturers
- Plastic manufacturers
- Wire and cable manufacturers
- Electronics makers

**Others**
- Firing range employees
- Police officers
- Artists
- Radiator repair workers
- Car mechanics
- Printers
- Scrap yard workers and recyclers
The Lead Paint Problem in the United States

Lead is a known poison. Other countries limited the use of lead-based paint as early as 1840. The United States did not act until the 1970's. The U.S. Government banned the use of lead-based paint in houses, hospitals, schools, parks, playgrounds, and public buildings in 1978. Lead-based paint has been found in homes built before 1980 (40% of all housing; 69% of housing 1940-1959).

Lead-based paint can still be used on cars, boats, metal furniture, industrial steel, farm equipment, and on roads as traffic paint. This lead-based paint sometimes has been used for the wrong purpose.

Today millions U.S. homes contain lead-based paint. This number includes houses and apartments in the cities, in suburbs, and in the country. It includes the homes of people and families from all levels of income. Older homes are more likely to have lead-based paint than newer homes.

Renovation in a home where lead-based paint is found is one of the greatest causes of childhood lead poisoning. Many homes with lead-based paint are occupied by families with children under age 6. Children under 6 are most easily damaged by lead because their nervous systems are still developing. Millions of children in the United States are at risk for lead poisoning.
Damaged and deteriorating lead-based paint is in many of our homes, day care centers, schools, hospitals, and other buildings. Lead-based paint is also on many bridges and steel structures. When lead-based paint deteriorates or is disturbed, it creates lead dust. Lead dust from paint removal on steel structures can pollute a whole community if it is not removed properly.

Doing lead abatement safely is very important. When you work safely with lead, you prevent lead poisoning. Removing lead-based paint from buildings and structures in our communities helps prevent serious lead exposures and lead poisoning.

Key Facts for Chapter 1

What is lead?
Lead is a heavy metal. Lead has been used for thousands of years. It prevents corrosion and kills mold and mildew. It is durable and easy to shape. Lead is a poison. It can make you sick if you breathe or swallow it.

Lead-based paint is paint, varnish, shellac, or other coatings on surfaces that contain more than 1.0 mg/cm² of lead (XRF) or more than 0.5% lead by weight (laboratory analysis) or 5,000 ppm.

Sources of lead exposure:
Lead-based paint, Leaded gasoline, Factories, Soil, Food, Water, Pottery, Crystal, Glassware, and different Jobs and Hobbies.

Lead dust
Lead paint is a health hazard when it chips or becomes dust or fumes. Lead dust is created when:
... Lead-based paint gets old and deteriorates.
... Lead-painted surfaces are broken, damaged, or disturbed.
... Lead-painted surfaces are sanded or scraped.
... Lead dust and particles tend to stick to surfaces.
... Lead dust particles can be so small, you can't see them.

Lead–based paint in the home
Lead paint in the home is a major cause of childhood lead poisoning. Renovation of these homes is the greatest cause of childhood lead poisoning. The United States banned the use of lead paint in homes in 1978. Millions of American homes still contain lead paint during the late 1990s.

For More Information
These publications have more information on the topics covered in this chapter.

EPA. *Lead Poisoning And Your Children.* (October 2000).
EPA. *Protect Your Family From Lead In Your Home.* (April 1999).
Some Sources of Lead Exposure

- Leaded Gas
- Industrial Sources
- Lead Exposure at Home