

## **New Lead Paint Regulations: USEPA and OSHA Updates on Best Practices**

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### **Introduction**

Lead has been a significant health hazard for centuries and is recognized for its toxic effect on the body. In the construction industry, traditionally, most over-exposures to lead have been found in the trades, such as plumbing, welding and painting. Lead has been present in lead-based paint; zinc coatings; plumbing supplies, such as pipe and solder; and as tetra ethyl lead in leaded gasoline. Although there are many uses of lead in building construction, lead-based paints and lead-bearing coatings are now more heavily regulated by the EPA and OSHA.

The use of lead- based paint in residential application was banned by the Consumer Product Safety Commission (CPSC) in 1978. However, since lead- based paint (LBP) inhibits the rusting and corrosion of iron and steel, it is still used on bridges, railways, ships, lighthouses, and other steel structures, although substitute coatings are available (OSHA , 1993). Whenever working in a building or on a structure with old paint, lead may be present. Workers involved with the disturbance of LBP-coatings risk exposure to lead fumes, dust, or paint chips. Inhalation or ingestion of lead can cause serious bodily harm and even death. Failure to utilize safe work practices during the disturbance of LBP coatings can have consequences, resulting in lead exposures to other workers, non-workers and building occupants. Children (under six years of age) and pregnant women are especially susceptible to the toxic effects of lead and are protected from such exposures by the EPA and public health regulations. Workers can incur exposures to lead dust and fumes, and also bring lead contamination home with them and expose their families. Improper disturbance can also create environmental contamination, and generate regulated hazardous wastes. Since the early 1970s the federal government has taken several steps to reduce worker and building occupant health risks due to exposure to LBP. This paper will cover best practices utilizing the lead paint regulation and guidance issued by OSHA, EPA, and Housing and Urban Development (HUD) when LBP is disturbed during construction and renovation activities.

### **Regulatory Overview**

Lead paint was banned in residential paints used after 1977. However, industrial and commercial uses of LBP have not been banned. The EPA regulates lead-based paint in residential structures and for waste disposal. OSHA regulates worker exposures to all types of lead and lead-bearing

substances, including LBP. These regulations require inspections to identify the presence of lead-based paint, worker exposure monitoring, worker medical surveillance, mandatory training and work practices, special cleaning, and post-cleaning verification or clearance testing prior to mobilizing offsite. The EPA regulations apply to pre-1978 “target housing” stocks, which are single and multi-family dwellings and other child-occupied facilities where it is possible that children under age six might reside. OSHA regulations apply to employers with employees disturbing lead-bearing substances in these EPA-targeted buildings, as well as other commercial and industrial worksites. It will be important for employers and safety professionals to understand which regulations apply so that workers and building occupants are properly protected, while also assuring compliance.

The Emergence of LBP Regulations: Title X of the Housing and Community Development Act  
On October 28, 1992, the Congress of the United States passed Title X of the Housing and Community Development Act of 1992. Title X, the Lead-Based Paint Hazard Reduction Act of 1992 (P.L. 102-550), required that three agencies, OSHA, HUD and EPA, develop a national strategy to “...build the infrastructure necessary to eliminate lead-based paint hazards in all housing” (Title X, 1992). The HUD lead-based paint requirements went into effect immediately for federal housing, and were gradually implemented for housing receiving federal monies (such as Section 8 and weatherization programs). The HUD regulations required the use of “Lead Safe Work Practices” with Lead Dust Wipe and Visual Clearances at conclusion of Lead Mitigation and Abatement (HUD, 1996).

While many provisions of Title X have been promulgated by HUD for government-owned or government-financed housing stock, the EPA was slow to propose regulations regarding renovation activities in housing that does not receive federal subsidies. In 2005, the Public Employees for Environmental Responsibility sued the EPA in U.S. District Court in the District of Columbia, arguing that the agency has dragged its feet on issuing a ruling on renovation safety when LBP is disturbed. The EPA proposed the “Renovation, Repair, and Painting” (RRP) regulations for residential and child-occupied facilities in 2006, which were subsequently passed by the Congress and went into effect on April 22, 2010.

OSHA responded to the Title X legislation by issuing interim standards for protecting workers in general industry and construction under 29 CFR 1910.1025 and 29 CFR 1926.62. At the minimum, OSHA mandates the following elements that should be included in the employer's worker protection program for employees exposed to lead including hazard determination, including exposure assessment; engineering and work practice controls; respiratory protection; protective clothing and equipment; housekeeping; hygiene facilities and practices; medical surveillance and provisions for medical removal; employee training; signs; and recordkeeping.

## **OSHA Regulations Governing Lead-Based Paint**

The Occupational Safety and Health Administration (OSHA) has had regulations pertaining to occupational lead exposure since 1971. In October 1992, the Congress passed Section 1031 of Title X of the Housing and Community Development Act of 1992 requiring OSHA to issue an interim final lead standard for the construction industry. This interim rule was published on May 4, 1993 adding new section 1926.62, which will remain in effect until OSHA issues a final standard (Department of Labor, 2008). OSHA's lead in construction standard applies to all construction work where an employee may be occupationally exposed to lead. This standard is not specific to lead-based paint, but also includes metallic lead, all inorganic lead compounds,

and organic lead soaps. All construction, alteration and repair activities are covered by the standard.

The OSHA Construction Industry (29 CFR 1926.62) and General Industry (29 CFR 1910.1025) regulations for lead set the action level (AL) at 30  $\mu\text{g}/\text{m}^3$  (micrograms per cubic meter) of air, and the permissible exposure limit (PEL) at 50  $\mu\text{g}/\text{m}^3$  of air averaged over an eight-hour workday. For longer workdays, 400  $\mu\text{g}$  must be divided by the hours worked to arrive at the exposure limit for those workers. When workers are or may be exposed above the AL for 30 or more days per year, medical surveillance is required. The standard requires employers to utilize engineering, work practices, and administrative controls, when feasible, to reduce and maintain employee lead exposure to at or below the PEL.

Medical surveillance for lead includes blood lead level (BLL) and zinc protoporphyrin (ZPP). ZPP is chemical that is indicative of long-term exposure, while BLL indicates only the current level of lead in blood, and gives no idea as to the worker's exposure history. Medical surveillance must be performed every six months. However, when results of the BLL are  $>40$   $\mu\text{g}/\text{dl}$  (micrograms per deciliter) of blood, the interval is reduced to every two months until two consecutive BLLs are  $<40$   $\mu\text{g}/\text{dl}$  of blood. If the BLL exceeds 60  $\mu\text{g}/\text{dl}$ , or if the average of the three most recent BLLs exceeds 50  $\mu\text{g}/\text{dl}$ , OSHA mandates medical removal from work having an exposure greater than the AL. During medical removal, the employer must provide alternate work if available. Additionally, OSHA requires other worker protections regarding medical surveillance, including the right to obtain a second opinion.

A worker exposed over the PEL requires the employer to provide respiratory protection, protective work clothing and equipment, change areas, hand-washing or shower facilities, biological monitoring, and training. An action level is the level at which an employer must begin to take certain actions or compliance activities, such as medical surveillance and training of employees. Until an employer performs an exposure assessment and documents worker exposures below the PEL, the employer must treat employees performing certain operations as if they were exposed above the PEL triggering compliance activities. Work tasks involving LBP that employers must treat as exceeding the PEL (unless exposure monitoring proves otherwise) are:

- Manual demolition of structures (e.g., dry wall), manual scraping, manual sanding, and use of heat gun where lead containing coatings or paints are present;
- Abrasive blasting, including cleanup activities, enclosure movement, and removal;
- Power tool cleaning;
- Spray painting with lead-containing paint;
- Rivet busting or welding, cutting, or burning on any structure where lead-containing coatings or paint are present.

If the initial determination, through air monitoring, is that the employee exposure is below the action level, further exposure determination or OSHA compliance activities need not be repeated unless there is a change in processes or controls. This is an important activity to achieve for an employer who has work practices that typically do not generate significant levels of airborne lead. If employee exposure is found to be between the AL and PEL or above the PEL, additional exposure monitoring and compliance activities are required. Refer to the OSHA resource section of this document for additional information.

Jobs involving exposures over the PEL, or where no initial determination is conducted, must establish and implement a written compliance program to reduce employee exposures to or

below the PEL. The written program must be revised every six months and include the following components:

- ❑ A description of each activity in which lead is emitted (e.g., equipment used, materials involved, controls in place, crew size, employee job responsibilities, operating procedures, and maintenance practices);
- ❑ Specific plans to achieve compliance and engineering plans and studies where engineering controls are required;
- ❑ Information on the technology considered to meet the PEL;
- ❑ Air monitoring data that document the source of lead emissions;
- ❑ A detailed schedule for implementing the program, including copies of documentation (e.g., purchase orders for equipment, construction contracts);
- ❑ A work practice program, including regulations for the use of protective work clothing and equipment, as well as housekeeping and hygiene facility guidelines;
- ❑ An administrative control schedule for job rotation, if used;
- ❑ A description of arrangements made among contractors on multi-contractor sites to inform affected employees of potential exposure to lead and their responsibility to comply with this standard; and
- ❑ Any other relevant information.

The OSHA Web site has interactive computer software that can assist an employer with compliance, including writing a job specific compliance program. Additional support for lead compliance programs are listed in the resources listing of this document.

## **HUD Regulations and Guidelines for Lead-Based Paint**

The Lead-Based Paint Poisoning Prevention Act (LBPPPA) of 1971 was adopted to reduce levels of lead in paint in federally financed and subsidized housing. It was amended in 1973 to require HUD to reduce or eliminate the hazards of LBP poisoning in federally financed and subsidized housing. In 1989, HUD developed comprehensive technical guidelines on testing, abatement, cleanup, and disposal of LBP in public and Indian housing. An official Guideline was published in 1990, followed by extensive revisions in 1995.

The 600+ page “Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing” (HUD 1996) provides detailed, comprehensive, technical information on how to identify and address LBP hazards safely and efficiently. The “Guide” lists three types of LBP hazard control: interim controls, abatement of LBP hazards, and total LBP abatement. Interim controls are designed to address hazards quickly, inexpensively, and temporarily, while abatement is intended to produce permanent solutions. The goal of the document is to help property owners, private contractors, and government agencies sharply reduce children’s exposure to lead without unnecessarily increasing the cost of housing.

HUD developed this document to complement regulations, other directives, and other guidelines to be issued by HUD, EPA, OSHA, and the Centers for Disease Control and Prevention (CDC). The “Guidelines” (HUD 1996) were developed to provide more comprehensive and complete guidance than do most regulations as to how activities related to LBP should be carried out, and why certain measures are recommended. The “Guidelines” *are not* enforceable by law unless a federal, state, or local statute or regulation requires adherence to certain parts of the “Guidelines.” Employers and building owners need to realize that the guidelines are designed for housing where small children are present. The HUD Guidelines are not designed for commercial or industrial LBP disturbance activities. Employers working in

single family and multi-family LBP activities can benefit from the mountain of guidance provided by HUD. Refer to the resource section of this document for additional HUD information and web links.

## **EPA Regulations for Training, Certification, Clearance Testing, and Disposal**

The overall purpose or policy of the EPA lead office is to formulate and execute programs that will promote the reduction of human exposure to lead hazards. The Residential Lead-Based Paint Hazard Reduction Act (Title X) developed a comprehensive federal strategy for reducing lead-paint hazard exposure. The EPA has developed standards, guidance documents, and training programs for employers performing renovation, remodeling, painting, and other activities in a manner. EPA regulations and resources are aimed at minimizing the creation and dispersal of lead-containing dust during renovations, repairs, and painting in pre-1978 housing to protect the residents from possible lead exposures. The EPA mandates safe work practices on HUD and other targeted housing, including child-occupied facilities, such as pre-schools, day care, and schools. Currently, only those inspectors, risk assessors, contractors, supervisors and, workers engaged in federally funded HUD projects or those working on federal public or Indian housing are required to be certified by accredited training providers. Most states also require licensing for workers, supervisors, and contractors performing HUD work as well. This training is mandatory for lead-abatement activities where lead hazards are removed from buildings.

### New EPA Revisions for Training and Certification of Individuals and Firms

Common renovation activities like sanding, cutting, and demolition can create hazardous lead dust and chips by disturbing lead-based paint, which can be harmful to adults and children. To protect against this risk, on April 22, 2008, EPA issued a rule requiring the use of lead-safe practices and other actions aimed at preventing lead poisoning. Under the rule, beginning in April 2010, contractors performing renovation, repair and painting projects that disturb lead-based paint in homes, childcare facilities, and schools built before 1978, must be certified and must follow specific work practices to prevent lead contamination.

Section 402(3) of the Toxic Substance and Control Act (TSCA) directs the EPA to revise regulations, codified at 40 CFR 745, subpart L, to ensure that individuals engaged in renovation and remodeling activities that create lead-based paint hazards are properly trained; that training programs are accredited; and that contractors engaged in such activities are certified. On January 10, 2006, the EPA proposed requirements to minimize the introduction of lead hazards resulting from the disturbance of lead-based paint during renovation, repair, and painting activities in most housing built before 1978. The new legislation was called the “Renovation, Repair, and Painting Rule” (RRP). Section 402(c)(3) of TSCA proposed lead training, certification, and safe work practice requirements for contractors involved in renovation, repair, and painting activities in pre-1978 housing and child-occupied facilities. It is one component of a comprehensive program to ensure the use of lead-safe work practices, which will also include training and an education and outreach campaign targeted at both workers and consumers. The EPA believes this new program will further its goal to eliminate childhood lead poisonings as a major public health concern.

The new RRP rules would apply to target housing, defined as residential property constructed before 1978, and excluding housing for the elderly or persons with disabilities (unless any children under age six reside or are expected to reside in such housing) or any 0-bedroom dwelling. The rule requires that renovators be trained in the use of lead-safe work practices, that renovators and firms be certified, that providers of renovation training be accredited, and that

renovators follow renovation work practice standards, as described in the standard. The regulation apply to all persons who do renovation for compensation, including renovators, painters and other specialty trades, as well as maintenance workers in multi-family housing. The proposed regulation does not apply to owner-occupied housing where children under six do not reside (with an “opt-out” provision), renovations in areas that are free of LBP, and minor repairs that disrupt 6 square feet or less of a painted surface.

The new RRP Rule calls for renovators and renovator firms to be certified and use certified renovators who would provide on-the-job training for uncertified workers. Work practices would include posting of signs defining the work area, and warning occupants and other persons to remain outside of the work area; isolating the work area to contain visible dust and debris; and containing waste generated by the renovation activities.

The certified renovator working for the renovator firm would be responsible for either performing or directing uncertified workers performing regulated renovation activities; providing training for uncertified workers; and being present at the worksite during “key stages of a renovation,” and available at other times either on-site or by telephone. The certified renovator would also be able to use an acceptable test kit to determine whether LBP is present in affected areas.

#### The Lead-Based Paint Debris Disposal Proposed Rule

The EPA regulates LBP waste/debris as hazardous and non-hazardous, depending upon where and how the LBP is disturbed (EPA, 1996). This rule allowed for easier disposal of lead-based paint debris generated in residences or public and commercial buildings. The rule was developed out of the recognition that the Resource Conservation and Recovery Act (RCRA), subtitle C, regulations for such disposal as hazardous waste were burdensome, time-consuming and costly, especially for average homeowners who are considering whether or not to have their homes abated. The standards allows for the disposal of lead-based paint debris in specified alternative, non-hazardous landfills (i.e., construction and demolition (C&D) landfills) without requiring a hazardous waste determination. To accomplish this, the rule shifted the regulations for management and disposal of lead-based paint debris from RCRA to a program under the Toxic Substances Control Act (TSCA). The proposed TSCA standards do not apply to the lead-based paint debris or soil generated by homeowners or contractors engaging in renovation activities in homes (EPA, 1996). Rather, this debris is covered under the household hazardous waste exclusion in RCRA, subtitle C (40 CFR 261.4(b)(1)).

Since 1980, the EPA has excluded household waste from all types of RCRA hazardous wastes under 40 CFR 261.4(b)(1). The household exclusion applies to waste generated by either residents or contractors conducting lead-based paint activities in residences. As a result of this clarification, contractors may dispose of hazardous lead-based paint wastes from residential lead paint abatements as household garbage, subject to applicable state regulations. Note, however, that some lead-based paint waste from residential LBP activities may still be subject to more stringent hazardous waste requirements in certain states, localities, territories and tribal areas. *LBP waste and debris generated from non-residential projects must be tested to determine if RCRA hazardous waste regulations apply. The only exclusion is for LBP adhered to building components during demolition, which can be handled as C & D waste.*

## Bibliography

Department of Labor. 2008. OSHA Interim Standard (retrieved March 7, 2010) ([http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=STANDARDS&p\\_id=10641](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=STANDARDS&p_id=10641)).

Occupational Safety and Health Administration (OSHA). 1993. Lead Exposure in Construction: Worker Protection (retrieved March 10, 2010) ([http://www.osha.gov/pls/oshaweb/owadisp.show\\_document?p\\_table=FACT\\_SHEET&p\\_id=161](http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=FACT_SHEET&p_id=161)).

*Residential Lead-Based Paint Hazard Reduction Act of 1992, Title X* (retrieved March 7, 2010) (<http://www.epa.gov/lead/pubs/titleten.html>).

## Appendix: Best Practices for LBP Activities

The regulatory review above is a brief description of possible regulatory requirements or guidelines that may apply to a maintenance, construction, renovation, or demolition project which involves LBP. The question then becomes, “How do we work with LBP in compliance with regulations while protecting workers and the public?” This can be best illustrated with case studies. The two projects selected for discussion identify two extremes of LBP disturbance: removing a lead painted window in a home by a small renovation/rehab contractor versus the removal of lead paint from a structural steel bridge over a river, using professional lead abatement contractors.

### Replacing a Window That Has Been Painted with LBP

The removal of windows painted with LBP involves HUD and EPA guidelines for safe work practices, clearance testing, and waste disposal. The OSHA lead in construction regulation compliance components apply, unless air monitoring is performed and worker exposures to airborne lead are not above the permissible exposure level (PEL). Fortunately, there are several resources available to assist employers with compliance with these regulations and for establishing best practices. Refer to resource guide for additional information.

NEVER FORGET: Lead dust is your enemy on LBP residential projects!!! The “Safe Work Practices” teach simple principles: (1) avoid activities that produce high levels of lead dust or fumes by prohibiting certain activities and avoiding disturbing (creating dust) and spreading lead-based paint to the greatest extent feasible; (2) protect occupants and workers: and (3) perform proper cleaning and verify with clearance testing.

- Prior to work starting:
  - Determine if the work will take place in the interior of the residence or from the exterior. Exterior work may appear to be more difficult (especially for windows above grade); however, there are great advantages for avoiding interior work. Interior work involves relocating occupants and furnishings. Interior work also requires clearance testing, where most exterior project do not.
  - OSHA requires a lead compliance program with components as outlined previously. HUD projects also require a worksite compliance plan with similar components to OSHA, except that HUD additionally addresses occupant notification and clearance testing. If respirators are used, a written respiratory

protection plan is required by OSHA. OSHA also requires a hazard communications plan onsite including material safety data sheets (MSDSs) for chemicals used on the jobsite.

- EPA and HUD would require “safe work practice” training if the window is replaced for renovation purposes. An employer could easily become an approved trainer to instruct their own employees. Certified contractors trained in abatement by an accredited training provider would be required by the EPA for targeted housing (federally funded or child-occupied) if the intent of removing the window was to eliminate a lead hazard (note that some states also require lead licenses). If respirators are used, OSHA requires employees to have documented respirator training. Finally, hazard communication training on chemicals used on the jobsite is also an OSHA requirement.
- Personal protective equipment (PPE) specific for lead would be required, including washable or disposable coveralls, N100 respirators, gloves and wash facilities, unless the employer conducts exposure monitoring, documenting compliance with the PEL. HUD and EPA recommend a disposable painters hat, coveralls (either disposable or stored in a bag onsite), and a N100 disposable respirator. Gloves are optional; however frequent hand washing is recommended (pre-moistened wipes are also suggested). If a respirator is issued, then the employer is required by OSHA to have a written respiratory protection program, including medical surveillance, fit testing, and training for employees. Chemical use (such as paint removal products) may require eye/face/hand/body and respiratory protection above and beyond protective equipment discussed above.
- Medical surveillance, including biological monitoring (blood lead level tests), is required by OSHA if no employee lead exposure monitoring has been performed. If exposure monitoring indicates employee exposure to airborne lead is over the AL or PEL, medical surveillance is also required. Finally, as mentioned above, the use of respirators triggers the medical surveillance requirements of OSHA’s respiratory protection standard.
- Worksite preparation and set up for interior work
  - Restrict access to the work area. OSHA requires establishing a regulated area where the PEL is expected to be exceeded. Eating, drinking and smoking are prohibited in the restricted area. This requirement is performance-based. Some jobs require a sign or barrier tape, while other jobs may require fences or lockable barriers.
  - Remove drapes, curtains, furniture, and rugs within five feet of the work area. Large furniture that cannot be moved should be covered with protective sheeting. A protective drop cloth should be securely placed immediately under the work area, extending at least 5 feet out (lead dust typically falls within 5 feet of a work area).
  - Avoid spreading lead dust! Bring in necessary supplies prior to the start of the job to avoid having to step off the protective sheeting. Protect shoes with disposable shoe covers, and remove the covers upon leaving the work area. Other options are to wipe the bottom of shoes with a damp towel, clean off shoes with a tack pad (large sticky pad that removes dust from bottom of shoes), or remove shoes when leaving the work area.
- Cleanup and waste disposal
  - Use special cleaning techniques. Pick up large paint chips with a damp paper towel and/or mist, then push into a dust pan. Wet-wipe and HEPA vacuum all surfaces. Lead cleaners and heavy scrubbing will be necessary multiple times to



remove the lead dust. Using dry sweeping or regular shop vacuums are prohibited cleaning methods.

- All debris, protective sheeting, and other disposables should be bagged prior to leaving the work area.
- Consider painting the surfaces prior to performing clearance testing.
- The waste, including the removed window, is classified by EPA as a non-hazardous residential waste. Refer to local agencies for disposal requirements in your area.
- Clearance testing
  - HUD and targeting housing projects require clearance testing on interior surfaces and exterior surfaces, such as porches. Dust wipes are used to determine if surfaces are safe for re-occupancy.
  - Clearance levels established by the EPA are extremely low. Surfaces must be clean enough for a toddler to lick, literally! Clearance on a floor surface is  $40\mu\text{g}/\text{ft}^2$ , a window sill is  $250\mu\text{g}/\text{ft}^2$ , and window troughs are  $400\mu\text{g}/\text{ft}^2$ . Clearance tests have to be conducted by certified inspectors or risk assessors and analyzed by EPA-accredited laboratories.
  - Clearance-testing-documents cleaning is not just construction site clean or even re-occupancy clean. Clearance is nearly clean room clean. Example: Take 100 rooms 10 feet by 10 feet. Evenly spread a half packet of sugar (filled with lead dust) over all 100 rooms. Clearance testing on the floor of all 100 rooms would fail clearance! Remember, dust is your enemy on residential projects.

This “routine” project can become very tedious, time-consuming and expensive if OSHA exposure monitoring does not indicate low lead exposure to workers. Most guidance information provided by HUD and EPA only mention OSHA in passing. Staying under OSHA’s action level will make window replacements involving lead paint safe, efficient and cost-effective for all.

#### Abrasive Blasting of LBP on a Structural Steel Bridge

Abrasive blasting on structural steel is a process that usually involves compressed air to propel the blasting media (coal slag, silica sand, steel shot or steel grit) to the surface being cleaned. Abrasive blast cleaning is used because it is a fairly quick and cost-effective way of removing paint, rust, and mill scale from a steel structure. Abrasive blasting can result in worker exposures over 100 times higher than OSHA’s permissible limit. There are also potential issues with environmental contamination of air, soil, and water. The potential for high employee exposures to lead, along with significant pollution concerns, makes abrasive blasting a heavily regulated activity. Associations have developed several guidance documents to assist employers with regulatory compliance and best work practices for abrasive blasting activities on steel structures. Refer to the resources listing for more information.

- Prior to work starting
  - Determine if the work will take place over ground, water, roads, or railways. Consider weather conditions and loads expected to act on the worksite. Environmental testing may be necessary to establish background levels prior to starting, and clearance levels upon conclusion of the project.
  - OSHA requires a lead compliance program with components as outlined previously. The EPA and many local regulatory agencies require containment plans to focus on pollution control as well. Respirators are mandatory, so a written respiratory protection plan is required by OSHA. OSHA also requires a hazard communications plan, onsite including material safety data sheets (MSDSs) for chemicals used on the jobsite. The use of hearing protection also requires a written program.

- EPA recommends the use of certified contractors trained in abatement by an accredited training provider. OSHA requires job-specific training addressing the hazards at the jobsite (note that some states also require lead licenses). OSHA requires respiratory protection, which necessitates the need for employees to have documented respirator training. Also, hazard communication training on chemicals used on the jobsite is also an OSHA requirement. Finally, jobsite hazards may require many more OSHA compliance on issues such as fall protection, scaffolding, hearing protection, and silica exposure.
- Personal protective equipment (PPE) specified for lead would be required, including washable or disposable full-body coveralls, gloves, shoe covers, and hats. Supplied-air type CE abrasive blasting hood respirators are required for those in contained work areas, and air-purifying P100 respirators for those outside of the blasting area. Wash facilities, including showers, are required (when feasible). Abrasive blasting involves high noise levels, so hearing protection and a written hearing conservation program is usually required. Finally, if silica is used as the blasting agent, additional precautions should be taken.
- Medical surveillance, including biological monitoring (blood lead level tests), is required by OSHA. As mentioned above, the use of respirators triggers the medical surveillance requirements of OSHA's respiratory protection standard. Finally, silica use and excessive noise will require additional medical surveillance, as specified by OSHA.
- Worksite preparation and setup
  - A partial or full containment is usually required by OSHA and EPA for worker protection and pollution control. Most enclosures require ventilation and filtration to reduce lead exposures.
  - Restrict access to the work area. OSHA requires establishing a regulated area where the PEL is expected to be exceeded. Eating, drinking and smoking are prohibited in the restricted area. This requirement is performance-based. Some jobs require a sign or barrier tape, while other jobs may require fences or lockable barriers.
  - A system has to be constructed to move waste from the blasting area to the storage area through large vacuums, funnels, or conveyers.
- Cleanup and waste disposal
  - OSHA requires that all surfaces be kept as free as practical of accumulations of lead with cleanup methods that minimize the likelihood of lead becoming airborne.
  - Shoveling, dry or wet sweeping, and brushing may only be used when the use of HEPA-filtered vacuuming is not effective.
  - The use of compressed air is prohibited except under rare conditions.
  - Waste should be segregated into hazardous and special classifications. Wastes typically considered hazardous include paint chips, dust, and contaminated blasting agents. Those materials that typically are not considered hazardous include paint still adhered to structural components, materials used in constructing containments, and disposable suits.
  - Clearance testing is not required on this project by the EPA.

Abrasive blasting of LBP has a great potential for excessive employee exposures to airborne lead. There is an equal concern for environmental pollution to soil, water, and the air. The project's proximity to water, wetlands, hospitals, schools, daycare, private property and, food sources must be incorporated into a sound containment plan. Waste handling and disposal is also

a concern. Finally, elevated jobsites near roads, railways, and other hazardous areas pose more complicated compliance plans. Failure to properly plan and implement a sound project can result in significant human health injuries and environmental pollution.

#### Other Lead Exposures in Construction

Lead has been poisoning workers for thousands of years. In the construction industry, traditionally most over-exposures to lead have been 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, soft solder, used chiefly for soldering tinsplate and copper pipe joints, is an alloy of lead and tin. Soft solder, in fact, has been banned for many uses in the United States. The use of lead-based paint in residential application has also been banned by the CPSC. However, since lead-based paint inhibits the rusting and corrosion of iron and steel, it is still used on bridges, railways, ships, lighthouses, and other steel structures, as discussed earlier in this section.

Operations that generate lead dust and fume include the following:

- Flame-torch cutting, welding, the use of heat guns, sanding, scraping and grinding of lead-painted surfaces in repair, reconstruction, dismantling, and demolition work;
- Abrasive blasting of bridges and other structures containing lead-based paints;
- Use of torches and heat guns, and sanding, scraping, and grinding lead-based paint surfaces during remodeling or abating lead-based paint; and
- Maintaining process equipment or exhaust duct work.

The employer of construction workers is responsible for the development and implementation of a worker protection program, in accordance with 29 CFR 1926.20 and 29 CFR 1926.62(e). This program is essential in minimizing worker risk of lead exposure. The most effective way to protect workers is to minimize exposure through the use of engineering controls and good work practices. It is OSHA policy that respirators are not to be used in lieu of engineering and work practices to reduce employee exposures to below the PEL. Respirators can only be used in combination with engineering controls and work practices to control employee exposures.

OSHA's standard for lead in construction limits worker exposures to 50 micrograms of lead per cubic meter of air averaged over an eight-hour workday. At the minimum, the following elements should be included in the employer's worker protection program for employees exposed to lead:

- Hazard determination, including exposure assessment;
- Engineering and work practice controls;
- Respiratory protection;
- Protective clothing and equipment;
- Housekeeping;
- Hygiene facilities and practices;
- Medical surveillance and provisions for medical removal;
- Training;
- Signs; and
- Recordkeeping.

To implement the worker protection program properly, the employer needs to designate a competent person, i.e., one who is capable of identifying existing and predictable hazards or working conditions that are hazardous or dangerous to employees, in accordance with the general

safety and health provisions of OSHA's construction standards. The competent person must have the authorization to take prompt corrective measures to eliminate such problems. Qualified medical personnel must be available to advise the employer and employees on the health effects of employee lead exposure and supervise the medical surveillance program.