

# **Clemson University Lead Management program**

In compliance with  
29 CFR 1910.1025 and 1926.62

## Introduction

Workers have been poisoned by lead for thousands of years. Most lead over-exposures in the construction industry are found in the trades such as plumbing, welding and painting. In building construction, lead is frequently used for roofs, cornices, tank linings and electrical conduits. In plumbing, an alloy of lead/tin had been used extensively for soldering tin-plate and pipe joints. Use of lead solders in plumbing systems is now prohibited by law. Lead-based paint had also been used extensively for residential and commercial applications but has been banned for residential use by the Consumer Product Safety Commission. Lead-based paint may still be used on metal structures (bridges, railways, beams, etc.) to prevent corrosion, although substitute coatings are now available.

Significant lead exposures can arise during stripping or demolition of structures containing lead-based paint. The types of work with the greatest potential for lead exposure include iron work, demolition, painting, plumbing, electrical, lead-based paint abatement, heating/air conditioning and carpentry/renovation activities.

This document is the official position on procedures and operations involving the use, maintenance, and disturbance of lead-containing materials at Clemson University. This document was developed to assure that lead and lead-containing materials are properly maintained and handled. The procedures outlined in this policy will promote the safe management of lead and lead-containing materials at Clemson. They will also help assure compliance with regulations applicable to lead.

Environmental Health and Safety (EHS) is designated as the University's representative regarding issues involving lead exposures. EHS will conduct sampling, monitoring and inspections as deemed necessary to protect employee health and safety, and ensure compliance with regulatory requirements. EHS will provide guidance to departments regarding lead, lead exposure, and if necessary, lead abatement. EHS will act as a resource for Clemson departments requesting services and lead abatement contractors. Any questions concerning lead or items specified in this guide should be directed to EHS at [ehs@clemson.edu](mailto:ehs@clemson.edu) or 656-2583.

## Scope

This policy applies to any work where Clemson and/or contractor personnel may be exposed to lead or lead-containing materials. Occupationally, these exposures may include:

Demolition or salvage of structures where lead-containing materials may be present.

Removal or encapsulation of materials containing lead (e.g. lead paint abatement).

New construction, alteration, repair or renovation of items containing lead.

Installation of materials containing lead.

Lead contamination or emergency cleanup.

Maintenance operations involving the disturbance of lead or lead-containing materials.

Firing range operations.

Unless working in a relatively new building (built since 1980), all paint should be treated as lead containing unless sampling shows otherwise.

Disturbance is defined as scraping, washing, limited wet sanding, grinding, welding, drilling, small surface cutting for installation of equipment, repainting activities, cleaning activities, and minor surface modifications.

## **Summary**

The following actions will be taken in order to comply with the OSHA Lead Standards (29 CFR 1910.1025 and 1926.62) and DHEC/EPA regulations:

Contractors performing lead abatement must be licensed by the South Carolina Department Of Health and Environmental Control (DHEC).

Prior to the performance of any demolition or renovation activities, materials must be assessed for the presence of lead.

Representative and periodic air monitoring will be conducted for all employees with airborne (fume, dust) lead exposure.

Employees with 8-hour time-weighted average (TWA) exposures over 30 ug/m<sup>3</sup> (Action Limit) for thirty days per year will be enrolled in a lead medical surveillance program.

All employees with potential exposure to lead must receive training.

Employees with lead exposure in excess of the Permissible Exposure Limit (PEL) of 50 ug/m<sup>3</sup> as an 8-hour TWA will be provided appropriate protective clothing and respiratory protection.

Engineering controls will be implemented, if feasible, to reduce lead exposures below the PEL.

A written compliance plan will be implemented if airborne concentrations of lead exceed 50 ug/m<sup>3</sup> as an 8-hour TWA.

Surfaces will be maintained as free as possible from accumulation of lead dust.

Signs will be posted outside areas where employees' lead exposures exceed the PEL.

Certain work practices such as open flame burning, dry sanding and dry scraping of lead-containing substances are not permitted.

Specific containment procedures are stipulated to control emissions from interior and exterior lead abatement sites.

Surfaces in lead abatement sites must be cleaned.

Lead-containing wastes must be handled, transported and disposed per DOT and EPA/DHEC regulations.

Specific surface lead dust testing will be performed in residential properties following lead abatement to verify adequate cleanup.

## **Health Hazards**

Health effects from lead exposure continue to be a concern both at the workplace and in the home. Since the ban on lead in gasoline, lead levels detected in areas near roadways have decreased dramatically; however, lead based paint used in buildings and housing prior to 1980 continue to serve as significant sources of exposure.

Lead poisoning can result from a single high level (acute) exposure or through a number of smaller repetitive (chronic) exposures. Most adults are exposed to lead through occupational sources, while children and infants are exposed primarily through surface dust and soil. Floors, chewable surfaces and soil contaminated with lead serve as primary exposure sources for children.

Lead has no beneficial effect on humans. Once it has been ingested into the body, lead is distributed in the bloodstream to red blood cells, soft tissues and bone. Lead in the body is eliminated very slowly, mainly by the kidneys and digestive tract. Irreversible kidney damage may have already developed by the time high blood lead levels are identified and treated, making avoidance to exposure and medical surveillance extremely important.

Acute lead poisoning symptoms usually include abdominal pain as in a gall bladder attack or appendicitis. Other non-specific complaints include irritability, fatigue, weakness and muscle pain. In rare instances, damage to the brain and central nervous system also may occur. Chronic lead poisoning may result after lead has accumulated over time in the body and has been deposited mostly in the bone.

Stored lead in the bone may be released to the blood stream to produce health effects such as defective hemoglobin synthesis, nervous system abnormalities, hypertension, effects in the reproductive system (including impotency) and damage to a developing fetus.

The measurement of blood lead level is the most reliable method of evaluating lead exposure. It indicates the amount of lead in the bloodstream, which is often a measure of recent exposure to lead. The present "level of concern" in children is ten micrograms of lead per deciliter of blood (10 µg/dl). The level of concern for adult workers, as established by OSHA, is 40 µg/dl.

## **General Lead Exposure**

### **Training and medical surveillance:**

#### **TRAINING**

All Clemson employees involved in the disturbance of lead-containing materials and lead based paint as part of regular work activities must have at least a lead awareness training class. EHS will provide an introductory level lead awareness class for employees involved in non-abatement activities. Departments may also choose to cover lead hazards during their Worker Right to Know training. Typical job classifications needing awareness training would include painters, carpenters, custodial personnel, welders, electricians, plumbers and general maintenance personnel.

There may be some lead exposures during non-maintenance activities (chiefly in the Arts and Engineering disciplines). Employees involved in lead abatement activities must receive more extensive EPA approved lead abatement worker and/or supervisor level training.

## **MEDICAL SURVEILLANCE**

All Clemson employees involved in the disturbance of lead-containing materials, working with lead compounds (glazes, solders, etc.), or lead based paint as part of regular work activities must be involved in Clemson's Occupational Medicine Program. Employees will have blood lead levels checked initially, then at least annually thereafter. Blood lead levels should also be checked at the termination of employment. The ultimate frequency of blood screening will be dictated by the amount of lead related work each affected employee performs and on advice from the Occupational Medicine physician.

EHS will fit test employees with proper respirators, provide respirator training and assist with the required paperwork. Occupational Medicine will perform all necessary medical tests and evaluations. The Occupational Medicine physician should include a written respirator approval as part of the medical surveillance.

## **Lead-Based Paint Defined**

For the purposes of operations at Clemson and until a more formal definition is adopted by OSHA or EPA, EHS will adopt the definition of lead based paint as follows:

0.5% by weight as analyzed by a chemical laboratory, or

1.0 milligrams per square centimeter (mg/cm<sup>2</sup>) as measured by an X-ray fluorescence analyzer (XRF).

## **Sampling**

Any painted surfaces (including stained and varnished) in buildings constructed prior to 1980 must be sampled before any significant disturbance takes place. Any other materials (i.e. window glazing, putties, plumbing) that are suspected to contain lead must also be sampled before significant disturbance takes place.

To conduct a thorough investigation, each different surface should be sampled separately (examples include doors, windows, moldings, walls, ceilings, etc.). The primary lead paint sampling methods include:

### **Spot chemical testing:**

Spot chemical testing involves a process where a small amount of solution is placed on a sampling surface, and if lead is present, a colorimetric change will take place. This method involves a certain amount of paint destruction in order to test a complete cross section of paints and has proven to be the least reliable of the three listed methods.

## **X-Ray Fluorescence (XRF)**

XRF analysis is a direct field reading instrument that will provide immediate results for example a Niton XRF spectrum analyzer. The Niton uses a non-destructive analysis method which automatically adjusts for the substrate. As with the other analyses, different surfaces should be sampled separately.

Because XRF instruments use a radioactive source to measure lead content, special precautions need to be taken. Equipment operators must receive special training. At the present time, there is no correlation between results from laboratory analysis and XRF measurement.

## **Laboratory Testing**

Laboratory analysis provides the most reliable information but it can take as long as three weeks to receive results. The steps listed below should be followed when collecting bulk samples:

All paint samples should be collected in a new plastic sample bag. Samples should be labeled with a sample number, the surface sampled, and the sample location.

For proper laboratory analysis, approximately 5 grams of paint chips must be collected. (For reference, a nickel weighs approximately 5 grams.)

Samples must represent a cross section of materials down to the substrate. Care should be taken to collect as little substrate as possible. (For example, a paint sample on a wood door should contain paint down to the bare wood surface, but should not contain a significant amount of the wood itself.)

## **Project Management/General Contractor Projects**

As part of any renovation project, paint and other lead suspect materials must be analyzed in all sites to be disturbed. Spot and/or full abatement of leaded surfaces may be required before renovation or demolition can take place.

EHS must be contacted prior to any activity that involves significant disturbance of materials potentially containing lead. For jobs involving the welding or cutting of painted surfaces or extensive removal of lead-containing plumbing, more specific personal protective equipment as well as ventilation may be required.

## **Personal Protective Equipment (PPE)**

Personal protective equipment (PPE) is required when disturbing lead-containing materials. This equipment would include but not be limited to:

Disposable or cleanable work gloves

Coveralls (Tyvek or similar) with foot covering

Goggles or face shields

Properly fitted half-face respirators with HEPA cartridges

Once removed, any disposable materials must be gathered and disposed of as lead waste. Specific requirements are outlined in the waste disposal section.

Work procedures not previously monitored will require personal air sampling to determine airborne lead levels and the adequacy of respiratory protection. Air samples will be collected by EHS, then forwarded to an accredited laboratory for analysis. Employees should be trained in the use, fitting and limitations of their PPE as per OSHA's Personal Protective Equipment Standard (29CFR 1910.132-138).

## **Hygiene Facilities**

Personal hygiene is critical in the control of lead exposure for employees working with lead containing materials. Hygiene facilities with soap, water and disposable towels must be provided for employees. If jobs are extensive or large in scope, or if the paint being disturbed has a high lead content, the waste water should be gathered and placed in drums for further analysis. Collection could take place until a correlation between the lead content of waste water, lead levels in paint and the activities performed could be established. Smoking, chewing tobacco, gum or food will not be allowed in the work area.

Employees must wash hands and face thoroughly before all breaks and at the end of the work shift.

## **Operations and Maintenance Activities**

In many instances, routine painting and repair jobs will disturb materials that contain lead. Lead-containing paint and window glazing are just two types of materials that may be encountered. NIOSH has concluded that significant exposures can occur during work to repaint lead-containing materials or to repair windows that have leaded glazing.

A small amount of care can significantly decrease the potential for exposure to lead during maintenance activities that involve the disturbance of lead-containing materials.

The guidelines in this section should be used when the primary purpose of the work is not to remove lead-containing materials, but to conduct a repair or maintenance activity. As an example, these guidelines would be used when scraping loose paint in preparation for a repainting job, but would not be appropriate in an instance where all paint from a surface (loose and intact) would be removed.

The following procedures should be employed for operations and maintenance activities where prior sampling has confirmed the presence of lead. Employees conducting these types of activities must have attended a lead awareness training session concerning the potential hazards of working with lead and proper use of personal protective equipment as well as be included in the Clemson Occupational Medicine Program for lead surveillance.

## **Interior Work**

Notify the building supervisor and occupants where work involving lead will take place.

Conduct work involving lead-containing materials at times when the area is unoccupied.

Place 6-mil polyethylene sheeting a minimum of 6 feet horizontally out in all directions from the work area to cover any immovable objects.

Personal protective equipment (PPE) must be used, and at a minimum should include a half- face respirator with HEPA cartridges, disposable clothing and gloves. Shoe covers may be necessary to avoid tracking lead dust and waste outside the immediate work area.

HEPA vacuums, disposable towels and wash-up facilities must be available to employees at the work site. Clean-up materials should be kept away from the immediate work area, but must be close enough to allow quick clean-up of employees and equipment. All reusable equipment (HEPA vacuums, scrapers, screw drivers, etc.) must be properly cleaned, using wet methods, at the end of each day's work and before leaving the job site.

The work area itself must be demarcated and barricaded using disposable danger tape and "Lead Danger" warning signs bearing the following legend:

"Warning: Lead Work Area"

"Poison: No Smoking or Eating"

Using a HEPA vacuum, vacuum any accumulated dust from the work area prior to beginning the maintenance activity. Do not sweep or brush potential lead containing dust.

Use care to minimize the production of dust from scraping or sanding. Use either wet sanding/scraping or HEPA filtration fitted equipment.

At break periods or when finished, workers must immediately proceed to assigned clean-up areas to decontaminate. The decontamination areas must be within the barricaded areas and must have polyethylene drop cloths or plastic tarpaulins as a floor. Upon completion of clean-up, discarded PPE will be gathered into 4-6 mil plastic bags or into drums for proper disposal. Waste PPE should be kept separate from paint chips, dusts and debris to allow appropriate disposal. Specific waste characterization and disposal information is outlined in the waste disposal section.

When activities are complete, clean up any debris using HEPA vacuums. Working surfaces and the immediate work area should then be wet wiped using disposable towels and a detergent solution. Gather and containerize paint chips, dust, and debris as lead-containing waste. Remove surface polyethylene and final clean the area again using wet methods and HEPA vacuuming. All used towels must be gathered and disposed of as contaminated waste. Surface polyethylene can then be HEPA vacuumed, rolled inwards and disposed of as general (non-hazardous) waste.

Waste generated in preparation activities (paint chips, glazing, etc.) should be collected and deposited in an appropriate container. Specific waste characterization and disposal information is outlined in Section XVI - Waste Disposal.

Monitoring (both area and personal) by EHS will be necessary until exposure potentials can be determined.

### **Exterior Work**

Notify the building supervisor and occupants where work involving lead will take place.

Building occupants should be notified to close windows and doors within 25 feet of the work area.

Pre-clean paint chips, dust and debris from existing surfaces (using HEPA vacuums and wet cleaning methods) before the job begins. Place plastic catch sheeting or tarpaulins to collect debris on the ground, floor or platform directly below the work area and at least 6 feet out in all directions from the working surfaces. When working on elevated surfaces, an additional 6 feet of catch sheeting is required per floor above the first to a maximum of 25 feet. Individual catch sheets or tarpaulins should be overlapped a minimum of 18 inches and secured to each other. Prepping should not take place on windy days. Catch sheets or tarps should be weighted or secured to the ground.

All windows, doors and other openings in the work area shall be sealed using polyethylene on the inside. Care should be taken not to disturb interior surfaces which may also contain lead. Barrier tape will be used to isolate the work area in such a way that no member of the public can get within 10 ft. of the work area. (This requirement may need to be adjusted for work on elevated surfaces.) The work area itself must be demarcated and barricaded using disposable danger tape and "Lead Danger" warning signs bearing the following legend:

"Warning: Lead Work Area"

"Poison: No Smoking or Eating"

Personal protective equipment (PPE) must be used, and at a minimum should include a 1/2 face respirator with HEPA cartridges, disposable clothing and gloves.

HEPA vacuums, disposable towels and wash-up facilities must be available to employees at the work site. Clean-up materials should be kept away from the immediate work area, but must be close enough to allow quick clean-up of employees and equipment. All reusable equipment (HEPA vacuums, scrapers, screw drivers, etc.) must be properly cleaned at the end of each day's work and before leaving the job site.

When preparation activities are completed, working surfaces and the immediate work area should be wet wiped using disposable towels and a detergent solution. All used towels must be gathered and disposed of as contaminated waste. Surface polyethylene will then be HEPA vacuumed, wet wiped, and then rolled inwards and disposed of as general waste.

At break periods or when finished, workers must immediately proceed to assigned clean-up areas to decontaminate. The decontamination areas must be within the barricaded areas and must have polyethylene drop cloths or plastic tarpaulins as a floor. Upon completion of clean-up, discarded PPE will be gathered into 4-6 mil plastic bags or into drums for proper disposal. Waste PPE should be kept separate from paint chips, dust and debris to allow appropriate disposal (see the waste disposal section).

Waste generated in preparation activities (paint chips, glazing, etc.) should be collected and deposited in an appropriate container. Specific waste characterization and disposal information is outlined in the waste disposal section.

Monitoring (both area and personal) by EHS will be necessary until exposure potentials can be determined.

## **Lead Removal Methods**

### **Acceptable Methods**

The removal methods listed below are acceptable for operations and maintenance or abatement activities by personnel that have had the proper training, medical surveillance, and have completed the appropriate work area set-up outlined earlier.

Operations and Maintenance Removal Methods:

Manual scrapers and wire brushes

Limited manual sanding (preferably wet sanding) with accompanied ventilation (e.g. HEPA vacuum)

Abatement Removal Methods:

Chemical formulations (preferably methylene chloride-free solutions)

Heat guns not exceeding 700 degrees Fahrenheit

Manual scraping with the aid of chemical solvents (preferably not containing methylene chloride)

Paste formulations containing potassium or sodium hydroxide

Mechanized sanding equipment with dedicated HEPA filtered exhaust systems

### **Prohibited methods:**

The following list of removal methods for either operations and maintenance or abatement activities are prohibited and will not be allowed.

Use of a heat gun generating temperatures exceeding 700 degrees Fahrenheit

Open flame torching

Dry abrasive blasting using sand, grit or any other particulate

Mechanized sanding without HEPA filtered collection systems

## **Routine Cleaning of Lead-Painted Surfaces**

The following items apply to personnel involved in sweeping or wall cleaning in areas where paint chips or dusts are present. This would primarily apply to custodial personnel and any other University employees cleaning areas potentially contaminated with lead paint or dust.

Employees should attend a lead awareness training class or be trained on the hazards of lead as part of their Worker Right to Know training.

Report peeling paint or paint in poor condition to area coordinators or building contacts. Coordinators or contacts should then contact the appropriate personnel (Zone Maintenance, University Facilities, Housing Maintenance, etc.).

Assume paint is lead-containing unless testing shows otherwise.

Cleaning of lead painted surfaces should be performed using HEPA vacuums dedicated for lead, followed by wet methods (i.e. use wet towels, sponges or cloths). To specifically clean lead dusts from surfaces, a detergent such as Spic and Span is recommended.

Disposable gloves must be worn during cleaning. Respirators are not considered necessary for small cleaning jobs. Larger cleaning jobs may require respirators. HEPA vacuums should be used whenever possible to minimize exposure.

Gloves, sponges, disposable towels and other non-cleanable materials used in the cleaning of lead painted or contaminated surfaces must be placed in plastic bags, labeled as "HAZARDOUS WASTE PAINT MATERIALS" and dated. The waste will be collected by EHS.

## **Other Lead Activities**

### **Welding and cutting of metal surfaces**

All painted metal surfaces (I-beams, pipes, etc.) shall be assumed to be lead-containing unless sampling or a manufacturer's specifications show otherwise. Industrial coatings often contain other hazardous ingredients in addition to or in place of lead. These might include, but are not be limited to, chromium, cadmium and mercury.

When welding and/or cutting lead painted surfaces, powered air purifying respirators (PAPR's) with HEPA filters are required. PAPR's are recommended for all welding and cutting operations unless ventilation is in place to control contaminants. If welding or cutting is done in an occupied building, proper exhaust ventilation must be supplied. Similar guidelines apply to soldering of sheet metal, tubing, piping, or sewer piping involving lead solder or other lead containing materials.

### **Lead-Cable Splicing**

Air monitoring during the splicing of lead-jacketed electrical lines has shown the potential for exposures to lead at or above the action level. Any soldering or heating of lead jacketed materials should be conducted using proper engineering controls (i.e. ventilation), personal hygiene, PPE, and personal monitoring.

EHS can assist in identifying the specific controls that are needed.

## **Requirements specific to Lead Paint Abatement**

### **Training**

Individuals performing certain lead-related functions must receive DHEC accredited initial and annual training. These functions include:

Lead Paint Abatement Worker

Lead Paint Abatement Contractor

Lead Paint Abatement Supervisor

Lead Abatement (Residential) Project Designer

Lead Paint Inspector

Lead Paint Risk Assessor

### **Reporting**

A facility owner is required to notify residential occupants of all planned contractual lead abatement.

**Licensed contractors must notify DHEC of all lead abatement projects.**

## **Disposal of Waste Materials**

EHS is responsible for coordinating the proper disposal of hazardous waste at Clemson. Lead paint chips, dust and debris will generally be classified as hazardous waste. Because of hazardous waste costs, efforts should be made to minimize the generation of lead contaminated waste.

Paint chips, dusts and contents from HEPA vacuums (including HEPA filters) should be collected and containerized to allow for testing and handling as a possible hazardous waste. Demolition materials painted with lead based paint will be disposed of as regular demolition waste.

Some items contaminated as part of the abatement process may be cleaned and classified as non-hazardous waste.

Polyethylene used to protect items may be cleaned using HEPA vacuuming and wet wiping, then disposed of as non-hazardous waste. All non-hazardous waste can be put in unlabeled bags and/or placed in dumpsters. For lead waste questions and/or assistance in obtaining and disposing of waste containers, call EHS at [ehs@clemson.edu](mailto:ehs@clemson.edu) or 656-2583.

## Summary

The Clemson Guidelines for Working with Lead-Containing Materials applies to any work where Clemson and/or contractor personnel may be exposed to lead or lead-containing materials. Activities covered by this guideline include (but are not limited to) demolition, renovation, encapsulation, maintenance operations, paint-prepping and firing range clean-up.

All Clemson employees involved in the disturbance of lead-containing materials and lead based paint as part of regular work activities must have at least a lead awareness training class. Clemson employees exposed to lead above the action level (A.L.) of 30  $\mu\text{g}/\text{m}^3$  must have medical surveillance.

EHS will conduct necessary sampling, monitoring and inspections to ensure compliance with regulations as well as to protect employee health and safety. EHS will provide guidance to departments regarding lead, lead exposure, and if necessary, lead abatement. EHS will act as a liaison between Clemson departments requesting services and lead abatement contractors.

Any questions concerning lead or items specified in the guideline should be directed to EHS at [ehs@clemson.edu](mailto:ehs@clemson.edu) or 656-2583.

# OSHA Regulations Substance data sheet for occupational exposure to lead - CFR 29 1910.1025

## Appendix A

### I. SUBSTANCE IDENTIFICATION

Substance: Pure lead (Pb) is a heavy metal at room temperature and pressure and is a basic chemical element. It can combine with various other substances to form numerous lead compounds.

Compounds Covered by the Standard: The word "lead" when used in this standard means elemental lead, all inorganic lead compounds and a class of organic lead compounds called lead soaps. This standard does not apply to other organic lead compounds.

Uses: Exposure to lead occurs in at least 120 different occupations, including primary and secondary lead smelting, lead storage battery manufacturing, lead pigment manufacturing and use, solder manufacturing and use, shipbuilding and ship repairing, auto manufacturing, and printing.

Permissible Exposure: The Permissible Exposure Limit (PEL) set by the standard is 50 micrograms of lead per cubic meter of air (50 ug/m<sup>3</sup>), averaged over an 8-hour workday.

Action Level: The standard establishes an action level of 30 micrograms per cubic meter of air (30 ug/m<sup>3</sup>), time weighted average, based on an 8-hour work-day. The action level initiates several requirements of the standard, such as exposure monitoring, medical surveillance, and training and education.

### II. HEALTH HAZARD DATA

#### A. Ways in which lead enters your body.

When absorbed into your body in certain doses lead is a toxic substance. The object of the lead standard is to prevent absorption of harmful quantities of lead. The standard is intended to protect you not only from the immediate toxic effects of lead, but also from the serious toxic effects that may not become apparent until years of exposure have passed.

Lead can be absorbed into your body by inhalation (breathing) and ingestion (eating). Lead (except for certain organic lead compounds not covered by the standard, such as tetraethyl lead) is not absorbed through your skin. When lead is scattered in the air as a dust, fume or mist it can be inhaled and absorbed through your lungs and upper respiratory tract. Inhalation of airborne lead is generally the most important source of occupational lead absorption. You can also absorb lead through your digestive system if lead gets into your mouth and is swallowed. If you handle food, cigarettes, chewing tobacco, or make-up which have lead on them or handle them with hands contaminated with lead, this will contribute to ingestion.

A significant portion of the lead that you inhale or ingest gets into your blood stream. Once in your blood stream, lead is circulated throughout your body and stored in various organs and body tissues. Some of this lead is quickly filtered out of your body and excreted, but some remains in the blood and other tissues. As exposure to lead continues, the amount stored in your body will increase if you are absorbing more lead than your body is excreting. Even though you may not be aware of any immediate symptoms of disease, this lead stored in your tissues can be slowly causing irreversible damage, first to individual cells, then to your organs and whole body systems.

## B. Effects of overexposure to lead

### 1. Short term (acute) overexposure.

Lead is a potent, systemic poison that serves no known useful function once absorbed by your body. Taken in large enough doses, lead can kill you in a matter of days.

A condition affecting the brain called acute encephalopathy may arise which develops quickly to seizures, coma, and death from cardiorespiratory arrest. A short term dose of lead can lead to acute encephalopathy. Short term occupational exposures of this magnitude are highly unusual, but not impossible. Similar forms of encephalopathy may, however, arise from extended, chronic exposure to lower doses of lead. There is no sharp dividing line between rapidly developing acute effects of lead, and chronic effects which take longer to acquire. Lead adversely affects numerous body systems, and causes forms of health impairment and disease which arise after periods of exposure as short as days or as long as several years.

### 2. Long-term (chronic) overexposure.

Chronic overexposure to lead may result in severe damage to your blood-forming, nervous, urinary and reproductive systems. Some common symptoms of chronic overexposure include loss of appetite, metallic taste in the mouth, anxiety, constipation, nausea, pallor, excessive tiredness, weakness, insomnia, headache, nervous irritability, muscle and joint pain or soreness, fine tremors, numbness, dizziness, hyperactivity and colic. In lead colic there may be severe abdominal pain.

Damage to the central nervous system in general and the brain (encephalopathy) in particular is one of the most severe forms of lead poisoning. The most severe, often fatal, form of encephalopathy may be preceded by vomiting, a feeling of dullness progressing to drowsiness and stupor, poor memory, restlessness, irritability, tremor, and convulsions. It may arise suddenly with the onset of seizures, followed by coma, and death. There is a tendency for muscular weakness to develop at the same time. This weakness may progress to paralysis often observed as a characteristic "wrist drop" or "foot drop" and is a manifestation of a disease to the nervous system called peripheral neuropathy.

Chronic overexposure to lead also results in kidney disease with few, if any, symptoms appearing until extensive and most likely permanent kidney damage has occurred. Routine laboratory tests reveal the presence of this kidney disease only after about two-thirds of kidney function is lost. When overt symptoms of urinary dysfunction arise, it is often too late to correct or prevent worsening conditions, and progression to kidney dialysis or death is possible.

Chronic overexposure to lead impairs the reproductive systems of both men and women. Overexposure to lead may result in decreased sex drive, impotence and sterility in men. Lead can alter the structure of sperm cells raising the risk of birth defects. There is evidence of miscarriage and stillbirth in women whose husbands were exposed to lead or who were exposed to lead themselves. Lead exposure also may result in decreased fertility, and abnormal menstrual cycles in women. The course of pregnancy may be adversely affected by exposure to lead since lead crosses the placental barrier and poses risks to developing fetuses. Children born of parents either one of whom were exposed to excess lead levels are more likely to have birth defects, mental retardation, behavioral disorders or die during the first year of childhood.

Overexposure to lead also disrupts the blood-forming system resulting in decreased hemoglobin (the substance in the blood that carries oxygen to the cells) and ultimately anemia. Anemia is characterized by weakness, pallor and fatigability as a result of decreased oxygen carrying capacity in the blood.

### 3. Health protection goals of the standard.

Prevention of adverse health effects for most workers from exposure to lead throughout a working lifetime requires that worker blood lead (PbB) levels be maintained at or below forty micrograms per one hundred grams of whole blood (40 ug/100g). The blood lead levels of workers (both male and female workers) who intend to have children should be maintained below 30 ug/100g to minimize adverse reproductive health effects to the parents and to the developing fetus.

The measurement of your blood lead level is the most useful indicator of the amount of lead being absorbed by your body. Blood lead levels (PbB) are most often reported in units of milligrams (mg) or micrograms (ug) of lead (1 mg=1000 ug) per 100 grams (100g), 100 milliliters (100 ml) or deciliter (dl) of blood. These three units are essentially the same. Sometime PbB's are expressed in the form of mg% or ug%. This is a shorthand notation for 100g, 100 ml, or dl. PbB measurements show the amount of lead circulating in your blood stream, but do not give any information about the amount of lead stored in your various tissues.

PbB measurements merely show current absorption of lead, not the effect that lead is having on your body or the effects that past lead exposure may have already caused. Past research into lead-related diseases, however, has focused heavily on associations between PbBs and various diseases. As a result, your PbB is an important indicator of the likelihood that you will gradually acquire a lead-related health impairment or disease.

Once your blood lead level climbs above 40 ug/100g, your risk of disease increases. There is a wide variability of individual response to lead, thus it is difficult to say that a particular PbB in a given person will cause a particular effect. Studies have associated fatal encephalopathy with PbBs as low as 150 ug/100g. Other studies have shown other forms of diseases in some workers with PbBs well below 80 ug/100g. Your PbB is a crucial indicator of the risks to your health, but one other factor is also extremely important. This factor is the length of time you have had elevated PbBs. The longer you have an elevated PbB, the greater the risk that large quantities of lead are being gradually stored in your organs and tissues (body burden). The greater your overall body burden, the greater the chances of substantial permanent damage.

The best way to prevent all forms of lead-related impairments and diseases-both short term and long term- is to maintain your PbB below 40 ug/100g. The provisions of the standard are designed with this end in mind. Your employer has prime responsibility to assure that the provisions of the standard are complied with both by the company and by individual workers. You as a worker, however, also have a responsibility to assist your employer in complying with the standard. You can play a key role in protecting your own health by learning about the lead hazards and their control, learning what the standard requires, following the standard where it governs your own actions, and seeing that your employer complies with provisions governing his actions.

#### 4. Reporting signs and symptoms of health problems.

You should immediately notify your employer if you develop signs or symptoms associated with lead poisoning or if you desire medical advice concerning the effects of current or past exposure to lead on your ability to have a healthy child. You should also notify your employer if you have difficulty breathing during a respirator fit test or while wearing a respirator. In each of these cases your employer must make available to you appropriate medical examinations or consultations. These must be provided at no cost to you and at a reasonable time and place.

The standard contains a procedure whereby you can obtain a second opinion by a physician of your choice if the employer selected the initial physician. [56 FR 24686, May 31, 1991]

## **Employee standard summary - 1910.1025 App B**

This appendix summarizes key provisions of the standard that you as a worker should become familiar with.

### **I. Permissible Exposure Limit (PEL) - Paragraph (C)**

The standard sets a permissible exposure limit (PEL) of fifty micrograms of lead per cubic meter of air (50 ug/m<sup>3</sup>), averaged over an 8-hour work-day. This is the highest level of lead in air to which you may be permissibly exposed over an 8-hour workday.

Since it is an 8-hour average it permits short exposures above the PEL so long as for each 8-hour work day your average exposure does not exceed the PEL.

This standard recognizes that your daily exposure to lead can extend beyond a typical 8-hour workday as the result of overtime or other alterations in your work schedule. To deal with this, the standard contains a formula which reduces your permissible exposure when you are exposed more than 8 hours. For example, if you are exposed to lead for 10 hours a day, the maximum permitted average exposure would be 40 ug/m(3).

## **II. Exposure Monitoring - Paragraph (D)**

If lead is present in the workplace where you work in any quantity, your employer is required to make an initial determination of whether the action level is exceeded for any employee. This initial determination must include instrument monitoring of the air for the presence of lead and must cover the exposure of a representative number of employees who are reasonably believed to have the highest exposure levels. If your employer has conducted appropriate air sampling for lead in the past year he may use these results. If there have been any employee complaints of symptoms which may be attributable to exposure to lead or if there is any other information or observations which would indicate employee exposure to lead, this must also be considered as part of the initial determination. This initial determination must have been completed by March 31, 1979. If this initial determination shows that a reasonable possibility exists that any employee may be exposed, without regard to respirators, over the action level (30 ug/m(3)) your employer must set up an air monitoring program to determine the exposure level of every employee exposed to lead at your workplace.

In carrying out this air monitoring program, your employer is not required to monitor the exposure of every employee, but he must monitor a representative number of employees and job types. Enough sampling must be done to enable each employee's exposure level to be reasonably represented by at least one full shift (at least 7 hours) air sample. In addition, these air samples must be taken under conditions which represent each employee's regular, daily exposure to lead. All initial exposure monitoring must have been completed by May 30, 1979.

If you are exposed to lead and air sampling is performed, your employer is required to quickly notify you in writing of air monitoring results which represent your exposure. If the results indicate your exposure exceeds the PEL (without regard to your use of respirators), then your employer must also notify you of this in writing, and provide you with a description of the corrective action that will be taken to reduce your exposure.

Your exposure must be rechecked by monitoring every six months if your exposure is over the action level but below the PEL. Air monitoring must be repeated every 3 months if you are exposed over the PEL. Your employer may discontinue monitoring for you if 2 consecutive measurements, taken at least two weeks apart, are below the action level. However, whenever there is a production, process, control, or personnel change at your workplace which may result in new or additional exposure to lead, or whenever there is any other reason to suspect a change which may result in new or additional exposure to lead, your employer must perform additional monitoring.

### **III. Methods Of Compliance - Paragraph (E)**

Your employer is required to assure that no employee is exposed to lead in excess of the PEL. The standard establishes a priority of methods to be used to meet the PEL.

### **IV. Respiratory Protection - Paragraph (F)**

Your employer is required to provide and assure your use of respirators when your exposure to lead is not controlled below the PEL by other means. The employer must pay the cost of the respirator. Whenever you request one, your employer is also required to provide you a respirator even if your air exposure level does not exceed the PEL.

You might desire a respirator when, for example, you have received medical advice that your lead absorption should be decreased. Or, you may intend to have children in the near future, and want to reduce the level of lead in your body to minimize adverse reproductive effects. While respirators are the least satisfactory means of controlling your exposure, they are capable of providing significant protection if properly chosen, fitted, worn, cleaned, maintained, and replaced when they stop providing adequate protection.

Your employer is required to select respirators from the seven types listed in Table II of the Respiratory Protection section of the standard (Sec. 1910.1025(f)). Any respirator chosen must be approved by the National Institute for Occupational Safety and Health (NIOSH) under the provisions of 42 CFR part 84. This respirator selection table will enable your employer to choose a type of respirator that will give you a proper amount of protection based on your airborne lead exposure. Your employer may select a type of respirator that provides greater protection than that required by the standard; that is, one recommended for a higher concentration of lead than is present in your workplace. For example, a powered air-purifying respirator (PAPR) is much more protective than a typical negative pressure respirator, and may also be more comfortable to wear. A PAPR has a filter, cartridge, or canister to clean the air, and a power source that continuously blows filtered air into your breathing zone.

Your employer might make a PAPR available to you to ease the burden of having to wear a respirator for long periods of time. The standard provides that you can obtain a PAPR upon request.

Your employer must also start a Respiratory Protection Program. This program must include written procedures for the proper selection, use, cleaning, storage, and maintenance of respirators.

Your employer must ensure that your respirator facepiece fits properly. Proper fit of a respirator facepiece is critical to your protection from airborne lead. Obtaining a proper fit on each employee may require your employer to make available several different types of respirator masks. To ensure that your respirator fits properly and that facepiece leakage is minimal, your employer must give you either a qualitative or quantitative fit test as specified in Appendix A of the Respiratory Protection standard located at 29 CFR 1910.134.

You must also receive from your employer proper training in the use of respirators. Your employer is required to teach you how to wear a respirator, to know why it is needed, and to understand its limitations.

The standard provides that if your respirator uses filter elements, you must be given an opportunity to change the filter elements whenever an increase in breathing resistance is detected. You also must be permitted to periodically leave your work area to wash your face and respirator facepiece whenever necessary to prevent skin irritation. If you ever have difficulty in breathing during a fit test or while using a respirator, your employer must make a medical examination available to you to determine whether you can safely wear a respirator. The result of this examination may be to give you a positive pressure respirator (which reduces breathing resistance) or to provide alternative means of protection.

#### **V. Protective Work Clothing And Equipment - Paragraph (G)**

If you are exposed to lead above the PEL, or if you are exposed to lead compounds such as lead arsenate or lead azide which can cause skin and eye irritation, your employer must provide you with protective work clothing and equipment appropriate for the hazard. If work clothing is provided, it must be provided in a clean and dry condition at least weekly, and daily if your airborne exposure to lead is greater than 200 ug/m<sup>3</sup>. Appropriate protective work clothing and equipment can include coveralls or similar full-body work clothing, gloves, hats, shoes or disposable shoe coverlets, and face shields or vented goggles. Your employer is required to provide all such equipment at no cost to you.

He is responsible for providing repairs and replacement as necessary, and also is responsible for the cleaning, laundering or disposal of protective clothing and equipment.

Contaminated work clothing or equipment must be removed in change rooms and not worn home or you will extend your exposure and expose your family since lead from your clothing can accumulate in your house, car, etc.

Contaminated clothing which is to be cleaned, laundered or disposed of must be placed in closed containers in the change room. At no time may lead be removed from protective clothing or equipment by any means which disperses lead into the workroom air.

#### **VI. Housekeeping - Paragraph (H)**

Your employer must establish a housekeeping program sufficient to maintain all surfaces as free as practicable of accumulations of lead dust.

Vacuuming is the preferred method of meeting this requirement, and the use of compressed air to clean floors and other surfaces is absolutely prohibited. Dry or wet sweeping, shoveling, or brushing may not be used except where vacuuming or other equally effective methods have been tried and do not work. Vacuums must be used and emptied in a manner which minimizes the reentry of lead into the workplace.

## **VII. Hygiene Facilities And Practices - Paragraph (I)**

The standard requires that change rooms, showers, and filtered air lunchrooms be constructed and made available to workers exposed to lead above the PEL. These requirements have temporarily been delayed by the court of appeals in situations where new facilities must be constructed, or where substantial renovations must be made to existing facilities. When the PEL is exceeded, the employer must assure that food and beverage is not present or consumed, tobacco products are not present or used, and cosmetics are not applied, except in these facilities. Change rooms, showers, and lunchrooms, must be used by workers exposed in excess of the PEL. After showering, no clothing or equipment worn during the shift may be worn home, and this includes shoes and underwear. Your own clothing worn during the shift should be carried home and cleaned carefully so that it does not contaminate your home. Lunchrooms may not be entered with protective clothing or equipment unless surface dust has been removed by vacuuming, downdraft booth, or other cleaning method. Finally, workers exposed above the PEL must wash both their hands and faces prior to eating, drinking, smoking or applying cosmetics.

All of the facilities and hygiene practices just discussed are essential to minimize additional sources of lead absorption from inhalation or ingestion of lead that may accumulate on you, your clothes, or your possessions.

Strict compliance with these provisions can virtually eliminate several sources of lead exposure which significantly contribute to excessive lead absorption.

## **VIII. Medical Surveillance - Paragraph (J)**

The medical surveillance program is part of the standard's comprehensive approach to the prevention of lead-related disease. Its purpose is to supplement the main thrust of the standard which is aimed at minimizing airborne concentrations of lead and sources of ingestion. Only medical surveillance can determine if the other provisions of the standard have effectively protected you as an individual.

Compliance with the standard's provision will protect most workers from the adverse effects of lead exposure, but may not be satisfactory to protect individual workers (1) who have high body burdens of lead acquired over past years, (2) who have additional uncontrolled sources of non-occupational lead exposure, (3) who exhibit unusual variations in lead absorption rates, or (4) who have specific non-work related medical conditions which could be aggravated by lead exposure (e.g., renal disease, anemia). In addition, control systems may fail, or hygiene and respirator programs may be inadequate. Periodic medical surveillance of individual workers will help detect those failures. Medical surveillance will also be important to protect your reproductive ability- regardless of whether you are a man or woman.

All medical surveillance required by the standard must be performed by or under the supervision of a licensed physician. The employer must provide required medical surveillance without cost to employees and at a reasonable time and place. The standard's medical surveillance program has two parts-periodic biological monitoring and medical examinations.

Your employer's obligation to offer you medical surveillance is triggered by the results of the air monitoring program. Medical surveillance must be made available to all employees who are exposed in excess of the action level for more than 30 days a year. The initial phase of the medical surveillance program, which includes blood lead level tests and medical examinations, must be completed for all covered employees no later than August 28, 1979. Priority within this first round of medical surveillance must be given to employees whom the employer believes to be at greatest risk from continued exposure (for example, those with the longest prior exposure to lead, or those with the highest current exposure). Thereafter, the employer must periodically make medical surveillance-both biological monitoring and medical examinations-available to all covered employees.

Biological monitoring under the standard consists of blood lead level (PbB) and zinc protoporphyrin tests at least every 6 months after the initial PbB test. A zinc protoporphyrin (ZPP) test is a very useful blood test which measures an effect of lead on your body. Thus biological monitoring under the standard is currently limited to PbB testing. If a worker's PbB exceeds 40 ug/100g the monitoring frequency must be increased from every 6 months to at least every 2 months and not reduced until two consecutive PbBs indicate a blood lead level below 40 ug/100g. Each time your PbB is determined to be over 40 ug/100g, your employer must notify you of this in writing within five working days of his receipt of the test results. The employer must also inform you that the standard requires temporary medical removal with economic protection when your PbB exceeds certain criteria. (See Discussion of Medical Removal Protection-Paragraph (k).) During the first year of the standard, this removal criterion is 80 ug/100g. Anytime your PbB exceeds 80 ug/100g your employer must make available to you a prompt follow-up PbB test to ascertain your PbB. If the two tests both exceed 80 ug/100g and you are temporarily removed, then your employer must make successive PbB tests available to you on a monthly basis during the period of your removal.

Medical examinations beyond the initial one must be made available on an annual basis if your blood lead level exceeds 40 ug/100g at any time during the preceding year. The initial examination will provide information to establish a baseline to which subsequent data can be compared. An initial medical examination must also be made available (prior to assignment) for each employee being assigned for the first time to an area where the airborne concentration of lead equals or exceeds the action level. In addition, a medical examination or consultation must be made available as soon as possible if you notify your employer that you are experiencing signs or symptoms commonly associated with lead poisoning or that you have difficulty breathing while wearing a respirator or during a respirator fit test. You must also be provided a medical examination or consultation if you notify your employer that you desire medical advice concerning the effects of current or past exposure to lead on your ability to procreate a healthy child.

Finally, appropriate follow-up medical examinations or consultations may also be provided for employees who have been temporarily removed from exposure under the medical removal protection provisions of the standard. (See Part IX, below.)

The standard specifies the minimum content of pre-assignment and annual medical examinations. The content of other types of medical examinations and consultations is left up to the sound discretion of the examining physician. Pre-assignment and annual medical examinations must include (1) a detailed work history and medical history, (2) a thorough physical examination, and (3) a series of laboratory tests designed to check your blood chemistry and your kidney function. In addition, at any time upon your request, a laboratory evaluation of male fertility will be made (microscopic examination of a sperm sample), or a pregnancy test will be given.

The standard does not require that you participate in any of the medical procedures, tests, etc. which your employer is required to make available to you. Medical surveillance can, however, play a very important role in protecting your health. You are strongly encouraged, therefore, to participate in a meaningful fashion. The standard contains a multiple physician review mechanism which would give you a chance to have a physician of your choice directly participate in the medical surveillance program. If you were dissatisfied with an examination by a physician chosen by your employer, you could select a second physician to conduct an independent analysis. The two doctors would attempt to resolve any differences of opinion, and select a third physician to resolve any firm dispute. Generally your employer will choose the physician who conducts medical surveillance under the lead standard-unless you and your employer can agree on the choice of a physician or physicians. Some companies and unions have agreed in advance, for example, to use certain independent medical laboratories or panels of physicians. Any of these arrangements are acceptable so long as required medical surveillance is made available to workers.

The standard requires your employer to provide certain information to a physician to aid in his or her examination of you. This information includes (1) the standard and its appendices, (2) a description of your duties as they relate to lead exposure, (3) your exposure level, (4) a description of personal protective equipment you wear, (5) prior blood lead level results, and (6) prior written medical opinions concerning you that the employer has. After a medical examination or consultation the physician must prepare a written report which must contain (1) the physician's opinion as to whether you have any medical condition which places you at increased risk of material impairment to health from exposure to lead, (2) any recommended special protective measures to be provided to you, (3) any blood lead level determinations, and (4) any recommended limitation on your use of respirators. This last element must include a determination of whether you can wear a powered air purifying respirator (PAPR) if you are found unable to wear a negative pressure respirator.

The medical surveillance program of the lead standard may at some point in time serve to notify certain workers that they have acquired a disease or other adverse medical condition as a result of occupational lead exposure. If this is true, these workers might have legal rights to compensation from public agencies, their employers, firms that supply hazardous products to their employers, or other persons. Some states have laws, including worker compensation laws, that disallow a worker who learns of a job-related health impairment to sue, unless the worker sues within a short period of time after learning of the impairment.

(This period of time may be a matter of months or years.) An attorney can be consulted about these possibilities. It should be stressed that OSHA is in no way trying to either encourage or discourage claims or lawsuits. However, since results of the standard's medical surveillance program can significantly affect the legal remedies of a worker who has acquired a job-related disease or impairment, it is proper for OSHA to make you aware of this.

The medical surveillance section of the standard also contains provisions dealing with chelation. Chelation is the use of certain drugs (administered in pill form or injected into the body) to reduce the amount of lead absorbed in body tissues.

Experience accumulated by the medical and scientific communities has largely confirmed the effectiveness of this type of therapy for the treatment of very severe lead poisoning. On the other hand, it has also been established that there can be a long list of extremely harmful side effects associated with the use of chelating agents.

The medical community has balanced the advantages and disadvantages resulting from the use of chelating agents in various circumstances and has established when the use of these agents is acceptable. The standard includes these accepted limitations due to a history of abuse of chelation therapy by some lead companies. The most widely used chelating agents are calcium disodium EDTA, (Ca Na<sub>2</sub> EDTA), Calcium Disodium Versenate (Versenate), and d-penicillamine (pencillamine or Cupramine).

The standard prohibits "prophylactic chelation" of any employee by any person the employer retains, supervises or controls. "Prophylactic chelation" is the routine use of chelating or similarly acting drugs to prevent elevated blood levels in workers who are occupationally exposed to lead, or the use of these drugs to routinely lower blood lead levels to predesignated concentrations believed to be 'safe'. It should be emphasized that where an employer takes a worker who has no symptoms of lead poisoning and has chelation carried out by a physician (either inside or outside of a hospital) solely to reduce the worker's blood lead level, that will generally be considered prophylactic chelation. The use of a hospital and a physician does not mean that prophylactic chelation is not being performed.

Routine chelation to prevent increased or reduce current blood lead levels is unacceptable whatever the setting.

The standard allows the use of "therapeutic" or "diagnostic" chelation if administered under the supervision of a licensed physician in a clinical setting with thorough and appropriate medical monitoring. Therapeutic chelation responds to severe lead poisoning where there are marked symptoms. Diagnostic chelation involved giving a patient a dose of the drug then collecting all urine excreted for some period of time as an aid to the diagnosis of lead poisoning.

In cases where the examining physician determines that chelation is appropriate, you must be notified in writing of this fact before such treatment. This will inform you of a potentially harmful treatment, and allow you to obtain a second opinion.

## IX. Medical Removal Protection - Paragraph (K)

Excessive lead absorption subjects you to increased risk of disease. Medical removal protection (MRP) is a means of protecting you when, for whatever reasons, other methods, such as engineering controls, work practices, and respirators, have failed to provide the protection you need. MRP involves the temporary removal of a worker from his or her regular job to a place of significantly lower exposure without any loss of earnings, seniority, or other employment rights or benefits. The purpose of this program is to cease further lead absorption and allow your body to naturally excrete lead which has previously been absorbed. Temporary medical removal can result from an elevated blood lead level, or a medical opinion. Up to 18 months of protection is provided as a result of either form of removal. The vast majority of removed workers, however, will return to their former jobs long before this eighteen month period expires. The standard contains special provisions to deal with the extraordinary but possible case where a longterm worker's blood lead level does not adequately decline during eighteen months of removal.

During the first year of the standard, if your blood lead level is 80 ug/100g or above you must be removed from any exposure where your air lead level without a respirator would be 100 ug/m(3) or above. If you are removed from your normal job you may not be returned until your blood lead level declines to at least 60 ug/100g. These criteria for removal and return will change according to the following schedule:

	Removal blood lead (ug/100 g)	Air lead(ug/m(3))	Return blood lead (ug/100 g)
After Mar. 1, 1980	70 and above	50 and above	At or below 50
After Mar. 1, 1981	60 and above	30 and above	At or below 40
After Mar. 1, 1983	50 and above averaged over six months	30 and above	Do.

You may also be removed from exposure even if your blood lead levels are below these criteria if a final medical determination indicates that you temporarily need reduced lead exposure for medical reasons. If the physician who is implementing your employers medical program makes a final written opinion recommending your removal or other special protective measures, your employer must implement the physician's recommendation. If you are removed in this manner, you may only be returned when the doctor indicates that it is safe for you to do so.

The standard does not give specific instructions dealing with what an employer must do with a removed worker. Your job assignment upon removal is a matter for you, your employer and your union (if any) to work out consistent with existing procedures for job assignments. Each removal must be accomplished in a manner consistent with existing collective bargaining relationships. Your employer is given broad discretion to implement temporary removals so long as no attempt is made to override existing agreements. Similarly, a removed worker is provided no right to veto an employer's choice which satisfies the standard.

In most cases, employers will likely transfer removed employees to other jobs with sufficiently low lead exposure. Alternatively, a worker's hours may be reduced so that the time weighted average exposure is reduced, or he or she may be temporarily laid off if no other alternative is feasible.

In all of these situations, MRP benefits must be provided during the period of removal - i.e., you continue to receive the same earnings, seniority, and other rights and benefits you would have had if you had not been removed. Earnings includes more than just your base wage; it includes overtime, shift differentials, incentives, and other compensation you would have earned if you had not been removed. During the period of removal you must also be provided with appropriate follow-up medical surveillance. If you were removed because your blood lead level was too high, you must be provided with a monthly blood test. If a medical opinion caused your removal, you must be provided medical tests or examinations that the doctor believes to be appropriate. If you do not participate in this follow up medical surveillance, you may lose your eligibility for MRP benefits.

When you are medically eligible to return to your former job, your employer must return you to your "former job status." This means that you are entitled to the position, wages, benefits, etc., you would have had if you had not been removed. If you would still be in your old job if no removal had occurred that is where you go back. If not, you are returned consistent with whatever job assignment discretion your employer would have had if no removal had occurred. MRP only seeks to maintain your rights, not expand them or diminish them.

If you are removed under MRP and you are also eligible for worker compensation or other compensation for lost wages, your employer's MRP benefits obligation is reduced by the amount that you actually receive from these other sources. This is also true if you obtain other employment during the time you are laid off with MRP benefits.

The standard also covers situations where an employer voluntarily removes a worker from exposure to lead due to the effects of lead on the employee's medical condition, even though the standard does not require removal. In these situations MRP benefits must still be provided as though the standard required removal.

Finally, it is important to note that in all cases where removal is required, respirators cannot be used as a substitute.

Respirators may be used before removal becomes necessary, but not as an alternative to a transfer to a low exposure job, or to a lay-off with MRP benefits.

#### **X. Employee Information And Training - Paragraph (L)**

Your employer is required to provide an information and training program for all employees exposed to lead above the action level or who may suffer skin or eye irritation from lead. This program must inform these employees of the specific hazards associated with their work environment, protective measures which can be taken, the danger of lead to their bodies (including their reproductive systems), and their rights under the standard. In addition your employer must make readily available to all employees,

including those exposed below the action level, a copy of the standard and its appendices and must distribute to all employees any materials provided to the employer by the Occupational Safety and Health Administration (OSHA).

Your employer is required to complete this training program for all employees by August 28, 1979. After this date, all new employees must be trained prior to initial assignment to areas where there is a possibility of exposure over the action level. This training program must also be provided at least annually thereafter.

#### **XI. Signs - Paragraph (M)**

The standard requires that the following warning sign be posted in work areas where the exposure to lead exceeds the PEL:

**WARNING**  
**LEAD WORK AREA**  
**NO SMOKING OR EATING**

**XII. Recordkeeping - Paragraph (N)**

Your employer is required to keep all records of exposure monitoring for airborne lead. These records must include the name and job classification of employees measured, details of the sampling and analytic techniques, the results of this sampling, and the type of respiratory protection being worn by the person sampled. Your employer is also required to keep all records of biological monitoring and medical examination results. These must include the names of the employees, the physician's written opinion, and a copy of the results of the examination. All of the above kinds of records must be kept for 40 years, or for at least 20 years after your termination of employment, whichever is longer.

Recordkeeping is also required if you are temporarily removed from your job under the medical removal protection program. This record must include your name and social security number, the date of your removal and return, how the removal was or is being accomplished, and whether or not the reason for the removal was an elevated blood lead level. Your employer is required to keep each medical removal record only for as long as the duration of an employee's employment.

The standard requires that if you request to see or copy environmental monitoring, blood lead level monitoring, or medical removal records, they must be made available to you or to a representative that you authorize.

Your union also has access to these records. Medical records other than PbB's must also be provided upon request to you, to your physician or to any other person whom you may specifically designate. Your union does not have access to your personal medical records unless you authorize their access.

**XIII. Observations Of Monitoring - Paragraph (O)**

When air monitoring for lead is performed at your workplace as required by this standard, your employer must allow you or someone you designate to act as an observer of the monitoring. Observers are entitled to an explanation of the measurement procedure, and to record the results obtained. Since results will not normally be available at the time of the monitoring, observers are entitled to record or receive the results of the monitoring when returned by the laboratory. Your employer is required to provide the observer with any personal protective devices required to be worn by employees working in the area that is being monitored. The employer must require the observer to wear all such equipment and to comply with all other applicable safety and health procedures.

**XIV. Effective Date - Paragraph (P)**

The standard's effective data is March 1, 1979, and employer obligations under the standard begin to come into effect as of that date.

## XV. For Additional Information

A. Copies of the Standard and explanatory material may be obtained by writing or calling the OSHA Docket Office, U.S. Department of Labor, room N2634, 200 Constitution Avenue, N.W., Washington DC 20210. Telephone: (202) 219-7894. 1. The standard and summary of the statement of reasons (preamble), Federal Register, Volume 43, pp. 52952-53014, November 14, 1978.

2. The full statement of reasons (preamble) Federal Register, vol. 43, pp. 54354-54509, November 21, 1978.

3. Partial Administrative Stay and Corrections to the standard, (44 FR 5446-5448) January 26, 1979.

4. Notice of the Partial Judicial Stay (44 FR 14554-14555) March 13, 1979.

5. Corrections to the preamble, Federal Register, vol. 44, pp. 20680-20681, April 6, 1979.

6. Additional correction to the preamble concerning the construction industry, Federal Register, vol. 44, p. 50338, August 28, 1979.

7. Appendices to the standard (Appendices A, B, C), Federal Register, Vol. 44, pp. 60980-60995, October 23, 1979.

8. Corrections to appendices, Federal Register, Vol. 44, 68828, November 30, 1979.

9. Revision to the standard and an additional appendix (Appendix D), Federal Register, Vol. 47, pp. 51117-51119, November 12, 1982.

10. Notice of reopening of lead rulemaking for nine remand industry sectors, Federal Register, vol. 53, pp. 11511-11513, April 7, 1988.

11. Statement of reasons, Federal Register, vol. 54, pp. 29142-29275, July 11, 1989.

12. Statement of reasons, Federal Register, vol. 55, pp. 3146-3167, January 30, 1990.

13. Correction to appendix B, Federal Register, vol. 55, pp. 4998-4999, February 13, 1991.

14. Correction to appendices, Federal Register, vol. 56, p. 24686, May 31, 1991.

B. Additional information about the standard, its enforcement, and your employer's compliance can be obtained from the nearest OSHA Area Office listed in your telephone directory under United States Government/Department of Labor. [60 FR 52856, Oct. 11, 1995; 63 FR 1152, Jan. 8, 1998]