



**L E A D
-IN-
CONSTRUCTION
-IN-
DEMOLITION
W O R K**

**A SUPERVISORS
GUIDE TO OSHA
REQUIREMENTS
29CFR1926.62**

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LEAD-IN-CONSTRUCTION IN DEMOLITION WORK

A Supervisors Guide to OSHA Requirements

Background

The OSHA rule for protecting (construction) workers from the toxic effects of lead has been in effect since 1971. Based upon research information, OSHA revised their standard for all other (general) industries in 1978. This standard contained additional provisions and greater restrictions than previously existed but it applied only to general industry. In October 1992, Congress passed the Housing and Community Development Act of 1992 which addressed the use of lead-based paints in residential units. It also required OSHA to adopt a new standard for the protection of construction workers from lead. Since a new OSHA standard frequently requires several years to complete, Congress required OSHA to adopt an interim (temporary) standard until a final rule could be developed. The interim rule, 29 CFR 1926.62, was published by OSHA on May 4, 1993. It basically reads like the general industry standard but includes additional comments pertinent to construction activities. OSHA is now working on the permanent rule. However, the demolition industry must comply with the new standard, probably for several years.

Toxic Effects of Lead

Lead is a substance, which is toxic to the body when present in high concentrations. Lead can only cause ill effects if it accumulates in the body. First, of course, it must enter the body. This can occur through inhaling lead dust or fumes, which are present in the air. Abrasive blasting, dry sanding, torch cutting, or welding can all (generate lead in the air.

Another way in which lead can enter the body is through accidental ingestion. If food or beverages are kept in an area where lead is present they can become contaminated. When eaten or drunk, lead then enters the body. Another way ingestion can take place is if employees smoke cigarettes or handle food or tobacco with hands which are dirty with lead dust which may not even be visible.

Many health effects can be caused by an exposure to lead. Lead interferes with the body's ability to carry oxygen, resulting in anemia. This decreased oxygen supply in the blood results in fatigue, weakness, headaches and irritability.

The nervous system is also affected by lead. In its earliest stages, behavioral and other nervous system effects can occur. These include restlessness, insomnia, fatigue, depression, apathy, poor memory and lead tremors. These symptoms can progress to drowsiness, hallucinations, muscle weakness (including wrist drop), convulsions, seizures, cardiopulmonary arrest and even death.

Lead may affect the digestive system causing abdominal pain, colic, constipation, diarrhea, nausea, vomiting and anorexia. Kidney function can be impaired causing hypertension and requiring dialysis. Reproductive effects in men include decreased sexual drive; sterility and impotence while those in women can result in sterility, premature births, spontaneous miscarriages and stillbirths. Continuing research may reveal additional toxic effects of lead on the human body. If workers with an occupational exposure to lead complain or state that they have symptoms of lead exposure, a medical evaluation is necessary.

Of course, whether the health effects occur at all will depend upon how much lead enters and stays in the body. How much enters the body will depend upon the level and length of exposure and the protective measures taken.

Much of the lead which is taken into the body is eventually eliminated. The body is unable to excrete lead quickly resulting in an accumulation in the body. To eliminate only one half of the lead which has entered the body it takes 25 days if the lead is in the blood, 40 days if it is in other organs, and more than 25 years if it is in the bone. Therefore, if exposure continues, lead will accumulate in the body resulting in what is called a body burden.

Clearly, all efforts should be made to **prevent** lead from entering the body. In fact, the Housing and Community Development Act passed by Congress bans the use of lead-based paints for residential use to protect children who are exposed to lead in the home from lead laden house dust, and who may eat leaded paint chips. While this law will prevent future use of lead-based paints, eventually those old buildings will be torn down. Demolition workers will continue to be exposed to lead from paints and other sources for many years to come. Therefore, protective measures must be taken.

When The OSHA Standard Applies

The new OSHA interim rule applies to all construction activities, where lead or lead containing materials (LCM) are present. These include demolition and salvage operations; removal or encapsulation of LCM; lead-based paint hazard reduction; renovation of structures, substructures or portions of structures that contain lead or LCM; installation and cleanup of LCM and transportation and disposal of LCM at construction sites. It does not apply if a valid lead detection method is used to detect the presence of lead (e.g. lead-based paint) and none is found. It is important to identify lead sources and LCM during pre-job meetings and, ideally, prior to submitting a bid so that any additional costs to protect workers from exposure to lead are anticipated and preventive measures are planned.

OSHA Limits

The OSHA standard sets two limits which are important to remember. The first is the **Action Level (AL)**. If worker's exposure to lead exceeds the AL, certain provisions contained in the standard are "triggered." Precautions must then be taken. **The Action Level is 30 ug/m³**. The second limit is the **Permissible Exposure Limit or PEL**. No worker is allowed to exceed the **PEL of 50 ug/m³** averaged over an 8-hour day without adequate control measures. These units are metric units of measurement.

A packet of artificial sweetener weighs a gram and a microgram is one one-millionth of a gram. A cubic meter is somewhat larger than a cubic yard. Therefore each cubic yard of air which you breathe can contain no more than 50 ug/m³ of lead. If more than 50 ug/m³ is present in the air which a worker breathes, all parts of the standard must be met. If employees work more than 8 hours a day over a full work week, the PEL must be reduced according to the following formula:

$$\text{Adjusted PEL (ug/m}^3\text{)} = \frac{400 \text{ minutes}}{\text{Number of Work Hours}}$$

The requirements of the standard which the employer must follow are based upon the amount of lead to which employees are exposed. Different requirements are "triggered" if the exposure level exceeds the AL or PEL. The lower the exposure level, the less you must do to comply and to protect worker's health.

Therefore, the first step is to find out the present level of employee exposure to lead. This is usually done by collecting full shift air samples within the worker's breathing zone just as you may have done for asbestos. A small vacuum pump is hooked on the employee's belt. It is connected to tubing with a filter cassette at the end. Once the shift is over, the pump is turned off and the filter is removed and sent to a chemical laboratory for analysis. The lab must use accurate test measures to find out how much lead is on the filter. The lab will report the number of micrograms per cubic meter of lead to which the worker was exposed during that shift. If the results are needed quickly, many labs will analyze the filter overnight if you

pay a premium; otherwise, it may take a month to get the results. Until the initial assessment is performed, workers exposed to lead while doing certain jobs must be assumed to exceed the PEL (based upon industry statistics) and must be protected accordingly. The table below lists the tasks and levels which must be assumed.

Assumed Exposure Level	Task
1 - 10 x PEL	<ul style="list-style-type: none"> • Where lead containing coatings or paint is present <ul style="list-style-type: none"> - Manual demolition of structures (as dry wall) - Manual scraping and sanding - Heat gun applications - Power tool cleaning with dust collectors • Spray painting with lead • Where the employer believes the exposure exceeds the PEL
More than 10 x PEL	<ul style="list-style-type: none"> • Lead-containing mortar • Lead burning • Where lead containing coatings or paint are present <ul style="list-style-type: none"> - Rivet busting - Power tool cleaning without dust collection - Clean up of dry abrasives - Movement or removal of abrasive blasting and enclosures
More than 50 x PEL	<ul style="list-style-type: none"> • Where lead containing coatings or paint is present on structures <ul style="list-style-type: none"> - Abrasive blasting - Welding - Cutting - Torch burning

When the above tasks are performed, respirators and protective clothing,

change areas and hand washing facilities, biological monitoring and training must all be done until you do the initial assessment and determine the worker's exposure level. The meaning of all of these terms will be explained later in this booklet but the bottom line is that the employer must protect the worker's health.

Monitoring

The initial determination of employee exposure is based on air monitoring results; previous monitoring; and any other information, including worker's complaints of symptoms which indicate exposure to lead. Monitoring records which include date, location, employee name, and social security number must be kept for 30 years. These records should also include the workplace conditions, type of task, materials, control methods used, work practices and environmental conditions. Representative monitoring may be conducted. If a group of workers performs the same task, only the one with the highest exposure level need be monitored and the others can be assumed to have the same level of exposure.

If the initial determination shows that no worker is exposed to lead above the AL, records must be kept but only a few parts of the standard will apply. For most demolition jobs, however, the exposure level will at least exceed the action level which then requires that monitoring representative of each worker's exposure be conducted.

If the results are above the PEL, monitoring must be done at least every three months. If two consecutive measurements taken at least seven days apart are below the PEL but above the AL, only semiannual monitoring is required. Air monitoring must also be repeated. If the result is at or above the AL but at or below the PEL, it must be done at least every six months. When two consecutive measurements taken at least seven days apart are below the AL, monitoring is no longer required.

Additional monitoring is also required any time there is a change in

equipment, process, control, personnel, or a new task is started.

After each exposure assessment, employees must be notified in writing of the results. If representative monitoring is conducted, all workers assumed to have the same exposure level must be notified. If exposure levels are above the PEL, the written notification must include comments which state that it exceeds the PEL and the corrective action which will be, or has been, taken.

Methods of Compliance

When employees' exposure levels exceed the PEL, **feasible engineering** and **work practice controls** must be used to reduce employee exposure to lead. A written compliance program describing the air monitoring results, the work activities, compliance measures and implementation schedule, and methods of informing other contractors with affected employees about the lead hazard is required. Various engineering and work practice controls are listed in the table below.

FEASIBLE CONTROL MEASURES

Engineering	Work Practices
<ul style="list-style-type: none"> • Remove LCM within 4 inches of area prior to cutting, burning or welding • Local exhaust ventilation • Enclosures (isolation) • Vacuum shroud for power tools used for paint removal • Extended handles on cutting tools • Use of hydraulic shears • Good housekeeping 	<ul style="list-style-type: none"> • Use of wetting agents • Centrifugal, wet or vacuum blasting • Heating and scraping • Chemical stripping • Use of needle guns • Vacuum with high efficiency (HEPA) filters • Use of roto peeners • Prohibit day sweeping • Prohibit blowdown with compressed air

A third control method is the use of administrative controls.

Administrative measures may include limiting the number of hours an employee works at a task or rotating different employees to do jobs which produce high lead-in-air levels.

A key provision of the control program is the requirement for regular and frequent inspections by a designated competent person. The competent person must have a knowledge of the lead hazards gained through experience or training and must have the authority to take corrective action and enforce the program requirements.

The compliance program must be made available to employees or their representatives and to OSHA and it must be reviewed and updated at least every six months.

Respiratory Protection

Respiratory protection is required when employee exposure cannot be controlled below the PEL. Respirators must also be used for some tasks before the exposure assessment has been made. Lastly, respirators must be provided if an employee requests one. In all cases, respirators must be provided at no cost to employees and a written respirator program must be prepared and implemented in accordance with 29 CFR 1910.134 and 1926.62 (F). Employees must also be trained in the proper use, care and limitations of the respirator.

Only approved respirators can be used. Each type of approved respirator will provide only limited protection from lead dust and fume. Some are approved for 10 times the PEL while others are effective up to 25, 50, 1000 or 2000 times the PEL. Only self-contained breathing apparatus (SCBA) operated in pressure demand or positive pressure mode can be used for unknown or unlimited concentrations of lead in air. Once the worker's exposure level has been measured, the number of times that it exceeds the PEL can be used to determine the proper respirator to use. The respirator selection table in the OSHA standard should be used to make this decision.

If employees must use or choose to use a negative pressure (one-

half or full facepiece) respirator, a quantitative or qualitative fit test must be given to make sure that it fits properly. Some brands or sizes may fit one employee but not another. The fit test should be conducted by the method stated in Appendix D of the OSHA standard. If the worker has difficulty breathing with a respirator on, a medical examination must be done to ensure that they can safely wear a respirator. Employees must be permitted to change the filters when breathing resistance occurs and an adequate supply of filters must be kept on hand. Workers who wear respirators may leave their work areas to wash their face and respirator to prevent skin irritation.

Other Protective Clothing

When employee exposure exceeds the PEL and employees are exposed to lead compounds such as lead arsenate and lead azide which can cause skin and eye irritation (or before the exposure assessment is done), work clothing and equipment must be provided to prevent contamination of worker's garments. This includes coveralls, gloves, hats, face shields, goggles and other equipment necessary to protect workers. Clean protective garments must be provided at least weekly (daily if exposure levels exceed 200 ug/m^3). They must be removed in separate change areas at the end of the shift and placed in closed containers with caution labels prior to cleaning or disposal. The launderer must be informed of the potentially harmful effects of lead.

Hygiene Practices and Facilities

In areas where employees are exposed to lead in excess of the PEL, food, beverages, and tobacco products may not be present or consumed and cosmetics may not be applied. Also, change areas, showers and eating and handwashing facilities must be provided and used. Frequent maintenance of these areas must be performed to minimize accumulations of lead.

Employees may not leave the workplace wearing protective clothing.

Separate storage facilities for work and street clothes must be provided and clothing and equipment may not be cleaned by shaking or blowing. Change areas are also required prior to making the initial exposure assessment.

Showers with soap and towels must also be provided and used at the end of each shift. Showers are required only when feasible. The length of the job, availability of potable water, climate, and location must be considered when determining if showers are feasible to provide.

Handwashing facilities are required if employees must wash their face and respirator because they are exposed to lead compounds which can cause skin or eye irritation. They are also required when providing showers is not feasible.

Readily accessible lunchrooms or eating areas are also required. Workers must vacuum or otherwise remove surface lead from protective clothing (or remove the clothing) and wash their hands and face prior to entering the lunch area to eat, drink or use tobacco products or cosmetics.

All hygiene facilities must be maintained as clean as practicable. One way to test the cleanliness of the change rooms, storage and lunch areas is to conduct air monitoring or to collect wipe samples in these areas. Eating facilities must be absent of all lead to prevent ingestion. Diligent maintenance is required.

Medical Surveillance

Initial medical surveillance must be offered to workers who are exposed to lead above the AL for even one shift. This means that biological monitoring consisting of blood sampling and analysis for lead and zinc protoporphyrin (ZPP) levels must be made available to employees.

The blood sampling must be repeated every two months for the first six months and every six months thereafter for employees who are exposed to lead above the AL for 30 days within any 12 month period. If the last blood lead level was at or above 40 ug/dl, it must also be repeated every two months until two consecutive samples are below 40 ug/dl and

monthly for workers medically removed from their job due to lead exposure.

Whenever the results of the Blood Lead Level (BLL) exceed the removal criteria of 50 ug/dl, the employer shall provide a second, follow-up blood sampling test within two weeks of receiving the results of the first test.

All blood lead analysis must be performed by laboratories approved by OSHA. Workers must be notified in writing of their blood lead results within five workdays of the employer's receipt of those results from the laboratory.

Medical examinations and consultations must be made available to the following employees:

- Annually for those exposed above the AL for 30 days in any 12 month period
- Those who have signs or symptoms of lead intoxication
- Those who desire medical advice about the effects of past exposure on child bearing
- Those who are pregnant
- Those who have difficulty breathing while wearing a respirator
- Those who have been medically removed from their job or limited due to risk of impaired health

The content of the medical examination shall include:

- Work and medical history
- Physical examination
- Blood pressure
- Blood sample analysis and urinalysis
- Other tests which the physician believes are necessary
- Pregnancy testing for women or fertility evaluations for men who so request it

The employer must use a qualified physician and give the physician a copy of the OSHA lead standard, a description of the employee's job and

exposure levels, a description of personal protective equipment used, any prior blood lead results and written medical opinions. The employer must also tell the physician not to reveal to the employer findings unrelated to occupational exposure to lead but to reveal to the employee both occupational and non-occupational medical conditions which warrant further examination or treatment.

The physician, in turn, must give the employer a written medical opinion as to any medical condition which would place the employee at increased risk of impairment to their health or any special protective measures or limitations (including respirator usage) due to exposure to lead as well as any blood lead test results. Some states require that health care providers notify them of persons with elevated blood lead levels (BLL). In some cases this must be done for levels as low as 15 ug/dl.

The employer must provide the employee with a copy of the physician's written opinion and advise the employee that a second physician's opinion may be sought. The employee must notify the employer of an intent to seek a second opinion and take steps to do so within 15 days or the employer can refuse to pay for the second opinion. If the two doctors diagnoses differ and they cannot resolve their differences, the employer and the employee, through their physicians, can choose a third physician to review the findings and conduct any necessary examinations. The employer must follow the recommendations of the third physician unless the employee and employer jointly agree to follow the recommendations of one of the other physicians. This process is referred to as the multiple physician review mechanism and must be followed unless the employer and employee (or authorized employee representative) agree to use an alternate physician review mechanism which is at least as prompt and protective. All medical surveillance under OSHA standard must be paid by the employer and made available to employees at a reasonable time and location.

Medical Removal Protection

If the employee's air monitoring results are above the AL and a peri-

odic blood lead test is above 50 ug/dl or a final medical opinion indicates that a worker's health is at risk due to an occupational exposure to lead, the employee must be removed from the job and placed in a job where their exposure level is below the AL until such time as two consecutive blood tests are at or below 40 ug/dl.

Employees who are medically removed from their job must be paid their normal earnings (including overtime) and benefits for as long as the job continues or 18 months, whichever is longer. The employer may reduce the employee's compensation by the amount of any worker's compensation award or income from another source made possible because of the worker's removal. Drugs cannot be given to routinely remove lead from the body. Treatment to remove lead must be under the supervision of a licensed physician in a clinical setting.

Information, Training and Signs

Employers must inform their workers about warning signs and labels, Material Safety Data Sheets (MSDS), and otherwise train employees about lead hazards. If workers are exposed above the action level or are subject to skin and eye irritation, a training program must be conducted before the job assignment and at least each year after. The training must include the requirements set by OSHA, the tasks which may result in exposure above the action level, and employee's rights to their medical and air monitoring test results. Employees also have the right to review the training materials. Warning signs must be posted in work areas where employees are exposed to lead above the permissible exposure level.

Recordkeeping

The importance of accurate record keeping under the lead standard

cannot be overemphasized. Not only are records required to be kept, but also they must be made available to employees, former employees, employee representatives and OSHA.

Air monitoring records must be kept for 30 years and shall include:

- Dates, number, deviation, location, and results of each sample and a description of the sampling procedures
- Sampling and analytical method used and evidence of accuracy
- Type of respirator worn
- Name, social security number and job classification of employees monitored and those whose exposure the test was intended to represent
- Environmental variables (e.g. wind and temperature) which could affect the measurement

Medical surveillance records must include the name, social security number and job description of the employee; physician's written opinions; exposure-monitoring results provided to the physician; and any employee medical complaints. The employer must also either keep or assure that the physician keeps medical examination results, laboratory procedures and biological monitoring results

For medical removals, records shall be kept and include the name and social security number of the employee, the date of removal and return, an explanation of how the removal was accomplished, and a statement as to whether the removal was due to an elevated blood lead level. These records must be kept as long as the worker is employed. Records of objective data demonstrating that lead-in-air levels cannot exceed the AL must also be documented and kept.

When a contractor ceases to do business, the records must be transferred to the successor employer. If there is none, the records must be transferred to the Director of the National Institute of Occupational Safety and Health (NIOSH). The Director of NIOSH must be notified at least three months before the records retention period expires and records must be transferred to NIOSH rather than destroyed if the Director so requests.

Other Requirements

Employers or their designated representatives may observe all steps of air monitoring and receive an explanation of the measurement procedures and record and receive copies of the results.

Effective Dates

The OSHA standard was published May 4, 1993, and went into effect on June 3, 1993. Compliance with the standard was required as of August 3, 1993, except for the engineering control provisions which were required as of October 2, 1993. Appendices to the standard were provided for informational purposes.

Summary

OSHA's Interim Rule for Lead in the construction industries is quite extensive and can be difficult to understand. This manual was intended to simplify the explanation but not serve as a substitute for the standard itself. To further assist foreman, Appendix A lists the requirements which you must meet in most cases. It is intended to be used as a reminder or checklist. Because air monitoring results and blood lead levels trigger additional requirements or tests, those charts which have been duplicated from OSHA Instruction CP1- 2-2.58, Lead Exposure in Construction and are included as Appendices B, C, and D of this manual.

APPENDIX A

Checklist of Requirements

- Protect workers with respirators, clothing, change areas, hand washing facilities, biological monitoring and training before exposure monitoring is done.
- Conduct air monitoring to find out how much lead workers in each job task are exposed to.
- Notify workers of the results of their air monitoring results in writing within five workdays.
- Maintain records of objective data and air monitoring results for 30 years.
- Repeat air monitoring as necessary.
- Develop and implement a written compliance program.
- Write a respirator program and do:
 - Fit testing for negative pressure respirator
 - Training - Medical examination if breathing difficulty
- Protective clothing and equipment
 - Provide clean each week
 - Notify launderer
- Hygiene facilities
 - Showers
 - Lunchrooms or eating areas
 - Handwashing facilities
 - Change areas
- Prohibit eating, drinking, tobacco products, and application of cosmetics.
- Medical surveillance
 - Blood lead and ZPP
 - Medical exams
 - Notify workers in writing within five working days
 - Provide and receive information from the physician

- Training
 - Prior to the start of the job and annually
 - Employees can review materials

- Post caution signs

- Keep accurate records and make them available
 - Exposure monitoring
 - Medical surveillance
 - Objective data

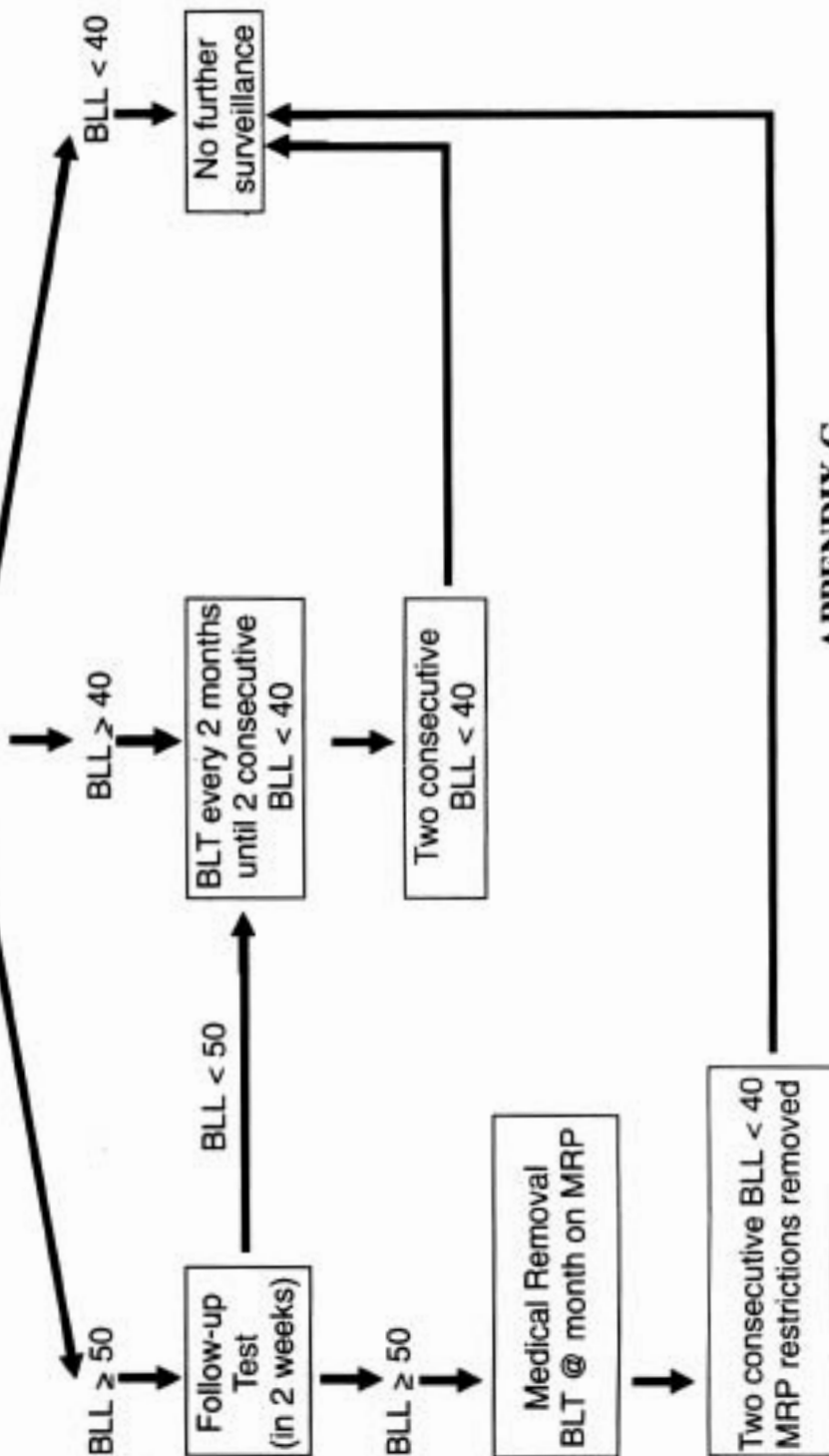
- Permit employees to observe monitoring

APPENDIX B

Applicable Paragraphs of 1926.62

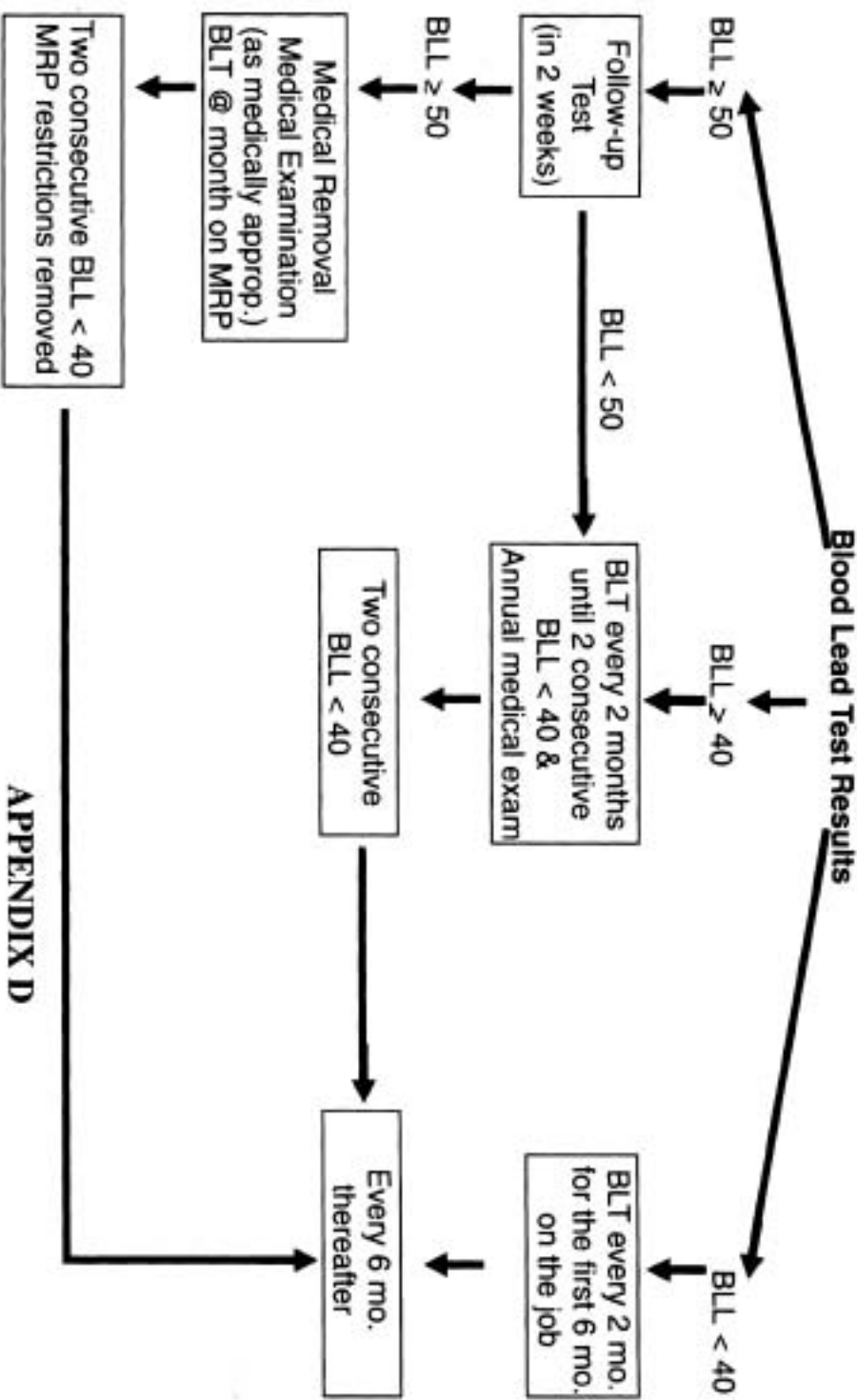
For Specific Air Lead Levels					During Assessment of Trigger Tasks
Regardless of Level	≥ AL		> PEL	> 4 x PEL	
	1-30 Days	> 30 Days			
1926.62(d)- Exposure Assessment and Interim Protection	1926.62(d)(4)- Monitoring Representative of Exposure for Each Exposed Employee	1926.62(j)(1)(ii)- Medical Surveillance Program	1926.62(e)- Engineering and Work Practice Controls	1926.62(g)(2)- Clean Protective Clothing Daily	1926.62(f)- Appropriate Respiratory Protection
1926.62(h)- Housekeeping	1926.62(j)(1)(i)- Initial Medical Surveillance	1926.62(j)(3)- Medical Exams and Consultation (if required)	1926.62(f)- Respiratory Protection		1926.62(g)- Protective Clothing and Equipment
1926.62(i)(5)- Handwashing Facilities	1926.62(j)(2)(ii)- Follow-up Blood Sampling		1926.62(g)- Protective Clothing and Equipment		1926.62(i)(2)- Change Areas
1926.62(l)(1)(i)- Hazcom Training (and/or 1926.21 - Safety Training and Education)	1926.62(k)- Temporary Removal Due to Elevated Blood Lead & MRP Benefits		1926.62(i)- Hygiene Facilities and Practices		1926.62(i)(5)- Handwashing Facilities
	1926.62(l)(1)(iii)-(iv)- Information and Training		1926.62(m)- Signs		1926.62(j)(1)(i)- Biological Monitoring 1926.62(l)(1)(i)- Hazcom Training 1926.62(l)(2)(iii)- Respirator Training 1926.21 - Safety Training and Education

Medical Surveillance Flowchart I
EXPOSURE > AL AT LEAST ONE DAY IN 12 CONSECUTIVE MONTHS
Initial Blood Lead Test Results



APPENDIX C

**Medical Surveillance Flowchart II
EXPOSURE > AL MORE THAN 30 DAYS IN 12 CONSECUTIVE MONTHS**



APPENDIX D



The National Demolition Association is the trade organization for the Demolition Industry in the United States and Canada.

Part of the National Demolition Association's mission is "to eliminate as far as possible the occurrence of injury or death to employees of its members. . ." This OSHA-funded document is part of the Association's effort to continually inform its members about the safe work practices the industry can follow to protect its most valuable asset, its workforce.

The National Demolition Association is committed to the development of a safe, productive work environment. As part of the Association's overall Demolition Safety Program, this document continues the National Demolition Association's commitment to serve the demolition industry, the construction community and the general public.





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