

LEAD IN INDUSTRY

Lead is one of the Earth's fundamental substances. An element that occurs naturally in the soil and the air, lead has a long history as one of mankind's most useful metals.

In ancient times, it was a by-product of silver production but its characteristics - corrosion resistance, low melting point and malleability - soon made lead a desirable and commonly used product. Egyptians used lead for sculpture, sinkers for fishing nets, jewelry and dishes. Romans used large amounts of lead for lining water supply lines and cisterns, for roofing and shipbuilding, and as weights, cooking pots, and wine sweeteners. As a result, lead poisoning was common in Roman times.

Lead exposure continues to pose serious problems today, even though much is now known about lead and its adverse effects. Exposure is difficult to control because, once lead is removed from ore, it cannot be disposed of or changed in the environment (it can be recycled and reused, however).

Ninety percent of lead dust in surface soil will be there 70 to 200 years later.

Lead finds its way into modern life in many forms. A large proportion of the lead used today serves the automobile industry in components such as storage batteries, radiators and solder for joints. Lead is an important part of chemical tank liners and of radiation shields in telephone and power cable conduit. It also is used in solder for plumbing and some paints, especially those for ships where corrosion can be a significant problem. Bullets, pottery, crystal glassware, wire and stained glass windows all may require lead.

HEALTH EFFECTS

Lead can be inhaled, ingested, and, occasionally, absorbed through the skin. Most industrial exposure is from breathing inorganic lead dust and fumes. Eating, drinking and smoking on the work site or carelessly handling contaminated objects can result in unintentional exposure to lead.

Once it enters the body, lead is stored in three places: the blood, body organs and bones. Lead stays in the blood about a month and in soft tissues for several months, it can remain in the bones for decades, a potent poison, it affects the brain and nervous system, reproductive capabilities, the kidneys, the digestive system, and the ability to make blood.

Lead poisoning can be acute (high level of exposure) or chronic (low exposure or over a long period of time). Chronic poisoning is more common in industrial settings where small amounts of lead gradually can build in the body and result in temporary or permanent damage. An elevated blood lead level indicates that lead is building in the body faster than it can be eliminated. There is a wide range of symptoms, many of which imitate other diseases.

Short-terms Effects to Lead Poisoning

- Fatigue
- Headache
- Irritability
- Metallic taste in mouth
- Poor appetite
- Reproductive problems.
- Sleeplessness
- Stomach upset

Long-term Effects to Lead Poisoning

- Kidney problems
- Memory loss
- Muscle and joint pains
- Premature loss of teeth
- Shortened life span
- Stomach aches and pains, nausea
- Weak wrists and ankles
- Weight loss
- Extreme cases of lead poisoning can result in convulsions, coma, or death.

REQUIREMENTS OF THE LEAD STANDARD

The "lead standard," developed by the Occupational Safety and Health Administration, outlines practices for reducing lead exposure and for protecting the health of workers. No employee should be exposed to lead at or above concentrations of 50 micrograms per cubic meter of air (mcg/m^3), OSHA's permissible exposure limit (PEL). In all industries, lead concentrations of $50 \text{ mcg}/\text{m}^3$ of air through adequate ventilation and work practice controls. If concentrations are higher, appropriate respirators must be worn by employees to keep their exposure below $50 \text{ mcg}/\text{m}^3$ of air. Employers also must provide clean showers, change rooms and lunchrooms for their employees. The standard also specifies monitoring requirements, methods for reducing lead exposure, medical surveillance of employees to evaluate whether they are absorbing excessive lead, and medical removal protection in cases of overexposure.

Lead standard requirements are based on airborne concentrations of lead in the workplace. It should be remembered, however, that ingested lead dust can cause problems, even in work areas where airborne lead is below the PEL.

If lead exposure in the workplace is a possibility, and employer must

- train workers about the health effects of lead and the requirements of the lead standard, and
- monitor for airborne lead concentrations during each shift, in each work area, and

job classification.

If monitoring shows lead levels above 30 mcg/m³ of air (OSHA's action limit) but below 50 mcg/m³ of air (PEL), an employer also must-

- repeat monitoring every six months,
- repeat training annually,
- provide medical surveillance, including blood sampling for lead and zinc protoporphyrin, medical exams and consultation,
- provide medical removal protection for employees with excessively elevated blood lead levels.

If monitoring shows lead above mcg/m³, an employer must -

- repeat monitoring every three months,
- post warning signs in work areas where lead exposure exceeds the PEL,
- install local exhaust ventilation or institute other engineering or work practice measures to limit employee exposure so that it does not exceed the PEL,
- provide effective respiratory protection for employees and training in its use, until the PEL can be reached through engineering or work practice controls,
- provide protective clothing and equipment, including overalls, gloves, goggles, and shoes, and make sure employees use them,
- provide clean showers, changing rooms and separate storage for street clothes and soiled work clothes and make certain employees shower and change before leaving the work site,
- install a lunchroom with air conditioning and positive pressure and make sure employees wash before eating, drinking or smoking (**Do not** allow these activities in work areas), and
- provide medical surveillance and medical removal protection.

Chelation is a medical treatment used to remove lead from the blood. Treatment for lead poisoning is to be done only under the supervision of a physician. It is not to be used routinely to keep blood lead at acceptable levels.

All items above summarize major requirements of OSHA's lead standard (29 CFR 1910.1025). Employers should know and comply with ALL provisions of the standard.

PROTECTIVE PRACTICES

Employers should provide employees with adequate training, facilities, and equipment so that, whenever possible, they are able to avoid breathing or eating lead fumes or dust. All employers should be required to follow these safety practices to protect themselves.

- Use the ventilation systems. Be aware of how these systems work and make sure they are working correctly.
- Keep work areas clean. Do not use compressed air to remove lead dust. Instead, use

- a high efficiency particulate air (HEPA) vacuum.
- Do not eat, drink or smoke in work areas. Use a properly constructed lunchroom or other separate area free of lead dust or fumes.
 - Thoroughly wash hands and face before eating.
 - Use the correct respirator. Make sure it is clean, in good repair and fits properly.
 - Store street clothes in separate locker from where work clothes are stored.
 - Shower, wash hair and change into clean clothes and shoes before leaving the workplace. Lead dust on work clothes can contaminate an employee's home and affect his or her children. (If an employee exhibits elevated blood lead levels, his or her children also should be tested).
 - Eat a well-balanced diet; proper nutrition can reduce lead absorption. Fasting can increase the body's rate of absorption.

RESOURCES

Additional information is available from several state agencies.

The Department of Commerce and Community Affairs provides assistance to private sector companies that are seeking an evaluation of occupational safety and health hazards, including exposure to lead in their workplaces.

Illinois Department of Commerce
and Community Affairs
Industrial Services
James R. Thompson Center
100 W. Randolph St. Suite 3-400
Chicago, IL 60601
312-814-2337 or 800-972-4216

The Department of Labor's toxic substances section offers assistance to public sector agencies

Illinois Department of Labor
Division of Public Safety
1 W. Old State Capitol Plaza, Suite 300
Springfield, IL 62701
217-782-4102

The Illinois Department of Public Health offers several forms of assistance. Those seeking assistance from a toxicologist should contact the Department's environmental toxicology section.

Illinois Department of Public Health
Division of Environmental Health
525 W. Jefferson St,
Springfield, IL 62761

217-782-5830

For assistance and information about the adult elevated blood level program and information about epidemiologic and surveillance studies, write or call-

Illinois Department of Public Health
Division of Epidemiologic Studies
Occupational Disease Registry
535 W. Jefferson St.
Springfield, IL 62761
217-785-1873
800-547-0466 TTY (for hearing impaired use only)

Local or county public health departments also may be of assistance to an employer. Please check the local telephone directory for the name, address, and number of the local health department.